

# TrackerPAL™ Operations Guide

## RemoteMDx, Inc.

**Version 1.1.0**

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**Referenced To:**

**OTD Hardware Release PP2b**

**OTD Firmware Revision: v460 & v478**



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## 1 Overview

This document describes the major features associated with the OTD Device Hardware and how to operate them. The operator may need to consult associated system documentation for additional detail.

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## 2 Personal Safety and Health

### Responsibilities of Administrating Agencies

**The TrackerPAL™ device meets the government's requirements for exposure to radio waves.**

It is the direct and sole responsibility of all agencies (government or private) that oversee use of TrackerPAL™ to assure, and formally document, that wearers of TrackerPAL™ devices understand the safety and health topics below.

It is also the direct and sole responsibility of such parties to assess special individual needs in order to protect the health and well being of those wearing TrackerPAL™ devices. This includes identifying any special environmental or personal health needs specific to an individual wearer of the device.

### 2.1 Personal Hygiene

**Simple hygiene measures can avoid discomfort and skin irritations.**

The TrackerPAL™ is designed to be worn over a standard sock. This aids in maintaining sanitary conditions. Not wearing over a sock or not changing socks on a daily basis may result in skin irritations or other health concerns. The same applies for

For additional comfort the wearer of a TrackerPAL™ may elect to wear a thick wrist sweat band on the ankle just below the main body of the TrackerPAL™. Such a band may be purchased from most any sports store. Typically the band would be worn just above the ankle bone but may also be used to elevate the TrackerPAL™ to accommodate for special foot wear like work boots.

### 2.2 Specific Absorption Rate Data

**The TrackerPAL™ device meets the government's requirements for exposure to radio waves.**

Your tracking device is a radio transmitter and receiver. It is designed and manufactured not to exceed limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission

(FCC) of the U.S. Government and by the Canadian regulatory authorities. These limits are part of comprehensive guidelines and establish permitted levels of RF energy for the general population. The guidelines are based on standards that were developed by independent scientific organizations through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons, regardless of age or health.

The exposure standard for cellular communication devices employs a unit of measurement known as the Specific Absorption Rate, or SAR. The tests for SAR have been conducted based on the standard operating position (on the ankle) the tracking device transmitting at its highest certified power level in all tested frequency bands. Although the SAR is determined at the highest certified power level, the actual SAR level of the device while operating is usually well below the maximum value. This is because the cellular device is designed to operate at multiple power levels so as to use only the power required to reach the network. In general, the closer you are to a wireless base station, the lower the power output.

Before a cellular device is available for sale to the public in the U.S. and Canada, it must be tested and certified to the FCC and Industry Canada that it does not exceed the limit established by each government for safe exposure. The highest SAR value for this device when tested for use on the ankle as described in this user guide, is:

GSM 850 - 0.232 W/kg over 10g average  
GSM 1900 - 0.693 W/kg over 10g average

Additional information on Specific Absorption Rates (SAR) can be found on the Cellular Telecommunications & Internet Association (CTIA) Web Site:

<http://www.phonefacts.net>

or the Canadian Wireless Telecommunications Association (CWTA) Web Site:

<http://www.cwta.ca>

## **2.3 Safety and General Information**

### **Exposure To Radio Frequency (RF) Energy**

Your TrackerPAL™ device contains a transmitter and receiver. When it is ON, it receives and transmits RF energy. When communicating with this device, the service network handling your call controls the power level at which your device transmits.

Your TrackerPAL device is designed to comply with local regulatory requirements in your country

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concerning exposure of human beings to RF energy.

### **RF Energy Interference/Compatibility**

Nearly every electronic device is subject to RF energy interference from external sources if inadequately shielded, designed, or otherwise configured for RF energy compatibility. In some circumstances your mobile device may cause interference with other devices.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### **Potentially Explosive Atmospheres**

Areas with potentially explosive atmospheres are often but not always posted, and can include fueling areas such as below decks on boats, fuel or chemical transfer or storage facilities, or areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

When you are required to be in such an area, immediately contact your Supervision Officer or the TrackerPAL™ Monitoring Center before entering such areas. Do not remove, install, or charge batteries...sparks can occur and cause an explosion or fire. Any regular proximity to such areas must be reported to and thoroughly discussed with your Supervision Officer and, if job related, your employer.

### **Battery Charger**

The charger should not be operated in the immediate proximity of water. Doing so may result in electrical short and equipment damage

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## 3 Features & Limitations

The section describes the features and limitations of this release of the Offender Tracking Device (OTD) units.

### 3.1 GPS Locations

The unit intermittently monitors its location using the Global Positioning System (GPS) network. It can be expected to acquire and maintain a valid fix whenever it is in direct line of sight of a minimum of three to four GPS satellites with sufficient signal strength. Various environmental factors may interfere with a location fix, which may result in position error or the inability to acquire a valid position.

### 3.2 Voice Calls

The unit places and receives voice calls over the GSM (Global System for Mobile communication) cellular network, operating as a type of speaker phone using a built-in microphone and loudspeaker. Outgoing voice calls are to predefined phone numbers, and incoming voice calls are from any landline or cellular telephone. The same service limitations which one experiences with standard cell phones will also be experienced with these units.

### 3.3 Data Transmission

The unit transmits and receives information to and from a specified server on the Internet by way of the GSM network, using GPRS (General Packet Radio Service). This information includes unsolicited messages from the OTD, such as GPS location records and alarm notifications, as well as configuration data and remote alert commands sent to the OTD from the server.

GPRS cannot operate simultaneously with a voice call. Therefore, SMS is used for the transmission of all traffic between the unit and gateway when a voice call is in progress.

The unit is commissioned with a particular SIM (Subscriber Identity Module) card and on a particular cellular provider's network/sub-network. Neither the use of an alternate SIM card nor roaming to a different cellular network/sub-network are supported at this time.

### 3.4 Remote Alert Commands

The unit can be remotely commanded to issue both an audible alert event and a vibration alert event.

### 3.5 User Interface

The unit can communicate in a variety of information and modes to the wearer through the speaker, the vibration motor, and the three indicator lights: Power (red/amber/green tri-color), Alert (red), and Call Status (red).

**Unit Interface:**

Inputs:	Button #1
	Name: Call button
	Location: Top left of unit when facing it
	Feedback: Should provide a “click” sensation when depressed, and a simulate “click on” / “click off” sound when depressed / released.
	Button #2
	Name: Reset button (optional; not populated by default)
	Location #1: Push button on JTAG-Light Programming Board
	Location #2: Bottom right corner at back of unit under back panel (not user accessible)
Output LED's:	LED #1
	Name: Power LED
	Location: Top right LED when facing unit
	Color: Red / Amber / Green tri-color (one color lit at a time)
	LED #2
	Name: Alert LED
	Location: Middle LED
	Color: Red
	LED #3
	Name: Call Status LED
	Color: Red
	Location: Top left LED when facing unit (under Call Button)

## External Battery:

Location: Sliding latched module on bottom of unit

Speaker:

Location: Under shield at front of unit

Microphone:

Location: Two tiny holes at bottom left corner on front of unit

Vibrator:

Location: Inside unit

Access Hatch:

Location: Metal panel on back of unit

SIM Socket:

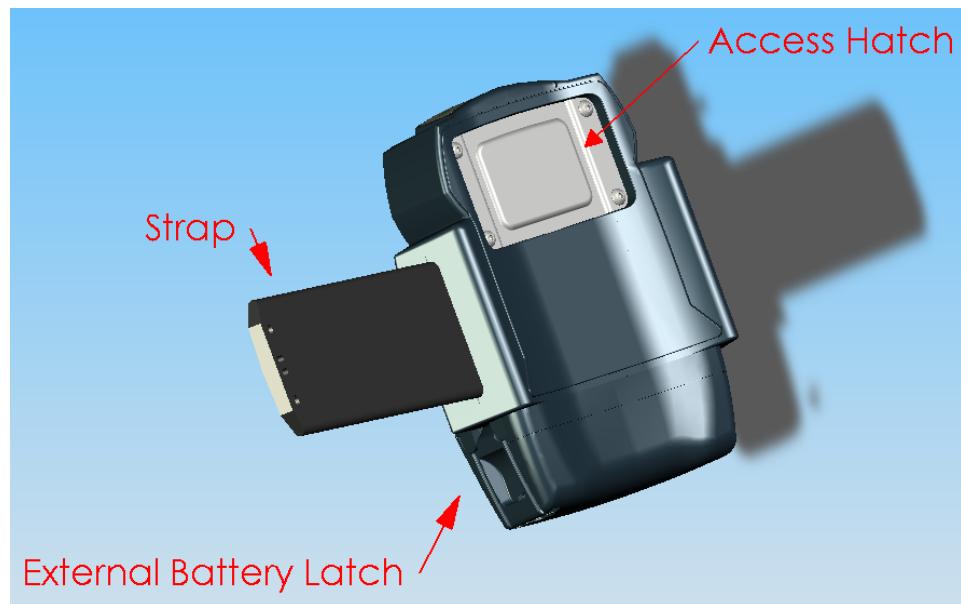
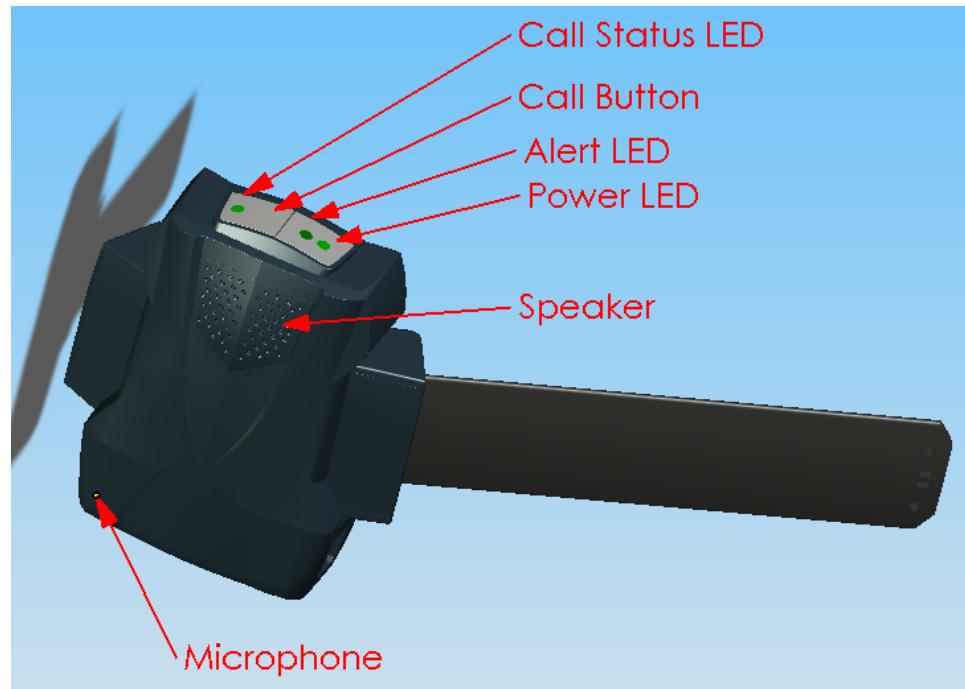
Location: Under access hatch at back of unit

JTAG Interface:

Location: White rectangular plug under SIM socket behind access hatch

Tamper Detect:

Location: Spring pins under SIM socket behind access hatch



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## 4 User Guide

The following describes the Pre-Production unit's various operational scenarios, including events, user inputs, device outputs, and operational standards and recommendations.

### 4.1 Activation & Shutdown

#### 3.1.1 Power Up

Usage: Power up unit from cold state

- 1) Press and hold Call Button
- 2) Power LED will light up Red after approximately 5 seconds
- 3) Release Call Button (device will make button "click off" sound)
- 4) Unit will sound "Power Up" Tone, and begin power up sequence
- 5) Alert LED may go on solid to indicate a Tamper Alarm if back access hatch is removed
- 6) Alert LED will begin flashing as GPS Module is initialized
- 7) Power LED will begin to blink a pattern periodically (pattern dependent on Battery Status as described in section 3.8 – Power LED Blink Patterns)
- 8) Two tone alerts may be heard as the unit powers up
  1. "Waterfall Up" Tone – Indicates Modem Power up (May be disabled)
  2. "Waterfall Down" Tone – Indicates Modem Acquired GSM registration (May be disabled, this tone also occurs during normal operation as the unit reacquires registration).

NOTES:

1. Unit will refuse to power up when external battery is not attached. Unit will instead play a tone and flash all LED's sequentially.
2. Cellular registration may take approx. 1 minute if unit is coming up from a cold boot state.

#### 3.1.2 Power Off Sequence

Usage: To completely power off unit

Result: OTD will blink its LEDs rapidly in succession, and then poweroff. Power LED will stop blinking its pattern.

## Scenario A:

- 1) Execute Power Off command from the Gateway Interface
- 2) OTD will reply to acknowledge, and then shutdown a short while later (approximately 5 secs.)

## Scenario B:

- 1) Remove external battery
- 2) Press Reset button, if present

## Scenario C:

- 1) Remove external battery
- 2) Wait for device to power off. This is a configurable setting, which defaults to running until the internal battery is depleted (approximately 2 hours).

## 4.2 External Battery Replacement

The device will indicate a low external battery charge state with the following:

- an amber Power LED flashing every 5 seconds
- a periodic “Low External Battery” alert sound
- a periodic vibrate

When the external battery is low:

- 1) Remove the external battery pack by releasing the latch, and sliding it off along the rails. Device will make “External Battery Removed” alert sound, and transmit an informational message (configurable).
  - a) If the external battery pack is not replaced within a configurable time period (default 15 seconds), the device will make an “External Battery Removed Timeout” siren sound.
  - b) If the external battery pack is still not replaced within a configurable time period (default 30 seconds), the device will send an “External Battery Removed Timeout” alarm message.
  - c) If the external battery pack is still not replaced within a configurable time interval (default 60 seconds), the device will make an “External Battery Removed Reminder” alert sound, and continue repeating at the configurable time interval until the battery pack is replaced.
- 2) Attach a freshly charged external battery pack by following the same instructions in reverse. Device will make “External Battery Attached” alert sound, and transmit an informational

message (configurable).

- 3) Recharge the external battery as described below.

### **4.3 External Battery Charging**

A fully charged external battery will allow approximately twelve to twenty-four hours of passive operation. (This is highly dependent on GSM signal strength, sleep modes enabled, amount of messaging traffic, and internal battery charge level).

There are two indicator lights on the charger: power and charging. When the power cord is plugged into the wall outlet and the charger, the power indicator will light. When the external battery is then placed into the charger, the charging indicator will light (may not light if battery is fully charged). Once the external battery has finished charging, the charging indicator will blink until the battery is removed.

NOTE:

- 1) A fully discharged external battery can be fully charged by the charger board in under two hours.
- 2) The internal battery has limited operating time (approximately 2 hours).

### **4.4 Automated GPS Location and Alarm Messages**

The unit automatically generates autonomous messages to the gateway to indicate the units current status and location. Alarm messages are attempted to be sent to the server as they occur, with a retry mechanism in place (100 messages maximum queue length). Events are also logged to the internal audit log for retrieval at a later date, if necessary.

#### 3.3.1 Configurable System Default Values

Autonomous Reporting Interval: ~300 seconds

Alarms/events are generated automatically whenever an alarm event occurs. Several alarms/events generate messages to the server:

- 1) Power up message
- 2) Location update
- 3) Status Request
- 4) Exclusion Zone Entered
- 5) Exclusion Zone Exited
- 6) Inclusion Zone Entered
- 7) Inclusion Zone Exited
- 8) External Battery Removed

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- 9) External Battery Removed Timeout
- 10) External Battery Attached
- 11) External Battery Low
- 12) External Battery Critical
- 13) Internal Battery Low
- 14) Internal Battery Critical
- 15) Access Hatch Opened
- 16) Strap Cut or Tampered With (Optical and/or Electrical tamper circuits)
- 17) Device Error

Such automated GPS location and alarm/event messages are sent immediately to the predefined server URL (Universal Resource Locator) on the Internet over GPRS.

The Offender Management Assistant tool (OMAt) can be used to view these location and alarm messages, as well as to configure the Autonomous Reporting Interval.

### 3.3.2 Tamper Indications

The Alert LED will light up when the OTD has been tampered with (ie. Access hatch open). This feature is configurable.

## 4.5 Voice Calls

This unit can both initiate and receive voice calls.

### 3.4.1 Call Mode input and feedback is provided via the following inputs and outputs:

#### Call Button

Used to Initiate, Cancel, and Accept calls

#### Call Status LED

Three very quick blinks – Button press and command acknowledged

Slow blink – Outgoing call attempt in progress

Fast blink – Incoming call ring indicator

Off – No call activity present

#### Vibrator

Three vibrate pulses on incoming call

#### Speaker Ring Tone

“Regular” ring tone alert on incoming call

### 3.4.2 Configurable System Default Values

Primary Call Center Number:	SecureAlert specified number
Secondary Call Center Number:	SecureAlert specified number
Incoming Call Auto Answer timeout:	5 seconds
Outgoing Call timeout:	20 seconds

### 3.4.3 Initiate a Voice Call

Usage: Initiate a voice call from unit to the call center

- 1) Ensure unit is operational and registered on the GSM network
- 2) Press and hold Call Button for approx. 5 seconds (between 3 to 8 seconds accepted)
- 3) Call Status LED will blink 3 times very quickly to indicate button press has been acknowledged
- 4) Release Call Button
- 5) Call Status LED will blink 3 times very quickly to indicate command has been acknowledged
- 6) Call Status LED will begin to blink slowly to indicate it is initiating an outbound call
- 7) When call is answered at call center, Call Status LED will change to solid on

#### NOTES:

- 1) If the outgoing call to the first call center number is not answered within a configurable amount of time, the unit will hangup, pause 5 seconds, and then try the second call center number.
- 2) If the second call center number is not answered in within the same configurable amount of time, the unit will hangup.

### 3.4.2 Cancel a Unit Initiated Voice Call

Usage: Cancel a call if there is no answer at the remote end (phone rings indefinitely) or unit connects to machine which leaves it connected indefinitely.

- 1) Press and hold Call Button for approx. 5 seconds
- 2) Call Status LED will blink 3 times very quickly to indicate button press has been acknowledged
- 3) Release Call Button
- 4) Call Status LED will blink 3 times very quickly to indicate command has been acknowledged
- 5) Unit will hangup and Call Status LED will go off

### 3.4.3 Answer an Incoming Voice Call

Usage: Answer and Call Center Initiated Voice Call

- 1) Incoming call occurs
- 2) Unit will indicate incoming call: Vibrator will activate, Ring tone will occur, Call Status will flash quickly
- 3) Press and hold Call Button for approximately 1 second
- 4) Call Status LED will flash 3 times very quickly to indicate button press recognized
- 5) Call Status LED will flash 3 times very quickly to indicate event accepted
- 6) Vibrator and ring tone will stop
- 7) Call Status LED will go solid on to indicate call in progress

#### NOTES:

The unit is only able to make calls while the unit is registered on the cellular network (the same as a regular cell phone). The “waterfall down” ring tone indicates that registration has occurred (ring tone may be disabled).

Incoming calls to the unit may be initiated from any telephone number. (Call screening may be enabled to prevent unauthorized usage).

An incoming call is indicated simultaneously by a periodic ring sound emitted by the speaker and periodic activation of the vibration motor.

## 4.6 Remotely Generated Alerts

Alerts can be generated and sent to the unit through the selected gateway's website. The possibilities include an audible alert event, which causes a short ring tone to be played through the speaker, and a vibrate alert event, which causes the vibrator motor to vibrate in a set of bursts. No user response to these events is required, though the unit does acknowledge to the website that it has received and processed these alerts.

## 4.7 GeoZones

All required GeoZone functionality and support has been implemented. Please refer to Device Gateway Reference Guide for further information.

## 4.8 Diagnostics Mode

A simple diagnostics mode has been implemented to indicate the current state of the unit. This is a special mode intended for field testing and is disabled by default.

### 3.6.1 Entering Diagnostics Mode

Usage: Toggle Unit Into and Out of Diagnostics Mode From Normal Run Mode

- 1) Press and hold Call Button for approx. 12 seconds
- 2) Unit will generate a “mystery” tone to indicate the unit is entering or leaving Diagnostics Mode
- 3) Alert LED will begin to flash a pattern when entering Diagnostics Mode

#### NOTES:

- 1) Once in Diagnostics Mode, Location updates can be generated to the server on demand by pressing the Call Button for approximately 1 second (Unit will generate a short “beep” tone).

#### Diagnostics Mode Alert LED Pattern Description:

Repeating Diagnostics Mode Alert LED Pattern Description:

- 1) Long LED pulse: New Pattern Sequence Beginning
- 2) Short pause
- 3) One, two, or three short LED pulses: GPS Status
  1. One pulses: GPS Module Not Running (Sleeping or Error)
  2. Two pulses: Invalid GPS Fix
  3. Three pulses: Valid GPS Fix
- 4) Short pause
- 5) One to thirteen short LED pulses: GPS Satellites In View
  1. One pulse: No Satellites In View
  2. Greater than one pulse: Number of pulses minus one number of satellites in view
- 6) Short pause
- 7) One, two, or three short LED pulses: GSM and GPRS Status
  1. One pulse: No GSM or GPRS registration
  2. Two pulses: GSM registered
  3. Three pulses: GSM and GPRS registered
- 8) Short pause
- 9) Pattern repeats from Step #1 again

The diagnostics pattern is interpreted by counting the number of LED pulses in each set.

### 3. 8 Power LED Blink Patterns

Blink color indicates the battery charge level of the battery currently in use

Blink rate indicates the battery that is currently being used

Blink pattern indicates charging status

Blink Color:

1) Green	Battery Normal
2) Amber	Battery Low
3) Red	Battery Critical

NOTE: When a “Seeking Battery Status” state occurs, (ie. Blink Rate is 0.5 Seconds between blinks) the Red LED will also be used.

Blink Rate:

1) 5 Seconds between blinks	Running on External Battery
2) 2 Seconds between blinks	Running on Internal Battery
3) 0.5 Seconds between blinks	Seeking Battery Status

Blink Pattern:

1) Single Blinks	Internal Battery is not charging
2) Double Blinks	Internal Battery is charging

NOTES:

- 1) The “Seeking Battery Status” state may occur temporarily during external battery replacement.
- 2) The Power LED blink pattern is updated as soon as it detects a change.

Examples:

- 1) Unit is running on external battery, internal battery is charging, and external battery is low:  
Unit will show a double amber blink pattern 5 seconds apart.
- 2) Unit is running on internal battery, internal battery is critical:  
Unit will show a single red blink 2 seconds apart.