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## MONARCH INSTRUMENT

*Instruction Manual*



### Pocket Laser Tach 200 (PLT200)

Tachometer / Rate Meter / Totalizer / Timer

## SAFEGUARDS AND PRECAUTIONS



**WARNING** - This product emits a visible beam of laser light. Avoid exposure to the laser radiation. The use of optical viewing aids (binoculars, for example) may increase the ocular hazard.

**CAUTION** - The laser beam should not be intentionally aimed at people or animals.

**CAUTION** - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



Read and follow all instructions in this manual carefully, and retain this manual for future reference.

Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.

This instrument is not user serviceable. For technical assistance, contact the sales organization from which you purchased the product.

Monarch Instrument's Limited Warranty applies. See [www.monarchinstrument.com](http://www.monarchinstrument.com) for details.

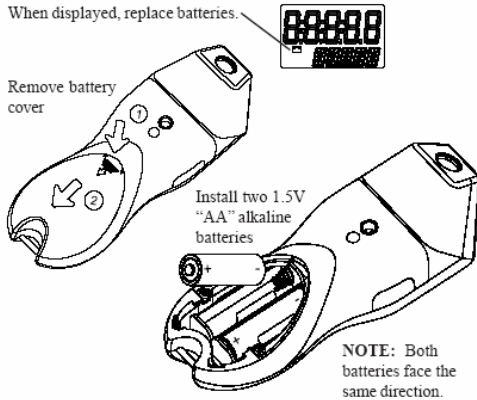
Warranty Registration and Extended Warranty coverage available online at [www.monarchinstrument.com](http://www.monarchinstrument.com).

## 14.0 OPTIONS /ACCESSORIES

T-5	Reflective Tape, 5 foot [1.5 m] roll, ½ inch [13 mm] wide
RCA	Remote Contact Assembly with 10 cm wheel, concave and convex tips
CTE	Concave/convex contact tips and 10 cm linear contact wheel
12 inch Wheel	12 inch circumference wheel for use with RCA
CA-4044-6	6 foot Input/Output cable, 1/8" mono phone plug to BNC connector
ROS-P	Remote Optical Sensor
ROS-P-25	Remote Optical Sensor with 25 foot cable
EC-25P	25 foot extension cable for all sensors
MT-190-P	Amplified Magnetic Sensor
IRS-P	Infrared Sensor
CC-10	Padded Nylon Carrying Case
CC-11	Latching Carrying Case for Pocket Tach and accessories
CAL-N.I.S.T.	N.I.S.T. Traceable Certificate of Calibration

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## 12.0 BATTERIES



## 13.0 CLEANING

To clean the instrument, wipe with a damp cloth using mild soapy solution.

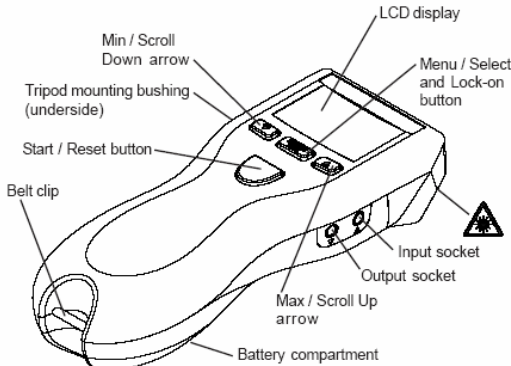
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## 1.0 OVERVIEW

The Pocket Laser Tach 200 is a precision hand-held multifunction Tachometer, Ratemeter, Totalizer and Timer. It is programmable to display directly in Revs, Inches, Feet, Yards, Miles, Centimeters and Meters or function as a stopwatch or interval timer. Input / output sockets allow for remote sensing and pulse output to external indicating devices. For ease of use, the instrument can be "Locked-on" for continuous operation.

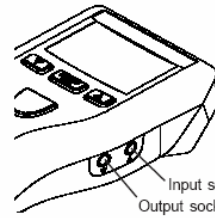
## 2.0 FEATURE LOCATIONS



 **AVOID EXPOSURE - LASER RADIATION IS EMITTED FROM THIS APERTURE**

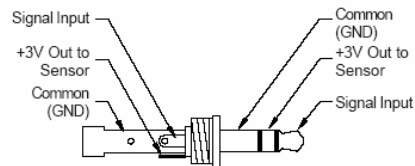
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## 11.0 INPUT / OUTPUT

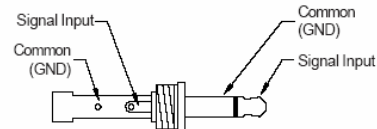


**Input:** Accepts remote sensor or Remote Contact Assembly (RCA). 1/8" (3.5mm) stereo phone plug.

**Output:** 1 pulse per revolution TTL output on internal operation. Pulse repeater with external sensors. 1/8" (3.5mm) mono phone plug.



Input Connector Detail (Stereo plug)

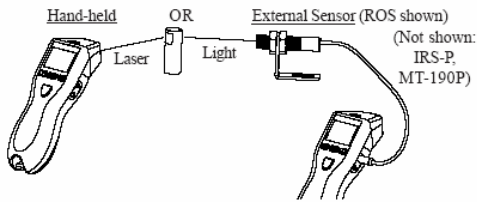


Output Connector Detail (Mono plug)

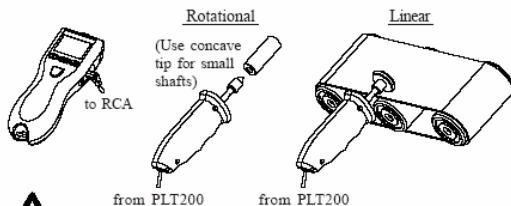
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## 10.0 MAKING MEASUREMENTS

### 10.1 Non-Contact Measurements



### 10.2 Direct Contact Measurements

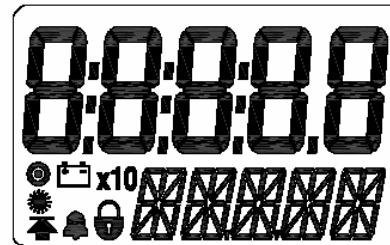



 **ONLY USE MODERATE PRESSURE**


**WARNING:** Making measurements in direct contact with rotating equipment can be dangerous. Keep all loose clothing and hair away from exposed moving machinery. Keep the hand holding the instrument well behind the back end of the Remote Contact Assembly. Properly replace all machinery guards after completing measurement. Do not use for rotation greater than 20,000 RPM.


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## 3.0 LCD DISPLAY SYMBOLS




 **On Target Indicator.** Blinks on whenever there is an input signal. Will appear to be solid on at higher frequencies.

 **Low Battery icon.** Indicates that the batteries are low and need to be replaced.

**x10**  **Times Ten icon.** Indicates that the value shown is ten times that which is displayed.

 **Laser Indicator.** Red laser is on when this indicator is illuminated.

 **Lock icon.** Indicates that the unit is "Locked" on and making continuous measurements (Lock mode).

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## 4.0 PLT200 SPECIFICATIONS

### Laser Specifications:

Classification: Class 3R (per IEC 60825-1 Ed 1.2 2001-8)  
 Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.

**Maximum Laser Output:** 3mW  
**Pulse Duration:** Continuous  
**Laser Wavelength:** 650 nm  
**Beam Divergence:** < 1.5 mrad  
**Beam Diameter:** 4 x 7 mm typical at 2 meters  
**Laser Diode Life:** 8,000 operating hours MTBF (1 year warranty)

### Non-Contact Specifications:

**Ranges:** RPM 5 – 200,000  
 RPS 0.084 – 3,333.3  
 RPH 300-999,990

**Resolution:** Fixed: 1 (10 above 99,999)  
 Auto-ranging: 0.001 to 1.0 (10 above 99,999)

**Accuracy:** ±0.01% of reading or resolution limit

**Operating Range:** up to 25 feet (7.62 m) or up to 70 degrees off perpendicular to T-5 tape target

### Contact Specifications using optional Remote Contact Assembly:











**Range:** Contact Tips: 0.5 to 20,000 RPM  
 10 cm / 12-inch Wheel: 0.5 to 12,000 RPM

**Resolution:** Fixed: 1 (10 above 99,999)  
 Auto-ranging: 0.001 to 1.0 (10 above 99,999)

8. Save and advance  
9. Exit Setup – Ready to measure   DOME, then Units selected


















Unit will remember these settings (including lock on/off) even if turned off and back on.

## 9.2 TIMER Operation

- Measure:
- Manual  Each press toggles Start and Stop 
  - Auto  OR Start and Stop triggered by Remote Optical Sensor (ROS) 
  - Reset  With Timer stopped - Resets time to 00:00.0 
  - Lap  With Timer running - Stops at elapsed time to date. To continue, press again. 
  - Power Off  OR Automatic after 90 seconds if unit not Locked on 

## 9.0 TIMER Mode

### 9.1 TIMER Setup

1. Turn Power ON  Last Units selected are displayed 
- 1a. To toggle Lock On/Off  Press and Hold  Locked On 
2. Enter Setup Mode  
3. Enter selection of Mode  Last Mode selected is displayed 
4. Select TIMER Mode  OR  Repeat until **TIMER** displayed
5. Save and advance  
6. Enter selection of Timer function   MAN or AUTO
7. Select Timer function  OR  Toggles between Manual and Auto

### Contact Specifications (continued):

**Accuracy:** Revs: ±0.05% of reading (RPM) or resolution limit (with no slippage)  
 Linear: ±0.5% of reading or resolution limit (with no slippage)

### Contact Measurements Ranges:

TACHOMETER:		
Revolutions per Minute (RPM)	0.5 to 20,000 RPM	
Revolutions per Second (RPS)	0.0833 to 333.33 RPS	
Revolution per Hour (RPH)	30 to 999,990 RPH	
RATES:		
Inches per Second	10 cm:	0.033 to 1312.3 IPS
	12 in:	0.100 to 2,400.0 IPS
Inches per Minute	10 cm:	1.969 to 78,740 IPM
	12 in:	6.000 to 144,000 IPM
Inches per Hour	10 cm:	118.11 to 999,990 IPH
	12 in:	360.00 to 999,990 IPH
Feet per Second	10 cm:	0.003 to 109.36 FT/S
	12 in:	0.009 to 200.00 FT/S
Feet per Minute	10 cm:	0.164 to 6,561.7 FT/M
	12 in:	0.500 to 12,000 FT/M
Feet per Hour	10 cm:	9.843 to 393,700 FT/H
	12 in:	30.000 to 720,000 FT/H
Yards per Second	10 cm:	0.001 to 36.453 YPS
	12 in:	0.003 to 66.667 YPS
Yards per Minute	10 cm:	0.055 to 2,187.2 YPM
	12 in:	0.167 to 4,000.0 YPM

**Contact Measurements Ranges (continued):**

RATES:		
	Wheel	Circumference:
Yards per Hour	10cm:	3.281 to 131,233 YPH
	12 in:	10.000 to 240,000 YPH
Miles per Hour	10 cm:	0.002 to 74.564 MPH
	12 in:	0.006 to 136.36 MPH
Centimeters per Second	10 cm:	0.084 to 3,333.3 CM/S
	12 in:	0.21 to 3,048.0 CM/S
Centimeters per Minute	10 cm:	5.000 to 200,000 CM/M
	12 in:	15.240 to 365,760 CM/M
Centimeters per Hour	10 cm:	300.00 to 999,990 CM/H
	12 in:	914.40 to 999,990 CM/H
Meters per Second	10 cm:	0.001 to 33.333 M/SEC
	12 in:	0.003 to 60.960 M/SEC
Meters per Minute	10 cm:	0.050 to 2,000.0 M/MIN
	12 in:	0.153 to 3,657.6 M/MIN
Meters per Hour	10 cm:	3.000 to 120,000 M/H
	12 in:	9.144 to 219,460 M/H

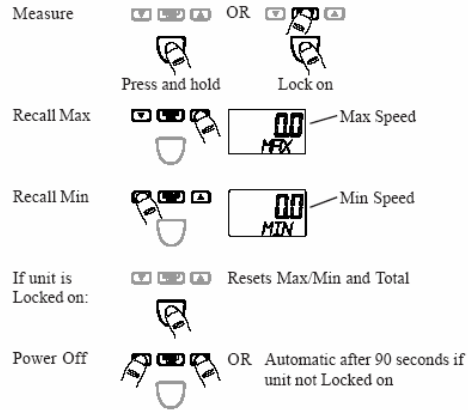
**TOTALIZER:**

Counts: 0 to 999,999  
 Scale Totals in Inches, Feet, Yards, Centimeters or Meters  
 Input: Internal or External optics or linear contact wheel

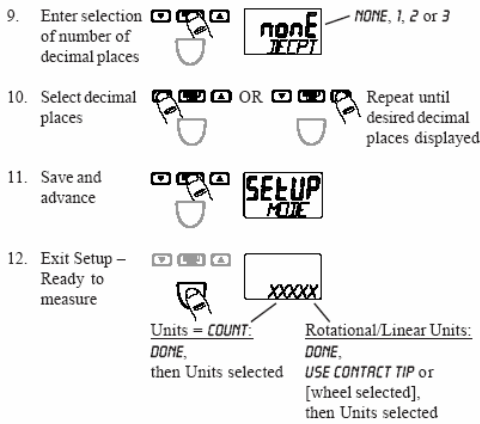
**Timer Specifications:**

Minutes:Seconds.Tenths to 99:59.9  
 Accuracy: ±0.2 second  
 Resolution: 0.1 second

**8.2 TOTALizer Operation**



**TOTALizer Setup (continued):**



Unit will remember these settings (including lock on/off) even if turned off and back on.

- Display:** 5 x 0.5" (12.7mm) numeric digits plus 5 Alpha-numeric LCD
- Batteries:** 2 "AA" 1.5 V (DC) alkaline included (Note: Batteries are NOT rechargeable.)
- Battery Life:** 30 hours continuous typical with batteries provided
- External Input:**
  - Absolute max:** -0.3 V to 5 V (DC)
  - Minimum:** low below 1.2 V and high above 2 V (TTL compatible)
  - Edge:** Triggers on Positive edge
  - Power Out:** 3.0 V nominal, approx. 2.8 V @ 20 mA max
- Pulse Output:** 0 V to 3.3 V (DC) pulse Same shape as External Input signal or high when internal optics sees a reflection
- Dimensions:** 6.92" (17.58 cm) H x 2.4" (6.10 cm) W x 1.6" (4.06 cm) D
- Weight:** Approx. 7 oz. (210 g)

This product is designed to be safe for indoor use under the following conditions (per IEC61010-1).

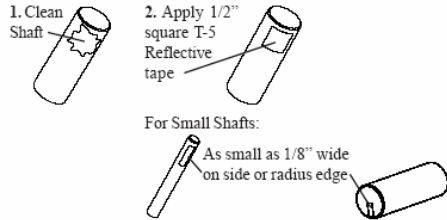
- Installation Category II** per IEC 664
- Pollution Degree Level II** per IEC 664
- Temperature:** 40 °F to 105 °F (5 °C to 40 °C)
- Humidity:** Maximum relative humidity of 80% for temperatures up to 88 °F (31 °C) decreasing linearly to 50% relative humidity at 100 °F (40 °C). Humidity non-condensing.

Specifications subject to change without notice.

## 5.0 PREPARATION FOR MEASUREMENT

### 5.1 Non-Contact Preparation

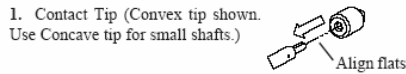
For Internal operation (Red laser) or External operation using optional Remote Optical Sensor (ROS-Red LED).



### 5.2 Direct Contact Preparation

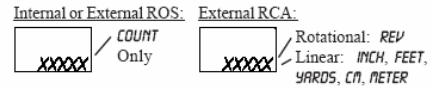
For External operation ONLY using optional Remote Contact Assembly (RCA).

Select and install contact option:



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6. Enter selection of Units Different options displayed for Internal or External operation.



7. Select Units OR Repeat until desired Units displayed



Only for Linear Units:

- 8a. Enter selection of Wheel Last Wheel selected is displayed

- 8b. Select Wheel OR Toggles between 10CM and 12IN

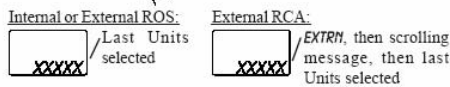
- 8c. Save and Advance **SAVE** **ADVANCE**  
COUNT or REV

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## 8.0 TOTALizer Mode

### 8.1 TOTALizer Setup

1. Turn Power ON Different messages displayed for Internal or External operation.



- 1a. To toggle Lock On/Off Press and Hold Locked On

2. Enter Setup Mode **SETUP** **MODE**

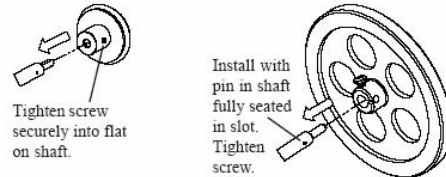
3. Enter selection of Mode Last Mode selected is displayed

4. Select TOTAL Mode OR Repeat until TOTAL displayed.

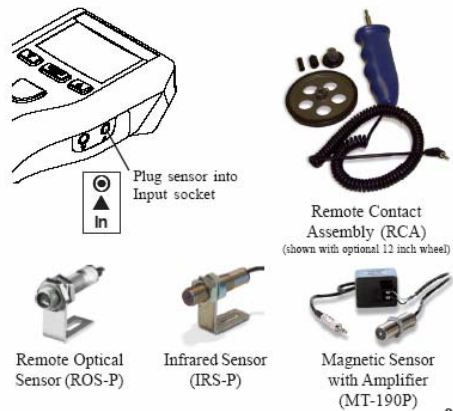
5. Save and advance **SAVE** **ADVANCE**  
COUNT or REV

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2. 10 cm Wheel OR 3. 12 inch Wheel



### 5.3 Connecting External Sensors



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## 6.0 TACHometer Mode

### 6.1 TACHometer Setup

1. Turn Power ON Last Units selected are displayed
- 1a. To toggle Lock On/Off Press and Hold Locked On
2. Enter Setup Mode
3. Enter selection of Mode Last Mode selected is displayed
4. Select TACH Mode OR Repeat until TACH displayed
5. Save and advance
6. Enter selection of Units RPS, RPM or RPH

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11. Save and advance
12. Exit Setup – Ready to measure DONE, USE CONTACT TIP or [wheel selected], then Units selected

Unit will remember these settings (including lock on/off) even if turned off and back on.

### 7.2 RATE Operation

- Measure OR
- Recall Max Press and hold Lock on Max Speed
- Recall Min Min Speed
- If unit Locked on: Resets Max/Min
- Power Off OR Automatic after 90 seconds if unit not Locked on

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### RATE Setup (continued):

6. Enter selection of Units Rotational: CRPS, CRPA or CRPH  
Linear: IPS, IPA, IPH, FT/S, FT/A, FT/H, YPS, YPA, YPH, CM/S, CM/A, CM/H, M/SEC, M/MM, M/H
7. Select Units OR Repeat until desired Units displayed
8. Save and advance OR Rotational Units Linear Units
- Only for Linear Units:
- 8a. Enter selection of Wheel Last Wheel selected is displayed
- 8b. Select Wheel OR Toggles between 10CM and 12MM
- 8c. Save and Advance
9. Enter selection of number of decimal places NONE, 1, 2 or 3
10. Select decimal places OR Repeat until desired decimal places displayed

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7. Select Units OR Repeat until desired Units displayed
8. Save and advance
9. Enter selection of number of decimal places NONE, 1, 2 or 3
10. Select decimal places OR Repeat until desired decimal places displayed
11. Save and advance
12. Exit Setup – Ready to measure DONE, then Units selected

Unit will remember these settings (including lock on/off) even if turned off and back on.

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## 6.2 TACHometer Operation

Measure OR

Press and hold Lock on

Recall Max Max Speed

Recall Min Min Speed

If unit Locked on: Resets Max/Min

Power OFF OR Automatic after 90 seconds if unit not Locked on

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## 7.0 RATE Mode

**NOTE:** External Remote Contact Assembly (RCA) must be inserted into input socket.

### 7.1 RATE Setup

- Turn Power ON *EXTRN*, then scrolling message, then last Units selected
- To toggle Lock On/Off Press and Hold Locked On
- Enter Setup Mode
- Enter selection of Mode Last Mode selected is displayed
- Select RATE Mode OR Toggles between *RATE* and *TOTAL*. Select *RATE*.
- Save and advance

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