



SimpleTerm V5.5 – User Guide

Serial Port Data Analyser / Terminal Emulator

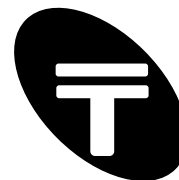
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1 Copyright Notice, Acknowledgements

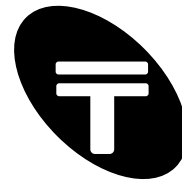
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2 Introduction

SimpleTerm is an advanced serial port test, simulation and data analysis tool. It will allow you to view and send (all 256) ASCII/Extended-ASCII (non-printable) data in an easy to read colour coded sequence. It is a high performance C++ application designed to run on almost all PCs running Microsoft® Windows 9x, NT, 2000, XP Vista and Windows 7.

SimpleTerm is a mature, stable product used by professional technicians, engineers and software developers as a development aid and debugging tool for RS232/serial port related projects.

SimpleTerm will work with the serial/COM ports provided by your operating system. Physically, these ports will be male RS232 SUB D9 interfaces in most cases. However, it is also possible to use SimpleTerm for other communication standards such as RS485 and RS422, which have a different electrical design to RS232 but follow the RS232 communication mechanism. Also supported are “Virtual COM” ports presented by e.g. USB to Serial adaptors & Bluetooth™ Serial Port Profile devices. The quality of support is limited only by the quality / compliance of the device drivers in emulating a normal COM port. This manual will only refer to RS232 based connections as this is the basis for the other standards mentioned above.

2.1 Features List

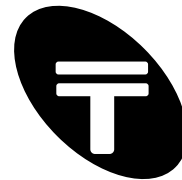
A brief list of some of the features included in SimpleTerm are given below:

- Colour coded ASCII terminal, hexadecimal and “mixed mode” data views
- Standard 110 to 3 Megabaud plus custom baud rates
- Supports COM1 to COM256
- Designed for Microsoft® Windows 98, ME, NT, 2000, XP Vista, Windows 7 (32 & 64 Bit).
- Advanced “Macro List” support with Import/Export facility
- High performance, large display matrix (up to 1000 lines by 140 columns)
- “Visual Scripting” feature for rapid test, automation or device simulation
- Powerful fixed or variable length sequence detector with wildcard support
- Data entry using the PC keyboard – similar to a terminal emulator
- Selection View pane for alternative radix/notation views.
- Ability to extract, process or save to file selection data
- Import and Export SimpleTerm Profiles
- Notation Converter
- Integrated feature rich notepad
- Cyclic Redundancy Checking (CRC). MODBUS RTU support.
- RS232 control signal monitoring using “Virtual LEDs”
- Capture to file and send data from files
- Online changing of line settings and display font
- Copy & paste data to other applications in RTF (Rich Text Format)
- Built in search and colour print capability
- Reference ASCII table
- RTF data exporting – saved files load in Microsoft® WordPad, Word etc.
- Supports “Virtual COM” ports (e.g. as presented by USB to Serial adaptors)
- COM port lister

2.2 System Requirements

Operating system:

Microsoft® Windows 98/ME/NT/2000/XP/Vista/Windows 7 (32 & 64 Bit)



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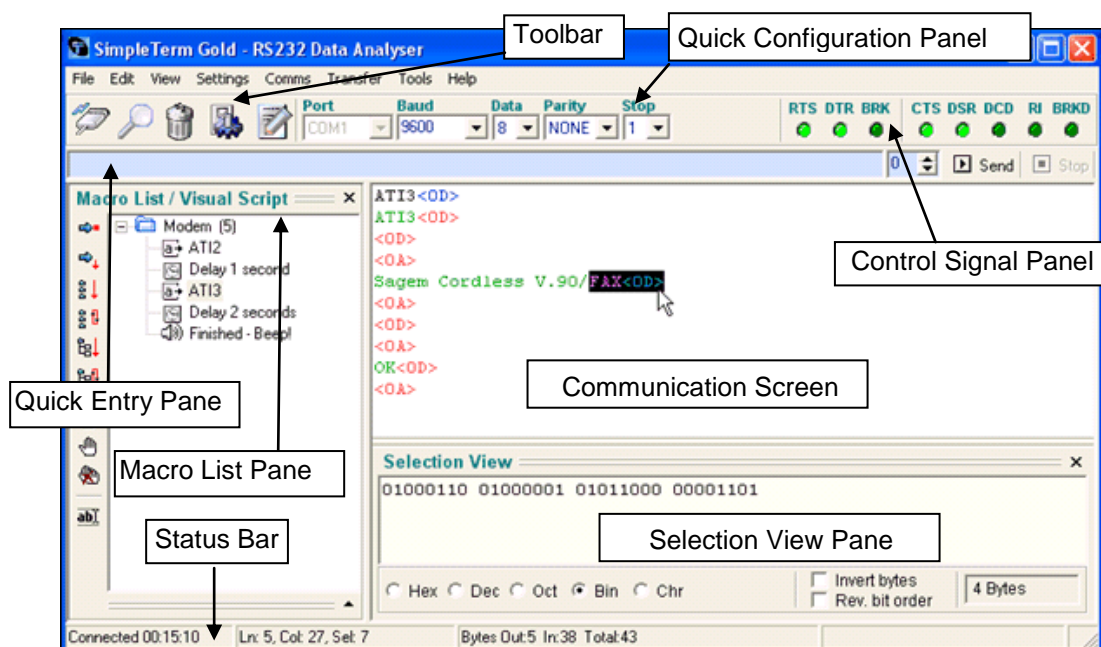
Minimum recommended hardware requirements:

Pentium processor or equivalent, 300 MHz or faster, 256 MB RAM, one or more available COM ports. Note that additional cables may be required for connecting any equipment to be tested. SVGA monitor and graphics card capable of at least 256 colours.

2.3 User Interface

A screenshot of the application is shown below in Figure 1. The user interface of SimpleTerm is divided into eight main sections – a brief description of each is given here:

Figure 1: SimpleTerm – Running in Windows® XP.



Toolbar

Most common functions may be selected from the toolbar by clicking on the icons. Placing the mouse cursor over each icon will display a 'hint' window indicating its function.

Quick Configuration Panel

This may be used to rapidly configure the serial port line settings. With the exception of the Port (COM port) setting the line settings may be changed while online/connected.

Quick Entry Pane

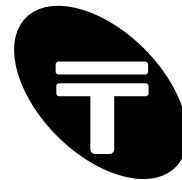
This is used to quickly type in a sequence of data (sometimes referred to as a string) for transmitting via the COM port. The data can contain normal ASCII data or special/extended characters using an escape character to define characters in hexadecimal.

Communication Screen

This is the input/output display screen. It displays the out going and incoming communication from the serial port. The font used for displaying the data is changeable. The communication screen may also be referred to generally as the screen.

Control Signal Panel

This panel contains "Virtual LEDs" to display the state of the RS232 control lines. The LEDs for the output handshaking lines from the PC's serial port (DTR and RTS) are "clickable" using the mouse and therefore may be used as switches to toggle the state of these lines manually.



Status Bar

Additional information about the communication status, errors, input/output byte count, screen selection or the current settings may be shown in the status bar.

Macro List / Visual Script Pane

Common data sequences or actions may be stored as macros within this pane. Macro items are grouped within folders (in a similar way to files and folders in the Windows Explorer application). The macro items may be executed in sequence once or continuously as a “Visual Script”.

Selection View Pane

This provides an alternative representation of any data selected within the Communication Screen. This option is only available in the advanced display modes: Hexadecimal or Mixed (ASCII/Hexadecimal).

3 Features and Usage

SimpleTerm displays all incoming serial port data and all outgoing serial port data sent via the keyboard or sent using the “Quick Entry Pane” in its communication screen. Incoming and outgoing data are displayed using different colours. SimpleTerm has scroll functionality that allows the viewing of received data that has scrolled off the screen. The logged data on SimpleTerm's communication screen may be copied to the clipboard, printed or exported as a RTF (Rich Text Format) file. These files may then be loaded in Microsoft® WordPad, Word & other programs that support RTF for further processing.

SimpleTerm processes serial data streams containing any ASCII characters from 0 – 255 decimal (when operating in 8-bit mode).

Note that keys typed within the communication screen may be sent directly to the serial port. Alternatively any character from 0 - 255 decimal may be inserted into SimpleTerm's communication screen (for transmission) using the “Alt + key” sequence. Hold down the "Alt Key" on your keyboard and press the numbers (0 followed by the 3-digit ASCII value in decimal) for the character you want on your numeric keypad. For example, “Alt + 0065” will result in the ASCII character ‘A’ being inserted into the communication screen.

3.1 Display Modes, Data Formatting and Colour Code

SimpleTerm handles all the serial port data in an 8 bit-oriented way. Every sequence of serial data consists of one or more 8 bit characters.

Display Modes

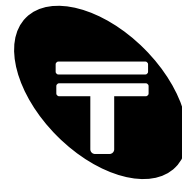
The serial port data is displayed in the communication screen in various colour coded display mode options. The data viewing modes for the communication screen include basic “ASCII Terminal”, advanced “Mixed (ASCII, hexadecimal)” and “Hexadecimal” only modes.

“ASCII Terminal” text mode is provided for simple terminal emulation functionality and does not show characters in hexadecimal notation unlike with the other modes. Also note that a “non-printable” character such as null character (00 hexadecimal) is sent and received but is displayed on screen as a SPACE character unlike with the other modes. This is because a null character does not have a displayable character assignment in the ASCII character set.

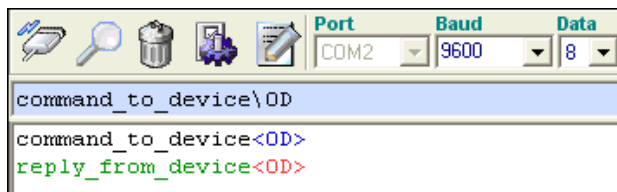
Any ASCII/8-bit character can be displayed in “Mixed (ASCII, hexadecimal)” and “Hexadecimal” modes using hexadecimal notation where required.

Data Formatting and Colour Code

Incoming and outgoing data are displayed in various colours as described here.



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Output data:

- Standard “printable” ASCII characters are shown on-screen in black.
- Special/extended characters (00h to 31h and 7Fh to FFh) characters are shown on-screen in **blue** and are enveloped in left and right angle brackets e.g. <hh> where hh are the two hexadecimal digits of the 8-bit character.

Note – all outgoing data is in black when running in “ASCII Terminal” mode.

Input data:

- Standard “printable” ASCII characters are shown on-screen in green.
- Special/extended characters (00h to 31h and 7Fh to FFh) characters are shown on-screen in **red** and are enveloped in left and right angle brackets e.g. <hh> where hh are the two hexadecimal digits of the 8-bit character.

Note – all incoming data is in green when running in “ASCII Terminal” mode.

Here is an example of the data formatting and colour coding used for outgoing data when running in “Mixed (ASCII, hexadecimal)” mode:

OUTPUT<0D>

For the above example, standard ASCII characters “OUTPUT” were typed in using the keyboard. After this the ENTER key was pressed resulting in the display of a “special” character in hexadecimal enveloped in “<>”.

Here is an example of the data formatting and colour coding used for incoming data when running in “Mixed (ASCII, hexadecimal)” mode:

INPUT<0D>

For the above example, standard ASCII characters “INPUT” followed by a CR (CARRIAGE RETURN) character of value 0D hex were received at the opened COM port.

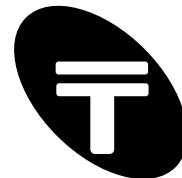
3.2 Com Port Initialisation and Connection

The words “open”, “connected” and “online” may be used throughout this document to refer to the state of a COM port as being selected, initialised and “open” for communication.

Line Settings

All common line settings are configurable via the “Quick Configuration Panel”. SimpleTerm supports standard baud rates from 110 to 230400 which are configurable while online. Custom baud rates may be typed in the baud rate field when offline (disconnected from the COM port). Data bits, parity and stop bits are also configurable online. Standard COM port numbers and “Virtual COM” ports 1 to 256 are supported on SimpleTerm. “Virtual COM” ports may be presented by devices such as our Tronix USB to Serial adaptors and Bluetooth Serial Port Profile devices.





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Connect / Disconnect

You can open a COM port for communication by clicking on the Connect / Disconnect icon in the “Toolbar” or alternatively by selecting the menu item “Comms->Connect”:



The COM port number and its settings are as displayed in the “Quick Configuration Panel”. Note that the hardware control signals RTS and DTR are always asserted on connection to enable reception of data.

Note that certain functions and menu items are disabled until a valid COM port has been opened for communication.

After the COM port is opened, the Connect / Disconnect icon in the “Toolbar” changes its image to that shown below. This image depicts a cable connection to a serial port and signifies the state of the COM port as open for communication. Clicking on this icon will toggle the connection state back again so that the COM port is closed.



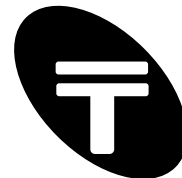
Note that after the COM port has been opened the “Comms->Connect” menu item is disabled and the “Comms->Disconnect” menu item becomes enabled for selection.

CAUTION: it is good practice and more importantly to avoid system instability, to always disconnect (if connected) before physically removing devices which present a Virtual COM port to your PC/Laptop. These may be USB-Serial adaptors for example for which the emulated COM port disappears on physically removing the device.

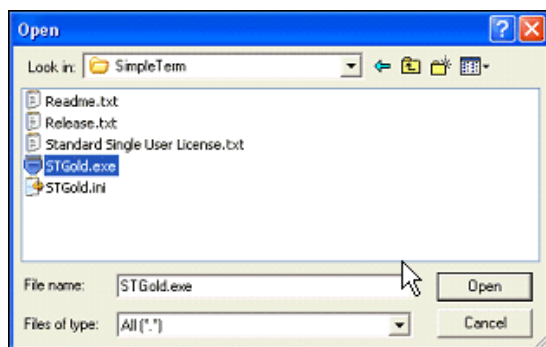
3.3 Data transmission from file / Log to file

Send file ...

Click on the menu item “Transfer->Send file...” and select the file to transmit via the serial port. All data within the file is sent through the port and a progress bar is used to show the progress of the transfer and the status bar shows any additional information -including the file size and percentage of transfer completed. The menu item will change during the transfer of a file to “Transfer->Stop Sending”. This will allow the data transfer to be stopped or cancelled. Alternatively, hitting the End key on the keyboard may also be used to cancel / stop data transfers.



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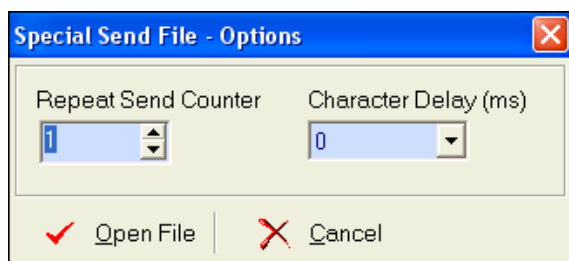


Tip: when transferring binary or data files containing 8-bit data, ensure that the COM port has been initialised for 8-bit communications, that is, make sure that the “Data bits” in the “Quick Configuration Panel” is set to 8.

Special Send File...

This function is a more flexible version of the “Send file...” option above.

Data within a file may be sent through the serial port (when connected) with the option of sending multiple times and with an accurate inter-character delay. A dialog box is presented to set the number of times to send a file by using the “Repeat Send Counter” field and an inter-character delay by setting the “Character Delay” field. Then click on the “Open File” button to bring up another dialog box for finally selecting the file to send.



Log to File... (raw data logging)

SimpleTerm can capture/save outgoing & incoming serial data into a file.

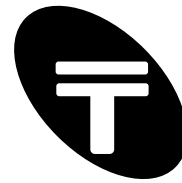
Click on the menu item “File->Log To File...” and enter the location and filename of the file to save incoming serial data to.

The menu item will change during capture to “File->Stop Logging” so that the data logging may be stopped. Alternatively, hitting the End key on the keyboard may also be used to cancel / stop data capture.

The following data is logged:

Any incoming serial data bytes will be logged. All outgoing serial data bytes will be logged except data sent from files e.g. using the “Transfer->Send File...” menu item.

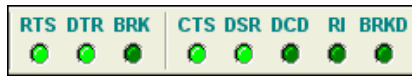
Tip: when capturing binary data or data files containing 8-bit data, ensure that the COM port has been initialised for 8-bit communications, that is, make sure that the “Data bits” in the “Quick Configuration Panel” is set to 8.



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3.4 Control Signal Panel

This panel contains “Virtual LEDs” to display the state of the RS232 control lines when connected/online. The LEDs turn bright green when the RS232 control lines are asserted.



The right hand side of the panel monitors the PC's serial port input signals CTS, DSR, RI and DCD. The panel also contains an indicator which flashes briefly (bright green) when a “break” condition is detected on the serial communications line.

The left hand side of the panel contains the output handshaking lines RTS and DTR which may be controlled manually if “Flow Control” is set to none. These signal lines are asserted by default (LEDs bright green) but can be switched off by clicking on the respective LEDs using the mouse or by using function key keyboard shortcuts F7 and F8 respectively. Similarly a break condition may be set by clicking on the LED labelled “BRK” or using the keyboard shortcut F9.

3.5 Quick Entry Pane

This is used to quickly type in a sequence of data for transmitting via the COM port. Insert data for transmission in ASCII or in hexadecimal using the escape character ‘\’ in the form ‘\hh’ where hh are two hexadecimal digits.



Click on the Send button on the right hand side (or press the Insert key) to actually send the data to the serial port. The data can be sent repeatedly by setting the “repeat send counter” field (to the left of the Send button) to a value greater than zero. If set to zero then the data will be sent continuously until the Stop button is pressed (or the End key is hit).

Escape Sequences

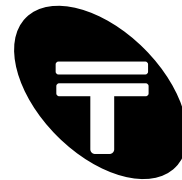
Note that the following escape sequences for inserting characters are valid (values in hexadecimal):

```
\hh Any 8-bit character in hex notation where hh are two hex
    digits (in either uppercase or lowercase).
\n  0a hex (Line feed)
\r  0d hex (Carriage Return)
\t  09 hex (Horizontal Tab)
\\  5c hex (Backslash)
```

For example to send "TEST", Carriage Return and a Line Feed character then try:
TEST\0D\n

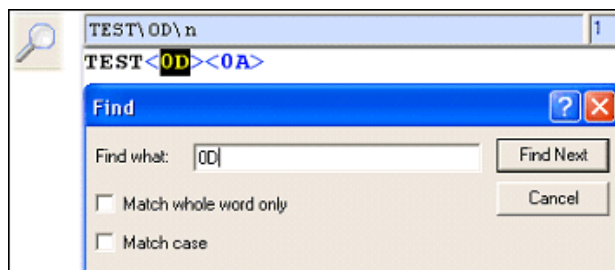
Keyboard Shortcuts

Insert – send data.
End – stop sending data.



3.6 Find

The “Find” dialog box is displayed when the menu item “Edit->Find...” is clicked or alternatively click on the tool bar icon (shown top left here):



You may search for specific words or characters displayed in the communication screen. Place the cursor on the communication screen to select the start position to search from. On the “Edit” menu, click “Find”. In “Find what”, type the characters or words you want to find, and then click Find Next. To find additional instances of the same text, continue to click Find Next.

3.7 Data Exporting and Printing

Copy

SimpleTerm can copy serial data to the clipboard which can then be pasted into other applications such as word processors in colour if the RTF (Rich Text Format) is supported or as plain text into most text editors.

First select the area of data to copy. Then use the menu item “Edit->Copy to Clipboard” to copy the text to the clipboard or alternatively, “right-click” on the communication window and select “Copy to Clipboard” from the pop-up (context) menu.

The data can be pasted as plain text in a suitable text editor such as notepad or as RTF text in applications like Microsoft® Wordpad.

Saving Screen Contents

You can save the contents of the communication screen as a RTF file (.rtf extension) using the “File->Save Communication Screen (RTF)” or Save Communication Screen (RTF) As...” menu items.

Colour Printing

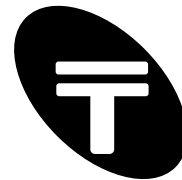
The on-screen data can be printed off in colour. Use the menu item “File->Print Setup...” to setup the printer and page settings then use “File->Print” to print.

3.8 New Session / Clear Screen

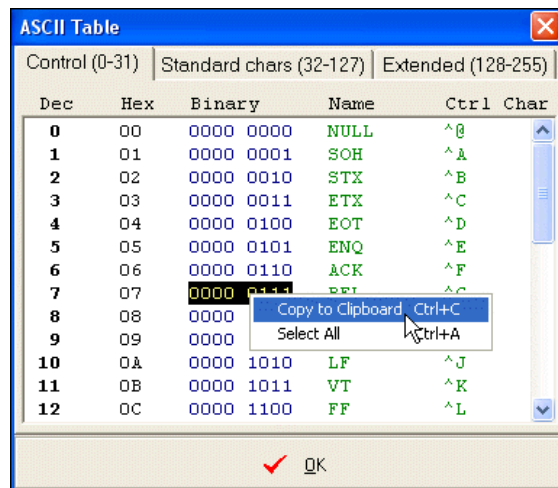
The communication screen’s contents may be cleared using the menu item “Edit->New Session”. This also resets any screen, error message or character information on the status bar (such as the byte count). Only the running timer in the status bar (indicating the duration the COM port has been opened for) is not reset.

To just clear the communication screen of data then use the menu item “Edit->Clear Communication Screen” or click on the tool bar icon shown here:





3.9 ASCII table



An ASCII Table is provided for reference under the menu item “ Help->ASCII Table...”. ASCII characters 00-FF hexadecimal are displayed in various notations including decimal, hexadecimal and binary. The text within this window may be selected and copied to the clipboard.

3.10 Settings Window

This settings window is shown when the menu item “Settings->Display...” is clicked or alternatively click on the following tool bar icon:



This window is split into four tab separated sections for configuring the applications behaviour and display options.

The three buttons at the bottom of the Settings Window allow any changes to the configuration to be applied temporarily (“OK” button), saved permanently to the configuration settings *.ini file (“Save Settings” button) or discarded (“Cancel” button).

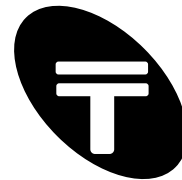
Display Settings

The first tab section (Display Settings) contains various settings to configure the display options of the communication screen:

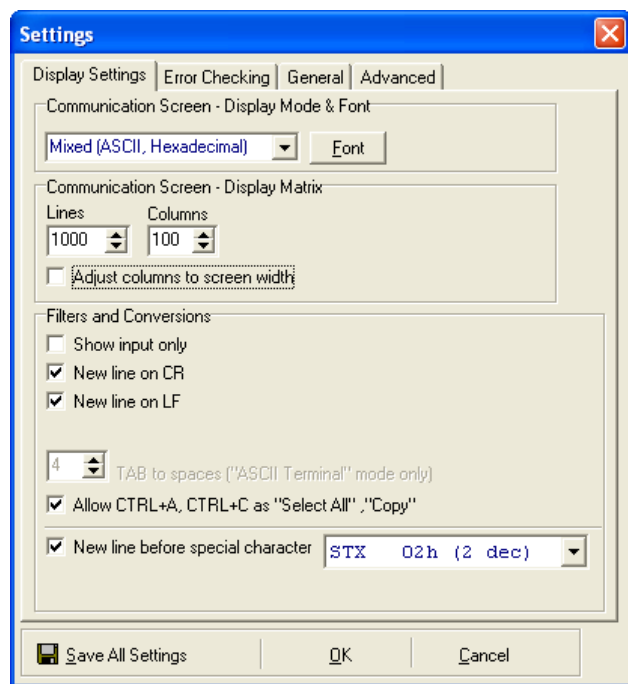
Display Mode & Font

The data viewing options for the communication screen are available here via a drop down list. The selections of viewing modes include “ASCII Terminal”, “Mixed (ASCII, hexadecimal)” and “Hexadecimal” modes.

The font used to display data on the communication screen may be changed by clicking on the button labelled “Font”.



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Display Matrix

The communication screen displays data on a matrix of lines and columns.

“Lines” - The number of lines to display in the communication screen (1000 maximum).

“Columns” - The number of columns to display in the communication screen (140 maximum).

“Adjust Columns To Screen Width” - the column width will be automatically adjusted as the application screen width is adjusted if this item is ticked. Leave un-ticked to enable the column width to be set manually.

Filters and Conversion

“Show input only” – if this item is ticked then only incoming data from the opened COM port is displayed on the communication screen.

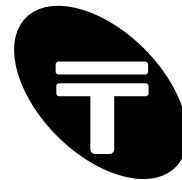
“New line on CR” – if this item is ticked then a new line is inserted into the communication screen after a CARRIAGE RETURN character (0D hex) has been received.

“New line on LF” – if this item is ticked then a new line is inserted into the communication screen after a LINE FEED character (0A hex) has been received.

“TAB to spaces (“ASCII Terminal” mode only)” – TAB (09 hexadecimal) characters are replaced with space (20 hexadecimal) characters for correct display and alignment when running in ASCII (display) mode. Insert an integer between 1 and 12 for the number of spaces per TAB.

“Allow CTRL+A, CTRL+C as Select All, Copy”. This option if ticked will process CTRL+A and CTRL+C key sequences as “Select All” text or “Copy” text functions as is normally expected in a Windows™ environment.

“New line before special character” option for display settings; allows start of message separation for easier analysis of data formats in protocols. If ticked will insert a new line before the “special/custom” character specified using the drop down list to the right.



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Error Checking

The second section “Error Checking” contains an Option to enable the checking of communication errors including parity errors.

This option is dependent on the support of error checking within the COM port drivers installed for your serial port hardware e.g. some early (non-compliant) device drivers for USB to Serial adaptors did not support parity error checking.

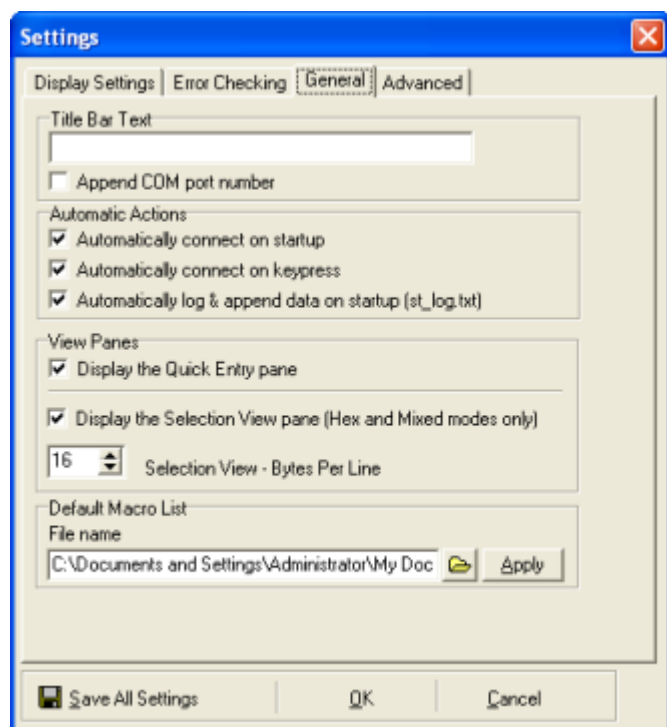
If a communication error is detected, a message is flashed in section 5 of the Status Bar (see section 3.12). The following messages may be displayed:

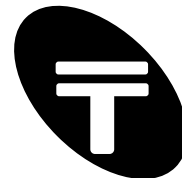
Error Message	Meaning
UNDEFINED/RXPARITY	The hardware detected a serious line error or multiple errors. Check baud, parity and data bits settings are set correctly for the communication device used.
RXPARITY	The hardware detected at least one parity error. Check parity setting is set correctly.
FRAME	The hardware detected a framing error.
BREAK	The hardware detected a break condition.

General

The third section “General” contains other miscellaneous options:

"Title Bar Text" - appends the title bar of the running copy of SimpleTerm with text of your choice. Can be useful for distinguishing your running instance of SimpleTerm as to which device you are testing.





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“Automatically connect on startup” - if this item is ticked then on startup, SimpleTerm will attempt to automatically open the COM port (preset in the saved configuration settings).

“Automatically connect on keypress” - if this item is ticked then SimpleTerm will attempt to automatically open the COM port (preset in the saved configuration settings) when a key has been pressed within the communication screen.

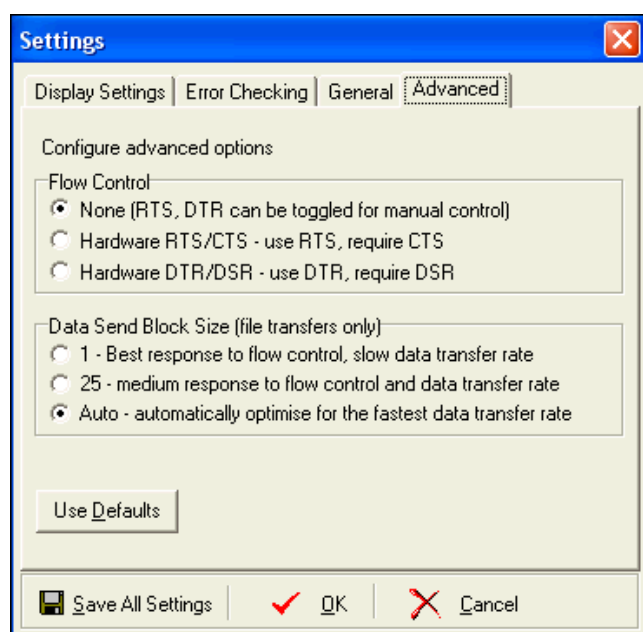
“Display the Quick Entry Pane” – if this item is ticked then the Quick Entry Pane is visible.

“Display the Selection View Pane” – if this item is ticked then the Selection View Pane is made visible. However, the Selection View Pane is only available for the advanced Hex or Mixed (ASCII/Hex) display modes. Note that the number of bytes displayed on each line of the Selection View Pane can be set in the edit box shown above.

“Default Macro List” – type in the filename here of the default Macro List file to load when SimpleTerm starts up (usually stmacros.stml).

Advanced

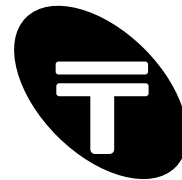
The fourth section “Advanced” contains advanced options for flow control and file transmission block sizes.



“Flow control” - the following flow control options are supported:

- None – the RTS/DTR line may be manually controlled using function keys F7/F8 respectively.
- RTS/CTS (hardware) flow control
- DTR/DSR (hardware) flow control

“Data Send Block Size (file transfers only)” - for efficient data transfer, the data from files may be sent to the serial port in blocks of bytes as opposed to one character after another.



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The following options are supported:

- 1 - characters are sent one by one. This is inefficient but most responsive to flow control.
- 25 - up to 25 characters are sent as a block of data.
- Auto – the number of characters sent as a block is variable and is optimised to achieve a highly efficient data transfer rate.

3.11 Import and Export SimpleTerm Profiles

For rapid configuration when working with different devices or applications which require different configuration settings, SimpleTerm supports the saving of all display and serial port configuration information in named text files (with extension .stp) known as Profiles. Instead of reconfiguring all the communications and display settings every time a different RS232 / COM port device is used, simply import (a previously exported) SimpleTerm Profile.

Note that SimpleTerm will still automatically load the default settings (within its SimpleTerm.ini configuration file) when it starts. Also note that only a reference to the location of the Macro List (normally a file called stmacros.stml) is saved in the profile settings (and not the actual Macro List data).

Export as a Profile

Allows saving of the current SimpleTerm display and serial port configuration as a Profile so that the configuration may be recalled in future by importing the Profile.

Generally export a Profile for each new device so all the information does not have to be entered again in the future.

To export a Profile:

- 1) Adjust all the SimpleTerm display and configuration settings appropriate for the device or application used. Insert any data for saving within the Quick Entry pane.
- 2) Click the menu item “Settings->Export as a Profile” and type the name of the Profile using the displayed “Save As” dialog box.

Import from Profile

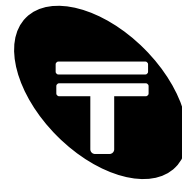
Reconfigures SimpleTerm by loading the configuration settings from a Profile (of file extension .stp). This option also clears the communication screen after re-configuration by starting a new communication session.

To import a Profile, click the menu item “Settings->Import from Profile” and select a file using the displayed “Open” dialog box.

Tip: another (perhaps faster way) to import a profile is to “drag & drop” a Profile file (of file extension .stp) into the “Communication Screen”.

3.12 Status Bar and Byte Selection Information

The status bar is a horizontal area at the bottom of the Communication Screen in SimpleTerm for providing additional user feedback and information about the communication status, errors, input / output byte count and screen selection. The bar is split into 5 sections and each section is described here in visual order from left to right:

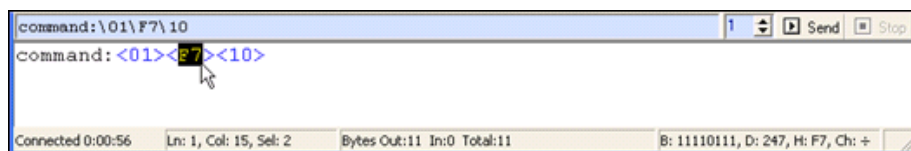


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Section 1 displays a running timer indicating the duration for which the COM port has been in a connected state.

Section 2 displays the line and column number (abbreviated to “Ln:” and “Col:” respectively) of the last character in a selection made in the communication screen’s display matrix. Also displayed is the number of selected display characters on screen (abbreviated to “Sel:”).

Section 3 displays the number of bytes recorded as having been sent (“Bytes Out:”) or received (“In:”) through the open COM port. A total of outgoing and incoming bytes is also displayed (“Total:”). Note that to reset the byte count (and also clear the screen) use the menu item “File->New Session”.

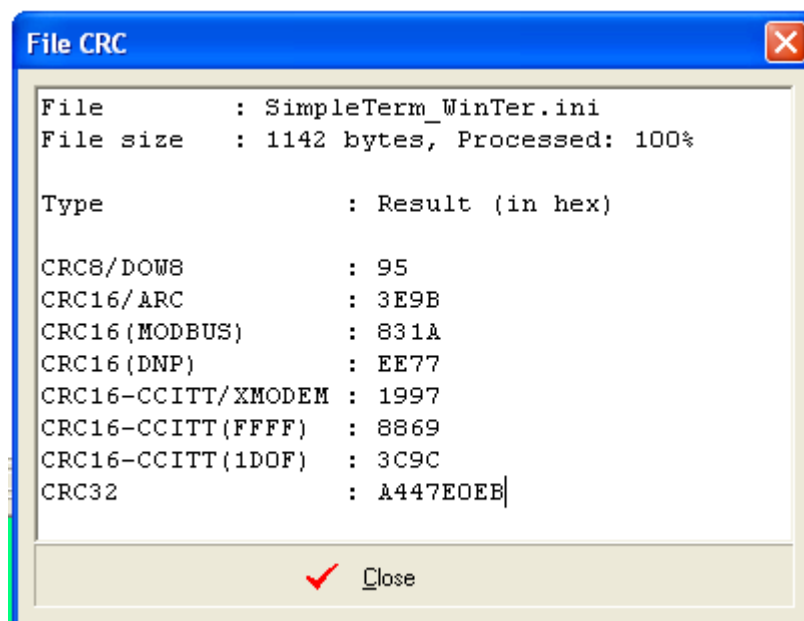


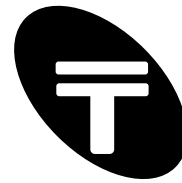
Section 4 displays a selected byte within the communication screen in binary, decimal and hexadecimal notations. The selection must be for a single byte of data. To select a byte that is already displayed on screen in hexadecimal, both characters within the “<>” envelope must be selected as shown above.

Section 5 may be used to display miscellaneous text for user feedback or to indicate communication errors.

3.13 Calculate File CRC

SimpleTerm provides a tool to calculate Cyclic Redundancy Check (CRC) values of files to help check the data integrity of files received and transmitted (e.g. via the serial port). The “File CRC” screen is displayed when the menu item “Tools->Calculate File CRC” is clicked. A dialog box is provided to select a file for processing. The results are displayed on a screen similar to the following. Popular/industry standard CRCs are calculated such as CRC16/ARC, CRC16(MODBUS), CRC-CCITT and CRC32.





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The CRC's are computed using the following initial values and constants for the polynomial coefficients:

CRC Type	Initial Values (hex)	Polynomial Coefficients (hex)
CRC8	0	8C
CRC16/ARC	0	A001
CRC16(MODBUS)	FFFF	A001
CRC16(DNP)	0	A6BC
CRC-CCITT/XMODEM	0	1021
CRC-CCITT(FFFF)	FFFF	1021
CRC-CCITT(1D0F)	1D0F	1021
CRC32	FFFFFFFF	EDB88320

3.14 Notation Converter

This dialog box is shown when the menu item “Tools->Notation Converter” is clicked. Use this to convert data to and from decimal / hexadecimal notation. Conversion of binary to decimal and hexadecimal is also possible.

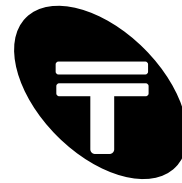


The following example shows how to use this dialog box to view three different number representations (hex, decimal and binary) of hexadecimal F0:

- 1) Type F0 in the Hex field. Notice that “240” is displayed in the Dec field and “1111 0000” is displayed in the Bin field.
- 2) Similarly, (delete the current text) and type 240 in the Dec field. Notice that F0 will be displayed in the Hex field and “1111 0000” is displayed in the Bin field.
- 3) Click the Close button to close the Notation Converter dialog box.

Note:

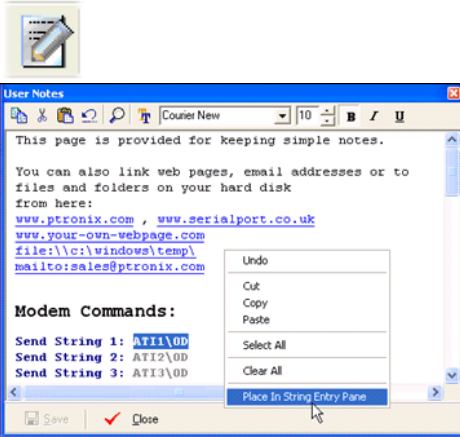
- a) The label “(MSB)” indicates that the most significant bit in the binary representation is the leftmost bit within the “Bin:” field.
- b) “Bin Digits” label indicates the number of binary bits entered/displayed in the “Bin:” field.



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3.15 User Notes

The User Notes is a simple, yet feature rich single page notepad for storing handy notes or data during a debugging session for example. The “User Notes” screen is displayed when the menu item “Tools->User Notes” is clicked or alternatively click on the following tool bar icon:



The notepad supports different font colour and style selections within the page and provides a lot of editing functionality similar to the Microsoft WordPad application. In addition, hyperlinks to internet web pages, email addresses or to files and folders on your computer may be stored.

To save changes made in the User Notes screen press the “Save” button. When the notes are saved, the data is stored in a RTF (Rich Text Format) file called notes.rtf within SimpleTerm’s main directory. This file is importable into other applications that support RTF files including Microsoft WordPad and Word if required.

To close the User Notes screen press the “Close” button.

User Notes - Toolbar and Pop-up Menu

Toolbar icons from left to right and pop-up (context) menus are described here:

Copy - copies text so you can paste it in another location by selecting the text and then clicking the Copy icon or alternatively “right-click” using the mouse and select “Copy” from the pop-up menu.

Cut - cuts text so you can move it to another location by selecting the text and then clicking the Cut icon or alternatively select “Cut” from the pop-up menu.

Paste – inserts text you have cut or copied by clicking in the document where you want to insert the text and then clicking the Paste icon or alternatively select “Paste” from the pop-up menu.

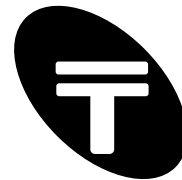
Find – use to search for words or characters in your User Notes document by clicking the Find icon. To find additional instances of the same text, continue to click Find Next.

Font Selector - changes a font type, style, size and colour by selecting the text that you want to change and then clicking the “Font Selector” icon to display the font options.

Select All (Pop-up menu only) – selects all the text within the document.

Clear All (Pop-up menu only) – clears the notes screen for a blank document.

Paste In String Entry Pane (Pop-up menu only) – places selected text into the “String Entry Pane” ready for sending to the serial port.



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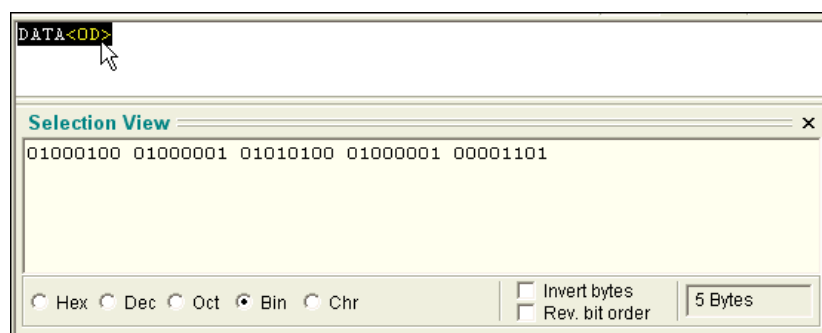
There are also icons/buttons (at the top right of the User Notes screen) for quick changes to the font and style of selected text. These include a drop down list of available system fonts and a “B”, “I” and “U” button for changing the style of selected text to bold, italic or underlined respectively.

User Notes - Editing Keyboard Shortcuts

Key Strokes	Shortcut to
CTRL+A	Select all text
CTRL+C	Copy
CTRL+X	Cut
CTRL+V	Paste
CTRL+F	Font selector
CTRL+B	Bold
CTRL+I	Italics
CTRL+U	Underline
Increment Font Size	CTRL+}
Decrement Font Size	CTRL+{
CTRL+S or ALT+S	Save Changes
CTRL+Z	Undo (multiple undo support)
CTRL+Y	Redo (multiple redo support)
ALT+C	Close (User Notes screen)
F3	Find

3.16 Data Analysis - Selection View Pane & Communication Screen

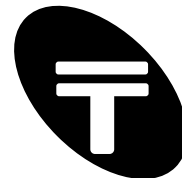
This Selection View Pane displays any selected data within the Communication Screen in different notations for advanced data analysis / debugging purposes. This option is only available in the advanced display viewing modes which show all 8-bit characters i.e. Hexadecimal or Mixed (ASCII/Hexadecimal) modes.



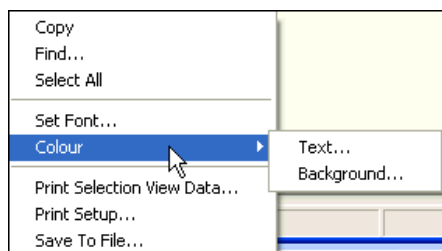
The data can be represented in hexadecimal, decimal, octal, binary and character notations. Note that for the character “chr” option, non-printable control characters (less than 20 hex) are replaced with a ‘.’ for correct display.

To select bytes that are displayed on screen in hexadecimal, both characters within the “<>” envelope must be selected.

“Right clicking” within the Selection View Pane provides a menu with options to customise the display colours / fonts, or copy, print and save the selected data to file:

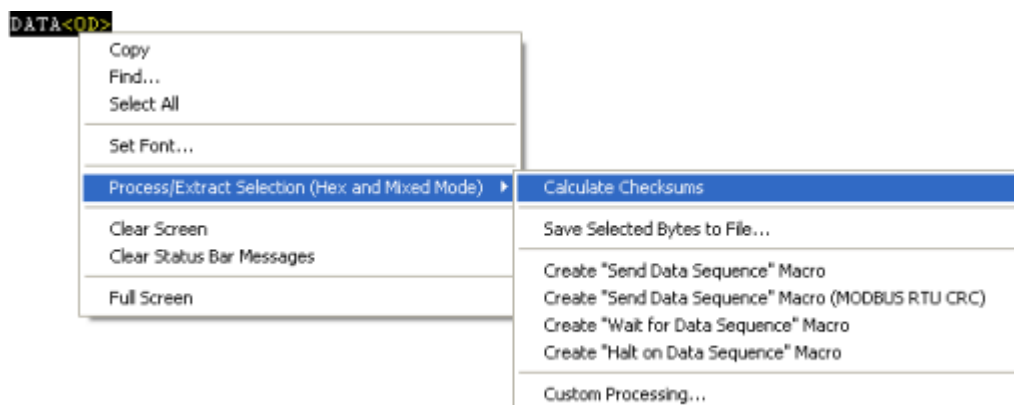


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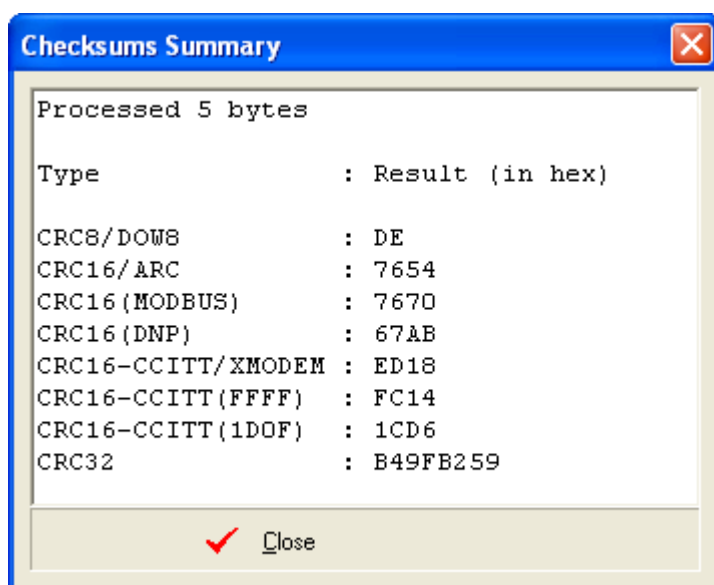


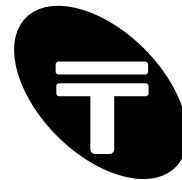
“Right clicking” within the Communication Screen provides a menu with options to process selected data or to save the raw data to file for performing custom data analysis.

Rapid macros can also be created from monitored on screen data. Simply select the data and choose the required option such as the “Create Send Data Sequence Macro” to rapidly record a RS232 transaction as a macro for later playback using the “Visual Scripting” (e.g. in order to simulate a device or to create test sequences).



One built in data analysis function calculates industry standard CRC checksums on the selected data:



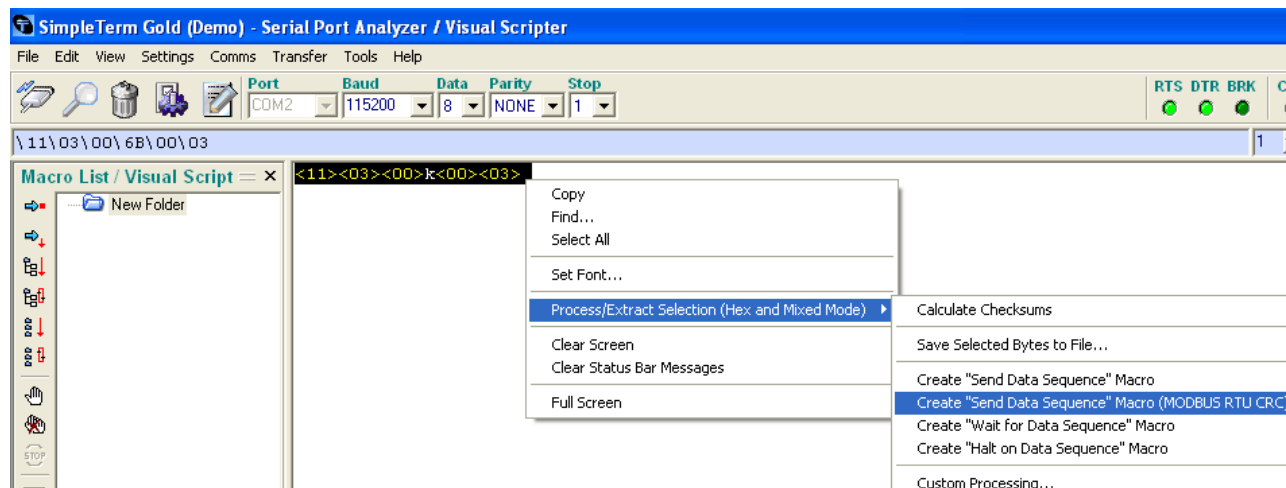


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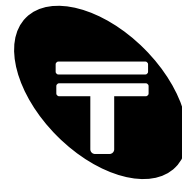
Create "Create Send Data Sequence" Macro and a new "Create Send Data Sequence Macro (with MODBUS RTU CRC)".

For MODBUS RTU CRC appended message creation - send an example message to a COM port by using the String Entry Pane or typing message bytes starting with Slave ID. Then select on screen data and "right-click" to see "Process/Extract Selection" menu items.

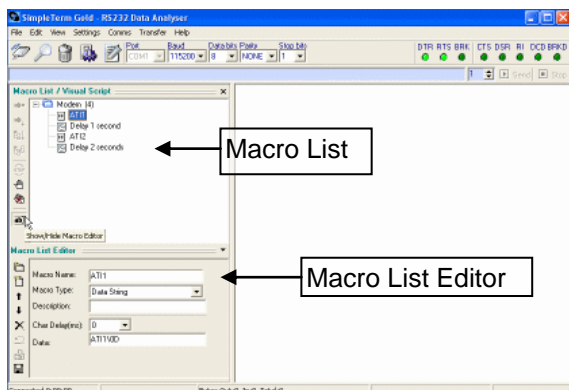
For example: "\11\03\00\6B\00\03" will create "\11\03\00k\00\03\76\87" where MODBUS RTU CRC is 8776 hex (byte order is swapped when transmitting calculated value hence last two characters are 76h and 87hex respectively).



Similarly other macros can be automatically created from selection data for reuse later. See next section for more information on the Macro List / Visual Script pane.



3.17 Macro List & Visual Script Pane

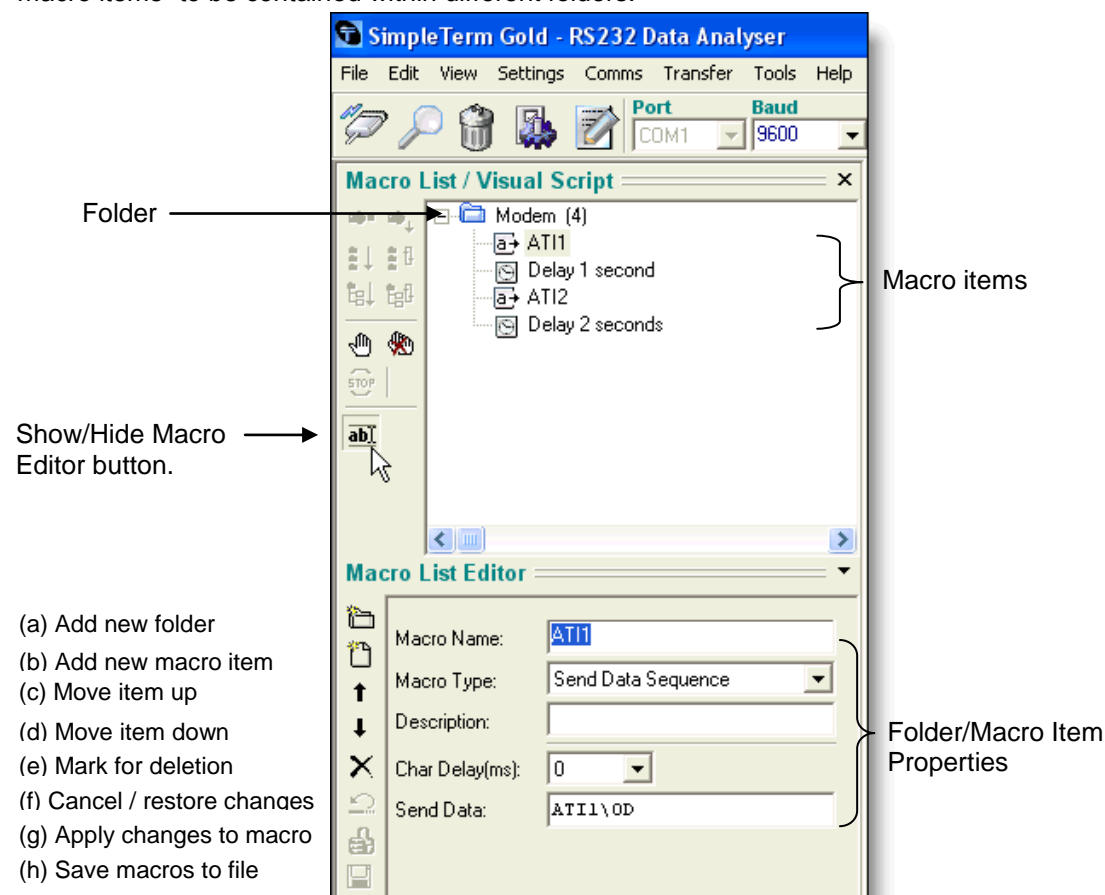


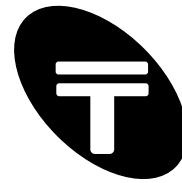
To aid in efficient and productive testing/debugging, a Macro List Pane is included (see the “View->Macro List Pane” menu item). “Macros” are a convenient way to store commonly used data or actions and can be saved to file. Saved macros can then be “executed” in order to transmit data through the serial port or carry out an action such as setting the RTS control signal active.

Note that the Macro List (when saved) is stored in a file called stmacros.stml (as the default filename but other files may be loaded or imported).

3.18 Creating Macros

Ensure the “Show/Hide Macro Editor” button is pressed so that the “Macro List Editor” is visible. Macro items must be contained within a folder as shown below. This allows different sets of “macro items” to be contained within different folders.





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To create a new folder press the “Add new folder” - button (a) shown above. Each folder must be given a name and optionally a description that will be displayed in the Macro List section. Hence the folder properties “Macro Name” and (optionally) “Description” should be filled in.

The “Description” property is a free text field that is not used by the application for anything – it is simply provided for the users benefit e.g. to remind the purpose behind a macro or for any other additional information. The “Macro Type” property does not apply to folders and is not editable for a folder.

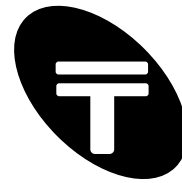
A folder / macro items position can be changed using buttons (c) and (d) shown above. Alternatively macro items can be moved around using “drag and drop” actions. Macros within one folder can be moved to another using this technique. A macro can be marked for deletion using button (e), however the macro is only deleted when the Macro List is saved to file using button (h).

Modifications of the folder/macro item properties should be “applied” using button (g). Any modifications not “applied” can be cancelled / restored using button (f). To create a new macro item press button (b) shown above (“Add new macro item”.) Again fill in the “Macro Name” (and optionally the “Description”) property. Now set the “Macro Type” property as the name suggests to select the type of macro or action to store. Different macro types will provide different additional properties for filling in.

List of Macro Types

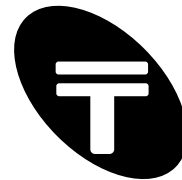
The list of currently supported macro types and their description are shown here.

Macro Type	Additional property 1	Additional property 2
“Send File” Send data to the serial port from a file.	“Char Delay (ms)” Allows an intercharacter delay in milliseconds to be set.	“File name” Set the location of the file to transmit from. Note: you can double click this property box to bring up an Open file dialog screen or press the button to the right of the property box.
“Send Data Sequence” Sequence of data for transmitting via the serial port.	“Char Delay (ms)” Allows short or long intercharacter delays to be set in milliseconds.	“Data” Insert data in ASCII or in hexadecimal using the escape character '\ ' in the form '\hh' where hh are two hex digits. See section “3.5 Quick Entry Pane” for a fuller description of the format. Note: you can double click this property box to bring up a help screen.



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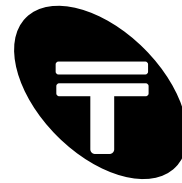
Macro Type	Additional property 1	Additional property 2
“Play Sound” This allows a sound to be output.	“Sound / file” WAV files can be played by specifying a file name. If no sound card is present then a “beep:frequency” command can be typed in to emit sound via the computers internal speakers (assuming one exists). E.g. “Beep: 500” will emit a short sound of frequency 500 Hertz through the internal speakers.	(N/A)
“Control Signal” This allows the control of the serial port hardware signals states.	“Signal State” Set to one of the following options or combinations: <ul style="list-style-type: none"> - RTS OFF - RTS ON - DTR OFF - DTR ON - RTS OFF, DTR OFF - RTS OFF, DTR ON - RTS ON, DTR OFF - RTS ON, DTR ON Note: signal states can only be changed if “Flow Control” option is set to “NONE”.	(N/A)
“Jump to Folder Start”	(N/A) This macro jumps execution to the top of the current folder for looping through lines within the current folder.	(N/A)
“(NONE)”	(N/A) This is a “do nothing” macro. It can be used to provide a place marker or comment line (using its name and description property).	(N/A)
“Delay in ms” Pause execution for a period of time.	Delay (ms) Set the number of milliseconds to pause for.	(N/A)



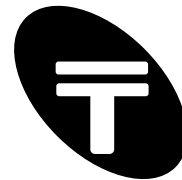
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Macro Type	Additional property 1	Additional property 2
<p>“Wait for Data Sequence” Type in a sequence of data here to record as a "Wait for Data Sequence" macro.</p>	<p>“Data” This macro is used for detecting data sequences within the serial data stream. On triggering on the data sequence, execution of the next macro item is allowed to proceed.</p> <p>Powerful "Wildcard" escape sequences are also supported for detecting variable length non-specific sequences.</p> <p>A wildcard is a special character that serves as a placeholder within a data sequence. It may be used for data sequences for which parts of the received data are unspecified in data and in length e.g. measurement readings reported by RS232 interface devices.</p> <p>Insert data in ASCII or in hexadecimal using the escape character '\ ' in the form '\hh' where hh are two hexadecimal digits.</p> <p>Note that the following escape sequences for inserting characters (in hexadecimal) or wildcards are valid:</p> <p>\hh Any 8-bit character in hex notation where hh are two hex digits (uppercase or lowercase). \n 0a hex (Line Feed) \r 0d hex (Carriage Return) \t 09 hex (Horizontal Tab) \ 5c hex (Backslash) \? Wildcard: matches exactly one ASCII character (any code between 0 and 255) * Wildcard: matches zero or multiple characters. Note that this wildcard must be combined with other characters or wildcards for correct operation.</p> <p>Example 1: To look for simple data sequences such as "WEIGHT=" followed by three unknown digits then use the following: WEIGHT=\?\?\?</p> <p>Example 2: To look for a complex data sequence that starts with an STX (02 hex) and ends with an ETX (03 hex) plus two unknown check digits, use the following: \02*\03\?\?</p>	(N/A)

Macro Type	Additional property 1	Additional property 2
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<p>“Halt on Data Sequence” Type in a sequence of data here to record as a "Halt on Data Sequence" macro.</p>	<p>“Data” This macro is used for detecting data sequences within the serial data stream. On triggering on the data sequence, the opened COM port is closed and serial communications halted so that the data sequence remains visible within the communication window (e.g. for further analysis).</p> <p>Powerful "Wildcard" escape sequences are also supported for detecting variable length non-specific sequences.</p> <p>A wildcard is a special character that serves as a placeholder within a data sequence. It may be used for data sequences for which parts of the received data are unspecified in data and in length e.g. measurement readings reported by RS232 interface devices.</p> <p>Insert data in ASCII or in hexadecimal using the escape character '\ ' in the form '\hh' where hh are two hexadecimal digits.</p> <p>Note that the following escape sequences for inserting characters (in hexadecimal) or wildcards are valid:</p> <p>\hh Any 8-bit character in hex notation where hh are two hex digits (uppercase or lowercase).</p> <p>\n 0a hex (Line Feed) \r 0d hex (Carriage Return) \t 09 hex (Horizontal Tab) \ 5c hex (Backslash) \? Wildcard: matches exactly one ASCII character (any value between 0 and 255) * Wildcard: matches zero or multiple characters. Note that this wildcard must be combined with other characters or wildcards for correct operation.</p> <p>Example 1: To halt communication on finding a simple data sequence such as "ERROR=" followed by two unknown digits then use the following: ERROR=\?\?</p> <p>Example 2: To halt communication on a complex data sequence that starts with an STX (02 hex) and ends with an ETX (03 hex) plus two unknown check digits, use the following: \02*\03\?\?</p>	<p>(N/A)</p>
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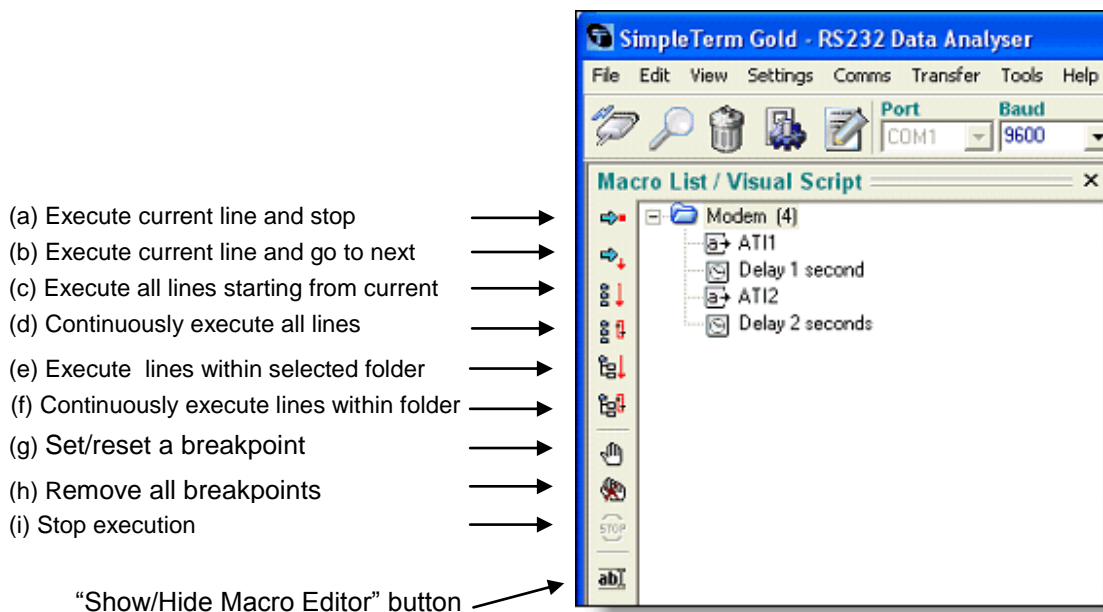
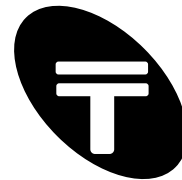
Macro Type	Additional property 1	Additional property 2
“LOG: Start - Log To File”	“Filename” Log data on to file specified. As per “File->Log To File” menu item.	(N/A)
“LOG: Stop - Log To File”	(N/A) As per “File->Stop Logging” menu item.	(N/A)
“COMMS: Connect”	(N/A) As per “Comms->Connect” menu item.	(N/A)
“COMMS: Disconnect”	(N/A) As per “Comms->Disconnect” menu item.	(N/A)
“COMMS: Reconnect New Settings”	“Settings” Disconnect & reconnect from COM port with new COM port settings. e.g. “DEFAULT, 9600, 8, NONE, 1” or “COM2, 9600, 8, NONE, 1” The text “DEFAULT” indicates the use of the same COM port as specified already.	(N/A)
“COMMS: Set Line Settings”	“Settings” Change default line settings without disconnecting from COM port; fast but for line settings only (will clear screen for new comms). e.g. “9600, 8, NONE, 1”	(N/A)

3.19 Visual Scripting Feature

There is also a “Visual Scripting” feature to run/execute macros in sequence or repeatedly in a loop. This can be of great help for debugging or testing the robustness of RS232 based embedded systems. It is equally powerful for testing a variety of equipment by executing a sequence of macros/tasks written to exercise that equipment.

Powerful sequence detection macros such as “Wait for Data Sequence” may also be specified to pause the script execution until a specific or even a *non-specific variable length* data sequence has been detected. This facilitates many test, simulation or automation scripts to be created with ease and without having to resort to complex programming scripts.

The Communication Screen (within the set screen matrix limits) displays all data sent using the “Send Data Sequence” macros. Bytes transferred using the “Send File” macro option are not displayed in order to maintain high speed operation. However, all data received from the serial port are displayed within the Communication Screen as usual.



Visual Scripting Usage

Ensure that SimpleTerm is online, that is, connected to a valid COM port with the correct line settings. Click on the “Show/Hide Macro Editor” button such that the Macro List Editor section is not visible.

Simply select the macro item/line to execute first. Then to execute just a single line press button (a) or double-click on the selected macro item.

To execute just a single line and then move to the next press button (b).

In order to execute all lines starting from the current selection press button (c).

In order to continuously execute all lines starting from the current selection press button (d).

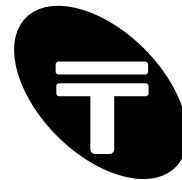
In order to execute all lines within a selected folder only - press button (e).

In order to continuously execute all lines within a selected folder only - press button (f).

Breakpoints may be set or removed using the toggle action (g).

All breakpoints can be removed using button (h).

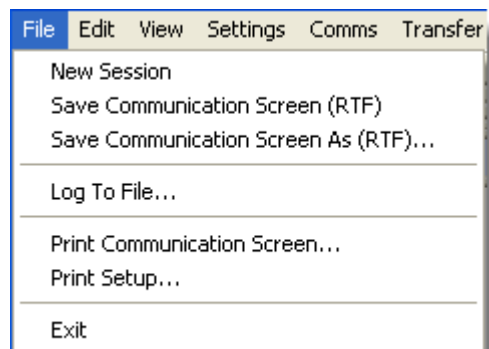
To stop execution e.g. before completion or to stop a loop then press button (i).



4 Reference: Menu, Toolbar, Startup and Keyboard Shortcuts

Most menu items have an ALT+key combination keyboard shortcut to select items within the menu. For example, to the menu item “File->New Session”, hold down the ALT key and then press the ‘f’ key for the file menu. Then press the ‘n’ key for New session. Other menu items have a Function key (F2-F10) associated and these are shown below.

4.1 File Menu



New Session

Clears the display screen and resets the byte count in the status bar.

Save Communication Screen (RTF) / Save Communication Screen As (RTF)...

Saves the (colour coded) display data in the Communication Screen as a “Rich Text Format” file.

Print Communication Screen... / Print Setup...

Setup the printer and print the contents of the communication screen.

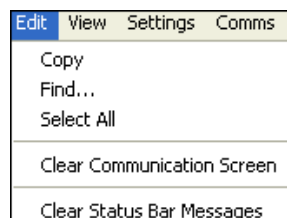
Log To File...

Log/save serial data into a file (when connected). Useful for logging communication data within a specified file for capturing very large data logs or for permanent logs of capture sessions.

Exit

Exit the SimpleTerm application. Keyboard shortcut: F10.

4.2 Edit Menu

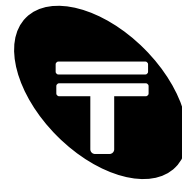


Copy

To copy the text in the communication to the clipboard so that you can paste it in another application, select the text, and then on the “Edit” menu, click “Copy”.

Find...

Search for words or characters in the communication screen. Keyboard shortcut: F3.



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Select All

You can select all text/characters in the communication screen at once by clicking “Edit”, and then clicking “Select All”.

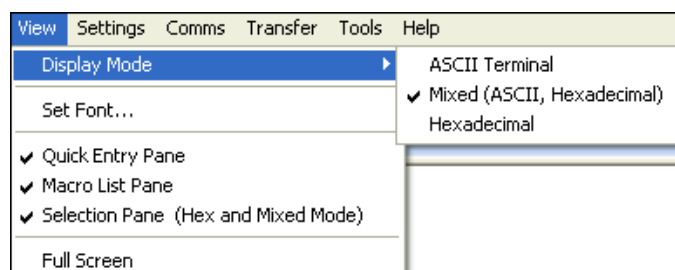
Clear Communication Screen

Clear the contents of the communications screen. Note that this does not affect the byte count in the status bar (see File Menu->New Session). Keyboard shortcut: F4.

Clear Status Bar Messages

Clears any notification or error messages in the status bar.

4.3 View Menu



Display Mode

This expanding menu item allows selection of the data viewing options for the Communication Screen. A sub-menu allows the selection between “ASCII Terminal”, “Mixed (ASCII, hexadecimal)” and “Hexadecimal” modes.

Set Font...

Set the font used for displaying data in the Communication Screen.

Quick Entry Pane

Toggle the display of the Quick Entry Pane.

Macro List Pane

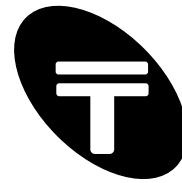
Toggle the display of the Macro List / Visual Scripting Pane.

Selection Pane (Hex and Mixed Mode)

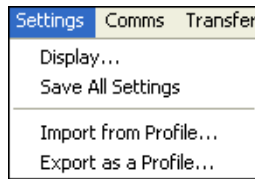
Toggle the display of the Selection View Pane. This option is only available in the advanced display modes: Hexadecimal or Mixed (ASCII/Hexadecimal).

Full Screen / Exit Full Screen

Full Screen option maximises the SimpleTerm application window so it covers the full screen. Exit Full Screen option (shown when window is already maximised) restore the window to its previous size. Keyboard shortcut: ALT+ENTER (toggle action).



4.4 Settings



Display...

Show the Settings window for selecting the application program options (e.g. for display and other communication settings).
Keyboard shortcut: F5.

Save All Settings

Save application settings (which include the serial port line settings) to a file called STGold.ini in the current directory. Note that the Macro List items are also saved but in a separate file called stmmacros.stml (as the default filename but other files may be loaded or imported).

Import from Profile

Reconfigure SimpleTerm by loading the display and serial port configuration settings from a Profile (file extension .stp).

Export as a Profile

Save the current SimpleTerm display and serial port configuration as a Profile (file extension .stp) so that the configuration may be recalled in future by importing the Profile. Note that the Macro List data items are not stored as part of the "Profile" - only a reference/location to the separate Macro List file is stored.

4.5 Comms

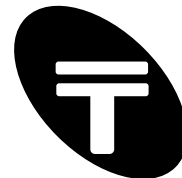


Connect

Open the communication port selected in the Quick Configuration Panel and enable serial data transfer. Keyboard shortcut: F2 (toggle action).

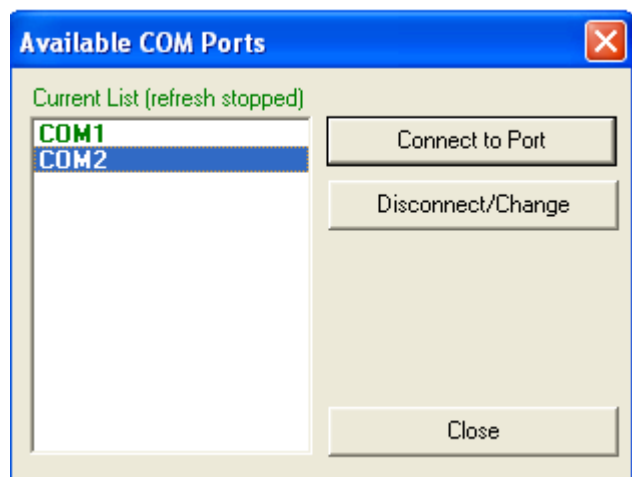
Disconnect

Close the communication port selected in the Quick Configuration Panel and enable serial data transfer. Keyboard shortcut: F2 (toggle action).



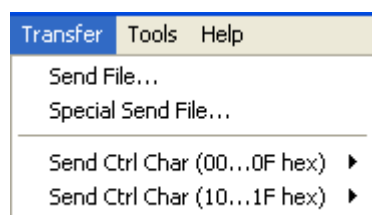
Find Available Ports

Will search for and list known COM ports within your system automatically refreshing the search until a specific COM port has been selected for use. Select a COM port and press "Connect to Port" or double-click the selection to connect to that COM port. Alternatively select a COM port and press "Disconnect/Change " to switch to a different COM port than one currently connected to but not connect to it automatically.



Alternatively see your "Ports (COM & LPT)" section under the Device Manager (via the Control Panel) for a full listing of possible COM ports you can use and connect to.

4.6 Transfer



Send File...

Send data within a file through the serial port (when connected).

Special Send File...

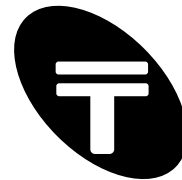
Send data within a file through the serial port (when connected) with the option of sending multiple times and with an accurate inter-character delay.

Send Ctrl Char (00...0F hex)

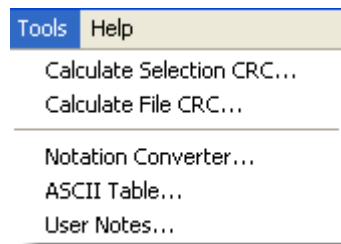
Transmit a control char within the range 00 and 0F hex to the serial port (when connected).

Send Ctrl Char (10...1F hex)

Transmit a control char within the range 10 and 1F hex to the serial port (when connected).



4.7 Tools



Calculate Selection CRC...

Perform Cyclic Redundancy Checks on selected data within the communication screen.

Calculate File CRC...

Perform Cyclic Redundancy Checks on files using this menu option.

Notation Converter...

Show the display of the Notation Conversion window.

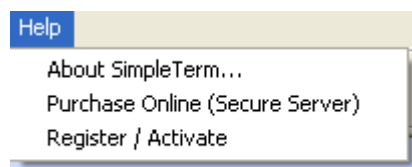
ASCII Table...

Display a list of ASCII codes in various representations.

User Notes...

Show the User Notes window. Keyboard shortcut: F6.

4.8 Help



About SimpleTerm...

Display information about your SimpleTerm application including version number and copyright information.

Purchase Online (Secure Server)...

For demonstration version of SimpleTerm an online link is provide to purchase software licenses.

Register / Activate...

Follow the on-screen instruction to activate your purchased software license for the computer you will use it on.

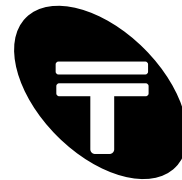
4.9 Toolbar



Icons from left to right:

Connect / Disconnect

Open / close the communication port. Keyboard shortcut: F2 (toggle action).



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Find

Search for words or characters in the communication screen. Keyboard shortcut: F3.

Clear Screen

Clear the contents of the communications screen. Keyboard shortcut: F4.

Show Settings Window

Show the Settings window. Keyboard shortcut: F5.

User Notes

Show the User Notes window. Keyboard shortcut: F6.

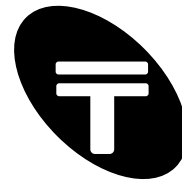
4.10 Startup – Command Line Parameters

SimpleTerm allows the filename of a Profile to be provided as part of the command line parameters. See section 3.11 “Import and Export SimpleTerm Profiles” for information about creating Profiles.

Use the following syntax:

```
stgold.exe profile.stp
```

This will start up SimpleTerm with the settings defined within the file “profile.stp”.



Appendix A – ASCII Chart

ASCII, the American Standard Code for Information Interchange, was developed in the 1960's as a standard 7-bit code for identifying letters, numbers, symbols, and special characters in the English language. It was later expanded (as Extended ASCII) to include additional symbols and foreign language characters. Standard ASCII consists of 128 characters, ranging from 0 to 127 which can be broken down into the following subgroups:

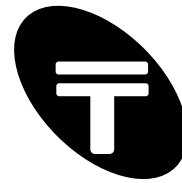
- 0 to 31, 127: Control codes (includes null, backspace, line feed and others)
- 32 to 47, 58 to 64, 81 to 86, 123 to 126: Punctuation marks, mathematical (and other) symbols
- 48 to 57: Numbers 0 through 9
- 65 to 80: Capital letters A through Z
- 87 to 122: Lower case letters a through z

Standard ASCII Chart

The standard chart includes the ASCII character or control and their related decimal and hexadecimal values. Also shown are the control key sequences for the control codes. Note, to obtain codes 0 to 31, console Control Key is pressed while simultaneously pressing a Letter Key, e.g. ^J is the line feed character. Control Key subtracts decimal 64 (40h) from Letter Key pressed.

Dec	Hex	^Key	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII
0	0	^@	NUL (Null)	32	20	(Space)	64	40	@	96	60	`
1	1	^A	SOH (Start of Heading)	33	21	!	65	41	A	97	61	a
2	2	^B	STX (Start of Text)	34	22	"	66	42	B	98	62	b
3	3	^C	ETX (End of Text)	35	23	#	67	43	C	99	63	c
4	4	^D	EOT (End of Transmission)	36	24	\$	68	44	D	100	64	d
5	5	^E	ENQ (Enquiry)	37	25	%	69	45	E	101	65	e
6	6	^F	ACK (Acknowledgement)	38	26	&	70	46	F	102	66	f
7	7	^G	BEL (Bell)	39	27	'	71	47	G	103	67	g
8	8	^H	BS (Backspace)	40	28	(	72	48	H	104	68	h
9	9	^I	HT (Horizontal Tab)	41	29	)	73	49	I	105	69	i
10	A	^J	LF (Line Feed)	42	2A	*	74	4A	J	106	6A	j
11	B	^K	VT (Vertical Tab)	43	2B	+	75	4B	K	107	6B	k
12	C	^L	FF (Form Feed)	44	2C	,	76	4C	L	108	6C	l
13	D	^M	CR (Carriage Return)	45	2D	-	77	4D	M	109	6D	m
14	E	^N	SO (Shift Out)	46	2E	.	78	4E	N	110	6E	n
15	F	^O	SI (Shift In)	47	2F	/	79	4F	O	111	6F	o
16	10	^P	DLE (Data Line Escape)	48	30	0	80	50	P	112	70	p
17	11	^Q	DC1 (Device Control 1)	49	31	1	81	51	Q	113	71	q
18	12	^R	DC2 (Device Control 2)	50	32	2	82	52	R	114	72	r
19	13	^S	DC3 (Device Control 3)	51	33	3	83	53	S	115	73	s
20	14	^T	DC4 (Device Control 4)	52	34	4	84	54	T	116	74	t
21	15	^U	NAK (Negative Ack.)	53	35	5	85	55	U	117	75	u
22	16	^V	SYN (Synchronous Idle)	54	36	6	86	56	V	118	76	v
23	17	^W	ETB (End of Transmit Block)	55	37	7	87	57	W	119	77	w
24	18	^X	CAN (Cancel)	56	38	8	88	58	X	120	78	x
25	19	^Y	EM (End of Medium)	57	39	9	89	59	Y	121	79	y
26	1A	^Z	SUB (Substitute)	58	3A	:	90	5A	Z	122	7A	z
27	1B	^[	ESC (Escape)	59	3B	;	91	5B	[	123	7B	{
28	1C	^\	FS (File Separator)	60	3C	<	92	5C	\	124	7C	|
29	1D	] ^	GS (Group Separator)	61	3D	=	93	5D	]	125	7D	}
30	1E	^^	RS (Record Separator)	62	3E	>	94	5E	^	126	7E	~
31	1F	^_	US (Unit Separator)	63	3F	?	95	5F	_	127	7F	(Delete)

Legend: ^Key - Control Key + Letter Key combination except 30 (1E hex) = Control +caret.



Appendix B – Radix Conversion Charts

Converting Hexadecimal to Decimal

This chart shows the conversion between hex and decimal.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	000	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015
1	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031
2	032	033	034	035	036	037	038	039	040	041	042	043	044	045	046	047
3	048	049	050	051	052	053	054	055	056	057	058	059	060	061	062	063
4	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078	079
5	080	081	082	083	084	085	086	087	088	089	090	091	092	093	094	095
6	096	097	098	099	100	101	102	103	104	105	106	107	108	109	110	111
7	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
8	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
9	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
A	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
B	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

Usage example:

Hex 31 is equivalent to decimal 49. Alternatively decimal 255 is equivalent to hex FF.

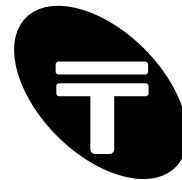
Converting Hexadecimal to Octal

This chart shows the conversion between hex and octal

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	000	001	002	003	004	005	006	007	010	011	012	013	014	015	016	017
1	020	021	022	023	024	025	026	027	030	031	032	033	034	035	036	037
2	040	041	042	043	044	045	046	047	050	051	052	053	054	055	056	057
3	060	061	062	063	064	065	066	067	070	071	072	073	074	075	076	077
4	100	101	102	103	104	105	106	107	110	111	112	113	114	115	116	117
5	120	121	122	123	134	125	126	127	130	131	132	133	134	135	136	137
6	140	141	142	143	144	145	146	147	150	151	152	153	154	155	156	157
7	160	161	162	163	164	165	166	167	170	171	172	173	174	175	176	177
8	200	201	202	203	204	205	206	207	210	211	212	213	214	215	216	217
9	220	221	222	223	224	225	226	227	230	231	232	233	234	235	236	237
A	240	241	242	243	244	245	246	247	250	251	252	253	254	255	256	257
B	260	261	262	263	264	265	266	267	270	271	272	273	274	275	276	277
C	300	301	302	303	304	305	306	307	310	311	312	313	314	315	316	317
D	320	321	322	323	324	325	326	327	330	331	332	333	334	335	336	337
E	340	341	342	343	344	345	346	347	350	351	352	353	354	355	356	357
F	360	361	362	363	364	365	366	367	370	371	372	373	374	375	376	377

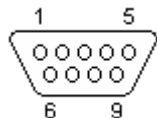
Usage example:

Hex 7F is equivalent to octal 367. Alternatively octal 377 is equivalent to Hex FF.



Appendix C – Pinout and Signals for the PC RS232 Connector

DB9 RS232 Port (IBM PC XT/AT)

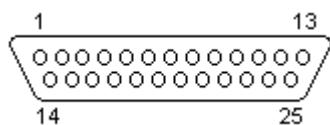


DB9 pin D-SUB male

Pin	Signal Name	Direction (DTE ← DCE)
1	CD (Carrier Detect)	←
2	RXD (Receive Data)	←
3	TXD (Transmit Data)	→
4	DTR (Data Terminal Ready)	→
5	GND (System Ground)	-
6	DSR (Data Set Ready)	←
7	RTS (Request to Send)	→
8	CTS (Clear to Send)	←
9	RI (Ring Indicator)	←

Note: a) Signal names are with respect to the computer/PC. b) Direction is from peripheral/modem (DCE) to the computer (DTE) e.g. RXD is the computer's input pin.

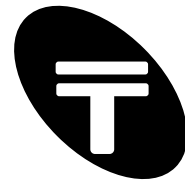
DB25 RS232 Port



DB25 pin D-SUB male

Pin	Signal Name	Direction (DTE ← DCE)
1	SHIELD (Shield/Protective Ground)	-
2	TXD (Transmit Data)	→
3	RXD (Receive Data)	←
4	RTS (Request to Send)	→
5	CTS (Clear to Send)	←
6	DSR (Data Set Ready)	←
7	GND (System Ground)	-
8	CD (Carrier Detect)	←
9	n/c	-
10	n/c	-
11	n/c	-
12	n/c	-
13	n/c	-
14	n/c	-
15	n/c	-
16	n/c	-
17	n/c	-
18	n/c	-
19	n/c	-
20	DTR (Data Terminal Ready)	→
21	n/c	-
22	RI (Ring Indicator)	←
23	n/c	-
24	n/c	-
25	n/c	-

Note: a) Signal names are with respect to the computer/PC. b) Direction is from peripheral/modem (DCE) to the computer (DTE) e.g. RXD is the computer's input pin. c) Do not connect SHIELD(1) to GND(7).



Appendix D – SimpleTerm Half Duplex Monitoring Cable

SimpleTerm may be used as a low cost half duplex RS232 data monitor with the addition of some minimal external hardware. Two devices that take turns sending data are said to be communicating in "half duplex" mode. See Figure C1 below for the pass through hardware required.

With this straightforward pass through arrangement, DEVICE A will still communicate with DEVICE B and vice versa but the communication (if half-duplex) may be monitored via a connection to the PC's serial port.

Figure C1: Half Duplex Monitoring Adaptor / Cable

