

STEERING CLUTCHES AND BRAKES

Removal

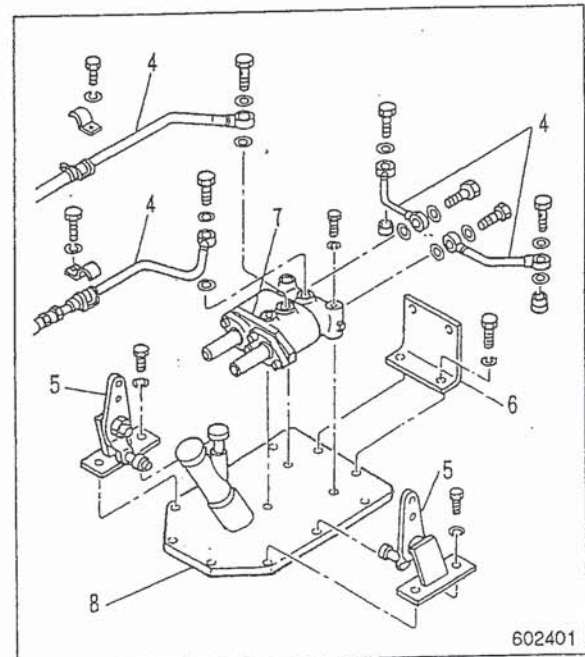
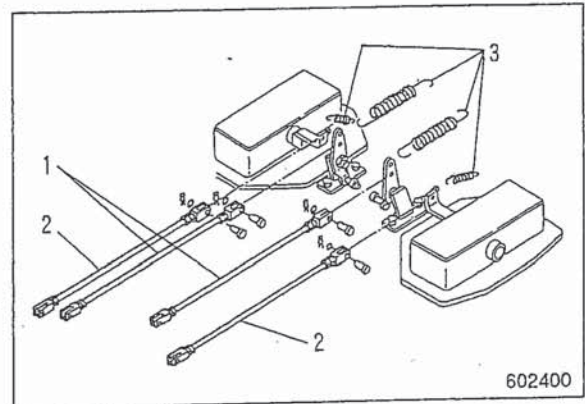
Start by:

- (a) drain the oil from the bevel gear case and transmission case [9.5 liters (2.5 U.S. gal), approx.]
- (b) remove the tracks (on both sides)

It is not necessary to remove the tracks unless they engage the sprockets. (Refer to Removal, TRACKS.)

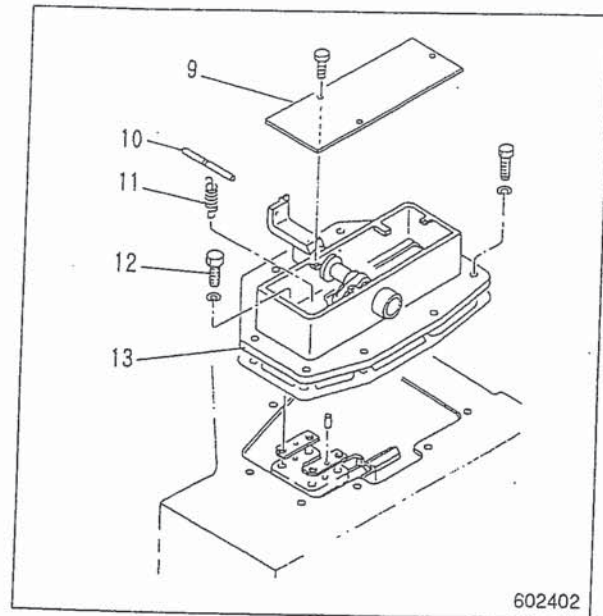
Removal sequence

1. Disconnect the following electric wires:
 - (1) Wire between battery switch and battery
 - (2) Clamp for wire between battery and starter
2. Remove the following parts:
 - (1) Floor plate
 - (2) Operator's seat and seat plate
 - (3) Rear cover
3. Remove the following parts:
 - 1 Steering control rods (2 pcs)
 - 2 Brake control rods (2 pcs)
 - 3 Springs (4 pcs)
- 4 Steering clutch oil pipes (4 pcs)
- 5 Levers (2 pcs)
- 6 Bracket
- 7 Steering valve
- 8 Cover

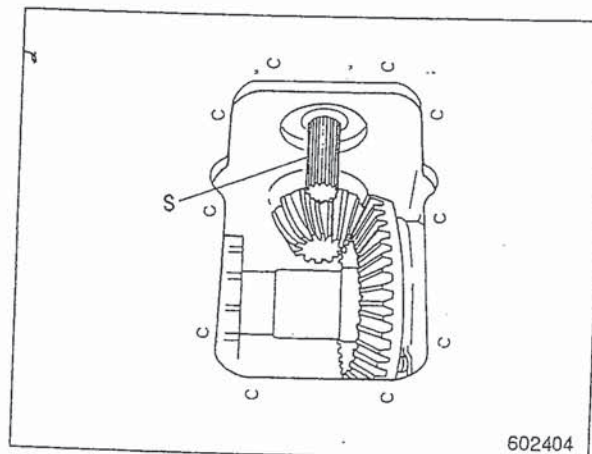
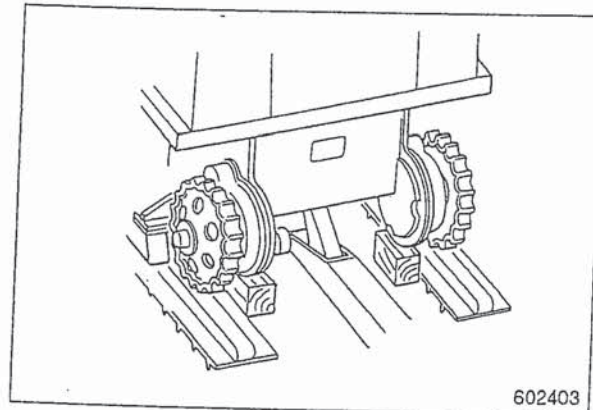


DISASSEMBLY AND REASSEMBLY

- 9 Cover
- 10 Shaft
- 11 Spring
- 12 Steering brake mounting bolts (4 pcs)
- 13 Bracket



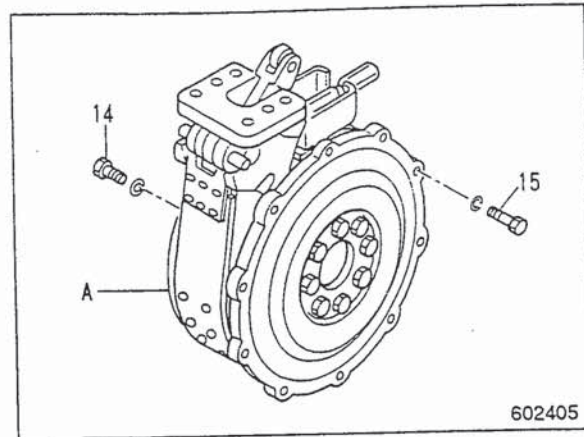
4. Raise the rear end of the machine by positioning a jack under the steering clutch case so that the sprockets can be freely rotated, and block the final drive cases, using wood blocks, as shown.
5. Hold the clutch pedal in depressed position, and place the transmission control lever in forward 1st position.
6. Unscrew bolts 14 and 15 securing the steering clutch & brake assembly. To do this, turn the splined portion of transmission input shaft S to rotate that assembly to remove the bolts one by one.



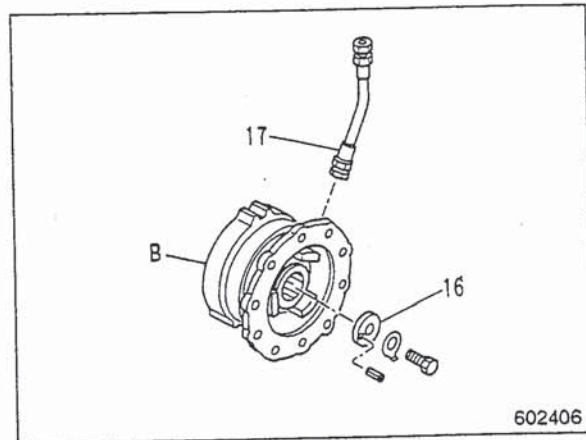
DISASSEMBLY AND REASSEMBLY

7. Remove the following parts:

- 14 Mounting bolts
- 15 Mounting bolts
- A Steering clutch & brake assembly



- 16 Washer
- 17 Hose
- B Steering clutch cylinder assembly



Installation

To install, follow the reverse of removal sequence.

Suggestions for steering clutch & brake assembly and cylinder assembly removal

These assemblies can be removed from the steering clutch case by removing bracket 13, with the operator's seat tilted forward. It is not necessary to remove the seat plate.

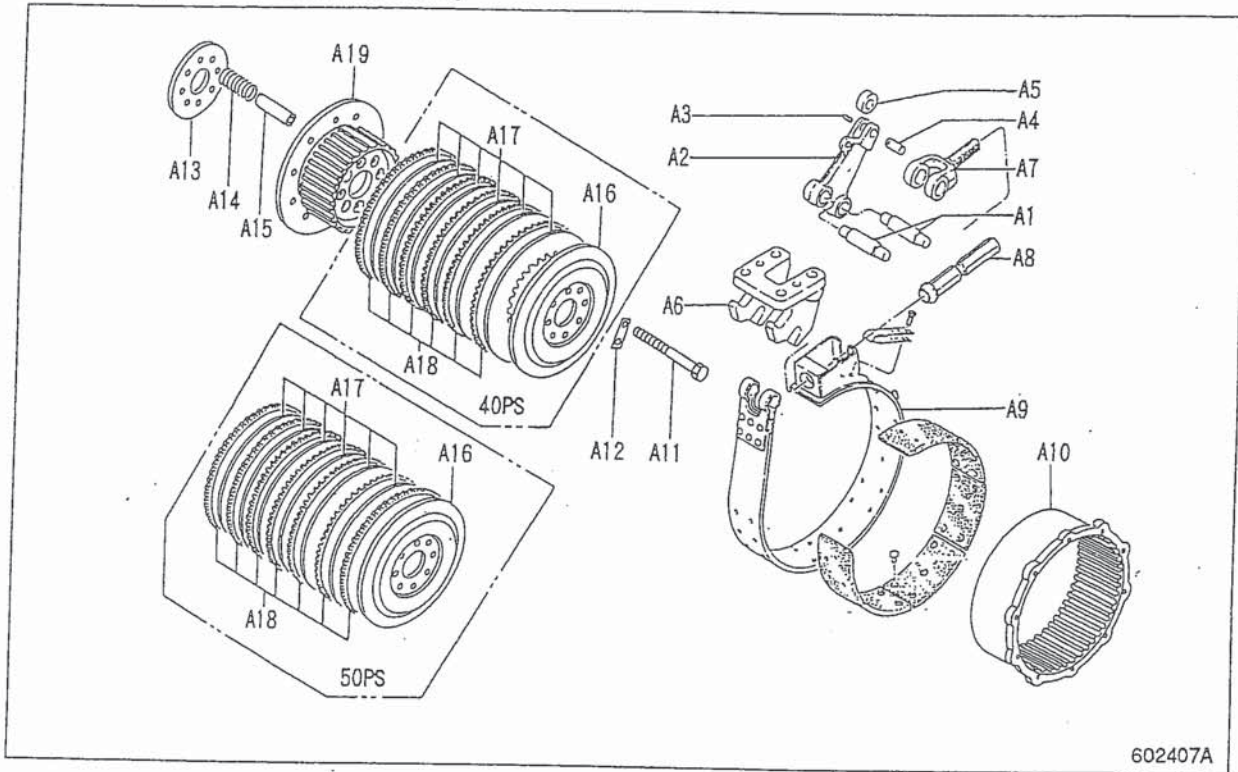
Inspection after installation

- (1) Make sure that the oil pipes are connected properly.
- (2) Fill the steering clutch with recommended oil.

DISASSEMBLY AND REASSEMBLY

Disassembly

A Steering clutch & brake assembly



602407A

Disassembly sequence

(Remove A1 thru A9 as an assembly.)

A1 Pin

(Remove A2 thru A5 as an assembly.)

A2 Lever

A3 Spring pin

A4 Pin

A5 Roller

A6 Anchor

A7 Clevis

A8 Adjusting nut

A9 Brake band assembly

A10 Outer drum

A11 bolt

A12 Plate

A13 Plate

A14 Spring

A15 Spacer

A16 Pressure plate

A17 Disc plate

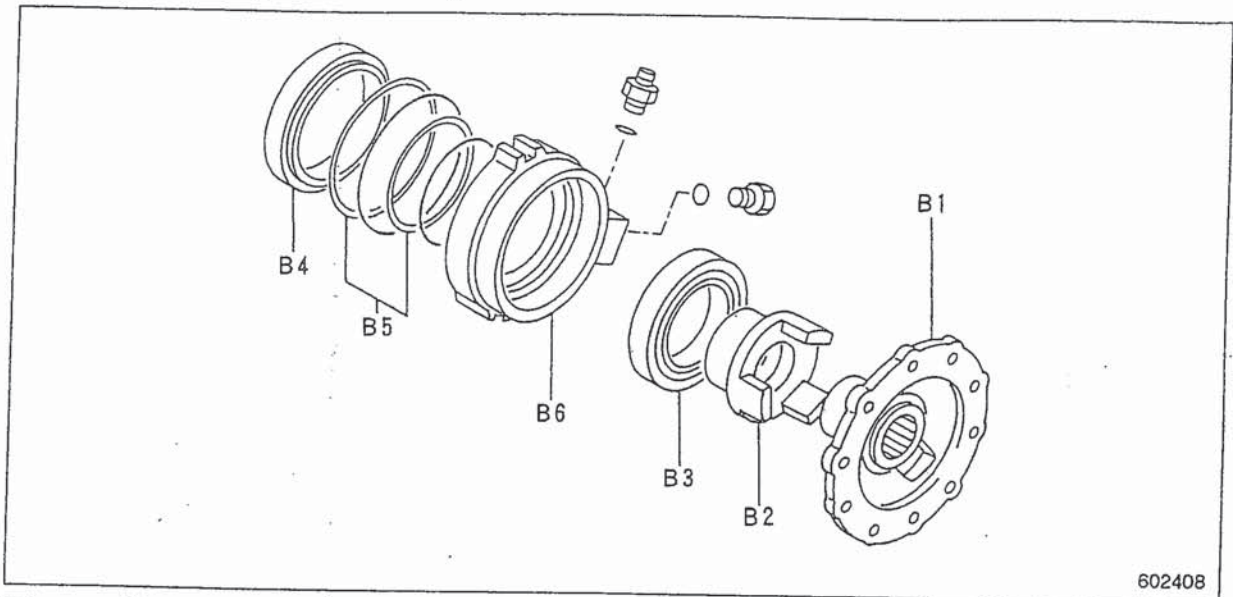
A18 Friction plate

A19 Inner drum

Number of friction plates A18

Machine model	No. of friction plates A18
40PS (standard/swamp models)	6, each side
50PS (super/ultra-super swamp models)	7, each side

B Steering clutch cylinder assembly



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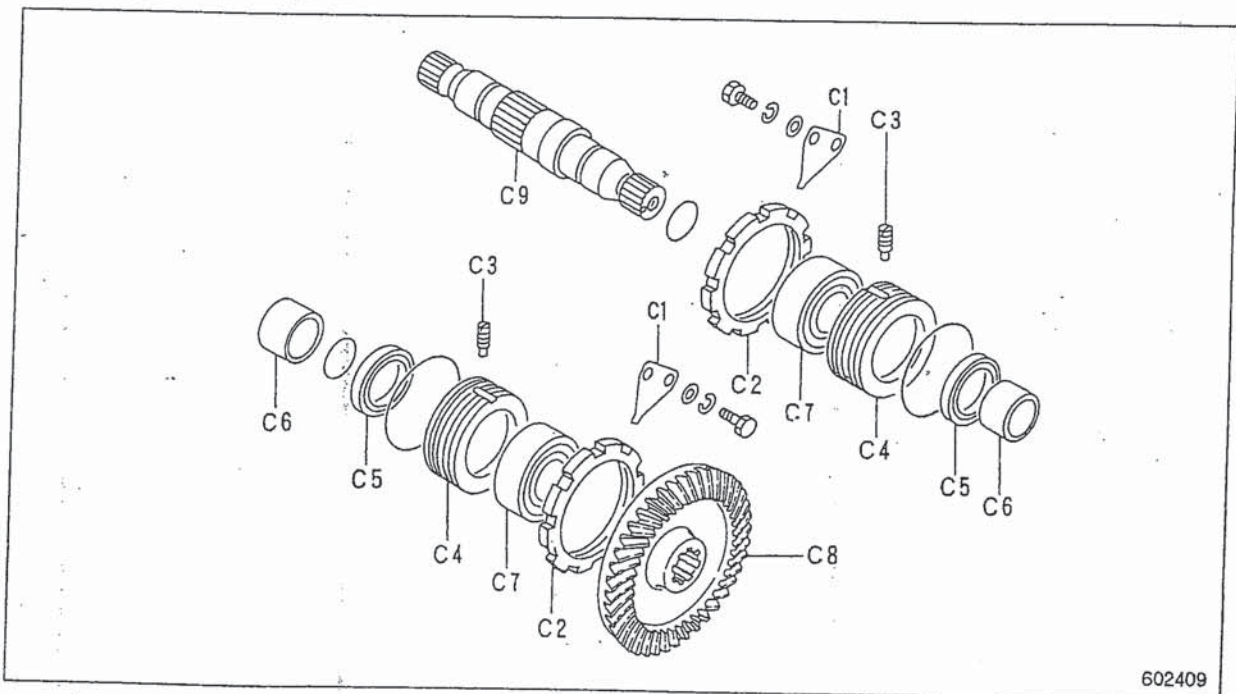
Disassembly sequence

B1 Flange
B2 Shifter

B3 Bearing
B4 Piston

B5 Backup ring
B6 Cylinder

C Bevel gear assembly



602409

Disassembly sequence

C1 Locking plate

C2 Nut

C3 Set screw (to be loosened)

(Remove C4, C5 and outer race of C7 as an assembly.)

C4 Bearing cage

C5 Oil seal

C6 Collar

C7 Roller bearing

C8 Bevel gear

C9 Drive shaft

DISASSEMBLY AND REASSEMBLY

Inspection

1. Thickness of disc plates and friction plates

Measure the thickness of the disc plates and friction plates. If the thickness is less than the service limit, do the steps 2 and 3 below.

Unit: mm (in.)

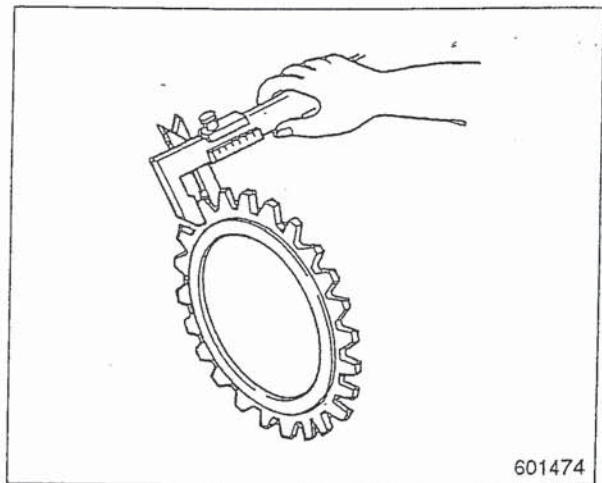
Item	Assembly standard	Service limit
Thickness of disc plates (6 pcs) and friction plates (6 pcs) (40PS model)	69 (2.72)	66 (2.60)
Thickness of disc plates (6 pcs) and friction plates (7 pcs) (50PS model)	69.3 (2.728)	66 (2.60)

2. Friction plates

Measure the thickness of each friction plate and its backlash with the outer drum splines. Replace the plate if any of these measurements exceeds the service limit.

Unit: mm (in.)

Item	Assembly standard	Service limit
Thickness	50PS model 8.7 (0.343)	6.0 (0.236)
	40PS model 7.5 (0.295)	
Backlash with outer drum splines	0.16 to 0.52 (0.0063 to 0.0205)	0.80 (0.0315)

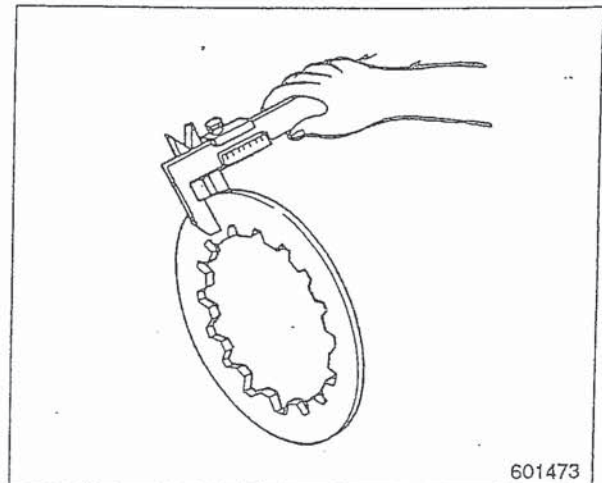


3. Disc plates

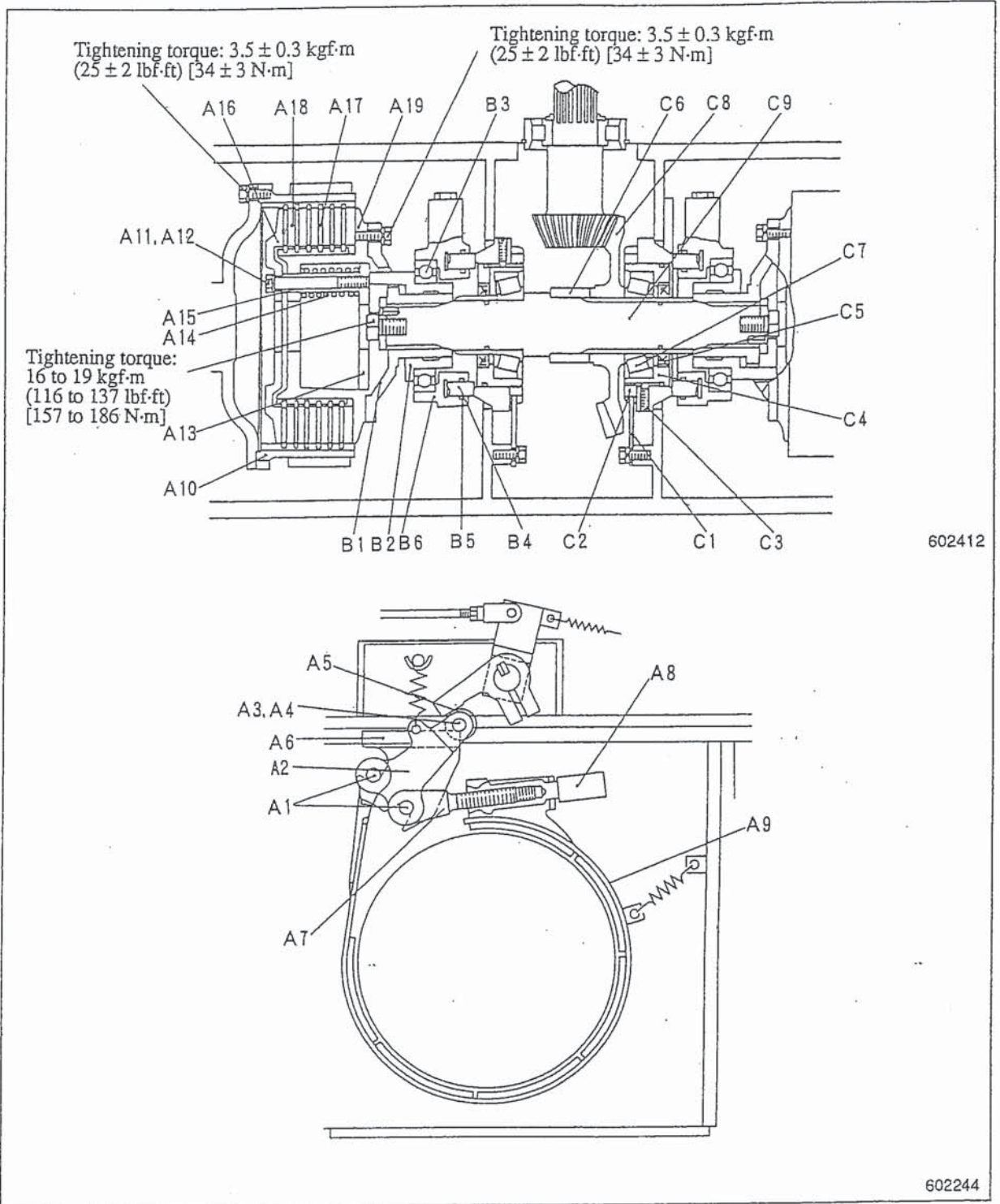
Measure the thickness of each disc plate and its backlash with the inner drum splines. Replace the disc plate if any of these measurements exceeds the service limit.

Unit: mm (in.)

Item	Assembly standard	Service limit
Thickness	2.8 (0.110)	2.3 (0.091)
Backlash with inner drum splines	0.14 to 0.30 (0.0055 to 0.0118)	0.60 (0.0236)



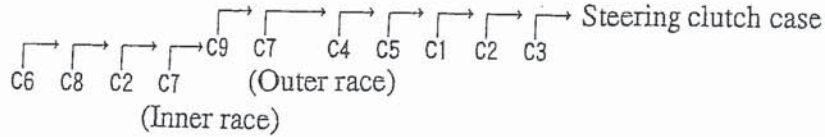
Reassembly



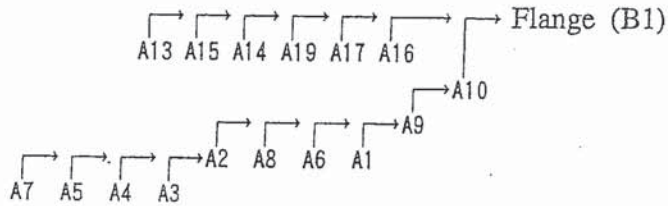
DISASSEMBLY AND REASSEMBLY

Reassembly sequence

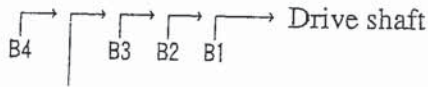
C Bevel gear assembly



A Steering clutch & brake assembly



B Steering clutch cylinder assembly



B5→B6.

Suggestions

1. Drive shaft installation

- (1) Before installing drive shaft C9, fit the inner race of left-hand roller bearing C7 and collar C6 to the shaft.
- (2) After installing shaft C9 and bevel gear C8 in the steering clutch case, fit the inner race of right-hand roller bearing C7 to the shaft.

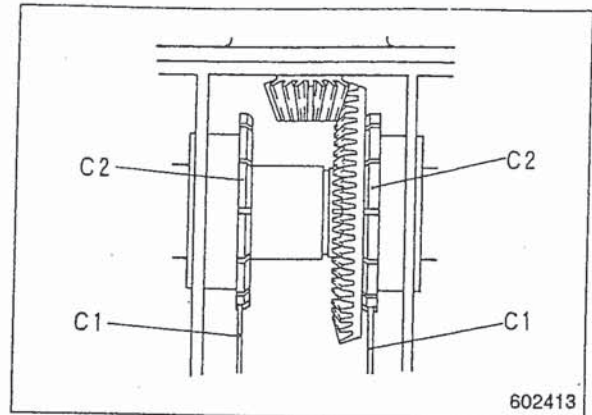
2. Friction plate and disc plate installation

- (1) The 50 PS model has seven friction plates while the 40 PS model has six friction plates.
- (2) In the 50 PS model, put the friction plate next to the pressure plate.

3. Tapered roller bearing preload adjustment

- (1) Tighten adjusting nuts C2, right and left, to settle them in place. Lock one of the nuts with its lock plate C1, and tighten or loosen the other nut to adjust the preload. (Tightening the nut increases the preload.)
- (2) Hook a spring balancer to the tooth of bevel gear in mesh with the pinion with a wire, pull the balancer in the tangential direction, and read the balancer indication.

Item	Assembly standard
Preload	0.72 to 0.88 kgf·m (5.2 to 6.4 lbf·ft) [7.1 to 8.6 N·m]
Spring balancer reading	6.55 to 8.00 kgf (14.4 to 17.6 lbf) [64.2 to 78.5 N]



4. Bevel gear and pinion backlash adjustment

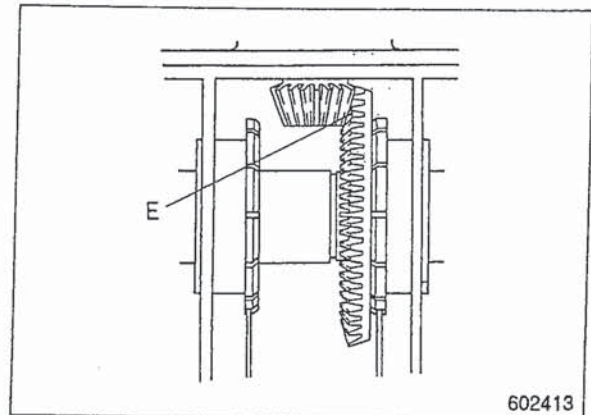
- (1) Put a fuse stock into between the bevel gear and pinion at the place indicated as E, roll it and measure the amount of flattening.
- (2) Measure the backlash at a total of four places by turning the bevel gear 90° at a time, and take the smallest measurement for comparison with the assembly standard.
- (3) To adjust the backlash, tighten or loosen the adjusting nuts, right and left.

Unit: mm (in.)

Item	Assembly standard
Backlash	0.15 to 0.20 (0.0059 to 0.0079)

NOTE

If one nut is loosened, for instance, the other nut must be tightened by the same amount to keep the preload unchanged.



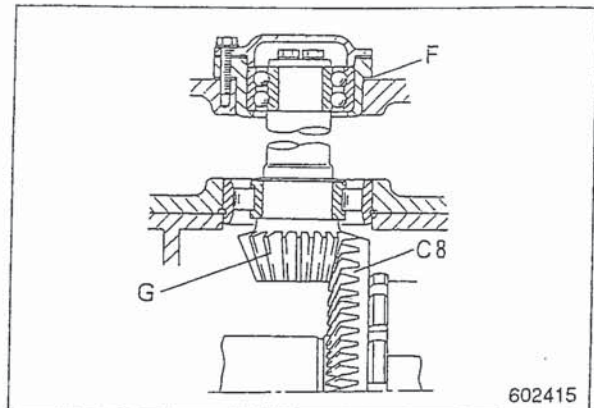
DISASSEMBLY AND REASSEMBLY

5. Tooth contact adjustment

- (1) To move the bevel pinion G toward or away from the bevel gear C8 for tooth contact adjustment, decrease or increase shims F between the bearing cage and transmission case.
- (2) To determine the tooth contact pattern, brush red lead sparingly on the bevel gear teeth, and rotate the pinion backward and forward until a contact pattern is noted on both concave and convex faces of the gear teeth.

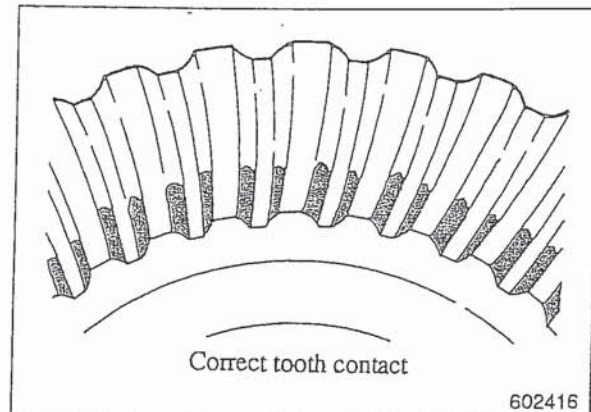
NOTE

To make the tooth contact pattern more visible, lightly press the gear when rotating the pinion.



Correct tooth contact

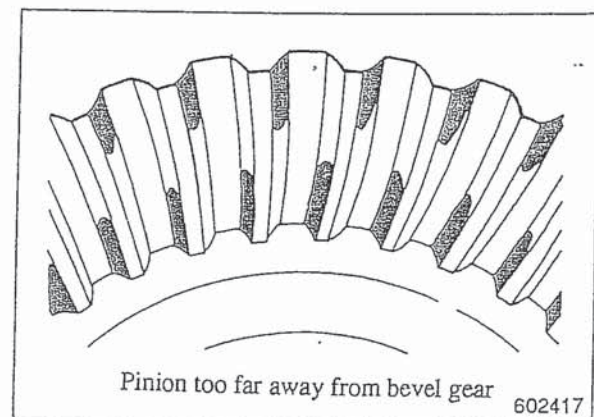
Contact (indicated by the dark areas on the tooth faces) is heaviest toward the toe end and extends about 30% of the tooth length on both convex and concave faces.



Incorrect tooth contact

• Pinion too far away from bevel gear

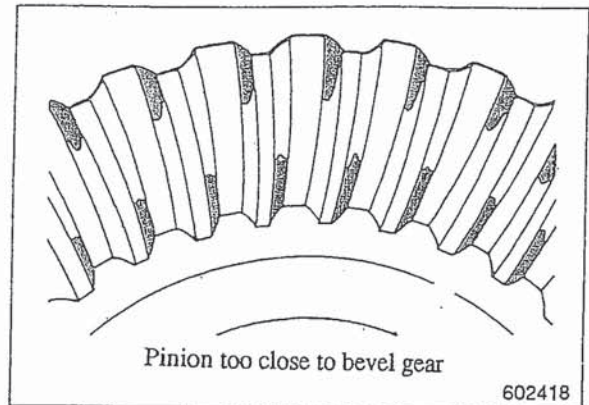
- (1) Contact extends toward the toe end of concave faces and toward the heel end of convex faces.
- (2) To correct this contact, decrease the thickness of shims F, and turn adjusting nuts C2 to move pinion G away from gear C8. Again brush red lead on the gear teeth, and check the contact pattern.



- Pinion too close to bevel gear
- (1) Contact extends toward the heel end of concave faces and toward the toe end of convex faces.
 - (2) To correct this contact, increase the thickness of shims F, and turn adjusting nuts C2 to move gear C8 toward pinion G. Recheck the contact pattern by brushing red lead.

NOTE

The foregoing tooth contact adjustments are meaningless unless the bevel gear and pinion backlash has been adjusted properly.



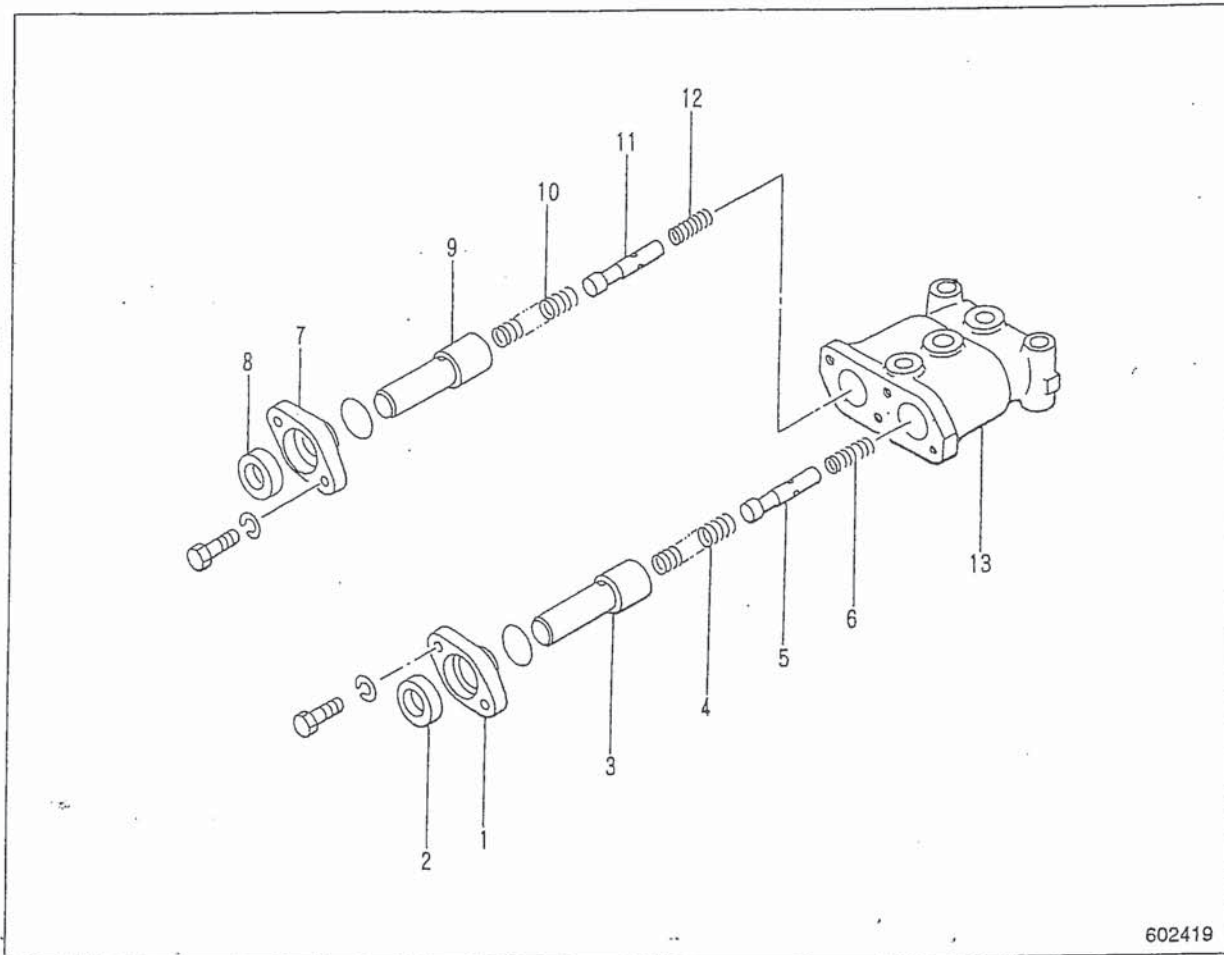
DISASSEMBLY AND REASSEMBLY

STEERING VALVE

Removal and installation

For removal and installation of the steering valve, refer to Removal, STEERING CLUTCHES AND BRAKES.

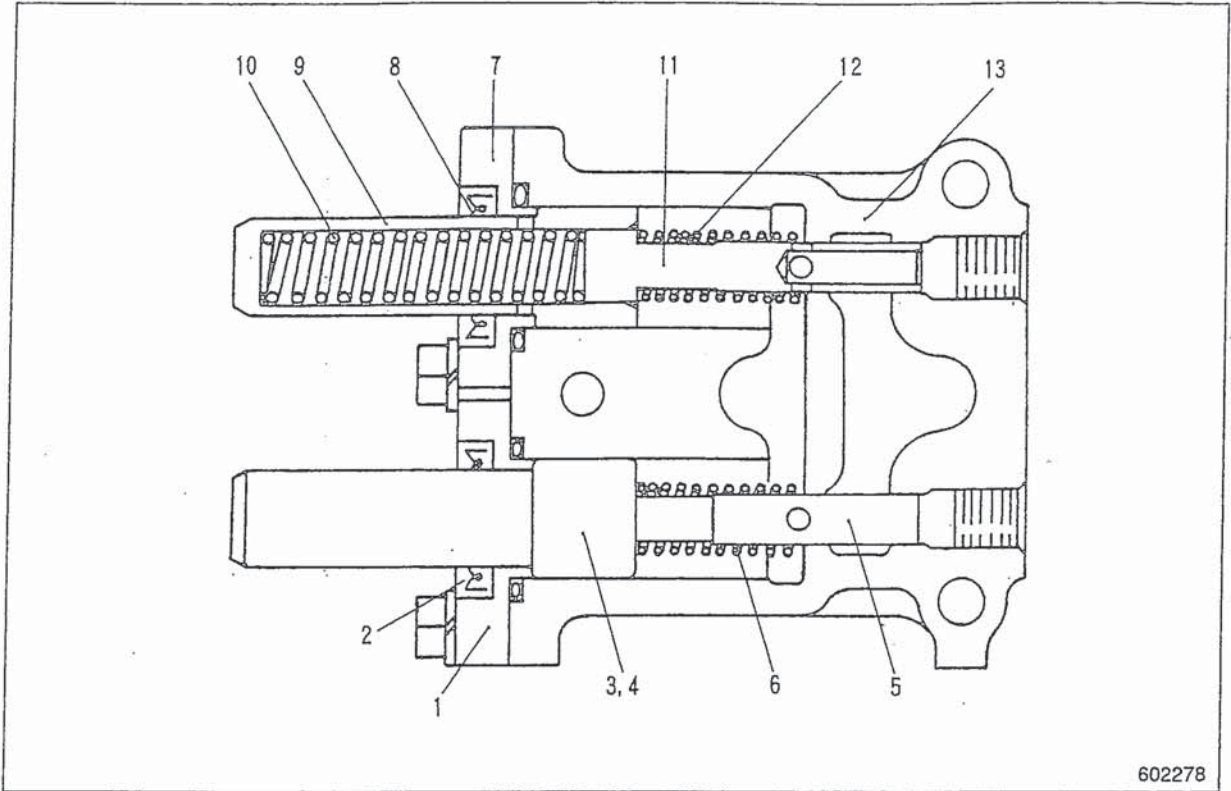
Disassembly



Disassembly sequence

- | | | |
|-----------------|-----------------|------------------|
| 1 Cover | 6 Return spring | 11 Plunger valve |
| 2 Oil seal | 7 Cover | 12 Return spring |
| 3 Piston | 8 Oil seal | 13 Valve housing |
| 4 Valve spring | 9 Piston | |
| 5 Plunger valve | 10 Valve spring | |

Reassembly



602278

Reassembly sequence

