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2007 FORD Freestyle OEM Service and Repair Workshop Manual

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PINPOINT TEST AC : NOISE - OVER BUMPS, ROUGH ROADS, DIPS, DEPRESSIONS OR WHEN ENTERING A DRIVEWAY

Normal Operation and Fault Conditions

Description

- Noises over bumps and rough roads involve parts which move and contact during an up and down motion.

Pinpoint Test Applicability

- This test applies to the following diagnostic concerns:
- Noises occurring over bumps, rough roads, dips, depressions or when entering a driveway

This test DOES NOT apply to any other DTC (diagnostic trouble code) or symptom.

Diagnostic Strategy

- To visually check for obvious parts that may be damaged within parts that are in motion during this drive event, followed up by Chassis Ears usage to further define where the noise source may be while steering (turning the steering wheel) during this drive event.

Pinpoint Test Purpose

- To search for the components contributing to steering noises during this drive event and determine if the resulting components are defective or the noise is a normally occurring noise for this vehicle type.

Possible Sources

- Heat shields
- Stabilizer bar insulators or links
- Front shock brackets or strut mounts
- Loose steering gear tie rods
- Loose steering gear bolts
- Loose front brake calipers or pins
- Loose lower control arm-to-subframe bolts or bushings
- Loose ball joint
- Loose exhaust heat shield, isolators or brackets
- Subframe to body attachments points
- Upper or lower steering shaft
- Internal or external steering gear stops

Pinpoint Test Steps available in the on-line Workshop Manual.

PINPOINT TEST AD : NOISE - INSIDE THE CABIN WHEN TURNING STEERING WHEEL

This test DOES NOT apply to any other DTC (diagnostic trouble code) or symptom.

Diagnostic Strategy

- To visually check for obvious parts that may be damaged within parts that are in motion during this drive event, followed up by Chassis Ears usage to further define where the noise source may be while steering (turning the steering wheel) during this drive event.

Pinpoint Test Purpose

- To search for the components contributing to steering noises during this drive event and determine if the resulting components are defective or the noise is a normally occurring noise for this vehicle type.

Possible Sources

- Steering shaft slip joints or lower input shaft (requires lubrication)
- Roll restrictor
- Powertrain mounts
- Exhaust heat shield (tinny rattle)
- Exhaust isolators and brackets
- Subframe mounts
- Engine to chassis wiring, tubes, brackets (loose or out of position)
- Halfshafts (if equipped)
- Mid- shaft bearing (right hand halfshaft)

AE1 FRONT END NOISE EVALUATION

- Test drive the vehicle, determine if the noise occurs only during braking or if the noise occurs during braking, acceleration and deceleration.

Does the noise ONLY occur during vehicle braking?

Yes	DIAGNOSE the braking system. REFER to: Brake System (206-00 Brake System - General Information, Diagnosis and Testing).
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No	GO to AE2
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AE2 SERVICE BAY ACTIVE UNDER HOOD FRONT END NOISE INSPECTION

- **NOTE**

Noise sources can be identified by stethoscope or hands-on during vehicle rocking. Tip-in and tip-out noise not usually steering gear related.

- Heat shield(s) (tinny rattle)
- Steering gear shield(s)
- Exhaust isolators and bracket
- Steering column shaft slip joints (dry condition)
- Subframe mounts
- Engine or chassis wiring, tubes or brackets (loose or out of position)
- Halfshafts or driveshafts
- Mid-shaft bearing (if equipped)

Are all of the listed components OK?

<p>Yes</p>	<p>Components may pass a visual inspection but could still be making internal noises. Noise may only be identified during a test drive. REFER to the list of components in the pinpoint test step and, using a Chassis Ears or similar tool, pinpoint the noise source. For additional NVH (noise, vibration and harshness) information, REFER to: Noise, Vibration and Harshness (NVH) (100-04 Noise, Vibration and Harshness, Diagnosis and Testing). . REPAIR or INSTALL new components as necessary.</p>
<p>No</p>	<p>REPAIR or INSTALL new components as necessary</p>

PINPOINT TEST AF : NOISE - DURING BRAKING

Normal Operation and Fault Conditions

Description

- If the noise occurs while braking AND during tip-in or tip-out, this is not typically a steering gear related noise.
- Noises when braking involve parts which move during braking.

Pinpoint Test Applicability

- This test applies to the following diagnostic concerns:
- Noises occurring during braking

This test DOES NOT apply to any other DTC (diagnostic trouble code) or symptom.

Diagnostic Strategy

- To visually check for obvious parts that may be damaged within parts that are in motion during this drive event, followed up by Chassis Ears usage to further define where the noise source may be while

- Shut the engine off.
- Release the parking brake.
- Open the hood.
- Rock the vehicle backwards and forwards by pushing on the front bumper and attempt to locate the source of the noise.
 - Rocking the vehicle causes the engine mounts to flex, resulting in the movement of several components.
- Possible noise sources could be, but are not limited to:
 - Steering column shaft slip joint
 - Transmission or engine mounts
 - Roll restrictor
 - Subframe mounts
 - Axle shafts or halfshafts
 - Drive shafts
 - All coolant tubes, air conditioning tubes and wiring harnesses
 - Exhaust hangers and other related exhaust components

Was the noise identified and located during this test?

Yes	REPAIR or INSTALL new components as necessary. REFER to the appropriate section of the Workshop Manual.
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No	GO to AF3
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AF3 VISUAL INSPECTION FOR FRONT END NOISE SOURCE

- With the transmission in NEUTRAL, position the vehicle on a hoist.
REFER to: [Jacking and Lifting - Overview](#)(100-02 Jacking and Lifting, Description and Operation).
- Using a strong light source, visually inspect the following components for a potential concern (loose, damaged, broken):
 - Engine mounts
 - Transmission mounts
 - Roll restrictors
 - Heat shield(s) (tinny rattle)
 - Steering gear shield(s)

- Transmission fluid
- Brake fluid
- Fluid from nearby reservoir bottles

AG1 IDENTIFY THE STEERING SYSTEM TYPE

- Consult the VIN (vehicle identification number) and associated steering components to verify if the steering system is electric or hydraulic assist.
 - If there are hydraulic hoses connected to the steering gear, the steering system is hydraulic assist.
 - If there are no hydraulic hoses connected to the steering gear, the steering system is electric assist.

Is the steering system electric assist?

<p>Yes</p>	<p>The electric steering gear is not filled with power steering fluid (or any fluids) and therefore does not leak fluids. The fluids on the housing and other steering components may be due to an engine compartment source of external fluids.</p> <p>INSPECT the vehicle and engine compartment for sources of fluid leaks.</p> <p>CHECK OASIS (Online Automotive Service Information System) for any applicable service articles: TSB (Technical Service Bulletin), GSB (General Service Bulletin), SSM (special service message) or FSA (Field Service Action).</p> <p>. If a service article exists for this concern, FOLLOW the service article instructions.</p>
<p>No</p>	<p>SELECT the appropriate vehicle line in the workshop manual and PROCEED with diagnosing the hydraulic steering system.</p>

PINPOINT TEST AH : STEERING WHEEL VIBRATES OR RESISTS TURNING

Normal Operation and Fault Conditions

Description

- The steering wheel can vibrate or shake as well as resist turning into the next lane when the turn signals are not used to change lanes. This may be a normal operation of the Lane Keeping Assist feature.
- .

REFER to: [Lane Keeping System - System Operation and Component Description](#)(419-07 Lane Keeping System, Description and Operation).

- Verify the vehicle has been driven for at least 152 meters (500 ft), with little to no steering wheel torque input.

Possible Sources

- PSCM (power steering control module) has lost the steering angle center position

Diagnostic steps are not provided for this symptom or DTC. REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

PINPOINT TEST BV : PSCM (POWER STEERING CONTROL MODULE) DTC (DIAGNOSTIC TROUBLE CODE) U0428:00 INVALID DATA RECEIVED FROM THE STEERING ANGLE SENSOR MODULE

Refer to Wiring Diagrams Cell 43 for schematic and connector information.

Normal Operation and Fault Conditions REFER to: [Power Steering - System Operation and Component Description](#)

(211-02 Power Steering, Description and Operation).

Description

- The PSCM (power steering control module) monitors the HS-CAN (high-speed controller area network) messages when the voltage to the PSCM (power steering control module) is greater than 10 volts and there are no Diagnostic Trouble Codes (DTCs) present inhibiting PSCM (power steering control module) operation.

Pinpoint Test Applicability

- This test applies to PSCM (power steering control module) DTC (diagnostic trouble code) U0428 Invalid Data Received from the SASM (steering angle sensor module) only. It does not apply to any other module except the PSCM (power steering control module) .

DTC Diagnostic Strategy

- If the module DTC (diagnostic trouble code) list results in a large number of Diagnostic Trouble Codes (DTCs), diagnose all module hard faults first (C102D, C1B00, C200B, C200C, C200D, U2011 and U3000) before diagnosing any network faults (lost communication or invalid data). If voltage concern Diagnostic Trouble Codes (DTCs) are present, diagnose those after any module hard faults and before any network faults. Diagnose all current and active Diagnostic Trouble Codes (DTCs) before diagnosing any historic Diagnostic Trouble Codes (DTCs).

Pinpoint Test Purpose

- To direct the diagnosis to the module and associated circuit sending the faulty or unknown information in the messages.

Diagnostic Aids

- For additional information on the messages sent to the PSCM (power steering control module) from the SASM (steering angle sensor module) module, refer to the Network Message List in Section 211-02 of the workshop manual.

This test DOES NOT apply to any other DTC (diagnostic trouble code) or symptom.

Diagnostic Strategy

- To visually check for obvious parts that may be damaged within parts that are in motion during this drive event, followed up by Chassis Ears usage to further define where the noise source may be while steering (turning the steering wheel) during this drive event.

Pinpoint Test Purpose

- To search for the components contributing to steering noises during this drive event and determine if the resulting components are defective or the noise is a normally occurring noise for this vehicle type.

Possible Sources

- Springs, shocks, struts and bearings or bushings (most common)
- Tires
- Steering gear internal stops (full turn)
- External steering stops (full turn)
- Steering tie rods (loose)
- Loose steering gear mounts or bolts
- Stabilizer bar insulators or links
- Integrated front wheel ends (4x4 only)
- Front control arms and bushings
- Front halfshaft and bearings (ting or ping metallic noise at slow speeds) (if equipped)
- Subframe or crossmember condition, mounts or fasteners
- Engine or transmission mounts

AK1 CHECK FOR APPLICABLE SERVICE ARTICLES

- Ignition OFF.
- Check OASIS (Online Automotive Service Information System) for any applicable noise TSB (Technical Service Bulletin) , GSB (General Service Bulletin) , SSM (special service message) , or FSA (Field Service Action) relating to the following components:
 - Dash boots
 - Front axles
 - Motor mounts
 - Shocks
 - Struts
 - Suspension control arms and links
 - Sway bars
 - Wheel hubs

Does a service article exist for any of the above components?

- Loose exhaust head shield, isolators or brackets

Do any of the listed components appear to be loose, worn, damaged, broken, or impaired?

Yes	INSTALL new or REPAIR the affected components. REFER to the appropriate section in the Workshop Manual.
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No	GO to AK4
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AK4 VERIFY GENERAL NOISE LOCATION (LEFT OR RIGHT SIDE OF VEHICLE)

- Using a listening device, such as Chassis Ears:
 - Install the listening device on the left and front strut towers.
 - Prepare the vehicle for a road test.
 - Using an assistant, attempt to duplicate the noise while listening to the device.

Is the noise louder on the left side?

Yes	GO to AK5
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No	If the noise is louder on the right side, GO to AK6 If neither the left or the right side is louder, GO to AK7
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AK5 EVALUATION FOR LEFT SIDE NOISE

- Using a listening device, such as Chassis Ears:
 - Attach probe 1 to the left strut tower.
 - If loudest, inspect the strut tower area and attachments for looseness and wear.
 - Attach probe 2 to the left coil spring.
 - If loudest, inspect the upper strut bearing assembly for looseness and wear.
 - Attach probe 3 to the left lower control arm-to-subframe attachment point.
 - If loudest, inspect the control arm and bushings, subframe and bushings, sway bar bushings and links (common), and associated bolts for looseness and wear.
 - Attach probe 4 to the steering gear housing.

transferring into steering gear (common). Verify whether other nearby components are transferring noise vibration into steering gear (common).

- Using an assistant, test drive the vehicle and listen to the 4 probes.

Do any of the probe locations reveal the noise under consideration?

Yes	Referring to the possible noise source listed with each probe: If probe 1 is the loudest, REPAIR or INSTALL new components listed with probe 1 as necessary. If the issue still exists, EVALUATE the next loudest probe channel. If probe 2 is the loudest, REPAIR or INSTALL new components listed with probe 2 as necessary. If the issue still exists, EVALUATE the next loudest probe channel. If probe 3 is the loudest, REPAIR or INSTALL new components listed with probe 3 as necessary. If the issue still exists, EVALUATE the next loudest probe channel. If probe 4 is the loudest, REPAIR or INSTALL new components listed with probe 4 as necessary. If the issue still exists, EVALUATE the next loudest probe channel. If all component inspections are OK and the steering gear is the primary noise source, GO to AK8
No	If the noise is not revealed to be on the left side through the above 4 probes, RE-EVALUATE the noise condition with the customer. If the noise is still not revealed to be on the right side, GO to AK7

AK7 EVALUATION FOR NOISE IN CENTER

NOTE

NOTE: The steering gear is central to steering system and noises may be transferred to it from other nearby components.

- Using a listening device, such as Chassis Ears:
 - Attach probe 1 to the center of the subframe (or engine crossmember for body-on-frame vehicles).
 - If loudest, inspect the subframe, subframe mounts and any attaching hardware (sway-bar bushing mounts) for correct torque specifications, damage, wear, or witness marks. Inspect the engine and transmission mounts for debris, correct torque specification, damage, or wear.
 - Attach probe 2 to the bulkhead.