BT Svenska

SERVICE MANUAL

TOYOTA FBESF 10-15

INDEX

< Tillbaka till Index

Per Wärmlund

GENERAL

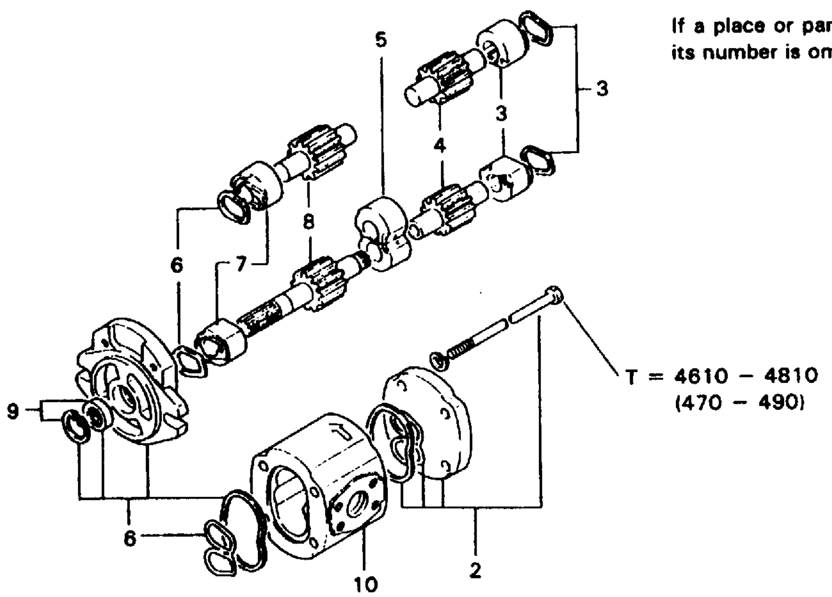
HOW TO READ THIS MANUAL

EXPLANATION METHOD

1. Operation procedure
   (1) The operation procedure is described in either pattern A or pattern B below.
   Pattern A: Explanation of each operation step with illustration.
   Pattern B: Explanation of operation procedure by indicating step numbers in one illustration, followed by explanation of cautions and notes summarized as point operations.

Example of description in pattern B

DISASSEMBLY·INSPECTION·REASSEMBLY Tightening torque unit T=N·m (kgf-cm)[ft-lbf]



If a place or part cannot be indicated directly, its number is omitted in the illustration.

Disassembly Procedure

1 Remove the cover. **[Point 1]**

2 Remove the bush **[Point 2]** ← Operation explained later

3 Remove the gear.

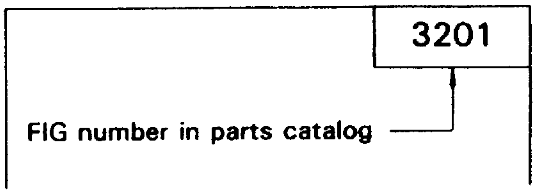
Point operations Explanation of key point for operation with an illustration

[Point 1]
Disassembly: Put a match mark when removing the pump cover.

[Point 2]
Inspection: Measure the bush inside diameter.
Bush inside diameter limit: **19.12mm (0.7528 in)**

2. How to read components figures
   (1) The components figure use the illustration in the parts catalog for the vehicle model. Please refer to the catalog for checking the part name.
   The number at the right shoulder of each components figure indicates the Fig. number in the parts catalog.

(Example)



3. Matters omitted in this manual
   (1) This manual omits description of the following jobs, but perform them in actual operation:
   ① Cleaning and washing of removed parts as required
   ② Visual inspection (Partially described)

TERMINOLOGY

Caution:
Important matters of which negligence may cause accidents. Be sure to observe them.

Note:
Important items of which negligence may cause accidents or matters in operation procedure requiring special attention.

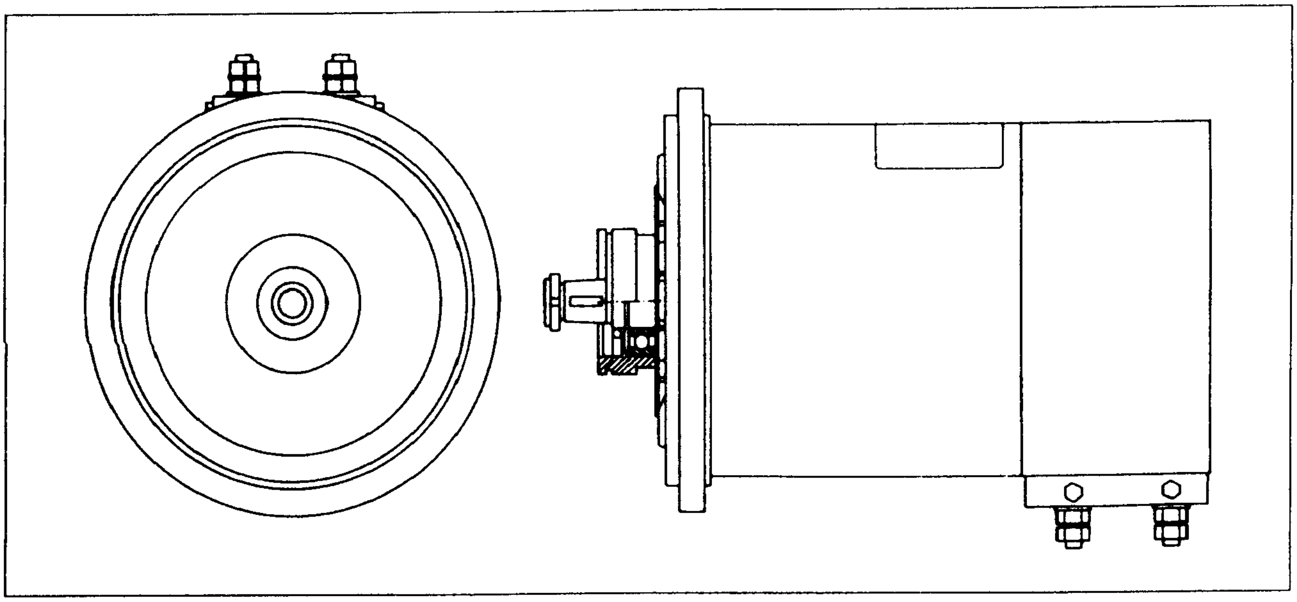
Standard: Values showing allowable range in inspection and adjustment.
Limit: Maximum or minimum allowable value in inspetion or adjustment.

ABBREVIATIONS

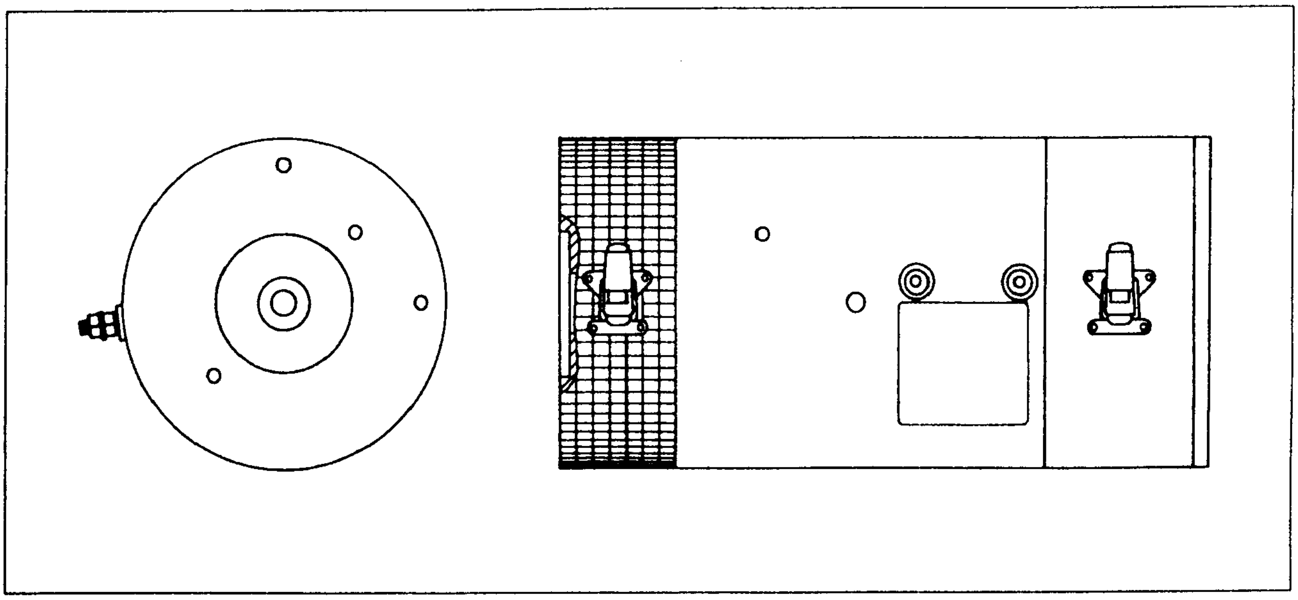
Abbreviation (code)	Meaning	Abbreviation (code)	Meaning
ASSY	Assembly	RR	Rear
EPS	Electrical power steering	SAE	Society of automotive engineers (USA)
FR	Front	SST	Special service tool
L/	Less	STD	Standard
LH	Left hand	T =	Tightening torque
OPT	Option	OOT	Number of teeth(OO)
O/S	Oversize	U/S	Undersize
PS	Power steering	W/	With
RH	Right hand		

GENERAL

Drive motor



Pump motor

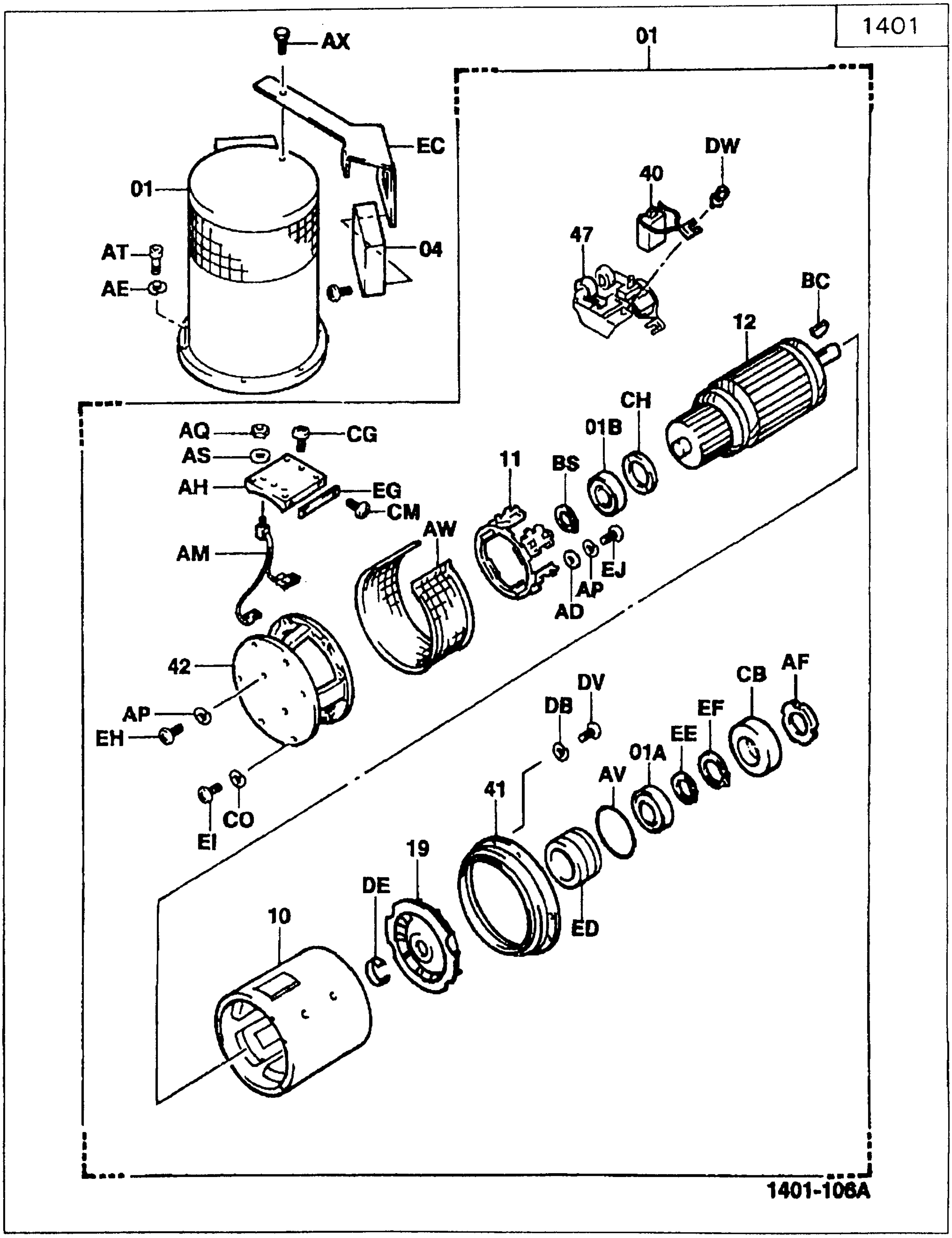


SPECIFICATIONS

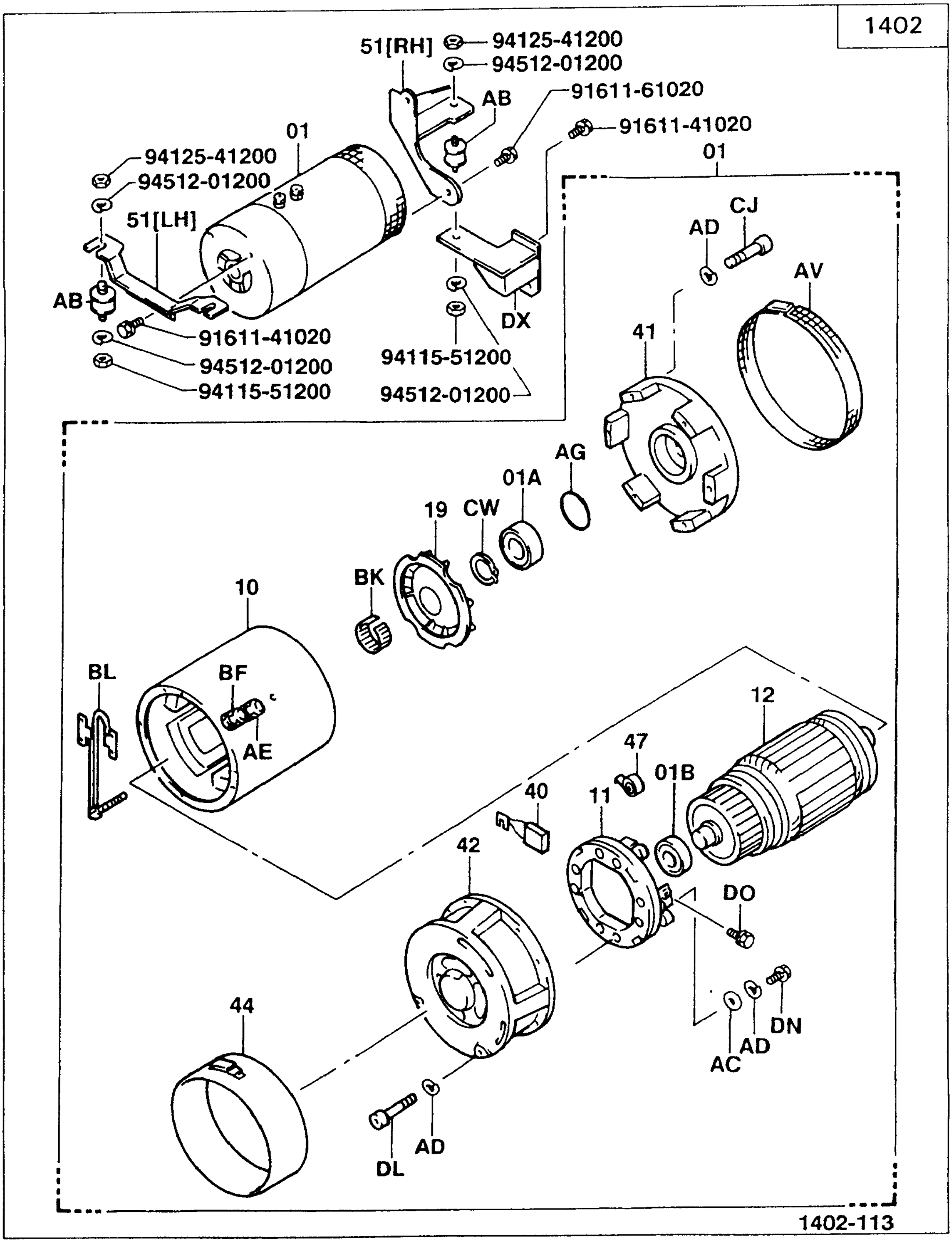
	Drive motor	Pump motor
Type	DC direct wound, open type	←
Rated voltage	24 V	←
Rated output	4.2 kw	8.8 kw
Insulation class	H	←
Brush size (thickness × width × length)	12.5 × 25 × 32 mm	16 × 20 × 28 mm
Number of brushes	8	←

COMPONENTS

(Drive Motor)

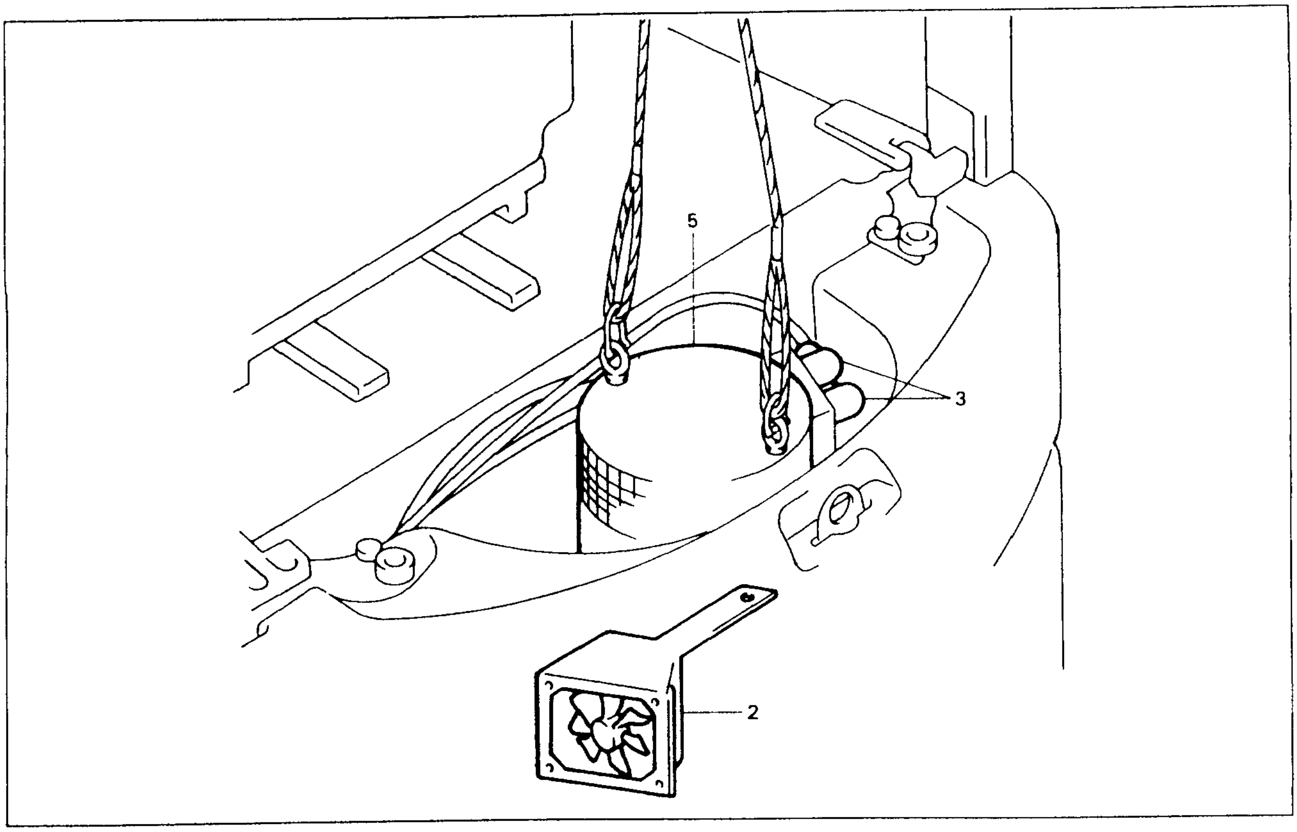


(Pump Motor)


1402
51[RH]
94125-41200
94512-01200
91611-61020
AB
91611-41020
01
01
94125-41200
94512-01200
51[LH]
CJ
AD
AV
AB
DX
91611-41020
94512-01200
94115-51200
94115-51200
94512-01200
41
AG
01A
19
CW
BK
10
BL
BF
AE
12
47
01B
40
11
42
DO
DN
AD
AC
44
AD
DL
1402-113

DRIVE/PUMP MOTOR ASSEMBLY

REMOVAL·INSTALLATION (DRIVE MOTOR)



Removal Procedure

1 Remove the rear panel and controller upper cover.

2 Remove the fan motor w/bracket.

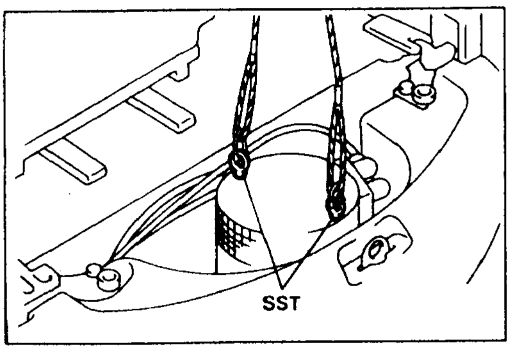
3 Disconnect the wiring

4 Remove the drive motor set bolts.

5 Hoist the drive motor using wire rope and remove the motor. **[Point 1]**

Installation Procedure

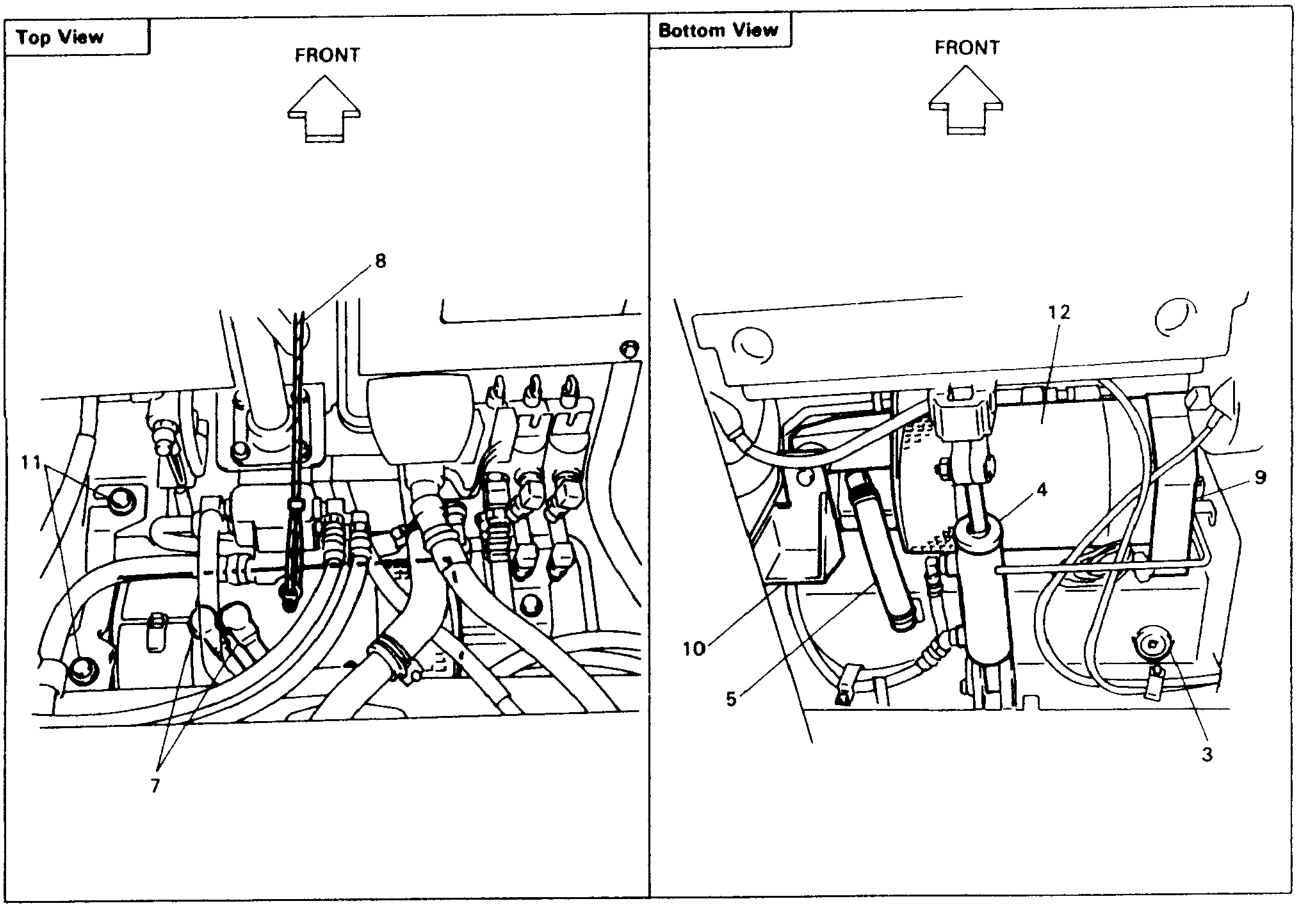
Installation is reverse of the removal procedure.



Point Operation

[Point 1]
Removal·Installation: SST 09140-12460-71

REMOVAL·INSTALLATION (PUMP MOTOR)



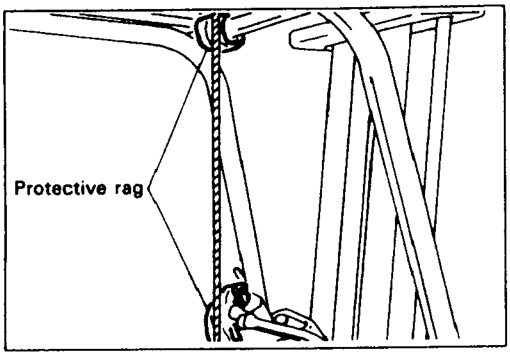
Removal Procedure

1 Set the steering tilt angle to the forward-most position and remove the steering wheel (see the section on removal of steering wheel and mast jacket).
2 Remove the front and rear toeboards.
3 Drain the hydraulic oil.
4 Remove only the front of the tilt cylinder to free it (see the section on removal of tilt cylinder).
5 Disconnect the inlet hose.
6 Disconnect the high-pressure hose.
7 Disconnect the wiring.
8 Tentatively hoist the pump motor ASSY by wire rope. **[Point 1]**
9 Remove the motor cover. **[Point 2]**
10 Remove the bracket.
11 Loosen pump motor ASSY set bolts, move the ASSY to the left and remove from the cutout.
12 Lower the pump motor ASSY slowly to remove it.

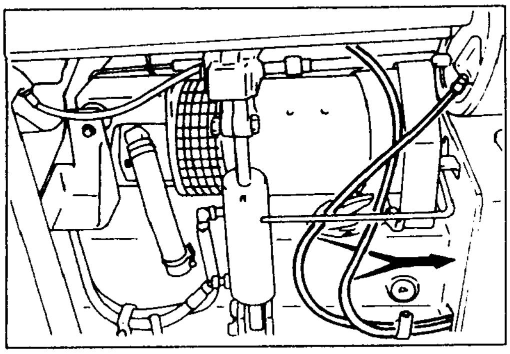
Installation Procedure

Installation is reverse of the removal procedure.

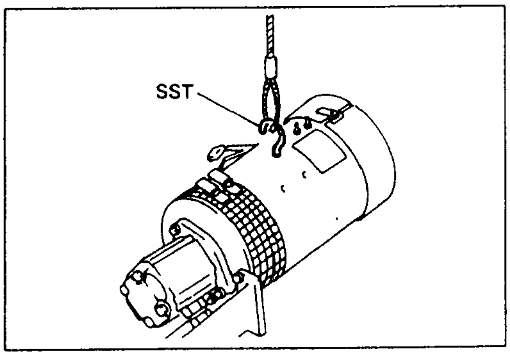
Point Operations



[Point 1]
Removal·Installation: Protect the body with rags so that the wire rope does not come in direct contact.



[Point 2]
Removal: Move the parking brake wire aside to avoid interference when lowering the pump motor.

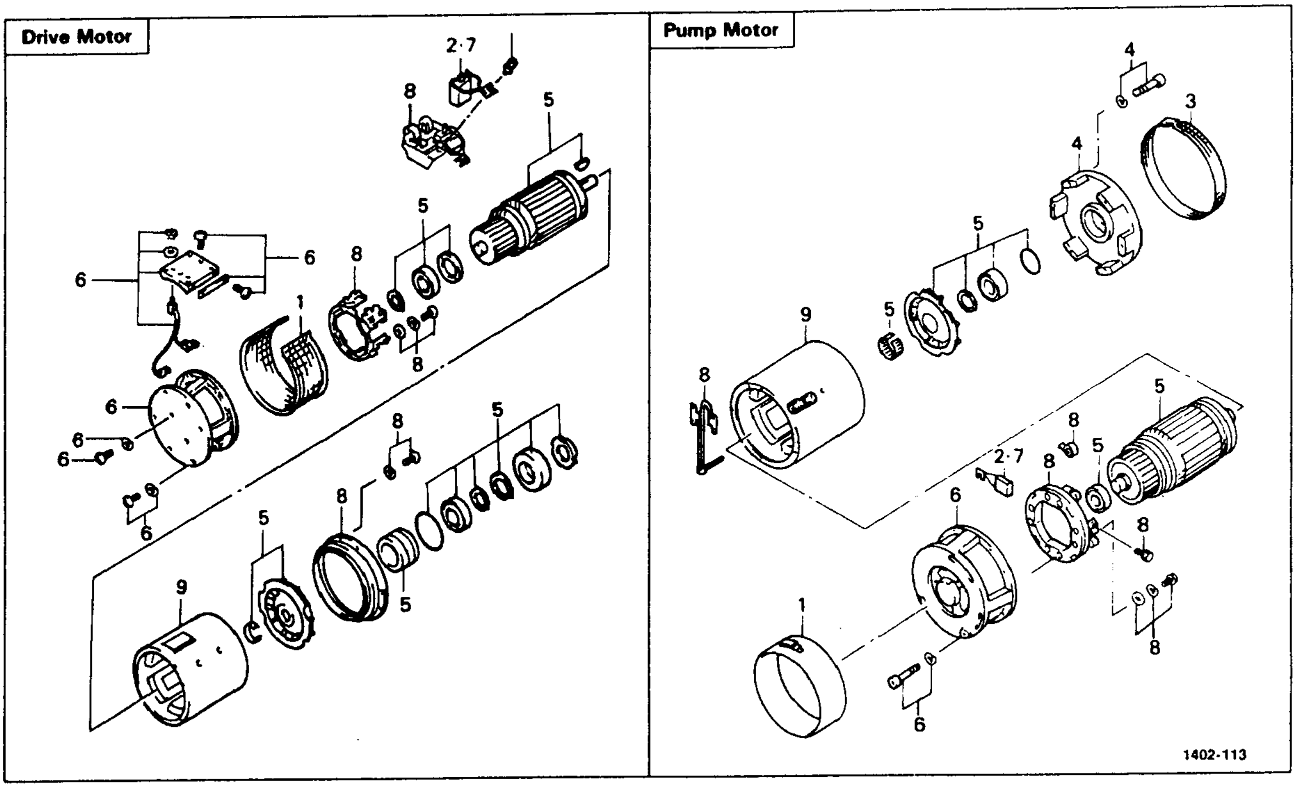


Removal·Installation: SST 09010-10260-71

DISASSEMBLY·INSPECTION·REASSEMBLY (DRIVE MOTOR, PUMP MOTOR)

Note:
Measure the insulation resistance of the motor wirings and the motor before beginning overhaul.

Reference value: 1 MΩ or more (500 VDC megger)



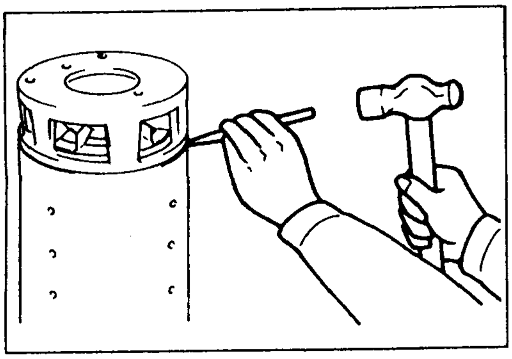
Disassembly Procedure

1 Remove the brush cover.
2 Free the brushes.
3 Remove the cover. (Pump motor)
4 Remove bracket No.1. (Pump motor) **[Point 1]**
5 Remove the armature ASSY. **[Point 2]**
6 Remove the commutator frame ASSY. **[Point 3]**
7 Remove the eight brushes from the commutator frame. **[Point 4]**
8 Remove the brush holder from the commutator frame.
9 Remove the yoke ASSY. **[Point 5]**

Reassembly Procedure

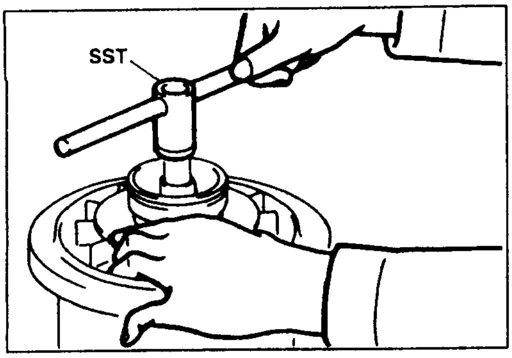
Reassembly is reverse of the disassembly procedure.

Note:
- **Measure the insulation resistance of motor wirings and the motor body.**
  Reference: 1 MΩ or more (500 VDC megger)
- **Check the continuity of the field coil. Measuring terminals: Between E and F**
  Reference: 0 Ω (circuit tester range × 1Ω)

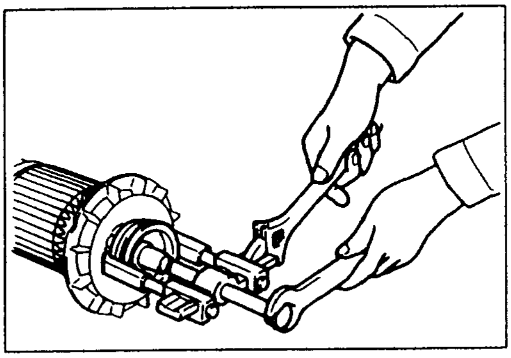


Operation Points

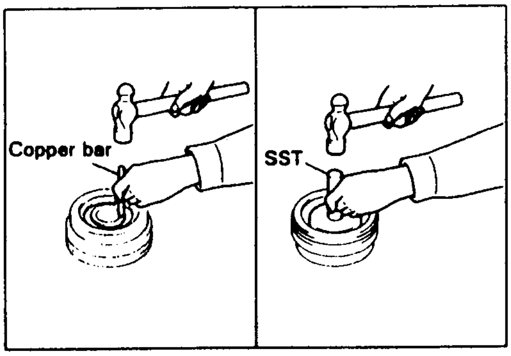
[Point 1] Pump motor
Disassembly: Mark matching marks on bracket No.1 and the yoke (also on the commutator frame and yoke).



[Point 2] Drive Motor
Disassembly: Remove the safety nut.
SST 09310-10330-71



Disassembly: Remove the hub ASSY.
SST 09950-40010

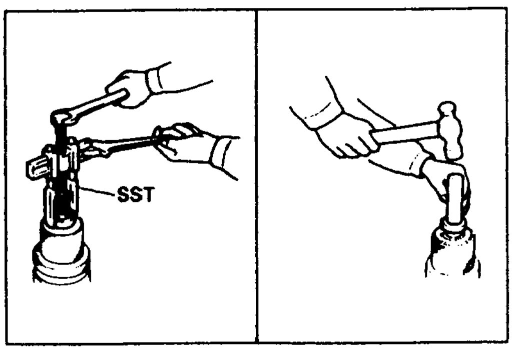


Inspection: Inspect bearings No.1 and No.2. Replace if worn or damaged.

No.1 bearing

Removal: Remove using a suitable copper bar.

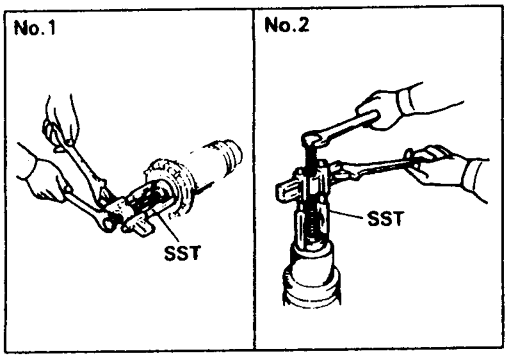
Installation: SST 09950-60010 (set)
SST 09951-00600 (single part)



No.2 bearing

Removal: SST 09950-40010

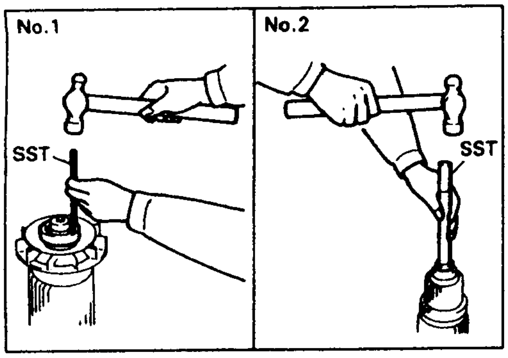
Installation: SST 09381-41950-71



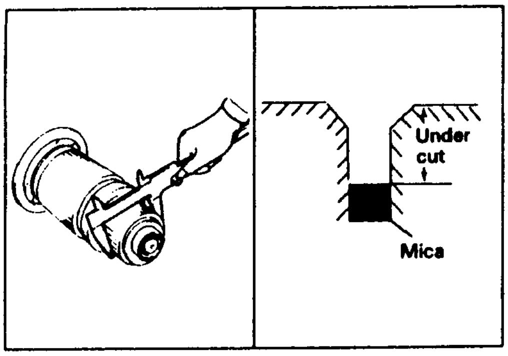
[Point 2] Pump motor

Inspection: Inspect bearings No.1 and No.2. Replace if worn or damaged.

Removal (common for No.1 and No.2):
SST 09950-40010



Installation: No.1: SST 09700-30200-71
No.2: SST 09620-30010



[Point 2-1] Drive motor, Pump motor

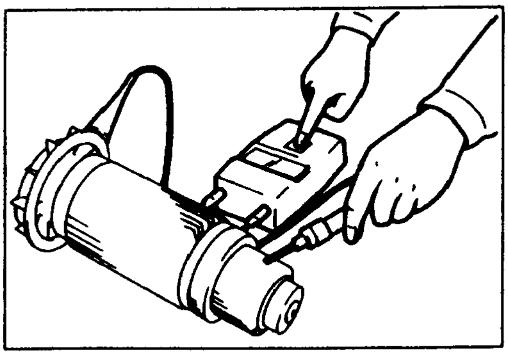
Inspection: If the commutator surface is rough, repair using emery paper (#600 or so) and completely clean after repair. If the surface is excessively rough, repair in a lathe.

Commutator outside diameter

	Drive motor	**Pump motor**
Standard:	**90 mm**	**80 mm**
Limit:	**87 mm**	**70 mm**

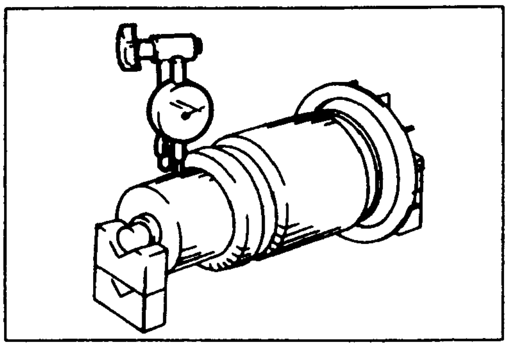
Under-cut the mica when repairing the commutator.

	Drive motor	**Pump motor**
Standard:	**0.6 mm**	←
Limit:	**0.3 mm**	←



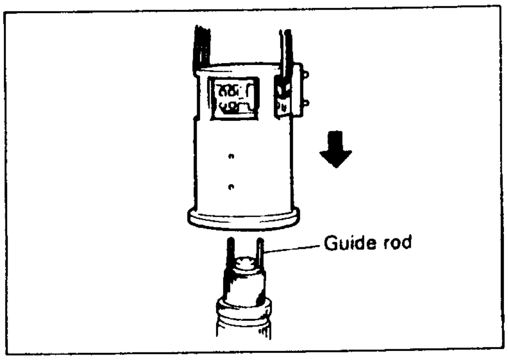
Inspection: Measure the insulation resistance of the armature coil.

Standard: 1 MΩ or more



Inspection: Measure commutator deviation.

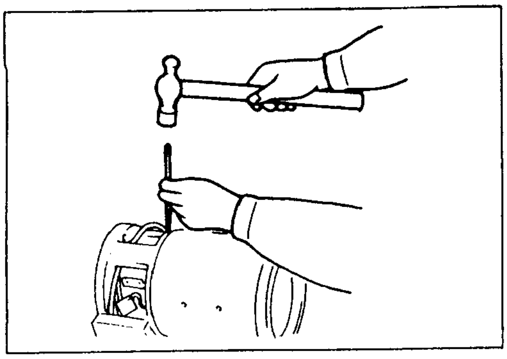
Standard: 0.02 mm or less



[Point 2-2] Drive motor

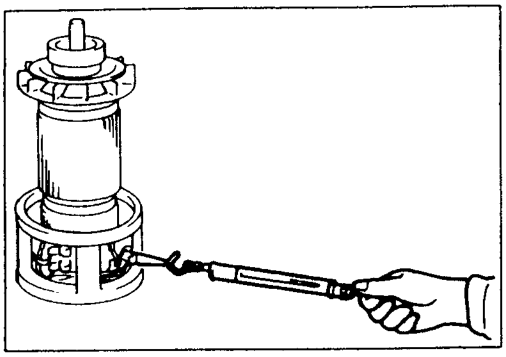
Reassembly: Attach the guide rod to the armature coil plate, hoist the yoke assembly by wire rope and position so that the guide rod can be inserted into the screw hole by lowering the assembly.

Prepare the guide rod whose size is as follows:
5 mm dia round rod, length at 380 mm or more



[Point 3] Drive motor

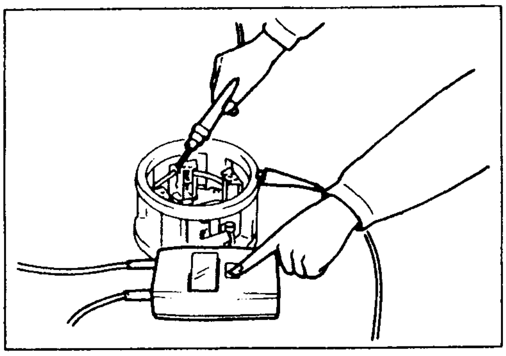
Removal: Mark matching marks on the commutator frame and yoke.



[Point 3-1] Drive motor, Pump motor

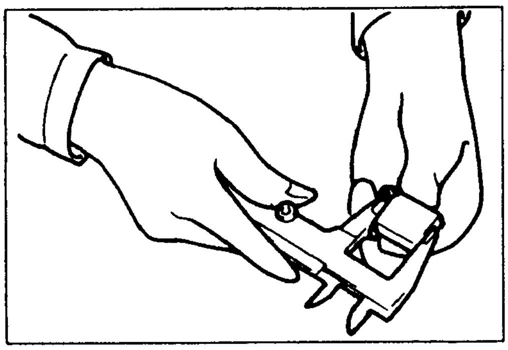
Inspection: Install the armature coil and brushes and then hook a spring balance to the brush spring to measure the spring force when the brush separates from the spring.

Standard:	**Drive motor**	**9.35 ± 0.9 N (0.95 ± 0.1 kgf)**
	Pump motor	**9.6 ± 0.7 N (0.98 ± 0.07 kgf)**



Inspection: Measure the insulation resistance between the brush holder and the commutator.

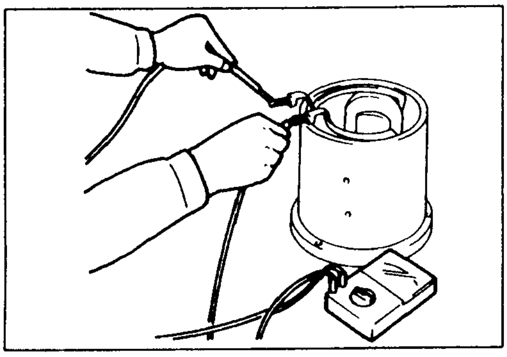
Standard: 1 MΩ or more



[Point 4] Drive motor, Pump motor

Inspection: Check brush wear and degree of contact.

	Drive motor	Pump motor
Standard:	**32 mm**	**28 mm**
Limit:	**13 mm**	**11 mm**

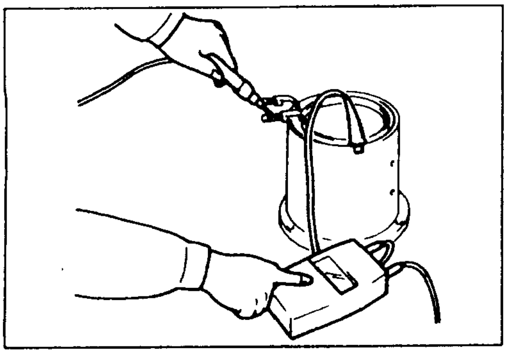


[Point 5]

Inspection: Check the continuity of the field coil.

Measuring terminals: Between terminals E and F (Drive motor)

Standard: Between terminal E/F and coil end terminal (Pump motor)
0 Ω (circuit tester range × 1 Ω)



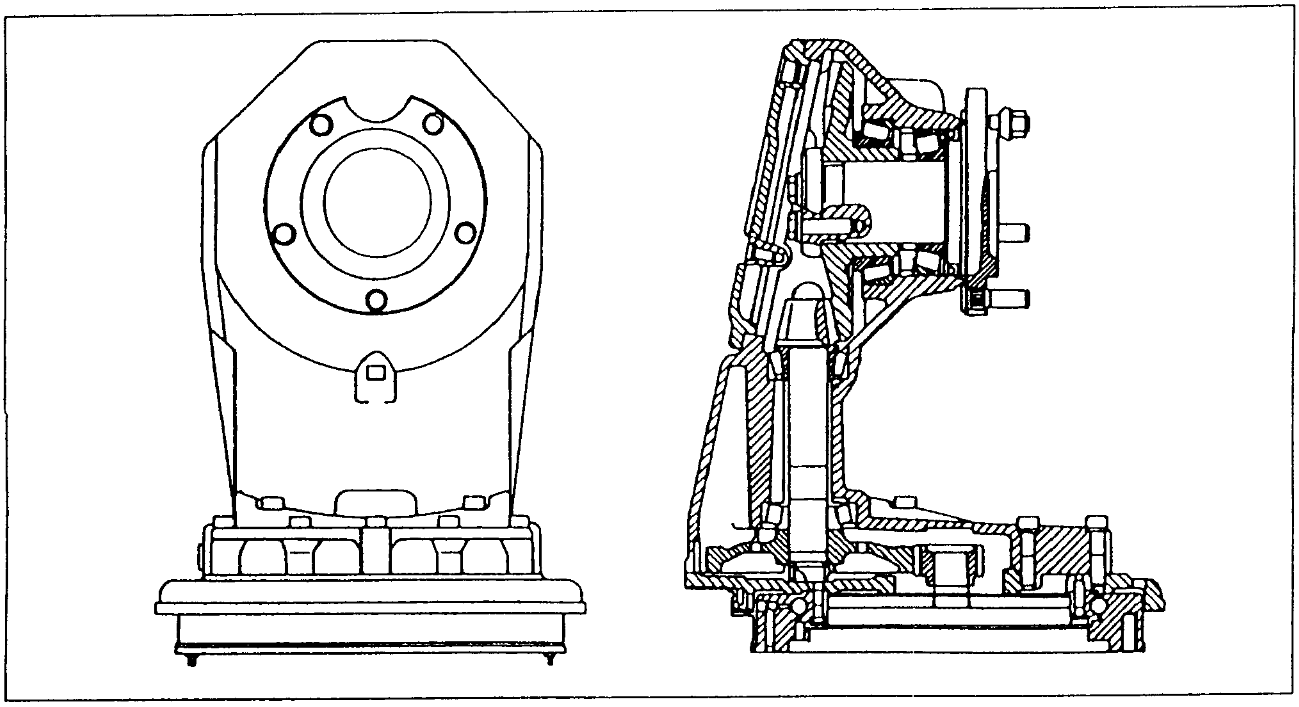
Inspection: Measure the insulation resistance of the field coil.

Measuring terminals: Between terminals E and F

Standard: 1 MΩ or more

DRIVE UNIT AND REAR WHEELS

GENERAL



SPECIFICATIONS

Drive Unit

Item \ Vehicle model			EC 10T-15T
Reduction-gear type			Single-stage helical gear Single-stage spiral bevel gear
Number of gear teeth	Helical gear first stage	Drive	15
		Driven	57
	Spiral bevel gear	Drive	9
		Driven	37
Total reduction ratio			20.37
Drive unit gear oil quantity ℓ (US gal)			Approx. 4.5 (1.19)

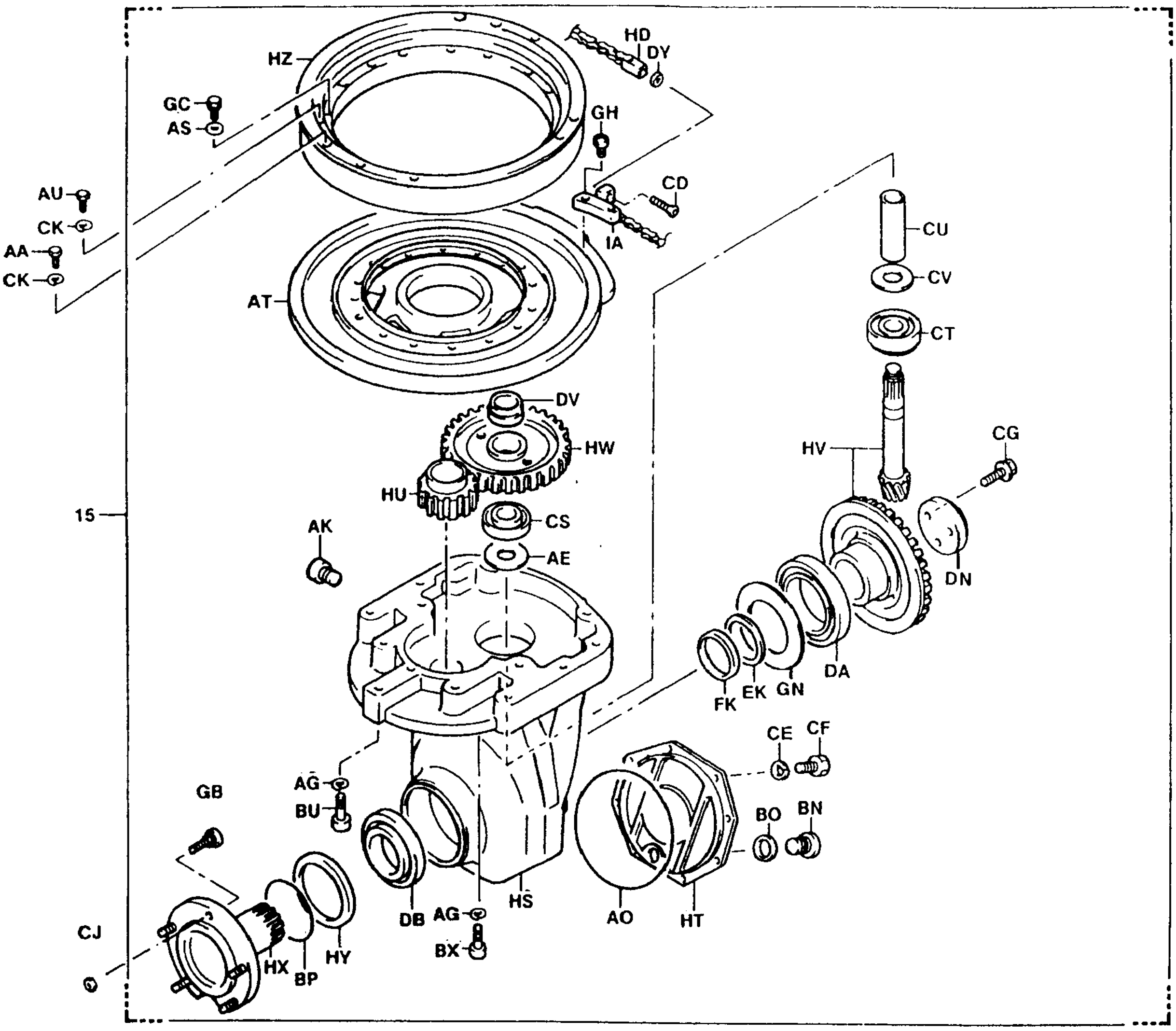
Rear wheel tire

○: STD △: OPT –: Not available

	PSC tire	Pneumatic tire	Cushion tire
Tire outside diameter × width (in)	18 × 7 – 8	18 × 7 – 8 16 PLY	16.25 × 7 × 11.25
Rim	Side ring rim 4.33R-8	←	–
EC 10T	○	△	△
EC 12T	○	△	△
EC 15T	○	△	△
Air pressure kPa (kgf/cm²)	–	980 (10)	–
Offset (mm)	19 (common for front and rear)	9 (common for front and rear)	

COMPONENTS

4301



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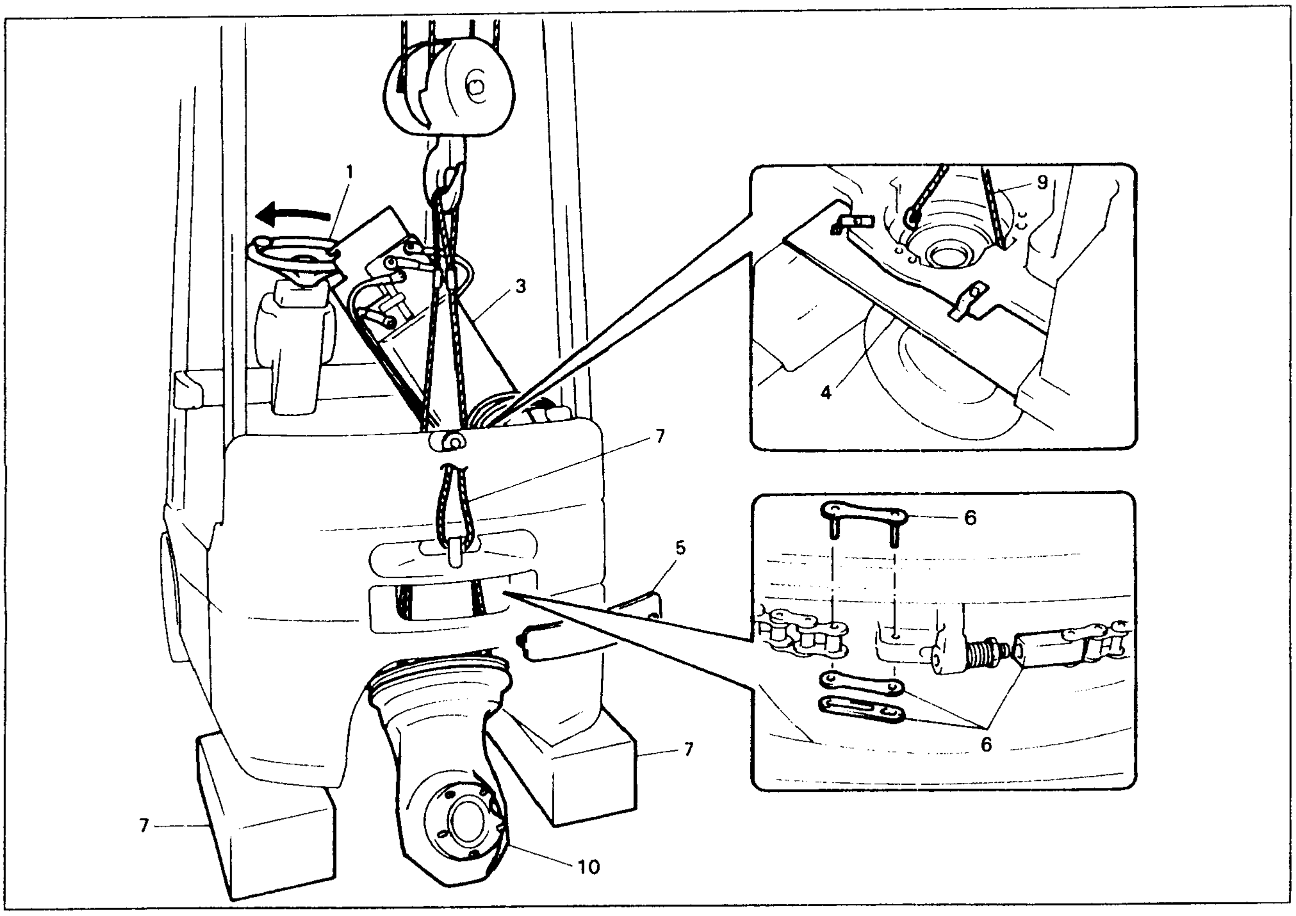
DRIVE UNIT ASSEMBLY

REMOVAL·INSTALLATION



Removal Procedure

1 Lift the fork slightly and turn the steering wheel fully counterclockwise for hoisting the vehicle. **[Point 1]**
2 Remove the drive motor (see page (P4-6) for removal of drive motor).
3 Set the controller with its left end raised (see page (P4-6) for removal of the controller).
4 Remove the center cover.
5 Remove the chain cover.
6 Disconnect the steering chain from the weight window and remove the steering chain. **[Point 2]**
7 Hoist the vehicle by wire rope, set supporting wooden blocks and remove the rear wheel.
8 Drain the gear oil.
9 Tentatively hoist the drive unit and remove the set bolts. **[Point 3]**
10 Remove the drive unit from the bottom.

Installation Procedure

Installation is reverse of the removal procedure.

Note:
- **Standard gear oil quantity: 4.5 liters**
- **Use Hypoid Gear Oil SAE80W-90 API GL-5**
- **Oil replacement**
  Replace the oil after the first 170 hours of operation. The oil replacement thereafter is about every 1000 hours or annually.