



SPEKTRUM

RC Telemetry Technology

Race Smart.™

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Spektrum Telemetry Real Time Functions

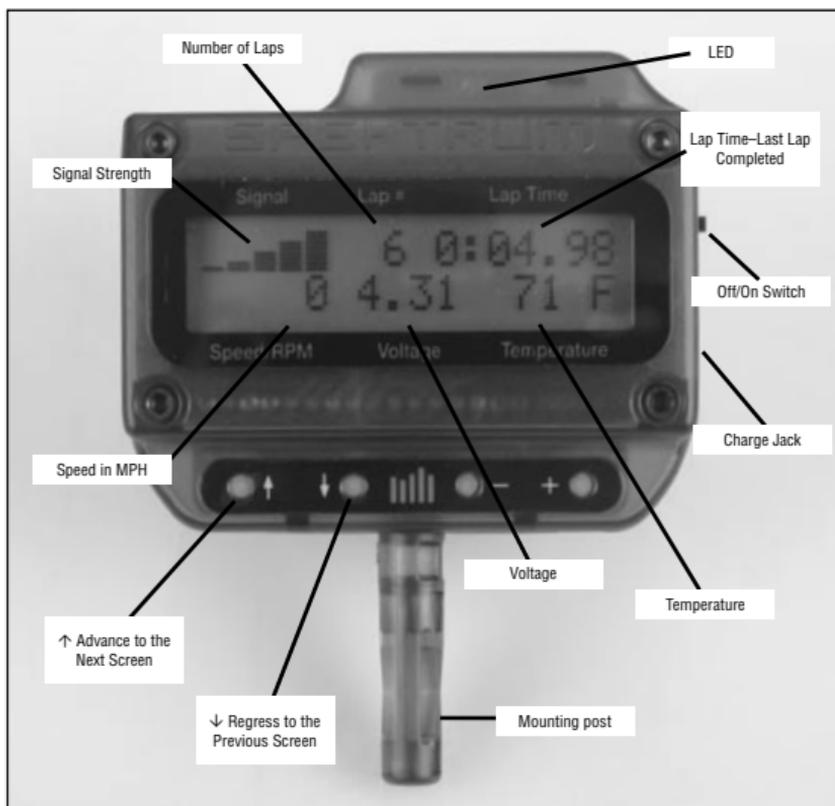
- Signal strength
- Number of laps
- Individual lap times
- Speed/rpm
- Battery voltage
- Temperature

Additional Features

- Records and displays up to 99 individual laps
- Recalls best lap time
- Gives total number of laps and total time
- Records maximum speed or rpm
- Records maximum temperature
- Temperature can be displayed in Fahrenheit or Celsius
- Speed can be displayed in mph
- A vibration alarm can be selected to alert you at a programmed value for:
 - Over temperature—ideal for preventing over-lean runs with nitro engines
 - Low voltage—prevents runaways in nitro vehicles from dead batteries

Handheld Unit

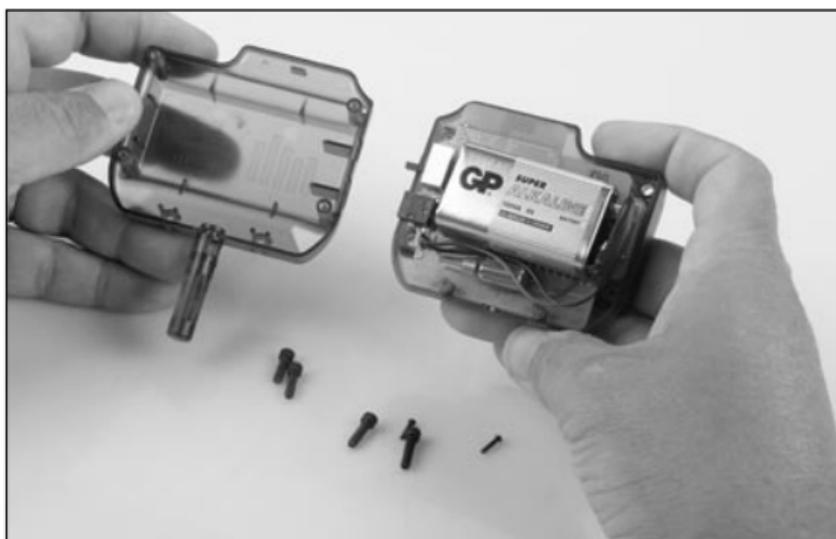
The handheld unit displays real time information plus it can store and recall lap times, display maximum temperature, maximum speed and maximum rpm. Normally the pitman monitors the handheld unit and then informs the driver of critical information as needed. Mounting posts are included that can be installed in the open antenna hole in module radios allowing the handheld to be easily read by the driver. The handheld unit also features a vibration alarm that can be programmed to alert the driver when a preset temperature or voltage is exceeded, preventing over-lean runs and battery failures. It is even possible for multiple handheld units to monitor the same car.



Note: Two sizes of mounting posts are provided. This allows the handheld unit to be mounted in different antenna holes.

Note: Pressing both the ↑ and ↓ keys simultaneously at any time will directly bring up the main information screen. + and - are used to increase or decrease the values or enable/disable features.

Installing the Battery



Using a 3/32" and .050" hex wrench, unscrew the case and install a 9-volt battery as shown.

Note: If desired, the mounting post (two sizes provided) can be installed at this time. The post allows the handheld unit to be mounted in the antenna hole when using a module radio.

Reinstall the case being careful not to over-tighten the screws.

Binding the Handheld Unit



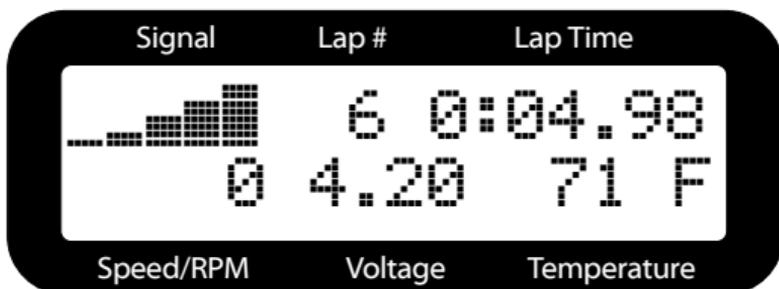
It is necessary to bind the handheld unit to the transmitter. Binding teaches the handheld unit the specific code of the transmitter and when bound, the handheld unit will only listen to information coming from the receiver(s) that are bound to that transmitter. To bind the handheld unit:

- Press and hold the ↑ button while turning on the handheld unit. The LED should flash continuously.
- With the transmitter in close proximity to the handheld, press and hold the bind button on the transmitter while turning it on. The LED on the transmitter should blink for several seconds. When a successful bind is completed, the LED will go off on the handheld unit and the LED will go solid on the transmitter.

Real Time Information Screen

The Real Time Information screen displays the following information

- Signal strength
- Number of laps
- Last lap time
- Speed or rpm
- Voltage
- Temperature



The Real Time Information screen is displayed automatically when the system is turned on and the handheld unit connects to the receiver.

Note: If the receiver is not turned on or if the handheld unit is not bound to the transmitter that the receiver is operating from, the Real Time Information screen will display Spektrum Telemetry on the screen. This indicates that no signal is present. When a connection is made, the green LED on the handheld lights and the Real Time Information screen appears.

Note: To access the Real Time Information screen from any other screen simply push the ↑ and ↓ keys simultaneously.

Store Lap



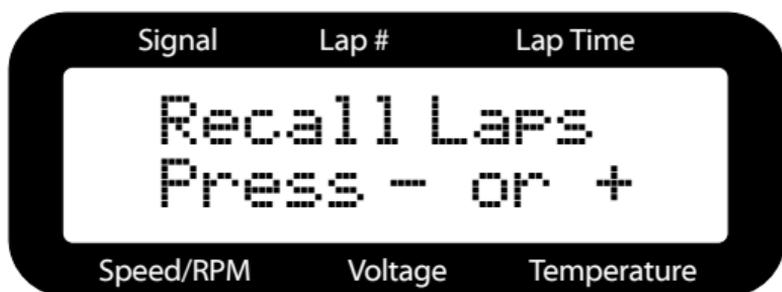
During a run, current lap information is stored in the telemetry module. (Not in the handheld unit). This information is then displayed on the handheld unit. To reset the lap information, it is necessary to turn the receiver off then on. This will reset the lap information and the screen will display 0 laps at 0:00.00 seconds. Previous laps will remain in memory of the handheld unit until it is power cycled.

To store lap information in the handheld unit for future review, the **Store Laps** screen is provided. This screen allows you to store the lap information (number of laps and the individual lap times) from the presently recorded run that's stored in the telemetry module memory, and to recall that information at a later date even if the receiver and handheld unit is turned off.

To store lap information, access the Store Lap screen by pressing the \uparrow button until **Store Lap** appears on the screen, then press the $-$ or $+$ button to store the lap information from the previous run.

Note: If the handheld is turned off before the laps are stored, the lap information will be lost.

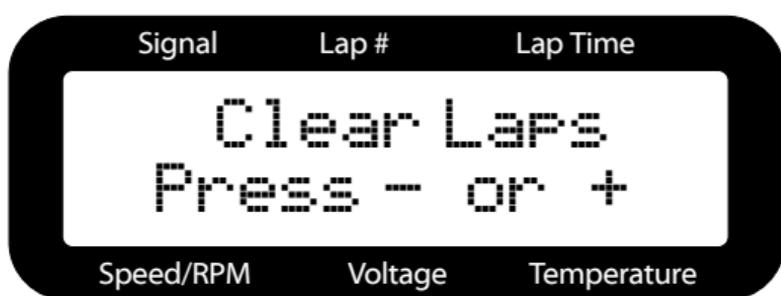
Recall Lap



The Recall Lap screen allows you to recall the lap information (number of laps and the individual lap times) from the previously stored information from Store Laps above. To recall laps, lap information must have been previously stored in the Store Laps screen (see above).

To access the Recall Laps screen, press the \uparrow button until **Recall Laps** appears on the screen, then press the $+$ or $-$ button to recall the lap information. Reading laps will appear and the screen will display the lap # and time. Pressing the $-$ or $+$ button will allow you to scroll up or down through the laps.

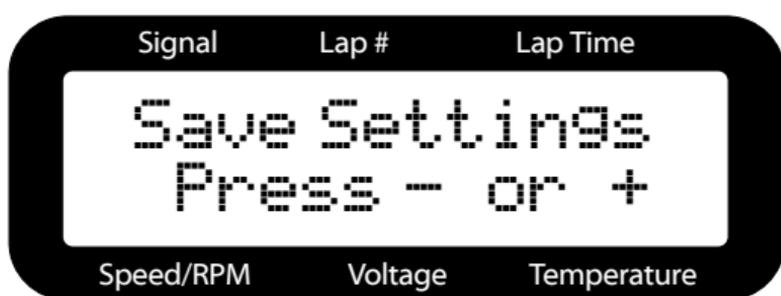
Clear Lap



The Clear Lap function erases the lap information stored in the handheld unit's memory.

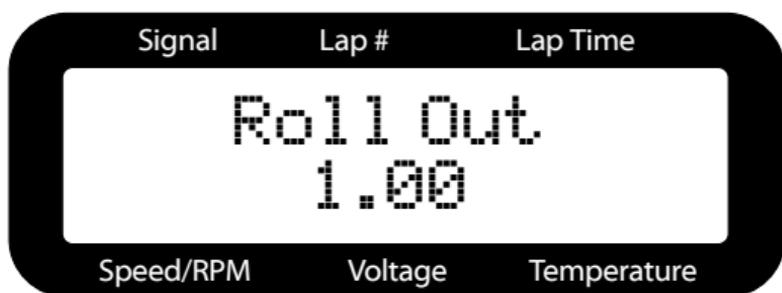
To access the clear laps screen press the \uparrow button until **Clear Laps** appears on the screen, then press the + or- button to clear the lap information.

Save Settings



The Save Settings function stores all the programmed handheld parameters such as temperature and voltage thresholds, the roll out value, temperature units, etc. that you've programmed in the handheld unit when it is turned off. If the Save Setting function is not used, all of the parameters will default to their factory setting each time the power is turned off on the handheld unit.

To access the Save Settings screen press the \uparrow button until **Save Settings** appears on the screen, then press the – or + button to save settings to memory.



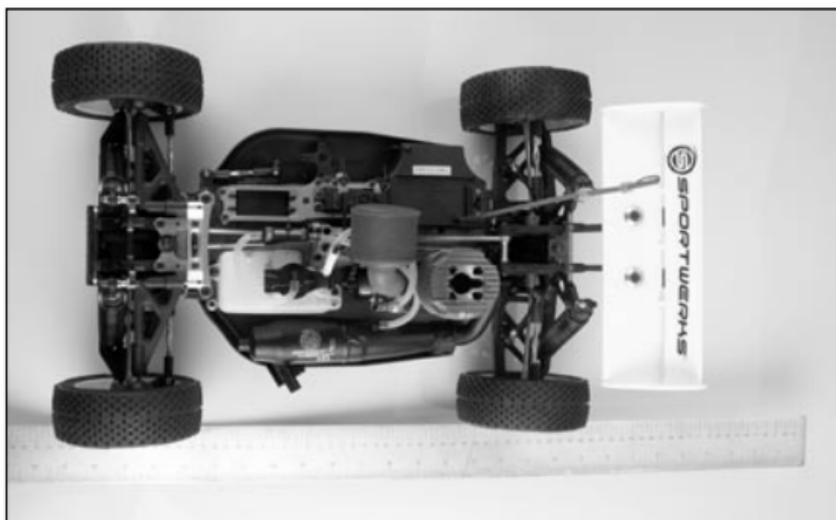
The Roll Out function is the internal calculator that allows rpm data to be converted to mph. When the Roll Out value is set to 1.00, the default setting, the value displayed on the main screen and stored in maximum speed, is true rpm of the shaft gear or flywheel that the rpm sensor is hooked up to. In order to program the unit to display speed in mph, a conversion factor is needed. Following are two methods of determining the conversion factor:

Method A

- Mark the gear or clutch bell that the sensor is reading from with a small reference mark. A marker works well.



- Set the car next to a ruler and at 0" then roll the car forward by hand, counting each revolution of the reference mark. At exactly 10 revolutions stop the car.



- Measure the exact distance that the car traveled in ten revolutions and divide this distance by 10 (i.e. 12.0" divided by 10 = 1.20").
- In the Roll Out screen press the + or – button until 1.20 appears on the screen. Now all the rpm related functions will be displayed in mph.

Method B

For this method you either need to know the internal gear ratio (normally provided in the vehicle's manual) or be able to calculate the ratio via the number of teeth on the gears. It is also necessary to calculate the circumference (distance around) the tire. Once the internal ratio is known, and the circumference in inches has been determined, simply divide the circumference by the internal ratio and use this value as the conversion.

To calculate circumference—multiply 3.14 x the tire's diameter in inches

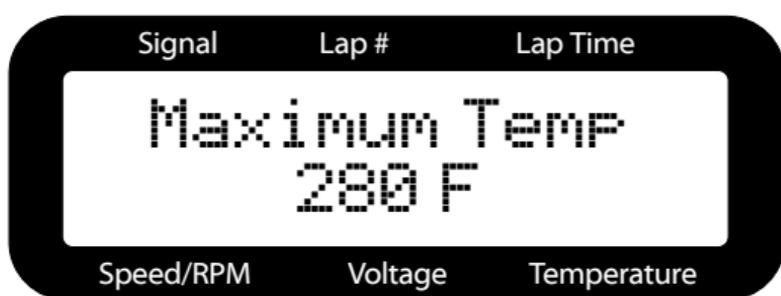
To calculate internal gear ratio—divide the larger gear by the small gear. With multiple gear transmissions, it is necessary to multiply each of the ratios to arrive at the final ratio.

Temperature Units



The Temperature Units screen allows you to select between Fahrenheit or Celsius. To access the Temperature Units screen press the \uparrow or \downarrow button until **Temp Units** appears on the screen. Pressing the + or – button will change the units from Celsius to Fahrenheit.

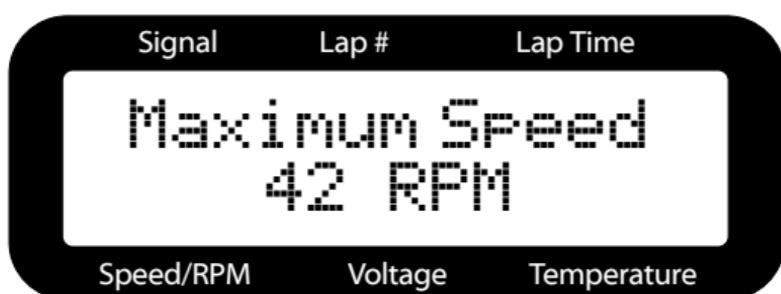
Maximum Temperature



The Maximum Temperature screen displays the maximum achieved temperature from the point that the receiver/telemetry module was turned on. To reset the maximum temperature, it is necessary to turn off the receiver/telemetry module, then back on.

To access the Maximum Temperature screen, press the \uparrow button until the **Maximum Temp** appears. The display will give the maximum temperature in F° or C° depending on the temperature units selected and the value representing the highest temperature achieved since the receiver was last turned on. Reset Maximum Temperature by turning off the receiver.

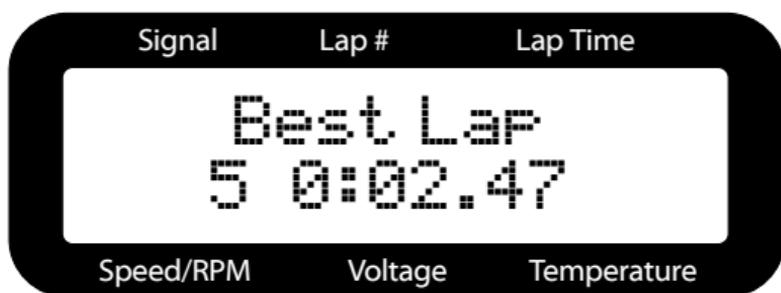
Maximum Speed



The Maximum Speed screen displays the maximum speed or rpm achieved from the point the receiver/telemetry module was turned on. To reset the Maximum Speed, it is necessary to turn off the receiver/telemetry module, then back on.

To access the Maximum Speed screen press the \uparrow button until **Maximum Speed** appears on the screen. The display will give the maximum speed or rpm achieved since the receiver was last turned on. Reset the Maximum Speed by turning off the receiver.

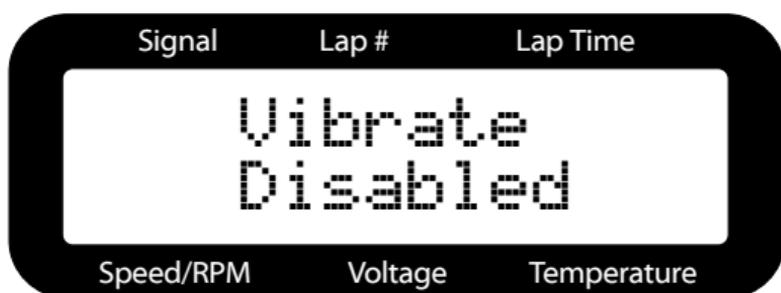
Best Lap



The Best Lap screen displays the fastest lap from the point that the receiver/ telemetry module was last turned on. The display gives the lap number and the fastest lap time. To reset the fastest lap, it is necessary to turn off the receiver.

To access the Best Lap screen, press the **↑** button until **Best Lap** appears on the screen. The display will give best lap number and lap time achieved since the receiver was last turned on. Reset the Best Lap by turning off the receiver.

Vibrate

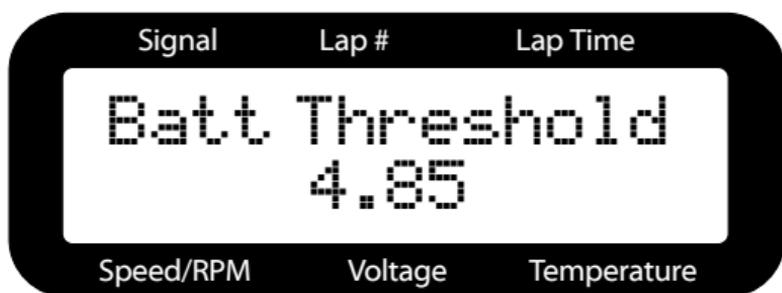


The handheld unit features a vibration alarm that can be programmed to warn of over temperature or low voltage, preventing engine damage or loss of control due to low batteries. The temperature and voltage thresholds can be programmed and, when exceeded, the handheld will vibrate alerting the driver/ pitman of the situation.

To access the Vibrate function press the **↑** button until **Vibrate** appears on the screen. Press the **+ or-** button to enable or disable the vibration alarm.

Note: The battery and temperature threshold screen are only available when the Vibrate function is enabled. (See above)

Battery Threshold



The Battery Threshold screen allows you to preset a voltage. When the battery voltage in your vehicle drops below the preset voltage, the vibration alarm in the handheld unit will activate. Typical recommended preset values are 1.1 volts per cell, however, when using high current draw servos it may be necessary reduce that value to .9 volts per cell.

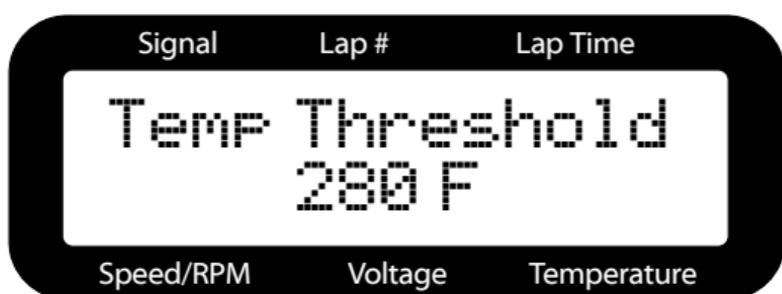
Recommended voltage settings:

- 5-cell 6.0 volt pack = 6.6 volts
- 4-cell 4.8 volt pack = 4.4 volts

To access the Battery Threshold function press the \uparrow button until **Batt Threshold** appears on the screen. Press the + or - button to increase or decrease the battery voltage value.

Note: The Battery Threshold screen is only available when the vibration function is enabled. (See above)

Temperature Threshold



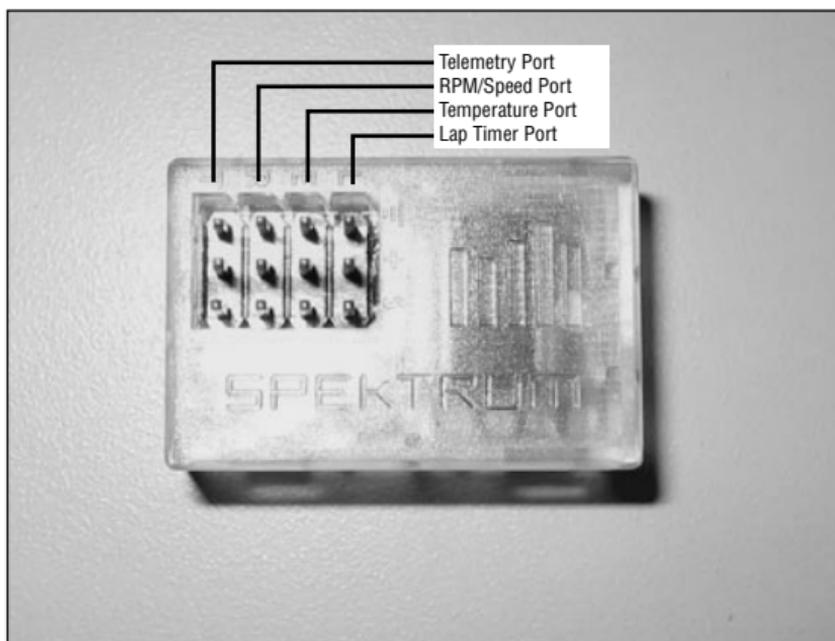
The Temperature Threshold screen allows you to preset a do not exceed temperature value. When the engine temperature in your vehicle exceeds this preset temperature, the vibration alarm in the handheld unit activates warning of an over-lean condition. Each type of vehicle will require it is own maximum temperature value. It is best to determine this by finding the optimum operating temperature and then setting the maximum temperature range 15°F to 20°F higher.

To access the Temperature Threshold function, press the \uparrow button until **Temp Threshold** appears on the screen. Press the + or - button to increase or decrease the temperature threshold value.

Note: The Temperature Threshold screen is only available when the vibration function is enabled. (See above)

Installing the Unit in Your Vehicle

Telemetry Module



The telemetry module is used to interface the sensors to the receiver (transceiver). The module is attached to the receiver via the included male-to-male telemetry lead provided. The telemetry lead must be plugged into the BAT/TEL port in the receiver and into the T battery port in the module. See photo of receiver and telemetry hooked up with cord.

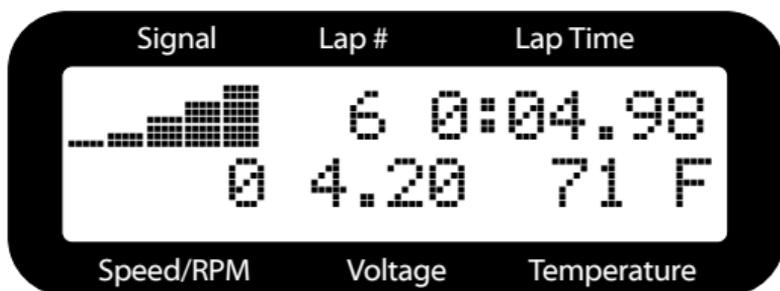
Telemetry Module Installation



- Using servo tape, mount the telemetry module near your receiver.
- Hook up the telemetry lead to the battery/telemetry ports in the receiver and telemetry module as shown above.

Signal and Battery Voltage

Signal strength and battery voltage is built into the telemetry module and no further attachment of sensors is necessary. The telemetry module must be properly hooked up to the receiver, and with the handheld unit and receiver bound together. Signal strength and battery voltage will be displayed when the receiver and handheld units are turned on.



Note: The voltage displayed is the receiver voltage. This is especially useful for nitro cars in alerting you to change your receiver pack before your vehicle goes into failsafe due to low battery pack voltage. If you wish to monitor another voltage source (like the drive batteries in an electric car), a voltage harness is provided. The voltage harness replaces the telemetry lead and the open wires must be attached (soldered) to the desired voltage source that you wish to monitor.

Note: The source must be above 3.2 volts.



RPM/Speed Sensor (Nitro)

An infrared sensor is provided to record rpm values that can be converted by the handheld unit to actual speed in mph. The sensor emits an infrared light and a receptor records the reflection vs. the absorption of light. It is necessary to place a reflective or light absorbing decal (provided) on the gear or flywheel to allow the sensor to record rpm. Mounting hardware is provided for easy installation.

RPM/Speed Sensor Installation (Nitro)

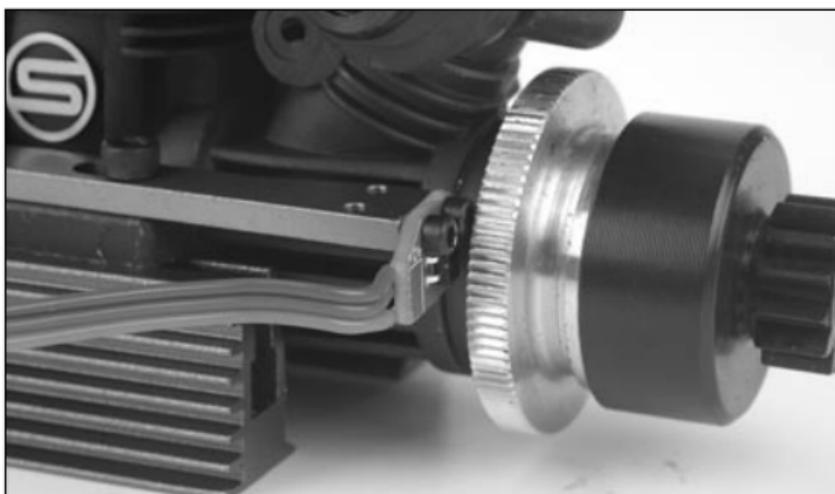
- Choose the correct nitro mount for your engine. Two mounts are provided: one for 12–.18 engines and one for .21–.28 engines.



- Using 2mm screw, attach the sensor to the mount as shown.



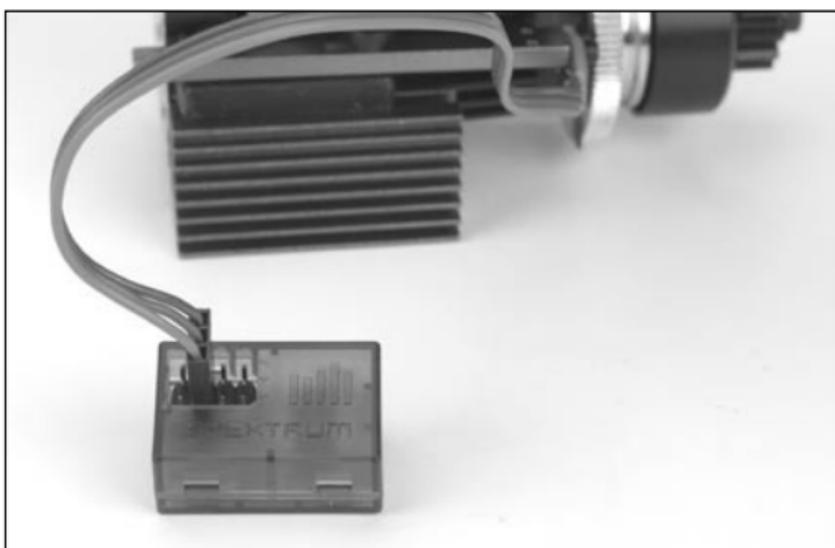
- Install the mount under the engine screw and adjust the sensor so it is 1/8" from the flywheel.



- If the flywheel is reflective (bare metal), place a flat black decal on the flywheel so it passes between the sensor and the flywheel when rotated. If the flywheel is non-reflective, place a reflective decal on the flywheel so that it passes between the sensor and the flywheel when rotated.



- Plug the sensor into the R (speed/rpm) port in the telemetry module.



RPM/Speed Sensor (Electric)

In electric cars and trucks, the rpm sensor is mounted near the spur gear and gets rpm readings directly from that gear. A conversion in the handheld can be programmed to give speed in mph or rpm. See the Handheld Unit section on rpm and speed for more details. A mount is provided that allows the rpm sensor to be conveniently mounted in many applications. Because of the diverse types of electric vehicles, it may be necessary to fabricate a mount from Lexan for some types of vehicles.

RPM/Speed Sensor Installation (Electric)

- Determine the best method to mount the sensor near the spur gear. The face of the sensor must face the side of the gear. A mount is provided that can be taped in place using servo tape then bent to allow installation in most applications.
- Mount the rpm sensor such that the sensor is 1/8" from the side of the gear.
- If the gear is non-reflective, place a reflective decal on the gear so it passes between the sensor and the flywheel when rotated. If the gear is reflective, place a flat black decal on the gear so it passes between the sensor and the gear when rotated.
- Plug the sensor into the R (speed/rpm) port in the telemetry module.

Temperature Sensor (Nitro)

A temperature sensor loop is provided in the nitro system that wraps around the head of the engine to monitor head temperature. This is useful in tuning engines and in preventing damaging over-lean runs.

Temperature Sensor Installation (Nitro)

- Install the loop as shown around the cylinder of the engine. It is best to place the sensor near the point at which the head meets the cylinder to get the most accurate consistent readings.



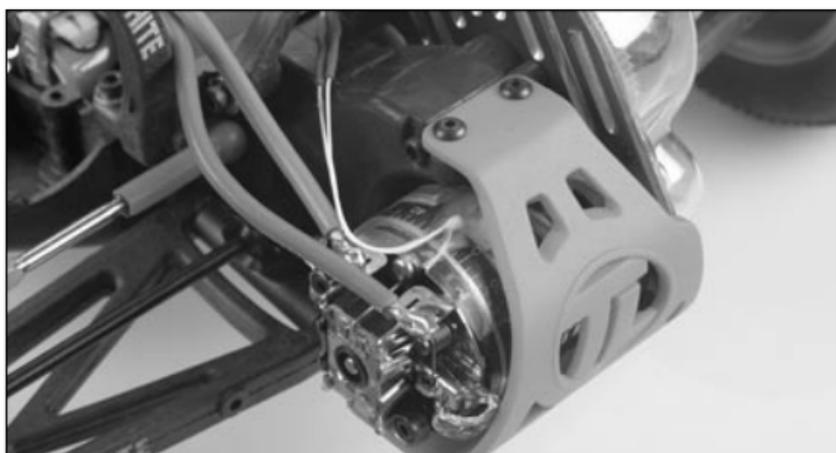
- Plug the temperature sensor into the port marked E in the telemetry module. The handheld unit should now display room temperature.

Temperature Sensor (Electric)

A Thermister type temperature sensor is included in the electric system that can be taped to the battery or motor to monitor real time temperature. Transparent tape can be used to attach the sensor for temperatures up to approximately 250°F high. Temperature tape is needed for temperatures exceeding 250°F.

Temperature Sensor Installation (Electric)

- Tape the temperature sensor to the desired area you wish to monitor (normally the batteries or motor).



- Plug the temperature sensor into the port marked E in the telemetry module. The handheld unit should now display room temperature.

Lap Counter/Timer

The lap counter records and displays the number of laps and lap time for up to 99 laps. In order to use the lap timer, an optional lap trigger must be used. The lap counter/timer system utilizes an infrared sensor in the car and the lap trigger projects an infrared light across the track that triggers the sensor when the car passes. A Lexan mount is provided to allow easy mounting of the lap counting sensor in your vehicle.

Note: The lap sensor must be mounted in visible sight of the lap trigger. Normally this means just inside the side window. If the windows are painted, it will be necessary to cut a small hole in the body to allow the IR light to trigger the sensor.

Lap Counter/Timer Installation

- Servo tape the lap sensor to the Lexan mount as shown.



- Determine the mounting position that will place the sensor behind the side window.
- Cut and/or bend the Lexan mount to position the sensor in the appropriate position and servo tape the mount in place.
- Plug the lap sensor into the L (lap) port in the telemetry module (see telemetry module photo above).

Lap Trigger

The Lap Trigger is placed next to the track and projects an infrared beam of light across the track that triggers the infrared sensor in the car each time it passes. The receiver records each lap time and sends that information to the handheld unit where it is displayed. Laps can then be stored and recalled from the handheld unit plus the fastest lap is displayed. A programmed delay of 2 seconds prevents double lap counts.

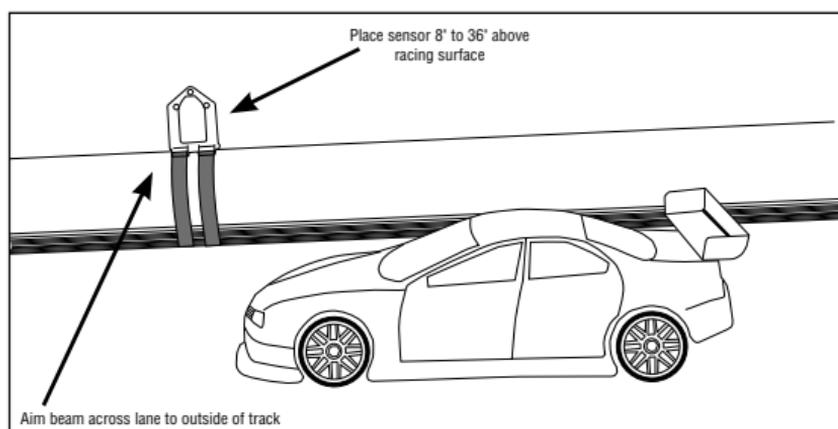
Installing the Lap Trigger Battery



Use 3/32" and 5/64" hex wrenches to unscrew the case and install the 9-volt battery as shown. Reinstall the case, being careful not to over-tighten the screws.

Note: A typical 9-volt battery will power the lap timer for 9 hours. For extended use, an optional AC/DC adapter is available. Remove the 9-volt battery when operating the unit from AC power.

Mounting the Lap Trigger



The lap trigger should be mounted 8" to 36" above the racing surface facing outward from the track. Facing the trigger outward keeps the IR beam from crossing the track in more than one lane preventing unwanted false triggering. Hook and loop strips make mounting easy. Only one lap trigger is necessary at each track, as a single infrared beam will trigger the lap timer in all cars.

Attention

Although this product is designed for ease of use, it is not a toy and requires some basic mechanical ability and adult supervision. This Manual contains basic instructions for safety, operation and maintenance. It's essential to read and follow all the instructions and warnings in this manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

Safety Precautions

This is a sophisticated product that must be operated with caution and common sense. Failure to operate this product in a safe and responsible manner could result in injury or damage to the product or other property. **This product is not intended for use by children without direct adult supervision.**

Horizon Hobby, Inc. shall not be liable for any loss or damages, whether direct, indirect, special, incidental, or consequential, arising from the use or misuse of this product or any product required for operating it. (See warranty and limits of liability)

- Carefully read and follow the directions and warnings associated with this product.
- As the user of this product you are solely responsible for operating in a manner that does not endanger yourself and others or result in damage to the product or the property of others.
- Keep away from liquid, flammable chemicals and moisture.
- Keep all chemicals, small parts and anything electrical out of the reach of children.

Warranty & Limits of Liability

Horizon Hobby, Inc. guarantees this product to be free from defects in both material and workmanship for a period of 1 year from the date of purchase. This warranty is limited to the original purchaser and is not transferable. It does not cover any component parts damaged by use, modification, improper installation or serviced by an unauthorized service center. In no case shall Horizon Hobby's liability exceed the original cost of the purchased product and will not cover consequential, incidental or collateral damage. Horizon Hobby, Inc. reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon Hobby, Inc. Further, Horizon Hobby reserves the right to change or modify this warranty without notice.

As Horizon Hobby has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the product has been started, you must contact Horizon Hobby, Inc. directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance.

If you as the purchaser or user are not prepared to accept the liability associated with the use of this product, you are advised to return this product immediately in new and unused condition to the place of purchase.

Questions or Assistance

For questions or assistance, please direct your email to productsupport@horizonhobby.com, or call 877.504.0233 toll free to speak to a service technician.

Inspection or Repairs

If your product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as Horizon Hobby, Inc. is not responsible for merchandise until it arrives and is accepted at our facility. Include your complete name, address, phone number where you can be reached during business days, RMA number, and a brief summary of the problem. Be sure your name, address, and RMA number are clearly written on the shipping carton.

Warranty Inspection and Repairs

To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Providing warranty conditions have been met, your product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby, Inc.

Non-Warranty Repairs

Should your repair not be covered by warranty and the expense exceeds 50% of the retail purchase cost, you will be provided with an estimate advising you of your options. You will be billed for any return freight for non-warranty repairs. Please advise us of your preferred method of payment. Horizon Hobby accepts money orders and cashier's checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly.

Products requiring inspection or repair should be shipped to the following address (freight prepaid):

Horizon Service Center
4105 Fieldstone Road
Champaign, Illinois 61822

RC Telemetry Technology



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www.spektrumrc.com

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8439