SECTION 14

TRANSFER GEAR BOX

CONTENTS

14-I. GENERAL DESCRIPTION 14-2

14-2. SELECTIVE FLOWS OF TRANSFER DRIVE 14-3

14-3. GEAR RATIO DATA 14-4

14-4. TRANSFER SERVICES NOT REQUIRING TRANSFER REMOVAL . . . . . , ... 14-5

14-5. REMOVAL 14-6

14-6. DISASSEMBLY 14-8

14-7. INSPECTION OF COMPONENTS 14-12

14-8. REASSEMBLY 14-14

14-9. MAINTENANCE SERVICES 14-22

14-10. TIGHTENING TORQUE 14-23

14-1. GENERAL DESCRIPTION

The transfer gear box is an auxiliary transmission for on-off control of two-speed drive transmitted to both front and rear axles concurrently and provides additional speed reductions, HIGH and LOW, for any selection of main transmission gears.

The functions of this auxiliary transmission are mainly two-selection between four-wheel drive (front and rear axles) and two-wheel drive (rear axle) and between HIGH and LOW for four-wheel drive. Three propeller shafts are associated with the gear box.

These functions are accomplished by means of four shafts arranged in three-axis configuration and two sliding clutches. The selection is effected by actuating these clutches from a single control lever located beside the driver's seat. The gear box is mounted on a chassis frame.

1. Flange
2. Oil seal
3. Circlip
4. Bearing
5. Nut
6. Input shaft
7. Bearing
8. Counter shaft lock plate
9. O-ring
10. Counter shaft
11. Bearing
12. Spacer
13. Thrust washer
14. Counter gear
15. Flange
16. Oil seal
17. Circlip
18. Bearing
19. Output front shaft
20. Bearing
21. Circlip
22. Sleeve
23. Hub
24. Bearing
25. Thrust washer
26. Bearing
27. Output high gear
28. Sleeve
29. Output rear shaft
30. Output low gear
31. Bearing
32. Speedometer drive gear
33. Bearing
34. Retainer
35. Oil seal
36. Speedometer driven gear
37. Speedometer gear case
38. Oil seal
39. Shim
40. Flange
41. Washer

Fig. 14-1

14-2. SELECTIVE FLOWS OF TRANSFER DRIVE

2-Wheel Drive (Rear-Wheel Drive)

Rear shifter fork pushes rear clutch sleeve into "high" gear, thus coupling the gear to output rear shaft.

Drive flows from input shaft to output rear shaft through big gear, "high" gear and rear clutch.

Fig. 14-2

4-Wheel Drive HIGH (All-Wheel Drive on HIGH)

Under the conditions of rear-wheel drive, described above, front shifter fork pushes the sleeve of front clutch onto the toothed clutch ring, thus coupling output rear shaft to output front shaft. Front shaft and rear shaft run together on HIGH.

Fig. 14-3

4-Wheel Drive LOW (All-Wheel Drive on LOW)
Front shifterforkactuates front clutch to couple rear shaft to front shaft; and rear shifter fork actuates rear clutch to couple "low" gear to rear shaft. Front shaft and rear shaft run together on LOW.

Fig. 14-4

14-3. GEAR RATIO DATA

Shift position	Rear-wheel drive	All-wheel drive high	All-wheel drive low
Gear	41/44 · 62/41	41/44 · 62/41	41/44 · 56/23
Reduction	1.409	1.409	2.268

14-4. TRANSFER SERVICES NOT REQUIRING TRANSFER REMOVAL

Following parts or components do not require transfer removal to receive services (replacement, inspection) :

Part or Component	Nature of Service
1. Universal-joint yoke flanges	Replacement or inspection
2. Front drive shift shaft fork	Replacement or inspection
3. Transfer output front shaft oil seal	Replacement or inspection
4. Transfer output front shaft bearing	Replacement
5. Transfer output front shaft	Replacement
6. Transfer front case	Replacement
7. Front drive clutch hub	Replacement or inspection
8. Front drive clutch sleeve	Replacement or inspection
9. Transfer input shaft oil seal	Replacement
10. 4WD indicator light switch	Replacement or inspection
11. Speedometer driven gear	Replacement or inspection
12. Gear shift control lever	Replacement or inspection
13. Gear shift control boot No. 1, No. 2	Replacement
14. Gear shift control lever spring seat	Replacement or inspection

14-5. REMOVAL

1) Lift up car and remove securing bolts from each universal-joint flange connection to sever 3 propeller shafts from transfer gear box.

Fig. 14-5

2) Remove clamp ① and boot ② from transfer gear box.

Fig. 14-6

3) Twist control lever guide counterclockwise while pushing it down; this will permit lever to be removed from gear box.

Fig. 14-7

4) Drain out oil from gear box by loosening its drain plug.

Fig. 14-8

5) Disconnect speedometer drive cable from transfer gear box.

Fig. 14-9

6) Disconnect 4WD switch lead wire at coupler.
7) Remove 3 mounting nuts securing gear box to chassis, and take down gear box.

Fig. 14-11

14-6. DISASSEMBLY

Universal-Joint Yoke Flanges

There are 3 flanges to be removed: one from input shaft and other from output front and rear shafts. Lock flange so that it will not turn, and loosen and remove nut holding flange to the shaft. Draw off flange.

Fig. 14-12 Ⓐ Special tool (09930401131

Speedometer Driven Gear

Loosen speedometer driven gear case bolt and remove speedometer driven gear case with gear.

Fig. 14-15

Transfer Front Case

Remove the indicator light switch from front case.

NOTE:

Use care not to lose switch ball. This ball is larger than interlock ball and locating balls.

Fig. 14-16

Remove bolts securing transfer front case, and take off case.

Fig. 14-17

By tapping output front shaft with a plastic hammer, remove output front shaft from front case.

Fig. 14-18

After removing oil seal, remove circlip and drive bearing out of front case by using bearing installer (special tool).

Bearing installer Ⓒ : (09913-76010)

Fig. 14-19

Transfer Center Case

Remove bolts fastening center case and rear case together.

Do not loosen bolt ① at this point.

Fig. 14-20

By tapping rear case and output rear shaft with. a plastic hammer, separate center and rear case.

Fig. 14-21

Fig. 14-22

Given below are procedures for disassembling component parts of center case as separted from rear case.

1) Loosen gear shift locating spring plug and take out spring and locating ball.

Fig. 14-23

2) Using spring pin remover (special tool), drive 2 spring pins out of front drive shift shaft ① and reduction shift shaft ②.
Spring pin remover Ⓓ : (09922-85811).

3) Remove forks and shift shafts.

NOTE:
At this time, locating ball and spring will jump out of hole, use care not to lose them.

Fig. 14-25

4) Hammer output rear shaft with a plastic hammer to drive it out of center case.

Fig. 14-26

5) Pull out counter gear, bearings and spacer. Remove counter shaft from center case by loosening counter shaft lock plate bolt.

Fig. 14-27

6) Remove input shaft from center case by hammering thick part of case or input shaft center with a plastic hammer.

Fig. 14-28

7) Remove output shaft rear bearing and retainer together by using bearing puller. After removing bearing, speedometer drive gear, thrust washer, output low gear and needle roller bearing can be removed.

Fig. 14-29

8) Remove front drive clutch hub circlip and pull clutch hub off shaft by using bearing puller and puller attachment (special tool A).

NOTE:
Use care to prevent damage to needle roller bearing in output rear shaft when removing clutch hub.

Fig. 14-30

9) Remove front bearing by using bearing puller and puller attachment (special tool A).

NOTE:
Use care to prevent damage to needle roller bearing in output rear shaft while bearing is being removed.

Fig. 14-31

10) When input shaft is removed or center case and rear case are separated, input shaft bearings may come off. In such a case, bearings can be removed from shaft by using bearing puller.

Fig. 14-32

11) When input shaft is removed, front bearing may be left in case. In this case, after removing oil seal and circlip, bearing can be taken out of case by using bearing installer (special tool).
Bearing installer Ⓕ : (09913-75810)

Fig. 14-33

Transfer Rear Case

1) When center case and rear case are separated, input shaft may be left in rear case. In this case, remove input shaft from rear case by hammering thick part of case with a plastic hammer.

Fig. 14-34

14-7. INSPECTION OF COMPONENTS

Gear Teeth

Inspect gear teeth ① internal teeth of rear clutch sleeve ② and clutch teeth of gear 3. for wear, cracking, chipping and other malcondition. Replace gear or sleeve as necessary.

Fig. 14-35

Fig. 14-36

Locating Spring

Check each shifter fork shaft locating spring for strength by measuring its free length. If length is noted to be less than service limit, replace it.

	Standard	Service limit
Free length of locating spring	23.7 mm (0.933 in)	22.0 mm (0.866 in)

Fig. 14-37

Bearings

Check each bearing by spinning its outer race by hand to "feel" smoothness of rotation. Replace bearing if noted to exhibit sticking, resistance or abnormal noise when spun or rotated by hand.

Fig. 14-38

Side Clearance of Gears

With gear, bearing and thrust washer installed on shaft, check for side clearances of gears. If clearance exceeds service limit, replace thrust washer.

Side clearance of gear		Standard	Service limit
output gears	low gear	0.175 — 0.325mm	0.7mm
	high gear	(0.007 — 0.012in)	(0.027in)

Fig. 14-39 Output high gear

Fig. 14-40 Output low gear

Gear Shift Shafts

Check each part as indicated in below figures for uneven wear. Replace defective parts.

Fig. 14-41

4WD Gear Shift Lever

Check lower end of gear shift lever where gear shift fork shaft contacts ① for wear and any kind of damage. Worn or damaged shift lever must be replaced with new one.

Fig. 14-42

14-8. REASSEMBLY

NOTE:

- **All parts to be used in reassembly must be perfectly clean.**
- **Oil or grease sliding and rubbing surfaces of transfer components just before using them in reassembly with gear oil and SUZUKI SUPER GREASE A (99000-25010).**
- **Oil seals, "0" rings, gaskets and similar sealing members must be in perfect condition. For these members, use replacement parts in stock.**
- **Tightening torque is specified for important fasteners — mainly bolts — of transfer and other components. Use torque wrenches and constantly refer to specified data given in P. 14-23.**

Input Shaft

Press-fit bearings onto both sides of input shaft by using bearing installer (special tool).

Bearing installer (A) : (09913-84510)

Fig. 14-43

Output Rear Shaft

Install following parts onto shaft in such order and directions as prescribed in the figure.

1. Circlip	9. Sleeve
2. Hub	10. Bearing (short)
3. Bearing	11. Outputlowgaar
4. Bearing outer ring	12. Thrust washer
5. Thrust washer	13. Speed meter drive gear
6. Output high gear	14. Bearing
7. Bearing (long)	15. Retainer
8. Output rear shaft	

Fig. 14-44

1) After installing bearing (long), high gear and thrust washer, press-fit bearing 1. and then hub ② by using bearing installer (special tool).

Bearing installer (A) : (0991384510)

Fig. 14-45

2) Fit circlip ① securely into groove in shaft.

Fig. 14-46

3) After installing sleeve, bearing (short), low gear and thrust washer, press-fit speedometer drive gear by using bearing installer (special tool).

Bearing installer (A) : (09913-84510)

Fig. 14-47

4) Press-fit bearing ⑭ and the retainer ⑮ by using bearing installer (special tool).

Bearing installer (A) : (0991384510)

Fig. 14-48

Shim Adjustment of Input and Output Shafts

Clearance in thrust direction of both input and output shafts is adjusted by putting shims between input shaft rear bearing and rear case for input shaft and between output shaft rear bearing and rear case for output shaft.

As thrust clearance is specified as follows determine shim thickness to meet specification according to the following procedures.

Thrust clearance specification	0.05 — 0.15 mm (0.002 — 0.006 in.)

[Input shaft]

1) Take measurement "A" of rear case as shown in figure below by using depth gauge,
2) Take measurement "B" of center case with bearing circlip installed.
3) Take measurement "C" (between bearing inner races) of input shaft with bearings installed, by using micrometer.

NOTE:

- Before measuring, make sure that each bearing is free from abnormal noise or resistance by spinning its outer race.
- Each measurement in above steps 1) to 3) must be taken accurately in careful manner, If shim thickness is determined based on rough measurement, clearance of each shaft in thrust direction will not satisfy specification. And improper clearance may cause oil leakage, broken bearing and abnormal noise.
- Take the same measurement at 3 to 4 different positions and use their mean.

1. Center case
2. Rear case
3. Input shaft
4. Output shaft
5. Bearing circlip
6. Gasket
7. Gasket thickness (0.3 mm or 0.012 in)

Fig. 14-48-1

4) Using measurements obtained in steps 1) to 3) and equation described below, calculate shim thickness which is necessary for proper thrust clearance.

Thrust clearance = ("A" + "B" + Gasket thickness) — "C"

As the above equation holds for thrust clearance and gasket thickness is specified as 0.3 mm and thrust clearance as 0.05 to 0.15 mm, shim thickness is calculated by the following equation.

Shim thickness = ("A" + "B" + 0.3) — ("C" + 0.05 ~ 0.15)

[Example]

Supposing A, B and C are as follows;

A = 81.35 mm (3.203 in.)
B = 35.70 mm (1.405 in.)
C = 117.05 mm (4.608 in.)

Shim thickness = (81.35 + 35.70 + 0.3) — (117.05 + 0.05 ~ 0.15)
= 117.35 — 117.10 ~ 117.20
= 0.25 ~ 0.15

In this case, use of 0.15 to 0.25 mm (0.006 to 0.009 in) thick shim(s) will ensure specified thrust clearance which is 0.05 to 0.15 mm (0.002 to 0.006 in). Therefore 2 pieces of 0.1 mm (0.004 in) thick shim should be selected in available shims below to satisfy thickness.

5) When shim thickness is determined, select proper shim(s) from among the following shims and use it (them) between input shaft rear bearing and rear case when matching center case and rear case.

Available shim size (thickness)	0.1, 0.3, 0.5 mm (0.004, 0.012, 0.020 in.)

[Output shaft]
Just as with input shaft, take measurements of "A'", "B'" and "C'" as indicated in Fig. 14-48-1, calculate shim thickness and install proper shim(s) between output shaft rear bearing and rear case when matching center case and rear case.

1. Shim for input shaft
2. Shim for output shaft

Fig. 14-48-2

Rear Case

1) **Install oil seal in rear case and apply grease to oil seal lip.**

Fig. 14-49

2) **Install counter shaft thrust washer to rear case, bringing its face without depressions against case and fit its bent portion securely into groove in case.**

NOTE:

Apply ample amount of grease to both surfaces of washer so as to lubricate sliding surfaces and prevent washer from moving out of place or slipping off.

Fig. 14-50

Center Case

1) **Install input shaft front bearing circlip and oil seal in center case.**
   Snap ring pliers Ⓐ : (09900~6108)

Fig. 14-51

2) **Install input shaft to center case.**

Fig. 14-52

3) **After greasing 0 ring on counter shaft, insert shaft into center case and secure shaft with lock plate and bolt.**

Fig. 14-53

4) Install the counter shaft thrust washer to center case. For installation, apply ample amount of grease to both faces of the washer so as to lubricate sliding surfaces and prevent it from moving out of place or slipping off and bring its face without depressions against center case, and fit its bent portion into groove in case securely.

Fig. 14-54

5) Install needle roller bearings, spacer and counter gear on counter shaft.

Fig. 14-55

6) Install output shaft assembly to center case.

Fig. 14-56

7) When installing front drive shift shaft and reduction shift shaft in center case, install spring ①, ball ②, shaft ③, ball ④, shaft ⑤, ball ⑥, spring ⑦ and plug 8. in that order.

Fig. 14-57

8) Fit forks on shift shafts and lock them with spring pins. Forks should be fitted in correct direction according to below figure.

Fig. 14-58

Center and Rear Cases

1) Check center case (or rear case) to ensure that it is provided with 2 dowel pins ①.

Fig. 14-59

2) Put gasket on center case. Bring rear case and center case into match and apply uniform force gradually all around rear case with a plastic hammer. Tighten center case securing bolts to specified torque.

NOTE:

- **Matching must be made carefully so as not to move countershaft thrust washers out of place.**
- **Be sure to install shims determined in previous item "Shim Adjustment of Input and Output Shafts" between input shaft rear bearing and rear case and between output shaft rear bearing and rear case.**

Fig. 14-60

Fig. 14-61

Fig. 14-62

3) Apply grease to output front shaft rear bearing.

Fig. 14-63

Front Case

1) Install bearing, circlip and oil seal to front case. Apply grease to oil seal lip and install output front shaft using bearing installer (special tool).
   Bearing installer (A) : (09913-76010)

Fig. 14-64

2) Put gasket on center case.
3) Check front case to ensure that it is provided with 2 dowel pins.

Fig. 14-65

4) Install front case to center case.

Fig. 14-66

5) When installing speedometer driven gear and its gear case in rear case, apply grease to 0 ring and oil seal lip, and align bolt holes in rear case and driven gear case.

Fig. 14-67

6) Install 4WD ball and switch. Then clamp switch lead wire properly.

Fig. 14-68

7) Install propeller shaft flanges and tighten nuts to specified torque and calk the nuts.
8) Upon completion of entire assembly work, install transfer in chassis body in reverse sequence of removal. Pour gear oil into transfer gear box.
Refer to information given in next oil and oil capacity for oil to be used and specified amount.

NOTE:
When installing oil filler and drain plugs to transfer case, apply sealant (SUZUKI BOND No.1215, 99000-31110) to thread part of plug.

14-9. MAINTENANCE SERVICES

Oil Level

Oil level must be checked with car held in horizontal position in both front to rear and side to side directions.
Oil level plug and oil filler plug are one and the same as shown in figure.
If oil flows out of filler plug hole or if oil level is found up to hole when plug is removed, amount of oil is appropriate. Replenish oil if noted as insufficient.

Oil and Oil Capacity

Whenever car is lifted up for any service including oil change, make sure to check around transfer gear box for oil leakage. Correct defects, if any, and change or refill oil.

Transfer oil capacity	0.8 litre (1.7/1.4 US/Imp. pt)
Transfer oil specification	Gear oil SAE 80W–90, 75W–80 or 75W–90

It is highly recommended to use SAE 75W–90 gear oil.
For viscosity chart, refer to P. 1-20.

Fig. 14-70

① : Oil drain plug
② : Oil filler & level plug

14-10. TIGHTENING TORQUE

Fastening parts	N·m kg-m	lb-ft
Front case bolt	13 – 23 1.3 – 2.3	9.5 – 16.5
Center case bolt	13 – 23 1.3 – 2.3	9.5 – 16.5
Counter shaft lock plate bolt	9 – 17 0.9 – 1.7	7.0 – 12.0
Universal joint flange nut	110 – 150 11.0 – 15.0	80.0 – 108.0
Transfer mounting bracket bolt	18 – 28 1.8 – 2.8	13.5 – 20.0
Transfer mounting nut	25 – 35 2.5 – 3.5	18.5 – 25.0
Cross joint bolt & nut	23 – 30 2.3 – 3.0	17.0 – 21.5
Oil filler and drain plug	18 – 28 1.8 – 2.8	13.5 – 20.0