

SeeGull[®] CW Transmitter User Guide

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Table of Contents

1	Preface	5
1.1	Purpose.....	5
2	Introduction	6
2.1	Overview	6
2.2	Feature List	6
2.3	Safety Compliances	6
3	Setup	7
3.1	Parts.....	7
3.2	CW Transmitter Interface	8
3.3	CW Transmitter Keypad.....	9
3.4	Screen Display	10
4	General Operations.....	11
4.1	Preparations.....	11
4.2	Menus	11
4.2.1	Start Test:	11
4.2.2	Saved Channels:.....	11
4.2.3	New Channel:	12
4.2.4	Settings:	12
4.2.5	Memory Status:.....	13
4.3	Starting a Test Scenario.....	14
4.3.1	Start a New Test	14
4.3.2	Save a Reusable Configuration	14
4.3.3	Recall Saved Configuration.....	15
5	Specifications.....	16
6	Support	17
6.1	Contact Information.....	17
6.2	Repair and Calibration Options	17

Figures

Figure 1 - Parts	7
Figure 2 - Interface	8
Figure 3 - Keypad	9
Figure 4 - Screen Display	10
Figure 5 - Main Menu	11
Figure 6 - Saved Channels Menu.....	11
Figure 7 - Add Channel	12
Figure 8 - Settings Menu	12
Figure 9 - Battery Status.....	12
Figure 10 - Port Upgrade.....	13
Figure 11 - Memory Menu	13
Figure 12 - Ch. Info.....	14

1 Preface

1.1 Purpose

This document walks the user through the menu setup and functionality of the CW Transmitter to emit up to four continuous wave (CW) signals for network testing.

2 Introduction

2.1 Overview

PCTEL's SeeGull CW Transmitter supports the design, verification, and optimization of in-building networks. It emits up to four simultaneous continuous wave signals on any technology or band, with a frequency range of 400 MHz to 2.7 GHz. This replicates a live network environment for RF propagation testing. The data can be collected through a PCTEL scanning receiver and processed using SeeHawk® or third party post processing tools. Results are used to validate or modify design with optimal antenna locations and coverage capability for each segment of an in-building cellular network.

2.2 Feature List

- Transmitter mode: Four-Port Continuous Wave.
- Adjustable frequency.
- Standard frequency step: 100 KHz.
- Adjustable output power range: -10 dBm to 10, 12, or 15 dBm depending on frequency selected.
- Output power accuracy of 1 dBm.
- Up to 24 saved channel configurations for quick access.
- Intuitive interface with LCD display.
- Internal, rechargeable battery.
- Optional external battery for increased operation time.
- Portable and light weight ergonomic design.
- One year PCTEL warranty.

2.3 Safety Compliances

WARNING: These devices have no protection against lightning. Please turn off the CW Transmitter during a thunderstorm and, if applicable, take the antenna(s) inside before a thunderstorm approaches. The transmitter itself is not intended for "in weather" outdoor use.

3 Setup

3.1 Parts

Customer shipping will include two items. Please contact [support](#) if any piece is missing or damaged.



Figure 1 - Parts

1. SeeGull CW Transmitter.
2. Charger. **Note: use only supplied charger. Using other chargers may damage the CW Transmitter and void the warranty.**

3.2 CW Transmitter Interface

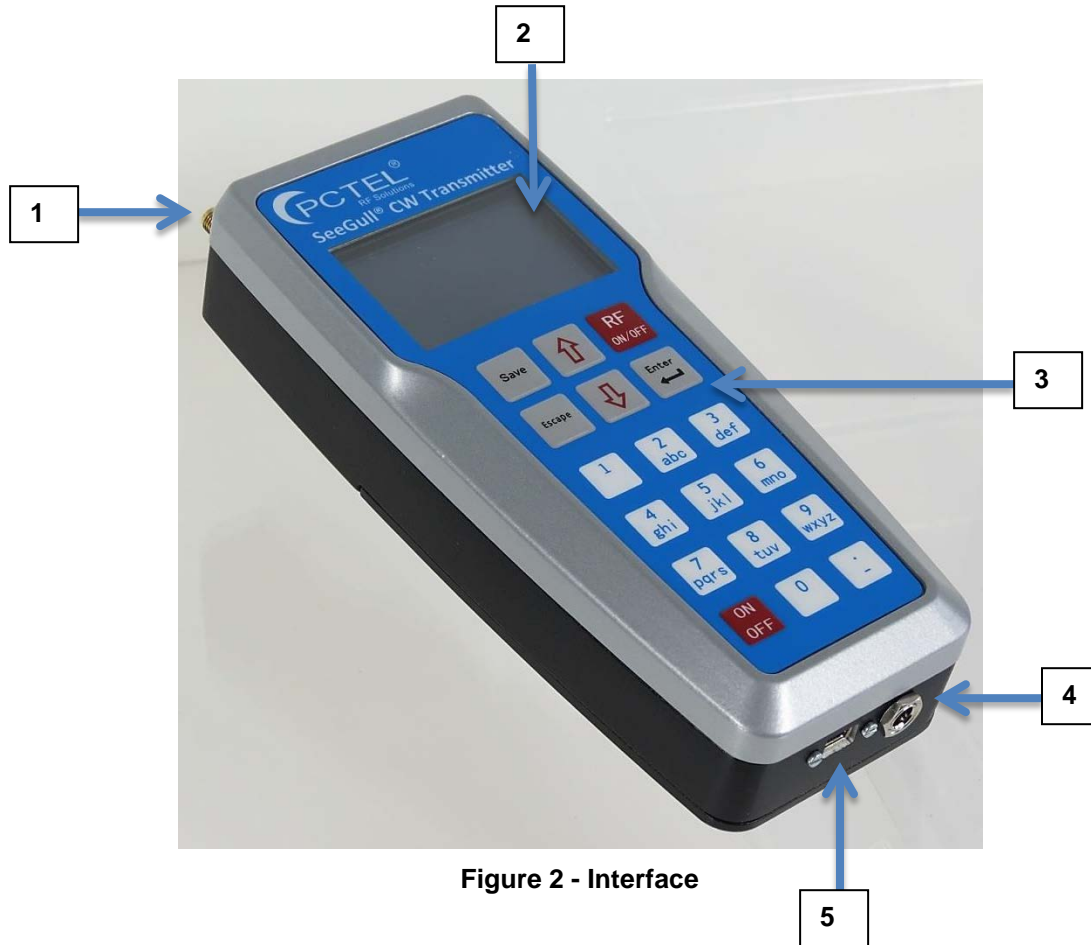


Figure 2 - Interface

1. Antenna port interface.
2. LCD menu screen.
3. Keypad.
4. Charger socket.
5. USB: Strictly for PCTEL calibration and firmware updates. Not intended for customer use.

3.3 CW Transmitter Keypad

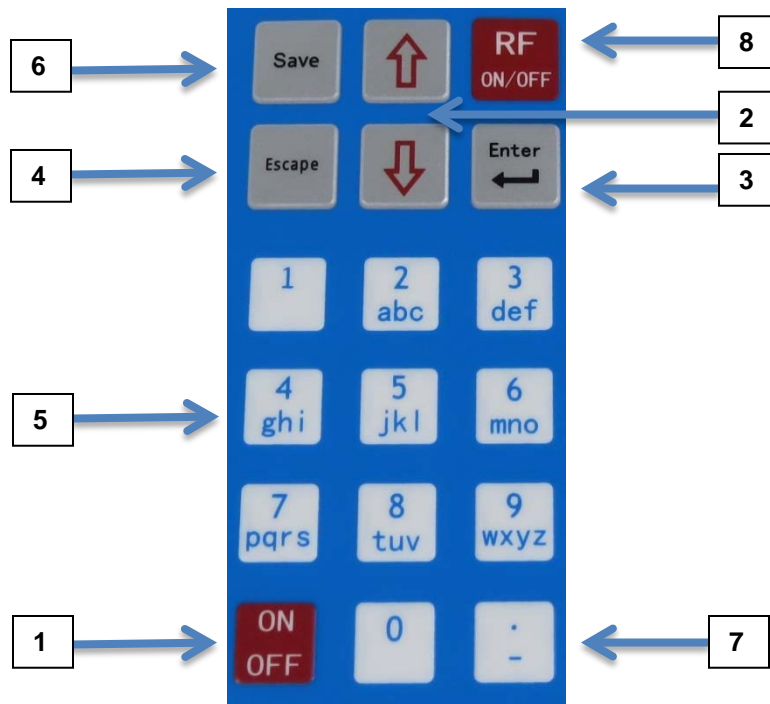



Figure 3 - Keypad

1. ON/OFF: Power on and off the device by holding for one second.
2. Up/Down Arrows:
 - Navigate through each menu screen.
 - Adjust Freq MHz edit field in steps of 100 KHz.
 - Adjust Amp dBm edit field in steps of 1 dBm.
 - Space (Up Arrow) and backspace (Down Arrow) when naming saved channels.
3. Enter:
 - Enters to selected submenus.
 - Accepts choice or edit.
4. Escape:
 - a. Revert back to previous menu.
 - b. Cancel entered data.
5. Number Keypad:
 - Inputs numbers and characters in selected field.
 - Numbers 1-4 toggle corresponding antenna ports between active or inactive prior to RF transmission.
 - Number 1 key enters a space when naming a saved Channel.

6. Save: Save current configuration for future use.



7. Edit Key:

- Prompts edits of selected value or Channel name.
- When a Freq or Amp field is selected, pressing  enables fine-tune adjusting with arrow keys.
- Inputs decimals when entering a specific Freq MHz.
- Inputs negative symbol when editing Amp dBm.

8. RF ON/OFF: Starts or stops RF transmission.

3.4 Screen Display

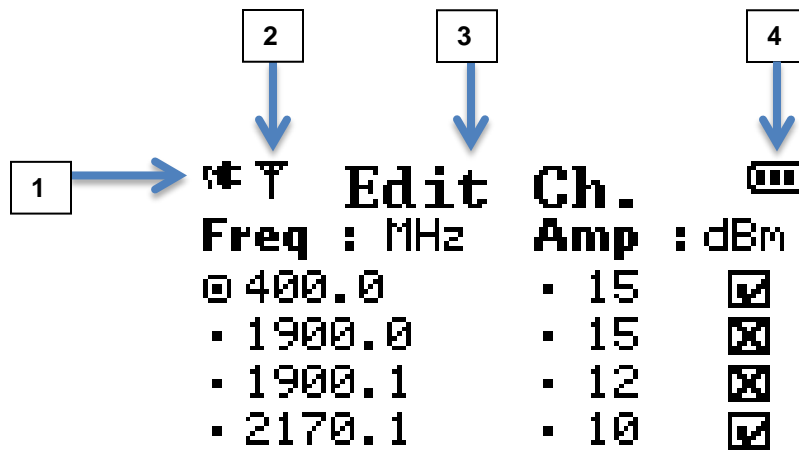


Figure 4 - Screen Display

1. Charging Icon.
2. RF Transmission ON.
3. Menu Title.
4. Battery Life.

4 General Operations

4.1 Preparations

Steps:

1. Connect the charger if needed. **Note: use only supplied charger. Using other chargers may damage the CW Transmitter and void the warranty.**
2. Power on the device by holding down the ON button for one second.
3. Connect antenna(s) to device.

4.2 Menus

```

* T Main Menu [ ]
. Start Test
@ Saved Channels
. New Channel
. Settings
. Memory Status
    
```

Figure 5 - Main Menu

From the Main Menu, there are five major sub menus:

4.2.1 Start Test:

This will recall all configurations for the last test setup, including: Mode, Freq, Amp, and active ports. All items can be modified to meet current testing parameters.

4.2.2 Saved Channels:

```

Saved Ch. [ ]
. TEST 1
. 800 BAND
. OFFICE 1
. OFFICE 2
@ STADIUM
-----
1:Delete    2:Select
    
```

Figure 6 - Saved Channels Menu

This menu contains saved test channels including all previously saved configurations. Up to 24 channels can be stored at a time.

- From the [saved channel](#) list, highlight the desired channel with the Arrow Keys:
 - Press Keypad-1 to delete.
 - Press Keypad-2 to start RF transmission with these settings, or press RF ON.

4.2.3 New Channel:

```

* Add Channel [00]
Freq : MHz      Amp : dBm
@ 840.8         . 15      [ ]
. 882.2         . 13      [ ]
. 2110.0        . 8       [X]
. 2700.0        . 10      [X]
    
```

Figure 7 - Add Channel

To add a new channel for transmission or to be saved for future use:

- **Freq:** Enters the required channel frequency from 400 MHz to 2.7 GHz in the relevant band, with a standard frequency step of 100 KHz.
- **Amp:** Enters the desired channel amplitude from -10 dBm to 10, 12, or 15 dBm depending on frequency selected, with a standard frequency step of 1 dBm.
- **Port On/Off:** Use the number pad keys 1-4 to check or uncheck the corresponding antenna ports 1-4. A box with a check depicts the port will be active when the RF ON button begins RF transmission. A box with an X is inactive.

4.2.4 Settings:

```

* Settings [00]
@ Factory Reset
. Battery Status
. Port Upgrade
. Device Information
    
```

Figure 8 - Settings Menu

- **Factory Reset:** Option to restore device to original factory settings. It will delete all saved channel configurations, and will erase activated key-code license.
 - Press Enter on this option, and Enter again on the “Are you sure?” prompt.
 - Press Escape on the “Are you sure?” prompt to cancel.
- **Battery Status:** Provides battery information, including capacity percentage of battery life remaining.

```

Bat. Status [00]
Current : -91 mA
Voltage : 7895 mV
Capacity: 71 %
    
```

Figure 9 - Battery Status

- Port Upgrade: Displays Wideband 2 port or Wideband 4 port. A check box will indicate the device's current configuration. 2 port transmitters can be upgraded to 4 ports:
 - Contact PCTEL Sales for purchasing information to receive an upgrade code.
 - Select "Wideband 4 port" and press Enter.
 - Input the upgrade code and press Enter.
 - Confirm on the Port Upgrade menu that "Wideband 4 port" is checked, and begin a four port transmission.

```

Port Upgrade [ ]
  • [x] Wideband 2 port
  @ [x] Wideband 4 port
  
```

Figure 10 - Port Upgrade

- Device Information: Displays the product name, hardware version, firmware version (to help determine if future firmware updates are needed), and serial number.

4.2.5 Memory Status:

```

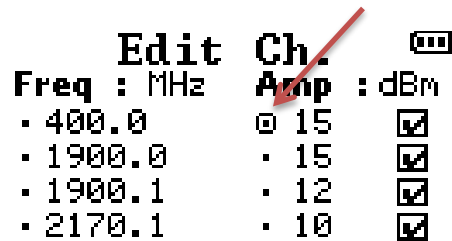
* Memory Menu [ ]
  • Used: 5
  • Free: 19
  [████████████████████]
  
```

Figure 11 - Memory Menu

Shows the number of used and free saved channels. CW Transmitter can store up to 24 test channels.



4.3 Starting a Test Scenario

4.3.1 Start a New Test



Ch.	Freq : MHz	Amp : dBm	Port 1	Port 2	Port 3	Port 4
1	400.0	15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	1900.0	15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	1900.1	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	2170.1	10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>


Figure 12 - Ch. Info

1. Press the RF ON/OFF key. This will recall the last test configuration. The menu page is labeled: "Ch. Info."
2. To edit parameters:
 - o Use the Arrow Keys to scroll through Freq and Amp. A **circle icon** indicates which value is highlighted for edit.
 - o Press Enter to select a value to edit.
 - o Use Keypad numbers and Edit Key  (for negative sign or decimals) to input desired value and press Enter to apply.
 - o Example: In Figure 12 - Ch. Info, the Amp of port 1 is currently 15. Press Enter to select, then the number pad to enter a new Amp, and Enter again to confirm.
 - Max dBm is dependent on Freq range and will auto correct if the user inputs a number out of range. Ex: 14 dBm for 2170.1 Freq will auto correct to 10. See [Spec Chart](#) below for details.
3. Use the number Keypad 1-4 to check or uncheck the corresponding antenna ports 1-4. A box with an check depicts the port will be active when RF transmission begins. A box with an X is inactive. As seen in figure 12, all four ports are active.
 - o If the transmitter is set to 2 port configuration, ports 3 and 4 will not be available.
4. Press RF ON/OFF again to begin transmitting. This will be indicated by the  icon. A temporary message will flash, indicating which ports are active. If no ports have been activated, a "No Port is Selected" error message will display. Refer to step three to use the check box to activate the desired ports for RF transmitting.
 - o A second method is to select "Start Test" from the Main Menu and press the Enter Key.


4.3.2 Save a Reusable Configuration

After setting new test configuration parameters the user can save for quick access for future testing needs. Up to 24 configurations can be stored on the CW Transmitter's memory at a time.

1. When parameters are set, press the Save Key. A box will appear on the screen with a default name.

- Press Enter to save with this name.
- Press the Edit Key  to use the Keypad letters to change the name – press the Enter Key to complete saving process (Note: 12 character limit).

4.3.3 Recall Saved Configuration

1. From Main Menu, use Arrow Keys to select Saved Channels Menu, press Enter.
2. Within Saved Channels Menu, previously saved test configurations are listed in alphabetical order.
3. Use Arrow Keys to select the desired saved parameters.
 - Unwanted saved Channels can be deleted by selecting and pressing Keypad-1.
4. Press Keypad-2 to activate settings and begin transmitting – RF indicator icon will appear. 

5 Specifications

RF Characteristics	
Active RF Ports	2 or 4 Ports
Frequency Accuracy	1.1 ppm
Frequency Range	400 MHz to 2.7 GHz
Frequency Step	100 KHz
Modulation	Continuous Wave
Min. Output Power	-10 dBm
Max. Output Power	15 dBm: 400 MHz – 1900 MHz 12 dBm: 1900.1 MHz – 2170 MHz 10 dBm: 2170.1 MHz – 2700 MHz
Power Accuracy	+/- 1 dB
Off Transmit Power	-100 dBm
Non-Harmonic Spurious	-40 dBc
RF Output	50 ohm SMA Female
Power Supply	
Input Power	12Vdc, 2A
Charger	12Vdc, 2A or 12V Car Lighter Power Cable
Battery Operating Time (Continuous Maximum Output Power of Four Ports)	105 Minutes
Battery Standby Time	7.5 Hours
Operation Time with External Battery (Continuous Maximum Output of Four Ports)	>7 Hours
Physical Characteristics	
External Dimensions	7.5" L x 3.1" W x 1.7" H [191 mm L x 79 mm W x 43 mm H]
Weight	1.5 lb [0.7 kg]
Operating Range	-10° to + 40° C
Standard Package	Transmitter, Charger, and Manual
Safety (CE)	EN 61010-1: 2010
EMC	EN 55011:2009+A1:2010
RoHS	Compliant (6/6)

6 Support

6.1 Contact Information

PCTEL Department	Phone Number	E-Mail Address
Customer Support	+1 240-460-8833	Support.rfsg@pctel.com
Quality Manager	+1 301-444-2045	Quality.rfsg@pctel.com
Sales	+1 301-515-0036	RFS.Sales@pctel.com

6.2 Repair and Calibration Options

OPS140	Full Calibration, SeeGull CW Transmitter
OPS141	RMA Evaluation Fee, SeeGull CW Transmitter