PRAXSYM
PRACTICAL SYSTEMS ENGINEERING

PST
practical systems transmitter

Practical Systems Transmitter User's Manual

Praxsym Warranty Statement

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1.0 Introduction

1.1 Overview

The PST a portable CW test source capable of transmitting test signals in two bands simultaneously. The output from each band can be enabled independently and level can be adjusted between -10 dBm and +12 dBm in 0.1 dB steps. Different transmitter models can be configured to cover VHF, UHF, Cellular, GSM850, GSM900, iDEN, PCS, GSM1800, GSM1900, UMTS bands.

The transmitter frequency and output level for each channel can be set from the touch keys on the front panel. The transmitter status can easily be monitored from the backlit LCD display. The touch-screen on the display should be cared for properly. The transmitter also contains a USB interface enabling the user to control the transmitter remotely.

The transmitter can be powered using the internal 6 AA rechargeable batteries for 6 to 8 hours of continuous operation or from the AC/DC wall adapter included.

1.2 Functional Description

The PST will power on to a splash screen with the Praxsym Logo, and immediately proceed to the main operation screen. The previous settings from the last use will be retained. The transmitter will not power on transmitting RF energy, though it may have been powered off previously while transmitting. The PST may safely be powered off in any state using the ON/OFF button.

The PST is configured with channel spacing of many common wireless standards. Once the channel spacing is selected within the Channel Setup menu, the step size may be adjusted from the main operation screen. This function makes stepping across multiple channels quick and easy during testing.

2.0 Operation

2.1 Battery Charging

The PST transmitter is fully operational while the batteries are being charged. Charging can occur whether or not the unit is powered on.

When "batt low" appears in the battery icon, the battery life is nearing its end. The transmitter will shut down soon. Connect the AC/DC adapter (12 V/1.5 A) to the unit's CHARGE jack. Plug the adapter into a wall outlet. An internal battery charger will control and terminate the charging of the 6 NiMH cells within each unit. When beginning a charge cycle with batteries which have been completely depleted, allow about two and a half hours for a full charge to be restored. A top-off charge is recommended immediately before use for maximum battery life.

A flashing red LED indicates a precharge state. Usually it will flash for a few moments and then enter a fast charge state. This precharge state may last up to a few hours with drained batteries and indefinitely if one or more cells have failed. All cells must be replaced in the latter case. When the LED turns green, the batteries are nearly full and enter trickle charge mode. Continuing to charge when the LED turns green for approximately an hour will give maximum battery life. Fully charged batteries will give six to eight hours of use. Also, the battery icon on the display will be completely darkened. Leaving the charger connected to the PST will initiate a new charge cycle once the batteries have discharged. This will occur continually.

Though designed for many recharge cycles, the batteries are user replaceable. Use only Energizer® NH15 AA NiMH rechargeable batteries, as supplied originally. Other AA battery types such as Alkaline or Lithium Ion may result in damage to the transmitter.

2.2 Keypad Definition

ON/OFF—Turns unit on or off

Numerals 0-9—Enter a new frequency, amplitude level or step size, select corresponding menu item choice where applicable

Numerals 1&2– From the main screen, pressing 1 or 2 will toggle the LCD between channel 1 and channel 2 set up screens. Pressing 1 while on the channel 1 set up screen will toggle the channel 1 output between RF on and RF off. Likewise for channel 2.

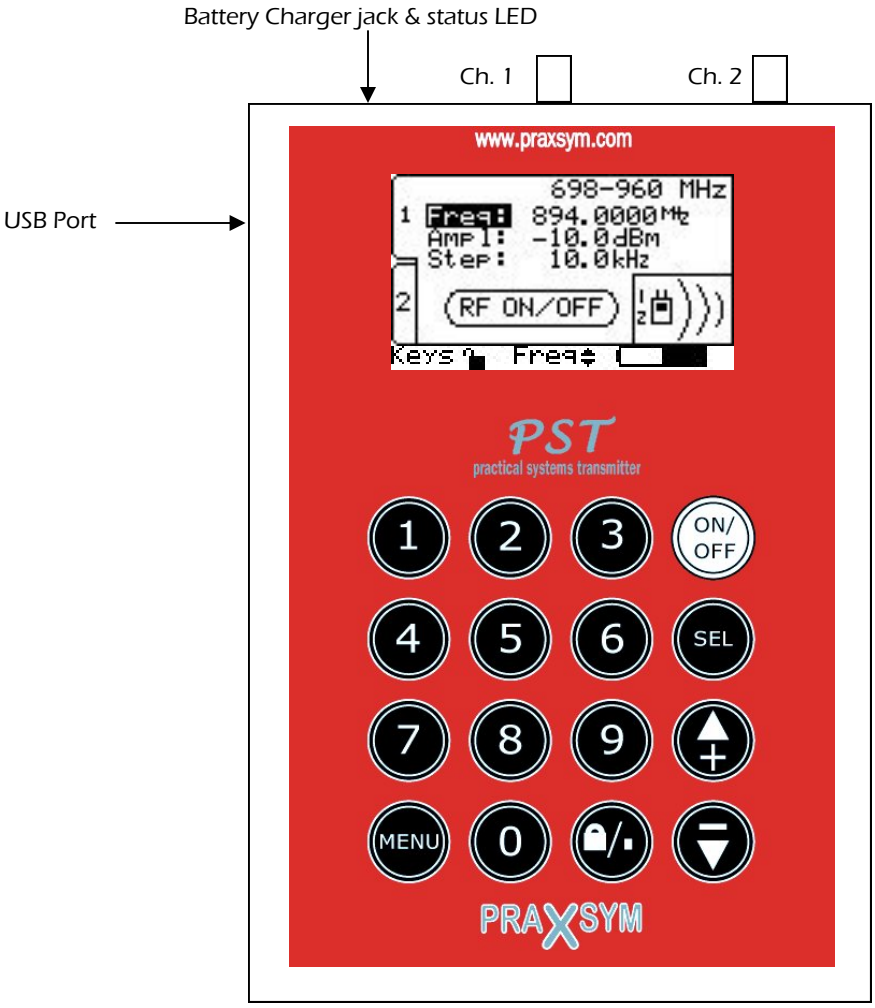
SEL—Select. Toggles between frequency, amplitude and step size on the main screen or chooses highlighted menu option in applicable screens. Also the same as the "OK" touch screen button.

UP/DOWN ARROWS—Adjust frequency, amplitude or step size of highlighted channel in the main screen using the arrows. Adjustments to frequency are made in the set step size. In applicable sub-menus, the arrows control selection of menu options.

PLUS/MINUS SIGNS— Change to a positive or negative amplitude value

LOCK/DECIMAL POINT–Locks the keypad from any unintentional changes. Indication of lock status is on the display during the main screen only. The keypad may be locked and unlocked from the main operation screen only. The Decimal Point is for use when numerically entering a new frequency, amplitude or step size.

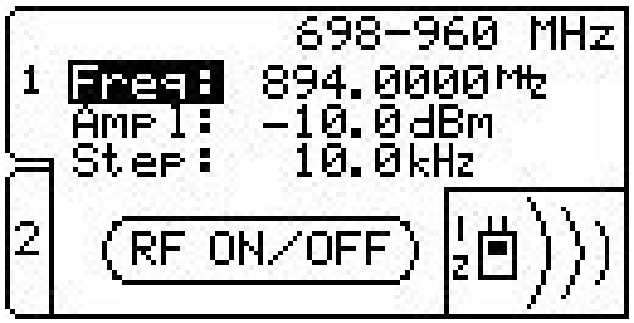
MENU—This brings up the Main Menu screen from the main operation screen, returns to main screen from Main Menu and backtracks through menus within sub-menu screens.


Battery Charger jack & status LED
Ch. 1
Ch. 2
USB Port
www.praxsym.com
698-960 MHz
1 Freq: 894.0000MHz
Ampl: -10.0dBm
Step: 10.0kHz
2
RF ON/OFF
Keys
Freq
PST
practical systems transmitter
1
2
3
ON/
OFF
4
5
6
SEL
7
8
9
MENU
0
PRAXSYM

2.3 Display Definition

The tabs may be toggled between with the touch screen, with the active channel band noted at the top

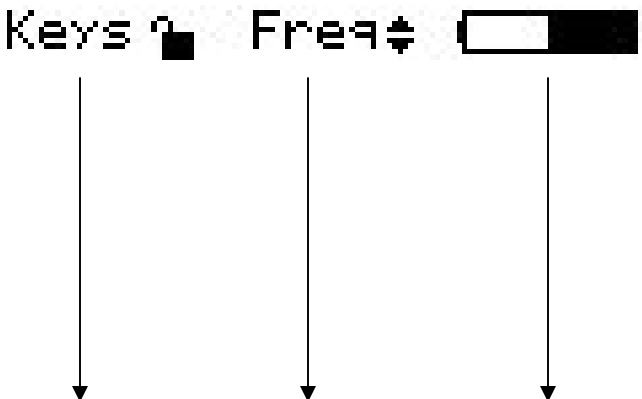
Frequency, Amplitude and Step size for both channels may be controlled using SEL to change between the three, while the arrow keys make adjustments to the values



Touch screen control of RF transmission

Numbers present indicate channels which are transmitting

Animation will run when either or both channels are transmitting


Keys
Freq
Lock status of the keypad is Indicated by the padlock icon
Indicates setting which may be adjusted using the arrow keys
Battery Level indicator

2.4 Menu Navigation

Pressing the MENU button from the main operation screen brings up the Main Menu. All transmitter settings are available from this menu. Pressing MENU again from this screen returns to the main operation screen.

Using the arrow keys will change the highlighted menu option. SEL chooses the highlighted menu option. Pressing the corresponding menu option on the keypad will also select menu options directly.

The Channel Setup options allow for setting of Frequency, Amplitude and Step Size. Channel Information displaying minimum and maximum values for frequency and RF power output are also available.

Display Settings contains user-selectable parameters for the duration of Backlight Timeout and also Backlight Level brightness.

System Settings contains options to change Baud Rate or Disable/ Enable Transmitting when the Frequency is changed. If Disable On New RF is 'ON', the PST will not transmit when a new frequency is entered. If a new step size does not require change of frequency, the PST will continue transmitting.

Pressing the MENU button while in any menu screen will backtrack through the menu hierarchy.

2.5 Controlling the PST Remotely

The PST can be controlled by a PC or embedded controller via the USB interface. Procedures in this section also describe control with terminal emulation software on a PC or laptop computer.

Install the supplied cable between a USB port on the PC/laptop and the USB port on the transmitter.

Start the terminal emulation software and setup with the following parameters.

Baud rate	9600, 38400, or 115200 (user selectable)
Data bits	8
Stop bits	1
Parity	none
Com port	assigned by PC operating system
Local echo	ON

Select line feed (LF) after carriage return (CR) when receiving

The settings may be found in various places depending on the terminal emulation software used. Generally, check the Serial Port and Terminal configuration menus.

Power up the Transmitter by depressing the 'ON/OFF' button. The transmitter frequency is stored in non-volatile memory. When power is applied to the transmitter, it will return to the last entered frequency.

2.5 Controlling the PST Remotely (continued)

Set up the transmitter, following the recommended sequence:

Set the target channel CH=X<CR>

Set the frequency in MHz FR=XXXX.yyyy<CR>

See Section 3.3 for a complete listing of all error responses.

2.6 Installing the USB-Serial Driver

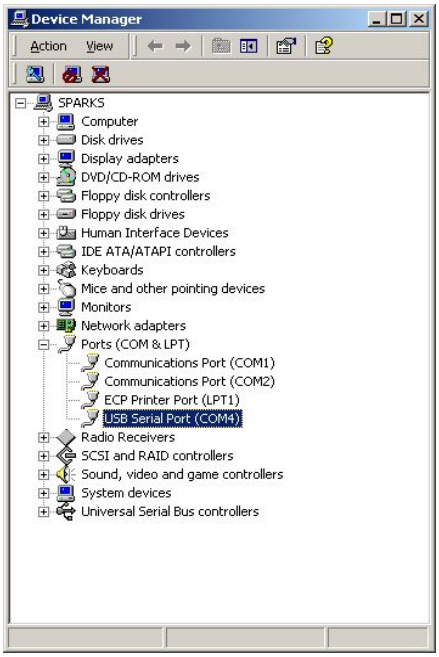
Plug the PST into an available USB port with the supplied cable.

Click 'Next'

Leave on the default setting and click 'Next'

Put your USB driver CD-ROM into your computer CD drive. Click 'Next'

Click 'Finish'



You can now go to the 'Device Manager' and verify the driver was installed successfully. Also note the COM number designated for the USB drivers.

3.0 Serial Interface Operation

3.1 Configuring Tera Term Pro

Open the Terminal setup window from the Setup Menu. Select CR+LF for Receive and CR for Transmit. Enable Local Echo. Also within the Setup menu, choose the Serial Port option. Ensure parameters are matched to what settings were configured within the transmitter for communication.

Tera Term must be closed and the USB cable removed before manually powering down the transmitter.

3.2 Commands

Commands may be sent in lower or upper case. <CR> represents 'ENTER.'

SET COMMANDS

The response to successfully executed SET commands is the message OK <CR>.

FR = XXXX.yyyy<CR> Sets output frequency (in MHz). The Inclusion of the decimal point and digits to the right of the decimal are optional.

CH=X<CR> Sets the channel you wish to configure. X = 1 or 2 *While the display will not change to reflect selection of a different channel with a serial commanded channel change, control of the serially selected channel will function properly

TX=X<CR> Enable/Disable output command. TX=1 turns the output on for the current channel. TX=0 turns the output off for the current channel.

AMP=+/-XX.y<CR> Sets the output amplitude for the current channel.

ST=X.yyyy<CR> Sets the channel spacing (in MHz). Example: ST=0.0125 (12.5 kHz Channel Spacing)

QUERY COMMANDS

FR?<CR>	Returns the current frequency setting in the form XXXX.yyyy (MHz). Example: 950.0000
MN?<CR>	Returns the lowest frequency that the currently selected channel can be set in the form XXXX.yyyy (in MHz). See "FR?" for example.
MX?<CR>	Returns the highest frequency that the currently selected channel can be set in the form XXXX.yyyy (in MHz). See "FR?" for example.
ST?<CR>	Returns the synthesizer step size setting in the form X.yyyy (MHz). Example: 0.0100
AMP?<CR>	Returns the current output amplitude in the form +/-XX.y (dBm) for the current channel. Example: +5.0
AMN?<CR>	Returns the minimum output amplitude in the form +/-XX.y (dBm) that the current channel can output. See "AMP?" for example.
AMX?<CR>	Returns the maximum output amplitude in the form +/-XX.y (dBm) that the current channel can output. See "AMP?" for example.
LD?<CR>	Returns "0" if the synthesizer for the current channel is unlocked. Returns "1" if the synthesizer for the current channel is locked.
VR?<CR>	Returns software version of the receiver board in the form X.yy. Example: 0.93
VD?<CR>	Returns software version of the keypad/display board in the form X.yy. Example: 2.07
BV?<CR>	Returns the battery voltage level "BV=XX.y". Example: BV=73%

3.3 Error Responses

Invalid commands will be acknowledged with an error response. An error response will consist of 4 ASCII bytes followed by a carriage return. The error code consists of the two characters ER followed by a two-character error status code.

ERIC<CR> Invalid command

The command was not recognized because it was not in the proper format.

ERIN<CR> Invalid number or range

The data included in the previous command was invalid or out-of-range.

4.0 Specifications

4.1 Electrical Specifications

310-010108-006 (N-type)

Channel 1 Frequency	**2110-2170 MHz**
channel spacing	250 kHz, 1.25 MHz, 5 MHz steps
Channel 2 Frequency	**1710-1880 MHz**
channel spacing	250 kHz, 1.25 MHz, 5 MHz steps
Output Power	-10 to +10 dBm
adjustable	0.1 dBm
Harmonics	< -60dBc

310-010108-008 (N-type) & 310-010108-010 (SMA)

Channel 1 Frequency	**698-960 MHz**
channel spacing	10, 12.5, 30, & 200 kHz, 1.25 MHz
Channel 2 Frequency	**1710-2170 MHz**
channel spacing	30 kHz, 200 kHz, 1.25 MHz
Output Power	-10 to +12 dBm
adjustable	0.1 dBm
Harmonics	< -60dBc

310-010108-011 (N-type)

Channel 1 Frequency	**136-174 MHz**
channel spacing	12.5 kHz, 25 kHz
Channel 2 Frequency	**396-512 MHz**
channel spacing	12.5 kHz, 25 kHz
Output Power	-10 to +12 dBm
adjustable	0.1 dBm
Harmonics	< -50dBc

4.2 Environmental Specifications

Temperature Range: 0-50° C

4.3 Mechanical Specifications

RF Connectors:	SMA or N-type
Display:	Transflective 128x64 Black/White White LED Backlight
Keypad:	Sixteen keys – see definition on page 3
Enclosure:	aluminum
Power Source:	6 AA NiMH cells rechargeable
Size:	7″ x 5″ x 2.75″ (excluding RF connectors)
Weight:	4 lbs.

Notes

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