ALTRONIC®, INC.
712 TRUMBULL AVENUE
GIRARD, OHIO 44420

PICK-UP POWERED TACHOMETER SERIES **INSTALLATION INSTRUCTIONS APTHO II 7-86**
PT / PTH / PTO / PTHO - 2100

WARNING:	Read these instructions carefully before installing or operating the tachometer device. An improperly installed or operating device may result in an unsafe operating condition of the monitored machine which consequently could pose the threat of personal injury to operators or other nearby personnel.

1.0 DESCRIPTION

1.1 The Altronic digital tachometer device is a solid state unit operating directly from a magnetic pick-up and requires no other power source. It is designed for continuous operation. The tachometer reads out on a LCD display, normally in 1 RPM increments. The PT series devices can be set for a wide variety of speeds and employ a quartz crystal time base for accuracy and long term consistency.

1.2 There are four basic models:

- PT-2100 Tachometer
- PTH-2100 Tachometer/Hourmeter - This model adds a 5-digit hourmeter with a 99,999 hour range in 1 hour increments. The hours are displayed automatically every 64 seconds.
- PTO-2100 Tachometer with Overspeed Trigger
- PTHO-2100 Tachometer/Hourmeter with Overspeed Trigger

1.3 In addition to the above basic type designation, the devices have a specific part number stamped on the back (example: 691 018-3). This number identifies the specific internal settings such as Update Time, Overspeed Setpoint, Overspeed Time Interval, etc. When ordering a replacement or spare unit, always include this 691 XXX-XX part number.

1.4 For reliable operation, the following installation instructions must be adhered to strictly.

2.0 SETTING FOR OPERATION

2.1 DISASSEMBLY - The update time can be set at the factory or authorized Altronic distributor or dealer. To set the update time, the tachometer must be disassembled. Remove the three flush mounted screws holding the back panel to the gray case. Separate the back panel from the case.

2.2 TACHOMETER UPDATE TIME - The update time can be set at the factory or authorized Altronic distributor or dealer. The update time is calculated by the following formula:

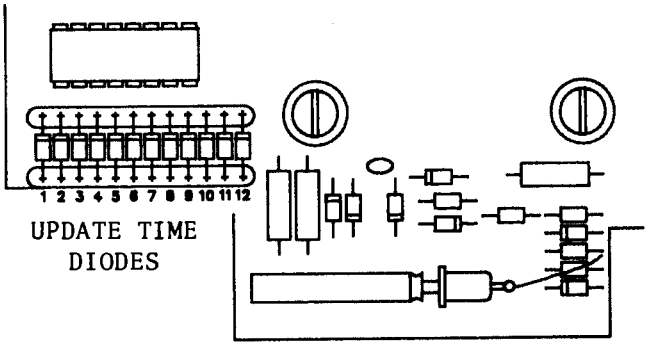
$$\text{Update Time} = \frac{60}{N} + \frac{1}{1024} = \frac{60}{N} + .00097656$$

$$\text{where } N = \text{No. of gear teeth } X \frac{\text{gear speed}}{\text{speed of interest}}$$

The update time is set by selecting certain internal diodes in the device that add up to the calculated time. Each diode has an assigned amount of time shown in the chart in section 2.3.

2.3 DIODE SELECTION CHART - Add diode times given in the table below to achieve the Update Time calculated in section 2.2; these diodes remain. Clip out unused diodes. DO NOT use solder iron.

TIME	DIODE NO.	USED	REMOVE
2.0	2		
1.0	1		
0.5	9		
0.25	11		
0.125	10		
0.0625	5		
0.03125	3		
0.015625	4		
0.0078125	6		
0.00390625	7		
0.00195313	8		
0.00097656	12		



UPDATE TIME DIODES

EXAMPLE: 118 tooth gear, 1:1 ratio

Update Time = 60/118 + 1/1024
= 0.50847458 + 0.00097656
= 0.50945114 seconds

DIODES:
0.50945114
- 0.5 (diode 9)

0.00945114
- 0.00781250 (diode 6)

0.00163864
- 0.00195320 (diode 8 is closest)

- 0.00031456 seconds error = 0.06% error

Leave diodes 9, 6 and 8.
Clip out all other diodes.

2.4 OVERSPEED SETPOINT (PTO, PTHO) - See Section 7.0.

3.0 MOUNTING THE PT SERIES DEVICE

3.1 Mount the tachometer inside a control panel using the template provided. For outdoor installations, enclose the tachometer within the panel to avoid direct exposure to the weather.

NOTE: Avoid mounting with the LCD display facing direct sunlight. The display temperature range is -40°F. to +175°F.

4.0 INSTALLING THE MAGNETIC PICK-UP

4.1 For best results, a gear with 20 pitch or courser should be used. The pick-up core should be set within .005"/.007" of the gear teeth to obtain the lowest operational RPM.

NOTE: The minimum voltage needed from the magnetic pick-up for proper operation is 2.5 volts RMS (AC).

4.2 Mount the magnetic pick-up to a secure, rigid bracket. Be sure the sensed gear will not hit the pick-up in the complete 360° of rotation.

5.0 WIRING (SEE WIRING DIAGRAMS)

5.1 MAGNETIC PICK-UP - Connect the two leads from the magnetic pick-up to the lower two terminals on the back of the tachometer (see General Hook-up).

5.2 OVERSPEED SWITCH WIRING (PTO, PTHO) - An overspeed condition actuates a normally open solid state switch in the tachometer; this is accessible through the "D" and "E" OVERSPEED terminals on the back of the device. See the Wiring Diagrams for several possible hook-ups of the overspeed output circuit. Unless the overspeed circuit is being powered from continuous DC current, it is necessary to connect the tachometer overspeed output to a latching device.

5.3 CLASS I, DIVISION 1 OPERATION - The PT series devices are CSA certified as intrinsically safe if powered from Altronic magnetic pick-ups 691 118 series (5/8"-18 thread) or 691 120 series (3/4"-20 thread).

A. Models PT-2100, PTH-2100 - Class I, Groups A, B, C, D

B. Models PTO-2100, PTHO-2100 - Class I, Group D when the overspeed output is connected to the Altronic DA series annunciator system.

6.0 BATTERY REPLACEMENT (PTH, PTHO)

6.1 A long life 3V. lithium battery serves as the memory power supply for the hours count when the device is not operating. Battery life is estimated at 5 years. If the battery needs replacement, use National type BR435 or return the device to an authorized Altronic distributor or dealer.

7.0 SETTING THE OVERSPEED TRIP POINT (PTO, PTHO)

7.1 DISASSEMBLY - The tachometer must be disassembled to set the overspeed trip point. Remove the three flush mounted screws holding the back panel to the gray tachometer case. Separate the back panel from the case.

7.2 CALCULATE SET NO. - To set the overspeed setpoint to the desired trigger RPM, first calculate the SET NO. as determined by the following formula:

$$N = \text{No. of gear teeth} \times \frac{\text{gear speed}}{\text{speed of interest}}$$

t = Overspeed reaction time (set by factory) = _____ secs.

$$\text{Overspeed Increment} = \frac{60}{N \times t} = \_\_\_\_\_ \text{ RPM}$$

$$\text{SET NO.} = \frac{\text{Desired trigger RPM}}{\text{Overspeed Increment}}$$ (round up the answer to the next whole number)

Actual Trigger RPM = Overspeed Increment X SET NO. (Rounded up)

7.3 ESTABLISH SET NO. - Establish the SET NO. in the tachometer by LEAVING those diodes that add up to the desired number. CLIP OUT the unwanted diodes. Each digit must be set as a separate number.

EXAMPLE: N = 118 teeth (gear speed = speed of interest)
t = 1/32 second (set by factory)

$$\text{Overspeed Increment} = \frac{60}{118 \times 1/32} = 16.27 \text{ RPM}$$

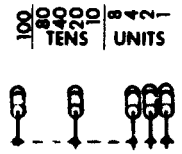
Desired trigger RPM = 2060 RPM

$$\text{SET NO.} = \frac{2060}{16.27} = 126.61$$ (Round up to 127)

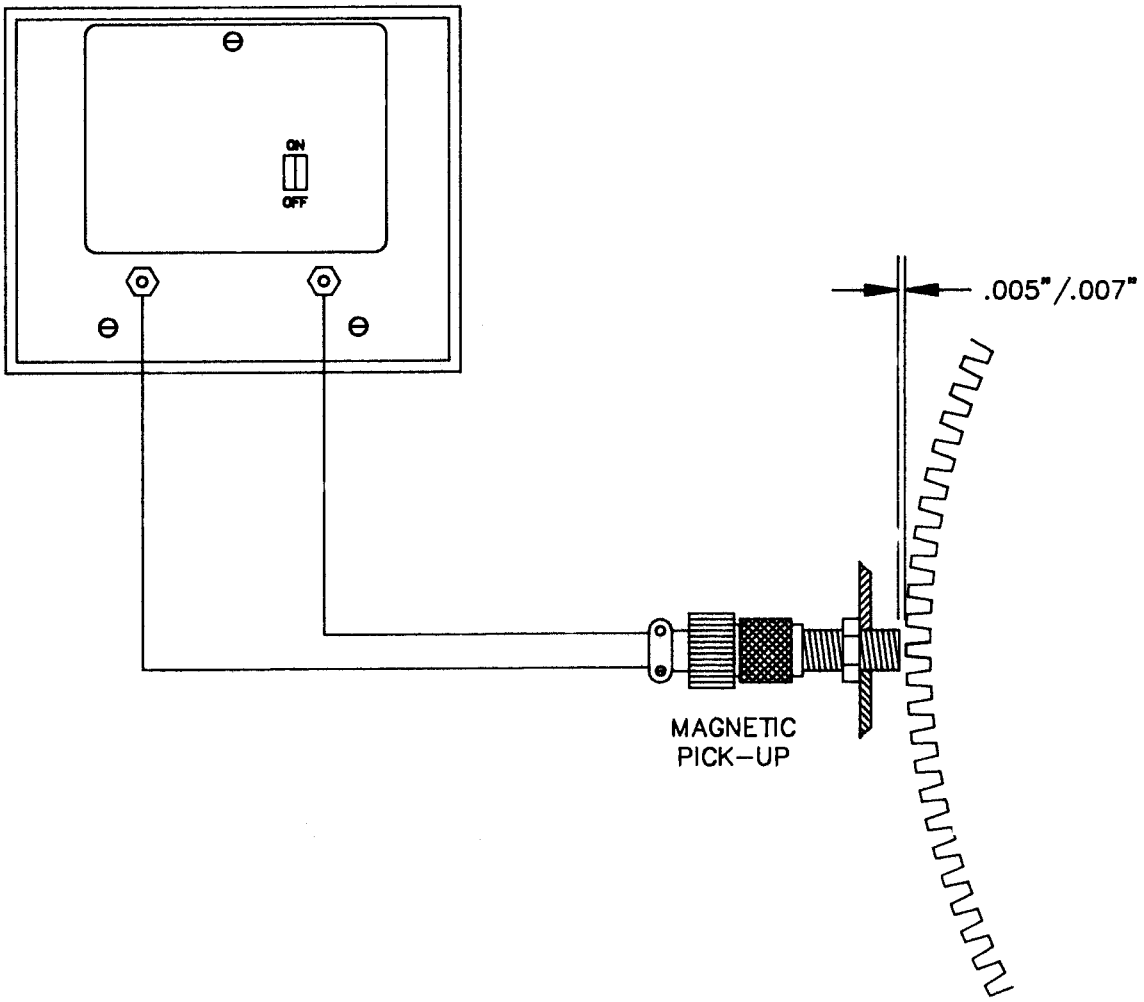
Actual Trigger RPM = 16.27 X 127 = 2066 RPM

NOTE: Shutdown will occur as low as the Actual Trigger RPM minus the Overspeed Increment.
EXAMPLE: 2066 - 16.27 = 2050 RPM

Set "127" with diodes: 100 = 100
20 = 20
7 = 4 + 2 + 1

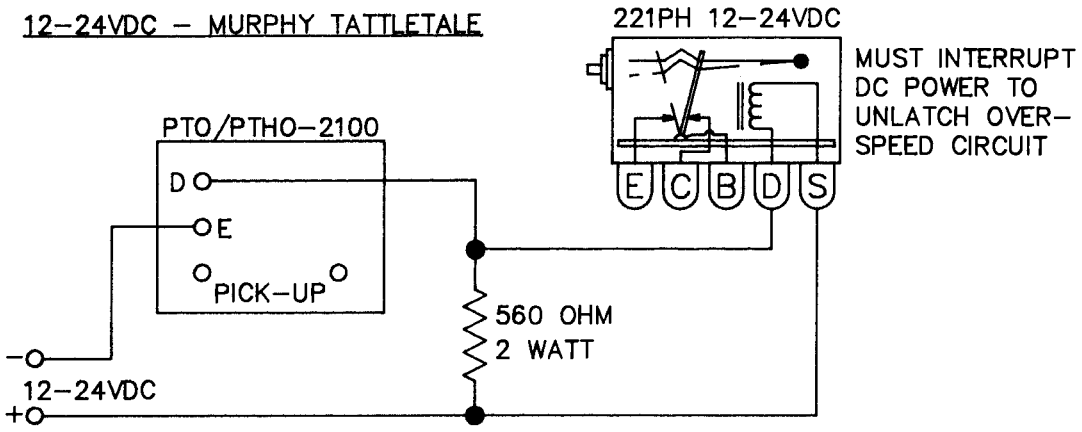


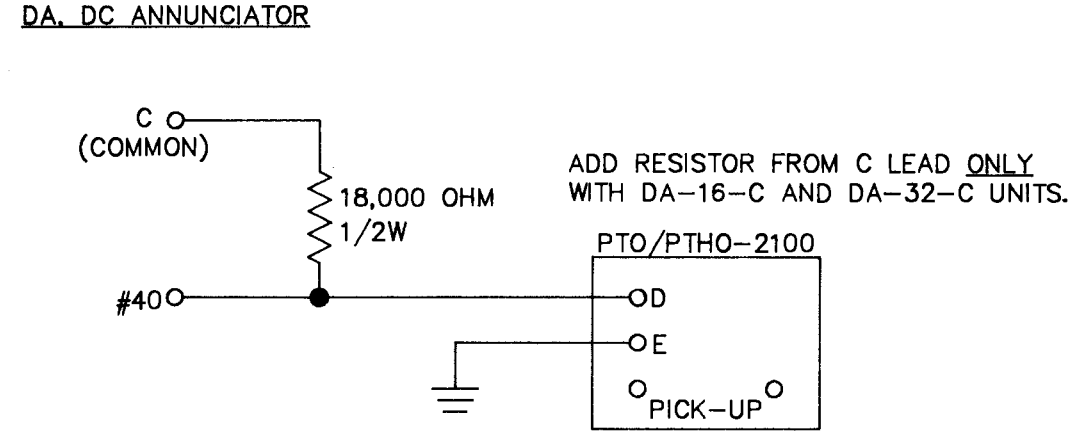
GENERAL HOOK–UP



RECOMMEND 8 TO 20 PITCH GEAR

WIRING DIAGRAMS – PTO–2100, PTHO–2100





NOTE: #40 SENSOR OF THE DA/DC ANNUNCIATOR MUST BE USED FOR OVERSPEED WITH AN ALTRONIC PTO/PTHO DEVICE.