

E350 Series Overhaul

APPLICATION

TRANSAXLE APPLICATION

Application	Transaxle Model
Camry 2.4L ⁽¹⁾	E351
Camry Solara 2.4L ⁽¹⁾	E351
RAV4	
2WD	E352
4WD	E352F
(1) 2002-03 models.	

IDENTIFICATION

TRANSAXLE

Transaxle series is listed on ID label located on driver's side door post.

GEAR RATIOS

TRANSAXLE GEAR RATIOS (E351)

Gear Range	Gear Ratio
1st	3.538:1
2nd	2.045:1
3rd	1.333:1
4th	0.972:1
5th	0.731:1
Reverse	3.583:1

TRANSAXLE GEAR RATIOS (E352 & E352F)

Gear Range	Gear Ratio
1st	3.833:1
2nd	2.045:1
3rd	1.333:1
4th	1.028:1
5th	0.820:1
Reverse	3.583:1

LUBRICATION

NOTE: For information, see appropriate **SERVICING** article.

TROUBLE SHOOTING

SYMPTOM DIAGNOSIS

Noise

Check for low oil level, incorrect type oil. Worn or damaged gears and/or bearings.

Oil Leakage

Check high oil level. Leaking gasket, seal and/or "O" ring.

Hard To Shift Or Will Not Shift

Check for malfunctioning shift control cable. Worn or damaged synchronizer ring. Damaged shift key spring.

Jumps Out Of Gear

Check for damaged locking ball spring, worn shift fork, gear, and/or bearing.

Tight Corner Braking

Check malfunctioning differential and/or center differential (4WD).

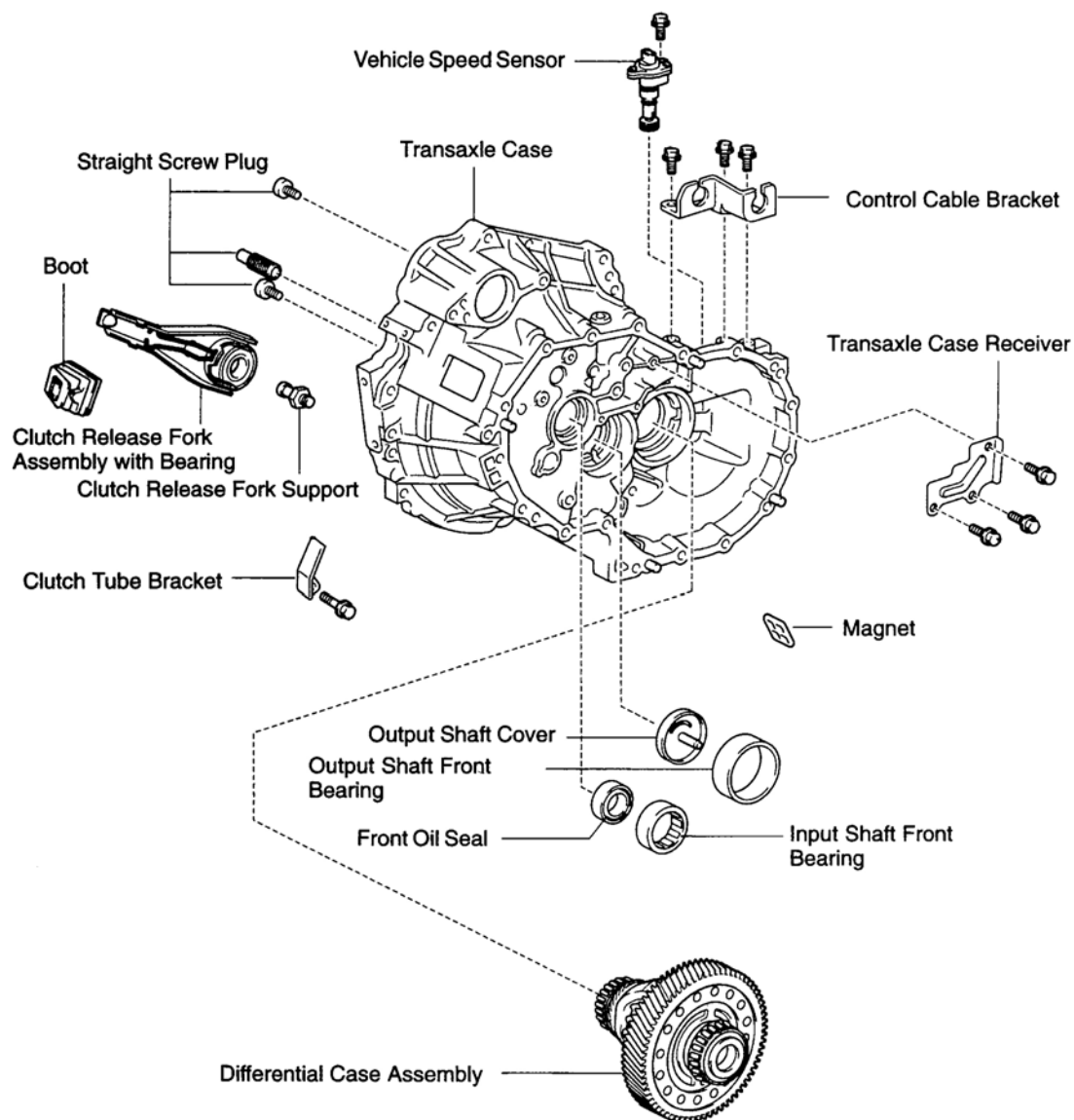
TRANSAXLE DISASSEMBLY

1. Remove clutch release fork assembly with bearing. See **Fig. 1** and **Fig. 2** . Remove back-up light switch with gasket. See **Fig. 3** . Remove vehicle speed sensor and sensor drive gear. Remove breather plug. Remove lock ball assembly No. 1.
2. Remove selecting bellcrank with support. Remove shift and select lever shaft assembly with gasket.
3. Remove transaxle case cover. Unstake output shaft lock nut. See **Fig. 4** . Lock transaxle in 2 gears (double meshing). See **Fig. 5** . Remove output shaft lock nut. Unlock transaxle.
4. Measure 5th gear clearances, and record for reassembly reference. Using dial indicator, measure 5th gear thrust clearance. See **Fig. 6** . Standard clearance is .004-.022" (.10-.57 mm). Service limit is .026" (.65 mm). Measure radial clearance (oil clearance) of 5th gear. Standard clearance is .0004-.0020" (.009-.05 mm).
5. Remove No. 3 shift fork set bolt. Remove No. 3 hub sleeve and the No. 3 shift fork. Using appropriate puller, remove 5th driven gear from output shaft.
6. Remove input shaft snap ring. Using appropriate puller, remove No. 3 clutch hub with synchronizer ring assembly and 5th gear. Remove needle bearing. Remove 7 Torx screws (T45) and rear bearing retainer.

7. Remove output shaft rear bearing shim. Remove input shaft snap ring. Remove shift fork shaft snap rings. Remove reverse idler gear shaft retaining bolt. See **Fig. 4**.

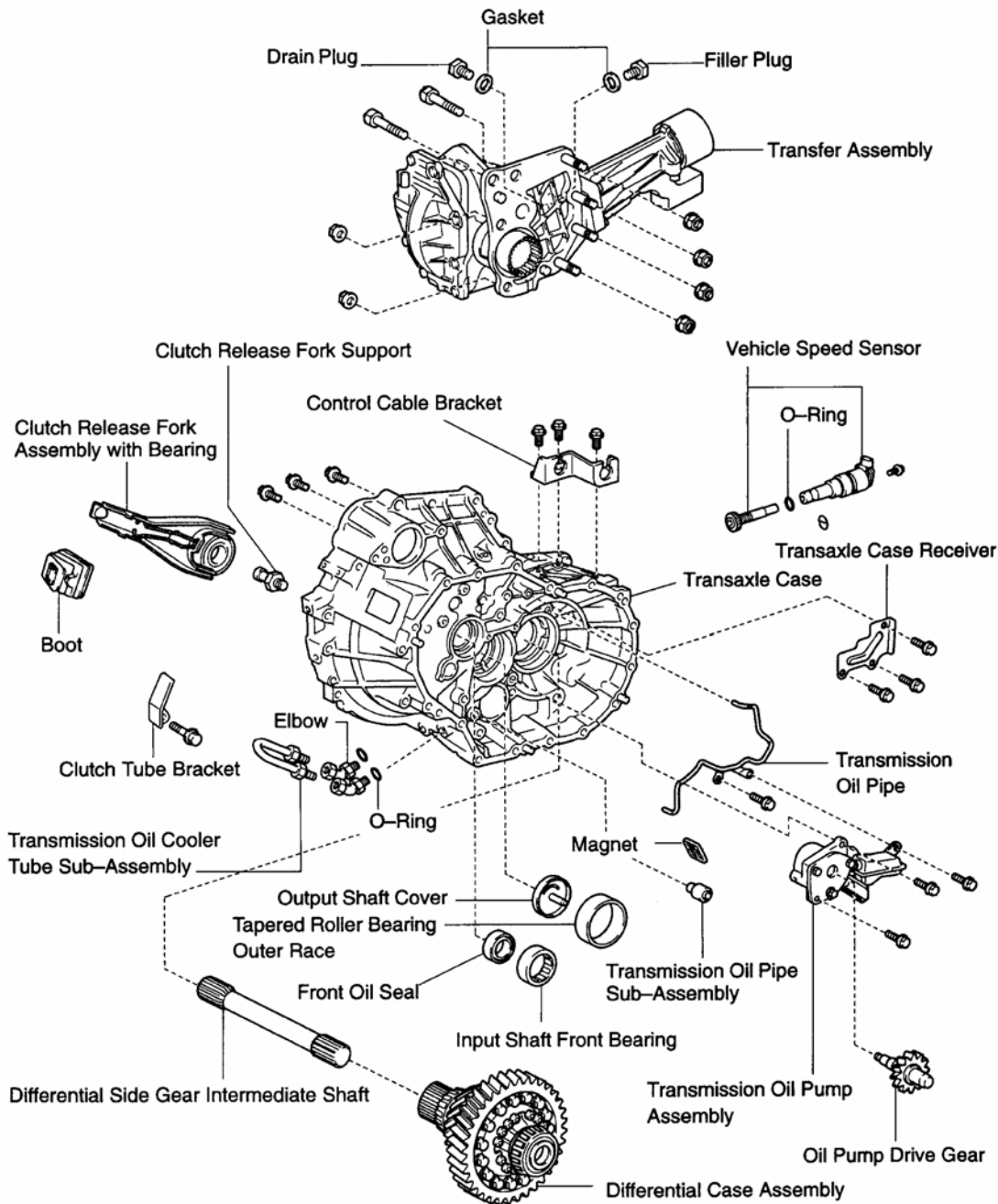
NOTE: Three bolts must be removed from transaxle case (clutch housing) side.

8. Remove bolts holding transaxle case to clutch housing. Use a plastic hammer to loosen case to housing seal. Remove No. 2 oil receiver pipe. See **Fig. 3**.
9. Remove plug. Remove and inspect reverse restrict pin. See **Fig. 7**. Replace pin if worn or damaged. Remove magnet.
10. Remove bolts and remove reverse shift arm bracket. Remove reverse idler gear, thrust washer and shaft. Remove all remaining plugs, seats, springs and detent balls.
11. Remove No. 1 shift fork shaft by pulling up No. 3 shift fork shaft. Remove interlock roller from reverse shift fork. Remove No. 2 shift fork shaft, shift head and No. 1 shift fork. Remove No. 3 shift fork shaft with reverse shift fork and No. 2 shift fork. Remove snap ring and reverse shift fork from No. 3 shift fork shaft. Remove snap rings from No. 1, No. 2 and No. 3 shift fork shafts. See **Fig. 3**.
12. Move output shaft toward differential and remove input shaft assembly. Lift differential case and remove output shaft assembly. Remove oil pump drive gear and remove differential assembly. Remove oil pipe and oil pump assembly (4WD). If necessary, replace input shaft bearing and oil seal. Remove transaxle case receiver (2WD). See **Fig. 3**. Remove input shaft bearing and oil seal. Install NEW bearing and oil seal. Install transaxle case receiver. Tighten receiver bolts to 65 INCH lbs. (7.4 N.m). Remove No. 5 synchronizer ring and key spring from No. 3 clutch hub. Remove snap rings. See **Fig. 4**.



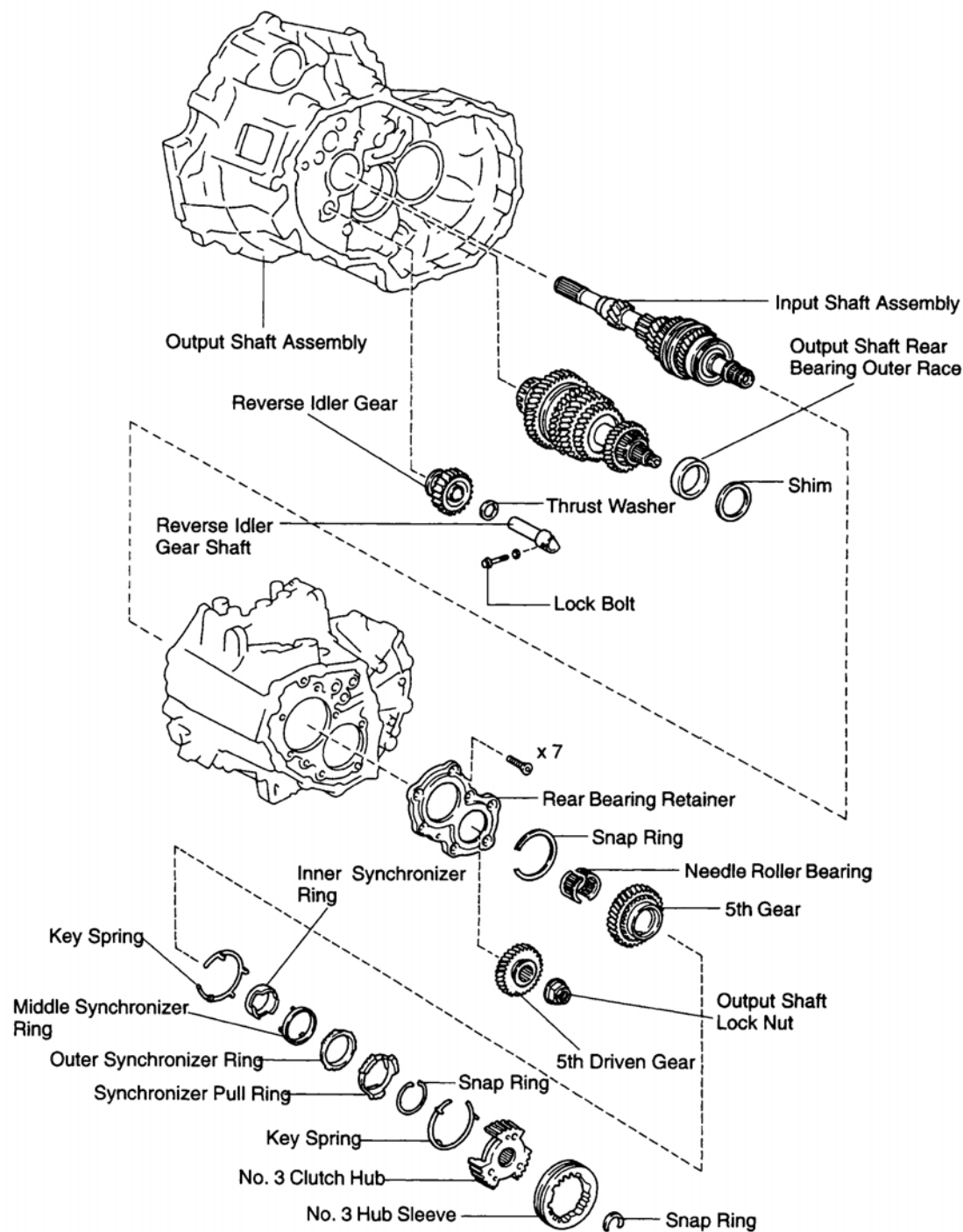
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Fig. 1: Exploded View Of Transaxle Case Components (2WD)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



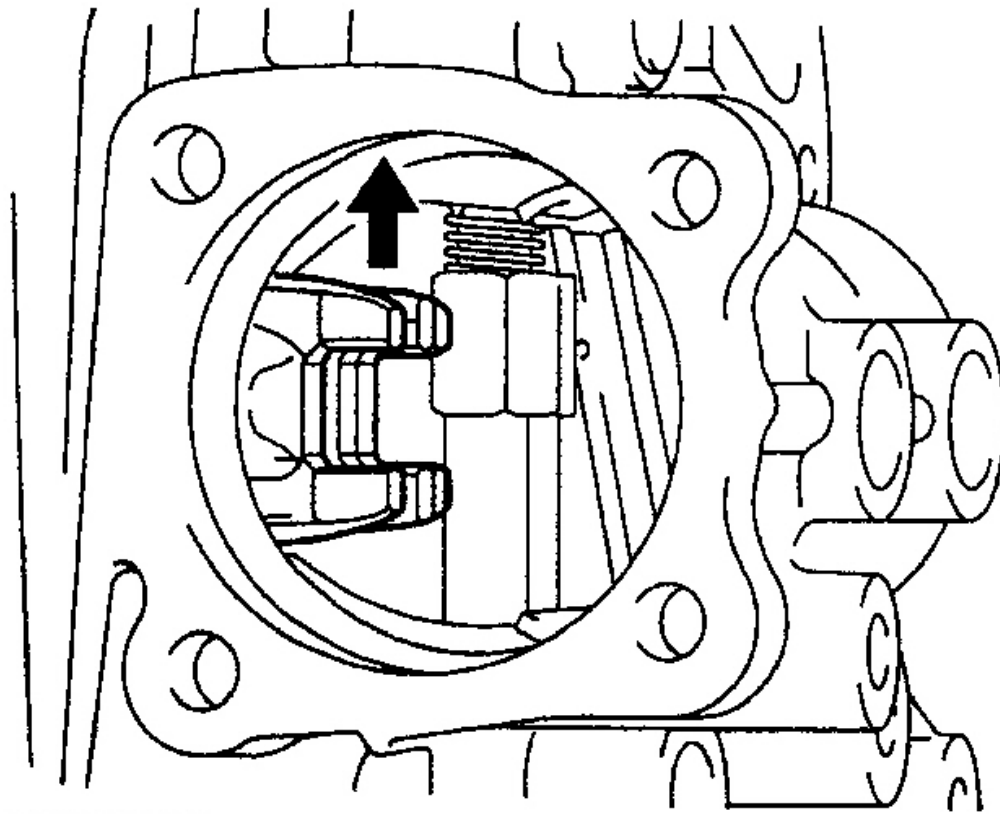
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Fig. 2: Exploded View Of Transaxle Case Components (4WD)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



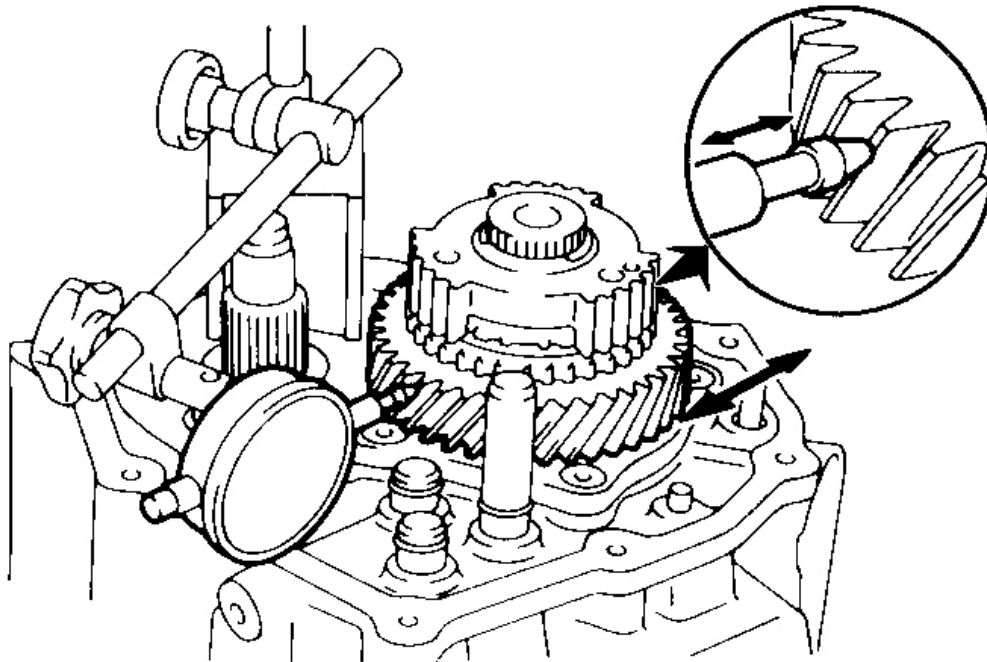
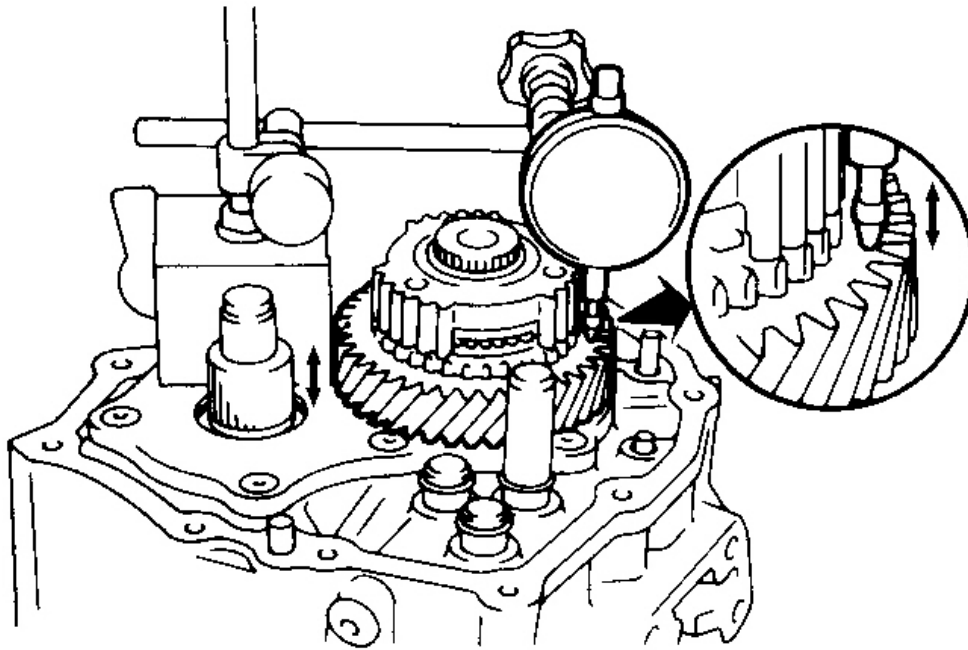
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Fig. 4: Exploded View Of Transaxle Internal Components (Geartrain Assemblies)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 5: Locking Transaxle Into 2 Gears
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 6: Measuring 5th Gear Clearances
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

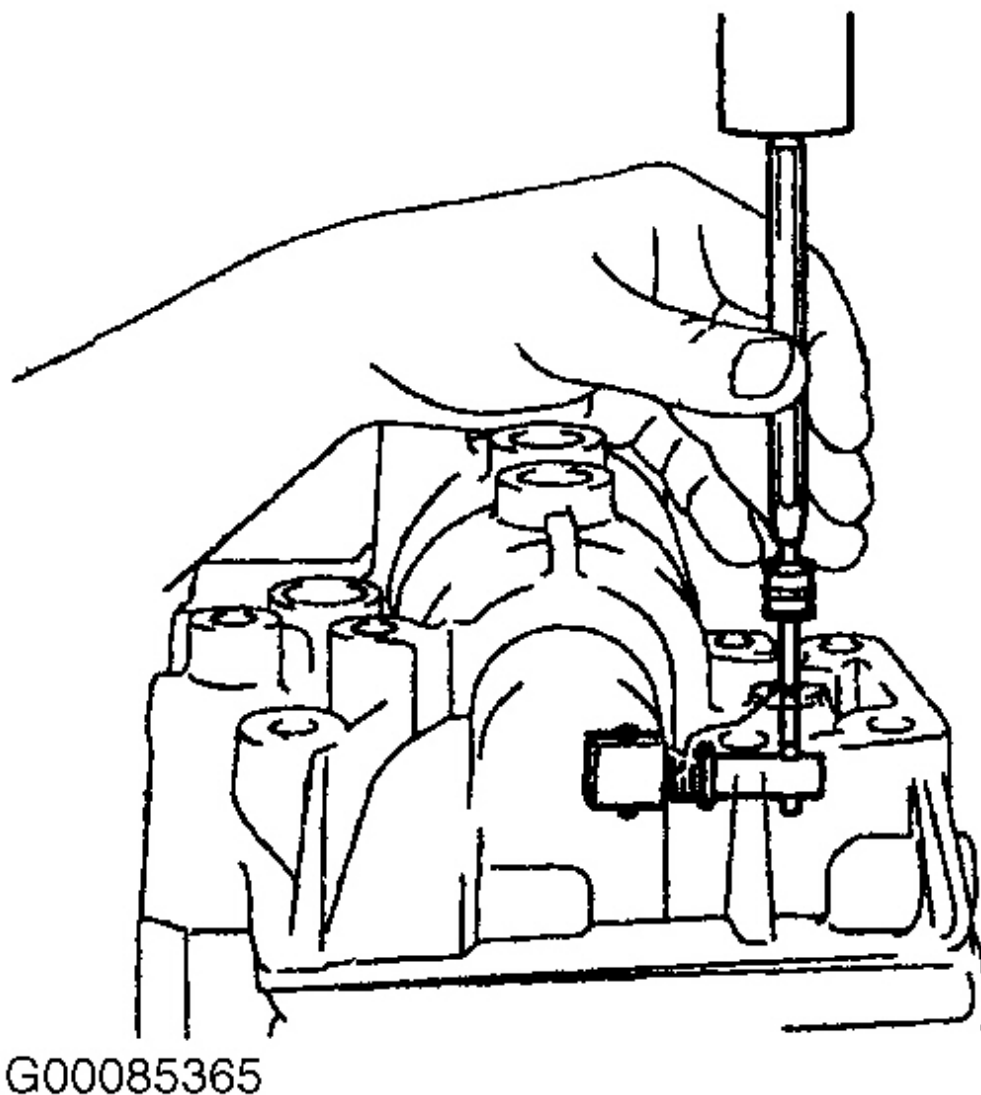


Fig. 7: Removing Reverse Restrict Pin Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

INPUT SHAFT (MAINSHAFT)

Disassembly

1. For all input shaft measurement specifications, see **INPUT SHAFT CLEARANCE SPECIFICATIONS** table. Using a feeler gauge, measure 3rd and 4th gear thrust clearances. See **Fig. 8** . Secure input shaft in soft-jaw vise. Using a dial indicator, measure 3rd and 4th gear lateral movement (oil clearance). See **Fig. 9** . If clearance exceeds maximum specification, replace gear, needle bearing and/or shaft.
2. Remove snap ring from input shaft. Using a bearing splitter or appropriate blocks, support 4th gear, and press input shaft out of rear bearing and 4th gear. Remove needle bearings, spacer and synchronizer ring. Remove snap ring. Supporting 3rd gear, press input shaft out of No. 2 hub sleeve, synchronizer ring, needle bearing and 3rd gear. Remove needle bearing. Press input shaft out of front bearing inner race. See **Fig. 10** .

INPUT SHAFT CLEARANCE SPECIFICATIONS

Application	In. (mm)
3rd Gear Thrust Clearance	.004-.014 (.10-.35)
4th Gear Thrust Clearance	.004-.022 (.10-.55)
3rd & 4th Gear Radial Clearance	.0004-.002 (.009-.05)

Inspection

1. Inspect all parts for damage and wear. Replace if necessary. Clean all parts in solvent, dry and lubricate all parts. Ensure oil passages are free of contamination.
2. Measure input shaft at points "A", "B" and "C". See **Fig. 11** . Support input shaft on "V" blocks. Using a dial indicator, rotate input shaft 2 complete revolutions and measure shaft runout. See **Fig. 12** . Replace input shaft if runout is not within service limit. See **INPUT SHAFT BEARING SPECIFICATIONS** table.

INPUT SHAFT BEARING SPECIFICATIONS

Application ⁽¹⁾	Minimum Diameter - In. (mm)
"A" Journal Diameter	1.1004 (27.950)
"B" Journal Diameter	1.415 (35.95)
"C" Journal Diameter	1.415 (35.95)
Runout Limit	.002 (.05)
(1) "A", "B", and "C" refer to measuring points indicated in illustration. See Fig. 11 .	

Reassembly

1. Install clutch hub and shifting keys to No. 2 hub sleeve. See **Fig. 13** . Ensure key spring end-gaps are not in-line.
2. Apply multipurpose grease to needle bearings. Install bearing in 3rd gear. Place synchronizer ring on 3rd gear, and align ring slots with shifting keys. Using a press, install 3rd gear and No. 2 hub sleeve. See **Fig. 10** .
3. Select thickest snap ring that fits into groove, which will allow minimum axial play (thrust clearance). See **Fig. 14** . See **SNAP RING APPLICATION CHART NO. 1** table. Install selected snap ring.

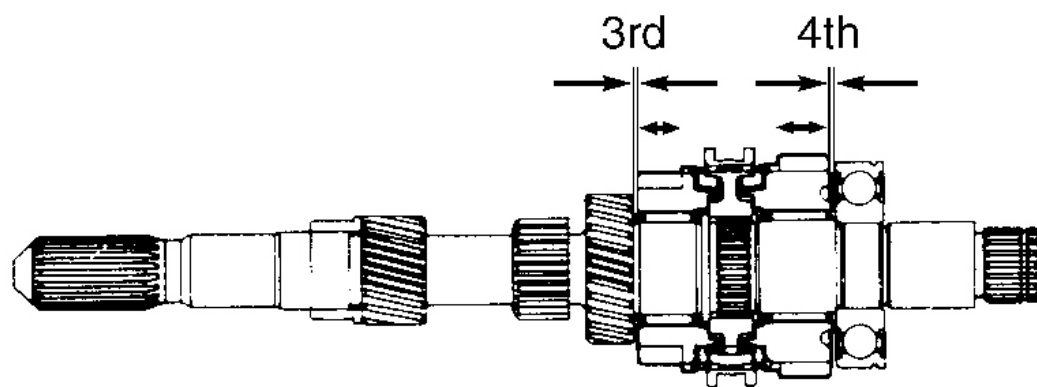
4. Check 3rd gear thrust clearance. Standard clearance is .004-.014" (.10-.35 mm). Install spacer. Place synchronizer ring on 4th gear and align ring slots with shifting keys. Install 4th gear. Using a press, install on ball bearing. See **Fig. 10** .
5. Select thickest snap ring that fits into groove which will allow minimum axial play thrust clearance. See **Fig. 15** . See **SNAP RING APPLICATION CHART NO. 2** table. Install selected snap ring.
6. Check 4th gear thrust clearance. Standard clearance is .004-.022" (.10-.55 mm). Using a press, install input shaft front bearing inner race.

SNAP RING APPLICATION CHART NO. 1

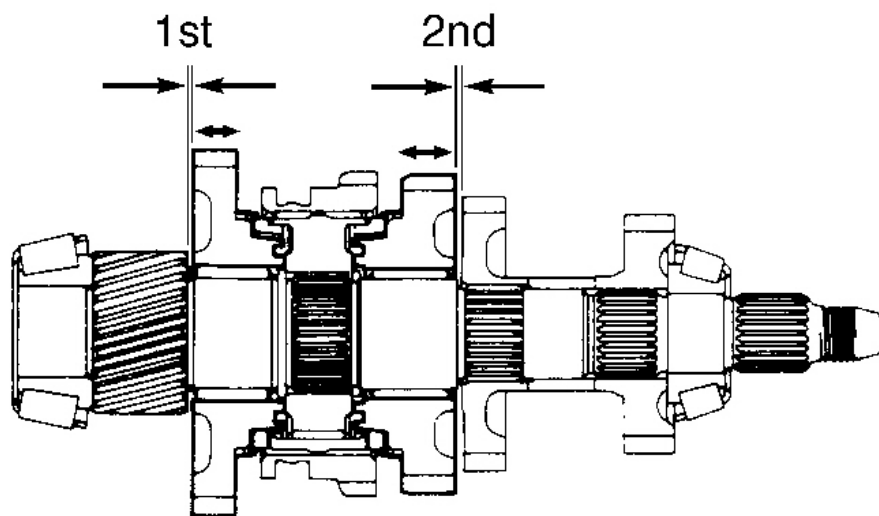
Stamped Letter	Thickness - In. (mm)
H	.091 (2.30)
J	.093 (2.35)
K	.095 (2.40)
L	.097 (2.45)
M	.098 (2.50)
N	.100 (2.55)
P	.102 (2.60)

SNAP RING APPLICATION CHART NO. 2

Stamped Number	Thickness - In. (mm)
1	.093 (2.35)
2	.095 (2.40)
3	.097 (2.45)
4	.098 (2.50)
5	.100 (2.55)
6	.102 (2.60)
7	.104 (2.65)
8	.106 (2.70)



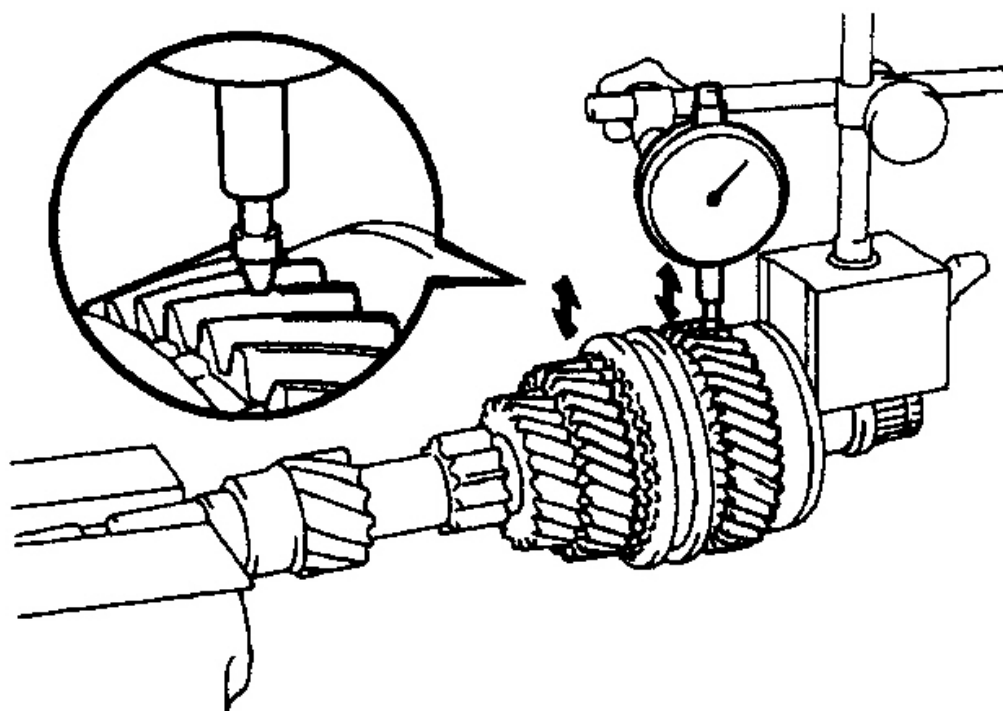
INPUT SHAFT



OUTPUT SHAFT

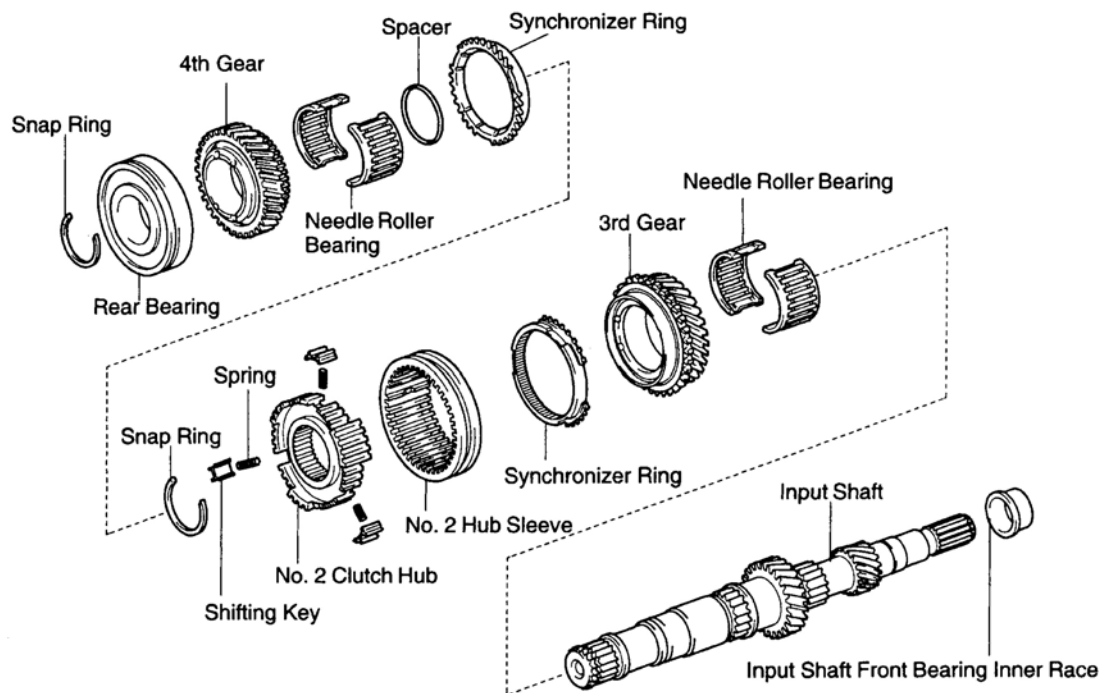
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Fig. 8: Measuring Input & Output Shaft Clearances
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



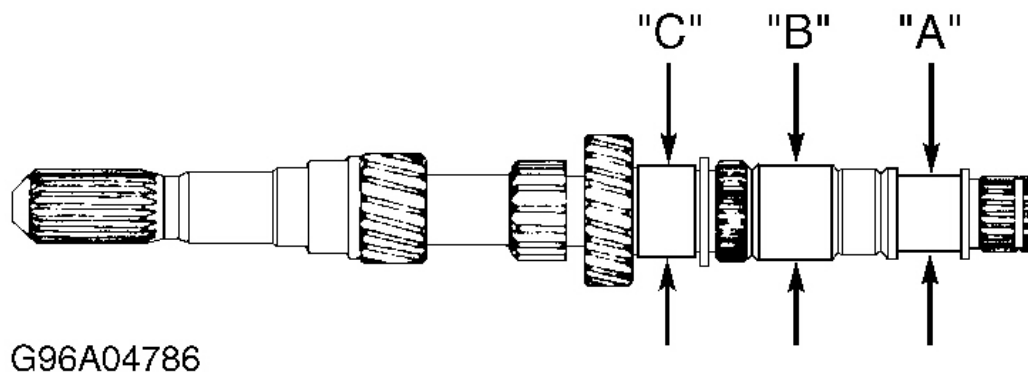
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Fig. 9: Checking Input Shaft 3rd & 4th Gear Radial Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



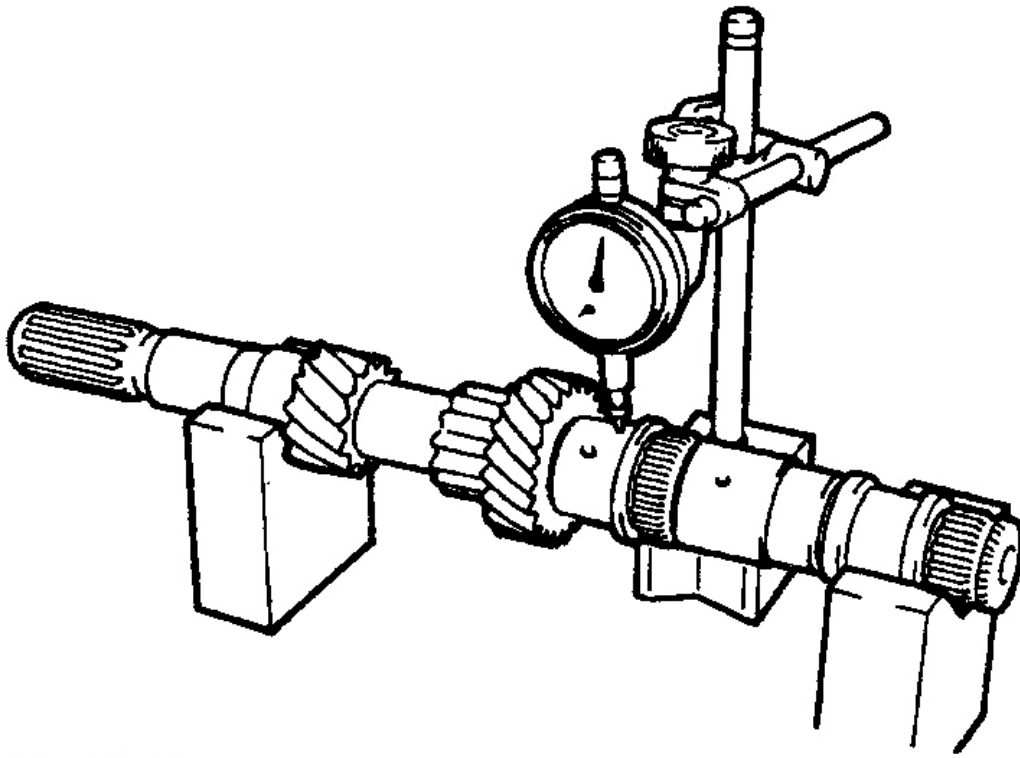
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Fig. 10: Exploded View Of Input Shaft
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 11: Measuring Input Shaft Bearing Journals
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 12: Checking Input Shaft Runout
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

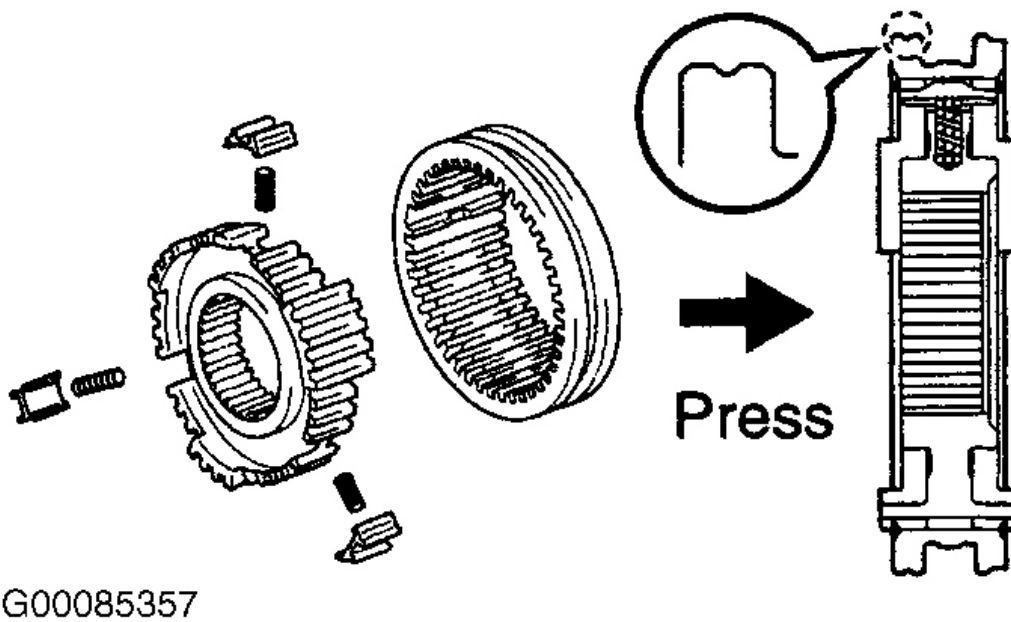
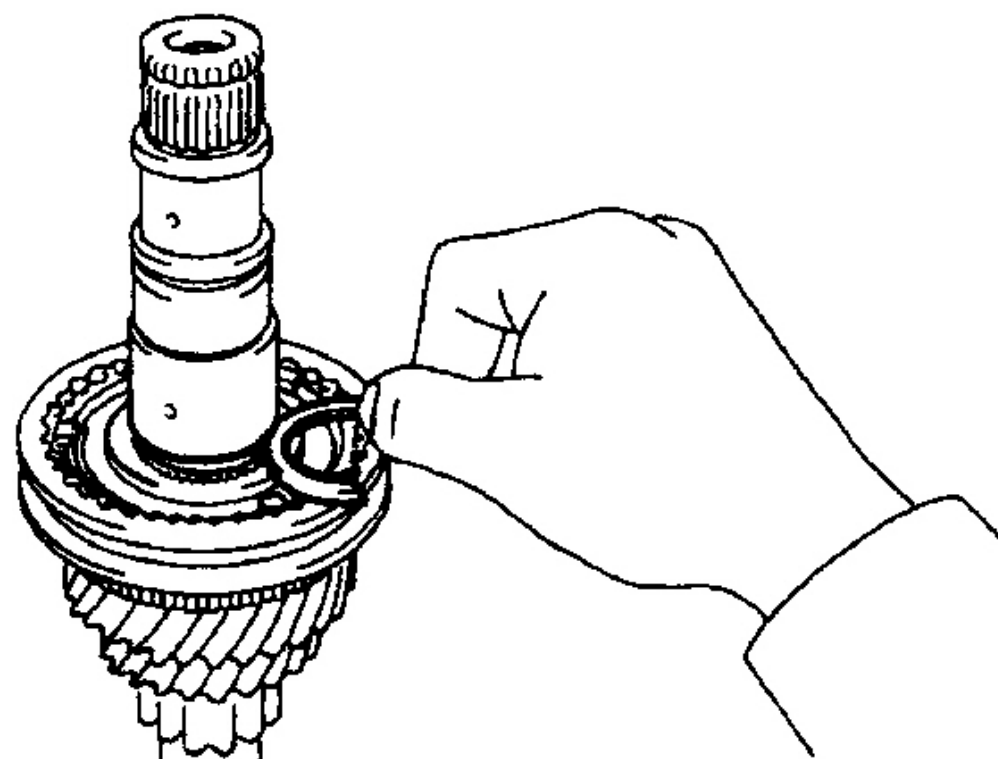
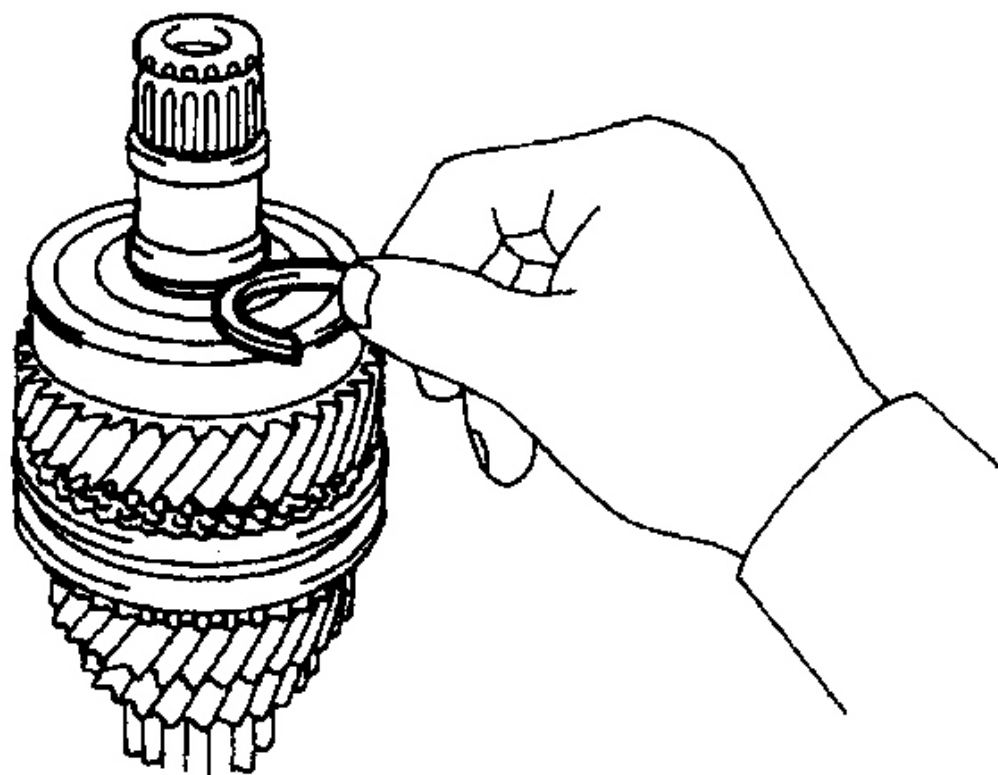


Fig. 13: Identifying Correct Installation Of No. 2 Sleeve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 14: Selecting Clutch Hub No. 2 Snap Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 15: Selecting Input Shaft Bearing Snap Ring
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OUTPUT SHAFT (COUNTERSHAFT)

Disassembly

NOTE: For all output shaft clearance specifications, see OUTPUT SHAFT CLEARANCE SPECIFICATIONS table.

1. Using a feeler gauge, measure 1st and 2nd gear thrust clearances. See **Fig. 8** . Secure output shaft in soft-jaw vise. Using a dial indicator, measure 1st and 2nd gear lateral movement (oil clearance). See **Fig. 16** . If clearance exceeds maximum, replace gear, needle bearing and/or shaft.
2. Using a bearing splitter or appropriate blocks, support 4th driven gear and press output shaft out of rear bearing and 4th driven gear. Remove spacer. See **Fig. 17** . Support 2nd gear, and press output shaft out of 3rd driven gear and 2nd gear. Remove needle bearing, spacer and synchro ring. Remove snap ring.

Support 1st gear, and press output shaft out of No. 1 hub sleeve and 1st gear. Remove synchronizer ring and needle bearing. See **Fig. 17** .

OUTPUT SHAFT CLEARANCE SPECIFICATIONS

Application	In. (mm)
1st Gear Thrust Clearance	.010-.016 (.25-.40)
2nd Gear Thrust Clearance	.004-.014 (.10-.35)
1st & 2nd Gear Radial Clearance	.0004-.002 (.009-.05)

Inspection

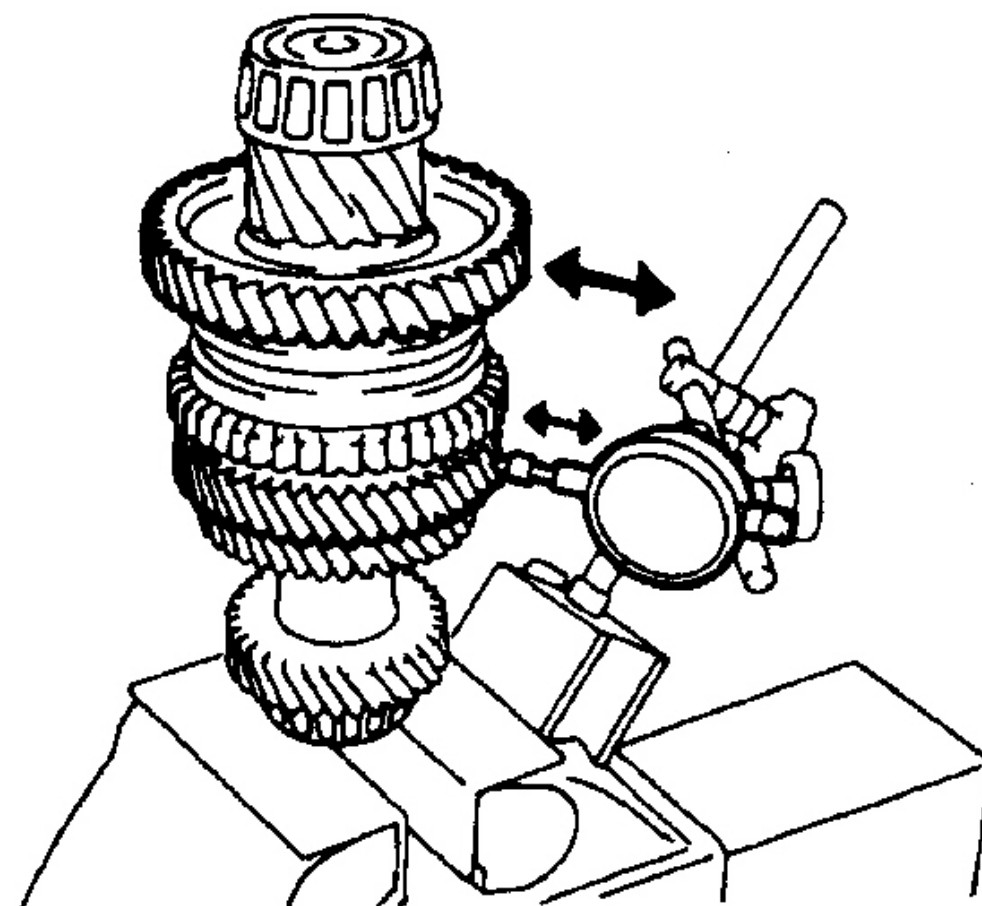
1. Inspect all parts for damage and wear. Replace if necessary. Clean all parts in solvent. Dry and lubricate all parts before reassembly. Ensure oil passages are free of contamination.
2. Measure output shaft at points "A" and "B". See **Fig. 18** . Support output shaft on "V" blocks and using a dial indicator, measure shaft runout. See **Fig. 19** . Rotate output shaft 2 complete revolutions. Replace output shaft if runout is not within service limit. See **OUTPUT SHAFT MEASUREMENT SPECIFICATIONS** table.

OUTPUT SHAFT MEASUREMENT SPECIFICATIONS

Application ⁽¹⁾	Minimum Diameter - In. (mm)
"A" Journal Diameter	1.534 (38.95)
"B" Journal Diameter	1.534 (38.95)
Runout Limit	.002 (.05)
(1) "A" and "B" refer to measuring points indicated in illustration. See Fig. 18 .	

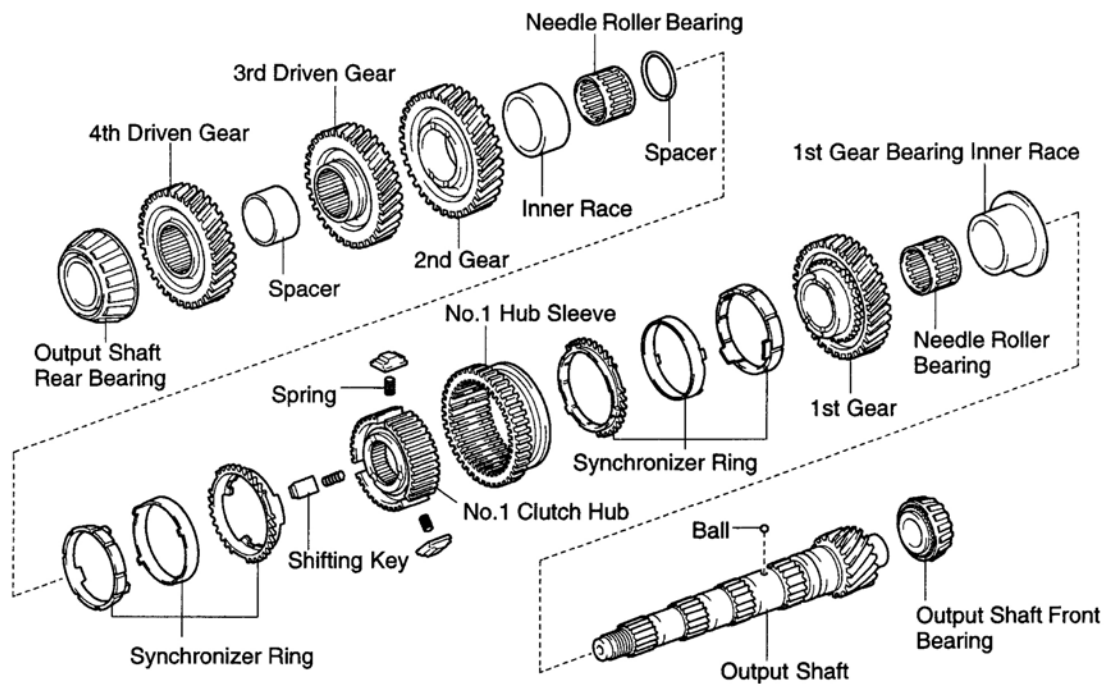
Reassembly

1. If output shaft bearing replacement is necessary, support bearing with bearing splitter or appropriate blocks, and press output shaft out of bearing. To replace, support bearing with appropriate adapter, and press shaft onto bearing.
2. Assemble components in reverse order of disassembly. Ensure 1st gear bearing inner race hole is correctly aligned. See **Fig. 20** .
3. Install No. 1 clutch hub and shifting keys to No. 1 hub sleeve. Install shifting key springs under shifting keys. Ensure key spring end-gaps are not in-line. Apply multipurpose grease to needle bearings. Install bearing in 1st gear. Place synchronizer ring onto gear, and align ring slots with shifting keys. Press 1st gear and No. 1 hub sleeve onto output shaft. See **Fig. 17** .
4. Check 1st gear thrust clearance. Standard clearance is .010-.016" (.25-.40 mm). Install spacer. Apply multipurpose grease to needle bearing. Place synchronizer ring on 2nd gear, and align ring slots with shifting keys. Install 2nd gear bushing ball. See **Fig. 21** . Install 2nd gear. Using a press, install 3rd driven gear onto output shaft. Check 2nd gear thrust clearance. Standard clearance is .004-.014" (.10-.35 mm). Install spacer. Using a press, install 4th driven gear onto output shaft. Press on output shaft rear bearing.



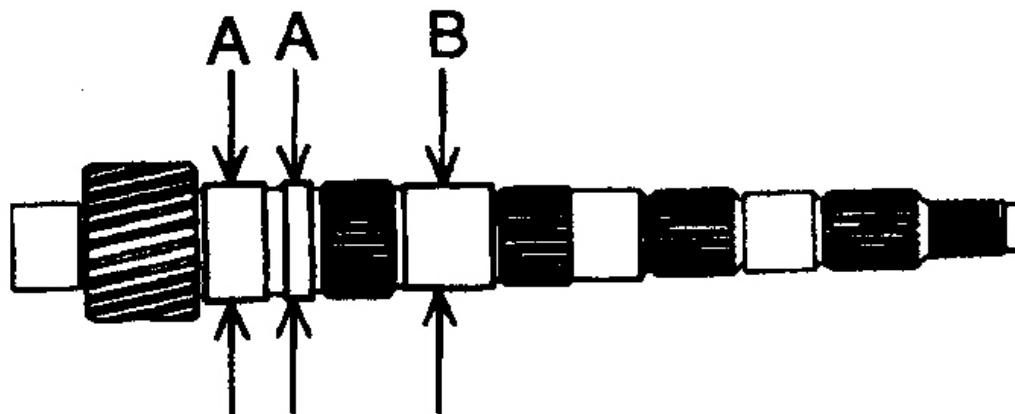
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Fig. 16: Checking 1st & 2nd Gear Radial Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



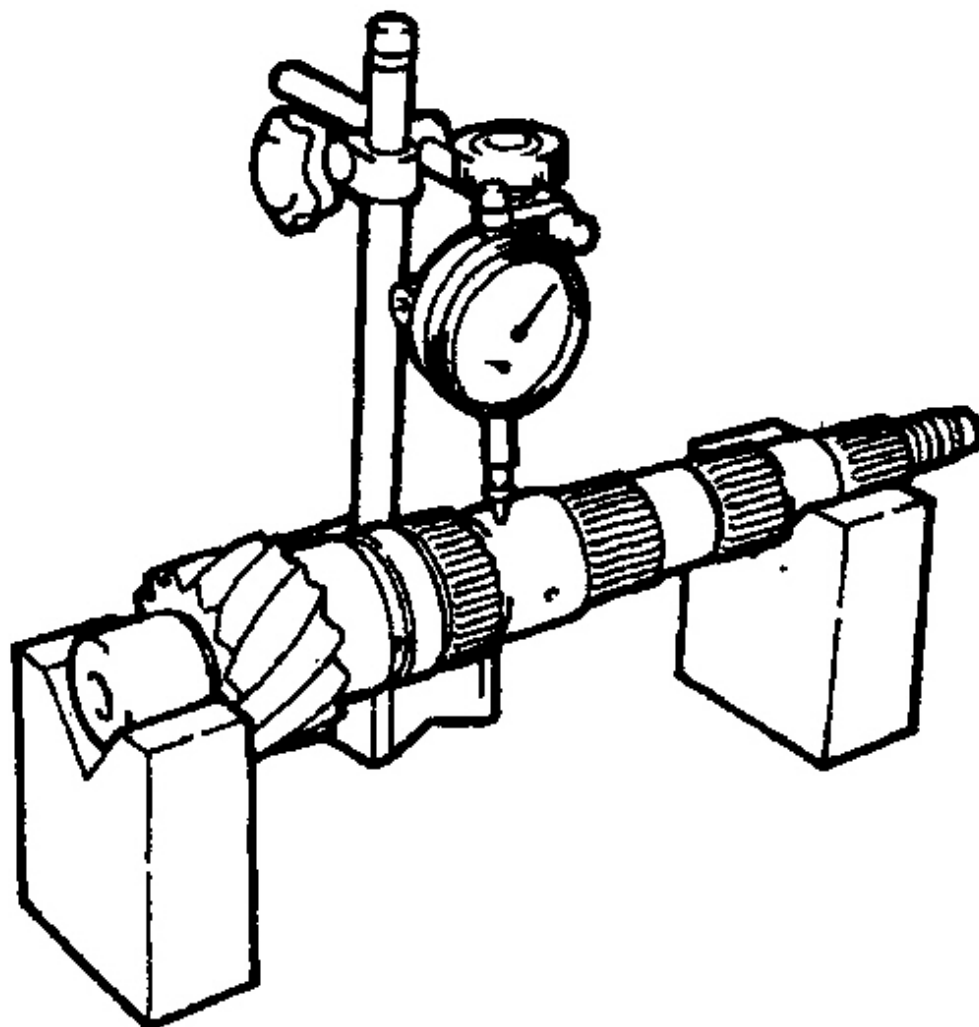
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Fig. 17: Exploded View Of Output Shaft
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 18: Identifying Output Shaft Measuring Points
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 19: Checking Output Shaft Runout
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

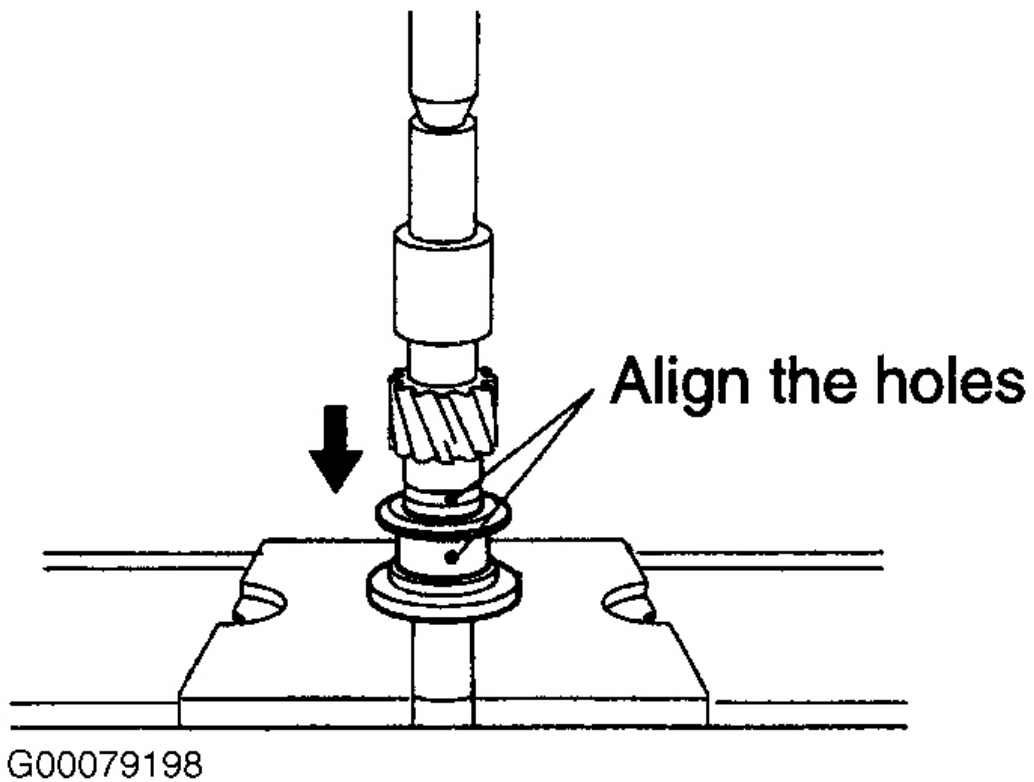
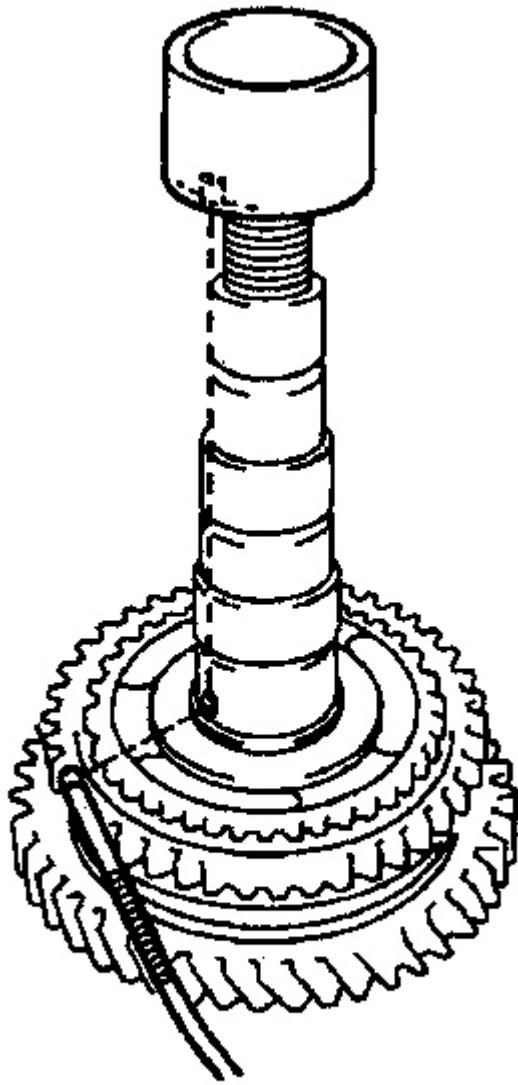


Fig. 20: Installing 1st Gear Bearing Inner Race
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 21: Installing Ball & Inner Race To Output Shaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OIL PUMP

Disassembly

1. Install oil pump drive gear to drive rotor. Ensure drive rotor turns smoothly. Remove gasket from oil pump case. Remove bolt, and pull out oil strainer. Hold oil pump cover. Unbolt and remove cover. Remove spring holder, spring, ball and relief valve seat. See **Fig. 22** .
2. Install oil pump drive gear to drive rotor. Measure body clearance between drive rotor and oil pump case. See **Fig. 23** . Standard clearance is .004-.006" (.10-.16 mm). Service limit is .012" (.30 mm). Measure tip clearance between drive and driven rotors. Standard clearance is .003-.006" (.08-.15 mm). Service limit is .012" (.30 mm).
3. Remove oil pump drive gear. Using straightedge and feeler gauge, measure side clearance of both rotors. Standard clearance is .001-.003" (.03-.08 mm). Service limit is .006" (.15 mm). Remove oil pump drive rotor and driven rotor. Replace "O" ring in oil pump case.

Reassembly

Install driven rotor and drive rotor. Install relief valve, ball, spring and spring holder to oil pump case. Install oil strainer to oil pump case. Tighten oil pump cover bolts to 96 INCH lbs. (10 N.m). Insert oil pump drive gear to drive rotor. Ensure drive rotor turns smoothly. Install NEW gasket to oil pump case.

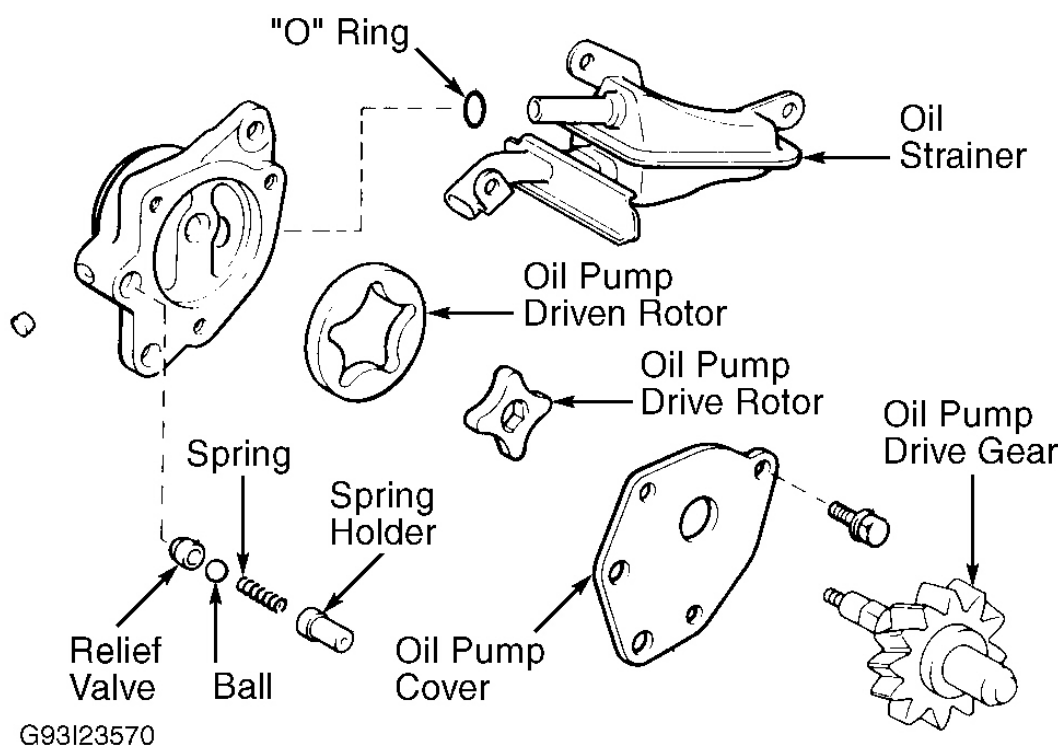


Fig. 22: Exploded View Of Oil Pump Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

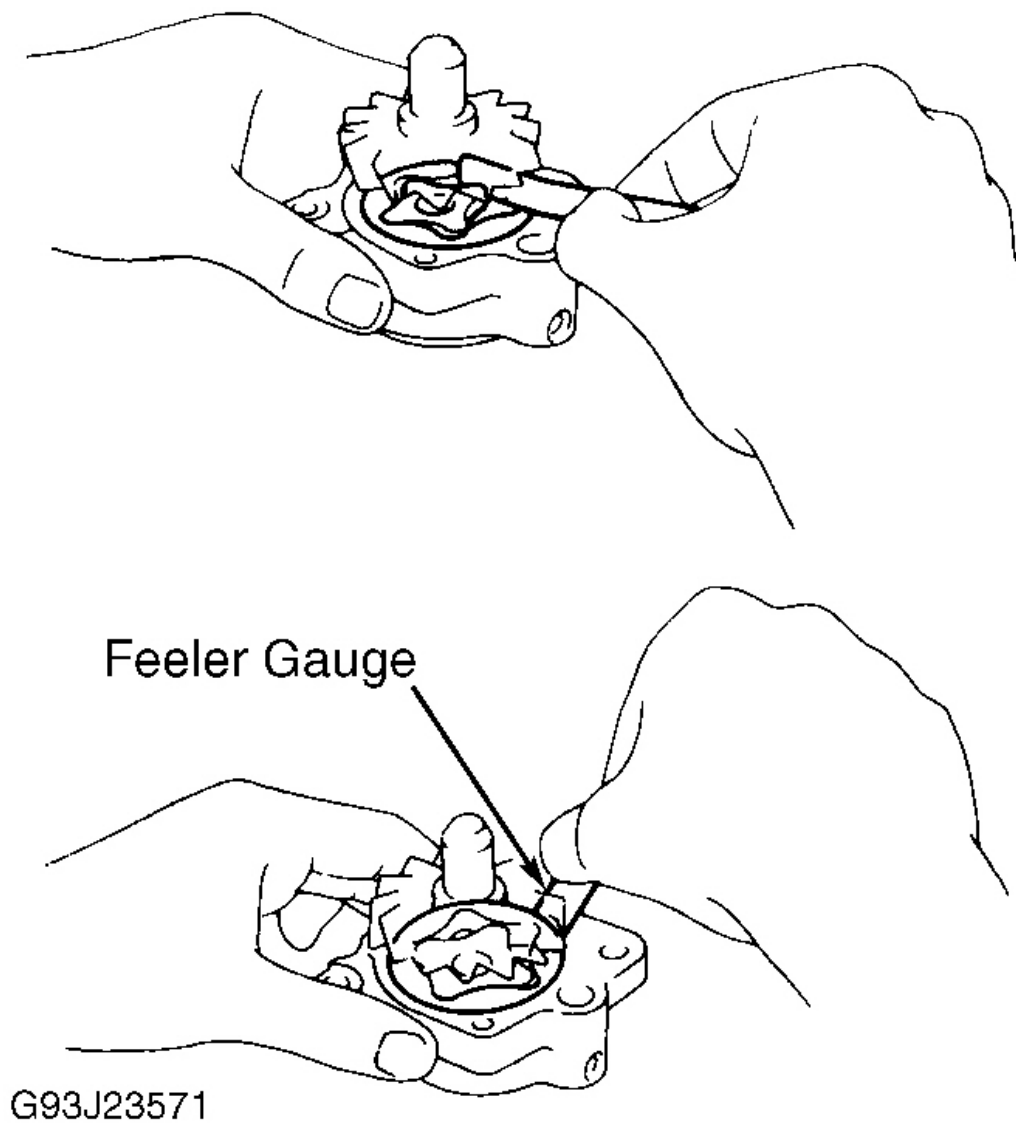


Fig. 23: Measuring Oil Pump Clearances
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SHIFT & SELECT LEVER

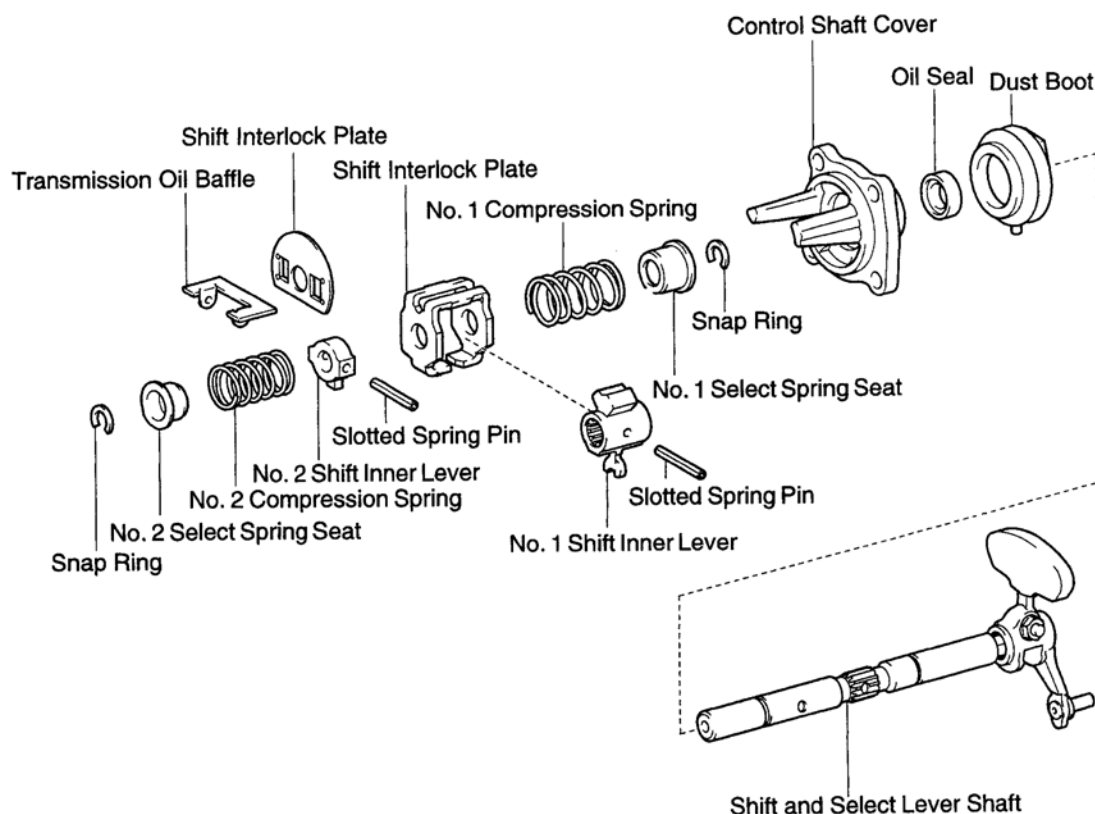
Disassembly

1. Using a pin punch and hammer, drive out roll pin from No. 2 shift inner lever. Remove snap ring. Remove No. 2 select spring seat, No. 2 spring and No. 2 shift inner lever. Drive out roll pin from No. 1 shift inner lever. Remove shift interlock plate and No. 1 shift inner lever from shaft.

2. Remove No. 1 compression spring and No. 1 select spring seat. Remove snap ring. Remove control shaft cover. If necessary, replace control shaft cover oil seal. Drive in NEW oil seal to a depth of 0-.020" (0-.51 mm). Apply multipurpose grease to oil seal. See **Fig. 24** .

Reassembly

1. Check shift and select lever shaft and components for wear or damage. Replace as needed. Apply multipurpose grease to shift and select lever shaft. Install boot to control shaft cover. Install shift and select lever or control shaft to control shaft cover. Install snap ring.
2. Install No. 1 spring seat and No. 1 compression spring. Ensure No. 1 select spring seat slides smoothly. Install shift interlock plate and No. 1 shift inner lever. Drive roll pin into shift inner lever. Ensure shift interlock plate turns smoothly. See **Fig. 24** .
3. Install No. 2 shift inner lever, No. 2 spring and No. 2 select spring seat. Install snap ring. Drive roll pin into No. 2 shift inner lever. Ensure No. 2 select spring seat slides smoothly.



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Fig. 24: Exploded View Of Shift & Select Lever Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SHIFT FORK ASSEMBLY

Measure clearance between hub sleeve and shift fork. Service limit is .039" (1.00 mm). If clearance exceeds

specification, replace shift fork or hub sleeve. See **Fig. 25** .

SYNCHRONIZER RING CLEARANCE

Check synchronizer rings for wear or damage. Turn and push ring to check braking action. Measure clearance between synchronizer ring back and gear spline end; 1st and 4th synchronizer ring to gear minimum clearance is .024" (.61 mm). 2nd and 3rd synchronizer ring to gear minimum clearance is .028" (.71 mm). If clearance is less than specification, replace synchronizer ring. See **Fig. 25** .

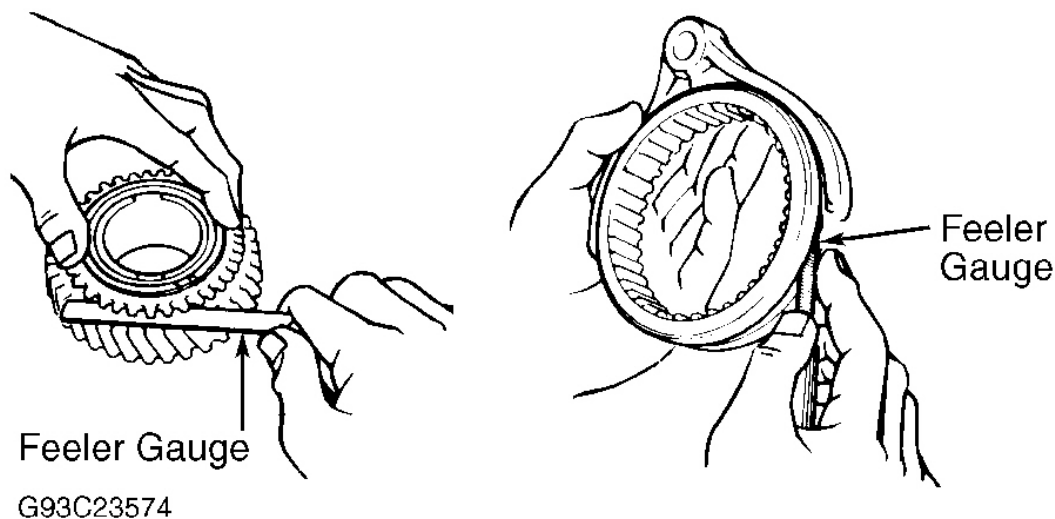
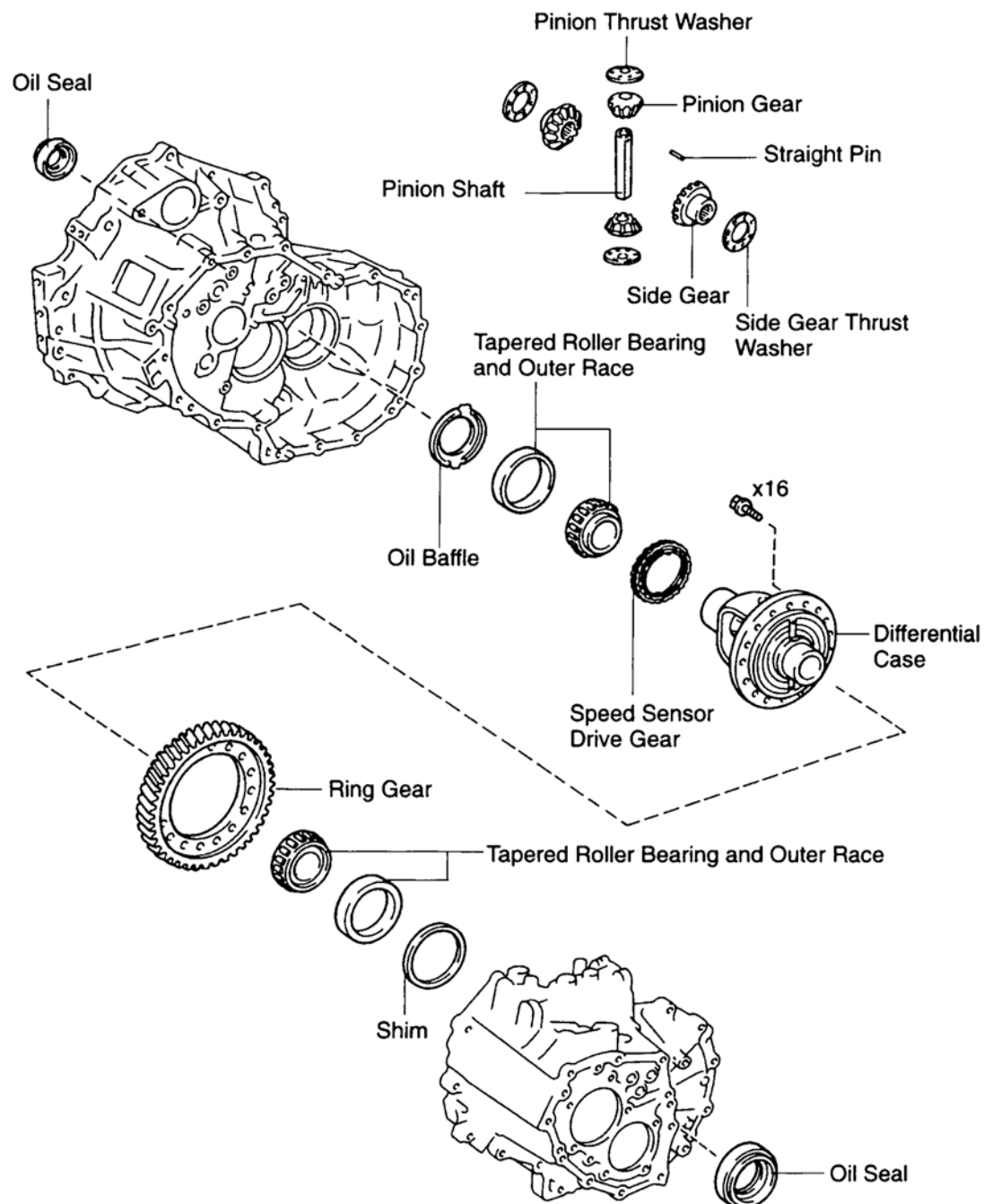


Fig. 25: Measuring Shift Fork & Synchro Ring Assemblies
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIFFERENTIAL CASE

Disassembly

1. Perform pre-disassembly inspection. Position dial indicator assembly on transaxle case. Position dial indicator tip against side gear. See **Fig. 27** . Measure side gear backlash while holding one pinion gear toward case. Backlash should be .002-.008" (.05-.20 mm). Note and record reading.
2. Mark ring gear and differential case for reassembly reference. Remove 16 ring gear bolts. Using a plastic hammer, tap on ring gear to remove it from differential case.
3. Using appropriate puller, remove front and rear tapered roller bearings (if necessary). Using a pin punch and hammer, drive out pinion shaft pin from ring gear side of case. See **Fig. 26** . Remove differential pinion shaft from differential case.
4. Remove 2 differential pinion gears, side gears, and 4 thrust washers. Using appropriate puller, remove side gear bearing outer races and shim from transaxle housing and transaxle case. Remove oil seals from transaxle housing and transaxle case.



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Fig. 26: Exploded View Of Differential Case
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

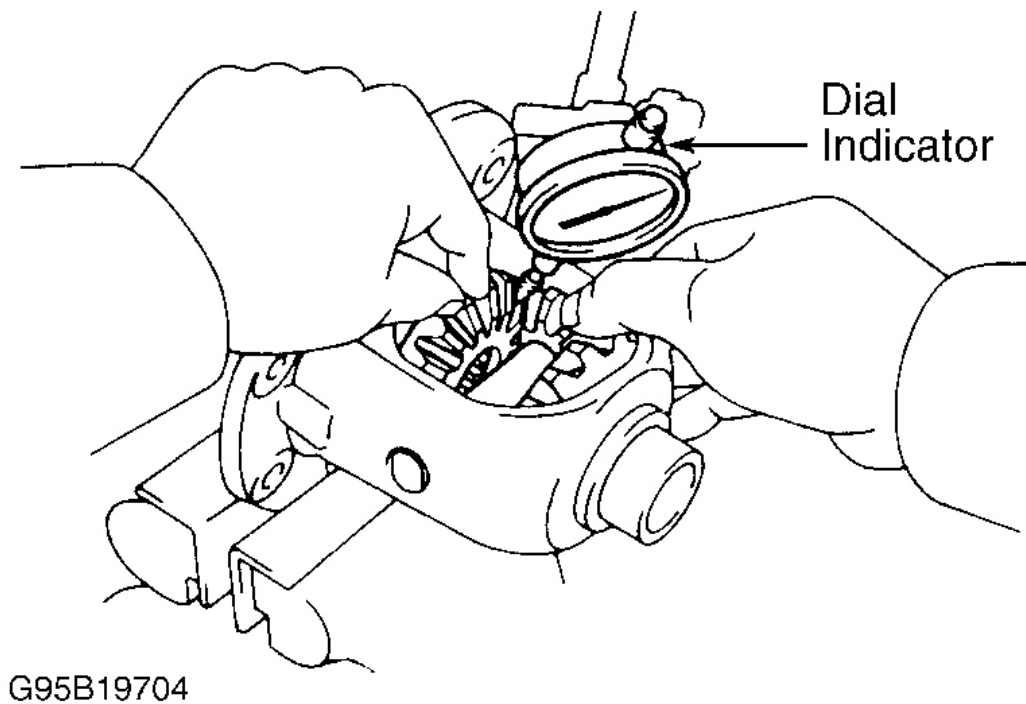


Fig. 27: Measuring Differential Backlash
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Cleaning & Inspection

Clean all parts with solvent. Dry with compressed air. Check bearings, races and gears for wear or damage. Replace if necessary.

Reassembly

1. Coat thrust washers, side gears and pinion gears with oil. Install 2 thrust washers onto 2 differential side gears. Install 2 thrust washers with 2 side gears, and 2 thrust washers with pinion gears into differential case. Install pinion shaft, aligning lock pin holes on pinion shaft and differential case.
2. Mount differential case in a soft-jawed vise. Using a dial indicator, check side gear backlash. Hold one pinion gear against case. Measure side gear backlash. See **Fig. 27** . Backlash must be .002-.008" (.05-.20 mm). If backlash is not within specification, side gear thrust washers must be replaced.
3. Select appropriate thrust washers to obtain correct side gear backlash. Thrust washers are available in thicknesses from .039" (1.0 mm) to .051" (1.3 mm) in .004" (.10 mm) increments. Install thrust washers and side gears in differential case. If possible, install same size thrust washers on both sides. Install pinion gears and pinion shaft. Check side gear backlash to ensure proper thrust washers are used.
4. Using a pin punch and hammer, drive pinion shaft pin through transaxle case and pinion shaft. Stake

differential case. Using appropriate press, install differential case tapered roller bearings.

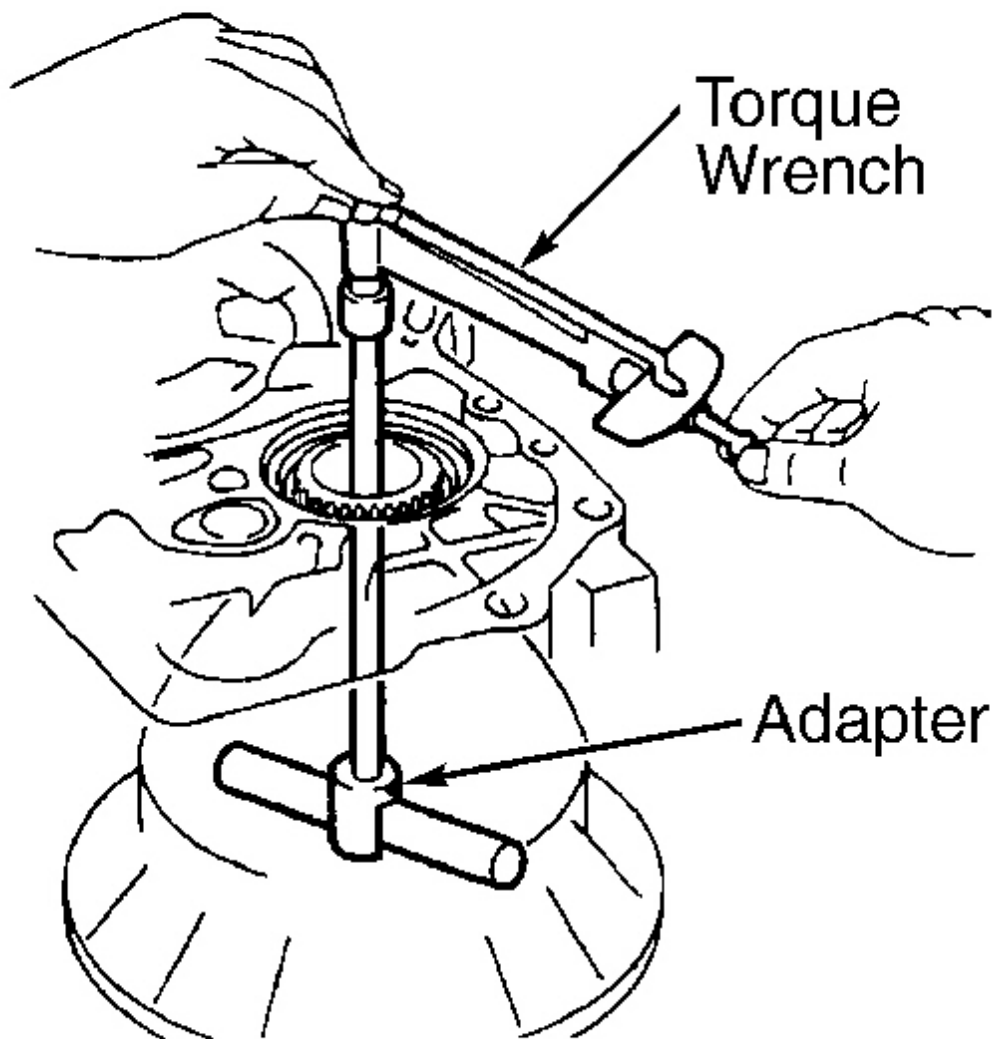
5. Clean contact surface of differential case and ring gear using cleaning solvent. Heat ring gear to 212°F (100°C) in water. DO NOT heat ring gear above 230°F (110°C).
6. After moisture on ring gear has completely evaporated, quickly align match marks made during disassembly. Install ring gear on differential case. Install ring gear bolts and tighten to 78 ft. lbs. (106 N.m). Install NEW oil seals in transaxle housing and transaxle case. Coat lip of oil seals with lubricant.
7. Adjust differential bearing preload. See **DIFFERENTIAL BEARING PRELOAD** under TRANSAXLE ADJUSTMENTS.

TRANSAXLE ADJUSTMENTS

DIFFERENTIAL BEARING PRELOAD

NOTE: Transaxle case may also be known as clutch housing.

1. If new differential side bearings have been installed, bearing races must be replaced. Remove axle oil seal from transaxle housing. Remove oil baffle. Using a brass punch and hammer, remove bearing race. Remove shim. Install NEW shim .002" (.05 mm) thinner than shim removed. Using a hammer and appropriate driver, install NEW race. Install oil baffle and oil seal.
2. Remove transaxle case cover from clutch housing area of transaxle case. See **Fig. 26** . Remove oil seal. Remove race. Press in NEW race. Install NEW oil seal. Apply Three Bond (1281) sealant to transaxle case. Install cover to transaxle case.
3. Install differential case assembly to transaxle case. Install output shaft assembly. Install transaxle housing without using sealant. Tighten bolts to 22 ft. lbs. (29 N.m).
4. Using an INCH-lb. torque wrench and Differential Turning Adapter (09564-32011), measure starting preload. Starting preload for new bearings should be 7.1-14.2 INCH lbs. (.8-1.6 N.m). If differential case side bearings have not been replaced, starting preload should be 4.4-8.9 INCH lbs. (.5-1.0 N.m).
5. If bearing starting preload is not within specification, select appropriate thrust shim for correction. Shims range in thickness from .079" (2.00 mm) to .112" (2.85 mm) in increments of .002" (.05 mm). Shims are stamped "0"- "9" and "A"- "H". The total preload will change approximately .35-.44 INCH lbs. (.04-.05 N.m) with each .002" (.05 mm) change in shim thickness.
6. Remove case bolts and disassemble transaxle case. Remove differential assembly. Install appropriate shim in transaxle housing. Recheck differential side bearing starting preload. Once starting preload is within specification, disassemble transaxle.



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Fig. 28: Measuring Differential Bearing Preload
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OUTPUT SHAFT BEARING PRELOAD

NOTE: Transaxle case may also be known as clutch housing.

1. Install magnet to transaxle case. Using NEW gaskets, install oil pump and oil pipe. Install output shaft in transaxle case. Install transaxle housing. Install housing bolts and tighten to 21 ft. lbs. (29 N.m). See **TORQUE SPECIFICATIONS** . Install output shaft rear bearing outer race. Install original adjusting shim if output shaft bearing has not been replaced. If a NEW bearing has been installed, use .002" (.05 mm) thinner adjusting shim. Install bearing retainer. Install housing bolts and tighten to 31 ft. lbs. (42 N.m).
2. Install lock nut onto output shaft. Rotate output shaft in both directions to ensure bearings are seated. Using an INCH-lb. torque wrench, measure output shaft starting preload. See **Fig. 29** . Starting preload should be 6.9-13.9 INCH lbs. (.8-1.6 N.m) for a new bearing. If bearing has not been replaced, starting preload should be 4.3-8.7 INCH lbs. (.5-1.0 N.m).
3. If starting preload is not within specifications, select an alternate adjusting shim. Starting preload changes about .35-.44 INCH lbs. (.04-.05 N.m) with each shim thickness. Shims range in thickness from .051" (1.30 mm) to .098" (2.50 mm) in increments of .002" (.05 mm) increments. Shims are stamped "0"-"9" and "A"-"Q". Install appropriate shim. Disassemble transaxle.

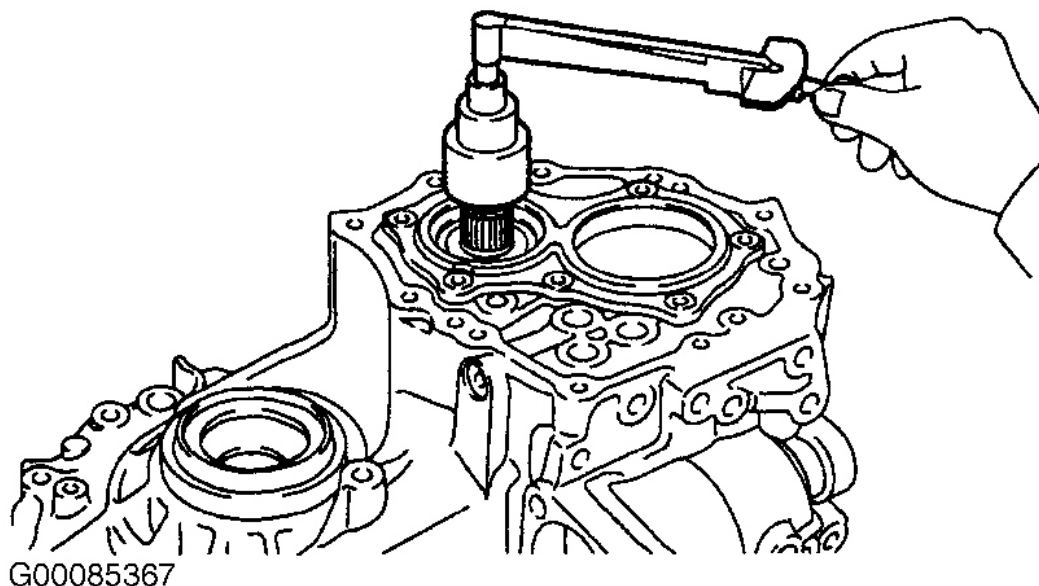


Fig. 29: Measuring Output Shaft Bearing Preload
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TRANSAXLE REASSEMBLY

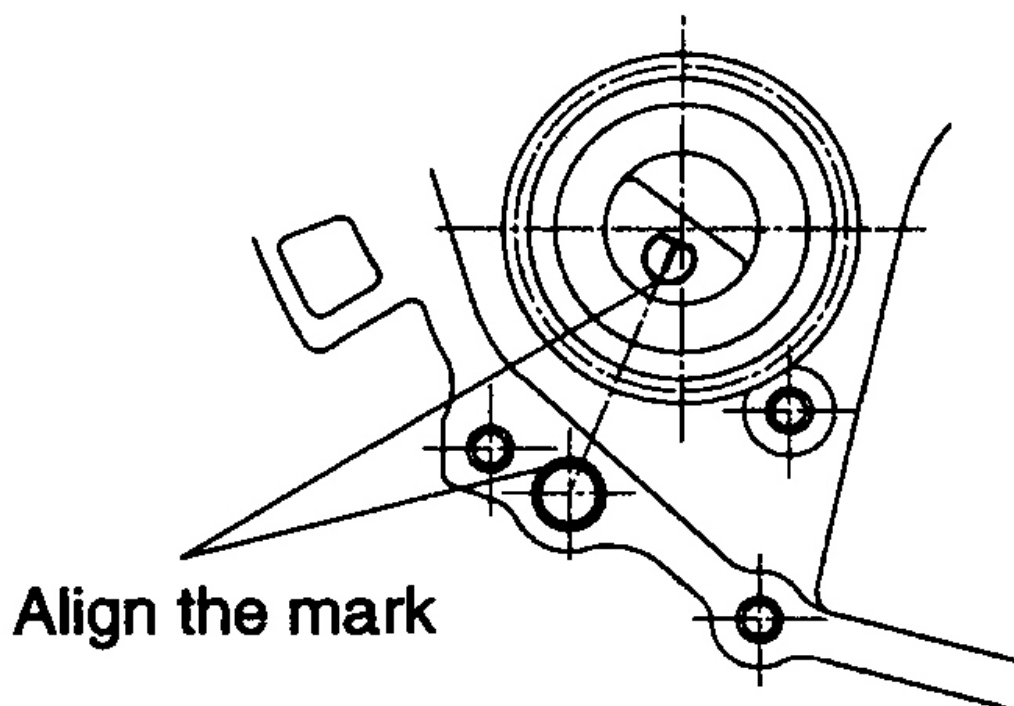
1. Install oil pump drive gear (4WD). Install transaxle case receiver (2WD). Install differential assembly. Install input and output shaft assemblies.
2. Coat the gear shift fork No. 2 with gear oil and install it to the input shaft assembly. Install gear shift fork No. 3 to gear shift fork shaft No. 3. See **Fig. 3** . Using a brass bar and hammer, install the 2 shift fork

shaft snap rings to the gear shift fork shaft.

3. Apply gear oil to each sliding part of gear shift fork shaft No. 3 and install it to transaxle case. Apply gear oil to each sliding part of gear shift fork No. 1 and install it to output shaft assembly. Install gear shift head No. 1 to gear shift fork shaft No. 2. Apply gear oil to each sliding part of the gear shift fork shaft No. 2 and install it to the transaxle case.
4. Install 2 shift fork bolts to gear shift head No. 1. Tighten to 18 ft. lbs. (24 N.m). Using a magnetic finger, install reverse shift fork roller to reverse shift fork. Using a brass bar and hammer, install the shift fork shaft snap ring to the shift fork shaft No. 1. Install gear shift fork shaft No. 1 to transaxle case. Install shift fork bolt to gear shift fork No. 1.
5. Install reverse idler gear and shaft. Ensure reference marks on idler gear and clutch housing are aligned. See **Fig. 30** . Place reverse shift fork pivot into reverse shift arm and install reverse shift arm bracket to clutch housing. Install No. 1 and No. 2 oil pipes. See **Fig. 4** .
6. Using a pin punch (5 mm), install the reverse restrict pin and reverse restrict pin assembly. See **Fig. 31** . Clearance should be .49-.53" (12.5-13.5). Coat the reverse restrict pin plug with appropriate sealant and install in transaxle case.

NOTE: **This transaxle uses no gasket between major cases; use Three Bond (1281) sealant. Assemble cases within 10 minutes after applying liquid gasket. Allow 30 minutes curing time before filling with oil.**

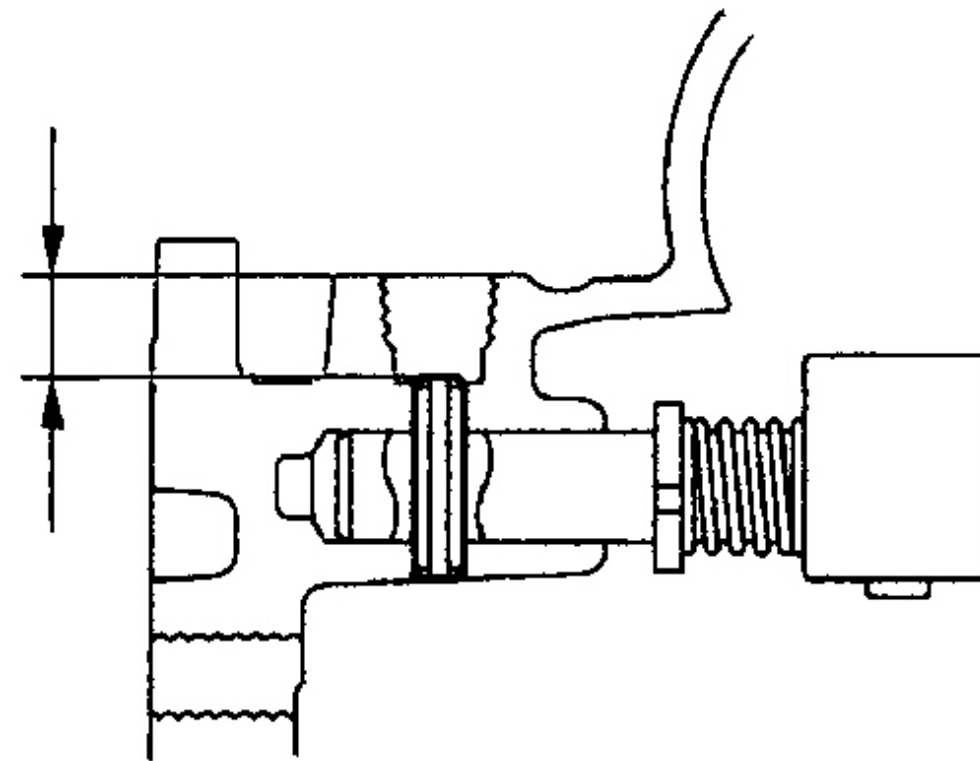
7. Apply Three Bond (1281) sealant to transaxle case. Install transaxle case to clutch housing. Install reverse idler gear shaft retaining bolt.
8. Install output shaft rear bearing outer race. Install appropriate adjusting shim. Install snap ring to input shaft rear bearing. Install rear bearing retainer. Install needle bearing and 5th gear. Install synchronizer ring and key spring to No. 3 clutch hub. Install No. 3 clutch hub with synchronizer assembly.
9. Select a snap ring that will allow minimum axial play and install snap ring on shaft. Snap rings are available in .002" (.05 mm) increments from .069" (1.75 mm) to .085" (2.15 mm) thick. Shims are stamped "a"-"j". See **Fig. 4** .
10. Recheck 5th gear thrust clearance. Standard clearance is .004-.026" (.10-.65 mm). Install 5th driven gear. Install No. 3 hub sleeve and No. 3 shift fork. Tighten No. 3 hub sleeve set bolt to specification. Lock transaxle in 2 gears. See **Fig. 5** . Install and tighten NEW output shaft lock nut to specification. See **TORQUE SPECIFICATIONS** . Stake lock nut. Unlock transaxle.
11. Apply Three Bond (1281) sealant to transaxle case cover. Install cover. Install shift and select lever shaft. Install control shaft cover. Install lock bolt. Install boot to control shaft oil seal. Ensure boot is installed in correct direction. Position air bleed of boot downward. Align shaft notch with pin groove, and install pin. Install and tighten nut to 106 INCH lbs. (12 N.m). Install selecting bellcrank.
12. Install back-up light switch, breather plug, lock ball assembly and vehicle speed sensor. See **Fig. 3** . See **TORQUE SPECIFICATIONS** . Remove clutch release fork assembly with bearing. See **Fig. 1** and **Fig. 2** .



Align the mark

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Fig. 30: Aligning Reverse Idler Gear Shaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 31: Installing Reverse Restrict Pin
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Back-Up Light Switch	30 (40)
Breather Plug	36 (49)
Clutch Release Fork Support Bolt	35 (47)
Control Shaft Cover Bolt	14 (19)
Differential Ring Gear Bolt	78 (106)
Drain & Filler Plug	36 (49)
Elbow Fitting-To-Transaxle	20 (27)

Lock Ball Assembly	21 (29)
Oil Cooler Tube-To-Elbow Fitting	25 (34)
Output Shaft Lock Nut	90 (122)
Rear Bearing Retainer Bolt	31 (42)
Reverse Idler Shaft Lock Bolt	22 (29)
Selecting Bellcrank Support Set Bolt	14 (19)
Shift Fork Lock Bolt	18 (24)
Shift & Select Lever Lock Bolt	14 (20)
Shift Fork Shaft Screw Plug	18 (24)
Transaxle Case Cover Bolt	22 (29)
Transaxle Case-To-Transaxle Case Bolt	22 (29)
Transfer Assembly Nut	22 (29)
Transfer Assembly Stud Nut	58 (79)
Vehicle Speed Sensor	13 (18)
5th Driven Gear Lock Nut	91 (123)
INCH Lbs. (N.m)	
Clutch Tube Bracket Bolt	13 (18)
Control Cable Bracket Bolt	13 (18)
Oil Pipe Clamp	13 (18)
Oil Pump Bolt	13 (18)
Oil Pump Cover Bolt	96 (11)
Reverse Restrict Pin Screw Plug	115 (13)
Reverse Shift Arm Bracket Bolt	13 (18)
Selecting Bellcrank Set Bolt	106 (12)
Shift Lever Lock Nut	106 (12)
Transaxle Case Receiver	65 (7.3)

TRANSAXLE SPECIFICATIONS

TRANSAXLE SPECIFICATIONS

Application	In. (mm)
Gear Radial Clearance (All)	
Service Limit	.002 (.05)
Gear Thrust Clearances	
1st Gear	
Service Limit	.016 (.40)
2nd & 3rd Gear	
Service Limit	.014 (.35)
4th Gear	
Service Limit	.022 (.55)
5th Gear	

Service Limit	.026 (.65)
Hub Sleeve-To-Shift Fork Clearance (Maximum)	
1st & 3rd Gear	.014 (.35)
2nd Gear	.027 (.69)
Oil Pump Clearances	
Housing-To-Drive Rotor	
Standard	.004-.006 (.10-.16)
Service Limit	.012 (.30)
Drive-To-Driven Rotor Tip	
Standard	.003-.006 (.08-.15)
Service Limit	.012 (.30)
Rotor-To-Housing (Side Clearance)	
Standard	.001-.003 (.03-.08)
Service Limit	.006 (.15)
Pinion Gear Backlash	.002-.008 (.05-.20)
Reverse Idler Gear Bushing Inside Diameter	.7896-.7903 (20.056-20.074)
Reverse Idler Gear Shaft Outside Diameter	.7868-.7874 (19.984-20.000)
Synchronizer-To-Gear Clearance (Minimum)	
1st, 2nd & 5th	.028 (.70)
3rd	.026 (.65)
4th	.030 (.75)
5th Gear Bushing Inside Diameter	1.3772-1.3778 (34.981-34.997)