Rail Switch Service LLC.
Test Bench Construction and Test Procedure for Wheel Sensors

To assemble a simple test bench to evaluate sensors you will need the following items:

1.One standard main module (PN 300/001)

2. 12 volt battery or 12 volt power supply

3. 1 amp fuse and fuse holder

4. Electrical wiring in 16-18 gauge size.

5. Wheel Detection Software, available at our website, www.railswitchservice.com under "Schematics and Manuals".

6. Programming cable for the Main Module (PN 300/PC).

Other items that would be useful but not entirely necessary are:
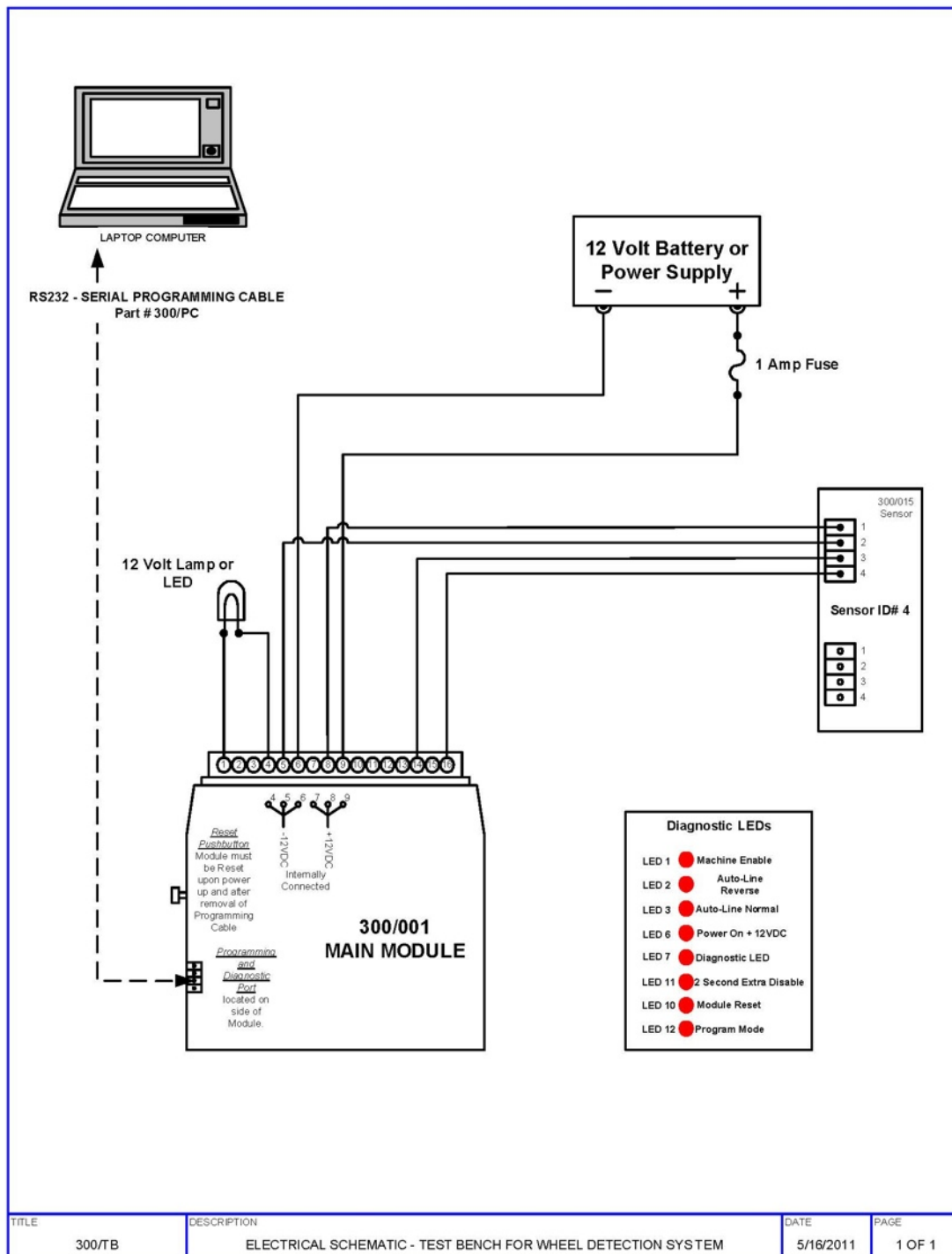
7. DIN rail to attach the main module to.

8. Small 12 volt light or LED to wire into the Main Module at "pin 1" to show when the output of the Main Module is on or off.

Note: A spare wheel counter connector should be added and left at the end of the test cable to allow ease of connecting and disconnecting the wheel sensors being tested.

Begin by wiring the Main Module using the supplied schematic on page 2:

Rail Switch Service LLC.
Test Bench Construction and Test Procedure for Wheel Sensors

LAPTOP COMPUTER

RS232 - SERIAL PROGRAMMING CABLE
Part # 300/PC

12 Volt Battery or
Power Supply
−   +

1 Amp Fuse

12 Volt Lamp or
LED

300/015
Sensor

1
2
3
4

Sensor ID# 4

1
2
3
4

Reset
Pushbutton
Module must
be Reset
upon power
up and after
removal of
Programming
Cable

4 5 6 7 8 9
-12VDC   +12VDC
Internally
Connected

Programming
and
Diagnostic
Port
located on
side of
Module.

300/001
MAIN MODULE

Diagnostic LEDs

LED 1 — Machine Enable

LED 2 — Auto-Line Reverse

LED 3 — Auto-Line Normal

LED 6 — Power On + 12VDC

LED 7 — Diagnostic LED

LED 11 — 2 Second Extra Disable

LED 10 — Module Reset

LED 12 — Program Mode

TITLE	DESCRIPTION	DATE	PAGE
300/TB	ELECTRICAL SCHEMATIC - TEST BENCH FOR WHEEL DETECTION SYSTEM	5/16/2011	1 OF 1

After wiring is complete, close or install the fuse to the main module. You should have only the #6 LED on the main module lit at this time. Connect the programming cable to the 4-pin plug under the red re-set button on the main module and to your computer. Typical connection port would be the serial port but most later laptop computers do not have this specific port arrangement. If this is the case, you will need a USB to Serial Port Converter. After connecting the programming cable, the #12 LED should come on indicating that the main module is in programming mode.

Open the Wheel Detector System Setup Software. The first page you will see is the main module page. To establish that you can communicate to the main module, click the "Read" button in the upper left hand box labeled "Main Module Setup". If your computer is configured correctly, you should get a "read-out" of the ID numbers programmed into that main module in the large white box in the upper right corner of the software page. If you get a "Communication Error", go to the top of the page and select the "Communication" tab. On the pull down menu, first select "Line type" and verify that RS 232 is checked. Then go to the "Comm. port" tab. Select the next Comm. port and try the "Read" tab in the Main Module Setup. Continue this step until you either establish communication or exhaust all of the four Comm. ports available on the pull down menu. If still not able to establish communication, you will have to go into your "Device Manager" and manually configure the Comm. port to accept Comm. 1 thru 4.

After successfully establishing communication with the main module, hook the test cable up to your wheel sensor that is to be tested. There are a few important items to getting accurate test results from the wheel sensor. They are as follows:

1. Sensor should not be tested on top of a metal surface. A wooden desktop or non-conductive surface is best.
2. Once the sensor is connected and "powered up", do not move the sensor at all. This could affect the "pass or fail" portion of the software test. If you do have to move the sensor while it is hooked up, power the whole "Test Bench" down then back up to recalibrate the sensor to its environment.
3. Have your "Testing Tools" ready for the Scan/Monitor test and the vibration test portion of the test procedure. Simple test tools consist of a standard metal railroad spike to input simulated wheel counts over the wheel sensor and a piece of wood or non-conductive item that will be used to tap on the coils of the wheel sensor to induce vibrations. Note it is recommended that the metal test tool used to stroke the sensor to simulate wheel counts be at least 5 inches long. Too short of a test tool may give inconsistent results.

4. Do not have other sensors or any metal objects around the sensor being tested. Other sensors in close proximity of the test sensor will result in a false "Fail" during the scan test.

To begin testing the wheel sensor, select the "Diagnostics" tab. Click the "Check Now" button and let the software complete its scan of the wheel sensor. After the scan is complete, the parameters of the wheel sensor will be displayed in the white box at the bottom of the page. If no information is displayed and the message below the "Check Now" button is "No sensors were detected", the sensor may have a major failure common to extreme lightning damage. Cycle the power on the test bench to recalibrate and try the "Check Now" once again. If the same results are displayed, the sensor is non-functioning and cannot be put back in service without being rebuilt. If you do get a good scan and information is displayed in the white box, the very last column will say "Pass" or "Fail". If you get a "Fail" message, cycle the power on the test bench and run the scan again. If the results are the same, record the parameters for future reference when checking the parameters against standard settings. This sensor is non-functioning and cannot be put back in service without being rebuilt. If you get a "Pass" message, write the ID number displayed in the first column down for use in Scan/Monitor testing later. Even if you get a "Pass" message be sure to check the factory set "Threshold" level displayed in the second and fourth columns in the parameters. The factory settings rarely ever change, and will not result in a "Fail" if they are incorrect, so these parameters need to be checked every time you scan a sensor. The factory settings should be 05 on Coil 1 (+) and 08 on Coil 1 (-), the same for Coil 2, 05 on Coil 2 (+) and 08 on Coil 2 (-). If these parameters are anything other than the factory parameters, the sensor will not count efficiently and should be reset to the factory settings. These settings can be easily reset. Go to the "Wheel Sensor Tab", in the lower right corner, click the "Start" button on the Wheel Sensor Auto Detect box. Allow the software to identify the sensor, then double-click on the ID number that is displayed in the "Sensors Detected" box. This will put the ID number of that wheel sensor in all of the boxes on this page. At this time click the "Send" button on the lower left corner of the page. This will send the factory parameters to the wheel sensor.

Note: Be sure to cycle the power on the test bench to lock-in the changes to the wheel sensor. You can now go back to the "Diagnostics" tab, click "Check Now" and read the sensor to ensure that the threshold levels were restored to the factory settings. This portion of the "Diagnostics" testing is complete.

Select the "Main Module" tab. In the upper left corner of the page, place your curser in the small white box beside the "Sensor ID Number" and type in the ID number of the

sensor being tested. On the upper right side of the page, find the "Add" button and click once. This will add the ID number of the sensor into the large white box on the upper right side of the page. Single click the ID number, this should "highlight" the ID number. Go to the bottom left corner of the page and single click the "Scan Single" button. The "Scan Active" light should start blinking indicating that the sensor is being monitored. Take the rail spike or metal device that will be used to simulate wheel counts and stroke it directly over and on top of the wheel sensor. No air gap will need to be maintained, the top of the sensor can be contacted during this test.

 Depending on the ID number of the wheel sensor, one direction being stroked will result in a "Wheels in Zone" message, the other direction will subtract wheels from this "Zone". Be sure to put several "wheel counts" in both directions to verify that the sensor counts both up and down. When you determine which direction will input wheels "into the zone", add at least 4-5 wheel counts.

While observing this wheel count number, take the non-conductive/wooden item selected to induce the vibrations into the sensor and tap on both ends of the sensor at least 10-20 times each end, while holding the sensor firmly to the test bench. If there is no variance in the "Wheels in Zone" number, increase the severity of the tap until it is obvious that the number in the box is not going to change. If this wheel count number changes while performing the "Tap Test", then the sensor is possibly unstable and should not be put back in service. If the sensor is unstable, you will possibly see these wheel count numbers change even with slight tapping of the sensor.

This final test completes the standard "First Level" of testing and will allow the customer to do their own Pass or Fail evaluation of the wheel sensors removed from the field that have been deemed questionable. In most cases, the field technician has to "get in" and "get out" so quick that field replacement is the most logical alternative when there is only a 15 minute window of opportunity. This usually fixes the problem, but only because the wiring connections at the sensor were renewed and this would have fixed the original fault.