

MARK I NAVIGATION SYSTEM CALIBRATION

The Mark I navigation system will require “calibration” at some point in it’s service life. The reasons that cause the necessity of a calibration procedure are as varied as inaccurate navigation display data, after the installation of a new set of tires, to the replacement of a shattered rear window.

Calibration procedures are divided into two categories

- **Vehicle Owner Calibration** - Calibration that the vehicle owner can perform.
- **Dealership Calibration** - Procedures only an authorized dealer can perform.

This section is divided into these two categories. Always consider what the owner of the vehicle could have inadvertently changed when troubleshooting and/or calibrating the vehicle. Check these data inputs **before** you embark on a full dealership calibration procedure.

VEHICLE OWNER CALIBRATION

The vehicle owner’s manual contains the information on how to set the vehicle position and adjust the tire calibration. Both of these adjustments are found on the vehicle position screen which is accessed from the information screen as shown on page 24.

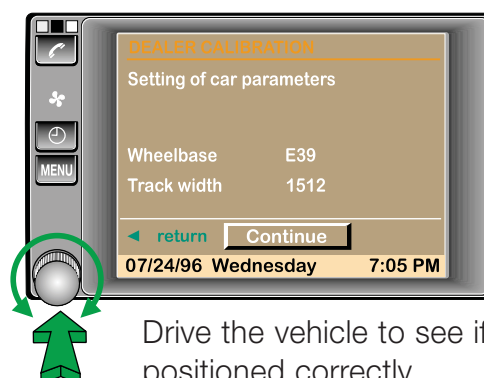
“The Owner Calibration Procedures shown on pages 25-27 are for information purposes only. A full Dealership Calibration is the recommended method for accurate system calibration.”

1. RESETTING VEHICLE POSITION

A mis-located vehicle is caused by driving in and out of the digitized map areas or starting a vehicle after it has traveled on a flat bed or train. The system will eventually relocate itself automatically through GPS but it can be entered through the on-board monitor for immediate resetting.

From the Vehicle Position Screen, rotate the knob to “city:” and push the knob. Enter the city and street information as you would enter a destination. Press the “Intersection” button and select the closest intersecting street from the displayed index.

Drive to the entered intersection and press the “Crossing the intersect.” button when you cross.



Drive the vehicle to see if it is positioned correctly.

2. ADJUSTING TIRE SIZE

Tire calibration is a required input for the Nav computer to base, **tire rotation: distance covered ratio**. It should be checked to determine that the entered tire size is the same as the tires equipped on the vehicle.

Additionally, if the vehicle does not have factory equipped tires installed, the tire calibration will need to be changed to match the new tire size.

Press the "Tire Calibration" button from the vehicle position screen. The following message is displayed noting the overwrite of existing values once the procedure is completed.

Press continue to access the tire adjustment screen.

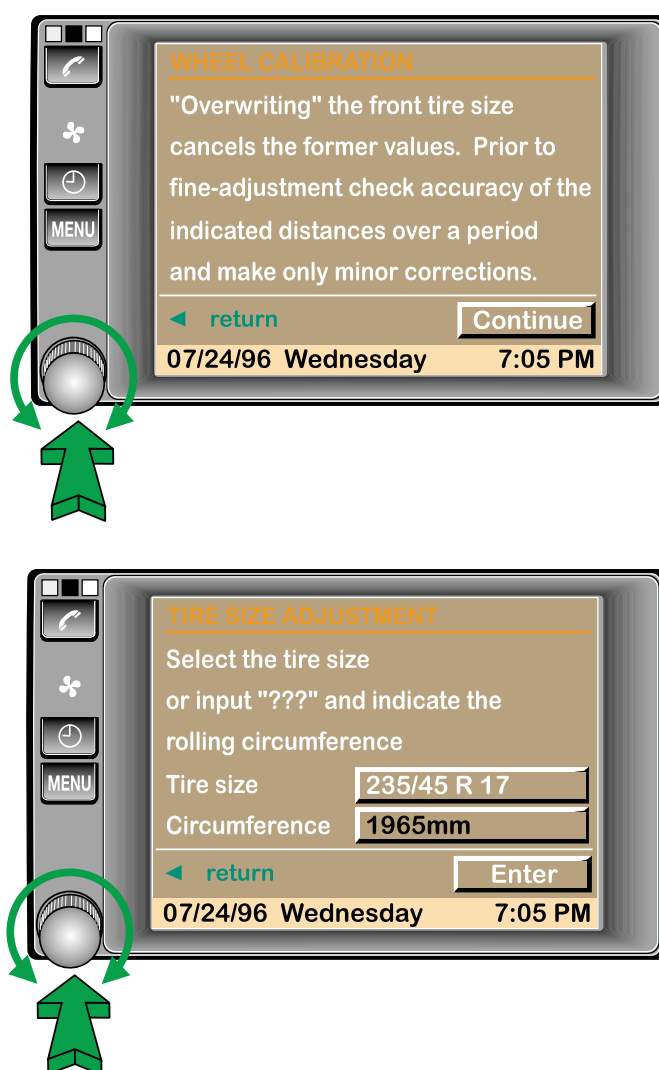
Press the tire size and rotate the knob to see if the tire size is listed.

Select the correct tire size and press the button once again. Note that the tire circumference size automatically changes to the set tire size.

If the tire size is not listed the tire circumference value must be entered manually by rotating the tire size button to the "???" position.

Press and adjust the actual tire size dimension in millimeters.

This value is available from the tire manufacture or it can be measured as illustrated on the next page.

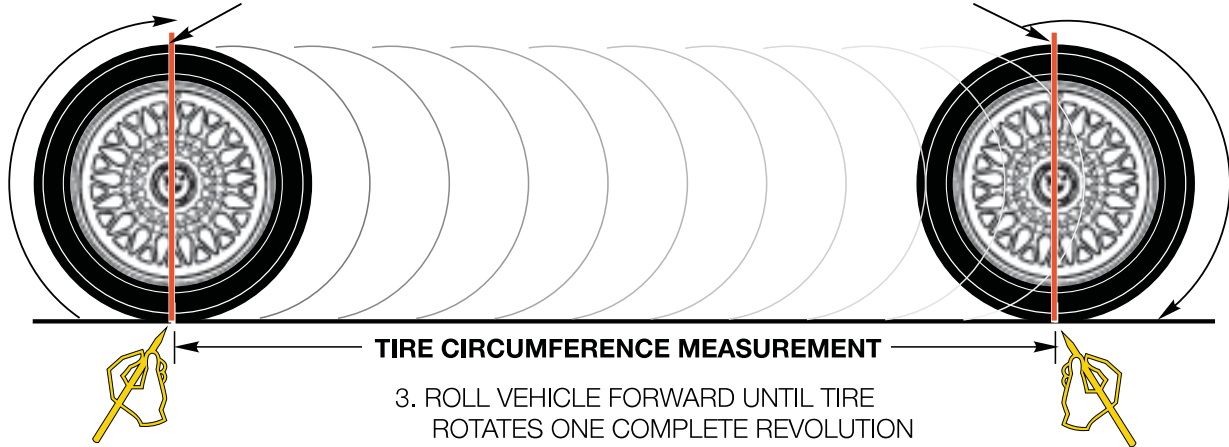


Once the correct tire size or circumference has been entered, press the return button to return to the information screen or press the continue button to go on to the Precision Adjustment screen.

TIRE CIRCUMFERENCE MEASUREMENT

1. PLACE A STRAIGHT EDGE UP AGAINST THE TIRE DIRECTLY IN THE VERTICAL CENTERLINE OF THE TIRE

4. PLACE STRAIGHT EDGE AGAINST TIRE. MOVE VEHICLE PRECISELY TO ALIGN THE MARK WITH THE STRAIGHT EDGE.



2. MARK TIRE AND GROUND AT SAME POINT

3. ROLL VEHICLE FORWARD UNTIL TIRE ROTATES ONE COMPLETE REVOLUTION

5. MARK GROUND. MEASURE DISTANCE.

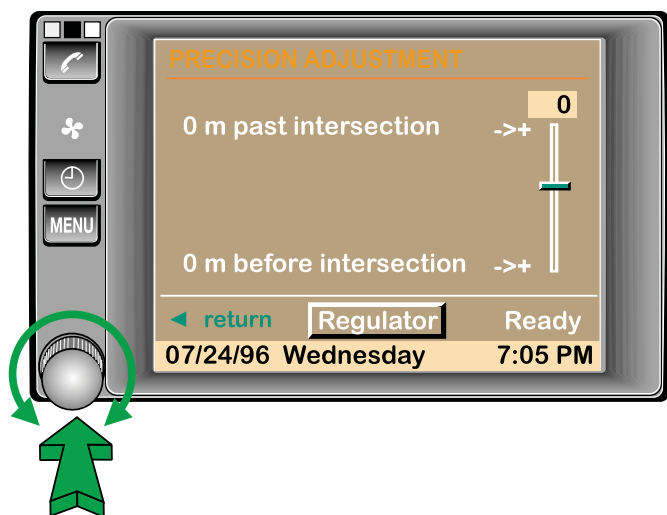
PRECISION ADJUSTMENT

This screen activates a “Regulator” function that “fine tunes” the tire adjustment with regard to the displayed distance to an intersection measurement.

If the displayed measurement is consistently “0” before the intersection is reached slide the regulator bar towards the “-” end of the scale.

If the displayed measurement is consistently “0” after the vehicle has passed the intersection, slide the regulator bar towards the “+” end of the scale. When finished press the Ready button.

It will require a little “trial and error” to achieve precision adjustment.



Keep in mind that distance displays that are 30’ to 60’ out of intersection, in either direction, are within the design tolerances of the system and are acceptable. Don’t expect major results from using the regulator function.

If there is an unacceptable displayed distance (more than 150’), the most effective method to calibrate the system is to keep the regulator adjustment at “0” and perform a full dealership calibration procedure.

DEALERSHIP CALIBRATION

Calibration of the navigation system must be checked or performed when various components of the system are changed or when the troubleshooting procedures of the diagnostic module call for it.

The calibration procedures are stored in the Navigation computer module and are called up for display on the LCD screen.

Complete or partial calibration is required when the following components are changed:

- Navigation Computer Module - Complete calibration automatically required.
- Magnetic Field Sensor or rear window (defroster replacement) - Sensor Check and Compass Calibration
- Tires/Wheels - Setting of tire size in tire calibration screen (from Owner Calibration Section) and wheel sensor calibration.

Additionally, if the vehicle has had body work (new sheet metal or welding work) a sensor check and Compass calibration should be performed .

The following preconditions must exist before a successful calibration can be carried out:

- No faults stored in the Navigation system.
- The correct tire size set in the tire calibration screen. Tires inflated to correct pressures.
- Known location of:
 - A large flat parking lot with enough width to allow the vehicle to be driven in tight circles to the left and right.
 - A “back street” (no traffic) with a minimum 100 meter (approx 330 ft) straight path.
- There should be no overhead power lines/transformers in the immediate vicinity of the parking lot to create any magnetic interference with the magnetic field sensor.
- All electrical consumers should be switched off - Rear window heating, Radio, seat heating, air conditioning, etc.

TOOLS NEEDED FOR DEALERSHIP CALIBRATION

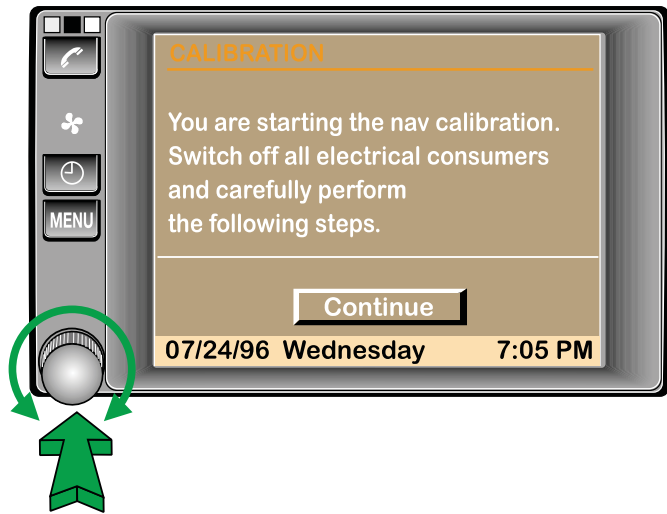
- Metric tape measure (minimum 8 meters).
- Piece of white chalk.
- 2” X 2” angle iron (6’ long).

CALIBRATION PROCEDURES

The navigation system calibration screen menu is called up from the information menu screen.

Select "Vehicle Position" from the information screen, then **press and hold the menu button** for a few seconds. The system will enter the calibration mode.

Press "Continue" to proceed with the desired system calibration.

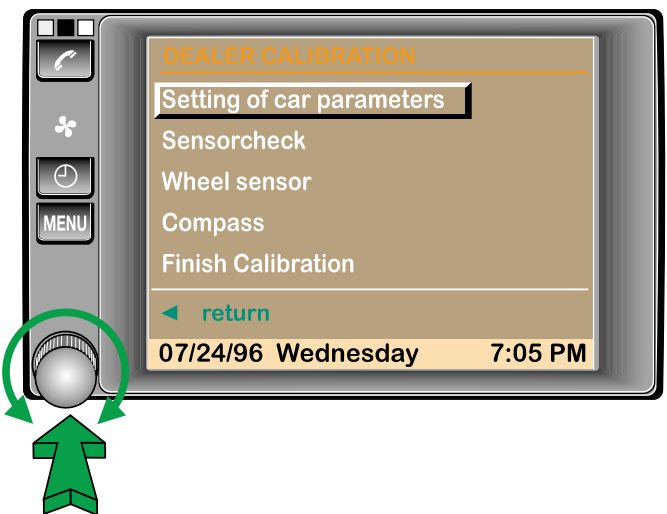


The first Dealer calibration screen provides five selections. A full dealer calibration procedure consists of carrying out all five selections.

Though they can be done individually with positive results, it is recommended to complete all five steps to achieve consistent positive results.

Start at "Setting Car Parameters" and end with "Finish Calibration".

NOTE: If a new navigation computer is being calibrated for the first time, the individual buttons will not be selectable.



The system will automatically go into a "fixed sequence calibration" requiring all steps be performed.

1. SETTING OF CAR PARAMETERS

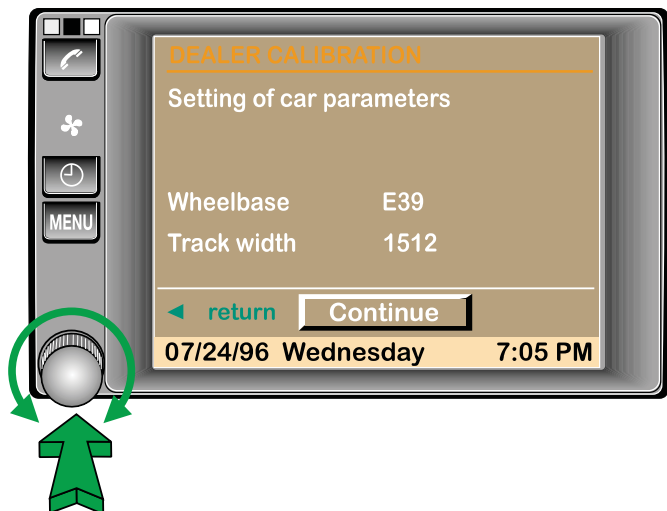
There are two settings in the parameters screen:

- The vehicles wheel base which will be an E38 long/short wheel base or an E39.
- The vehicle's track which is as follows for the different vehicles:

E38 - long = 1549

E38 - short = 1549

E39 = 1512



Changing these settings is not required unless a new Navigation computer is installed in the vehicle. If a new nav computer is being calibrated for the first time, enter the vehicle type.

NOTE: These settings should be checked as part of the troubleshooting procedures to verify that they are correct. If the displayed setting does not match the figures above, momentarily select another vehicle type and switch back to the correct vehicle. The track width value will change to the displayed values as shown above.

AFTERMARKET WHEELS OR SUSPENSION MODIFICATIONS:

If the vehicle is equipped with aftermarket wheels or has modified suspension components, the track width **may** need to be manually adjusted. Do the following to obtain this figure:

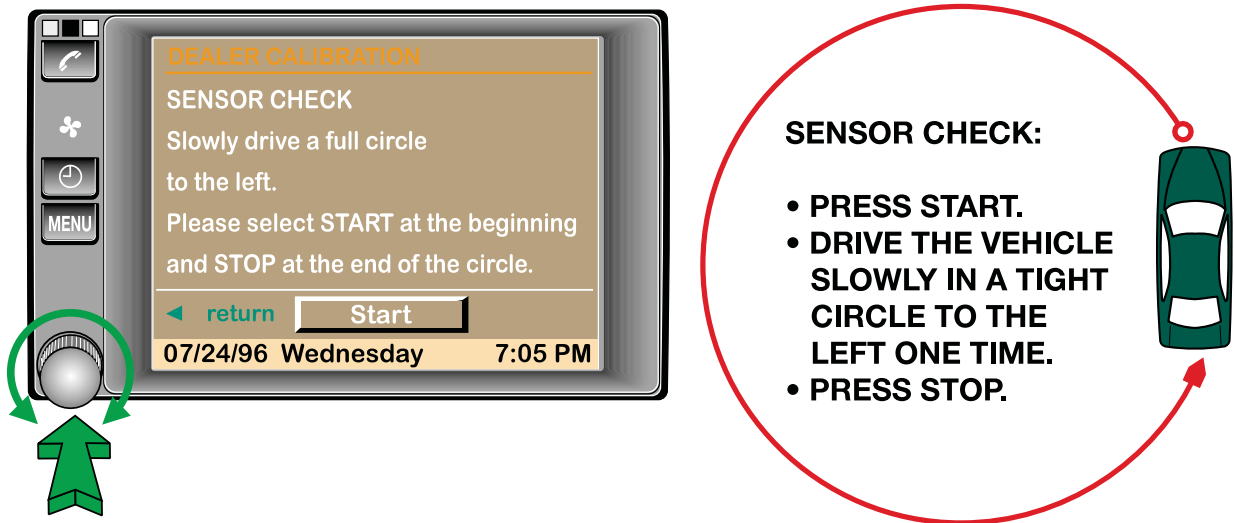
1. With the vehicle on the ground (suspension loaded), measure the distance between the two front rims (inner rim tire bead lips) in millimeters and note the measurement.
2. Measure the thickness of one front rim (inside lip to outside lip) using calipers and note the measurement.
3. Add these two figures together. The total is the measured track width.

Turn the rotary knob to the vehicle type. Then turn the knob **“one click”** to the **LEFT** to access the track measurement. Turn the knob to enter the value manually. Press knob when finished.

2. SENSOR TEST

The Sensor Test performs a functional check of the wheel speed sensors and magnetic field sensor inputs to the navigation computer.

This test must be carried out if the navigation computer is replaced. The DIS will also call for this test to be carried out as part of the troubleshooting procedures.



The test requires driving the vehicle in a tight circle at a speed of 6 MPH or less.

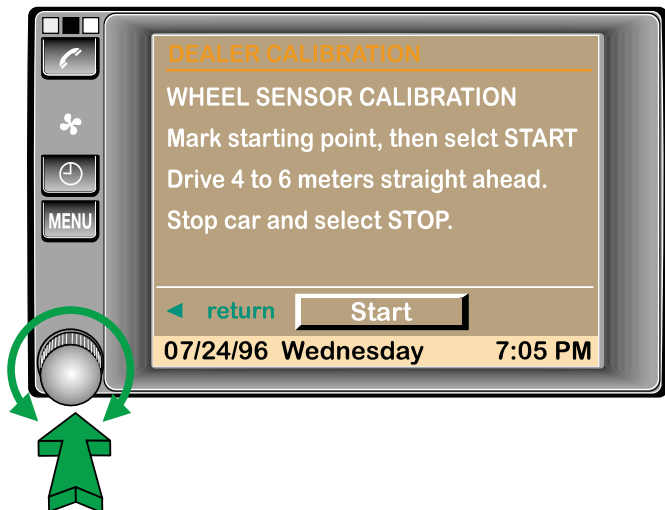
If there are no faults with the inputs, the system will display "Calibration Successful". At this point the calibration procedures can be continued or the vehicle can be returned to the workshop to continue the diagnostic procedures.

3. WHEEL SENSOR

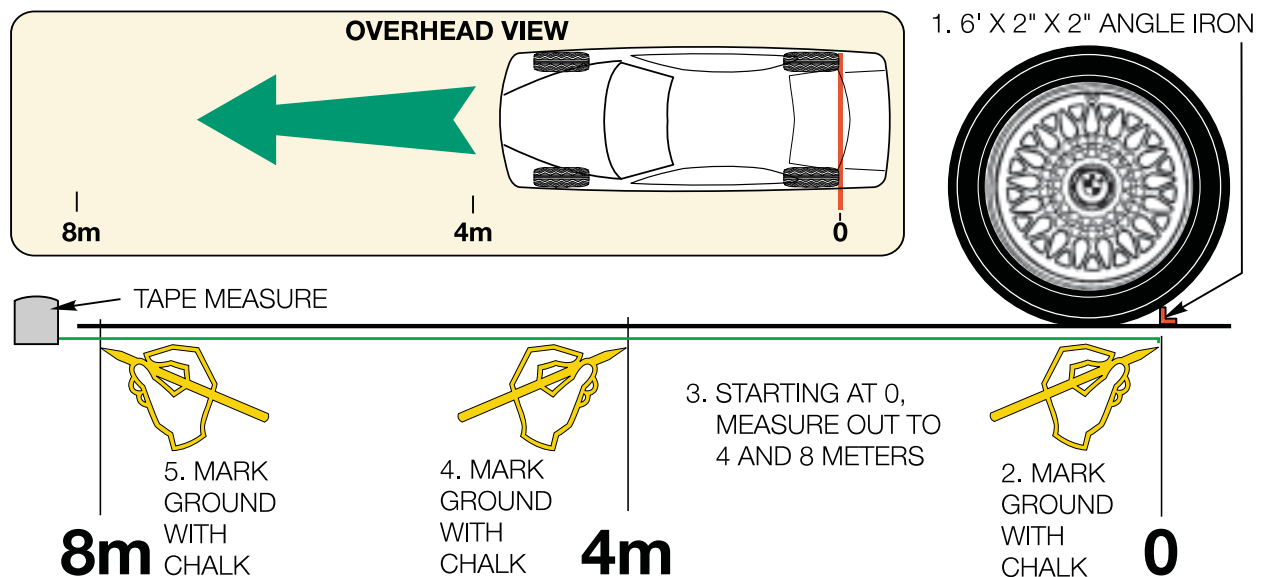
This procedure is necessary when the navigation computer or wheel/tires have been changed. The procedure calibrates the wheel circumference/speed sensor input to the navigation computer so that the distance traveled input is correct.

The tire inflation pressure must be checked and correctly set prior to carrying out this test.

NOTE: The screen instructions will indicate a 4 and 6 meter distance in this procedure. Field testing has proven that a distance of 8 meters provides a more precise wheel sensor calibration.

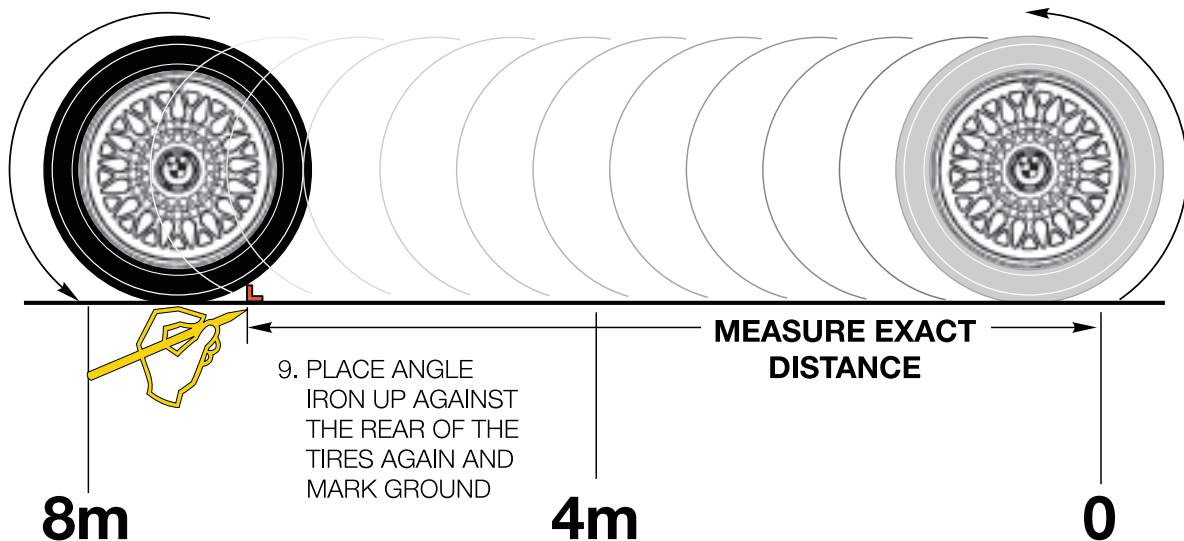


1. Make sure the front wheels are facing forward. Place the angle iron against the back side of the rear tires.

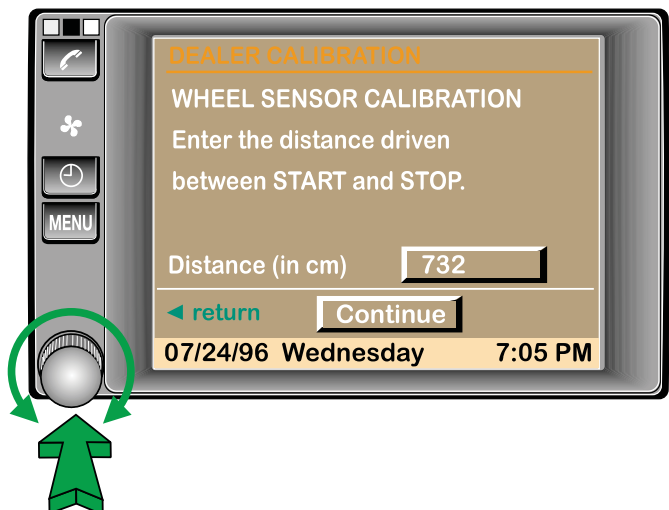


2. Mark the road with the chalk where the angle iron contacts the road. This is your starting point.
3. Using a metric tape measure, measure out 4 and 8 meters from the starting point
4. Mark the distance on the road surface at four (4) meters.
5. Mark the distance on the road surface at eight (8) meters.

6. Press the start function on the On-board monitor.
7. Drive the vehicle slow and continuously forward (don't stop) until the rear tires are between the 4 and 8 meter marks (go as close to the 8 meter mark as possible) and



- stop.
8. Press the stop button on the monitor. Set the parking brake.
9. Place the angle iron up against the rear of the back tires again and mark the ground with the chalk.
- 10 Precisely measure the distance from the starting point to the end point (tolerance < 1cm) and input this value using the rotary knob. Then press continue.



Drive the vehicle to the known minimum 100 meter street or area.

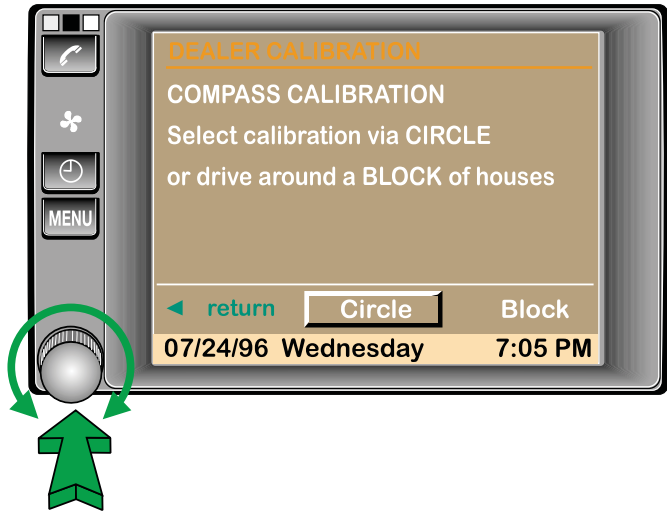
Press the start button by driving the vehicle **straight ahead** for a distance of at least 100 meters.

- The vehicle speed must also be < 40 KMH and the steering wheel must be held straight.
- Once you have travelled at least 100 meters stop the vehicle and press stop.
- The monitor screen will display the calibration has successfully completed.

3. COMPASS (MAGNETIC FIELD SENSOR CALIBRATION)

The magnetic field sensor must be calibrated if:

- The field sensor is replaced
- The navigation computer is replaced
- The rear window with the heating grid is replaced
- Body work (welding, reconstruction)



Calibration of the field sensor is a **three step process** that includes:

COMPASS STEP 1. Allowing the sensor to read all directions of travel. This is carried out in one of two different methods;

- Driving the vehicle in several tight “circles”, or
- Driving several times around a “block” (“city block”, “block of houses”)

One of these methods must be selected on the monitor before beginning.

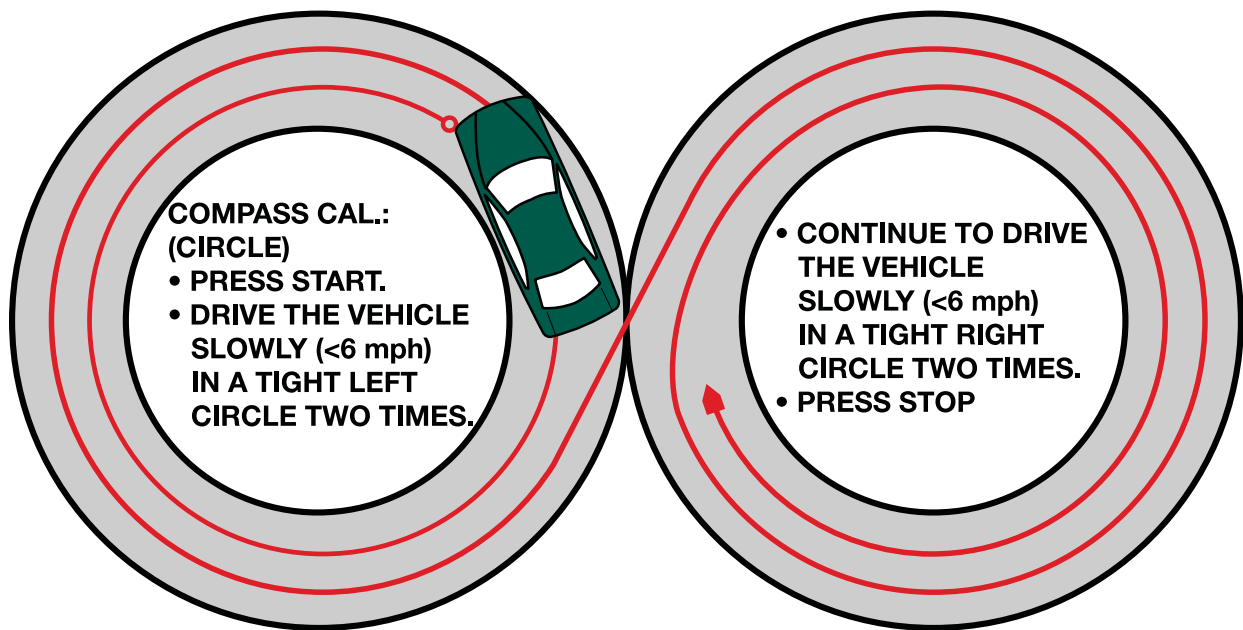
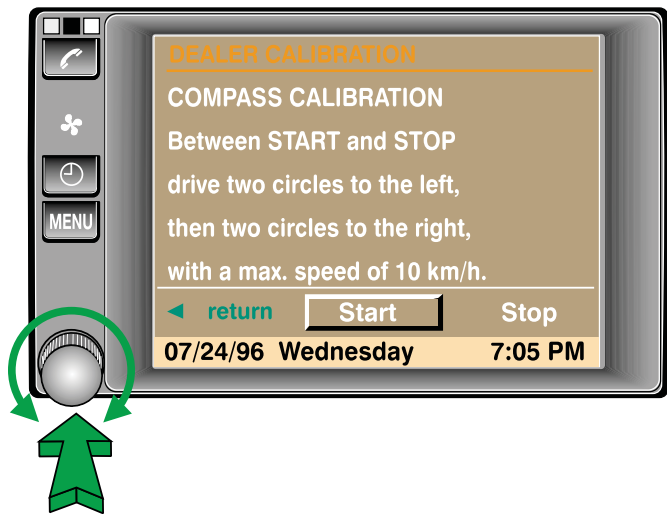
[illegible]

Preferred Method- CIRCLE

Driving the vehicle two complete circles - both counterclockwise and clockwise - will cover all directions.

Press Start, the speed of the vehicle must not exceed 6 MPH during the calibration.

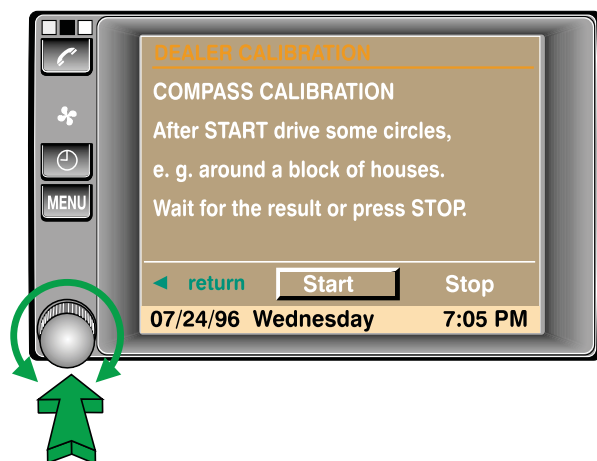
Press Stop when you have completed. The monitor will indicate that the navigation computer has seen all directions of travel by displaying "Calibration Successful".



Alternate Method - BLOCK

Driving the vehicle around a block several times will also allow the navigation computer to see all directions of travel.

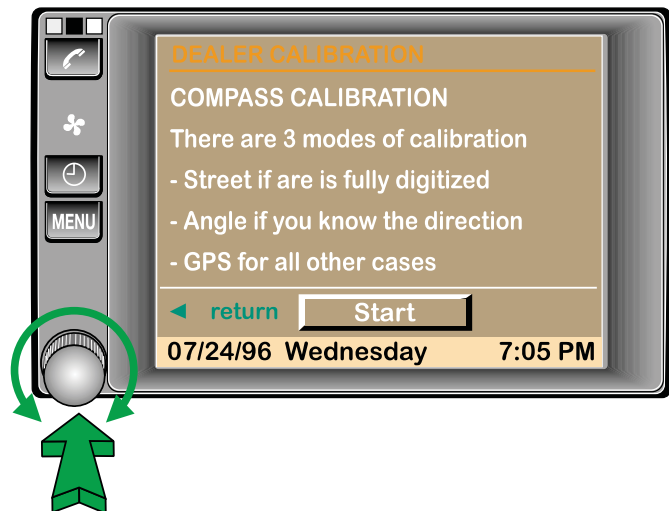
The monitor will automatically indicate when this section of the calibration is completed.



COMPASS STEP 2. Calibration of the magnetic field sensor input to the navigation computer.

This procedure is only possible after STEP 1 has been completed. Step 2 is carried out in one of three different methods;

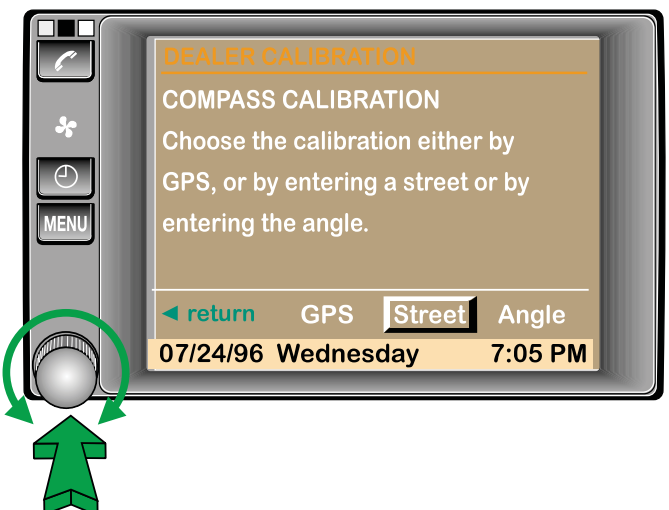
- Calibration using a digitized address.
- Calibration using the GPS satellite signals.
- Angular calibration using the direction of a long section of road.



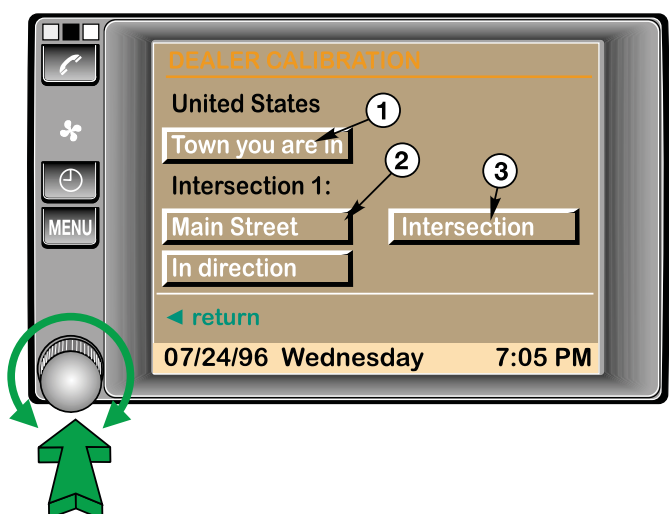
Preferred Method - DIGITIZED ADDRESS

This procedure can only be used within a fully digitized CD map area.

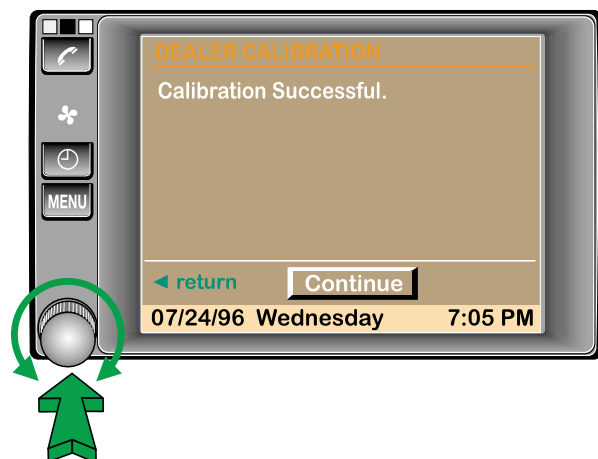
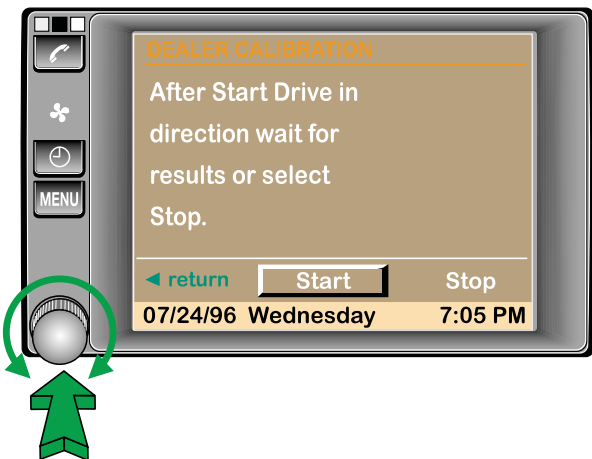
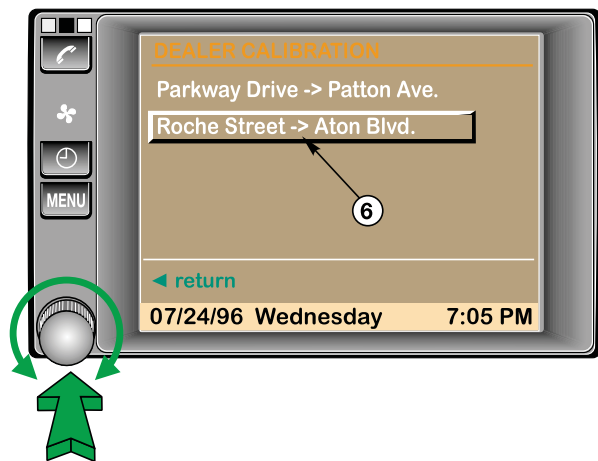
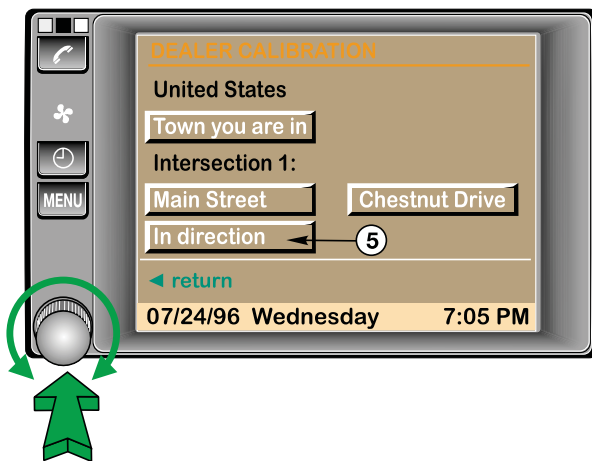
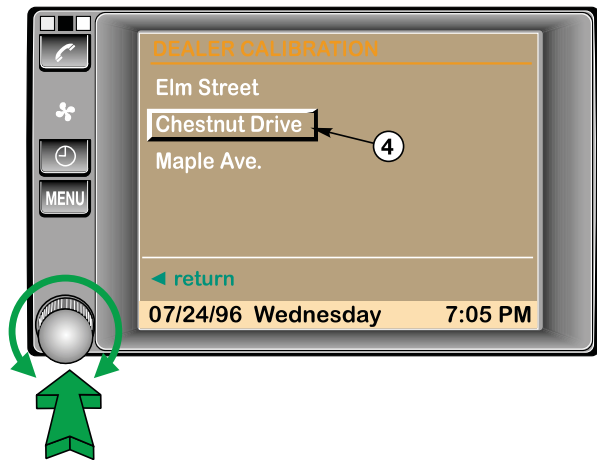
The actual location is entered into the on-board monitor and the navigation system will display a route between two road intersections, along which the vehicle must be driven.



1. If the town is not already displayed, enter it in the same method as entering a destination.
2. Enter the street at which you want to start the calibration.
3. Press the intersection button.



4. Select the street from the list of intersecting streets that is close to where the vehicle is at this point.
5. Press the "In direction" button. This brings up a list of streets that are in the direction of your planned calibration drive.
6. Select the street that is in your planned direction of travel.
7. Press Start when you begin to drive.



The screen will automatically confirm that the calibration was successful. Press the continue button to go to Compass Step 3; Rear Window Defroster grid compensation calibration

COMPASS STEP 2 (Continued)

Alternate Method - GPS

This requires driving the vehicle in all directions until the navigation computer fixes the field sensor inputs.

This may require several minutes of driving to complete this step. The roads should be as straight as possible and free from any overhead obstructions that might block the upward view to the satellite signals.

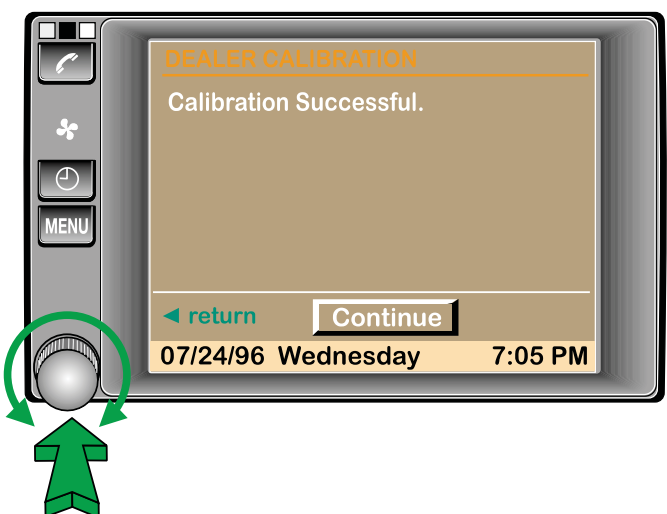
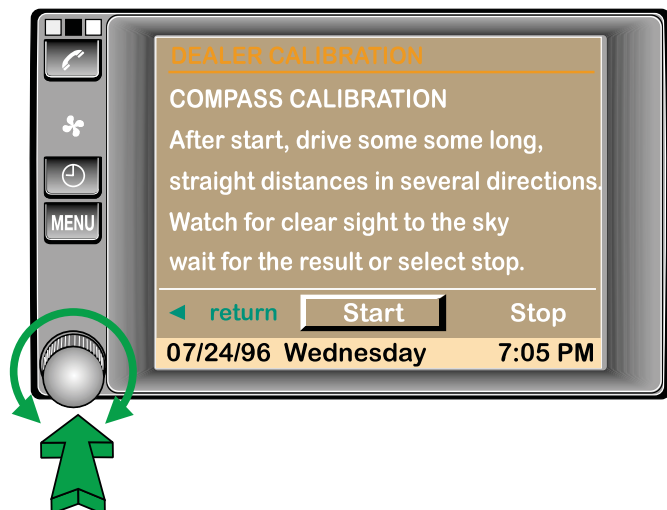
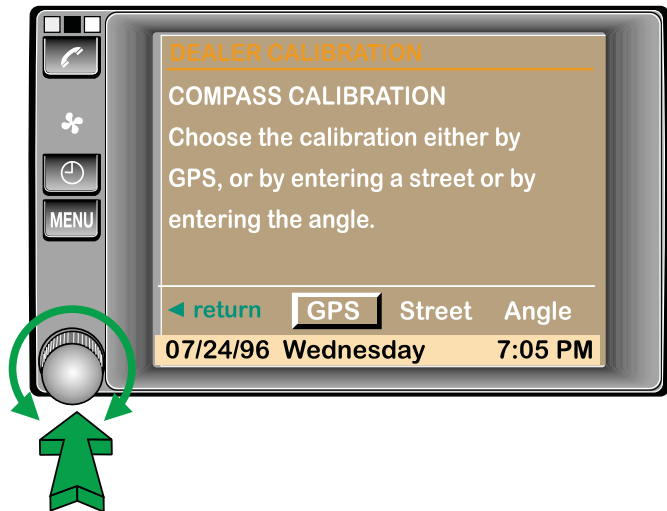
The screen will automatically confirm that the calibration was successful.

Press the continue button to go to Compass Step 3; Rear Window Defroster grid compensation calibration

Last Method - Angle

Angular calibration using the direction of a long section of road. To use this method, the geographical angle of the road must be known and input into the navigation computer to within $\pm 1^\circ$, then the vehicle must be driven along this route.

Any of these three described methods will perform the second step in the compass calibration. Once this step is complete, the last step can be carried out.



COMPASS STEP 3 - REAR WINDOW DEFROSTER COMPENSATION

This procedure is only possible after steps #1 and #2 have been successfully completed.

The navigation computer determines the magnetic field generated by the defogger grid so it can compensate for this when the rear defogger is switched on.

- Switch the rear defogger ON and confirm the input on the Monitor screen. Wait for acknowledgment by the navigation system.
- Switch the rear defogger OFF and confirm the input on the monitor screen. Wait for acknowledgment by the navigation system

FINISH CALIBRATION

Once all of the required calibration procedures have been carried out, press the finish calibration button.

This will display whether the calibration process was successful or if faults or problems have occurred that require troubleshooting with the DIS .

