Stalker Hump Yard Sensor II
User's Manual
011-0223-00 Rev. A

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1. Overview

The Stalker Analog Speed sensor is Doppler radar in a small, rugged housing. The sensor outputs an analog signal (sinusoid) with its frequency proportional to the speed of the target. The amplitude of the output signal is proportional to the size and/or the distance of the target to the sensor. The Stalker Analog Speed sensor can be set up through its RS232 port.

2. Specifications

GENERAL SPECIFICATIONS

Product Type	Analog Speed Sensor
Operating temperatures	-30°C to +70°C (-22°F to +158°F) 90% relative humidity
Storage Temperatures	-40°C to +85°C (-40°F to +185°F)

MICROWAVE SPECIFICATIONS

Operating Frequency	24.125 GHz (K-band)
Frequency Stability	±50 MHz
Antenna Type	Planar array
3 dB Beam Width	30 by 32°
Power Output	18 dBm EIRP

ELECTRICAL SPECIFICATIONS

Supply Voltage 10 - 22 VDC

Current (at 12 VDC Nominal)	Transmitter On: 210mA, Transmitter Off: 130mA

PHYSICAL SPECIFICATIONS

Weight	13 oz (0.35 kg)
Size (LxWxH)	4.4 x 3.9 x 1.6 inches 11.2 x 9.9 x 4 cm
Case Material	Aluminum die cast

PERFORMANCE SPECIFICATIONS

Speed Range	Max target speed: 200 MPH (89 meters/sec)
Target speed versus output frequency	**1.39×10^{-2} Hz per mph** (6.217×10^{-3} Hz per m/s)

3. Electrical connections

Refer to table 1 for the connections to the sensor.

Table 1: I/O Cable pinout

Pin number	Wire Color	Primary function
1	Brown	Squelch Input
2	Red	RS232-RX(To computer)
3	Orange	RS232-TX(From computer)
4	Yellow	DC IN
5	Dark Green	DC IN
6	Blue	GND
7	Violet	Analog VOUT-
8	Gray	Analog VOUT+
9	Black	GND
10	White	Do not connect
11	Pink	Test Input
12	Light Green	GND

The diagrams in Figure 1 show the pinouts of the cable and sensor connector as mated

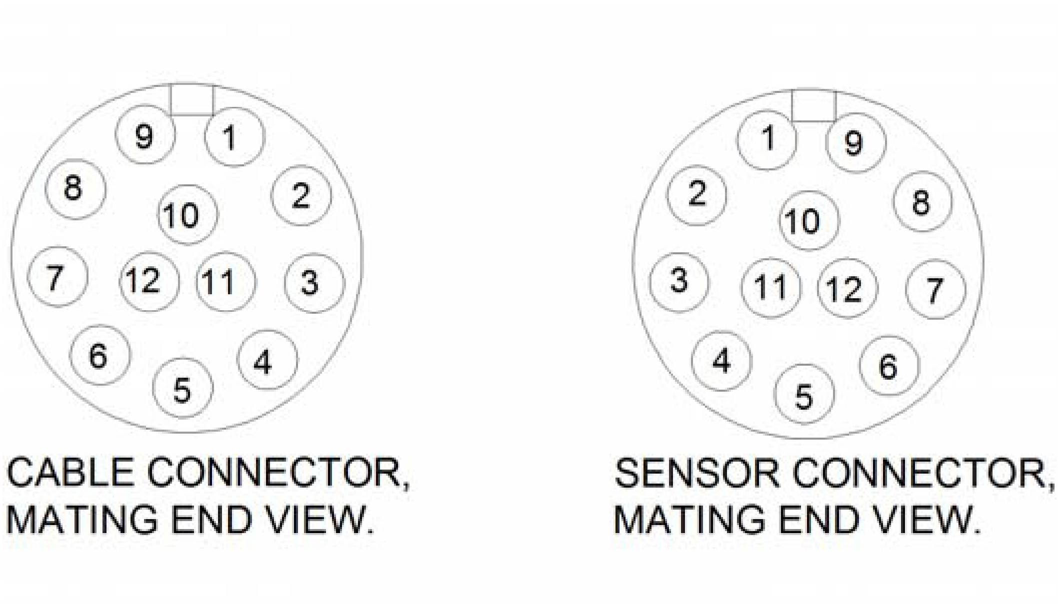

Figure 1

3.1 Pin Descriptions

1: Squelch input: Short this wire to ground (or connect it to pin 6, blue wire) to disable the transmitter. When the squelch is activated, the sensor will not see any target.
2:RS232-RX: RS232 signal from the sensor to a computer running the set up software
3:RS232-TX: RS232 signal from a computer running the set up software to the sensor
4:DC IN: DC power input to the sensor. Connect to a DC source with a voltage between 10V and 22V. **Any voltage above 24V will permanently damage the sensor**
5:DC IN: DC power input
6: GND
7: Analog VOUT-: Negative leg of the differential analog signal out.
8: Analog VOUT+: Positive leg of the differential analog signal out. The sensor is set to drive a differential load.
9: GND
10: Do not connected: currently not used
11: Test input: Short this wire to ground to activate the test mode. With the test mode activated, the sensor will output an 1150 Hz sinusoid, which corresponds to a 16mph target. This test signal can be used to set up the gain of the sensor.
12:GND:

4. Analog sensor's operation

The sensor has two modes of operation: The fixed gain mode and AGC (Automatic Gain Control) mode. These modes can be selected by the operator using the sensor's set up software (through the RS232 port). The operation of the configuration software is described in a separate document.

In the fixed mode, there are 256 levels for the gain.

The AGC mode is actually a combination of an AGC portion and the fixed gain, which means that if a sensor is set to AGC mode and the output signal saturates, the user can reduce the fix gain. The output signal saturates at ±12VDC. Note that in the AGC mode, the output signal looks like "noise" when there is no target.

The sensor is configured to drive a differential load. The matching impedance is 600ohms. Any load impedance lower than this value will result in lower amplitude of the output signal. A load impedance of 600ohms or greater is recommended. Figure 2 and Figure 3 show a typical output signal at different load impedance.

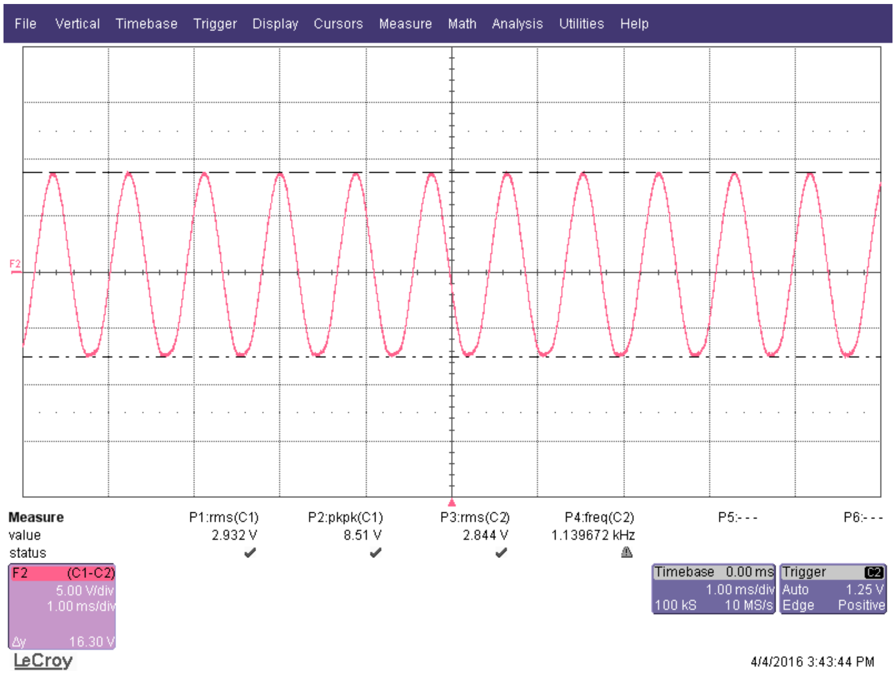

Figure 2: Differential output signal from the sensor. The differential load was 1kohm. The frequency was 1.135kHz which corresponds to a 16mph target. The amplitude of the differential signal is 16.3V in this case.

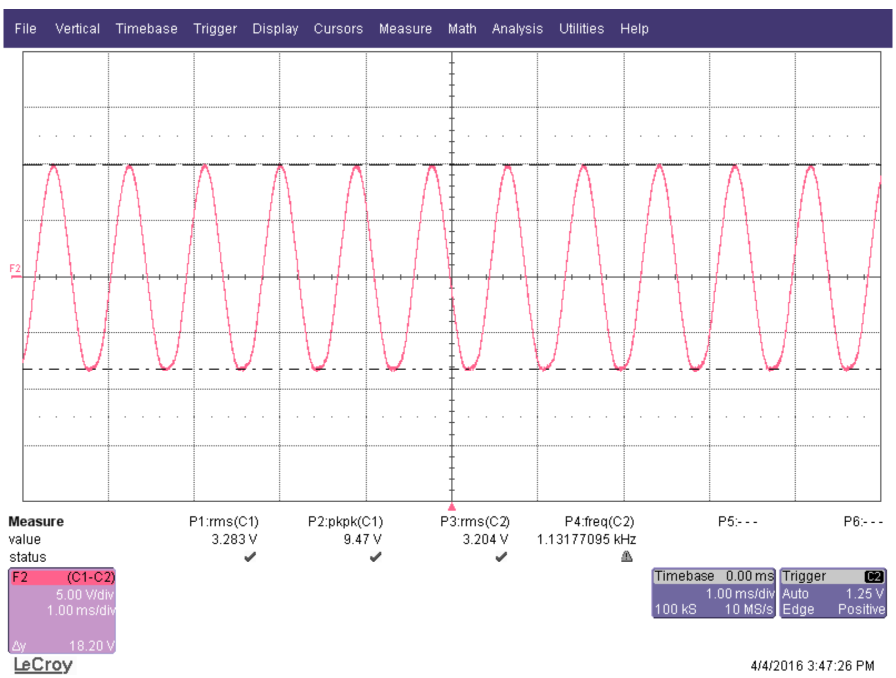

Figure 3: Differential output from sensor. The load was 10kohms. The output frequency was 1.135 kHz which corresponds to a 16mph target. The amplitude of the differential signal is 18.2V in this case.