SECTION INDEX
TOYOTA FBMF 16-30

< Tillbaka till Index

FOREWORD

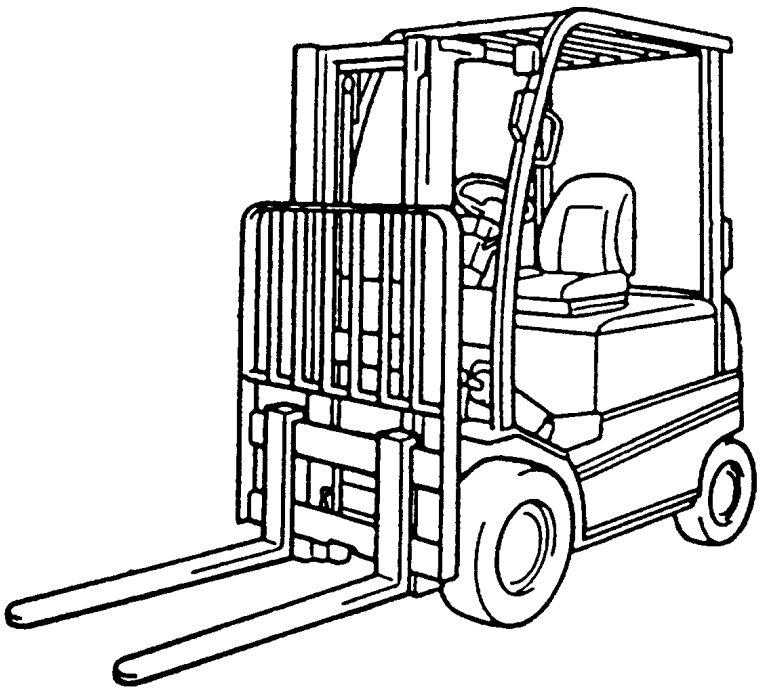
This manual covers the service procedures of the TOYOTA BATTERY FORKLIFT FBMF16 ~ 30 Series. Please use this manual for providing quick, correct servicing of the corresponding forklift models.

This manual deals with the above models as of June 1996. Please understand that disagreement can take place between the descriptions in the manual and actual vehicles due to change in design and specifications. Any change or modifications thereafter will be informed by Toyota Industrial Vehicles' Parts & Service News.

TOYOTA Material Handling Company
A Division of TOYOTA INDUSTRIES CORPORATION

GENERAL

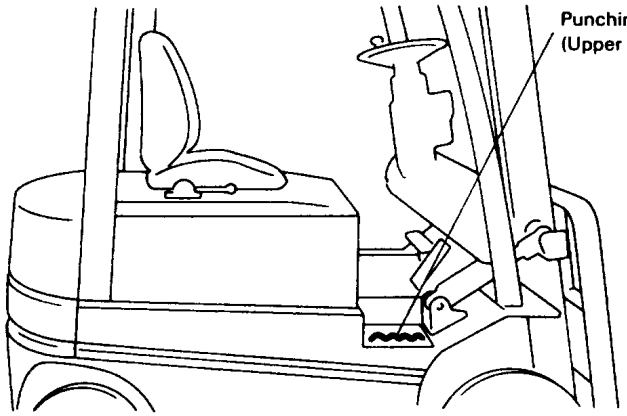
EXTERIOR VIEWS



VEHICLE MODELS

Item \ Model		FBMF16	FBMF20	FBMF25	FBMF30
Load capacity	kg (lb)	1600 (3200)	2000 (4000)	2500 (5000)	3000 (6000)
Voltage	V	72/80	←	←	←
Battely capacity	STD capacity	360	480	←	600
AH/5H	Max. capacity	450	600		750

FRAME NUMBER



Model **Punching format**

FBMF16 : FBMF16 Ⓔ 10001 ~

FBMF20·25: FBMF25 Ⓔ 10001 ~

FBMF30 : FBMF30 Ⓔ 10001 ~

LIST OF REFERENCE PAGES IN PUBLISHED NEW MODEL FEATURES

The FBMF16, 20, 25 and 30 are based on the body for FBM 16 to 30.
For the sections not included in this manual, please refer to the published new model features for the FBM16 to 30 (No. PE301). This list shows the reference pages for each section.

Item (published new model features for the FBM16 to 30)		FBMF16·20·25·30
ELECTRICAL SYSTEM	BATTERY	*2-2
	CHARGER	—
	ACCELERATOR	←
	DRIVE MOTOR	←
	PUMP MOTOR	←
	POWER STEERING MOTOR	←
	CONTROLLER	*2-5
POWER TRAIN	DRIVE UNIT	←
DRIVE, STEERING AND BRAKE SYSTEM	FRONT AXLE	←
	REAR AXLE	*2-6
	WHEELS	*2-7
	STEERING	*2-8
	BRAKE	*2-8
FRAME & AUXILIARY EQUIPMENT	BODY FRAME	*2-10
	LAMPS & SWITCHES	←
	INSTRUMENTS	*2-12
	Digital Multi-Display	*2-12
	Diagnosis	←
	Analyzer	←
MATERIAL HANDLING AND HYDRAULIC SYSTEMS	V MAST	2-13
	FV MAST (OPT)	2-14
	FSV MAST (OPT)	2-14
	FORK & BACKREST	2-15
	MAST INTERCHANGEABILITY	2-16
	LIFT CYLINDER	*2-17
	TILT CYLINDER	*2-20
	OIL PUMP	*2-21
	OIL CONTROL VALVE	←
	HYDRAULIC CIRCUIT	*2-22

*: Only the modified points are described.

HOW TO READ THIS MANUAL

EXPLANATION METHOD

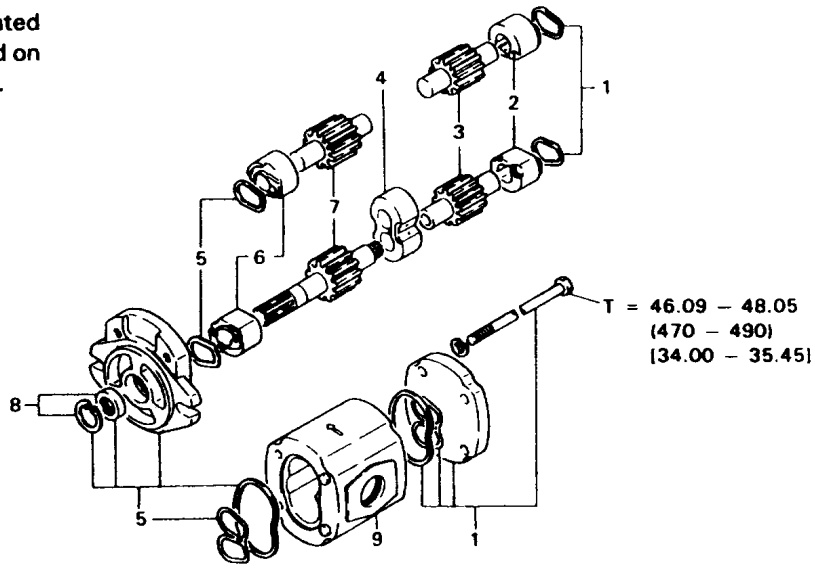
1. Operation procedure
   (1) The operation procedure is described in either pattern A or pattern B below.
   Pattern A: Explanation of each operation step with illustration.
   Pattern B: Explanation of operation procedure by indicating step numbers in one illustration, followed by explanation of cautions 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, the part name is described on the either side of the illustration.

Example: 1 Piping



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

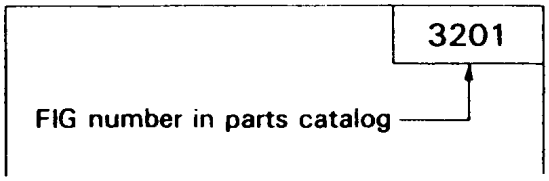
[Point 1]
Disassembly: Put a match mark when removing the pump cover.

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

2. How to read components figures

(1) The components figure uses 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 inspection or adjustment.

ABBREVIATIONS

Abbreviation (code)	Meaning	Abbreviation (code)	Meaning
ASSY	Assembly	SST	Special service tool
LH	Left hand	STD	Standard
LLC	Long life coolant	T =	Tightening torque
OPT	Option	○ ○ T	Number of teeth (○ ○)
O/S	Oversize	U/S	Undersize
PS	Power steering	W/	With
RH	Right hand	L/	Less
SAE	Society of Automotive Engineers (USA)		

Disassembly Procedure

1 Remove the two pick up sensors.

2 Remove the drive unit cap.

3 Remove the drive gear lock nut. **[Point 1]**

4 Remove the tapered roller bearing. **[Point 2]**

5 Remove the front axle housing RH. **[Point 3]**

6 Remove the differential ASSY.

7 Remove the reduction gear key plate.

8 Remove the front axle housing LH. **[Point 4]**

9 Remove the drive gear, reduction gear and output gear.

10 Remove the drive gear bearing. **[Point 5]**

11 Remove the bearings from the output gear. **[Point 6]**

12 Remove the bearings from the reduction gear. **[Point 7]**

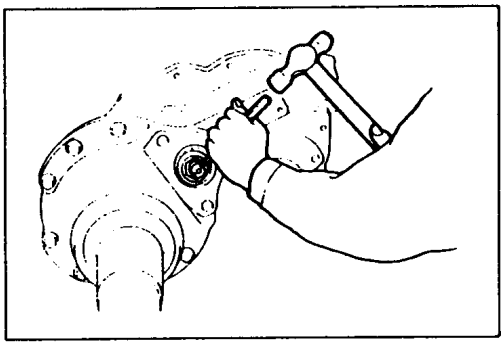
Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

Note:
•The tightening torque for each portion is as follows:

Unit: T = N·m (kgf-cm) [ft-lbf]

Front axle housing LH set bolt	60.8 ~ 113.7 (620 ~ 1160) [44.9 ~ 83.9]
Front axle housing RH set bolt	60.8 ~ 113.7 (620 ~ 1160) [44.9 ~ 83.9]
Out put gear lock nut	167 ~ 226 (1700 ~ 2300) [123 ~ 166]
Drive unit cap set bolt	60.8 ~ 113.7 (620 ~ 1160) [44.9 ~ 83.9]

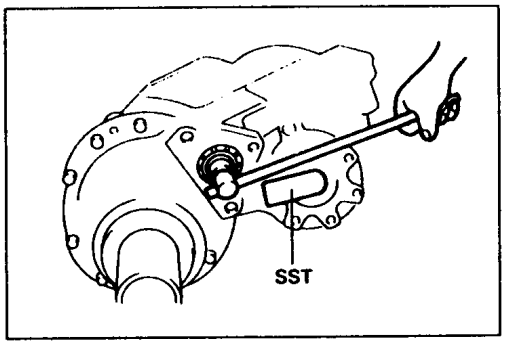


Point Operations

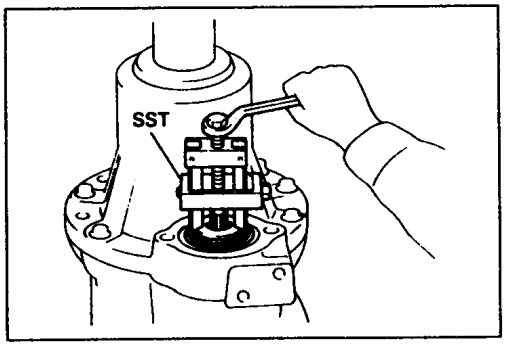
[Point 1]

Disassembly: Using a chisel, unstake the nut.

Reassembly: Using a punch, stake the nut.

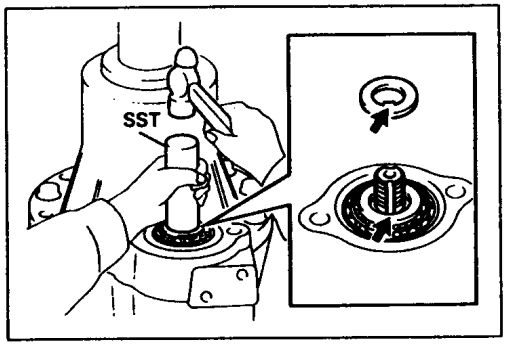


Disassembly·Reassembly: SST 09330-13200-71

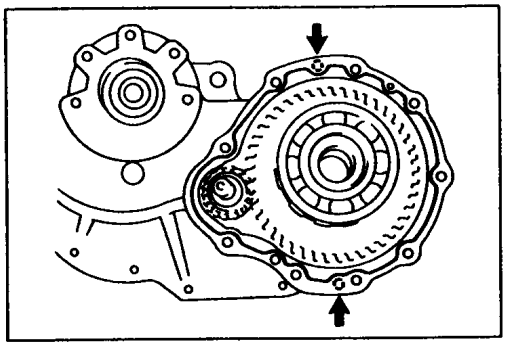


[Point 2]

Disassembly: 1 Remove the washer.
2 Using SST, remove the tapered roller bearing.
SST 09556-76001-71 (SST 09556-22010)



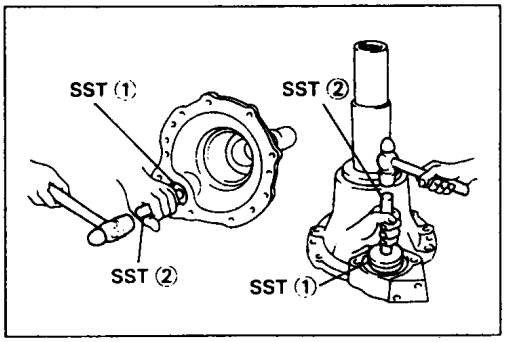
Reassembly: 1 Using SST, temporarily install the tapered roller bearing.
SST 09608-04031
2 Install the washer, as shown.



[Point 3]

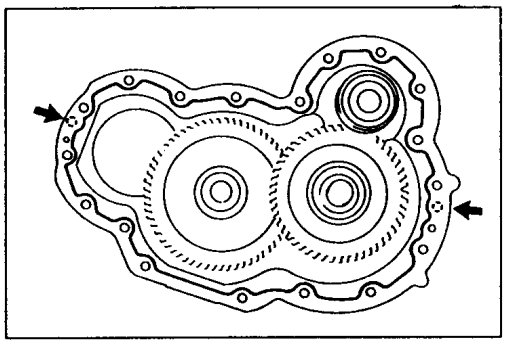
Disassembly: Use two service bolts for disassembly.
Service bolt size: M14 × 1.5

Reassembly: Coat liquid gasket on the gear case matching surface before reassembly.
Gasket: 08826-76002-71 (08826-00090)



Disassembly: Using SST, remove the bearing outer races and spacer.
SST 09950-76018-71 (SST 09950-60010)····①
SST 09950-76020-71 (SST 09950-70010)····②

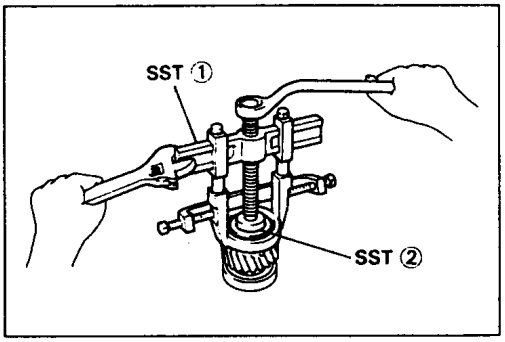
Reassembly: Using SST, install the bearing outer races and spacer.
SST 09950-76018-71 (SST 09950-60010)····①
SST 09950-76020-71 (SST 09950-70010)····②



[Point 4]

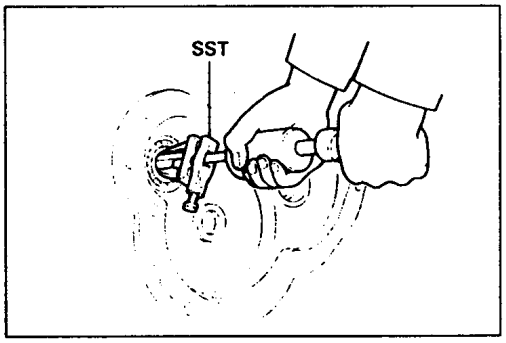
Disassembly: Use two service bolts for disassembly.
Service bolt size: M14 × 1.5

Reassembly: Coat liquid gasket on the gear case matching surface before reassembly.
Gasket: 08826-00090

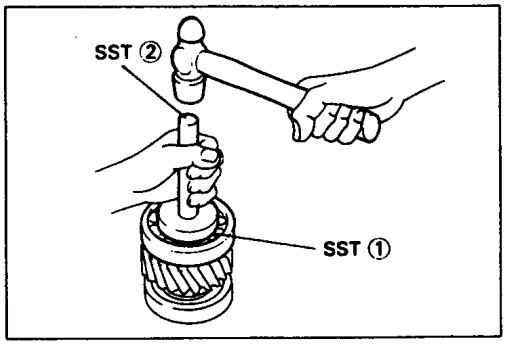


[Point 5]

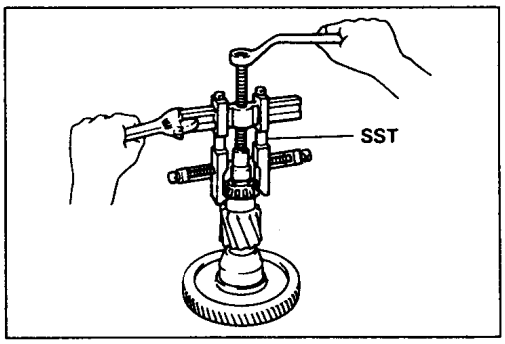
Disassembly: Using SST, remove the bearings.
SST 09950-76004-71 (SST 09950-40011)····①
SST 09950-76018-71 (SST 09950-60010)····②



If the drive gear bearing remains in the axle housing LH:
SST 09308-10010

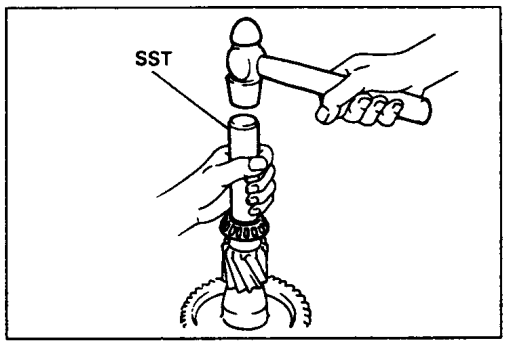


Reassembly: SST 09950-76018-71 (SST 09950-60010)····①
SST 09950-76020-71 (SST 09950-70010)····②

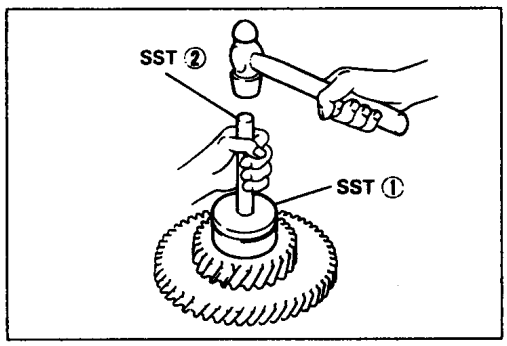


[Point 6]

Disassembly: Using SST, remove the tapered roller bearing.
SST 09950-76014-71 (SST 09950-40011)



Reassembly: Using SST, install the tapered roller bearing.
SST 09608-76003-71 (SST 09608-04031)



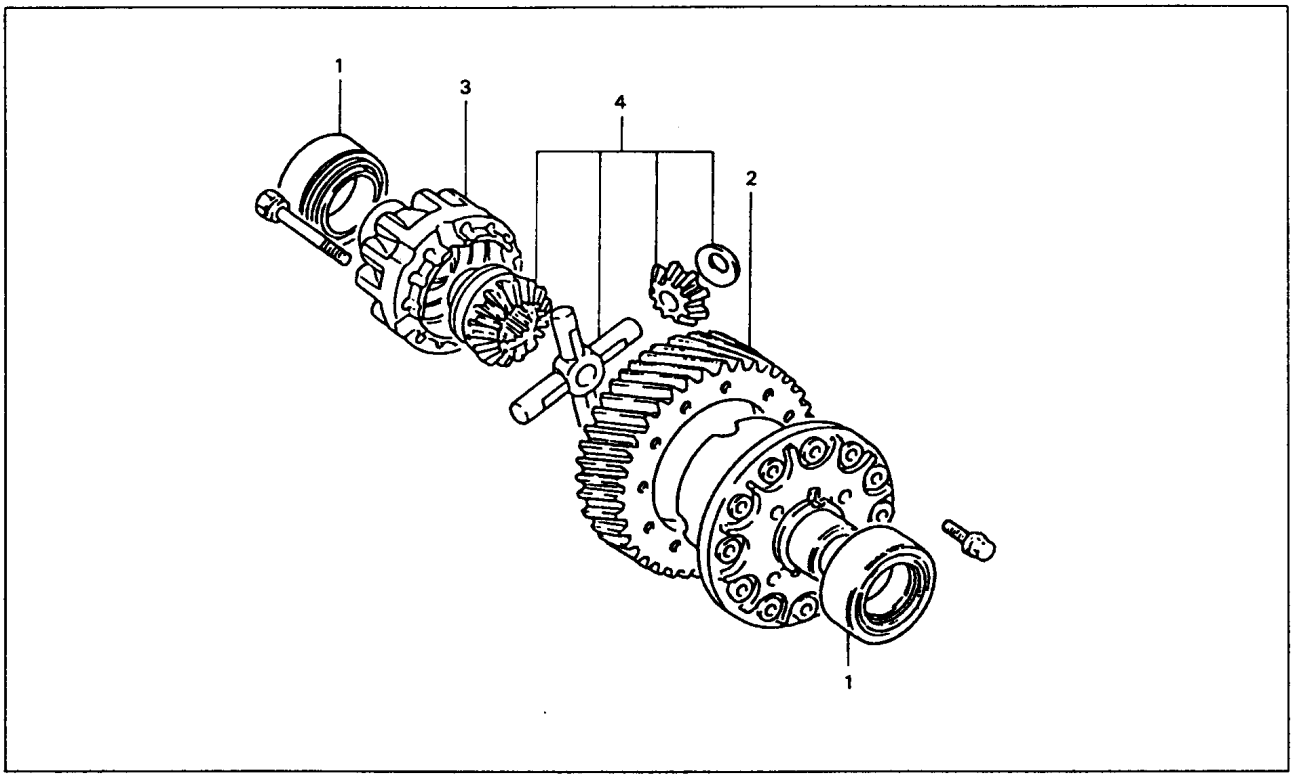
[Point 7]

Disassembly: Using a brass bar, remove the bearing.

Reassembly: Using SST, install the bearing.
SST 09950-76018-71 (SST 09950-60010)····①
SST 09950-76020-71 (SST 09950-70010)····②

DIFFERENTIAL

DISASSEMBLY·INSPECTION·REASSEMBLY



Disassembly Procedure

1 Remove the differential case bearings. **[Point 1]**

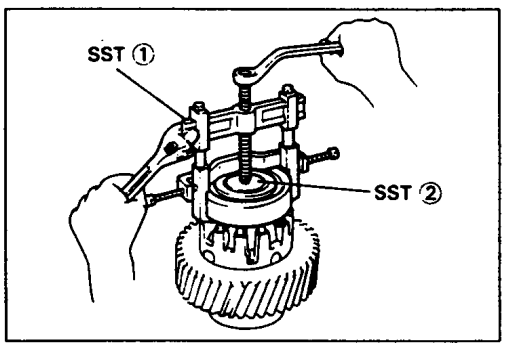
2 Remove the ring gear. **[Point 2]**

3 Remove the RH differential case. **[Point 3]**

4 Remove the side gears, pinion gears, spider and thrust washers. **[Point 4]**

Reassembly Procedure

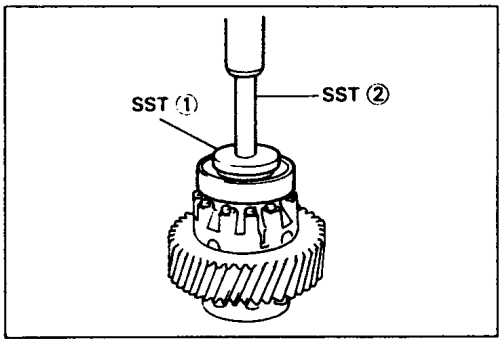
The reassembly procedure is the reverse of the disassembly procedure.



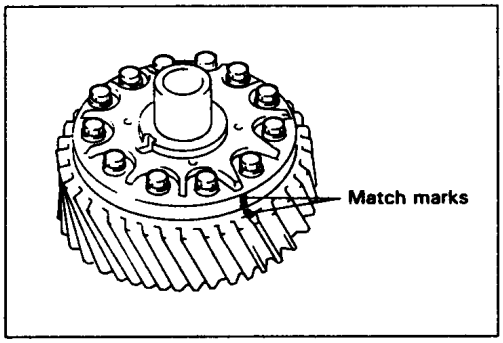
Point Operations

[Point 1]

Disassembly: SST 09950-76014-71 (SST 09950-40011)····①
SST 09950-76018-71 (SST 09950-60010)····②



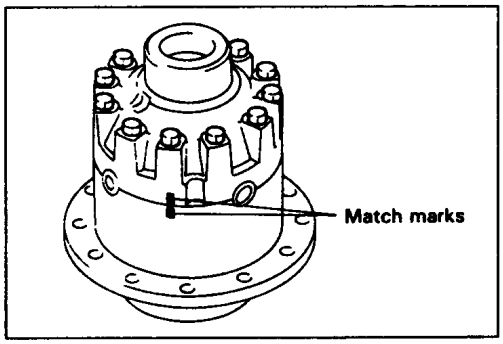
Reassembly: SST 09950-76018-71 (SST 09950-60010)····①
SST 09950-76020-71 (SST 09950-70010)····②



[Point 2]

Disassembly: Punch match marks on the ring gear and LH differential case.

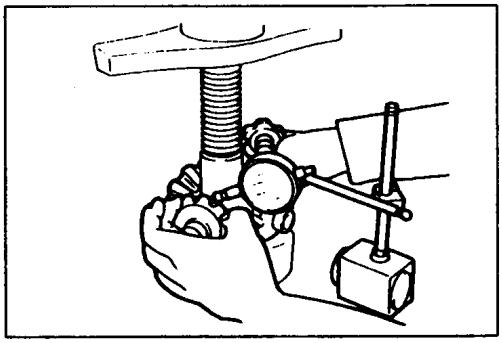
Reassembly: Align the match marks.



[Point 3]

Disassembly: Punch match marks on the RH and LH differential cases.

Reassembly: Align the match marks.

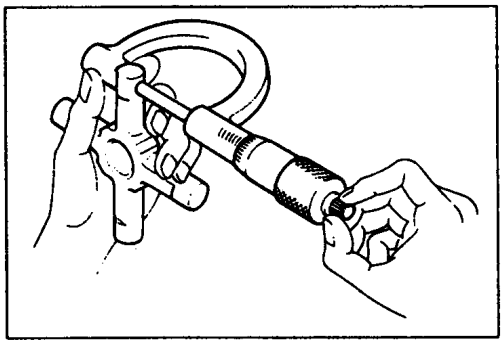


[Point 4]

Inspection: Measure the backlash between the side gear and pinion gear.
Install the side gear and pinion gear on the case. Lightly push the spider to bring pinion gear and side gear close to the thrust washer for measurement.

Backlash:
0.2 ~ 0.3 mm (0.008 ~ 0.012 in)

Measure the backlash at both cases.



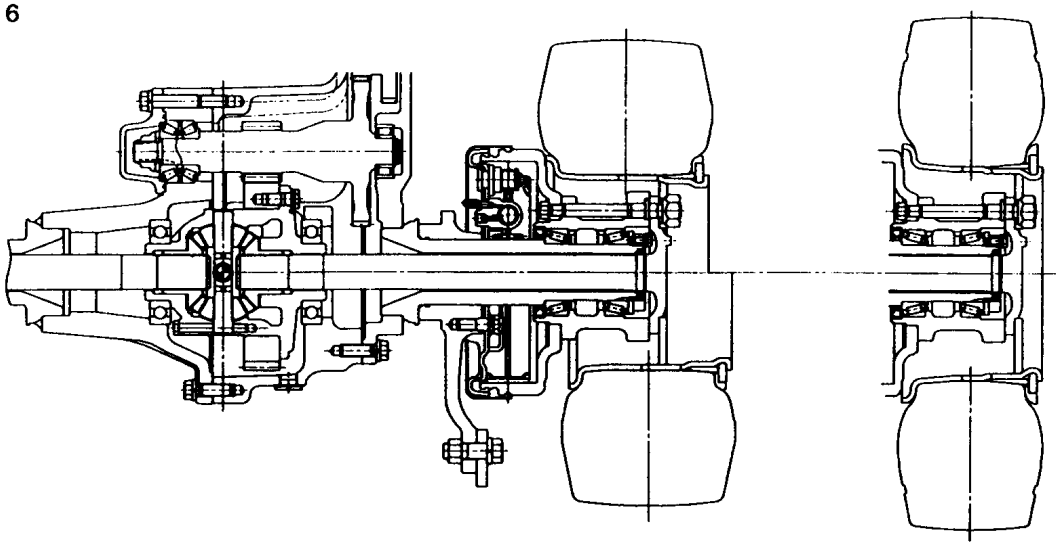
Inspection: Measure the spider outside diameter.

Standard: 22.00 mm (0.8661 in)
Limit: 21.75 mm (0.8563 in)

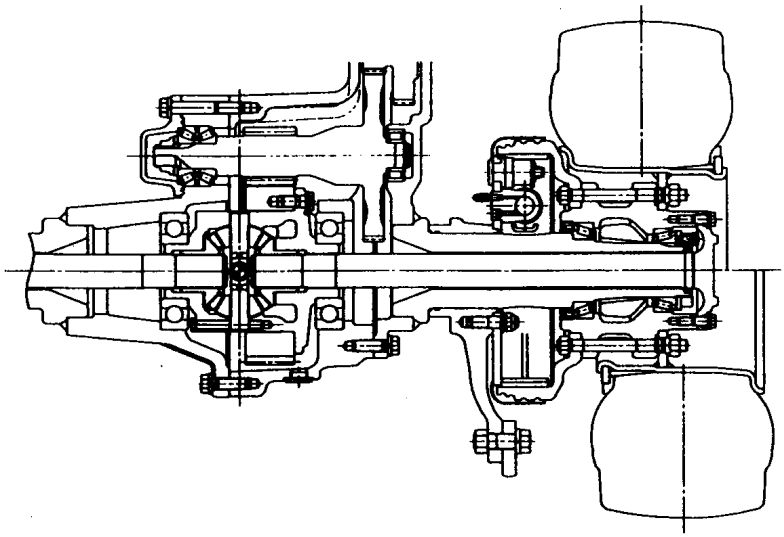
FRONT AXLE

GENERAL

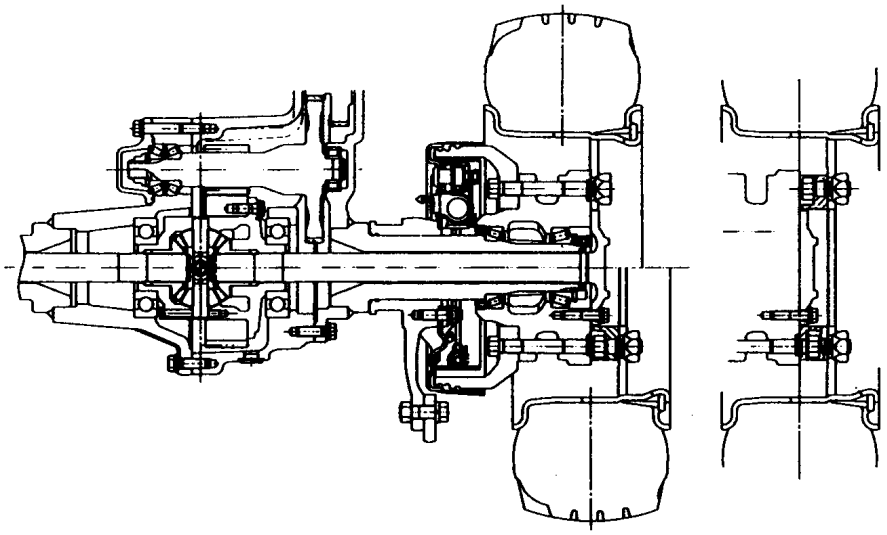
FBMF16



FBMF20·25



FBMF30



SPECIFICATIONS

Item \ Model		FBMF16	FBMF20·25	FBMF30
Front axle type		Full-floating	←	←
Suspension type		Fixed to frame	←	←
Axle shaft diameter mm (in)		40 (1.57)	←	←
Axle shaft diameter (spline portion) mm (in)		40 (1.57)	←	←
Wheel (STD)	Tire size	21 × 8 – 9	23 × 9 – 10	28 × 9 – 15
	Rim size	9 × 6.00E	10 × 6.50F	15 × 7.00T

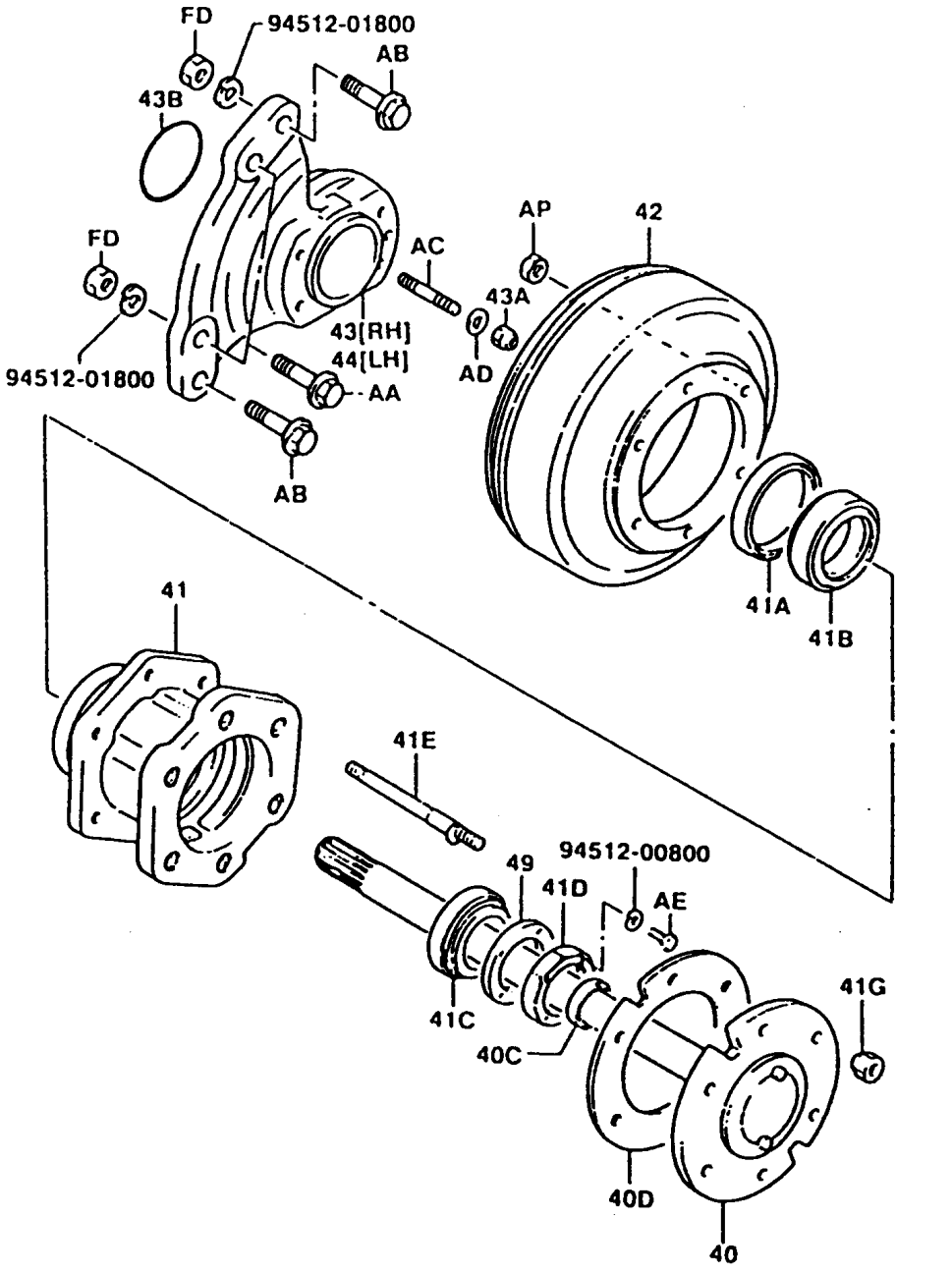
Tire inflating pressure

Model	Type	Rim size	Pneumatic shaped cushion tire	Pneumatic tire	Inflating pressure kPa (kgf/cm²) [psi]
FBMF16	Standard	9 × 6.00E TB	21 × 8 – 9	21 × 8 – 9 – 14PR	883 (9.0) [128]
	Over size	10 × 5.00F TB	6.50 – 10	6.50 – 10 – 12PR	
	Wide tread	9 × 6.00E TB	21 × 8 – 9	21 × 8 – 9 – 14PR	
FBMF20·25	Standard	10 × 6.50F TB	23 × 9 – 10	23 × 9 – 10 – 18PR	883 (9.0) [128]
	Wide tread				
FBMF30	Standard	15×7.00T IR	28 × 9 – 15	—	—
		15 × 7.00S SDC			
	Wide tread	15 × 7.00T IR	—	28 × 9 – 15 – 14PR	785 (8.0) [114]
		15 × 7.00S SDC			

COMPONENTS

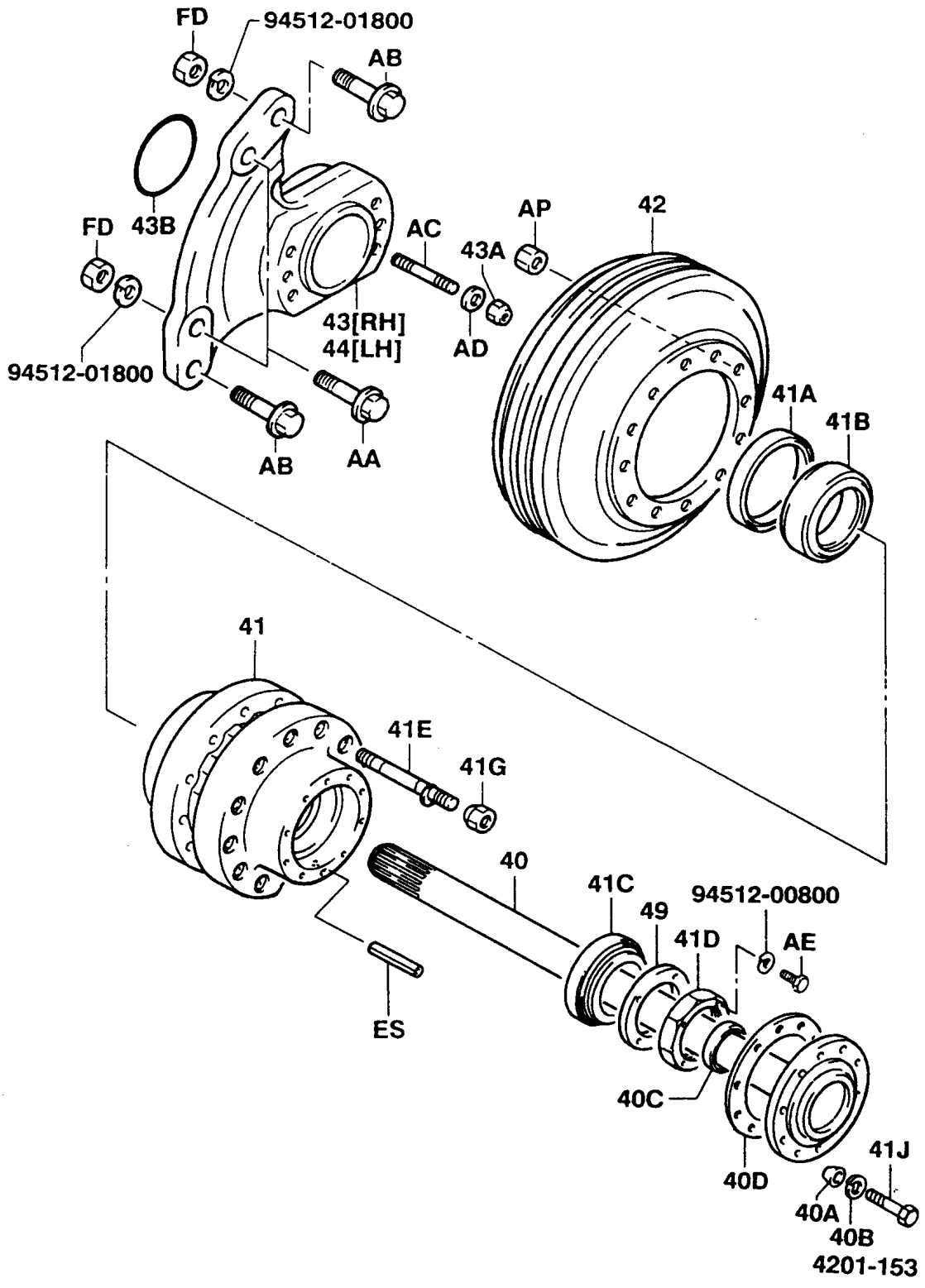
FBMF16

4201



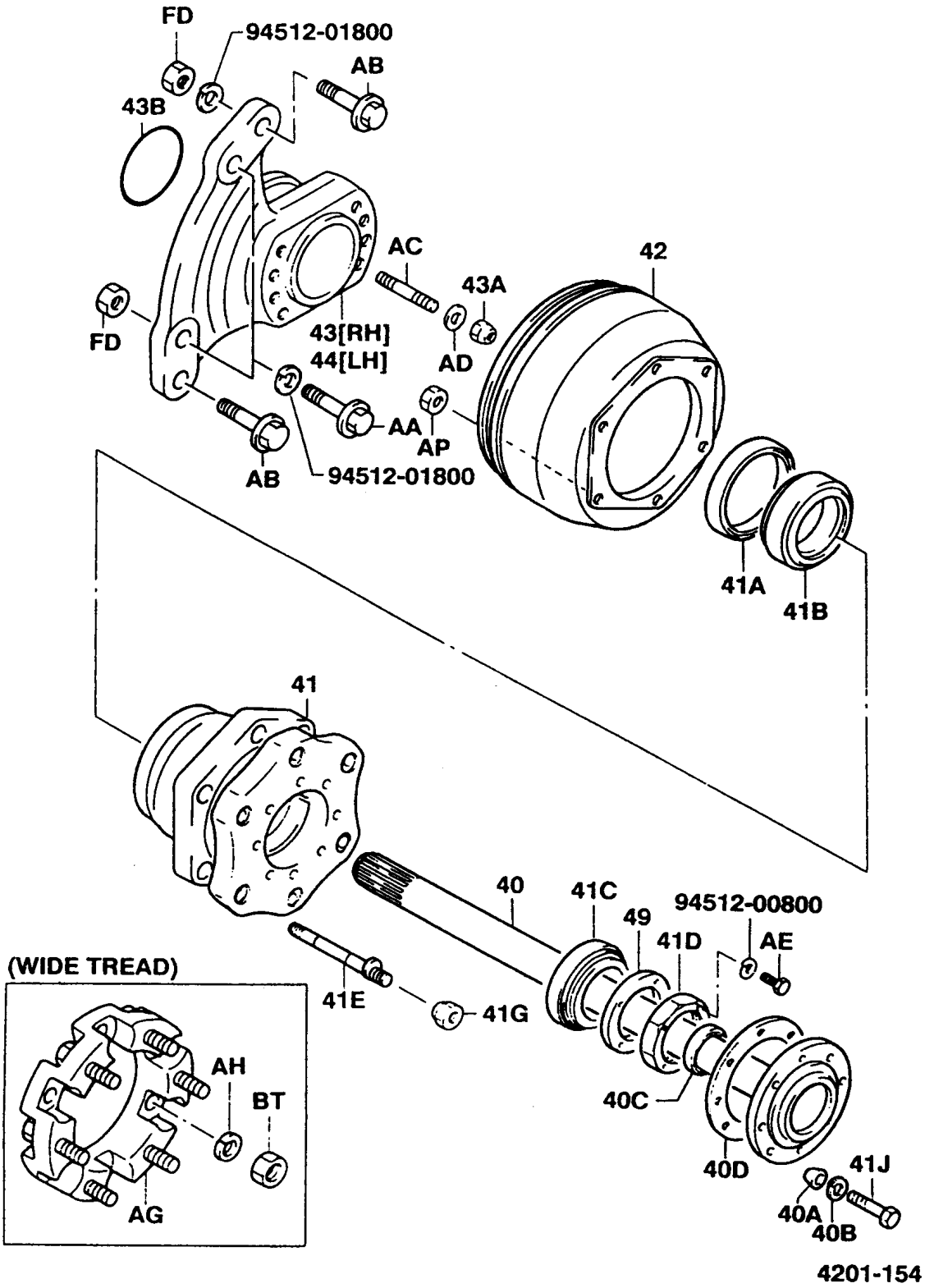
FBMF20·25

4201



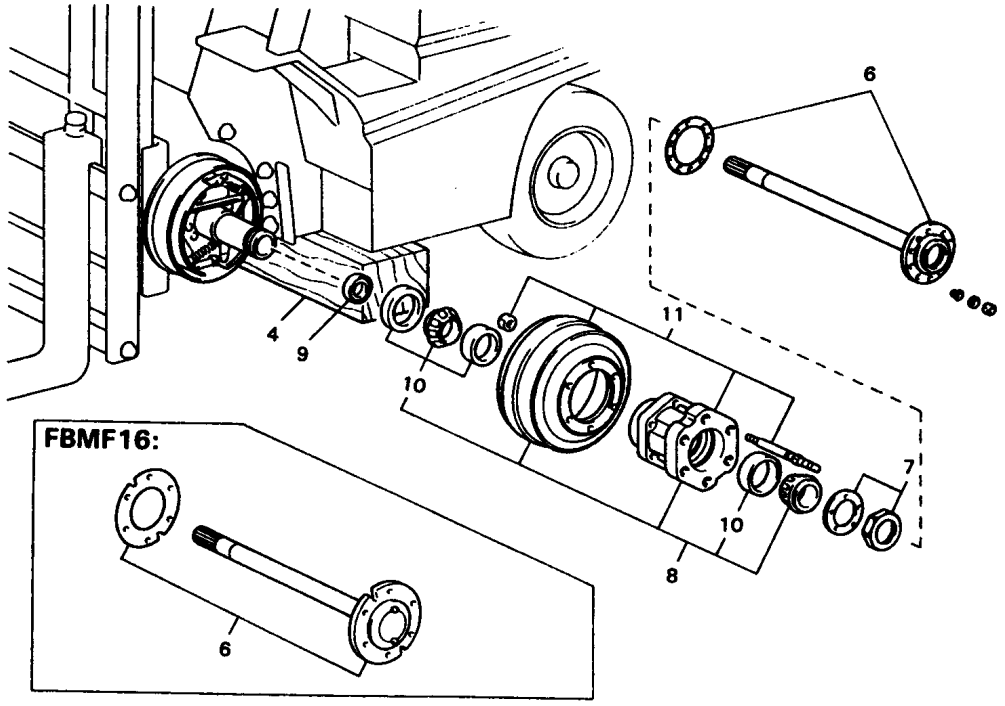
FBMF30

4201


FD
94512-01800
AB
43B
AC
42
43A
FD
43[RH]
44[LH]
AD
AA
AP
AB
94512-01800
41A
41B
41
40
41C
49
94512-00800
41D
AE
41E
41G
(WIDE TREAD)
AH
BT
AG
40C
40D
41J
40A
40B
4201-154

FRONT AXLE SHAFT·HUB

REMOVAL·INSTALLATION



1 Drive unit and differential oil
2 Rear wheel
3 Front wheel hub nut
5 Front wheels

Removal Procedure

1 Drain differential oil.
2 Chock the rear wheels.
3 Loosen the front wheel hub nuts.
4 Jack up the frame and support its bottom with a stand or wooden blocks.
5 Remove the front wheels.
6 Remove the axle shaft. **[Point 1]**
7 Remove the bearing lock nut and lock nut plate. **[Point 2]**
8 Remove the front axle hub W/brake drum. **[Point 3]**
9 Remove the axle shaft oil seal. **[Point 4]**
10 Remove the hub oil seal and bearing. **[Point 5]**
11 Disconnect the brake drum. **[Point 6]**

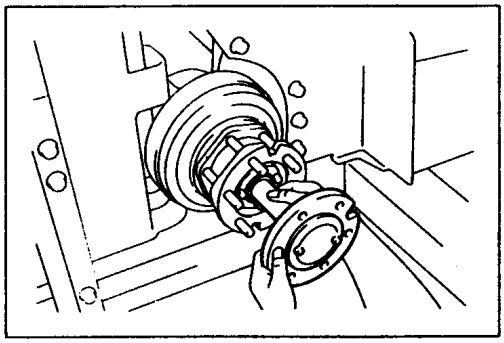
Installation Procedure

The installation procedure is the reverse of the removal procedure.

Note:
- **Coat thread tightener (08833-00070) on the brake drum set nut before tightening.**
- **Adjust the braking performance after installation. Make the vehicle travel in the forward and reverse directions about 10 times and depress the brake pedal to stop the vehicle each time.**
- **The tightening torque for each portion is as follows:**

Unit: N·m (kgf-cm) [ft-lbf]

Brake drum set nut (hub bolt set nut)	FBMF16: FBMF20·25: FBMF30:	68.65 ~ 88.26 (700 ~ 900) [50.65 ~ 86.82] 78.45 ~ 107.87 (800 ~ 1100) [57.88 ~ 79.59] 168.71 ~ 205.94 (1700 ~ 2100) [123.00 ~ 151.94]
Bearing lock nut stopper bolt		14.71 ~ 21.57 (150 ~ 220) [10.85 ~ 15.92]
Axle shaft set bolt	FBMF20·25: FBMF30:	68.65 ~ 88.26 (700 ~ 900) [50.65 ~ 86.82] 98.07 ~ 127.49 (1000 ~ 1200) [72.35 ~ 94.06]
Hub nut	FBMF16: FBMF20·25: FBMF30:	176.52 ~ 392.27 (1800 ~ 4000) [130.23 ~ 289.40] 107.87 ~ 196.13 (1100 ~ 2000) [79.59 ~ 144.70] 294.20 ~ 588.40 (3000 ~ 6000) [217.05 ~ 434.10]

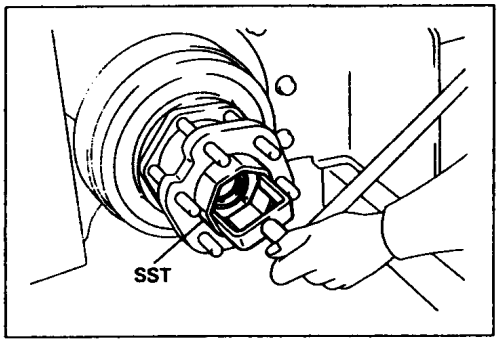


Point Operations

[Point 1]

Removal: After removing the axle shaft set bolts (except FBMF16), lightly tap the center of the axle shaft flange with a copper hammer for easy removal.

Removal·installation: Carefully operate so as not to damage the oil seal.

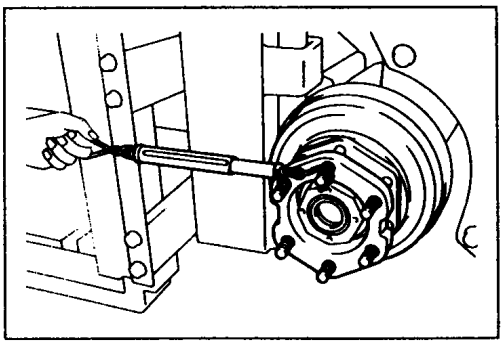


[Point 2]

Removal·installation:
SST 09509-76002-71 (SST 09509-55020)

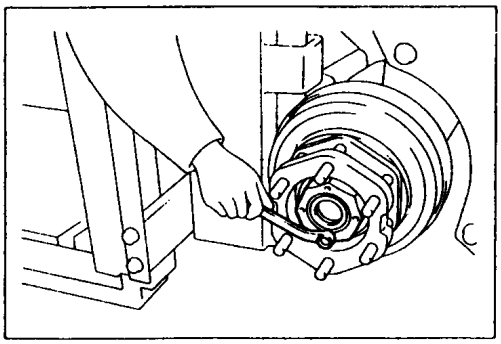
Installation: Adjust the front axle bearing starting torque.

1. Fully tighten the bearing lock nut, rotate the hub by 4 to 5 turns. Then loosen the lock nut by 1/12 to 1/6 turn and rotate the hub by 4 to 5 turns again.

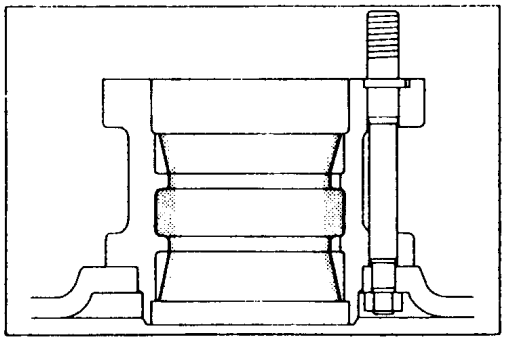


2. Set a spring scale on the hub bolt and measure the starting force.

   Starting force
   24.5 ~ 44.1 N (2.5 ~ 4.5 kgf) [18.1 ~ 32.6 lbf]

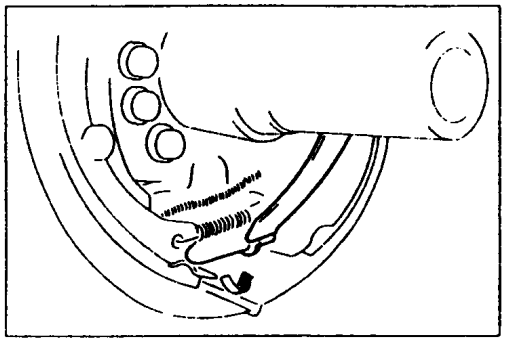


3. If the measured value does not satisfy the standard above, make adjustment by tightening or loosening the lock nut.
4. Align the lock nut plate stopper hole with the lock nut threaded hole.
5. Coat thread tightener (08833-00070) on the lock nut stopper bolt, and tighten it.

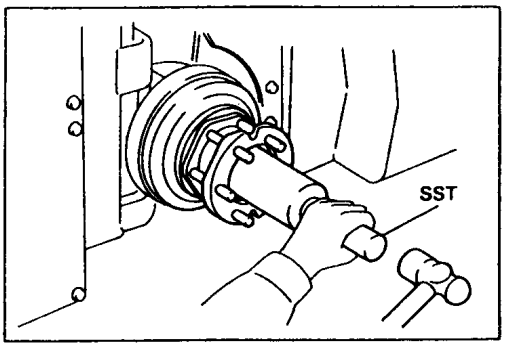


[Point 3]

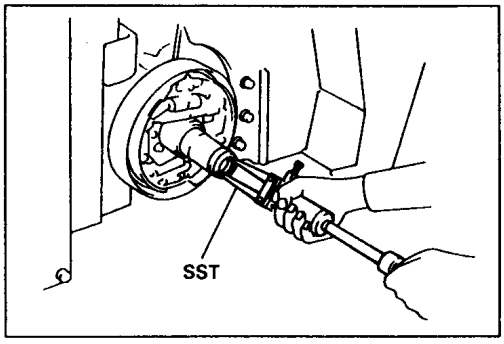
Installation: **Fill MP grease in the hub and bearings before installing the front axle hub W/brake drum.**



Installation: Turn the brake auto adjuster screw to contract the brake shoe slightly for easier brake drum installation.



Installation: SST 09370-10410-71



[Point 4]

Removal: SST 09308-76001-71 (SST 09308-00010)