1965-69 FORD (BENDIX) INTEGRAL POWER STEERING

Ford (1965-69)

NOTE – Some models use other units. See Ford (Thompson) Integral Power Steering in this Section.

DESCRIPTION

Bendix Integral Power Steering is torsion bar type, with steering gearbox consisting of: worm and valve assembly, sector shaft with worm follower, and a power piston rack. Turning of gearbox input shaft rotates valve rotor within valve sleeve. Torsion bar, which is connected to input shaft and valve rotor assembly at one end, and to hollow worm at the other end, transmits input shaft rotation to worm and valve sleeve assembly. Worm and valve sleeve assembly then causes sector shaft to rotate through action of roller type worm follower.

LUBRICATION

Check fluid level in pump reservoir every 6,000 miles. Steering gear and fluid must be at normal operating temperature. If necessary, add Power Steering Fluid to bring level to proper mark on dipstick.

ADJUSTMENT

WORM BEARING PRELOAD

1) Using suitable tool (T64P-3590-F) remove pitman arm from sector shaft. Disconnect power steering fluid return line at pump reservoir and cap reservoir return pipe. Place end of return line in a clean container, and turn steering wheel from side-to-side as necessary to force all fluid out of gearbox.

2) Remove horn button from center of steering wheel, and position steering wheel 1½ turns to either right or left of center. Using an INCH lb. torque wrench on steering wheel attaching nut, measure torque required to turn steering wheel through a 15° arc. Required torque should be 2-4 INCH lbs.

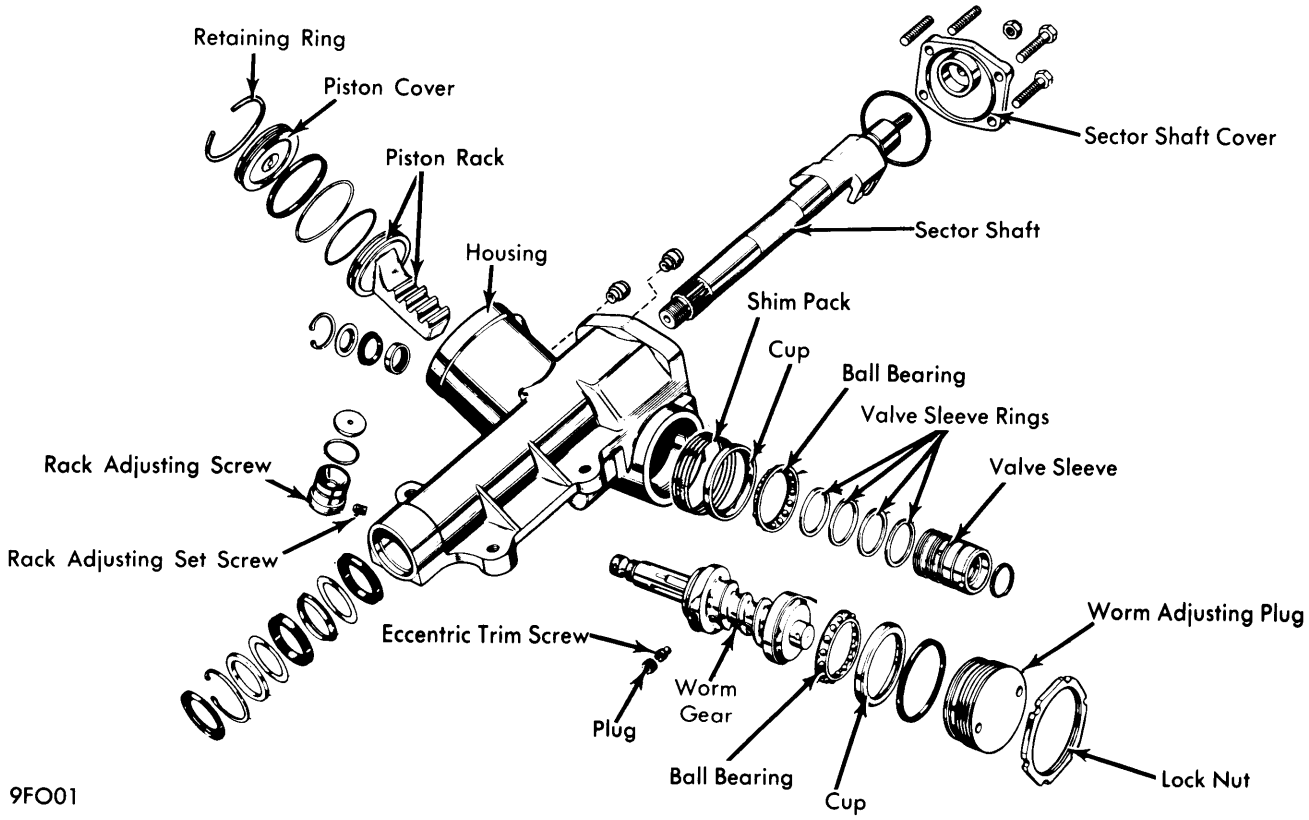
3) If bearing preload is not correct, loosen worm bearing adjuster lock nut, and turn bearing adjuster to right or left to obtain proper preload. Tighten adjuster lock nut, remove tools from vehicle, reconnect pitman arm, hydraulic lines, and horn button, then refill and bleed system. See *POWER STEERING PUMPS in this Section.*

RACK ADJUSTMENT

1) Using suitable tool (T64P-3590-F), remove pitman arm from sector shaft. Disconnect power steering fluid return line at pump reservoir and cap reservoir return pipe. Place end of return line in a clean container, and turn steering wheel from side-to-side as necessary to force all fluid out of gearbox.

2) Remove horn button from center of horn ring, and center steering wheel. Using an INCH lb. torque wrench, measure force required to rotate steering shaft back and forth across center position. Torque reading should be 1-10 INCH lbs. more than worm bearing preload.

3) If rack preload is incorrect, loosen rack adjusting set screw and rack adjusting screw. Loosen sector shaft lock nut, and turn sector shaft adjusting screw to obtain reading 3-5 INCH lbs. higher than previous reading. Tighten lock nut. Turn rack adjusting screw to obtain a reading 3-5 INCH lbs. higher than reading obtained after sector shaft adjustment. Tighten rack



STEERING GEAR ASSEMBLY

1965-69 FORD (BENDIX) INTEGRAL POWER STEERING (Cont.)

adjusting screw set screw, then recheck adjustment. *NOTE — Reading should never exceed 22 INCH lbs.* Remove tools from vehicle, reinstall pitman arm, hydraulic lines, and horn button, then refill and bleed system. *See POWER STEERING PUMPS in this Section.*

VALVE TRIM ADJUSTMENT

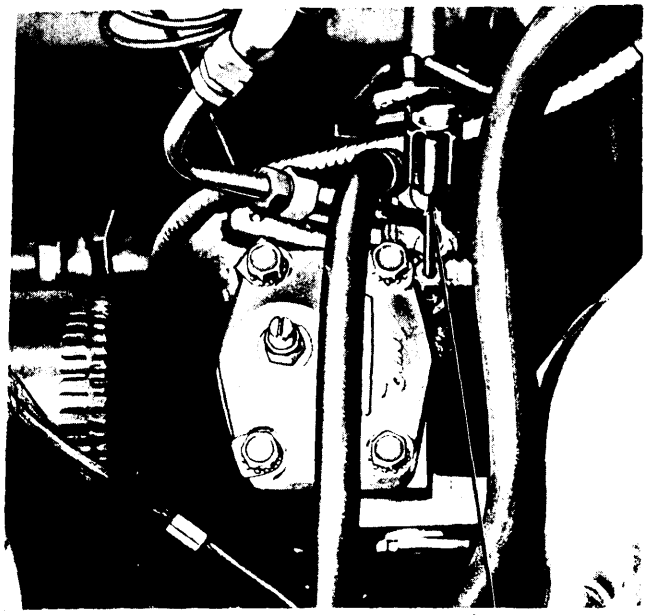
1) Install a 0-2000 psi pressure gauge and valve assembly between pump high pressure outlet and steering gearbox inlet, with valve in open position. Remove horn button from center of horn ring. With power steering fluid at proper level and operating temperature, set engine idle to 1000 RPM.

2) Using an INCH lb. torque wrench, rotate steering wheel either side of center until pressure reading of 250 psi is obtained. Note reading on torque wrench at this point. Rotate steering wheel in opposite direction, and note torque reading when 250 psi is obtained. *NOTE — Torque reading in both directions should be the same.*

3) If torque readings obtained differ more than 2 INCH lbs., set steering wheel 85-90° to right of center. Remove trim screw access hole plug and look into port to see if trim screw is centered under port. If screw is not visible, slowly turn steering shaft back and forth until screw is visible and centered.

4) Install suitable tool (T66T-3504-D) in trim screw and tighten tool plug securely in port. Turn trim screw 10° to either the right or left, and recheck torque required to obtain 250 psi in each direction. *CAUTION — Scribe mark across end of trim screw tool should never be aligned with worm gear (at right angle to steering shaft). Never turn steering shaft while tool is engaged in slot of trim screw head.*

5) If difference between readings lessens, continue turning trim screw, in 10° increments, in same direction until readings are within 2 INCH lbs. of each other. If difference increases, turn trim screw in opposite direction. Remove tools from vehicle, install pressure line and access hole plug, then refill and bleed system. *See POWER STEERING PUMPS in this Section.*



9FO02 Tool #T66T-3504-D

ADJUSTING VALVE TRIM

TESTING

PUMP PRESSURE

With fluid at proper level in pump reservoir, belt tension properly adjusted, and power steering fluid at normal operating temperature, install suitable gauge and valve assembly between power steering pump and high pressure hose. With engine idling at 600-800 RPM, and gauge valve open, note pressure reading while turning wheels from stop-to-stop. If maximum pressure reading is below 620 psi, temporarily close gauge valve and note pressure reading obtained. If this reading is below 620 psi, pump is faulty. If reading is above 620 psi, steering gear is faulty.

REMOVAL & INSTALLATION

STEERING GEAR

Removal & Installation — Remove pitman arm from sector shaft, and disconnect hydraulic lines at steering gear. Remove steering gear-to-steering shaft clamp bolt. Remove parking brake cable from fender apron and tie out of the way. Remove gearbox attaching bolts, and remove gearbox and pitman arm stop bracket from vehicle. To install, reverse removal procedure, and bleed system. *See POWER STEERING PUMPS in this Section.*

OVERHAUL

STEERING GEAR

NOTE — If complete assembly is not to be overhauled, remove unit and proceed to disassembly and reassembly of that unit.

Disassembly — Position gearbox in a vise, clamping it on mounting bosses, with sector shaft pointing down. Loosen rack adjustment set screw, then loosen rack adjustment screw ⅛ turn. Remove sector shaft cover attaching bolts, and rotate input shaft until gear is in straight ahead position. Tap end of sector shaft lightly with soft-faced hammer, and remove sector shaft and cover as an assembly. Loosen worm adjuster plug lock nut, then reposition gearbox in vise with input shaft up and adjuster plug opening down. Remove adjuster plug assembly. Tap end of input shaft lightly to remove outer bearing and race, then remove worm and valve assembly and inner bearing through same opening. Tap piston cylinder cover in until bottomed, then remove cover retaining ring and cover from gearbox. Push rack piston out of cylinder opening, then remove rack adjusting screw.

Reassembly — Position gearbox housing in a vise, clamping it on mounting bosses, with input shaft port down and adjusting screw opening up. Lubricate worm and valve sleeve with power steering fluid, then slip suitable seal protector (T65P-3A537-B) over input shaft splines and insert worm and valve sleeve assembly into worm adjusting plug opening, input shaft first. Install outer bearing and race, then rotate input shaft to seat worm and valve on inner bearing. Install adjusting plug until finger tight, then back off ½ turn. Remove gearbox from vise and reposition it in vise with sector shaft end down. Install adjusting plug lock nut, then tighten or loosen adjusting plug until input shaft bearing preload is 2-4 INCH

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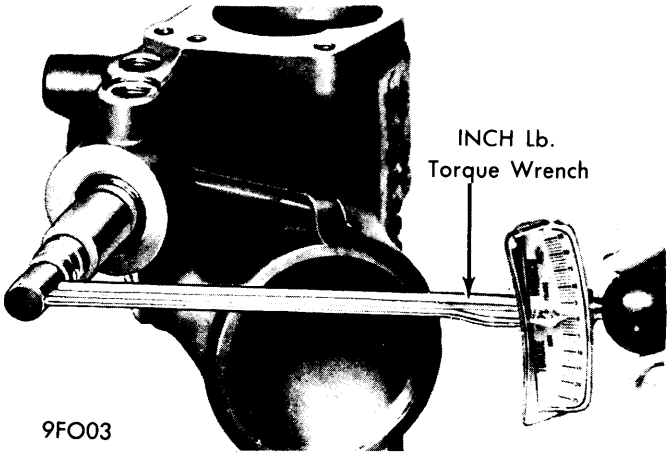
lbs. Tighten lock nut. Lubricate piston rack cylinder bore with power steering fluid, and insert piston into cylinder opening, head first. Stroke piston in bore, to size piston ring, then remove piston from bore. Carefully insert piston into bore, rack end first, making sure piston is square in bore and rack teeth are parallel to sector shaft centerline. Position rack center tooth space at centerline of sector shaft bore, with upper edges angled slightly away from bore. Rotate input shaft until missing spline on shaft facing is aligned with two tube seats. Lubricate lower end of sector shaft with power steering fluid, and install in gearbox. Install sector shaft cover attaching screws, and tighten, making sure cover boss is fully seated on housing. Alternately tighten sector shaft adjusting screw, and lock until input shaft rotational torque is 3-5 INCH lbs. higher at center than at 1 ¼ turns to either side of center. Tighten rack adjusting screw to 20 ft. lbs., then back off ¼ turn. Tighten adjusting screw gradually, until rotational torque at center is 3-5 INCH lbs. higher than sector shaft adjustment preload. Install piston rack cover and cover retaining ring.



CHECKING ROTATIONAL TORQUE

SECTOR SHAFT SEALS

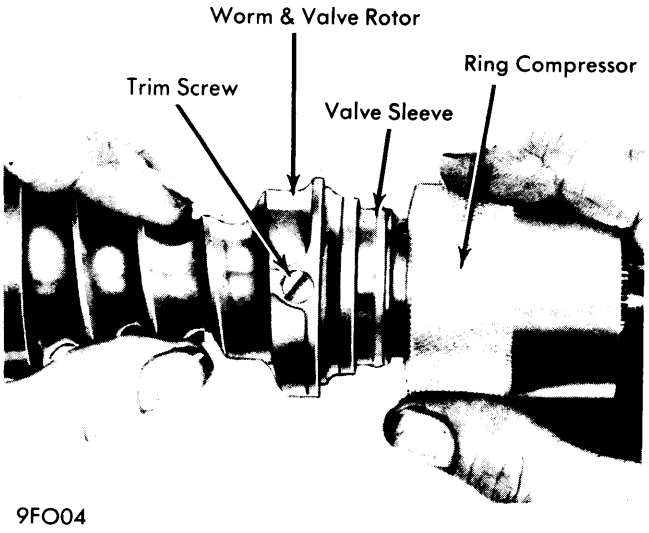
Disassembly – With sector shaft and cover removed from gearbox, remove lock nut from sector shaft adjusting screw. Remove sector shaft and adjusting screw from cover by turning adjusting screw clockwise. Pry dust seal from sector shaft bore, then remove internal snap ring, washers, and seals remaining in bore.

Reassembly – To reassemble, reverse disassembly procedure, being sure to install inner seals lip side first and dust seal with flat side out.

WORM & VALVE SLEEVE

Disassembly – With worm and valve assembly removed from gearbox, remove and discard trim screw. Slide valve sleeve off splined end worm. *CAUTION – No further disassembly of worm, rotor, or torsion bar is possible without damage to parts.* Carefully cut Teflon valve sleeve rings from valve sleeve. Using a dull probe, slide damping ring from groove inside valve sleeve, being careful not to scratch groove shoulders.

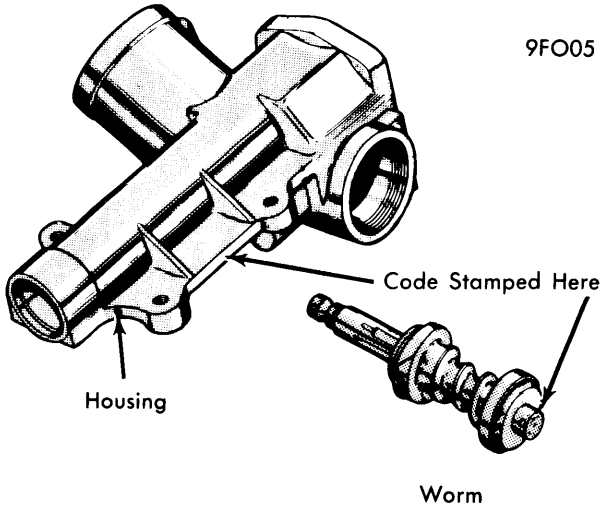
Reassembly – Using suitable tool (T66T-3504-A), install new Teflon rings onto valve sleeve and into ring grooves. Install ring compressor (T66T-3504-B) over rings and leave installed for at least five minutes to fully compress rings. Lubricate new damping ring with power steering fluid, and install securely in valve sleeve. Lubricate worm and valve rotor, and valve sleeve with power steering fluid, and slide valve sleeve onto rotor. With ring compressor against worm and valve rotor, press valve sleeve into recess of worm. Align trim screw holes in worm and sleeve, then install new trim screw into hole until bottomed. Turn trim screw back out TWO FULL TURNS to prevent damage to worm and valve assembly. Remove ring compressor.



INSTALLING VALVE SLEEVE

INNER BEARING RACE

Disassembly – Using suitable tool (T66T-3504-C), remove bearing race and shims from inner shoulder of housing. If parts



HOUSING & WORM CODE LOCATIONS

1965-69 FORD (BENDIX) INTEGRAL POWER STEERING (Cont.)

are to be replaced, determine code letter on worm and valve, and code number on gearbox housing. Using worm and housing codes, determine shim thickness required for correct installation. *NOTE — Shim packs are available with two .002" shims and two .005" shims.* Never use more than three shims on any installation.

	Service Shims For Housing & Worm Combinations				
	Housing				
	Code	5	6	7	8
Worm	A	0.004"	0.005"	0.005"	0.007"
	B	0.005"	0.005"	0.007"	0.007"
	C	0.005"	0.007"	0.007"	0.009"
	D	0.007"	0.007"	0.009"	0.010"
	E	0.007"	0.009"	0.010"	0.010"

Reassembly — To reassemble, reverse disassembly procedure, using new bearings and shims, as previously determined.

VALVE ROTOR NEEDLE BEARING

Disassembly — With sector shaft, worm and valve assembly, and input shaft seal removed, position gearbox in an arbor press. Position suitable tool (T64K-3576-A1) between press ram and bearing, and press bearing from housing.

Reassembly — Lubricate new needle bearing with power steering fluid, and position bearing in input shaft opening with bearing identification markings facing press ram. Press bearing into housing until bottomed in bore.