How To Setup The Gear Pot

The gear pot is a critical sensor for shift system performance and reliability. It forms the primary positional input on which the majority of shift system strategy outputs are based on both before, during and after the gear shift. As such it is **vital** that the gear pot is setup correctly.

Mechanical Installation Of The Gear Pot

The gear pot should be of a none contacting hall effect type for maximum reliability and should provide accurate feedback of the gear barrel position across its entire range of movement. The gear pot should be fitted so the lowest voltage output from the gear pot is supplied in the lowest gear (e.g. Reverse, or Neutral if Reverse is not fitted) and the highest voltage output from the gearpot in the highest gear (e.g. 6th or 7th).

The gearpot should be secured to the gearbox using cap head bolts or similar as recommended by the gearbox manufacturer. If the gearbox is fitted with AV mounts for the gearpot these should be removed and the gearpot bolted directly to the gearbox. AV mounts are used to improve the reliability of contacting “wiper” type gear pots which are not suitable for use in closed loop gear control applications. If the gearbox is fitted with a contacting type pot it should be replaced with a none contacting hall effect gear pot.

Most gearpots are of a “spade” design with a rectangular sensing element on the pot locating into a rectangular cutout on the gear barrel. Many gearpots are supplied with spring elements to remove play from this mechanical interface and these should be retained if all cases **except** those where the gear pot sensing element is a machined fit into the gear barrel and has no natural “slop”. In rare cases (e.g. Porsche 996/997 Cup Car) the gear pot is driven from a shaft off the gear barrel and is not directly connected to the gear barrel, careful attention should be paid to the condition of the gear pot drive assembly when working with this type of gearbox to ensure the gearpot drive shaft is not worn and has no play relative to the gear barrels actual position.

In all installations the gear pot should be protected from high levels of radiated heat e.g. exhaust silencers/pipes. If the exhaust runs close to the gear pot then a heat shield should be installed to protect the gear pot.

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Calibration Of The Gear Pot / Setting The Gear Position

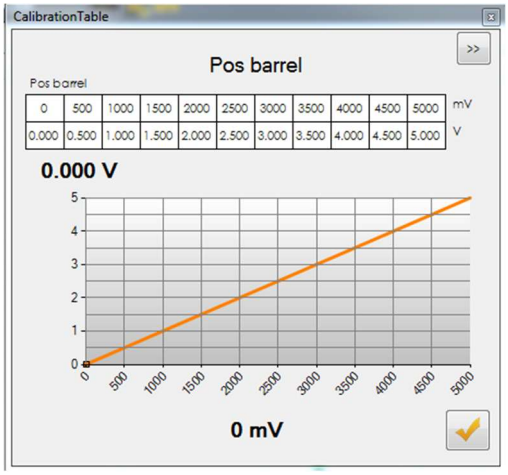
The gear pot must be accurately calibrated to reference the gear barrel position which relates to the engaged gear. Failure to ensure the gear positions are calibrated correctly will result in poor shift performance or damage to the gearbox. Calibration should always be checked on stands before the vehicle is run.

The method for calibrating the gearpot will depend on the control system used. If you are using an ECU with transmission control strategies please refer to the ECU manufacturers documentation on how to calibrate the gear pot / in gear voltages and the transmission control strategies accordingly.

If you are using a Shiftec GCU please refer to the steps below to calibrate the gear pot.

GCU Input Configuration.

1. With the ECU powered up a laptop connected open the Shiftec iFace software and establish comms with the GCU. Navigate to input setup via the gear icon on the left hand side navigation pane.
2. In the “Name” column locate “Pos barrel”, select the relevant source for the gear pot. This will the analogue input to which the gear pot is wired on the GCU.
3. Click the “Table” link in the “Calibration” column.
4. The top line display 0mv – 5000mv should be linear. The lower line should also be linear relating directly to the input voltage. If the mechanical installation of the gearpot is correct there should be no reason to change these values.
5. Manually move through the gears and check the displayed MV valve at the bottom of the calibration table window moves as the engaged gear does. In nearly all installations the value of the rise or fall in voltage between gears should be a consistent amount.



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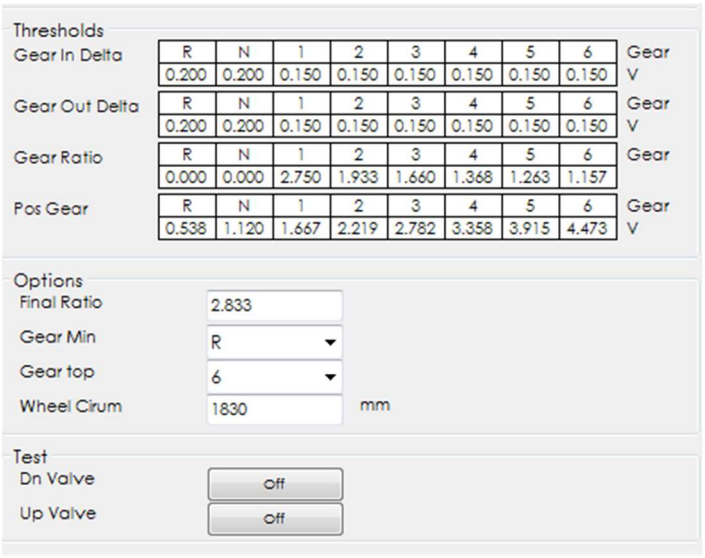
In Gear Voltage Calibration.

1. Navigate to the Options window within iFace via the Options icon on the left hand side navigation pane.
2. Navigate to the “Gear” tap within the options window. The thresholds section within this window allows you to specify relevant values and options. It is recommended you setup all items within the thresholds section at the same time as setting the in gear voltages.



3. Set the final drive ratio value in the “Final Ratio” box.
4. Select the Gear Min from the drop down (this will be R in most cases or N if your gearbox does not have reverse). Select the Gear Top from the drop down.
5. Set the wheel circumference. This value is used in conjunction with the final drive ratio to calculate the expected engine RPM of the next or prior gear.
6. Within the Thresholds table the “Gear In Delta” and “Gear Out Delta” tables set the voltage window around the in gear voltage where the gearbox is considered to be in gear. In the vast majority of cases the default values should be acceptable and should only be modified if required for shift performance. They should **not** be used to compensate for a noisy or failing gear pot.
7. The gear ratios fitted to the gearbox should be specified in the “Gear Ratio” line of the “Thresholds” table. It is important for reliable and accurate shift system operation that these are configured correctly.
8. The “Pos Gear” line of the Thresholds table relates to the actual gear pot voltage measured when each gear is fully engaged. It is **vital** that this table is calibrated correctly. To calibrate the in gear voltages begin with the gearbox in Reverse gear or Neutral if your gearbox does not have reverse. The “Dn Valve” and “Up Valve” buttons in the test section will allow you to trigger the relevant valves to move the gear position as required during setup.

9. The “Pos Barrel” value displayed in the “Live Values” section on the right hand side of the gear tab displays the current gear barrel position as a voltage. Ensure the gearbox is in reverse and enter the value displayed here in the “R” column of the “Pos Gear” table.
10. Either mechanically shift the gearbox to Neutral or use the “Up Valve” button to move the gearbox to Neutral. **Note**: It is recommended you move the wheels during this process to ensure the gearbox is able to change gear and you do note accidently enter a false value for the gear position. When you are confident the gearbox is in neutral enter the value displayed in the “Pos Gear” live value into the “N” column of the “Pos Gear” table.
11. Shift the gearbox to 1st gear. Repeat the process of ensuring the gearbox is fully in gear and entering the value displayed in the “Pos Gear” live value into the relevant column of the “Pos Gear” table.
12. Repeat this process for all gears until the top gear “Pos Gear” value is set.
13. In the “Live Values” section of the window the “Gear Valid” status should now report as “Yes”
14. Shift down the gearbox and ensure that the “Gear Valid” status for all gears selected displays as “Yes”.
15. Save your configuration. The gear pot setup is now complete. You should test the vehicle on stands to ensure the gear positions recorded are valid and correct before the vehicle is used on circuit.