

Hapeman Speed Sensor Tester Manual



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Speed Sensor 2020 Manual

Background

The Hapeman Speed sensor tester is used to check the operation of the speed sensor and its placement and orientation in the motor. It also checks that every tooth in the speed sensor gear is present and is not damaged. Correct speed sensor operation is critical in the correct operation of the traction motor and the proper operation of the locomotive drive system.

Setup

Connect power to the Speed Sensor tester and connect the speed sensor test cable to speed sensor. Be sure that all cables and equipment are clear of any rotating and energized parts. Open the speed sensor software by clicking on the Icon. Before testing rotate the motor between 500 to 1000 RPM.

Login

Please fill in the "User Name" field with your name, Select the correct Motor Information, and enter the corresponding Frame Serial Number. When this is complete, press Enter.

The screenshot shows a software window titled "Please Login". It contains the following elements:

- Enter User Name:** A text box containing the text "GE".
- Motor Information:** A list box containing the following items: GEB-7C1, GEB-8, GEB-9, GEB-13 (highlighted in blue), GEB-14, GEB-16, GEB-17, and GEB-23.
- Enter Frame SN:** A text box containing the text "Enter Frame SN".
- Enter:** A button located at the bottom right of the window.

Software Layout

Operator: Ge
Motor Type: GEB-13
10/30/2020 6:36:40 AM

Frame Serial No: 1
Speed Sensor Serial No: 1
Standard Rotation: Viewed from drive end. CCW (selected), CW

SPEEDSENSOR WAVEFORMS

Legend:
Pin C (v1)
Pin D (v2)
Pin F (v1')
Pin G (v2')

Channel Delay:
Ch1-Ch2: 0
Ch1-Ch3: 0
Ch2-Ch4: 0

	(V1)	(V2)	(V1)	(V2)	Motor Speed
Frequency	0	0	0	0	0
Peak Voltage	0	0	0	0	0
Duty Cycle	35	0	0	0	65

Green

The Run button performs the primary functional test on the Speed Sensor/Speed Gear verifying all sensor channels are operating correctly and the channel delay is correct.




Blue

The Run With Analysis button performs the standard speed sensor test first then adjusts the amount of data collected as necessary to perform an analysis of the speed gear. The goal of this test is to find possible defects on the teeth of the gear.

Red

This setting must match the actual rotation of the motor for the test to run properly.

Preliminary Test (Run)

Operator: **Ge**

Motor Type: **GEB-13**

Frame Serial No: **1**

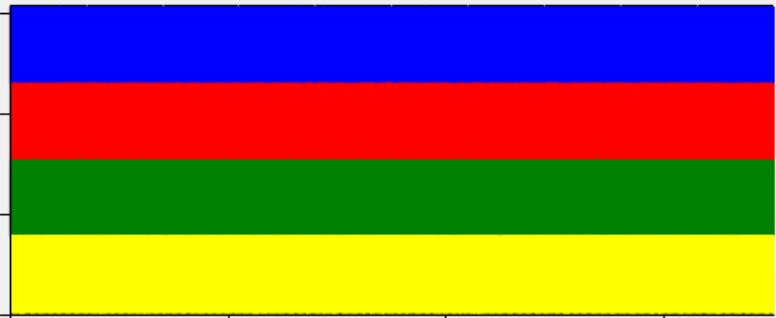
Speed Sensor Serial No: **1**

10/30/2020 6:37:26 AM

Standard Rotation: **CCW**

Viewed from drive end.

Speed Sensor Passed



Channel Delay

Ch1-Ch2: -73.65

Ch1-Ch3: .00


Ch2-Ch4: .00

		(V1)	(V2)	(V̄1)	(V̄2)	
Click to Run	Frequency	1325.7	1325.7	1325.7	1325.7	Motor Speed: 414.3
	Peak Voltage	16.6	16.1	16.0	16.1	
	Duty Cycle	35	45.7	39.0	52.3	

Saving Data.

After running the preliminary test, it will either pass and show the above message, or fail and show you a failure message with an exact description of the failure as presented below.

Delay Ch1-Ch2 Bad



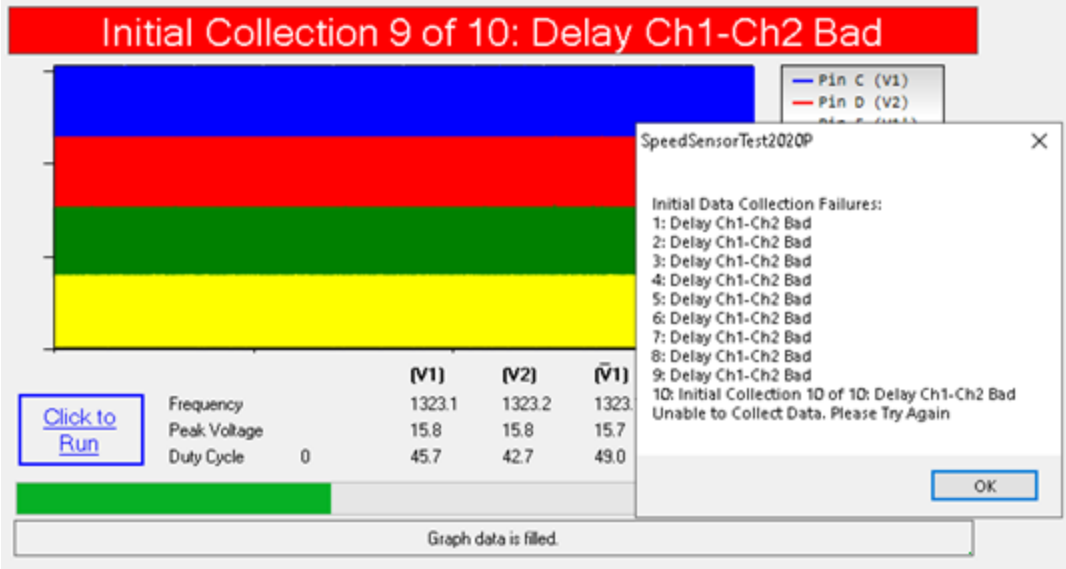
Channel Delay

Ch1-Ch2: -74.50

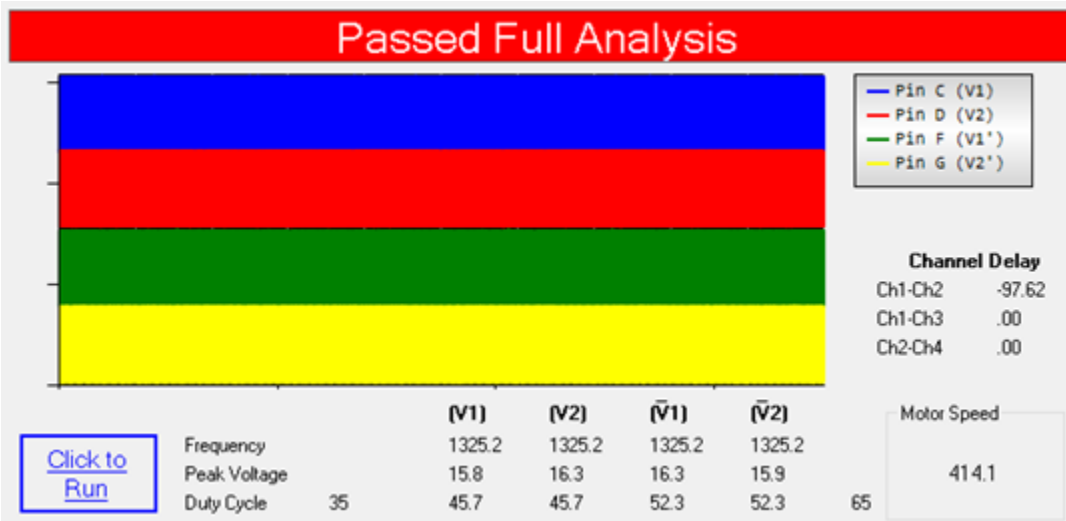
Ch1-Ch3: .00

Ch2-Ch4: .00

		(V1)	(V2)	(V̄1)	(V̄2)	
Click to Run	Frequency	1321.7	1321.7	1321.7	1321.7	Motor Speed: 413.0
	Peak Voltage	16.9	16.1	17.9	16.4	
	Duty Cycle	0	45.7	42.7	52.3	

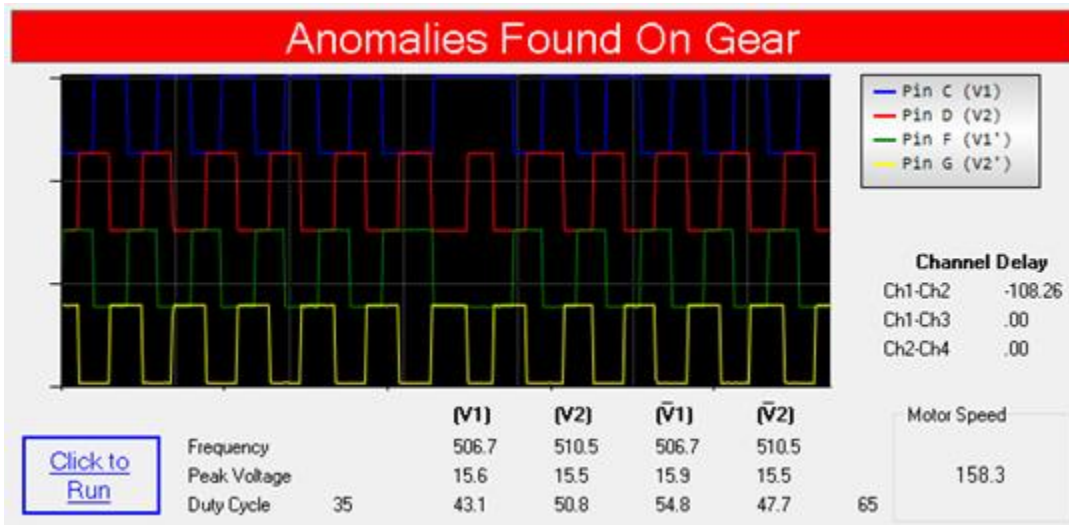


Extended Full Test (Run W/ Analysis)



A successful extended test.

This is a failure to pass the initial test.



This happens when an anomaly is found on the gear. This is usually a missing tooth. The graph will zoom in on the anomaly as pictured.

Troubleshooting

Delay Channel Ch1-Ch3

Check that the Motor rotation is correct on the screen and the motor. Correct if necessary.

Missing Teeth.

Check the speed sensor gear for anomalies by removing the sensor and looking into the hole slowly rotating the motor. Check for cuts in the gear teeth and debris in the gear teeth.

Missing Channels

Change the sensor. Check the connection to the Speed sensor check the condition of the cable and the test cable.

Parts List

Part Number	Description
HE 87000	HE Speed Sensor Parts List
87010	Laptop Computer w/ Software
87011	Pico Scope
87012	Speed Sensor Power Supply
87013	Speed Sensor Kit Cable 15 foot
87014	Protective Case
	Contact Hapeman for pricing and availability



Part # 87013 Speed Sensor Cable