Fuel Gauge Principles of Operation				
Mode	**Time it takes to go from Empty to Full**	**How do I get INTO this mode?**	**How do I get OUT of this mode?**	**Precautions when Diagnosing a Fuel Gauge Issue**
Anti-Slosh	55 min	1) Whenever vehicle is put into drive. - OR - 2) When vehicle is in Park and key is ON with no fuel added or greater than 15% capacity added	1) Add minimum of 15% fuel capacity to fuel tank in either key-OFF or key-ON modes. 2) Disconnect Battery or pull Cluster fuse.	1) Gauge will not respond (quickly) to input from the resistance box or sender if Cluster is in Anti-Slosh mode. 2) Must get out of Anti-Slosh mode prior to performing diagnostics.
Key-OFF Fueling	2 sec	1) Key-OFF, shifter in Park or Park Brake applied. - AND - 2) Add minimum of 15% fuel capacity to fuel tank.	Whenever vehicle is put into Drive or key is turned ON	**Recommended Mode for Refueling and Diagnosing** 1) Key should remain in OFF position while refueling. 2) Cycling key ON repeatedly while refueling will result in inaccurate gauge response.
Key-ON Fueling	90 sec	1) Key-ON, shifter in Park or Park Brake applied. - AND - 2) Add minimum of 15% fuel capacity to fuel tank.	Whenever vehicle is put into Drive or key is turned OFF	1) Vehicle must remain in Park for Auto Transmissions and Park Brake applied for Manual Transmissions. 2) Failure to do this will put Cluster into Anti-Slosh mode.
Recovery	20 min	Cluster goes into this automatically when missing a fuel level input during refueling due to intermittant opens in wiring or sender.	Will automatically revert to Anti-Slosh mode after fuel level inputs return to normal.	This mode is not controlled by input from the Customer or Technician.
Note: When removing fuel, a minimum of 25% tank capacity must be removed in order to see gauge respond in less than 90 sec.				

Fuel Gauge Diagnosis --- Best Practices and Common Mistakes
1) Improved diagnostics can be found in the latest [on-line] version of the workshop manual.
2) Make sure to pull all DTC's prior to starting Fuel Gauge Pinpoint tests
3) When performing Pinpoint tests to simulate Fuel Gauge Operation, use resistance/decade box (Rotunda tester #014-R1063 or equivalent) to simulate fuel levels for Empty and Full
4) Multimeter must be used to verify correct resistance when using Rotunda Tester/Resistance box. Inaccuracies by more than 10-ohm may result in out of range responses from Cluster.
5) Ensure correct resistance values are used when performing Pinpoint tests for Empty and Full. These values may vary among vehicle lines and model years. Although most vehicles use low and high resistance values to represent Empty and Full respectively, some 2006 programs have implemented senders which swap these values (i.e. Low=Full, High=Empty).
6) Observe all wait times in Pinpoint tests when simulating Fuel Gauge Operation (i.e. pull fuse, wait 1 minute, reinsert fuse). These times must be strictly observed in order to clear all fuel related timers in the cluster. If not cleared, gauge may not respond as anticipated.
7) Intentionally creating and open or short at the fuel sender WILL NOT simulate Full / Empty gauge operation.

Common DTCs related to Fuel Gauge Issues	Hill Hold Feature
P0460 - fuel sensor A fault - stuck float related to customer refueling habits P0462 - short circuit sensor A P0463 - open circuit sensor A B1201 - fuel sender circuit failure B1202 - fuel sender circuit open B1204 - fuel sender circuit short to ground	When parking on a Hill - Fuel Gauge doesn not update to new sender value unless there has been a significant change in the fuel level between Key-OFF and Key-ON. The Gauge will reflect last known value before vehicle was parked on hill.
<u>Saddle Tank Specific DTCs</u> P2065 - fuel sensor B fault - stuck float related to customer refueling habits P2067 - sensor B short circuit P2068 - sensor B open circuit B2627 - JPM fuel sender open circuit B2628 - JPM fuel sender circuit short B2879 - fuel tank jet pump fault - occurs when FDM fuel level is low and the AJPM fuel level is high	**Zero Speed Sample (ZSS)** The Cluster uses Key-ON, Key-OFF, and ZSS to determine the gauge position. ZSS is only acquired if the vehicle is running and in Park. It is used for Key-ON fueling scenario and is cleared when vehicle speed is greater than zero.