

MONARCH INSTRUMENT

Instruction Manual



Pocket-Tach Plus Kit

P/N 1071-4835-001
Rev 1.4

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USE OF THIS EQUIPMENT IN A MANNER THAT IS INCONSISTENT WITH IT'S INTENDED PURPOSE, OR IN AN ENVIRONMENT THAT EXCEEDS THE RATED SPECIFICATIONS BY THE MANUFACTURER, MAY IMPAIR THE PROTECTION PROVIDED BY THE EQUIPMENT.

READ SECTIONS 4 AND 5 FULLY BEFORE MAKING CONTACT MEASUREMENTS.

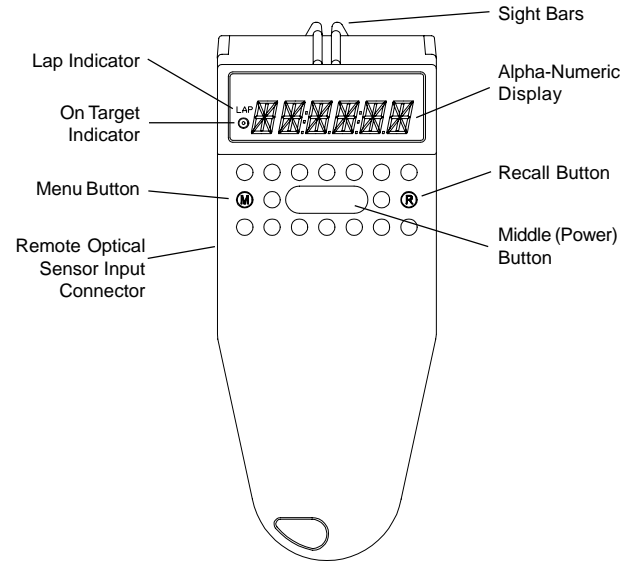


WARNING

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 CONTACT TIP ASSEMBLY. PROPERLY REPLACE ALL MACHINERY GUARDS AFTER COMPLETING MEASUREMENT. DO NOT USE FOR ROTATION GREATER THAN 20,000 RPM.

THE SOCKET ON THE SIDE OF THE INSTRUMENT IS FOR USE WITH AN OPTIONAL REMOTE OPTICAL SENSOR MODEL ROS-9P ONLY.

For Technical Assistance Contact the Sales Organization you purchased the product from. If they cannot assist you, they will refer you to the manufacturer.



Pocket Tach Plus

1. SPECIFICATIONS

This product is designed to be safe for indoor use under the following conditions (per IEC1010-1)

Temperature:	5°C to 40°C
Humidity:	Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C.
Pollution Degree:	2 per IEC 664
Power:	9VDC @ 70mA MAX. Battery Type IEC-6LR61.

TACHOMETER & STROBOSCOPE LIMITED WARRANTY

SELLER warrants hardware products to be free from any defect in materials or workmanship for A period of one (1) year from date of shipment to BUYER. SELLER's entire liability and BUYER's sole and exclusive remedy resulting from any defect in workmanship or material in the hardware product covered by this limited warranty shall be limited to and fully discharged by replacement or repair of such item as SELLER's option without charge. The limited warranty provided in this clause is in lieu of all other warranties, expressed or implied, arising by law or otherwise. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED. This limited warranty shall not be modified except by an arrangement signed by both parties specifically referencing this clause.

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IN NO EVENT SHALL SELLER BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE LOSSES OR DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSSES OR DAMAGES FOR ANY LOST PROFITS OR LOST DATA) AS THE RESULT OF ANY BREACH OR DEFAULT BY SELLER WITH RESPECT TO THE HARDWARE OR SOFTWARE, EVEN IF SELLER HAS BEEN ADVISED OR MADE AWARE OF THE POSSIBILITY OF ANY SUCH LOSSES OR DAMAGES AND REGARDLESS OF WHETHER THE CLAIM IS BASED ON CONTRACT, TORT, STRICT LIABILITY, OR OTHER THEORY OF LIABILITY.

This limited warranty does not extend or apply to consumables (including, but not limited to, lamps and batteries) or equipment, instruments or accessories which are warranted separately by the original manufacturer of these items.

TIMER (Stopwatch):

Minutes:Seconds:Hundredths to 59:59:99 - Resolution 0.01 Second (1/100)
Hours:Minutes:Seconds to 99:59:59 - Resolution 1 second.
Pushbutton or Remote control.
Accuracy 0.01 second

Accessories Provided:

Contact Tip Assembly, Concave Tip, Convex Tip, Linear Speed Wheel
Latching Carry Case, Battery, Reflective Tape, Instruction Manual

2. INTRODUCTION

The POCKET-TACH Plus KIT consists of a hand-held Tachometer, the POCKET-TACH Plus, a removeable Contact Tip Assembly with two rubber tips, one concave, the other with a point, a linear speed wheel, a roll of Reflective Tape and a battery, all in a rugged plastic carry case.

POCKET-TACH Plus is a versatile instrument with advanced features and options. In order to get acquainted with and know all the features of the POCKET-TACH Plus KIT it is recommended that you **READ THIS MANUAL IN ITS ENTIRETY BEFORE ATTEMPTING TO USE THE INSTRUMENT.**

The POCKET-TACH Plus is a multifunction Tachometer, Ratemeter, Totalizer and Timer. It has programmable options to allow it to measure in Revs, Inches, Feet, Yards, Miles, Centimeters and Meters using the included Contact Tip Assembly. It has an external input socket allowing an optional Remote Optical Sensor (ROS-9P) to be used. The Timer function operates as a simple stopwatch, or can be triggered by reflective targets. The unit can also totalize in various units to a maximum of 999,999.

The POCKET-TACH Plus has a six digit alphanumeric display capable of displaying words and numbers. There are three control buttons. The **middle** button is the main control button and is the primary button used to operate the unit. The two smaller buttons are for programming and auxiliary functions. To the left, the button marked **M** is for the Menu function, while the button to the right marked **R** is for the Recall and Reset functions.

Once programmed, the unit is fairly straightforward to operate. The function of the buttons is dependent upon the current operating mode of the unit. There are three primary modes of operation -

Tachometer

measures speed or linear rate with respect to time. Time intervals are seconds, minutes or hours. Rotational speed can be measured as Revolutions (Revs) per second, per minute or per hour. The most common measurement being RPM or Revs per minute using the optical tachometer mode. Measurement of units other than Revs requires the attachment of the linear contact wheel and contact tip assembly. With this easily attached wheel, the unit can measure RATE inputs - inches, feet, yards, centimeters and meters either per second, per minute or per hour, as well as miles per hour. The user can recall the maximum and minimum values with the **R** button.

Totalizer

accumulates input on an ongoing basis. In the simplest form the unit acts as an optical counter, incrementing the display each time an input pulse is sensed. Using the Contact Wheel attachment the unit can totalize in inches, feet, yards, centimeters and meters. The user can freeze the display at any time without affecting the count by pressing the **R** button. Press the **middle** button to reset total to 0 (zero).

Timer

accumulates time in hours, minutes, seconds and hundredths of a second. There are two modes of operation. The Manual mode operates like a stopwatch, the timing period being started and stopped by the **middle** button. The Auto mode can be stopped and started by the user or by a piece of reflective tape on the objects. A LAP time can be saved in either mode by pressing the **R** button.

3. NON-CONTACT MEASUREMENTS - Select "RPM" Mode

To prepare a shaft for non-contact measurement of speed, carefully clean an area of the shaft of all grease and dirt and apply a piece of Reflective Tape to the cleaned surface. Typically, a half inch square of Reflective Tape is convenient. For smaller shafts, smaller pieces of tape down to approximately 1/8 inch in length may be used. Always use Reflective Tape supplied. Additional tape is available in five foot rolls, part number T-5.

The ergonomic design of POCKET-TACH makes the non-contact measurement of speed extremely simple. Aim POCKET-TACH at the reflective marker using the sight bars on the top surface of the instrument as an aid in locating the target. A light emanates from the underside of the POCKET-TACH parallel to the top surface and in line with the sight bars. This design allows you to view the target on the rotating shaft and the display on the instrument simultaneously. To measure, press and hold the **middle** button on the front

DECLARATION OF CONFORMITY

As Manufacturer:
Monarch Instrument
Division of Monarch International Inc.
15 Columbia Drive, Amherst NH 03031 USA

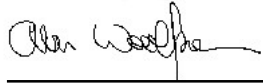
declares under Monarch's sole responsibility that the product:
to which this declaration relates is in conformity with the following standards:

Name: Pocket-Tach Hand Held Tachometer
Models: Plus, 100

EMC: EN50082-2:1995
EN55011: 1991 Group 1 Class B
EN61000-4-2
ENV50140

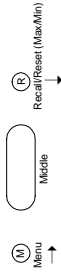
and therefore conforms with the requirements of Council Directive 89/336/EEC relating to electromagnetic compatibility. The testing of this product was performed by Retlif Testing Laboratories, NH, in December of 1995 (File R-2700NA).

27th March 1996
Manufacturer (Amherst, NH)


Alan Woolfson, VP Engineering
(Authorized Signature)

MENU OVERVIEW - Simple to Operate!

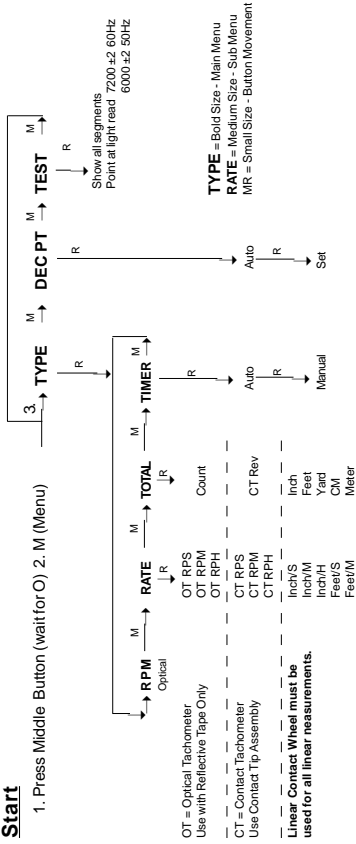
Note: Instrument is factory preset in optical RPM mode.



- > Press middle button to turn instrument on and begin measurement or menu selections.
- > Scroll across (M) until the desired main menu selection is displayed.
- > Scroll down (R) until the desired operating mode is displayed. **Press middle button to enter/escape your selection.**
- > Press middle and (R) buttons simultaneously to shut off. Automatic shut-off after 30 seconds on inactivity.

Start

1. Press Middle Button (wait for O) 2. M (Menu)

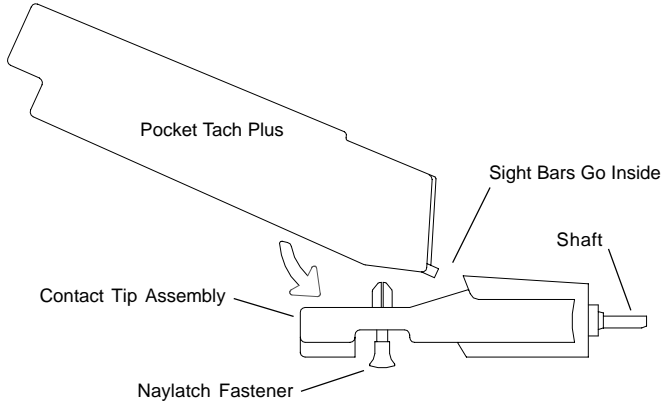


How to measure Linear lengths of cables, bells, surfaces, etc.

- A. Select under **DECPT** - Auto
- B. Select **M** (Menu) then, under **TOTAL**, the desired unit of Inches, Feet, Yards, CM or Meters

panel and aim the instrument until a steady illumination of the on-target indicator or "bull's eye" indicates you are receiving valid data. Above 200 RPM wait for three updates of the display for the instrument to stabilize. At lower speeds, a few additional updates may be required for the instrument to initially "lock on". Once a measurement is complete, release the middle button while still viewing the target. The last reading will be held on the display for approximately 90 seconds and then the instrument automatically times out and shuts off. The operative speed range is from 5 to 100,000 RPM when using a Reflective Tape target.

4. CONTACT MEASUREMENTS - Select "RATE" Mode (CT-RPM). Do not use in "RPM" mode.



To measure rotational speed by directly contacting a shaft, POCKET-TACH must be equipped with the CTA-2P Contact Tip Assembly, speed range is 2.5 to 20,000 RPM. This accessory is attached to the bottom of the instrument with two Nylatch® fasteners which install in the holes provided for attachment. To assemble, first pull back on the grips on the two Nylatch® fasteners to insure they are in the released (pulled out) position. **DO NOT ATTEMPT TO PULL THEM BEYOND THE UNLOCKED POSITION** (loose feel). Install the Contact Tip Assembly onto the POCKET-TACH by sliding the sight bars on the POCKET-TACH into the corresponding notch in the top of the Contact Tip Assembly (above the window exposing the shaft). Push the Contact Tip Assembly

flush against the POKET-TACH so that the fasteners fit into the two locating holes on the underside of the POKET-TACH. Secure the tip assembly by pushing firmly on both of the Nylatch® fasteners until they snap securely in place. Select either a convex or concave tip appropriate for the measurement to be made and install it firmly on the shaft extension of the CTA-2P. Note that the shaft has a flat surface on it which must align with the flat in the rubber tips. The convex (conical) tip is used for moderate to larger diameter shafts that are equipped with a turned center, while the concave (inverted conical) tip is used on smaller diameter shafts. To make a measurement, start the equipment and carefully move the contact tip against the end of the rotating shaft. KEEP THE HAND HOLDING THE INSTRUMENT WELL BEHIND THE BACK EDGE OF THE CONTACT TIP ASSEMBLY. Only a moderate amount of pressure is required to keep the rubber tip in contact with the rotating shaft. Depress the **middle** button and hold the instrument in position until the reading is complete. Once again, the on target indicator or “bull’s eye” symbol will be your indication of reliable data being received. When the measurement is complete, release the middle button while still in contact with the shaft, remove the instrument from contact with the shaft, and POKET-TACH will retain the last reading for approximately 90 seconds then automatically shut off. To disassemble the Contact Tip Assembly, pull the grip of each of the Nylatch® fasteners to release them from the back of POKET-TACH, and remove the Contact Tip Assembly by gently pulling it from the back of the instrument.



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5. SURFACE SPEED MEASUREMENTS - Select “RATE” mode for linear contact value.

Surface speed measurements are made with the CTA-2P Contact Tip Assembly and the Linear Speed Wheel. Install the Contact Tip Assembly on the POKET-TACH as described previously. The Linear Speed Wheel must be pushed right back onto the shaft, aligning the flats. Secure the Linear Speed Wheel in position by tightening the small machine screw on the neck of the wheel.

14. BATTERY

The POKET-TACH is powered from a single NEDA Type 1604 (PM9) nine volt dc alkaline battery. The battery is installed by removing the sliding cover from the back of the instrument, connecting the battery to the battery snap, and installing the battery into the compartment with leads arranged so that they will not be damaged when replacing the battery compartment cover.

When the battery voltage in POKET-TACH is getting low, the display will blink on and off to indicate this condition. At the time the low battery indication comes on, POKET-TACH should operate another fifteen minutes.

15. CLEANING

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

16. OPTIONS AND ACCESSORIES

CC-5	Latching Carrying Case with space for POKET-TACH and all accessories
CC-6	Nylon Padded Carrying Case
CTA-2P	Contact Tip Assembly with convex and concave tips and .1 meter Contact Wheel for POKET-TACH Plus KIT <u>only</u> .
CT-1M	0.1 meter Linear Contact Wheel
CT-TIPS	One CT-2P Conical Tip and one CT-3C Concave Tip, one “ O ” ring (Part # 9088) for linear contact wheel and two Nylatch Fastners (Part # 9083, 9084).
ROS-9P	Remote Optical Sensor with 5 foot (1.5M) cable
T-5	Reflective Tape, 5 foot (1.5M) roll, 1/2 inch (13mm) wide
CAL-N.I.S.T.	N.I.S.T.Traceable Certificate of Calibration Optical RPM mode of operation only.

one more time. The display will be RESET to zero by pressing the **middle** button. To shut the unit off manually, press the **middle** and **R** buttons simultaneously.

Note that the total may have an uncertainty of ± 0.5 revolution of the contact wheel circumference (0.05m or 1.8") depending on where the wheel starts or stops.

In TOTALIZER mode, the unit will shut off if no inputs are received or no buttons are pressed in 90 seconds.

11. DECIMAL POINT (DEC PT)

The instrument can display measurements in a "set" range format - 1234 with a resolution of 1 digit, or in an "auto" floating point format - 1234.56 for maximum resolution. It is not applicable to the TIMING mode.

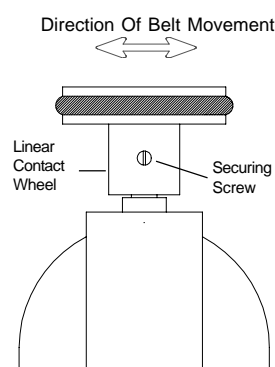
The decimal point operation is selected by pressing the **M** (menu) button until the display shows *DEC PT*. Press the **R** button to select either *SET* or *AUTO* modes then press the **middle** button to return to the measurement.

12. TEST

The TEST mode is used to check the instrument calibration against a known standard, the AC mains frequency. The Contact Wheel Assembly or Remote Sensors must not be attached to the instrument. To enter the TEST mode turn the unit on and press the **M** button until the unit shows *TEST*. Press the **R** button. The display will show all segments on and then enter the RPM mode. To test the unit, aim it at an old style fluorescent light. The display should show 7200 ± 2 counts for countries with 60 cycle AC mains and 6000 ± 2 counts for countries with 50 cycle AC mains. To exit the TEST mode press the **M** button then the **middle** button. The unit will remember the previous mode of operation. Note that this test does not check the internal lamp. This can be accomplished during the RPM mode by looking into the lens hole on the underside of the unit and pressing the **middle** button. Check to see that the lamp comes on and is bright white not yellow in color.

13. USING THE OPTIONAL ROS-9P REMOTE OPTICAL SENSOR

The optional ROS-9P Remote Optical Sensor can be plugged into the side of the instrument housing. The green LED on the ROS-9P is the on-target indicator. Operation in all modes is the same as using the internal optics of the instrument. The ROS-9P should be plugged into the POCKET-TACH Plus while the power is off.



Yard/M; Centimeters, 25.0 to 120,000 Cm/Min; Meters, .250 to 1,200 M/Min; Miles per Hour, 0 to 44 Mile/H.

NOTE: PLEASE READ AND HEED WARNINGS FOR CONTACT MEASUREMENTS ABOVE.

6. OPERATION

The unit is started by pressing the **middle** button. The display will turn on with all segments lit, the unit will then indicate what operating mode has been preset. The display will then show *READY* and the display will go to 0 (zero). The unit will automatically shut off after 90 seconds of inactivity.

TO SHUT THE UNIT OFF AT ANY TIME, PRESS THE R AND MIDDLE BUTTONS SIMULTANEOUSLY.

SELECTING OPERATING MODES: See menu overview chart in back of manual.

To change the operating mode press the **M** button so that the display shows *MENU*. There are a number of Main Menu choices that can be selected by pressing the **M** button. These are:

TYPE Selects the primary operating mode - RPM, RATE, TOTAL, TIMER.

DEC PT Decimal Point- select SET for a resolution of one, or AUTO for auto ranging with moving decimal point (fractional resolution to 0.0001).

DO NOT ATTEMPT TO USE THE LINEAR SPEED WHEEL IF THE SECURING SCREW IS NOT TIGHT.

To measure a linear surface speed such as a moving belt or web, hold the POCKET-TACH at a right angle (90 degrees) to the direction of movement and gently contact the side of the rubber tip against the top surface of the object to be measured. For accurate results, be sure that the tip is held flat against the moving object. Only a very moderate amount of pressure is required. Excess pressure can load the CTA-2P shaft and distort the rubber tip causing an erroneous reading and eventual wear in the bearings of the Contact Tip Assembly. Linear speeds are read out directly based on the operating mode previously selected in the menu modes. The "Per Minute" measurement ranges are: Inches, 10 to 40,000 Inch/M; Feet, .84 to 3,900 Feet/M; Yards, .28 to 1,200

TEST All segments will be illuminated, then press the **middle** button, aim it at a fluorescent lamp and observe $7200 \pm$ two counts. (Note: In countries with a 50 Hz, power line frequency, the Tachometer will read 6000 ± 2 .)

When setting modes the **M** button acts as the primary select button and the **R** button acts as the secondary select button. The **middle** button is the enter/save button and will return the user to the new operating mode. The unit will remember all menu settings when turned off. Refer to the POCKET-TACH Menu overview sheet on last page.

7. RPM MODE - CONTACT TIP CAN NOT BE USED IN THIS MODE

Note: The instrument is factory preset in optical RPM mode of operation.

To select RPM mode, press the **middle** button until the display shows READY then **O**. Press and hold the **middle** button, aim the Tachometer at a reflective target up to 30 inches away and an angle not exceeding 30 degrees to take readings. Notice the on-target indicator "bulls eye" must be on steadily indicating the target is being hit correctly.

To measure RPM, you can use the internal optics or the optional ROS-9P remote optical sensor.

In the INTERNAL mode it is necessary to press and hold the **middle** button to take a reading. The unit will shut itself off after 90 seconds of inactivity in all modes. It will also hold the last reading on the display for 90 seconds.

In the EXTERNAL mode the Remote Sensor is powered on continuously, taking readings all the time until it is shut off by pressing the **middle** and **R** buttons simultaneously or shuts off after 90 seconds of inactivity.

When measuring RPM the user can recall the **MAX**imum and **MIN**imum by pressing the **R** (Recall) button. Press once for MAX and again for MIN. Each time the **middle** button is pressed to begin readings, the MAX and MIN values are cleared.

8. RATE MODE - USE WITH CONTACT TIP FOR CONTACT RPM, FPM, MPM, AND OTHER LINEAR RATE MODE MEASUREMENTS

The RATE mode is an extension of the RPM mode and, with the exception of Revs, all work with the 0.1 meter Linear Speed Wheel and Contact Tip Assembly attachment. This mode is used to measure linear rate, such as conveyer belt speed.

To select RATE Mode turn the unit on and press **M** twice so the display shows *TYPE*. Press **R** once to enter the TYPE menu then press **M** until the display shows *RATE*. Now press **R** until the operating mode you wish to measure is displayed. Press the **middle** button to save/enter your mode selection.

OT RPS, OT RPM and OT RPH are **Optical Tachometer** or non-contact measurements. CT RPS, CT RPM and CT RPH are **Contact Tachometer** measurements, and are used with the Contact Tip Assembly. The rest are linear measurements and must be used with the contact wheel. The contact tip and wheel use 2 pulses per Rev. Carefully place the Linear Contact Wheel or contact tip on the surface to be measured.

Note : /S is per second, /M is per minute, /H is per hour, CM/ is centimeters and M/ is meters.

9. TIMER MODE

To select the TIMER mode, turn the unit on and press the **M** button twice so the display shows *TYPE* then press the **R** button to access the TYPE menu. Press the **M** button until the display shows *TIMER*. Press the **R** button to select MANUAL or AUTO then press the **middle** button to enter the timer mode.

MANUAL mode acts like a stopwatch. Timing is started and stopped using the **middle** button. A LAP time can be held by pressing the **R** button while timing. The display will show the lap value and will blink *LAP* in the top left corner of the display. To return to the timing mode press **R** button again. To reset to 00:00:00 press **R** button when timer is stopped.

The AUTO mode is similar to the MANUAL mode except that the timing can be started and stopped from the internal optics or external sensor ROS-9P as well as the **middle** button.

The unit will time in hundredths of a second to 1 hour and will then change to seconds.

NOTE: Once timing is initiated, the unit needs to be TURNED OFF MANUALLY or the battery will go dead.

10. TOTALIZE MODE

To select TOTALIZE mode, turn the unit on and press the **M** button twice so the display shows *TYPE* then press the **R** button to access the TYPE menu. Press the **M** button until the display shows *TOTAL*. Press the **R** button to select the desired mode. The COUNT scale simply increments the display by one for each reflective optical pulse received.

The unit can totalize in units by selecting COUNT or REV or in distance by selecting INCHes, FEET, YARDs, CentiMeters or METERS.

Press the **middle** button to save/enter your selection.

In the TOTALIZE mode the lamp or external sensor ROS-9P is powered continuously. The reading on the display can be held without affecting the count by pressing the **R** button while totalizing. The display will hold the reading and will blink *LAP* in the top left corner indicating that the display is on hold. To revert back to the count display press **R**