



DIAGNOSTIC REPAIR MANUAL

8FBCU 20, 25, 28, 30, 32
8FBCHU 25

VOL. 1

SECTION INDEX

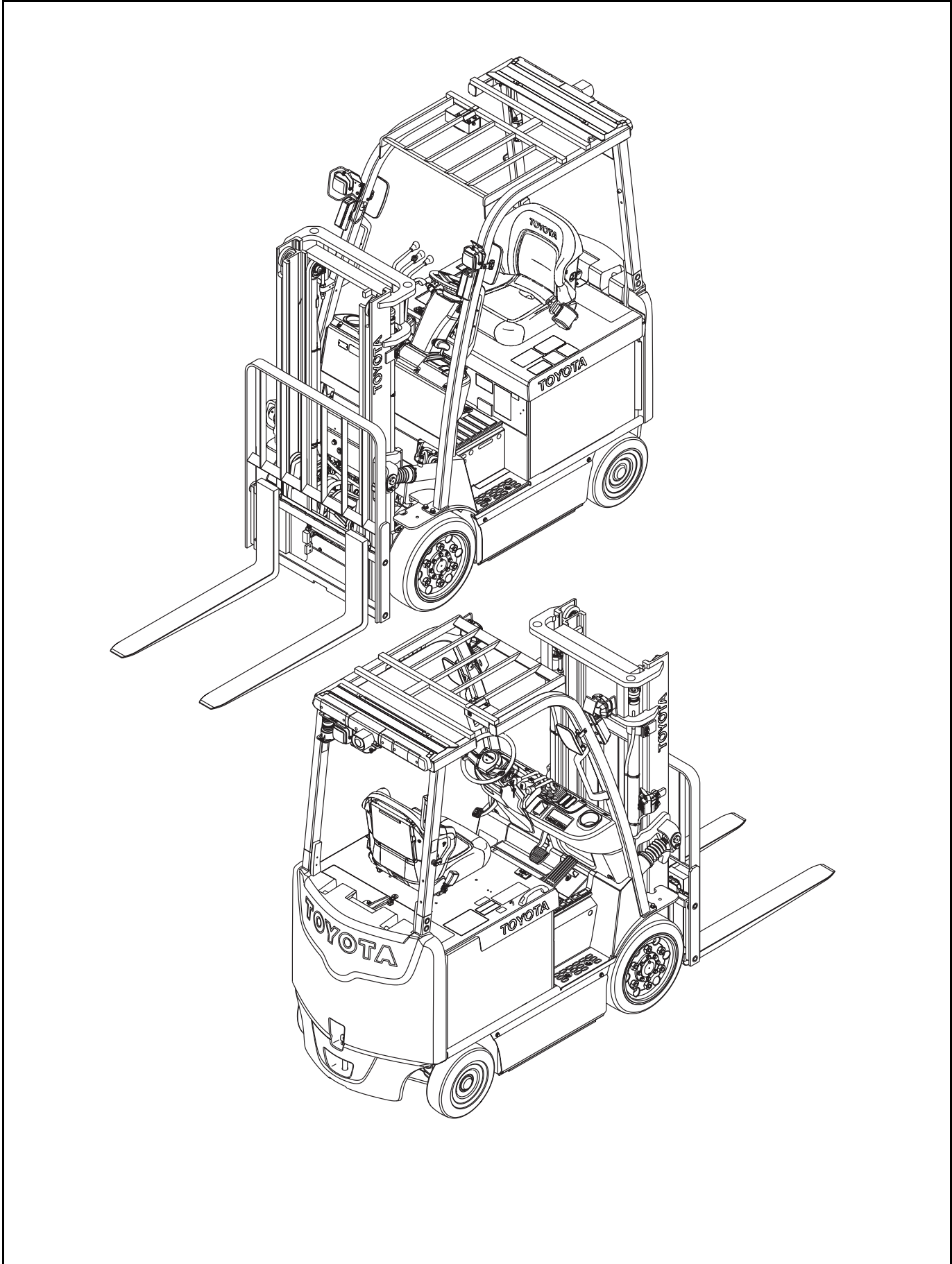
NAME	SECTION
GENERAL	0
BATTERY	1
CONTROL SYSTEM	2
MULTI-FUNCTION DISPLAY	3
TROUBLESHOOTING	4
MOTOR	5
DRIVE UNIT	6
FRONT AXLE	7
REAR AXLE	8
STEERING	9
BRAKE	10
BODY	11
MATERIAL HANDLING SYSTEM	12
MAST	13
CYLINDER	14
OIL PUMP	15
OIL CONTROL VALVE	16
SAS FUNCTIONS	17
APPENDIX	18

Sections indicated by solid characters are included in this manual.
Sections indicated by half-tone characters: See vol. 2.

GENERAL

	Page		Page
EXTERIOR VIEWS	0-2	RECOMMENDED LUBRICANT QUANTITY & TYPES	0-20
VEHICLE MODEL.....	0-3	LUBRICATION CHART.....	0-21
FRAME NUMBER.....	0-4	PERIODIC MAINTENANCE.....	0-22
HOW TO USE THIS MANUAL	0-5	PERIODIC REPLACEMENT OF PARTS AND LUBRICANTS	0-27
EXPLANATION METHOD	0-5		
TERMINOLOGY.....	0-6		
ABBREVIATIONS.....	0-6		
SI UNITS	0-7		
OPERATIONAL TIPS	0-8		
JACK-UP POINT	0-10		
HOISTING THE VEHICLE	0-11		
CAUTION FOR TOWING.....	0-11		
ATTENTIVE POINTS ON SAS ...	0-12		
CIRCUIT TESTER	0-13		
STANDARD BOLT & NUT TIGHTENING TORQUE.....	0-15		
BOLT STRENGTH CLASS IDENTIFICATION METHOD.....	0-15		
PRECOAT BOLTS.....	0-18		
HIGH PRESSURE HOSE FITTING TIGHTENING TORQUE.....	0-18		
WIRE ROPE SUSPENSION ANGLE LIST.....	0-19		
SAFE LOAD FOR EACH WIRE ROPE SUSPENSION ANGLE.....	0-19		
COMPONENTS WEIGHT	0-20		

EXTERIOR VIEWS

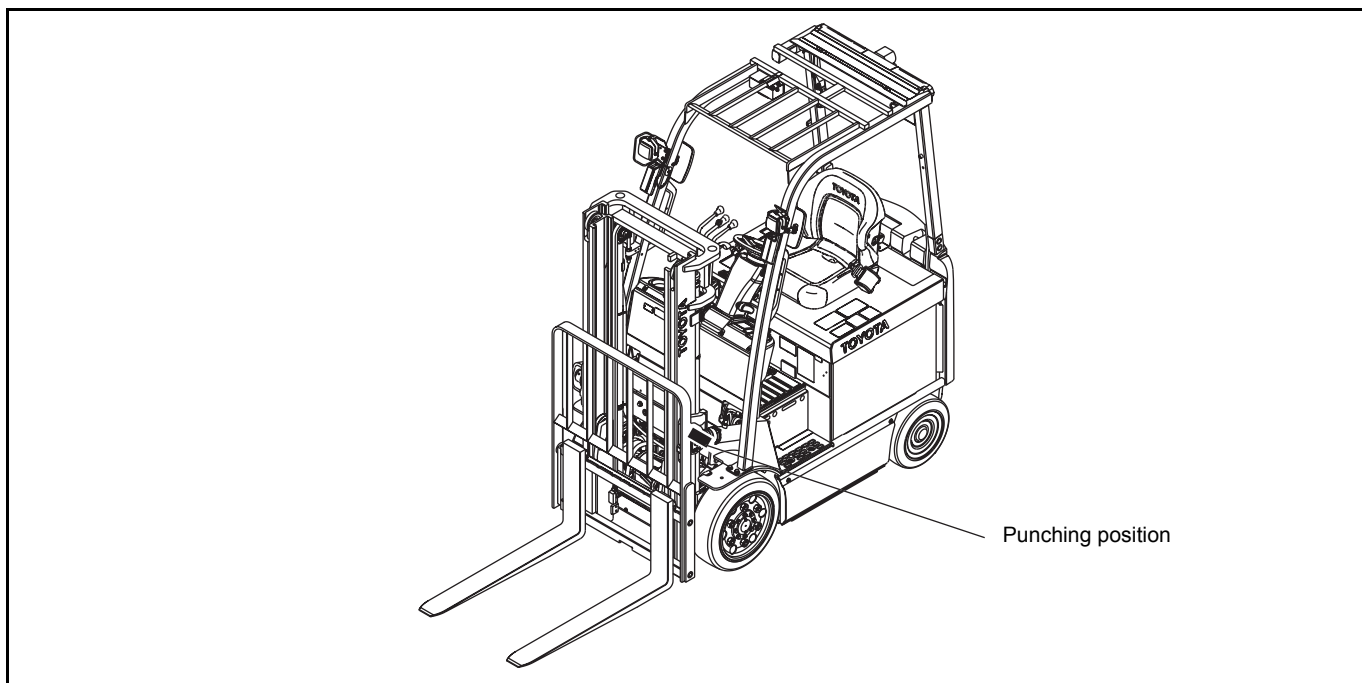


VEHICLE MODEL

Model Code	Load Capacity	Vehicle Model	Voltage	Remarks
20	4000 lbs	8FBCU20	36V/48V	
25	5000 lbs	8FBCU25	↑	
		8FBCHU25	↑	
28	5500lbs	8FBCU28	↑	
30	6000 lbs	8FBCU30	↑	
32	6500 lbs	8FBCU32	↑	USA·CANADA·MEXICO only

FRAME NUMBER

Frame No. Punching Position



Vehicle Model	Punching format
8FBCU20	8FBCU25-60011
8FBCU25	* 8FBCU25©60011
8FBCHU25	8FBCHU25-60011
8FBCU28	8FBCU28-60011
	* 8FBCU28©60011
8FBCU30	8FBCU32-60011
8FBCU32	* 8FBCU32©60011

*: EEC spec.

HOW TO USE THIS MANUAL

EXPLANATION METHOD

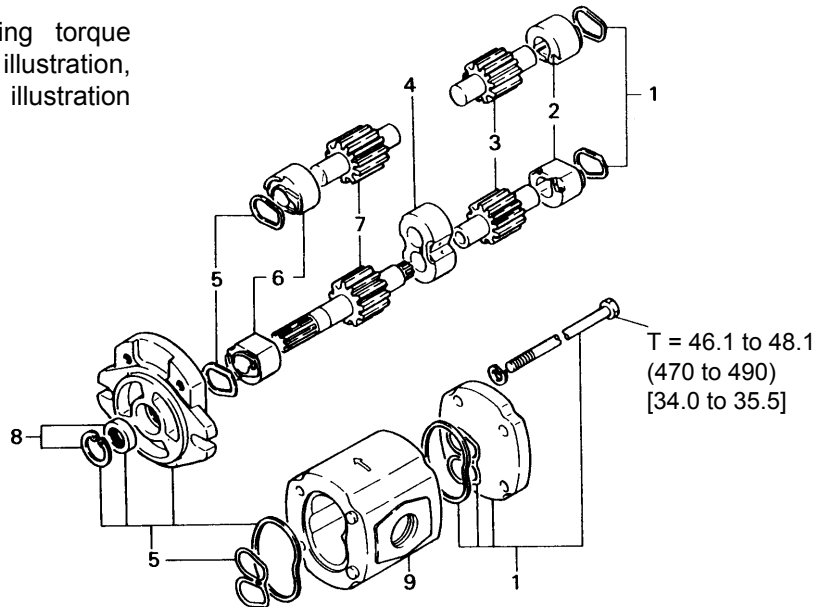
1. Operation procedure

Example of description in pattern B

DISASSEMBLY·INSPECTION·REASSEMBLY

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

- Step Nos. are partially sometimes omitted in illustrations.
- When a part requiring tightening torque instruction is not indicated in the illustration, the part name is described in the illustration frame.




Disassembly Procedure

- 1 Remove the cover. **[Point 1]**
- 2 Remove the bushing. **[Point 2]** ← Operation explained later
- 3 Remove the gear.

Point Operations

[Point 1] Explanation of key point for operation with an illustration

Disassembly: 
Put a match mark when removing the pump cover.

[Point 2]

Inspection:
Measure the bush inside diameter.

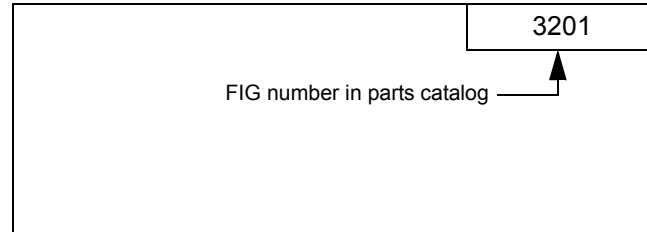
Limit: 19.12 mm (0.7528 in)

2. How to read components figures (Example)

- (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.

- (2) Refer to the parts catalog for the latest information.



3. Matters omitted in this manual

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 hazards on human body. Be sure to observe them.

Note:

Important items of which negligence may cause breakage or breakdown, 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	RR	Rear
ATT	Attachment	SAE	Society of Automotive Engineers (USA)
EHPS	Electronically controlled fully hydraulic power steering	SAS	System of active stability
FHPS	Fully hydraulic power steering	SOL	Solenoid
LH	Left hand	SST	Special service tool
FR	Front	STD	Standard
OPS	Operator Presence Sensing	T=	Tightening torque
OPT	Option	OOT	Number of teeth (OO)
O/S	Oversize	U/S	Undersize
PS	Power steering	W/	With
RH	Right hand	L/	Less

SI UNITS

Meaning of SI

This manual uses SI units. SI represents the International System of Units, which was established to unify the various systems of units used in the past for smoother international technical communication.

New Units Adopted in SI

Item	New unit	Conventional unit	Conversion rate* ¹ (1 [conventional unit] = X [SI unit])
Force* ²	N (newton)	kgf	1 kgf = 9.80665 N
Torque* ² (Moment)	N·m	kgf·cm	1 kgf·cm = 9.80665 N·m
Pressure* ²	Pa (pascal)	kgf/cm ²	1 kgf/cm ² = 98.0665 kPa = 0.0980665 MPa
↑	↑	mmHg	1 mmHg = 0.133322 kPa
Revolving speed	rpm	rpm	1 rpm = 1 r/min
Spring constant* ²	N/mm	kgf/mm	1 kgf/mm = 9.80665 N/mm
Volume	l	cc	1 cc = 1 ml
Power	W	PS system	1 PS = 0.735499 kW
Heat quantity	W·h	cal	1 kcal = 1.16279 W·h
Specific fuel consumption	g/W·h	g/PS·h	1 g/PS·h = 1.3596 g/kW·h

<Reference>

* 1: X represents the value in SI units as converted from 1 [in conventional units], which can be used as the rate for conversion between conventional and SI units.

* 2: In the past, kilogram [kg] representing mass was often used in place of weight kilogram [kgf], which should be used as the unit of force.

Conversion between Conventional and SI Units

Equation for conversion

Value in SI unit = Conversion rate × Value in conventional unit	Conversion rate: Figure corresponding to X in the conversion rate column in the table above
Value in conventional unit = Value in SI unit ÷ Conversion rate	

When converting, change the unit of the value in conventional or SI units to the one in the conversion rate column in the table above before calculation. For example, when converting 100 W to the value in conventional unit PS, first change it to 0.1 kW and divide by the conversion rate 0.735499.

OPERATIONAL TIPS

1. Safe operation

- (1) After jacking up, always support with wooden blocks or rigid stands.
- (2) When hoisting the vehicle or its heavy component, use wire rope(s) with a sufficient reserve in load capacity.
- (3) Always disconnect the battery plug before the inspection or servicing of electrical parts.

2. Tactful operation

- (1) Prepare the mechanic tools, necessary measuring instruments (circuit tester, megger, oil pressure gauge, etc.) and SSTs before starting operation.
- (2) Before disconnecting wiring, always check the cable color and wiring state.
- (3) When overhauling functional parts, complicated portions or related mechanisms, arrange the parts neatly to prevent confusion.
- (4) When disassembling and inspecting such a precision part as the control valve, use clean tools and operate in a clean location.
- (5) Follow the described procedures for disassembly, inspection and reassembly.
- (6) Replace, gaskets, packing and O-rings with new ones each time they are disassembled.
- (7) Use genuine Toyota parts for replacement.
- (8) Use specified bolts and nuts. Observe the specified tightening torque at the time of reassembly. (Tighten to the center of the specified tightening torque range.)
If no tightening torque is specified, tighten the bolt or nut according to the standard tightening torque table.

3. Protection of functional parts

- (1) Thoroughly check each connector for any failure in or imperfect connection before reconnecting the battery plug after the end of vehicle inspection or maintenance.
Failure in or imperfect connection of connectors related to controllers, especially, may damage elements inside the controllers.

4. Confirming defect status

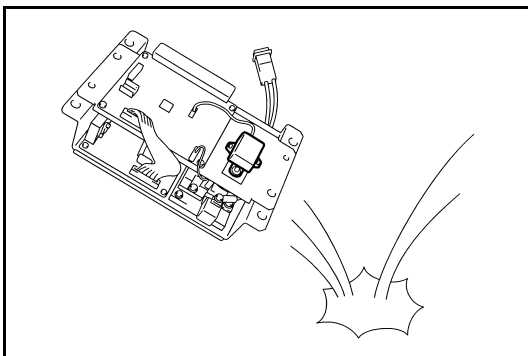
Do not start immediate disassembly or replacement, but first confirm if such disassembly or replacement is actually needed.

5. Handling of waste fluid, etc.

When draining waste fluid from the vehicle, always receive it with an appropriate container.

Since careless or arbitrary discharge or disposal of oil, fuel, coolant, oil filter, battery or any other harmful substance may cause adverse affect to people or environmental destruction, sort each waste and always ask an authorized contractor for appropriate disposal.

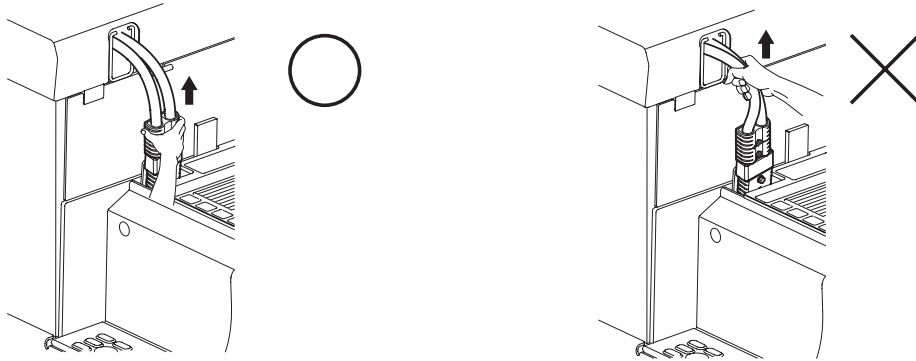
6. Handling of electronic parts



- (1) Never apply impacts to electronic parts such as a microcomputer or relay.
- (2) Never let electronic parts be exposed to a high temperature or humidity.
- (3) Do not touch connector pins since they may be deformed or be damaged due to static electricity.

7. Disconnect the battery plug
When unplugging the battery plug, use the grip. Do not pull up the cable.

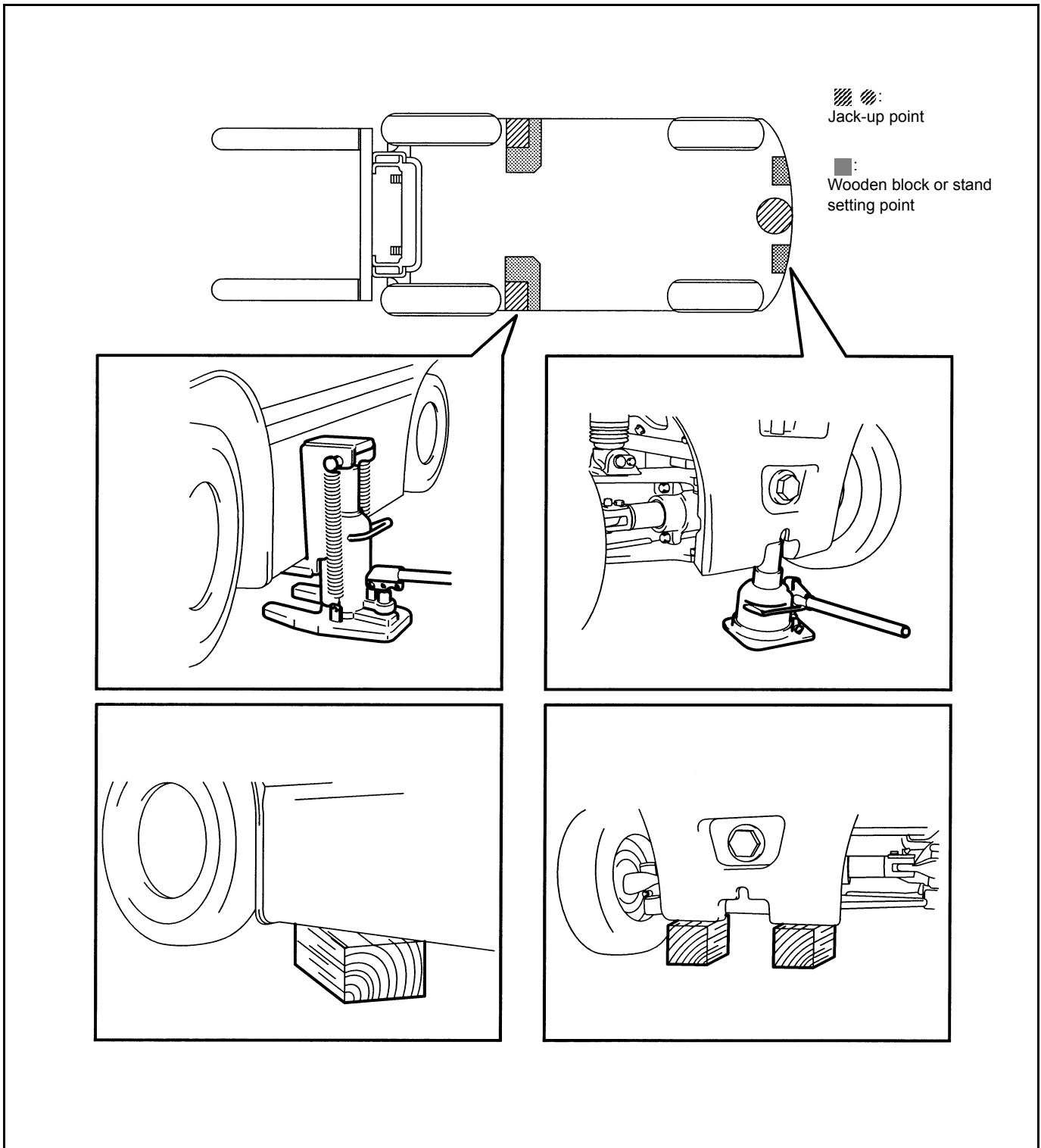
For example:

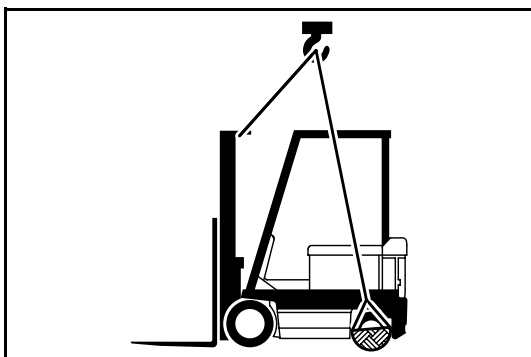


JACK-UP POINT

Strictly observe the following instructions when jacking up the vehicle.

- When a load is on the fork, unload it and park the vehicle on a flat floor. Be sure to avoid an inclined or rugged place.
- Use a jack with ample capacity and jack up the vehicle at the specified jack-up point. Jacking up at any other point will be dangerous.
- Never operate while the vehicle is held with a jack. Always support the frame with a wooden block after jacking up.
- In any case, never let a part of the body (including hands and feet) be under the jacked-up vehicle.



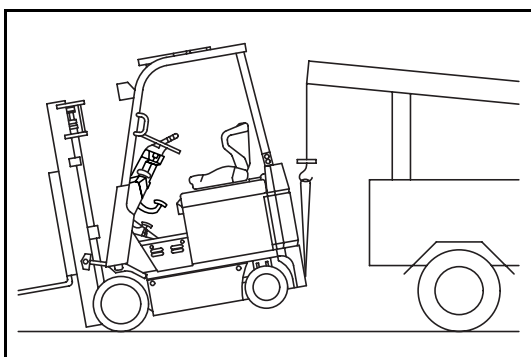


HOISTING THE VEHICLE

When hoisting the vehicle, use the mast hook on the front of the vehicle and a wire net on the rear wheel.

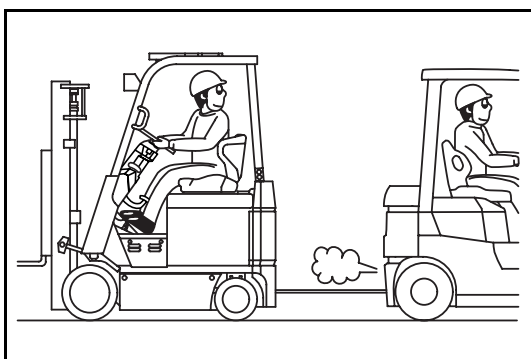
Caution:

- Use wire ropes having sufficient strength.
- Never hoist the forklift by the weight hook holes or head guard.



CAUTION FOR TOWING

1. When towing the forklift, always lift the rear wheels away from the ground.
2. The traveling speed in towing must not exceed the maximum traveling speed of the forklift.
3. Always set the key switch to OFF and the direction switch to the neutral position before starting towing. In case of towing by connection with a wire rope with the operator on the forklift, however, set the key switch to ON (PS operation) and always set the direction switch to the neutral position.
4. Before towing, either remove the fork or take an action to prevent fork contact with the ground due to bounding.



ATTENTIVE POINTS ON SAS

1. Reference should be made to separate manual “New Model Feature 8FBCU20 to 32 Pub. No.PU319” for the explanations of SAS functions and operations.
2. Read Section 17 “SAS Precautions for Repair” on Page 17-9 in this repair manual in advance.
3. Whenever the repair or replacement is performed to the place where relative to SAS function, machining procedure by which the SAS regain proper function must be performed. (See 17-18)
4. The warning on the SAS caution label must be confirmed when the modification or change is such as to change the original specification.
If improper, change the label. (See Page 17-22)
5. Care should always be exercised for safety operation whenever you operate the truck.
Make distinction between the SAS featured trucks and those of none, because the control features are different.
6. The SAS oil control valves comprise many precision valves. Since dirty or contaminated hydraulic oil will adversely affect the functions of these valves, always wash the parts clean at the time of installation after disassembly or for replacement of hydraulic parts (valves, piping, etc.). Periodic replacement of the hydraulic oil is very important.
7. Since this vehicle uses high-precision electronic devices, modification of electrical parts may cause faults. Always use genuine Toyota parts when replacing or installing electrical parts (auxiliary equipment, optional parts, etc.)

CIRCUIT TESTER

Circuit testers are available in both the analog and digital types. They should be used selectively according to the purpose of measurement.

Analog type: This type is convenient for observing movement during operation, but the measured value should only be used for reference or rough judgement.

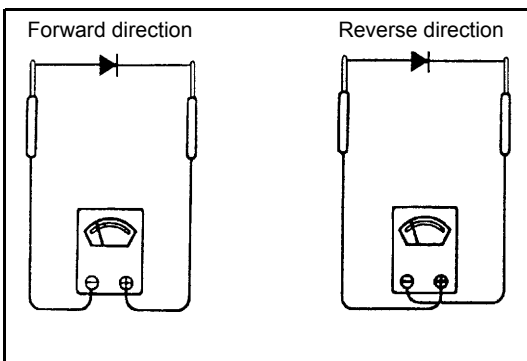
Digital type: Fairly accurate reading is possible, but it is difficult to observe the variation or movement.

1. Difference in measurement results with the digital type and analog type

- * The result may be different between measurements with the analog type and digital type. Always use a circuit tester according to its operation manual.

Cautions when the polarities are different between the analog type and digital type are described below.

(1) Analog circuit tester

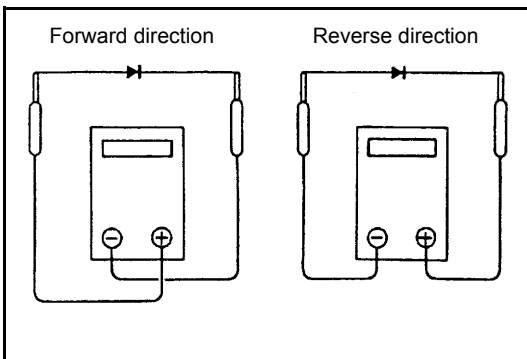


Measurement result example

Tester range: kΩ range

	Analog type
Forward	Continuity exists 11 kΩ
Reverse	No continuity ∞

(2) Digital circuit tester



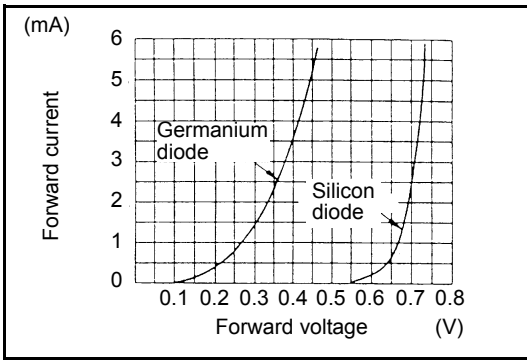
Measurement result example

Tester range: MΩ range

	Digital type
Forward	No continuity 1
Reverse	Continuity exists 2 MΩ

2. Difference in result of measurement with circuit tester

The circuit tester power supply voltage depends on the tester type. 1.5 V, 3.0 V or 6.0 V is used. The resistance of a semiconductor such as a diode varies with the circuit tester power supply voltage. The diode characteristics are shown in the figure below.

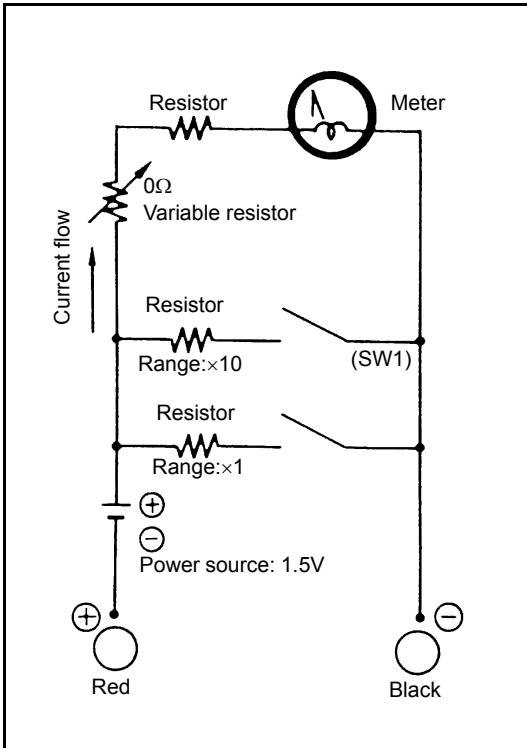


The resistance values of the same semiconductor measured with two types of circuit testers having different power supply voltages are different.

This manual describes the results of measurement with a circuit tester whose power supply voltage is 3.0 V.

3. Difference in measurement result by measurement range (analog type)

In the analog type circuit tester, changing the measurement range switches over the internal circuit to vary the circuit resistance. Even when the same diode is measured, the measurement result varies with the measurement range.



Always use the range described in the repair manual for measurement.

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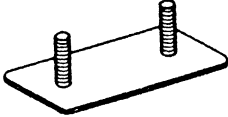


STANDARD BOLT & NUT TIGHTENING TORQUE

Standard bolt and nut tightening torques are not indicated.
Judge the standard tightening torque as shown below.

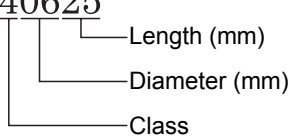
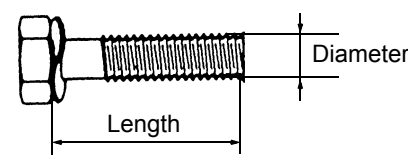
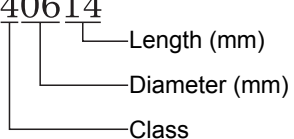
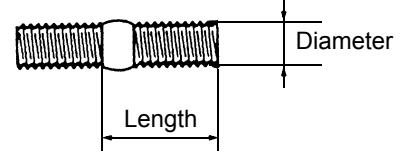
1. For tightening torque of hexagon head bolt, welded bolt and stud bolt with the standard bearing surface, identify bolt class based on the below chart and then determine using the tightening torque table.
2. For tightening torque of hexagon flange bolts, identify bolt class based on the below chart and then determine using the tightening torque table.
3. For tightening torque of nuts, check the mating bolt and use the method 1.

BOLT STRENGTH CLASS IDENTIFICATION METHOD

Identification by Bolt Shape

	Shape and class	Class
Hexagon head bolt	 Bolt head No.	4 = 4T 5 = 5T 6 = 6T 7 = 7T 8 = 8T
	 No mark	4T
	 Two protruding lines	5T
	 Three protruding lines	7T
	 Four protruding lines	8T
Welded bolt		4T
Stud bolt	 No mark	4T
	 Grooved	6T

Identification by Part No.

	Part No.	Shape
Hexagon head bolt	91611-40625 	
Stud bolt	92132-40614 	

Tightening Torque Table

Class	Diameter mm	Pitch mm	Specified torque		
			N·m	kgf·cm	ft·lbf
4T	6	1.0	5.4	55	4
	8	1.25	13	130	9
	10	1.25	25	260	19
	12	1.25	47	480	35
	14	1.5	75	760	55
	16	1.5	113	1150	83
5T	6	1.0	6.5	65	5
	8	1.25	16	160	12
	10	1.25	32	330	24
	12	1.25	59	600	43
	14	1.5	91	930	67
	16	1.5	137	1400	101
6T	6	1.0	7.8	80	6
	8	1.25	19	190	14
	10	1.25	39	400	29
	12	1.25	72	730	53
	14	1.5	108	1100	80
	16	1.5	172	1750	127
7T	6	1.0	11	110	8
	8	1.25	25	260	19
	10	1.25	52	530	38
	12	1.25	95	970	70
	14	1.5	147	1500	108
	16	1.5	226	2300	166
8T	6	1.0	12	120	9
	8	1.25	29	300	22
	10	1.25	61	620	45
	12	1.25	108	1100	80
	14	1.5	172	1750	127
	16	1.5	265	2700	195