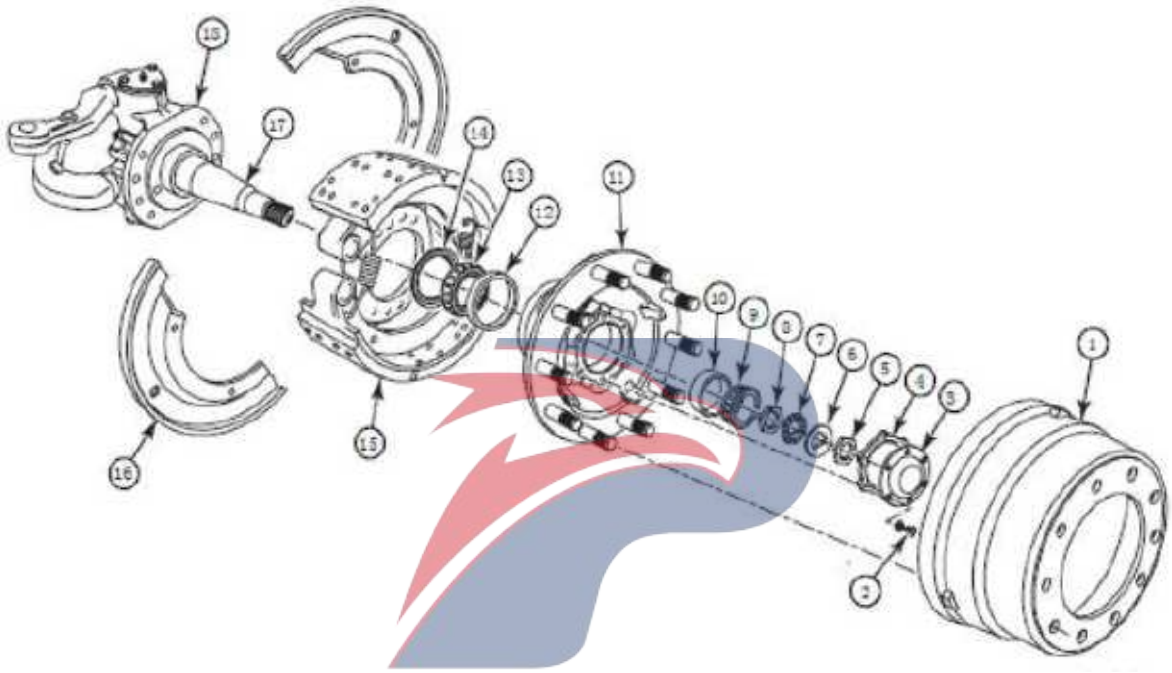
Meritor

Exploded view-wheel end

Figure 1 Conventional wheel end – MFS-series non-drive steering front axle with QP drum brake

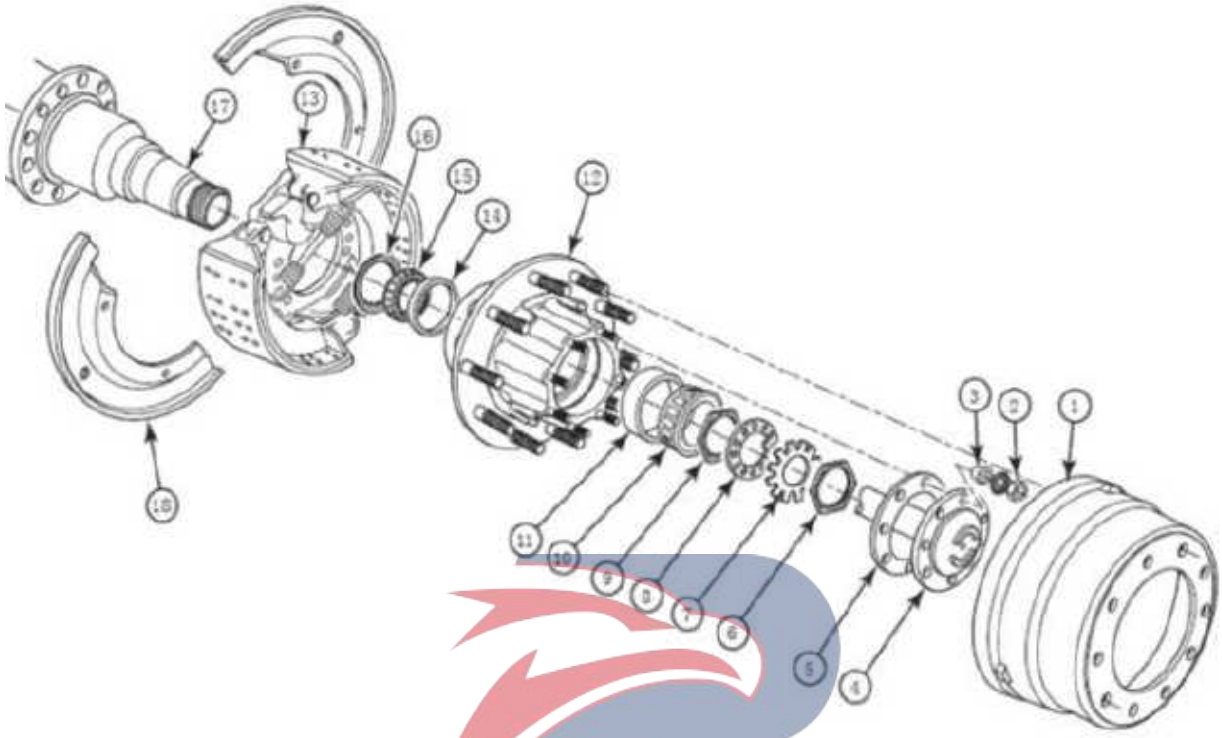
Apply to front axle MFS45122, MFS66122MFS73122, MFS73149 and MFS90133



Item	Name	Item	Name
1	Brake drum	10	Outer ring of hub outer bearing
2	Bolt and flat washer	11	Wheel hub
3	Wheel hub cover	12	Inner ring of hub outer bearing
4	Seal gasket	13	Hub inner bearing
5	Hub bearing lock	14	Oil seal
6	D-type lock washer	15	QPlus™ drum brake assembly
7	D-type lock ring	16	Dust cover
8	Hub bearing adjusting nut.	17	Knuckle spindle head
9	Outer wheel hub bearing	18	Steering knuckle

Figure 2 Conventional wheel ends - MS, MC, MD, MP and MR series rear drive axle with QP or Q series drum brake

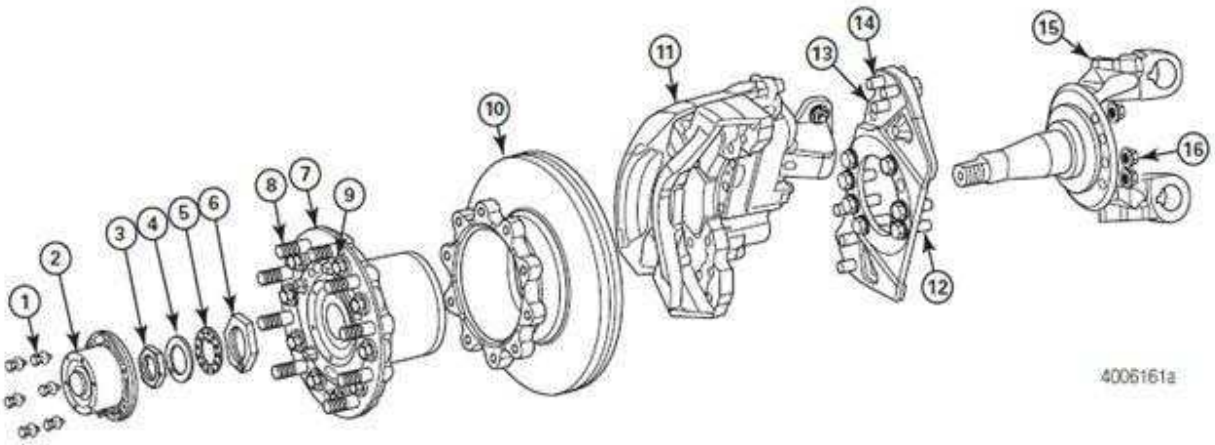
Apply to axle MS13176, MC13176, MS13166, MC13166, MD13166,



Item	Name	Item	Name
1	Brake drum	10	Outer wheel hub bearing
2	Nut and flat washer	11	Outer ring of hub outer bearing
3	Taper sleeve	12	Wheel hub
4	Half shaft	13	QPlus or Q drum brake assembly
5	Seal gasket	14	Inner ring of hub outer bearing
6	Hub bearing lock nut	15	Hub inner bearing
7	Lock washer	16	Oil seal
8	Clamping ring	17	Spindle head
9	Hub bearing adjusting nut	18	Dust cover

Figure 3 Conventional wheel ends – MFS-series non-drive steering front axle with ELSA / EX disc brake

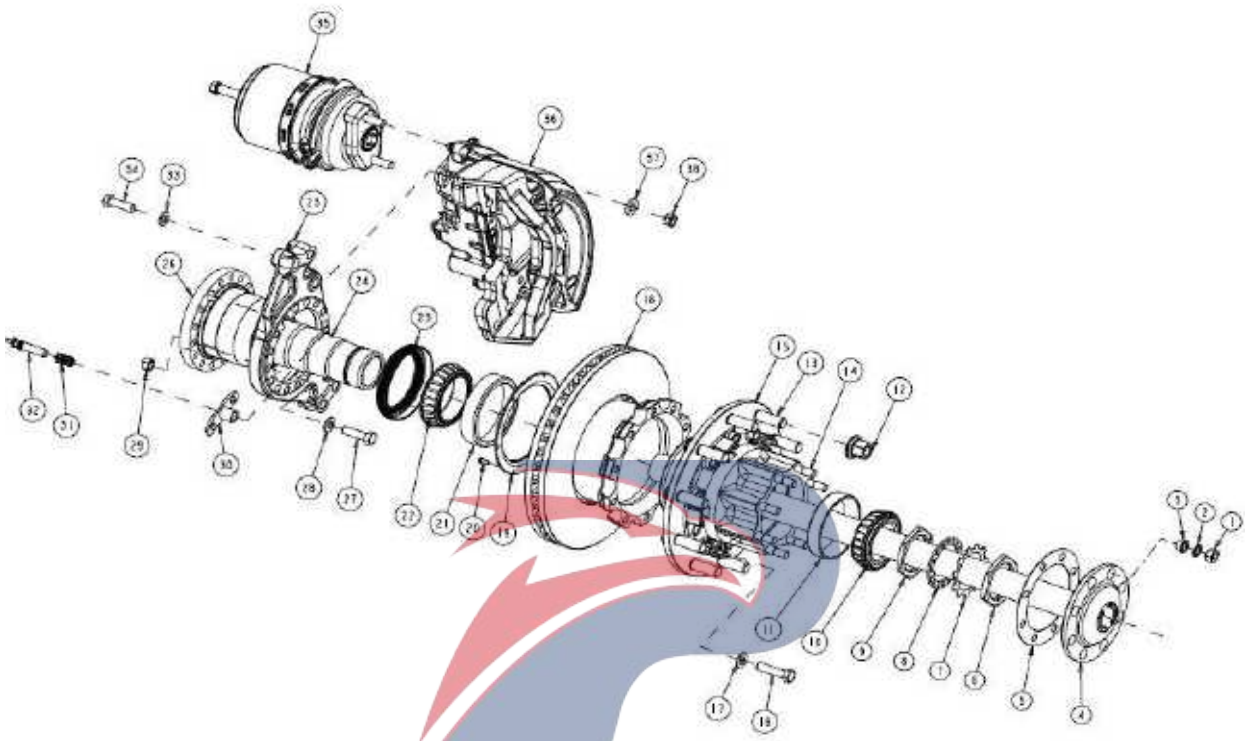
Apply to front axle MFS45122, MFS66122, MFS73122, MFS73149, MFS90133



Item	Name	Item	Name
1	Bolt	9	Brake disc - hub bolt
2	Wheel hub cover	10	Brake disc
3	Outer nut	11	Brake
4	Lock washer	12	Torque disc - knuckle bolt
5	Snap ring	13	Torque gauge
6	Inner nut	14	Torque disc - brake bolt
7	Conventional hub	15	Steering knuckle
8	Wheel bolt	16	Nut

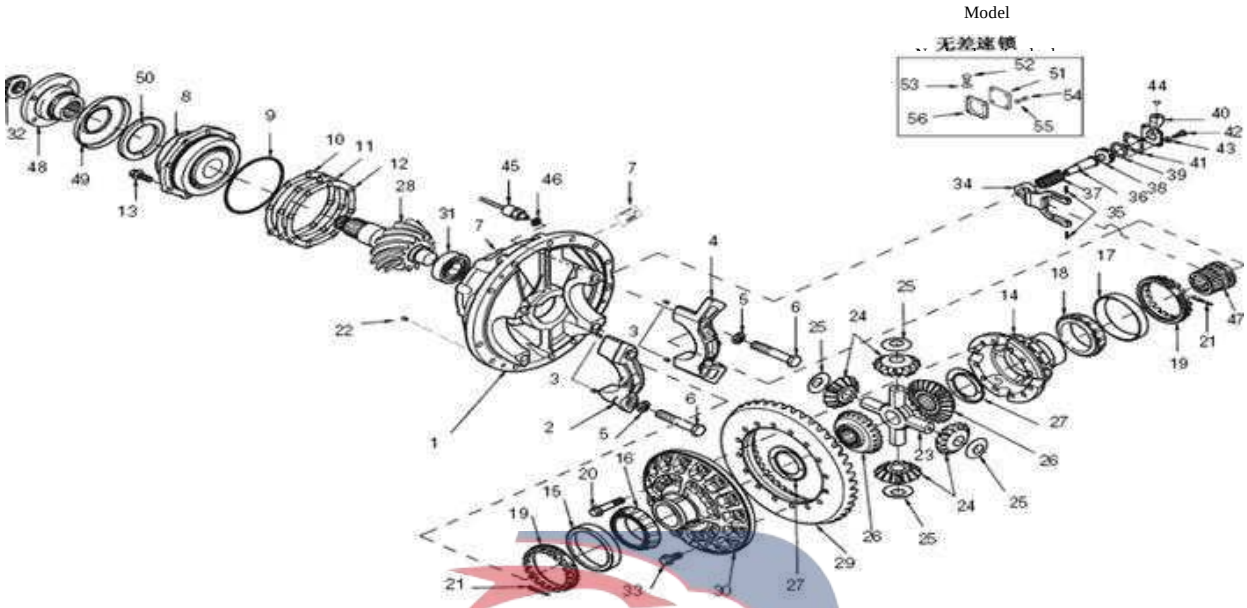
Figure 4 Conventional wheel ends- MS, MC, MD, MP, and MR series rear drive axle with ELSA / EX disc brake

Apply to axle MS13176,MC13176,MS13166,MC13166,MR13166



Item	Name	Item	Name
1	Nut	20	Bolt
2	Serrated lock washer	21	Hub inner bearing
3	Taper sleeve	22	Inner ring of hub outer bearing
4	Half shaft	23	Hub oil seal
5	Seal gasket	24	Axle head (belonging to axle housing assembly)
6	Hub bearing lock nut	25	Torque gauge
7	Lock washer	26	Flange (belonging to axle housing assembly)
8	Clamping ring	27	Hexagon bolt
9	Hub bearing adjusting nut	28	Plain washer
10	Outer wheel hub bearing	29	NUT, HEXAGON
11	Outer ring of hub outer bearing	30	Bracket
12	Wheel nut	31	Sensor cover
13	Wheel bolt	32	ABS sensor
14	Half shaft bolt	33	Plain washer
15	Wheel hub	34	NUT, HEXAGON
16	Hexagon bolt	35	Brake air chamber
17	Plain washer	36	Disc brake
18	Brake disc	37	Plain washer
19	ABS gear ring	38	Self-locking nut

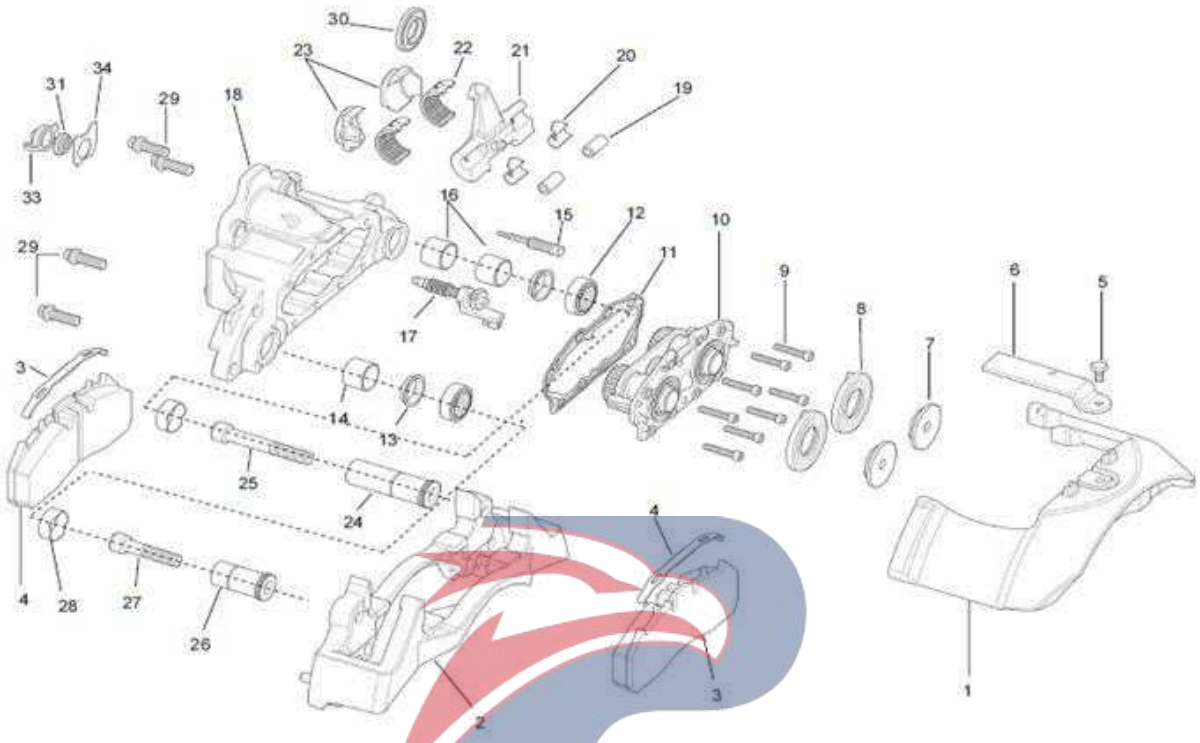
Exploded view- Figure 5177 standard single-step final drive



No.	Part name	No.	Part name	No.	Part name
1	Main reatrder housing	20	Bolt - differential case	39	"O" ring of piston
2	Differential bearing cap, left	21	Lock pin	40	Cylinder cover
3	Positioning pin	22	Screw plug	41	Cylinder head gasket
4	Differential bearing cap, right	23	Cross shaft	42	Bolt - cylinder cover
5	Gasket - differential bearing cap	24	Planetary gears - differential	43	washer
6	Bolt - differential bearing cap	25	Washer - planetary gear	44	Screw plug
7	Nameplate	26	Half axle gear - differential	45	HO2S
8	Drive bevel gear bearing pedestal	27	Gasket - axle shaft gear	46	Locknut - sensor switch
9	“O” ring (bearing pedestal)	28	Drive bevel gear	47	Sliding sleeve
10	Adjusting shim - Active bevel gear bearing seat	29	Driven bevel gear	48	Face tooth flange
11	Adjusting shim - Active bevel gear bearing seat	30	Left shell - differential	49	Dust cover
12	Adjusting shim - Active bevel gear bearing seat	31	Guide bearing - driving bevel gear	50	Oil seal- drive bevel gear
13	Bolt - drive bevel gear bearing pedestal	32	Nut- drive bevel gear		Model of final drive without differential lock
14	Right shell - differential	33	Bolt - driven bevel gear	51	END COVER
15	Outer ring - differential bearing, left	34	Shifting fork	52	Sensor hole stopper
16	Inner ring and roller assembly - differential bearing, left	35	Plug pin	53	washer
17	Outer ring - differential bearing, right	36	Shift shaft	54	Bolt
18	Inner ring and roller assembly - differential bearing, right	37	Spring/	55	washer
19	Adjusting ring	38	Piston	56	End cap gasket

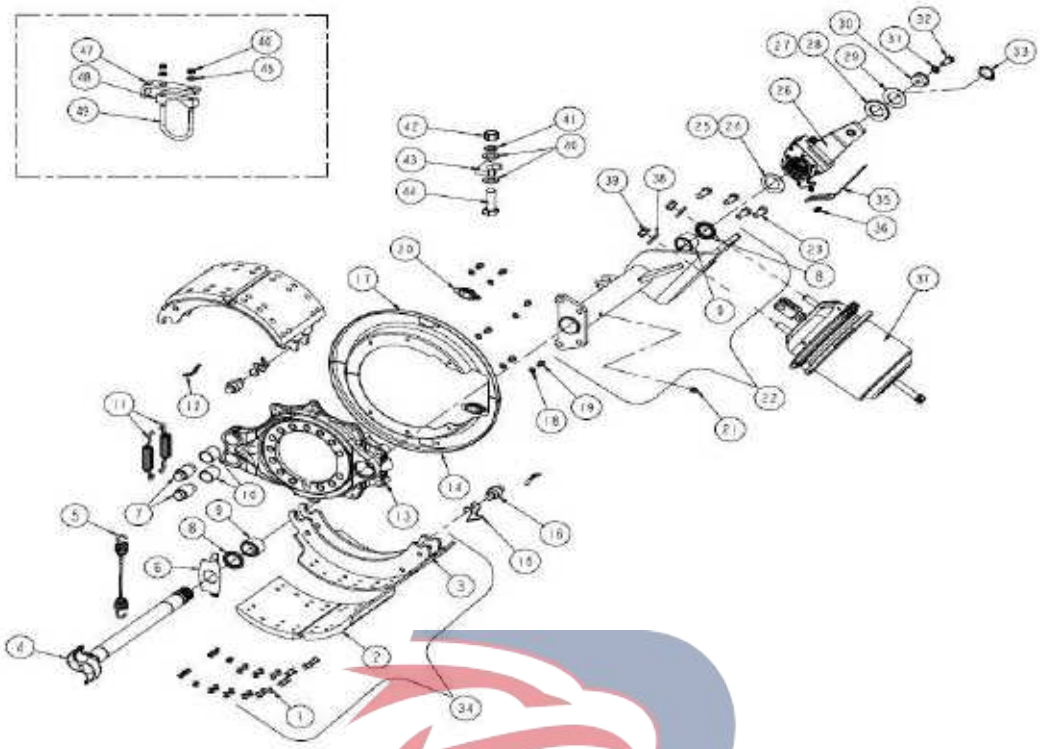
Exploded view- brake

Figure 6 Exploded view of axial brake



No.	Part name	No.	Part name	No.	Part name
1	Bolt (short guide pillar)	11		21	
2	Dust cover (manual regulator)	12		22	Bracket
3	Bolt (long guide pillar)	13	Guide pillar - short	23	Friction lining
4	Guide pillar -long	14		24	Friction plate spring
5	Auxiliary plier bolt (4 PCS)	15		25	Guide pillar bushing - round
6	Brake caliper body assembly	16		26	Dust cover bezel of guide pillar (belonging to brake caliper body assembly)
7	Dust cover of guide pillar	17	Visual wear indicator (where applicable)	27	Piston dust cover (belonging to brake caliper body assembly)
8	Friction plate fixing plate	18	Auxiliary pliers	28	Piston cap (belonging to brake caliper body assembly)
9	Bolt (friction plate fixing plate)	19		29	Guide pillar bushing (belonging to brake caliper body assembly)
10	PWWI (Friction plate wear warning indicator) (timely)	20			

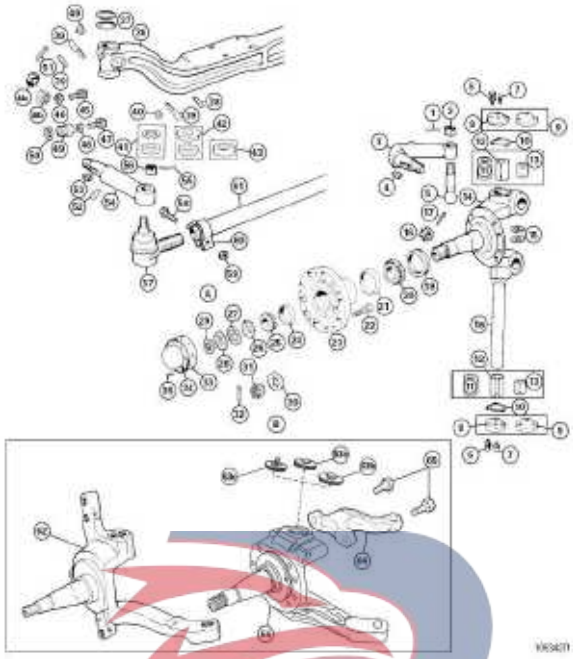
Figure 7Q-410 brake



No.	Part name	No.	Part name	No.	Part name
1	Rivet	18	Lock washer	35	Bracket
2	Friction lining	19	Bolt	36	Nut
3	Brake assembly	20	Clogging	37	Brake air chamber
4	Brake camshaft	21	Grease nipple	38	Washer
5	Return spring	22	Air chamber bracket assembly	39	Nut
6	Washer	23	Bolt	40	Washer
7	Backing pin	24	Plain washer(optional)	41	Washer
8	Oil seal	25	Plain washer(optional)	42	Nut
9	Bushing - camshaft hole	26	Self-aligning arm assembly	43	Bracket
10	Bushing - dupport pin	27	Plain washer(optional)	44	Bolt
11	Hold spring	28	Plain washer(optional)	45	Washer
12	Return spring pin	29	Plain washer(optional)	46	Nut
13	Brake back plate	30	Space ring with steps	47	Bracket
14	Dust cover	31	Gasket 12	48	PLATE
15	Roller holder	32	Bolt M12*1.25*35	49	U-bolt
16	Roller column	33	Snap ring	50	
17	Dust cover	34	Brake with friction plate assembly		

Exploded view - front axle

Figure 8 front axle with conventional wheel end



S/N	Description	S/N	Description	S/N	Description	S/N	Description
A	Double nuts	18	Master pin	37	Gasket	55	Crankpin
B	Single nut	19	Hub grease seal	38	Conical positioning key	56	Tie rod arm to tie rod ball slotted nut
1	Crankpin	20	Bearing inner ring of inner wheel	39	Lock pin	57	Horizontal pull rod ball head
2	Longitudinal tie to the steering arm slotted nut	21	Bearing outer ring of inner wheel	40	Locking pin nut	58	Tightening screw
3	Steering arm	22	Stud	41	Thrust bearing and plain bearing seal	59	Fixture lock nut
4	Key	23	Wheel hub	42	Thrust bearing and cover bearing seal	60	Tie rod fixture
5	Ball head bolt	24	Bearing outer ring of outer wheel	43	One-piece thrust bearing and oil seal	61	Tie rod body
6	Cap screw and washer	25	Bearing inner ring of outer wheel	44a	Steering arm to knuckle slotted nut		
7	Grease nozzle	26	Adjusting nut	44a	Steering arm to knuckle slotted nut with reinforcement base		
8	Grease lubrication knuckle cover	27	Lock ring with hole	45	3/4 inch stop bolt		
9	Seal knuckle cover	28	Locking washer	46	3/4 inch lock nut		
10	Gasket	29	Hub bearing nut	47	1/2 inch stop bolt		
11	EasySteer™ king pin bushing	30	D-type gasket	48	1/2 inch lock nut		
12	Bronze kingpin bushing	31	Adjusting nut	49	3/4 inch adapter		
13	Nylon kingpin bushing	32	Crankpin	50	washer		
14	Steering knuckle	33	Gasket	51	Crankpin		
15	Kingpin bushing seal	34	Hubcap	52	Square key		
16	Tie rod arm to knuckle slotted nut	35	Cap screw and washer	53	Woodruff key		
17	Crankpin	36	Front axle	54	Knuckle tie rod arm		

Product Description Section I Wheel End

1 Introduction

Danger warning

Read and follow every danger warning of "Warning" and "Caution" in this publication.Such information can help prevent serious personal injury or damage to components.

Warning:

When carrying out vehicle maintenance or service, you should always wear eye protection to prevent serious eye damage.

Vehicles shall be parked on a level road. A wedge shall be put below the tire to prevent the vehicle from moving. Support the vehicle with a safety gantry.Do not operate under vehicles jacked only, because the sliping and tipping of jacks can cause serious personal injury and damage to components.

Technical documents

Other references are required when servicing and maintaining the wheel ends according to the procedures described in this manual. Please see the files in the table. Please refer to "Maintenance Precautions" on the inside cover page of this manual if required.

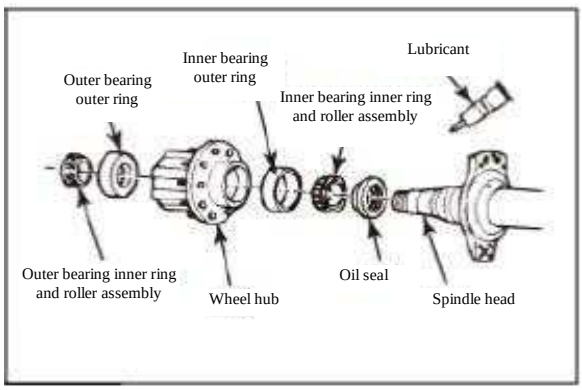
Other references

No.	File name
MM1	Preventive Maintenance and Lubrication
MM2	Non-driven Steering Front Axle
MM5A	Single-step Final Drive
MM0140	177 Single-step Final Drive Series
MM23	Front Axle of Bus
Pneumatic type ABS	
MM-0112	E-class ABS of Truck, Motor Tractor and Bus
MM30	D-class ABS of Truck, Motor Tractor and Bus

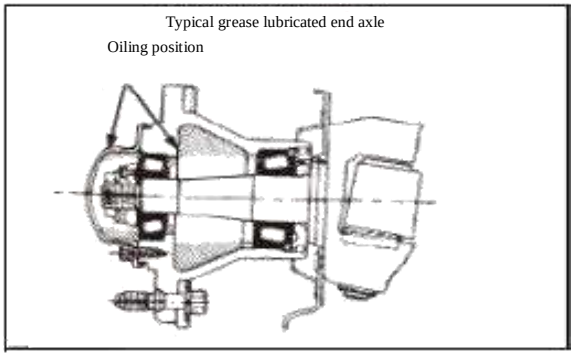
Description

Conventional wheel end assembly

The instructions and procedures contained in this Maintenance Manual apply to the wheel end assemblies of Meritor non-drive steering front axle, support axle and rear drive axle.

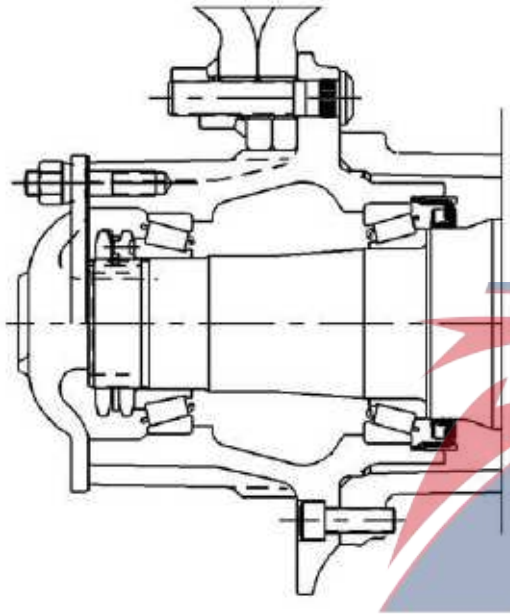


In conventional wheel ends, hubs, oil seals, lubricants and bearings are separate parts mounted on the axle head, as shown in the diagram. Bearings and oil seals need to be regularly inspected and lubricated to ensure their performance.



Non-driving front axle wheel end bearings and related components shall be lubricated with grease or oil. Grease lubrication is shown in the diagram.

Gear to be lubricated with oil shall be provided with a dedicated hub end cap with oil filler and level line and oil seal.

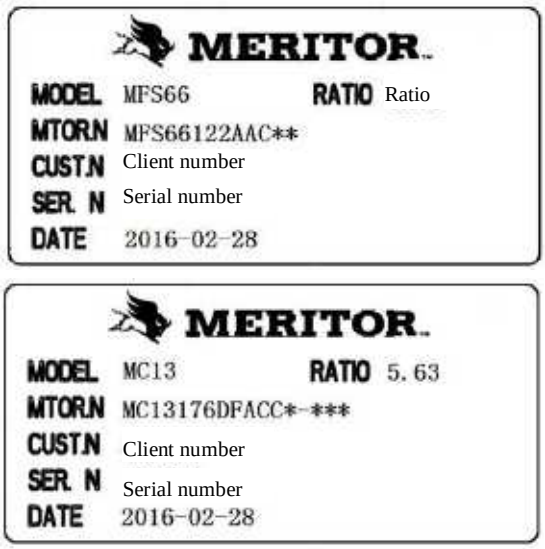


Rear drive axle wheel end bearings and the relevant components shall be lubricated with gear oil. Lubricants for such components mainly flow out from the final drive or axle housing, and then flow to the hub and wheel end bearings, and then flow back to the final drive or axle housing. As shown in the figure.

To confirm the model, see the nameplate in the middle of the front axle. Please use the complete model codes to order parts.

Mark

Front axle and rear axle wheel end



Information on the models, customer numbers, serial numbers and speed ratios, etc. of the non-driven steering front axles and rear drive axles of Meritor can be found on the nameplate of the axle as shown in the diagram.

Front axle nameplate is usually fixed in front middle of the front axle, and the rear axle nameplate is usually pasted on the axle housing, next to the final drive.

2 Removal

Danger warning

Read and follow every danger warning of "Warning" and "Caution" in this publication.Such information can help prevent serious personal injury or damage to components.

Warning:

When carrying out vehicle maintenance or service, you should always wear eye protection to prevent serious eye damage.

Vehicles should be parked on a level surface.Put a wedge under the tire to prevent the vehicle from moving. Support the vehicle with a safety gantry.Do not operate under vehicles jacked only, because the sliping and tipping of jacks can cause serious personal injury and damage to components.

Empty the air suspension system before lifting the vehicle or removing parts. Compressed air may cause serious personal injury.

When filling and deflating air springs, make sure that all personnel are away from the vehicle. There are many parts on the air suspension system easy to clamp hand that can cause serious personal injury.

Short hammers made of copper or synthetic material shall be used during assembly and disassembly. Do not use steel hammer to directly beat the steel parts. Peeling parts may cause serious personal injury and damage to parts.

Removal

Conventional wheel end—MFS-series non-drive steering front axle with QP drum brake or ELSA/EX disc brake

Note: It is not necessary to remove the brake and dust cover when inspecting the wheel end assembly.

1 Park the vehicle on a level road. Place a wedge below the wheel to prevent the vehicle from moving. Pull up the handbrake.

2 Raise the front of the vehicle until the front wheel off the ground and support the body with a safety gantry.

3 Remove the wheel assembly.

4 Remove the brake drum.

5 Remove the four bolts that connect the hub cap to the hub. Remove the hub cap and gasket.

6 Remove the fasteners of hub bearing.

A. Straighten the D-lock washer from the bearing lock nut.

B. Remove the bearing lock nut, the D-lock washer, the D lock ring with hole and the bearing adjustment nut from the axle head.

7 Shake the hub carefully left and right to loosen the outer bearing and remove it. Then remove the hub assembly.

8 Use special tools of oil seal to remove the oil seal of inner bearing from the hub and discard it.

9 Remove the inner bearing.

10 Check whether the bearings, inner and outer rings and axle heads are damaged.

Note: If the wheel end components wear or damage must be replaced completely.

11 If damage is found on the inner or outer ring, use a copper hammer to knock out the inner ring and the outer ring and then discard them.

12 Use a suitable cleaning agent to clean away the old lubricant from each part.

Conventional wheel end—MS, MC, MD, MP and MR series rear drive axle with QP or Q drum brake or ELSA/EX disc brake

1 Park the vehicle on level ground. Put wedges under wheels to prevent the vehicle from moving. Pull up the handbrake.

2 Raise the vehicle until the rear wheel off the ground. Use the safety frame to support the bodywork.

3 Remove the tire and wheel assembly.

4 Shrink the spring chamber and release the parking brake.

5 Remove the brake drum.

6 Remove all half-axle nuts and serrated lock washers.

7 Tap the half-axle flange to release the conical sleeve.

8 Remove the tapered sleeve, half-axle and gasket.

9 Remove the fasteners of hub bearing.

A Straighten the lock catch of the lock washer securing the bearing lock nut.

B Remove the bearing lock nut.

C Remove the lock washer, lock ring and bearing adjustment nut from the axle head.

10 Carefully shake the hub left and right so that the outer bearing is loose. Remove the outer bearing and hub.

11 Use a special tool of oil seal to remove the oil seal of inner bearing from the hub and discard it.

12 Remove the inner bearing.

13 Check whether the bearings, inner and outer rings and axle heads are damaged.

Note: If the wheel end components wear or damage must be replaced completely.

14 If damage is found on the inner or outer ring, use a copper hammer to knock out the inner ring and the outer ring and then discard them.

15 Use a suitable cleaning agent to clean away the old lubricant from each part.

3 Preparation of parts before assembly

Danger warning

Read and follow every danger warning of "Warning" and "Caution" in this publication, which is conducive to prevent serious personal injury or damage to parts.

Warning:

When carrying out vehicle maintenance or service, always wear goggles to avoid damage to eyes.

Replace damaged or non-compliant axle components. Without permission, the axle components shall not be straightened, or repaired and restored by welding and heat treatment. The strength of the axle after straightening will be reduced, which will in turn affect the operation of the vehicle and will void the warranty of Meritor, as well as causing serious injury and damage to parts.

Replacement

Worn or damaged parts

Do not repair or restore the wheel end components. Replace the damaged, worn, or non-compliant components. Do not polish or process any component.

Warning:

Solvent cleaners are flammable, toxic and can cause fire. Typical solvent cleaners are carbon tetrachloride, emulsion and petroleum base. Before using solvent cleaners, carefully read the manufacturer's instructions and strictly observe it. At the same time the following steps shall be followed:

● Wear safety goggles;

● Wear protective clothing to protect the skin;

● Work in a well-ventilated environment.

● Do not use gasoline or gasoline-containing solvents as gasoline may explode.

●Use hot solution tanks and various alkaline solutions correctly. Carefully read the manufacturer's instructions and strictly observe it before use.

Caution

Do not use hot solution tank, water and various alkaline solution to clean the ground or polished parts, or it will damage the parts.

Cleaning, drying and inspection of parts

Ground or polished parts

Clean the floor or polish the part and its surface with cleaning solvent such as kerosene or diesel. Do not use gasoline.

Preparation of parts

1. Do not clean the ground or polished parts in hot solution tank, or with water, steam or alkaline solution. These solutions can cause parts to corrode.

2. Thoroughly clean the hub cavity by spraying the degreaser until there is no any metallic scum or dirt in the cavity.

3. Remove grease from the wheel end with hard brushes and kerosene or diesel (not with wire brushes and gasoline) and then wipe it dry. As the residual solvents will either dilute the grease or lubricating oil or interfere with the good adhesion of the lubricant to the wheel end components, it must be wiped dry.

4. Clean and inspect hub bearings, inner and outer rings, journals, and hubs. Bearings shall be cleaned with suitable non-flammable solvents

Note: If you want to use compressed air to dry, be careful not to rotate the bearing for fear that the roller will be scratched due to lack of lubrication. Make sure that there is no water in the air pipe.

Non-precision parts

Non-precision parts can be cleaned either with ground or polished parts, or with weak alkaline solutions in hot solution tank. Parts must be immersed in a hot solution tank before being thoroughly cleaned and heated.

Dry the cleaned parts

After cleaning, dry the parts with clean paper, cloth or compressed air immediately.

Anti-corrosion of parts after cleaning

Apply a thin layer of lubricant to parts that have been cleaned and dried and undamaged and need to be assembled immediately. However, it can not be applied to friction plates or brake drums.

Apply grease with good corrosion resistance to all surfaces of parts are to be stored. However, it cannot be applied to friction plates or brake drums. Parts shall be wrapped in special paper or other corrosion-resistant materials for preservation.

Note: the mating surface of all tapered joints shall be clean without lubricant or preservative.

Inspection

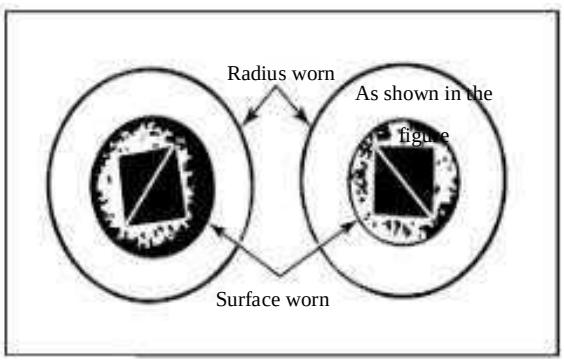
Wheel end parts

1 After removing and cleaning the wheel end parts, check whether the journal of the axle head, hub and hub bearings are worn and damaged. Note: either the hub bearing or the inner and outer rings are damaged, both of them must be replaced at the same time.

2 Check whether the following problems are found on the bearing outer ring, inner ring, roller and bearing retainer:

- Retainers or rollers are cracked or ripped;
- Roller or inner and outer rings are pitted or peeled off;
- Bearing is overheated;
- Roller or inner and outer ring is scratched;
- Key surface is worn or corroded;

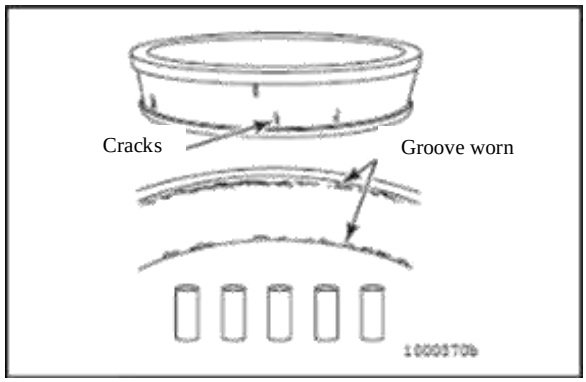
The bearings must be replaced if any of the following conditions occur. As shown in the figure.



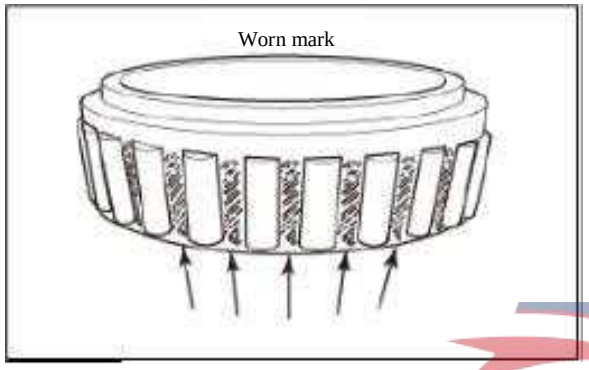
●The larger end of the diameter of the roller is worn, the outer ring is flush with the center or in the central plane

●The arc at the larger end of diameter of the roller is ground into a sharp edge. As shown in the figure.

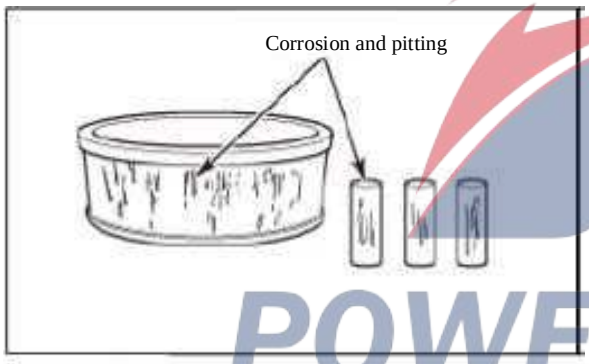
●There is an obvious groove worn by the roller on the surface of the bearing outer ring or inner ring. This groove can be seen from either the small end or the large end of the diameter on both parts.



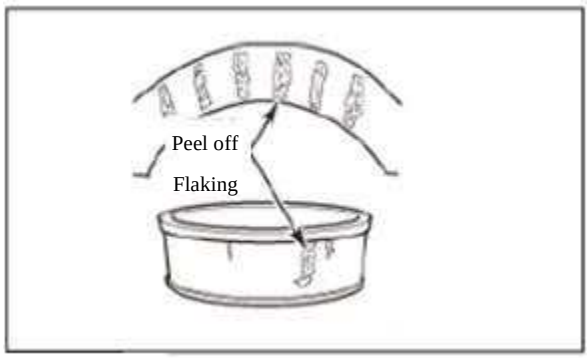
●There are deep cracks or rips on the surface of bearing outer ring, inner ring or roller. As shown in the figure.



●There are abvious worn marks on the surface of roller retainer. As shown in the figure.



●There are damages on surface of roller and bearing outer ring and inner ring. As shown in the figure.



●There are damages on the surface of bearing outer ring and inner ring contacting with the roller. As shown in the figure.

4 Assembly

Danger warning

Read and follow every danger warning of "Warning" and "Caution" in this publication.Such information can help prevent serious personal injury or damage to components.

Warning:

When carrying out vehicle maintenance or service, you should always wear eye protection to prevent serious eye damage.

Installation

Conventional wheel end—MFS series non-drive steering front axle with QP drum brake or ELSA/EX disc brake

1 Lubricate the inner and outer bearings.

●It is necessary to replace the complete set of the hub bearing if there is any damage found during disassembly. Press the new inner or outer bearing outer ring into the hub.

2 Use a grease injector to press the specified grease from the large end of the bearing inner ring into the cavity between the pin roller and the retainer. Grease between the two bearing outer rings of the hub and apply to the smallest diameter of the outer ring.

●If the grease injector cannot be used: apply oil to the bearings with bare hands with proper protection.

3 Insert the inner bearing into the hub.

4 Install a new oil seal with a suitable special tool for oil seals.

5 Carefully install the hub assembly onto the axle head. Make sure the position is correct.

6 Insert the outer bearing into the hub.

7 Use the bearing adjustment nut to secure the hub assembly to the axle head. When installing the adjusting nut, the protruding end shall be directed outward toward the hub cover and tightened by hand.

8 Turn the hub back and forth and tighten the bearing adjustment nut to 136 Nm to ensure that the bearing and hub are installed in place.

9 Fully loosen the bearing adjustment nut and tighten it to 27Nm while turning the hub.

10 Rotate the bearing adjustment nut back for 1/3 turn.

11 Install the D-type punched retainer ring through the flattened position on the axle head. Make sure that the projection on the bearing adjustment nut engages with a hole on the retainer ring.

12 Install a new D-lock washer.

13 Install the bearing lock nut and tighten it to 271-407Nm.

14 Use a dial indicator to measure the bearing end clearance. The measured value shall be between 0.025 and 0.127 mm.

15 If necessary, loosen the bearing lock nut and adjust the hub bearing clearance so that the dial indicator can reach the correct reading range.

16 Bend the side of the D-lock washer to the bearing lock nut to lock it in place.

17 Install the gasket and hub cover and tighten it to 27-41Nm with six bolts and flat washers.

Conventional wheel end—MS, MC, MD, MP and MR series rear drive axle with QP or Q series drum brake or ELSA/EX disc brake

1 Lubricate the inner and outer bearings.The hub bearing shall be applied with the same lubricant as that used in the differential case.

● It is necessary to replace the complete set of the hub bearing if there is any damage found during disassembly. Press the new inner or outer bearing outer ring into the hub.

2Insert the inner bearing into the hub bore.

3 Install a new oil seal with a suitable special tool for oil seals.

4. Carefully install the hub assembly onto the axle head. Make sure the assembly is installed correctly.

Caution

Do not assemble without lubrication, otherwise it will damage the wheel end parts.

5. Prior to mounting the outer bearing, apply a small amount of lubricant same as that in the differential case to the hub cavity.

6. Insert the outer bearing into the hub.

7. Use the bearing adjustment nut to secure the hub assembly to the axle head. When installing the adjusting nut, the protruding end shall be outward and tightened by hand.

8. Turn the hub back and forth and tighten the bearing adjustment nut to 136 Nm to ensure that the bearing and hub are installed in place.

9. Turn the bearing adjustment nut back for one full circle.

10. Turn the hub and fasten the bearing adjustment nut to 68 Nm.

11. Turn the bearing adjustment nut back for 1/3 turn.

12. Install the lock ring and secure it in the axle head keyway with the projection of the bearing adjustment nut engaging with a hole on the retainer ring.

13. Install a new lock washer on the axle head.

14. Install the bearing lock nut and tighten it to 136-339Nm.

15. Use a dial indicator to measure the bearing axle end clearance, and the measured value shall be between 0.025-0.127mm.

16 If necessary, adjust the bearing axle end clearance so that the dial indicator can reach the correct reading.

17 Bend the two opposing lock washer locking plates to the bearing lock nut to lock it in place.

18 Install the half axle and gasket.

19 Install conical sleeve.

20 Secure the half-axle with eight serrated locking washers and nuts and tighten it to 203-312Nm.

21 Remove the oil filler plug from the axle housing and check the oil level. If necessary, add the specified lubricating oil through the oil hole on the axle housing so that the oil level is flush with the bottom of the oil filling port.

Wheel bolts and wheel nuts

The following is a reminder of the wheel bolt and wheel nut conditions and program-based maintenance, which is related to safety and the integrity of the vehicle and its components.

Please read it carefully before installing the wheel.

Warning:

Replace the bent, loose, broken or tripped bolts. When replacing a tripped bolt, replace it with another bolt adjacent to the tripped stud, as there will be fatigue damage even if the adjacent bolt is not cracked, which can cause the wheel to loosen and separate from the vehicle, and further result in a serious personal injury and damage to parts.

Be sure to use the new knurled studs and bolts, which cannot be reused.

Do not paint on wheel end mounting surfaces, bolts or nuts. The coating can reduce the ability of the fasteners to sustain the load, loosen the wheel and separate it from the vehicle, which can result in serious personal injury and damage to parts.

Make sure that the bolt threads are not damaged, or the load capacity of the bolt will not meet the wheel fastening requirements, which can cause the wheels to loosen and separate from the vehicle, and then further result in serious personal injury and damage to parts.

Do not lubricate the threads of bolts or nuts.Lubricants make no contribution to properly tightening the parts, but will cause the overlarge load, so that the bolts are ruptured, the wheels are loose and separated from the vehicle, leading to serious personal injury.

Install the correct wheel system components to avoid misuse of similar components from different wheel systems, as this will loosen and separate the wheel from the vehicle, which results in serious personal injury and damage to parts.

All the axles marketed in China by Meritor are of the structure type positioned by ISO standard hub center hole.

Aluminum wheels may require special wheel nuts due to different wheel bolt hole diameter.

Warning:

If you are going to re-use a nut with a removable flange, add two drops of grease to the gap between the nut flange and the hexagonal part of the turning surface in each reassembly, or the fastener will not generate enough loads to loose wheels and separate from vehicle, causing serious personal injury and damage to parts.

1 Check the bolt. Repair or replace loose, bent, tripped or broken bolts.

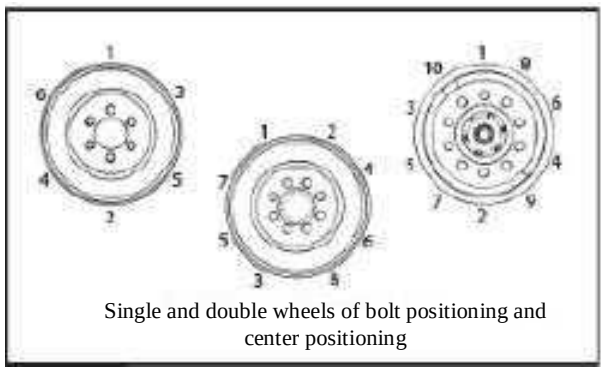
2 Knurled bolts with different hub part numbers are usually not interchangeable. Check its purpose.

3 Install the appropriate wheel nuts according to the wheel system.

● ISO285.75mm bolt circle and ISO335mm bolt circle hub shall be installed with hexagon flange nut with width of 33 or 32mm.

4 Aluminum wheels may require special wheel nuts due to different wheel bolt hole diameter, please contact the manufacturer of the vehicle or wheel.

5 After tightening the nut to the specified torque, check the extension of the bolt.



Single and double wheels of bolt positioning and center positioning

5 When installing the wheel nuts, follow the part tightening sequence provided by the wheel manufacturer. As shown in the figure.Be sure to check by the cycle recommended by the wheel manufacturer.

6 After 80-160 km of operation, all wheel nuts in all systems shall be re-tightened according to the specified torque.

7 Make sure that the total vehicle is not overloaded and the axle load does not exceed the rated axle load.

Wheel bolt replacement process

Warning:

Do not use the hammer to remove or install the bolts, otherwise it will damage the bearing raceway, shorten the service life of the bearing, and may cause serious personal injury and damage to parts.

During installation, ensure that the bolt threads are not damaged, otherwise the load capacity of the bolt will not meet the wheel fastening requirements, which may cause the wheel to loosen and separate from the vehicle, and lead to serious personal injury and damage to parts.

If the bolt is tripped and needs to be replaced, take one of the following methods.

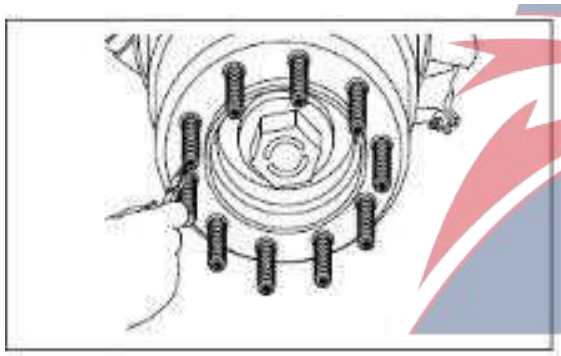
The preferred method - replace the hub and stud together

Warning:

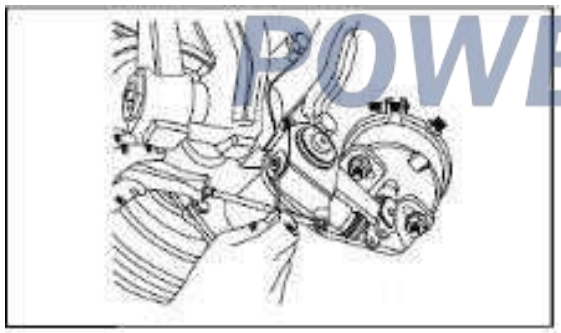
Vehicles should be parked on a level surface.Put wedges below the tire to prevent the vehicle from moving. Support the vehicle with a safety gantry.Do not operate under vehicles jacked only, because the sliping and tipping of jacks can cause serious personal injury and damage to components.

1 Park the vehicle on a level road. Place a wedge below the wheel to prevent the vehicle from moving.

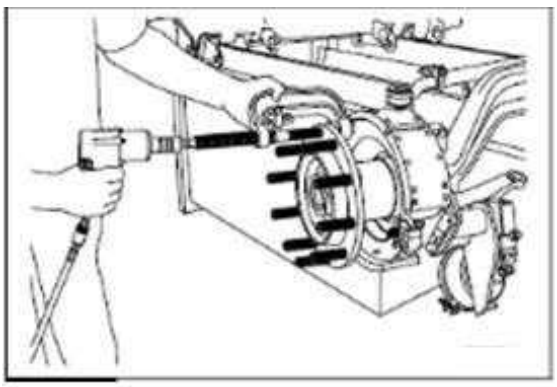
2 Lift the front of the vehicle until the front wheel off the ground. Support the vehicle with a safety gantry.



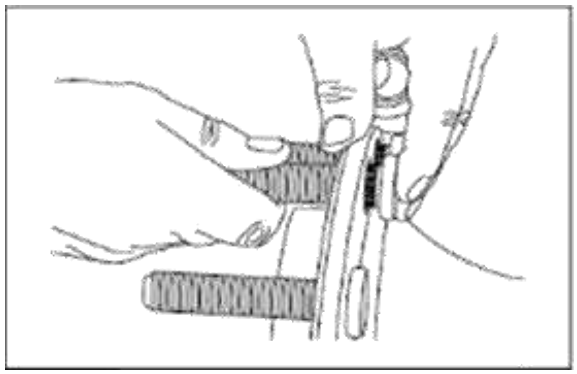
3 Make a mark of the wheel-hub position relationship on the stud to be removed with the paint marker, and never use the removed bolt. As shown in the figure.



4 For drum brakes, the brake can be adjusted backwards by loosening the adjustment arm, if necessary, until the brake is retracted and the brake drum is separated from the friction plate. As shown in the figure.



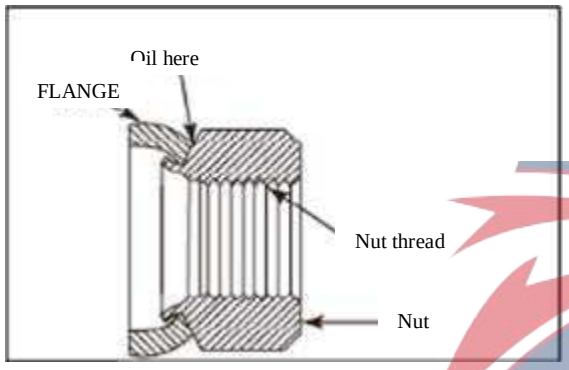
5 Remove the brake drum. About 13mm impact socket wrench and ball joint shall be used



6 Use the gauze to wipe the junction surface of the wheel and hub. Insert the new bolt into the hub. Align the knurling of the bolt with the indentation in the hub bore. As shown in the figure.

Warning:

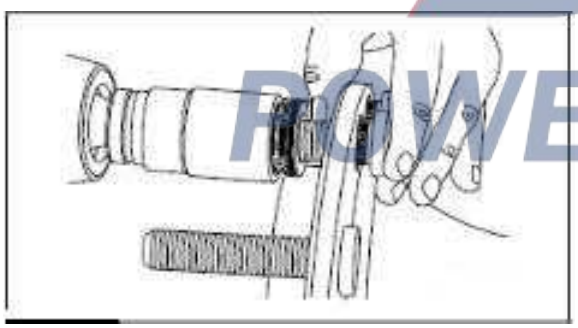
Do not lubricate the threads of bolts or nuts.Lubricants can cause excessive load resulting in broken bolts, which may loose wheels and separate it from the vehicle, and result in serious personal injury.



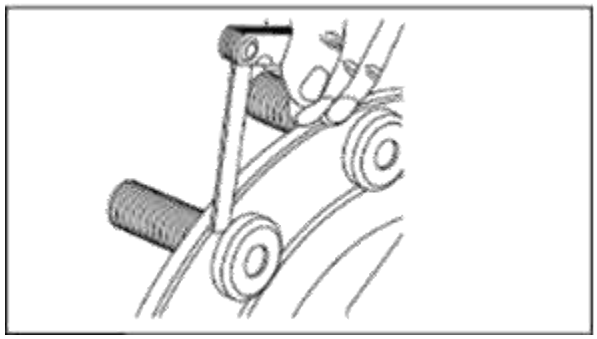
7 Add two drops of lubricant between the body of the bolt and nut and the flange and do not add more. As shown in the figure.

Warning:

The bolt must be fitted with the nuts with correct thread specification.



8 Install the nut on the bolt. Pull the stud into the hub, but not exceeding 408Nm, with a 13mm impact socket wrench. As shown in the figure.



9 Check whether the bolt is installed correctly with 0.05mm feeler gauge. As shown in the figure.

● If the bolts are not installed correctly: Remove the studs, clean each surface, and install the new studs according to the above procedure.

10 Remove all nuts, and install tire and wheel assembly.

11 All the removed bolts are scrapped.

5 Adjustment

Danger warning

Read and follow every danger warning of "Warning" and "Caution" in this publication. Such information can help prevent serious personal injury or damage to components.

Warning:

Always wear goggles when carrying out vehicle maintenance or repairs to prevent serious eye damage.

Check and adjustment

Hub bearing

Only the most accurate bearing axle end clearance can be measured after removing the tires and the brake drum.

● If the brake drum and tire are installed and the clearance between the bearings is greater than 0.127mm, remove the brake drum and tire-wheel assembly and recheck the clearance between the bearings.

Warning:

Vehicles should be parked on a level surface.Put a wedge under the tire to prevent the vehicle from moving. Support the vehicle with a safety gantry.Do not operate under vehicles jacked only, because the sliping and tipping of jacks can cause serious personal injury and damage to components.

1 Park the vehicle on level ground. Put wedges under wheels to prevent the vehicle from moving. Pull up the handbrake.

2 Raise the vehicle so that the wheels are off the ground and then support it with the safety gantry.

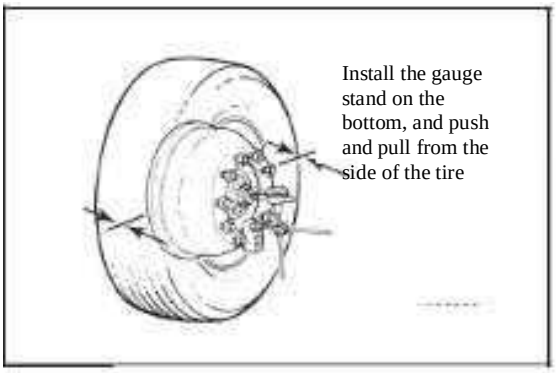
3 Remove the bolts and remove the gasket and end cap from the hub.

4 Confirm whether the brake drum and hub fasteners have been tightened according to the manufacturer's specifications.

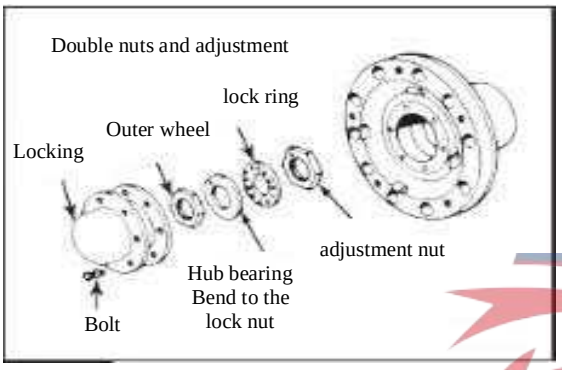
5 Place the magnetic dial indicator on the bottom of the hub or brake drum. Adjust the dial indicator so that the pointer is turned back on to the knuckle center and then zeroed. Note: Do not push or pull the top or bottom of the hub or brake drum, otherwise it will affect the measurement of the bearing axle end clearance.

6 Observe the dial indicator and measure the clearance between the bearings by pushing the opposite side of the hub or the brake drum. The clearance between the bearings is the sum of the observed travels.

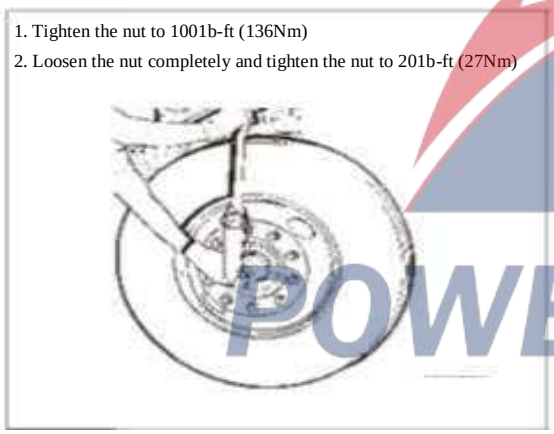
●If the clearance is between 0.025-0.127mm, there is no need to adjust the bearing.



●If the clearance is not between 0.025-0.127mm, re-adjust the hub bearing clearance. Take the previous hub for example. As shown in the figure.



7 Double nuts and lock ring: Separate the lock washer from the wheel bearing nut. Remove the wheel bearing nut, lock washer and lock ring. As shown in the figure.



8 Turn the tire back and forth and use a torque wrench to tighten the adjustment nut to Nm. As shown in the figure.

9 Adjust the nut back for one circle, and then tighten the adjusting nut to 27 Nm while turning the tire. As shown in the figure. (Rear axle hub needs to be fastened to 68Nm)

10 Follow the steps below to make adjustments.

A Turn the adjusting nut back for 1/3 turn.

B Install lock ring, lock washer and hub bearing lock nut.

C Tighten the front hub bearing lock nut to 271-407Nm; (Rear axle hub bearing lock nut tightened to 136-339Nm).

D Measure the axial clearance of the bearing 100%, the measured value shall be between 0.025-0.127mm. Re-adjust it as needed.

E After the axial clearance of bearing meets the specifications, the gasket shall at least be bent to one side of the outer hub bearing nut.

11 Install the gasket and end cap, and then install the bolts and tighten to 27-41Nm. (The rear axle needs to be fitted with gasket, half axle, tapered sleeve, serrated locking washer and nut to secure the half axle, and the nuts shall be tightened to 203-312Nm).

12 Fall the vehicle to the ground and check whether it can work properly.

6 Trouble removal

Troubleshooting table

If the wheel assembly is severely worn, the ABS wear warning light will be on and the fault code will be displayed. Steering wheels returning slowly to the neutral position after steering may also indicate that the wheel end assembly is worn. See table.

Table: Troubleshooting of wheel end components

Conditions	Causes	Corrective measures
Tires are worn too fast or tread patterns are worn unevenly	Tire pressure is not appropriate	Make the tire pressure meet the requirements
	Tires or wheels are unbalanced	Balance or replace the tire or wheel
	Doubl-axle parallel is not adjusted	Adjust the double axle
	Toe-in is set incorrectly	Adjust the toe-in to the specified range
	Steering arm is not in place	Maintain the steering system
	The wheel end clearance is too large	Adjust the wheel bearing
Vehicle is steered hardly	Power steering system pressure is low	Maintain the power steering system
	Steering gear is engaged incorrectly	Correctly install the steering gear
	Steering connection isL lck of lubrication	Lubricate steering connection
	The king pin is clamped	Replace the master pin
	The geometric position of steering arm is incorrect	Maintain the steering mechanism
	The kingpin caster angle is not adjusted	Adjust the kingpin caster angle
	Steering tie rod ball is clamped	Replace the horizontal pull rod ball head
	Thrust bearing is worn out	Replace thrust bearing
Steering tie rod ball is worn and need to be replaced	The ball is lack of lubrication	Lubricate the ball. Always observe the lubrication interval
	Operating conditions are too harsh	Increase the frequency of inspection and lubrication
	The protection cover of the ball is damaged	Replace the protection cover
Steering tie rod, steering tie rod ball or tie rod arm is bent or damaged. Components need to be replaced.	Power steering system is stressed out, exceeding the provisions of the vehicle manufacturer	Adjust the power steering system to the specified pressure
	The pressure limiting of power steering system is not adjusted	Adjust the pressure limiting of power steering system to the specified pressure
	Vehicle operating environment is harsh	Make sure that the vehicle is used correctly
	Additional power steering system is not installed properly	Install the additional power steering system correctly
	The over-travel valve of the steering gear is not set correctly or fails	Check whether the over-travel valve of the steering gear is operating normally or is adjusted according to the vehicle manufacturer's specifications
	The steering stop device of the axle is not set correctly	Adjust the steering stop device of the axle according to the vehicle manufacturer's request
Steering ball studs are worn or damaged.	Fasteners are over-tightened, higher than the vehicle manufacturer's specifications	Tighten the tie rod fasteners according to the vehicle manufacturer's specifications
	Lack of lubricant or lubricant mismatched	Lubricate the connection deivce with the specified lubricant
	Power steering stop device is not adjusted	Adjust the limiting device to the specified requirements
The kingpin and its bushing are worn.	Sealing elements and sealing rings are worn or missing	Replace sealing elements and sealing rings
	Incorrect lubricant	Use the specified lubricant
	The axle fails to be lubricated according to the specified period	Lubricate the axle according to the specified period
	Lubrication procedure is not correct	Take the correct lubrication procedure
	The lubrication period does not match the operating conditions	Change the lubrication period to match the operating conditions
The front axle oscillates or swings during operation.	Kingpin caster angle is inappropriate	Adjust the kingpin caster angle
	Wheel or tire is not balanced	Replace or change wheels or tires
	Shock is worn out	Replace the shock

7 Specifications

Fastener tightening torque

Conventional wheel end - MFS series non-drive steering front Axle with ELSA / EX disc brake

Axle type	Wheel hub	Brake disc	Size of brake disc connecting bolt	Brake disc connecting bolt torque(Nm)
MFS45122	0515986(Φ285.75)	23123642	5/8-18	224
MFS66122	0516051	23123647	M16X2	224-258
MFS73122	0516093	23123647	M16X2	224-258
MFS73149	0516007	23123647	M16X2	224-258

Conventional wheel end - MS, MC, MD, MP, MR series drive axles with ELSA / EX disc brake

Axle type	Wheel hub	Brake disc	Size of brake disc connecting bolt	Brake disc connecting bolt torque(Nm)	Half shaft fastener	Half shaft fastener torque (Nm)*
MC13175	0416017	23123647	M16X2	224-258	M16X1.5	244-312
MC13160						
MS13176						
MC13176						
MS13166						
MC13166						
MS10145	0416001	23123642	5/8-18	224	5/8-18	203-312

Conventional wheel end - MS series drive axle with QP or Q drum brake

Axle type	Wheel hub	Drum brake (410×200)	Size of brake drum connecting bolt	Torque of brake drum connecting bolt (Nm)	Half shaft fastener	Half shaft fastener torque (Nm)*
MS13176	90110028	90130022	N/A	N/A	M16X1.5	244-312
MC13176						
MS13166						
MC13166						
MS10145	0416090	85123496	N/A	N/A	5/8-18	203-312

8 Lubrication and maintenance

Danger warning

Read and follow every danger warning of "Warning" and "Caution" in this publication.Such information can help prevent serious personal injury or damage to components.

Warning:

When carrying out vehicle maintenance or service, you should always wear eye protection to prevent serious eye damage.

Ordinary wheel end

Maintenance of wheel end

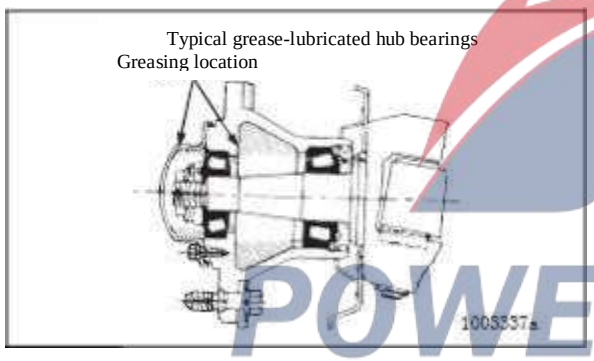
Grease-lubricated hub bearings

1 Park the vehicle on level ground. Put wedges under wheels to prevent the vehicle from moving.

2 Raise the vehicle so that the wheels are off the ground and support it by a safety gantry.

3 Remove the tire and wheel assembly and remove the hub.

4 Use appropriate detergent to remove grease from the parts. Discard the seals. Check whether the hub bearing is worn or damaged. If it is, replace it.



5 Before installing the wheel bearings, lubricate the journal on the axle head with the special lubricating grease for bearings. As shown in the figure.

6 Use a grease injector to press the specific grease from the larger end of the bearing inner race into the cavity between the roller and retainer. Lubricate the hub between the bearing outer rings until the smallest diameter of the outer ring.

●If the grease injector cannot be used, apply oil to the bearing by hand.

7 Insert the inner ring and components of the outer bearing and inner bearing into the bearing outer ring in the hub. Bearing outer ring must be pressed to the shoulder in the hub.

8 Install a new bearing oil seal on the hub.

9 Install the hub, brake disc and wheel assembly. Install the outer bearing outer ring and roller assembly into the hub. Then install the adjusting nut.

10 Adjust the hub bearing.

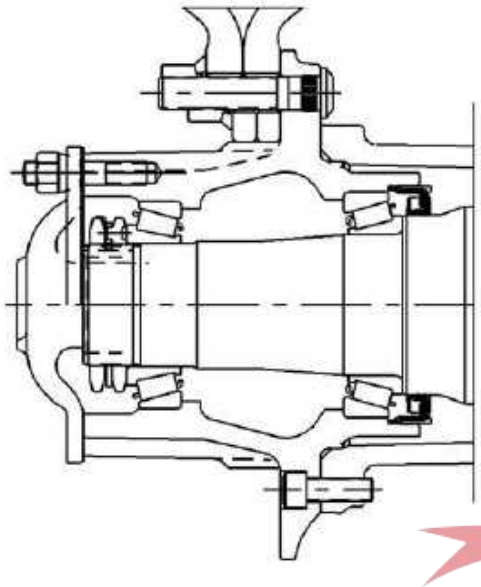
Lubricating oil-lubricated hub bearings, drive axle hub without oil filling port

1 Park the vehicle on level ground. Put wedges under wheels to prevent the vehicle from moving.

2 Add the specified amount of oil through the oil filling port of the final drive or axle housing.

3 Tilt the axle to the right and keep it for one minute, and then to the left for another minute, so that the oil can flow into the hub cavity.

4 Keep the vehicle in a horizontal position, and add the appropriate type of lubricant so that the oil level is parallel to the bottom edge of the filler plug hole.



5 Install and tighten the filler plug.

Lubrication cycle and lubricant specifications

Table: Lubrication cycle and lubricant specifications for wheel end

Lubrication cycle	Lubricating grease	Meritor specifications	NLGI class	Description of lubricating grease	Typical application location	External temperature
Whichever comes first: replace the seals, check and replace as needed Highway mileage: 48,000km or once a year; highway / off-highway and off-highway mileage: 24,000km or twice a year	Multi-function lubricating grease*	No. 1 or No. 2 universal lithium base grease	1 or 2	Lithium-12-hydroxystearate or complex lithium-based grease	Hub bearing hub axle head	Refer to grease manufacturer's specifications for temperature limits

* Meritor found that the trend of the entire vehicle maintenance industry is moving towards the widespread use of synthetic greases. However, some seals will expand when they come in contact with synthetic lubricant. Therefore, before using synthetic lubricants for wheel end care and maintenance, consult your local representative of Meritor for the relevant application.

Table: wheel end lubricating oil change period and specifications

Operation	Highway mileage	Off-highway mileage
Check the oil level	1,600km	1,600km
Change the oil	160,000km or once a year, whichever comes first.	40,000km or once a year, whichever comes first.
Change the synthetic oil	480,000km or once envey three years, whichever comes first.	160,000km or once envey two years, whichever comes first.

Meritor specifications	Military / SAE specifications	Lubricant name	Outdoor temperature			
			◦F		◦C	
			Min	Max	Min	Max
0-76-A gear oil	MIL-PRF-2105-	GL-5,SAE85W/140	-10	No	-12	No
0-76-D gear oil	EandSAE	GL-5,SAE80W/90	-15	No	-26	No
0-76-E gear oil		GL-5,SAE75W/90	-40	No	-40	No
0-76-J gear oil		GL-5,SAE75	-40	35	-40	2
0-76-M full synthetic oil		GL-5,SAE75W/140S	-40	No	-40	No
0-76-N full synthetic oil		GL-5,SAE75W/90	-40	No	-40	No
Heavy engine oil	MIL-L-2104E or F	A.P.I.-CD,-CE,-SG,-SH or -SJSAE40 or 501	-10	No	-12	No
Heavy engine oil	MIL-L-210E or F	A.P.I.-CD,-CE,-SG,-SH or -SJSAE302	-15	No	-26	No

1 The present provisions are acceptable. Multi-grade engine oil is acceptable if rated value of SAE does not exceed 40 or 50.

2 The present provisions are acceptable. Multi-grade engine oil is acceptable if rated value of SAE does not exceed 30.

Product Description Section II Final Drive

1. Introduction

General description

The final drive is a single-stage reduction device featuring a hypoid gear pair. The drive bevel gear is mounted on two tapered roller bearings and one cylindrical roller bearing. The position of the drive bevel gear corresponding to the driven gear can be accomplished by adjusting the thickness of the gasket unit located between the final drive and the drive bevel gear bearing pedestal. The differential assembly is mounted on two tapered roller bearings and is adjusted with adjusting ring nuts on both sides to provide a proper pre-load on the bearings.

Two models of Series 177 final drives are available:

• Without differential lock

• Both types of final drives with differential lock are "standard" types with axial spline -engaged clutches.

Specifications and data	
Hyperboloid drive bevel gear bearing	Two tapered roller bearings and a cylindrical roller bearing
177 final drive	Speed ratio 2.64; 2.85; 3.08; 3.36; 3.70; 4.11; 4.63; 5.29,5.63,6.14
Gear clearance	0.25-0.51mm
Opening amount of differential bearing cap	0.15-0.33mm
Driving torque of differential planetary gears and half axle gear	Min 68Nm
Run-out range on the back of the driven bevel gear and differential case assembly	Max 0.20mm

2. Maintenance

Introduction

In order to ensure reliable and effective operation of the final drive, please strictly observe the manufacturer's specifications on maintenance intervals and the correct use of lubricants. For more information, please contact the engineering department of the manufacturer or visit the Web site of Meritor www.Meritorhvs.com.

Spare parts

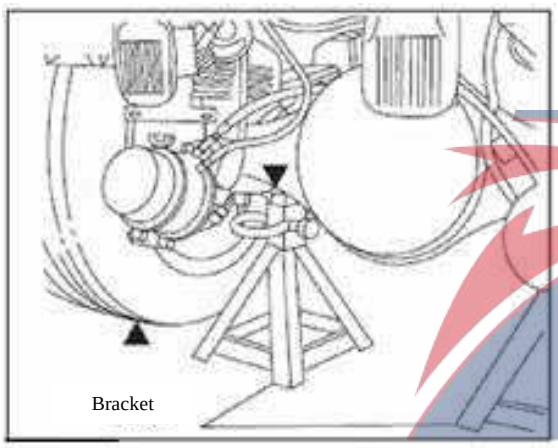
Only the original parts of Meritor allowed

Disassembly and installation of final drive

Removal

1. If the vehicle is loaded, remove the rear axle before removing the final drive.

2. Park the vehicle on level ground and block the front wheels with wedges.



3. Place the rear axle on two sturdy shelves.

4. Remove the drain plug from the bottom of the rear axle housing and drain the lubricant.

5. Engage the differential locks before the pressure drops to 2.8 bars.

6. Remove the nuts and washers used to tighten the half axle.

7. Remove the half axle.

8. Remove the transmission shaft.

9. Disconnect the air pipe and sensor line of the differential lock.

10. Dismantle the fastening bolts from the final drive to the rear axle housing (leave two bolts in place to prevent the final drive from slipping off).

11. Use suitable tools to provide a safe support for the final drive during disassembly. Remove the last two bolts and remove the final drive.

Check the rear axle housing

Check the alignment of the rear axle to prevent abnormal stress, noise and aerodynamic losses due to possible deformation.

Install reverse execution disassembly procedure and tighten the bolts and / or nuts according to the specified torque with the reference of the listed specifications. After thoroughly cleaning the mounting surface and the bolts, apply the silicone sealant to the rear axle housing and the mounting surface of final drive.

⚠ Caution:

Only the original parts of Meritor are allowed. The use of non-genuine spare parts can seriously affect the performance of the final drive. The use of non-recommended lubricants will affect the performance and service life of the final drive.

⚠ Warning:

Disposal of waste oil must comply with current legal requirements.

⚠ Caution:

The final drive shall be removed and handled with the specified prying and supporting equipment.

⚠ Caution:

During the process of disassembly or reassembly, always engage the differential locks to ensure that the spline jointed parts are in place and prevent shift forks from being bent and spline from being damaged.

Finally, the following points shall be guaranteed:

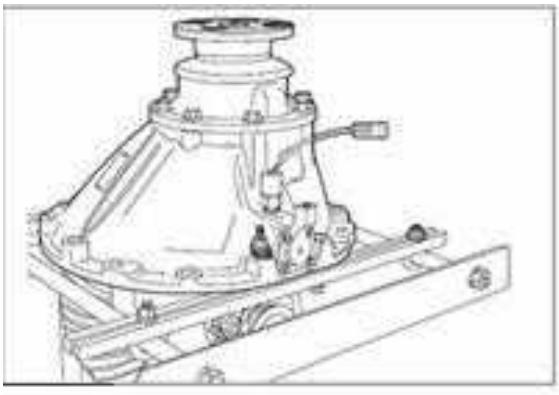
• Air pipe is free of leakage.

• Lubricant complies with the manufacturer's specifications.

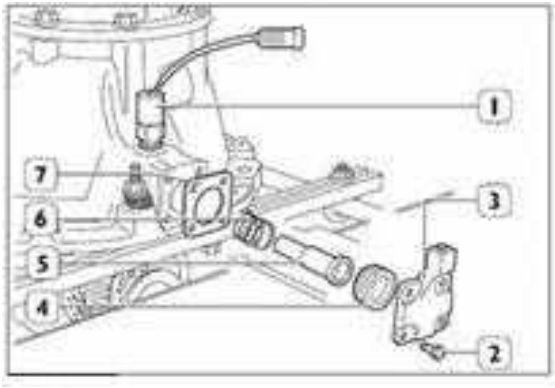
• The differential lock warning light in the cab is working properly.

Maintenance of differential lock of the single-stage final drive

Removal



1. Fix the final drive on the workbench.

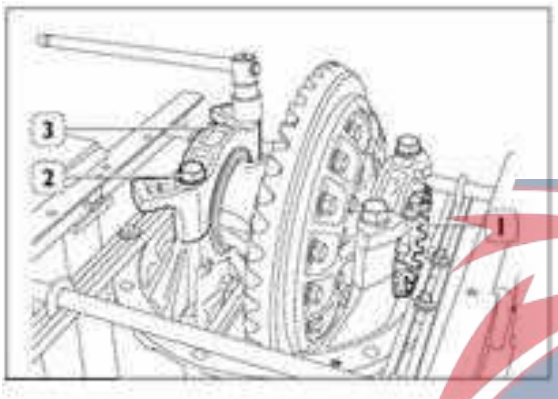


2. Loosen the bolts (2) and remove the cylinder cover (3) and the gasket (7).

3. Remove piston (4), shaft (5) and spring (6).

4. Remove the shift fork (3) together with the sliding sleeve (2).

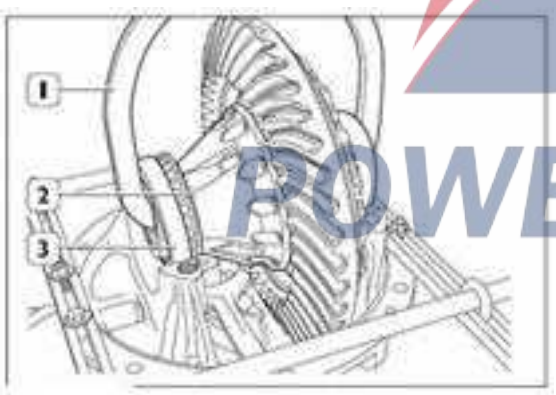
5. "Standard" type: remove the locking pin.



6. Disassemble the bearing adjustment ring.

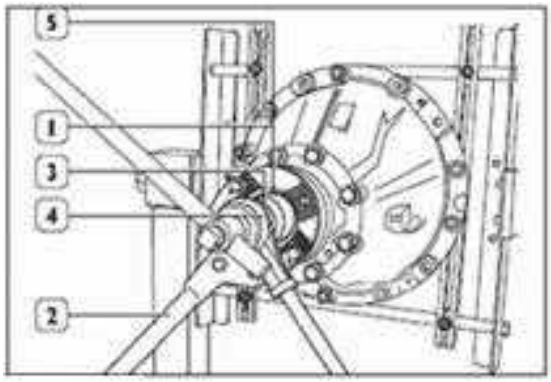
7. Use a suitable wrench to loosen and remove the bolt (2) and its washers; repeat the same operation on the opposite side.

8. Remove the bearing cap (3)



9. Use a suitable prying device (1) to remove the differential bearing (2) together with the driven gear and the bearing outer ring (3).

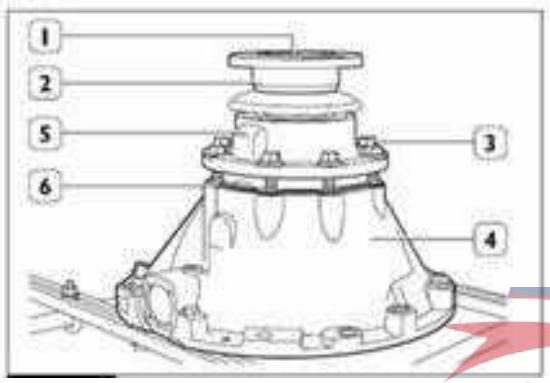
Note: The final drive shall be dismantled and disposed with the specified required prying and carrying equipment.



10. The final drive flange recommended by Meritor shall be loosened by inserting the flange locking tools to stop the flange (1) from rotating.

11. Loosen the drive bevel gear nuts (5) with the wrench and special maintenance tools (3) and booster (4), but do not disassemble it.

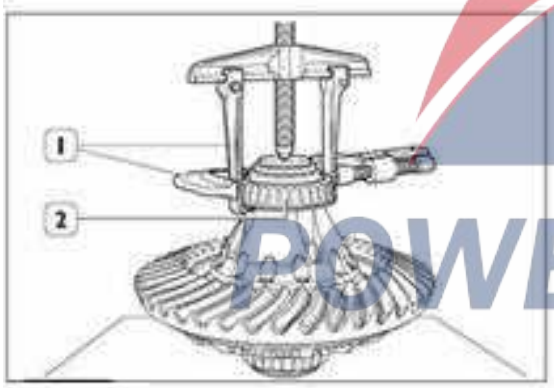
12. Remove and discard the flush bolts (3) that connect the drive bevel gear bearing pedestal to the final drive housing (4).



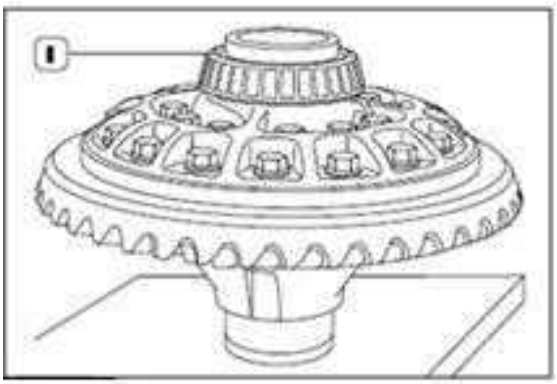
13. Install the hook on the flange and remove the bearing pedestal (5) from the final drive. During disassembly, use two studs and special tools to ensure that the final drive is centered (aligned). Remove and discard the drive bevel gear locknut (1) and pull out the flange (2) if necessary with the extractor.

14. Remove the adjusting shim (6) from the drive bevel gear bearing pedestal and measure the overall thickness of the gasket with a screw micrometer (micrometer).

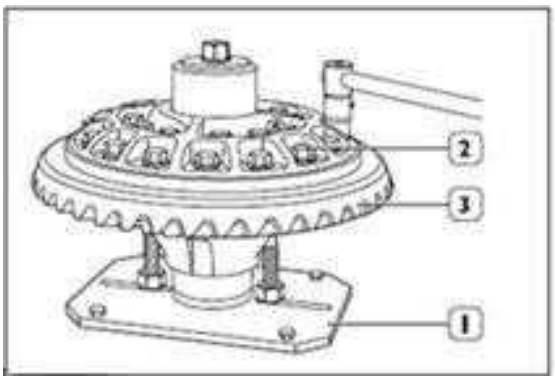
Disassemble the differential bearing:



1. Remove the bearings (2) with a suitable extractor (1).



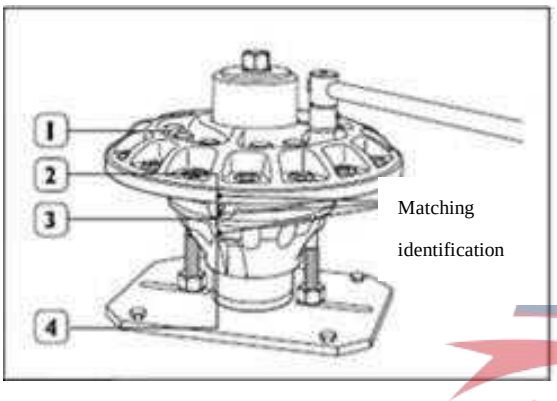
2. Turn the differential assembly over and disassemble the bearing inner ring (1).



3. Secure the differential case to the appropriate tooling (1) to prevent it from rotating.

4 Disassemble and discard the lock bolts (2) that connect the driven bevel gears (3) to the left differential case.

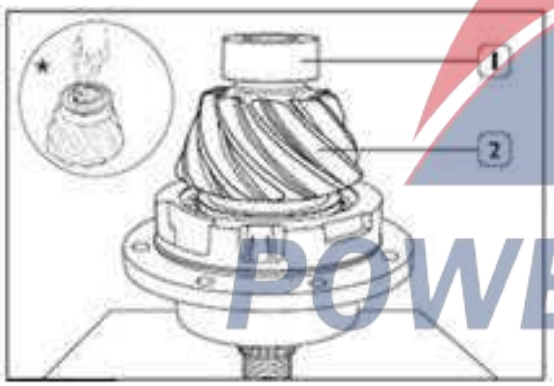
5. Remove the driven bevel gear with a copper rod or press machine.



6. Mark the two half-shells (2, 3) and the planet wheels (4) to ensure proper mating during reassembly.

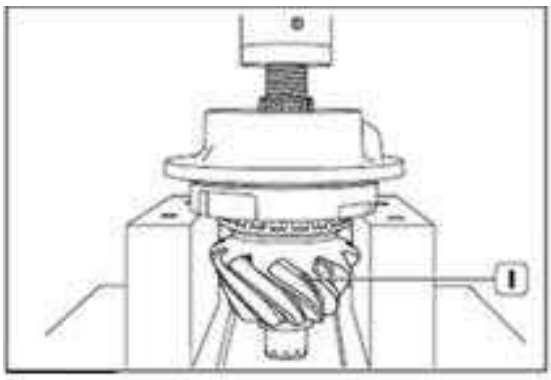
7. Remove and discard the bolts (1) and raise the flanged differential case.

Remove the drive bevel gear from the bearing pedestal. *

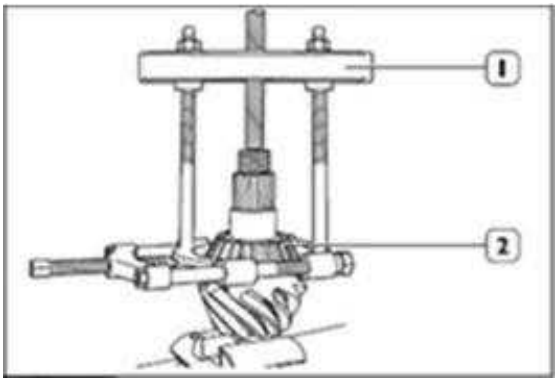


1. If the guide bearing of drive bevel gear (1) is worn or damaged and needs to be replaced, it shall be removed from the drive bevel gear (2) by using a suitable extractor.

⚠ **Caution:** To prevent debris from causing serious eye damage, always wear protective goggles when performing the above disassembly.



2. Use the special tools, such as the pressure machine to separate the drive bevel gear (1) from the bearing pedestal.



3. Use a suitable tool (1) to disassemble inner bearing inner ring (2).

Inspection of differential parts

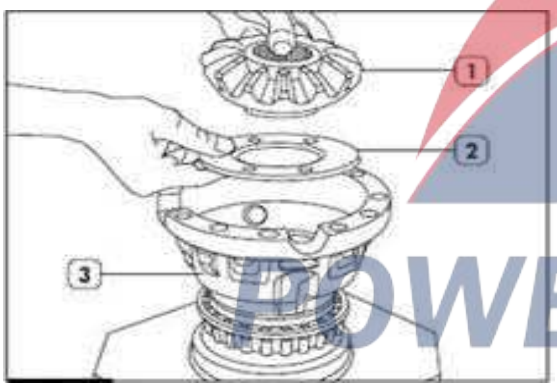
1. Thoroughly clean all differential parts.

2. Lubricate the bearings and turn the roller retainer: the rotation shall be smooth without any sticking signs.

3. Check the mounting surface of the driven bevel gear to ensure the full mating contact with the differential case bearing surface. Misalignment or distortion of these surfaces can cause the mounting bolts to vibrate, and result in premature failure.

4. Check whether the parts of the drive bevel gear connected with the spline are excessively worn, if any, the whole set of gear pairs and input flange shall be replaced.

Parts of differential case

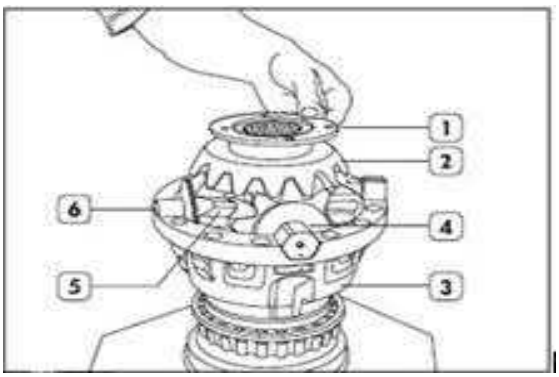


1. Place the half-shell (3) without flange on the workbench.

2. After installing the half-axle gear thrust washers (2) in the half-shell, install the half-axle gear (1).

⚠ Danger

If the cross axle is not replaced, check the exactly aligned paired marks made during disassembly to avoid overlarge run-out amount on the back of the driven bevel gear.



3. Install the cross axle (6) on the half-shell (3) together with the differential planet wheels (5) and the thrust washers (4).

4. Install the second half axle gear (2) and its thrust washer (1).

5. Install the flanged differential case (2). Make sure that the paired marks are correctly aligned during disassembly. Install the new bolt and tighten as follows.

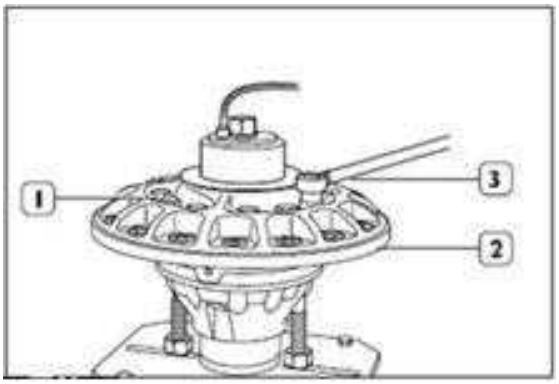
Note: Lubricate all parts with gear oil.

All fasteners shall be tightened according to the following steps:

1. Tighten the first pair of bolts located on the diametrically opposite ends.

2. Continue to tighten the second pair of bolts (perpendicular to the first pair of flush bolts) by following the first procedure above.

3. The bolts shall be tightened according to the same mode.



• Stage 1: Tighten the bolts by a torque of 100 Nm (10 kgm) in a star-shaped manner by using a torque wrench (3).

• Stage 2: Tighten the bolts by 110 °to 120 °

⚠ Caution:

When operating hot bearings, you should wear safety gear and gloves to avoid injury.

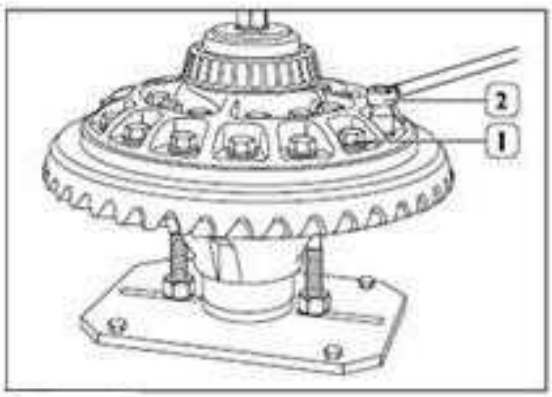
6. In an air oven, heat the bearings for about 15 minutes to 100 °C a nd install them in place by using a suitable punch.

7. In an air oven, heat the driven bevel gear to 100 ℃ to 150 ℃ and install it on a flanged differential case. Make sure it is free to rotate and install 4 bolts to make sure that the driven bevel gear is aligned with the bolt hole of the flanged differential case. Or heat the driven bevel gear in a water tank to 70 ℃ to 80 ℃ and reassemble it as described above. Do not stamp the un-heated driven gear on flanged differential case. The un-heated driven gear may damage the differential half-case due to assembly interference.

⚠ Damger:

When operating the heated driven gear, wear safety clothing and gloves to prevent injury.

8 After the driven bevel gear is cooled, turn over the bearing pedestal on the tools.



9. Install and tighten the bolts (1) in the following order:

• Stage 1: Tighten it with a torque wrench (2) at a torque of 100 Nm (10 kgm).

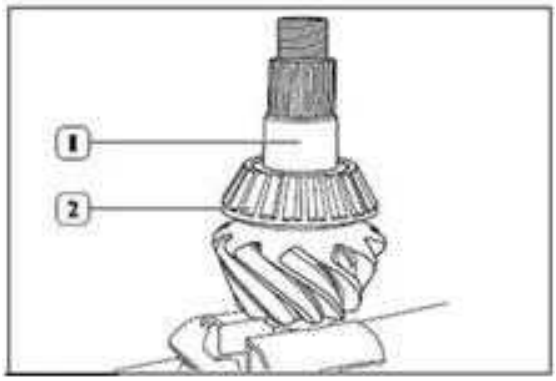
• Stage 2: Use a socket wrench to turn the bolt by 80 °to 90 °

10. After heating the bearing on one side of the driven gear to 100 ℃ for 15 minutes in an air heating furnace, install it in place with a suitable punch.

⚠ Damger:

When operating hot bearings, you should wear safety gear and gloves to avoid injury.

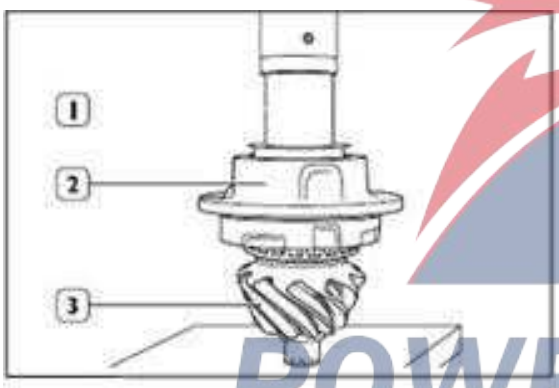
Install the drive bevel gear on the bearing pedestal



1. After the bearing is heated to 100 °C in an air - heating furnace for 15 minutes, install it on the drive bevel gear (1). Wait for the bearing to cool.

⚠ Damger:

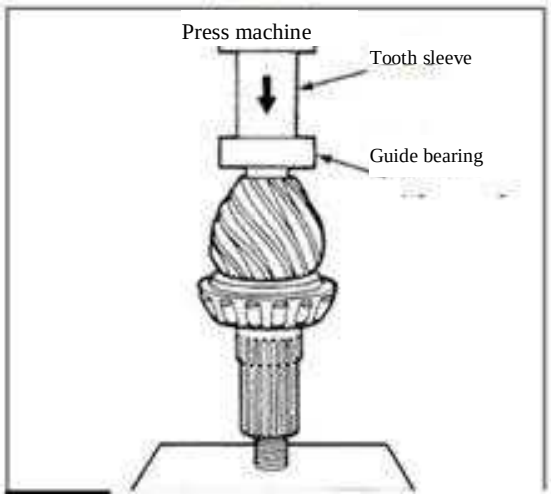
When operating hot bearings, you should wear safety gear and gloves to avoid injury.



2. Use special service tools to press the housing (2) onto the drive bevel gear (3).

Another way to guide the bearing

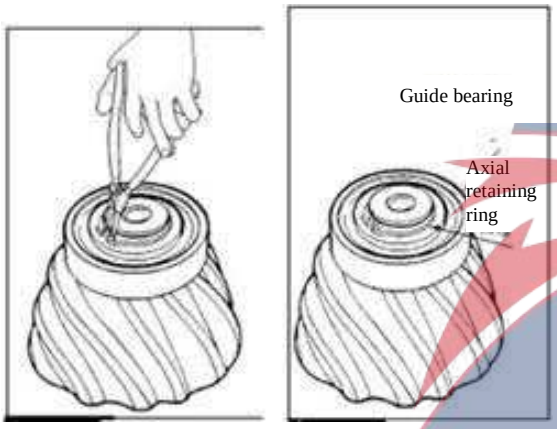
Install the integral axial bearing with axial retaining ring on the driving bevel gear.



1. Place the drive bevel gear on the press machine with the gear head (gear teeth) facing the top.

2. Press the guide bearing into the end of the driving bevel gear until the bearing is flush with the gear head. In the pressure bearing operation should use special tools.

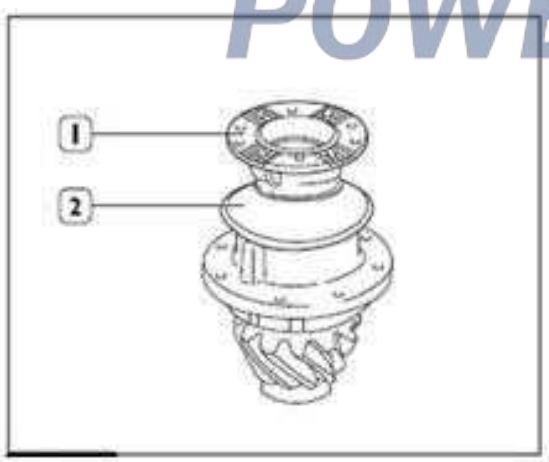
Note: When mounting the guide bearing, the larger fillet radius shall face the head of the drive bevel gear.



3. Install the axial retaining ring (*) in the ring groove on the end of the drive bevel gear with the axial retaining ring pliers.

Note: (*) There are no such parts on some final drives of Meritor.

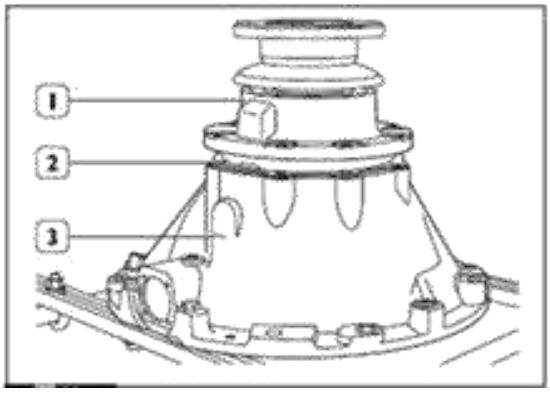
Complete the assembly operation



1. Install the input flange (1) with dust cover (2) in place with special maintenance tool. It is recommended to use the press machine.

2. Temporarily tighten the locknut.

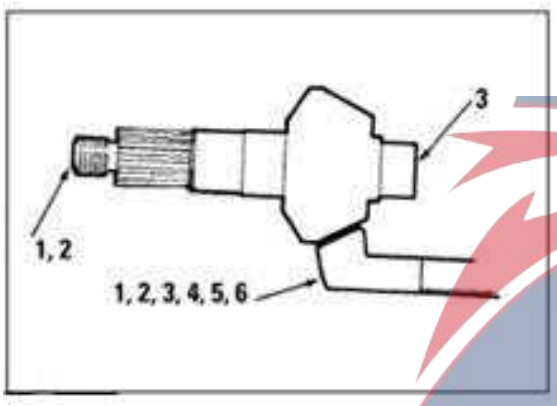
Warning:



If the same drive bevel gear drive is removed as that dismantled, the tested gasket unit (2) and drive bevel gear bearing pedestal (1)shall be configured on the carrying device (3) by using the "O" ring of bearing pedestal to ensure proper alignment of the lubricant passage grooves.

Any damaged "O" ring shall be replaced to prevent oil from leaking from the gasket.

3. If the new drive and driven bevel gears are used to replace the original gear pair, the correct position of drive bevel gear is essential, which shall be determined by referring to the marks on the drive and driven bevel gears.



1. Part number
2. Gear pair number
3. Drive bevel gear matching number
4. Determine the variation number of the gasket group to be inserted between the drive bevel gear bearing pedestal and the final drive (in the following example, this number is identified as P.C).
5. Production and test date of drive bevel gear (month / year).
6. Calibration side clearance value of drive bevel gear.

The part number and gear pair number are engraved on the threaded end of the drive bevel gear. For driven gears, such numbers are usually engraved on the outer surface. For all final drives, the classification number of the driven bevel gear is always even number (e.g. 36786), while the classification number of the paired driven bevel gear is always odd number (e.g. 36787). The number (e.g. 10-41) of gear pair indicates that the number of teeth of the drive bevel gear is 10 and the driven bevel gear is 41, which corresponds to a transmission ratio of 4.10: 1.

Warning:

The pairing number of the drive bevel gear and the driven bevel gear shall be the same.

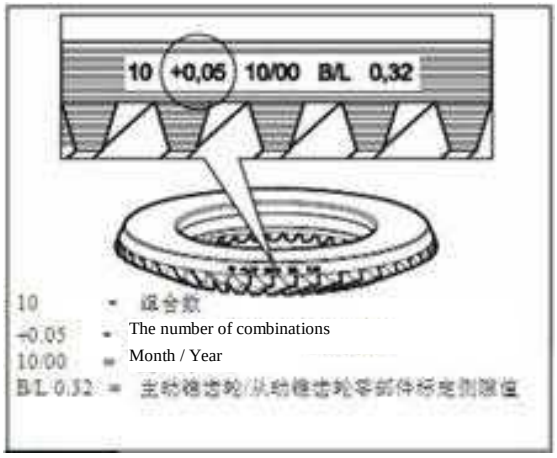
All driven bevel gears are marked with a variation number, which describes the distance of the calibrated components. This number can be used to calculate the thickness of the gasket unit inserted between the drive bevel gear bearing pedestal and the final drive. This number (for example, PC + 0.1 or PC-0.1mm) is marked on the outer surface of the driven bevel gear.

Thickness of adjusting shim pack of the drive bevel gear bearing pedestal

1. Measure the thickness of the shim pack that is removed with the final drive of the old drive bevel gear with micrometers or gauges and record the readings.

2. Read P.C. marked on the driven bevel gear to be replaced. If it is a number with +, deduct it from the value obtained from the first clause above. If it is a number with -, add it to the value obtained from the first clause above.

Warning:



The value obtained in Example 2 will be used to calculate the thickness of the gasket unit to be inserted between the drive bevel gear bearing pedestal and the final drive to calibrate the new components. Spare shims to be inserted between final drive and bearing pedestal can be 0.125, 0.200 or 0.500mm thick.

Record the results.

3. Read P.C. marked on the new driven bevel gear. The results of the measurement from item 2 above shall be added or deducted (+ add, - deduct) based on the variation symbol.

The results indicate the thickness of the new gasket unit to be assembled.

See the following example, which includes all possible combinations of calculations.

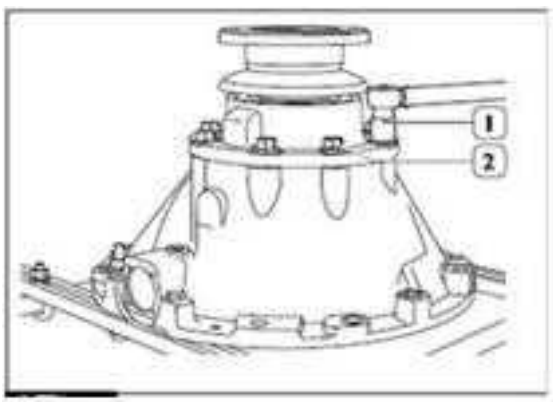
All numbers are engraved on the drive and driven gears and indicate the nominal side clearance obtained between the drive bevel gear and the driven bevel gear when processing is complete. The nominal side clearance value is indicated on the outer diameter of the driven bevel gear.

Case I:

Thickness of the original gasket unit	mm	0.75
P.C+0.05 marked on the old driven bevel gears		-0.05
Results	mm	0.70
P.C+0.10 marked on the new driven bevel gears		+0.10
Thickness of the new gasket unit	mm	0.80

Final drive assembly

1. Install and tighten the new bolts (2) by the following two stages:



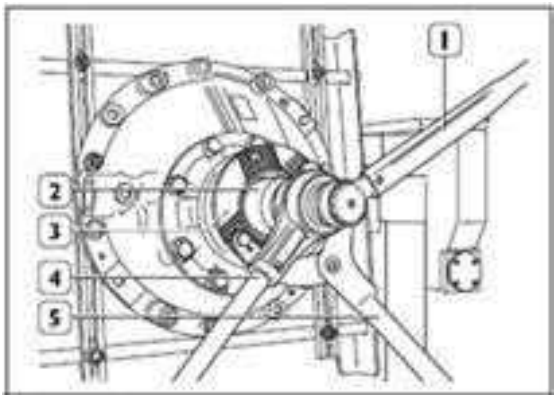
• Step I:

Tighten with torque wrench (1) at 100 Nm (10 kgm). (Figure 42)

• Step II:

Use a socket wrench to continue to tighten the bolt (2) by 60 ℃to 70 ℃(1) and then lock it.

2. Turn the device by 90 °

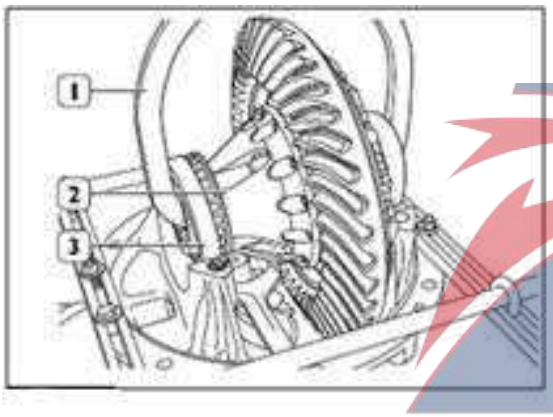


3. Use a tool to stop the input flange (3) from rotating. Tighten the new bevel gear nut by the specified torque (1350 to 1670Nm) with sleeve (2), torsion bar (4) and torque wrench (1).

Torsion bar:

Make sure the ratio of the torsion bar is correct.

4. Place the final drive bearing cap and align the locating pin (alignment). Screw in the washer-fitted bolts and tighten it with a torque wrench by a torque of 650 to 810 Nm.



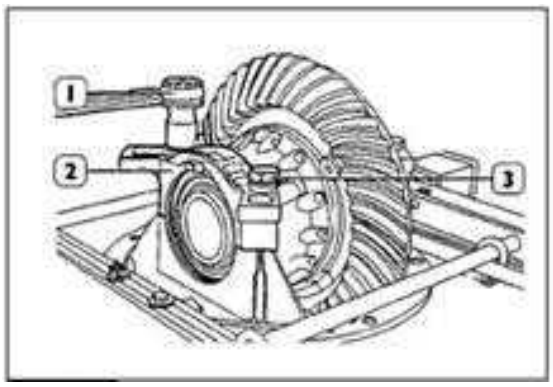
5. Place the tapered bearing outer ring (3).

6. Raise the assembled differential assembly (2) by using suitable prying device (1) and place it in place on the carrying device.

Warning:

The final drive shall be removed and handed by using the specified prying and carrying equipment.

7. Place the bearing cap (2) and make sure the locating pins are aligned.

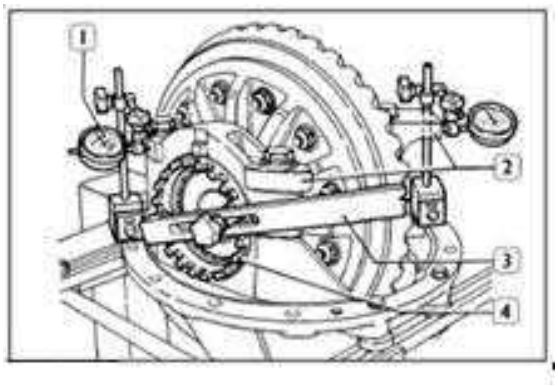


8. Install the bolts (3) and washers, and use a torque wrench (1) to tighten the bolts without locking to the specified torque.

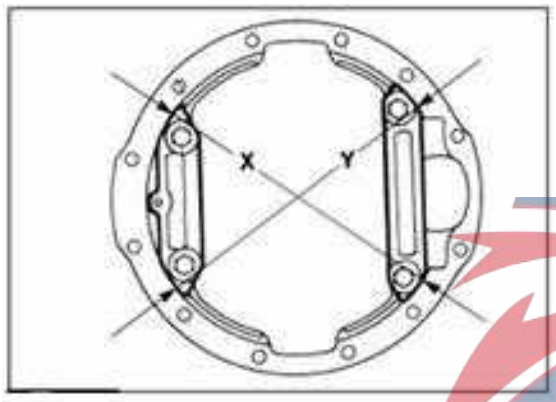
9. Lubricate the tapered roller bearing (1) with the axle oil and screw it into the adjusting ring (2) until it comes into contact with the conical outer ring of the bearing. Lock the flush bolts (3) by 650 to 810 Nm (65 to 81 kgm). Lock bolt (3) by 650 to 810Nm (65 to 81kgm)

Differential bearing preload adjustment

Expansion between bearing caps (strut expansion) can be done in two ways:



1. Use a special wrench maintenance tool (3) to tighten the bearing adjustment ring (4) until the readings of axle end clearance and the side clearance between the drive bevel gear and the driven bevel gear are zero. Check whether the driven bevel gear and drive bevel gear are interfered with each other.



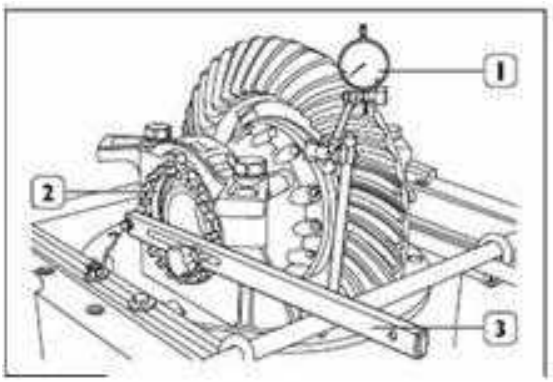
2. Use the appropriate micrometer (indicated by the arrow) at the intersection of the point x and point y, read and record the bearing cap clearance.

3. Tighten the adjusting ring (4) until the bearing cap (2) is open - as described in point 2 above, the reading measured on the x axis or y axis is between 0.15 and 0.33 mm, corresponding to 1.7 to 3.9Nm (0.17 to 0.39kgm) of bearing preload.

Hyperboloid driven gear side clearance adjustment

The tooth side axle clearance of the drive and driven bevel gear shall be adjusted in accordance with the following provisions: 177 final drive: 0.25-0.51mm

a. Drive bevel gear is fixed;

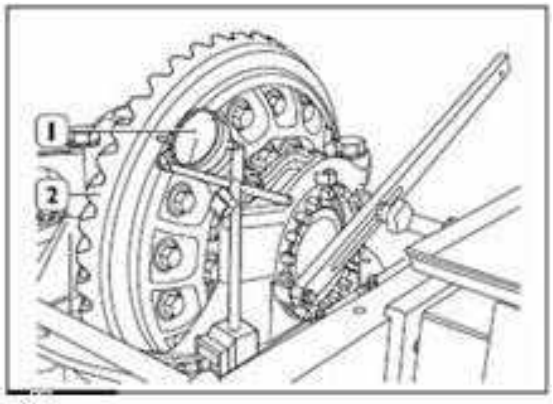


b. Place a magnetic dial indicator (1) as shown in the diagram;

c. Use a tool (3) to loosen the adjusting ring on the driven bevel gear and tighten the same number of adjusting rings on the opposite (2) (so that the opening amount reading of the measured bearing cap remains unchanged);

d. Follow the instructions above to obtain the specified bearing preload value. Four points shall be checked every 90°of the t eeth -side clearance.

Differential bearing preload

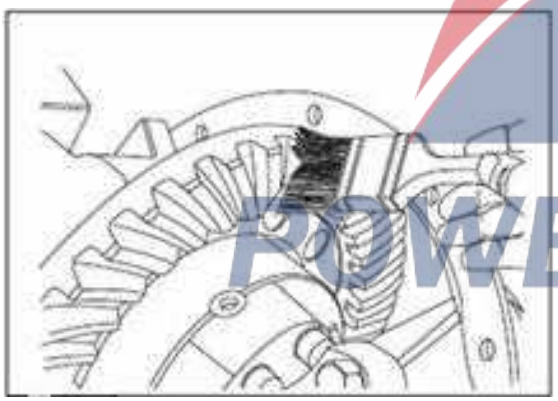


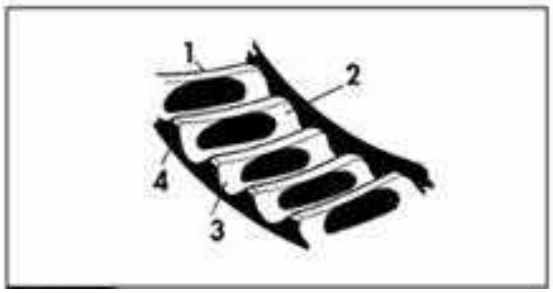
The opening amount between the bearing caps (opening amount of landing legs) can be measured in two ways: Measure the run-out amount on the back of the driven bevel gear (2), which shall not exceed 0.2mm, with a magnetic dial indicator (1).

Otherwise, disassemble the final drive to find the cause of the malfunction.

Reassemble and repeat the above adjustment. A thin layer of Prussian blue shall be applied to the driven bevel gear teeth. Turn the drive bevel gear and check the contact mark left by the drive bevel gear teeth on the driven gear teeth. The following figures show the possible types of contact and how to correct the deviations.

Contact type of gear pair tooth surface





1. Sliding surface (concavity)
2. Small end
3. Driving surface (convexity);
4. Large end

Convexity contact status: The center is closer to the small end and is centered on the tooth height.

Concavity contact status: The center is closer to the large end, and is centered along the tooth height.

Excessive contact toward the top of the gear tooth

Case A - B (page 50)

The drive bevel gear is too outside, which needs to be further adjusted. In order to get a qualified contact area, the gasket under its bearing can be reduced.

Case A (page 50)

Reduce gasket and increase the side clearance to the maximum.

Case B (page 50)

Check the side clearance reading, reduce the gasket thickness, and set it to the correct value.

Excessive contact toward the bottom of the drive gear tooth

Case C - D (pages 50-51)

Drive bevel gear is too inside, which needs to be further adjusted.

To make the contact area more accurate, add gaskets under its bearing.

Case C (page 50)

Check the side clearance reading, increase the gaskets and set it to the correct value. Case D (page 51)

Increase the gaskets so that the teeth-side clearance is adjusted to the minimum.

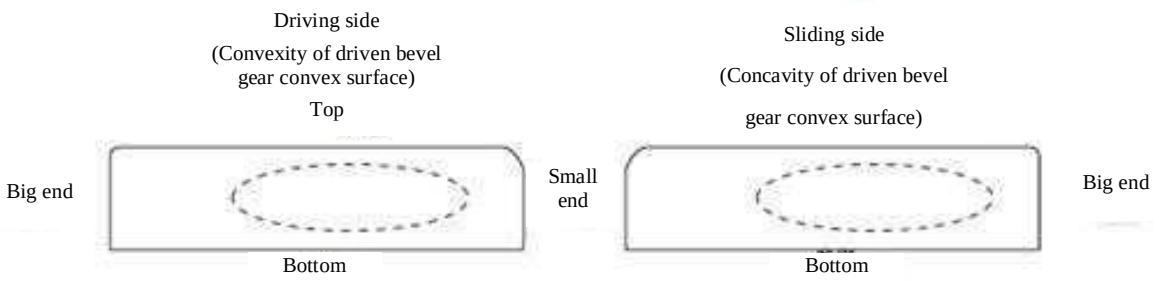
Case E (page 51.) Reduce the teeth-side clearance

Case F (page 51) Increase the teeth-side clearance

WARNING: If the drive gear guide bearing hinders the driven gear when changing the gasket unit, loosen the adjusting nut on the mounting side of the driven bevel gear and record its position; replace the gasket and install the adjusting nut back to the previous recorded position.

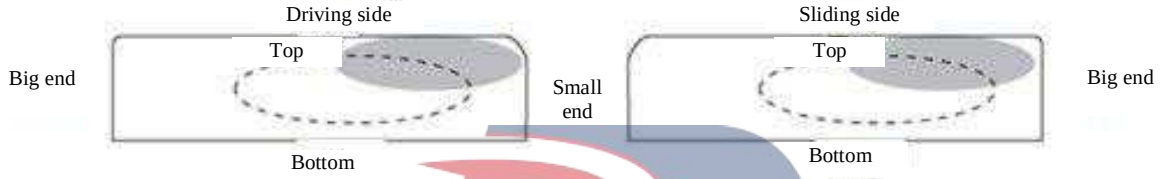
Contact type of hypoid gear pair tooth

Ideal contact shape



- Driving side: The center of the mating face is offset toward the small end in the tooth width direction and is centered on the tooth height.
- Sliding side: The center of the mating surface is offset toward the large end in the tooth width direction and is centered along the tooth height.

Case “A”

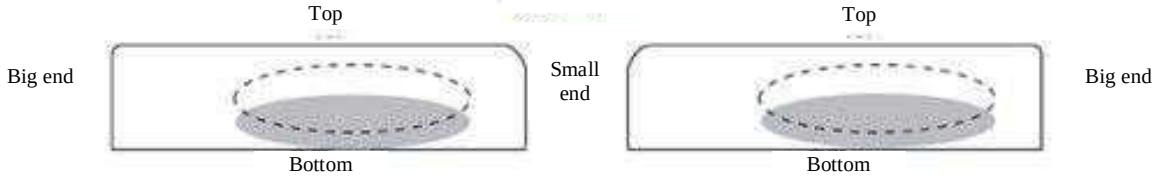


- Driving release: The mating area is too high.
- Driving side: The mating area is too close to the small end.
- Sliding side: The mating area is too close to the large end.
- Correction: reduce the thickness of the gasket and adjust the teeth-side clearance to the maximum.

Case “B”

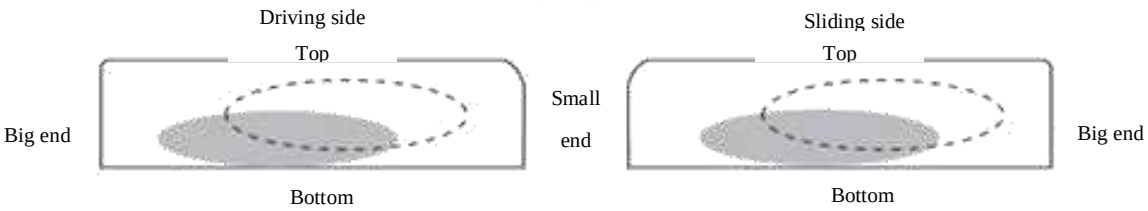
- Driving-sliding: the mating area is too close to the tooth crest.
- Correction: Record the side clearance reading, reduce the gasket thickness, and set the side clearance to the correct value.

Case “C”



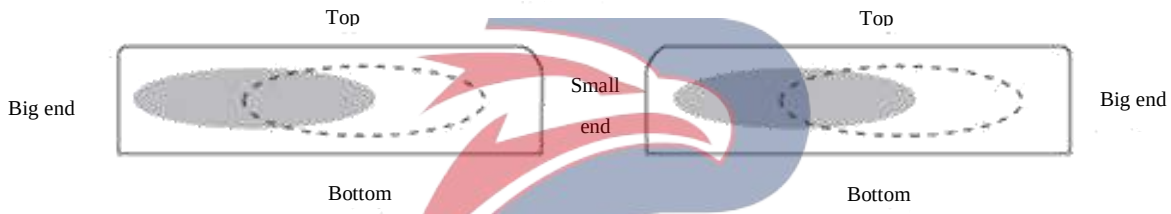
- Driving - sliding: The engagement zone is too close to the bottom.
- Correction: Record the side clearance reading, increase gasket and set the side clearance to the correct value.

Case “D”



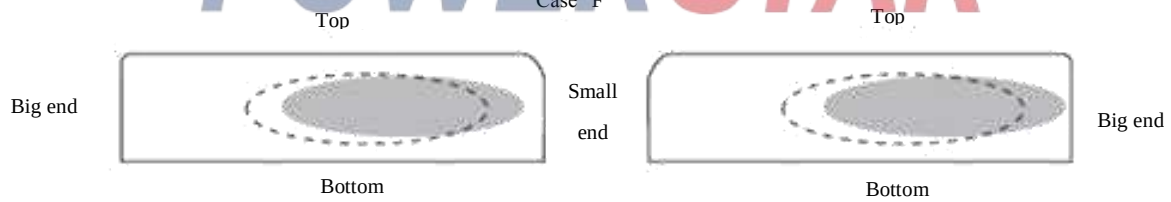
- Driving - sliding: The engagement zone is too close to the bottom.
- Convex: too close to the big end.
- Concave: too close to the small end.
- Correction: Increase the thickness of the gasket and adjust the teeth-side clearance to the maximum.

Case “E”

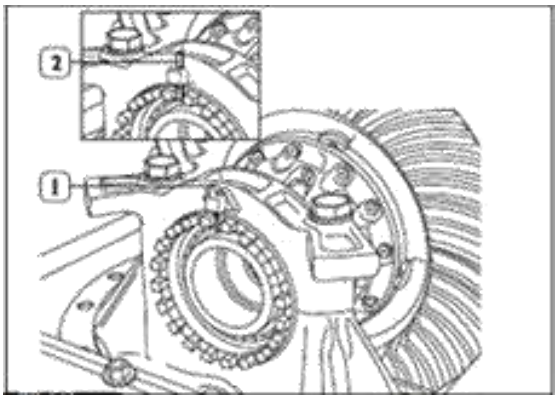


- Convex: too close to the big end.
- Concave: too close to the small end.
- Correction: reduce the side clearance.

Case “F”



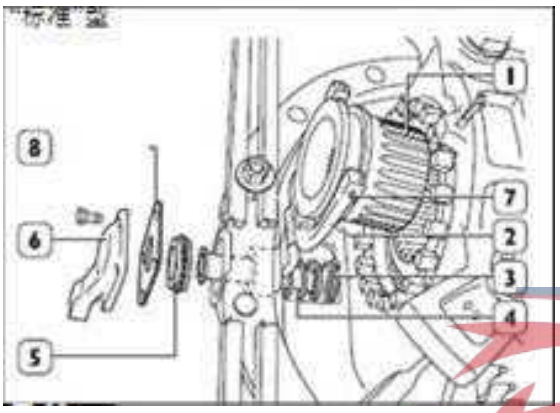
- Convexity: too close to the small end.
- Concavity: too close to the large end.
- Correction: increase the side clearance.



Only for the final drive with differential lock:

1 Install the shift sleeve (1) and shift fork (2).

2 Apply a small amount of special grease to the working bevel of the shift fork.



3 Use a tool (3) and shift shaft (4) to place the shift fork and spring-loaded shift sleeve.

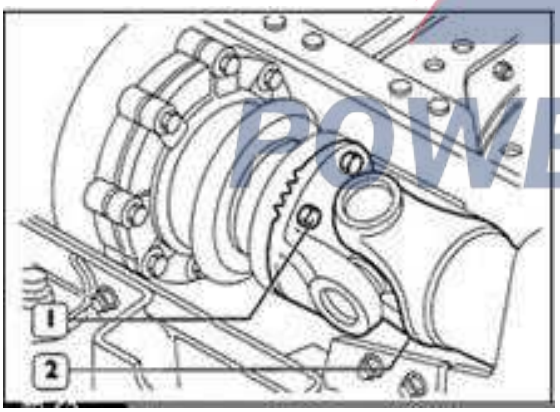
4 Install the piston (5) with "O" ring. Before assembling the piston, apply the specified grease (such as Molikote44) to on the "O" ring.

5 Install the cylinder end cap (6) with gasket (8), insert the bolts with gaskets, and tighten with torque wrench at the torque of 12 ~ 16Nm.

Replace the bearing pedestal oil seal

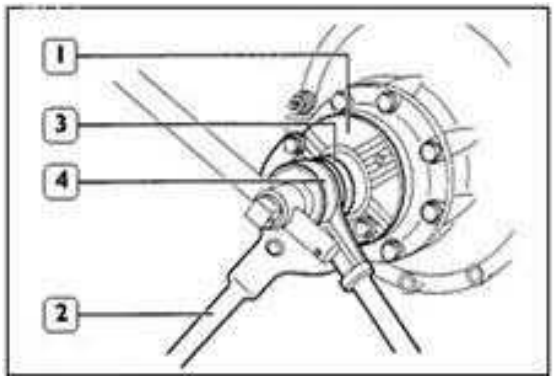
The following maintenance operations can be carried out on the final drive mounted on the vehicle.

Removal



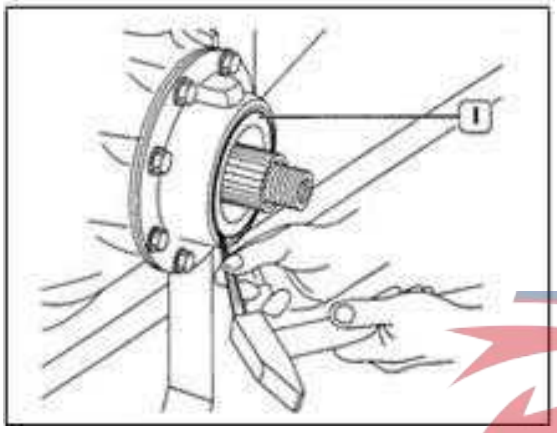
1 Loosen the nut (1) that connects the transmission shaft to the input flange

2 Disconnect the transmission shaft (2) and secure it to the chassis.

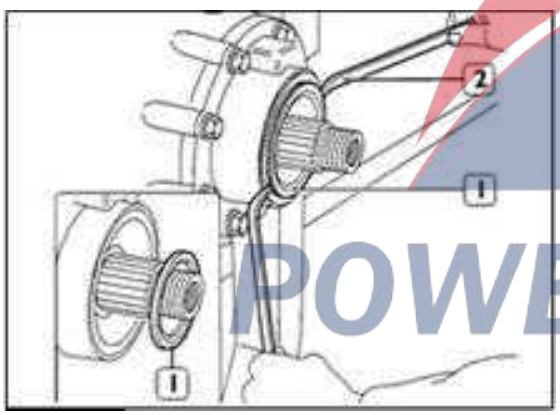


3 Use a tool (2) to stop the flange (1) from rotating.

4 Loosen the drive bevel gear nut by using the wrench (3), torque rod (4) and tool, and remove the flange (1).



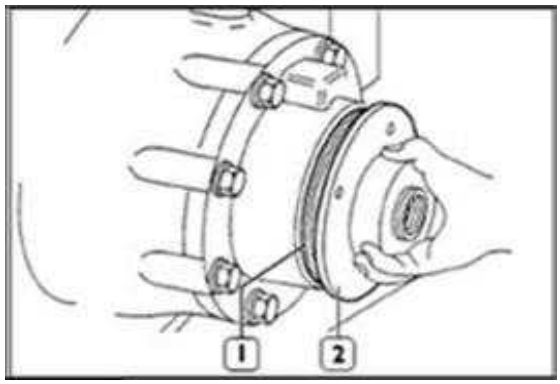
5 Use the appropriate tool to pry out the oil seal (1) from the two opposite points.



6 Pry with two levers (2) to remove the oil seal (1).

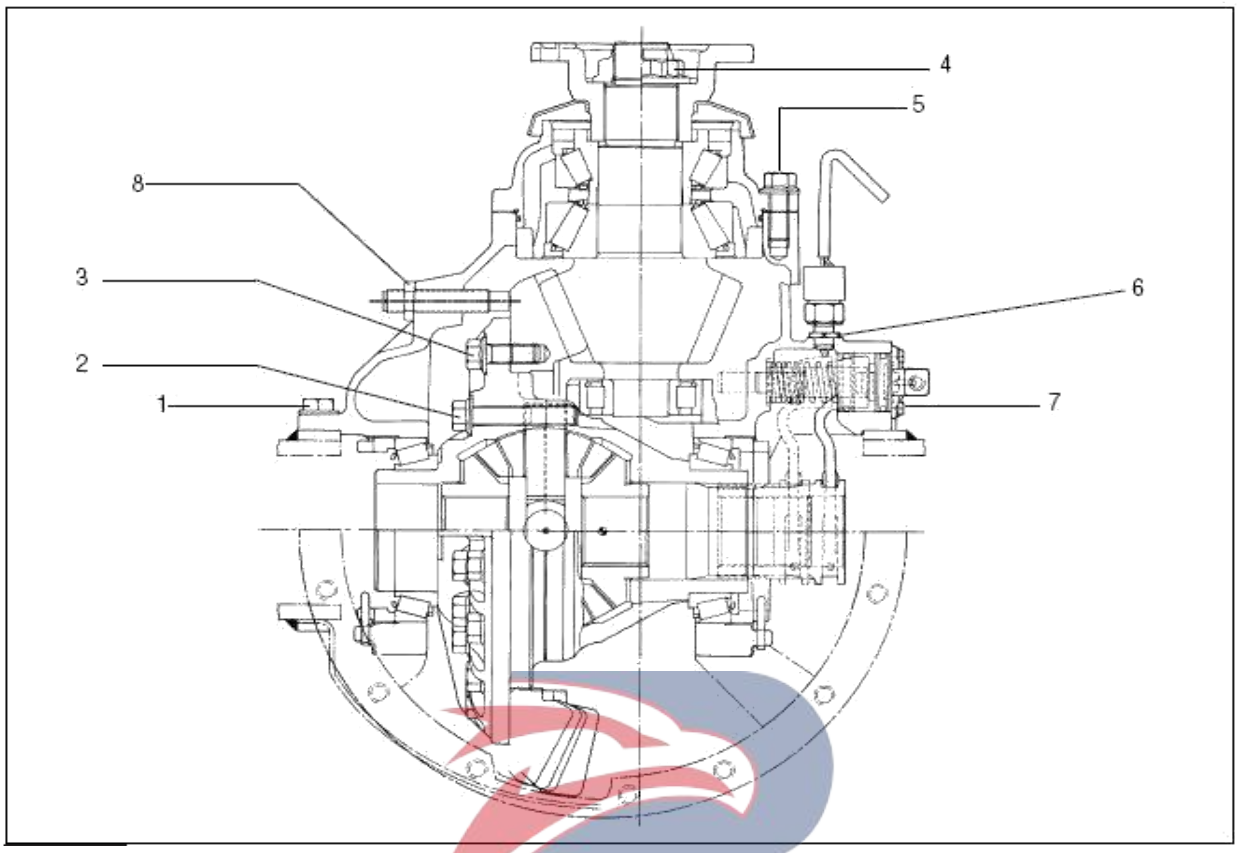
Assembly

1 Carefully clean the oil seal seat to avoid dirt or grease residue.



2 Place a new oil seal (1). Screw in the guide nut machined from the old drive bevel gear nut with the maintenance tool (2) and embed the oil seal into the top.

3 Loosen the guide nut and remove the installation tool (2). Reinstall the flange and screw in a new nut, and tighten it with a torque wrench by the specified torque. Reinstall the transmission shaft and tighten the fitting nut by the specified torque.



Name	Torque	Nm	◦	kgm
1 Studs and / or final drive to the axle housing (M16 * 2Durlock)	The torque of the first phase The torque of the second phase	100	80-90	10
2 Differential case bolts	The torque of the first phase The torque of the second phase	100	110-120	10
3 Driven bevel gear bolts	The torque of the first phase The torque of the second phase	100	80-90	10
4 Drive bevel gear nuts		1350-1670		135-167
5 Drive bevel gear bearing pedestal bolts	The torque of the first phase The torque of the second phase	100	60-70	10
6 Sensor switch locknut		35-45		3.5-4.5
7 Differential cap bolt		10-12		1.0-1.2
8 Thrust bolt and nut (optional)		270-335		27-33.5
9 Bearing cap bolts (not marked)		650-810		65-81

3. Trouble removal

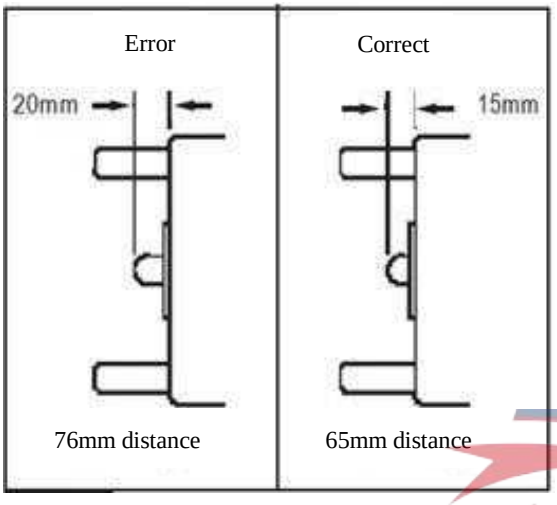
Fault	Possible causes	Corrective measures
1 Hub noise and possible overheating	Use a lubricant not specified by the manufacturer	Release the lubricant from the axle housing and inject with the specified type of new lubricant
	Low oil level	Rise the oil level
	Side clearance between the drive and driven bevel gear does not meet the requirements	Remove the final drive. Find reasons that may cause gear clearances to be unqualified. Adjust as required.
	Gear damaged	Replace a new pair
	Improper use of retarder / exhaust brake	Replace the damaged parts
	final drive / exhaust brake torque may be too large	Check retarder / exhaust brake torque and settings. Look for possible damage to bevel gears and bearings.
2 The differential strikes irregularly during acceleration / deceleration	Thrust washers on the cross shaft of the differential drive bevel gear are worn	Replace all thrust washers
	Differential spider gear or differential cross shaft is worn	Replace worn parts
	Driving medium on the hub are loose	Inspect and tighten the wheel nuts at regular intervals as required
	Spline on the half axle gear is worn	Replace worn parts
3Noise in ruuning	Oil level inside the axle housing is low	Rise the oil level
	Gear and / or bearings worn or damaged	Replace the damaged parts
	Bearings are adjusted imporperly or damaged	Adjust or replace the bearing as required
4 Oil leak	Oil level inside the axle housing is too high	Replace the oil seal;
	Vents blocked	Clean or replace vents
	Oil seal is damaged	Replace the damaged oil seal
	Bolts / nuts loose	Clean the bolt and tighten by the specified torque
	Seal between the axle housing and final drive is damaged	Disassemble the final drive as required, inspect and clean all sealing surfaces

Product Description Section III ELSA225H / EX225L disc brake

1 Induction

Air chamber

ELSA225H, EX225L disc brakes are provided with a 65mm-stroke air chamber.



The air chamber is provided with the push rod with extension elongation of 15mm.

It is important to install the air chamber correctly. For the wrong installation in the side diagram, the stroke is too long of 76mm, and the set length of the push rod is too long of 20mm

Caution:

If the wrong brake air chamber is installed, when securing the air chamber to the caliper body,

Incorrect length of the push rod will result in brake dragging which may cause the brake to be locked.

The air chamber can be identified by the part number on the nameplate of air chamber.

Pad Wear Warning Indicator (PWWI)

ELSA225H is equipped with PWWI, EX225L is not equipped with PWWI

Continuous Wear Sensor (CWI)

Both the ELSA225H and EX225L can be provided with CWI

2 Operation inspection

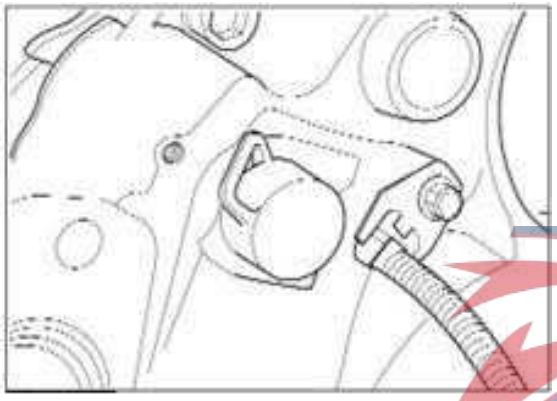
Automatic regulator function test

This operation is usually performed when the vehicle is driven onto the inspection ditch or the vehicle is lifted.

When the vehicle is parked, firmly block the wheels with the wedges and unlock the parking brake. When necessary, remove the wheels;

Park the vehicle on a hard field and block the wheel with a wedge.Apply pressure and inflate the system sufficiently to ensure that the parking brake is fully unlocked, as applicable. Lift the axle with a jack, attach a suitable axle stand securely and disassemble the wheel.

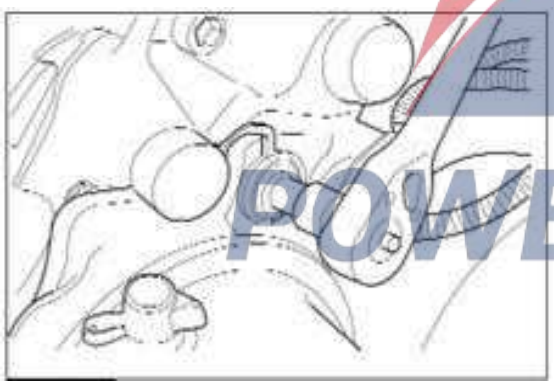
Steps



Remove the dust cover of the manual regulator and loosen the manual regulator for one turn to increase the clearance between the friction plate and the brake disc, or

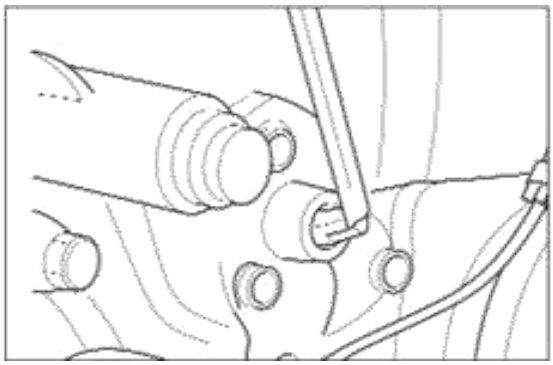
When the wheel is removed, set the clearance between the friction plate and the brake disc as a measurement gap of about 2-3 mm,

Loosen the brake, place a suitable 10mm socket wrench on the manual adjuster and turn it freely clockwise (see from the air chamber side) for 1/4 turn at least.



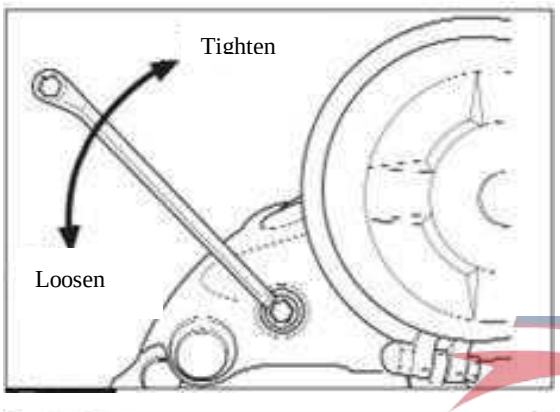
Caution: If the wrench cannot be turned when loosing, turn the wrench for 1/4 turn to the opposite direction

WARNING: Always carefully loosen / tighten the brakes manually by using a suitable wrench. The maximum torque of any rotating direction shall not exceed 40Nm, and the electric tools shall not be used



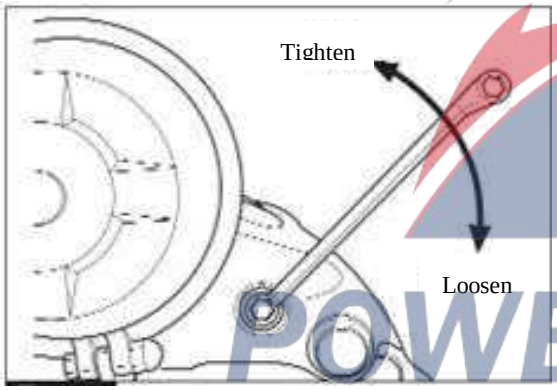
As a regulator function indicator; place a 10mm ring wrench on the manual regulator and turn it freely clockwise (see from the air chamber side) for 1/4 turn at least.

Caution: Do not hold the wrench while operating the brake.



Operate the service brake for several times at a pressure of approx. 1 to 2 bars.

Pay attention to the direction of rotation of the ring wrench. It shall be clockwise when seeing from the air chamber side, as shown in the diagram



Note: As the number of brake applications increases, the amount of movement of the ring wrench will decrease.

Possible faults:

Ring wrench cannot rotate or rotates back and forth

In the event of any of the above faults, the brake caliper assembly must be replaced. Refer to the Section "Replacing the brake caliper". After a successful inspection, set the operating clearance between the brake disc and the friction plate. To do this, turn the manual adjuster clockwise (see from the air chamber side) until the resistance is felt to increase, and both friction plates touch the brake disc. Then turn the adjuster back for1/2 turn to create an operating clearance. Reinstall the dust cover on the manual regulator to inflate the air system and brake 5 times to stabilize the friction plates, so that the automatic regulator can be set with the correct operating clearance.

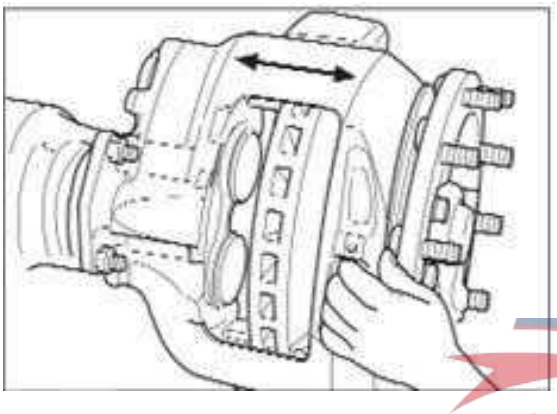
When removing the wheel to perform the adjuster test, check and confirm that the brake disc is free to rotate.

After confirming, reinstall the wheel and tighten the nut to the braking torque specifications of the vehicle manufacturer. Use jacks to lower the vehicle to the ground to carry out the road test.

Check slide operation of the brake caliper

Park the vehicle on a hard field and block the wheel with a wedge. Apply air pressure to unlock the parking brake and lock the spring brake retract bolt (in use). Lift the axle with a jack and maintain a safe support. Remove the wheels and drain the system of air.

Disassemble the friction plate as described in Section 3 "Replacing the friction plate".



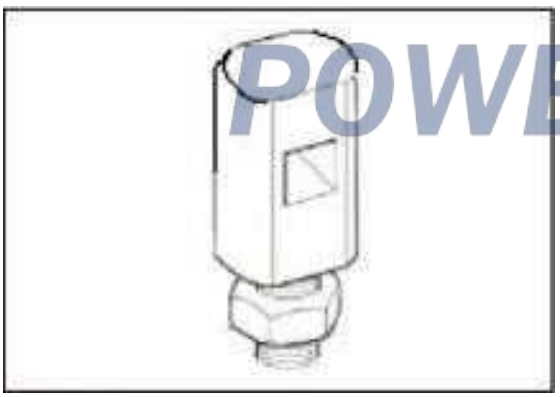
Move the brake caliper back and forth along the direction of the arrow as shown in the diagram. It must be easy to push / pull to brake manually

CAUTION: When sliding the caliper, be careful not to damage the dust cover of the guide pillar.

Caution:Be careful not to get stuck while sliding the brakes

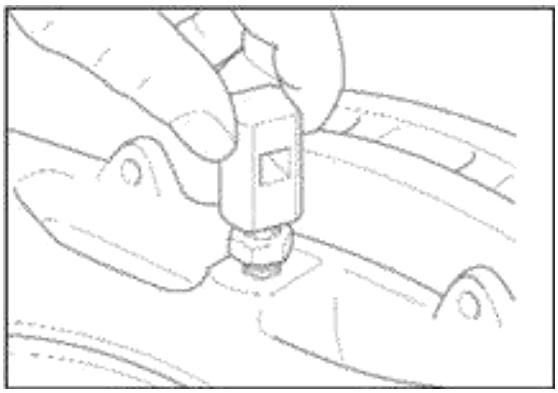
Check the wear of the guide pillar bushing

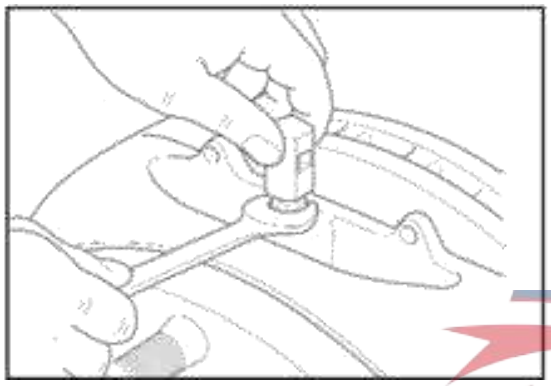
Radial inspection



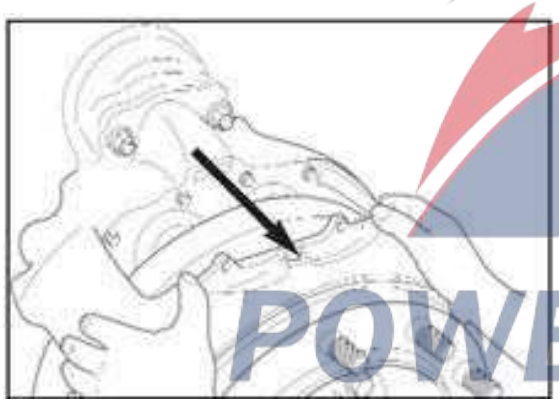
Disassemble the friction plate as described in Section "Replacing the friction plate ".

Install the MST1017 service tool of Meritor into the correct position of the threaded hole of the fixing plate of friction plate. The groove of the tool must be parallel to the brake disc.



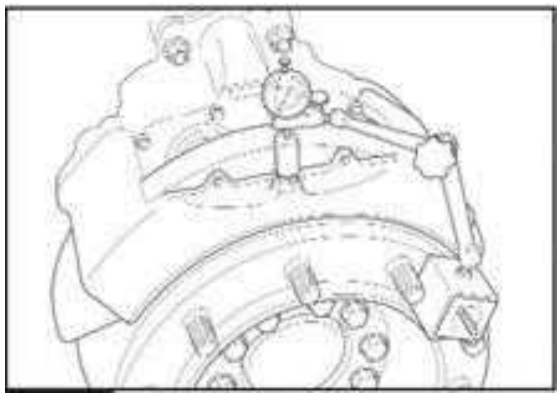


Use a lock nut to lock the tool in place as shown in the diagram

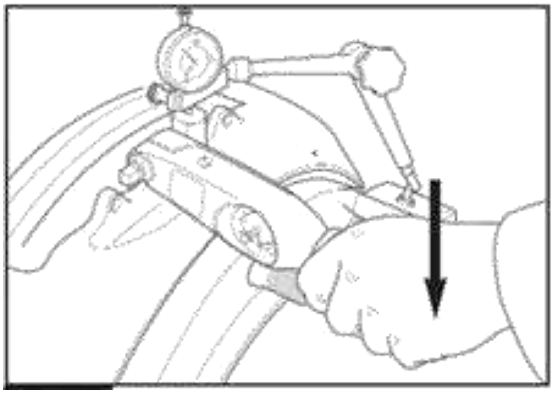


Place the brake in a status of the new friction plate by fully sliding the brake caliper along the direction of arrow A (towards the hub)

Caution:Be careful not to get stuck while sliding the brakes

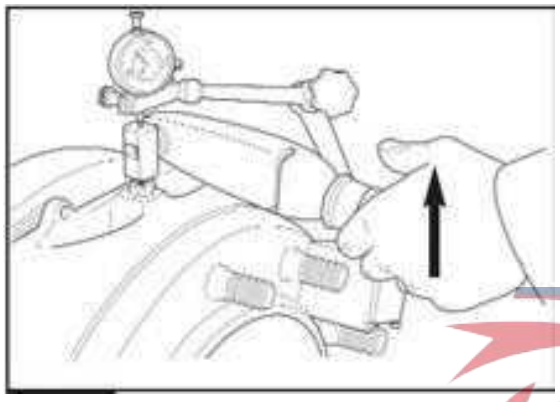


Attach a dial indicator in place on the wheel hub, opposite to the service tool, as shown in the diagram. Make sure that the hub does not rotate and then return the dial indicator to zero.



Install the torque wrench on the tool as shown in the diagram above.

Rotate the torque wrench to 25 Nm in the correct direction without sliding the brakes and note the dial indicator readings.



Remove the torque wrench and install it in the sleeve on the other side of the service tool

Note: Do not reset the dial indicator.

Rotate the torque wrench to 25 Nm in the correct direction without sliding the brakes and note the dial indicator readings.

Note: When turning the torque wrench, be careful not to change the position of the dial indicator.

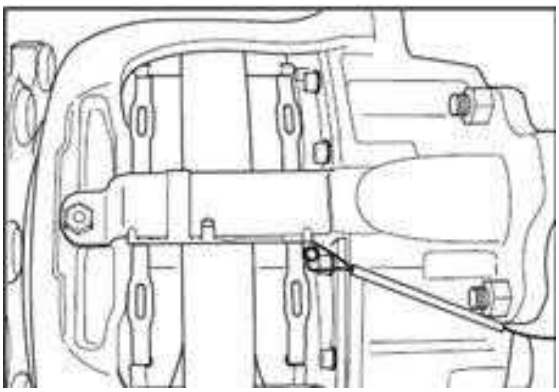
Add the readings of both dial indicators to obtain the total free clearance measurement value.

Note: The maximum acceptable free clearance measurement value is 2.0 mm. If this value is exceeded, pay attention to the guide pillar pin and bushing.

Remove the service tool MST1017 and set the operating clearance and test it while PWWI is in use.

Wear inspection of friction plate

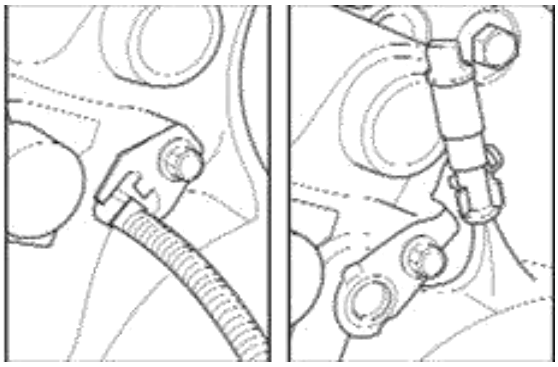
The wear of the friction plate of the ELSA225H / EX225L air disc brake can be monitored by a variety of devices, include any of the following devices or combinations;



a) PWWI (Pad Wear Warning Indicator) mounted to the friction plate (its typical arrangement is shown).

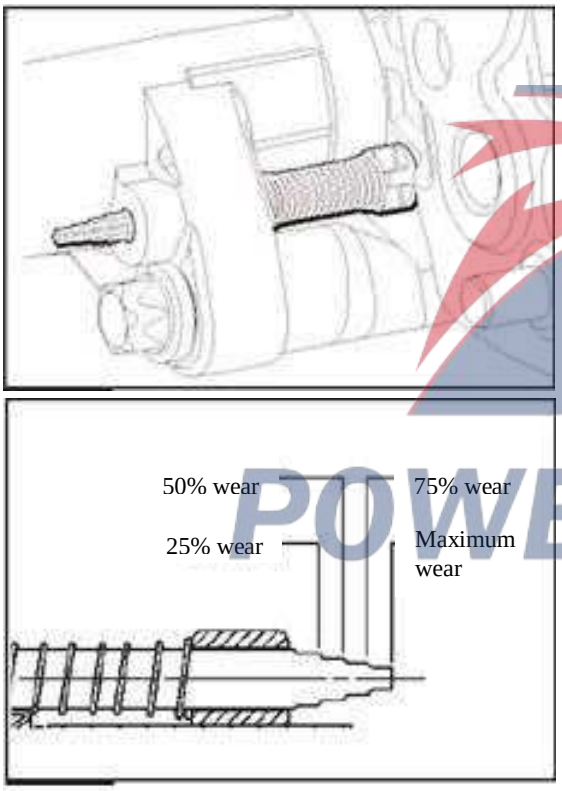
b) Electronic CWS-continuous wear sensor in the brake (Figure a) or switch (Figure b)

c) Visual wear indicator



Both option a and b above can activate the warning light on the instrument panel of the vehicle to indicate the need to replace the friction plate.

When the liner thickness wear to 3.0mm, you should replace the friction plate.If the visual friction plate wear indicator is integrated in the automaton, you can quickly and easily estimate the remaining life of the friction plate.



With the new friction plate, the end of the indicator rod can extend beyond the edge of the caliper. As the friction plate is worn, the visible length of the indicator beyond the edge will decrease. The indicator will increase with each increment equivalent to the wear of the friction plate.

Caution: The friction plate of two wheel on the same axle must be replaced at the same time. Only the vehicle-approved friction plate can be used.

Check and maintain the brake disc

Check whether the brake disc is grooved, cracked, hot cracked, scratched and blued.

Wear suitable eye protection devices when removing dirt, dust and corrosion from the edges of the brake disc. Use gauze when necessary.

Note: A possible way to remove corrosion is to support a screwdriver or scraper on the brake body, and then manually rotate the brake disc.

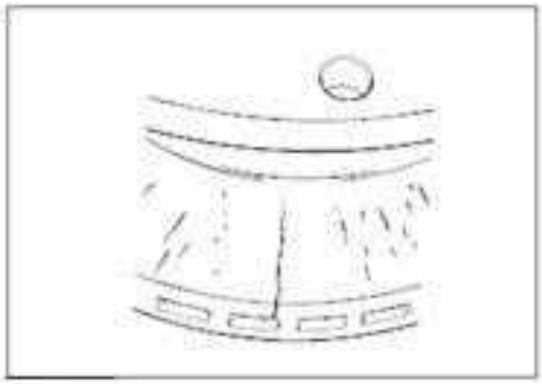
Brake disc

Check and confirm whether the thickness of the brake disc is in accordance with the manufacturer's technical specifications and the specifications detailed in Section 12 "Reworking and replacing the brake disc". If you have any questions regarding the applicability of the brake disc, please refer to the vehicle manufacturer's disposal instructions.

NOTE: Replace the brake disc if the brake disc thickness is not large enough to allow the expected wear before the next replacement of the brake disc.

Caution: The brake disc of two wheel on the same axle must be replaced at the same time. Only the vehicle-approved brake disc can be used.

Check whether there are the following conditions on the two surfaces of the brake disc.



Crack

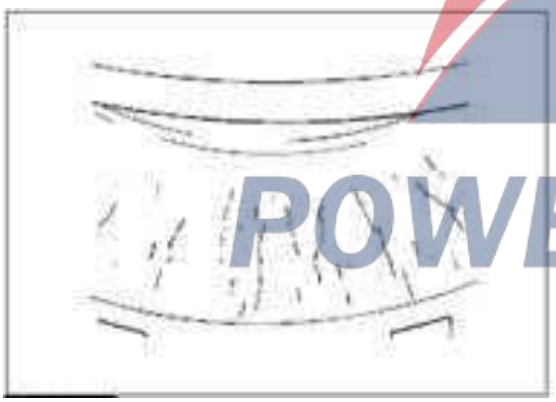
If the crack extends to the vent of the ventilated brake disc or if the crack exceeds 25% of the thickness at the outer edge of the solid brake disc, replace the brake disc.

Hot crack

Hot crack is the minute crack on the surface of the brake disc.

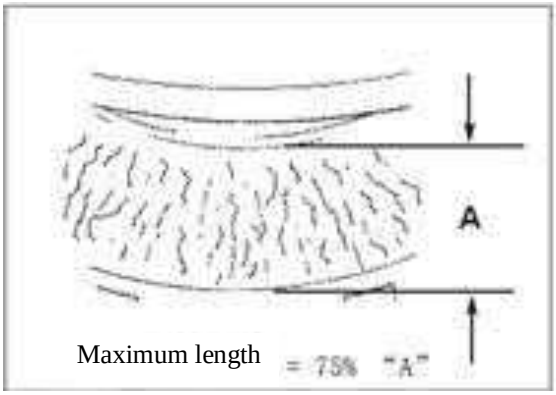
This is the normal condition caused as that the friction surface is heated and cooled continuously.

Braking under normal operating conditions can cause hot cracks to separate and deepen, which increases the gasket wear. There are two types of hot cracks: light and heavy.



Light hot crack

Slight hot crack is the thin and tight crack on the surface of brake disk. Brake discs with light hot crack can be used continuously.



Heavy hot crack

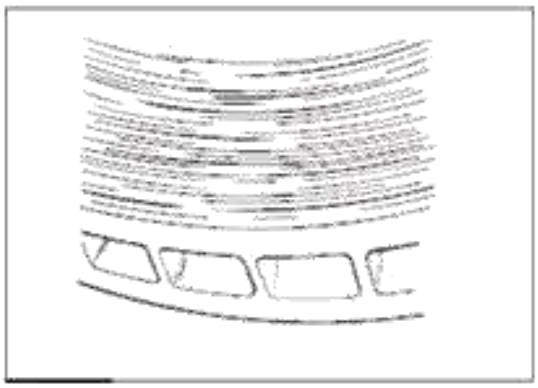
Heavy hot crack is a crack that radially extends on the surface of the brake disc and has a single width of 75% of the width of the brake path.

Brake discs with heavy hot crack shall be reconditioned or replaced.

Note: The roughness of the machined surface shall be 5 mm at most.

Note: Local cracks / blue patches / only one part of the brake disc is cracked

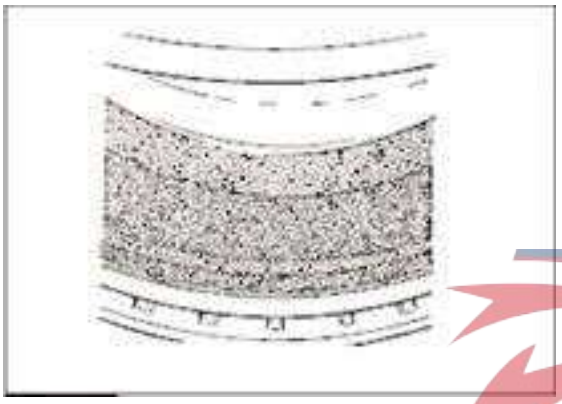
It may be caused by run-out of brake disc or thickness changes. See the vehicle manufacturer's tolerances.



Scratches

Scratches are deep circumferential grooves that appear on both sides of the brake disc. If the grooves or multiple scratches are less than 0.5mm deep, continue to use the brake disc. If the groove / scratch is deeper than 0.5mm, it is recommended to renovate the brake disc.

It is advisable to refurbish the brake disc before installing the new friction lining.



"Blued" brake disc

Blue spots or streaks on the brake disc indicate that there is extreme high temperature during operation.It is advisable to refurbish the brake disc before installing the new friction lining.

Caution: The cause of extremely high temperature must be found out as this can adversely affect the brake performance and the lining wear. Continued operation at extreme temperature can eventually adversely affect the function of the brake

3 Replace the friction plate and pad pressing plate

Caution: The friction plates of two wheels on the same axle must be replaced at the same time

Only the vehicle-approved friction plate can be used.

When the gasket thickness is worn to a minimum of 3mm, the friction plate must be replaced.

Park the vehicle on a hard field and block the wheel with a wedge.Apply sufficient air pressure to the parking brake system to ensure that the parking brake is fully unlocked, unscrew the spring retract bolt, as applicable. Lift the axle with the jack and firmly support it on a suitable stand. Remove the wheels and drain the system of air.Remove all dust from the brake assembly. Make sure that the rubber dust cover fitted to the piston cap and guide pillar is damaged.

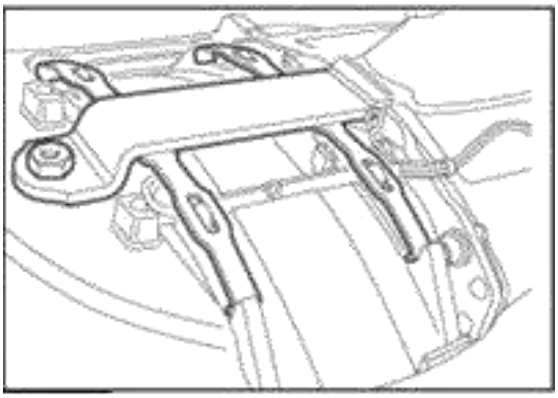
Caution: Do not use air pipes to blow out dust in the brake / brake disc area.

Inhalation of any form of dust can cause inflammation,while life-threatening.

You can also use a damp cloth to wipe the area,

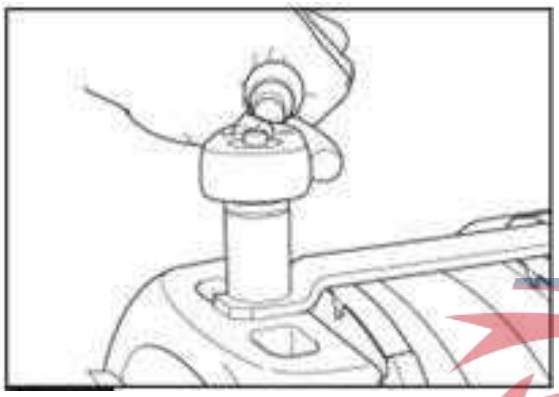
Do not try to blow with air pipe to speed up the drying.

Remove the friction plate pressing plate (with PWWI if installed)

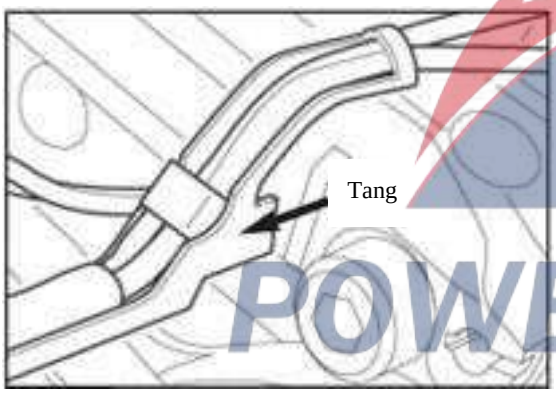


Elsa225 air disc brake can be monitored with the optional PWWI

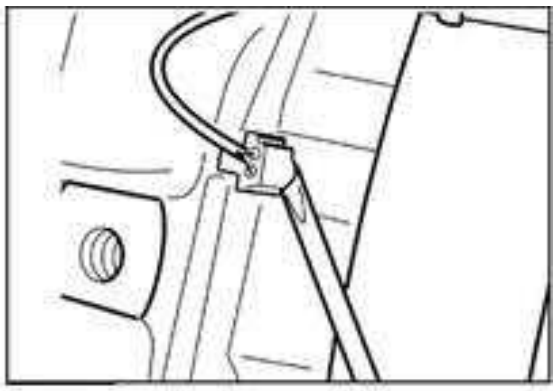
Friction plate wear, different PWWI layout is shown in the diagram.



Remove the friction plates and plate bolts.



Remove the friction plate pressing plate from groove of the brake caliper and remove it from the brake. Remove the friction plate spring. Remove the PWWI assembly and separate the tangs from the caliper body



If the PWWI still needs to be reused, carefully remove the two plastic sensors from the corresponding position of the friction plate.

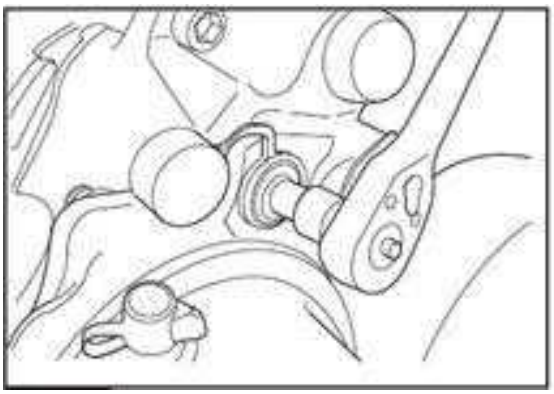
Do not apply excessive force to avoid damage.

Remove the friction plate

Caution:The piston boot must be held in position prior to any loosening operation.If the boot is significantly damaged, the piston must be thoroughly cleaned.

Failure to do so may result in damage to the secondary piston seal.

Note: To remove worn friction plates, it may be necessary to loosen the brake first.



Remove manual regulator cover. Place a suitable 10mm socket wrench on the regulator and turn the wrench counter-clockwise (see from the air chamber side)

Do not completely loose the brake, as long as the inner friction plate can be disassembled.

Note: The torque required when adjusting is larger than tightening.

Warning: After removing the friction plates at this stage, do not loosen the brake.

Always carefully loosen / tighten the brakes manually with a suitable wrench.

The maximum torque in any direction of rotation must not exceed 40Nm, the electric tool never be allowed

Cleaning and inspection

When the friction plate is removed, check the integrity of the guide pillar and piston dust cover. Both shall be strong and free of signs of damage. If damaged, replace it according to the procedures listed in Section 10 and 11.

Check and confirm that the caliper assembly is free to slide on the guide pillar.

Warning: Be careful of your fingers to be clamped when checking the sliding operation of the brake.

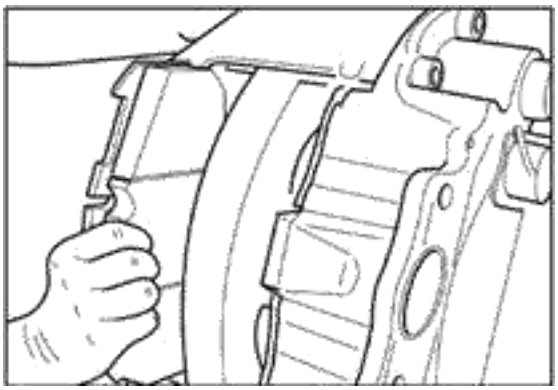
Check whether the brake disc is worn.

In addition, check if there is corrosion, groove, and deep crack traces as described in "operation inspection". If you have any questions regarding the suitability of any part, please refer to the vehicle manufacturer's handling instructions.

Wear a suitable eye protection device when removing all dirt, dust and other debris from the friction plate clearance / bearing surface and the edge of the disc brake, especially the area embedded in the brake.

Support a scraper or old screwdriver on the brake body and rotate the brake disc to see most of the corrosion. Use emery cloth for cleaning if necessary. Remove all dirt, dust and other debris from the friction plate clearance / bearing surface and the edge of the disc brake as they will limit the movement of the friction plates and prevent the brakes from being adjusted sufficiently.

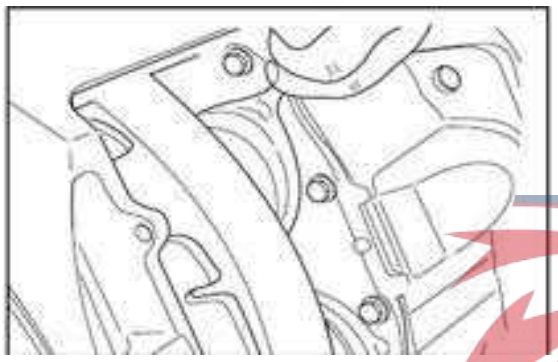
Install a new friction plate



Loosen the brake and pull the caliper outward until there is enough clearance to install the friction plate outside. Install new friction plate outside.

Push the caliper back toward the brake disc until the new friction plate contacts the surface of brake disc.

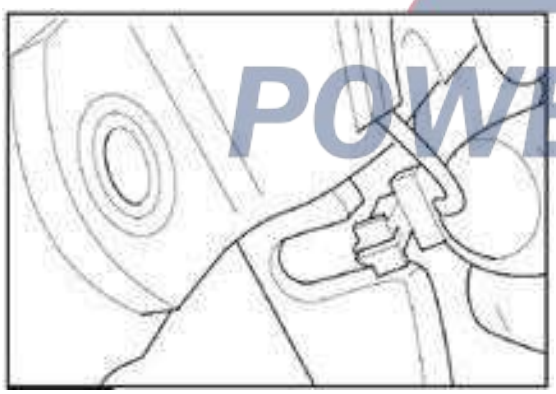
Caution: Care must be taken when sliding the caliper by hand on the dowel pin.Excessive force can cause damage to the guide pillar dust covert



Continue to transfer the brake until the gap between the piston cap and brake disc surface is large enough to accommodate the new friction plate inside. When the brake is fully loosened, it may be necessary to install the new friction plate inside by pulling the ears on the dust cover to release residual air from the raised dust cover.

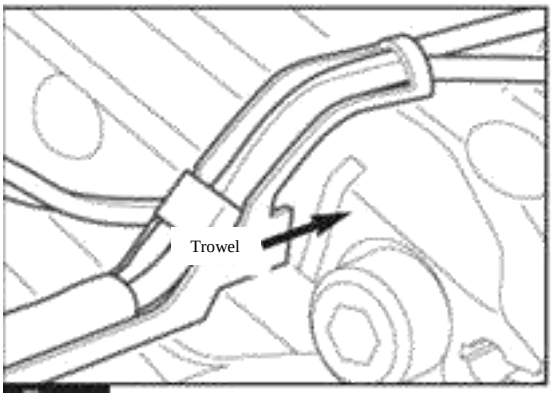
Warning: Always use the appropriate wrench to carefully loosen / tighten the brakes manually.

The maximum torque in any direction of rotation must not exceed 40Nm, the electric tool never be allowed



Install the PWWI plastic sensor in the friction plate.

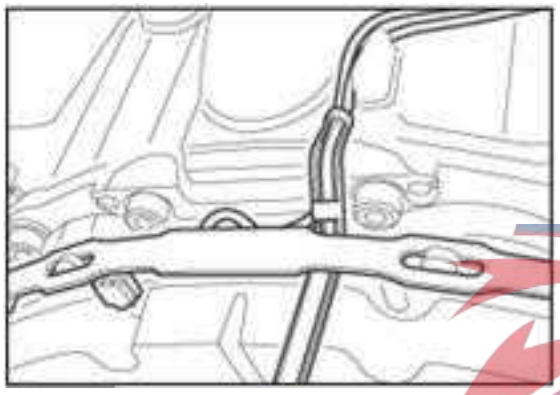
Do not apply force too much, but make ensure that it can be pushed into the bottom.



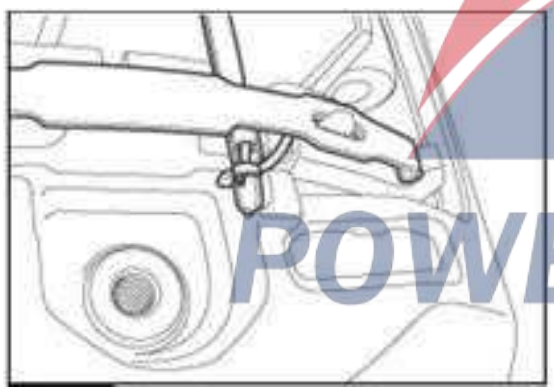
Position the PWWI assembly in the brake and engage the tang to the caliper body

Make sure that the PWWI line is laid above the bottom of the friction plate and away from the brake disc.

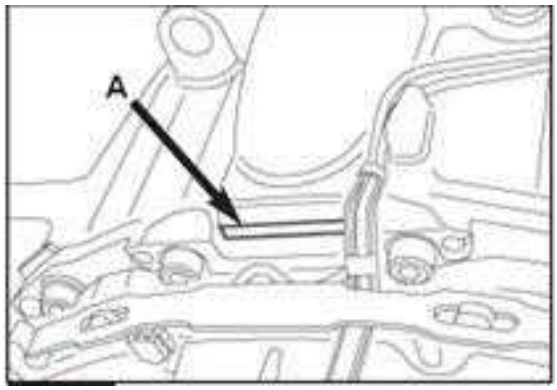
Friction plate spring and pad pressing plate



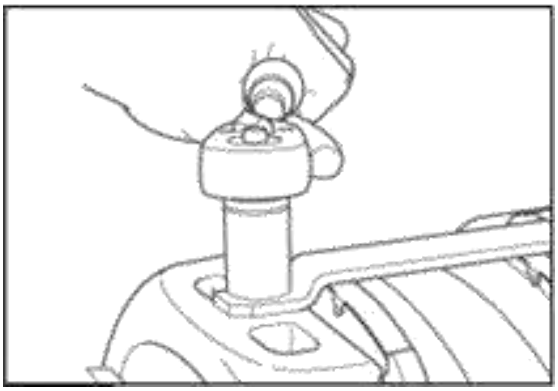
Reinstall the two friction plate springs to ensure that they are correctly positioned in the back plate of the friction plate. The diagram shows the mounting position of the inner friction plate spring.



The left picture shows the mounting position of the outer friction plate spring.



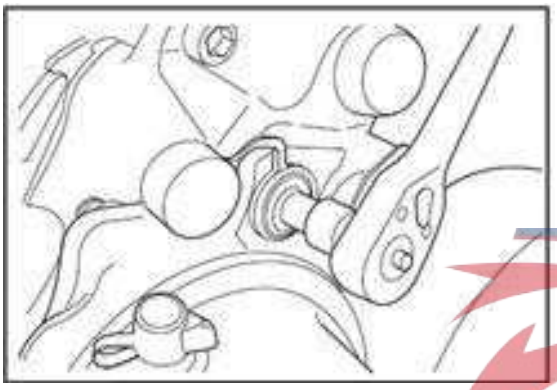
Insert the friction plate fixing plate into the groove of the brake caliper body



Reinstall the friction plate fixing plate bolts and tighten it by a torque of 33-40 Nm

Reconnect the PWWI to the vehicle harness.

Manual adjustment



Set the initial running clearance and locate the 10mm socket wrench on the manual adjuster, place a suitable 10mm socket wrench on the regulator, and turn the wrench clockwise (see from the air chamber side).

Continue adjusting the brake until the resistance increases and both friction plates touch the brake disc. Then use a wrench to turn the adjuster back for 1/2 turn to create a running clearance.

Note: The torque required when adjusting is larger than tightening.

Make sure the sealing area on the cover plate is clean. Always reinstall manual regulator dust cover.

Warning: Always use the appropriate wrench to carefully loosen / tighten the brakes manually.

The maximum torque in any direction of rotation must not exceed 40Nm, the electric tool never be allowed

Inflate the air system and brake it for 5 times to stabilize the friction plates and set the correct running clearance of the auto-regulator. Check whether the brake disc can rotate freely.

Install the wheel and tighten the nut to the torque specified by the vehicle manufacturer. Use a jack to lower the vehicle to the ground and conduct the road test.

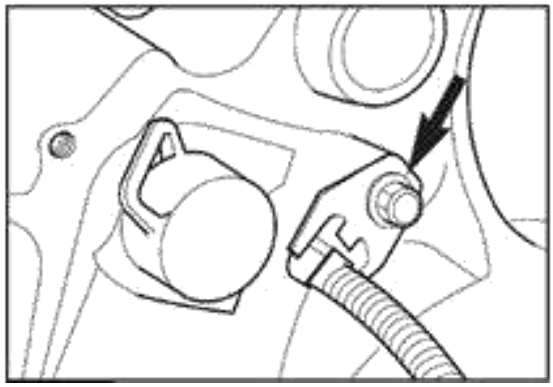
4 Change CWS (sensor / continuous wear)

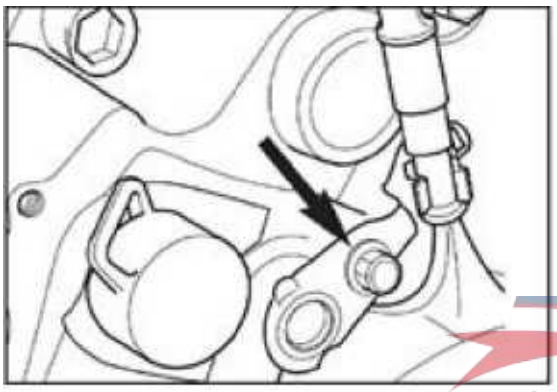
Park the vehicle on a hard field and block the wheel with a wedge.

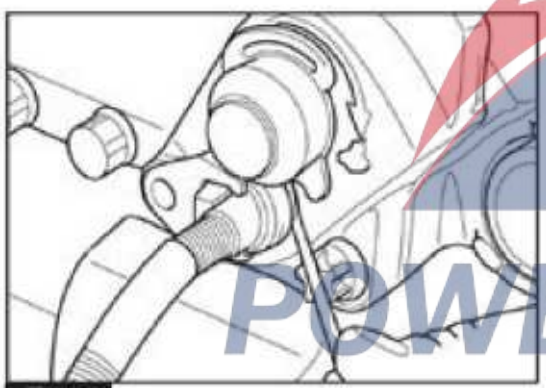
Apply air pressure to unlock the parking brake and unscrew the spring retract bolt (in use).Lift the axle with a jack and maintain a safe support.Remove the wheel and drain all air from the system.Remove any dust from the brake assembly. Make sure the rubber boot is not damaged.

Caution:Do not use air pipes to blow out dust in the brake / brake disc area.Inhalation of any form of dust can cause inflammation, while life-threatening.Use a vacuum brush to remove dry brake dust.You can also use a damp cloth to wipe the area, do not try to use the air pipe to speed up the drying time

Remove sensor / switch







When applicable, remove the electronic pad wear sensor or switch mounting bolts, carefully pry out the sensor / switch assembly and discard it.

Install sensor / switch

Clean sensor / switch inspection hole and mounting surface of the brake caliper and ensure that no debris falls into the caliper body.

Apply a small amount of grease to the O- seal ring on the wear sensor / switch of the new electronic friction plate. Install a new sensor / switch on the caliper to ensure that the sensor rod is properly positioned on the sensor gearbox of the caliper, as applicable.

Caution: Only greases supplied with replacement parts / kits or specified by the vehicle manufacturer can be used. No other type of grease may be used under any circumstances.

Note: Make sure the regulator dust cover fixing band is not jammed under the sensor. Install new fixing bolt by the torque specified in "Maintenance and Specifications", tightened it and inflate the system. Screw in the spring brake retract bolt (where applicable).

Reinstall the wheels, remove the axle support and lower the vehicle to the ground.

5 Replace the brake

Remove the brake

Park the vehicle on a hard and level surface and block the wheel with a wedge.

Apply air pressure to disengage the parking brake and unscrew the spring retract bolt (in use). Lift the axle with a jack and maintain a safe support. Remove the wheel and drain all air from the system.Remove any dust from the brake assembly. Make sure the rubber boot is not damaged.

Caution:Do not use air pipes to blow out dust in the brake / brake disc area.Inhalation of any form of dust can cause inflammation, while life-threatening.Use a vacuum brush to remove dry brake dust.You can also use a damp cloth to wipe the area, do not try to use the air pipe to speed up the drying time.

Important note:Make a note of the brake assembly number to obtain the correct repair kit.

Note: To reinstall the original brake assembly, observe the following precautions.

Caution:The piston boot must be held in position prior to any loosening operation.If the boot is significantly damaged, the piston must be thoroughly cleaned. Failure to do so may result in damage to the secondary piston seal.

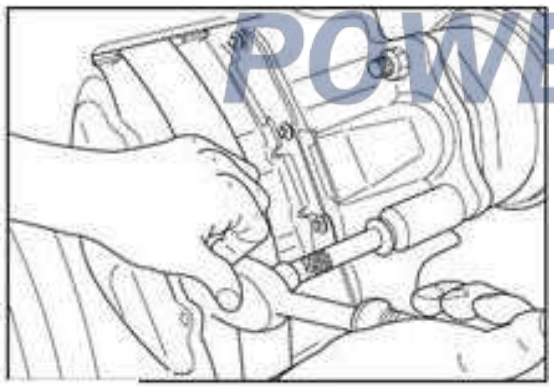
The brake assembly can be fitted with either of the following wear indicators, but the indicator must be disconnected before removing the brakes.

PWWI (Pad Wear Warning Indicator)

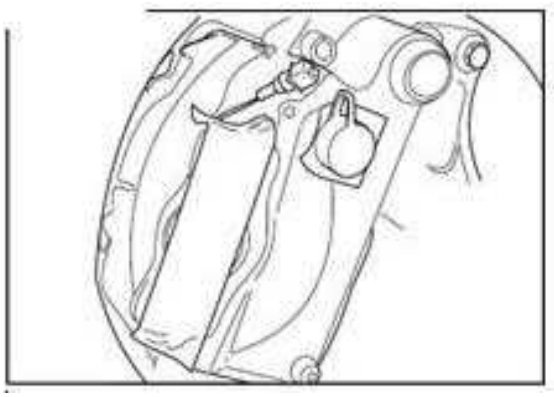
Disconnect the PWWI plug (mounting location).

CWS (continuous wear sensor / switch)

Disconnect the sensor cable and remove the sensor / switch as described in Section 3 "Replacing CWS". When reinstalling the original brake caliper assembly, block the CWS mounting hole to prevent dust from entering the caliper body.



Remove the air chamber from the brake body by removing two nuts



Tape the exposed mounting holes of air chamber to prevent debris from entering the caliper body.

Note: The support position of the air chamber below the wheel cavity shall not interfere with the brake disassembly or generate the improper tension to the connected air tube.

Disassemble the friction plates and PWWI (where applicable) as described in Section "Replacing the friction plates".

Then remove the brakes by removing the bracket bolts following the vehicle manufacturer's instructions.

Note: The brake assembly is heavy, about 50kg (110 pounds). When removing the fixing bolts, be sure to hold the brakes in place to avoid damaging the threads.

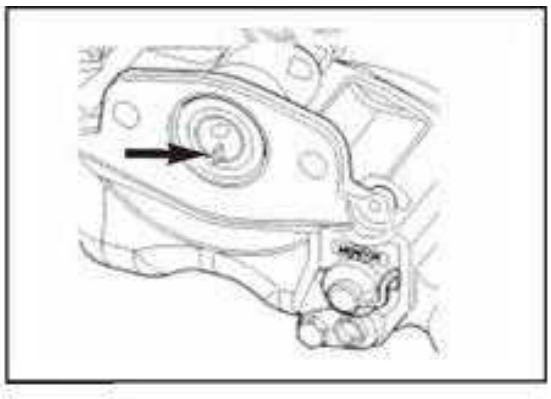
Caution: Be careful of your fingers to be clamped between the brake caliper and the bracket when lifting the brake assembly, both of which can slide freely relative to each other. At the same time, prevent any sudden movements, which will lead the parts to slide rapidly and damage the rubber dust cover area.

Install the brake

Make sure all mounting surfaces are clean and free of corrosion.

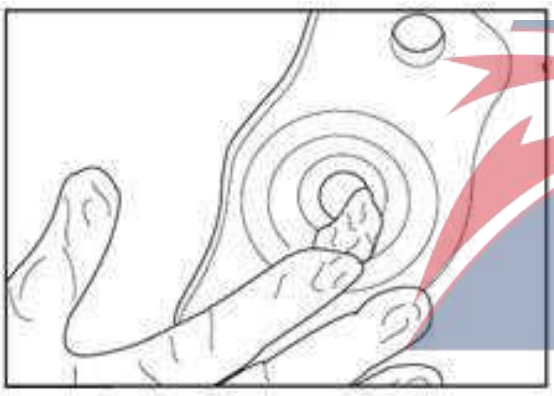
With the assistance of others, carefully lower the brake assembly to the axle mount bracket.

Avoid the brake from acting excessively during positioning, and the brake shall not fall onto the axle, which may cause damage to the guide pillar dust cover. Install new fixing bolts and tighten it by the torque recommended by the vehicle manufacturer.



Note: If installing a new brake assembly, the seal ring must be removed from the chamber before installing the air chamber.

Note: If replacing the original brake assembly, remove the tape from the mounting hole of air chamber.



Lubricate the lever ball socket slightly with the specified grease.

Caution: Only greases supplied with replacement parts / kits or specified by the vehicle manufacturer can be used.No other type of grease may be used under any circumstances.

Place the air chamber on the brake caliper assembly, make sure that the mount surface and push rod are clean and the push rod is properly positioned in the lever ball socket. Secure the air chamber to the caliper assembly and tighten by the torque recommended by the vehicle manufacturer.

Or tighten the two nuts with a preload torque of 80-100 Nm at the beginning of T to ensure that the seal ring of the air chamber is not deformed.

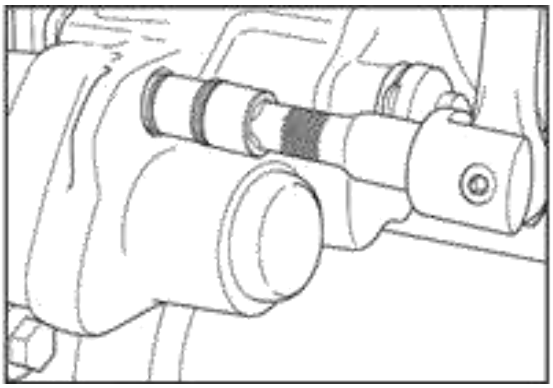
Tighten it by the torque of 180-210Nm. In use, remove the jam protector from the CWS bore and reinstall the CWS as described in "Replacing a CWS."

Install or reinstall the friction plates and PWWI (where applicable), as described in "Replacing the friction plate ", set the initial operating clearance and test.

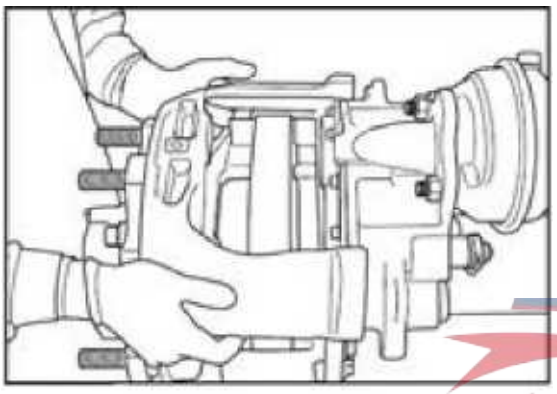
6 Replace the auxiliary pliers

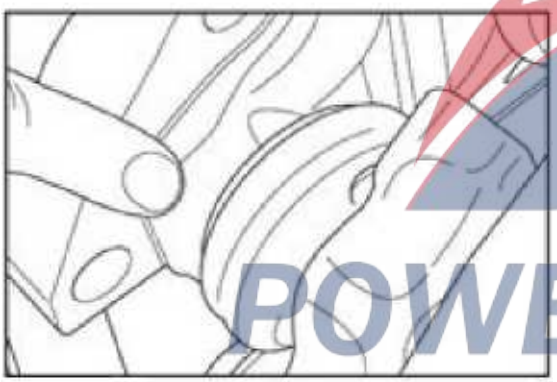
Remove the auxiliary pliers

As described in Section "Replacing the friction plate", install a new or reinstall friction plate and PWWI (where applicable), set initial running clearance and test.

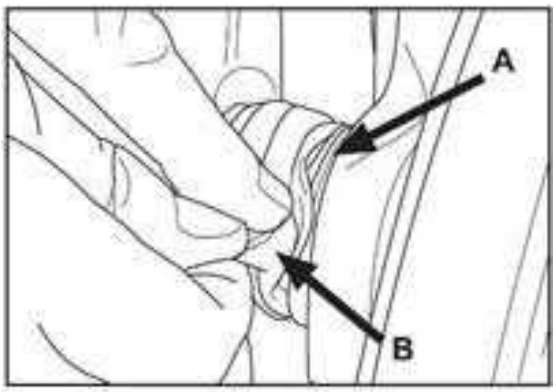


Hold the auxiliary pliers by hand and loosen the four bolts of auxiliary pliers. Remove and discard these bolts (they cannot be used again). Carefully remove the auxiliary pliers.





Note: Make sure the caliper does not slip off the guide pillar. Make sure the mating surfaces of brake caliper are clean. Check if there are any signs of damage to the dust cover of the guide pillar and if the dust cover is reliably positioned. If you have any doubt, make replacement following the procedures described in "Guide pillar, dust cover race, and bushing".



Pay special attention to that whether the mounting position is correct A and dust cover is damaged, such as cracks or tear B

Install the auxiliary pliers

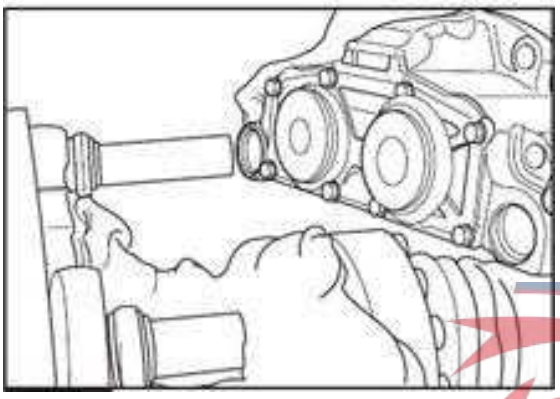
Keep the auxiliary pliers against the caliper body and do not damage the dust cover. Install 4 new bolts of auxiliary pliers while supporting the weight of the auxiliary pliers. Note: There are two kinds of fixing bolts of auxiliary pliers are available. Tighten the bolts by the specified torque as described in Section 13 "Maintenance and Technical Specifications". Reinstall the friction plates and PWWI as described in "Replacing the friction plate" (where applicable), set the initial operating clearance and test.

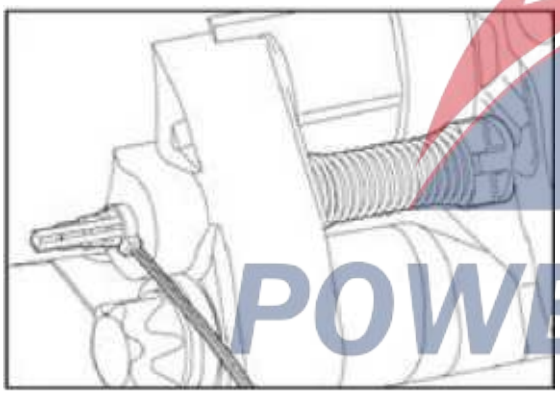
7 Replace the brake caliper and visual wear indicator

Remove the brake assembly

As described in Section "Replacing the brakes", support the vehicle and remove the air chamber.

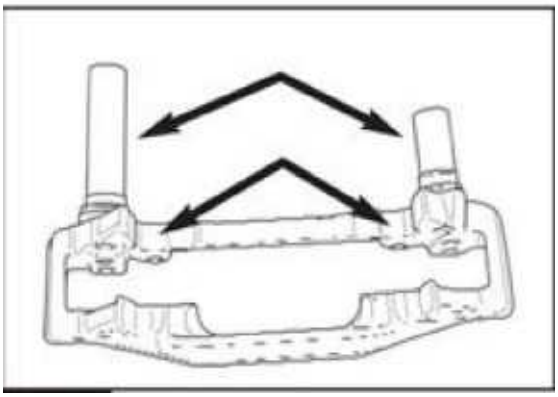
Where applicable, remove CWS as described in the Section "Replacing the CWS". When reinstalling the original caliper assembly, block the CWS mounting hole to prevent dust from entering the interior of the caliper body. Disassemble the friction plate as described in Section "Replacing the friction plate". Remove the auxiliary pliers as described in Section "Replacing the auxiliary pliers". Important note:Make a note of the brake assembly number to obtain the correct repair kit.





Carefully slide the brake caliper out of the guide pillar fastened to the bracket. It is best to fix the visual wear indicator and spring (where applicable) before removing the caliper.

This can prevent the spring load indicator from popping when the brake caliper is removed. Make sure that the visual wear indicator is not damaged.



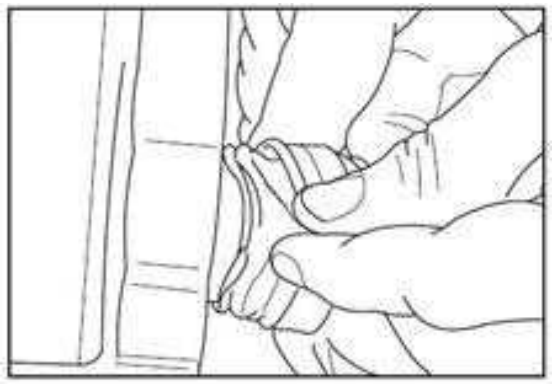
Clean and inspect the bracket for any signs of damage or wear, and pay particular attention to the friction plate support area and guide pillar.

If there is any doubt as to the suitability for further maintenance, replace with new guide pillar and, if necessary, replace the new bracket. Clean and inspect brake disc as described in "Operation inspection".

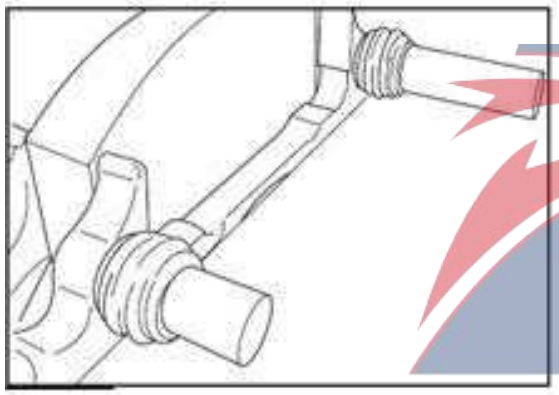
Replace the visual wear indicator

Remove the shaft retainer of the visual wear indicator with the spring by the brake caliper. Install the new spring on the new indicator shaft. Slide the indicator shaft into the caliper and put it in the same position as before.

Install the brake caliper assembly

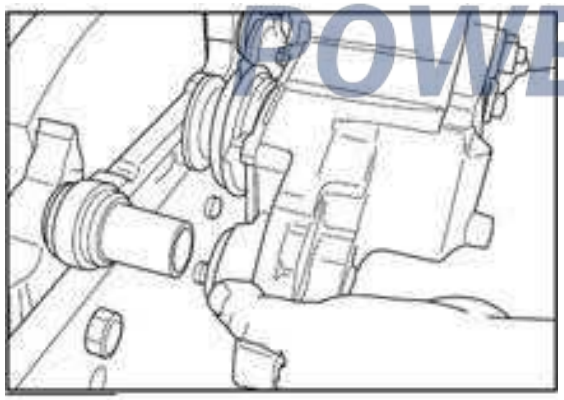


Lightly lubricate the inner surface of the new guide pillar dust cover and install it on the guide pillar. Make sure that the bayonet of the dust cover is properly installed on the race of the bracket.



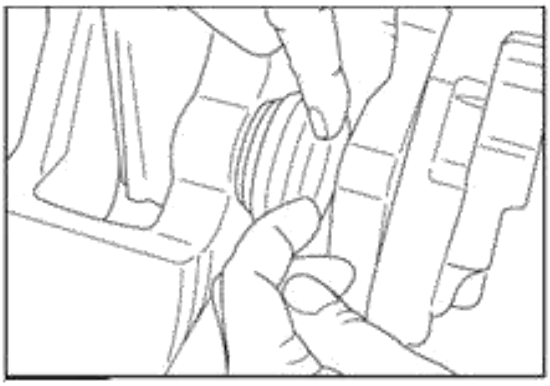
Grease the guide pillar and guide pillar hole of caliper

Caution: only use the greases supplied with replacement parts / kits or specified by the vehicle manufacturer. No other type of grease may be used under any circumstances.



Carefully slide the caliper assembly to the guide pillar that is secured to the bracket

Warning: When positioning the brake caliper assembly on the bracket, be careful not to damage the dust cover of the guide pillar.



Position the dust cover of the guide pillar on the race of the caliper body.

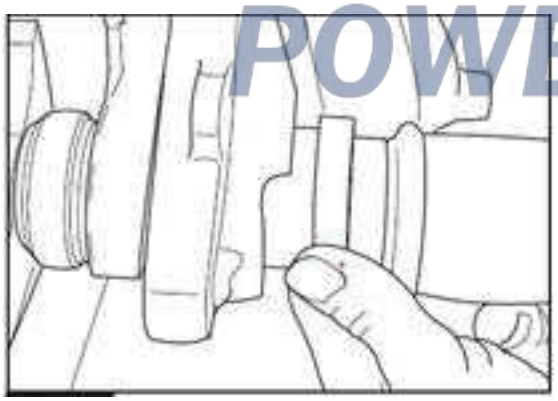
Make sure the dust cover is properly positioned on the race of the bracket and caliper body.

Slide the caliper back and forth several times to check if the motion on the guide post is smooth.

Caution: Care must be taken when sliding the caliper by hand on the dowel pin.Excessive force may cause damage to the locating pin boot.

Install the new end cap

The brake structure currently in use is subject to change. Follow the appropriate procedure below when installing a new Reissue.

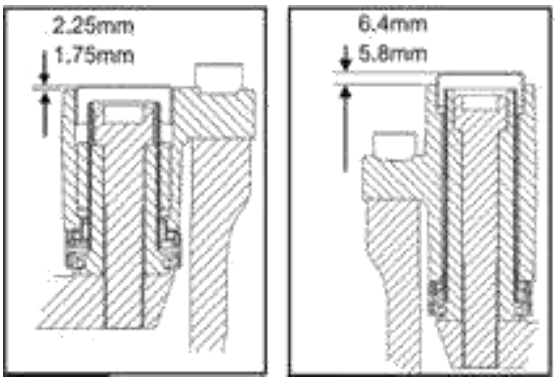


EX225L

Using a copper mallet and a mandrel from the Miter Maintenance Tool MST1000, carefully insert a new Reissue into the body until it stops.

Repeat the above operation with the other end cover.

Knock on the end cover with the mandrel of the MIT 1000 repair tool of Meritor until the short guide pillar meets the size of 1.75mm-2.25mm and the long guide pillar meets the size of 6.4mm-5.8mm



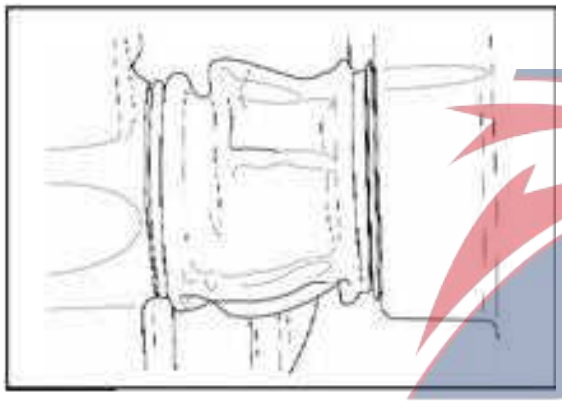
Note: The end cover of the long pin and short pin must be installed in different sizes. The dimensions of the short pin are shown in Figure 8.10 and the dimensions of the long pin are shown in the diagram (long pin).

The dimensions must be checked to ensure that the dimensions do not exceed the specified maximum value.

Note: It will limit sufficient movement of the caliper assembly if the push-in end cover is less than the specified minimum.

Using a copper mallet and a mandrel from the Miter Maintenance Tool MST1000, carefully insert a new Reissue into the body until it stops.Repeat the above operation with the other end cover.Reach the lid with the mandrel in the MIT 1000 Maintenance Tool until the dimension is 1.75mm-2.25mm.

Note: The dimensions must be checked to ensure that the dimensions do not exceed the specified maximum value.

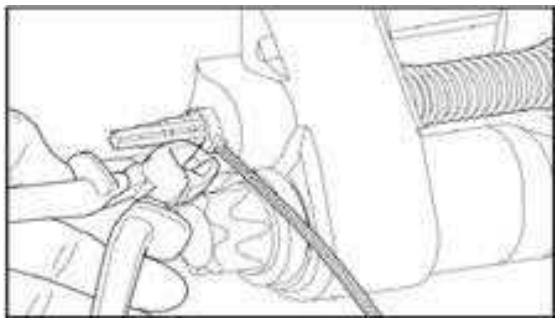


After the end cap is installed correctly, check again whether the caliper assembly slides freely on the guide column.Slide the caliper body back and forth several times to check if the caliper body is moving smoothly on the guide post.Slide the caliper to check the position of the boot.This can be identified by the destruction of the dust cover caused by pressure changes in the mechanical range of the guide pillar.Caution: Care must be taken when sliding the caliper by hand on the dowel pin.Excessive force may cause damage to the locating pin boot.

As described in Section "Replacing the auxiliary pliers", reinstall the auxiliary pliers.

Warning:

Always use new vice clamp bolt / bolt. Remove the vice clamp bolt / bolt must not be used again.



Where applicable, remove the clamp / race from the visual wear indicator.

Where applicable, remove the blocking protective device from CWS bore as described in Section "Replacing the CWS" and reinstall the CWS.

Reinstall the air chamber as described in "Replacing the brake."

As described in "Replacing the friction plate", reinstall the friction plates and the PWWI (where applicable), set the initial operating clearance and test.

8 Replace the bracket

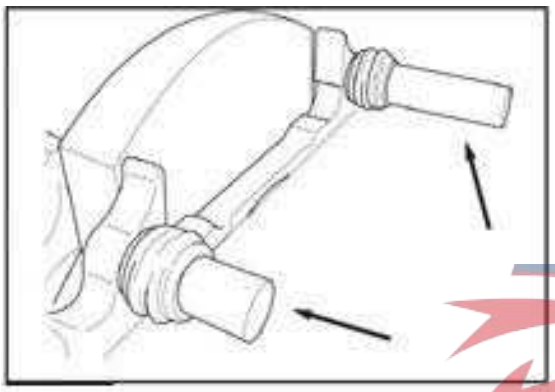
Remove the bracket

As described in Section "Replacing the brake", support the vehicle and remove the air chamber.

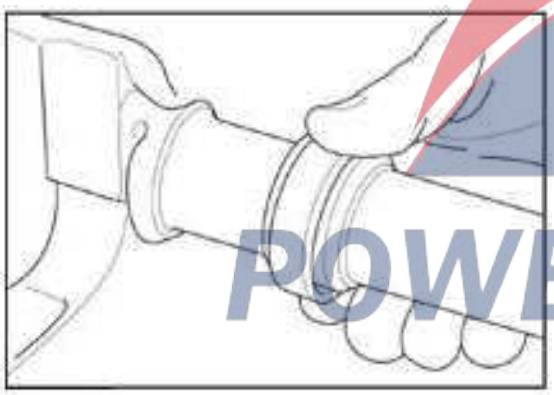
Where applicable, remove CWS as described in Section "Replacing the CWS". When reinstalling the original brake caliper assembly, block the CWS mounting holes to prevent dust from entering the caliper body.

Disassemble the friction plate as described in Section "Replacing the friction plate". Remove the auxiliary pliers as described in Section "Replacing the auxiliary pliers".

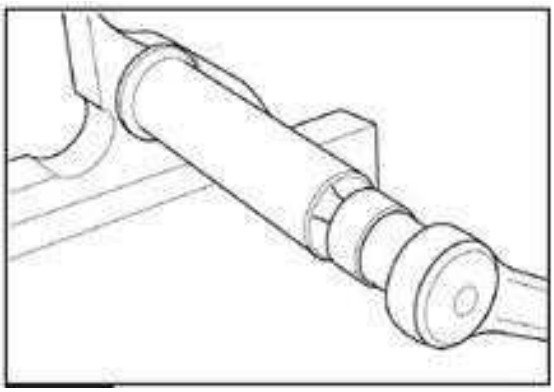
Remove the caliper assembly as described in Section "Replacing the brake caliper".



Note: Where applicable, it is best to note the position of the guide pillar with short / long or large /small diameter on the original bracket. This ensures that the guide pillars can be installed in the correct position on the new bracket.

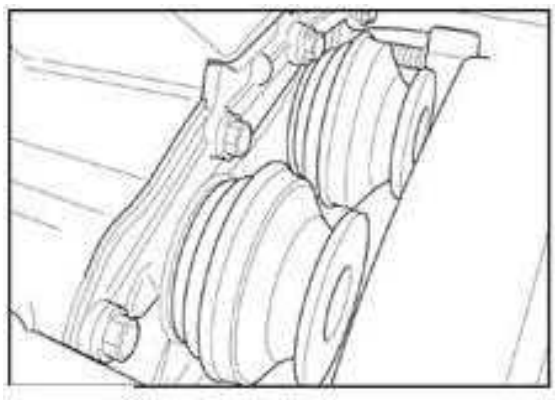


After removing the brake caliper, if the dust cover of the guide pillar remains on the bracket, carefully remove the dust cover from the bracket and slide it off the guide pillar. Discard the old dust cover of guide pillar.



Remove and discard the guide pillar bolts that secure the guide pillar to the bracket. If necessary, use a rubber or soft metal hammer to carefully knock on the guide pillar from the bracket.

Cleaning and inspection

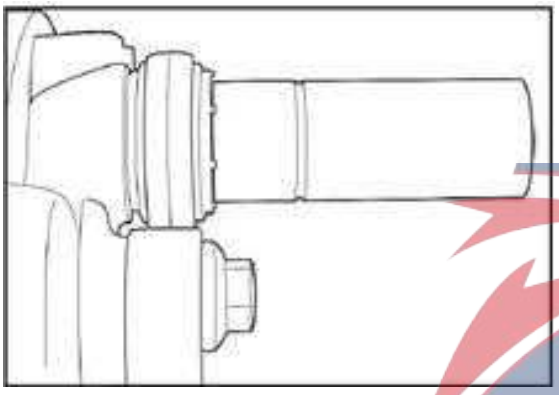


Check the integrity of the piston dust cover, which shall be firm without any signs of damage. If damaged, replace it as described in Section 10.

Clean and inspect the guide pillar removed from the bracket. If there is obvious damage, wear or corrosion, replace with new parts.

Remove the existing grease from the guide pillar hole of caliper body and inspect the bushing and dust cover race. If there are signs of damage, wear, or corrosion, replace the bushing and race as described in Section 11, or replace the caliper assembly as described in Section 8.

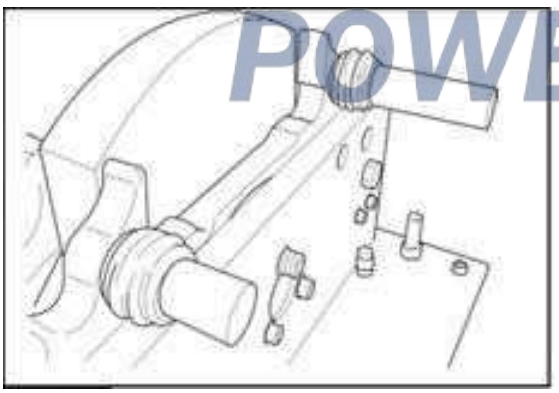
Install new bracket



Position the new bracket correctly on the same axle and secure with new fixing bolts. Tighten the bolts by the torque specified by the vehicle manufacturer.

Slightly lubricate the guide pillar with the grease provided in the repair kit.

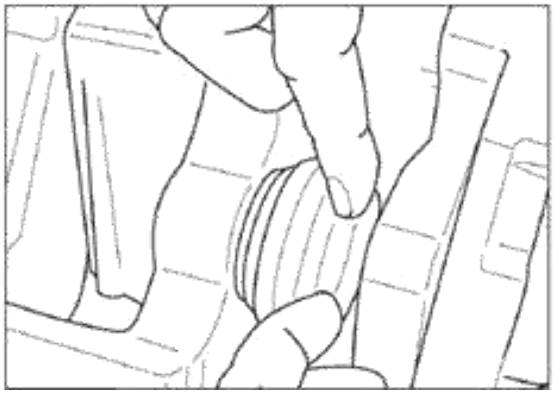
Caution: Only greases supplied with replacement parts / kits or specified by the vehicle manufacturer can be used.No other type of grease may be used under any circumstances.Position the guide pillar on the new bracket and screw in the new guide pillar stud.



Tighten by a torque of 430-450 Nm as specified in "Maintenance and technical specifications"

New locating pin bolts. Slightly lubricate the inner surface of the dust cover of the new guide pillar with grease and be sure to position it in the correct position on the bracket. Grease the guide pillar and the guide pillar hole of the brake caliper.

Caution: Only greases supplied with replacement parts / kits or specified by the vehicle manufacturer can be used.No other type of grease may be used under any circumstances.



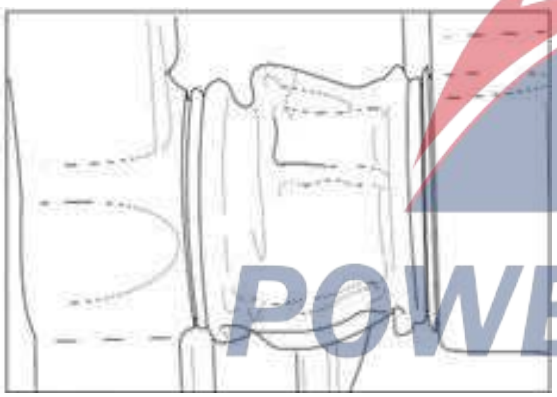
Carefully slide the caliper assembly to the guide pillar that is fixed to the bracket. The dust cover of the guide pillar is positioned on the caliper body race.

Note: When positioning the caliper on the bracket, be careful not to damage the dust cover of the guide pillar.

Make sure the boot is properly seated on the bracket and caliper body race.

Push the caliper to the end and hold it for a while so that the trapped air can escape from the dust cover

Slide the caliper body back and forth several times to check if the caliper body is moving smoothly on the guide post.



Slide the caliper to check the position of the boot.

As described in "Replacing the auxiliary pliers", reinstall the auxiliary pliers with the new auxiliary pliers bolts provided.

Caution:

Always use new vice clamp bolt / bolt. Remove the vice clamp bolt / bolt must not be used again.

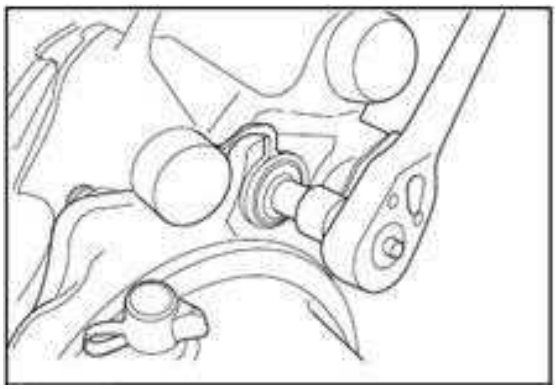
Where applicable, reinstall the CWS as described in "Replacing the CWS."

Reinstall the air chamber as described in "Replacing the brake"

As described in "Replacing the friction plate", reinstall the friction plates and the PWWI, as applicable, set the initial operating clearance and test.

9 Replace the piston cap and dust cover

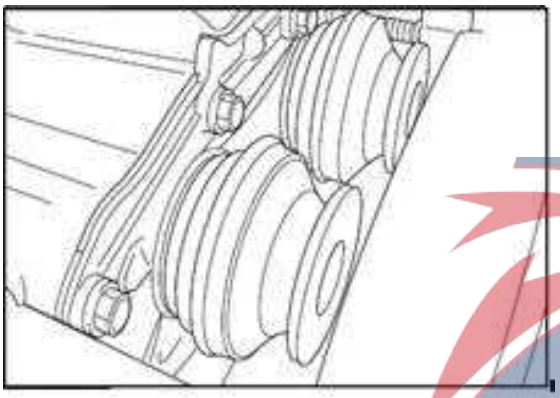
Replace piston cap and dust cover



Disassemble the friction plate as described in Section "Replacing the friction plate". Use a manual adjuster to adjust the piston assembly outward for approximately 40 mm

Adjust the piston assembly outward to facilitate removal of the dust cover of the piston and remove the piston cap if necessary.

Note: The torque required when adjusting is larger than tightening.



Warning: Always use the appropriate wrench to carefully loosen / tighten the brakes manually.The maximum torque in any direction of rotation must not exceed 40Nm, the electric tool never be allowed

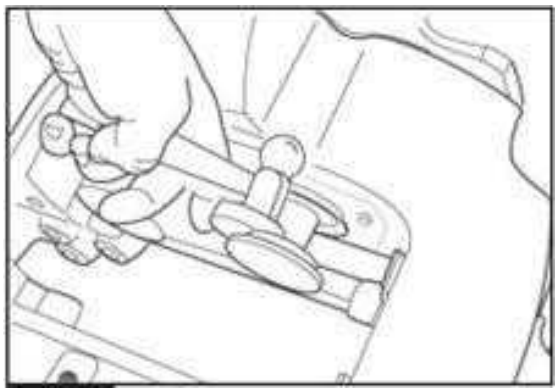
Remove the dust cover of the piston

Remove the dust cover of the piston and discard it. Use a suitable brake cleaner to clean the race on the piston cap and caliper body.

Check piston cap for damage or excessive corrosion. If you have doubt about the suitability of further maintenance, replace the piston cap according to the replacement procedure as detailed below. Check the condition of the dust cover of the piston cap and race. If there is damage, excessive corrosion or wear, replace the caliper assembly or brake assembly as described in Section 8 "Replacing the brake" or Section 6 "Replacing the brake".

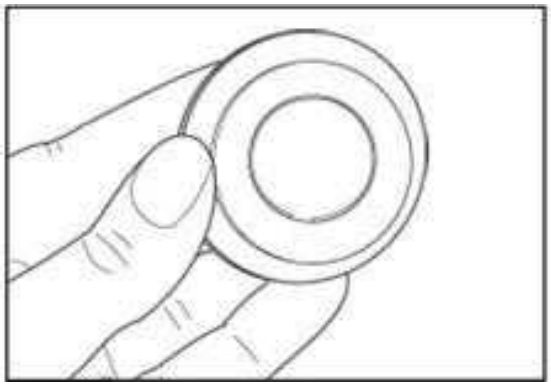
Note: There is no need to remove the piston cap to replace the dust cover.

Replace the piston cap

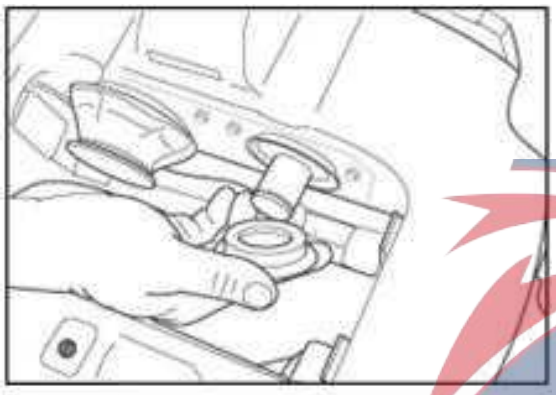


Carefully knock the piston cap off the piston pin

Caution: Do not apply excessive force or use heavy hammer to disassemble the piston cap. Do not damage the piston. If the piston is damaged when removing the piston cap, replace the brake caliper assembly or brake assembly.



There is a locating ring on the piston cap.



Place a new piston cap on the piston and firmly press against the piston. Repeat the above operation with another piston cap.

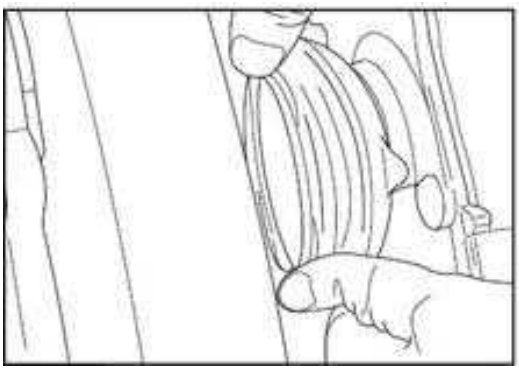
Install a new dust cover of the piston

Slightly lubricate the piston pin with the grease provided in the kit.

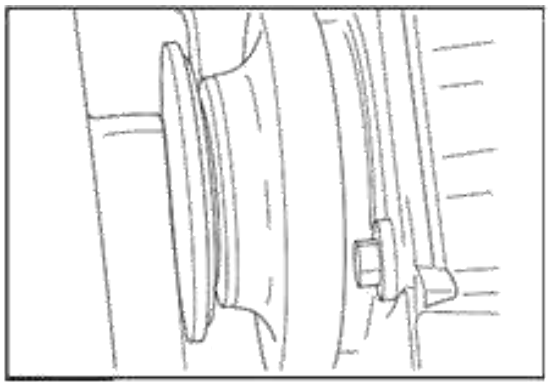
Caution: Only greases supplied with replacement parts / kits or specified by the vehicle manufacturer can be used. No other type of grease may be used under any circumstances.

Warning: When installing a new dust cover of the piston, do not use any grease to aid the assembly.

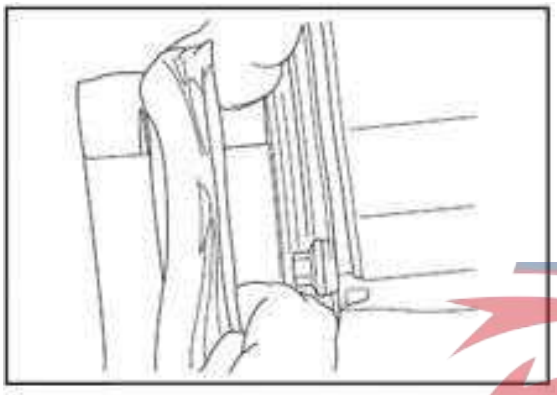
Wash your hands clean with no grease left. Ignoring this instruction may result in premature failure of the dust cover of the piston.



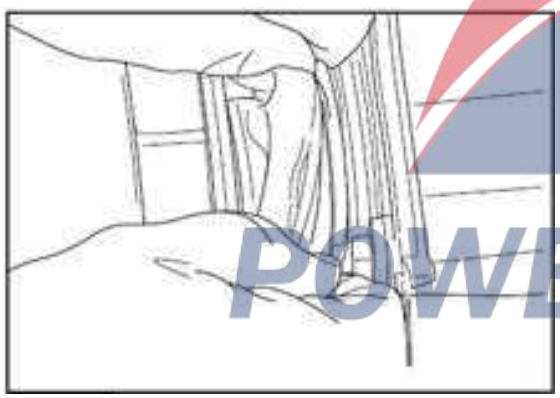
Carefully install a new dust cover of the piston on the piston cap and do not install the bayonet of the dust cover in the retaining groove of the brake caliper at this stage.



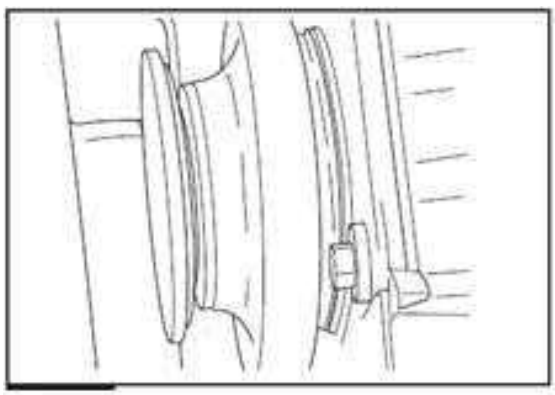
Carefully install the dust cover in the groove on the piston cap. Make sure that the bayonet of the dust cover is properly positioned in the groove of the piston cap.



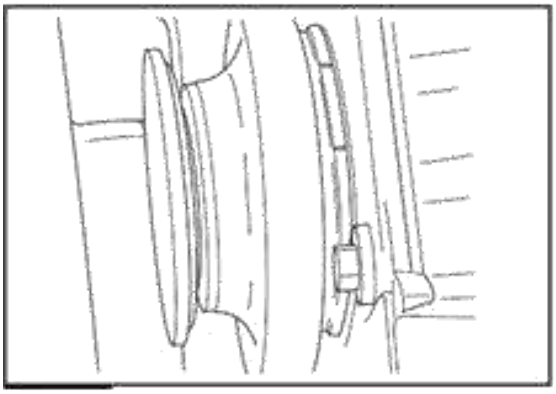
In the next step, extend the dust cover with two fingers.



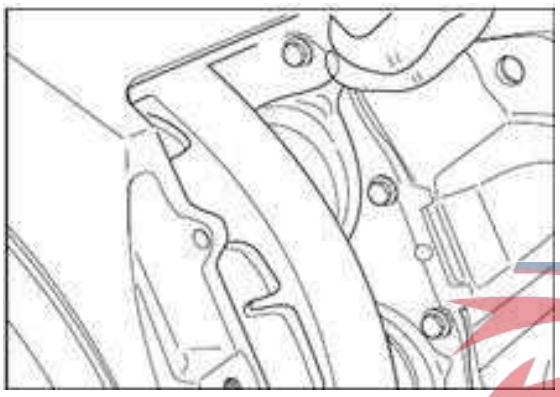
After the dust cover has been extended, pull it out and fit it into the race groove of the caliper body.



The dust cover must be properly installed. Rotate the dust cover to get the best installation effect and check whether the bayonet is evenly installed into the race groove of the caliper body.



The diagram shows the wrong installation of the dust cover. The bayonet is not completely positioned in the race on the caliper body.



Make sure the ears of the dust cover are in the correct position for easy access and operation as shown in the diagram. Repeat the above procedure for the other dust cover of the piston.

As described in "Replacing the friction plate", loosen the brakes and reinstall the friction plates and PWWI (where applicable), set the initial operating clearance and test.

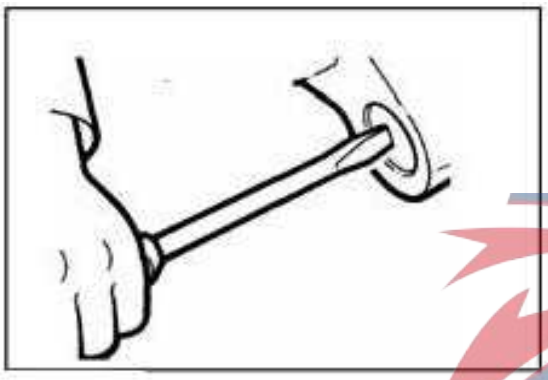
10 Replace the guide pillar, dust cover, race and bushing

Important note:Make a note of the brake assembly number to obtain the correct repair kit.Disassemble the friction plate as described in "Replacing the friction plate".

Where applicable, remove CWS as described in "Replacing the CWS". Block the CWS mounting holes to prevent dirt from entering the caliper body. As described in "Changing the auxiliary pliers", remove the auxiliary pliers.

Remove the caliper assembly as described in "Replacing the brake caliper". Transfer the brake caliper to the appropriate workbench.

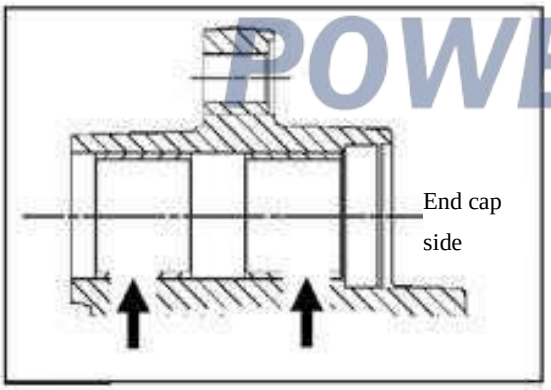
Check the integrity of the dust cover of the piston, both of which shall be firm without any signs of damage. In the event of damage, replace it as described in "Replacing the dust cover of piston ".



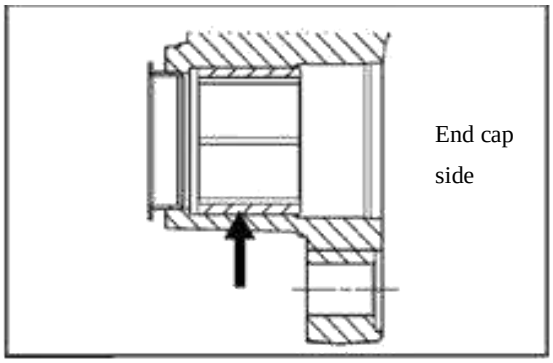
Carefully rush it out of the guide pillar hole or pry out the end cover of the guide pillar.

Bushing and race of guide pillar

Note: There are two optional layouts of guide pillars on the ELSA225H / EX22L brakes. Axial brakes shall be arranged with1 long and 1 short guide pillar.

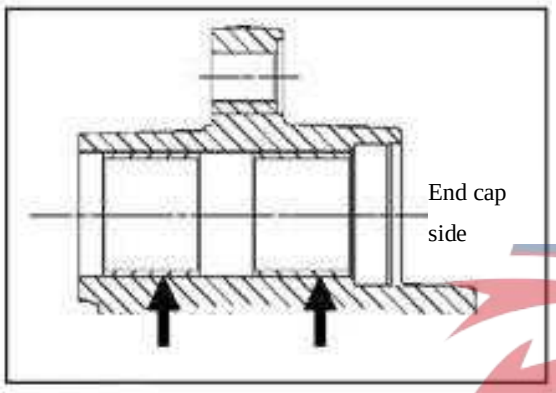


Long guide pillar shall be provided with 2 round plastic bushings.

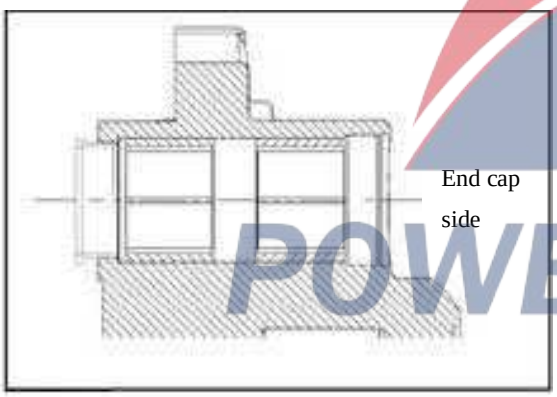


Short guide pillar shall be provided with a single bronze oval bushing.

Radial brake is provided with2 long guide pillars.



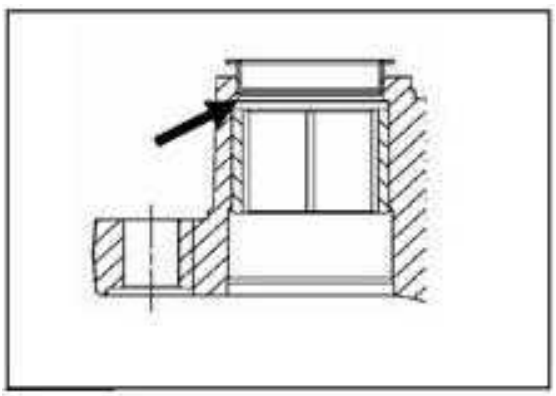
One guide pillar is provided with 2 round plastic bushings.



The other guide pillar is provided with a single bronze oval bushing.

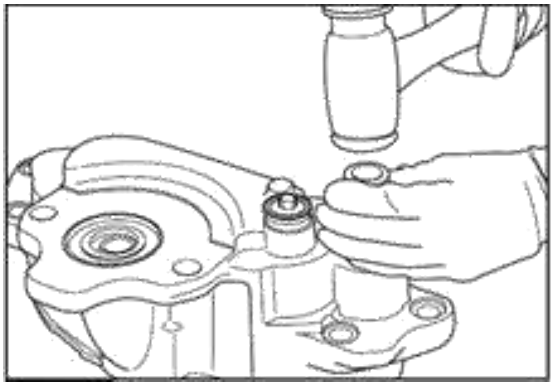
Note: During the extrusion of the round plastic guide pillar bushing from the caliper body, the dust cover race will also be simultaneously extruded out, which is located in the guide pillar hole of the brake caliper.

Important notice:



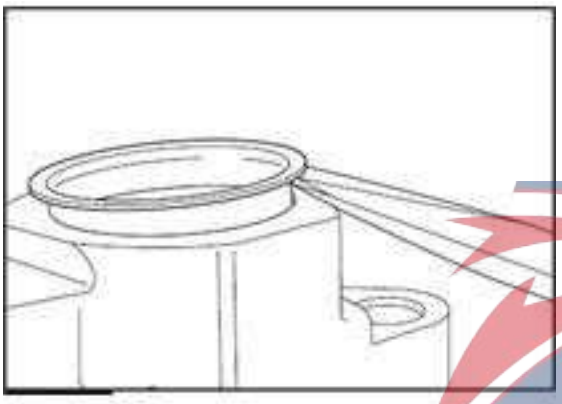
This does not apply to the removal of bronze oval bushing due to that the caliper body is ribbed. The bushing must be removed from the opposite direction of the round plastic guide pillar bushing.

Remove the plastic bushing of the round guide pillar

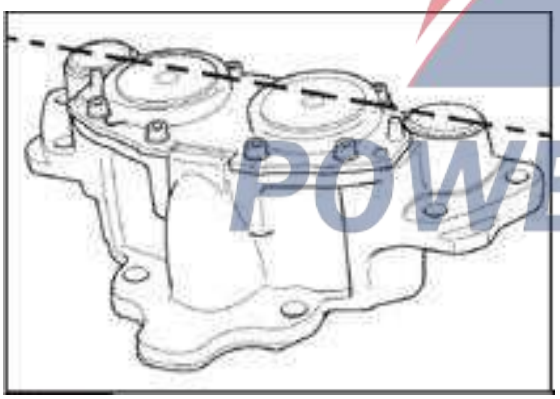


To remove the round bushing, use a suitable mandrel to press or slightly knock the bushing out of the caliper body and dust cover race, as shown in the diagram

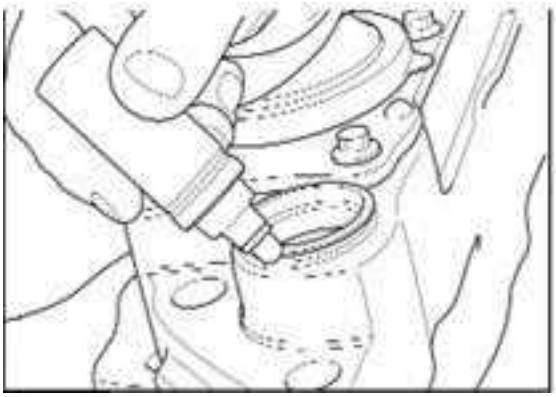
Remove the "oval" bushing of the guide pillar



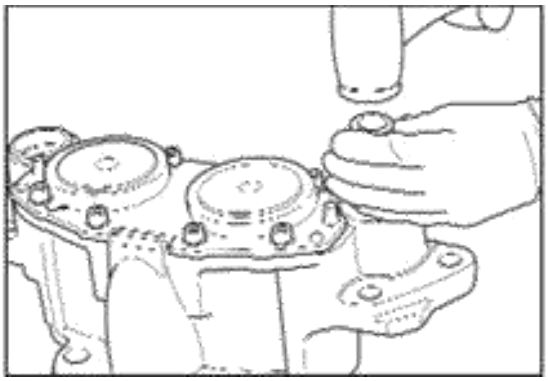
Use a suitable rod to remove the dust cover race of the guide pillar



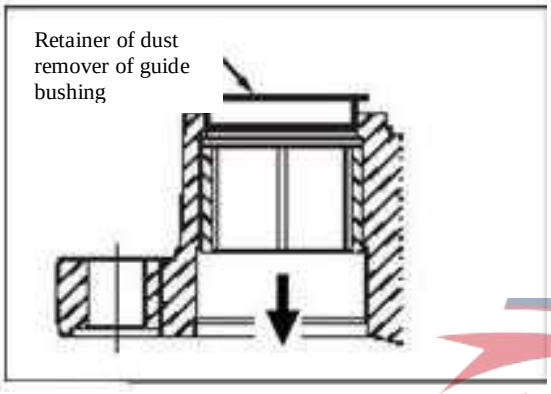
Note: It is important to ensure that the installed location of the bushing is correct. The bushing groove shall be at the position level with the two guide pillar holes.



Before disassembly, check whether the oval bushing is aligned and marked on the caliper so that the new bushing can be properly positioned before installation.



Use the MST1023 repair tool of Meritor to press or flush the bushing out of the caliper body

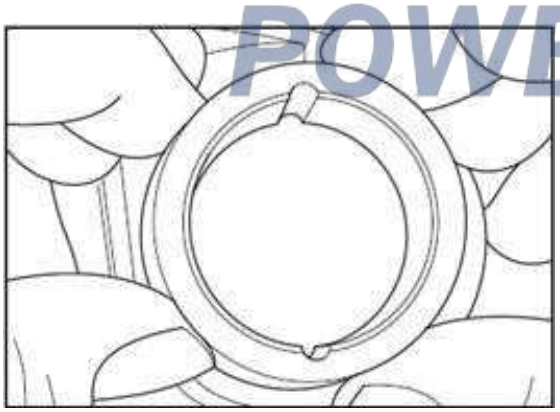


Note: The oval bushing must be pushed toward the end cover of the hole

Note: Clean the guide pillar hole with a suitable brake cleaner. Check if the guide pillar hole is corroded or damaged. If you have doubt about the suitability for further maintenance, replace with the new brake caliper assembly.

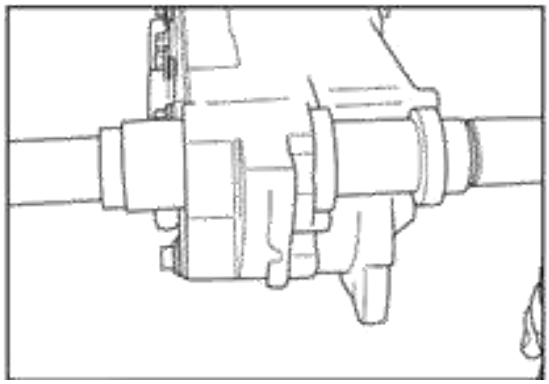
Install oval bushing of the guide pillar

Axial brake

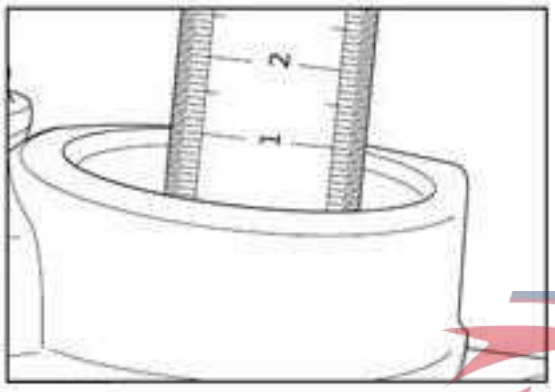


Align the new oval bronze bushing with the marks on the caliper body

Note: The bushing must be installed at the air chamber side of the caliper body.



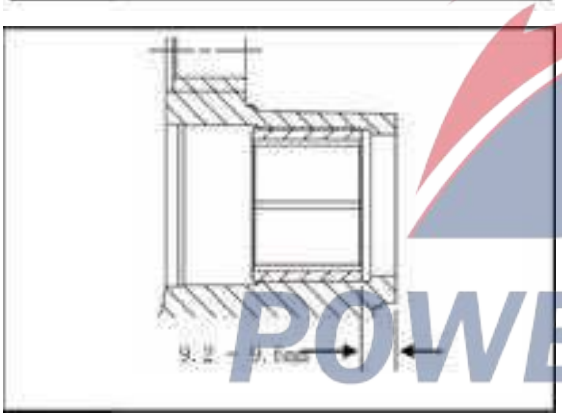
Install with the MST1000 and MST1023 repair tools of Meritor and insert the new bushing into the caliper hole. Use the remaining parts of the MST 1000 repair tool of Meritor.



Pull the oval bushing into the guide pillar hole until the depth from the end of the dust cover race of the guide pillar is between 9.2 and 9.6 mm.

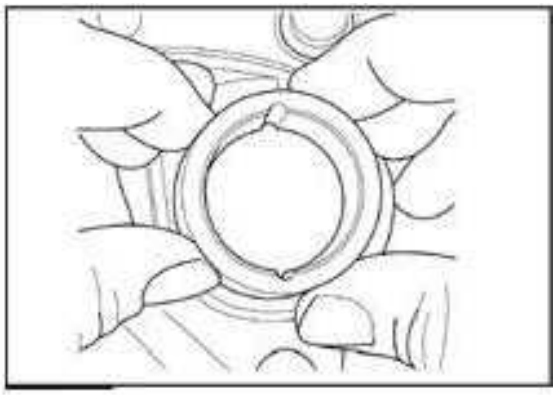
The bushing must be installed at the air chamber side of the caliper body.

Do not punch into the bushing with a chisel, as this may damage the edges and prevent the guide pillar from being installed.

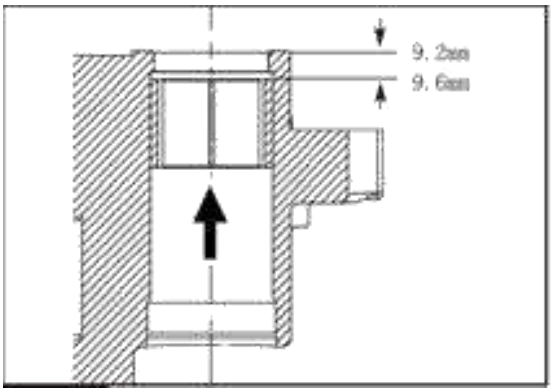


Radial brake

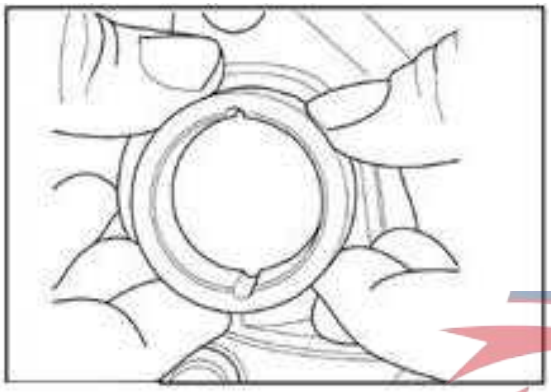
Note: The bushing must be installed at the air chamber side of the caliper body. Never punch into the bushing, as this may damage the edges and prevent the guide pillar from being installed.



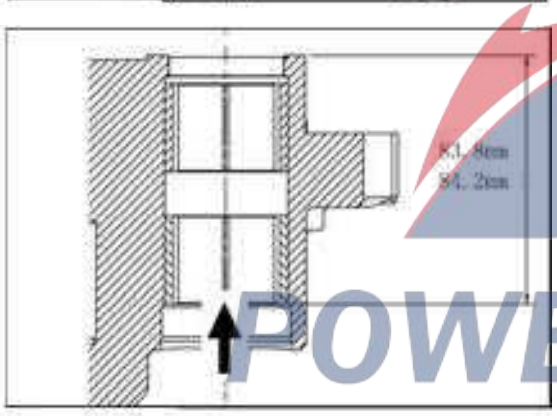
Place a new oval bushing on the caliper body and ensure that the groove on the bushing edge is aligned with the mark on the caliper body.



Use the repair tools of Meritor (part number: MST1000 and MST1023), pull the bushing into the guide pillar hole until the depth from the end face of the caliper (dust cover race side of the guide pillar hole) is 9.2 and 9.6 mm.



Place the other bushing on the caliper body and ensure the groove alignment marks on the bushing edge.



Use the repair tools of Meritor (part number: MST1000 and MST1023),

To pull the bushing into the guide pillar hole.

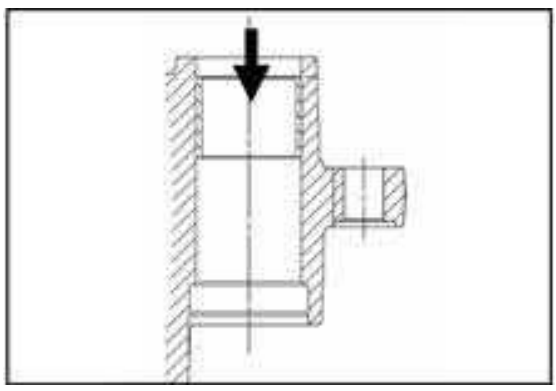
The correct position of the bushing shall be 83.8-84.2mm by measuring the distance from the same end face of the caliper body (one side of the dust cover race of the guide pillar) to the bottom edge of the other bushing.

Race and bushing

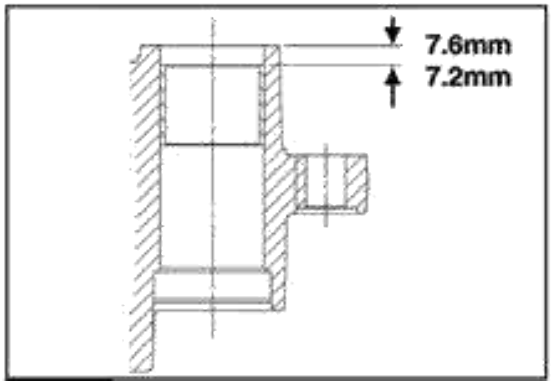
Install the round bushing of the guide pillar

Axial and radial brakes

Place a new bushing on the appropriate mandrel of the MST 1000 service tool of Meritor.



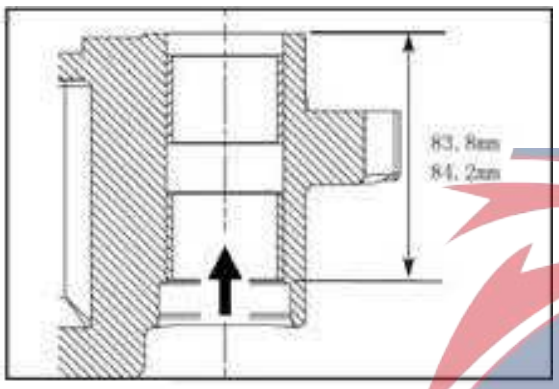
Insert the brake caliper hole from the dust cover race side of the guide pillar hole.



Pull the bushing into the guide pillar hole until the depth measured from the end face of the caliper (dust cover race side of the guide pillar hole) is 7.2 to 7.6 mm.

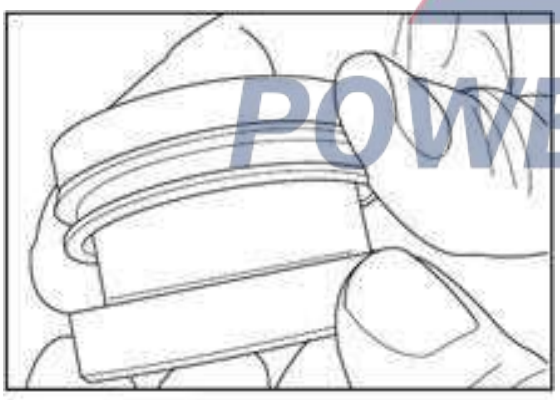
Caution: Do not apply excessive force when pulling the bushing into the caliper as this may cause damage to the bushing.

Repeat this procedure for the other bushing, but insert the bushing from the end cover side of the guide pillar.



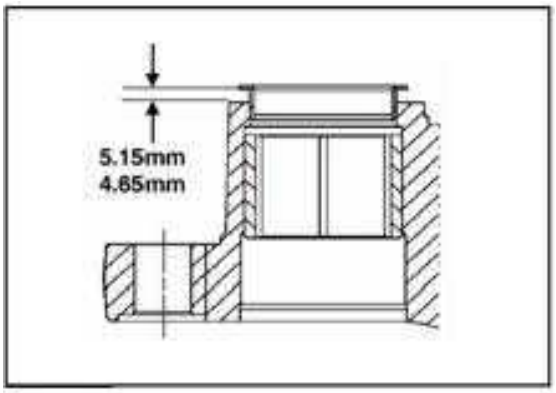
The correct position of the bushing can be confirmed by measuring the distance from the same end face of the caliper body (dust cover race side of the guide pillar hole) to the bottom of the other bushing, which shall be 83.8 to 84.2mm.

Install a new dust cover race



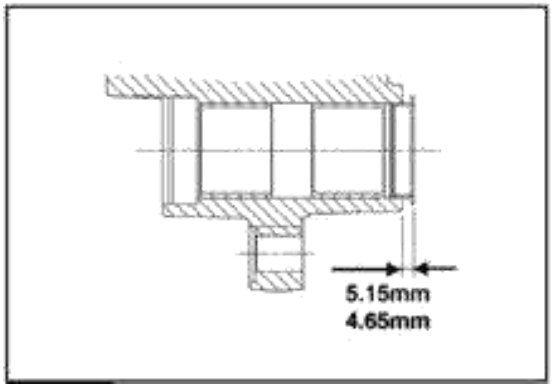
Place the race on the appropriate mandrel using the MST 1000 repair tool of Meritor.

Install the guide pillar race - oval bushing



Place the seat ring on the caliper body and pull the seat into the guide post hole with the remaining suitable service parts until the seat plane distance is between 4.65 and 5.15 mm from the guide post hole end.

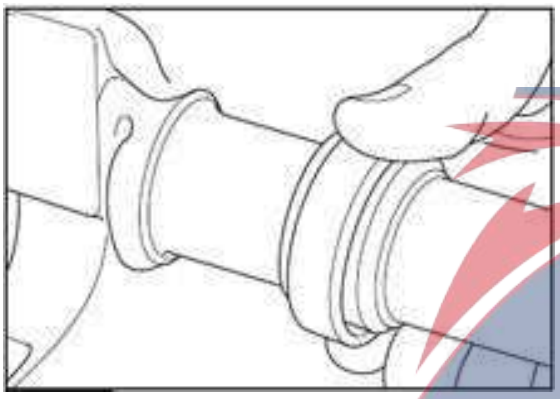
Install the guide pillar race - round bushing



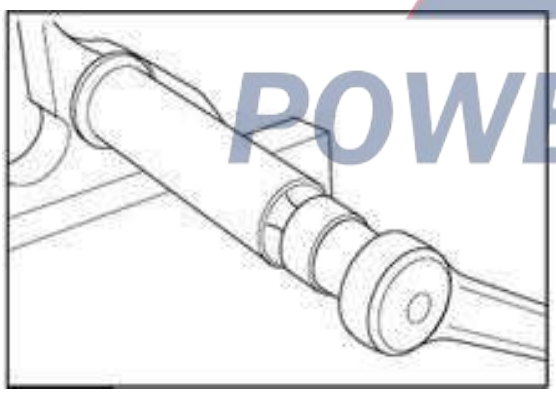
Place the seat ring on the caliper body and pull the seat into the guide post hole with the remaining suitable service parts until the seat plane distance is between 4.65 and 5.15 mm from the guide post hole end.

Caution: Do not apply excessive force when pulling the race into the hole, as this may result in damage to the bushing or race.

Remove the guide pillar and the dust cover



Carefully separate the dust cover of the guide pillar from the bracket and slide it off the guide pillar.



Note: The dust cover of the guide pillar may remain attached to the race on the brake caliper body, so remove it with the brake caliper.

Where applicable, note the positions of the guide pillar with long and short or larger and smaller diameter on the bracket to ensure proper orientation of the new guide pillar on the assembly.

Remove the guide pillar bolts that secure the guide pillar to the bracket. Use a rubber or soft metal hammer to carefully knock out the guide pillar from the bracket, if necessary.

Clean the contact area of the guide pillar and the threaded holes on the bracket to check for wear. If you have doubt about the suitability of further repairs, replace the brackets as described in "Replacing the bracket."

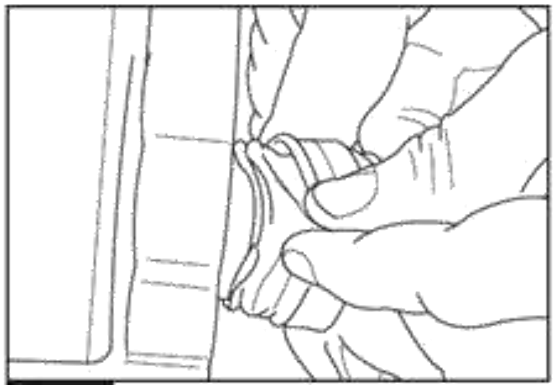
Install new guide pillar

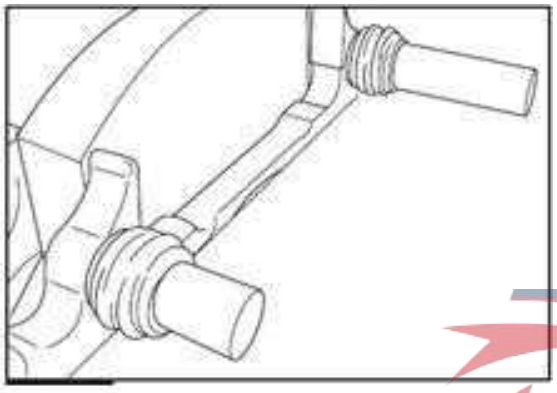
Position the new guide pillar in the correct position on the bracket and secure with the new guide pillar bolts. **Note**: Make sure the guide pillars with long and short or larger and smaller diameter are properly positioned on the bracket.

Tighten the new locating pin bolt by a torque of 430-450 Nm as specified in chapter "Maintenance and technical specifications". Lightly lubricate new guide pillar and the dust cover (internal only).

Caution: Only greases supplied with replacement parts / kits or specified by the vehicle manufacturer can be used.No other type of grease shall be used under any circumstances.

Install new dust cover

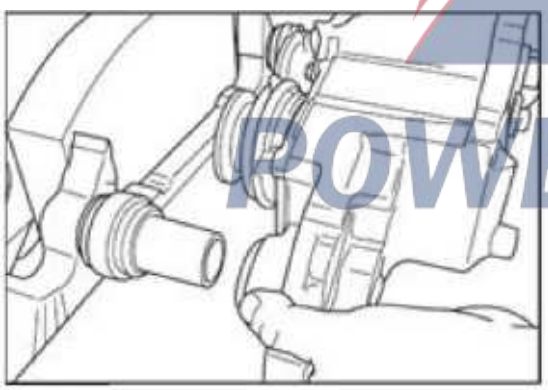




Slide the dust cover onto the guide pillar to ensure that the bayonet of the dust cover is positioned in the groove on the bracket.

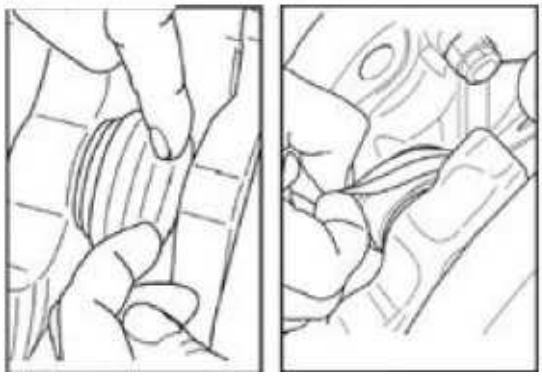
Grease the guide pillar hole of the brake caliper.

Caution: Only greases supplied with replacement parts / kits or specified by the vehicle manufacturer can be used. No other type of grease may be used under any circumstances.



Carefully slide the caliper assembly onto the guide pillar of the bracket. Where applicable, do not forget to install visual wear indicators and springs.

Note: When positioning the brake caliper on the bracket, be careful not to damage the dust cover of the guide pillar.



Place the bayonet of the dust cover of the guide pillar in the groove of the caliper race.

Make sure the boot is properly seated on the bracket and caliper body race. Slide the caliper back and forth several times to check if the motion on the guide post is smooth.

Caution: Care must be taken when sliding the caliper by hand on the dowel pin.Excessive force may cause damage to the dust cover of the locating pin

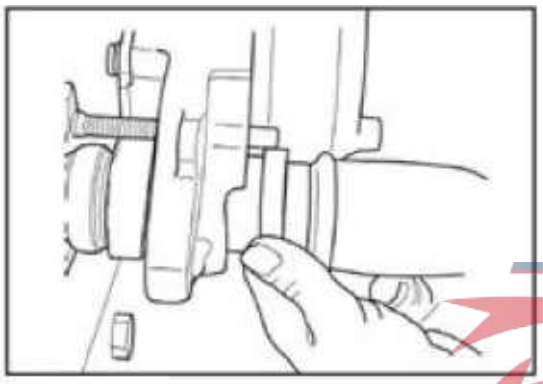
Caution:

Be careful of your fingers from being clamped when checking whether the guide pillar is moving smoothly.

Install the new end cap

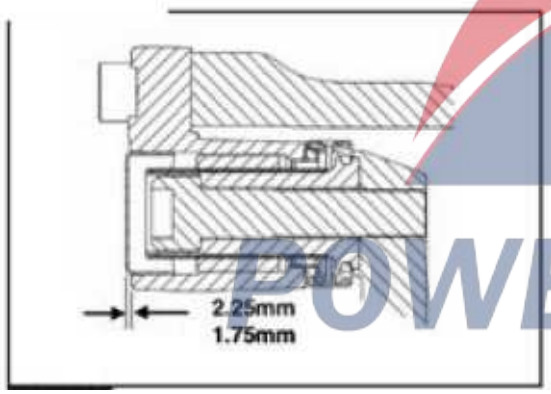
The brake structure currently in use is subject to change. Follow the appropriate procedure below when installing a new Reissue.

EX225L



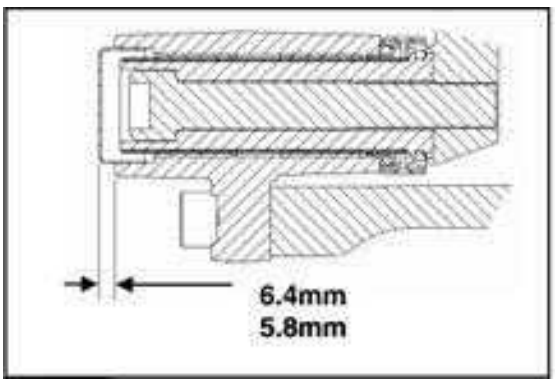
Using a copper mallet and a mandrel from the Miter Maintenance Tool MST1000, carefully insert a new Reissue into the body until it stops.

Repeat for the other end cap.Knock on the end cover with the mandrel of the MST 1000 repair tool of Meritor until the short guide pillar is 1.75mm-2.25mm and the long guide pillar is 6.4mm-5.8mm.



Knock on the end cover with the mandrel of the MST1000 repair tool of Meritor until the short guide pillar is 1.75mm-2.25mm and the long guide pillar is 6.4mm-5.8mm.

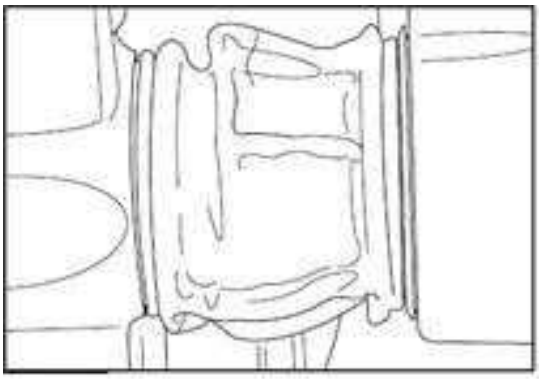
Note: The end cover of the long pin and short pin must be installed in different sizes, where the dimensions of the short pin and long pin are shown in the diagram. The dimensions must be checked to ensure that the dimensions do not exceed the specified maximum value.



ELSA225H

Using a copper mallet and a mandrel from the Miter Maintenance Tool MST1000, carefully insert a new Reissue into the body until it stops.

Repeat for the other end cap. Reach the lid with the mandrel in the MIT 1000 Maintenance Tool until the dimension is 1.75mm-2.25mm.



Note: The dimensions must be checked to ensure that the dimensions do not exceed the specified maximum value.After the end cap is installed correctly, check again whether the caliper assembly slides freely on the guide column.Slide the caliper back and forth several times to check if the brake caliper moves smoothly on the guide pillar. When sliding the caliper, check the position of the dust cover. **Caution**: Care must be taken when sliding the caliper by hand on the dowel pin. Excessive force may lead damage to the dust cover of the locating pin of guide pillar. As described in "Replacing the auxiliary pliers", reinstall the auxiliary pliers.

Caution:

Always use the new bolts of auxiliary pliers. Removed bolts of auxiliary pliers must not be used again.

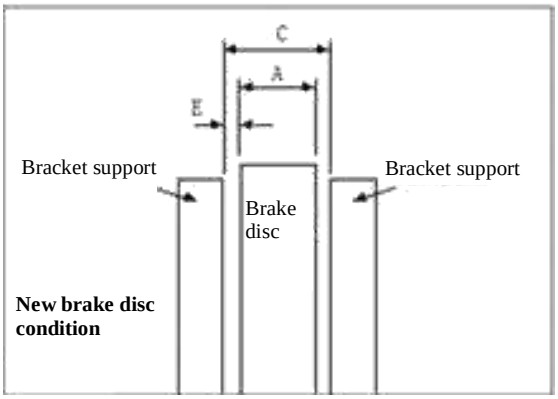
As described in "Replacing the CWS", reinstall the blocking protection device of the CWS hole to protect and reinstall the CWS.

Reinstall the air chamber as described in "Replacing the brakes." As described in "Replacing the friction plate", reinstall the friction plates and the PWWI, as applicable, set the initial operating clearance and test.

11 Repair and replace the brake disc

This section details the safe work practices for the service life limits of the brake discs of the ELSA-195 and 225 Meritor air disc brakes with a 9 mm or thicker backboard of friction plate.

Detailed dimensions	195	225
Thickness of new brake disc -A	45mm	45mm
Minimum allowable thickness of re-processing disc	41mm	41mm
Minimum thickness of the complete wear disc -B	39mm	39mm
Thickness of backboard of friction plate	9mm	9mm
Bracket - brake disc clearance -C	49.3mm	50mm
Minimum thickness of the friction material	3mm	3mm
New brake disc clearance -E	2.15mm	2.5mm



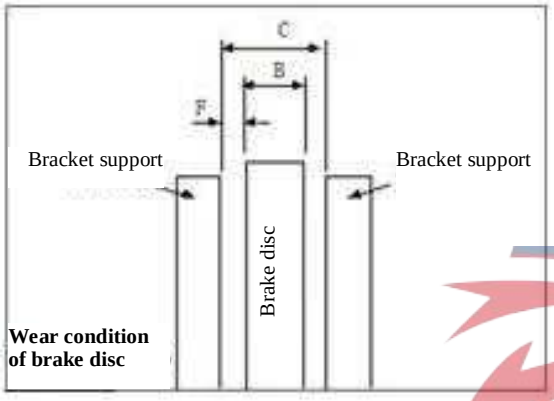
New brake disc condition

The maximum rated thickness of the disc brake (new condition) is A.

The rated brake disc clearance between the brake assembly brackets is C.

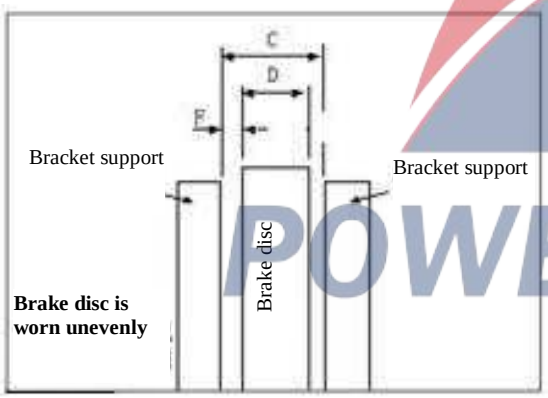
Therefore, if the brake disc is centered between the bracket brackets, the equal nominal clearance E can be reached on both sides of the brake disc

However, due to tolerances, the brake discs are not always in the middle of the brackets, which may result in the need to replace the brake disc before it is worn to the minimum thickness.



Maximum allowable wear of brake disc

The brake disc is allowed to be worn to the minimum thickness B, but the maximum amount of wear on any one of the brake disc surfaces must not exceed 3 mm. The brake disc maintains a centered position in the bracket support when the amount of wear on both sides of the brake disc is the same. Brake disc clearance F must not exceed 5.15mm (195 brakes) or 5.5mm (225 brakes).



Brake disc is worn unevenly

In many cases there will be uneven wear D, you need to replace the brake disc before it is worn to the minimum thickness B. When the brake disc is worn unevenly, the clearance F between the brake disc and the bracket support shall not exceed: 5.15mm (195 brakes) and 5.5mm (225 brakes).

Caution:The brake disc of two wheel on the same axle must be replaced at the same time. Only the vehicle-approved brake disc can be used.

Warning: Failure to observe these recommendations may result in serious damage to the vehicle assembly (due to thermal damage caused by contact of the backboard of metal friction plate with the brake disc).

When the backboard of the friction plate is worn to a certain thickness, it may cause the wheel is locked as the bracket support and the brake plate are clamped (good case) and the backboard of the friction plate falls out of the brake assembly (the worst case). Failure to follow these recommendations will invalid any warranty claims and Meritor HVS is not liable for the consequences caused as the negligence of the operator.

12 Maintenance and technical specifications

Maintenance

Although the brakes need not to be subject to routine maintenance, the following inspections may need to be carried out within a specified period of time or the inspections described in the vehicle manufacturer's manual may be performed.

Every 3 months or driving for 20,000Km

Remaining service life. When the liner thickness wear to 3.0mm, you should replace the friction plate.

The remaining life of the friction plate shall be evaluated visually. If the visual pad wear indicator is integrated into the brake, a quick and easy way to evaluate whether the brake assembly is damaged or corroded can be provided, and particular attention shall be paid to the locating pin and dust cover of the piston. If you have doubt about suitability for further repairs, replace / adjust according to the vehicle manufacturer's recommendations.

Every 12 months

Disassemble the wheel and the friction plate as described in Section 3 "Replacement of friction plate". Inspect the guide pillar and the dust cover of piston and make sure that they are not damaged and firmly seated. If any dust cover is removed or damaged, remove the brake-related area and check for corrosion or damage. Replace / correct according to the vehicle manufacturer's recommendations.

Perform the operation inspection in Section 2 of this manual

If you have any doubt as to the suitability of further repairs, replace with a new part.

Check scratches, cracks or corrosion of the brake disc (as described in "operation inspection" in Section 2) and thickness dimensions (as described in "rework and replace the brake disc" in Section 12 or the vehicle manufacturer’s recommendations). Replace if necessary.

Caution: The friction plate of two wheel on the same axle must be replaced at the same time. Only the vehicle-approved friction plate can be used.

Caution: The brake disc of two wheel on the same axle must be replaced at the same time. Only the vehicle-approved brake disc can be used.

Caution: Be careful of your fingers while checking the sliding operation of the brake.

Caution: Only greases supplied with replacement parts / kits or specified by the vehicle manufacturer can be used. No other type of grease may be used under any circumstances

T tightening torque

M18 guide pillar bolts (long)	430-450Nm	
M18 guide pillar bolts (short)	430-450Nm	
Manual regulator	Maximum 40Nm	
Friction plate follower bolts	33-40Nm	
CWS Fixing bolt	30-40Nm	
Air chamber fixing nut	Preload torque 80-100Nm	Final torque 180-210Nm

Auxiliary pliers bolts ELSA225H plum head bolt (Elsa225H) 95-105Nm+75±5

ELSA225L plum head bolt (Elsa225L) 235-275Nm

Maintenance diagnosis

Condition	Probable cause	Check content	Repair it
Brake resistance	Incorrect initial adjustment	Correct clearance from friction plate to brake disc	Readjust to set the correct clearance from friction plate to brake disc
	Incorrect clearance from friction plate to brake disc	Autoregulator function	Replace caliper or brake assembly
	Spring or service brake does not unlock the vehicle air system	Correct operation of the air system or air chamber	See the vehicle manufacturer's instructions.Repair or replace parts as required
	Air pipe is too short	Correct the length of the airpipe	Replace the air pipe. See the vehicle manufacturer's operating instructions
	Brake is not unlocked	Locating pin dust cover is damaged; remove lining and move caliper back and forth by hand	Replace dowel pins, boot and bushing
			Replace caliper or brake assembly
		Internal water access or lever stuck	Replace caliper or brake assembly and air chamber
		Tappet is not released: tappet dust cover is damaged	Replace caliper or brake assembly
Short service life of friction plate lining	See "Brake Resistance"	See "Brake Resistance"	See "Brake Resistance"
	Brake disc surface is damaged	Cracks or hot spots / streaks	Refer to the vehicle manufacturer's instructions or brake service manual. Repair or replace parts as required
	Overloaded vehicles	See weight limit on vehicle identification plate	Follow the vehicle manufacturer’s load recommendations
	Paired brake is not working properly	Check pairs of vehicle brakes and air system	Adjust or repair as needed
Brake smokes	Brake temperature is high	See brake resistance and short service life of friction plate lining	See brake resistance and short service life of friction plate lining: Temporary conditions for new or low mileage of friction plate
	Friction disc or brake disc is dirty	Grease, oil, paint or paint on friction plates or brake discs	Check the wheel hub seal. Change as needed
			Clean the brake disc and brake assembly
			Replace the friction plate kit

Condition	Probable cause	Check content	Repair it
Insufficient braking power	Vehicle air system failure	Correct air pressure at the air chamber inlet	Whether the air system has the appropriate brake
Long braking distance	Friction disc or brake disc is dirty	Grease, oil, paint or paint on friction plates or brake discs	Check the wheel hub seal. Change as needed
			Clean the brake disc and brake assembly
			Replace the friction plate kit
High brake pressure	Paired brake is not working properly	Check the pairs of brake and air system of the vehicle	Adjust or repair as needed
The driver feels bad	Improper brake adjustment	Brake disc clearance of the friction plate is too large	Readjust to set the correct clearance from friction plate to brake disc
Vehicle deviation		Autoregulator function	Replace caliper or brake assembly
	The friction plate does not slide in th bracket / seat	Too much dust / corrosion in friction plate mounting position	Clean the friction plate and bracket / seat mounting position
		Friction plate mounting position worn 大	Install new bracket / seat
	Friction plate installed is incorrect	See the vehicle manufacturer's correct friction plate	Replace the friction plate kit
	Brake gets stuck or is stuck on the locating pin	The dust cover of the locating pin is damaged: Remove the friction plate and move the caliper back and forth by hand	Replace dowel pins, boot and bushing
			Replace caliper or brake assembly
	Overloaded vehicles	See weight limit on vehicle identification plate	Follow the vehicle manufacturer's load recommendations
Brake noise / quiver	Friction plate is not installed properly	Friction material towards the brake, rather than the brake disc surface	Friction plate is installed correctly. When necessary, replace the friction plate and brake disc
	Friction plate installed is incorrect	See the vehicle manufacturer's correct friction plate	Replace the friction plate kit

	The friction plate of brake cannot move freely	There is corrosion or debris in the mounting location of the friction plate or bracket / seat friction plate	If necessary, clean or replace the friction plate. Clean the mounting location of the bracket / seat friction plate
		Friction plate mounting position worn	Install new bracket / seat
	Friction plate wron	Lining thickness	If necessary, replace the friction plate axle kit
	Friction plate loose	Friction plate pressing plate bent or friction plate pressing plate bolts loose	Replace or tighten the friction plate pressing plate
	Friction plate spring damaged or not installed	Friction plate spring installed correctly	Install the friction plate spring
	Brake disc is cracked or runs out too much / thickness changes	Crack is too large, hot spots / stripes or run-out / brake disc thickness changes	See the vehicle manufacturer's operating instructions or brake service manual. Repair or replace parts as required
	Brake parts and accessories are not installed in accordance with the technical specifications	Check connections and fasteners for looseness	Tighten the connections and fasteners by the specified torque

Q-410 Brake

Disassembly

Wheel

1 Park in a level field, and block the wheels with wedges to avoid sliding.

2 Lift the tire off the ground with jack and safely support the vehicle.

！ Before maintaining a spring air chamber-loaded brake, fully compress and lock the spring to fully release the brake, in accordance with the manufacturer's operating instructions. Make sure there is no residual pressure in the service cavity.

3 For spring-applied brake, tighten and lock the spring to fully release the brake.

4 Make sure there is no residual pressure in the service cavity.

Brake adjustment arm

1. Turn the hexagon head of the adjusting arm counterclockwise to fully return the brake.

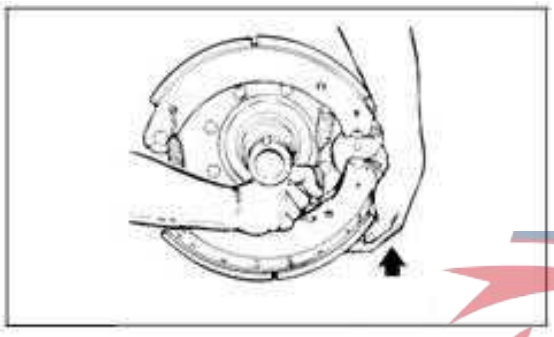
Be careful not to use electric or pneumatic wrenches

2. Disengage the connection between the push rod of brake chamber and the adjusting arm, remove the cotter of the hinge pin and hinge pin.

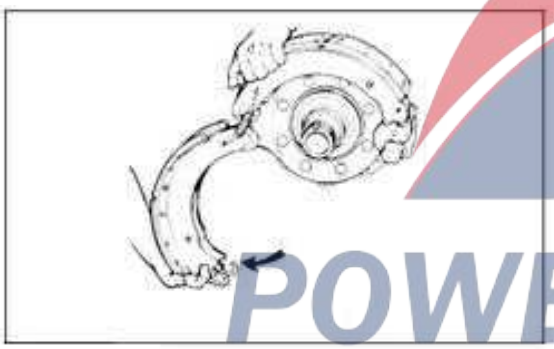
Brake

1. Press down on the lower brake, then pull the roller retainer and remove the roller.

2. Lift the upper brake, then pull the roller retainer and remove the roller.



3. Lower brake, remove the return spring.



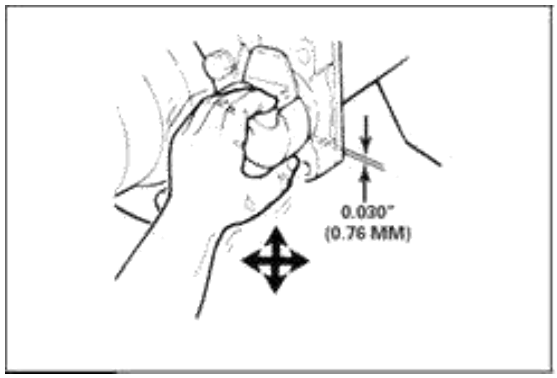
4. Lower brake, keep the spring loose; remove the brake retaining spring and brake.

5. Brake support pin.

6. Exact the bushing head and remove the support pin bushing.

Check the wear of the camshaft bush

Confirm that the clearance between the cam and bushing is up to standard



1. Disassemble the auto-adjusting arm and camshaft after confirming that the radial clearance between the camshaft and bushing is within the standard range and the camshaft is checked in all directions.

2 If the clearance is less than 0.76mm, there is no need to replace the camshaft bushing and oil seal; if the radial clearance is greater than 0.76mm, replace the bushing and oil seal.

Remove the auto adjusting arm from the camshaft

1. Control arm lock nut of adjusting arm.

2. The axle is constructed differently, remove the snap ring (33) and gasket from the end of the camshaft, or remove the bolt (32), locking washer, stepped spacer bush and washer from the end of the camshaft.

3 Automatic adjusting arm.

Preparation of parts before assembly

For cleaning, drying and rust protection of arts see the general requirements of Meritor.

Brake

Check if the support pin hole on the brake plate is enlarged or cracked, and replace the damaged brake plate or support pin bushing. Check the air chamber bracket for open welds, cracks and deformation, replace the damaged air chamber bracket, check the wear and corrosion of support pin, and replace the excessively worn or damaged support pin.

Check the brake for corrosion and rivet holes for enlarging, open welding and deformation, if there is any damage, replace it.

- For Q-410 brake, the diameter of the support pin hole shall be no more than 25.63mm, and the distance from the support pin hole to roller hole shall not to exceed 293.8mm

Brake drum

！ Warning:

Do not use brake drums that are excessively worn or those with drum diameter beyond the scrap indication.

！ Note

Replace the out-of-round brake drum, do not continue to use after the vehicle or boring is processed and repaired.

Check the brake drum for crack, severe hot cracking, hot spots, scratches and deformation, and see MM-99100 for replacement standards.

Check the inner diameter of the brake drum and run-out, the brake drum with diameter of 410mm that are worn to 413mm needs to be replaced, and the braking surface with run-out more than 0.38mm needs to be replaced.

Camshaft

Check the cam for cracks, wear and rust, especially the head, journal and spline. Replace damaged camshaft.

1. Bolts on the base plate, backing plate and axle housing flange bolts (M16X1.5) to 250-320Nm; air chamber bracket and backing plate bolts (1 / 2-20) to 115-190Nm.

2. Dedicated pressure head shall be installed with bushing and oil seal. The direction of the lip of the oil seal shall be toward the spline end of the camshaft.

Assembly

Camshaft bracket

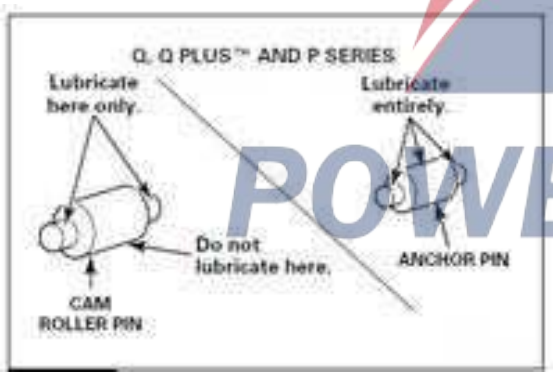
1. The chamber bracket is removed and reinstalled. If the bracket is provided with auxiliary support, apply Loctite 262 to the auxiliary support bolts and tighten the bolts of the auxiliary support nuts and the four air chamber brackets and backing plates slightly, and then tighten the bolts (1/2 -20) of the four air chamber brackets and braking plates to 115-190Nm, and finally tighten the auxiliary support nuts M20X1.5 to 300-350Nm or M10X1.5 to 36-43Nm.

Camshaft

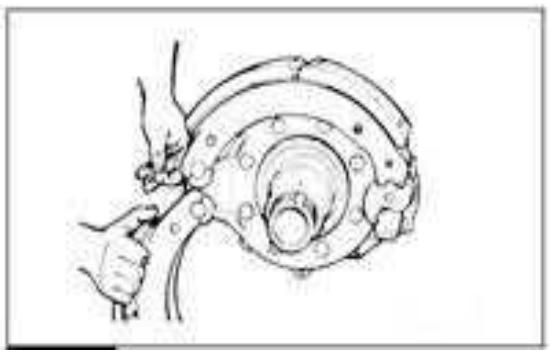
1. For the butterfly washers on the camshaft head, apply grease O-617 (No. 2 lithium-based grease) on the bushings, oil seals and camshaft

2. Camshaft

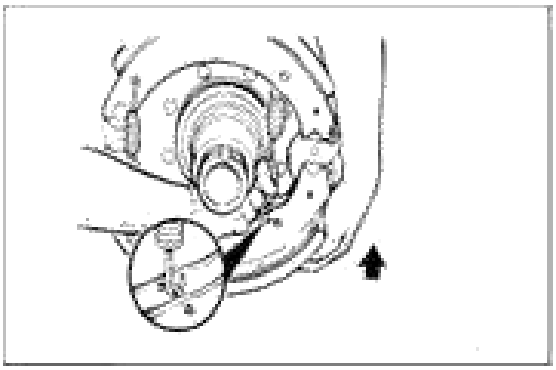
Brake



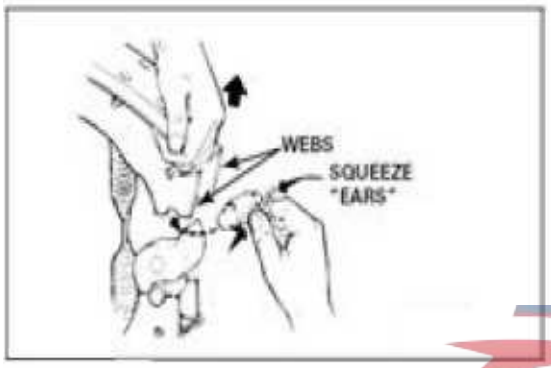
1. Apply a little grease on the contact area between the device and the support pin, and the contact area between brake and roller, and do apply the grease on the contact surface of the roller and cam.



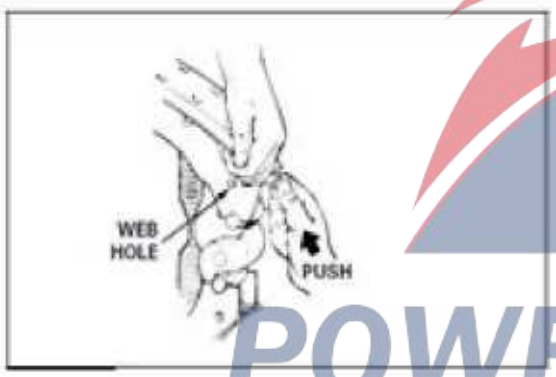
2. The brake is seated on the upper support pin and the lower brake is held by hand and hung on the lower support pin to install the new retention spring.



3. Lower brake, install a new return spring with hook opening toward the cam.



4. Brake until the roller and roller retainer can be fitted, hold the ears of the retainer and insert the roller and retainer into the brakes.



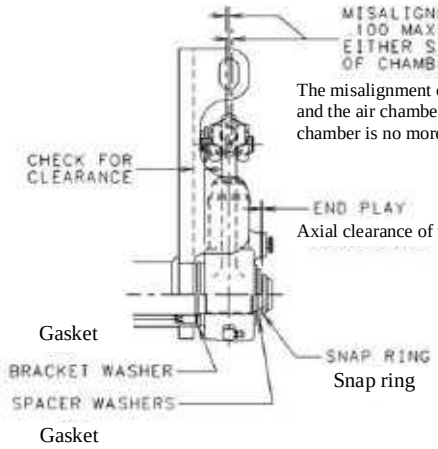
5. Hold the retainer until the ears of the retainer are locked into the hole of the brake.

Install the brake chamber

1. Push the pin hole center on the U-shaped fork of the push rod to 64mm at the front of the air chamber, if it needs to be adjusted, ensure that the direction of the U-shaped fork of the push rod and the adjusting arm are matched, and then tighten the locknut to 35-70Nm.

2. Flat washers and self-locking nuts, two air chambers are installed with nuts and respectively tightened to 80-100Nm, and then tightened to 180-210Nm.

Install the automatic adjustment arm on the camshaft



The misalignment of the adjusting arm and the air chamber bracket or air chamber is no more than 2.5mm

Axial clearance of the camshaft

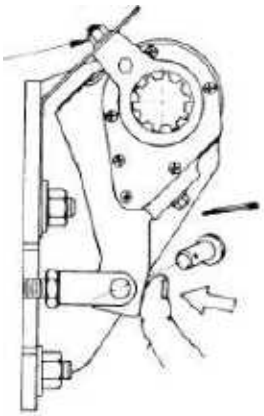
Gasket

Snap ring

Gasket

1. Adjust the gaskets between the air chamber brackets and adjust the axial position of the adjusting arm to ensure that the misalignment of the center of the adjusting arm and the center of the push rod of air chamber is no more than 2.5mm, select the gasket between the adjusting arm and snap ring to ensure that the axial clearance is 0.12 to 1.6mm.

2. For the arm mounted on the camshaft with bolts, the bolts shall be tightened to 100-140Nm



3. Turn the hexagon head of worm on the end of adjusting arm clockwise with SW12 wrench (note: do not use electric or pneumatic wrench) so that the adjusting arm and the pin hole of the U-shaped fork of air chamber push rod are naturally enfiladed. Then, Insert the cylindrical pin into the U-shaped fork hole, and install the pin, washer and cotter pin. Install the control arm lock nut and tighten it to 22-30Nm,

4. Clearance adjustment, use a wrench to turn the hexagon head of worm of the adjusting arm clockwise until the resistance increases, and then counterclockwise turn the hexagon head of worm for 3/4 turn (there will be click clack sound in reverse rotation). At this time, the brake clearance is slightly larger than the setting range, and the brake clearance will be automatically adjusted to the normal range after several times of braking.

Lubrication

Fill the camshaft bracket with Grease Q-617 (No. 2 universal lithium base grease) through grease nipple (21)

Product Description Chapter IV front axle

1 Introduction

Risk Warning Information

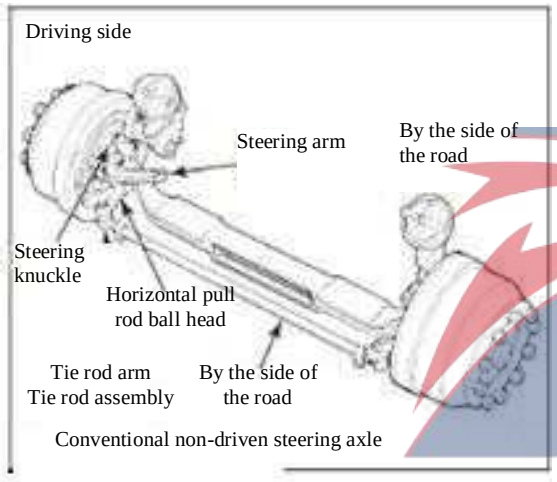
Read and understand the warnings and reminders for all the notices in this manual. These warnings and hints can prevent serious personal injury or damage to parts.

Warning:

When performing vehicle maintenance or repair work,you should take goggles to prevent serious eye injury.

Description

The descriptions and procedures in this maintenance manual apply to the relevant non-driven steering front axle of Meritor.



In this manual, the non-driven steering front axle of Meritor has the following components.

Tie rod arm, knuckle and kingpin

Left and right tie rod arms are connected with tie rod assembly reflectively.

The right steering knuckle and kingpin assembly are usually mirrored to that in left, but the steering arm is only fitted on the desired side.

Steering knuckle

Steering knuckles are classified based on front axle performance. All models are provided with cylinder kingpin. Three main types of kingpin bushings are used: nylon, bronze and EasySteer ™.

Steering knuckle arm

The knuckle arm is a forged part that converts the trailing arm force into a rotational movement of the wheel through the kingpin and knuckle.

If there is no hubcap, you can confirm the model according to the axle model. Refer to the identification plate at the front of front axle to confirm the axle model.

Tie rod assembly

The tie rod assembly connects two knuckles to achieve uniform motion and maintain steering control. Tie rod and clamp assembly basically move in parallel with the front axle. Tie rod is equipped with right-hand and left-hand thread ball on both sides. Tie rod clamp is to ensure that the tie rod ball head is in the tie rod.

2 Inspection

Risk Warning Information

Read and understand the warnings and reminders for all the notices in this manual. These warnings and hints can prevent serious personal injury or damage to parts.

Warning:

When performing vehicle maintenance or repair work,you should take goggles to prevent serious eye injury.

When someone works below the vehicle, apart from using jacks to lift the vehicle, other support measures must be taken.Jack may slip or fall. It may cause serious injury or damage to parts.

Replace the damaged or failed front axle assembly.Do not bend, repair, and repair the bridge assembly using welding or heat treatment.Curved front axle to reduce the strength of the axle, but also may affect the vehicle, and does not enjoy the Meritorus warranty.It may cause serious injury or damage to parts.

Before checking the axle components, check if you have the correct tools. Use the right tools to ensure safety and get the most accurate results.

Dial indicator, tire block, safety shelf of jack, torque wrench of pinch bar

Inspection

Check the parts

Fasteners

1.Verify that all fasteners have been tightened to the specified torque.

2. Use torque wrench to check torque. Once the fasteners start to move, record the torque immediately. Please correct if necessary.

3. Replace any worn or damaged fasteners.

Wear and damage

Check axle parts for wear or damage. Check if there are bent or broken parts. Replace any worn or damaged parts.

Pivot point

Make sure that the pivot point is not loosened. Make sure the pivot points are fully lubricated.

Operation

Verify that all components can move smoothly throughout the turn radius.

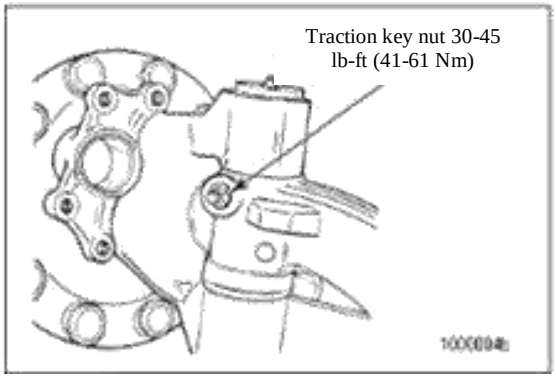
Tire wear

Check the type of the tire wear, which indicates that the suspension is damaged or misplaced. Please correct if necessary.

Steering knuckle arm bolts

Check the bolt torque on the tightening steering knuckle arm every 300,000 km.

Locking pin nut



Tighten the lock nut to 41-60 N • m on an axle with normal wheel ends based on the following intervals.

• After a new vehicle first runs for 10,000 km

• After every 60,000 km of running

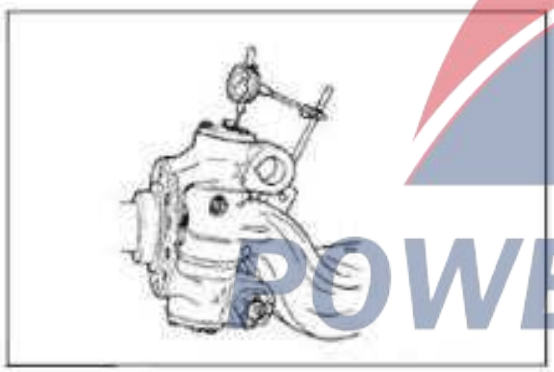
Vertical axial clearance of knuckle

Table B: Axial clearance range	
New axle or rebuilt axle	0.025-0.254 mm
Axle in service	0.025-0.762 mm

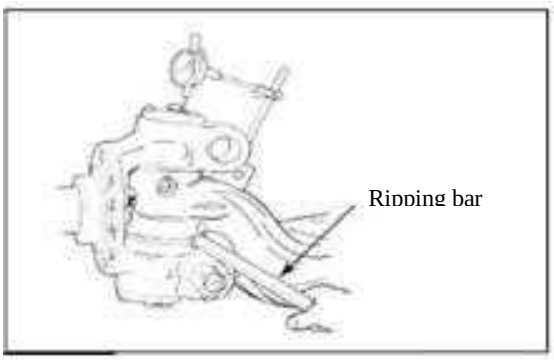
Axle with conventional wheel end

1.Park the vehicle in a flat place.Prevent the vehicle from moving. Use parking brake.

2. Use jacks to raise the vehicle until the front wheels off the ground. Support the front axle with safety brackets.



3. Install the dial indicator, mount the base on the I-beam and the top on the top knuckle cover.



4. Place a pinch bar between the I-beam and knuckle. Push the knuckle to the bottom of the vertical stroke.

5. Set the dial indicator to zero.

6. Use the pinch bar to push the knuckle upward. Record the reading of the dial indicator.

- If the reading is zero: Remove the knuckle. Remove the gasket of the gasket unit.
- If the reading is higher than the correct axial clearance specifications in Table B: Remove steering knuckle. Re-insert the gasket into the gasket unit.

Upper and lower bushing of the kingpin

Wheel to hub installation

First check the wheel-to-hub installation to help determine the cause of the displacement and loosening.

1. Check if the wheel is properly installed and all wheel end fasteners and hardware are tightened to the correct torque.

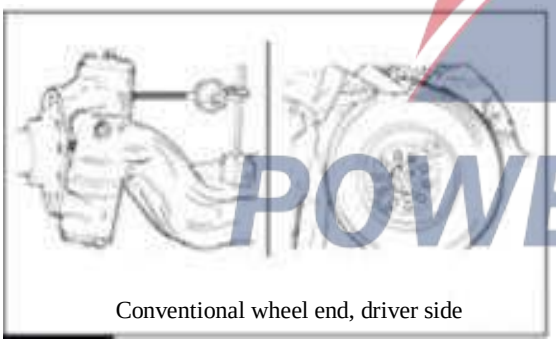
2. Use the service brake to lock the hub with the spindle.

- If check the displacement: check the kingpin or kingpin bushing.
- If the service brake can be used to eliminate the displacement, further check the axial clearance of the hub.

Axle with conventional wheel end

1.Park the vehicle in a flat place.Take measures to limit the wheel to prevent the vehicle from moving.Use parking brake.

2. Use jacks to raise the vehicle until the wheel off the ground.Use safety racks to lift the vehicle.



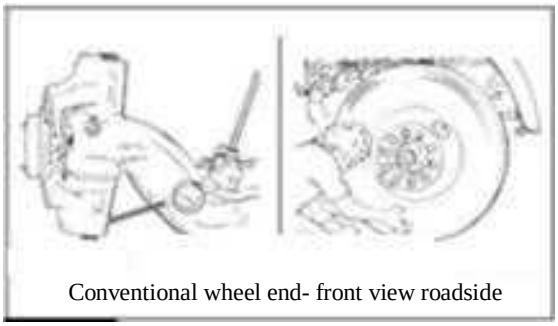
Conventional wheel end, driver side

3. Check if the kingpin bushing is worn. Install the dial indicator, mount the base on the I-beam and the top close to the top of the knuckle.

4.Return the dial indicator to zero.

5. Move the top of the tire back and forth in the direction towards or away from the vehicle.

If the dial indicator changes by 0.254mm: The upper bushing is worn or damaged. Replace the two bushings of the knuckle.



Conventional wheel end- front view roadside

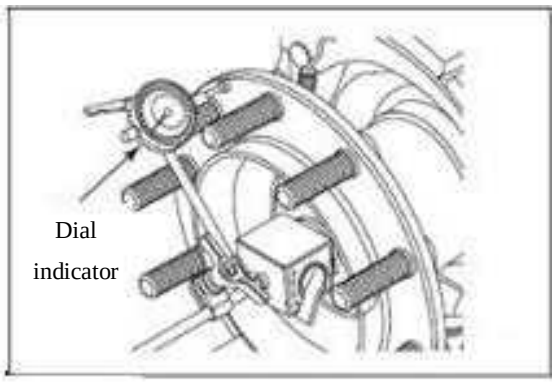
6. Check the lower shaft sleeve of the kingpin. Install the dial indicator, mount the base on the I-beam and the top close to the downside of the knuckle.

If the dial indicator changes by 0.254mm: The lower bushing is worn or damaged. Replace the two bushings of the knuckle.

7.Return the dial indicator to zero.

8. Move the bottom of the tire back and forth in the direction towards or away from the vehicle.

Note: This higher frequency check plan is different from the usual recommendation (only 300,000 km), and the basic inspection with the maximum interval of 80,000 km can only be carried out after the initial detailed inspection.



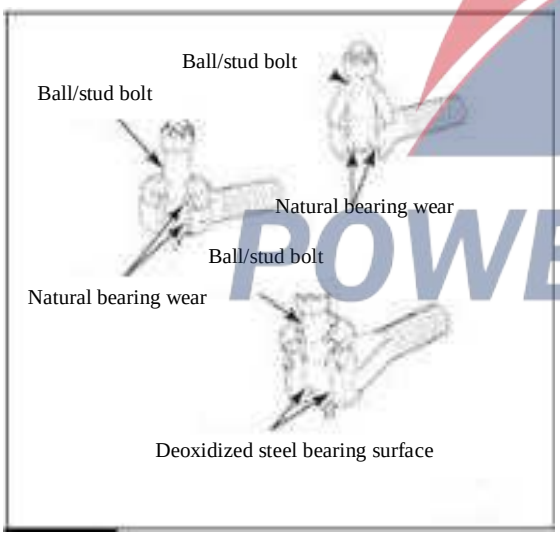
9. Remove wheel and brake drum. Attach the magnetic base of the dial indicator to the outer end face of the knuckle shaft. Place the indicating arm vertically against the mounting surface of hub.

10.Return the dial indicator to zero.Never rotate the wheel end. Put your hands on the position of nine o'clock and three o'clock.

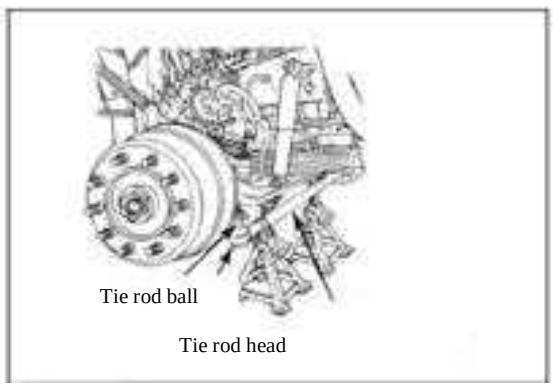
Tie rod assembly

Note: Never grease the tie rod assembly before performing the inspection.

You may not be able to detect the loose or worn tie rod balls during operation. Under normal operating conditions, the wear appears over time. The preload in each tie rod ball decreases with use, which affects steering control, front tire wear, and other axle assemblies.



With the regular scheduled inspections and maintenance, the impact of tie rod wear on the vehicle can be minimized. For inspection interval please refer to Table L.



1. Park the vehicle on a level surface and keep the wheels straight.Take measures to limit the wheel to prevent the vehicle from moving.Use parking brake.

2. Raise the vehicle until the front wheel off the ground.Use safety racks to lift the vehicle.Do not use jacks to support the vehicle.

3. Turn off the engine and turn the wheel from full left to full right. Return to the right ahead position. This step requires more force on the vehicle powered off.

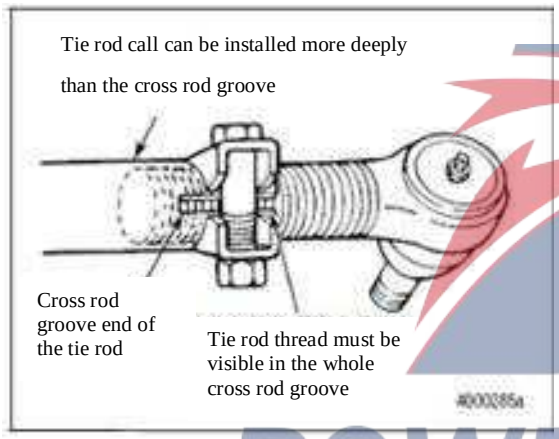
4. Check the protection sleeve of tie rod ball for cracks, wear or other damage. If it is damaged or missing, replace the entire tie rod ball.

Warning:

Check if the cotter pin is installed through the tie rod ball and the tie rod ball nut is tightened to the correct torque specification. Replace the missing cotter pin and tighten the loose tie rod ball nut. Missing cotter pins or loose tie rod ball nuts can cause steering control to fail.It may cause serious injury or damage to parts.

5. Check if the tie rod nut is mounted with cotter pin and protected by it.

If the cotter is missing: Tighten the tie rod ball nut to the correct specification. Install a new cotter pin. When setting the cotter, always tighten the tie rod nut to the specified torque. Do not loosen the nut to insert the cotter pin.



6. Check whether the tie rod ball is correctly screwed into the tie rod and installed in the correct position. There must be a sufficient screwing length for the tie rod ball in the groove of the tie rod.

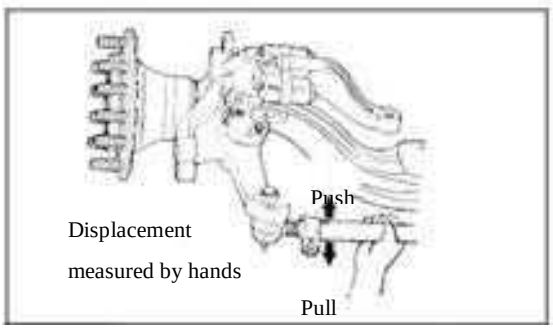
6. Check if the tie rod ball is correctly screwed into the tie rod and installed correctly

7. Check if grease nipple is fitted. Replace damaged grease nipple.

8. Turn the tie rod and place the tie rod body in the stop position, that is, the length of thread engagement of ball on both ends of the tie rod is the same.

Warning:

Only use both hands to check the displacement or looseness of the tie rod assembly. Do not apply external force to the tie rod assembly ends or joints by using pinch bar, which may cause damage to components...



9. Apply about 50 kg of force by hand to push and pull in a vertical direction. Check if the balls at both ends of the tie rod are displaced or loose.

If the tie rod assembly is displaced: replace the balls at both ends of the tie rod.

10. Check if the tie rod and clamp are damaged. If the tie rod is bent or broken:

Replace it. If the clamp is damaged: Replace it.

Note: Replace the bent or damaged tie rod with original parts. Never attempt to straighten the bent tie rod.

3 Removal

Risk Warning Information

Read and understand the warnings and reminders for all the notices in this manual. These warnings and hints can prevent serious personal injury or damage to parts.

Warning:

When performing vehicle maintenance or repair work,you should take goggles to prevent serious eye injury.

Park the vehicle in a flat place.Take measures to limit the wheel to prevent the vehicle from moving.Use safety racks to lift the vehicle.When someone works on the bottom of the vehicle, in addition to using jacks to lift the vehicle, other support measures must be taken.Jack may slip or fall. It may cause serious injury or damage to parts.

Assembly and removal shall be completed by using copper or leather mallet.Do not use steel hammer to hit steel parts.The parts may crack.It may cause serious injury or damage to parts.

Removal

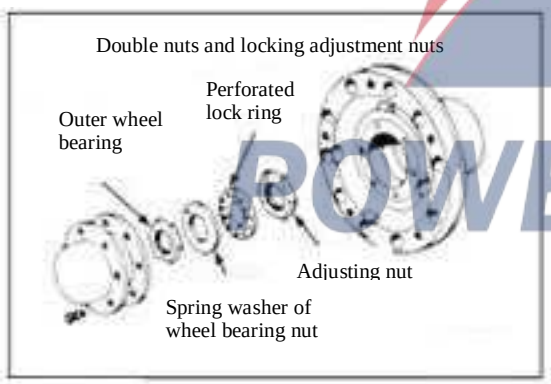
Wheel ends - Axles with conventional wheel ends

1.Park the vehicle in a flat place.Take measures to limit the wheel to prevent the vehicle from moving.Use parking brake.

2. Raise the front of the vehicle until the front wheels off the ground.Use safety racks to lift the vehicle.

3. Remove the screw on the hub cap using an appropriately sized sleeve. Remove cover and washer.

4. Remove the wheel bearing fasteners. See related steps.



A. Remove wheel bearing nuts, locking washers, locking ring with hole and adjusting nut from steering knuckle.

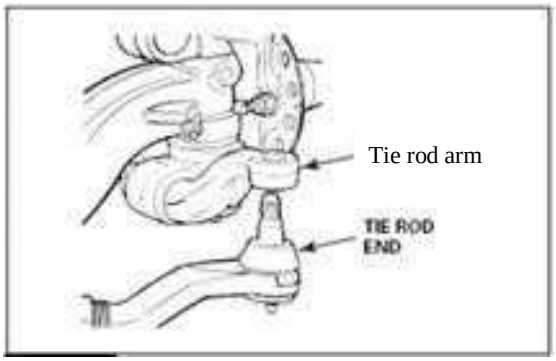
5. Remove the outer bearing outer ring of the hub. Remove the axle, tires, hubs and other assemblies.

6.Remove the brake parts. See the instructions provided by the brake manufacturer.

7.Remove the oil seal of wheel. Remove the inner hub bearing inner ring. Check the wheel bearings.

Warning:

Do not heat the steering arm to remove the tie rod assembly. Heating the tie rod arm may cause fire and damage to parts.



1. Remove the cotter pins and nuts that secure each tie rod connector to the tie rod arm.

2. Disconnect the tie rod assembly. If possible, use a tie rod ball extractor to remove the ball head from the tie rod arm.

3. Remove the cotter pin and nut that secure the tie rod arm to the knuckle.

4. Remove the tie rod arm of knuckle. If necessary, use a leather or plastic mallet to tap the tie rod ball. Remove the locating key.

Locating key, kingpin and knuckle

Axle with bolting kingpin cover

1. Follow this section to remove the wheel end.

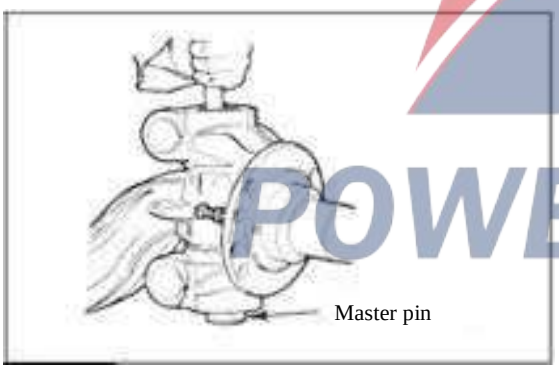
2. Disconnect the air line of the brake.

3.Remove the brake parts. See the instructions provided by the brake manufacturer.

4. Remove the tie rod arm and steering arm of the knuckle. Please refer to the operating procedures in this section.

5. Remove the cap screws that secure the kingpin cover to the knuckle. Remove the cap and gasket.

6. If the bushing is not replaced, take the following steps to prevent damage to the bushing during removal of kingpin.



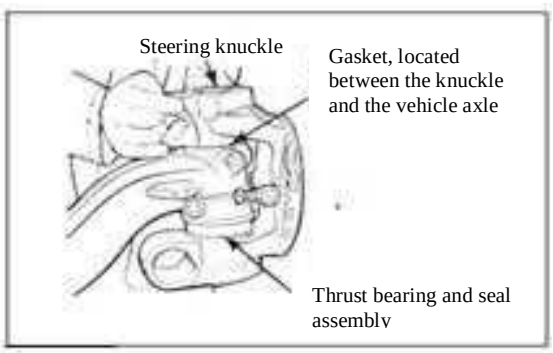
A. Use a copper punch and hammer to remove the kingpin from the knuckle.

B. Remove all revers on the punch that touch the bushing.

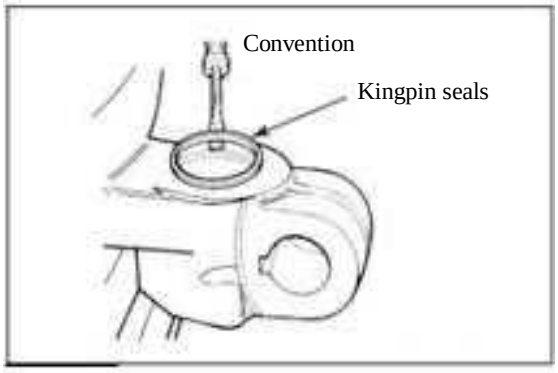
C. Wrap the1.5 mm thick tape in the punch end.

7. If the king pin is difficult to disassemble, use the hydraulic kingpin remover.

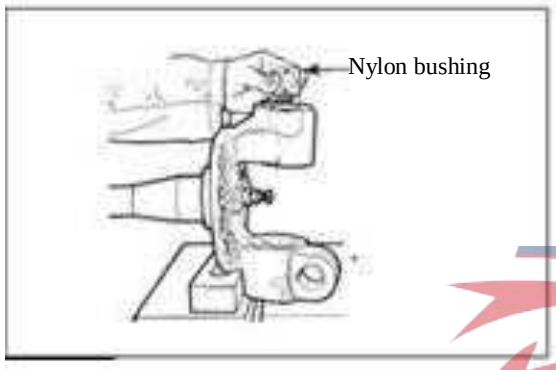
8. Remove the knuckle on the front axle.



9. After wearing gloves, remove the gaskets, thrust bearings and seal rings from the front axle and knuckle.



10. Remove and discard the kingpin seals.



11. Remove the upper and lower bushing from the knuckle hole

4 Assemble the spare parts

Risk Warning Information

Read and understand the warnings and reminders for all the notices in this manual. These warnings and hints can prevent serious personal injury or damage to parts.

Warning:

When performing vehicle maintenance or repair work,you should take goggles to prevent serious eye injury.

Replace damaged or failed shaft assembly.Do not bend, repair, and repair the bridge assembly using welding or heat treatment.Curved front axle to reduce the strength of the axle, but also may affect the vehicle, and does not enjoy the Meritorus warranty.It may cause serious injury or damage to parts.

Replacement

Worn or damaged parts

Never repair and restore the front axle components. Replace the damaged or unqualified parts. All major components shall be subject to heat treatment and strengthen treatment.

Do not do the following operations for the front axle assembly:

- Welding steering arm, tie rod arm, knuckle, kingpin, front axle, tie rod assembly, hub, brake drum or brake disc.
- Hot or cold bending of knuckle, steering arm, tie rod arm, ball stud, front axle or tie rod assembly.
- Drill hole on the front axle for kingpin positioning. Drill hole on knuckle for locating key.

Warning:

Solvent detergents may be flammable and toxic and may cause a fire. For example, solvent detergents may be carbon tetrachloride and emulsion petroleum based cleaners. Before using solvent detergents, be sure to read the manufacturer's instructions, and solvent detergents must be used in accordance with the instructions. What's more, the following rules shall be followed.

Wear goggles, protective clothing and work in the well-ventilated area.

Do not use gasoline or gasoline-contained solvents. Gasoline may cause an explosion.

The hydrothermal solution tank or aqueous alkali must be used correctly. Before using hydrothermal solution tank or aqueous alkali, read the manufacturer's instructions. The hydrothermal solution tank or aqueous alkali must be used in accordance with the instructions.

Caution

Do not clean the floor or polish the surface using hydrothermal solution tank or aqueous alkali, which may cause damage to parts.

Clean, dry and inspect the parts

Floor or polished parts

Use cleaning agents to clean the abraded or polished parts and surfaces. Kerosene or diesel fuel can be used. Do not use gasoline.

Do not clean the abraded or polished parts in hydrothermal solution tank or using water, steam or aqueous alkali. These solutions can cause parts to rust.

Dry and clean the parts

The parts must be dried immediately after being cleaned. Dry the parts with clean paper towels or cloth waste or compressed air. Do not use compressed air to rotate the bearings for drying.

Prevent corrosion of parts after cleaning

Apply light oil on clean and dry parts that are undamaged and ready to be assembled. Never apply oil on the surface of brake friction plate or on the surface of the drum brake disc.

If parts are to be stored, take good corrosion precautions on all surfaces. Never use material on the brake lining or brake drum. Store the parts in special paper or other anti-corrosive materials.

All tapered surfaces must be clean and dry with lubrication or rust preventions.

Installation

New pre-glued fasteners

1. Clean away the grease and dirt in the threaded hole. Use a wire brush to remove old stickers. No special cleaning is required.

Caution

Do not use it in the new pre-glued fasteners or threaded holes. If other marks are used, the new glue will not function properly, which may cause damage to components...

2. Use new pre-glued fasteners to assemble the parts.

Note: No drying time is needed for the pre-glued fasteners.

3.Depending on the fastener type, tighten it to the desired torque value.

Old or used fasteners shall be applied with Loctite 680 solid glue or the same glues.

Warning:

When using Loctite solid glue, you must be particularly careful to avoid serious personal injury. Before using this product, you must read the manufacturer's instructions. Follow the instructions below to prevent eye and skin irritation. If Loctite solid glue gets in eyes inadvertently, follow the manufacturer's emergency procedures immediately. Go to a doctor as soon as possible to check your eyes.

1. Clear away the oil stain, dirt and old solid glue on all threads and threaded holes with wire brush.

Caution

Do not glue the fastener threads. Air pressure in the threaded hole will drain the glue when installing the fasteners, which may cause damage to components...

Note: no drying time is needed for Loctite 680 solid glue or the same solid glue.

2. Each threaded hole shall be only applied with four to five drops Loctite 680 solid glue or the same solid glue

3. Depending on the fastener type, tighten it to the desired torque value.

Check the Dri-Loc anti-loosening torque values without removing fasteners

If you do not need to remove the Dri-Loc fastener from the assembly, use the following procedures to check if the fastener torque value is correct.

Adjust the torque to the minimum required for this size of fastener. Fasteners cannot be rotated.

- If the fastener rotates: Remove the fastener from the assembly. Check if the fasteners and holes are worn or damaged. If necessary, repair it.

- If the fasteners and holes are intact: Apply glue to the threaded hole. Follow the steps below to install the old Dri-Loc fastener.

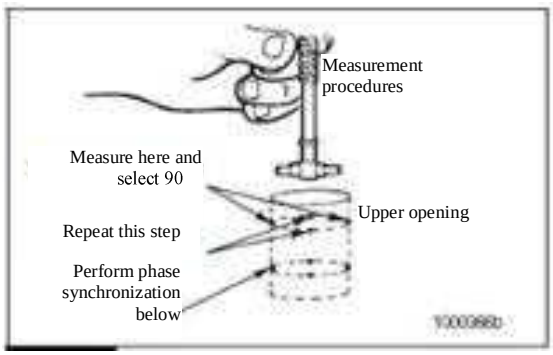
Inspection

Axle with conventional wheel end

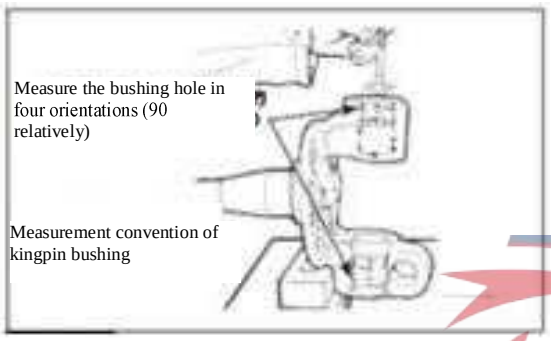
Refer to the following instructions to inspect all disassembled parts carefully before assembly.

1. Inspect and replace any worn, cracked, or damaged parts. Check for cracks by using dye penetration, magnetic powder or fluorescent particle test method. Follow the instructions provided by the manufacturer of the product being inspected.

2. Remove the old bushing on the knuckle. Measure the inner diameter of the knuckle openings in two locations. Use micrometer and telescopic gauge to measure the knuckle hole.



3. Carry out the hole measurement in four orientations in two locations. The two positions are in 90 °to each other. If the average measurement value is higher than the maximum diameter of the knuckle hole in Table D, replace the knuckle.



4. Repeat this step to measure the lower knuckle hole. See the maximum diameter of knuckle hole in the table.

• If the measured value of the upper or lower knuckle hole exceeds the maximum diameter of knuckle hole in the following table: Replace the knuckle.

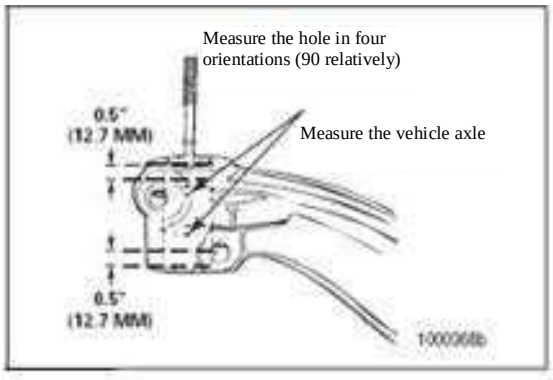
5. Use the micrometer and telescopic gauge to measure the diameter of the kingpin bushing.

• If the average measurement value of the internal diameter is higher than the maximum internal diameter of the kingpin bushing in the table below: Install a new bushing.

6. After installing and reaming the new bushing, measure its inner diameter in four orientations in two positions. The two positions must be in 90 °to each other.

• If the average measurement value is higher than the maximum inner diameter of the kingpin bushing in the following table: Replace the bushing.

7. Measure the diameter of the front axle hole. It is acceptable to round the top and bottom of the front axle. Measure the front axle hole in four orientations. See the following guidelines.



A. 12.7 mm below the top of the hole

B. 12.7 mm above the bottom of the hole

• If the average measured value is higher than the maximum inner diameter of the front axle hole in the table below: Replace the entire front axle.

Wear limit specifications

Model	**Maximum diameter of knuckle hole**	**Maximum diameter of front axle hole**	**Maximum inner diameter of kingpin bushing**
MFS45122 or FD-965MFS66122 or FG-941	1.9220 inches (48.818 mm)	1.7960 inches (45.6180 mm)	1.7980 inches (45.6692 mm)
MFS73122, MFS73149MFS90133 or FL-941	2.1270 inches (54.025 mm)	2.0030 inches (50.8762 mm)	2.0010 inches (50.8250 mm)

5 Assembly

Risk Warning Information

Read and understand the warnings and reminders for all the notices in this manual. These warnings and hints can prevent serious personal injury or damage to parts.

Warning:

When performing vehicle maintenance or repair work,you should take goggles to prevent serious eye injury.

Installation

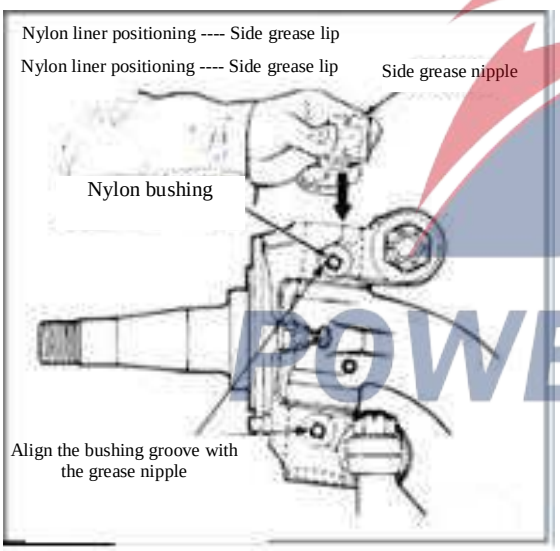
Kingpin bushing

Nylon bushing - axle with conventional wheel ends

1. Insert the nylon bushing into each knuckle hole by hand. The entire outer surface of the nylon bushing must be supported against the knuckle hole.

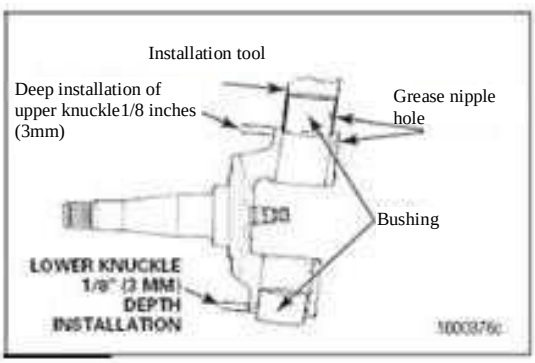
2. Before attempting to install the knuckle on the front axle, check the installation of the nylon bushing.

3. The kingpin goes through the upper and lower holes. Each nylon bushing must be fully seated in the knuckle hole.



4. The bushing lubrication groove must align with the grease nipple of the knuckle.

Installation of kingpin bushing-axle with conventional wheel ends

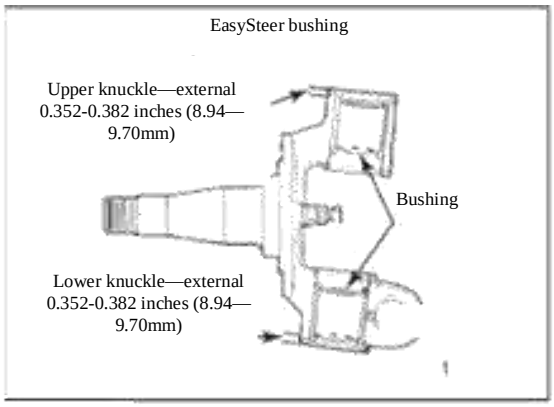


1. Insert the new bushing into the upper knuckle hole.

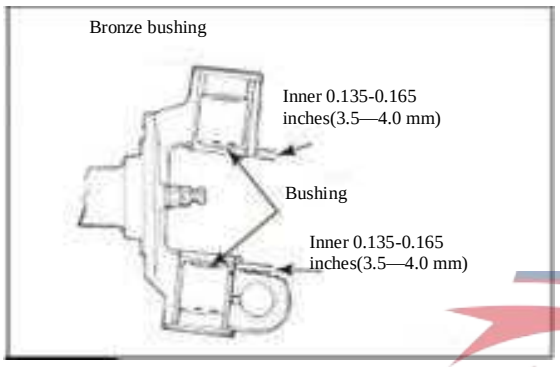
2. Use the installation tool to press the bushing straightly into the hole.

3. Turn over the knuckle so that its bottom is upward. The hole must be parallel to the top of the press machine.

4. Use the installation tool to press the bushing straightly into the hole.



A. For bushings used for the MFS front axle, press the bushing to 9-10 mm deep below the top of the upper knuckle hole or until it is aligned with the grease nipple.



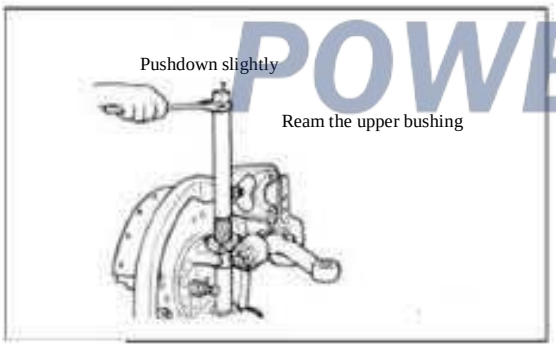
B. For bronze bushing, press it to 3.5-4.0 mm above the bottom of the upper hole.

5. Ream the bushing. See the procedure in this section.

Ream the kingpin bushing

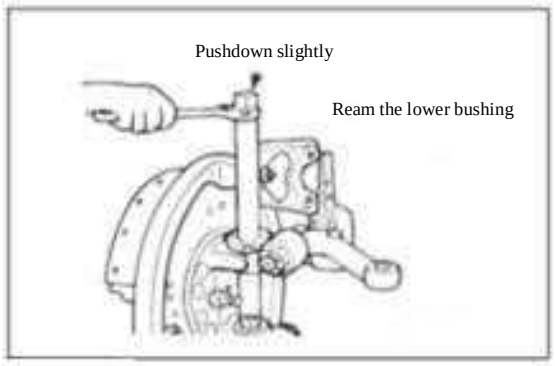
Axle with conventional wheel ends - Bronze or nylon bushing

Use a stationary reamer to ream the kingpin bushing.



1. Slide the guide shaft of reamer into the top bushing until the reamer blade contacts the bushing.

2. Turn the reamer slightly downwards. Do not apply excessive force.



3. After reaming the top bushing, send the reamer into the bottom bushing. Repeat the step 1and 2.

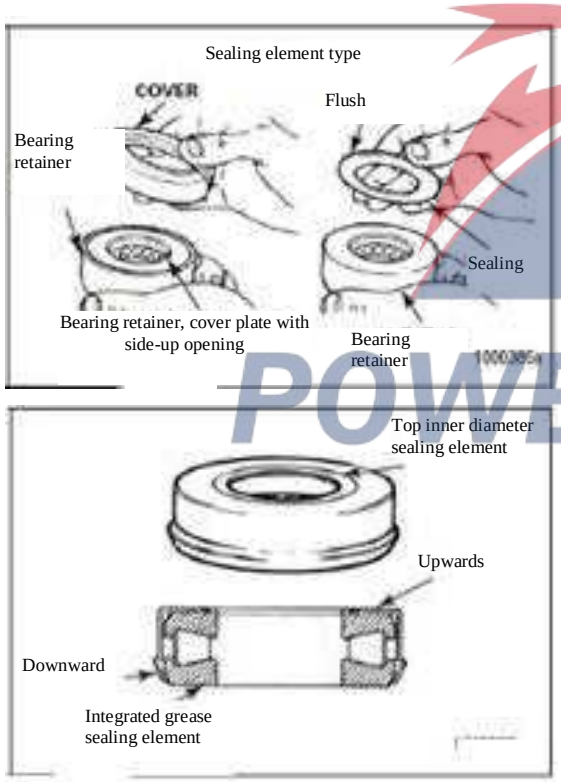
4. Remove all debris and other materials on the bushing.

Install the knuckle onto the front axle

Warning:

The copper or rawhide hammers are adopted in assembly and dismantling procedure. Do not use steel hammer to hit steel parts.

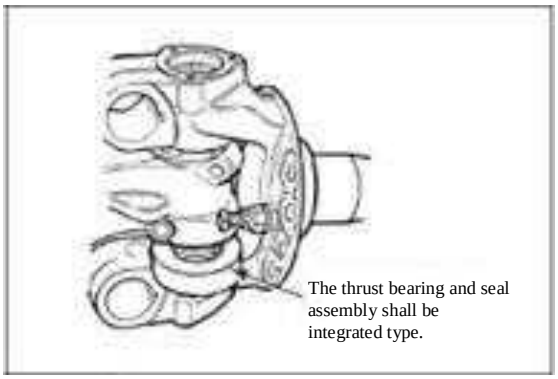
1. Clean the steering knuckle opening and front axle.



2. Install the sealing element outside the thrust bearing. The sealed cover must be properly installed.

A. Overlay sealing element: install the sealing element on the upper end of the bearing opening.

B. Flat-plate sealing element: install the sealing element in the sealing part of the bearing.



3. Install the sealing element and thrust bearing assembly on the inward steering knuckle. The upward side of the sealing element must be clung to the front axle.

Warning:

Please wear gloves when installing the gasket. The edge of the gasket is sharp, which may cause serious personal injury.

4. Check whether the gasket is damaged before installation.

A. Replace damaged gaskets with the same size gaskets, or use them together, and it is necessary to meet the minimum requirement of the axial clearance of the steering knuckle.

B. If a new gasket group is needed, the number of gaskets that can meet the minimum requirements of the axial clearance is selected.

5. After inspection, the gasket is placed on the machining surface of the front axle tapping machine. Make it aligned so as to install kingpin.

6. Place the steering knuckle on the front axle.

7. Place the pinch bar between the steering arm and the front axle. Lift the steering knuckle and slide the gasket between the top of the front axle and the steering knuckle.

8. Align with all openings. If the openings are not aligned, the components will be damaged when the kingpin is installed.

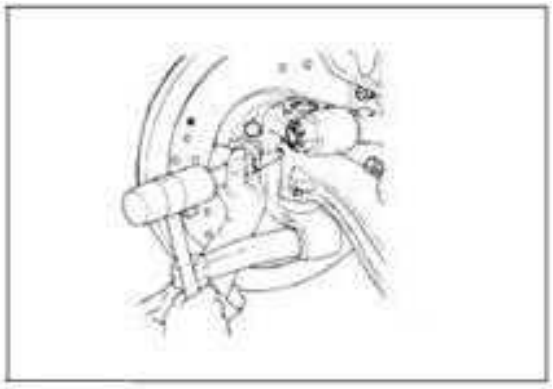
9. Remove the pinch bar. Multi-functional grease is smeared to the bottom half of the kingpin before the kingpin is installed to the top of the steering knuckle.

10. Confirm the up and down direction of the kingpin.

11. Rotate the kingpin, and align the two grooves of the positioning key with the groove of the positioning key on the steering knuckle.

12. Install the kingpin to the top of the steering knuckle and pass through the location of the gasket. Do not overexert and cause the kingpin through the top bushing.

13. If necessary, use a hammer and copper punch knocking the kingpin directly, make the kingpin fixed to the opening of the downward steering knuckle.

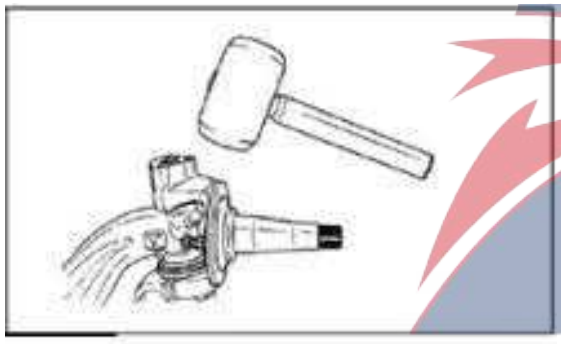


14. Fix the top positioning key to the front of the front axle. Use a hammer and punch to knock the bottom positioning key and make it fixed to the back of the front axle. These keys must be flush with the kingpin groove. Do not install or fasten lock nuts before checking the axial clearance of the steering knuckle.

Check the vertical axial clearance of the steering knuckle

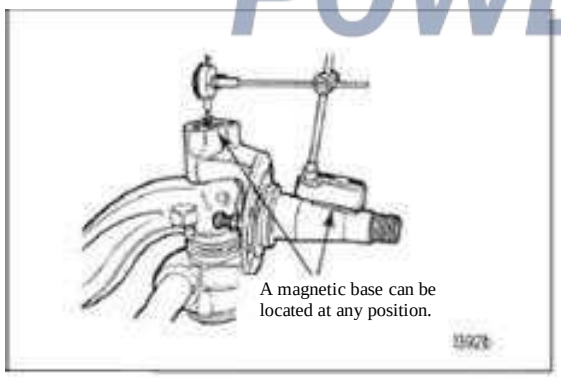
Table F: The specification of axial clearance	
New axle or reassembly of axle	0.025-0.254 mm
Use middle axle	0.025-0.762 mm

Conventional wheel end axle



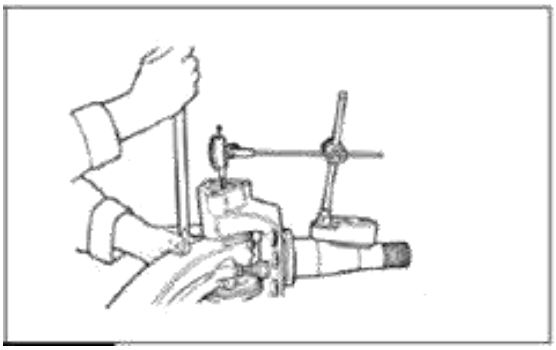
1. Use the rubber hammer to knock the axle sleeve of steering knuckle and make it into position.

2. Turn the steering knuckle to the front.

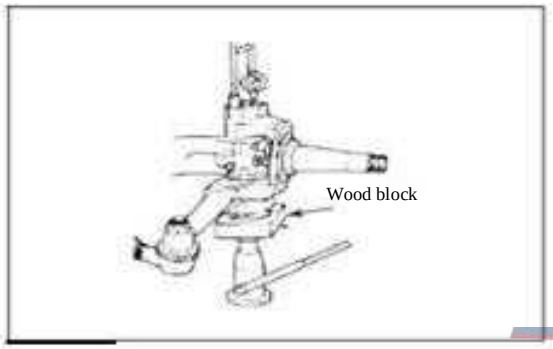


3. Attach a dial indicator. Install the steering knuckle base. Make the point located in the kingpin center. Return the dial indicator to zero.

4. The axial clearance is measured by one of the following methods.



• Place the pinch bar between the steering knuckle and the top center of the front axle. Push up the steering knuckle and measure the axial clearance.



• Place the skid and hydraulic jack under the bottom of the steering knuckle. Lift the steering knuckle until the pointer on the dial indicator stops moving.

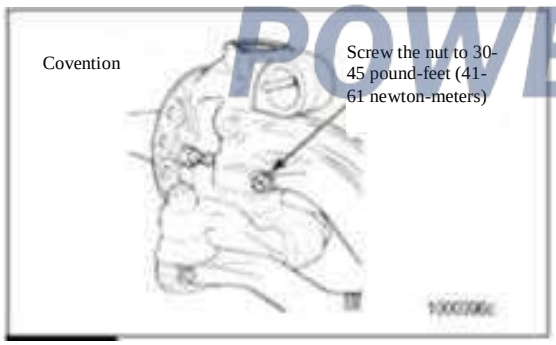
5. Place the axle on the full right or full left side, and repeat steps 3-4.

6. Record the reading of the dial indicator.

• If the steering knuckle is limited or fails to measure the axial clearance, dismantle the gasket from the gasket set.

• If the reading is higher than the correct specifications of the vertical axial clearance of the steering knuckle, the gasket shall be added between the steering knuckle and front axle.

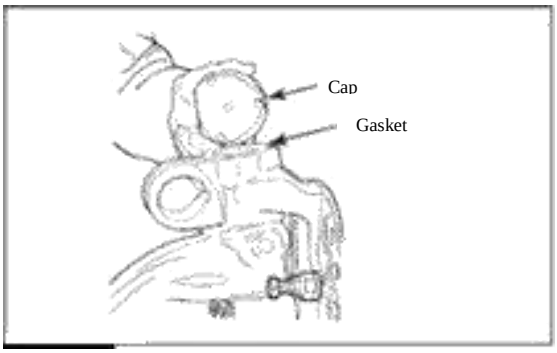
Lock pin- axle with conventional wheel end



Install the lock nut and screw it to 41-46 newton-meters.

Kingpin cap

Bolt-tightened kingpin cap

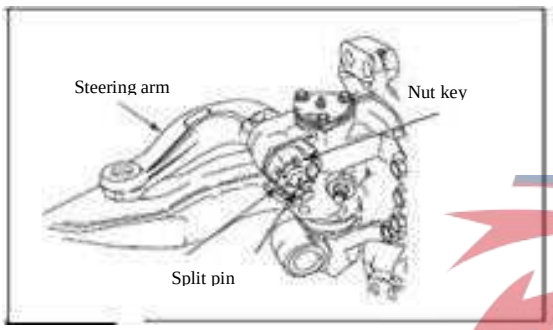


1. Install the gasket or cap at the top and bottom of the steering knuckle. Install the screw and gasket and screw them to 28-40 newton-meters.

2. Connect the cross tie rod arms of the steering knuckle. See the procedure in this section.

Steering knuckle arm

The steering knuckle arm axle controlled by the positioning key



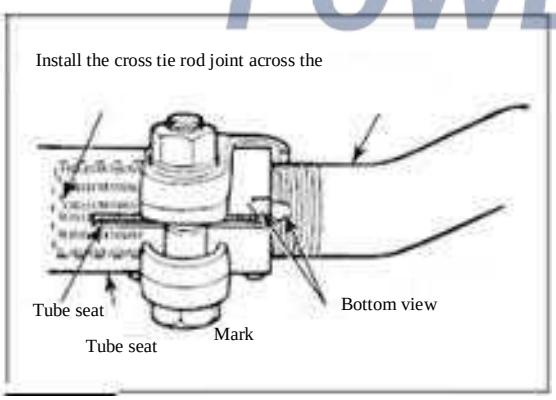
1. Insert the positioning key into the steering knuckle arm groove. Install the steering arm to the steering knuckle.

2. Install the nuts. Tighten to the specified torque.

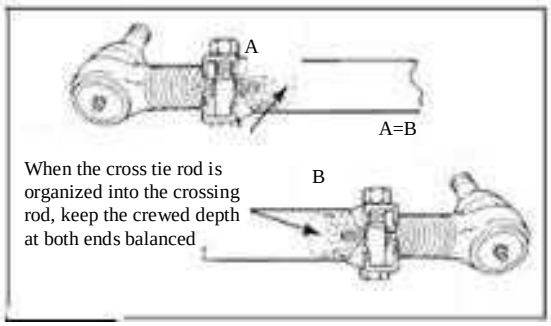
3. Install the split pins. If necessary, screw the nut till it is aligned with the aperture. Don't loosen the nuts or install the split pins.

Install the cross tie rod joint to the cross tie rod.

Notes: the right-hand thread of the cross tie rod is on the right side of the vehicle and left-hand thread is on the left side of the vehicle.



Replace the cross tie rod with one with the same length and diameter as the original one. Use the thread counting as the reference. Install the cross tie rod joint to cross tie rod joint of the thread. Install it to the labeled depth when the cross tie rod is dismantled.



If a new cross rod joint is being installed, then screw it to the original depth in the cross tie rod.

The cross tie rod joints at both ends shall be installed into the deeper position than the notching of the cross tie rod.

1. Check if the hoop is fixed at the bottom of the cross tie rod.
2. Install the nuts and bolts of the hoop. Tighten to the specified torque.

6 Adjustment

Risk Warning Information

Read and understand the warnings and reminders for all the notices in this manual. These warnings and hints can prevent serious personal injury or damage to parts.

Warning:

When performing vehicle maintenance or repair work,you should take goggles to prevent serious eye injury.

Inspection

Check before positioning

Wheel and tire

1. Check whether the tire is inflated to the specified pressure.
2. Check whether the size and type of the front tire are the same.
3. Check whether the wheel nut is tightened to the specified torque.
4. Check whether the wheel is balanced.
5. Check whether the wheel is bent or damaged.

Front suspension

1.Verify that all fasteners have been tightened to the specified torque.
2. Check whether the steel plate spring is worn or damaged.
3. Check whether the shock absorber is worn or damaged.

The rear axle and the rear suspension device

Wear condition of the front wheel may be caused by the rear axle. If the outer edge of a front tire is worn and the inner edge of the other front tire is worn, then check the following items.

1. Screw all fasteners to the specified torque.
2. Check whether the steel plate springs and bushes are worn or damaged?
3. If a stabilizer bar is used, the lever is adjusted correctly.
4.The frame is not bent.
5. Refer to the additional rear axle and the suspension parts recommendations provided by the vehicle manufacturer.

Positioning

Positioning of front wheel

Check the positioning of the front wheel:

1. Every 300,000 kilometers or 24 months (normal maintenance).
2. When the vehicle fails to turn correctly.
3. Repair the wear condition of the tire.

Positioning of the secondary front wheel

The following steps shall be taken to implement positioning of the secondary front wheel under all normal maintenance situations.

1. Check all systems that have an effect on the positioning of the wheel.

2. Check and adjust the axial clearance of the hub bearing.

3. Check and adjust the toe.

The important positioning of the front wheel

The following steps shall be taken to implement the important positioning of the front wheel to correct the wear condition of the steering and tie.

1. Check all the links that will influence the positioning of the wheel.

2. Check and adjust the hub bearing.

3. Check and adjust the biggest angle of rotation.

• If the vehicle is equipped with the power steering: check and adjust the pressure release conditions in the power steering system.

4. Check and adjust the angle of turning radius.

5.Check the inward camber and caster angle of the kingpin.

6. Check the camber angle of the wheel.

Caution

Change the damaged or unqualified components like front axle. Do not allow using welding or heat treatment to bend, maintain and repair the axle assembly.Curved front axle to reduce the strength of the axle, but also may affect the vehicle, and does not enjoy the Meritorus warranty.It may cause serious injury or damage to parts.

7. Check and adjust the caster angle.

8. Check and adjust the toe.

Check and adjust

Hub bearing

After the brake drum and tire are dismantled, get the most accurate measurement of the bearing axial clearance.

Adjustment

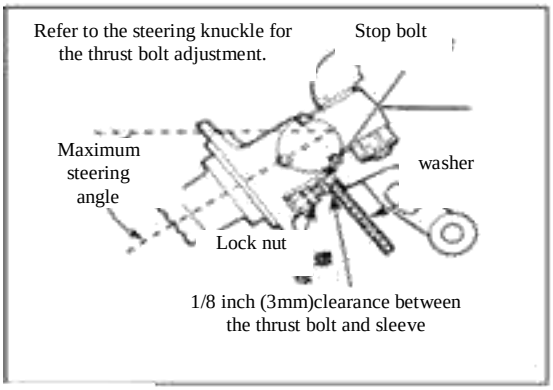
Maximum steering angle

Caution

Do not exceed the biggest angle of rotation specified by the vehicle manufacturer. If it exceeds, it will cause damage to the steering arm, cross tie rod and cross tie rod joint.

Thrust bolts shall control the biggest angle of rotation. If the thrust bolt is deficient, bent or damaged, it needs adjustment. Adjust pressure release by using mechanical thrust in the steering system.

If the friction between the front tie and frame or repair on steering gear occurs, please check the angle. Use the positioning device to check the angle. Please refer to the steps provided by the positioning device manufacturer.



• As to power steering system, the thrust bolt shall not touch the front axle. When the steering knuckle is in the position of full rotation as shown in the figure, the thrust bolt shall always keep at least 3mm clearance.

Four-patch steering 1/2 inch thrust bolt, only conventional

1. Install the gasket on the adaptor.

2. Paint the Loctite to the opening of the adaptor of the thrust bolt in the tapping of the steering knuckle.

3. Install the adaptor with the gasket into the thread knuckle chamber.

4. Screw the adaptor to 115-155 newton-meters.

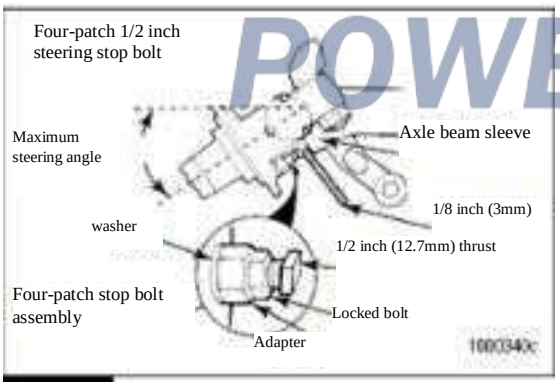
5. Install the lock nut on the 12.7mm bolt and install the assembly of bolt and lock nut on the adaptor.

6. Place a 3mm spacer between the thrust bolt and the protruded limit on the front axle.

7. Turn the steering wheel until the protruded limit on the front axle touches the spacer in front of the thrust bolt. Measure the angle of rotation.

8. If the biggest angle of rotation doesn't conform to the specifications specified by the vehicle manufacturer, then adjust the biggest angle.

9. When the biggest angle of rotation is correct, follow the following introduction

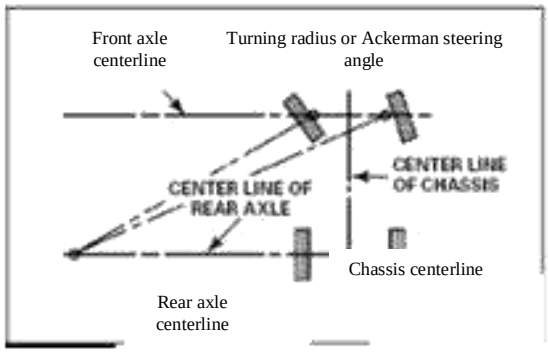


A. Release the lock nut of the thrust bolt.

B. Place a 3mm spacer between the thrust bolt and protruded limit on the front axle. Keep the steering knuckle arm on the position of full rotation.

C. Screw the lock nut to 68-101 newton-meters.

Turning radius



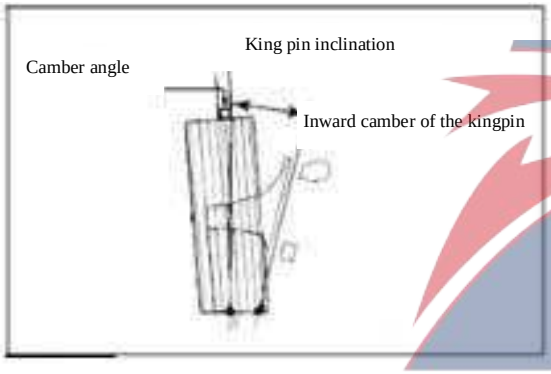
When turning, the turning angle of inside wheel shall be bigger than that of outside wheel. The angle refers to turning radius, usually called Ackerman turning angle.

Use special gauge on the positioning device to check angle of turning radius. Please refer to the manual provided by the vehicle manufacturer to ensure correct specification of turning radius angle.

• If the angle is beyond the specification parameter, the tire shall wear prematurely. Check if the steering knuckle, cross tie rod arm, cross tie rod joint and cross tie rod are worn or damaged.If necessary, overhaul it.

King pin inclination

Notes: refer to the specifications of inward camber of the kingpin provided by the vehicle manufacturer.



Inward camber of the kingpin on the axle and camber outside the wheel are designed so that the centerline of the tire can touches with the pavement. It will reduce steering force and improve directional stability.

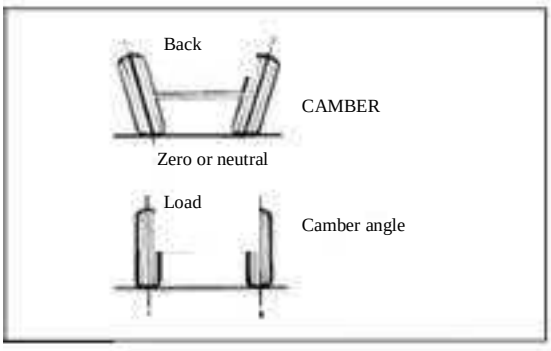
Use the positioning device to check the inward camber of the kingpin. Please refer to the inward camber specifications provided by the vehicle manufacturer.

Inward camber of the kingpin can't be adjusted. If the inward camber is not the specified angle, check if the front axle and steering knuckle are damaged.If necessary, overhaul it.

Camber angle

Warning:

Replace damaged or failed shaft assembly.Do not bend, repair, and repair the bridge assembly using welding or heat treatment.Curved front axle to reduce the strength of the axle, but also may affect the vehicle, and does not enjoy the Meritorus warranty.It may cause serious injury or damage to parts.



The camber is the angle of a tire relative to the ground. When the distance between the tops of the wheels is larger than the distance between the wheels on the ground, the camber will be positive.

When the vehicle operates under normal load, it will produce a camber close to zero.

If the camber is out of specification for greater than 1.5°, it will cause rapid or uneven wear of the tire. Vehicles fitted with radial tires will not be overtilted obviously.

The camber is unadjustable when being machined to the front axle and the knuckle. If the camber is not a specified angle, check if the front axle and the knuckle are damaged. Overhaul shall be conducted if necessary.

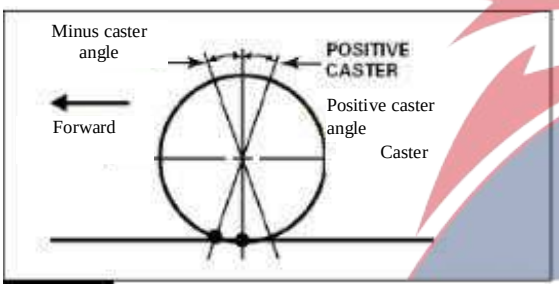
The positioning device shall be used to check the camber angle.

I gives the specifications of the Meritor front axles, but the specifications provided by the vehicle manufacturers are usually used.

I: Suggestions for the camber

Vehicle condition	Different cambers on the left and right side of the axle	Same camber on the left and right side of the axle
The truck or tractor on the pointing device	Left side: +1-3/16°~ +5/16°	+11/16° ~ −3/16°
	Right side: +11/16° ~ −3/16°	
The axle uninstalled on the frame	Left side: +3/4°nominal value	+1/4°nominal value
	Right side: +1/4°nominal value	

Caster angle



The caster refers to the forward or backward inclination of the kingpin centerline at the view from the side of the vehicle. The caster angle refers to the angle from the vertical direction to the kingpin centerline. If the top of the kingpin axis faces the rear of the vehicle, it is a positive caster. The slight positive caster may bring the self-aligned action. It may assist in stabilizing the car body and make it run forward steadily and straightly after the steering.

The positioning device is usually used to check the caster angle. When checking the caster, please refer to the steps provided by the positioning device manufacturers.

The caster specifications shall be set by the vehicle manufacturers. Please refer to the technical specifications for the caster setting provided by the vehicle manufacturers.

Measurement and adjustment of the toe-in

The toe-in is the relationship of the distance between the front and rear of the front tire.

When the front distance is lower than the rear distance, the wheel is at the “toe-in”. The vehicle is provided with a toe-in to counteract the trend of the tire extension while the vehicle is running.

The wrong toe-in will cause the tire wear.

Warning:

Park the vehicle in a flat place.Take measures to limit the wheel to prevent the vehicle from moving.Use safety racks to lift the vehicle.When someone works on the bottom of the vehicle, in addition to using jacks to lift the vehicle, other support measures must be taken.Jack may slip or fall. It may cause serious injury or damage to parts.

1.Park the vehicle in a flat place. Take measures to limit the wheel to prevent the vehicle from moving.Use parking brake.

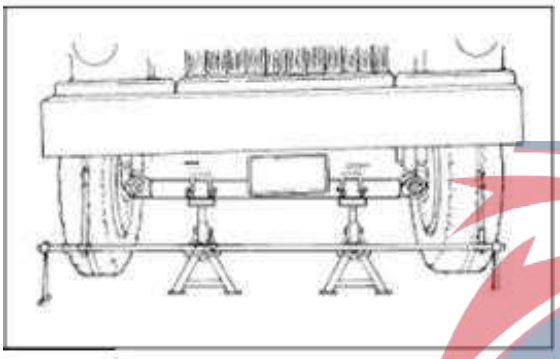
2. A jack shall be used to lift the car body and make the tires off the ground.

3. The oil pike or chalk shall be used to mark the center areas of two front tires around the entire outer surface of the tires.

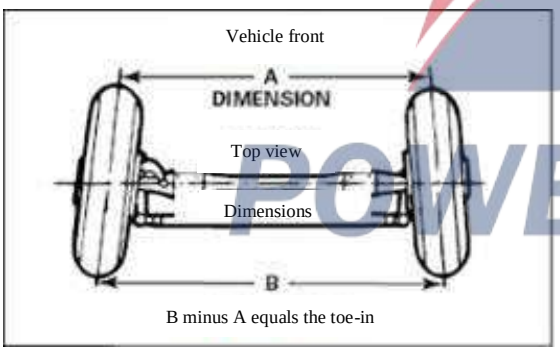
4. The beam compasses pointer shall be placed at each tire marker. Rotate the tire and verify whether the outer surface of the tire is marked with a straight line.

5. The vehicle shall be dropped to the ground. The toe-in shall not be measured when the front axle is in the lifting position. During the measurement of the toe-in, the weight of the vehicle must be loaded on the front axle. The vehicle shall be moved forward and backward for about 3 meters.

6. The measuring rod shall be placed behind the tire. The pointer shall be lifted to make it as high as the center of the axle. Align the pointer to the mark on the tire. Measure and record the spacing between the pointers.



7. Step 6 shall be repeated in front of the tire.



8. The toe-in measured value can be obtained by the rear distance reading minus the front distance reading of the tire.

9. If the toe-in measured value is not within the correct specifications shown in the table below, the following steps shall be taken.

Toe-in specifications

Unloaded vehicles of 1.587 mm ±0.794 mm

Fully-loaded vehicles of 0.794 ±0.794 mm

A. The clamp nuts and bolts at each end of the tie rod shall be loosened.

B. The tie rod shall be turned until it reaches the specified toe-in value.

C. The nuts and bolts at each end of the tie rod shall be screwed to the specified torque.

7 Troubleshooting

Table K of Non-driven Steering Front Axle Troubleshooting

Condition	Causes	Improvement measures
The tire is quickly or unevenly worn.	Incorrect tire pressure	Exert a specified pressure on the tire
	The tire in imbalance	Balance or replace the tire
	Incorrect double-axle positioning	Position the double-axle
	Incorrect toe-in setting	Adjust the toe-in to the specified setting value
	Incorrect geometry of the steering arm	Check the steering system if necessary.
	Existence of excessive wheel axial clearance	Adjust the wheel bearings
The vehicle is difficult to steer.	Low pressure of the power steering system	Repair the power steering system
	Incorrect linkage assembly of the steering gear	Correctly assemble the steering gear
	The steering linkage in need of lubrication	Lubricate the steering linkage
	Inflexible kingpin rotation	Replace the master pin
	Incorrect geometry of the steering arm	Check the steering system if necessary.
	Backward of disorder	Adjust the caster if necessary
	The cross tie rod joint difficult to rotate	Replace the horizontal pull rod ball head
	Thrust bearing is worn out	Replace the thrust bearing
The cross tie rod joint is worn and it needs to be replaced.	The cross tie rod joint in need of lubrication	Lubricate the cross tie rod joints at both ends. Ensure to follow the lubrication maintenance plan
	Bad driving conditions	Increase the frequency of inspection and lubrication intervals
	Damaged protective cover of the cross tie rod joint	Replace the protective cover
The cross tie rod, the cross tie rod joint stud, the steering arm or the cross rod joint bends or they are damaged in need of renewal of components.	Excessive pressure of the power steering system over the one provided by the vehicle manufacturers	Adjust the power steering system to the specified pressure.
	Specifications as provided	
	The pressure cutting and disorder of the power steering system	Adjust the power steering system to the specified pressure.
	Operation of vehicles under severe conditions	Check whether the vehicles are running correctly
	Incorrect installation of the external power steering system	Correctly install the external power steering system
	Incorrect over-stroke lifting setting or failure of the steering gear	Check the correct operation or set the over-stroke lifting at the specifications provided by the vehicle manufacturers
	Incorrect stop setting of the axle	Set the axle stop at the specifications provided by the vehicle manufacturers
The steering ball stud is worn or damaged.	The longitudinal tie rod fasteners are tightened to the specifications above those specified by the vehicle manufacturers	Tighten the longitudinal tie rod fastener to the torque specified by the vehicle manufacturers
	Lack of lubrication or misuse of the lubricants	Lubricate the linkage members with the specified lubricants
	Power steering stop in imbalance	Adjust the stop to a specified size
The kingpin and its bushing are worn.	Worn or missing seals and washers	Replace the seals and washers
	Misuse of the lubricants	Use the specified lubricants to lubricate the axle
	The axle not lubricated with the planned frequency	Lubricate the axle with the planned frequency
	Wrong lubrication steps	Take the correct lubrication steps
	The lubrication plan unmatched with the operating conditions	Change the lubrication plan to make it matched with the operating conditions
The front axle vibrates or swings during operation.	Backward of disorder	Adjust the caster angle
	Wheels and / or tires in imbalance	Balance or replace the wheels and / or tires
	Shock absorber is worn out	Replace the shock absorber

8 Lubrication and maintenance

Maintenance

Notice: the inspection steps are seen as the following.

The lubrication, inspection and maintenance plan based on the use of vehicles refers to Table L and Table M.

Table L: Industry grouping

Classification No.	**Typical application**	**Vehicle construction**	**Typical driving conditions**
1Mild	On a highway or tollway, only long-distance transportation	Afer 1 July 1996 and before 1 July 1996, Category 3 was adopted	95% of them operate with high mileage (over 80,000 km/year) on the highway/ tollway.
2Moderate	Fire-fighting and rescue, inter-city transport, inter-city passenger transport, heavy load, school bus, hostel car and public bus.	Afer 1 July 1996 and before 1 July 1996, Category 3 was adopted	Operation with low mileage (less than 80,000 km/year)
3Wasteland	Lumbering, oil field, construction, heavy load, stock dump tractor (highway permission), and disposal of residential waste.	All	Operation with low mileage (less than 40,000 km/year). And it has a large number of heavy load service with cross-country service.
4Heavy	Mining, stock dump tractor (without highway permission) and disposal of land fill waste.		Heavy type load
5Extremely heavy	Mining, lumbering and construction industry.		Heavy load 80-100% off-road vehicle

Table M: Lubrication, inspection and maintenance timetable

	Maintenance interval									
Components	**48 hours**	**8,000 km/100h**	**10,000 km running for the first time**	**16,000 km**	**32,000km**	**58,000 km**	**64,000 km**	**80,000 km**	**160,000 km**	**320,000 km**
The cross tie rod joint 1										
Class 1 application								I	L2	
Class 2 application					I		L2			
Class 3 application				I,L2						
Class 4 application		I,L2								
Class 5 application	I,L2									
Check the assembly movement of the cross tie rod										
Class 1 application								I		
Class 2 application					I					
Class 3 application				I						
Class 4 application		I								
Class 5 application	I									
The ball stud on the steering arm									L2	
The cross tie rod joint stud									I	
The sealed axle ball stud									I	

The kingpin and bushing									L2	
The steering arm bolt										I
The thrust bearing									L2	
Check of the vertical axial clearance of the steering knuckle										
Class 1 application								I		
Class 2 application					I					
Class 3 application				I						
Class 4 application		I								
Class 5 application	I									
Wear condition of the upper and lower kingpins and bushings										
Class 1 application								I		
Class 2 application					I					
Class 3 application				I						
Class 4 application		I								
Class 5 application	I									
Locating key nut			T			T				
Inspection of the sealed hub assembly										I

I=Inspection L= Lubrication T= Tighten to the specified torque

If power washers are used in the process of vehicle cleaning, the lubrication interval shall be adjusted. Vehicles that have been frequently cleaned by the power will need the lubrication of higher frequency.

Lubrication

Lubrication specification

Table N: Grease lubrication specification of the non-driven front axle

Lubricating grease*	**Meritor specifications**	**Level of NLGI**	**Type of lubricating grease**	**External temperature**
No. 1 or No. 2 universal lithium base grease	O-617-A or B	1	12-hydroxy stearate	For temperature limits, please refer to the technical specifications provided by the lubricating grease manufacturer.
		2		

* Meritor has recognized that the trend of the industry is moving toward the situation of vehicle maintenance with more and more options and the use of artificial lubricating grease. However, some of the seals are known to expand when contacting with the artificial lubricating grease. When repairing and maintaining the axle, and before using any artificial lubricating grease, please consult your local Meritor agent to get the suggestion on the use of artificial lubricating grease for reference.

Grease lubricated hub bearing

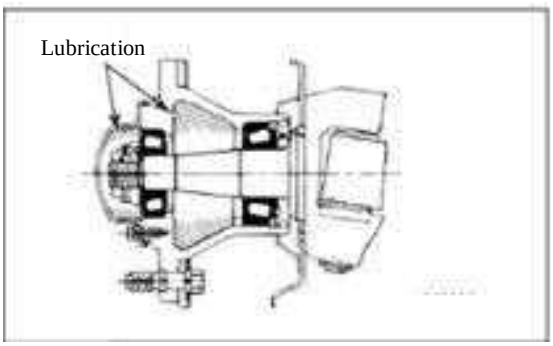
Axle with conventional wheel end

Cautions: this step is applicable to the hub with wheel bearing lubricated by the lubricating grease.

1.Park the vehicle in a flat place.The wheels shall be chocked to prevent the vehicle body from moving.

2. The tire and wheel assembly shall be removed. The hub shall be removed.

3. The old lubricant on the parts shall be thoroughly removed. Waste seals. Check whether the wheel bearing is worn or damaged. If the bearing is worn or damaged, it shall be replaced.



4. The specified lubricant is injected from the larger end of the inner ring to the cavity between the idler wheel and the hood. The lubricant shall be used to wrap the hub between the outer rings of the bearing to the minimum diameter of the outer ring.

5. The inner ring of the inner and outer bearings shall be installed on the outer ring of the hub. The outer ring of the hub shall be tightly pressed on the scapula inside the hub.

6. The new wheel seals shall be installed on the hub.

7. The hub, wheel and tire assembly shall be installed. The tapered inner ring of the bearing of the outer wheel shall be installed inside the hub. The adjusting nut shall be installed.

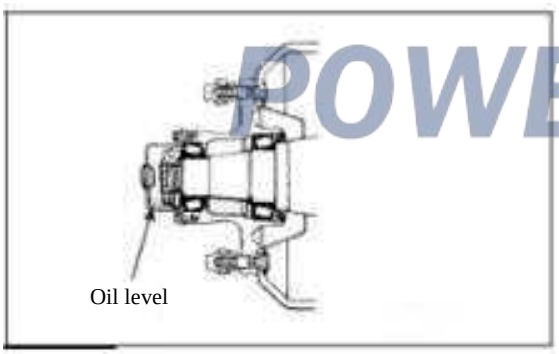
8. The wheel bearing shall be regulated.

Oil-lubricated hub bearing

Axle with conventional wheel end

Caution: this step is applicable to the hub with wheel bearing lubricated by the lubricating grease.

1. Check the oil level from the hubcap. If the oil level of the hubcap is lower than the designated oil level, the oil filler plug shall be removed to add oil.



2.The specified lubricating oil shall be added until the oil level reaches the specified level.

9 Specification

Torque specifications

Table P: Front axle torque specification with conventional wheel end

			Torque range	
S/N	**Description**	**Dimensions**	**Pound-foot**	**N. Meter**
1	From the steering arm to the longitudinal tie rod nut	Please refer to the specification parameters provided by the vehicle manufacturer.		
2	The steering knuckle cap screw	5/16"-18	20-30	27-40
3	From the steering arm to the steering knuckle nut	7/8"-14	250-450	339-610
		1"-14	390-725	529-982
		1-1/8"-12	550-1025	746-1389
		1-1/4"-12	775-1450	1051-1965
		1-1/2"-12	1350-2525	1831-3423
4	Locating key nut	7/16"-20	30-45	41-61
5	3/4 inch limit screw adapter		65-115	88-155
6	1/2 inch limit screw locking/anti-loose nut		50-75	68-101
7	3/4 inch limit screw locking/anti-loose nut		65-85	88-115
8	From the cross tie rod arm to the cross tie rod joint nut	7/8"-14	160-300	217-406
		1"-14	250-450	339-610
		1-1/8"-12	350-650	475-881
		1-1/4"-12	500-675	678-915
9	The cross tie rod clamp nut	5/8"-11	60-80	81-110
		3/4"-10	155-175	211-237
10	From the cross tie rod arm to the steering knuckle nut	7/8"-14	250-450	339-610
		1"-14	390-725	529-982
		1-1/8"-12	550-1025	746-1389
		1-1/4"-12	775-1450	1051-1965
		1-1/2"-12	1350-2525	1831-3423

Gear oil specifications and recommended oil-change interval

Applicable gear oil specification and outdoor temperature range

Stipulation of American Petroleum Institute	Gear oil SAE Level	Meritor specifications	Army/SAE Standard	The minimum ambient temperature
GL-5, with extreme pressure additive	85W/140	O-76-A	SAEJ2360	-12.2℃
GL-5, with extreme pressure additive	80W/90	O-76-D	SAEJ2360	-26.1℃
GL-5. with extreme pressure additive	75W/90	O-76-E	SAEJ2360	-40.0℃

Recommended oil-change interval**

Meritor recommends the use of analysis plan of the lubricating oil to conduct preventive periodic analysis of the gear oil and get the actual time of oil change.

Vehicle applications	Long-distance transport	Inter-city vehicles	Inter-city carrier vehicle, school bus, fire truck and recreational vehicle	Bus, construction vehicle, garbage truck, heavy traction vehicle and oil field car
First oil-change interval	5,000km	5,000km	5,000km	5,000km
Check the height of the oil level	Every 20,000 kilometers or fleet required oil change intervals first arrived	Every 20,000 kilometers or fleet required oil change intervals first arrived	Every 10,000 kilometers or fleet required oil change intervals first arrived	Every 5,000 kilometers or fleet required oil change intervals first arrived
The petroleum base gear oil approved by Meritor. (SAEJ2360)	One year or 160,000 kilometers first arrived	One year or 160,000 kilometers first arrived	One year or 80,000 kilometers first arrived	One year or 40,000 kilometers first arrived

**is the recommendation made by Meritor based on the gear oil meeting the SAEJ2360 Standard. At present, Sinopec can provide the gear oil meeting that standard. The oil-change interval of the regular GL-5 with extreme pressure additive is about 75% of the above recommended oil-change interval.

Driving system, wheel axle

Differential

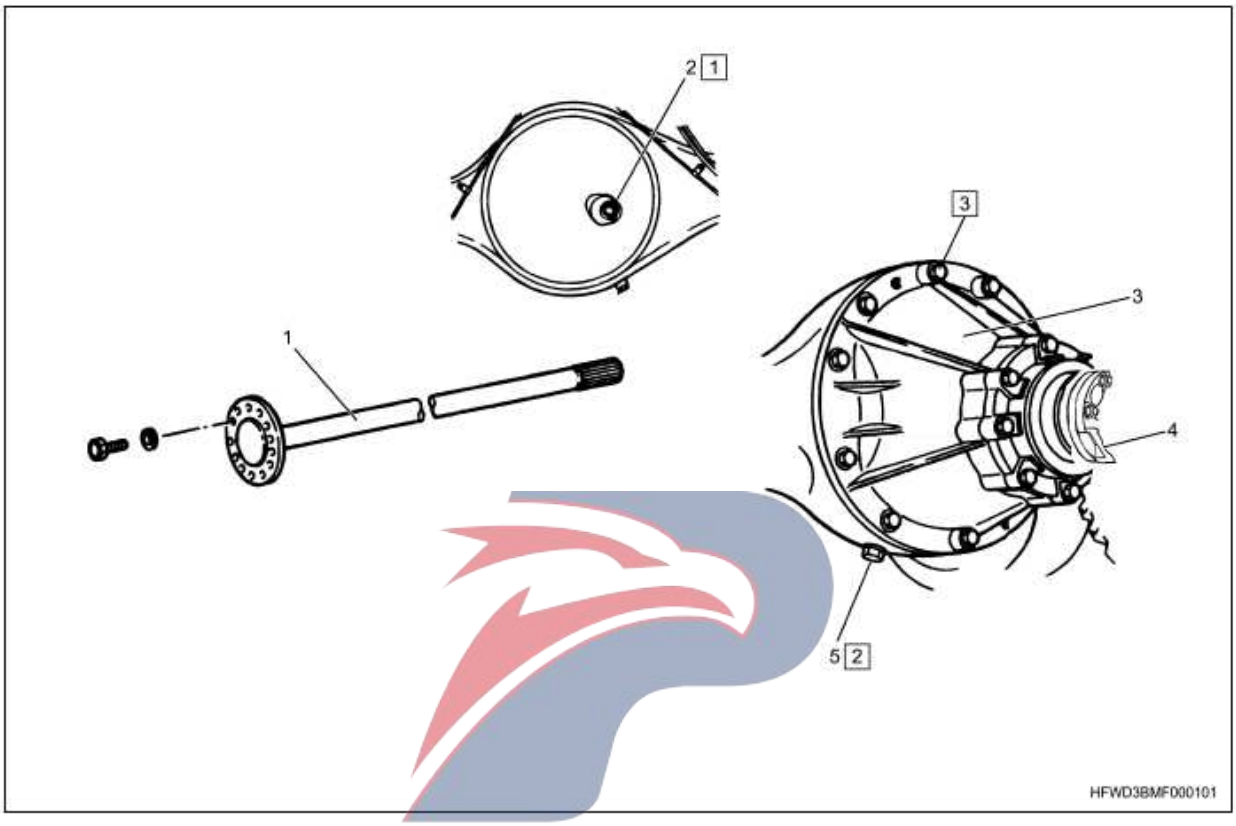
Table of contents

Rear differential gear (single) (17.5H)

Removal

1. Assembly view

Rear differential gear (single)



Part Name

1. Rear axle drive shaft
2. Injection port plug
3. Final drive
4. Drive shaft
5. Oil drain plug

Tightening torque

1: 69N・m{7.0kgf・m/51lb・ft}
2: 69N・m{7.0kgf・m/51lb・ft}
3: 219N・m{22.3kgf・m/73.48kg・ft}

2. Differential gear oil drain

1) Remove the oil filling port plug from the rear axle housing.

2) Remove the oil drain plug from the rear axle housing and let the differential gear oil flow out of the oil drain screw plug port.

3. Drive shaft removal

1. Model with single rear differential gear

1) Make an alignment mark on each connector.

2) Remove the drive shaft between the transmission and drive axle from the flange of the transmission.

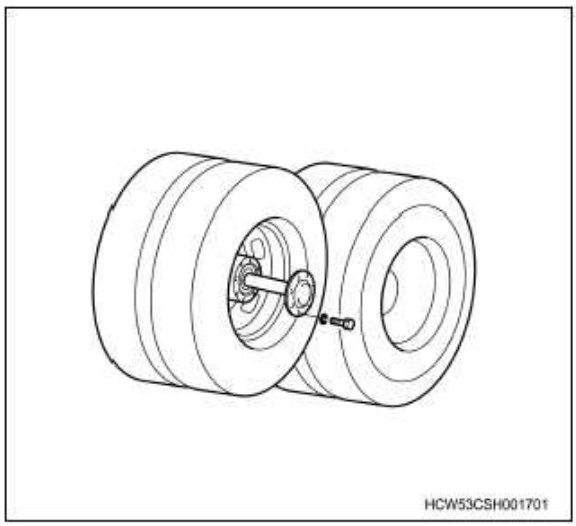
2. Tandem-type rear differential gear model

1) Make an alignment mark on each connector.

2) Remove the drive shaft connecting the drive axles in series from the drive axle flanges.

4. Rear axle drive shaft removal

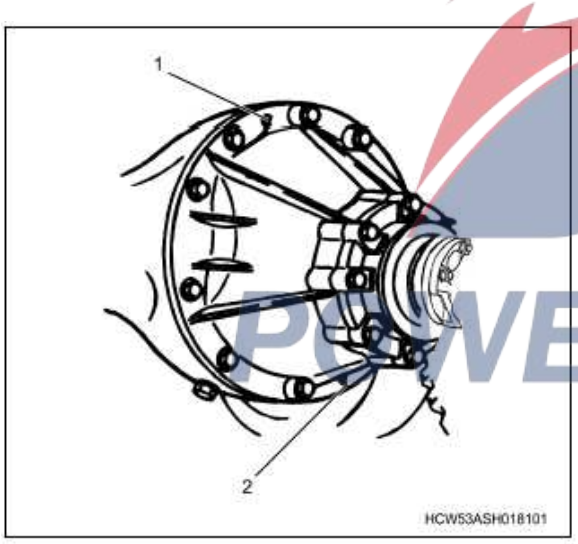
1) Remove the axle shaft on the rear hub's reel.



5. Final drive removal

1) Remove the bolts on the differential gear seat rack.

2) Install the bolt into the bolt change hole in the differential gear seat rack and pull out the final drive out of the rear axle housing.



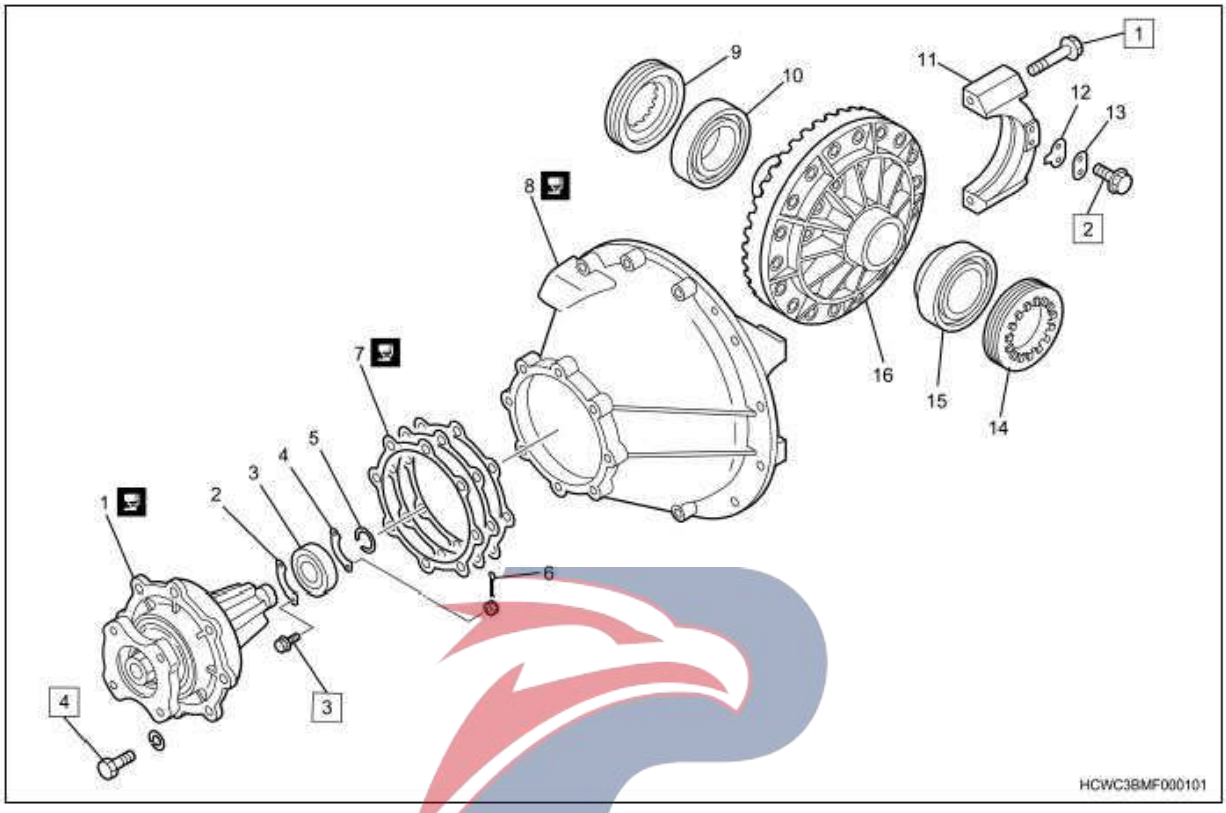
1. Bolt change hole

2. Bolt change hole

Removal

Final drive (17.5H, 18.5H)

1. Assembly view



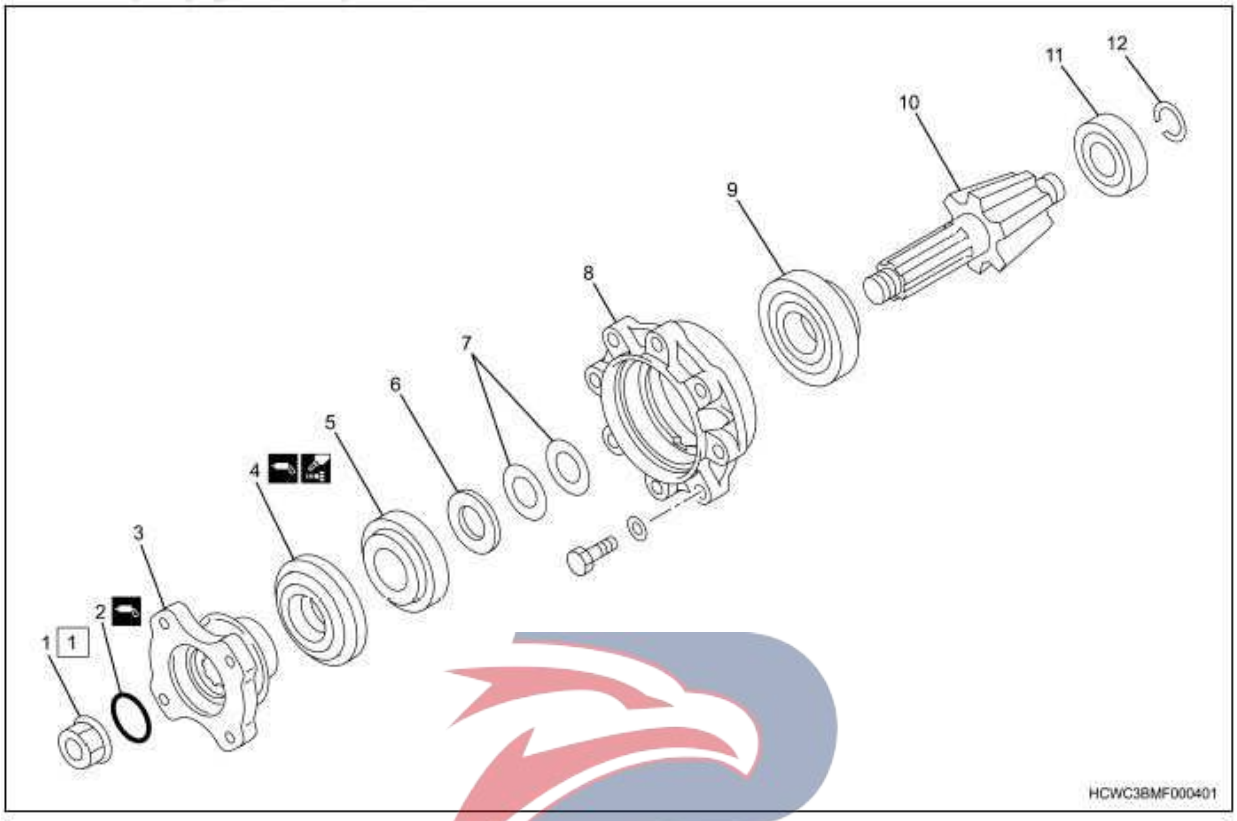
Part Name

1. Driving pinion
2. Guard ring
3. Guide bearing
4. Guard ring
5. Snap ring
6. Cotter pin
7. Gasket
8. Differential gear pedestal
9. Adjusting nut
10. Side bearing
11. Bearing cover
12. Locking plate
13. Lock washer (17.5H)
14. Adjusting nut
15. Side bearing
16. Differential gear housing

Tightening torque

1: 402N・m{41.0kgf・m/134.26kg・ft}
2:20Nm (2.0kgf.m/15lb.ft) 17.5H profile
2: 26N・m{2.7kgf・m/19lb・ft}18.5H
3: 13N・m{1.3kgf・m/115lb・in}
4: 165N・m{16.8kgf・m/55.34kg・ft}

Driving pinion, final drive (17.5H, 18.5H)



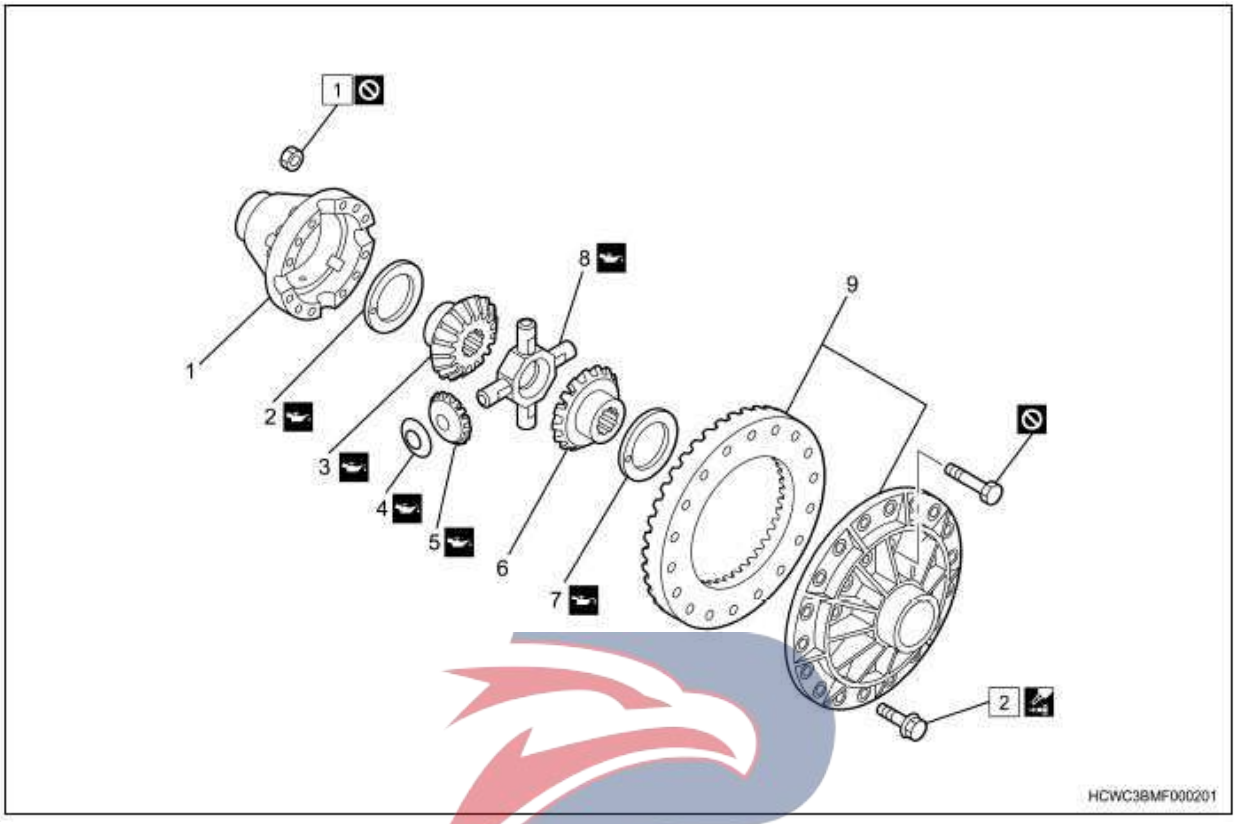
Part Name

1. Flange nut
2. O-ring
3. Flange
4. Oil seal
5. Outer bearing
6. spacer
7. Gasket
8. Driving gear bracket
9. Inner bearing
10. Driving pinion
11. Guide bearing
12. Snap ring

Tightening torque

1: 845N・m{86.2kgf・m/282.59kg・ft}

Differential gear, final drive (17.5H, 18.5H)



Part Name

1. Differential gear housing A
2. Side gear thrust washer
3. Side gear
4. Driving gear thrust washer
5. Driving gear
6. Side gear
7. Side gear thrust washer
8. Cross axle
9. Differential gear housing B and gear ring

Tightening torque

1: 206N・m{21.0kgf・m/68.95kg・ft}

2: 431N・m{43.9kgf・m/144.24kg・ft}

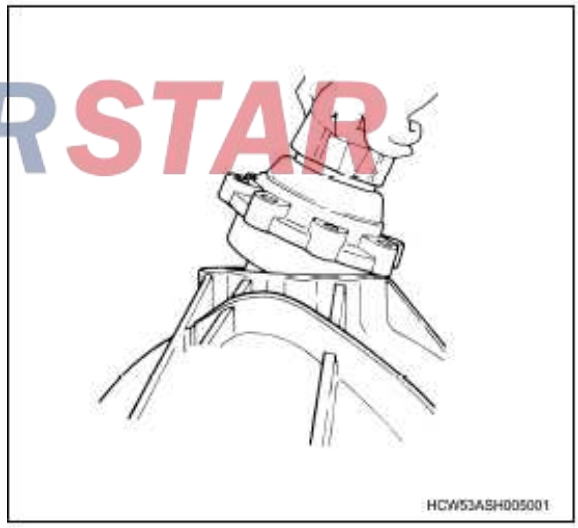
2. Final drive removal

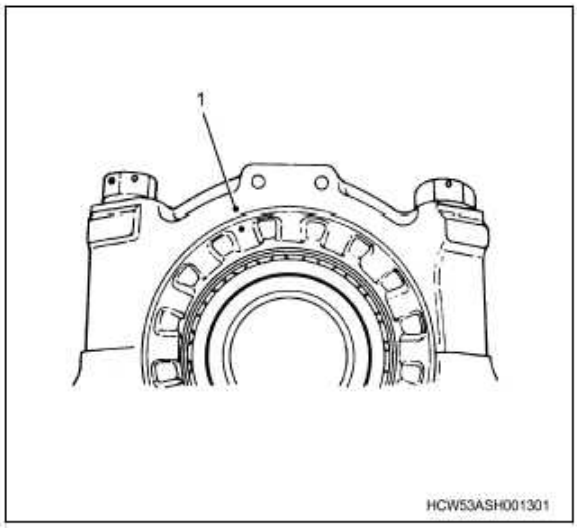
1) Remove the driving pinion and washer from the differential gear seat rack.

Caution:

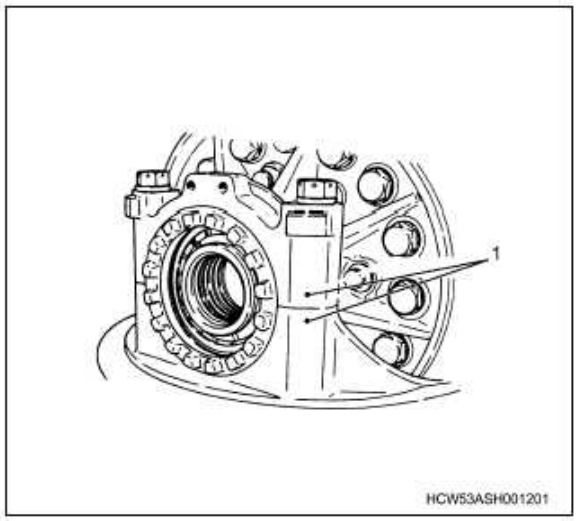
・Do not damage the washer when the driving pinion is removed.

2) Make alignment marks on the adjusting nut and the bearing cover.



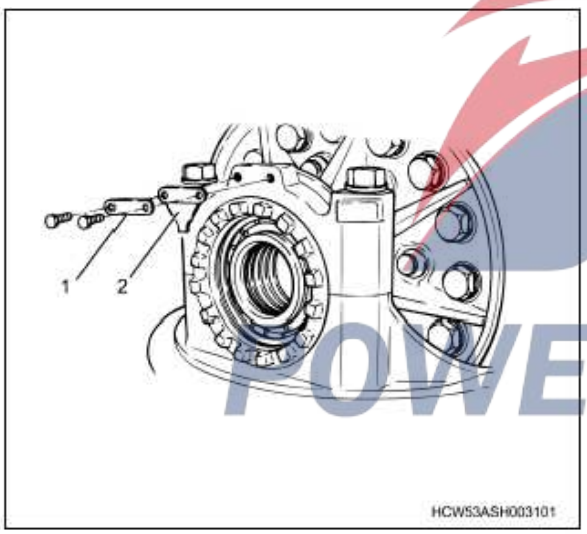


1. Alignment mark



1. Alignment mark

3) Remove the lock washer and the lock plate from the bearing cover.



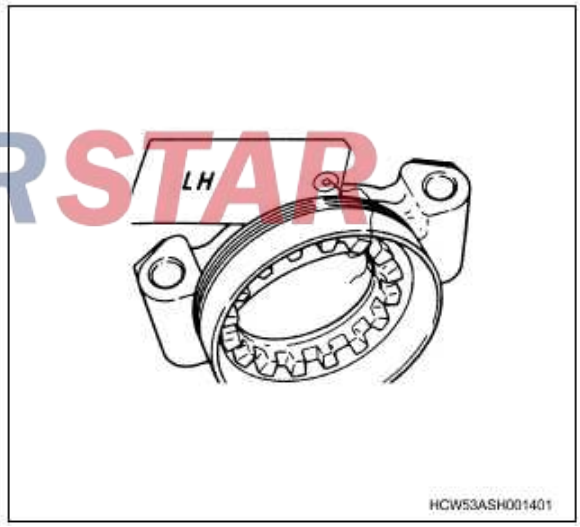
1. Lock washer
2. Locking plate

4) Make marks on the bearing cover and the differential gear housing.

5) Remove the bearing cover from the differential gear seat rack.

Caution:

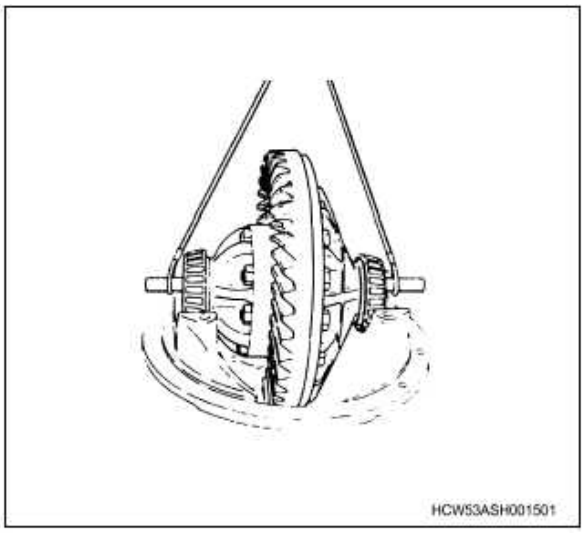
・Put labels on the removed bearing cover, adjusting nut, and outer bearing cup and indicate whether they are on the left side or on the right side.



6) Remove the differential gear housing from the differential gear seat rack.

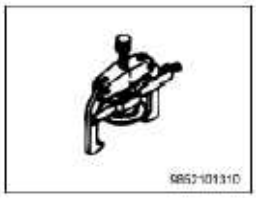
Caution:

・Now, pull the differential gear housing toward the gear ring to prevent the housing from being stuck on the guide bearing.

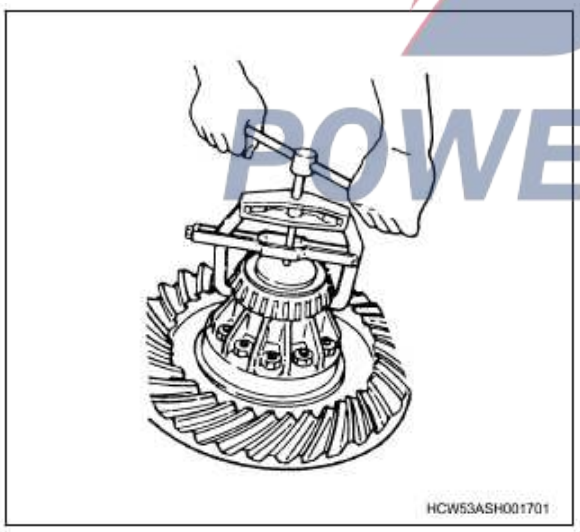


7) Make the left and right identification marks on the side bearing.

8) Remove the side bearing from the differential gear housing using a special tool.



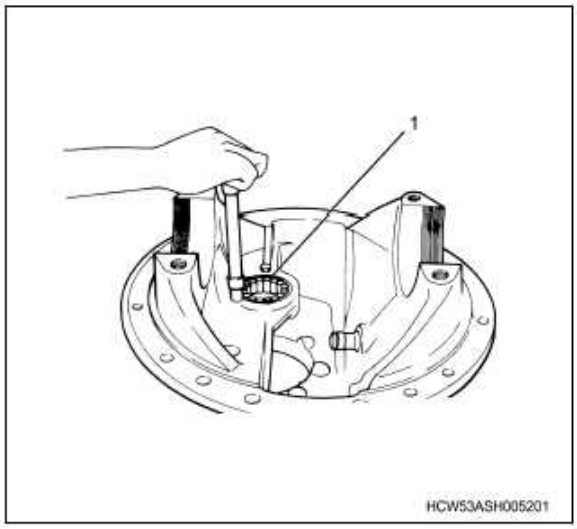
SST:9-8521-0095-0-bearing removal tool



9) Remove the split pin from the stop screw.

10) Remove the following parts from the differential gear seat rack.

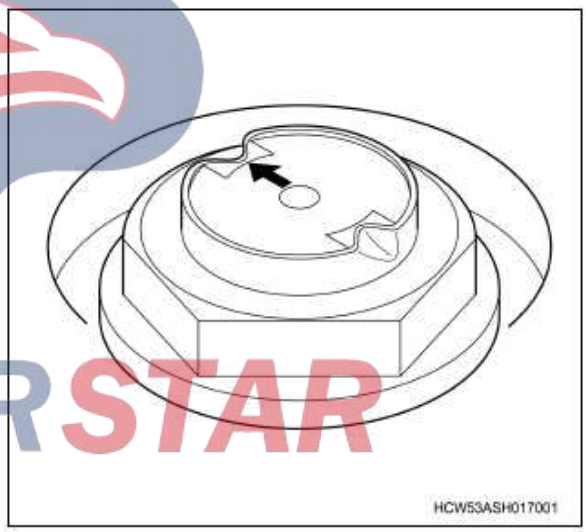
- Guard ring
- Bolt
- Nut
- Guide bearing



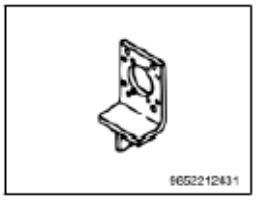
1. Guide bearing

3. Drive pinion removal

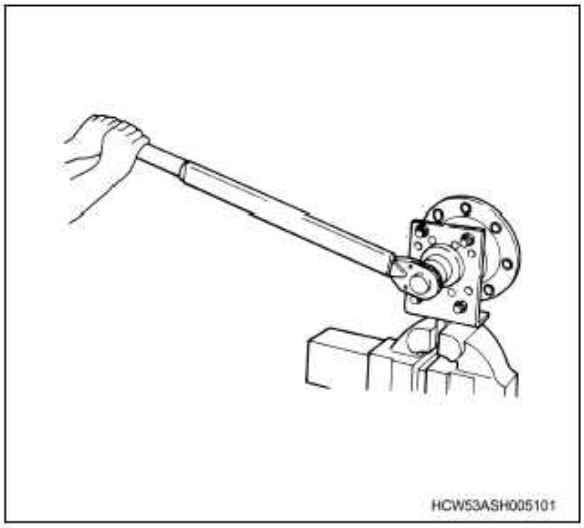
1) Use a punch to pry up the cylindrical flange nut.



2) Remove the flange nut from the driving pinion using a special tool.



SST:9-8522-1243-1-spline fork bracket



3) Slightly hit the rear of the driving pinion using a copper hammer or a brass bar so as to remove the following components.

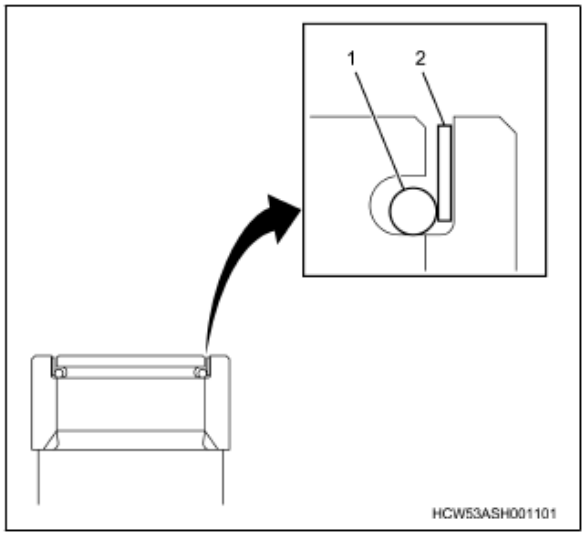
- Flange
- Driving gear rack
- Gasket
- Spacer

4) Remove the oil seal from the driving gear rack.

5) Remove the outer bearing from the driving gear rack.

6) Use special tools to push the snap ring into the snap ring groove.

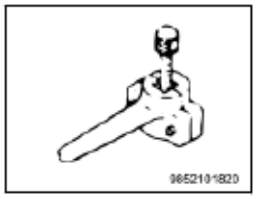
SST:1-8521-9009-0-guide bearing removal tool



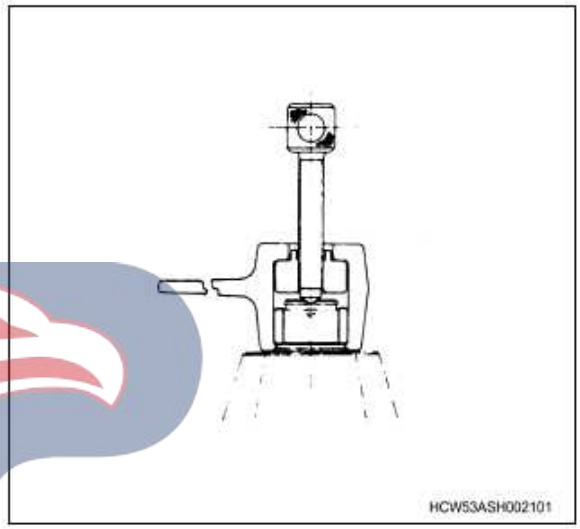
1. Snap ring

2.1-8521-9009-0

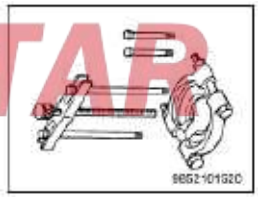
7) Use special tools to dismount the inner race of guide bearing.



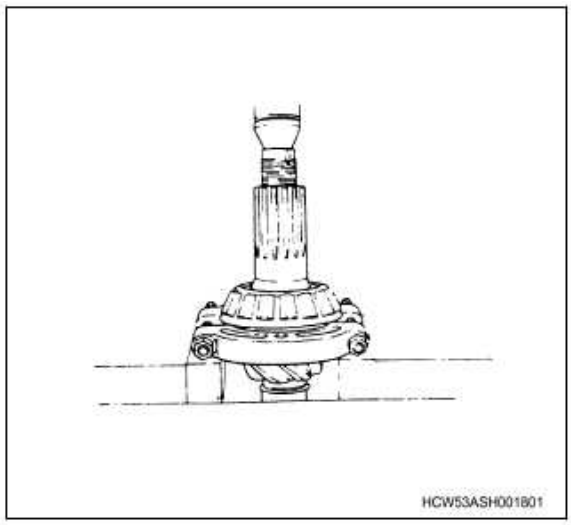
SST:9-8521-0182-0- bearing removal tool



8) Remove the inside bearing from the driving pinion using a special tool.

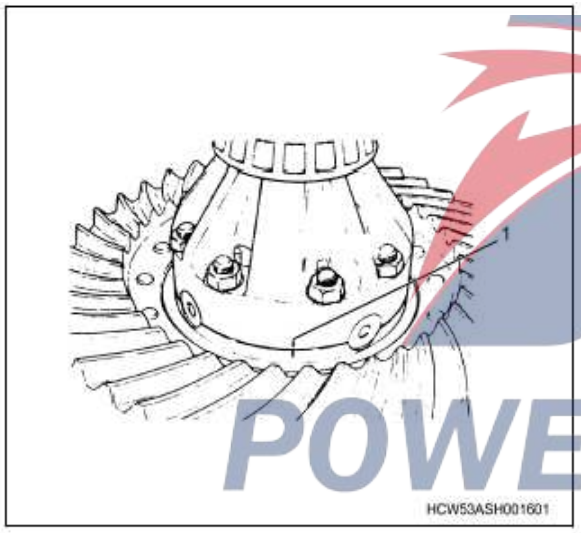


SST:9-8521-0152-0- bearing removal tool



4. Differential gear housing removal

1) Make alignment marks on the differential gear housings A and B.



1. Alignment mark

2) Remove the differential gear housing A from the differential gear housing B.

Caution:

・Do not reuse the bolts and nuts of the differential gear housing.

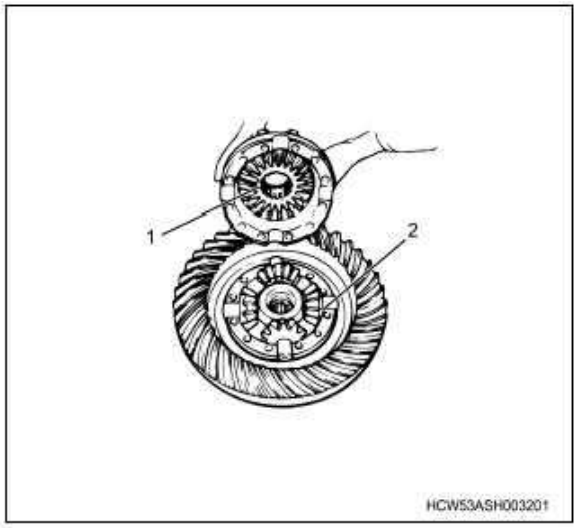
3) Remove the side gear and the side gear thrust washer from the differential gear housing A.

4) Remove the following parts from the differential gear housing B.

・Cross axle

・Driving gear

・Driving gear thrust washer



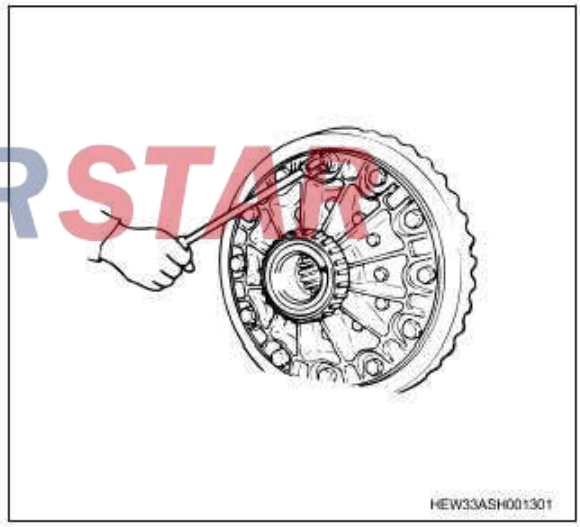
1. Side gear

2. Driving gear

5) Remove the gear ring from the differential gear housing B.

Caution:

・Because the Loctite binder has been used to fix the gear ring's tightening bolt, do not remove it in any case unless it is necessary to change the gear ring.



Inspection

1. Final drive inspection

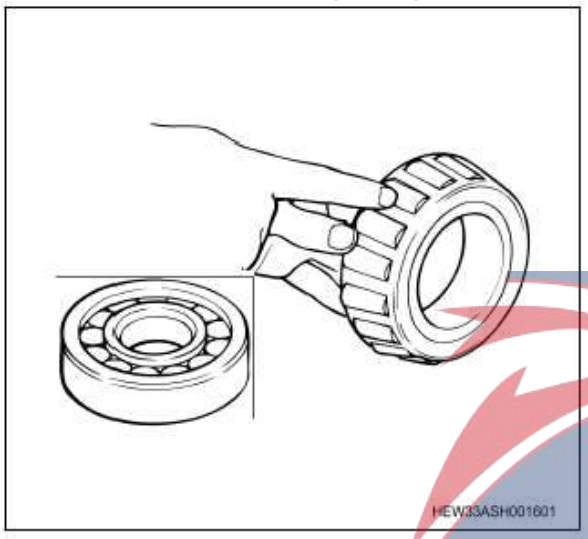
Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1. Bearing inspection

1) Check the following items.

・The gap between the inner cup or outer cup, and the rolling shaft is excessive or there is any crack, wear, or damage on them.

・There is an abnormal feeling during hand rotation.



2. Driving pinion check

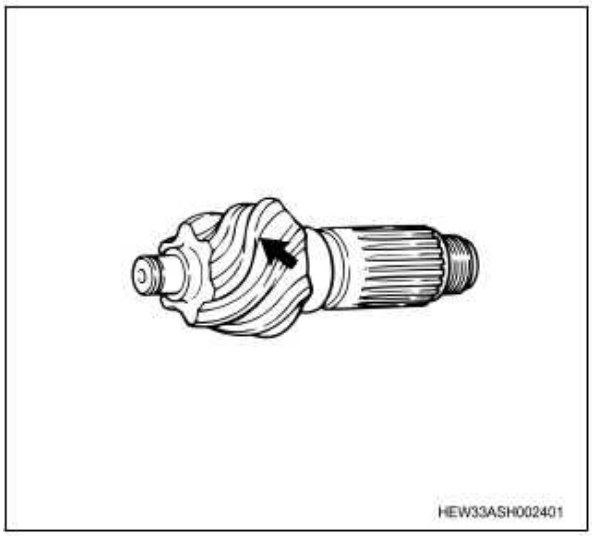
Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1) Check whether the driving pinion has any of the following.

・Abrasion

・Damaged

・Tilt



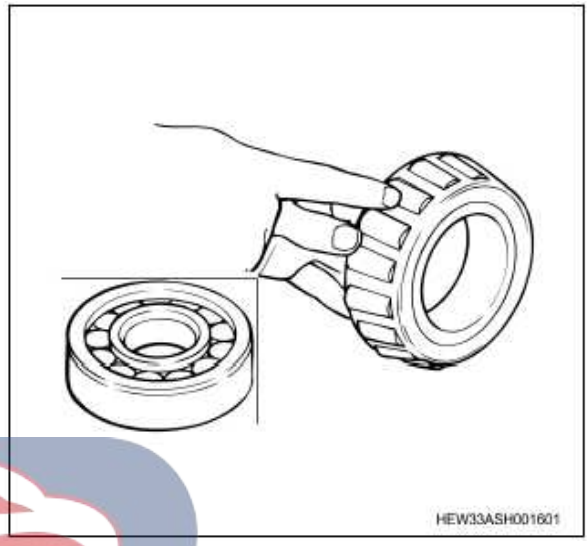
Caution:

・Change the driving pinion and the gear ring together.

2) Check the following items on the bearings.

・Gap, crack, wear, and excessive damage

・There is an abnormal feeling during hand rotation.



3. Differential gear housing check

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

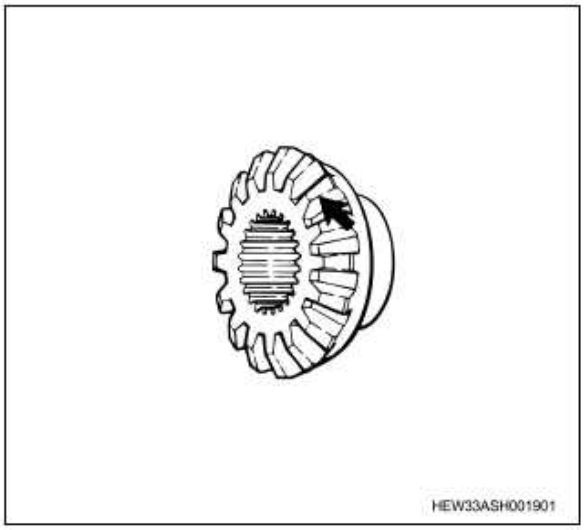
1. Side gear check

1) Check the following items.

・Abrasion

・Damaged

・Tilt



2. Side gear thrust washer check

1) Check the following items

・Serious wear

・Damaged

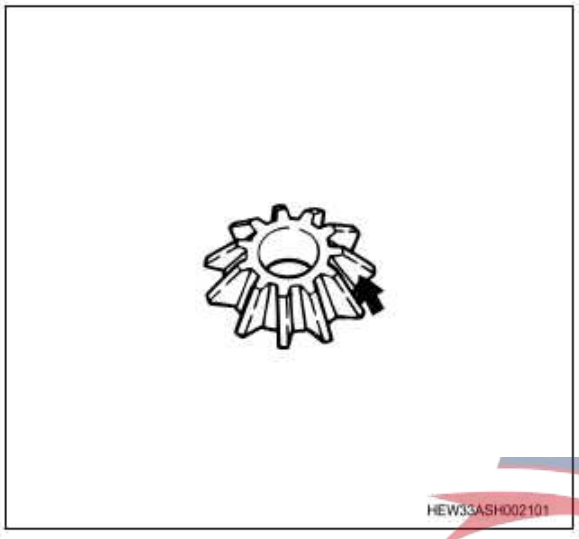
3. Driving gear check

1) Check the following items

・Worn gear face and internal surface

・Damaged gear face and internal surface

・Gear pitch



4. Driving gear thrust washer check

1) Check the following items

・Serious wear

・Damaged

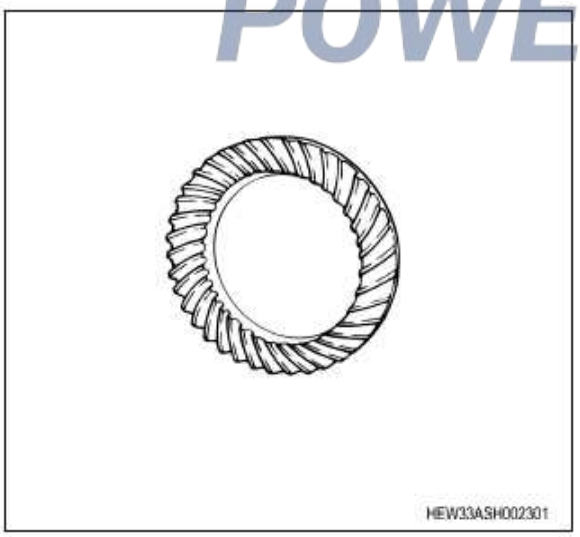
5. Gear ring check

1) Check the following items

・Abrasion

・Damaged

・Tilt



Caution:

・Change the gear and driving pinion together.

6. Measure the gap between the differential housing and the side gear

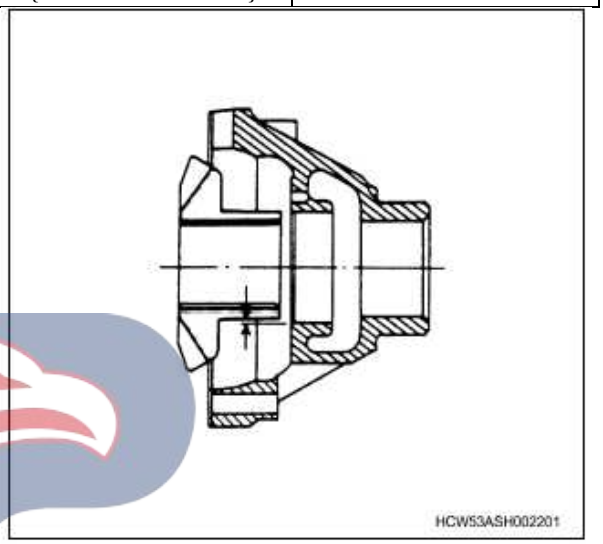
1) Measure the inside diameter of the differential gear housing.

2) Measure the outer diameter of the side gear.

3) Calculate the gap according to the measured value.

Gap between differential housing and side gear

Prescribed value	Limit
: 0.18 to 0.25mm { 0.0071to 0.2489mm }	: 0.5mm { 0.5004mm }



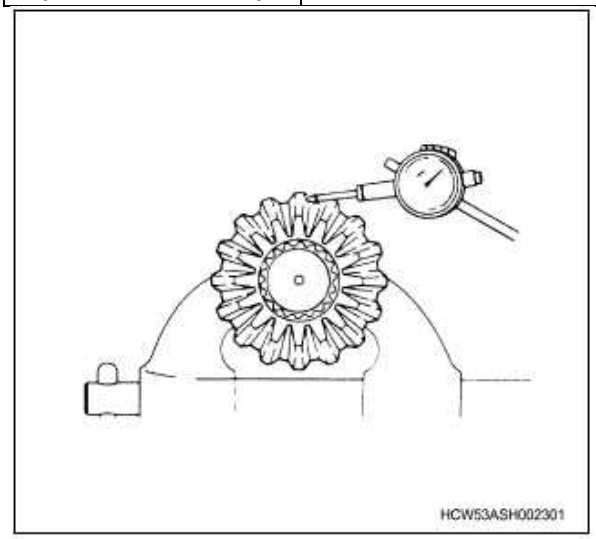
7) Measure the clearance in the rotation direction of the side gear's spline.

1) Insert the axle into the side gears.

2) Measure the clearance in the rotation direction of the side gear's spline.

Clearance in spline rotation direction

Prescribed value	Limit
: 0.2mm or below { 0.2007mm or below }	: 0.5mm { 0.5004mm }

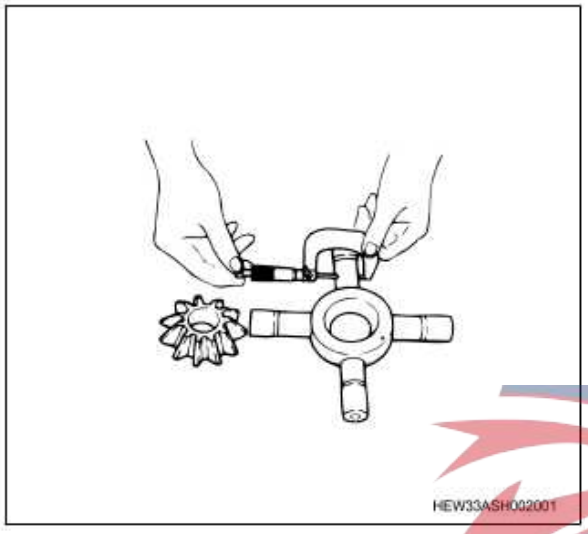


8. Measurement of gap between star wheel and pinion

1) Measure the outside diameter of the star wheel.
2) Measure the inside diameter of the pinion.
3) Calculate the gap according to the measured value.

Gap between star wheel and pinion

Prescribed value	Limit
: 0.06 to 0.15mm { 0.0024to0.1499mm }	: 0.3mm { 0.2997mm }

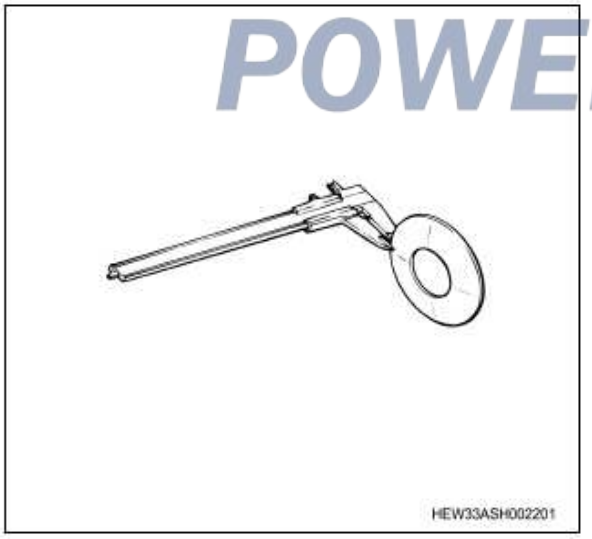


9. Pinion thrust washer thickness measurement

1) Measure the thickness of the pinion thrust washer.

Driving gear thrust washer thickness

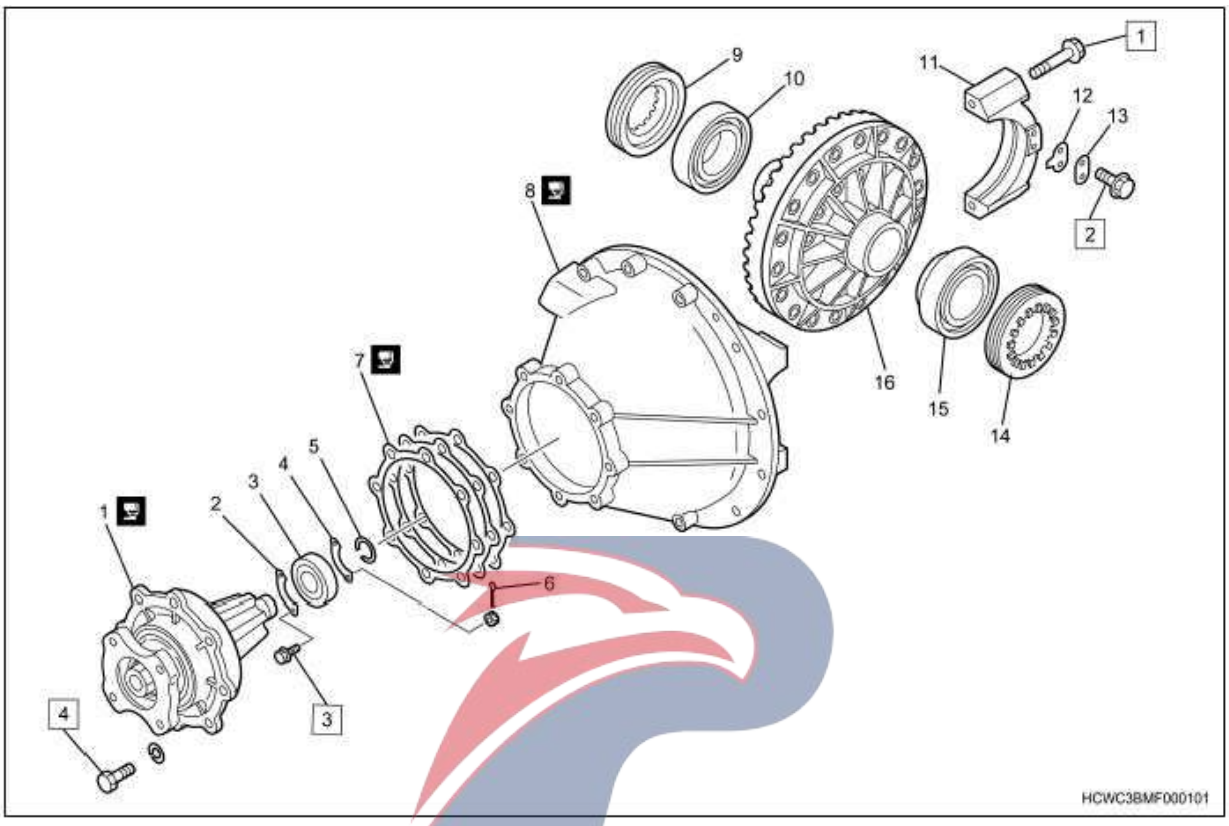
Prescribed value	Limit
: 1.6mm { 1.6002mm }	: 1.5mm { 1.5011mm }



Reassembly

1. Assembly view

Final drive (17.5H, 18.5H)



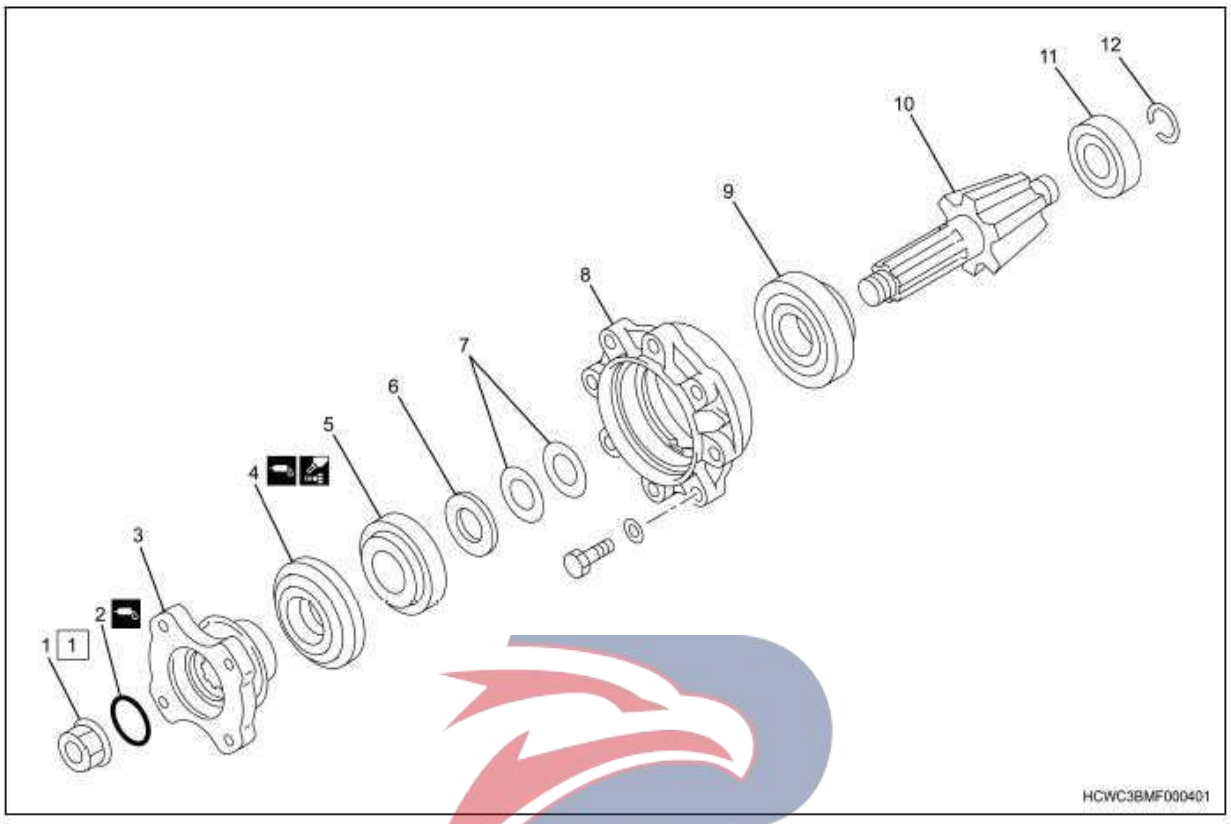
Part Name

1. Driving pinion
2. Guard ring
3. Guide bearing
4. Guard ring
5. Snap ring
6. Cotter pin
7. Gasket
8. Differential gear pedestal
9. Adjusting nut
10. Side bearing
11. Bearing cover
12. Locking plate
13. Lock washer (17.5H)
14. Adjusting nut
15. Side bearing
16. Differential gear housing

Tightening torque

1: 402N・m{41.0kgf・m/134.26kg・ft}
2:20Nm (2.0kgf.m/15lb.ft) 17.5H profile
2: 26N・m{2.7kgf・m/19lb・ft}18.5H
3: 13N・m{1.3kgf・m/115lb・in}
4: 165N・m{16.8kgf・m/55.34kg・ft}

Driving pinion, final drive (17.5H, 18.5H)



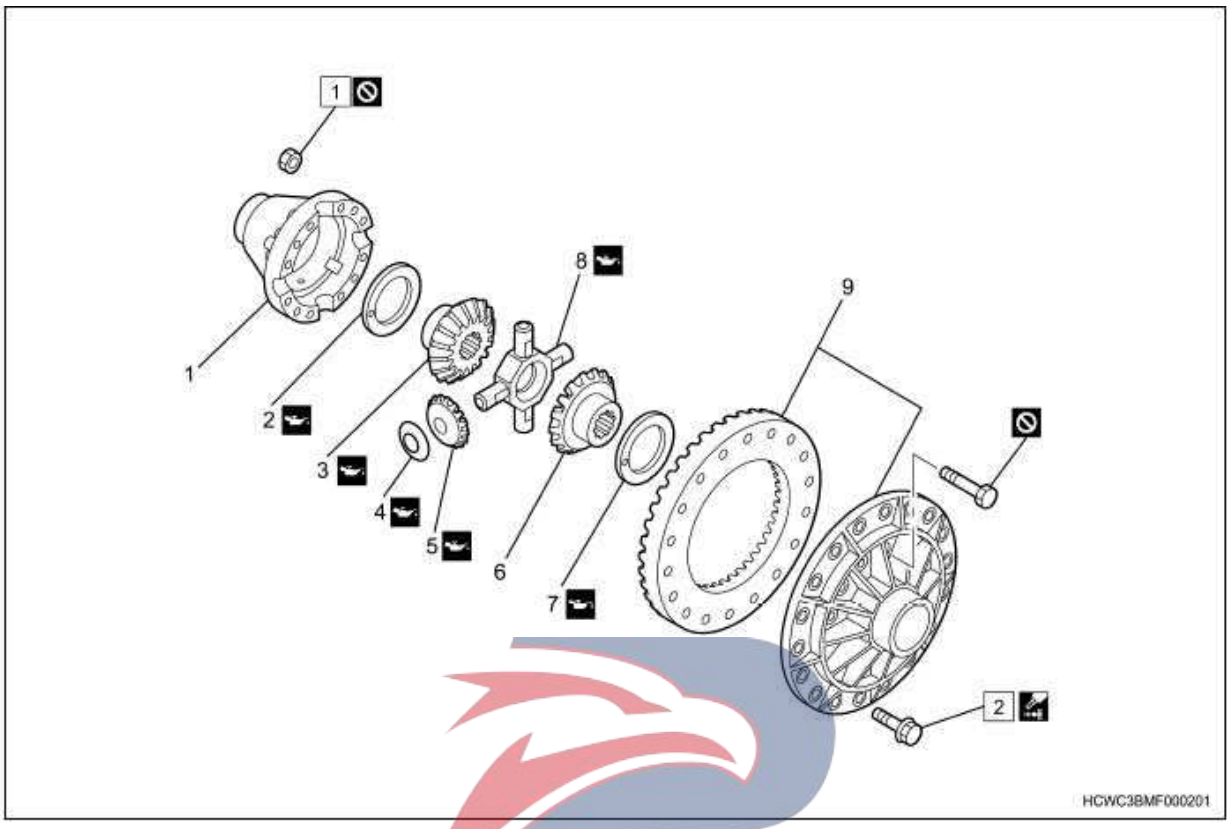
Part Name

1. Flange nut
2. O-ring
3. Flange
4. Oil seal
5. Outer bearing
6. Spacer
7. Gasket
8. Driving gear bracket
9. Inner bearing
10. Driving pinion
11. Guide bearing
12. Snap ring

Tightening torque

1: 845N・m{86.2kgf・m/282.59kg・ft}

Differential gear, final drive (17.5H, 18.5H)



Part Name

1. Differential gear housing A
2. Side gear thrust washer
3. Side gear
4. Driving gear thrust washer
5. Driving gear
6. Side gear
7. Side gear thrust washer
8. Cross axle
9. Differential gear housing B and gear ring

Tightening torque

1: 206N・m{21.0kgf・m/68.95kg・ft}

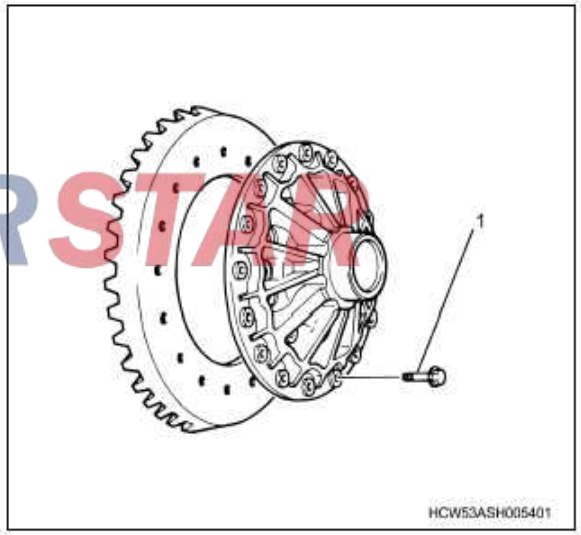
2: 431N・m{43.9kgf・m/144.24kg・ft}

2. Differential gear housing reassembly

1) Smear Loctite 271 or any composite equivalent on the thread of the bolt.

2) Install the gear ring on the differential gear housing B.

Tightening torque: 431N・m{43.9kgf・m/317.99lb・ft}



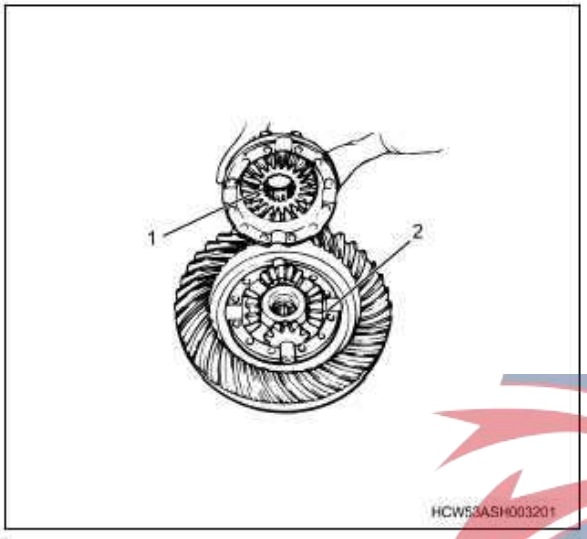
1. Bolt

---

3) Smear gear oil on the following parts.

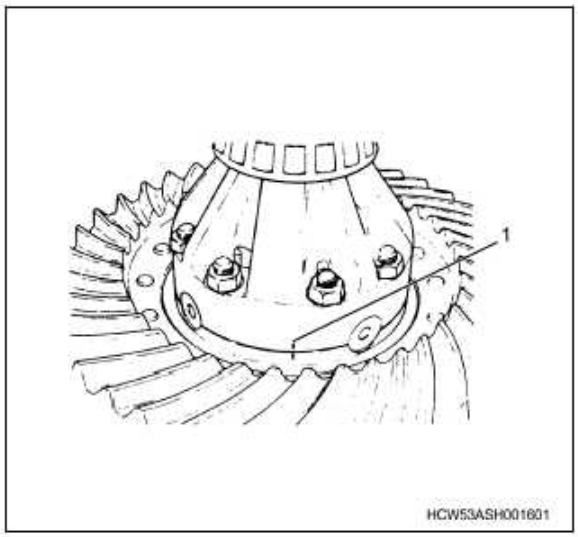
・Side gear thrust washer
・Side gear
・Cross axle
・Driving gear
・Driving gear thrust washer

4) Install the side gear thrust washer and the side gear on the differential gear housing A.
5) Install the following parts on the differential gear housing B.
・Side gear thrust washer
・Side gear
・Cross axle
・Driving gear
・Driving gear thrust washer



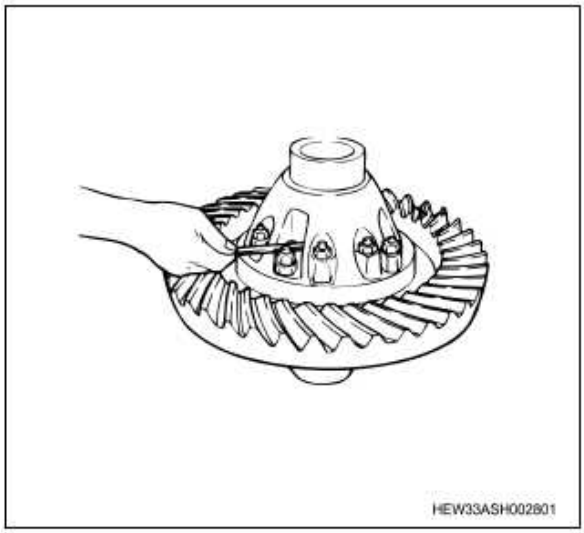
1. Side gear
2. Driving gear

6) Temporarily fix the differential gear housing A to the differential gear housing B.
Caution:
・Make the installation according to the alignment marks used during the removal.
Caution:
・Do not reuse the nuts and bolts.
Tightening torque: 92N・m{9.4kgf・m/30.84kg・ft}



1. Alignment mark

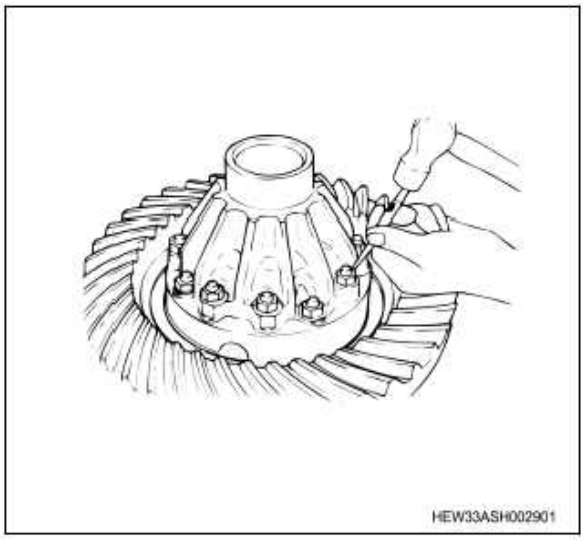
7) Measure the gap of the side gear.
Standard: 0.23 to 0.32mm{0.0091 to 0.0126in} side gear clearance



Caution:
・If the side gear gap is beyond the specified range, please replace the thrust washer of side gear, and adjust;
Applicable side gear thrust washer thickness

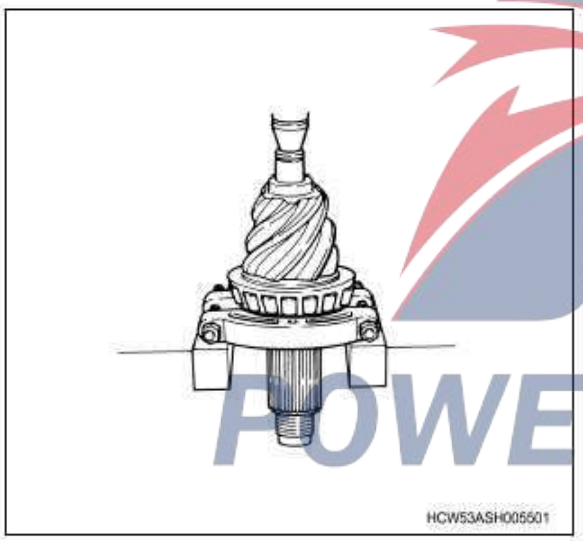
: 2.8mm { 2.7991mm }
: 2.9mm { 2.9007mm }
: 3.0mm { 2.9997mm }
: 3.1mm { 3.0988mm }
: 3.2mm { 3.2004mm }
: 3.3mm { 3.2995mm }
: 3.4mm { 3.4011mm }

8) Fix the differential gear housing A to the differential gear housing B (final tightening).
Tightening torque: 206N・m{21.0kgf・m/152.01lb・ft}
9) Hit the nuts into two positions.



3. Drive pinion reassembly

1) Install the internal bearing on the driving pinion using a press.



2) Install the snap ring in the snap ring groove of the driving pinion.

3) Install the inner cup of the guide bearing on the driving pinion using a copper hammer or a brass bar.

Caution:

・Set the side of the inner with serious angle cut on the driving pinion side.

1. Inner race

4) Install the outer cup of the inside bearing on the planet gear rack.

5) Install the outer cup of the outer bearing on the planet gear rack.

6) Temporarily tighten the following parts using a special tool.

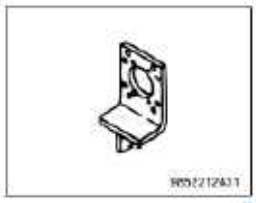
・Driving gear rack

・Gasket

・spacer

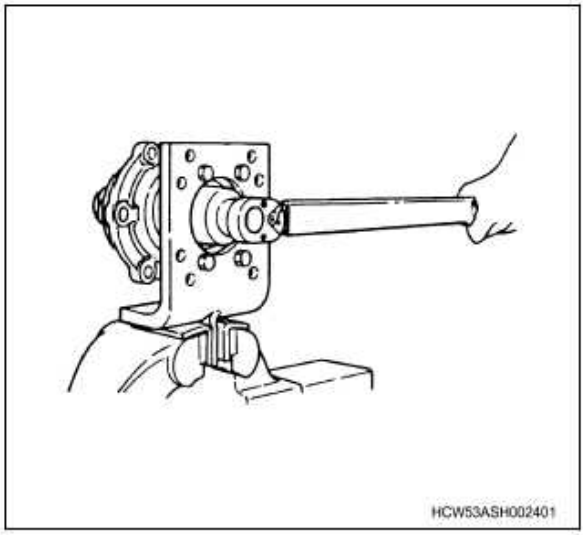
・Outer bearing

・Flange



SST:9-8522-1243-1-spline fork bracket

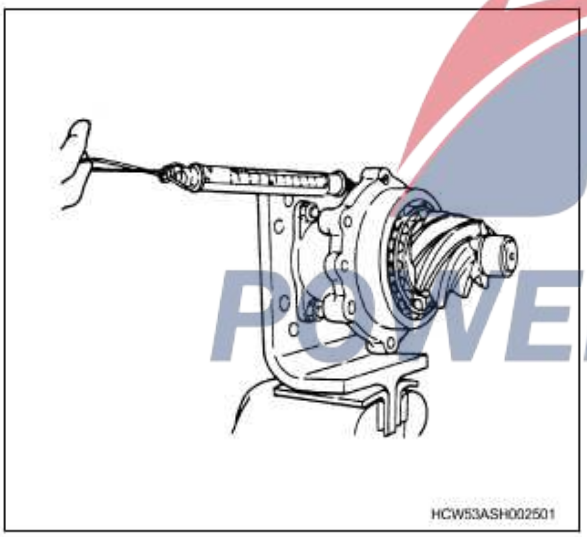
Tightening torque: 834N・m{85.0kgf・m/615.00lb・ft}



7) Lift the spring balance to the bolt hole in the driving gear bracket.

8) Pull the spring balance in the tangential direction and measure the pre-applied load on the driving gear bracket.

Specified value: 35.3-45.1N{3.6-4.6kgf/7.9-10.1lb} pre tightening force of planetary gear carrier



Caution:

・Use spacer and gasket for adjustment when the measured preload is beyond the specified range;

Applicable spacer

: 7.6mm { 7.5997mm }
: 7.8mm { 7.8003mm }
: 8.0mm { 8.0010mm }
: 8.2mm { 8.1991mm }
: 8.4mm { 8.3998mm }
: 8.6mm { 8.6004mm }
: 8.8mm { 8.8011mm }
: 9.0mm { 8.9992mm }

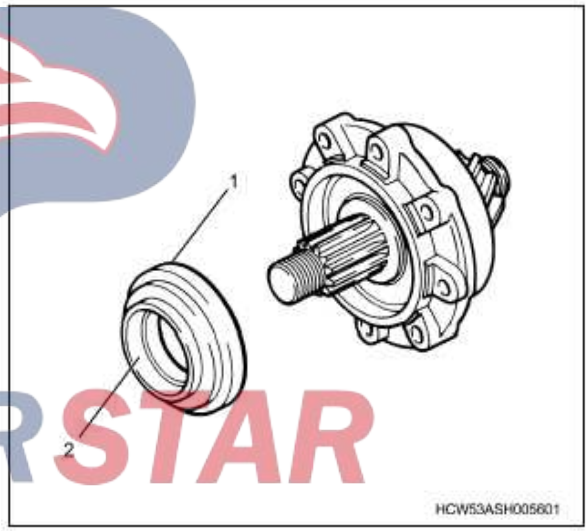
Applicable washer

: 3.25mm { 3.2512mm }
: 3.26mm { 3.2588mm }
: 3.27mm { 3.2690mm }
: 3.28mm { 3.2791mm }
: 3.29mm { 3.2893mm }
: 3.30mm { 3.2995mm }
: 3.31mm { 3.3096mm }
: 3.32mm { 3.3198mm }
: 3.33mm { 3.3299mm }
: 3.34mm { 3.3401mm }
: 3.35mm { 3.3503mm }

9) Remove the nuts and flange from the driving gear bracket.

10) Smear Loctite 242 or any composite equivalent around the outer peripheral of the oil seal.

11) Smear chassis grease on the lip of the oil seal.



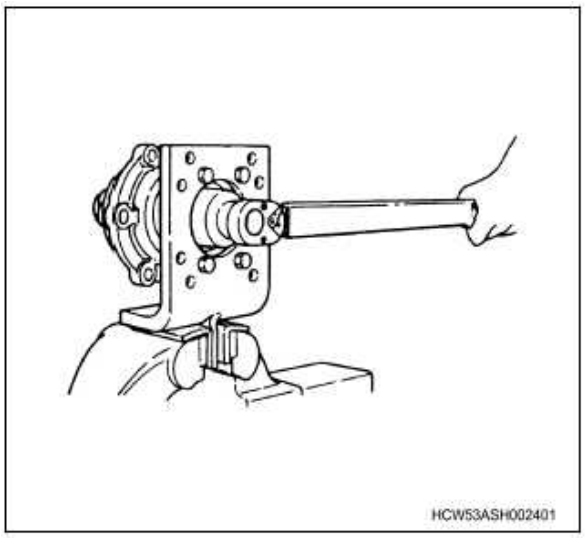
1. Oil seal circumference
2. Oil seal lip segment

12) Smear chassis grease on the O-ring.

13) Install the oil seal on the flange.

14) Install the nuts and flange on the driving gear rack.

Tightening torque: 834N・m{85.0kgf・m/615.00lb・ft}



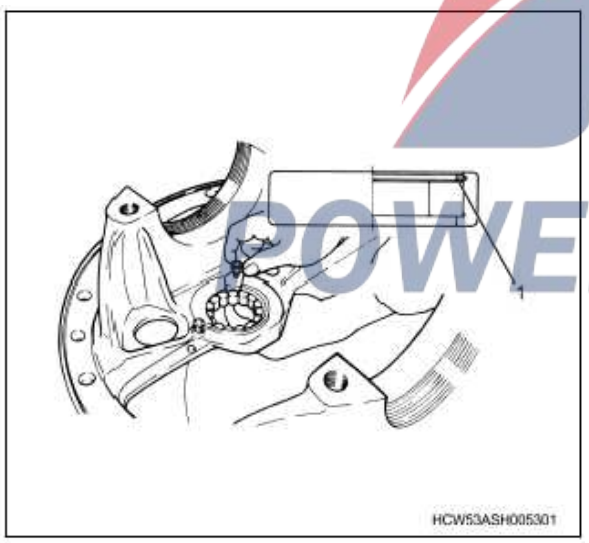
15) Hit the nuts into two positions.

Caution:

・Knock it in to allow its close contact with the tightening side of the groove surface.

4. Final drive reassembly

1) Install the guide bearing on the differential gear's seat rack in the way that the stop ring and the bearing cover are on the same side.



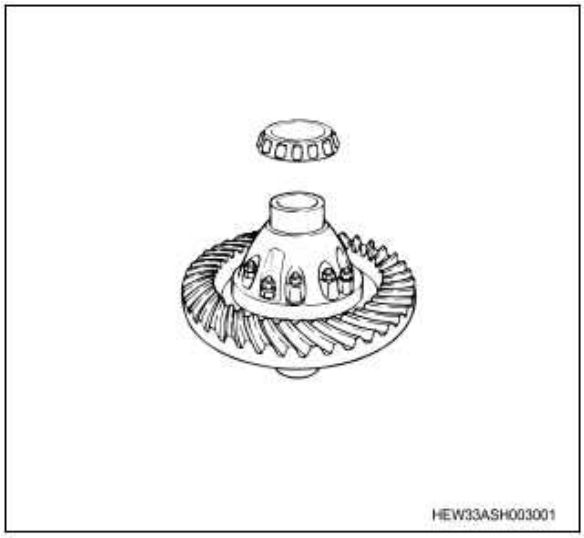
1. Snap ring

2) Install the stopper on the differential gear seat rack.

Tightening torque: 13N・m{1.3kgf・m/115lb・in}

3) Install the stop device on the split pin.

4) Install the side bearing on the differential housing using a tool like a brass bar.

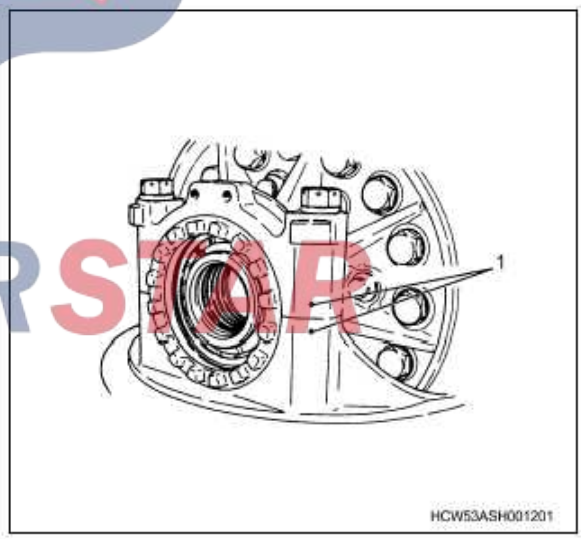


5) Install the differential gear housing on the differential gear seat rack.

6) Install the bearing cover, side bearing outer cup, and adjusting nut onto the differential gear support.

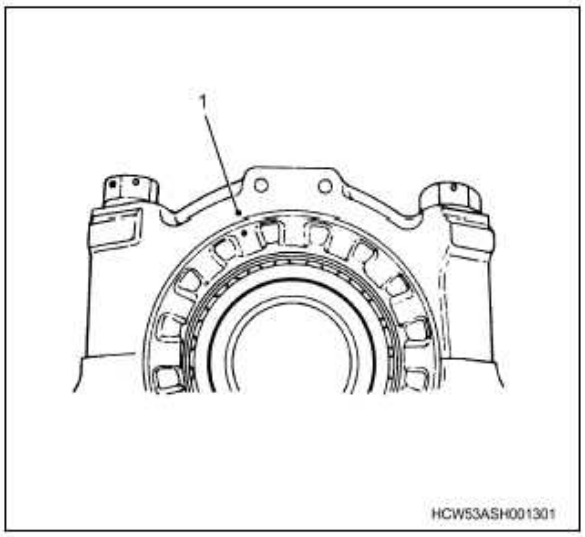
Caution:

・Make the installation according to the alignment marks used during the removal.



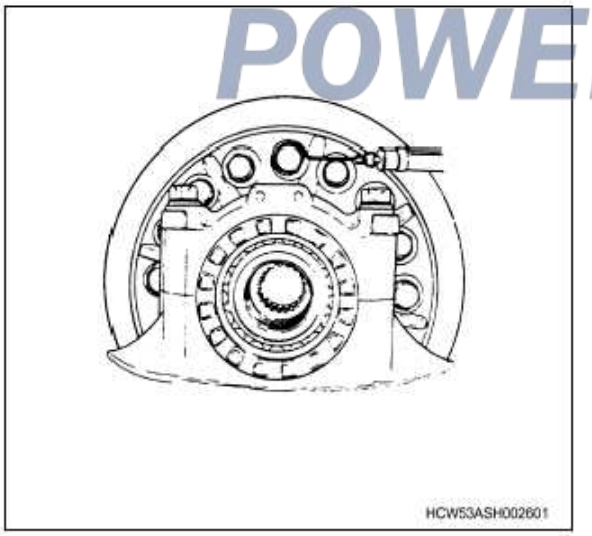
1. Alignment mark

7) Tighten the adjusting nut according to the alignment mark used in the removal process.

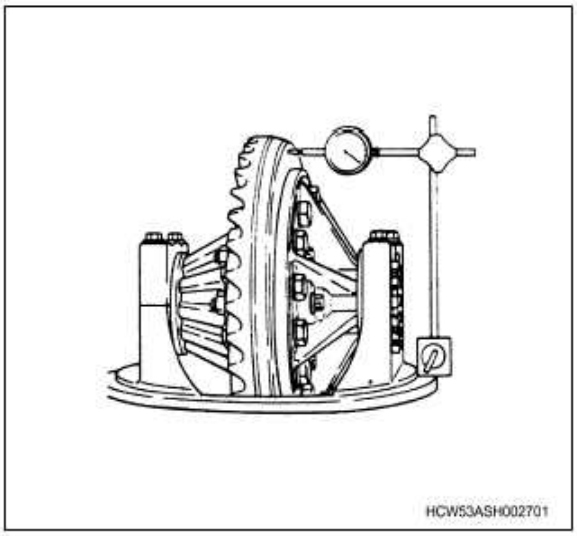


1. Alignment mark

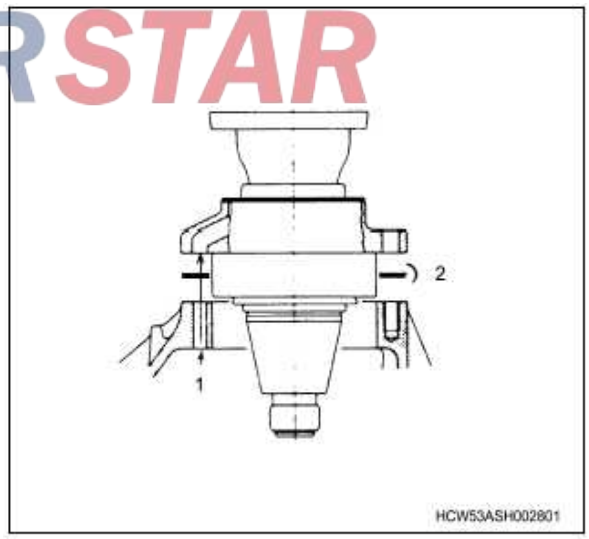
8) Temporarily fix the bearing cover bolts on the differential gear seat rack.
Tightening torque: 49N・m{5.0kgf・m/36.00lb・ft}
9) Lift the spring balance to the tightening bolt on the ring gear.
10) Pull the spring balance in the tangential direction and measure the pre-applied load on the side bearing.
Standard: side bearing pre tightening degree, 29.5-49.0N (3.0-5.0kg/6.6-11.0lb)
Prescribed value: 402-804N·cm{41-82kgf·cm/36-71lb·in} Side bearing preload degree



Caution:
・If the measured pre-load is not within the specified range, make an adjustment with the adjusting nut.
11) Measure the radial run-out of the gear ring using a dial gauge.
Standard: 0.1mm or below (0.0039in or below)
Limit: 0.01in (0.0079in)
Caution:
・If the measured run out greater than the limit value, repair or change the gear ring or the side bearing.



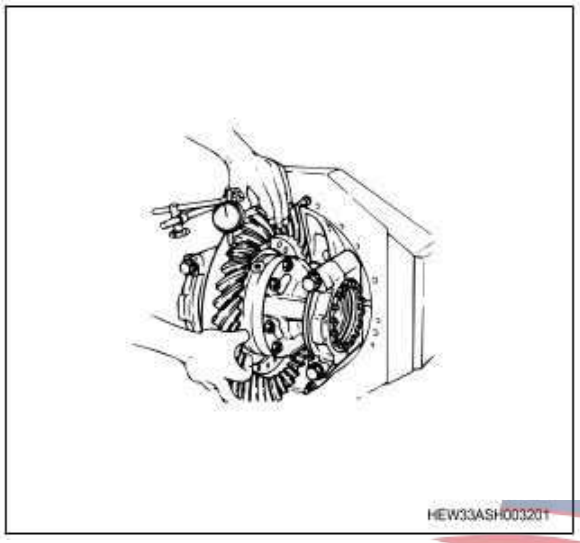
12) Temporarily fix the driving pinion and washer on the differential gear seat rack.
Caution:
・Align the oil hole in the differential gear housing and do the installation.
Caution:
・Do not smear grease on the liquid sealing gasket at this point.
Tightening torque: 185N・m{18.9kgf・m/136.00lb・ft}



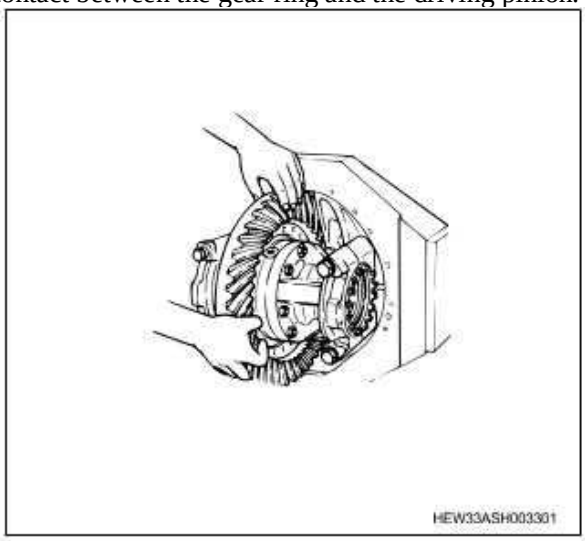
1. Oil hole
2. Gasket

13) Fix the dial gauge on the flange surface of the differential gear seat rack.
14) Install the cover of the dial gauge on the rear of the gear ring and then set its long pointer to zero.

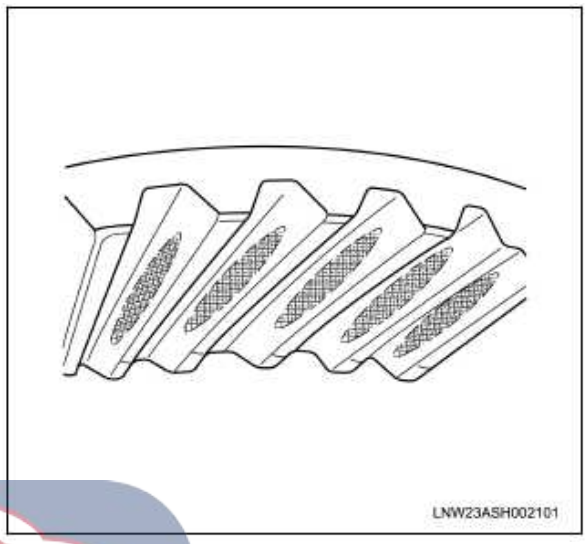
15) Hold the driving pinion by hand, slightly move the gear ring back and forth, and measure the tooth space between the gear ring and the driving pinion.
Standard: gap between gear ring and driving pinion, 0.28-0.36mm (0.0110-0.0142in)



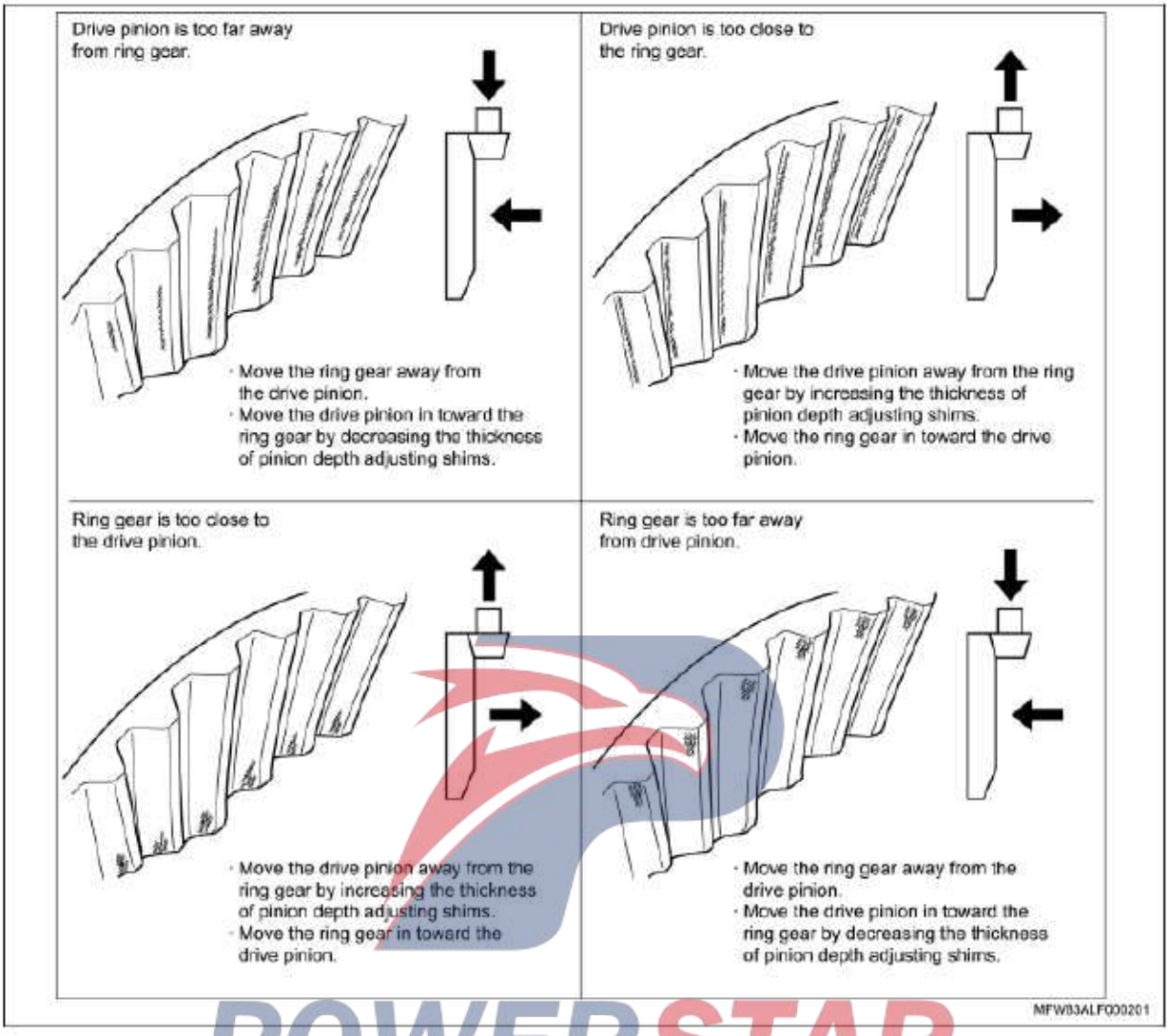
Caution:
・If the measured tooth space is not within the specified range, adjust the piston of the differential gear with the adjusting nut.
Caution:
・In order to prevent the pre-tightening degree of the side bearing from changing, tighten the adjusting nut to the previous degree.
16) Clean the teeth of the gear ring and the driving pinion.
17) Smear red lead paint on the teeth of the gear ring.
Caution:
・Smear grease on seven or eight gear teeth on both sides.
18) Hold the driving pinion by hand, slightly move the gear ring back and forth, and check the tooth face contact between the gear ring and the driving pinion.



19) The correct length of the contact is 70% of the total gear length located at the center of the pitch line. The direction is toward the heed side (outer side). It shall be nearly 5mm (0.2in) away from the toe side (inner side).



Caution:
・If an inappropriate contact is found between the gear ring and the driving pinion during the check, adjust their positions as shown in the following figure.



20) Smear THREEBOND TB1110D or any equivalent on the driving gear rack and transmission housing and between the washers.

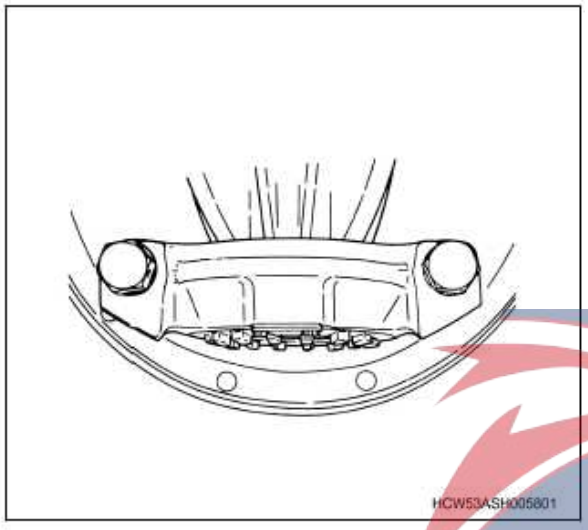
1. Between washers.

21) Install the driving gear rack on the differential gear seat rack.

Tightening torque: 185N・m{18.9kgf・m/136.00lb・ft}

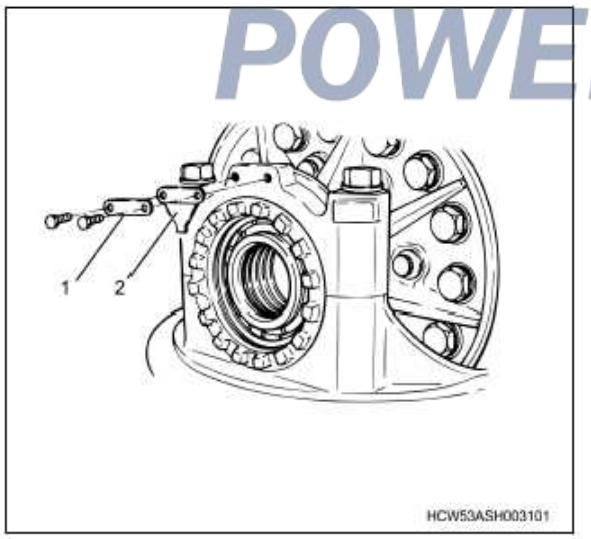
22) Tighten the bearing cover bolts on the differential gear seat rack.

Tightening torque: 402N・m{41.0kgf・m/295.99lb・ft}



23) Align the lock plate and lock washer with the adjusting nut groove for the installation.

Tightening torque: 20N・m{2.0kgf・m/14.99lb・ft}



1. Lock washer
2. Locking plate

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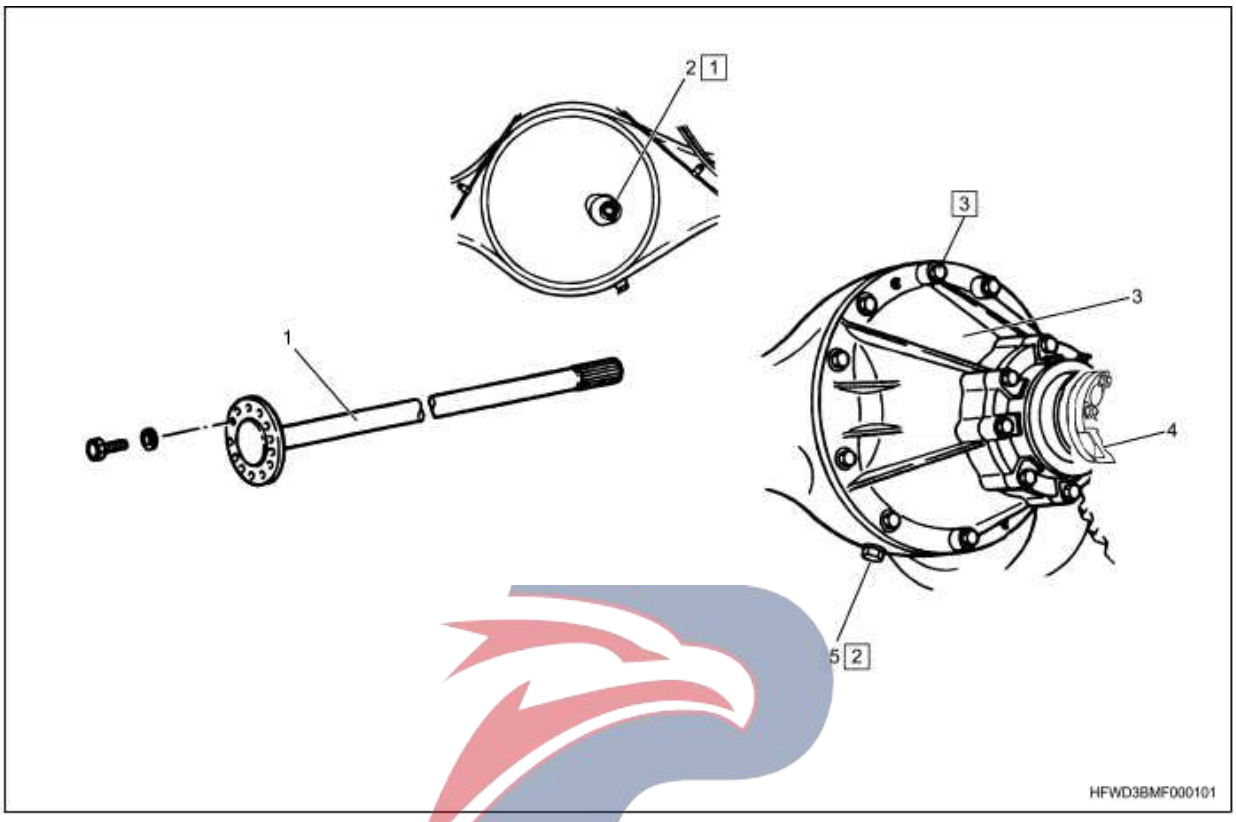
24) Fix the adjustment bolt by bending the lock washer.

Installation

1. Assembly view

Rear differential gear (single)



Part Name

1. Rear axle drive shaft
2. Injection port plug
3. Final drive
4. Drive shaft
5. Oil drain plug

Tightening torque

1: 69N・m{7.0kgf・m/51lb・ft}

2: 69N・m{7.0kgf・m/51lb・ft}

3: 219N・m{22.3kgf・m/73.48kg・ft}

2. Final drive installation

1) Clean the bolts and axle housing.

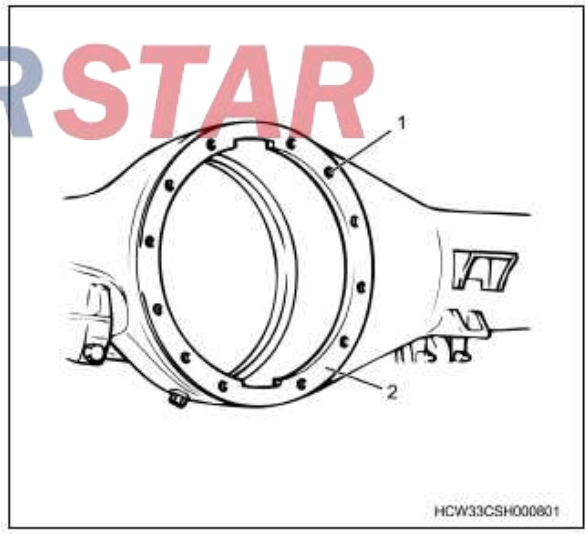
Caution:

・Remove the residual Loctite binder on the bolts to be reused and their holes.

・If necessary, clean the bolts with dies and the bolt holes with taps.

2) Smear Loctite 242 or any composite equivalent on the thread of the bolt.

3) Smear FMD127 or any equivalent on the axle housing's transmission rack mounting surface.



1. Bolt hole
2. Differential gear seat installation surface

---

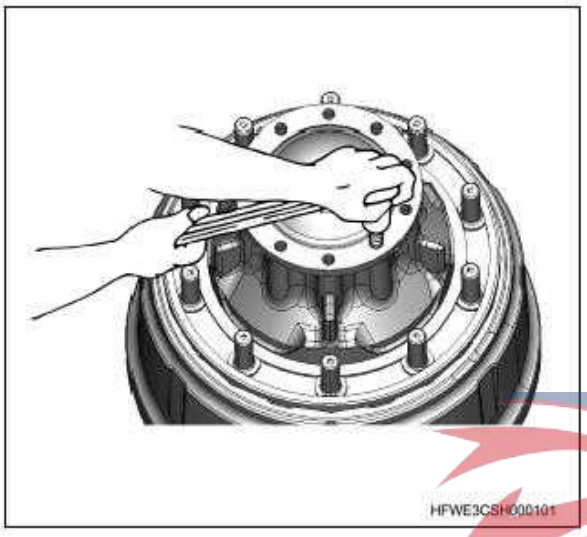
4) Install the final drive on the axle housing.

Tightening torque: 219N・m{22.3kgf・m/162.00lb・ft}

3. Rear axle drive shaft installation

1) Install the rear axle on the reel of the rear hub.

Tightening torque: 181N・m{18.5kgf・m/133.00lb・ft}



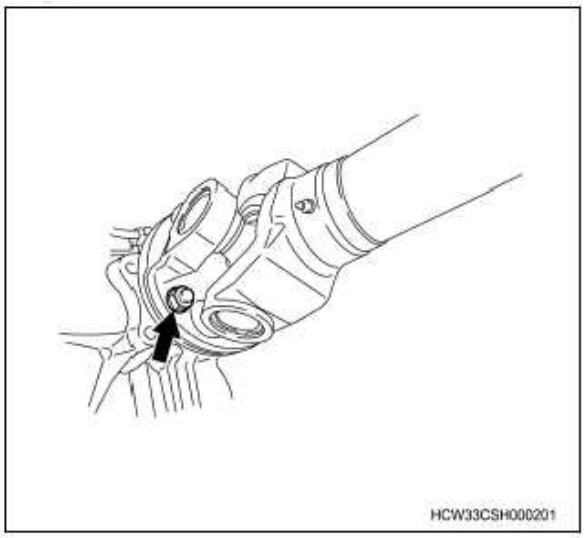
4. Drive shaft installation

1. Model with single rear differential gear

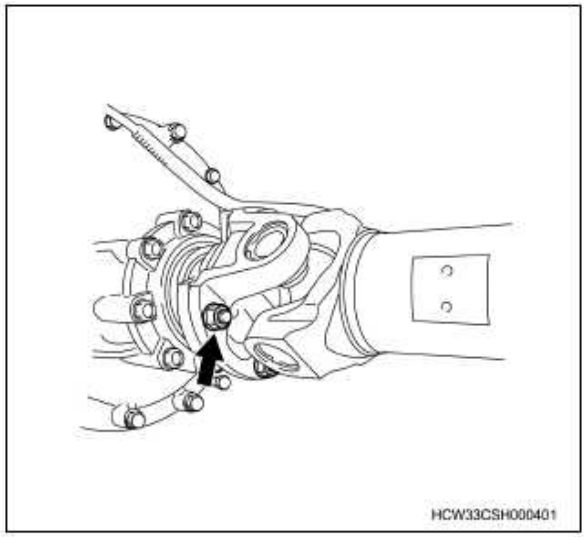
1) Align the calibration marks made during removal, and then, install the drive shaft between the transmission and the axle on the flanges.

Tightening torque: 206N・m{21.0kgf・m/152lb・ft}M14

Transmission side



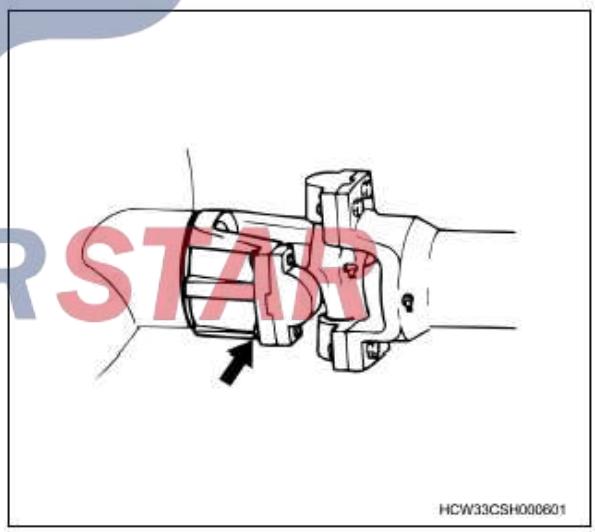
Differential gear pedestal side



2. Tandem-type rear differential gear model

1) Install the drive shaft between the wheel shafts in series onto the flanges.

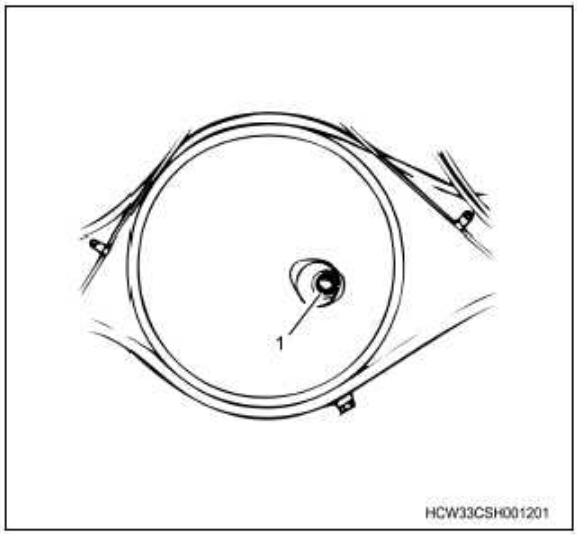
Tightening torque: 103N・m{10.5kgf・m/76lb・ft}M12-1.25



5. Differential gear oil filling

1) Install the oil drain plug on the rear axle housing.

2) Smear the differential gear oil on the rear axle housing.



1. Injection port plug hole

3) Install the injection port plug on the rear axle housing.

Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}

1. Reference oil amount

Final drive (17.5J) (rear-placed rear axle)

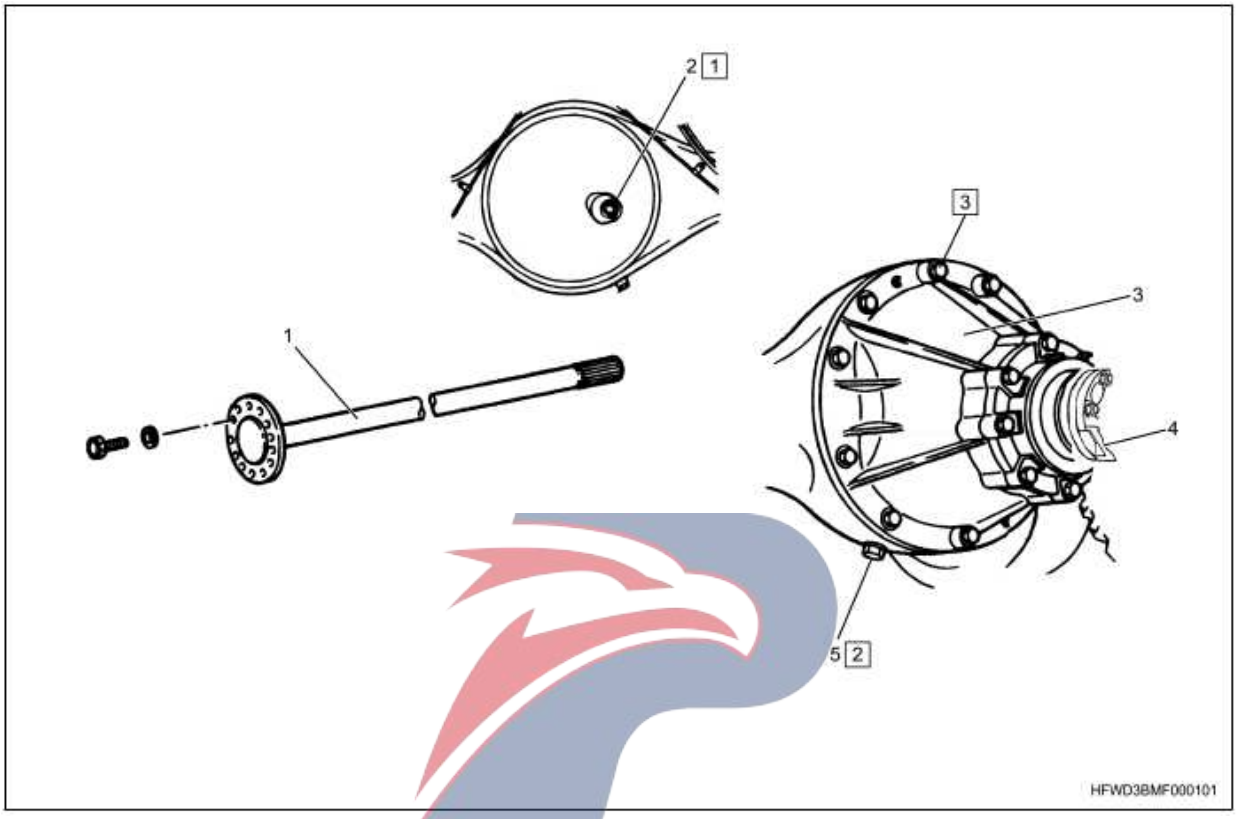
Oil volume	Oil type
: About 12L (about 2.64 British gallons/about 3.17 American gallons)	GL-5(API)–90(SAE)
	GL-5(API)-140(SAE)
	GL-5(API)–80W-90(SAE)

Rear differential (single)(18.5H)

Removal

1. Assembly view

Rear differential gear (single)



Part Name

1. Rear axle drive shaft
2. Injection port plug
3. Final drive
4. Drive shaft
5. Oil drain plug

Tightening torque

1: 69N・m{7.0kgf・m/51lb・ft}
2: 69N・m{7.0kgf・m/51lb・ft}
3: 219N・m{22.3kgf・m/73.48kg・ft}

2. Differential gear oil drain

1) Remove the oil filling port plug from the rear axle housing.

2) Remove the oil drain plug from the rear axle housing and let the differential gear oil flow out of the oil drain screw plug port.

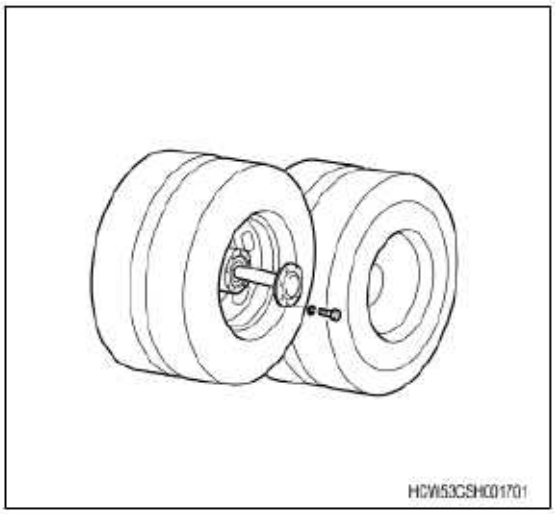
3. Drive shaft removal

1) Make an alignment mark on each connector.

2) Remove the drive shaft between the transmission and drive axle from the flange of the transmission.

4. Rear axle drive shaft removal

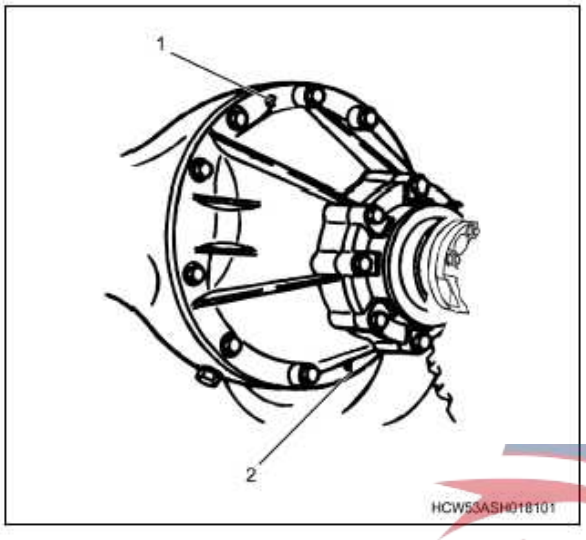
1) Remove the axle shaft on the rear hub's reel.



5. Final drive removal

1) Remove the bolts on the differential gear seat rack.

2) Install the bolt into the bolt change hole in the differential gear seat rack and pull out the final drive out of the rear axle housing.

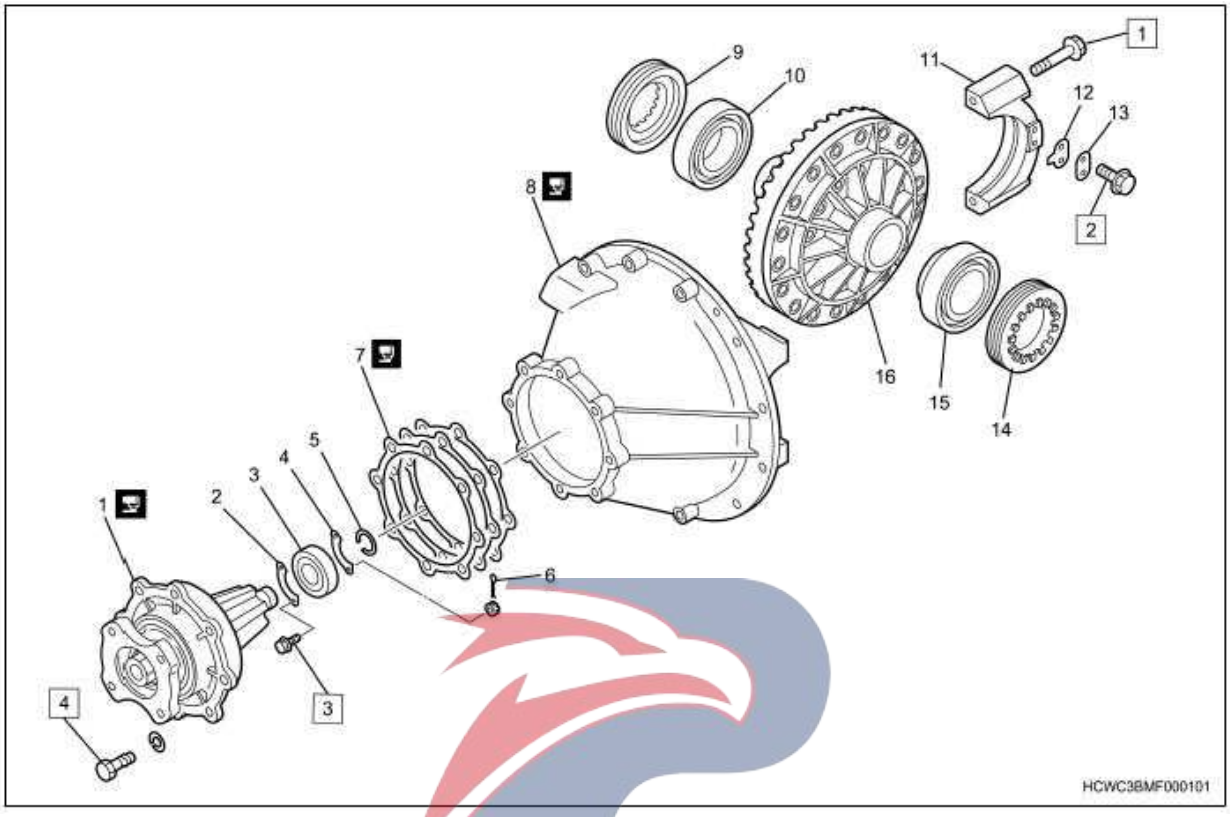


1. Bolt change hole
2. Bolt change hole

Removal

1. Assembly view

Final drive (17.5H, 18.5H)



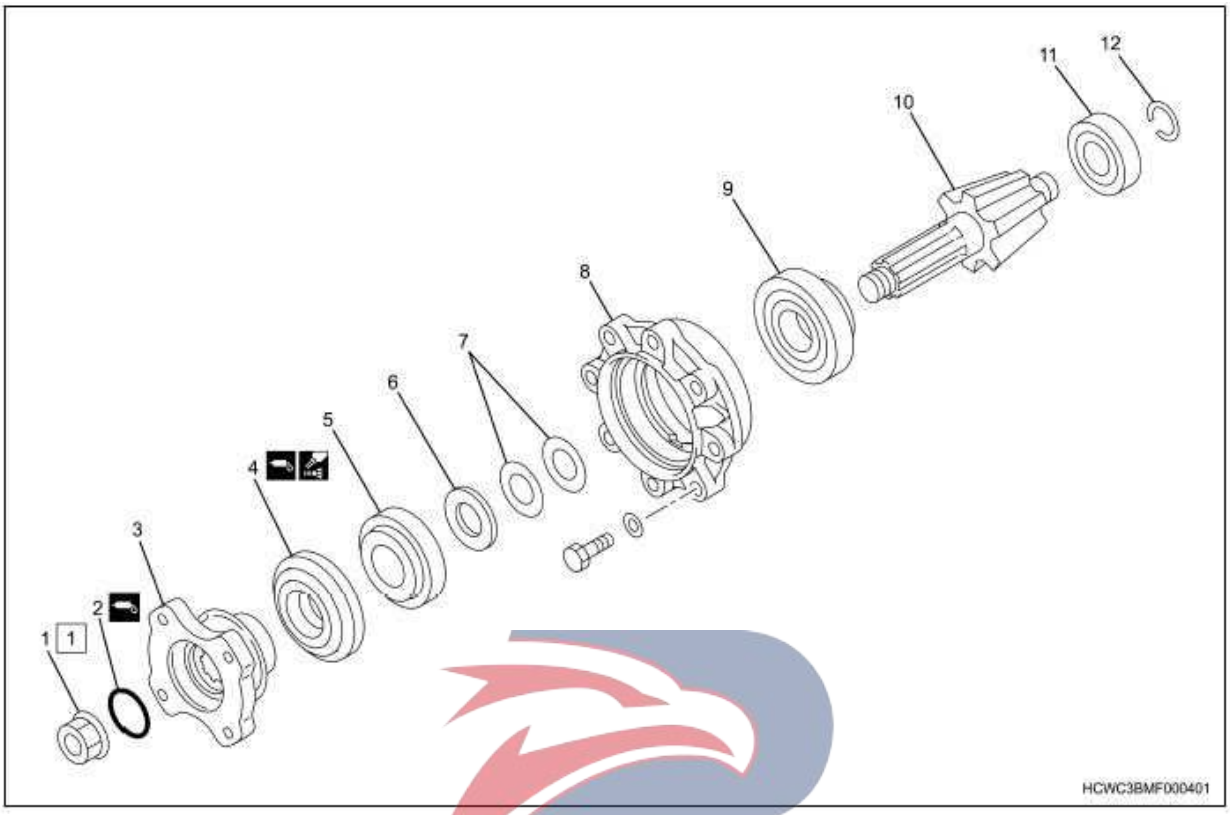
Part Name

1. Driving pinion
2. Guard ring
3. Guide bearing
4. Guard ring
5. Snap ring
6. Cotter pin
7. Gasket
8. Differential gear pedestal
9. Adjusting nut
10. Side bearing
11. Bearing cover
12. Locking plate
13. Lock washer (17.5H)
14. Adjusting nut
15. Side bearing
16. Differential gear housing

Tightening torque

1: 402N・m{41.0kgf・m/134.26kg・ft}
2:20Nm (2.0kgf.m/15lb.ft) 17.5H profile
2: 26N・m{2.7kgf・m/19lb・ft}18.5H
3: 13N・m{1.3kgf・m/115lb・in}
4: 165N・m{16.8kgf・m/55.34kg・ft}

Driving pinion, final drive (17.5H, 18.5H)



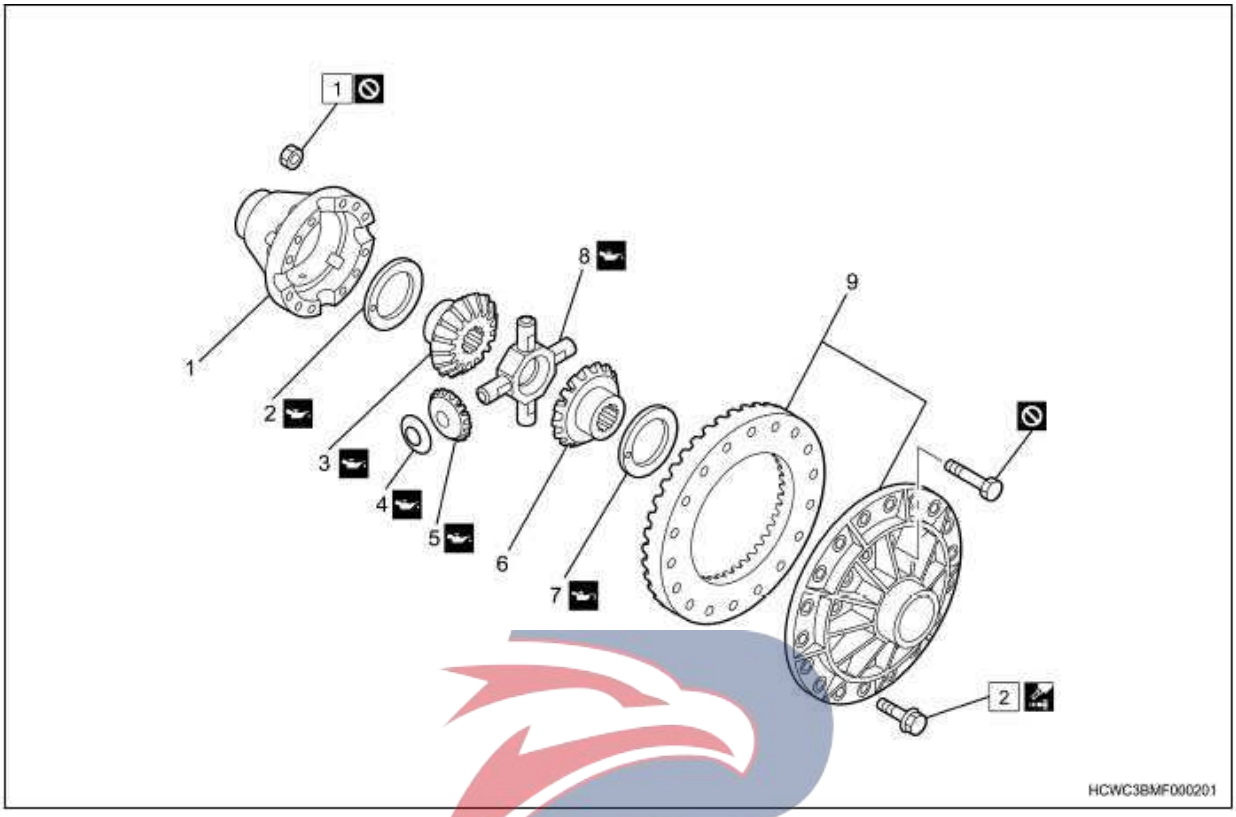
Part Name

1. Flange nut
2. O-ring
3. Flange
4. Oil seal
5. Outer bearing
6. spacer
7. Gasket
8. Driving gear bracket
9. Inner bearing
10. Driving pinion
11. Guide bearing
12. Snap ring

Tightening torque

1: 845N・m{86.2kgf・m/282.59kg・ft}

Differential gear, final drive (17.5H, 18.5H)



Part Name

1. Differential gear housing A
2. Side gear thrust washer
3. Side gear
4. Driving gear thrust washer
5. Driving gear
6. Side gear
7. Side gear thrust washer
8. Cross axle
9. Differential gear housing B and gear ring

Tightening torque

1: 206N・m{21.0kgf・m/68.95kg・ft}

2: 431N・m{43.9kgf・m/144.24kg・ft}

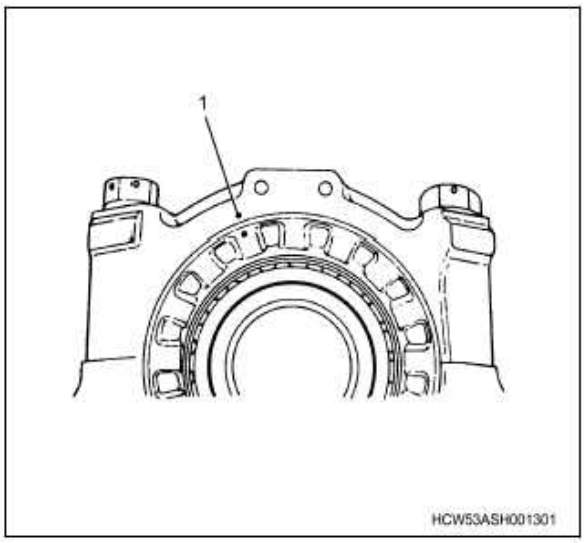
2. Final drive removal

1) Remove the driving pinion and washer from the differential gear seat rack.

Caution:

・Do not damage the washer when the driving pinion is removed.

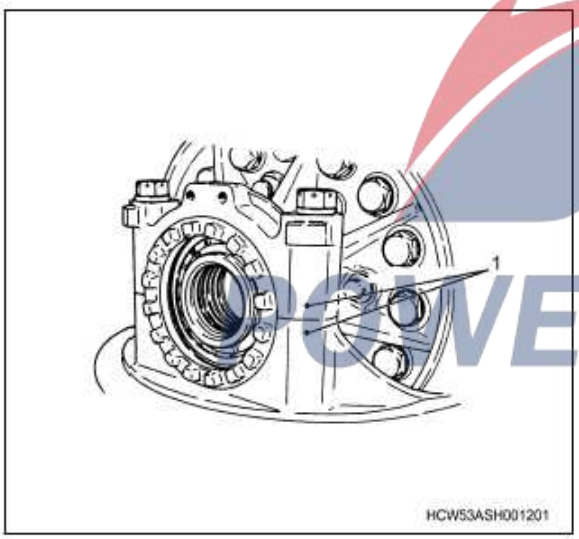
2) Make alignment marks on the adjusting nut and the bearing cover.



1. Alignment mark

3) Remove the locking plate from the bearing cap.

4) Make marks on the bearing cover and the differential gear housing.

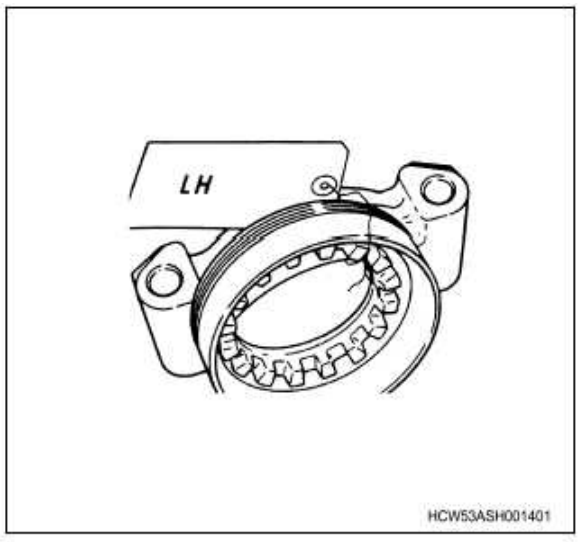


1. Alignment mark

5) Remove the bearing cover from the differential gear seat rack.

Caution:

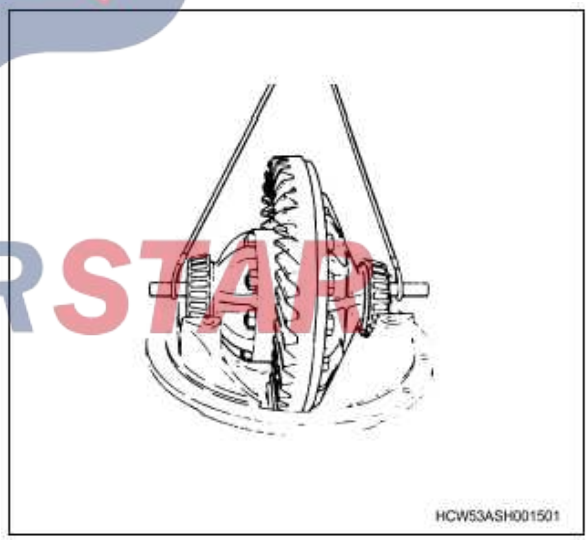
・Put labels on the removed bearing cover, adjusting nut, and outer bearing cup and indicate whether they are on the left side or on the right side.



6) Remove the differential gear housing from the differential gear seat rack.

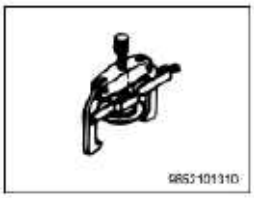
Caution:

・Now, pull the differential gear housing toward the gear ring to prevent the housing from being stuck on the guide bearing.

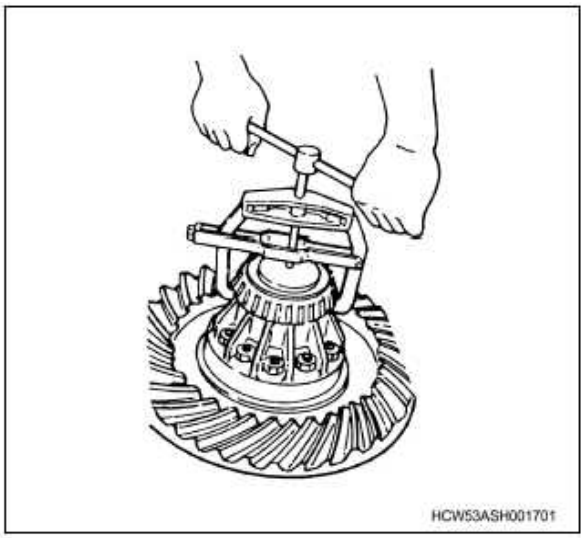


7) Make the left and right identification marks on the side bearing.

8) Remove the side bearing from the differential gear housing using a special tool.



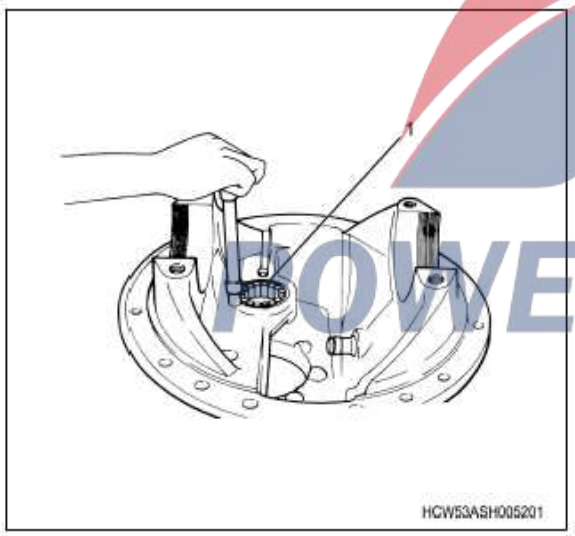
SST:9-8521-0095-0-bearing removal tool



9) Remove the split pin from the stop screw.

10) Remove the following parts from the differential gear seat rack.

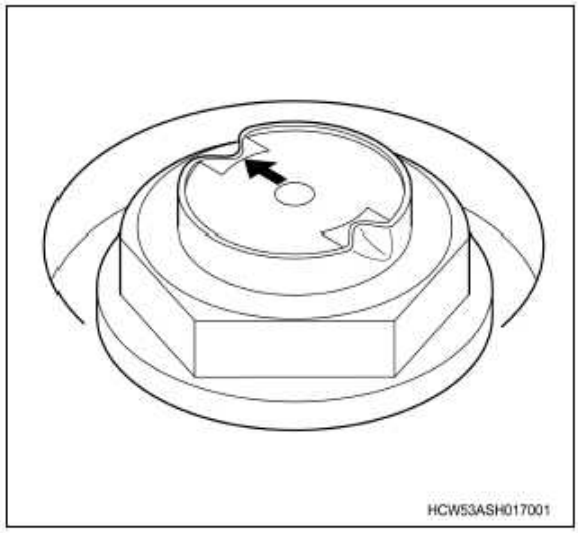
- Guard ring
- Bolt
- Nut
- Guide bearing



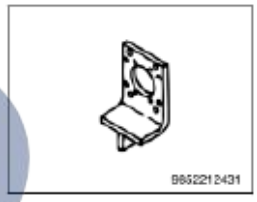
1. Guide bearing

3. Drive pinion removal

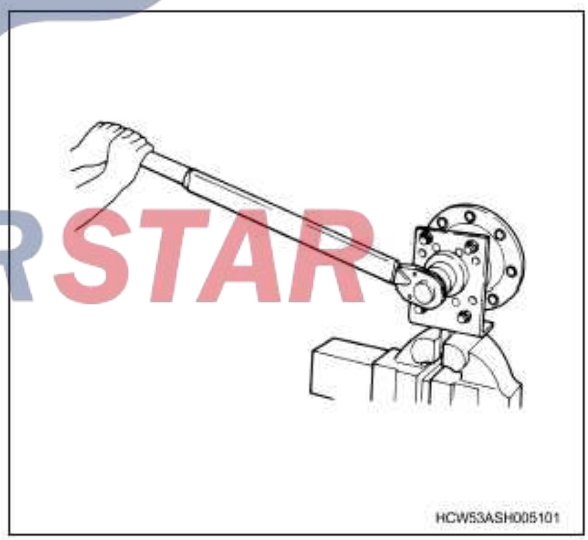
1) Use a punch to pry up the cylindrical flange nut.



2) Remove the flange nut from the driving pinion using a special tool.



SST:9-8522-1243-1-spline fork bracket



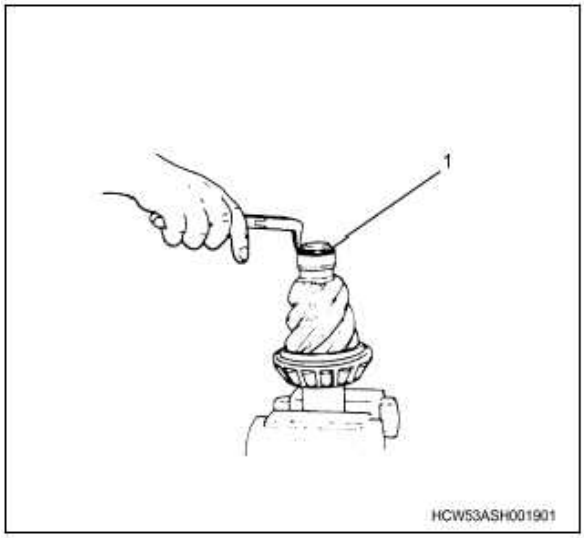
3) Slightly hit the rear of the driving pinion using a copper hammer or a brass bar so as to remove the following components.

- Flange
- Driving gear rack
- Gasket
- spacer

4) Remove the oil seal from the driving gear rack.

5) Remove the outer bearing from the driving gear rack.

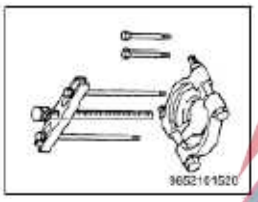
6) Remove the snap ring from the drive pinion with using a snap ring clamp.



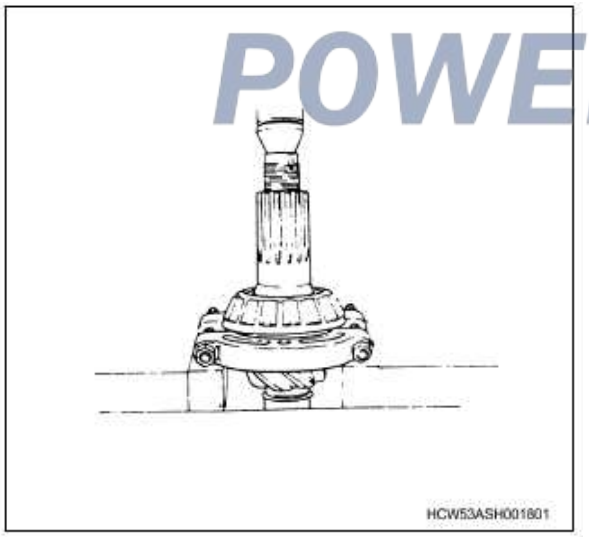
1. Snap ring

7) Dismount the guide bearing from the driving pinion.

8) Remove the inside bearing from the driving pinion using a special tool.

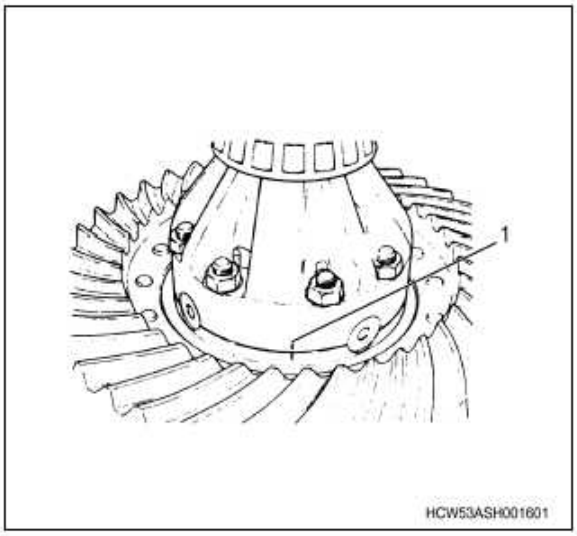


SST:9-8521-0152-0- bearing removal tool



4. Differential gear housing removal

1) Make alignment marks on the differential gear housings A and B.



1. Alignment mark

2) Remove the differential gear housing A from the differential gear housing B.

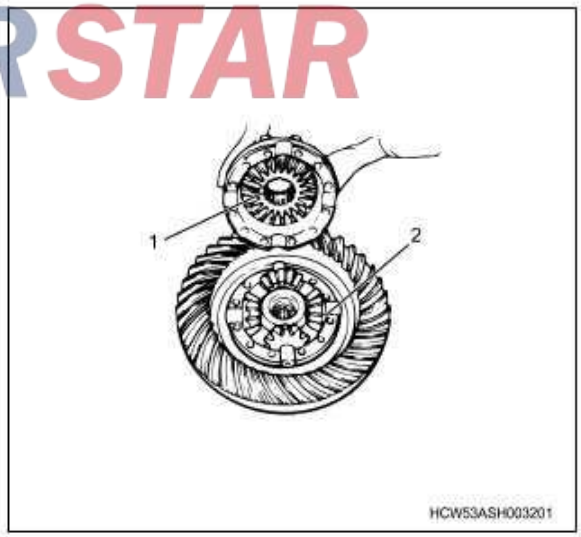
Caution:

・Do not reuse the bolts and nuts of the differential gear housing.

3) Remove the side gear and the side gear thrust washer from the differential gear housing A.

4) Remove the following parts from the differential gear housing B.

・Cross axle
・Driving gear
・Driving gear thrust washer

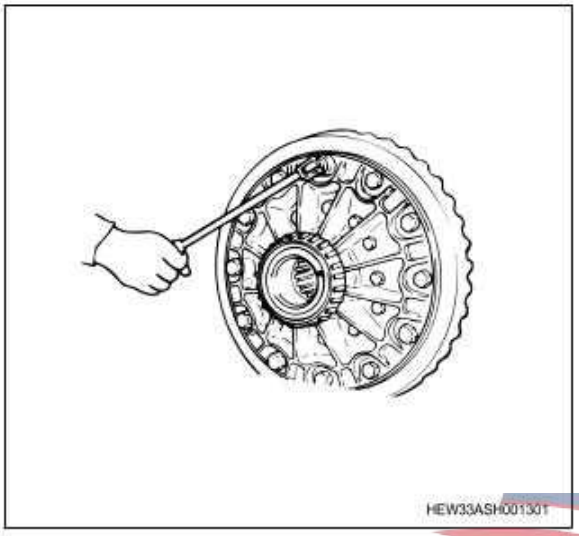


1. Side gear
2. Driving gear

5) Remove the gear ring from the differential gear housing B.

Caution:

・Because the Loctite binder has been used to fix the gear ring's tightening bolt, do not remove it in any case unless it is necessary to change the gear ring.



Inspection

1. Final drive inspection

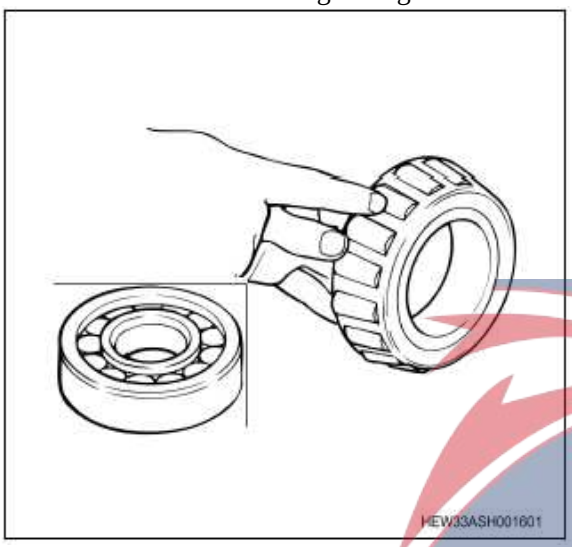
Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1. Bearing inspection

1) Check the following items.

・The gap between the inner cup or outer cup, and the rolling shaft is excessive or there is any crack, wear, or damage on them.

・There is an abnormal feeling during hand rotation.



2. Driving pinion check

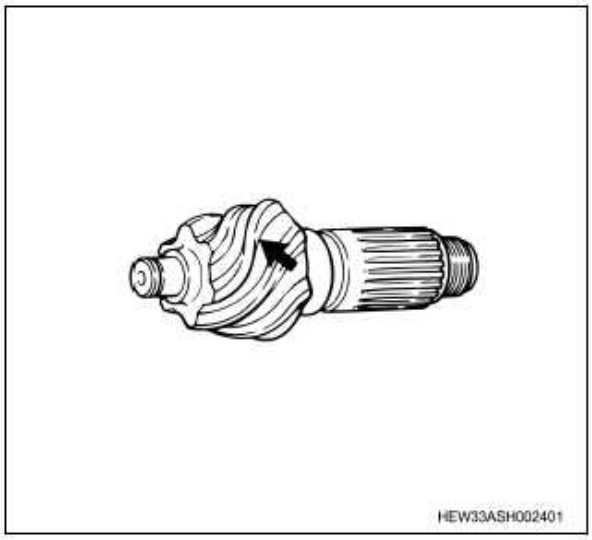
Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1) Check whether the driving pinion has any of the following.

・Abrasion

・Damaged

・Tilt



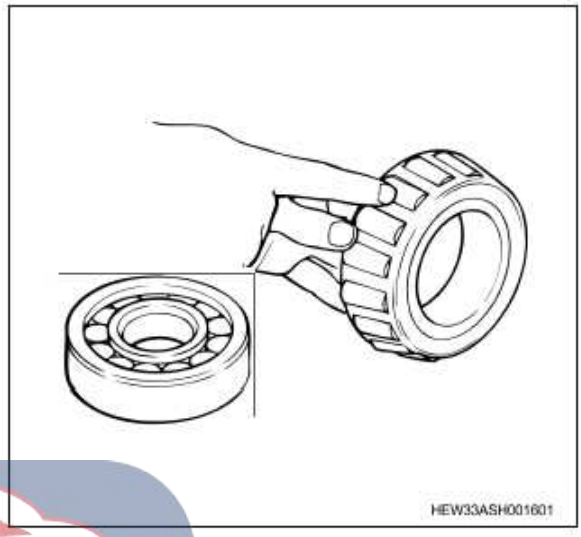
Caution:

・Change the driving pinion and the gear ring together.

2) Check the following items on the bearings.

・Gap, crack, wear, and excessive damage

・There is an abnormal feeling during hand rotation.



3. Differential gear housing check

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

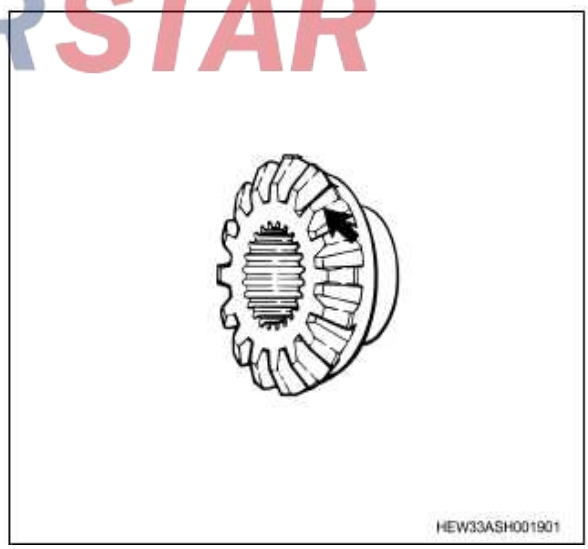
1. Side gear check

1) Check the following items.

・Abrasion

・Damaged

・Tilt



2. Side gear thrust washer check

1) Check the following items

・Serious wear

・Damaged

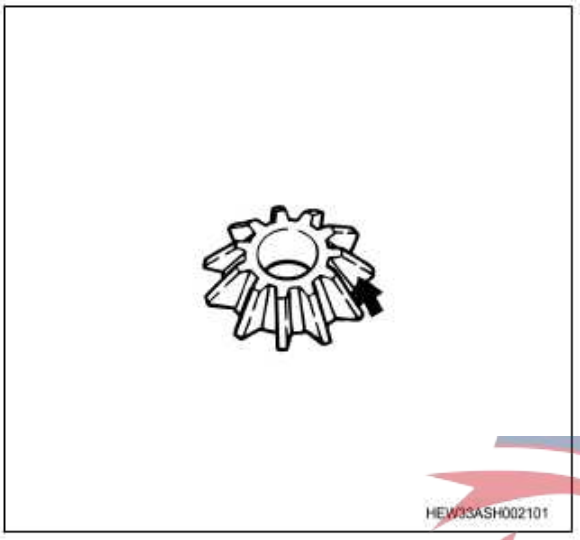
3. Driving gear check

1) Check the following items

・Worn gear face and internal surface

・Damaged gear face and internal surface

・Gear pitch



4. Driving gear thrust washer check

1) Check the following items・Serious wear

・Damaged

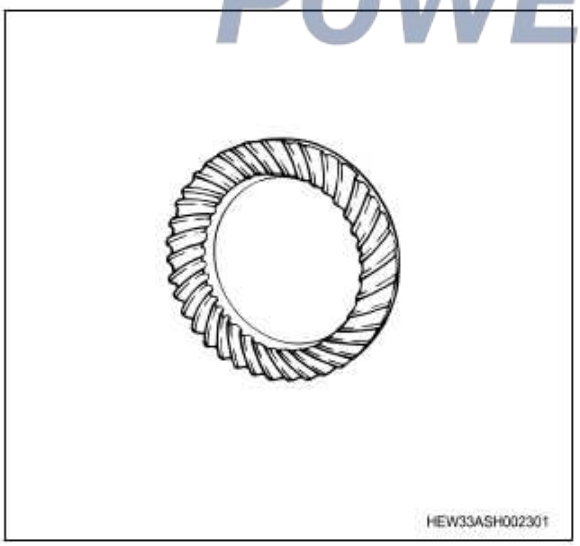
5. Gear ring check

1) Check the following items

・Abrasion

・Damaged

・Tilt



Caution:

・Change the gear and driving pinion together.

6. Measure the gap between the differential housing and the side gear

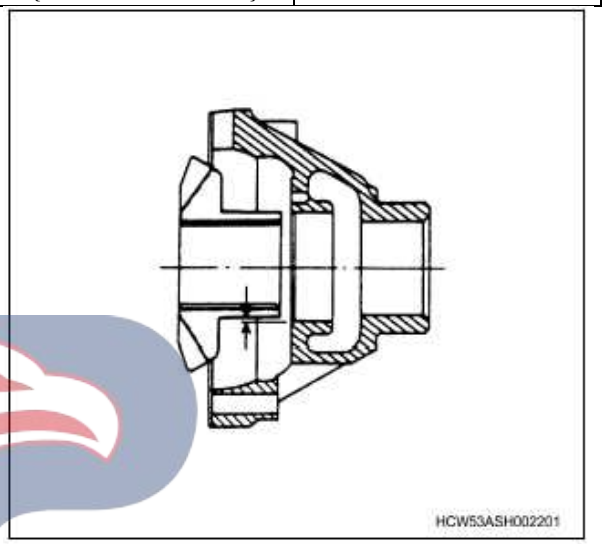
1) Measure the inside diameter of the differential gear housing.

2) Measure the outer diameter of the side gear.

3) Calculate the gap according to the measured value.

Gap between differential housing and side gear

Prescribed value	Limit
: 0.18 to 0.25mm { 0.0071to 0.2489mm }	: 0.5mm { 0.5004mm }



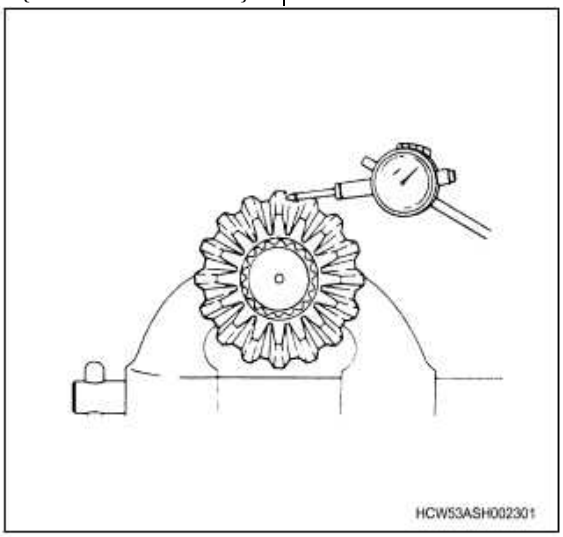
7) Measure the clearance in the rotation direction of the side gear's spline.

1) Insert the axle into the side gears.

2) Measure the clearance in the rotation direction of the side gear's spline.

Clearance in spline rotation direction

Prescribed value	Limit
: 0.2mm or blown { 0.2007mm or blown }	: 0.5mm { 0.5004mm }



8. Measurement of gap between star wheel and pinion


POWERSTAR

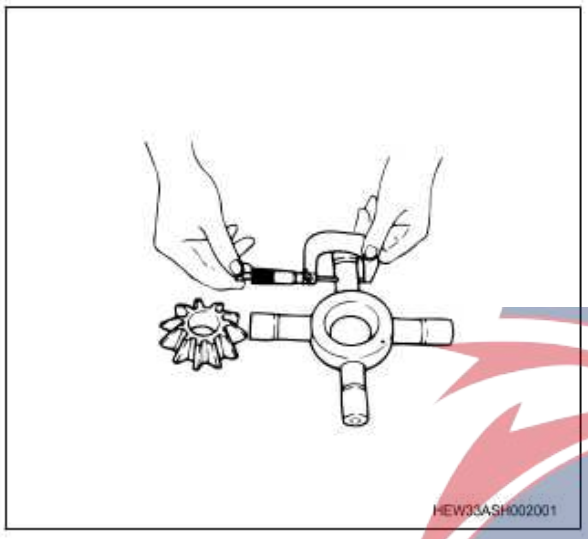
1) Measure the outside diameter of the star wheel.

2) Measure the inside diameter of the pinion.

3) Calculate the gap according to the measured value.

Gap between star wheel and pinion

Prescribed value	Limit
: 0.06 to 0.15mm { 0.0024 to 0.1499mm }	: 0.3mm { 0.2997mm }

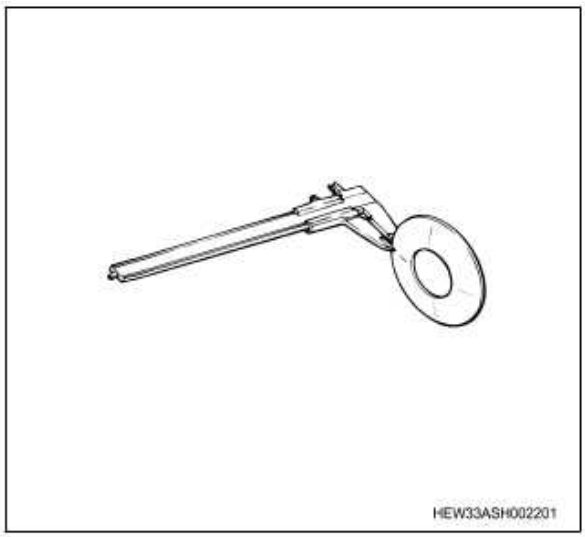


9. Pinion thrust washer thickness measurement

1) Measure the thickness of the pinion thrust washer.

Driving gear thrust washer thickness

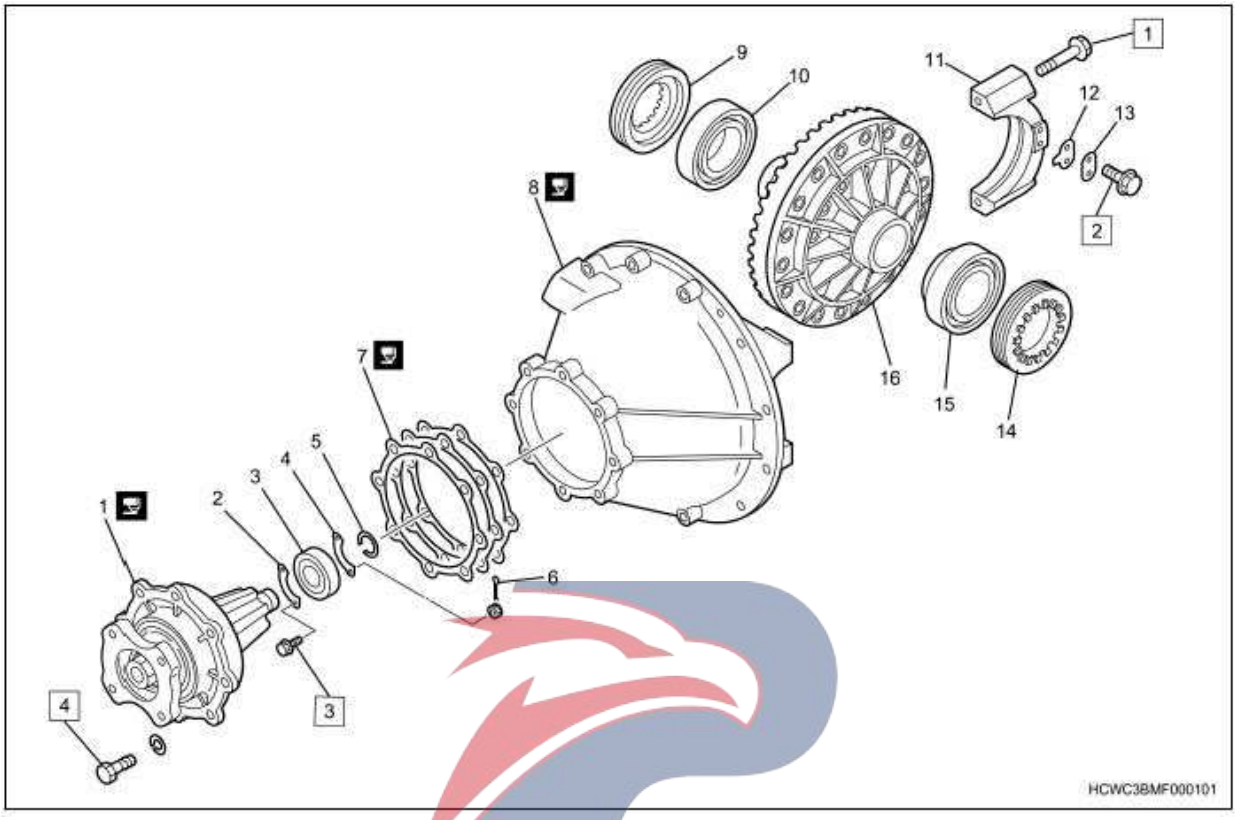
Prescribed value	Limit
: 1.6mm { 1.6002mm }	: 1.5mm { 1.5011mm }



Reassemble

1. Assembly view

Final drive (17.5H, 18.5H)



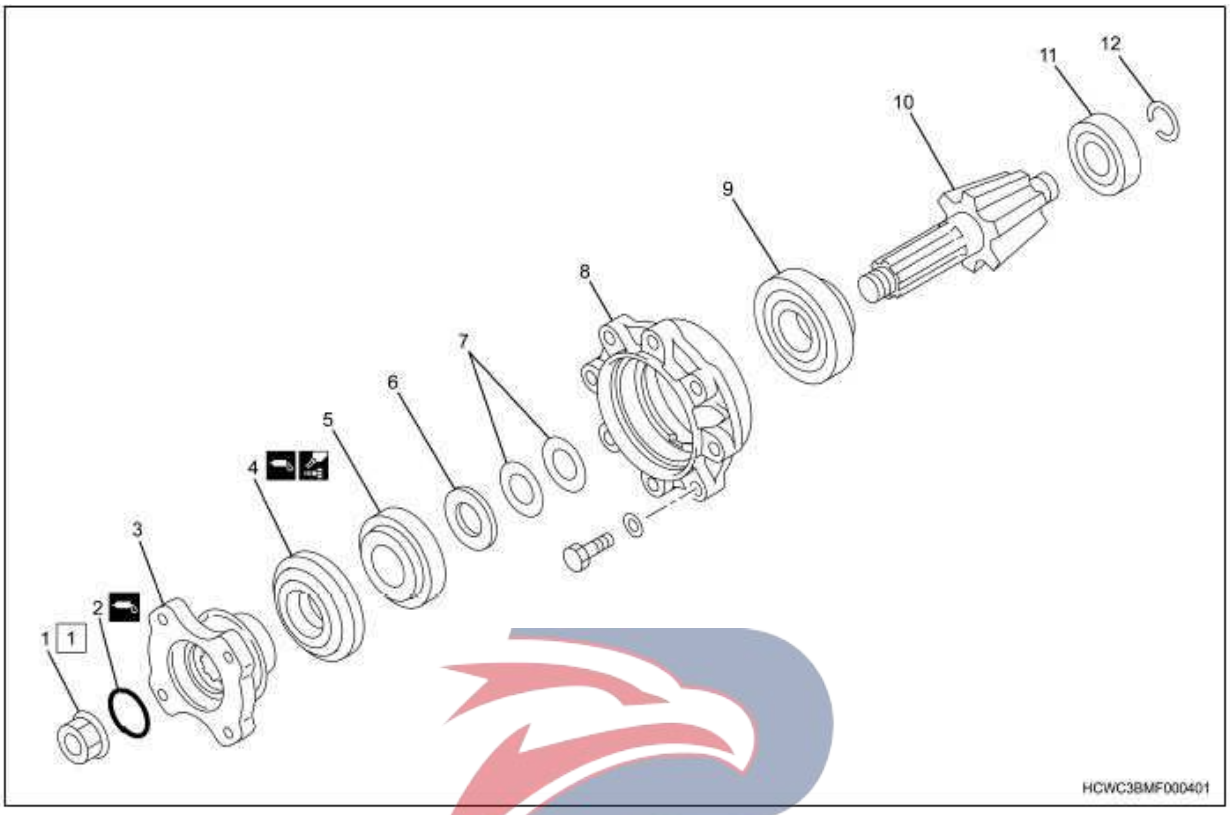
Part Name

1. Driving pinion
2. Guard ring
3. Guide bearing
4. Guard ring
5. Snap ring
6. Cotter pin
7. Gasket
8. Differential gear pedestal
9. Adjusting nut
10. Side bearing
11. Bearing cover
12. Locking plate
13. Lock washer (17.5H)
14. Adjusting nut
15. Side bearing
16. Differential gear housing

Tightening torque

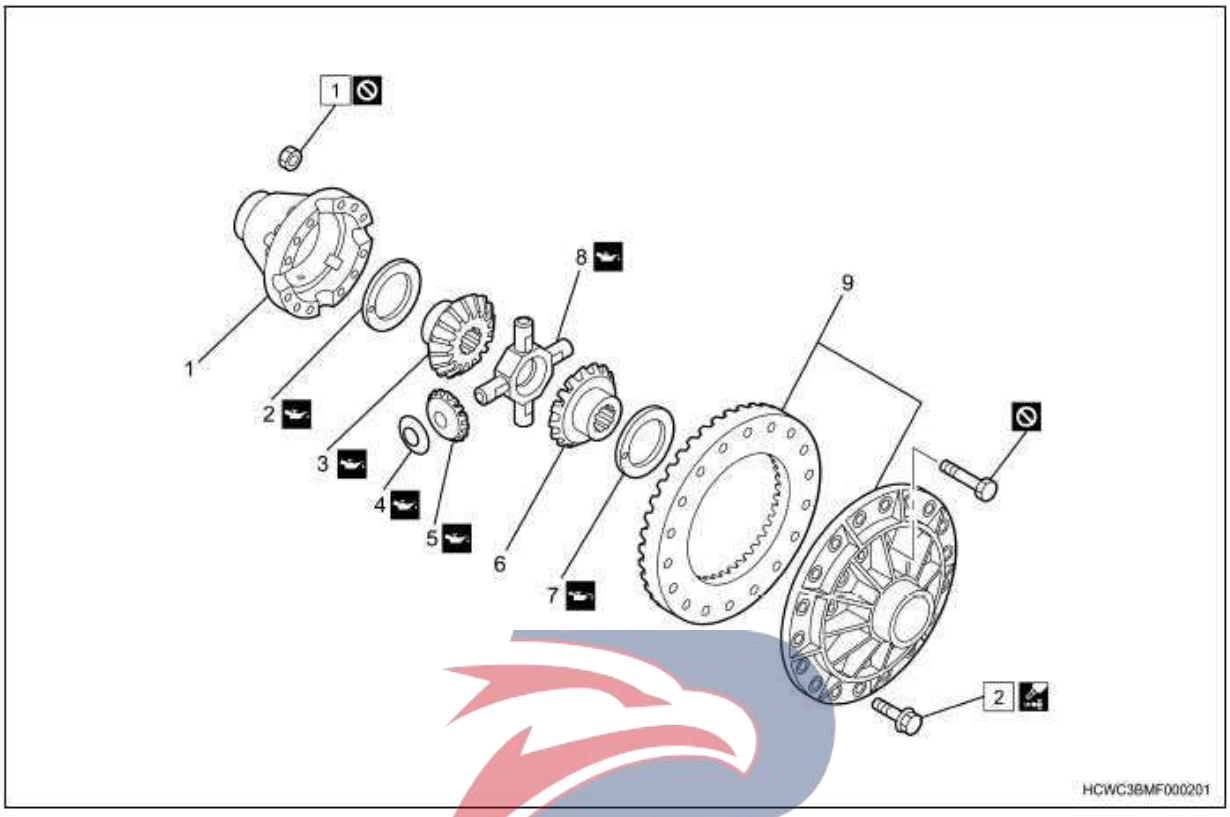
1: 402N・m{41.0kgf・m/134.26kg・ft}
2:20Nm (2.0kgf.m/15lb.ft) 17.5H profile
2: 26N・m{2.7kgf・m/19lb・ft}18.5H
3: 13N・m{1.3kgf・m/115lb・in}
4: 165N・m{16.8kgf・m/55.34kg・ft}

Driving pinion, final drive (17.5H, 18.5H)



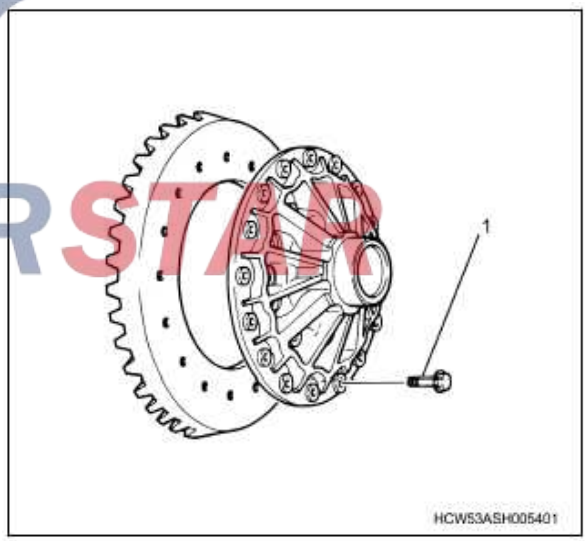
Part Name	
1. Flange nut	8. Driving gear bracket
2. O-ring	9. Inner bearing
3. Flange	10. Driving pinion
4. Oil seal	11. Guide bearing
5. Outer bearing	12. Snap ring
6. spacer	Tightening torque
7. Gasket	1: 845N・m{86.2kgf・m/282.59kg・ft}

Differential gear, final drive (17.5H, 18.5H)



Part Name
1. Differential gear housing A
2. Side gear thrust washer
3. Side gear
4. Driving gear thrust washer
5. Driving gear
6. Side gear
7. Side gear thrust washer
8. Cross axle
9. Differential gear housing B and gear ring

Tightening torque
1: 206N・m{21.0kgf・m/68.95kg・ft}
2: 431N・m{43.9kgf・m/144.24kg・ft}
2. Differential gear housing reassembly
1) Smear Loctite 271 or any composite equivalent on the thread of the bolt.
2) Install the gear ring on the differential gear housing B.
Tightening torque: 431N・m{43.9kgf・m/317.99lb・ft}

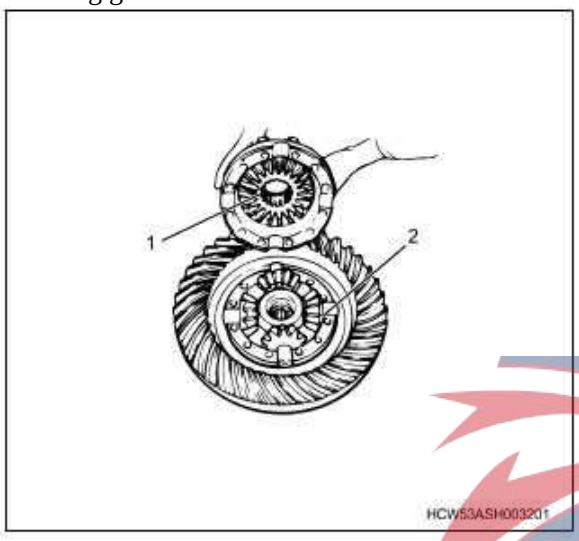


1. Bolt

---

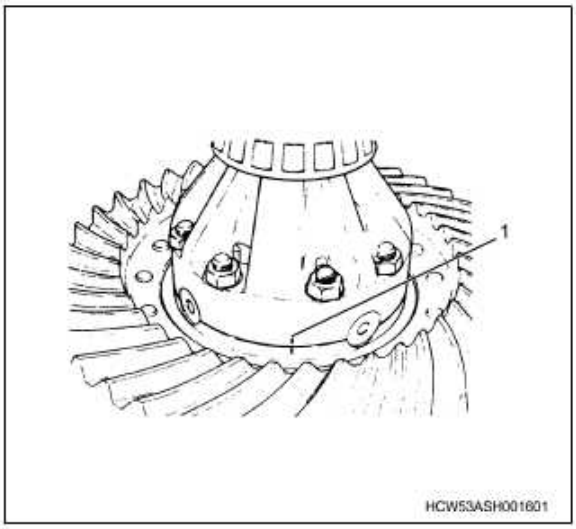
3) Smear gear oil on the following parts.
・Side gear thrust washer
・Side gear
・Cross axle
・Driving gear
・Driving gear thrust washer

4) Install the side gear thrust washer and the side gear on the differential gear housing A.
5) Install the following parts on the differential gear housing B.
・Side gear thrust washer
・Side gear
・Cross axle
・Driving gear
・Driving gear thrust washer



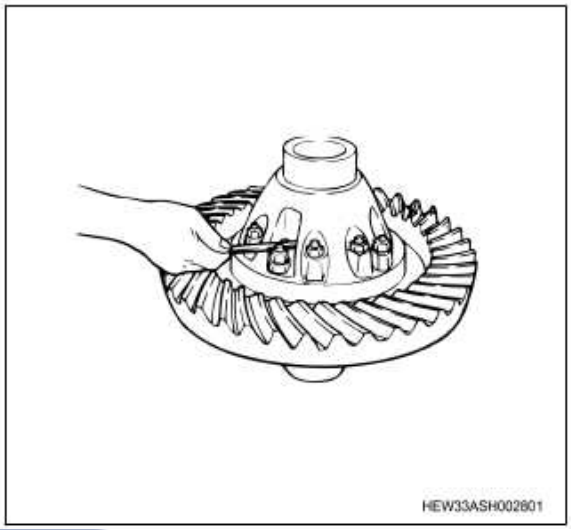
1. Side gear
2. Driving gear

6) Temporarily fix the differential gear housing A to the differential gear housing B.
Caution:
・Make the installation according to the alignment marks used during the removal.
Caution:
・Do not reuse the nuts and bolts.
Tightening torque: 98N・m{10.0kgf・m/72.00lb・ft}



1. Alignment mark

7) Measure the gap of the side gear.
: Side gear clearance 0.29 to 0.38mm{0.0114to 0.0150in}

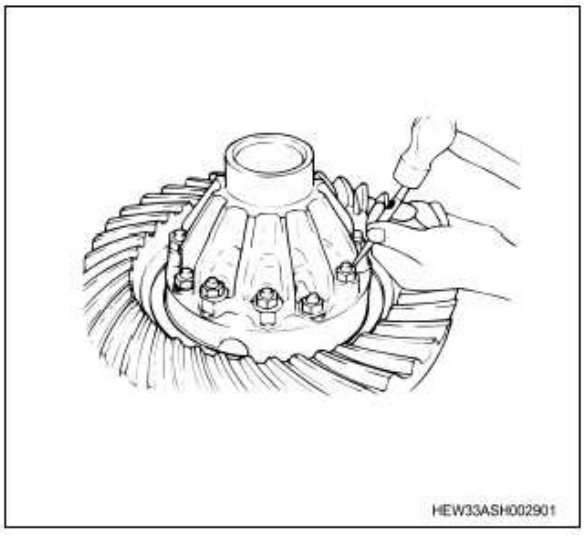


Caution:
・If the side gear gap is beyond the specified range, please replace the thrust washer of side gear, and adjust;
Applicable side gear thrust washer thickness

: 2.8mm { 2.7991mm }
: 2.9mm { 2.9007mm }
: 3.0mm { 2.9997mm }
: 3.1mm { 3.0988mm }
: 3.2mm { 3.2004mm }
: 3.3mm { 3.2995mm }
: 3.4mm { 3.4011mm }

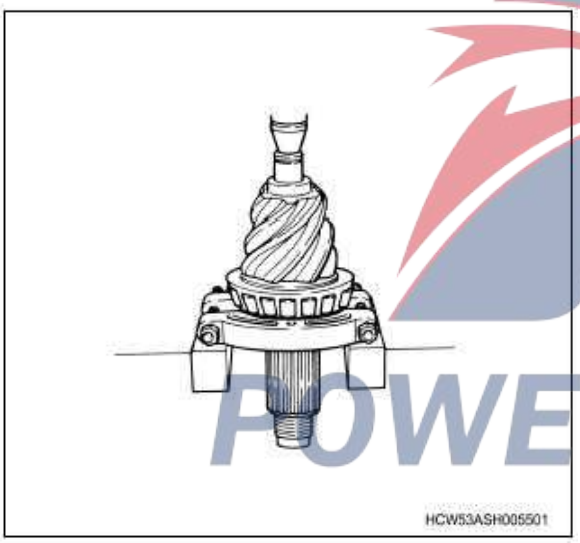
8) Fix the differential gear housing A to the differential gear housing B (final tightening).
Tightening torque: 206N・m{21.0kgf・m/152.01lb・ft}
9) Hit the nuts into two positions.


POWERSTAR



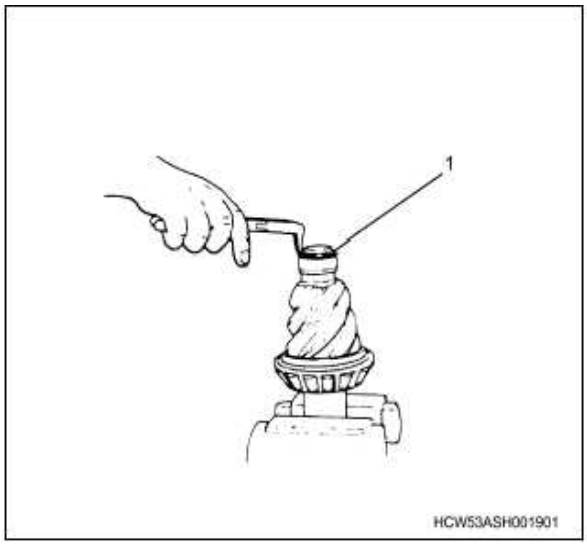
3. Drive pinion reassembly

1) Install the internal bearing on the driving pinion using a press.



2) Install the inner cup of the guide bearing on the driving pinion using a copper hammer or a brass bar.

3) Install the snap ring on the driving pinion.



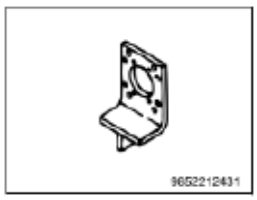
1. Snap ring

4) Install the outer cup of the inside bearing on the planet gear rack.

5) Install the outer cup of the outer bearing on the planet gear rack.

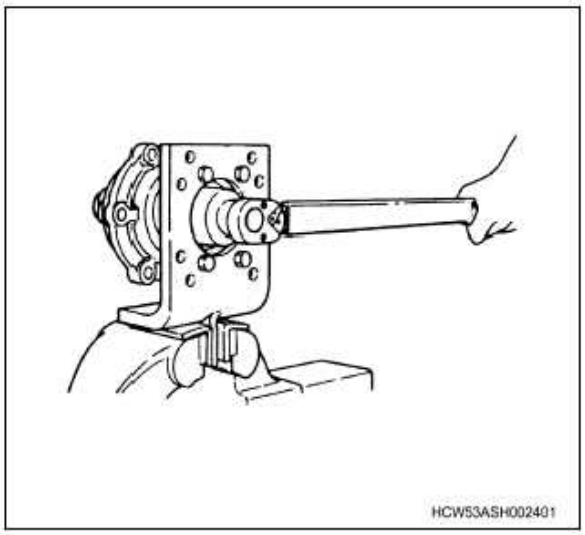
6) Temporarily tighten the following parts using a special tool.

- Driving gear rack
- Gasket
- spacer
- Outer bearing
- Flange



SST:9-8522-1243-1-spline fork bracket

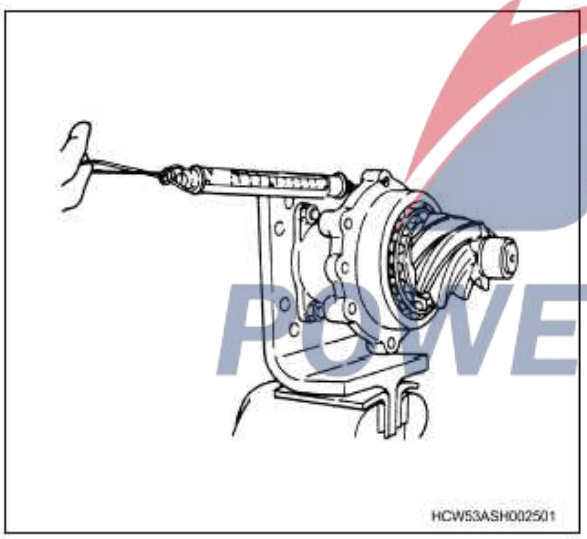
Tightening torque: 834N・m{85.0kgf・m/615.00lb・ft}



7) Lift the spring balance to the bolt hole in the driving gear bracket.

8) Pull the spring balance in the tangential direction and measure the pre-applied load on the driving gear bracket.

Preload: 37.3to 48.1N{3.8 to 4.9kg/8.4to 10.8lb}



Caution:

・Use spacer and gasket for adjustment when the measured preload is beyond the specified range;

Applicable spacer

: 7.6mm { 7.5997mm }
: 7.8mm { 7.8003mm }
: 8.0mm { 8.0010mm }
: 8.2mm { 8.1991mm }
: 8.4mm { 8.3998mm }
: 8.6mm { 8.6004mm }
: 8.8mm { 8.8011mm }
: 9.0mm { 8.9992mm }

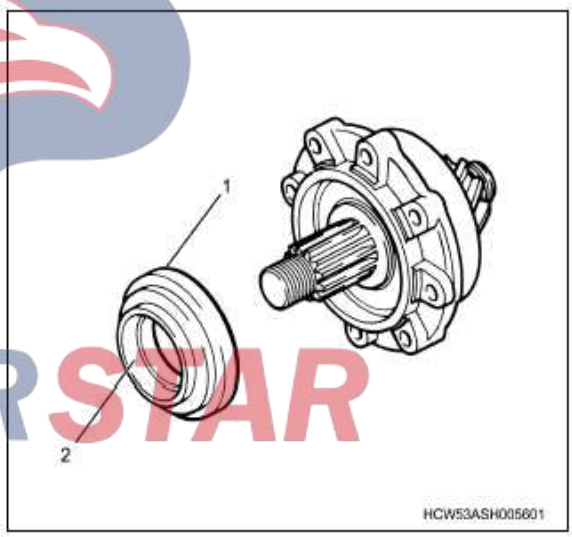
Applicable washer

: 3.25mm { 3.2512mm }
: 3.26mm { 3.2588mm }
: 3.27mm { 3.2690mm }
: 3.28mm { 3.2791mm }
: 3.29mm { 3.2893mm }
: 3.30mm { 3.2995mm }
: 3.31mm { 3.3096mm }
: 3.32mm { 3.3198mm }
: 3.33mm { 3.3299mm }
: 3.34mm { 3.3401mm }
: 3.35mm { 3.3503mm }

9) Remove the nuts and flange from the driving gear bracket.

10) Smear Loctite 242 or any composite equivalent around the outer peripheral of the oil seal.

11) Smear chassis grease on the lip of the oil seal.



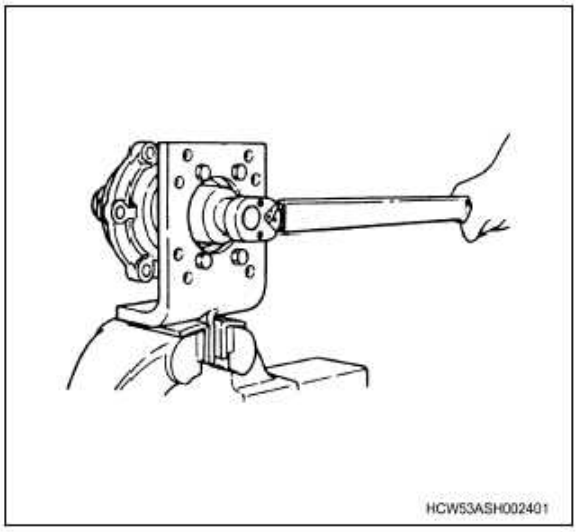
1. Oil seal circumference
2. Oil seal lip segment

12) Smear chassis grease on the O-ring.

13) Install the oil seal on the flange.

14) Install the nuts and flange on the driving gear rack.

Tightening torque: 834N・m{85.0kgf・m/615.00lb・ft}



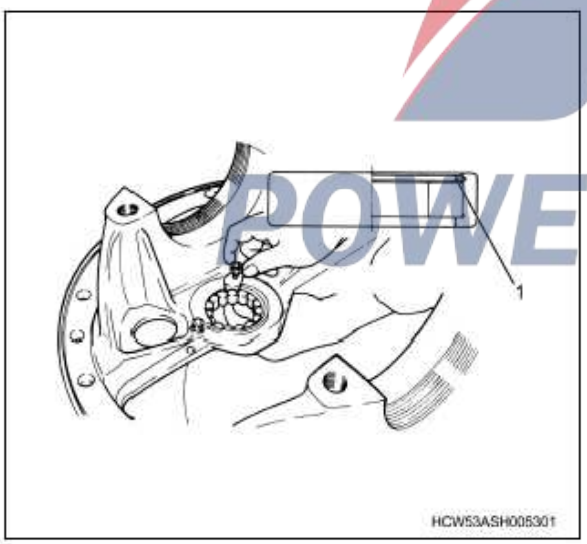
15) Hit the nuts into two positions.

Caution:

・Knock it in to allow its close contact with the tightening side of the groove surface.

4. Final drive reassembly

1) Install the guide bearing on the differential gear's seat rack in the way that the stop ring and the bearing cover are on the same side.



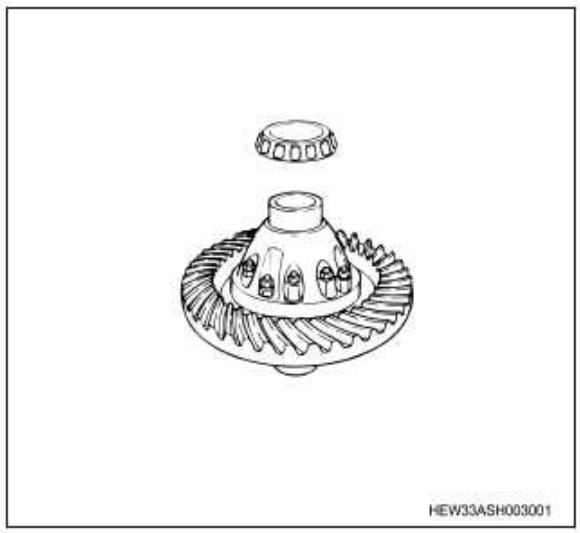
1. Snap ring

2) Install the stopper on the differential gear seat rack.

Tightening torque: 13N・m{1.3kgf・m/115lb・in}

3) Install the stop device on the split pin.

4) Install the side bearing on the differential housing using a tool like a brass bar.

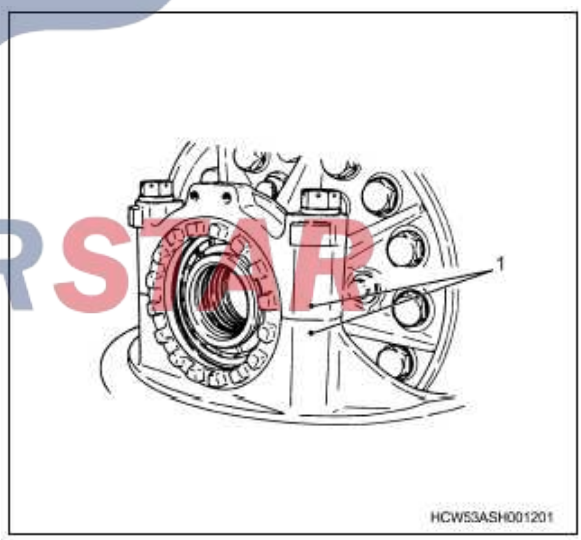


5) Install the differential gear housing on the differential gear seat rack.

6) Install the bearing cover, side bearing outer cup, and adjusting nut onto the differential gear support.

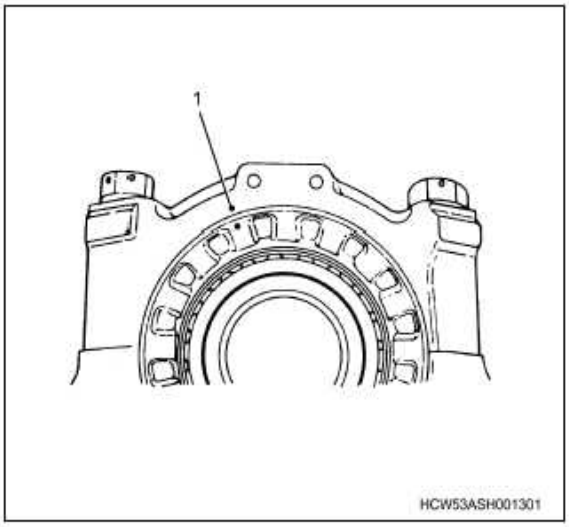
Caution:

・Make the installation according to the alignment marks used during the removal.



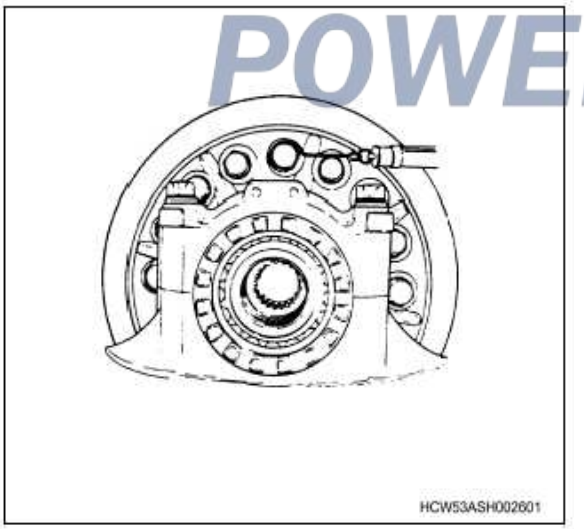
1. Alignment mark

7) Tighten the adjusting nut according to the alignment mark used in the removal process.

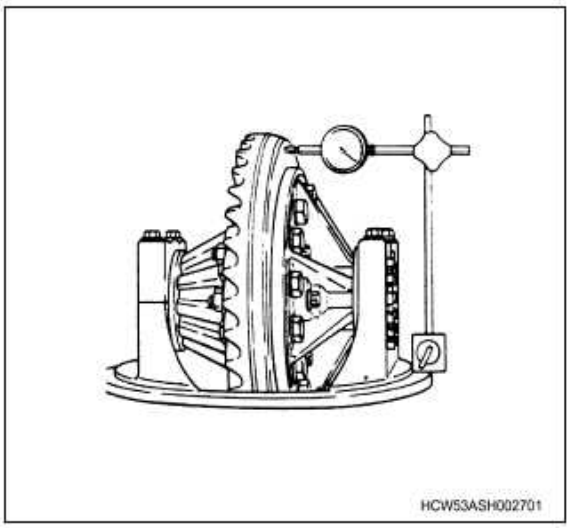


1. Alignment mark

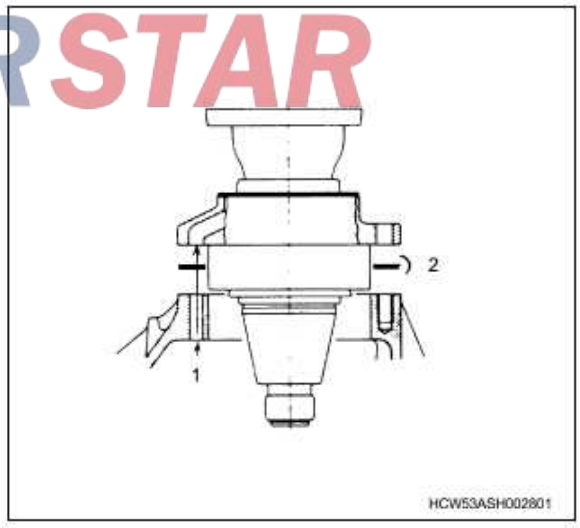
8) Temporarily fix the bearing cover bolts on the differential gear seat rack.
Tightening torque: 49N・m{5.0kgf・m/36.00lb・ft}
9) Lift the spring balance to the tightening bolt on the ring gear.
10) Pull the spring balance in the tangential direction and measure the pre-applied load on the side bearing.
Standard: side bearing pre tightening degree, 24.5-49.0N (2.5-5.0kg/5.5-11.0lb)
Prescribed value: 441-833N·cm{45-90kgf·cm/39-35.38kg·in} Side bearing preload degree



Caution:
・If the measured pre-load is not within the specified range, make an adjustment with the adjusting nut.
11) Measure the radial run-out of the gear ring using a dial gauge.
Standard: 0.1mm or below (0.0039in or below)
Limit: 0.01in (0.0079in)
Caution:
・If the measured run out greater than the limit value, repair or change the gear ring or the side bearing.



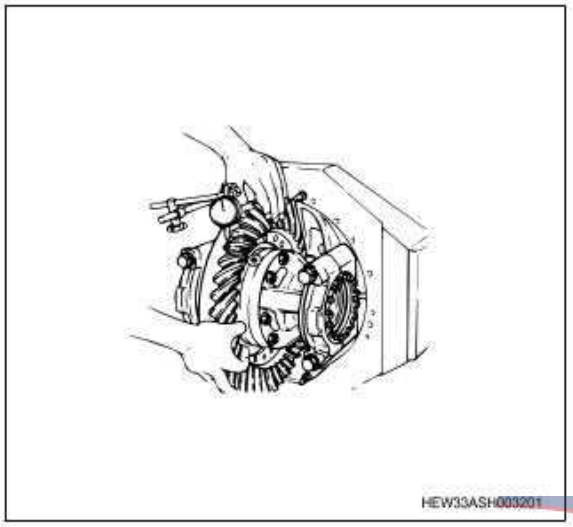
12) Temporarily fix the driving pinion and washer on the differential gear seat rack.
Caution:
・Align the oil hole in the differential gear housing and do the installation.
Caution:
・Do not smear grease on the liquid sealing gasket at this point.
Tightening torque: 185N・m{18.9kgf・m/136.00lb・ft}



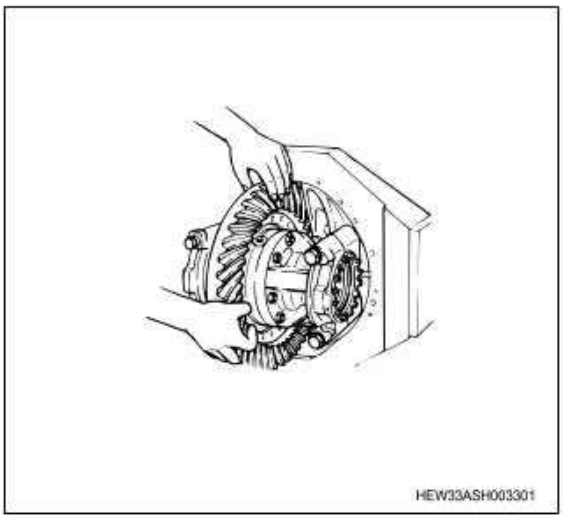
1. Oil hole
2. Gasket

13) Fix the dial gauge on the flange surface of the differential gear seat rack.
14) Install the cover of the dial gauge on the rear of the gear ring and then set its long pointer to zero.

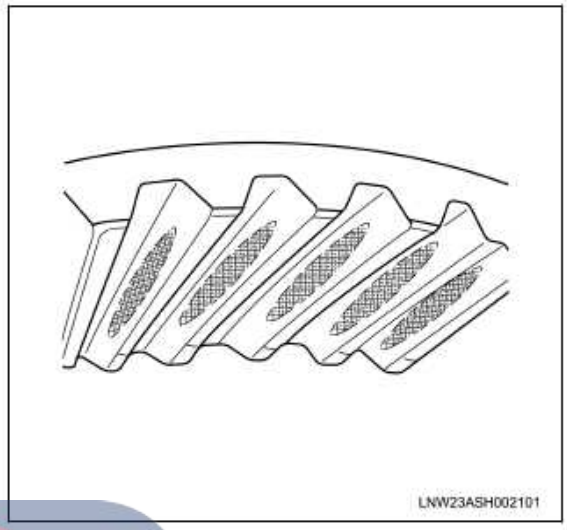
15) Hold the driving pinion by hand, slightly move the gear ring back and forth, and measure the tooth space between the gear ring and the driving pinion.
Standard: gap between gear ring and driving pinion, 0.28-0.36mm (0.0110-0.0142in)



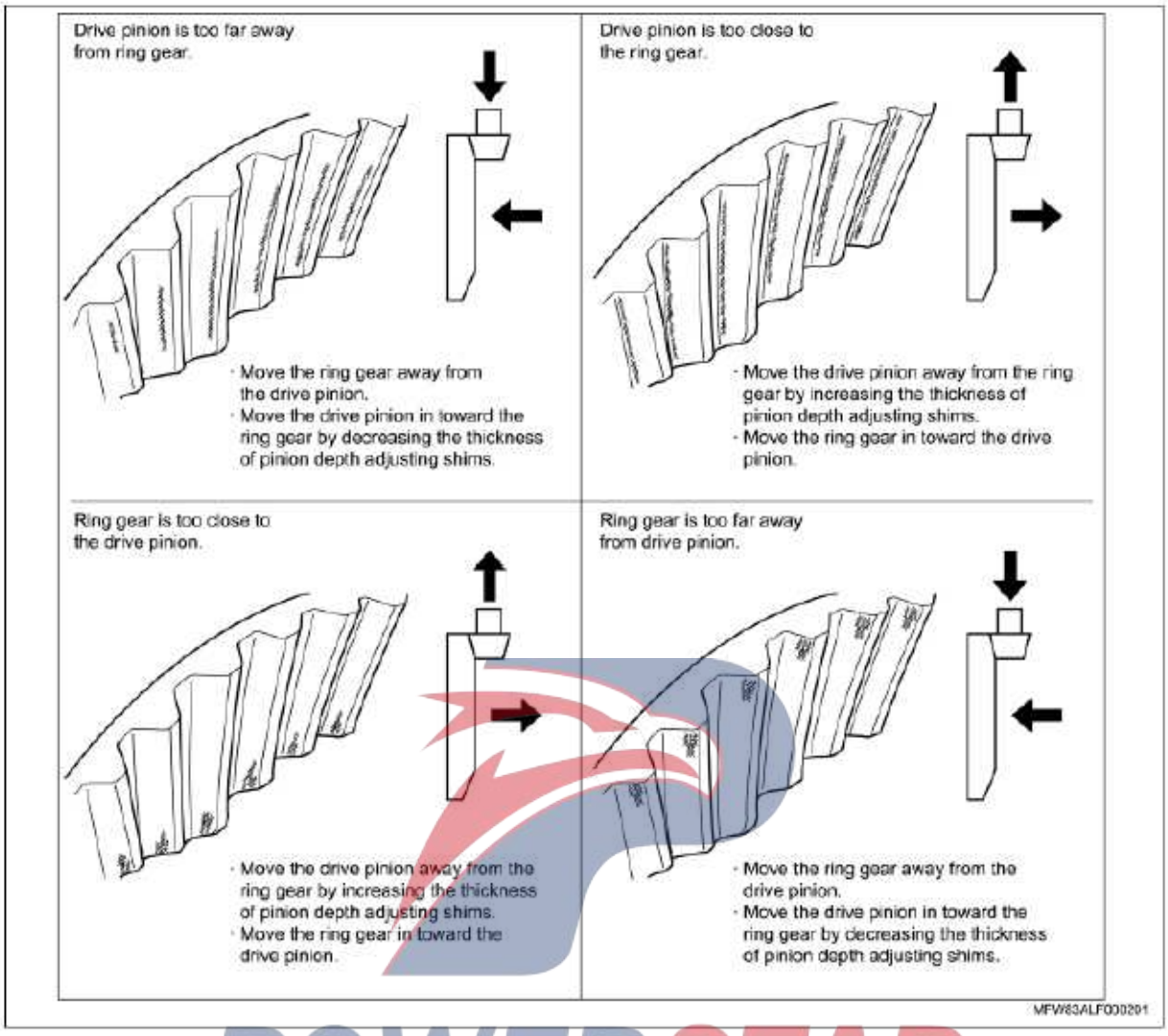
Caution:
・If the measured tooth space is not within the specified range, adjust the piston of the differential gear with the adjusting nut.
Caution:
・In order to prevent the pre-tightening degree of the side bearing from changing, tighten the adjusting nut to the previous degree.
16) Clean the teeth of the gear ring and the driving pinion.
17) Smear red lead paint on the teeth of the gear ring.
Caution:
・Smear grease on seven or eight gear teeth on both sides.
18) Hold the driving pinion by hand, slightly move the gear ring back and forth, and check the tooth face contact between the gear ring and the driving pinion.



19) The correct length of the contact is 70% of the total gear length located at the center of the pitch line. The direction is toward the heed side (outer side). It shall be nearly 5mm (0.2in) away from the toe side (inner side).



Caution:
・If an inappropriate contact is found between the gear ring and the driving pinion during the check, adjust their positions as shown in the following figure.



20) Smear THREEBOND TB1110D or any equivalent on the driving gear rack and transmission housing and between the washers.

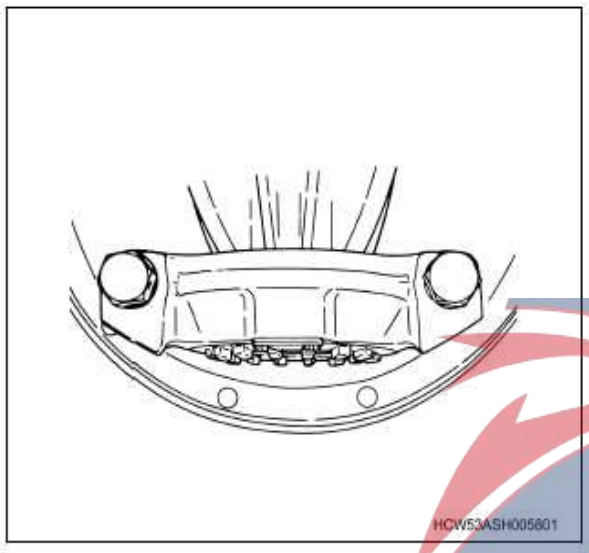
1. between the washers.

21) Install the driving gear rack on the differential gear seat rack.

Tightening torque: 185N・m{18.9kgf・m/136.00lb・ft}

22) Tighten the bearing cover bolts on the differential gear seat rack.

Tightening torque: 402N・m{41.0kgf・m/295.99lb・ft}



23) Smear Loctite 242 or any composite equivalent on the thread of the bolt.

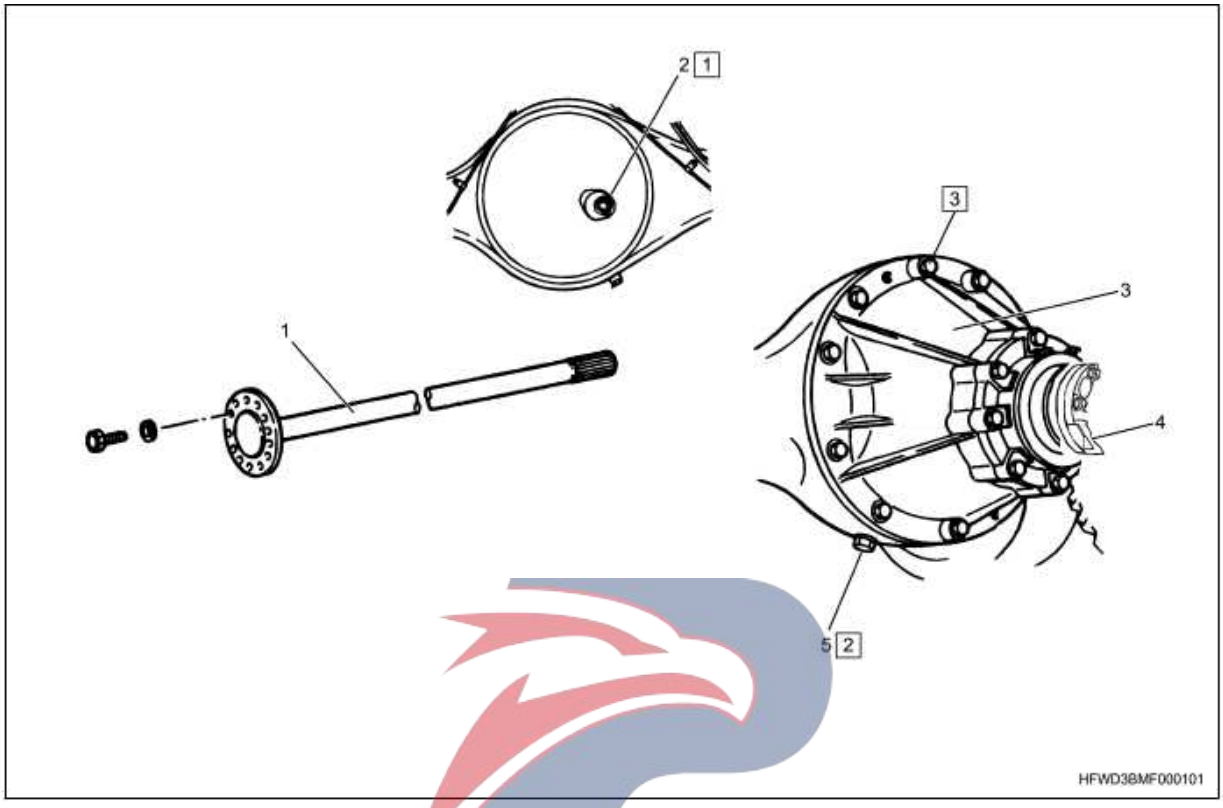
24) Align the lock plate with the adjusting Nut slot for installation.

Tightening torque: 26N・m{2.7kgf・m/19.00lb・ft}

Installation

1. Assembly view

Rear differential gear (single)



Part Name

1. Rear axle drive shaft
2. Injection port plug
3. Final drive
4. Drive shaft
5. Oil drain plug

Tightening torque

1: 69N・m{7.0kgf・m/51lb・ft}

2: 69N・m{7.0kgf・m/51lb・ft}

3: 219N・m{22.3kgf・m/73.48kg・ft}

2. Final drive installation

1) Clean the bolts and axle housing.

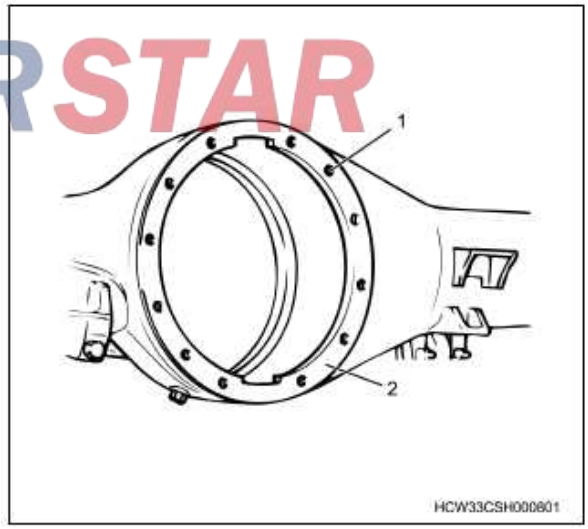
Caution:

・Remove the residual Loctite binder on the bolts to be reused and their holes.

・If necessary, clean the bolts with dies and the bolt holes with taps.

2) Smear Loctite 242 or any composite equivalent on the thread of the bolt.

3) Smear FMD127 or any equivalent on the axle housing's transmission rack mounting surface.



1. Bolt hole
2. Differential gear seat installation surface

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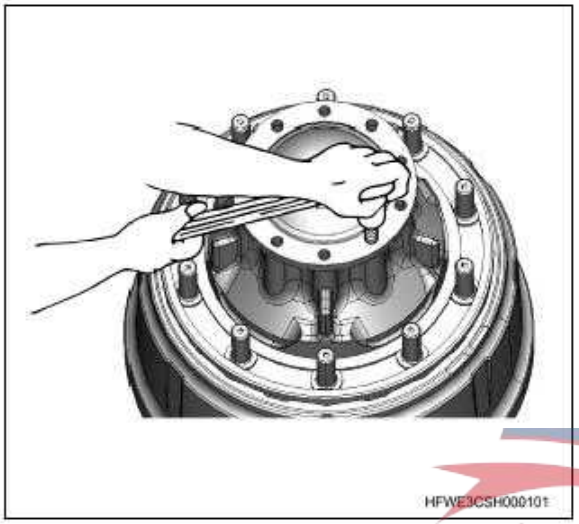
4) Install the final drive on the axle housing.

Tightening torque: 219N・m{22.3kgf・m/162.00lb・ft}

3. Rear axle drive shaft installation

1) Install the rear axle on the reel of the rear hub.

Tightening torque: 181N・m{18.5kgf・m/133.00lb・ft}

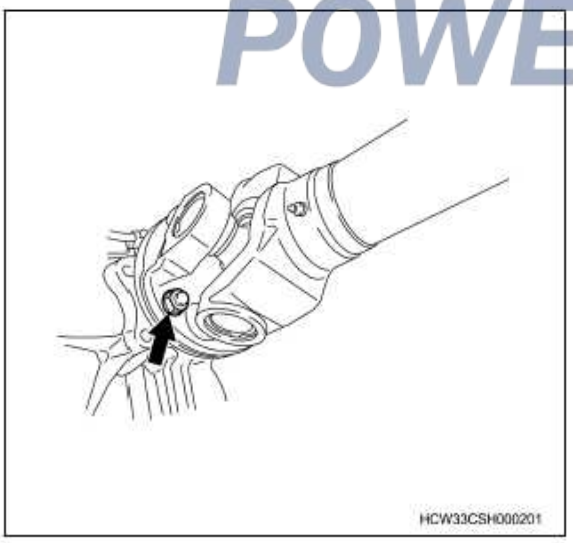


4. Drive shaft installation

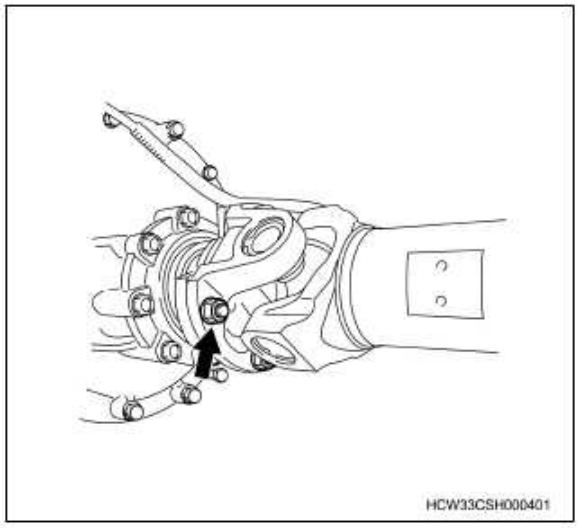
1) Align the calibration marks made during removal, and then, install the drive shaft between the transmission and the axle on the flanges.

Tightening torque: 206N・m{21.0kgf・m/152lb・ft}M14

Transmission side



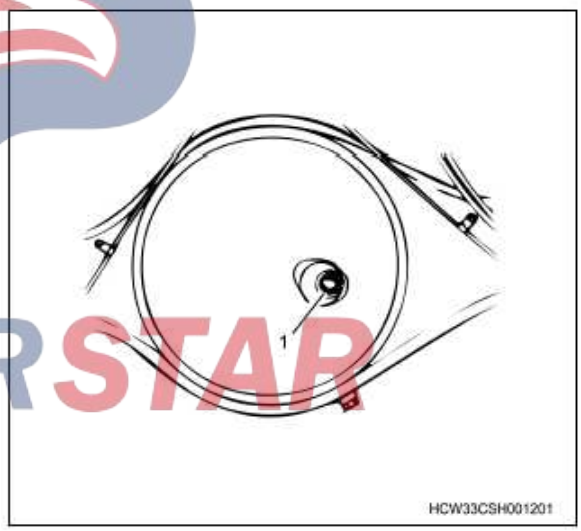
Differential gear pedestal side



5. Differential gear oil filling

1) Install the oil drain plug on the rear axle housing.

2) Smear the differential gear oil on the rear axle housing.



1. Injection port plug hole

3) Install the injection port plug on the rear axle housing.

Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}

1. Reference oil amount

Final drive (18.5H)

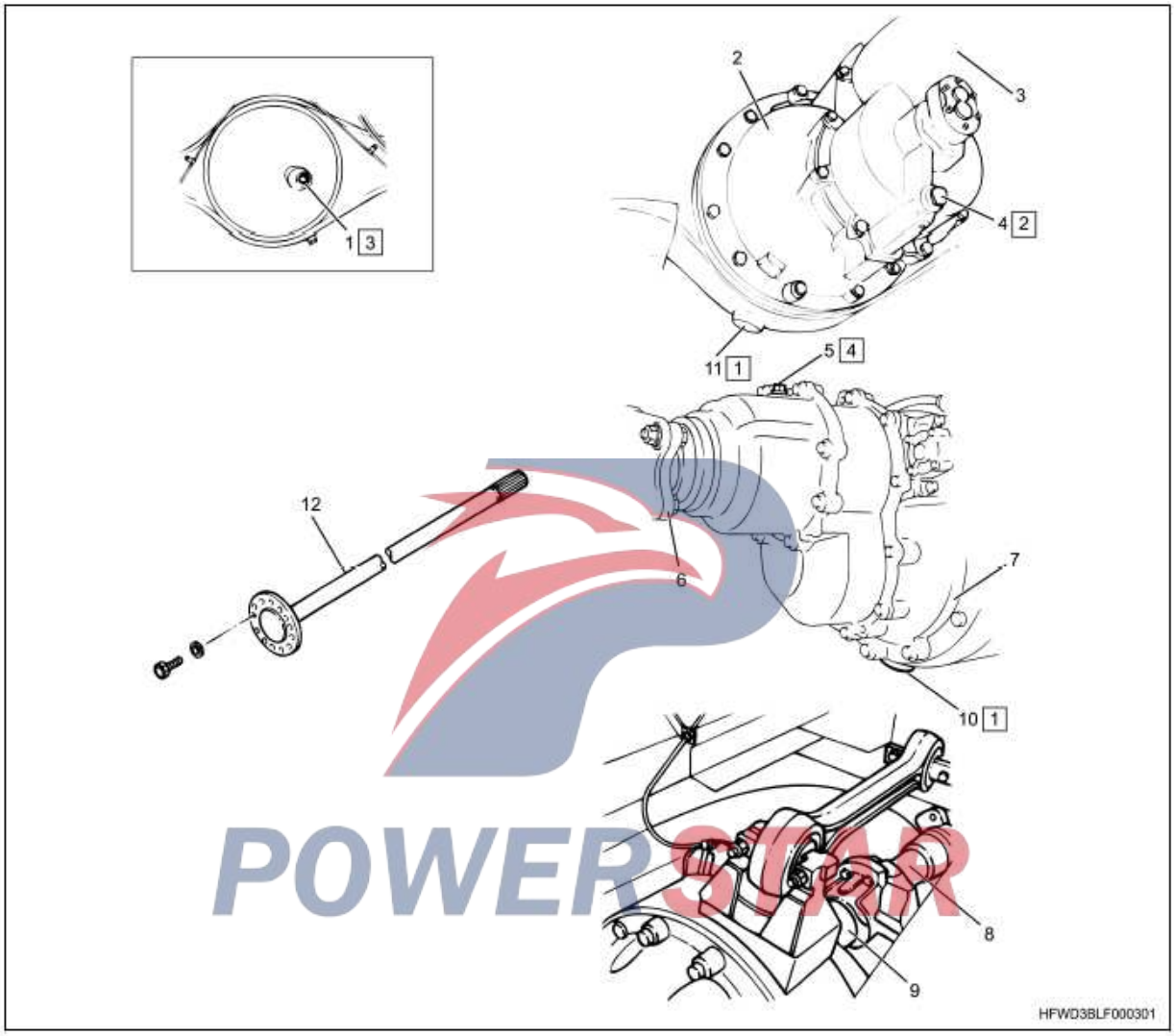
Oil volume	Oil type
: About18L(about 3.96 American gallons/about 4.76 British gallons)	GL-5(API)–90(SAE)
	GL-5(API)-140(SAE)
	GL-5(API)–80W-90(SAE)

Rear differential gear (in series) (17.5HT)

Removal

1. Assembly view

Rear differential gear (in series)



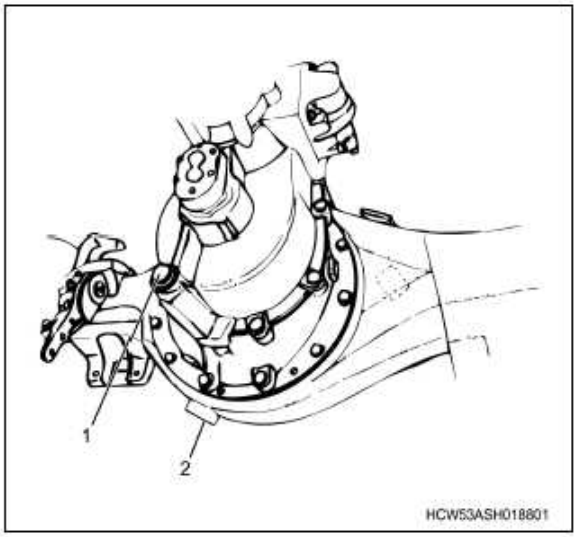
Part Name
1. Injection port plug
2. Final drive
3. Drive shaft flange
4. Coarse filter plug
5. Injection port plug
6. Drive shaft flange
7. Final drive
8. Drive shaft (between the two rear axles)
9. Output shaft
10. Oil drain plug
11. Oil drain plug
12. Axle

Tightening torque
1: 69N・m{7.0kgf・m/51lb・ft}
2: 69N・m{7.0kgf・m/51lb・ft}
3: 69N・m{7.0kgf・m/51lb・ft}
4: 44N・m{4.5kgf・m/14.51kg・ft}

2. Differential gear oil drain

1) Remove the oil drain plug from the axle housing and let the differential gear oil flow from the axle housing.

2) Remove the coarse filter plug and the differential gear oil from the transfer case housing.



1. Oil drain plug
2. Coarse filter plug

3. Drive shaft removal

1) Make an alignment mark on each connector.

2) Remove the drive shaft between the transmission and drive axle from the flange of the transmission.

3) Remove the center bearing bracket from the frame. (If there is any center bearing bracket)

4) Remove the drive shaft connecting the drive axles in series from the drive axle flanges.

4. Disconnection of nylon tube and air hose

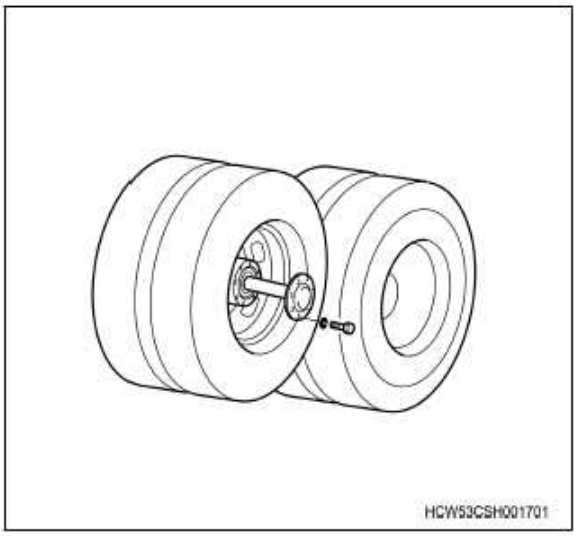
1. Model with differential lock

1) Discharge air from the gas receiver.

2) Disconnect the nylon air hose on the differential lock gearshift device.

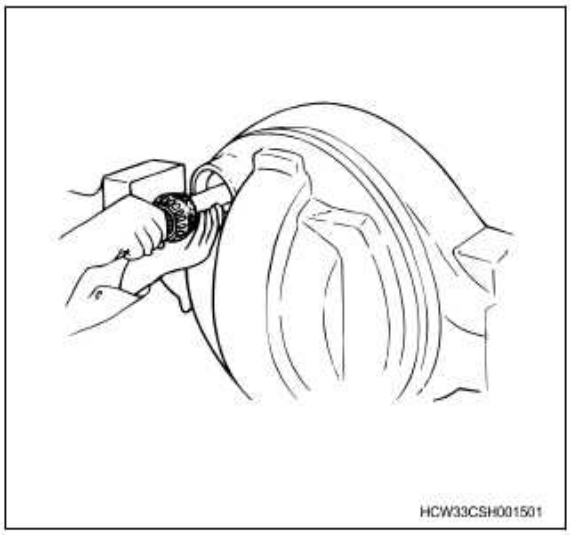
5. Rear axle drive shaft removal

1) Remove the axle shaft on the rear hub's reel.



6. Dismounting of output shaft

1) Dismount the output shaft from the driving axle housing.

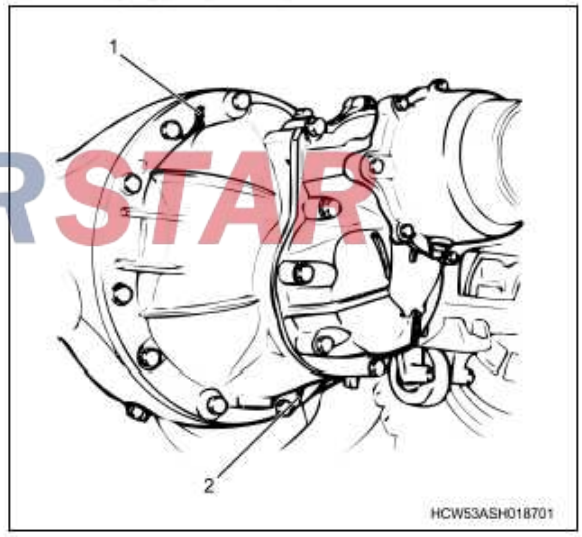


7. Final drive removal

1) Remove the bolts on the differential gear seat rack.

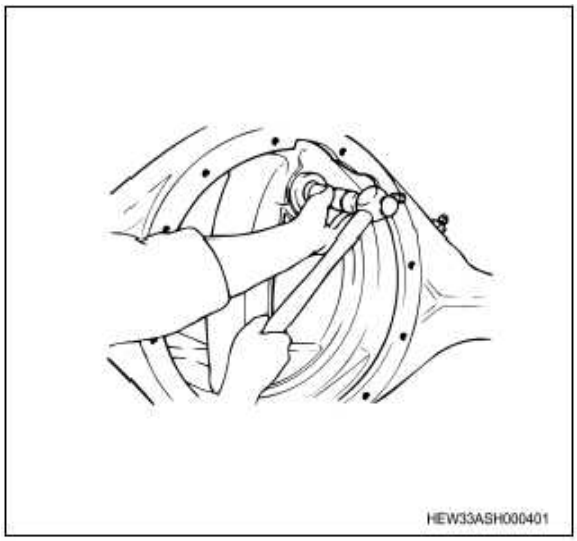
2) Install the bolt into the bolt change hole in the differential gear seat rack and pull out the final drive out of the rear axle housing.

Series-type final drive (17.5HT)



1. Bolt change hole
2. Bolt change hole

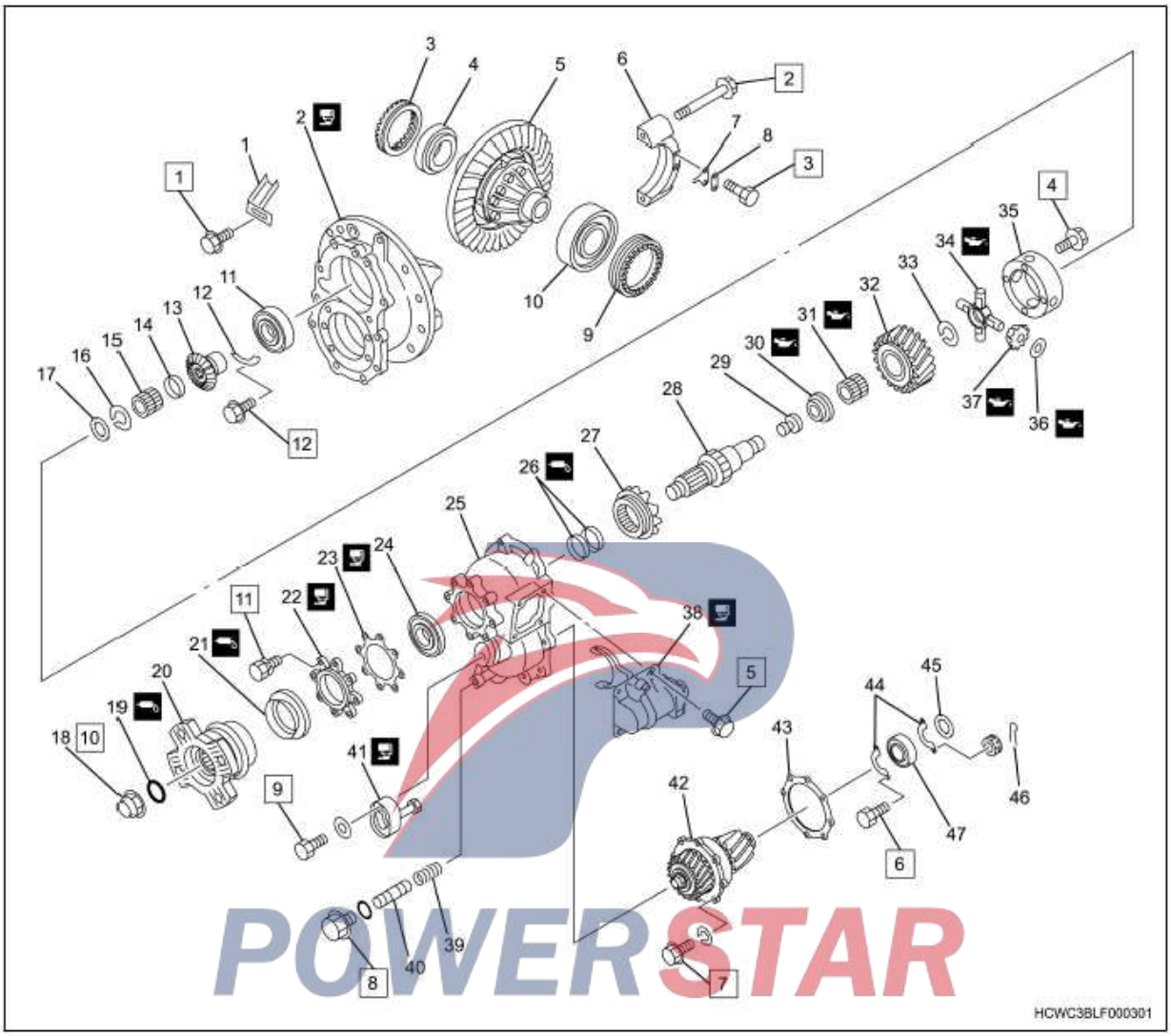
3) Remove the outer cup of the front output shaft bearing from the drive axle housing.



Removal

1. Assembly view

Series-type final drive (17.5HT)



Part Name

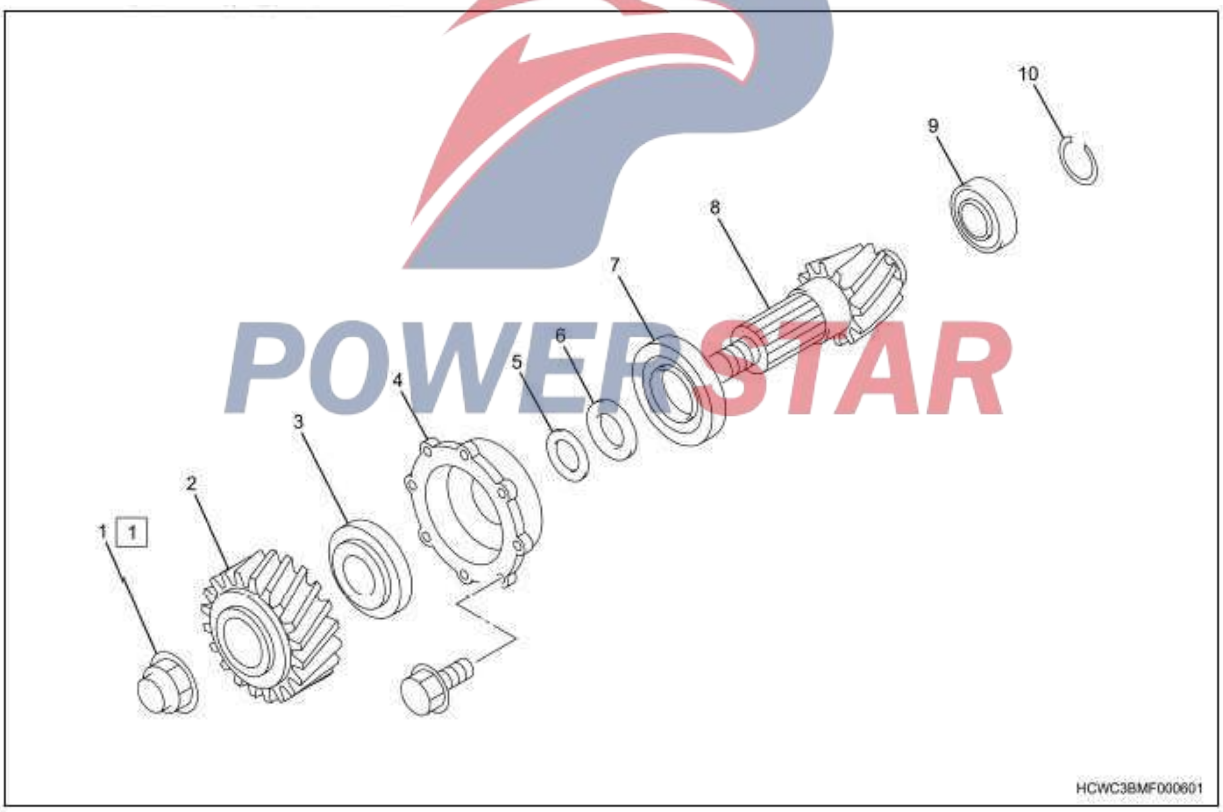
1. Oil spoon
2. Differential gear pedestal
3. Adjusting nut
4. Side bearing
5. Differential gear
6. Bearing cover
7. Locking plate
8. Lock washer
9. Adjusting nut
10. Side bearing
11. Input shaft bearing
12. Oil catcher
13. Side gear
14. spacer
15. Needle roller bearing
16. Snap ring
17. Thrust washer
18. Nut
19. O-ring
20. Flange
21. Oil seal
22. Bearing retainer
23. Gasket
24. Input shaft bearing
25. Power distributor housing
26. Seal ring
27. Differential lock switch
28. Input shaft
29. Plug
30. Thrust washer
31. Needle roller bearing

32. Driven spiral gear
33. Snap ring
34. Cross axle
35. Differential gear housing
36. Driving gear thrust washer
37. Driving gear
38. Differential lock gearshift device
39. Spring
40. Coarse filter
41. Oil pump
42. Driving pinion
43. Gasket
44. Guard ring
45. Snap ring
46. Cotter pin
47. Guide bearing

1: 26N・m{2.7kgf・m/8.62kg・ft}
2: 402N・m{41.0kgf・m/134.26kg・ft}
3: 20N・m{2.0kgf・m/6.80kg・ft}
4: 51N・m{5.2kgf・m/17.24kg・ft}
5: 50N・m{5.1kgf・m/16.78kg・ft}
6: 13N・m{1.3kgf・m/4.54kg・ft}
7: 185N・m{18.9kgf・m/61.69kg・ft}
8: 69N・m{7.0kgf・m/51lb・ft}
9: 18N・m{1.8kgf・m/5.90kg・ft}
10: 686N・m{70.0kgf・m/229.52kg・ft}
11: 98N・m{10.0kgf・m/32.66kg・ft}
12: 26N・m{2.7kgf・m/8.62kg・ft}

Tightening torque

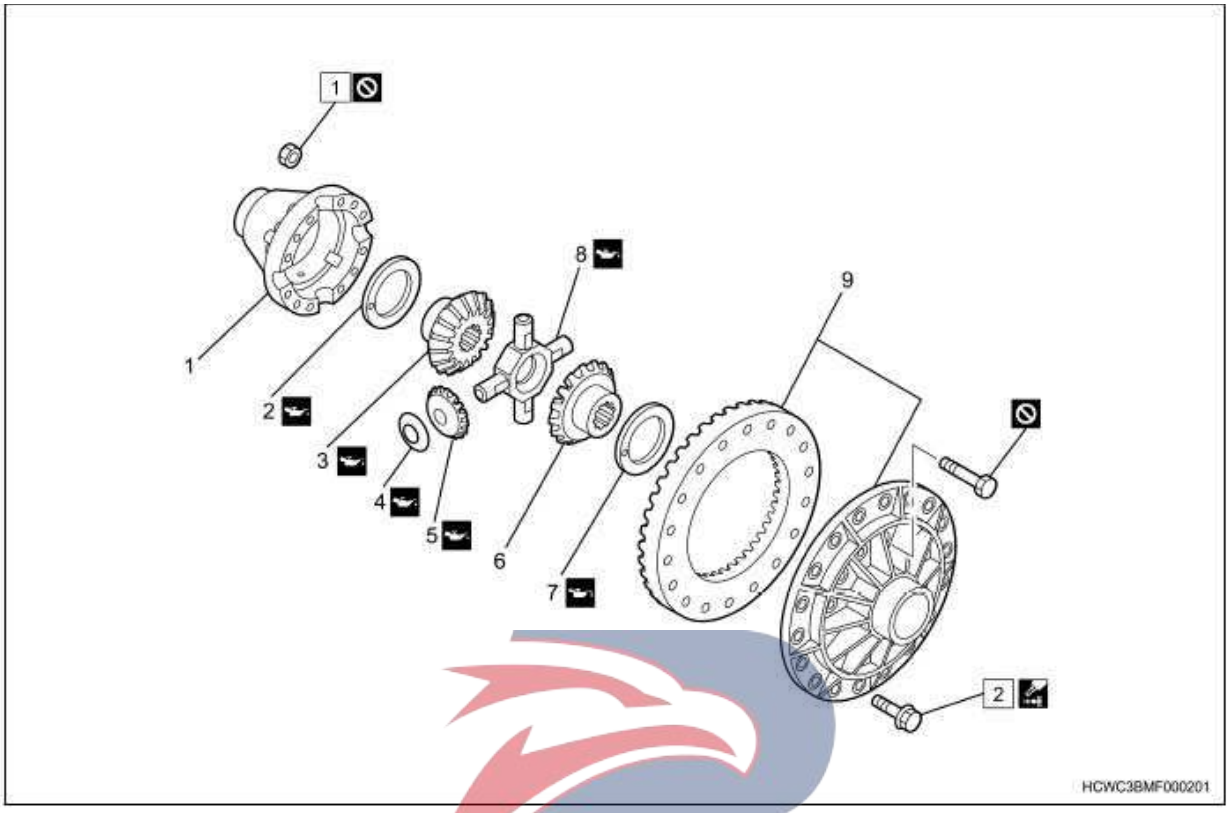
Driving pinion, in-series final drive (17.5HT)



Part Name
1. Pinion nut
2. Driven spiral gear
3. Outer bearing
4. Driving gear bracket
5. Gasket
6. spacer
7. Inner bearing
8. Driving pinion
9. Guide bearing
10. Snap ring

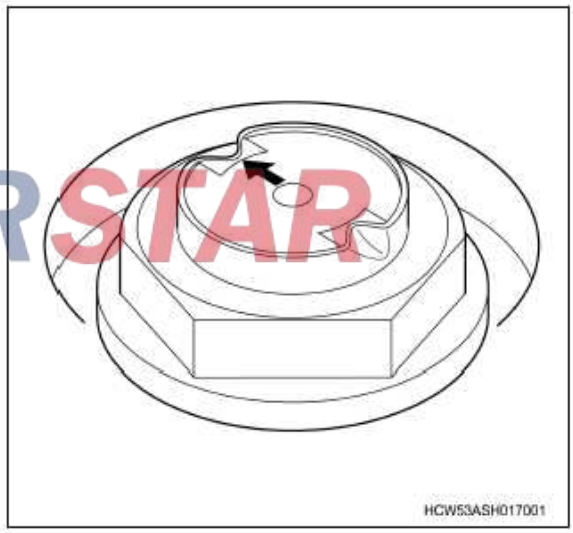
Tightening torque
1: 834N・m{85.0kgf・m/278.96kg・ft}

Differential gear, series-type final drive (17.5HT)



Part Name

1. Differential gear housing A
2. Side gear thrust washer
3. Side gear
4. Driving gear thrust washer
5. Driving gear
6. Side gear
7. Side gear thrust washer
8. Cross axle
9. Differential gear housing B and gear ring



Tightening torque

1: 206N・m{21.0kgf・m/152lb・ft}17.5HT

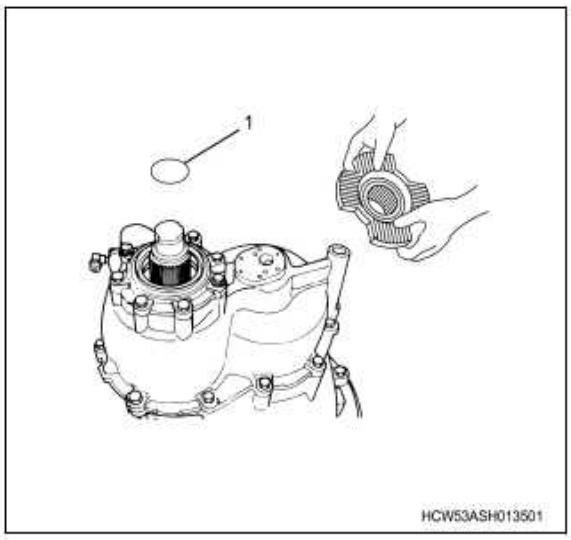
2: 431N・m{43.9kgf・m/144.24kg・ft}17.5HT

2. Final drive removal

1) Use a punch to pry up the cylindrical flange nut.

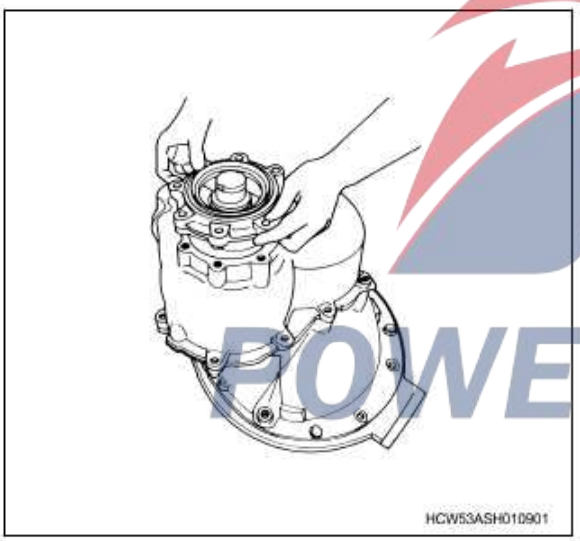
2) Remove the flange nuts from the input shaft.

3) Remove the flange and the O-ring from the housing of power transfer unit.



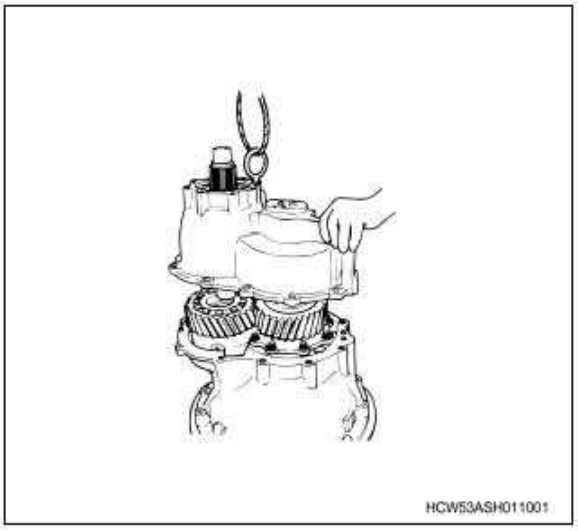
1. O-ring

4) Remove the bearing retainer and the washer from the transfer case housing.

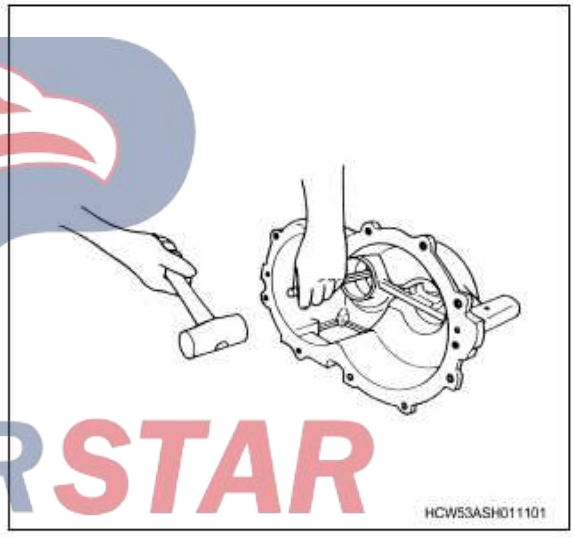


5) Dismount the oil seal from the housing of power transfer unit.

6) Remove the housing of power transfer unit from the differential carrier.

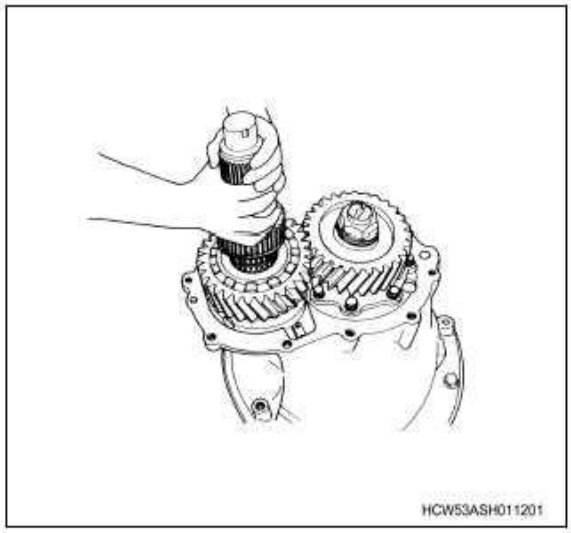


7) Dismount the outer race of input shaft bearing from the housing of power transfer unit.

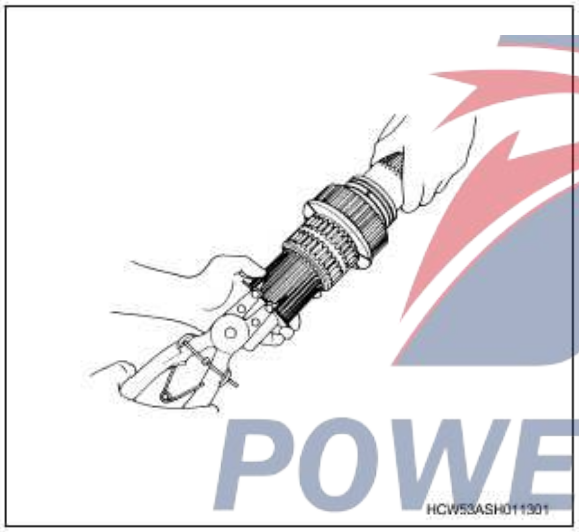


8) Dismount the differential lock gear shift mechanism and the differential lock clutch from the housing of power transfer unit.

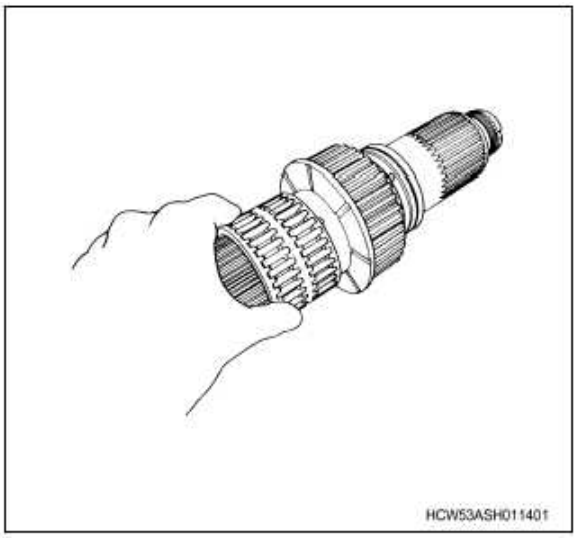
9) Remove the input shaft from the differential carrier.



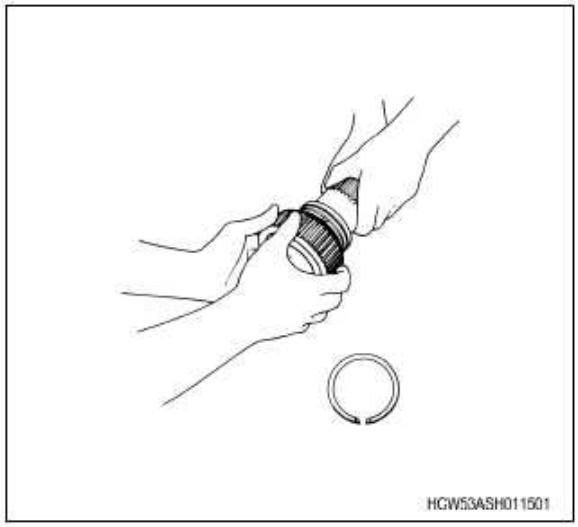
10) Remove the seal ring and the snap ring from the input shaft.



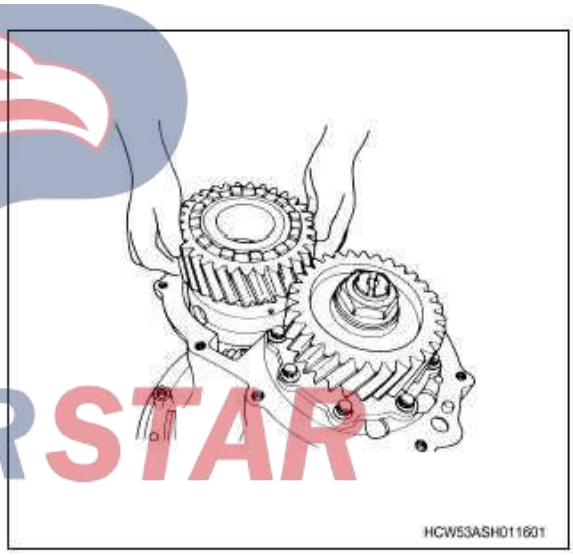
11) Remove the needle roller bearing from the input shaft.



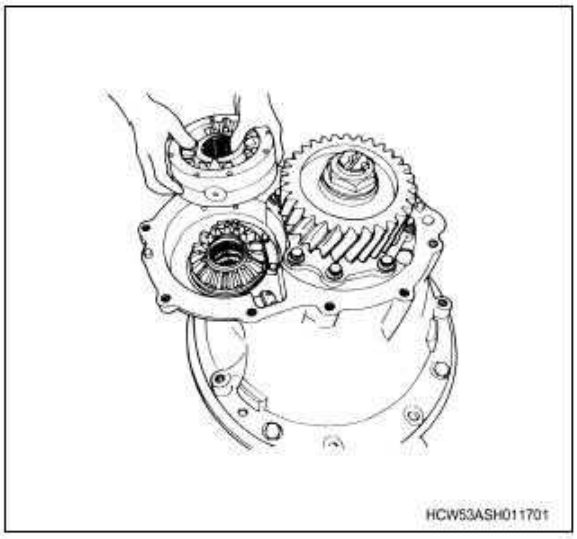
12) Dismount the thrust washer from the input shaft.



13) Remove the driving screw gear from the differential carrier.

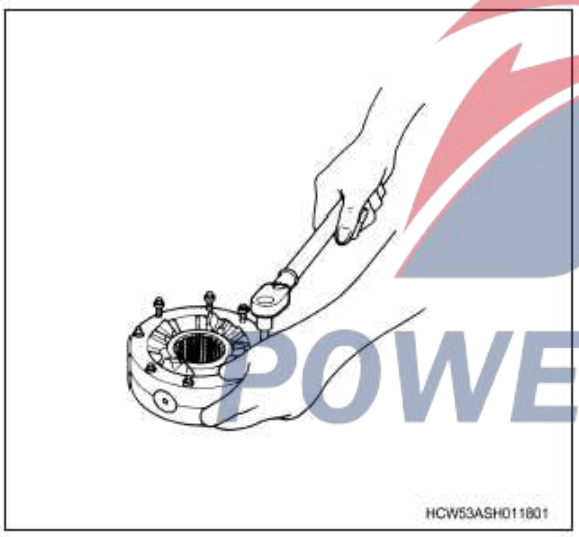


14) Remove the differential gear housing from the differential gear seat rack.



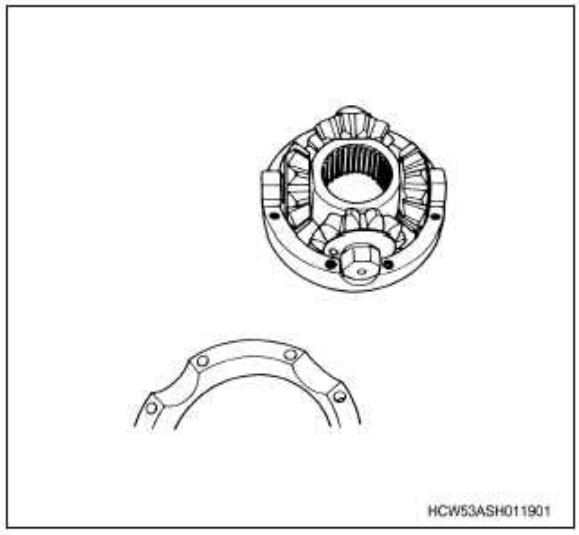
15) Make an alignment mark on the differential housing.

16) Remove the differential gear housing A from the differential gear housing B.



17) Remove the following parts from the differential gear housing B.

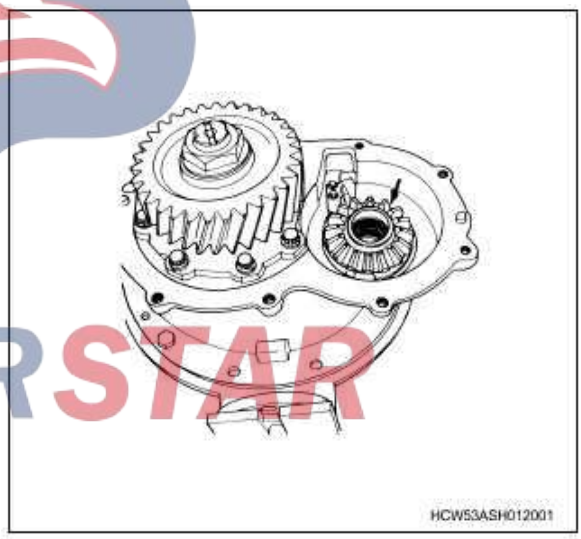
- Driving gear
- Driving gear thrust washer
- Cross axle



18) Dismount the thrust washer from the side gear.

19) Remove the oil retaining disk from the differential carrier.

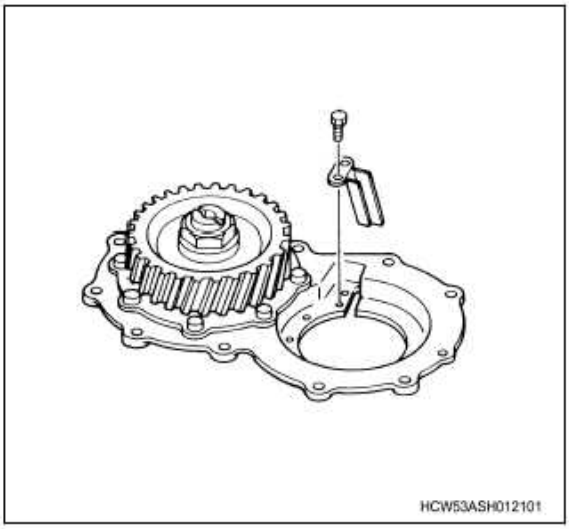
20) Remove the side gear from the differential carrier.



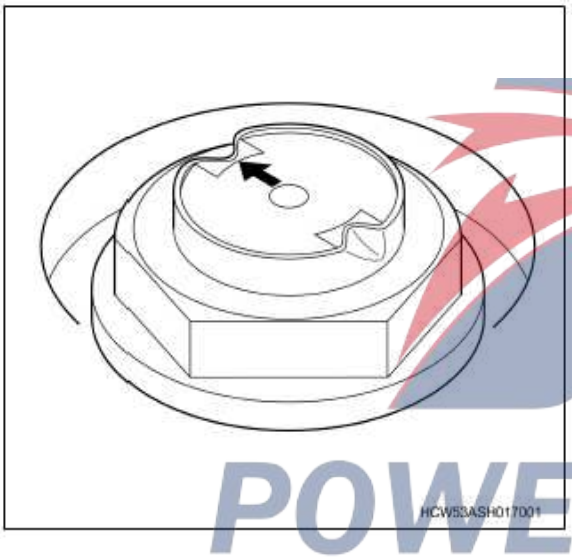
21) Remove the following components from the side gear.

- Snap ring
- Bearing of input shaft
- spacer

22) Remove the connecting rod oil spoon from the differential carrier.



23) Use a punch to pry up the pinion nut column.



24) Snap the ring gear to remove the pinion nut from the pinion.

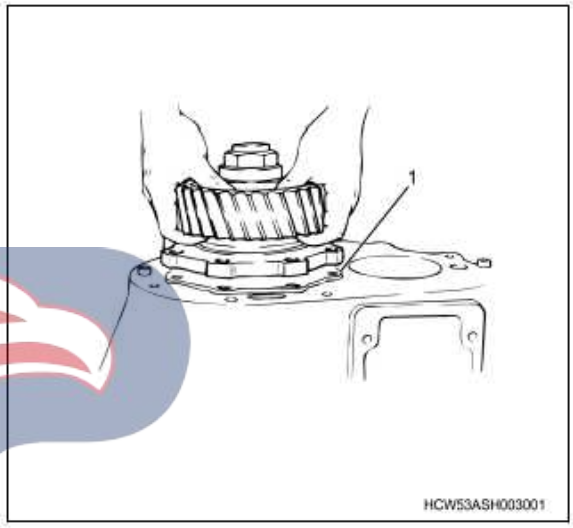
25) Remove the driven screw gear from the driving pinion.

26) Dismount the bolts on the driving gear carrier.

27) Temporarily install the driven helical gear and pinion Nut and then remove the pinion and Gasket from the differential carrier.

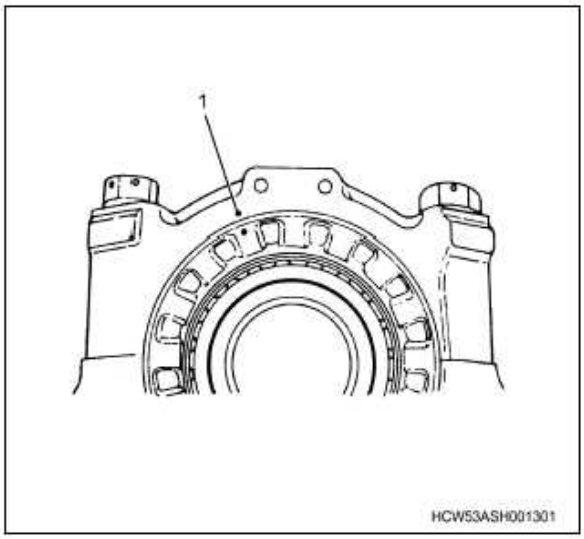
Caution:

・Store the gasket at a safe place to prevent damage;

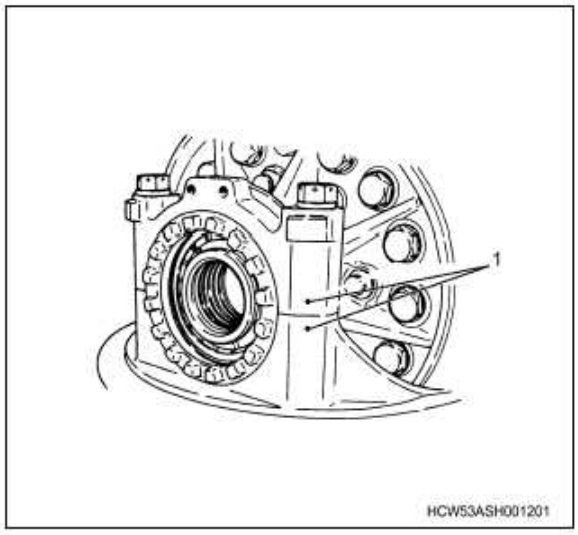


1. Gasket

28) Make left and right identification marks on the adjusting nut and bearing cap.

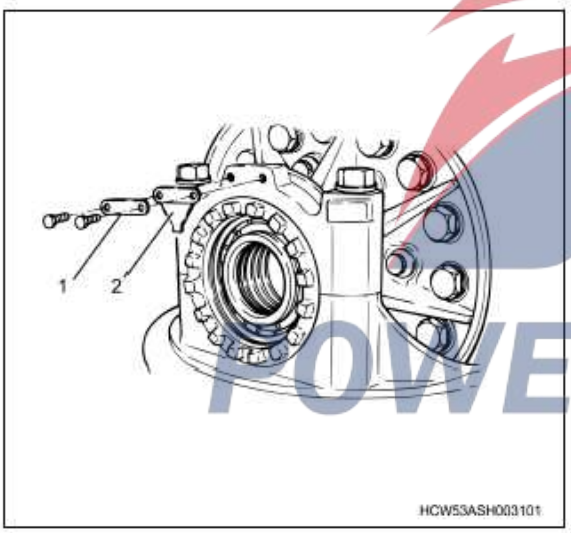


1. Alignment mark



1. Alignment mark

29) Remove the lock washer and the lock plate from the bearing cover.



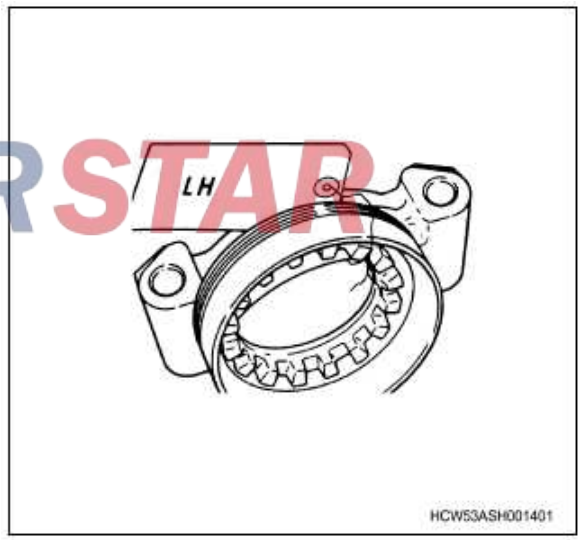
1. Lock washer
2. Locking plate

30) Make marks on the bearing cover and the differential gear housing.

31) Remove the bearing cover from the differential gear seat rack.

Caution:

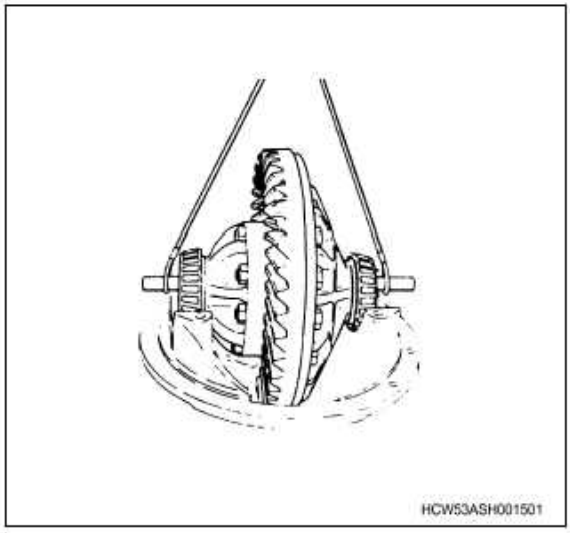
・Put labels on the removed bearing cover, adjusting nut, and outer bearing cup and indicate whether they are on the left side or on the right side.



32) Remove the differential gear housing from the differential gear seat rack.

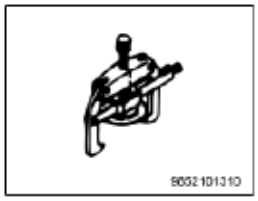
Caution:

・Now, pull the differential gear housing toward the gear ring to prevent the housing from being stuck on the guide bearing.

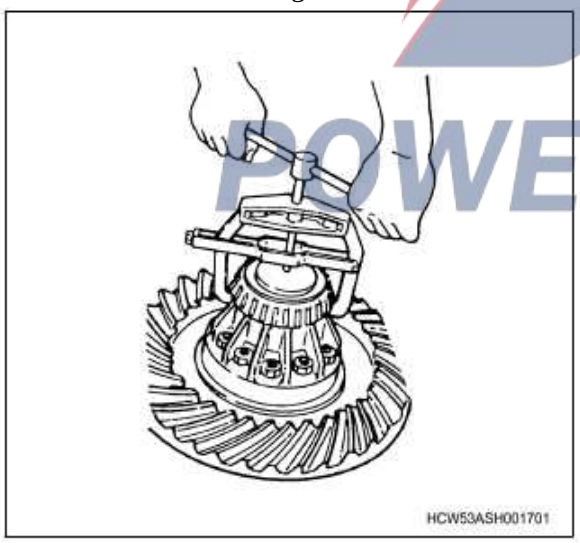


33) Make the left and right identification marks on the side bearing.

34) Remove the side bearing from the differential gear housing using a special tool.



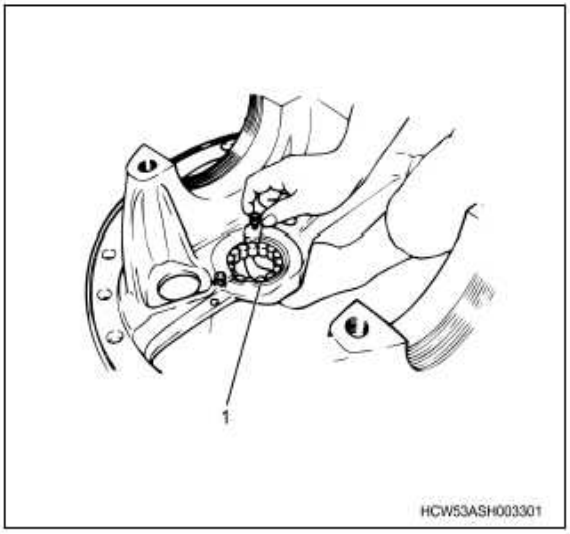
SST:9-8521-0095-0-bearing removal tool



35) Pull the split pin out of the stop screw.

36) Remove the following parts from the differential gear seat rack.

- Guard ring
- Nut
- Bolt
- Guide bearing



1. Guide bearing

37) Remove the oil pump and two bolts from the housing of power transfer unit.

Caution:

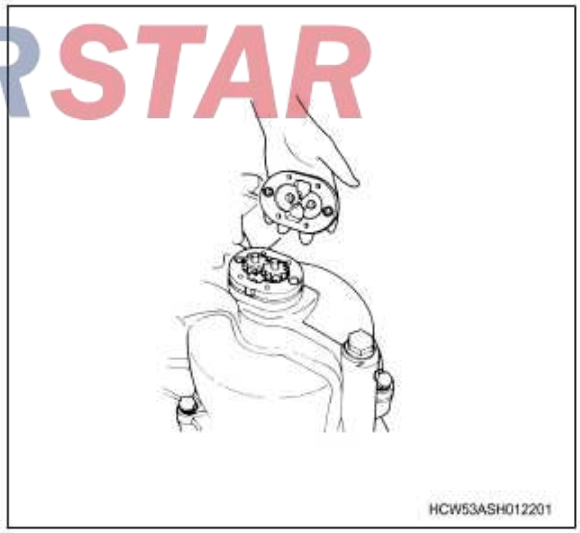
- Should be careful

Caution:

Do not lose the Gasket and drive gear.

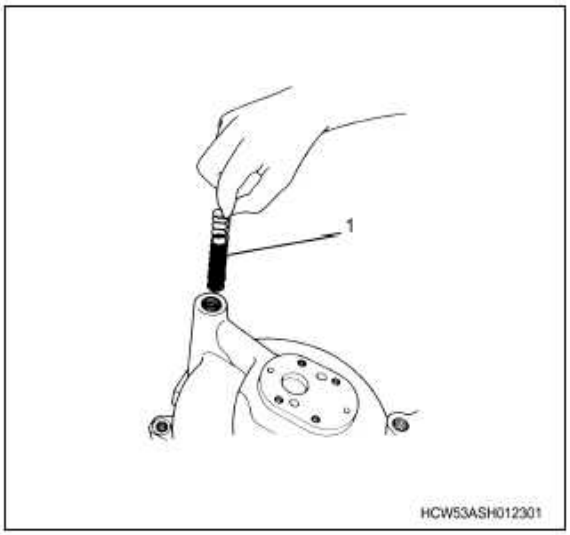
Caution:

- If there are no problems, remove the 4 cover bolts and rotate the shaft manually. If the rotation is smooth, it will not be removed.



38) Remove the following parts from the housing of power transfer unit.

- Coarse filter;
- Coarse filter plug;
- Spring
- O-ring



1. Coarse filter

Caution:

・If the coarse filter is dirty, please clear the stains by diesel oil or similar article;

3. Drive pinion removal

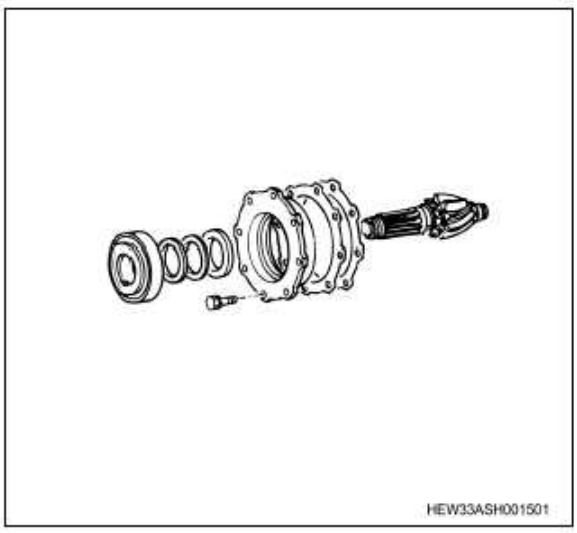
1) Gently tap the rear of the pinion using a copper hammer and remove the following parts from the pinion.

・Pinion bearing

・Gasket

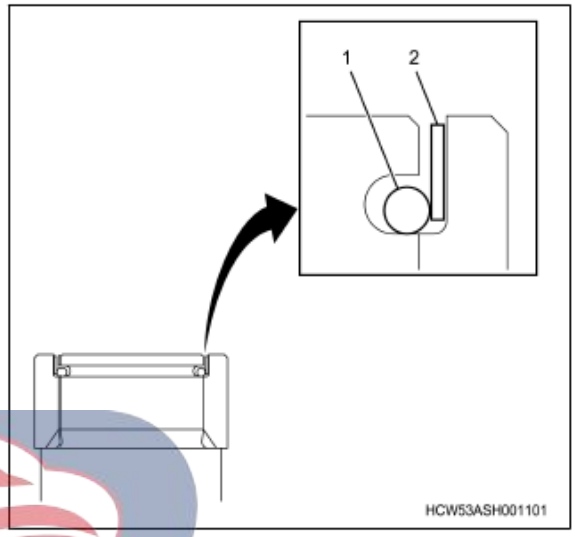
・spacer

・Driving gear rack



2) Insert a special tool into the inner race and push the snap ring into the snap ring groove.

SST:1-8521-9009-0-guide bearing removal tool



1. Snap ring

2.1-8521-9009-0

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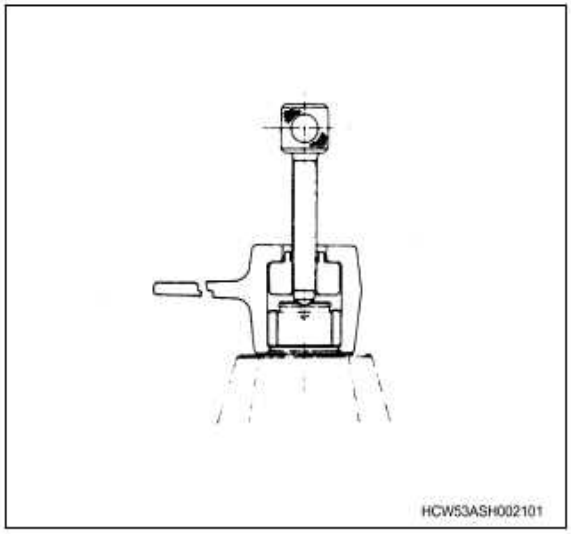
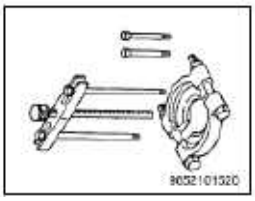
3) Use special tools to remove inner race from driving pinion.

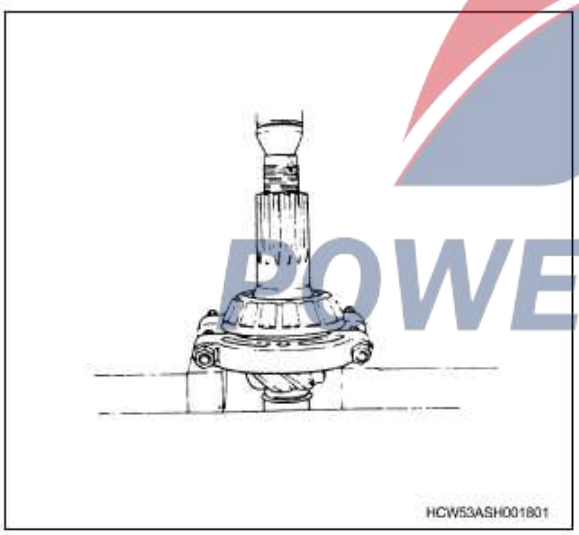
SST:9-8521-0182-0- bearing removal tool



4) Use special tools to remove inner bearing.

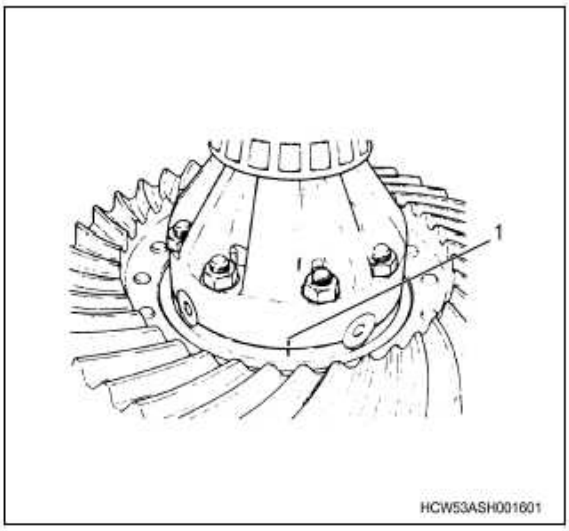


SST:9-8521-0152-0- bearing removal tool



4. Differential gear housing removal

1) Make alignment marks on the differential gear housings A and B.



1. Alignment mark

2) Remove the differential gear housing A from the differential gear housing B.

Caution:

・Do not reuse the bolts and nuts of the differential gear housing.

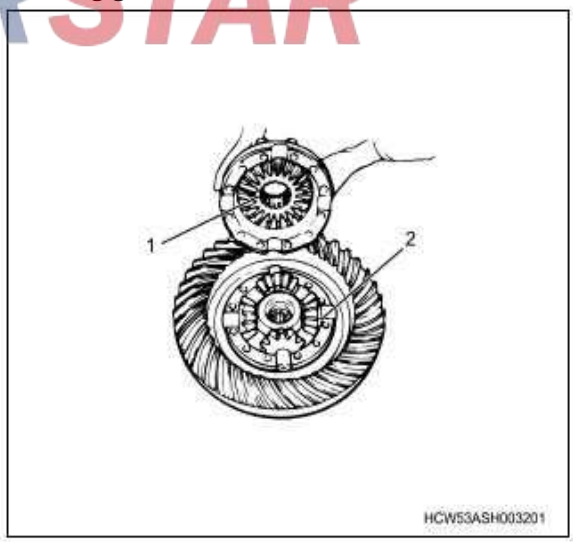
3) Remove the side gear and the side gear thrust washer from the differential gear housing A.

4) Remove the following parts from the differential gear housing B.

・Cross axle

・Driving gear

・Driving gear thrust washer



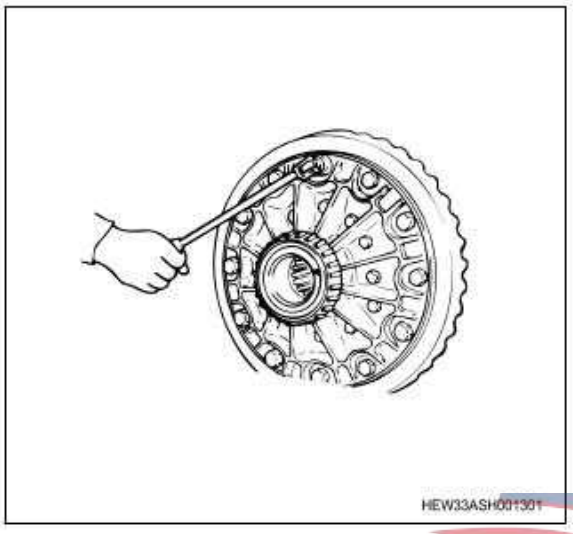
1. Side gear

2. Driving gear

5) Remove the gear ring from the differential gear housing B.

Caution:

・Because the Loctite binder has been used to fix the gear ring's tightening bolt, do not remove it in any case unless it is necessary to change the gear ring.



Inspection

1. Final drive inspection

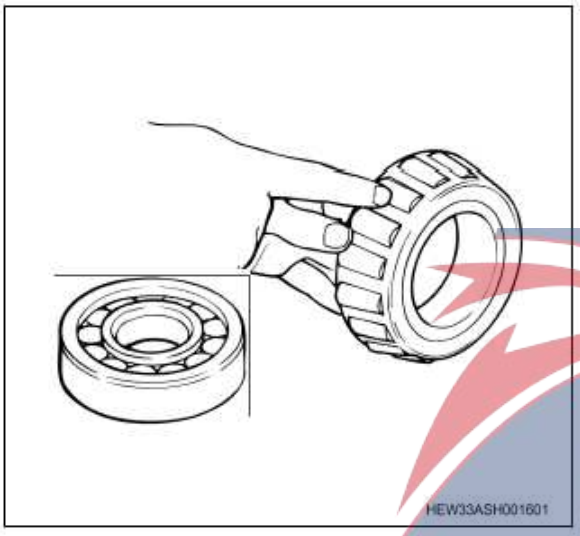
Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1. Bearing inspection

1) Check the following items.

・The gap between the inner cup or outer cup, and the rolling shaft is excessive or there is any crack, wear, or damage on them.

・There is an abnormal feeling during hand rotation.



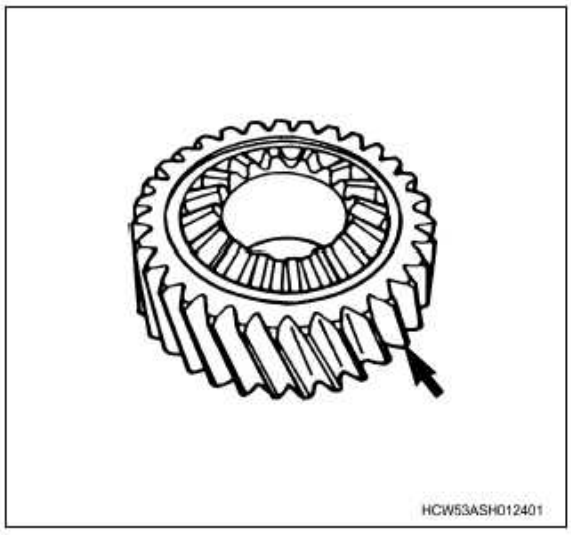
2. Check of driven screw gear

1) Check the following items.

・Abrasion

・Damaged

・Tilt



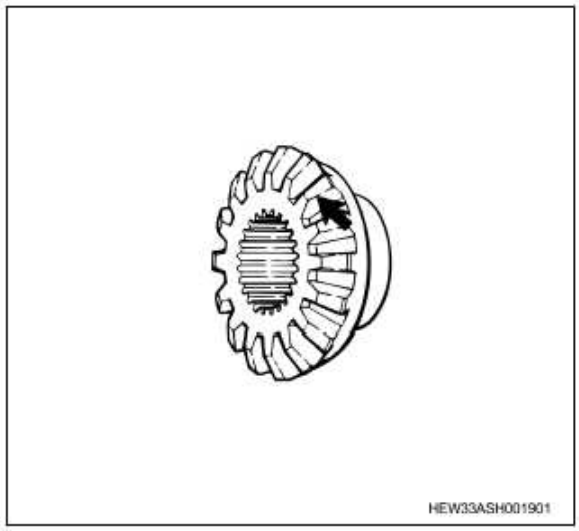
3. Side gear check

1) Check the following items.

・Abrasion

・Damaged

・Tilt



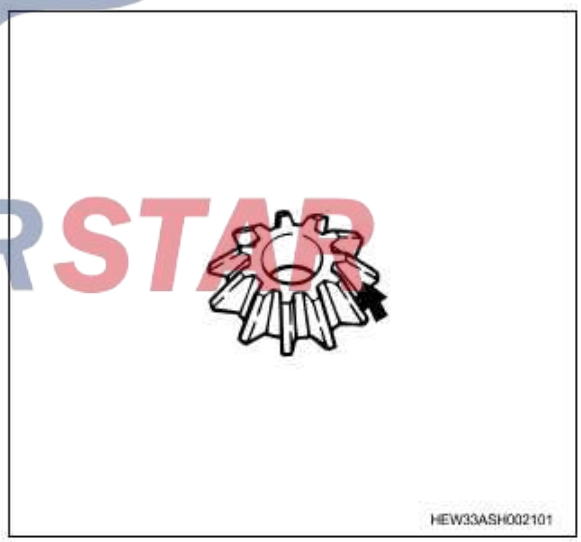
4. Driving gear check

1) Check the following items.

・Abrasion

・Damaged

・Tilt

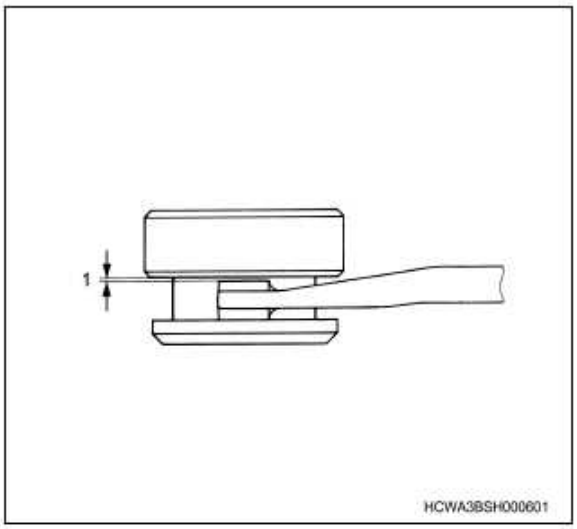


5. Measurement of the clearance between the shifting yoke and the clutch

1) Measure the clearance between the shifting yoke and the clutch.

Standard: 0.2 to 0.4mm{0.0079 to 0.0157in}

Limit: 0.01in (0.0079in)



1. The clearance between the shifting yoke and the clutch

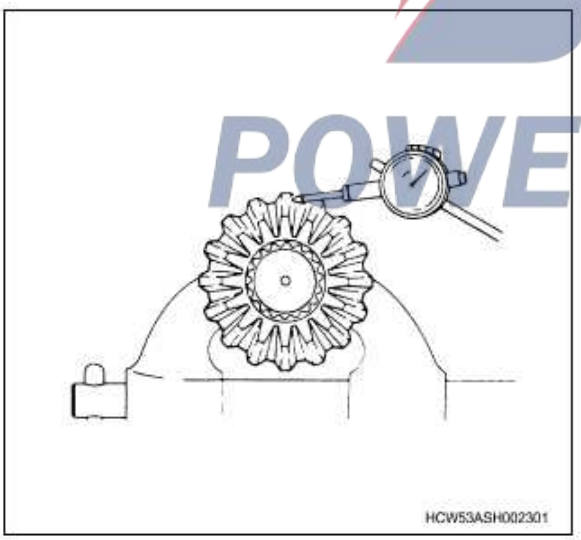
6. Measurement of clearance in the rotation direction of the side gear spline

1) Insert the output shaft into the side gear.

2) Use a dial gauge to measure the clearance in the rotation direction of the side gear spline.

Standard: 0.01in or below (0.0079in or below)

Limit: 0.02in (0.0197in)



7. Measurement of gap between star wheel and pinion

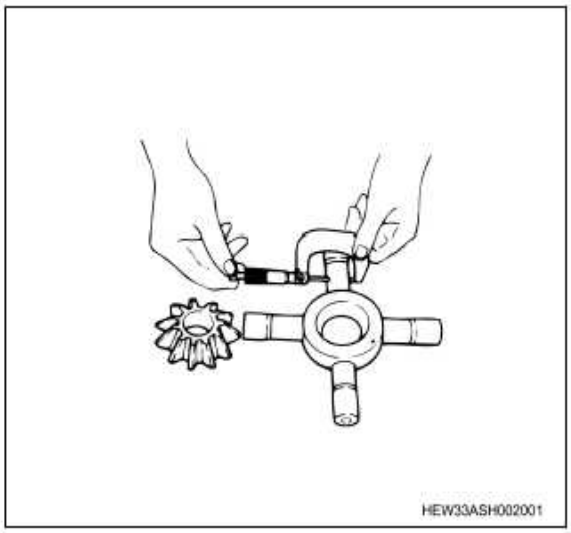
1) Measure the outside diameter of the star wheel.

2) Measure the inside diameter of the pinion.

3) Calculate the distance between the planetary gear and pinion based on the measured values.

Standard: 0.06 to 0.15mm{0.0024 to 0.1499mm}

Limit: 0.01in (0.0118in)

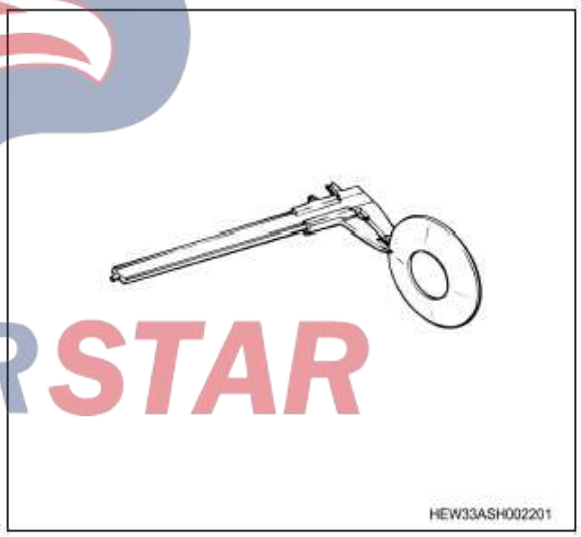


8. Pinion thrust washer thickness measurement

1) Measure the thickness of the pinion thrust washer.

Standard: 0.06in{0.0630in}

Limit: 0.06in (0.0591in)



2. Driving pinion check

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

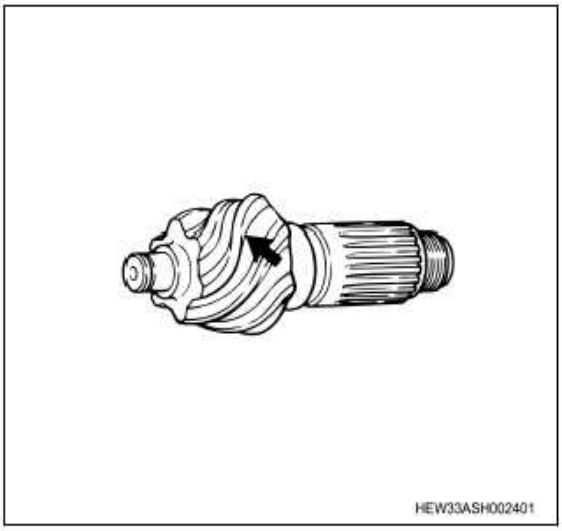
1. Driving pinion check

1) Check the following items.

Abrasion

・Damaged

・Tilt



Caution:

・Change the driving pinion and the gear ring together.

2. Check of driven screw gear

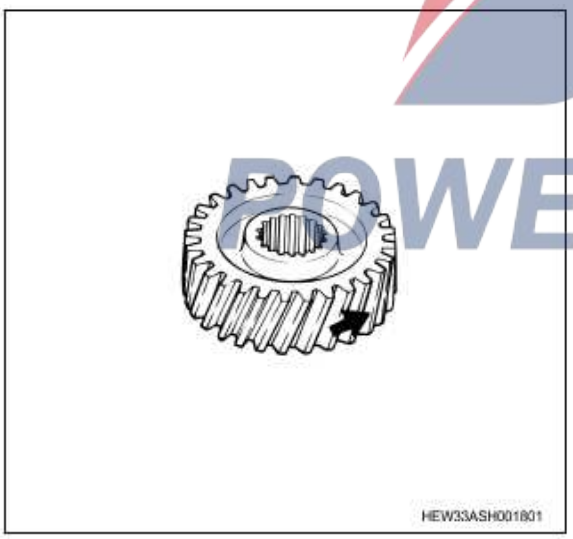
1) Check the following items.

Abrasion

・Damaged

・Tilt

・Gap between drive pinion and spline base;

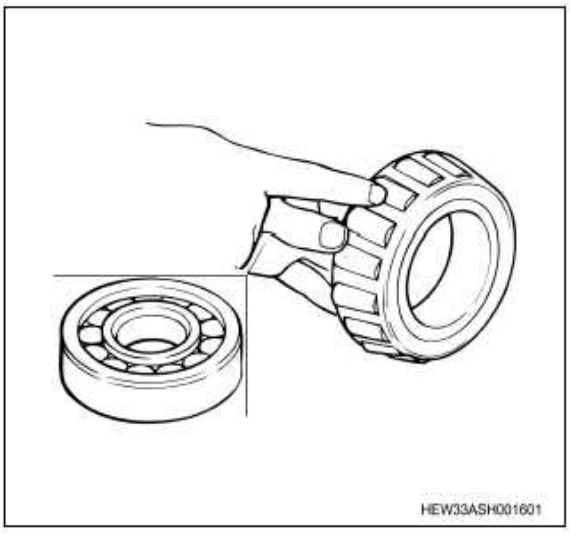


3. Bearing inspection

1) Check the following items.

・Gap, crack, wear, and excessive damage

・There is an abnormal feeling during hand rotation.



3. Differential gear housing check

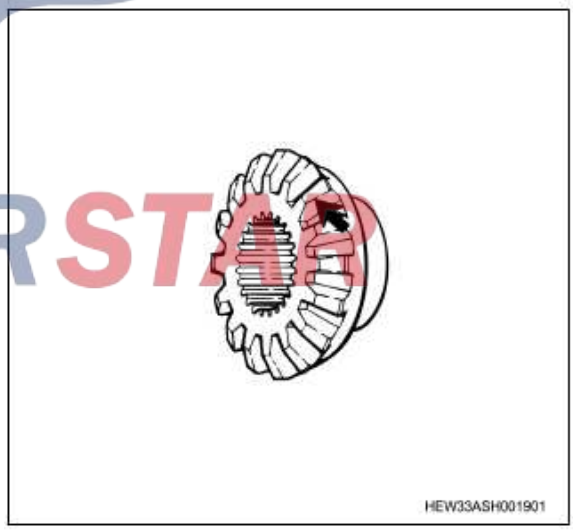
Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .1. Side gear check

1) Check the following items.

・Abrasion

・Damaged

・Tilt



2. Side gear thrust washer check

1) Check the following items.

・Serious wear

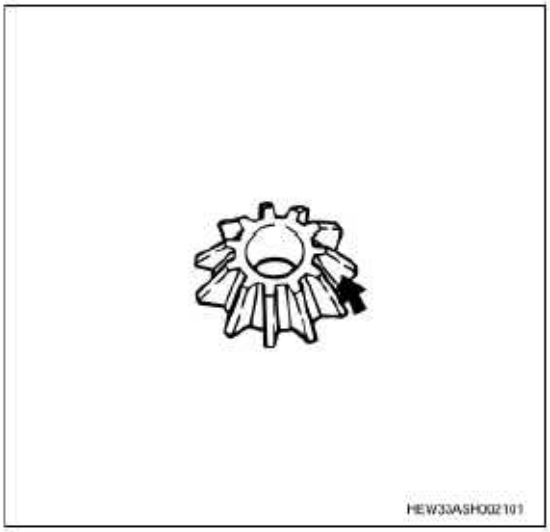
・Damaged

3. Driving gear check

1) Check the following items. ・Worn gear face and internal surface

・Damaged gear face and internal surface

・Gear pitch



4. Driving gear thrust washer check

1) Check the following items.

・Serious wear

・Damaged

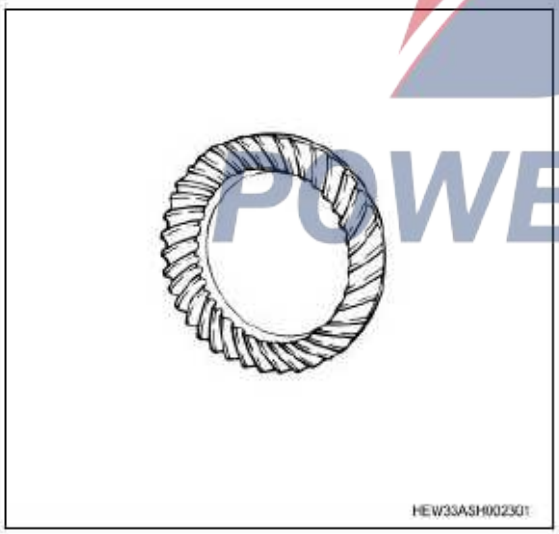
5. Gear ring check

1) Check the following items.

・Abrasion

・Damaged

・Tilt



Caution:

・Change the gear and driving pinion together.

6. Measure the gap between the differential housing and the side gear

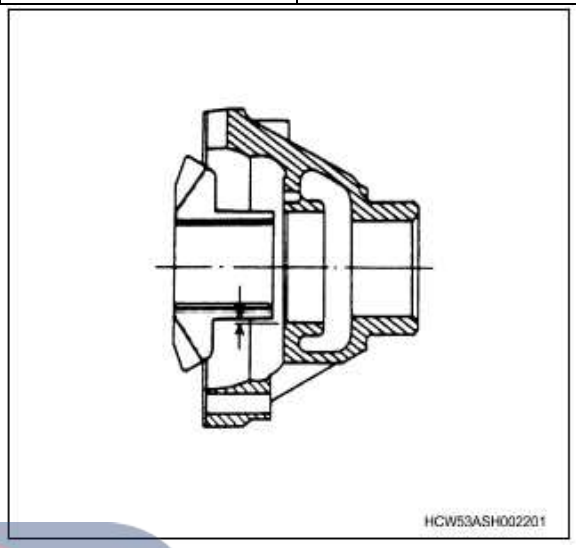
1) Measure the inside diameter of the differential gear housing.

2) Measure the outer diameter of the side gear.

3) Calculate the gap according to the measured value.

Gap between differential housing and side gear

Prescribed value	Limit
: 0.18 to 0.25mm { 0.0071to 0.2489mm }	: 0.5mm { 0.5004mm }



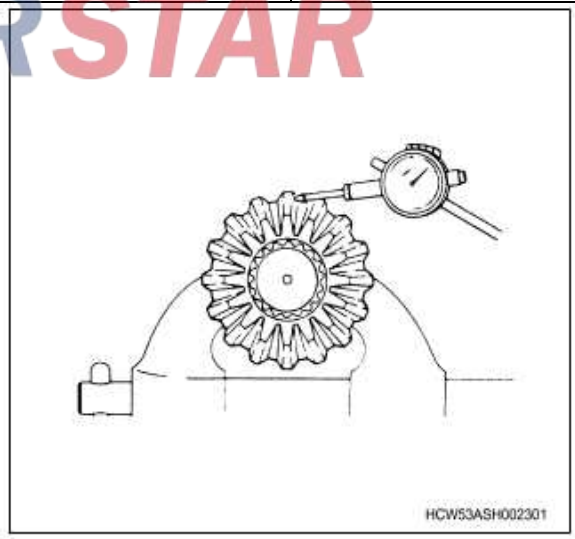
7. Measure the clearance in the rotation direction of the side gear's spline.

1) Insert the axle into the side gears.

2) Measure the clearance in the rotation direction of the side gear's spline.

Clearance in spline rotation direction

Prescribed value	Limit
: 0.2mm or below { 0.2007mm or below }	: 0.5mm { 0.5004mm }



8. Measurement of gap between star wheel and pinion

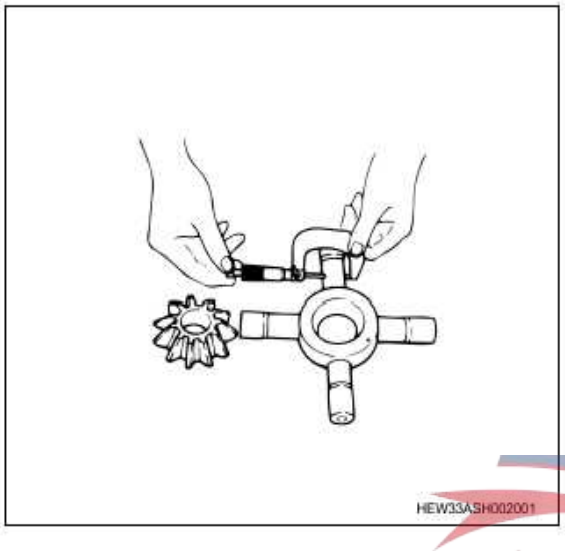
1) Measure the outside diameter of the star wheel.

2) Measure the inside diameter of the pinion.

3) Calculate the gap according to the measured value.

Gap between star wheel and pinion

Prescribed value	Limit
: 0.06 to 0.15mm { 0.0024 to 0.1499mm }	: 0.3mm { 0.2997mm }

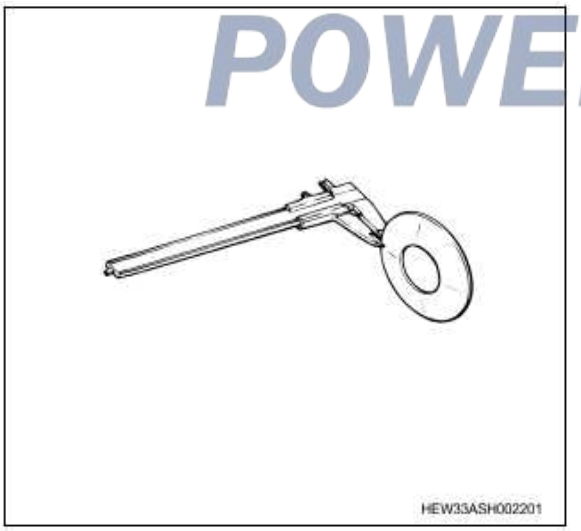


9. Pinion thrust washer thickness measurement

1) Measure the thickness of the pinion thrust washer.

Driving gear thrust washer thickness

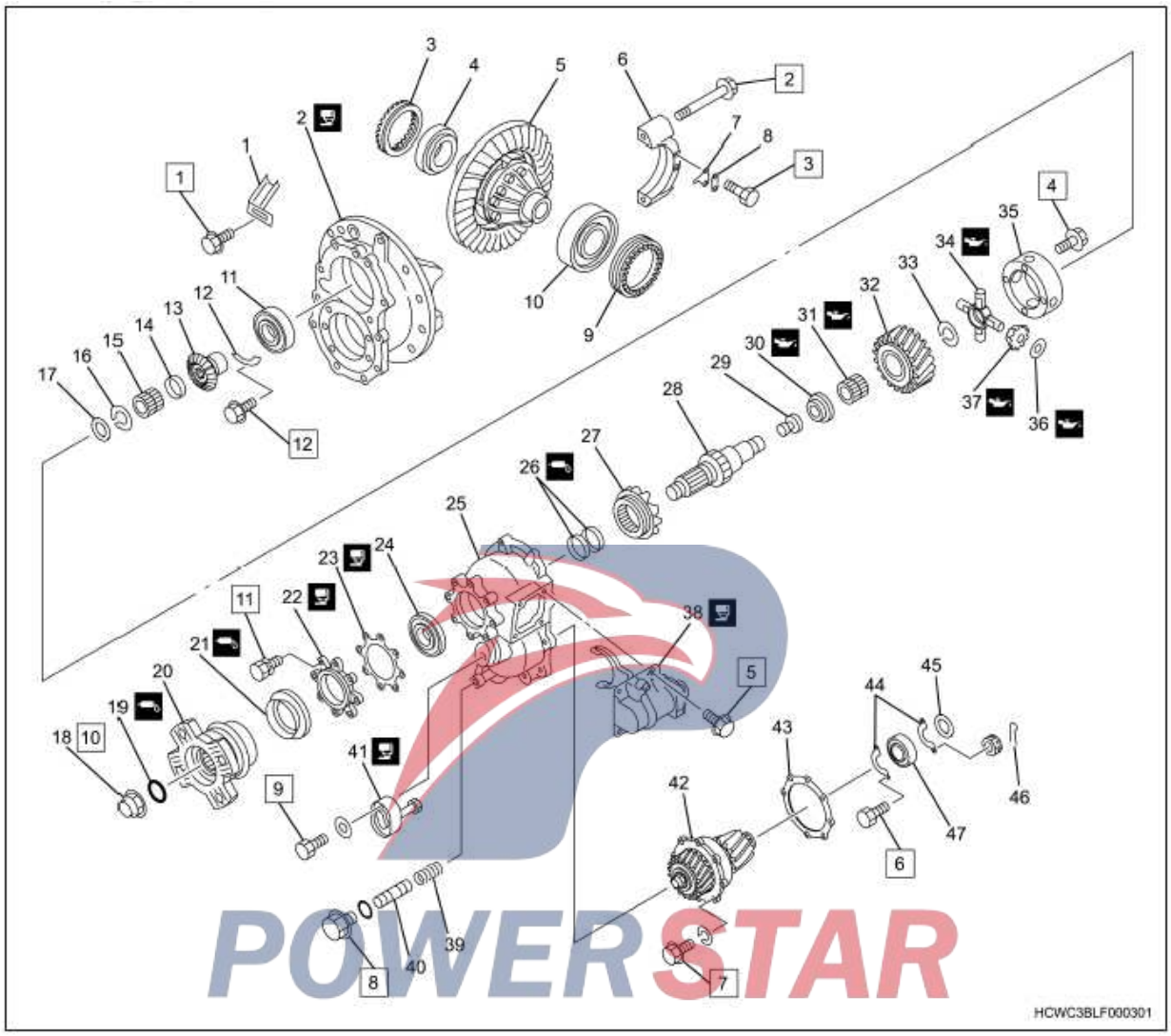
Prescribed value	Limit
: 1.6mm { 1.6002mm }	: 1.5mm { 1.5011mm }



Reassemble

1. Assembly view

Series-type final drive (17.5HT)



Part Name

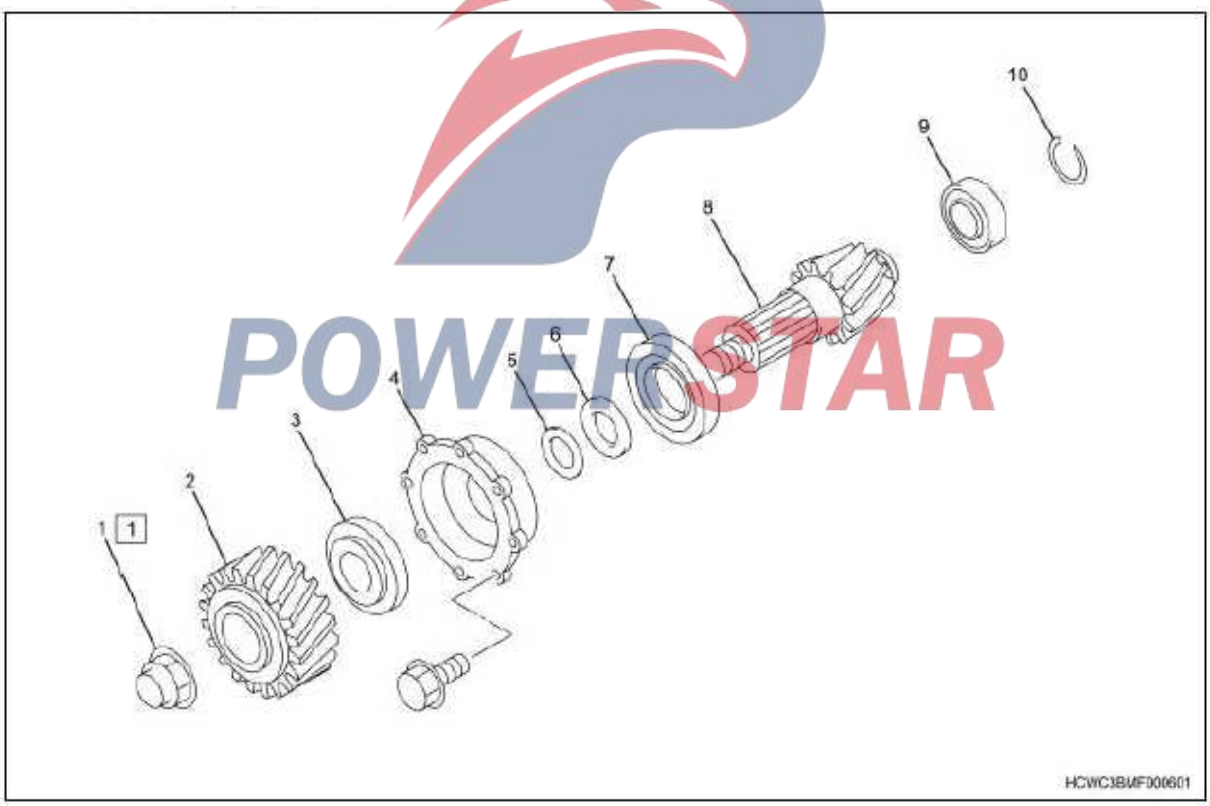
1. Oil skimmer
2. Differential gear pedestal
3. Adjusting nut
4. Side bearing
5. Differential gear
6. Bearing cover
7. Locking plate
8. Lock washer
9. Adjusting nut
10. Side bearing
11. Input shaft bearing
12. Oil catcher
13. Side gear
14. spacer
15. Needle roller bearing
16. Snap ring
17. Thrust washer
18. Nut
19. O-ring
20. Flange
21. Oil seal
22. Bearing retainer
23. Gasket
24. Input shaft bearing
25. Power distributor housing
26. Seal ring
27. Differential lock switch
28. Input shaft
29. Plug
30. Thrust washer
31. Needle roller bearing

32. Driven spiral gear
33. Snap ring
34. Cross axle
35. Differential gear housing
36. Driving gear thrust washer
37. Driving gear
38. Differential lock gearshift device
39. Spring
40. Coarse filter
41. Oil pump
42. Driving pinion
43. Gasket
44. Guard ring
45. Snap ring
46. Cotter pin
47. Guide bearing

1: 26N・m{2.7kgf・m/8.62kg・ft}
2: 402N・m{41.0kgf・m/134.26kg・ft}
3: 20N・m{2.0kgf・m/6.80kg・ft}
4: 51N・m{5.2kgf・m/17.24kg・ft}
5: 50N・m{5.1kgf・m/16.78kg・ft}
6: 13N・m{1.3kgf・m/4.54kg・ft}
7: 185N・m{18.9kgf・m/61.69kg・ft}
8: 69N・m{7.0kgf・m/51lb・ft}
9: 18N・m{1.8kgf・m/5.90kg・ft}
10: 686N・m{70.0kgf・m/229.52kg・ft}
11: 98N・m{10.0kgf・m/32.66kg・ft}
12: 26N・m{2.7kgf・m/8.62kg・ft}

Tightening torque

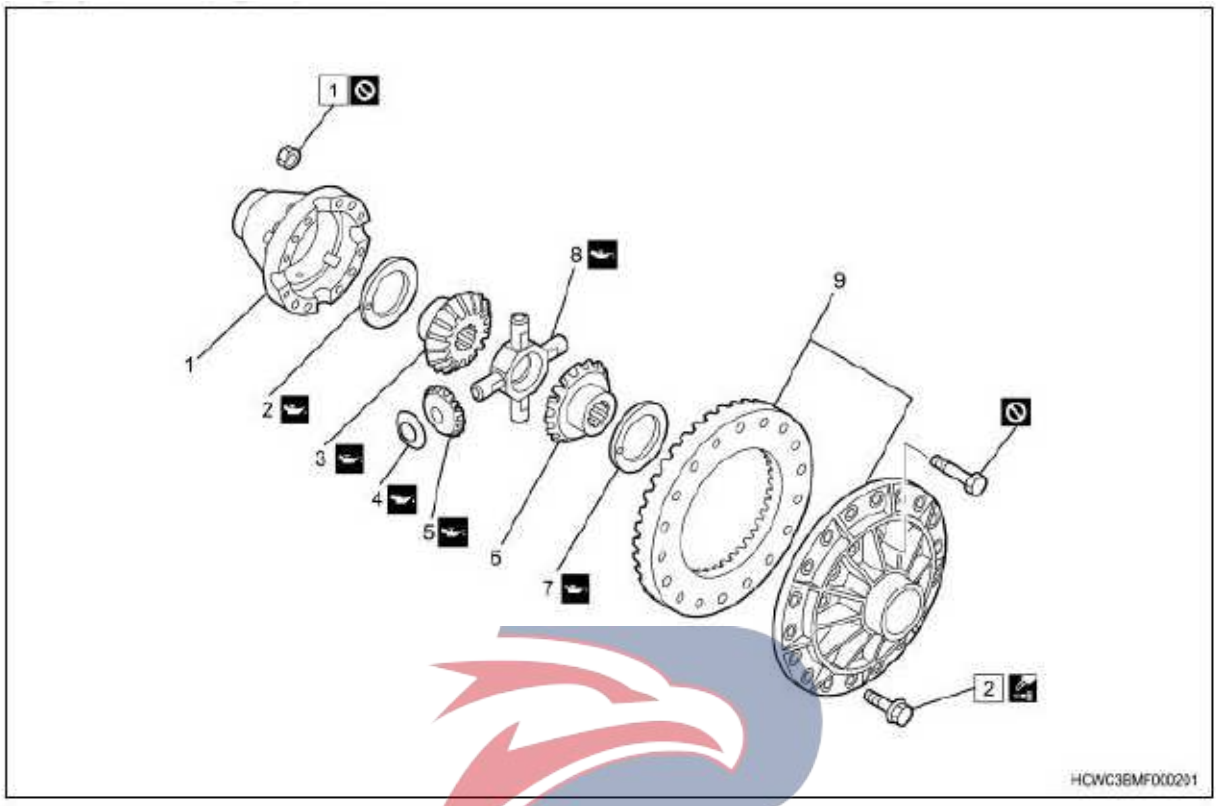
Driving pinion, in-series final drive (17.5HT)



Part Name
1. Pinion nut
2. Driven spiral gear
3. Outer bearing
4. Driving gear bracket
5. Gasket
6. spacer
7. Inner bearing
8. Driving pinion
9. Guide bearing
10. Snap ring

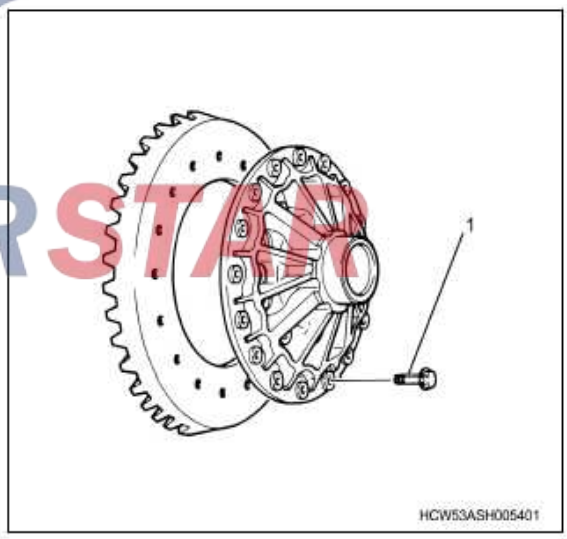
Tightening torque
1: 834N・m{85.0kgf・m/278.96kg・ft}

Differential gear, series-type final drive (17.5HT)



Part Name
1. Differential gear housing A
2. Side gear thrust washer
3. Side gear
4. Driving gear thrust washer
5. Driving gear
6. Side gear
7. Side gear thrust washer
8. Cross axle
9. Differential gear housing B and gear ring

Tightening torque
1: 206N・m{21.0kgf・m/152lb・ft}17.5HT
2: 431N・m{43.9kgf・m/144.24kg・ft}17.5HT
2. Differential gear housing reassembly
1) Smear Loctite 271 or any composite equivalent on the thread of the bolt.
2) Install the gear ring on the differential gear housing B.
Tightening torque: 431N・m{43.9kgf・m/317.99lb・ft}

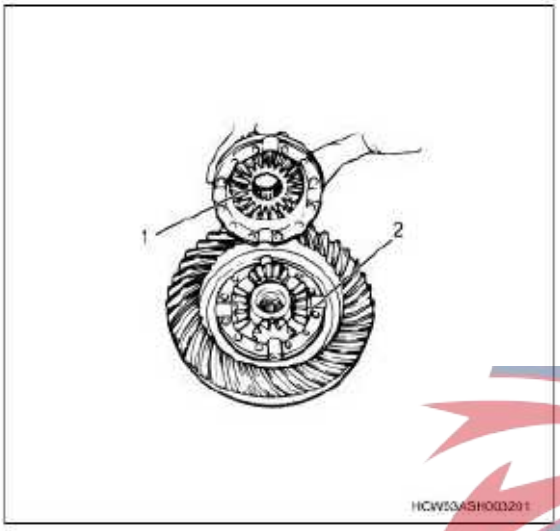


1. Bolt

---

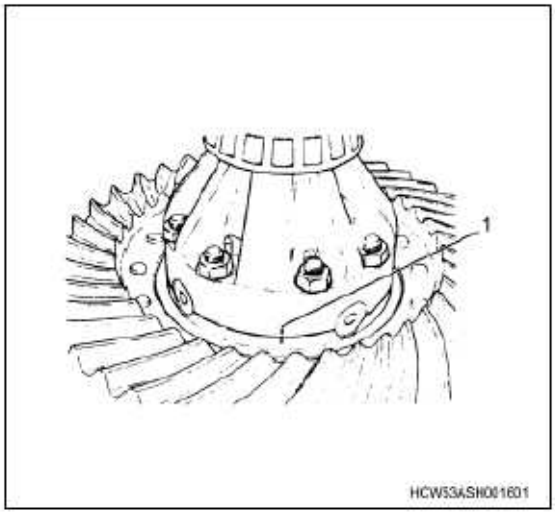
3) Smear gear oil on the following parts.
・Side gear thrust washer
・Side gear
・Cross axle
・Driving gear
・Driving gear thrust washer

4) Install the side gear thrust washer and the side gear on the differential gear housing A.
5) Install the following parts on the differential gear housing B.
・Side gear thrust washer
・Side gear
・Cross axle
・Driving gear
・Driving gear thrust washer



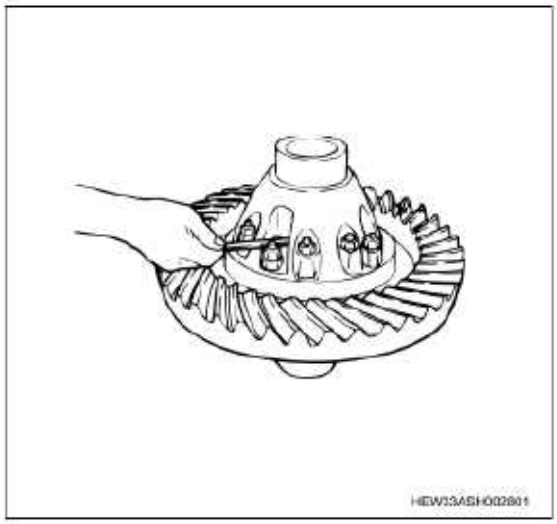
1. Side gear
2. Driving gear

6) Temporarily fix the differential gear housing A to the differential gear housing B.
Caution:
・Make the installation according to the alignment marks used during the removal.
Caution:
・Do not reuse the nuts and bolts.
Tightening torque: 98N・m{10.0kgf・m/72.00lb・ft}



1. Alignment mark

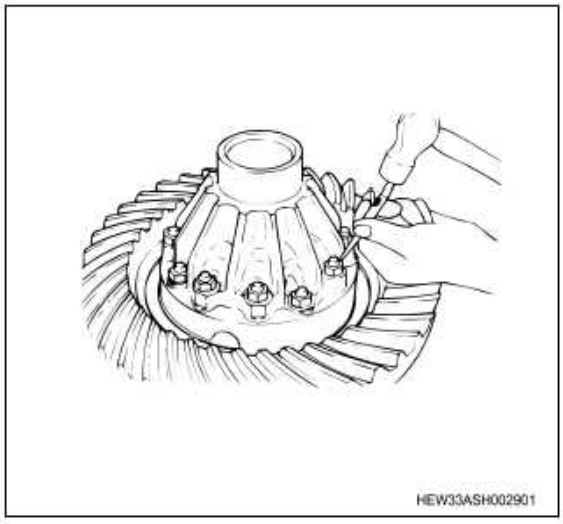
7) Measure the gap of the side gear.
Standard: 0.23 to 0.32mm{0.0091to 0.3200mm}



Caution:
・If the side gear gap is beyond the specified range, please replace the thrust washer of side gear, and adjust;
Applicable side gear thrust washer thickness

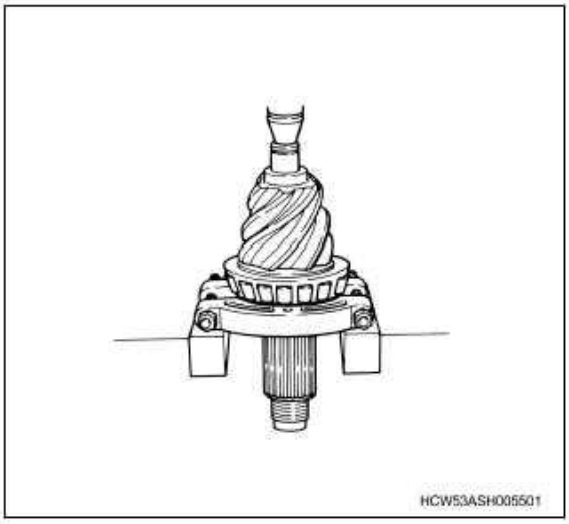
: 2.8mm { 2.7991mm }
: 2.9mm { 2.9007mm }
: 3.0mm { 2.9997mm }
: 3.1mm { 3.0988mm }
: 3.2mm { 3.2004mm }
: 3.3mm { 3.2995mm }
: 3.4mm { 3.4011mm }

8) Fix the differential gear housing A to the differential gear housing B (final tightening).
Tightening torque: 206N・m{21.0kgf・m/152.01lb・ft}



3. Drive pinion reassembly

1) Install the internal bearing on the driving pinion using a press.

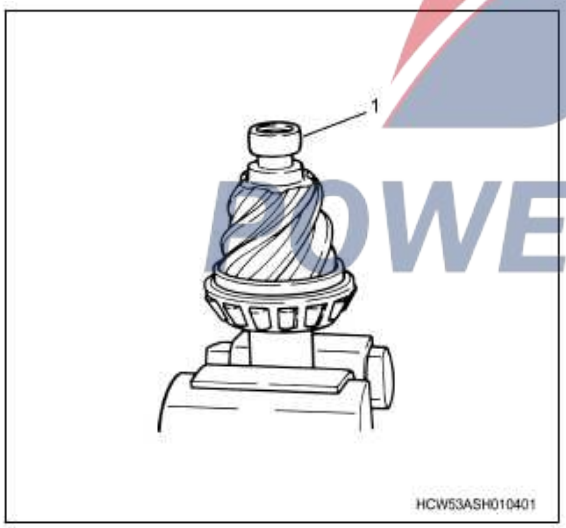


2) Install the snap ring in the snap ring groove of the driving pinion.

3) Install the inner cup of the guide bearing on the driving pinion using a copper hammer or a brass bar.

Caution:

・Set the side of the inner with serious angle cut on the driving pinion side.



1. Inner race

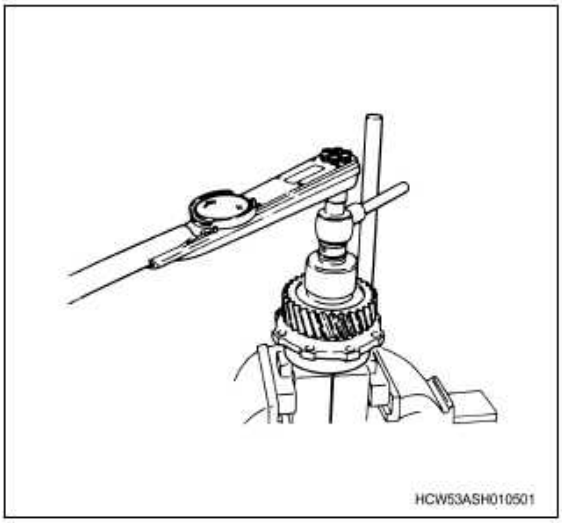
4) Fit the inner bearing outer race to the pinion depth gauge.

5) Install the outer race of outer bearing on the pinion depth gauge.

6) Temporarily fasten the following components to the driving pinion.

・Driving gear rack
・Gasket
・spacer
・Drive spiral gear;
・Outer bearing
・Pinion nut

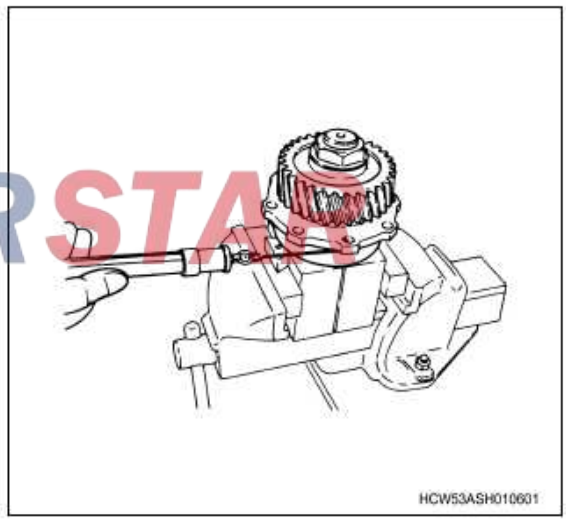
Tightening torque: 834N・m{85.0kgf・m/615.00lb・ft}



7) Lift the spring balance to the bolt hole in the driving gear bracket.

8) Pull the spring balance in the tangential direction and measure the pre-applied load on the driving gear bracket.

Preload: 35.3 to 45.1N{3.6 to 4.6kg/7.9 to 4.58kg}



Caution:

・Use spacer and gasket for adjustment when the measured preload is beyond the specified range;

Applicable spacer

: 7.6mm { 7.5997mm }
: 7.8mm { 7.8003mm }
: 8.0mm { 8.0010mm }
: 8.2mm { 8.1991mm }

: 8.4mm { 8.3998mm }
: 8.6mm { 8.6004mm }
: 8.8mm { 8.8011mm }
: 9.0mm { 8.9992mm }

Applicable washer

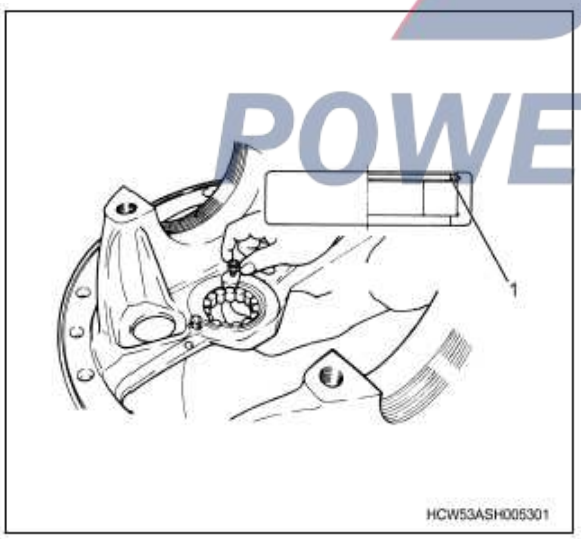
: 3.25mm { 3.2512mm }
: 3.26mm { 3.2588mm }
: 3.27mm { 3.2690mm }
: 3.28mm { 3.2791mm }
: 3.29mm { 3.2893mm }
: 3.30mm { 3.2995mm }
: 3.31mm { 3.3096mm }
: 3.32mm { 3.3198mm }
: 3.33mm { 3.3299mm }
: 3.34mm { 3.3401mm }
: 3.35mm { 3.3503mm }

9) Finally fasten the pinion nut to the driving pinion.

Tightening torque: 834N・m{85.0kgf・m/615.00lb・ft}

4. Final drive reassembly

1) Install the guide bearing on the differential gear's seat rack in the way that the stop ring and the bearing cover are on the same side.

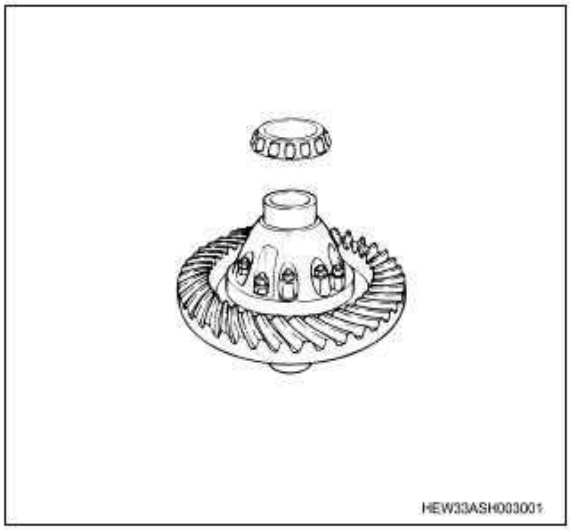


1. Snap ring

2) Use split pins to install limiters on the differential carrier and the stopper.

Tightening torque: 13N・m{1.3kgf・m/115lb・in}

3) Use a press or a brass bar to install the side bearing on the differential housing.

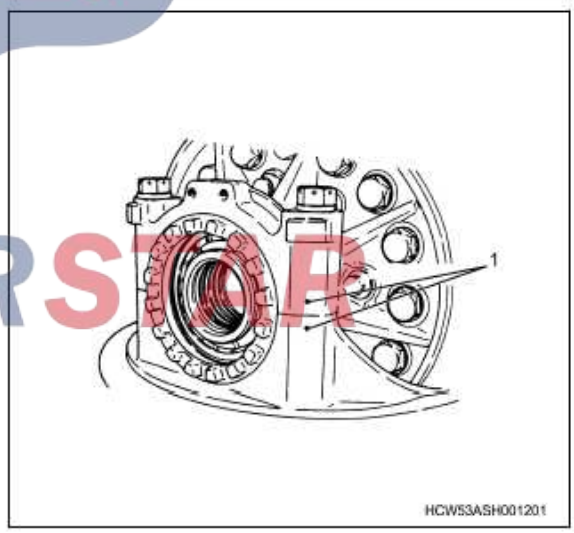


4) Install the differential gear housing on the differential gear seat rack.

5) Install the bearing cover, side bearing outer cup, and adjusting nut onto the differential gear support.

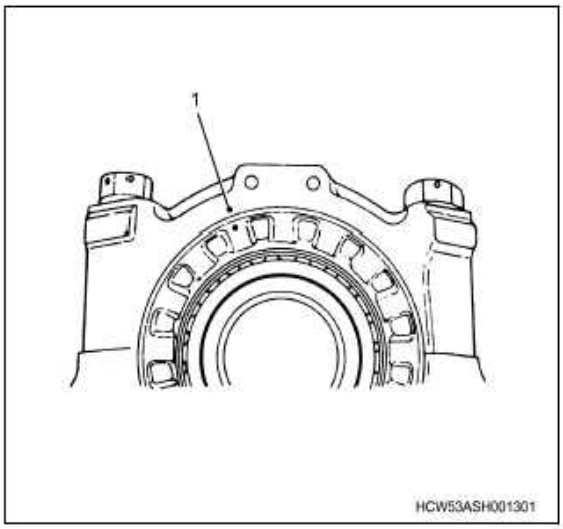
Caution:

・Make the installation according to the alignment marks used during the removal.



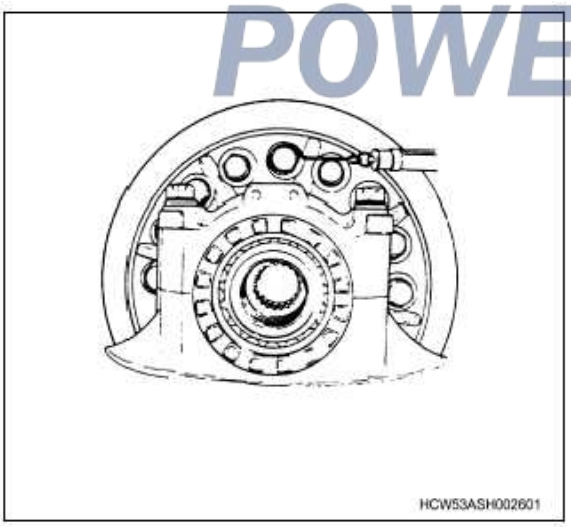
1. Alignment mark

6) Tighten the adjusting nut according to the alignment mark used in the removal process.

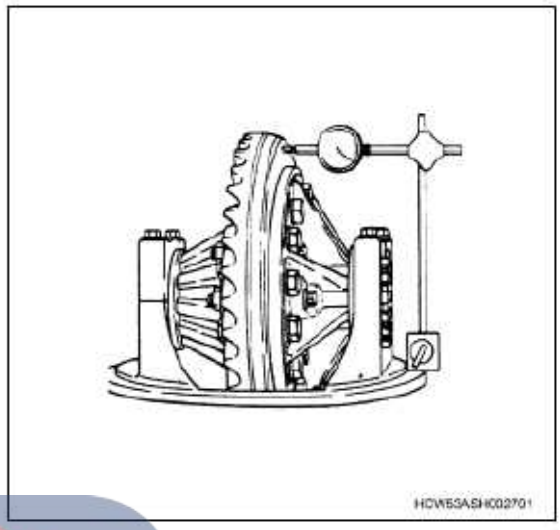


1. Alignment mark

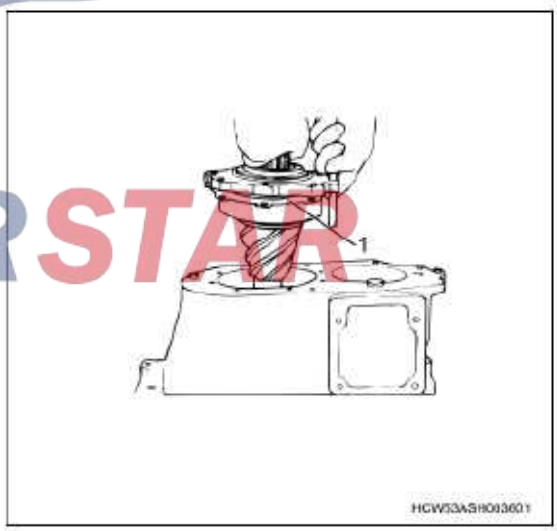
7) Temporarily fix the bearing cover bolts on the differential gear seat rack.
Tightening torque: 49N・m{5.0kgf・m/36.00lb・ft}
8) Lift the spring balance to the tightening bolt on the ring gear.
9) Pull the spring balance in the tangential direction and measure the pre-applied load on the side bearing.
Standard: side bearing pre-tightening degree, 29.5-49.0N (3.0-5.0kg/6.6-11.0lb)
Prescribed value: 402-804N·cm{40-80kgf·cm/36-71lb·in} Side bearing preload degree



Caution:
・If the measured pre-load is not within the specified range, make an adjustment with the adjusting nut.
10) Measure the radial run-out of the gear ring using a dial gauge.
Standard: 0.1mm or below (0.0039in or below)
Limit: 0.01in (0.0079in)
Caution:
・If the measured runout is greater than the limit value, repair or change the gear ring or the side bearing.

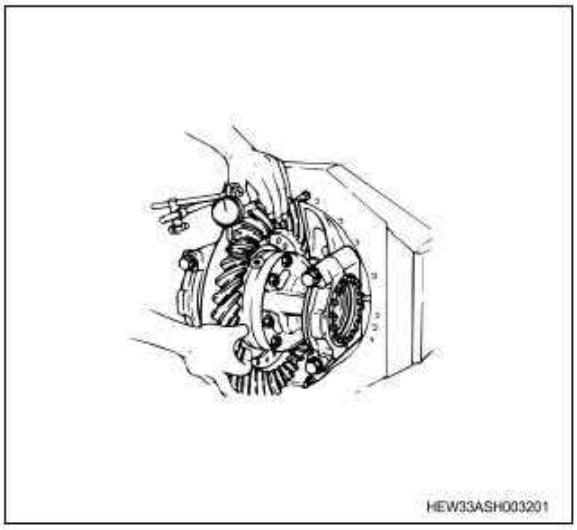


11) Temporarily fix the driving pinion and washer on the differential gear seat rack.
Tightening torque: 185N・m{18.9kgf・m/136.00lb・ft}



1. Gasket

12) Fix the dial gauge on the flange surface of the differential gear seat rack.
13) Install the cover of the dial gauge on the rear of the gear ring and then set its long pointer to zero.
14) Hold the driving pinion by hand, slightly move the gear ring back and forth, and measure the tooth space between the gear ring and the driving pinion.
Standard: gap between gear ring and driving pinion, 0.28-0.36mm (0.0110-0.0142in)



Caution:

・If the measured tooth space is not within the specified range, adjust the piston of the differential gear with the adjusting nut.

Caution:

・In order to prevent the pre tightening degree of the side bearing from changing, tighten the adjusting nut to the previous degree.

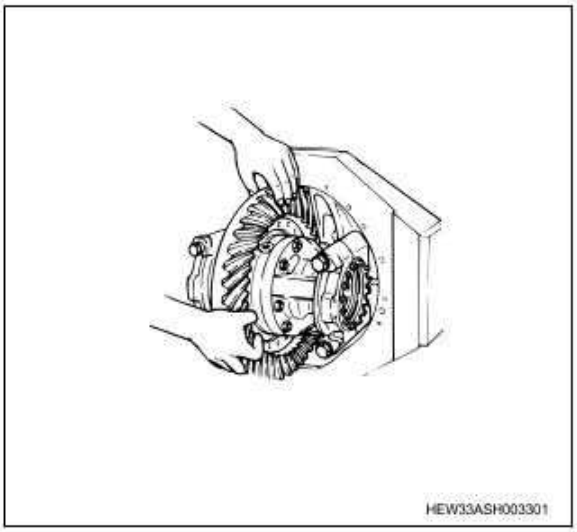
15) Clean the teeth of the gear ring and the driving pinion.

16) Smear red lead paint on the teeth of the gear ring.

Caution:

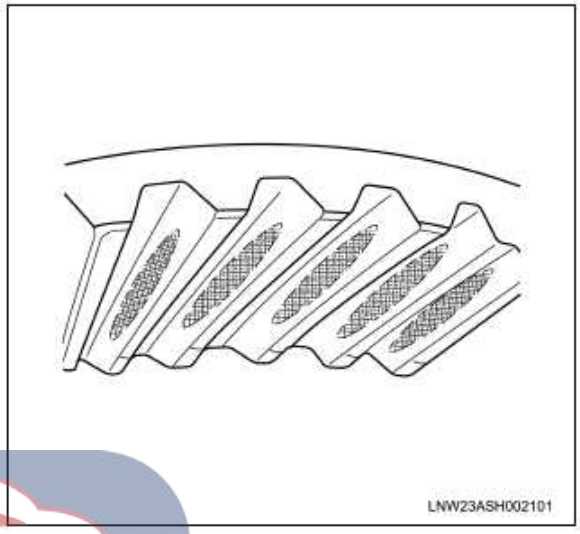
・Smear grease on seven or eight gear teeth on both sides.

17) Hold the driving pinion by hand, slightly move the gear ring back and forth, and check the tooth face contact between the gear ring and the driving pinion.



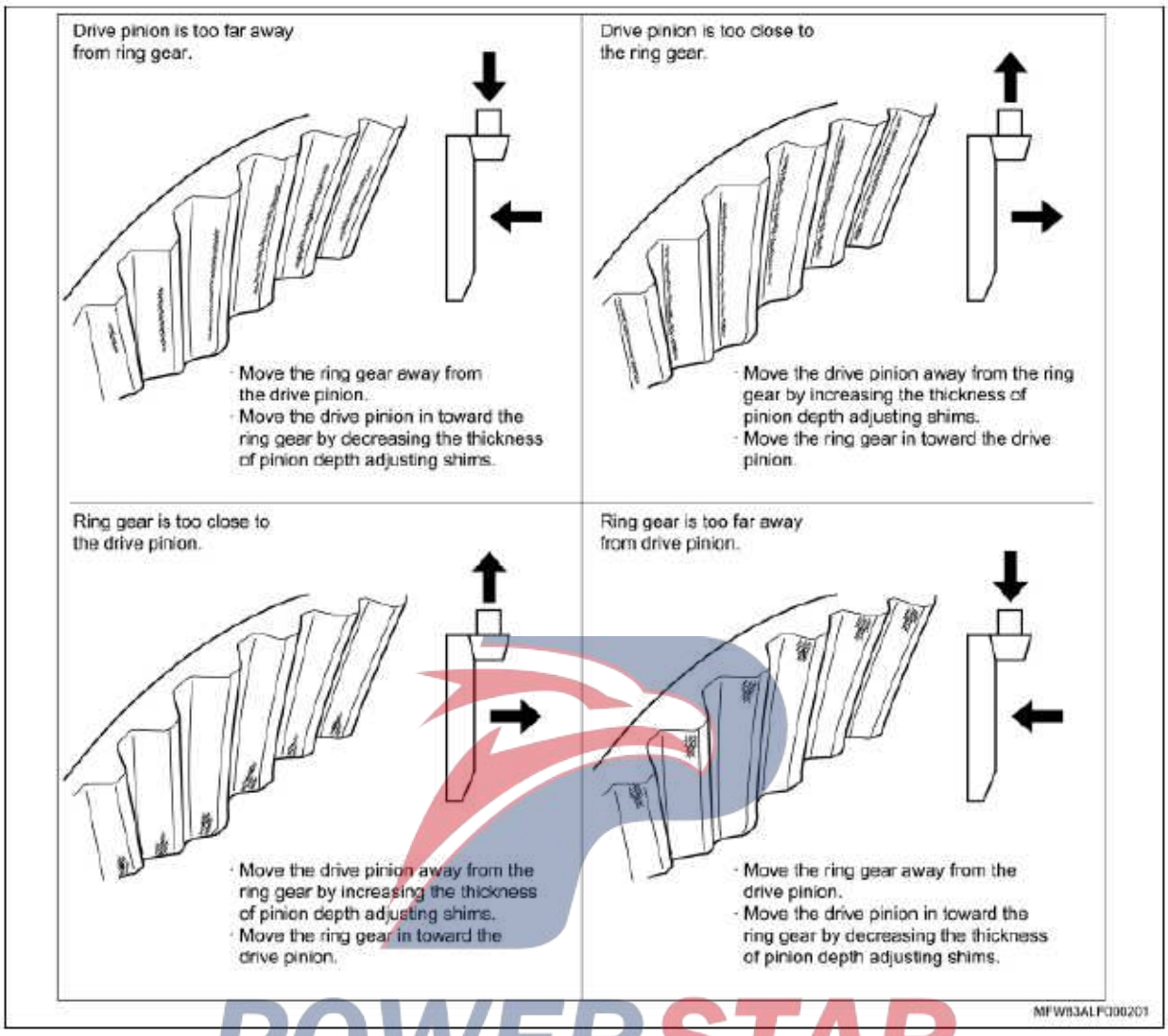
Caution:

・The correct contact length is 70% of the full gear length centered on the pitch line, toward the heel side (outer side) and 5 mm {0.20 inch} from the toe side (inner side).



Caution:

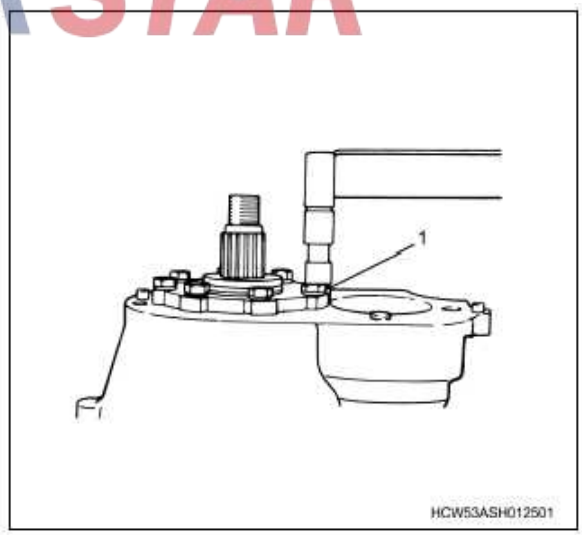
・If an inappropriate contact is found between the gear ring and the driving pinion during the check, adjust their positions as shown in the following figure.



18) Smear Loctite 242 or any composite equivalent on the thread of the bolt.

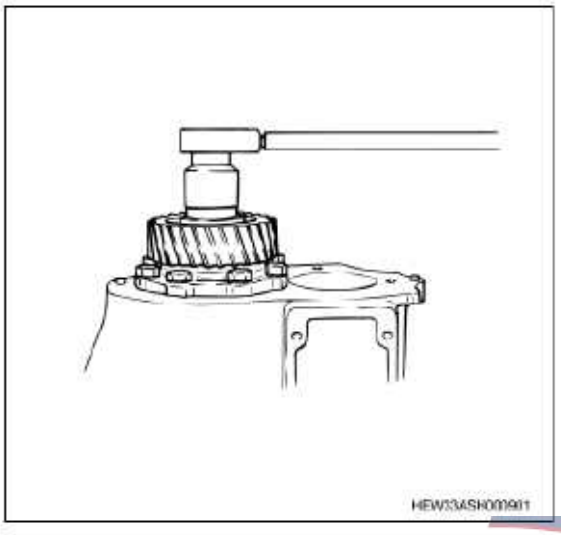
19) Fasten the driving gear carrier to the differential carrier.

Tightening torque: 185N・m{18.9kgf・m/136.00lb・ft}

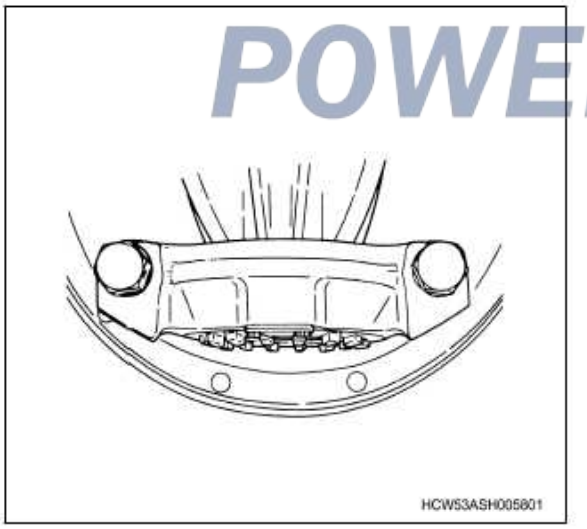


1. Bolt

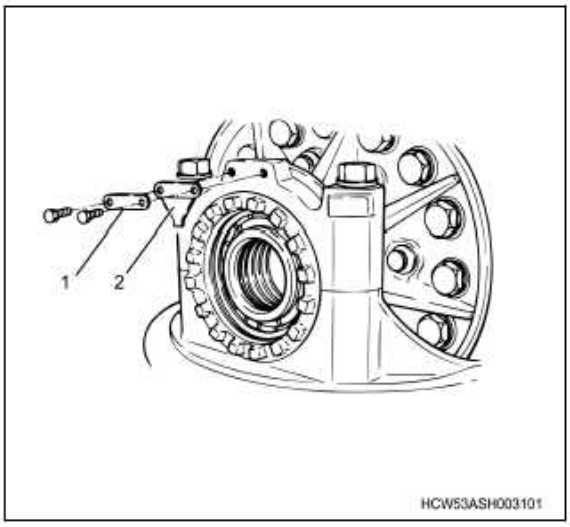
20) Install the driven screw gear on the driving pinion.
Tightening torque: 834N・m{85.0kgf・m/615.00lb・ft}



21) Drive pinion nuts into two positions.
Caution:
・Knock it in to allow its close contact with the tightening side of the groove surface.
22) Tighten the bearing cover bolts on the differential gear seat rack.
Tightening torque: 402N・m{41.0kgf・m/295.99lb・ft}



23) Align the lock plate and lock washer with the adjusting nut groove for the installation.
Tightening torque: 20N・m{2.0kgf・m/14.99lb・ft}



1. Lock washer
2. Locking plate

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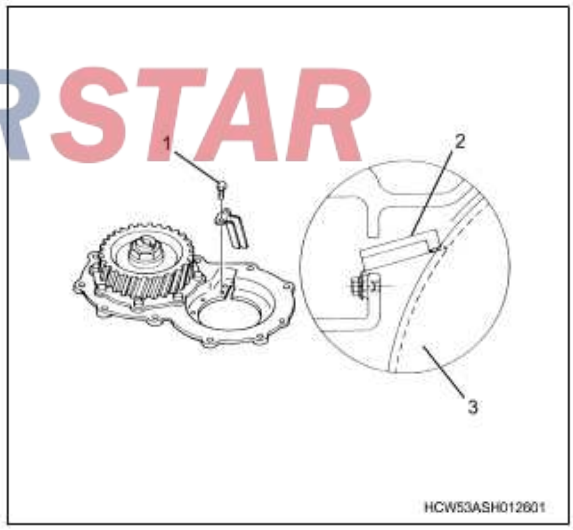
24) Fix the bolt by bending the lock washer.
25) Smear Loctite 242 or any composite equivalent on the thread of the bolt.
26) Temporarily fasten the connecting rod oil scoop to the differential carrier.
27) Locating the oil skimmer outside the lip part of the ring gear will eventually secure the oil skimmer.
Tightening torque: 26N・m{2.7kgf・m/19.00lb・ft}



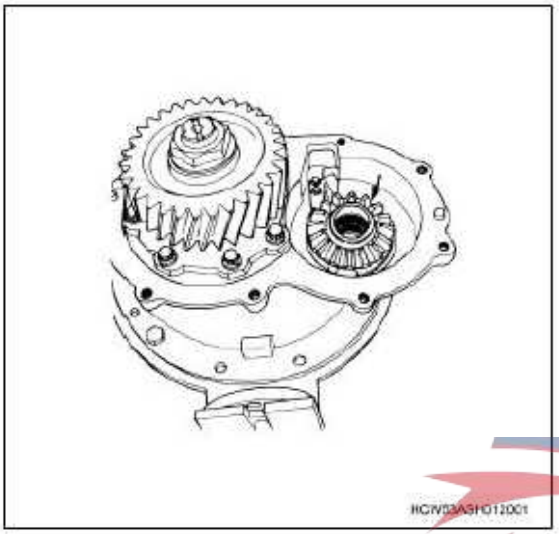
1. Bolt
2. Oil skimmer
3. Gear ring

---

28) Install the outer race of input shaft bearing on the differential carrier.
29) Install the oil collector on the differential carrier.
Tightening torque: 26N・m{2.7kgf・m/19.00lb・ft}

30) Install the following components on the side gear.
・spacer
・Needle roller bearing;
・Snap ring
・ Inner race of bearing

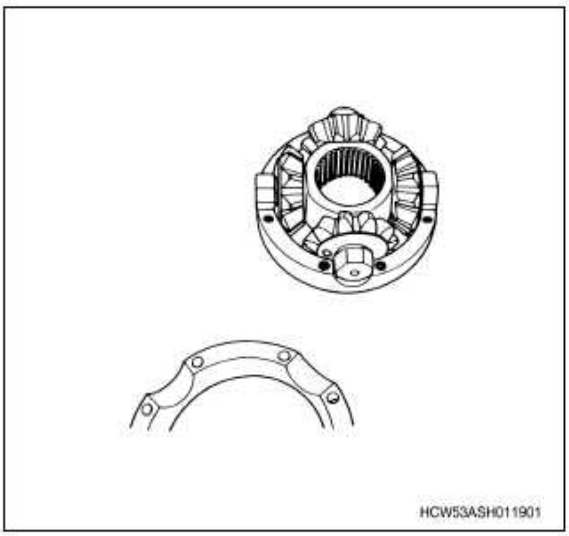
31) Install the side gear on the differential carrier.



32) Install the thrust washer on the differential carrier.

33) Smear gear oil on the following parts.
1. Cross axle
2. Driving gear
3. Driving gear thrust washer

34) Install the following components on the differential housing.
・Cross axle
・Driving gear
・Driving gear thrust washer



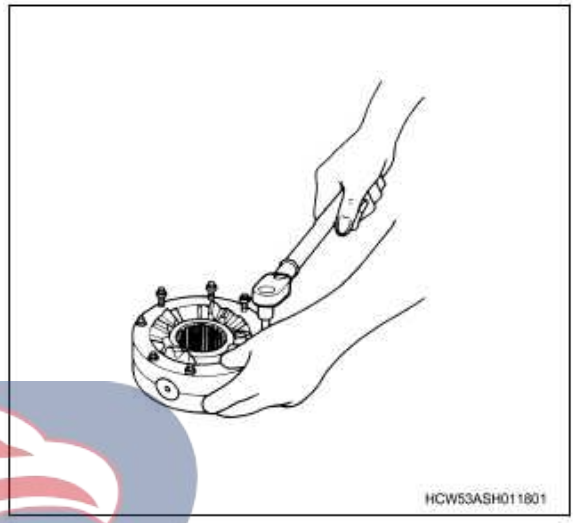
35) Smear Loctite 242 or any composite equivalent on the thread of the bolt.

36) Install differential housing B to differential housing A.

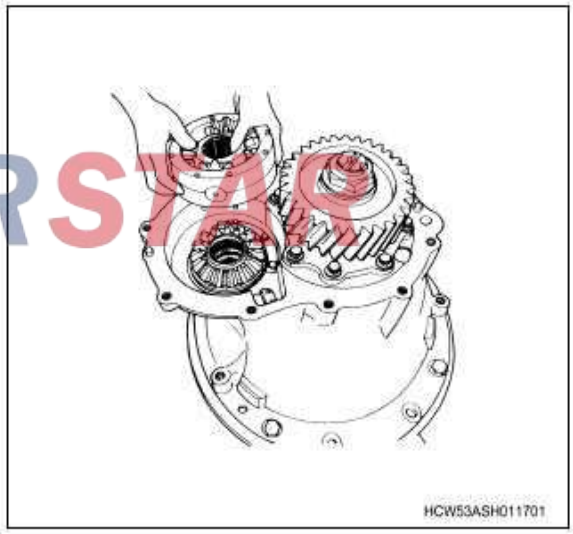
Caution:

・Inspect whether the 4 pinions can smoothly rotate after fastening;

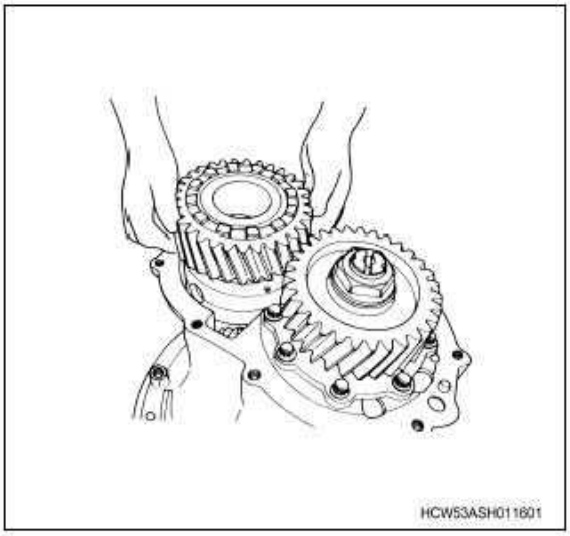
Tightening torque: 51N・m{5.2kgf・m/17.24kg・ft}



37) Face the bolt head to the side gear and install the differential case and differential carrier.



38) Install the driving screw gear on the differential carrier.

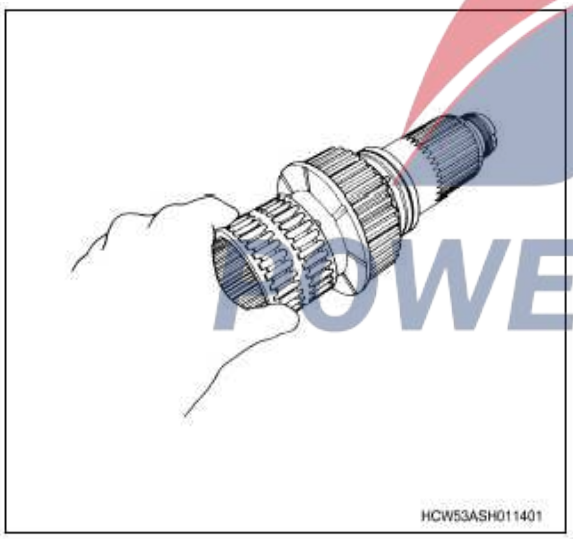


39) Apply gear oil to the thrust washer and the needle roller bearing.

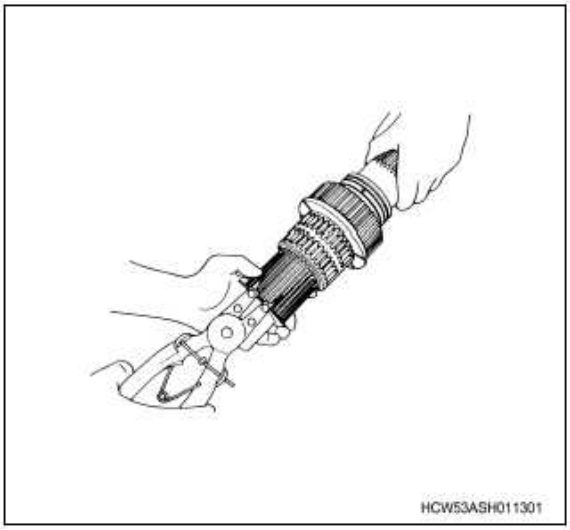
40) Install the thrust washer and the needle roller bearing on the input shaft.

Caution:

・Let the oil tank toward the needle roller bearing side during the installation of trust washer;



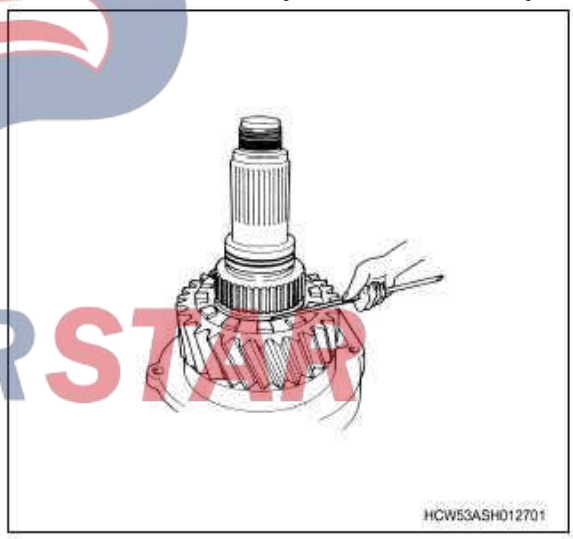
41) Install a snap ring on the input shaft.



42) Install the input shaft inside the driving screw gear.

43) Insert the feeler gauge between the input shaft and the bevel gear and measure the axial clearance of the side gear。

Standard: 0.40 to 1.10mm{0.0157 to 1.0998mm}



Caution:

・If the measured axial gap of side gear(s) is beyond the specified range, please adjust by changing the thickness of thrust washer;

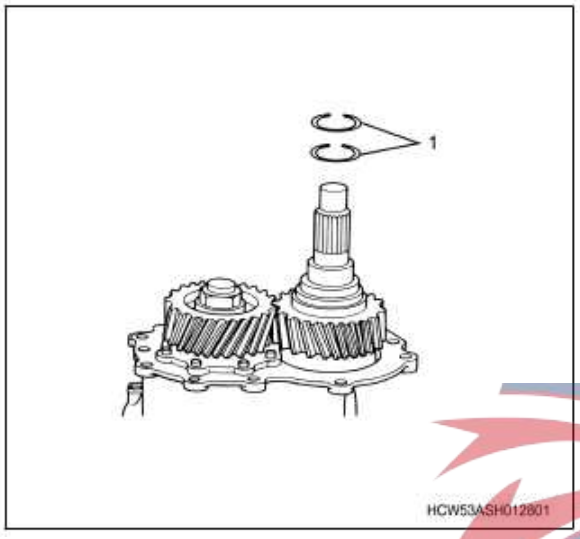
Thickness of applicable thrust washer

: 5.9mm { 5.9004mm }
: 6.0mm { 5.9995mm }
: 6.1mm { 6.1011mm }
: 6.2mm { 6.2001mm }
: 6.3mm { 6.2992mm }
: 6.4mm { 6.4008mm }
: 6.5mm { 6.4999mm }
: 6.6mm { 6.5989mm }
: 6.7mm { 6.7005mm }

: 6.8mm { 6.7996mm }
: 6.9mm { 6.9012mm }
: 7.0mm { 7.0002mm }
: 7.1mm { 7.0993mm }

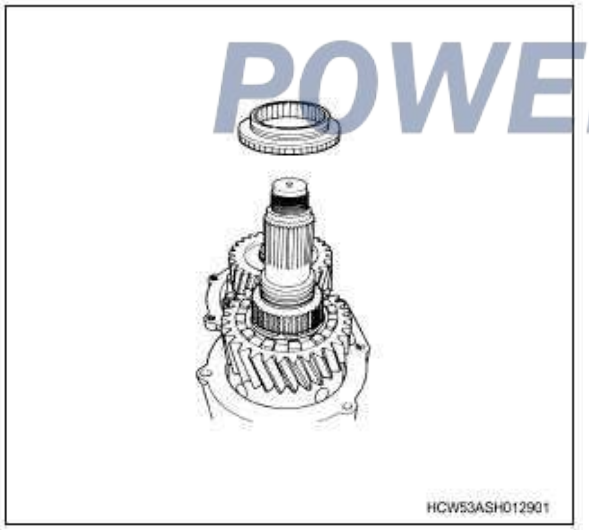
44) Apply chassis grease to the seal ring.

45) Install the seal ring on the input shaft.



1. Seal ring

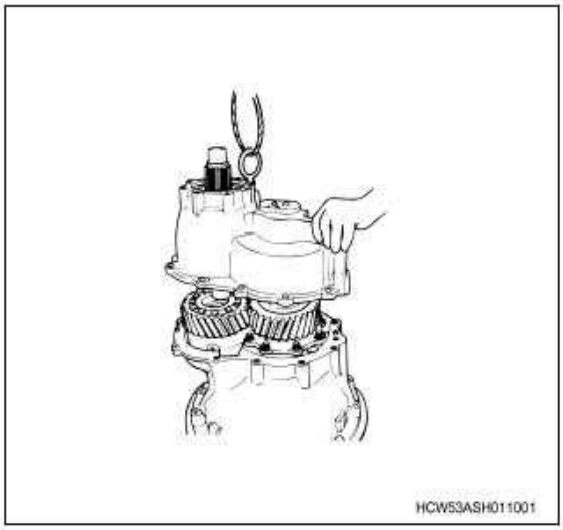
46) Install the differential lock clutch on the input shaft.



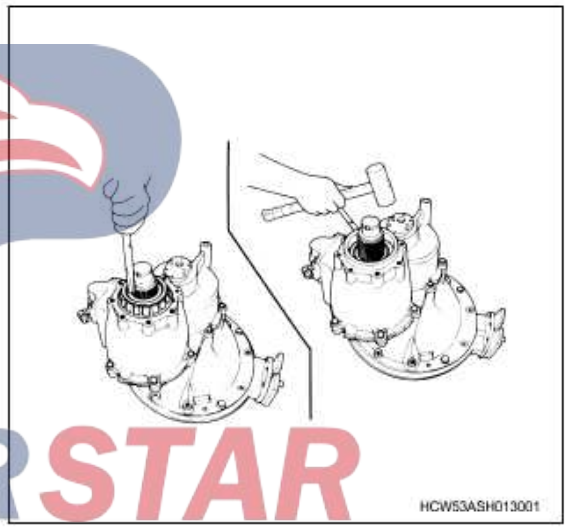
47) Apply FMD127 or equivalent grease to the differential carrier.

48) Install the housing of power transfer unit on the differential carrier.

Tightening torque: 126N・m{12.8kgf・m/42.18kg・ft}



49) Use a brass bar to install the input shaft bearing on the input shaft.

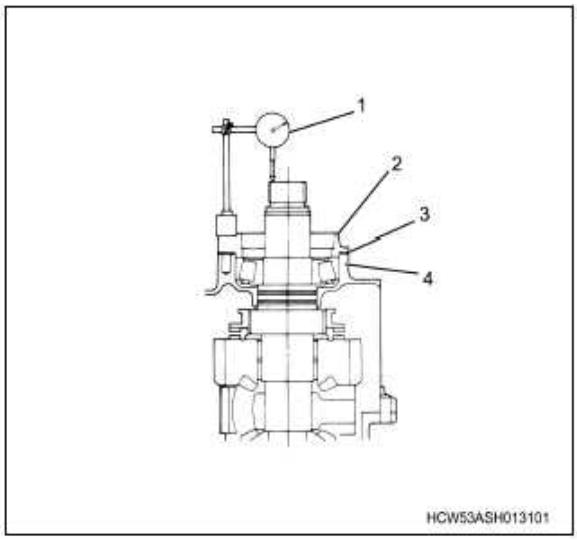


50) Insert two gasket to temporarily fasten the bearing support to the transfer case.

Tightening torque: 18N・m{1.8kgf・m/13.01lb・ft}

51) Use a dial gauge to measure the axial clearance of the bearing.

Standard: 0.02-0.13mm{0.0008-0.1295mm}



1. Dial gauge
2. Bearing retainer
3. Gasket
4. Power distributor housing

Caution:
・If the measured axial gap of bearing(s) is beyond the specified range, please adjust by changing the thickness of gasket.

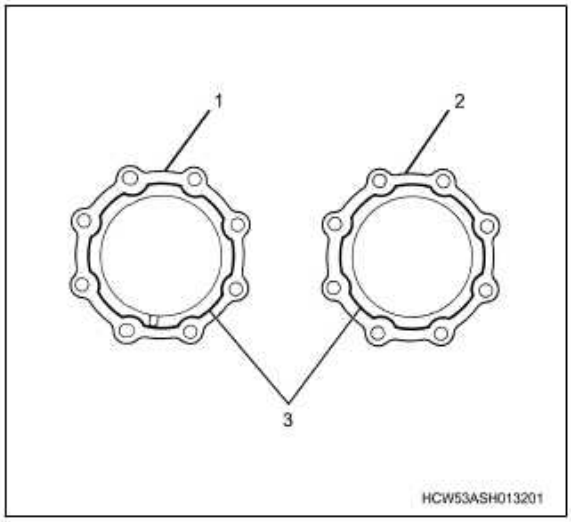
Thickness of applicable gasket

: 0.3mm { 0.2997mm }
: 0.4mm { 0.3988mm }
: 0.5mm { 0.5004mm }
: 1.0mm { 1.0008mm }

52) Remove the bearing retainer and the washer from the transfer case housing.

53) Apply Loctite 962T or any other equivalent adhesive to the gaskets and the housing of power transfer unit.

Caution:
・Avoid applying Loctite grease to the oil port of power distribution box;

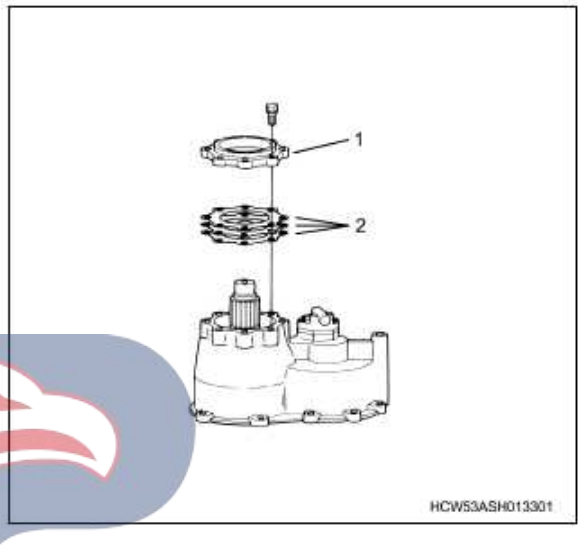


1. Power distributor housing
2. Gasket
3. Application zone of Loctite adhesive

54) Apply Loctite 962T or any other equivalent adhesive to the bearing retainer.

55) Install the bearing retainer and gaskets on the housing of power transfer unit.

Tightening torque: 98N・m{10.0kgf・m/72.00lb・ft}

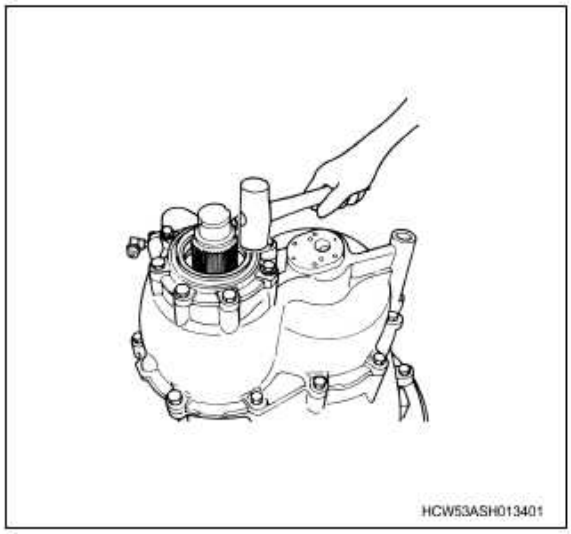


1. Bearing retainer
2. Gasket

56) Smear Loctite 242 or any composite equivalent around the outer peripheral of the oil seal.

57) Smear chassis grease on the lip of the oil seal.

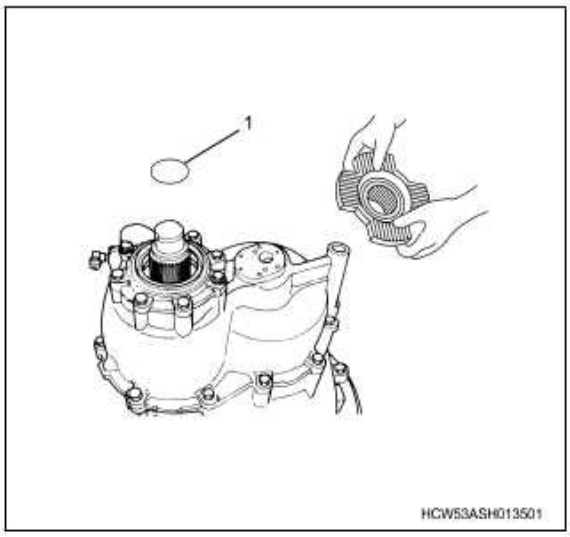
58) Use a rubber hammer to install the oil seal on the housing of power transfer unit.



59) Smear chassis grease on the O-ring.

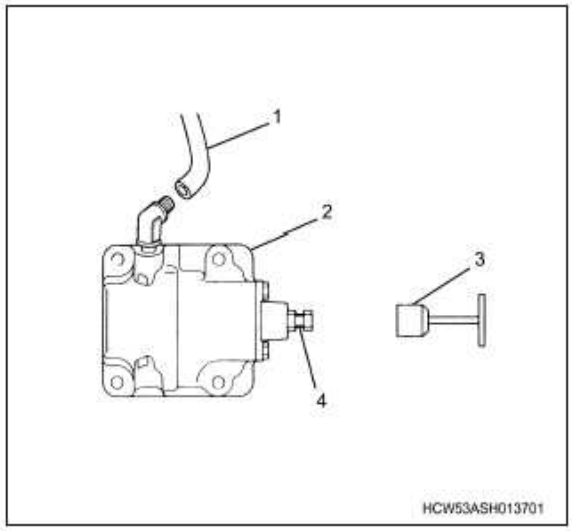
60) Install the O-ring on the input shaft.

61) Install the flange on the input shaft.
Tightening torque: 686N・m{70.0kgf・m/229.52kg・ft}



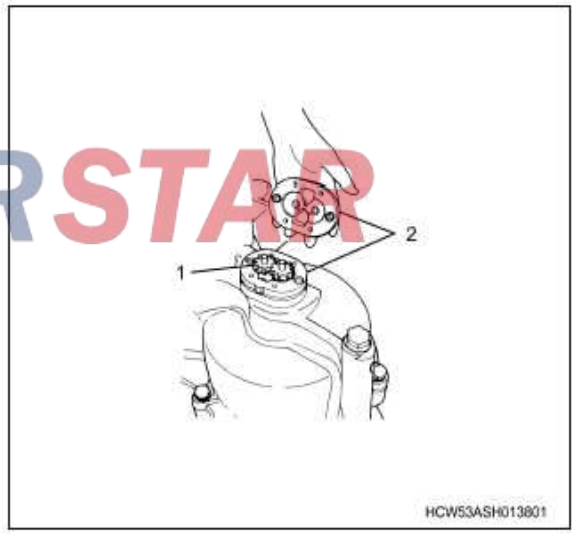
1. O-ring

62) Press the flange nut.
Caution:
・Firmly support the two points with piles.
63) Smear FMD127 or any equivalent on the installation surface of the differential lock gearshift device.
64) Install the differential lock gearshift mechanism to the transfer case.
Tightening torque: 50N・m{5.1kgf・m/36.99lb・ft}
65) Check the running state of the differential gear lock through injecting air into the differential lock gearshift device.
66) Removal tightens Nut and applies Loctite 242 or other equivalent brand of glue to the threaded parts.
・Inspect the operation state of differential lock;
Caution:
・Rotate the fastening bolt toward the tightening direction while avoiding any grease's adhesion from the lock cylinder of differential to threads;
67) Screw it in the fixing bolt by hand until it cannot be screwed in any more.
68) Tighten it further using a tool.
Angle: 60–120°
69) Tighten the lock nut and thus the lock bolt.



1. External air source
2. Differential lock gearshift device
3. Tool
4. Fixing bolt

70) Apply gear oil to the oil pump.
71) Apply FMD127 or equivalent grease to the mounting surface of oil pump.
72) Install the oil pump on the housing of power transfer unit.
Tightening torque: 18N・m{1.8kgf・m/13.01lb・ft}



1. Inside of oil pump
2. Mounting surface of oil pump

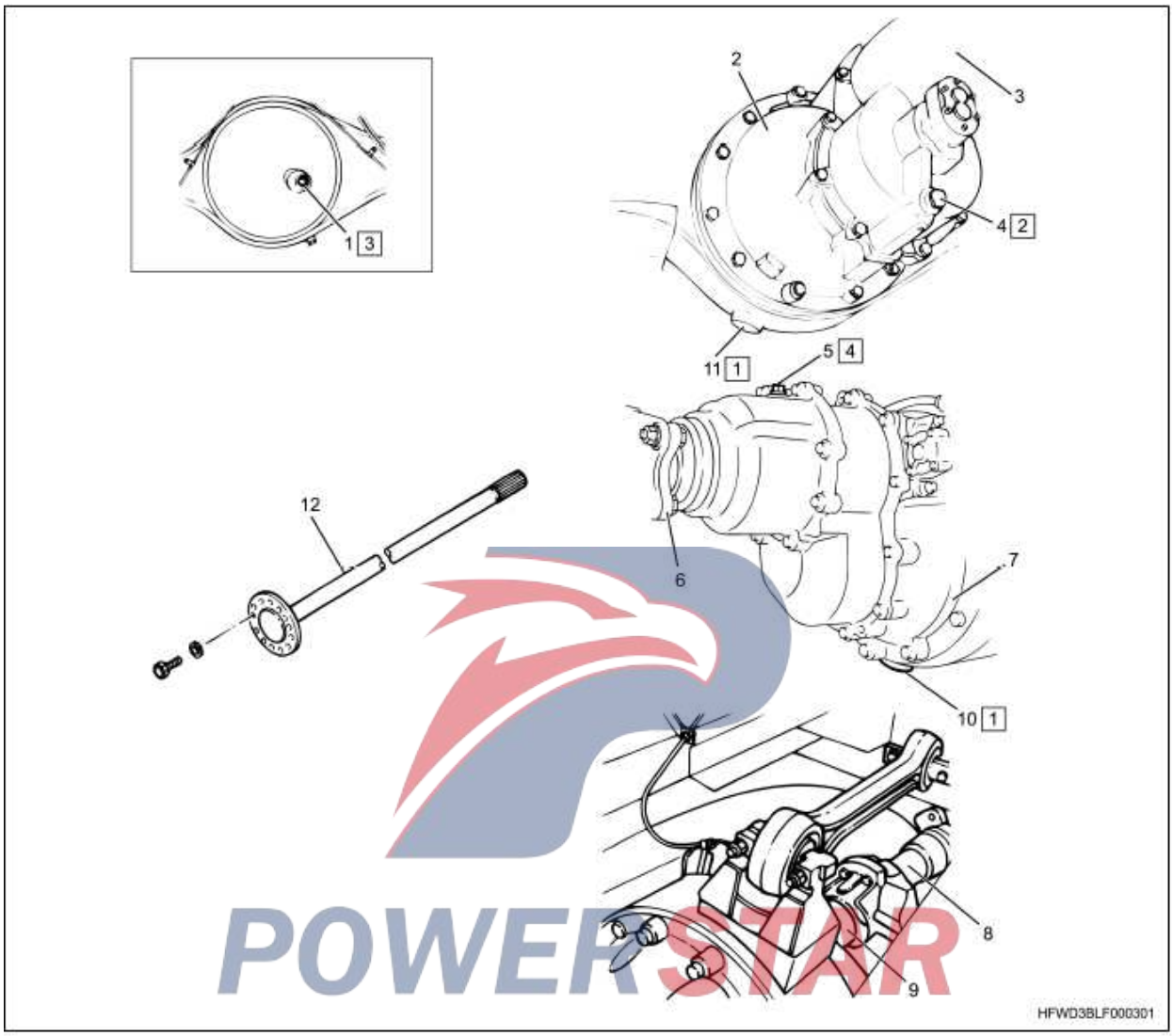
73) Install the following components on the housing of power transfer unit.
1. spring
2. Coarse filter
3. O-ring
4. Coarse filter plug

Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}

Installation

1. Assembly view

Rear differential gear (in series)



Part Name

1. Injection port plug
2. Final drive
3. Drive shaft flange
4. Coarse filter plug
5. Injection port plug
6. Drive shaft flange
7. Final drive
8. Drive shaft (between the two rear axles)
9. Output shaft
10. Oil drain plug
11. Oil drain plug
12. Axle

Tightening torque

1: 69N・m{7.0kgf・m/51lb・ft}
2: 69N・m{7.0kgf・m/51lb・ft}
3: 69N・m{7.0kgf・m/51lb・ft}
4: 44N・m{4.5kgf・m/14.51kg・ft}

2. Final drive installation

1) Clean the bolts and axle housing.

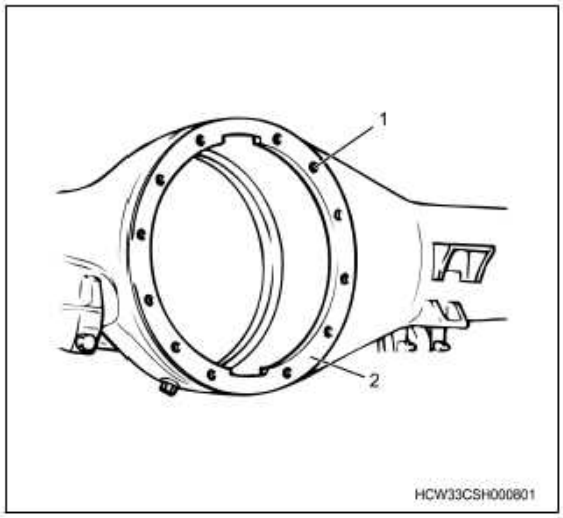
Caution:

・Remove the residual Loctite binder on the bolts to be reused and their holes.

・If necessary, clean the bolts with dies and the bolt holes with taps.

2) Smear Loctite 242 or any composite equivalent on the thread of the bolt.

3) Smear FMD127 or any equivalent on the axle housing's transmission rack mounting surface.



1. Bolt hole
2. Differential gear seat installation surface

---

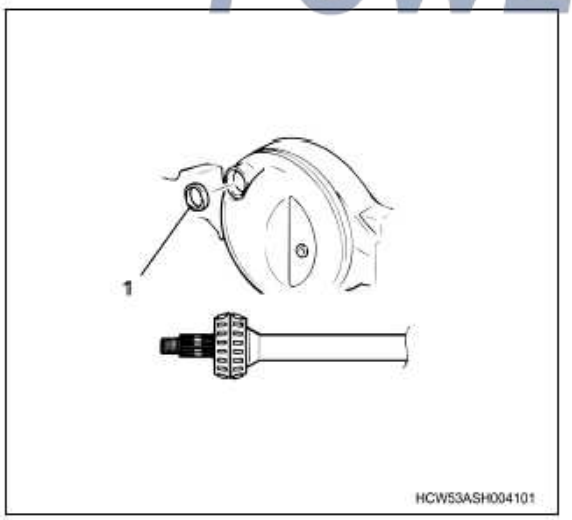
4) Install the final drive on the axle housing.

Tightening torque: 219N・m{22.3kgf・m/162.00lb・ft}

3. Installation of output shaft

1) Use a brass bar to install the outer race inside on the axle housing.

2) Install both inner bearing and outer bearing on the output shaft.



1. Outer race inside

---

3) Align the differential lock ring with the shaft spline and mount the output shaft to the axle housing.

4) Install the spacer on the output shaft and fasten it with snap ring.

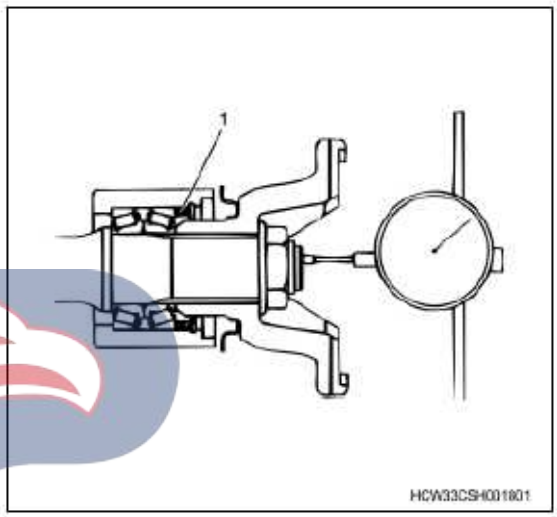
5) Install the flange and flange nuts on the output shaft.

Tightening torque: 337N・m{34.4kgf・m/248.99lb・ft}

6) Use a dial gauge to measure the axial clearance of output shaft.

Standard: 0.02 to 0.13mm{0.0008 to 0.1295mm}

Specified value: output shaft end clearance



1. spacer

Caution:

・If the measured axial gap of output shaft is beyond the specified range, please adjust by changing the thickness of spacer;

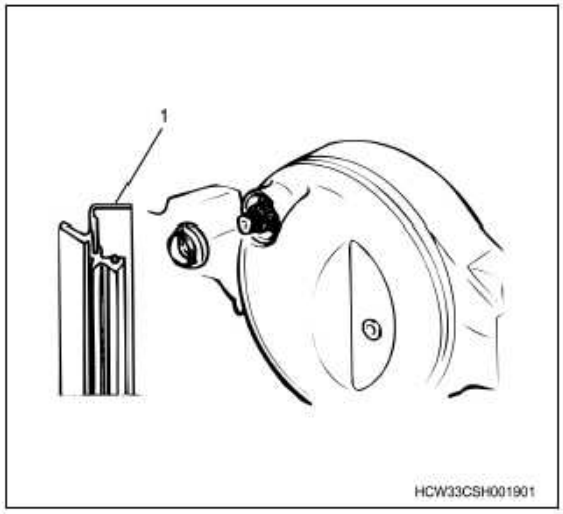
Thickness of applicable spacer

: 4.5mm { 4.5009mm }
: 4.6mm { 4.5999mm }
: 4.7mm { 4.6990mm }
: 4.8mm { 4.8006mm }
: 4.9mm { 4.8997mm }
: 5.0mm { 5.0013mm }
: 5.1mm { 5.1003mm }
: 5.2mm { 5.1994mm }
: 5.3mm { 5.3010mm }
: 5.4mm { 5.4000mm }

7) Remove the flange and flange nuts from output shaft.

8) Smear Loctite 242 or any composite equivalent around the outer peripheral of the oil seal.

9) Install the oil seal on the axle housing.



1. Oil seal circumference

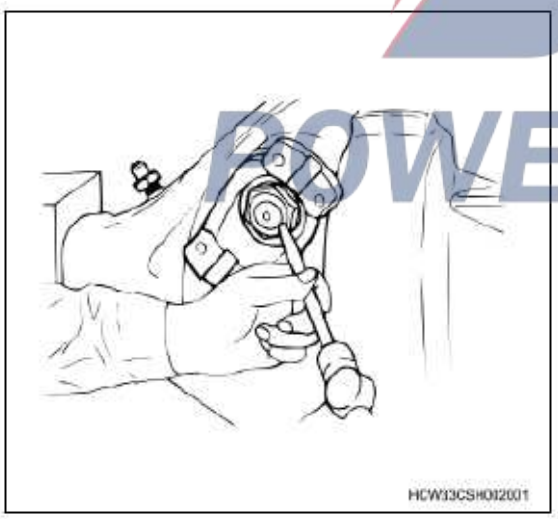
10) Smear chassis grease on the O-ring.

11) Install the flange and the O-ring on the output shaft.

Caution:

・Fasten 17.5HT till the differential is engaged;

Tightening torque: 373N・m{38.0kgf・m/124.74kg・ft}



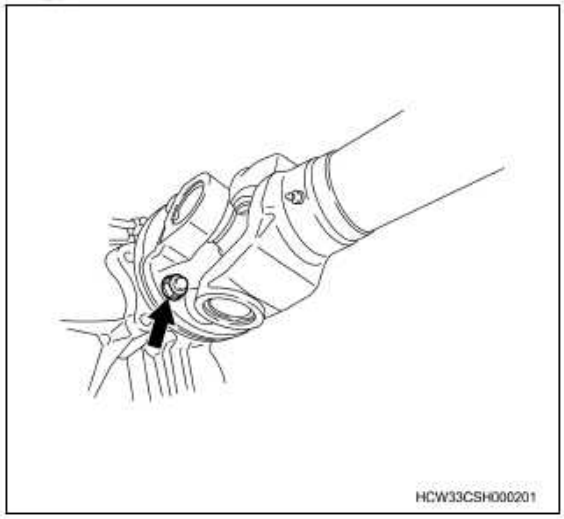
12) Use punching machine, knock Nut into 2 positions.

4. Drive shaft installation

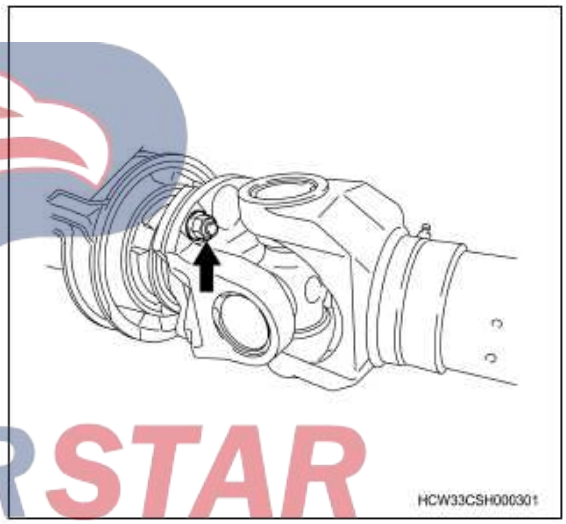
1) Align the calibration marks made during removal, and then, install the drive shaft between the transmission and the axle on the flanges.

Tightening torque: 206N・m{21.0kgf・m/152.01lb・ft}

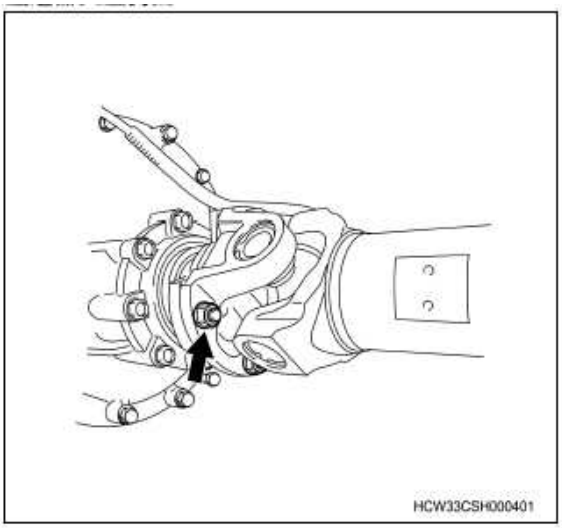
Transmission side



Side of center bearing (if any exposed)



Differential gear pedestal side



Caution:

・If the center shaft spline flange has been removed, reinstall it.

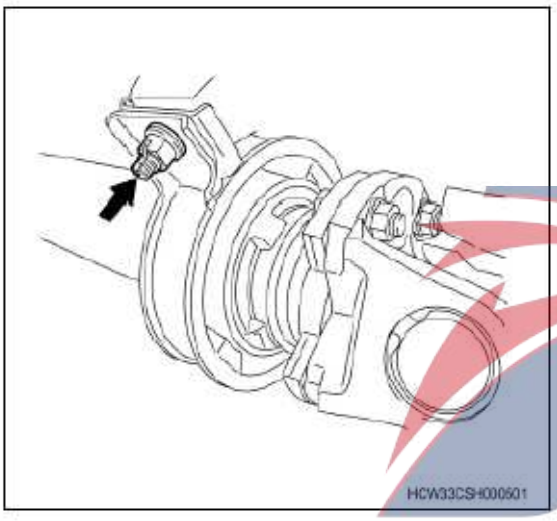
Tightening torque: 1,078N・m{109.9kgf・m/795.01lb・ft}

2) Install the center bearing bracket on the frame. (If there is any center bearing bracket)

Caution:

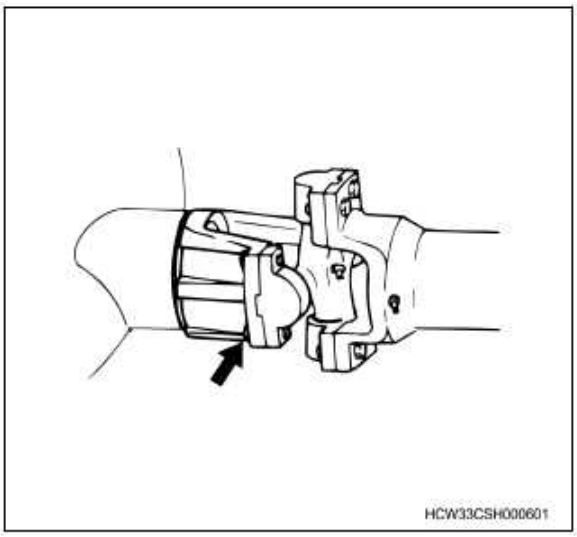
・Be careful to allow the liner on the center bearing to not be pulled to the front or rear of the vehicle.

Tightening torque: 187N・m{19.1kgf・m/138.01lb・ft}



3) Install the drive shaft between the wheel shafts in series onto the flanges.

Tightening torque: 103N・m{10.5kgf・m/76lb・ft}M12-1.25

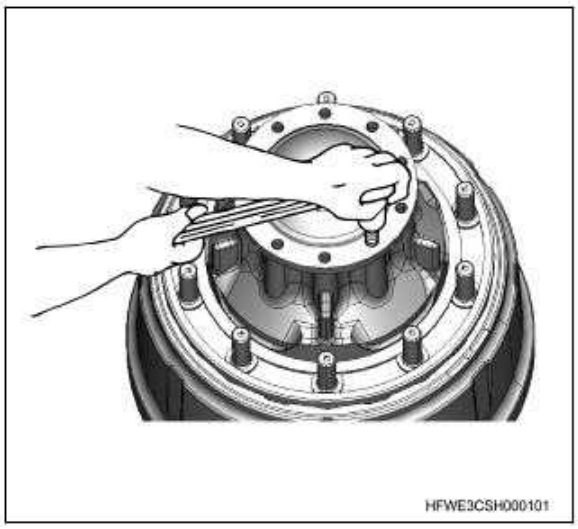


5. Rear axle drive shaft installation

1) Install the rear axle on the reel of the rear hub.

g.

Tightening torque: 181N・m{18.5kgf・m/133.00lb・ft}



6. Connection of nylon tube and air hose.

1. Model with differential lock

1) Connect the nylon air hose to the gearshift device of the differential lock.

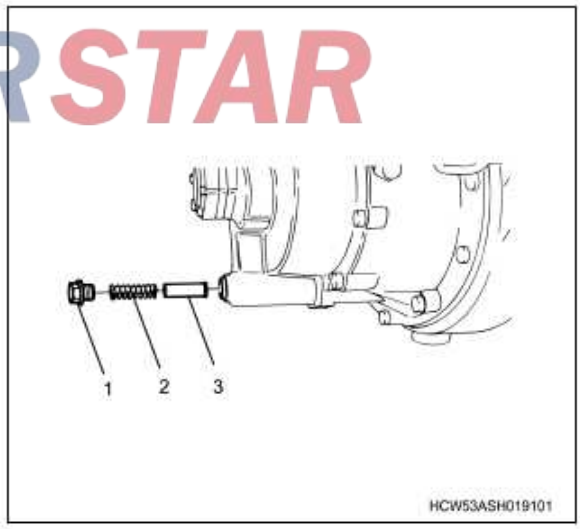
7. Differential gear oil filling

1) Install the oil drain plug on the axle housing

Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}

2) Check whether the coarse filter plug has been installed.

Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}

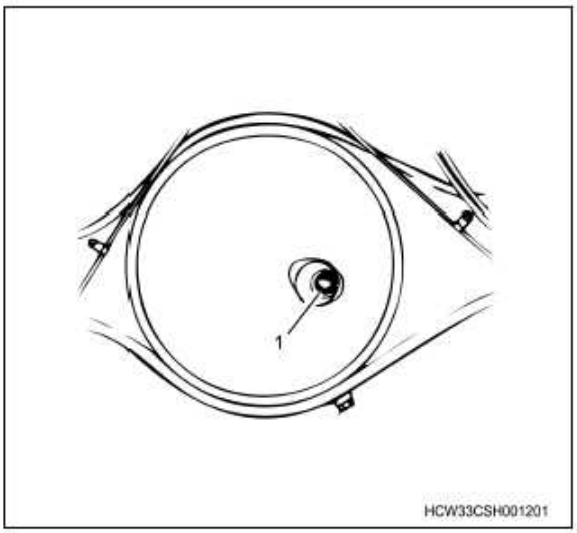


1. Coarse filter plug
2. spring
3. Oil coarse filter

3) Smear differential gear oil on the axle housing.

Caution:

・Adjust the oil level at the oil filling port.



1. Injection port plug hole

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4) Install the injection port plug on the axle housing.

Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}

1. Reference oil amount

Series-type final drive (17.5HT) (forward rear axle)

Oil volume	Oil type
: About18L(about 3.96 American gallons/about 4.76 British gallons)	GL-5(API)–90(SAE)
	GL-5(API)-140(SAE)
	GL-5(API)–80W-90(SAE)

Shaft differential lock shift mechanism(17.5HT)

Removal

1. Dismounting of inter-axle differential lock gear shift mechanism

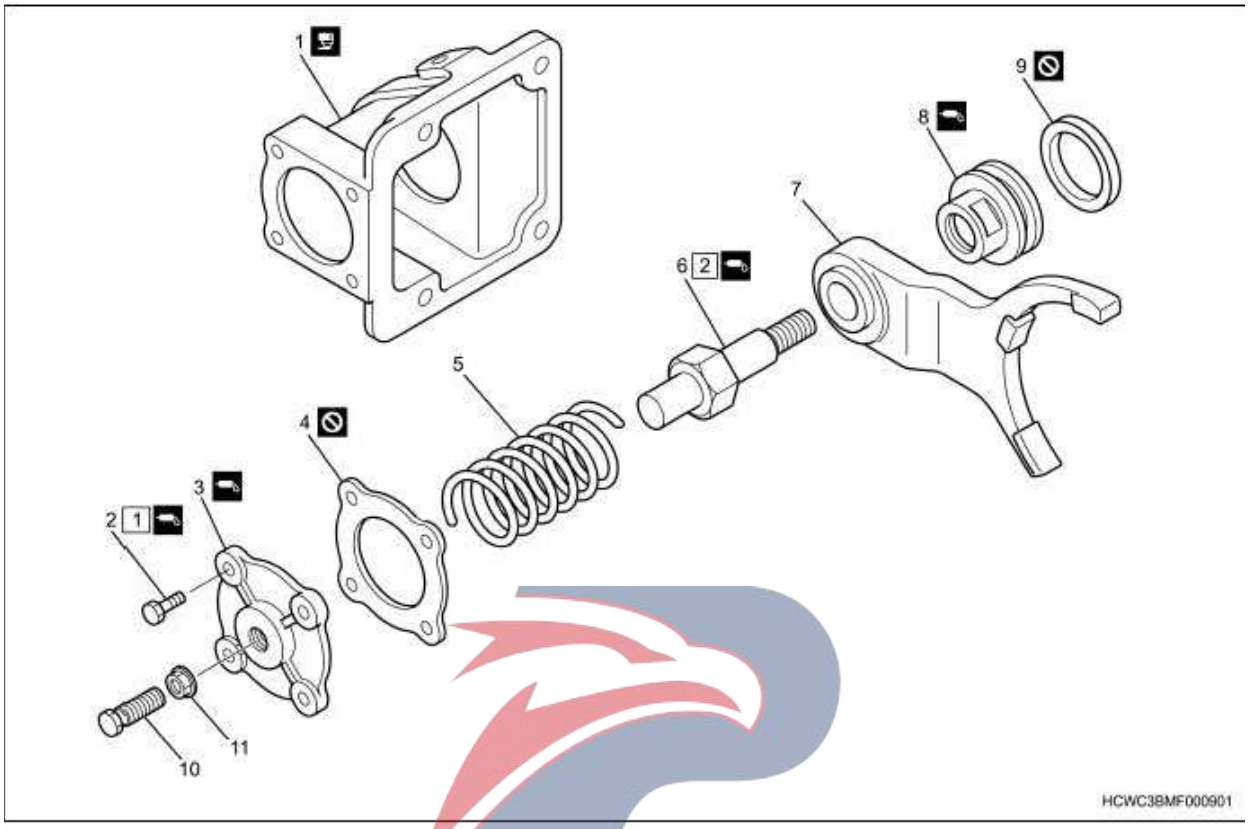
1) Disconnect the nylon air hose on the differential lock gearshift device.

2) Dismount the differential lock gear shift mechanism from the housing of power transfer unit.

Removal

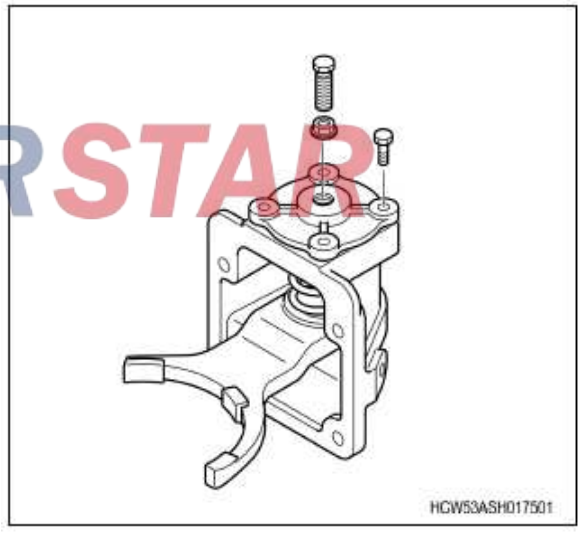
1. Assembly view

Differential lock gearshift device, series-type final drive (17.5HT)



Part Name

1. Air cylinder
2. Cover bolt
3. Cylinder head
4. Cover washer
5. Return spring
6. Gearshift lever
7. Gearshift lever
8. Piston
9. Piston washer
10. Fixing bolt
11. Locking nut



Tightening torque

1: 13N・m{1.3kgf・m/4.54kg・ft}

2: 88N・m{9.0kgf・m/29.48kg・ft}

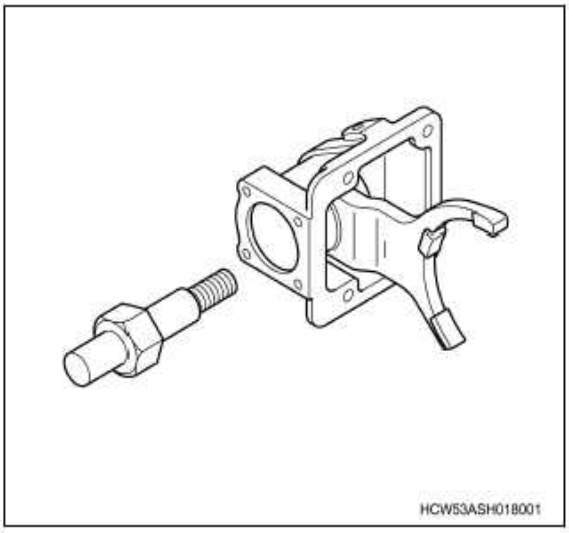
2. Dismounting of inter-axle differential lock gear shift mechanism

1) Dismount the cylinder cover from the differential lock gear shift mechanism.

2) Dismount the cover gasket from the differential lock gear shift mechanism.

3) Remove the return spring from the shifting yoke.

4) Place the wrench on the two flat plates of the piston, stop it and remove the shift lever from the piston.



5) Remove the shifting yoke from the differential lock gear shift mechanism.

6) Remove the piston from the differential lock gear shift mechanism.

7) Remove the piston gasket from the piston.

Inspection

1. Check of inter-axle differential lock gear shift mechanism

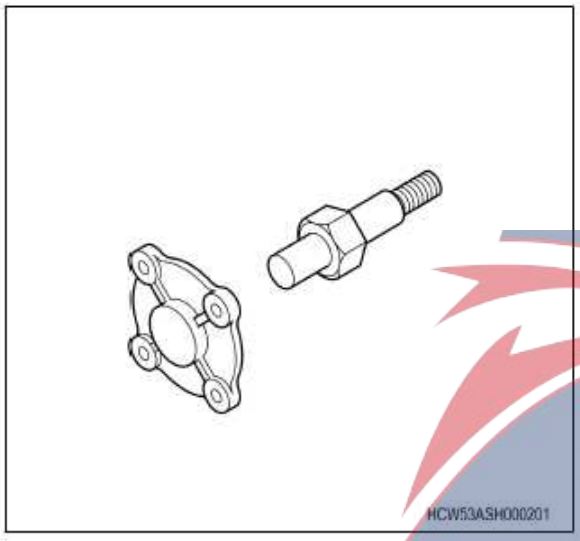
Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1. Check of cylinder cover and gear shift lever

1) Assemble the cylinder head and shift lever and check the following items.

・Serious wear

・Damaged

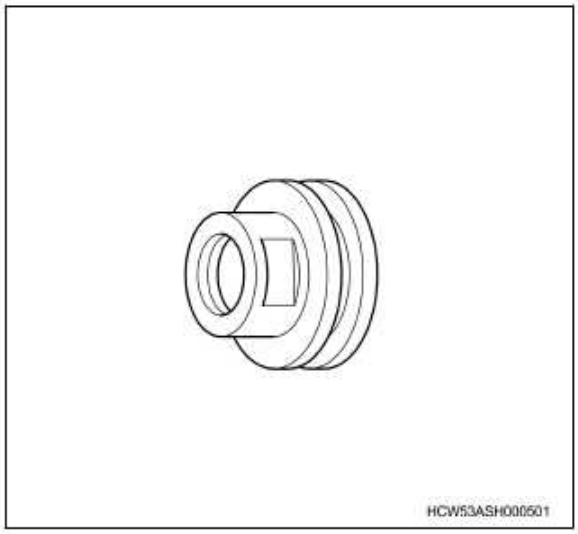


2. Check of piston and cylinder

1) Check the following items.

・Serious wear

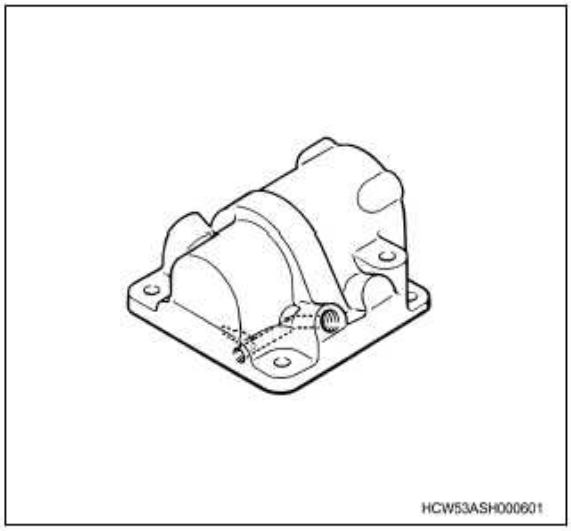
・Damaged



3. Check of cylinder air passage

1) Check the following items.

・Air duct blockage;



4. Check of return spring

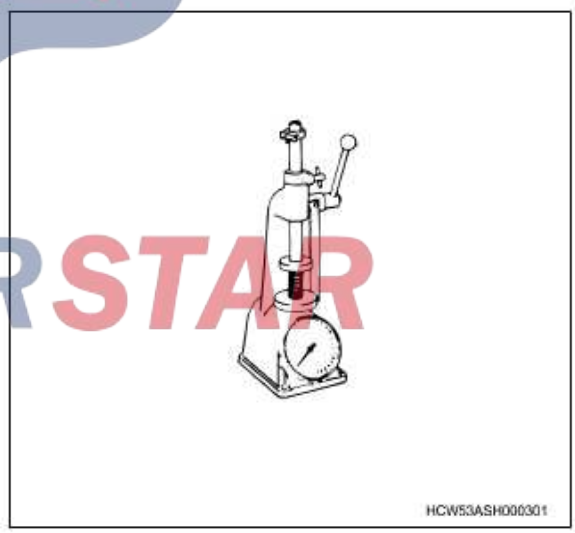
1) Check the following items.・ Rust

5. Measurement of the tightness of return spring

1) Measure the tightness of the return spring.

Specified value: 363N {37kgf/81.6lb·ft}

Limit: 314 N. (32 kilograms force / 70.6 pounds · feet)

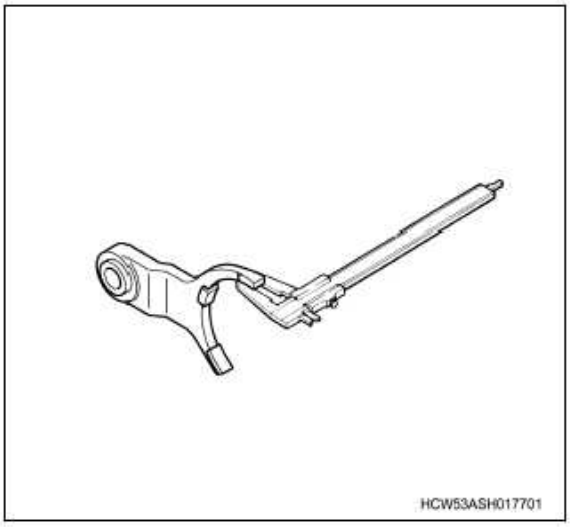


6. Thickness measurement of top sliding surface of shifting yoke

1) Measure the thickness of the top sliding surface of the shifting yoke.

Standard: 0.47 in{0.4724in}

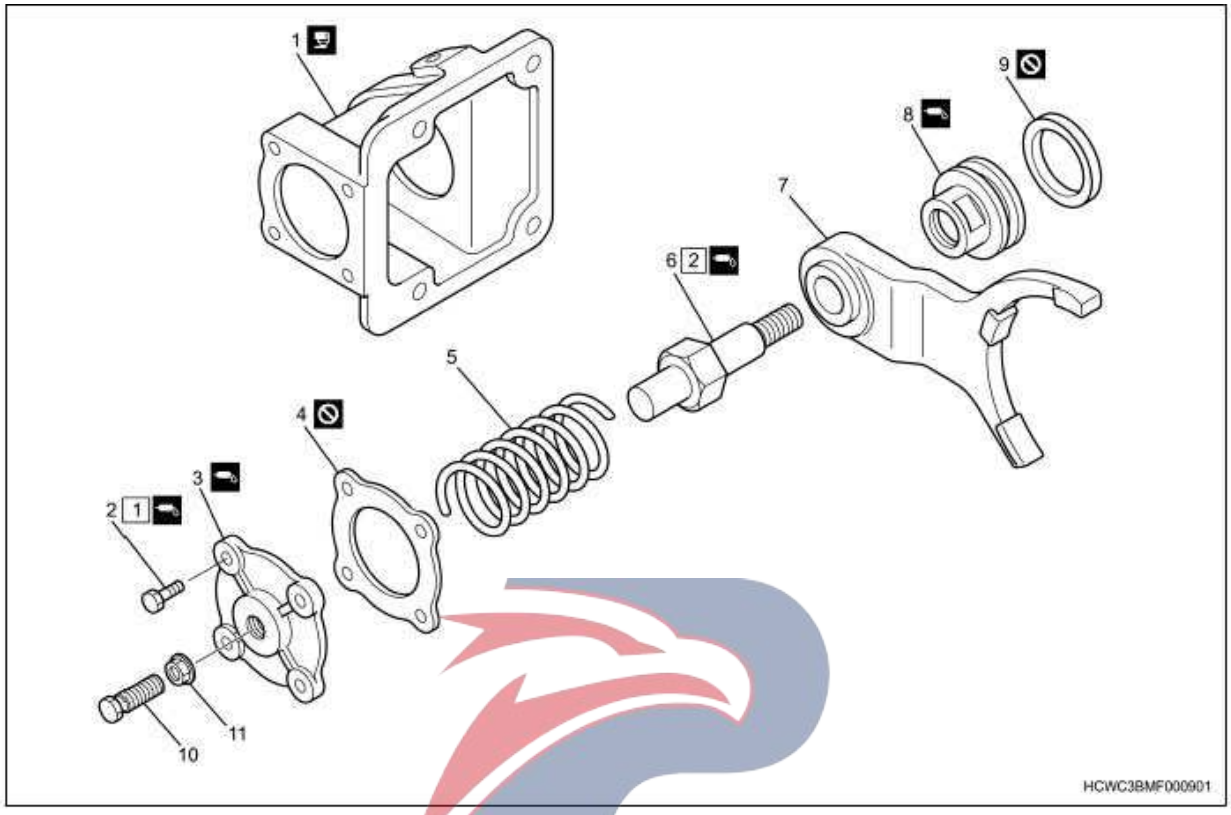
Limit: 0.43in (0.4331in)



Reassemble

1. Assembly view

Differential lock gearshift device, series-type final drive (17.5HT)



Part Name
1. Air cylinder
2. Cover bolt
3. Cylinder head
4. Cover washer
5. Return spring
6. Gearshift lever
7. Gearshift lever
8. Piston
9. Piston washer
10. Fixing bolt
11. Locking nut

Tightening torque
1: 13N・m{1.3kgf・m/4.54kg・ft}
2: 88N・m{9.0kgf・m/29.48kg・ft}

2. Reassembly of inter-axle differential lock gear shift mechanism

1) Install the piston gasket on the piston.

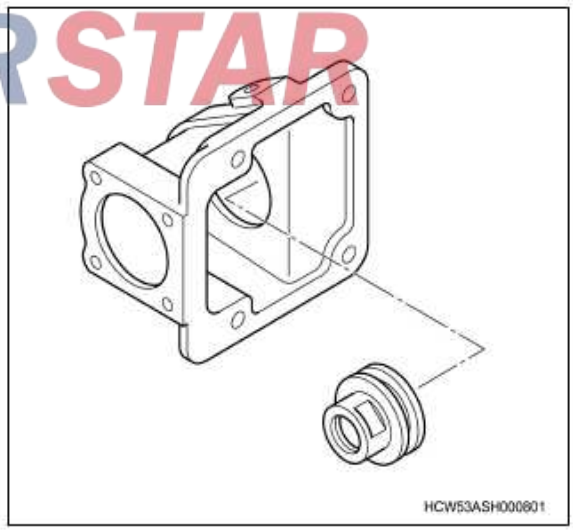
Caution:

・Do not reuse the gasket.

2) Apply molybdenum disulphide multifunctional complex grease to the piston gasket and the piston crown.

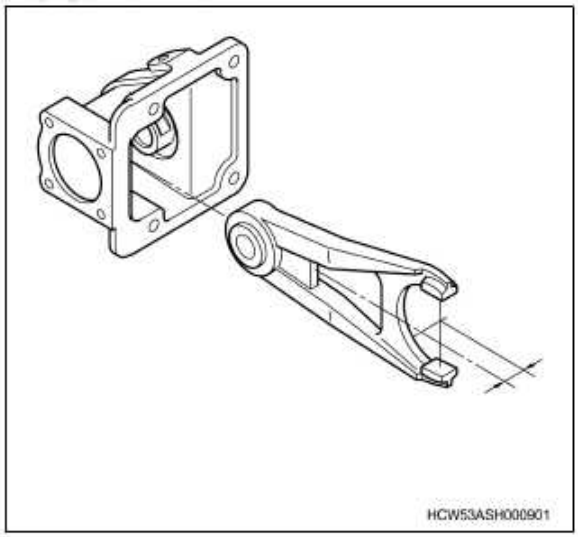
Weight : 3.0g{0.106oz}

3) Install the piston on the differential lock gear shift mechanism.



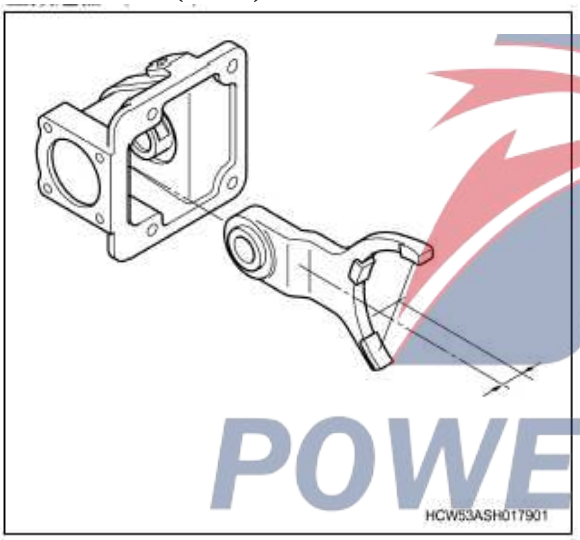
4) In the face of piston side deviations, install the shift fork to the differential lockup mechanism.

Main decelerator



(16.5H)

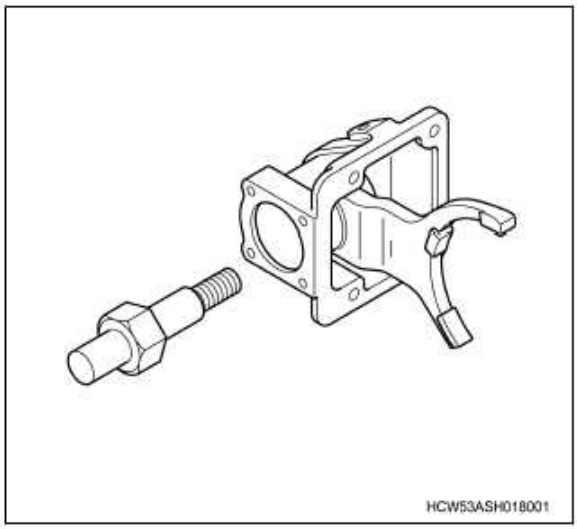
Main decelerator(17.5H)



5) Smear Loctite 242 or any composite equivalent on the thread of the bolt.

6) Install the gear shift lever on the piston.

Tightening torque: 88N・m{9.0kgf・m/29.48kg・ft}



7) Install the return spring on the gear shift lever.

8) Install the seal cover on the differential lock gear shift mechanism.

Caution:

・Do not reuse the gasket

9) Apply molybdenum disulphide multifunctional complex grease to the following parts.

・Inner circular surface of cylinder cover;

・Contact surface;

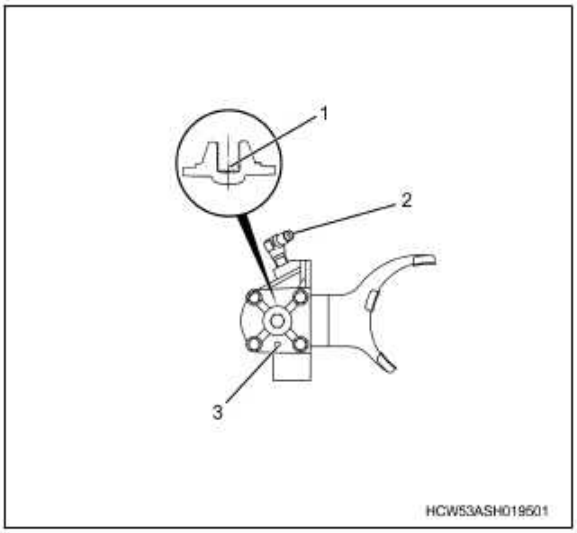
・Outer periphery of gearshift lever;

Weight: 1.0g{0.992g}

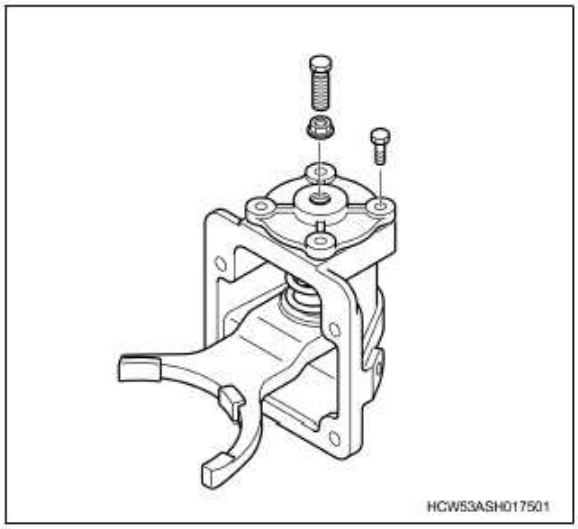
10) Smear Loctite 242 or any composite equivalent on the thread of the bolt.

11) Install the cylinder head on the differential lock as shown below, with the exhaust hole on the cylinder head located opposite the fitting.

Tightening torque: 13N・m{1.3kgf・m/115lb・in}



1. Grease application
2. Joint
3. Exhaust port



Installation

1. Installation of inter-axle differential lock gear shift mechanism

1) Smear FMD127 or any equivalent on the installation surface of the differential lock gearshift device.

2) Install the differential lock gearshift mechanism to the transfer case.

Tightening torque: 50N・m{5.1kgf・m/36.99lb・ft}

3) Check the running state of the differential gear lock through injecting air into the differential lock gearshift device.

Caution:

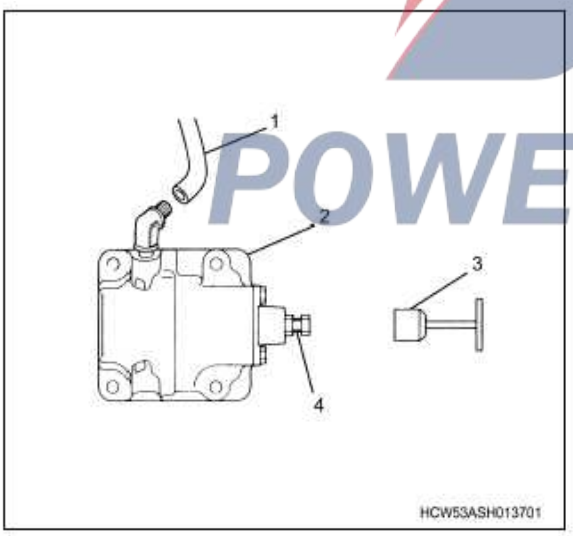
・Take off the lock nut, and apply Loctite 242 or other equivalent glue to the threads;

4) Screw it in the fixing bolt by hand until it cannot be screwed in any more.

5) Tighten it further using a tool.

Angle: 60–120°

6) Tighten the lock nut and thus the lock bolt.



1. External air source

2. Differential lock gearshift device

3. Tool

4. Fixing bolt

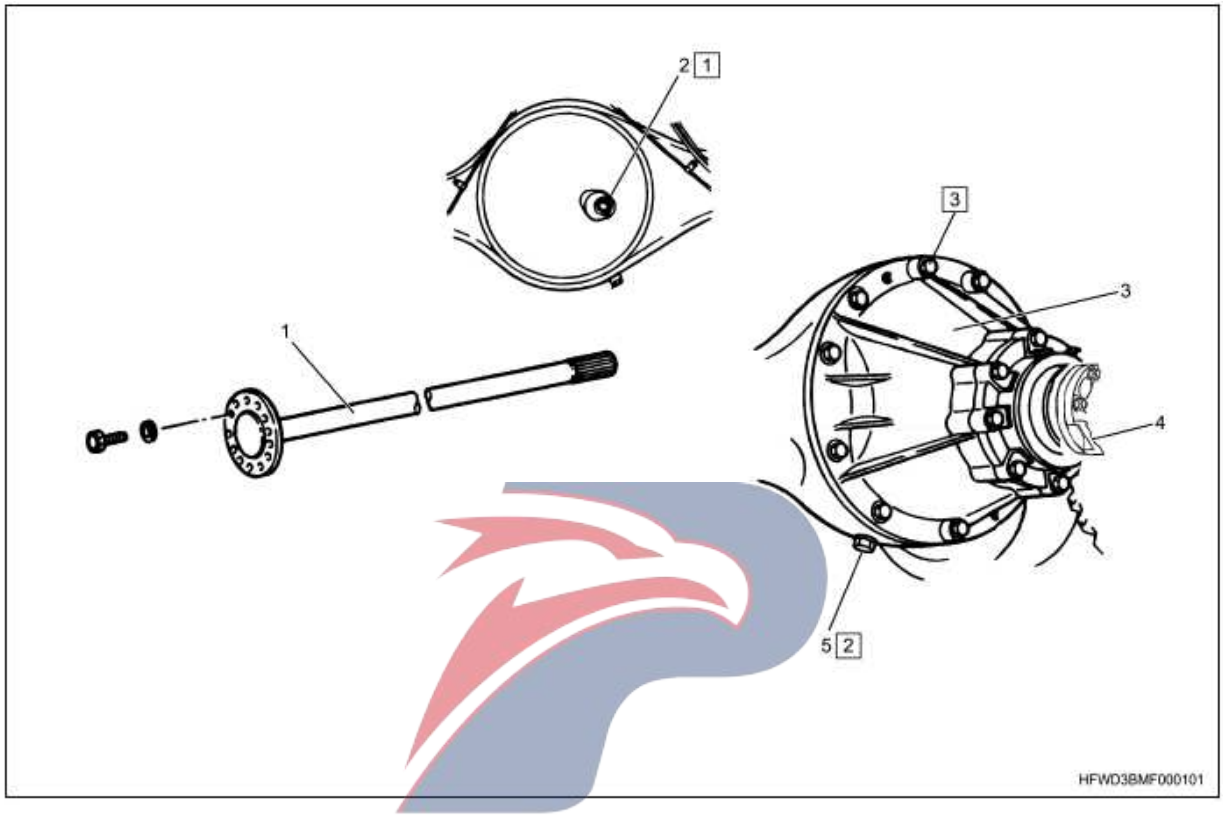
---

7) Connect the nylon air hose to the gearshift device of the differential lock.

Supplementary information

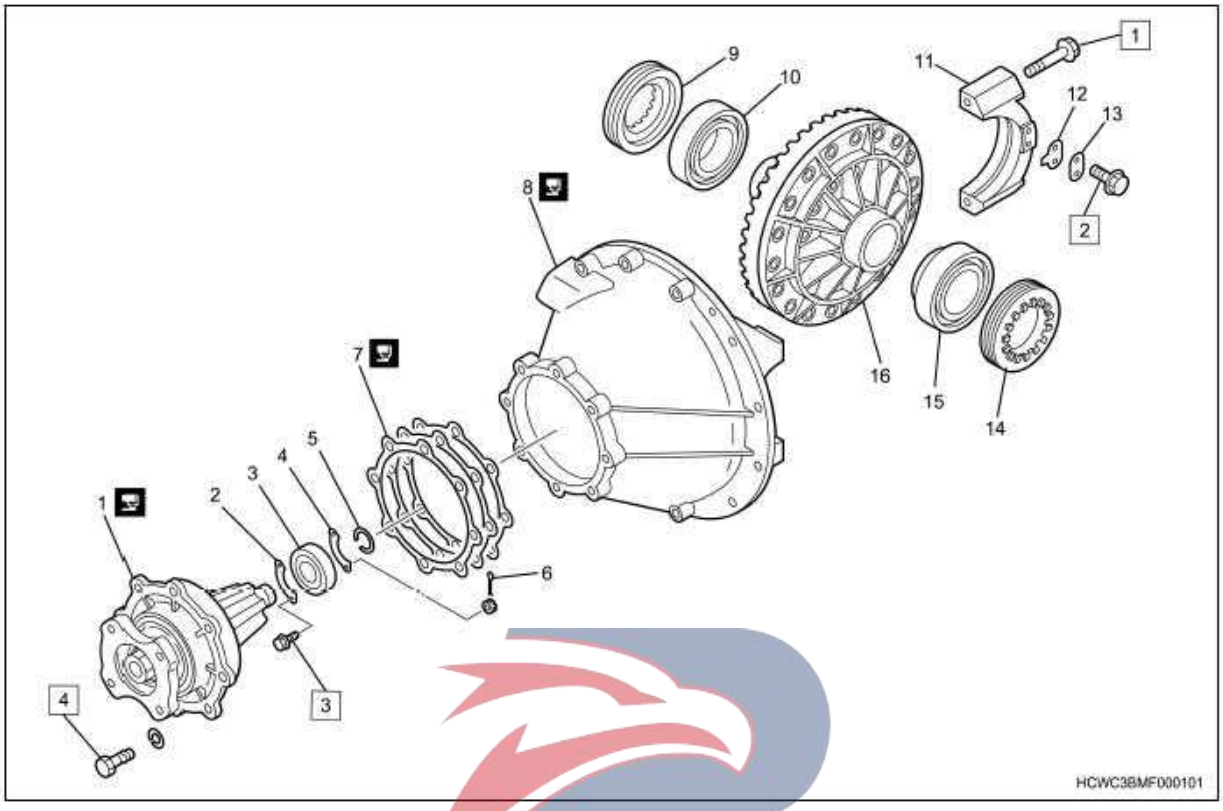
1. Assembly view

Rear differential gear (single)



Part Name	Tightening torque
1. Rear axle drive shaft	
2. Injection port plug	1: 69N・m{7.0kgf・m/51lb・ft}
3. Final drive	2: 69N・m{7.0kgf・m/51lb・ft}
4. Drive shaft	3: 219N・m{22.3kgf・m/73.48kg・ft}
5. Oil drain plug	

Final drive (17.5H, 18.5H)



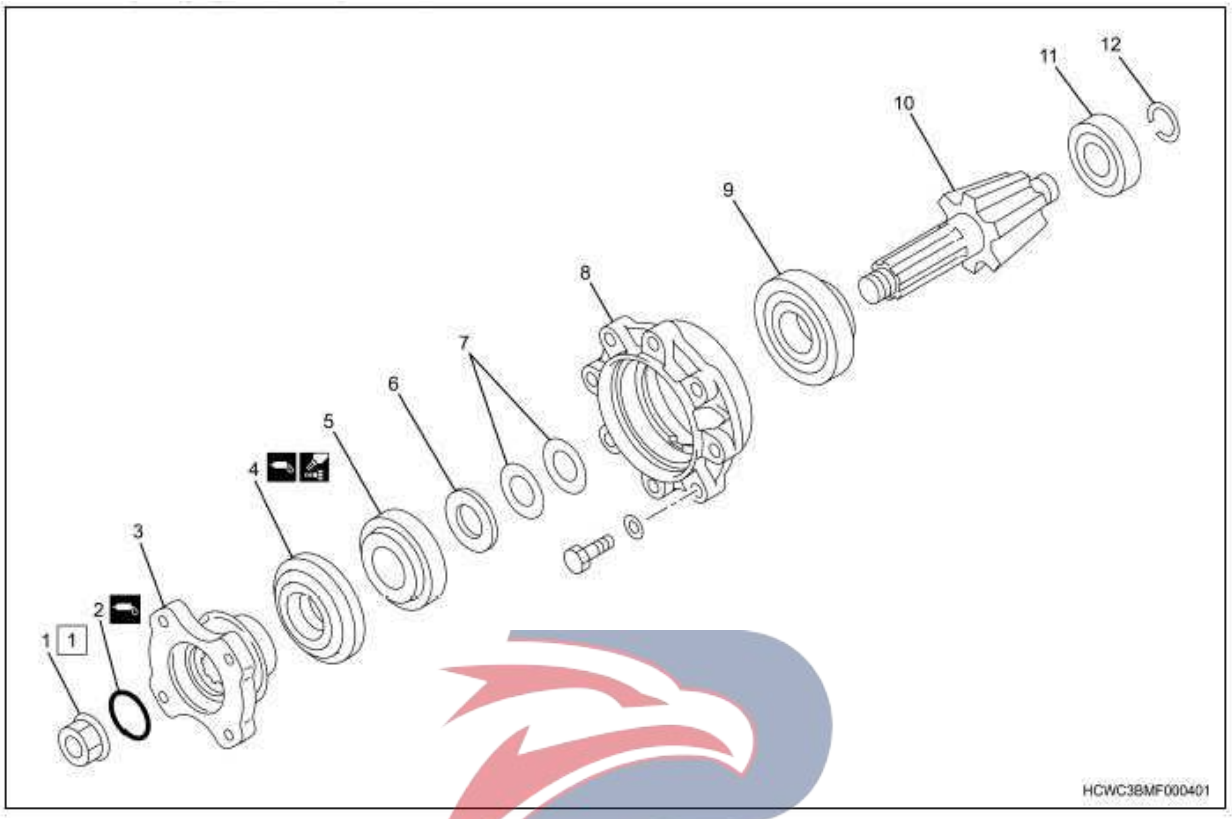
Part Name

1. Driving pinion
2. Guard ring
3. Guide bearing
4. Guard ring
5. Snap ring
6. Cotter pin
7. Gasket
8. Differential gear pedestal
9. Adjusting nut
10. Side bearing
11. Bearing cover
12. Locking plate
13. Lock washer (17.5H)
14. Adjusting nut
15. Side bearing
16. Differential gear housing

Tightening torque

1: 402N・m{41.0kgf・m/134.26kg・ft}
2:20Nm (2.0kgf.m/15lb.ft) 17.5H profile
2: 26N・m{2.7kgf・m/19lb・ft}18.5H
3: 13N・m{1.3kgf・m/115lb・in}
4: 165N・m{16.8kgf・m/55.34kg・ft}

Driving pinion, final drive (17.5H, 18.5H)



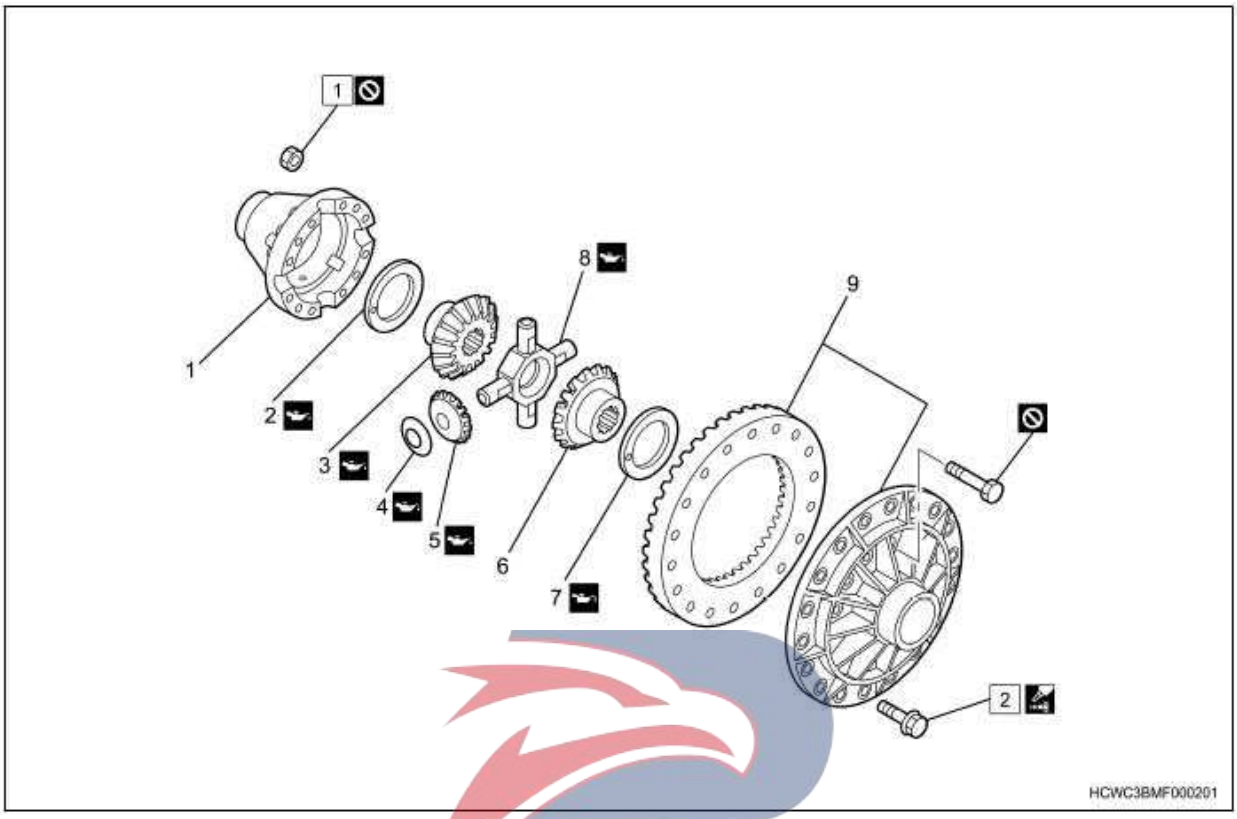
Part Name

1. Flange nut
2. O-ring
3. Flange
4. Oil seal
5. Outer bearing
6. spacer
7. Gasket
8. Driving gear bracket
9. Inner bearing
10. Driving pinion
11. Guide bearing
12. Snap ring

Tightening torque

1: 845N・m{86.2kgf・m/282.59kg・ft}

Differential gear, final drive (17.5H, 18.5H)



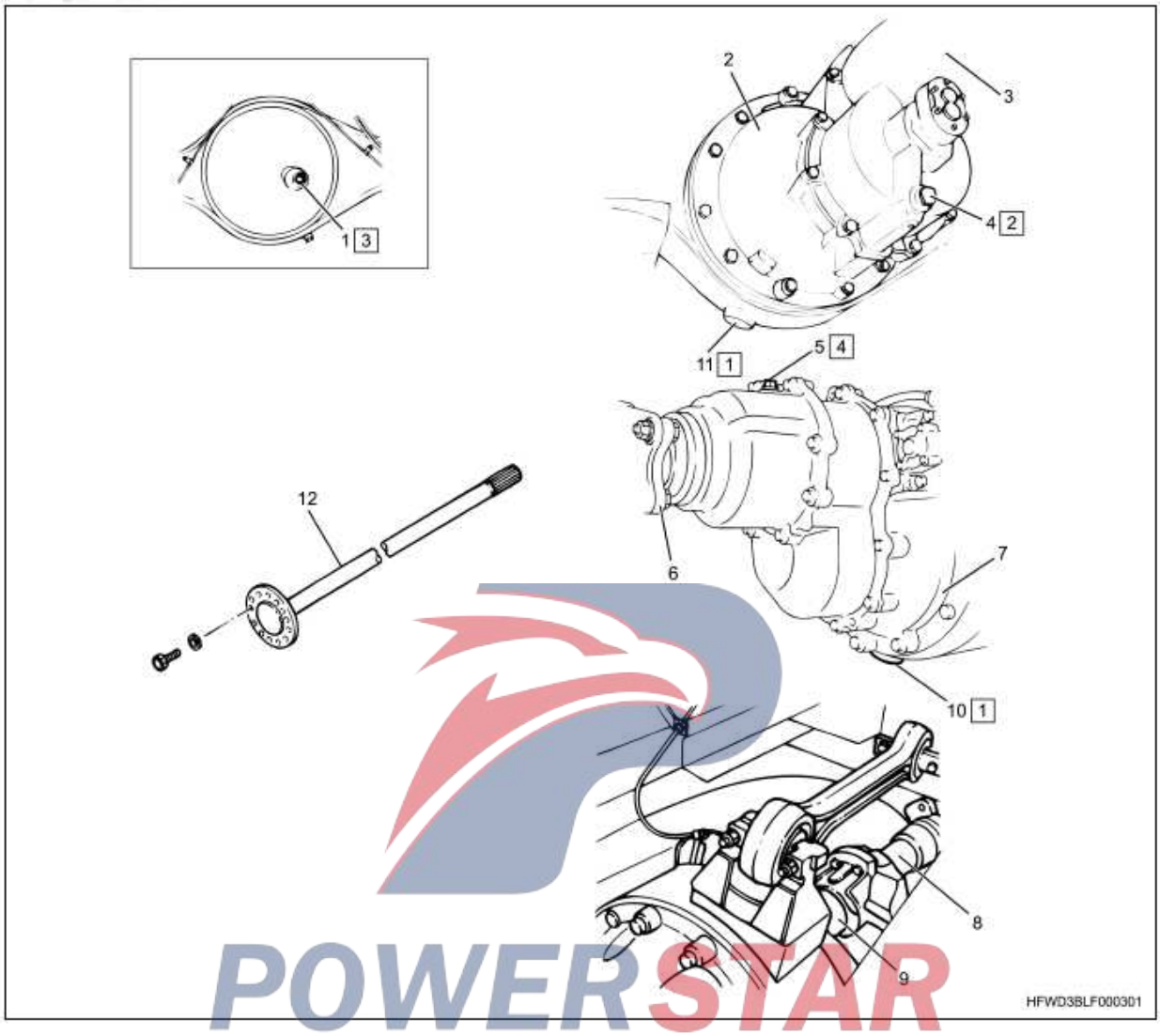
Part Name

1. Differential gear housing A
2. Side gear thrust washer
3. Side gear
4. Driving gear thrust washer
5. Driving gear
6. Side gear
7. Side gear thrust washer
8. Cross axle
9. Differential gear housing B and gear ring

Tightening torque

1: 206N・m{21.0kgf・m/68.95kg・ft}
2: 431N・m{43.9kgf・m/144.24kg・ft}

Rear differential gear (in series)



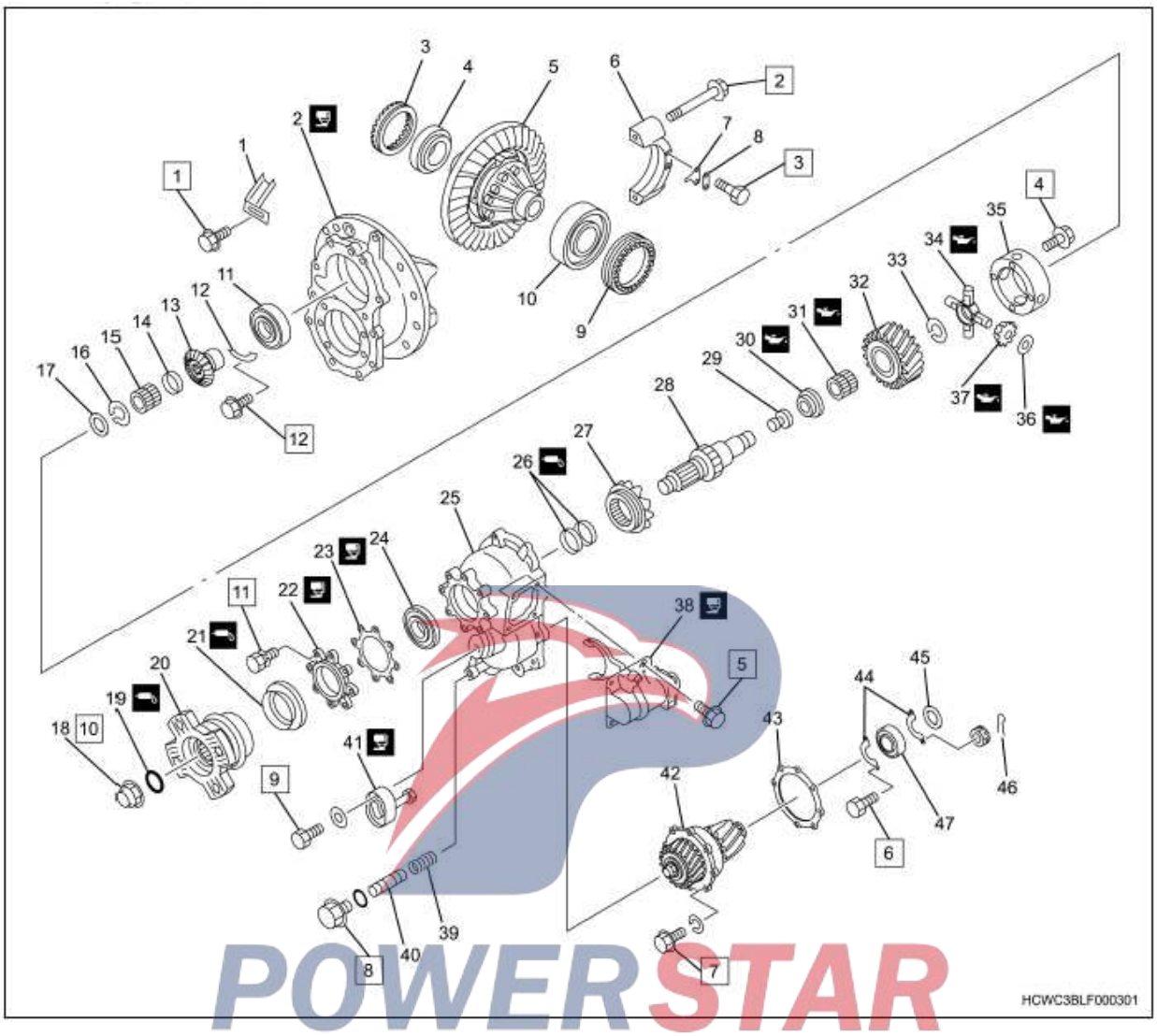
Part Name

1. Injection port plug
2. Final drive
3. Drive shaft flange
4. Coarse filter plug
5. Injection port plug
6. Drive shaft flange
7. Final drive
8. Drive shaft (between the two rear axles)
9. Output shaft
10. Oil drain plug
11. Oil drain plug
12. Axle

Tightening torque

1: 69N・m{7.0kgf・m/51lb・ft}
2: 69N・m{7.0kgf・m/51lb・ft}
3: 69N・m{7.0kgf・m/51lb・ft}
4: 44N・m{4.5kgf・m/14.51kg・ft}

Series-type final drive (17.5HT)



Part Name

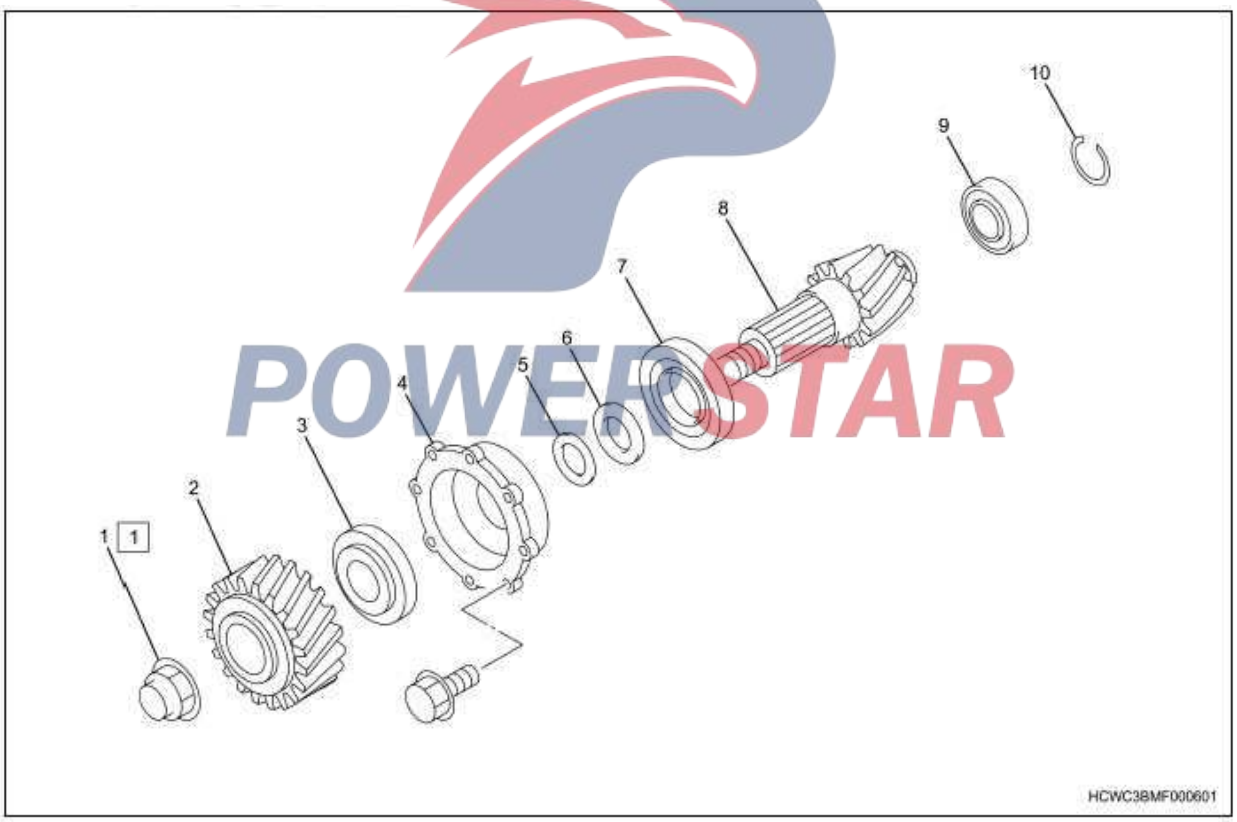
1. Oil skimmer
2. Differential gear pedestal
3. Adjusting nut
4. Side bearing
5. Differential gear
6. Bearing cover
7. Locking plate
8. Lock washer
9. Adjusting nut
10. Side bearing
11. Input shaft bearing
12. Oil catcher
13. Side gear
14. spacer
15. Needle roller bearing
16. Snap ring
17. Thrust washer
18. Nut
19. O-ring
20. Flange
21. Oil seal
22. Bearing retainer
23. Gasket
24. Input shaft bearing
25. Power distributor housing
26. Seal ring
27. Differential lock switch
28. Input shaft
29. Plug
30. Thrust washer
31. Needle roller bearing
32. Driven spiral gear
33. Snap ring
34. Cross axle
35. Differential gear housing

36. Driving gear thrust washer
37. Driving gear
38. Differential lock gearshift device
39. spring
40. Coarse filter
41. Oil pump
42. Driving pinion
43. Gasket
44. Guard ring
45. Snap ring
46. Cotter pin
47. Guide bearing

3: 20N・m{2.0kgf・m/6.80kg・ft}
4: 51N・m{5.2kgf・m/17.24kg・ft}
5: 50N・m{5.1kgf・m/16.78kg・ft}
6: 13N・m{1.3kgf・m/4.54kg・ft}
7: 185N・m{18.9kgf・m/61.69kg・ft}
8: 69N・m{7.0kgf・m/51lb・ft}
9: 18N・m{1.8kgf・m/5.90kg・ft}
10: 686N・m{70.0kgf・m/229.52kg・ft}
11: 98N・m{10.0kgf・m/32.66kg・ft}
12: 26N・m{2.7kgf・m/8.62kg・ft}

Tightening torque
1: 26N・m{2.7kgf・m/8.62kg・ft}
2: 402N・m{41.0kgf・m/134.26kg・ft}

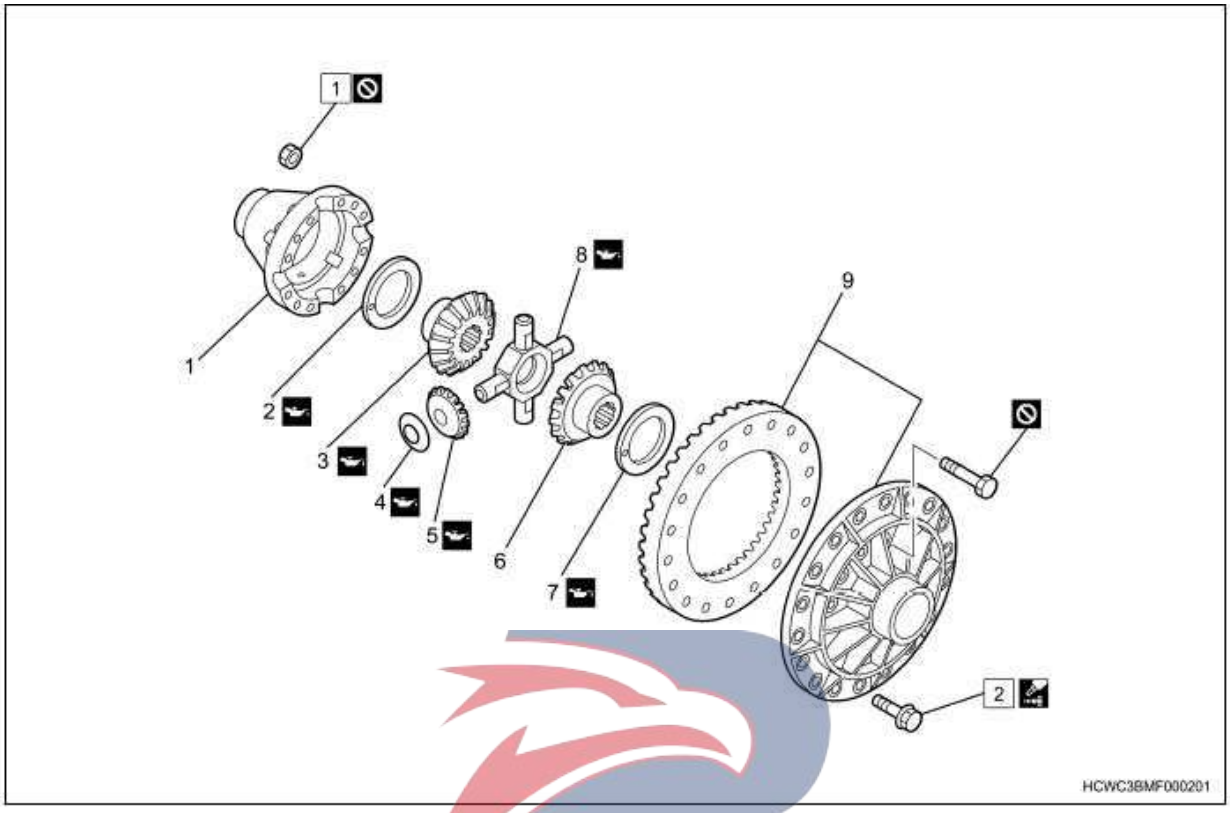
Driving pinion, in-series final drive (17.5HT)



Part Name
1. Pinion nut
2. Driven spiral gear
3. Outer bearing
4. Driving gear bracket
5. Gasket
6. spacer
7. Inner bearing
8. Driving pinion
9. Guide bearing
10. Snap ring

Tightening torque
1: 834N・m{85.0kgf・m/278.96kg・ft}

Differential gear, series-type final drive (17.5HT)



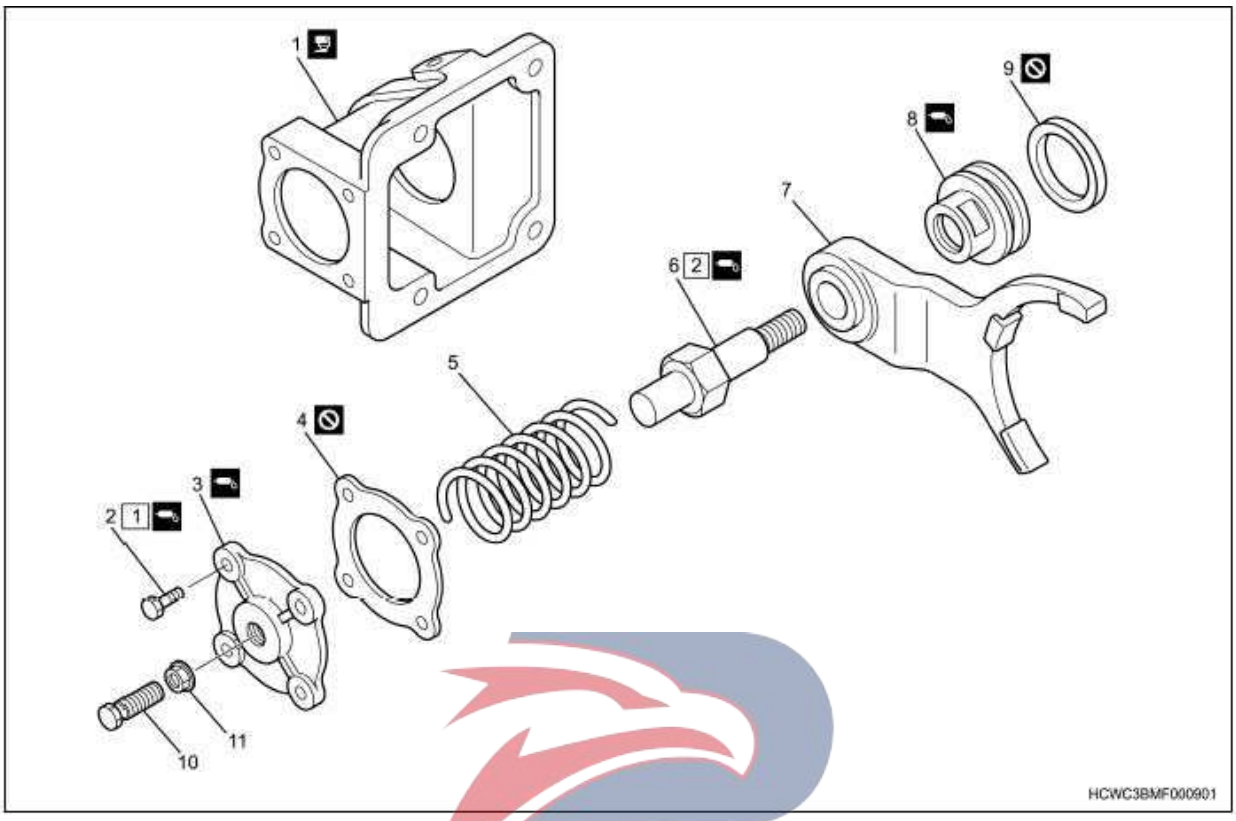
Part Name

1. Differential gear housing A
2. Side gear thrust washer
3. Side gear
4. Driving gear thrust washer
5. Driving gear
6. Side gear
7. Side gear thrust washer
8. Cross axle
9. Differential gear housing B and gear ring

Tightening torque

1: 206N・m{21.0kgf・m/152lb・ft}17.5HT
2: 431N・m{43.9kgf・m/144.24kg・ft}17.5HT

Differential lock gearshift device, series-type final drive (17.5HT)



Part Name

1. Air cylinder
2. Cover bolt
3. Cylinder head
4. Cover washer
5. Return spring
6. Gearshift lever
7. Gearshift lever
8. Piston
9. Piston washer
10. Fixing bolt
11. Locking nut

Tightening torque

1: 13N・m{1.3kgf・m/4.54kg・ft}

2: 88N・m{9.0kgf・m/29.48kg・ft}

Drive train, axle

Drive shaft system

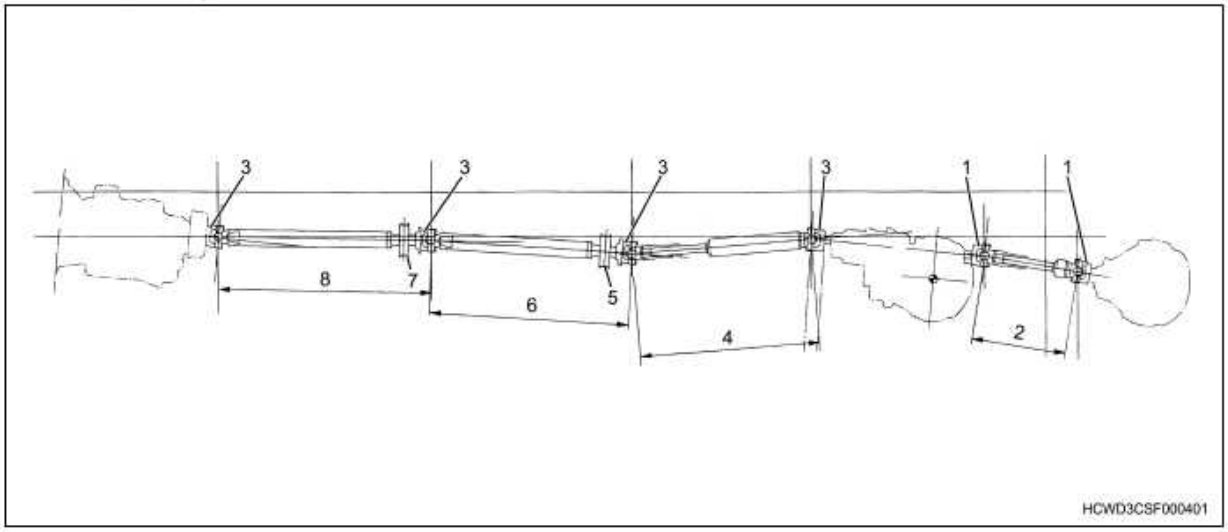
Table of contents

Rear drive shaft

Removal

Component view

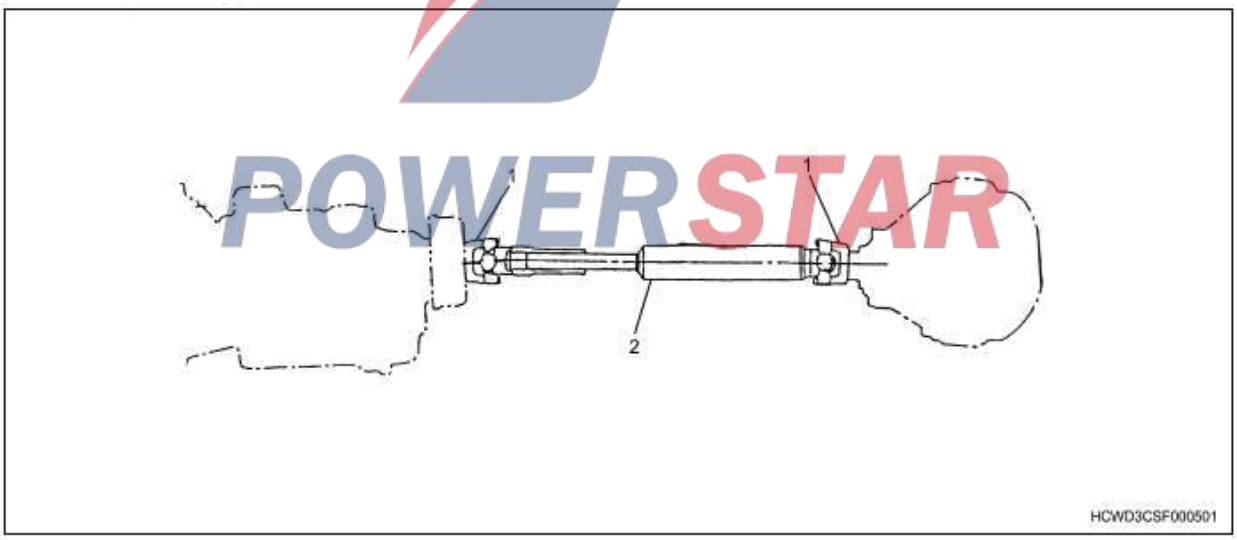
Rear drive shaft（F**）



Part Name

1. Flange fork (between the two rear axles)
2. Drive shaft (between the two rear axles)
3. Flange fork
4. End drive shaft
5. Center bearing bracket (if applicable)
6. 2nd-position drive shaft (if applicable)
7. Center bearing bracket (if applicable)
8.1 1st-position drive shaft (if applicable)

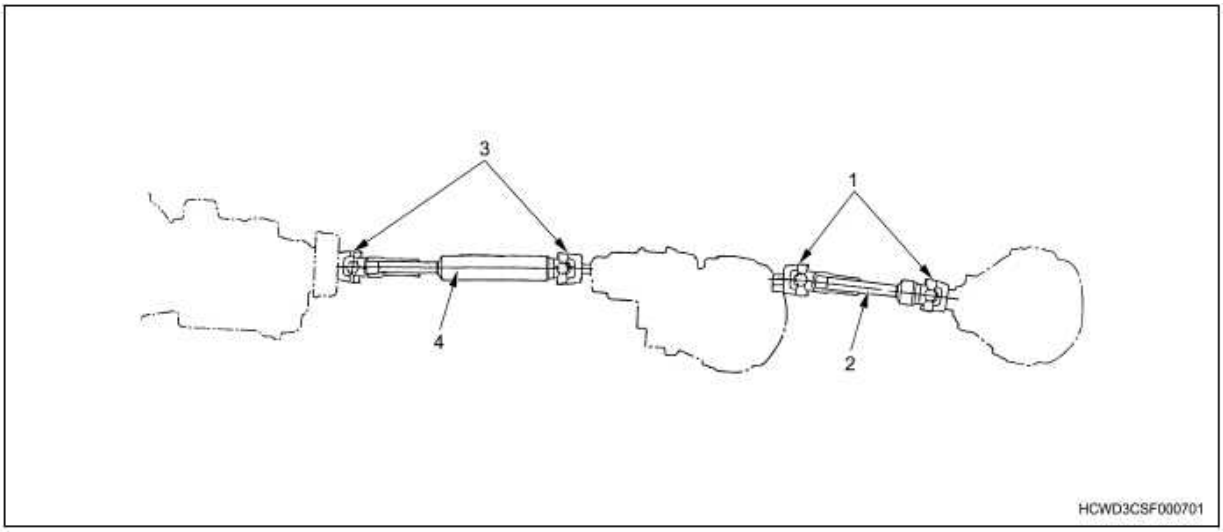
Rear drive shaft (GXR)



Part Name

1. Flange fork
2. Drive shaft

Rear drive shaft (GXZ)



Part Name

1. Flange fork (between the two rear axles)
2. Drive shaft (between the two rear axles)
3. Flange fork
4. End drive shaft

---

2. Drive shaft removal

1. Model with single rear differential gear

1) Make an alignment mark on each connector.

2) Remove the drive shaft between the transmission and drive axle from the flange of the transmission.

2. Tandem-type rear differential gear model

1) Make an alignment mark on each connector.

2) Remove the drive shaft between the transmission and drive axle from the flange of the transmission.

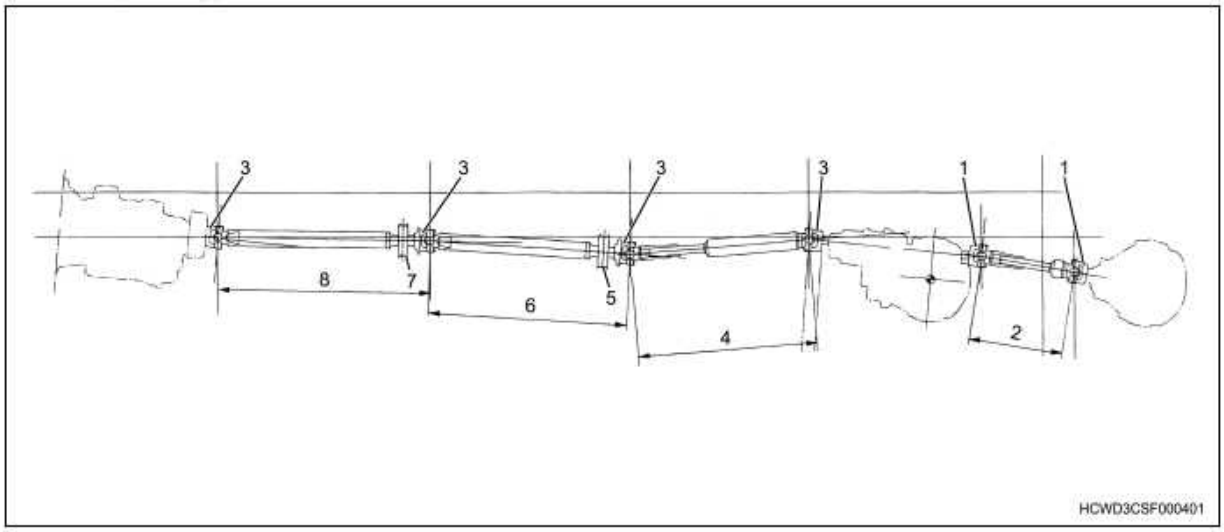
3) Remove the center bearing bracket from the frame. (If there is any center bearing bracket)

4) Remove the drive shaft connecting the drive axles in series from the drive axle flanges.

Installation

1. Component view

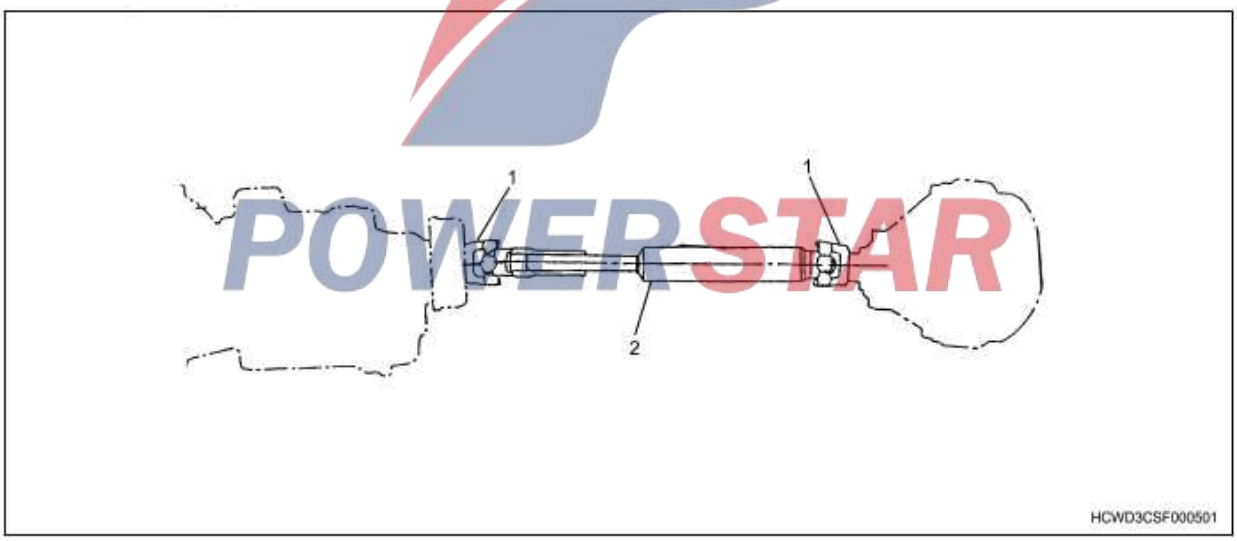
Rear drive shaft（F**）



Part Name

1. Flange fork (between the two rear axles)
2. Drive shaft (between the two rear axles)
3. Flange fork
4. End drive shaft
5. Center bearing bracket (if applicable)
6. 2nd-position drive shaft (if applicable)
7. Center bearing bracket (if applicable)
8. 1st-position drive shaft (if applicable)

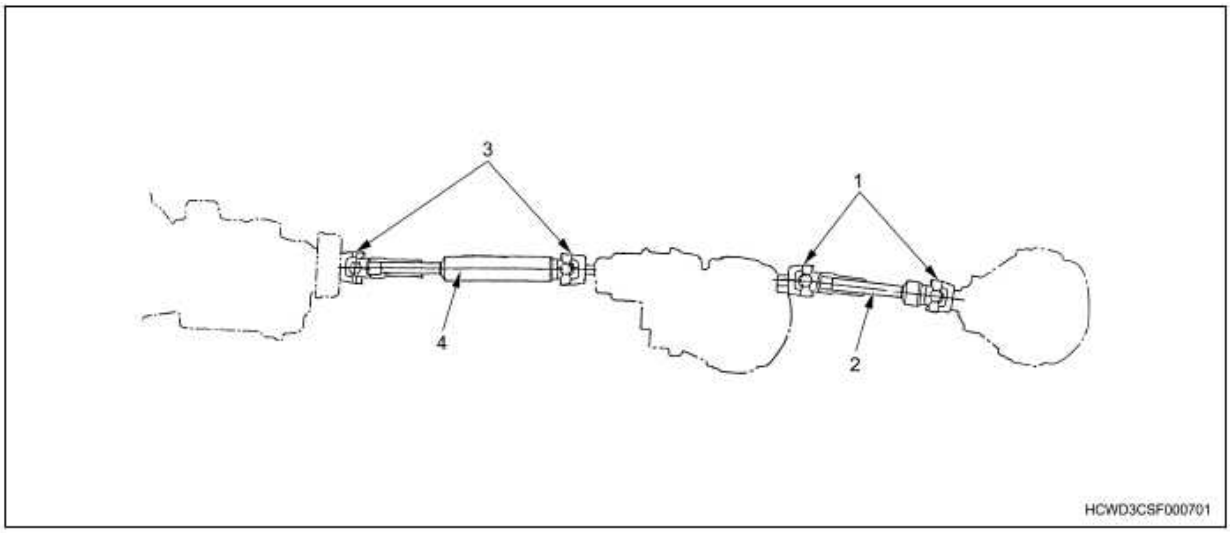
Rear drive shaft (GXR)



Part Name

1. Flange fork
2. Drive shaft

Rear drive shaft (GXZ)



Part Name

1. Flange fork (between the two rear axles)
2. Drive shaft (between the two rear axles)
3. Flange fork
4. End drive shaft

---

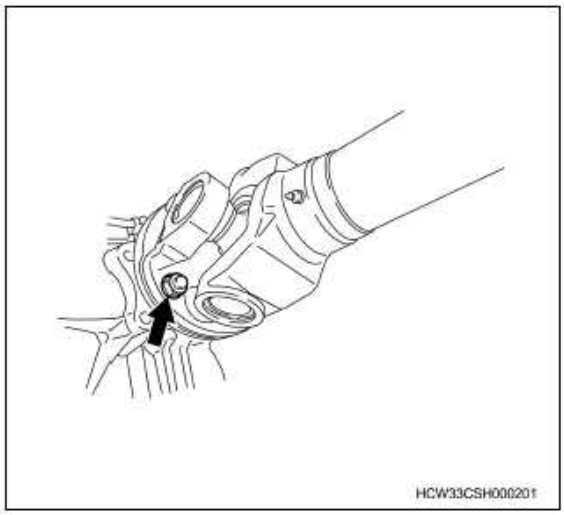
2. Drive shaft installation

1. Model with single rear differential gear

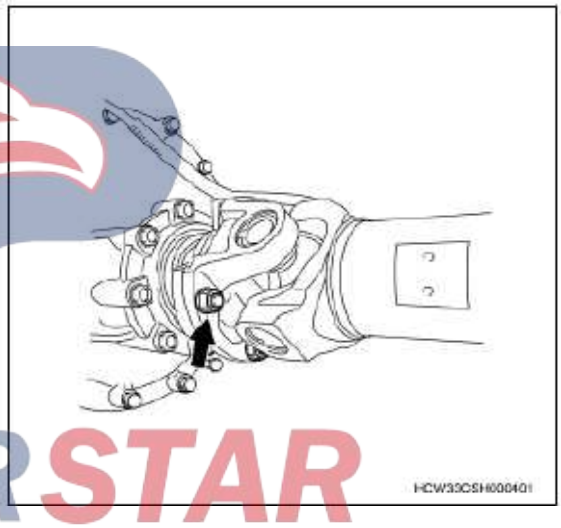
1) Align the calibration marks made during removal, and then, install the drive shaft between the transmission and the axle on the flanges.

Tightening torque: 206N・m{21.0kgf・m/152lb・ft}M14

Transmission side



Differential gear pedestal side

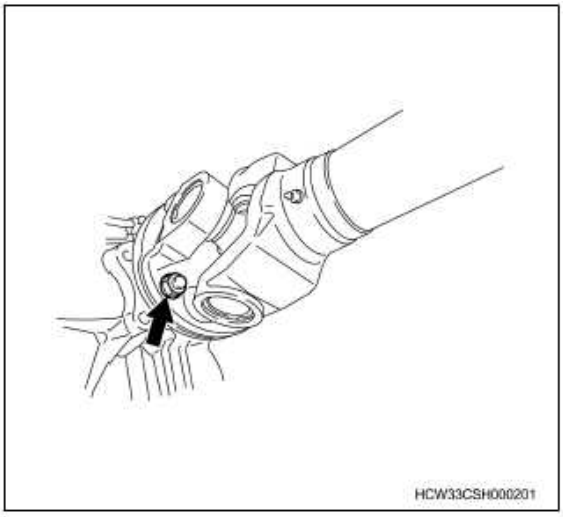


2. Tandem-type rear differential gear model

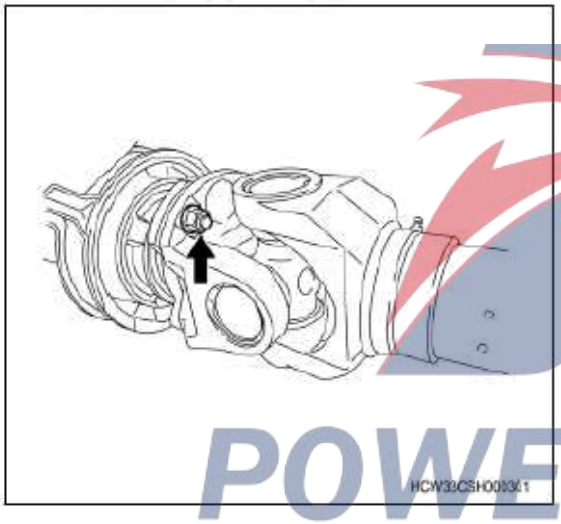
1) Align the calibration marks made during removal, and then, install the drive shaft between the transmission and the axle on the flanges.

Tightening torque: 206N・m{21.0kgf・m/152.01lb・ft}

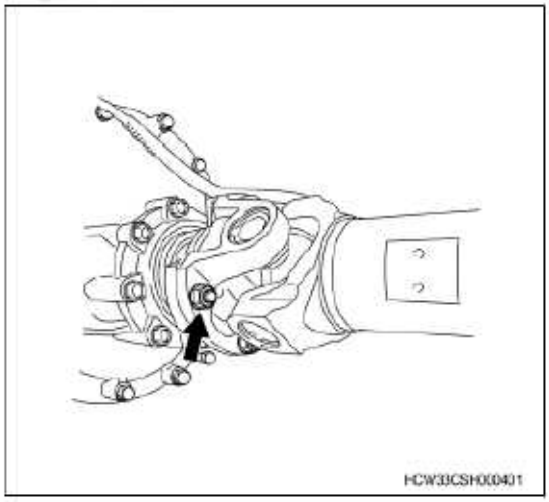
Transmission side



Side of center bearing (if any exposed)



Differential gear pedestal side



Note:

・If the center shaft spline flange has been removed, reinstall it.

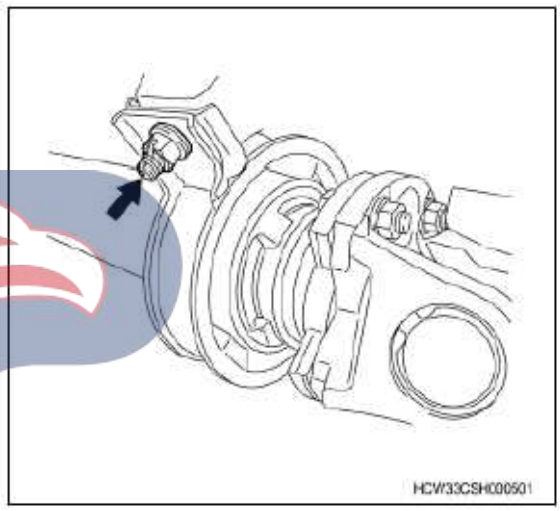
Tightening torque: 1,078N・m{109.9kgf・m/795.01lb・ft}

2) Install the center bearing bracket on the frame. (If there is any center bearing bracket)

Caution:

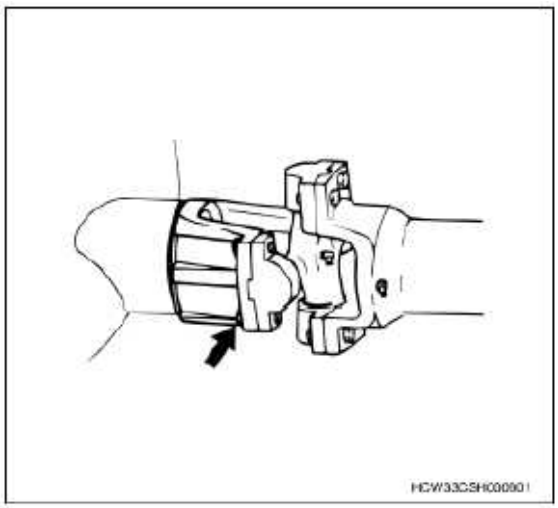
・Be careful to allow the liner on the center bearing to not be pulled to the front or rear of the vehicle.

Tightening torque: 187N・m{19.1kgf・m/138.01lb・ft}



3) Install the drive shaft between the wheel shafts in series onto the flanges.

Tightening torque: 103N・m{10.5kgf・m/76lb・ft}M12-1.25

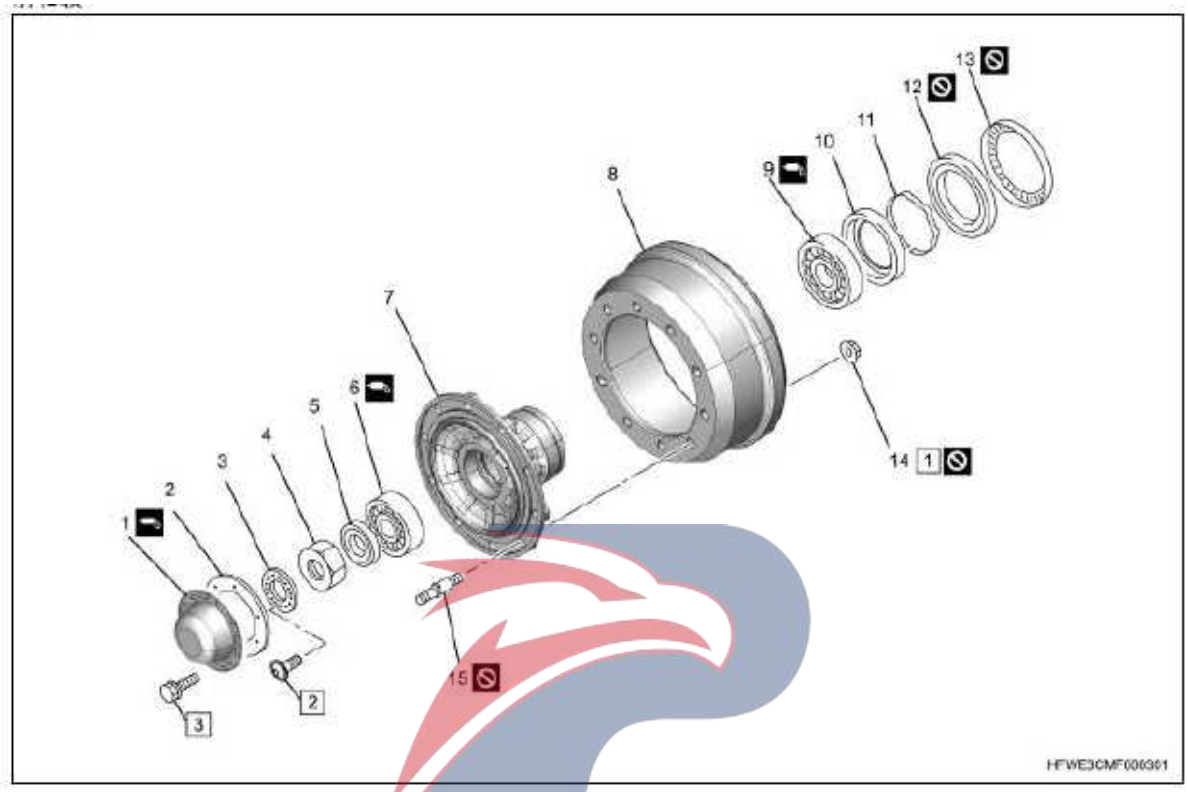


Front wheel hub

Removal

1. Component view

Front wheel hub



Part Name

1. Wheel hub cap
2. Hub cap gasket
3. Lock washer
4. Wheel hub nut
5. Front wheel hub bearing washer
6. Outer bearing
7. Front wheel hub
8. Brake drum
9. Inner bearing
10. Cover
11. Snap ring
12. Oil seal
13. Front excitation ring
14. Nut
15. Wheel pin

Tightening torque

1: 397N・m{40.5kgf・m/132.90kg・ft}
2: 9N・m{0.9kgf・m/36.29kg・in}
3: 23N・m{2.3kgf・m/7.71kg・ft}

2. Removal of disc wheel and tire

1) Move the vehicle onto a flat ground.
2) Pull out the parking brake rod.
3) Put the stop wedge on the vehicle.
4) Jack up the vehicle.

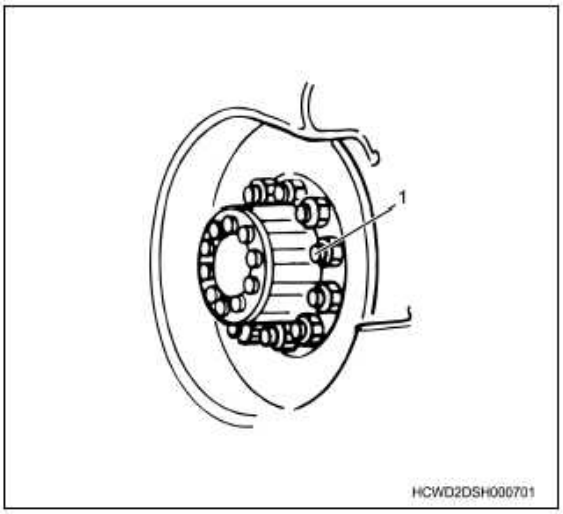
Note:

・Jack it up but ensure that its tires are on the ground.

5) Loosen the wheel nuts until the disc wheel does not issue chucks.

Caution:

・Do not remove the wheel nuts.
・Do not loosen the wheel nuts excessively, and otherwise, the wheel pin may be damaged.



1. Wheel pin mark position: R indicates RH thread

6) Jack up the vehicle.

Note:

・Jack up the vehicle and allow all of its tires to be away from the ground.

7) Remove the wheel nut from the wheel pin.

8) Remove the disc wheel from the vehicle.

Warning:

・Be careful to prevent the heavy tire from inflicting any injury.

Caution:

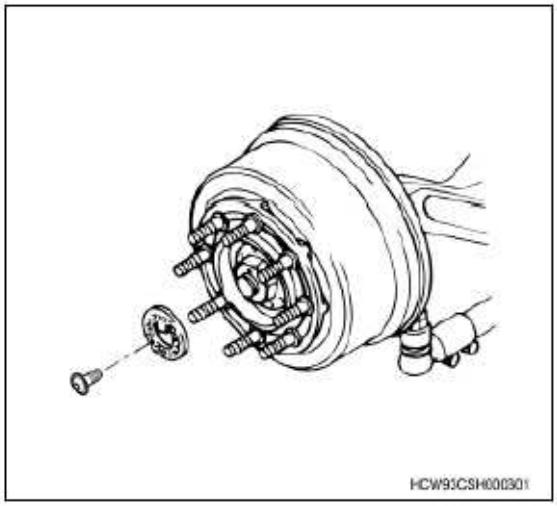
・Remove the component and ensure the thread part of the wheel pin and the disc wheel mounting surface of the hub.

3. Brake drum removal

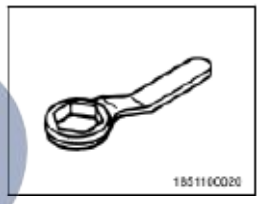
1) Remove the hub cap from the front wheel hub.

2) Remove the hub cap washer from the front wheel hub.

3) Remove the lock washer from the front wheel hub.



4) Remove the wheel hub nut from the steering knuckle using a special tool.



SST:1-8511-0002-0-wheel hub nut wrench

5) Remove the front wheel hub bearing washer from the steering knuckle.

6) Remove the inner cup of the outer bearing from the front wheel hub.

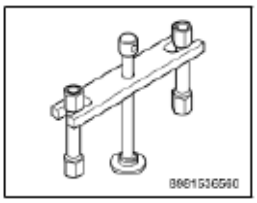
7) Remove the brake drum from the steering knuckle using a special tool.

Caution:

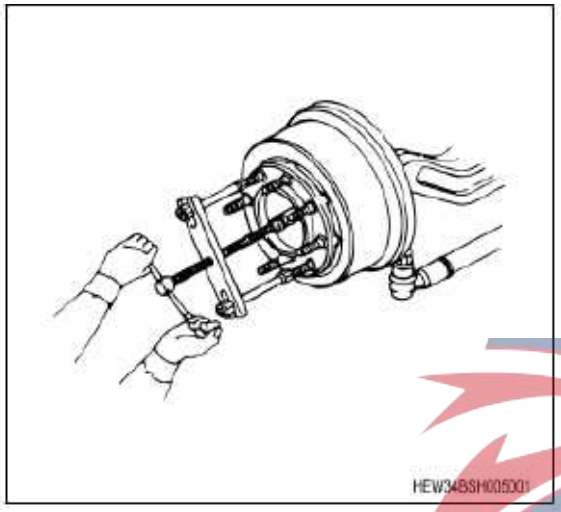
・Be careful to prevent any heavy part from inflicting any injury.

・When the front wheel hub is removed, do not allow the brake or the parking brake to engage.

・Be careful to prevent any impurity or dirt from entering the front wheel hub or the front bearing.



SST:8-9815-3656-0-wheel hub puller



4. Wheel hub bearing removal

1) Use a screwdriver or other tool to remove the oil seal from the front hub.

2) Use a screwdriver or other tool to remove the snap ring from the front hub.

3) Use a screwdriver or other tool to remove the cover from the front hub.

4) Remove the inner race of inner bearing from the front hub.

5) Using a brass rod to remove the outer race of the inner bearing from the front hub.

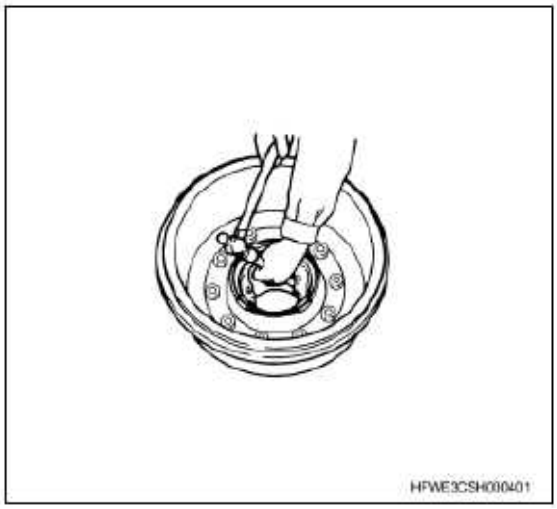
Note:

・Use the two carved grooves of the inner front hub for flattening.

6) Using a brass rod to remove the outer race of the outer bearing from the front hub.

Note:

・Use the two carved grooves of the inner front hub for flattening.



5. Removal of front hub

1. Precautions for front hub

Caution:

・If a wheel pin is damaged, change all the wheel pins, nuts, and wheel nuts.

・If a wheel pin is damaged, all the wheel pins, nuts, and wheel nuts of the axle shall be changed.

1) Remove the wheel pin and nut from the drum brake.

Note:

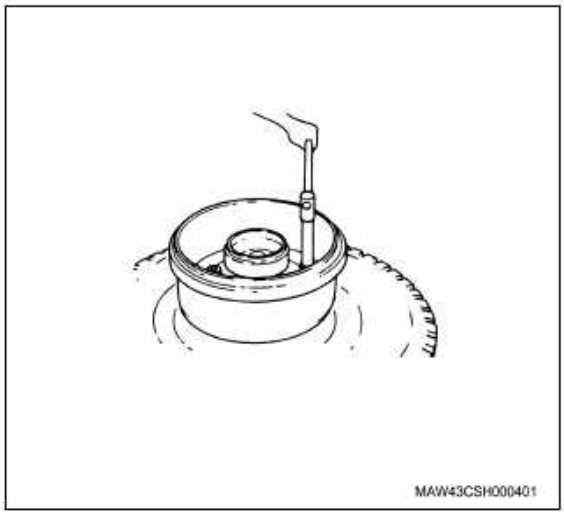
・Because each pin and nut has 3 fastening points, tools must be used when loosening pins and nuts.

Caution:

・Be careful and do not damage the interior of the brake drum.

・The screws of the left and right hub drum are right-hand thread screws.

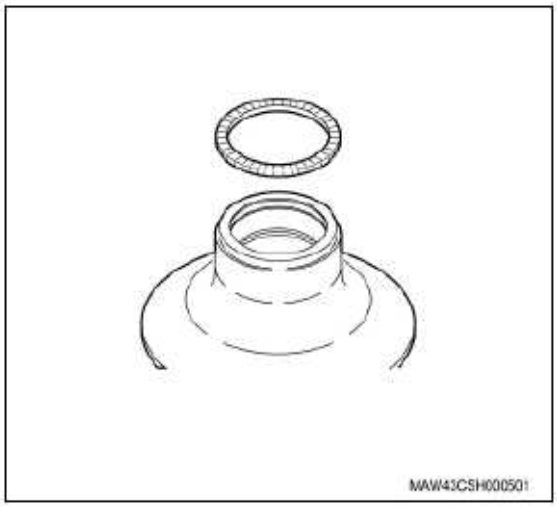
・Do not reuse the wheel pins, nuts, or wheel nuts.



2) Remove the front excitation ring if necessary.

Note:

・Use a screwdriver or other tool to remove the front excitation ring.



Inspection

1. Inspection of front hub

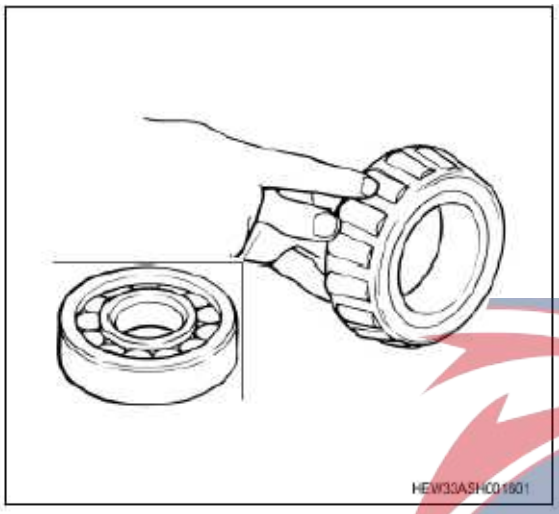
Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1. Bearing inspection

1) Check the following items.

・There is an abnormal feeling during hand rotation.

2. Wheel pin check



1) Check the damage of the wheel pin.

Caution:

・If a wheel pin is damaged, all the wheel pins, nuts, and wheel nuts of the axle shall be changed.

2) Check the damage of the wheel pin.

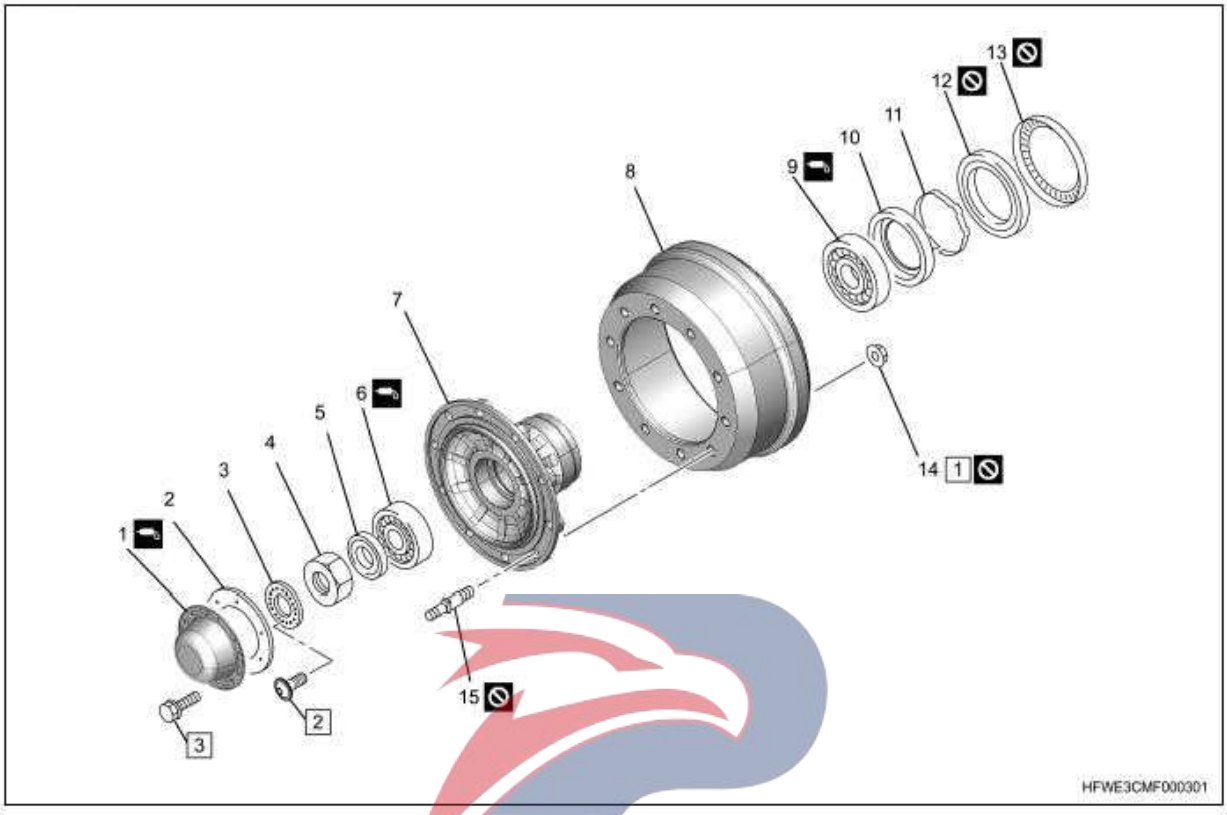
Caution:

・If a wheel pin is damaged, change all the wheel pins, nuts, and wheel nuts.

Installation

1. Component view

Front wheel hub



Part Name
1. Wheel hub cap
2. Hub cap gasket
3. Lock washer
4. Wheel hub nut
5. Front wheel hub bearing washer
6. Outer bearing
7. Front wheel hub
8. Brake drum
9. Inner bearing
10. Cover
11. Snap ring
12. Oil seal
13. Front excitation ring
14. Nut
15. Wheel pin

Tightening torque
1: 397N・m{40.5kgf・m/132.90kg・ft}
2: 9N・m{0.9kgf・m/36.29kg・in}
3: 23N・m{2.3kgf・m/7.71kg・ft}

2. Front hub installation

1) If you removed the front excitation ring, attach it to the front hub.

Note:
・Use pads to evenly stroke the front excitation ring to prevent distortion.

Caution:
・Do not reuse the front excitation ring.
・Knock it slightly until it is tightened.

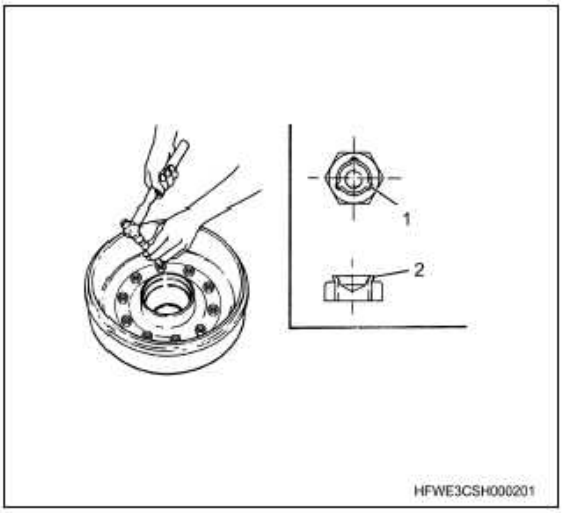
2) Smear engine oil on the thread of the wheel pin.

3) Install the wheel pin and nut on the brake drum.

Caution:
・Do not reuse the wheel pins, nuts, or wheel nuts.

Tightening torque: 397N・m{40.5kgf・m/292.99lb・ft}

4) Knock each wheel pin into 3 positions.



1.6.5-7.0mm (0.256–0.276 inch)

1. Knock into three positions.

3. Wheel hub bearing installation

1) Inject the multifunctional grease into the hub bearing.

Caution:

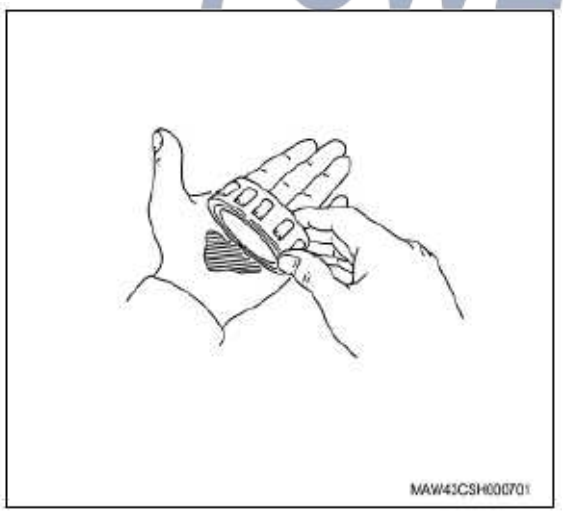
・Apply new multi-purpose grease to the inner race of the outer bearing, the spacing of the rollers, and the bracket of the inner race of the inner bearing.

Caution:

・Smear oil evenly and thoroughly.

Amount of filled air: About 50g{1.8 ounce }（Inner bearing）

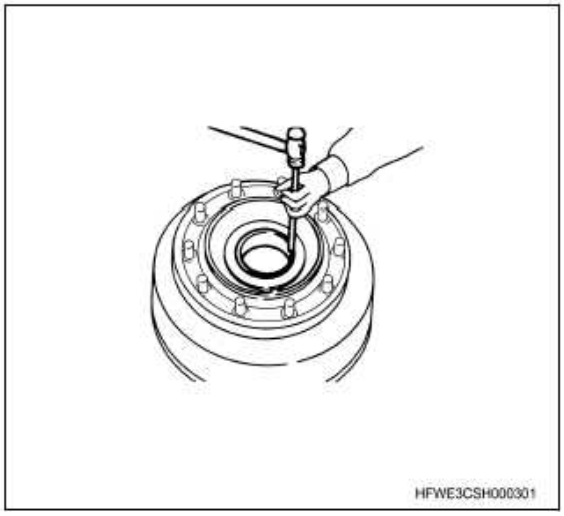
Filler level: ≈ 45g {1.6 ounces} (outer bearing)



2) Install the outer cups of the outside and inside bearings on the brake drum using a brass bar.

Caution:

・Knock it slightly until it is tightened.



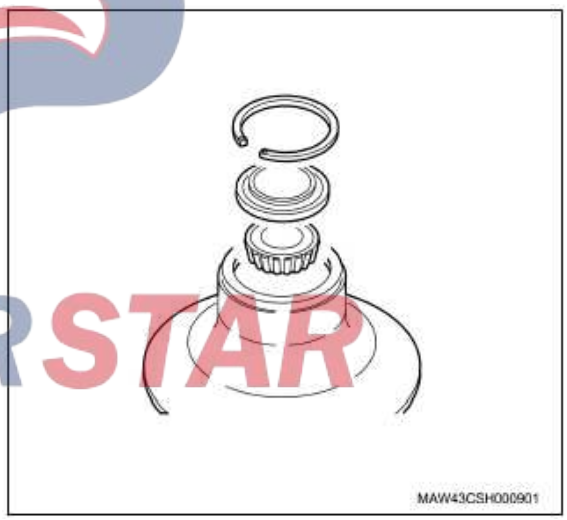
3) Install the inner race of inner bearing to the front hub.

4) Install the cover on the front hub.

5) Attach the snap ring to the front hub.

Caution:

・Safely injected into the groove.



6) Install the oil seal onto the front hub by brass rod;

Caution:

・Do not reuse the oil seals.

4. Brake drum installation

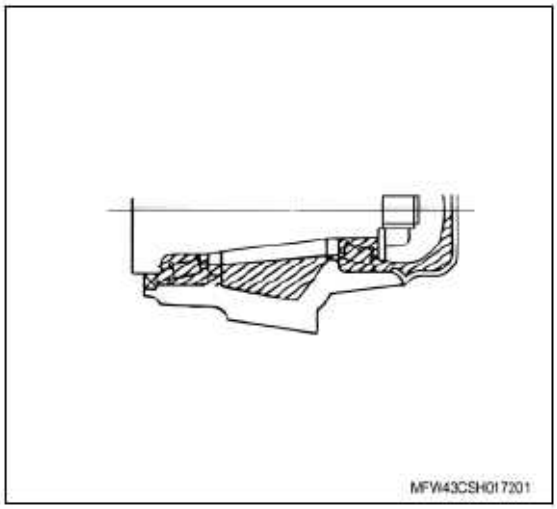
1) Fill the grease chamber of the front wheel hub with BESCO L-2 grease.

Caution:

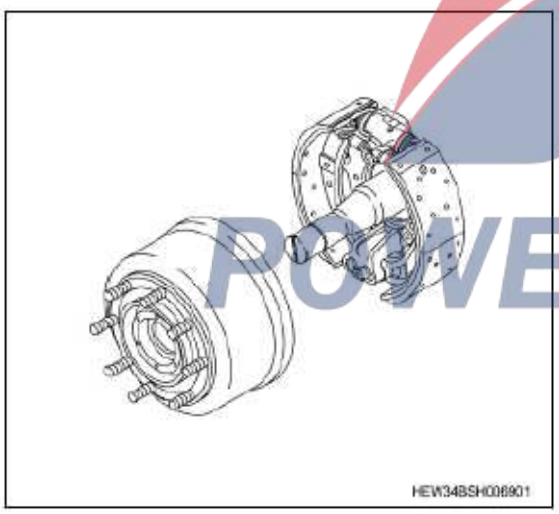
・BESCO L-3 grease or any equivalent can be injected.

Caution:

・Always inject new grease.

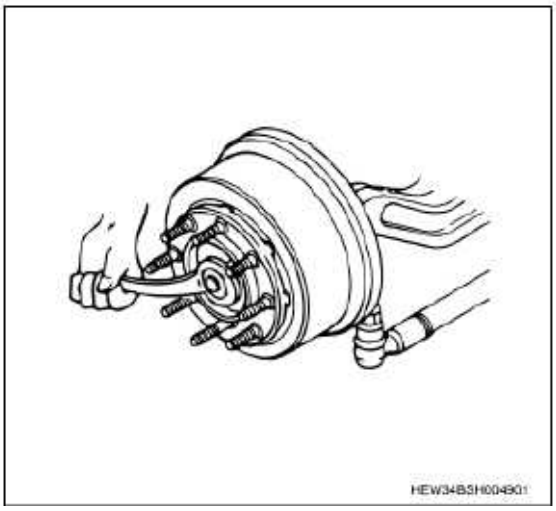


2) Install the brake drum on the steering knuckle.
Caution:
・Be careful to prevent any heavy part from inflicting any injury.
・Check whether there is any grease on the internal drum surface or lining.
・Be careful to prevent any impurity or dirt from sticking on the front wheel hub or the front bearing.



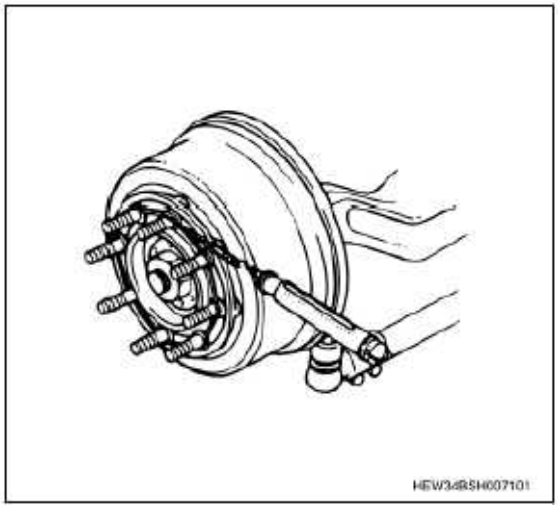
3) Install the inner cup of the outside bearing on the front wheel hub.
4) Install the front wheel nub bearing washer on the steering knuckle.
5) Install the wheel hub nut from the steering knuckle using a special tool.

SST:1-8511-0002-0-wheel hub nut wrench

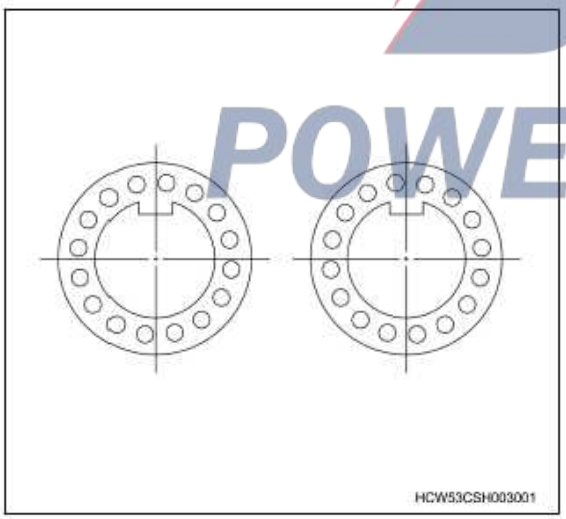


6) Rotate the brake drum leftward and rightward to tighten the wheel hub bearing.
7) Continuously rotate the brake drum, and tighten the wheel hub nut until the brake drum stops.
Caution:
・Continuously rotate the brake drum during the tightening.
・Do not any pneumatic tool.
8) Loosen the wheel hub nuts and check whether the brake drum rotates smoothly.
Caution:
・If the brake drum does not rotate, pull back the brake drum and use a special tool to do the above procedure again.
・Loosen the hub nuts completely.
9) Pass one wire through the vehicle pin and hook the spring balance to the spring.
10) Pull the spring balance in the tangential direction and adjust the pre-applied load on the outside bearing.
Note:
・Make adjustment through tightening the hub nuts.
Caution:
・If the pre-load is not stable, rotate the brake drum multiple times. When the brake drum stops completely, make a remeasurement.
・If it is not still firm, rotate the brake drum leftward and rightward and do the hub bearing stabilization procedure.
Amount of injected grease

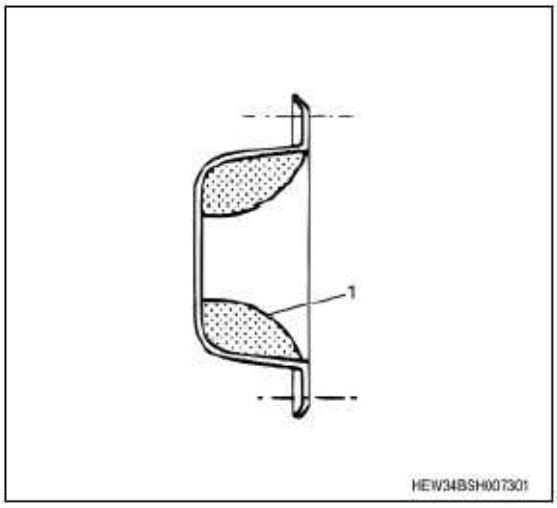
Amount of filled air	Remarks
: About 37.74oz (about 37.70oz)	The amount of grease used for one wheel, including the usage in the wheel hub bearing, is about 1325g (46.8oz).



11) Install the lock washer onto the wheel hub nut.
Note:
・If the bolt hole of the lock washer is not aligned with the hub nut, rotate the lock washer for installation.
・If there is still no match after overturn and installation, rotate the hub nut in the tightening direction for bolt hole match.
・If the lock washer is upside down, the hole would match with it.
Angle: 11°15′



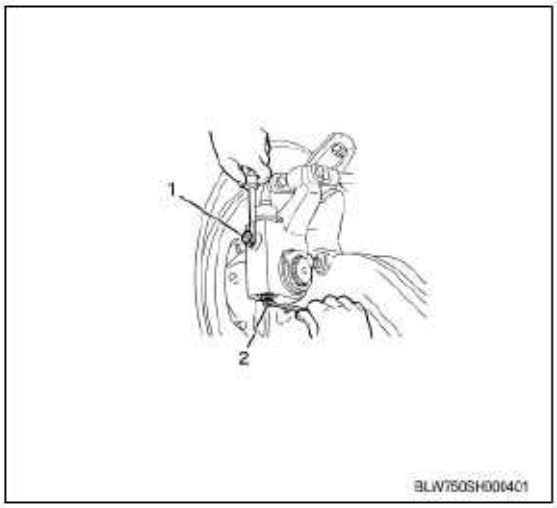
Tightening torque: 9N・m{0.9kgf・m/80.01lb・in}
12) Install the wheel hub cap washer under the wheel hub cap.
13) Fill the hub cover with BESCO L-2 grease.
Note:
・BESCO L-3 grease or any equivalent can be injected.
Caution:
・Always inject new grease.



1. Grease

14) Install the wheel hub cap on the front wheel hub.
Tightening torque: 23N・m{2.3kgf・m/17.00lb・ft}
5. Brake lining check
1. Brake lining gap check
1) Remove the inspection hole protection ring from the dust cover.
2) Measure the brake lining gap using a gap gauge.
Standard: 0.01in{0.01in}
Caution:
・If the measurement result is beyond the specified range, adjust the brake lining gap.
2. Brake lining gap adjustment (specifications of manual gap regulator)
1) Rotate the worm shaft to adjust the brake lining.
1. Worm shaft

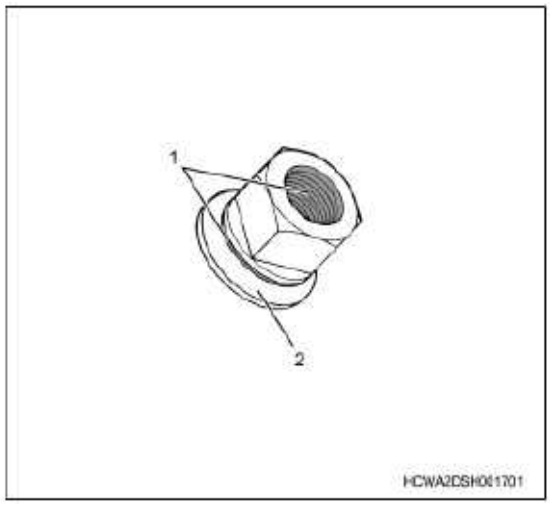
3. Brake lining gap adjustment (specifications of automatic gap regulator)
1) Use a slot-headed screwdriver to pull up the rod.
2) Rotate the worm shaft to adjust the brake lining.



1. Rod
2. Worm shaft

---

6. Installation of disc wheel and tire
1. Precautions for disc wheel installation
Caution:
・If necessary, clean the following parts.
・Disc wheel mounting surface
・Wheel mounting surface of hub
・Conical cross section of nut
If the disc wheel is installed when it is not clean, the wheel nuts may be loose and thus the tire may come off.
Caution:
・Do not smear any MoS2 grease on any wheel pin or wheel nut.
The tightening force may be excessively great in relation to the tightening torque, thus causing the wheel pin to be damaged.
Caution:
・Before a commercial impact wrench is used, check its tightening torque.
The torque produced by the commercial socket wrench may be greater than the specified tightening torque value. If it is tightened using a torque greater than the specified value, the wheel pin may be damaged.
Caution:
・If a tightening wrench is used for tightening, be careful with the adjustment or tightening of the air pressure regulator. Do not tighten it excessively.
・Even if a tightening wrench is used for tightening, a tool like a torque wrench shall be used to tighten it to the specified torque at the end.
2. Disc wheel installation
1) Smear engine oil on the wheel nuts.
Note:
・Gear oil or power steering fluid can be used.
Wheel nut



1. Lubrication area
2. Cleaner

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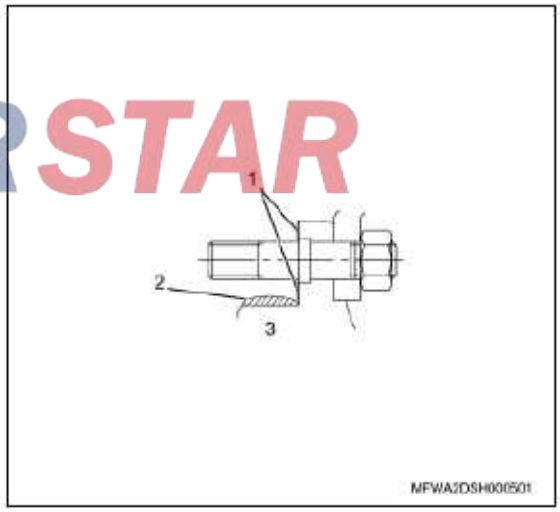
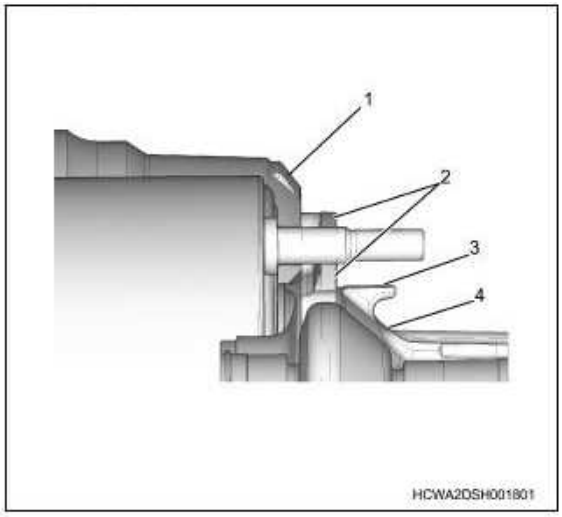
2) Smear engine oil on the wheel pin.
Note:
・Gear oil or chassis grease can be used.
Wheel pin class A



1. The contact surface of the disc wheel is not smeared with grease
2. Wheel hub
3. Grease application area

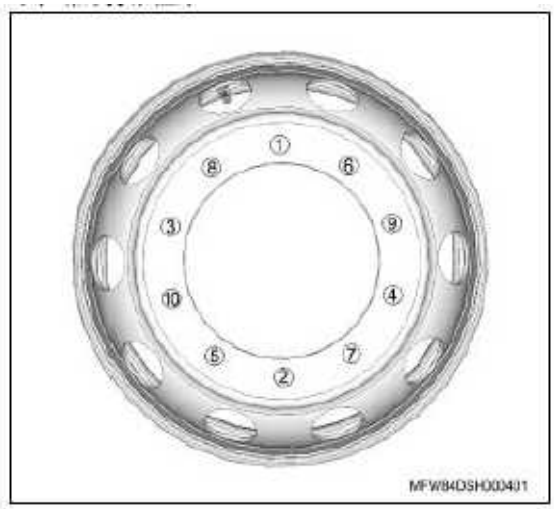
Wheel pin class B



1. Brake drum
2. The contact surface of the disc wheel is not smeared with grease
3. Grease application area
4. Wheel hub

---

3) Install the disc wheel on the wheel pin.
4) Temporarily tighten the wheel nut onto the wheel pin.
Note:
・Rotate and insert the wheel nut by hand until it is fixed on the contact surface of the disc wheel. Temporarily tighten the wheel nuts until the disc wheel does not issue chucks.
5) To lower the vehicle.
6) Tighten the wheel nut diagonally two or three times as shown in the following figure.
Wheel nut tightening procedure



7) Tighten the inner wheel nut using a torque wrench, etc.

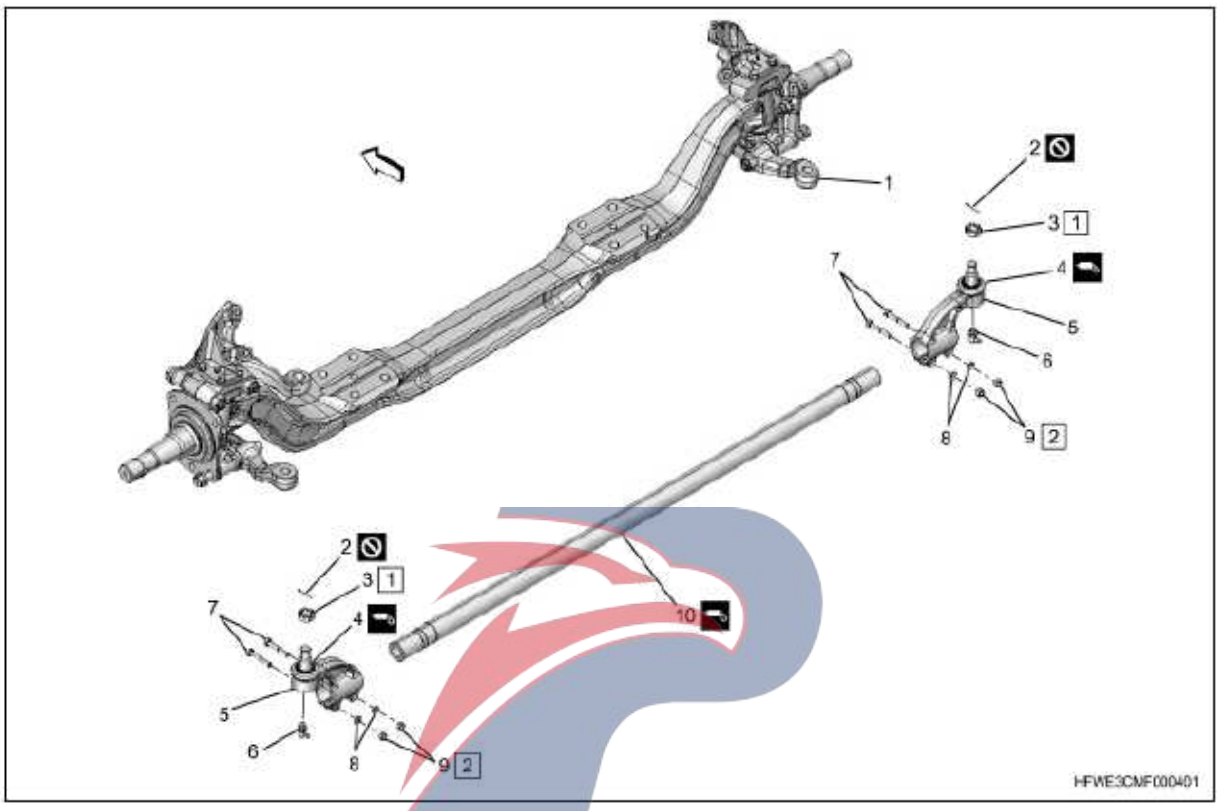
Tightening torque: 500-550N·m{50-55kgf·m/362-398lb·ft}
Caution:
・When the front tires are installed, do the following checks.
・Ensure no interference to any nearby part when rotating the steering wheel leftward or rightward.
Caution:
・After the installation, drive the vehicle a distance greater than the specified value and then retighten the wheel nuts with the specified torque.
Standard: 50 to 100km{31 to 99.78km}

Tie rod

Removal

1. Component view

Tie rod



Part name

1. Tie rod arm
2. Cotter pin
3. Groove top nut
4. Slipper
5. Tie rod end
6. Grease nozzle
7. Tie rod end bolt
8. Cleaner
9. Nut
10. Tie rod arm

Tightening torque

1: 304N・m{31.0kgf・m/101.60kg・ft}

2: 83N・m{8.5kgf・m/27.67kg・ft}

2. Removal of disc wheel and tire

1) Move the vehicle onto a flat ground.

2) Pull out the parking brake rod.

3) Put the stop wedge on the vehicle.

4) Jack up the vehicle.

Note:

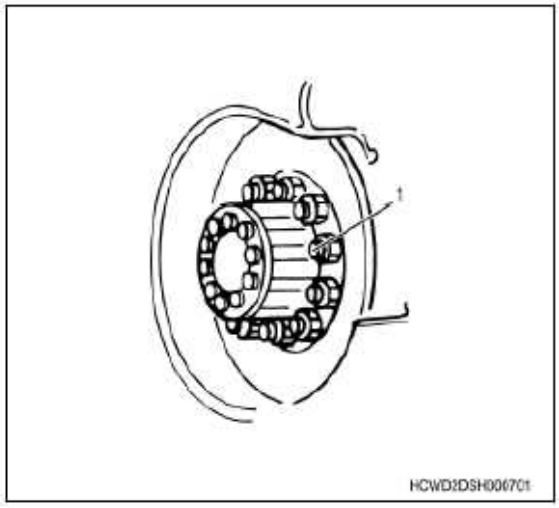
・Jack it up but ensure that its tires are on the ground.

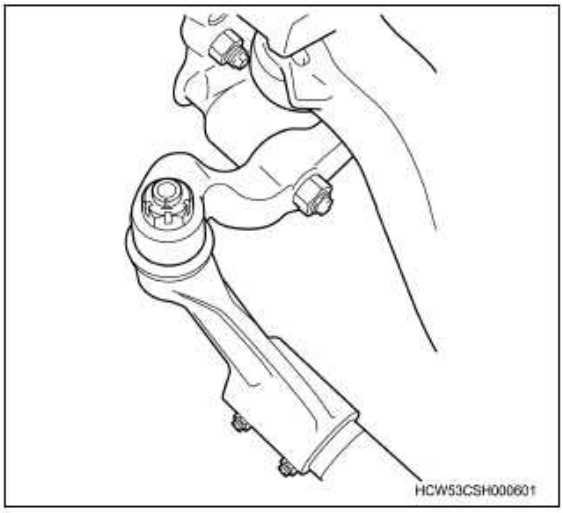
5) Loosen the wheel nuts until the disc wheel does not issue chucks.

Caution:

・Do not remove the wheel nuts.

・Do not loosen the wheel nuts excessively, and otherwise, the wheel pin may be damaged.





1. Wheel pin mark position: R indicates RH thread

---

6) Jack up the vehicle.

Note:

・Jack up the vehicle and allow all of its tires to be away from the ground.

7) Remove the wheel nut from the wheel pin.

8) Remove the disc wheel from the vehicle.

Warning:

・Be careful to prevent the heavy tire from inflicting any injury.

Caution:

・Remove the component and ensure the thread part of the wheel pin and the disc wheel mounting surface of the hub.

3. Tie rod removal

1) Remove the split pin from the tie rod end.

2) Install the groove top nut on the tie rod end and remove it.

3) Remove the tie rod from the tie rod arm using a brass bar.

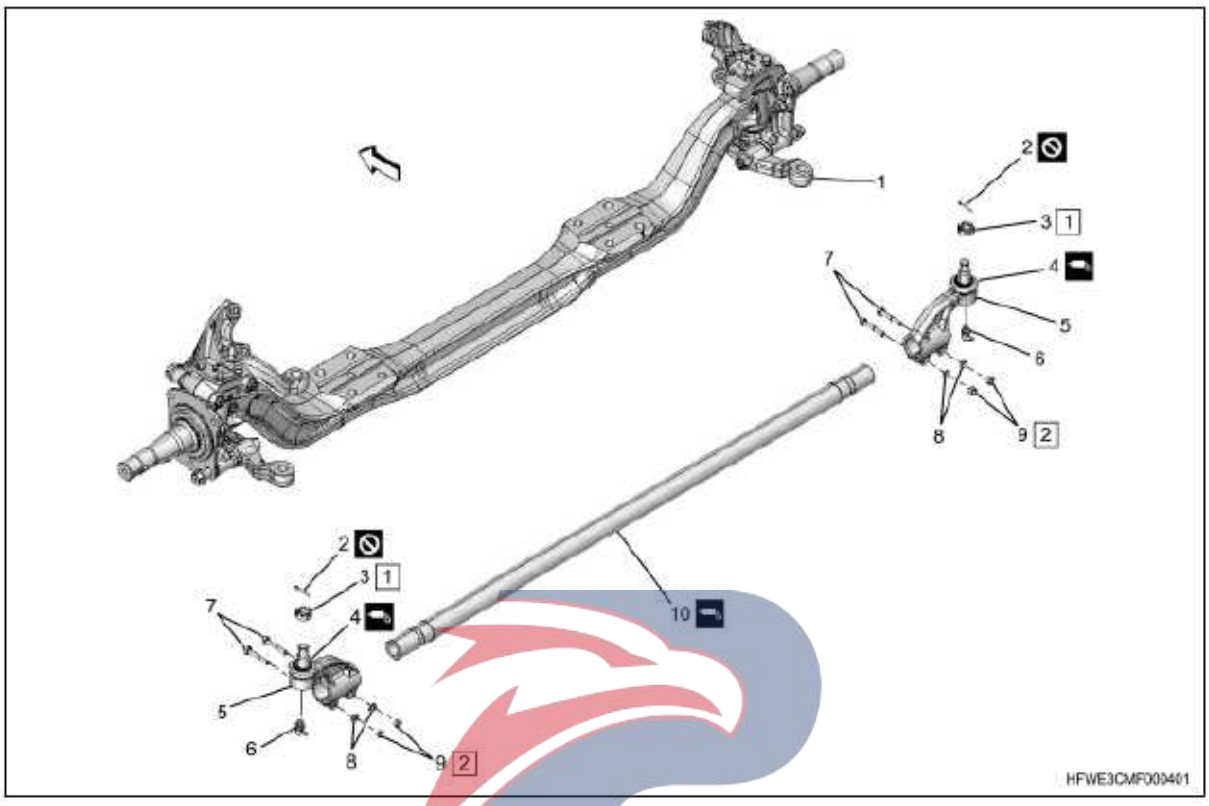
Note:

・Remove the fitting part between the ball joint and the tie rod arm.

Removal

Tie rod

1. Component view

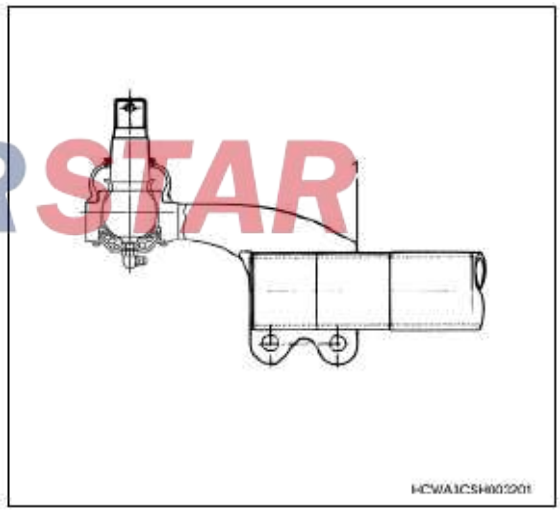


Part name
1. Tie rod arm
2. Cotter pin
3. Groove top nut
4. Slipper
5. Tie rod end
6. Grease nozzle
7. Tie rod end bolt
8. Cleaner
9. Nut
10. Tie rod arm

Tightening torque
1: 304N・m{31.0kgf・m/101.60kg・ft}
2: 83N・m{8.5kgf・m/27.67kg・ft}

2. Tie rod end removal

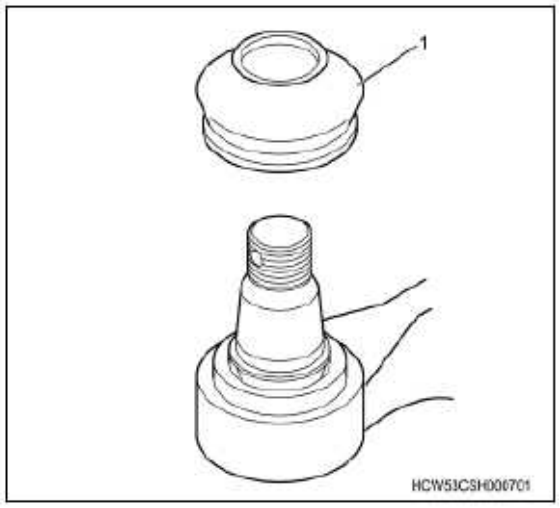
1) Mark the drive-in position at the end of the tie rod with an alignment mark.



1. Alignment mark

2) Remove the tie rod end from the tie rod.

3) Use a screwdriver or other tool to remove the piston shoes at the tie rod end.



1. Slipper

Inspection

1. Inspection of tie rod

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1. Inspection of piston shoes

1) Check the following items.

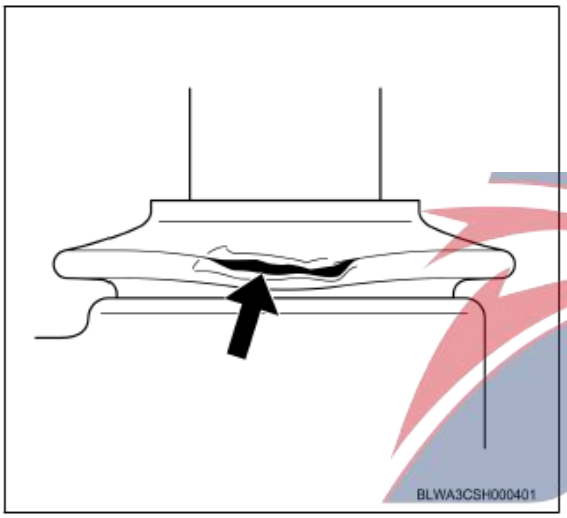
・Damage

・Punch

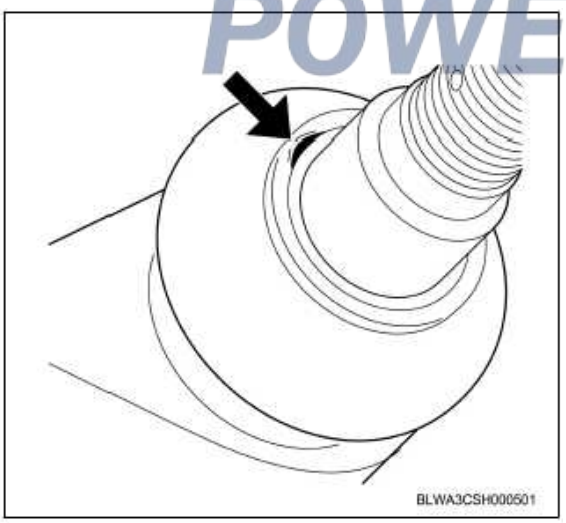
・Crack

・Grease leak

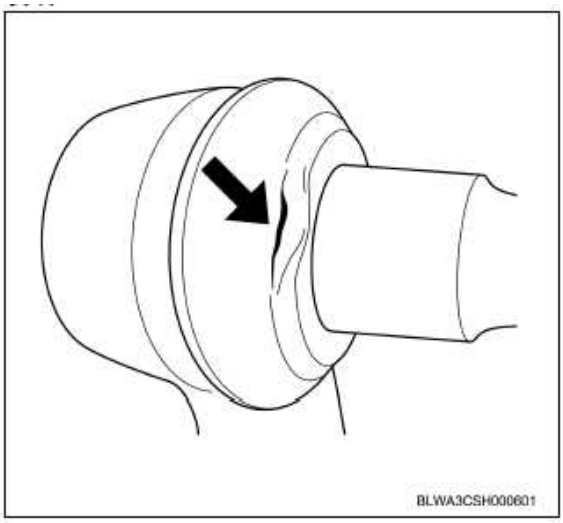
Break



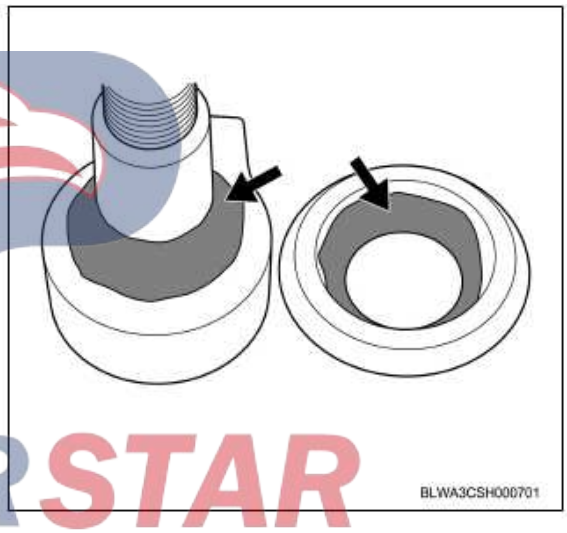
Hole



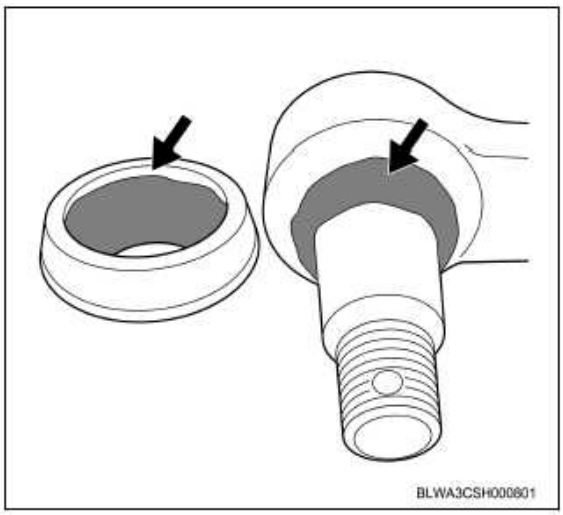
Cracks



Grease leak 1

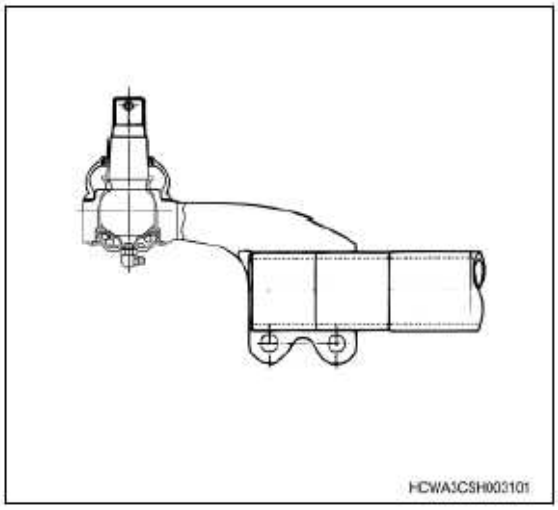


Grease leak 2



2. Ball pin inspection

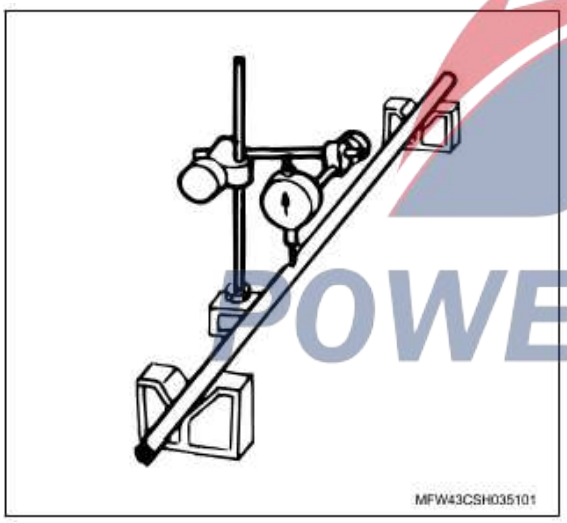
1) Check if the ball screw is loose.



3. Check the tie rod bending

1) Use a dial indicator to measure whether the rod is bent

Limit: 1.0mm (0.039in)



2. Tie rod end inspection

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1) Move the vehicle onto a flat ground.

2) Pull out the parking brake rod.

3) Put the stop wedge on the vehicle.

4) Jack up the vehicle.

Note:

・Jack up the vehicle and allow all of its tires to be away from the ground.

Caution:

・Jack up with 2 or more wheels to eliminate the risk of spoke wheels jumping out.

5) Use the chassis frame to support the frame of the vehicle.

6) Rotate the steering wheel.

Note:

・Repeatedly turn the left and right lock position.

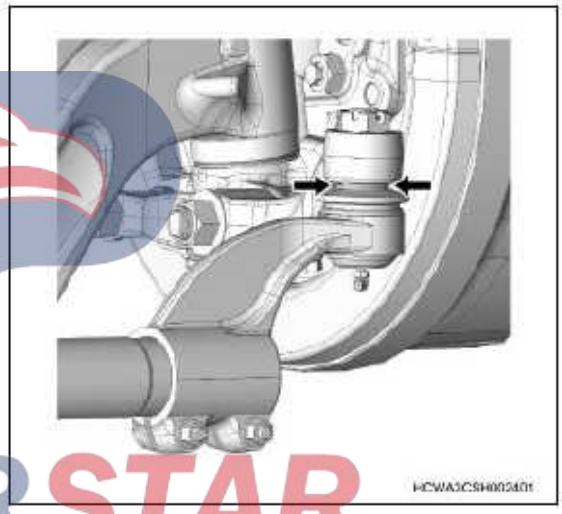
Caution:

・If abnormal be found, check the steering wheel.

7) Remove the disc wheel from the vehicle.

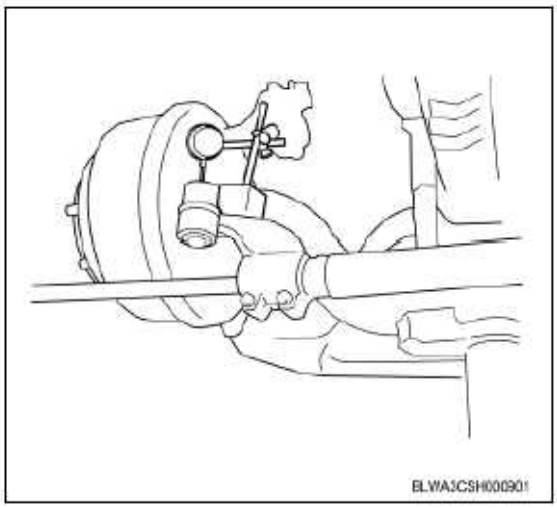
Please refer to "2. Suspension 2D Wheels and tire system – removal of wheel disc and tire" in this section.

8) Inspecting the gap between tie rod end piston shoes and tie rod arm;

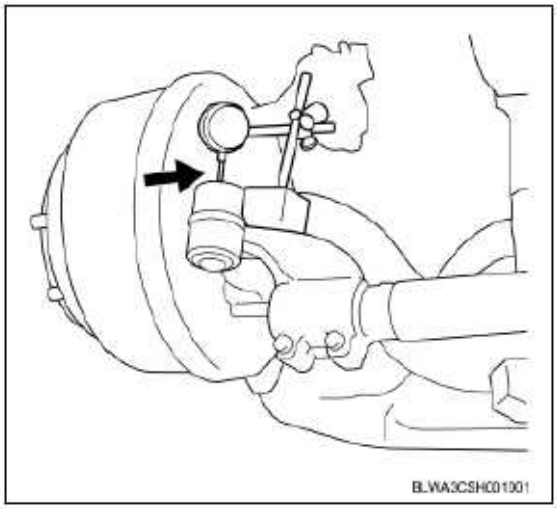


9) If any gap is found, the tie rod end shall be replaced.

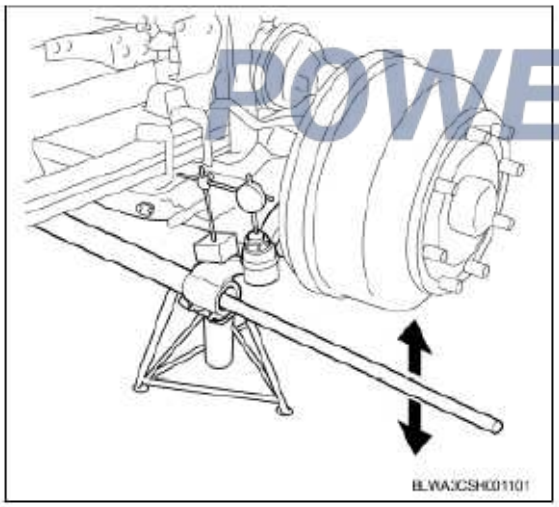
10) Fasten the dial indicator to the lever arm at the tie rod end.



11) Align the dial gauge pointer with the spherical stud.



12) Insert the following metal tubing into the tie rod hole to lower the tie rod.
Length: about 500mm (19.685 inches)
Insertion amount: about 200mm{7.874in}
Force: 98N{10.0kgf/22.1lb}
13) With the tie rod lowered condition, set the dial indicator memory to 0.
14) Use the pipe to lift the pull rod.
Force: 294N{30.0kgf/30.03kg}



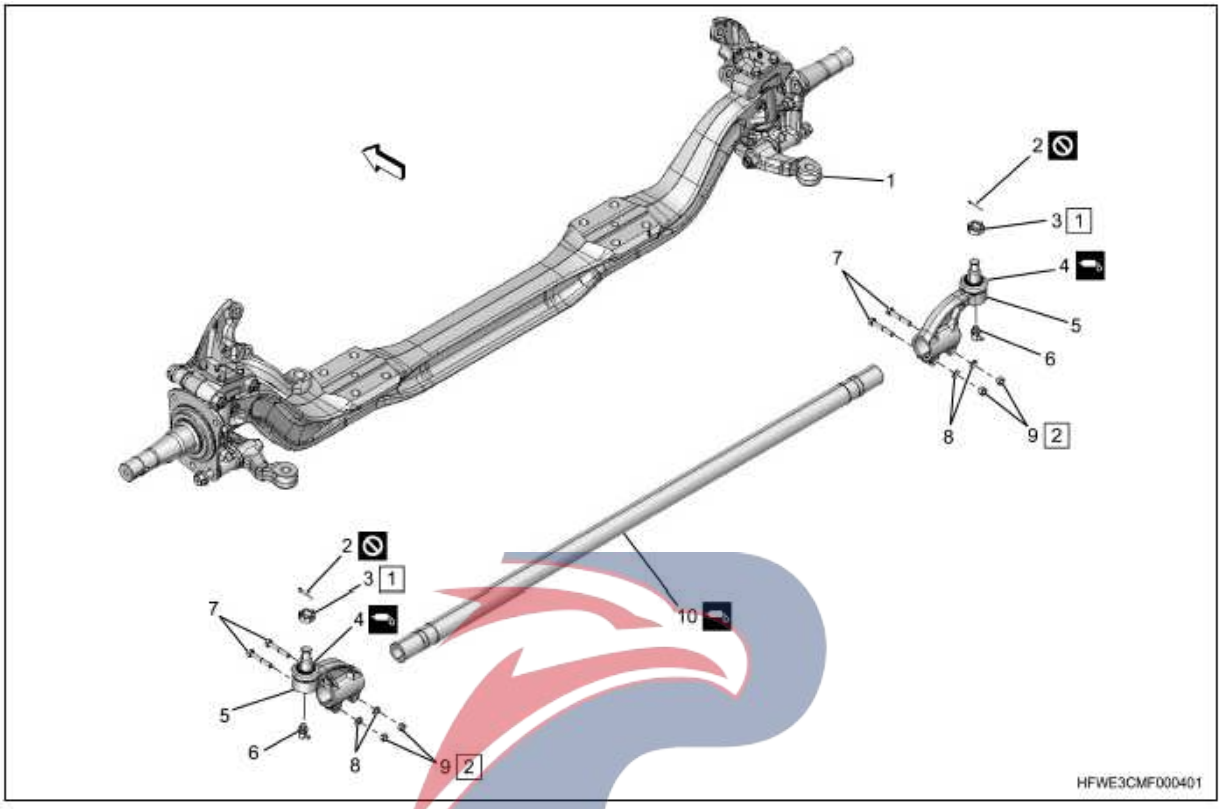
Caution:
Łift the lever straightly and do not move forward or backward during lift.
Đo not apply excessive lifting force during lifting.
Simulation of external forces probably lowering measurement accuracy, damage the ball joint or causing the chassis support to fall.

15) Check the measured value of the dial gauge.
Standard: <1.0mm{<0.039in}

Reassembly

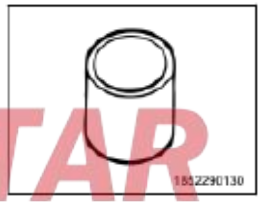
1. Component view

Tie rod



Part name

1. Tie rod arm
2. Cotter pin
3. Groove top nut
4. Slipper
5. Tie rod end
6. Grease nozzle
7. Tie rod end bolt
8. Cleaner
9. Nut
10. Tie rod arm



SST:1-8522-9013-0-luggage compartment mounting tool

Tightening torque

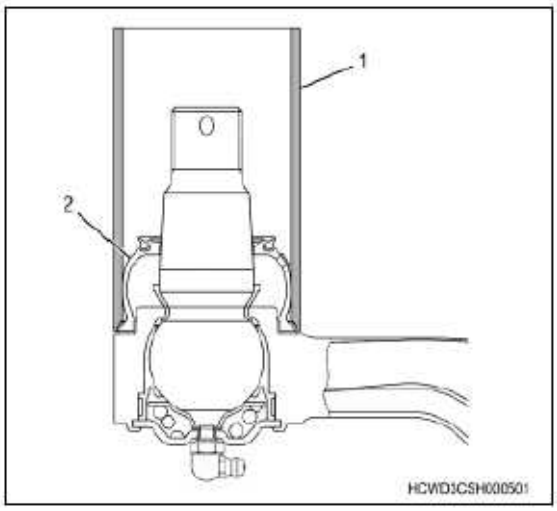
1: 304N・m{31.0kgf・m/101.60kg・ft}

2: 83N・m{8.5kgf・m/27.67kg・ft}

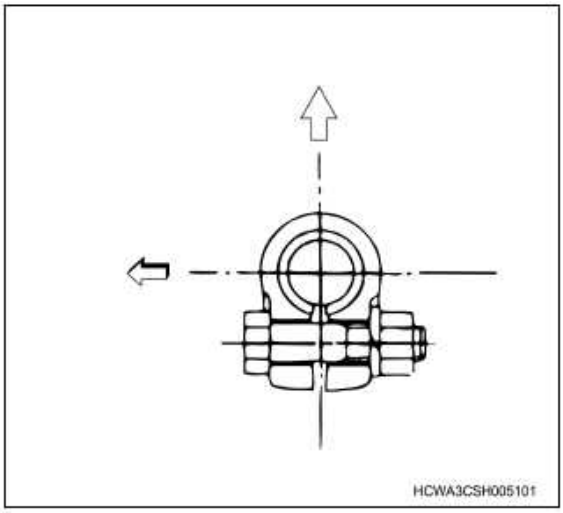
2. Tie rod end installation

1) Use a special tool to press the piston shoes into the tie rod.

Insertion force: 980N{100kgf/221lb}



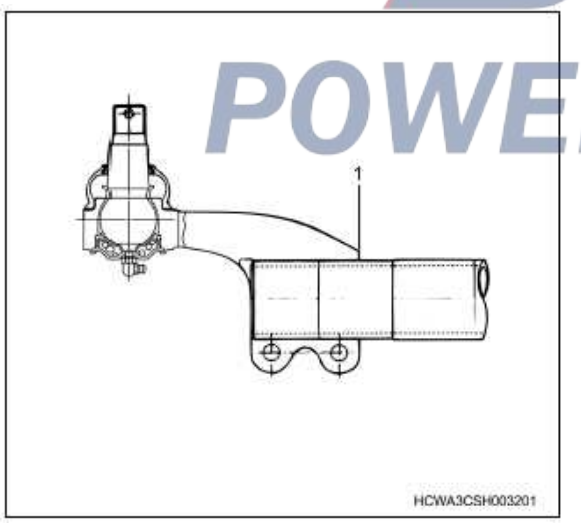
1.1-8522-9013-0
2. Slipper



Caution:
・Tighten the railing ends after adjusting the toe-in.

---

2) Apply the chassis grease to the threaded part of the tie rod.
3) Temporarily fasten the tie rod end to the tie rod.
Caution:
・The right screw is a right-hand thread and the left-hand screw is a left-hand thread.
・Make the installation according to the alignment marks used during the removal.



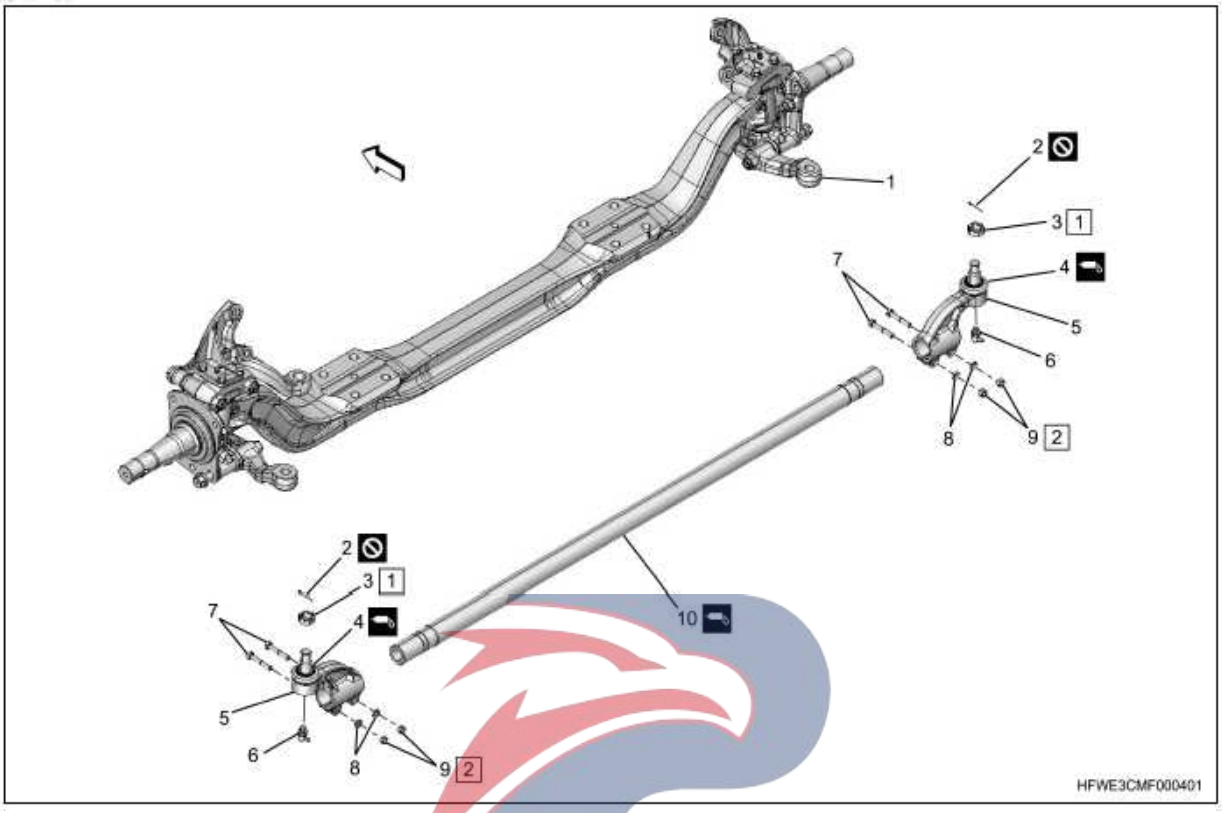
1. Alignment mark

Caution:
・Install the rod end nut (the rod end of the rod is facing the rear of the vehicle).

Installation

Tie rod

1. Component view



Part Name

1. Tie rod arm
2. Cotter pin
3. Groove top nut
4. Slipper
5. Tie rod end
6. Grease nozzle
7. Tie rod end bolt
8. Cleaner
9. Nut
10. Tie rod arm

Tightening torque

1: 304N・m{31.0kgf・m/101.60kg・ft}

2: 83N・m{8.5kgf・m/27.67kg・ft}

2. Tie rod installation

1. Tie rod installation

1) Install the tie rod on the tie rod arm.

2) Install the groove top nut on the tie rod.

Tightening torque: 304N・m{31.0kgf・m/223.99lb・ft}

3) Install the split pin on the groove top nut and bend it.

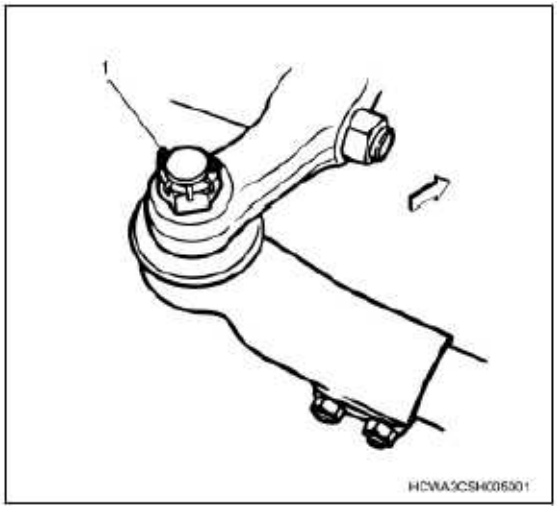
Note:

・If the top nut of the groove is not aligned with the ball pin hole, further tighten the nut for the alignment.

Caution:

・Do not make the hole alignment in the loosening direction.

・Do not reuse the split pin.



1. Cotter pin
2. Grease filling

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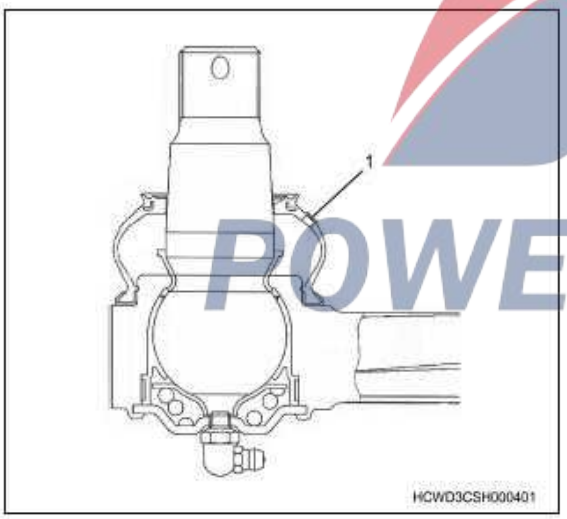
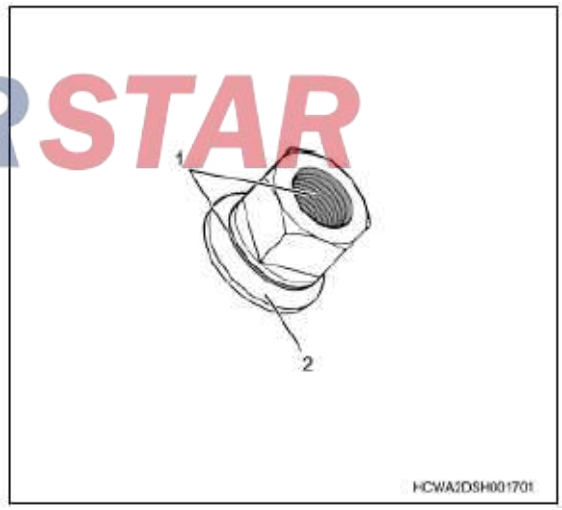
1) Use a grease gun to inject new grease into the piston shoes from the grease nipple.
Note:
・Fill the grease until the grease overflows the safety valve.



1. Safety valve

---

3. Installation of disc wheel and tire
1. Precautions for disc wheel installation
Caution:
・If necessary, clean the following parts.
・Disc wheel mounting surface
・Wheel mounting surface of hub
・Conical cross section of nut
If the disc wheel is installed when it is not clean, the wheel nuts may be loose and thus the tire may come off.
Caution:
・Do not smear any MoS2 grease on any wheel pin or wheel nut.
The tightening force may be excessively great in relation to the tightening torque, thus causing the wheel pin to be damaged.
Caution:
・Before a commercial impact wrench is used, check its tightening torque.
The torque produced by the commercial socket wrench may be greater than the specified tightening torque value. If it is tightened using a torque greater than the specified value, the wheel pin may be damaged.
Caution:
・If a tightening wrench is used for tightening, be careful with the adjustment or tightening of the air pressure regulator. Do not tighten it excessively.
・Even if a tightening wrench is used for tightening, a tool like a torque wrench shall be used to tighten it to the specified torque at the end.
2. Disc wheel installation
1) Smear engine oil on the wheel nuts.
Note:
・Gear oil or power steering fluid can be used.
Wheel nut

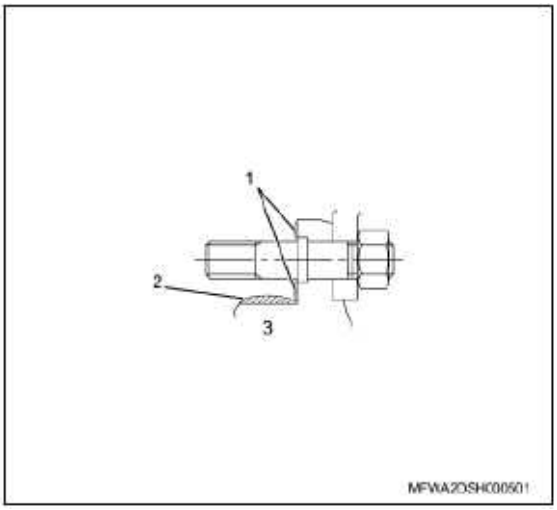


1. Lubrication area
2. Cleaner

---

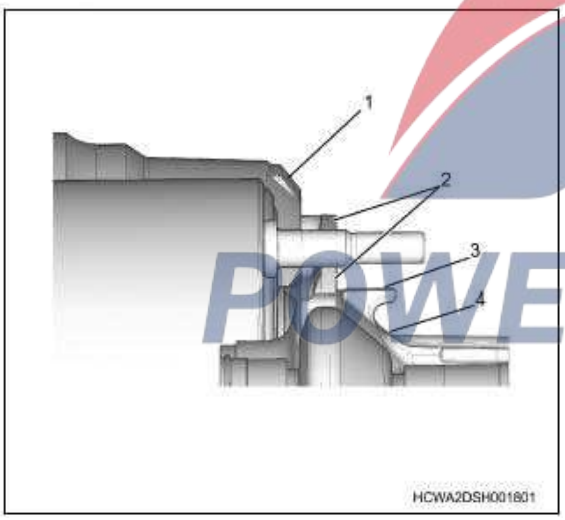
2) Smear engine oil on the wheel pin.
Note:
・Gear oil or chassis grease can be used.

Wheel pin class A



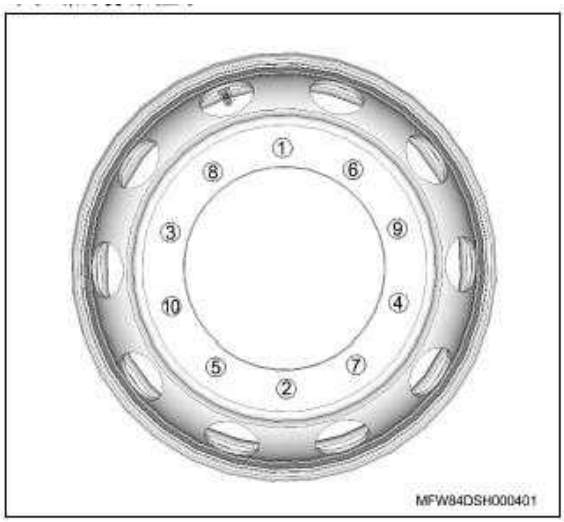
1. The contact surface of the disc wheel is not smeared with grease
2. Wheel hub
3. Grease application area

Wheel pin class B



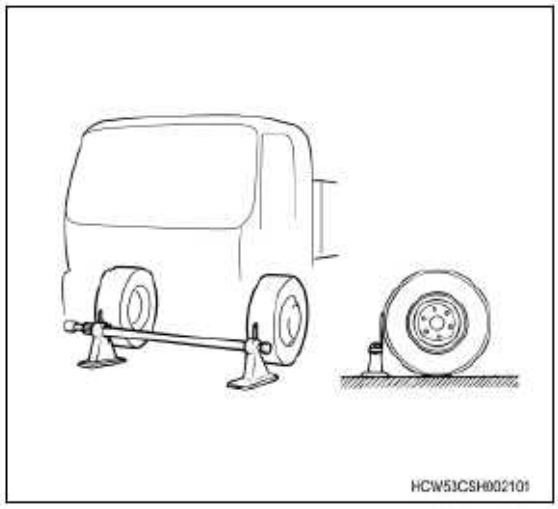
1. Brake drum
2. The contact surface of the disc wheel is not smeared with grease
3. Grease application area
4. Wheel hub

3) Install the disc wheel on the wheel pin.
4) Temporarily tighten the wheel nut onto the wheel pin.
Note:
・Rotate and insert the wheel nut by hand until it is fixed on the contact surface of the disc wheel. Temporarily tighten the wheel nuts until the disc wheel does not issue chucks.
5) To lower the vehicl
6) Tighten the wheel nut diagonally two or three times as shown in the following figure.
Wheel nut tightening procedure



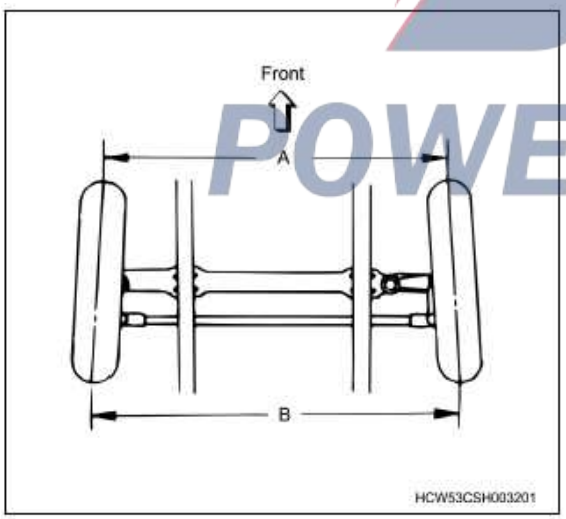
7) Tighten the inner wheel nut using a torque wrench, etc.
Tightening torque: 500-550N·m{50-55kgf·m/362-398lb·ft}
Caution:
・When the front tires are installed, do the following checks.
・Ensure no interference to any nearby part when rotating the steering wheel leftward or rightward.
Caution:
・After the installation, drive the vehicle a distance greater than the specified value and then retighten the wheel nuts with the specified torque.
Standard: 50 to 100km{31 to 99.78km}
4 Tie rod adjustment
1) Check the following items.
・The vehicle must be of no load.
・The surface must be flat.
・The vehicle must have a normal gesture.
・The wheel must not have any offset or deformation
・There shall not be any loosened part.
・The bolt or nut shall not be loose.
2) Rock every corner of the vehicle to confirm whether the suspicion is true.
3) Set the front wheels in the way that ensures the vehicle runs forward straightly.
4) Align the end of the toe-in measuring rule with the following position.
・Height of center line of left and right front wheels
・Tire tread pattern center
5) Make a mark where there is a contact with the toe-in measuring rule.
6) Measure the distance A between the marks made on the rears of the front wheels.

7) Rotate the front wheel for 180°.
8) Measure the distance A between the marks made in the front of the vehicle.



1. Toe-in measuring rule

9) Calculate the toe-in according to the measured value.
Note:
・Subtract the measured value of A from the measured value of B to obtain the calculation result.



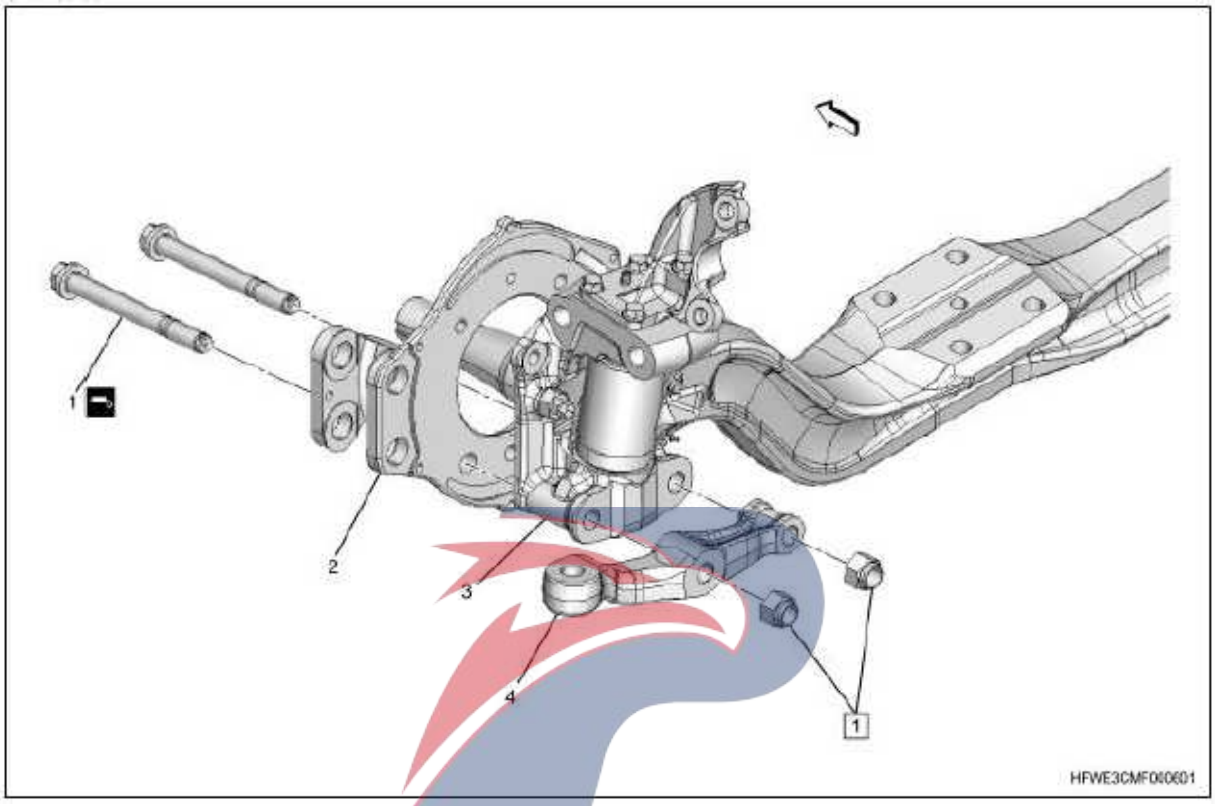
Specified value 0±1mm(0±0.0394in)
Cauion:
・If the calculated toe-in is not the specified value, rotate the tie rod to make an adjustment.
10) Fix the tie rod end to the tie rod.
Tightening torque: 83N・m{8.5kgf・m/61lb・ft}

Tie-rod arm

Removal

Tie-rod arm

1.Component view



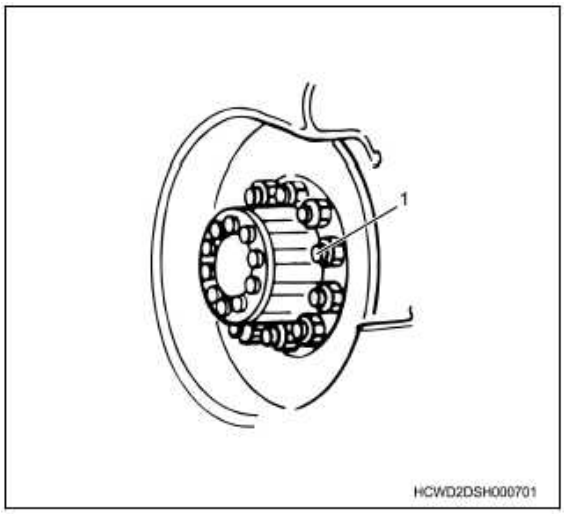
Part Name

1. Stud
2. Front anchor pin support
3. Steering knuckle
4. Tie rod arm

Caution:

・Do not remove the wheel nuts.

・Do not loosen the wheel nuts excessively, and otherwise, the wheel pin may be damaged.



1. Wheel pin mark position: R indicates RH thread

Tightening torque

1: 471N・m{48.0kgf・m/157.40kg・ft}

2. Removal of disc wheel and tire

1) Move the vehicle onto a flat ground.

2) Pull out the parking brake rod.

3) Put the stop wedge on the vehicle.

4) Jack up the vehicle.

Note:

・Jack it up but ensure that its tires are on the ground.

5) Loosen the wheel nuts until the disc wheel does not issue chucks.

6) Jack up the vehicle.

Note:

・Jack up the vehicle and allow all of its tires to be away from the ground.

7) Remove the wheel nut from the wheel pin.

8) Remove the disc wheel from the vehicle.

Warning:

・Be careful to prevent the heavy tire from inflicting any injury.

Caution:

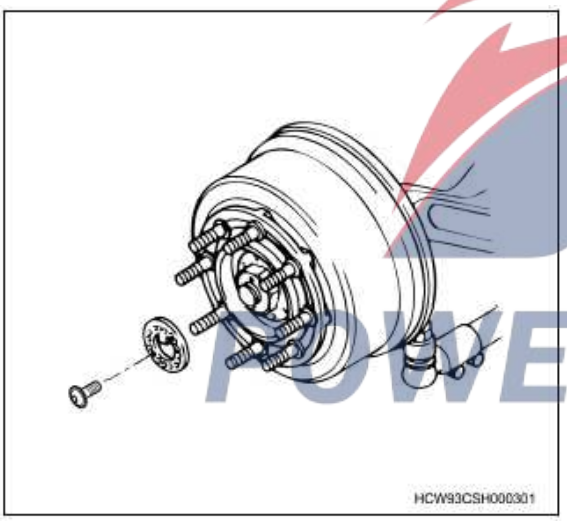
・Remove the component and ensure the thread part of the wheel pin and the disc wheel mounting surface of the hub.

3. Brake drum removal

1) Remove the hub cap from the front wheel hub.

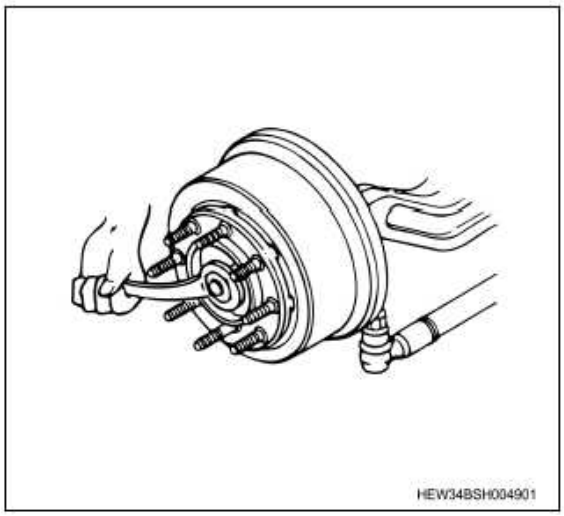
2) Remove the hub cap washer from the front wheel hub.

3) Remove the lock washer from the front wheel hub.



4) Remove the wheel hub nut from the steering knuckle using a special tool.

SST:1-8511-0002-0-wheel hub nut wrench



5) Remove the front wheel hub bearing washer from the steering knuckle.

6) Remove the inner cup of the outer bearing from the front wheel hub.

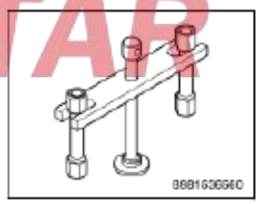
7) Remove the brake drum from the steering knuckle using a special tool.

Caution:

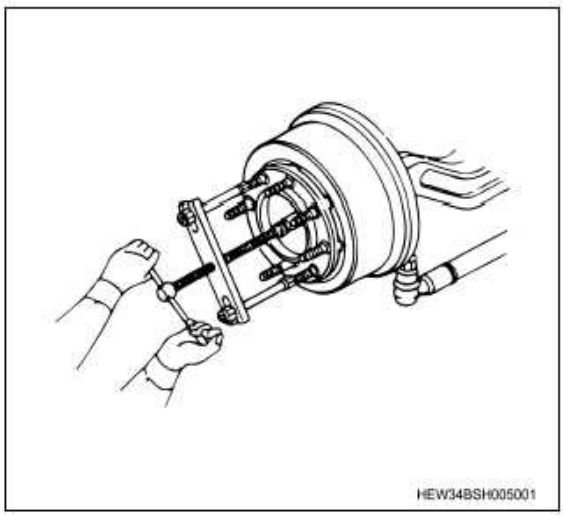
・Be careful to prevent any heavy part from inflicting any injury.

・When the front wheel hub is removed, do not allow the brake or the parking brake to engage.

・Be careful to prevent any impurity or dirt from entering the front wheel hub or the front bearing.



SST:8-9815-3656-0-wheel hub puller



4. Tie rod removal

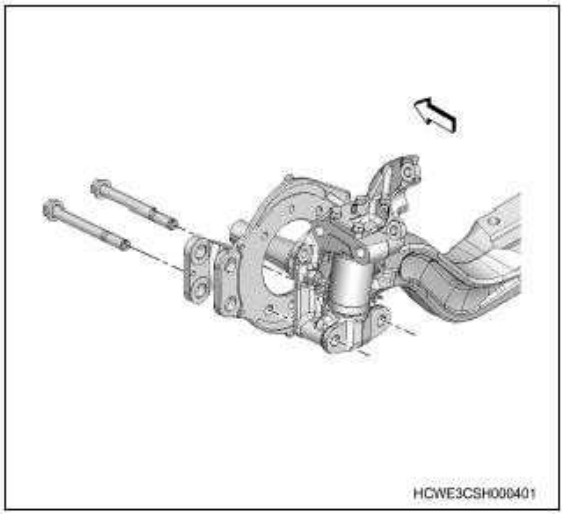
1) Remove the split pin from the tie rod end.

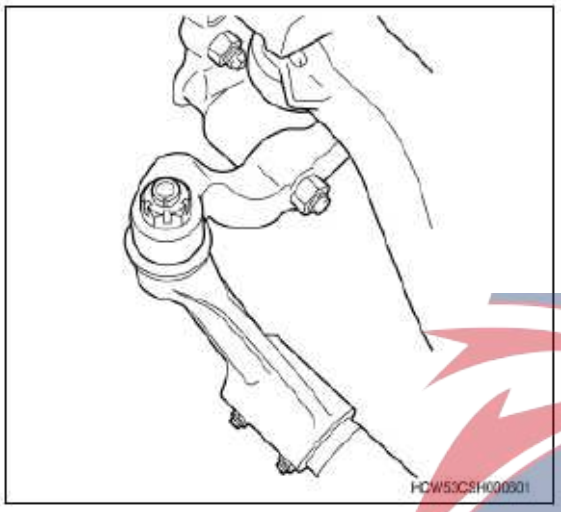
2) Install the groove top nut on the tie rod end and remove it.

3) Remove the tie rod from the tie rod arm using a brass bar.

Note:

・Remove the fitting part between the ball joint and the tie rod arm.

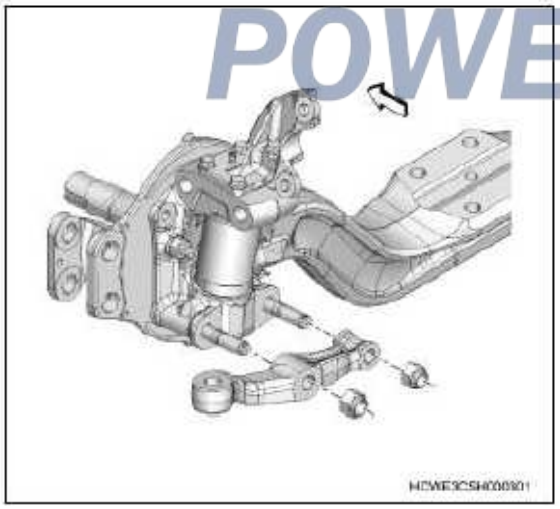




5. Tie rod arm removal

1) Use the punch to pry up the cylindrical flange nut.

2) Remove the tie rod arm from the steering knuckle.



3) Remove the stud from the steering knuckle.

Inspection

1. Inspection of tie rod arm

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1) Check the following items.

・Crack

・Bent

・Twist degree

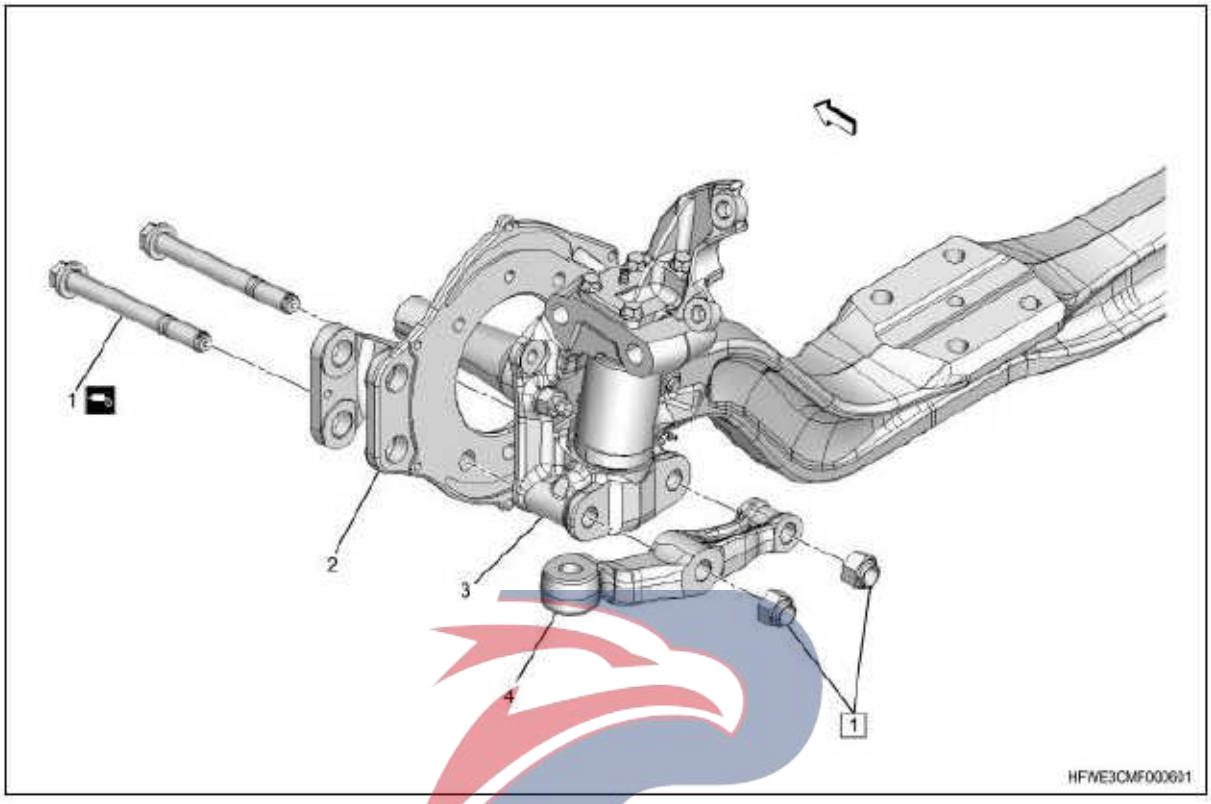
・Damaged

2) If necessary, check using a detector or red-liquid penetration test method.

Installation

1. Component view

Tie-rod arm



Part Name

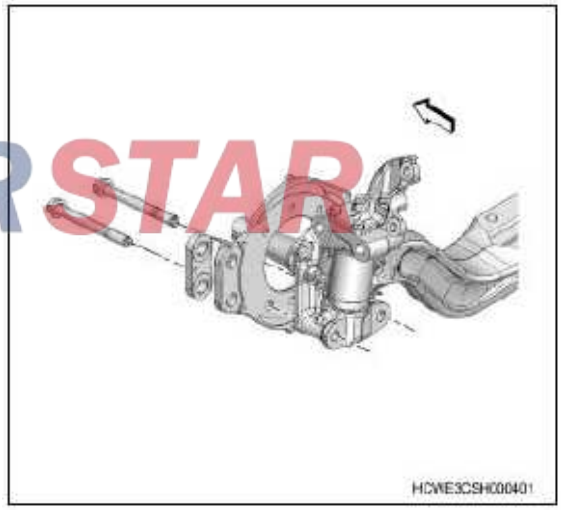
1. Stud
2. Front anchor pin support
3. Steering knuckle
4. Tie rod arm

Tightening torque

1: 471N・m{48.0kgf・m/157.40kg・ft}

2. Tie rod arm installation

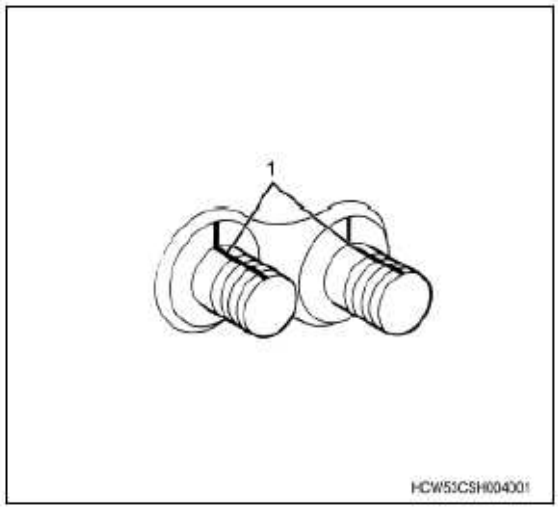
1) Install the stud on the steering knuckle.



2) Smear MoS2 grease on the thread of the stud and the surface of the tie rod arm bearing.

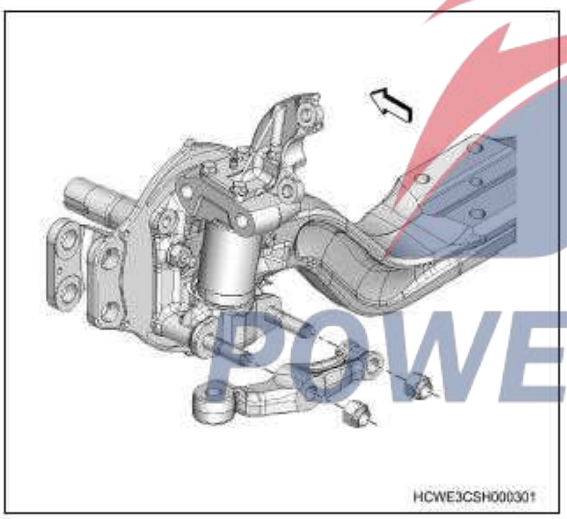
Note:

・Operate as shown in the following drawing.



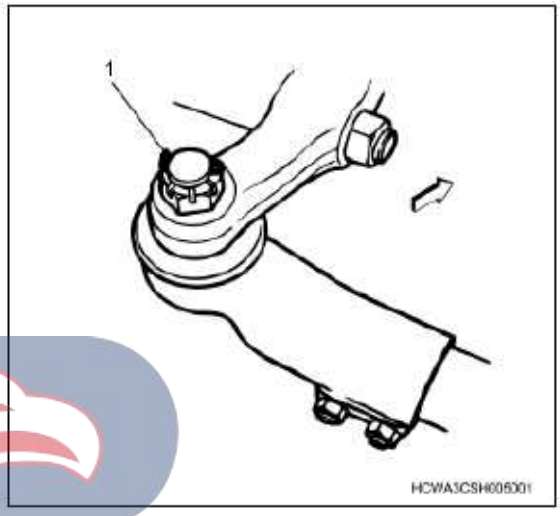
1. Each bolt just needs one slight spot smear.

3) Install the tie rod arm on the steering knuckle.
Tightening torque: 471N・m{48.0kgf・m/347.01lb・ft}



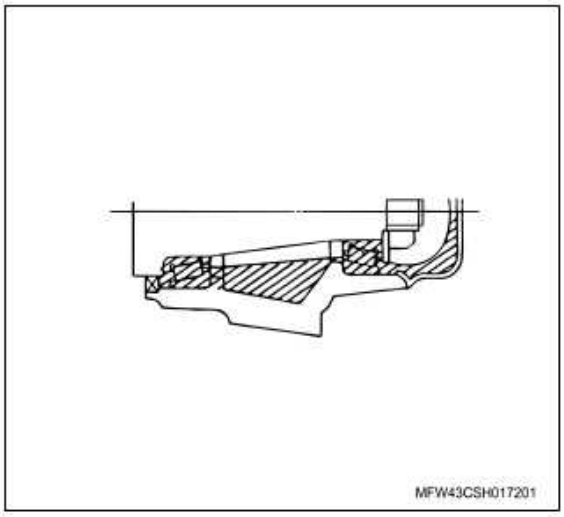
4) Hit the nuts into two positions.
Note:
・Knock to allow the two surfaces of the stud are flush with each other.
3. Tie rod installation
1) Install the tie rod on the tie rod arm.
2) Install the groove top nut on the tie rod.
Tightening torque: 304N・m{31.0kgf・m/223.99lb・ft}
3) Install the split pin on the groove top nut and bend it.

Note:
・If the top nut of the groove is not aligned with the ball pin hole, further tighten the nut for the alignment.
Caution:
・Do not make the hole alignment in the loosening direction.
・Do not reuse the split pin.



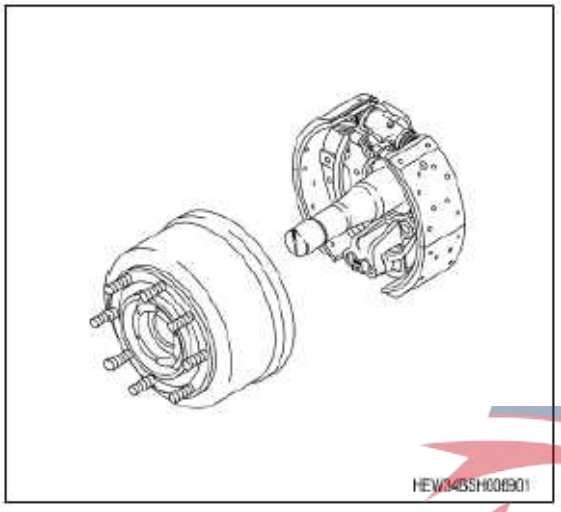
1. Cotter pin

4. Brake drum installation
1) Fill the grease chamber of the front wheel hub with BESCO L-2 grease.
Note:
・BESCO L-3 grease or any equivalent can be injected.
Caution:
・Always inject new grease.



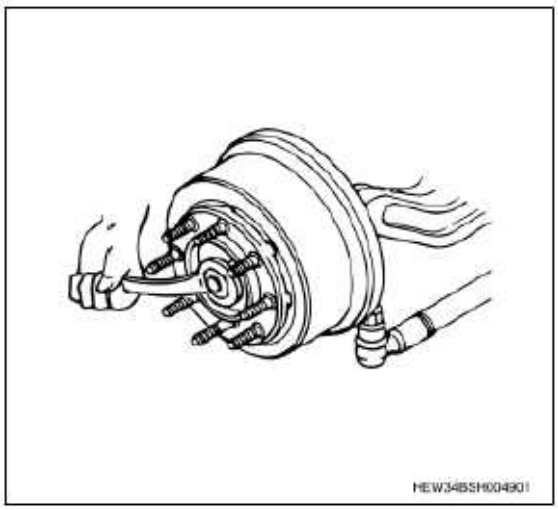
2) Install the brake drum on the steering knuckle.

Caution:
・Be careful to prevent any heavy part from inflicting any injury.
・Check whether there is any grease on the internal drum surface or lining.
・Be careful to prevent any impurity or dirt from sticking on the front wheel hub or the front bearing.



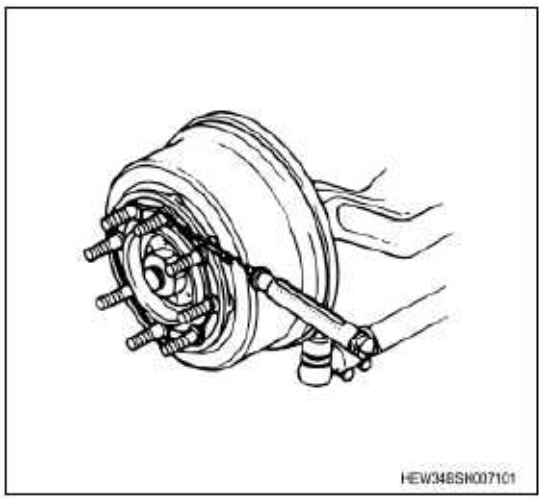
3) Install the inner cup of the outside bearing on the front wheel hub.
4) Install the front wheel nub bearing washer on the steering knuckle.
5) Install the wheel hub nut from the steering knuckle using a special tool.

SST:1-8511-0002-0-wheel hub nut wrench



6) Rotate the brake drum leftward and rightward to tighten the wheel hub bearing.
7) Continuously rotate the brake drum, and tighten the wheel hub nut until the brake drum stops.
Caution:
・Continuously rotate the brake drum during the tightening.
・Do not any pneumatic tool.
8) Loosen the wheel hub nuts and check whether the brake drum rotates smoothly.
Caution:
・If the brake drum does not rotate, pull back the brake drum and use a special tool to do the above procedure again.
・Loosen the hub nuts completely.
9) Pass one wire through the vehicle pin and hook the spring balance to the spring.
10) Pull the spring balance in the tangential direction and adjust the pre-applied load on the outside bearing.
Note:
・Make adjustment through tightening the hub nuts.
Caution:
・If the pre-load is not stable, rotate the brake drum multiple times. When the brake drum stops completely, make a remeasurement.
・If it is not still firm, rotate the brake drum leftward and rightward and do the hub bearing stabilization procedure.
Amount of injected grease

Amount of filled air	Remarks
: About 37.74oz (about 37.70oz)	The amount of grease used for one wheel, including the usage in the wheel hub bearing, is about 1325g (46.8oz).

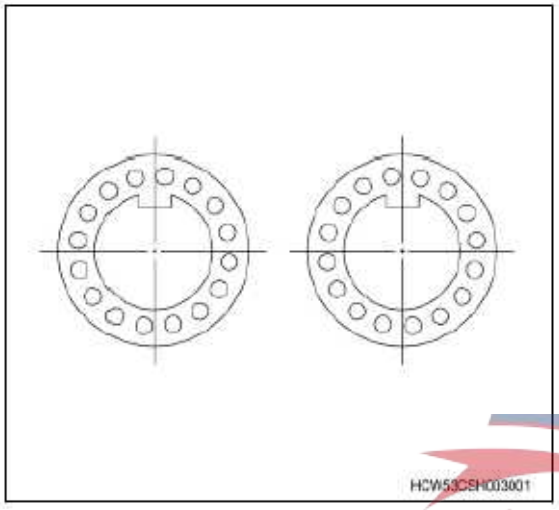


11) Install the lock washer onto the wheel hub nut.
Note:
・If the bolt hole of the lock washer is not aligned with the hub nut, rotate the lock washer for installation.

・If there is still no match after overturn and installation, rotate the hub nut in the tightening direction for bolt hole match.

・If the lock washer is upside down, the hole would match with it.

Angle: 11°15′



Tightening torque: 9N・m{0.9kgf・m/80.01lb・in}

12) Install the wheel hub cap washer under the wheel hub cap.

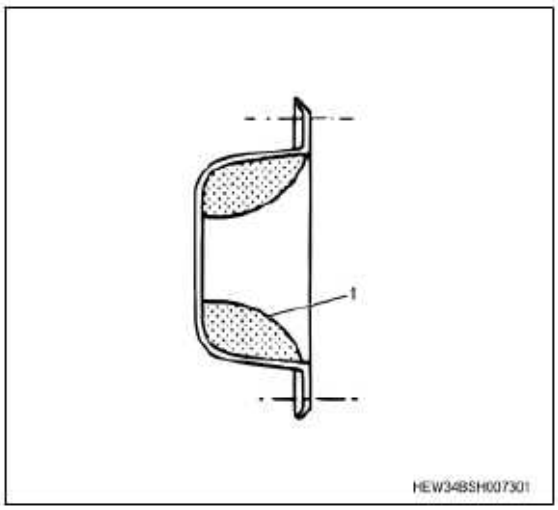
13) Fill the hub cover with BESCO L-2 grease.

Note:

・BESCO L-3 grease or any equivalent can be injected.

Caution:

・Always inject new grease.



1. Grease

14) Install the wheel hub cap on the front wheel hub.

Tightening torque: 23N・m{2.3kgf・m/17.00lb・ft}

5. Brake lining check

1. Brake lining gap check

1) Remove the inspection hole protection ring from the dust cover.

2) Measure the brake lining gap using a gap gauge.

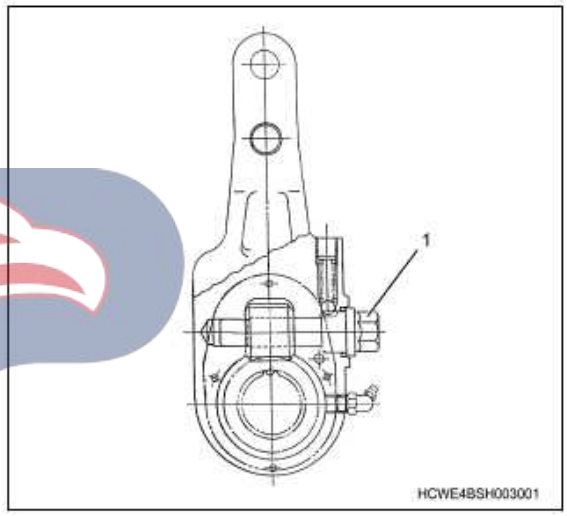
Standard: 0.01in{0.01in}

Caution:

・If the measurement result is beyond the specified range, adjust the brake lining gap.

2. Brake lining gap adjustment (specifications of manual gap regulator)

1) Rotate the worm shaft to adjust the brake lining.

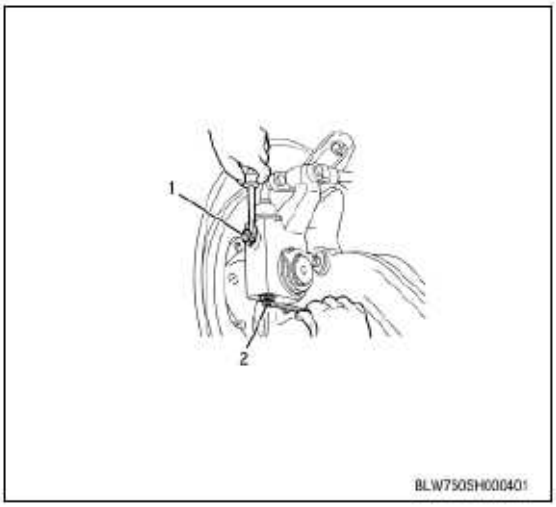


1. Worm shaft

3. Brake lining gap adjustment (specifications of automatic gap regulator)

1) Use a slot-headed screwdriver to pull up the rod.

2) Rotate the worm shaft to adjust the brake lining.



1. Rod

2. Worm shaft

6. Installation of disc wheel and tire

1. Precautions for disc wheel installation

Caution:

・If necessary, clean the following parts.

・Disc wheel mounting surface

・Wheel mounting surface of hub

・Conical cross section of nut

If the disc wheel is installed when it is not clean, the wheel nuts may be loose and thus the tire may come off.

Caution:

・Do not smear any MoS2 grease on any wheel pin or wheel nut.

The tightening force may be excessively great in relation to the tightening torque, thus causing the wheel pin to be damaged.

Caution:

・Before a commercial impact wrench is used, check its tightening torque.

The torque produced by the commercial socket wrench may be greater than the specified tightening torque value. If it is tightened using a torque greater than the specified value, the wheel pin may be damaged.

Caution:

・If a tightening wrench is used for tightening, be careful with the adjustment or tightening of the air pressure regulator. Do not tighten it excessively.

・Even if a tightening wrench is used for tightening, a tool like a torque wrench shall be used to tighten it to the specified torque at the end.

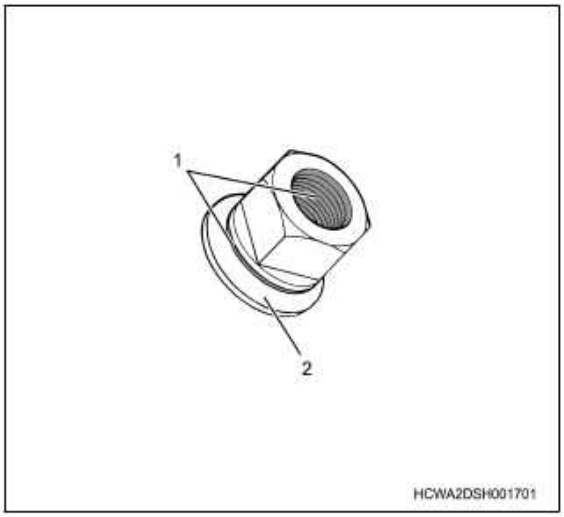
2. Disc wheel installation

1) Smear engine oil on the wheel nuts.

Note:

・Gear oil or power steering fluid can be used.

Wheel nut



1. Lubrication area

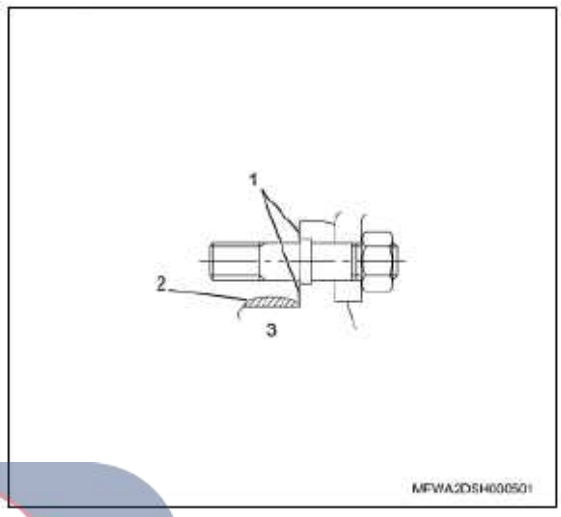
2. Cleaner

2) Smear engine oil on the wheel pin.

Note:

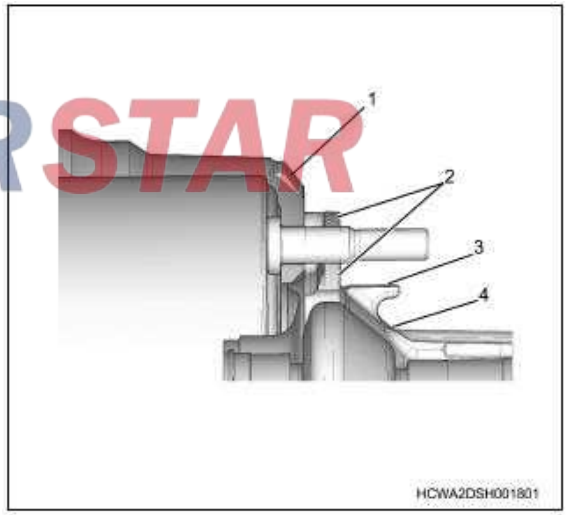
・Gear oil or chassis grease can be used.

Wheel pin class A



1. The contact surface of the disc wheel is not smeared with grease
2. Wheel hub
3. Grease application area

Wheel pin class B

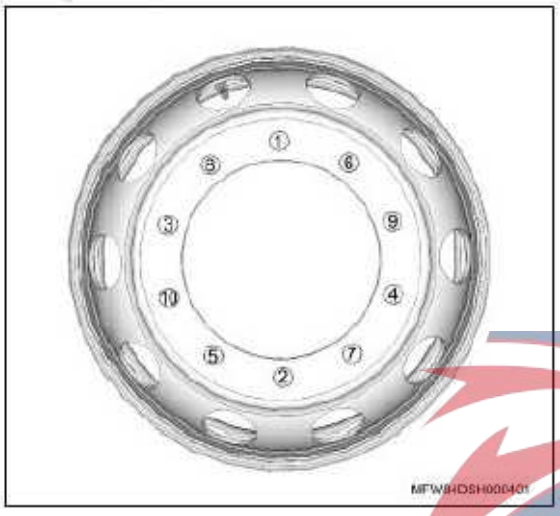


1. Brake drum
2. The contact surface of the disc wheel is not smeared with grease
3. Grease application area
4. Wheel hub

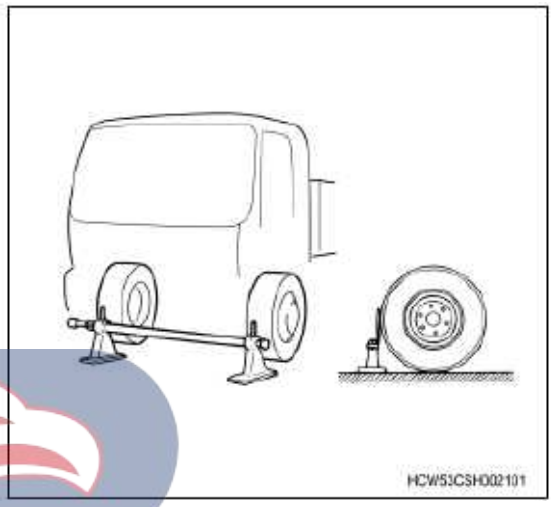
3) Install the disc wheel on the wheel pin.

4) Temporarily tighten the wheel nut onto the wheel pin.

Note:
・Rotate and insert the wheel nut by hand until it is fixed on the contact surface of the disc wheel. Temporarily tighten the wheel nuts until the disc wheel does not issue chucks.
5) Lower vehicle
6) Tighten the wheel nut diagonally two or three times as shown in the following figure.
Wheel nut tightening procedure

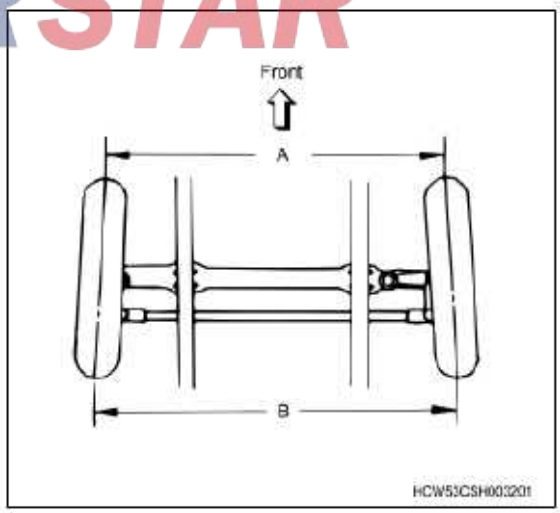


7) Tighten the inner wheel nut using a torque wrench, etc.
Tightening torque: 500-550N·m{50-55kgf·m/362-398lb·ft}
Caution:
・When the front tires are installed, do the following checks.
・Ensure no interference to any nearby part when rotating the steering wheel leftward or rightward.
Caution:
・After the installation, drive the vehicle a distance greater than the specified value and then retighten the wheel nuts with the specified torque.
Standard: 50 to 100km{31 to 99.78km}
7 Tie rod adjustment
1) Check the following items.
・The vehicle must be of no load.
・The surface must be flat.
・The vehicle must have a normal gesture.
・The wheel must not have any offset or deformation
・There shall not be any loosened part.
・The bolt or nut shall not be loose.
2) Rock every corner of the vehicle to confirm whether the suspicion is true.
3) Set the front wheels in the way that ensures the vehicle runs forward straightly.
4) Align the end of the toe-in measuring rule with the following position.
・Height of center line of left and right front wheels
・Tire tread pattern center
5) Make a mark where there is a contact with the toe-in measuring rule.
6) Measure the distance A between the marks made on the rears of the front wheels.
7) Rotate the front wheel for 180°.
8) Measure the distance A between the marks made in the front of the vehicle.



1. Toe-in measuring rule

9) Calculate the toe-in according to the measured value.
Note:
・Subtract the measured value of A from the measured value of B to obtain the calculation result.



Specified value 0±1mm(0±0.0394in)
Caution:
・If the calculated toe-in is not the specified value, rotate the tie rod to make an adjustment.

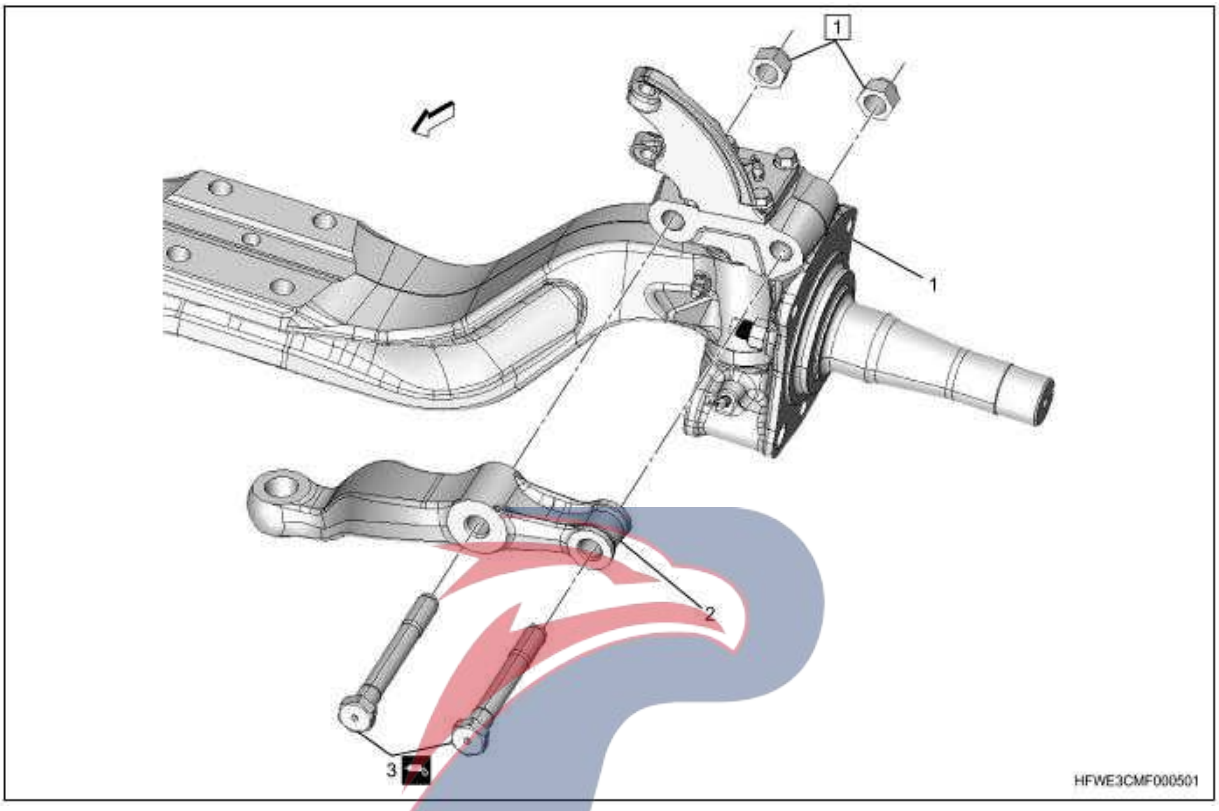
10) Fix the tie rod end to the tie rod.
Tightening torque: 83N・m{8.5kgf・m/61lb・ft}

Steering knuckle arm

Removal

Steering knuckle arm

1.Component view



Part name

1. Steering knuckle
2. Steering knuckle arm
3. Stud

Tightening torque

1: 515N・m{52.5kgf・m/172.37kg・ft}

2. Removal of disc wheel and tire

1) Move the vehicle onto a flat ground.

2) Pull out the parking brake rod.

3) Put the stop wedge on the vehicle.

4) Jack up the vehicle.

Note:

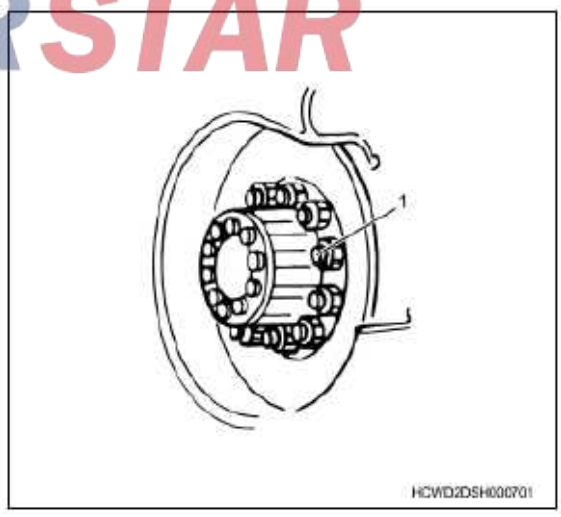
・Jack it up but ensure that its tires are on the ground.

5) Loosen the wheel nuts until the disc wheel does not issue chucks.

Caution:

・Do not remove the wheel nuts.

・Do not loosen the wheel nuts excessively, and otherwise, the wheel pin may be damaged.



1. Wheel pin mark position: R indicates RH thread

---

6) Jack up the vehicle.

Note:

・Jack up the vehicle and allow all of its tires to be away from the ground.

7) Remove the wheel nut from the wheel pin.

8) Remove the disc wheel from the vehicle.

Warning:

・Be careful to prevent the heavy tire from inflicting any injury.

Caution:

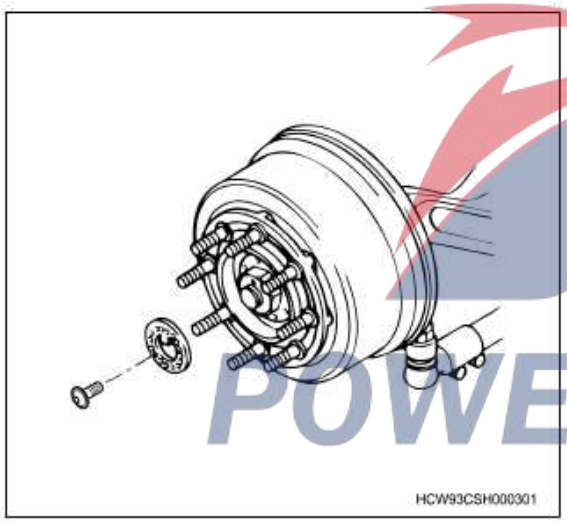
・Remove the component and ensure the thread part of the wheel pin and the disc wheel mounting surface of the hub.

3. Brake drum removal

1) Remove the hub cap from the front wheel hub.

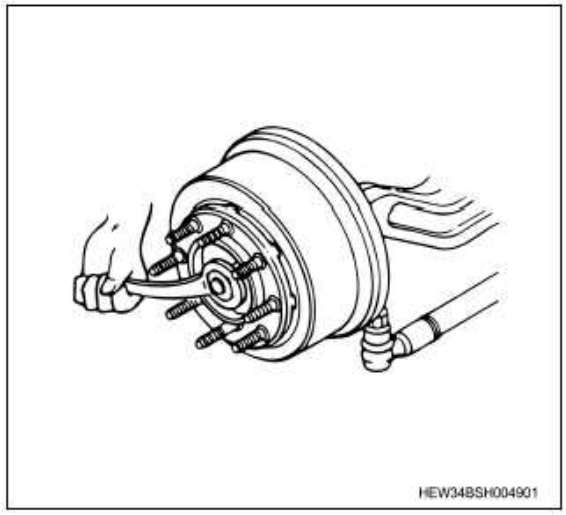
2) Remove the hub cap washer from the front wheel hub.

3) Remove the lock washer from the front wheel hub.



4) Remove the wheel hub nut from the steering knuckle using a special tool.

SST:1-8511-0002-0-wheel hub nut wrench



5) Remove the front wheel hub bearing washer from the steering knuckle.

6) Remove the inner cup of the outer bearing from the front wheel hub.

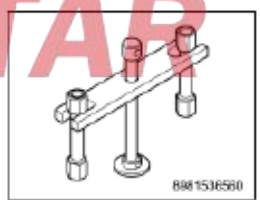
7) Remove the brake drum from the steering knuckle using a special tool.

Caution:

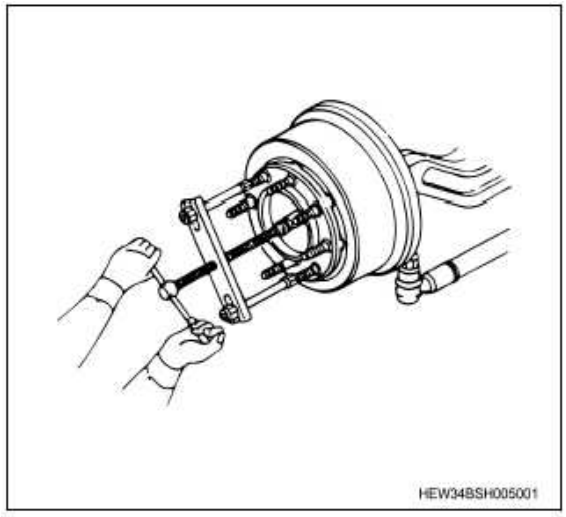
・Be careful to prevent any heavy part from inflicting any injury.

・When the front wheel hub is removed, do not allow the brake or the parking brake to engage.

・Be careful to prevent any impurity or dirt from entering the front wheel hub or the front bearing.

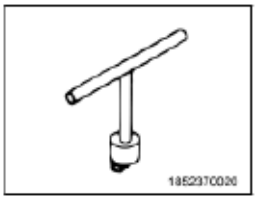


SST:8-9815-3656-0-wheel hub puller

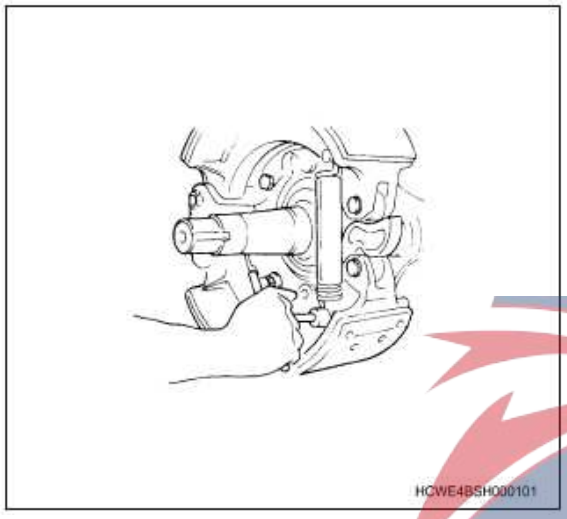


4. Brake shoe removal

1) Remove the return spring from the brake shoe using a special tool.



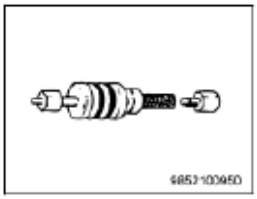
SST:1-8523-7002-0-return spring removal tool



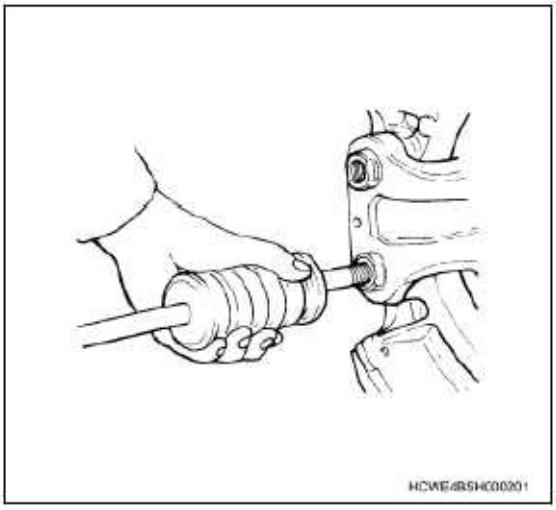
2) Remove the lock washer and the lock plate from the front anchor pin bracket.

3) Remove the dust cover from the front locating pin bracket.

4) Remove the anchor pin and the brake shoe from the front anchor pin bracket using a special tool.



SST:9-8521-0095-0-pin removal tool



5) Remove the snap ring from the brake shoe.

6) Remove the roller and pin from the brake shoe.

5. Brake drum removal

1) Disconnect the air hose of the brake chamber.

2) Remove the split pin from the brake chamber.

3) Remove the pin from the brake chamber and gap adjuster.

4) Remove the brake chamber from the steering knuckle.

6. Gap adjuster removal

1) Remove the snap ring from the camshaft.

2) Remove the limit plate from the camshaft.

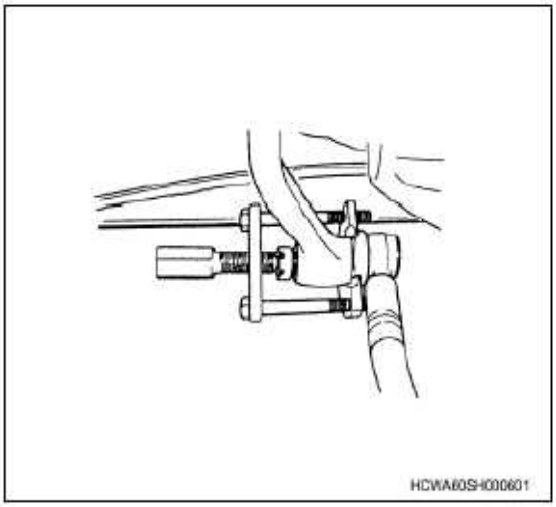
3) Remove the gap adjuster from the camshaft.

7. Removal of straight tie rod

Except the 1.8x4 mode

1) Make a mark on the straight rod to distinguish which side is the front side.

2) Use a suitable tool to remove the straight rod from the knuckle and steering rocker arm.



2. 8x4 mode

1) Mark the first longitudinal tie rod to identify which side is the front side.

2) Using a suitable tool to remove the 1st gear straight rod from the knuckle and steering rocker arm.

3) Mark the 2nd gear straight rod to distinguish which side is the front side.

4) Using a suitable tool, remove the 2nd gear straight rod from the linkage arm and knuckle arm.

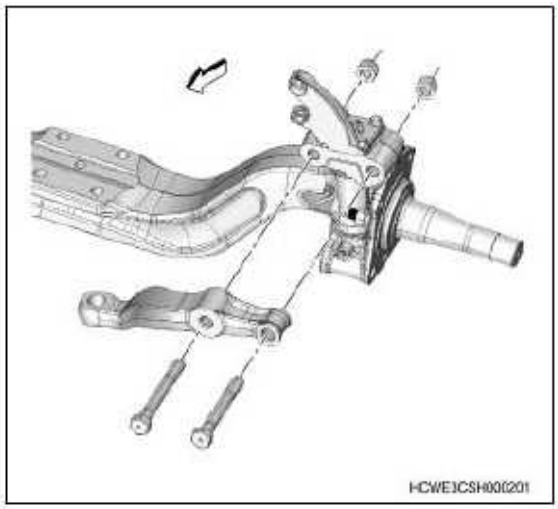
5) Make a mark on the connecting rod to identify which side is the front side.

6) Remove the connecting rod from the link arm by suitable tool;

8. Steering knuckle arm removal

1) Use the punch to pry up the cylindrical flange nut.

2) Remove the steering knuckle arm from the steering knuckle.



Inspection

1. Steering knuckle arm check

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1) Check the following items.

・Crack

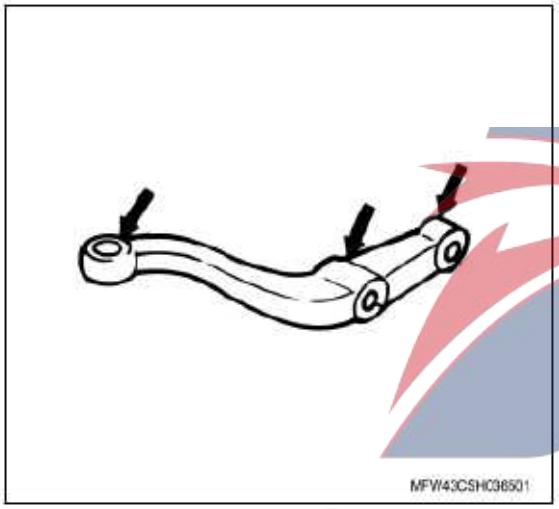
・Bent

・Twist degree

・Damaged

Note:

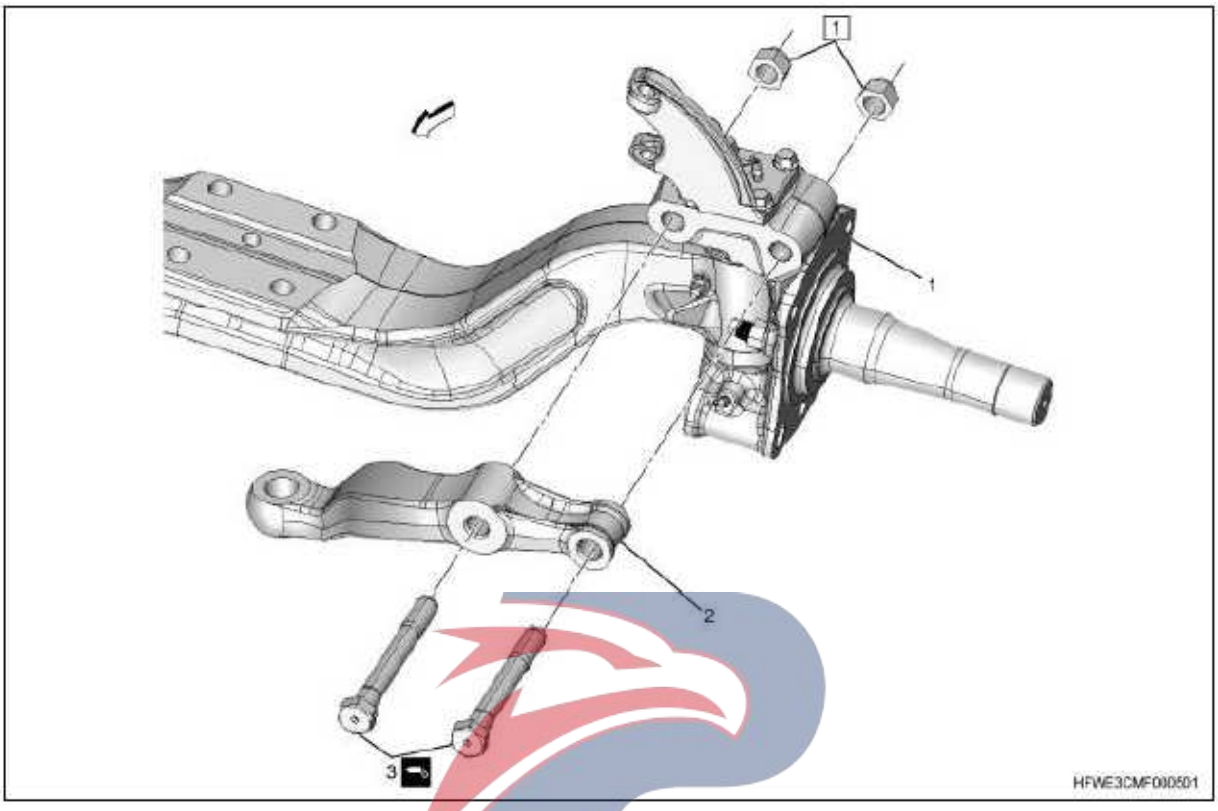
・If necessary, do the check using a detector or the red penetrate examination method.



Installation

Steering knuckle arm

1. Component view



Part name

1. Steering knuckle
2. Steering knuckle arm
3. Stud

Tightening torque

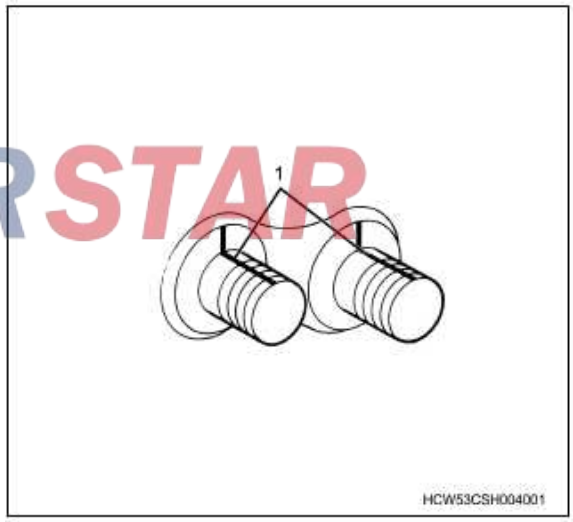
1: 515N・m{52.5kgf・m/172.37kg・ft}

2. Steering knuckle arm installation

1) Smear Bell Moly grease or any equivalent on the thread of the stud and the surface of the steering knuckle arm bearing.

Note:

・Operate as shown in the following drawing.



1. Each bolt just needs one slight spot smear.

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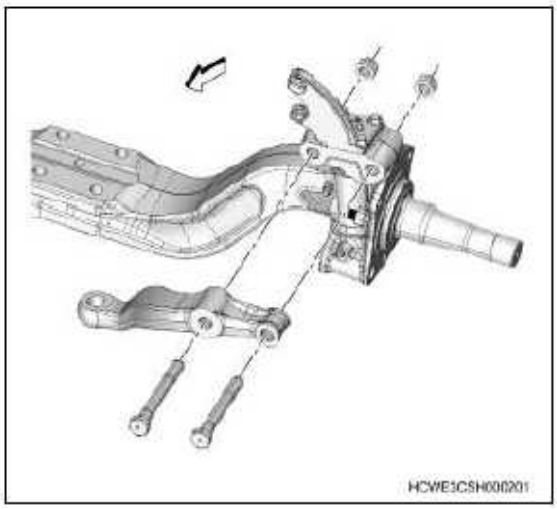
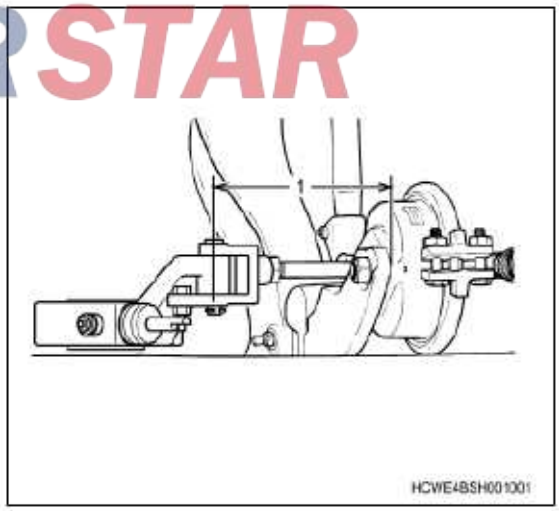
2) Install the steering knuckle arm on the steering knuckle.

Tightening torque: 515N・m{52.5kgf・m/380.01lb・ft}



3) Hit the nuts into two positions.
Note:
・Rivet fix the nut sleeve until the surfaces of the sleeve and stud are in close contact.
Caution:
・Avoid any crack at the rivet position during operation.
3. Drag link installation
Except the 1.8x4 mode
1) Face the markings made during disassembly toward the the rocker arm side and attach the tie rod to the knuckle and steering rocker arm.
Tightening torque: 265N・m{27.0kgf・m/195.00lb・ft}
2) Install the split pin on the tie rod.
Caution:
・Do not reuse the split pin.
Note:
・If the split pin hole is not aligned, rotate the nut in the tightening direction for the hole alignment.
・Insert the split pin in the hole from its upper end.
2. 8x4 mode
1) Face the markings made during disassembly toward the the rocker arm side and attach the 1st gear rod to the knuckle and steering rocker arm.
Tightening torque: 265N・m{27.0kgf・m/195.00lb・ft}
2) Install the split pin on the tie rod.
Caution:
・Do not reuse the split pin.
Note:
・If the split pin hole is not aligned, rotate the nut in the tightening direction for the hole alignment.
・Insert the split pin in the hole from its upper end.
3) Face the markings made during disassembly toward the the rocker arm side and attach the 2nd gear pull rod to the knuckle and steering rocker arm.
Tightening torque: 265N・m{27.0kgf・m/195.00lb・ft}
4) Install the split pin on the tie rod.
Caution:
・Do not reuse the split pin.
Note:
・If the split pin hole is not aligned, rotate the nut in the tightening direction for the hole alignment.
・Insert the split pin in the hole from its upper end.
5) Face the markings made during disassembly toward the the rocker arm side and attach the connecting rod to the connecting rod arm.
Tightening torque: 265N・m{27.0kgf・m/195.00lb・ft}
6) Install the split pin on the tie rod.
Caution:
・Do not reuse the split pin.
Note:
・If the split pin hole is not aligned, rotate the nut in the tightening direction for the hole alignment.
・Insert the split pin in the hole from its upper end.
4. Brake chamber installation
1) Adjust the length of the brake chamber's push rod.
Standard: 5.98in{5.98in}



1. Length of push rod

3) Connect the air hose to the brake chamber.

5. Gap adjuster installation

1) Install the gap adjuster on the camshaft.

Note:

・Install the gap adjuster in place. Thus, the gap adjuster bushing and the brake chamber push rod is also installed in this place.

Caution:

・Do not change the length of the brake chamber's push rod. Do not rotate the camshaft.

2) Install the pin on the brake chamber and gap adjuster.

3) Install the split pin on the brake chamber.

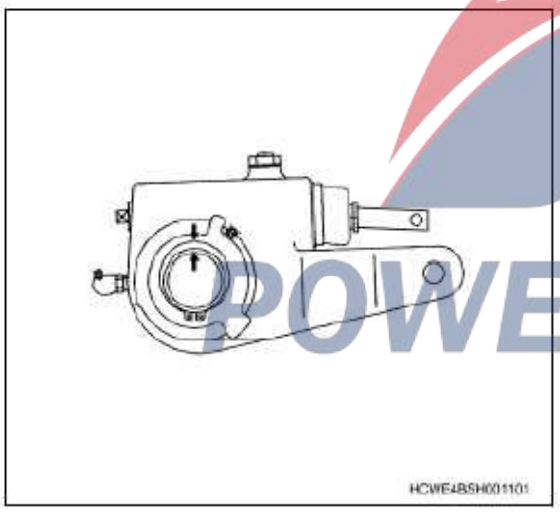
4) Install the washer and the limit plate on the camshaft.

Note:

・Align the camshaft with the arrow on the stop plate for the installation.

Caution:

・Do not rotate the camshaft.



5) Install the snap ring on the camshaft.

6. Brake shoe installation

1) Install the roller and pin on the brake shoe.

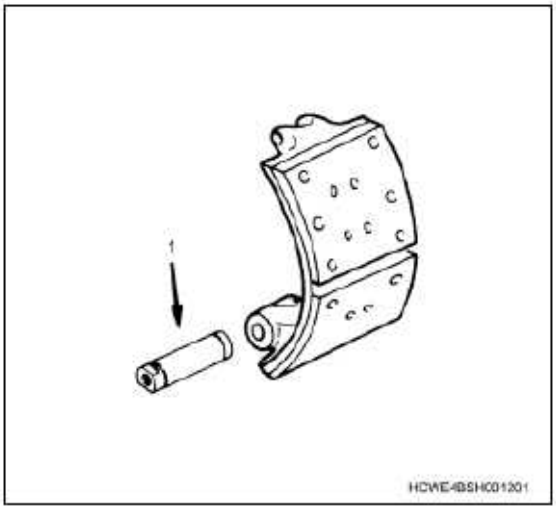
2) Install the snap ring on the brake shoe.

3) Smear grease on the anchor pin and brake shoe lining.

4) Install the brake shoe and the anchor pin on the front anchor pin bracket.

Caution:

・Do not confuse the leading shoe with the trailing shoe.

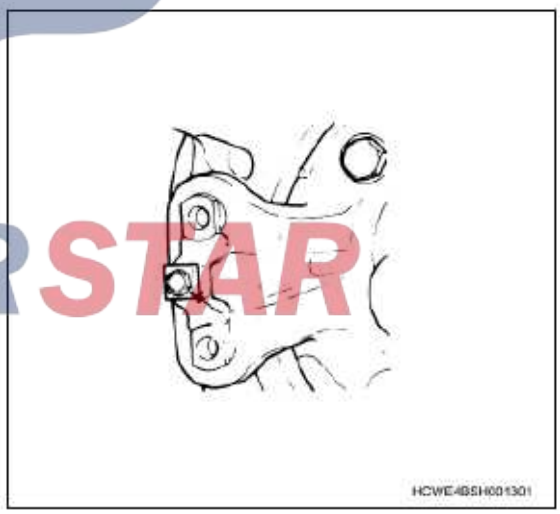


1. Grease application

5) Install the dust cover on the front anchor pin support.

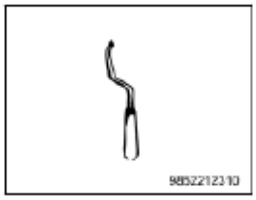
6) Install the lock plate and the lock washer on the front anchor pin bracket.

7) Rivet-fix the lock washer.

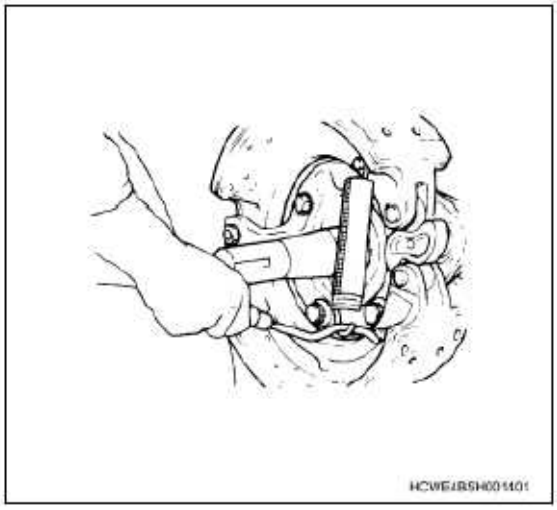


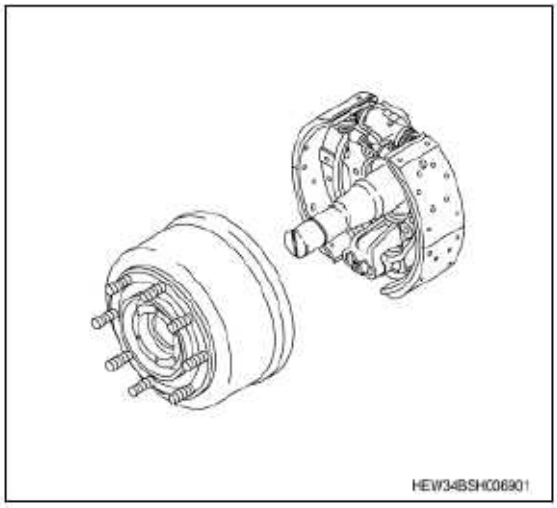
1. Calibration position

8) Install the return spring on the brake shoe using a special tool.



SST:9-8522-1231-0-return spring fixing tool





7. Brake drum installation

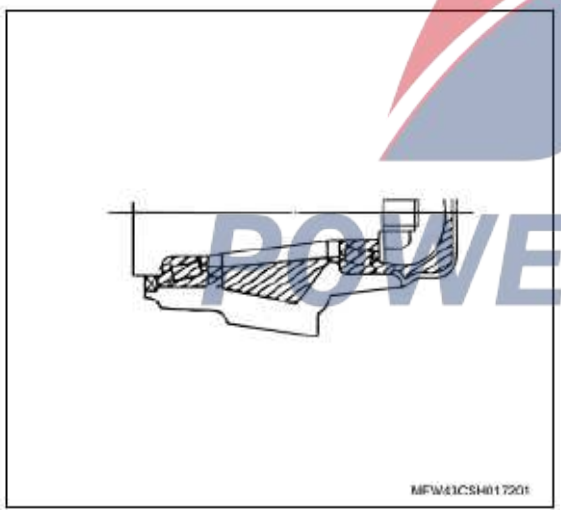
1) Fill the grease chamber of the front wheel hub with BESCO L-2 grease.

Note:

・BESCO L-3 grease or any equivalent can be injected.

Caution:

・Always inject new grease.



2) Install the brake drum on the steering knuckle.

Caution:

・Be careful to prevent any heavy part from inflicting any injury.

・Check whether there is any grease on the internal drum surface or lining.

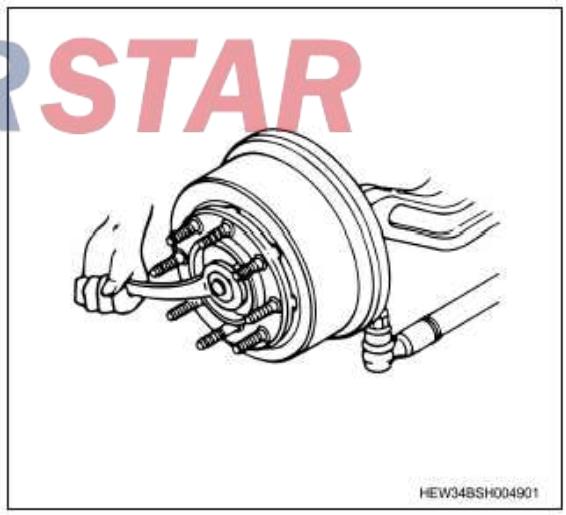
・Be careful to prevent any impurity or dirt from sticking on the front wheel hub or the front bearing.

3) Install the inner cup of the outside bearing on the front wheel hub.

4) Install the front wheel nub bearing washer on the steering knuckle.

5) Install the wheel hub nut from the steering knuckle using a special tool.

SST:1-8511-0002-0-wheel hub nut wrench



6) Rotate the brake drum leftward and rightward to tighten the wheel hub bearing.

7) Continuously rotate the brake drum, and tighten the wheel hub nut until the brake drum stops.

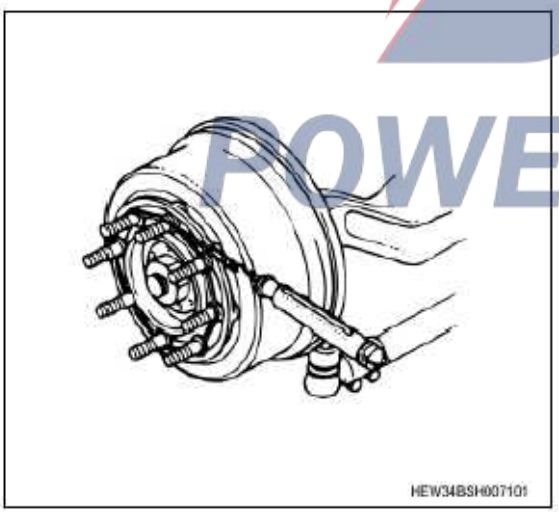
Caution:

・Continuously rotate the brake drum during the tightening.

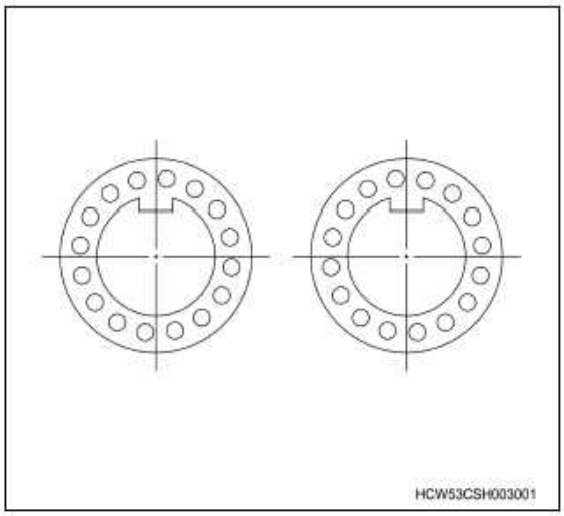
・Do not any pneumatic tool.

8) Loosen the wheel hub nuts and check whether the brake drum rotates smoothly.
Caution:
・If the brake drum doesn't rotate, pull back the brake drum and use a special tool to do the above procedure again.
・Loosen the hub nuts completely.
9) Pass one wire through the vehicle pin and hook the spring balance to the spring.
10) Pull the spring balance in the tangential direction and adjust the pre-applied load on the outside bearing.
Note:
・Make adjustment through tightening the hub nuts.
Caution:
・If the pre-load is not stable, rotate the brake drum multiple times. When the brake drum stops completely, make a remeasurement.
・If it is not still firm, rotate the brake drum leftward and rightward and do the hub bearing stabilization procedure.
Amount of injected grease

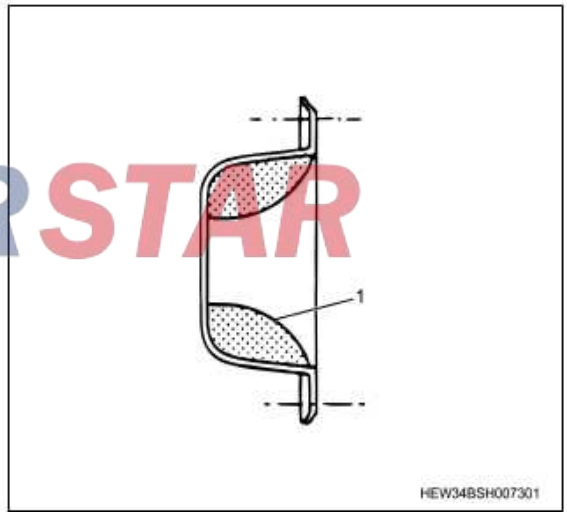
Amount of filled air	Remarks
: About 37.74oz (about 37.70oz)	The amount of grease used for one wheel, including the usage in the wheel hub bearing, is about 1325g (46.8oz).



11) Install the lock washer onto the wheel hub nut.
Note:
・If the bolt hole of the lock washer is not aligned with the hub nut, rotate the lock washer for installation.
・If there is still no match after overturn and installation, rotate the hub nut in the tightening direction for bolt hole match.
・If the lock washer is upside down, the hole would match with it.
Angle: 11°15′



Tightening torque: 9N・m{0.9kgf・m/80.01lb・in}
12) Install the wheel hub cap washer under the wheel hub cap.
13) Fill the hub cover with BESCO L-2 grease.
Note:
・BESCO L-3 grease or any equivalent can be injected.
Caution:
・Always inject new grease.
1. Grease



14) Install the wheel hub cap on the front wheel hub.
Tightening torque: 23N・m{2.3kgf・m/17.00lb・ft}
8. Brake lining check
1. Brake lining gap check
1) Remove the inspection hole protection ring from the dust cover.
2) Measure the brake lining gap using a gap gauge.

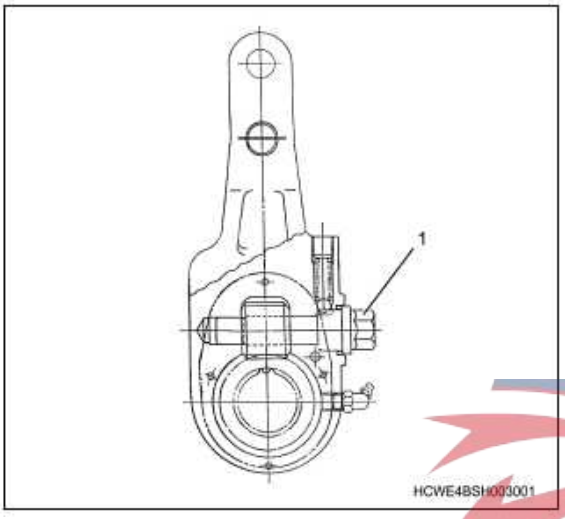
Standard: 0.01in{0.01in}

Caution:

・If the measurement result is beyond the specified range, adjust the brake lining gap.

2. Brake lining gap adjustment (specifications of manual gap regulator)

1) Rotate the worm shaft to adjust the brake lining.

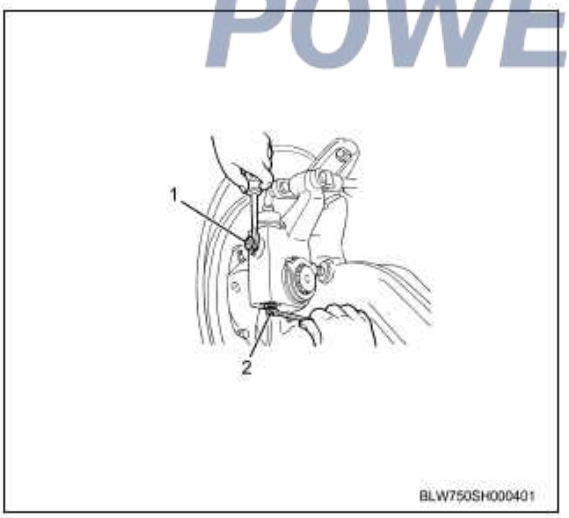


1. Worm shaft

3. Brake lining gap adjustment (specifications of automatic gap regulator)

1) Use a slot-headed screwdriver to pull up the rod.

2) Rotate the worm shaft to adjust the brake lining.



1. Rod
2. Worm shaft

9. Installation of disc wheel and tire

1. Precautions for disc wheel installation

Caution:

・If necessary, clean the following parts.

・Disc wheel mounting surface

・Wheel mounting surface of hub

・Conical cross section of nut

If the disc wheel is installed when it is not clean, the wheel nuts may be loose and thus the tire may come off.

Caution:

・Do not smear any MoS2 grease on any wheel pin or wheel nut.

The tightening force may be excessively great in relation to the tightening torque, thus causing the wheel pin to be damaged.

Caution:

・Before a commercial impact wrench is used, check its tightening torque.

The torque produced by the commercial socket wrench may be greater than the specified tightening torque value. If it is tightened using a torque greater than the specified value, the wheel pin may be damaged.

Caution:

・If a tightening wrench is used for tightening, be careful with the adjustment or tightening of the air pressure regulator. Do not tighten it excessively.

・Even if a tightening wrench is used for tightening, a tool like a torque wrench shall be used to tighten it to the specified torque at the end.

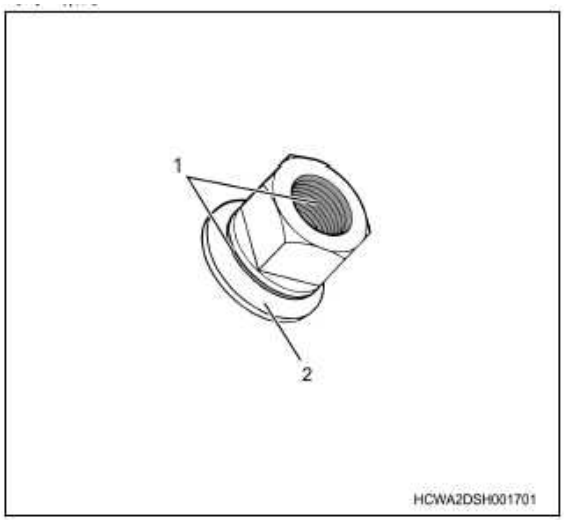
2. Disc wheel installation

1) Smear engine oil on the wheel nuts.

Note:

・Gear oil or power steering fluid can be used.

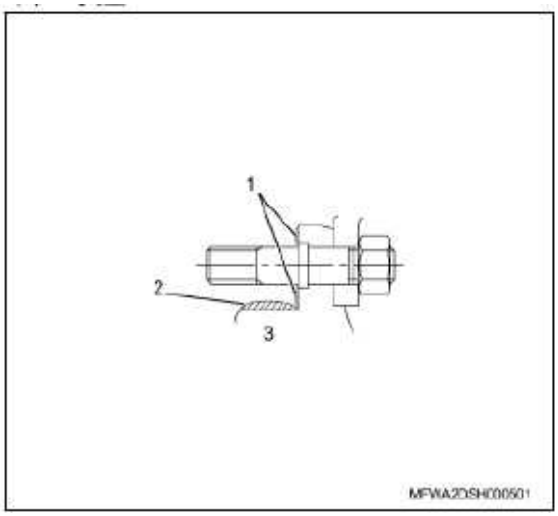
Wheel nut



1. Lubrication area
2. Cleaner

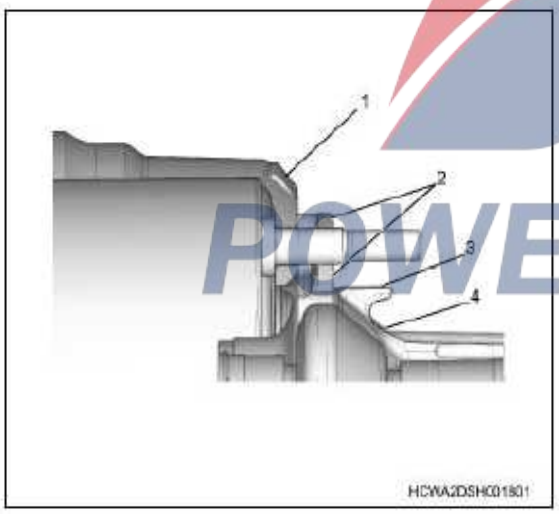
2) Smear engine oil on the wheel pin.

Note:
・Gear oil or chassis grease can be used.
Wheel pin class A



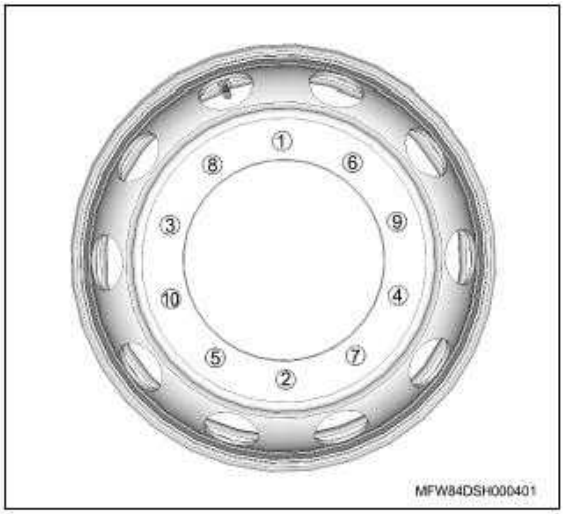
1. The contact surface of the disc wheel is not smeared with grease
2. Wheel hub
3. Grease application area

Wheel pin class B



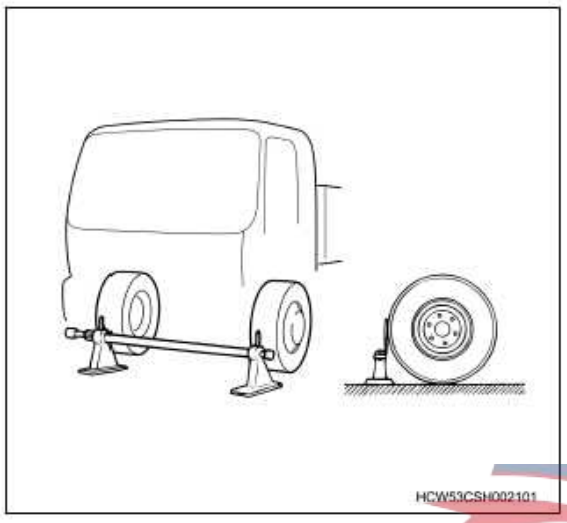
1. Brake drum
2. The contact surface of the disc wheel is not smeared with grease
3. Grease application area
4. Wheel hub

3) Install the disc wheel on the wheel pin.
4) Temporarily tighten the wheel nut onto the wheel pin.
Note:
・Rotate and insert the wheel nut by hand until it is fixed on the contact surface of the disc wheel. Temporarily tighten the wheel nuts until the disc wheel does not issue chucks.
5) Lower vehicle
6) Tighten the wheel nut diagonally two or three times as shown in the following figure.
Wheel nut tightening procedure



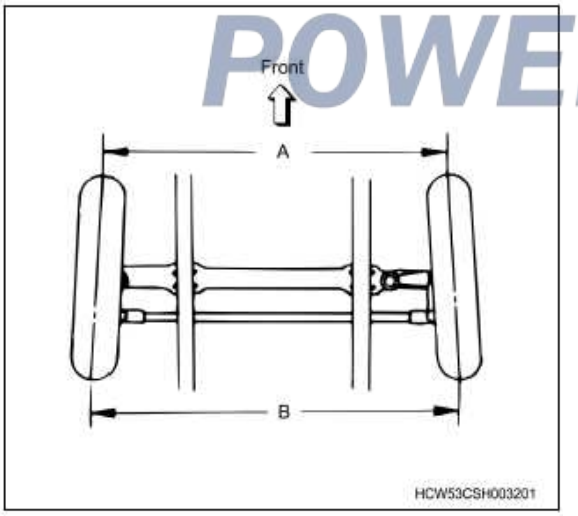
7) Tighten the inner wheel nut using a torque wrench, etc.
Tightening torque: 500-550N·m{50-55kgf·m/362-398lb·ft}
Caution:
・When the front tires are installed, do the following checks.
・Ensure no interference to any nearby part when rotating the steering wheel leftward or rightward.
Caution:
・After the installation, drive the vehicle a distance greater than the specified value and then retighten the wheel nuts with the specified torque.
Standard: 50 to 100km{31 to 99.78km}
10 Tie rod adjustment
1) Check the following items.
・The vehicle must be of no load.
・The surface must be flat.
・The vehicle must have a normal gesture.
・The wheel must not have any offset or deformation
・There shall not be any loosened part.
・The bolt or nut shall not be loose.
2) Rock every corner of the vehicle to confirm whether the suspicion is true.
3) Set the front wheels in the way that ensures the vehicle runs forward straightly.
4) Align the end of the toe-in measuring rule with the following position.
・Height of center line of left and right front wheels
・Tire tread pattern center
5) Make a mark where there is a contact with the toe-in measuring rule.

6) Measure the distance A between the marks made on the rears of the front wheels.
7) Rotate the front wheel for 180°.
8) Measure the distance A between the marks made in the front of the vehicle.



1. Toe-in measuring rule

9) Calculate the toe-in according to the measured value.
Note:
・Subtract the measured value of A from the measured value of B to obtain the calculation result.



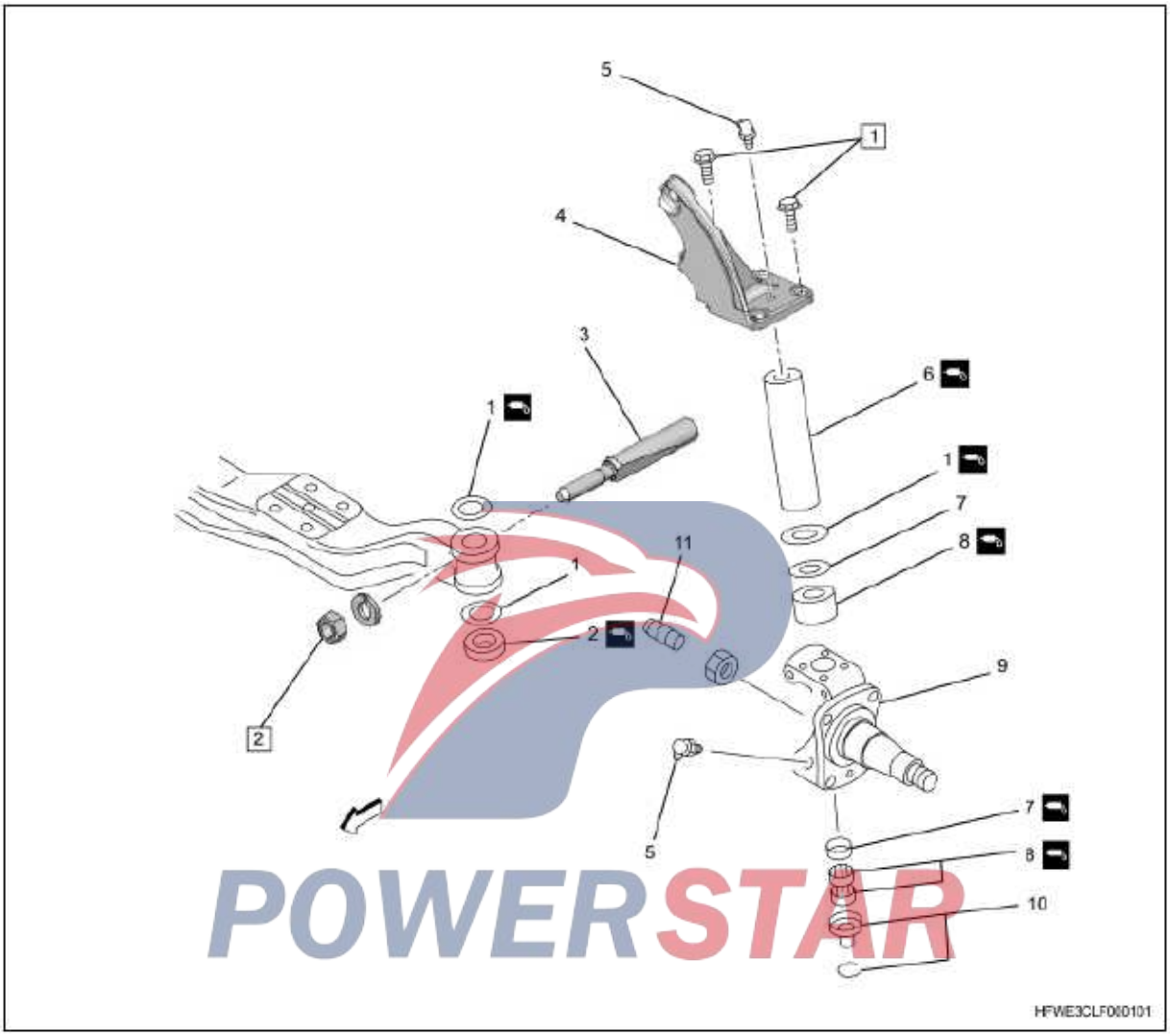
Specified value 0±1mm(0±0.0394in)
Caution:
・If the calculated toe-in is not the specified value, rotate the tie rod to make an adjustment.
10) Fix the tie rod end to the tie rod.
Tightening torque: 83N・m{8.5kgf・m/61lb・ft}

Steering knuckle

Removal

1. Component view

Steering knuckle



Part name

1. Thrust washer
2. Thrust bearing
3. Key bolt
4. Pumping chamber support
5. Grease nozzle
6. King pin
7. Kingpin sealing
8. Needle roller bearing
9. Steering knuckle
10. Cover plug and snap ring
11. Stop bolt

Tightening torque

1: 83N・m{8.5kgf・m/27.67kg・ft}
2: 49N・m{5.0kgf・m/16.33kg・ft}

2. Removal of disc wheel and tire

1) Move the vehicle onto a flat ground.
2) Pull out the parking brake rod.
3) Put the stop wedge on the vehicle.
4) Jack up the vehicle.

Note:

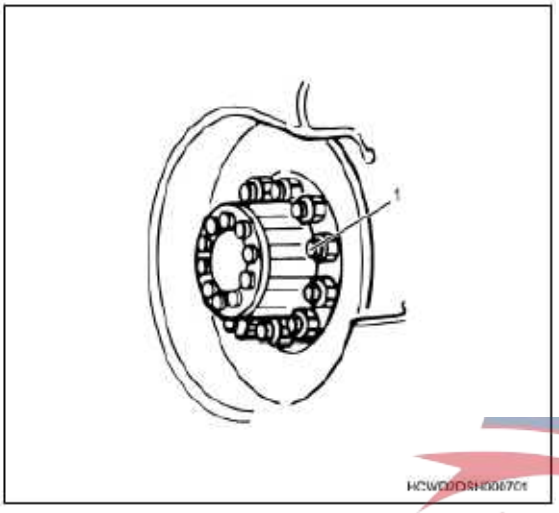
・Jack it up but ensure that its tires are on the ground.

5) Loosen the wheel nuts until the disc wheel does not issue chucks.

Caution:

・Do not remove the wheel nuts.

・Do not loosen the wheel nuts excessively, and otherwise, the wheel pin may be damaged.



1. Wheel pin mark position: R indicates RH thread

6) Jack up the vehicle.

Note:

・Jack up the vehicle and allow all of its tires to be away from the ground.

7) Remove the wheel nut from the wheel pin.

8) Remove the disc wheel from the vehicle.

Warning:

・Be careful to prevent the heavy tire from inflicting any injury.

Caution:

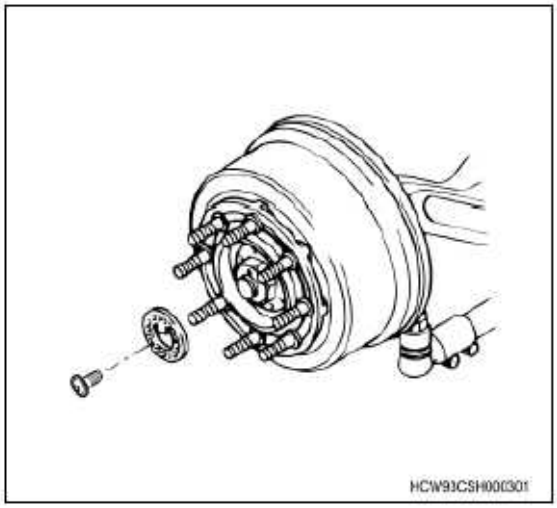
・Remove the component and ensure the thread part of the wheel pin and the disc wheel mounting surface of the hub.

3. Brake drum removal

1) Remove the hub cap from the front wheel hub.

2) Remove the hub cap washer from the front wheel hub.

3) Remove the lock washer from the front wheel hub.



4) Remove the wheel hub nut from the steering knuckle using a special tool.

SST:1-8511-0002-0-wheel hub nut wrench

5) Remove the front wheel hub bearing washer from the steering knuckle.

6) Remove the inner cup of the outer bearing from the front wheel hub.

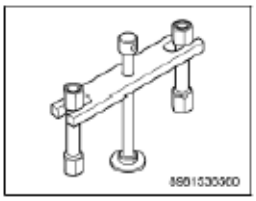
7) Remove the brake drum from the steering knuckle using a special tool.

Caution:

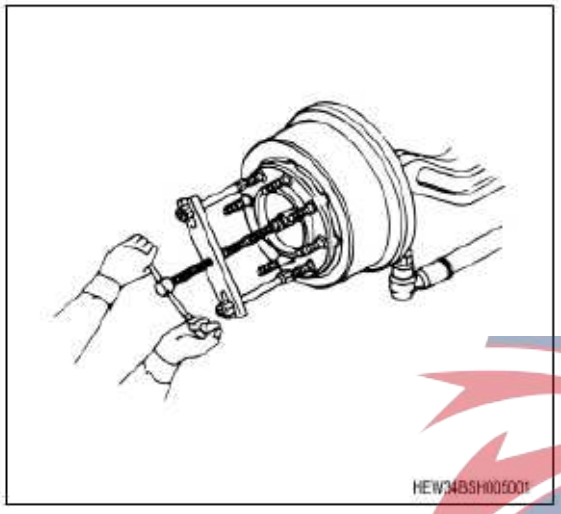
・Be careful to prevent any heavy part from inflicting any injury.

・When the front wheel hub is removed, do not allow the brake or the parking brake to engage.

・Be careful to prevent any impurity or dirt from entering the front wheel hub or the front bearing.

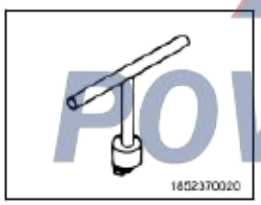


SST:8-9815-3656-0-wheel hub puller

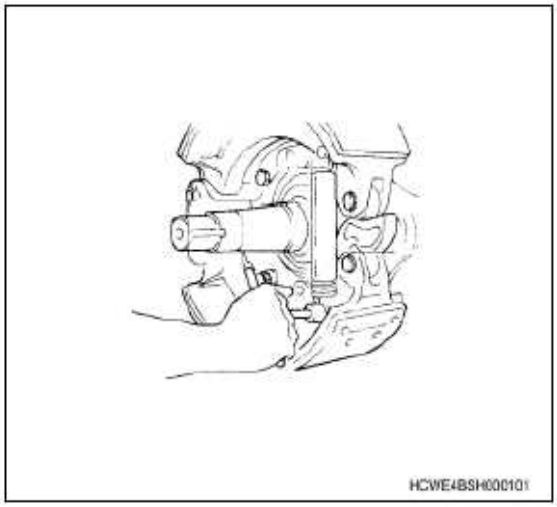


4. Brake shoe removal

1) Remove the return spring from the brake shoe using a special tool.



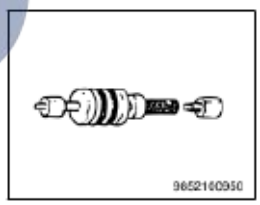
SST:1-8523-7002-0-return spring removal tool



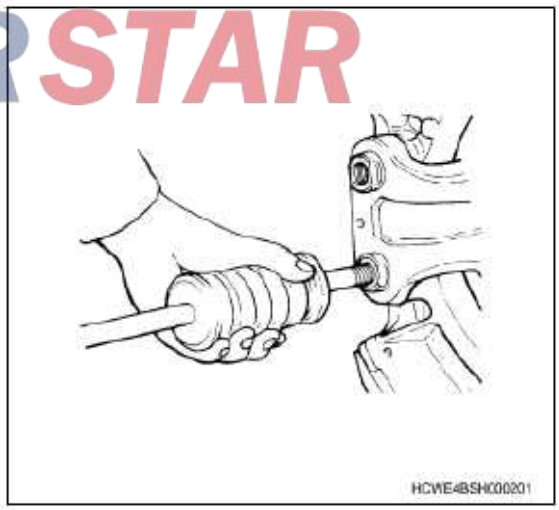
2) Remove the lock washer and the lock plate from the front anchor pin bracket.

3) Remove the dust cover from the front locating pin bracket.

4) Remove the anchor pin and the brake shoe from the front anchor pin bracket using a special tool.



SST:9-8521-0095-0-pin removal tool



5) Remove the snap ring from the brake shoe.

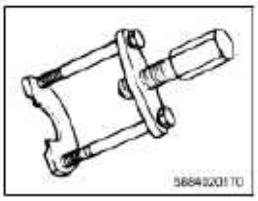
6) Remove the roller and pin from the brake shoe.

5. Brake drum removal

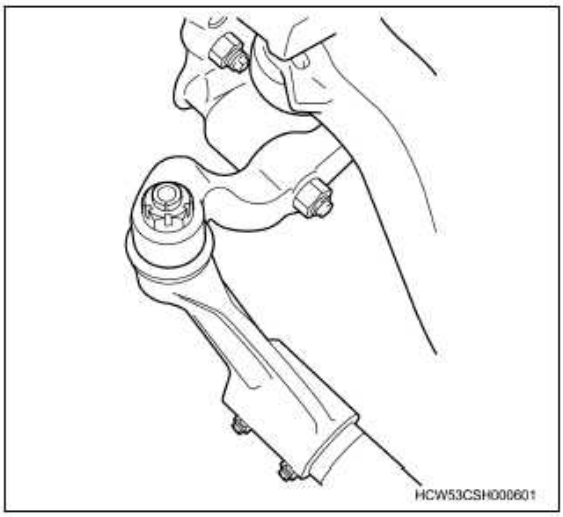
1) Disconnect the air hose of the brake chamber.

2) Remove the split pin from the brake chamber.

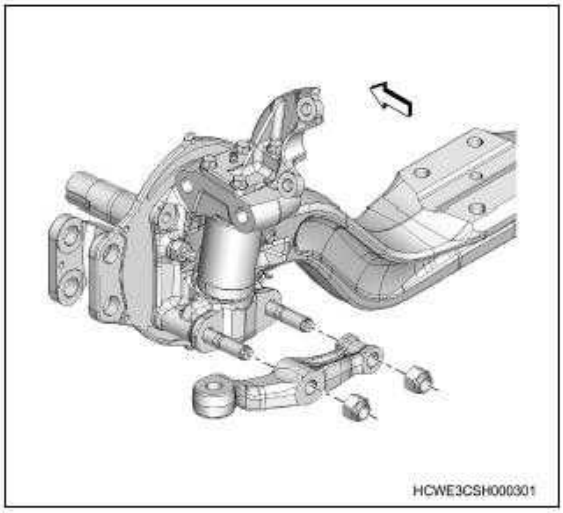
3) Remove the pin from the brake chamber and gap adjuster.
4) Remove the brake chamber from the steering knuckle.
6. Gap adjuster removal
1) Remove the snap ring from the camshaft.
2) Remove the limit plate from the camshaft.
3) Remove the gap adjuster from the camshaft.
7. Camshaft removal
1) Remove the snap ring from the camshaft.
2) Remove camshaft from front anchor pin bracket.
8. Disconnected straight pull rod
1) Remove the split pin and groove top nut on the pull rod.
2) Separate the tie rod from the steering knuckle arm using a special tool.



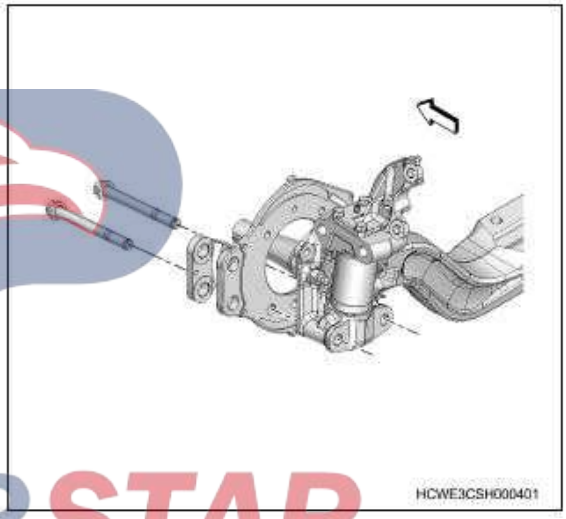
SST:5-8840-2017-0-roll ball connector removal tool
9. Tie rod removal
1) Remove the split pin from the tie rod end.
2) Install the groove top nut on the tie rod end and remove it.
3) Remove the tie rod from the tie rod arm using a brass bar.
Note:
・Remove the fitting part between the ball joint and the tie rod arm.



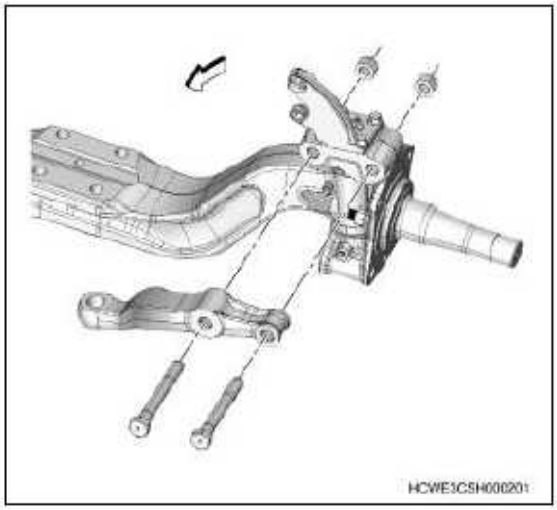
10. Tie rod arm removal
1) Use the punch to pry up the cylindrical flange nut.
2) Remove the tie rod arm from the steering knuckle.



3) Remove the stud from the steering knuckle.

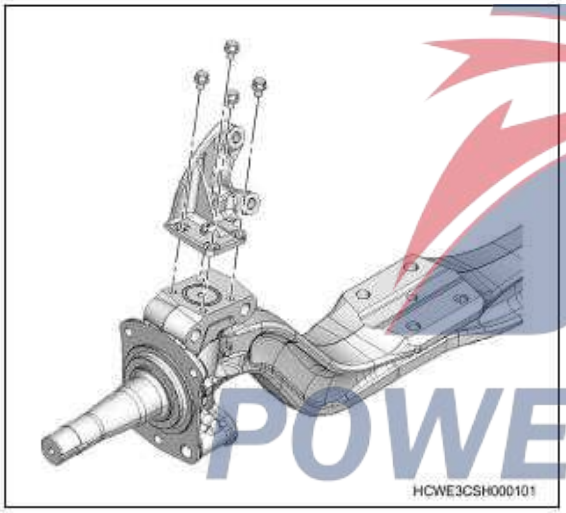


11. Remove the front anchor pin bracket
1) Remove the front locating pin bracket from the knuckle.
12. Steering knuckle arm removal
1) Use the punch to pry up the cylindrical flange nut.
2) Remove the steering knuckle arm from the steering knuckle.



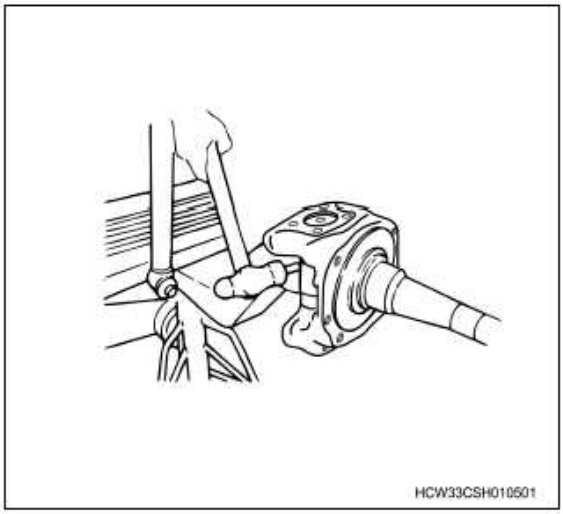
13. Remove the knuckle

1) Remove the brake chamber bracket from the knuckle.

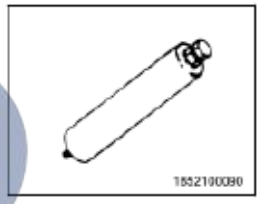


2) Loosen the nut flush with the top of the key bolt

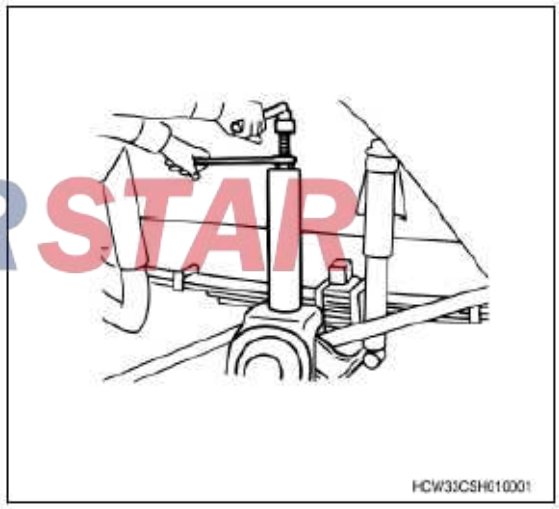
3) Use a copper hammer to remove the key bolt from the axle.



4) Use a special tool to remove the kingpin from the knuckle.



SST:1-8521-0009-0-kingpin removal tool



5) Remove knuckle from front axle.

6) Remove the thrust bearing from the front axle;

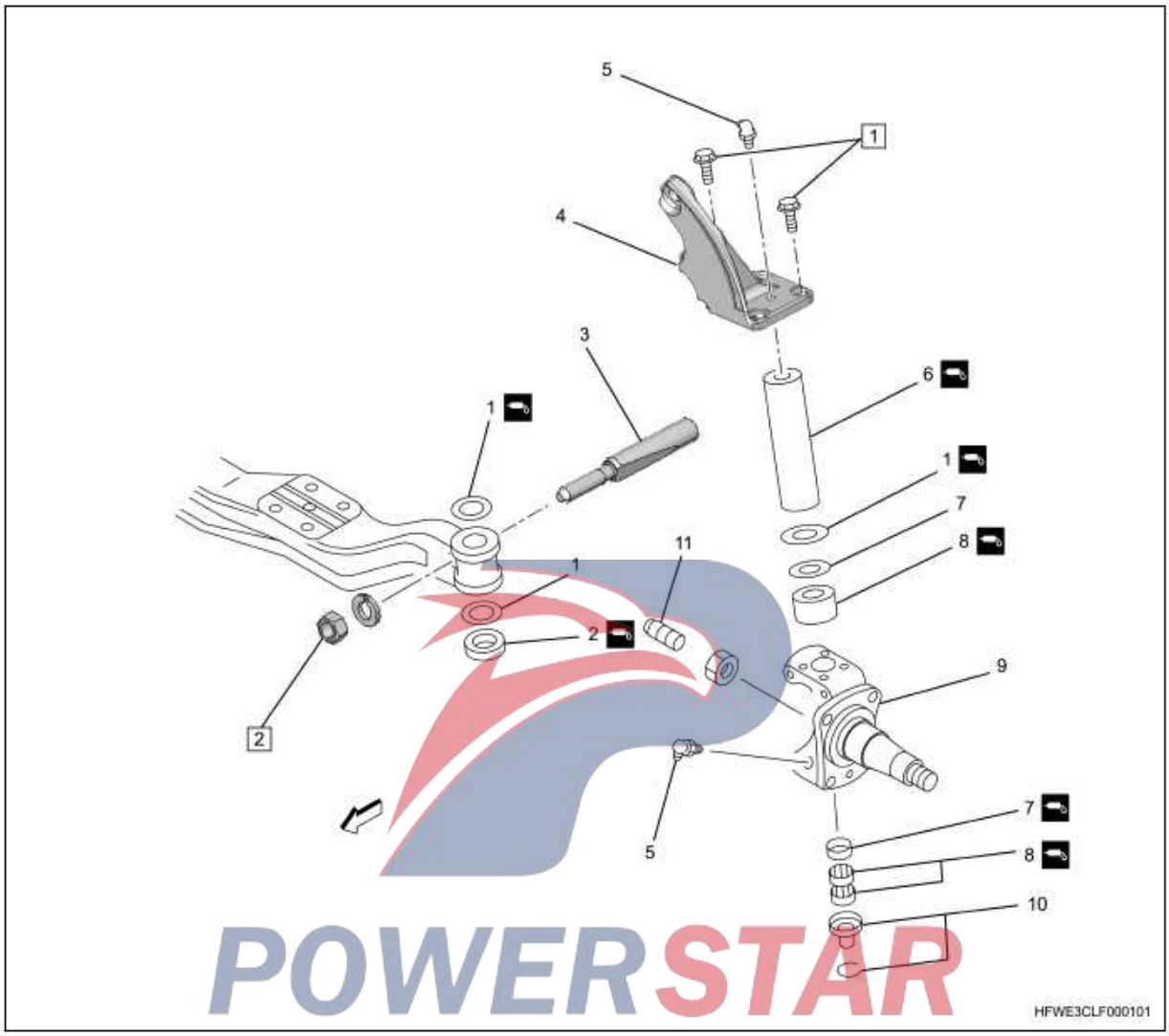
7) Remove the thrust washer from the front axle;

8) Remove the cover plug and the snap ring;

Removal

Steering knuckle

1. Component view



Part name

1. Thrust washer
2. Thrust bearing
3. Key bolt
4. Pumping chamber support
5. Grease nozzle
6. King pin
7. Kingpin sealing
8. Needle roller bearing
9. Steering knuckle
10. Cover plug and snap ring
11. Stop bolt

Tightening torque

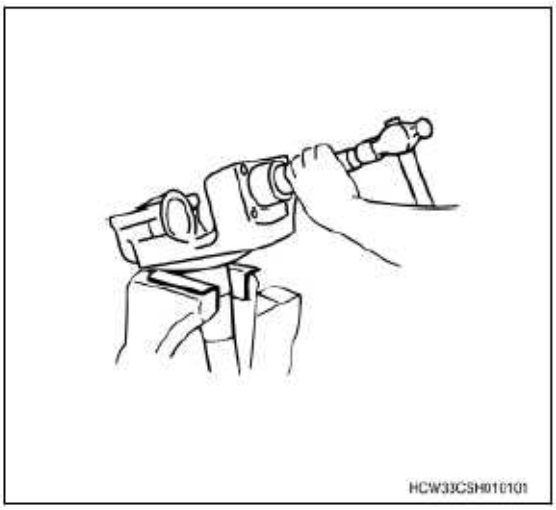
1: 83N・m{8.5kgf・m/27.67kg・ft}

2: 49N・m{5.0kgf・m/16.33kg・ft}

2. Knuckle disassembly

1) Use special tools to remove the needle roller bearings and king pin seal from the knuckle.

SST:1-8523-8001-0-kingpin bearing removal tool



Inspection

1. Inspection of knuckle

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1. Thrust bearing check

1) Check the following items.

・Abrasion

・Insert

2. Steering knuckle arm check

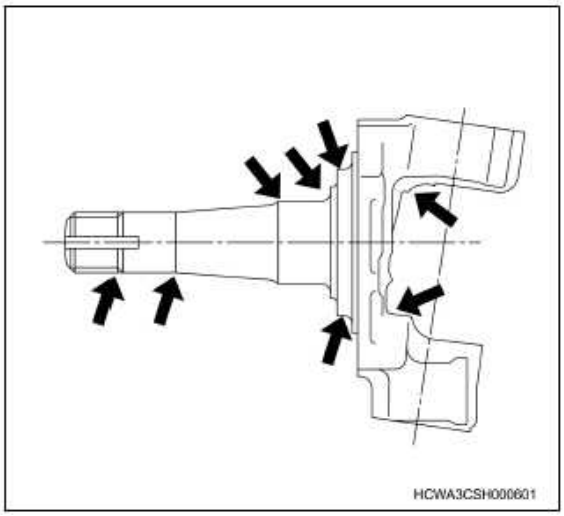
1) Check the following items.

・Bent

・Crack

Note:

・If necessary, check the shaft section, stepped section and base of the shifting fork using a detector or red-liquid penetration test method.



3. Knuckle measurement

1) Measure the outer diameter of the knuckle hub bearing assembly.

2) Measure the outer diameter of the oil seal contact surface of knuckle.

Nominal dimensions

Outer bearing section	: 50.0mm { 5.0000cm }
Inner bearing part	: 68.262mm { 6.8263cm }
Sealing section	: 120.0mm { 12.0000cm }

4.Kingpin inspection

1) Check the following items.

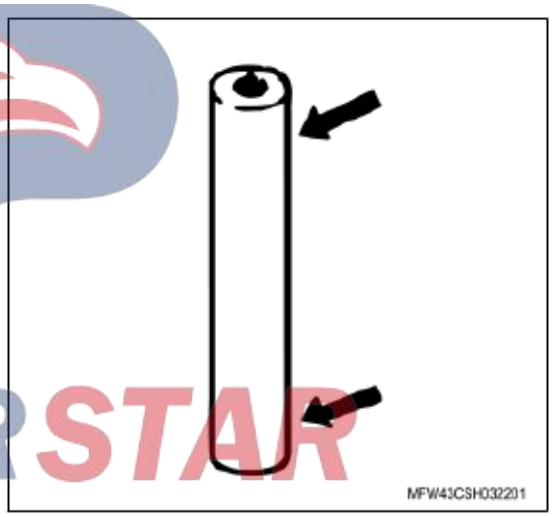
・Crack

・Scratch

・Correction

Note:

・If necessary, do the check using a detector or the red penetrant examination method.



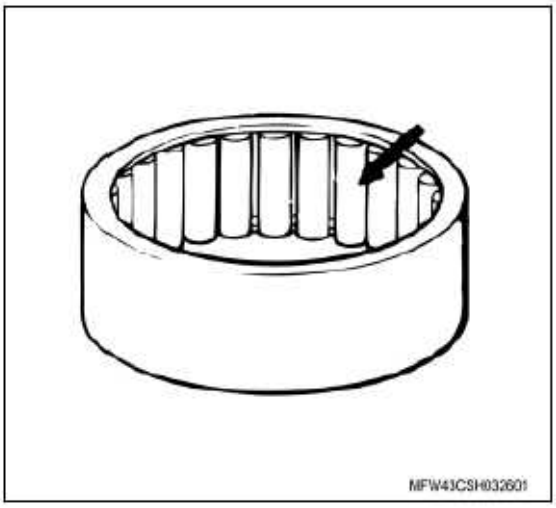
5. Thrust bearing check

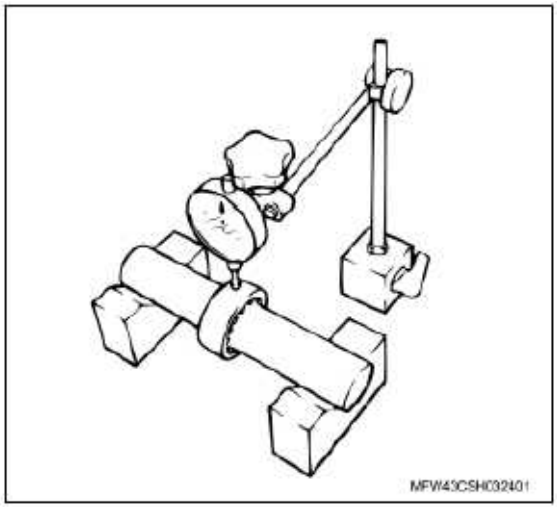
1) Check the following items.

・Scratch

・Roller losing

・Correction





6. Kingpin measurement

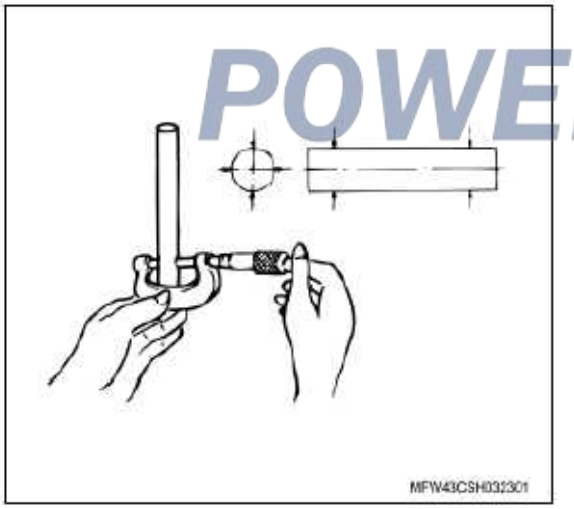
1) Use a micrometer gauge to measure the outer diameter of kingpin.

Note:

・Measure the 2 right-angle directions for the four needle roller bearing assemblies on the top and bottom.

External diameter of kingpin

Nominal dimensions	Use limit
Diameter: 50.0mm{1.9685in}	Diameter: 49.9mm{4.9901cm}



2) Measure the space between king pin and needle bearing.

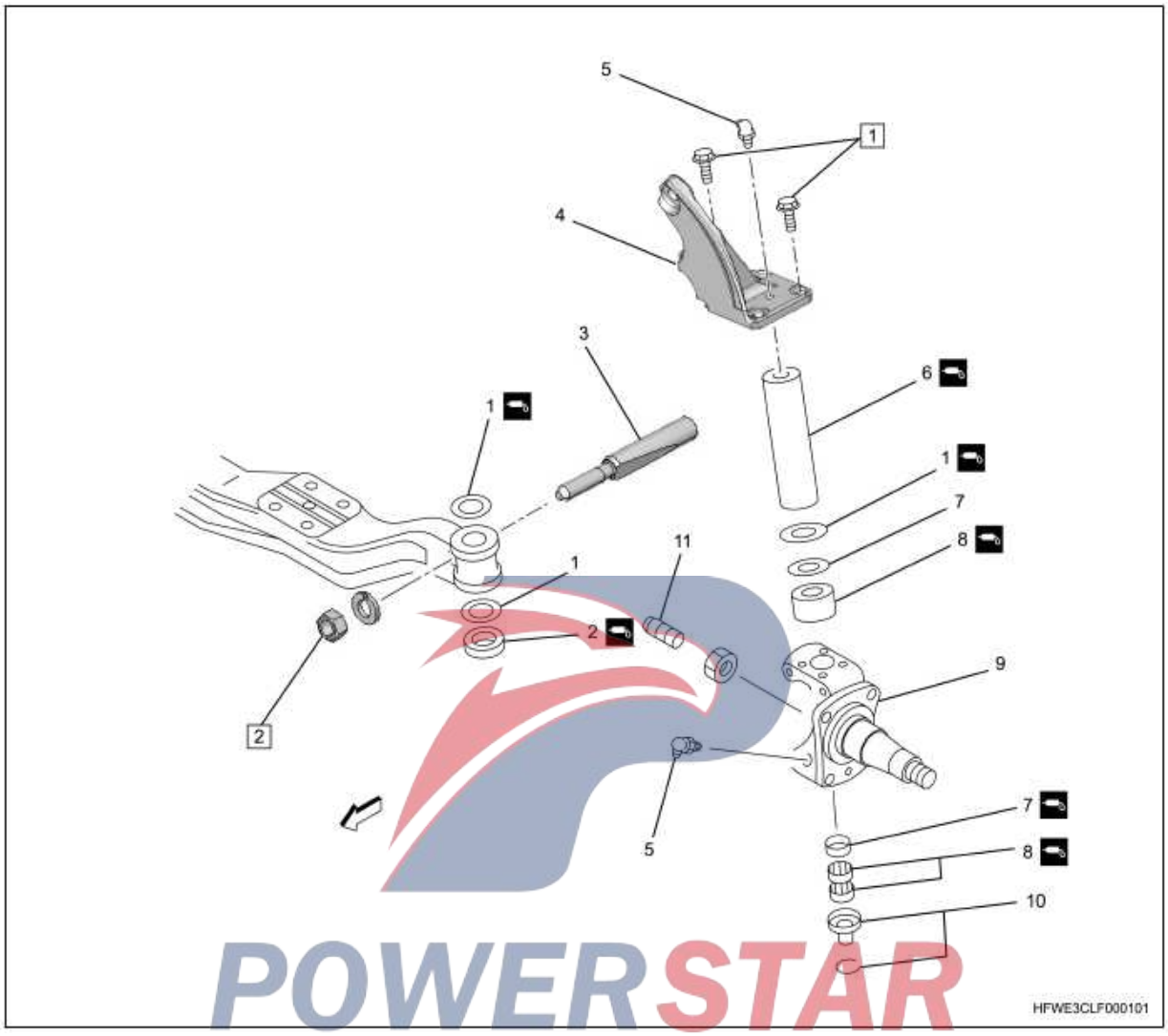
Gap between kingpin and needle roller bearing

Assembly preparation	Use limit
: 0.001 to 0.072mm { 0.00004to 0.07188mm }	: 0.12mm { 0.11989mm }

Reassembly

1. Component view

Steering knuckle



Part name

1. Thrust washer
2. Thrust bearing
3. Key bolt
4. Pumping chamber support
5. Grease nozzle
6. King pin
7. Kingpin sealing
8. Needle roller bearing
9. Steering knuckle
10. Cover plug and snap ring
11. Stop bolt

Tightening torque

1: 83N・m{8.5kgf・m/27.67kg・ft}

2: 49N・m{5.0kgf・m/16.33kg・ft}

2. Knuckle reassembly

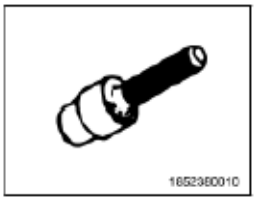
1) Use a special tool to install the needle roller bearings on the steering knuckle.

Note:

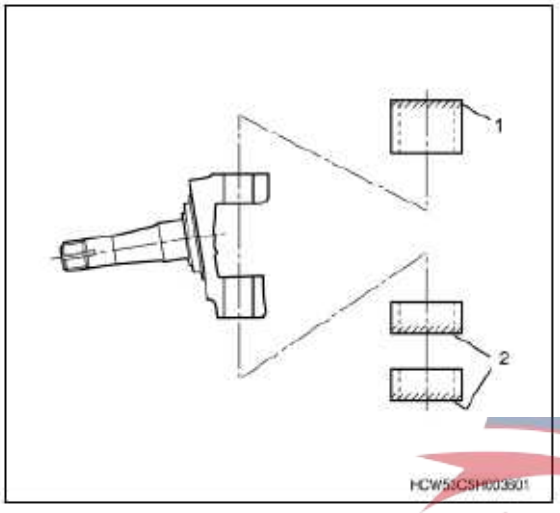
・Fix the upper side of the bearing housing marking side upwards and the lower side down。

Caution:

・Understand that pressing the mark edge surface can cause deformation of bearing box or damage to needle roller bearing.



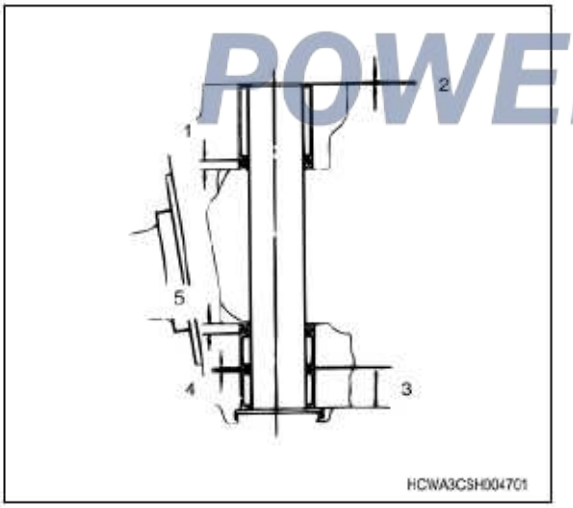
SST:1-8523-8001-0-kingpin bearing removal tool



1. Upper mark
2. Lower mark

Note:

・Install needle roller bearings as shown in the diagram.



1.6.5mm{0.2559 inch }
2.0mm{0 inch }
3.31.5mm{1.2402 inch }
4.4.0mm{0.1575 inch }
5.6.0mm{0.2362 inch }

---

2) Grease the inner surface of the lip of the kingpin seal.

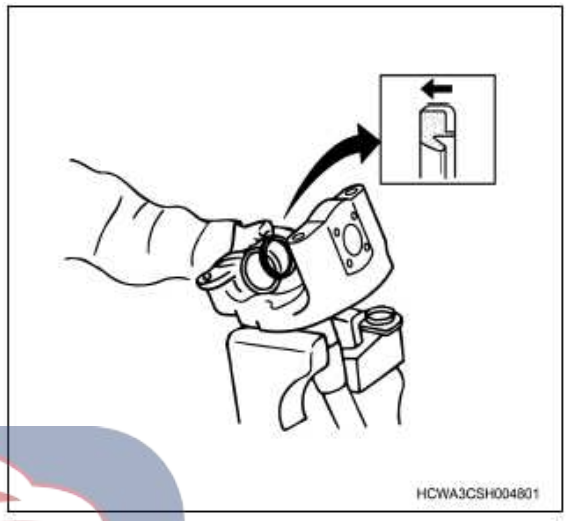
3) Install the seal of kingpin to the knuckle.

Note:

・Make the flange side face the pressed side.

Caution:

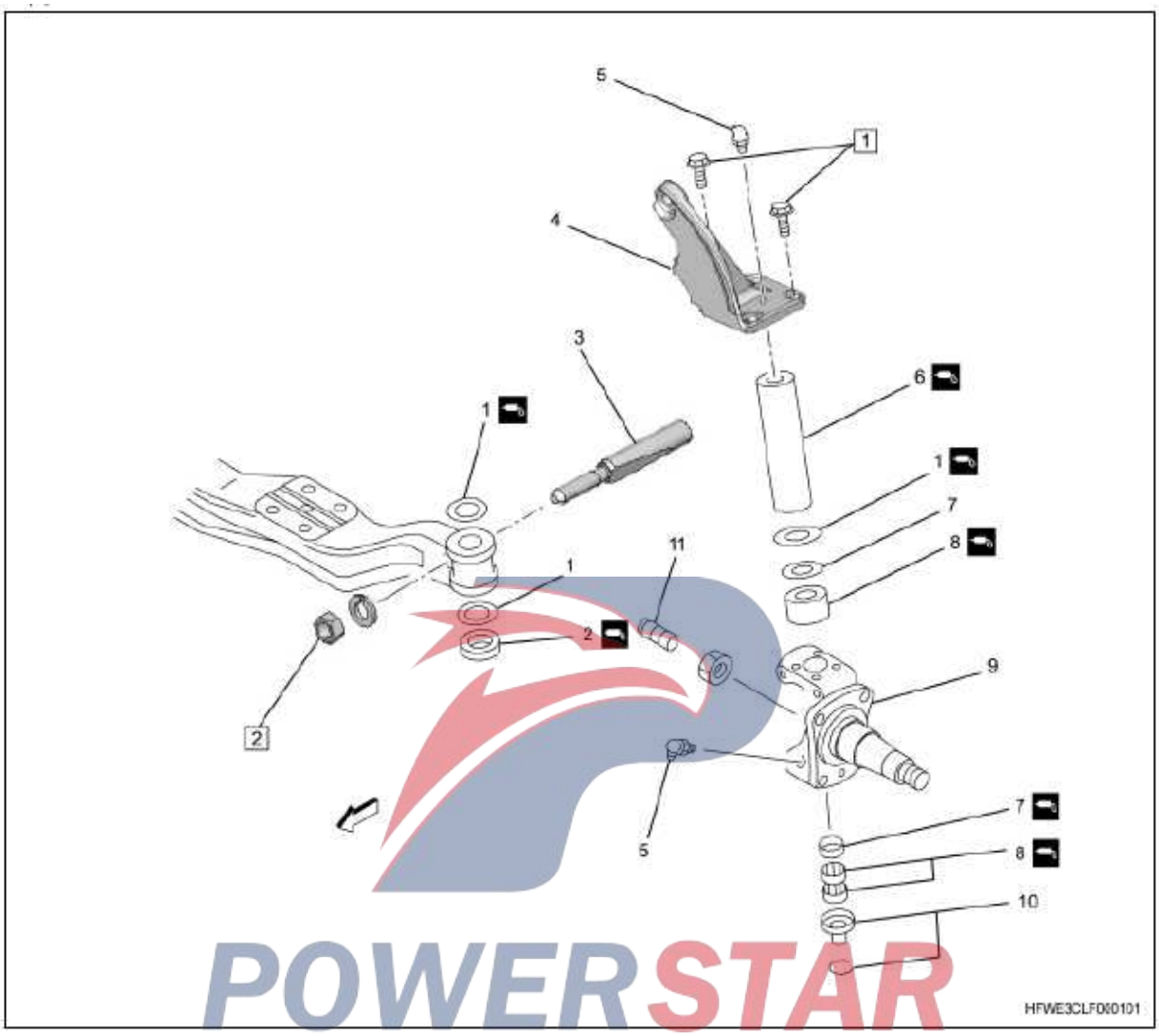
・Fix the pad and press it until it engages the surface of the knuckle and the seal must not deform.



Installation

1. Component view

Steering knuckle



Part name

1. Thrust washer
2. Thrust bearing
3. Key bolt
4. Pumping chamber support
5. Grease nozzle
6. King pin
7. Kingpin sealing
8. Needle roller bearing
9. Steering knuckle
10. Cover plug and snap ring
11. Stop bolt

Tightening torque

1: 83N・m{8.5kgf・m/27.67kg・ft}
2: 49N・m{5.0kgf・m/16.33kg・ft}

2. Knuckle installation

1) Temporarily assemble the following parts to the front axle.

・Knuckle
・Thrust bearings
・Kingpin

2) Use a feeler gauge to measure the space between the knuckle and the front axle.

3) Select a thrust washer so that the clearance at the time of assembly meets the specified value.

Standard: 0.010 to 0.060mm{0.00039 to 0.05994mm}

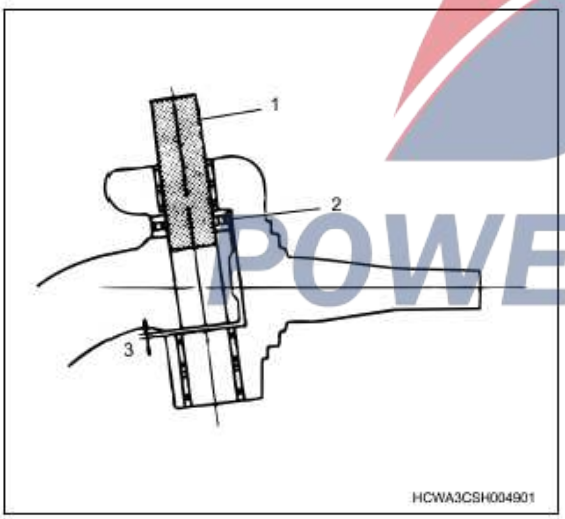
Part No.	Thickness

1-43171-185-0	: 4.875 to 4.900mm { 0.19193 to 4.89991mm }
1-43171-186-0	: 4.900 to 4.925mm { 0.19291 to 4.92506mm }
1-43171-187-0	: 4.925 to 4.950mm { 0.19390 to 4.94995mm }
1-43171-188-0	: 4.950 to 4.975mm { 0.19488 to 4.97510mm }
1-43171-189-0	: 4.975 to 5.000mm { 0.19587 to 4.99999mm }
1-43171-190-0	: 5.000 to 5.025mm { 0.19685 to 5.02488mm }
1-43171-191-0	: 5.025 to 5.050mm { 0.19783 to 5.05003mm }
1-43171-192-0	: 5.050 to 5.075mm { 0.19882 to 5.07492mm }
1-43171-193-0	: 5.075 to 5.100mm { 0.19980 to 5.10007mm }
1-43171-194-0	: 5.100 to 5.125mm { 0.20079 to 5.12496mm }
1-43171-195-0	: 5.125 to 5.150mm { 0.20177 to 5.15010mm }
1-43171-196-0	: 5.150 to 5.175mm { 0.20276 to 5.17500mm }
1-43171-197-0	: 5.175 to to 5.200mm { 0.20374 to 5.19989mm }
1-43171-198-0	: 5.200 to to 5.225mm { 0.20472 to 5.22503mm }
1-43171-199-0	: 5.225 to 5.250mm { 0.20571 to 5.24993mm }

Caution:

・When the thrust washer can not be adjusted, replace the thrust bearing.

・Since the part numbers may change, all the necessary part numbers in the inspection parts list must be checked.



1. King pin
2. Thrust bearing
3. Space between the knuckle and the front axle

Note:

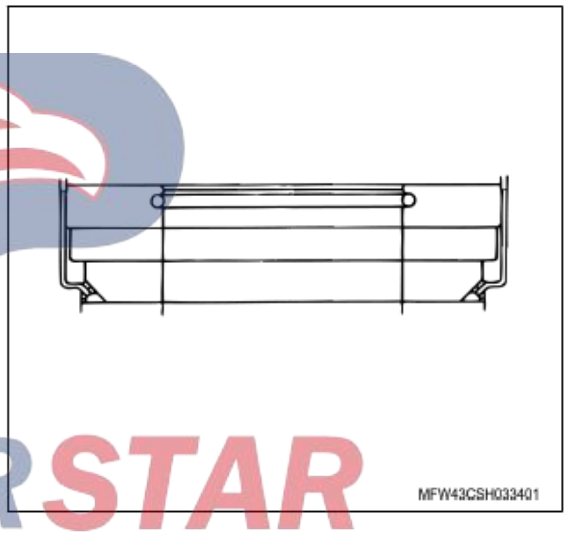
・After selecting the thrust washers, remove the temporarily assembled parts.

4) Apply grease to the interior of the thrust bearing.

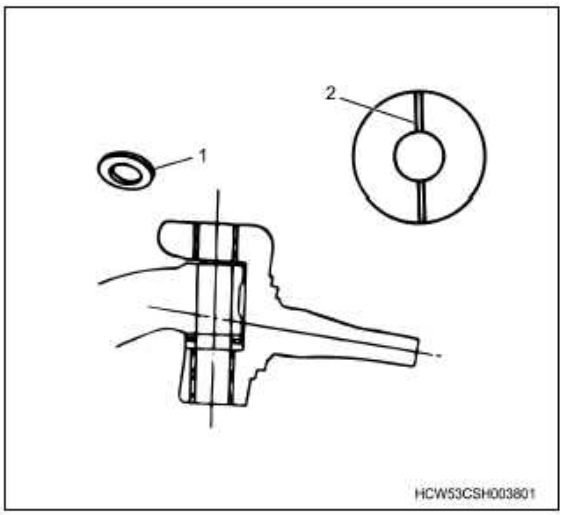
5) Install the thrust bearing on the front axle.

Note:

・When positioned, the side with the larger outside diameter (81.2 mm / 3.1968 inches) is facing up and insert under the front axle.



6) Apply grease onto both sides of thrust washer;



1. Thrust washer

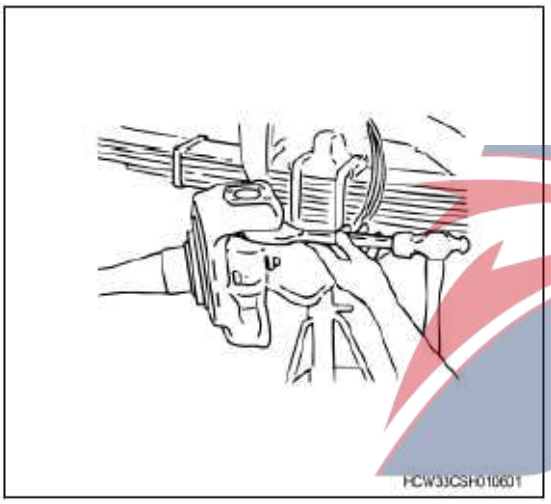
2. Oil groove

7) Install the thrust washer to the front axle by special tool;

Note:

・Face the oil groove up to install it on top of front axle.

SST:1-8523-8002-0-thrust washer drive



8) Apply grease onto the external surface of kingpin and the internal surface of needle roller bearing.

9) Fit the special tool onto the upside of kingpin;

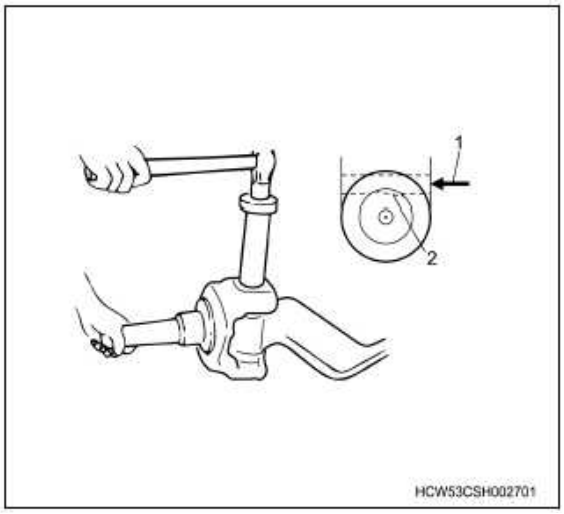
SST:1-8523-8003-0-kingpin mounting device

10) Install the kingpin on the knuckle.

Note:

・Align the king pin holes with the knuckle, align the thrust washers, the front axle, and the thrust bearings, and hit the kingpin.

• With the key groove face facing the key bolt projection side, secure the key bolt insert.



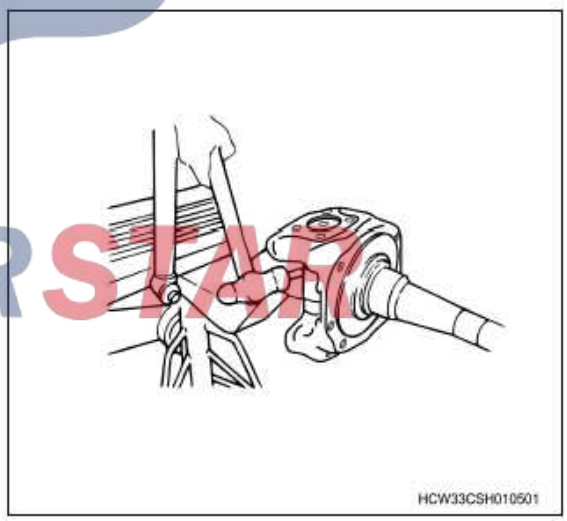
1. Extrusion side of key bolt
2. Kingpin keyway surface

11) Attach the key bolt to the axle.

Note:

・Insert the key bolt from the back of the vehicle.

Tightening torque: 49N・m{5.0kgf・m/36.00lb・ft}



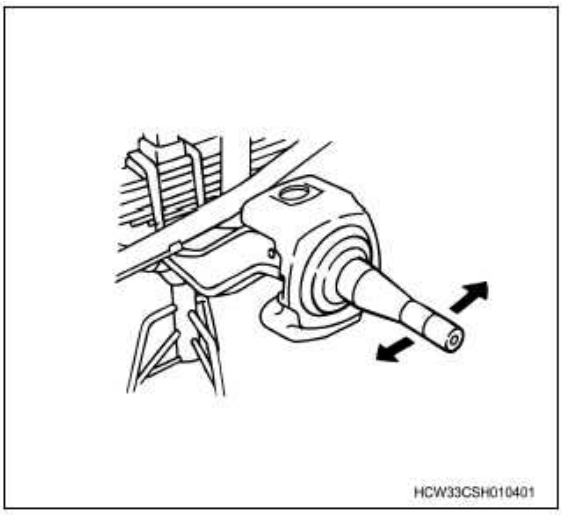
12) Hang the spring balance to the bottom of the threaded section of the knuckle shaft.

13) Use the spring balance to measure the preload of the knuckle.

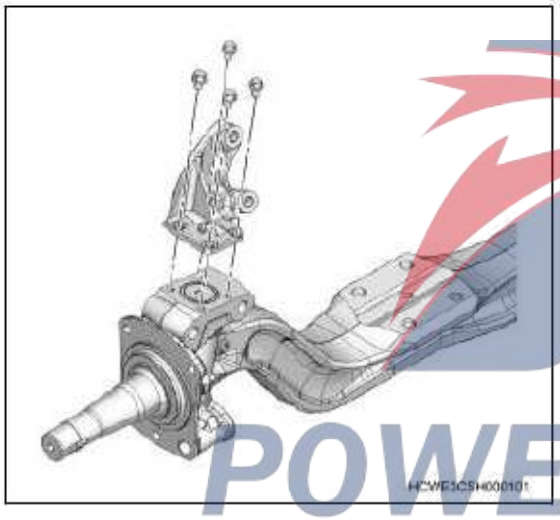
Standard: 39N or below {4.0kg or below /8.8lb or below } Preload

Caution:

・When the measurement is not within the specified range, replace the thrust washer for adjustment.



14) Install plenum chamber bracket to the knuckle.
Tightening torque: 83N・m{8.5kgf・m/61lb・ft}



15) Install the cap plug and snap ring onto the knuckle.

16) Apply grease from the top and bottom of the grease nipple with a grease gun.

Note :

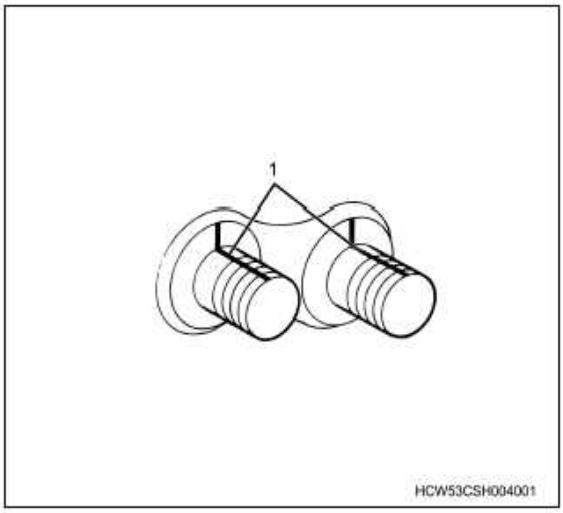
・Fill the grease until the grease spills between the front shaft and the knuckle or between the front shaft and the thrust bearing.

3. Steering knuckle arm installation

1) Smear Bell Moly grease or any equivalent on the thread of the stud and the surface of the steering knuckle arm bearing.

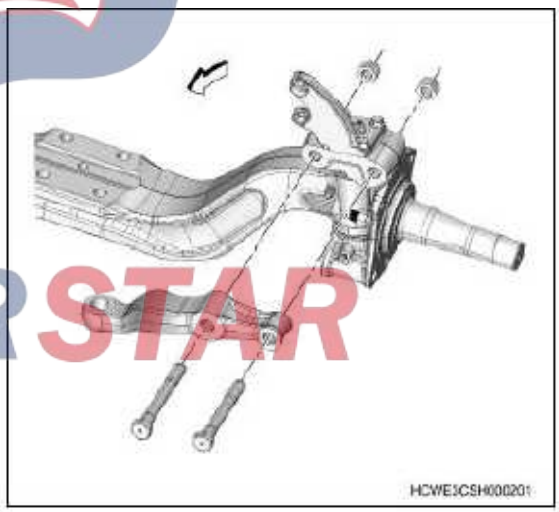
Note:

・Operate as shown in the following drawing.



1. Each bolt just needs one slight spot smear.

2) Install the steering knuckle arm on the steering knuckle.
Tightening torque: 515N・m{52.5kgf・m/380.01lb・ft}



3) Hit the nuts into two positions.

Note:

・Rivet fix the nut sleeve until the surfaces of the sleeve and stud are in close contact.

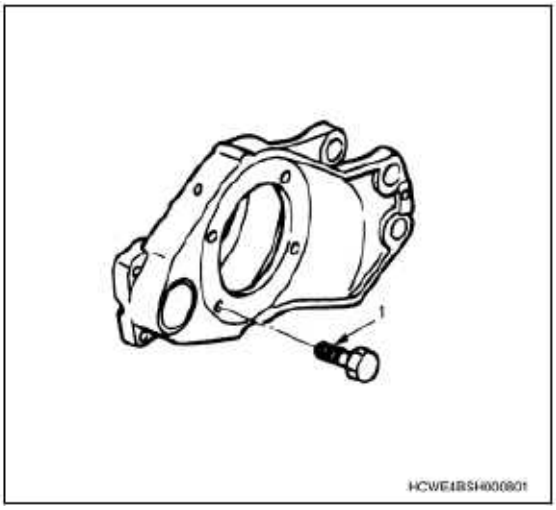
Caution:

・Avoid any crack at the rivet position during operation.

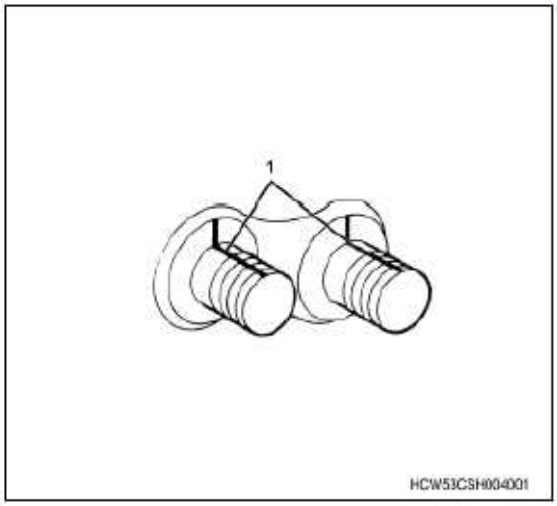
4. Front anchor pin bracket installation

1) Apply molybdenum disulfide grease to the threaded part of the bolt.

2) Mount the anchor pin bracket to the knuckle.
Tightening torque: 181N・m{18.5kgf・m/133lb・ft} upside



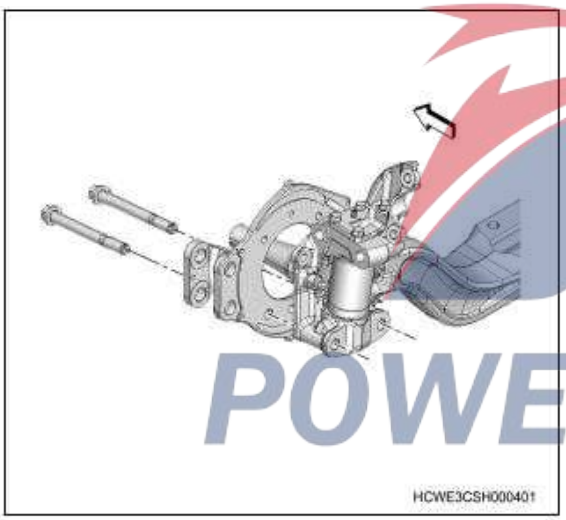
1. Molybdenum disulfide grease



1. Each bolt just needs one slight spot smear.

5. Tie rod arm installation

1) Install the stud on the steering knuckle.



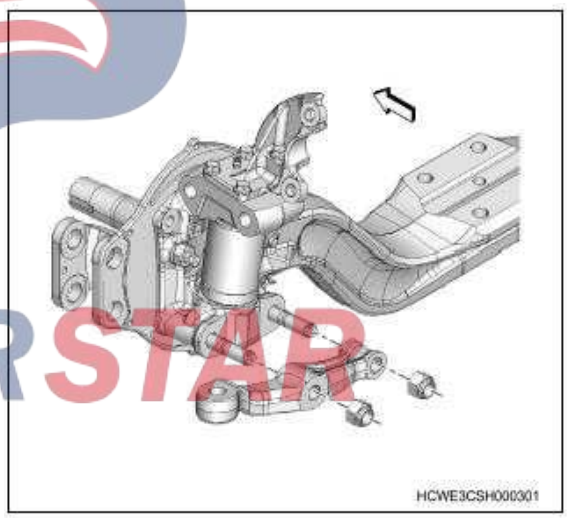
2) Smear MoS2 grease on the thread of the stud and the surface of the tie rod arm bearing.

Note:

・Operate as shown in the following drawing.

3) Install the tie rod arm on the steering knuckle.

Tightening torque: 471N・m{48.0kgf・m/347.01lb・ft}



4) Hit the nuts into two positions.

Note:

・Knock to allow the two surfaces of the stud are flush with each other.

6. Tie rod installation

1) Install the tie rod on the tie rod arm.

2) Install the groove top nut on the tie rod.

Tightening torque: 304N・m{31.0kgf・m/223.99lb・ft}

3) Install the split pin on the groove top nut and bend it.

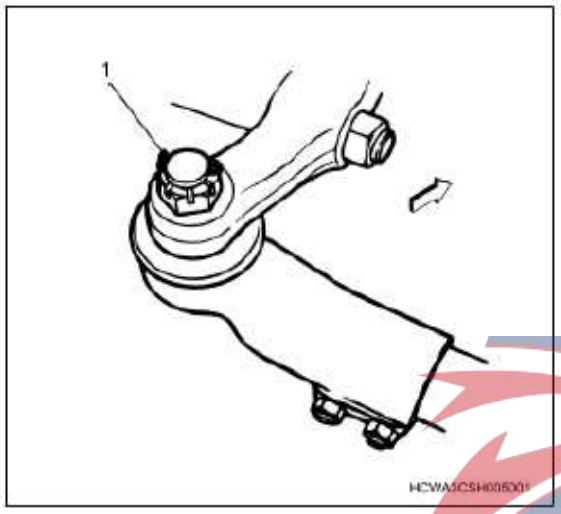
Note:

・If the top nut of the groove is not aligned with the ball pin hole, further tighten the nut for the alignment.

Caution:

・Do not make the hole alignment in the loosening direction.

・Do not reuse the split pin.



1. Cotter pin

---

7. Straight pull rod connection

1) Install the straight pull rod on the steering knuckle arm.

Tightening torque: 265N・m{27.0kgf・m/195.00lb・ft}

2) Install the split pin on the tie rod and bend it.

Note:

・If the top nut of the groove is not aligned with the ball joint hole, further tighten the nut for the alignment.

Caution:

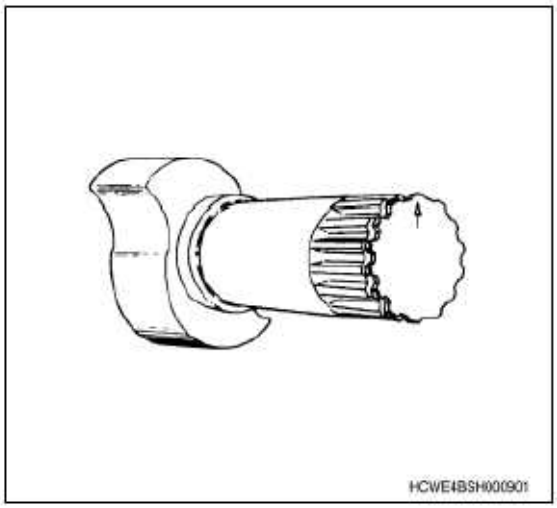
・Do not reuse the split pin.

・During the hole alignment, do not loosen the top nut of the groove.

8. Camshaft Installation

1) Grease the camshaft.

2) Make the arrow on the camshaft end toward the front of the vehicle and install the camshaft on the front locating pin support.



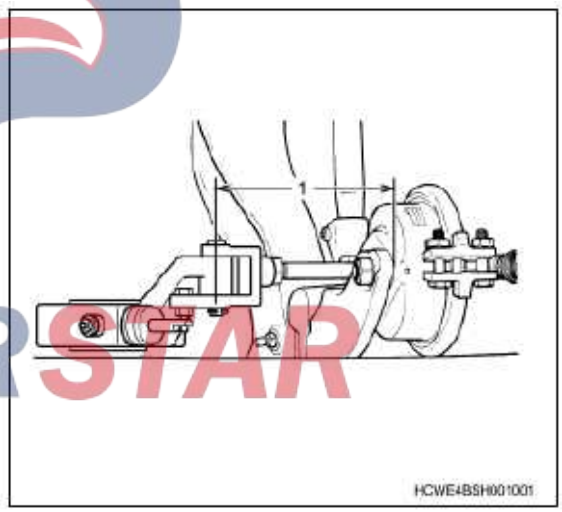
3) Install the washer on the camshaft.

9. Brake chamber installation

1) Adjust the length of the brake chamber's push rod.

Standard: 5.98in{5.98in}

2) Install the brake chamber on the knuckle.



1. Length of push rod

---

3) Connect the air hose to the brake chamber.

10. Gap adjuster installation

1) Install the gap adjuster on the camshaft.

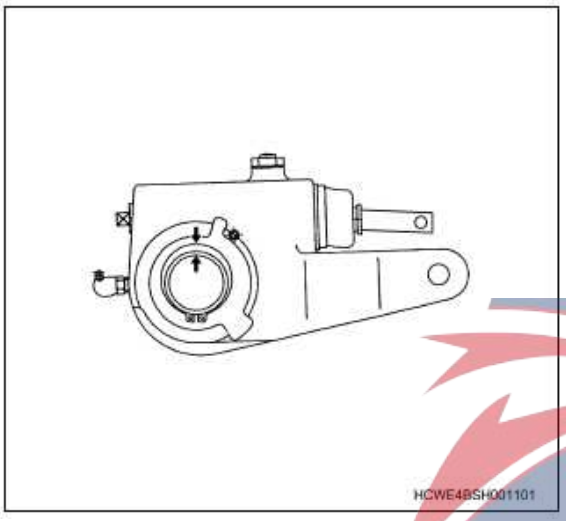
Note:

・Install the gap adjuster in place. Thus, the gap adjuster bushing and the brake chamber push rod is also installed in this place.

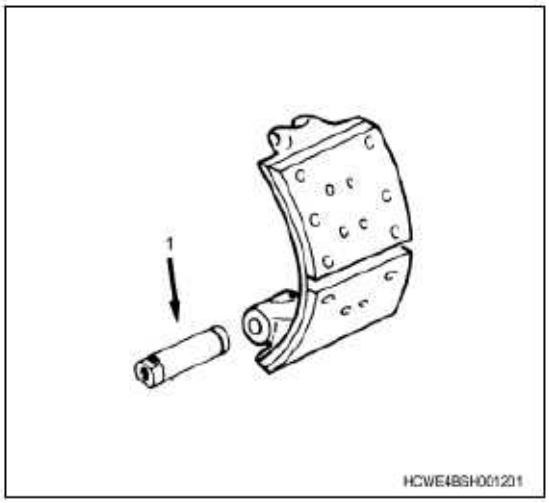
Caution:

・Do not change the length of the brake chamber's push rod. Do not rotate the camshaft.

2) Install the pin on the brake chamber and gap adjuster.
3) Install the split pin on the brake chamber.
4) Install the washer and the limit plate on the camshaft.
Note:
・Align the camshaft with the arrow on the stop plate for the installation.
Caution:
・Do not rotate the camshaft.

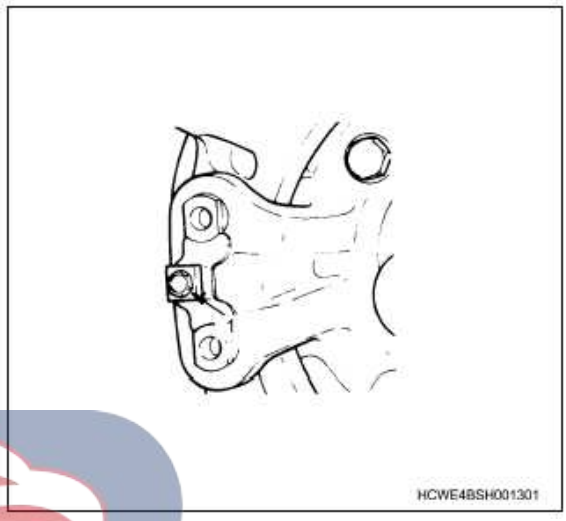


5) Install the snap ring on the camshaft.
11. Brake shoe installation
1) Install the roller and pin on the brake shoe.
2) Install the snap ring on the brake shoe.
3) Smear grease on the anchor pin and brake shoe lining.
4) Install the brake shoe and the anchor pin on the front anchor pin bracket.
Caution:
・Do not confuse the leading shoe with the trailing shoe.



1. Grease application

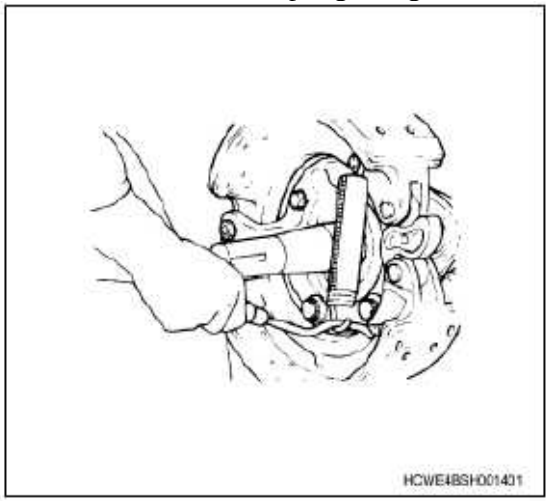
5) Install the dust cover on the front anchor pin support.
6) Install the lock plate and the lock washer on the front anchor pin bracket.
7) Rivet-fix the lock washer.



1. Calibration position

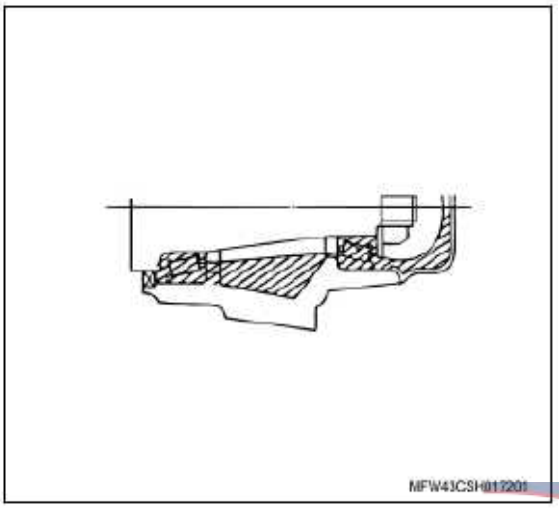
8) Install the return spring on the brake shoe using a special tool.

SST:9-8522-1231-0-return spring fixing tool

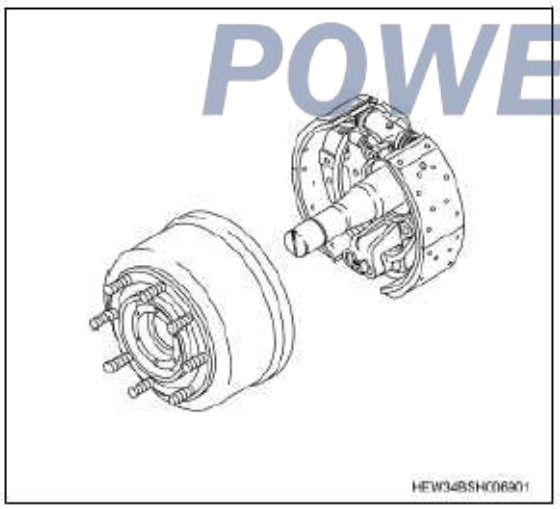


12. Brake drum installation
1) Fill the grease chamber of the front wheel hub with BESCO L-2 grease.

Note:
・BESCO L-3 grease or any equivalent can be injected.
Caution:
・Always inject new grease.

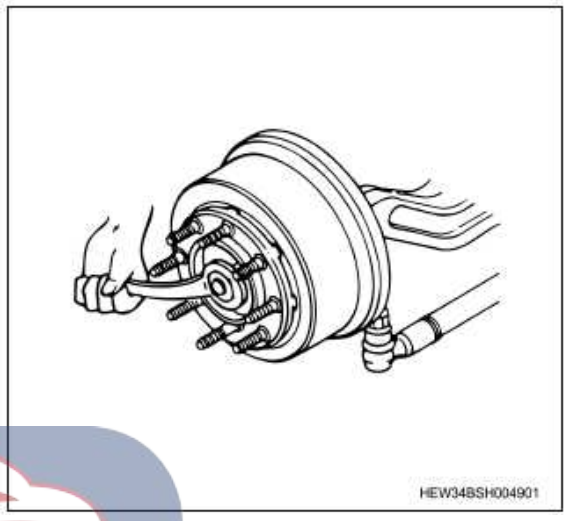


2) Install the brake drum on the steering knuckle.
Caution:
・Be careful to prevent any heavy part from inflicting any injury.
・Check whether there is any grease on the internal drum surface or lining.
・Be careful to prevent any impurity or dirt from sticking on the front wheel hub or the front bearing.



3) Install the inner cup of the outside bearing on the front wheel hub.
4) Install the front wheel nub bearing washer on the steering knuckle.
5) Install the wheel hub nut from the steering knuckle using a special tool.

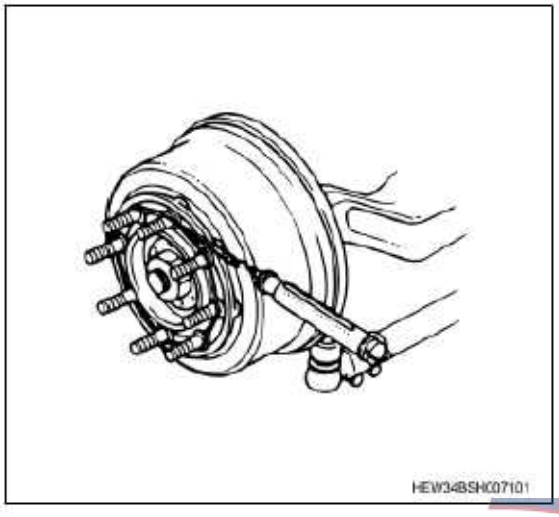
SST:1-8511-0002-0-wheel hub nut wrench



6) Rotate the brake drum leftward and rightward to tighten the wheel hub bearing.
7) Continuously rotate the brake drum, and tighten the wheel hub nut until the brake drum stops.
Caution:
・Continuously rotate the brake drum during the tightening.
・Do not any pneumatic tool.
8) Loosen the wheel hub nuts and check whether the brake drum rotates smoothly.
Caution:
・If the brake drum does not rotate, pull back the brake drum and use a special tool to do the above procedure again.
・Loosen the hub nuts completely.
9) Pass one wire through the vehicle pin and hook the spring balance to the spring.
10) Pull the spring balance in the tangential direction and adjust the pre-applied load on the outside bearing.
Note :
・Make adjustment through tightening the hub nuts.
Caution:
・If the pre-load is not stable, rotate the brake drum multiple times. When the brake drum stops completely, make a remeasurement.
・If it is not still firm, rotate the brake drum leftward and rightward and do the hub bearing stabilization procedure.
Amount of injected grease

Amount of filled air	Remarks

: About 37.74oz (about 37.70oz)	The amount of grease used for one wheel, including the usage in the wheel hub bearing, is about 1325g (46.8oz).



11) Install the lock washer onto the wheel hub nut.

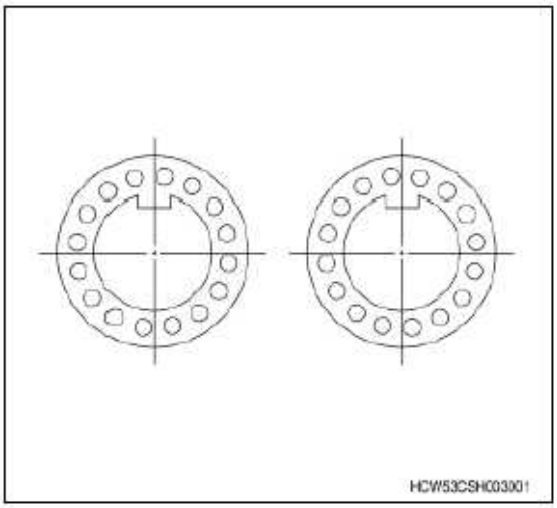
Note:

・If the bolt hole of the lock washer is not aligned with the hub nut, rotate the lock washer for installation.

・If there is still no match after overturn and installation, rotate the hub nut in the tightening direction for bolt hole match.

・If the lock washer is upside down, the hole would match with it.

Angle: 11°15′



Tightening torque: 9N・m{0.9kgf・m/80.01lb・in}

12) Install the wheel hub cap washer under the wheel hub cap.

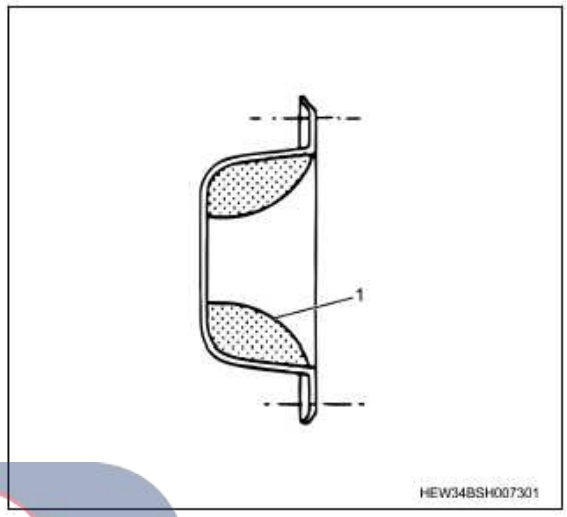
13) Fill the hub cover with BESCO L-2 grease.

Note:

・BESCO L-3 grease or any equivalent can be injected.

Caution:

・Always inject new grease.



1. Grease

14) Install the wheel hub cap on the front wheel hub.

Tightening torque: 23N・m{2.3kgf・m/17.00lb・ft}

13. Brake lining check

1. Brake lining gap check

1) Remove the inspection hole protection ring from the dust cover.

2) Measure the brake lining gap using a gap gauge.

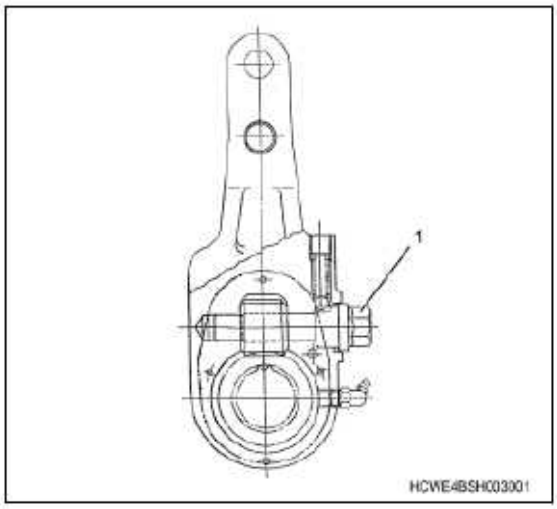
Standard: 0.01in{0.01in}

Caution:

・If the measurement result is beyond the specified range, adjust the brake lining gap.

2. Brake lining gap adjustment (specifications of manual gap regulator)

1) Rotate the worm shaft to adjust the brake lining.



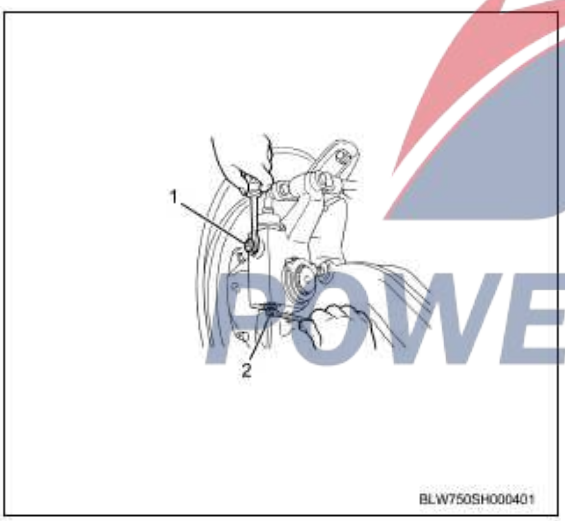
1. Worm shaft

---

3. Brake lining gap adjustment (specifications of automatic gap regulator)

1) Use a slot-headed screwdriver to pull up the rod.

2) Rotate the worm shaft to adjust the brake lining.



1. Rod
2. Worm shaft

---

14. Installation of disc wheel and tire

1. Precautions for disc wheel installation

Caution:

・If necessary, clean the following parts.

・Disc wheel mounting surface

・Wheel mounting surface of hub

・Conical cross section of nut

If the disc wheel is installed when it is not clean, the wheel nuts may be loose and thus the tire may come off.

Caution:

・Do not smear any MoS2 grease on any wheel pin or wheel nut.

The tightening force may be excessively great in relation to the tightening torque, thus causing the wheel pin to be damaged.

Caution:

・Before a commercial impact wrench is used, check its tightening torque.

The torque produced by the commercial socket wrench may be greater than the specified tightening torque value. If it is tightened using a torque greater than the specified value, the wheel pin may be damaged.

Caution:

・If a tightening wrench is used for tightening, be careful with the adjustment or tightening of the air pressure regulator. Do not tighten it excessively.

・Even if a tightening wrench is used for tightening, a tool like a torque wrench shall be used to tighten it to the specified torque at the end.

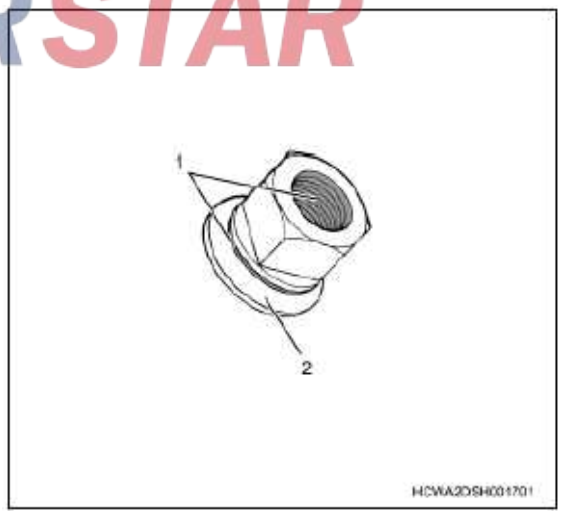
2. Disc wheel installation

1) Smear engine oil on the wheel nuts.

Note:

・Gear oil or power steering fluid can be used.

Wheel nut



1. Lubrication area
2. Cleaner

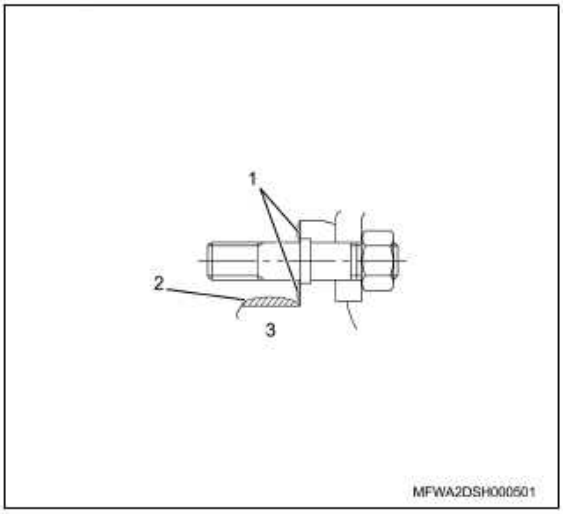
---

2) Smear engine oil on the wheel pin.

Note:

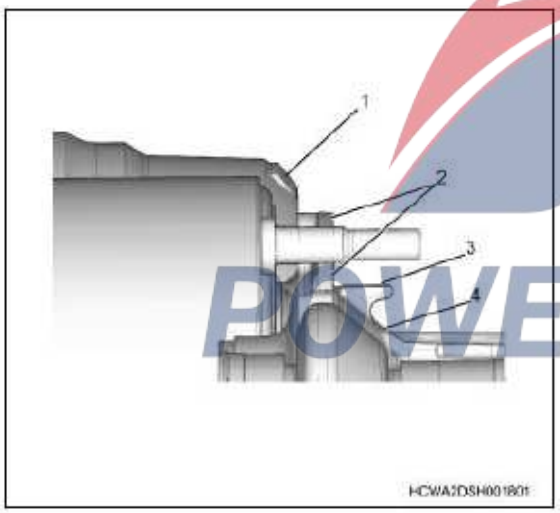
・Gear oil or chassis grease can be used.

Wheel pin class A



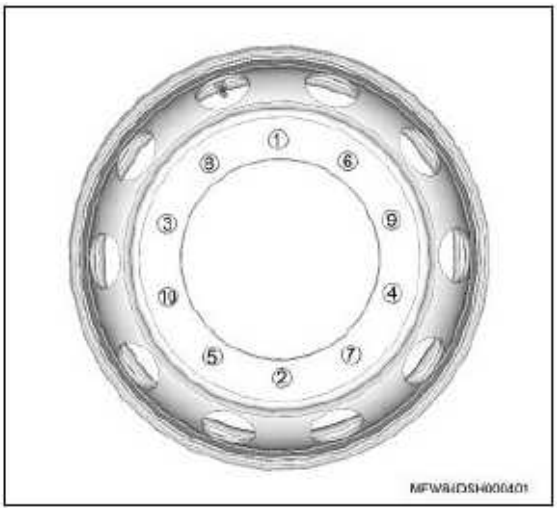
1. The contact surface of the disc wheel is not smeared with grease
2. Wheel hub
3. Grease application area

Wheel pin class B

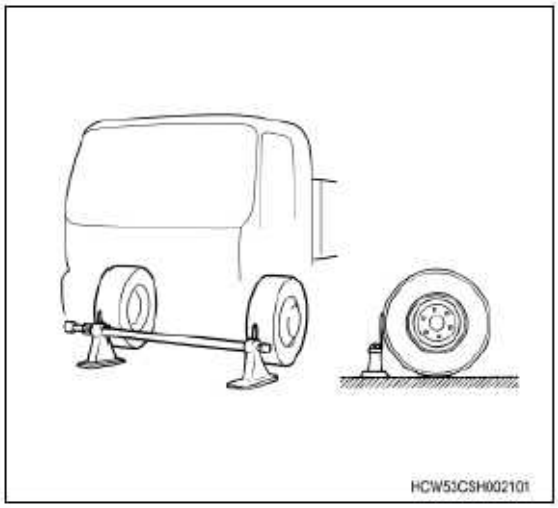


1. Brake drum
2. The contact surface of the disc wheel is not smeared with grease
3. Grease application area
4. Wheel hub

3) Install the disc wheel on the wheel pin.
4) Temporarily tighten the wheel nut onto the wheel pin.
Note:
・Rotate and insert the wheel nut by hand until it is fixed on the contact surface of the disc wheel. Temporarily tighten the wheel nuts until the disc wheel does not issue chucks.
5) Lower vehicle
6) Tighten the wheel nut diagonally two or three times as shown in the following figure.
Wheel nut tightening procedure



7) Tighten the inner wheel nut using a torque wrench, etc.
Tightening torque: 500-550N·m{50-55kgf·m/362-398lb·ft}
Caution:
・When the front tires are installed, do the following checks.
・Ensure no interference to any nearby part when rotating the steering wheel leftward or rightward.
Caution:
・After the installation, drive the vehicle a distance greater than the specified value and then retighten the wheel nuts with the specified torque.
Standard: 50 to 100km{31to 99.78km}
15 Tie rod adjustment
1) Check the following items.
・The vehicle must be of no load.
・The surface must be flat.
・The vehicle must have a normal gesture.
・The wheel must not have any offset or deformation
・There shall not be any loosened part.
・The bolt or nut shall not be loose.
2) Rock every corner of the vehicle to confirm whether the suspicion is true.
3) Set the front wheels in the way that ensures the vehicle runs forward straightly.
4) Align the end of the toe-in measuring rule with the following position.
5) Make a mark where there is a contact with the toe-in measuring rule.
6) Measure the distance A between the marks made on the rears of the front wheels.
7) Rotate the front wheel for 180°.
8) Measure the distance A between the marks made in the front of the vehicle.

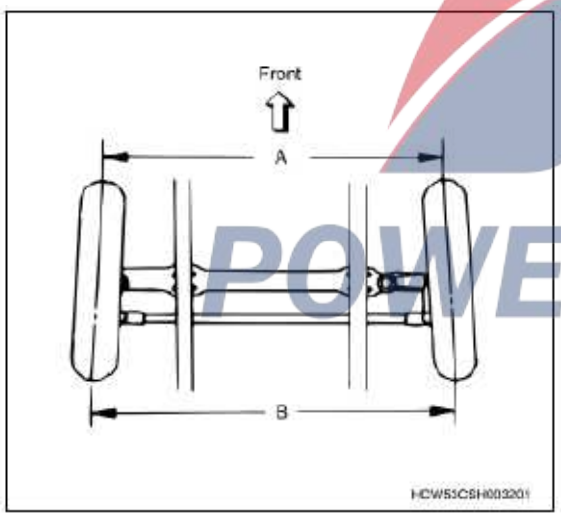


1. Toe-in measuring rule

9) Calculate the toe-in according to the measured value.

Note:

・Subtract the measured value of A from the measured value of B to obtain the calculation result.



Specified value 0±1mm(0±0.0394in)

Caution:

・If the calculated toe-in is not the specified value, rotate the tie rod to make an adjustment.

10) Fix the tie rod end to the tie rod.

Tightening torque: 83N・m{8.5kgf・m/61lb・ft}

AXLE, FRONT

Removal

1. Removal of disc wheel and tire

1) Move the vehicle onto a flat ground.

2) Pull out the parking brake rod.

3) Put the stop wedge on the vehicle.

4) Jack up the vehicle.

Note:

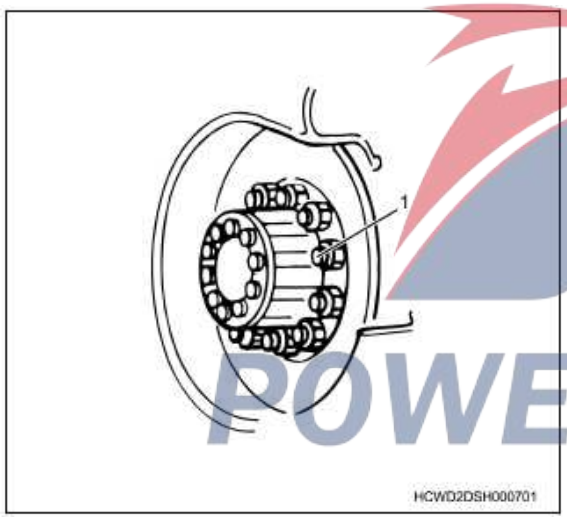
・Jack it up but ensure that its tires are on the ground.

5) Loosen the wheel nuts until the disc wheel does not issue chucks.

Caution:

・Do not remove the wheel nuts.

・Do not loosen the wheel nuts excessively, and otherwise, the wheel pin may be damaged.



1. Wheel pin mark position: R indicates RH thread

---

6) Jack up the vehicle.

Note:

・Jack up the vehicle and allow all of its tires to be away from the ground.

7) Remove the wheel nut from the wheel pin.

8) Remove the disc wheel from the vehicle.

Warning:

・Be careful to prevent the heavy tire from inflicting any injury.

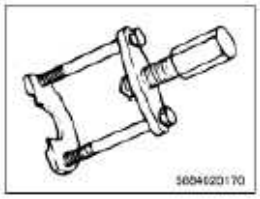
Caution:

・Remove the component and ensure the thread part of the wheel pin and the disc wheel mounting surface of the hub.

2. Disconnected straight pull rod

1) Remove the split pin and groove top nut on the pull rod.

2) Separate the tie rod from the steering knuckle arm using a special tool.



SST:5-8840-2017-0-roll ball connector removal tool

3. Brake nylon tube disconnected

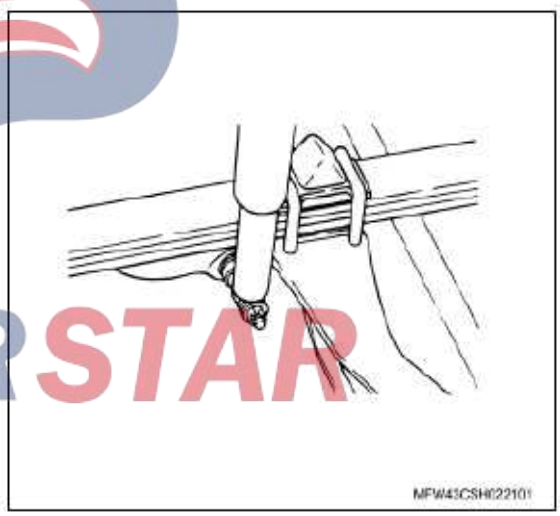
1) Purify the air from the air tank

2) Disconnect the brake nylon hose of the connector.

4. Damper disconnected

1. Model with stabilizer

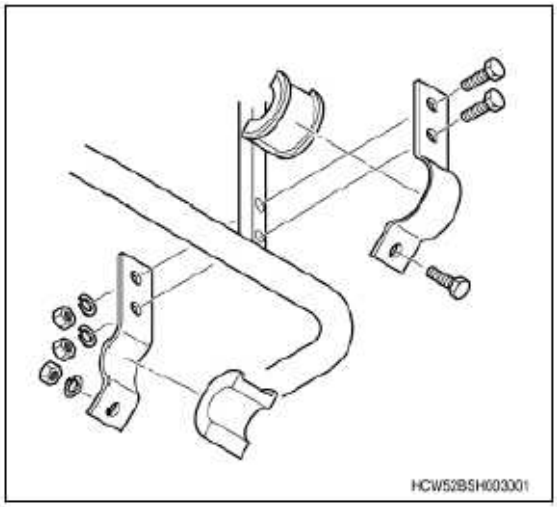
1) Disconnect the damper connected to the front axle.



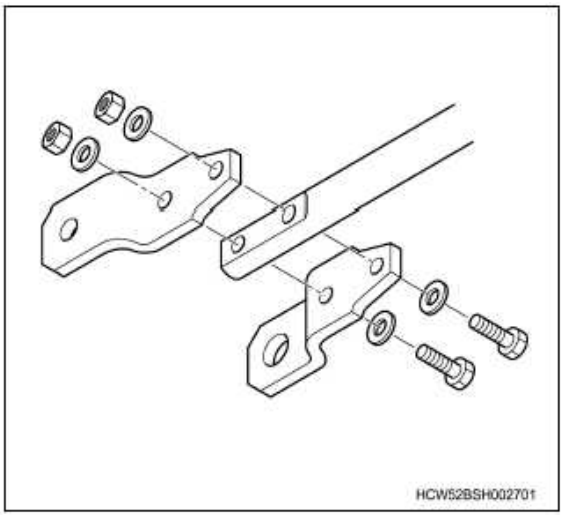
5. Removal of stabilizer bar

1. Model with stabilizer

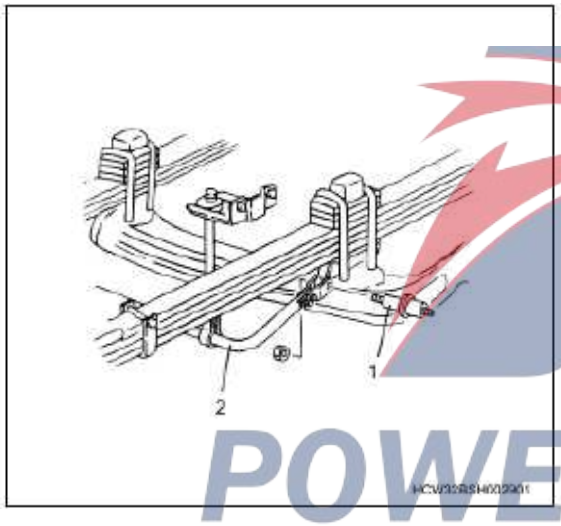
1) Remove the stabilizer clamp and stabilizer clamp bushing from the stabilizer bar.



2) Remove the lower kingpin from the stabilizer bracket.

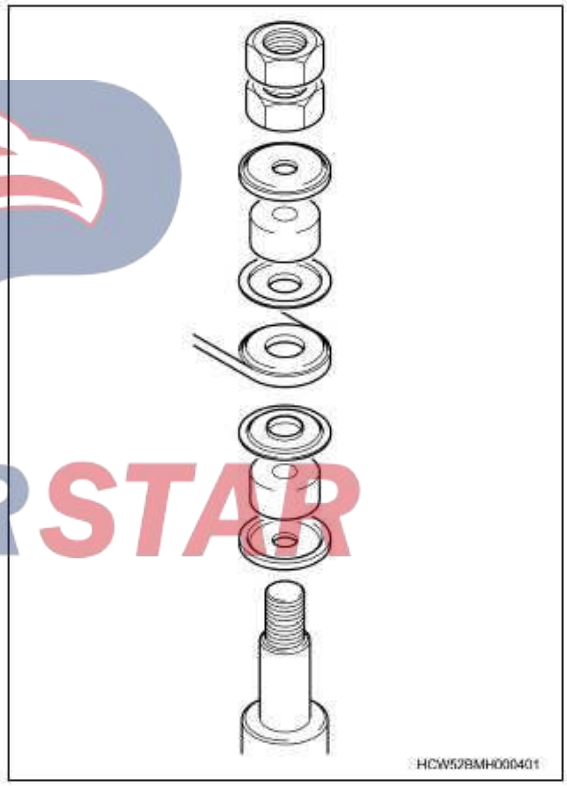


4) Remove the stabilizer bar from the bracket.



1. Bottom pin
2. Stabilizer bar

3) Remove the stabilizer bracket from the stabilizer bar.

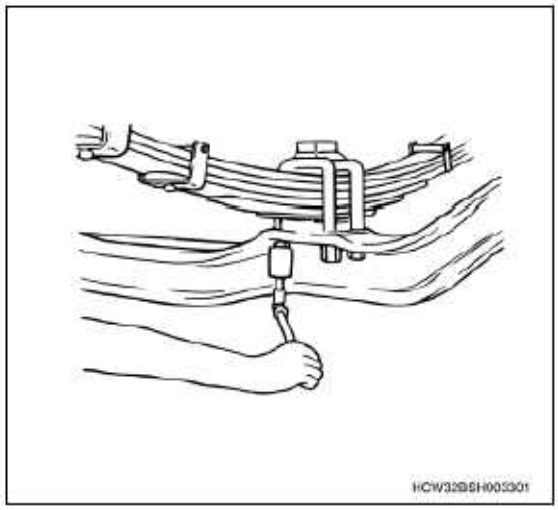


5) Remove the stabilizer bushing from the spring bracket.

6. Removal of front axle

1) Use the jack to support the center of the front axle.

2) Remove the U-bolts and nuts of the leaf spring from the front axle.



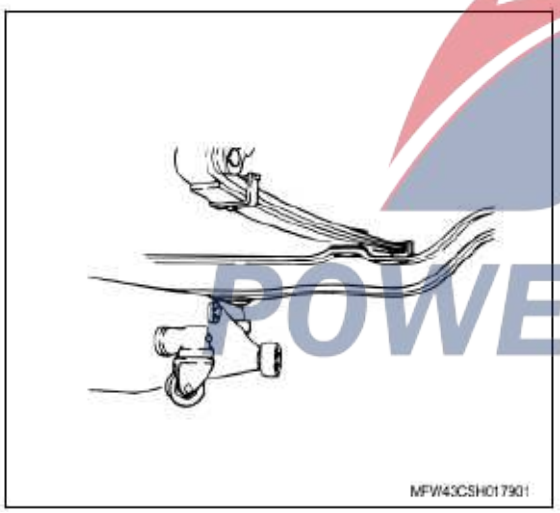
3) Remove the front axle from the vehicle.

Note:

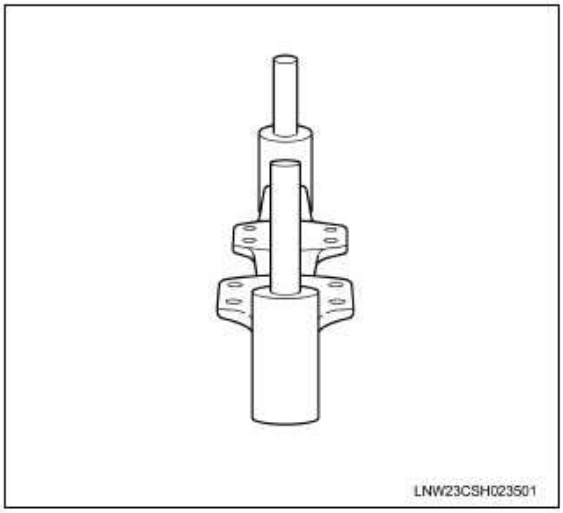
・Pull out the front axle forwards.

Caution:

・Be careful when operating, do not cause the front axle to fall.



Inspection

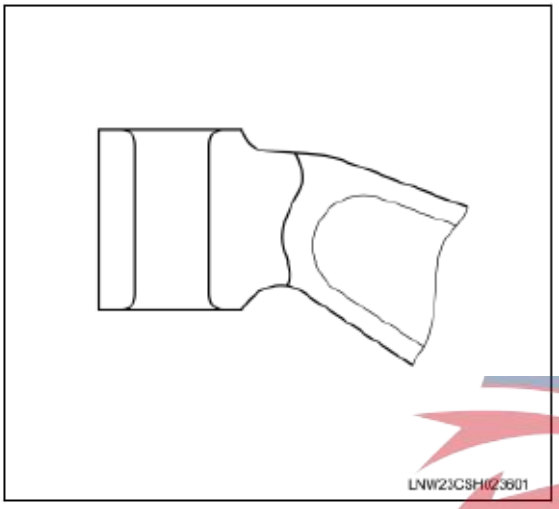


1. Front axle check

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1. Front axle check

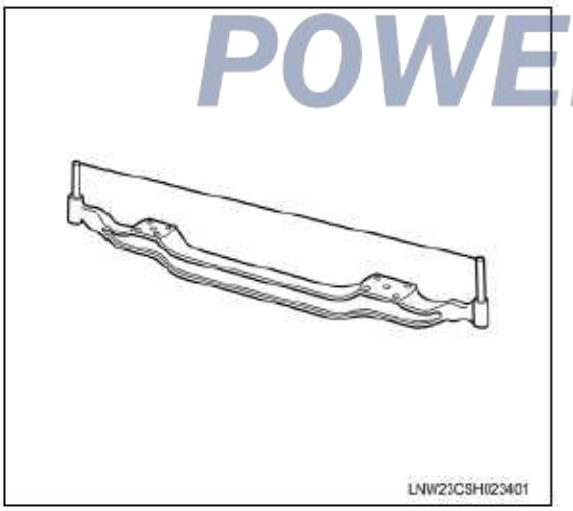
1) Check the following items.



・Kingpin hole worn

2) Install the kingpin on the front axle.

3) Insert a thread into the top of the kingpin and check that the thread aligns with the leaf spring center bolt hole center from the top



4) Check whether the two kingpins are matched from the front axle side.

Installation

1. Front axle installation

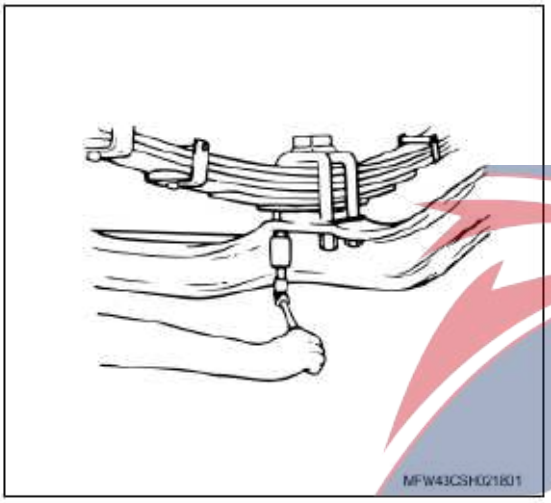
1) Apply molybdenum disulfide grease on the U-bolts.

2) Use the jack to support the center of the front axle.

3) Connect the front axle with the leaf spring to guide the center leaf of the leaf spring to the positioning hole of the front axle.

4) Install U-bolts and nuts to secure the front axle to the leaf spring.

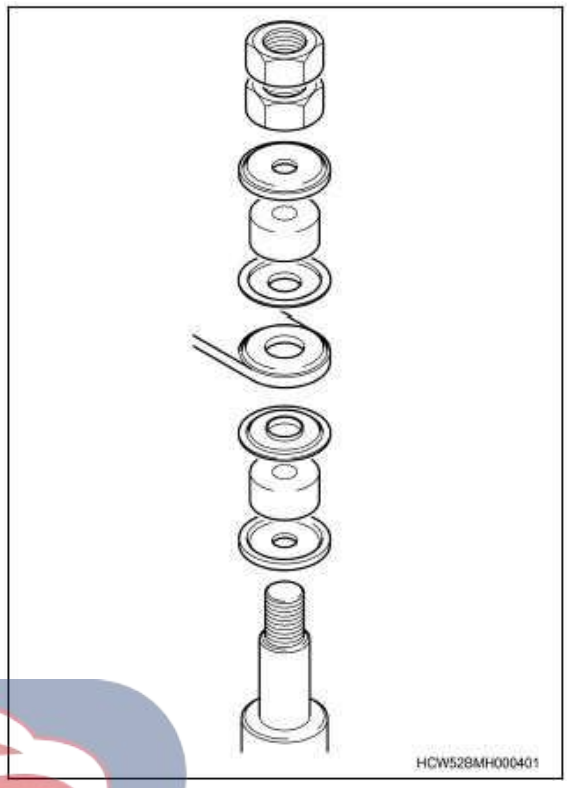
Tightening torque: 539N・m{55.0kgf・m/180.53kg・ft}



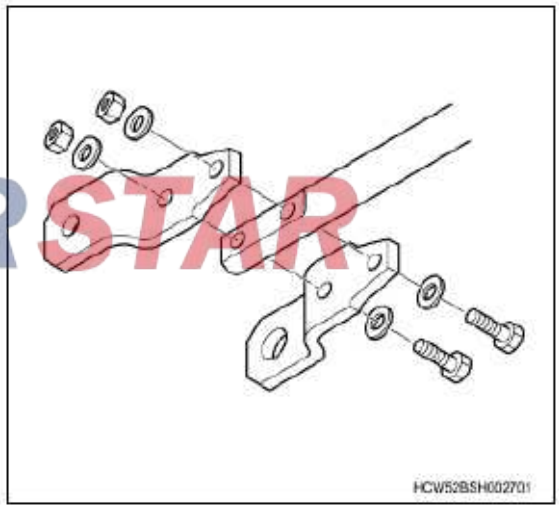
2. Stabilizer bar installation

1. Model with stabilizer

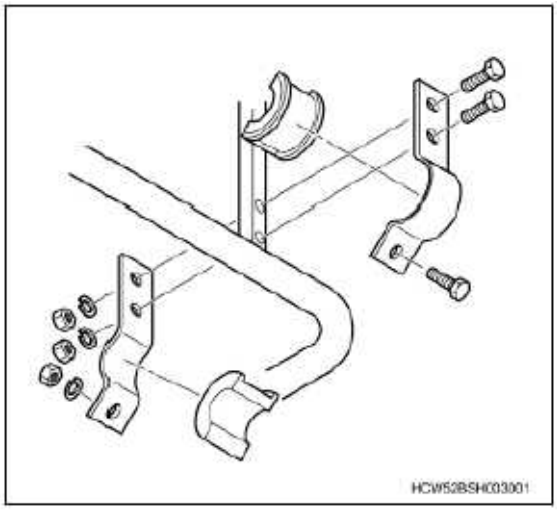
1) Temporarily fasten the stabilizer bar to the bracket.



2) Temporarily fasten the stabilizer bracket to the stabilizer bar.



3) Align the boss of the clamp bushing with the adjustment surface of the clamp so that the clamp gap faces the rear of the vehicle and then temporarily tighten the clamp stabilizer bar.

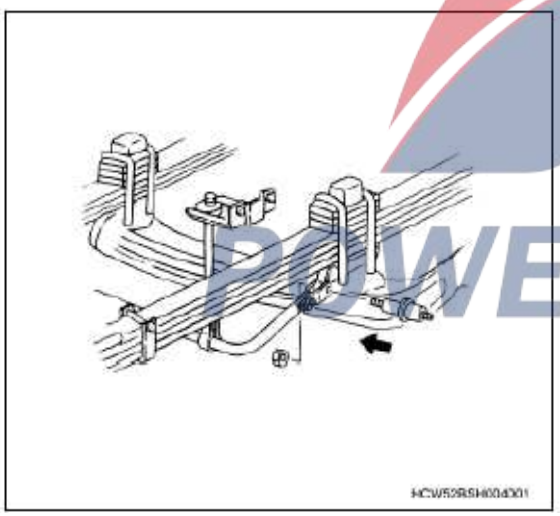


4) Install the stabilizer bushing on the spring bracket.

5) Temporarily fasten the lower pin to the stabilizer bar and spring bracket.

6) Finally fasten the downside pin to balance bar and spring support

Tightening torque: 343N・m{35.0kgf・m/114.76kg・ft}

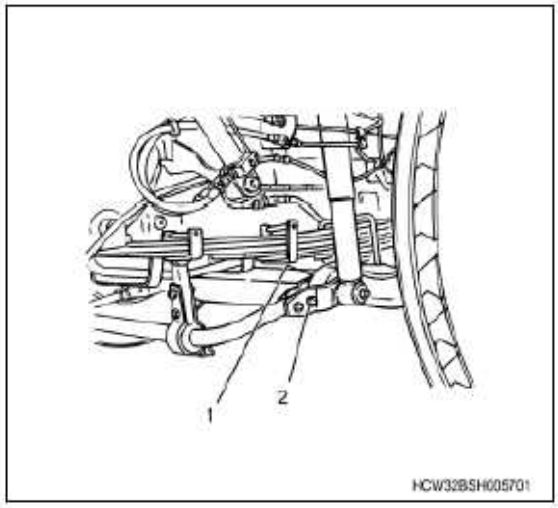


7) Finally fasten the stabilizer bracket.

Tightening torque: 157N・m{16.0kgf・m/116.01lb・ft}

8) Final fastening of clamping device;

Tightening torque: 83N・m{8.5kgf・m/61lb・ft}



1. Bottom pin mounting nut
2. Mounting nut of stabilizer bracket

---

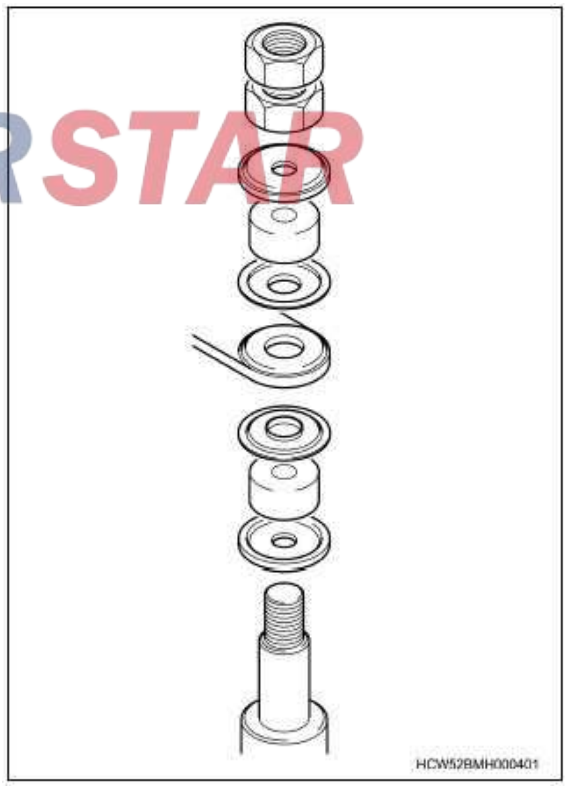
9) Fasten the stabilizer bar onto a support;

Tightening torque: 78N・m{8.0kgf・m/26.31kg・ft}

Inner nut

Tightening torque: 98N・m{10.0kgf・m/72.00lb・ft}

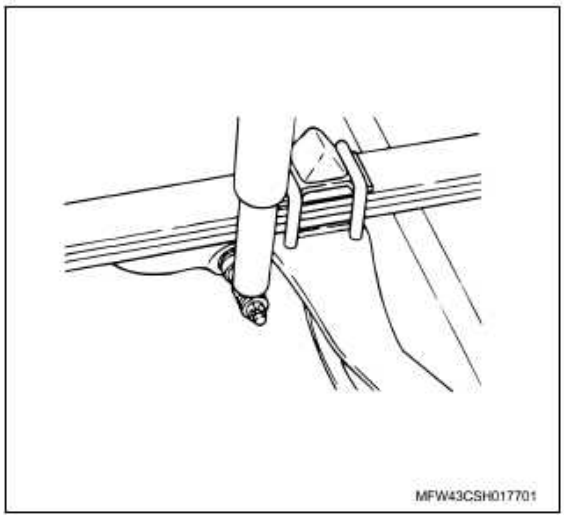
Outer nut



3. Damper connection
1. Model with stabilizer

1) Connect the damper to the front axle.

Tightening torque: 337N・m{34.4kgf・m/248.99lb・ft}



4. Brake nylon hose connection

1) Connect the brake nylon tube to the connector.

5. Straight pull rod connection

1) Install the straight pull rod on the steering knuckle arm.

Tightening torque: 265N・m{27.0kgf・m/195.00lb・ft}

2) Install the split pin on the tie rod and bend it.

Note:

・If the top nut of the groove is not aligned with the ball joint hole, further tighten the nut for the alignment.

Caution:

・Do not reuse the split pin.

・During the hole alignment, do not loosen the top nut of the groove.

6. Installation of disc wheel and tire

1. Precautions for disc wheel installation

Caution:

・If necessary, clean the following parts.

・Disc wheel mounting surface

・Wheel mounting surface of hub

・Conical cross section of nut

If the disc wheel is installed when it is not clean, the wheel nuts may be loose and thus the tire may come off.

Caution:

・Do not smear any MoS2 grease on any wheel pin or wheel nut.

The tightening force may be excessively great in relation to the tightening torque, thus causing the wheel pin to be damaged.

Caution:

・Before a commercial impact wrench is used, check its tightening torque.

The torque produced by the commercial socket wrench may be greater than the specified tightening torque value. If it is tightened using a torque greater than the specified value, the wheel pin may be damaged.

Caution:

・If a tightening wrench is used for tightening, be careful with the adjustment or tightening of the air pressure regulator. Do not tighten it excessively.

・Even if a tightening wrench is used for tightening, a tool like a torque wrench shall be used to tighten it to the specified torque at the end.

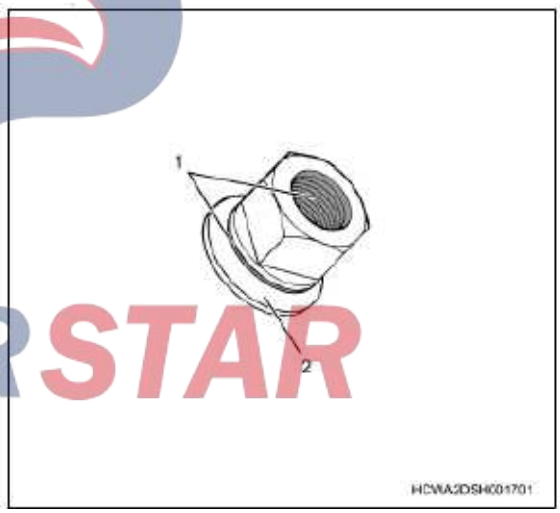
2. Disc wheel installation

1) Smear engine oil on the wheel nuts.

Note:

・Gear oil or power steering fluid can be used.

Wheel nut



1. Lubrication area
2. Cleaner

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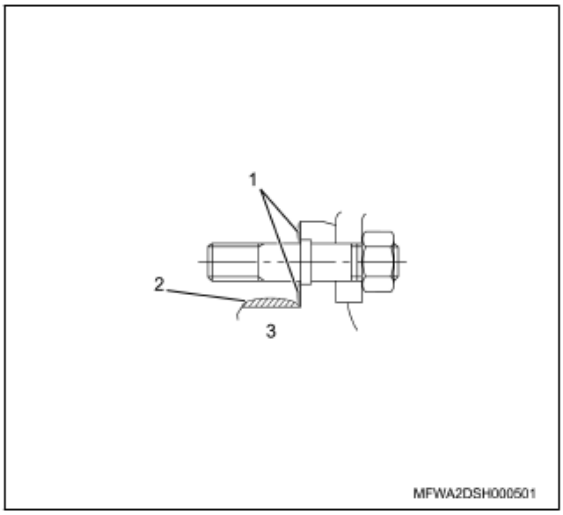
2) Smear engine oil on the wheel pin.

Note:

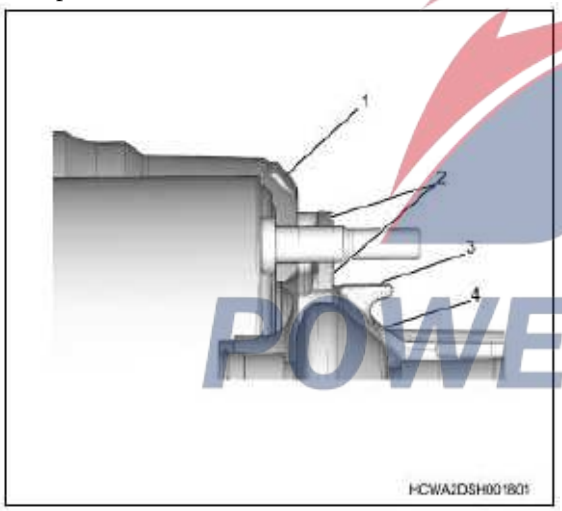
・Gear oil or chassis grease can be used.

Wheel pin class A



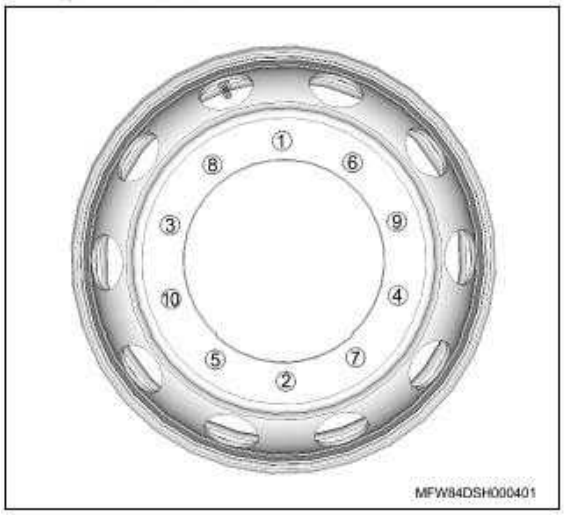
1. The contact surface of the disc wheel is not smeared with grease
2. Wheel hub
3. Grease application area

Wheel pin class B



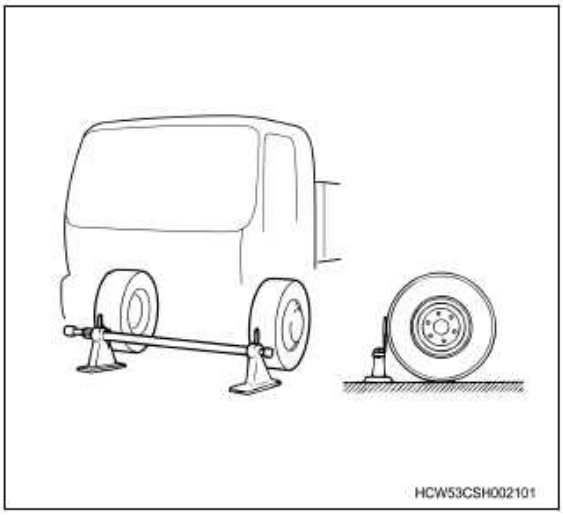
1. Brake drum
2. The contact surface of the disc wheel is not smeared with grease
3. Grease application area
4. Wheel hub

3) Install the disc wheel on the wheel pin.
4) Temporarily tighten the wheel nut onto the wheel pin.
Note:
・Rotate and insert the wheel nut by hand until it is fixed on the contact surface of the disc wheel. Temporarily tighten the wheel nuts until the disc wheel does not issue chucks.
5) Lower vehicle
6) Tighten the wheel nut diagonally two or three times as shown in the following figure.
Wheel nut tightening procedure



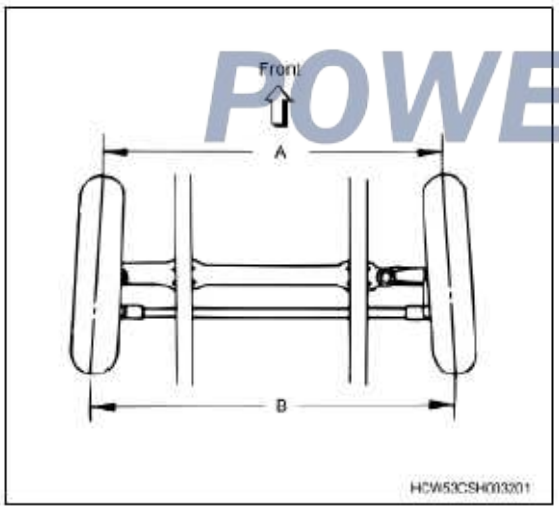
7) Tighten the inner wheel nut using a torque wrench, etc.
Tightening torque: 500-550N·m{50-55kgf·m/362-398lb·ft}
Caution:
・When the front tires are installed, do the following checks.
・Ensure no interference to any nearby part when rotating the steering wheel leftward or rightward.
Caution:
・After the installation, drive the vehicle a distance greater than the specified value and then retighten the wheel nuts with the specified torque.
Standard: 50 to 100km{31 to 99.78km}
7 Tie rod adjustment
1) Check the following items.
・The vehicle must be of no load.
・The surface must be flat.
・The vehicle must have a normal gesture.
・The wheel must not have any offset or deformation
・There shall not be any loosened part.
・The bolt or nut shall not be loose.
2) Rock every corner of the vehicle to confirm whether the suspicion is true.
3) Set the front wheels in the way that ensures the vehicle runs forward straightly.
4) Align the end of the toe-in measuring rule with the following position.
・Height of center line of left and right front wheels
・Tire tread pattern center
5) Make a mark where there is a contact with the toe-in measuring rule.
6) Measure the distance A between the marks made on the rears of the front wheels.

7) Rotate the front wheel for 180°.
8) Measure the distance A between the marks made in the front of the vehicle.



1. Toe-in measuring rule

9) Calculate the toe-in according to the measured value.
Note:
・Subtract the measured value of A from the measured value of B to obtain the calculation result.
Specified value 0±1mm(0±0.0394in)



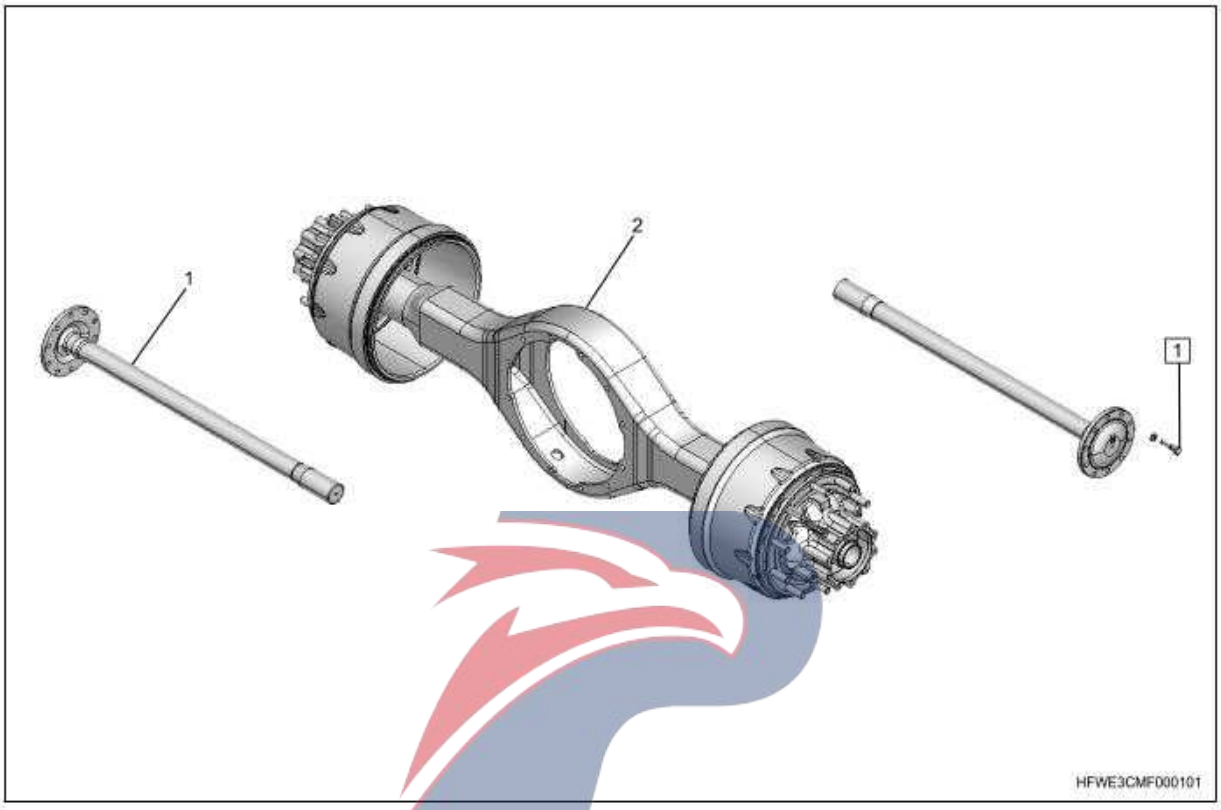
Caution:
・If the calculated toe-in is not the specified value, rotate the tie rod to make an adjustment.
10) Fix the tie rod end to the tie rod.
Tightening torque: 83N・m{8.5kgf・m/61lb・ft}

Rear axle drive shaft

Removal

1. Component view

Rear axle drive shaft



Part name

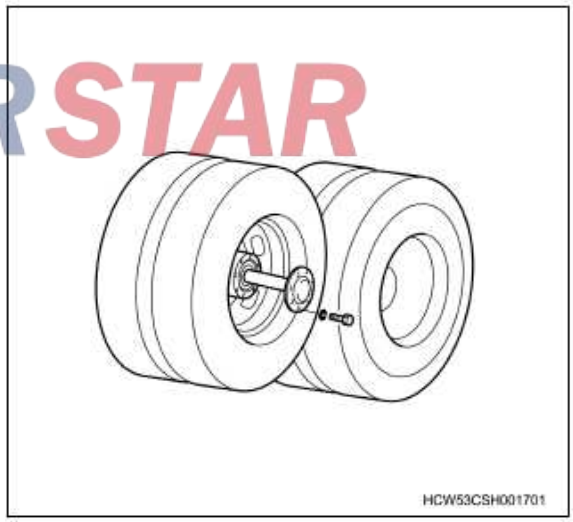
1. Rear axle drive shaft
2. Rear axle housing

Tightening torque

1: 181N・m{18.5kgf・m/60.33kg・ft}

2. Rear axle drive shaft removal

1) Remove the axle shaft on the rear hub's reel.



Inspection

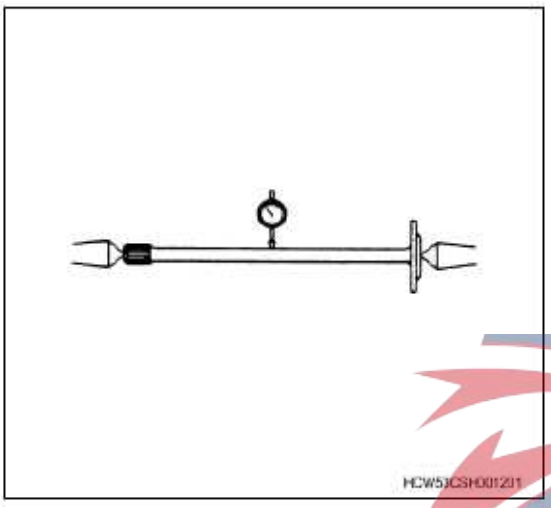
1. Inspection of rear axle drive shaft

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1) Check if the rear axle shaft is damaged.

2) Check the radial run-out of the rear axle shaft.

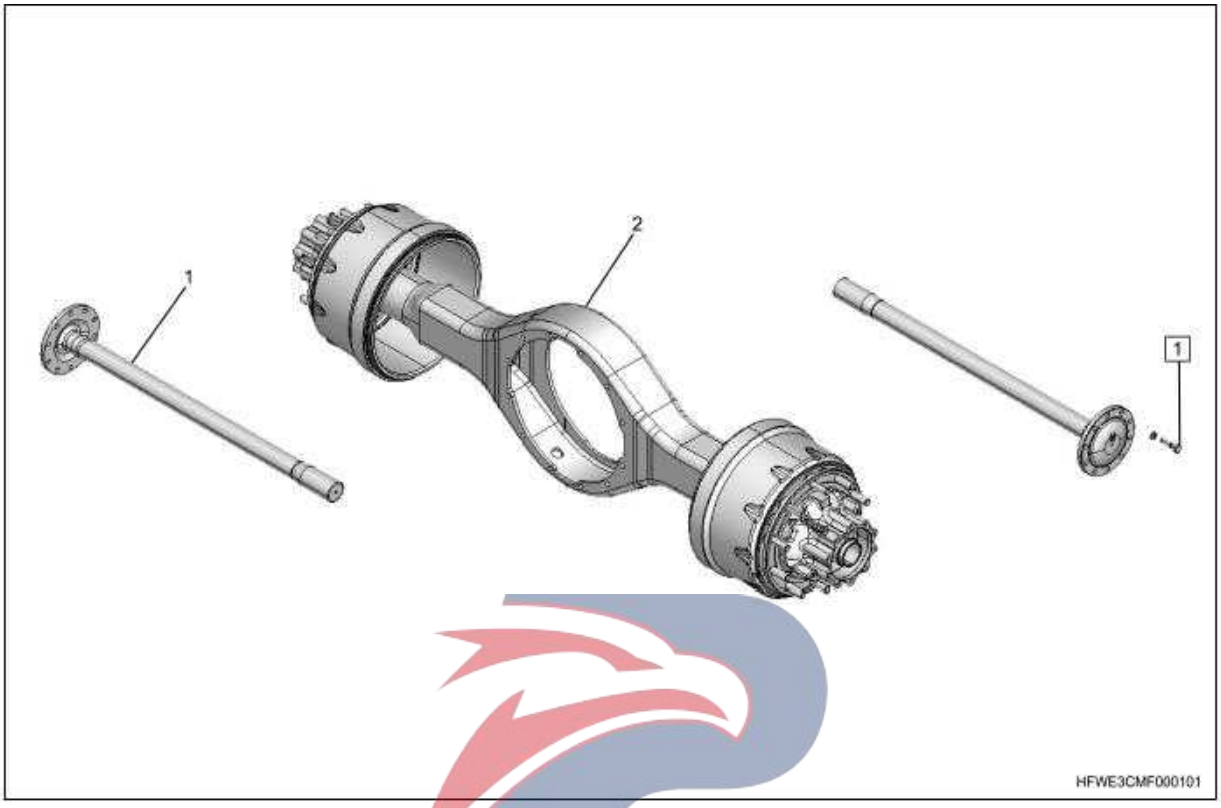
Limit: 1.0mm (0.0394in)



Installation

1. Component view

Rear axle drive shaft



Part name

1. Rear axle drive shaft
2. Rear axle housing

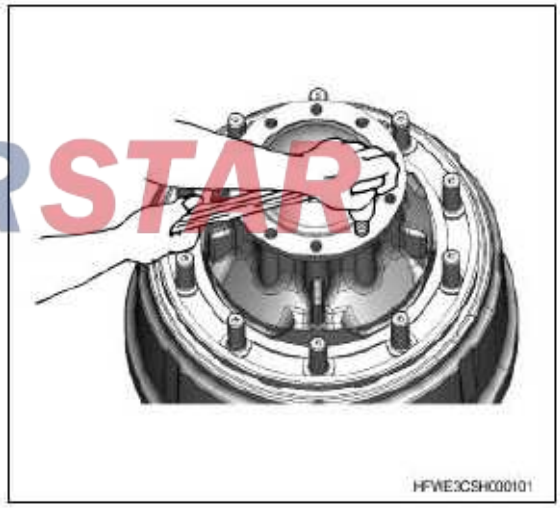
Tightening torque

1: 181N・m{18.5kgf・m/60.33kg・ft}

2. Rear axle drive shaft installation

1) Install the rear axle on the reel of the rear hub.

Tightening torque: 181N・m{18.5kgf・m/133.00lb・ft}

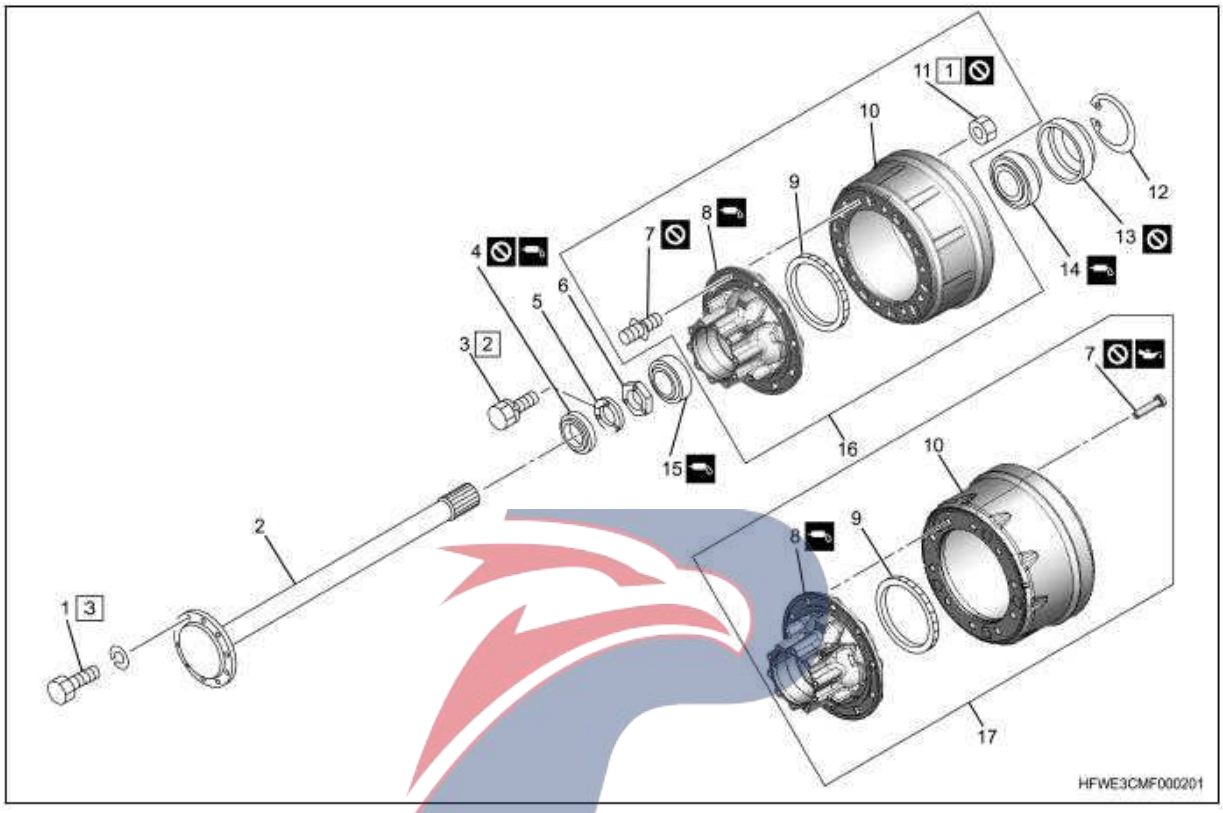


Rear wheel hub

Removal

1. Component view

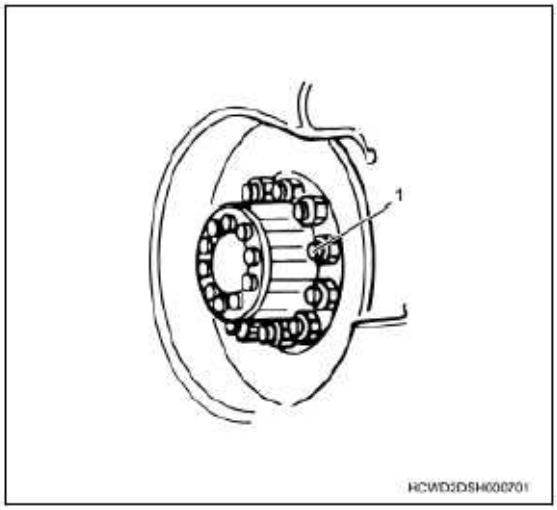
Rear wheel hub



Part name
1. Axle bolt
2. Rear axle drive shaft
3. Lock washer bolt
4. Wheel hub outer oil seal
5. Lock washer
6. Wheel hub nut
7. Wheel pin
8. Wheel hub
9. Excitation ring
10. Brake drum
11. Nut
12. Snap ring
13. Inner oil seal
14. Inner hub bearing
15. Outer wheel hub bearing
16. Stud type A
17. Stud type B

Tightening torque
1: 397N・m{40.5kgf・m/132.90kg・ft}
2: 9N・m{0.9kgf・m/36.29kg・in}
3: 181N・m{18.5kgf・m/60.33kg・ft}

2. Removal of disc wheel and tire
1) Move the vehicle onto a flat ground.
2) Pull out the parking brake rod.
3) Put the stop wedge on the vehicle.
4) Jack up the vehicle.
Note:
・Jack it up but ensure that its tires are on the ground.
5) Loosen the wheel nuts until the disc wheel does not issue chucks.
Caution:
・Do not remove the wheel nuts.
・Do not loosen the wheel nuts excessively, and otherwise, the wheel pin may be damaged.



1. Wheel pin mark position: R indicates RH thread

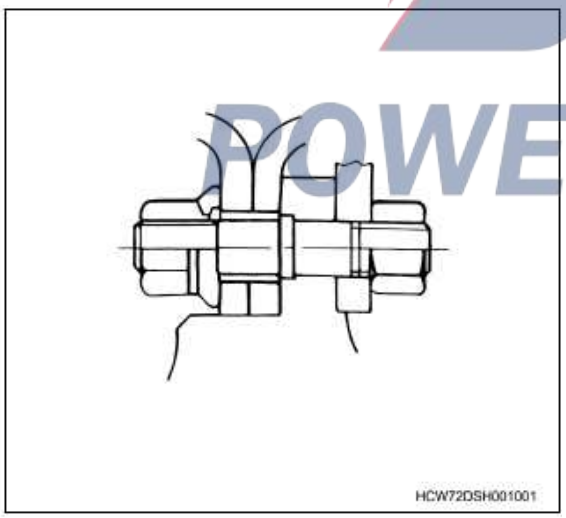
6) Jack up the vehicle.

Note:

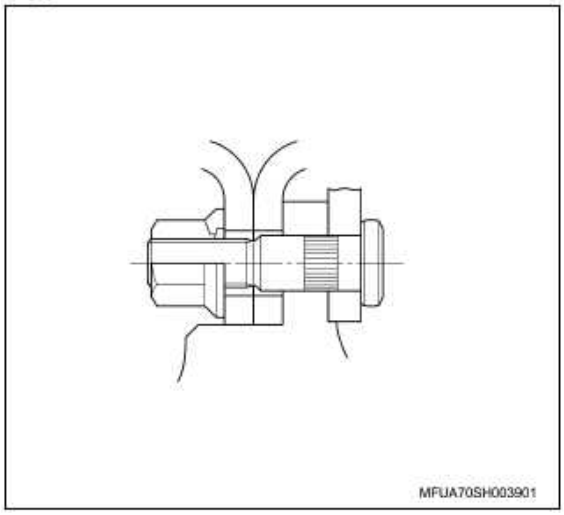
・Jack up the vehicle and allow all of its tires to be away from the ground.

・For a dual-tire assembly, the two tires need to be jacked up at the same time because the two disc wheels are fixed with one wheel nut.

A Class



B class



7) Remove the wheel nut from the wheel pin.

8) Remove the disc wheel from the vehicle.

Warning:

・Be careful to prevent the heavy tire from inflicting any injury.

Caution:

・Remove the component and ensure the thread part of the wheel pin and the disc wheel mounting surface of the hub.

3. Parking brake release

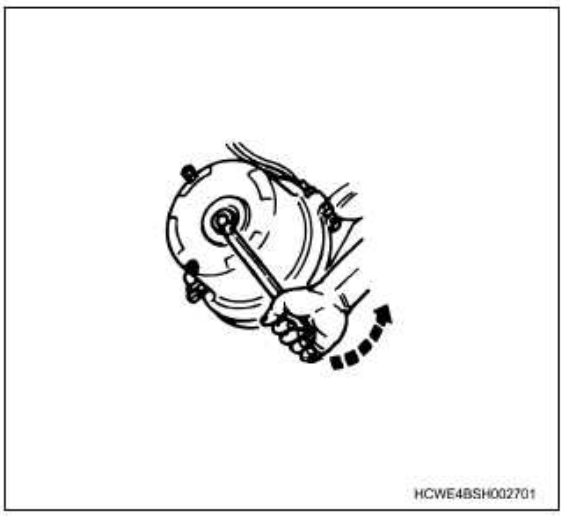
1) Loosen the parking brake.

2) Rotate the machine release bolt leftward until the distance between the edge of the brake chamber and the top of the machine release bolt is up to the specified value.

Caution:

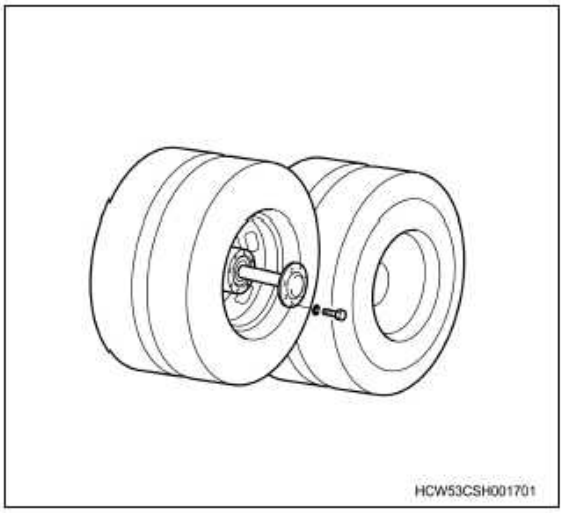
・Do not use any tightening wrench.

Standard: 70mm{2.76in}



4. Rear axle drive shaft removal

1) Remove the axle shaft on the rear hub's reel.



5. Brake drum removal

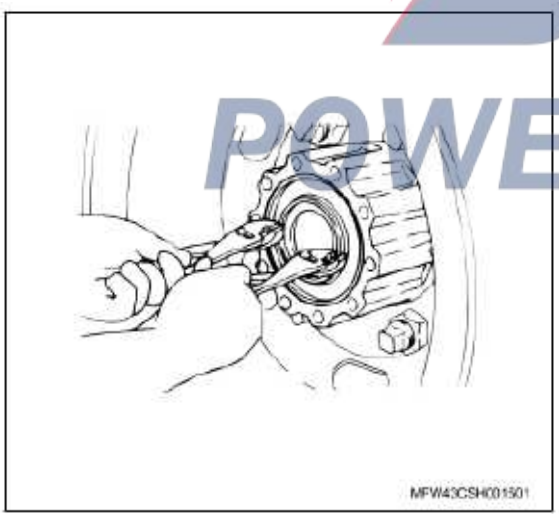
1) Use the vice to remove the hub outer oil seal from the rear wheel hub.

Note:

・During the removal, clamp the middle rib.

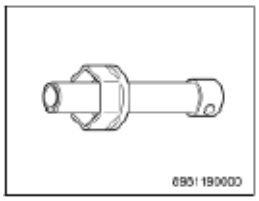
Caution:

・Be careful. Do not damage the oil seal when it is removed.

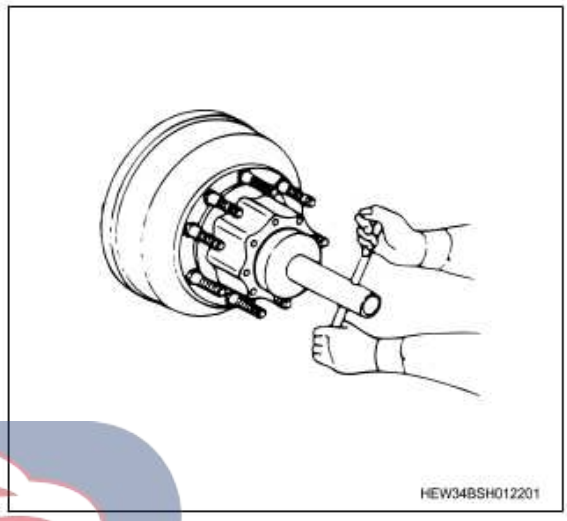


2) Remove the lock washer from the rear wheel hub.

3) Remove the wheel hub nut from the rear axle using a special tool.



SST:8-9811-0002-0-wheel hub nut wrench



4) Remove the washer from the rear wheel hub.

5) Remove the inner cup of the wheel hub outer bearing from the rear wheel hub.

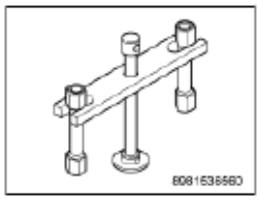
6) Remove the brake drum from the rear axle using a special tool.

Caution:

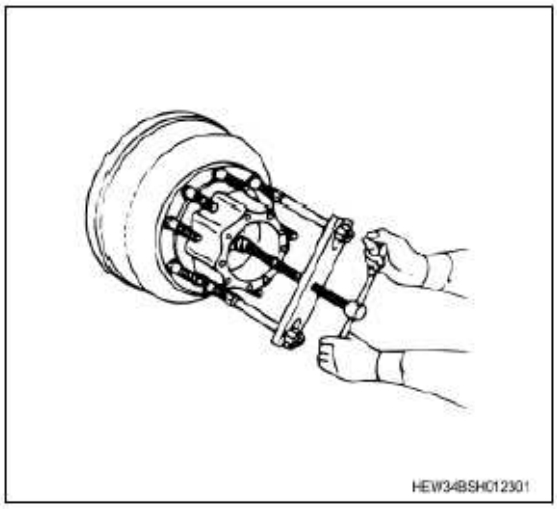
・Be careful to prevent any heavy part from inflicting any injury.

・When the rear wheel hub is removed, do not allow the brake or the parking brake to engage.

・Prevent any impurity or dirt from entering the rear hub or bearing.



SST:8-9815-3656-0-wheel hub puller



6. Wheel hub bearing removal

1) Use a vice to remove the snap ring from the rear wheel hub.

2) Remove the inside oil seal from the rear wheel hub.

3) Remove the inner cup of the inside bearing from the rear wheel hub.

4) Remove the outer cup of the inside bearing from the rear wheel hub using a brass bar.

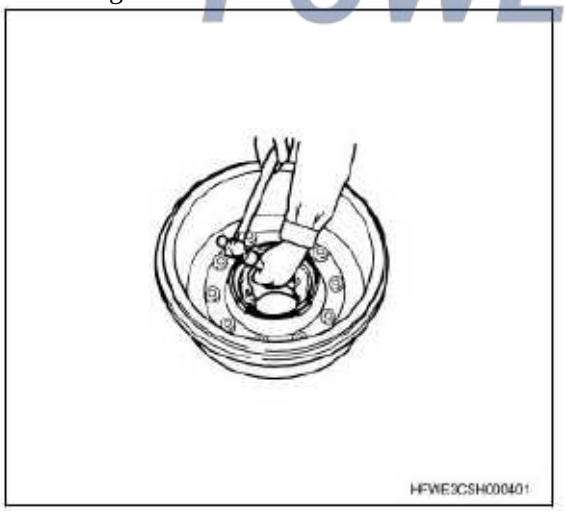
Note:

・Use the two carved grooves of the inner rear hub for flattening.

5) Remove the outer cup of the outer bearing from the rear wheel hub using a brass bar.

Note:

・Use the two carved grooves of the inner rear hub for flattening.



7. Rear wheel hub removal

1. Precautions for rear hub

Caution:

・If the wheel pin is damaged, complete replacement of wheel pin and nut.

・If a wheel pin is damaged, all the wheel pins and nuts of the axle shall be changed.

2. A class

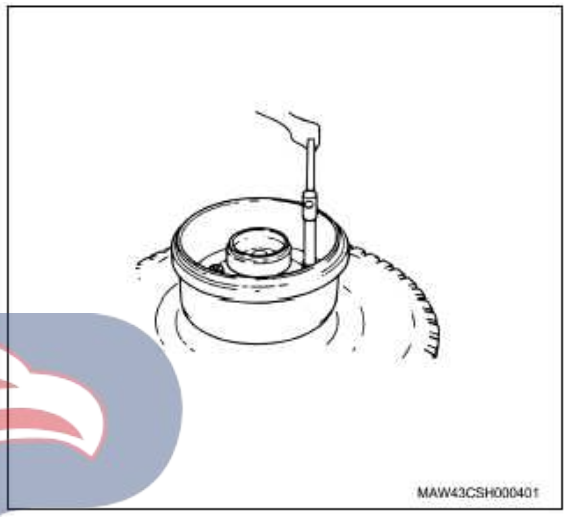
1) Remove the wheel pins from the brake drums.

Caution:

・Because each nut has three fixing points, a tool must be used when it is loosened.

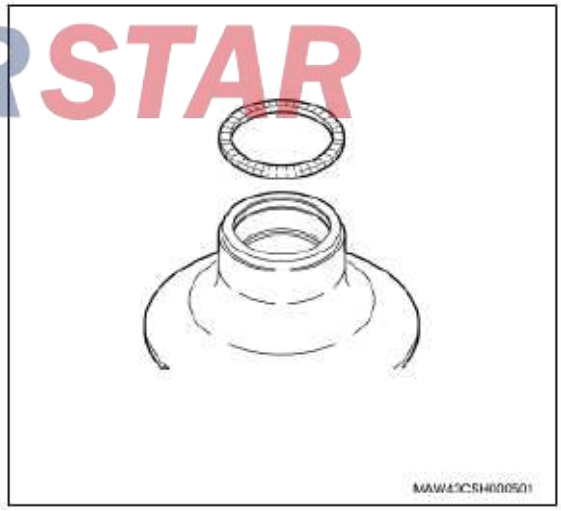
・Do not reuse the wheel pins, nuts, or wheel nuts.

・During operation, be cautious and do not damage the inside of the brake drum.



2) Remove the rear wheel hub from the brake drum.

3) If necessary, remove the excitation ring from the rear wheel hub using a screwdriver or some other tool.



3. B class

1) Remove the wheel pins from the brake drums.

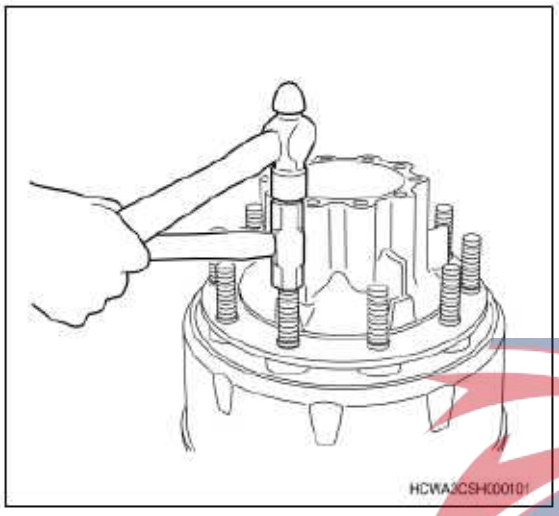
Note:

・Make the brake drum face downward, put a brass hammer on the top end of the wheel pin, and move it out vertically.

Caution:

・Do not use any hammer to hit the rear hub.

・Vertically insert it toward the wheel pin to prevent the wheel pin from being bent.

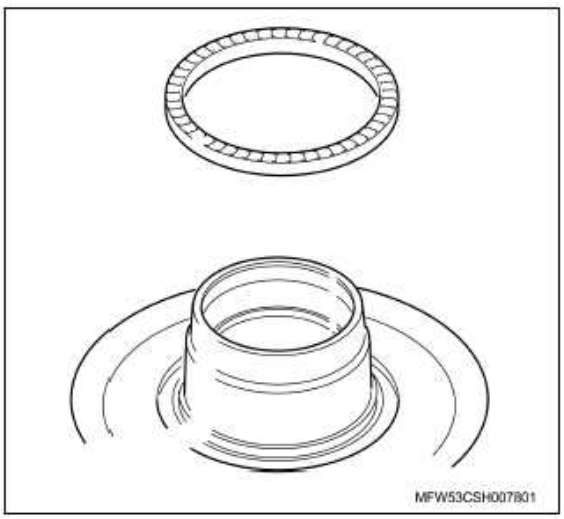


Caution:

・After the wheel pin is removed, do not reuse the wheel pin and nut.

2) Remove the rear wheel hub from the brake drum.

3) If necessary, remove the excitation ring from the rear wheel hub using a screwdriver or some other tool.



Inspection

1. Inspection of rear hub

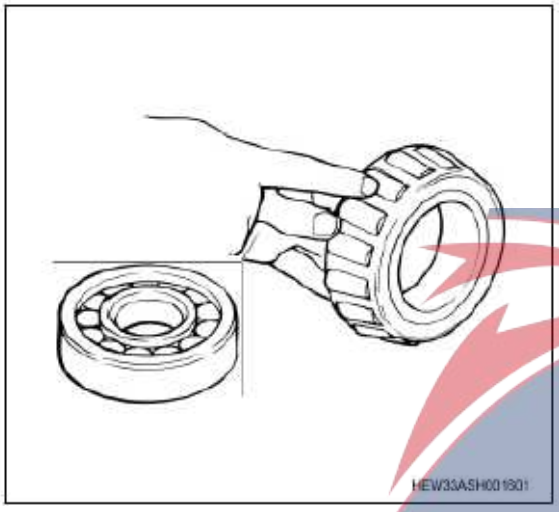
Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1. Bearing Inspection

1) Check the following items.

・The gap between the inner cup or outer cup, and the rolling shaft is excessive or there is any crack, wear, or damage on them.

・There is an abnormal feeling during hand rotation.



2. Wheel pin check

1) Check the damage of the wheel pin.

Caution:

・If a wheel pin is damaged, all the wheel pins and nuts of the axle shall be changed.

2) Check the damage of the wheel pin.

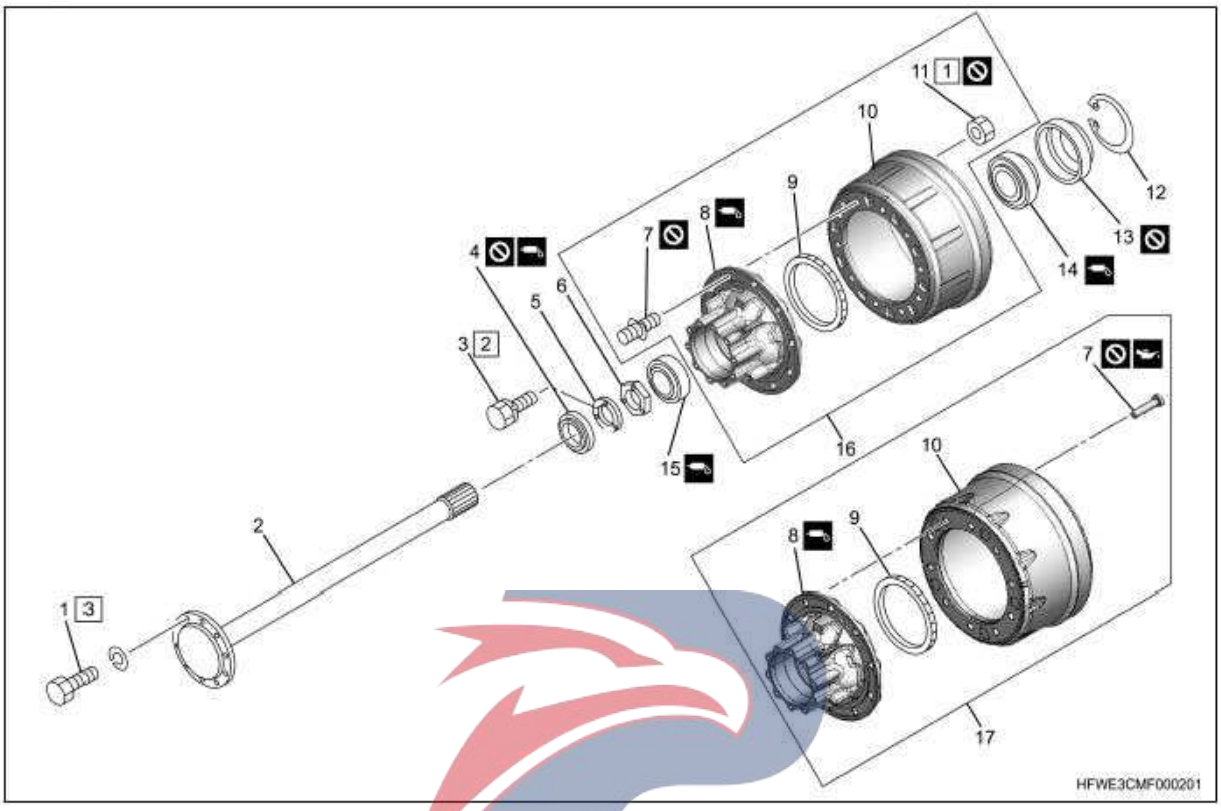
Caution:

・If the wheel pin is damaged, replace the wheel pin and nut.

Installation

1. Component view

Rear wheel hub



Part name

1. Axle bolt
2. Rear axle drive shaft
3. Lock washer bolt
4. Wheel hub outer oil seal
5. Lock whasher
6. Wheel hub nut
7. Wheel pin
8. Wheel hub
9. Excitation ring
10. Brake drum
11. Nut
12. Snap ring
13. Inner oil seal
14. Inner hub bearing
15. Outer wheel hub bearing
16. Stud type A
17. Stud type B

2. Rear wheel hub installation

1. A class

1) Smear engine oil on the thread of the wheel pin.

2) Install the brake drum cap on the rear wheel hub.

Caution:

・Knock the wheel pins and nuts into three places.

Tightening torque: 397N・m{40.5kgf・m/292.99lb・ft}

Caution:

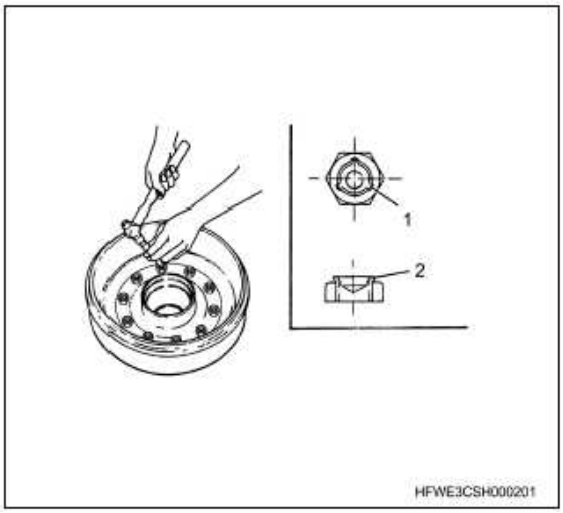
・Do not reuse the wheel pins, nuts, or wheel nuts.

Tightening torque

1: 397N・m{40.5kgf・m/132.90kg・ft}

2: 9N・m{0.9kgf・m/36.29kg・in}

3: 181N・m{18.5kgf・m/60.33kg・ft}



1.6.5-7.0mm (0.256–0.276 inch)

2. Knock into three positions.

---

3) If the excitation ring has been removed, install it on the rear wheel hub.

Caution:

・Do not reuse the excitation ring.

・Knock it slightly until it is tightened.

Note:

・Evenly hit the excitation ring using a cushion block to prevent it from being deformed.

2. B class

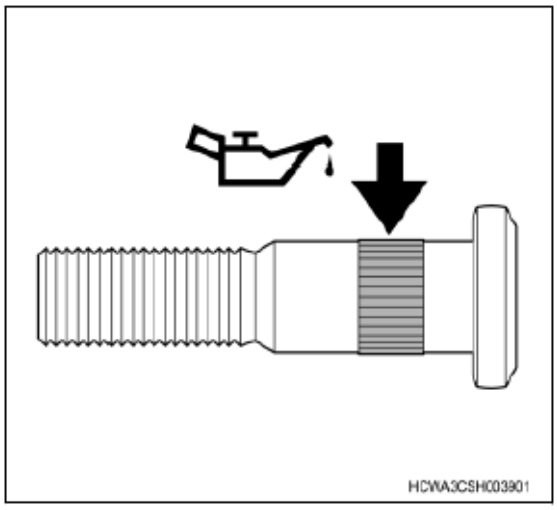
1) Clean the wheel pin and the hole in the surface of the base.

2) Install the rear wheel hub on the brake drum.

3) Smear engine oil on the nodal part of the wheel pin.

Caution:

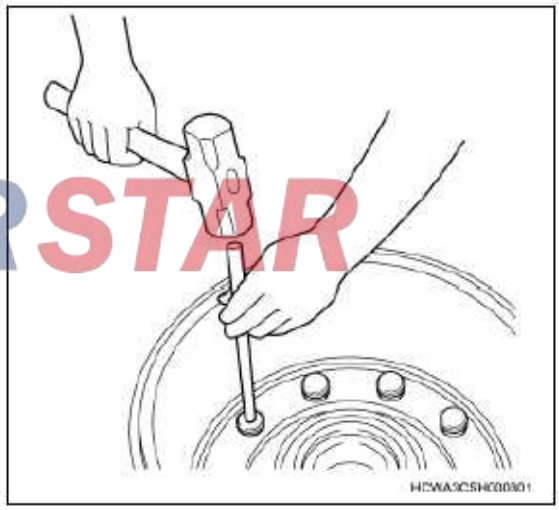
・Do not reuse the wheel pins and nuts.



4) Align the nodal tooth of the wheel pin with its corresponding position, align the nodal tooth of the wheel pin on the rear wheel hub with its corresponding position, and finally insert the wheel pin into the brake drum.

5) Hit the wheel pin slightly into the rear wheel hub using a brass bar and a hammer.

: 3-5mm (0.11811-0.19685in) tapping



6) Insert the nut into the wheel pin and install the wheel nut.

Note:

・ Nut specification example: M30, 15mm high(0.5906in)

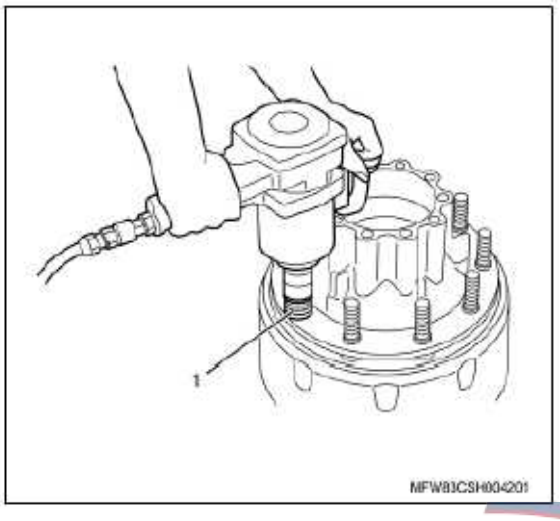
7) Smear engine oil on the thread of the wheel nut and in the gap between the nut and washer.

8) Remove the wheel pin from the rear wheel hub using a wheel nut.

Tightening torque: 304Nm (31.0kgf.m/224lb.ft) or so

Caution:

・ Slightly pull out the piston using an impact wrench, etc. Pay attention to its rotation speed.



1. Nut

9) Confirm using a gap gauge that the wheel pin end is against the inside of the brake drum.

10) If the excitation ring has been removed, install it on the rear wheel hub.

Note:

・Evenly hit the excitation ring using a cushion block to prevent it from being deformed.

Caution:

・Do not reuse the excitation ring.

・Knock it slightly until it is tightened.

3. Wheel hub bearing installation

1) Inject the multifunctional grease into the hub bearing.

Note:

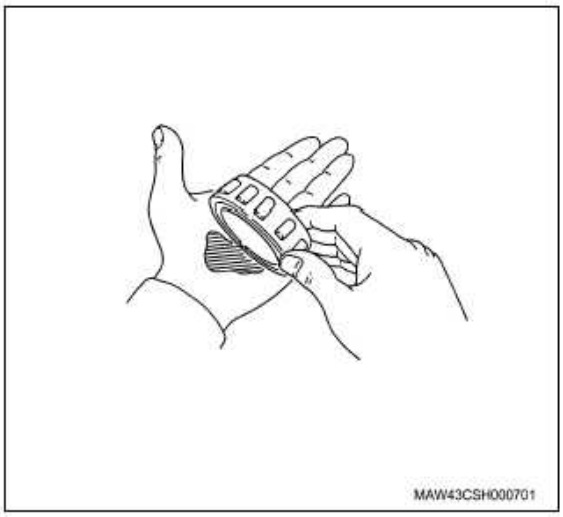
・Smear the multifunctional grease on the inner cup of the outer bearing, the roller spacings, and the inner cup of the inner bearing.

Amount of injected grease

Inside bearing	: About 135g (about 4.80oz)
Outside bearing	: About120g{ about 4.2oz}

Caution:

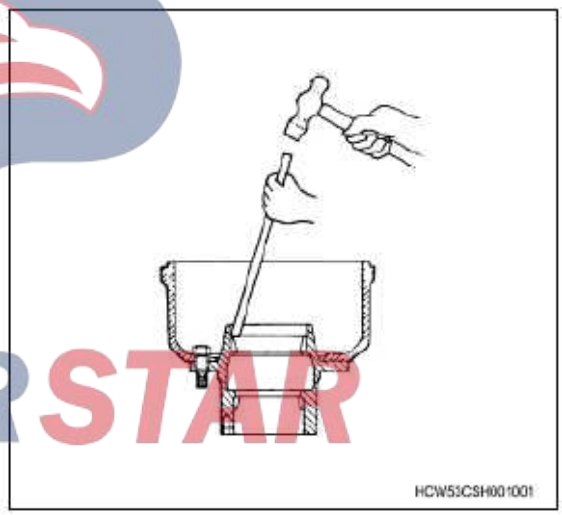
・Smear oil evenly and thoroughly.



2) Install the outer cups of the outside and inside bearings on the brake drum using a brass bar.

Caution:

・Knock it slightly until it is tightened.



3) Install the inner cup of the inside bearing on the rear wheel hub.

4) Install the inside oil seal on the rear wheel hub using the brass bar.

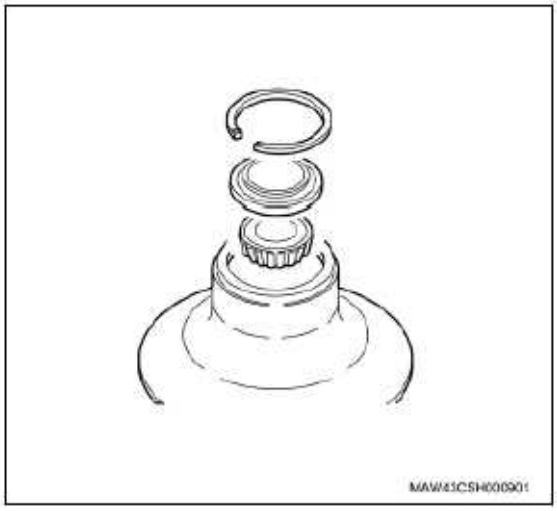
Caution:

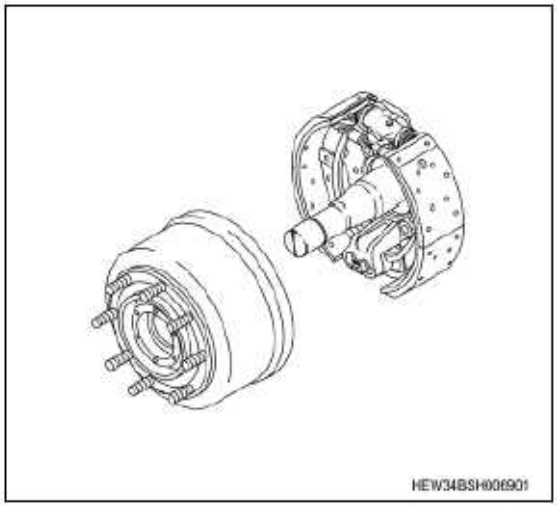
・Do not reuse the oil seals.

5) Install the snap ring on the rear wheel hub.

Caution:

・Safely injected into the groove.





4. Brake drum installation

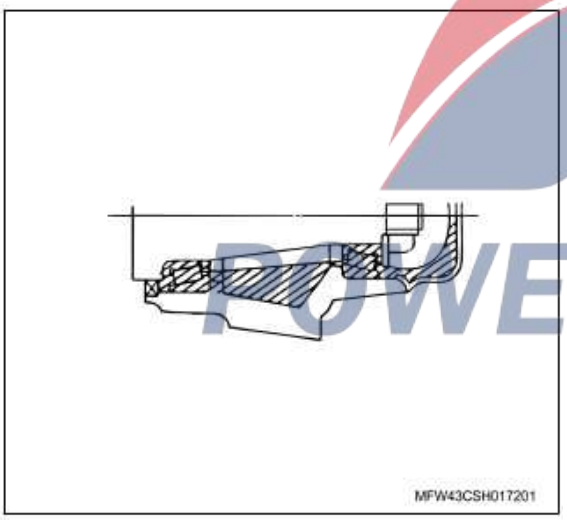
1) Fill the grease chamber of the rear wheel hub with BESCO L-2 grease.

Mote:

・BESCO L-3 grease or any equivalent may also be used.

Caution:

・Always inject new grease.



2) Install the brake drum on the rear axle.

Caution:

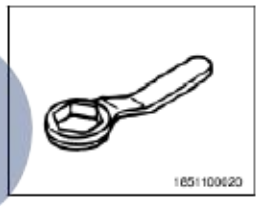
・Be careful to prevent any heavy part from inflicting any injury.

・Check whether there is any grease on the internal drum surface or lining.

・Be careful to prevent any impurity or dirt from sticking on the rear wheel hub or the rear bearing.

3) Install the washer on the rear wheel hub.

4) Install the wheel hub nut from the rear axle using a special tool.



SST:1-8511-0002-0-wheel hub nut wrench

5) Rotate the brake drum leftward and rightward to tighten the wheel hub bearing.

6) Continuously rotate the brake drum, and tighten the wheel hub nut until the brake drum stops.

Caution:

・Continuously rotate the brake drum during the tightening.

・Do not any pneumatic tool.

7) Loosen the wheel hub nuts and check whether the brake drum rotates smoothly.

Caution:

・If the brake drum does not rotate, pull back the brake drum and use a special tool to do the above procedure again.

・Loosen the hub nuts completely.

8) Pass one wire through the vehicle pin and hook the spring balance to the spring.

9) Pull the spring balance in the tangential direction and adjust the pre-applied load on the outside bearing.

Note:

・Make adjustment through tightening the hub nuts.

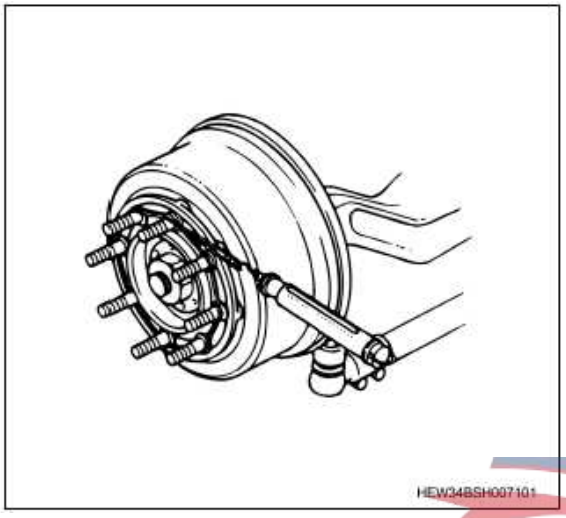
Caution:

・If the pre-load is not stable, rotate the brake drum multiple times. When the brake drum stops completely, make a remeasurement.

・If it is not still firm, rotate the brake drum leftward and rightward and do the hub bearing stabilization procedure.

Hub bearing preload

If it is new	: 25-59N{2.5 - 6.0kg/5.6-13.3lb}
After reuse	: 25-59N{2.5 - 6.0kg/5.6-13.3lb}



10) Install the lock washer onto the wheel hub nut.

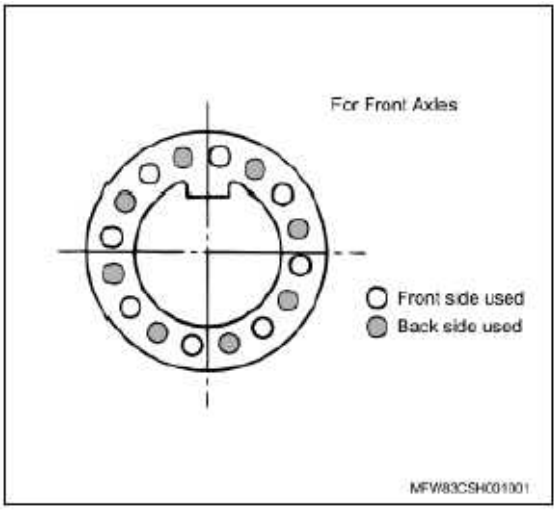
Note:

・If the bolt hole of the lock washer is not aligned with the hub nut, rotate the lock washer for installation.

・If there is still no match after overturn and installation, rotate the hub nut in the tightening direction for bolt hole match.

・If the lock washer is upside down, the hole would match with it.

Angle: 11°15′



Tightening torque: 9N・m{1kgf・m/80.01lb・in}

11) Install the washer on the rear wheel hub.

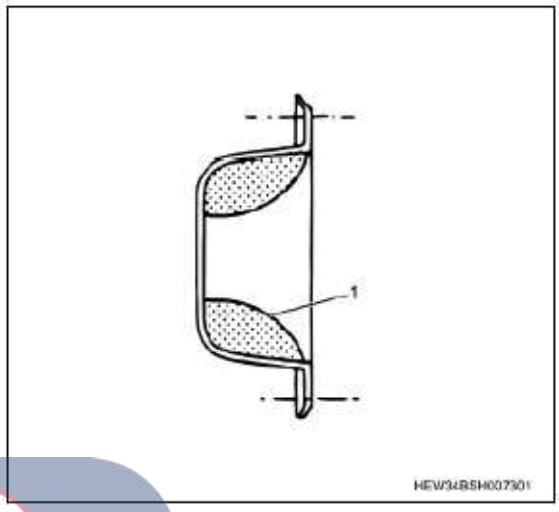
12) Fill the hub cover with BESCO L-2 grease.

Note:

・BESCO L-3 grease or any equivalent may also be used.

Caution:

・Always inject new grease.



1. Grease

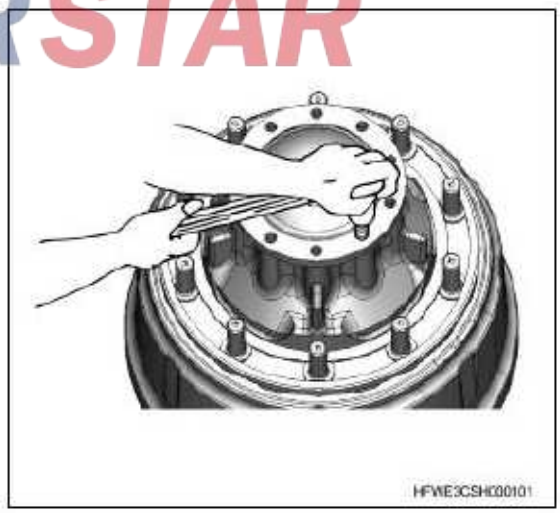
13) Install the wheel hub cap on the rear wheel hub.

Tightening torque: 23N・m{2.3kgf・m/17.00lb・ft}

5. Rear axle drive shaft installation

1) Install the rear axle on the reel of the rear hub.

Tightening torque: 181N・m{18.5kgf・m/133.00lb・ft}



6. Brake lining check

1. Brake lining gap check

1) Remove the inspection hole protection ring from the dust cover.

2) Measure the brake lining gap using a gap gauge.

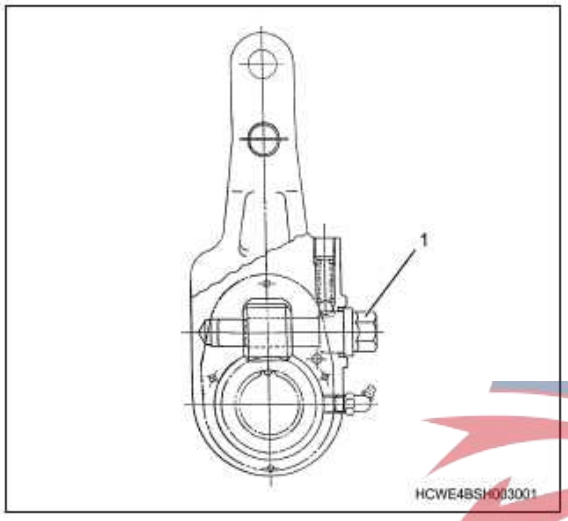
Standard: 0.01in{0.01in}

Caution:

・If the measurement result is beyond the specified range, adjust the brake lining gap.

2. Brake lining gap adjustment (specifications of manual gap regulator)

1) Rotate the worm shaft to adjust the brake lining.



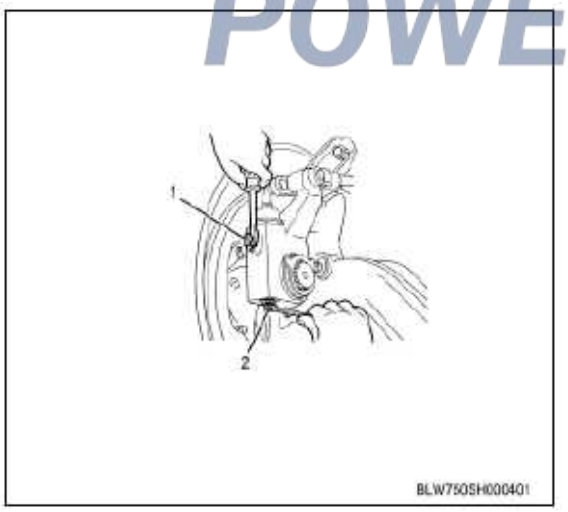
1. Worm shaft

---

3. Brake lining gap adjustment (specifications of automatic gap regulator)

1) Use a slot-headed screwdriver to pull up the rod.

2) Rotate the worm shaft to adjust the brake lining.



1. Rod

2. Worm shaft

---

7. Parking brake setting

1) Clockwise rotate and remove the machine release.

Caution:

・Do not use any tightening wrench.

Tightening torque: 25 - 45N・m{2.5 - 4.6kgf・m/18 - 33lb・ft}

8. Installation of disc wheel and tire

1. Precautions for disc wheel installation

Caution:

・If necessary, clean the following parts.

・Disc wheel mounting surface

・Wheel mounting surface of hub

・Conical cross section of nut

If the disc wheel is installed when it is not clean, the wheel nuts may be loose and thus the tire may come off.

Caution:

・Do not smear any MoS2 grease on any wheel pin or wheel nut.

The tightening force may be excessively great in relation to the tightening torque, thus causing the wheel pin to be damaged.

Caution:

・Before a commercial impact wrench is used, check its tightening torque.

The torque produced by the commercial socket wrench may be greater than the specified tightening torque value. If it is tightened using a torque greater than the specified value, the wheel pin may be damaged.

Caution:

・If a tightening wrench is used for tightening, be careful with the adjustment or tightening of the air pressure regulator. Do not tighten it excessively.

・Even if a tightening wrench is used for tightening, a tool like a torque wrench shall be used to tighten it to the specified torque at the end.

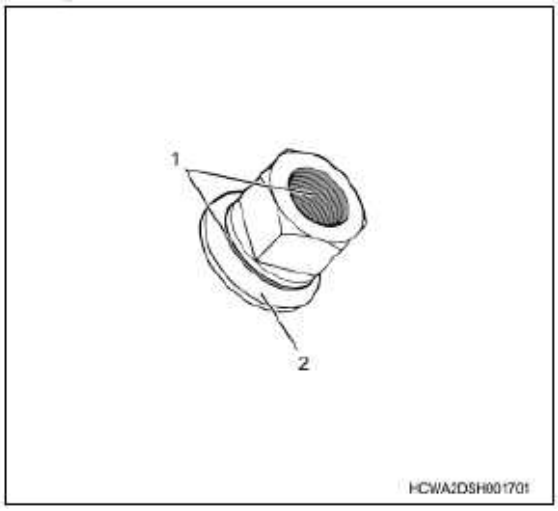
2. Disc wheel installation

1) Smear engine oil on the wheel nuts.

Note:

・Gear oil or power steering fluid can be used.

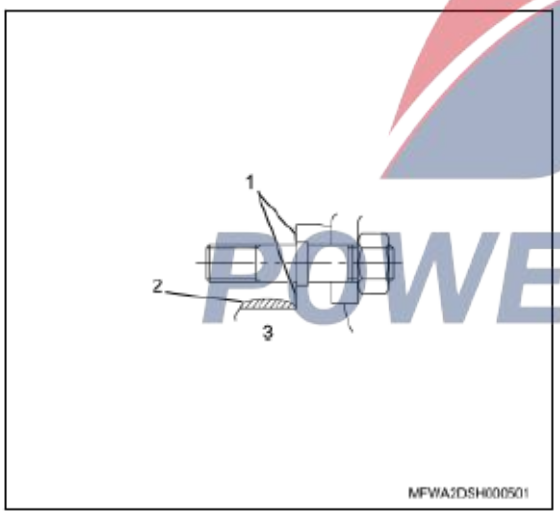
Wheel nut



1. Lubrication area
2. Cleaner

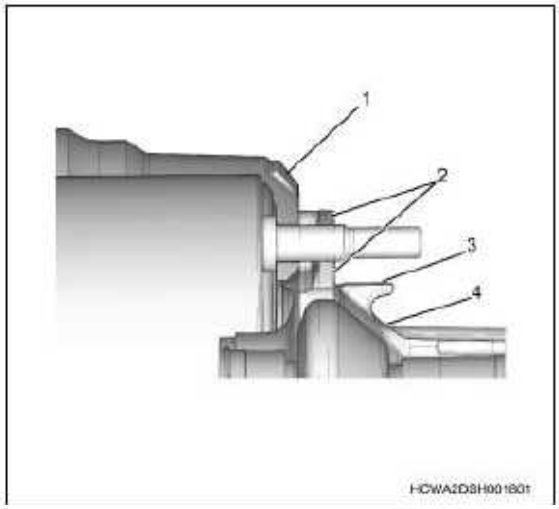
2) Smear engine oil on the wheel pin.
Note:
・Gear oil or chassis grease can be used.

Wheel pin class A



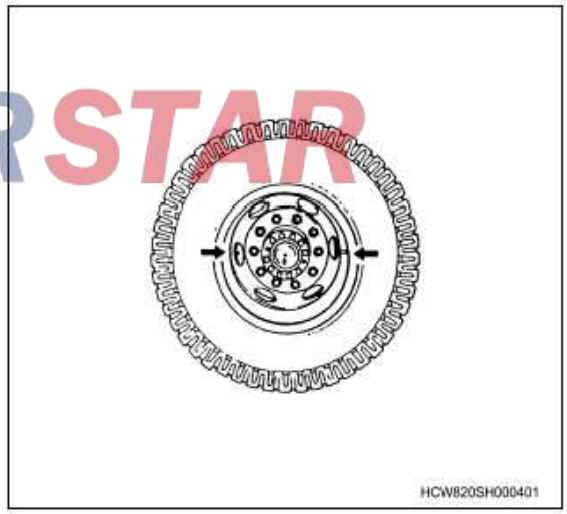
1. The contact surface of the disc wheel is not smeared with grease
2. Wheel hub
3. Grease application area

Wheel pin class B



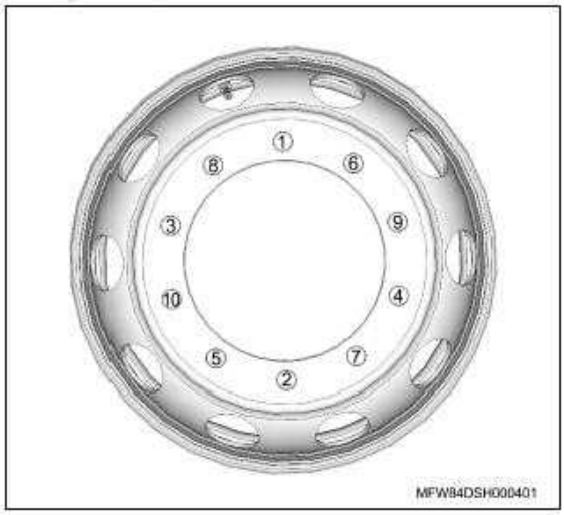
1. Brake drum
2. The contact surface of the disc wheel is not smeared with grease
3. Grease application area
4. Wheel hub

3) Install the disc wheel on the wheel pin.
Note:
・When a dual-tire assembly is installed, put the valve of the outside tire away from that of the inside tire in order to allow both of them to be inflated.



4) Temporarily tighten the wheel nut onto the wheel pin.
Note:
・Rotate and insert the wheel nut by hand until it is fixed on the contact surface of the disc wheel. Temporarily tighten the wheel nuts until the disc wheel does not issue chucks.
5) Lower vehicle
6) Tighten the wheel nut diagonally two or three times as shown in the following figure.

Wheel nut tightening procedure



7) Tighten the inner wheel nut using a torque wrench, etc.

Tightening torque: 500-550N·m{50-55kgf·m/362-398lb·ft}

Caution:

・After the installation, drive the vehicle a distance greater than the specified value and then retighten the wheel nuts with the specified torque.

Standard: 50 to 100km{31 to 99.78km}

Rear axle

Removal

1. Removal of disc wheel and tire

1) Move the vehicle onto a flat ground.

2) Pull out the parking brake rod.

3) Put the stop wedge on the vehicle.

4) Jack up the vehicle.

Note:

・Jack it up but ensure that its tires are on the ground.

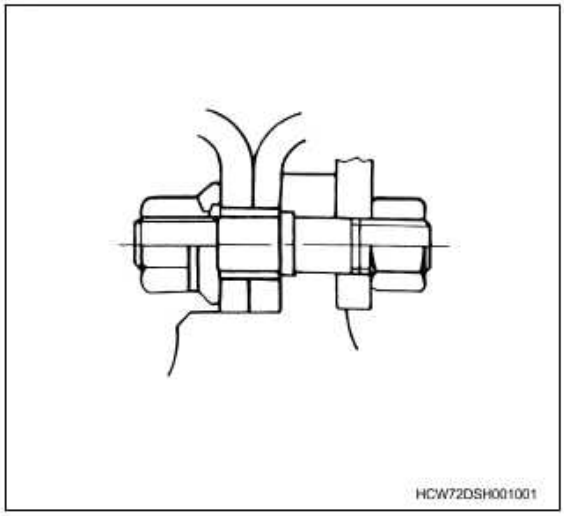
5) Loosen the wheel nuts until the disc wheel does not issue chucks.

Caution:

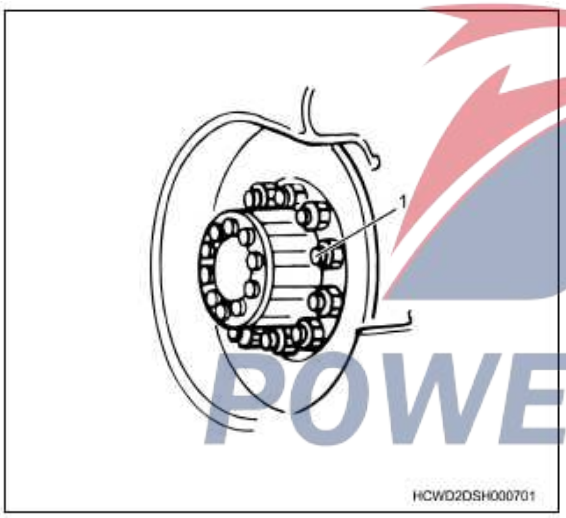
・Do not remove the wheel nuts.

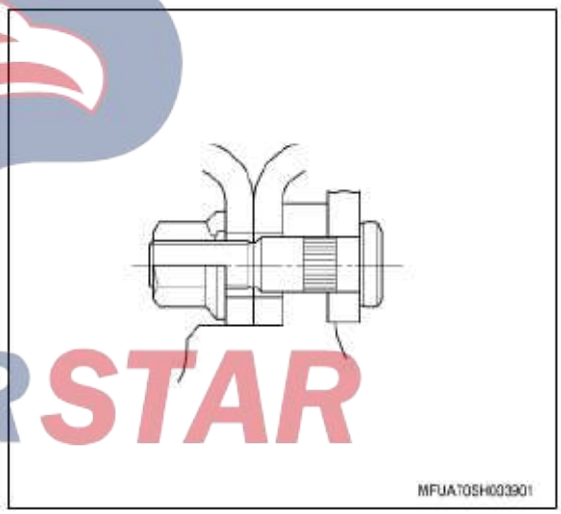
・Do not loosen the wheel nuts excessively, and otherwise, the wheel pin may be damaged.

A Class



B class





1. Wheel pin mark position: R indicates RH thread

---

6) Jack up the vehicle.

Noet:

・Jack up the vehicle and allow all of its tires to be away from the ground.

・For a dual-tire assembly, the two tires need to be jacked up at the same time because the two disc wheels are fixed with one wheel nut.

7) Remove the wheel nut from the wheel pin.

8) Remove the disc wheel from the vehicle.

Warning:

・Be careful to prevent the heavy tire from inflicting any injury.

Caution:

・Remove the component and ensure the thread part of the wheel pin and the disc wheel mounting surface of the hub.

2. Drive shaft removal

1. Model with single rear differential gear

1) Make an alignment mark on each connector.

2) Remove the drive shaft between the transmission and drive axle from the flange of the transmission.

2. Tandem-type rear differential gear model

1) Make an alignment mark on each connector.

2) Remove the drive shaft between the transmission and drive axle from the flange of the transmission.

3) Remove the center bearing bracket from the frame. (If there is any center bearing bracket)

4) Remove the drive shaft connecting the drive axles in series from the drive axle flanges.

3. Parking brake release

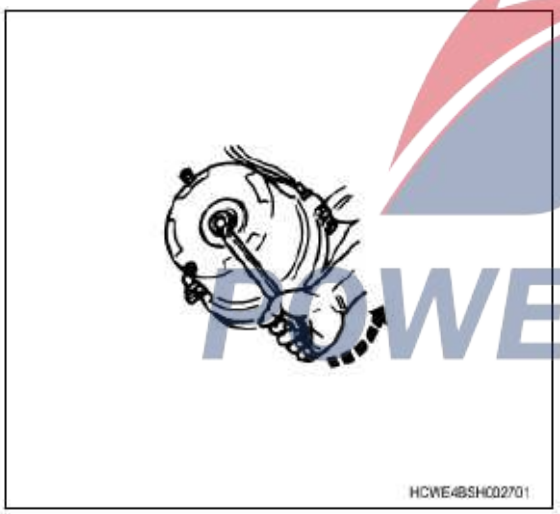
1) Loosen the parking brake.

2) Rotate the machine release bolt leftward until the distance between the edge of the brake chamber and the top of the machine release bolt is up to the specified value.

Caution:

・Do not use any tightening wrench.

Standard: 70mm{2.76in}



4. Air pipe disconnected

1. Model with differential lock

1) Disconnect the air pipe of the rear axle.

5. Removal of brake nylon tube

1) Disconnect the brake nylon hose of the connector.

6. Disconnection of wheel speed sensor

1) Disconnect the harness connector of the wheel speed sensor.

7. Removal of damper

1. Model with damper

1) Disconnect the damper connected to the lower bracket.

Note:

・Remove the following components.

・Split pin

・nut

・Cleaner

・Rubber liner

2) Remove the damper from the damper bracket.

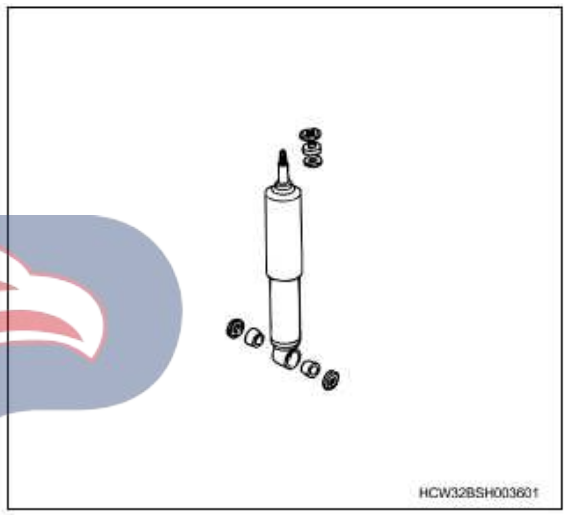
Note:

・Remove the following components.

・nut

・Cleaner

・Rubber liner

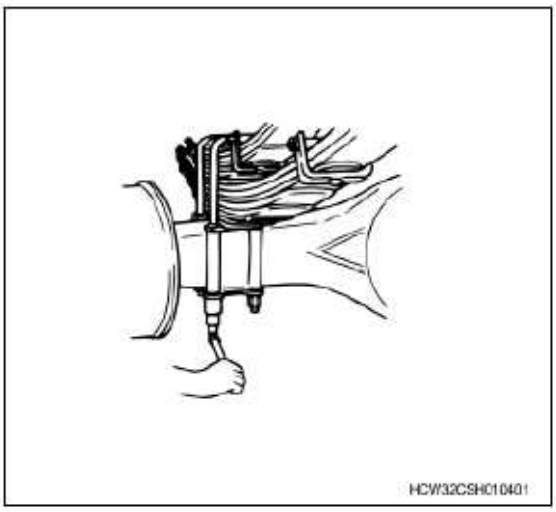


8. Removal of rear axle

1. Rear leaf spring suspension model

1) Use the jack to support the rear axle housing.

2) Remove the U-bolts and nuts of the leaf spring from the rear axle.



3) Remove the rear axle from the vehicle.

Note:

・Pull out the rear axle backwards.

Note:

・In order to keep the rear axle from dropping, be careful during operation.

2. Rear trunnion suspension model

1) Use the jack to support the rear axle housing.

2) Disconnect the torsion bar connected to the rear axle.

3) Remove the rear axle from the vehicle.

Note:

・The rear axle toward the front side is pulled to the front side, and the rear axle toward the rear side is pulled to the rear side.

Caution:

・In order to keep the rear axle from dropping, be careful during operation.

Removal

1. Differential gear oil discharge

1. Rear differential gear (single)

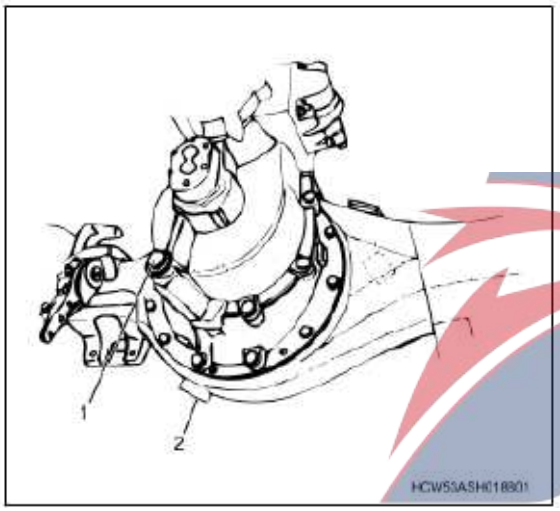
1) Remove the oil filling port plug from the rear axle housing.

2) Remove the oil drain plug from the rear axle housing and let the differential gear oil flow out of the oil drain screw plug port.

2. Tandem main reducer（17.5HT）

1) Remove the oil drain plug from the axle housing and let the differential gear oil flow from the axle housing.

2) Remove the coarse filter plug and the differential gear oil from the transfer case housing.

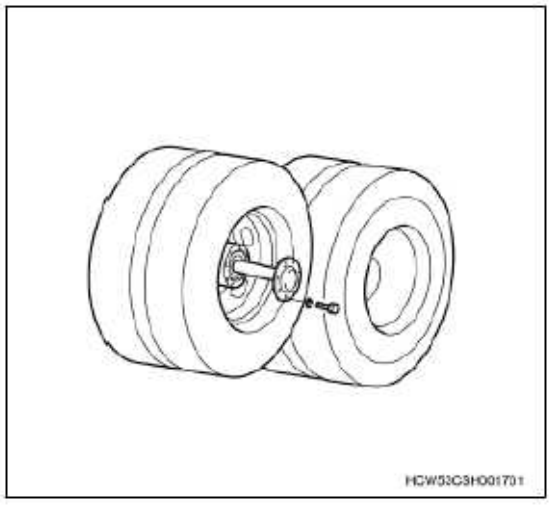


1. Drain oil plug
2. Coarse filter plug

---

2. Rear axle drive shaft removal

1) Remove the axle shaft on the rear hub's reel.



3. Brake drum removal

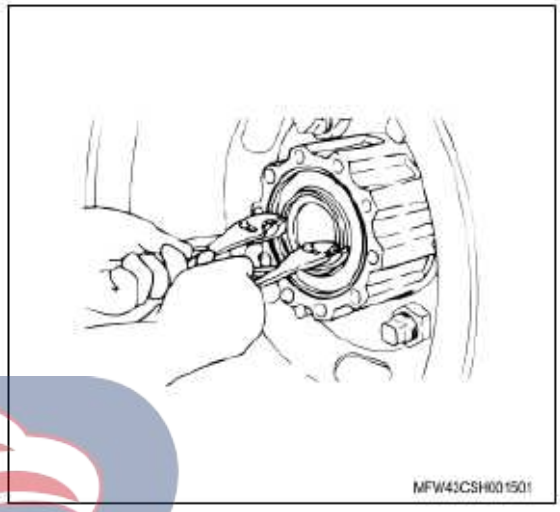
1) Use the vice to remove the hub outer oil seal from the rear wheel hub.

Note:

・During the removal, clamp the middle rib.

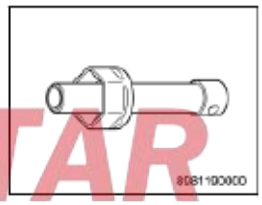
Caution:

・Be careful. Do not damage the oil seal when it is removed.

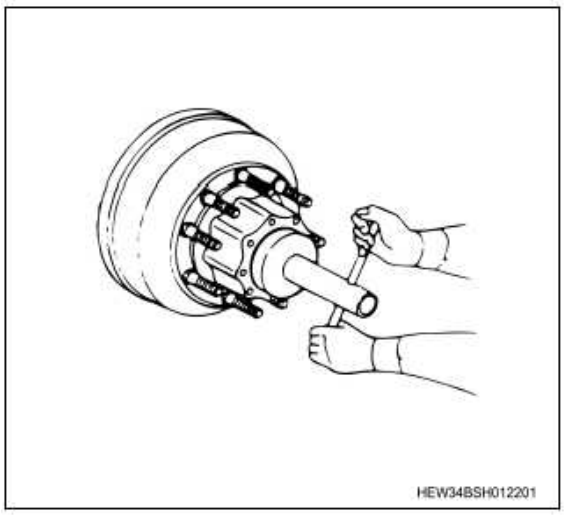


2) Remove the lock washer from the rear wheel hub.

3) Remove the wheel hub nut from the rear axle using a special tool.



SST:8-9811-0002-0-wheel hub nut wrench



4) Remove the washer from the rear wheel hub.

5) Remove the inner cup of the wheel hub outer bearing from the rear wheel hub.

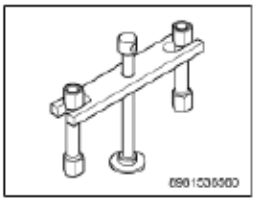
6) Remove the brake drum from the rear axle using a special tool.

Caution:

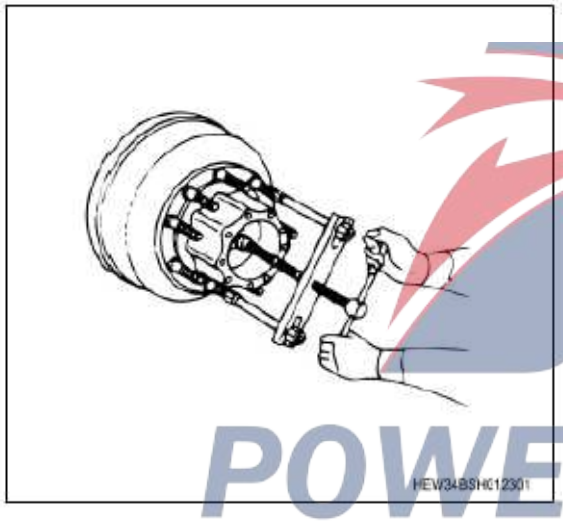
・Be careful to prevent any heavy part from inflicting any injury.

・When the rear wheel hub is removed, do not allow the brake or the parking brake to engage.

・Prevent any impurity or dirt from entering the rear hub or bearing.



SST:8-9815-3656-0-wheel hub puller



4. Wheel hub bearing removal

1) Use a vice to remove the snap ring from the rear wheel hub.

2) Remove the inside oil seal from the rear wheel hub.

3) Remove the inner cup of the inside bearing from the rear wheel hub.

4) Remove the outer cup of the inside bearing from the rear wheel hub using a brass bar.

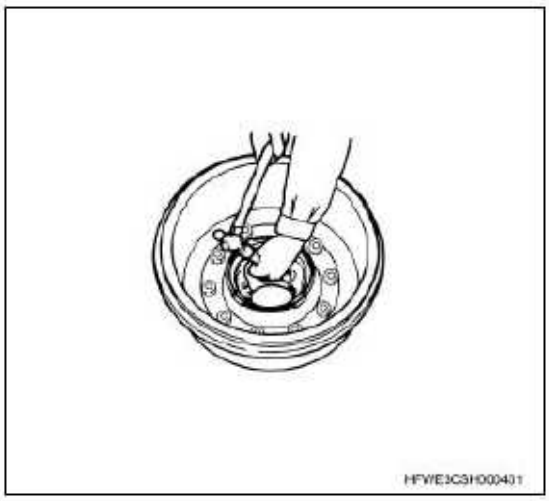
Note:

・Use the two carved grooves of the inner rear hub for flattening.

5) Remove the outer cup of the outer bearing from the rear wheel hub using a brass bar.

Note:

・Use the two carved grooves of the inner rear hub for flattening.



5. Rear wheel hub removal

1. A class

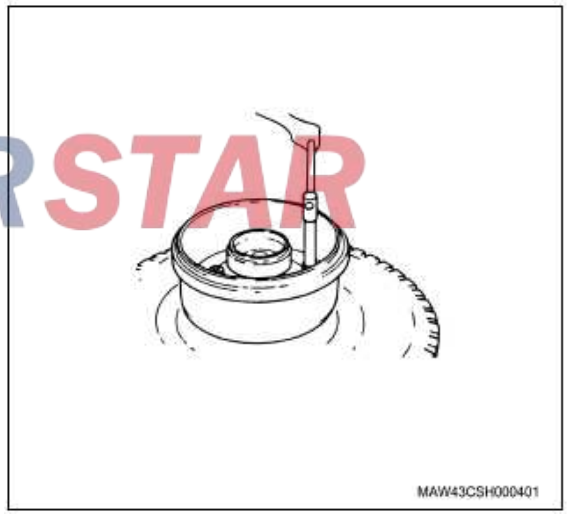
1) Remove the wheel pins from the brake drums.

Caution:

・Because each nut has three fixing points, a tool must be used when it is loosened.

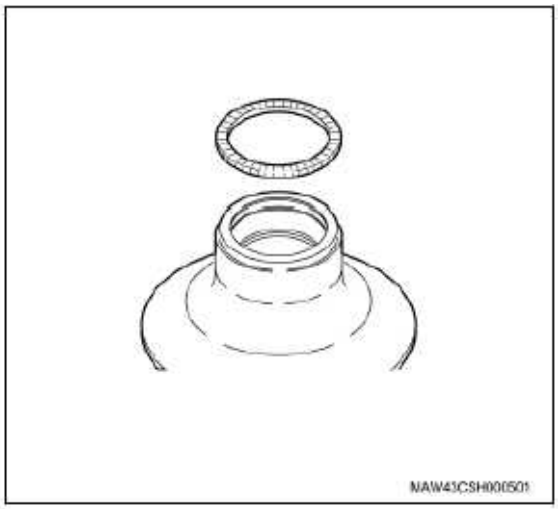
・Do not reuse the wheel pins, nuts, or wheel nuts.

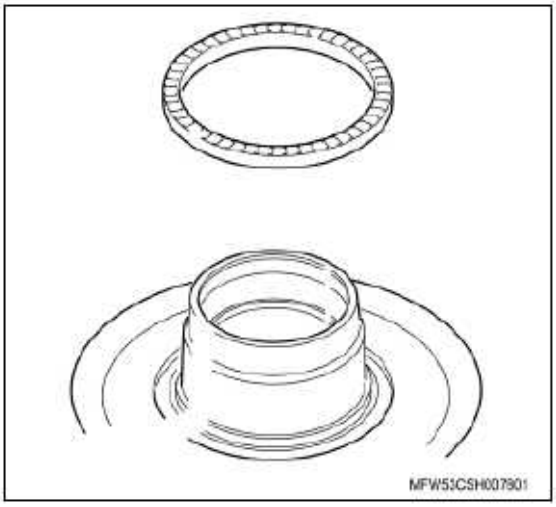
・During operation, be cautious and do not damage the inside of the brake drum.



2) Remove the rear wheel hub from the brake drum.

3) If necessary, remove the excitation ring from the rear wheel hub using a screwdriver or some other tool.





2. B class

1) Remove the wheel pins from the brake drums.

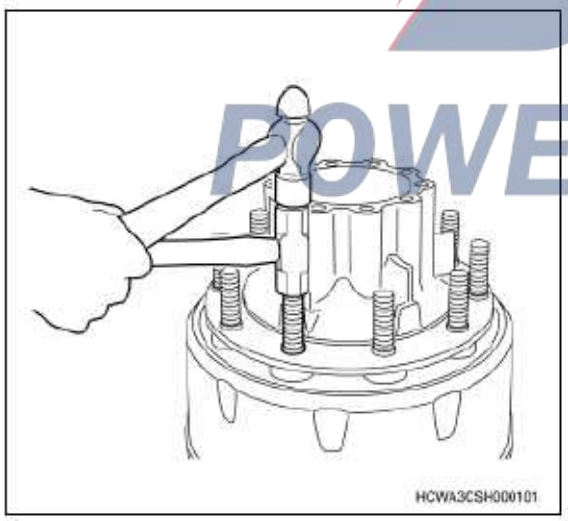
Note:

・Make the brake drum face downward, put a brass hammer on the top end of the wheel pin, and move it out vertically.

Caution:

・Do not use any hammer to hit the rear hub.

・Vertically insert it toward the wheel pin to prevent the wheel pin from being bent.



Caution:

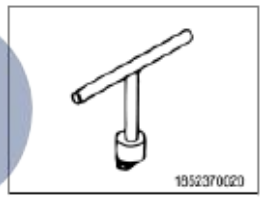
・After the wheel pin is removed, do not reuse the wheel pin and nut.

2) Remove the rear wheel hub from the brake drum.

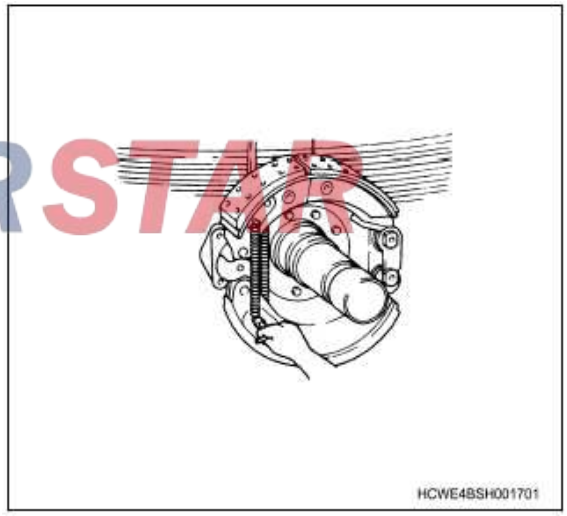
3) If necessary, remove the excitation ring from the rear wheel hub using a screwdriver or some other tool.

6. Brake shoe removal

1) Use a special tool to remove the external return spring from the brake shoe.



SST:1-8523-7002-0-return spring removal tool

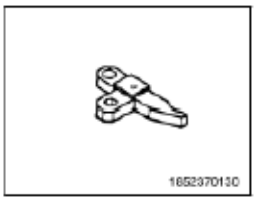


2) Use a special tool to remove the internal return spring from the brake shoe.

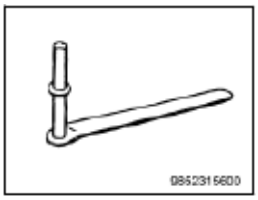
Note:

・Hook the special tool arm against the end of the internal return spring and attach the arm to the handle.

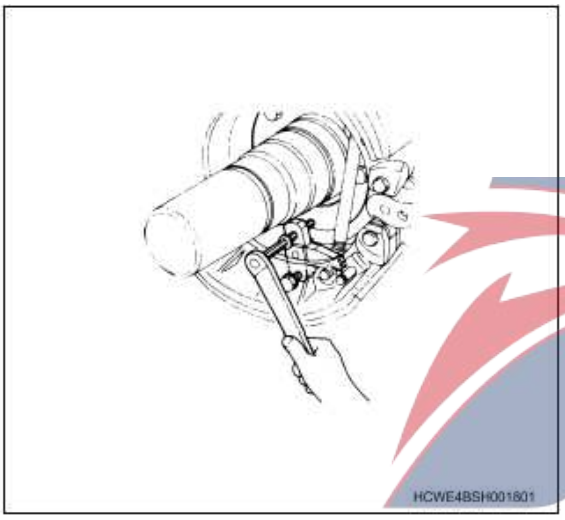
• Turn the handle to stretch the internal return spring and remove it from the brake shoe.



SST:1-8523-7013-0-return spring change tool



SST:9-8523-1560-0-handle



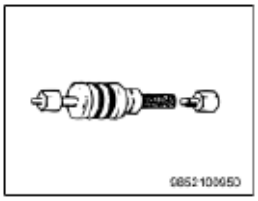
3) Remove the E-ring from the pin.

4) Remove the pin from the brake shoe.

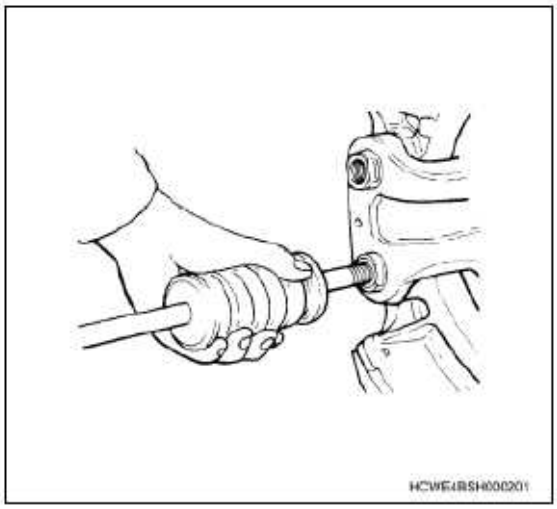
5) Remove the lock washer and lock plate from the anchor pin bracket.

6) Remove the dust cover from the anchor bracket;

7) Remove the anchor pin and the brake shoe from the front anchor pin bracket using a special tool.



SST:9-8521-0095-0-pin removal tool



8) Remove the snap ring from the brake shoe.

9) Remove the roller and pin from the brake shoe.

7. Brake drum removal

1) Disconnect the air hose of the brake chamber.

2) Remove the pin from the brake chamber and gap adjuster.

3) Remove the brake chamber from the bracket.

8. Gap adjuster removal

1) Remove the snap ring from the camshaft.

2) Remove the spacer from the camshaft.

3) Remove the gap adjuster from the camshaft.

9. Camshaft Removal

1) Remove the snap ring from the camshaft.

2) Remove the bushing gasket from the camshaft.

3) Remove camshaft bracket from rear anchor pin bracket.

4) Remove the bushing bracket from the rear anchor pin bracket.

5) Remove the clamp from the camshaft.

6) Remove the felt washer and felt ring from the camshaft;

7) Remove the camshaft from the rear anchor bracket;

8) Remove the spacer ring and oil seal from the camshaft;

10. Remove the rear anchor pin bracket

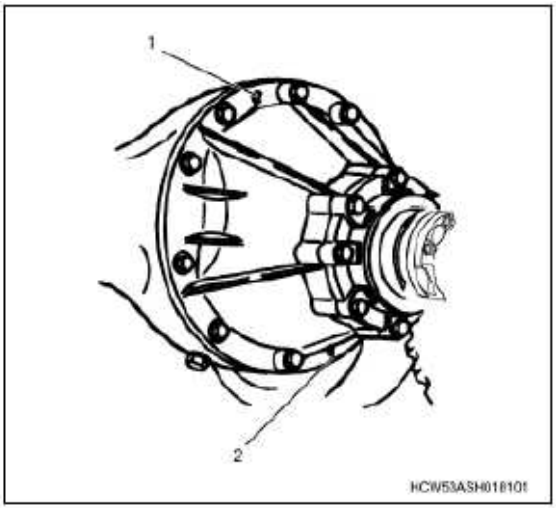
1) Remove the rear locating pin bracket from the rear axle.

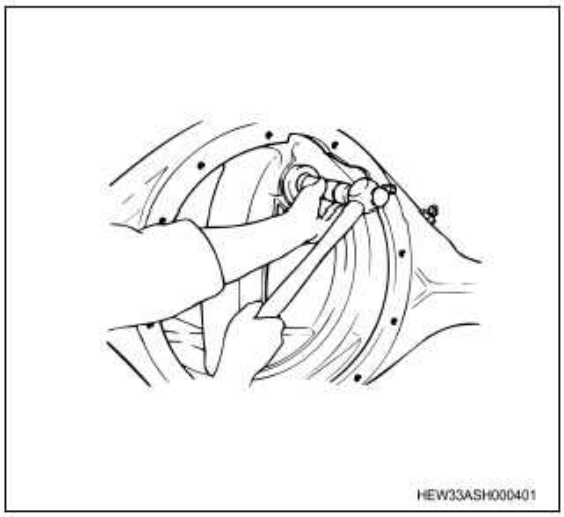
11. Main reducer removal

1. Rear differential (single) model

1) Remove the bolts on the differential gear seat rack.

2) Install the bolt into the bolt change hole in the differential gear seat rack and pull out the main reducer out of the rear axle housing.





1. Bolt change hole
2. Bolt change hole

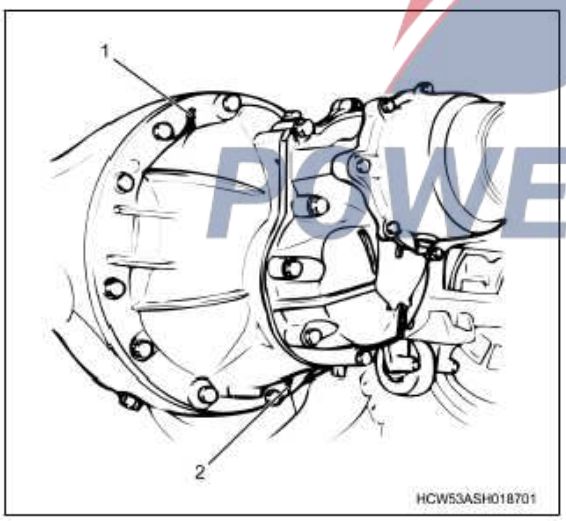
---

2. Rear differential (single) model

1) Remove the bolts on the differential gear seat rack.

2) Install the bolt into the bolt change hole in the differential gear seat rack and pull out the main reducer out of the rear axle housing.

Series-type main reducer(17.5HT)



1. Bolt change hole
2. Bolt change hole

---

3) Remove the outer cup of the front output shaft bearing from the drive axle housing.

Inspection

1. Inspection of rear axle

Defective parts found during inspection should be adjusted, repaired or replaced. Must be clean the dirty or rusty parts .

1) Check the following items of the axle housing.

・Crack

・Damaged

・Bent

Note:

・Check for cracks by dye penetration and magnetic detection method.

2) Check if the threaded part of the bearing nut is damaged.

Note:

・Repair minor damage.

3) Check if the bearing and seal joint section are worn.

4) Align the simple ruler with the flange and inspect it at multiple locations between flange and ruler.

Note:

・By grinding, the flange surface any small deformation to be repaired.

·In case of severe deformation, replace the axle housing.

Reassembly

1. Main reducer installation

1) Clean the bolts and axle housing.

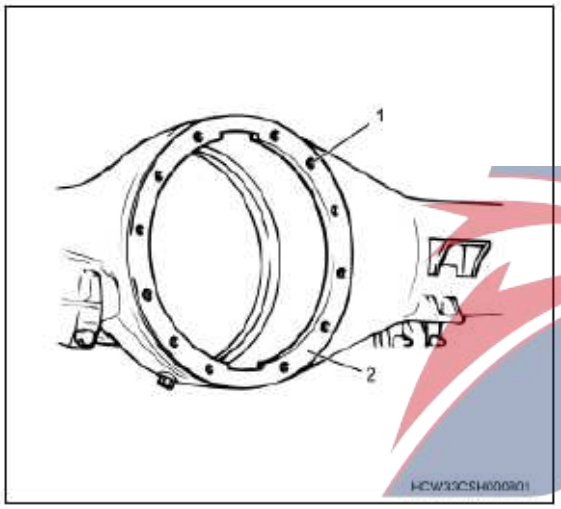
Note:

・Remove the residual Loctite binder on the bolts to be reused and their holes.

・If necessary, clean the bolts with dies and the bolt holes with taps.

2) Smear Loctite 242 or any composite equivalent on the thread of the bolt.

3) Smear FMD127 or any equivalent on the axle housing's transmission rack mounting surface.



1. Bolt hole
2. Differential gear seat installation surface

4) Install the main reducer on the axle housing.

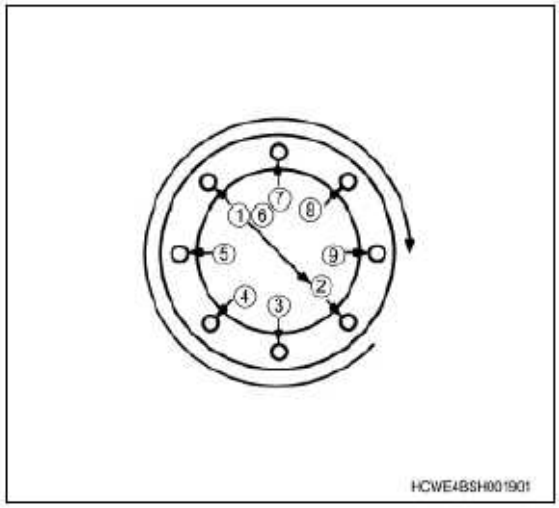
Tightening torque: 219N・m{22.3kgf・m/162.00lb・ft}

2. Rear anchor pin bracket installation

1) Refer to the chart below to attach the rear anchor bracket to the rear axle。

Tightening torque: 127N・m{13.0kgf・m/42.64kg・ft}

Tightening torque: 157N・m{16.0kgf・m/116.01lb・ft}

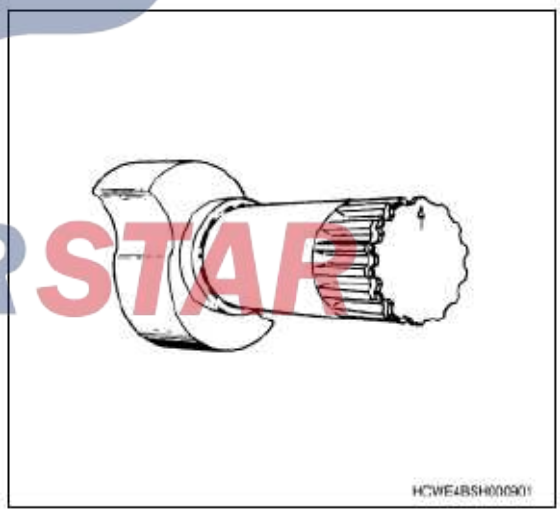


3. Camshaft Installation

1) Install the oil seal and spacer ring onto the camshaft.

2) Grease the camshaft and bushing.

3) Make the arrow on the camshaft end toward the front of the vehicle and install the camshaft on the front locating pin support.



4) Install the camshaft to the rear anchor pin bracket.

5) Mount the felt washer and felt ring to the camshaft.

6) Install the clamp onto the camshaft;

7) Install the camshaft bracket onto the rear anchor bracket;

8) Fit the bushing bracket onto the rear anchor bracket;

9) Fit the bushing bracket onto the camshaft;

10) Install the washer on the camshaft.

4. Gap adjuster installation

1) Install the gap adjuster on the camshaft.

Caution:

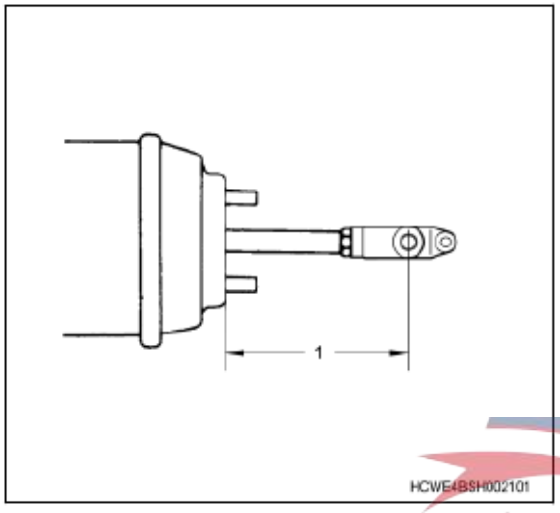
・Do not rotate the worm shaft or camshaft.

2) Install the gasket and snap ring on the camshaft.

5. Brake chamber installation

1) Adjust the length of the brake chamber's push rod.

Standard: 11.34in{11.34in}



1. Rod length

2) Install the brake chamber on the bracket.

3) Install the pin on the brake chamber and gap adjuster.

4) Connect the air hose to the brake chamber.

6. Brake shoe installation

1) Install the roller and pin on the brake shoe.

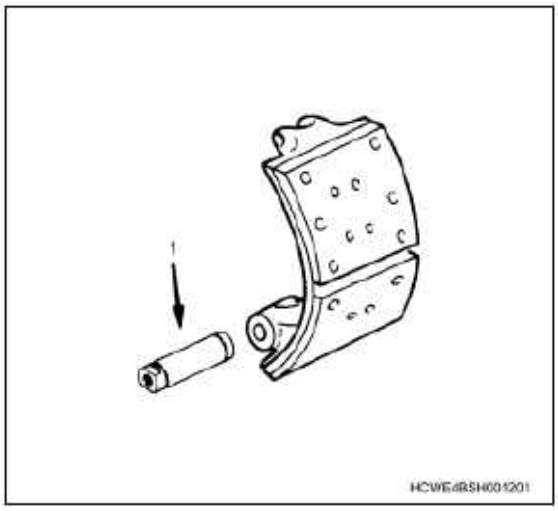
2) Install the snap ring on the brake shoe.

3) Smear grease on the anchor pin and brake shoe lining.

4) Install the brake shoe and anchor pin on the rear anchor pin bracket.

Caution:

・Do not confuse the leading shoe with the trailing shoe.

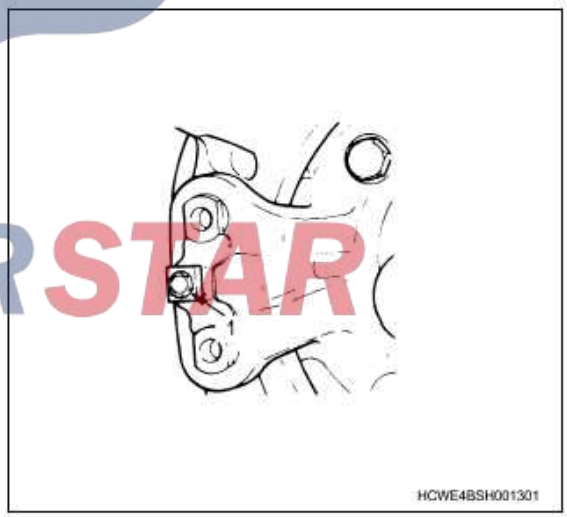


1. Grease application

5) Install the dust cover on the rear anchor pin bracket.

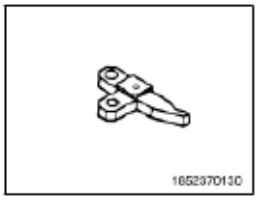
6) Install the lock sheet and lock washer onto the rear anchor bracket;

7) Rivet-fix the lock washer.

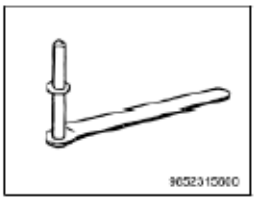


1. Calibration position

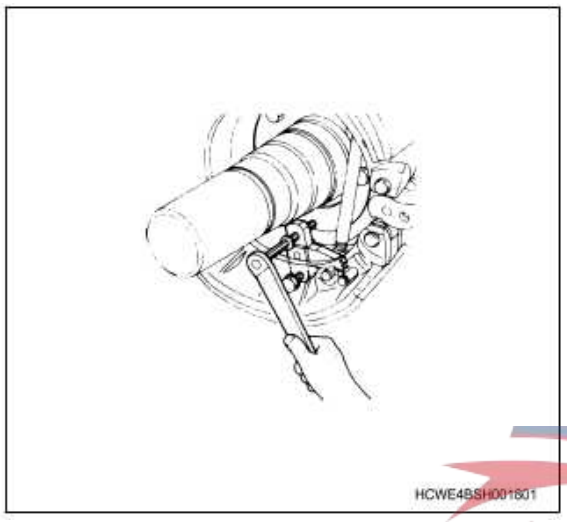
8) Fit the internal return spring onto the brake shoe by special tool;



SST:1-8523-7013-0-return spring change tool

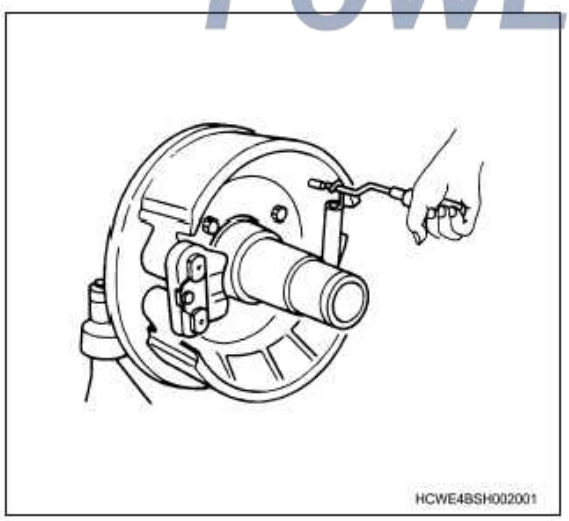


SST:9-8523-1560-0-handle



9) Fit the external return spring onto the brake shoe by special tool;

SST:9-8522-1231-0-return spring fixing tool



7. Rear wheel hub installation

1. A class

1) Smear engine oil on the thread of the wheel pin.

2) Install the brake drum cap on the rear wheel hub.

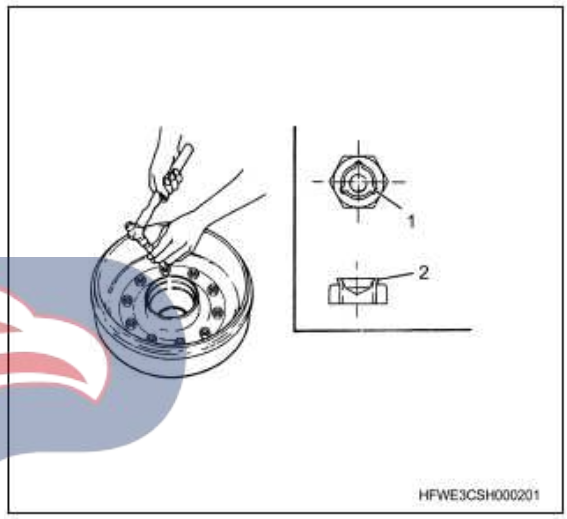
Caution:

・Knock the wheel pins and nuts into three places.

Tightening torque: 397N・m{40.5kgf・m/292.99lb・ft}

Caution:

・Do not reuse the wheel pins, nuts, or wheel nuts.



1.6.5-7.0mm (0.256–0.276 inch)

2. Knock into three positions.

3) If the excitation ring has been removed, install it on the rear wheel hub.

Caution:

・Do not reuse the excitation ring.

・Knock it slightly until it is tightened.

Note:

・Evenly hit the excitation ring using a cushion block to prevent it from being deformed.

2. B class

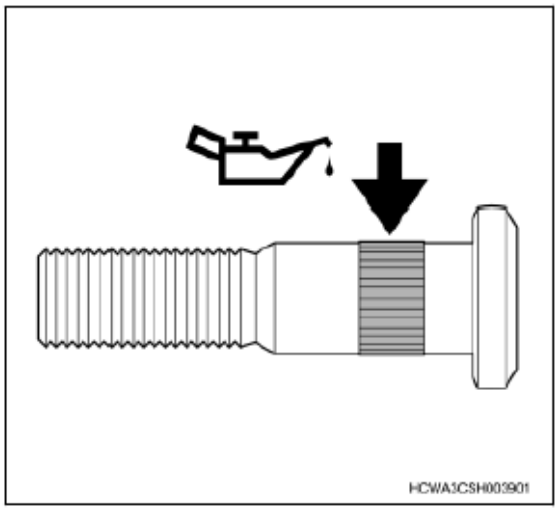
1) Clean the wheel pin and the hole in the surface of the base.

2) Install the rear wheel hub on the brake drum.

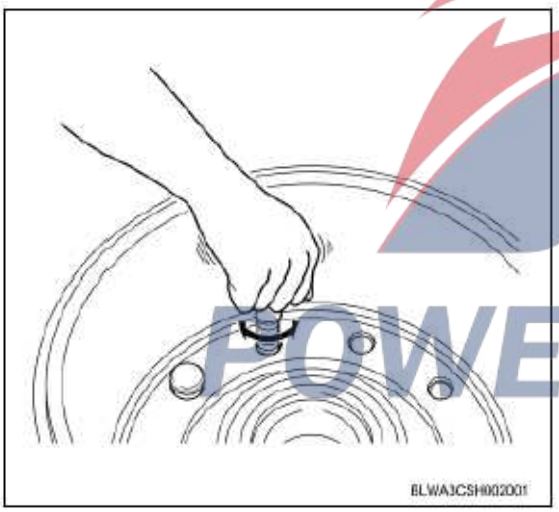
3) Smear engine oil on the nodal part of the wheel pin.

Caution:

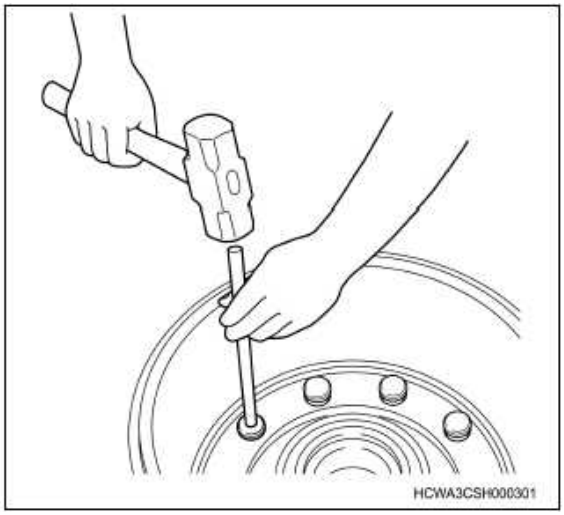
・Do not reuse the wheel pins and nuts.



4) Align the nodal tooth of the wheel pin with its corresponding position, align the nodal tooth of the wheel pin on the rear wheel hub with its corresponding position, and finally insert the wheel pin into the brake drum.



5) Hit the wheel pin slightly into the rear wheel hub using a brass bar and a hammer.: 3-5mm (0.11811-0.19685in) tapping



6) Insert the nut into the wheel pin and install the wheel nut.

Note:

・ Nut specification example: M30, 15mm high(0.5906in)

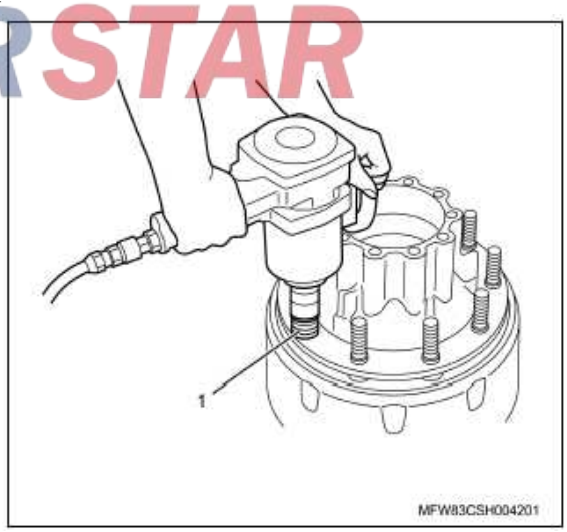
7) Smear engine oil on the thread of the wheel nut and in the gap between the nut and washer.

8) Remove the wheel pin from the rear wheel hub using a wheel nut.

Tightening torque: 304Nm (31.0kgf.m/224lb.ft) or so

Caution:

・ Slightly pull out the piston using an impact wrench, etc. Pay attention to its rotation speed.



1. Nut

9) Confirm using a gap gauge that the wheel pin end is against the inside of the brake drum.

10) If the excitation ring has been removed, install it on the rear wheel hub.

Note:

・Evenly hit the excitation ring using a cushion block to prevent it from being deformed.

Caution:

・Do not reuse the excitation ring.

・Knock it slightly until it is tightened.

8. Wheel hub bearing installation

1) Inject the multifunctional grease into the hub bearing.

Note:

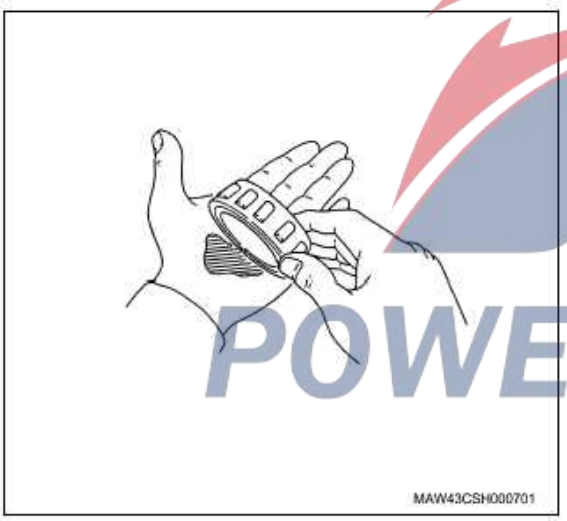
・Smear the multifunctional grease on the inner cup of the outer bearing, the roller spacings, and the inner cup of the inner bearing.

Amount of injected grease

Inside bearing	: About 135g (about 4.80oz)
Outside bearing	: About120g{ about 4.2oz}

Caution:

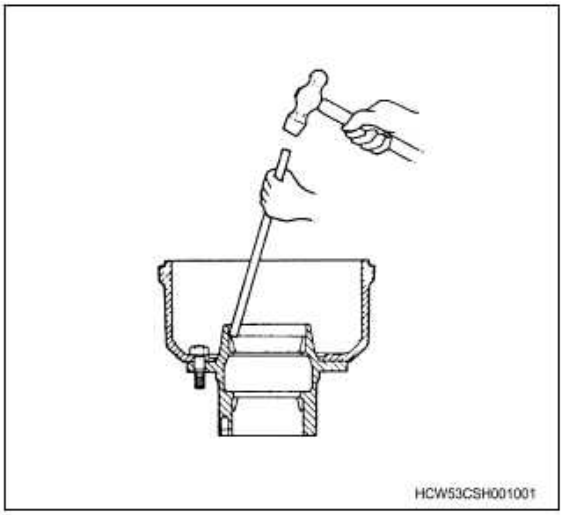
・Smear oil evenly and thoroughly.



2) Install the outer cups of the outside and inside bearings on the brake drum using a brass bar.

Caution:

・Knock it slightly until it is tightened.



3) Install the inner cup of the inside bearing on the rear wheel hub.

4) Install the inside oil seal on the rear wheel hub using the brass bar.

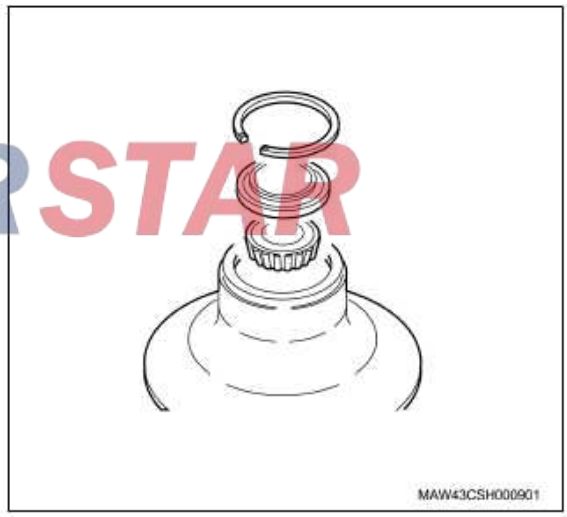
Caution:

・Do not reuse the oil seals.

5) Install the snap ring on the rear wheel hub.

Caution:

・Safely injected into the groove.



9. Brake drum installation

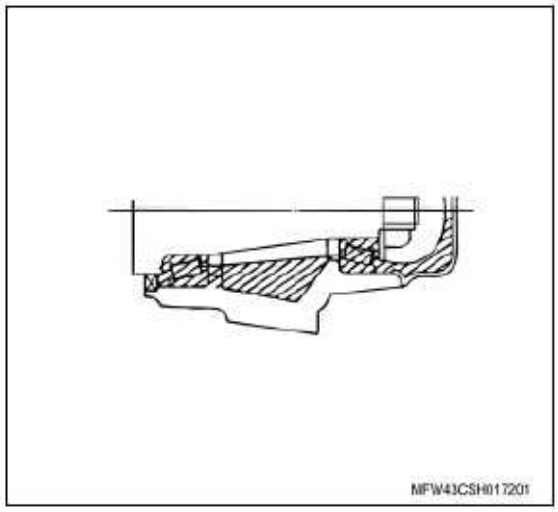
1) Fill the grease chamber of the rear wheel hub with BESCO L-2 grease.

Note:

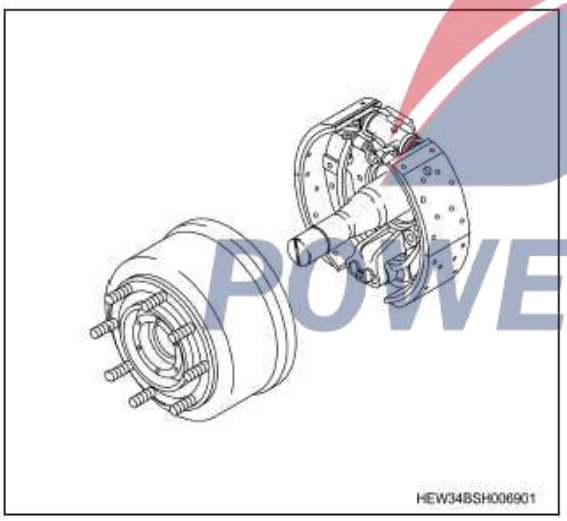
・BESCO L-3 grease or any equivalent may also be used.

Caution:

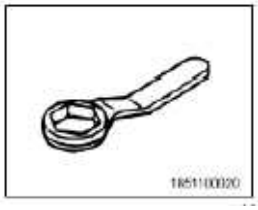
・Always inject new grease.



2) Install the brake drum on the rear axle.
Caution:
・Be careful to prevent any heavy part from inflicting any injury.
・Check whether there is any grease on the internal drum surface or lining.
・Be careful to prevent any impurity or dirt from sticking on the rear wheel hub or the rear bearing.



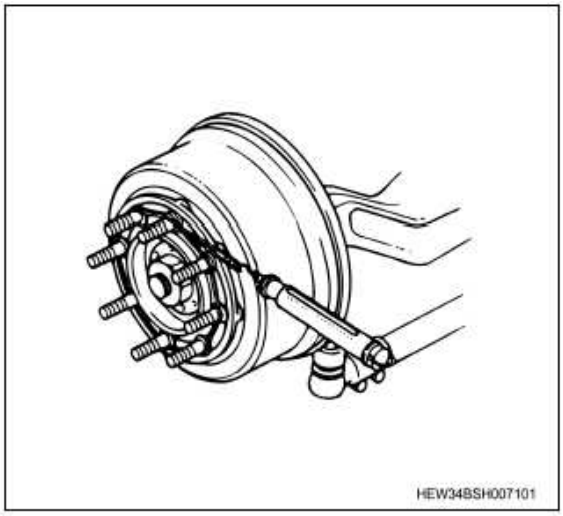
3) Install the washer on the rear wheel hub.
4) Install the wheel hub nut from the rear axle using a special tool.



SST:1-8511-0002-0-wheel hub nut wrench

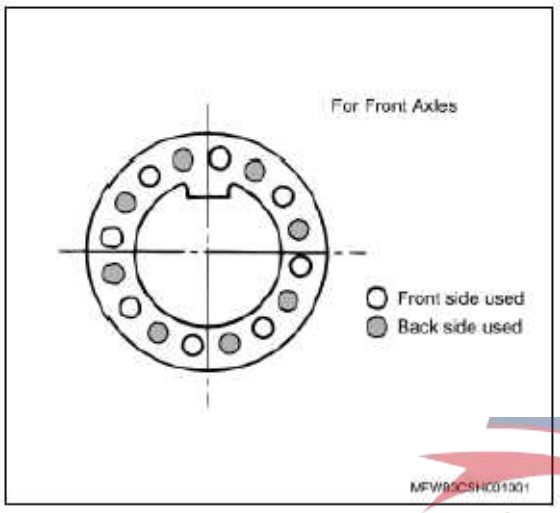
5) Rotate the brake drum leftward and rightward to tighten the wheel hub bearing.
6) Continuously rotate the brake drum, and tighten the wheel hub nut until the brake drum stops.
Caution:
・Continuously rotate the brake drum during the tightening.
・Do not any pneumatic tool.
7) Loosen the wheel hub nuts and check whether the brake drum rotates smoothly.
Caution:
・If the brake drum does not rotate, pull back the brake drum and use a special tool to do the above procedure again.
・Loosen the hub nuts completely.
8) Pass one wire through the vehicle pin and hook the spring balance to the spring.
9) Pull the spring balance in the tangential direction and adjust the pre-applied load on the outside bearing.
Note:
・Make adjustment through tightening the hub nuts.
Caution:
・If the pre-load is not stable, rotate the brake drum multiple times. When the brake drum stops completely, make a remeasurement.
・If it is not still firm, rotate the brake drum leftward and rightward and do the hub bearing stabilization procedure.
Hub bearing preload

If new	: 25-59N{2.5 - 6.0kg/5.6-13.3lb}
After reuse	: 25-59N{2.5 - 6.0kg/5.6-13.3lb}

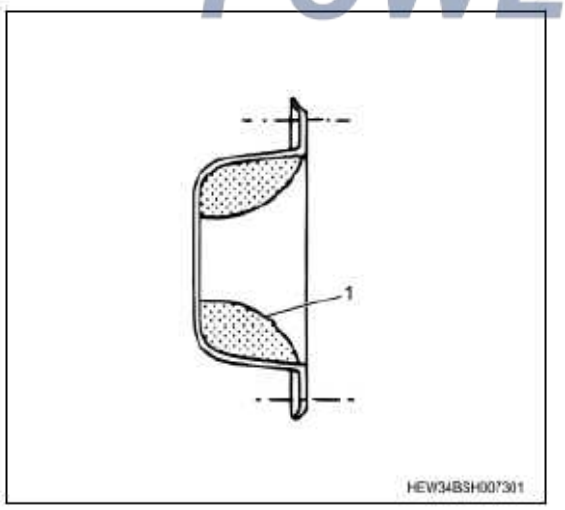


10) Install the lock washer onto the wheel hub nut.
Note:
・If the bolt hole of the lock washer is not aligned with the hub nut, rotate the lock washer for installation.

・If there is still no match after overturn and installation, rotate the hub nut in the tightening direction for bolt hole match.
・If the lock washer is upside down, the hole would match with it.
Angle: 11°15′



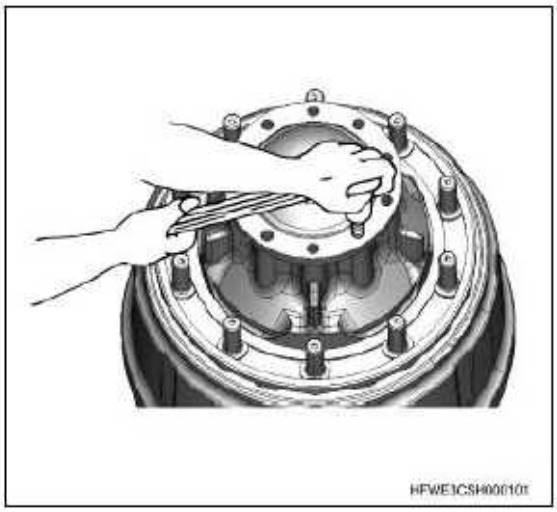
Tightening torque: 9N・m{1kgf・m/80.01lb・in}
11) Install the washer on the rear wheel hub.
12) Fill the hub cover with BESCO L-2 grease.
Note:
・BESCO L-3 grease or any equivalent may also be used.
Caution:
・Always inject new grease.



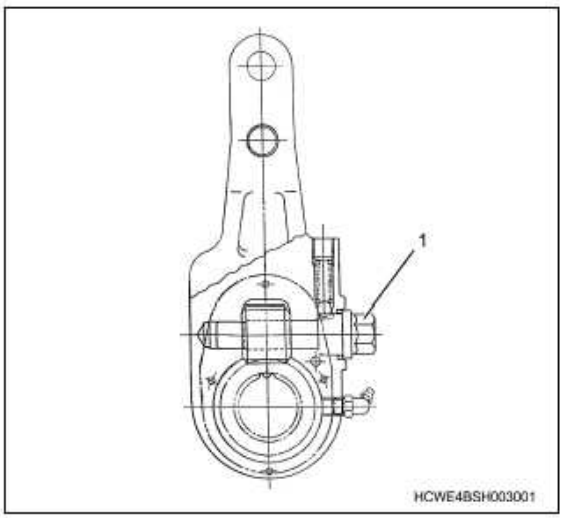
1. Grease

13) Install the wheel hub cap on the rear wheel hub.
Tightening torque: 23N・m{2.3kgf・m/17.00lb・ft}
10. Rear axle drive shaft installation

1) Install the rear axle on the reel of the rear hub.
Tightening torque: 181N・m{18.5kgf・m/133.00lb・ft}



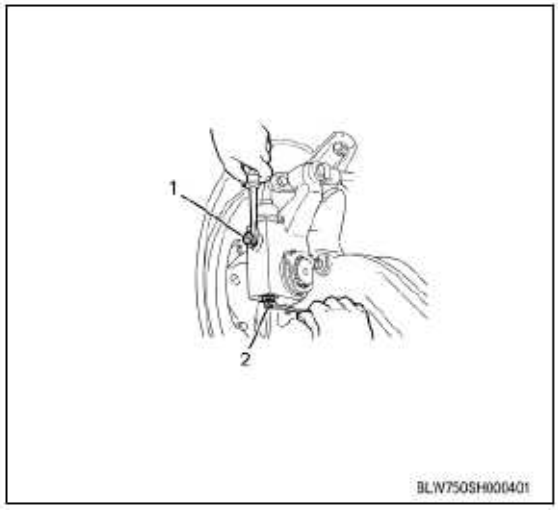
11. Brake lining check
1. Brake lining gap check
1) Remove the inspection hole protection ring from the dust cover.
2) Measure the brake lining gap using a gap gauge.
Standard: 0.01in{0.01in}
Caution:
・If the measurement result is beyond the specified range, adjust the brake lining gap.
2. Brake lining gap adjustment (specifications of manual gap regulator)
1) Rotate the worm shaft to adjust the brake lining.



1. Worm shaft

3. Brake lining gap adjustment (specifications of automatic gap regulator)

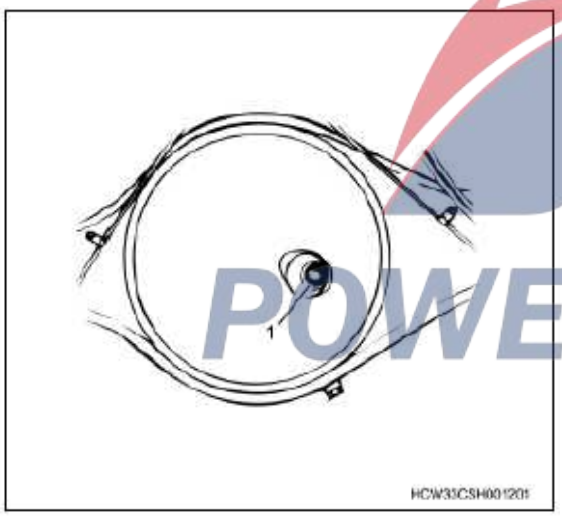
1) Use a slot-headed screwdriver to pull up the rod.
2) Rotate the worm shaft to adjust the brake lining.



1. Rod
2. Worm shaft

---

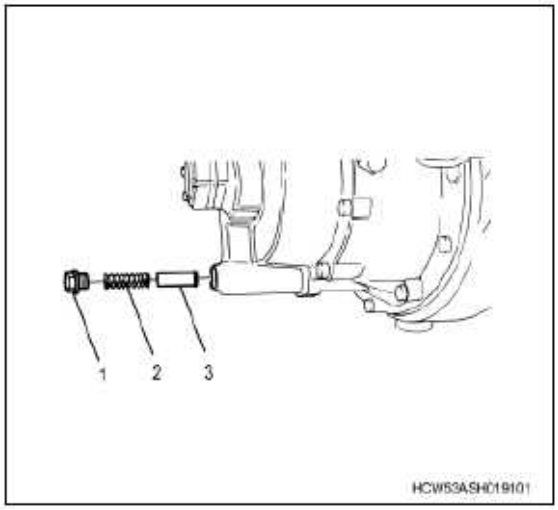
12. Differential gear oil filling



1. Rear differential gear (single)

---

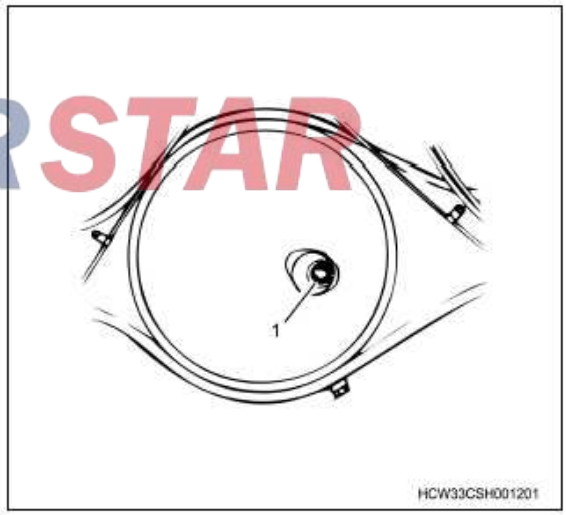
1) Install the oil drain plug on the rear axle housing.
2) Smear the differential gear oil on the rear axle housing.
1. Injection port plug hole
3) Install the injection port plug on the rear axle housing.
Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}
2. Rear differential（17.5HT）
1) Install the oil drain plug on the axle housing.
Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}
2) Check whether the coarse filter plug has been installed.
Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}



1. Coarse filter plug
2. Spring
3. Oil coarse filter

---

3) Smear differential gear oil on the axle housing.
Note:
・Adjust the oil level at the oil filling port.



1. Injection port plug hole

---

4) Install the injection port plug on the axle housing.
Tightening torque: 69N・m{7.0kgf・m/50.99lb・ft}
3. Reference oil amount
Main reducer (17.5J) (rear-placed rear axle)

Oil volume	Oil type

: About 12L (about 2.64 British gallons/about 3.17 American gallons)	GL-5(API)–90(SAE)
	GL-5(API)-140(SAE)
	GL-5(API)–80W-90(SAE)

Main reducer (18.5H)

Oil volume	Oil type
: About18L(about 3.96 American gallons/about 4.76 British gallons)	GL-5(API)–90(SAE)
	GL-5(API)-140(SAE)
	GL-5(API)–80W-90(SAE)

Series-type main reducer (17.5HT) (forward rear axle)

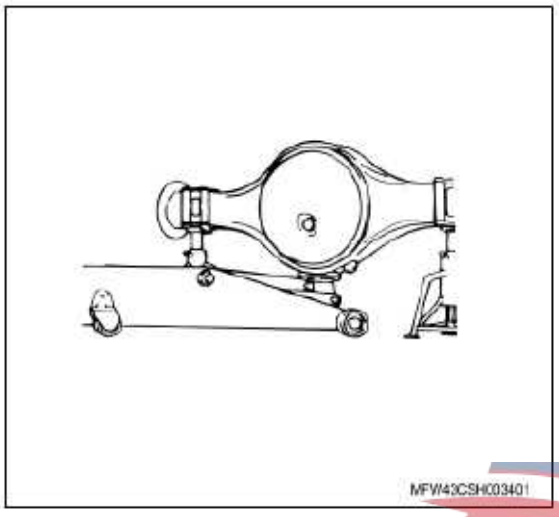
Oil volume	Oil type
: About18L(about 3.96 American gallons/about 4.76 British gallons)	GL-5(API)–90(SAE)
	GL-5(API)-140(SAE)
	GL-5(API)–80W-90(SAE)

Installation

1. Rear axle installation

1. Rear leaf spring suspension model

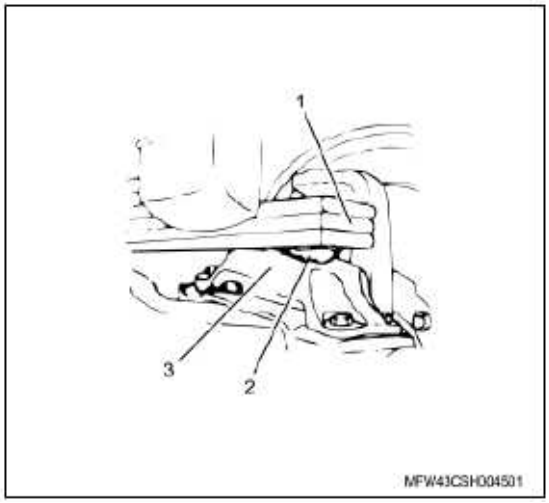
1) Use a garage jack to mount the rear axle to the leaf spring.



2) Apply molybdenum disulfide grease to the threaded part of the U-bolt.

3) Install the U-bolt on the leaf spring and rear axle.

Tightening torque: 588N・m{60.0kgf・m/196.86kg・ft}



1. Leaf spring
2. Grease
3. Spring pad

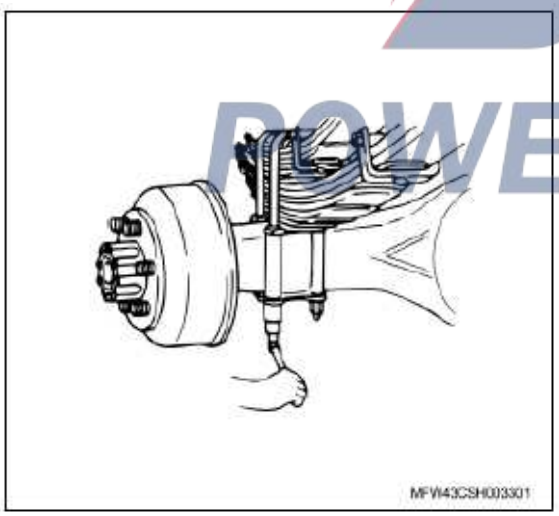
---

3) Temporarily tighten the torsion bar on the rear axle.

4) Fasten the torsion bar on the rear axle.

Tightening torque: 314N・m{32.0kgf・m/105.23kg・ft}

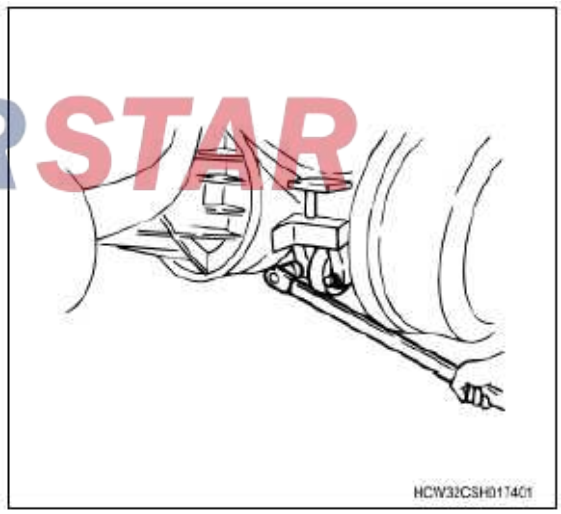
2. Damper installation



2. Rear trunnion suspension model

1) Apply Besco chassis grease to the spring plate of the axle housing.

2) Use a garage jack to mount the rear axle to the vehicle.



1. Model with damper

---

1) Mount the damper to the damper bracket.

Note:

・Install the following parts.

・Nut

・Cleaner

・Rubber liner

Tightening torque: 188N・m{19.2kgf・m/63.05kg・ft}

2) Connect the damper to the lower bracket.

Note:

・Install the following parts.

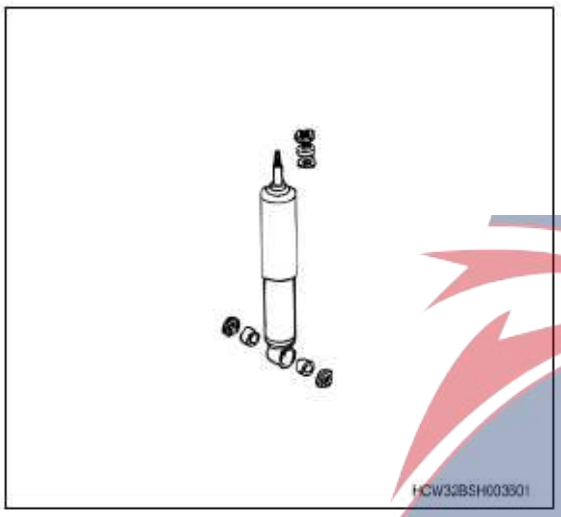
・Split pin

・Nut

・Cleaner

・Rubber liner

Tightening torque: 423N・m{43.1kgf・m/141.52kg・ft}



Caution:

・Do not reuse the split pin.

3. Air pipe connection

1. Model with differential lock

1) Connect the air hose to the rear axle.

4. Wheel speed sensor connected

1) Connect the harness connector to the wheel speed sensor.

5. Brake nylon hose connection

1) Connect the brake nylon tube to the connector.

6. Parking brake setting

1) Clockwise rotate and remove the machine release.

Caution:

・Do not use any tightening wrench.

Tightening torque: 25 - 45N・m{2.5 - 4.6kgf・m/18 - 33lb・ft}

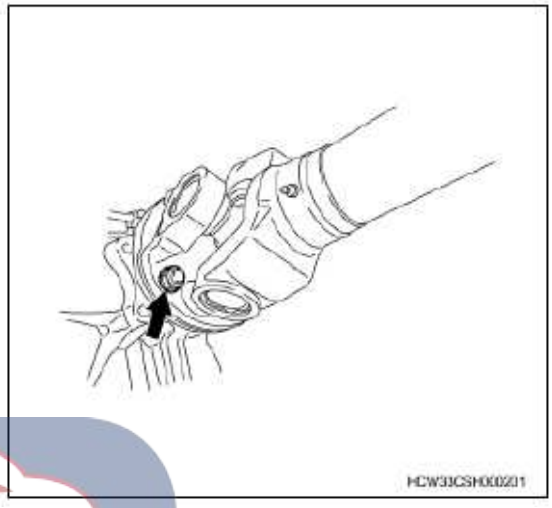
7. Drive shaft installation

1. Model with single rear differential gear

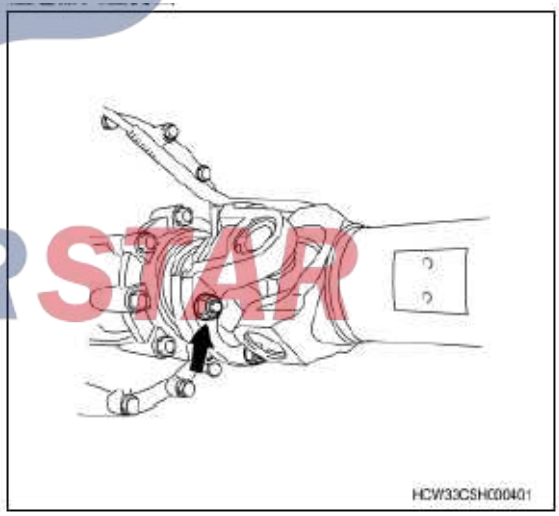
1) Align the calibration marks made during removal, and then, install the drive shaft between the transmission and the axle on the flanges.

Tightening torque: 206N・m{21.0kgf・m/152lb・ft}M14

Transmission side



Differential gear pedestal side

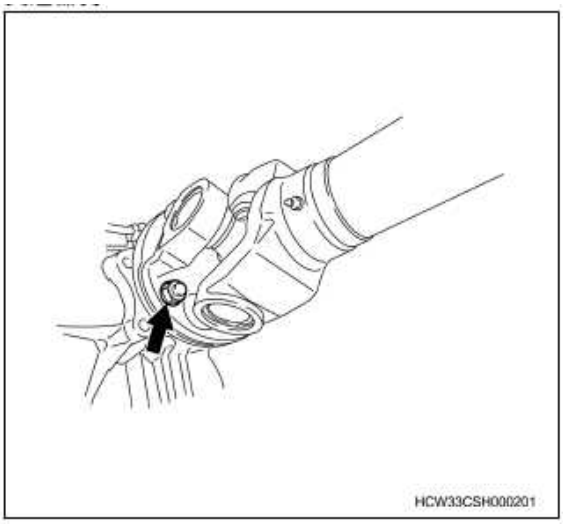


2. Tandem-type rear differential gear model

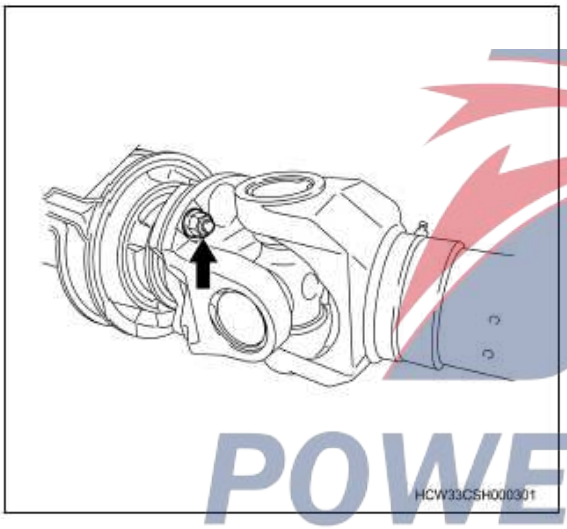
1) Align the calibration marks made during removal, and then, install the drive shaft between the transmission and the axle on the flanges.

Tightening torque: 206N・m{21.0kgf・m/152.01lb・ft}

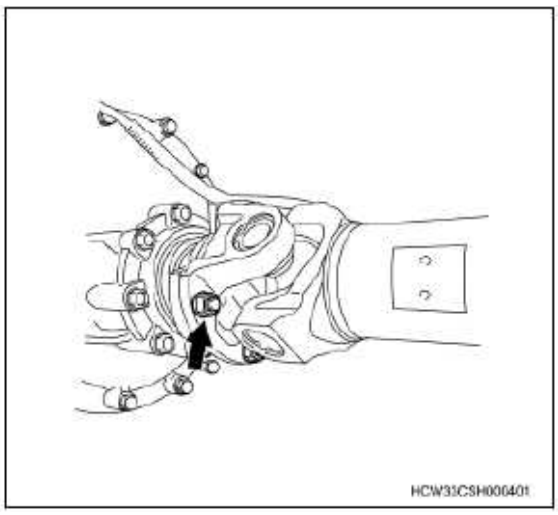
Transmission side



Side of center bearing (if any exposed)



Differential gear pedestal side

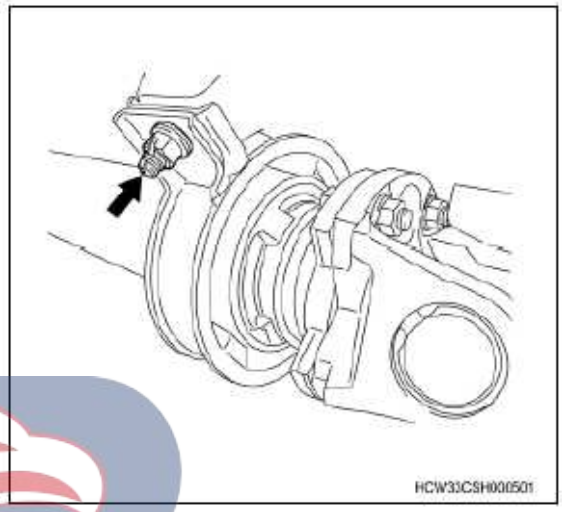


2) Install the center bearing bracket on the frame. (If there is any center bearing bracket)

Caution:

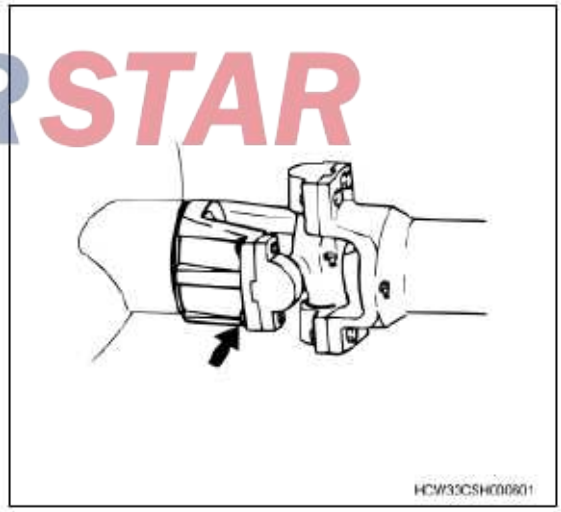
・Be careful to allow the liner on the center bearing to not be pulled to the front or rear of the vehicle.

Tightening torque: 187N・m{19.1kgf・m/138.01lb・ft}



3) Install the drive shaft between the wheel shafts in series onto the flanges.

Tightening torque: 103N・m{10.5kgf・m/76lb・ft}M12-1.25



8. Installation of disc wheel and tire

1. Precautions for disc wheel installation

Caution:

・If necessary, clean the following parts.

・Disc wheel mounting surface

・Wheel mounting surface of hub

・Conical cross section of nut

If the disc wheel is installed when it is not clean, the wheel nuts may be loose and thus the tire may come off.

Caution:

・Do not smear any MoS2 grease on any wheel pin or wheel nut.

The tightening force may be excessively great in relation to the tightening torque, thus causing the wheel pin to be damaged.

Caution:

・Before a commercial impact wrench is used, check its tightening torque.

The torque produced by the commercial socket wrench may be greater than the specified tightening torque value. If it is tightened using a torque greater than the specified value, the wheel pin may be damaged.

Caution:

・If a tightening wrench is used for tightening, be careful with the adjustment or tightening of the air pressure regulator. Do not tighten it excessively.

・Even if a tightening wrench is used for tightening, a tool like a torque wrench shall be used to tighten it to the specified torque at the end.

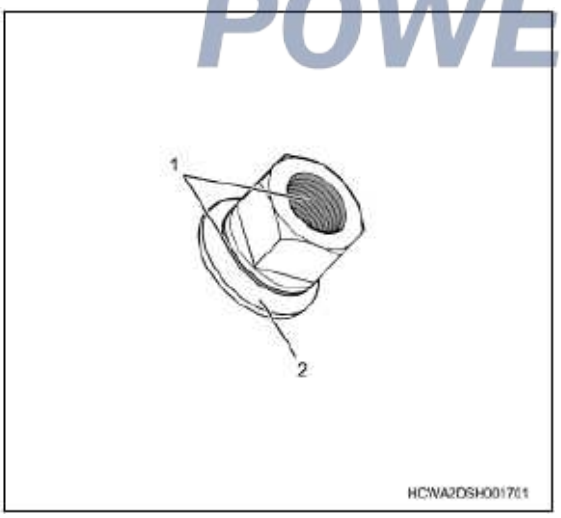
2. Disc wheel installation

1) Smear engine oil on the wheel nuts.

Note:

・Gear oil or power steering fluid can be used.

Wheel nut



1. Lubrication area

2.Cleaner

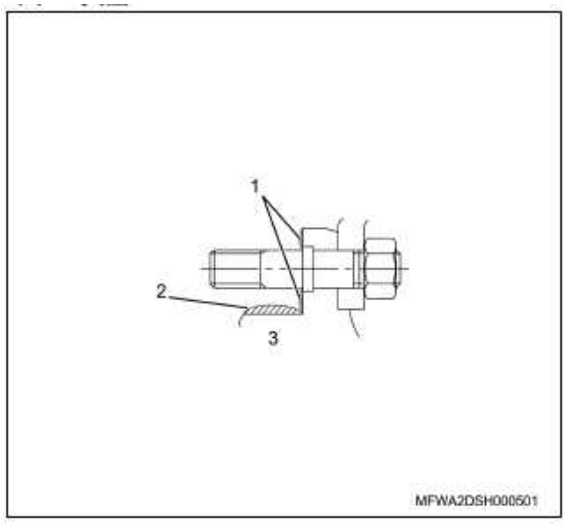
---

2) Smear engine oil on the wheel pin.

Note:

・Gear oil or chassis grease can be used.

Wheel pin class A

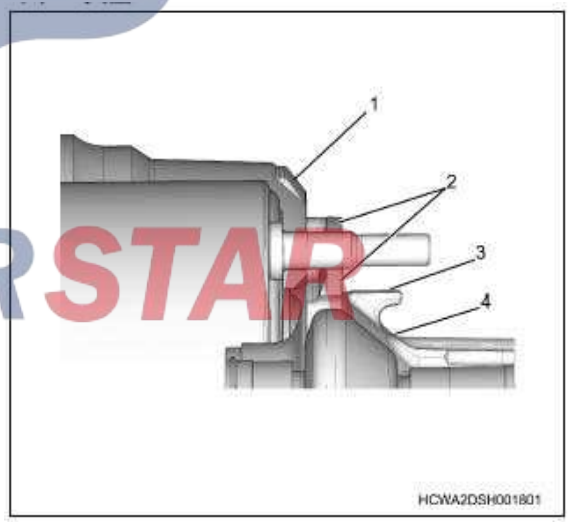


1. The contact surface of the disc wheel is not smeared with grease

2. Wheel hub

3. Grease application area

Wheel pin class B



1. Brake drum

2. The contact surface of the disc wheel is not smeared with grease

3. Grease application area

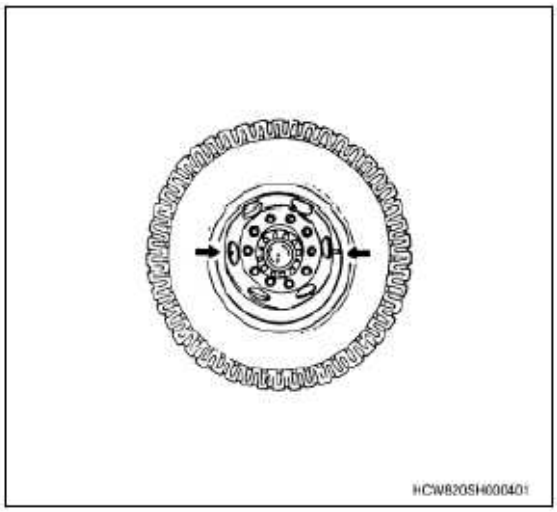
4. Wheel hub

---

3) Install the disc wheel on the wheel pin.

Note:

・When a dual-tire assembly is installed, put the valve of the outside tire away from that of the inside tire in order to allow both of them to be inflated.



4) Temporarily tighten the wheel nut onto the wheel pin.

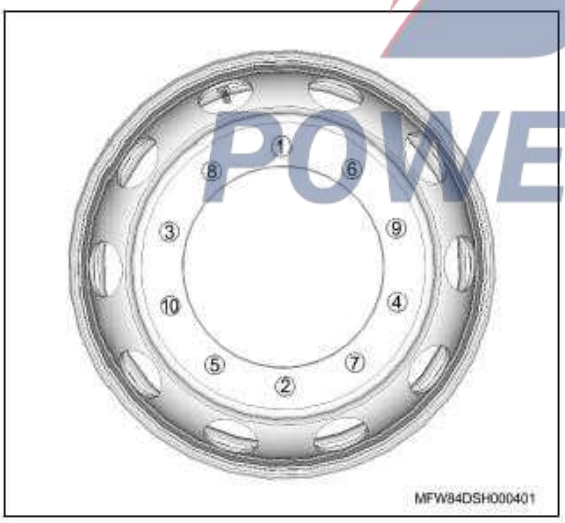
Note:

・Rotate and insert the wheel nut by hand until it is fixed on the contact surface of the disc wheel. Temporarily tighten the wheel nuts until the disc wheel does not issue chucks.

5) Lower vehicle

6) Tighten the wheel nut diagonally two or three times as shown in the following figure.

Wheel nut tightening procedure



7) Tighten the inner wheel nut using a torque wrench, etc.

Tightening torque: 500-550N·m{50-55kgf·m/362-398lb·ft}

Caution:

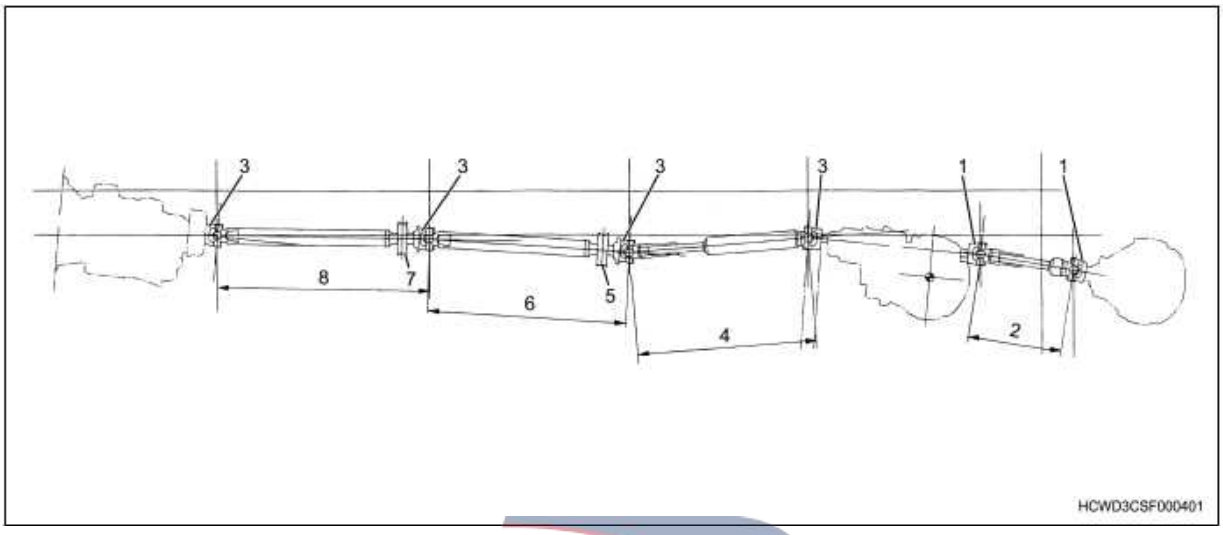
・After the installation, drive the vehicle a distance greater than the specified value and then retighten the wheel nuts with the specified torque.

Standard: 50 to 100km{31 to 99.78km}

Supplementary information

1. Component view

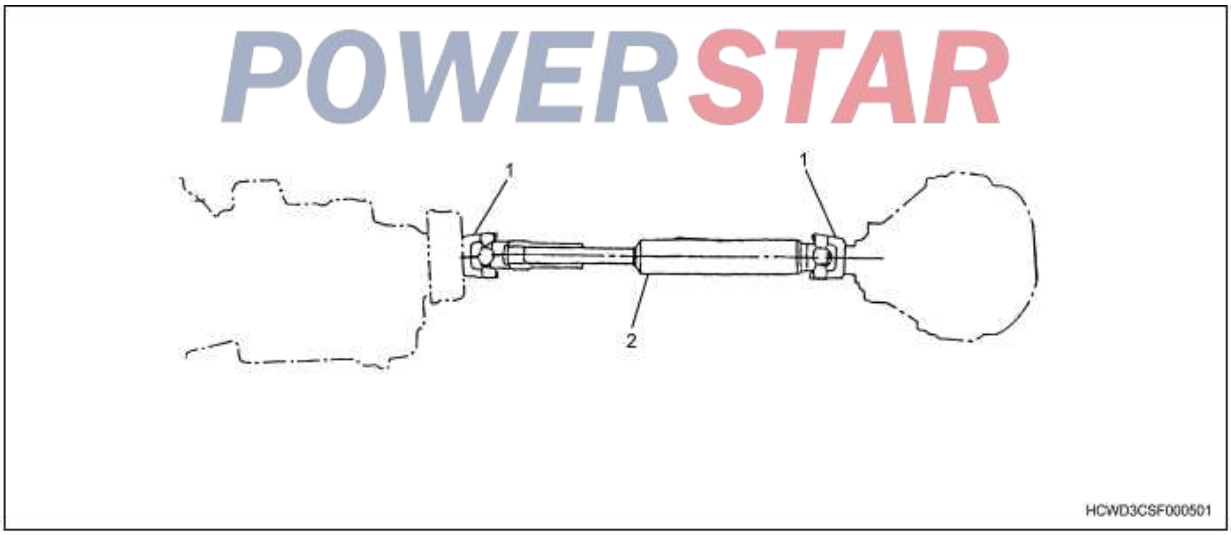
Rear drive shaft（F**）



Part name

1. Flange fork (between the two rear axles)
2. Drive shaft (between the two rear axles)
3. Flange fork
4. End drive shaft
5. Center bearing bracket (if applicable)
6. 2nd-position drive shaft (if applicable)
7. Center bearing bracket (if applicable)
8. 1st-position drive shaft (if applicable)

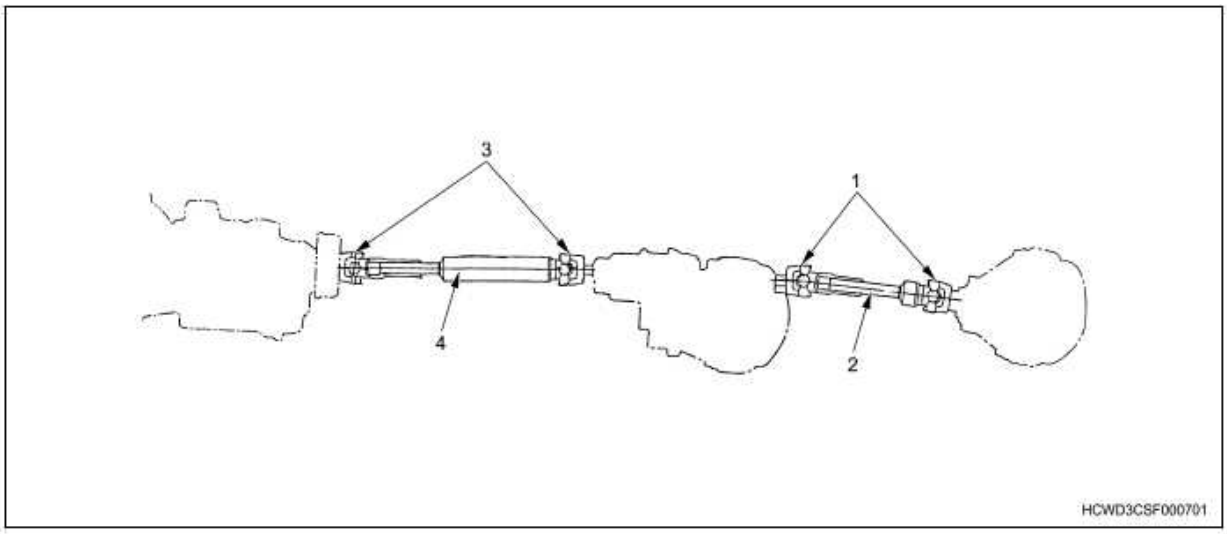
Rear drive shaft (GXR)



Part name

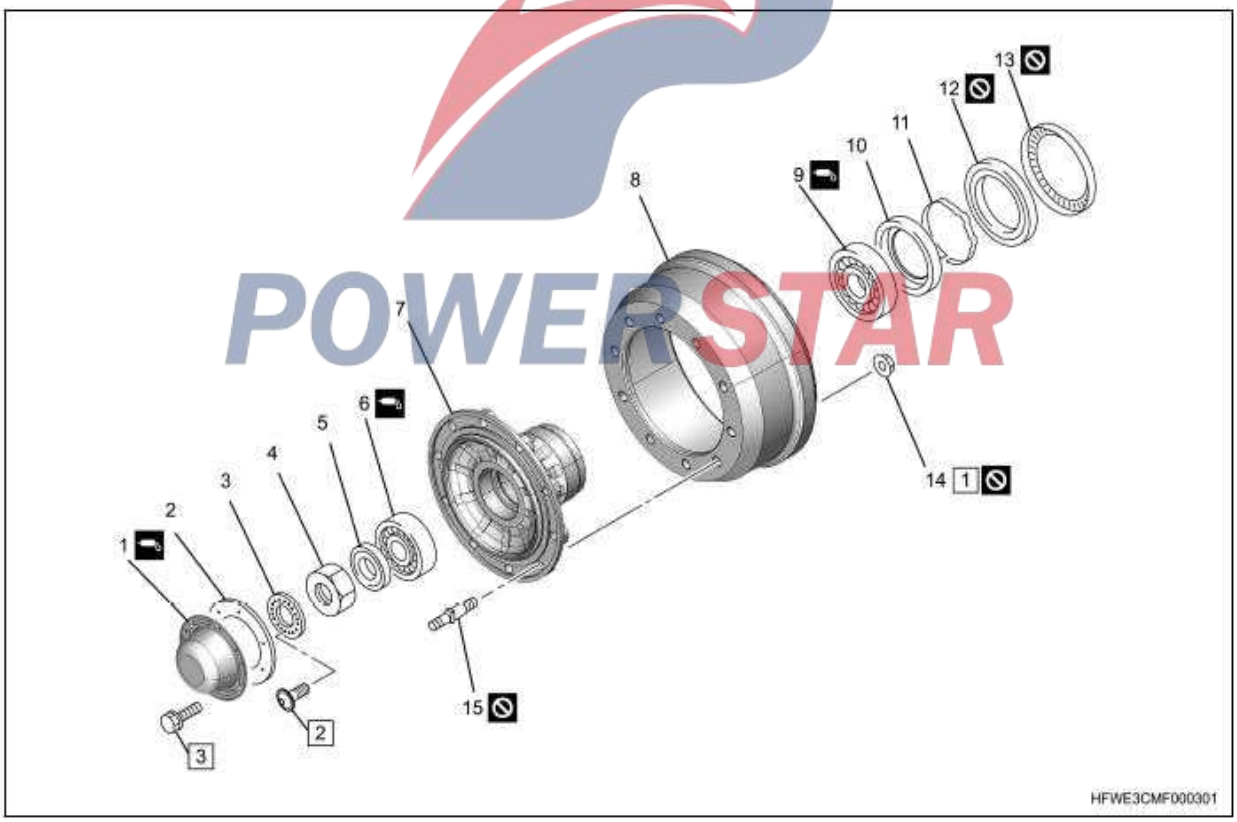
1. Flange fork
2. Drive shaft

Rear drive shaft (GXZ)



Part name	3. Flange fork
1. Flange fork (between the two rear axles)	4. End drive shaft
2. Drive shaft (between the two rear axles)	

Front wheel hub

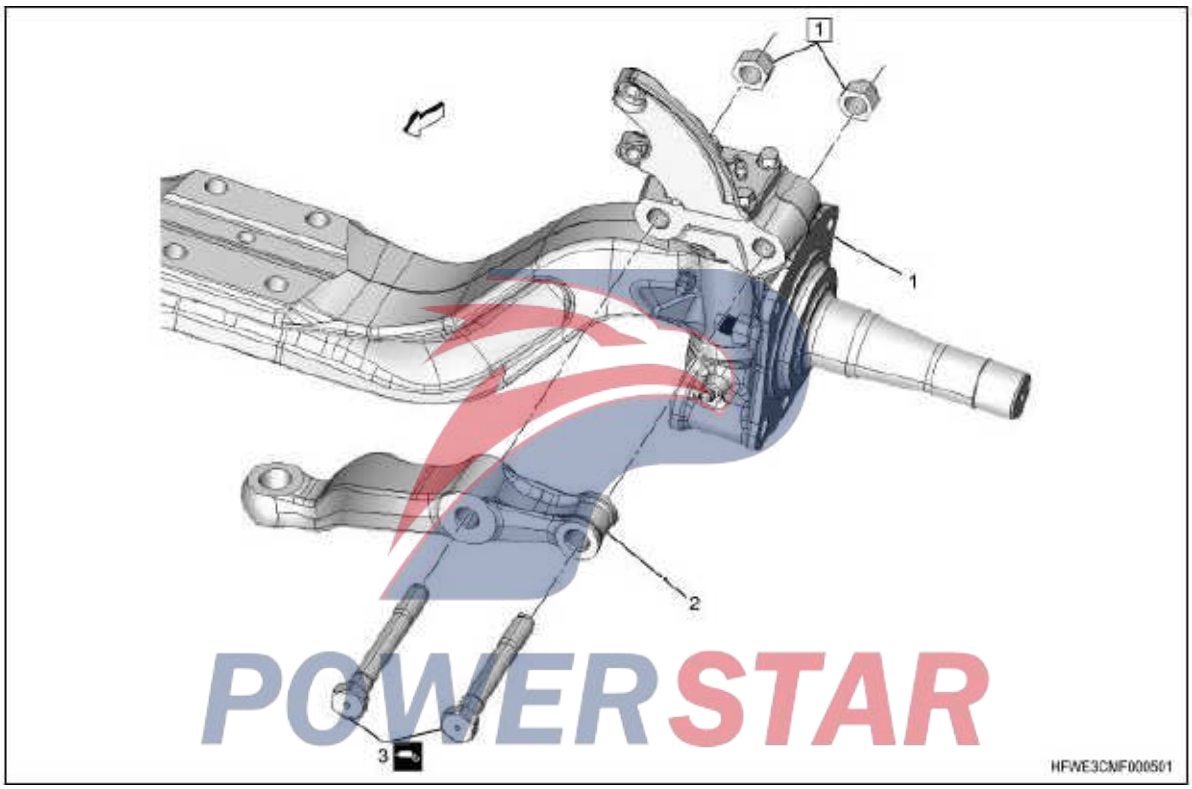


Part name	4. Wheel hub nut
1. Wheel hub cap	5. Front wheel hub bearing washer
2. Hub cap gasket	6. Outer bearing
3. lock washer	7. Front wheel hub

8. Brake drum
9. Inner bearing
10. Cover
11. Snap ring
12. Oil seal
13. Front excitation ring
14. Nut
15. Wheel pin

Tightening torque
1: 397N・m{40.5kgf・m/132.90kg・ft}
2: 9N・m{0.9kgf・m/36.29kg・in}
3: 23N・m{2.3kgf・m/7.71kg・ft}

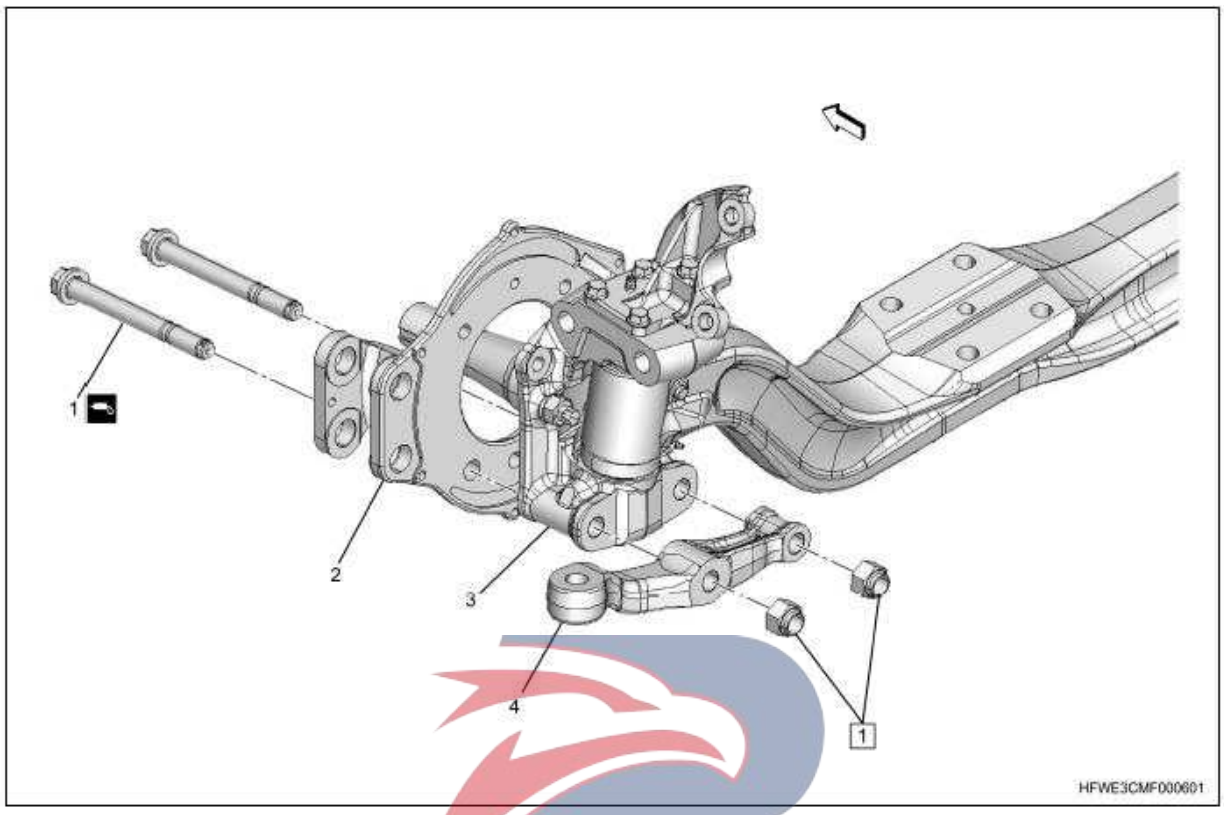
Steering knuckle arm



Part name
1. Steering knuckle
2. Steering knuckle arm
3. Stud

Tightening torque
1: 515N・m{52.5kgf・m/172.37kg・ft}

Tie rod arm



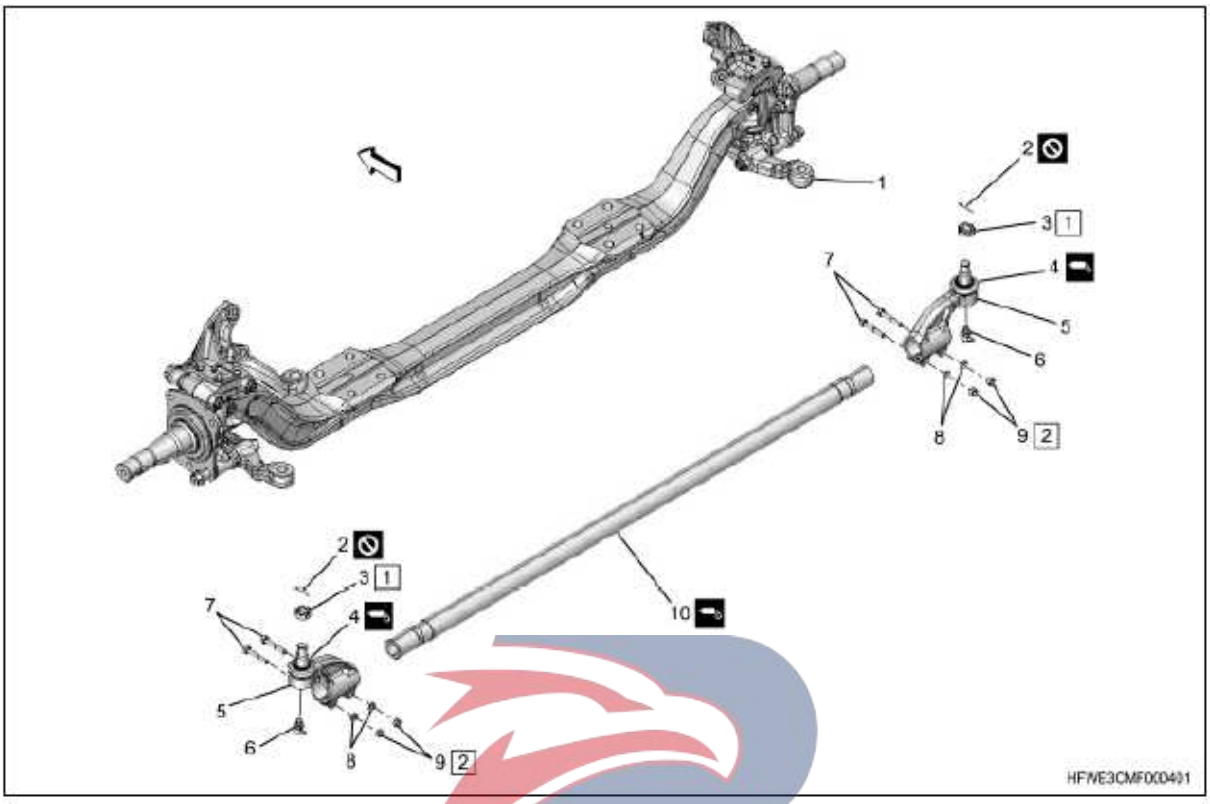
Part name

1. Stud
2. Front anchor pin support
3. Steering knuckle
4. Tie rod arm

Tightening torque

1: 471N・m{48.0kgf・m/157.40kg・ft}

Tie rod



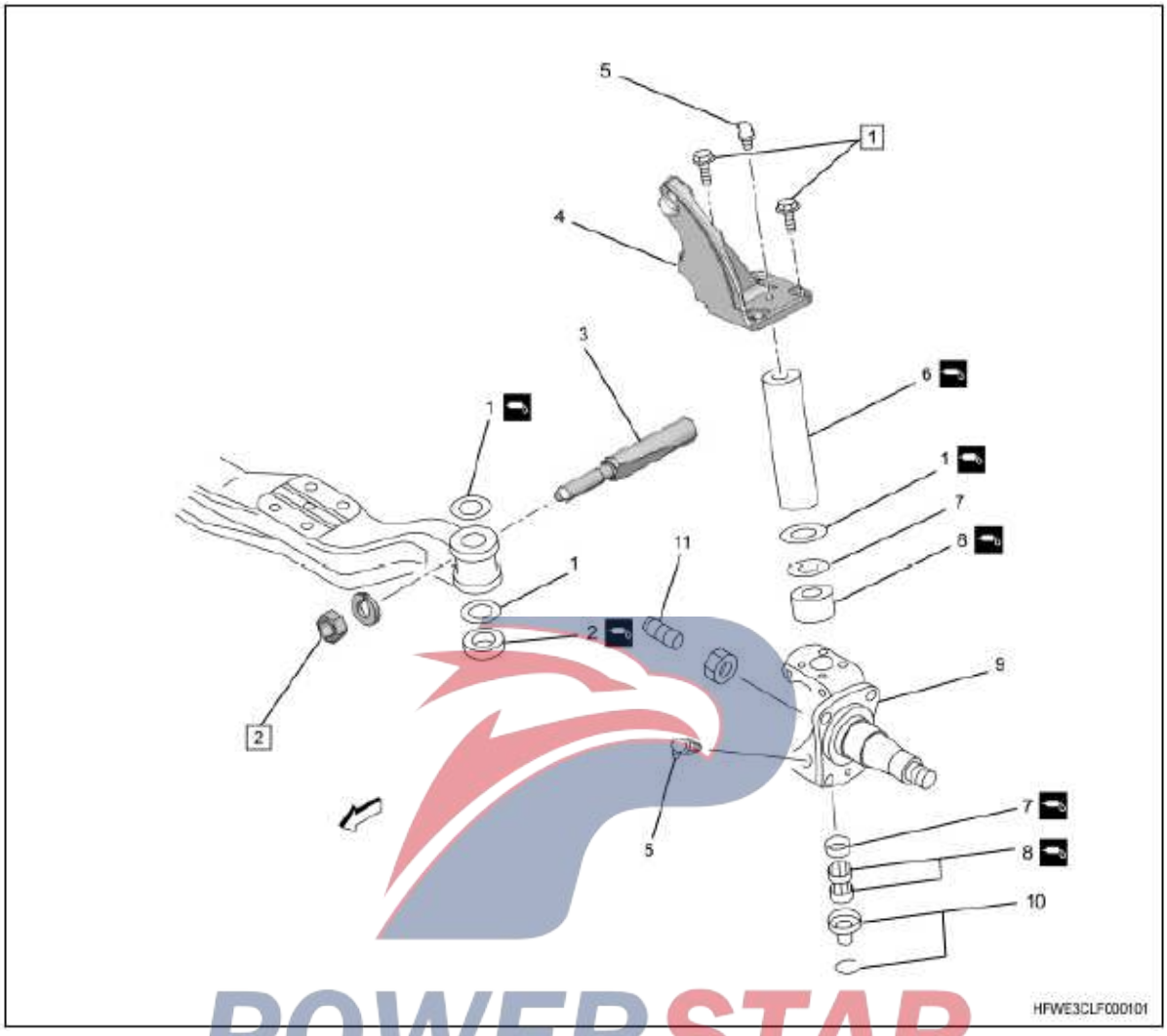
Part name

1. Tie rod arm
2. Cotter pin
3. Groove top nut
4. Slipper
5. Tie rod end
6. Grease nozzle
7. Tie rod end bolt
8. Cleaner
9. Nut
10. Tie rod arm

Tightening torque

1: 304N・m{31.0kgf・m/101.60kg・ft}
2: 83N・m{8.5kgf・m/27.67kg・ft}

Steering knuckle



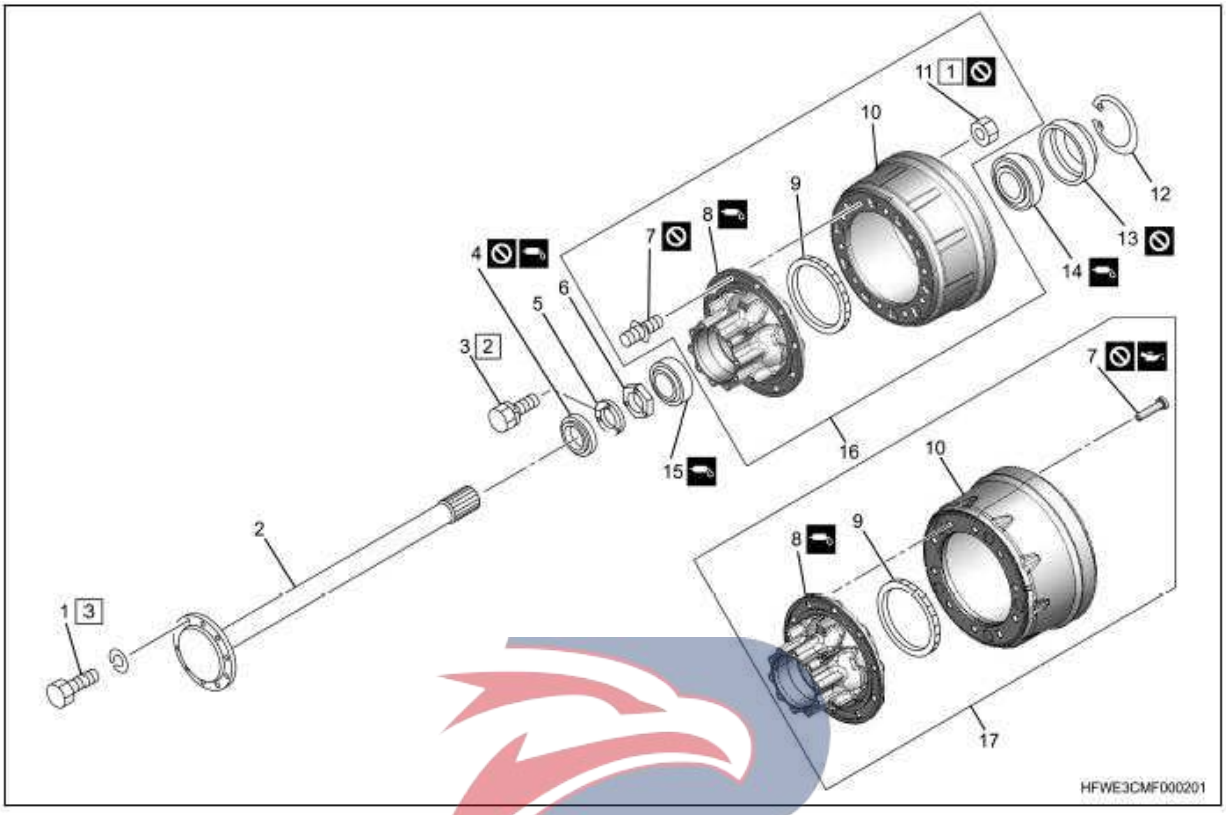
Part name

1. Thrust washer
2. Thrust bearing
3. Key bolt
4. Pumping chamber support
5. Grease nozzle
6. King pin
7. Kingpin sealing
8. Needle roller bearing
9. Steering knuckle
10. Cover plug and snap ring
11. Stop bolt

Tightening torque

1: 83N・m{8.5kgf・m/27.67kg・ft}
2: 49N・m{5.0kgf・m/16.33kg・ft}

Rear wheel hub



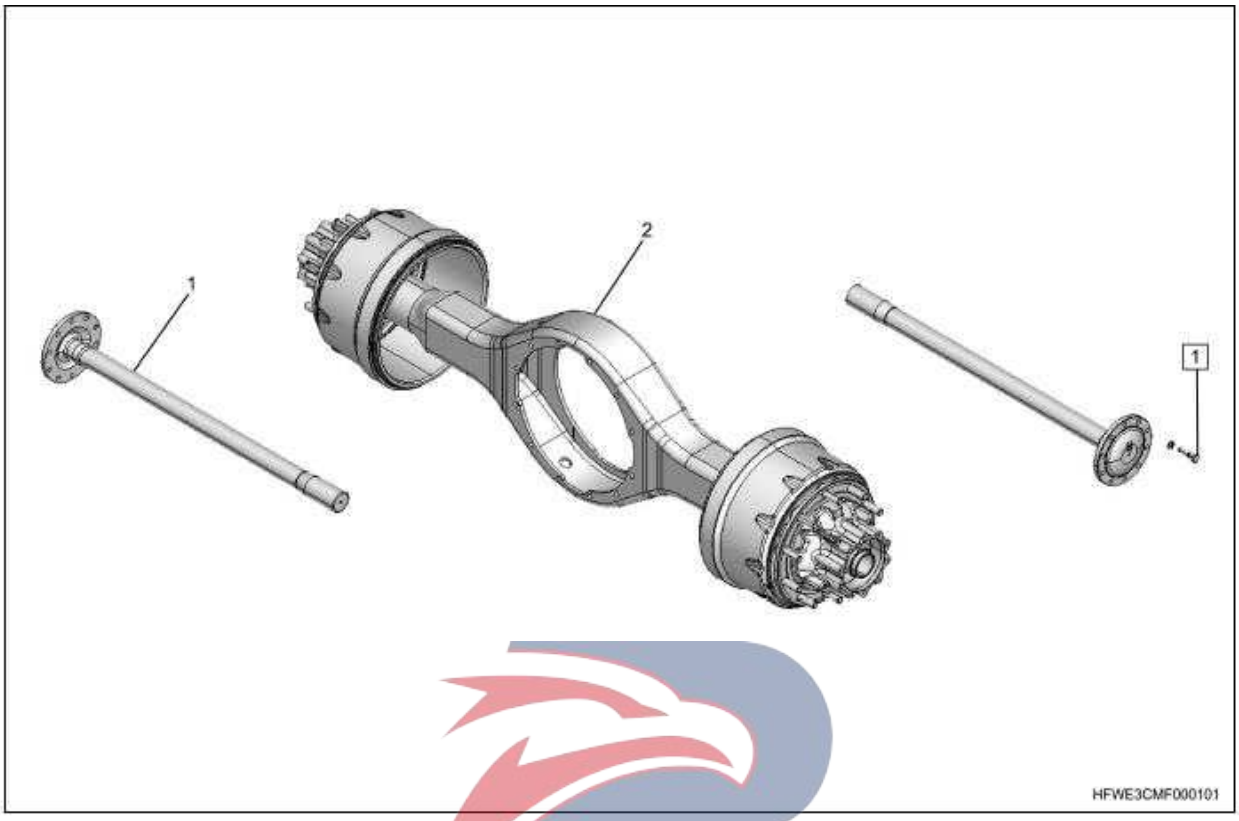
Part name

1. Axle bolt
2. Rear axle drive shaft
3. Lock washer bolt
4. Wheel hub outer oil seal
5. lock washer
6. Wheel hub nut
7. Wheel pin
8. Wheel hub
9. Excitation ring
10. Brake drum
11. Nut
12. Snap ring
13. Inner oil seal
14. Inner hub bearing
15. Outer wheel hub bearing
16. Stud type A
17. Stud type B

Tightening torque

1: 397N・m{40.5kgf・m/132.90kg・ft}
2: 9N・m{0.9kgf・m/36.29kg・in}
3: 181N・m{18.5kgf・m/60.33kg・ft}

Rear axle drive shaft



Part name

1. Rear axle drive shaft
2. Rear axle housing

Tightening torque

1: 181N・m{18.5kgf・m/60.33kg・ft}

Power train, wheel axle

Maintenance information

Table of contents

Preventive measures for maintenance of power train and wheel axle

1. Preventive measures for maintenance of power train and wheel axle

1. About the parts that must not be reused.

Do not reuse the following components.

・Packing
・Gasket
・Oil seal
・O-ring
・Lock bolt
・Locking washer

2. Loctite glue 242 (moderate intensity, blue liquid)

1) Oil application area

・ Various bolts, joints and plugs
・Fixing part of oil seal

2) Usage instructions

・Use wiping cloth to clean away the engine oil and grease in the two connecting sections.
・ Apply Loctite adhesive to the thread part of bolts, joints and plugs.
・ Tighten the bolts, joints or plugs according to the specified torque.

3. Loctite glue 271(High-intensity, red liquid)

1) Oil application area

・Mounting bolt of gear ring

2) Usage instructions

・Thoroughly wipe the connecting segment using a kind of detergent, such as brake disc detergent.
・Allow the cleaning agent to dry naturally.
・Apply Loctite adhesive to the thread part of bolts
・Tighten the bolts with the specified torque.
・The time of applying a strong force must not exceed 1h.

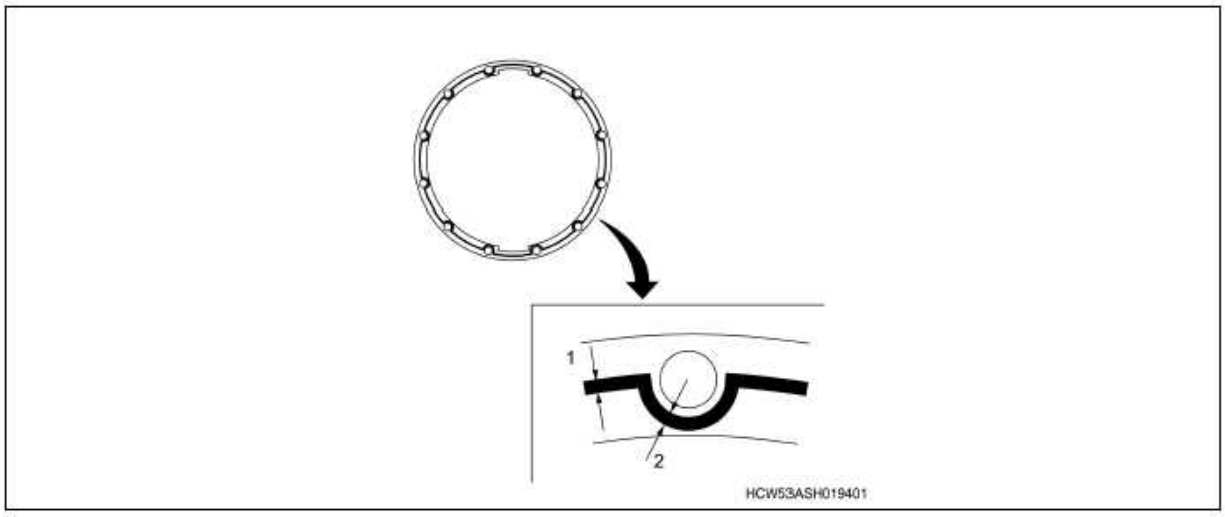
4. Loctite glue FMD127(Sealant, blue liquid)

1) Oil application area

・Located between the differential carrier and the axle housing.
・ Located between the differential carrier and the housing of power transfer unit.
・Between the housing of power transfer unit and the inter-axle differential cover.
・Located between the differential carrier and the gear shift mechanism.
・ Between the housing of power transfer unit and the gear shift mechanism.
・ Between the housing of power transfer unit and the oil pump.

2) Usage instructions

・Thoroughly wipe the connecting segment using a kind of detergent, such as brake disc detergent.
・Allow the cleaning agent to dry naturally.
・Loctite glue is applied over the entire bead length of 2.0-2.5 mm {0.08-0.10 "} width as shown in Figures 1 and 2. Before smearing, push the tire bead's curled edge out of the pipeline.
・Tighten the bolts with the specified torque.
・Keep it in the state for 30 minutes or longer to allow it to be naturally dried.



1. Tire bead width
2. Tire bead width

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5. Loctite glue 962T(Sealants, red liquid)

1) Oil application area

・ Input shaft bearing retainer and bearing adjusting shim

2) Usage instructions

・Thoroughly wipe the connecting segment using a kind of detergent, such as brake disc detergent.

・Allow the cleaning agent to dry naturally.

・Smear Loctite glue on the entire tire bead with the width of 2.0-2.5mm (0.08-0.10in). Before smearing, push the tire bead's curled edge out of the pipeline.

・Tighten the bolts with the specified torque.

・Keep it in the state for 30 minutes or longer to allow it to be naturally dried.

6. Three key TB1110D (sealant, gray liquid)

1) Oil application area

・ Between the differential carrier, the gasket and the driving gear carrier.

2) Usage instructions

・Thoroughly wipe the connecting segment using a kind of detergent, such as brake disc detergent.

・Allow the cleaning agent to dry naturally.

・Smear Loctite glue on the entire tire bead with the width of 2.0-2.5mm (0.08-0.10in). Before smearing, push the tire bead's curled edge out of the pipeline.

・Tighten the bolts with the specified torque.

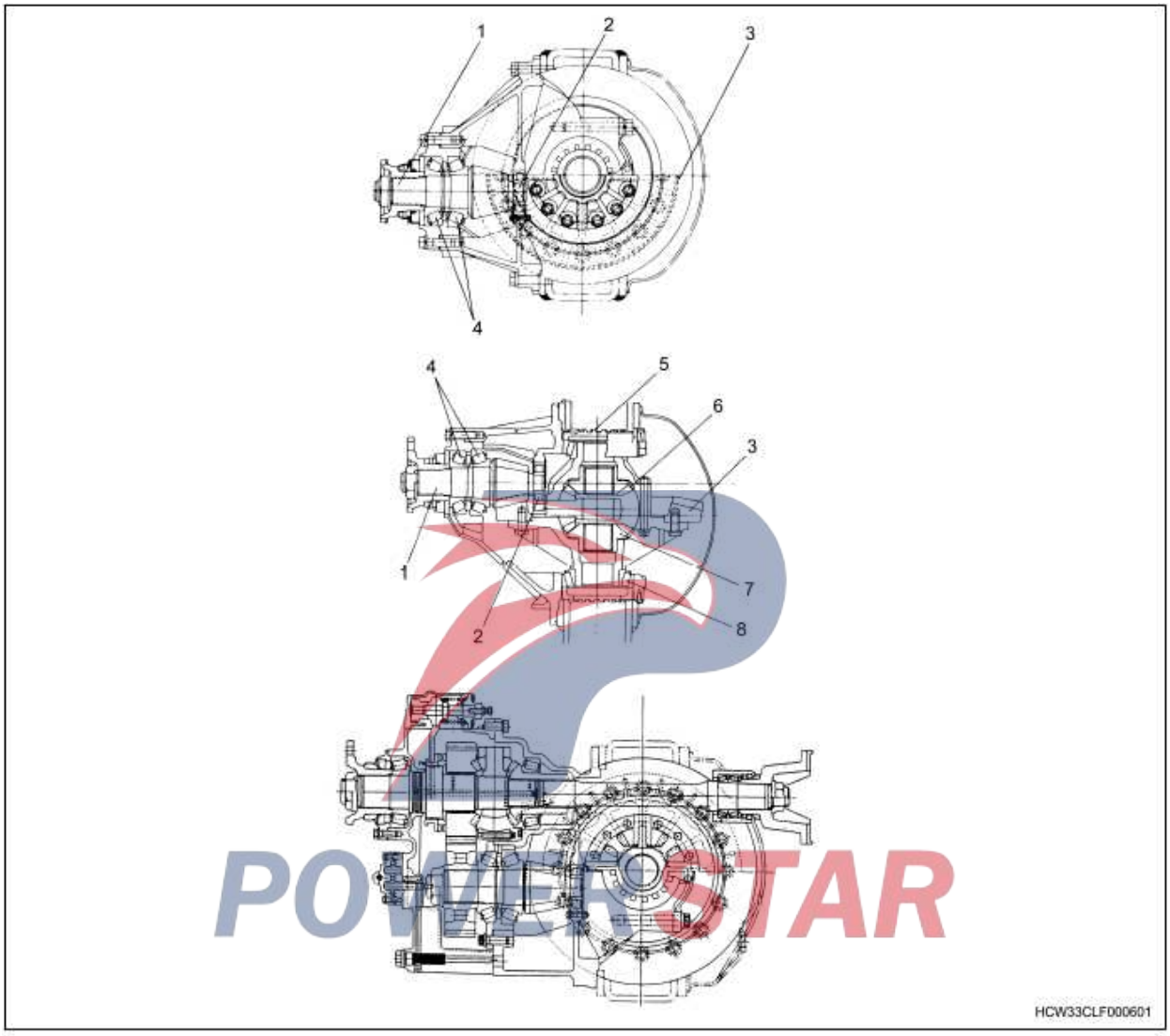
・Keep it in the state for 30 minutes or longer to allow it to be naturally dried.

Function, structure and operation of power train and axle

1. Differential

1. Structure drawing of differential

Main decelerator(17.5 inches H type)and Main decelerator(17.5 inches HT type)



1. Driving pinion
2. Guide bearing
3. Gear ring
4. Driving pinion bearing
5. Adjusting nut
6. Driving gear
7. Side gear
8. Side bearing

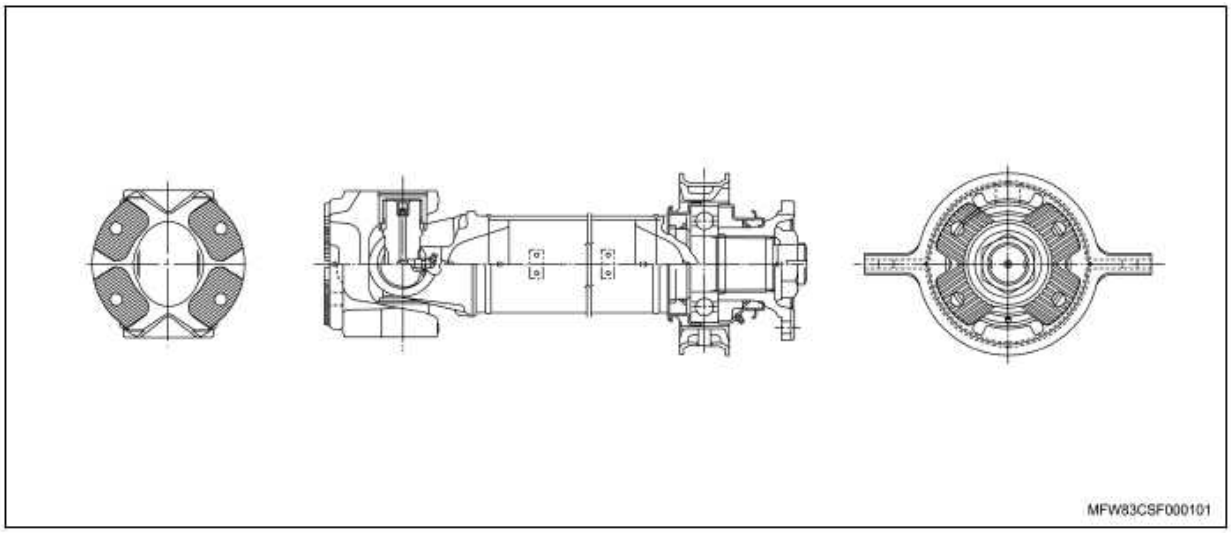
---

2. Drive shaft system

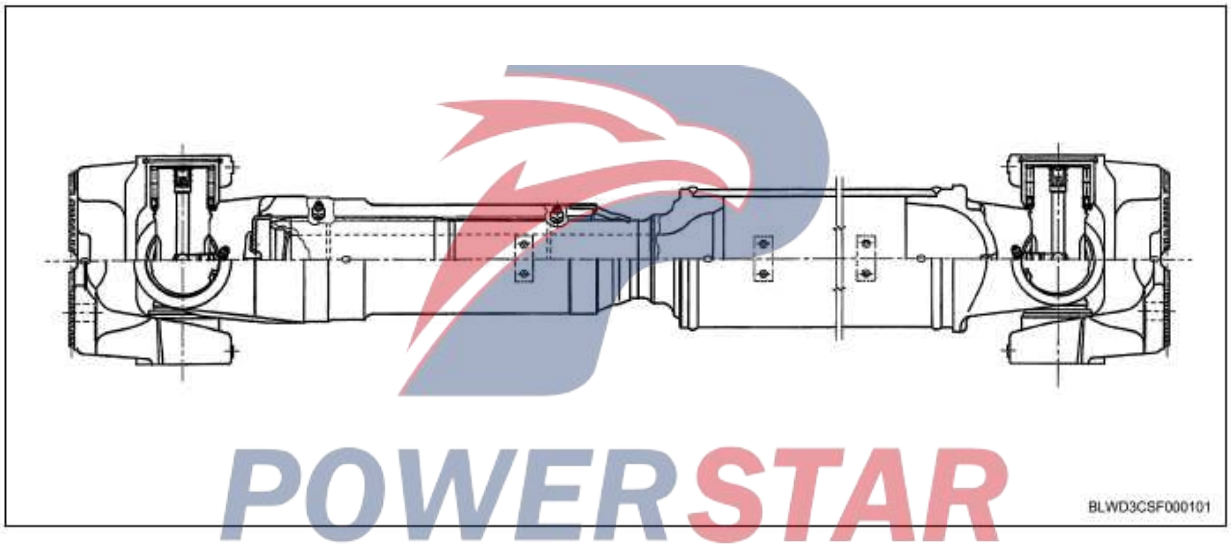
1. Schematic drawing of drive shaft

The driving shaft with a center bearing

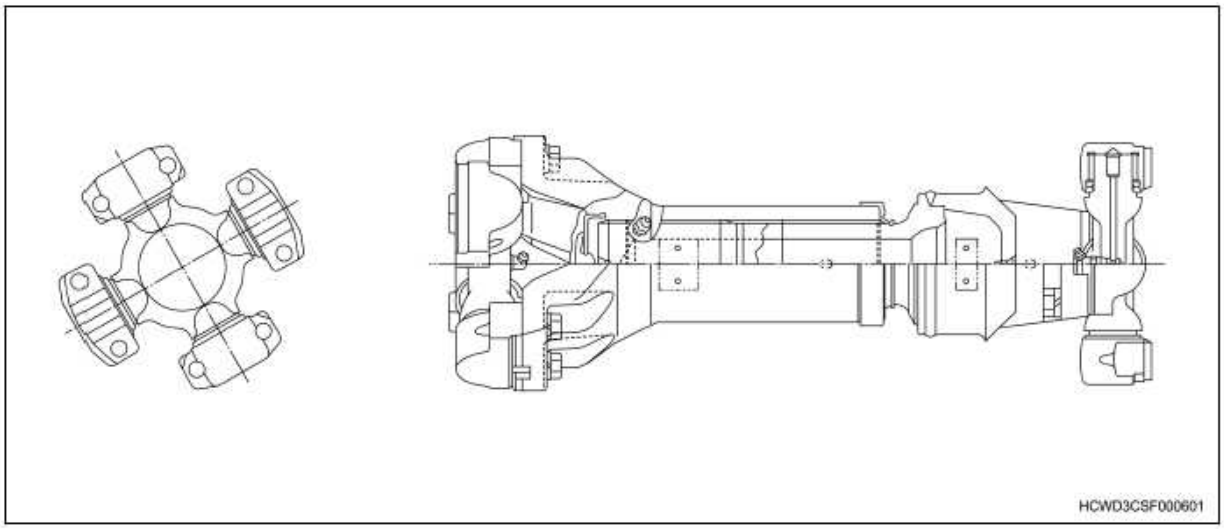
P115H



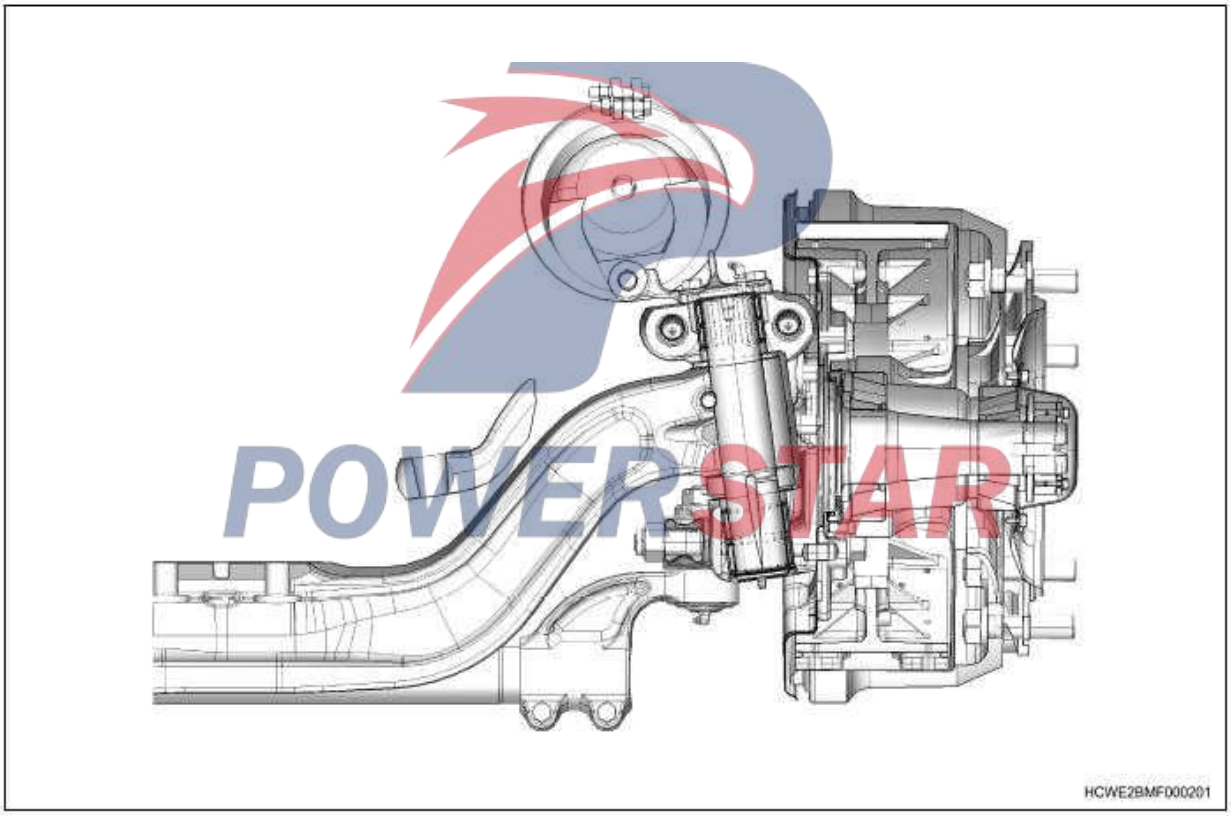
End driving shaft



The driving shaft between tandem axles



2. Structure drawing of front axle



Main specifications and parameters of power train and wheel axle

1. Main specifications and parameters of power train and wheel axle

1. Specifications of main differential

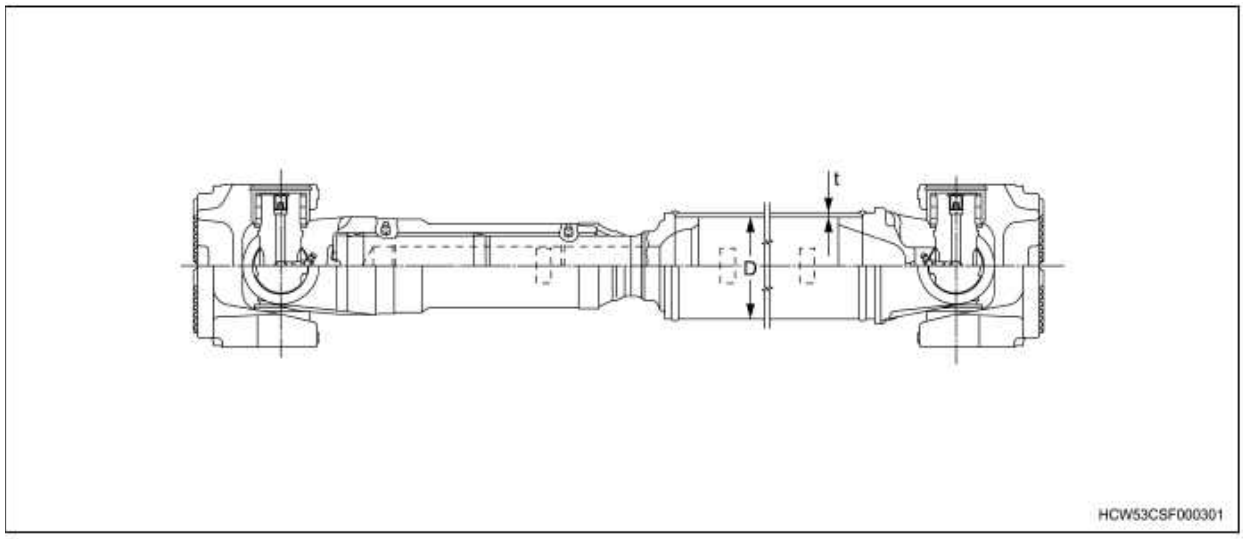
Nominal diameter of gear ring	17.5 inches H type(Differential (series))
Gear type	Hyperboloid gear
Differential gear type	Four pinions
Reduction ratio	4.555(41/9)
	4.875(39/8)
	5.571(39/7)
	6.143(43/7)
Amount of lubricating oil (reference value)	： About 12L {About 3.17 US gal / 2.64 Imperial Gallons}
Lubricating oil type	GL-5(API)–90,140,80W-90(SAE)
Nominal diameter of gear ring	18.5 inches H-shape
Gear type	Hyperboloid gear
Differential gear type	Four pinions
Reduction ratio	5.429(38/7)
Amount of lubricating oil (reference value)	： About 18L (about 4.76 American gallons/about 3.96 British gallons)
Lubricating oil type	GL-5(API)–90,140,80W-90(SAE)
Nominal diameter of gear ring	17.5 inch HT shape
Gear type	Hyperboloid gear
Differential gear type	Four pinions
Reduction ratio	4.555(41/9)
	4.875(39/8)
	5.571(39/7)
	6.143(43/7)
Amount of lubricating oil (reference value)	： About 18L (about 4.76 American gallons/about 3.96 British gallons)
Lubricating oil type	GL-5(API)–90,140,80W-90(SAE)

2. Main data and specifications of screw shaft

Type of driving shaft for heavy-duty vehicles

Type of driving shaft	Vehicle model	Type
Universal joint	F**GX*	P115H
Wing-shaped connector	F**GXZ	P60W

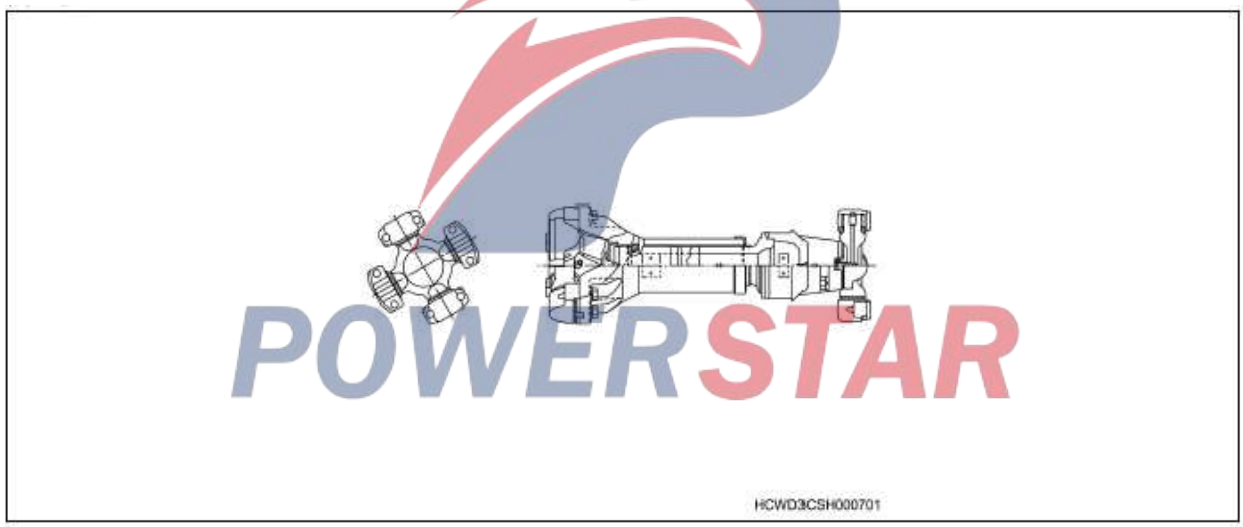
Universal joint



Symbol sample of universal joint

P	115H
Drive shaft acronym	Strength class

Wing-shaped connector



Symbol sample of wing connector

P	60	W
Drive shaft acronym	Strength class	Airfoil type(excluding W：Universal joint type)

The size of universal coupling type driving shaft

Model	Outer diameter (D) ×thickness (t)	Material
P115H	φ114.3mm(4.500 in)-t5.5 mm(0.217 in)	High strength steel tube

Flange york has a flat key. Cross shaft elasticity circlip composed a support system.

The size of wing coupling type driving shaft

Model	Diameter of driving shaft	Outside diameter of spider journal
P60W	φ59mm(2.323inches)	φ28.6 mm(1.126 in)

Power train, axle

Function inspection

Table of contents

Wheel location inspection

1. Wheel location inspection

1. Wheel alignment measuring condition

・After the vehicle unloading , make measurements on a flat surface.

・ Before making adjustments, re-confirm the area which has been checked .

2. Check before adjusting the wheel alignment.

・ Check whether the vehicle attitude is correct.

・Check whether the wheel yaws or is deformed.

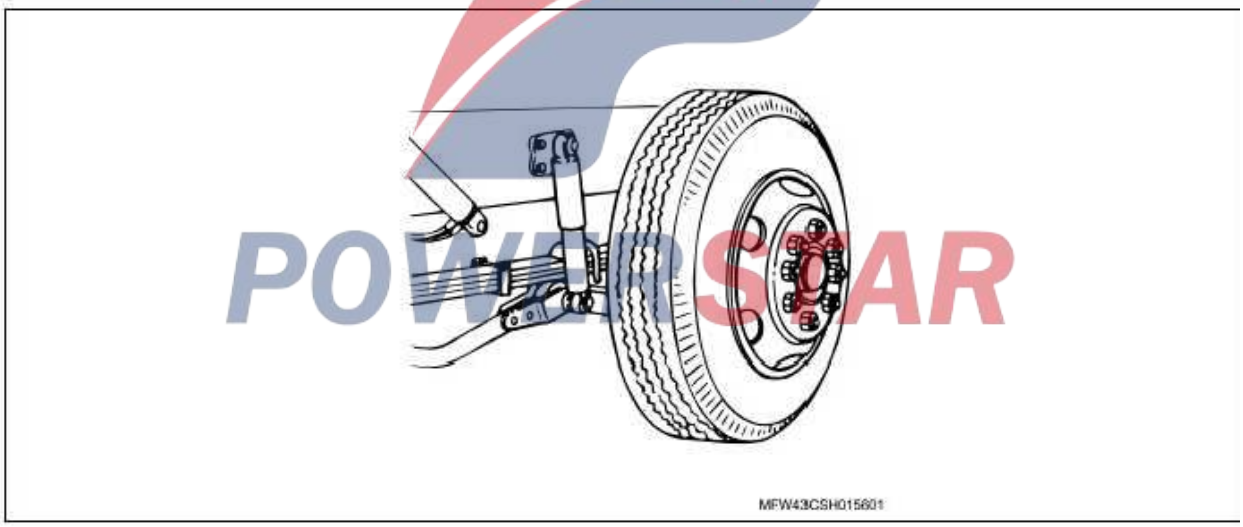
・Check whether each part (such as hub bearing) is loose.

・Check whether fastening bolts of components are loose.

・Check whether the tie is normal.

Note:

・If necessary, adjust the hub bearing preload.

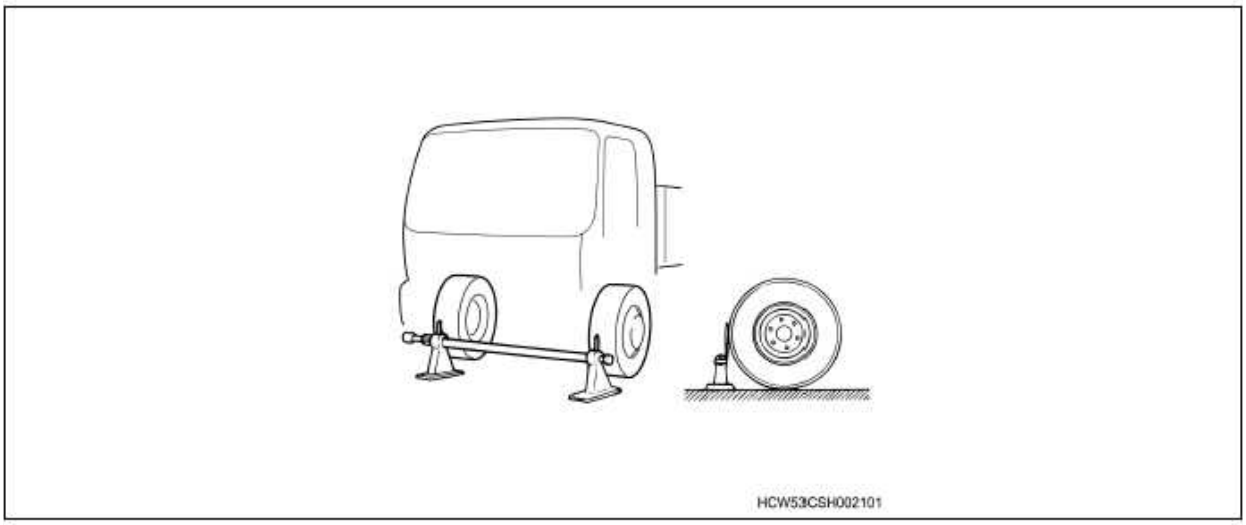


3. Toe-in measurement

1) Rock up and down every corner of the vehicle to fix the suspension.

2) Set the front wheels in the way that ensures the vehicle runs forward straightly.

3) Place the tip of the front wheel toe detector in the middle of the tire tread with a height equal to the center of the axle on the back of the left and right front wheels and make a mark.

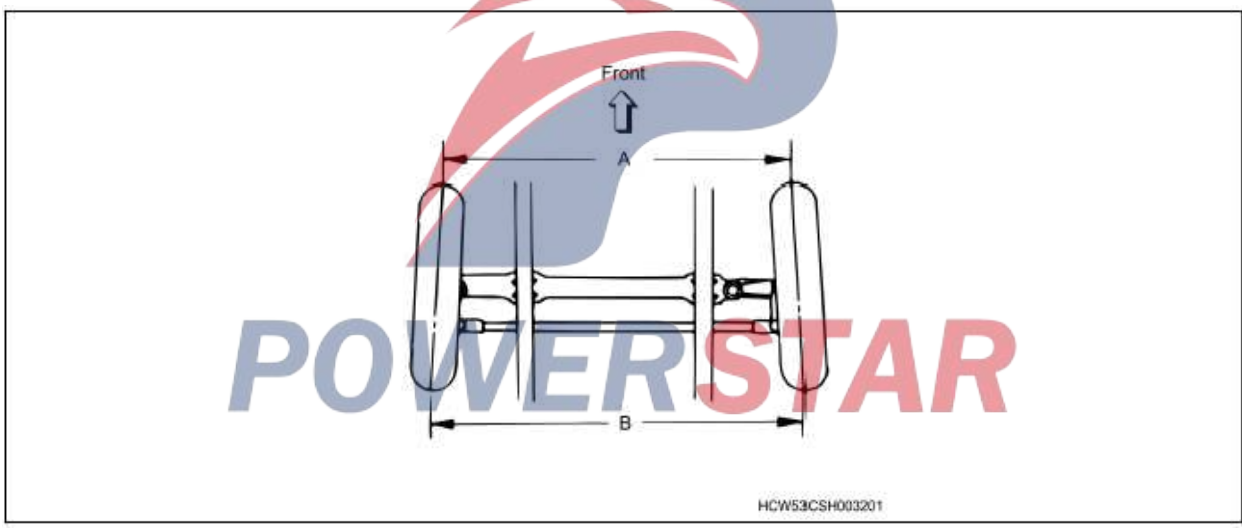


4) Measure the distance A between the marks made on the rears of the front wheels.

5) Rotate the front wheel for 180°.

6) To measure the distance B between the left and right marks in the front of vehicle;

7) Toe-in calculation



Toe-in (B-A)

Prescribed value	0±1mm{0±0.0394inch}

4. Toe-in adjustment

1) Turn the tie rod left and right similarly, loosen the lock nut and adjust the toe-in to the specified value.

Toe-in (B-A)

Prescribed value	0±1mm{0±0.0394inch}

2) Tighten the locking nut according to the specified torque.

Tightening torque: 83N・m{8.5kgf・m/61lb・ft}

5. Camber angle measurement

1) Jack up the vehicle.

2) Lock the turning radius gauge.

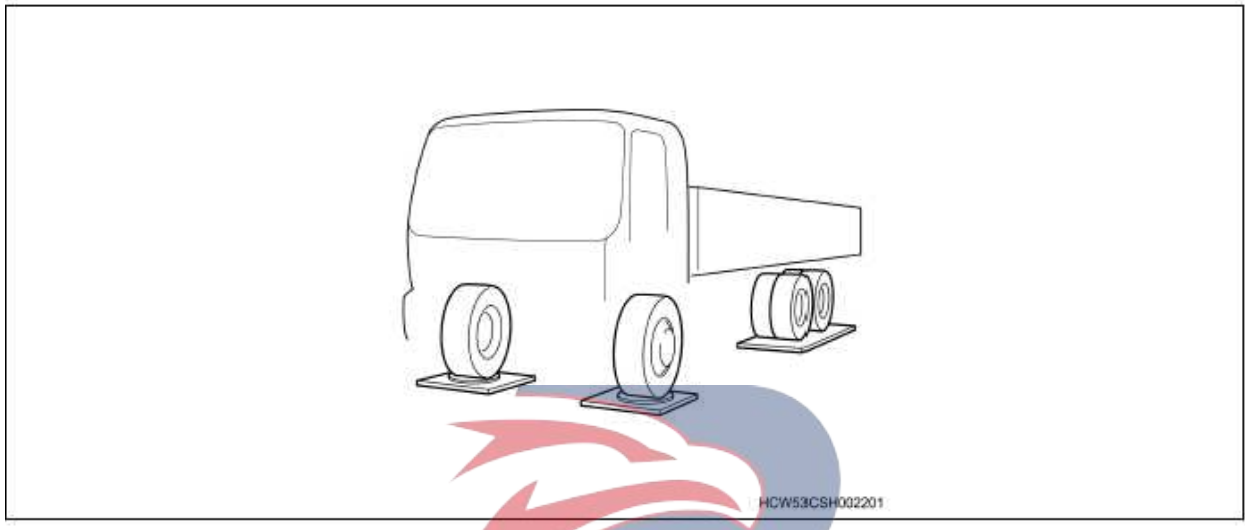
3) Set the front wheels in the way that ensures the vehicle runs forward straightly.

4) Place the rear wheel on a bracket of the same height as the steering radius to balance the vehicle.

5) Align the center of the tire contact surface with the center of the steering radius gauge and lower the vehicle so that the tire of the axle to be measured falls on the steering radius gauge.

6) Rock up and down every corner of the vehicle to fix the suspension.

7) To confirm the vehicle has steadily parked at the turning radius gauge and platform.



8) To remove the lock pin from the turning radius gauge

9) Remove the hubcap and install the wheel alignment gauge.

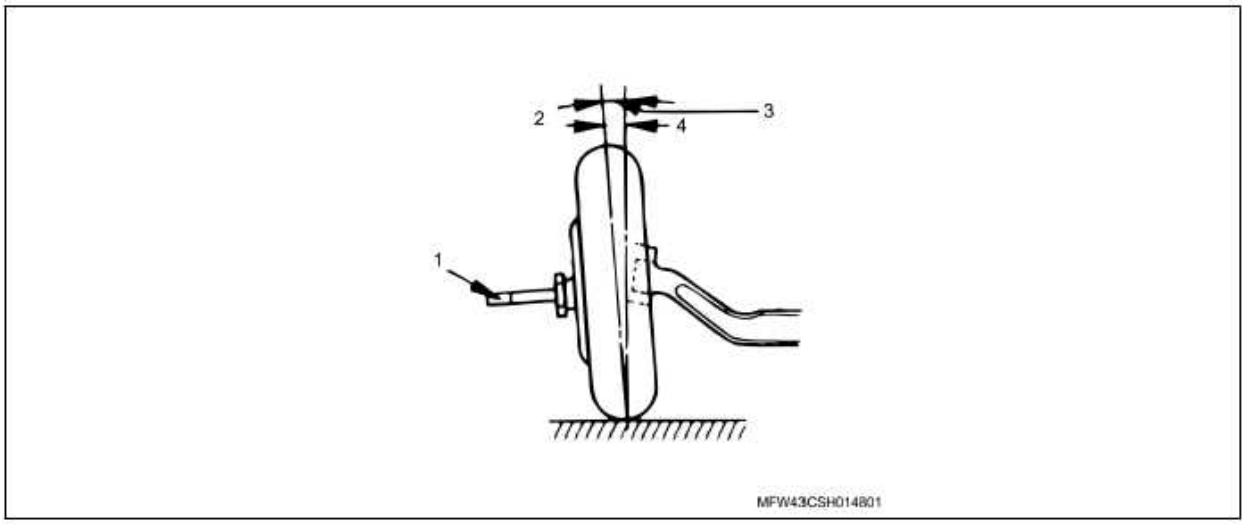
10) Measure the camber angle according to the bubble of the liquid level meter.

Note:

・Keep the foot brake in the depressed position during the measurement.

Camber angle

Prescribed value	0°30’±45’



1. Wheel alignment gauge

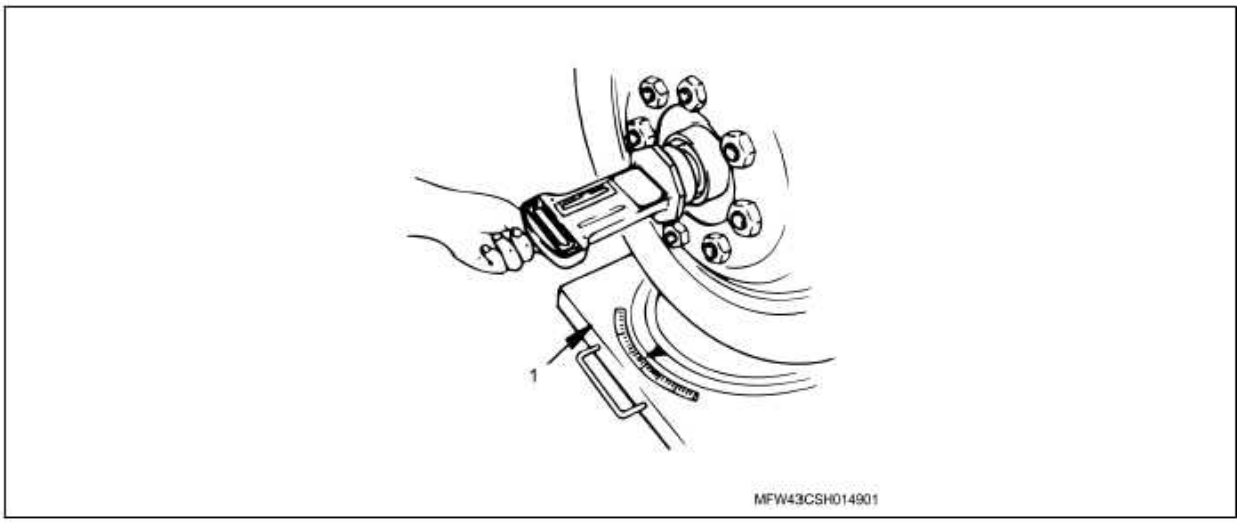
2. Tire center line

3. Camber angle

4. Vertical line

6. Measurement of caster angle and kingpin angle

1) Use the rotation radius gauge and the support set for measuring the camber angle.



1. Rotation radius gauge

Measure the right front wheel Measure the right front wheel Turn the steering wheel to the right, when the wheel steering angle to the right deviation of 20 °, the main pin angle meter and king pin measuring instrument bubble at 0 °. After adjustment, turn the steering wheel to the left, when the steering wheel to the left deviation of 20 °, read out the caster angle gauge and kingpin gauge on the scale.

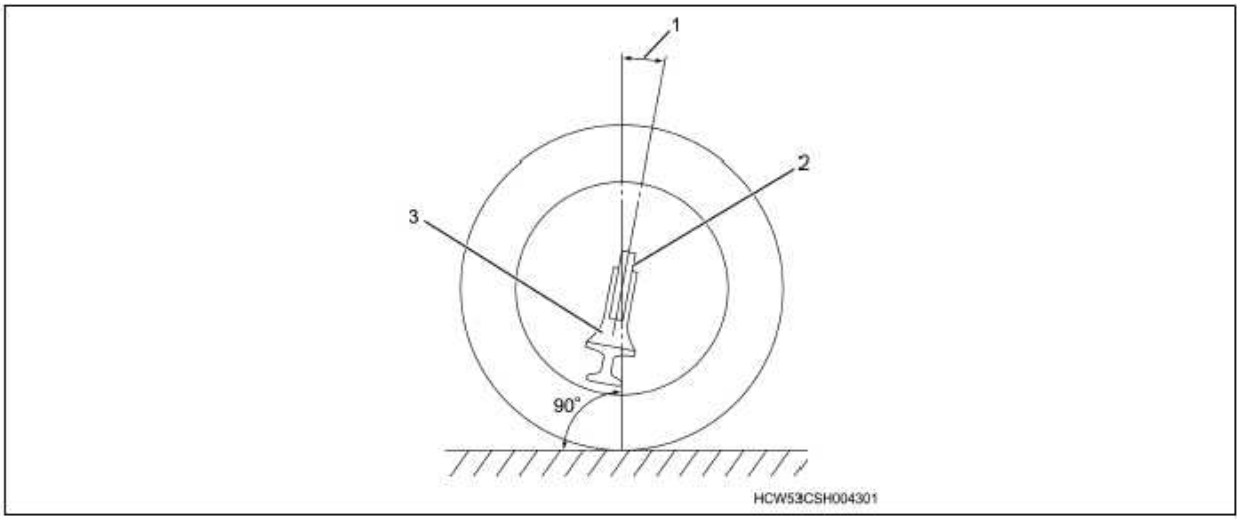
Note:

・When measuring the left front wheel, turn left and right and then follow the above procedure.

・Keep the foot brake in the depressed position during the measurement.

Caster

Prescribed value	FYH	3°±45’
	Except FYH	2°±45’



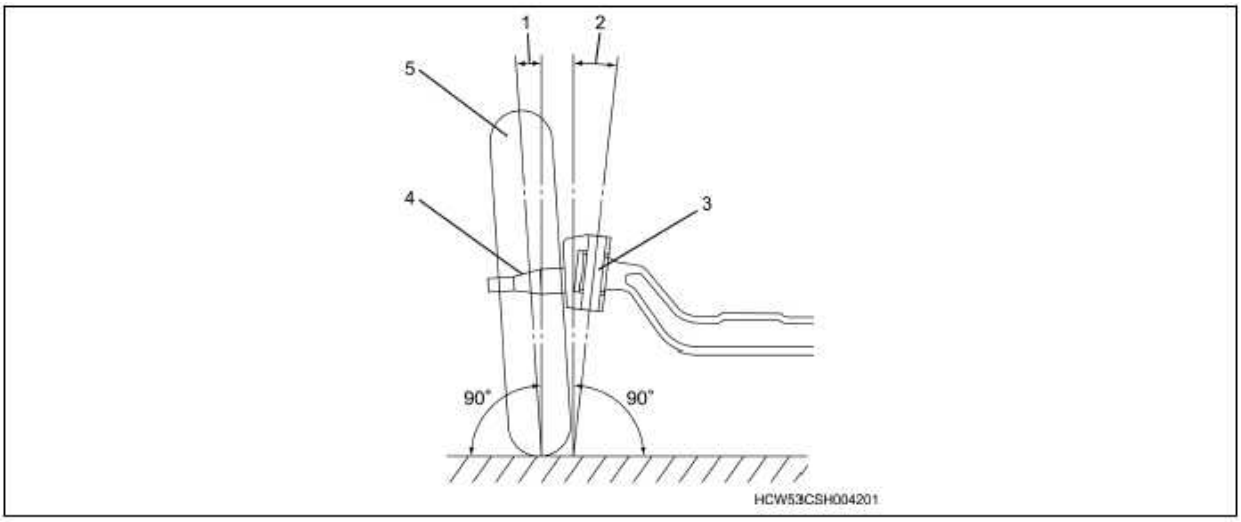
1. Caster angle

2. King pin

3. Front axle

Kingpin angle

Prescribed value	7°30’



1. Camber angle
2. King pin angle
3. King pin
4. Steering knuckle shaft
5. Tire

7. Measurement of maximum steering angle

1) Measure the wheel steering angle using the gyration gauge and bracket set for camber measurement.Turn the steering wheel to the left or right to the limit and read the reading on the turning radius gauge.

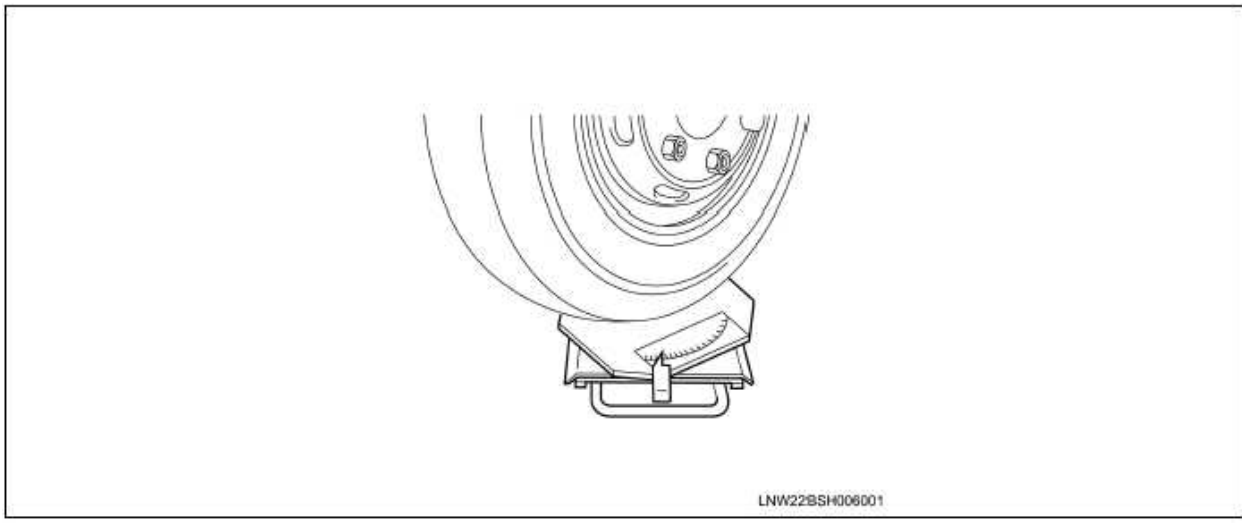
Note:

・Keep the foot brake in the depressed position during the measurement.

・When measuring, make sure that the front tires are not affected by the frame or suspension components.

Tire turning angles (inside/outside)

Vehicle model	Tire specifications	Steering angle
FYH	11.00R20-16	Preposition front axle: 45°35′(postposition front axle: 37°30′)
	295/80R22.5	Preposition front axle: 47°36′(postposition front axle: 39°31′)
Except FYH	11.00R20-16	47°36°
	295/80R22.5	49°37°



8. Adjustment of turning angle of wheel

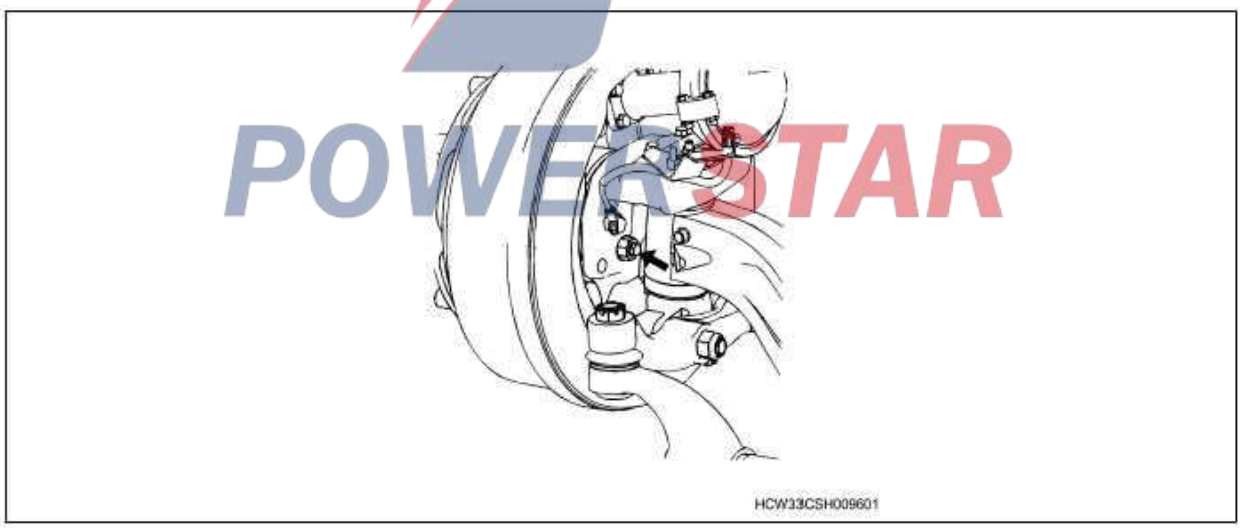
Adjust knuckle stop bolt height and adjust tire steering angle.

Loosen the knuckle stop bolt and adjust the stop bolt length while the internal steering angle is in the specified position so that the clearance between the axle and the stop bolt is 0-0.1 mm (0-0.0039 inch). When the steering wheel is fully turned to the left, adjust the length of the stop bolt toward the right front of the vehicle until it touches each other, and then use the lock nut to tighten it.

Caution:

・After adjusting, tighten the lock nut.

Tightening torque: 59N・m{6.0kgf・m/19.96kg・ft}



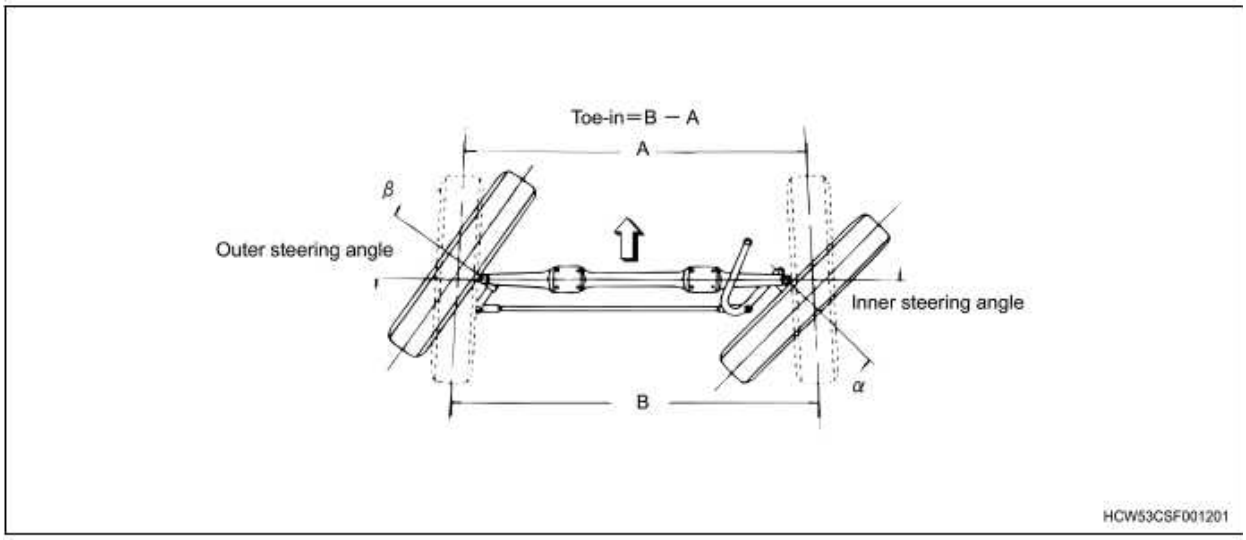
Note:

・Adjust the wheel steering angle,after adjustment, make sure that it does not interfere with other components.

Tire turning angles (inside/outside)

Vehicle model	Tire specifications	Steering angle
FYH	11.00R20-16	Preposition front axle: 45?35° (postposition front axle: 37?30°)
	295/80R22.5	Preposition front axle: 47?36° (postposition front axle: 39?31°)

Except FYH	11.00R20-16	47′36°
	295/80R22.5	49′37°

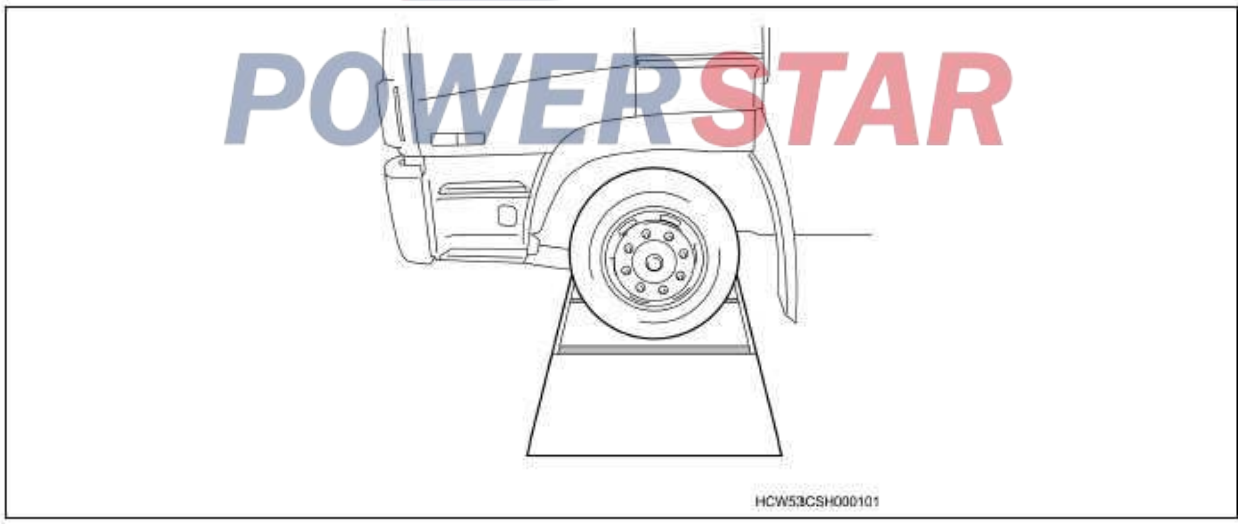


9. Sideslip measurement

Adjust the toe-in, camber, back caster, and kingpin angle to the correct angle and use the skid tester to measure sideways.。

Side slide amount

Prescribed value	FYH	Within ±0.08in{0.079in}/1,000mm{39.370in}
	Except FYH	Within ±3mm{0.118in}/1,000mm{39.370in}



10. Measurement of axle slippage

After the front toe and rear front axle toe, camber, caster angle and kingpin inclination adjusted in accordance with the provisions of the axle with a sliding test machine measuring axle slip, according to the provisions of the adjustment 2 parallelism of the front axle.

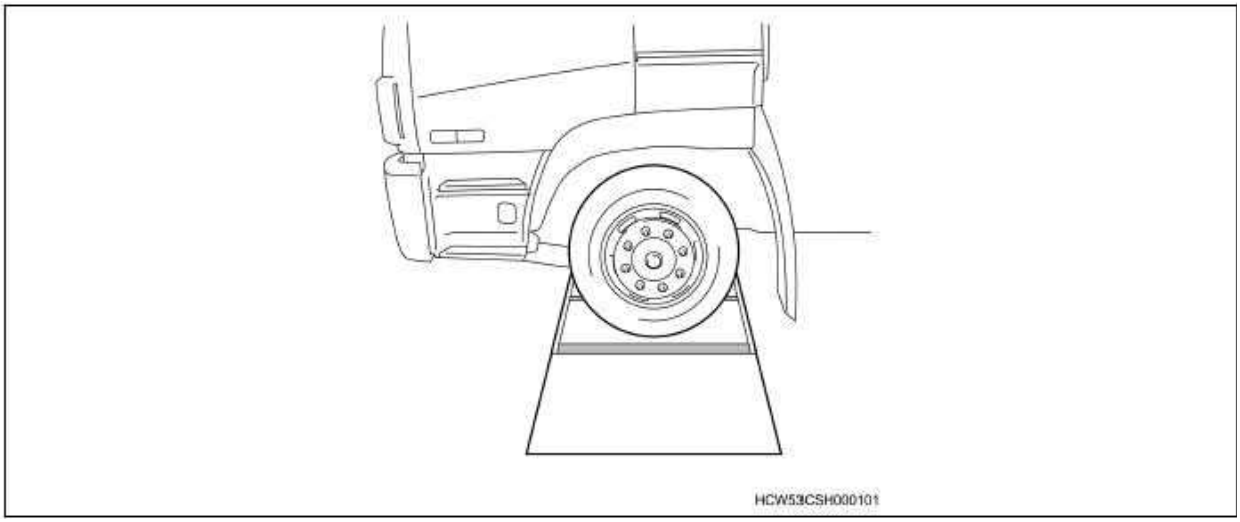
1) Release the tie rod and adjust the parallelism of the front tandem bridge.

Please refer to "6 - Steering wheel 6B, to install straight tie rod of power assisting system" in this section.

2) Use a side slip tester to measure the axle slippage.

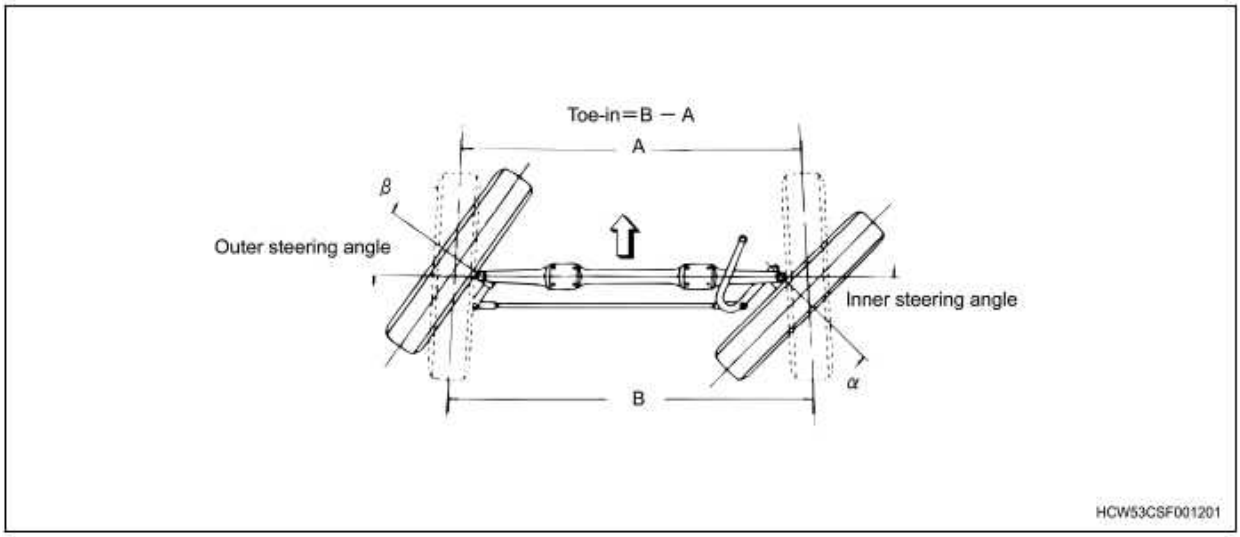
Axle slide amount

Prescribed value	Within 2mm{0.079in}/1,000mm{39.370in}



11. Specified value for maintenance

Items	Vehicle model	Tire specifications	Prescribed value
Toe-in	All modules	-	0±1mm{0±0.0394inch}
Camber angle	All modules	-	0°30’±45’
Caster angle	FYH	-	3°±45’
	Except FYH	-	2°±45’
Kingpin angle	All modules	-	7°30’
Tire turning angles (inside/outside)	FYH	11.00R20-16	Preposition front axle: 45°35°(postposition front axle: 37°30°)
		295/80R22.5	Preposition front axle: 47°36°(postposition front axle: 39°31°)
	Except FYH	11.00R20-16	47°36°
		295/80R22.5	49°37°
Side slide amount	FYH	-	Within ±0.08in{0.079in}/1,000mm{39.370in}
	Except FYH	-	Within ±3mm{0.118in}/1,000mm{39.370in}
Axle slide amount	FYH	-	Within 2mm{0.079in}/1,000mm{39.370in}


Toe-in=B − A
A
β
Outer steering angle
Inner steering angle
α
B
HCW53CSF001201

Power train, axle

Symptom

Table of contents

Abnormal sound or noise of differential

1. Diagnosis method of abnormal sound or noise of differential

1. Continuous unclear metal clash during high speed operation

Worn main reducer gear

・Change it or adjust the play.

Deep engagement of main reducer gear

・Adjust the tooth space.

Poor contact of tooth clearances of pinion and ring gear

・ Adjustment of gear engagement or gear replacement;

2. Continuous unclear metal clash during acceleration

Worn main reducer gear

・Change it or adjust the play.

Slight engagement of main reducer gear

・Adjust the tooth space.

3. Continuous unclear metal clash during uniform speed operation

Gear oil shortage

・Makeup;

Wrong preload of pinion bearing and side bearing

・Adjust or change the pre-load.

Loose or worn hub bearing

・Adjust or change the pre-load.

Loose driven gear

・Bolt replacement or repair;

4. Continuous unclear metal clash during circle-making by bend pipe

Worn inner gear or thrust washer of differential

・Change it.

5. Intermittent clash

Gear damage

・Change it.

Impurity of axle box

・Cleaning;

Excessive gap of axle spline

・Change it.

Oil leak of differential

1. Oil leak diagnosis method of differential

1. Oil leak from flange

High oil level

・Repair.

Oil seal damaged

・Change it.

Vent plug

・Clean or change it.

2. Oil leak from axle housing

Loose mounting bolt of seat support

・Retighten it.

Damage of support gasket

・Change it.

Crack of axle housing

・Change it.

Vent plug

・Clean or change it.

3. Gear oil flow to hub

Outer oil seal damage of hub

・Change it.

High oil level

・Repair.

4. Gear oil flow to brake drum

Inner oil seal damage of hub

・Change it.

Abnormal noise and vibration of transmission shaft

1. Diagnosis method of abnormal noise and vibration of transmission shaft

1. Vibration

Loose fastening bolt(s)

・Retighten it.

Misalignment of alignment marks of flange yoke, sleeve and axle

・Reassembly.

Cardan joints loose, or needle roller bearings worn or damaged

・Change it.

Excessive axial clearance of universal joint

・Replacement of worn or damaged part;

Drive shaft unbalance

・Correct the balance degree or make a change.

2. Abnormal sound or noise

Grease shortage

・Grease, correct or replacement.

Excessive gap between axle spline and sleeve

・Spline replacement;

Drive shaft unbalance

・Correct the balance degree or make a change.