



Technical Bulletin

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Summary: Instructions for mounting, aligning and setting up the 2100-696 Frauscher Zero-Speed Dual Gating Assembly for use with the SmartScanNG².

Critical (Affects safe operation of a system)

Informational

Distribution List:

SmartScanNG² / Frauscher Zero-Speed Transducers – Installation & Setup

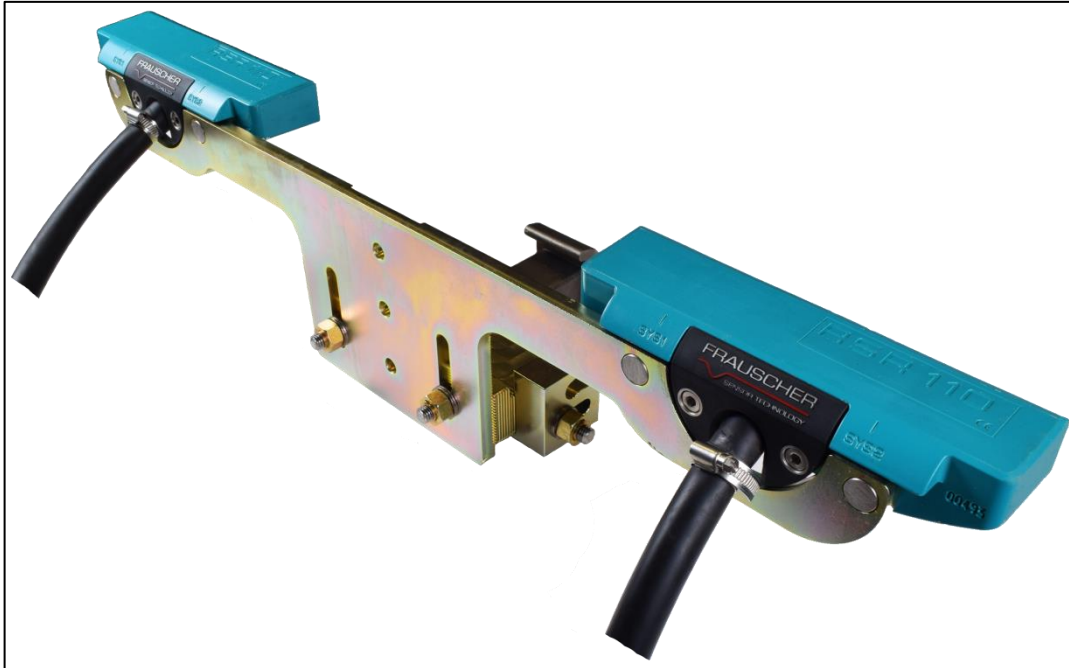
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Introduction

2100-696 Frauscher Zero-Speed Dual Gating Assembly



The Frauscher Zero-Speed Dual Gating Wheel Detector Assembly is a rail-mounted device that generates precision wheel timing signals for the SmartScanNG² Defect Detector. The combination of inductive operating principles and the robust design of the RSR110 sensors guarantee high reliability, even when subjected to extreme mechanical, electromagnetic, climatic, and environmental working conditions.

The following link to our web page provides additional resources, including instructional videos.

<https://www.southern-tech.com/products/item/wheel-detector-frauscher-dual-gating>

Acronyms

SICM: System Interface & Controller Module – Electronics package mounted on the chassis providing interface circuitry and several modes of communication to two onboard microprocessor modules running custom engineered software.

TO1, TO2: Wheel Transducer 1 and Wheel Transducer 2 – The wheel sensors provide signals for the SICM to calculate speed, direction, and a reference location for bearing and wheel temperature measurements.

UTB: Universal Transient Barrier – Brand name from ERICO for electrical surge protections device.

WSC: Frauscher Wheel Signal Converter – Interface device used with early versions of the SmartScanNG² before transducer incorporating interface circuitry into the SICM.

Preparation

Tools Required

- 11/16" Socket
- 7/8" Socket
- 7/8" Wrench
- 1-1/2" Socket
- Torque Wrench (foot-pound)
- External Retaining Ring Pliers
- 6 mm Hex Key Wrench
- Straight Slot Screwdriver approximately 1/8 inch wide.
- Wire cutters
- Wire Strippers

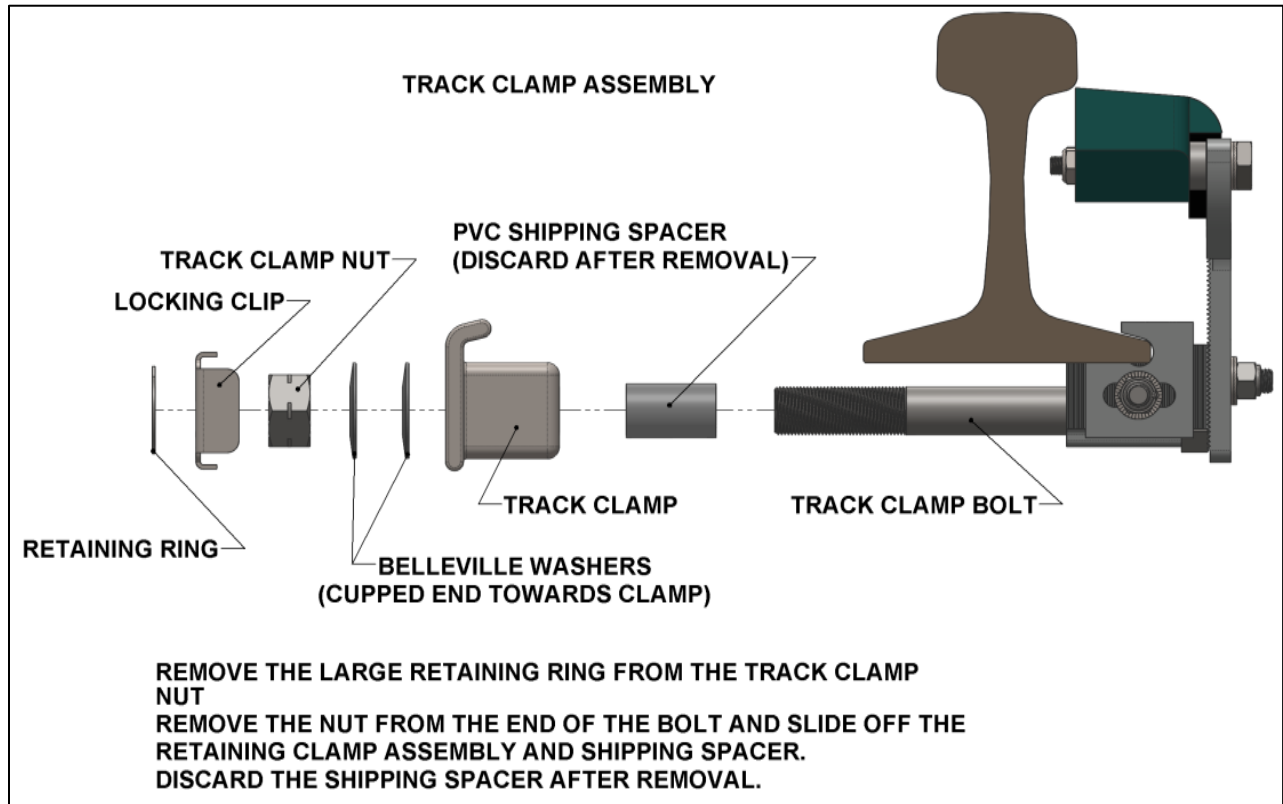
Default Configuration



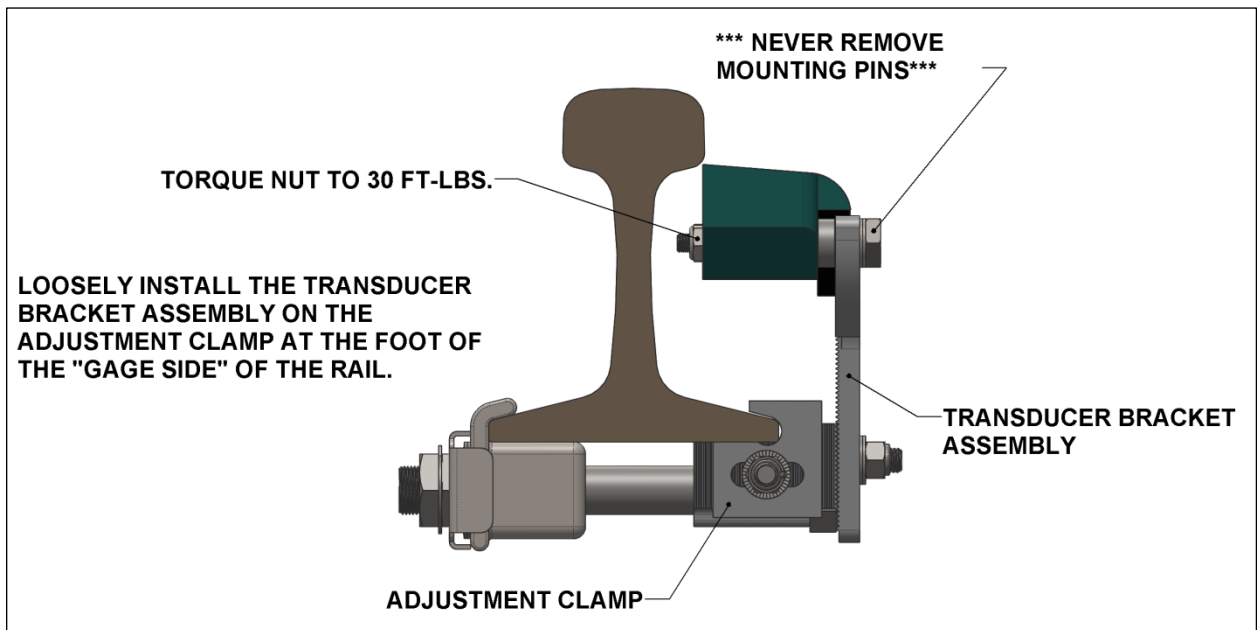
The 2100-696 Double Gating Transducer brackets are pre-adjusted for 132lb – 141 LB. rails.

Installation

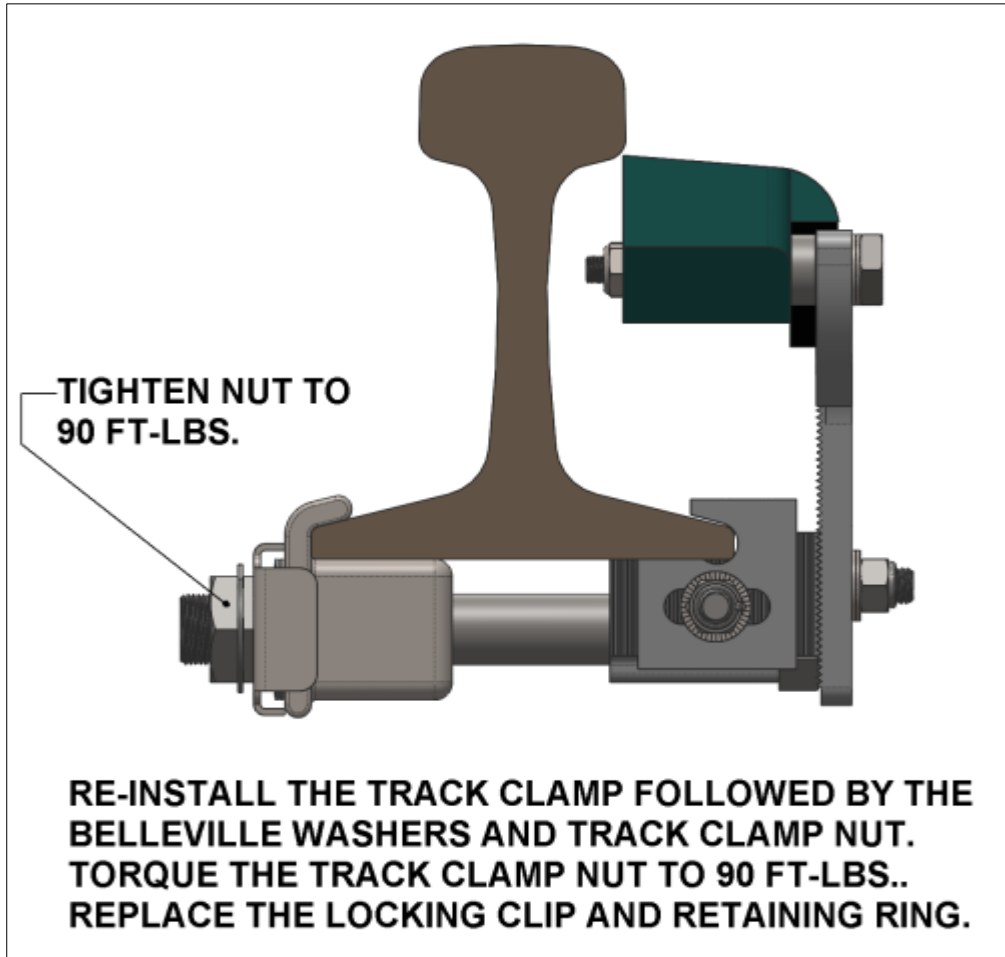
Removal of Mounting Hardware



Locate Mounting Bracket on Foot of Rail

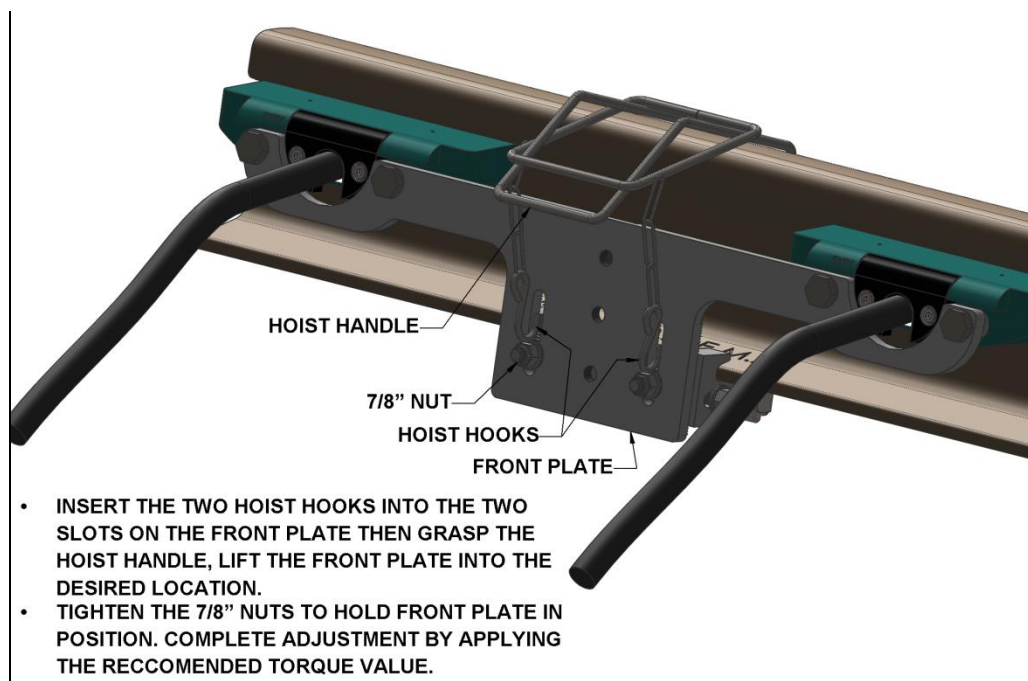
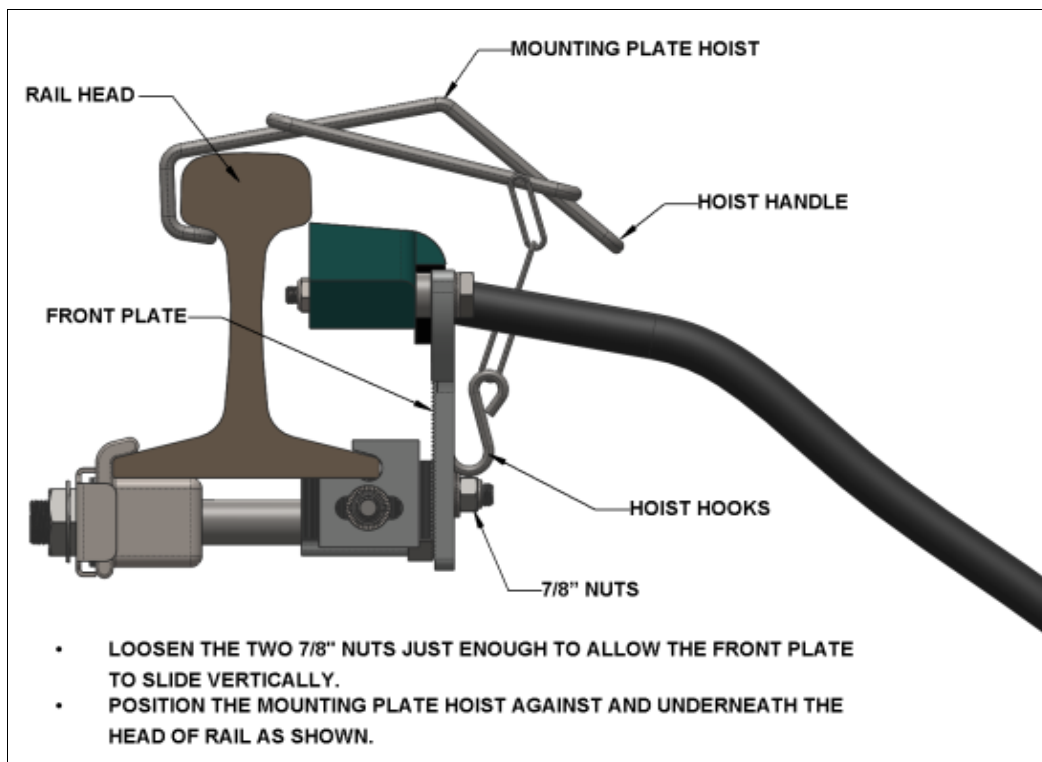


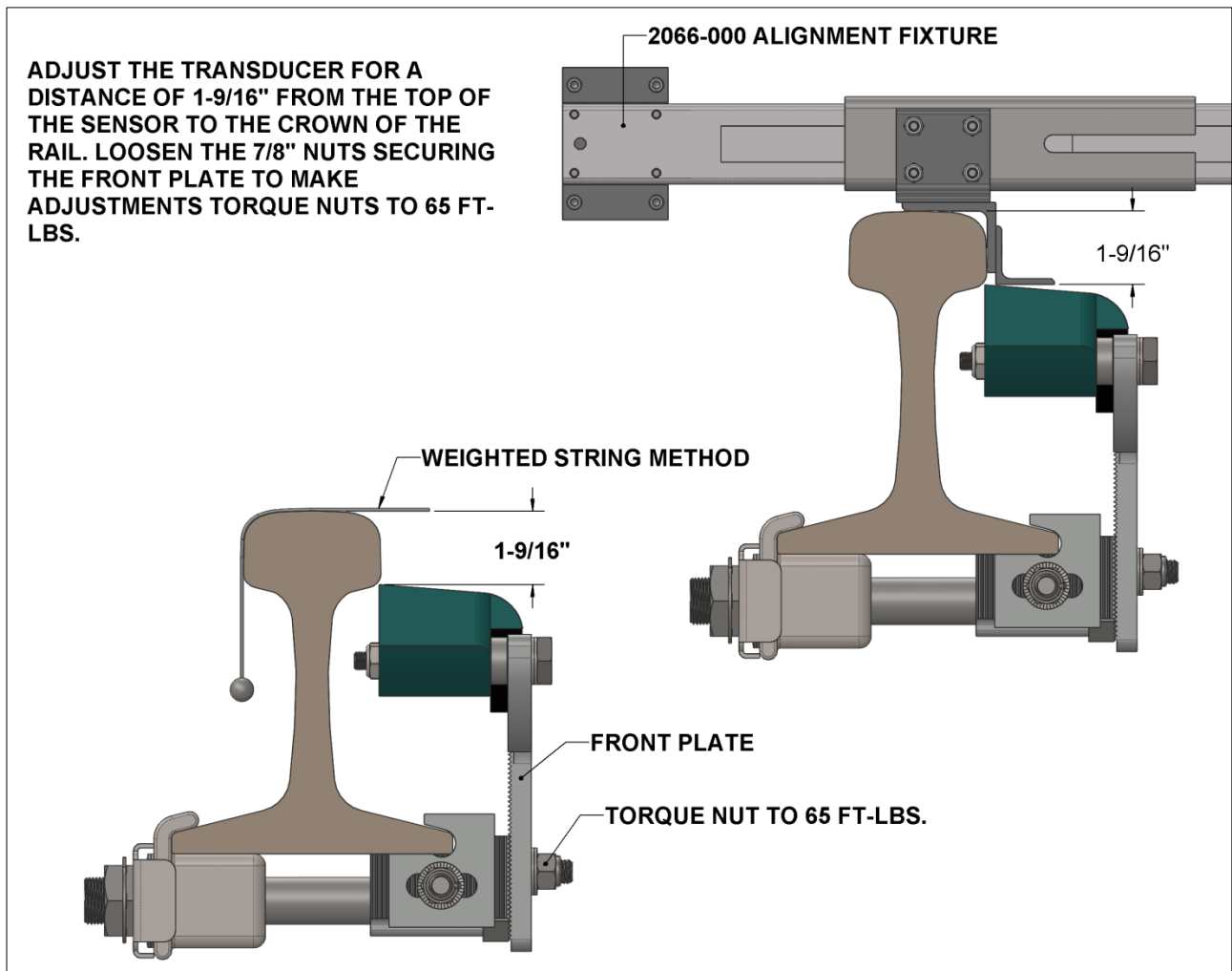
Installation of Transducer Assembly



Alignment

Vertical Adjustment

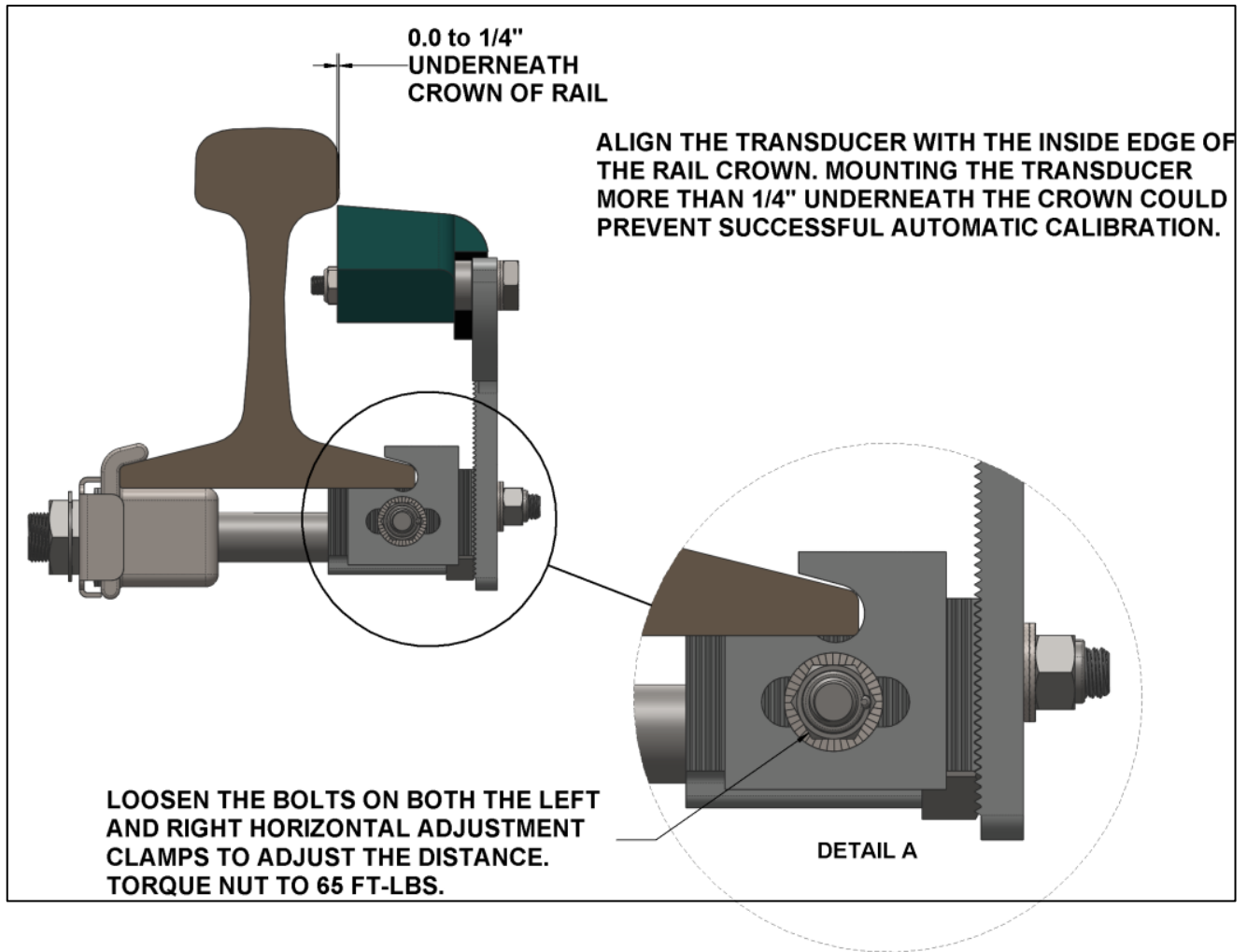




Loosen the two 7/8-inch nuts securing the Adjustable Mounting Plate and move the transducers into adjustment, referring to the dimensions above.

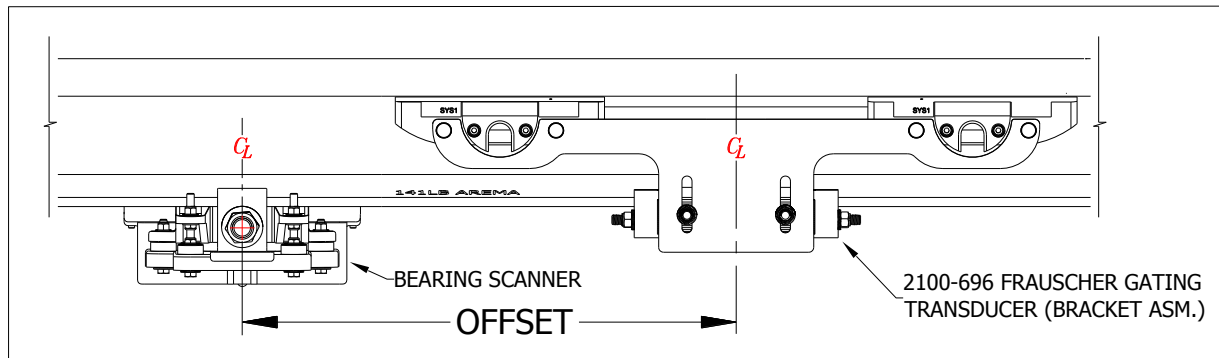
Note: The transducer can be lowered one or two additional adjustment detents below the Alignment Fixture, and still be within specification, which on rare occasions may be necessary for successful transducer calibration. Each adjustment detent represents 0.100 inches.

Horizontal Adjustment



Offset Measurements

Measuring the Location of the Bearing Scanners



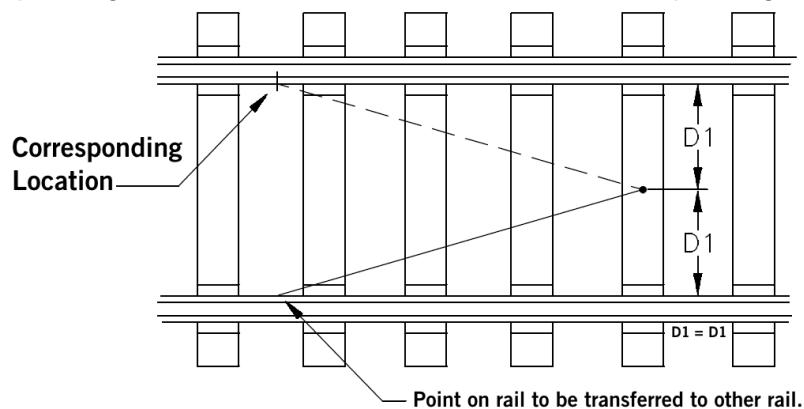
Note: When using the Frauscher Gating Transducers, you are not limited to mounting the Bearing Scanners and Wheel Scanners in specific locations as with the Magnetic Transducers. Centering the scanners in the crib is recommended for convenient access and isolation from vibrating crossties. Always aim the view of the Bearing Scanners toward the Frauscher Gating Transducers. The OFFSET dimension cannot be more than 100 inches. However, locate the Bearing Scanners in the next crib over from the Gating Transducer whenever possible to maintain a standard installation configuration.

- Obtain the OFFSET dimension as illustrated above for the Bearing Scanner mounted on the same rail with the Gating Transducers.
- Using the method below, transfer the location from the center of Gating Transducer mounting bracket to the other rail, to establish a reference point for measuring in the next step.
- Obtain the OFFSET dimension for the second Bearing Scanner by measuring from the point that you transferred to the center of the Bearing Scanner mounting bracket.
- Write down both OFFSET values. They are entered, to nearest the inch, in the “[Entering Setup Parameters](#)” section of this document.

Method for Transferring a Location to the Opposite Rail

Refer to the illustration below.

1. At equal distances between the rails place a mark on the fourth crosstie from the point to be transferred, as represented in the figure below between the two D1 dimensions.
2. Measure from the mark that you made on the crosstie to the point on the rail that you need to transfer to the other rail. Use this dimension in the next step.
3. Measure the same distance from to the mark in the center of the crosstie to the Corresponding Location on the other rail. Mark the corresponding location on the rail.

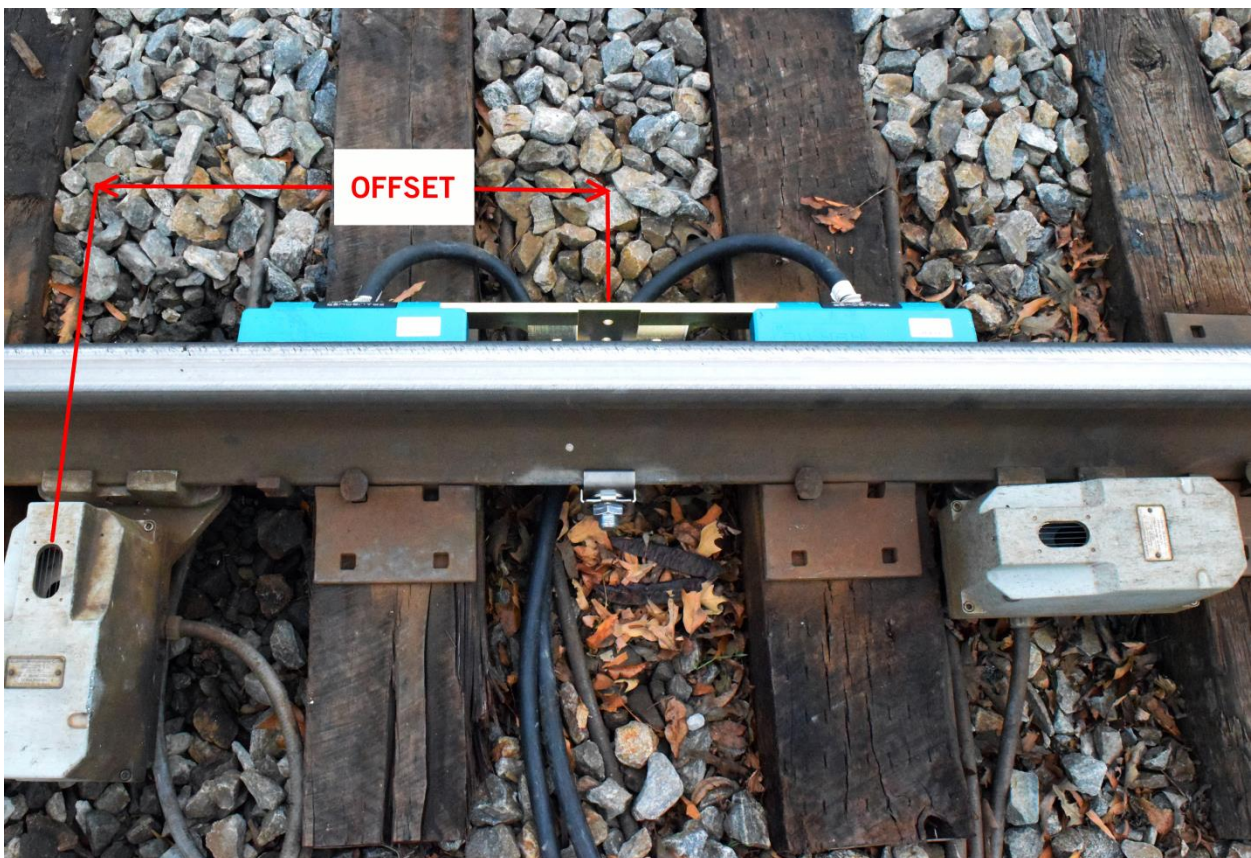


Measuring the Location of the Wheel Scanners

Skip this step if you are not using Wheel Scanners.

- **First Rail:** The Wheel Scanner located on the same rail with the Gating Transducers, mounts in the crib on either side of Gating Transducer Assembly.
 - If the closest crib to the Gating Transducers is not available, mount the Wheel Scanner in the next crib to either side of the Gating Transducers. Do not exceed 100 inches from the center of the Gating Transducer mounting bracket to the center of the Wheel Scanner bracket.
- **Second Rail:** Mount the Wheel Scanner on the opposite rail from the Gating Transducers, at the location directly across from Gating Transducers if possible. Optionally this Wheel Scanner can be mounted up to 100 inches in either direction.
 - If you have not already done so, transfer the location from the center of the Gating Transducers to this rail.
 - Measure from the mark that you moved from the first rail to the center of the Wheel Scanner mounting bracket to get the OFFSET dimension for the second Wheel Scanner. *If the Wheel Scanner mounts directly across from the Gating Transducers, this dimension is zero.*

Write down the OFFSET dimensions for each Wheel Scanner to be entered in the “[Entering Setup Parameters](#)” section of this document.

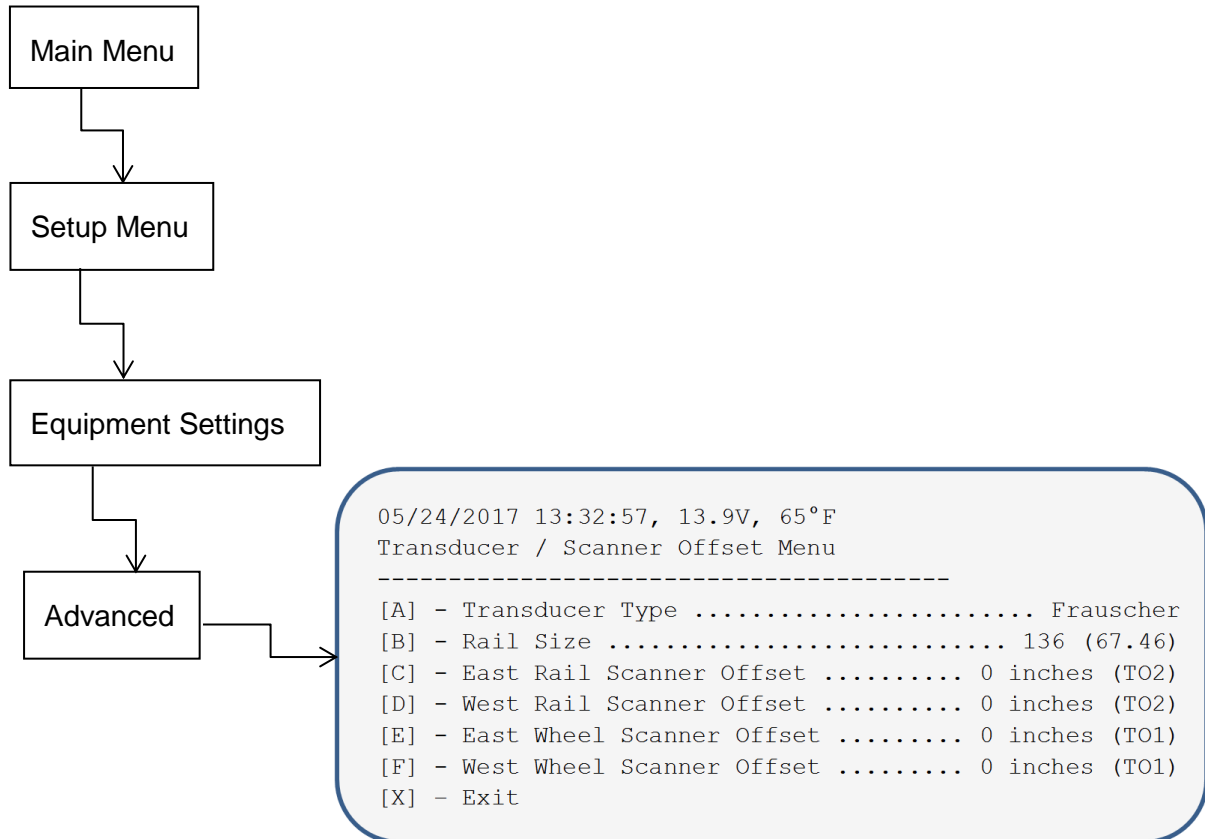


Entering Setup Parameters

This section provides instructions for entering the OFFSET dimensions into the “Transducer / Scanner Offset” menu of SmartScanNG². The accompanying STC video covers System Setup. <https://youtu.be/EYGXRSwpHJY>

Note: The setup menus shown below are available by way of the RS-232 interface via COM-1 or through a Telnet connection.

Drilling down to the “Transducer / Scanner Offset Menu”



1. Press the A key to select transducer type. The latest software version provides you with the following submenu.

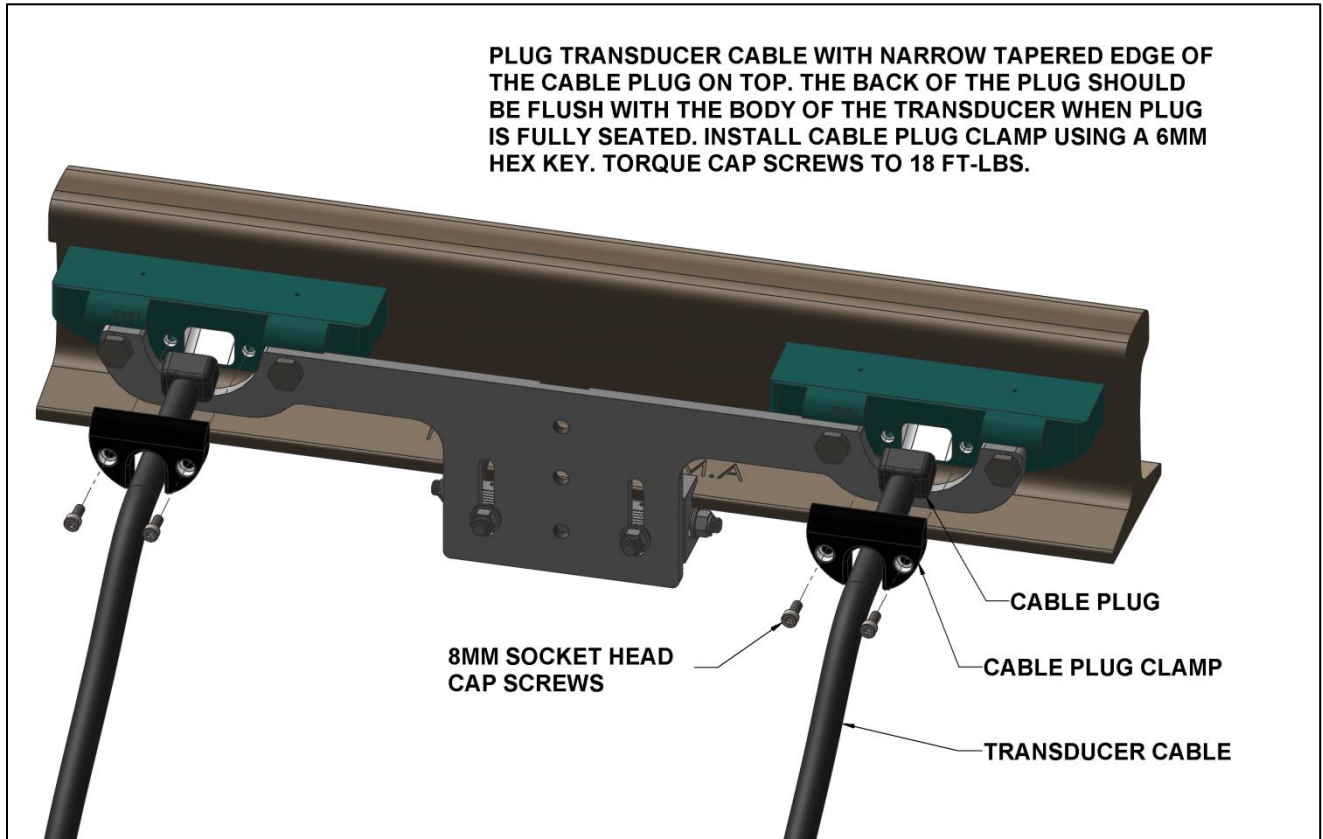
```
Select Transducer Type:  
[A] - Magnetic  
[B] - Frauscher  
[C] - Frauscher (with WSC)
```

Note: Earlier software versions toggle between “Frauscher” and “Magnetic” as you press the ‘A’ key. If you are using a WSC with a SICM 1.3 or newer, and not provided with the “Frauscher (with WSC)” menu option, please contact Southern Technologies technical support. [Appendix I](#) guides in determining if you need a WSC in your system.

2. Press the B key for a list of rail sizes and choose the one matching the size at your location.
3. For items, C, D, E, and F, enter the measurements representing the associated scanner's OFFSET dimension, to the nearest inch, and reply to questions asking for the closest Gating Transducer to the scanner — TO1 or TO2.
4. Back out of the menus by pressing the X key in each menu. Type "setup" when asked to do so, if you want to save your entries.

Wiring and Automatic Adjustment

Connection of Transducer Cables

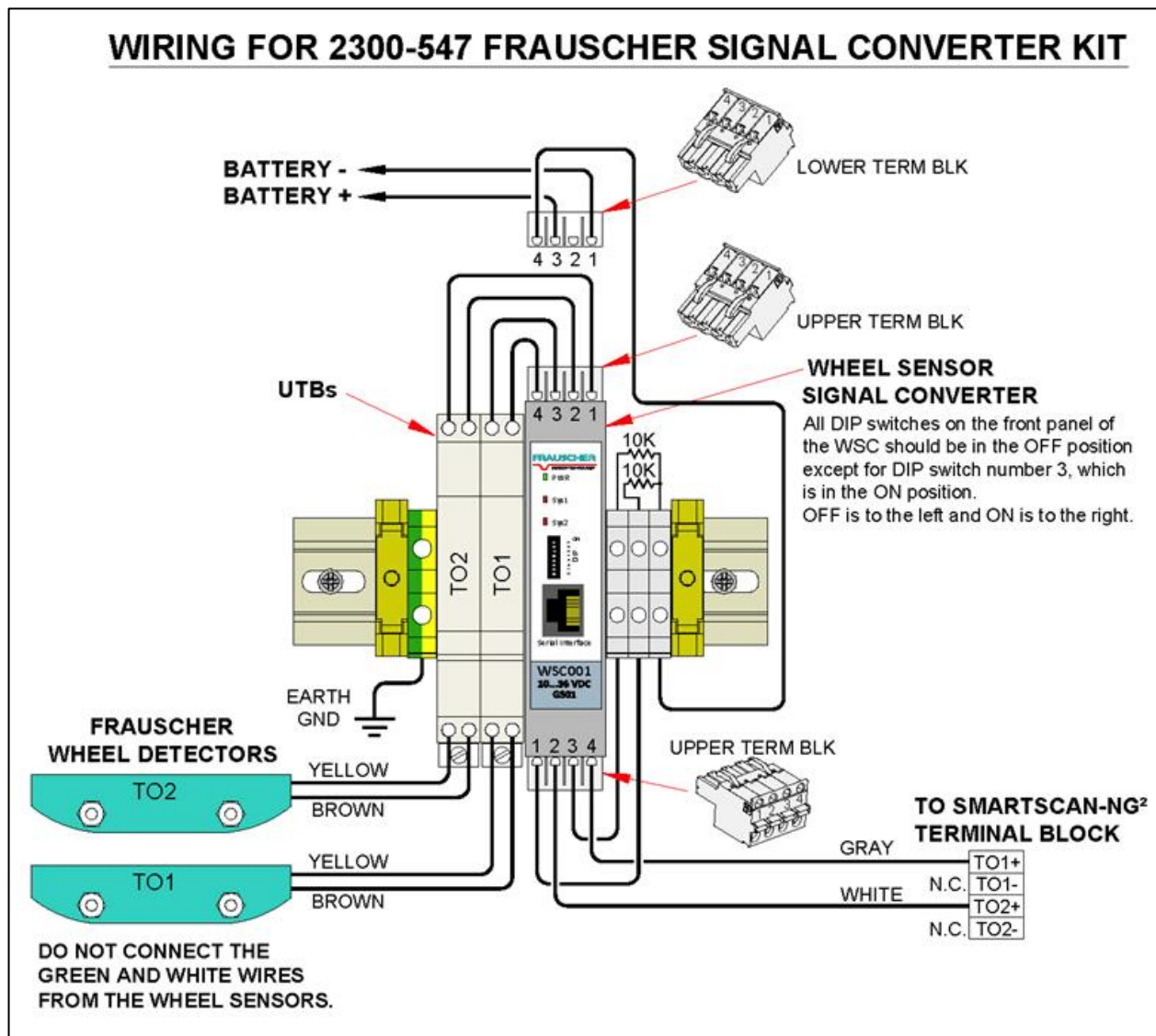


Wiring the Frauscher Signal Converter

Note: Use the 2300-547 Frauscher Signal Converter Kit, shown below, with early versions of SmartScanNG² manufactured before February of 2017, which do not have built-in Frauscher interface circuitry. The Wheel Signal Converter (WSC) provides an interface for Frauscher Zero-Speed transducers to the Magnetic Transducer inputs of the SmartScanNG² Hot Box Detector versions that do not have Frauscher transducer input terminals.

In February of 2017, Southern Technologies began manufacturing SmartScanNG²'s that have a built-in Frauscher interface with dedicated wiring terminals, and do not require the 2300-547 Signal Converter Kit. If you are not sure of the date of your system, see [Appendix I](#) for guidance.

Run the provided cable from the transducers into the bungalow or optionally into a nearby pull-box to make use of existing shielded or unshielded 20AWG and larger cable used with previous transducers installation. Attach the DIN rail mounted assembly to the wall near the Defect Detector and connect the wiring as illustrated below.



Automatic Adjustment with Frauscher Wheel Signal Converter

The Automatic Adjustment function nulls out any influence of the rail and mounting hardware located in the area of the sensor. Run the Automatic Adjustment process after installation and after making physical changes to transducer alignment. Tie plates, track spikes, rail anchors, rail clips – and similar hardware – used in the area under the transducer do not interfere with the operation. Run the Auto Adjustment function after removing or adding metal hardware in the vicinity of the transducers.



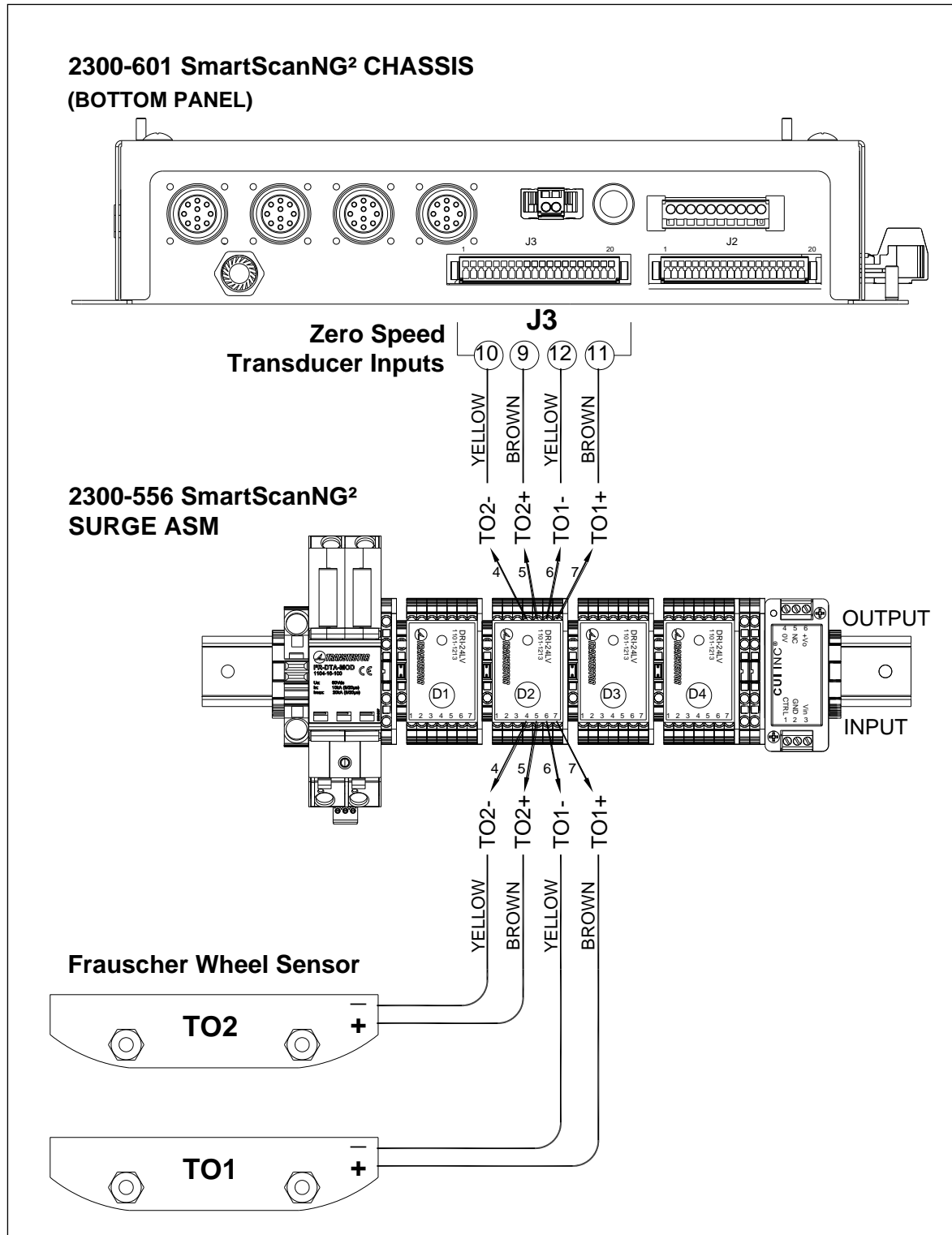
Wheel Signal Converter (WSC)

Follow these steps to run the Automatic Adjustment feature.

1. Connect transducers to the WSC by following the wiring diagram on the previous page.
2. Apply power to the system.
3. Confirm that the wheel sensors are mounted correctly, and ready for use.
4. Locate the DIP switches on the WSC and move DIP switch number 8 to the ON position for between two and six seconds.
5. Return DIP switch number 8 to the OFF position. As a result, the Sys1 and Sys2 LEDs should light up, indicating that the Automatic Adjustment function has started.
 - The WSC adjusts both wheel sensors simultaneously requiring up to forty seconds.
 - The Sys1 and Sys2 LEDs turn off when the session finishes, indicating successful calibration.
 - A blinking Sys LED after the calibration process means that the associated sensor(s) did not successfully adjust.

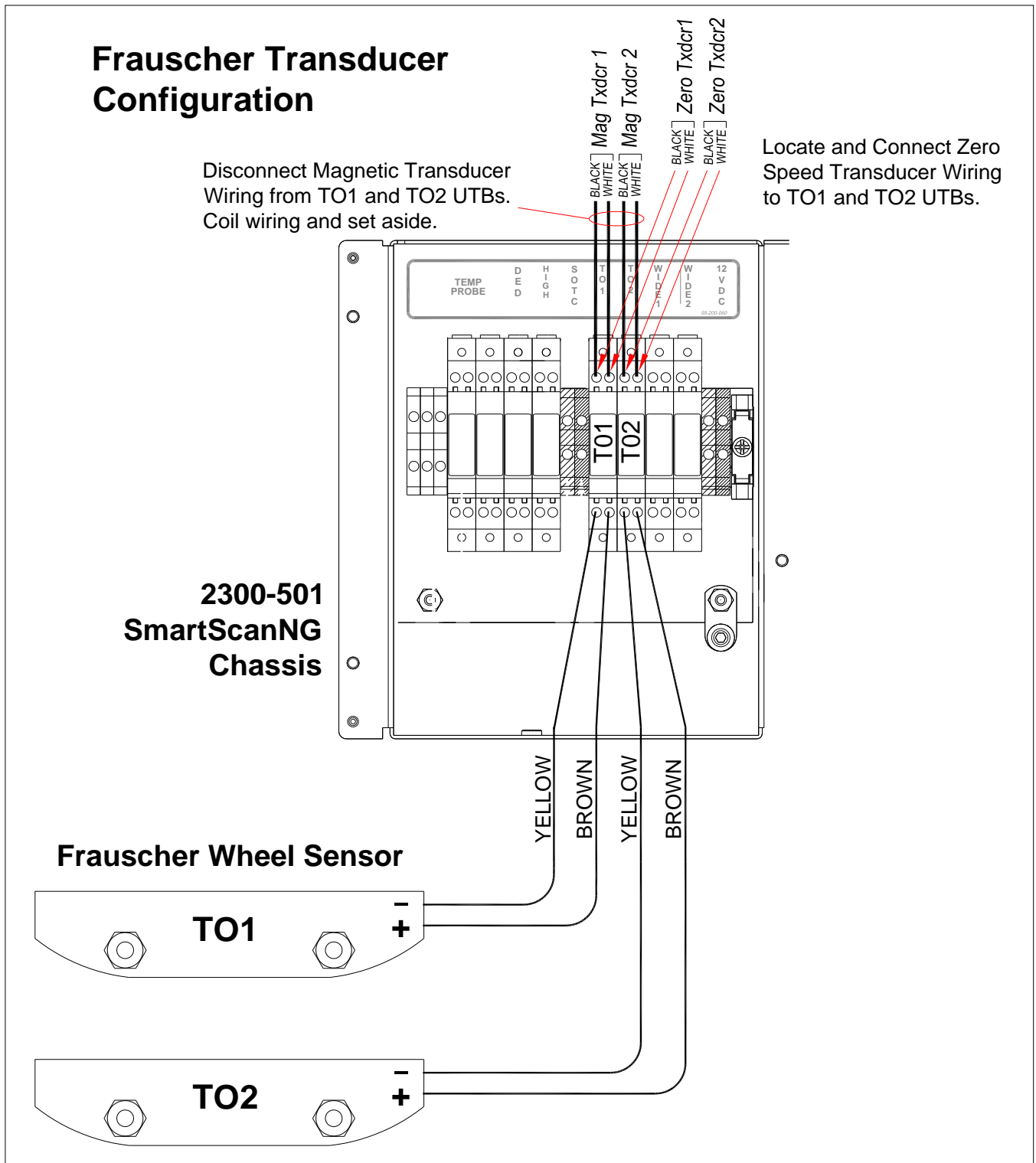
Wiring Connections for SmartScanNG² Chassis

The drawing provided below shows Frauscher transducer wiring connections for the SmartScanNG² chassis with the 2300-556 SmartScanNG² Surge Panel. Figure 2 of [Appendix I](#) provides a photo of the SmartScanNG² chassis for further identification.



Wiring Connections for SmartScanNG Chassis

You can use the SmartScanNG² Controller Module on the older SmartScanNG chassis as long as the chassis has the version 1.8 and up Interconnect Board. [Appendix I](#) covers version compatibilities in detail. The drawing below shows Frauscher transducer wiring connections for the SmartScanNG chassis with built-in surge suppression.



Automatic Adjustment with SmartScanNG²

The Frauscher Automatic Adjustment function nulls out any influence of the rail and mounting hardware located in the area of the sensor. Run the Automatic Adjustment function after installation or after making physical changes to transducer alignment. Tie plates, track spikes, rail anchors, rail clips – and similar hardware – used in the area under the transducer do not interfere with transducer operation. Run the Automatic Adjustment function after removing or adding metal hardware in the vicinity of the transducers.

Initiate Automatic Adjustment via the NG² Serial Interface (see your operator's guide for login instructions). From the Main Menu, select System Functions Menu.

```
SmartSCAN NG2, MP/KP:1234.5, Track: North
03/07/2019 08:33:57, 14.8V, 34°F
Main Menu - Comm
-----
[A] - Train Summary
      .
      .
      .
[K] - System Functions Menu
[L] - Replay train
[M] - Security Menu
[X] - Exit
```

Select **Calibrate Frauscher Transducers**.

```
SmartSCAN NG2, MP/KP:1234.5, Track: North
03/07/2019 08:34:11, 14.8V, 34°F
System Functions Menu
-----
[A] - Radio Test
      .
      .
      .
[Q] - Calibrate Frauscher Transducers
[R] - Virtual gate test
[X] - Exit
```

The following prompt appears.

```
Calibration started, please wait up to 60 seconds...
Calibration complete
Transducer 1: Success
Transducer 2: Success
```

If both wheel transducers indicate Success, calibration is complete.

Additional Information: Calibration is successful when the voltage from the yellow transducer wire, as measured to system ground, is approximately 1.65 VDC (+/- 2%). Measure the voltage while each wheel transducer is in the inactive state (no metal objects near the SYS1 area of the transducers). The “Success” indications appear on your screen if these voltages are within specification. So, manual measurements are not necessary.

Testing

Occupancy Detection

After successful Automatic Adjustment of both transducers, use the PB200 Test Wheel Sensor Target, shown at right, to test for occupancy detection as follows.

1. Place the Sensor Target on the SYS1 sensor of transducer TO1. Align the notch on the bottom of the Sensor Target with the hash mark on the top of the SYS1 transducer. The TO1 LED on the SmartScanNG² should light up.
2. Repeat the procedure with transducer TO2. The TO2 LED on the SmartScanNG² should light up.



Note: If you are using the Frauscher Wheel Signal Converter (WSC) in the circuit, the SYS1 and SYS2 LEDs should correspond with the TO1 and TO2 LEDs, respectively, on the SmartScanNG².

Virtual Gate Description

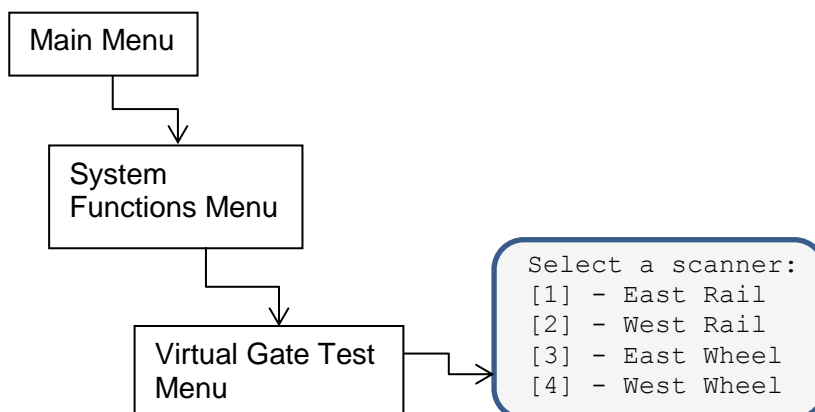
The SmartScanNG² using Frauscher transducers allow you to install each Wheel Scanner and Bearing Scanner up to 100 inches to either side of the center of the Gating Transducer Mounting Bracket. To ensure that all wheel and bearing temperatures are measured, the system records a continuous stream of data samples from each scanner allowing it to provide bearing and wheel temperature measurements from scanners aimed outside of the area defined by the Gating Transducers. Synchronizing the scanner's temperature measurements to the Gating Transducer's wheel signals is done after a given axle crosses the Gating Transducers. At that time, the correct heat samples are picked out based on the speed and direction of the axle. The SmartScanNG² determines the scanners relative position to the Gating Transducers from the offset measurements entered in the "[Entering Setup Parameters](#)" section of this document.

Verifying Virtual Gate Operation

The data that you enter into the "Transducer / Scanner Offset" menu places the Virtual Gate areas at each of the scanners positioned at various distances from the Gating Transducers.

The test mode described in this section helps to double check that the OFFSET measurements and associated entries are correct. The most accurate method to verify OFFSET is the use of a tape measure following the previous instructions in this document.

Drilling down to the "Virtual Gate Test Menu"



Simulate Wheels Passing

While in Virtual Gate Test Mode, the goal is to simulate a wheel that passes over the Gating Transducers and then continues moving to the scanner under test. The system notifies you when the simulated wheel is in the Virtual Gate area by cycling the shutters. The following steps describe how to use the Virtual Gate Test Mode, and the video located at <https://youtu.be/EYGXRSwpHJY> includes a demonstration of the procedure.

1. From the Virtual Gate Test Mode menu, select a scanner in which you want to see its Virtual Gate position.
2. Swipe across the Gating Transducers with a metal object, such as a wrench or railroad spike, in the direction of the scanner under test. Maintain a speed faster than 1.6 seconds between the transducers.
3. Swipe across the sensors again and keep moving the metal object to the scanner under test, in one motion, while maintaining a constant speed.
4. The scanner shutters rapidly cycle one time to indicate when the system is looking for heat in the virtual window located at the scanner, which should be at the time that the metal object (simulated axle) passes the scanner. *If the shutters do not cycle, the entry for closest transducer (TO1 or TO2) may be incorrect.*
5. Repeat step number four, simulating various axle speeds, as needed to confirm settings.

The test mode runs for two minutes before timing out. Otherwise, any keypress ends the session. Rapid shutter flutter is an indication that two minutes have expired and the test has ended automatically. The event log records a canceled train at the end of the testing session.

Appendix I – SmartScanNG² System Version Identification

This appendix provides information for determining if your SmartScanNG² requires the Frauscher Wheel Signal Converter (WSC) to interface with Frauscher Zero-Speed Transducers. All the NG² systems shipped beginning in February of 2017 have built-in Frauscher interface circuitry permitting the transducer wires to be connected directly into the NG² chassis without the need of the WSC. Our earlier systems required the WSC.

The first version of Controller Module that did not require WSC had SICM Board Rev 1.3 installed. Consult the System Status Report from the NG² for the SICM Board Revision. A Controller Module with SICM Board Rev 1.3 or higher, has the Frauscher interface circuitry and does not require a WSC; that is if you also have a late model chassis.

The Interconnect Board resides in the chassis and routes external signals up to the Controller Module. Interconnect Board revision 1.8 and later does not require the WSC. See Figure – 1 below for Interconnect Board access and identification. All Interconnect Board versions earlier than 1.8 need the WSC regardless of the Controller Module's SICM Board version.

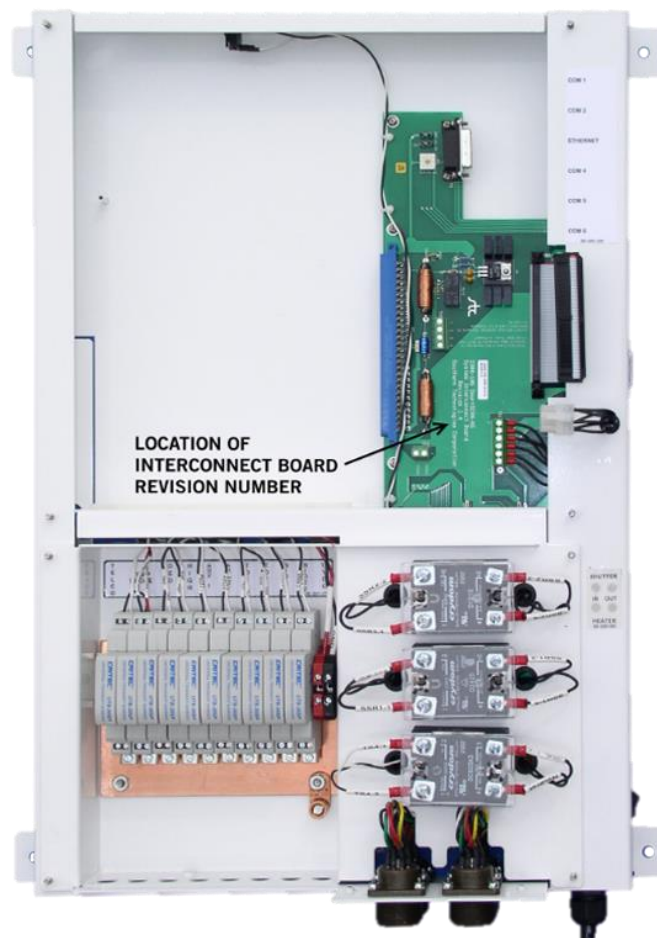


Figure 1 – Location of Interconnect Board and revision number inside the SmartScanNG chassis, which is the predecessor to the SmartScanNG² chassis shown in Figure 2.

The chassis in Figure 1, above, is representative of the SmartScanNG (pre-NG²) chassis, which is an earlier chassis that is forward compatible with the SmartScanNG² Controller Module.

Figure 2 shows the SmartScanNG² Controller Module mounted on the latest NG² chassis. The NG² chassis has dedicated Frauscher transducer wiring terminals, so it does not require a Wheel Signal Conditioner interface. The configuration in Figure 2 represents the most current hardware.



Figure 2 - SmartScanNG² Controller Module and SmartScanNG² Chassis

Summary of This Appendix

- Revisions 1.3, 1.4 and newer of the Controller Module’s SICM Board do not need the Frauscher Wheel Signal Conditioner (WSC), and you must have an Interconnect Board in the chassis that is version 1.8 or newer or an NG² chassis represented in Figure 2.
- If you have an Interconnect Board that is older than revision 1.8, you need a WSC regardless of which Controller Module you have.
- If you purchased the complete NG² system after January of 2017, do not install the WSC. The Frauscher connections are in the chassis, and the interface circuitry is in the Controller Module’s SICM Board.

SICM Board Revision	Interconnect Board Revision	Wheel Signal Converter Needed
1.3 and up	1.8 and up	NO
1.2 and lower	ANY	YES
ANY	1.7 and lower	YES

Appendix II - Troubleshooting with Frauscher Wheel Signal Conditioner

The following instructions provide methods for locating problems in the Zero-Speed transducer system with systems equipped with the Wheel Signal Conditioner.

PWR LED Off

MEANING	POSSIBLE SOLUTIONS
No power supply	Apply power supply
Wrong polarity	Reverse polarity
Open fuse	Replace WSC

Sys1 / Sys2 LED Flashes Slowly

MEANING	POSSIBLE SOLUTIONS
WSC did not initiate Automatic Adjustment correctly	Run Automatic Adjustment Function
Wire break in the wheel sensor circuit	Check wiring for open circuit
Overcurrent in the wheel sensor circuit	Check wiring for short circuit

Appendix III - Checking the Sensor for Correct Current Flow

The following information outlines a procedure to measure and verify current flow through a Frauscher wheel transducer. By doing so, you may rule out a possible faulty wheel transducer while troubleshooting a system.

There are approximately five milliamps of current flow through the sensor when it is working correctly, and it is not sensing a target. During this procedure, disconnect the yellow sensor wire and connect a DC milliamp meter in series with the transducer wiring, thus providing a means to measure current flow through the transducer.

Tools Needed

- A digital Volt/Ohm meter (VOM) with a milliamps setting.
- Small bladed straight slot screwdriver approximately 1/8 inch wide.

Procedure

Set the VOM to DC milliamps and connect in series with the yellow transducer wire as follows.

1. Measure the voltage from the brown wire to the battery ground. A voltage reading of from 23 to 24 VDC indicates that the transducer is powered.
2. Set the VOM to measure DC milliamperes as follows. Unplug the red meter lead from the voltage jack on your VOM and plug it into the milliamps jack on the VOM.
3. Disconnect the yellow sensor wire from any connection between the transducer and the SmartScanNG² and connect the black VOM probe in its place under the terminal.
4. Touch the red meter probe to the loose yellow sensor wire that you removed from the terminal. You now have the VOM set for milliamps and connected in series with the yellow sensor wire.
5. The meter should measure 5 mA, within a tolerance of +/- 2%.
6. The current measurement should decrease from 5 mA (+/- 2%) as a metal object comes near the sensor. The SmartScanNG²'s TO-1 or TO-2 LED should indicate presence as the current measurement drops.

Troubleshooting

If the current flow is not correct, try the following.

- Run the Automatic Adjustment function.
- Check for breaks in the sensor wiring.
- Rule out the possibility of a faulty surge suppressor.
- Replace sensor.

Appendix IV – What To Do If the Transducer Will Not Successfully Calibrate

This section applies to SmartScanNG² systems that *do not* use the Frauscher Wheel Signal Converter (WSC). On systems not using the WSC, the brown and yellow transducer wires from the wheel transducers connect to surge protection devices, and then to terminals on the SmartScanNG² chassis.

Possible Causes of Unsuccessful Calibration

- The brown and yellow transducer wires from the wheel transducer(s) connected in reverse polarity.
- Transducers adjusted too close to the rail.

Before checking the wiring polarity, verify that both COP LEDs are blinking on the SmartScanNG² and that no metal object, except the rail, is near the SYS1 area of either wheel transducer. Use a DC voltmeter to measure from the system ground (same as battery ground) to the transducer's brown wire and also to the transducer's yellow wire from system ground. Verify that the voltage measured on the yellow wire is less than the brown wire's voltage. If the brown wire's voltage is less than the yellow wire's voltage, then swap the two wires and recalibrate the transducers by running the [Automatic Adjustment](#) function.

If calibration is not successful with correct wiring, the next step is to verify correct transducer mounting positions. A transducer adjusted too close to the rail prevents successful calibration.

First, verify the accuracy of the Horizontal and Vertical Adjustments as per the drawing in the "[Installation](#)" section of this document. Then lower the transducer's Vertical Adjustment by one notch (0.100 inch) on the transducer bracket. Up to 0.200 inch of space between the alignment gauge and the top of the transducer is still within specification, but 0.300 inch of clearance is too low for reliable operation. Each adjustment detent in the transducer mounting bracket represents 0.100 inch. If the calibration is not successful after lowering by one notch, drop the transducers by a total of two detents (0.200 inch) below the alignment fixture and recalibrate. Be aware that the bracket may rise while tightening so recheck your measurement before continuing.

If the transducer does not calibrate successfully after performing all the steps above, consult with a customer service technician at Southern Technologies Corporation 1-423- 892-3029. Please reference this Technical Bulletin and that you are working on calibrating Frauscher transducers used with a SmartScanNG². Please provide your name, railroad name, call-back telephone number, let us know if this is a new or existing installation and tell us what you have tried so far.

Additional Information - A voltage measurement on the brown wire of approximately 23.5 to 24.8 volts is typical for a correctly wired transducer. The voltage on the yellow transducer wire represents the transducer signal and should be 1.65 VDC (+/- 2%) after successful calibration with no metal object near the transducer's sensing area. The voltage level on the yellow wire from an uncalibrated transducer is not predictable but is less than the voltage on the brown wire.

Wiring a Frauscher transducer in reverse polarity into a SmartScanNG² or a Frauscher WSC cannot cause damage to the transducer, NG² or the WSC. However, this is an alternate way to make the transducer run its Automatic Adjustment function. Since it cannot detect wheels with the wires swapped, you must correct the wiring and check for proper voltage (1.65VDC +/- 2%) on the yellow wire to determine if the calibration was successful. The Frauscher Automatic Adjustment function requires about 40 seconds to complete.

Appendix V – Troubleshooting Transducer Miscounts

This section provides troubleshooting guidance for a SmartScanNG² system experiencing transducer miscounts.

The system should perform as follows.

- The axle count reported for a given train by each transducer should be an even number and equal in value.
- Neither transducer should report an odd number of axles for any train.
- The number of axles for a given train should match the count from each transducer.

If the system is not carrying out all of the above functions, perform the following.

Possible Solutions

- 1 Calibrate the transducers by running the Automatic Adjustment function. If you are working with a SmartScanNG² that *does not* have the Frauscher Wheel Signal Conditioner (WSC), run the [Automatic Adjustment](#) function using the menu system, either while on-site or from a remote location. If the system includes a WSC, refer to the “[Automatic Adjustment with Frauscher Wheel Signal Converter](#)” section of this document.
- 2 Check the transducer mounting bracket and the transducers for a secure fit. If necessary, tighten the mounting hardware to the torque specifications provided in the “[Installation](#)” section of this document. It is required to recalibrate after adjusting the position of the wheel transducers.
- 3 Verify secure wiring connections.
- 4 Temporarily bypass the surge arrestors in the transducer circuit. If the transducers perform correctly, replace the surge arrestors, and monitor the system for accurate counts.

Appendix VI – Rail Temperature Imbalance

A general health check of the system is to determine if the Bearing Scanners are reporting roughly the same temperature for both sides of each train. This appendix guides in making that determination and, if necessary, provides solutions for correcting the problem.

What to do if the difference in average rail temperatures are consistently more than 4° F

From the Main Menu, select the Train Summary Report. On the Train Summary Report, locate the “Avg Bearing” heading. Under this heading are two columns, one for each rail, representing the average temperature read by the bearing scanners on a train-by-train basis. With a properly functioning system, the two average temperatures reported for each train are within approximately four degrees of each other. If the difference in average temperatures, per train, is consistently higher than four degrees, do the following.

- Referring to the “[Offset Measurements](#)” section, confirm that the measurements entered into the system are correct. Re-measure and confirm all entries are accurate. Incorrect Offset Measurements result in the system looking at the wrong point in time for the bearings or wheels as a train moves through the site. Note that since you do not have to mount the scanners across from each other, as with traditional Hotbox Detectors, there are separate Offset Measurements associated with each rail as covered in the “[Offset Measurements](#)” section.
- Realign and recalibrate the scanners. See the instructions for scanner alignment and calibration in the SmartScanNG² Track Hardware Manual located at <https://www.southern-tech.com/our-services/resources>.

Appendix VII – Preventive Maintenance

Periodically perform the following maintenance work with frequency adapted to the conditions of the track, but at least every two years.

- Visual and mechanical check.
- Check the wheel transducers for excessive dirt build-up. Clean as necessary.
- Check the wheel transducers for visual damage. The replacement of the transducer could be required.
- Check the mounting bracket for a secure fit on the rail. Torque the rail clamp nut to 90 ft-lbs.
- Check the transducer mounting plate for vertical and horizontal movement. Torque each adjustment nut to 65 ft-lbs.
- Check the transducers for a secure fit to the mounting bracket. Torque each to 30 ft-lbs.
- Check the rubber conduit tube for damage.
- Check cable connection terminals for a secure fit.