8. General Diagnostic Table

A: INSPECTION

Trouble	Possible cause	Corrective action
• Steering effort is heavy in all ranges. • Steering effort is heavy at stand still. • Steering wheel vibrates when turning.	1. Tire and wheel • Improper tire out of specifications • Improper wheel out of specification • Tires not properly inflated	Replace or reinflate.
	2. Measure the steering wheel effort. <Ref. to PS-38, TURNING RESISTANCE OF GEARBOX, INSPECTION, Electric Power Steering Gearbox.>	Adjust or replace.
• Vehicle leads to one side or the other. • Returning force of steering wheel to center is poor. • Steering wheel vibrates when turning.	1. Tire and wheel • Flat tire • Mixed use of different tires • Mixed use of different wheels • Abnormal wear of tire • Unequal tread remaining • Unequal pressure of tire	Adjust, fix or replace.
	2. Front wheel alignment • Improper or unequal caster • Improper or unequal toe-in • Loose suspension connections	Adjust or retighten.
	3. Measure the steering wheel effort. <Ref. to PS-38, TURNING RESISTANCE OF GEARBOX, INSPECTION, Electric Power Steering Gearbox.>	Adjust or replace.

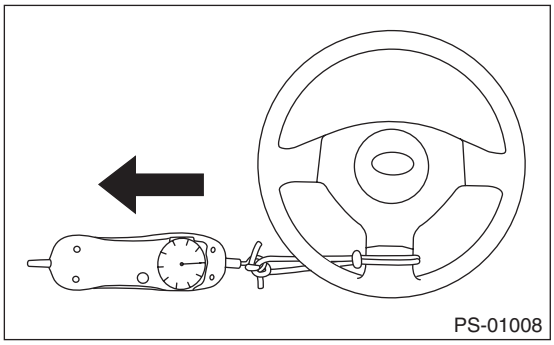
NOTE:
When performing repeated steering operation with the vehicle at standstill, the steering effort may be temporarily heavy because the heat generated in the system activates the power steering protection control. This is not a malfunction caused by the steering system. After a while, it will return to normal steering effort. (In this case, the steering warning light will not come on and there will be no DTC.)

1. NOISE AND VIBRATION

NOTE:
• When turning the steering wheel with the brake applied when the vehicle is parked, a screeching noise may be generated by the brake disc and pads. This is not a fault in the steering system.
• There may be a small vibration around the steering devices when turning the steering wheel at standstill, even though the component parts are operating properly.

Trouble	Possible cause	Corrective action
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check the clearance. Correct if necessary.
	Looseness of linkage, play of steering, improper tightening (looseness) of suspension joint or column assembly - steering	Retighten or replace.
	Noise emitted from inside of the gearbox	Replace the gearbox assembly.
Knocking When turning steering wheel in both directions with small angle repeatedly at engine ON or OFF.	Excessive backlash Loosened lock nut for adjusting backlash	Adjust the backlash. When the noise remains after adjustment, replace the gearbox assembly.
	Insufficient tightening or play in the tie-rod or tie-rod end	Retighten or replace.
Grinding noise (continuous) While engine is running. (While operating the steering.)	Fault inside of gearbox	Replace the gearbox assembly.
	Faulty bearing of the column assembly - steering	Apply grease or replace.
	Occurs when turning the steering wheel with brakes (service or parking) applied.	If the noise goes off when brake is released, it is normal.
Vibration While engine is running. (with/without steering turned)	Excessive play in steering, looseness of suspension parts	Retighten.

2. MEASUREMENT OF STEERING EFFORT

	Step	Check	Yes	No
1	**CHECK STEERING WARNING LIGHT.**	Does the STEERING warning light illuminate?	Read the DTC, and inspect according to it.	Go to step **2**.
2	**CHECK STEERING WARNING LIGHT.** 1) Connect the Subaru Select Monitor, and turn the steering wheel. (one lock to lock) 2) Check the “EPS operation flag” in the current data.	Is the EPS operation flag normal without displaying any DTC code?	Go to step **3**.	If the EPS operation flag is “Assist limitation”, stop the engine for approx. 10 minutes and perform the procedures from step 1 again.
3	**CHECK STEERING EFFORT.** 1) Stop the vehicle on paved road. 2) Set the tire air pressure to the specification. 3) Start the engine. 4) Run the engine at idle. 5) Install a spring scale on the steering wheel. 6) Pull the spring scale at a right angle to the steering wheel, and measure both right and left steering wheel efforts.  PS-01008	Is the steering effort less than 29.4 N (3.0 kgf, 6.6 lbf)?	Go to step **4**.	Go to step **8**.
4	**CHECK STEERING EFFORT.** 1) Stop the engine. 2) Pull the spring scale at a right angle to the steering wheel, and measure both right and left steering wheel efforts.	Is the steering effort less than 294.2 N (30 kgf, 66.2 lbf)?	Go to step **5**.	Perform the inspection or adjustment around the suspension part.
5	**CHECK TORQUE SENSOR OUTPUT VALUE.** 1) Connect the Subaru Select Monitor. 2) Read the output of torque sensor voltage. NOTE: When measuring, place the steering wheel at the center position.	Is the voltage 2.425 — 2.575 V?	Go to step **6**.	Replace the gearbox assembly. <Ref. to PS-26, Electric Power Steering Gearbox.>
6	**CHECK TORQUE SENSOR OUTPUT VALUE.** 1) Remove the universal joint assembly - steering. 2) Connect the Subaru Select Monitor. 3) Read the output of torque sensor voltage.	Is the voltage 2.425 — 2.575 V?	Go to step **7**.	Replace the gearbox assembly. <Ref. to PS-26, Electric Power Steering Gearbox.>

	Step	Check	Yes	No
7	**CHECK TORQUE SENSOR OUTPUT VALUE.** 1) Remove the universal joint assembly - steering. NOTE: Check that the universal joint assembly - steering moves up and down smoothly without installing the bolt. Then tighten the bolts first on the gearbox side and then on the column shaft side. 2) Connect the Subaru Select Monitor. 3) Read the output of torque sensor voltage.	Is the voltage 2.425 — 2.575 V?	Go to step **8**.	Check the universal joint assembly - steering. <Ref. to PS-26, Electric Power Steering Gearbox.>
8	**CHECK STEERING WHEEL EFFORT.** 1) Remove the universal joint assembly - steering. 2) Measure the steering wheel effort.	Is the steering effort less than 2.26 N (0.23 kgf, 0.51 lbf)?	Go to step **9**.	Replace the column assembly - steering. <Ref. to PS-26, Electric Power Steering Gearbox.>
9	**CHECK STEERING WHEEL EFFORT.** Measure the steering wheel effort.	Is the difference of steering effort between right and left less than 20%?	Go to step **10**.	Replace the column assembly - steering. <Ref. to PS-18, Steering Column.>
10	**CHECK UNIVERSAL JOINT ASSEMBLY - STEERING.** Measure the swing torque of joint. (Yoke of column assembly - steering side) <Ref. to PS-16, INSPECTION, Universal Joint.>	Is the swing torque of the universal joint assembly - steering less than 7.3 N (0.74 kgf, 1.64 lbf)?	Go to step **11**.	Replace the universal joint assembly - steering with a new part. <Ref. to PS-13, Universal Joint.>
11	**CHECK UNIVERSAL JOINT ASSEMBLY - STEERING.** Measure the swing torque of joint. (Yoke of gearbox side) <Ref. to PS-16, INSPECTION, Universal Joint.>	Is the swing torque of the universal joint assembly - steering less than 3.8 N (0.39 kgf, 0.86 lbf)?	Go to step **12**.	Replace the universal joint assembly - steering with a new part. <Ref. to PS-13, Universal Joint.>
12	**CHECK FRONT WHEEL.** Check the front wheels.	Does the front wheels have unsteady revolution or rattling, or does the brake drag?	Inspect, readjust and replace if necessary.	Go to step **13**.
13	**CHECK TIE-ROD ENDS.** Remove the tie-rod ends.	Does the tie-rod ends of suspension have unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **14**.
14	**CHECK BALL JOINT.** Remove the ball joint.	Does the ball joints of suspension have unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **15**.
15	**CHECK GEARBOX.** Measure the rotating of gearbox. <Ref. to PS-36, LIMIT, INSPECTION, Electric Power Steering Gearbox.>	Is the turn resistance of the steering gearbox less than 18.3 N (1.9 kgf, 4.1 lbf)? Is the difference between the right and left rotational resistances less than 20%?	Go to step **16**.	Replace the gearbox assembly. <Ref. to PS-26, Electric Power Steering Gearbox.>
16	**CHECK GEARBOX.** Measure the sliding of gearbox.	Is the sliding resistance of the steering gearbox less than 350 N (35 kgf, 79 lbf)? Is the difference between the right and left sliding resistances less than 20%?	Steering effort is normal.	Replace the gearbox assembly. <Ref. to PS-26, Electric Power Steering Gearbox.>

POWER ASSISTED SYSTEM (POWER STEERING) (DIAGNOSTICS)

PS(diag)