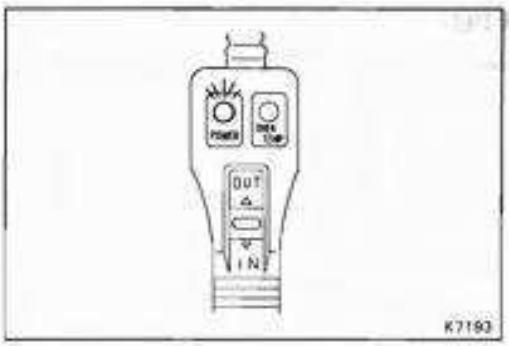


K7193

ELECTRIC WINCH

On-Vehicle Inspection

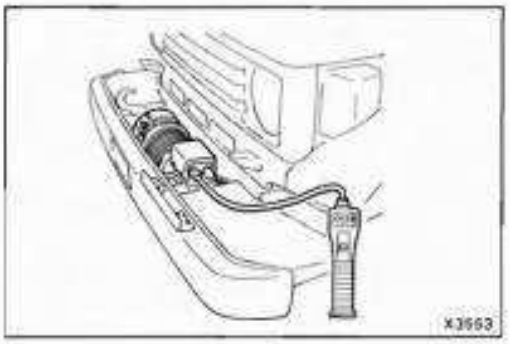
INSPECTION OF WINCH REMOTE CONTROL SWITCH

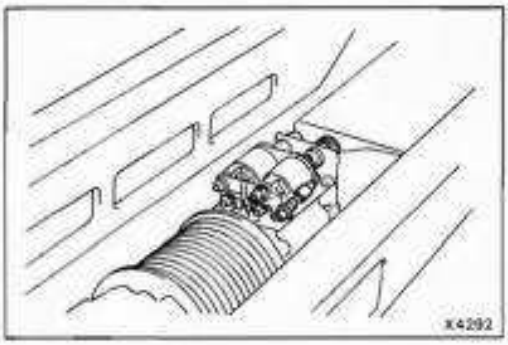
1. **CONNECT WINCH CONTROL SWITCH CONNECTOR**

2. **INSPECT WINCH CONTROL SWITCH**
   (a) The power indicator light will light when the winch turns ignition switch ON.
   (b) Operate winch control switch, confirm winch function.

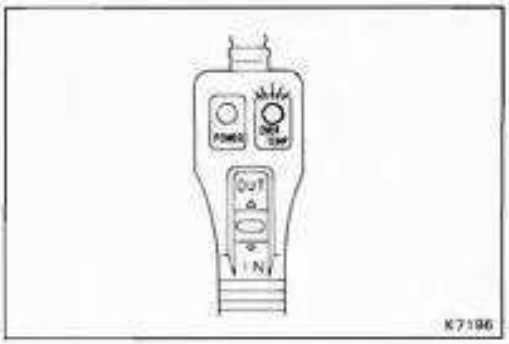
   HINT: Be careful not to tighten or strain the winch wire.

   (c) Turn ignition switch OFF.


X3553

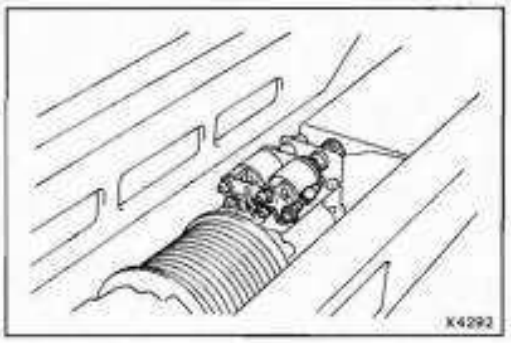

K4292

3. **INSPECT OVERHEAT TEMPERATURE INDICATOR**
   (a) Remove the four screws and the cover.
   (b) Disconnect the connector of magnet switch No.2.



K7196

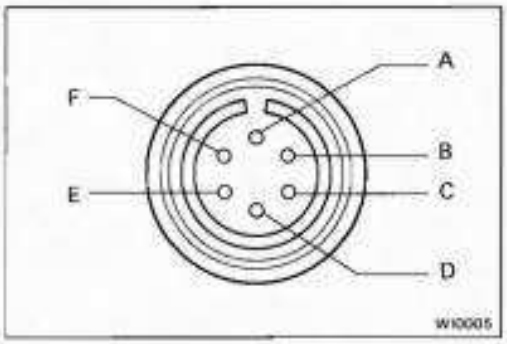
   (c) When ignition switch ON, the overheat temperature indicator light will light and buzzer sound.
   (d) Turn ignition switch OFF.


K4292

   (e) Connect the connector.
   (f) Install the four screws and the cover.

4. **DISCONNECT WINCH CONTROL SWITCH CONNECTOR**

RM183e 1990 7 Series Chassis and Body



5. **CHECK WINCH REMOTE CONTROL SWITCH CIRCUIT**

Check that there is continuity between terminals.

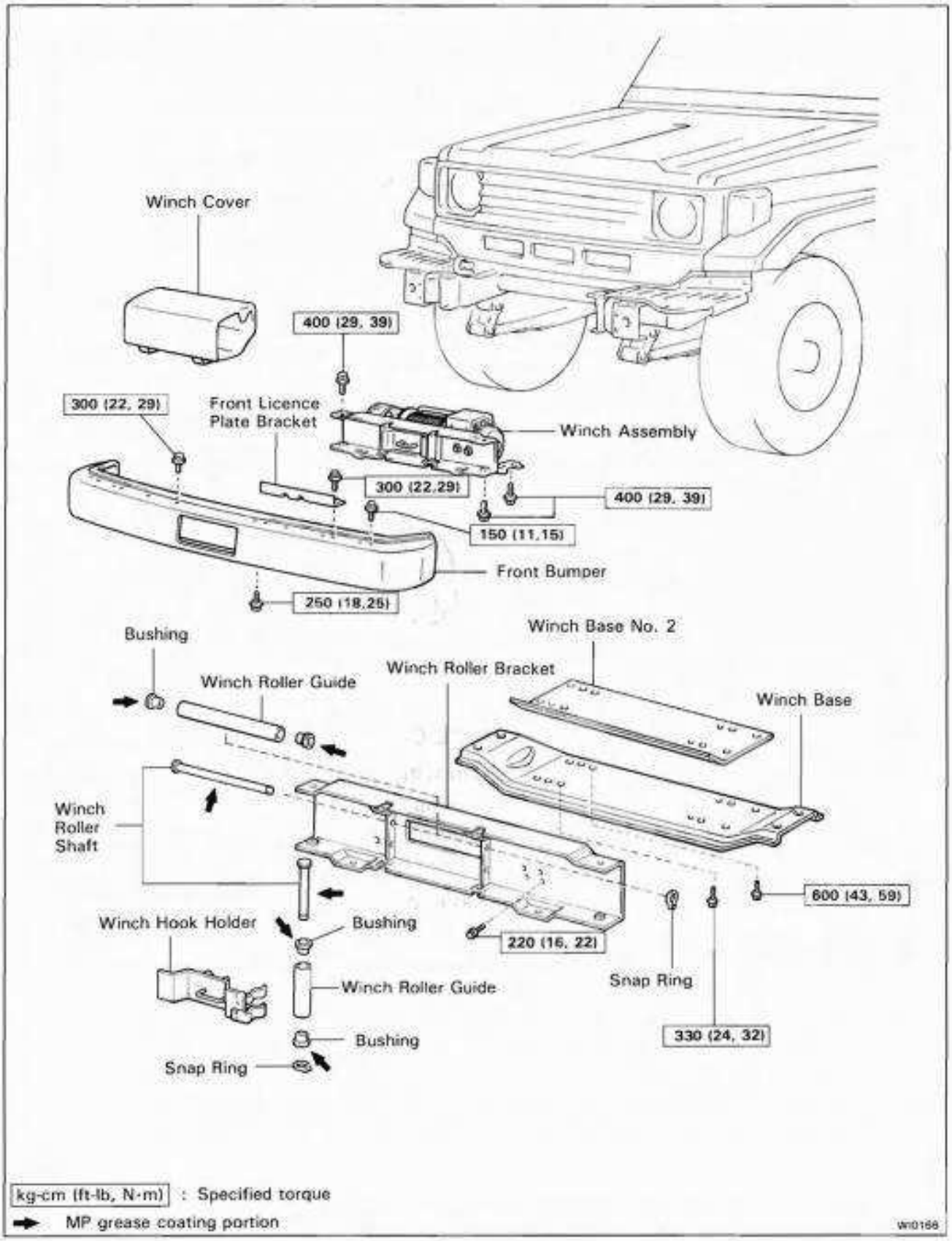
SW Position \ Terminal	A	B	C	D	E	F
NEUTRAL	○	○	○		○	
		○				
		○				
IN		○	○			
		○		○		
OUT		○	○			
		○				○

If there is no continuity, replace the remote control switch.

RM183e 1990 7 Series Chassis and Body

Removal and Installation of Winch Assembly

Remove and install the parts as shown.



kg-cm (ft-lb, N·m) : Specified torque

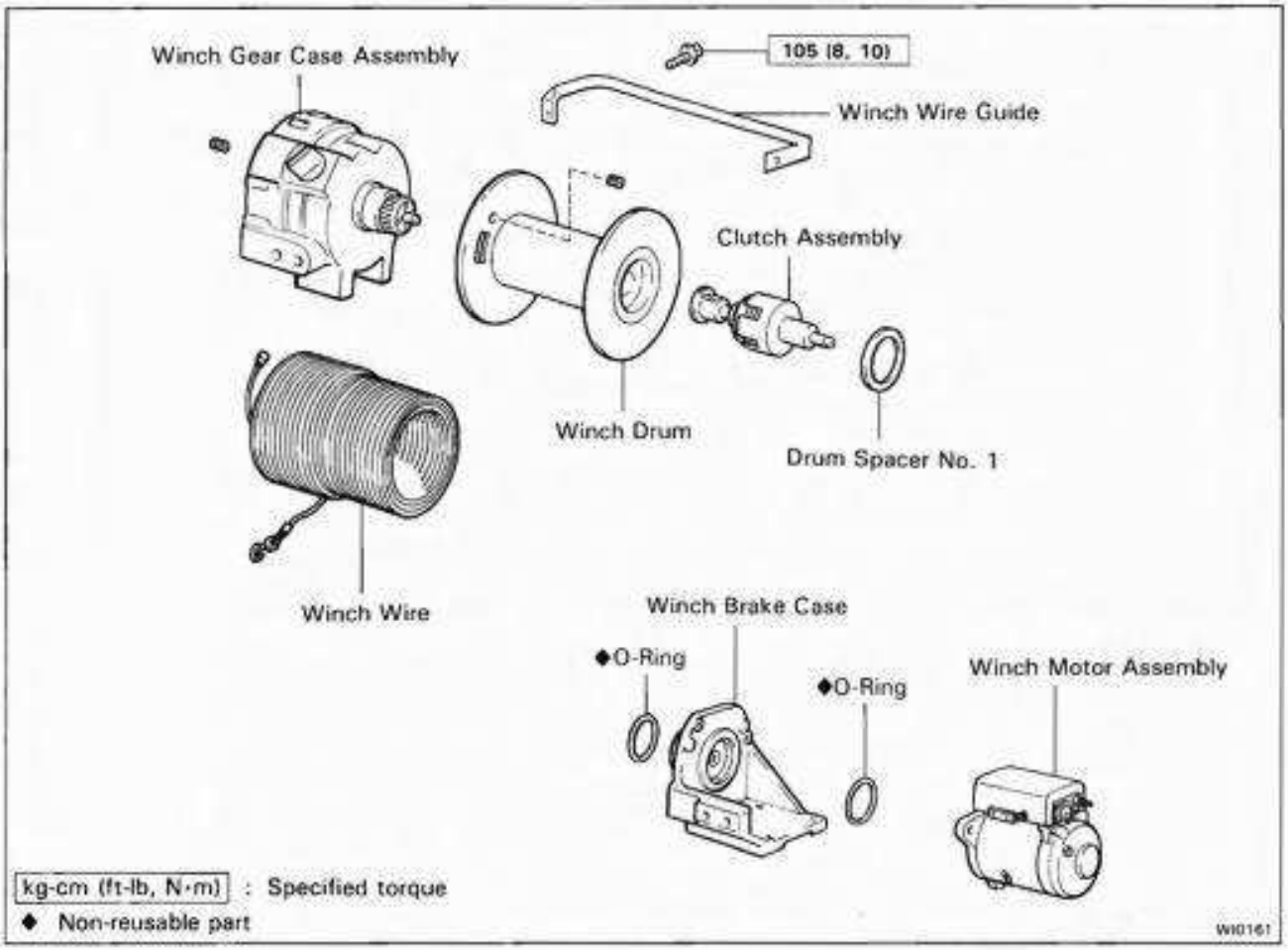
➡ MP grease coating portion

WI0168

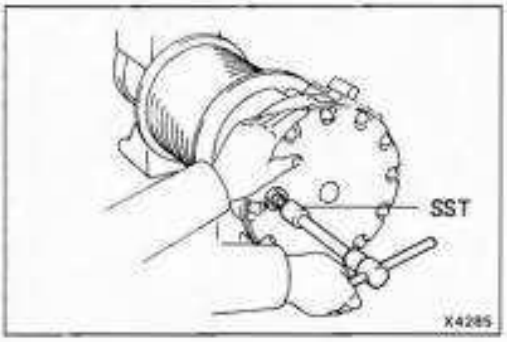
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Winch Assembly

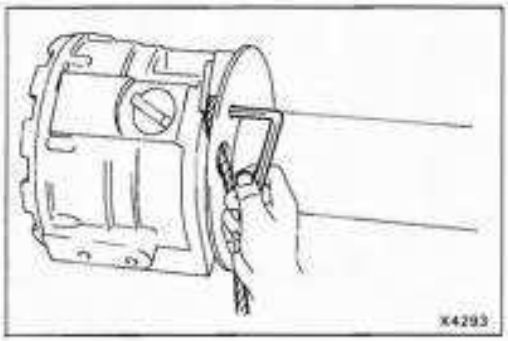
COMPONENTS



REMOVAL OF WINCH ASSEMBLY

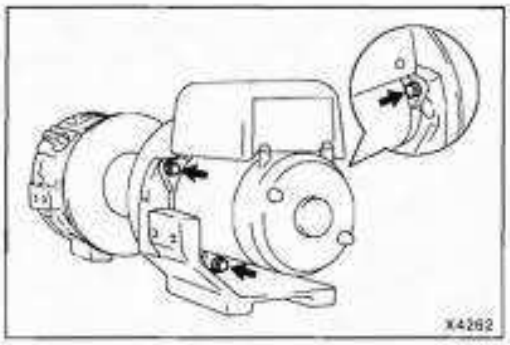


1. **DRAIN WINCH FLUID**
   (a) Using SST, remove the drain plug.
   SST 09313-30021
   (b) Drain the winch fluid.
2. **REMOVE WINCH WIRE GUIDE**



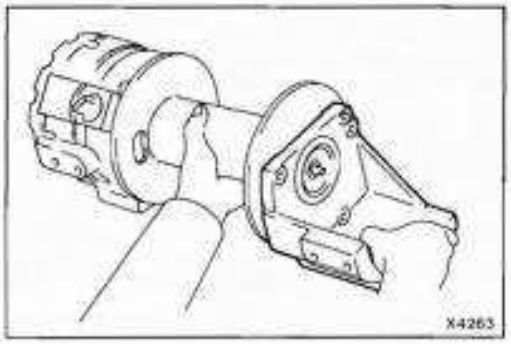
3. **REMOVE WINCH WIRE**
   (a) Shift the shift lever to the neutral position.
   (b) Pull out the winch wire from the drum.
   (c) Using a hexagon wrench, remove the bolt.
   (d) Remove the winch wire.

RM183e 1990 7 Series Chassis and Body



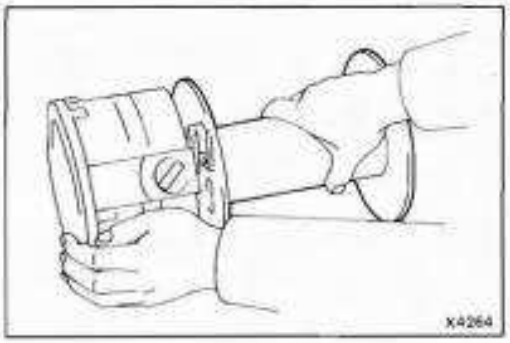
4. REMOVE WINCH MOTOR ASSEMBLY

Remove the three bolts, the winch motor assembly and the O-ring.



5. REMOVE WINCH BRAKE CASE

Remove winch brake case, the O-ring and drum spacer No.1.

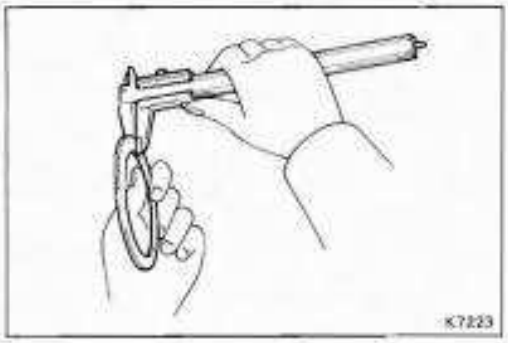


6. REMOVE WINCH DRUM

(a) Remove the clutch assembly.

(b) Remove the winch drum from the gear case assembly.

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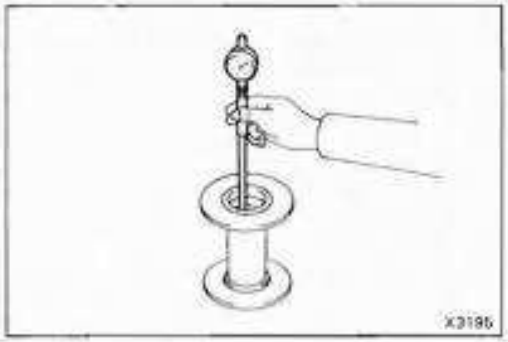
INSPECTION OF WINCH ASSEMBLY

1. INSPECT DRUM SPACER NO.1

Using calipers, measure the thickness of drum spacer No.1.

Standard bore: 1.4 mm (0.0551 in.)

Minimum bore: 1.0 mm (0.0394 in.)



2. INSPECT WINCH DRUM

Using a cylinder gauge, measure the each side bushing bore.

Standard bore: 64.20 mm (2.5276 in.)

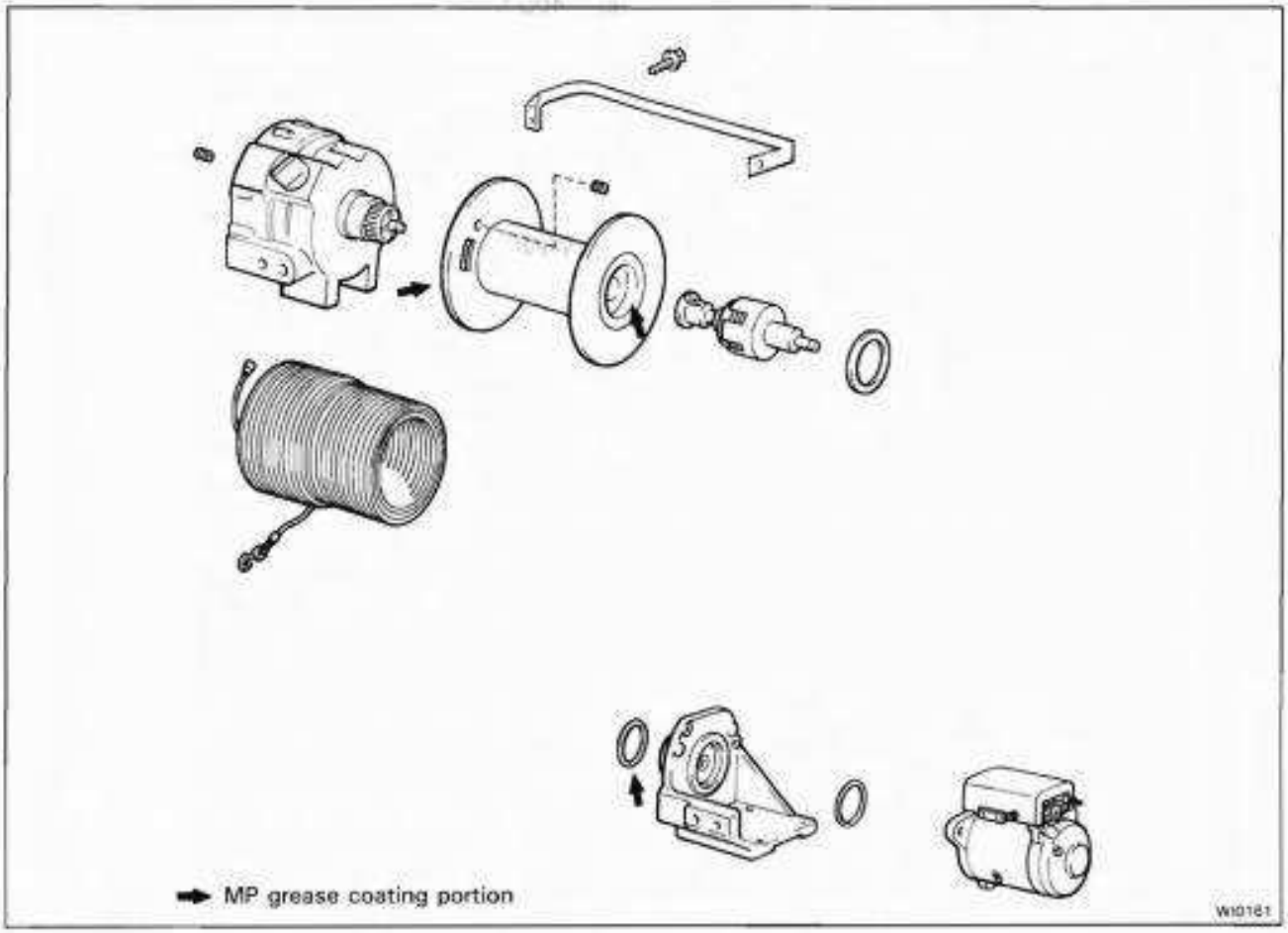
Maximum bore: 64.36 mm (2.5339 in.)

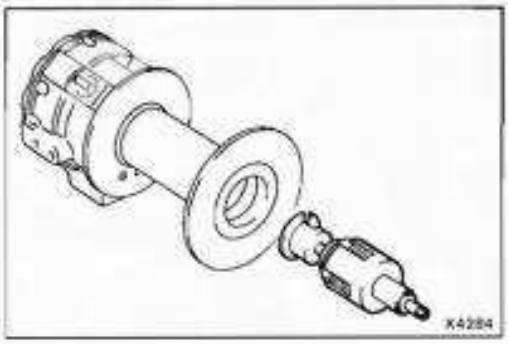
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INSTALLATION OF WINCH ASSEMBLY

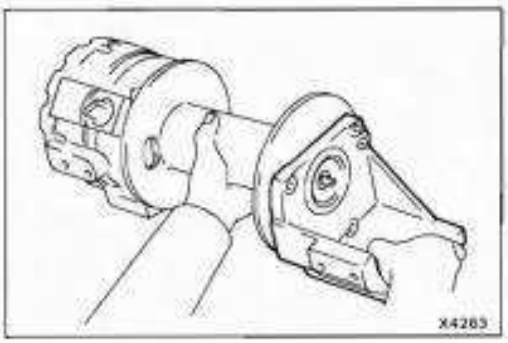
(See page WI-34)

1. COAT MP GREASE ON FOLLOWING PARTS:



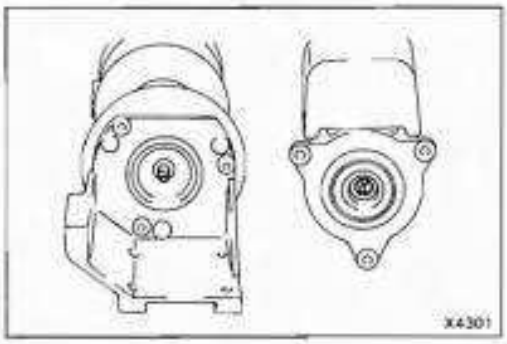


2. INSTALL WINCH DRUM
   (a) Install the winch drum to the gear case.
   (b) Install the clutch assembly.



3. INSTALL WINCH BRAKE CASE

RM183e 1990 7 Series Chassis and Body

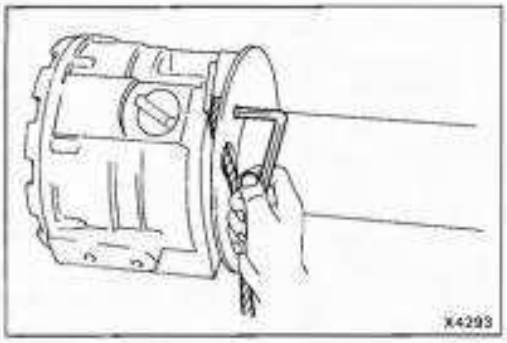


4. INSTALL WINCH MOTOR ASSEMBLY

(a) Align the groove and the tip of the input shaft.

(b) Torque the three bolts.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)



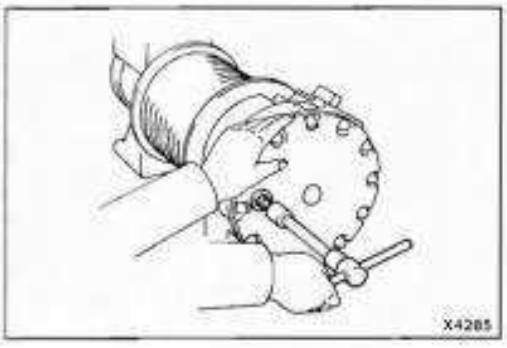
5. INSTALL WINCH WIRE

(a) Install the winch wire to the winch drum.

(b) Using a hexagon wrench, install the bolt.

Torque: 10 kg-cm (9 in.-lb, 1.0 N·m)

(c) Wind the winch wire around the winch drum.



6. FILL WINCH WITH AUTOMATIC TRANSMISSION FLUID

Fill the winch with automatic transmission fluid and torque the drain plug.

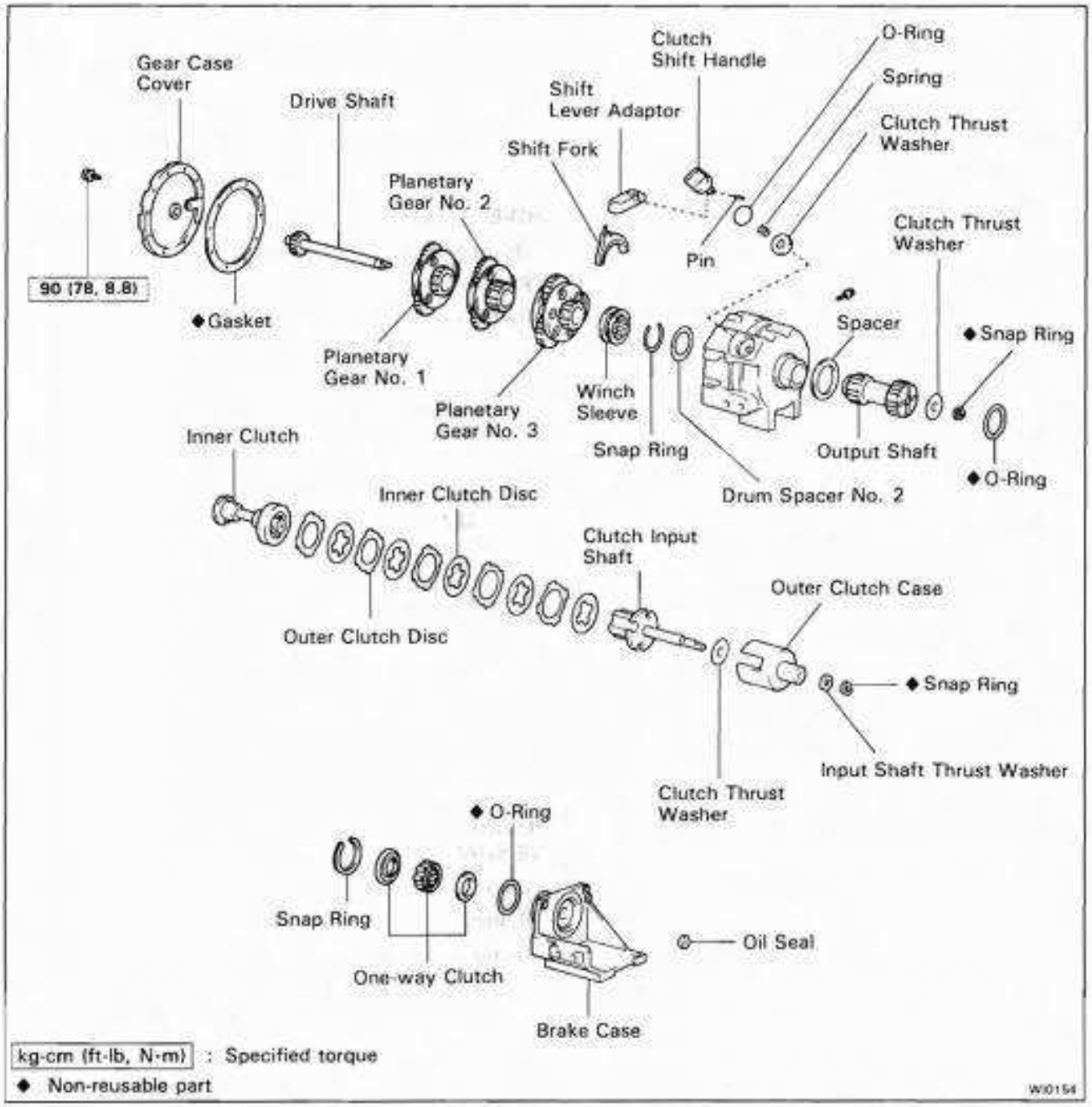
Torque: 175 kg-cm (13 ft-lb, 17 N·m)
Oil grade: ATF Type F
Capacity: 0.9 liters (0.95 US qts, 0.79 Imp.qts)

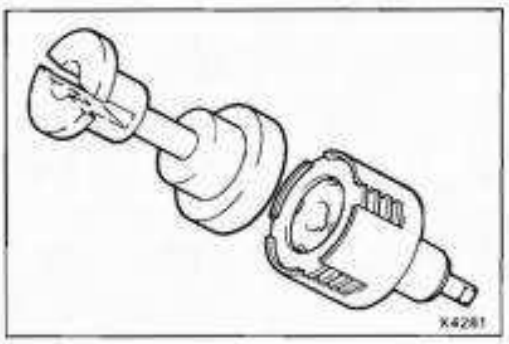
7. WINCH WIRE GUIDE

RM183e 1990 7 Series Chassis and Body

Winch Components

COMPONENTS

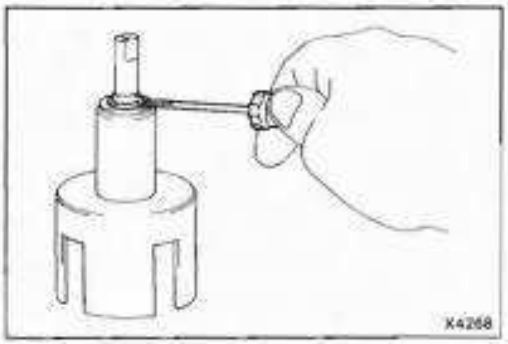




DISASSEMBLY OF WINCH COMPONENTS

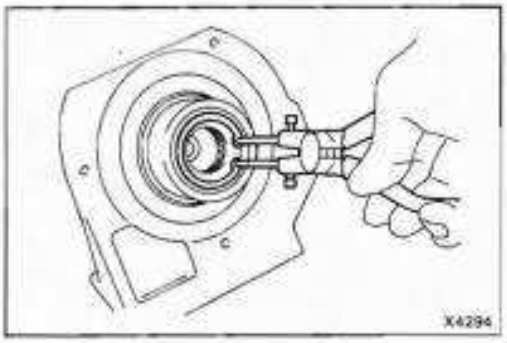
1. **REMOVE INNER CLUTCH, CLUTCH DISCS FROM OUTER CLUTCH**

RM183e 1990 7 Series Chassis and Body



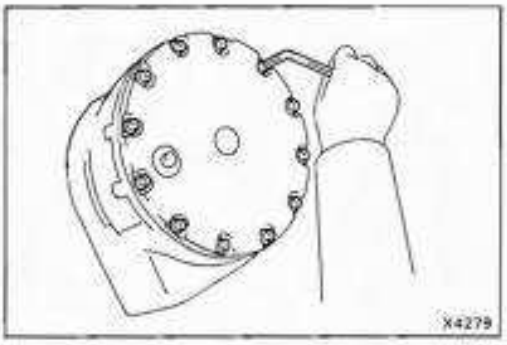
2. REMOVE OUTER CLUTCH

(a) Using a screwdriver, remove the snap ring.
(b) Remove the thrust washer.
(c) Remove the clutch input shaft and thrust washer.



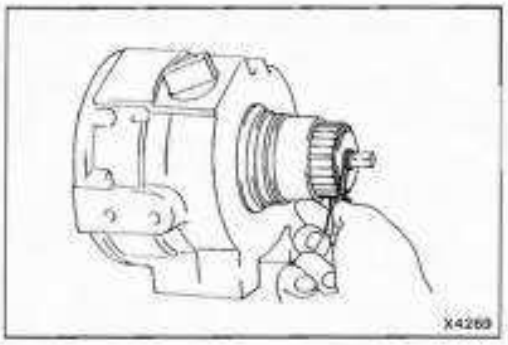
3. REMOVE ONE-WAY CLUTCH FROM BRAKE CASE

(a) Using snap ring pliers, remove the snap ring.
(b) Remove the one-way clutch.
(c) Remove the O-ring.



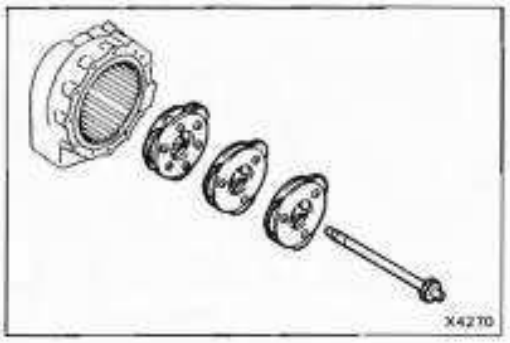
4. REMOVE GEAR CASE COVER

Using a hexagon wrench, remove the gear case cover and gasket.



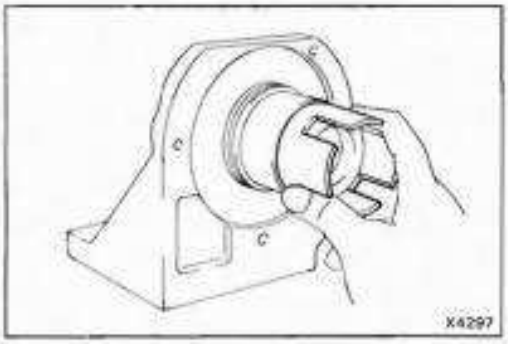
5. REMOVE PLANETARY GEAR NO.1, NO.2, NO.3 AND DRIVE SHAFT

(a) Using a screwdriver, remove the snap ring.
(b) Remove the thrust washer.
(c) Remove the O-ring.



(d) Pull out the drive shaft, and remove the planetary gear No.1, No.2 and No.3.

RM183e 1990 7 Series Chassis and Body



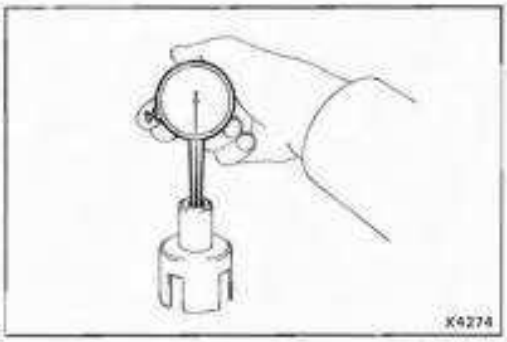
INSPECTION AND REPLACEMENT OF WINCH COMPONENTS

1. INSPECT ONE-WAY CLUTCH

(a) Install one-way clutch.
(See page WI-48)

(b) Install the outer clutch and turn it. Then the outer clutch turns freely counterclockwise and locks clockwise.

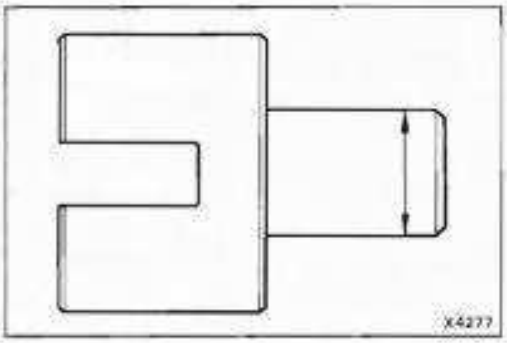
(c) If necessary, replace the one-way clutch.



2. INSPECT OUTER CLUTCH

(a) Using a caliper gauge, measure the bushing bore.

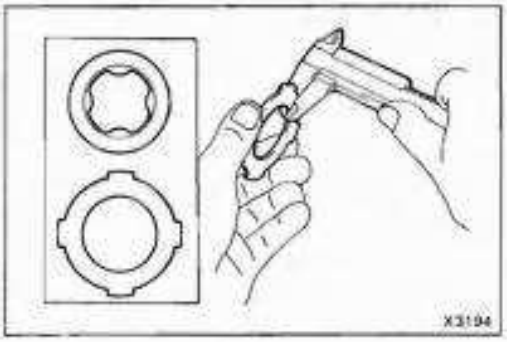
Standard bore: 12.00 mm (0.4724 in.)
Maximum bore: 12.03 mm (0.4736 in.)



(b) Inspect the outer clutch for wear or damage.

If necessary, replace the drive shaft.

Standard outer diameter: 27.77 mm (1.0933 in.)

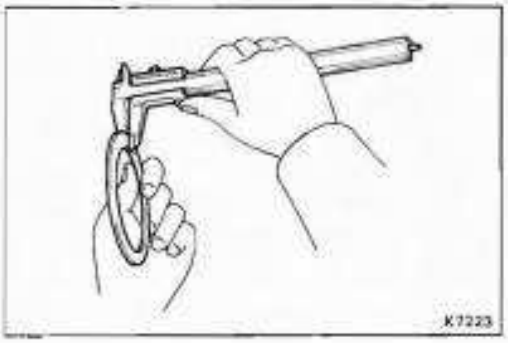


3. INSPECT CLUTCH OUTER DISC AND INNER DISC

Using calipers, measure the thickness of clutch outer disc and inner disc.

Outer disc:
Standard thickness: 1.60 mm (0.0630 in.)
Minimum thickness: 1.50 mm (0.0591 in.)

Inner disc:
Standard thickness: 2.30 mm (0.0906 in.)
Minimum thickness: 2.15 mm (0.0846 in.)

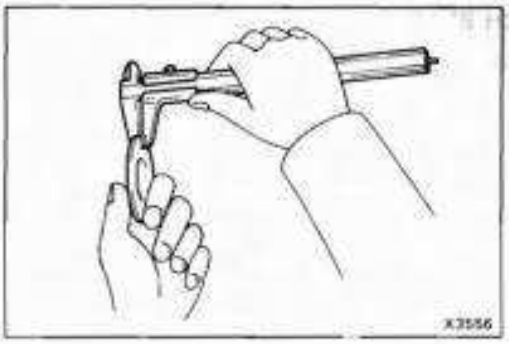


4. INSPECT DRUM SPACER NO.2

Using calipers, measure the thickness of drum spacer No.2.

Standard thickness: 1.4 mm (0.0551 in.)
Minimum thickness: 1.0 mm (0.0394 in.)

RM183e 1990 7 Series Chassis and Body



5. INSPECT INPUT SHAFT THRUST WASHER, CLUTCH THRUST WASHER

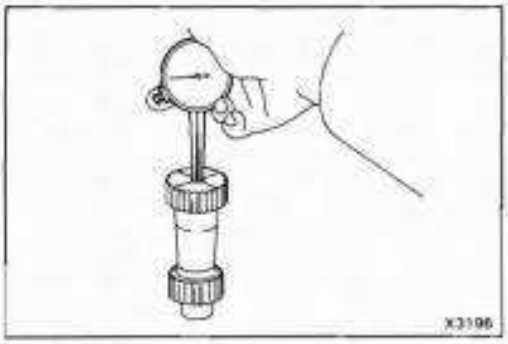
Using calipers, measure the thickness of thrust washers.

INPUT SHAFT THRUST WASHER

Standard thickness: 2.00 mm (0.0787 in.)
Minimum thickness: 1.80 mm (0.0709 in.)

CLUTCH THRUST WASHER

Standard thickness: 1.25 mm (0.0492 in.)
Minimum thickness: 1.00 mm (0.0394 in.)



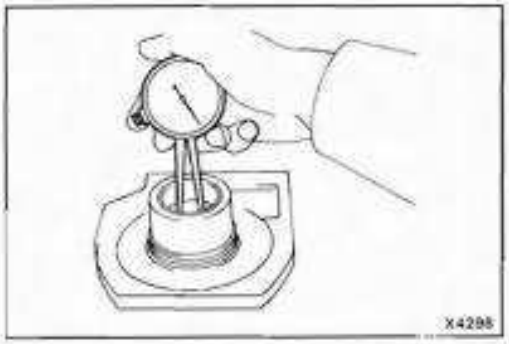
6. INSPECT OUTPUT SHAFT

(a) Using a caliper gauge, measure the bushing bore.

Standard bore: 12.00 mm (0.4724 in.)
Maximum bore: 12.03 mm (0.4736 in.)

(b) Using a caliper, measure the outer diameter of the bushing.

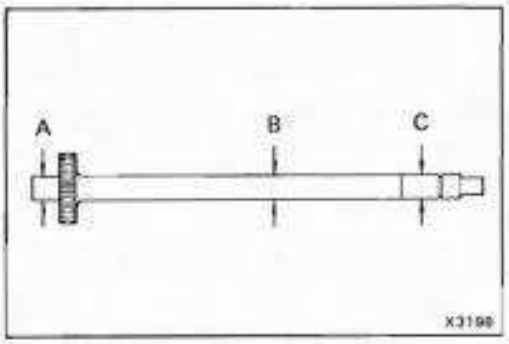
Standard diameter: 28.00 mm (1.1024 in.)
Minimum diameter: 27.90 mm (1.0984 in.)



7. INSPECT BRAKE CASE

Using calipers, measure the bushing bore.

Standard bore: 27.76 mm (1.0929 in.)
Maximum bore: 27.82 mm (1.0953 in.)



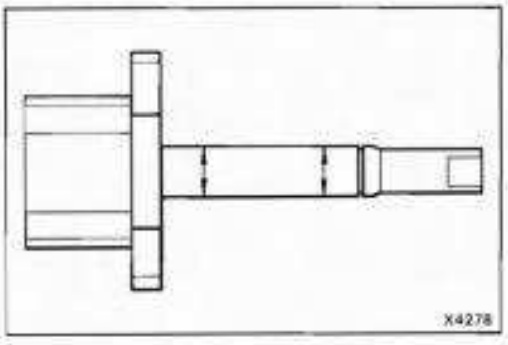
8. INSPECT DRIVE SHAFT

(a) Inspect the drive shaft for wear or damage the drive shaft.

(b) Using a micrometer, measure the outer diameter of the drive shaft.

Minimum outer diameter:

Part	**A**	**11.86 mm (0.4669 in.)**
	B	**11.70 mm (0.4606 in.)**
	C	**11.95 mm (0.4705 in.)**

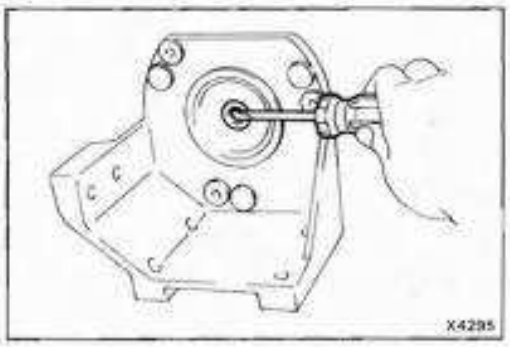


9. INSPECT CLUTCH INPUT SHAFT

Inspect clutch input shaft for wear or damage.
If damage, replace the clutch input shaft.

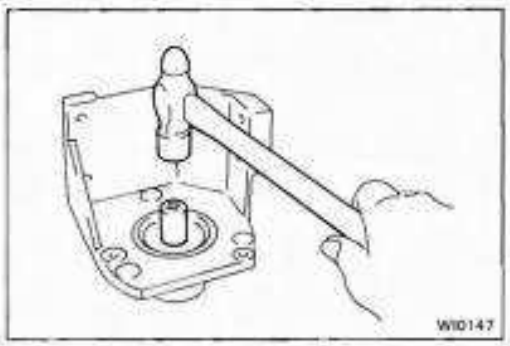
Standard outer diameter: 11.95 mm (0.4705 in.)

RM183e 1990 7 Series Chassis and Body

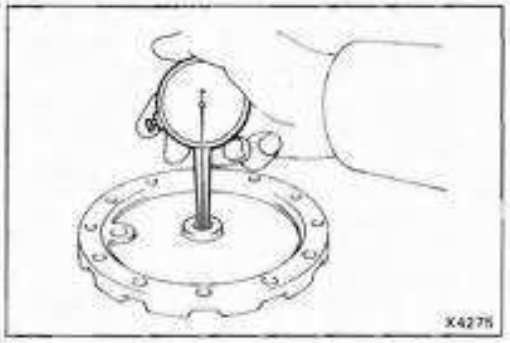


10. REPLACE WINCH BRAKE CASE OIL SEAL

(a) Using a screwdriver, pry out the oil seal.



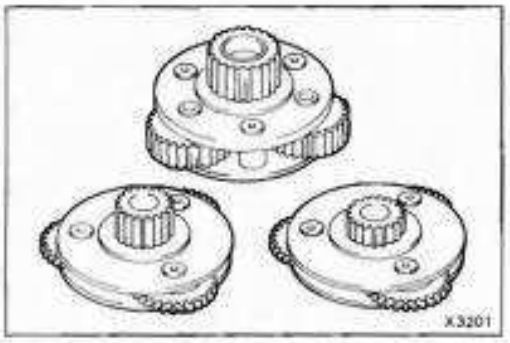
(b) Using a socket wrench, install the oil seal.



11. INSPECT WINCH GEAR CASE COVER

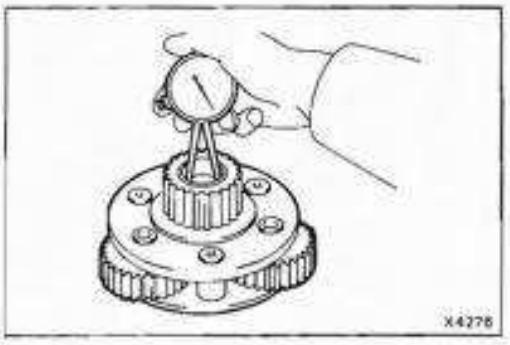
Using a caliper gauge, measure the bushing bore.

Standard bore: 12.00 mm (0.4724 in.)
Maximum bore: 12.15 mm (0.4783 in.)



12. INSPECT PLANETARY GEAR NO.1, NO.2 AND NO.3

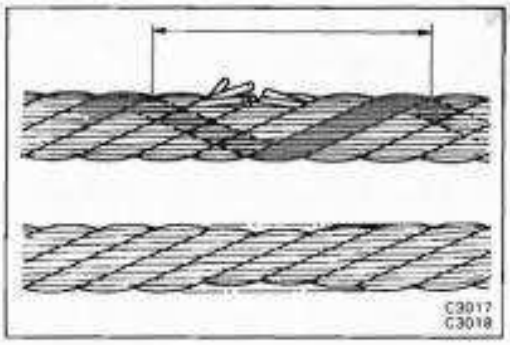
(a) Check that the bearing rotates smoothly.



(b) Using a caliper gauge, measure the bushing bore of the planetary gear No.3.

Standard bore: 28.00 mm (1.1024 in.)
Maximum bore: 28.05 mm (1.1043 in.)

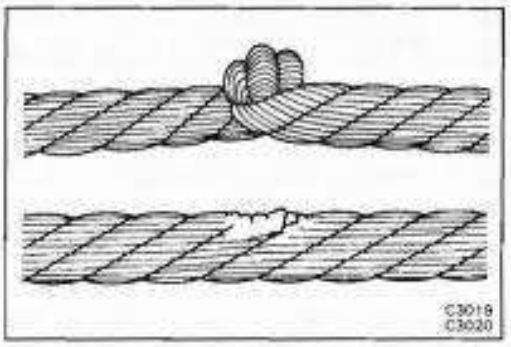
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13. INSPECT WINCH WIRE

Inspect the winch wire for the following items. If damage, replace the winch wire.

- Wire than 12 severed strands per wind.
- Wire diameter of less than 7.5 mm (0.295 in.)



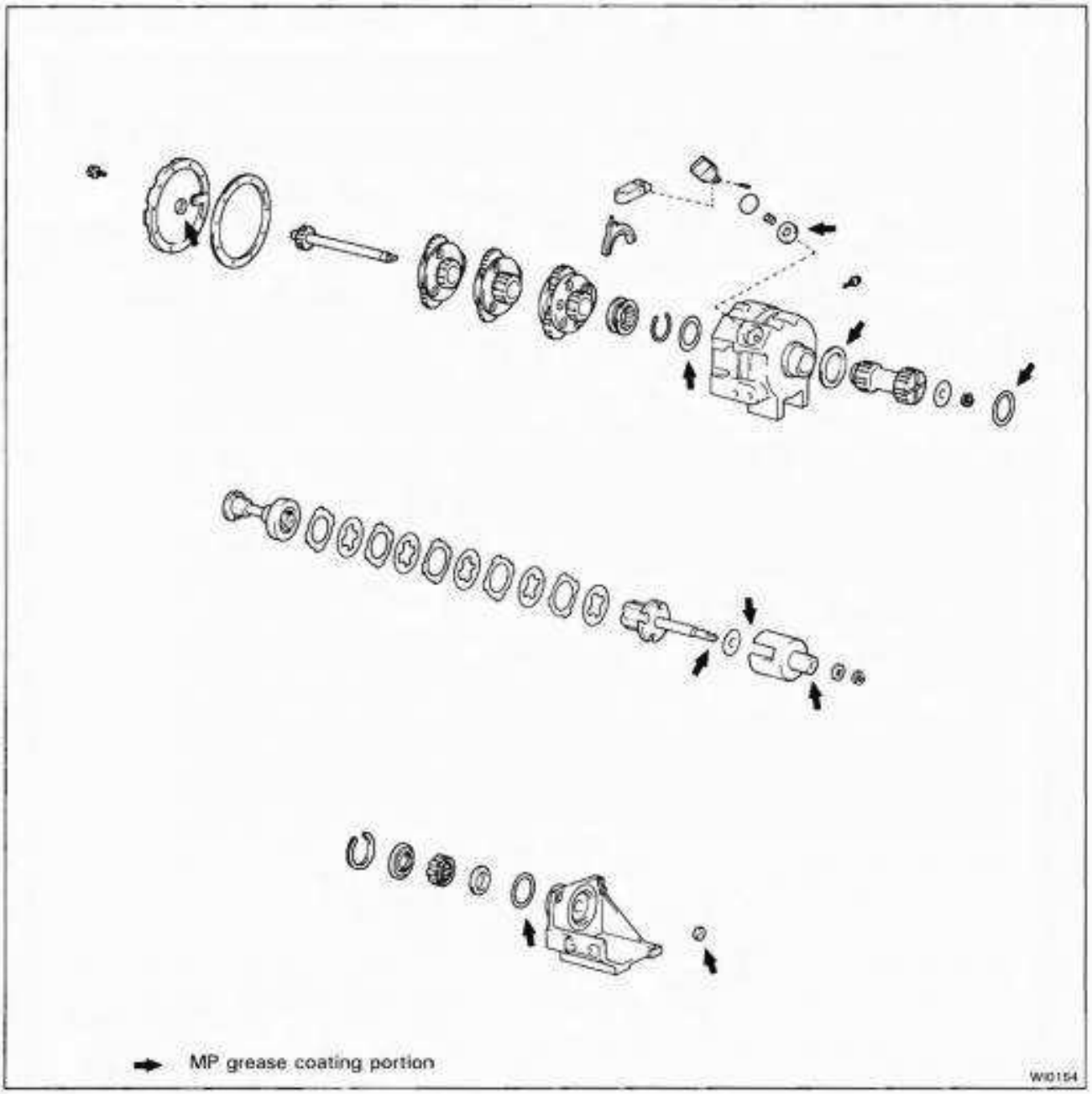
- Kinks
- Corrosion
- Fraying

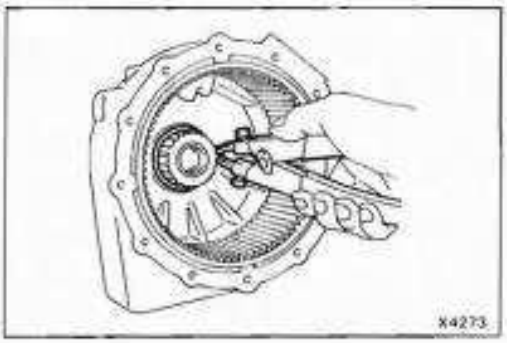
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ASSEMBLY OF WINCH COMPONENTS

(See page WI-39)

1. **COAT MP GREASE ON FOLLOWING PARTS:**

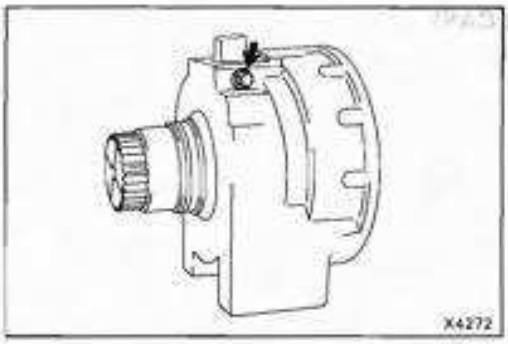




2. **INSTALL OUTPUT SHAFT**
   (a) Install output shaft to the gear case.
   (b) Using snap ring pliers, install the snap ring.

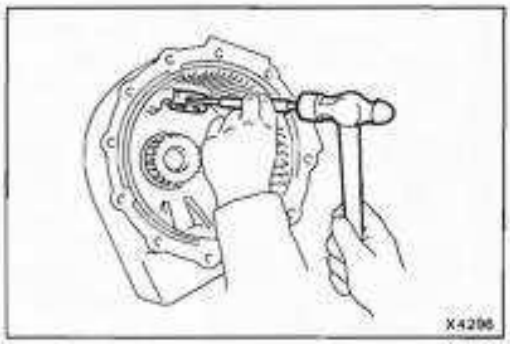
3. **INSTALL CLUTCH SHIFT LEVER**
   (a) Install a new O-ring, the spring and the thrust washer.
   (b) Install the shift lever adaptor.
   (c) Install the clutch shift lever.

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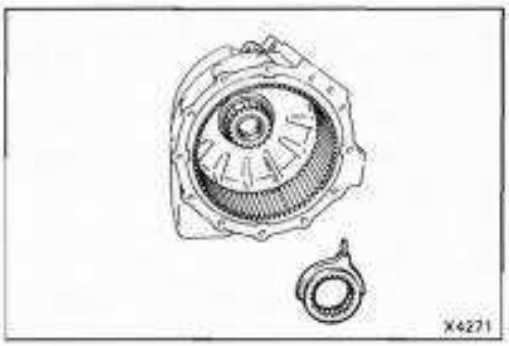


(d) Install the bolt and washer.

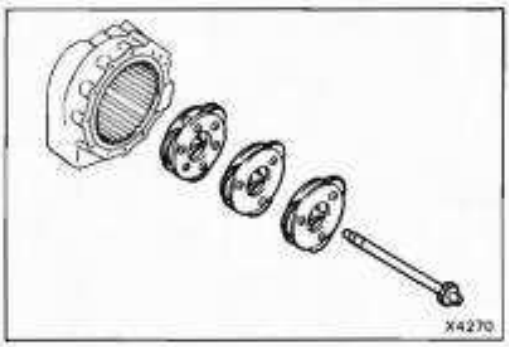
Torque: 45 kg-cm (39 in.-lb, 4.4 N·m)



(e) Using a pin punch and a hammer, drive in the pin.



4. INSTALL WINCH SLEEVE WITH SHIFT FORK



5. INSTALL PLANETARY GEAR NO.3, NO.2, NO.1 AND DRIVE SHAFT

(a) Coat the each gear with ATF.

Fluid type: ATF DEXRON® II

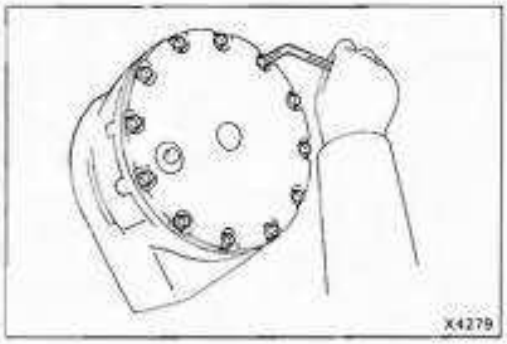
(b) Install the planetary gear No.3, No.2, No.1 and the drive shaft.

(c) Install a new O-ring.

(d) Install the thrust washer.

(e) Install the snap ring.

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6. **INSTALL GEAR CASE COVER**

Using a hexagon wrench, install a new gasket and the gear case cover.

Torque: 90 kg-cm (78 in.-lb, 8.8 N·m)

7. **INSTALL ONE-WAY CLUTCH**

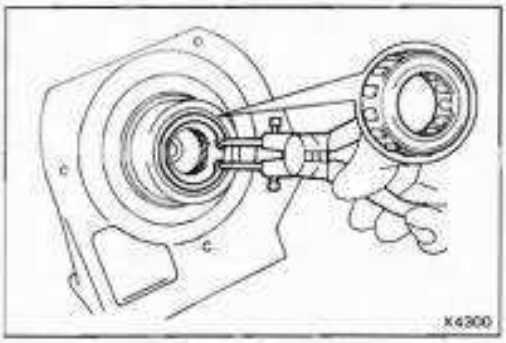
(a) Install a new O-ring.

(b) Install the one-way clutch.

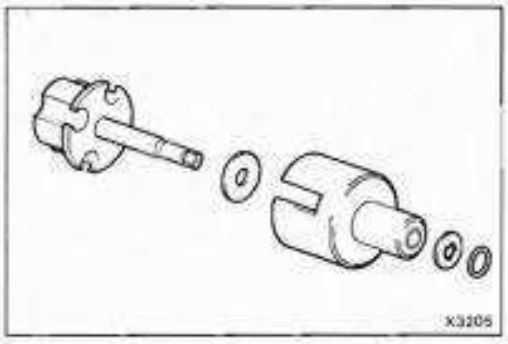
(c) Coat the one-way clutch with ATF.

Fluid type: ATF DEXRON® II

HINT: Install in proper direction only.



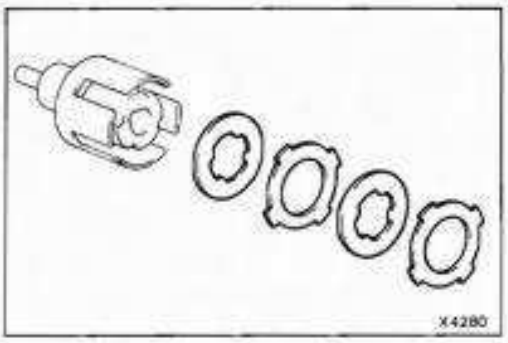
(d) Using snap ring pliers, install the snap ring.



8. **INSTALL OUTER CLUTCH**

(a) Install the clutch input shaft and thrust washer to the outer clutch.

(b) Install the input shaft thrust washer and the snap ring.

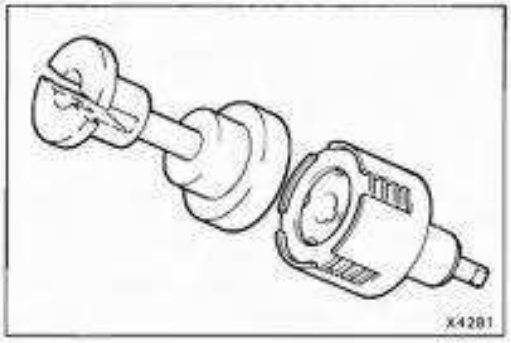


(c) Install the inner disc and the outer disc to the outer clutch.

HINT: Before assembly new clutch discs, soak them in automatic transmission fluid for at least two hours.

Fluid type: ATF DEXRON® II

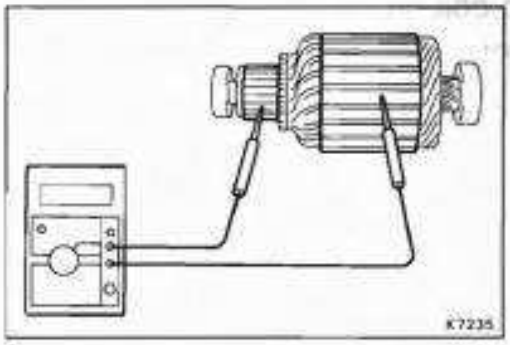
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(d) Install the inner clutch.

HINT: Coat the threads of the inner clutch with ATF and install inner clutch.

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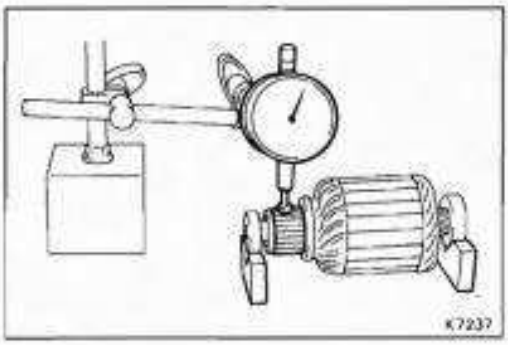
INSPECTION OF WINCH MOTOR

1. INSPECT THAT COMMUTATOR IS NOT GROUNDED

Using an ohmmeter, check that there is no continuity between the commutator and armature core. If there is continuity, replace the armature.

2. INSPECT COMMUTATOR FOR DIRTY OR BURNT SURFACE

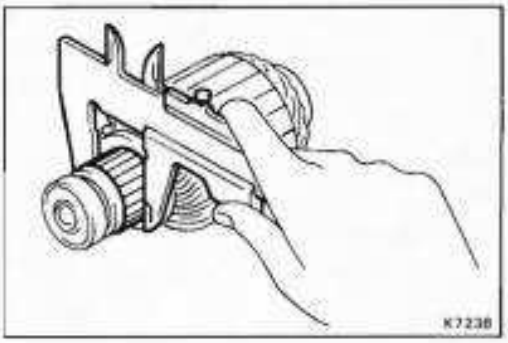
If the surface is dirty or burnt, clean with sandpaper (No.400) or a lathe.



3. INSPECT COMMUTATOR CIRCLE RUNOUT

Using a dial indicator, measure the circle runout of the commutator. If the circle runout is greater than the maximum, correct with a lathe.

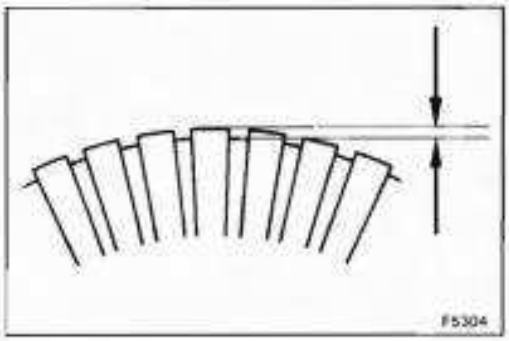
Standard runout: 0.05 mm (0.0020 in.) or less
Maximum runout: 0.2 mm (0.008 in.)



4. MEASURE DIAMETER OF COMMUTATOR

Using calipers, measure the diameter of the commutator. If the diameter of the commutator is less than minimum, replace the armature.

Standard diameter: 43 mm (1.69 in.)
Minimum diameter: 41 mm (1.61 in.)



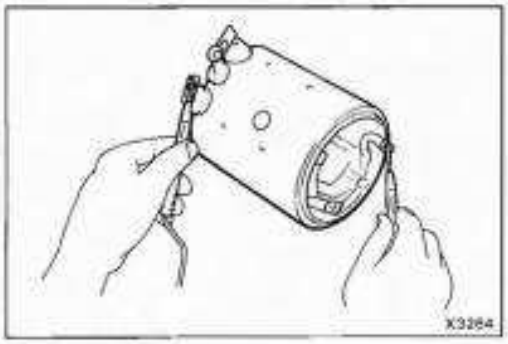
5. INSPECT UNDERCUT DEPTH

Check that the undercut depth is clean and free of foreign particles. Then smooth off the edge. If the undercut depth is less than the minimum, correct with a hacksaw blade.

Standard under cut depth:
0.5 – 0.8 mm (0.020 – 0.031 in.)

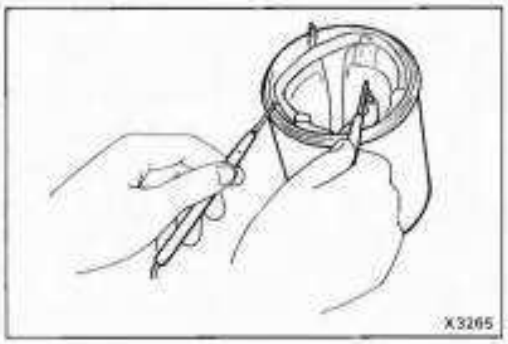
Minimum undercut depth:
0.2 mm (0.008 in.)

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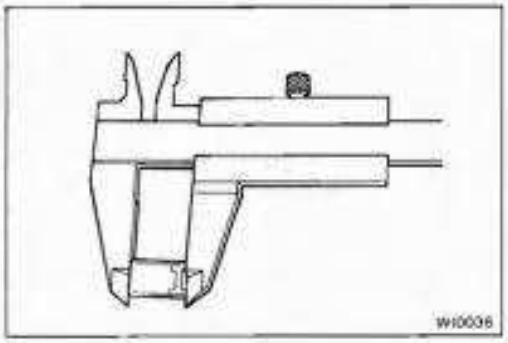
6. INSPECT FIELD COIL FOR OPEN CIRCUIT

Using an ohmmeter, check for continuity between the lead wire and field coil brush lead. If there is no continuity, replace the field coil.



7. INSPECT THAT FIELD COIL IS NOT GROUNDED

Using an ohmmeter, check for continuity between the field coil brush lead and field frame. If there is continuity, repair or replace the yoke subassembly.

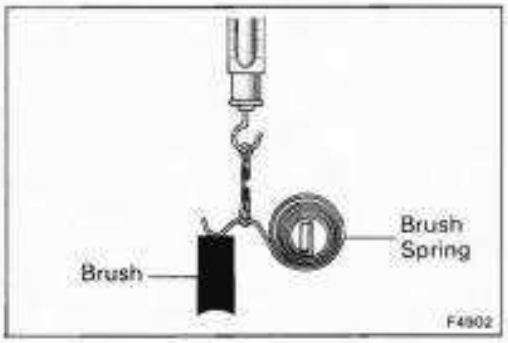


8. MEASURE BRUSH LENGTH

Using calipers, measure length of the brush.

Standard length: 22 mm (0.87 in.)
Minimum length: 15 mm (0.59 in.)

If the brush length is less than the minimum, replace the brush.

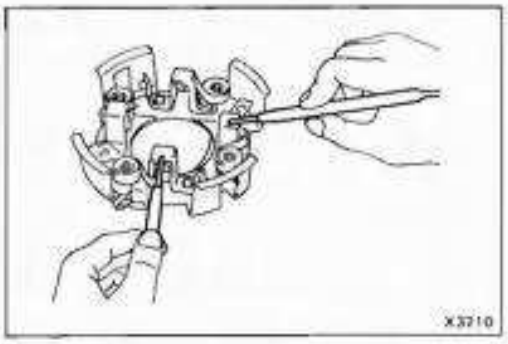


9. MEASURE BRUSH SPRING LOAD

Using a pull scale, measure the installed load of the brush spring.

Standard installed load: 1.8 kg (4.0 lb, 18 N)

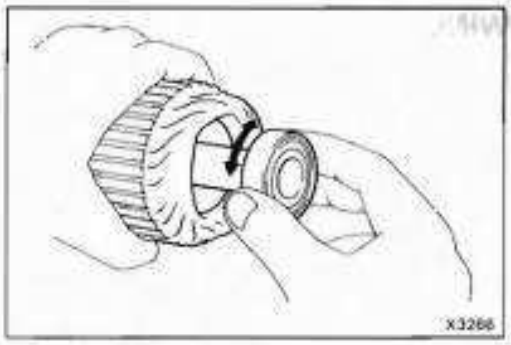
HINT: Take the pull scale reading at the very instant the brush spring separates from the brush.



10. INSPECT BRUSH HOLDER

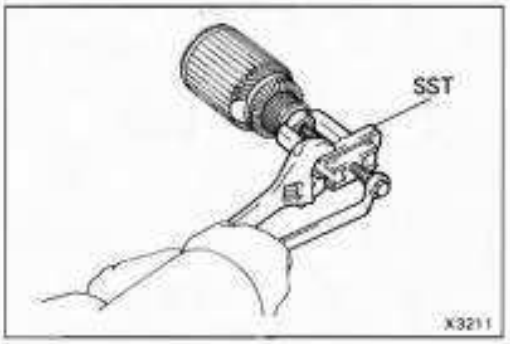
Using an ohmmeter, check for continuity between the positive and negative brush holders. If there is continuity, replace the brush holder assembly.

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11. INSPECT BEARING

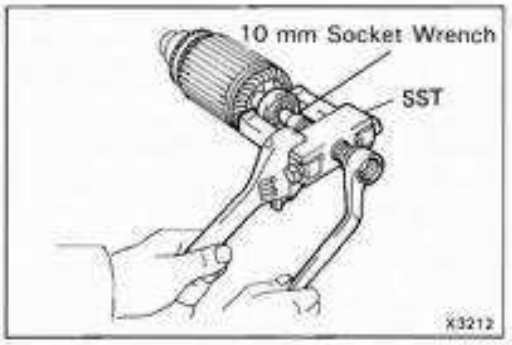
Turn each bearing by hand while applying inward force. If the bearing sticks or resists, replace it.



12. IF NECESSARY, REPLACE BEARINGS

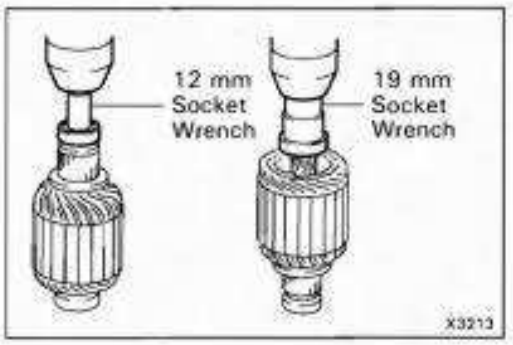
(a) Using SST, remove the bearing.

SST 09286-46011



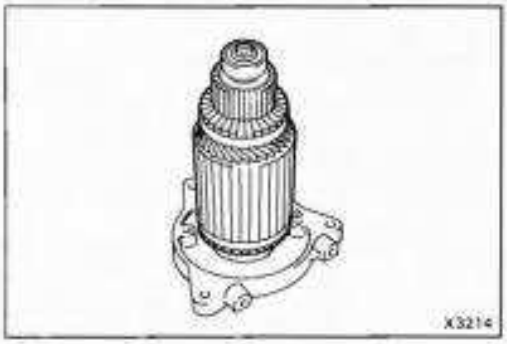
(b) Using SST, remove the bearing.

SST 09628-62011



(c) Using a socket wrench and a press, press in a new bearing.

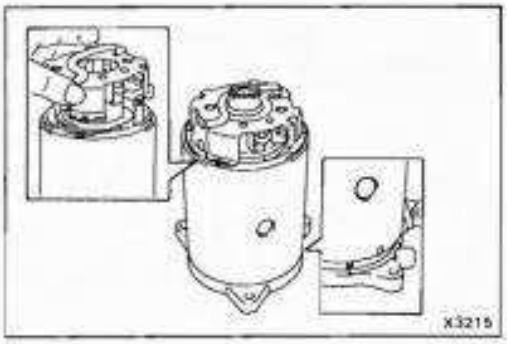
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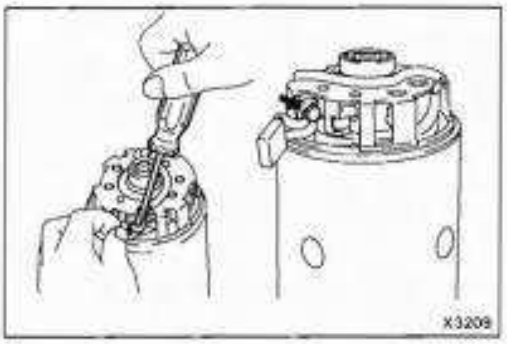
ASSEMBLY OF WINCH MOTOR

(See page WI-50)

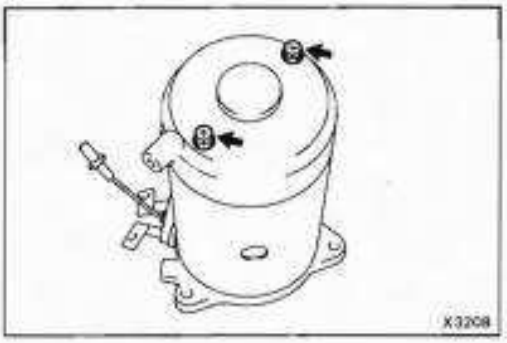
1. **INSTALL ARMATURE AND YOKE TO END FRAME**
   (a) Apply high temperature grease to the inside of the end frame bushing.
   (b) Install the armature to the end frame.



2. **INSTALL YOKE SUBASSEMBLY AND BRUSH HOLDER**
   Align the alignment mark, install the yoke subassembly to the end frame and the brush holder to the yoke subassembly.



3. **INSTALL BRUSH**
   Torque: 35 kg-cm (30 in.-lb, 3.4 N·m)



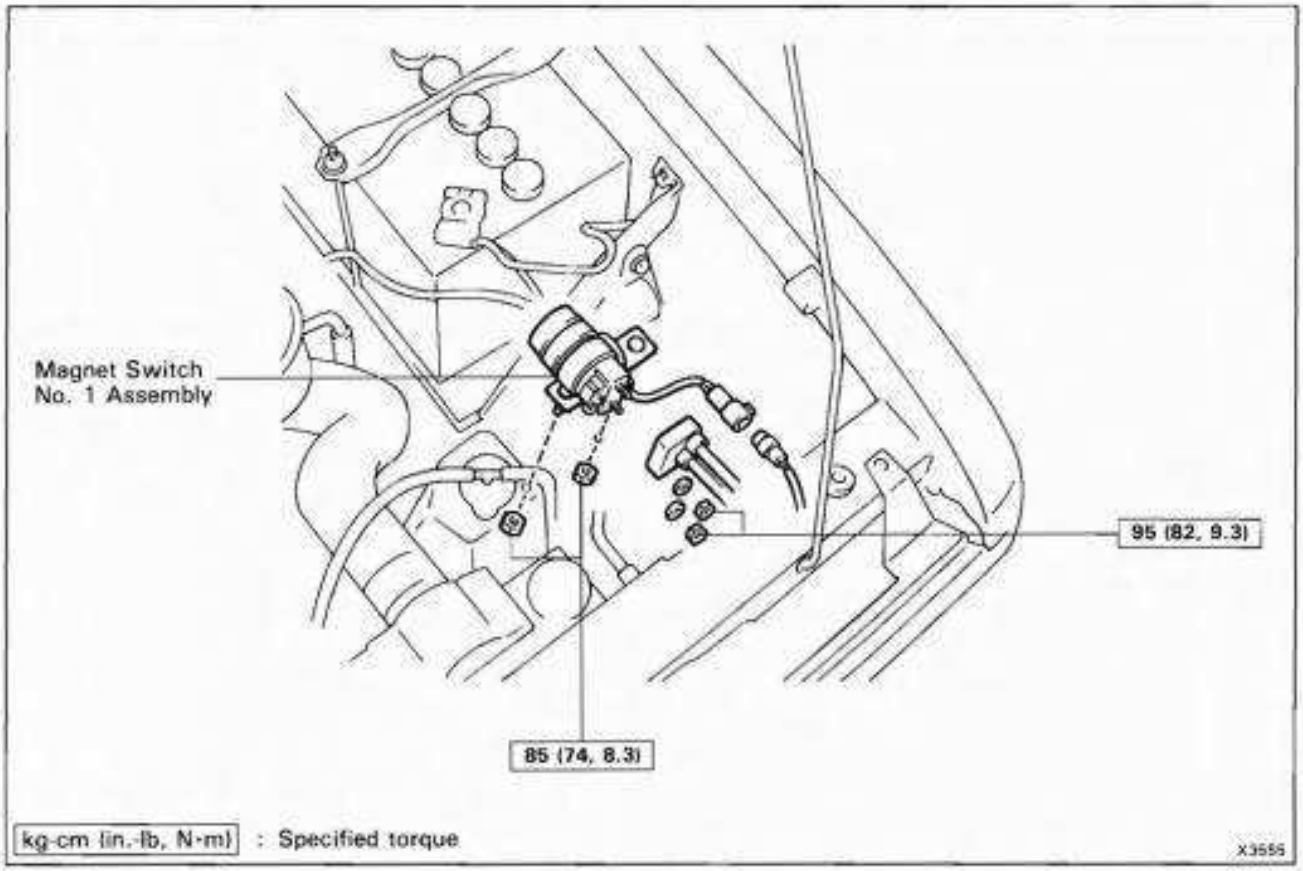
4. **INSTALL COMMUTATOR END FRAME**
   (a) Apply MP grease to a new O-ring.
   (b) Install a new O-ring on the yoke.
   (c) Torque the two bolts.
   Torque: 78 kg-cm (68 in.-lb, 7.7 N·m)

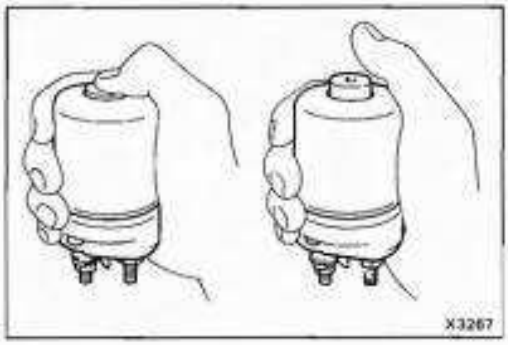
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Magnet Switch No.1

REMOVAL AND INSTALLATION OF MAGNET SWITCH NO.1

Remove and install the parts as shown.

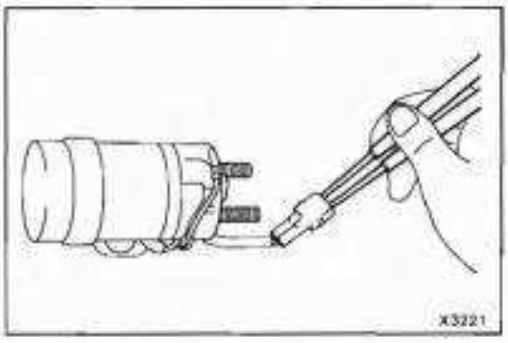




INSPECTION OF MAGNET SWITCH NO.1

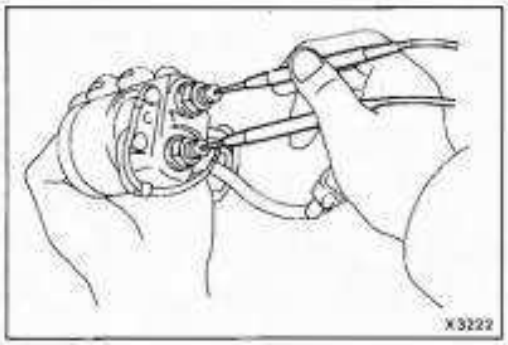
INSPECT MAGNET SWITCH NO.1

(a) Push in the plunger and release it. Check that it returns quickly to its original position.



(b) Using an ohmmeter, check for continuity between the connector terminals.

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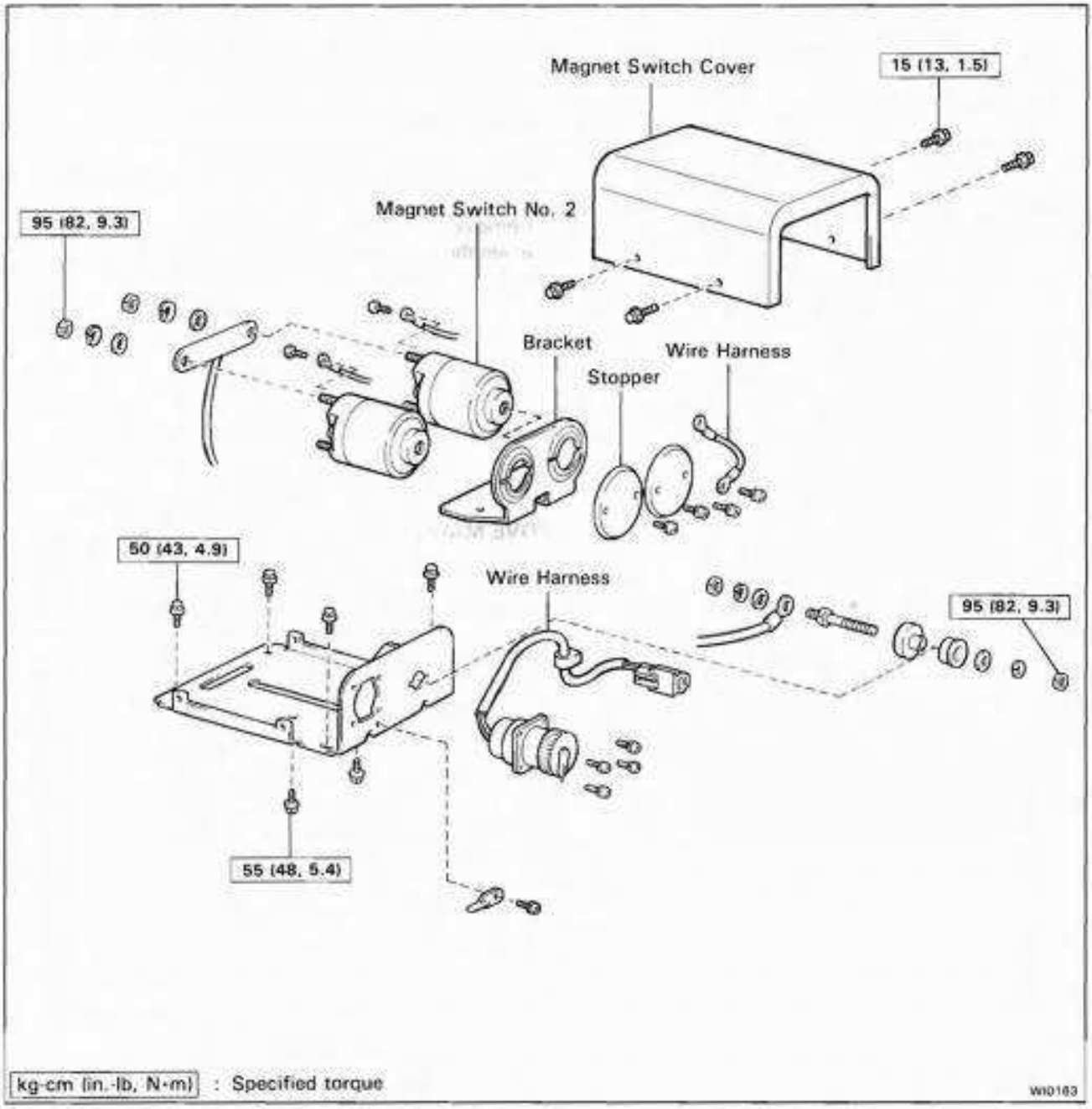


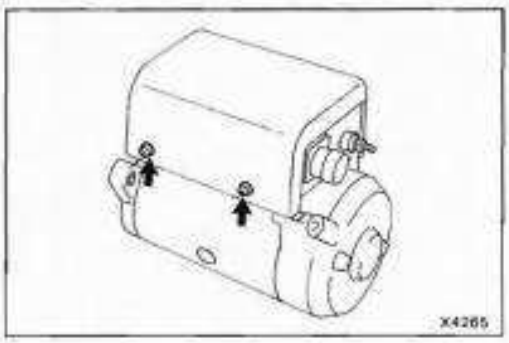
(c) Using an ohmmeter, check for no continuity between the terminals with the plunger released.

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Magnet Switch No.2

COMPONENTS



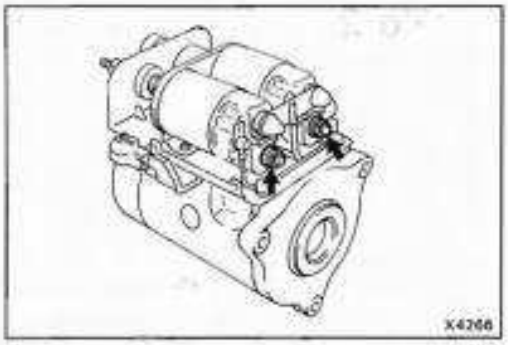


DISASSEMBLY OF MAGNET SWITCH NO.2

1. **REMOVE MAGNET SWITCH COVER**

   Remove the four screws and the magnet switch cover.

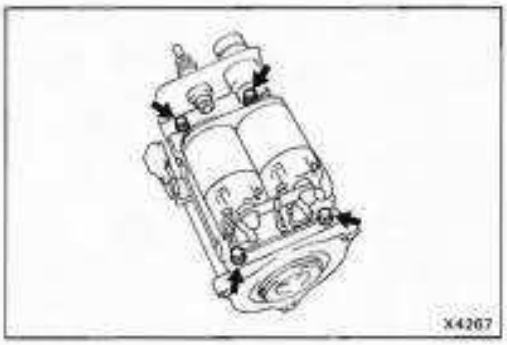
RM183e 1990 7 Series Chassis and Body



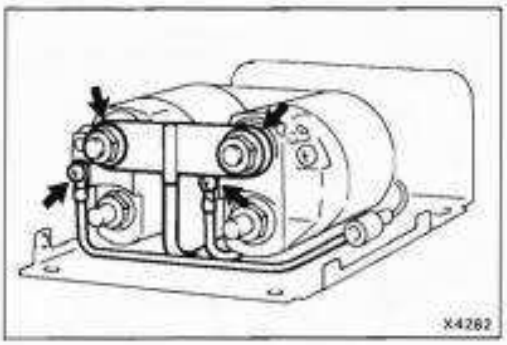
2. **REMOVE MAGNET SWITCH NO.2 ASSEMBLY**

(a) Disconnect the connector.

(b) Remove the two nuts and the wire harness.



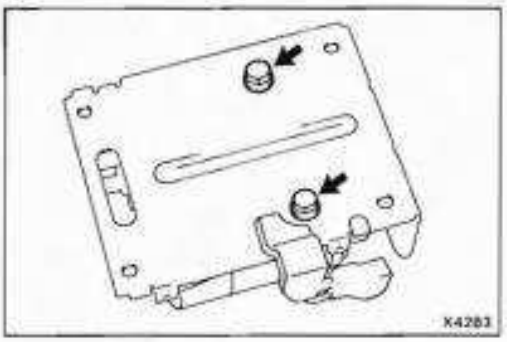
(c) Remove the four bolts and the magnet switch No.2 assembly.



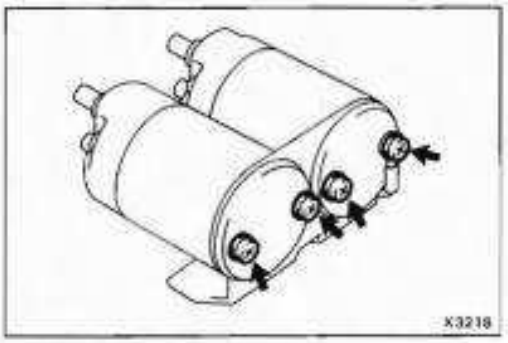
3. **REMOVE MAGNET SWITCH NO.2**

(a) Remove the two screws, disconnect wire harness.

(b) Remove the two nuts and terminal plate.

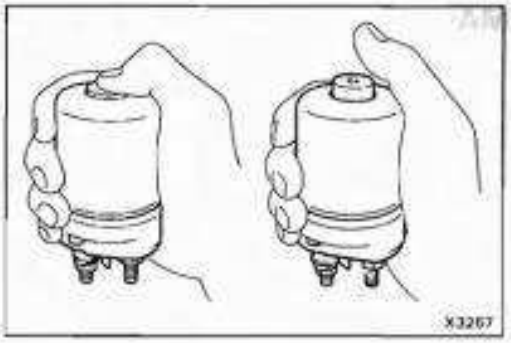


(c) Remove the two bolts and the magnet switches.



(d) Remove the four screws, the bracket and the stoppers.

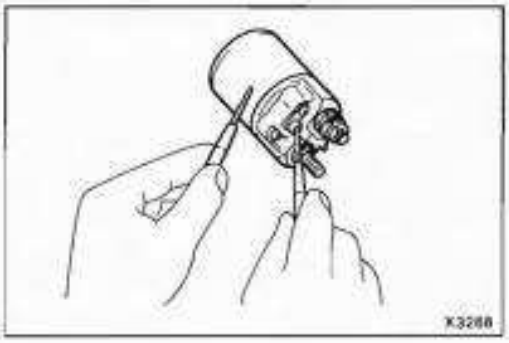
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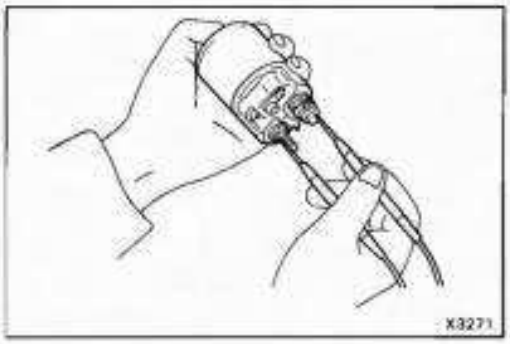
INSPECTION OF MAGNET SWITCH NO.2

1. INSPECT MAGNET SWITCH NO.2

(a) Push in the plunger and release it. Check that it returns quickly to its original position.

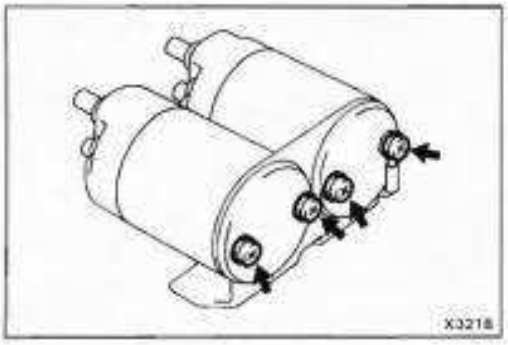


(b) Using an ohmmeter, check for continuity between the base lead wire terminal and magnet switch body. If there is no continuity, replace the magnet switch.



(c) Using an ohmmeter, check for no continuity between the magnet switch terminal and the motor lead wire terminal with the plunger released.

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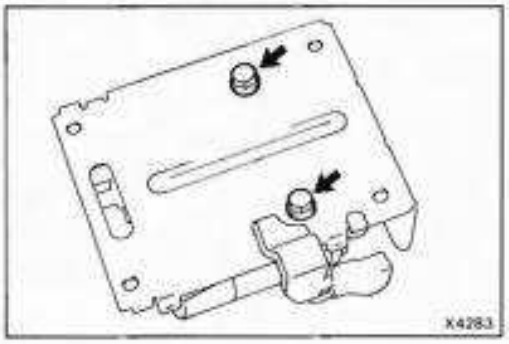


ASSEMBLY OF MAGNET SWITCH NO.2

(See page WI-57)

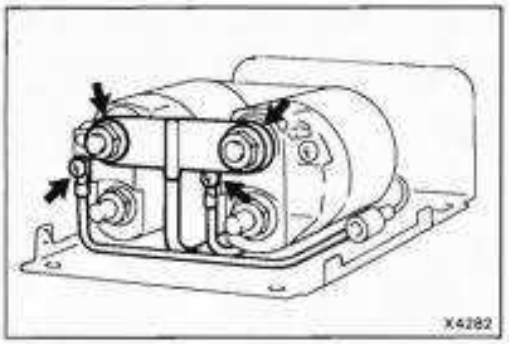
1. INSTALL MAGNET SWITCH NO.2

(a) Install the stoppers and the bracket with the four screws.



(b) Install the two magnet switches with the two bolts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)



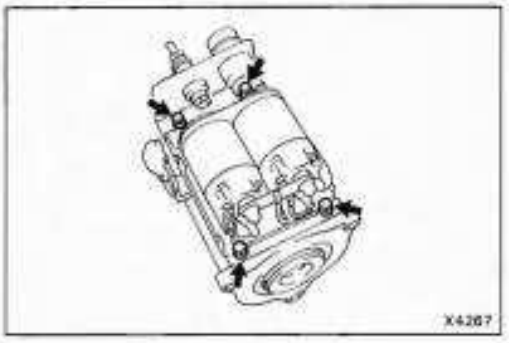
(c) Install the wire harness with the two screws.

Torque: 18 kg-cm (16 in.-lb, 2.0 N·m)

(d) Install the terminal plate with the two nuts.

Torque: 95 kg-cm (82 in.-lb, 9.3 N·m)

2. INSTALL MAGNET SWITCH NO.2 ASSEMBLY

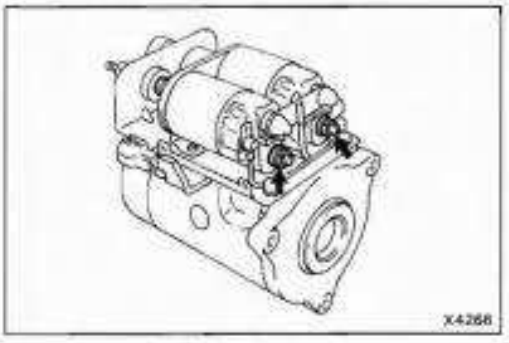


(a) Install the magnet switch to the winch motor assembly with the wire harness.

(b) Torque the four bolts.

Torque: 50 kg-cm (43 in.-lb, 4.9 N·m)

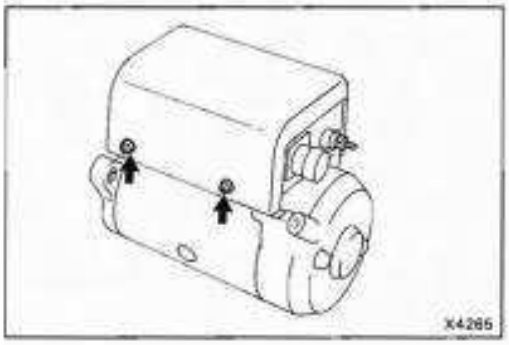
(c) Connect the connector.



(d) Install the wire harness with the two nuts.

Torque: 95 kg-cm (82 in.-lb, 9.3 N·m)

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3. **INSTALL MAGNET SWITCH COVER**

Install the magnet switch cover with the four screws.

Torque: 15 kg-cm (13 in.-lb, 1.5 N·m)

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