

DPS – Dynamic Power Steering

1. System Overview
2. Trouble Shooting



1. System Overview



System main features (DPS)

- V-Twin Outlander XT, LTD, XTP, Xmr and Renegade X xc
- Tri Mode: „MIN“, „MED“ and „MAX“- Mode, adjustable on the fly (up to MY 11, Dual Mode available only, MIN/MAX)
- Variable assistance based on vehicle speed and steering torque
- Model-specific calibration
- Direct -link magnetic field sensors for quicker response to steering input
- Less kickback, more feedback because of higher final gear ratio
- High capacity fade-resistant 50-amp motor
- Add mode available as a PAC accessory to adjust assist level for a track kit

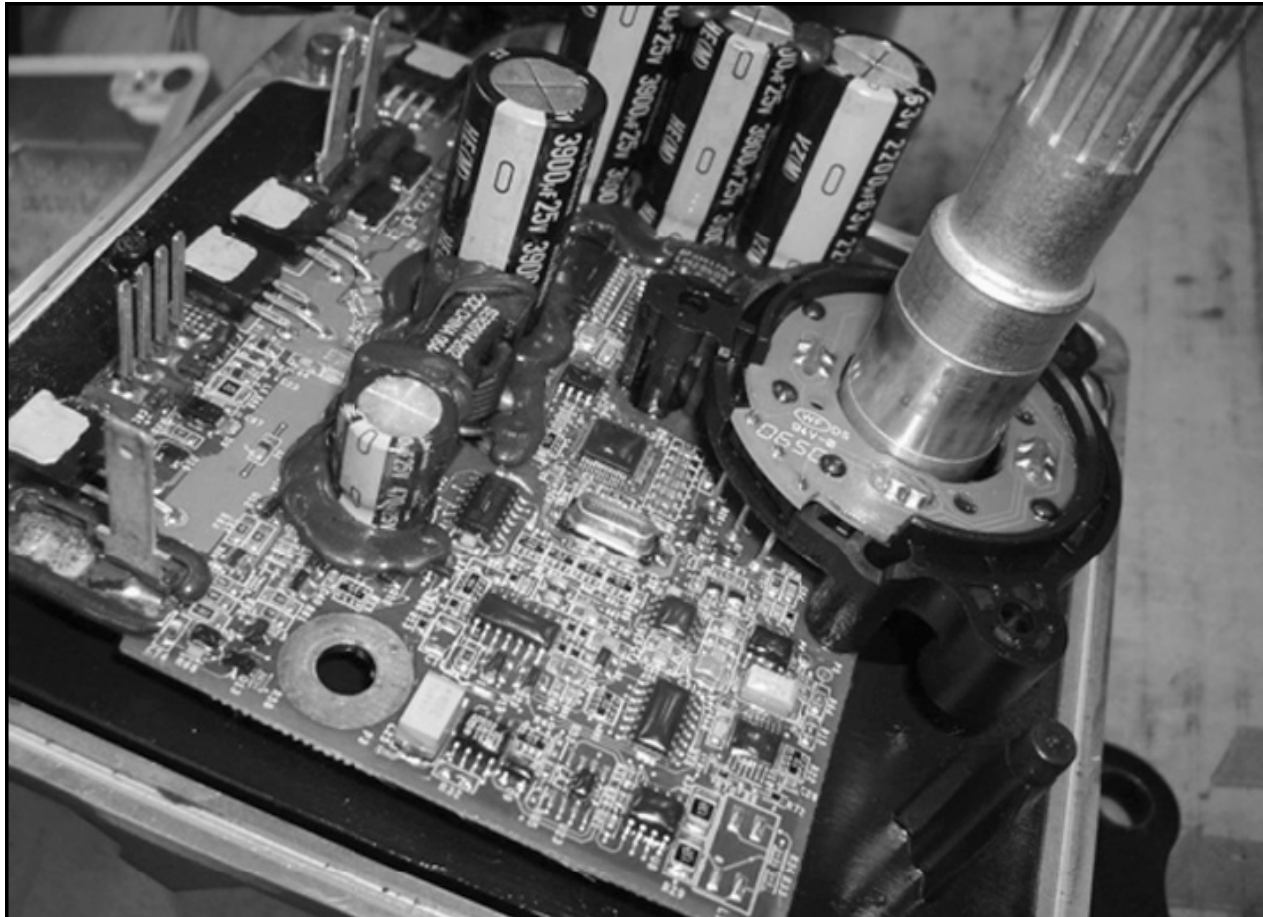


System description

- The control module analyzes the torque load being sensed and compares it with the vehicle speed to determine how much DC current to apply to the 50 amp DCmotor
- The DC motor does not spin and drive a gear reduction mechanism to assist the rider but rather only rotates slightly from full-lock right, to full-lock left. The total number of revolutions is less than 3.
- There is a solid connection from the handlebars, down the steering shaft straight through the DPS unit, into the tie rods. DC motor only “assists” the rider who has solid control even when no assisting occurs.
- The DC power to the motor is supplied by the vehicle battery which is charged by the all new 650 watt alternator. through a 40 amp fuse. The motor is rated at 50 amps but the system can peak momentarily up to 60 amps.



System description



- Here you can see the steering shaft, the sensor area, and the computation circuitry

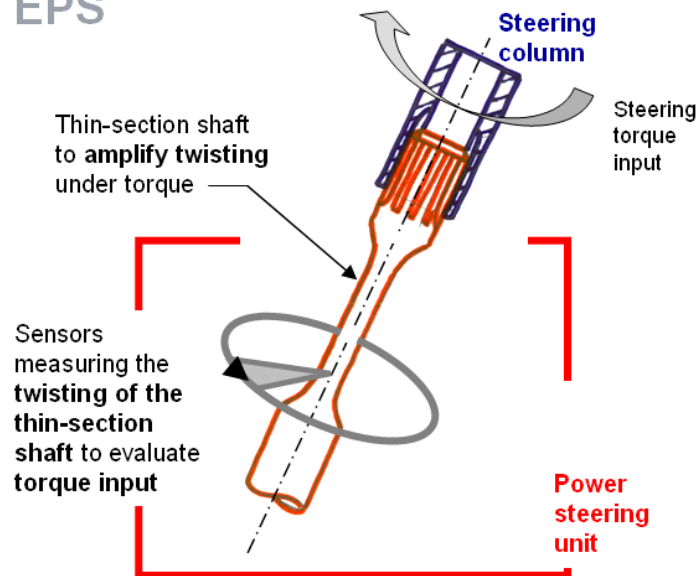


Direct -link magnetic field sensors

Can-Am DPS is 5 times more rigid in the center (5° - 10°) than competitive systems Unlike conventional steering shaft sensor systems that measure the bending or twisting of their steering posts the Can-Am system utilizes magnetic sensors that can pick up precise input (for feedback) and peak impacts (for kickback control)

The magnetic sensors pick up deflections in a magnetic field incorporated in the ridged steering shaft.

Conventional EPS

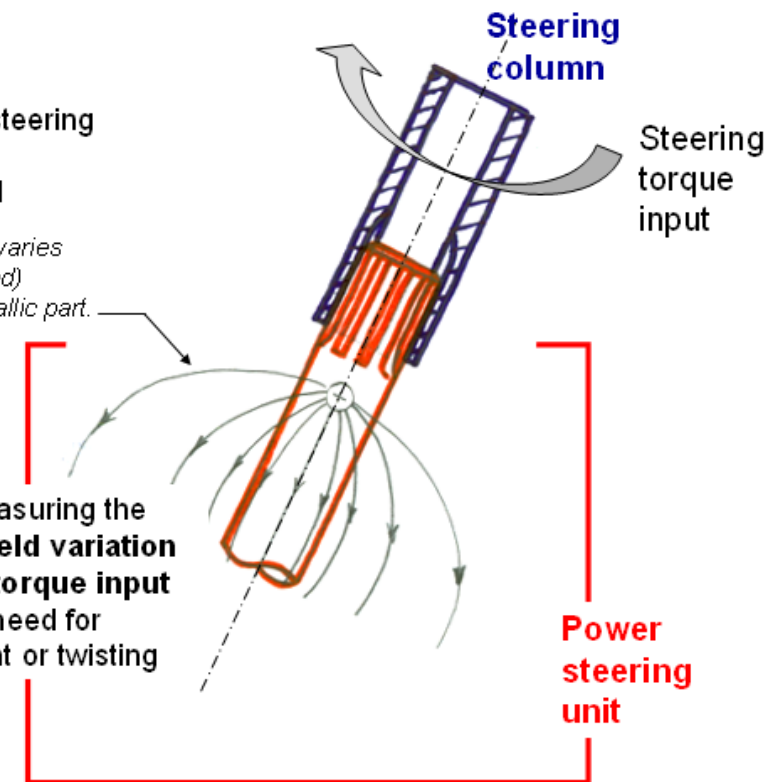


Can-Am DPS

The power steering unit shaft is **magnetized**

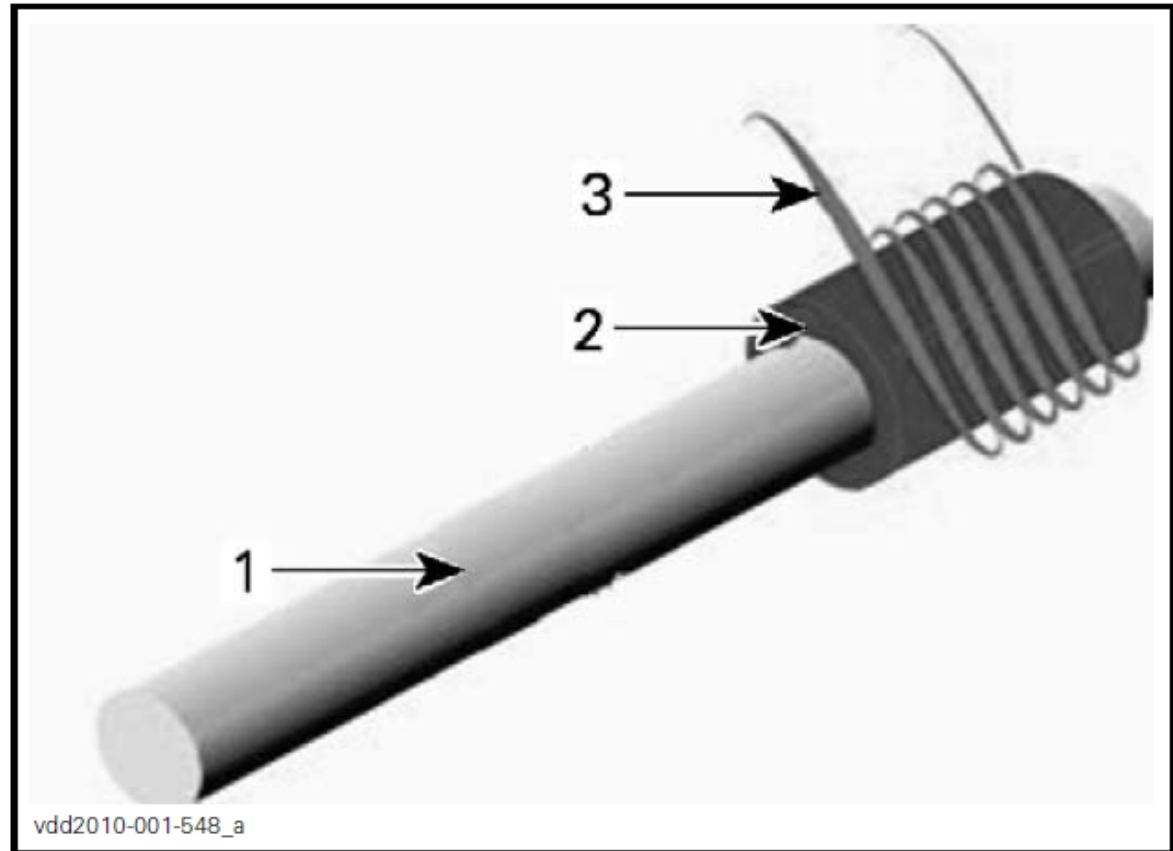
Magnetic field varies with stress (load) levels in a metallic part.

Sensors measuring the **magnetic field variation** to evaluate torque input without the need for displacement or twisting



Direct -link magnetic field sensors

- The degree of the deflecting magnetic field is “sensed” by a MAGNETOELASTIC RING(a coil of wire surrounding the magnetized shaft.)

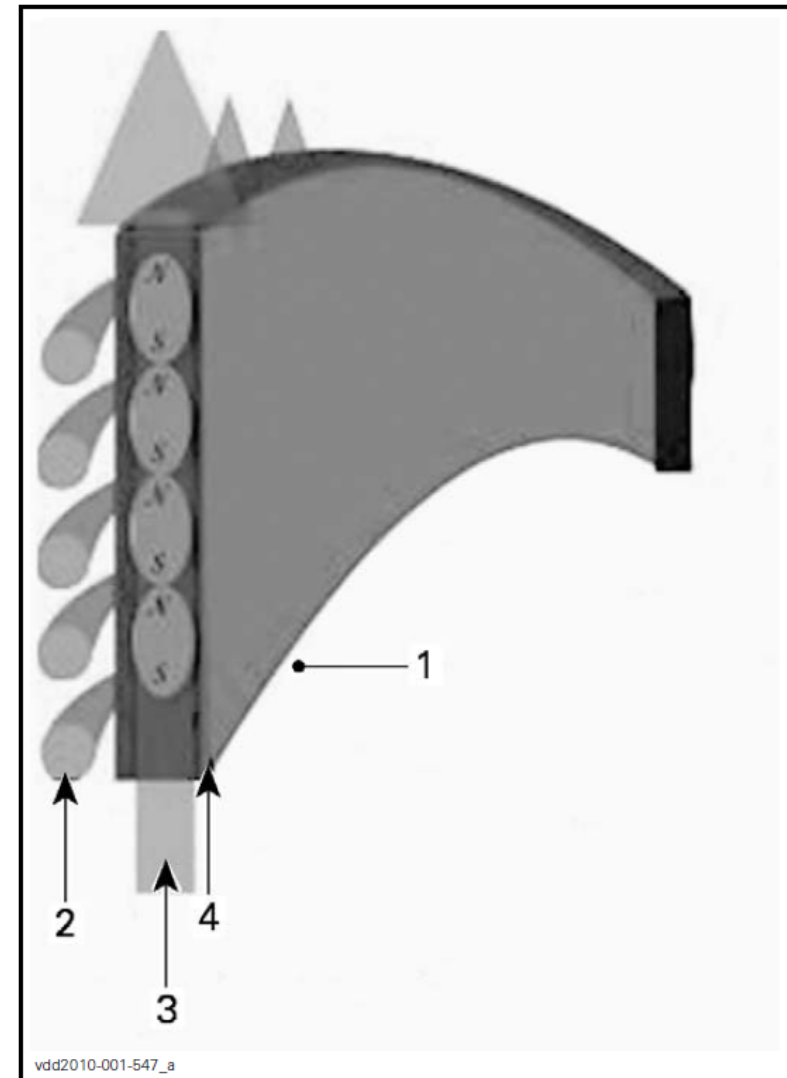


1. Shaft
2. Magnetoelastic ring
3. Pick-up coil



Direct -link magnetic field sensors

- When no torque load is being applied by the rider, or from front wheel input due to terrain, the magnetic field is stable and aligned with the steering shaft.

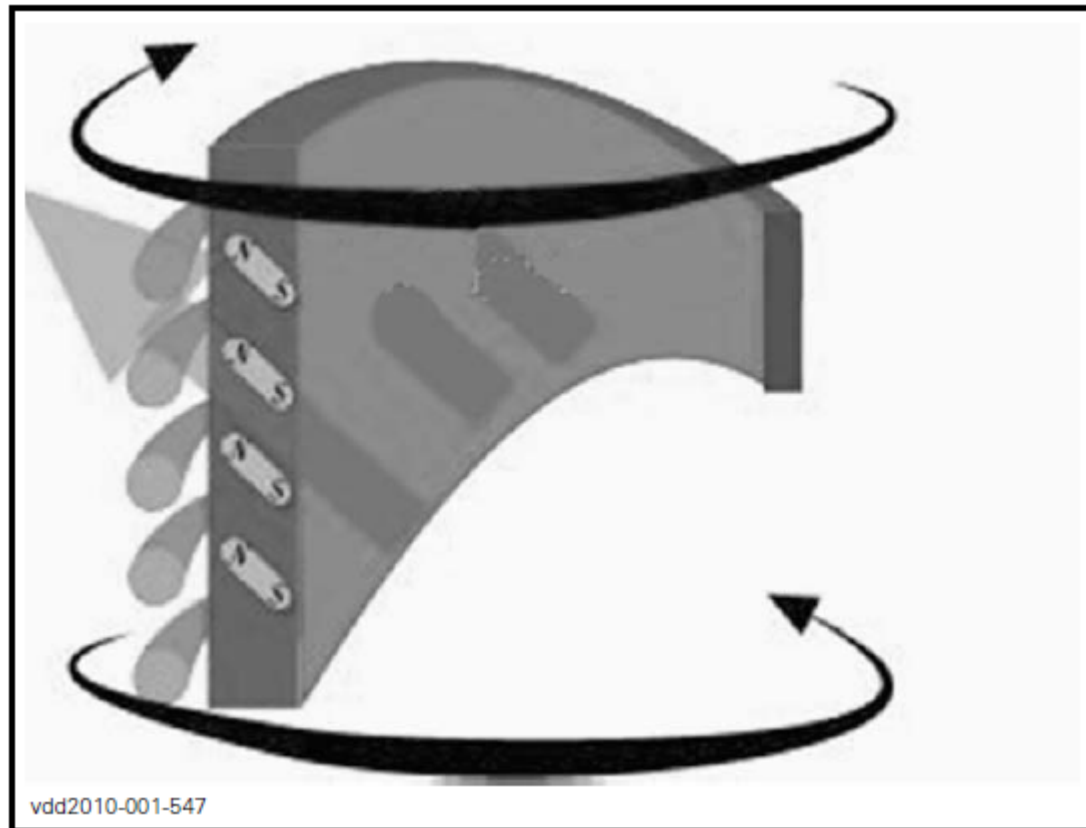


1. *Alignment of domains before torque is applied*
2. *Coil*
3. *Magnetic field*
4. *Magnetoelastic ring*



Direct -link magnetic field sensors

- When torque load is applied and the magnetic field deflects, it's lines of flux cross the sensor's wire coil inducing current



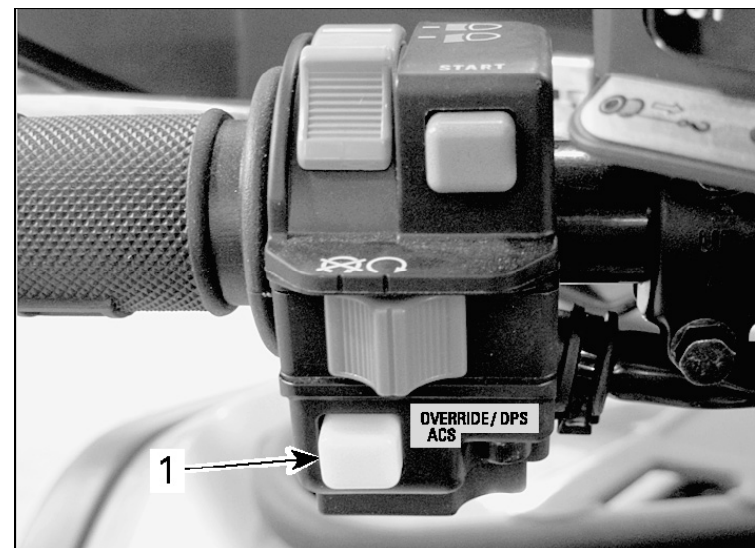
System Adjustments

- The Tri-mode DPS offers on-the-fly, rider-selectable assist levels with variable assistance based on vehicle speed and steering torque.
- The On-the-fly function gives the rider, the possibility to reduce or increase the effort required to turn the steering
- 3 modes are available:
 1. DPS MAXIMUM ASSIST for low speed, technical riding
 2. DPS MEDIUM ASSIST for mixed applications
 3. DPS MINIMUM ASSIST for high speed touring, increased feedback

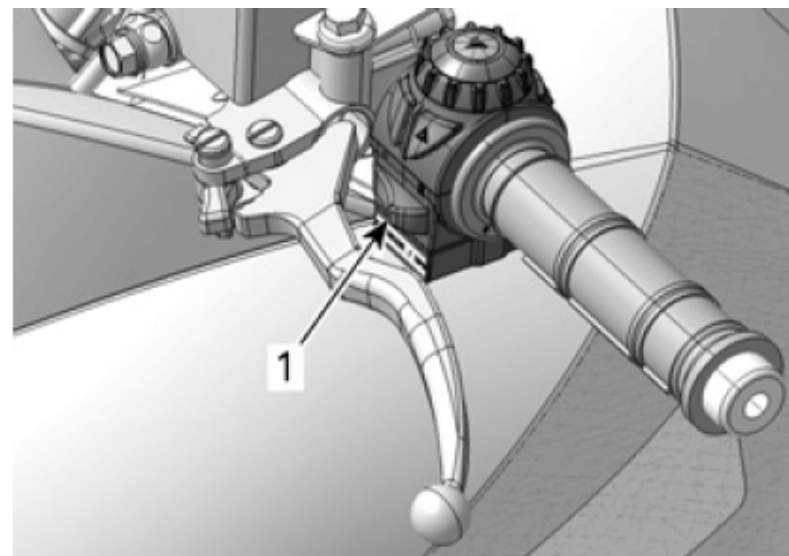


System Adjustments

- The DPS button shares it's functionality with the Reverse Over-ride system, and the Air-Controlled Suspension on some models
- It is used to adjust the amount of steering assist while “on the fly”
- To adjust the steering assist, press the gauge mode button untill DPS MIN / MED/ MAX appears at the bottom of the cluster. Then use the DPS button to select the amount of steering assist desired.



The position of this switch is different, depends on the model



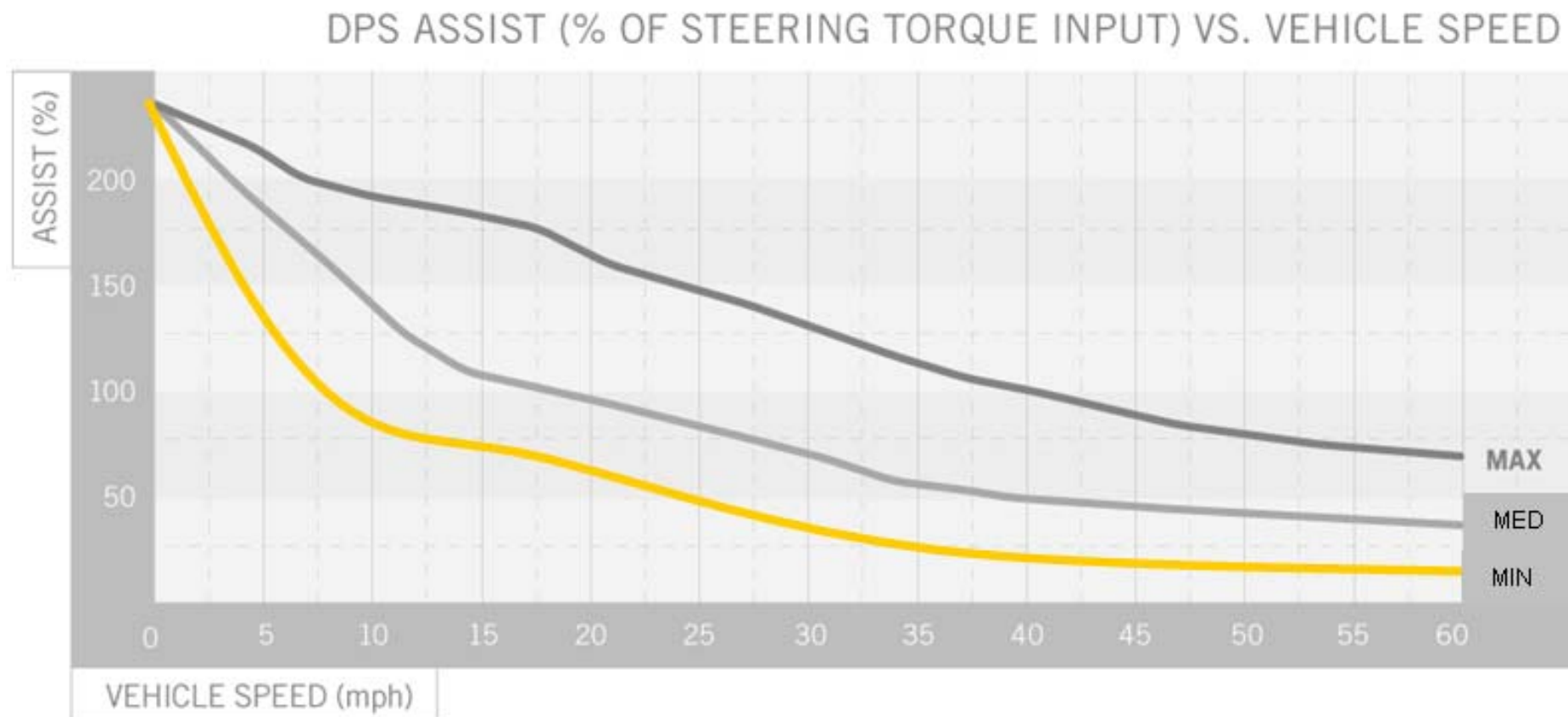
System Adjustments

- The multifunction gauge will confirm the current DPS mode.



System Adjustments

Note: The old „MIN“ mode is the new „MED“ mode



2. Trouble Shooting



Dynamic Power Steering (DPS)

- **The DPS system uses the following parameters to determine how much steering assist it provides:**
 - Engine RPM
 - Battery/electrical system voltage
 - Vehicle speed
 - DPS shaft torque sensor input
 - Internal board temperature
-
- **Note! All those systems or components needs to be taken into consideration during DPS troubleshooting**



Adjustments - TORQUE OFFSET RESET

- When replacing the following parts or adjusting steering alignment, the sensor torque offset must be reset to zero) for proper system operation.

PART ADJUSTED OR REPLACED	WHAT TO DO
<ul style="list-style-type: none">– DPS unit– Steering column half bushings– Steering column– Tie rod– Tie rod end– Knuckle– Wheel bearing– Ball joint– Front suspension arm (lower/upper)– Pitman arm– Steering alignment	Reset Torque Offset in Setting, DPS



Adjustments - TORQUE OFFSET RESET

1. Ensure proper STEERING ALIGNMENT, see procedure in this subsection
2. Connect vehicle to the latest applicable B.U.D.S. software version
3. In B.U.D.S., select Read Data
4. Choose the Setting page tab
5. At the bottom LH corner of the Setting page, choose the DPS tab
NOTICE Ensure handlebar is free and centered within ± 10 degrees of center position. There **MUST NOT** be any effort applied to the steering column
6. Press Reset Torque Offset button



Derating Explanation

- Derating is an internal protection system which decreases the assistance level available when DPS works too hard, internal temperature reaches critical level or current ripples are too high caused by:
 - Loose battery connections
 - Low battery voltage
 - Bad grounds
 - Defective stator or bad stator output wires connection
 - Failed regulator
 - High electrical loads.

- NOTE: This reaction is a normal protective behavior of the unit and it does not necessarily raise a fault in the cluster.



Derating Explanation-Voltage

The following chart gives an overview on the available assistance level related to charging system's condition

	1000 RPM	2000 RPM	4000 RPM	5000 RPM	6000 RPM	7000 RPM
8 V	5%	8%	11%	14%	17%	20%
9 V	10%	14%	18%	22%	26%	30%
10 V	15%	20%	25%	30%	35%	40%
11 V	25%	30%	35%	40%	45%	50%
12 V	35%	40%	45%	50%	55%	60%
13 V	100%	100%	100%	100%	100%	100%



Derating Explanation- Thermal Protection

- The following chart gives an overview on the thermal protection:

CONDITION	DPS BEHAVIOR
When motor internal temperature reaches a certain temperature (DPS continuously estimates it)	Steering assist will gradually decrease.
DPS internal board temperature is above 85°C (185°F)	
DPS internal board temperature is above 100°C (212°F)	Steering assist is stopped.



TROUBLESHOOTING FLOW CHARTS

- Use the troubleshooting flow charts to diagnose a problem. If a problem cannot be solved, contact a service representative for support before replacing a DPS.

- Here is the list of provided flow charts:
 - Flow chart A: No Assistance From DPS
 - Flow chart B: DPS Intermittent Assistance
 - Flow chart C: Derating or Limited Assistance
 - Flow chart D: Free Play Felt in Steering System
 - Flow chart E: Steering Turn Easier on One Side than the Other.



Chart A

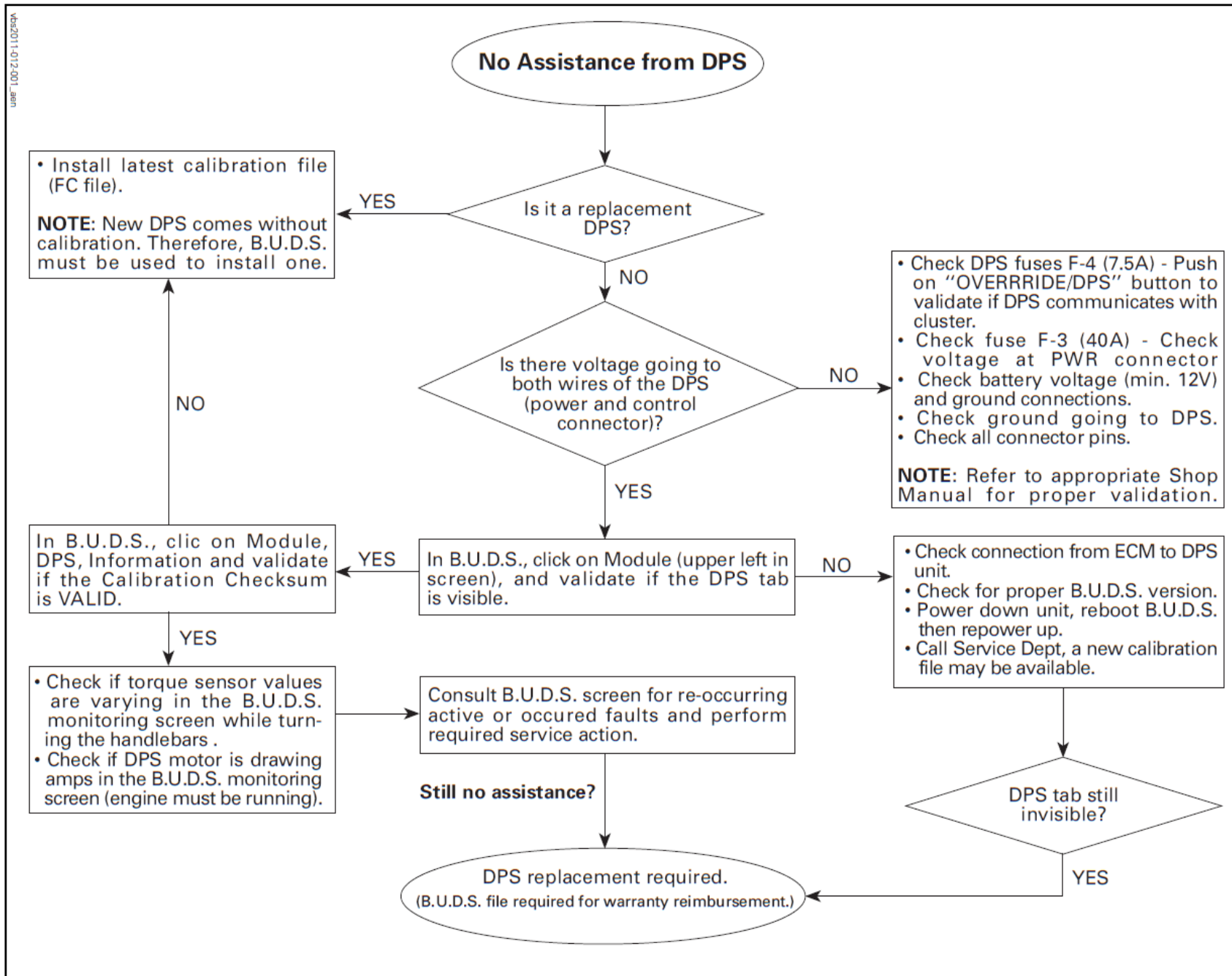


Chart B

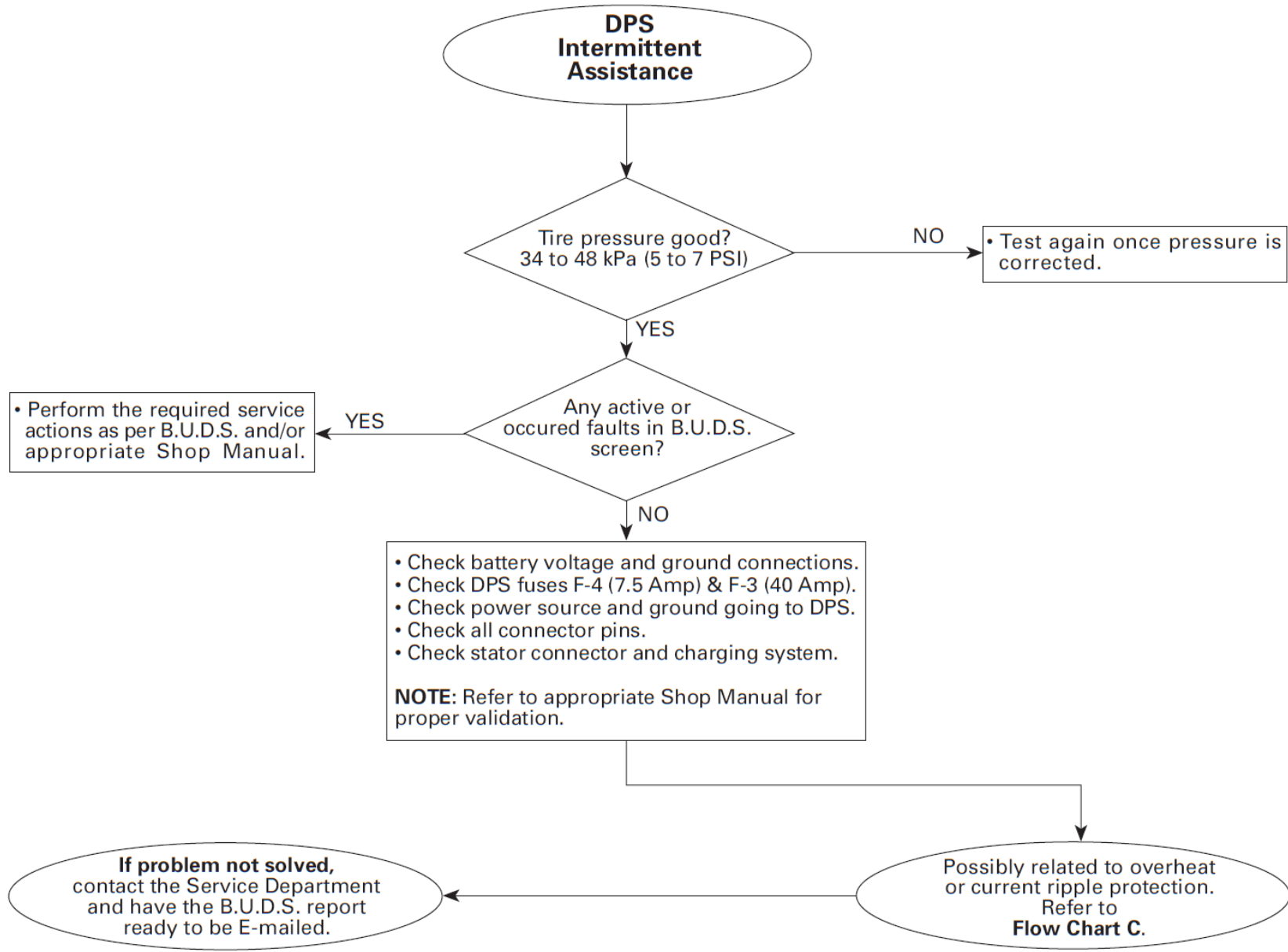


Chart C

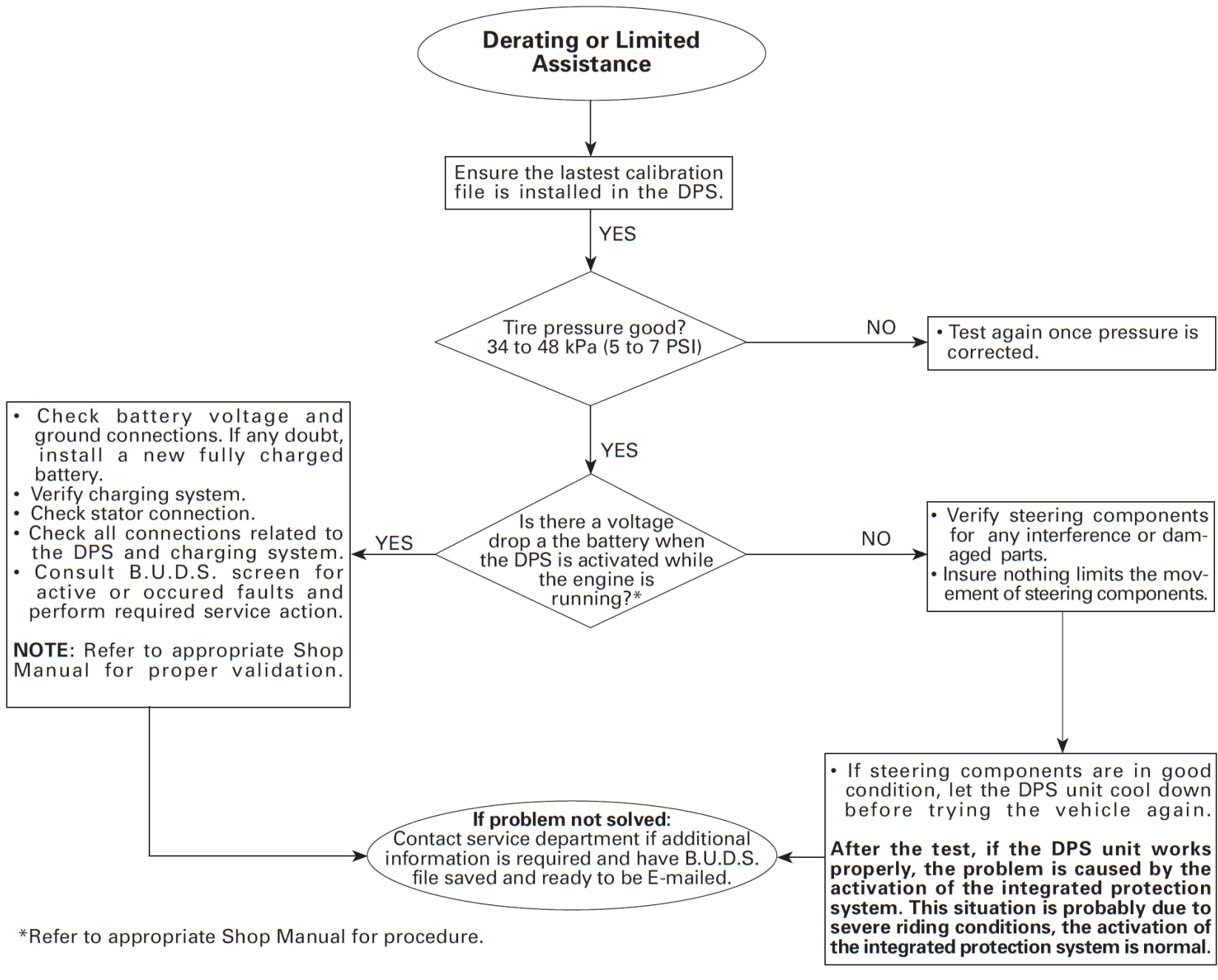


Chart D

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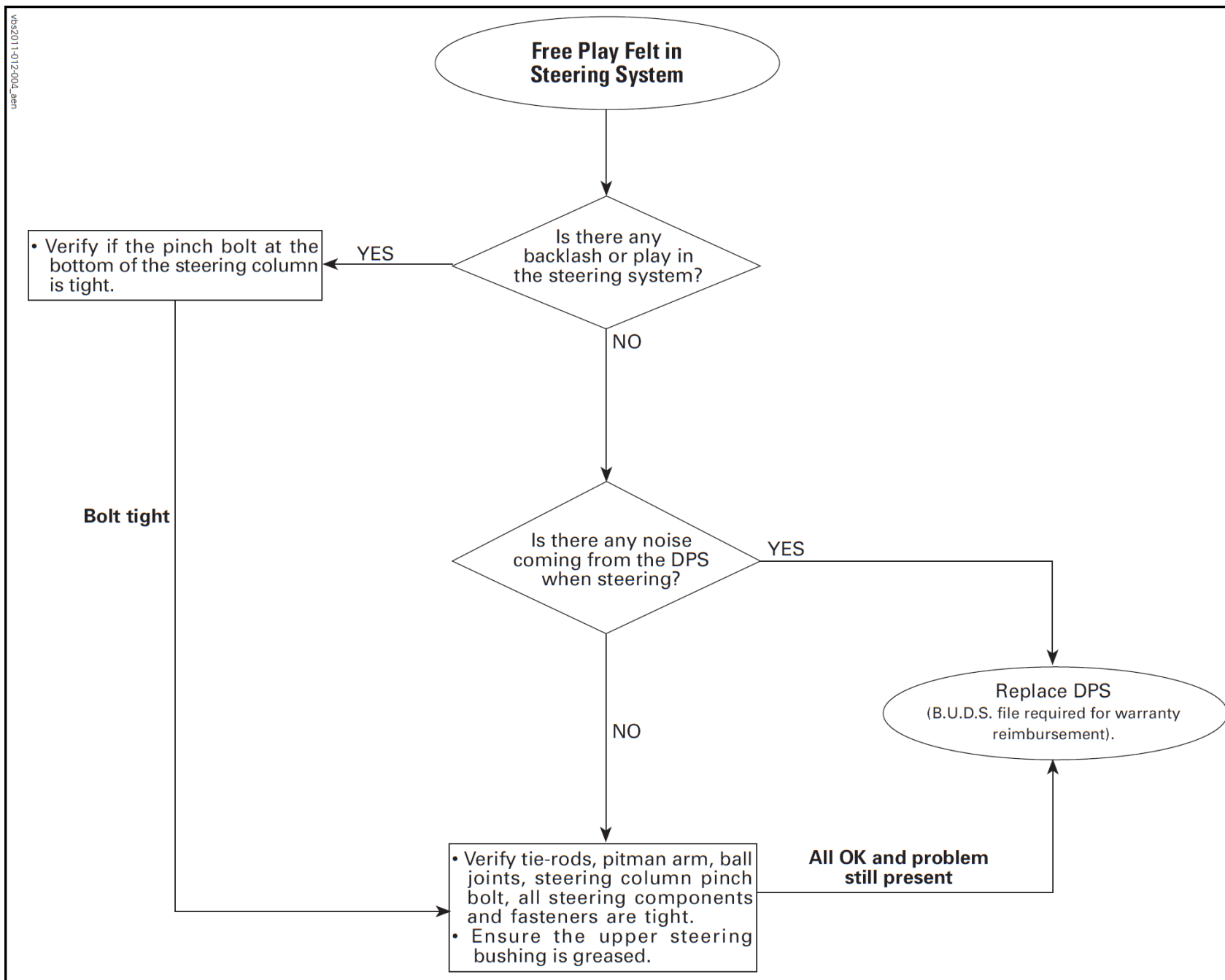
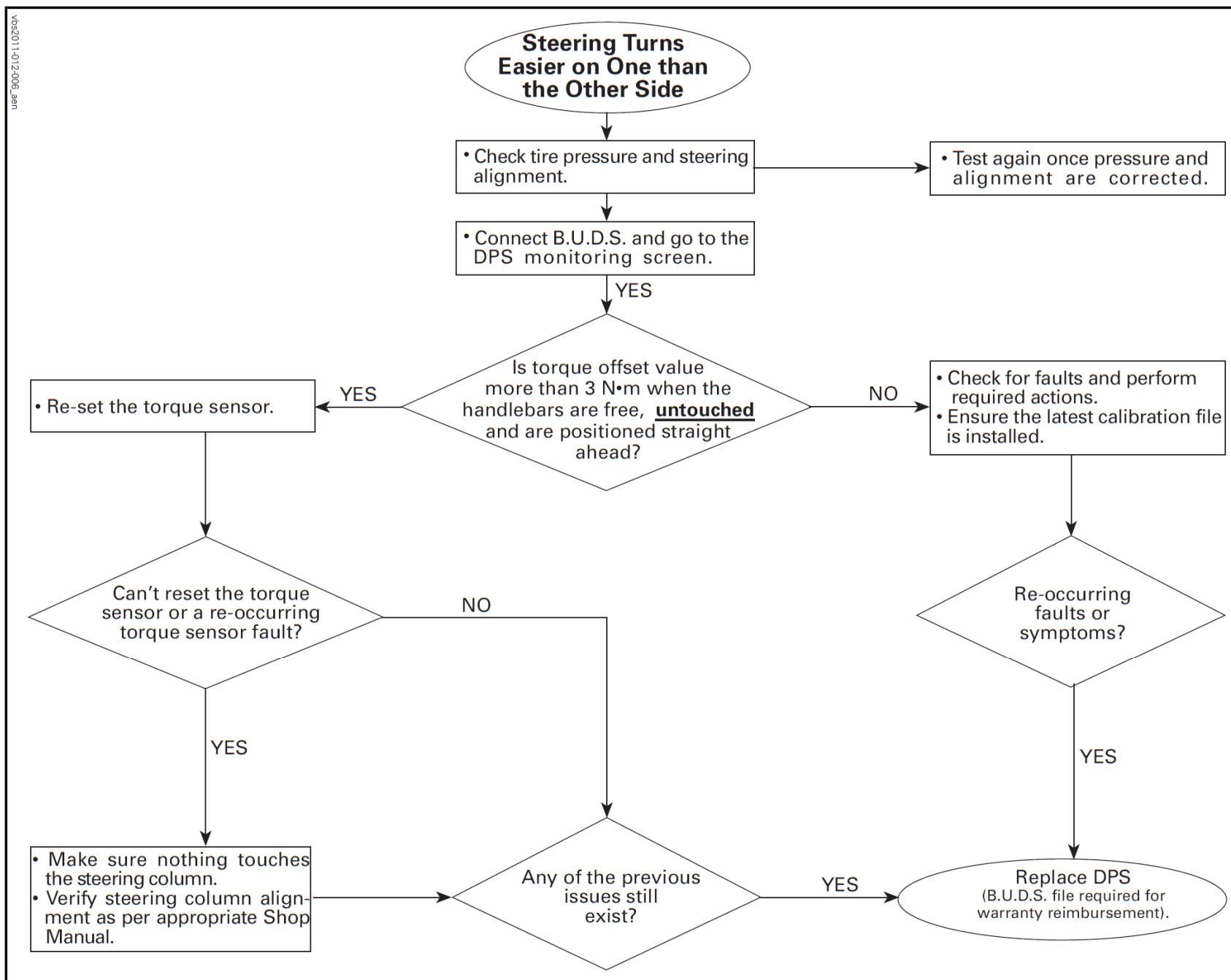


Chart E





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