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Trimble TDL 450H Frequently Asked Questions

The Trimble TDL 450 series is an advanced, high speed, wireless UHF data radio built to endure the stresses of daily use in harsh conditions. Full metal construction provides impact and weather resistance that will keep you working with complete confidence.

Q: Does the TDL 450H replace the HPB450 radio?

Yes, the TDL 450H is replacing the HPB450 radio.

Q: The TDL 450H is a 35W radio, but I'm only licensed to transmit 20W can I still buy this radio?

Your distributor will configure the radio with the frequencies for which you are licensed, as well as the maximum output power allowed with your license. You can then program the TDL 450H to transmit at any power up to and including this maximum.

Q: What software utility do I use to configure the radio?

TDLCONF is the software utility that is used to configure the TDL 450 series of radios. Your distributor will use it to program your frequencies and other regional settings. You can use it to program additional receive-only channels, change the over-the-air protocols, and change other configuration parameters.

Q: Is the TDL 450H compatible with other Trimble radios?

Yes, the radio has been tested for backward compatibility with a number of radios including the TDL 450L, HPB450, PDL450, TRIMMARK™ 2, TRIMMARK™ 3, and TRIMTALK™ 450S.

Q: Is the TDL 450H compliant with the U.S. FCC narrowbanding requirements?

Yes, the TDL 450H is spectrally efficient per the requirements mandated by the FCC in January 2011 as well as the requirements that will be mandated in January 2013.

Q: What is the maximum cable length to an antenna that can be used?

That depends on the type of cable. The smaller the diameter, the shorter the length you could use. There is something called "line loss", which is signal level. At some point, the "line loss" will offset the gain.

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From customer experience, it appears possible to use lengths up to 100ft with a high quality cable. (LMR600,LMR400, 9913)

Q: What frequencies can be used?

That is dictated by the license issued by the government agency responsible for wireless communications in your country. The customer must have applied for and received a license which will have the exact frequencies on it.

Q: When I return to my TDL 450H, the LCD is off. How do I turn it back on?

To prolong battery life, the TDL 450H puts the LCD into sleep mode after 5 minutes of keypad inactivity. The radio continues to function normally with the LCD turned off. To turn the LCD back on, press the On/Off button for one full second. The LCD will perform a system check and turn on after one more second. To turn the entire radio off, press the On/Off button for more than 5 seconds, or simply disconnect the radio from power.

Best Practices for Operating a TDL 450H

The TDL 450H is a high-power radio transmitter that can provide you with a productive communications solution that can be used all day long over long distances if used correctly. There are some recommendations on how to use the radio based on how it has been designed.

A. Battery, cable and connectors

1. How old is the battery?

All "12V" batteries output 13.8V when new but their maximum voltage drops with age. Batteries typically can be charged 300 times before rapidly losing the ability to output the 10V required by TDL 450H radios for transmission. This often occurs within two years of normal use. All batteries eventually reach a point in their lives when they can still output 10V during the radio's receive cycle but fail to deliver 10V during the radio's transmit cycle. The radio will receive properly but if the TDL 450H detects the voltage has dropped below 10V it will no longer transmit to prevent damage to the battery. Unfortunately, standard voltmeters cannot tell you if a battery's output voltage is less than 10V during the radio's transmit cycle because the transmit cycle (about 1/10 second) is too short. We recommend instead that you mark batteries with the date of first use and replace them after 300 charge cycles or two years.

2. How hot/cold is it?

Extreme temperatures can reduce a battery's power output.

3. What is the condition of the battery cable?

The battery may fail to deliver full power if the cable is frayed, cracked, etc.

4. What is the condition of the battery connectors?

The battery may fail to deliver full power if its connectors are dirty. Cleaning with a brush and contact cleaner is recommended every few months.

5. What type of clips are you using?

The battery may fail to deliver full power if you use alligator clips.

B. Transmit Power / Duty Cycle

Q: What is transmit power?

It is the amount of power (measured in Watts) used while wirelessly transmitting data.

Q: What is Duty Cycle?

It is the time (usually measured as a percentage of total up-time) that the radio is transmitting.

1. Use only the power that you need.

This is somewhat relative and depends on a number of factors that can affect the range of the transmitter (see the next section on Range Issues). The radio has 5 power output levels that can be configured by the customer. The lower the output power, the longer you will be able to transmit as it will draw less power from the battery.

2. Output Power + Duty Cycle = Heat.

This is an important concept to understand. The higher the transmit power combined with a high duty cycle will mean the radio will run hot. Because of this it is important to configure your system to run as optimally as possibly. This is accomplished by transmitting data more efficiently (or transmitting less data) and transmitting data more quickly. For example, the CMRx protocol is 3 times more efficient than CMR+. This means that RTK corrections will be transmitted using 1/3 of the amount of data required for that same transmission with CMR+.

C. Managing Heat

1. Reducing Heat.

- Transmit data efficiently – we strongly recommend using CMRx if possible. Most modern Trimble GNSS receivers support CMRx.
- Transmit data at a higher baud rate – we recommend always transmitting at a minimum of 9600bps. You can do this at both 25 kHz and 12.5 kHz channel bandwidth by using the right protocols. The following table shows the modes supported with recommendations in bold:

Protocol	**12.5 kHz**	**25 kHz**
TRIMTALK 450s	4800, **8000**	4800, **9600**, 16000
TRIMMARK II/IIe	4800	4800
TT450S (HW)	4800	4800, 9600
TRIMMARK 3	**9600** (USA)	**19200** (USA)
Transparent EOT, EOC and Packet Switched	4800	4800, 9600
Transparent FST	9600	19200

- Ensure proper ventilation – for fixed mount radio installations ensure that your radio room has proper ventilation that will move air across the radio. An optional fan accessory (p/n 74450-15) is available from Trimble that will attach to the back of the radio to provide adequate airflow across the radio's heat sink.

2. Heat Safeguards.

The radio has been designed to prevent itself from damaging internal components by automatically reducing transmit power by 30% if the internal temperature reaches 83° C. If the radio's internal temperature cools, then it will resume transmitting at full power. If the temperature continues to rise, the radio's transmit power will be reduced another 30%. If after the second reduction the radio's temperature still increases, the transmitter will be shut down and an error condition will be visible on the display (and the LEDs will flash 8 times per sequence indicating this condition). Once the radio cools to 73° C, it will resume transmitting automatically.

Resolving Radio Range Issues

Radio range issues are best resolved by analyzing five factors: the environment, the antenna, the antenna's cables, the battery and the radio itself. Answering the following questions may help you troubleshoot your system and improve range.

A. Environment (terrain and ambient noise)

1. Have other radios given better range in the same area? If not, terrain may be a factor. (If so, was the radio with the better range configured the same: same over-the-air baud rate, same frequency, same channel spacing, etc?)
2. Does range improve when you move to flatter areas or areas without buildings, trees and hills?
3. Are there airports, seaports or radio towers nearby? Radars and other radio emissions can greatly reduce range.
4. Are you using an itinerant frequency? These are crowded in many areas and interference from other users can greatly reduce range.
5. Have you used a scanner to check for radio interference on your licensed frequency?

B. Antenna

1. Are you using a "mobile whip" antenna? These work much better than the so-called "rubber duck" antennas.
2. Is the frequency range of both the upper and lower elements of the whip antenna the same as that of the radio?
3. Does the upper element of the whip antenna have the same gain as the lower element, i.e., are both either 0 dB ("Unity") gain or 5 dB gain?
4. Is the frequency band the same as the radio?
5. How high is the antenna off the ground? It should be as high as possible. The easiest way to elevate the antenna is with an antenna mast.

6. If your antenna has a metal spring clip at the bottom, is it compressed so that it cannot make contact with the radio or cable adapter? If so, gently pry the clip out.

C. Antenna Cables

1. How long is the cable between the radio and the antenna (the shorter, the better)?

2. What type of cable are you using? LMR200 cabling is much more efficient than RG58.

3. Is the cable damaged? You can test this by swapping out the antenna cable if you have another one.

D. Radio

1. Are you using the latest release of firmware in the radio?

2. Are you using the radio as a base, a repeater or a rover? You should set the Sensitivity parameter to "Low" when using the radio as a base. Set it to "High" when using it as a rover or repeater. The "Moderate" setting should be used only when it eliminates interference when the radio is set to "High."

3. Are you avoiding the radio's harmonic frequencies? Harmonics of the unit's reference crystal can internally interfere with received signals at frequencies that are an exact multiple of 18.000 MHz, such as at 414.000 MHz, 432.000 MHz, 450.000 MHz, and 468.000 MHz.