PICO Technology - Parking sensor Test using the TA329

You will require a PicoScope to perform this test.

The purpose of this test is to evaluate the operation of Ultrasonic Proximity Sensors (referred to as Parking Sensors) with Pico Technology's Ultrasonic parking sensor detector.

<u>Safety Notice</u>

To test the proximity sensors, you may have to have the engine running with a gear selected in the transmission (e.g. Reverse). Under no circumstances must these conditions be met without a qualified driver in control of the vehicle at all times. Testing of proximity sensors, therefore, requires two operatives; one to control the vehicle and one to acquire the relevant signal.

Note: The correct operation of parking sensors is dependent upon their position/orientation (aftermarket fitment), wiring harness connectivity, surface contamination or degradation, control unit functionality, and their operational environment being removed from sources of intense telecommunication and ultrasonic activity.

How to perform the test

Accessories

TA329 Ultrasonic parking sensor detector

PicoScope settings:

Channel A

DC coupled

Input range: ± 50 mV

Timebase 1 ms/div

(Optional timebase 100 ms/div)

Sample count 1 MS

Trigger:

Channel A, Auto

Rising edge approximately 10 mV

30% Pre-trigger setting

How to connect PicoScope

Connect the parking sensor detector to Channel A on the PicoScope

Run your scope by pressing either the space bar on your keyboard or the Go button in PicoScope

Activate the vehicle's parking sensors (refer to the owner's manual). Assistance may be required to ensure personal safety (see Safety Notice).

Hold the parking sensor detector close to (within about 25 mm of) the surface of the parking sensor.

While aiming the parking sensor detector directly at the parking sensor, manoeuvre it in a circular fashion to obtain the best possible signal.

Stop your scope by pressing either the space bar on your keyboard or the Stop button in PicoScope.

Restore the vehicle to a safe rest position (engine off).

Use the waveform buffer to scroll through your captured waveforms to assess the parking sensors under test.

Diagnosis

The output from the parking sensor can be measured with the Ultrasonic parking sensor detector to confirm activity in the parking sensor under test. In general, the frequency of the signal generated by a parking sensor is around 40,000 Hz (40 kHz), which is above the frequency of audible sound to humans (ultrasonic).

The parking sensor detector is tuned to detect high-frequency signals like these in the immediate vicinity of the parking sensor. The high frequency will excite the pick-up inside the detector to produce a voltage, reflecting parking sensor activity and display the signal on your PicoScope screen.

High-Frequency signal

Use the windowed zoom feature to draw a box around the peak amplitude point of the captured signal. This will zoom in on and reveal each cycle of the captured waveform.

Use the time rulers to measure the frequency of one cycle at the approximate peak amplitude. The frequency value is displayed in the frequency legend.

In the example waveform images, the measured operational frequency of our parking sensor is 45.93 kHz.

Peak-to-peak measurement

Click on the Measurements tab to reveal the Add Measurement option. Select the channel you wish to add a measurement to, select Peak To Peak as the type of measurement and Whole trace as the area of the waveform you would like to measure. Click OK and your selections will add the peak-to-peak voltage of your captured waveform as a numerical value. Typical values can vary from 50 mV to 200 mV depending on the location and distance of the detector in relation to the parking sensor. An alternative method to measure peak-to-peak voltages would be to use the signal rulers. Drag both signal rulers to align with specific areas of the waveform (e.g. min. and max) where the numerical min, max and delta values of the signal rulers are displayed in the ruler legend. Compare the peak amplitudes of each parking sensor. This will allow for a judgment to be made about their respective serviceability

Time rulers, signal rulers and the ruler legend

Once the time and signal rulers are dragged onto the waveform buffer, their respective numerical min, max, and delta values will be displayed in the ruler legend. You can also use the locking feature to lock a selected pair of rulers together, making them move in tandem to help with comparison measurements for multiple events.

More information

A typical parking sensor can be considered as both a transmitter and receiver. An internal piezoelectric device is utilised to not only generate a high-frequency pulse through the air but also to convert any reflected pulses into a voltage that can be detected.

The parking sensor is initially driven by the relevant on-board vehicle computer for sufficient time to excite the piezoelectric element at high frequency (40 kHz). This excitement results in a pressure pulse being emitted from the surface of the parking sensor. Think of the pressure pulse as an inaudible sound wave.

The time taken to excite the parking sensor (computer controlled) is critical as the piezoelectric element is required to resonate at 40 kHz almost instantaneously, then return to rest and await any reflections. The return to rest from such a high frequency will, however, take time and this decay time is referred to as ringing (this can be likened to a bell that continues to ring long after the strike of a hammer). Here we are dissipating the sound energy generated by the piezoelectric element.

During the ringing, the onboard computer will pause before listening to any reflections received by the parking sensor, as ringing may well interfere and disguise any true reflections.

When the sound waves leave the surface of the parking sensor, the time taken for the piezoelectric element to receive any reflected sound waves determines the distance between the parking sensor and reflecting object.

Disclaimer