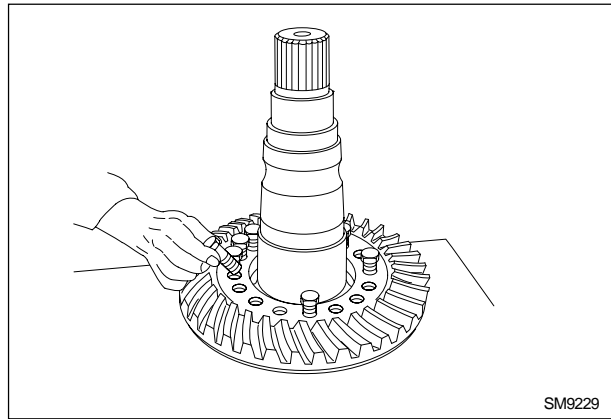


Disassembly of bevel gear crown



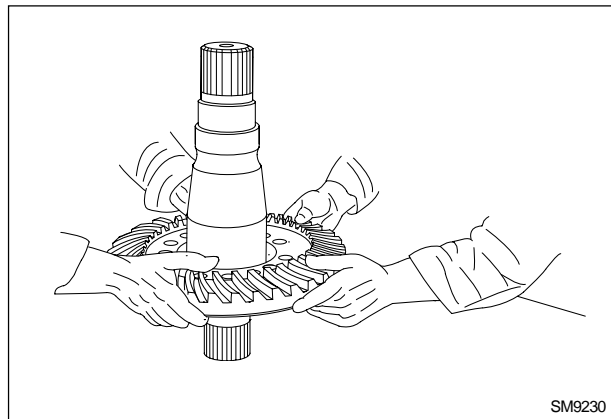
WARNING

Lift and handle all heavy items with a hoist of appropriate capacity.
 Make sure that all parts are held by appropriate slings and hooks.



Use a puller to extract the bearings from the bevel gear shaft.
 Place the bevel gear assembly on a bench equipped with a vice and remove the securing screws.

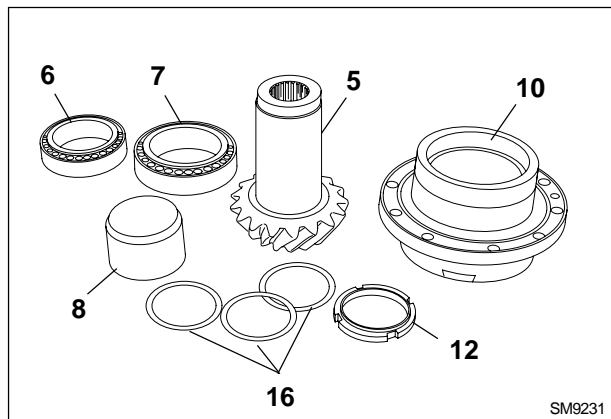
Remove the bevel gear crown from the shaft.



Components of the pinion/bevel gear group

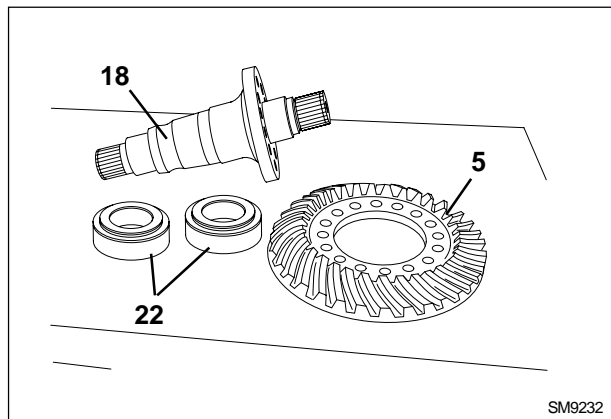
Pinion:

- 5. Bevel gear pinion
- 6-7. Bearing
- 8. Spacer
- 10. Bearing housing
- 12. Ring nut
- 16. Adjusting shims



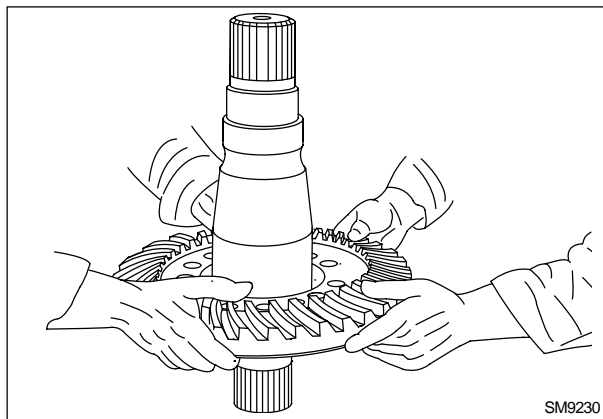
Bevel gear crown:

- 5. Bevel gear crown shaft
- 18. Bevel gear crown shaft
- 22. Bearings

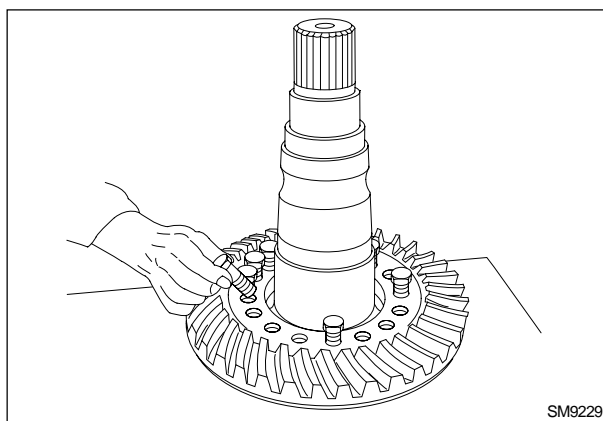


Re-assembly of bevel gear crown

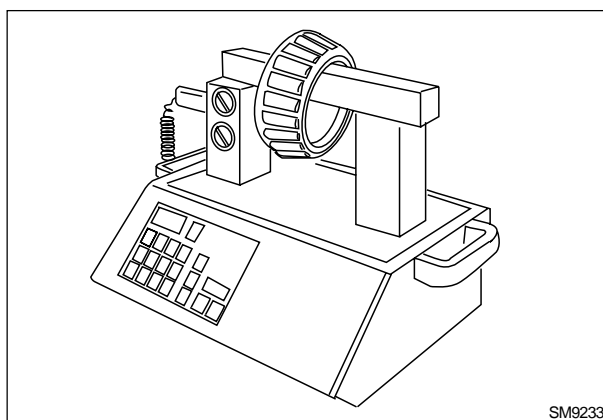
Install the crown gear on the shaft.



Tighten the crown gear on the shaft with the 16 self-locking screw.
For the tightening torques, see the table of **SECTION 0 TABLE OF TIGHTENING TORQUES.**

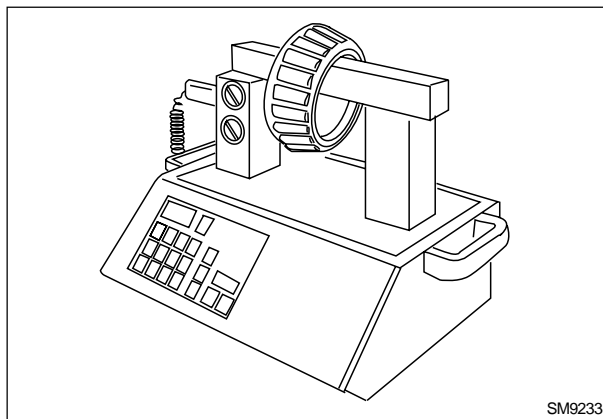


Warm-up the taper bearings up to 110 °C (248 °F) and install them individually on the shaft.

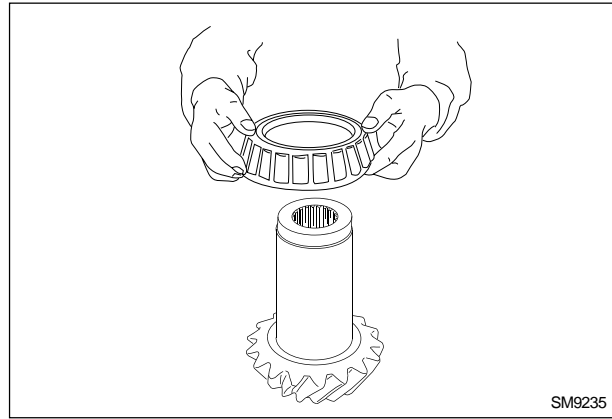


Installation of the bevel pinion

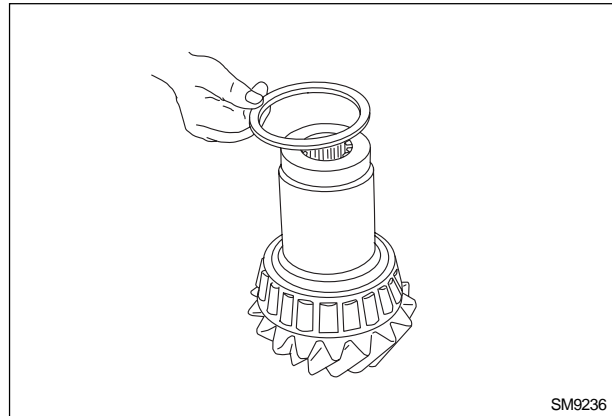
Warm-up the half bearing up to 110 °C (248 °F).



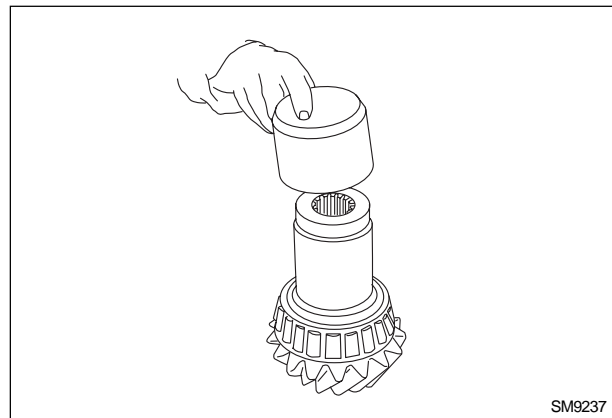
Install the half bearing on the pinion.



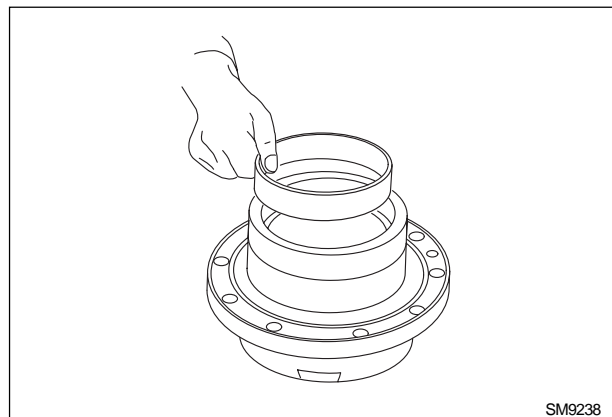
Install a sample ring 4 mm thick, on the pinion.



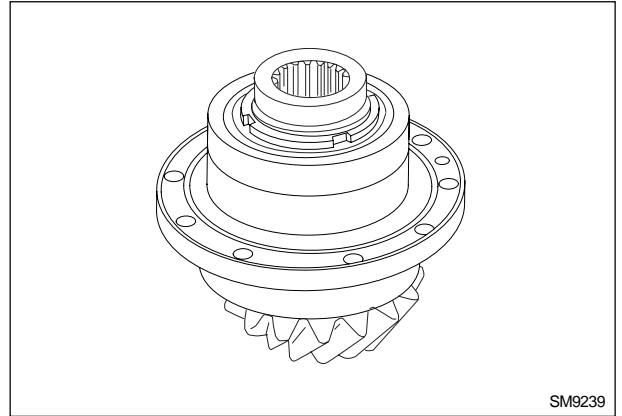
Install the bearing spacer.



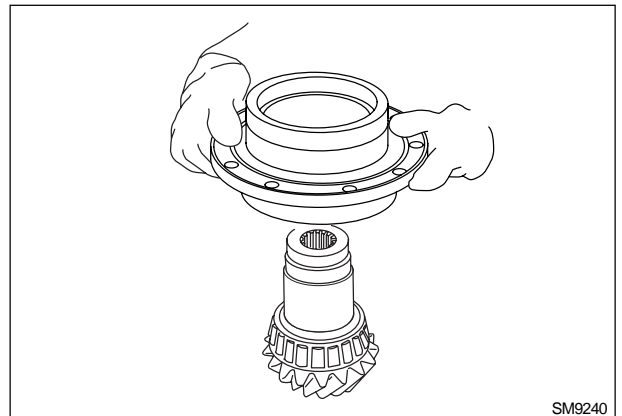
Prepare the bearing housing, inserting first the outer race of the bearing.
To facilitate the insertion of the race, use a hydraulic press.



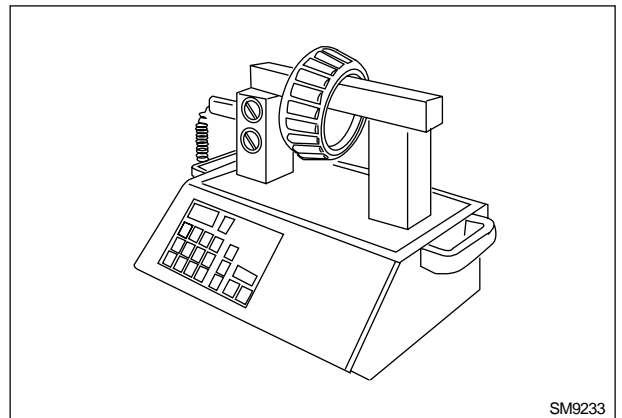
Turn the housing upside down and insert the other outer race of the bearing with a hydraulic press.



Install the housing into the pinion.



Warm-up the half bearing at a temperature of 110 °C (248 °F).

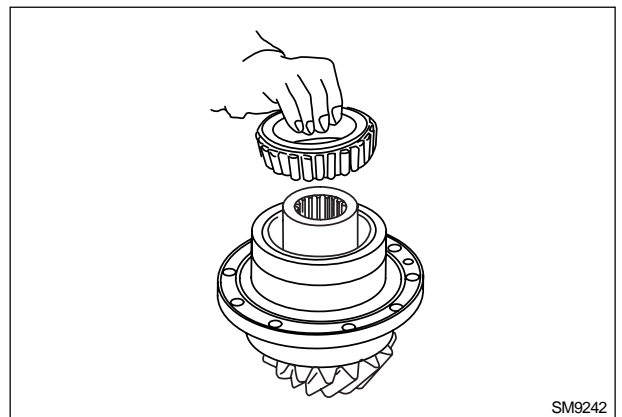


Lubricate and install the half bearing.

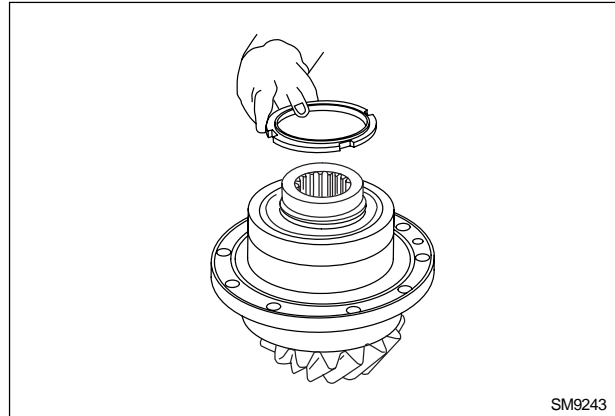


WARNING

It is dangerous to hit hardened steel made parts with tools different from a mild steel or non ferrous metal mallet. When performing the removal and installation of these components, always wear safety glasses with side shields, gloves etc. to minimise the possibility of injuries.

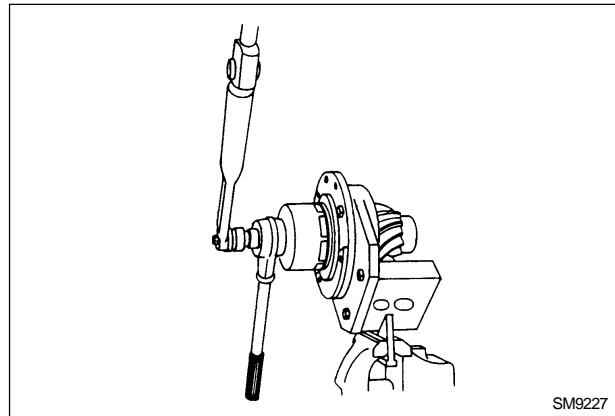


Place the retaining ring nut on the bevel pinion.

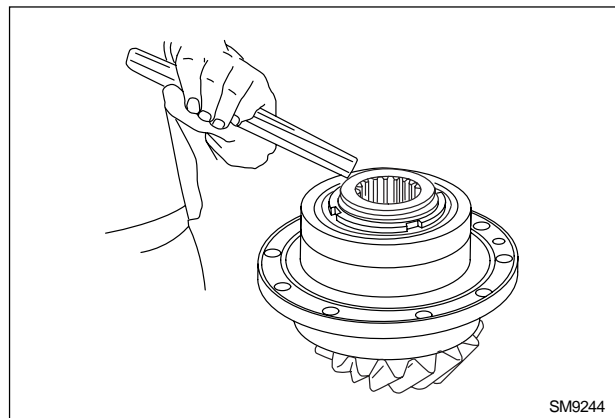


Secure the pinion assembly to the appropriate bracket and place it in a vice.

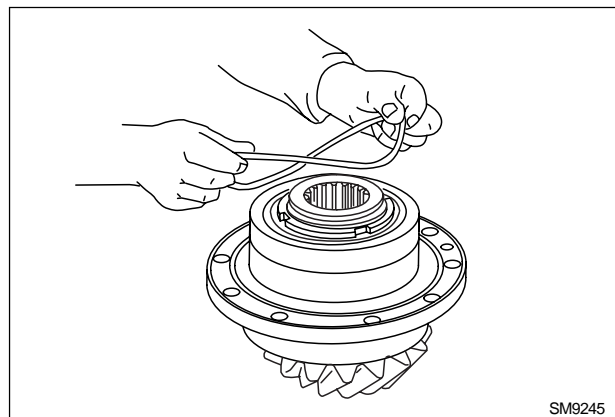
Tighten the ring nut with the appropriate wrench **380000919** and torque multiplier to 130 to 150 daNm (958.5 to 1106 lbf.ft).



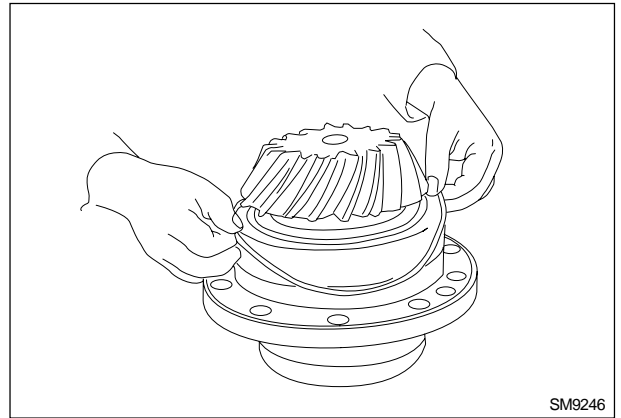
Punch the ring nut with a chisel on the two sides of the pinion.



Lubricate and install the O-Ring in the relevant seat of the housing.



Turn the pinion assembly upside down.
lubricate and insert the O-Ring in the seat of the housing.



SM9246

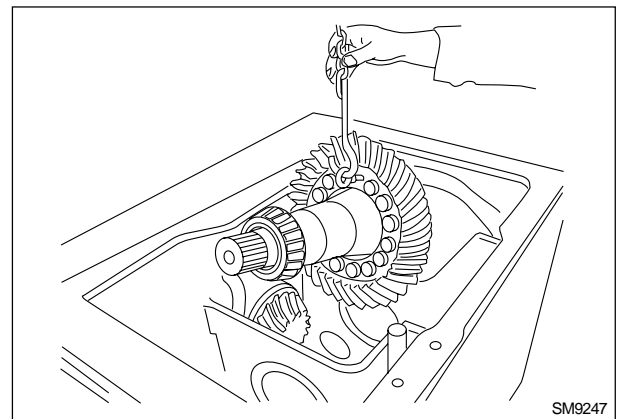
Re-installation of the bevel gear crown

Re-install the bevel gear crown, following what listed here below.
Install a lifting hook to the crown and insert it into the bevel gear compartment.



WARNING

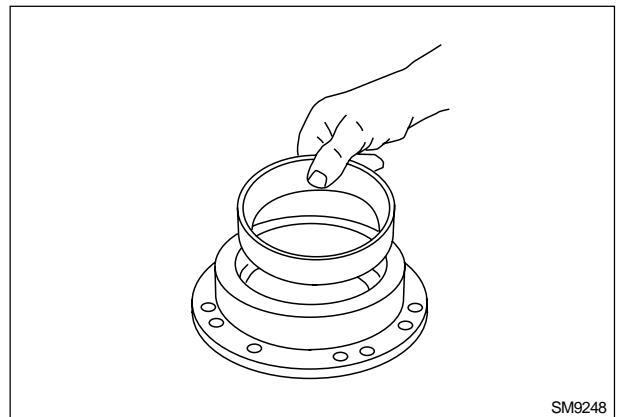
**Lift and handle all heavy items with a hoist of appropriate capacity.
Make sure that all parts are held by appropriate slings and hooks.**



SM9247

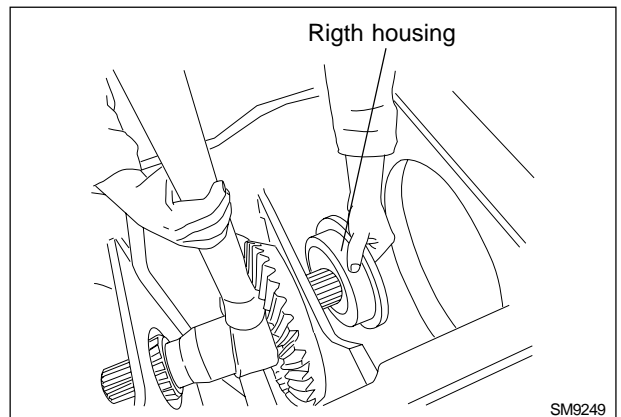
Lubricate adequately the bearings with engine oil.

Pre-install the right and left supports, installing the bearing outer races inside, using a hydraulic press.



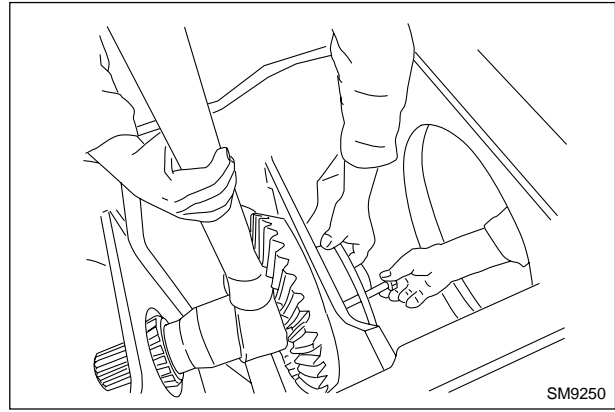
SM9248

First, install the left support assembly, without adjusting shims, using 4 screws only and tighten to a torque of 13 daNm (95.8 lbf.ft).



SM9249

Then, install the right support, without adjusting shims, (0.73 lbf.ft) with two retaining screws, tightening them with increments of 0.1 daNm (5.16 lbf.ft) up to a final value of 0.7 daNm. At the same time, turn manually the bevel gear crown a few turns, to set the taper rollers in the relevant races.

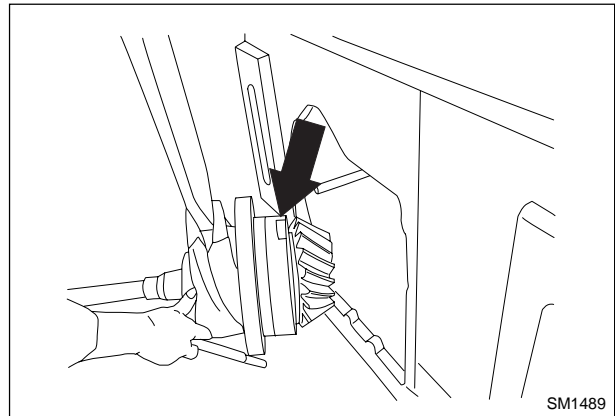


Re-installation of the pinion

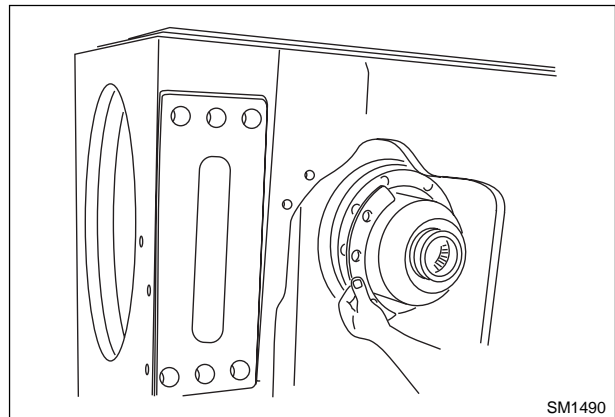
Lubricate adequately all the mating surfaces of the pinion.

Prearrange the assembly for the installation on the housing, slinging it with cables and a hoist.

To facilitate the centring of the pinion, use two guiding screws, positioning the notch upward, as in the figure.



Install the pinion in the housing and set the position and the backlash as described at item 4.4.6 of this section.

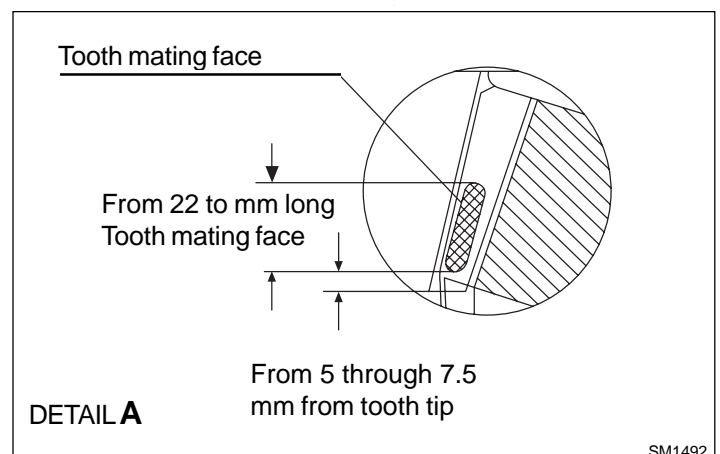
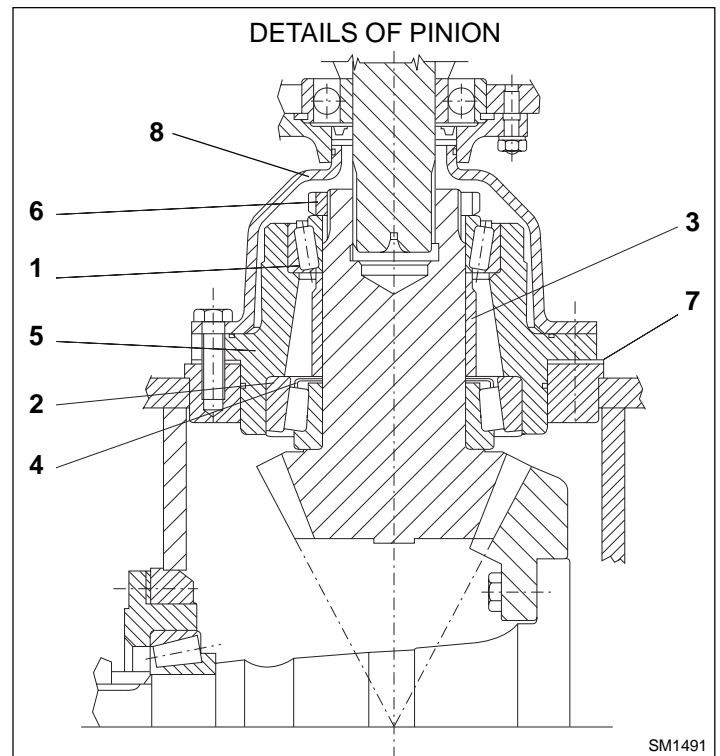


4.4.6 PROCEDURE FOR THE SETTING OF THE BEVEL PINION BEARINGS PRE-LOAD

Set the pre-load of the bearing, complying with the phases as follows:

- A. Install bevel pinion (8) on pinion housing (5) complete with bearings (1 and 2).
- B. Insert spacer (3) and the sample ring 4 mm thick, the inner race of bearing (1) using a press, then tighten ring nut (6).
- C. Holding pinion housing (5) still, measure the axial play of the pinion with a dial gauge located on the head or the tail of it.
- D. After reading the value, loosen the ring nut and pull-out bearing (1), remove spacer (3) and the sample ring. Deduct the value measured from the thickness of the sample ring (4 mm), then shim using shims (4), in the location indicated, for the resulting value. Insert spacer (3), half bearing (1) then tighten the ring nut to a torque of **130 to 150 daNm**.
- E. Check that the rolling torque is included between **0.2 to 0.4 daNm**. Then bead the ring nut on the pinion. Otherwise, repeat the operation adding or removing shims to obtain the rolling torque indicated.

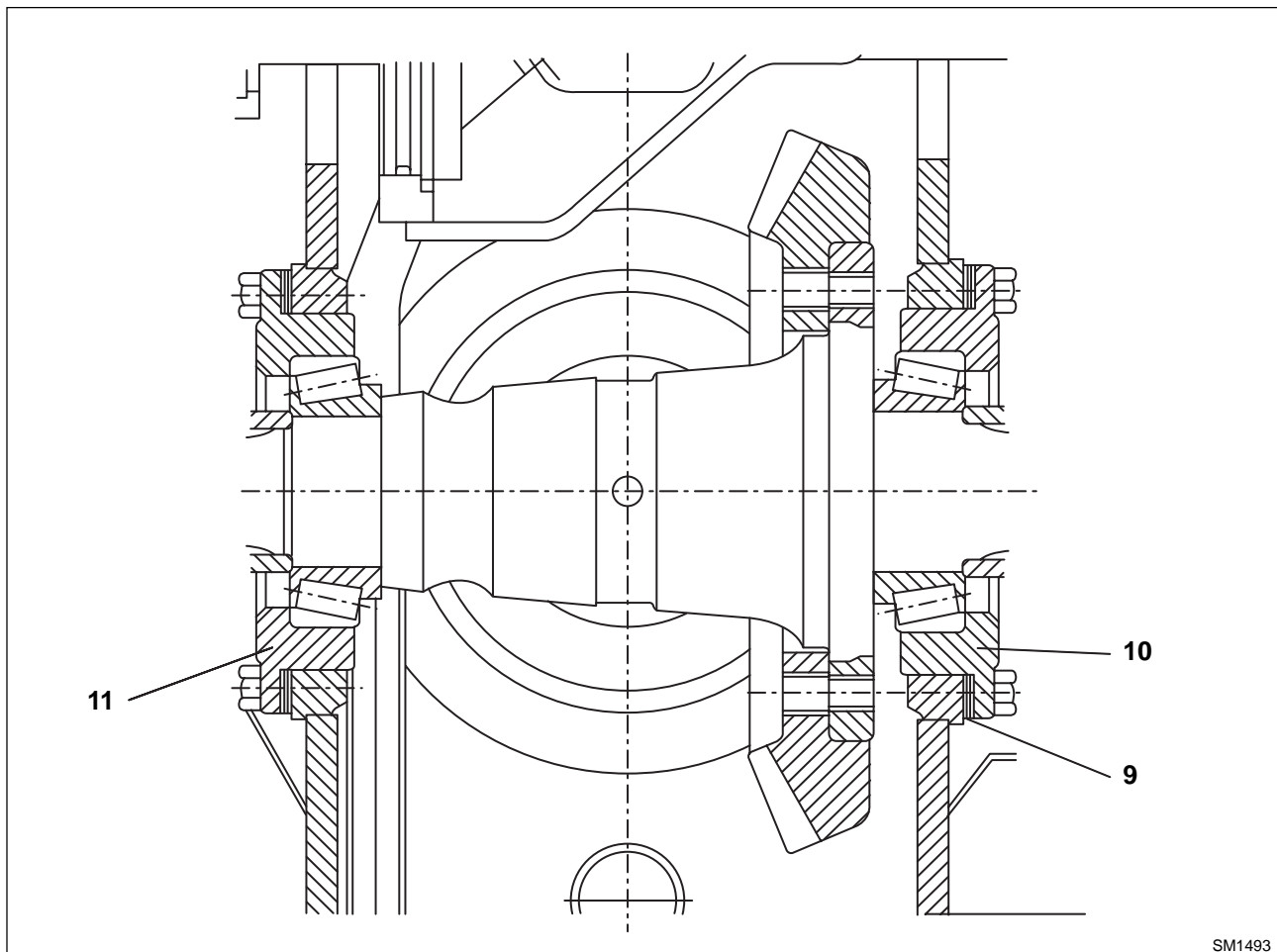
1. Pinion half bearing
2. Pinion half bearing
3. Spacer
4. Bearing adjusting shims
5. Housing
6. Ring nut
7. Adjusting shims available:
1 mm
0.5 mm
0.2 mm
8. Bevel pinion



4.4.7 PROCEDURE FOR THE SETTING OF THE BEVEL GEAR CROWN

Set the pre-load of the bearing, complying with the phases as follows:

- A.** Shim with shims (9) to obtain a rolling torque on the bevel gear crown shaft (without pinion) equivalent to 0.4 to 0.8 daNm (2.9 to 5.9 lbf.ft).
- B.** After pre-loading the bevel gear crown bearings according to item A, position pinion housing (5) (see item 4.4.5, procedure for the bevel pinion bearings pre-load) using shims (7) until a contact of the pinion/crown teeth according to what indicated in detail "A" of item 4.4.6 is obtained. See item 4.4.6 procedure for the setting of the preload of the bevel gear pinion bearings.
- C.** After the specified contact specified in phase B is obtained, split shims (9) between the two bearing housings (11) and (10) until a backlash between the pinion/crown teeth equivalent to 0.25 to 0.33 mm. Re-check that the teeth contact and (0.0098 to 0.013 in) the bearing pre-load of the bevel gear crown shaft are within the specifications of items A and B.
- D.** Check that the total rolling torque measured on the pinion is equal to 0.35 to 0.70 daNm (2.6 to 5.2 lbf.ft).



SM1493

4.4.8 RE-INSTALLATION OF HOUSING COVER

Install two lifting eyes on the cover and arrange it for the installation on the housing.

Apply a film of Loctite 548 to the mating faces of the housing and cover.



WARNING

Lift and handle all heavy components with a lifting device of appropriate capacity. Make sure that the parts are supported by appropriate slings and hooks. Use the lifting eyes provided for this purpose. Make sure that all bystanders keep clear from the load to be lifted.

Insert the dowels to facilitate the installation of the cover.

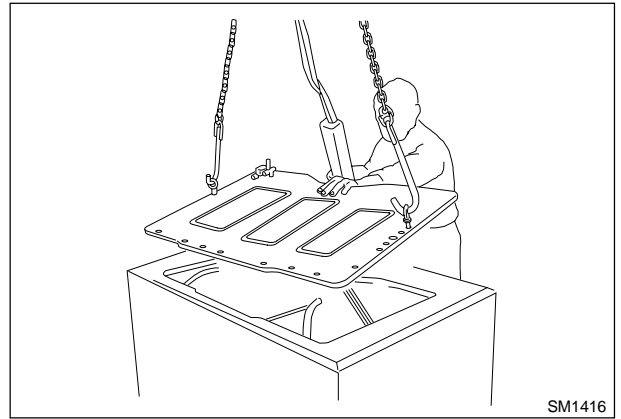
At first, install 4 or 5 screws to secure the cover to the housing.

To allow the mating of the gears of the shaft and the planetary gears, it is necessary to disengage the brakes.

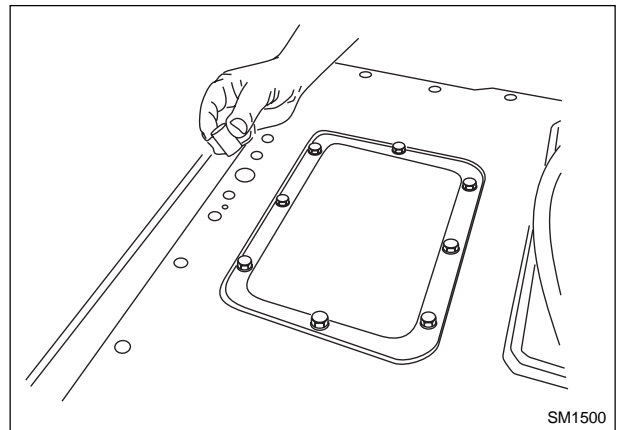
Using a hydraulic pump, power the partitioning block of the brake control circuit box with a pressure of at least 10 bar (145 psi).

Once the brakes are disengaged, turn the pinion a few turns in both directions to provide a good setting between the gears.

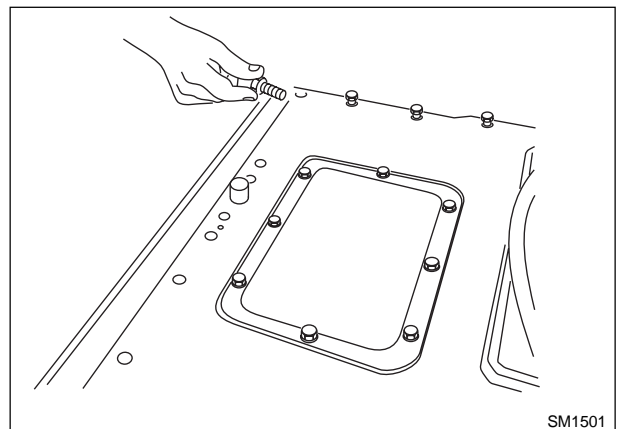
Tighten all the remaining screws on the cover.
Disconnect the pump from the partitioning block.



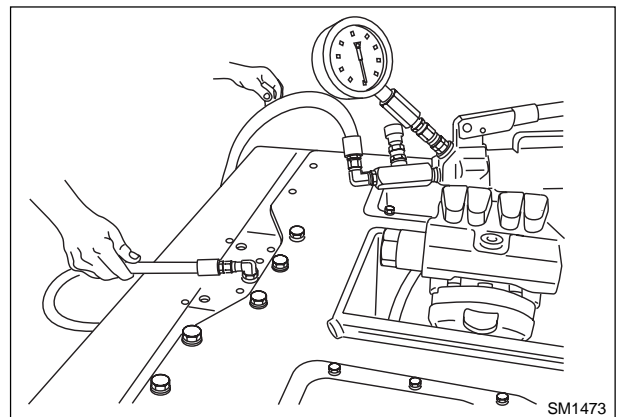
SM1416



SM1500



SM1501



SM1473

4.5 SPECIFICATIONS AND DATA

4.5.1 BEVEL GEAR REDUCTION UNIT (General data / dimensions)

General data

Type of gears helical teeth

Reduction ratio (17/36) 1:3.076

Backlash between the face of the teeth 0.25 to 0.33 (0.098 to 0.013 in)
 average 0.3 mm (0.012 in)

Dimensions - See pinion - crown gear sections

A Ø Inner diameter of bevel gear shaft bearing cage 139.948 to 139.988 (5.509 to 5.511 in)
 Ø Outer diameter of bearing 139.980 to 140.000 (5.511 to 5.512 in)

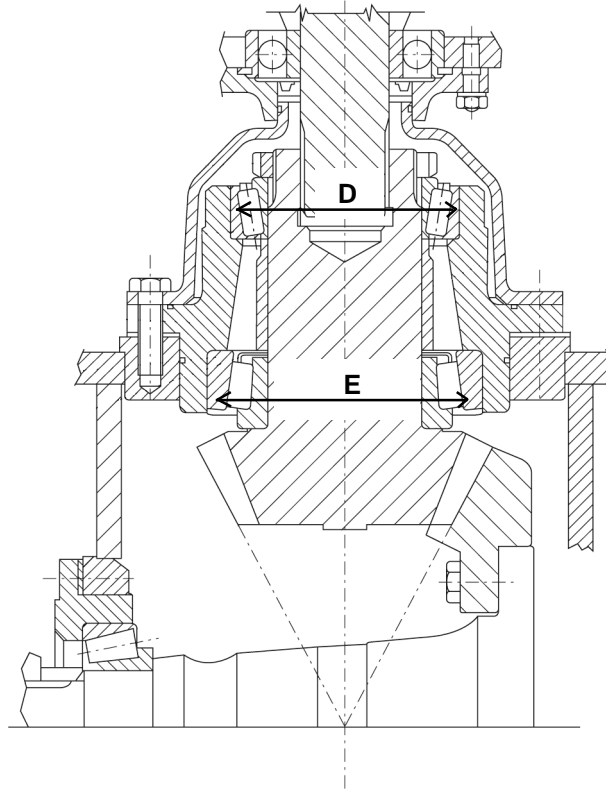
* **B** Ø Inner diameter of bearing 79.850 to 80.000 (3.144 to 3.149 in)
 Ø Outer diameter of bevel gear shaft 80.020 to 80.033 (3.150 to 3.151 in)

C Ø Outer diameter of bevel gear shaft hub 239.948 to 240.000 (9.446 to 9.448 in)
 Ø Inner diameter of bevel gear 240.000 to 240.052 (9.448 to 9.450 in)

E Ø Inner diameter of pinion housing 179.932 to 179.972 (7.084 to 7.085 in)
 Ø Outer diameter of pinion bearing 179.975 to 180.00 (7.086 to 7.087 in)

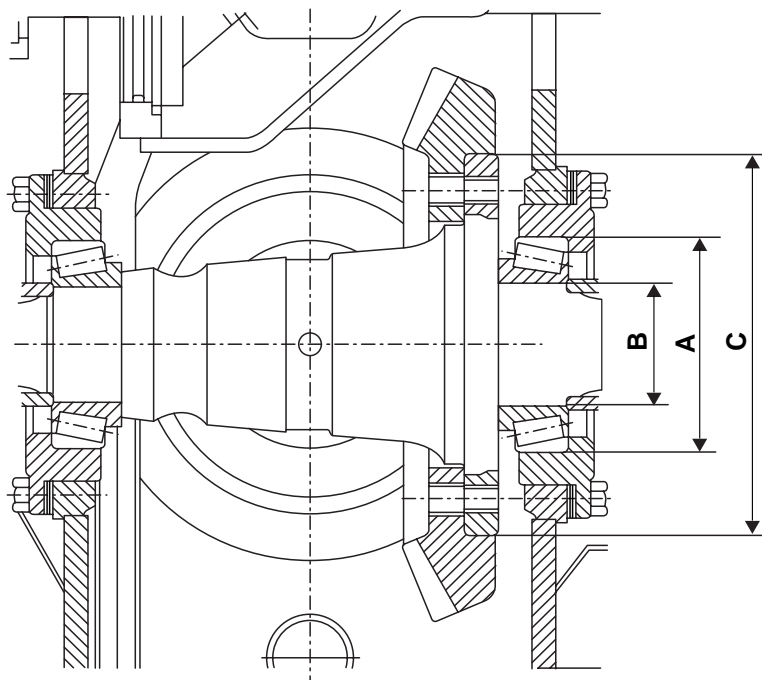
D Ø Inner diameter of pinion support 149.932 to 149.972 (5.902 to 5.904 in)
 Ø Outer diameter of bearing 149.980 to 150.00 (5.905 to 5.906 in)

* **Note** – *The dimensions are identical on both sides.*



Pinion sectional view

F14539



Crown gear sectional view

SM1503

4.5.2 BRAKES

General data and dimensions

TYPE	multiple disc, oil bath
Number of discs per brake	
- Driven (with sintered facing)	5
- Driving (steel)	4

Specification of springs

Number of springs for each brake	20
- Free length of spring	83 mm (3.268 in)
- Diameter of wire	5.5 ± 0.05 mm (0.216 ± 0.002 in)
- Outer diameter fully pressed	30 ± 0.30 mm (1.181 ± 0.012 in)

Load with compression at:

66 mm (2.598 in)	135 ± 7 daN (995.3 ± 51.6 lbf.ft)
61 mm (2.402 in)	174 ± 9 daN (1282.9 ± 66.4 lbf.ft)

Matings and tolerances

Thickness of clutch disc pack	36.5 ÷ 38.5 mm (1.437 to 1.516 in)
.....	(under a load of 300 to 400 kg, 661.4 to 881.8 lb.)
Average travel of pressure plate	4.5 mm (0.177 in)
Average wear	3.5 mm (0.138 in)
Total travel	8 mm (0.315 in)
Thickness of steel plates	3.35 to 3.65 mm (0.132 to 0.144 in)
Thickness of sintered driven discs	4.70 to 4.80 mm (0.185 to 0.189 in)

Clutch inner hub bearings

Inner diameter	Ø 104.985 to 105.000 (4.133 to 4.134 in)
Outer diameter	Ø 159.985 to 160.000 (6.298 to 6.299 in)