DIAGNOSTIC INFORMATION AND PROCEDURES

AIR/WIND NOISE

Air / Wind Noise-Diagnosis and Tests

Tools

- Stethoscope
- Duct tape, foam, etc.

WARNING: **Refer to Assistant Driving Warning .**

Overview

To analyze a reported wind noise condition, use the following outline:

- Speak with the customer to obtain as much information as possible.
- Perform a static evaluation of the vehicle to identify potential areas of concern.
- Test drive the vehicle to determine the source of the noise.
- Select the appropriate solution.
- After repair, re-evaluate the vehicle to confirm the customer's complaint is resolved.

When test driving the vehicle, choose a regular route with smooth and straight roads. The area should have little traffic and little noise in order to minimize interference with the test. Drive the vehicle at the speed in which the noise was noticed, or until the noise is heard. Maintain safe and legal speeds.

You can diagnose the following types of wind noise:

- Wind whistle / wind leaks
- Wind rush

When moving at highway speeds, air pressure inside the vehicle becomes greater than the air pressure outside. When a leak occurs, the escaping air causes a hiss or a whistle. Wind whistle / wind leaks are repairable when properly root caused.

Wind rush occurs when air presses over the vehicle's body, and is related to the aerodynamics of the vehicle. Some wind rush is repairable as it relates to part fits and body panel fits. A thorough root cause analysis is required before concluding that the wind noise is not repairable.

Air / Wind Noise - Diagnostic Procedure

Use the following procedure in order to diagnose wind noise:

1. It is important to obtain as many details from the customer as possible in order to assure that you are addressing the issue that the customer hears. Note the following details:
    - The perceived location (B-pillar, mirror, roof, rear of vehicle, front of vehicle, high or low in vehicle)
    - The location where the noise is loudest (specific location along the door header, front edge of sunroof, etc.)
    - The volume of the noise (very loud, can only hear when radio is off and no ambient noises)
    - The ambient conditions (temperature, windy, direction of wind, quiet)

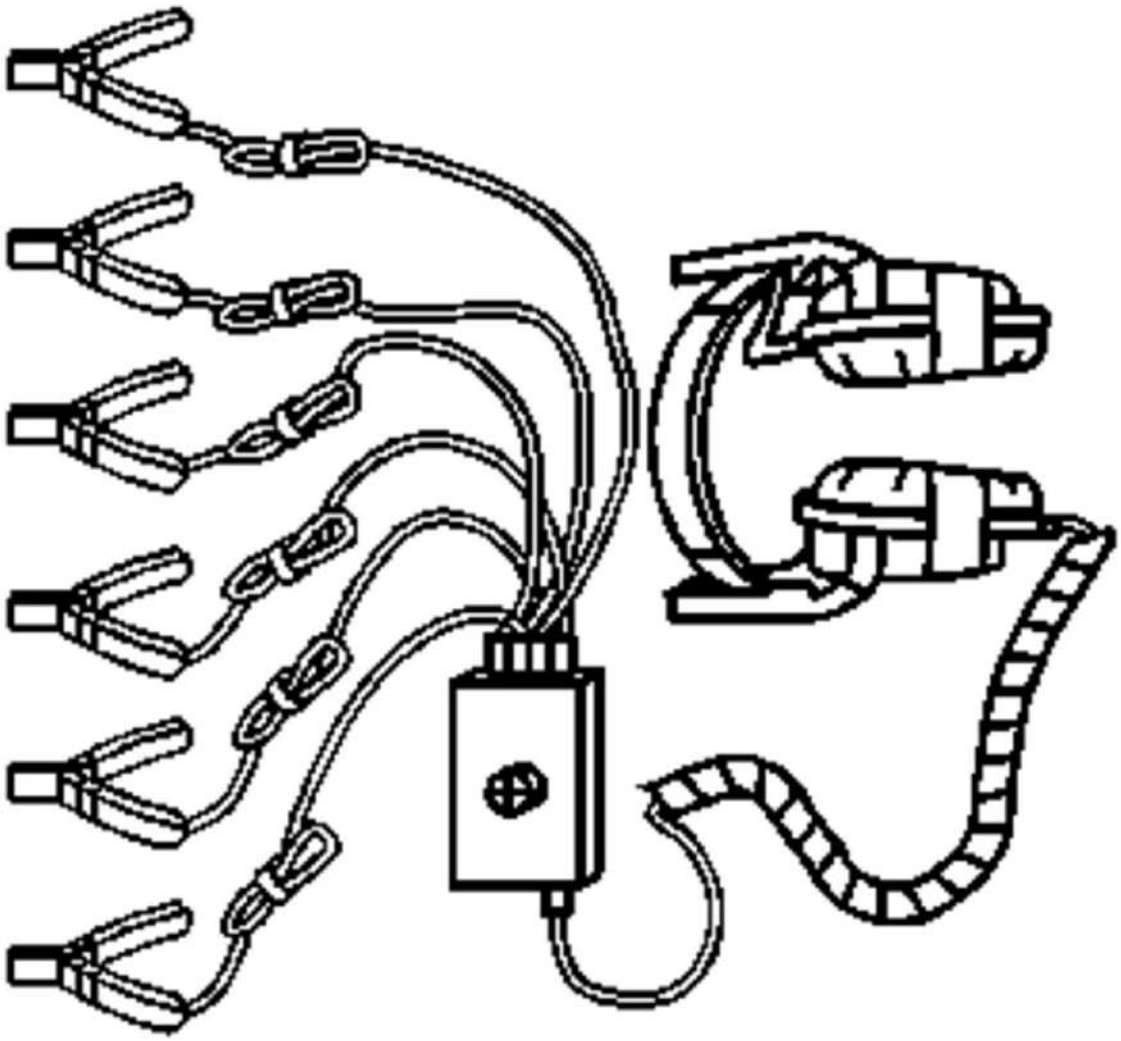
5. If unsuccessful in identifying the leak path, consider masking off the pressure relief valves (to increase cabin pressure) and perform the evaluation again.

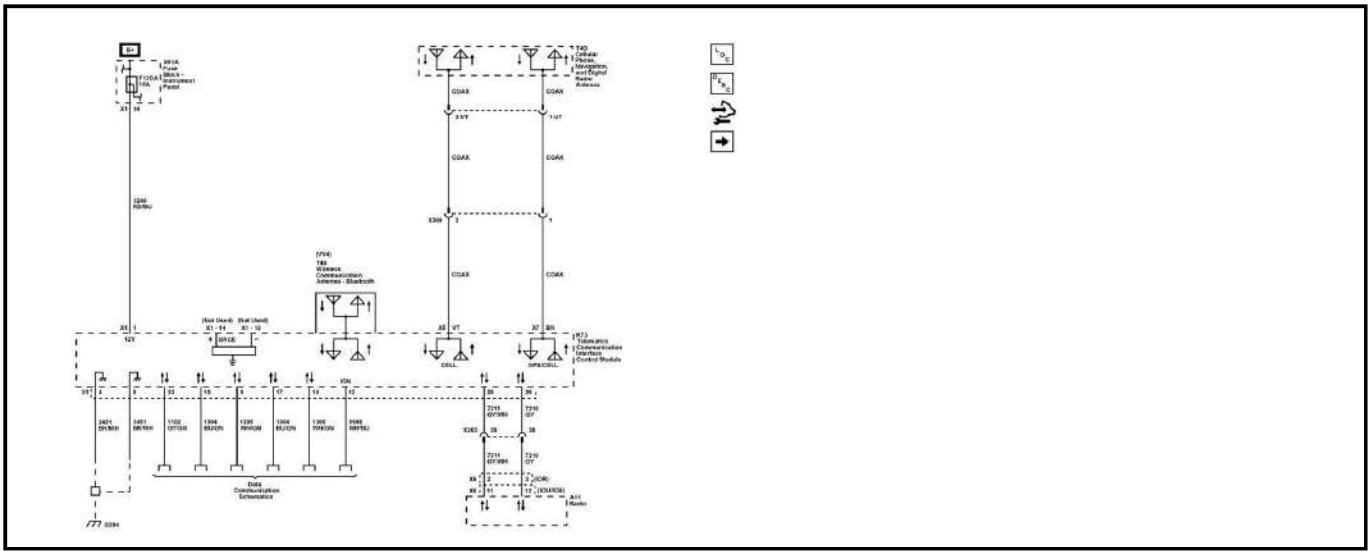
SOAP SUDS OR BUBBLE TEST

1. Close all the windows.
2. Turn the vehicles ventilation fan to the on position, with the selector on high speed and in the defrost mode (or panel mode with fresh air vent on - no recirc).
3. Unlock and close the doors.
4. Apply the soap solution to the potential leak areas.
5. Look for bubbles revealing escaping air.
6. If unsuccessful in identifying the leak path, consider masking off the pressure relief valves (to increase cabin pressure) and perform the evaluation again.

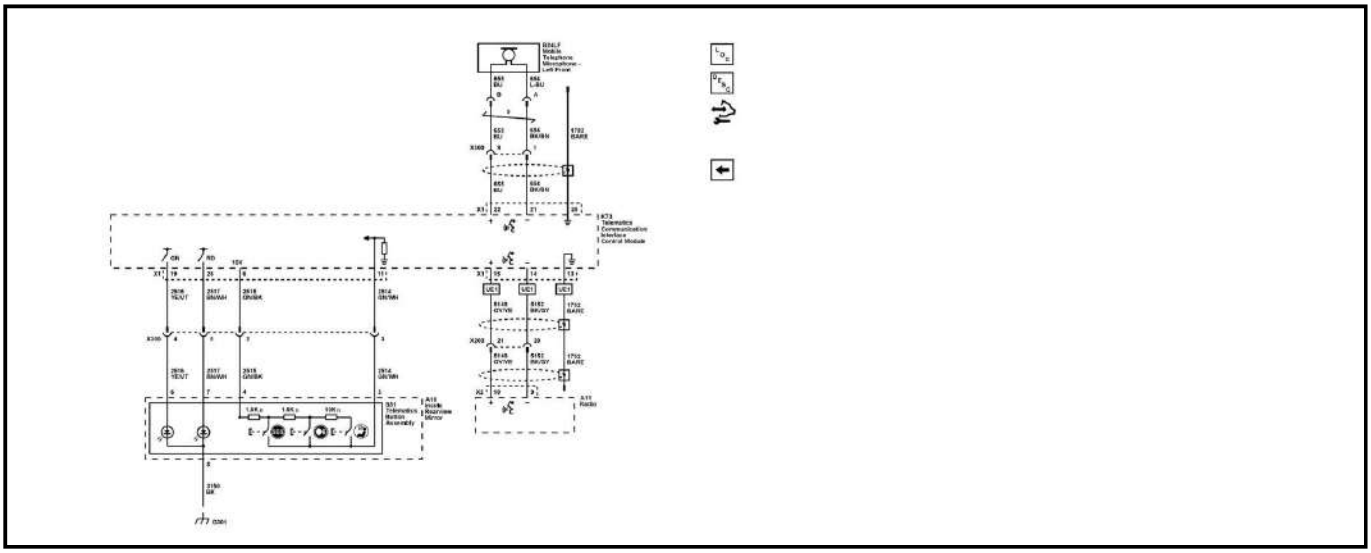
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description
	CH-39570 J 39570 Chassis Ear



Controls and Audio Signals



DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B0560

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: **Diagnostic System Check - Vehicle**
- Review the description of Strategy Based Diagnosis: **Strategy Based Diagnosis**
- An overview of each diagnostic category can be found here: **Diagnostic Procedure Instructions**

DTC Descriptor

DTC B0560 08

Invalid Engine Speed Signal

Symptom Byte Information: Symptom Byte List

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal circuit	B0560 08	B0560 08	-	B0560 08

- If 1 V or greater - Repair the short to voltage on the circuit.
- Go to next step: If less than 1 V

5. Ignition/Vehicle - Off
6. Test for infinite resistance between the test points: Signal circuit terminal 3 @ Component harness & Ground
   - If less than infinite resistance - Repair the short to ground on the circuit.
   - Go to next step: If infinite resistance
7. Test for less than 2 ohms between the test points: Signal circuit terminal 3 @ Component harness & Signal circuit terminal 6 @ S79D Window Switch - Driver
   - If 2 ohms or greater - Repair the open/high resistance in the circuit.
   - If less than 2 ohms - Replace the component: S79D Window Switch - Driver

- **Go to next step: If the specified state**

11. Connect a test lamp between the test points: Signal circuit terminal 7 & B+
12. Ignition - On / Vehicle - In Service Mode
13. Operate the component: Driver Left Front Window Switch @ S79D Window Switch - Driver - Pressed

    Verify the test lamp state:

    Driver Left Front Window Switch - Not Used = Test lamp Off

    Driver Left Front Window Switch - Pressed = Test lamp On

    - **If not the specified state**

    1. Ignition/Vehicle - Off & Remove - Test lamp
    2. Disconnect the electrical connector: S79D Window Switch - Driver
    3. Ignition - On / Vehicle - In Service Mode
    4. Test for less than 1 V between the test points: Signal circuit terminal 7 @ Component harness & Ground
       - If 1 V or greater - Repair the short to voltage on the circuit.
       - Go to next step: If less than 1 V
    5. Ignition/Vehicle - Off
    6. Test for infinite resistance between the test points: Signal circuit terminal 7 @ Component harness & Ground
       - If less than infinite resistance - Repair the short to ground on the circuit.
       - Go to next step: If infinite resistance
    7. Test for less than 2 ohms between the test points: Signal circuit terminal 7 @ Component harness & Signal circuit terminal 3 @ S79D Window Switch - Driver
       - If 2 ohms or greater - Repair the open/high resistance in the circuit.
       - If less than 2 ohms - Replace the component: S79D Window Switch - Driver

    - **Go to next step: If the specified state**

14. Connect a test lamp between the test points: Signal circuit terminal 5 & B+
15. Ignition - On / Vehicle - In Service Mode
16. Operate the component: Driver Left Front Window Switch @ S79D Window Switch - Driver - Pressed & Pulled

    Verify the test lamp state:

    Driver Left Front Window Switch - Not Used = Test lamp Off

    Driver Left Front Window Switch - Pressed = Test lamp On

- **Stable battery voltage is critical during programming. Any fluctuation, spiking, over voltage or loss of voltage will interrupt programming. When required, install a battery maintainer or power supply that provides a steady and stable voltage. Do not use a battery charger, as charging voltage will often fluctuate when connected to the vehicle. This may interrupt programing. If a battery maintainer is not available, connect a fully charged 12 V jumper or booster pack disconnected from the AC voltage supply.**
- **Turn OFF or disable systems that may put a load on the vehicles battery such as; interior lights, exterior lights (including daytime running lights), HVAC, etc.**
- **During the programming procedure, follow the SPS prompts for the correct ignition switch position.**
- **Clear DTCs after programming is complete. Clearing powertrain DTCs will set the Inspection/Maintenance (I/M) system status indicators to NO.**

Diagnostic Aids

During programming you may be required to select multiple calibrations dependent upon vehicle equipment. Have the vehicle build/RPO information available during the following procedure to ensure the correct calibrations are selected.

Replace and Program Control Module or Reprogram Control Module

To program a replacement or an existing control module, perform the following procedure:

1. Ignition ON, Vehicle OFF
2. Access the Service Programming System (SPS) and follow the on-screen instructions.
3. On the SPS Supported Controllers screen, select T3 Audio Amplifier - Programming and follow the on-screen instructions.
4. Clear DTCs.

Unsuccessful Programming Recovery

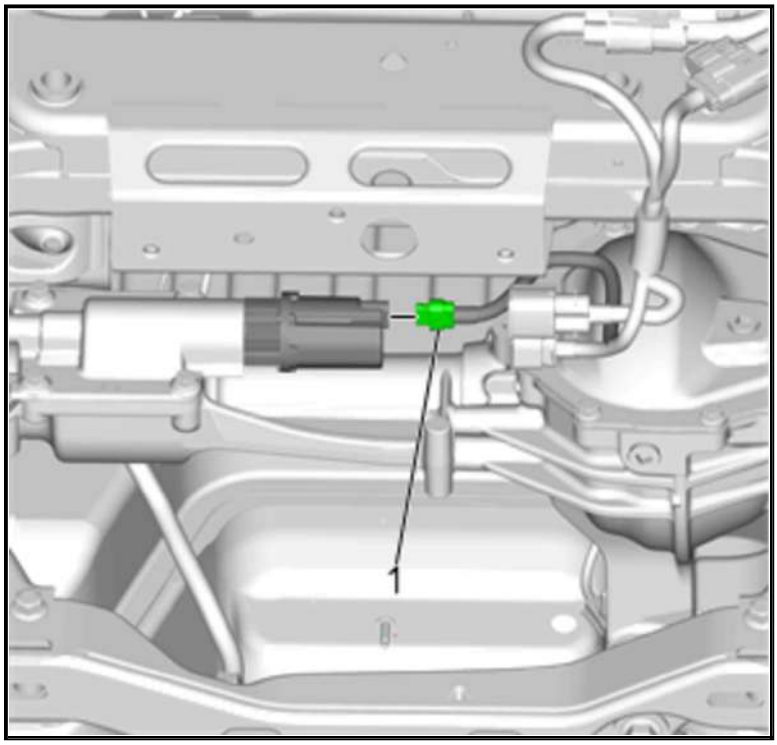
In the event of an interrupted or unsuccessful programming event, perform the following steps:

1. Ignition ON. Ensure the control module, DLC and programming tool connections are secure and the SPS software is up to date.
2. Verify the control module can be reprogrammed.
    - **If the control module cannot be reprogrammed**
    1. Ignition OFF for one minute, ignition ON.
    2. Verify the control module can be reprogrammed.
        - If the control module cannot be reprogrammed, replace the control module.
        - Go to next step: If the control module can be reprogrammed.
    3. All OK.
    - **Go to next step: If the control module can be reprogrammed**
3. All OK.

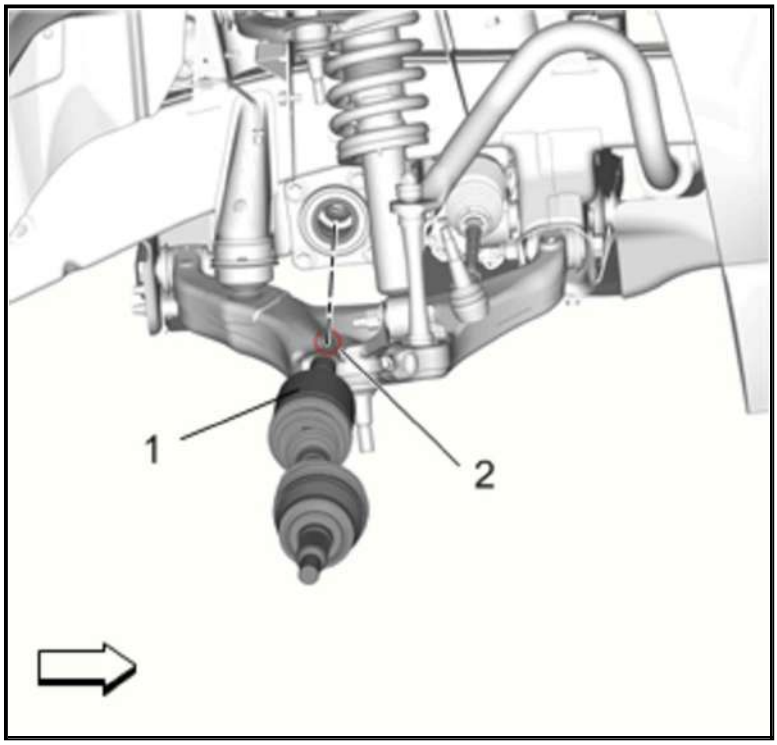
SERVICE PROGRAMMING SYSTEM (SPS)

For step-by-step control module programming instructions, please refer to the techline information system (TIS) terminal.

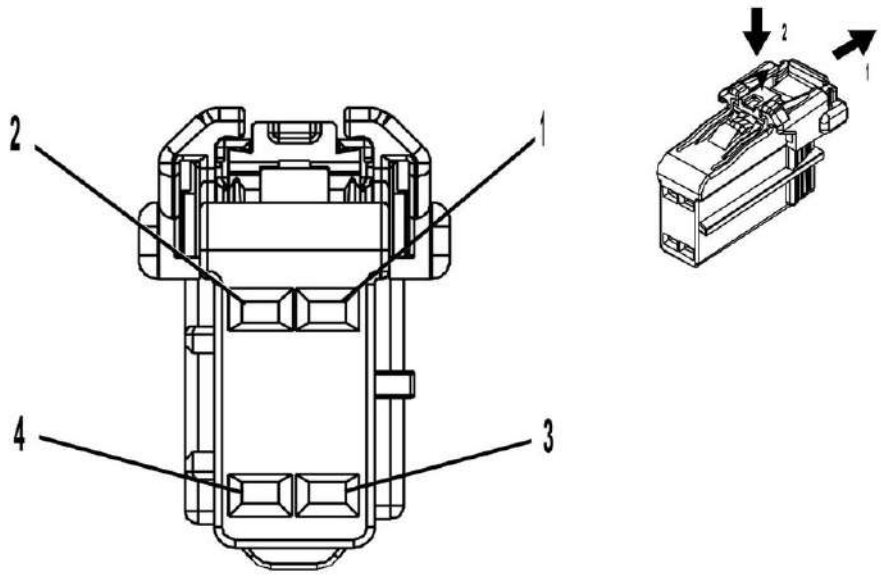
Review the information below to ensure proper programming protocol.



6. Install the front wheel drive shafts. **Front Wheel Drive Shaft Replacement - Left Side (Without ZR2)** , and **Front Wheel Drive Shaft Replacement - Right Side (Without ZR2)**



7. Install the front axle propeller shaft. **Front Axle Propeller Shaft Replacement (Without Bison)** , or **Front Axle Propeller Shaft Replacement (With Bison)**



Connector Part Information

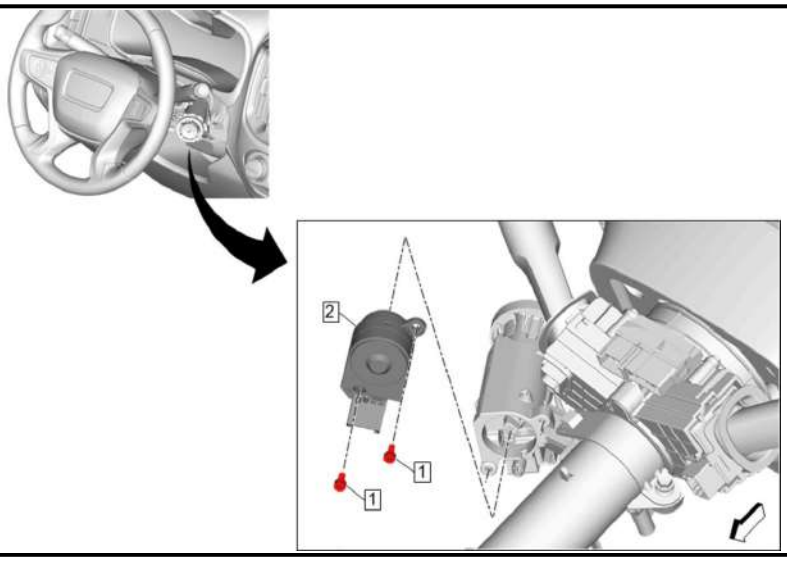
- Harness Type: Driver Seat Cushion
- OEM Connector: 13595574
- Service Connector: Service by Harness - See Part Catalog
- Description: 4-Way F 1.2 Series (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool
I	Not Required	Not Available	No Tool Required

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.75	BN/VT	2077	Driver Seat Heating Element Control	I	-
2	0.75	YE/GY	2079	Driver Seat Heating Temperature Sensor Signal	I	-
3	0.75	BK/YE	2080	Driver Heated Seat Thermistor Low Reference	I	-
4	0.75	VT/BK	2424	Driver Seat Back Heating Element Low Reference	I	-

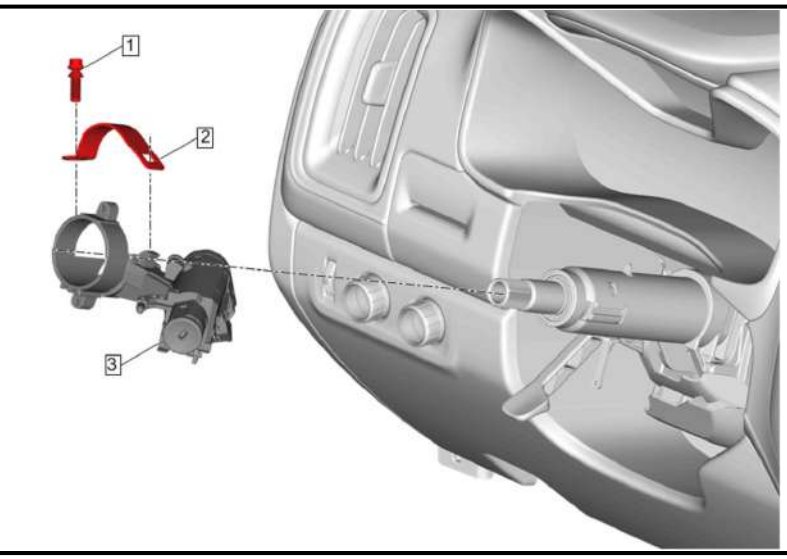
E14C SEAT HEATING ELEMENT - PASSENGER BACK (KA1)

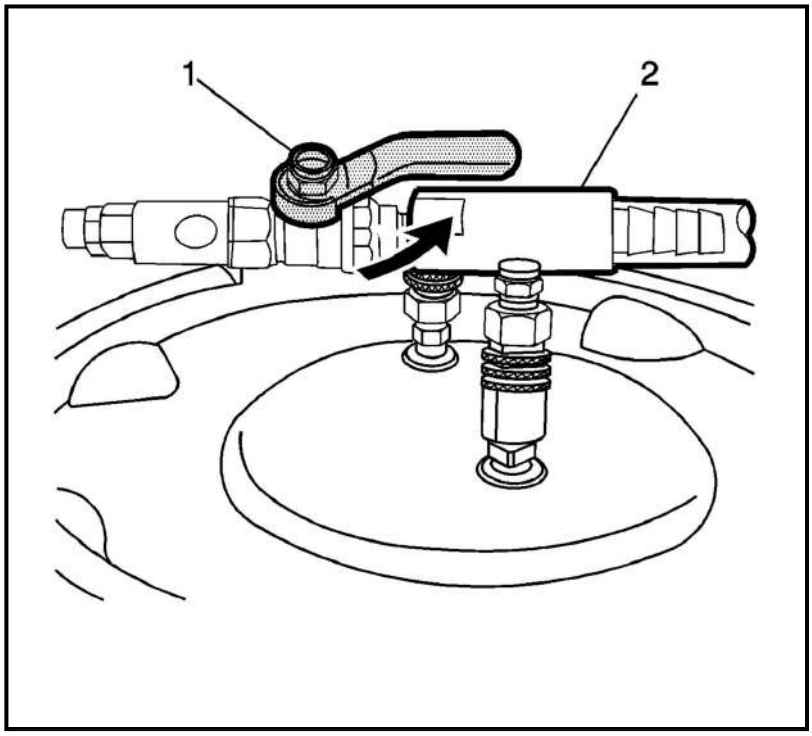


NOTE: **Callouts in the following chart represent components shown in graphic above.**

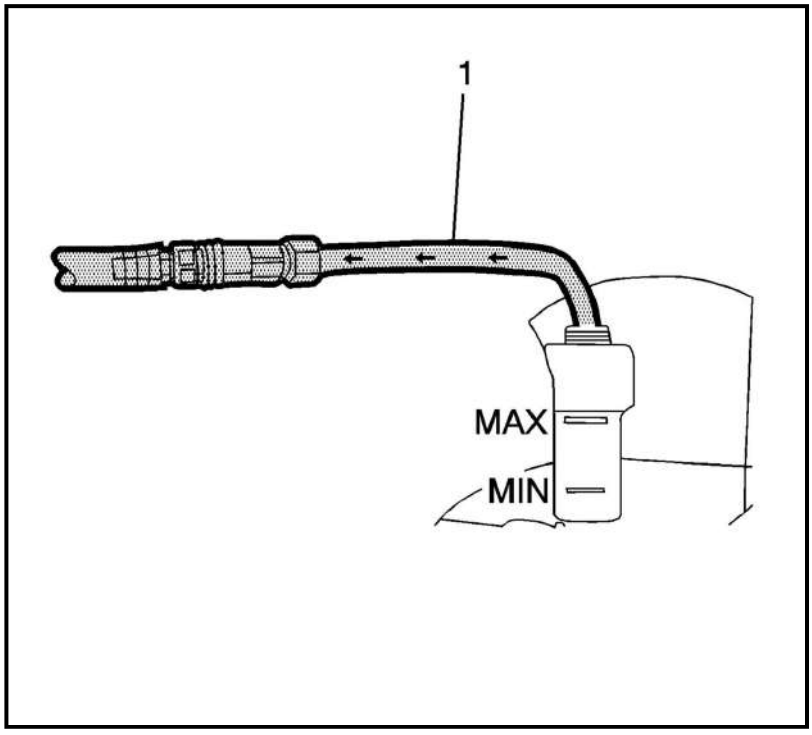
Callout	Component Name
Preliminary Procedures 1. Battery Negative Cable Disconnection and Connection 2. Steering Column Lower Trim Cover Replacement	
1	Ignition and Start Switch Bolt [2x] **CAUTION:** **Refer to Fastener Caution .** **Tighten** 2 N.m (18 lb in)
2	Ignition and Start Switch **Procedure** Disconnect the electrical connector.

IGNITION AND START SWITCH HOUSING REPLACEMENT

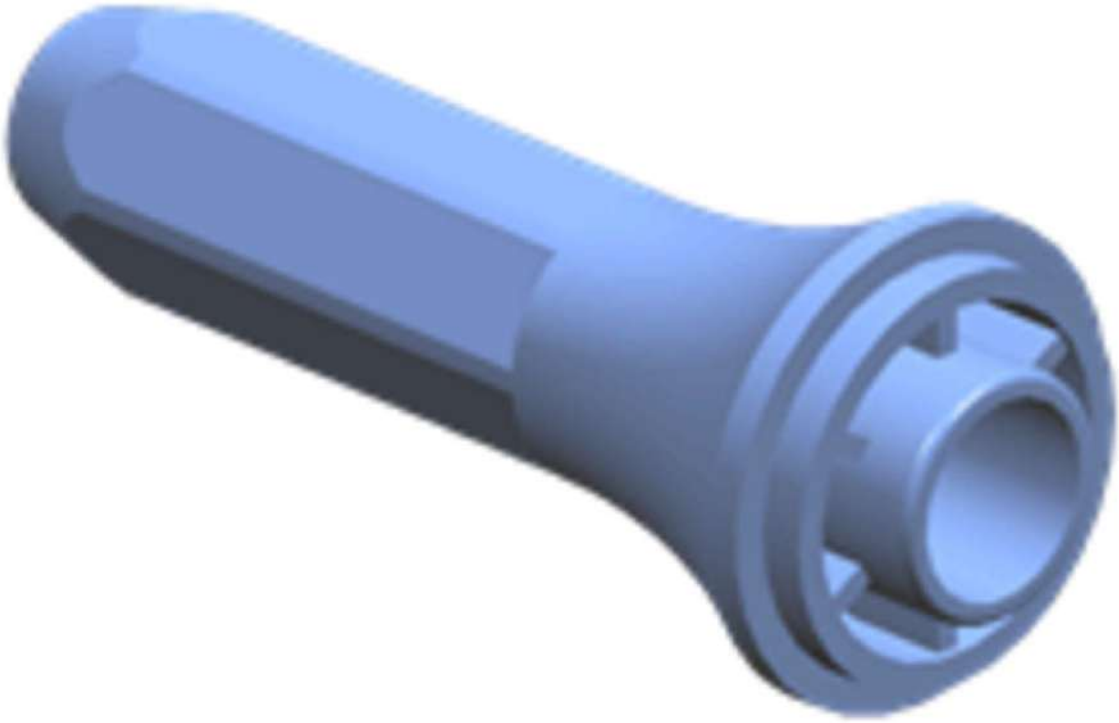




30. Use the extraction hose (1) to draw out coolant to the proper level.



31. The vacuum tank has a drain valve on the bottom of the tank. Open the valve to drain coolant from the vacuum tank into a suitable container for disposal.
32. Start the engine.
33. Run the engine at 2, 000 - 2, 500 RPM until the engine reaches normal operating temperature. Engine should reach an operating temperature of 90B°C (194B°F) and the upper radiator hose should be HOT.
34. Allow the engine to idle for 3 minutes.
35. Shut the engine OFF.
36. Allow the engine to cool.
37. Top off the coolant as necessary
38. Inspect the concentration of the engine coolant using the *J 26568* coolant and battery tester.
39. Install the radiator cap.
40. Rinse away any excess coolant from the engine and the engine compartment.

Illustration	Tool Number/Description
	DT-45866 J-45866 Input Shaft Seal Installer

8. Verify the scan tool parameter: Fuel Pressure Sensor = Greater than 4.8 V
    - **If 4.8 V or less**
    1. Ignition/Vehicle - Off & Remove - Jumper wire(s)
    2. Disconnect the electrical connector: X2 @ K20 Engine Control Module
    3. Test for infinite resistance between the test points: Signal circuit terminal 1 @ Component harness & Ground
        - If less than infinite resistance - Repair the short to ground on the circuit.
        - Go to next step: If infinite resistance
    4. Test for less than 2 ohms between the test points: Signal circuit terminal 1 @ Component harness & Terminal 20 @ Control module harness
        - If 2 ohms or greater - Repair the open/high resistance in the circuit.
        - If less than 2 ohms - Replace the component: K20 Engine Control Module
    - **Go to next step: If greater than 4.8 V**
9. Test or replace the component: B47 Fuel Pressure Sensor

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: **Diagnostic Repair Verification**

- **Fuel Pressure Sensor Replacement - Fuel Feed Pipe**
- For control module replacement, programming, and setup refer to **Control Module References**

DTC P0201-P0204, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P1248, P1249, P124A, P124B, P2147, P2148, P2150, P2151, P2153, P2154, P2156, OR P2157

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: **Diagnostic System Check - Vehicle**
- Review the description of Strategy Based Diagnosis: **Strategy Based Diagnosis**
- An overview of each diagnostic category can be found here: **Diagnostic Procedure Instructions**

DTC Descriptor

DTC P0201

Cylinder 1 Injector Control Circuit

DTC P0202

Cylinder 2 Injector Control Circuit

DTC P0203

Cylinder 3 Injector Control Circuit

DTC P0204

Cylinder 4 Injector Control Circuit

DTC P0261

Cylinder 1 Injector Control Circuit Low Voltage

DTC P0262

2. Disconnect the appropriate electrical connector: K20 Engine Control Module
3. Test for infinite resistance between the test points: Signal circuit terminal 4 @ Component harness & Ground
    - If less than infinite resistance - Repair the short to ground on the circuit.
    - If infinite resistance - Replace the component: K20 Engine Control Module
- **Go to next step: If greater than 4.7 V**

8. Connect a 3 A fused jumper wire between the test points: Signal circuit terminal 4 & Low Reference circuit terminal 1
9. Verify the scan tool parameter: MAP Sensor = Less than 0.2 V
    - **If 0.2 V or greater**
    1. Ignition/Vehicle - Off & Remove - Jumper wire(s)
    2. Disconnect the appropriate electrical connector: K20 Engine Control Module
    3. Ignition - On / Vehicle - In Service Mode
    4. Test for less than 1 V between the test points: Signal circuit terminal 4 @ Component harness & Ground
        - If 1 V or greater - Repair the short to voltage on the circuit.
        - Go to next step: If less than 1 V
    5. Ignition/Vehicle - Off
    6. Test for less than 2 ohms between the test points: Signal circuit terminal 4 @ Component harness & The other end of the circuit @ Control module harness
        - If 2 ohms or greater - Repair the open/high resistance in the circuit.
        - If less than 2 ohms - Replace the component: K20 Engine Control Module
    - **Go to next step: If less than 0.2 V**
10. Test or replace the component: B65 Intake Manifold Pressure and Air Temperature Sensor

Component Testing

NOTE: **Circuit/System Testing must be performed before proceeding with Component Testing.**

Dynamic Test - Using Vehicle Harness

1. Ignition/Vehicle - Off
2. Remove the component: B65 Intake Manifold Pressure and Air Temperature Sensor - Leave the electrical connector connected.
3. Install the special tool:<special tool><special tool-no>EN-23738-A</special tool-no><special tool-desc>Vacuum Pump</special tool-desc></special tool> @ B65 Intake Manifold Pressure and Air Temperature Sensor
4. Use the tool to achieve a gauge reading between -13 and -21 kPa (-0.13 and -0.21 bar, -3.8 and -6.2 in Hg).

    Verify the scan tool parameter: MAP Sensor = Decreases between 13 and 21 kPa (1.9 and 3.0 PSI)

    - **If the parameter does not decrease between 13 and 21 kPa (1.9 and 3.0 PSI)**

      Replace the component: B65 Intake Manifold Pressure and Air Temperature Sensor

    - **Go to next step: If the parameter decreases between 13 and 21 kPa (1.9 and 3.0 PSI)**
5. Use the tool to achieve a gauge reading between -30 and -38 kPa (-0.3 and -0.38 bar, -8.8 and -11.2 in Hg).

    Verify the scan tool parameter: MAP Sensor = Decreases between 30 and 38 kPa (4.4 and 5.5 PSI)

grounding the control circuit. The ECM controls each fuel injector with 65 V. This is controlled by a boost capacitor in the ECM. During the 65 V boost phase, the capacitor is discharged through an injector, allowing for initial injector opening. The injector is then held open with 12 V.

The fuel injector assembly is an inside opening electrical magnetic injector. The injector has six precision machined holes that generate a cone shaped oval spray pattern. The fuel injector has a slim extended tip in order to allow a sufficient cooling jacket in the cylinder head.

Fuel Metering Modes of Operation

The ECM monitors voltages from several sensors in order to determine how much fuel to give the engine. The ECM controls the amount of fuel delivered to the engine by changing the fuel injector pulse width. The fuel is delivered under one of several modes.

Starting Mode

The ECM supplies voltage to the fuel pump control module when the ECM detects that the ignition is ON. The voltage from the ECM to the fuel pump control module remains active for 2 s, unless the engine is in Crank or Run. While this voltage is being received, the fuel pump control module closes the ground switch of the fuel tank fuel pump module and also supplies a varying voltage to the fuel tank fuel pump module in order to maintain the desired fuel line pressure. The ECM calculates the air/fuel ratio based on inputs from the engine coolant temperature (ECT), manifold absolute pressure (MAP), mass air flow (MAF), and throttle position sensors. The system stays in starting mode until the engine speed reaches a predetermined RPM.

During a cold start, the engine control module (ECM) commands dual-pulse mode during Open Loop operation to improve cold start emissions. In dual-pulse mode, the injectors are energized twice during each injection event.

Clear Flood Mode

If the engine floods, the engine can be cleared by pressing the accelerator pedal down to the floor and then cranking the engine. When the throttle position sensor is at wide open throttle (WOT), the ECM reduces the fuel injector pulse width in order to increase the air to fuel ratio. The ECM holds this injector rate as long as the throttle stays wide open and the engine speed is below a predetermined RPM. If the throttle is not held wide open, the ECM returns to the starting mode.

Run Mode

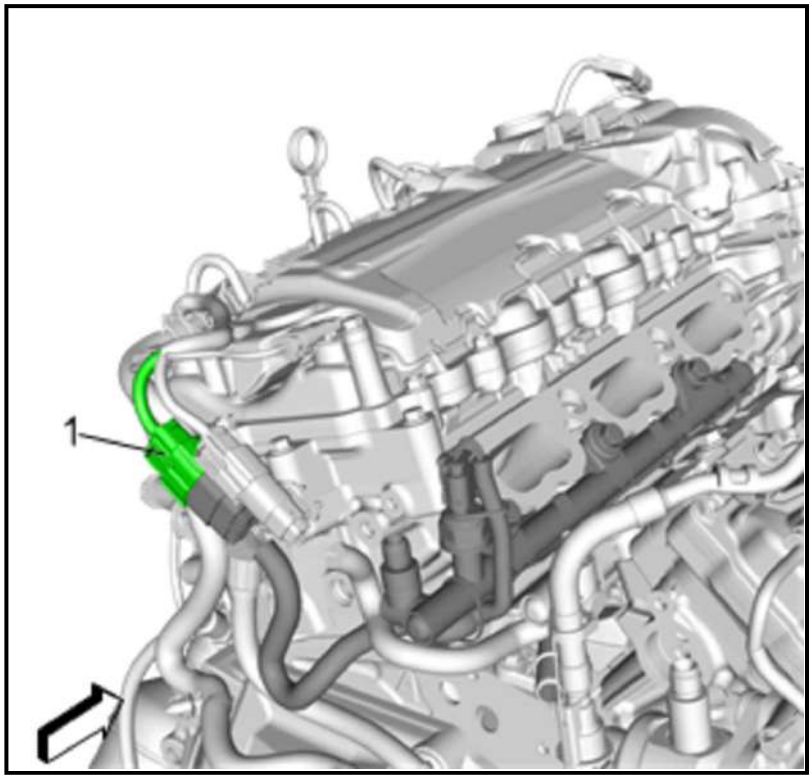
The run mode has 2 conditions called Open Loop and Closed Loop. When the engine is first started and the engine speed is above a predetermined RPM, the system begins Open Loop operation. The ECM ignores the signal from the heated oxygen sensor (HO2S). The ECM calculates the air/fuel ratio based on inputs from the engine coolant temperature (ECT), manifold absolute pressure (MAP), mass air flow (MAF), and throttle position sensors. The system stays in Open Loop until meeting the following conditions:

- The HO2S has varying voltage output, showing that the HO2S is hot enough to operate properly.
- The ECT sensor is above a specified temperature.
- A specific amount of time has elapsed after starting the engine.

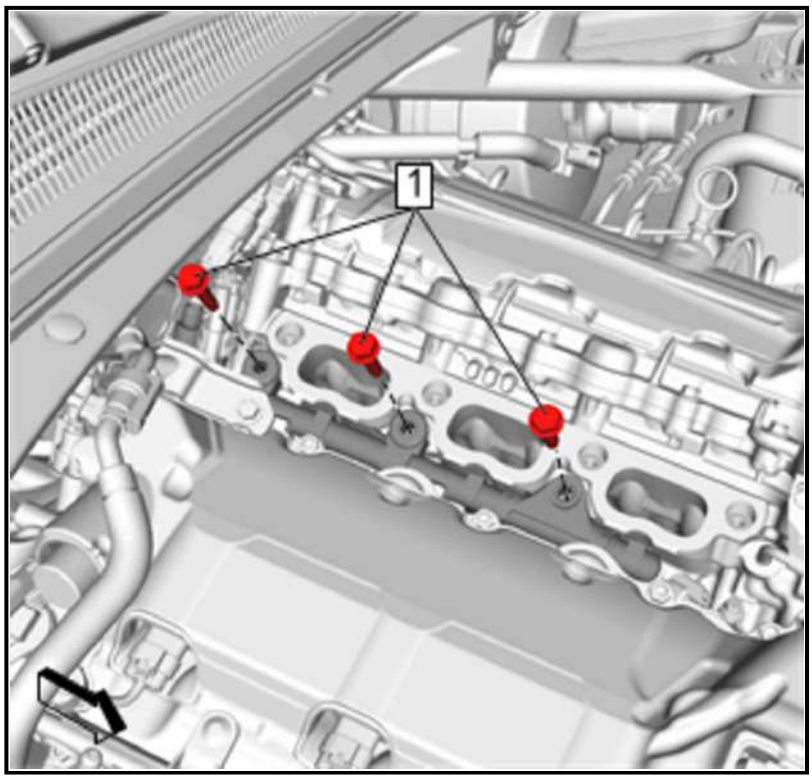
Specific values for the above conditions exist for each different engine, and are stored in the electrically erasable programmable read-only memory (EEPROM). The system begins Closed Loop operation after reaching these values. In Closed Loop, the ECM calculates the air/fuel ratio, injector ON time, based upon the signal from various sensors, but mainly from the HO2S. This allows the air/fuel ratio to stay very close to 14.7:1.

Acceleration Mode

When the driver pushes on the accelerator pedal, air flow into the cylinders increases rapidly. To prevent possible hesitation, the ECM increases the pulse width to the injectors to provide extra fuel during acceleration. This is also known as power enrichment. The ECM determines the amount of fuel required based upon throttle



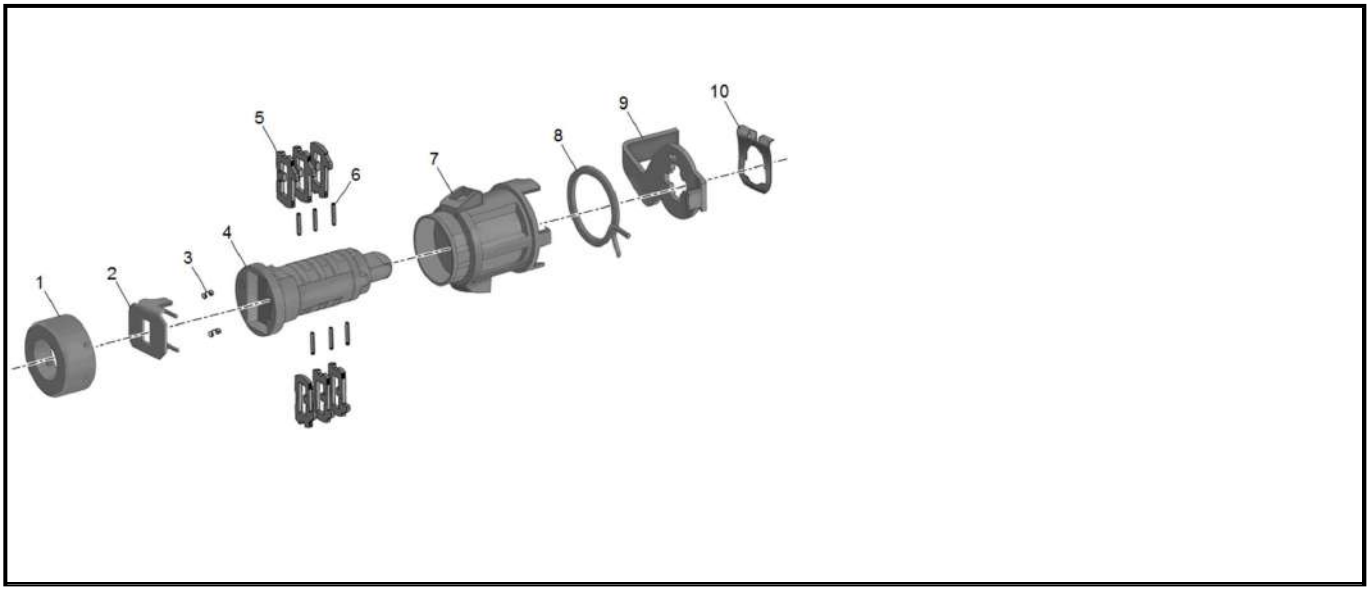
6. Fuel Injection Fuel Rail Fastener (1) - Remove [3x]



7. Install the **EN-49248** remover components (1) and slowly work the fuel injection fuel rail (2) upwards in small, even increments.

9. In the same manner, determine the cut depth and corresponding tumbler and install the two remaining tumblers (3) into the tumbler slots located at key cut positions 6 and 8.
10. Check the correct loading by holding the tumblers (3) in position and fully inserting the key into the cylinder (1). All tumblers should be flush with the outside diameter of the cylinder.
11. Lightly lubricate the tumbler (3) surfaces using the grease provided.
12. With the key fully inserted into the cylinder assembly, install the cylinder (1) into the case (4). Hold the lever and case (4) while pressing in on the cylinder (1) and rotate 90B°.
13. Remove the key being careful to ensure the cylinder (1) is locked into the case (4).
14. Install the lock cylinder cap (5) by aligning the open window of the cap with the corresponding protrusion area of the case (4). Snap the cap into place with light hand pressure. Be sure the cap is securely retained on the case.

PICKUP BOX ENDGATE LOCK CYLINDER CODING



WARNING: **Wear safety glasses in order to avoid eye damage.**

The pickup box endgate lock uses 6 out of 10 cut positions, 5 through 10 (when counting from the key head). The tumbler positions are staggered from side to side and are not self-retaining. The tumblers MUST be held in place if the key is not fully inserted into the lock cylinder or until the cylinder (4) is assembled into the case (7).

NOTE: **All lock cylinders for side milled keys have right and left tumblers. The location of the tooth of the tumbler determines whether it is right or left. All tumblers are marked 1R, 1L, 2R, 2L, etc. The number is cut depth and the letter identifies right or left. Tumblers identified as 1L to 4L must be inserted in the cylinder side where the first spring pocket is nearest to the back of the key head, tumblers identified as 1R to 4R must be inserted in the opposite side.**

1. Hold the cylinder (4) positioned so the side with the tumbler slot nearest to the cylinder head faces up.
2. Insert one tumbler spring (6) into each of the three tumbler slots on the cylinder (4).
3. The first tumbler (5) to be loaded will be the key cut position number 5 (the fifth number in the key code). Determine the cut depth at this position and install the corresponding tumbler (5) into the tumbler slot nearest the front of the cylinder (4). in the same manner, determine the cut depth and corresponding tumbler (5) and install the 2 remaining tumblers into the tumbler slots located at the key positions 7 & 9.
4. Check the correct loading by holding the tumblers (5) in position and fully inserting the key into cylinder (4). All tumblers should be flush with the outside diameter of the cylinder.
5. Rotate the cylinder (4) so the opposite tumbler slots are facing upward and than remove the key. Keep in mind it will be required to hold down all tumblers before removing the key to keep them from falling out.