Operations Manual

Juan – the Friendly Tachometer

Luxbeam Toronto

January, 2013

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	10/01/13	Initial release
Rev. 1	13/01/13	Accuracies amended and diagrams added

Contents

1.0 SAFETY INFORMATION

1.1 Laser

Avoid direct eye exposure to the laser. Special caution must be taken to avoid looking directly at laser light that is reflected off the phototransistor or any disk placed in the path of the laser.

1.2 Sensor Probe

Avoid contact with water. Avoid physical impact. Do not overly rotate the trimmable potentiometers inside the sensor. Do not plug the sensor to any device other than the Juan tachometer.

1.3 Signal Processing and Display Unit

Avoid contact with water. Avoid physical impact. Do not attach any device other than the Luxbeam approved laser sensor probe and 5V adapter.

2.0 TECHNICAL SPECIFICATIONS

2.1 Power

Input Voltage: 5 V DC
Max Current: 2 A

2.2 Laser Diode

Safety Classification: Class II
Wavelength: 630-680 nm
Max. Output: < 1 mW

2.3 Signal Processing and Display Unit

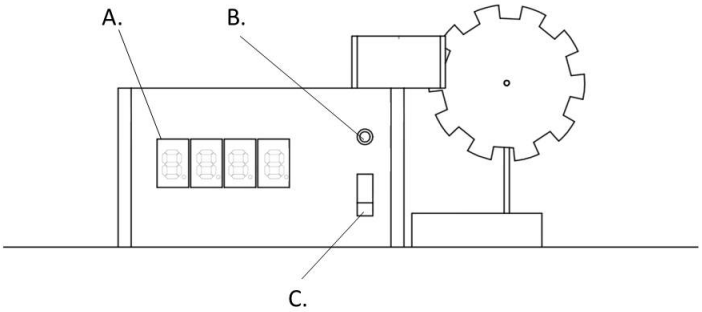
Maximum Count: 999.9 revolutions
Maximum RPS: 999.9 RPS
Maximum RPM: 998.4 RPM

Count Accuracy: ±.1 revolutions
RPS Accuracy: ±.1 RPS
RPM Accuracy: ±1.6 RPM

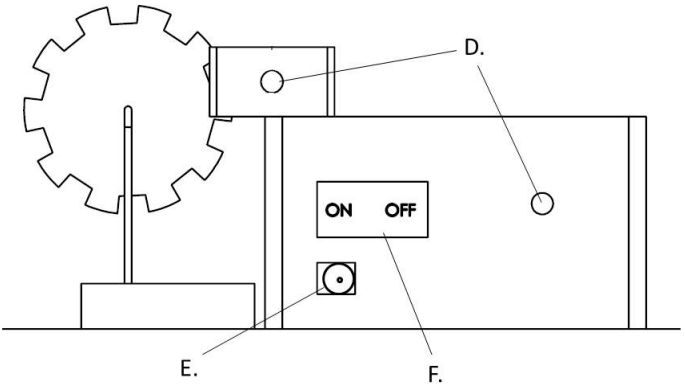
Delay Between RPS Update: 1 s
Delay Between RPM Update: 3.75 s

3.0 DIAGRAMS

3.1 Front



3.2 Rear



3.3 Legend

A. Display
B. Reset Button
C. Mode Selector Switch
D. 1/4" TRS Sensor Connection
E. 2.1 mm Coaxial Power Connection
F. On-off Switch

4.0 SETUP

4.1 Attaching the Slotted Disk to the Object Which is to be Measured

A disk with ten equally spaced slits must be attached to the axis of the spinning object to be measured. The slits must but cut at least 10 mm towards the center of the disk from the edge of the disk. The slits must also have an arc length of no less than 5 mm at the edge of the disk.

4.2 Connecting the Sensor to the Signal Processing and Display Unit

Ensure the power switch on the signal processing and display unit is at the off position prior to connecting the sensor to the unit. Connect the signal processing and display unit to the sensor using a TRS 1/4” cable. Ensure that the plug is completely inserted into the socket and that the connection is secure.

4.3 Connecting the Power Supply to the Signal Processing and Display Unit

Ensure the power switch on the signal processing and display unit is at the off position prior to connecting the sensor to the unit. Connect the unpolarized NEGA 1-15 plug in the provided 5 V adapter into a NEMA 1-15 or NEMA 5-15 socket. Connect the 2.1 mm plug into the corresponding socket in the signal processing and display unit.

5.0 OPERATION

5.1 Positioning the Sensor

As the motor spins, hold the sensor in a position such that the rotating disk can block the laser light passing through the sensor. The slits in the disk should allow light to pass through periodically. Keep the disk in the center of the slit in the sensor and prevent the disk from contacting the sensor.

5.2 Powering on the Tachometer

Ensure the sensor and power supply is securely connected to the signal processing and display unit. Move the switch from the off position (labelled “0”) to the on position (labelled “1”). The tachometer can be confirmed as on if the display lights up.

5.3 Selecting and Using Each Mode

5.3.1 Count Mode

To select the total count mode, move the mode selector switch to the full up position. The display should indicate the total number of revolutions counted. The count can be reset by pressing the red button located above the mode selector switch.

5.3.2 RPS Mode

The RPS mode can be selected by moving the mode selector switch to the middle position. The display should indicate the RPS observed in the last second. The display must be allowed to update at least twice after the RPS mode is selected to give a correct reading.

5.3.3 RPM Mode

The RPM mode can be selected by moving the mode selector switch to the full down position. The display should indicate the RPM observed in the last 3.75 seconds. The display must be

allowed to update at least twice after the RPM mode is selected to give a correct reading.

5.4 Powering off the Tachometer

Move the switch from the on position (labelled “1”) to the off position (labelled “0”). Confirm that the tachometer is off by checking that the display is not lit.

6.0 TROUBLESHOOTING

6.1 Unlit Display

Ensure the signal processing and display unit is plugged in and the power switch is set to the on position. Ensure there is power from the wall socket.

6.2 Display Only Shows Zeros

6.2.1 Loose Connections to the Sensor

Ensure the probe is plugged in and that the connection is secure at both ends. If the laser is not on, the probe is not receiving power or is broken. Caution must be taken to avoid looking directly into the laser beam.

6.2.2 Reset Button

Ensure the reset button is not inadvertently pressed or stuck in the pressed position. If the reset button is stuck, gently pull it loose.

6.2.3 Aiming of the Laser

After opening the box, verify whether the laser beam hits the phototransistor directly. If not, adjust the phototransistor as necessary. Ensure that the phototransistor is securely in its socket, with the flat side facing away from the laser and the lens facing the laser.

6.2.4 Sensor Calibration

The sensor uses a phototransistor and a Schmitt trigger to determine whether the laser beam is obstructed or not. If the voltage from the phototransistor is above a certain threshold, the beam is considered unobstructed. If the voltage is below a certain threshold, the opposite is true. Depending on ambient lighting and degrading of the laser's power over time, these

thresholds need to be adjusted. After opening the box, two trimmable potentiometers are visible. The one labeled RFB determines how close the two thresholds are. If the data is very noisy, or much higher than expected, turn it counter clockwise. If the data is not being outputted or is much lower than expected, turn it clockwise. The one labelled R1 determines the magnitude of both thresholds; rotate it counter-clockwise if there is much ambient light or clockwise if the laser beam is not being recognized. **Neither potentiometer should be adjusted to its fully counter clockwise position which makes its resistance zero.**