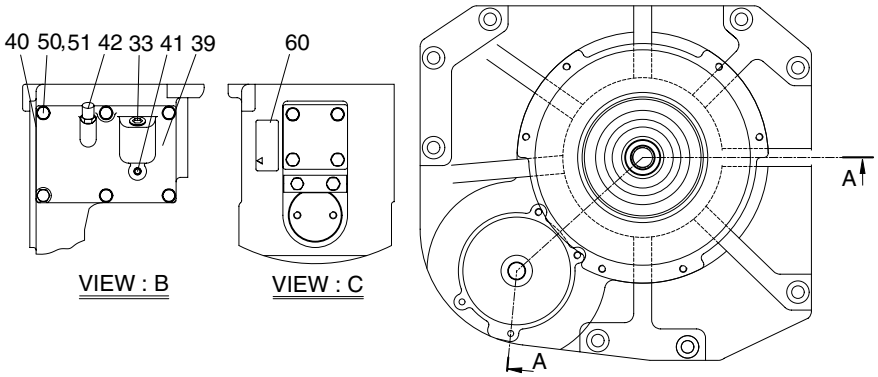
SECTION 3 POWER TRAIN SYSTEM

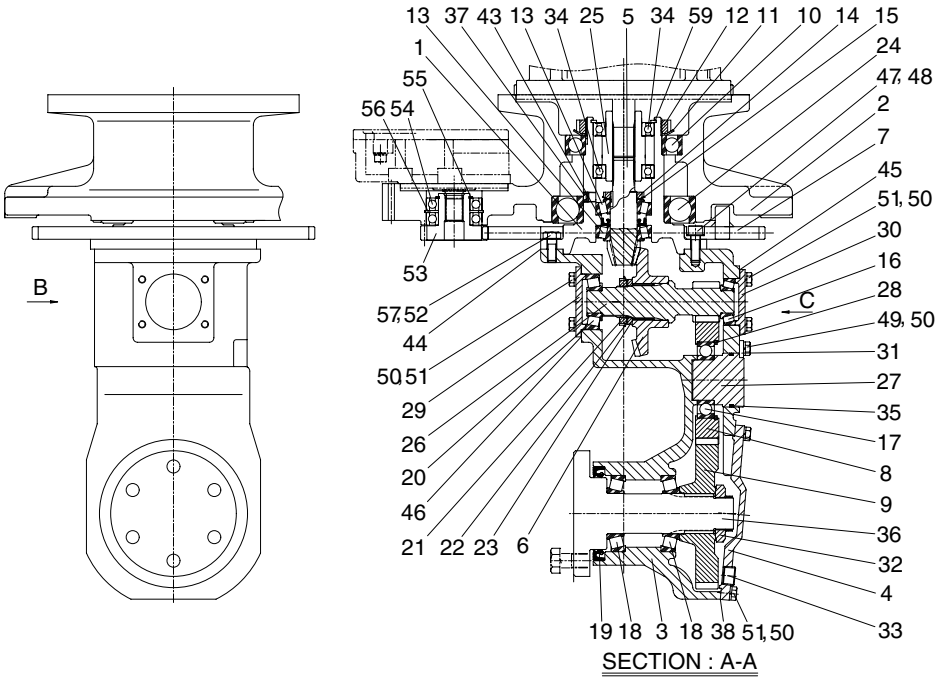
GROUP 1 STRUCTURE AND OPERATION

1. DRIVE AXLE UNIT

1) STRUCTURE

(1) Drive unit





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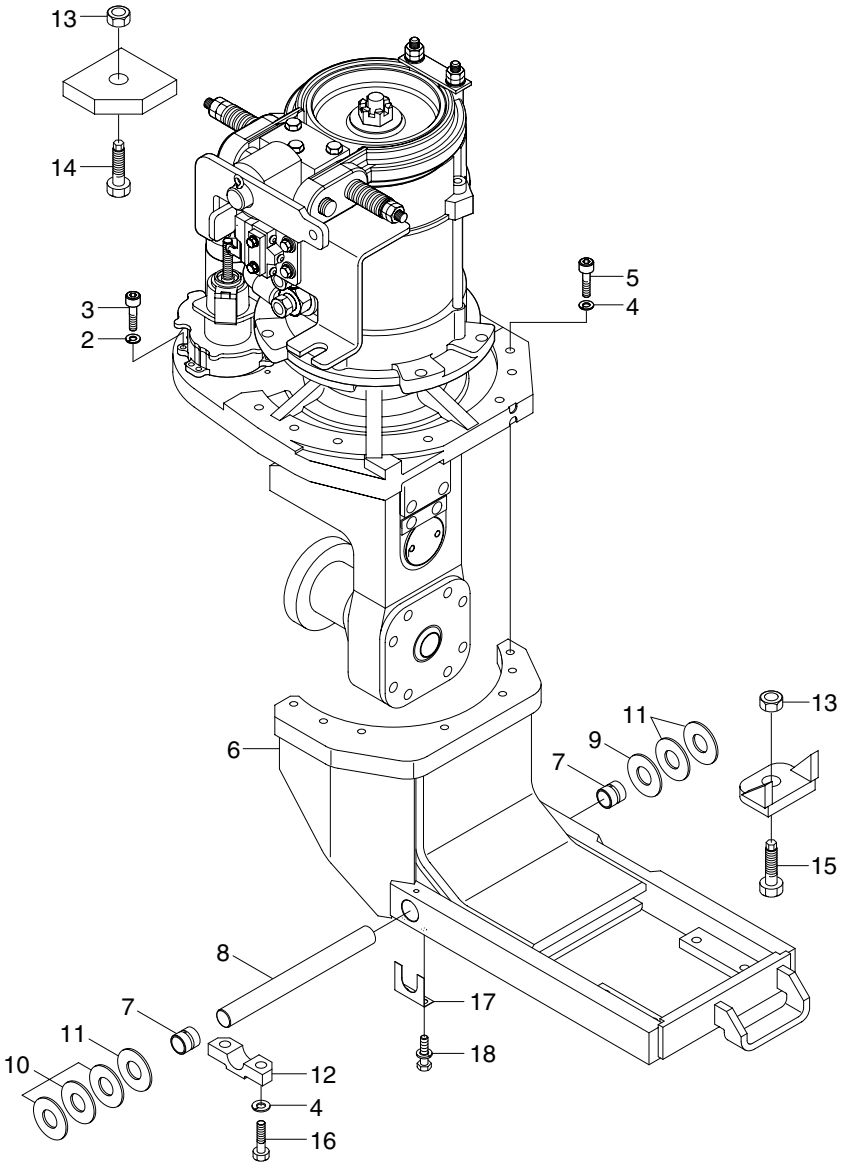
1	Gear case cover	16	Bearing	31	End plate	46	Shim
2	Bracket	17	Bearing	32	Drive shaft nut	47	Socket bolt
3	Gear box case	18	Bearing	33	Taper plug	48	Washer
4	Case cover	19	Oil seal	34	Bearing	49	Hexagon bolt
5	Spiral bevel pinion	20	Taper roller bearing	35	O-ring	50	Spring washer
6	Spiral bevel gear	21	Bearing lock nut	36	Drive wheel shaft	51	Hexagon bolt
7	Steering gear	22	Bearing lock washer	37	Taper plug	52	Hexagon bolt
8	Idle gear	23	Gear spacer	38	Gasket	53	Pinion gear
9	Gear	24	Bearing	39	Cover	54	Ball bearing
10	Bearing	25	Input sleeve	40	Gasket	55	Snap ring
11	Washer	26	Pinion shaft	41	Plug	56	Snap ring
12	Bearing lock nut	27	Idler gear shaft	42	Breather	57	Spring washer
13	Taper roller bearing	28	Snap ring	43	Oil seal	59	Snap ring
14	Bearing lock nut	29	End cover	44	Shim	60	Name plate
15	Bearing lock washer	30	End cover	45	Shim		

(2) Drive unit mounting



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2	Spring washer	8	Link pin	14	Special bolt
3	Socket bolt	9	Shim	15	Special bolt
4	Spring washer	10	Shim (1.0 t)	16	Hex bolt
5	Socket bolt	11	Shim (0.5 t)	17	Shim (0.5 t)
6	Undercarriage	12	Block	18	W/Washer bolt
7	Bronze bushing	13	Hex nut		

2. SPECIFICATION

Item	Unit	Specification
Gear ratio	-	20.125
Oil quantity	ℓ	1.6

GROUP 2 TROUBLESHOOTING

Problem	Probable cause	Remedy
Continuous metallic groan		
1) During acceleration	· Worn out gears.	- Adjust back-lash or replace gears.
	· Pinion and bevel gear meshed too deeply.	
2) During travelling at uniform speed	· Lack of gear oil.	- Refill
	· Worn out gears.	- Replace
	· Loose or worn out bearing.	- Adjust preload or replace.
	· Loose bevel gear wheel	- Replace bolts and washers. Tighten new bolts and washer.
3) When turning corners.	· Worn out differential gear or thrust washer.	- Replace
Continuous knocking sound		
1) During travelling at uniform speed	· Chipped gear teeth.	- Replace
	· Foreign matter in axle case.	- Clean
	· Worn out spline of drive shaft.	- Replace
Oil leakage		
1) Differential housing housing leaks.	· Oil level too high	- Lower oil level
	· Broken oil seal	- Replace
2) Axle case leaks	· Mounting bolts for housing loose.	- Retighten
	· Damaged packing case cracked.	- Replace
	· Worn out hub grease seal.	- Replace
3) Hub, leaks	· Worn out oil seal.	- Replace
	· Worn out bearing or eccentric rotation due to damage.	- Replace
Power is not transmitted		
1) Drive shaft, gear	· Broken or slipped out drive shaft.	- Repair or replace
	· Gear teeth stripped or worn out.	- Replace
	· broken differential case parts.	- Replace
Oil leakage on wheel shaft	· Radial shaft seal wrongly installed or damaged.	· Remove wheel shaft and install a new radial shaft seal.
	· Race on wheel shaft damaged.	· Remove wheel shaft. Check wheel shaft race for reusability; if possible, rework.
Oil leakage on housing cover	· Housing cover not sealed.	· Seal housing cover with LOCTITE No. 574.
	· Housing cover or housing plane face uneven.	· Touch up plane faces with oil rubber.
	· Bolts not tightened according to the specified tightening torque.	· Tighten bolts with the specified tightening torque.

Problem	Probable cause	Remedy
Oil leakage on oil filler or oil drain plug	· Dirt between sealing ring and housing. · Old sealing ring was used. · Bolts not tightened according to the specified tightening torque.	· Cleaning required. · Use new sealing ring · Tighten bolts with the specified tightening torque.
Oil leakage between hous-ing and top section	· Seal faces not sealed or uneven. · Burrs on cylinder pin. · Bolts not tightened according to the specified tightening torque.	· Apply LOCTITE 574 onto seal faces. Touch up seal faces with oil rubber. · Use a new cylinder pin. · Tighten bolts with the specified tightening torque.
Oil leakage on top section within helical gear stage / input	· Too much oil in transmission. · O-ring on cover defective. · Breather valve defective.	· Check oil level. · Install new O-ring. · Replace breather valve.
Beating noise at helical gear stage	· Teeth on input pinion and/or helical gear damaged by false installation.	· Check tooth flanks for damage and touch up damaged spots with oil rubber.
Ringing noise	· Helical gear stage running without oil.	· Check oil level. Refill oil.
Grinding noise	· Bearing preload or backlash not correctly adjusted.	· Checking and new adjustment.
Bearing damage on input pinion	· No axial play.	· Install new bearing and adjust axial play.
Pivoting bearing is difficult to rotate or backlash recog-nizable	· Cover disc loosened and dirt enter-ed into the bearing. · Cage segments are damaged. · Plastic deformation of balls or ball race. · Bearing not relubricated. · Grease not distributed.	· Replace pivoting bearing. · Replace pivoting bearing. · Replace pivoting bearing. · Relubricate pivoting bearing. · Rotate pivoting bearing several times by hand.

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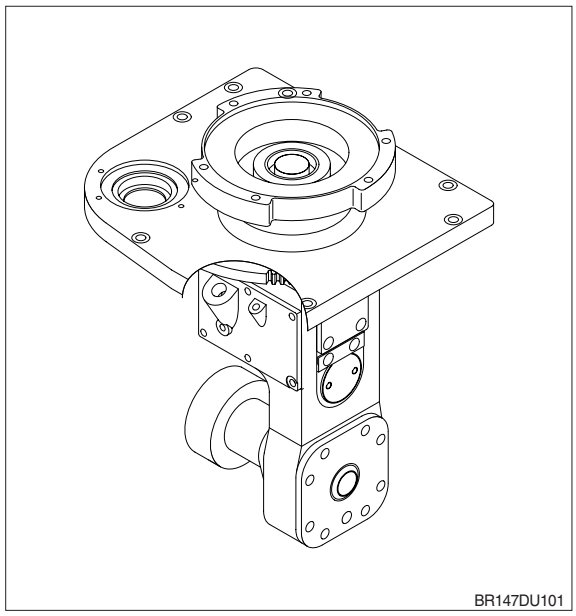
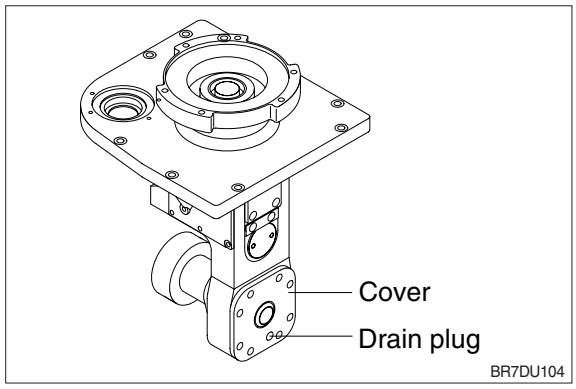
1) DISASSEMBLY

※ Before starting disassembly check the backlash and tooth contact for use as reference during assembly.

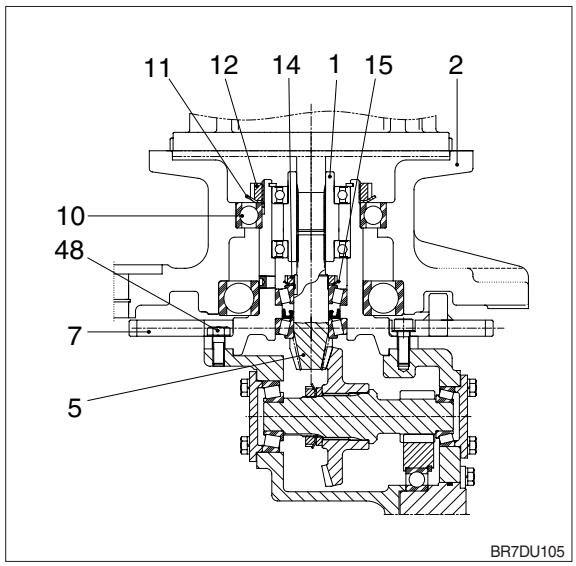
(1) Stabilize the drive unit assembly by using wooden block.



(2) Remove the plug and drain out the oil. Remove the gear case cover and drain out the oil.



(3) Loosen the lock nut and remove the lock nut (12) and washer (11).
(4) Remove drive unit bracket (2). Remove the outer race of bearing (10) and oil seal from bracket.
(5) Remove bolts (48) and remove the steering gear (7).
(6) Remove bolts (11 EA).
(7) Remove the cover (1) of gear case with spiral bevel pinion (5).
(8) Remove bearing nut (14) by straightening the locking part of the bearing washer (15), and remove the spiral bevel pinion (5) from the cover of gear case (1).



(9) Remove the end cover (29, 30).

(10) Remove the bearing (16, 20) installed on the side of spiral bevel gear (6) for pinion shaft (26).

Loose the nut for spiral bevel gear (6) by straightening the locking of the washer and remove the nut (21) and the washer (22).

When loosening the nut, lock the pinion shaft by puting capper for between the idle gear (8) and the pinion shaft (26).

※ After removing the idle gear (8) remove the pinion shaft (26) and spiral bevel gear (6).

(11) Support drive shaft (36) at drive wheel side not to rotate.

Remove the lock nut (32) of drive gear and pull out the drive shaft (36) to drive wheel side.

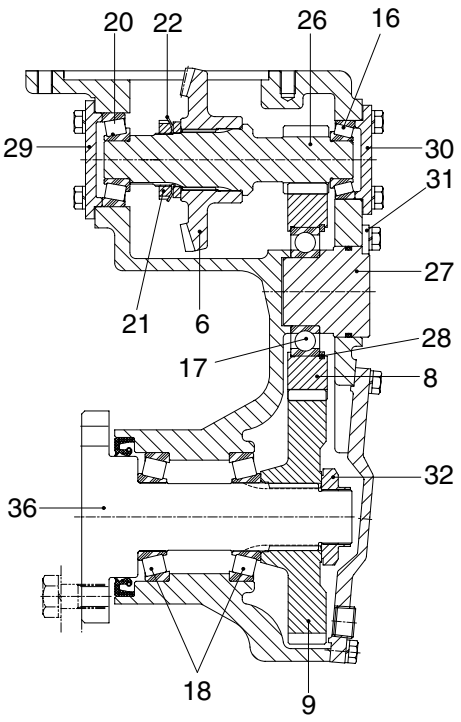
Remove the bearing (18) from drive shaft.

(12) Remove the locking plate (31) for idle gear shaft and remove idle gear shaft (27).

Pull out the idle gear from the side of drive gear (9).

(13) After removing the snap ring (28), remove the bearing (17) for idle gear.

(14) Pull out the pinion shaft (26) and the spiral bevel gear (6).



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2) INSPECTION

(1) Inspect the gear case for cracks, bearing insertion parts for injuries, oil seals for damage and for other defects. Replace if found defective.
Inspect for gear case cracks visually and by use of flaw penetrants.

(2) Inspect the drive unit bracket for cracks, bearing insertion parts for injuries, bushings for damage, and other defects. Replace if found defective.

(3) Inspect the gear case cover for cracks, bearing insertion parts for injuries and for other defects. Replace if found defective.

(4) Inspect the spring adjuster and spring bracket for damage and spring for deterioration.
Replace parts found defective.

(5) Inspect the tooth part and spline part of steering pinion for damage and the bearing for damage, and replace the parts found defective.

(6) Inspect the bearing and oil seal of steering part for damage, and replace the parts found defective.

(7) Inspect the steering gear for damage, and replace parts found defective.

(8) Inspect the spiral pinion shaft, counter gear shaft and idle gear shaft for tooth damage and shaft bend, and the bearings for damage. Replace the parts if found defective.

(9) Inspect the spiral bevel pinion shaft for tooth damage and shaft bend, and the bearing holder and bearing for damage. Also inspect spiral bevel gear for damage.
Replace the parts if found defective.

(10) Inspect the drive wheel shaft for cracks, splines for wear and damage, and the bearings for damage. Replace the parts found defective.

3) ASSEMBLY

(1) Assemble the oil seal to the cover of gear case, assemble the bearing to spiral bevel pinion shaft. Assemble the spiral bevel pinion shaft bearing, washer and nut to the cover of gear case, and screw on the locking nut.
Tighten the locking nut while measuring starting torque required to start the bevel pinion turning.
Bevel pinion starting torque. 2.7~3.0 kgf · cm (0.2~0.22 lbf · ft)

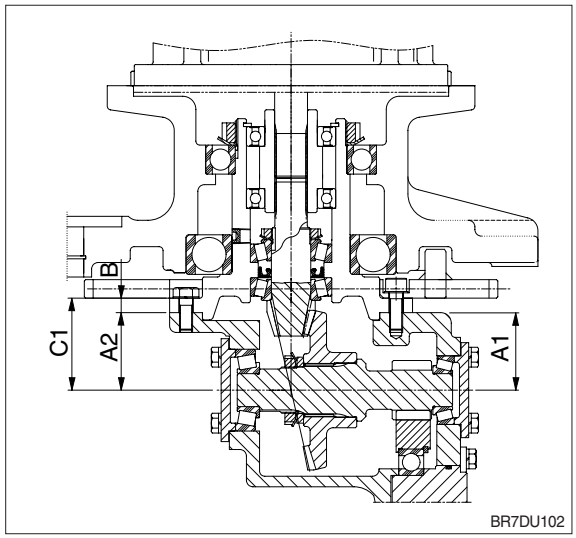
※ Apply loctite #271 white fastening lock nut (Item 12,14,21,32, Refer page 4-1).

(2) Assemble the drive wheel shaft to the gear case, assemble the spur gear from opposite side and screw on the locking nut. Tighten the locking nut while measuring starting torque required to start the spur gear turning. Spur gear starting torque. 23.6~26.3 kgf · cm (1.7~1.9 lbf · ft)

(3) Measure A1, A2 of the gear case and B of the gear case cover, and adjust C to be 69.00~69.10 by shim.

Shim thickness

3329022000 ·····	0.10 mm
3329022100 ·····	0.20 mm
3329022200 ·····	0.30 mm
3329022300 ·····	0.50 mm



(4) On the adjusting the tooth contact of spiral bevel gear, if changing the shim, idle of decrease the shim inserting between the cover of shaft both side and the gear case shim thickness.

Idle gear side		Drive tire side	
No.	Shim thickness	No.	Shim thickness
3329024400	0.10 mm	3329024000	0.10 mm
3329024500	0.20 mm	3329024100	0.20 mm
3329024600	0.30 mm	3329024200	0.30 mm
3329024700	0.50 mm	3329024300	0.50 mm

(5) Adjust the backlash between spiral bevel pinion and bevel gear.
Mount the dial gauge on gear case and read the backlash while rotating the drive wheel shaft.
Backlash 0.15~0.20 mm
If the backlash is not within the specified range, readjust the bevel gear shims. Increase the shim thickness if the backlash is too large, and decrease if too small.

(6) Check the contact between the drive pinion and bevel gear tooth.
Clean the gear tooth and apply red lead of the surfaces of 8 or 9 bevel gear tooth.
Turn the bevel gear in both forward and reverse directions and determine by the patterns made on the tooth face whether the tooth is contacting properly.

4) INSTALLATION

Perform the removal in reverse order.

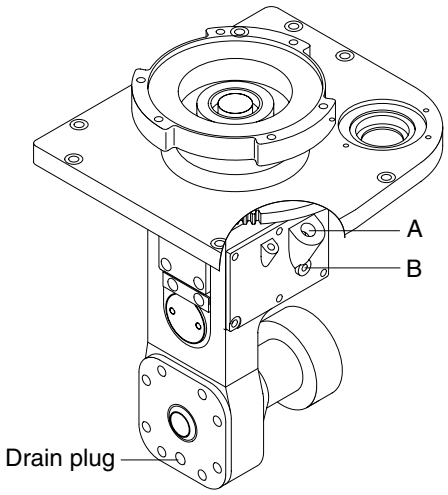
5) LUBRICATION PROCEDURES

Lubrication of drive unit gear case is performed as follows :

※ **Cover the brakes and drive motor with waste to prevent the gear oil from splashing on these parts.**

(1) Fill in oil through the filler hole A.

(2) After operating the vehicle for several hours, remove plug B and check the oil level. Replenish it now.



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