

ARTICLE BEGINNING

APPLICATION

TRANSMISSION APPLICATIONS

Vehicle Application	Transmission Model
4Runner	
1988-90 (4WD)	R150F
Pickup	
1989-90	
(2WD)	R150
(4WD)	R150F
1991-92 (2WD & 4WD)	R150
Pickup & 4Runner	
1987 (4WD)	R151F
1987-88 (2WD)	R150
1991-92 (4WD)	R150F
1993 (2WD & 4WD)	
4-Cylinder	R150
V6	R150F
1994 V6	
(2WD)	R150
(4WD)	R150F
Supra	
1988-92	R154
T100 V6	
1994	
(2WD)	R150
(4WD)	R150F
Van	
1988 (4WD)	R150F

IDENTIFICATION

Transmission type is identified on ID label. ID label is located on driver-side door post.

DESCRIPTION & OPERATION

Transaxle uses constant mesh synchronizers for forward gears and a sliding mesh reverse gear. Input shaft is composed of first and second speed gears and reverse drive gear. The output shaft is composed of the drive gear (for use with the ring gear). For illustrations of transmission powerflow or engagements, see [Fig. 1](#).

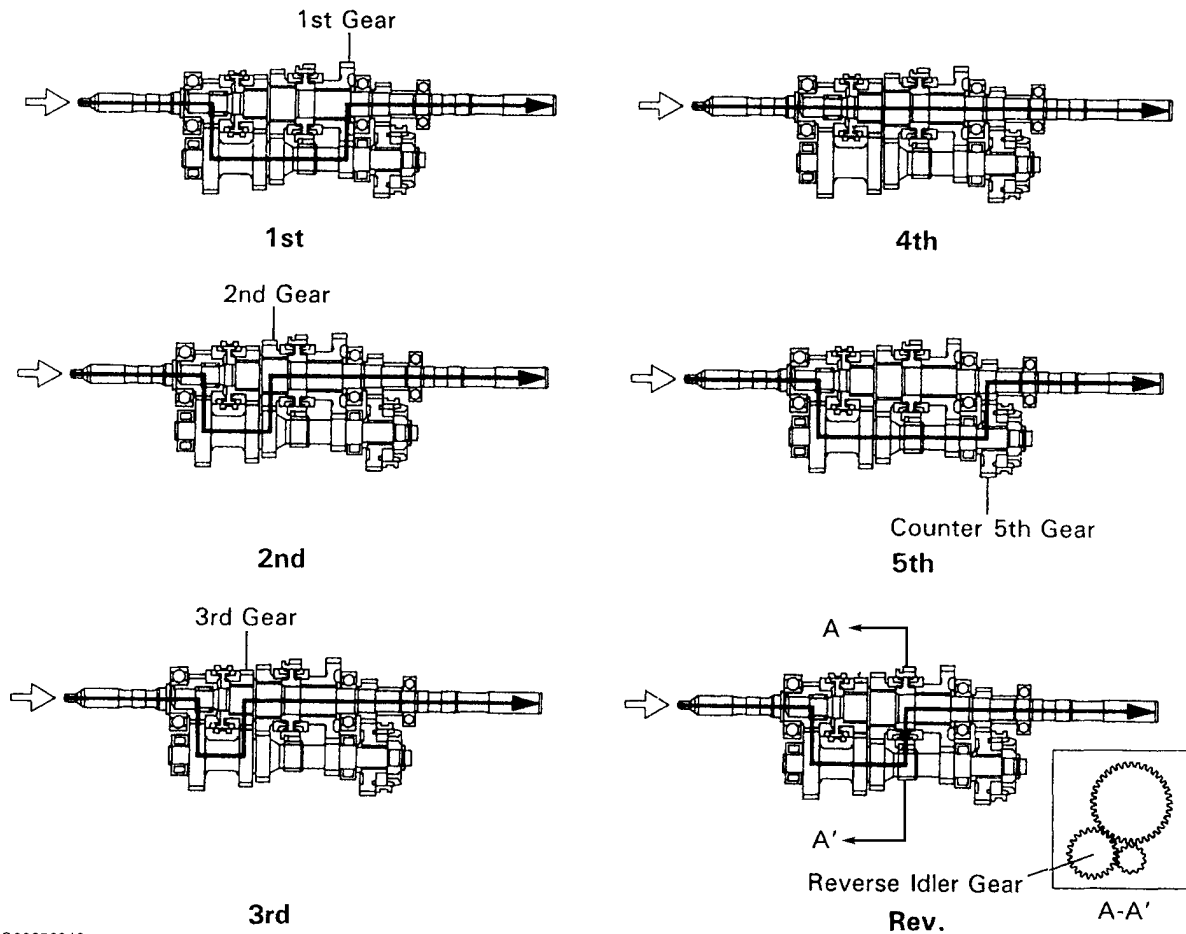


Fig. 1: Engagements Of 150F Manual Transmission Gears

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

LUBRICATION & ADJUSTMENTS

See appropriate TRANSMISSION SERVICING - M/T article in MANUAL TRANS SERVICE section.

ON-VEHICLE SERVICE

DRIVE AXLE SHAFTS

See appropriate AXLE SHAFT article in DRIVE AXLES section.

TROUBLESHOOTING

See **TRUBLE SHOOTING - BASIC PROCEDURES** article in the GENERAL TROUBLE SHOOTING section.

REMOVAL & INSTALLATION

See appropriate TRANSMISSION REMOVAL & INSTALLATION - M/T article in MANUAL TRANS SERVICE section.

TRANSMISSION DISASSEMBLY

1. Remove back-up light switch and speedometer driven gear (2WD). Remove shift lever retainer and restrict pins. On R154 models equipped with Anti-Lock Brakes (ABS), remove rear speed sensor. On all models, remove clutch housing from transmission case. Using Torx (T40) socket, remove screw plug from extension housing or transfer adapter. Remove spring and ball using a magnet. See [Fig. 2](#).
2. On 2WD models, remove extension housing-to-case bolts. Remove shift lever housing set bolt. Using a plastic hammer, loosen housing from case. Remove shift lever housing and shift and select lever. Remove extension housing. See [Fig. 2](#).
3. On 4WD models, remove shift lever housing set bolt. Remove transfer adapter-to-case bolts. Using plastic hammer, loosen transfer adapter and remove shift lever housing and shift and select lever. Remove transfer from case.
4. On all models, remove front bearing retainer. Remove both front bearing snap rings. Using a brass bar and hammer, carefully loosen and separate intermediate plate from transmission case. Remove magnet from intermediate plate.
5. On all models, mount intermediate plate in vise. Use 2 bolts with nuts and washers in bottom holes of intermediate plate to prevent damage to sealing surface of intermediate plate. DO NOT apply pressure on intermediate plate.
6. Using Torx (T40) head socket, remove 4 screw plugs, springs and balls from side of intermediate plate. Remove shift fork set bolts. Remove 3 shift shaft snap rings. Drive out 2 roll pins from the reverse shift head and reverse shift fork. Pull out No. 5 and No. 2 shift fork shaft from intermediate plate. Remove No. 2 shift fork. Remove interlock pin from intermediate plate. See [Fig. 2](#).
7. Pull out shift fork shaft No. 1 from intermediate plate. Remove interlock pins from shaft hole and intermediate plate. Pull out No. 3 shift fork shaft from intermediate plate. Remove No. 1 shift fork. Remove interlock pin and locking ball from shaft hole and intermediate plate.
8. Pull out No. 4 shift fork shaft from intermediate plate. Remove reverse shift head and locking ball. Remove No. 3 shift fork. Remove reverse arm from reverse shift arm bracket. Remove reverse shift arm bracket. On 2WD models, remove rear speedometer drive gear snap ring. Remove speedometer gear and ball. Remove front snap ring. On 4WD models, use puller to remove sleeve from output shaft. See [Fig. 2](#) and [Fig. 5](#).
9. On all models, remove output shaft rear bearing snap ring. Using Puller (09950-20017), remove bearing from shaft. Remove spacer. Measure countershaft 5th gear thrust clearance. See [Fig. 4](#). Standard clearance should be .004-.014" (.10-.35 mm). Maximum clearance is .016" (.40 mm).
10. Lock transmission in 2 gears. Unstake countershaft lock nut and remove. Unlock transmission. Using Puller (09213-31021), remove No. 5 gear spline piece. Remove countershaft 5th gear with No. 3 hub sleeve.
11. Remove thrust washer and ball. Remove rear bearing retainer. Pull out reverse idler gear shaft toward rear. Remove rear bearing snap ring. Remove output shaft and countershaft

from intermediate plate by pulling on countershaft and tapping intermediate plate with plastic hammer. Remove input shaft with needle bearings from output shaft. Using driver, remove countershaft rear bearing from intermediate plate. See [Fig. 2](#).

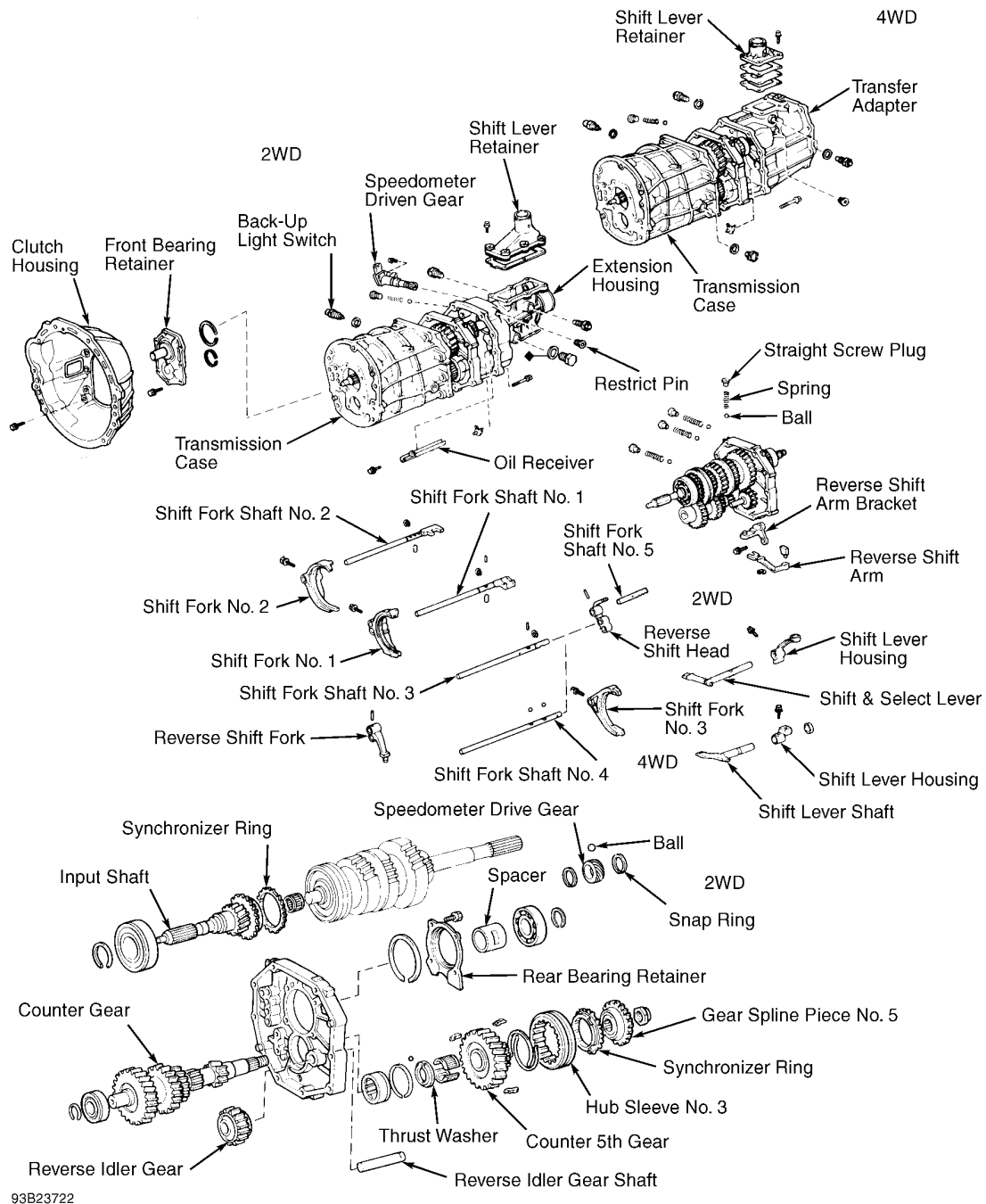


Fig. 2: Exploded View Of Transmission Assembly (1 of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

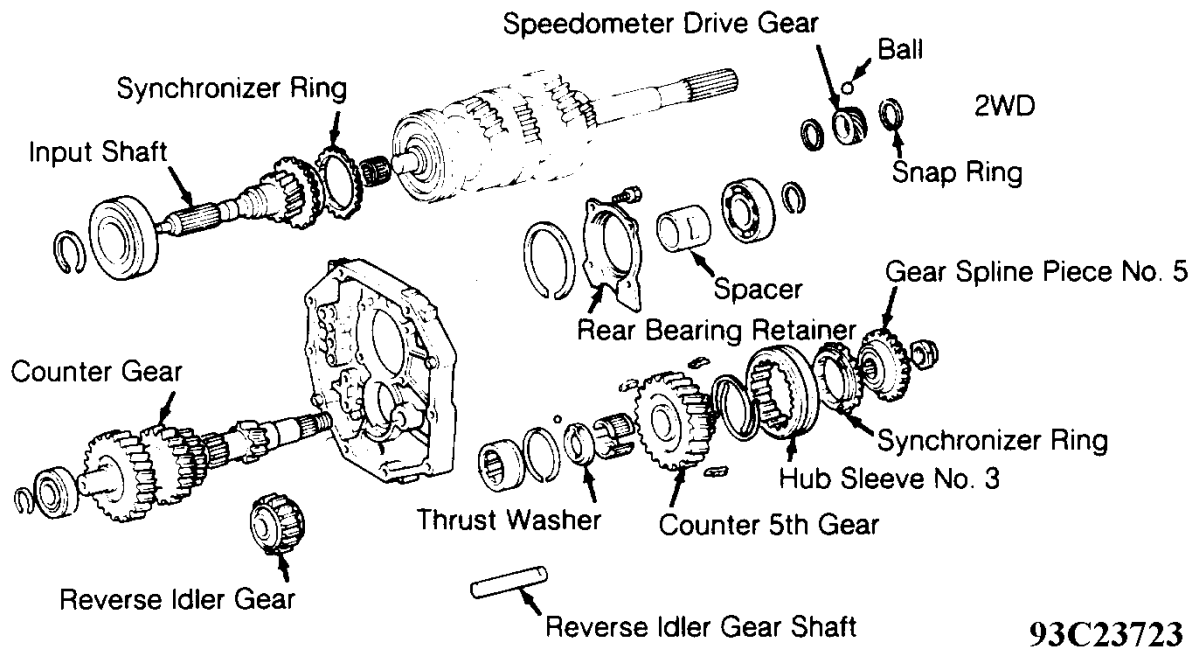
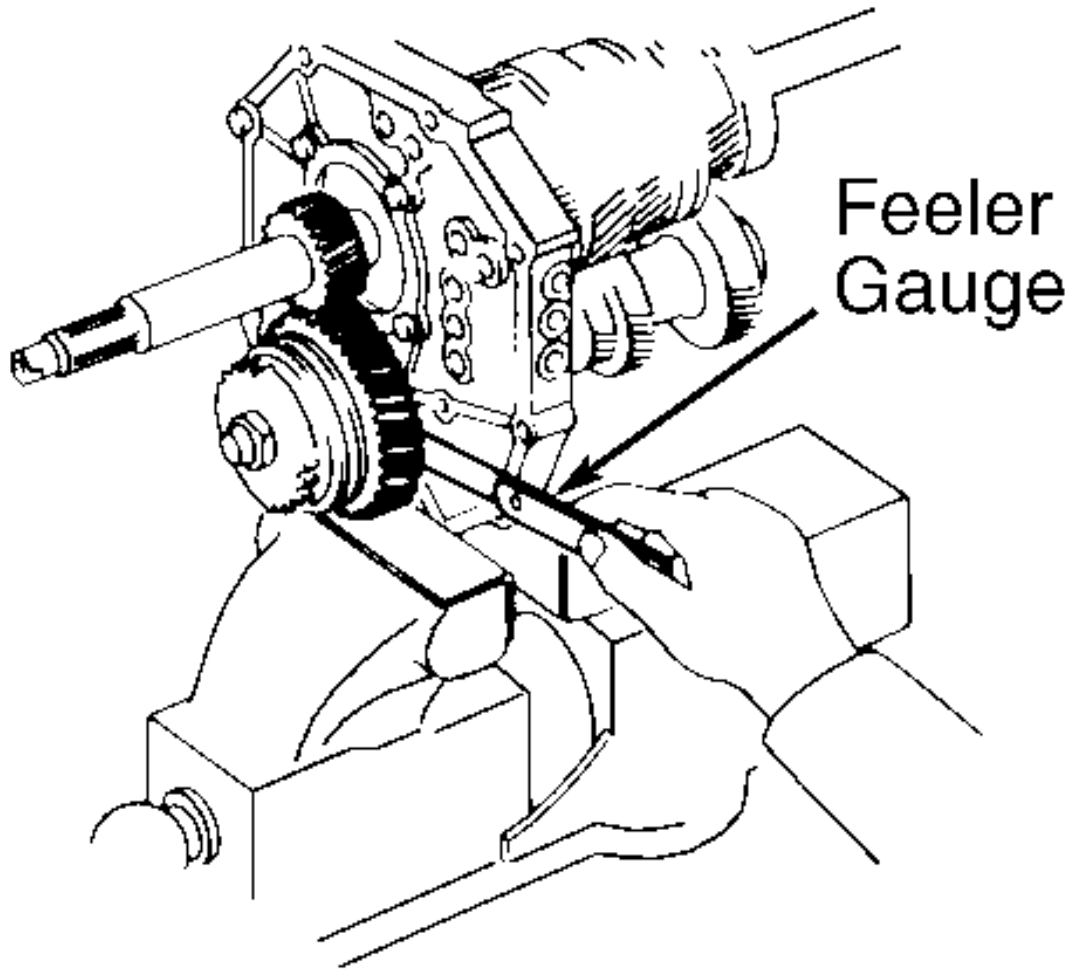


Fig. 3: Exploded View Of Transmission Assembly (2 of 2)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 4: Measuring 5th Gear Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

INPUT SHAFT

Inspect input shaft, synchronizer ring and input shaft bearing for wear or damage. Rotate bearing by hand. If any roughness or binding is felt, replace input shaft bearing. Support bearing in blocks and press input shaft out of bearing. Reverse procedure to install bearing. Select and install bearing retaining snap ring that will allow minimum axial play. See INPUT SHAFT SNAP RING SPECIFICATIONS table.

INPUT SHAFT SNAP RING SPECIFICATIONS

Thickness In. (mm)	ID Stamp
.083-.085 (2.10-2.15)	A
.085-.087 (2.15-2.20)	B
.087-.089 (2.20-2.25)	C
.089-.091 (2.25-2.30)	D
.091-.093 (2.30-2.35)	E
.093-.095 (2.35-2.40)	F
.095-.097 (2.40-2.45)	G

OUTPUT SHAFT (MAINSHAFT)

Disassembly

1. For all measurement specifications, refer to **OUTPUT SHAFT CLEARANCE SPECIFICATIONS** table. Using feeler gauge, measure 1st and 3rd gear thrust clearances. See [Fig. 7](#) . Using a dial indicator, measure 2nd gear thrust clearance. See [Fig. 7](#) . Secure output shaft in soft-jaw vise. Using dial indicator, measure 1st, 2nd and 3rd gear lateral movement (gear oil clearance). See [Fig. 7](#) . If clearance exceeds maximum, replace gear, needle bearing and/or shaft. See **OUTPUT SHAFT CLEARANCE SPECIFICATIONS** table.

OUTPUT SHAFT CLEARANCE SPECIFICATIONS

Application	INCHES (mm)
Thrust Clearance	
1st Gear	
Standard Clearance	.004-.018 (.10-.45)
Minimum Clearance	.020 (.50)
2nd & 3rd Gear	
Standard Clearance	.004-.010 (.10-.25)
Minimum Clearance	.012 (.30)
Lateral Movement	
1st Gear	
Standard Clearance	.0008-.003 (.020-.073)
Minimum Clearance	.006 (.16)
2nd & 3rd Gear	
Standard Clearance	.0006-.003 (.10-.25)
Minimum Clearance	.006 (.16)

- Support 1st gear in blocks. Press 5th gear, center bearing, thrust washer and 1st gear from output shaft. Remove synchronizer ring, straight pin, needle bearing and spacer. Remove snap ring. See [Fig. 11](#) .
- Supporting 2nd gear, press No. 1 hub with sleeve, synchronizer ring and 2nd gear from output shaft. Remove needle bearing. Remove front snap ring. Supporting 3rd gear, press No. 2 hub with sleeve, synchronizer ring and 3rd gear from output shaft. Remove needle bearing. See [Fig. 11](#) .

Inspection

Measure output shaft at points "A", "B", "C" and "D". See [Fig. 11](#) . Support output shaft on "V" blocks. Using dial indicator to measure runout, rotate output shaft 2 complete revolutions. Replace output shaft if runout or any part of shaft is not within service limit. See [OUTPUT SHAFT BEARING SURFACE SPECIFICATIONS](#) .

OUTPUT SHAFT BEARING SURFACE SPECIFICATIONS

Application ⁽¹⁾	Minimum Diameter INCHES (mm)
"A" Needle Bearing Surface	1.530 (38.86)
"B" Needle Bearing Surface	1.845 (46.86)
"C" Needle Bearing Surface	1.491 (37.86)
"D" Shaft Flange Thickness	.185 (4.70)
Runout Limits	.002 (.05)
(1) "A", "B", "C" and "D" refer to measuring points indicated in Fig. 11 .	

NOTE: Coat all parts with gear oil before assembly.

Reassembly

- Install No. 1 and 2 clutch hubs and shifting keys to hub sleeve. Install shifting key springs under shifting keys so end-gaps are not in line. Apply gear oil to shaft needle bearings. Place synchronizer ring on 3rd gear and align ring slots with shifting keys. Install needle bearing in 3rd gear. Support No. 2 clutch hub and install output shaft into 3rd gear and No. 2 hub with sleeve. See [Fig. 11](#) . Select No. 2 hub snap ring that will allow minimum axial play and install. See [OUTPUT SHAFT FRONT SNAP RING SPECIFICATIONS](#) .

OUTPUT SHAFT FRONT SNAP RING SPECIFICATIONS

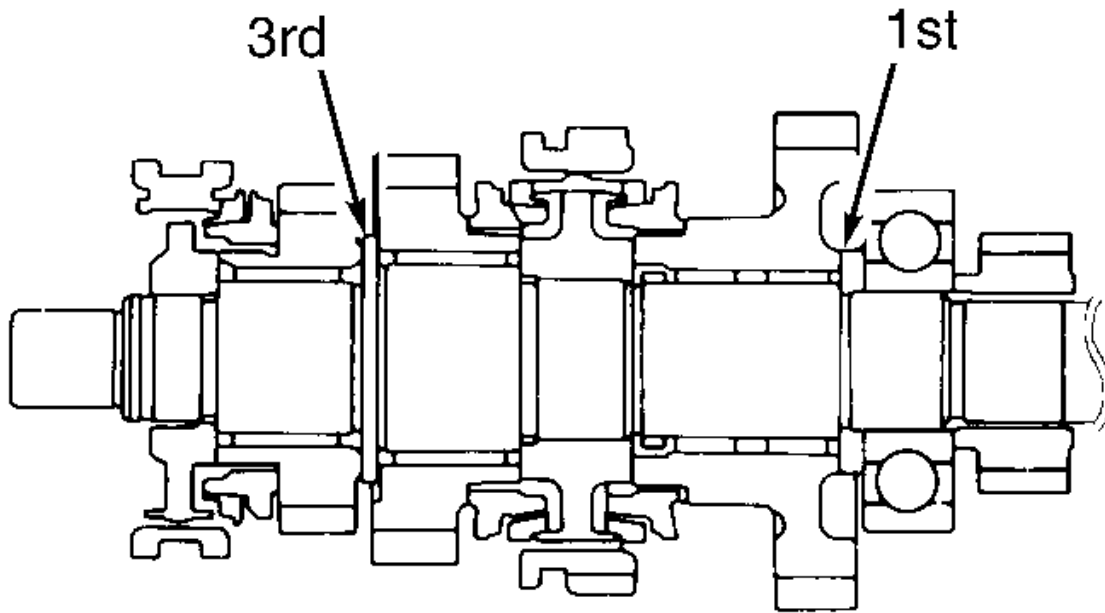
Thickness INCHES (mm)	ID Stamp
.071-.073 (1.80-1.85)	A
.073-.075 (1.85-1.90)	B
.075-.077 (1.90-1.95)	C
.077-.079 (1.95-2.00)	D
.079-.081 (2.00-2.05)	E
.081-.083 (2.05-2.10)	F
.083-.085 (2.10-2.15)	G

2. Re-check 3rd gear thrust clearance. Standard clearance should be .004-.010" (.10-.25 mm). Maximum clearance is .010" (.25 mm). Place synchronizer ring on 2nd gear and align ring slots with shifting keys. Install needle bearing in 2nd gear. Supporting No. 1 clutch hub, press output shaft into 2nd gear and No. 1 hub. See [Fig. 11](#) . Select No. 1 hub snap ring that will allow minimum axial play and install. See [OUTPUT SHAFT REAR SNAP RING SPECIFICATIONS](#) .

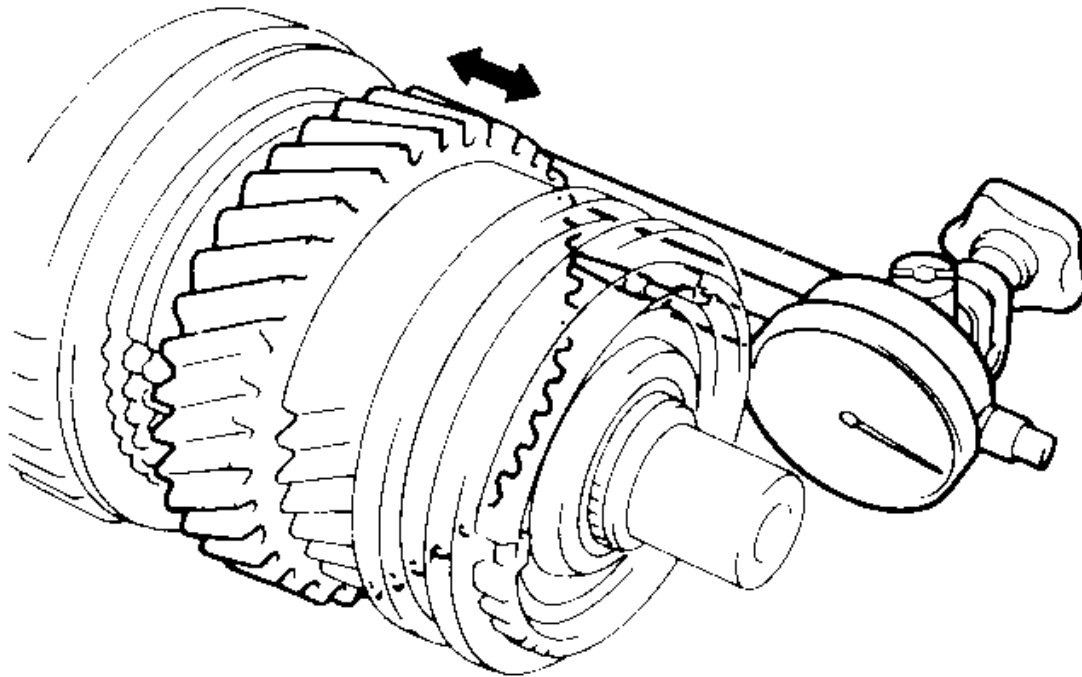
OUTPUT SHAFT REAR SNAP RING SPECIFICATIONS

Thickness INCHES (mm)	ID Stamp
.091-.093 (2.30-2.35)	A
.093-.095 (2.35-2.40)	B
.095-.097 (2.40-2.45)	C
.097-.098 (2.45-2.50)	D
.098-.100 (2.50-2.55)	E
.100-.102 (2.55-2.60)	F
.102-.104 (2.60-2.65)	G

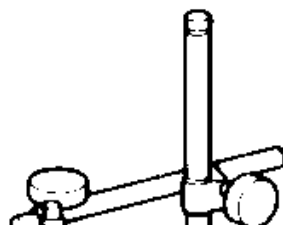
3. Install spacer on output shaft. Assemble 1st gear, synchronizer ring and needle roller bearing. Install assembly on output shaft with synchronizer ring slots aligned with shifting keys. Install 1st gear thrust washer on output shaft with straight pin aligned with 1st gear thrust washer. Drive on output shaft center bearing with outer race snap ring groove toward rear of shaft. Recheck 1st and 2nd gear thrust clearances. Clearance for 1st gear should be .004-.018" (.10-.45 mm). Clearance for 2nd gear should be .004-.010" (.10-.25 mm). Press on 5th gear.

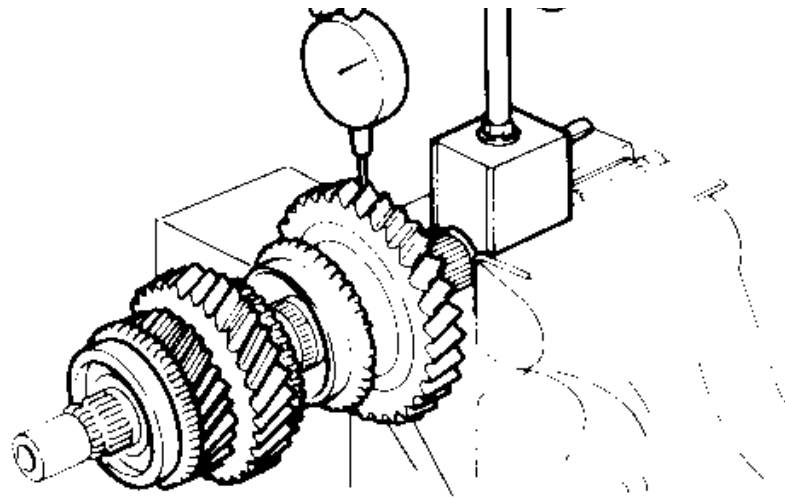


OUTPUT SHAFT

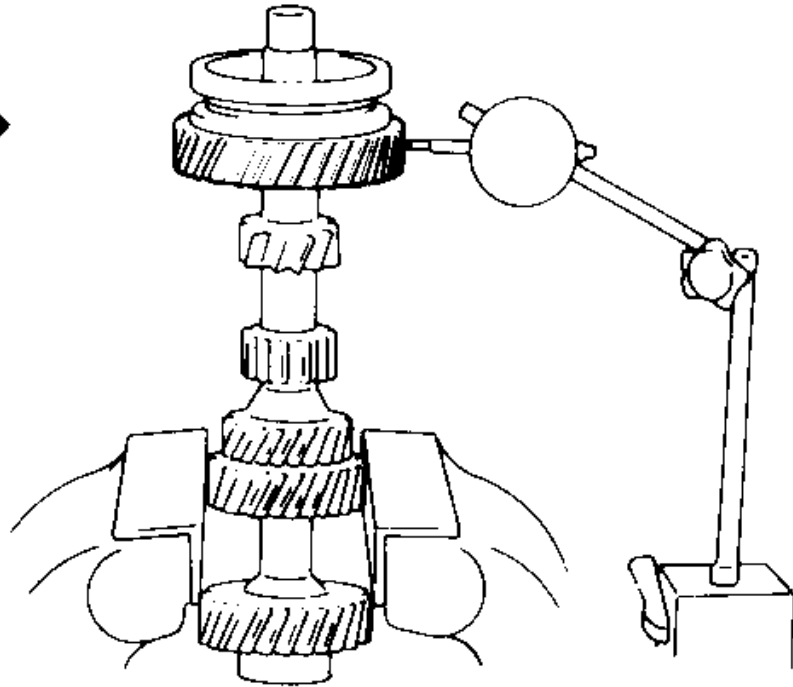


OUTPUT SHAFT





OUTPUT SHAFT



COUNTERSHAFT

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Fig. 5: Identifying Output & Countershaft Measuring Points (1 of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

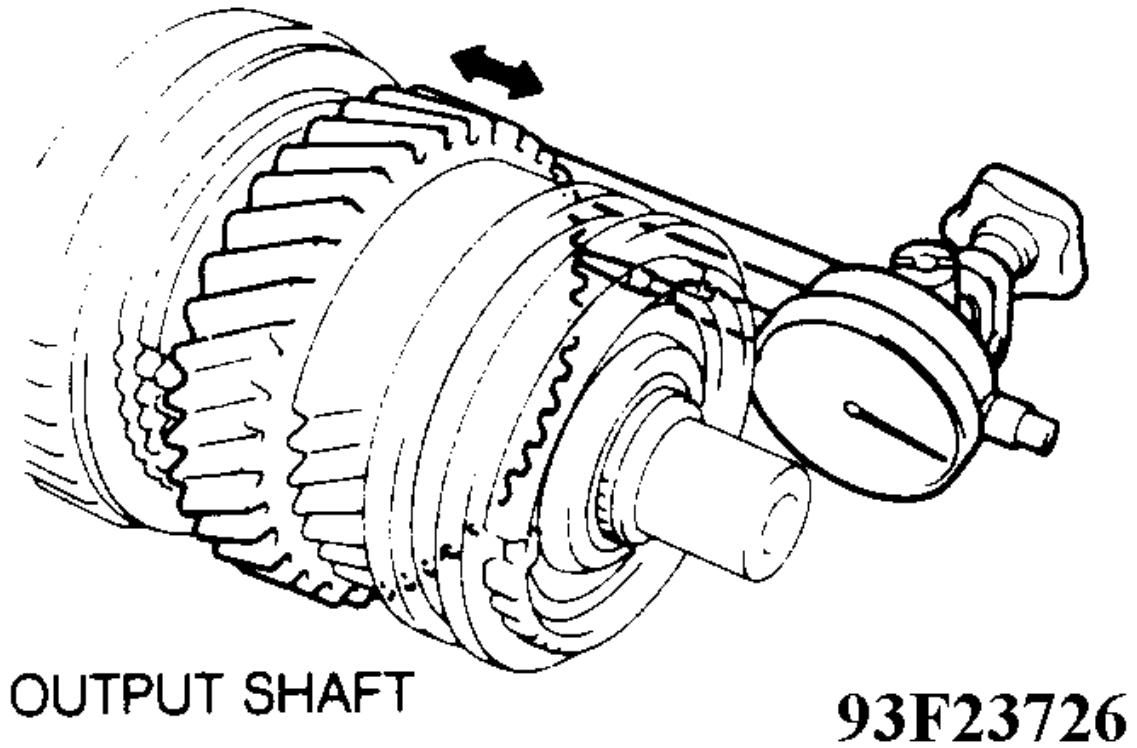


Fig. 6: Identifying Output & Countershaft Measuring Points (2 of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

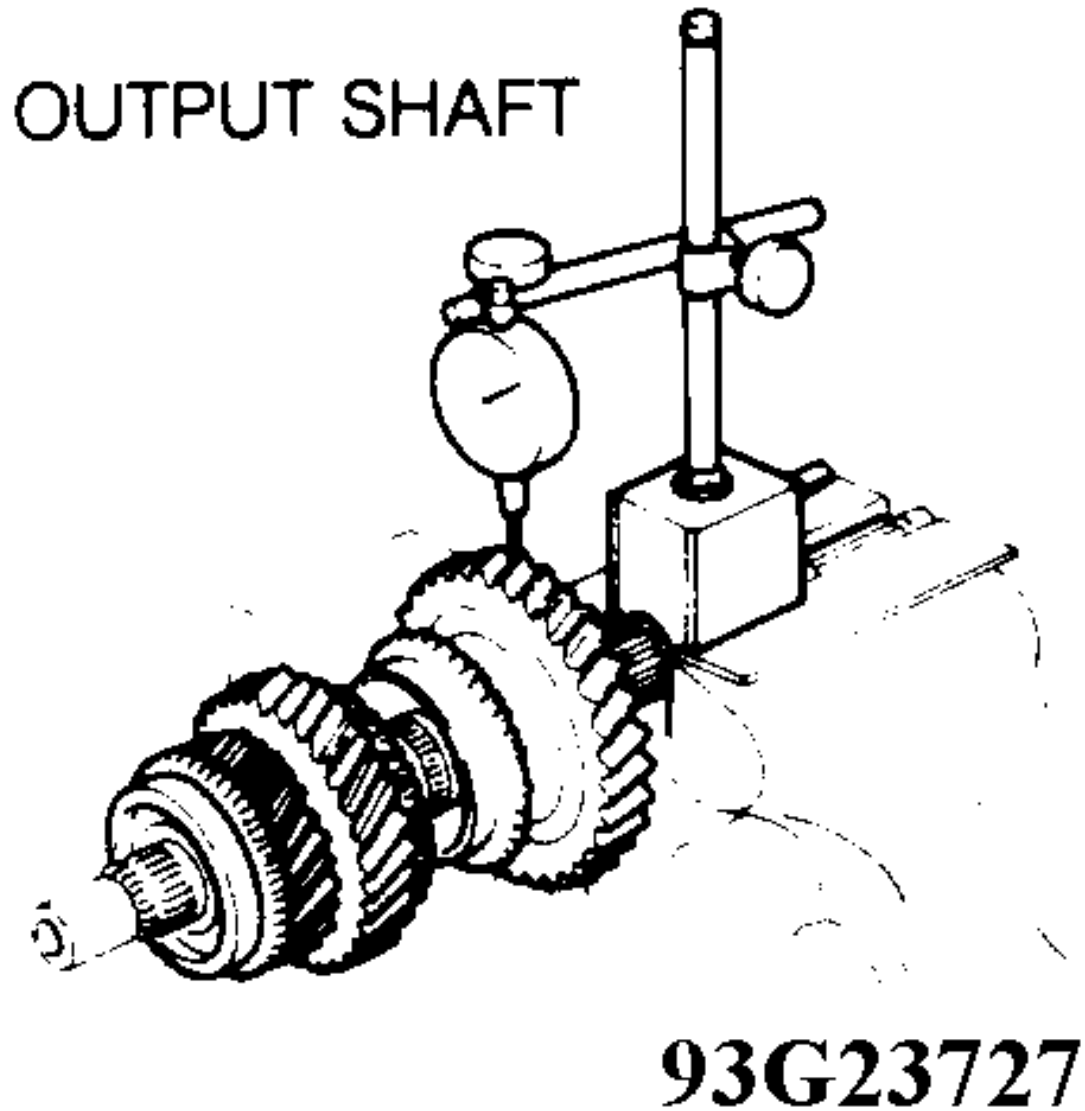


Fig. 7: Identifying Output & Countershaft Measuring Points (3 of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

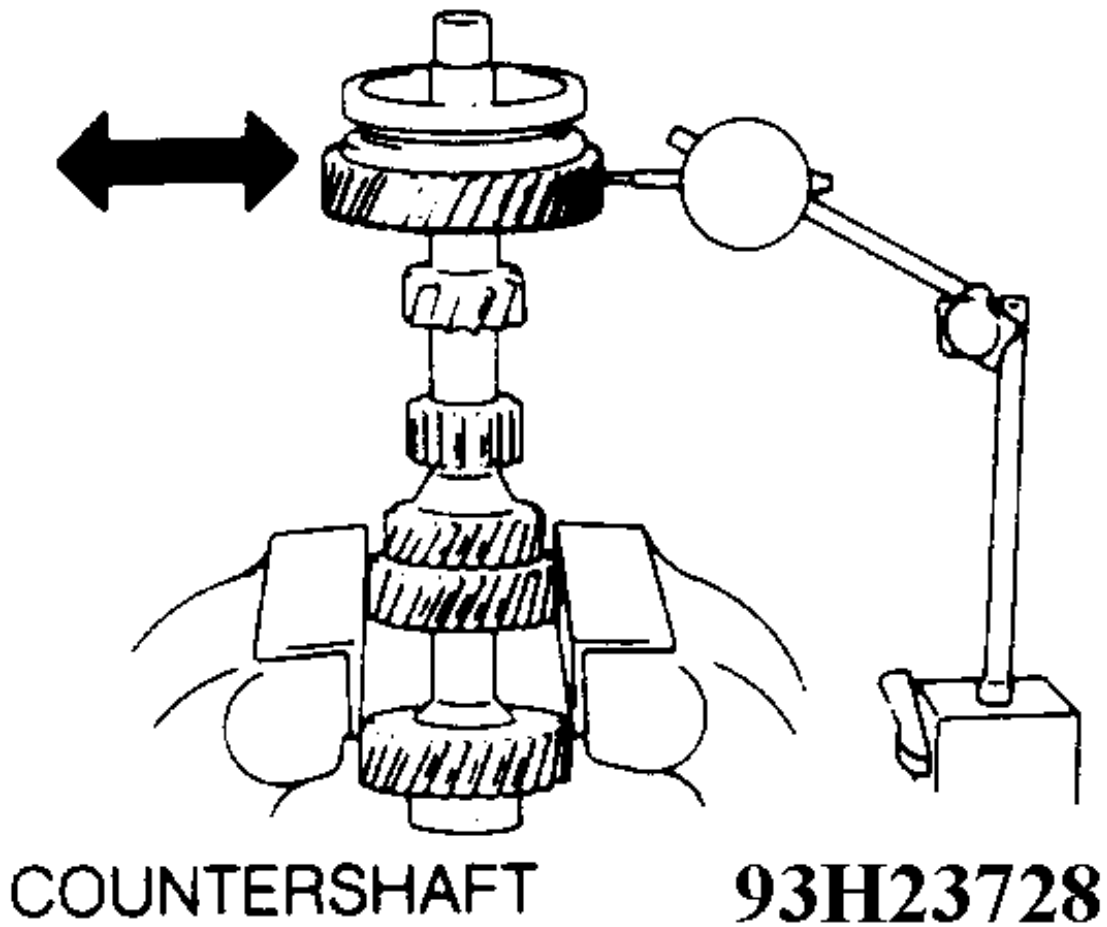


Fig. 8: Identifying Output & Countershaft Measuring Points (4 of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

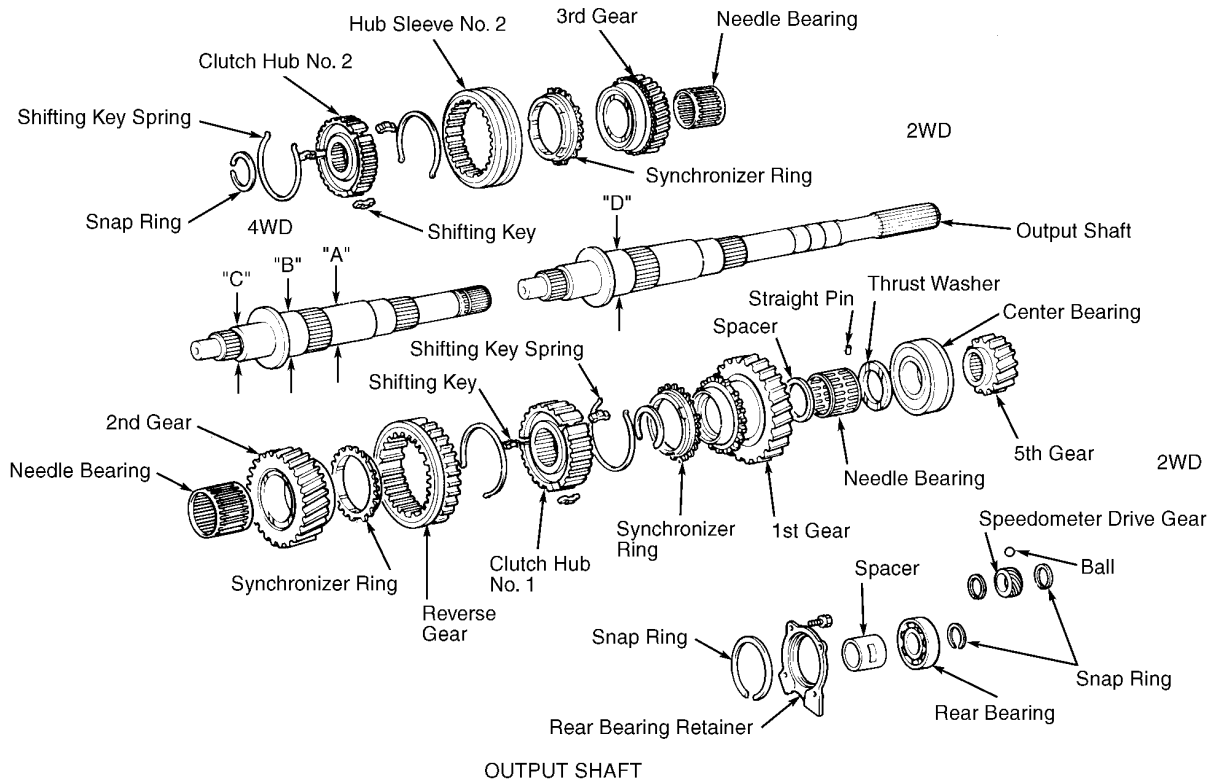
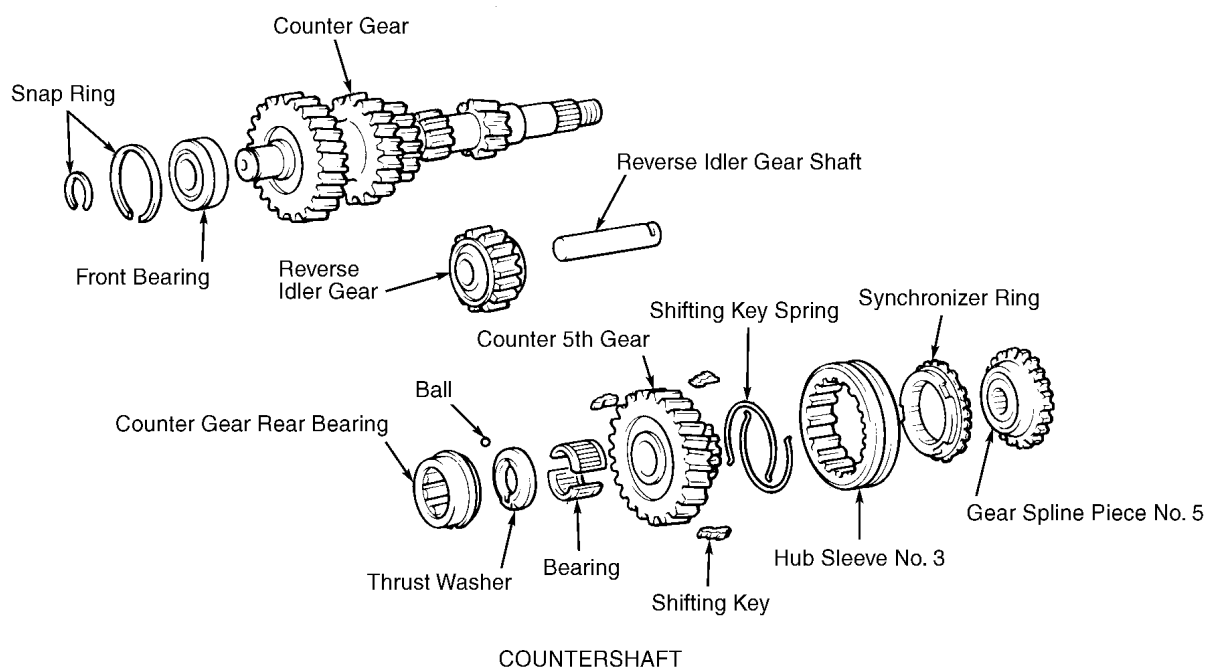


Fig. 9: Exploded View Of Output & Countershaft Assemblies (1 of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 10: Exploded View Of Output & Countershaft Assemblies (2 of 2)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COUNTERSHAFT & REVERSE IDLER GEAR

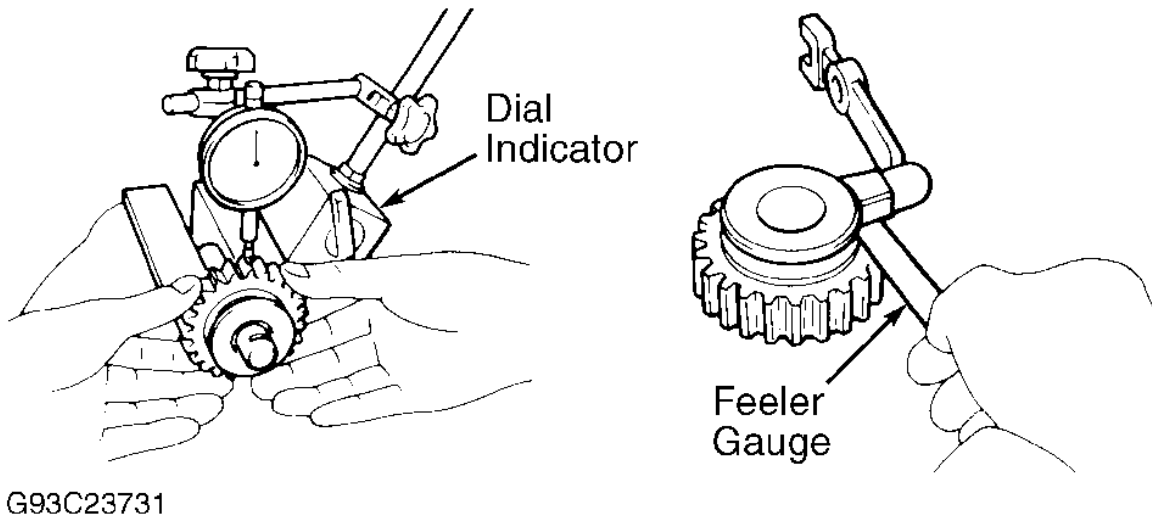
Inspection

1. Install spacer, needle roller bearing and 5th gear on countershaft. Measure countershaft 5th gear lateral movement (gear oil clearance). See [Fig. 7](#). Standard clearance should be .0006-.003" (.015-.068 mm). Maximum clearance is .006" (.16 mm). Measure outer diameter of countershaft needle bearing surface. Minimum diameter is 1.097" (27.86 mm).
2. Rotate countershaft front bearing by hand. If any roughness or binding is felt, replace countershaft bearing. Support bearing in blocks and press countershaft out of bearing. Reverse procedure to install bearing. Select and install bearing retaining snap ring that will allow minimum axial play. See [COUNTERSHAFT FRONT BEARING SNAP RING SPECIFICATIONS](#) table.

COUNTERSHAFT FRONT BEARING SNAP RING SPECIFICATIONS

Thickness INCHES (mm)	ID Stamp
.079-.081 (2.00-2.05)	A
.081-.083 (2.05-2.10)	B
.083-.085 (2.10-2.15)	C
.085-.087 (2.15-2.20)	D
.087-.089 (2.20-2.25)	E

3. Measure reverse idler gear oil clearance. See [Fig. 4](#) . Standard clearance should be .002-.003" (.04-.08 mm). Maximum clearance is .005" (.13 mm). Measure clearance between reverse idler gear and shift arm shoe. See [Fig. 11](#) . Standard clearance should be .002-.010" (.05-.25 mm). Maximum clearance is .020" (.50 mm).



[Fig. 11: Identifying Reverse Idler Gear Measuring Points \(1 of 2\)](#)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

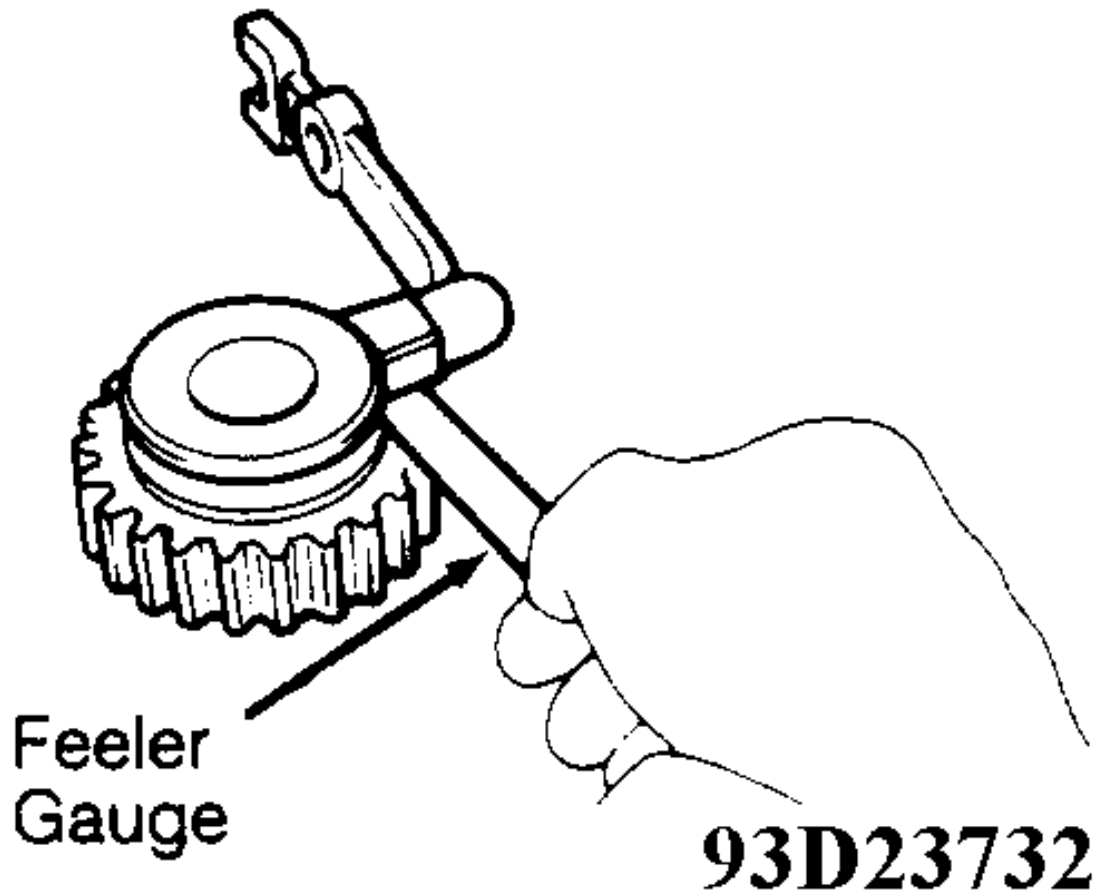


Fig. 12: Identifying Reverse Idler Gear Measuring Points (2 of 2)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SHIFT FORK ASSEMBLY

Measure clearance between hub sleeve and shift fork. Maximum clearance is .039" (1.00 mm). If clearance exceeds specification, replace shift fork or hub sleeve. See [Fig. 14](#) .

SYNCHRO RING & GEAR

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. Minimum clearance is .024" (.60 mm). If clearance is less than specification, replace synchronizer ring. See [Fig. 11](#) .

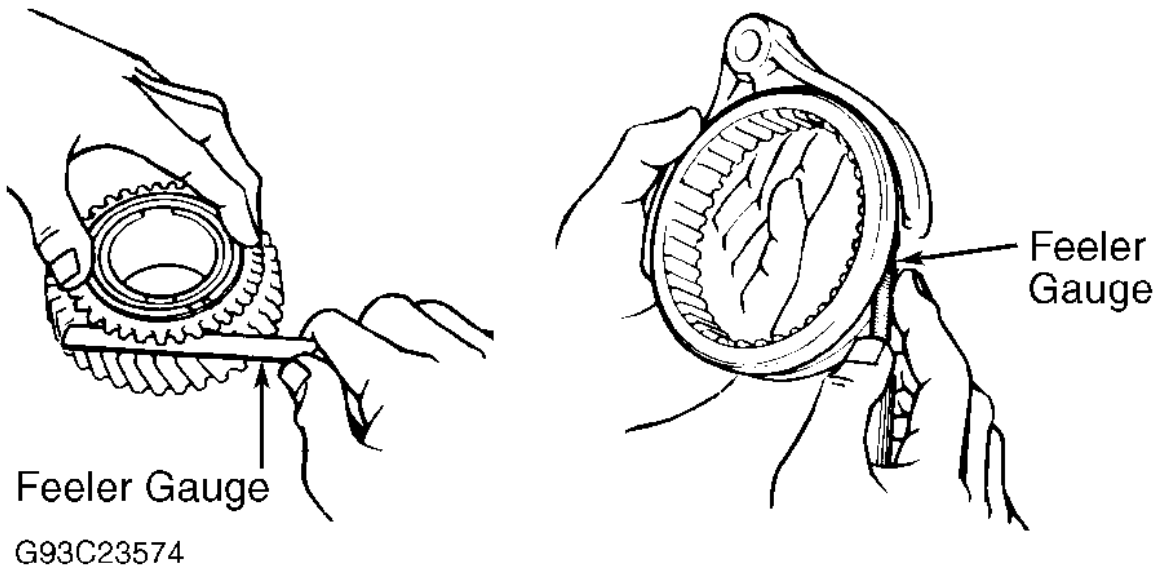


Fig. 13: Measuring Shift Fork & Synchro Ring Assemblies (1 of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

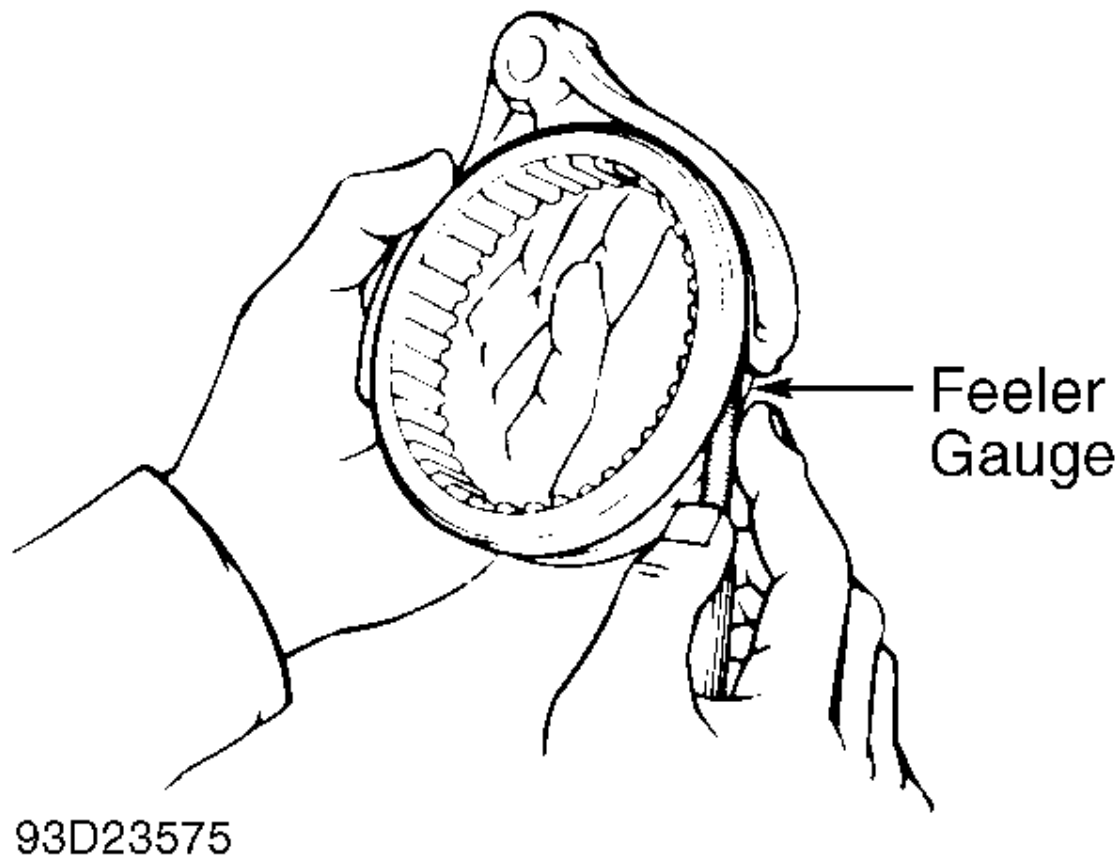


Fig. 14: Measuring Shift Fork & Synchro Ring Assemblies (2 of 2)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TRANSMISSION REASSEMBLY

NOTE: Coat all parts with gear oil before assembly.

1. Install output shaft into intermediate plate by pushing on output shaft and tapping on intermediate plate. Install snap ring. Install input shaft with needle bearing to output shaft with synchronizer ring slots aligned with shifting keys.
2. Install countergear in intermediate plate. Install countergear rear bearing with a plastic hammer. Install reverse shift arm bracket. Install reverse shifter arm to pivot of reverse shift arm bracket. Align reverse shift arm shoe to reverse idler gear groove. Insert reverse idler gear shaft to intermediate plate.
3. Align rear bearing retainer to reverse idler gear shaft groove and install. Install ball and thrust washer. Install countershaft 5th gear with No. 3 hub sleeve and needle roller bearings.

Install synchro ring on No. 5 gear spline piece. Using Driver (09316-60010), install No. 5 gear spline piece with synchro ring slots aligned with shifting keys. Support countershaft in front with 3-5 lb. hammer while installing No. 5 gear spline piece.

4. Lock transmission in 2 gears. Install countershaft lock nut. Tighten lock nut to specification. See **TORQUE SPECIFICATIONS** . Stake nut after installation. Unlock transmission. Recheck countershaft 5th gear thrust clearance. Standard clearance should be .004-.014" (.10-.35 mm).
5. Install spacer and output shaft rear bearing. Select and install snap ring that allows minimum axial play. See **OUTPUT SHAFT REAR BEARING SNAP RING SPECIFICATIONS** table.

OUTPUT SHAFT REAR BEARING SNAP RING SPECIFICATIONS

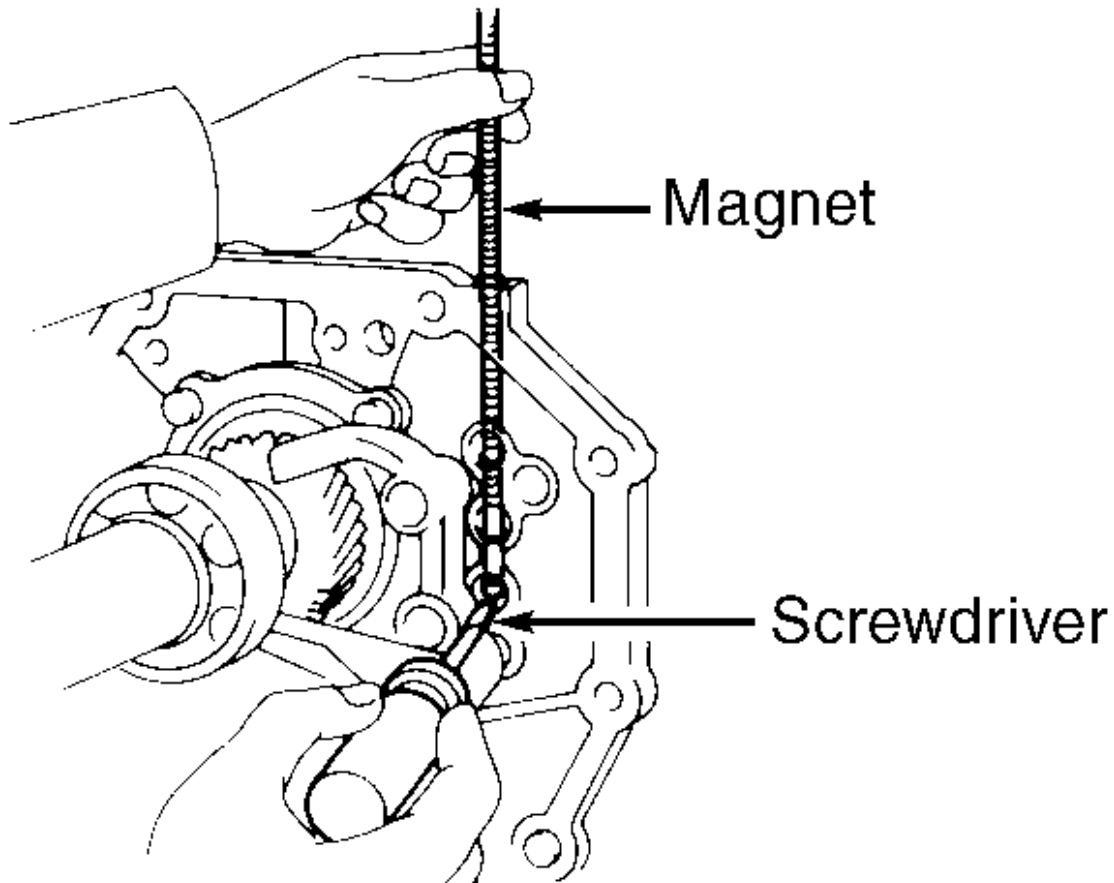
Thickness INCHES (mm)	ID Stamp
.104-.106 (2.65-2.70)	A
.106-.108 (2.70-2.75)	B
.108-.110 (2.75-2.80)	C
.110-.112 (2.80-2.85)	D
.112-.114 (2.85-2.90)	E
.114-.116 (2.90-2.95)	F
.116-.118 (2.95-3.00)	G
.118-.120 (3.00-3.05)	H
.120-.122 (3.05-3.10)	J
.122-.124 (3.10-3.15)	K
.124-.126 (3.15-3.20)	L
.126-.128 (3.20-3.25)	M
.128-.130 (3.25-3.30)	N
.130-.132 (3.30-3.35)	P
.132-.134 (3.35-3.40)	Q
.134-.136 (3.40-3.45)	R
.136-.138 (3.45-3.50)	S

6. On 2WD models, install speedometer drive gear front snap ring. Install ball and drive gear. Install rear snap ring. On 4WD models, drive sleeve onto output shaft. On all models, place No. 3 shift fork into groove of No. 3 hub sleeve. Install No. 4 shift fork shaft to No. 3 shift fork, reverse shift head and shift fork through intermediate plate. Install locking ball into reverse shift head.
7. Using a magnet and screwdriver, install locking ball into intermediate plate. See **Fig. 15** . Install interlock pin into No. 3 fork shaft hole. Place No. 1 shift fork into groove of No. 1 hub sleeve. Install No. 3 fork shaft through intermediate plate to reverse shift fork and shift head .
8. Install interlock pin into intermediate plate. Install interlock pin into No. 1 into shift forks shaft hole. Install No. 1 fork shaft through intermediate plate to No. 1 shift fork . Install interlock pin into intermediate plate. Place No. 2 shift fork into groove of No. 2 hub sleeve. Install No. 2 fork shaft through intermediate plate to No. 1 and 2 shift forks .
9. Install No. 5 shift fork shaft through intermediate plate to reverse shift head. Drive in 2 roll pins to reverse shift head and shift fork. Shift No. 1 fork shaft to 1st gear position. No. 2, 3,

4 and 5 fork shafts should not move. Install 3 shift shaft snap rings. Install and tighten 3 shift fork set bolts to specification. See [TORQUE SPECIFICATIONS](#) . Install all locking balls, springs and screw plugs into intermediate plate. Install magnet to intermediate plate.

NOTE: **This transmission uses no gasket between major housings; use Three Bond (1281) sealant. Assemble housing immediately after applying liquid gasket. Allow 30 minutes curing time before filling with oil.**

10. Dismount intermediate plate from vise and remove bolts, nuts and washers. Apply Three Bond (1281) sealant to transmission case. Install transmission case to intermediate plate. Install 2 front bearing snap rings. Apply Three Bond (1281) sealant to front bearing retainer and install to transmission case.
11. On 2WD models, apply Three Bond (1281) sealant to extension housing. Insert shift and select lever into housing. Connect shift and select lever to shift fork shaft. Install shaft lever into housing. Align No. 5 fork shaft to housing installation hole. Push in extension housing and install. Install shift lever housing bolt. Tighten to specification. See [TORQUE SPECIFICATIONS](#) .
12. On 4WD models, apply Three Bond (1281) sealant to transfer adapter and install to intermediate plate. Insert shift lever housing to transfer adapter and connect shift fork shafts. Insert shift lever shaft to transfer adapter and shift lever housing. Align shift fork shaft No. 5 to transfer adapter installation hole. Push in transfer adapter.
13. On all models, install lock ball, spring and screw plug in extension housing or transfer adapter. After installing extension housing or transfer adapter, ensure input and output shafts rotate smoothly. Ensure shifting occurs smoothly in all positions. Install black restrict pin on reverse gear-5th gear side. Install other restrict pin.
14. Install clutch housing. Install shift lever retainer. On all models, install back-up light switch. On 2WD models, install speedometer driven gear and lock plate. On R154 models, install rear speed sensor on vehicles with ABS.



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Fig. 15: Installing Locking Ball In Intermediate Plate
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Back-Up Light Switch	30 (40)
Clutch Housing Bolts	27 (37)
Countershaft Rear Lock Nut	94 (127)
Extension Housing Bolts	27 (37)

Application	Ft. Lbs. (N.m)
Front Bearing Retainer Bolts	13 (18)
Rear Bearing Retainer Bolts	13 (18)
Restrict Pin	20 (27)
Reverse Idler Gear Shaft Stopper Bolt	13 (18)
Reverse Shift Arm Bracket Bolt	13 (18)
Shift Fork Set Bolt	14 (19)
Shift Lever Housing Bolt	28 (38)
Shift Lever Retainer Bolts	
R150 & R150F	13 (18)
R154	12 (17)
Straight Screw Plug	14 (19)
Transfer Adapter	27 (37)
Transmission Housing Bolt	27 (37)
	INCH Lbs. (N.m)
Clutch Housing Cover Bolt	115 (13)
Oil Receiver-To-Extension Housing Bolt	97 (11)
Speedometer Gear Lock Plate (2WD) Bolt	97 (11)

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