FRONTERA

TRANSMISSION

MANUAL TRANSMISSION MUA 5C (4X4)

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Service Precaution

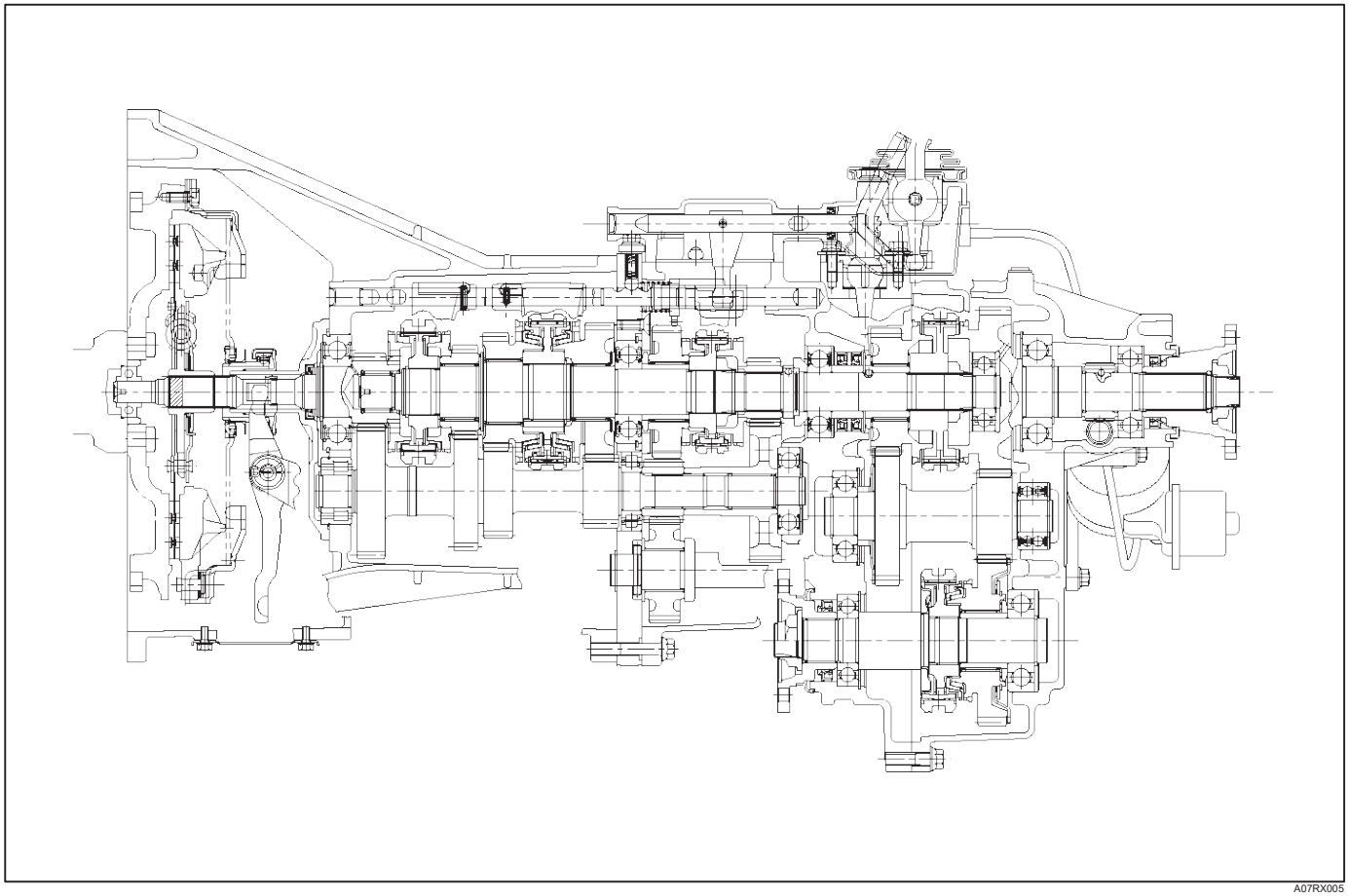
WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description

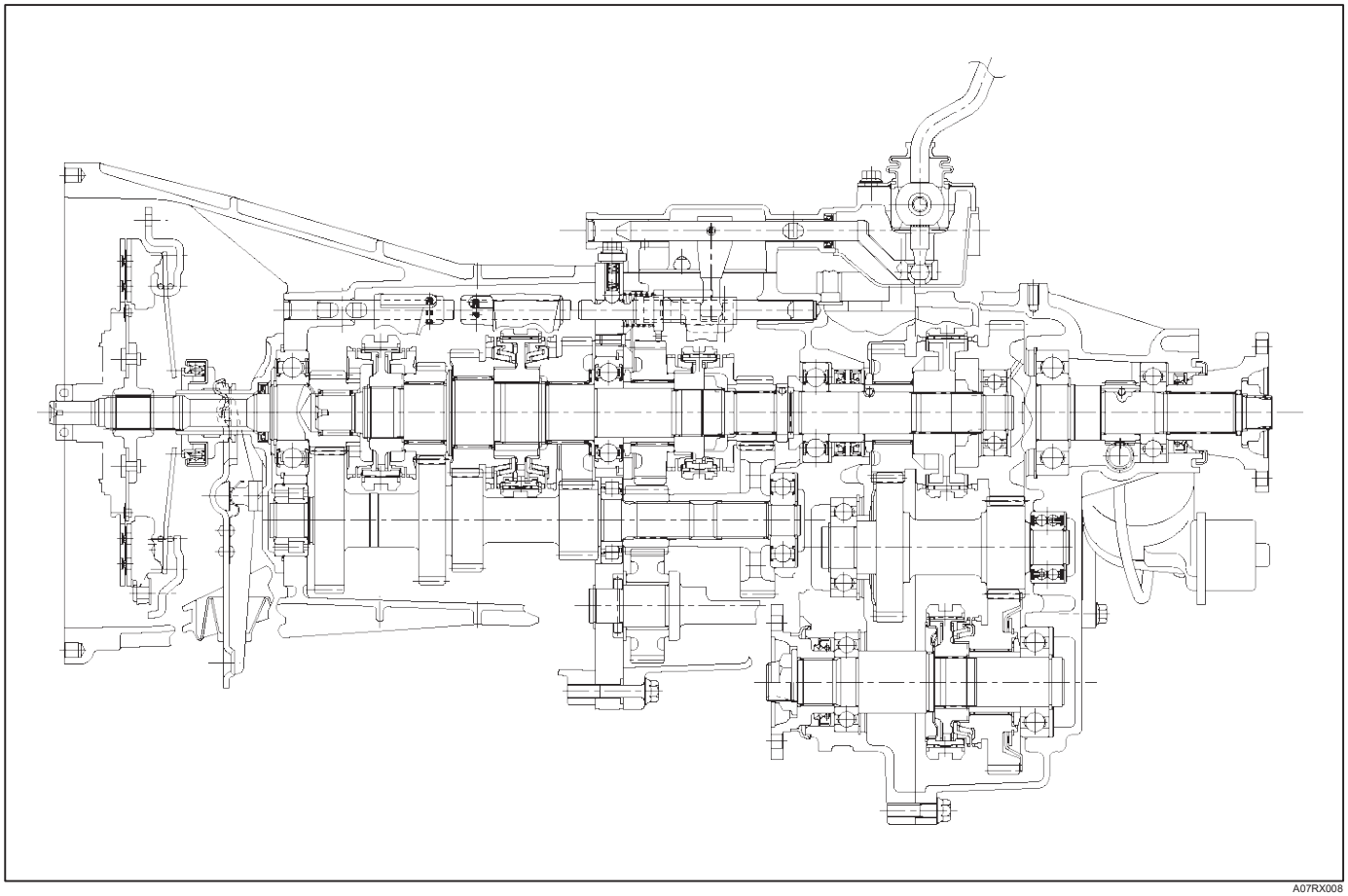
MUA5C Transmission

For 6VD1



A07RX005

For X22SE



A07RX008

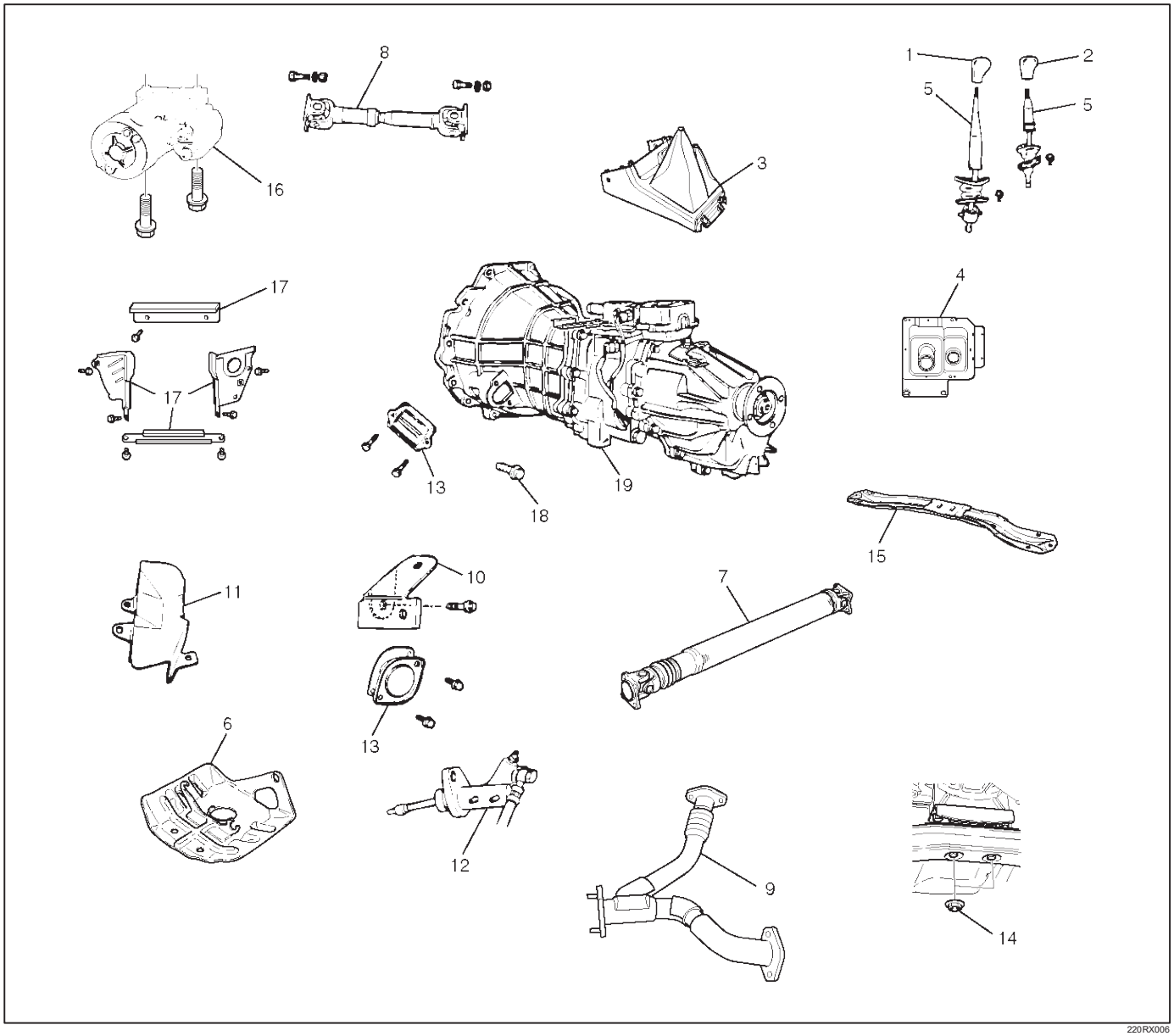
The MUA5C is a constant mesh transmission, synchronized in all speeds. The transmission is designed for a great reduction of the shift effort and the quietest possible operation.
Principle parts of the transmission are the integral clutch housing, intermediate plate, the transfer case, the rear cover, and the gears.
The transmission control box and transfer control box are built into the transmission and transfer case.

Diagnosis (MUA)

Condition	Possible cause	Correction
Abnormal noise	Flywheel pilot bearing worn	Replace
	Bearings worn or broken (Mainshaft, counter shaft, and transfer shaft)	Replace
	Gear tooth contact surfaces worn or scuffed (Mainshaft, counter shaft, reverse idler gear and transfer gears)	Replace
	Splines worn (Mainshaft, synchronizer clutch hub)	Replace
	Gear or bearing thrust face seized	Replace
	Lack of backlash between meshing gears	Replace
Hard Shifting	Improper clutch pedal free play	Readjust
	Change lever sliding portions worn	Repair or replace Regrease
	Shift block, shift rod and/or control box sliding faces worn	Replace
	Shift arm and synchronizer sleeve groove worn	Replace worn parts
	Thrust washer, collar, and/or gear thrust faces worn (Mainshaft and counter shaft thrust play)	Replace worn parts
	Synchronizer parts worn	Replace
Walking or Jumping out of gear	Detent ball worn	Replace
	Detent spring weakened or broken	Replace
	Shift rod and/or control box sliding faces worn	Replace
	Shift arm and synchronizer sleeve groove worn	Replace worn parts
	Thrust washer, collar, and/or gear thrust faces worn (Mainshaft and counter shaft thrust play)	Replace worn parts
	Bearings worn or broken	Replace
	Splines worn (Mainshaft, synchronizer hub)	Replace
	Synchronizer spring weakened or broken	Replace
Oil leakage	Loose drain plug(s) and/or filler plug(s)	Tighten Replenish oil
	Defective or improperly installed gasket(s)	Replace
	Oil seal worn or scratched	Replace

Transmission (MUA)

Disassembled View



Legend

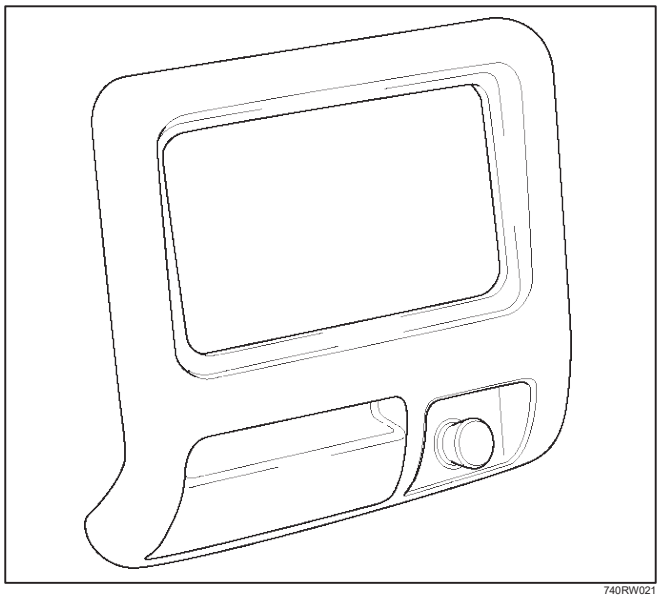
(1) Gear Control Lever Knob
(2) Transfer Control Lever Knob
(3) Center Console
(4) Grommet Assembly
(5) Gear Control Lever and Transfer Control Lever
(6) Transfer Protector
(7) Rear Propeller Shaft
(8) Front Propeller Shaft
(9) Center Exhaust Pipe
(10) Harness Clamp
(11) Harness Heat Protector
(12) Slave Cylinder
(13) Dust Cover
(14) Rear Mount Nut
(15) Third Crossmember
(16) Starter
(17) Flywheel Undercover
(18) Transmission Retaining Nut and Bolt
(19) Transmission

Removal

NOTE: Befor removing transmission assembly from vehicle, change the transfar mode to 2WD using the 4WD push button on dash panel.

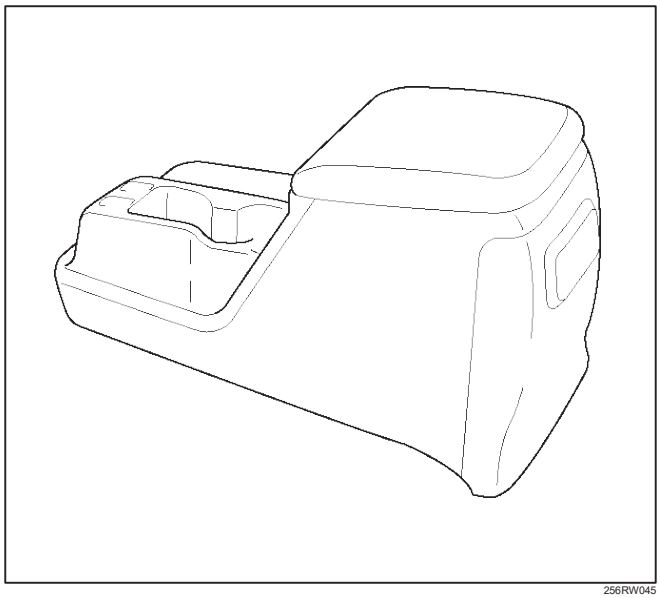
1. Disconnect battery ground cable.
2. Remove gear control lever knob(1).
3. Remove transfer control lever knob(2).

4. Remove lower cluster assembly.



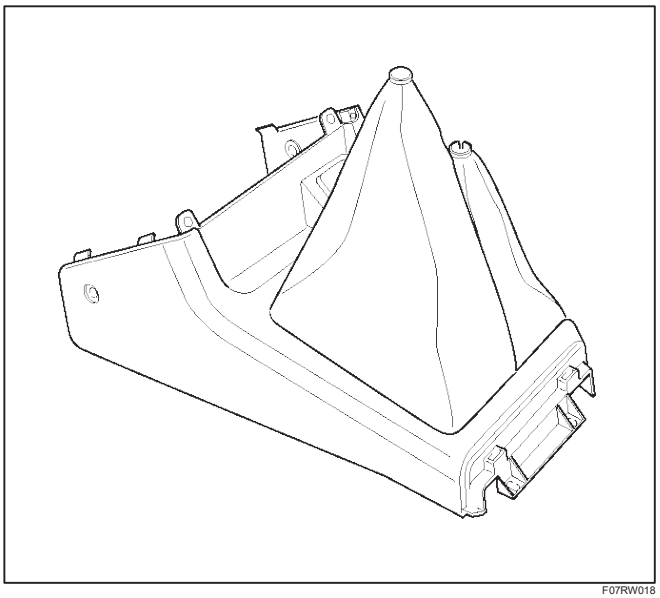
740RW021

5. Remove rear console.



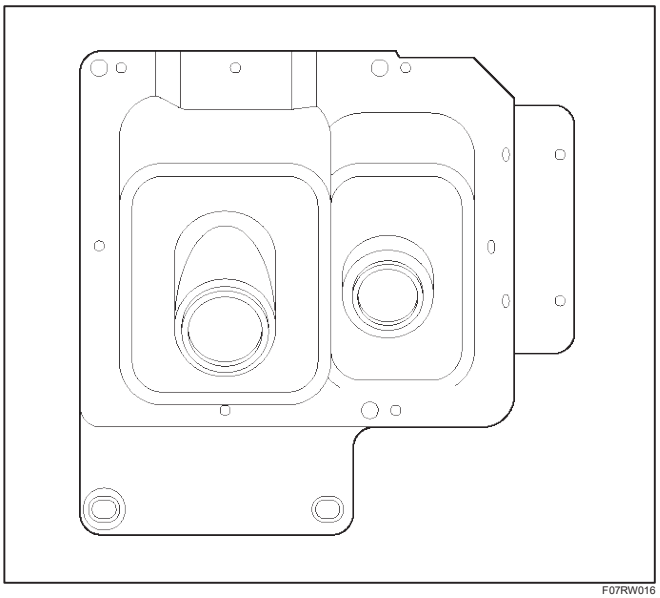
256RW045

6. Remove center console(3).



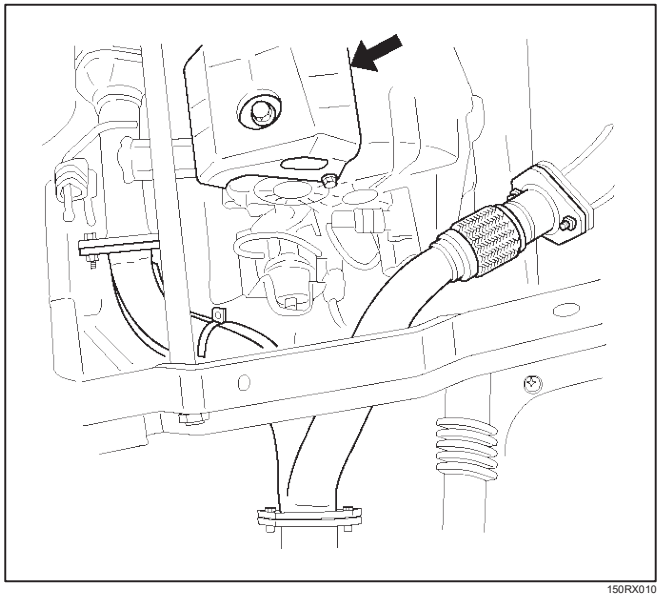
F07RW018

7. Remove grommet assembly(4).



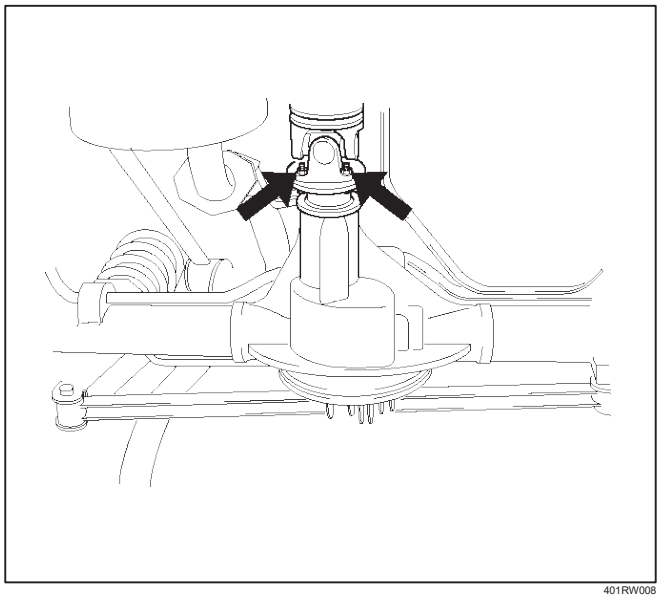
F07RW016

8. Remove gear control lever(5) and transfer control lever(5).
9. Raise and support vehicle with suitable stands. Remove transfer protector(6).


150RX010

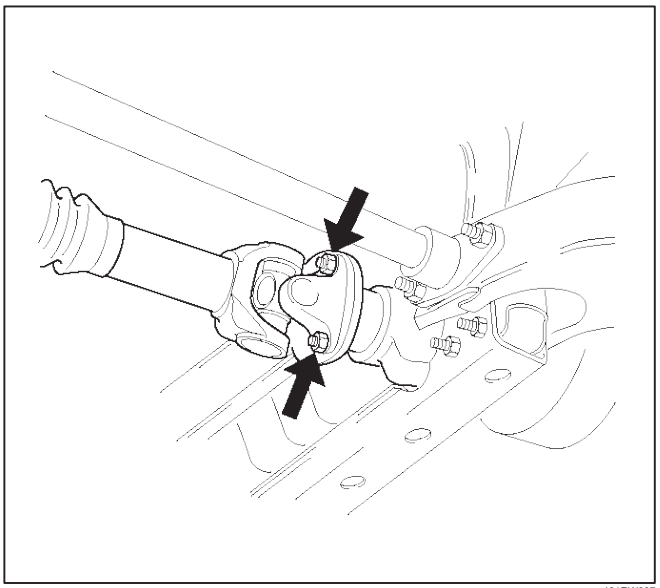
10. Remove rear propeller shaft(7).

NOTE: Apply alignment marks on the flange at both front and rear sides.

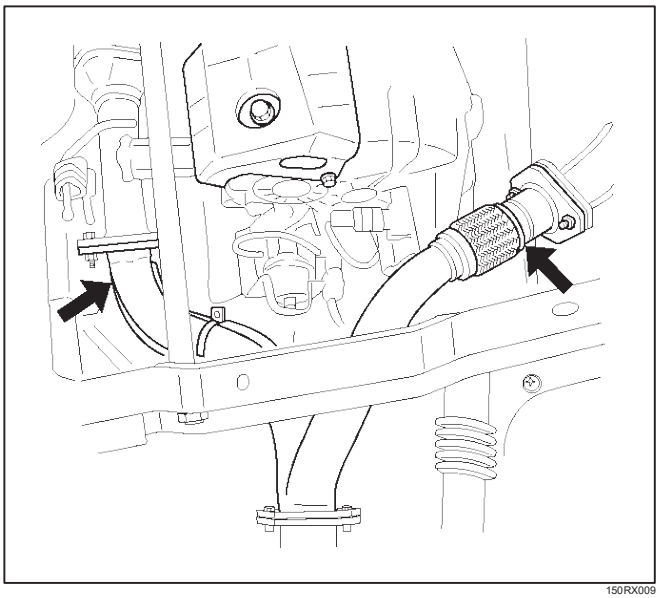

401RW008

11. Remove front propeller shaft(8).

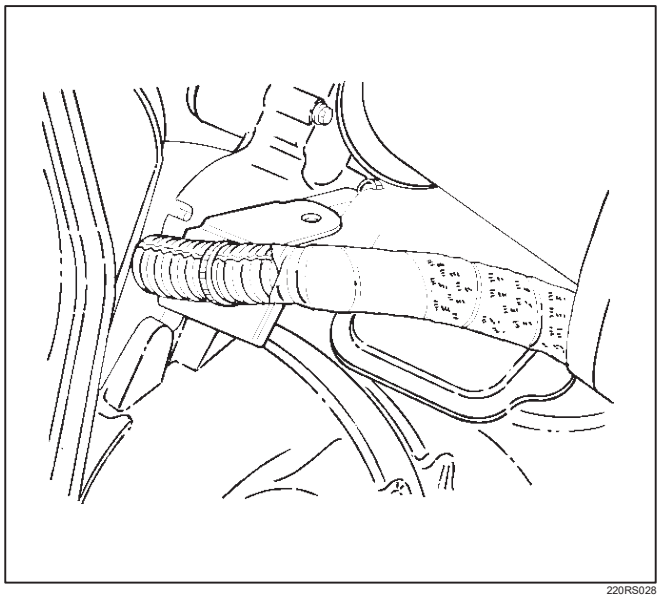
NOTE: Apply alignment marks on the flange at both front and rear sides.


401RW007

12. Remove center exhaust pipe(9) (6VD1).

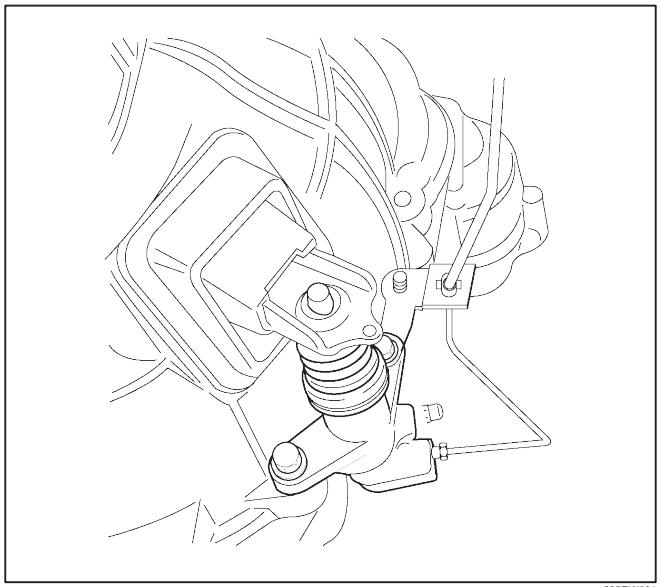

150RX009

13. Loosen the exhaust pipe nuts at the exhaust manifold side (X22SE).
14. Disconnect transmission harness connectors and clip.
    Connector: Transfer switch, 2–4 actuator, speed sensor, back up switch 1–2 indicator switch (6VD1) and 3–4 indicator switch (6VD1).
15. Remove transmission harness clamps(10) from the transmission case and bracket.



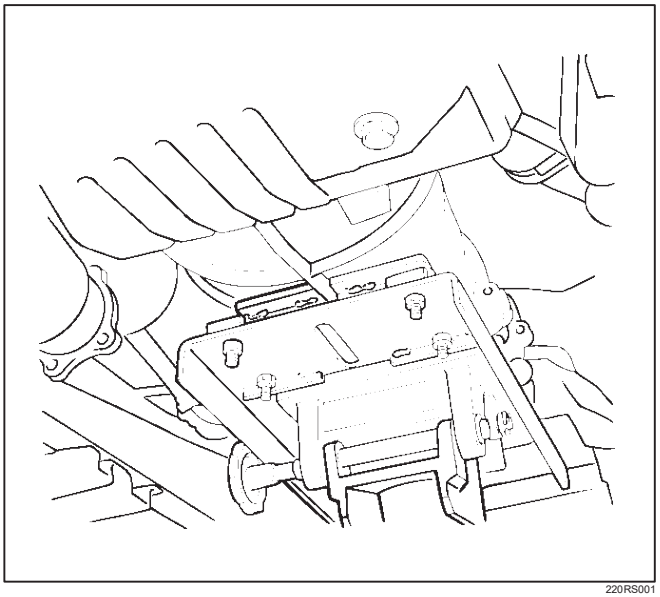
220RS028

16. Remove harness heat protector(11) (6VD1).
17. Remove slave cylinder(12) and flexible hose fixing bracket (X22SE).



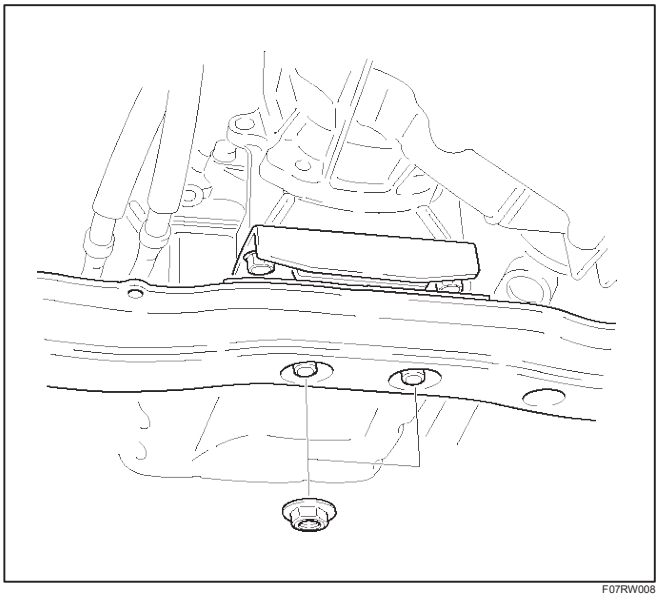
205RW001

18. Remove dust covers(13) (6VD1).
19. Support transmission with a transmission jack.



220RS001

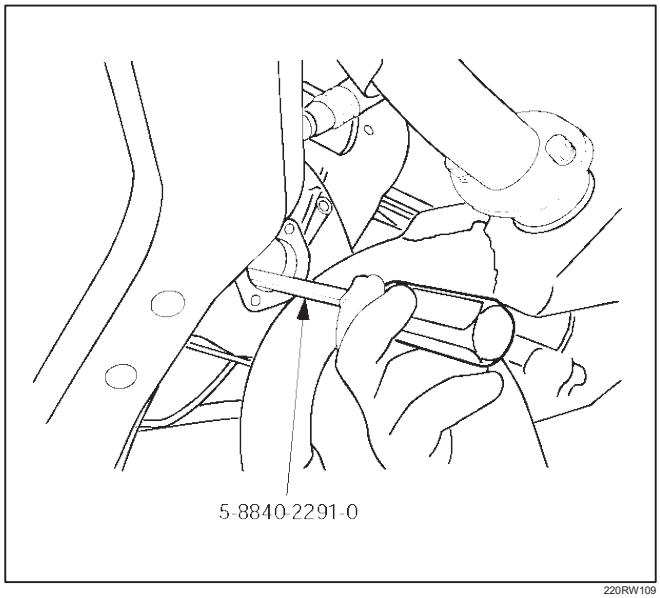
20. Remove engine rear mount nuts(14) from third crossmember.



F07RW008

21. Remove third crossmember(15) by removing six fixing bolts.
22. Remove starter(16) (6VD1).
23. Remove flywheel under cover(17). 6VD1:3 pieces, X22SE:1 piece.

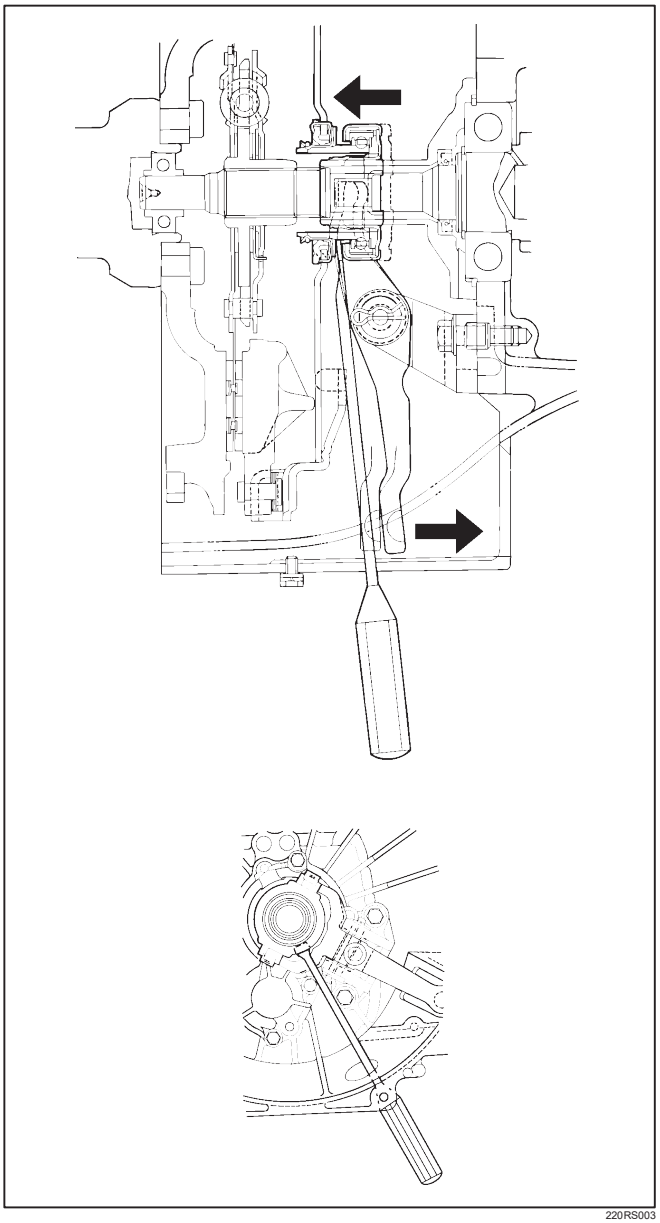
24. Use clutch release bearing remover 5–8840–2291–0 to disconnect the clutch release bearing from the clutch pressure plate (6VD1).



220RW109

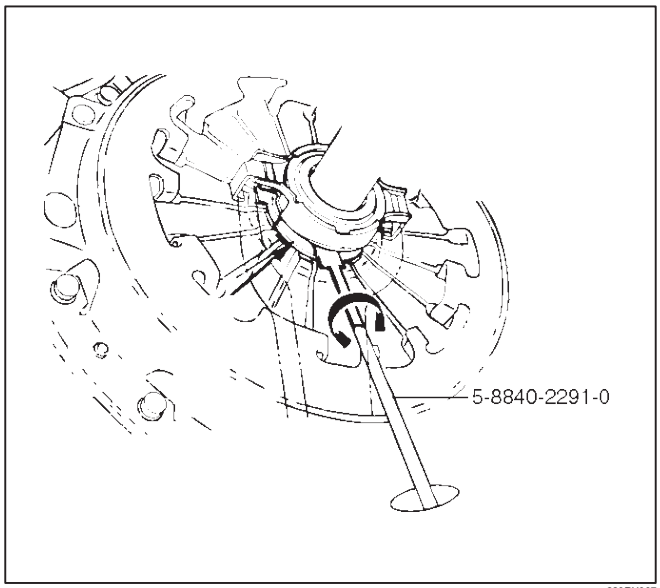
25. Pull the shift fork toward the transmission to press the clutch release bearing against the clutch pressure plate (6VD1).
26. Insert the clutch release bearing remover 5–8840–2291–0 between the wedge collar and the release bearing (6VD1).

NOTE: Be sure not to insert the remover between the wedge collar and the clutch.



220RS003

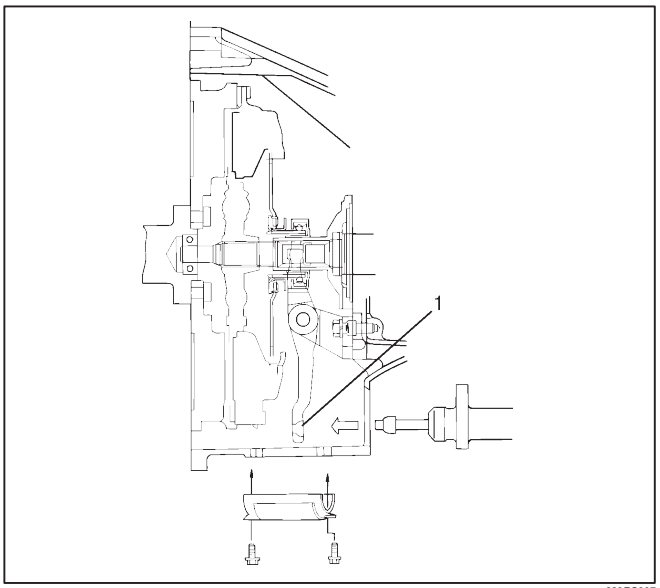
27. Turn the remover to separate the release bearing (6VD1).



28. Remove the front skid plate and then remove one right side bolt from the front (X22SE).
29. Remove transmission retaining nut and bolts(18). Remove transmission(19) from the vehicle.

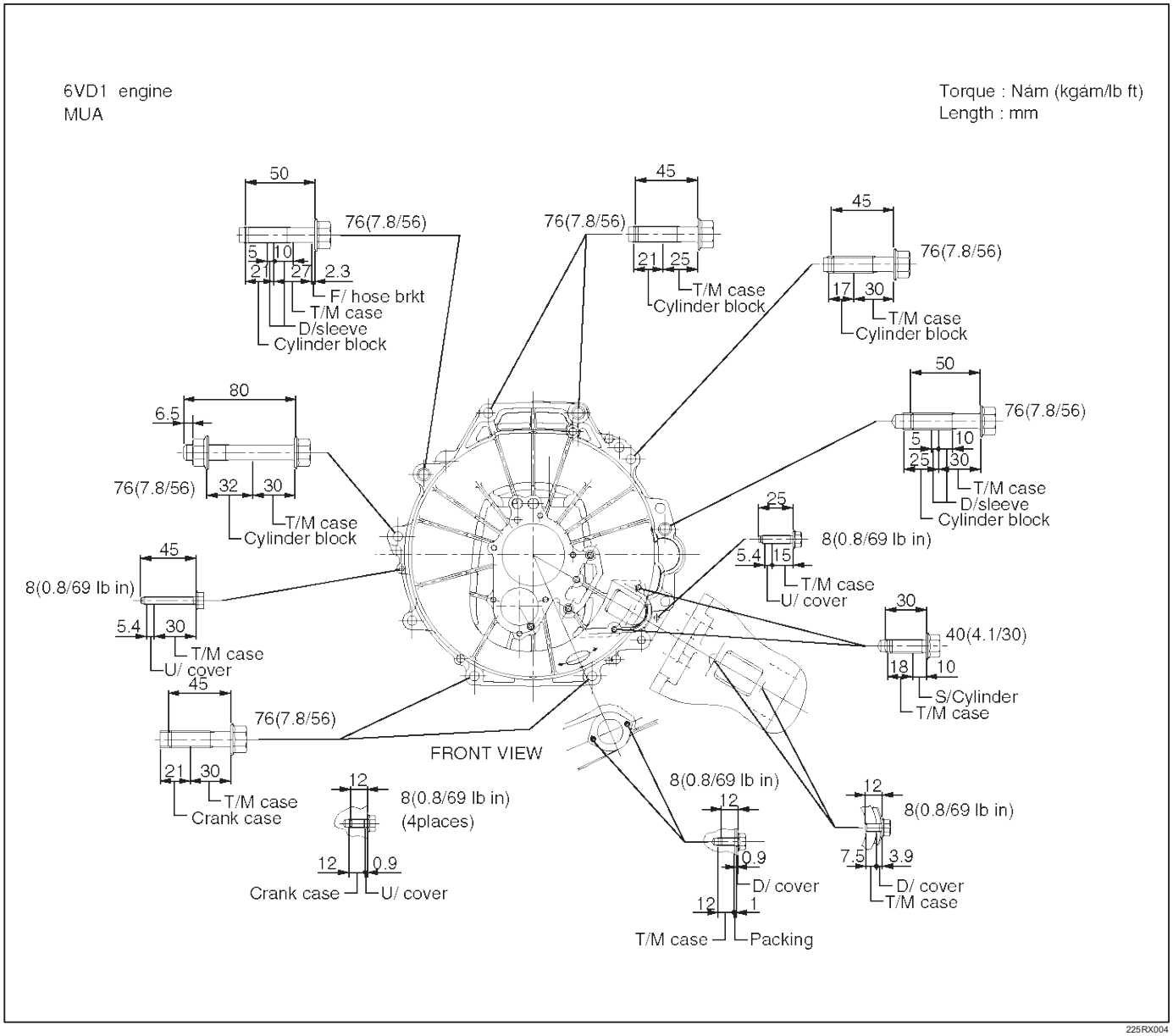
Installation

1. Apply a thin coat of molybdenum disulfide grease to the top gear shaft spline.
2. Drain coolant and disconnect the lower heater pipe from the hose on the back of the engine at right side (X22SE).
3. Turn the heater pipe assembly backward not to interfere with the transmission (X22SE).
4. Disconnect fuel pipes from hoses at the front side of the transmission (X22SE).
5. Slowly operate the transmission jack until the front of transmission is aligned with the rear of the engine. The slope of the engine and the transmission must be the same.
6. Align the top gear shaft spline with the clutch driven plate spline.

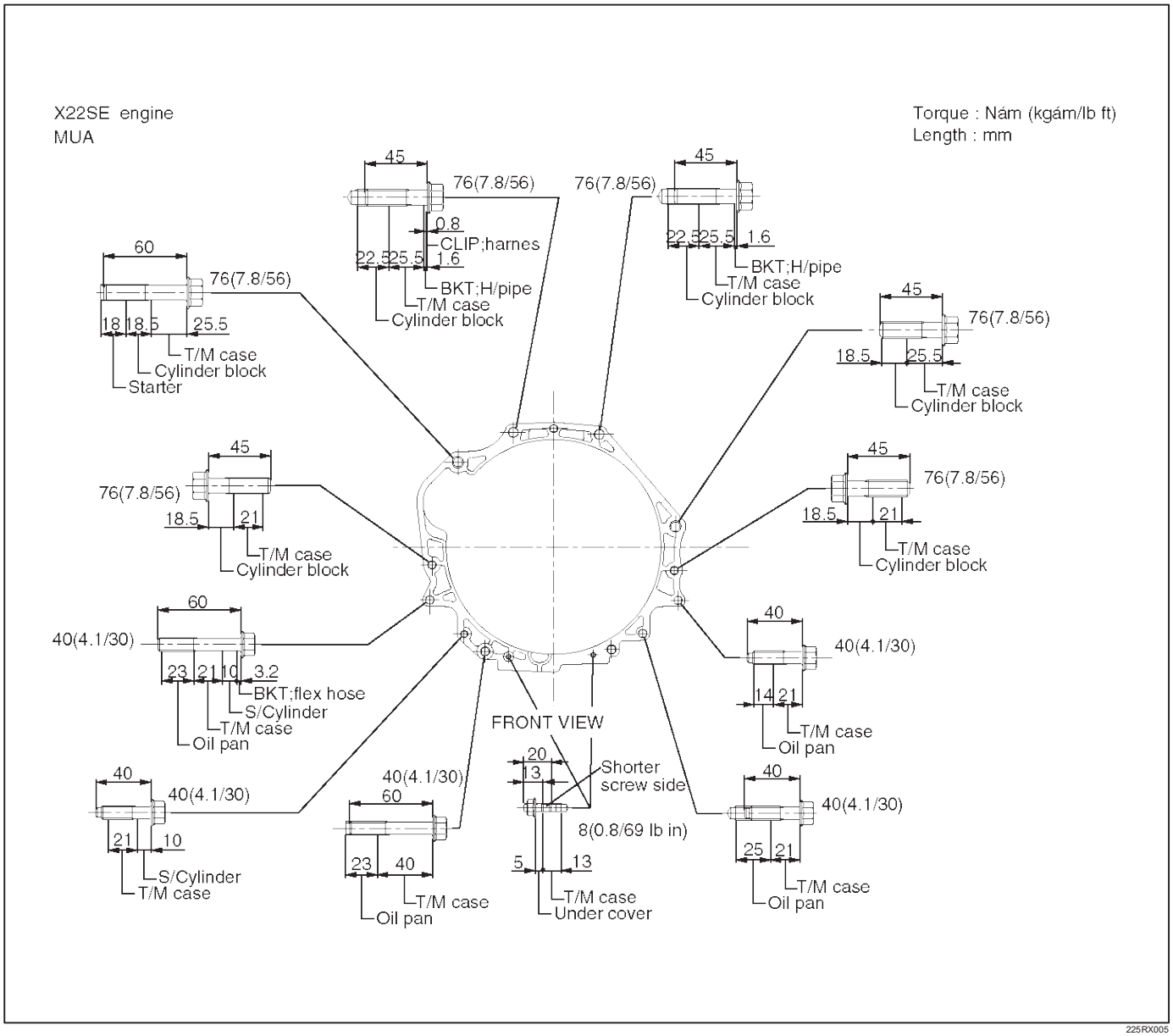


7. Install the transmission to the engine.
8. Connect the heater pipe with the hose (X22SE).

9. Tighten the transmission nut and bolts as shown in the figure.



225RX004

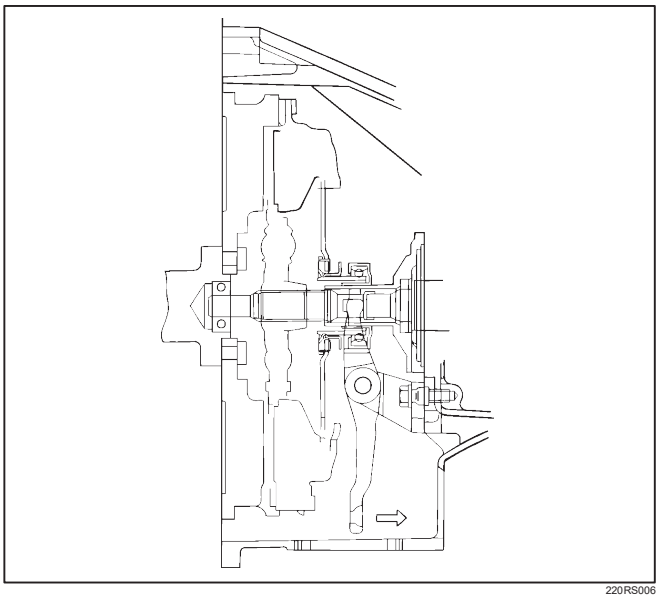


225RX005

10. Connect the fuel pipes with the hoses (X22SE).
11. Apply a force of 59 – 78 N (6.0 – 8.0 kg/ 13.2 – 17.6 lb) to the tip of the shift fork in the direction of the transmission to engage the clutch pressure plate and release bearing (6VD1).

NOTE: A click sound is heard when the release bearing and the tip of the diaphragm spring engage each other.

Check to see if they are securely engaged by pushing the tip of the shift fork toward the engine side while applying a force of about 25 N (2.5 kg/5.5 lb). If the shift fork will not move, then they are securely engaged (6VD1).



220RS006

12. Install flywheel under cover(17). 6VD1: 3 pieces, X22SE: 1 piece.

    Torque: 8 N·m (0.8 kg·m/69 lb in)

13. Install starter(16) (6VD1).

    Torque: 40 N·m (4.1 kg·m/30 lb ft)

14. Install third crossmember(15).

    Torque: 50 N·m (5.1 kg·m/37 lb ft)

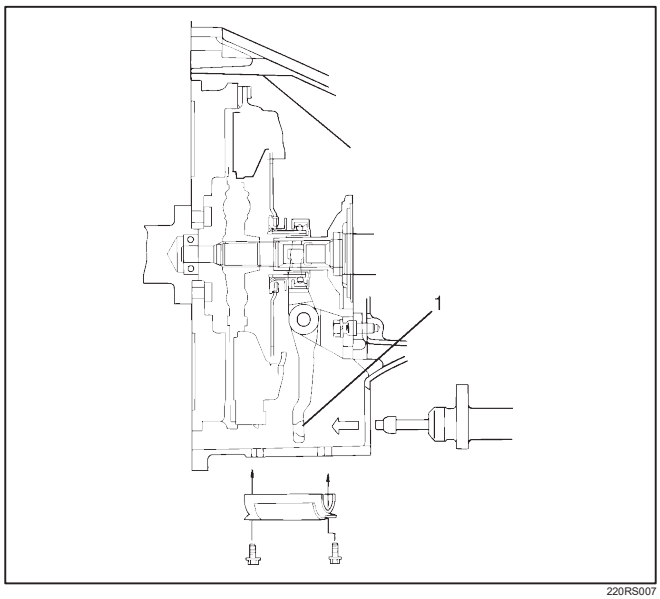
15. Install engine rear mount nuts(14).

    Torque: 40 N·m (4.1 kg·m/30 lb ft)

    Remove the transmission jack from transmission side.

16. Apply grease to top hole portion of the shift fork.
    Install slave cylinder(12) and flexible hose fixing bracket (X22SE).

    Torque: 43 N·m (4.4 kg·m/32 lb ft)



220RS007

Legend
(1) Apply Grease

17. Install clutch dust covers(13) to clutch housing (6VD1).

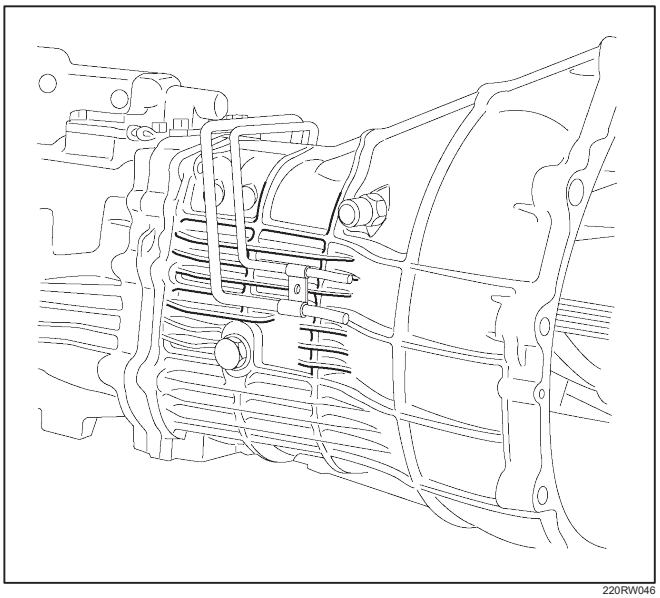
    Torque: 6 N·m (0.6 kg·m/52 lb in)

18. Connect transmission harness connectors and clip.
    Connector: transfer switch, 2–4 actuator, car speed sensor, 1–2 indicator switch (6VD1) and 3–4 indicator switch (6VD1).

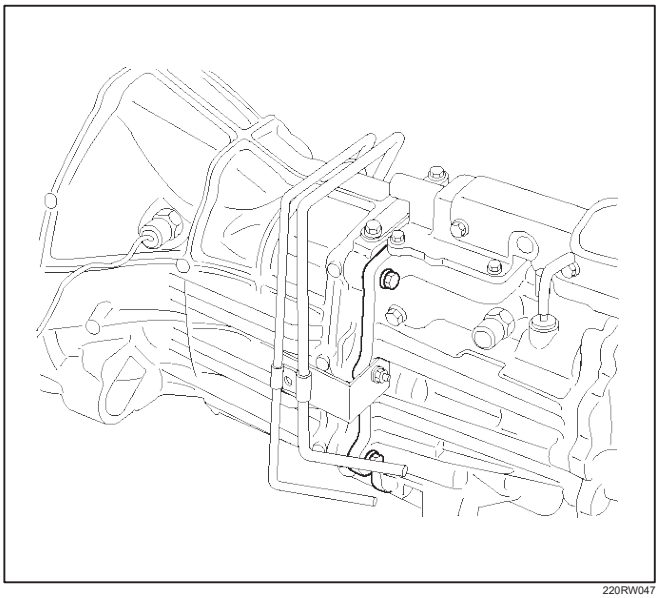
19. Install bracket and transmission harness clamps(10) to the transmission case.

20. Install harness heat protector(11) (6VD1).

21. Connect fuel pipe to transmission side.



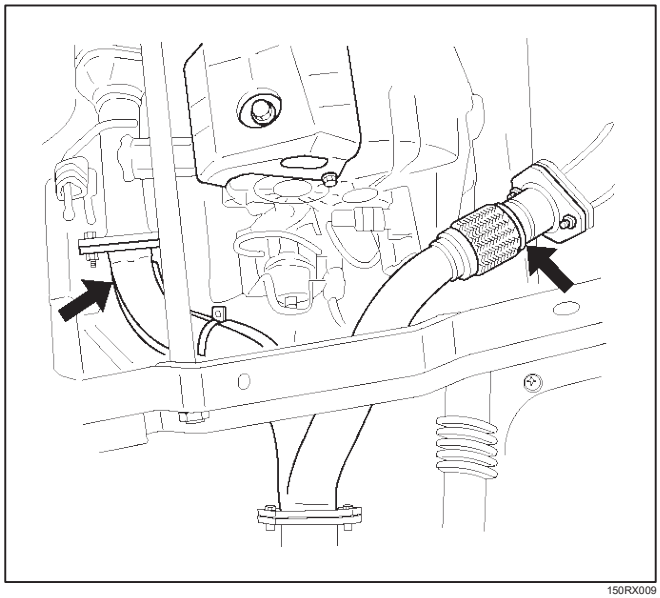
220RW046



220RW047

22. Install center exhaust pipe(9) (6VD1).

Torque: 43 N·m (4.4 kg·m/32 lb ft)



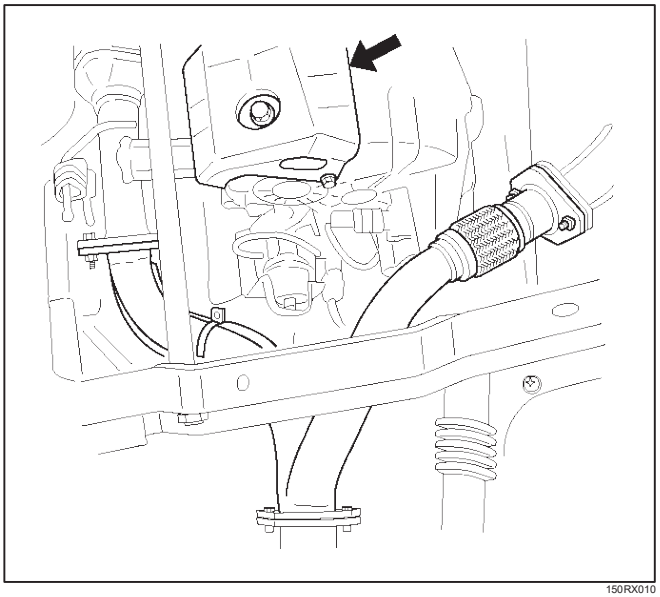
23. Tighten the exhaust pipe nuts at the manifold (X22SE).

Torque: 43 N·m (4.4 kg·m/32 lb ft)

24. Install front(8) and rear propeller shaft(7).

Torque: 63 N·m (6.4 kg·m/46 lb ft)

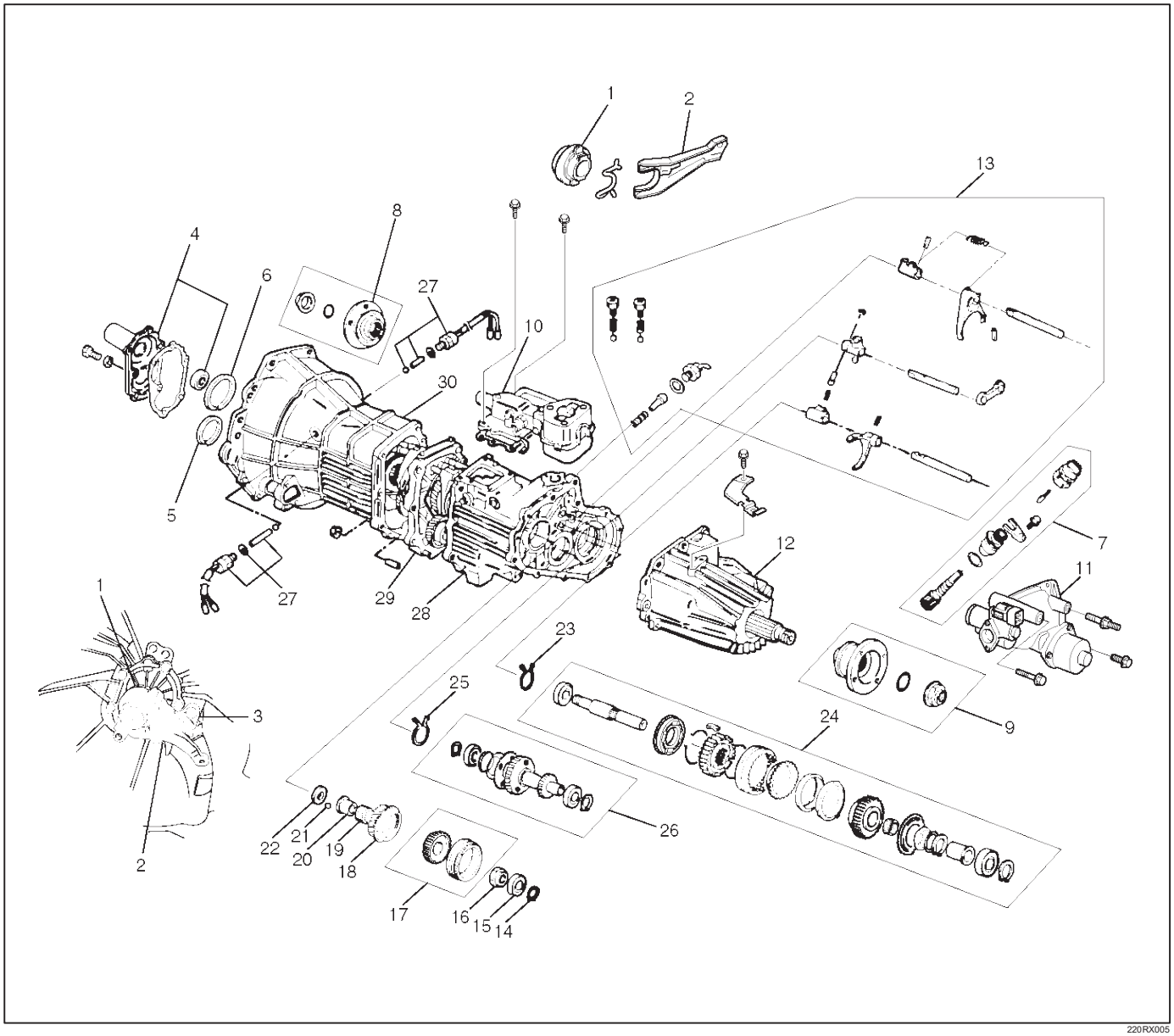
25. Install transfer protector(6).
Lower the vehicle.



26. Install gear control lever(5) and transfer control lever(5).
27. Install grommet assembly(4).
28. Install center console(3), rear console and lower cluster assembly.
29. Install transfer control lever knob(2) and gear control lever knob(1).
30. Connect battery ground cable.
31. Replenish engine coolant (X22SE).

Transmission Case and Transfer Case

Major Component (MUA)



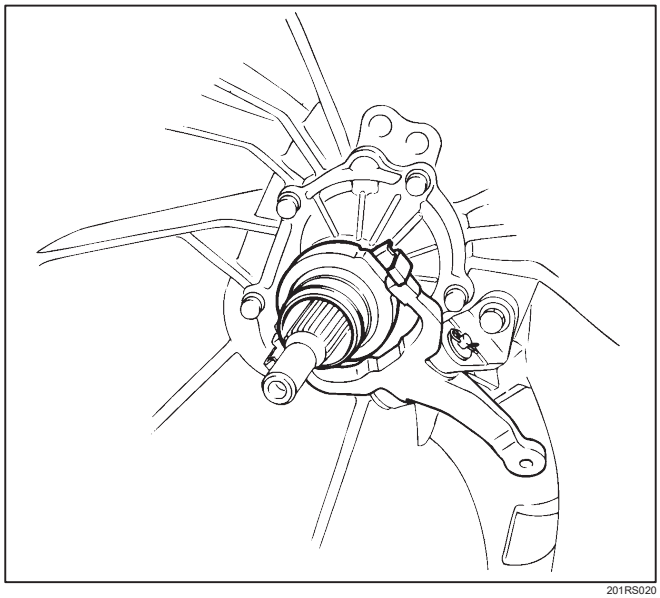
220RX005

Legend

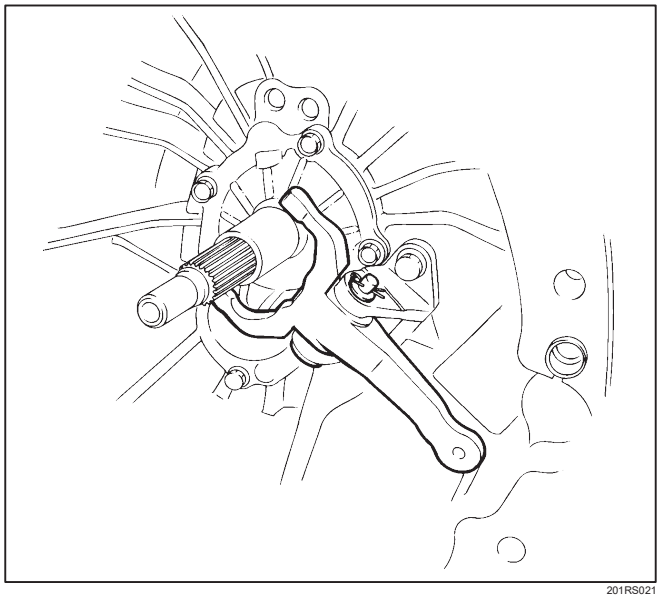
(1) Clutch Release Bearing
(2) Shift Fork
(3) Fulcrum Bridge
(4) Front Cover (with Oil Seal)
(5) Counter Front Bearing Snap Ring
(6) Top Gear Bearing Snap Ring
(7) Speedometer Sensor and Speedometer Driven Gear
(8) Front Companion Flange
(9) Rear Companion Flange
(10) Gear Control Box Assembly
(11) 2WD–4WD Actuator Assembly
(12) Transfer Rear Case Assembly
(13) Detent, Shift Arm, and Interlock Pin
(14) Bearing Snap Ring
(15) Ball Bearing
(16) Lock Nut
(17) High-Low Clutch Hub and Sleeve
(18) Transfer Input Gear
(19) Needle Bearing
(20) Bearing Collar
(21) Ball
(22) Plate
(23) Bearing Snap Ring
(24) Front Output Gear Assembly
(25) Bearing Snap Ring
(26) Counter Gear Assembly
(27) 1–2 and 3–4 Indicator Switch, Pin, and Ball
(28) Transfer Case Assembly
(29) Intermediate Plate with Gear Assembly
(30) Transmission Case

Disassembly

1. Clean the exterior of the unit with solvent.
2. Remove the drain plug from the transmission case and transfer case and drain the lubricant.
3. Remove the clutch release bearing(1) from the transmission case.

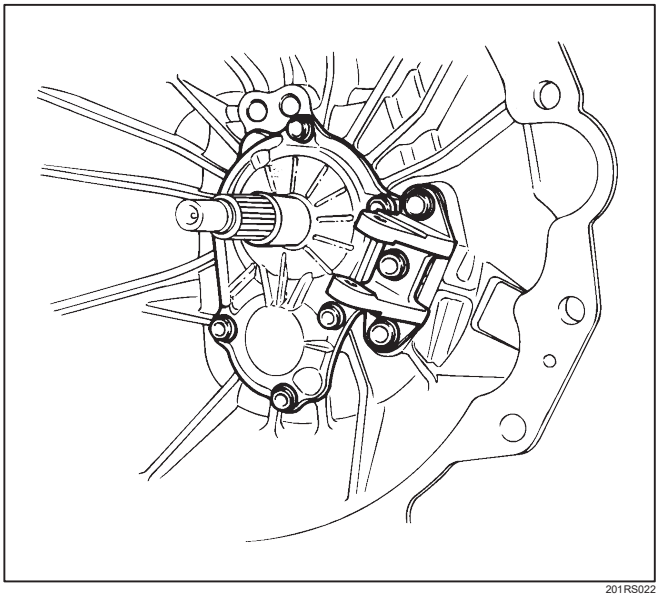

201RS020

4. Remove the snap pin (6VD1).
   Remove the shift fork pin (6VD1) and shift fork(2) from the fulcrum bridge(3) (6VD1).

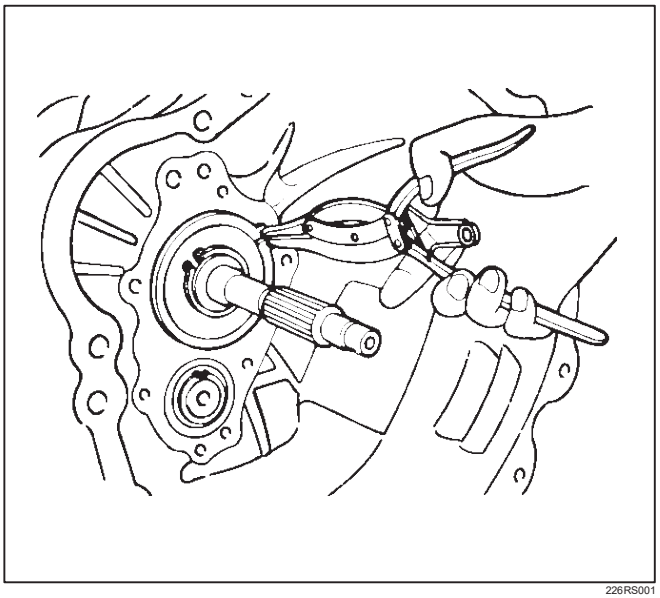

201RS021

5. Remove the fulcrum bridge bolts (6VD1).
   - Remove the fulcrum bridge(3) (6VD1) from the transmission case.

   Remove the front cover(4) and gasket from the transmission case.


201RS022

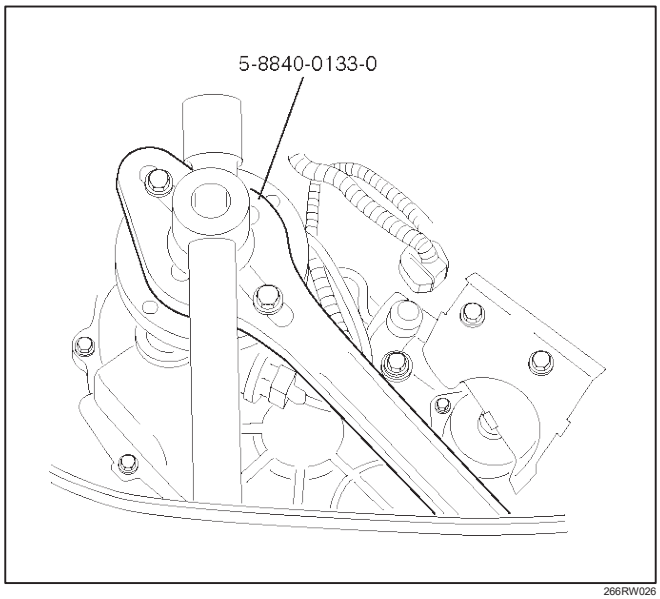
6. Remove counter front bearing snap ring(5) and top gear bearing snap ring(6).
   Use a pair of snap ring pliers to remove the snap ring.


226RS001

7. Remove the speedometer sensor(7).
   Remove the plate(7).
   Remove the driven gear bushing and driven gear(7).

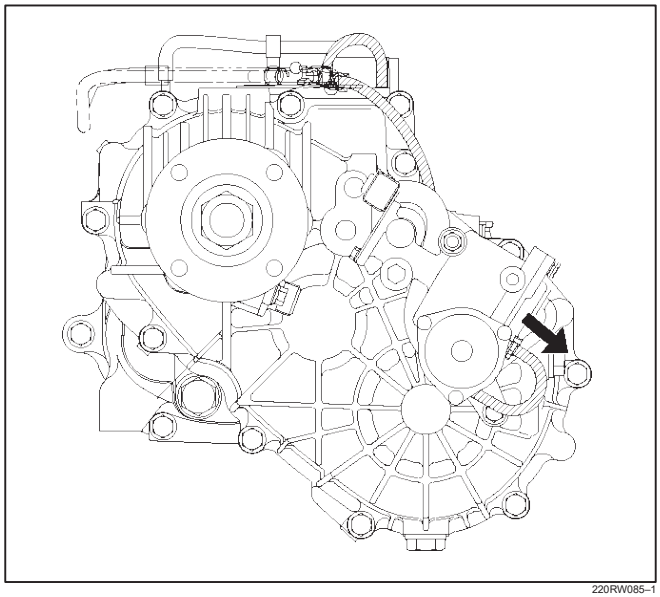
NOTE: Apply a reference mark to the driven gear bushing before removal.

8. Remove front companion flange(8) and rear companion flange(9) using the flange holder 5–8840–0133–0 to remove the end nut.



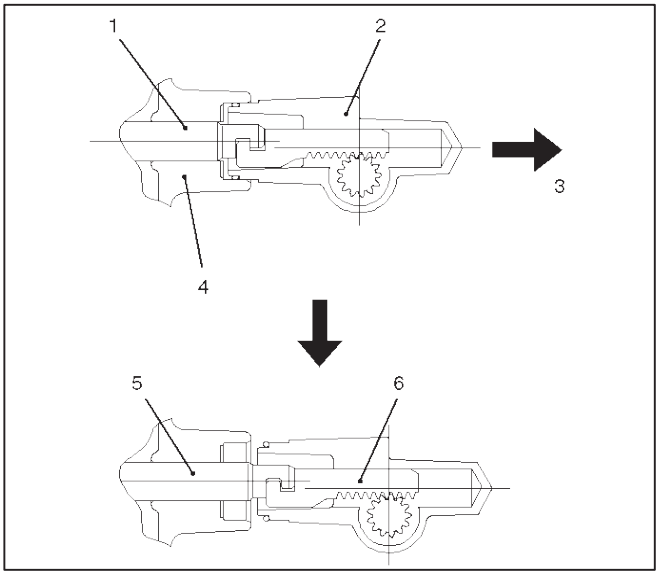
266RW026

9. Disconnect breather hose from transmission and remove gear control box assembly(10).
10. Remove 2WD–4WD actuator assembly(11) by performing the following steps:
    1. Disconnect the actuator breather hose from 2WD–4WD actuator assembly(11).



220RW085–1

2. Remove the 2WD–4WD actuator assembly bolts.
3. Pull the 2WD–4WD actuator assembly with 2WD–4WD shift rod.

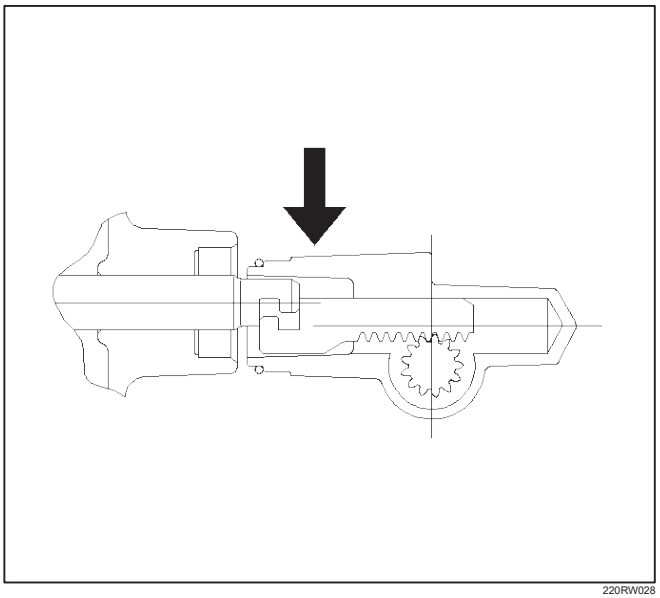


220RW027

Legend

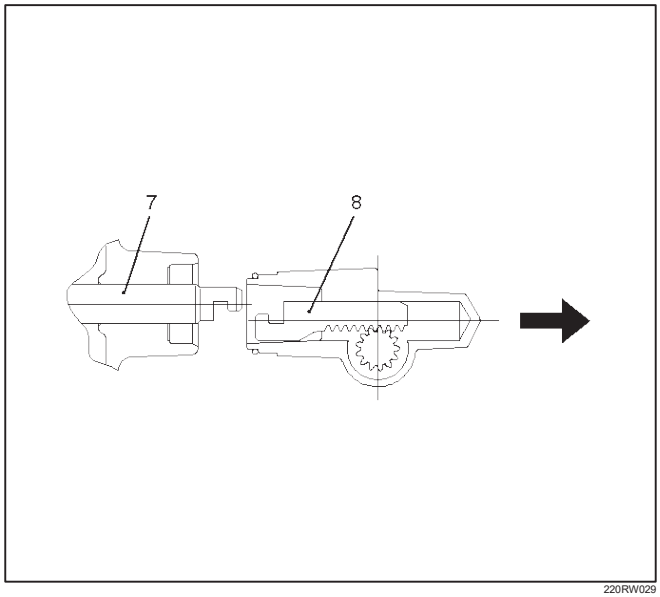
(1) Shift Rod: 2WD–4WD (Position: 2WD)
(2) 2WD–4WD Actuator Assembly
(3) Pull
(4) Rear Case Assembly
(5) Position: 4WD
(6) Position: 2WD

4. Offset the actuator assembly.



220RW028

5. Remove the actuator assembly.



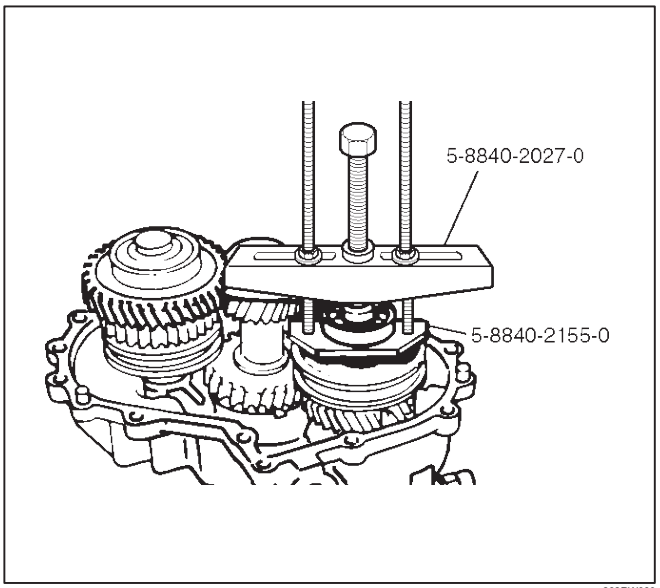
220RW029

Legend

(7) Position: 4WD
(8) Mode: 2WD

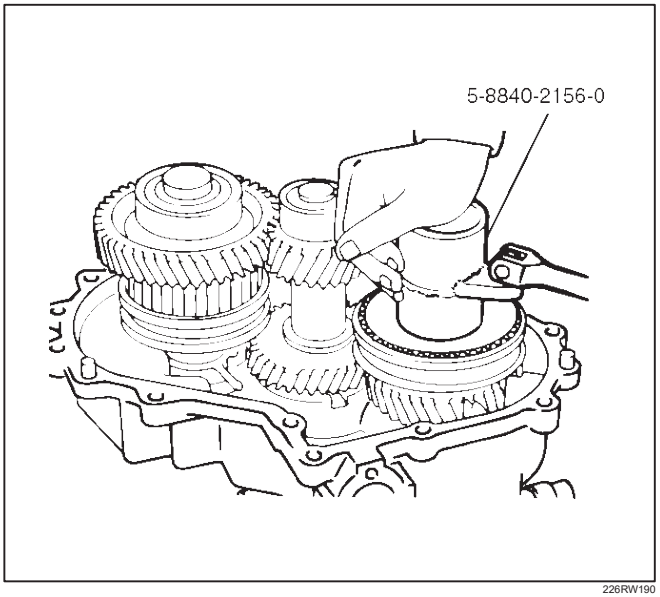
NOTE: Before removing the transmission and transfer assembly from vehicle, change the transfer mode to 2WD using the 4WD push button switch on dash panel.

11. Remove the transfer rear cover assembly(12) from the transfer case(28).
12. Regarding detent, shift arm, and interlock pin(13) disassembly, refer to Detent, Shift Arm, and Interlock Pin in Drive Line/Axle section.
13. Use a pair of snap ring pliers to remove the bearing snap ring(14).
14. Use a bearing remover 5–8840–2155–0 and puller 5–8840–2027–0 to remove the ball bearing(15).



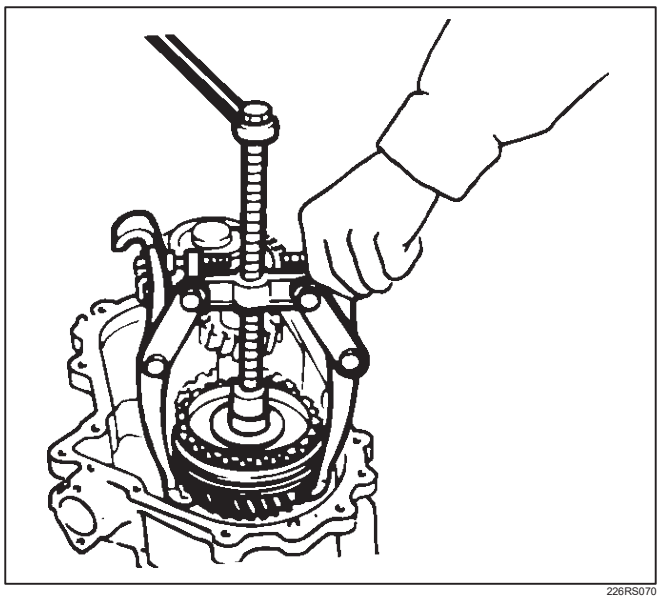
262RW069

15. Install the front companion flange temporarily. Use the flange holder 5–8840–0133–0 and lock nut wrench 5–8840–2156–0 to remove the lock nut(16). Remove the front companion flange.

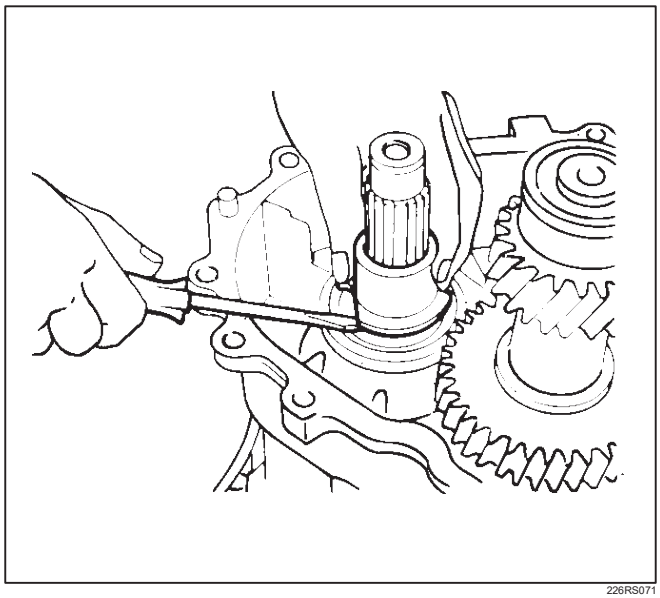


226RW190

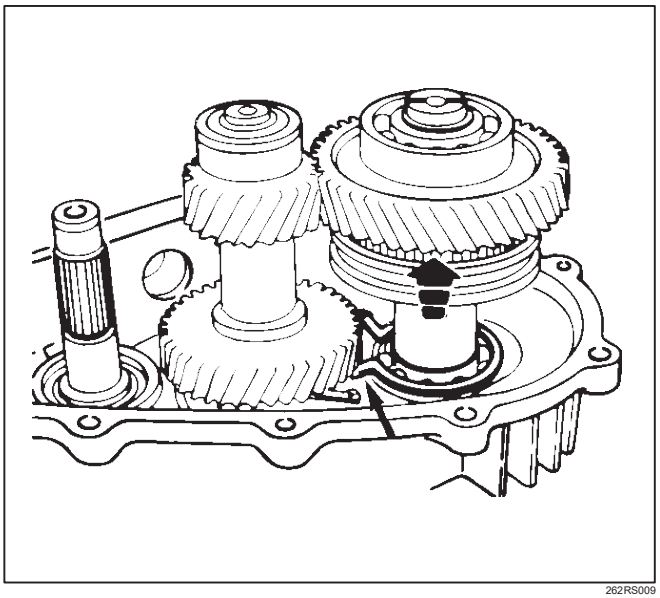
16. Remove high-low clutch sleeve(17).
    Use the universal puller to remove the high-low clutch hub(17) and transfer input gear(18).


226RS070

17. Remove needle bearing(19), bearing collar(20), ball(21), and plate(22).


226RS071

18. Use a pair of snap ring pliers to remove the bearing snap ring(23).
19. Use a plastic hammer to tap the front output gear assembly(24) free.


262RS009

20. Remove bearing snap ring(25) by using a pair of snap ring pliers.
21. Remove the counter gear assembly(26) from the transfer case(28).
22. Remove 1–2 and 3–4 indicator switch, pin and ball(27).
23. Remove the transfer case assembly(28) from the transmission case.
    - Refer to Transfer Case Assembly in Drive Line/Axle section for repair of transfer case assembly.
24. Pull out intermediate plate with gear assembly(29) from transmission case.

Reassembly

1. Apply recommended liquid gasket (LOCTITE 17430) or its equivalent to the transmission case(30), intermediate plate(29) and transfer case(28) fitting surfaces.
2. Install the intermediate plate with gear assembly(29) to the transmission case(30).
   Pull out the top gear shaft until the ball bearing snap ring groove protrudes from the transmission case front cover fitting face.
   Avoid subjecting the mainshaft to sudden shock or stress.
3. Install the transfer case assembly(28) to the intermediate plate with gear assembly.
   Tighten the eight transmission-transfer case bolts to the specified torque.

   Torque: 37 N·m (3.8 kg·m/27 lb ft)

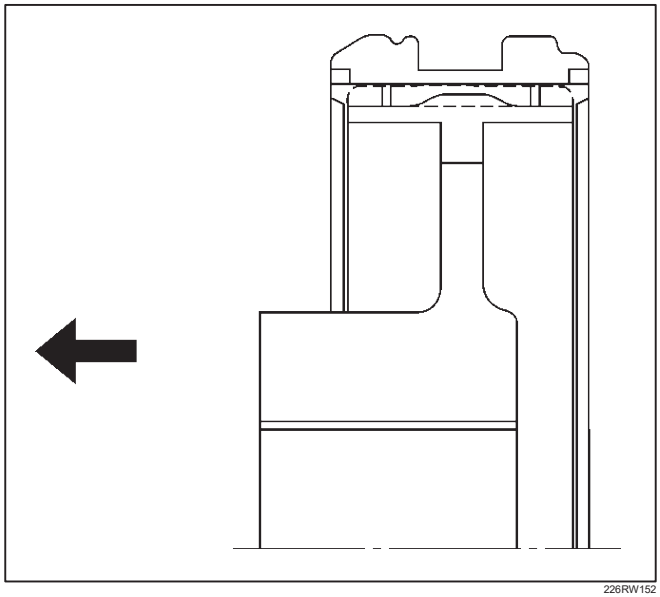
   Refer to Transfer Rear Case Assembly in Drive Line/Axle section for oil seal replacement.
4. Install 1–2 and 3–4 indicator switch, pin and ball(27) (6VD1).
5. Install the counter gear assembly(26) to the transfer case(28).
6. Use a pair of snap ring pliers to install the snap ring(25) to the transfer case(28).

NOTE: The snap ring must be fully inserted into the transfer case snap ring groove.

7. Install front output gear assembly(24).
8. Use a pair of snap ring pliers to install the snap ring (23) to the transfer case(28).

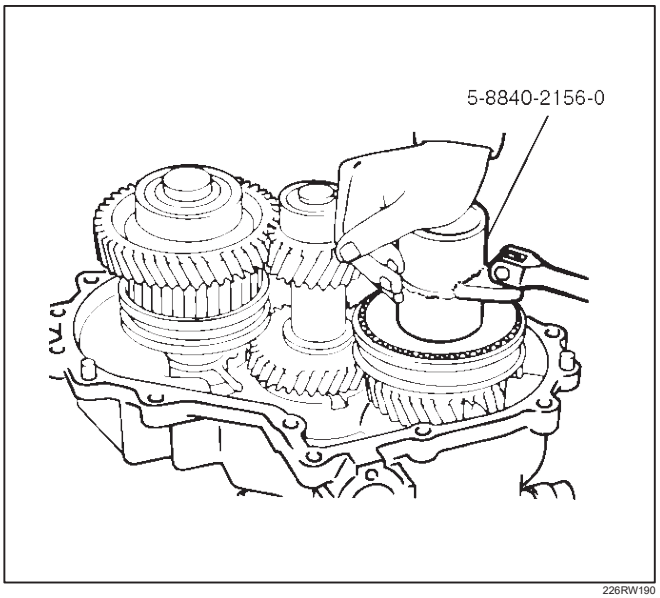
NOTE: The snap ring must be fully inserted into the transfer case snap ring groove.

9. Install plate(22), ball(21), bearing collar(20), needle bearing(19), and transfer input gear(18).
10. Install High-low clutch hub and sleeve(17).
    The clutch hub face (with the heavy boss) must be facing the transfer input gear side.


226RW152

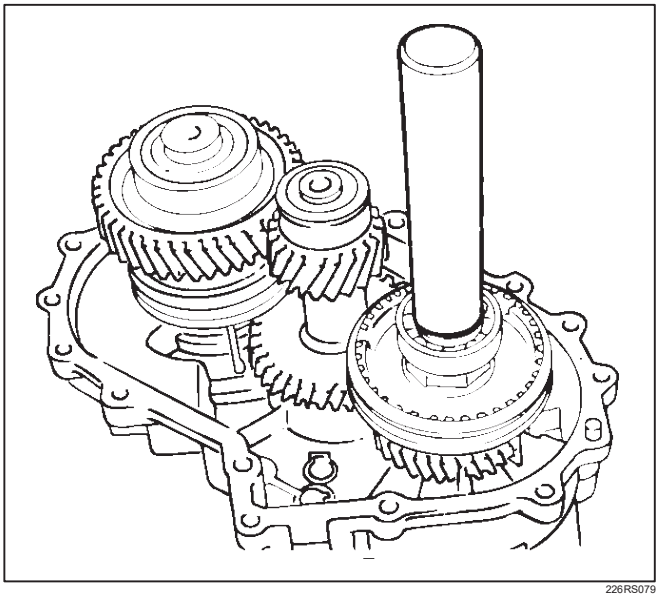
11. Install the front companion flange temporarily.
    - Use the flange holder 5–8840–0133–0 and lock nut wrench 5–8840–2156–0 to install the lock nut(16).

    Torque: 137 N·m (14.0 kg·m/101 lb ft)

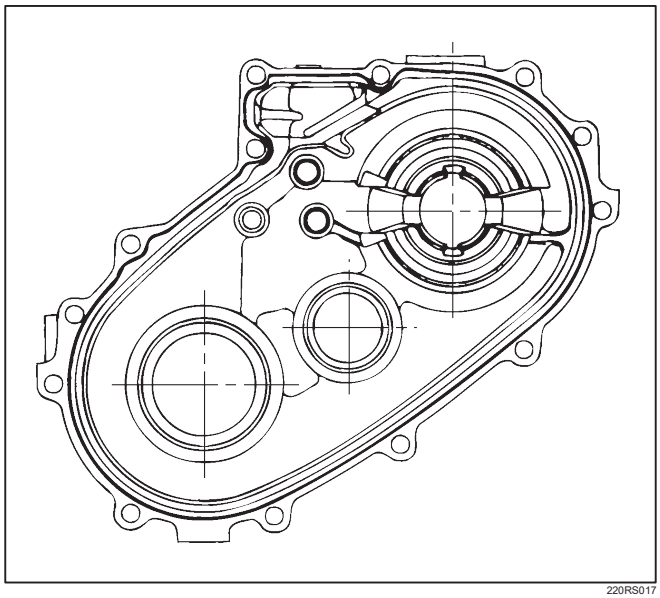


226RW190

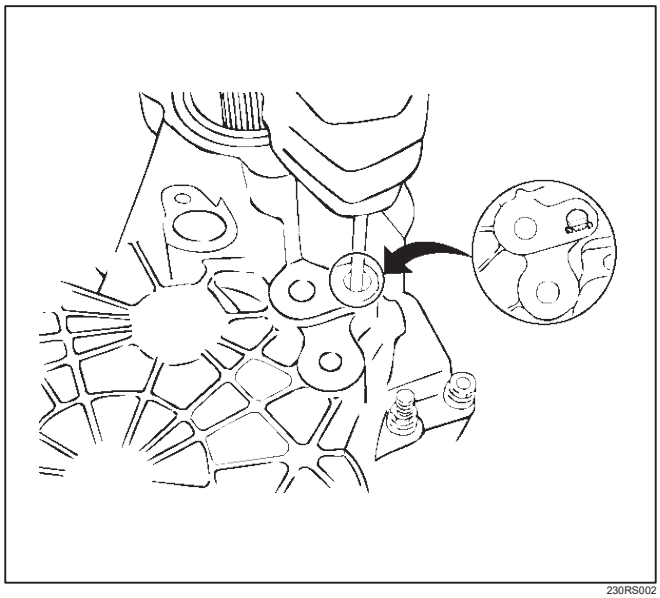
12. Use the punch to stake the lock nut at one spot.
13. Use a suitable drift and hammer to install the ball bearing(15).


226RS079

14. Use a pair of snap ring pliers to install the bearing snap ring(14).
15. Regarding detent, shift arm, and interlock pin(13) assembly, refer to Detent, Shift Arm, and Interlock Pin in Drive Line/Axle section.
16. Apply recommended liquid gasket (LOCTITE 17430) or its equivalent to the transfer rear case fitting faces.


220RS017

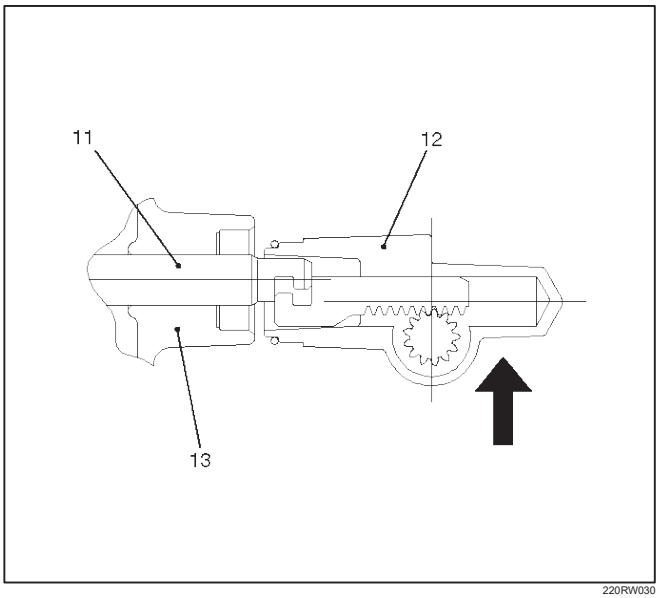
17. Perform the following steps before fitting the transfer rear cover(11):
    1. Shift the High-Low shift rod to the 4H side.
    2. The cut-away portion of select rod head should align with the rear case hole's stopper.


230RS002

18. Tighten the eleven transfer rear case bolts to the specified torque.

    Torque: 37 N·m (3.8 kg·m/27 lb ft)

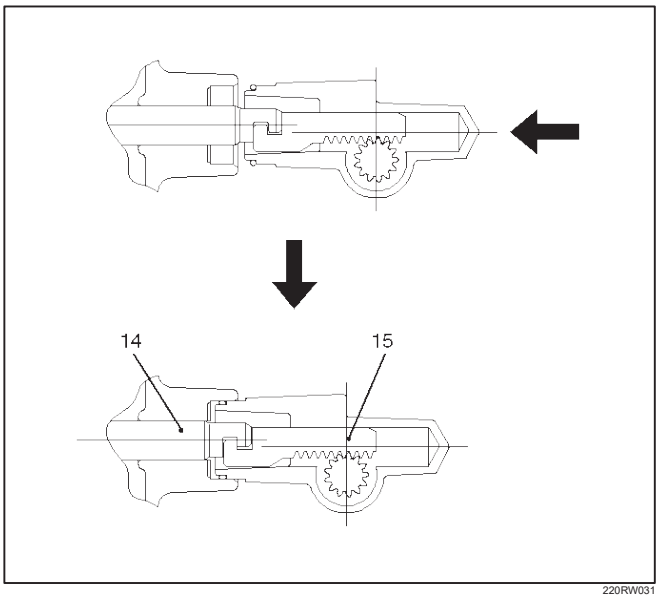
19. Install 2WD–4WD actuator assembly(11) by performing the following steps.
    1. Shift the 2WD–4WD shift rod to the 4WD side.
    2. Join the rod grooves of 2WD–4WD actuator assembly and shift rod.



220RW030

Legend
(11) Shift Rod: 2WD–4WD (Position: 4WD)
(12) 2WD–4WD Actuator Assembly (Mode: 2WD)
(13) Rear Case Assembly

3. Push the 2WD–4WD actuator assembly with 2WD–4WD shift rod till the shift rod reaches the 2WD position.



220RW031

Legend
(14) Position: 2WD
(15) Mode: 2WD

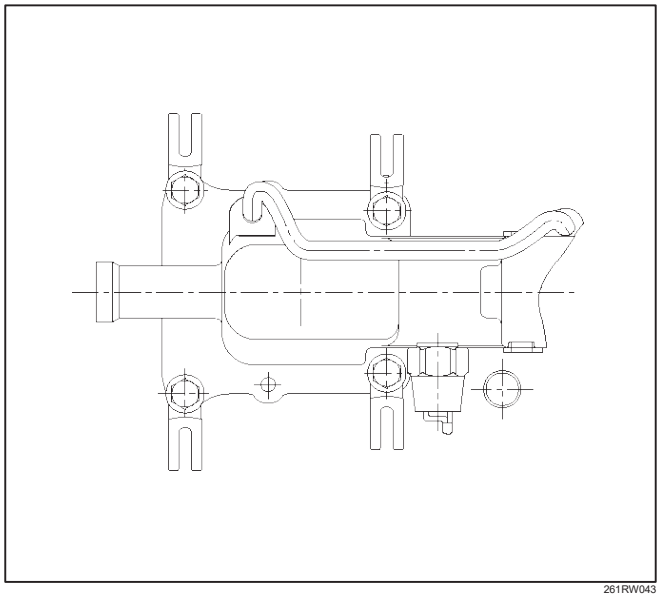
4. Tighten the 2WD–4WD actuator bolts to the specified torque.

   Torque: 19 N·m (1.9 kg·m/14 lb ft)

5. Connect the actuator breather hose to actuator.

20. Install a new packing and gear control box assembly(10).
    Install the harness clips and brackets and then tighten four new gear control box bolts to the specified torque.

    Torque: 20 N·m (2.0 kg·m/14 lb ft)


261RW043

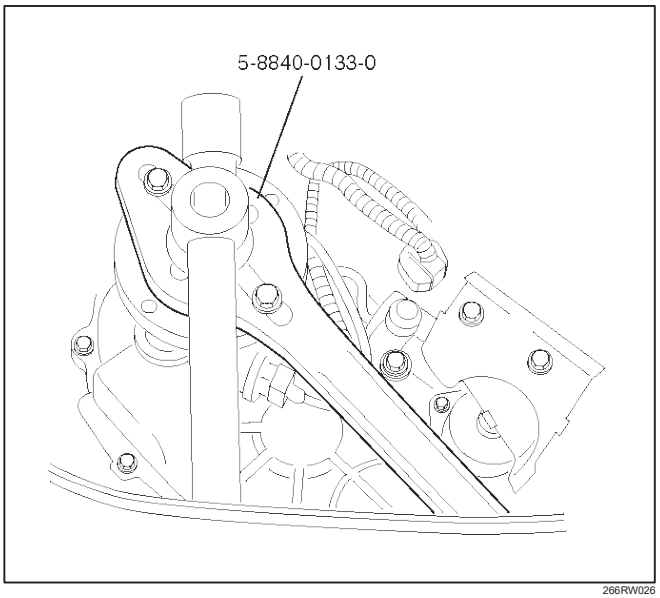
21. Install the rear and front companion flange(9) (8).
    Install the O-ring(9).
    Use the flange holder J–8614–11 to tighten the flange nuts(9) (8) to the transfer case.
    Tighten new transfer flange nuts(9) (8) to the specified torque.

    Rear Companion Flange

    Torque: 167 N·m (17.0 kg·m/123 lb ft)

    Front Companion Flange

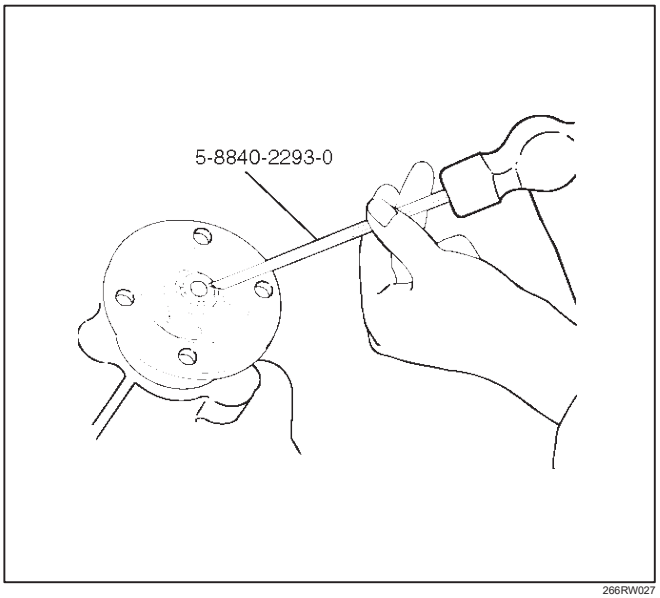
    Torque: 137 N·m (14.0 kg·m/101 lb ft)



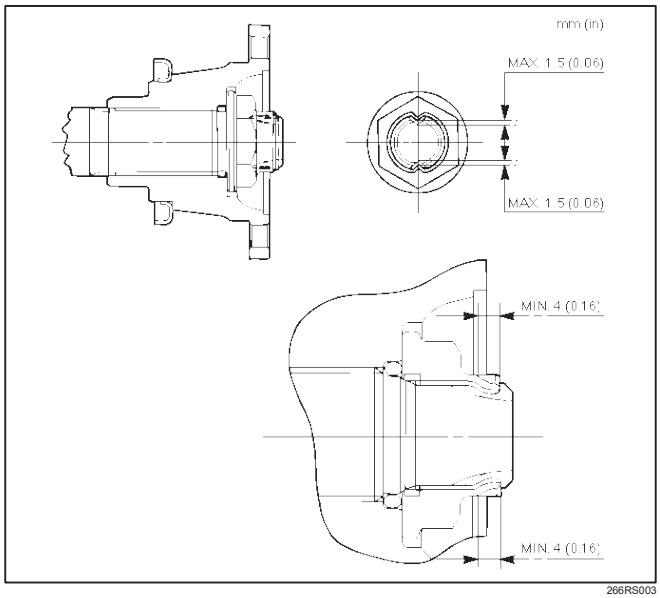
266RW026

22. Use the punch 5–8840–2293–0 to stake the rear companion flange nut at two spots.
    - Stake the front companion flange nut at one spot.

NOTE: Be sure to confirm that there is no crack at the staked portion of the flange nut after staking.

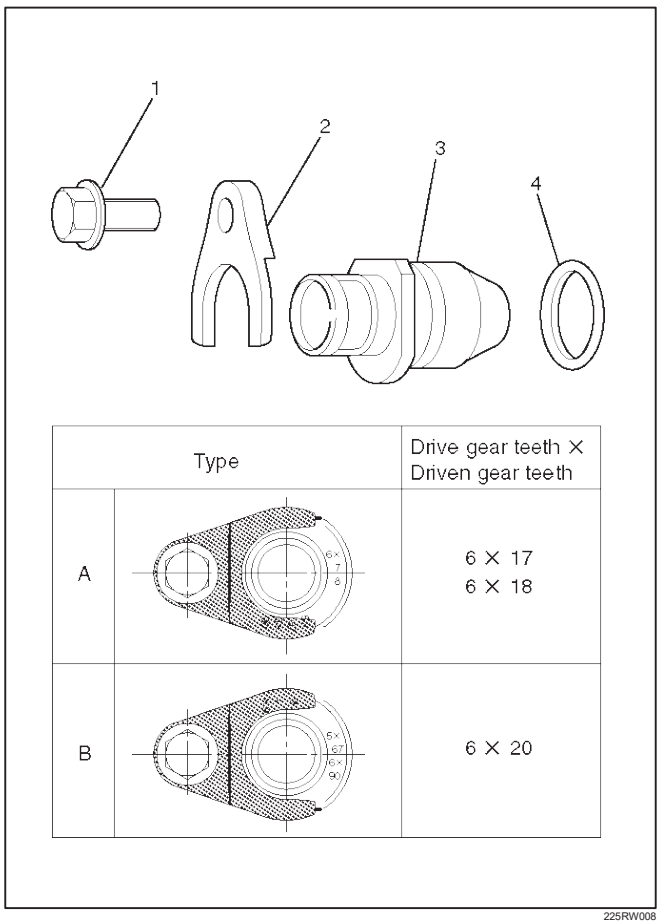


266RW027



266RS003

23. Install the O-ring (4) to the speedometer driven gear bushing(3).
    Install the driven gear to the speedometer driven gear bushing(3).
    Install the speedometer driven gear assembly(7) to the transfer rear cover.



225RW008

24. Install the plate to the transfer rear cover.
    Torque: 15 N·m (1.5 kg·m/11 lb ft)
25. Install the speedometer sensor.
    Torque: 27 N·m (2.8 kg·m/20 lb ft)
26. Install top gear bearing snap ring(6) and counter front bearing snap ring(5).
    Use a pair of snap ring pliers to install the snap rings to the mainshaft and countershaft.
    The snap rings must be fully inserted into the bearing snap ring groove.
27. Install a new packing and front cover (with oil seal) (4) to the transmission case.

NOTE: Take care not to damage the oil seal.

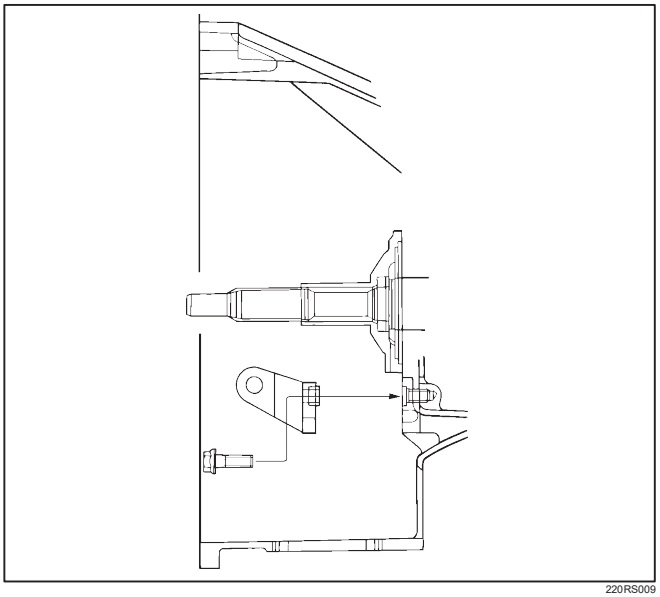
Notes When Tightening the Bolt:

- After cleaning the bolt hole, dry it thoroughly with air.
- After cleaning the screw face of a removed bolt or new one, dry it thoroughly. Apply recommended liquid gasket (LOCTITE 242) or its equivalent before tightening it.
  Tighten six new front cover bolts to the specified torque.

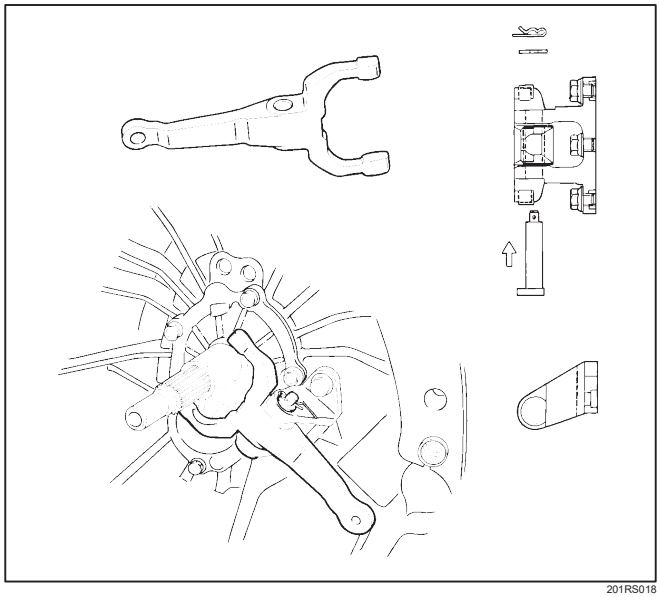
  Torque: 25 N·m (2.5 kg·m/18 lb ft)

28. Install the fulcrum bridge(3) to the transmission case.
    Tighten three fulcrum bridge bolts to the specified torque (6VD1).

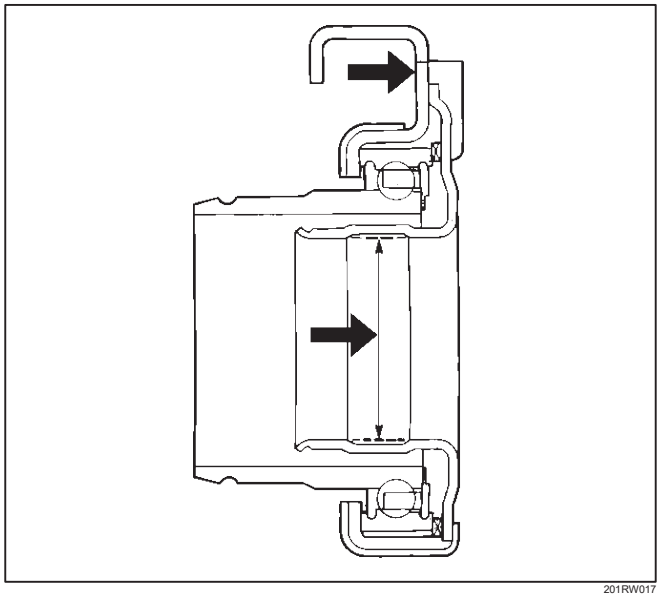
    Torque: 38 N·m (3.9 kg·m/28 lb ft)


220RS009

29. Apply grease to the pin hole inner circumferences and thrust surfaces (6VD1).
    Attach the shift fork(2) to the fulcrum bridge(3) by inserting the shift fork pin from the bottom side of the fulcrum bridge (6VD1).
    Install the washer and snap pin (6VD1).

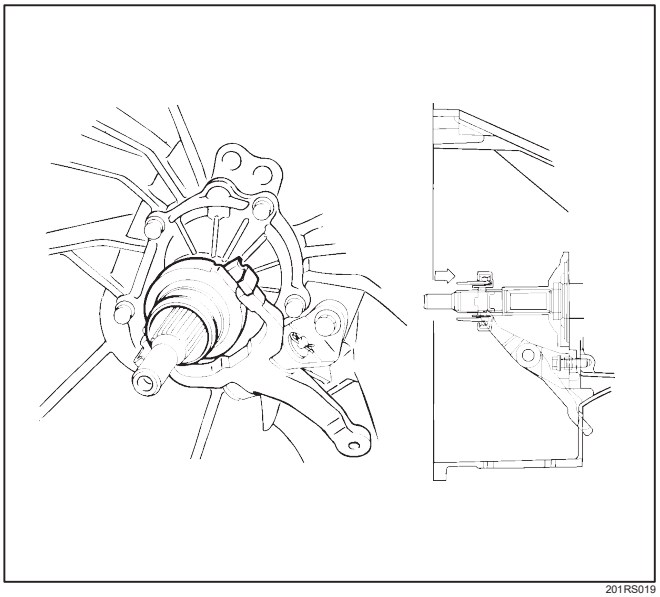

201RS018

30. Apply grease to the areas shown in the figure (6VD1).


201RW017

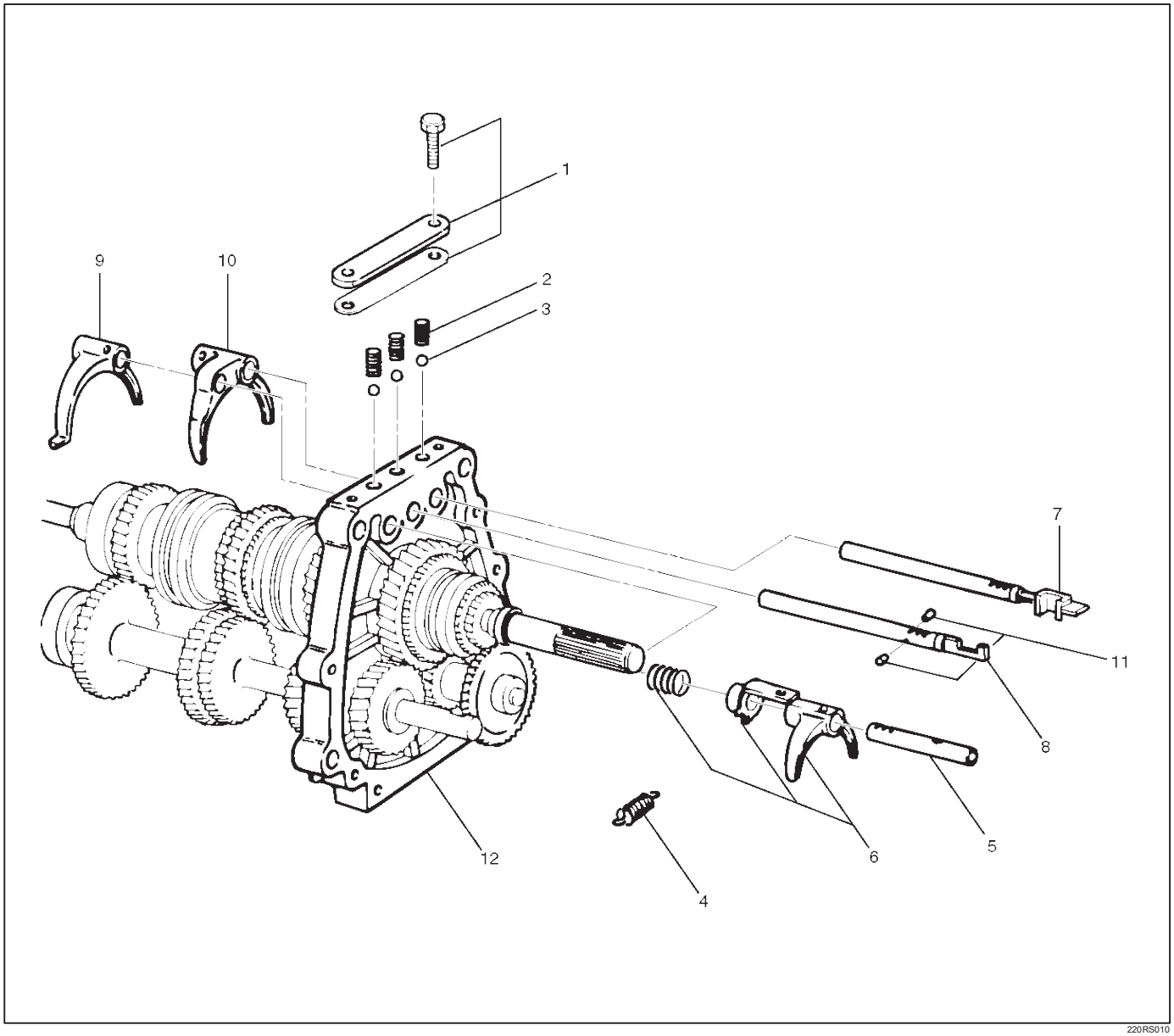
Install the release bearing(1) to the shift fork(2) in the proper direction.

NOTE: Ensure release bearing is properly positioned during installation, as shown in the figure (6VD1).


201RS019

Intermediate Plate with Gear Assembly, Detent, Shift Arm, and Interlock Pin (MUA)

Disassembled View



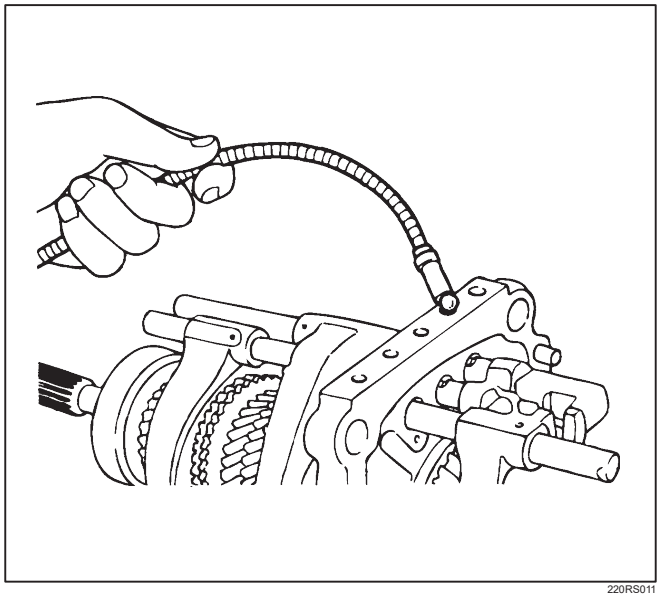
220RS010

Legend

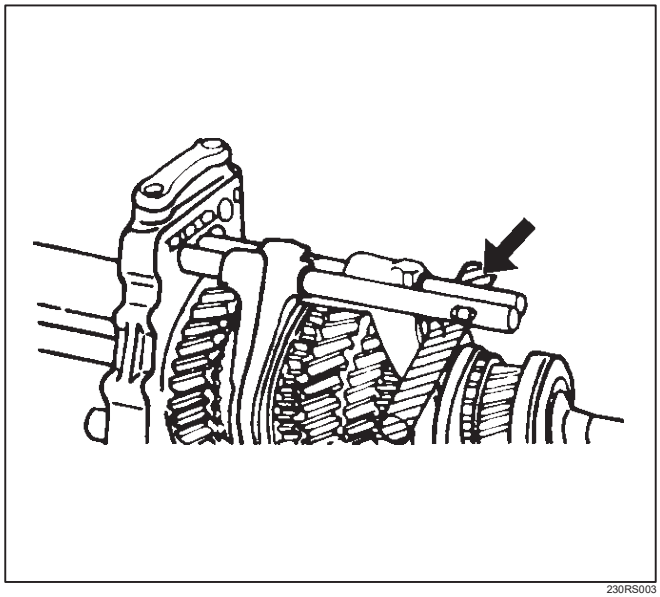
(1) Detent Spring Plate and Gasket
(2) Detent Spring
(3) Detent Ball
(4) Spring
(5) Rev–5th Shift Rod
(6) Rev–5th Shift Arm and Reverse Inhibitor
(7) 1st–2nd Shift Rod
(8) 3rd–4th Shift Rod
(9) 3rd–4th Shift Arm
(10) 1st–2nd Shift Arm
(11) Interlock Pin
(12) Intermediate Plate and Gear Assembly

Disassembly

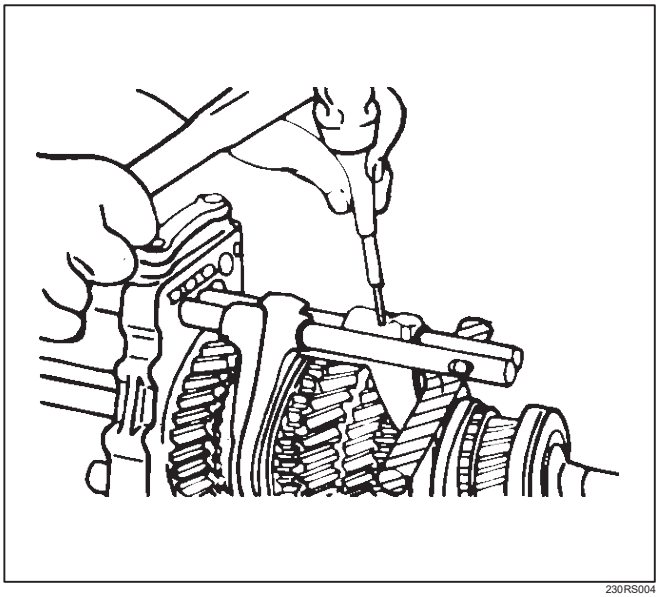
1. Remove detent spring plate and gasket(1), detent spring(2) and detent ball(3).
   Use a magnetic hand to remove the detent balls from the intermediate plate.


220RS011

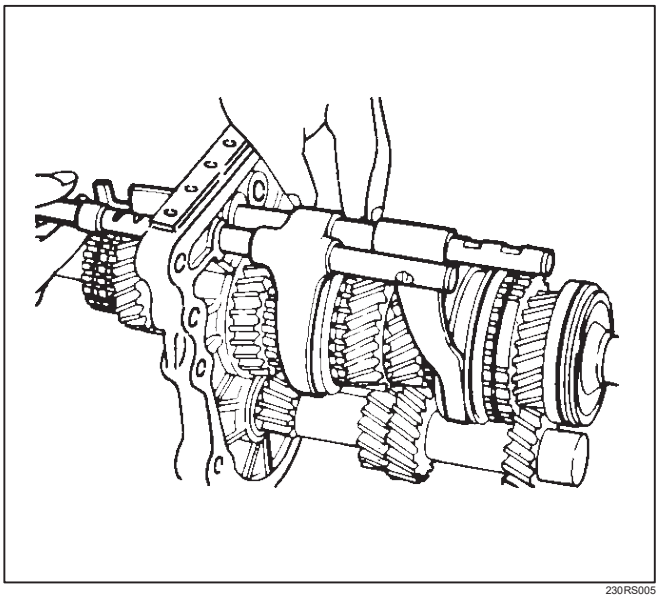
2. Remove spring(4).
3. Remove rev–5th shift rod(5), and rev–5th shift arm and reverse inhibitor(6).
   Remove 1st–2nd shift rod(7), 3rd–4th shift rod(8), 3rd–4th shift arm(9), and 1st–2nd shift arm (10).
   - Hold a round bar against the shift rod end.


230RS003

- Use a spring pin remover to remove the shift arm spring pins from the shift arms and the shift rods.


230RS004

- Move the 3rd–4th shift rod forward.


230RS005

- Remove the rev–5th, 1st–2nd and 3rd–4th shifter rods carefully. Interlock pins are located between the shifter rods in the intermediate plate.

4. Remove interlock pin(11) from intermediate plate and gear assembly(12).

Inspection and Repair

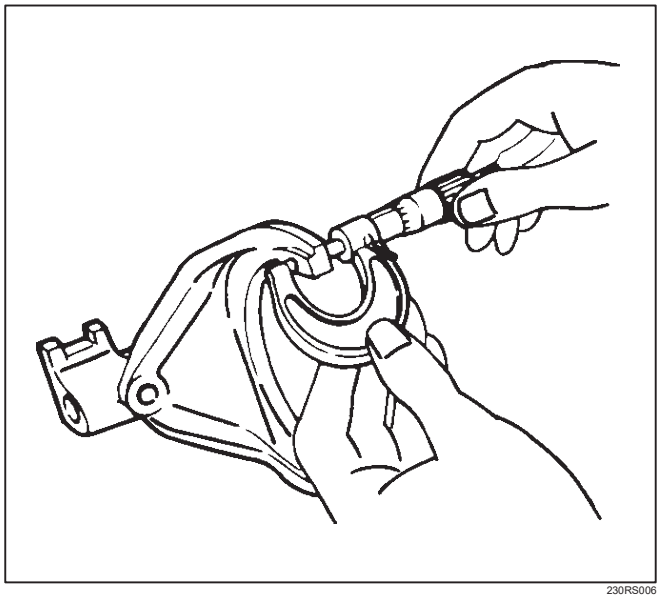
Make the necessary adjustments, and part replacements if excessive wear or damage is discovered during inspection.

Shift Arm Thickness

- Use a micrometer to measure the shift arm thickness.
  If the measured value is less than the specified limit, the shift arm must be replaced.

Shift Arm Thickness

	Standard	Limit
1st–2nd	9.60–9.85 mm (0.378–0.388 in)	9.0 mm (0.354 in)
3rd–4th Rev.5th	9.60–9.80 mm (0.378–0.386 in)	



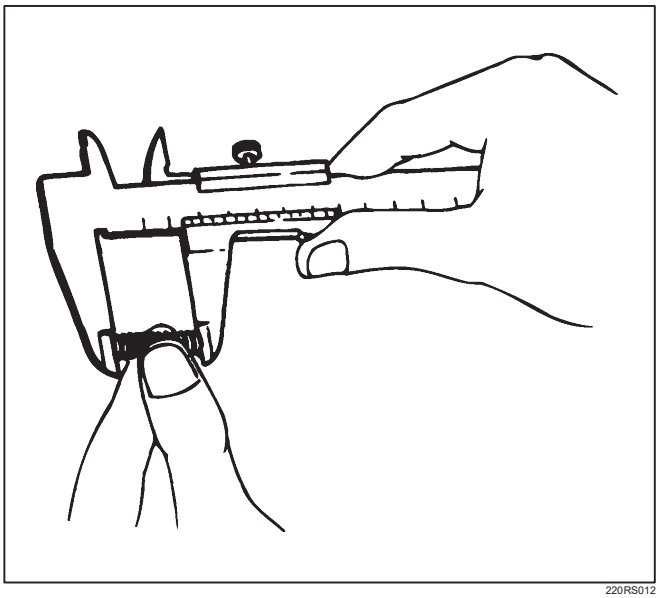
230RS006

Detent Spring Free Length

- Use a vernier caliper to measure the detent spring free length.
  If the measured value is less than the specified limit, the detent spring must be replaced.

Detent Spring Free Length

Standard	Limit
26.8 mm (1.06 in)	26.2 mm (1.03 in)



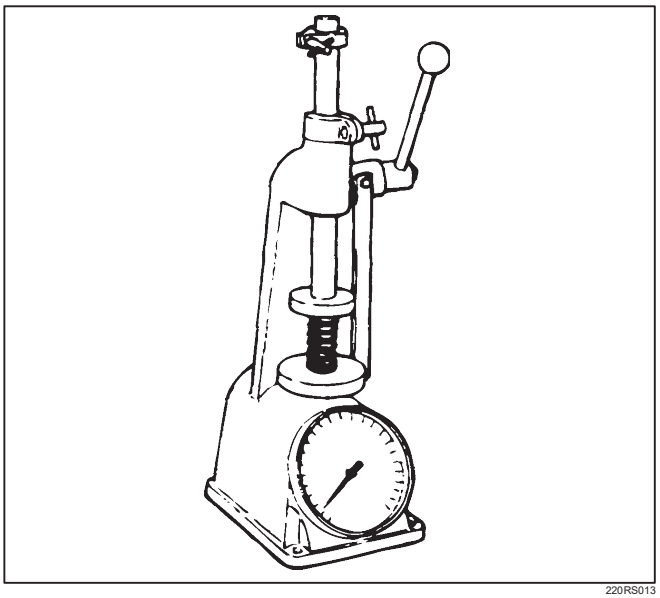
220RS012

Detent Spring Tension

- Use a spring tester to measure the valve spring tension.
  If the measured value is less than the specified limit, the detent spring must be replaced.

Detent Spring Tension

Compressed height	Standard
20 mm (0.787 in)	87.2 – 97.1 N (8.9 – 9.9 kg/ 19.6 – 21.8 lb)



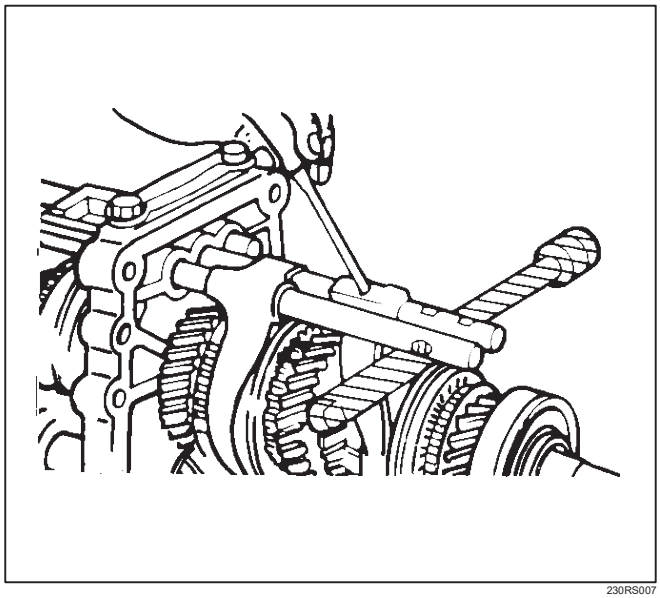
220RS013

Reassembly

1. Install 1st–2nd shift arm(10) and 3rd–4th shift arm(9) to intermediate plate and gear assembly(12).
2. Install 3rd–4th shift rod(8) and 1st–2nd shift rod(7).
   - Install the interlock pin(11) to the shift rod.
   - Install the shift rod together with the interlock pin to the intermediate plate.

     Do not allow the interlock pin to fall from the shift rod.
   - Hold a round bar against the shift rod end lower face to protect it against damage.
   - Install a new spring pin.

     Never reinstall the used spring pin.



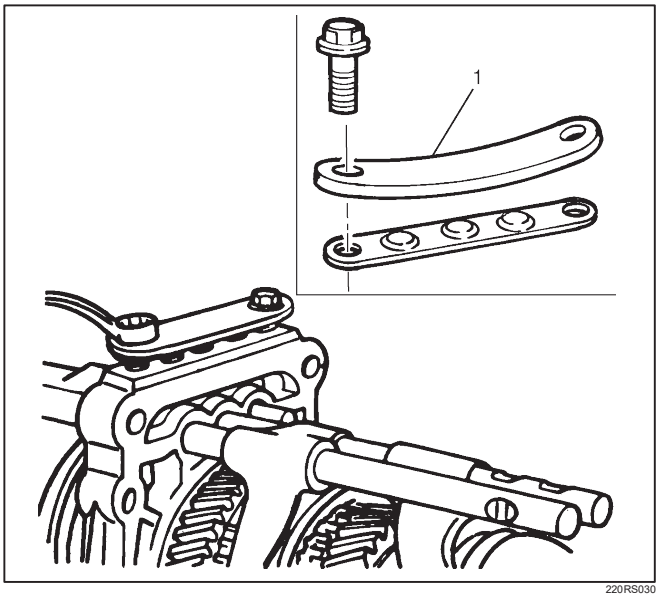
230RS007

3. Install rev–5th shift arm and reverse inhibitor(6) and rev–5th shift rod(5).
   - Apply oil to the reverse inhibitor inner surface.
   - Install the interlock pin(11) to the shift rod.
   - Install the shift rod together with the interlock pin to the intermediate plate.

     Do not allow the interlock pin to fall from the shift rod.
   - Hold a round bar against the shift rod end lower face to protect it against damage.
   - Install a new spring pin.

     Never reinstall the used spring pin.
4. Install spring(4).
5. Put detent balls(3) in the intermediate plate holes.
   - Apply oil to the detent balls.
6. Install detent springs(2) and detent spring plate and gasket(1).
   - Install a new gasket and the detent spring plate.
   - Tighten the detent spring plate bolts to the specified torque.

Torque: 20 N·m (2.0 kg·m/ 14 lb ft)

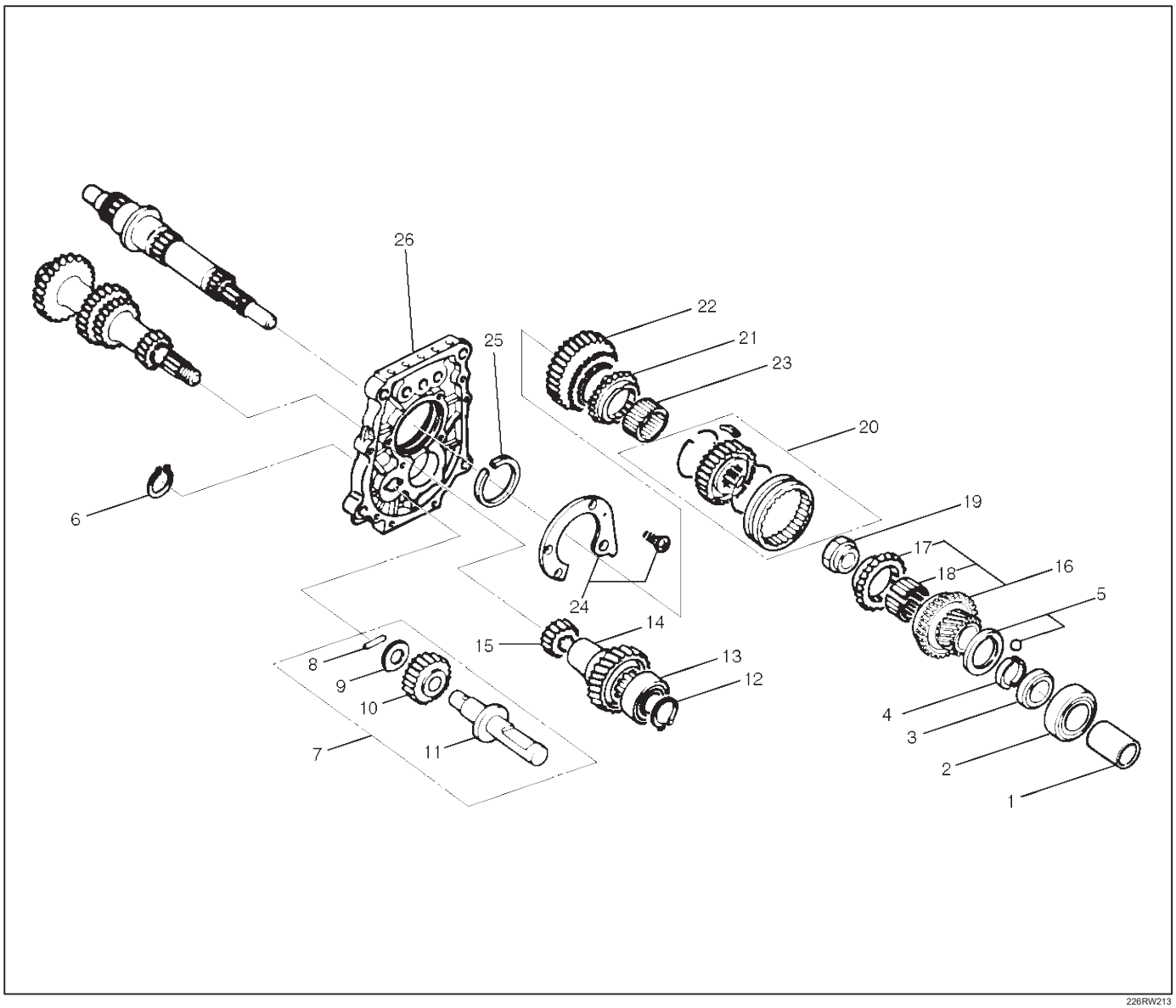


220RS030

Legend
(1) Warped

Reverse Gear and 5th Gear (MUA)

Disassembled View



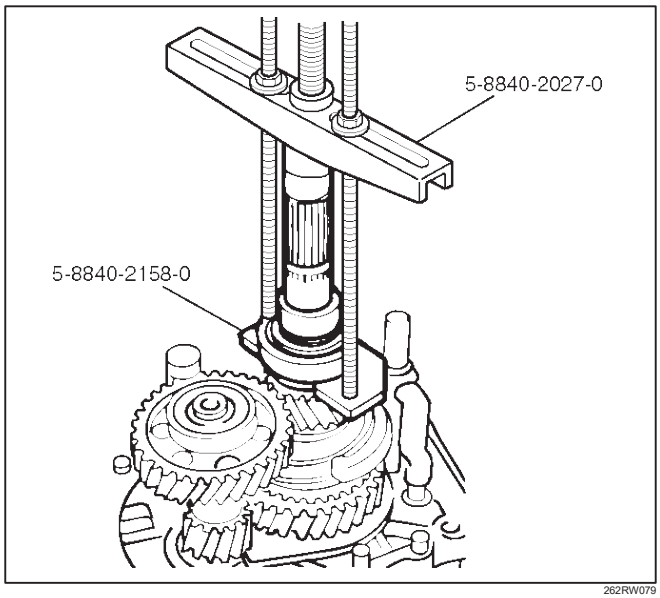
226RW213

Legend

(1) Oil Seal Collar
(2) Ball Bearing
(3) Retainer
(4) Thrust Plate
(5) Thrust Washer and Lock Ball
(6) Reverse Idler Gear Snap Ring
(7) Reverse Idler Gear Assembly
(8) Idle Shaft Pin
(9) Thrust Washer
(10) Reverse Idler Gear
(11) Reverse Idler Shaft
(12) Bearing Snap Ring
(13) Ball Bearing
(14) Counter 5th Gear
(15) Counter Reverse Gear
(16) 5th Gear
(17) 5th Block Ring
(18) Needle Bearing
(19) Mainshaft Nut
(20) Rev–5th Synchronizer Assembly
(21) Reverse Block Ring
(22) Reverse Gear
(23) Needle Baring
(24) Bearing Plate and Screw
(25) Bearing Snap Ring
(26) Intermediate Plate

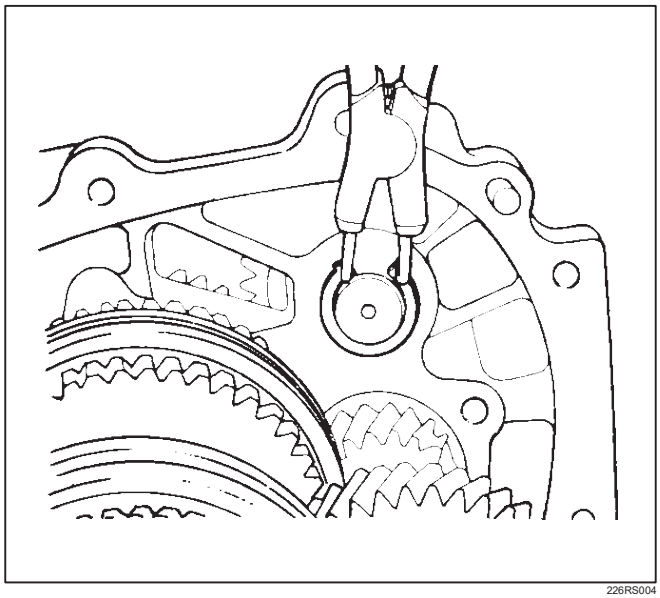
Disassembly

1. Set the retaining ring remover 5–8840–2158–0 and puller 5–8840–2027–0 to the retainer(3) and the mainshaft end.

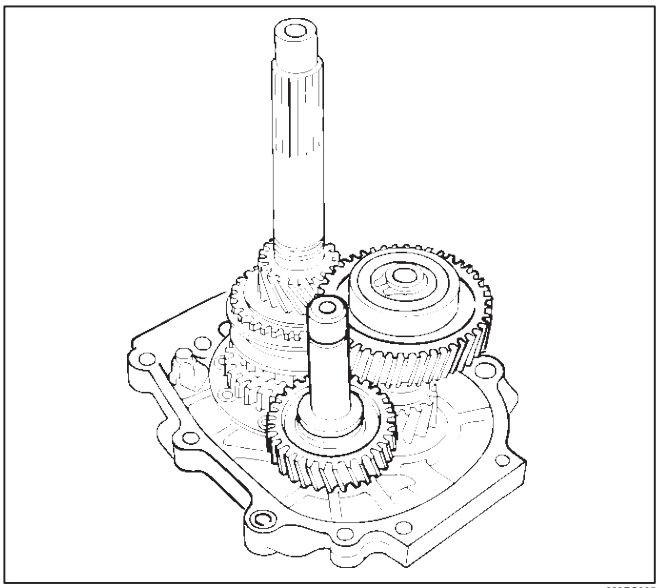


262RW079

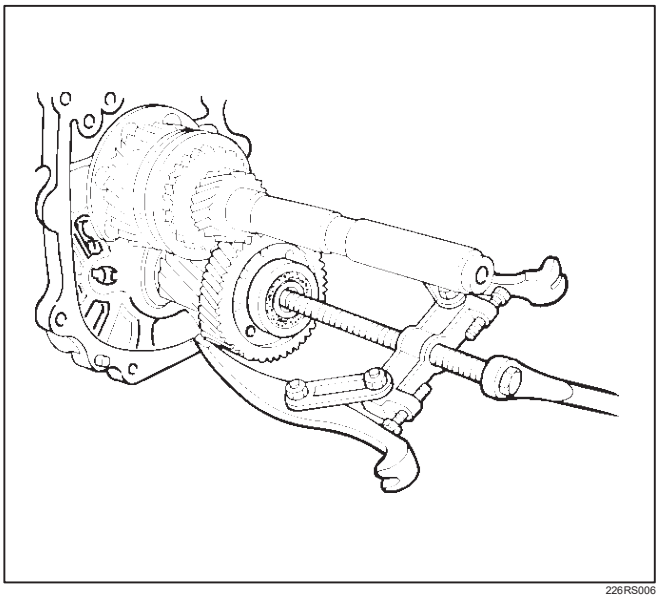
2. Remove the retainer(3) together with the bearing(2) and the oil seal collar(1).
   The universal puller may be used in place of the retaining ring remover.
3. Remove thrust plate(4) and thrust washer and lock ball(5).
4. Use a pair of snap ring pliers to remove reverse idler gear snap ring(6).


226RS004

5. Remove the reverse idler gear assembly(7) from the intermediate plate(26).

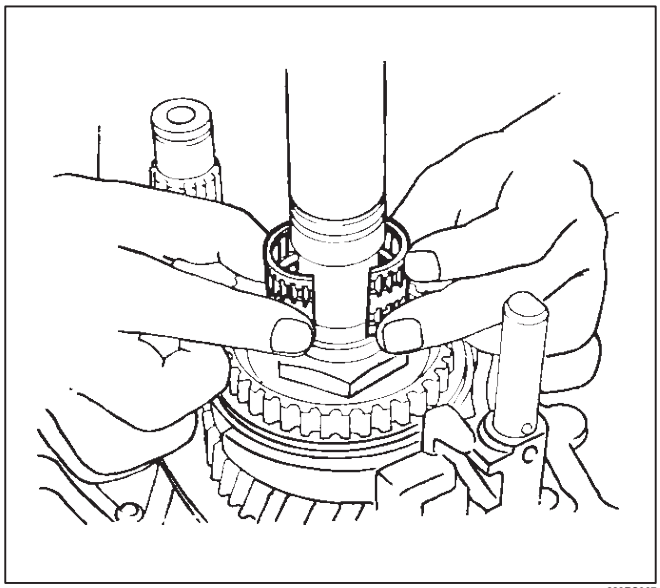

226RS005

6. Remove idle shaft pin(8), thrust washer(9), reverse idler gear(10), and reverse idler shaft(11).
7. Use a pair of snap ring pliers to remove the snap ring(12).
8. Attach the bearing remover to the counter gear shaft. Use the bearing remover to remove the ball bearing(13) and the counter 5th gear(14).

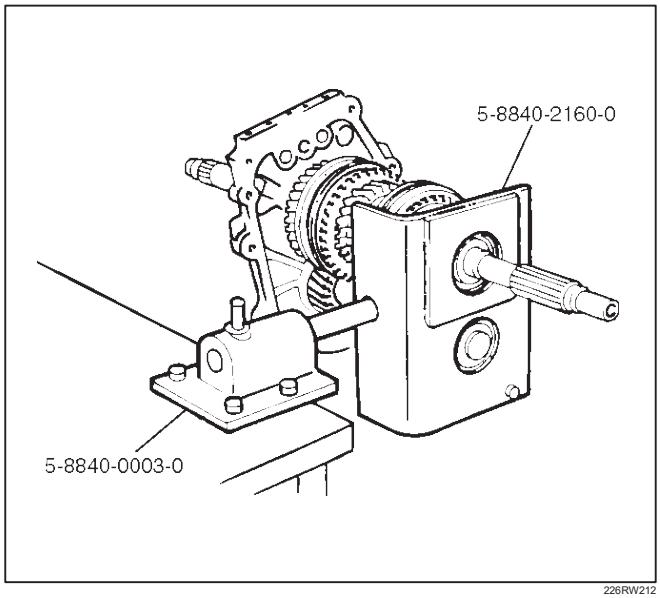

226RS006

9. Remove counter reverse gear(15).

10. Remove 5th gear(16), 5th block ring(17), and needle bearing (2 piece type) (18).

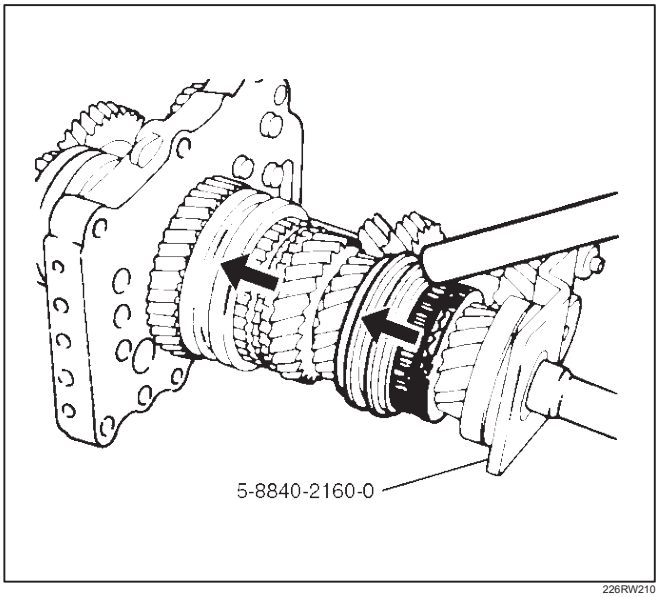

226RS007

11. Attach the holding fixture 5–8840–2160–0 and base 5–8840–0003–0 to the mainshaft and the counter gear.



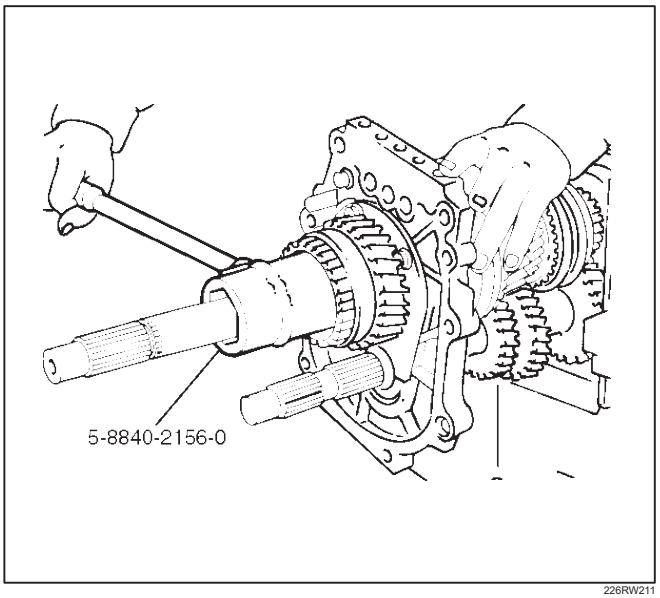
226RW212

12. Engage the 3rd–4th synchronizer with the 3rd gear. Engage the 1st–2nd synchronizer with the 1st gear.



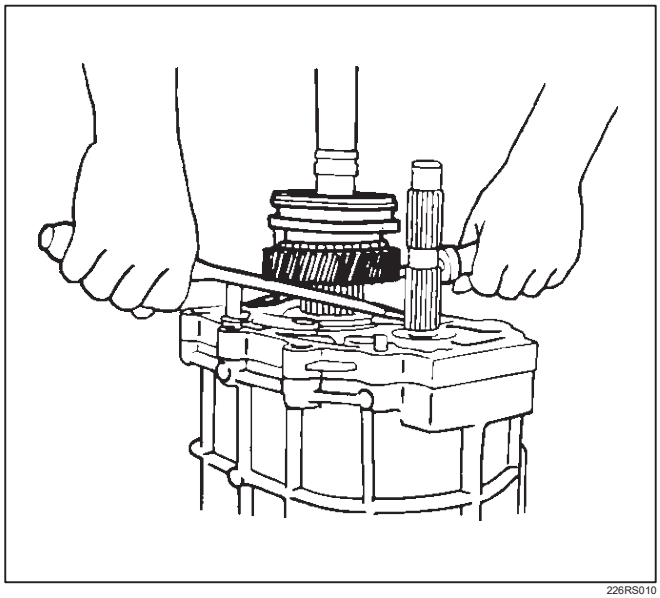
226RW210

Use the mainshaft nut wrench 5–8840–2156–0 to remove the mainshaft nut(19).

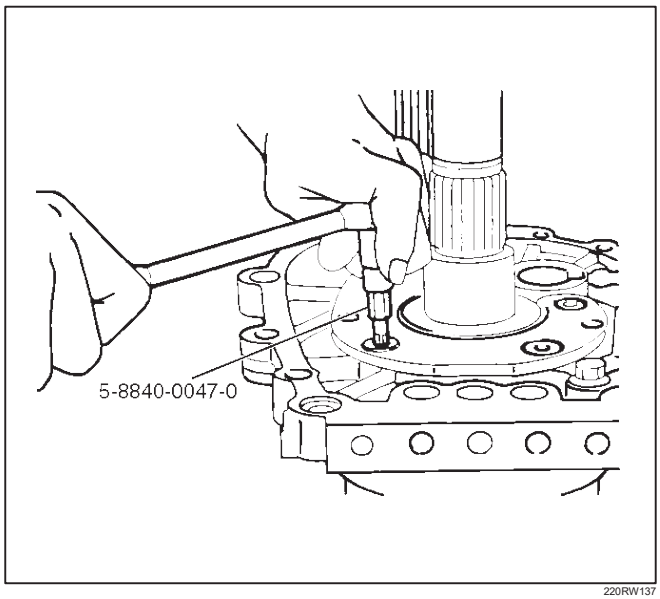


226RW211

13. Use pry bars between the reverse gear(22) and bearing plate(24) to remove the Rev–5th synchronizer assembly(20) together with reverse block ring(21) and reverse gear(22).

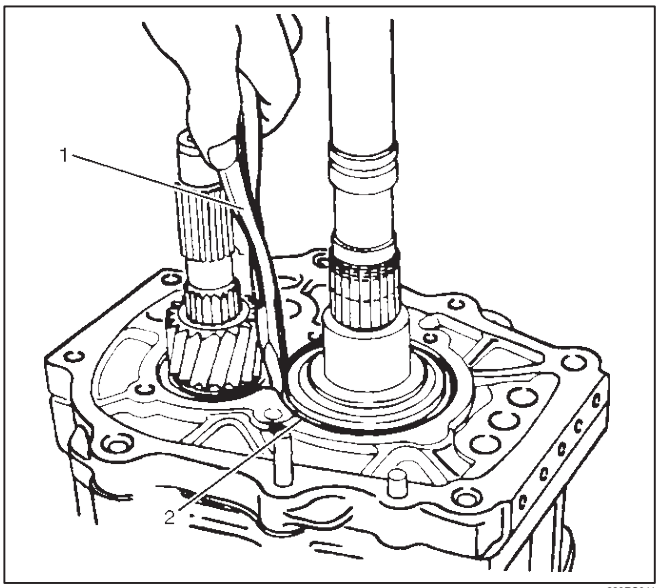

226RS010

14. Remove needle bearing(23).
15. Use the torx bit wrench 5–8840–0047–0(T45) to remove the bearing plate and screw(24) from the intermediate plate.



220RW137

16. Use the snap ring pliers(1) to remove the mainshaft bearing snap ring(29).



226RS011

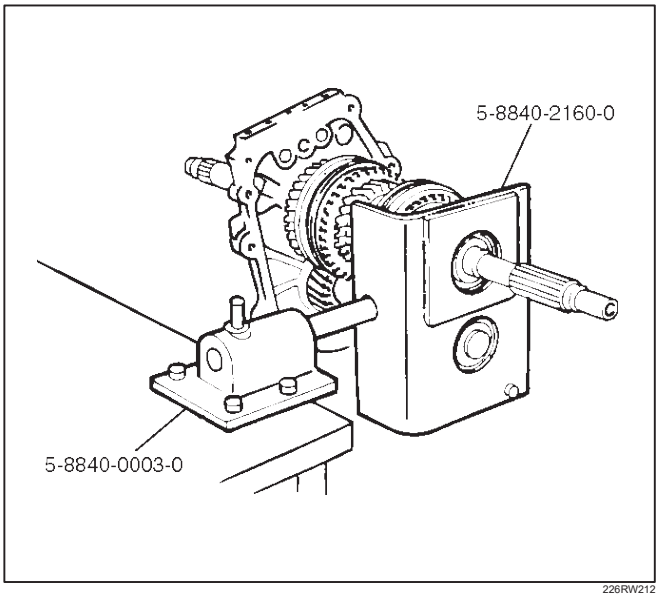
17. Hold the snap ring open with the pliers.
    Push the intermediate plate(26) toward the rear of the transmission to remove it.
    The bearing snap ring(25) will come free.

Inspection and Repair

Refer to Top Gear Shaft, Main Gear Shaft, and Counter Gear in this section for inspection and repair.

Reassembly

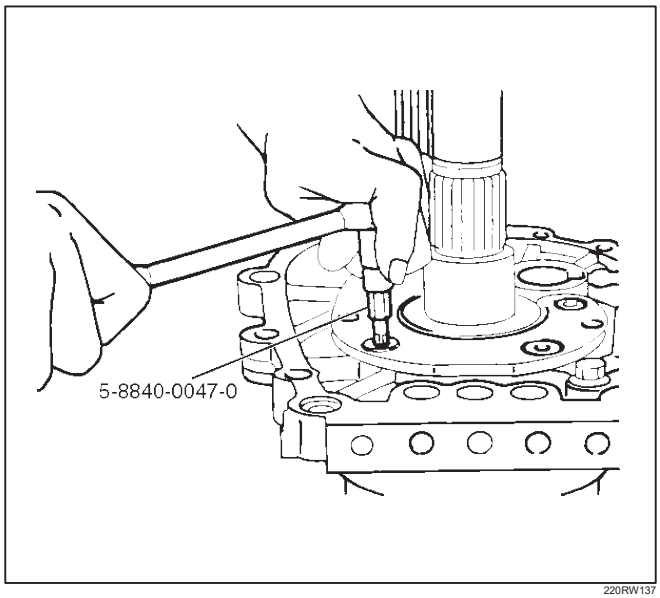
1. Mesh the counter gear with the mainshaft assembly.
   Install the holding fixture 5–8840–2160–0 and base 5–8840–0003–0 to the mainshaft and the counter gear.



226RW212

2. Place the holding fixture (with the mainshaft and the counter shaft) in a vise.
   Install the intermediate plate(26).
3. Install bearing snap ring(25).
4. Apply recommended thread locking agents (LOCTITE 242) or its equivalent to each of the bearing plate screw threads.
   Install bearing plate and screw(24).
   Tighten the screws to the specified torque by using torx bit wrench 5–8840–0047–0.

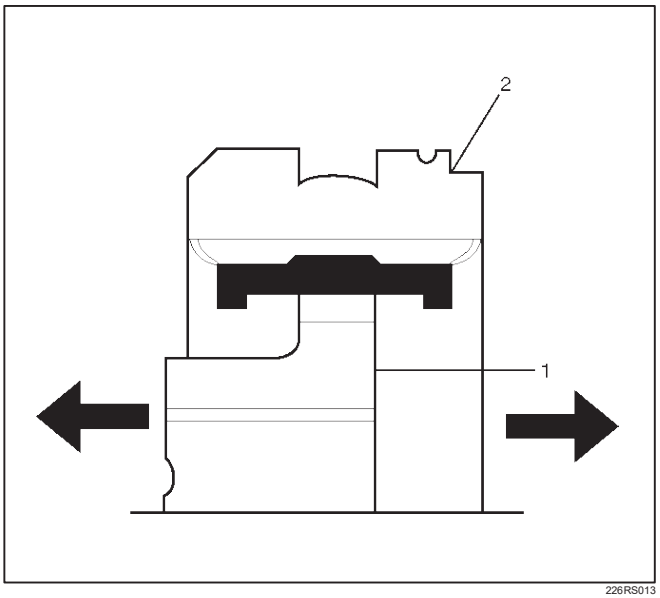
Torque: 15 N·m (1.5 kg·m/11 lb ft)



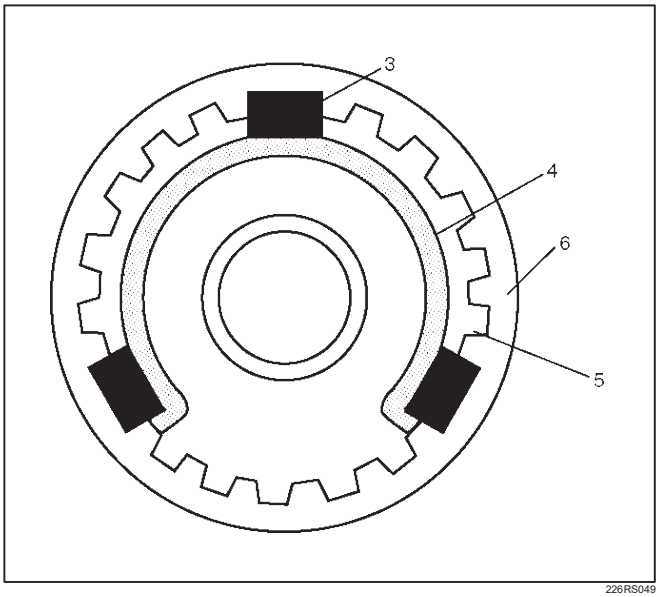
220RW137

5. Install needle bearing(23), reverse gear(22), and reverse block ring(21).
6. Assemble rev–5th synchronizer assembly(20) by performing the following steps.
   1. Turn the clutch hub face(1) toward the sleeve groove(2) (rear side) on the outer circumference.
   2. Check that the inserts(3) fit snugly into the block ring insert grooves.
   3. Check that the inserts springs(4) are fitted to the inserts as shown in the illustration.
   4. Check that the clutch hub(5) and the sleeve(6) slide smoothly.
   5. Install the synchronizer assembly(20) to the mainshaft.

   The clutch hub face (with the heavy boss) must be facing the reverse gear(22) side.

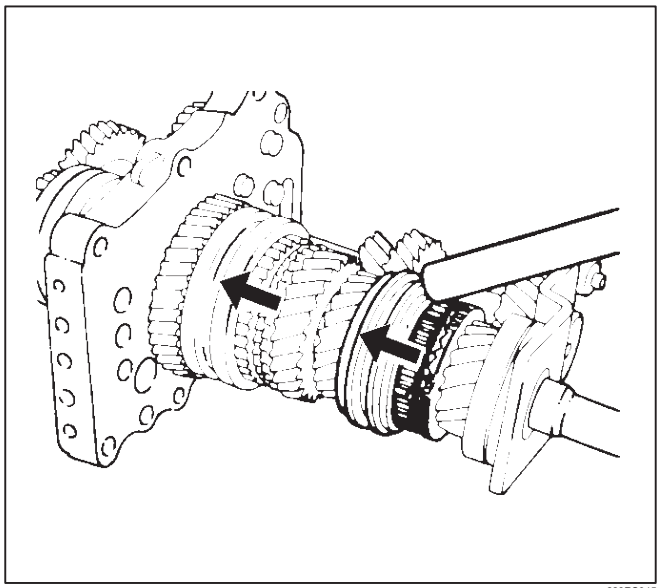


226RS013



226RS049

7. Mesh the 1st–2nd and 3rd–4th synchronizers with both the 1st and 3rd gears (double engagement).

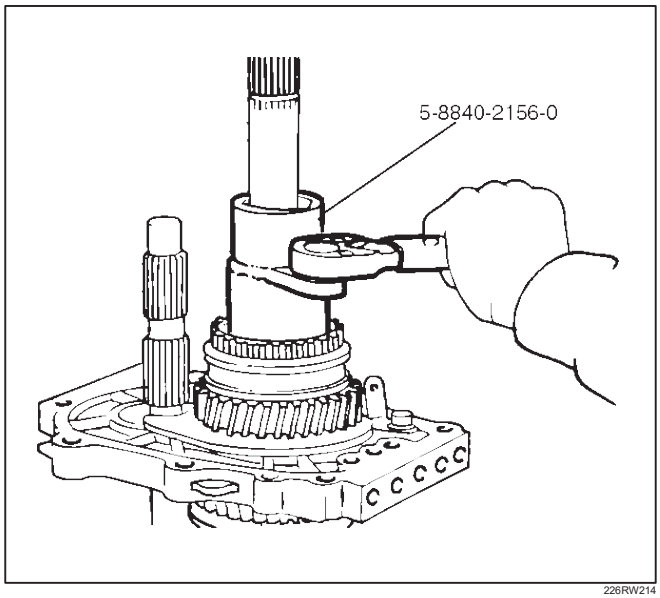


226RS015

This will prevent the mainshaft from turning.

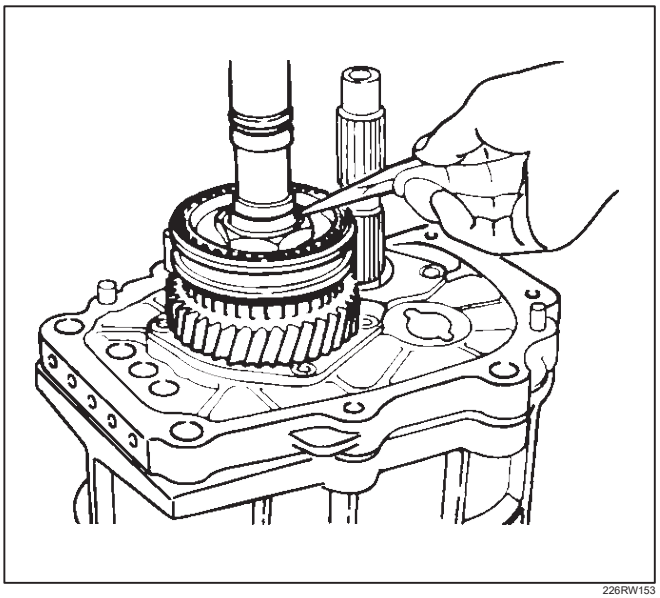
8. Install the new mainshaft hub nut(19).
   Use the mainshaft nut wrench 5–8840–2156–0 to tighten the mainshaft nut(19) to the specified torque.

Torque: 137 N·m (14.0 kg·m/101 lb ft)



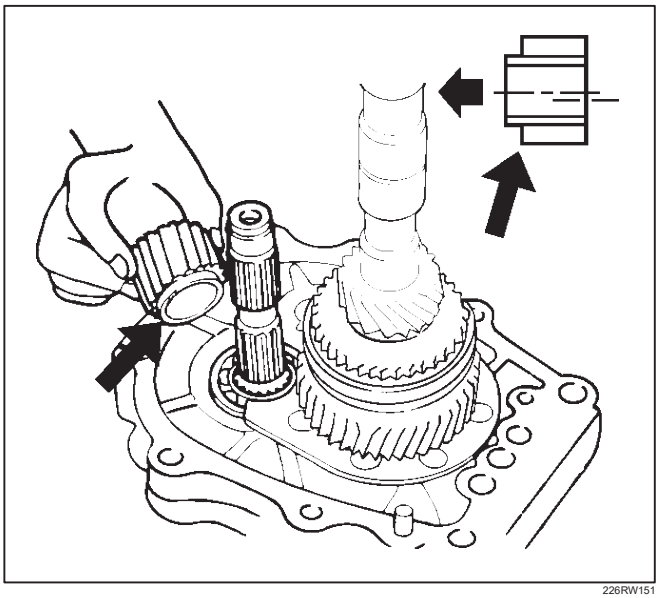
226RW214

9. Use a punch to stake the mainshaft nut at one spot.



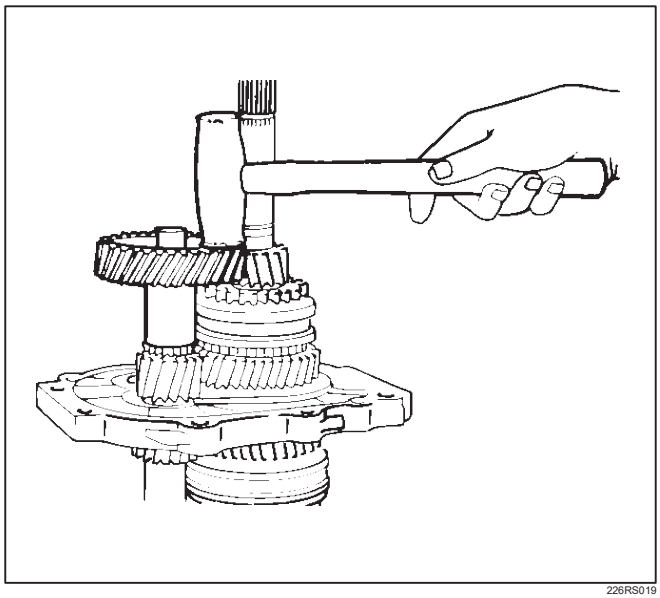
226RW153

10. Install needle bearing(18), 5th block ring(17), and 5th gear(16).
11. Apply engine oil to the counter reverse gear(15) and the reverse gear(22).
    Install the counter reverse gear(15) to the counter shaft.
    The reverse gear projection must be facing the intermediate plate.



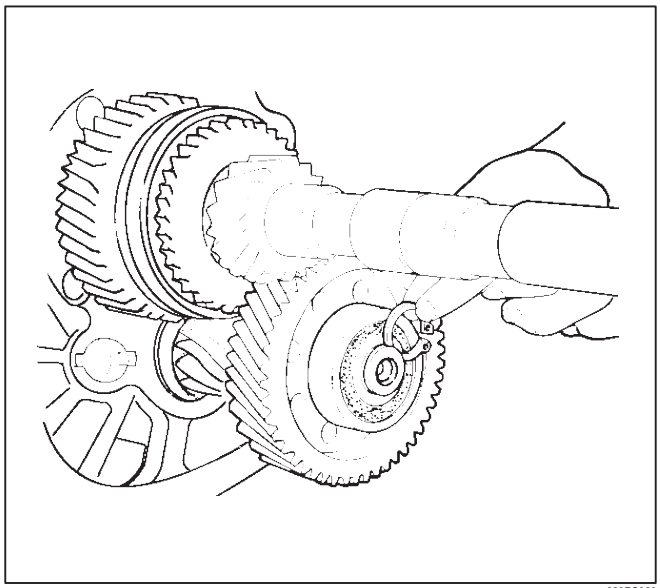
226RW151

12. Install the counter 5th gear(14) to the transmission.



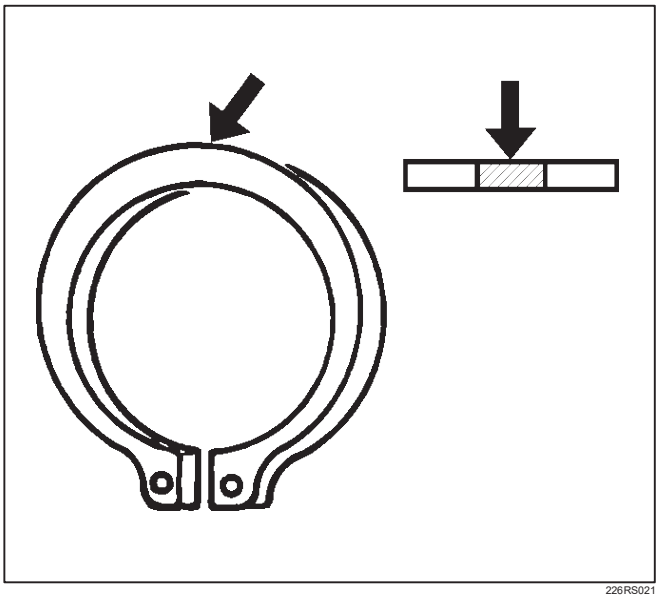
226RS019

13. Install ball bearing(13) and bearing snap ring by performing the following steps:
    - Select the snap ring(12) which will provide the minimum clearance between the ball bearing and the snap ring.



226RS020

- There are six snap ring sizes available.
  The snap rings are color-coded to indicate their thickness.



226RS021

Ball Bearing and Snap Ring Clearance

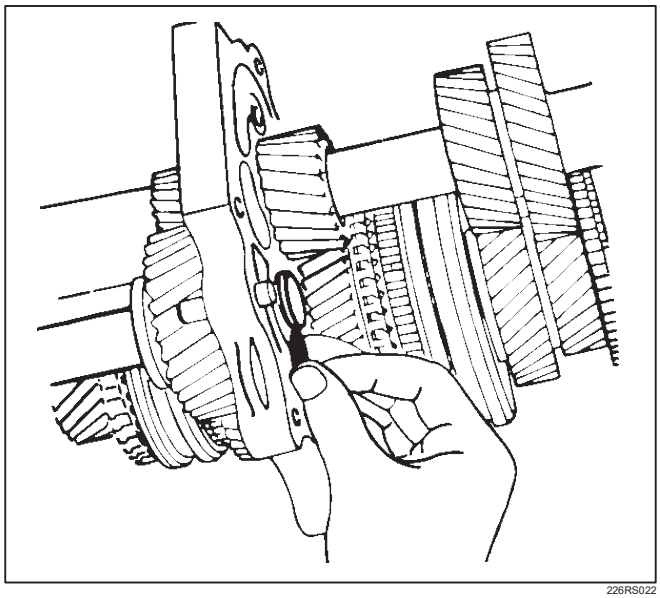
Standard: 0–0.15 mm (0–0.0059 in)

Snap Ring Availability

Thickness	Color Coding
1.1 mm (0.043 in)	White
1.2 mm (0.047 in)	Yellow
1.3 mm (0.051 in)	Blue
1.4 mm (0.055 in)	Pink
1.5 mm (0.059 in)	Green
1.6 mm (0.063 in)	Brown

- Use a pair of snap ring pliers to install the snap ring(12) to the counter gear shaft.
  The snap ring must be fully inserted into the counter gear shaft snap ring groove.

14. Assemble reverse idler shaft(11), reverse idler gear(10), thrust washer(9), and idle shaft pin(8) into reverse idler gear assembly(7).
15. Select reverse idler gear snap ring(6) which will provide the minimum clearance between the intermediate plate(26) and the snap ring(6).


226RS022

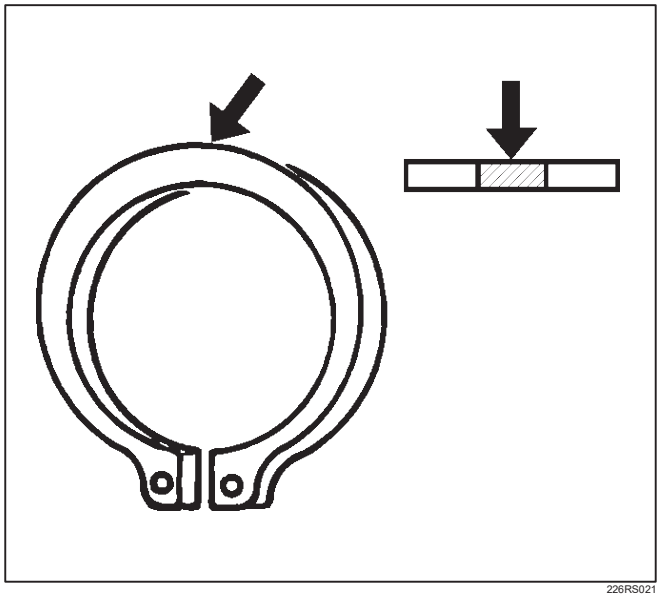
- There are three snap ring sizes available.
  The snap rings are color-coded to indicate their thickness.

Intermediate Plate and Snap Ring Clearance

Standard: 0 – 0.15 mm (0 – 0.0059 in)

Snap Ring Availability

Thickness	Color Coding
1.2 mm (0.047 in)	White
1.3 mm (0.051 in)	Yellow
1.4 mm (0.055 in)	Blue


226RS021

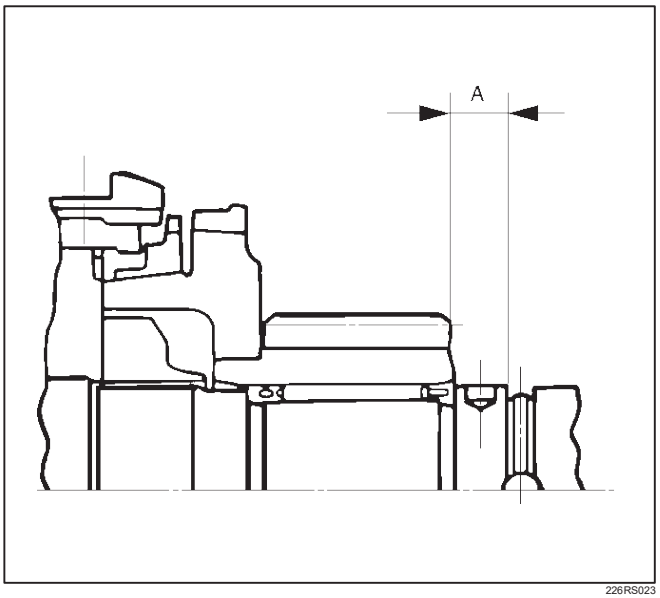
- Use a pair of snap ring pliers to install the snap ring to the reverse idler shaft.
  The snap ring must be fully inserted into the reverse idler shaft snap ring groove.

16. Install thrust washer and lock ball(5) by performing the following steps:
    - Use a thickness gauge to measure the clearance between the 5th gear and the thrust washer.

5th Gear and Thrust Washer Clearance

Standard: 0.10 – 0.25 mm (0.004 – 0.010 in)

- Measure clearance “A” as shown in the figure.

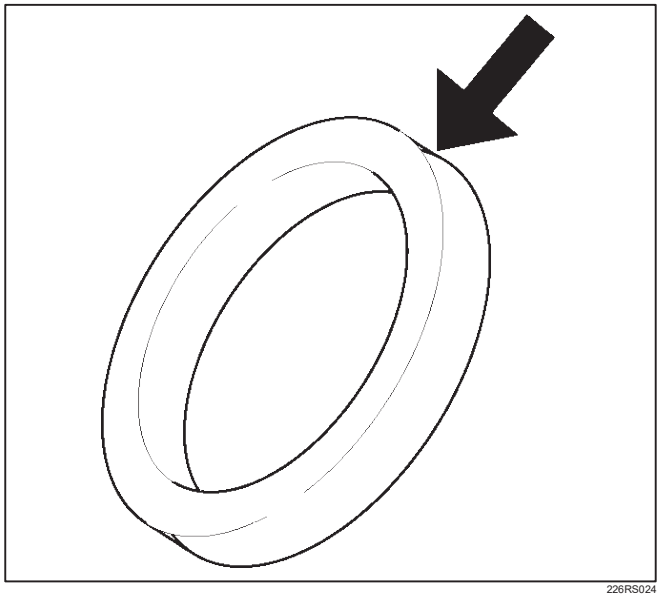


226RS023

- Select appropriate thrust washer from chart.
- There are four thrust washer sizes available.
- The thrust washers are color coded to indicate their thickness.

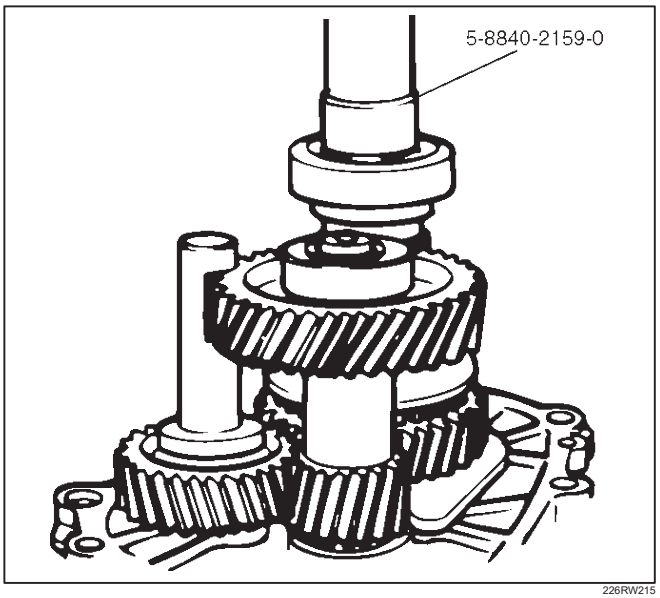
Thrust Washer Availability

Thickness mm (in)	Color Coding	A mm (in)	Clearance mm (in)
7.9 (0.311)	White	8.05–8.1 (0.317–0.319)	0.15–0.25 (0.006–0.010)
8.0 (0.315)	Yellow	8.1–8.2 (0.319–0.323)	0.1–0.25 (0.004–0.010)
8.1 (0.319)	Green	8.2–8.3 (0.323–0.327)	0.1–0.25 (0.004–0.010)
8.2 (0.323)	Bluen	8.3–8.36 (0.327–0.329)	0.1–0.21 (0.004–0.008)


226RS024

- Apply grease to the thrust washer and the lock ball.
- Install the thrust washer and the lock ball.

17. Install thrust plate(4) and retainer(3).
18. Apply engine oil to the bearing inner and outer circumference.
    Use the installer 5–8840–2159–0 to install the ball bearing(2) to the mainshaft in proper direction.

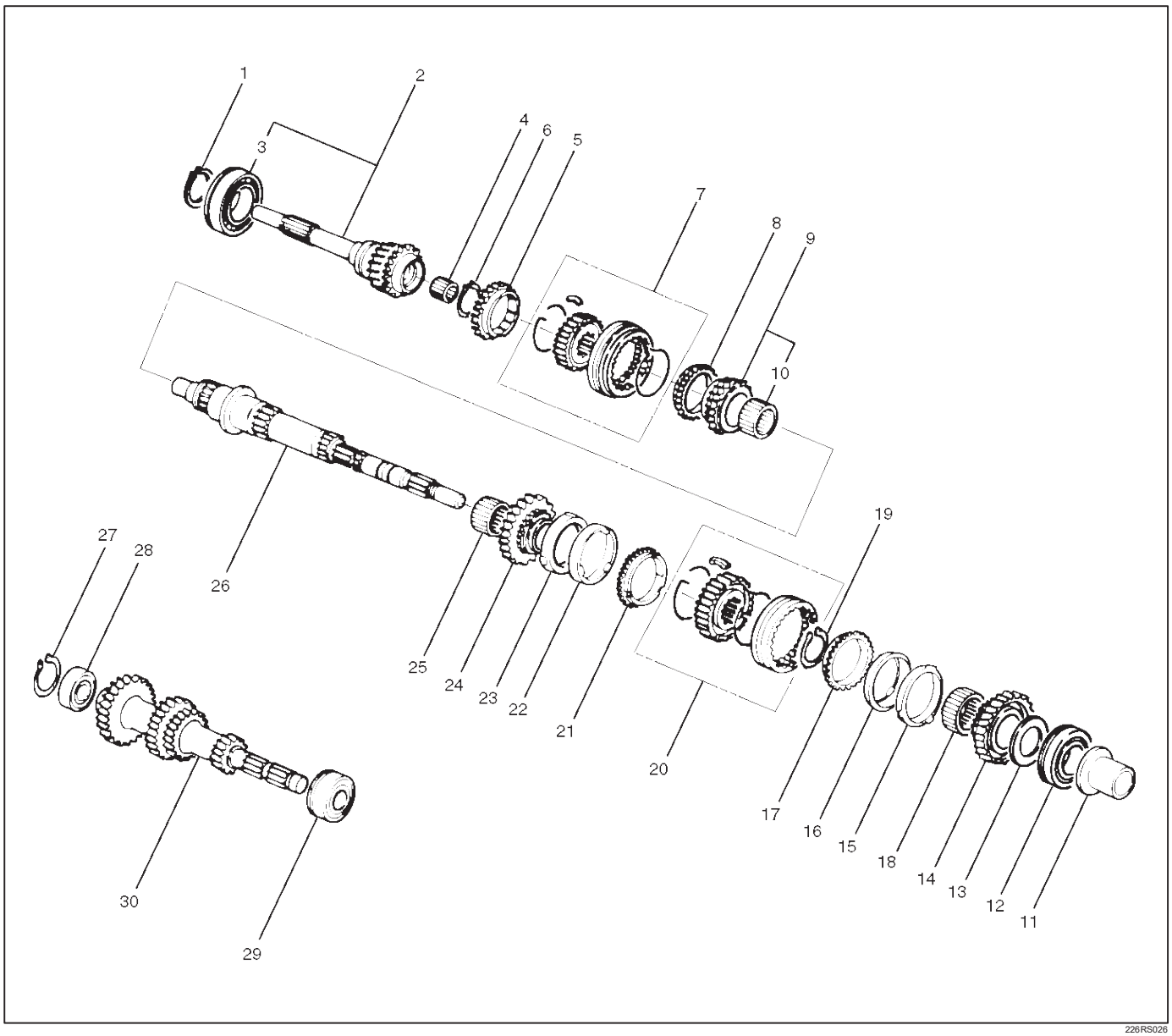


226RW215

19. Install oil seal collar(1).

Top Gear Shaft, Main Gear Shaft, and Counter Gear Shaft (MUA)

Disassmebled View



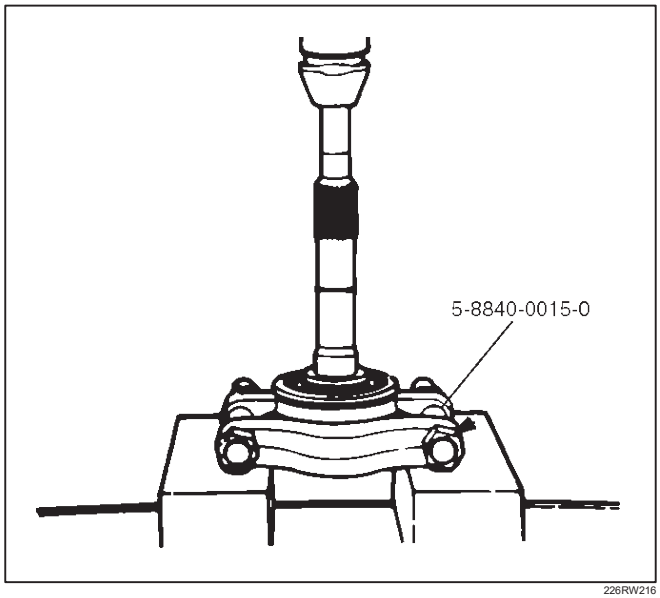
226RS026

Legend

(1) Top Gear Shaft Snap Ring
(2) Top Gear Shaft
(3) Ball Bearing
(4) Needle Bearing
(5) Top Block Ring
(6) Mainshaft Snap Ring
(7) 3rd–4th Synchronizer Assembly
(8) 3rd Block Ring
(9) 3rd Gear
(10) Needle Bearing
(11) Needle Bearing Collar
(12) Mainshaft Ball Bearing
(13) 1st Gear Thrust Bearing
(14) 1st Gear
(15) 1st Inside Ring
(16) 1st Outside Ring
(17) 1st Block Ring
(18) Needle Bearing
(19) Clutch Hub Snap Ring
(20) 1st–2nd Synchronizer Assembly
(21) 2nd Block Ring
(22) 2nd Outside Ring
(23) 2nd Inside Ring
(24) 2nd Gear
(25) Needle Bearing
(26) Mainshaft
(27) Bearing Snap Ring
(28) Front Rollar Bearing
(29) Center Roller Bearing
(30) Counter Gear Shaft

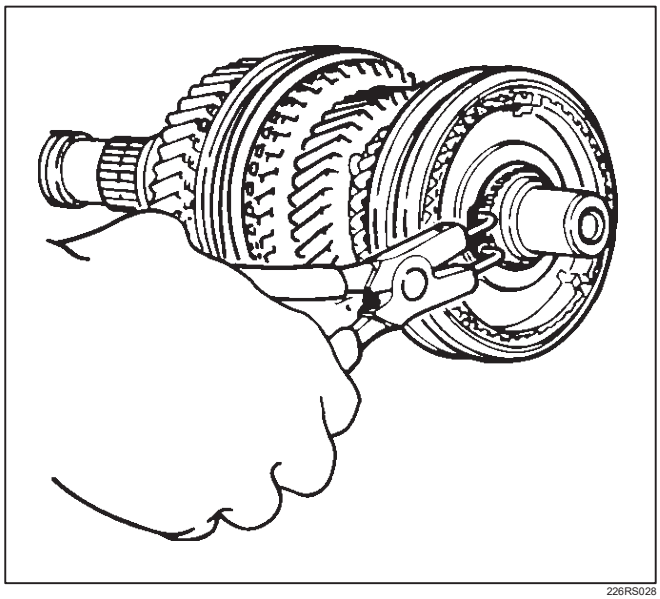
Disassembly

1. Use a pair of snap ring pliers to remove the top gear shaft snap ring(1).
2. Remove top gear shaft(2) with ball bearing(3).
3. Use a bench press and the bearing remover 5–8840–0015–0 to remove the ball bearing(3).

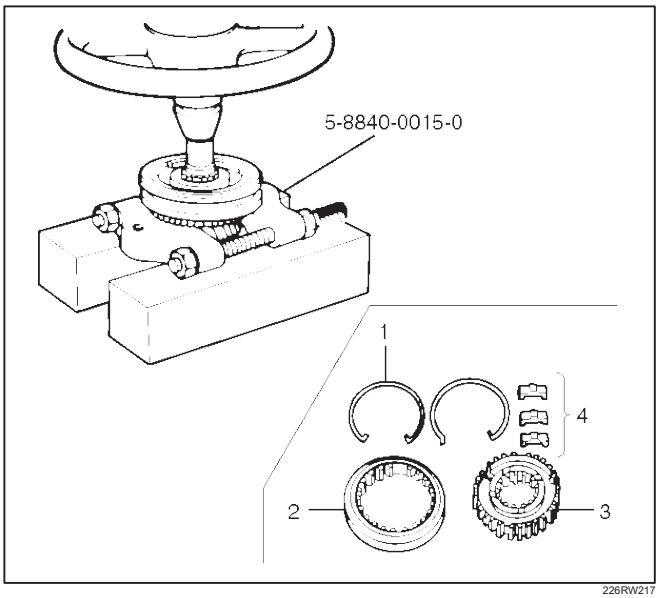


226RW216

4. Remove needle bearing(4) and top block ring(5), mainshaft snap ring.
5. Use a pair of snap ring pliers to remove the mainshaft snap ring(6).


226RS028

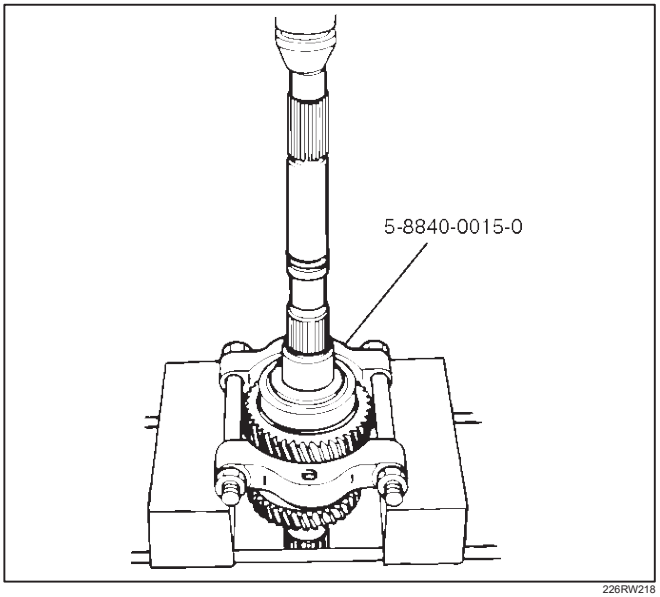
6. Use a bench press and the bearing remover 5–8840–0015–0 to remove the 3rd–4th synchronizer assembly(7) as a set.
   Disassemble the synchronizer assembly.



226RW217

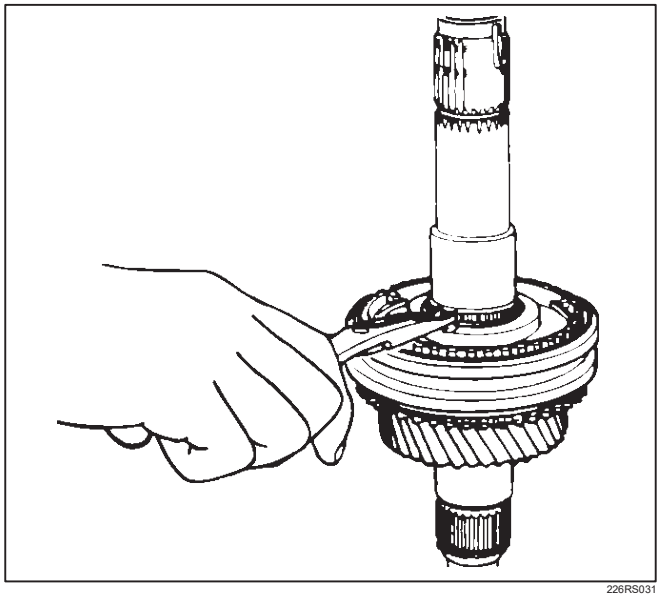
Legend
(1) Springs
(2) Sleeve
(3) Clutch Hub
(4) Inserts

7. Remove 3rd block ring(8), 3rd gear(9), and needle bearing(10).
8. Remove needle bearing collar(11).
9. Use a bench press and the bearing remover 5–8840–0015–0 to remove the 1st gear(14) together with the mainshaft ball bearing(12) and 1st gear thrust bearing(13).

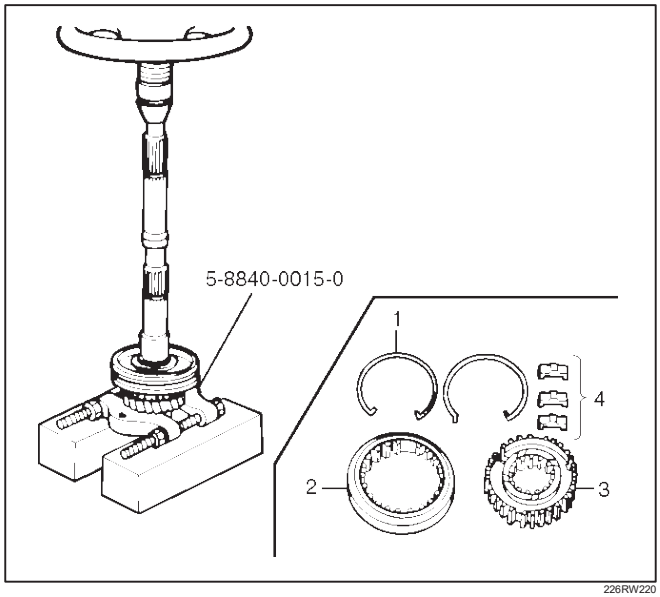


226RW218

10. Disassemble 1st inside ring(15), 1st outside ring(16), and 1st block ring(17).
11. Remove needle bearing(18).
12. Use a pair of snap ring pliers to remove the clutch hub snap ring(19).


226RS031

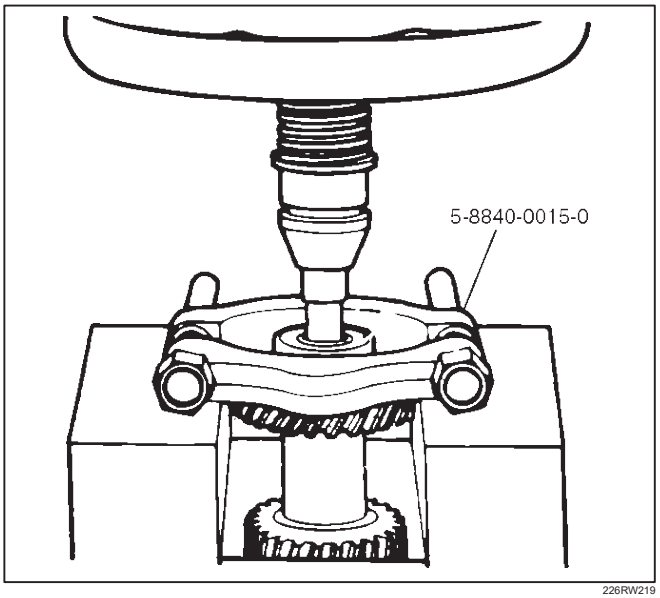
13. Use a bench press and the bearing remover 5–8840–0015–0 to remove the 2nd gear(24) together with 1st–2nd synchronizer assembly(20), 2nd block ring(21), 2nd outside ring(22), and 2nd inside ring(23).
    Disassemble the synchronizer assembly.



226RW220

Legend
(1) Springs
(2) Sleeve
(3) Clutch Hub
(4) Inserts

14. Remove needle bearing(25) from mainshaft(26).
15. Remove bearing snap ring(27)
16. Use a bench press and the bearing remover 5–8840–0015–0 to remove the front roller bearing(28).



226RW219

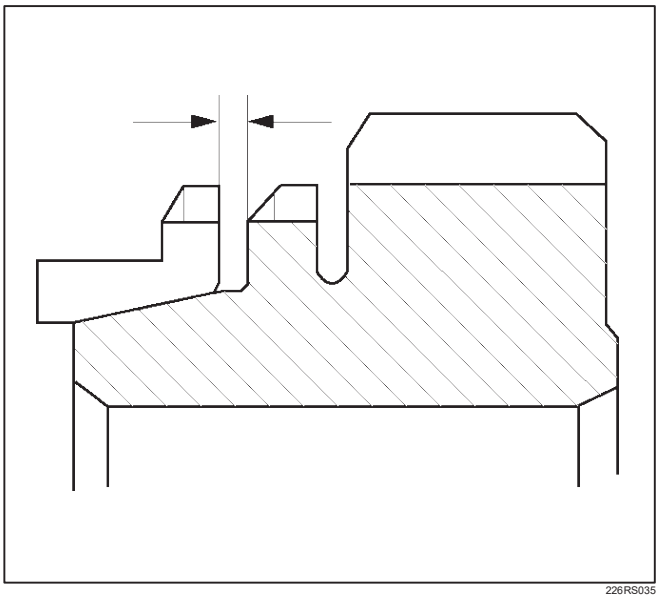
17. Remove center roller bearing(29) from counter gear shaft(30).

Inspection and Repair

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.

Block Ring and Dog Teeth Clearance

- Use a thickness gauge to measure the clearance between the block ring and the dog teeth.


226RS035

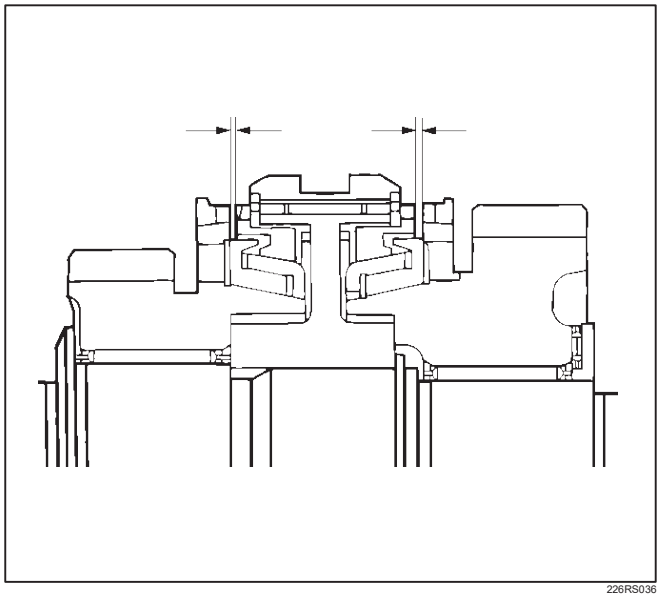
If the measured value exceeds the specified limit, the block ring must be replaced.

Block Ring and Dog Teeth Clearance

Standard	Limit
1.5 mm (0.059 in)	0.8 mm (0.032 in)

1st–2nd Synchronizer (3–CONE)

- Use a thickness gauge to measure the clearance between the block ring and the dog teeth.



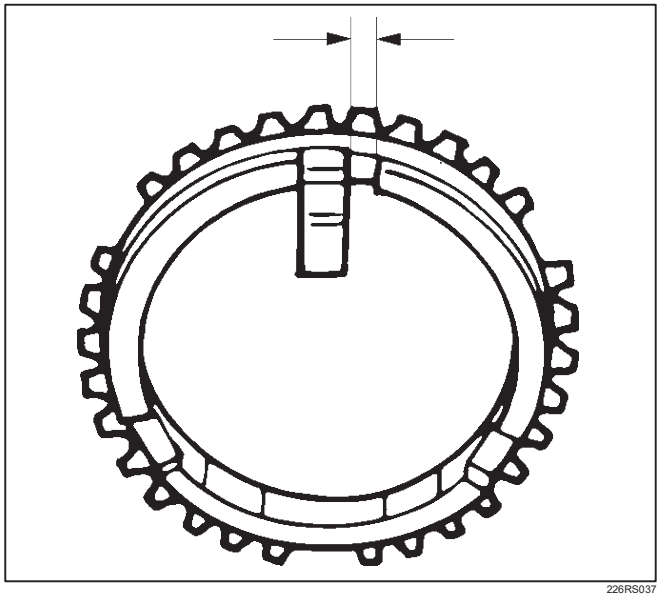
If the measured value exceeds the specified limit,the 1st–2nd synchronizer assembly must be replaced.

Block Ring and Dog Teeth Clearance

Standard	Limit
1.5 mm (0.059 in)	0.8 mm (0.032 in)

Block Ring and Insert Clearance

- Use a vernier caliper or thickness gauge to measure the clearance between the block ring and the insert.



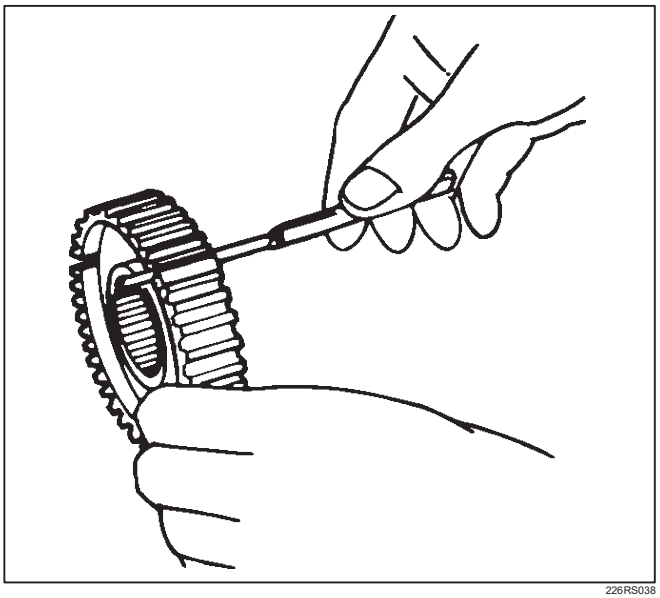
If the measured value exceeds the specified limit, the block ring and the insert must be replaced.

Block and Insert Clearance

	Standard	Limit
3rd–4th	3.46 – 3.74 mm (0.136 – 0.147 in)	4.0 mm (0.158 in)
1st–2nd	4.34 – 4.66 mm (0.171 – 0.183 in)	4.9 mm (0.193 in)
Rev–5th	3.59 – 3.91 mm (0.141 – 0.154 in)	4.1 mm (0.161 in)

Clutch Hub and Insert Clearance

- Use a thickness gauge to measure the clearance between the clutch hub and the insert.



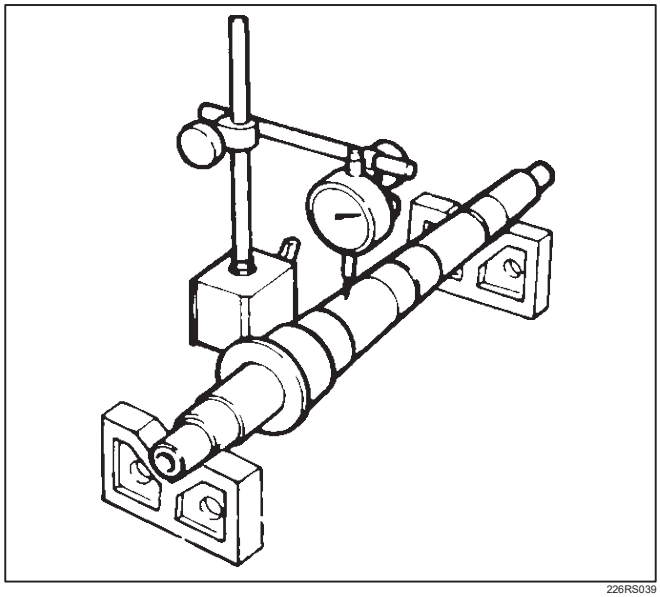
If the measured value exceeds the specified limit, the clutch hub and the insert must be replaced.

Clutch Hub and Insert Clearance

	Standard	Limit
3rd–4th	0.01 – 0.19 mm (0.0004 – 0.0075 in)	0.3 mm (0.012 in)
1st–2nd Rev–5th	0.09 – 0.31 mm (0.0035 – 0.0122 in)	0.4 mm (0.016 in)

Mainshaft Run-out

- Install the mainshaft to V-blocks.
- Use a dial indicator to measure the mainshaft central portion run-out.



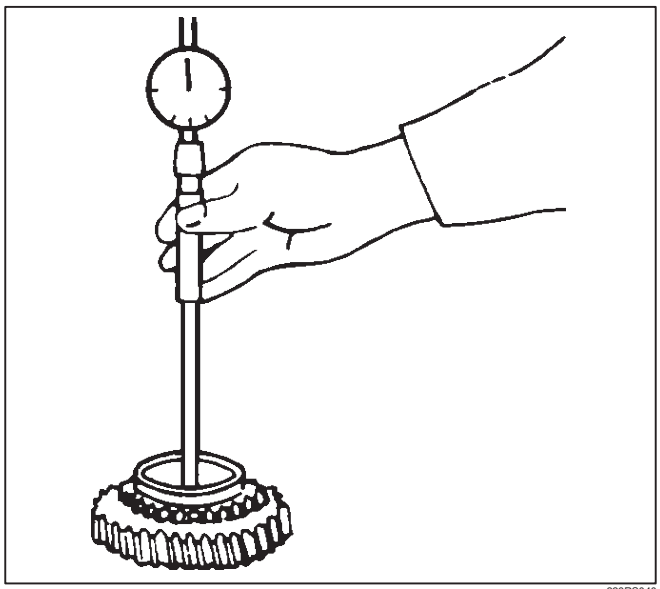
If the measured mainshaft run-out exceeds the specified limit, the mainshaft must be replaced.

Mainshaft Run–out

Limit: 0.05 mm (0.0020 in)

Gear Inside Diameter

- Use an inside dial indicator to measure the gear inside diameter.



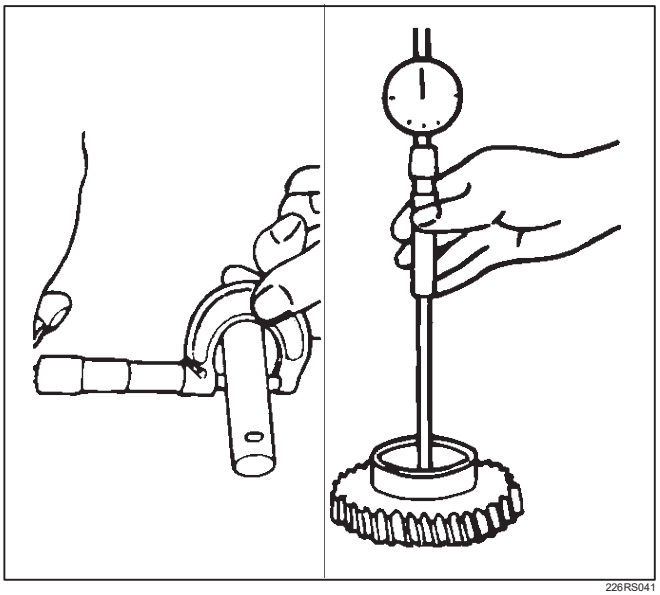
If the measured value is less than the specified limit, the gear must be replace.

Gear Inside Diameter

	Standard	Limit
1st 3rd	45.000 – 45.013 mm (1.771 – 1.772 in)	45.100 mm (1.776 in)
2nd	52.000 – 52.013 mm (2.047 – 2.048 in)	52.100 mm (2.051 in)
Rev.	48.000 – 48.013 mm (1.889 – 1.890 in)	48.100 mm (1.894 in)
5th	32.000 – 32.013 mm (1.259 – 1.260 in)	32.100 mm (1.246 in)

Reverse Idler Gear and Idler Gear Shaft Clearance

- Use a micrometer to measure the idler gear shaft diameter.
- Use an inside dial indicator to measure the idler gear inside diameter.



- Calculate the idler gear and idler gear shaft clearance.

  Idler gear inside diameter-idler gear shaft diameter = idle gear and idler gear shaft clearance.

  If the measured value exceeds the specified limit, the idle gear and/or the idler gear shaft must be replaced.

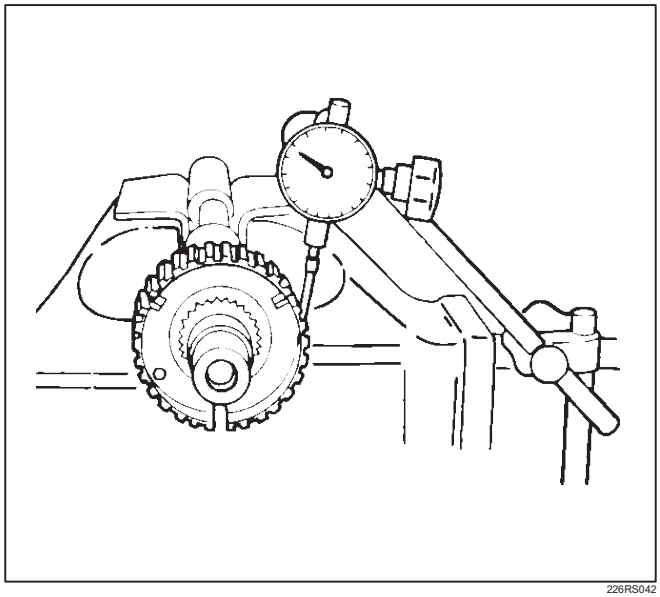
Idler Gear and Idler Gear Shaft Clearance

Standard: 0.041–0.074 mm (0.016–0.0029 in)

Limit: 0.150 mm (0.0059 in)

Clutch Hub Spline Play

- Set a dial indicator to the clutch hub to be measured.



- Move the clutch hub as far as possible to both the right and the left.
  Note the dial indicator reading.
  If the measured value exceeds the specified limit, the clutch hub must be replaced.

Clutch Hub Spline Play

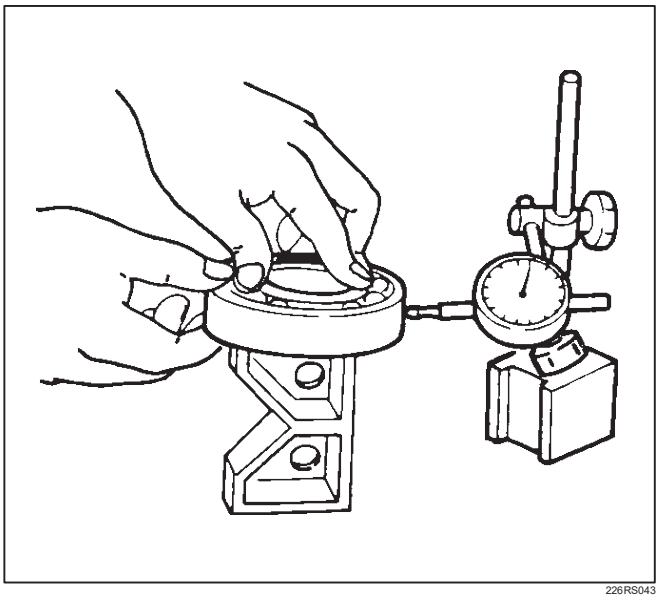
	Standard	Limit
1st–2nd 3rd–4th	0 – 0.1 mm (0 – 0.004 in)	0.2 mm (0.008 in)
Rev. 5th	0 – 0.2 mm (0 – 0.008 in)	0.3 mm (0.012 in)

Ball Bearing Play

- Use a dial indicator to measure the ball bearing play.

Ball Bearing Play

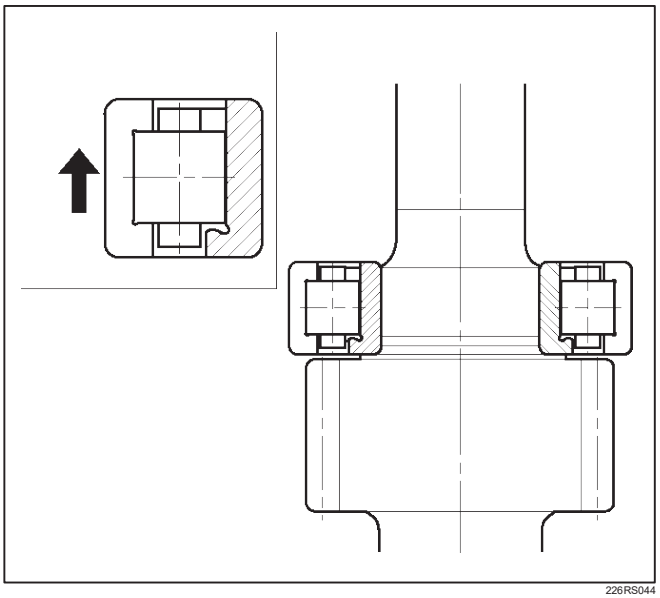
Limit: 0.2 mm (0.008 in)



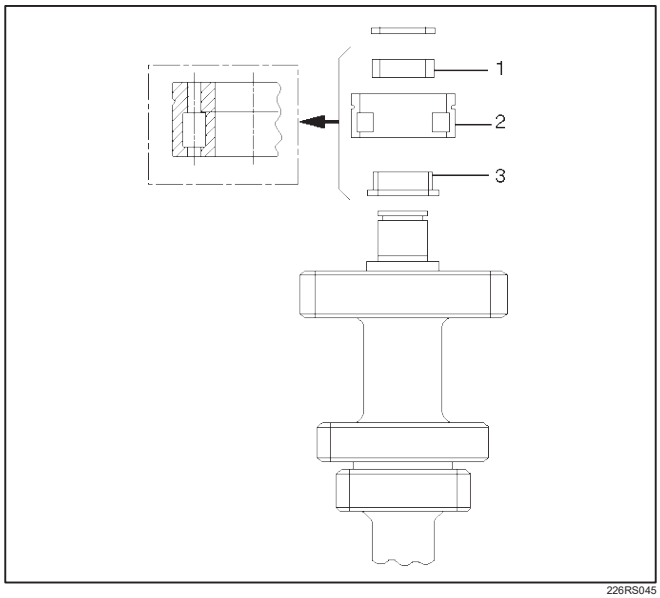
Reassembly

1. Install center roller bearing(29) to counter gear shaft(30).
   - Apply engine oil to the bearing inner and outer circumferences.
   - Install the roller bearing in the proper direction.

NOTE: Check that outer race moves only in the direction of arrow.



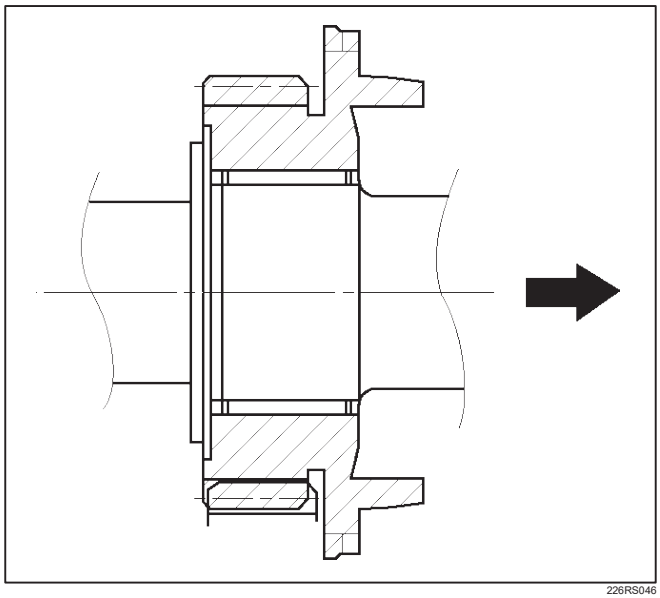
2. Install front roller bearing(28) by performing the following steps.
   - Use bearing installer to install the front roller bearing inner race to the counter gear shaft.
   - Install the outer race and roller assembly.
     The snap ring groove must be facing the transmission front side.
   - Use bearing installer J–35283 to install the ring.



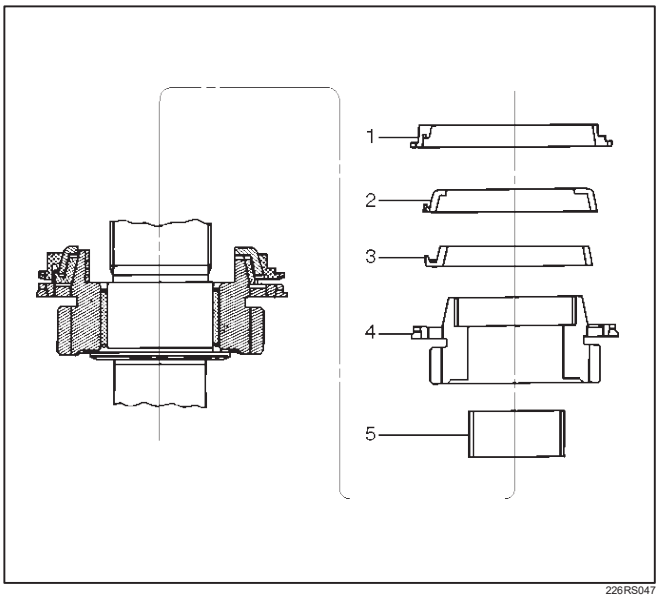
226RS045

Legend
(1) Ring
(2) Outer Race and Roller Assembly
(3) Inner Race

3. Install bearing snap ring(27) to mainshaft(26).
4. Apply engine oil to the needle bearing(25) and the 2nd gear thrust surfaces.
   Install the needle bearing(25) and the 2nd gear(24) to the mainshaft.
   The 2nd gear dog teeth must be facing the transmission rear side.


226RS046

5. Assemble 2nd inside ring(23), 2nd outside ring(22), and 2nd block ring(21).
   - Apply engine oil to the synchronizer ring friction surfaces.

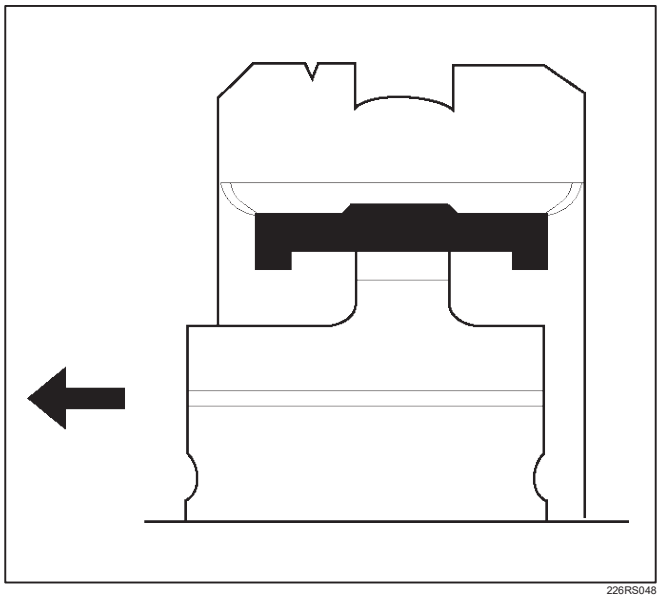


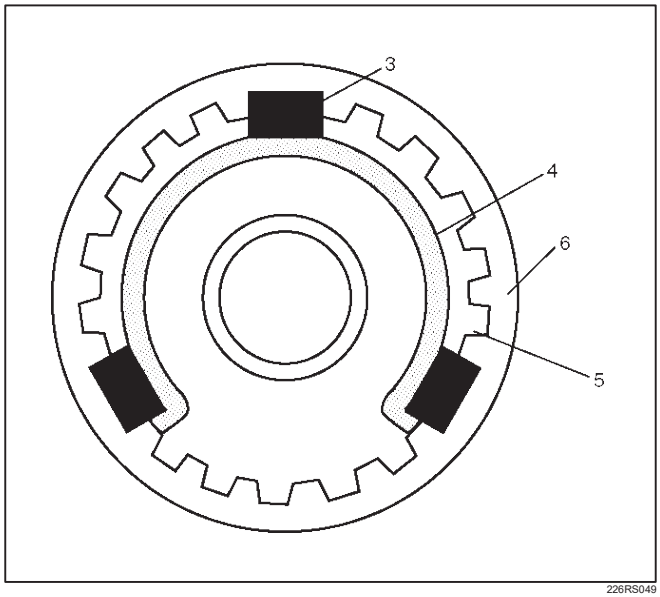
226RS047

Legend
(1) Block Ring
(2) Outside Ring
(3) Inside Ring
(4) 2nd Gear
(5) Needle Bearing

6. Assemble 1st–2nd synchronizer assembly by performing the following steps:
   1. Check that the inserts(3) fit snugly into the block ring insert grooves.
   2. Check that the inserts springs(4) are fitted to the inserts as shown in the illustration.
   3. Check that the clutch hub(5) and the sleeve(6) slide smoothly.
   4. Install the synchronizer assembly to the mainshaft.

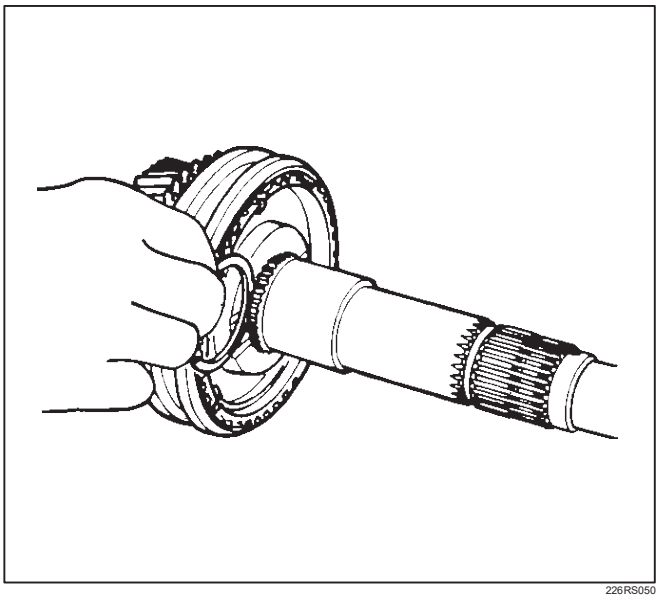
   The clutch hub face (with the heavy boss) must be facing the 2nd gear side.


226RS048



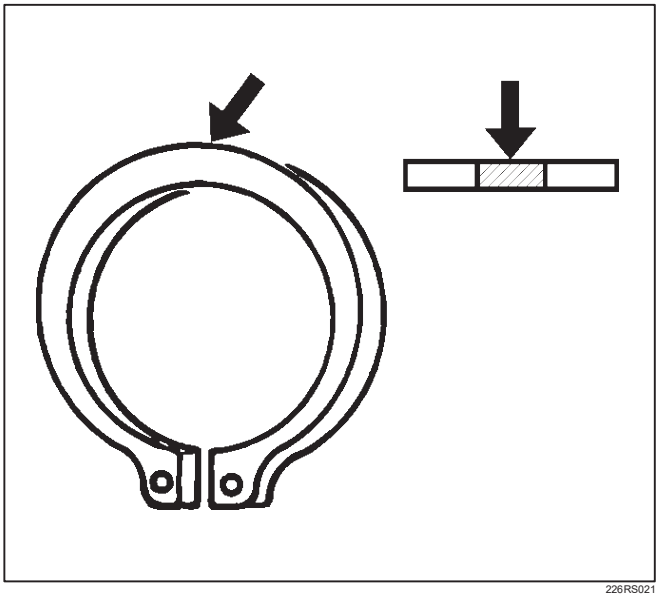
226RS049

7. Install clutch hub snap ring(19) by performing the following steps:
   - Select the snap ring which will provide the minimum clearance between the 1st–2nd clutch hub and the snap ring.


226RS050

There are three snap ring sizes available.

The snap rings are color coded to indicate their thickness.


226RS021

Clutch Hub and Snap Ring Clearance

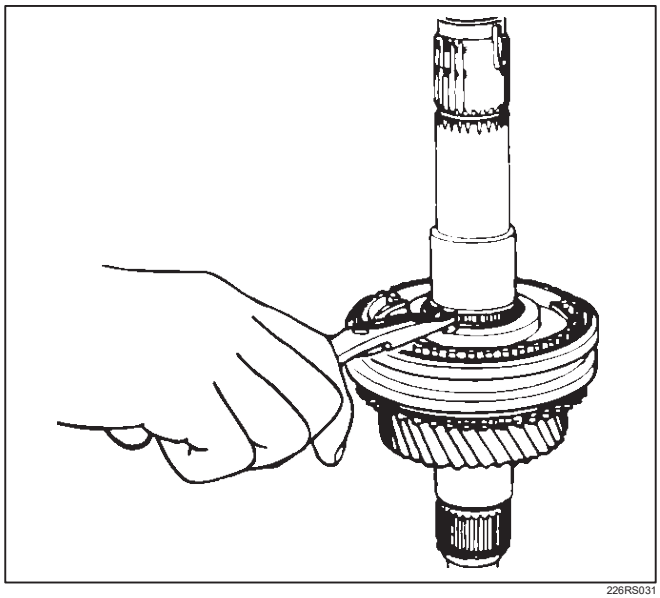
Standard: 0 – 0.1 mm (0 – 0.004 in)

Snap Ring Availability

Thickness	Color Coding
1.80 mm (0.071 in)	White
1.85 mm (0.073 in)	Yellow
1.90 mm (0.075 in)	Blue

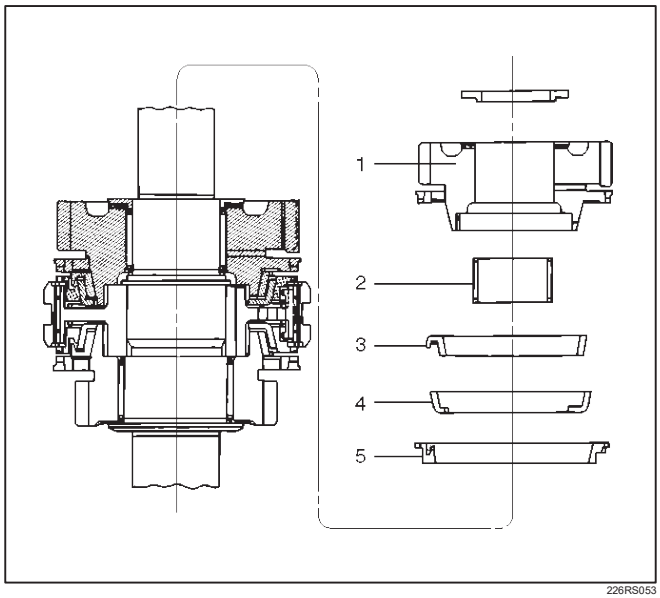
- Use a pair of snap ring pliers to install the snap ring to the mainshaft.

  The snap ring must be fully inserted into the mainshaft snap ring groove.


226RS031

8. Install needle bearing(18), 1st block ring(17), 1st outside ring(16), 1st inside ring(15), and 1st gear(14).
   - Apply engine oil to the needle bearing, 1st gear thrust surfaces and synchronizer ring friction surfaces.
   - Install the needle bearing and the 1st gear to the mainshaft.

     The 1st gear dog teeth must be facing the transmission front side.



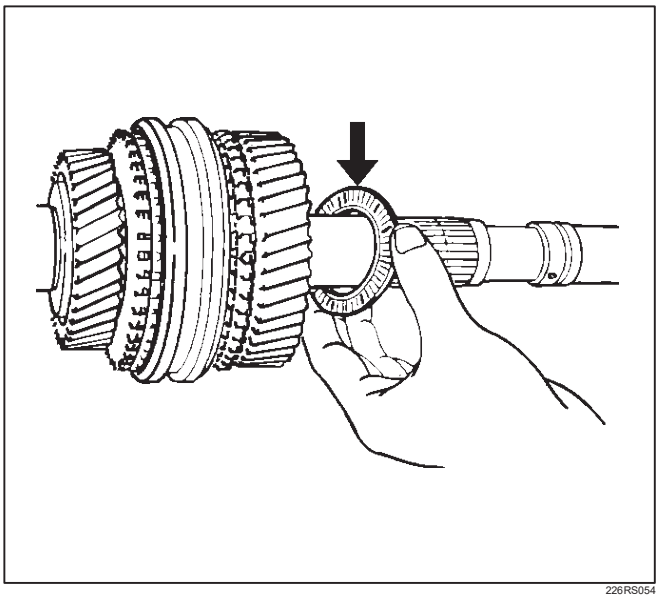
226RS053

Legend

(1) 1st Gear
(2) Needle Bearing
(3) Inside Ring
(4) Outside Ring
(5) Block Ring

9. Install the 1st gear thrust bearing and the race(13) to the main shaft.

   The thrust bearing side must be facing the transmission front side.

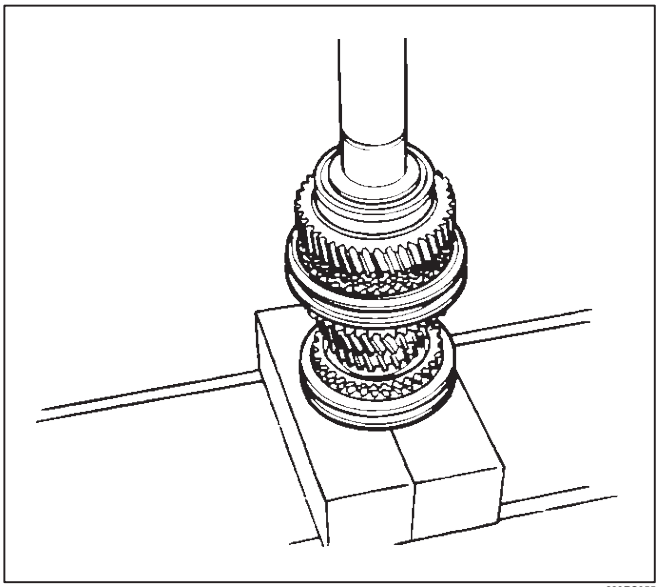

226RS054

10. Apply engine oil to the mainshaft ball bearing(12) and the mainshaft(26).

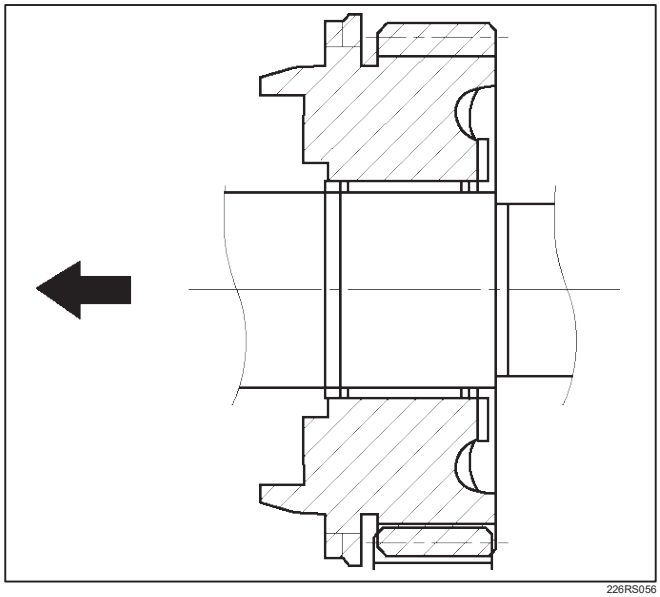
    Install the ball bearing(12) and needle bearing collar(11) to the mainshaft(26).

    The ball bearing snap ring groove must be facing the transmission rear side.

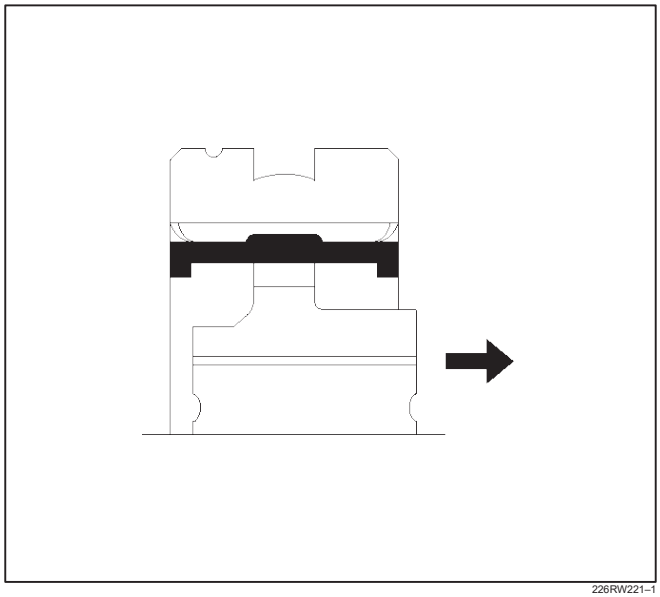
    Use a bench press and installer J–6133–01 to slowly force the collar into place.

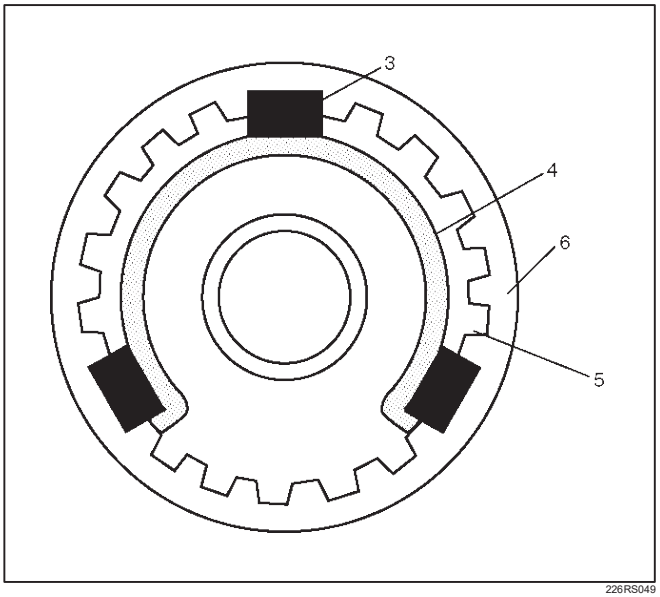

226RS055

11. Apply engine oil to the needle bearing and the 3rd gear thrust surfaces.
    Install the needle bearing(10) and the 3rd gear(9) to the mainshaft.
    The 3rd gear dog teeth must be facing the transmission front side.


226RS056

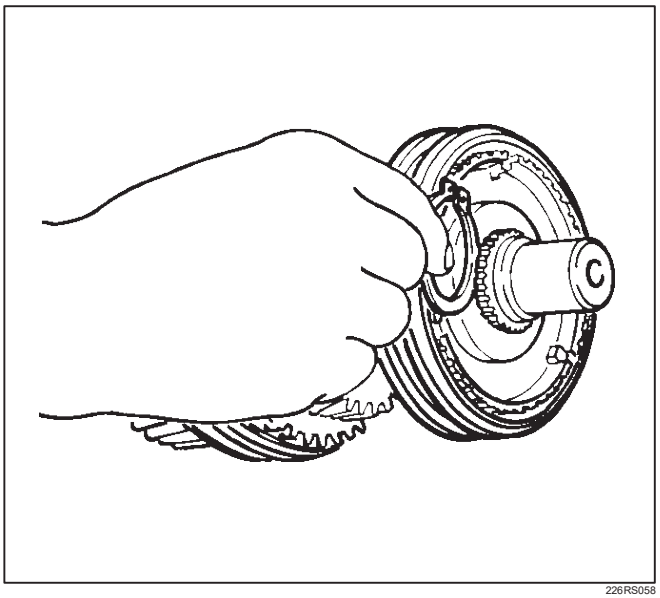
12. Install 3rd block ring(8).
13. Check and install 3rd–4th synchronizer assembly(7) by the following steps:
    1. Check that the inserts(3) fit snugly into the block ring insert grooves.
    2. Check that the insert springs(4) are fitted to the inserts as shown in the illustration.
    3. Check that the clutch hub(5) and the sleeve(6) slide smoothly.
    4. Install the synchronizer assembly to the mainshaft.
    The clutch hub face (with the heavy boss) must be facing the 3rd gear side.


226RW221–1

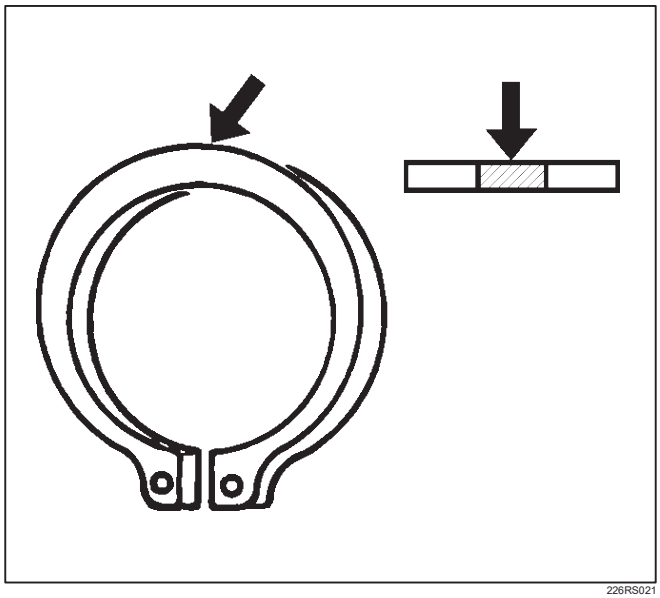


226RS049

14. Select and install mainshaft snap ring(6) in the following way:
    - Select the snap ring which will provide the minimum clearance between the 3rd–4th clutch hub and the snap ring.


226RS058

    There are three snap ring sizes available.
    The snap rings are color coded to indicate their thickness.



Clutch Hub and Snap Ring Clearance

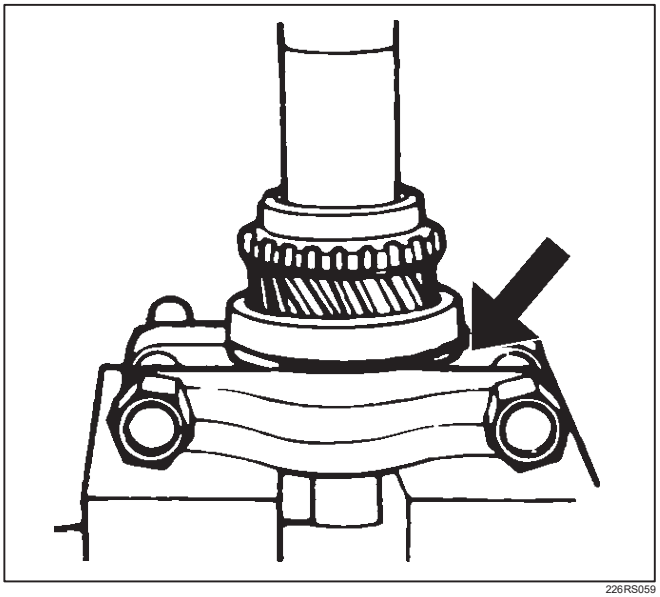
Standard: 0 – 0.1 mm (0 – 0.004 in)

Snap Ring Availability

Thickness	Color Coding
1.80 mm (0.071 in)	White
1.85 mm (0.073 in)	Yellow
1.90 mm (0.075 in)	Blue

- Use a pair of snap ring pliers to install the snap ring to the mainshaft.
  The snap ring must be fully inserted into the mainshaft snap ring groove.

15. Install top block ring(5).
16. Apply grease to the bearing inner and outer circumferences and install needle bearing(4).
17. Use a bench press to install the top gear shaft ball bearing(3) to the top gear shaft(2).



The snap ring groove must be facing the transmission front side.

18. Use a pair of snap ring pliers to install the top gear shaft snap ring(1) to the bearing.

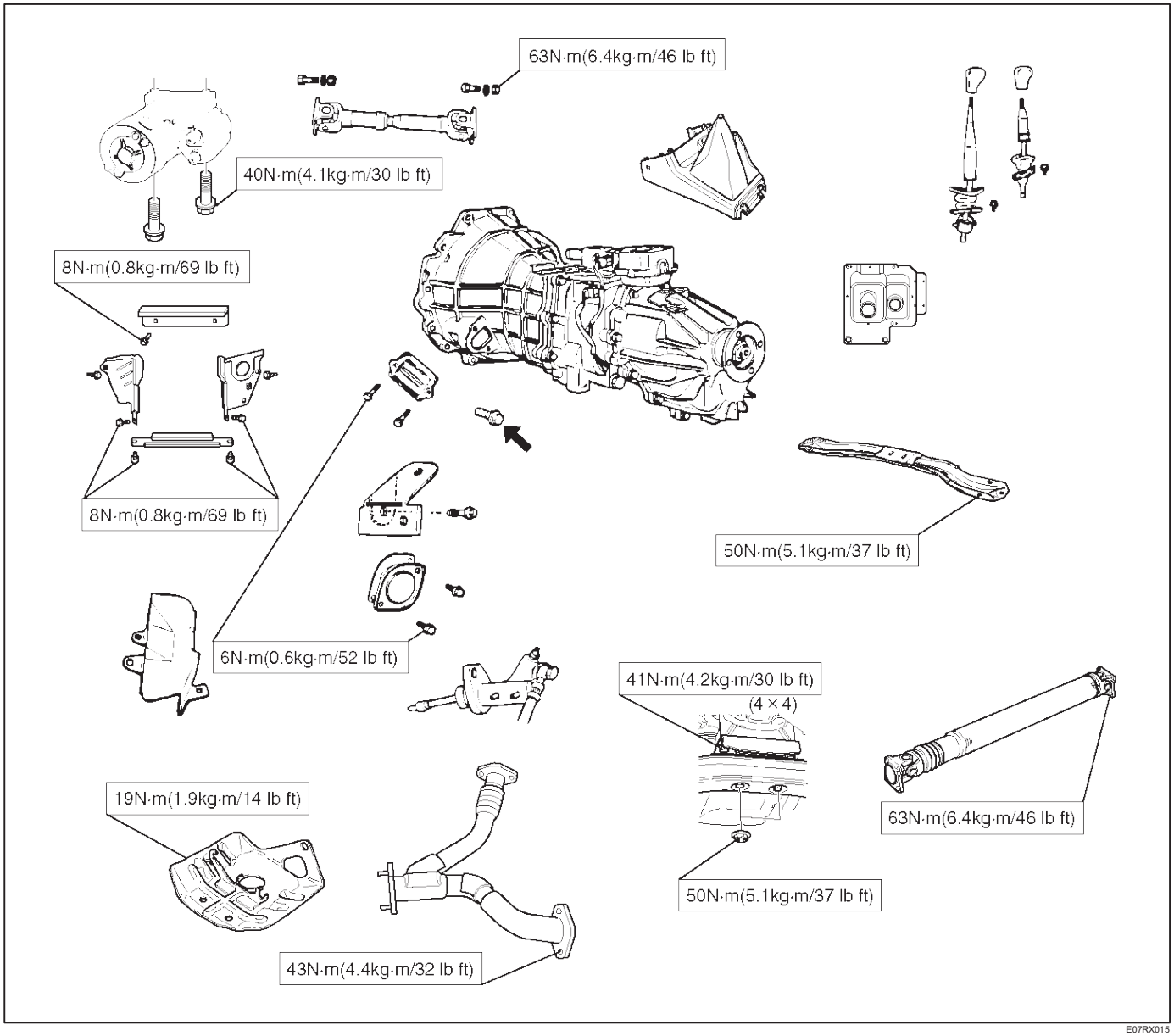
Main Data and Specifications

General Specifications

MUA 5C Manual Transmission 5 Speed

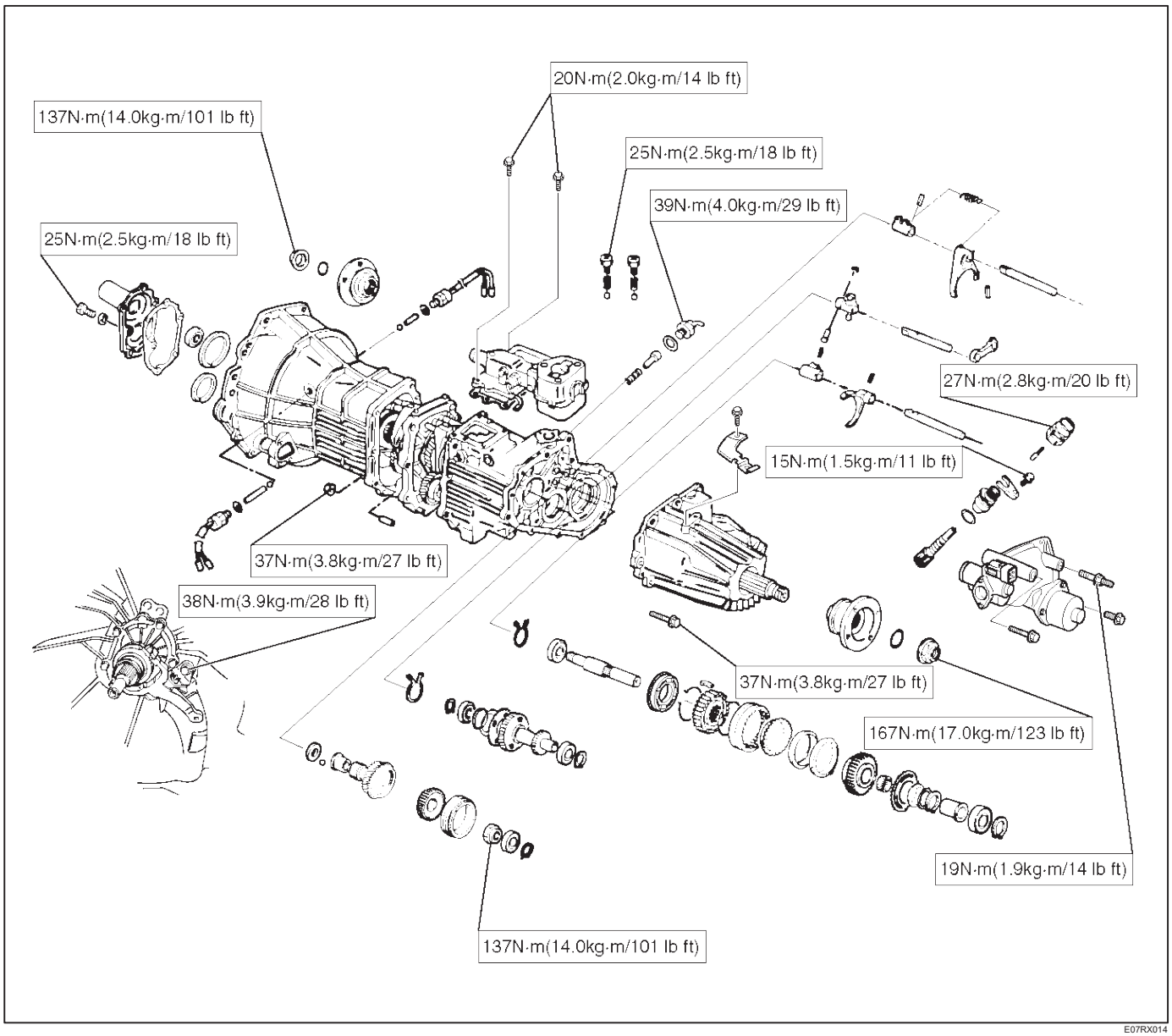
		4X4
Transmission type		Fully synchronized forward and reverse gears
Transfer case		Synchronized type gears shifting between the 2– and 4–wheel drive mode. Constant mesh type gears between “low” and “high”
Control method		Remote control with the gear shift lever on the floor.
Gear ratio: Transmission	1st	3.767
	2nd	2.248
	3rd	1.404
	4th	1.000
	5th	0.809
	Rev.	3.873
Gear ratio: Transfer	High	1.000
	Low	2.050
Transmission oil capacity		2.95 lit. (3.12 US qt)
Transfer oil capacity		1.45 lit. (1.53 US qt)
Type of lubricant		Engine oil: Refer to the chart in “SECTION 0”

Torque Specifications



About arrow mark, refer to Transmission(MUA) Installation in this section.

Torque Specifications (Cont'd)



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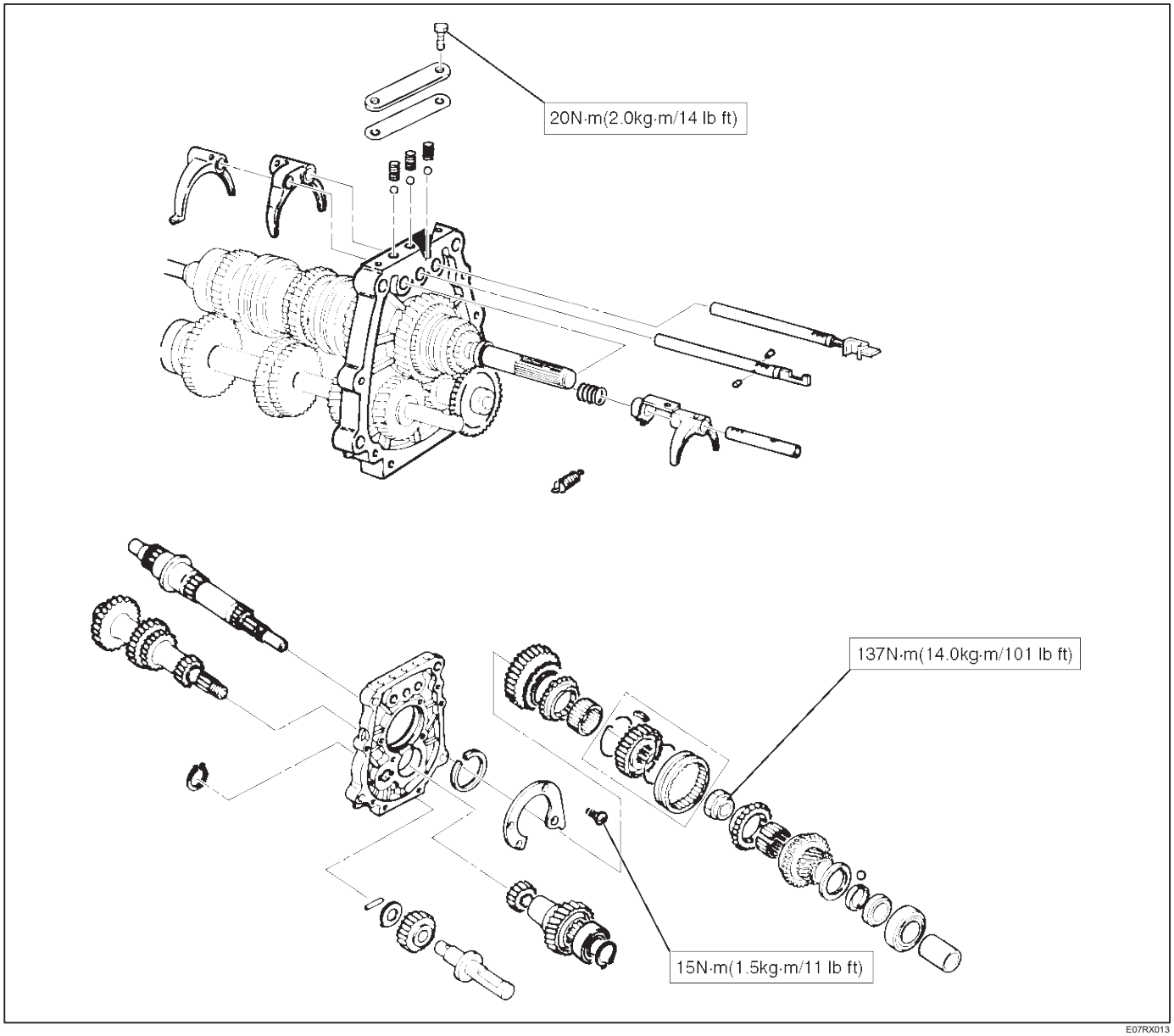
Torque Specifications (Cont'd)



Special Tools (MUA)

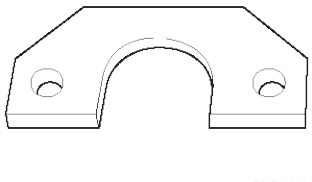
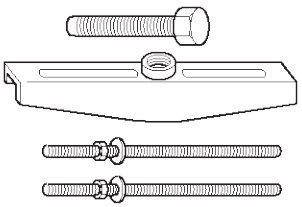
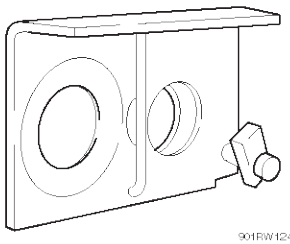
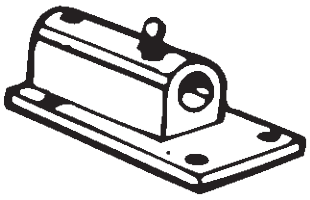
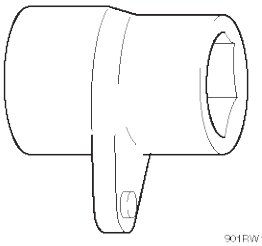
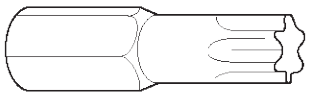
ILLUSTRATION	TOOL NO. TOOL NAME
 901RW143	**5–8840–2158–0** Mainshaft collar remover
 901RW132	**5–8840–2027–0** Puller
 901RW124	**5–8840–2160–0** Holding fixture
 901RS213	**5–8840–0003–0** Holding fixture base
 901RW122	**5–8840–2156–0** Wrench
 901RW125	**5–8840–0047–0** Tork bit wrench (T–45)

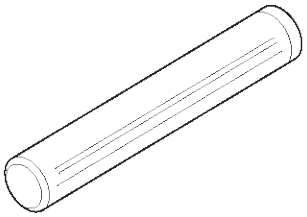
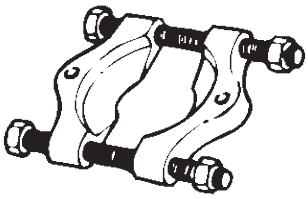
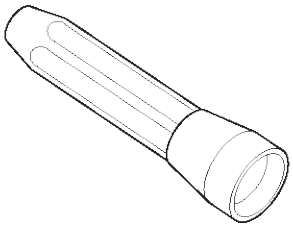
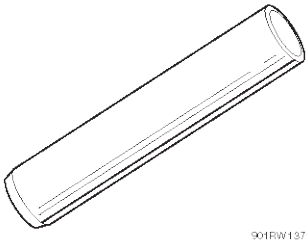
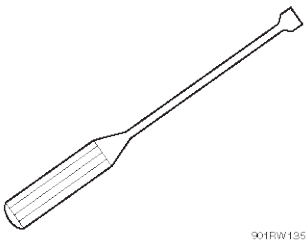
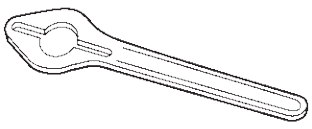
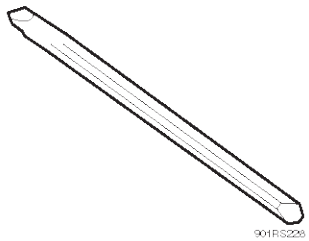
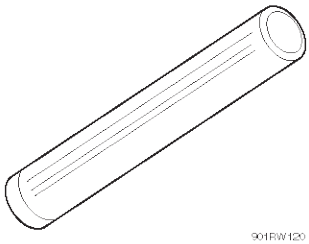
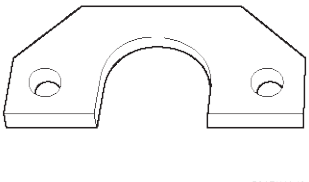
ILLUSTRATION	TOOL NO. TOOL NAME
 901RW123	**5–8840–2159–0** Mainshaft end bearing installer
 901RS239	**5–8840–0015–0** Bearing remover/installer
 901RW118	**5–8840–0026–0** Front cover oil seal installer
 901RW137	**9–8522–1165–0** Mainshaft collar installer
 901RW135	**5–8840–2291–0** Remover; Clutch release bearing
 901RW071	**5–8840–0133–0** Flange holder

ILLUSTRATION	**TOOL NO.** TOOL NAME
	**5–8840–2293–0** Punch; end nut
	**5–8840–2194–0** Counter shaft bearing installer
	**5–8840–2155–0** Bearing remover