IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words WARNING, CAUTION and NOTE have special meanings. Pay special attention to the messages highlighted by these signal words.

| WARNING: | Indicates a potential hazard that could result in death or injury. |
| CAUTION: | Indicates a potential hazard that could result in vehicle damage. |
| NOTE: | Indicates special information to make maintenance easier or instructions clearer. |

| WARNING: |
| This service manual is intended for authorized Suzuki dealers and qualified service mechanics only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual. Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers. |

| WARNING: |
| For vehicles equipped with a Supplemental Restraint Air Bag System: |
| • Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury. |
| • If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation. |
| • Do not modify the steering wheel, instrument panel or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury. |
| • If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components (air bag (inflator) modules, SDM and/or seat belt with pretensioner) beforehand to avoid component damage or unintended activation. |
FOREWORD

This manual provides information on the unit repair service procedures for the following units.

Applicable Units:
Manual Transmission/Automatic Transmission/Transfer/Differentials (Front and Rear)
for SQ416/SQ420/SQ625

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricant, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others.
Therefore, note that illustrations may differ from the vehicle being actually serviced.
The right is reserved to make changes at any time without notice.

SUZUKI MOTOR CORPORATION
OVERSEAS SERVICE DEPARTMENT

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SECTION 7A

MANUAL TRANSMISSION (TYPE 1)

TYPE 1 (For G16/J20 Engines)

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GENERAL DESCRIPTION

COMPONENTS

1. Input shaft 14. Circlip 27. Front bearing 40. Low speed sleeve 53. Reverse idle gear
3. Input shaft bearing 16. Low gear 29. Center bearing 42. Reverse sleeve 55. Idle gear shaft
6. Oil seal 19. 2nd gear 32. Circlip 45. Low speed spring 58. Washer
8. Main shaft bearing 21. 3rd gear 34. Bolt 47. Synchronizer key 60. Friction gear retainer
9. C-ring 22. Needle bearing 35. 5th gear 48. 5th synchronizer key 61. Friction gear spring
1. Lower gear shift fork  
2. High gear shift fork  
3. 5th-reverse gear shift fork  
4. Low gear shift shaft  
5. High gear shift shaft  
6. 5th-reverse gear shift shaft  
7. Plug  
8. Gasket  
9. Locating spring  
10. Locating ball  
11. Spring pin  
12. Roller  
13. Gear shift lever case  
14. Case seat  
15. Bolt  
16. Spring  
17. Select guide pin  
18. Spring (inner)  
19. Reverse gear shift limit bolt  
20. Breather hose  
21. Gear shift shaft  
22. Case plug  
23. Gear shift lever  
24. Reverse gear shift limit spring  
25. Reverse gear shift limit yoke  
26. Gear shift arm  
27. Gear control lever bush  
28. Case plate  
29. Plug
UNIT DISASSEMBLY

GEAR SHIFT LEVER CASE (4WD MODEL)

1) Remove 4 screws with screwdriver and remove case plate.

2) With case (1) supported with soft jawed vise, remove select return spring bolt (10) with wrench.

**NOTE:**
Use aluminum plates between vise and case to protect case (1) against damage.

3) Using spring pin remover, drive out double spring pin (2) for gear shift arm (9).

**NOTE:**
Double spring pin (2) can be driven out through the hole (14) after removing its plug (15). After removing the double spring pin (2), apply sealant to the plug (15) and install it.

“A” : Sealant 99000-31110

**NOTE:**
All spring pin (except double spring pin (2)) can be driven out only in such direction that it comes out toward the deeper side of the shift lever case (1).

4) Drive out spring pin (4) for reverse gear shift limit spring (7).
5) Drive out double spring pin (2) for gear shift lever (5).
6) Pull out gear shift shaft (8) a little and take out gear shift arm (9).

**NOTE:**
• Case plug may come off during above work.
• If it is not possible to take out gear shift arm in above step 6, do it after following steps 7 and 8.

7) Push gear shift shaft inward and drive out spring pin for reverse gear shift limit yoke (6).
8) Pull out gear shift shaft (8) from case (1).

---

3. Reverse gear shift limit bolt
11. Select return inner and outer spring (double coil spring)
12. Select guide pin
13. Select return outer spring
GEAR SHIFT LEVER CASE (2WD MODEL)

1) Using spring pin remover, drive out double spring pin (10) for gear shift arm (9).
2) Drive out spring pin (4) for reverse gear shift limit spring (7).
3) Drive out double spring pin (2) for gear shift lever (5).
4) Pull out gear shift shaft (8) a little and take out gear shift arm (9).

NOTE:
- Case plug may come off during above work.
- If it is not possible to take out gear shift arm (9) in above step 4, do it after following steps 5 and 6.

5) Push gear shift shaft (8) inward and drive out spring pin for reverse gear shift limit yoke (6).
6) Pull out gear shift shaft (8) from case (1).

TRANSMISSION UNIT

1) Remove 12 fastening bolts and separate rear case (3).
2) Remove clutch release bearing (2).
3) Remove 8 clutch housing bolts and then remove clutch housing (1).

4) Remove 8 bolts and pull out input shaft bearing retainer (1) by using large size screwdrivers (2) and clean cloth (3).

CAUTION:
When pulling out, do not scratch the transmission case surface contacting with the clutch housing.
5) Remove 10 bolts and separate cases (1,2) by using special tool.

**Special tool**

(A) : 09912-34510

6) If equipped with scissors gears (3,5), put match mark (1) (paint) on teeth of low (4) and reverse (6) gear assembly as shown in the figure before taking out input and main shaft assembly from lower case (2).

7) Take out input and main shaft assembly.

8) Remove bearing circlip (2) at the rear part of counter shaft by using screwdriver (1).

9) Remove bolt (3) for reverse idle gear shaft (2) and then remove idle gear (1) and shaft (2) as a set.

10) Remove center bearing plate (1) by removing its 2 bolts (2).
11) Remove outside circlip (1) of front bearing (2) on counter shaft.

12) Using plastic hammer, drive counter shaft (1) rearward.

13) Pull out 5th gear (2) and rear bearing (1) with bearing puller (3) and press.

**NOTE:**
- Apply pressing force while adjusting position of front bearing so that it will fit in its original position (hole in lower case).
- Be sure to set flat face of puller (3) against 5th gear so as not to cause damage to teeth.

14) In the same manner as 12), drive counter shaft rearward again.

15) Pull out reverse gear (1) with bearing puller (2) and press.
16) Pull out roller bearing by hand and then remove shaft from lower case.
17) Remove circlip (3) of counter shaft (1) front bearing (2) and pull out bearing (2) by using puller.

Special tool
(B) : 09913-60910

18) Remove circlip (2), friction gear retainer (3), friction gear spring (4), friction gear (5) and pin (6) from counter shaft (1) in that order.

SUB-ASSEMBLY
INPUT SHAFT

1) Take out oil seal (1) from input shaft oil seal retainer (2) and install new oil seal (1) with special tool and hammer up to case surface.
   Unless oil seal (1) is leaky or its lip is excessively hardened, replacement is unnecessary.

Special tool
(A) : 09913-84510

2) Remove circlip of input shaft (1) and pull out bearing (2) with bearing puller (3) and press as necessary.

NOTE:
Sealed bearing must not be washed. Replace it with new one when required.
3) When installing bearing (1), bring it so that its groove for circlip is in the front and press-fit with special tool and press.

**Special tool**

(B) : 09925-18011

4) After fitting circlip (1), air-blow lubrication oil hole (2).

**MAIN SHAFT**

1) After removing needle bearing for input shaft at the front end of main shaft, pull out high speed sleeve from its hub (3) and remove 3 synchronizer keys.

2) Remove circlip in front of hub (3) and pull off hub (3) with special tool, then take out synchronizer springs.

**Special tool**

(A) : 09913-61510

3) Remove 3rd synchronizer ring (2), 3rd gear (1) and needle bearing.

**NOTE:**

High speed sleeve-hub assembly, synchronizer ring (2) and 3rd gear (1) can be removed all at once by using puller and hydraulic press.

4) Remove circlip in the rear part of main shaft (1) and pull off rear bearing (2) with bearing puller (3) and press.

5) Remove thrust washer and steel ball and then remove 5th gear, synchronizer ring and needle bearing.
6) Pull out reverse sleeve from its hub (2) and remove 3 synchronizer keys.

7) Remove circlip and pull off reverse hub (2) from main shaft (1) with bearing puller (3) and press, then take out synchronizer springs.

**NOTE:**

It is also possible to remove reverse sleeve-hub as assembly and reverse gear all at once by using puller and press, after removing circlip.

8) Remove main shaft reverse gear and needle bearing by hand.

9) Using bearing puller (4) and press, remove reverse gear bush (2) and bearing washer (3) from main shaft (1).

**NOTE:**

During above work, watch out for steel ball which will come out from inside of washer so as not to lose it.

**CAUTION:**

Do not attempt to pull out bearing, washer (3) and bush (2) all together at once. Steel ball would stop bearing and cause damage to it.

10) Pull off bearing (1) with bearing puller (2) and press.

11) Remove the following in that order: bearing washer, steel ball, low gear, low synchronizer ring, needle bearing and low gear bush (1).

12) Using bearing puller (4) and press, pull out low speed sleeve and hub assembly (2), 2nd gear (3) and 2nd synchronizer ring all together.

**NOTE:**

If bush can't be pulled out by hand at step 11, pull off sleeve and hub together by using press.

13) Remove sleeve from hub and then take off synchronizer keys and springs.
UPPER CASE AND SHIFTER

1) Remove back up light switch (2) and locating spring bolts (3) from upper case (1).
2) Take out locating springs and locating balls.

3) Remove 2 spring pins and pull out low speed gear shift shaft (3) and high speed gear shift shaft (2) in that order.
4) Pull out reverse gear shift shaft (1), then disconnect fork from shaft (1) by removing spring pin.

Special tool
(A) : 09922-85811

NOTE:
Make sure that remaining gear shift shafts are all neutral position when removing a gear shift shaft.

5) Take out rubber plug and 2 interlock balls from case.
6) Remove interlock pin from high speed gear shift shaft.

COMPONENT INSPECTION

COUNTER SHAFT AND MAIN SHAFT INNER PARTS

• Check tooth surface of gear and rotation of bearing and replace with new one if necessary. As long as no abnormal condition such as noise exists before removal, replacement is unnecessary.
- Inspect needle bearings and needle contacting surfaces (rotating surfaces) and replace with new ones as required.

**NOTE:**
Should abnormal noise be heard before disassembly, it is necessary to carefully check needle contacting surface inside of each gear besides those parts shown in the figure.

1. Main shaft
2. Low gear bush - identical
3. Reverse gear bush - identical
4. Input shaft needle bearing
5. 3rd gear needle bearing
6. 2nd gear needle bearing - identical
7. Low gear needle bearing - identical
8. Reverse gear needle bearing (2 pieces)
9. 5th gear needle bearing (2 pieces)

- Check clearance “a” between synchronizer ring and gear, key slot width “b” in synchronizer ring and each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

**Clearance “a” between synchronizer ring and gear:**
- Standard: 1.0 – 1.4 mm (0.039 – 0.055 in.)
- Service limit: 0.5 mm (0.019 in.)

**Key slot width “b”:**
- Standard: 10.1 mm (0.397 in.)
- Service limit: 10.4 mm (0.409 in.)

- Using feeler gauge, check clearance between sleeve (1) and shifter fork (2) and replace parts if necessary.

**Clearance “c” between sleeve and shifter fork:**
- Maximum 1.0 mm (0.039 in.)

- Check chamfered part of each sleeve for damage and excessive wear, and replace as necessary.
- Check each synchronizer key and synchronizer spring and replace as necessary.
- Check splined portions and replace parts if excessive wear are found.
LOW AND REVERSE SCISSORS GEAR ASSEMBLIES (IF EQUIPPED)

Check for the following items.
- Match mark (3) provided for reassembly should be almost at such position as shown in the figure.
- Try to turn scissors gear against main shaft low (and reverse) gear. It should feel light when turned in “A” direction but heavy when turned in “B” direction.
- Play of scissors gear against main shaft low (or reverse) gear in “A” – “B” direction should be about half of tooth width as shown in the figure.

If any faulty condition is noted, remove snap ring, open up assembly unit and check that all components are installed at proper positions. If all components are positioned properly and yet faulty condition exists, replace the low (reverse) gear assembly.

1. Scissors low gear
2. Main shaft low gear
4. Scissors reverse gear
5. Main shaft reverse gear

1. Main shaft (low or reverse) gear
2. Scissors (low or reverse) gear spring
3. Scissors (low or reverse) gear
4. Snap ring
5. Pin (Main gear side)
6. Pin (scissors gear side)
UPPER CASE AND SHIFTER

- Using feeler gauge, check clearance between fork (2) and sleeve (1) and replace those parts if it exceeds limit.

Clearance “a” between fork and sleeve:
Service limit : 1.0 mm (0.039 in.)

- Insert each gear shift shaft into case and check that it moves smoothly. If it doesn't, correct by using oilstone, reamer or the like.

- Check gear shift shaft for excessive wear and correct or replace a necessary.

  1. Locating groove
  2. Yoke portion

- Check free length of each locating spring (1) and replace if it is below service limit.

Locating spring free length “b”:
Standard : 27.0 mm (1.063 in.)
Service limit : 24.0 mm (0.945 in.)

REAR CASE

- If oil seal leaks and/or its lip is excessively hardened, replace it with new one and at the same time, check main shaft where oil seal contacts. If contacting surface is not smooth, correct or replace. Apply grease to oil seal lip portion.

  Grease “A” : 99000-25010

Special tool
(A) : 09913-75510

  1. Oil seal
  2. Rear case
UNIT ASSEMBLY

GEAR SHIFT LEVER CASE (4WD MODEL)

1) Wash and inspect each part and replace if necessary. Also check items as described below and correct whatever necessary carefully by using reamer, oilstone and the like, wash it thoroughly and reassemble them.

Items to be checked are:
- Shift shaft should go into case smoothly.
- Shift lever, limit yoke and shift arm should go into shift shaft smoothly.

2) Insert shift shaft (1) as shown while making sure that inner parts are in proper direction.

**NOTE:**
- Cut off portion (5) in shift shaft should face downward when shift shaft (1) is installed.
- Use care for installing direction of shift limit spring (4).
- Shift arm should be installed at the same time.

3) Drive in spring pin (single short) for reverse gear shift limit yoke.

4) Drive in spring pin (double) for shift lever.

5) Drive in spring pin (single long) for return spring.

6) Fit straight end of shift limit spring (2) into line groove in shift limit yoke (1) and with its other hooked end turned in its winding direction by about 90° from its free state, hook it on spring pin (4).

7) Drive in spring pin for shift arm.
8) Press-fit case plug (1) into case.

9) After applying grease “A”, install select guide pins, select return springs and spring bolts (2) and torque them to specification.

“A” : Grease 99000-25010

Tightening torque
Select return spring bolt (a) : 35 N·m (3.5 kg-m, 25.5 lb-ft)

NOTE:
Double coil spring is required at 5th/Reverse select side.

10) Clean mating surfaces of both case plate and case, apply sealant “B” to case side evenly, mate them and fasten with screws (5).

“B” : Sealant 99000-31110

Tightening torque
Shift lever case plate screws (b) :
9 N·m (0.9 kg-m, 6.5 lb-ft)

11) If reverse gear shift limit bolt (1) has been removed, apply thread lock cement “C” to bolt then install and torque it to specification.

“C” : Thread lock cement : 99000-32020

Tightening torque
Reverse gear shift limit bolt (c) :
23 N·m (2.3 kg-m, 17.0 lb-ft)

3. Inner and outer spring (Double coil spring)
4. Outer spring
12) Install gear shift lever case (2) to transmission without using sealant for functional check.

13) Install shift control lever and check to make sure that it shifts smoothly according to shift pattern.

NOTE:
- Apply thread lock cement “C” to control lever locating bolts (1) when replaced.
- Be sure to apply sealant to mating surface of gear shift lever for its final installation.

“C” : Cement 99000-32020

Tightening torque
Control lever locating bolt (d) :
17 N·m (1.7 kg-m, 12.5 lb-ft)

GEAR SHIFT LEVER CASE (2WD MODEL)

1) Wash and inspect each part and replace if necessary. Also check items as described below and correct whatever necessary carefully by using reamer, oilstone and the like, wash it thoroughly and reassemble them.

Items to be checked are;
- Shift shaft should go into case smoothly.
- Shift lever, limit yoke and shift arm should go into shift shaft smoothly.

2) Insert shift shaft (1) as shown while making sure that inner parts are in proper direction.

NOTE:
- Cut off portion (5) in shift shaft should face downward when shift shaft (1) is installed.
- Use care for installing direction of shift limit spring (4).
- Shift arm should be installed at the same time.

2. Shift lever
3. Shift limit yoke
3) Drive in spring pin (single short) for reverse gear shift limit yoke.
4) Drive in spring pin (double) for shift lever.
5) Drive in spring pin (single long) for return spring.
6) Fit straight end of shift limit spring (2) into line groove in shift limit yoke (3) and with its other hooked end turned in its winding direction by about 90° from its free state, hook it on spring pin (1).
7) Drive in spring pin for shift arm.

8) Press-fit case plug (1) into case (2) and caulk it with punch.

9) If reverse gear shift limit bolt (1) has been removed, apply thread lock cement “A” to bolt then install and torque it to specification.

“A” : Cement 99000-32020

Tightening torque
Reverse gear shift limit bolt (a) :
23 N·m (2.3 kg-m, 17.0 lb-ft)

10) Install gear shift lever case (3) to transmission without using sealant for functional check.
11) Install shift control lever (1) and check to make sure that it shifts smoothly according to shift pattern as shown in the figure.

NOTE:
• Apply thread lock cement “A” to control lever locating bolts (2) when replaced.
• Be sure to apply sealant to mating surface of gear shift lever case (3) for its final installation.

“A” : Cement 99000-32020

Tightening torque
Control lever locating bolt (a) :
17 N·m (1.7 kg-m, 12.5 lb-ft)
SUB ASSEMBLY
MAIN SHAFT

NOTE:
- Before installation, wash each part and apply specified gear oil to sliding faces of bearing and gear.
- Use new circlips on shaft for reinstallation. Don’t reuse used circlips.

1) Fit sleeve to low speed hub (1), place 3 synchronizer keys (4) in it and set synchronizer spring (3).
Refer to the figure for proper installing direction of hub (1), sleeve (2) and springs (3). Synchronizer key (4) has no specific direction for installation.

NOTE:
When installing each synchronizer spring, insert its hooked end to hub hole and put it toward right.

A : Thick (2nd and front side)
B : Thin (Low and rear side)
C : Punch mark (Low and rear side)
2) Install needle bearing (2), 2nd gear (3) and 2nd synchronizer ring to main shaft (1).

3) Press-fit low speed sleeve and hub assembly (2) onto main shaft (1) with press (3).

Special tool
(A) : 09927-08210

4) Insert low gear bush (1) and set synchronizer ring (3), needle bearing (2) and low gear (4).

5) Set steel ball (1) and washer (2).


Special tool
(B) : 09925-18011
7) Fit sleeve (4) to reverse hub (3), place 3 synchronizer keys (2) in it and then set synchronizer springs (1). Refer to the figure for proper installing direction of hub (3), sleeve (4) and springs (1). Also, note that key (2) has specific installing direction.

8) Set steel ball and bearing washer (2) and insert reverse gear bush (3), needle bearing (4) and reverse gear (5).

9) Press-fit reverse sleeve and hub assembly (1) with special tool and press.

Special tool
(B) : 09925-18011

10) After setting large circlip (2), install 5th speed synchronizer ring, needle bearing, 5th gear (4), steel ball (5) and washer (6).

NOTE:
Washer should be installed with its oil slot side facing gear.

11) Press-fit bearing (1) with special tool and press.

Special tool
(B) : 09925-18011

12) Fit small circlip.
13) Fit sleeve (4) to high speed hub (3), place 3 synchronizer keys (2) and set synchronizer springs (1) as shown in the figure. Neither sleeve nor key has specific installing direction.

14) Install needle bearing, 3rd gear (3) and 3rd synchronizer ring (2). Then using special tool and press, press-fit high speed sleeve and hub assembly (1) onto shaft.

Special tool (C) : 09913-84510

15) Fit large circlip.
16) Install needle bearing.

COUNTER SHAFT

1) Install pin (6), friction gear (5), friction gear spring (4), friction gear retainer (3) and circlip (2) to counter shaft (1) in that order.

2) Press-fit front bearing (1) and fit circlip.

Special tool (A) : 09913-84510

2. Counter shaft
3) With shaft inserted into case, install center bearing outer race (1) on it and then press-fit countershaft (2) by using special tool and hammer. Meanwhile case should be supported on wood blocks.

Special tool
(B) : 09951-16080

4) Press-fit reverse gear (1) and then 5th gear (2).

NOTE:
When press-fitting, hold counter shaft (4) as shown in the figure with its front end set on special tool.

Special tool
(C) : 09913-80112
(D) : 09944-66010

5) Install bearing plate (1) applying thread lock cement “A” to their thread part of bolts.

“A” : Cement 99000-32020

Tightening torque
Bearing plate bolt (a) :
6 N·m (0.6 kg-m, 4.0 lb-ft)

6) Install reverse idle gear (3) together with needle bearing (2) and thrust washer (1) on reverse idle gear shaft (4) and fix them with bolt (5) from outside of case.

NOTE:
Be sure to use aluminum washer for bolt.

Tightening torque
Reverse idle gear shaft bolt (b) :
23 N·m (2.3 kg-m, 17.0 lb-ft)
7) After press-fitting rear bearing (1) to counter shaft, make sure to fit circlip securely.

**Special tool**
(E) : 09913-80112

8) Fit circlip (1) around front bearing (2) and check to make sure that circlip just contacts with case surface.

**UPPER CASE AND SHIFTER**

Interlock system is as shown in the figure.

1. Locating ball
2. Rubber plug
3. Reverse gear shift shaft
4. Interlock ball
5. Interlock pin
6. High speed gear shift shaft
7. Low speed gear shift shaft

1) With fork installed to reverse gear shift shaft (1), install it into case and put in interlock ball (2).
NOTE:
Reverse gear shift fork spring pin is different from other spring pins in length. It is longer than other spring pins.

1. Reverse gear shift fork spring pin
2. Low & High gear shift fork spring pin
3. High speed gear shift fork
4. Low speed gear shift fork
5. Reverse gear shift fork

NOTE:
When pressing gear shift fork spring pin (1) into reverse gear shift fork (2), do not allow to go all the way in, but leave its end protruded as much as the length shown in the figure.

2) With interlock pin fit to high speed gear shift shaft (2), insert it into case and set fork with spring pin and then put in interlock ball (3).

NOTE:
- Note that high speed gear shift shaft (2) can't be inserted unless reverse gear shift shaft (1) is placed at neutral position.
- When inserting high speed gear shift shaft (2), use care not to drop interlock pin.

3) With both reverse and high speed gear shift shafts placed at neutral position, insert low speed gear shift shaft (1) into case and fix fork with spring pin. Then apply sealant to rubber plug (2) and fit it in.

“A” : Sealant 99000-31110
4) Confirm that interlock system operates properly by checking the following.

- When shifted to low position (or 2nd position), shifting of 3rd/4th speed or 5th/Rev speed is not available.

  1. Low speed gear shift shaft (Low position)
  2. High speed gear shift shaft (Neutral)
  3. Reverse gear shift shaft (Neutral)

- When shifted to reverse position (or 5th position), shifting of 1st/2nd speed or 3rd/4th speed is not available.

  1. Low speed gear shift shaft (Neutral)
  2. High speed gear shift shaft (Neutral)
  3. Reverse gear shift shaft (Reverse position)

5) Install locating balls and locating springs and then set washers and bolts.

**Tightening torque**

Locating spring bolt (a) : 28 N·m (2.8 kg·m, 20.0 lb-ft)
TRANSMISSION UNIT

1) Put main shaft-input shaft assembly (7) into lower case (6), apply oil to component parts and check for proper engagement (smooth rotation) with counter shaft.

NOTE:
For vehicle equipped with scissors gears, align paint match marks (1) marked before disassembly as shown in figure when installing main shaft to lower case (6).

2) After cleaning mating surfaces of both cases, coat mating surface of upper case (8) with sealant evenly and put it over lower case (6). At this time, all gears and forks should be set to neutral position.

“A” : Sealant 99000-31150

3) Place bolts at their positions and check to make sure that their height from case surface is the same before tightening them. Also, check clamp position and torque them to specification.

Tightening torque
Upper case bolt (a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

“A” : Bolt height before screw in

4) Apply sealant “A” to mating surface of input shaft bearing retainer (1) and its bolts (2), then install them.

“A” : Sealant 99000-31110

Tightening torque
Input shaft retainer bolt (a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

5) Install clutch housing (1) and torque its bolts (2) to specification.

Tightening torque
Clutch housing bolt (a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

6) Install release bearing

2. Scissors low gear (if equipped)
3. Main shaft low gear
4. Scissors reverse gear (if equipped)
5. Main shaft reverse gear

A : Bolt height before screw in

NOTE:
For vehicle equipped with scissors gears, align paint match marks (1) marked before disassembly as shown in figure when installing main shaft to lower case (6).
7) Clean mating surfaces of both cases, coat mating surface (1) of rear case with sealant evenly and mate it with transmission itself.

“A” : Sealant 99000-31110

8) Install 12 rear case bolts and torque them to specification.

Tightening torque
Rear case bolt (a) : 23 N-m (2.3 kg-m, 17.0 lb-ft)

9) Install back up light switch (1).

Tightening torque
Back up light switch (a) : 20 N-m (2.0 kg-m, 14.5 lb-ft)

10) Install gear shift lever case (4) temporarily to confirm switch function by checking the following.
- Back up light switch (1) should conduct when gear shift control lever (3) is at reverse position.

11) After confirming switch function, remove gear shift lever case.
12) Connect transfer assembly to transmission and tighten its fastening bolts to specified torque.

**Tightening torque**

Transfer to transmission bolt (a) :
23 N·m (2.3 kg-m, 17.0 lb-ft)

13) With sealant applied to mating surface of transmission gear shift lever case (5), put it onto transmission and transfer assembly, and torque bolts to specification.

“A” : Sealant 99000-31110

**Tightening torque**

Gear shift case bolt (b): 13 N·m (1.3 kg-m, 9.5 lb-ft)

14) Install breather hoses (4) for transmission and transfer and set clamps.

15) Connect wiring harness (3) to each coupler of 4WD switch, 5th switch and back up light switch.

16) Clamp wiring harness (3) and breather hoses (4) securely.

**CAUTION:**

Fill specified amount of gear oil to transmission and transfer after remounting transmission and transfer assembly to vehicle.

---

1. Transmission assembly
2. Transfer assembly (4WD model) / Extension case (2WD model)
## TIGHTENING TORQUE SPECIFICATION

<table>
<thead>
<tr>
<th>Fastening part</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N·m</td>
</tr>
<tr>
<td>Oil level/filler and drain plugs</td>
<td>23</td>
</tr>
<tr>
<td>Back up light and 4WD switches</td>
<td>20</td>
</tr>
<tr>
<td>Control lever locating bolts</td>
<td>17</td>
</tr>
<tr>
<td>Reverse gear shift limit bolt</td>
<td>23</td>
</tr>
<tr>
<td>Select return spring bolts</td>
<td>35</td>
</tr>
<tr>
<td>Shift lever case plate screws</td>
<td>9</td>
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<tr>
<td>Gear shift case bolts</td>
<td>13</td>
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<tr>
<td>Center bearing plate bolts</td>
<td>6</td>
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<tr>
<td>Reverse idle gear shaft bolt</td>
<td>23</td>
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<td>Locating spring bolts</td>
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<td>Upper case bolts</td>
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<td>Input shaft retainer bolts</td>
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<td>Clutch housing bolts</td>
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<tr>
<td>Rear case bolts</td>
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<tr>
<td>Transfer to transmission bolts</td>
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## REQUIRED SERVICE MATERIAL

<table>
<thead>
<tr>
<th>Material</th>
<th>Recommended SUZUKI product (Part number)</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium grease</td>
<td>SUZUKI SUPER GREASE A (99000-25010)</td>
<td>• Oil seal lips</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Select return system</td>
</tr>
<tr>
<td>Thread lock cement</td>
<td>THREAD LOCK CEMENT SUPER 1333B (99000-32020)</td>
<td>• Shift control lever locating bolts</td>
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<td>• Reverse gear shift limit bolt</td>
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<td>• Counter shaft bearing plate bolts</td>
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<tr>
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<td>SUZUKI BOND No. 1215 (99000-31110)</td>
<td>• Oil Drain and level/filler plugs</td>
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<td></td>
<td></td>
<td>• Mating surface of gear shift lever case</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rubber plug for interlock ball bore</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Upper case mating surface</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mating surface of input shaft bearing retainer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Input shaft retainer bolts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rear case mating surface</td>
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### SPECIAL TOOL

<table>
<thead>
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<tbody>
<tr>
<td>09912-34510</td>
<td>Case separator</td>
</tr>
<tr>
<td>09913-60910</td>
<td>Bearing/Gear puller</td>
</tr>
<tr>
<td>09913-61510</td>
<td>Bearing puller</td>
</tr>
<tr>
<td>09913-75510</td>
<td>Bearing installer (O.D. 70.5 mm)</td>
</tr>
<tr>
<td>09913-75520</td>
<td>Bearing installer (O.D. 60.5 mm)</td>
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<tr>
<td>09913-80112</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09913-84510</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09922-85811</td>
<td>Spring pin remover</td>
</tr>
<tr>
<td>09925-18011</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09927-08210</td>
<td>Shaft remover</td>
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<tr>
<td>09944-66010</td>
<td>Wheel hub/knuckle oil seal installer</td>
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<tr>
<td>09951-16080</td>
<td>Bearing installer</td>
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<tr>
<td>09951-16080</td>
<td>Bearing installer</td>
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</table>
# SECTION 7A1

## MANUAL TRANSMISSION (TYPE 2)

### TYPE 2 (For H25/RF Engines)

![Manual Transmission Diagram](image.png)

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</table>
GENERAL DESCRIPTION

COMPONENTS

1. Input shaft
2. Clutch release bearing
3. Clutch release fork
4. Clutch operating cylinder
5. Main shaft 3rd gear
6. Main shaft 2nd gear
7. Main shaft low gear
8. Front case
9. Main shaft reverse gear
10. Gear shift inner shaft
11. Main shaft 5th gear
12. Gear shift lever case
13. Gear shift shaft
14. Main shaft
15. Rear case
16. Counter shaft 5th gear
17. Counter shaft
18. Clutch housing
<p>| 1. Input shaft | 14. 2nd gear | 27. 5th sleeve | 40. 5th gear shift fork |
| 2. Input shaft bearing | 15. Low speed hub | 28. 5th speed synchronizer dog | 41. Gear shift shaft inner lever |
| 3. Input shaft roller | 16. Low speed sleeve | 29. Reverse idle gear | 42. Bolt |
| 7. Synchronizer spring | 20. Main shaft bearing | 33. High gear shift shaft | 46. Locating spring |
| 8. Synchronizer key | 21. 5th gear | 34. High speed gear shift fork | 47. Locating ball |
| 11. 3rd gear | 24. Counter shaft rear bearing | 37. Low gear shift shaft | 50. Locating roller No. 1 |
| 13. Main shaft | 26. Counter shaft 5th gear (and hub) | 39. 5th gear shift shaft | |</p>
<table>
<thead>
<tr>
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<td>1</td>
<td>Clutch housing</td>
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<td>4</td>
<td>Input shaft bearing retainer</td>
</tr>
<tr>
<td>5</td>
<td>Gasket</td>
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<td>6</td>
<td>Transmission front case</td>
</tr>
<tr>
<td>7</td>
<td>Oil drain plug</td>
</tr>
<tr>
<td>8</td>
<td>Oil filler/level plug</td>
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<td>9</td>
<td>Reverse link stay</td>
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<td>10</td>
<td>Transmission intermediate case</td>
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<td>11</td>
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<td>12</td>
<td>Back-up light switch</td>
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<td>13</td>
<td>5th-reverse interlock cam comp.</td>
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<td>14</td>
<td>Return spring low bolt</td>
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<td>Counter shaft gutter</td>
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<td>16</td>
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<td>17</td>
<td>Main shaft oil seal</td>
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<tr>
<td>18</td>
<td>Return spring reverse bolt</td>
</tr>
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<td>19</td>
<td>Interlock cam plug</td>
</tr>
<tr>
<td>20</td>
<td>Interlock cam pin</td>
</tr>
<tr>
<td>21</td>
<td>Case plug</td>
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<tr>
<td>22</td>
<td>Gear shift shaft</td>
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<tr>
<td>23</td>
<td>Gear shift lever</td>
</tr>
<tr>
<td>24</td>
<td>Bush</td>
</tr>
<tr>
<td>25</td>
<td>Spring pin</td>
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<td>26</td>
<td>Gear shift arm</td>
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<tr>
<td>27</td>
<td>Case plate</td>
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<tr>
<td>28</td>
<td>Gear shift lever case</td>
</tr>
<tr>
<td>29</td>
<td>Gear shift control lever</td>
</tr>
</tbody>
</table>
UNIT DISASSEMBLY

GEAR SHIFT LEVER CASE

1) Remove case plate.

2) With case supported with soft jawed vise, remove lever locating bolts (6).

NOTE:
Use aluminum plates between vise and case to protect case against damage.

3) Using special tool, drive spring pin (2) into gear shift arm (5) as far as the position shown in the figure.

CAUTION:
When driving spring pin (2), use care not to damage gear shift lever case (1).

Special tool
(A) : 09922-85811

4) Likewise, drive spring pin (2) into gear shift lever (3) as far as the position shown in the figure.

CAUTION:
When driving spring pin (2), use care not to damage gear shift lever case (1).

Special tool
(A) : 09922-85811

5) Remove case plug (7).

6) Pull out gear shift shaft (4) from gear shift lever case (1) and take out gear shift lever (3).

TRANSMISSION UNIT

1) Remove clutch release bearing (1), release fork (2) and clutch housing (3).
2) Remove back-up light switch (1).

3) Remove locating screw (1), locating spring (2) and locating ball (3) as shown in the figure.

4) Remove return spring low bolt (1) and return spring reverse bolt (2).

5) Remove gear shift shaft inner bolt (1)/plug (2).
6) Using bolt hole, pull gear shift inner shaft (2) and then remove gear shift shaft inner lever (1).

7) After removing transmission case bolts/nut, remove transmission rear case (1) from intermediate case (2).

Special tool
(A) : 09912-34510

8) Remove input shaft bearing retainer (1) and gasket.
9) Remove C-ring (1) of input shaft bearing and C-ring (2) of counter shaft front bearing.

**Special tool**
(B) : 09900-06107

10) Using special tool, separate transmission front case (1) and transmission intermediate case (2).

**Special tool**
(A) : 09912-34510

11) Set transmission on workbench and remove transmission front case (1).

**NOTE:**
To remove transmission front case, tilt it as shown in the figure.

12) Set transmission intermediate case on vise securely.

13) Remove locating screws (1), locating springs (2) and locating ball (3) as shown in the figure.

14) Using special tool, remove spring pin and then remove 5th-reverse gear shift shaft (1).

**Special tool**
(C) : 09922-85811
15) Remove bolt from 5th gear shift fork (1).

16) Remove 5th gear shift fork (1), 5th gear shift shaft (3) and reverse gear shift yoke (2).

**NOTE:**
When pulling 5th gear shift shaft (3), place hand so as to catch balls (4) dropping from reverse gear shift yoke (2) and intermediate plate.

17) Remove locating roller No.2 (1) from reverse gear shift shaft (2) by using magnet (3).

18) Remove circlip (1) from reverse gear shift shaft (2) as shown in the figure.

19) Remove spring pin from reverse gear shift link component.

Special tool
(C) : 09922-85811
20) Remove reverse gear shift shaft (2), locating roller No. 1 (1),
and reverse gear shift link component (3) by using magnet.

**NOTE:**
When pulling gear shaft (2), hold locating roller No. 1 (1)
with magnet (4) to prevent it from falling.

21) Disassemble reverse gear shift link component (3) by
removing E-rings.

22) Remove locating roller No.2 (1) from low gear shift shaft (2)
by using magnet (3).

23) Remove circlip (1) from low gear shift shaft (2) as shown in
the figure.

24) Remove bolt from low speed gear shift fork (1).

25) Remove low gear shift shaft (2) and locating roller No.1 (1)
by using magnet (3).

**NOTE:**
When pulling gear shaft (2), hold locating roller No.1 (1)
with magnet (3) to prevent it from falling.
26) Remove circlip (1) from high gear shift shaft (2) as shown in the figure.

27) Remove bolt from high speed gear shift fork (1).
28) Remove high gear shift shaft (2), high speed gear shift fork (1) and low speed gear shift fork (3).

29) Check counter shaft 5th gear (1) thrust clearance by using thickness gauge (2).

Counter shaft 5th gear thrust clearance:
Standard: 0.10 – 0.30 mm (0.0040 – 0.0118 in.)

30) Remove circlip (1) from counter shaft (2) as shown in the figure.

31) Remove 5th speed synchronizer dog by using special tool.

Special tool
(D) : 09941-84510

32) Remove synchronizer ring, needle bearing and counter shaft 5th gear.
33) Remove thrust washer (2) and ball (1).

34) Remove reverse link stay (1) from intermediate case.

35) Remove reverse idle gear (1) and shaft (2).

36) Remove main and counter shaft bearing plate (1).

37) Remove C-ring (1) of counter shaft rear bearing.

Special tool
(B) : 09900-06107
38) Using rod (2) and hammer, remove counter shaft rear bearing (1) and counter shaft (3).

NOTE:
This removal requires 2 persons. One should hold counter shaft (3) and the other should remove bearing (1) by using rod (2) and hammer.

39) Remove input shaft assembly (1) with synchronizer ring from main shaft assembly (2).

NOTE:
When removing input shaft, be careful not to drop bearing roller.

40) Remove C-ring of main shaft and pull out main shaft assembly (1).

NOTE:
If intermediate case is engaged with bearing firmly, tap front face of intermediate case with plastic hammer lightly as it will cause main shaft assembly to come off forward.
SUB-ASSEMBLY

INPUT SHAFT ASSEMBLY

Remove circlip of input shaft (1) and pull out bearing (2) with puller (3) and press.

CAUTION:
Sealed bearing must not be washed. Replace it with new one when required.

MAIN SHAFT ASSEMBLY

1) Remove circlip (1) from main shaft (2) as shown in the figure.

2) Pull out 5th gear (1), needle bush (2), needle bearing (3), main shaft bearing (4) and low gear (5) with puller (6) and press (7).

3) Remove synchronizer ring and ball (1).
4) Pull out low speed sleeve/hub assembly (1), needle bearing and 2nd gear (2) from main shaft.
5) Pull off synchronizer springs/keys and low speed sleeve from hub.

6) Remove circlip from front part of main shaft and pull out 3rd gear (1), needle bearing, synchronizer ring and high speed sleeve/hub assembly (2).

COUNTER SHAFT & REVERSE IDLE GEAR

1) Remove circlip (1) from counter shaft.

Special tool

(A) : 09900-06107

2) Pull out bearing (3) from counter shaft by using puller (4), press (1) and rod (diameter approx. 22 mm (0.87 in.)) (2).
INPUT SHAFT BEARING RETAINER AND OIL SEAL

Remove oil seal (1) from bearing retainer (2) by using rod or the like as shown in the figure.

**NOTE:**
Unless oil seal is leaky or its lip is excessively hardened, replacement is not necessary.

TRANSMISSION REAR CASE

1) Remove counter shaft gutter (2) from transmission rear case (1).

2) Take out oil seal (1) from rear case (2).

3) Remove interlock cam plug (1) by using torx® (2).
4) Remove pin by using special tool.

Special tool
(A) : 09922-85811

5) Pull out interlock cam component (1).

COMPONENTS INSPECTION

SUB-ASSEMBLY

INPUT SHAFT ASSEMBLY

Check clearance “a” between synchronizer ring and gear, key slot width “b” in synchronizer ring and each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

Clearance “a” between synchronizer ring and gear (input shaft) :
Standard : 1.0 – 2.0 mm (0.039 – 0.078 in.)
Service limit : 0.8 mm (0.032 in.)

Key slot width “b” (input shaft) :
Standard : 10.0 – 10.2 mm (0.394 – 0.401 in.)
Service limit : 10.45 mm (0.411 in.)
MAIN SHAFT ASSEMBLY

Check clearance “a” between synchronizer ring and gear, key slot width “b” in synchronizer ring and each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

Clearance “a” between synchronizer ring and gear (Main shaft):
- Standard: 1.0 – 2.0 mm (0.039 – 0.078 in.)
- Service limit: 0.8 mm (0.032 in.)

Key slot width “b” (Main shaft):
- 1st, 2nd:
  - Standard: 12.2 – 12.4 mm (0.481 – 0.488 in.)
  - Service limit: 12.65 mm (0.498 in.)
- 3rd:
  - Standard: 10.0 – 10.2 mm (0.394 – 0.401 in.)
  - Service limit: 10.45 mm (0.411 in.)

Check clearance between fork and sleeve.
If clearance exceeds limit, replace fork and sleeve.

Clearance between fork and sleeve:
- Standard: 0.15 – 0.35 mm (0.006 – 0.013 in.)
- Limit: 1.0 mm (0.039 in.)

Check diameter of main shaft (1)/needle bush (2) and thickness of main shaft (1)/needle bush (2) flanges as shown in the figure. If measured value is out of specification, replace them (or it).

Main shaft/needle bush specification (diameter and thickness):

<table>
<thead>
<tr>
<th>Measuring portion</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>37.984 – 38.000 mm (1.4955 – 1.4960 in.)</td>
</tr>
<tr>
<td>B</td>
<td>34.984 – 35.000 mm (1.3774 – 1.3779 in.)</td>
</tr>
<tr>
<td>C</td>
<td>4.80 – 5.20 mm (0.1840 – 0.2047 in.)</td>
</tr>
<tr>
<td>D</td>
<td>38.985 – 39.000 mm (1.5348 – 1.5354 in.)</td>
</tr>
<tr>
<td>E</td>
<td>3.955 – 4.195 mm (0.1558 – 0.1651 in.)</td>
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</tbody>
</table>
• Using “V” blocks (1) and dial gauge (2), check runout. If runout exceeds limit below, replace main shaft (3).

**Main shaft runout:**
limit : 0.06 mm (0.0023 in.)

• Using cylinder gauge (1), check inside diameter of each gear. If its inside diameter exceeds specification, replace it.

**Inside diameter of gear:**

<table>
<thead>
<tr>
<th>Gear</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>44.015 – 44.040 mm (1.7329 – 1.7338 in.)</td>
</tr>
<tr>
<td>2nd</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td></td>
</tr>
</tbody>
</table>

• Check chamfered part of each sleeve for damage and excessive wear, and replace as necessary.
• Check each synchronizer key and synchronizer spring and replace as necessary.
• Check splined portions and replace parts if excessive wear is found.

• Check 2nd gear (1) thrust clearance by using thickness gauge (2). If clearance is out of specification, repress-fit or replace defective part.

**2nd gear thrust clearance:**
standard : 0.10 – 0.25 mm (0.004 – 0.009 in.)

• Check low gear (1) thrust clearance by using thickness gauge (2). If clearance is out of specification, repress-fit or replace main shaft bearing and 5th gear.

**Low gear thrust clearance:**
standard : 0.10 – 0.25 mm (0.004 – 0.009 in.)
COUNTER SHAFT AND REVERSE IDLE GEAR

- Using micrometer, check diameter of counter shaft as shown in the figure. If measured value is out of specification, replace it.

Counter shaft diameter (standard):
“a”: 25.986 – 26.00 mm (1.0231 – 1.0236 in.)
“b”: 30.957 – 30.972 mm (1.2188 – 1.2193 in.)

- Check clearance between fork and sleeve. If clearance exceeds limit, replace fork and sleeve.

Clearance between fork and sleeve:
Standard: 0.15 – 0.35 mm (0.006 – 0.013 in.)
Limit: 1.0 mm (0.039 in.)

- Check clearance “a” between synchronizer ring and gear, key slot width “b” in synchronizer ring and each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

Clearance “a” between synchronizer ring and gear (counter shaft):
Standard: 1.0 – 2.0 mm (0.039 – 0.078 in.)
Service limit: 0.8 mm (0.032 in.)

Key slot width “b” (counter shaft):
Standard: 10.0 – 10.2 mm (0.394 – 0.4015 in.)
Service limit: 10.45 mm (0.411 in.)

- Using cylinder gauge (1), check inside diameter of counter shaft 5th gear (2). If measured value exceeds specification, replace gear.

Counter shaft 5th gear diameter:
Standard: 33.015 – 33.040 mm (1.2999 – 1.3007 in.)
- Check oil clearance between reverse idle gear (2) and shaft (1) by measuring inside diameter of gear and diameter of shaft and calculate its clearance. If clearance exceeds limit, replace gear and shaft.

**Oil clearance between reverse idle gear and shaft**

**Standard :** 0.040 – 0.082 mm (0.0016 – 0.0032 in.)

**Limit :** 0.13 mm (0.005 in.)

- Check clearance between reverse idle gear (2) and shoe (1) of reverse gear shift link. If clearance exceeds limit, replace shoe.

**Clearance between reverse idle gear and shoe**

**Standard :** 0.05 mm – 0.28 mm (0.002 – 0.011 in.)

**Limit :** 0.5 mm (0.019 in.)
UNIT ASSEMBLY

GEAR SHIFT LEVER CASE

1) Wash and inspect each part and replace if necessary. Also check item as described below and correct whatever necessary carefully by using reamer, oilstone and the like, wash it thoroughly and reassemble it.

Item to be checked is;
- Shift shaft should go into case smoothly.

2) Insert shift shaft (1) as shown in the figure while making sure that inner parts are in proper direction.

NOTE:
- Cut off portion (3) in shift shaft (1) should face downward when shift shaft (1) is installed.
- Shift lever (2) should be installed at the same time.

3) Drive in spring pins (2) for gear shift lever (5) and shift arm (7).

NOTE:
When driving in spring pins, position their slits 180° ± 30° apart.

Special tool
(A) : 09925-78210

4) Apply sealant to new case plug (8) and drive it into lever case (1).

“A” : Sealant 99000-31110

5) Clean mating surface of gear shift lever case (1) and case plate (2), and then apply sealant evenly to surface of gear shift lever case (1).

“A” : Sealant 99000-31110

6) Tighten screws to specified torque.

Tightening torque
- Gear shift lever case plate screw (b) : 6 N·m (0.6 kg-m, 4.5 lb-ft)
7) Install gear shift lever case (2) to transmission without using sealant for functional check.
8) Install shift control lever and check to make sure that it shifts smoothly according to shift pattern as shown in the figure.

**NOTE:**
- Apply thread lock cement “C” to control lever locating bolts (1) when retightening.
- Be sure to apply sealant to mating surface of gear shift lever case (2) for its final installation.

“C” : Cement 99000-32020

**Tightening torque**
- Control lever locating bolt (a) :
  17 N·m (1.7 kg-m, 12.5 lb-ft)

**SUB-ASSEMBLY**

**INPUT SHAFT ASSEMBLY**

1) Bring bearing (1) so that its groove for circlip is in the front of input shaft (2) and press-fit with special tool and press.

**Special tool**
- (A) : 09940-51710

2) Select circlip (1) that will make thrust clearance of bearing 0.1 mm (0.0039 in) or less and install it.

**Circlip thickness specification :**

<table>
<thead>
<tr>
<th>ID mark</th>
<th>Circlip thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2.05 – 2.10 mm (0.0807 – 0.0826 in.)</td>
</tr>
<tr>
<td>1</td>
<td>2.10 – 2.15 (0.0827 – 0.0846 in.)</td>
</tr>
<tr>
<td>2</td>
<td>2.15 – 2.20 (0.0847 – 0.0866 in.)</td>
</tr>
<tr>
<td>3</td>
<td>2.20 – 2.25 (0.0867 – 0.0885 in.)</td>
</tr>
<tr>
<td>4</td>
<td>2.25 – 2.30 (0.0886 – 0.0905 in.)</td>
</tr>
<tr>
<td>5</td>
<td>2.30 – 2.35 (0.0906 – 0.0925 in.)</td>
</tr>
</tbody>
</table>
3) Apply grease to bearing roller (1) and install it to input shaft (2).

Grease : 99000-25010

MAIN SHAFT ASSEMBLY

NOTE:
- Before installation, wash each part and apply specified gear oil to sliding faces of bearing and gear.
- Use new circlips on shaft for installation. Don't reuse circlips.

1) Assemble high speed synchronizer hub (3), sleeve (4), springs (1) and keys (2) according to the following procedure.
   a) Slide hub (3) in sleeve (4) so that wider flange side of sleeve (4) and boss side of hub (3) face opposite as shown in the figure, also aligning hub slots with key location teeth of sleeve (4).
   b) Insert keys (2) in hub slots with depression side of keys face center of hub (3).
   c) Install springs (1) to internal circle of key locations with spring end gaps apart at angles about 120 degrees each other, in order to apply spring tension equally to each key.

NOTE:
Do not mix high and low speed synchronizer keys as dimensions are different.

A : Boss
B : Key location teeth
C : Wider flange (C>C')
D : Depression of key

2) Install synchronizer ring (1) by matching its key slots to keys as shown in the figure.
3) Insert 3rd gear, (2) needle bearing (3) and high speed sleeve/hub assembly (4) with synchronizer ring to main shaft (1).

4) Press-fit high speed sleeve/hub assembly (1) with special tool and press (2).

Special tool
(A) : 09940-53111

5) Select circlip (1) that will make thrust clearance of clutch hub 0.1 mm (0.0039 in) or less and install it.

Circlip thickness specification :

<table>
<thead>
<tr>
<th>ID mark</th>
<th>Circlip thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>C – 1</td>
<td>1.75 – 1.80 mm (0.0689 – 0.0708 in.)</td>
</tr>
<tr>
<td>D</td>
<td>1.80 – 1.85 mm (0.0709 – 0.0728 in.)</td>
</tr>
<tr>
<td>D – 1</td>
<td>1.85 – 1.90 mm (0.0729 – 0.0748 in.)</td>
</tr>
<tr>
<td>E</td>
<td>1.90 – 1.95 mm (0.0749 – 0.0767 in.)</td>
</tr>
<tr>
<td>E – 1</td>
<td>1.95 – 2.00 mm (0.0768 – 0.0787 in.)</td>
</tr>
<tr>
<td>F</td>
<td>2.00 – 2.05 mm (0.0788 – 0.0807 in.)</td>
</tr>
<tr>
<td>F – 1</td>
<td>2.05 – 2.10 mm (0.0808 – 0.0826 in.)</td>
</tr>
</tbody>
</table>

Special tool
(B) : 09900-06107

6) After installing circlip, check that 3rd gear turns lightly.

7) Check 3rd gear (2) thrust clearance by using thickness gauge (1). If clearance is out of specification, repress-fit or replace.

3rd gear thrust clearance :
Standard : 0.10 – 0.25 mm (0.004 – 0.009 in.)
8) Assemble low speed synchronizer hub (3), sleeve (4), springs (1) and keys (2) according to the following procedure.
   a) Slide hub (3) in sleeve (4) with aligning hub slots with key location teeth of sleeve (4).
   b) Insert keys (2) in hub slots with depression side of keys (2) face center of hub (3).
   c) Install springs (1) to internal circle of key locations with spring end gaps apart at angles about 120 degrees each other, in order to apply spring tension equally to each key.

**NOTE:**

Before installing hub (3), sleeve (4), springs (1) and keys (2) assembly to main shaft, there is no specific installation direction on each component. However, when installing assembly to main shaft, gear side of sleeve (4) should face to forward direction as shown in the figure.

![Diagram showing assembly process](image)

9) Install synchronizer ring (1) by matching its key slots to keys as shown in the figure.

![Diagram showing synchronizer ring installation](image)

10) Insert 2nd gear (2), needle bearing (3) and low speed sleeve/hub assembly (4) with synchronizer ring to main shaft (1).

![Diagram showing gear and bearing assembly](image)


**Special tool**

(A) : 09940-53111

12) Check 2nd gear thrust clearance, referring to “MAIN SHAFT ASSEMBLY” in this section.
13) Apply grease to ball (1) and set it to main shaft (3).
14) Install synchronizer ring (2).

15) Install needle bearing (2), low gear (3) and needle bush (1) to main shaft.

**NOTE:**
- Check the cut in needle bush and ball are engaged.
- After installation, check the synchronizer ring (4) moves in circumferential direction.

16) Press-fit main shaft bearing (1) and 5th gear with special tools and press (2).

**NOTE:**
Bring bearing so that its groove for circlip is in the rear.

Special tool
(C) : 09940-51710 or 09925-18011

17) Select circlip (1) that will make its thrust clearance 0.1 mm (0.0039 in.) or less and install it.

**Circlip thickness specification :**

<table>
<thead>
<tr>
<th>ID mark</th>
<th>Circlip thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.67 – 2.72 mm (0.1052 – 0.1070 in.)</td>
</tr>
<tr>
<td>B</td>
<td>2.73 – 2.78 mm (0.1075 – 0.1094 in.)</td>
</tr>
<tr>
<td>C</td>
<td>2.79 – 2.84 mm (0.1099 – 0.1118 in.)</td>
</tr>
<tr>
<td>D</td>
<td>2.85 – 2.90 mm (0.1123 – 0.1141 in.)</td>
</tr>
<tr>
<td>E</td>
<td>2.91 – 2.96 mm (0.1146 – 0.1165 in.)</td>
</tr>
<tr>
<td>F</td>
<td>2.97 – 3.02 mm (0.1170 – 0.1188 in.)</td>
</tr>
<tr>
<td>G</td>
<td>3.03 – 3.08 mm (0.1193 – 0.1212 in.)</td>
</tr>
<tr>
<td>H</td>
<td>3.09 – 3.14 mm (0.1217 – 0.1236 in.)</td>
</tr>
<tr>
<td>J</td>
<td>3.15 – 3.20 mm (0.1241 – 0.1259 in.)</td>
</tr>
<tr>
<td>K</td>
<td>3.21 – 3.26 mm (0.1264 – 0.1283 in.)</td>
</tr>
<tr>
<td>L</td>
<td>3.27 – 3.32 mm (0.1288 – 0.1307 in.)</td>
</tr>
</tbody>
</table>

18) Check low gear clearance, referring to “MAIN SHAFT ASSEMBLY” in this section.
COUNTER SHAFT AND REVERSE IDLE GEAR

1) Fit sleeve (4) to counter shaft 5th gear (3), place 3 synchronizer keys (2) in it and then set synchronizer springs (1). Refer to the figure for proper installing direction of gear, sleeve and springs. Also, note that key has specific installing direction.

2) Set inner race (2) to counter shaft front bearing (1) and press-fit bearing with press and special tool.

NOTE:
When installing bearing, bring it so that its groove for circlip is in the front.

Special tool
(A) : 09940-54950

3) Select circlip that will make its thrust clearance 0.1 mm (0.0039 in.) or less and install it.

Circlip thickness specification :

<table>
<thead>
<tr>
<th>ID mark</th>
<th>Circlip thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.05 – 2.10 mm (0.0807 – 0.0826 in.)</td>
</tr>
<tr>
<td>2</td>
<td>2.10 – 2.15 mm (0.0827 – 0.0846 in.)</td>
</tr>
<tr>
<td>3</td>
<td>2.15 – 2.20 mm (0.0847 – 0.0866 in.)</td>
</tr>
<tr>
<td>4</td>
<td>2.20 – 2.25 mm (0.0867 – 0.0885 in.)</td>
</tr>
<tr>
<td>5</td>
<td>2.25 – 2.30 mm (0.0886 – 0.0905 in.)</td>
</tr>
<tr>
<td>6</td>
<td>2.30 – 2.35 mm (0.0906 – 0.0925 in.)</td>
</tr>
</tbody>
</table>

Special tool
(B) : 09900-06107

1. Circlip
2. Thickness gauge
INPUT SHAFT BEARING RETAINER AND OIL SEAL

Install new oil seal (2) to bearing retainer (1) by using special tool as shown in the figure. Apply grease to oil seal lip.

**Grease:** 99000-25010

**Special tool**
- (A) : 09913-75821
- (B) : 09924-84510-004

Oil seal installing position “a” :
12.2 – 13.2 mm (0.49 – 0.51 in.)

TRANSMISSION REAR CASE

1) Check that interlock cam component (1) moves smoothly in both turning direction and sliding direction.

2) Insert interlock cam component (1) to rear case (2).

3) Set interlock cam component (1) as shown in the figure and drive pin by using special tool.

**Special tool**
- (A) : 09922-85811
4) Apply thread lock cement to thread of interlock cam plug (1) and tighten it to specification.

“A” : Cement 99000-32020

Tightening torque
Interlock cam plug (a) : 19 N·m (1.9 kg-m, 14.0 lb-ft)

5) Install oil seal to rear case so that end surface of oil seal becomes flush with that case. Apply grease to oil seal lip.

Grease : 99000-25010

Special tool
(B) : 09913-77510

6) Install counter shaft gutter (2) to transmission rear case (1).

TRANSMISSION INTERMEDIATE CASE AND FRONT CASE (LOCATION OF KNOCK AND PLUG)

• Install knock pin (1) and plug (2) (sealant applied) to front case as shown.

“A” : Sealant 99000-31110
TRANSMISSION UNIT

NOTE:
- Before installation, wash each part and apply specified gear oil to sliding faces of bearing and gear.
- Use new circlips on shaft for installation. Don’t reuse circlips.

1) Set intermediate case (1) to vise (3).
   Clean mating surfaces of intermediate case both sides, if intermediate case is reused.

2) Install main shaft assembly (1) to intermediate case.
3) Fix with C-ring (1) by using special tool.

Special tool
(A) : 09900-06107

4) Align key slots of synchronizer ring and synchronizer keys and set input shaft assembly to main shaft assembly. Check that input shaft assembly turns lightly.

5) Fix with C-ring to counter shaft rear bearing.

6) Install counter shaft (1) and rear bearing (2) to intermediate case.

NOTE:
- When installing bearing, bring it so that its C-ring side is at rear side of intermediate case as shown in the figure.
- When fitting of intermediate case and bearing is tight, tap outer race of bearing lightly and evenly with plastic hammer.
7) Install bearing plate (1).

Tightening torque
Bearing plate bolt (a) : 19 N·m (1.9 kg-m, 14.0 lb-ft)

8) Install reverse idle gear (1) and shaft (2).

9) Tighten reverse gear shaft bolt (1) to specification.

Tightening torque
Reverse gear shaft bolt (a) :
18 N·m (1.8 kg-m, 13.5 lb-ft)

10) Install reverse link stay (1).

Tightening torque
Reverse link stay bolt (a) :
19 N·m (1.9 kg-m, 14.0 lb-ft)

11) Set ball (1) and thrust washer (2) to counter shaft.
12) Install needle bearing (1), counter shaft 5th gear (2) and synchronizer ring.

**NOTE:**
When setting synchronizer ring to sleeve of 5th gear, align synchronizer key slot to key.

13) Press-fit 5th speed synchronizer dog (1) to counter shaft with press (2) and special tool.

**Special tool**
(B) : 09927-08220

14) Select circlip (1) that will make clearance in circlip groove 0.1 mm (0.0039 in.) or less.

**Circlip thickness specification :**

<table>
<thead>
<tr>
<th>ID mark</th>
<th>Circlip thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.80 – 2.85 mm (0.1103 – 0.1122 in.)</td>
</tr>
<tr>
<td>B</td>
<td>2.85 – 2.90 mm (0.1122 – 0.1141 in.)</td>
</tr>
<tr>
<td>C</td>
<td>2.90 – 2.95 mm (0.1142 – 0.1161 in.)</td>
</tr>
<tr>
<td>D</td>
<td>2.95 – 3.00 mm (0.1162 – 0.1181 in.)</td>
</tr>
<tr>
<td>E</td>
<td>3.00 – 3.05 mm (0.1182 – 0.1200 in.)</td>
</tr>
<tr>
<td>F</td>
<td>3.05 – 3.10 mm (0.1201 – 0.1220 in.)</td>
</tr>
<tr>
<td>G</td>
<td>3.10 – 3.15 mm (0.1221 – 0.1240 in.)</td>
</tr>
</tbody>
</table>

2. Thickness gauge

15) Fix with circlip (1) as shown in the figure and check that counter 5th gear turns lightly.
16) Check counter 5th gear (1) thrust clearance by using thickness gauge (2).

**Counter 5th gear thrust clearance:**
Standard : 0.1 – 0.3 mm (0.0040 – 0.0118 in.)

17) Install low speed gear shift fork, high speed gear shift fork and shaft.
18) Apply thread lock cement to thread of fork bolt and tighten bolt to specification.

“A” : Cement 99000-32020

**Tightening torque**
Shift fork bolt (a) : 20 N·m (2.0 kg-m, 14.5 lb-ft)

19) Fix new circlip (1) to high gear shift shaft by using lever or the like and hammer.

20) Apply grease “A” to locating roller No.2 (1) and install roller (1) to low gear shift shaft (2).

“A” : Grease 99000-25010

21) Supporting locating roller No. 3 (1) by magnet (2), insert low gear shift shaft (3) to intermediate case and low speed gear shift fork.
22) Apply thread lock cement “A” to thread of fork bolt and tighten bolt to specification.

“A” : Cement 99000-32020

Tightening torque
Shift fork bolt (a) : 20 N·m (2.0 kg-m, 14.5 lb-ft)

23) Fix with new circlip (1) to low gear shift shaft (2) by using lever or the like and hammer.

24) Apply grease to locating roller No.2 (1) and install roller (1) to reverse gear shift shaft (2).

“A” : Grease 99000-25010

25) Assemble reverse gear shift link assembly.

26) Insert reverse gear shift shaft (2) into reverse gear shift link assembly and intermediate case while holding locating roller No.1 (1) with magnet (3).

27) Supporting locating roller No.1 (1) with magnet (3), insert reverse gear shift shaft (2) into reverse gear shift link and intermediate case.

28) Fix with new circlip (1) to reverse gear shift shaft by using rod or the like and hammer.
29) Drive pin into reverse gear shift link (1) and shaft (2) by using special tool.

**Special tool**
(C) : 09922-85811

30) Install reverse gear shift yoke (1) and 5th gear shift fork (2) as shown in the figure.

31) Supporting ball (1) with magnet (3) as shown in the figure, insert 5th gear shift shaft (2) to 5th gear shift fork (4) and reverse gear shift yoke (5).

32) Supporting ball (1) with magnet (3) as shown in the figure, insert 5th gear shift shaft (2) into intermediate case (4).

33) Apply thread lock cement “A” to thread of fork bolt and tighten bolt to specification.

“A” : Cement 99000-32020

**Tightening torque**
5th gear shift fork bolt (a) : 20 N·m (2.0 kg-m, 14.5 lb-ft)
34) Insert 5th-reverse gear shift shaft (1) to reverse gear shift yoke and drive pin into shaft and yoke.

Special tool
(C) : 09922-85811

35) Install locating balls, locating springs and locating screw after checking free length of locating springs.

**Free length of locating springs :**

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>“a”</td>
<td>31.0 mm</td>
<td>30.1 mm</td>
</tr>
<tr>
<td></td>
<td>(1.22 in.)</td>
<td>(1.19 in.)</td>
</tr>
<tr>
<td>“b”</td>
<td>20.2 mm</td>
<td>19.6 mm</td>
</tr>
<tr>
<td></td>
<td>(0.79 in.)</td>
<td>(0.77 in.)</td>
</tr>
</tbody>
</table>

**NOTE:**
For 5th gear locating spring, use shorter spring (1).

“A” : Cement 99000-32020

**Tightening torque**
Locating spring screw (a) : 19 N·m (1.9 kg-m, 14.0 lb-ft)

36) Place intermediate case assembly upright as shown in the figure by using workbench or the like.

37) Apply sealant evenly to front case side of intermediate case (1) as shown.

“A” : Sealant 99000-31110
38) Clean mating surface of front case (1) and install it to intermediate case.

39) Fix C-rings (1, 2) to bearings as shown in the figure.

Special tool
(A) : 09900-06107

40) Apply cement “A” to input shaft bearing retainer bolt and install input shaft bearing retainer (1), new gasket and its bolts.

“A” : Cement 99000-32020

Tightening torque
Input shaft bearing retainer bolt (a) :
17 N·m (1.7 kg-m, 12.5 lb-ft)

41) Clean mating surface of rear case and apply sealant evenly to rear case side of intermediate case.

Sealant : 99000-31110

42) Install rear case to intermediate case.

Tightening torque
Rear case to intermediate case bolt (a) :
35 N·m (3.5 kg-m, 25.5 lb-ft)

1. Bolt (Longest)
2. Bolt (Middle)
43) With tip end of gear shift shaft inner lever (1) hooked on head of gear shift shaft (2), insert gear shift inner shaft (3) into gear shift shaft inner lever.

44) Apply cement “A” to inner gear shift shaft bolt/plug and tighten them to specification.

“A” : Cement : 66000-32020

Tightening torque
- Gear shift shaft inner bolt (a) : 39 N·m (3.9kg-m, 28.5 lb-ft)
- Gear shift shaft inner plug (b) : 19 N·m (1.9kg-m, 14.0 lb-ft)

45) Tighten return spring low bolt and return spring reverse bolt (Black color) (1).

NOTE:
- Install return spring reverse bolt (Black color) (1) to left side of case.

Tightening torque
- Return spring reverse bolt (Black color) (a) : 28 N·m (2.8 kg-m, 20.5 lb-ft)
46) Apply cement “A” to locating screw (1) and install locating ball (3), locating spring (2) and screw to rear case.

**Free length “a” of locating spring:**
Standard: 22.1 mm (0.87 in.)
Limit: 21.4 mm (0.83 in.)

“A”: Cement 99000-32020

**Tightening torque**
Locating screw (a): 19 N·m (1.9 kg-m, 14.0 lb-ft)

47) Install back-up light switch and new gasket.

**Tightening torque**
Back-up light switch (a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

48) Install clutch housing (3) and torque its bolts to specification.

**Tightening torque**
Clutch housing bolt (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)
## TIGHTENING TORQUE SPECIFICATION

<table>
<thead>
<tr>
<th>Fastening part</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N·m</td>
</tr>
<tr>
<td>Transfer oil filler/level and drain plugs</td>
<td>23</td>
</tr>
<tr>
<td>Transmission oil filler/level and drain plugs</td>
<td>38</td>
</tr>
<tr>
<td>Back-up light switch</td>
<td>45</td>
</tr>
<tr>
<td>Control lever locating bolts</td>
<td>17</td>
</tr>
<tr>
<td>Shift lever case plate screws</td>
<td>6</td>
</tr>
<tr>
<td>Gear shift lever case bolts</td>
<td>23</td>
</tr>
<tr>
<td>Interlock cam plug</td>
<td>19</td>
</tr>
<tr>
<td>Main &amp; counter shaft bearing plate screws</td>
<td>19</td>
</tr>
<tr>
<td>Reverse gear shaft bolt</td>
<td>18</td>
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<tr>
<td>Reverse link stay</td>
<td>19</td>
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<tr>
<td>Shift fork bolts</td>
<td>20</td>
</tr>
<tr>
<td>Locating spring screws</td>
<td>19</td>
</tr>
<tr>
<td>Input shaft bearing retainer bolt</td>
<td>17</td>
</tr>
<tr>
<td>Transmission case bolts</td>
<td>35</td>
</tr>
<tr>
<td>Inner gear shift shaft bolt</td>
<td>39</td>
</tr>
<tr>
<td>Inner gear shift shaft plug</td>
<td>19</td>
</tr>
<tr>
<td>Return spring low/reverse bolts</td>
<td>28</td>
</tr>
<tr>
<td>Clutch housing bolts</td>
<td>50</td>
</tr>
<tr>
<td>Transmission to transfer bolts</td>
<td>50</td>
</tr>
</tbody>
</table>

## REQUIRED SERVICE MATERIAL

<table>
<thead>
<tr>
<th>Material</th>
<th>Recommended SUZUKI product (Part Number)</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium grease</td>
<td>SUZUKI SUPER GREASE A (99000-25010)</td>
<td>• Oil seal lips&lt;br&gt;• Select return system&lt;br&gt;• Input shaft bearing roller&lt;br&gt;• Locating rollers</td>
</tr>
<tr>
<td>Thread lock cement</td>
<td>THREAD LOCK CEMENT SUPER 1333B (99000-32020)</td>
<td>• Shift control lever locating screws&lt;br&gt;• Gear shift fork bolts&lt;br&gt;• Input shaft retainer bolts</td>
</tr>
<tr>
<td>Sealant</td>
<td>SUZUKI BOND No. 1215 (99000-31110)</td>
<td>• Oil drain and filler/level plugs&lt;br&gt;• Mating surface of gear shift lever case&lt;br&gt;• Mating surface of transmission cases&lt;br&gt;• Front case plugs&lt;br&gt;• Gear shift shaft plug</td>
</tr>
<tr>
<td>Tool Code</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------</td>
<td></td>
</tr>
<tr>
<td>09912-34510</td>
<td>Case separator</td>
<td></td>
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<tr>
<td>09913-75510</td>
<td>Bearing installer (O.D. 70.5 mm)</td>
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</tr>
<tr>
<td>09940-51710</td>
<td>Bearing installer</td>
<td></td>
</tr>
<tr>
<td>09940-54950</td>
<td>Bearing installer attachment</td>
<td></td>
</tr>
<tr>
<td>09913-75821</td>
<td>Installer attachment</td>
<td></td>
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<tr>
<td>09924-84510-004</td>
<td>Bearing installer adapter (C)</td>
<td></td>
</tr>
<tr>
<td>09925-78210 (6 mm)</td>
<td>Spring pin remover</td>
<td></td>
</tr>
<tr>
<td>09922-85811 (4.5 mm)</td>
<td>Spring pin remover</td>
<td></td>
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<tr>
<td>09927-08220</td>
<td>Shaft remover</td>
<td></td>
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<tr>
<td>09940-53111</td>
<td>Bearing installer</td>
<td></td>
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<tr>
<td>09900-06107</td>
<td>Snap ring pliers (opening type)</td>
<td></td>
</tr>
<tr>
<td>09941-84510</td>
<td>Bearing inner remover</td>
<td></td>
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<tr>
<td>09925-18011</td>
<td>Installer attachment</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 7B1

AUTOMATIC TRANSMISSION (4 A/T)

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GENERAL DESCRIPTION

When repairing automatic transmission, it is necessary to conduct the on-vehicle test to investigate where the cause of the trouble lies first. Then whether overhaul should be done or not is determined. If the transmission is disassembled without such preliminary procedure, not only the cause of the trouble would be unknown, but also a secondary trouble may occur and often time would be wasted.
TORQUE CONVERTER DIAGNOSIS

STATOR ASSEMBLY FREEWHEELS

If the stator roller clutch becomes ineffective, the stator assembly freewheels at all times in both directions. With this condition, the vehicle tends to have poor acceleration from a standstill. If poor acceleration problems are noted, what to be checked first are that the exhaust system is not blocked, the engine is running properly and the transmission is in 1st gear when starting out.

STATOR ASSEMBLY REMAINS LOCKED UP

If the stator assembly remains locked up at all times, the engine rpm and vehicle speed will tend to be limited or restricted at high speeds. The vehicle performance when accelerating from a standstill will be normal. Engine overheating may be noted. Visual examination of the converter may reveal a blue color from the overheating that will result.

Under above conditions, if the converter has been removed from the transmission, the stator roller clutch can be checked by inserting a finger into the splined inner race of the roller clutch and trying to turn the race in both directions. The inner race should turn freely clockwise, but be heavy to turn counterclockwise.

NOTE:

- Converter placed with its flange upright does not fit for this inspection.
- For proper checking, position converter with its flange horizontal.
- Turn stator inner race clockwise as quickly as possible with finger, then turn reversely at the same speed and feel difference of inertia.

1. Stator inner race (Should turn freely clockwise only)

DO NOT REPLACE CONVERTER FOR FOLLOWING CONDITIONS:

1) The fluid has an odor, is discolored, and there is no evidence of metal particles. There is no indication of existence of internal damage, or oil pump damage. Dump out as much fluid as possible from the converter and replace only the oil pump screen in the pan.

2) A small amount of wear (sometimes referred to as fretting wear) appears on the hub where the oil pump drive gear is located. A certain amount of such wear is normal for both the hub and oil pump gear. Neither the converter nor the oil pump assembly should be replaced.
UNIT REPAIR

PRECAUTIONS

As the automatic transmission consists of high precision components, the following cautions should be strictly observed when handling its parts in disassembly and reassembly.

- Make sure to wash dirt off from the transmission so that no such dirt will enter the transmission during dismounting and remounting.
- Select a clean place free from dust and dirt for overhauling.
- Place a rubber mat on the work bench to protect parts from damage.
- Work gloves or shop cloth should not be used. (Use a nylon cloth or a paper towel.)
- When separating the case joint, do not pry with a screwdriver or such but tap with a plastic hammer lightly.
- Make sure to wash dirt off from the transmission so that no such dirt will enter the transmission during disassembly and reassembly.
- Wash the disassembled parts in ATF (Automatic Transmission Fluid) or kerosene (using care not to allow ATF or kerosene to get on your face, etc.) and confirm that each fluid passage is not clogged by blowing air into it. But use ATF to wash the disc, resin washers and rubber parts.
- Replace each gasket, oil seal and O-ring with a new one.
- Apply ATF to sliding or rotating parts before reassembly.
- A new disc should be soaked in ATF at least 2 hours before use.

PART INSPECTION AND CORRECTION TABLE

<table>
<thead>
<tr>
<th>Part</th>
<th>Inspect for</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casted part, machined part</td>
<td>Small flaw, burr</td>
<td>Remove with oil stone.</td>
</tr>
<tr>
<td></td>
<td>Deep or grooved flaw</td>
<td>Replace part.</td>
</tr>
<tr>
<td></td>
<td>Clogged fluid passage</td>
<td>Clean with air or wire.</td>
</tr>
<tr>
<td></td>
<td>Flaw on installing surface, residual gasket</td>
<td>Remove with oil stone or replace part.</td>
</tr>
<tr>
<td></td>
<td>Crack</td>
<td>Replace part.</td>
</tr>
<tr>
<td>Bearing</td>
<td>Unsmooth rotation</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Streak, pitting, flaw, crack</td>
<td>Replace.</td>
</tr>
<tr>
<td>Bushing, thrust washer</td>
<td>Flaw, burr, wear, burning</td>
<td>Replace.</td>
</tr>
<tr>
<td>Oil seal, gasket</td>
<td>Flawed or hardened seal ring</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Worn seal ring on its periphery or side</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Piston seal ring, oil seal, gasket, etc.</td>
<td>Replace.</td>
</tr>
<tr>
<td>Gear</td>
<td>Flaw, burr</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Worn gear tooth</td>
<td>Replace.</td>
</tr>
<tr>
<td>Splined part</td>
<td>Burr, flaw, torsion</td>
<td>Correct with oil stone or replace.</td>
</tr>
<tr>
<td>Snap ring</td>
<td>Wear, flaw, distortion</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>No interference</td>
<td>Replace.</td>
</tr>
<tr>
<td>Thread</td>
<td>Burr</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Damage</td>
<td>Replace.</td>
</tr>
<tr>
<td>Spring</td>
<td>Settling, sign of burning</td>
<td>Replace.</td>
</tr>
<tr>
<td>Clutch disc, brake disc</td>
<td>Wear, burning, distortion, damaged claw</td>
<td>Replace.</td>
</tr>
<tr>
<td>Clutch plate, brake plate</td>
<td>Wear, burning, distortion, damaged claw</td>
<td>Replace.</td>
</tr>
<tr>
<td>Sealing surface (where lip contacts)</td>
<td>Flaw, rough surface, stepped wear, foreign material</td>
<td>Replace.</td>
</tr>
</tbody>
</table>
UNIT DISASSEMBLY

1) Extract torque converter. And remove oil filler tube and dipstick.

**CAUTION:**
Remove torque converter as much straight as possible. Leaning it may cause to damage oil seal lip.

```plaintext
1. Torque converter
2. Converter housing
```

2) Remove speed sensor (1).
3) Remove 6 adapter case fixing bolts and then remove adapter case (2).

**NOTE:**
Use care not to cause damage to oil seal.

4) Remove gasket.

5) Remove shift switch (1).

6) Remove C-ring (1) and then remove speed sensor rotor (2).

**NOTE:**
Use care not to loose rotor stop key.
7) Remove oil pump (5) by using puller (1).

**NOTE:**
Use care not to cause damage to shaft bushing surface (2).

8) Remove bearing at the real of oil pump (5).
9) Remove O-ring from oil pump (5).
10) Holding input shaft (4) by hand, remove converter housing (3).

11) Check dimensions of overdrive (O/D) case surface and clutch cylinder surface for reassembly.
12) Remove overdrive (O/D) clutch assembly by holding input shaft (3).
13) Remove O/D case, bearing and bearing race.

**NOTE:**
Confirm direction of bearing and bearing race for reassembly.

1. Over drive case
2. Clutch cylinder

14) Remove oil pan (1).

**NOTE:**
- Hold oil pan with oil pan side down to prevent foreign material in oil pan from entering valve body.
- If iron powder is found, it is possible that bearing, gear or clutch plate is worn.

15) Remove oil tubes.

**NOTE:**
Refer to the figure for order of their removal.

16) Remove coupler from solenoid valve (1).
17) Remove oil strainer (1).
18) Remove valve body (2) mounting bolts as shown in the figure.

19) Lift valve body (1) and disconnect A/T throttle cable (2) from throttle cam. And remove valve body.
20) Disconnect throttle cable (3) from case (4).

21) Remove accumulator pistons (1) by blowing air into holes indicated in the figure.

**NOTE:**
Hold accumulator piston (1) with shop cloth while blowing.

22) Place transmission upright as shown in the figure.

**NOTE:**
- To prevent transmission case from getting damaged, protect its contacting surface with stand by using shop cloth or the like.
- A stand of such size as shown in the figure will facilitate work.
23) Check top surface level of forward clutch (2) against case (1) for reassembly.

24) Remove forward clutch.

**NOTE:**
Confirm direction of bearing and bearing race for reassembly.

25) Remove direct clutch (1).

26) Remove parking rod (1) and parking pawl (2).

27) Remove 2 bolts (1) from valve body side to remove center support.

28) Remove center support assembly (1).
29) Remove retaining ring (1), planetary gear assembly and leaf spring.

**NOTE:**
- Use care not to cause damage to case when removing retaining ring.
- Confirm direction of bearing and bearing race for reassembly.

30) Remove reverse brake retainer (1).

**Special tool**
- (A) : 09941-84510
- (B) : 09926-98320

31) Remove brake applying cover (1).

32) Remove rear action sleeve and reverse brake piston by blowing air into hole (1) with hole (2) closed.

33) Undo caulking of sleeve cover (1) by using moderate stick (2) and move sleeve cover.
34) Using a punch, drive out manual shift lever pin, pull out manual shift shaft (2) and remove manual shift lever (1). Then remove sleeve cover from manual shift lever (1).

35) Remove oil seal (1) from both sides of transmission case.

**SUB-ASSEMBLY REPAIR**

**OIL PUMP**

1. Oil pump assembly
2. Oil pump body oil seal
3. Oil pump cover O-ring
4. Driven gear
5. Drive gear
6. Oil pump cover
7. Seal ring
8. Oil pump body
DISASSEMBLY

1) Remove 6 bolts, oil pump cover (1), drive gear and driven gear in that order.
2) Remove oil pump cover O-ring.

INSPECTION

• Check seal ring (2) and bushing (1) for wear and damage.

• Check clearance between outer gear (1) and body.
  Clearance between outer gear and body :
  Standard : 0.07 – 0.15 mm (0.0028 – 0.0059 in.)
  Service limit : 0.30 mm (0.0118 in.)

• Check tip clearance between inner gear (1) and outer gear.
  Tip clearance between inner gear and outer gear
  Standard : 0.11 – 0.14 mm (0.0044 – 0.0055 in.)
  Service limit : 0.30 mm (0.0118 in.)

NOTE:
Measure with torque converter installed.
Check side clearance between inner gear/outer gear and pump body.

**Side clearance between inner gear/outer gear and pump body:**
- **Standard:** 0.02 – 0.05 mm (0.0008 – 0.0019 in.)
- **Service limit:** 0.1 mm (0.0039 in.)

**ASSEMBLY**
Assemble each component by reversing removal procedure and noting following points.
- Before installing inner gear and outer gear to pump body, apply A/T fluid to them.
- When installing pump cover, use care so that its splined part will not cause damage to oil seal and use specified torque to tighten it to pump body.

**Tightening torque**
- **Oil pump bolt (a):** 7.5 N·m (0.75 kg-m, 5.5 lb-ft)

- When installing O-ring and oil seal, apply enough A/T fluid to them and fit them securely in groove.
- After installation, check that inner gear turns smoothly by making use of torque converter.
- When installing seal ring, it should not be opened more than necessary.
- Fit claws of seal ring securely.
OVERDRIVE (PLANETARY GEAR SIDE)

DISASSEMBLY

1) With overdrive (O/D) clutch cylinder (1) held stationary, turn O/D input shaft (2) clockwise to check that it turns smoothly and then counterclockwise to check that it locks.

[A]: Rotates
[B]: Locks
2) Remove O/D planetary gear assembly (1).

3) With O/D clutch assembly (2) installed to oil pump (1), apply 4 to 8 kg/cm² air pressure into fluid hole in oil pump and measure stroke of clutch piston. If it is not within standard range, replace cushion clutch plate or clutch disc.

**Standard stroke of clutch piston:**
**Standard** : 1.47 – 2.28 mm (0.058 – 0.089 in.)

4) Remove retaining ring (1) and then remove brake hub (2).

5) Remove retaining clutch ring (1), cushion plate, backing plate and clutch disc in that order.

6) With clutch piston return spring compressed with special tools, remove clutch piston return spring.

**Special tool**
(A) : 09918-48211
(B) : 09926-98320
(C) : 09918-48220
7) Install O/D clutch cylinder to oil pump (2). Apply compression air into fluid hole in oil pump (2) and remove clutch piston (1).
8) Remove piston inner O-ring and piston outer O-ring from clutch piston (1).

9) Remove retaining ring from O/D planetary gear and then remove one-way clutch, thrust planetary washer and thrust bearing.

**INSPECTION**

- Check that ball valve of clutch piston is not stuck.
- Check valve for leakage by applying low pressure air into ball valve hole.

**ASSEMBLY**

Assemble each component by reversing removal procedure and noting the following points.
- When installing thrust washer (1), bring its oil groove (3) to the front.
- When installing one-way clutch to one-way clutch outer race, bring its flange (2) to the front.
- Before installing piston inner O-ring and piston outer O-ring, apply A/T fluid to them.
- Install so that snap opening and projection (1) of clutch piston return spring will not match.

- Install retaining clutch ring and retaining brake hub so that their slots (2) will not match with dent (1) in O/D clutch cylinder.

- For installing cushion clutch plate (1), refer to the figure.
OVERDRIVE (CASE SIDE)

[A]: [G16 and J20 engines]
1. Sealing
2. Bearing
3. Bearing race
4. O/D case
5. Planetary ring gear
6. O-ring
7. Brake piston
8. Return spring
9. Retainer
10. Retaining ring
11. Cushion plate
12. Brake backing plate
13. Brake disc
14. Brake plate

[B]: [H25 engine]
1. Sealing
2. Bearing
3. Bearing race
4. O/D case
5. Planetary ring gear
6. O-ring
7. Brake piston
8. Return spring
9. Retainer
10. Retaining ring
11. Cushion plate
12. Brake backing plate
13. Brake disc
14. Brake plate
**DISASSEMBLY**

1) Measure clearance between retaining ring (1) and brake backing plate (2) with thickness gauge. If it is not within standard range, replace brake disc or brake plate.

   **Clearance between retaining ring and brake backing plate**
   **Standard:**
   - 0.56 – 1.38 mm (0.022 – 0.054 in.) (G16 and J20 engines)
   - 0.40 – 1.38 mm (0.016 – 0.054 in.) (H25 engine)

2) Remove retaining ring (1), brake backing plate (2), brake disc (3), brake plate (4), cushion brake plate (5) in that order. Then remove planetary ring gear, thrust bearing race and thrust rear bearing.

3) Remove retaining ring (1), retainer (2) and piston return spring (3).

4) Blow air into fluid hole in O/D case (2) and remove brake piston (1).

5) Remove brake piston inner ring and brake piston outer ring from brake piston.
6) Unsnap seal ring (1).
7) Remove 2 seal rings (1).

NOTE:
Be careful not to open seal ring more than necessary.

INSPECTION

- Measure free length of piston return spring.

Standard free length of piston return spring:
16.12 mm (0.635 in.) (J20 engine)
15.10 mm (0.594 in.) (G16 and H25 engines)

ASSEMBLY

Install each component by reversing removal procedure and noting the following points.
- When installing rear seal ring, use care not to open it too wide.
- Apply A/T fluid to O-ring, disc, etc. before installing them.
- Opening of retaining brake front ring (2) and projection (1) of O/D case should be matched.
- When installing each component, refer to the first figure of “OVER DRIVE (CASE SIDE)” in this section.

- Install cushion brake plate (1) so that it warps convexly.
- As a final step, measure clearance between retaining brake front ring and brake backing plate again.

Standard clearance between retaining brake front ring and brake backing plate:
0.56 – 1.38 mm (0.022 – 0.054 in.) (G16 and J20 engines)
0.40 – 1.38 mm (0.016 – 0.054 in.) (H25 engine)
FORWARD CLUTCH

[A]: [J20 engine]  
1. Input shaft  
2. Piston  
3. Return spring  
4. O-ring  
5. Retaining ring  
6. Bearing race  
7. Bearing  
8. Clutch plate  
9. Clutch disc  
10. Forward clutch hub  
11. Direct clutch input hub

[B]: [G16 and H25 engines]  
1. Input shaft  
2. Piston  
3. Return spring  
4. O-ring  
5. Retaining ring  
6. Bearing race  
7. Bearing  
8. Clutch plate  
9. Clutch disc  
10. Forward clutch hub  
11. Direct clutch input hub
DISASSEMBLY

1) After removing retaining ring (1), remove direct clutch input hub (2) and forward clutch hub (3).

2) Remove bearing race and thrust bearing.

   1. Thrust bearing No. 2
   2. Thrust forward clutch bearing
   3. Thrust rear race

3) Install direct clutch input hub (1) and retaining ring (2).

4) Install forward clutch (2) to O/D case (1). Apply 4 – 8 kg/cm² air pressure into fluid hole at the right of cut in O/D case and measure movement of forward clutch piston. If measured value is not within standard range, use either 1.8 mm (0.071 in.) or 2.0 mm (0.079 in.) clutch disc to adjust it to standard value.

   Standard forward clutch piston movement:
   1.40 – 2.24 mm (0.056 – 0.088 in.)
5) Remove retaining ring (1) and then remove direct clutch input hub.
6) Remove retaining ring and then remove all clutch discs.

7) Using special tool and hydraulic press, compress forward clutch piston return spring and remove retaining return spring.

**Special tool**
(A) : 09926-98310

**CAUTION:**
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

8) Remove forward clutch piston return spring.

9) Install forward clutch to O/D case. Blow low pressure air into fluid hole at the right of cut in O/D case to remove forward clutch piston.

**INSPECTION**

**Forward Clutch Piston**

- Shake piston to check that ball is not stuck.
- Blow low pressure air to check ball section for leakage.
**FORWARD CLUTCH PISTON RETURN SPRING**

- Measure free length.

**Standard free length of forward clutch piston return spring:**
  15.13 mm (0.596 in.)

**INSTALLATION**

1) Apply A/T fluid to forward input shaft O-rings, install forward clutch piston and piston return spring (2) to forward input shaft and then install return spring ring with special tool and hydraulic press.

**Special tool**
(A) : 09926-98310

**NOTE:**
- When installing return spring (2), be careful so that return spring (2) will not fall or tilt.
- Do not align opening in retaining ring (1) with lug of forward clutch piston return spring (2) at its retainer section.

**CAUTION:**
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

2) Install clutch discs from the thinnest one to thicker ones to piston side and then install retaining clutch ring.

**NOTE:**
- Refer to the first figure of “FORWARD CLUTCH” in this section. When installing each component.
- Do not match opening in retaining clutch ring and dent in forward clutch input shaft.

3) Install bearing races and thrust bearing.

1. Thrust bearing No. 2 race
2. Thrust forward clutch bearing
3. Thrust rear race
4) Install forward clutch hub (3), direct clutch hub (2) and retaining ring (1) to input shaft (4) in that order.

**DIRECT CLUTCH**

1. Bearing race
2. Bearing
3. Retaining ring
4. Clutch backing plate
5. Clutch disc
6. Clutch plate
7. Return spring
8. O-ring
9. Direct clutch piston
10. Direct clutch inner piston
11. Direct clutch cylinder
DISASSEMBLY

1) Install direct clutch assembly (1) to center support (2) and with 4 – 8 kg/cm² air pressure applied to second fluid hole from the left, measure stroke of direct clutch piston as shown in figure.
   If it is not within standard range, use 3.55 mm, 3.75 mm or 4.0 mm (0.140 in., 0.147 in. or 0.157 in.) clutch backing plate to adjust it to standard stroke.

   Standard direct clutch piston stroke:
   1.06 – 2.14 mm (0.042 – 0.084 in.) (G16 and J20 engines)
   0.91 – 1.99 mm (0.036 – 0.078 in.) (H25 engine)

2) Remove direct clutch assembly from center support and then remove retaining ring.

3) Remove clutch backing plate (1) and then remove clutch disc (3) and clutch plate (2).

4) Using special tool and hydraulic press (1), compress direct clutch piston return spring (3) and remove retaining return spring ring (2).

   Special tool
   (A) : 09926-98310

   **CAUTION:**
   Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

5) Remove direct clutch piston return spring.
6) Install direct clutch cylinder to center support. Remove direct clutch piston by blowing air into the second hole from the left as shown in the figure. Also, remove direct clutch inner piston by blowing air into hole at the extreme right. And then remove O-rings from pistons.

**INSPECTION**

**Direct Clutch Piston Return Spring**

- Measure free length.

*Standard free length of direct clutch piston return spring : 15.13 mm (0.595 in.)*

**Direct Clutch Piston**

- Shake piston to check that ball is not stuck.
- Apply air pressure and check that there is no leakage.

**ASSEMBLY**

Assemble each component by reversing disassembly procedure and noting the following points.

- Always use new O-ring and apply A/T fluid before installation.
- Do not align opening in retaining ring (2) with lug of direct clutch piston return spring at retainer.

**Special tool**

(A) : 09926-98310
- Use care so that direct clutch piston return spring will not fall or tilt.

**CAUTION:**
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

- Do not match opening (1) in retaining back plate ring with cutout (2) in direct clutch cylinder.

- Install clutch backing plate with its grooved side facing the front.
### CENTER SUPPORT

#### Parts List

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
<th>[A]: G16 and J20 engines</th>
<th>[B]: H25 engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Center support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>O-ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>B1 brake (Second coast brake) piston</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Piston return spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Snap ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>B1 brake plate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>B1 brake disc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Clutch backing plate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Retaining ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Seal ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>B2 (Second brake) brake piston</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>B2 brake plate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>B2 brake disc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Planetary sun gear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>B2 brake hub assembly</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

[A]: G16 and J20 engines  
[B]: H25 engine
DISASSEMBLY

1) Remove retaining ring.

Special tool
   (A) : 09920-76010

2) Pull out center support assembly (2) from planetary sun gear (1).

3) Apply 4 – 8 kg/cm² air pressure into fluid hole at the extreme left and measure movement of B1 brake (Second coast brake) piston.
   If measured value is not within standard range, replace B1 brake plate or B1 brake disc.
   Standard B1 brake piston movement :
   1.00 – 1.20 mm (0.039 – 0.047 in.)

4) Remove retaining ring.
5) After removing clutch backing plate (1), remove B1 brake plates (3) and B1 brake discs (2).

6) Using special tool and hydraulic press, compress piston return spring and remove snap ring.

**CAUTION:**
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

Special tool
(A) : 09926-98310

7) Remove brake piston return spring (1).

8) Blow air into fluid hole at the extreme left and remove B1 brake piston as shown in the figure. Then remove piston inner O-ring and piston outer O-ring from B1 brake piston.

9) Remove 3 seal rear rings (1).

**NOTE:**
Use care not to open ring more than necessary.
10) Apply 4 – 8 kg/cm² air pressure into the second hole from the left and measure stroke of B2 brake (Second brake) piston as shown in figure. If measured value is not within standard range, replace B2 brake plate or B2 brake disc.

**Standard B2 brake piston stroke:**
1.01 – 2.25 mm (0.040 – 0.088 in.)

11) After removing retaining back plate ring, remove clutch backing plate, B2 brake plates and B2 brake discs.

12) Using special tool and hydraulic press, compress brake piston return spring and remove snap B1 brake ring.

**CAUTION:**
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

**Special tool**
(A) : 09926-98310

13) Remove brake piston return spring.

14) Blow air into the second air hole from the left and remove B2 brake piston. Then remove piston inner O-ring and piston outer O-ring from B2 brake piston.
15) With B2 brake hub assembly (3) held stationary, turn planetary sun gear (4) clockwise to check that it locks and then counterclockwise to check that it turns smoothly.

![Diagram of planetary sun gear and brake hub assembly]

16) Remove B2 brake hub assembly (1) from planetary sun gear (2).

17) Remove 2 sun gear seal rings (1) from planetary sun gear.

**NOTE:**
*Use care not to open sun gear seal ring more than necessary.*

---

**ASSEMBLY**

Assemble components by reversing disassembly procedure and noting the following points.

- Snap both ends of sun gear seal ring (1) securely.
- Do not open sun gear seal ring more than necessary.
- Always use new O-ring and apply A/T fluid before installation.
- When installing O-ring, make sure that it is not kinked or caught.
- Push in brake piston horizontally.
- When installing brake piston return spring, be careful so that spring will not fall or tilt.
- When installing snap ring, do not align lug (1) of retainer with opening in snap ring (2).

- When installing brake discs, brake plates and clutch backing plate, refer to the first figure of “CENTER SUPPORT” in this section.
- Install clutch backing plate with its chamfered side facing brake disc.

- After installing each retaining backing plate ring, measure movement of brake piston again. If it is not within standard range, it is possible that ring is not installed properly. Then disassemble and reassemble again.

**Standard movement of B1 brake piston:**
1.00 – 1.20 mm (0.039 – 0.047 in.)

**Standard movement of B2 brake piston:**
1.01 – 2.25 mm (0.040 – 0.088 in.)
PLANETARY GEARS AND OUTPUT SHAFT

[A]: [G16 and H25 engines only]

1. Inner shaft
2. Retaining ring
3. Reverse brake reaction plate
4. Retaining ring
5. One-way clutch
6. One-way clutch thrust washer
7. Front planetary gear
8. Reverse brake plate
9. Reverse brake disc
10. Reverse brake backing plate
11. Washer
12. Front planetary ring gear
13. Retaining ring
14. Rear planetary gear
15. Planetary sun gear
16. Bearing
17. Rear planetary ring gear
18. Bearing race
19. Output shaft assembly
20. Key
21. Seal ring
22. Brake applying tube
DISASSEMBLY

1) Remove front planetary gear assembly (1) from output shaft assembly (2).

2) Remove rear planetary thrust washer (1), reverse brake backing plate (2), reverse brake disc (3) and reverse brake plate (4) from front planetary gear assembly.

3) Remove reverse brake reaction plate (2) from front planetary gear (1).

4) After removing retaining ring (1), remove one-way clutch (2) and one-way clutch rear thrust washer (3).
5) After removing retaining ring (1), remove front planetary ring gear (2), thrust bearing and rear planetary race.

6) Remove rear planetary thrust washer (1), rear planetary gear (2) and rear planetary sun gear (3).

7) After removing retaining ring (2) from inner shaft (1), remove rear planetary ring gear (3) and thrust bearing assembly.

**ASSEMBLY**

Assemble components by reversing disassembly procedure and noting following points.

- Refer to the first figure of “PLANETARY GEARS AND OUTPUT SHAFT” when installing each component.
- Check seal sleeve ring for damage before installation and replace if damaged.
- Install planetary sun gear as shown in the figure.
- Fit retaining rings into groove securely.
• Install one-way clutch as shown in the figure.

1. Front planetary gear side

• Install reverse brake reaction plate (2) to front planetary gear (1). With reverse brake reaction plate (2) fixed stationary, turn front planetary gear (1) clockwise to check that it locks and then counterclockwise to check that it turns smoothly.

[A]: Rotates
[B]: Locks
## VALVE BODY ASSEMBLY

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual valve</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>TCC solenoid valve</td>
<td>(Solenoid valve No.2)</td>
</tr>
<tr>
<td>3</td>
<td>O-ring</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Detent spring</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Plate</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Ball</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Shift solenoid valve A &amp; B</td>
<td>(Solenoid valve No.1)</td>
</tr>
<tr>
<td>9</td>
<td>Gasket</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Lower valve body assembly</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Plate</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Front upper valve body</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Rear upper valve body</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Intermediate coast modulator valve</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Low coast modulator valve</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>By-pass valve</td>
<td></td>
</tr>
</tbody>
</table>
DISASSEMBLY

1) Remove detent spring (2), plate (1) and manual valve (3).

2) Remove bolts from upper valve body side.

3) Remove bolts from lower valve body side.

4) Separate upper valve body (2) and lower valve body (1) while pressing separator plate and valve body gasket against lower valve body (1) to prevent balls, spring and others from coming out of valve body.
5) Confirm that there are valve, balls and plate as shown in the figures.

- Front upper valve body assembly.

- Rear upper valve body assembly.

- Lower valve body assembly.

ASSEMBLY

1) Place separator plate and new lower valve body gasket on lower valve body assembly and tighten installation section of front upper valve body assembly with 2 bolts (1) temporarily.
2) Place new upper valve body gasket on lower valve body assembly.

3) While holding upper valve body gasket and lower valve body (1) assembly together, install it on rear upper valve body assembly (2).

4) Tighten 3 bolts indicated in the figure temporarily.

5) Turn over lower valve body assembly and tighten 4 bolts indicated in the figure temporarily.

6) Remove 2 bolts tightened temporarily in Step 1).

**NOTE:**
Be careful not to damage gasket.
7) Install lower valve body assembly (1) on front upper valve body (2).

8) Tighten 3 bolts indicated in the figure temporarily.

9) Turn over control valve lower body and tighten 5 bolts indicated in the figure temporarily.

10) Tighten bolts on upper valve body side to specified torque.

Tightening torque
Upper valve body bolt : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

NOTE:
Tighten bolts by a certain amount of torque evenly and repeat it several times till specified torque is attained.

11) Tighten bolts on lower valve body inside to specified torque.

Tightening torque
Lower valve body bolt : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

NOTE:
Tighten bolts by a certain amount of torque evenly and repeat it several times till specified torque is attained.
12) After installing manual valve (3), install detent spring (2) and plate (1) and tighten detent spring bolt to specified torque.

**Tightening torque**
- Detent spring bolt: 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

---

**FRONT UPPER VALVE BODY**

- 1. Front upper valve body
- 2. Cut valve retainer
- 3. Cut back plug
- 4. Cut back valve
- 5. Spring
- 6. Front valve end cover
- 7. Secondary regulator valve
- 8. Secondary regulator spring
- 9. Throttle valve keep plate
- 10. Washer
- 11. Throttle valve cam
- 12. Cam return spring
- 13. Cam spacer
- 14. Throttle valve
- 15. Throttle valve primary spring
- 16. Locating pin
- 17. Down shift plug
- 18. Throttle valve secondary spring
- 19. Throttle valve compensating ring
DISASSEMBLY

1) Remove throttle valve keep plate (1).

2) Using screwdriver with vinyl tape or the like wound around its tip, hold cut back valve plug and remove cut back retainer (1) with magnet. Then remove cut back plug, cut back valve and cut back valve spring.

3) Remove one cover bolt on front valve end cover (1) and loosen the other to move cover as shown in figure. Remove secondary regulator valve sub assembly and secondary regulator valve spring. Then remove remaining loose cover bolt to remove front valve end cover (1).

WARNING:
When moving cover, be sure to hold valve with finger to prevent secondary regulator valve sub assembly from jumping out.

4) Remove throttle cam bolt (1) and then remove throttle valve cam (2), throttle cam return spring (4) and cam spacer (3).
5) With throttle valve held as shown in the figure, remove locating pin (1) with magnet (2) and then remove throttle valve and throttle valve primary spring.

6) Remove throttle valve and then remove throttle valve secondary spring and throttle valve compensating ring(s) (1).

**NOTE:**
Write down how many throttle valve compensating rings (1) there were, for throttle pressure varies with number of them.

---

**ASSEMBLY**

Assemble each component by reversing disassembly procedure and noting the following points.

- Coil outer diameter and free length of each valve spring should be as listed below. Be sure to use each one of correct size.

**Coil outer diameter and free length of each valve spring**

<table>
<thead>
<tr>
<th>Name of spring</th>
<th>Outer diameter</th>
<th>Free length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary regulator valve spring</td>
<td>17.43 mm (0.681 in.)</td>
<td>71.27 mm (2.806 in.)</td>
</tr>
<tr>
<td>Cut back valve spring</td>
<td>6.85 mm (0.269 in.)</td>
<td>23.00 mm (0.905 in.)</td>
</tr>
<tr>
<td>Throttle valve secondary spring</td>
<td>7.16 mm (0.282 in.)</td>
<td>19.24 mm (0.757 in.)</td>
</tr>
<tr>
<td>Throttle valve primary spring</td>
<td>10.90 mm (0.429 in.)</td>
<td>39.55 mm (1.557 in.)</td>
</tr>
</tbody>
</table>

- Install as many throttle valve compensating rings as written down when disassembled.
• Tighten throttle cam bolt (1) to specified torque.

**Tightening torque**
- Throttle cam bolt (a) : 7.5 N·m (0.75 kg-m, 5.5 lb-ft)

• Tighten pressure relief valve bolts (1) to specified torque.

**Tightening torque**
- Pressure relief valve bolt (b) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)
REAR UPPER VALVE BODY

DISASSEMBLY

1) Take out 6 valve body balls (1).

2. Needle roller
2) With 3 – 2 kickdown control valve plug (1) pressed with finger, take out needle roller (2) with magnet (3). Then remove 3-2 kickdown control valve plug (1), clutch sequence valve and reverse brake sequence valve spring.

3) With shift valve plug (1) pressed with finger, take out shift valve retainer (2) with magnet and then remove shift valve plug (1) and 3 – 4 shift valve spring.

4) Remove 2 plate bolts. Then remove rear upper valve body plate (1) and rear upper valve body gasket and take out 1 – 2 shift valve and shift valve spring.

5) With shift valve plug (1) pressed with finger, remove valve retainer with magnet (2) and then remove shift valve plug (1), 2 – 3 shift valve and shift valve spring.
ASSEMBLY
Assemble each component by reversing disassembly procedure and noting the following points.

- Coil outer diameter and free length of each valve sprig should be as listed below. Be sure to use each one of correct size.

Coil outer diameter and free length of each valve sprig

<table>
<thead>
<tr>
<th>Name of spring</th>
<th>Outer diameter</th>
<th>Free length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse brake sequence valve spring</td>
<td>9.10 mm (0.358 in.)</td>
<td>37.55 mm (1.478 in.)</td>
</tr>
<tr>
<td>1 – 2 shift valve spring</td>
<td>8.90 mm (0.350 in.)</td>
<td>29.15 mm (1.147 in.)</td>
</tr>
<tr>
<td>2 – 3 shift valve spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 – 4 shift valve spring</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Use new rear upper valve body gasket.

- Tighten rear upper valve body plate (1) bolt to specified torque.

Tightening torque
Rear upper valve body plate bolt:
5.5 N·m (0.55 kg-m, 4.0 lb-ft)
1. Lower valve body
2. Spring
3. Pressure relief valve ball
4. Pressure relief valve retainer
5. Lower valve body plate
6. Lower valve body gasket
7. TCC (Lock-up) control valve plate
8. TCC (Lock-up) control valve gasket
9. TCC (Lock-up) control sleeve
10. TCC (Lock-up) control valve
11. Pin
12. Retainer
13. Primary regulator valve sleeve
14. Primary regulator valve plunger
15. Primary regulator valve
DISASSEMBLY

1) Remove bypass valve (1), bypass valve spring, check ball valve damping spring, valve body ball (2) and ball valve spring.

2) Remove lower valve body plate (1) and lower valve body plate gasket.

3) Remove TCC (lock-up) control valve plate (2) and TCC (lock-up) control valve gasket.

4) With pressure relief valve retainer (1) pressed with finger, remove pressure relief valve bolt and then remove pressure relief valve retainer (1), pressure relief valve spring and pressure relief valve ball.

5) Remove TCC (lock-up) solenoid valve (1) and Then remove O-ring (2) from TCC solenoid valve (1).
6) After removing shift solenoid valve (A & B) (1), remove solenoid valve gasket, low coast modulator valve spring (2), intercoast modulator valve spring (3) and 2 intermediate coast modulator valves (4).

7) Pressing TCC (lock-up) control sleeve with finger and using magnet (1), remove locating pin and then remove TCC (lock-up) control sleeve, TCC (lock-up) control valve and TCC (lock-up) control valve spring.

8) Check which step of primary regulator valve sleeve (1) (how many steps down from its tip) contacts primary regulator valve sleeve retainer (2).

9) Pressing primary regulator valve sleeve (1) with finger and using magnet, remove primary regulator valve sleeve retainer and then remove primary regulator valve sleeve (1), primary regulator valve plunger (2), primary regulator valve spring (3) and primary regulator valve (4).
ASSEMBLY

Assemble each component by reversing disassembly procedure and noting the following points.

- Coil outer diameter and free length of each valve spring should be as listed below. Be sure to use each one of correct size.

Coil outer diameter and free length of each valve spring:

<table>
<thead>
<tr>
<th>Name of spring</th>
<th>Outer diameter</th>
<th>Free length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure relief valve spring</td>
<td>13.14 mm (0.517 in.)</td>
<td>32.14 mm (1.265 in.)</td>
</tr>
<tr>
<td>TCC (Lock-up) control valve spring</td>
<td>11.40 mm (0.449 in.)</td>
<td>32.60 mm (1.283 in.)</td>
</tr>
<tr>
<td>Valve damping spring</td>
<td>4.95 mm (0.195 in.)</td>
<td>20.00 mm (0.787 in.)</td>
</tr>
<tr>
<td>Low coast modulator valve spring</td>
<td>10.00 mm (0.394 in.)</td>
<td>35.43 mm (1.395 in.)</td>
</tr>
<tr>
<td>Inter coast modulator valve spring</td>
<td>9.04 mm (0.356 in.) (G16 and J20 engines)</td>
<td>27.26 mm (1.073 in.) (G16 and J20 engines)</td>
</tr>
<tr>
<td></td>
<td>10.00 mm (0.394 in.) (H25 engine)</td>
<td>25.60 mm (1.008 in.) (H25 engine)</td>
</tr>
<tr>
<td>Ball valve spring</td>
<td>13.14 mm (0.517 in.)</td>
<td>32.14 mm (1.265 in.)</td>
</tr>
<tr>
<td>Bypass valve spring</td>
<td>13.82 mm (0.544 in.)</td>
<td>28.90 mm (1.138 in.)</td>
</tr>
<tr>
<td>Primary regulator valve spring</td>
<td>13.62 mm (0.536 in.)</td>
<td>50.28 mm (1.980 in.)</td>
</tr>
</tbody>
</table>

- Install primary regulator valve sleeve so that its tip is positioned as it was before disassembly.
- Use new TCC (lock-up) control valve gasket, solenoid gasket and lower valve body plate gasket.
- Tighten shift solenoid valve bolt to specified torque.

**Tightening torque**

**Shift solenoid valve bolt**: 10 N·m (1.0 kg-m, 7.5 lb-ft)

1. Solenoid valve No. 1 (Shift solenoid valve)
2. Low coast modulator valve spring
3. Inter coast modulator valve spring
4. Intermediate coast modulator valve
5. Low coast modulator valve

**Tightening torque**

**TCC solenoid valve bolt**: 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

1. Solenoid valve No. 2 (TCC solenoid valve)
2. O-ring
- Tighten pressure relief valve bolt to specified torque.

**Tightening torque**

**Pressure relief valve bolt:**

5.5 N·m (0.55 kg-m, 4.0 lb-ft)

- Tighten lower valve body plate (1), TCC (lock-up) control valve plate (2) flange bolt to specified torque.

**Tightening torque**

**Lower valve body and TCC control valve Plate bolts:**

5.5 N·m (0.55 kg-m, 4.0 lb-ft)

---

**UNIT ASSEMBLY**

1) After applying A/T fluid to new O-rings, install them to reverse brake piston (3), reaction sleeve (2) and secondary reverse piston (1).

2) Install reverse brake piston assembly and brake piston return spring to transmission case, using care not to damage O-ring. Then install snap ring (1) with special tool.

**Special tool**

(A) : 09926-98320  
(B) : 09941-84510

**NOTE:**

- Install so that opening in snap ring (1) will not align with any of 3 lugs of spring seat.  
- Do not compress spring more than necessary and do not allow it fall or tilt.
3) Prepare a stand as shown in the figure. It is necessary because work will be done with transmission case set upright from this step on.

**NOTE:**
- To protect transmission case against damage, spread cloth on stand where case contacts.
- A stand of such size as shown in figure will facilitate work.

4) Install thrust output shaft bearing and thrust bearing output shaft race after lubricating them with grease.

**NOTE:**
Make sure that thrust bearing output shaft race is installed in proper direction.

5) Install brake applying tube (1) so that its lug fits in a transmission case. After installation, check that 4 lugs (3) along the underside of brake applying tube fit inside of reverse brake piston and leaf spring (2) is installed properly.

6) Remove reverse brake reaction plate of planetary gear assembly and align lugs of reverse brake plate, reverse brake disc and reverse brake packing plate. Install planetary gear assembly to transmission case so that aligned lugs fit in groove in transmission case.
7) Measure clearance between reverse brake plate and lugs of transmission case. If measured value is less than standard range, it is possible that something is installed improperly or dust or fluid is on reverse brake disc, etc. If it exceeds standard range, replace reverse brake disc, reverse brake plate or reverse brake backing plate.

**Standard clearance between reverse brake plate and lugs of transmission case:**
- 0.56 – 2.29 mm (0.022 – 0.090 in.) (G16 engine)
- 0.61 – 2.64 mm (0.024 – 0.103 in.) (J20 and H25 engines)

8) Install reverse brake reaction plate so that its lug with dent comes to the same position as leaf spring.

9) Using screwdriver with vinyl tape or the like wound at its tip, install retaining reaction plate ring (1). After installation, check that ring is in groove securely.

10) After confirming that lugs of all brake plates and brake discs are in grooves securely, hold retaining direct clutch ring (1) of planetary sun gear, install center support assembly by aligning fluid holes (2) in center support and transmission case.

**NOTE:**
Unless retaining direct clutch ring of planetary sun gear is held, brake valve gets off center support and that will make it impossible to align fluid holes with bolt holes.
11) Tighten center support bolts by certain amount at a time till specified tightening torque is obtained.

**Tightening torque**
- Center support bolt : 26 N·m (2.6 kg-m, 19.0 lb-ft)

12) Install direct clutch assembly by aligning splines in direct clutch cylinder with planetary sun gear.

**NOTE:**
- Ends of splines in direct clutch cylinder and planetary sun gear should come almost in match.

13) Apply grease to forward clutch rear No.1 race (1), thrust rear bearing (2), thrust bearing rear planetary ring race (3) and install thrust bearing planetary ring race (3) to direct clutch cylinder and forward clutch rear No.1 race and thrust bearing to forward clutch hub.

14) Install forward clutch assembly by putting all lugs of direct clutch disc hub together and matching them with groove cut in direct clutch input hub, and at the same time aligning splines in forward clutch hub with inner shaft.

**NOTE:**
- Use care not to let forward clutch rear No.1 race and thrust bearing installed to forward clutch hub fall off.
15) When clutch disc and plate have been replaced, check height difference between forward clutch input shaft and transmission case (1) by measuring as shown in the figure.

**Standard height difference “a” :**
About 2.0 mm (0.079 in.)

**NOTE:**
If measured value is less than standard value, remove forward clutch assembly and install it again.

16) Apply grease to thrust forward clutch bearing and install it to forward clutch input shaft. Also apply grease to thrust rear race and install it to O/D case.

**NOTE:**
Use care not to drop thrust rear race installed to O/D case.

17) Install O/D case by aligning cutout in O/D case (1) and that in transmission case.

**NOTE:**
Use care not to drop thrust rear race installed to O/D case.

18) Apply grease to thrust planetary rear washer and install it to O/D planetary gear. Also apply grease to thrust planetary ring front race and install it to planetary ring gear and then install O/D input shaft assembly to O/D case.

**NOTE:**
- Fit claws of thrust planetary rear washer and thrust planetary ring front race into holes securely.
- Use care not to drop thrust planetary rear washer installed to O/D planetary gear.
19) When clutch disc or plate has been replaced, check height difference between O/D case and O/D clutch cylinder by measuring it as shown in the figure.

**Standard height difference “a” between O/D case and O/D clutch cylinder:**
About 3.5 mm (0.138 in.)

**NOTE:**
Measure at the highest point along inner circumference of O/D clutch cylinder.

20) Apply A/T fluid to new housing O-ring and install it to O/D case. Then install converter housing and tighten housing bolt to specified torque.

**Tightening torque**
- Torque converter housing bolt (a) : 35 N·m (3.5 kg-m, 25.5 lb-ft)
- Torque converter housing bolt (b) : 58 N·m (5.8 kg-m, 42.0 lb-ft)

21) Apply grease to thrust front race and install it to O/D clutch cylinder.

22) Apply grease to front bearing assembly and install it to oil pump assembly. Also, apply A/T fluid to new oil pump cover O-ring and install it to oil pump assembly. Then install oil pump assembly aligning bolt holes in O/D case with those in transmission case oil pump assembly. Apply seal packing to oil pump assembly bolts and tighten them by certain amount of torque at each time one after another till specified torque is attained.

**Tightening torque**
- Oil pump bolt (a) : 22 N·m (2.2 kg-m, 16.0 lb-ft)
23) Apply 2 – 4 kg/cm² air pressure into fluid holes in the figure as numbered and check operation sound of each part.
   (1) O/D clutch
   (2) O/D brake
   (3) Forward clutch
   (4) Direct clutch
   (5) B1 brake (Second coast brake)
   (6) B2 brake (Second brake)
   (7) Reverse brake

24) Take down transmission from stand and measure clearance in shaft direction by applying dial gauge (1) to output shaft as shown in the figure.

   **Standard clearance in shaft direction:**
   0.3 – 0.9 mm (0.012 – 0.035 in.)

25) Check that inner shaft runs smoothly.

26) Install parking lock pawl (1), pawl pin (2) and pawl spring (3) to transmission case.

27) Apply grease to lip of new oil lip seal and drive in oil lip seal with special tool till it contacts transmission case.

   **Special tool**
   (A) : 09943-88211

28) After installing new sleeve cover to manual shift lever (1), install manual shift shaft (2) and manual shift lever (1) to transmission case.
29) Align hole in manual shift shaft with that in manual shift lever and drive in new manual shift lever pin (1).

30) Align hole in sleeve cover with dent in manual shift lever and caulk securely with pin punch (1). Then check that manual shift shaft turns smoothly.

31) With parking lock rod (1) installed to manual shift lever, place parking lock rod (1) on parking lock pawl (2) as shown in the figure. Then install pawl bracket and tighten bracket screw to specified torque.

**Tightening torque**

- Pawl bracket screw : 7.5 N·m (0.75 kg-m, 5.5 lb-ft)

32) Apply A/T fluid to new throttle cable O-ring (2) and install it to throttle cable then connect throttle cable (1) to transmission case (3).

**NOTE:**

Do not turn transmission case toward position where throttle cable is connected so as to protect retainer of throttle cable.
33) Apply A/T fluid to new O-ring and spring and install them to accumulator piston and install accumulator piston to transmission case.

Accumulator piston and spring specification (G16 engine):

<table>
<thead>
<tr>
<th>Used for</th>
<th>Piston outer diameter “a”</th>
<th>Spring free length “b”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct clutch accumulator (2)</td>
<td>31.80 – 31.85 mm</td>
<td>Upper spring 61.21 mm</td>
</tr>
<tr>
<td></td>
<td>(1.252 – 1.254 in.)</td>
<td>(2.410 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower spring –</td>
</tr>
<tr>
<td>Forward clutch accumulator (1)</td>
<td>31.80 – 31.85 mm</td>
<td>Upper spring 64.68 mm</td>
</tr>
<tr>
<td></td>
<td>(1.252 – 1.254 in.)</td>
<td>(2.546 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower spring –</td>
</tr>
<tr>
<td>Second brake accumulator (3)</td>
<td>34.80 – 34.85 mm</td>
<td>Upper spring 55.18 mm</td>
</tr>
<tr>
<td></td>
<td>(1.370 – 1.372 in.)</td>
<td>(2.172 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower spring 35.13 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.383 in.)</td>
</tr>
</tbody>
</table>

Accumulator piston and spring specification (J20 engine):

<table>
<thead>
<tr>
<th>Used for</th>
<th>Piston outer diameter “a”</th>
<th>Spring free length “b”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct clutch accumulator (2)</td>
<td>31.80 – 31.85 mm</td>
<td>Upper spring 59.82 mm</td>
</tr>
<tr>
<td></td>
<td>(1.252 – 1.254 in.)</td>
<td>(2.355 in.)</td>
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<tr>
<td></td>
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<td>Lower spring –</td>
</tr>
<tr>
<td>Forward clutch accumulator (1)</td>
<td>31.80 – 31.85 mm</td>
<td>Upper spring 64.68 mm</td>
</tr>
<tr>
<td></td>
<td>(1.252 – 1.254 in.)</td>
<td>(2.546 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower spring –</td>
</tr>
<tr>
<td>Second brake accumulator (3)</td>
<td>34.80 – 34.85 mm</td>
<td>Upper spring 55.18 mm</td>
</tr>
<tr>
<td></td>
<td>(1.370 – 1.372 in.)</td>
<td>(2.172 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower spring 35.13 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.383 in.)</td>
</tr>
</tbody>
</table>

Accumulator piston and spring specification (H25 engine):

<table>
<thead>
<tr>
<th>Used for</th>
<th>Piston outer diameter “a”</th>
<th>Spring free length “b”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct clutch accumulator (2)</td>
<td>31.80 – 31.85 mm</td>
<td>Upper spring 43.56 mm</td>
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<tr>
<td></td>
<td>(1.252 – 1.254 in.)</td>
<td>(1.715 in.)</td>
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<td></td>
<td></td>
<td>Lower spring 30.80 mm</td>
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<tr>
<td></td>
<td></td>
<td>(1.213 in.)</td>
</tr>
<tr>
<td>Forward clutch accumulator (1)</td>
<td>31.80 – 31.85 mm</td>
<td>Upper spring 64.68 mm</td>
</tr>
<tr>
<td></td>
<td>(1.252 – 1.254 in.)</td>
<td>(2.546 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower spring –</td>
</tr>
<tr>
<td>Second brake accumulator (3)</td>
<td>34.80 – 34.85 mm</td>
<td>Upper spring 58.80 mm</td>
</tr>
<tr>
<td></td>
<td>(1.370 – 1.372 in.)</td>
<td>(2.135 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower spring 35.13 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.383 in.)</td>
</tr>
</tbody>
</table>
34) Lift valve body a little and install nipple of throttle cable to throttle valve cam.

35) After confirming that accumulator piston is pushed all the way down, match pin of manual shift lever with groove in manual valve.

36) Fix valve body by using bolts with each nominal length as shown in the figure and tightening to specified torque.

**Tightening torque**
- Valve body bolt: 10 N·m (1.0 kg-m, 7.5 lb-ft)
- Valve body bolt nominal length:
  - “a”: 25 mm (0.98 in.)
  - “b”: 30 mm (1.18 in.)
  - “c”: 47 mm (1.85 in.)
  - “d”: 60 mm (2.36 in.)

37) Install new gaskets, oil screen spacer and oil screen.

**Tightening torque**
- Oil screen bolt: 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

38) Lubricate new O-ring with A/T fluid and attach it to grommet of solenoid wire harness. Then connect solenoid wire harness to transmission case and fix it with solenoid wire harness clamp. Connect each connector to solenoid. And install new gasket and brake applying cover.

**Tightening torque**
- Brake applying cover bolt: 10 N·m (1.0 kg-m, 7.5 lb-ft)
39) Using a plastic hammer, connect forward clutch applying tube (1), lube applying tube (2), reverse brake applying tube (3) and brake applying tube (4) in such order as shown in figure.

40) Install 2 oil pan magnets to transmission oil pan in such way that they do not interfere with oil tubes and install transmission oil pan with new oil pan gasket.

**NOTE:**
Align cutout in oil pan gasket with that in transmission case.

**Tightening torque**
- Transmission oil pan bolt : 4.5 N·m (0.45 kg-m, 3.3 lb-ft)

1. Cutout
2. Oil pan gasket

41) With wood rough key attached to output shaft, install sensor rotor by aligning its key groove with wood rough key and install C-ring by using special tool.

**Special tool**
- (A) : 09920-76010

1. Retaining ring

42) For G16 engine model, install adapter case (1) with new adapter gasket to transmission case and tighten adapter case bolts to specified torque.

**Tightening torque**
- Adapter case bolt (a) : 35 N·m (3.5 kg-m, 25.5 lb-ft)
43) For J20 and H25 engines, perform the following procedures.  

[J20 and H25 engines]  
a) Clean mating surface of transmission case (1) and adapter case (2) and apply sealant “A” to adapter case (2).  

“A” sealant : 99000-31110  

b) Tighten adapter case bolts to specified torque.  

Tightening torque  
Adapter case bolt (a) : 42 N·m (4.2 kg-m, 30 lb-ft)  

44) Apply A/T fluid to new O-ring and install it to vehicle speed sensor (1) and then install vehicle speed sensor (1) to adapter case (2).  

45) After turning manual shift shaft fully rearward, turn it back by 2 notches and set it to “N” range. Then install shift switch, lock washer and set nut and tighten set nut. After tightening it, bend claws of lock washer.  

Tightening torque  
Manual shift shaft set nut (a) :  
4 N·m (0.4 kg-m, 3.0 lb-ft)  

46) With neutral reference line (1) and cut groove (2) in switch aligned, tighten lock bolt.  

Tightening torque  
Shift switch lock bolt (b) :  
5.5 N·m (0.55 kg-m, 4.0 lb-ft)
47) Confirm that torque converter is fully fitted in transmission. Confirmation can be done by measuring dimension between end surface of housing case (2) and drive plate installation seat.

Standard dimension between end surface of case housing and drive plate installation seat “a”:
For G16 engine : 21.5 mm (0.85 in.)
For J20 engine : 17.3 mm (0.68 in.)
For H25 engine : 17.4 mm (0.69 in.)

48) Check that torque converter turns smoothly and apply grease to center piece (1) of torque converter.

BEARING AND RACE INSTALLATION DIAGRAM
## TIGHTENING TORQUE SPECIFICATION

<table>
<thead>
<tr>
<th>Fastening part</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N•m</td>
</tr>
<tr>
<td>Oil pump bolts</td>
<td>7.5</td>
</tr>
<tr>
<td>Upper/Lower valve body bolts</td>
<td>5.5</td>
</tr>
<tr>
<td>Detent spring bolt</td>
<td>5.5</td>
</tr>
<tr>
<td>Throttle cam bolt</td>
<td>7.5</td>
</tr>
<tr>
<td>Pressure relief valve bolts</td>
<td>5.5</td>
</tr>
<tr>
<td>Rear upper valve body plate bolts</td>
<td>5.5</td>
</tr>
<tr>
<td>Solenoid valve No.1 (Shift solenoid valve) bolts</td>
<td>10</td>
</tr>
<tr>
<td>Solenoid valve No.2 (TCC solenoid valve) bolts</td>
<td>5.5</td>
</tr>
<tr>
<td>Pressure relief valve bolt</td>
<td>5.5</td>
</tr>
<tr>
<td>Lower valve body plate bolts</td>
<td>5.5</td>
</tr>
<tr>
<td>TCC (Lock-up) control valve plates bolts</td>
<td></td>
</tr>
<tr>
<td>Center support bolts</td>
<td>26</td>
</tr>
<tr>
<td>Torque converter housing bolts (a)</td>
<td>35</td>
</tr>
<tr>
<td>Torque converter housing bolts (b)</td>
<td>58</td>
</tr>
<tr>
<td>Parking lock pawl bracket screw</td>
<td>7.5</td>
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<tr>
<td>Valve body bolts</td>
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<td>Oil screen bolts</td>
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<td>Brake applying cover bolts</td>
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<tr>
<td>Oil pump assembly bolts</td>
<td>22</td>
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<tr>
<td>Oil pan bolts</td>
<td>4.5</td>
</tr>
<tr>
<td>Adapter case bolts (G16 engine)</td>
<td>35</td>
</tr>
<tr>
<td>Adapter case bolts (J20 and H25 engines)</td>
<td>42</td>
</tr>
<tr>
<td>Manual shift shaft set nut</td>
<td>4</td>
</tr>
<tr>
<td>Shift switch lock bolt</td>
<td>5.5</td>
</tr>
<tr>
<td>Oil pipe flare nuts</td>
<td>30</td>
</tr>
<tr>
<td>Oil filler tube bolt</td>
<td>23</td>
</tr>
<tr>
<td>Transfer to transmission bolts</td>
<td></td>
</tr>
<tr>
<td>Drive plate bolts tightening torque</td>
<td>78</td>
</tr>
</tbody>
</table>

## REQUIRED SERVICE MATERIAL

<table>
<thead>
<tr>
<th>Material</th>
<th>Recommended SUZUKI product (Part Number)</th>
<th>Use</th>
</tr>
</thead>
</table>
| A/T fluid         | Refer to Section 0B                      | • Automatic transmission  
• Parts lubrication when installing |
| Lithium grease    | SUZUKI SUPER GREASE C (99000-25030)      | • Retaining parts in place when assembling  
• Oil seal lips  
• Oil pump O-ring |
|                   | SUZUKI SUPER GREASE A (99000-25010)      | Cable ends                                |
| Sealant           | SUZUKI BOND No. 1215 (99000-31110)       | • Mating surface of transmission case     |
## SPECIAL TOOL

<table>
<thead>
<tr>
<th>Tool Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>09920-76010</td>
<td>Snap ring opener</td>
</tr>
<tr>
<td>09941-84510</td>
<td>Bearing inner race remover</td>
</tr>
<tr>
<td>09918-48211</td>
<td>Oil pump remover</td>
</tr>
<tr>
<td>09918-48220</td>
<td>Oil pump remover attachment (M8)</td>
</tr>
<tr>
<td>09926-98320</td>
<td>Spring compressor No. 1set</td>
</tr>
<tr>
<td>09926-98310</td>
<td>Clutch spring compressor</td>
</tr>
<tr>
<td>09900-20606</td>
<td>Dial gauge</td>
</tr>
<tr>
<td>09900-20701</td>
<td>Magnetic stand</td>
</tr>
<tr>
<td>09943-88211</td>
<td>Bearing installer</td>
</tr>
</tbody>
</table>
SECTION 7D
TRANSFER (4WD)

CONTENTS

GENERAL DESCRIPTION ......................... 7D-2
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UNIT REPAIR ............................................. 7D-4
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SPECIAL TOOL ........................................... 7D-24
GENERAL DESCRIPTION

COMPONENTS

1. Transfer input gear
2. Reduction shift sleeve
3. Output low gear
4. Front drive clutch sleeve
5. Drive sprocket
6. 4WD switch
7. Transfer gear shift control lever
8. Sliding yoke
9. Output rear shaft
10. Speedometer driven gear
11. Synchronizer inner ring
12. Center cone
13. Synchronizer outer ring
14. Drive chain
15. Output front shaft
16. Transfer counter gear
17. Transfer counter shaft
18. Ball
19. Synchronizer plate
UNIT REPAIR
DISASSEMBLY

1) Remove 4WD switch (3) and take out steel ball.
2) Remove 5 bolts and then remove gear shift lever case (4).

3) For transfer for A/T and TYPE 1 manual transmission, after removing bolt of select return system, take out spring (4), steel ball (5) and pin (6).
For transfer for TYPE 2 manual transmission, remove select return spring bolt (8) and then return spring (9).

4) By hammering special tool, drive spring pin out of reduction shift yoke.

NOTE:
- Pin may drop into case when driven out. Therefore, take it out when case is disassembled.
- After spring pin is removed, yoke may be either taken out.

Special tool
(A) : 09922-85811
5) Remove 15 rear case bolts and then separate case by using special tool.

**NOTE:**
To separate case, use special tool at 4 points in turn and make opening wider evenly.

**Special tool**
(B) : 09912-34510

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Center case</td>
<td>2. Rear case</td>
</tr>
</tbody>
</table>

6) Remove circlip (1) by using screwdrivers and hammer, then pull out speedometer drive gear (3) and steel ball.

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Output rear shaft</td>
</tr>
</tbody>
</table>

7) Remove circlip for bearing and pull out bearing No. 2 (1) by combination of special tools.

**Special tool**
(C) : 09921-57810
(D) : 09927-18411

8) Remove synchronizer plate (1) screws (2) and pull out sprocket bush (4) and needle bearing (3) from output rear shaft (5).

9) Remove sprocket (6) with drive chain (7) and synchronizer plate (1).

**NOTE:**
Watch out for steel ball which comes off from shaft when bush is pulled out so as not to lose it.
10) Remove counter shaft plate bolt (1) from front case (3), and counter shaft plate will come off.
11) Remove front case (3) by removing its 9 bolts (2).

12) Remove input gear needle bearing (1). Remove counter gear (2) shaft (3) together with needle bearings, spacer, washers (4) and steel balls (5) from case.

**NOTE:**
- Watch out for steel balls which come out from between shaft and washers (front and rear) so as not to lose them.
- Check friction ring lip for damage and wear. Replace if necessary.
- Neither O-ring nor friction ring should be removed unless absolutely necessary. If removed, use new parts for reinstallation. Removed ones should not be reused.

13) Remove O-ring from counter gear shaft (2) and then remove friction ring (3) from shaft, using a proper size rod (1) and press.

14) Remove locating spring bolt (1) with washer (2), spring (3) and ball (4) for reduction shift. Remove rubber plug (5) as well.
15) Pull out reduction shift shaft (6) together with fork (7) and sleeve (8).

**NOTE:**
For this removal, be sure to place front drive fork shaft at 4WD position.
16) Remove locating spring bolt (1) with washer (2), spring (3) and ball (4) for front drive shift.
17) Pull out front drive shift fork (6) & shaft (5), sleeve (7) and hub (8) all together.

**NOTE:**
Watch out for interlock steel ball which comes out from between 2 shift shafts so as not to lose it. If it doesn’t come out, remove rubber plug and take it out.

18) Using plastic hammer (2), drive out output rear shaft assembly (1) with bearing. Output low gear and reduction clutch hub also come off as they are installed to shaft.

19) Pull off circlip from output rear shaft and remove reduction clutch hub (1) by using puller (2) and press. Then pull out output low gear and needle bearing.

20) Using puller (3) and press, remove bearing No. 1 (2) from shaft (1).
21) Remove oil seal from center case (1).
22) Using plastic hammer, drive out output front shaft (2) together with bearings.

**CAUTION:**
If oil seal remains in center case, be careful not to damage oil seal by hitting. Use drive punch for hammering.

23) Take off bearings (1, 3) from shaft by using press and puller (2). Removal of front side bearing requires special tool additionally as shown in the figure.

Special tool
(E) : 09925-98221

24) To remove needle bearing (2) from center case (1), combine special tools as shown in the figure and press them.

Special tool
(F) : 09913-84510
(G) : 09941-64511

25) Remove oil seal from rear case (1). And then, using same special tools and press as in step 24), remove needle bearing (2) from rear case.

**CAUTION:**
Be careful not to damage oil seal, if it remains in rear case.

Special tool
(F) : 09913-84510
(G) : 09941-64511
26) Using special tool, remove circlip (3) of input gear (1) from front case (2).

**NOTE:**
Be sure to use right tool to ensure proper work.

Special tool
(H) : 09900-06108

27) Using plastic hammer, drive input gear (2) out of front case (1).

**NOTE:**
- Be careful not to damage oil seal (3) by hitting.
- If removed, do not reuse oil seal.

28) Remove circlip (2) of input gear (1) by using special tool.

Special tool
(I) : 09900-06107

29) Remove bearing (2) from input gear (1) by using puller (3) and press.

**NOTE:**
Use metal pad for this removal, or gear spline may get damaged.

Special tool
(J) : 09951-76010

30) With spring (3) on front drive fork shaft (4) compressed, remove circlip (1) and then remove fork (2) and spring (3).
31) Remove center case gutter (1) with wrench.

COMPONENT INSPECTION

- Check each ball bearing for smooth rotation. If found abnormal, replace.

- Check each spring for distortion or breakage and change it with new one as necessary. Especially for locating springs (1), measure each free length “a” and replace if it is below service limit.

  Locating spring free length “a”:
  Standard 19.5 mm (0.768 in.)
  Service limit 18.0 mm (0.709 in.)

- Check needle bearing and bearing contacting surface for damage. Replace as required.
- Check gear tooth surface and shift mechanism in the same manner as with transmission. Correct or replace as necessary.
- Check drive chain and sprockets for abnormal wear or damage. Replace as required.
- Check oil seal for leakage and its lip for excessive hardness. If either is found, replace. Also, check corresponding surface of shaft where oil seal lip contacts. Correct or replace as necessary.
- Check gear tooth surface of speedometer drive gear. Replace if it is damaged.
- Put the synchronizer outer ring (1), inner ring (3) and the cone (2) together and then measure the step difference “b” between the outer ring (1) and the inner ring (3). And also check key slot or boss width “c” in synchronizer outer ring (1) and each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

**Difference “b” between the outer ring and the inner ring:**
- Standard: 1.0 – 1.4 mm (0.039 – 0.055 in.)
- Service limit: 0.5 mm (0.019 in.)

**Slot or Boss width “c” in synchronizer outer ring:**
- Standard: 10.1 mm (0.397 in.)
- Service limit: 10.4 mm (0.409 in.)

- Check chamfered part of each sleeve (1) for damage and excessive wear, and replace as necessary.
- Using feeler gauge, check clearance “d” between sleeve (1) and shift fork (2) and replace parts if necessary.

**Clearance “d” between sleeve and shift fork:**
- Maximum 1.0 mm (0.039 in.)

- Check each synchronizer key and synchronizer spring and replace as necessary.
- Check splined portions and replace parts if excessive wear is found.

**ASSEMBLY**

1) Using press and special tool, press-fit needle bearing into center case (1). As shown in the figure, apply straightedge (2) to top surface of case and press-fit till limit line (3) of special tool aligns with bottom surface of straightedge (2) (i.e., case surface).

**NOTE:**
- Press-fitting needle bearing according to above procedure will set needle bearing 3 mm before it hits case bottom.
- Once it is press-fit all way down to case bottom, removal would be very difficult if it becomes necessary.

**Special tool**
(A): 09951-76010
2) Using special tool and hammer, drive oil seal (1) into center case (2) until it becomes flush with case surface. Apply grease “A” to oil seal lip.

“A" : Grease 99000-25010

Special tool
(B) : 09913-75520

3) Install oil gutter and tighten bolt (1) applying thread lock cement “B”.

Tightening torque
Center case gutter bolt (a) : 8 N·m (0.8 kg-m, 5.5 lb-ft)

“B” : Cement 99000-32020

4) Using special tool and press, install needle bearing into rear case (1). As shown in the figure, apply straightedge (2) to case surface and press-fit till top of special tool (3) aligns with bottom surface of straightedge (i.e., case surface).

NOTE:
As with needle bearing in center case, above installation procedure will set needle bearing at a position 3 mm before it hits case bottom.

Special tool
(A) : 09951-76010

5) Using special tool and hammer, install oil seal (1) into rear case (2) until it becomes flush with case surface. Apply grease “A” to oil seal lip.

“A” : Grease 99000-25010

Special tool
(B) : 09913-75520
6) Install rear case plate (1) and bolt (2) applying thread lock cement “B”.

**NOTE:**
Removal of rear case plate is not required normally. However, if it is removed or replaced, install it with bolt applied with thread lock cement.

“B” : Cement 99000-32020

**Tightening torque**
Rear case plate bolt (a) : 8 N·m (0.8 kg-m, 5.5 lb-ft)

7) Using press and special tools, install bearings (2) to front shaft (1).
Bearings for both front and rear are identical.

Special tool
(C) : 09913-84510

8) Using press, drive output front shaft assembly (2) into center case (1).

9) Using press and special tools, install bearing No. 1 (1) into output rear shaft (2). Place circlip portion of bearing on top as shown in figure.

Special tool
(D) : 09925-18011
(E) : 09940-53111
10) Install needle bearing (3) and output low gear (4) and then press-fit reduction clutch hub (5) onto output rear shaft (1) by using press and special tool and secure them with circlip (6). Hub has specific installing direction.

Special tool
(D) : 09925-18011
(E) : 09940-53111

11) Combine special tools and press-fit output rear shaft assembly into center case (1).

NOTE:
Use special tool (F) with its under-cut side faced down (toward bearing).

Special tool
(D) : 09925-18011
(E) : 09940-53111
(F) : 09951-26010

12) Install fork to corresponding shift shaft.

1. Spring pin
2. Reduction fork
3. Reduction shift shaft
4. Circlip
5. Washer
6. Front drive shift fork
7. Spring
8. Front drive shift shaft
13) Fit sleeve to front drive clutch hub (1), place 3 synchronizer keys (4) (if equipped) in it and then set synchronizer springs (3) (if equipped). When installing, note that front drive clutch hub (1) and sleeve (2) have specific installing direction.

NOTE:
Make sure that bent end of synchronizer spring is inserted into hole (if equipped).

| A: Thick (Front side) |
| B: Thin (Rear side)   |
| C: Oil groove (Rear side) |

14) Install front drive fork shaft (5) assembly and sleeve (7) & hub (8) together into center case all at once. Then put locating ball (4) and spring (3) also into case and loosely install bolt (1).

2. Washer
6. Shift fork
9. Output rear shaft

15) With the outer ring (5), spring (4) (if equipped), cone (6) and inner ring (7) put together and installed to sprocket gear (2) as shown in figure, install them together with chain (3) to output rear shaft (1).
16) Install needle bearing (3) and bush (4) to sprocket (2). Also install steel ball (1), using care not to drop it.

**NOTE:**
- Point mark on output rear shaft between positions of bearing No. 2 and speedometer drive gear indicates steel ball location in the front.
- Point mark on bush flange also means position where steel ball is met.

17) Install synchronizer plate (1).

**Tightening torque**
- Synchronizer plate screw (a) : 10 N·m (1.0 kg-m, 7.5 lb-ft)
- “B” : Cement 99000-32020

18) Using special tool, press-fit bearing No. 2 (1) into output rear shaft. It is necessary to place support base at lower end of shaft.

**Special tool**
- (D) : 09925-18011
- (G) : 09926-68310

19) After installing large size circlip (4) install speedometer drive gear (3) and secure it with small size circlip (2).
20) Install interlock steel ball (1).

| 2. Front drive shift shaft |
| 3. Center case |

21) Fit sleeve (2) to reduction clutch hub (1).

**NOTE:**
- Circumferential groove mark (thicker rail side which works as shift stopper) should be inside (rear).
- Hub has no specific direction.

A: Groove (Inside – Rear)

22) Combine sleeve (8) & hub to reduction shift shaft (6) assembly and install them into center case (9). Then put locating ball (4) and spring (3) also into case and loosely install bolt (1).

23) With sealant applied to rubber plug (5), insert it into hole in case.

**NOTE:**
When installing reduction shift shaft, front drive shift shaft must be placed at 4WD position.

“C” : Sealant 99000-31110

| 2. Washer |
| 7. Shift fork |

24) If friction ring (2) has been removed from counter shaft (1), press-fit new one onto shaft, using care so that it is installed in proper direction and position as shown in the figure.

**Special tool**

(K) : 09913-80112

Installing position “a” :
39.5 mm (1.56 in.)
25) Install needle bearing (3), spacer (4), counter gear (2), steel balls (5) and washers (1) onto shaft (6).

**NOTE:**
Washers must be installed with its oil slot side facing gear.

26) Install counter shaft assembly into case. If O-ring (5) has been removed, install new O-ring onto shaft (3) and apply grease “A”.
Also, install low gear needle bearing (1).

“**A**” : Grease 99000-25010

27) With circlip (2) placed on input gear (1), press-fit input gear bearing (3).
28) Fix bearing with circlip (4).

**Special tool**
(D) : 09925-18011
(E) : 09940-53111
(H) : 09900-06107

29) Install oil seal (1) to front case (2) so that end surface of oil seal becomes flush with that case. Apply grease “A” to oil seal lip.

“**A**” : Grease 99000-25010

**Special tool**
(B) : 09913-75520

30) Using special tool, drive input gear assembly (2) into front case (1).

**Special tool**
(I) : 09951-16080
31) Fix with circlip (1) by means of snap ring pliers.

**Special tool**

(J) : 09900-06108

32) Oil to rotating parts and clean mating surfaces of center (1) case and front case (2).

33) Apply sealant “C” to mating surface of front case (2) evenly and put cases together.

**NOTE:**

- For smooth installation of front case, apply grease to counter shaft O-ring.
- When mating front case, make sure that input gear meshes with counter gear first.

“C” : Sealant 99000-31110

34) Torque 9 front case bolts (2) to specification.

35) Torque counter shaft plate fixing bolt (1) applied with thread lock cement to specification.

**NOTE:**

- After tightening bolts, check input gear and output rear shaft for smooth rotation by hand at low and high speed position.
- Also check front drive shift for proper operation.

“B” : Cement 99000-32020

**Tightening torque**

Counter shaft plate bolt (c) : 23 N·m (2.3 kg-m, 17.0 lb-ft)
Front case bolt (d) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

36) Before assembling rear case (2), shim adjustment is required. Follow steps described below.
a) Measure rear case (1) dimension “A” (from mating surface to bearing bore bottom) by using straightedge (2) and vernier caliper. Width of straightedge “D” plus “A” is obtained.

b) Place straightedge on bearing No. 2 (2) securely and measure bearing height “B” (from center case (1) mating surface to No. 2 bearing top).

CAUTION:
Bridging straightedge between No. 2 bearing and output front shaft bearing brings misreading.

c) Obtain clearance “C” in following calculation.

\[ C = (A + D) - (B + D) \]

d) Select a shim from among following available sizes and install it in bearing bore of rear case.

CAUTION:
Installing of over sized shim beyond specification in the following table may cause tight rotation of rear shaft and consequential bearing damage.

<table>
<thead>
<tr>
<th>Clearance C (mm)</th>
<th>Shim size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 0.13 (0 – 0.005 in)</td>
<td>NO NEED</td>
</tr>
<tr>
<td>0.13 – 0.23 (0.005 – 0.009 in)</td>
<td>0.1 (0.004 in)</td>
</tr>
<tr>
<td>0.23 – 0.33 (0.009 – 0.013 in)</td>
<td>0.2 (0.008 in)</td>
</tr>
<tr>
<td>0.33 – 0.43 (0.013 – 0.017 in)</td>
<td>0.3 (0.012 in)</td>
</tr>
<tr>
<td>0.43 – 0.53 (0.017 – 0.021 in)</td>
<td>0.4 (0.016 in)</td>
</tr>
<tr>
<td>0.53 – 0.58 (0.021 – 0.023 in)</td>
<td>0.5 (0.020 in)</td>
</tr>
</tbody>
</table>

37) Clean mating surfaces of both center (2) and rear (1) cases again, apply sealant to mating surface of rear case, and put them together.

“C” : Sealant 99000-31110

3. Install shim
38) Torque 15 rear case bolts (2) to specification.

**NOTE:**
After tightening bolts, provisionally install universal joint flange into rear shaft and check to make sure smooth rotation of shaft.

**Tightening torque**
Rear case bolt (e) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

39) For transfer for TYPE 2 manual transmission, perform the following procedure.
   a) With reduction shift shaft shifted to high speed side, fit yoke to shaft and install return spring (2) as shown in the figure. Tighten bolt (1) to specified torque.

**Tightening torque**
Select return spring bolt (TYPE 2 M/T) (f) :
5.5 N·m (0.55 kg-m, 4.0 lb-ft)

   b) Fix reduction shift yoke with spring pin (4) while aligning shift yoke with shift shaft as shown in the figure.

40) For transfer for A/T and TYPE 1 manual transmission, perform the following procedure.
   a) With reduction shift shaft (1) shifted to left (at high speed side) as shown in the figure, fit yoke (2) to shaft (1) and fix it with spring pin.

**NOTE:**
Be careful not to let spring pin fall off.

   b) Torque locating spring bolts (4) of shifters to specification.

**Tightening torque**
Locating spring bolt (g) : 26 N·m (2.6 kg-m, 19.0 lb-ft)
41) Install steel balls (1) and 4WD (2)/4WD-LOW switches.

**Tightening torque**
- 4WD switch (h) : 20 N·m (2.0 kg-m, 14.5 lb-ft)
- 4WD-Low switch : 20 N·m (2.0 kg-m, 14.5 lb-ft)

42) Fix lead of 4WD switch (1) with clamp.

43) Apply grease “A” to select return system parts and install them. Then torque select return spring bolt (5) to specification (For transfer with A/T or TYPE 1 manual transmission only).

“A” : Grease 99000-25010

**Tightening torque**
- Select return spring bolt (A/T or TYPE 1 M/T) (i) : 35 N·m (3.5 kg-m, 25.5 lb-ft)

44) Clean mating surfaces of both gear shift lever case (7) and rear case, and with sealant “C” applied to mating surface of gear shift lever case, push both cases together.

“C” : Sealant 99000-31110

45) Torque gear shift lever case bolts to specification.

**Tightening torque**
- Gear shift lever case bolt (j) : 13 N·m (1.3 kg-m, 9.5 lb-ft)

46) Install gear shift control lever temporarily and check to make sure that it shifts to each shift position smoothly. Also check shaft for rotation.

47) Confirm 4WD switch (2) has turned ON at 4WD position (4H and 4L) by using ohmmeter (1).
48) Confirm 4WD LOW switch has turned ON at 4WD LOW and Neutral position.
49) Upon completion of above checks, remove shift control lever.

### TIGHTENING TORQUE SPECIFICATION

<table>
<thead>
<tr>
<th>Fastening part</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N·m</td>
</tr>
<tr>
<td>Center case gutter bolt</td>
<td>8</td>
</tr>
<tr>
<td>Rear case plate bolt</td>
<td>8</td>
</tr>
<tr>
<td>Front case bolts</td>
<td>23</td>
</tr>
<tr>
<td>Counter shaft plate bolt</td>
<td>23</td>
</tr>
<tr>
<td>Rear case bolts</td>
<td>23</td>
</tr>
<tr>
<td>Locating spring bolts</td>
<td>26</td>
</tr>
<tr>
<td>4WD switch and 4WD- LOW switch</td>
<td>20</td>
</tr>
<tr>
<td>Select return spring bolt (For A/T and TYPE 1 M/T)</td>
<td>35</td>
</tr>
<tr>
<td>Select return spring bolt (For TYPE 2 M/T)</td>
<td>5.5</td>
</tr>
<tr>
<td>Gear shift lever case bolt</td>
<td>13</td>
</tr>
<tr>
<td>Control lever locating bolts</td>
<td>17</td>
</tr>
<tr>
<td>Synchronizer plate screws</td>
<td>10</td>
</tr>
</tbody>
</table>

### REQUIRED SERVICE MATERIAL

<table>
<thead>
<tr>
<th>Material</th>
<th>Recommended SUZUKI product (Part Number)</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium grease</td>
<td>SUZUKI SUPER GREASE A (99000-25010)</td>
<td>• Oil seal lips and O-rings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Splines of propeller shaft.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Select return system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shift control lever.</td>
</tr>
<tr>
<td>Thread lock cement</td>
<td>THREAD LOCK CEMENT SUPER 1333B (99000-32020)</td>
<td>• Control lever locating bolts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Center case gutter bolt.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rear case plate bolt.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Countershaft plate bolt.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Synchronizer plate screws.</td>
</tr>
<tr>
<td>Sealant</td>
<td>SUZUKI BOND No. 1215 (99000-31110)</td>
<td>• Oil drain and level/filler plugs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rubber plug.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mating surface of front case.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mating surface of rear case.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mating surface of gear shift lever case.</td>
</tr>
</tbody>
</table>
### SPECIAL TOOL

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>09900-06107</td>
<td>Snap ring plier (Opening type)</td>
</tr>
<tr>
<td>09900-06108</td>
<td>Snap ring plier (Closing type)</td>
</tr>
<tr>
<td>09912-34510</td>
<td>Separator</td>
</tr>
<tr>
<td>09913-75520</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09913-80112</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09913-84510</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09921-57810</td>
<td>Bearing remover</td>
</tr>
<tr>
<td>09927-18411</td>
<td>Universal puller</td>
</tr>
<tr>
<td>09922-85811</td>
<td>Spring pin remover</td>
</tr>
<tr>
<td>09925-18011</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09925-98221</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09926-68310</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09940-53111</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09941-64511</td>
<td>Bearing remover</td>
</tr>
<tr>
<td>09951-16080</td>
<td>Bearing installer</td>
</tr>
<tr>
<td>09951-26010</td>
<td>Bush remover plate</td>
</tr>
</tbody>
</table>
09951-76010
Bearing installer
SECTION 7E

DIFFERENTIAL (FRONT)

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GENERAL DESCRIPTION

COMPONENT

UNIT REPAIR
DISASSEMBLY UNIT

1) Remove front drive shaft (1) by using plastic hammer.

2) Remove 8 bolts for fastening differential carrier (2 of which are reamer bolts) and then take differential assembly out of housing.

3) Set special tool on vise (1) securely.

Special tool
(A) : 09944-76010


5) Take off differential side bearing lock plates (4) and differential side bearing caps (6) removing their bolts and then take out bearing adjusters (5), side bearing outer races and drive bevel gear with differential case (3).

6) Turn differential assembly together with special tool by 90 degrees and grip it with vise again.

Special tool
(A) : 09944-76010
7) Remove air inlet union (2).

8) Hold universal joint flange with special tool and then remove flange nut by using power wrench.

Special tool
(B) : 09922-66020

9) Make mating marks (1) on drive bevel pinion and companion flange.

CAUTION:
Don't make mating mark on the coupling surface of the flange.

10) Remove companion flange from pinion. Use special tool if it is hard to remove.

Special tool
(C) : 09913-65135

11) Remove bevel pinion with front bearing, and spacer from carrier.

If it is hard to remove, screw an used nut into pinion and hammer on that nut with a plastic hammer but never directly on pinion.
12) Using special tools, pull out differential side bearings.

Special tool
(D) : 09913-85230

13) With aluminum plates (3) placed on vise first, grip differential case with it and remove bevel gear (2) by removing its 10 bolts (1).

CAUTION:
Use care not to hold axle lock clutch part with vise. Be sure to hold differential left case.

14) Separate differential case assembly by removing 2 screws (2) and take out free axle hub, side gears and shims from differential left case.

15) Remove bevel pinion front bearing (2) by using bearing puller (3) and press.

1. Drive bevel pinion
16) Drive out bevel pinion bearing outer races in differential carrier by hammering metal stick applied to them.

COMPONENTS INSPECTION

- Check companion flange for wear or damage.
- Check bearings for wear or discoloration.
- Check differential carrier for cracks.
- Check drive bevel pinion and bevel gear for wear or cracks.
- Check side gears, pinion gears and pinion shaft for wear or damage.
- Check side gear spline for wear or damage.

DIFFERENTIAL LEFT CASE

- Check clutch for smooth movement by pushing plate of axle lock clutch fitted to differential left case. Also, check return spring (1) for settling.

- Check teeth of axle lock clutch (2) fitted to differential right case for wear, damage and any other faulty condition.
FREE AXLE HUB

Check teeth of free axle hub (1) for wear, damage and any other faulty condition.

ACTUATOR

1) Connect special tool, air compressor, actuator (1) and hoses as shown in the figure.

NOTE:
Loosen adjusting screw of special tool before connecting hoses to special tool.

Special tool
(A) : 09918-18110

2) With pressure from compressor applied to special tool, adjust pressure to specified level by turning adjusting screw of special tool and check actuator for operation.

Also, check that there is no air leakage from actuator.

Specified pressure for actuator inspection:
38.0 kPa (0.38 kg/cm², 5.40 psi)

Actuator stroke :
3 mm (0.118 in.)
SUBASSEMBLY ADJUSTMENT AND REASSEMBLY

Judging from faulty conditions noted before disassembly and what is found through visual check of bearing and gear tooth etc. after disassembly, prepare replacing parts and proceed to reassembly according to procedures as described below.

CAUTION:
- Bevel gear and pinion must be replaced as a set when either replacement becomes necessary.
- When replacing taper roller bearing, replace as inner race & outer race assembly.

DIFFERENTIAL CARRIER

For press-fitting bevel pinion bearing outer races, use special tools as shown in the figure.

CAUTION:
Perform press-fitting carefully so as not to tilt outer race.

Special tool
(A) : 09924-74510
(B) : 09926-68310
(C) : 09913-75510

DIFFERENTIAL CASE

1) Install differential gears (3), free axle hub (4) and washers (2) to left case (7).
2) Install left case to right case (1) and tighten screws (8).
3) Put bevel gear (1) on differential case (2) and fasten them with 10 bolts (3) by tightening them to specified torque. Use thread lock cement “A” for 10 bolts (3).

**CAUTION:**
Use of any other bolts than that specified is prohibited.

“A” : Thread lock cement 99000-32020

Tightening torque
Drive bevel gear bolt (a) :
85 N·m (8.5 kg·m, 61.5 lb-ft)

4) Press-fit side bearing (1) with special tool and press.

Special tool
(G) : 09944-66020

5) Install actuator (1) to differential case (2).

**NOTE:**
Note that installing direction is as shown in figure.

6) Hold bearing press-fitted in step 7 with holder and press-fit side bearing on the other side.

**NOTE:**
Be sure to use bearing holder for the purpose of protecting lower bearing.

Special tool
(G) : 09944-66020
(H) : 09951-16060
DRIVE BEVEL PINION

To engage bevel pinion and gear correctly, it is prerequisite to install bevel pinion to differential carrier properly by using adjusting shim as described on the following. Shown in the figure are relative positions of bevel pinion, differential carrier and mounting dummy.

Special tool
(A) : 09900-20606
(B) : 09926-78311
(C) : 09922-75222

1. Universal joint flange without groove (P/No. 27110 – 60A00)  "a": Pinion dummy height
2. No groove on flange periphery  "b": Axle dummy radius
3. Nut  "a" + "b" Mounting dummy side 94.00 mm (3.70078 in.)
4. Rear bearing  "c": Measured dimension
5. Differential carrier  "d": Differential carrier mounting distance ("a" + "b" + "c")
6. Front bearing  "e": Bevel pinion mounting distance (Marked in shaft in mm)
7. Spacer  "f": Shim size for mounting distance adjustment ("d" – "e")
8. Bevel pinion
9. Bevel gear
1) Install bevel pinion dummy with bearings into differential carrier and tighten flange nut (1) so that specified bearing preload is obtained.

**NOTE:**
- This installation requires universal joint flange not equipped with groove on flange periphery.
- This installation requires no spacer or oil seal.
- Before taking measurement with spring balance (2) or torque wrench (3), check for rotation by hand and apply small amount of oil to bearings.

Special tool
(A) : 09922-75222
(B) : 09926-78311

Pinion bearing preload (a) :
9.0 – 17.0 kg-cm (7.8 – 14.7 lb-in)

Spring measure reading :
1.8 – 3.4 kg (4.0 – 7.5 lb)

2) Set dial gauge to bevel pinion mounting dummy and make 0 (zero) adjustment on surface plate.

**NOTE:**
- When setting dial gauge to mounting dummy, tighten screw lightly. Be careful not to overtighten it, which will cause damage to dial gauge.
- With dial gauge set, turn dummy back and force by hand a couple of times and attain accurate 0 (zero) adjustment.
- It is desirable that short pointer indicates beyond 2 mm when long one is at 0 (zero).

Special tool
(C) : 09926-78311
(D) : 09900-20606
3) Place zero-adjusted mounting dummy and dial gauge set on pinion dummy and take measurement between zero position and extended dial gauge measuring tip.

**NOTE:**
- Repeat turning back and force of dummy and measure distance as far as top surface of pinion dummy accurately.
- When dial gauge measuring tip extends from 0 (zero) position, pointer turns counterclockwise.
- Measured value may exceed 1 mm. Therefore, it is also necessary to know reading of short pointer.

Special tool
(C) : 09926-78311  
(D) : 09900-20606

4) Obtain adjusting shim thickness by using measured value by dial gauge (which represents “c” in the first figure of “DRIVE BEVEL PINION” in this section) in the following equation.

\[
\text{Necessary shim thickness “f”} = 94 + \text{Dial gauge measured value “c”} - \text{Measurement printed on pinion “e”}
\]

94 in above equation is “a” + “b” of mounting dummy (special tool) as shown in the first figure of “DRIVE BEVEL PINION” in this section.

5) Select adjusting shim(s) (2) closest to calculated value from among the following available sizes and put it in place and then press-fit front bearing (1).

Special tool
(E) : 09925-18011  
(F) : 09927-66010

Available shim thickness
1.12, 1.15, 1.18, 1.21, 1.24, 1.27, 1.30 and 0.3 mm  
(0.044, 0.045, 0.046, 0.047, 0.048, 0.049, 0.050 and 0.012 in.)

6) With new pinion spacer (3) inserted as shown in the figure, install rear bearing (5) to differential carrier (4).

**NOTE:**
- Make sure to use new spacer for reinstallation.
- Apply oil to bearings.

1. Bevel pinion  
2. Front bearing
7) Using special tool and plastic hammer drive oil seal (2) into differential carrier (1) till it becomes flush with carrier end. Then apply grease “A” to oil seal lip.

Special tool
(G) : 09951-18210
“A” : Grease 99000-25010

8) While tightening flange nut gradually with flange holder (special tool) and power wrench (4 -10 magnification) (1), set preload of pinion to specification.

NOTE:
• Before taking measurement with spring balance (3) or torque wrench (4), check for smooth rotation by hand.
• Bearing preload can be measured roughly by pinion rotating angle which is due to arm weight of flange holder installed in flange. Refer to following page for further information.
• Be sure to tighten gradually and carefully till specified starting torque is obtained. Turning back overtightened flange nuts should be avoided.

Pinion bearing preload :
9.0 – 17.0 kg-cm (7.8 – 14.7 lb-in.)

Spring measure reading :
1.8 – 3.4 kg (4.0 - 7.5 lb)

Special tool
(A) : 09922-75222
(H) : 09922-66020

ASSEMBLY UNIT

1) Apply sealant “A” to thread part of air inlet union (2) and install it to differential carrier (1). Tighten it to specified torque.

“A” : Sealant 99000-31110

Tightening torque
Air inlet union (a) : 13 N·m (1.3 kg-m, 9.5 lb-ft)

2) Place bearing outer races on their respective bearings. Used left and right outer races are not interchangeable and install case assembly in carrier.

3) Install side bearing adjusters on their respective carrier, making sure adjusters are threaded properly.
4) Align match marks (1) on cap and carrier. Screw in 2 side bearing cap bolts 2 or 3 turns and press down bearing cap by hand.

**NOTE:**
If bearing cap does not fit tightly on carrier, side bearing adjuster is not threaded properly. Reinstall adjuster.

5) Tighten cap bolts to provisional torque below.

**Tightening torque**
- Side bearing cap bolt (provisional torque) (a) :
  15 N·m (1.5 kg-m, 11.0 lb-ft)

6) Install actuator bracket to bearing cap and tighten its bolts to specification.

**Tightening torque**
- Actuator bracket bolt (b) :
  12 N·m (1.2 kg-m, 8.5 lb-ft)

7) Tighten both bearing adjusters (1) so as to obtain specified gear backlash and at the same time, obtain preload of side bearing.

**Special tool**
- (A) : 09930-40120 (Attachment)
- (B) : 09930-40113 (Rotor holder)
- (C) : 09900-20701

**Bevel gear backlash :**
0.13 – 0.18 mm (0.005 – 0.007 in.)

**NOTE:**
- Be sure to apply measuring tip of dial gauge (1) at right angles to convex side of tooth.
- Measure at least 4 points on drive bevel gear periphery.
- As a practical measure the following would be recommended to obtain specified backlash and side bearing preload at the same time.
  a) Obtain specified backlash by turning both adjusters inward lightly.
  b) Tighten both adjusters further by one notch at a time.
8) Measure preload of pinion with spring balance (1) or torque wrench (2) and check composite preload of pinion bearing and side bearing.

Special tool
(D) : 09922-75222

NOTE:
Standard preload is shown in the graph, which should be read as follows.
Example:
When preload of bevel pinion is 2.6 kg/5.73 lb, acceptable composite preload of both pinion bearings and side bearings should be between 2.8 and 3.2 kg/6.17 and 7.05 lb.

3. Universal joint flange
4. Socket with adapter

NOTE:
Bearing preload can be checked roughly by using flange holder as shown in the figure. In this measurement, holder arm itself will work as balance weight and torque will be replaced with angle. However, flange should be rotated very slowly with hand support so as not to allow over revolution due to inertia.

Special tool
(E) : 09922-66020

"A": Pinion bearing starting torque range
"B": Pinion bearing plus side bearing starting torque range

NOTE:
Repeat side bearing adjustment until gear backlash and composite bearing preload are compatible within specification, if fail to obtain specified measurements first.
9) Torque bearing cap bolts to specification and install bearing lock plates.

**Tightening torque**

- **Bearing cap bolt (a):** 60 N·m (6.0 kg·m, 43.5 lb-ft)
- **Lock plate bolt (b):** 13 N·m (1.3 kg·m, 9.5 lb-ft)

10) As final step, check gear tooth contact as the follows.

a) After cleaning tooth surface of 10 bevel gears, paint them with gear marking compound evenly by using brush or sponge etc.

b) Turn gear to bring its painted part in mesh with bevel pinion and turn it back and forth by hand to repeat their contact.

c) Bring painted part up and check contact pattern, referring to the following table. If contact pattern is not normal, readjust or replace as necessary according to instruction in chart.

**NOTE:**

Be careful not to turn bevel gear more than one full revolution, for it will hinder accurate check.

1. Brush

"A": Paint gear marking compound evenly
<table>
<thead>
<tr>
<th>TOOTH CONTACT PATTERN</th>
<th>DIAGNOSIS AND REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NORMAL</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **HIGH CONTACT**      | Pinion is positioned too far from the center of driver bevel gear.  
1) Increase thickness of pinion height adjusting shim and position pinion closer to gear center.  
2) Adjust drive bevel gear backlash to specification. |
| **LOW CONTACT**       | Pinion is positioned too close to the center of drive bevel gear.  
1) Decrease thickness of pinion height adjusting shim and position pinion farther from gear center.  
2) Adjust drive bevel gear backlash to specification. |
|                      | If adjustment is impossible, replace differential carrier. |
|                      | 1) Check seating of bevel gear or differential case.  
(Check bevel gear for runout).  
2) If adjustment is impossible, replace drive bevel gear & pinion set or differential carrier. |
|                      | Replace drive bevel gear & pinion set or differential case. |
11) Upon completion of gear tooth contact check in step 9), caulk flange nut (2) with caulking tool (1) and hammer.

12) Clean mating surfaces of both housing and carrier and apply sealant “A” to housing side evenly.

   “A” : Sealant 99000-31110

13) With differential assembly installed in housing, position it with 2 reamer bolts (2) and then install other 6 bolts (1).

14) Torque all bolts to specification.

Tightening torque
   Differential carrier bolt (a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

15) Install front drive shaft.

TIGHTENING TORQUE SPECIFICATION

<table>
<thead>
<tr>
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<th>Tightening torque</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>N·m</td>
</tr>
<tr>
<td>Air inlet union</td>
<td>13</td>
</tr>
<tr>
<td>Actuator bracket bolts</td>
<td>12</td>
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<tr>
<td>Bevel gear bolts</td>
<td>85</td>
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<tr>
<td>Bearing cap bolts</td>
<td>60</td>
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<tr>
<td>Lock plate bolts</td>
<td>13</td>
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<tr>
<td>Front differential carrier bolts</td>
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</tbody>
</table>
## REQUIRED SERVICE MATERIAL

<table>
<thead>
<tr>
<th>Material</th>
<th>Recommended SUZUKI product (Part Number)</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread lock cement</td>
<td>THREAD LOCK CEMENT SUPER 1333B (99000-32020)</td>
<td>Bevel gear bolts</td>
</tr>
<tr>
<td>Lithium grease</td>
<td>SUZUKI SUPER GREASE A (99000-25010)</td>
<td>Oil seal lips</td>
</tr>
</tbody>
</table>
| Sealant         | SUZUKI BOND NO. 1215 (99000-31110)                              | • Front differential drain and filler plug  
  • Mating surface of differential housing  
  • Air inlet union                         |

## SPECIAL TOOL

<table>
<thead>
<tr>
<th>Tool</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>Dial gauge</td>
<td>09900-20606</td>
<td>09900-20701 Magnetic stand</td>
</tr>
<tr>
<td>Bearing puller</td>
<td>09913-61510</td>
<td>Bearing puller</td>
</tr>
<tr>
<td>Bearing installer</td>
<td>09913-75510</td>
<td>Bevel pinion mounting dummy</td>
</tr>
<tr>
<td>Bevel gear bolts</td>
<td>09900-32020</td>
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</tr>
<tr>
<td>Lithium grease</td>
<td>99000-25010</td>
<td>Oil seal lips</td>
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<td>Oil seal lips</td>
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<td>Bevel gear bolts</td>
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<tr>
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<td>Front differential drain and fillerplug</td>
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<td>Mating surface of</td>
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<td>Mating surface of differential housing</td>
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<tr>
<td>Air inlet union</td>
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<td>Bevel pinion mounting dummy</td>
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<td>09924-74510</td>
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<td>Bearing installer</td>
<td>09925-18011</td>
<td>Bearing installer</td>
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<tr>
<td>Bearing installer</td>
<td>09926-68310</td>
<td>Bearing installer</td>
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<tr>
<td>Bevel pinion mounting</td>
<td>09926-78311</td>
<td>Bevel pinion mounting dummy</td>
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<td>Rotor holder</td>
<td>09930-40113</td>
<td>Rotor holder</td>
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<td>Code</td>
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<td>09944-66020</td>
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<td>09944-76010</td>
<td>Differential carrier holder</td>
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<tr>
<td>09951-16060</td>
<td>Lower arm bush remover</td>
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<tr>
<td>09951-18210</td>
<td>Oil seal remover &amp; installer No. 2</td>
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<tr>
<td>09913-65135</td>
<td>Bearing puller</td>
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<tr>
<td>09918-18110</td>
<td>Air pressure regulator</td>
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</tbody>
</table>
SECTION 7F

DIFFERENTIAL (REAR)

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GENERAL DESCRIPTION

The differential assembly using a hypoid bevel pinion and gear is installed to the rear axle. It is set in the conventional type axle housing.

The reduction ratio and the differential case vary depending on transmission or engine type.

The differential assembly is decisive in that the drive power is concentrated there. Therefore, use of genuine parts and specified torque is compulsory. Further, because of sliding tooth meshing with high pressure between bevel pinion and gear, it is mandatory to lubricate them by hypoid gear oil.
UNIT REPAIR
DISASSEMBLING UNIT

1) Hold differential assembly securely and put identification marks on differential side bearing caps (6).
2) Take off differential side bearing lock plates (4) and differential side bearing caps (6) by removing their bolts and then take out bearing adjusters (5), side bearing outer races and drive bevel gear with differential case.

3) For 2 differential pinion type, remove differential side gear, pinion gear and pinion shaft.
   a) With aluminum plates (4) placed on vise first, grip differential case with it and remove bevel gear (3) by removing its bolts (1).
   b) Remove differential left case (2) from differential right case.
   c) Drive out spring pin with special tool and hammer and disassemble differential side gears, pinions, washers and shaft in differential case (1).

Special tool
(A) : 09922-85811

4) For 4 differential pinion type, remove drive bevel gear, pinion gear and pinion shaft.
   a) Remove bevel gear by removing its bolts in the same manner as step a) of 2 differential pinion type (Step 3).
   b) There are 8 bolts fastening two differential case halves together. Remove these bolts to sever right-hand case half from left-hand one, and take off right-hand one.

Special tool
(B) : 09930-40113
c) Remove pinion shaft, side gears, washers, differential pinions, spring washers, thrust washers.

5) Using special tools, pull out differential side bearings (1).

**Special tool**
(C) : 09913-85230
(D) : 09913-61510

6) Remove bevel pinion assembly.
   a) Hold universal joint flange with special tool and then remove flange nut by using power wrench (4 - 10 magnification) (2).

**Special tool**
(E) : 09922-66020

1. Socket wrench

b) Make mating marks (1) on drive bevel pinion and companion flange.

**CAUTION:**
Don’t make mating mark on the coupling surface of the flange.

c) Remove companion flange from pinion. Use special tool if it is hard to remove.

**Special tool**
(F) : 09913-65135
d) Remove bevel pinion with rear bearing, shim and spacer from carrier. If it is hard to remove, screw an used nut into pinion and hammer on that nut with a plastic hammer but never directly on pinion.

e) Remove bevel pinion rear bearing (2) by using bearing puller (3) and press.

7) Using a hammer and brass bar (1), drive out front bearing outer race with bearing (2) and oil seal (3).

8) Drive out rear bearing outer race in the same way as in the step 7).
COMPONENT INSPECTION

- Check companion flange for wear or damage.
- Check bearings for wear or discoloration.
- Check differential carrier for cracks.
- Check drive bevel pinion and bevel gear for wear or cracks.
- Check side gears, pinion gears and pinion shaft for wear or damage.
- Check side gear spline for wear or damage.

SUB-ASSEMBLY ADJUSTMENT AND REASSEMBLY

Judging from faulty conditions noted before disassembly and what is found through visual check of bearing and gear tooth etc. after disassembly, prepare replacing parts and proceed to reassembly according to procedures as described below.

CAUTION:

- Bevel gear and pinion must be replaced as a set when either replacement becomes necessary.
- When replacing taper roller bearing, replace as inner race & outer race assembly.

DIFFERENTIAL CARRIER

For press-fitting bevel pinion bearing outer races, use special tools as shown in the figure.

**Special tool**

(A) : 09924-74510  
(B) : 09926-68310  
(C) : 09913-75510

1. Differential carrier

DIFFERENTIAL CASE  
FOR 2 DIFFERENTIAL PINION TYPE

1) After applying differential oil to side gear (4), pinions (5), pinion shaft, thrust washer (2) and spring washer (1), install them in differential right case (3).  
For correct installing direction of thrust washer (2) and spring washer (1), refer to the figure.
2) Check pinion gear (1) for smooth rotation.

3) Align pinion shaft hole position with differential case and drive in 3 spring pins (1) till they are flush with end surface of case.

Special tool (A) : 09922-85811

4) In the same manner as described in Step 1), install thrust washer (2), spring washer (1) and side gear (4).

5) Put bevel gear on differential case (1) and fasten them with bolts (2) by tightening them to specified torque. Use thread lock cement for bolts (2).

**CAUTION:**
Use of any other bolts than that specified is prohibited.

“A” : Cement 99000-32020

**Tightening torque**
Bevel gear bolt (a) : 85 N·m (8.5 kg·m, 61.5 lb-ft)
6) Install special tool to differential case assembly and check that preload is within specification below. If preload exceeds specified value, check if foreign matter is caught or gear is damaged.

**Special tool**

(B) : 09928-06010-002

**Side gear preload**

Max. 2.5 N·m (0.25 kg-m, 1.8 lb-ft)

---

**FOR 4 DIFFERENTIAL PINION TYPE**

1) After applying differential oil to side gear (4), pinions (5), pinion shafts, washer, thrust washer (2) and spring washer (1), install them in differential left case (3). For correct installing direction of thrust washer (2) and spring washer (1), refer to the figure.

2) When installing pinion shaft No.2 (2) (shorter) into differential case and pinion, insert its “a” side into pinion joint (1).

**NOTE:**

“a” is longer than “b”. (“a” > “b”)

3) Check pinion gear (1) for smooth rotation.
4) In the same manner as described in Step 1), install thrust washer (2), spring washer (1) and side gear (4).

5) Install differential right case (1) and then tighten bolts to specified torque.

"A" : Cement 99000-32020

Tightening torque
Differential case bolt (a) :
41 N·m (4.1 kg-m, 30.0 lb-ft)

6) Install bevel gear in the same manner as step 5) of 2 differential pinion type.

7) Check preload in the same manner as step 6) of 2 differential pinion type.

DIFFERENTIAL SIDE BEARING

1) Press-fit side bearing (1) with special tool and press.

Special tool
(A) : 09944-66020

2) Hold bearing press-fitted in Step 1) with holder and press-fit side bearing on the other side.

NOTE:
Be sure to use bearing holder for the purpose of protecting lower bearing.

Special tool
(A) : 09944-66020
(B) : 09951-16060
DRIVE BEVEL PINION

To engage bevel pinion and gear correctly, it is pre-required to install bevel pinion to differential carrier properly by using adjusting shim as described on the followings. Shown below is relative positions of bevel pinion, differential carrier and mounting dummy.

Special tool
(A) : 09900-20606
(B) : 09926-78311
(C) : 09922-75222
(D) : 09951-16070
(E) : 09922-77250 (4 differential pinion type)
(F) : 09951-46010 (4 differential pinion type)
1) Install special tools with bearings and universal joint flange (2) to differential carrier (1).

**NOTE:**
- This installation requires universal joint flange (2) not equipped with groove on flange periphery.
- This installation requires no spacer or oil seal.

**Special tool**
(B) : 09926-78311
(F) : 09951-46010 (4 differential pinion type)

2) Tighten flange nut (1) so that specified bearing preload is obtained.

**NOTE:**
Before taking measurement with spring balance (2) or torque wrench (3), check for rotation by hand and apply small amount of oil to bearings.

**Special tool**
(B) : 09926-78311
(C) : 09922-75222

- **Pinion bearing preload:**
  9.0 – 17.0 kg-cm (7.8 – 14.7 lb-in.)

- **Spring measure reading with special tool:**
  1.8 – 3.4 kg (4.0 – 7.5 lb)

3) Set dial gauge to bevel pinion mounting dummy and make 0 (zero) adjustment on surface plate.

**NOTE:**
- When setting dial gauge to mounting dummy, tighten screw lightly. Be careful not to overtighten it, which will cause damage to dial gauge.
- With dial gauge set, turn dummy back and force by hand a couple of times and attain accurate 0 (zero) adjustment.
- It is desirable that short pointer indicates beyond 2 mm when long one is at 0 (zero).

**Special tool**
(A) : 09900-20606
(B) : 09926-78311

1. Surface plate
2. Screw
4) Place zero-adjusted mounting dummy and dial gauge set on pinion dummy and take measurement between zero position and extended dial gauge measuring tip.

NOTE:
- Repeat turning back and force of dummy and measure distance as far as top surface of pinion dummy accurately.
- When dial gauge measuring tip extends from 0 (zero) position, pointer turns counterclockwise.
- Measured value may exceed 1 mm. Therefore, it is also necessary to know reading of short pointer.

Special tool
(A) : 09900-20606
(B) : 09926-78311
(D) : 09951-16070
(E) : 09922-77250 (4 differential pinion type)

5) Obtain adjusting shim thickness by using measured value by dial gauge (which represents “c” in “Drive bevel pinion” in this section) in the following equation.

97 (2 differential pinion type) or 102 (4 differential pinion type) in above equation is “a” + “b” of mounting dummy (special tool) as shown in “Drive bevel pinion” in this section.

6) Select adjusting shim(s) (2) closest to calculated value from among following available sizes and put it in place and then press-fit rear bearing (1).

Calculated valve “g”:
Closest value to “f” (refer to Step 5.)

Special tool
(G) : 09925-18011
(H) : 09927-66010

Available shim thickness:
1.12, 1.15, 1.18, 1.21, 1.24, 1.27, 1.30 and 0.3 mm
(0.044, 0.045, 0.046, 0.047, 0.048, 0.049, 0.050 and 0.012 in.)
7) With new pinion spacer (3) inserted as shown in the figure, install front bearing (5) to differential carrier (4).

**NOTE:**
- Make sure to use new spacer for reinstallation.
- Apply oil to bearings.

8) Using special tool and plastic hammer, drive oil seal (2) into differential carrier (1) till it becomes flush with carrier end. Then apply grease “A” to oil seal lip.

“A” : Grease 99000-25010

Special tool
   (I) : 09951-18210

9) While tightening flange nut gradually with special tool and power wrench (4 - 10 magnification) (1), set preload of pinion to specification.

**NOTE:**
- Before taking measurement with spring balance (3) or torque wrench (4), check for smooth rotation by hand.
- Bearing preload can be measured roughly by pinion rotating angle which is due to arm weight of flange holder installed in flange.
- Be sure to tighten gradually and carefully till specified starting torque is obtained. Turning back overtightened flange nuts should be avoided.

Pinion bearing preload :
0.9 – 1.7 N·m (9.0 – 17.0 kg·cm, 7.8 – 14.7 lb-in.)

Spring measure reading with special tool :
18 – 34 N (1.8 – 3.4 kg, 4.0 – 7.5 lb)

Special tool
   (C) : 09922-75222
   (J) : 09922-66020

2. Socket wrench
ASSEMBLING UNIT

1) Place bearing outer races on their respective bearings. Used left and right outer races are not interchangeable.

2) Install case assembly in carrier.

3) Install side bearing adjusters on their respective carrier, making sure adjuster are threaded properly.

4) Align match marks (1) on cap and carrier. Screw in 2 side bearing cap bolts 2 or 3 turns and press down bearing cap by hand.

**NOTE:**

If bearing cap does not fit tightly on carrier, side bearing adjuster is not threaded properly. Reinstall adjuster.

5) Tighten cap bolts (provisional torque).

**Tightening torque**

- Bearing Cap bolt (Provisional torque) (a) :
  - 15 N·m (1.5 kg-m, 11.0 lb-ft)

6) Tighten both bearing adjusters (2) so as to obtain specified gear backlash and at the same time, obtain preload of side bearing.

**NOTE:**

- Be sure to apply measuring tip of dial gauge at right angles to convex side of tooth.
- As a practical measure the following would be recommended to obtain specified backlash and side bearing preload at the same time.
  - Obtain specified backlash by turning both adjusters inward lightly.
  - Tighten both adjusters further by one notch at a time.
- Measure at least 4 points on drive bevel gear periphery.

**Standard backlash :**

- 0.13 – 0.18 mm (0.005 – 0.007 in.)

**Special tool**

- (A) : 09930-40120
- (B) : 09930-40113
- (C) : 09900-20701

1. Bearing cap bolt
7) Measure preload of pinion with spring balance (1) or torque wrench (2) and check composite preload of pinion bearing and side bearing.

**NOTE:**
- Standard preload is shown in the following graph, which should be read as follows.
  
  **Example:**
  When preload of bevel pinion is 26 N (2.6 kg, 5.73 lb), acceptable composite preload of both pinion bearings and side bearings should be between 2.8 and 3.2 kg/ (6.17 and 7.05 lb).

**Special tool**
(D) : 09922-75222

3. Universal joint flange
4. Socket with adapter

**NOTE:**
- Bearing preload can be checked roughly by using flange holder as shown in left figure. In this measurement, holder arm itself will work as balance weight and torque will be replaced with angle. However, flange should be rotated very slowly with hand support so as not to allow over revolution due to inertia.
- Repeat side bearing adjustment until gear backlash and composite bearing preload are compatible within specification, if failed to obtain specified measurements first.

**Special tool**
(E) : 09922-66020

*A*: Pinion bearing starting torque range
*B*: Pinion bearing plus side bearing starting torque range
8) Torque bearing cap bolts (2) to specification and install bearing lock plates.

**Tightening torque**
- Lock plate bolt (b) : 12 N·m (1.2 kg-m, 9.0 lb-ft)
- Bearing cap bolt (c) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

9) As final step, check gear tooth contact as follows.
   a) After cleaning 10 bevel gear teeth, paint them with gear marking compound evenly by using brush or sponge etc.
   b) Turn gear to bring its painted part in mesh with bevel pinion and turn it back and forth by hand to repeat their contact.
   c) Bring painted part up and check contact pattern, referring to following chart. If contact pattern is not normal, readjust or replace as necessary according to instruction in chart.

**NOTE:**
Be careful not to turn bevel gear more than one full revolution, for it will hinder accurate check.
<table>
<thead>
<tr>
<th>TOOTH CONTACT PATTERN</th>
<th>DIAGNOSIS AND REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NORMAL</strong></td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td><strong>HIGH CONTACT</strong></td>
<td>Pinion is positioned too far from the center of drive bevel gear.</td>
</tr>
<tr>
<td></td>
<td>1) Increase thickness of pinion height adjusting shim and position pinion closer to gear center.</td>
</tr>
<tr>
<td></td>
<td>2) Adjust drive bevel gear backlash to specification.</td>
</tr>
<tr>
<td></td>
<td><img src="image1" alt="Diagram" /></td>
</tr>
<tr>
<td><strong>LOW CONTACT</strong></td>
<td>Pinion is positioned too close to the center of drive bevel gear.</td>
</tr>
<tr>
<td></td>
<td>1) Decrease thickness of pinion height adjusting shim and position pinion farther from gear center.</td>
</tr>
<tr>
<td></td>
<td>2) Adjust drive bevel gear backlash to specification.</td>
</tr>
<tr>
<td></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td>If adjustment is impossible, replace differential carrier.</td>
</tr>
<tr>
<td></td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td>1) Check seating of bevel gear or differential case. (Check bevel gear for runout).</td>
</tr>
<tr>
<td></td>
<td>2) If adjustment is impossible, replace drive bevel gear &amp; pinion set or differential carrier.</td>
</tr>
<tr>
<td></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td>Replace drive bevel gear &amp; pinion set or differential case.</td>
</tr>
<tr>
<td></td>
<td><img src="image5" alt="Diagram" /></td>
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</table>
10) Upon completion of gear tooth contact check in Step 8, caulk flange nut (2) with caulking tool (1) and hammer.

TIGHTENING TORQUE SPECIFICATION

<table>
<thead>
<tr>
<th>Fastening part</th>
<th>Tightening torque</th>
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<tbody>
<tr>
<td></td>
<td>N·m</td>
</tr>
<tr>
<td>Bevel gear bolts</td>
<td>85</td>
</tr>
<tr>
<td>Bearing cap bolts</td>
<td>85</td>
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<tr>
<td>Lock plate bolts</td>
<td>12</td>
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<tr>
<td>Differential case bolts</td>
<td>41</td>
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</table>

REQUIRED SERVICE MATERIAL

<table>
<thead>
<tr>
<th>Material</th>
<th>Recommended SUZUKI product (Part Number)</th>
<th>Use</th>
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</thead>
<tbody>
<tr>
<td>Thread lock cement</td>
<td>THREAD LOCK CEMENT SUPER 1333B (99000-32020)</td>
<td>• Bevel gear bolts</td>
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<tr>
<td></td>
<td></td>
<td>• Differential case bolts</td>
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<tr>
<td>Lithium grease</td>
<td>SUZUKI SUPER GREASE A (99000-25010)</td>
<td>Oil seal lips</td>
</tr>
<tr>
<td>Sealant</td>
<td>SUZUKI BOND NO. 1215 (99000-31110)</td>
<td>• Rear differential drain plug</td>
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<td></td>
<td>• Mating surface of differential housing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mating surface of rear axle housing</td>
</tr>
<tr>
<td>Part Number</td>
<td>Description</td>
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</tr>
<tr>
<td>-------------</td>
<td>----------------------------------</td>
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<tr>
<td>09900-20606</td>
<td>Dial gauge</td>
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<tr>
<td>09922-77250</td>
<td>Attachment</td>
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<tr>
<td>09922-75222</td>
<td>Preload adjuster</td>
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<tr>
<td>09926-68310</td>
<td>Bearing installer</td>
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<tr>
<td>09926-78311</td>
<td>Bevel pinion mounting dummy</td>
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<tr>
<td>09900-20701</td>
<td>Magnetic stand</td>
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<tr>
<td>09913-75510</td>
<td>Bearing installer</td>
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</tr>
<tr>
<td>09922-85811</td>
<td>Spring pin remover</td>
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<tr>
<td>09924-74510</td>
<td>Installer attachment</td>
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<tr>
<td>09900-20606</td>
<td>Bearing puller</td>
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<tr>
<td>09913-61510</td>
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<tr>
<td>09913-85230</td>
<td>Bearing removing jig</td>
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<tr>
<td>09922-85811</td>
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<td>09924-74510</td>
<td>Installer attachment</td>
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<tr>
<td>09925-18011</td>
<td>Bearing installer</td>
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<tr>
<td>09926-68310</td>
<td>Bearing installer</td>
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<tr>
<td>09927-66010/J-23082-01</td>
<td>Oil pump aligner</td>
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<tr>
<td>09928-06010-002</td>
<td>Differential torque checking tool</td>
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<tr>
<td>Part Number</td>
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<tr>
<td>09930-40113</td>
<td>Rotor holder</td>
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<tr>
<td>09930-40120</td>
<td>Attachment</td>
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<td>09944-66020</td>
<td>Bearing installer</td>
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<tr>
<td>09951-16060</td>
<td>Lower arm bush remover</td>
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<td>09951-16070</td>
<td>Attachment</td>
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<td>09951-18210</td>
<td>Oil seal remover &amp; installer No. 2</td>
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<td>09951-46010</td>
<td>Drive shaft oil seal installer</td>
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