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TOYOTA

REPAIR MANUAL

8FBN15, 16, 18, 20, 25, 30
50-8FBN15, 18, 20

VOL. 1

Pub. No. CE349

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FOREWORD

This Manual (Volume 1) contains maintenance, specifications and repair procedure for the chassis, body and material handling system of the TOYOTA ELECTRICAL POWERED FORKLIFT 8FBN15 to 30, 50-8FBN15·18·20 series.

For diagnosis and service procedures of electrical controller and display, refer to Volume 2 (Pub. No. CE350).

Please use these manuals for providing quick, correct servicing of the corresponding forklift models.

This manual deals with the above models as of January, 2012. 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 Equipment Parts & Service News.

TOYOTA Material Handling Company
A Division of TOYOTA INDUSTRIES CORPORATION

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Section indicated by solid characters are included in this manual.
Section indicated by half-tone characters: Refer to vol. 2 (Pub. No. CE350).

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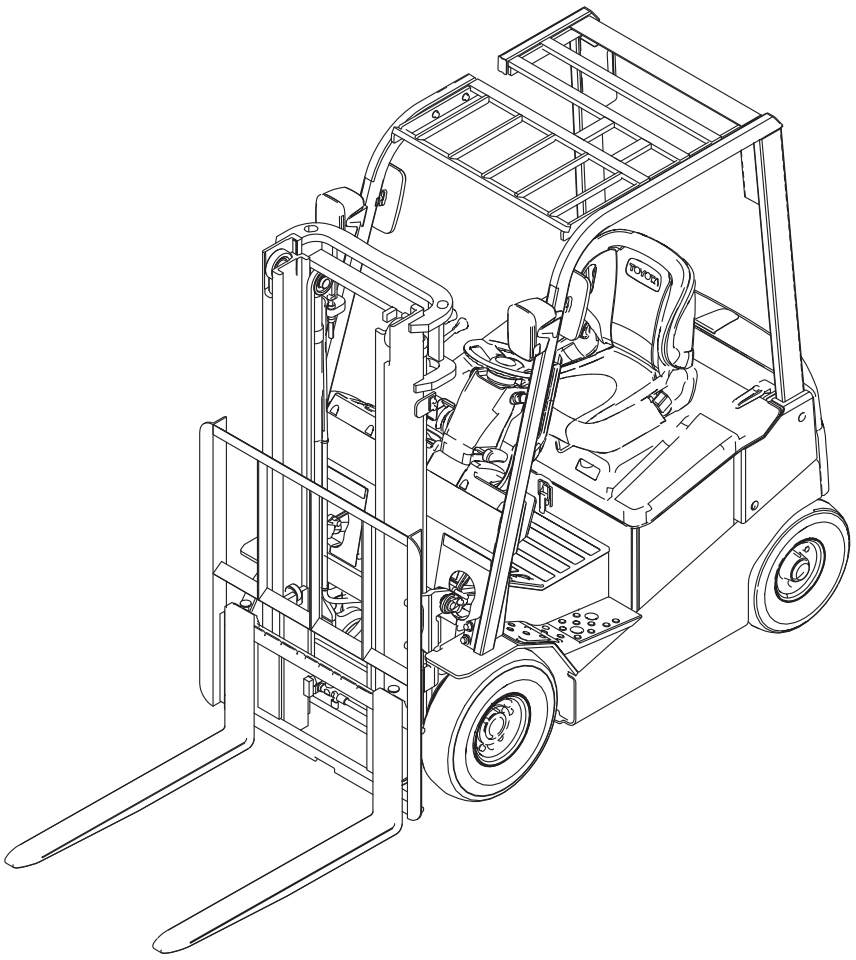
GENERAL

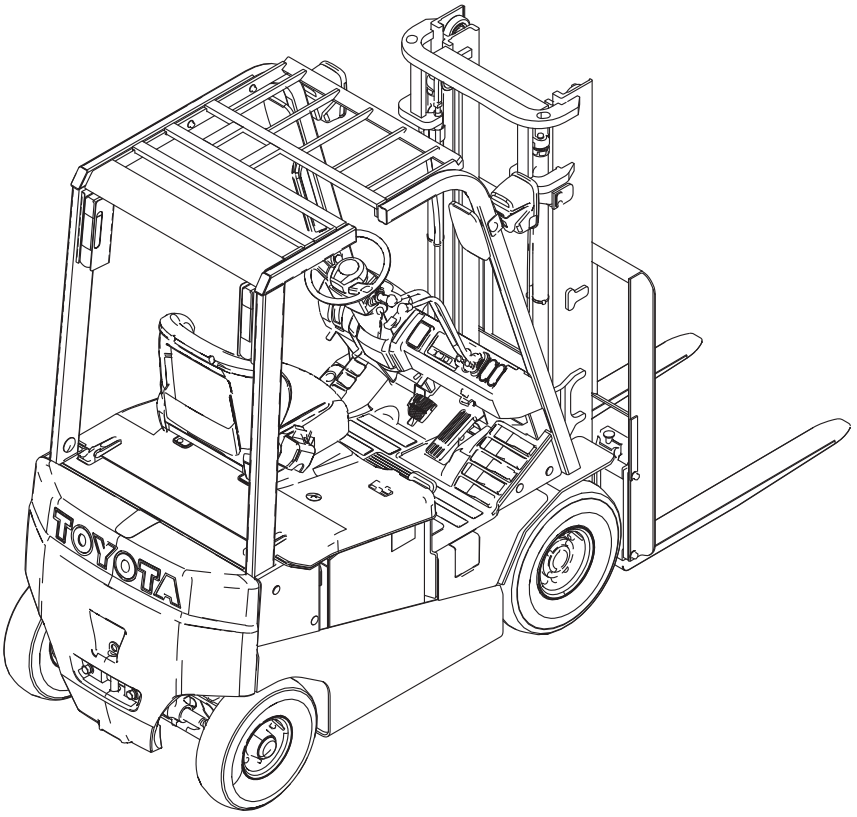
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EXTERIOR VIEWS





(Models with OPT)

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VEHICLE MODEL

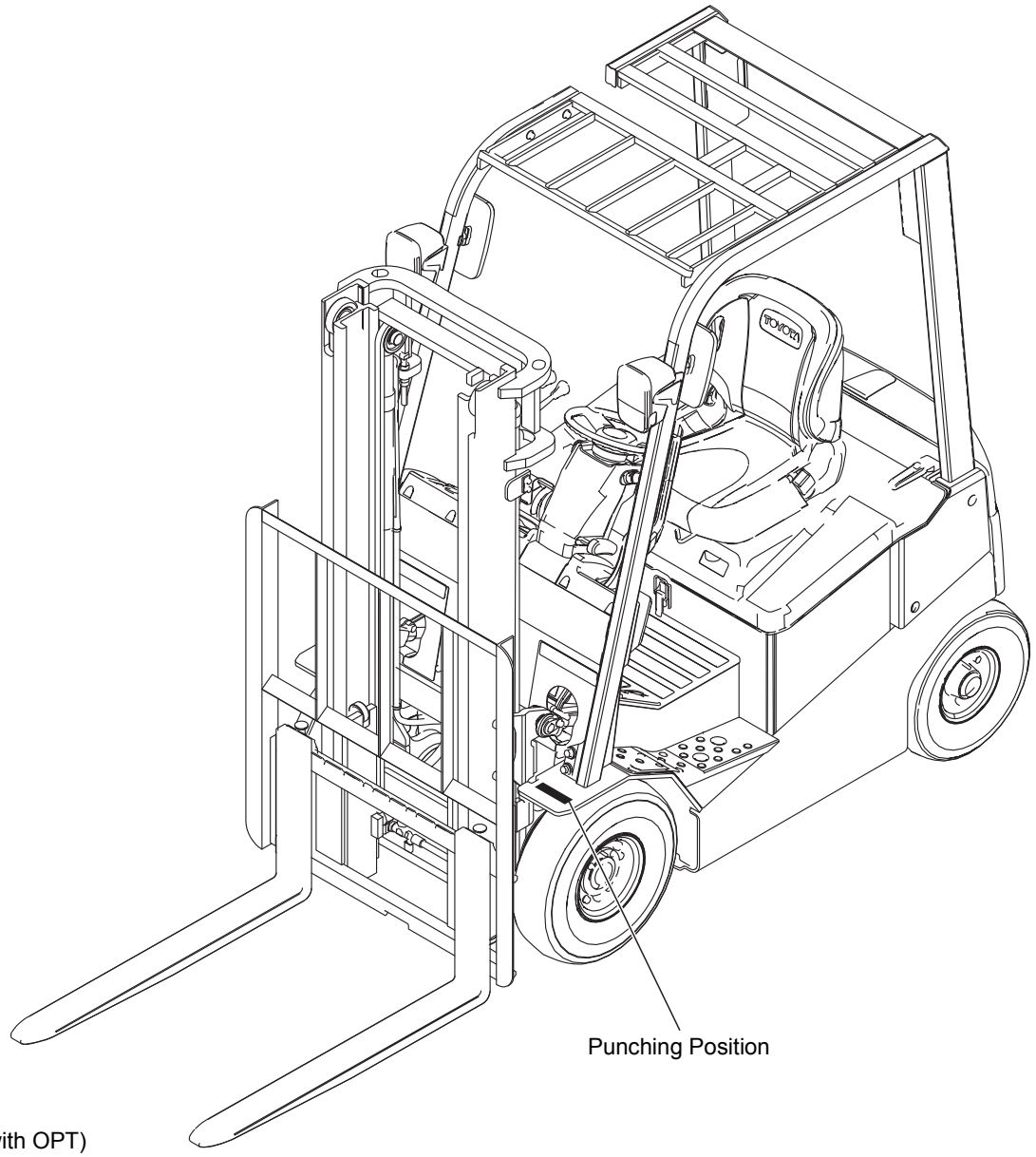
Classification	Vehicle model	Voltage (V)
1 ton series	8FBN15	48
	*50-8FBN15	↑
	*8FBN16	↑
	8FBN18	↑
	*50-8FBN18	↑
2 ton series	8FBN20	↑
	*50-8FBN20	↑
	8FBN25	↑
3 ton series	8FBN30	80

*: China only

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FRAME NUMBER

Frame No. Punching Position



(Models with OPT)

G85700101_

Series	Vehicle models	Punching format	
		Except EEC spec.	EEC spec.
1 ton	8FBN15	8FBN18-10011	8FBN18Ⓔ10011
	8FBN16		
	8FBN18		
	50-8FBN15	508FBN18-10011	
	50-8FBN18		
2 ton	8FBN20	8FBN25-10011	8FBN25Ⓔ10011
	8FBN25		
	50-8FBN20	508FBN20-10011	
3 ton	8FBN30	8FBN30-10011	8FBN30Ⓔ10011

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
ASC	Auto Speed Control	RH	Right hand
ATT	Attachment	RR	Rear
EHPS	Electronically controlled fully hydraulic power steering	SAE	Society of Automotive Engineers (USA)
FR	Front	SAS	System of active stability
J/B	Junction block	SOL	Solenoid
ASSY	Assembly	SST	Special service tool
LH	Left hand	STD	Standard
LLC	Long life coolant	T =	Tightening torque
M/T	Manual transmission	T/C	Torque converter & transmission
NMR	No-load maximum speed	TBC	Traction and brake control
OPS	Operator Presence Sensing	○ ○ T	Number of teeth (○ ○)
OPT	Option	U/S	Undersize
O/S	Oversize	W/	With
PS	Power steering	L/	Less
R/B	Relay block		

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SI UNITS

Meaning of SI

SI represents the International System of Units, which has been established for unifying various systems of units used in the past, for smoother international technical communication.

New Units Adopted in SI

Characteristic	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	P (pascal)	kgf/cm^2	1 kgf/cm^2 = 98.0665 kPa = 0.0980665 MPa
↑	↑	mmHg	1 mmHg = 0.133322kPa
Revolving speed	r/min	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	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	

Caution:
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 turn the key switch OFF and disconnect the battery plug before the inspection, maintenance or disassembly 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

   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. Grasping the trouble state

   When a trouble occurs, do not attempt immediate disassembly or replacement but first check if the trouble requires disassembly or replacement for remedying.

5. Disposal of waste fluid, etc.

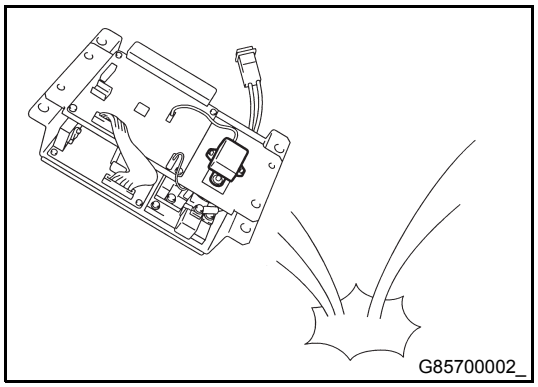
   When draining waste fluid from the vehicle, receive it in a container.
   If any oil, fuel, coolant, oil filter, battery or other harmful substance is directly discharged or scrapped without permission, it will either adversely affect human health or destroy the environment. Always sort waste fluids, etc. and treat them properly by requesting disposal by specialized companies.

6. Greasing up each part

   In addition to periodic grease-up according to the lubrication chart, apply MP grease (or molybdenum disulfide grease) to each sliding contact face when repairing a portion (like pedal link) involving sliding contact.

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7. Handling of electronic parts

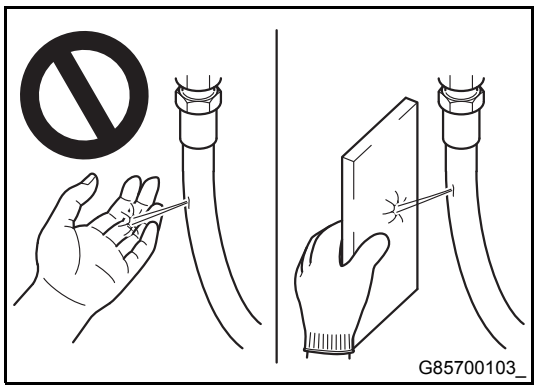


(1) Never apply impacts to electronic parts such as a microcomputer or relay.

(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.

8. Attention to high pressure oil

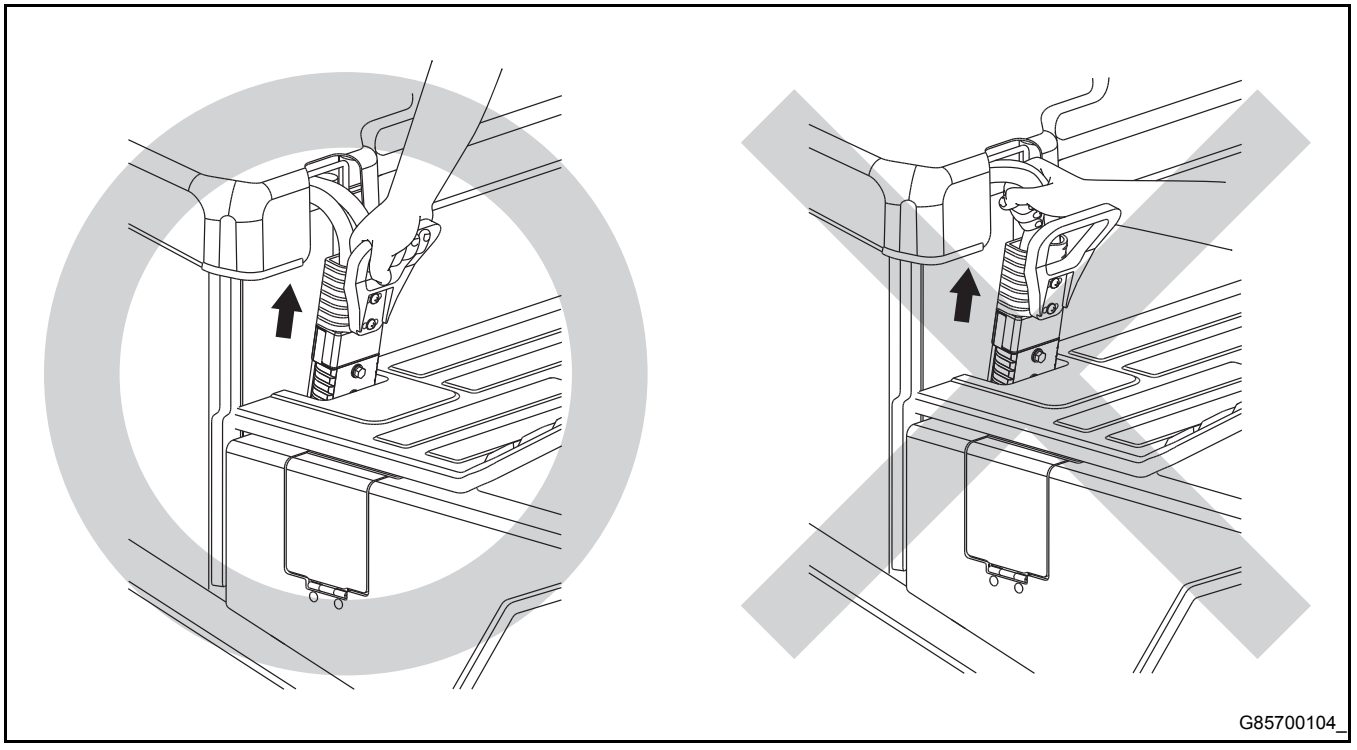


(1) Do not touch to the hydraulic hose/piping by bare hand on inspection of oil leakage.
It is very dangerous if high pressure oil from pin hole of hose/piping enters into the skin.
It is necessary to use a shield board together with gloves and goggles to prevent high pressure oil from directly hitting hands, face and so on.
Consult a doctor immediately if oil enters into the skin, which may cause gangrene.

(2) Reduce residual pressure before disconnecting hose/piping by operating material handling levers.

9. Disconnect the battery plug

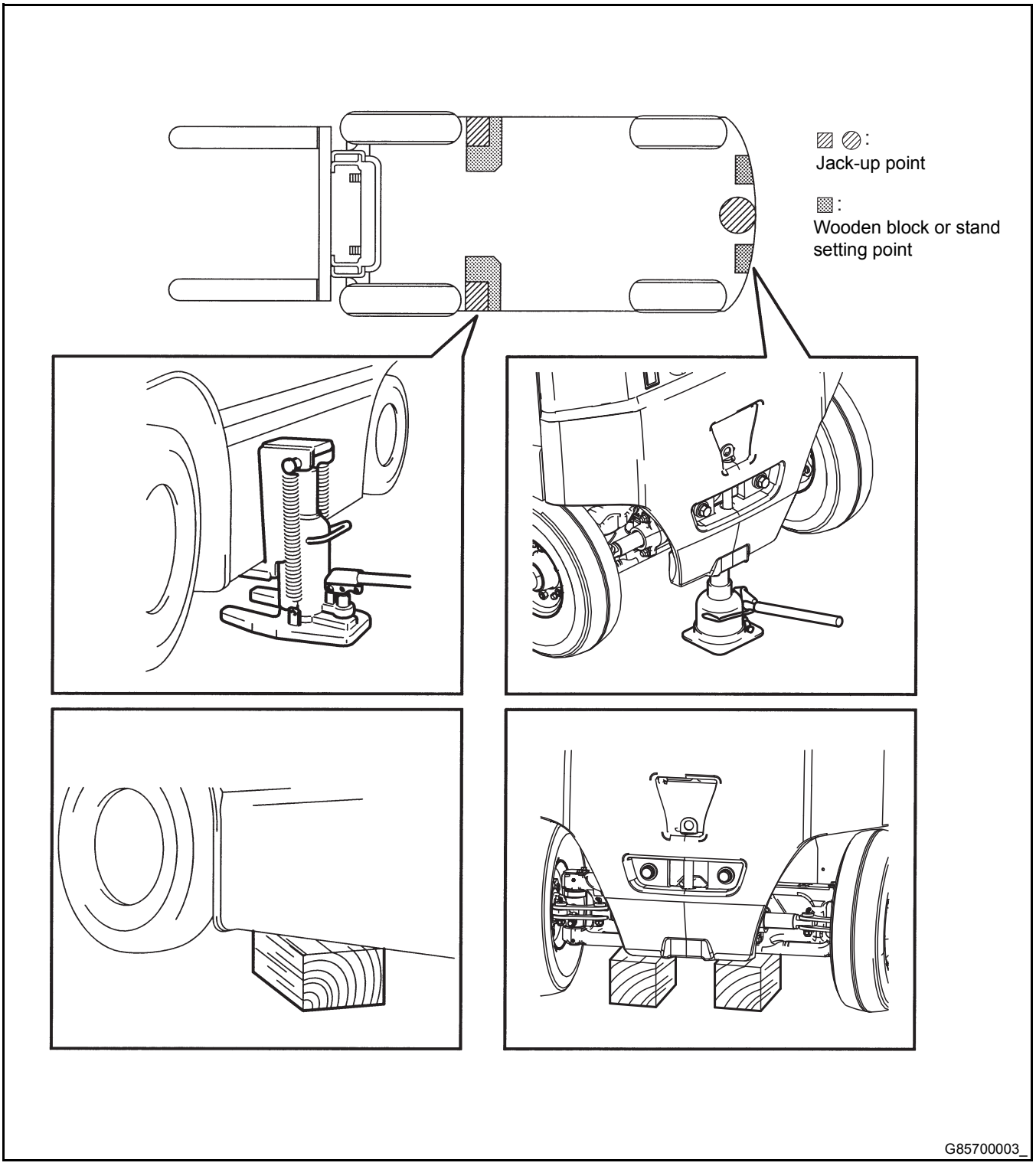
When unplugging the battery plug, use the grip. Do not pull up the cable.



JACK-UP POINT

Strictly observe the following instructions when jacking up the vehicle.

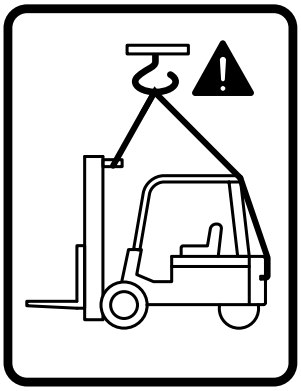
- **When a load is on the fork, unload it and park the vehicle on a flat floor. Be sure to avoid an inclined or rugged place.**
- **Use a jack with ample capacity and jack up the vehicle at the specified jack-up point. Jacking up at any other point will be dangerous.**
- **Never operate while the vehicle 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.**



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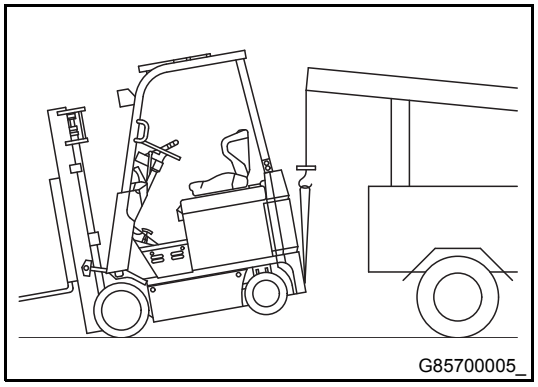
HOISTING THE VEHICLE

Always hoist each part of the vehicle at the specified position. Never hoist at any other position because it is very dangerous.

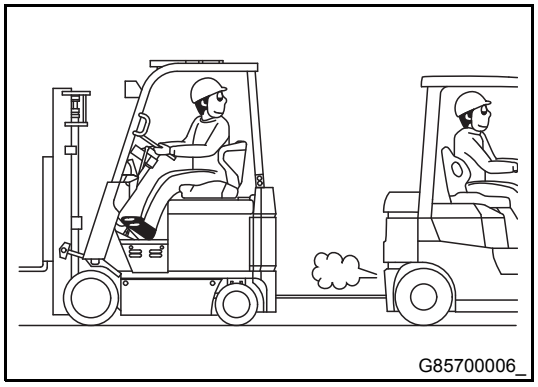


G85700004_

When hoisting the vehicle, sling with a fiber or wire rope at the mast hook hole and the counterweight hook hole.



G85700005_



G85700006_

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.
4. Before towing, either remove the fork or take an action to prevent fork contact with the ground due to bounding.

CIRCUIT TESTER

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

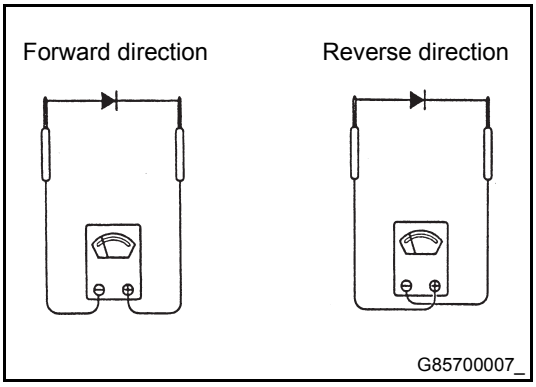
Analog type: This type is convenient for observing movement during operation, but the measured value should only be used for reference or rough judgement.

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.

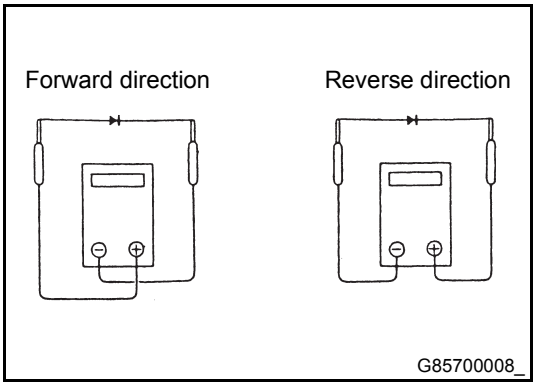
   (1) Analog circuit tester



Measurement result example
Tester range: kΩ range

	Analog type
Forward	Continuity exists
	11 kΩ
Reverse	No continuity
	∞

   (2) Digital circuit tester



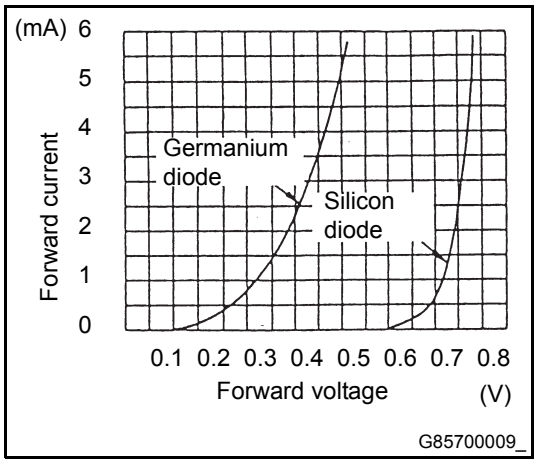
Measurement result example
Tester range: MΩ range

	Digital type
Forward	No continuity
	1
Reverse	Continuity exists
	2 MΩ

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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.

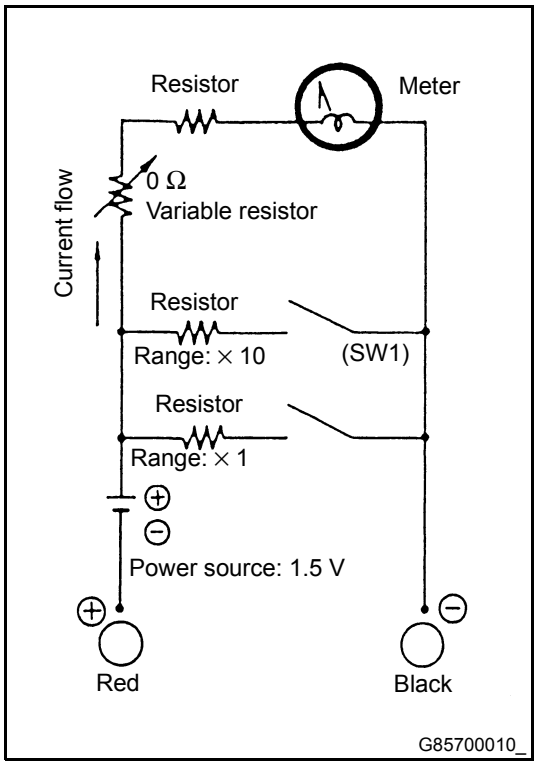


The resistance values of the same semiconductor measured with two types of circuit testers having different power supply voltages are different.

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.

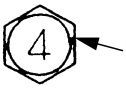
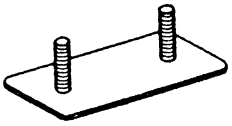
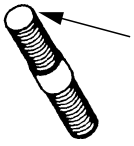
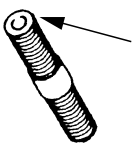
STANDARD BOLT & NUT TIGHTENING TORQUE

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.

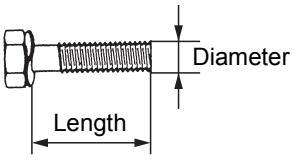
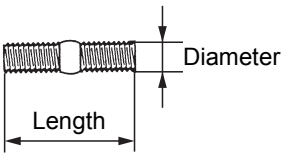
BOLT STRENGTH CLASS IDENTIFICATION METHOD

Identification by Bolt Shape

	Shape and class	Class
Hexagon head bolt	 G85700011_	4 = 4T 5 = 5T 6 = 6T 7 = 7T 8 = 8T
	 No mark G85700012_	4T
	 Two protruding lines G85700013_	5T
	 Three protruding lines G85700014_	7T
	 Four protruding lines G85700015_	8T
Welded bolt	 G85700016_	4T
Stud bolt	 G85700017_	4T
	 G85700018_	6T

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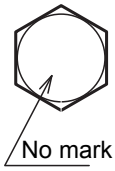
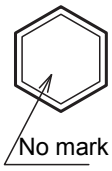
Identification by Part No.

	Part No.	Shape
Hexagon head bolt	91611-40625 Length (mm) Diameter (mm) Class	 G85700019_
Stud bolt	92132-40614 Length (mm) Diameter (mm) Class	 G85700020_

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

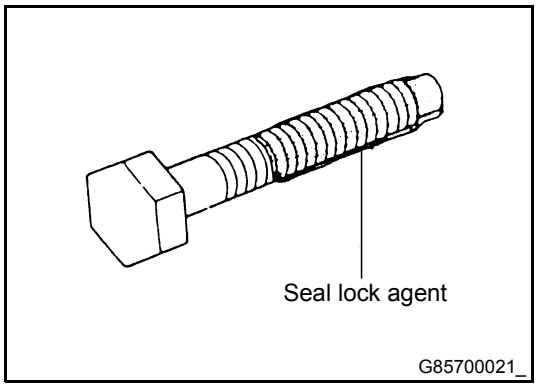
Identification by Bolt Shape (Hexagon flange bolt)

Class	4.8T	6.8T	8.8T	10.9T	11.9T
Hexagon flange bolt	 G85700022_	 G85700023_	 G85700024_	 G85700026_	 G85700028_
			 G85700025_	 G85700027_	
	 G85700029_	 G85700030_	 G85700031_	—	—
			 G85700032_		

Tightening Torque Table (Hexagon flange bolt)

Class	Diameter mm	Pitch mm	Specified torque		
			N·m	kgf·cm	ft·lbf
4.8T	6	1.0	5.5	56	4
	8	1.25	13	130	9
	10	1.25	27	280	20
	12	1.25	50	510	37
	14	1.5	78	800	58
	16	1.5	120	1220	88
6.8T	6	1.0	7.5	80	6
	8	1.25	19	190	14
	10	1.25	39	400	29
	12	1.25	71	720	52
	14	1.5	110	1120	81
	16	1.5	170	1730	125
8.8T	6	1.0	12	120	9
	8	1.25	29	300	22
	10	1.25	61	620	45
	12	1.25	110	1120	81
	14	1.5	175	1780	129
	16	1.5	270	2750	199
10.9T	6	1.0	15.5	160	12
	8	1.25	38	390	28
	10	1.25	80	820	59
	12	1.25	145	1480	107
	14	1.5	230	2350	170
	16	1.5	360	3670	266
11.9T	6	1.0	17.5	180	13
	8	1.25	42	430	31
	10	1.25	89	910	66
	12	1.25	160	1630	118
	14	1.5	260	2650	192
	16	1.5	400	4080	295

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PRECOAT BOLTS

(Bolts with seal lock agent coating on threads)

1. Do not use the precoat bolt as it is in either of the following cases:
   (1) After it is removed.
   (2) When the precoat bolt is moved (loosened or tightened) by tightness check, etc.

Note:
For torque check, use the lower limit of the allowable tightening torque range. If the bolt moves, retighten it according to the steps below.

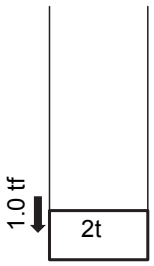
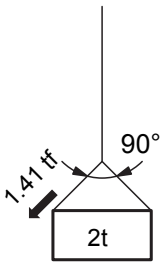
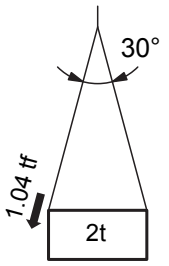
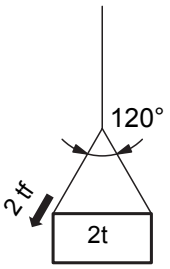
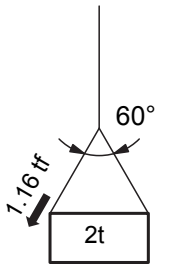
2. Method for reuse of precoat bolts
   (1) Wash the bolt and threaded hole. (The threaded hole must be washed even for replacement of the bolt.)
   (2) Perfectly dry the washed parts by air blowing.
   (3) Coat the specified seal lock agent to the threaded portion of the bolt.

HIGH PRESSURE HOSE FITTING TIGHTENING TORQUE

1. When connecting a high pressure hose, wipe the hose fitting and mating nipple contact surfaces with clean cloth to remove foreign matters and dirt. Also check no dent or other damage on the contact surfaces before installation.
2. When connecting a high pressure hose, hold the hose to align the fitting with the nipple and tighten the fitting.
3. The maximum tightening torque must not exceed twice the standard tightening torque.

Nominal diameter of screw	Standard tightening torque N·m (kgf·cm) [ft·lbf]		Hose inside diameter mm (in)
	Standard	Tightening range	
7/16 - 20UNF	25 (250) [18.1]	24 ~ 26 (240 ~ 270) [17.4 ~ 19.5]	6 (0.24)
9/16 - 18UNF	34 (350) [25.3]	32 ~ 36 (330 ~ 370) [29.3 ~ 26.8]	9 (0.35)
3/4 - 16UNF	59 (600) [43.4]	56 ~ 62 (570 ~ 630) [41.2 ~ 45.6]	12 (0.47)
7/8 - 14UNF	59 (600) [43.4]	56 ~ 62 (570 ~ 630) [41.2 ~ 45.6]	12 (0.47)
7/8 - 14UNF	78 (800) [57.9]	74 ~ 82 (740 ~ 840) [53.5 ~ 60.8]	15 (0.59)
1·1/16 - 12UNF	118 (1200) [86.8]	112 ~ 123 (1140 ~ 1250) [82.5 ~ 90.4]	19 (0.75)
1·5/16 - 12UNF	137 (1400) [101.3]	130 ~ 144 (1330 ~ 1470) [96.2 ~ 106.4]	25 (0.98)
PF1/4	25 (250) [18.1]	24 ~ 26 (240 ~ 270) [17.4 ~ 19.5]	6 (0.24)
PF3/8	34 (350) [25.3]	32 ~ 36 (330 ~ 370) [23.9 ~ 26.8]	9 (0.35)
PF1/2	59 (600) [43.4]	56 ~ 62 (570 ~ 630) [41.2 ~ 45.6]	12 (0.47)
PF3/4	118 (1200) [86.8]	112 ~ 123 (1140 ~ 1250) [82.5 ~ 90.4]	19 (0.75)
PF1	137 (1400) [101.3]	130 ~ 144 (1330 ~ 1470) [96.2 ~ 106.4]	25 (0.98)

WIRE ROPE SUSPENSION ANGLE LIST

Lifting angle	Tension	Compression	Suspension method	Lifting angle	Tension	Compression	Suspension method
0°	1.00 time	0 time	 G85700033_	90°	1.41 time	1.00 time	 G85700036_
30°	1.04 time	0.27 time	 G85700034_	120°	2.00 time	1.73 time	 G85700037_
60°	1.16 time	0.58 time	 G85700035_				

SAFE LOAD FOR EACH WIRE ROPE SUSPENSION ANGLE

Unit: N (tf) [lbf]

Rope diameter	Cutting load	Single-rope suspension	Two-rope suspension				Four-rope suspension			
		0°	0°	30°	60°	90°	0°	30°	60°	90°
6 mm (0.24 in)	21380 (2.18) [4807]	3040 (0.31) [683.6]	6080 (0.62) [1367]	5880 (0.6) [1323]	5200 (0.53) [1169]	4310 (0.44) [970]	12160 (1.24) [2734]	11770 (1.2) [2646]	10400 (1.06) [2337]	8630 (0.88) [1940]
8 mm (0.32 in)	31480 (3.21) [7078]	4410 (0.45) [992.3]	8830 (0.9) [1985]	8530 (0.87) [1918]	7650 (0.78) [1720]	6280 (0.64) [1411]	17650 (1.8) [3969]	17060 (1.74) [3937]	15300 (1.56) [3440]	12550 (1.28) [2322]
10 mm (0.4 in)	49230 (5.02) [11.69]	6960 (0.71) [1565.6]	14020 (1.43) [3153]	13440 (1.37) [3021]	11770 (1.2) [2646]	9810 (1.0) [2205]	27460 (2.8) [6174]	26480 (2.7) [5954]	23540 (2.4) [5292]	19610 (2.0) [4410]
12.5 mm (0.5 in)	76880 (7.84) [17387]	10980 (1.12) [2469.5]	21570 (2.2) [4851]	21280 (2.1) [4631]	18630 (1.9) [4190]	14710 (1.5) [3308]	43150 (4.4) [9702]	41190 (4.2) [9261]	37270 (3.8) [8379]	29420 (3.0) [6615]
14 mm (0.56 in)	96400 (9.83) [21675]	13730 (1.4) [3087]	27460 (2.8) [6174]	26480 (2.7) [5954]	23540 (2.4) [5292]	18630 (1.9) [4190]	54920 (5.6) [12348]	52960 (5.4) [11907]	47070 (4.8) [10584]	37270 (3.8) [8379]

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COMPONENTS WEIGHT

Member weight list

Member	Vehicle model	Weight kg
Battery ASSY	Refer to 1-2	
Drive motor ASSY	Refer to 6-18	
Pump motor ASSY	Refer to 6-27	
Front module ASSY (Without tire)	1 ton series	Approx. 300
	2 ton series	Approx. 340
	3 ton series	Approx. 435
Rear axle ASSY (Without tire)	1 ton series	Approx. 85
	2 ton series	Approx. 88
	3 ton series	Approx. 110
Counterweight	1.5·1.6 ton	Approx. 355
	1.8 ton	Approx. 520
	2.0 ton	Approx. 535
	2.5 ton	Approx. 840
	3.0 ton	Approx. 845
Oil control valve	2-way(STD)	Approx. 16
	4-way	Approx. 22
V mast ASSY W/lift bracket (W/lift cylinder, L/fork, lifting height: 3,000 mm)	1 ton series	Approx. 380
	2 ton series	Approx. 450
	3 ton series	Approx. 550

RECOMMENDED LUBRICANT QUANTITY & TYPES

Amounts and Types of Specified Lubricants

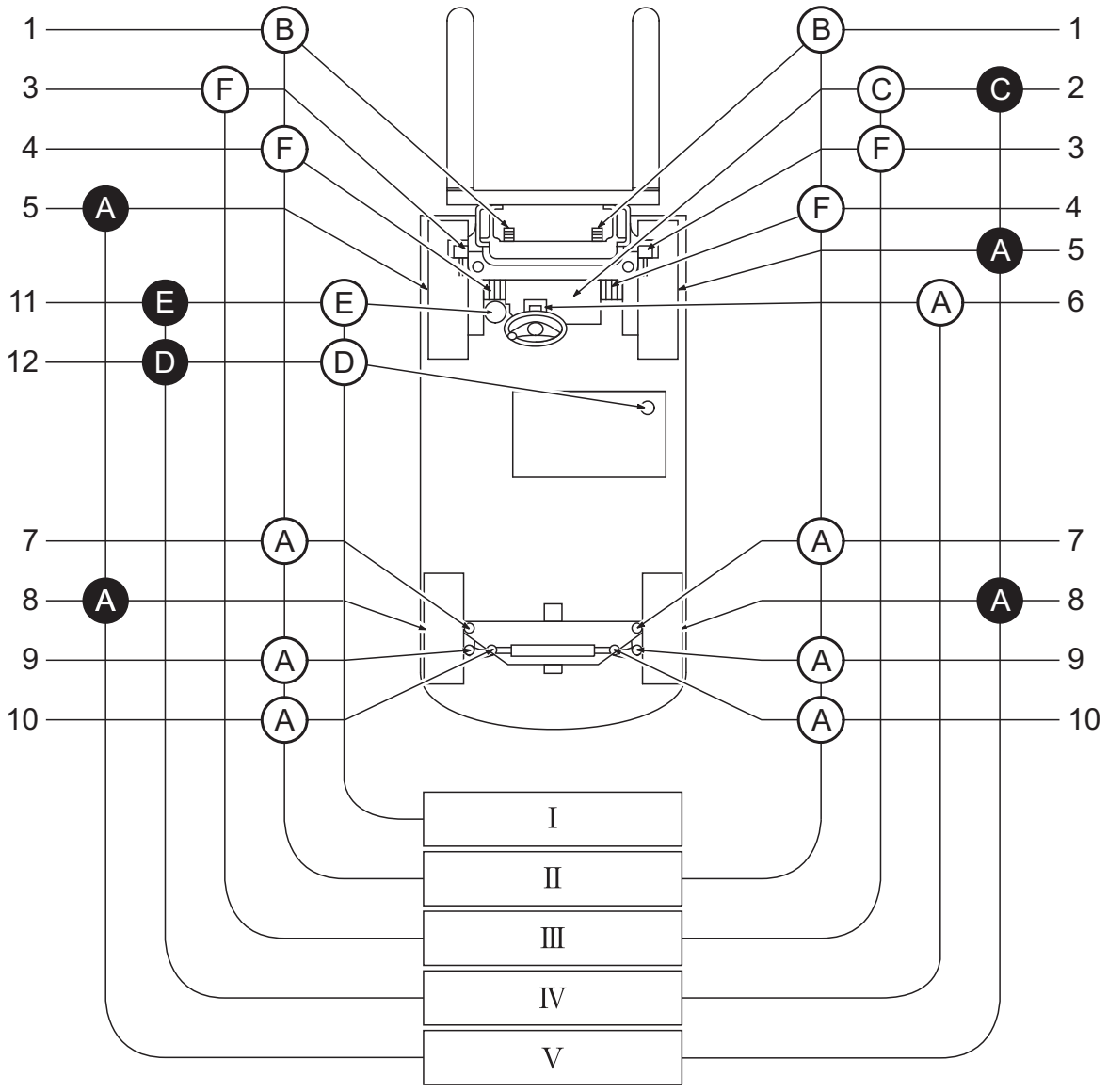
<table>
<tr><th>Description</th><th colspan="4">Application</th><th>Quantity ℓ</th><th>Type</th></tr>
<tr><td rowspan="3">Drive unit</td><td colspan="4">1 ton series</td><td>4.0</td><td rowspan="3">Hypoid Gear Oil (SAE75W-82W)
(ADI GL-4)</td></tr>
<tr><td colspan="4">2 ton series</td><td>4.2</td></tr>
<tr><td colspan="4">3 ton series</td><td>5.0</td></tr>
<tr><td rowspan="8">Hydraulic oil:
Volume of oil fill
(Without attachment only)</td><td rowspan="4">1 · 2 ton series</td><td>V,FSV</td><td>H3000~5500</td><td rowspan="2">17.5</td><td rowspan="8">STD models:
DAPHNE SUPER HYDRO 32AT

Cold storage model:
DAPHNE HYDRO GT-T</td></tr>
<tr><td>FV</td><td>H3000~3500</td></tr>
<tr><td>V,FSV</td><td>H6000</td><td rowspan="2">18.9</td></tr>
<tr><td>FV</td><td>H4000</td></tr>
<tr><td rowspan="4">3 ton series</td><td>V,FSV</td><td>H3000~4700</td><td rowspan="2">19.1</td></tr>
<tr><td>FV</td><td>H3000</td></tr>
<tr><td>V,FSV</td><td>H5000~6000</td><td rowspan="2">22.0</td></tr>
<tr><td>FV</td><td>H3500</td></tr>
<tr><td>Brake line</td><td colspan="4">–</td><td>Proper quantity</td><td>STD models: SAE J-1703 DOT-3

Cold storage model Type 45S:
Brake fluid Arctic S</td></tr>
<tr><td>Chassis parts</td><td colspan="4">–</td><td>Proper quantity</td><td>MP Grease</td></tr>
<tr><td>Battery</td><td colspan="4">–</td><td>Proper quantity</td><td>Distilled water</td></tr>
</table>

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LUBRICATION CHART



G85700102_

○ Inspection and addition
● Replacement
A MP grease
B Engine oil
C Hypoid gear oil
D Hydraulic oil
E Brake fluid
F Molybdenum disulfide grease

I. Inspect every 8 hours (daily)
II. Inspect every 40 hours (weekly)
III. Inspect every 250 hours (6 weeks)
IV. Inspect every 1000 hours (6 monthly)
V. Inspect every 2000 hours (annual)

1 Chain
2 Drive unit
3 Tilt cylinder front pin
4 Mast support bushing
5 Front wheel bearing
6 Tilt steering locking mechanism
7 Steering knuckle king pin
8 Rear wheel bearing
9 Tie rod end pin
10 Rear axle cylinder end pin
11 Brake master cylinder
12 Oil tank

PERIODIC MAINTENANCE

Inspection Method

I : Inspection·Repair or replacement if required.
M: Measurement·Repair or adjustment if required.
T : Retightening C: Cleaning L: Lubrication
* : For new vehicle *1: Flaw detector

Item \ Inspection Period		Every 6 weeks / Every 250 hours	Every 3 months / Every 500 hours	Every 6 months / Every 1000 hours	Every 12 months / Every 2000 hours
ELECTRICAL SYSTEM					
Motor	Rotation sound	I	←	←	←
	Insulation resistance		M	←	←
Battery	Charging level	I	←	←	←
	Electrolyte level	I	←	←	←
	Electrolyte specific gravity	M	←	←	←
	Looseness in the connecting parts	I	←	←	←
	Abnormality in the upper portion of the battery case	I	←	←	←
	Insulation resistance		M	←	←
	Voltage measurement of each battery cell after charging				M
Charger	Timer function	I	←	←	←
	Terminal looseness	I	←	←	←
	HVR function voltage measurement		M	←	←
	Operating condition of the magnetic switch, contact contamination, roughness				I
Magnet contactor	Contact looseness, damage, abrasion	I	←	←	←
	Operating condition of the auxiliary contact, contamination, abrasion	I	←	←	←
	Mounting condition of the arc shooter				I
	Operating condition and timings				I
	Looseness of the coil mounting parts				I
	Mounting condition of the main circuit lead wire, looseness				I
Micro switch	Operating condition and timing	I	←	←	←
	Damage and looseness of installing parts	I	←	←	←
Direction switch	Operation condition, damage	I	←	←	←
Controller	Operation condition	I	←	←	←
	Interior contamination, damage	C	←	←	←
	Motor input voltage				M
Fuse	Looseness	I	←	←	←
Wiring (including charging cord)	Harness deterioration, clamp damage and looseness	I	←	←	←
	Looseness in connecting parts, taping condition	I	←	←	←
	Connecting condition and damage of the battery connector and AC power plug	I	←	←	←

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Item \ Inspection Period		Every 6 weeks	Every 3 months	Every 6 months	Every 12 months
		Every 250 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
POWER TRANSFER SYSTEM					
Drive unit	Oil leakage	I	←	←	←
	Oil level	I	←	←	←
	Bolt or nut looseness				T
DRIVE SYSTEM					
Wheels	Tire inflation pressure	M	←	←	←
	Tire cuts, damage and uneven wearing	I	←	←	←
	Loose rim and hub nuts	T	←	←	←
	Tire groove depth	M	←	←	←
	Metal chips, pebbles and other foreign matter trapped in tire grooves	I	←	←	←
	Rim, side ring and disc wheel damage	I	←	←	←
	Abnormal sound and looseness of front wheel bearing	I	←	←	←
	Abnormal sound and looseness of rear wheel bearing	I	←	←	←
Front axle	Cracks, damage and deformation of housing				I
Rear axle	Cracks, damage and deformation of beam				I
	Looseness of axle beam in vehicle longitudinal direction				M
STEERING SYSTEM					
Steering wheel	Play and looseness	I	←	←	←
	Function	I	←	←	←
Steering valve	Oil leak	I	←	←	←
	Looseness of mounting	T	←	←	←
Power steering	Oil leak	I	←	←	←
	Mounting and linkage looseness	I	←	←	←
	Damage of power steering hoses				I
Knuckle	King pin looseness	I	←	←	←
	Cranks and deformation				I
BRAKING SYSTEM					
Brake pedal	Play and reserve	M	←	←	←
	Braking effect	I	←	←	←
Parking brake	Operating force	I	←	←	←
	Braking effect	I	←	←	←
	Rod and cable looseness and damage	I	←	←	←
Brake pipe	Leak, damage and mounting condition	I	←	←	←
Reservoir tank	Leak and fluid level	I	←	←	←
Master cylinder and wheel cylinder	Function, wear, damage, leak and mounting looseness				I

Item	Inspection Period	Every 6 weeks / Every 250 hours	Every 3 months / Every 500 hours	Every 6 months / Every 1000 hours	Every 12 months / Every 2000 hours
Brake drum and brake shoe	Clearance between drum and lining	M	←	←	←
	Wear of shoe sliding portion and lining				I
	Drum wear and damage				I
	Shoe operating condition				I
	Anchor pin rusting				I
	Return spring fatigue				M
	Automatic adjuster function				I
Backing plate	Deformation, cracks and damage				I
	Loose mounting				T
MATERIAL HANDLING SYSTEM					
Forks	Abnormality of fork and stopper pins	I	←	←	←
	Misalignment between left and right fork fingers	I	←	←	←
	Cracks at fork root and welded part				I*1
Mast and lift bracket	Deformation and damage of each part and crack at welded part	I	←	←	←
	Mast and lift bracket looseness	I	←	←	←
	Wear and damage of mast support bushing				I
	Wear, damage and rotating condition of rollers	I	←	←	←
	Wear and damage of roller pins				I
	Wear and damage of mast strips	I	←	←	←
Chain and chain wheel	Tension, deformation and damage of chain	I	←	←	←
	Chain lubrication	I	←	←	←
	Elongation of chain				I
	Abnormality of chain anchor bolts	I	←	←	←
	Wear, damage and rotating condition of chain wheel	I	←	←	←
Various attachments	Abnormality and mounting condition of each part	I	←	←	←
HYDRAULIC SYSTEM					
Cylinder	Loosening and damage of cylinder mounting	T	←	←	←
	Deformation and damage of rod, rod screw and rod end	I	←	←	←
	Cylinder operation	I	←	←	←
	Natural drop and natural forward tilt (hydraulic drift)	M	←	←	←
	Oil leak and damage	I	←	←	←
	Wear and damage of pin and pin support	I	←	←	←
	Lifting speed	M	←	←	←
	Uneven movement	I	←	←	←
Oil pump	Oil leak and abnormal sound	I	←	←	←

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Item	Inspection Period	Every 6 weeks / Every 250 hours	Every 3 months / Every 500 hours	Every 6 months / Every 1000 hours	Every 12 months / Every 2000 hours
Hydraulic oil tank	Oil level and contamination	I	←	←	←
	Tank and oil strainer			C	←
	Oil leak	I	←	←	←
Control lever	Loose linkage	I	←	←	←
	Operation	I	←	←	←
Oil control valve	Oil leak	I	←	←	←
	Relief pressure measurement				M
	Relief valve and tilt control valve functions	I	←	←	←
Hydraulic piping	Oil leak	I	←	←	←
	Deformation and damage	I	←	←	←
	Loose joint	T	←	←	←
SAFETY DEVICES, ETC.					
Head guard	Cracks at welded portion	I	←	←	←
	Deformation and damage	I	←	←	←
Back-rest	Loosening of mounting	T	←	←	←
	Deformation, crack and damage	I	←	←	←
Lighting system	Function and mounting condition	I	←	←	←
Horn	Function and mounting condition	I	←	←	←
Direction indicator	Function and mounting condition	I	←	←	←
Instruments	Functions	I	←	←	←
Backup buzzer	Function and mounting condition	I	←	←	←
Rear-view mirror	Dirt, damage	I	←	←	←
	Rear reflection status	I	←	←	←
Seat	Loosening and damage of mounting	I	←	←	←
	Seat belt damage and function	I	←	←	←
	Seat switch function	I	←	←	←
Body	Damage and cracks of frame, cross members, etc.				I
	Bolts and nuts looseness				T
SAS	Functions	I	←	←	←
	Loosening and damage at sensor mounting portion	I	←	←	←
	Damage, deformation, oil leakage and loosening of the mounting of functional parts	I	←	←	←
	Loosening and damage of wire harnesses	I	←	←	←
	Rusting and corrosion of load sensor				I
Others	Grease up	L	←	←	←

PERIODIC REPLACEMENT OF PARTS AND LUBRICANTS

● : Replacement

Item \ Replacement timing	Every 6 weeks / Every 250 hours	Every 3 months / Every 500 hours	Every 6 months / Every 1000 hours	Every 12 months / Every 2000 hours	Remarks
Drive unit oil				●	
Hydraulic oil			●	←	
Hydraulic oil filter	●*1		●	←	
Wheel bearing grease				●	
Brake fluid			●	←	
Brake master cylinder rubber parts				●	
Wheel cylinder cup seals				●	
Brake fluid reservoir hose					*2
Power steering hose					*2
Power steering rubber parts					*2
Hydraulic hose					*2
Chain					*3

*1: For new vehicle
*2: Replace every 2 years
*3: Replace every 3 years

Replacement shall be made upon arrival of the operation hours or months, whichever is earlier.

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BATTERY

Page

BATTERY COMPARTMENT AND REQUIRED WEIGHT 1-2

SERVICE STANDARDS 1-3

TROUBLESHOOTING 1-3

INSPECTION 1-4

BATTERY SIDE-OUT 1-7

ROLL OUT 1-7

SIDE-OUT FOR FORK POCKET 1-8

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BATTERY COMPARTMENT AND REQUIRED WEIGHT

When the battery is to be purchased locally, always adjust the weight to satisfy the minimum required weight as shown in the table below.

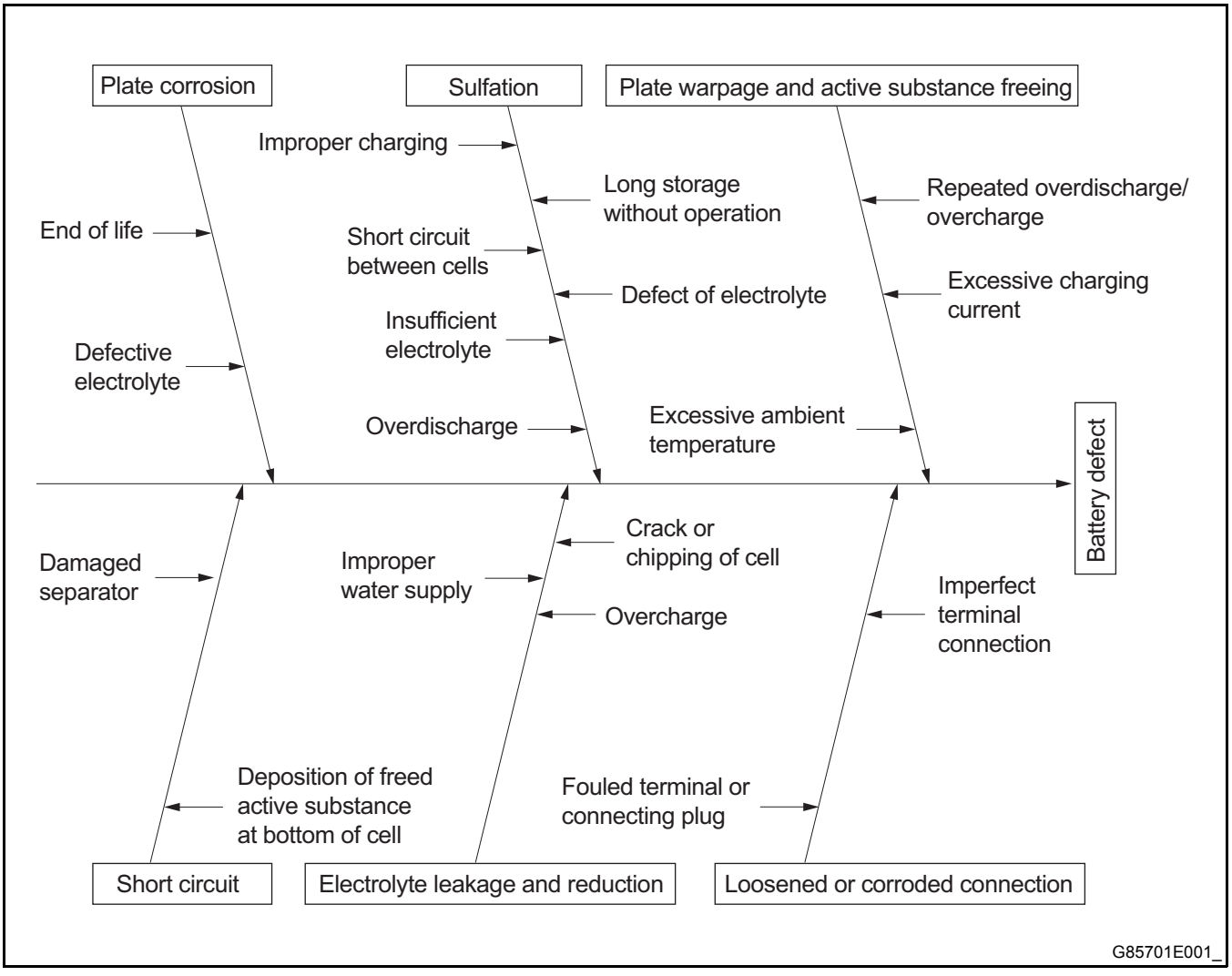
8FBN15		8FBN16		8FBN18		8FBN20		8FBN25		8FBN30	50-8FBN15		50-8FBN18		50-8FBN20		Compartment dimensions Length × Width × Height (mm)	Capacity	Manufacturer	Standard
		○		○							○		○				459 × 996 × 627	48V390AH	SHIN-KOBE GS YUASA	JIS
○		○		○							○		○				459 × 996 × 627	48V470AH	SHIN-KOBE GS YUASA	JIS
						○									○		548 × 996 × 627			
	○		○		○	○		○				○		○	○		548 × 996 × 627	48V565AH	SHIN-KOBE GS YUASA	JIS
							○		○							○	655 × 996 × 627	48V645AH	SHIN-KOBE GS YUASA	JIS
							○		○							○	655 × 996 × 627	48V725AH	SHIN-KOBE GS YUASA	JIS
										○							730 × 1058 × 627	80V370AH	SHIN-KOBE GS YUASA	JIS
										○							730 × 1058 × 627	80V470AH	SHIN-KOBE GS YUASA	JIS
											●		●				459 × 996 × 627	48V390AH	ANHUI	BS
															●		548 × 996 × 627	48V440AH	ANHUI	DIN
											●		●				459 × 996 × 627	48V450AH	ANHUI	BS
								●				●		●	●		548 × 996 × 627	48V525AH	ANHUI	BS
									●							●	655 × 996 × 627	48V600AH	ANHUI	BS
									●							●	655 × 996 × 627	48V675AH	ANHUI	BS
	●		●		●	●						●		●	●		548 × 996 × 627	48V480AH	GS YUASA	DIN
							●		●							●	655 × 996 × 627	48V600AH	GS YUASA	DIN
										●							730 × 1058 × 627	80V375AH	ANHUI	BS
										●							730 × 1058 × 627	80V440AH	ANHUI	DIN
										●							730 × 1058 × 627	80V480AH	GS YUASA	DIN
629						696		805		964	628				672		Minimum required battery weight (kg)			
L	S	L	S	L	S	L	S	L	S	-	L	S	L	S	L	S	Legroom			

○: The battery with the watering system is available.
●: The battery is available.
L: Large
S: Small

SERVICE STANDARDS

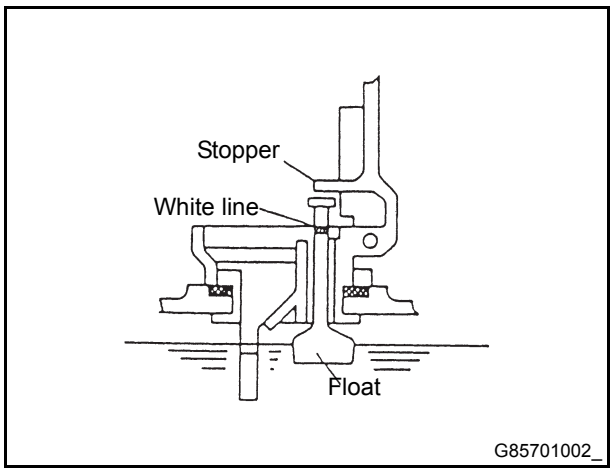
Specific gravity upon full charge	JIS	1.280 [20°C (68°F)]
	DIN	1.297 [20°C (68°F)]
	BS	1.280 [20°C (68°F)]
Specific gravity upon end of discharge	JIS	1.150 [20°C (68°F)]
	DIN	1.167 [20°C (68°F)]
	BS	1.150 [20°C (68°F)]
Discharge end voltage	48V	42.5V
	80V	68V
Electrolyte		Refined dilute sulfuric acid
Fluid to be added		Distilled water
Insulation resistance		1MΩ or more

TROUBLESHOOTING



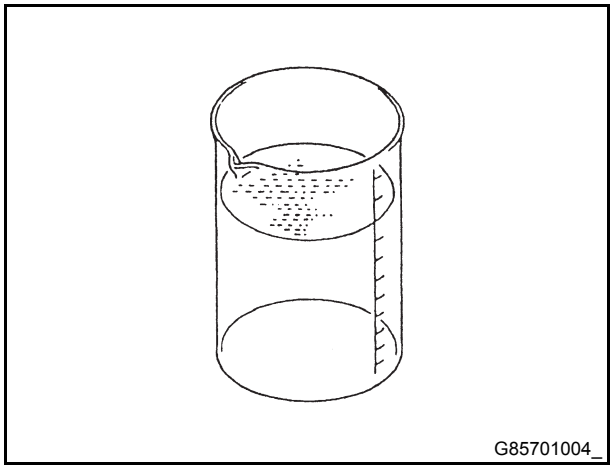
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INSPECTION



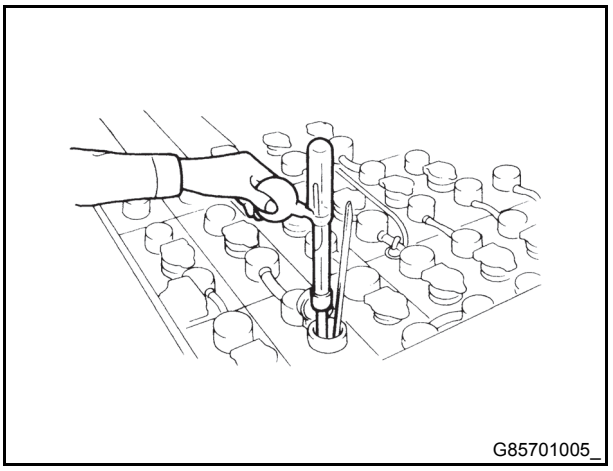
1 Electrolyte level inspection

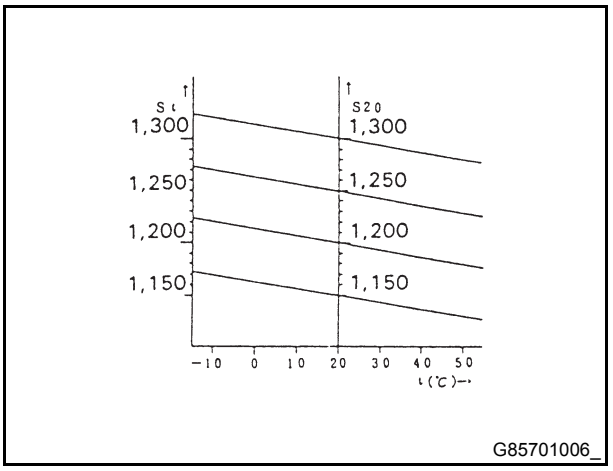
Open the cap, and if the white line on the red float has fallen, add water until the white line appears.
Since water addition is excessive if the float tip end comes into contact with the stopper, stop water addition as soon as the white line appears.



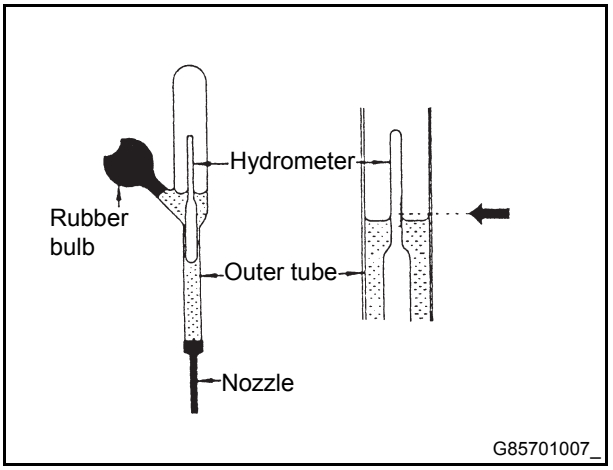
2 Electrolyte inspection

The battery electrolyte is colorless and transparent in normal state. Inspect any turbidity at the time of specific gravity inspection. If it cannot be checked clearly, put the electrolyte in a beaker for inspection.

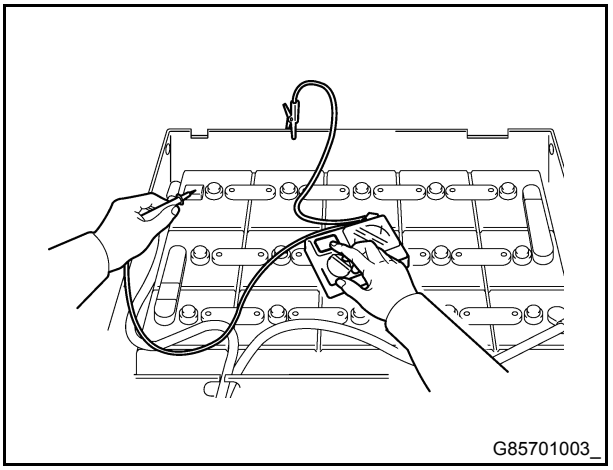

G85701005_



G85701006_



G85701007_


G85701003_

3 Battery electrolyte specific gravity inspection

Use a hydrometer to measure the specific gravity of the electrolyte.

All battery types except GS YUASA/DIN:
Specific gravity upon full charge .... 1.280[20°C(68°F)]
Specific gravity upon end of discharge .... 1.150[20°C(68°F)]

GS YUASA/ DIN battery:
Specific gravity upon full charge .... 1.297[20°C(68°F)]
Specific gravity upon end of discharge .... 1.167[20°C(68°F)]

The specific gravity of the electrolyte at 20°C (68°F) is used as the standard.
Equation for converting specific gravity
S_{20}=St+0.0007 (t-20)
S_{20}: Specific gravity at 20°C
St: Specific gravity at t°C
t: Electrolyte temperature upon measurement (°C)

* How to use the hydrometer

(1) Insert the nozzle of the hydrometer into the electrolyte port and allow the electrolyte to be sucked into its outer tube.

(2) Let the hydrometer float correctly without contact with the outer tube, top or bottom, and read the scale at the highest point of the electrolyte surface as illustrated at left when the bubbles in the electrolyte disappear.

(3) After the measurement, wash the inside and outside of the hydrometer well with clear water and store it after wiping water off with clean cloth.

4 Insulation resistance inspection

Measure the resistance between the battery and battery case with an insulation resistance meter (megohmmeter).
Insulation resistance .... 1 MΩ or more

Note:
When the insulation resistance is less than 1 MΩ, wash the battery with water after removing it from the vehicle.
Fully dry the washed battery and measure the insulation resistance again. Install the battery on the vehicle after confirming that the insulation resistance is 1 MΩ or more.

1

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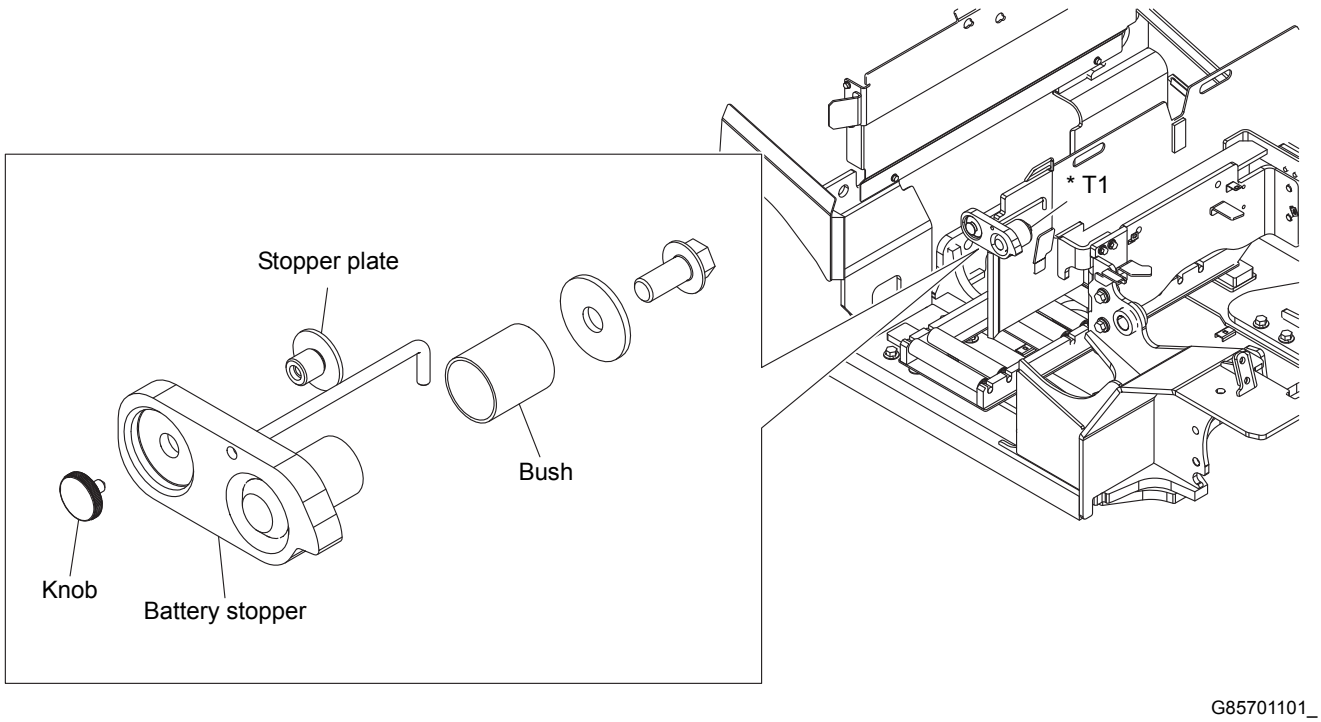
* Battery control table
Prepare a control table for each battery to record and maintain the inspection results.

Inspection date and time	Inspected cell No.	Specific gravity	Electrolyte temperature	Added water quantity	Remarks	Inspector

G85701E009_

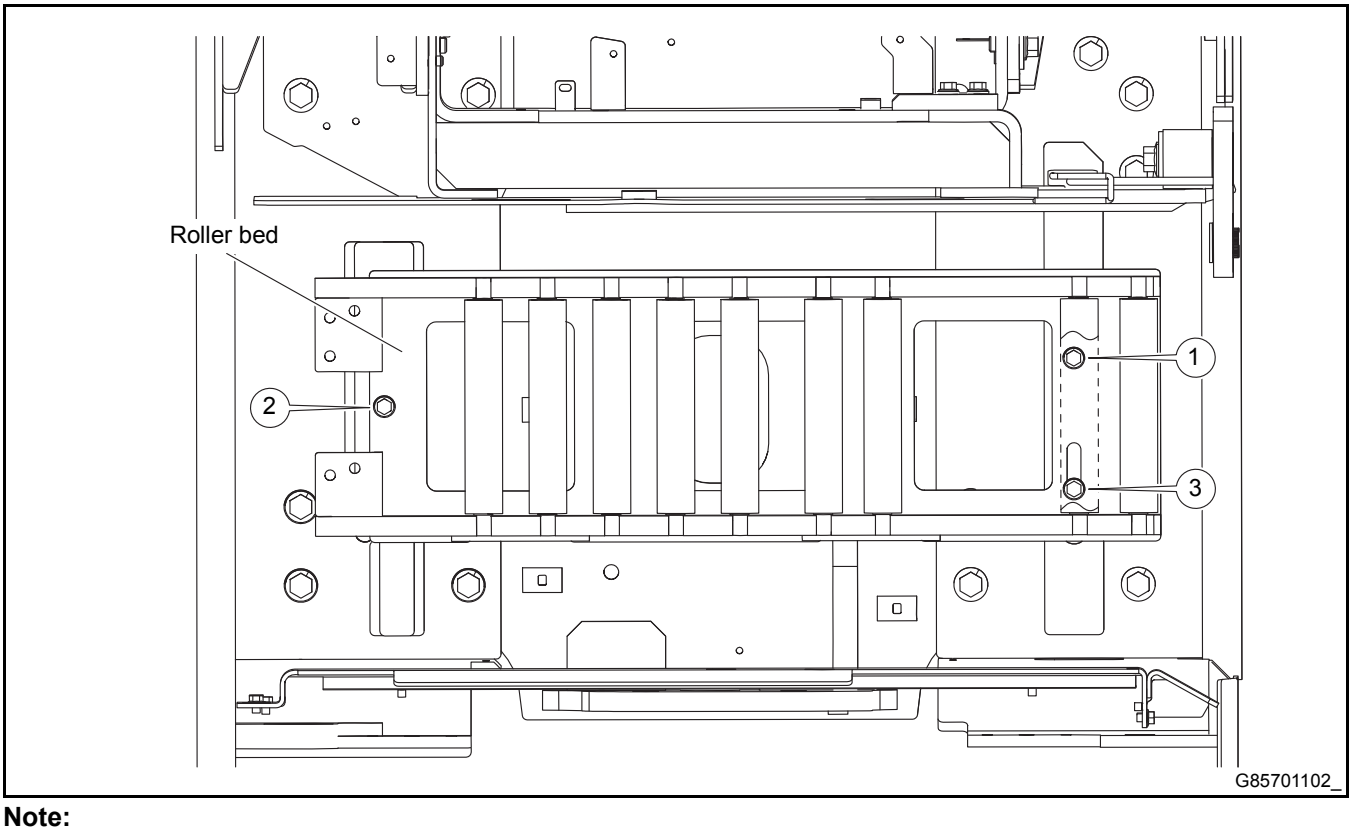
BATTERY SIDE-OUT

ROLL OUT



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 200 ~ 300 (2039 ~ 3059) [147.5 ~ 221.3]

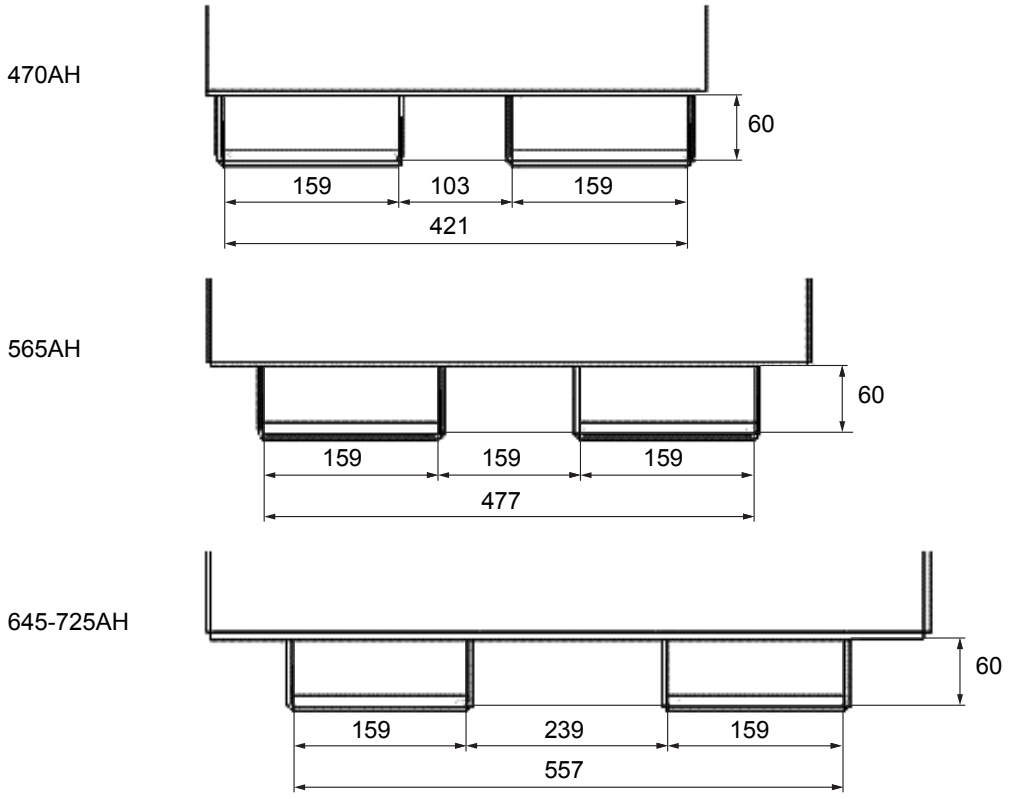
Note:
Apply the LOCTITE 243 on screwed portion of the knob.



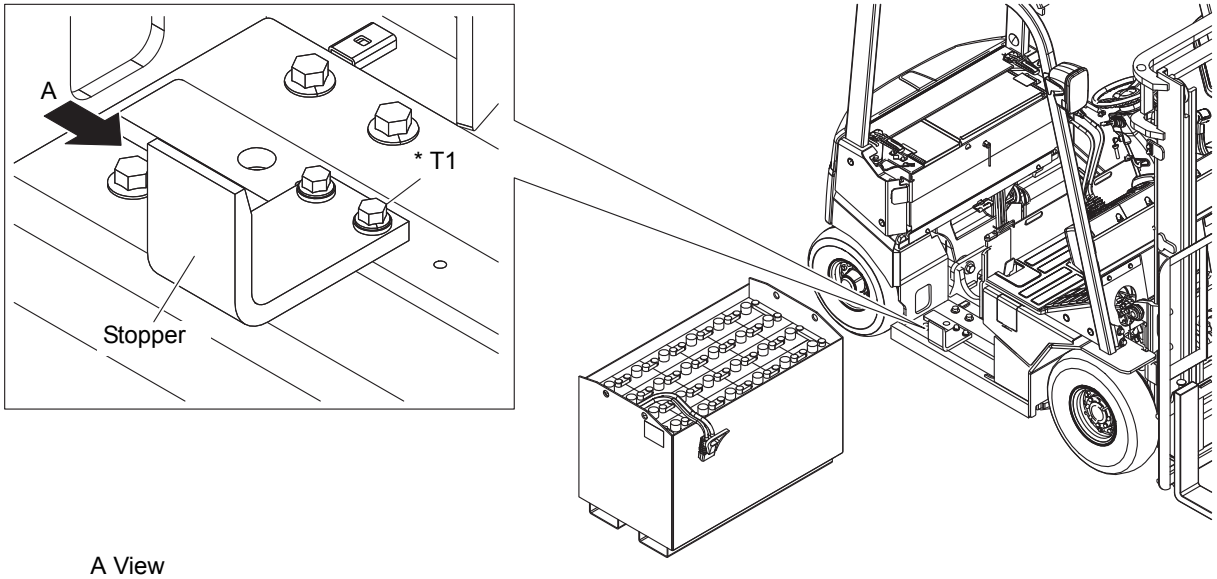
Note:
- **Install the bolts in the following order: 1 → 2 → 3**
- **Two roller bed are used on 2ton series.**

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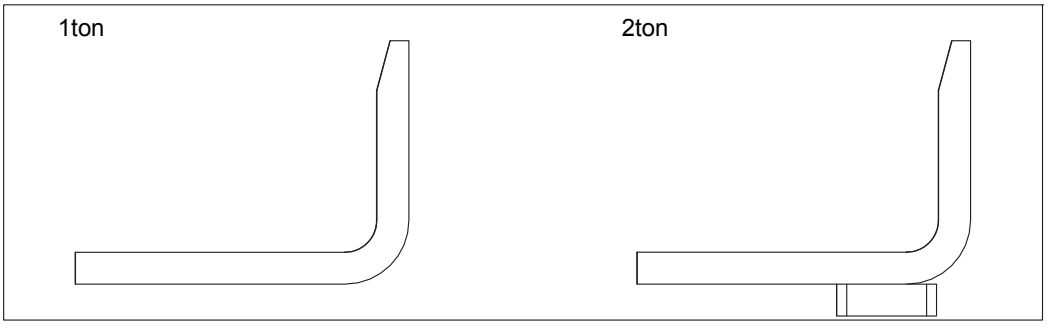
SIDE-OUT FOR FORK POCKET



G85701103_



A View



G85701104_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 80 ~ 140 (816 ~ 1428) [59.0 ~ 103.2]

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CHARGER

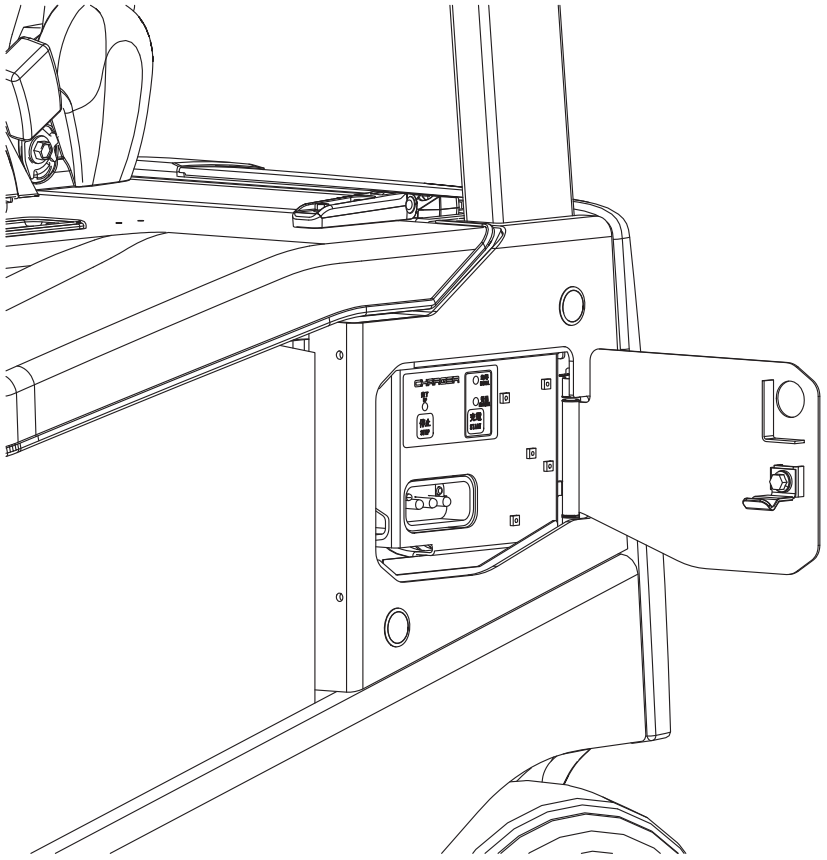
Page

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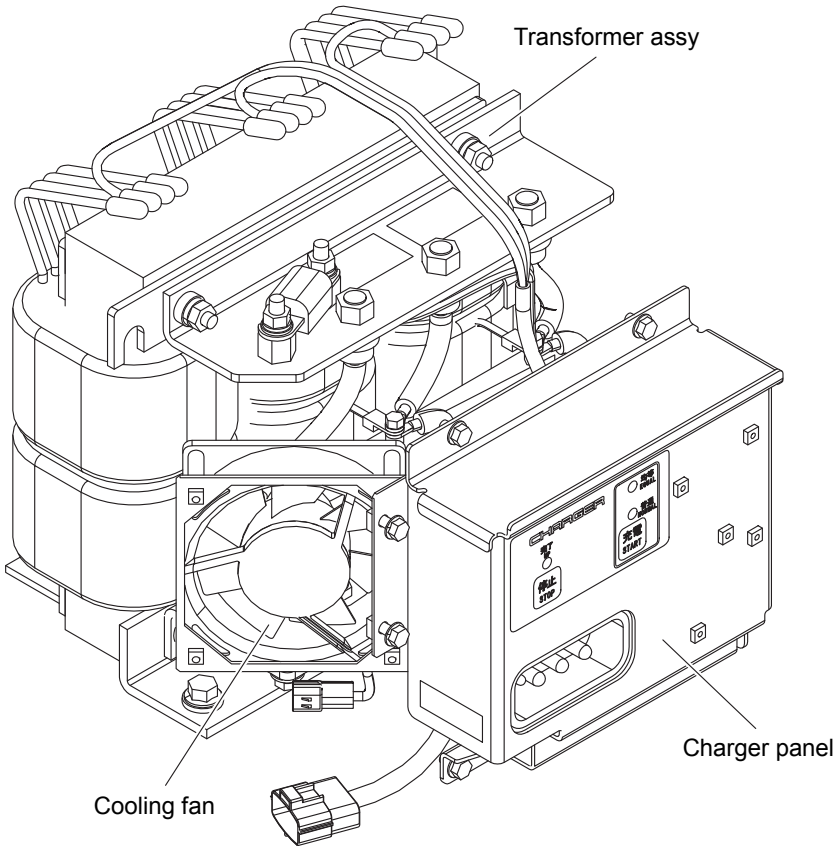
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ON-TRUCK TYPE

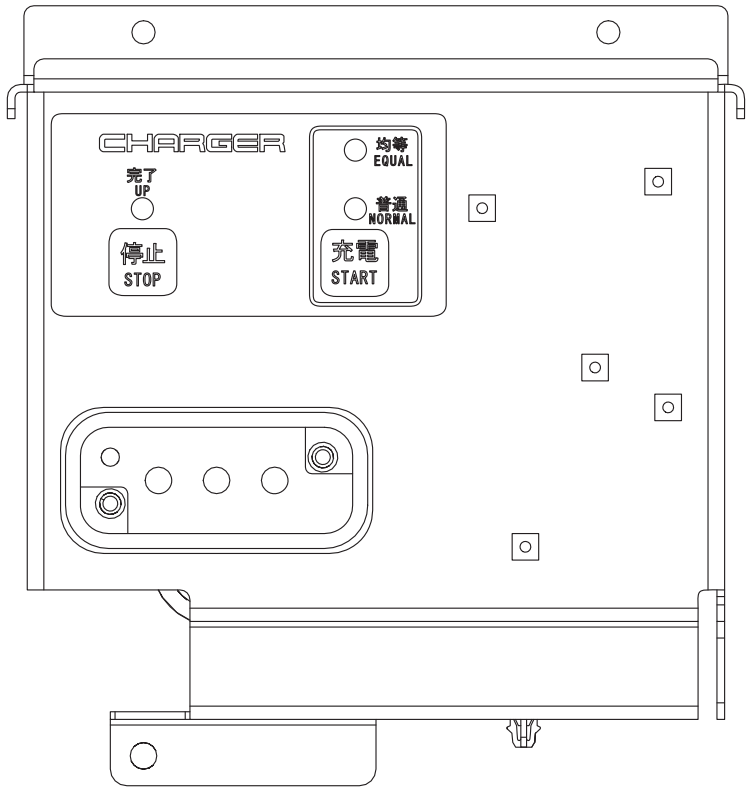
GENERAL



G85702101_



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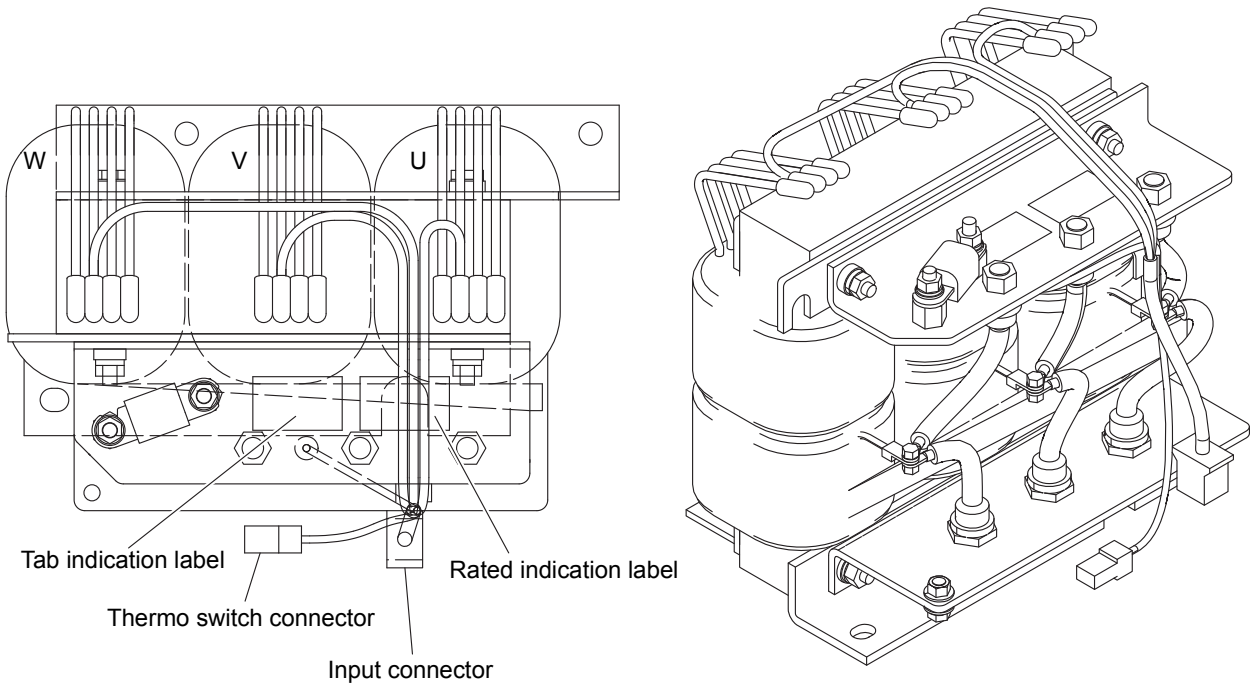


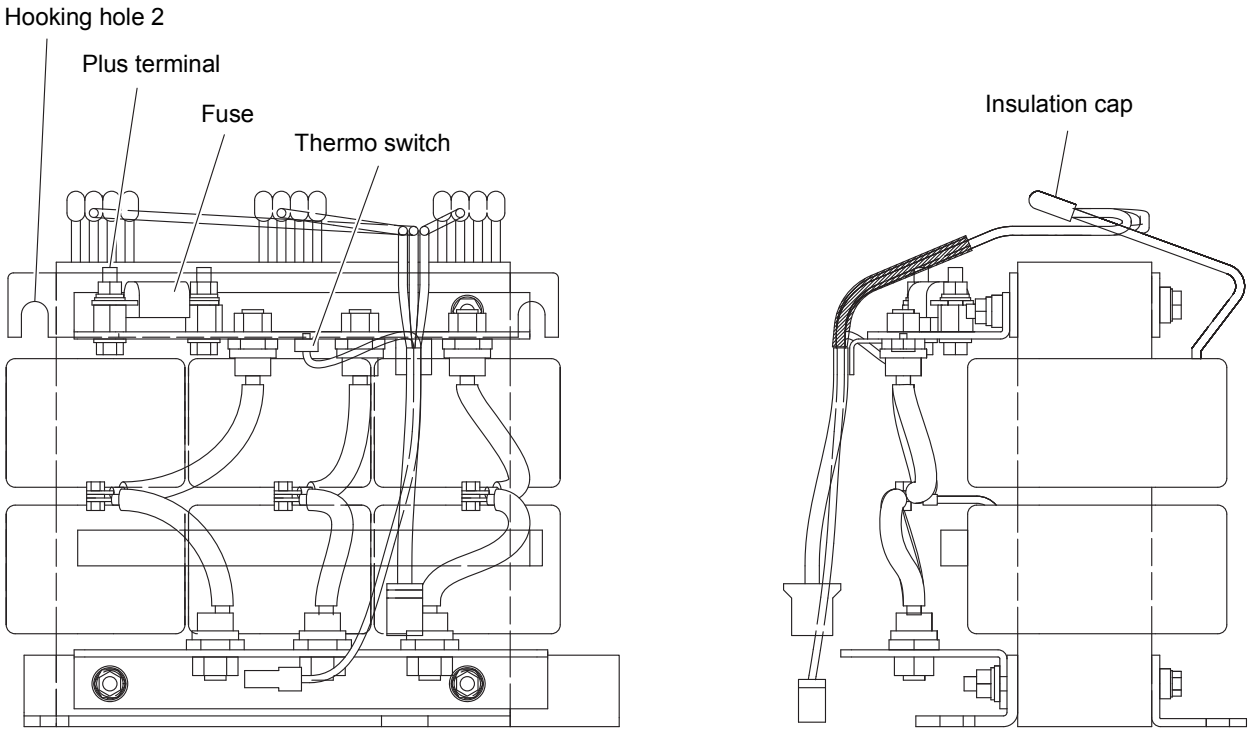
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TRANSFORMER ASSY

GENERAL

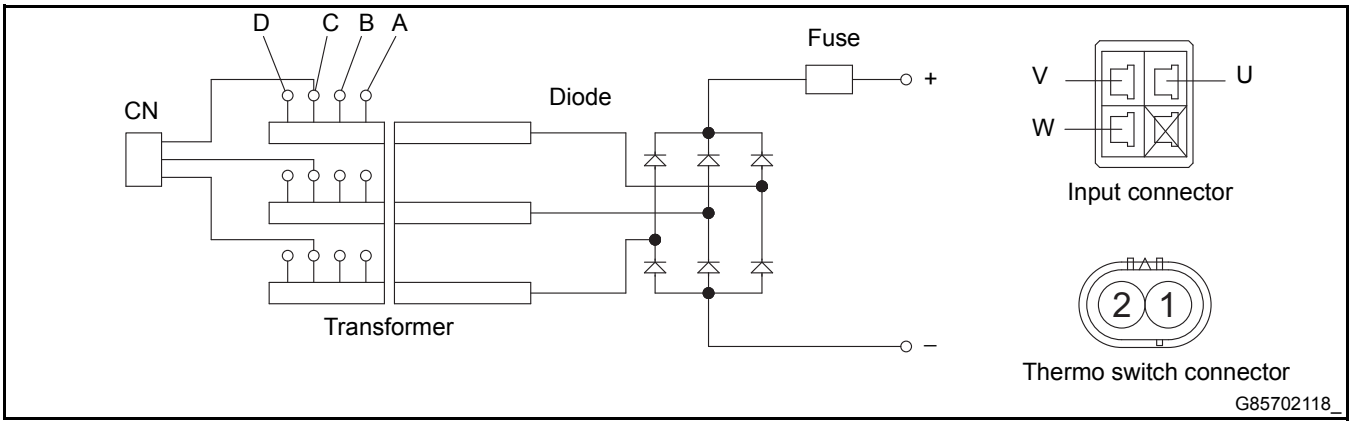




G85702116_

SPECIFICATIONS

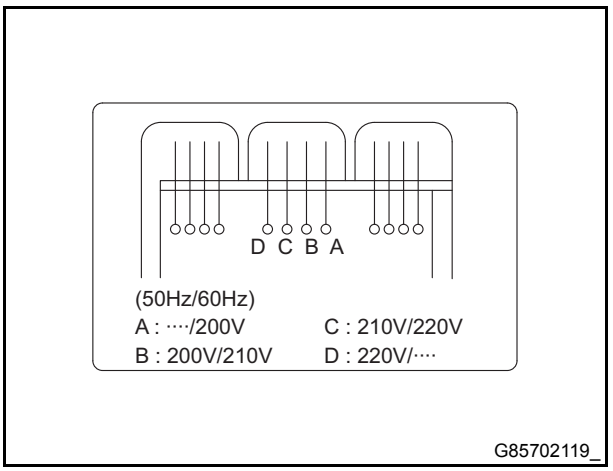
CIRCUIT DIAGRAM



TAP LAYOUT

	50Hz	60Hz
A	–	200V
B	200V	210V
C	210V	220V
D	220V	–

ENTRY OF TAP INDICATION LABEL



ENTRY OF RATED INDICATION LABEL

8FBN15,18

Part No. : 25510-16560-71
AC : 3Ph 200V 50/60Hz
5.7/6.3KVA
DC : 48V 390AH/5HR
TYPE :
DATE : SERIAL No.

8FBN15,18,20,25

Part No. : 25530-16560-71
AC : 3Ph 200V 50/60Hz
7.4/7.6KVA
DC : 48V 470～565AH/5HR
TYPE :
DATE : SERIAL No.

8FBN20,25

Part No. : 25520-26560-71
AC : 3Ph 200V 50/60Hz
10.4/10.3KVA
DC : 48V 645～725AH/5HR
TYPE :
DATE : SERIAL No.

8FBN30

Part No. : 25520-36560-71
AC : 3Ph 200V 50/60Hz
9.5/9.3KVA
DC : 80V 370～470AH/5HR
TYPE :
DATE : SERIAL No.

G85702120_

Caution:
Check the "ENTRY OF RATED INDICATION LABEL" to prevent any mistakes when replacing the parts.

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CAPACITY

1ton (390AH)

Item		
Diode	Type	SKR71/02, SKN71/02
Fuse		BFS 80A
Thermostat		US-602KXTLQL 130°C
Transformer	Capacity	3ph 200V (50/60Hz)
	Insulation	H
	Weight	34 ± 3kg

1 · 2ton (470~565AH)

Item		
Diode	Type	SKR100/04, SKN100/04
Fuse		BFS 100A
Thermostat		US-602KXTLQL 130°C
Transformer	Capacity	3ph 200V (50/60Hz)
	Insulation	H
	Weight	39 ± 4kg

2ton (645~725AH)

Item		
Diode	Type	SKR130/02, SKN130/02
Fuse		BFS 150A
Thermostat		US-602KXTLQL 140°C
Transformer	Capacity	3ph 200V (50/60Hz)
	Insulation	H
	Weight	45 ± 4kg

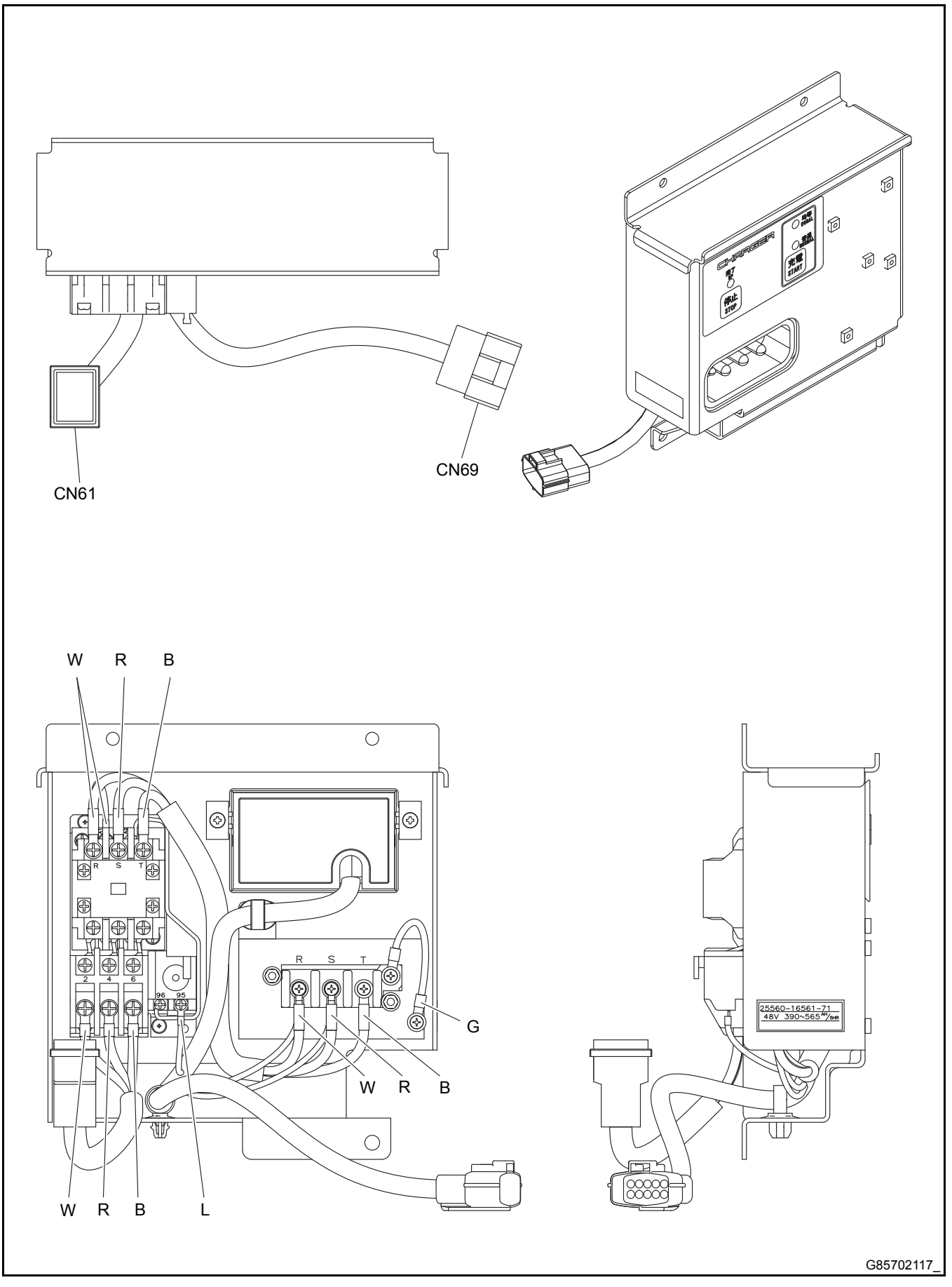
3ton (370~470AH)

Item		
Diode	Type	SKR70/04, SKN70/04
Fuse		BFS1.5 80A
Thermostat		US-602KXTLQL 120°C
Transformer	Capacity	3ph 200V (50/60Hz)
	Insulation	H
	Weight	50 ± 5kg

CHARGER PANEL

GENERAL

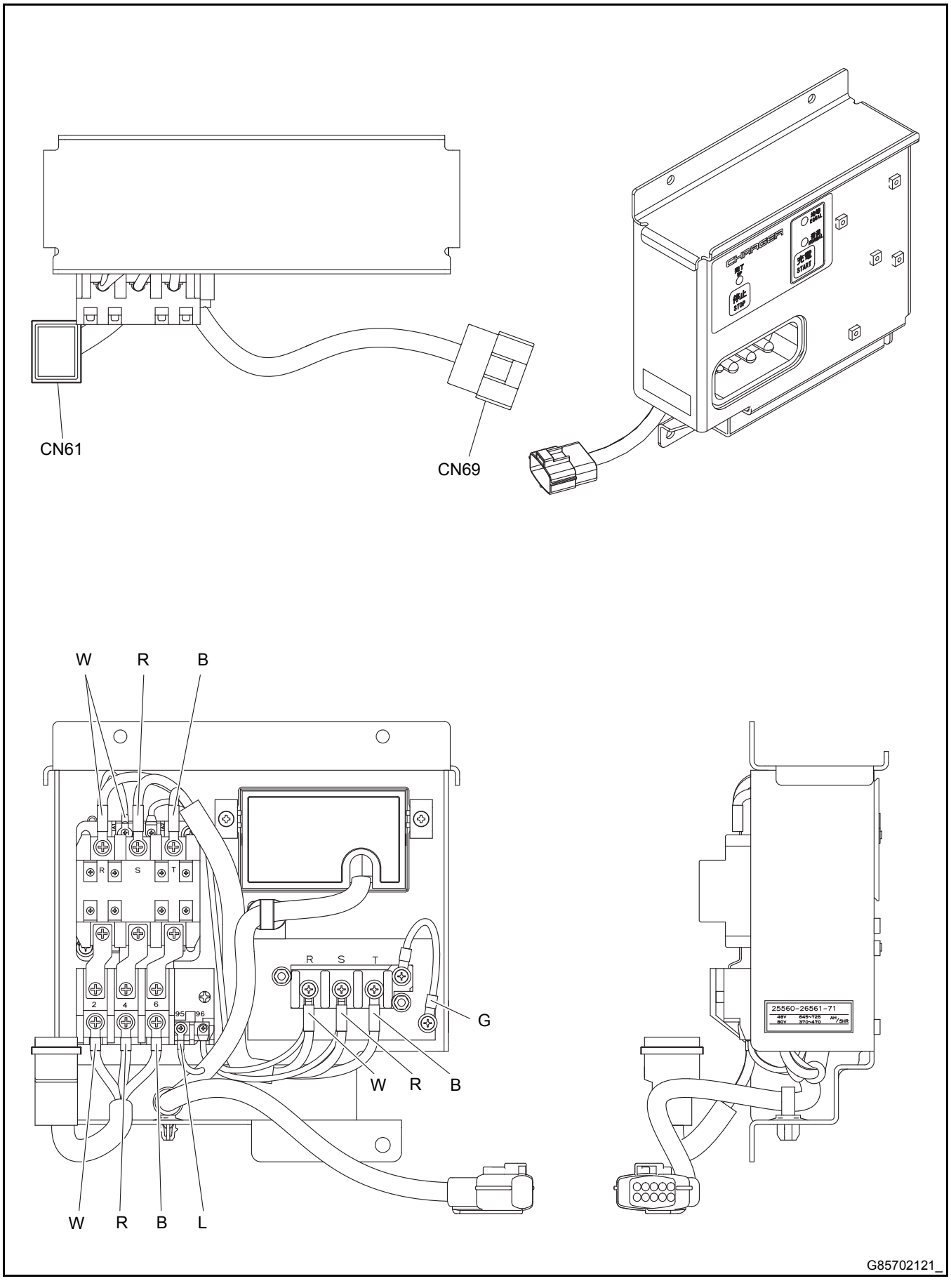
1 ton Series



G85702117_

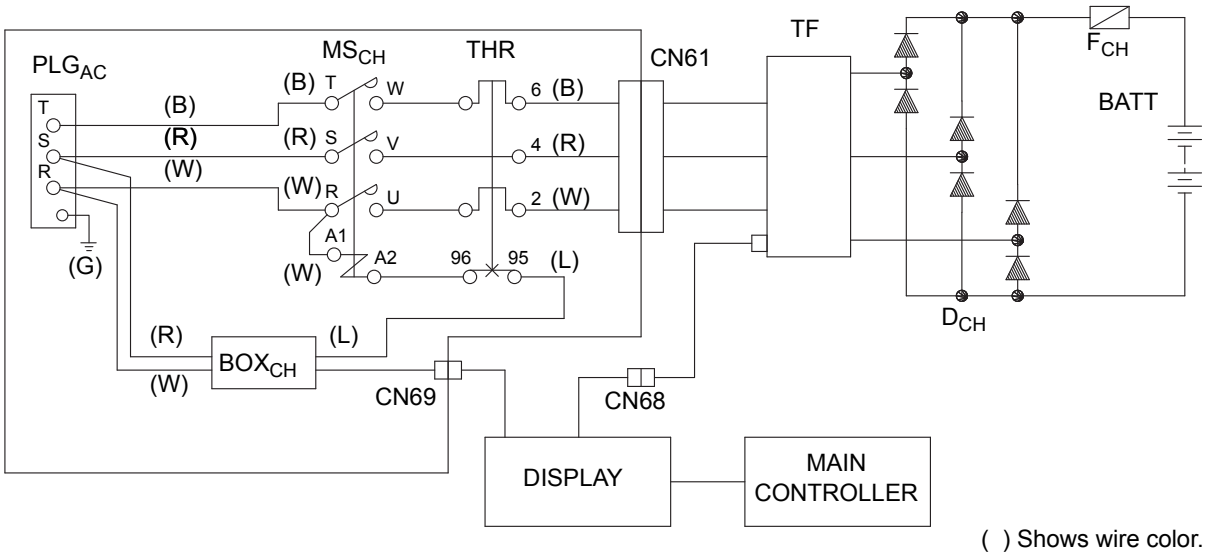
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2 · 3 ton series

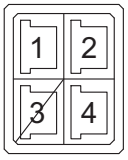


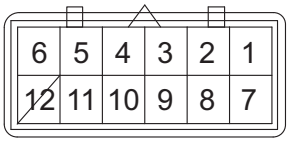
SPECIFICATIONS

CIRCUIT DIAGRAM



( ) Shows wire color.



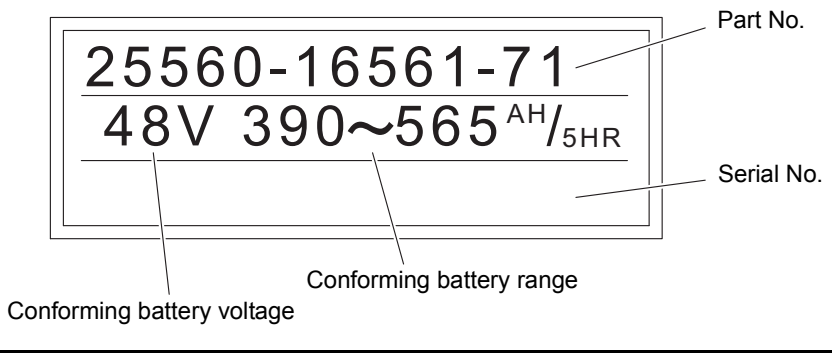


No.	POTENTIAL	CONNECTING TO	WIRE COLOR
1	U	TRANS	W
2	V	TRANS	R
3			
4	W	TRANS	B

No.	POTENTIAL	CONNECTING TO	WIRE COLOR
1	132	CHGMS	G-W
2	129	CHGAC	G-R
3	130	CHGGND	BR
4	128	CHG7V	R
5	121	SW3	G
6	122	SW2	Y
7	123	SW1	O
8	124	LED4	Y-W
9	125	LED3	Y-G
10	126	LED2	Y-B
11	127	LED1	Y-R
12			

G85702122_

NAME PLATE DESCRIPTION MATTER



G85702123_

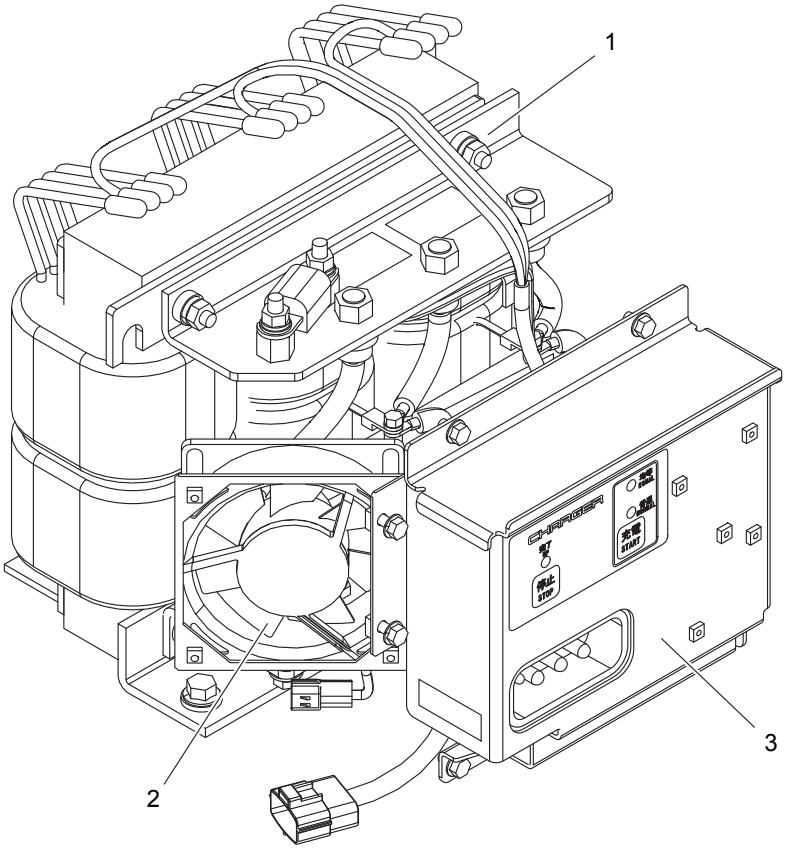
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CHARGER LIST

POWER SUPPLY VOLTAGE	TRANSFORMER CAPACITY (50/60Hz) (kVA)	CONFORMING BATTERY VOLTAGE	CONFORMING BATTERY CAPACITY (Ah/5Hr)	POWER SOURCE CAPACITY (50/60Hz)	Applicable vehicle model				
					8FBN15	8FBN18	8FBN20	8FBN25	8FBN30
200V	5.7/6.3	48V	390	20/20A	○	○			
↑	7.4/7.6	↑	470~565	30/30A	○	○	○	○	
↑	10.4/10.3	↑	645~725	40/30A			○	○	
↑	9.5/9.3	80V	370~470	30/30A					○

○: OPT

COMPONENTS

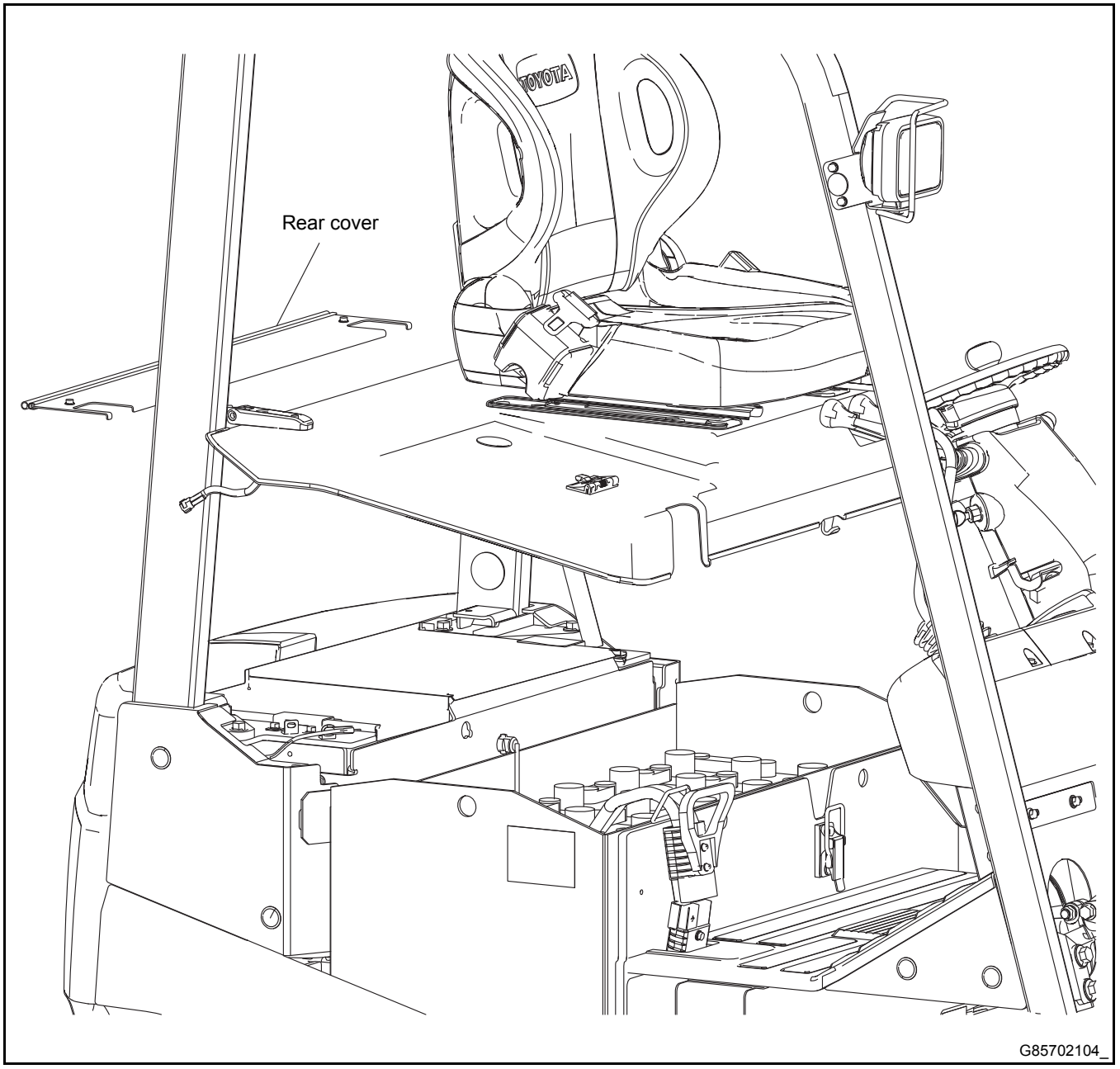


G85702103_

No.	Parts name	QTY	No.	Parts name	QTY
1	Transformer assy	1	3	Charger panel	1
2	Cooling fan	1			

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REMOVAL·INSTALLATION



Removal Procedure

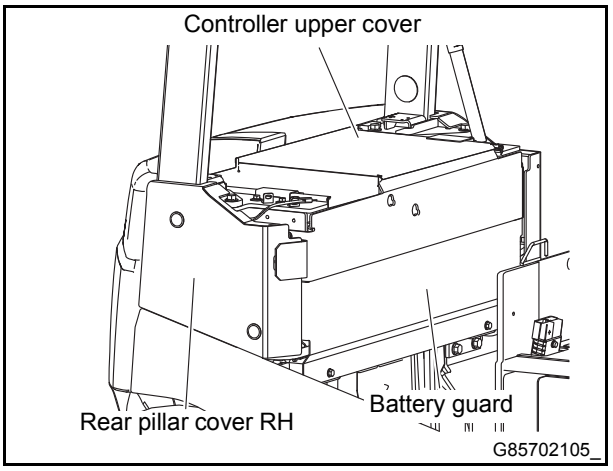
1 Turn the key switch OFF and disconnect the battery plug.

2 Remove the battery hood.

Caution:
- Be sure to disconnect the connector of the seat switch.
- Be sure to leave the damper in vehicle side.

3 Remove the rear cover.

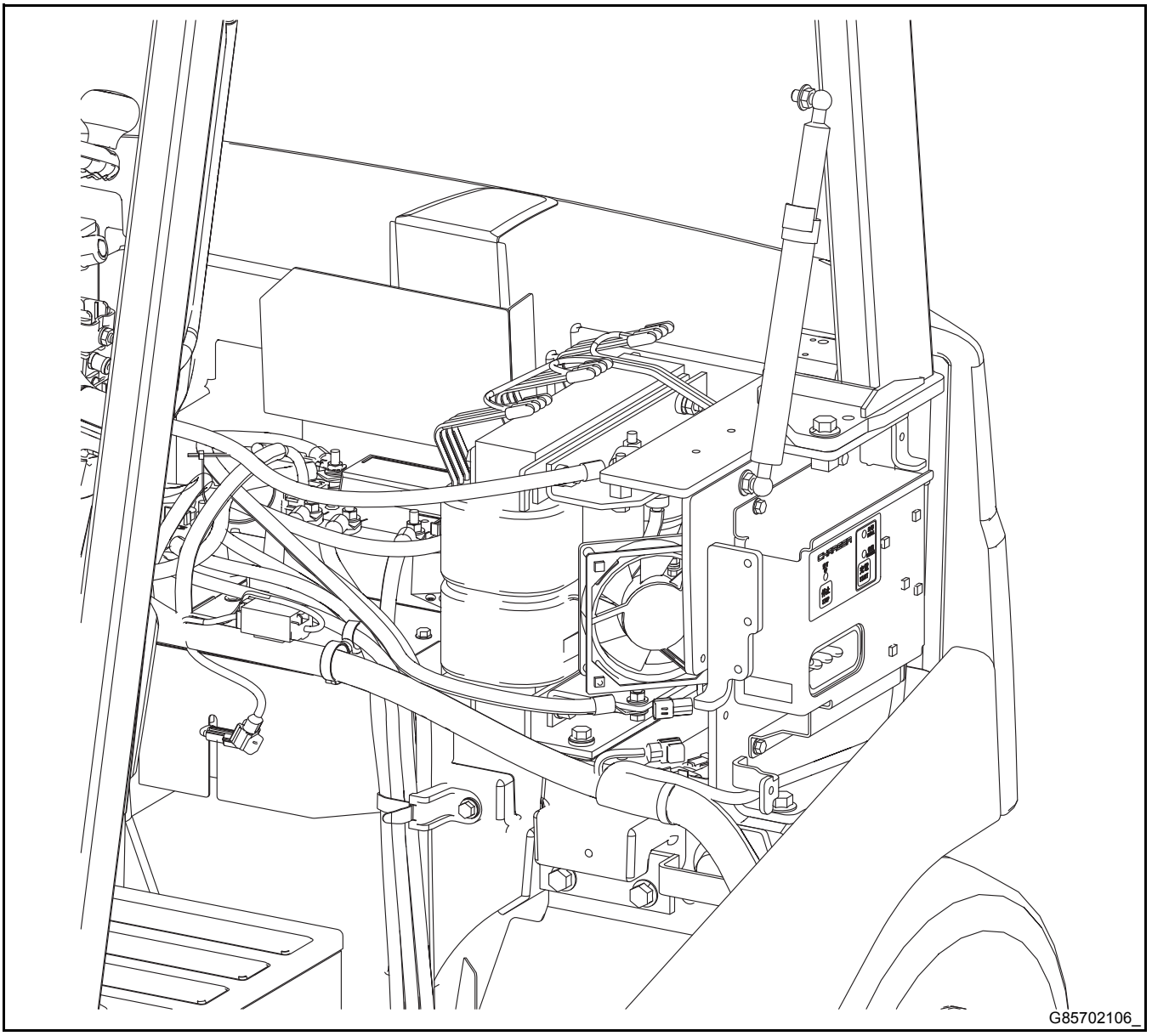
4 Remove the battery from the vehicle.



5 Remove the controller upper cover.

6 Remove the rear pillar cover LH and rear pillar cover RH.

7 Remove the battery guard.
(Refer to page 3-30 .)



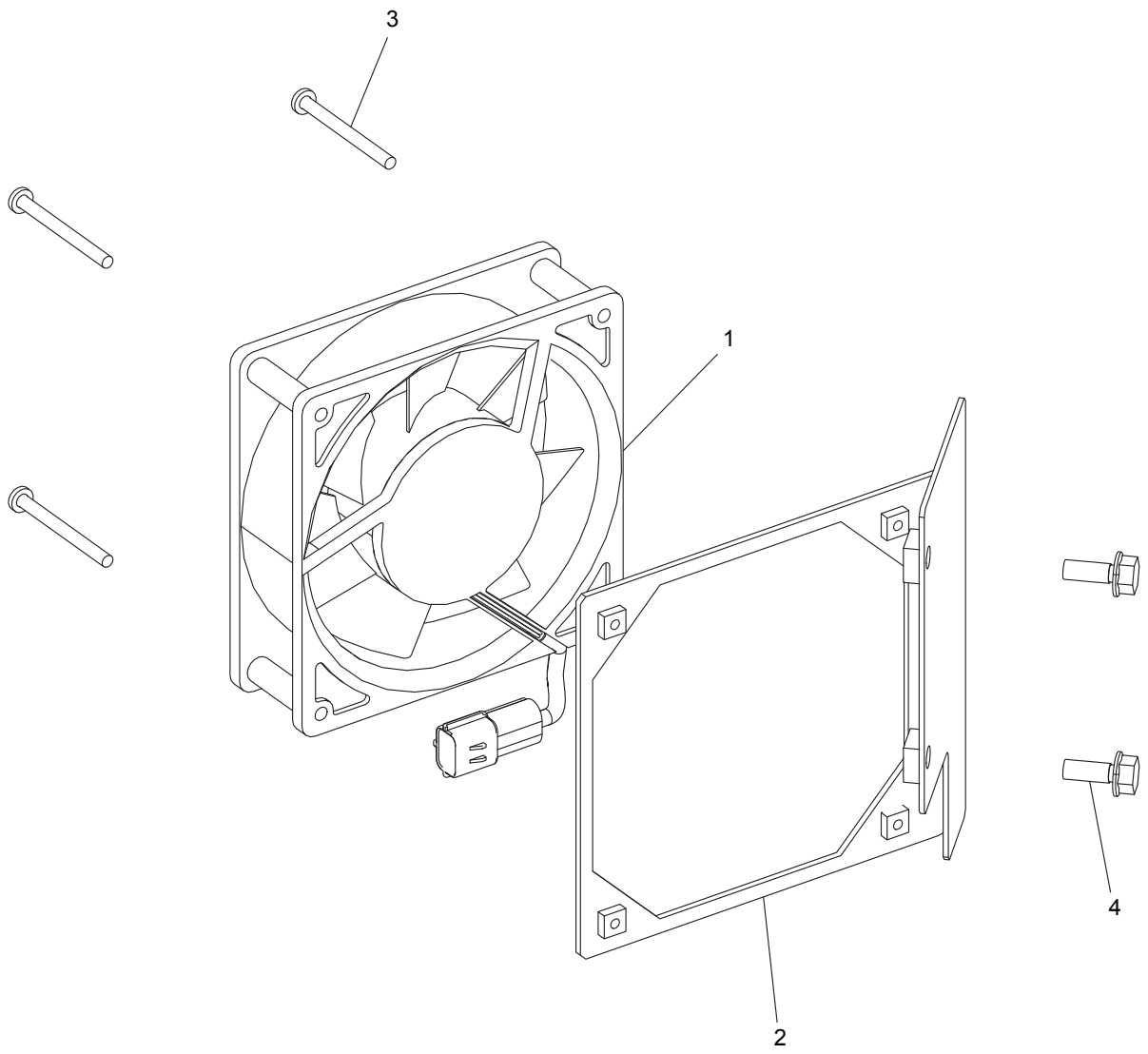
Installation Procedure

The installation procedure is the reverse of the removal procedure.

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COOLING FAN

COMPONENTS

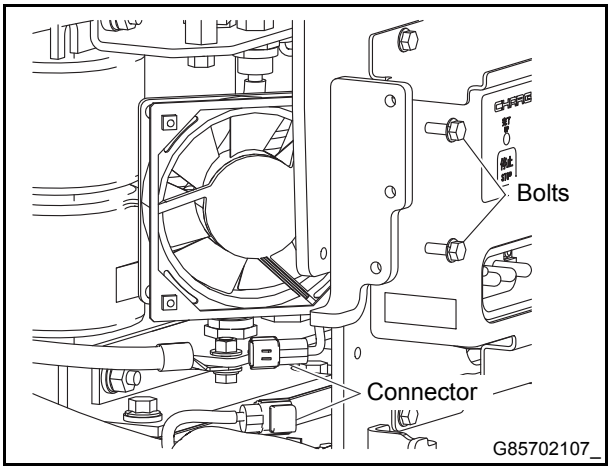


G85702109_

No.	Parts name	QTY	No.	Parts name	QTY
1	Cooling fan	1	3	Screw	4
2	Bracket	1	4	Bolt	2

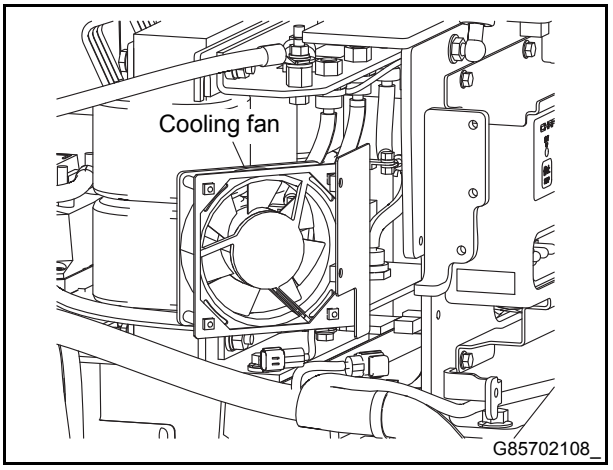
REMOVAL·INSTALLATION

Removal Procedure



1 Disconnect the connector.

2 Remove the bolts.



3 Remove the cooling fan.

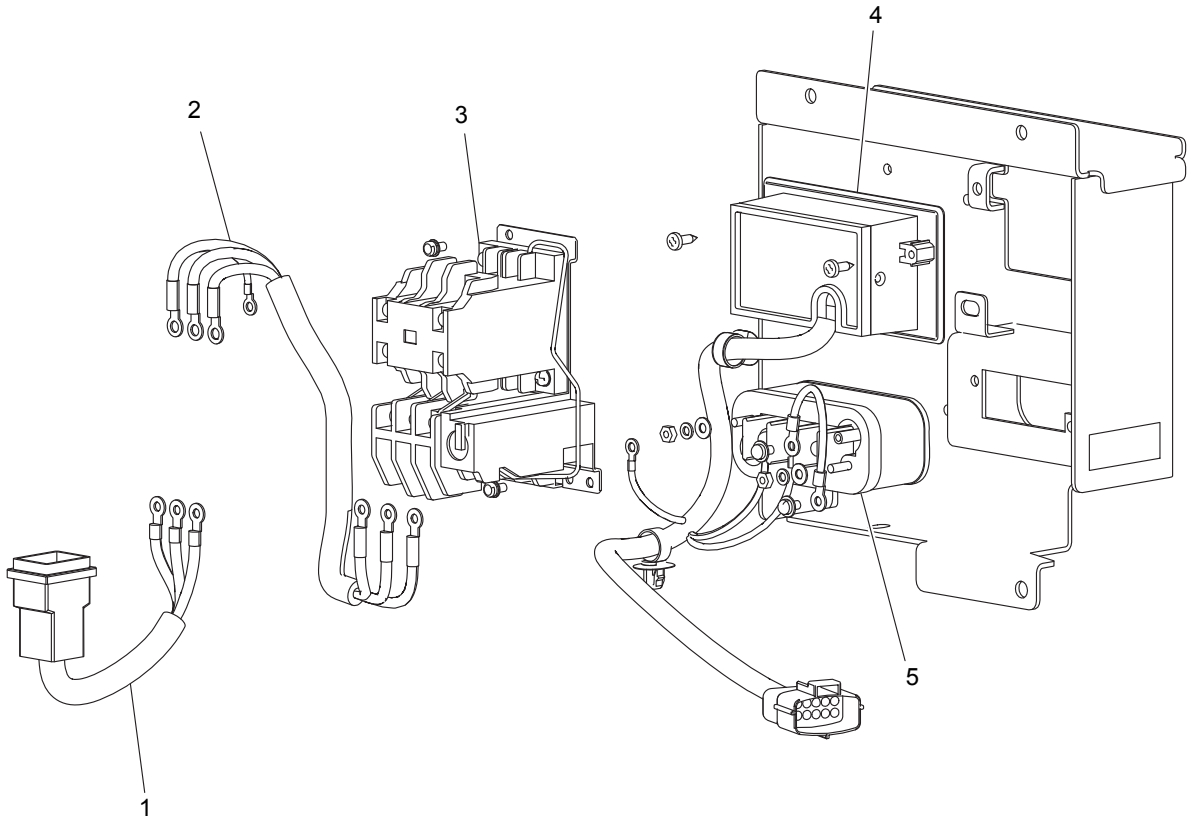
Installation Procedure

The installation procedure is the reverse of the removal procedure.

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CHARGER PANEL

COMPONENTS



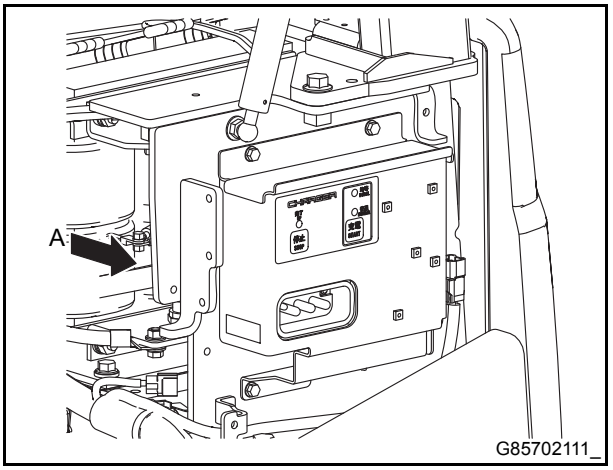
G85702110_

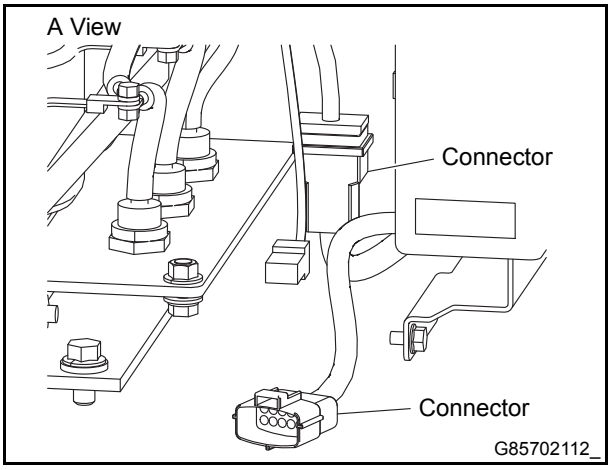
No.	Parts name	QTY	No.	Parts name	QTY
1	Magnet switch harness	1	4	Charger switch	1
2	AC plug harness	1	5	AC plug	1
3	Magnet switch	1			

REMOVAL·INSTALLATION

Removal Procedure

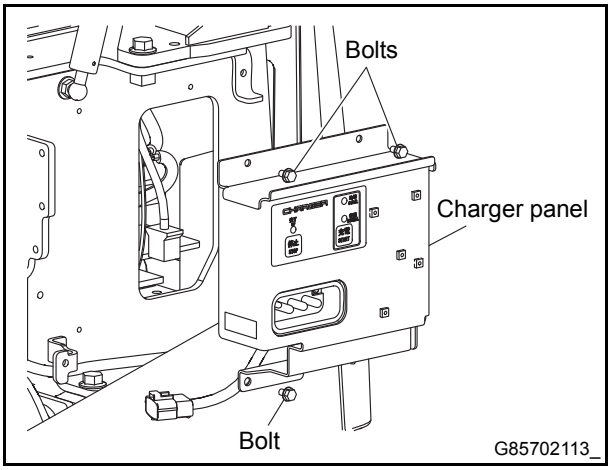
1 Disconnect the connectors (two places).





2 Remove the bolts.

3 Remove the charger panel.



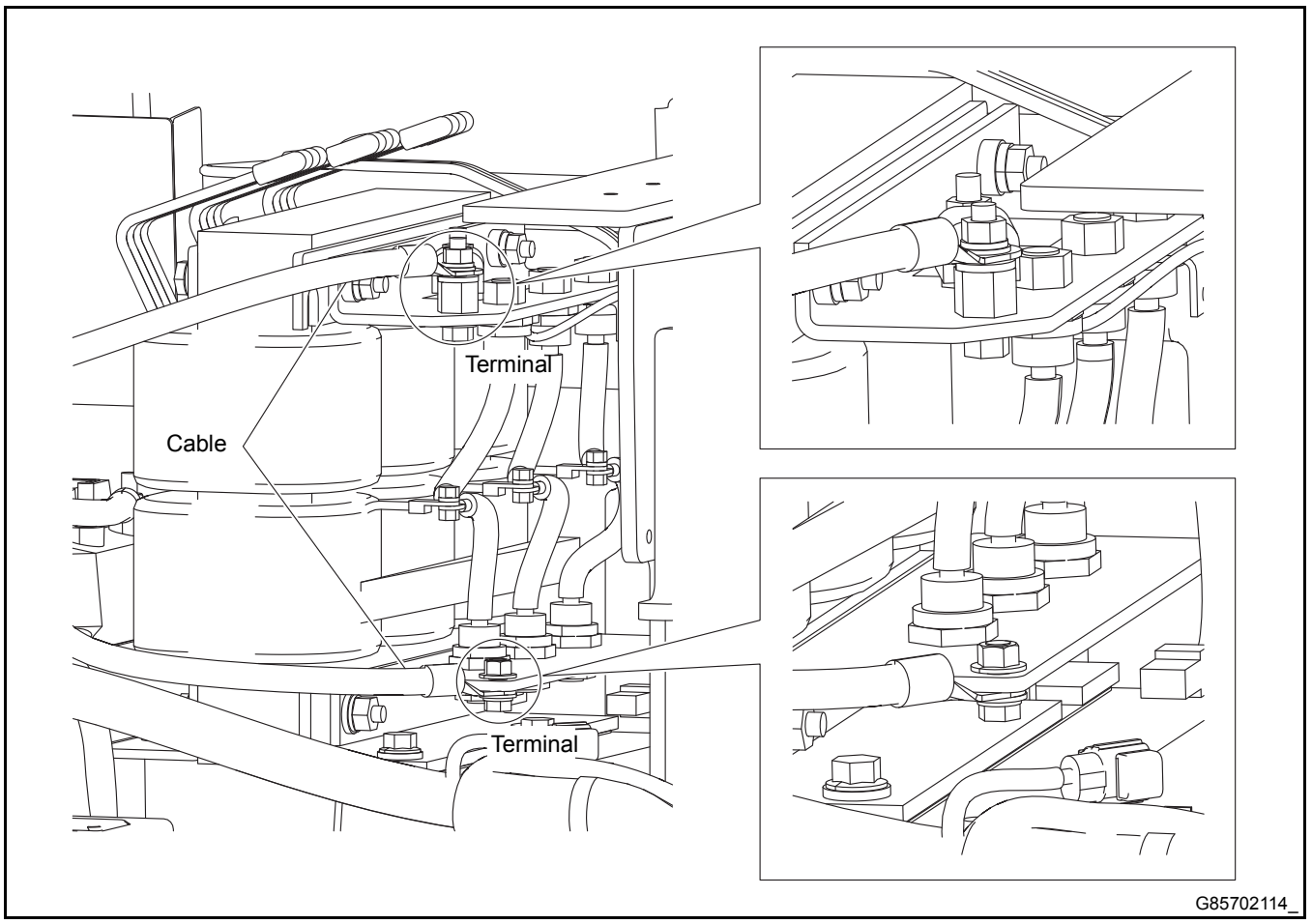
Installation Procedure

The installation procedure is the reverse of the removal procedure.

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TRANSFORMER ASSY

REMOVAL·INSTALLATION



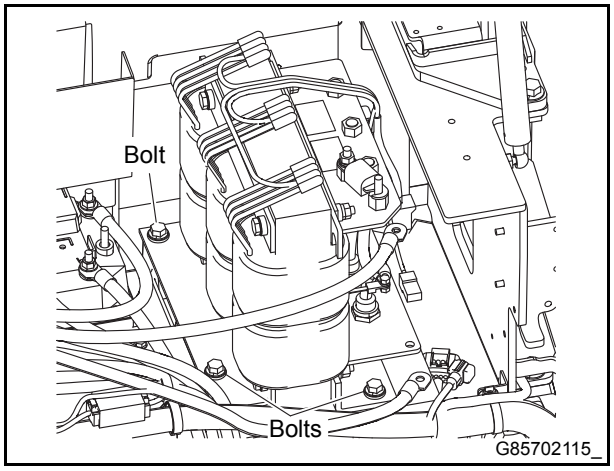
Removal Procedure

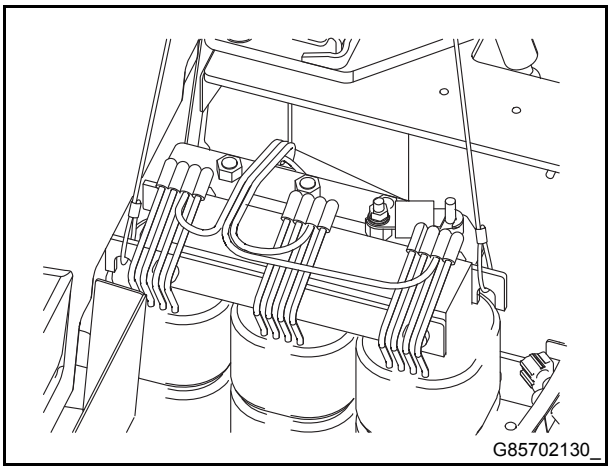
1 Disconnect the cable.

2 Remove the bolts.

3 Remove the transformer assy.

Transformer assy weight:
1 ton series: approx. 40 kg
2 ton series: approx. 50 kg
3 ton series: approx. 55 kg





Note:
Hoist up the transformer assy with wire rope.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

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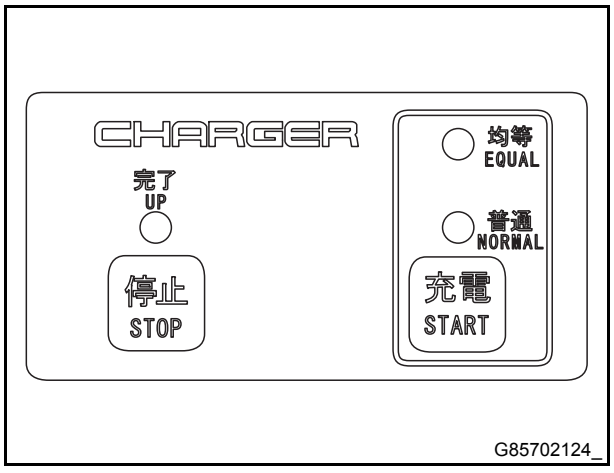
CHARGER INSPECTION

Inspection standard

- The corresponding LED on the operation panel should come on.
- LEDs other than the corresponding one should come off.
- The magnet switch should be turned on/off. (Check by sound)
- No error indication should be allowed during test.
- After test, press the decision button to display the specified charging screen.

Inspection procedures

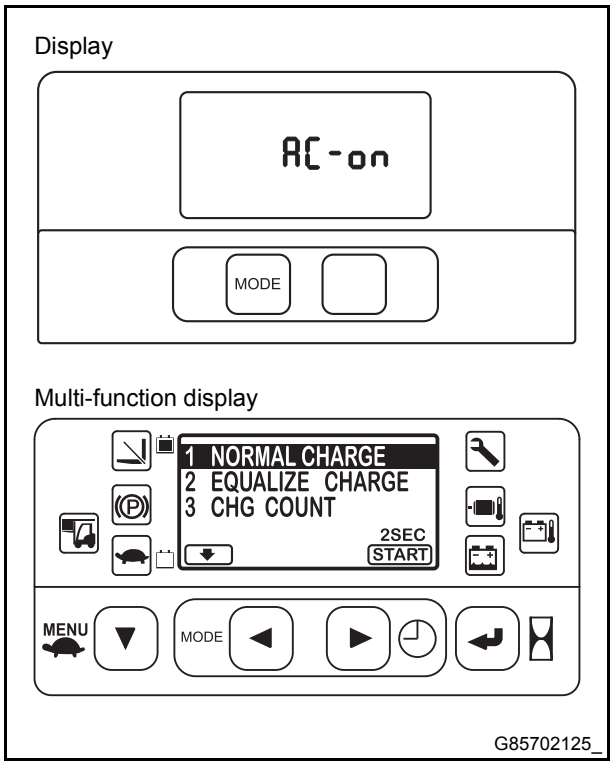
Perform inspection with actual vehicle in accordance with the following procedures.



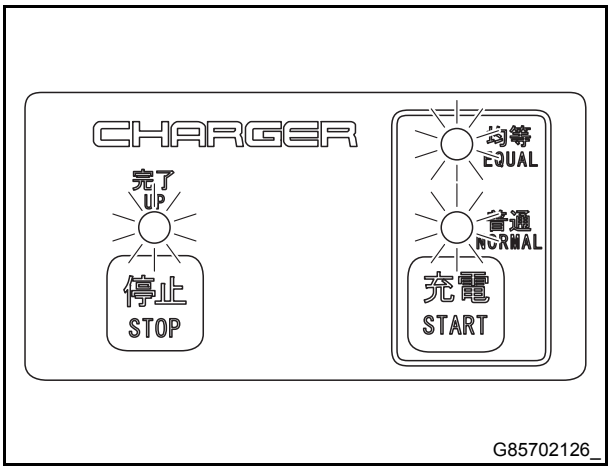
1. Connect the AC plug, and check if all LEDs on the operation panel come on, then come off after 2 seconds.

Caution:

- **If the LEDs do not come on even with the AC plug connected, disconnect the AC plug after pressing the “STOP” button and check a charging of AC 200V to the AC plug.**
- **If a charging of AC 200V is applied normally, connect the AC plug and perform inspection from the beginning.**
- **If the LEDs do not come on even when operate again, judge it as NG.**



2. Check if the display screen is changed.



3. Keep pressing the “START” button and the “STOP” button simultaneously for more than 2 seconds until a beep sound is heard.
   By the above operation, all LEDs come on, and the status turns to standby for a start of the timer test.

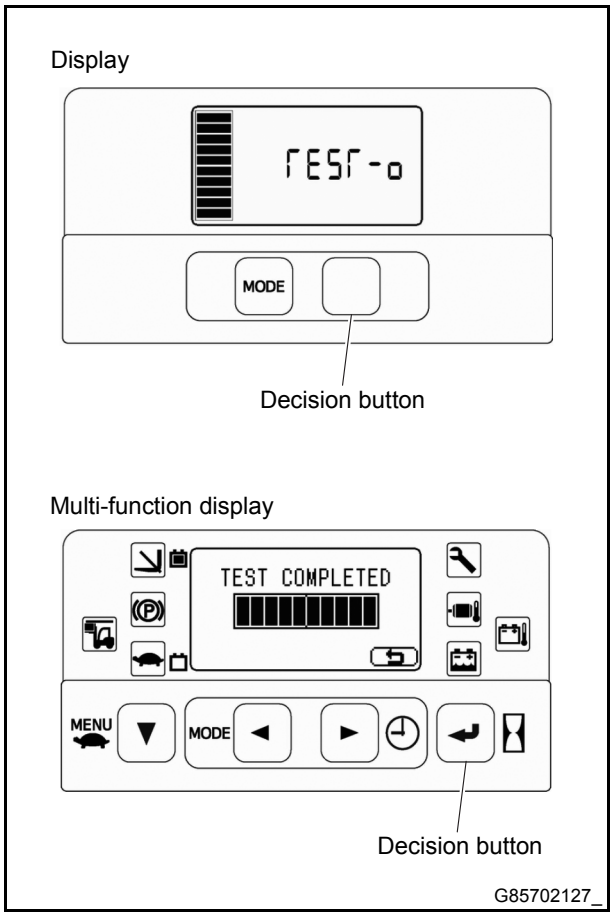
4. Press the “START” button within 5 seconds from step 3.
   By this operation, the timer test starts.

Caution:
If the LED comes off before operation, repeat the inspection from step 2.
(After 5 second from step 3, and any button other than the “START” button is pressed, the operation in step 3 will be cancelled.)

5. Check the status of the timer test.

Caution:
- **If the display comes off during the timer test, disconnect the AC plug after pressing the “STOP” button and check a charging of AC 200V to the AC plug.**
- **If a charging of AC 200V is applied normally, connect the AC plug and perform inspection from the beginning.**
- **If the display does not come on even when operate again, judge it as NG.**

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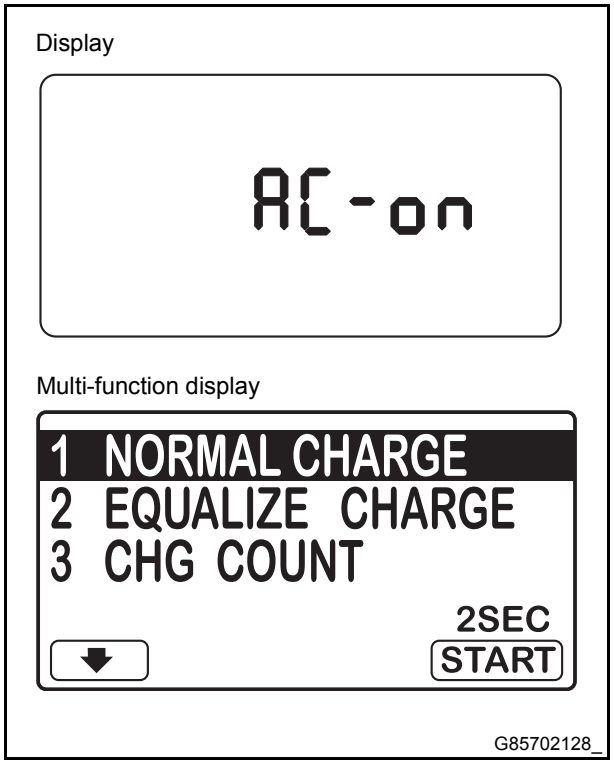


6. Check the completion indication when the timer test is completed.

   Display
   - The indication of “TEST-o” which means the test is ok should be displayed.
   - The battery capacity indicator should indicates amount of charge in the battery in 10 stages.

   Multi-function display
   - The indication of “TEST COMPLETED” should be displayed.
   - The timer test progress indication should reach stage 10.

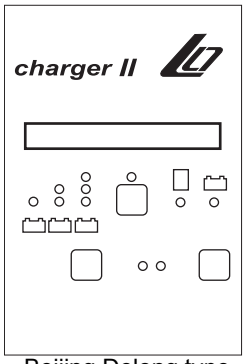
   After check, press the decision button.



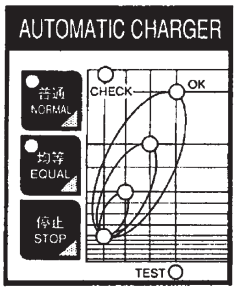
7. After pressing the decision button, check if the display screen is changed.

8. Disconnect the AC plug.

OFF-TRUCK TYPE



Beijing Delong type



GS YUASA type

G85702129_

CHARGER LIST

Beijing Delong type

	Battery voltage	Power supply voltage	Charger type	Transformer capacity (kVA) (50Hz)	Conforming battery capacity (Ah/5Hr)	Output plug	Power supply capacity (50Hz)	Weight (kg)	8FBN15	50-8FBN15	8FBN16	8FBN18	50-8FBN18	8FBN20	50-8FBN20	8FBN25	8FBN30
For China	48V	400V	econ charger II D48/50P	3.6	390	SB350	10A	71	○	○	○	○	○				
			econ charger II D48/60P	4.4	440~480		10A	74	○	○	○	○	○	○	○		
			econ charger II D48/70P	5.2	525		10A	78		○			○		○	○	
			econ charger II D48/80P	6.0	565~600		10A	78	○	○	○	○	○	○	○	○	
			econ charger II D48/90P	6.9	645~675		15A	81						○	○	○	
			econ charger II D48/100P	7.4	725		15A	86						○	○	○	
	80V	400V	econ charger II D80/50P	6.2	370~375	REMA 320A	10A	71									○
			econ charger II D80/60P	7.4	440~480		15A	78									○
For export models	48V	400V	econ charger II D48/50P	3.6	390	SB350	10A	71	○			○					
			econ charger II D48/60P	4.4	470~480		10A	74	○			○		○			
			econ charger II D48/70P	5.2	525		10A	78								○	
			econ charger II D48/80P	6.0	565~600		10A	78	○			○		○		○	
			econ charger II D48/90P	6.9	645~675		15A	81						○		○	
			econ charger II D48/100P	7.4	725		15A	86						○		○	
	80V	400V	econ charger II D80/50P	6.2	370~375	REMA 320A	10A	71									○
			econ charger II D80/60P	7.4	440~480		15A	78									○

○: OPT

- Only available for 50Hz frequency of input power supply.
- The power cord for China is applied with a AC input outlet.
- No AC input outlet is applied to the power cord for export.

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GS YUASA type

	Battery voltage	Power supply voltage	Charger type	Transformer capacity (kVA) (50/60Hz)	Conforming battery capacity (Ah/5Hr)	Output plug	Power supply capacity (50/60Hz)	Weight (kg)	8FBN15	50-8FBN15	8FBN16	8FBN18	50-8FBN18	8FBN20	50-8FBN20	8FBN25	8FBN30
For export models	48V	200V	SG3-69-80JBY	7.3/6.5	390	SB350	30/20A	47	○			○					
			SG3-69-100JBY	9.2/8.1	470~565		30/30A	52	○			○		○		○	
			SG3-69-130JBY	12.0/11.0	600~725		40/40A	61						○		○	
	80V	200V	SG3-115-80JBY	12.0/10.0	370~480	REMA 320A	40/30A	85									○
	48V	400V	SG3-69-80JBY	7.3/6.5	390	SB350	15/10A	47	○			○					
			SG3-69-100JBY	9.2/8.1	470~565		15/15A	52	○			○		○		○	
			SG3-69-130JBY	12.0/11.0	600~725		20/20A	61						○		○	
	80V	400V	SG3-115-80JBY	12.0/10.0	370~480	REMA 320A	20/15A	85									○

○: OPT

- Not available for China.

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FRONT MODULE

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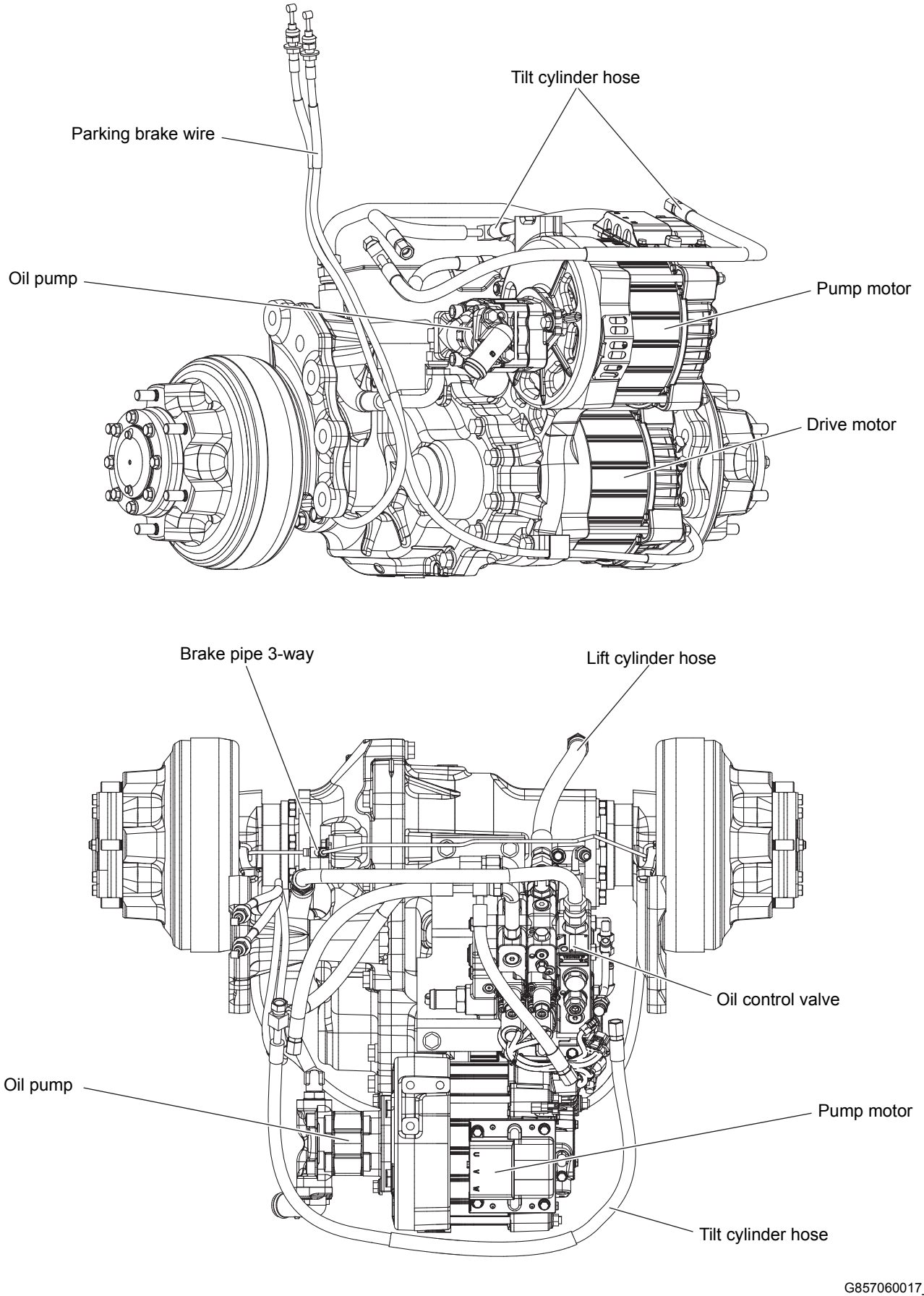
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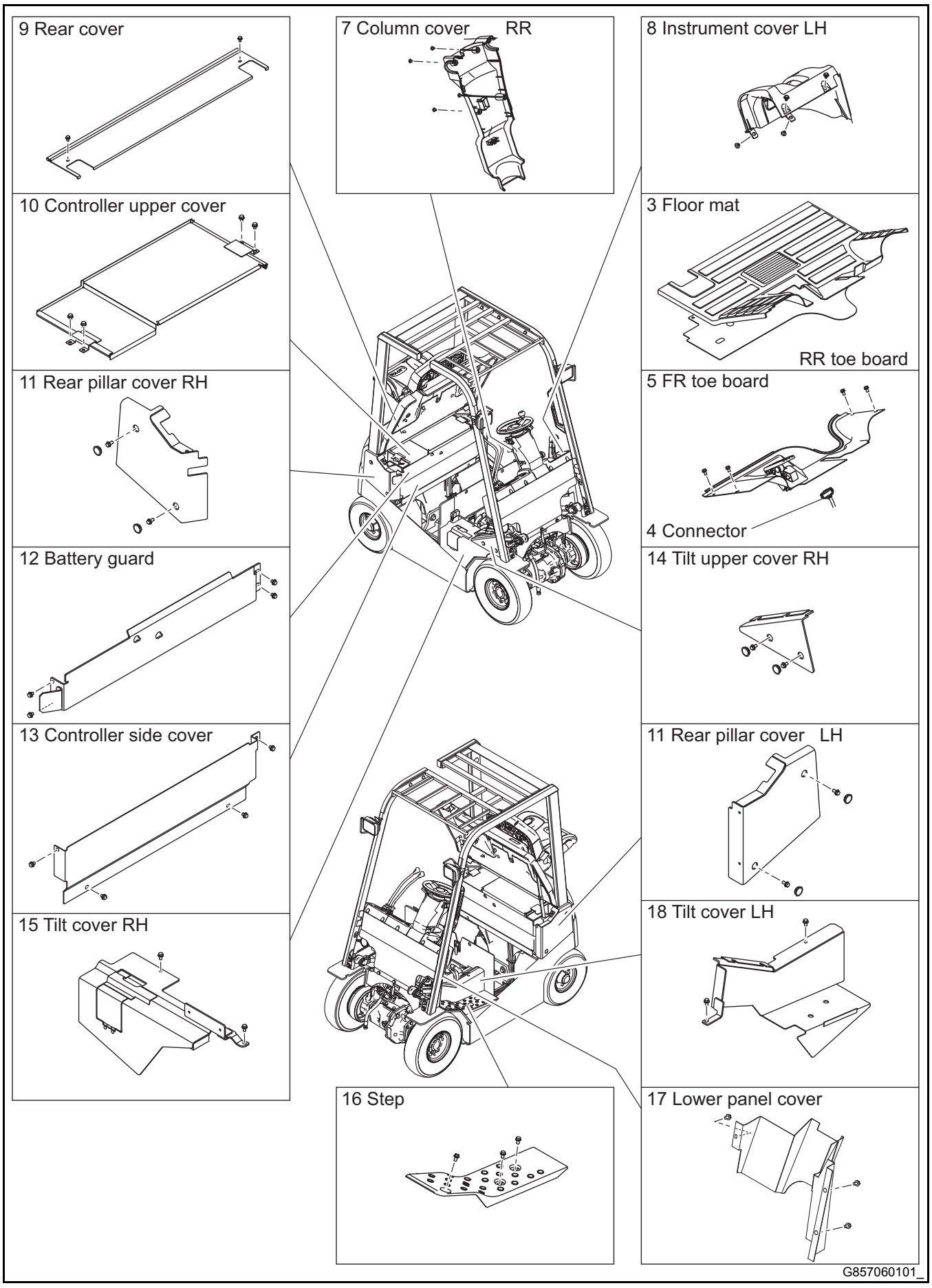
FRONT MODULE ASSY

GENERAL



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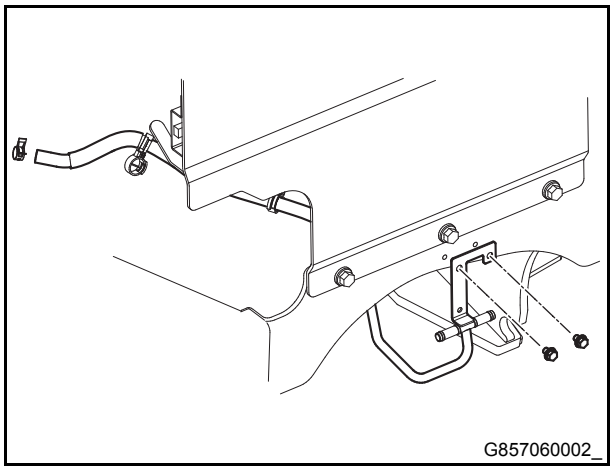
REMOVAL·INSTALLATION



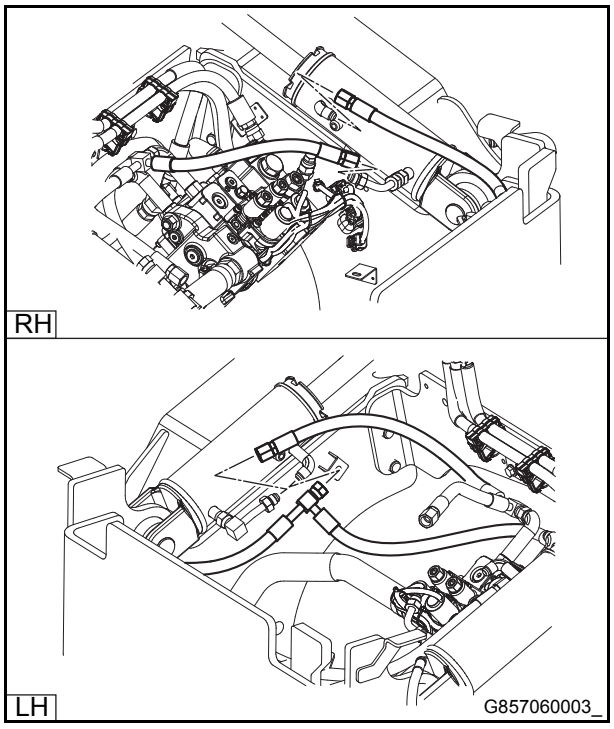
Removal Procedure

1 Remove the mast ASSY. (Refer to page 11-17)
2 Turn off the key switch and disconnect the battery plug.
3 Remove the floor mat and the RR toe board.
4 Disconnect the accelerator pedal connector.
5 Remove the FR toe board.
6 Remove the battery.
7 Remove the steering column cover RR.
8 Remove the instrument cover LH.
9 Remove the rear cover.
10 Remove the controller upper cover.
11 Remove the rear pillar covers RH and LH.
12 Remove the battery guard.
13 Remove the controller side cover.
14 Remove the tilt upper cover RH.
15 Remove the tilt cover RH.
16 Remove the step.
17 Remove the lower panel cover LH.
18 Remove the tilt cover LH.
19 Drain hydraulic oil from the oil tank.

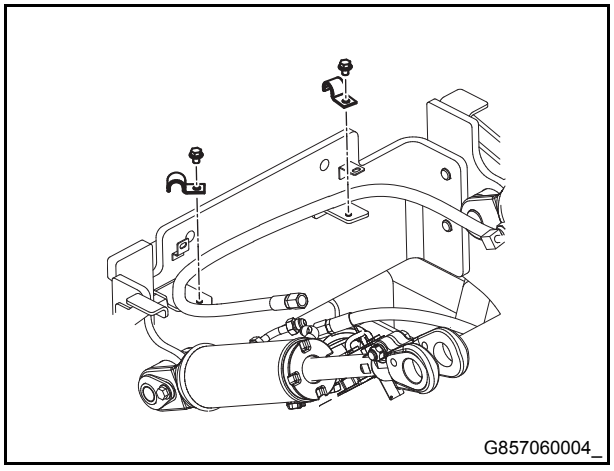
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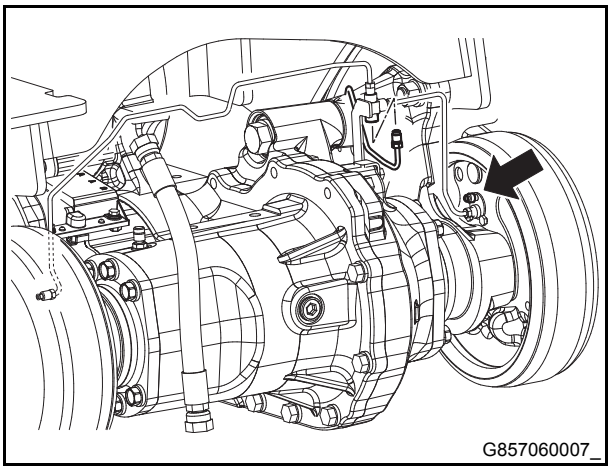
20 Disconnect the 3-way pipe W/ hose of the overflow hose from the oil tank.



21 Disconnect the tilt cylinder hose RH and LH.

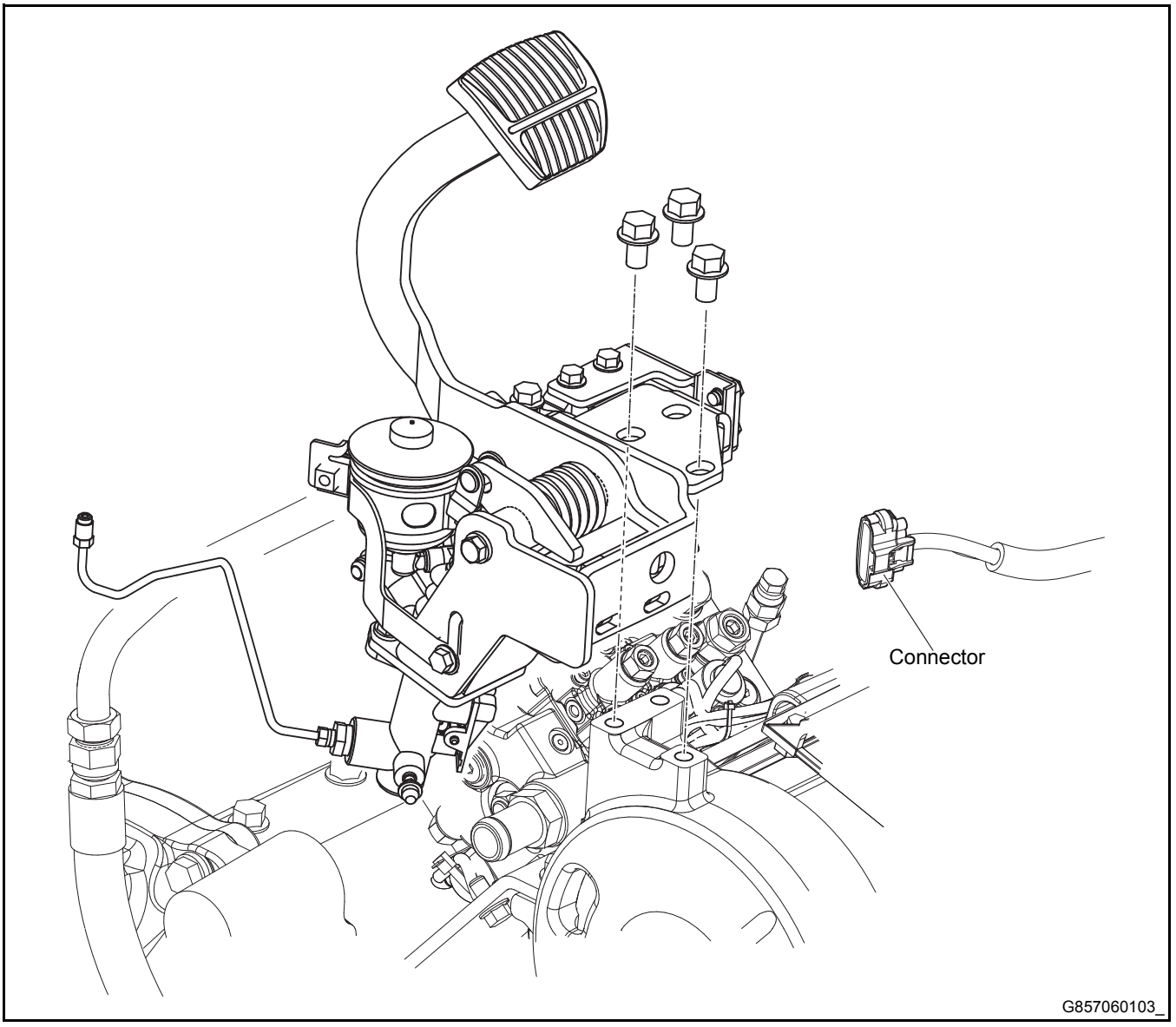


22 Remove the hose clamps in the tilt cylinder rod side.



23 Drain brake oil. (Refer to page 6-84)

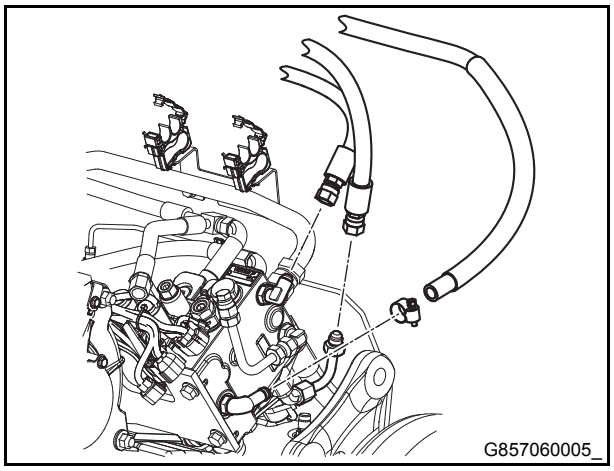
24 Disconnect the brake pipe in the 3-way side.



25 Disconnect the connector of the brake switch.

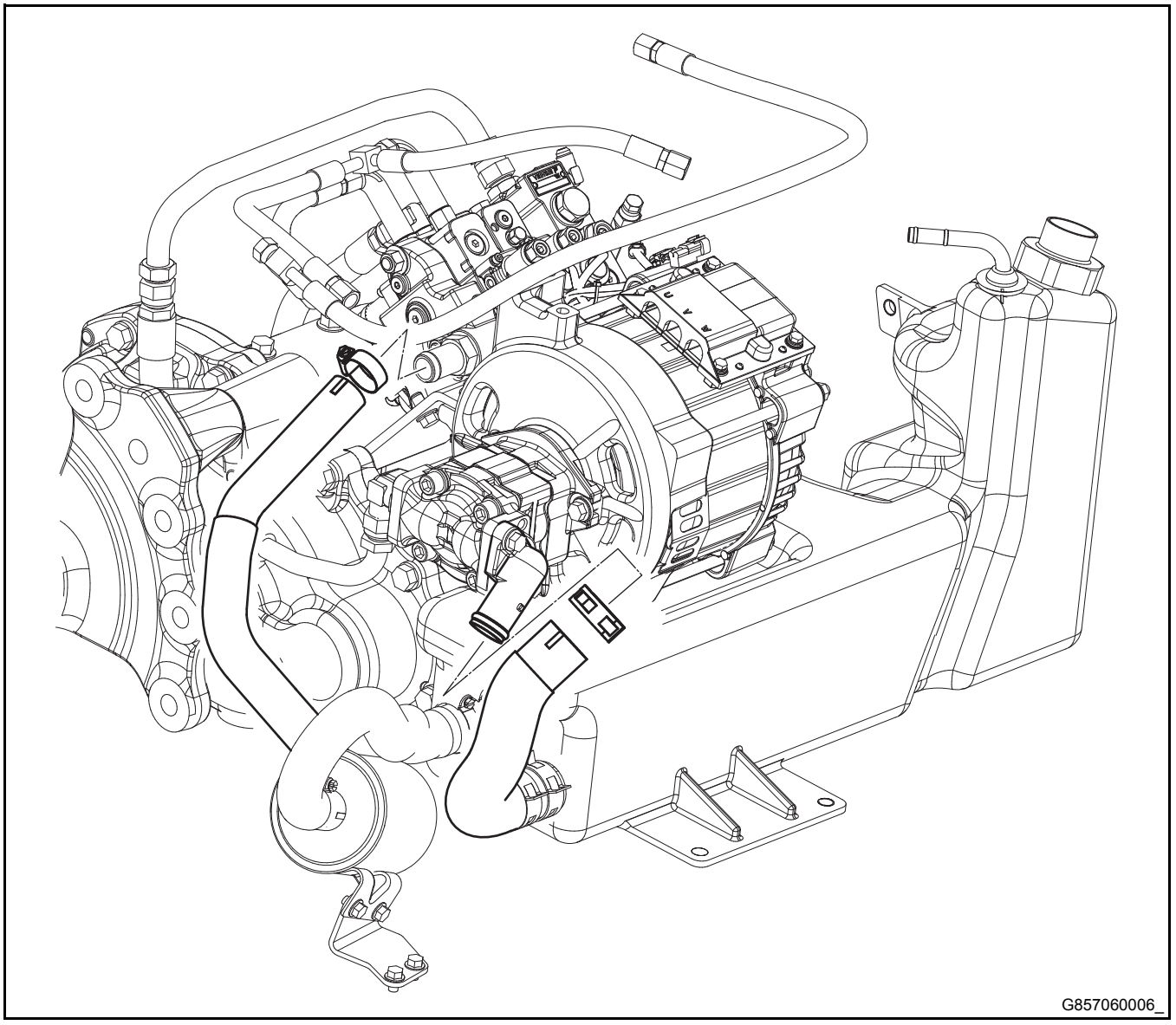
26 Remove the brake pedal and the brake pedal bracket W/ pipe.

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27 Disconnect the steering valve hoses in the oil control valve side.

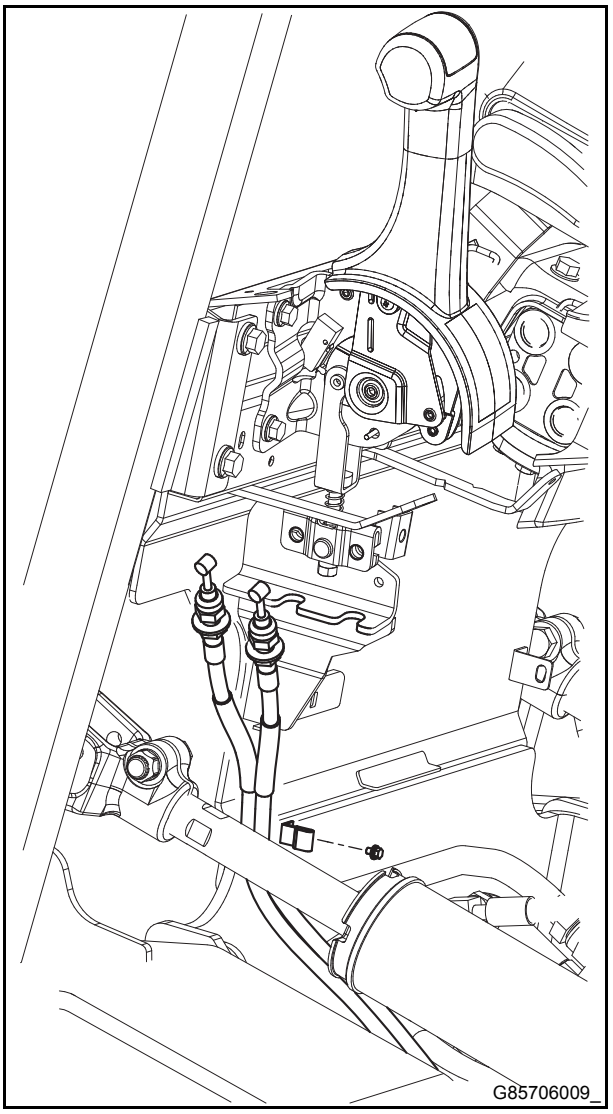
28 Disconnect the steering valve return hose in the oil control valve side.



29 Remove the oil tank return hose in the oil control valve side.

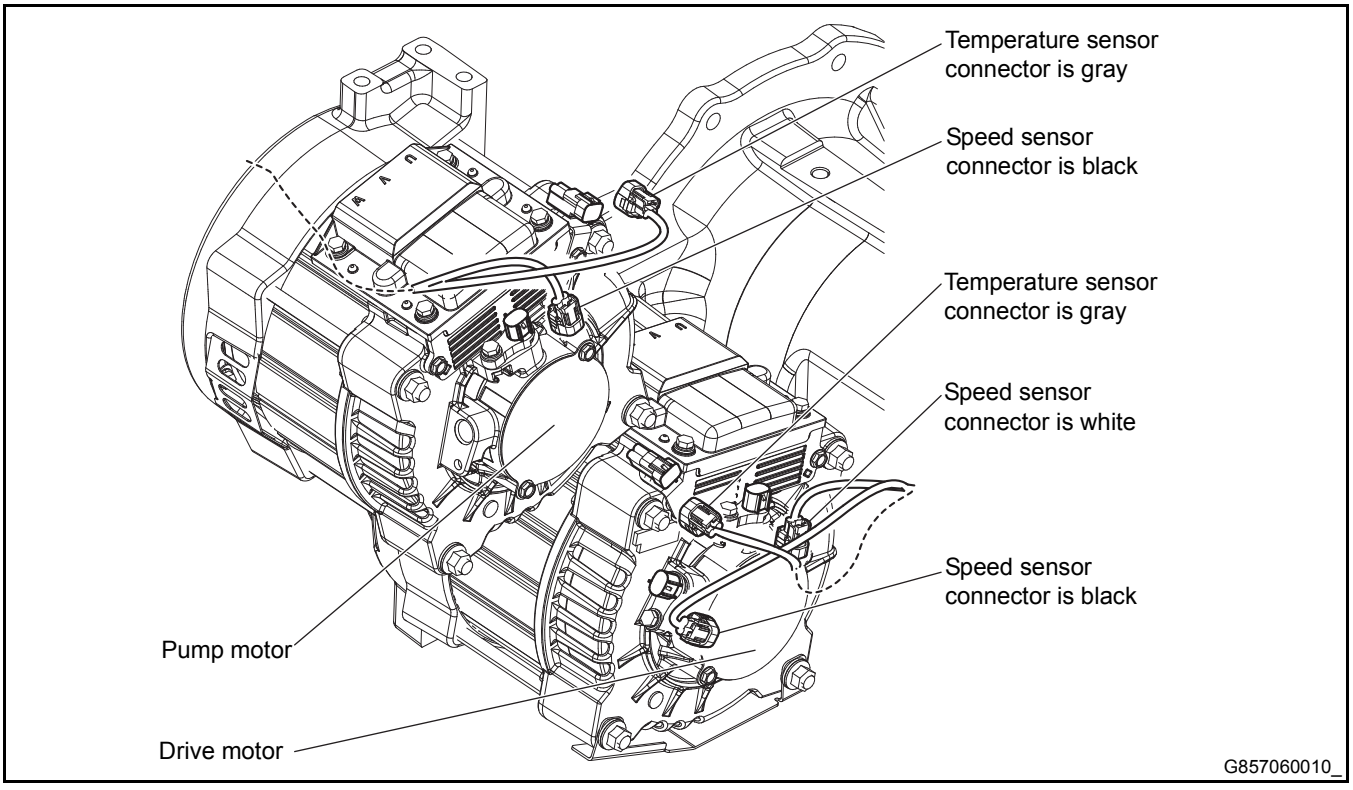
30 Remove the oil tank suction hose in the oil pump side.

31 Jack up the vehicle and support it with wooden blocks. Remove the front wheels.



32 Disconnect the parking brake wire.

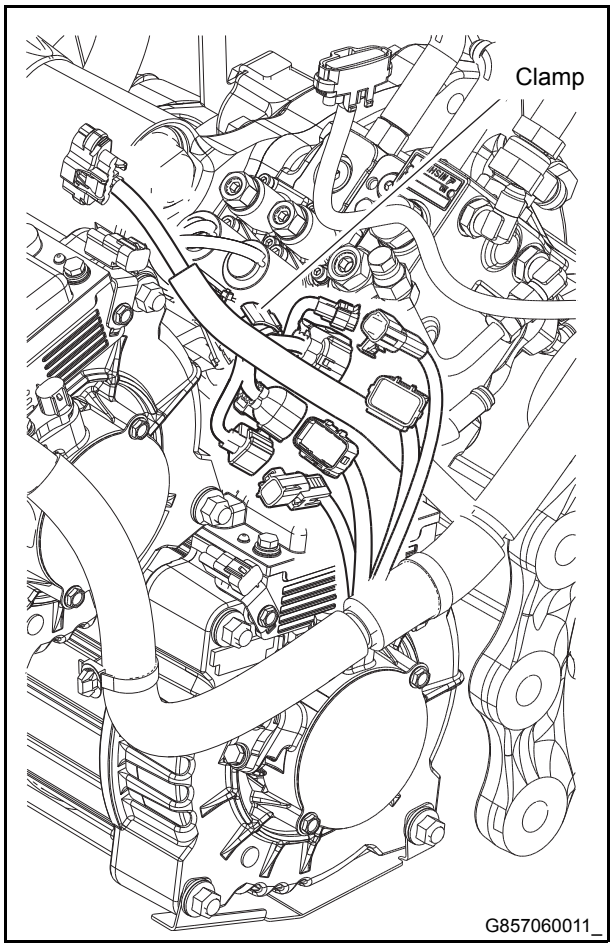
Note: For the parking brake adjustment, refer to page 6-91.



33 Disconnect the drive motor connectors. (Speed sensors and temperature sensor)

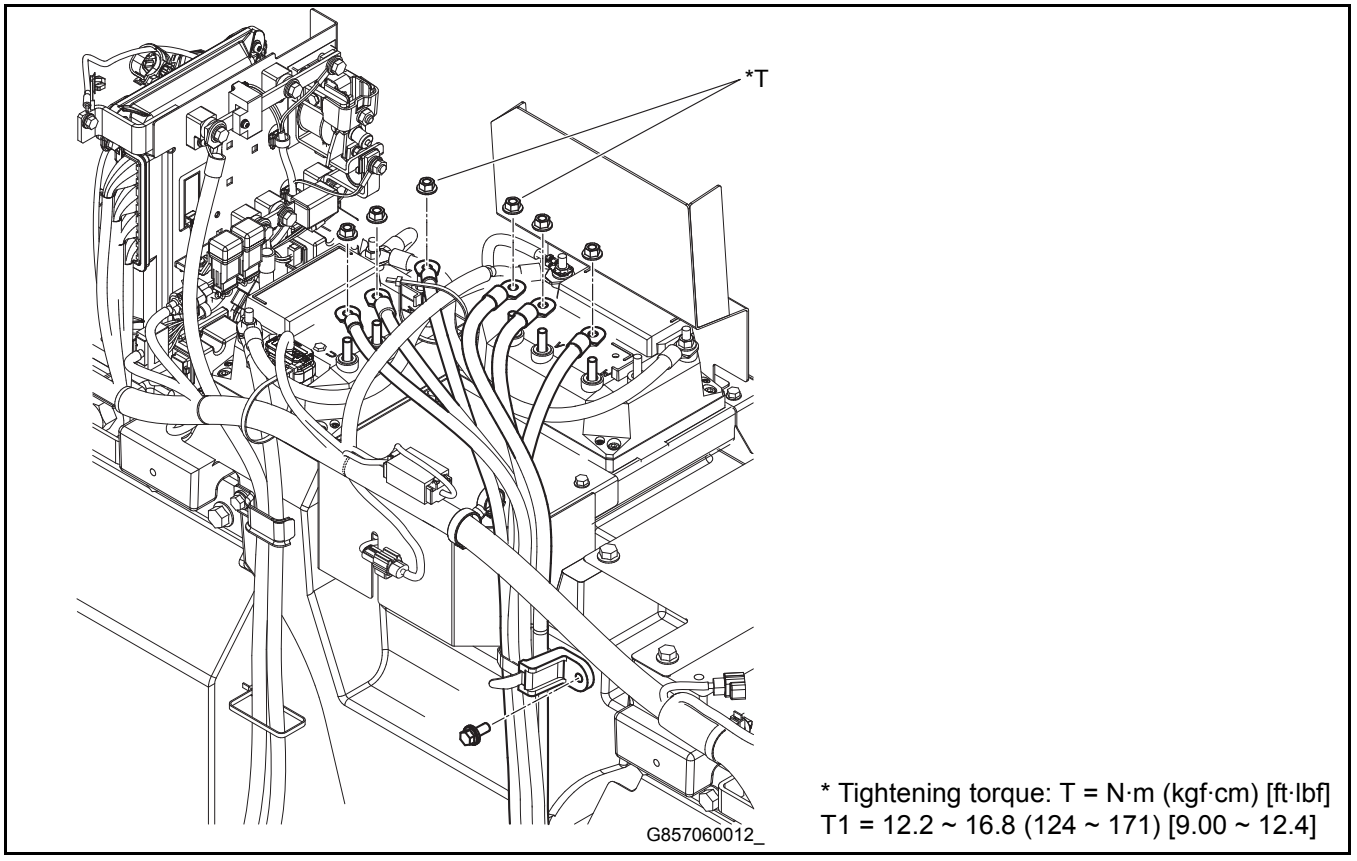
34 Disconnect the pump motor connectors. (Speed sensor and temperature sensor)

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35 Disconnect the connector of the oil control valve solenoid valve.

36 Remove the accelerator potentiometer sensor harness from the clamp.



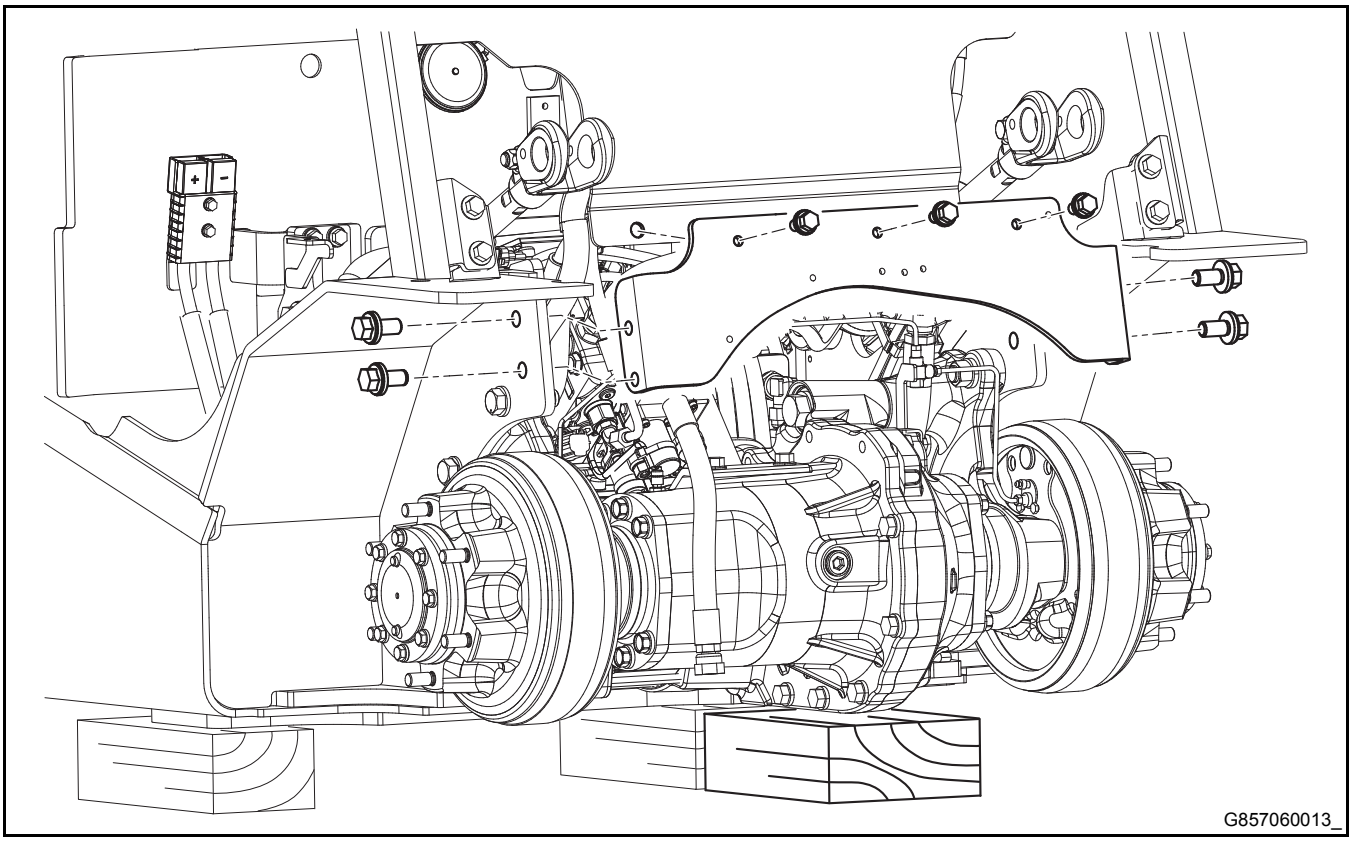
* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 12.2 ~ 16.8 (124 ~ 171) [9.00 ~ 12.4]

37 Disconnect the drive motor cable. (AC driver side)

38 Disconnect the pump motor cable. (AC driver side)

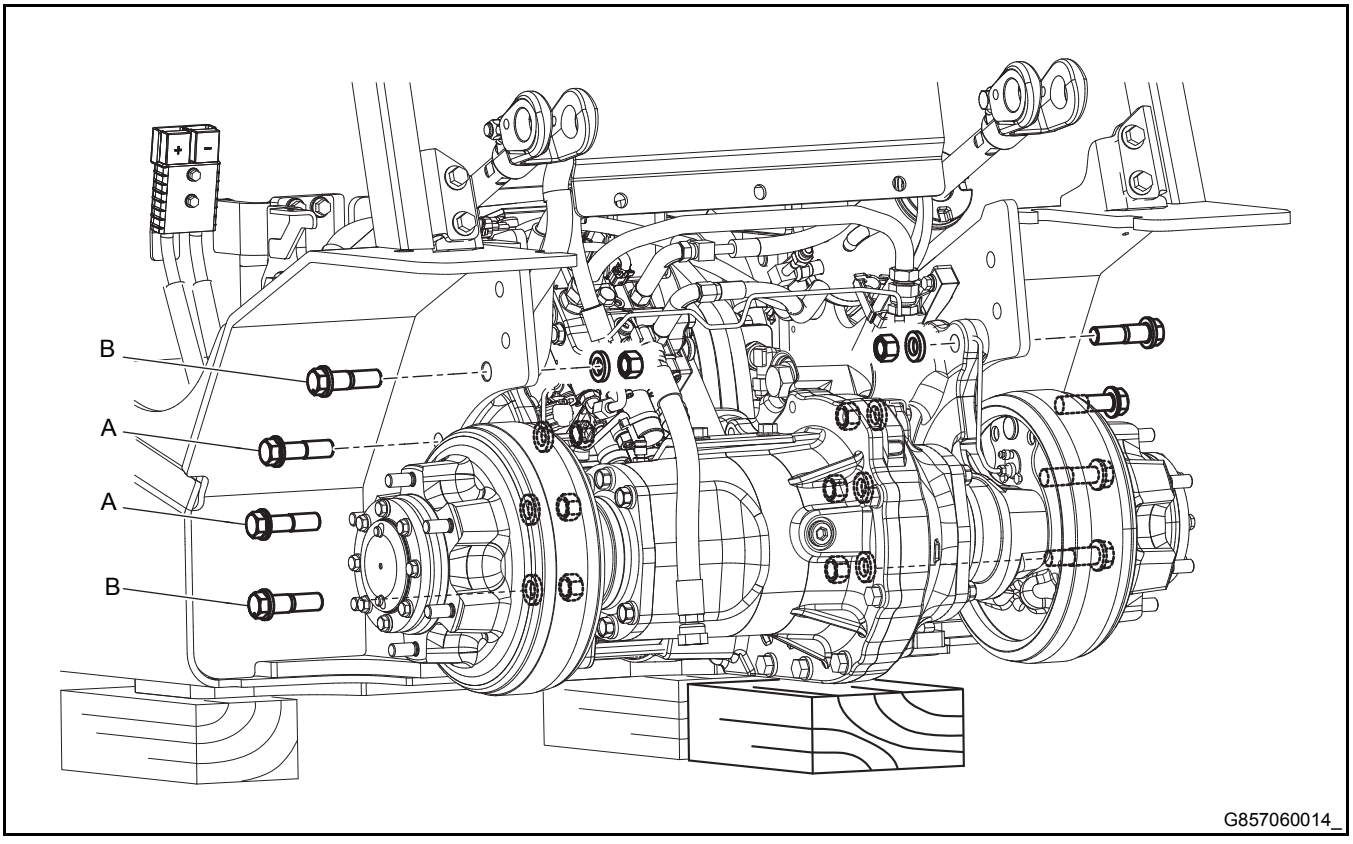
39 Remove the motor cable clamp bolt.

40 Remove the PS hose clamp and bracket.



41 Remove the front member.

42 Support the drive unit with wooden blocks.

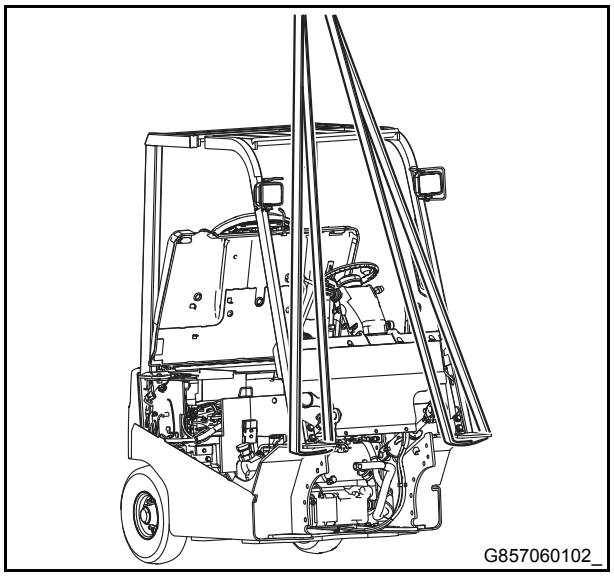


43 Remove the through bolts(A) from the front axle bracket.

44 Remove the reamer bolts(B) from the front axle bracket.

SST 09310-23320-71

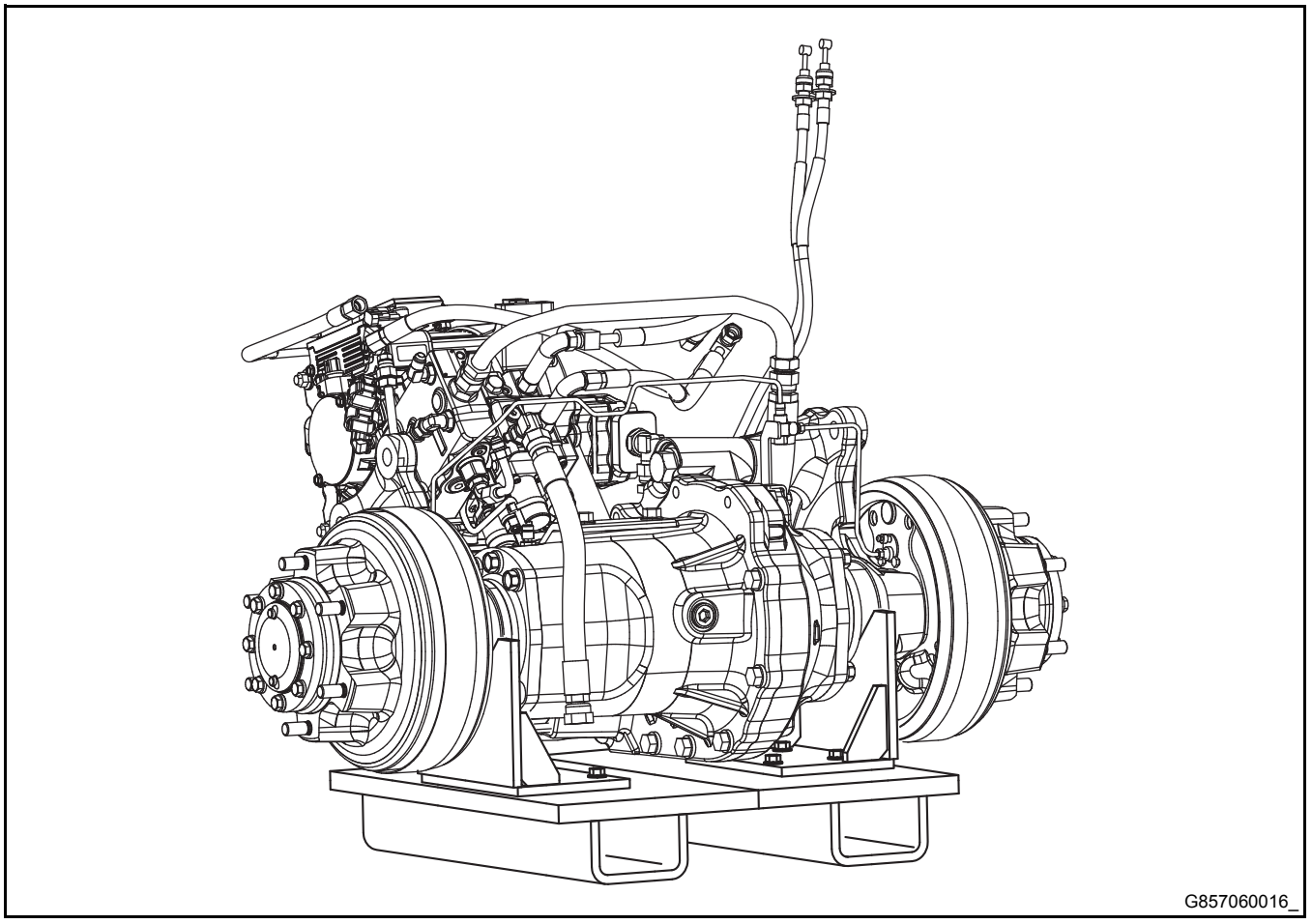
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G857060102_

45 Hoist up the frame with wire rope.

46 Carefully move the vehicle backward or remove the drive unit ASSY from the frame.

Note:
When removing the drive unit, it is recommended to use a tool and a hand pallet truck. For information about a tool, refer to the drawing on page 14-6 in Appendix.


G857060016_

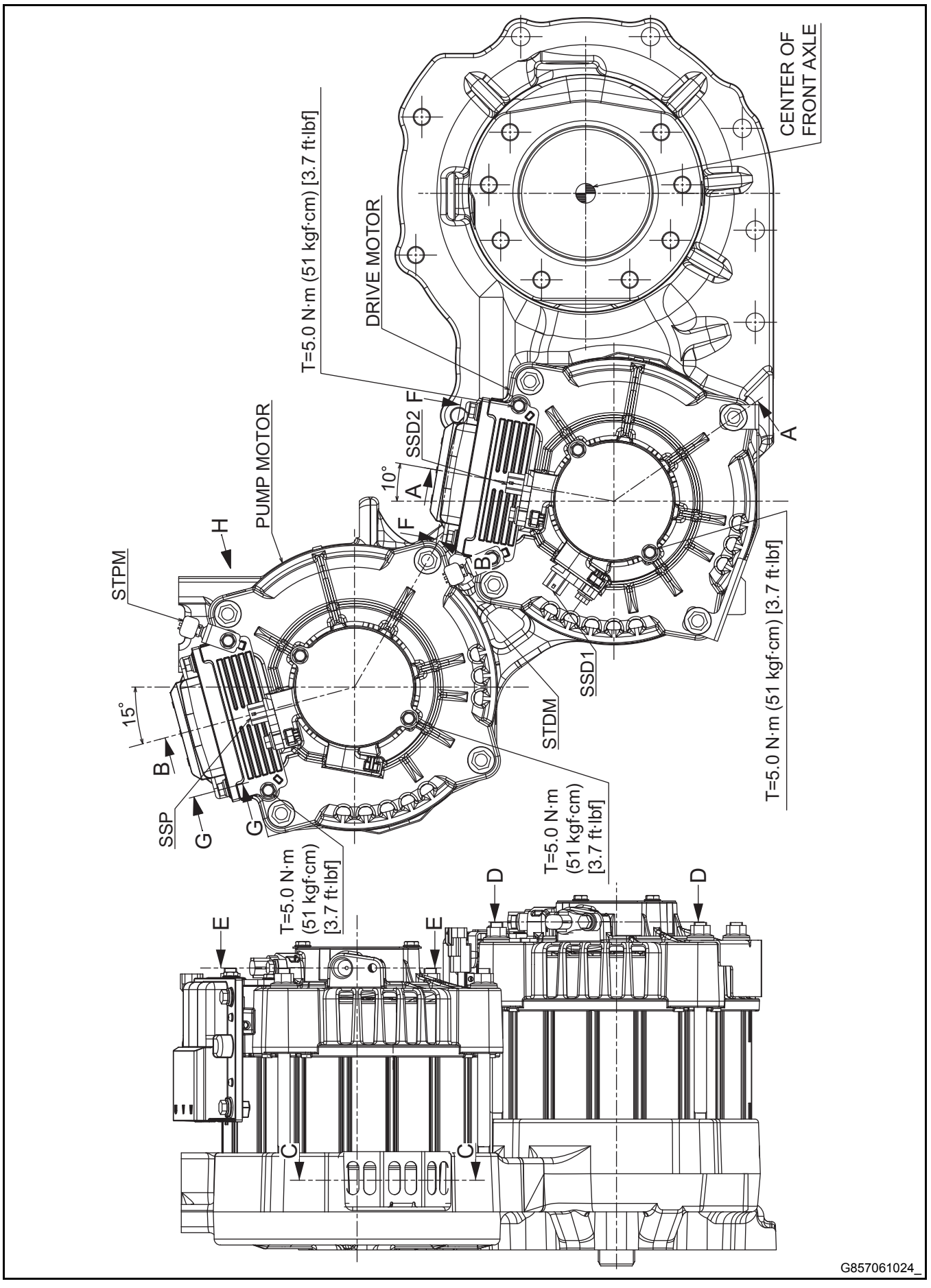
Installation Procedure

The installation procedure is the reverse of the removal procedure.

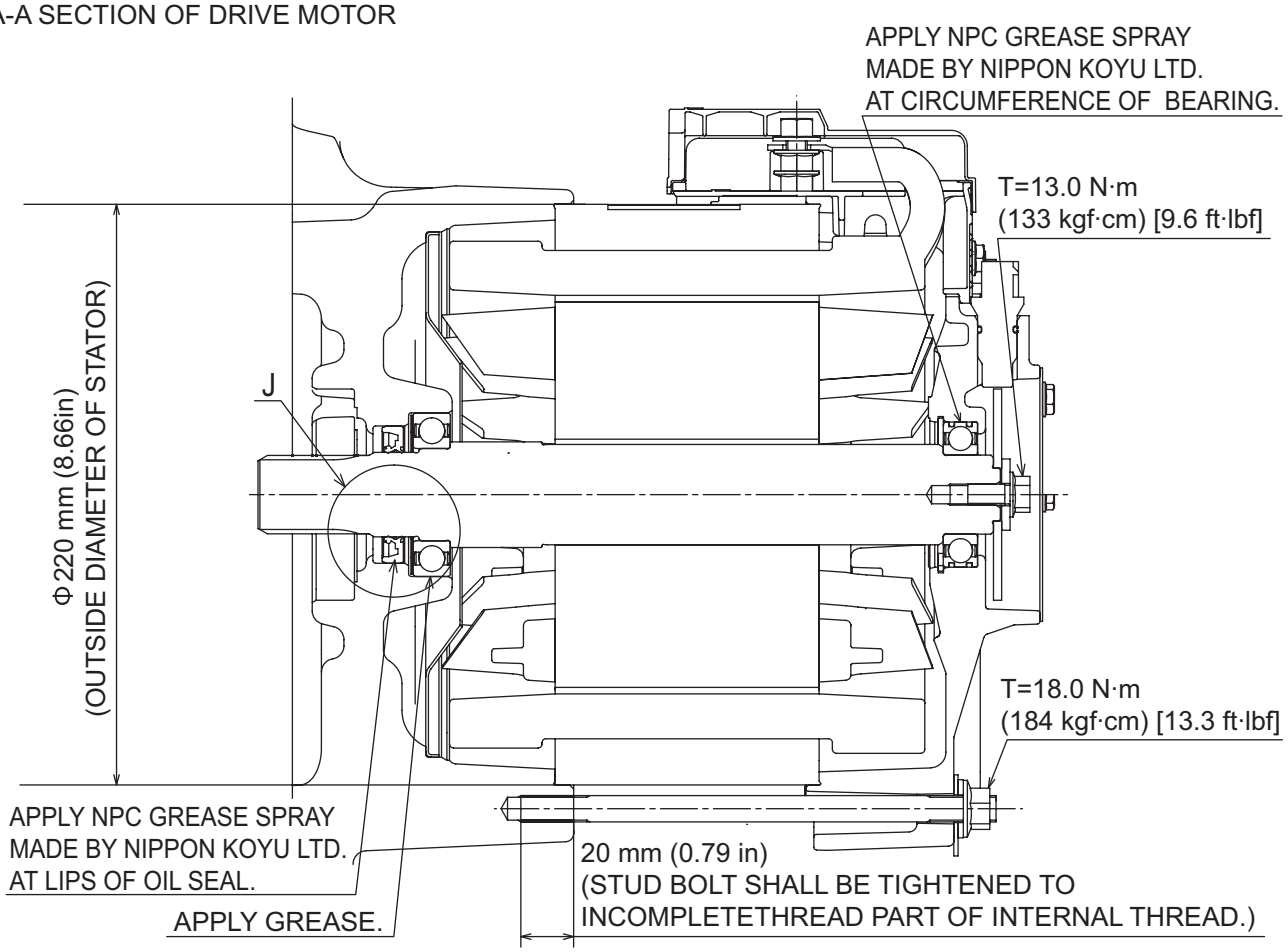
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MOTOR

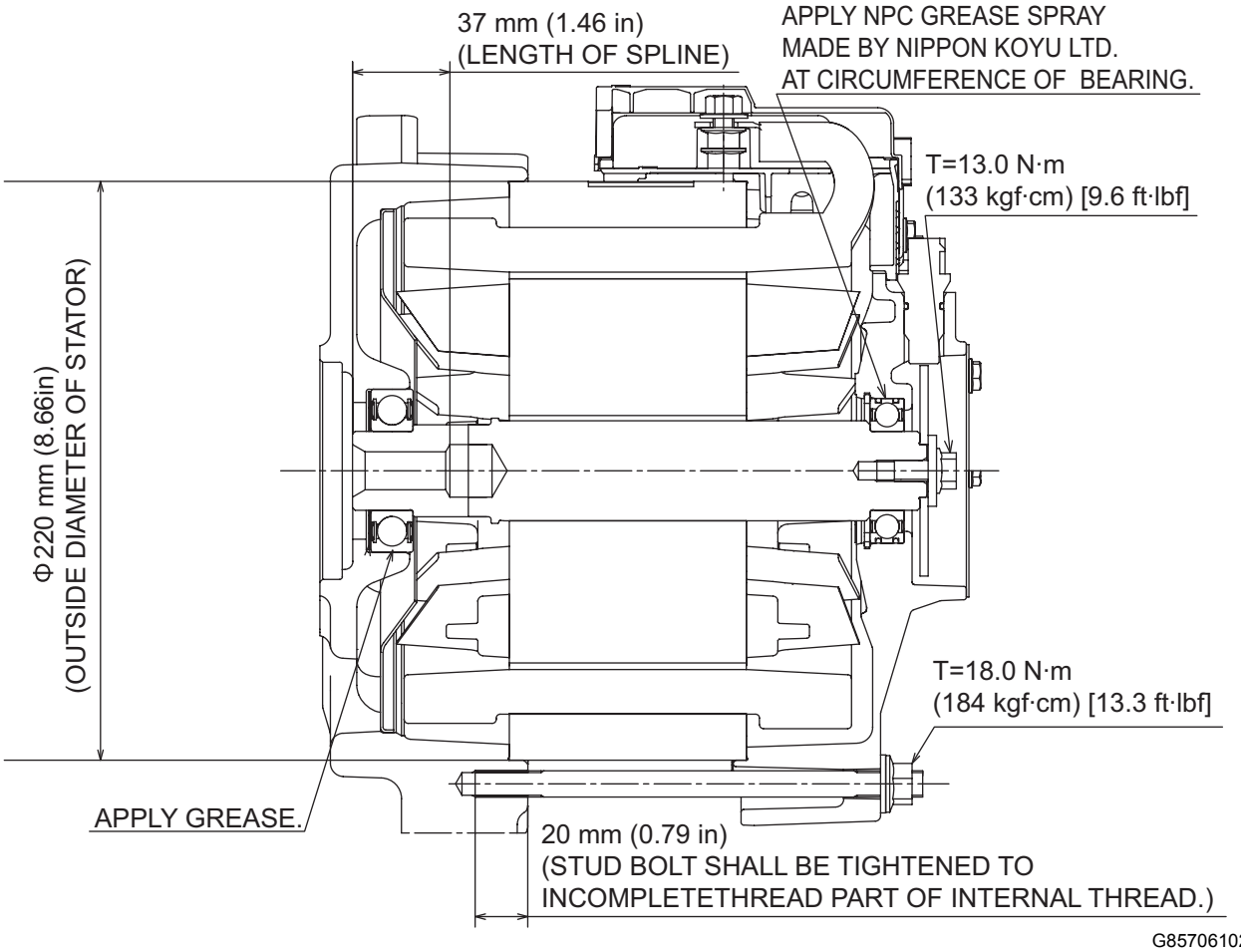
GENERAL CONFIGURATION



A-A SECTION OF DRIVE MOTOR



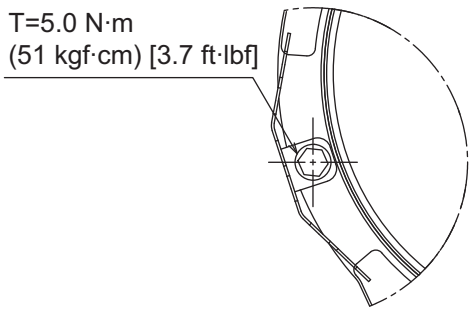
B-B SECTION OF PUMP MOTOR



G857061025_

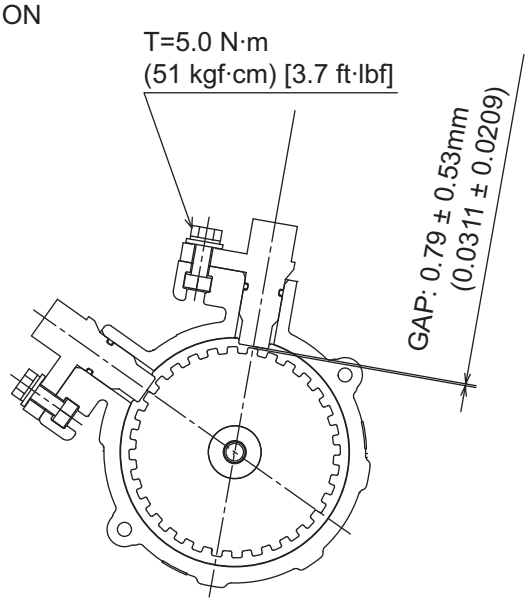
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DETAIL C-C



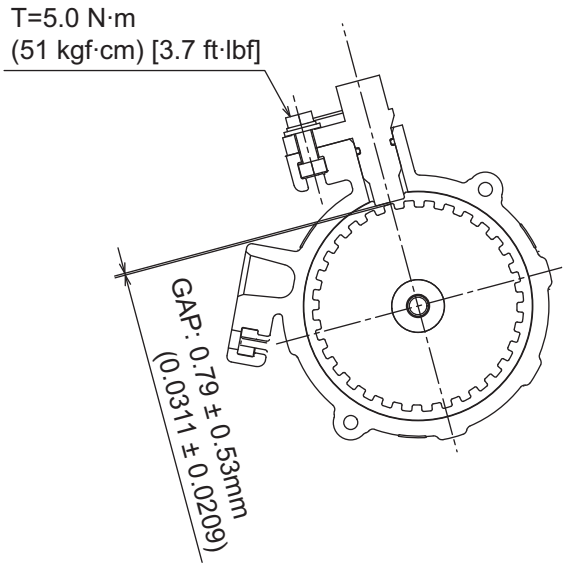
ATTACHING DUST COVER

D-D SECTION



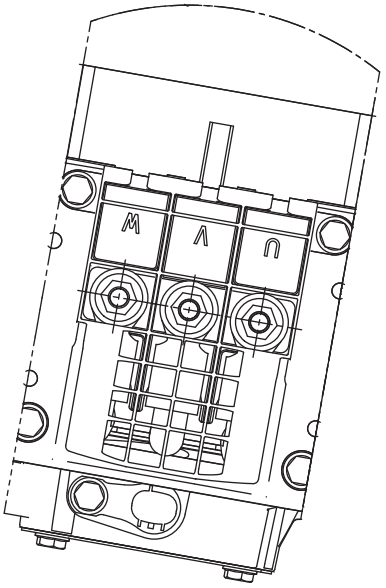
ASSEMBLE SPEED SENSOR
(DRIVE MOTOR SECTION)

E-E SECTION

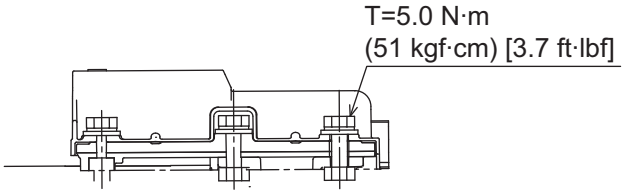


ASSEMBLE SPEED SENSOR
(DRIVE PUMP SECTION)

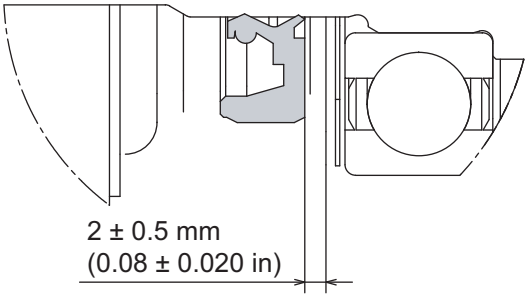
F-F SECTION



G-G SECTION



DETAIL J



G857061026_

DETAIL OF DRIVE MOTOR CONNECTOR

STDM



NO	P	C	J
1	87	-	STDM
2	86	-	STDM+

SSD1



NO	P	C	J
1	79	-	SSD1
2	78	-	SSD+

SSD2



NO	P	C	J
1	80	-	SSD2
2	78	-	SSD+

DETAIL OF PUMP MOTOR CONNECTOR

STPM



NO	P	C	J
1	89	-	STP
2	88	-	STP+

SSP

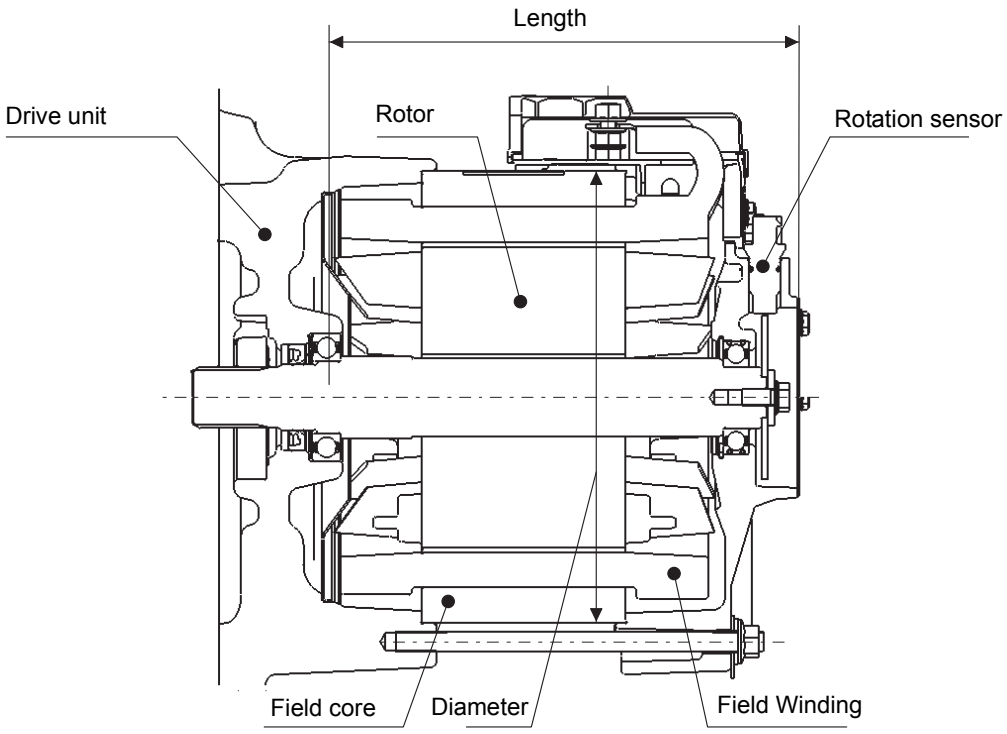


NO	P	C	J
1	82	-	SSP1
2	81	-	SSP+

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DRIVE MOTOR

GENERAL

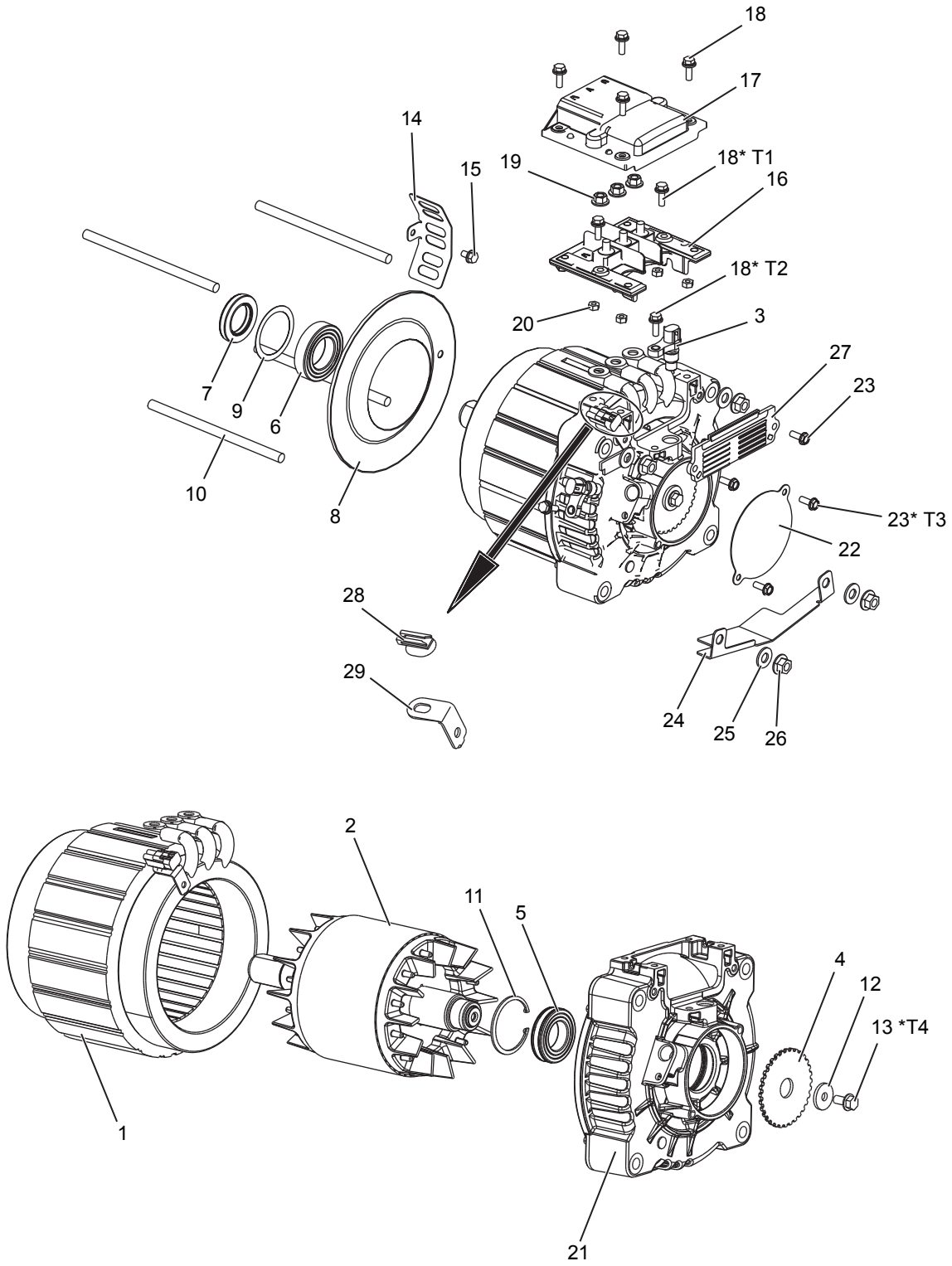


SPECIFICATIONS

Specification	Models	Nominal Voltage (V)	Rated Output (kW) (60-minutes rating)	Type	Body size Diameter × Length (mm)	Weight * (kg)
STD	8FBN15 · 16 · 18 50-8FBN20	29	7.6	Three phase AC	ϕ220 × 233	36
	8FBN20 · 25	28	10.7		ϕ220 × 273	46
	8FBN30	50	11.9		ϕ220 × 283	49
	50-8FBN15	28	4.8		ϕ220 × 223	32
Fisherman	8FBN15 · 18	29	5.2		ϕ220 × 233	36
	8FBN20 · 25	27	7.3		ϕ220 × 273	46
	8FBN30	50	8.2		ϕ220 × 283	49

*: Excluding the weight of the drive unit case.

COMPONENTS



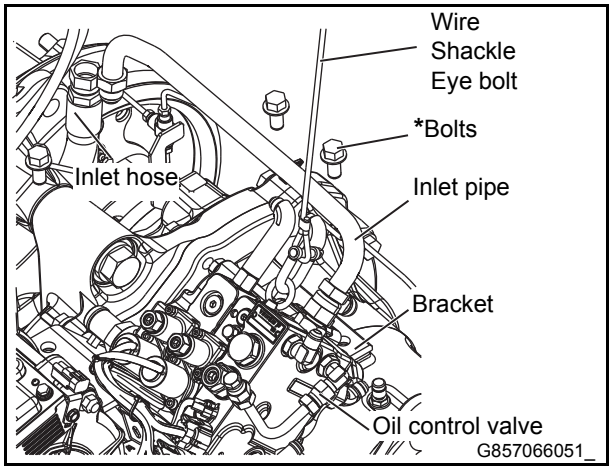
* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 5 (51) [3.69]
T2 = 5 (51) [3.69]
T3 = 5 (51) [3.69]
T4 = 13 (133) [9.59]

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No.	Parts name	QTY	No.	Parts name	QTY
1	Stator ASSY, drive motor	1	17	Cover, terminal	1
2	Rotor ASSY, drive motor	1	18	Bolt	8
3	Sensor ASSY, revolution	2	19	Nut	3
4	Gear, pick up	1	20	Nut	4
5	Bearing, rotor	1	21	Bracket	1
6	Bearing, rotor	1	22	Cover	1
7	Seal, oil	1	23	Bolt	4
8	Guide	1	24	Cover	1
9	Washer, wave	1	25	Washer, plate	4
10	Bolt	4	26	Nut	4
11	Ring, snap	1	27	Plate, cover	1
12	Washer, plate	1	28	Clamp	1
13	Bolt	1	29	Bracket, temperature sensor	1
14	Cover	1			
15	Bolt	1			
16	Terminal SUB-ASSY	1			

REMOVAL·INSTALLATION

Removal Procedure



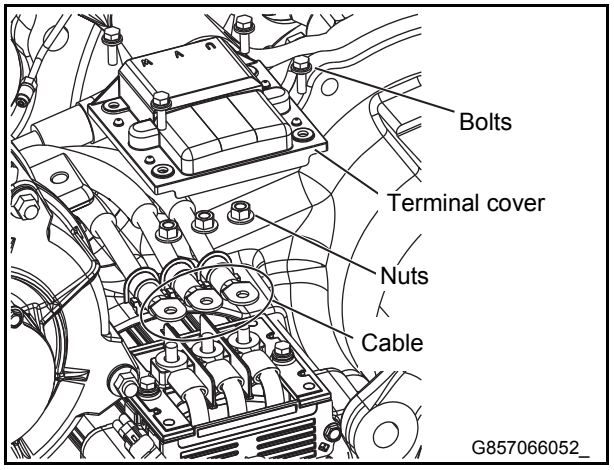
1 Disconnect the inlet hose of the oil control valve.

2 Install the eye bolt, the shackle and the wire.

3 Remove the installation bolts of the oil control valve bracket.

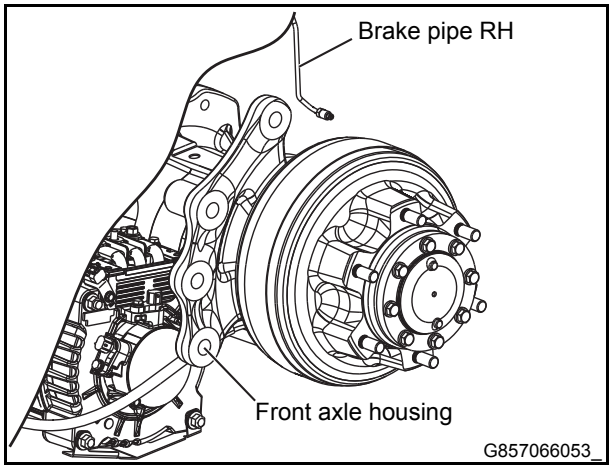
4 Hoist the oil control valve.

Eye bolt size:M8 × 1.25
*** Tightening torque: T = N.m (kgf.cm) [ft.lbf]**
T2 = 25.0 ~ 28.0 (255 ~ 286) [18.4 ~ 20.7]



5 Remove the terminal cover.

6 Disconnect the motor cable.



7 Remove the brake pipe RH.

8 Remove the parts below.

(a) Front axle housing

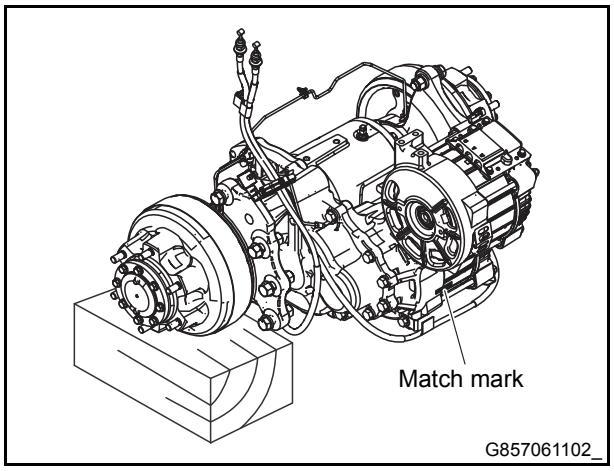
(b) Brake ASSY

(c) Front axle hub

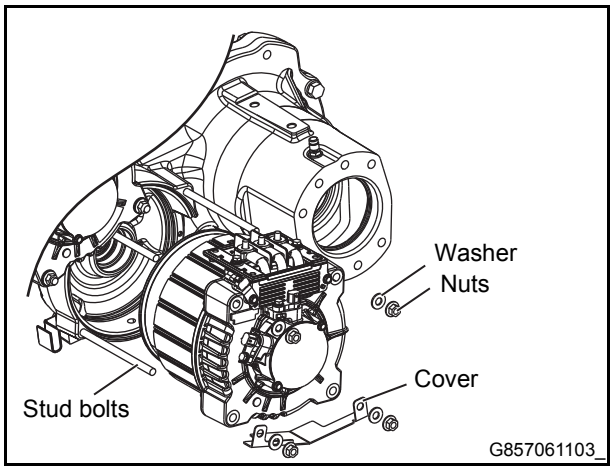
(d) Front axle shaft

(Refer to page 6-63)

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9 Put match marks between the drive unit case and stator ASSY.

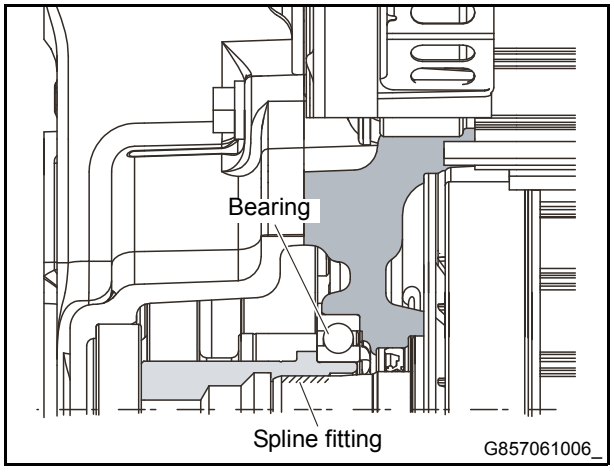


10 Remove the drive motor nuts.

11 Remove the drive motor.

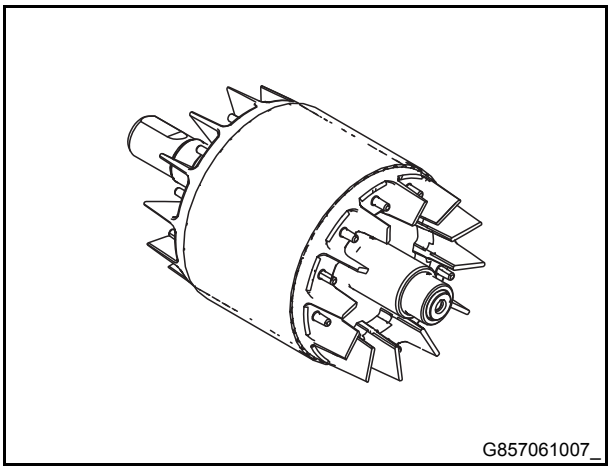
Installation Procedure

The installation procedure is the reverse of the removal procedure.

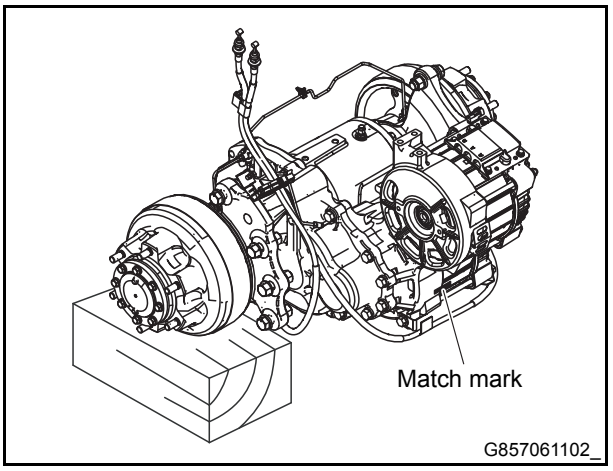


Note:

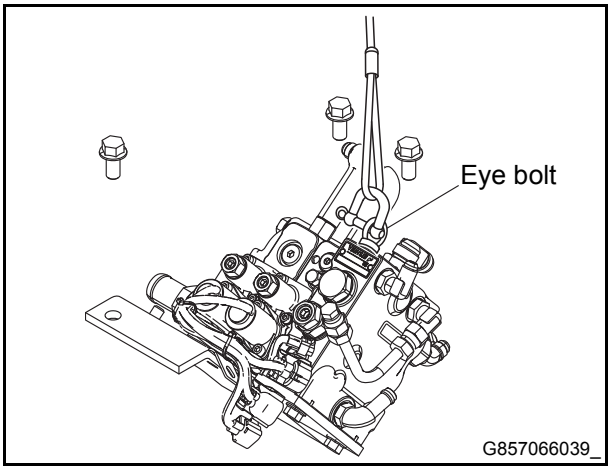
- **Install with the seal of bearing facing towards the shield drive motor side.**
- **Apply NPC grease around the entire drive motor spline.**



- **Carefully operate so as not to drop the rotor ASSY.**
  Drive motor rotor ASSY weight:
  1ton : 14 kg (31 lb)
  2ton : 18 kg (40 lb)
  3ton : 19 kg (42 lb)
- **Carefully operate so as not to damage the oil seal lip surface.**



4 Align match marks when reassembling these parts.



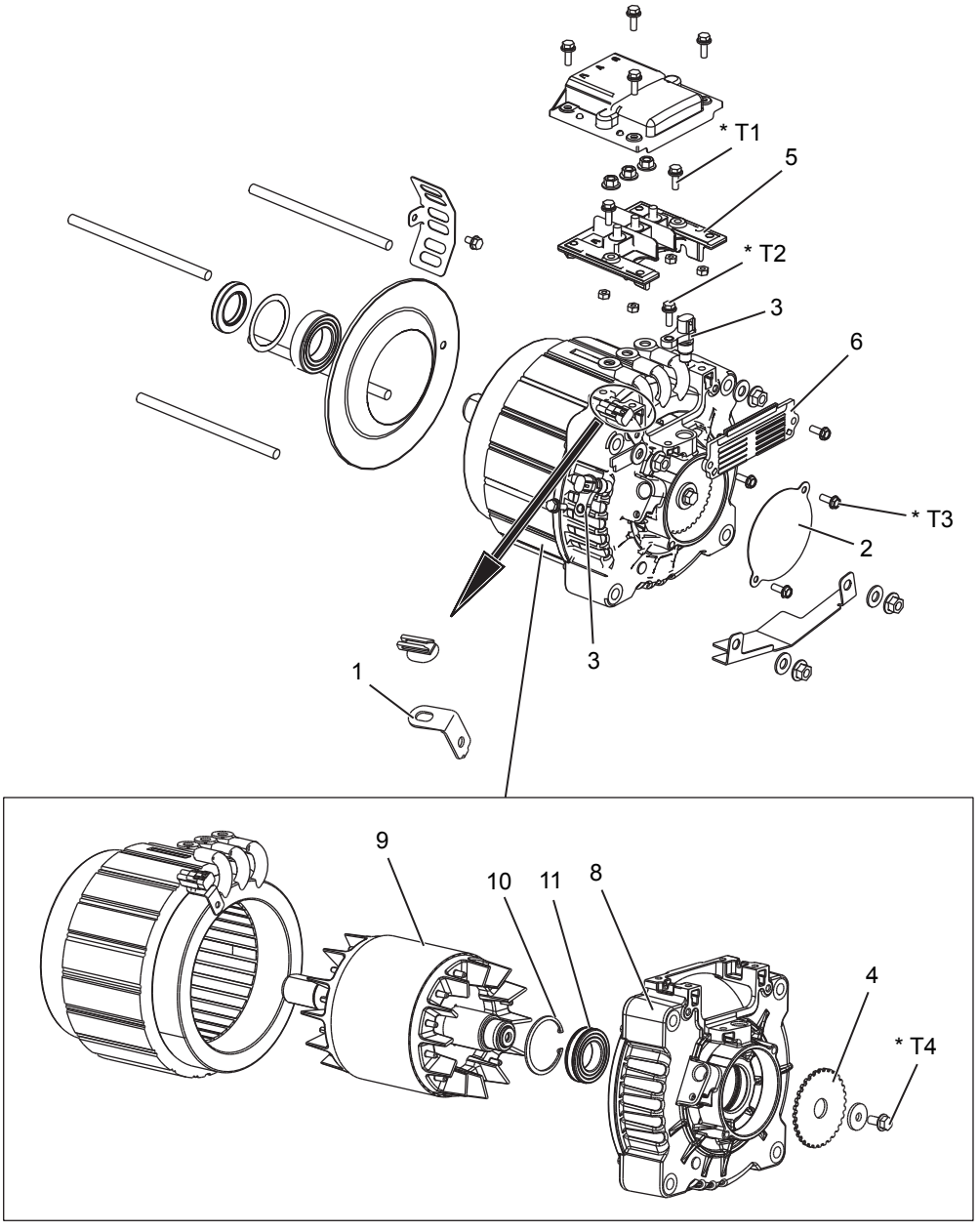
6 Install the oil control valve ASSY W/bracket.

Eye bolt: M8 × 1.25

Note:
Carefully lower after putting a rag on the drive motor terminal bracket.

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DISASSEMBLY·INSPECTION·REASSEMBLY



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 5 (51) [3.69]
T2 = 5 (51) [3.69]
T3 = 5 (51) [3.69]
T4 = 13 (133) [9.59]

Disassembly Procedure

1 Remove the temperature sensor connector from the terminal bracket.

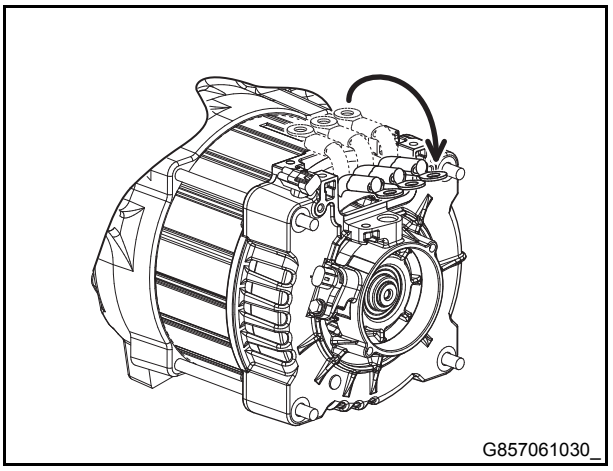
2 Remove the sensor cover.

3 Remove the revolution sensor.

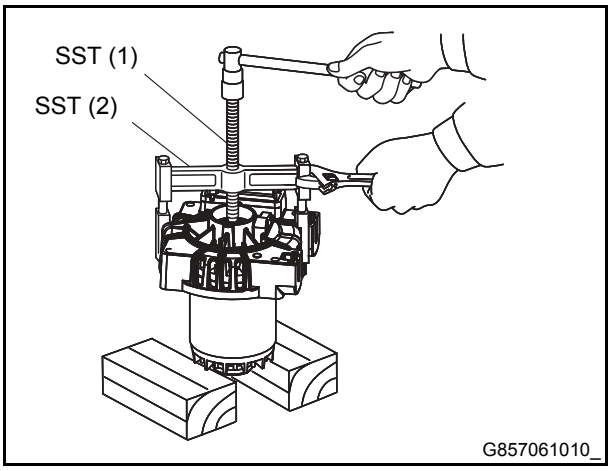
4 Remove the pickup gear.

5 Remove the terminal bracket.

6 Remove the plate cover.


G857061030_

7 Bend the coil to the direction of arrow.



G857061010_

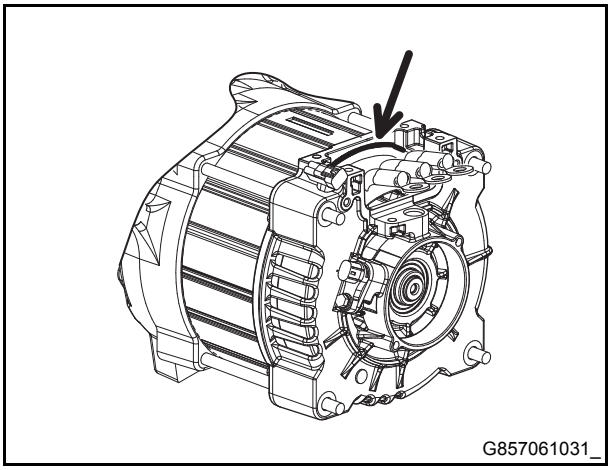
8 Remove the end bracket.

SST 09950-76014-71 ..... (1)
SST 09140-10920-71 ..... (2)

9 Remove the rotor ASSY.

Note:

Carefully operate so as not to drop the rotor ASSY.
Drive motor rotor ASSY weight:
1ton : 14 kg (31 lb)
2ton : 18 kg (40 lb)
3ton : 19 kg (42 lb)


G857061031_

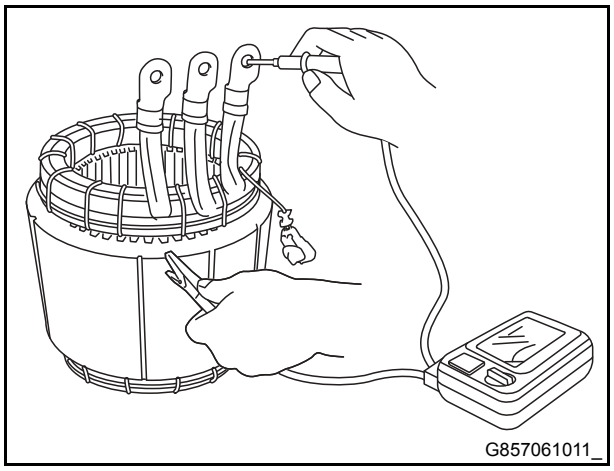
Note:

Ensure that the part indicated by arrow of the end bracket and the coil is not in contact and get damaged.
When assembling, be careful not to get the temperature sensor stuck between the end bracket and the stator.

10 Remove the snap ring.

11 Remove the bearing.

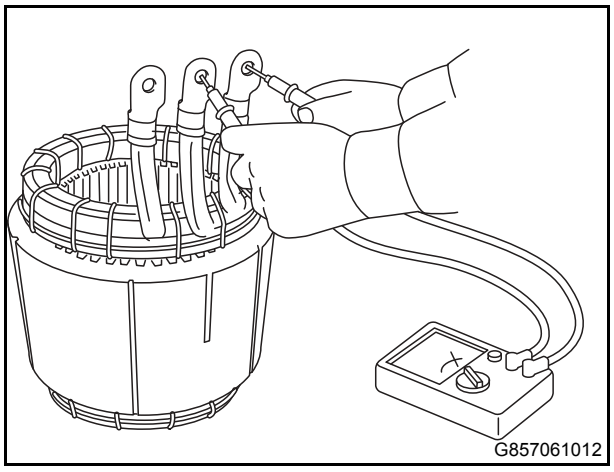
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G857061011_

12 Inspect the stator ASSY.

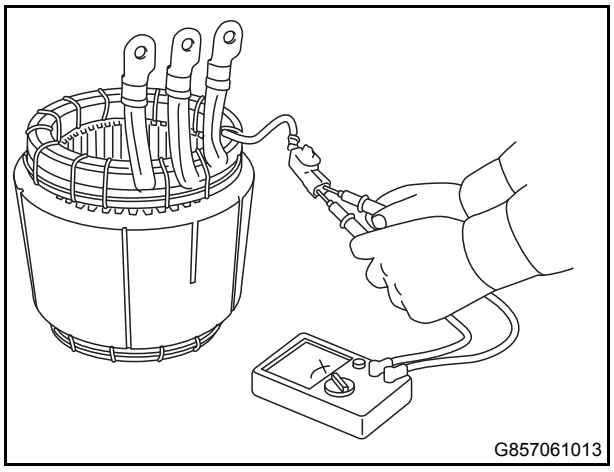
(1) Measure the insulation resistance of the stator ASSY.

Measurement terminals:
Between the terminals and body
Standard: 1MΩ or more


G857061012

(2) Check continuity between terminals.

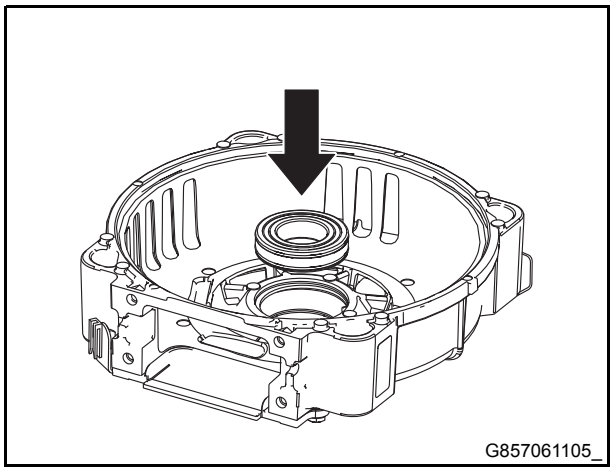
Measurement terminals: U-V, V-W, W-U
Standard: 0Ω


G857061013

(3) Measure the resistance of the thermo-sensor.

Measurement terminals:
Both terminals of temperature sensor connector

Standard:
Approx. 11 to 15 Ω (at 20 °C [68 °F])


G857061105_

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

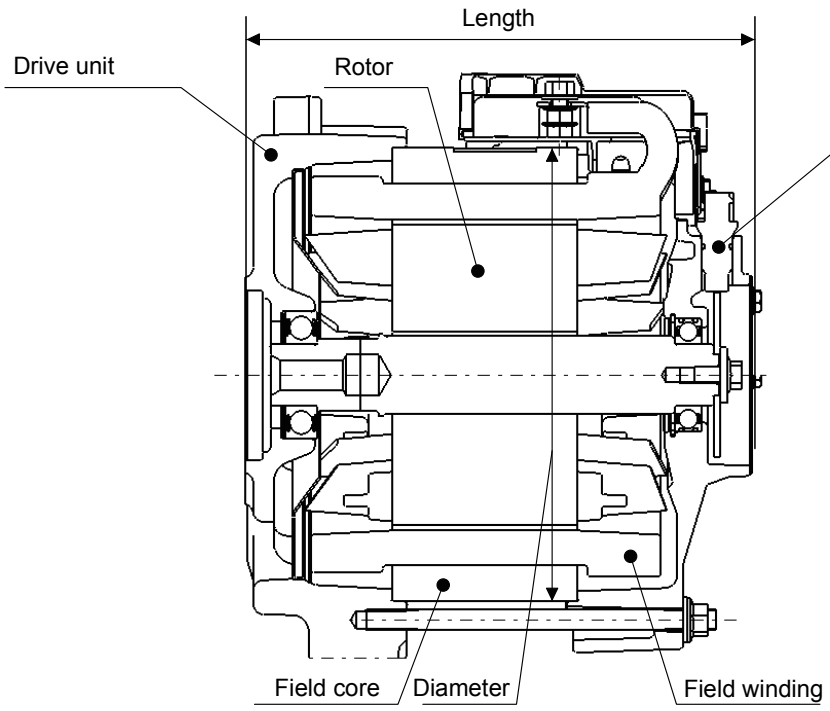
2 Install the bearing of the rotor ASSY.

SST 09950-76018-71

Note:
Check the bearing of the rotor ASSY.
If abnormal noise or damage is found, replace the bearing.

PUMP MOTOR

GENERAL



G857061015_

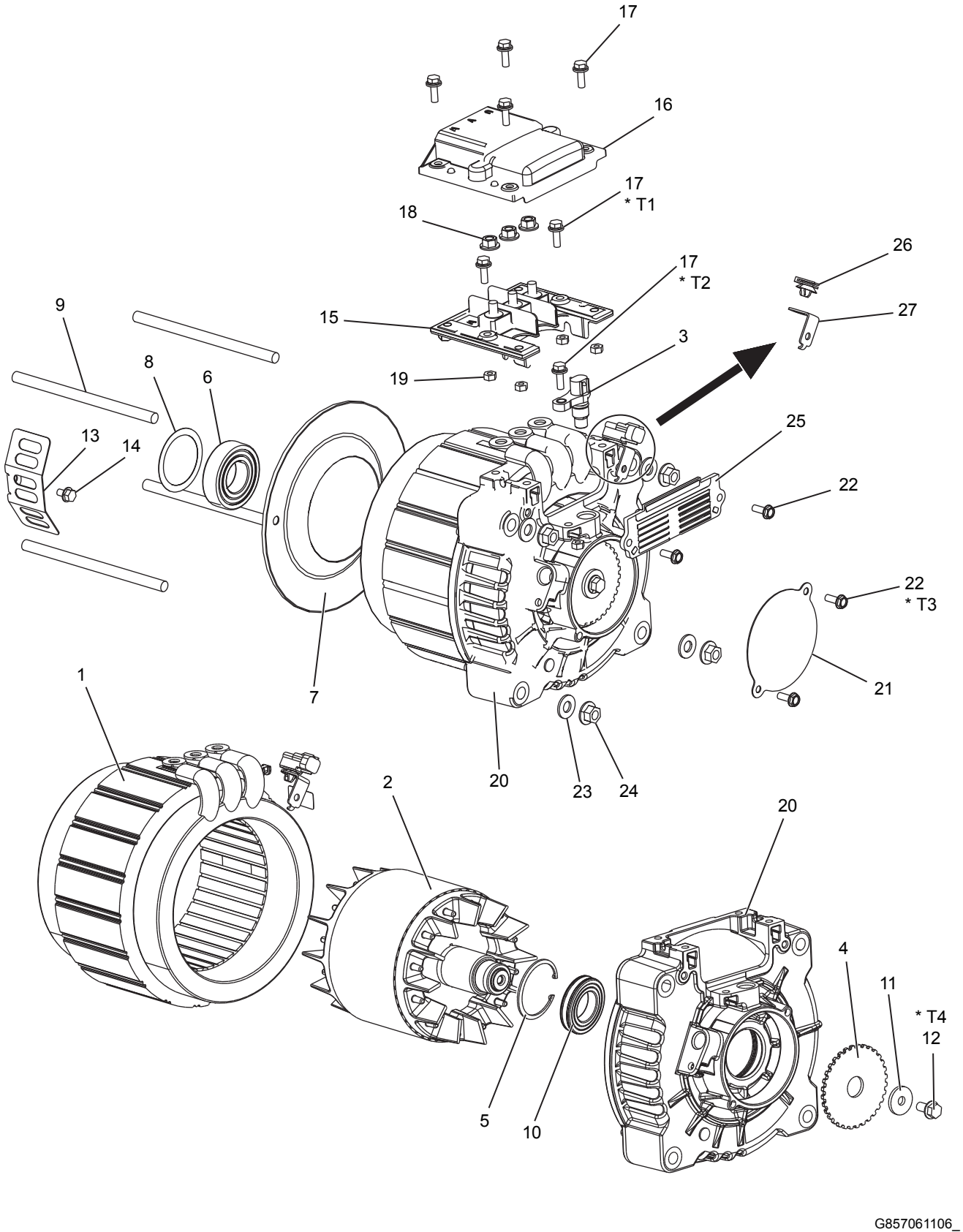
SPECIFICATIONS

Specification	Models	Nominal Voltage (V)	Rated Output (kW) (60-minutes rating)	Type	Body size Diameter × Length (mm)	Weight * (kg)
STD	8FBN15 · 16 · 18 50-8FBN20	25	9.5	Three phase AC	ϕ220 × 248	32
	8FBN20 · 25	26	12.2		ϕ220 × 268	37
	8FBN30	48	14.4		ϕ220 × 288	42
	50-8FBN15	26	7.0		ϕ220 × 223	26
Fisherman	8FBN15 · 18	25	6.7		ϕ220 × 248	32
	8FBN20 · 25	26	8.8		ϕ220 × 268	37
	8FBN30	48	10.1		ϕ220 × 288	42

*: Excluding the weight of the drive unit case.

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COMPONENTS



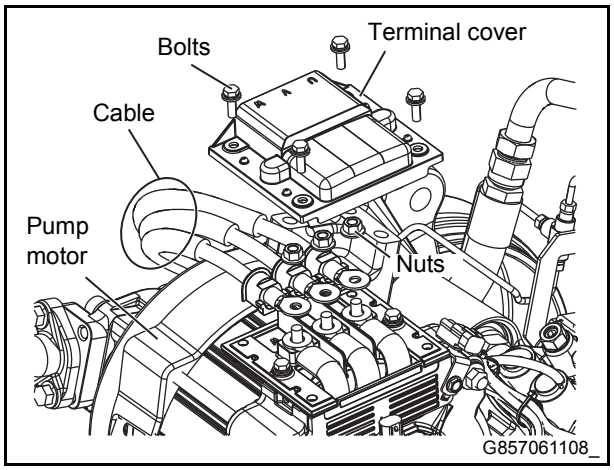
* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 5 (51) [3.69]
T2 = 5 (51) [3.69]
T3 = 5 (51) [3.69]
T4 = 13 (133) [9.59]

No.	Parts name	QTY	No.	Parts name	QTY
1	Stator ASSY, pump motor	1	16	Cover, terminal	1
2	Rotor ASSY, pump motor	1	17	Bolt	7
3	Sensor ASSY, revolution	1	18	Nut	3
4	Gear, pick up	1	19	Nut	5
5	Bearing, rotor	1	20	Bracket	1
6	Bearing, rotor	1	21	Cover	1
7	Guide, wind	1	22	Bolt	4
8	Washer, wave	1	23	Washer, plate	4
9	Bolt	4	24	Nut	4
10	Ring, snap	1	25	Plate, cover	1
11	Washer, plate	1	26	Clamp	1
12	Bolt	1	27	Bracket, temperature sensor	1
13	Cover	1			
14	Bolt	1			
15	Terminal SUB-ASSY	1			

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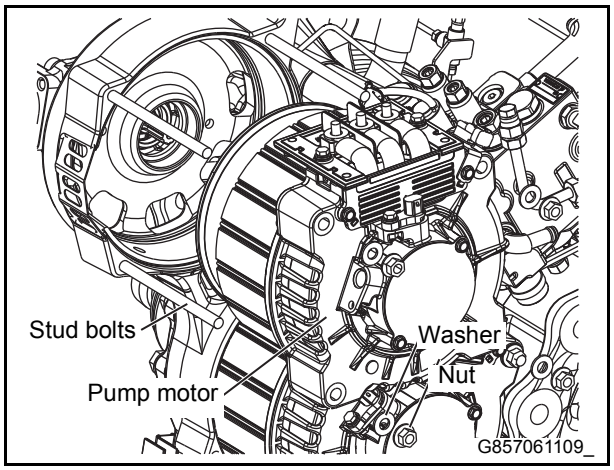
REMOVAL·INSTALLATION

Removal Procedure



1 Remove the terminal cover.

2 Remove the motor cable.

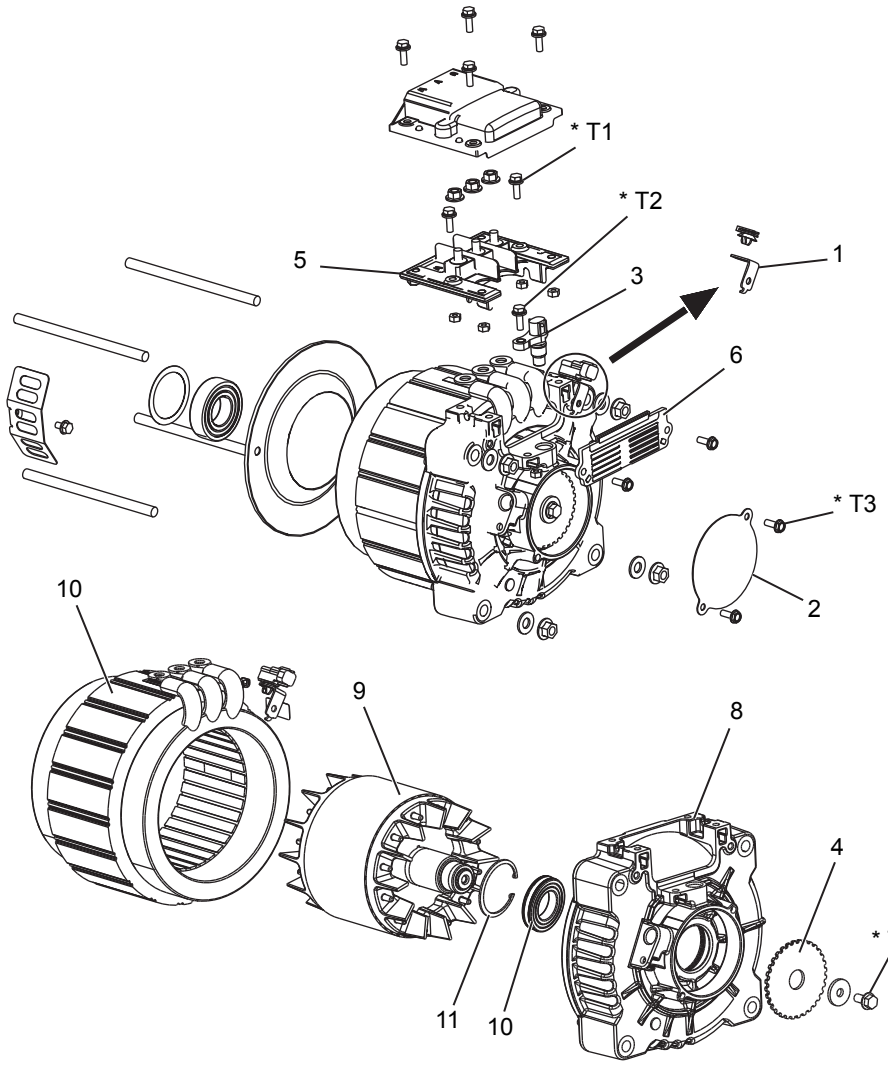


3 Remove the pump motor.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

DISASSEMBLY·INSPECTION·REASSEMBLY



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 5 (51) [3.69]
T2 = 5 (51) [3.69]
T3 = 5 (51) [3.69]
T4 = 13 (133) [9.59]

Disassembly Procedure

1 Remove the temperature sensor connector from the terminal bracket.

2 Remove the sensor cover.

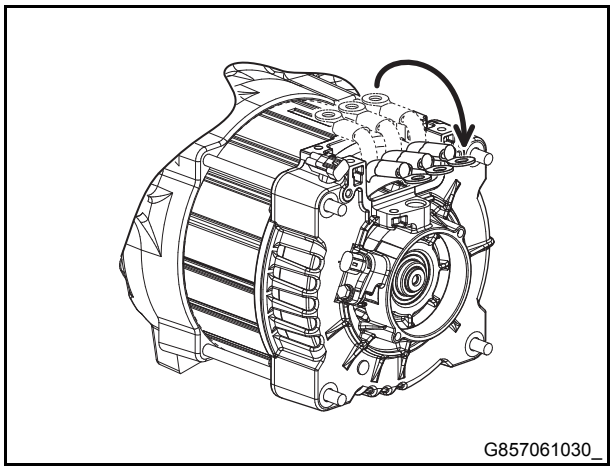
3 Remove the revolution sensor.

4 Remove the pickup gear.

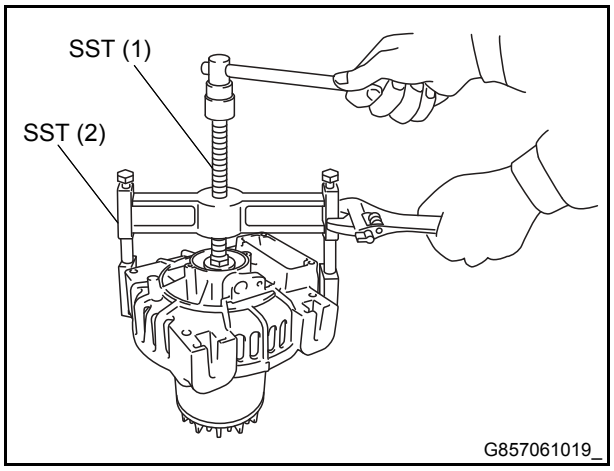
5 Remove the terminal bracket.

6 Remove the plate cover.

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G857061030_

7 Bend the coil to the direction of arrow.



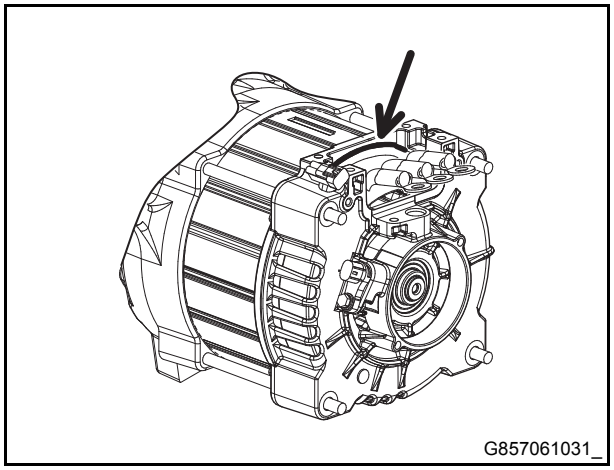
G857061019_

8 Remove the bracket.

SST 09950-76014-71..... (1)
SST 09140-10920-71..... (2)

9 Remove the rotor ASSY.

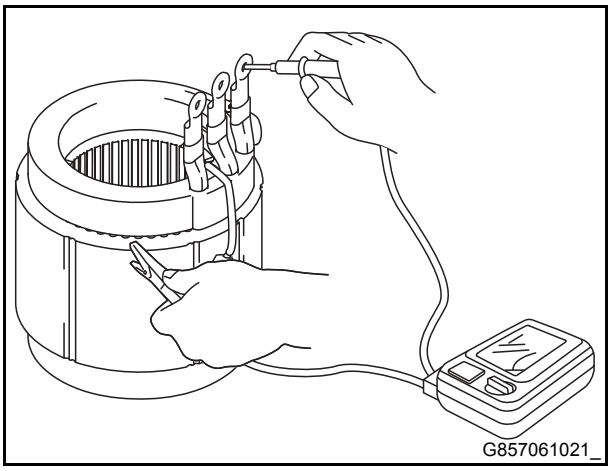
Note:
Carefully operate so as not to drop the rotor ASSY.
Pump motor rotor ASSY weight:
1ton : 12 kg (26 lb)
2ton : 14 kg (31 lb)
3ton : 17 kg (37 lb)


G857061031_

Note:
Ensure that the part indicated by arrow of the end bracket and the coil is not in contact and get damaged.
When assembling, be careful not to get the temperature sensor stuck between the end bracket and the stator.

10 Remove the snap ring.

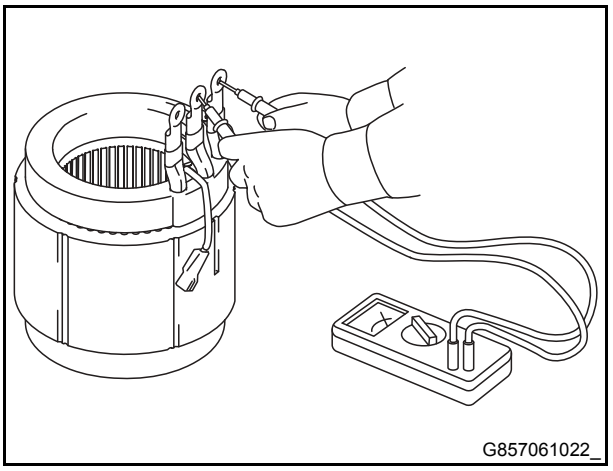
11 Remove the bearing.


G857061021_

12 Inspect the stator ASSY.

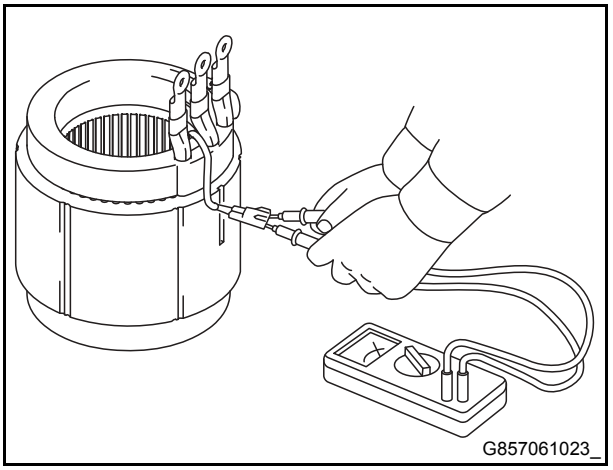
(1) Measure the insulation resistance of the stator ASSY.

Measurement terminals: between motor cable and body
Standard: 1 MΩ or more


G857061022_

(2) Check continuity between terminals.

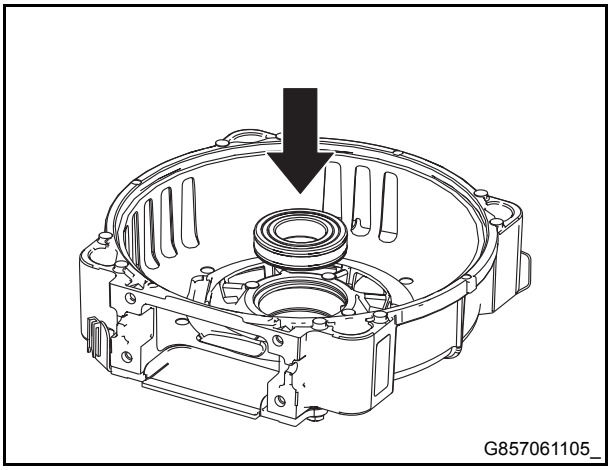
Measurement terminals: U-V, V-W, W-U
Standard: 0 Ω


G857061023_

(3) Measure the resistance of the thermo-sensor.

Measurement terminals:
Both terminals of temperature sensor connector

Standard: 11 to 15 kΩ (at 20 °C[68 °F])


G857061105_

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

2 Install the bearing of the rotor ASSY.

SST 09950-76018-71

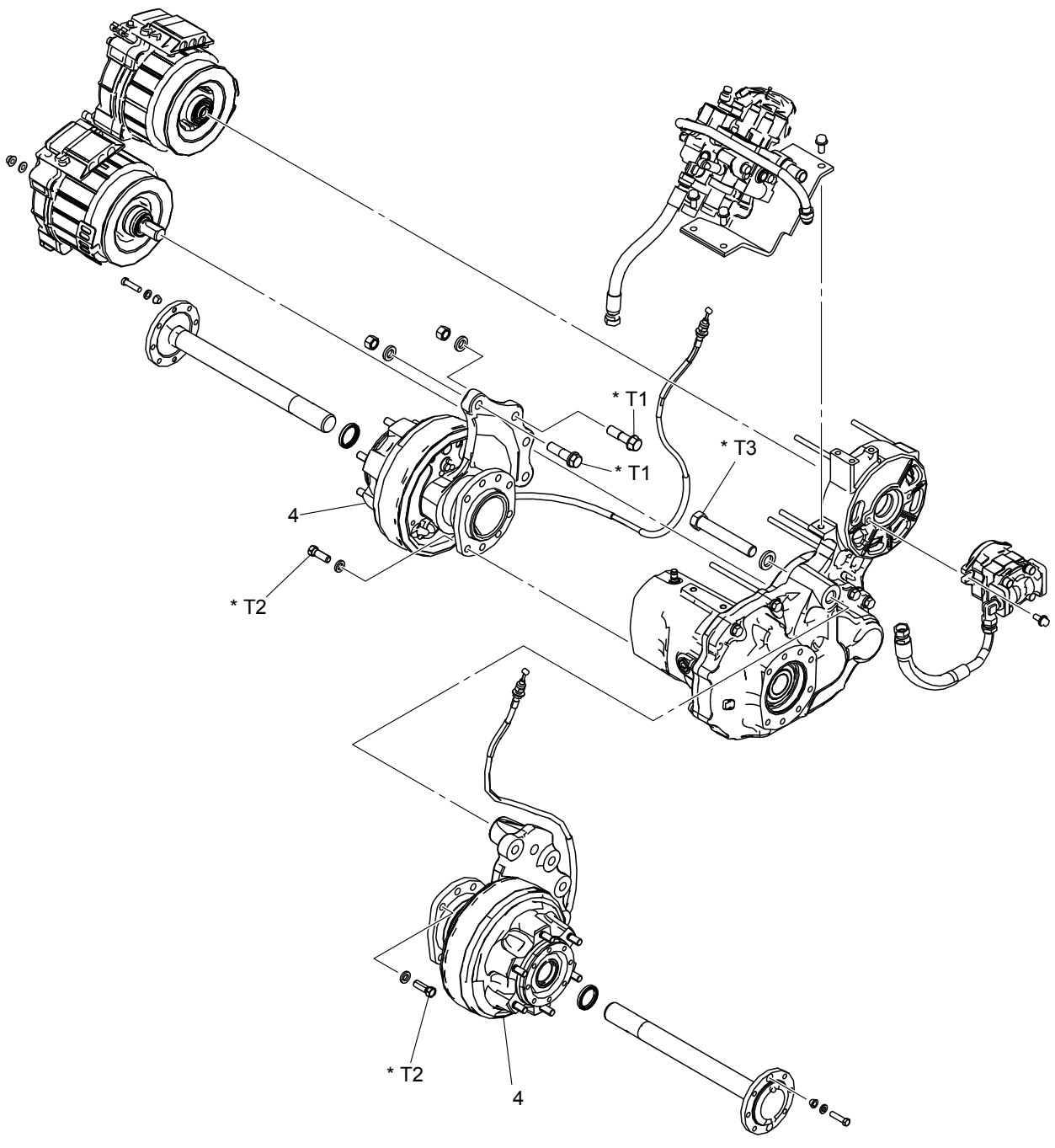
Note:

Check the bearing of the rotor ASSY.
If abnormal noise or damage is found, replace the bearing.

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DRIVE UNIT

REMOVAL·INSTALLATION



G857062001_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 235 ~ 294 (2400 ~ 3000) [173.6 ~ 217.1]
T2 (1·2 ton) = 108 ~ 159 (1101 ~ 1621) [79.7 ~ 117]
T2 (3 ton) = 127 ~ 190 (1295 ~ 1937) [93.7 ~ 140]
T3 = 294 ~ 343 (3000 ~ 3500) [217 ~ 253]

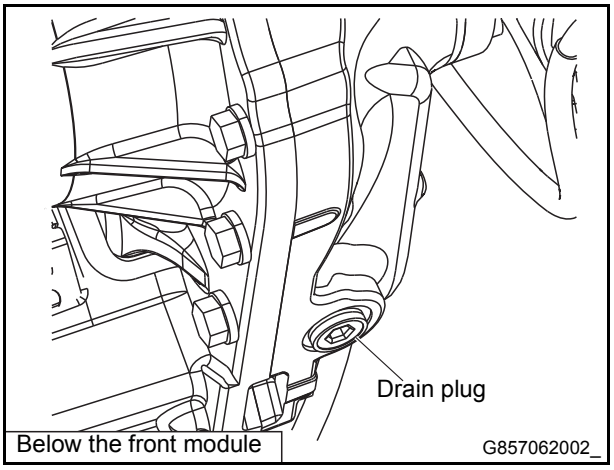
Removal Procedure

1 Remove the front module. (Refer to page 6-4)

2 Drain drive unit oil.

3 Remove the brake pipe.

4 Remove the front axle housing with front axle bracket and axle hub.
(Refer to page 6-63)



Installation Procedure

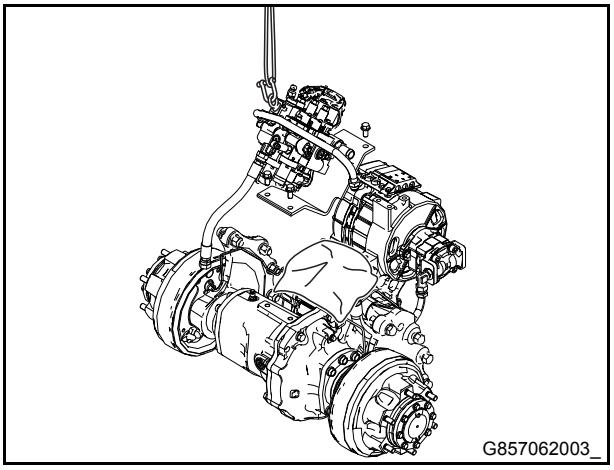
The installation procedure is the reverse of the removal procedure.

3 Install the front axle shaft and axle hub. adjust the front axle hub starting force. (Refer to page 6-61)

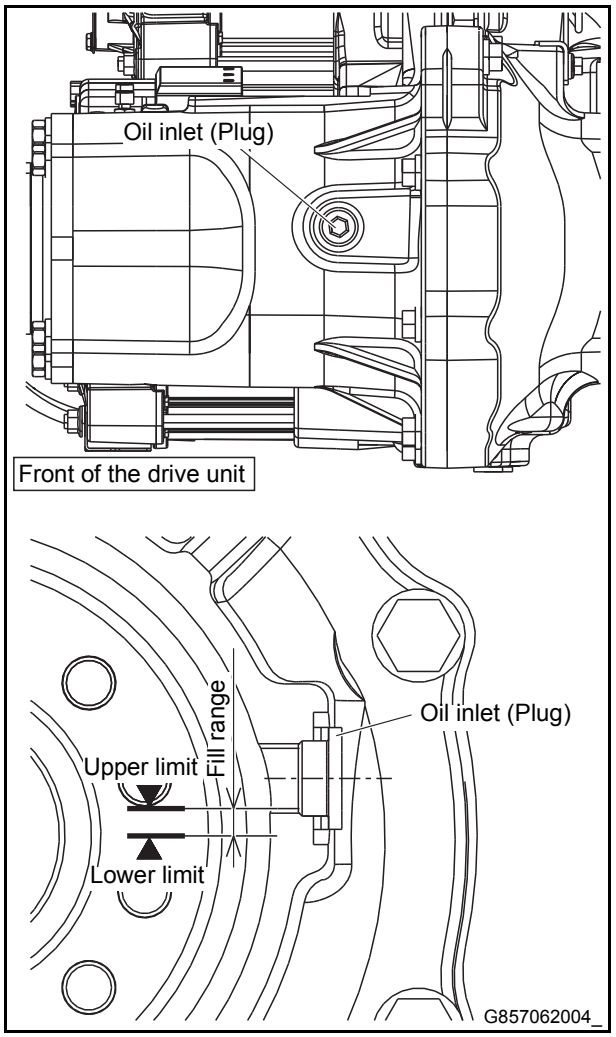
6 Install the brake pipe, bleed air from the brake system.

8 Install the oil control valve ASSY W/bracket.

Caution:
Carefully lower after putting a rag on the drive motor terminal bracket.



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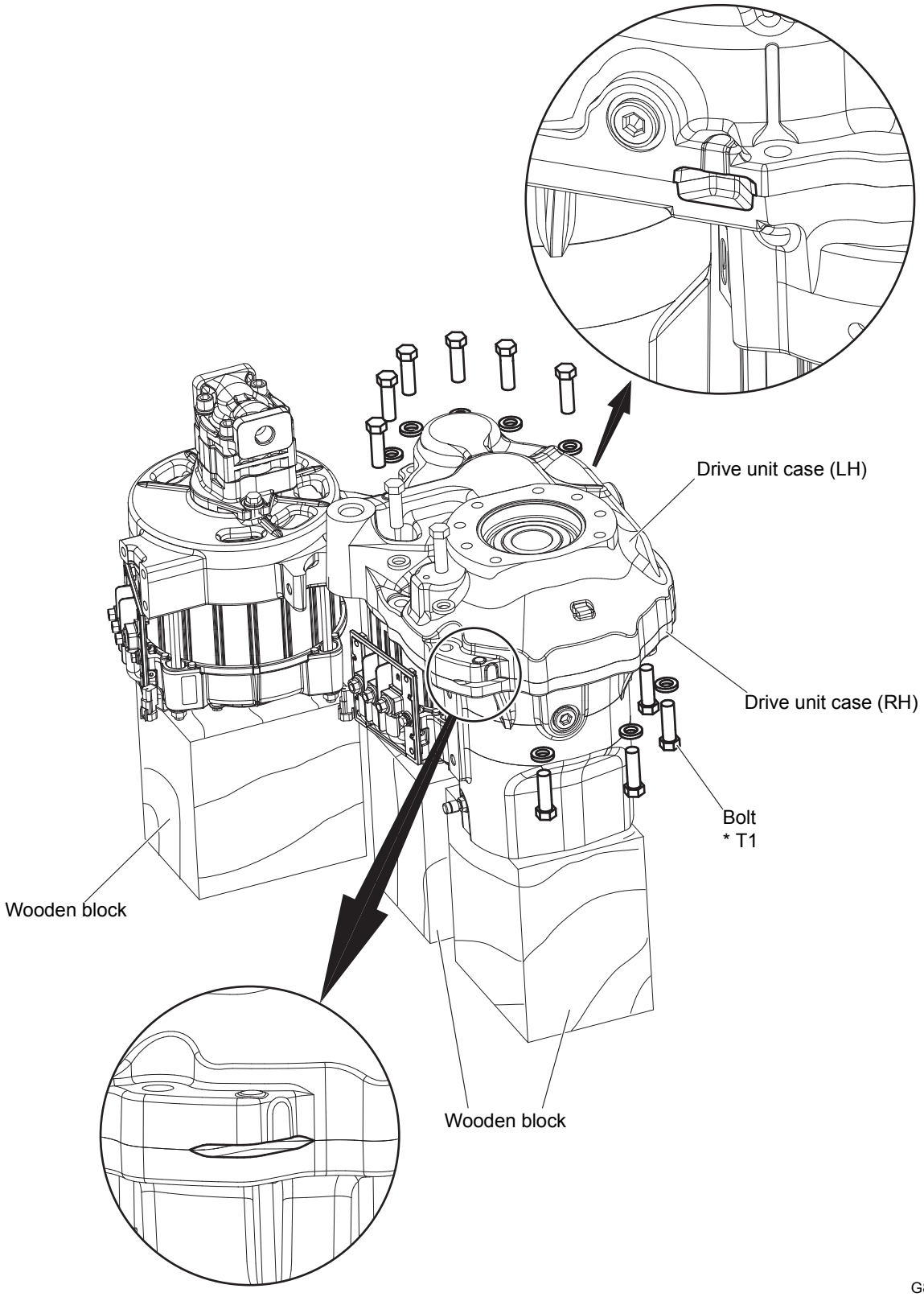
1 After installation, fill hypoid gear oil to the specified level.

Reference
1 ton series: 4.0 L
2 ton series: 4.2 L
3 ton series: 5.0 L
Oil used: API GL-4
SAE75W-82W

Note:
The lower limit for the oil level must be within 5mm of the screw mount plug.

DISASSEMBLY·INSPECTION·REASSEMBLY

Disassembly Procedure



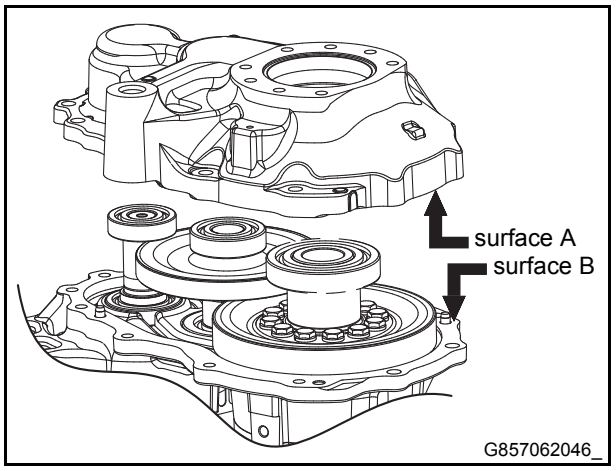
* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 60.8 ~ 113.8 (620 ~ 1160) [44.9 ~ 84.0]

1 Put the drive unit on the wooden block.

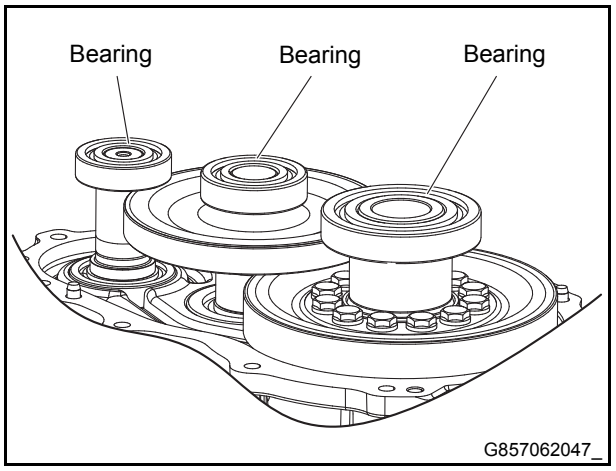
2 Remove the bolts.

3 Remove the drive unit case RH and LH from the notched portion, which is indicated in the illustration.

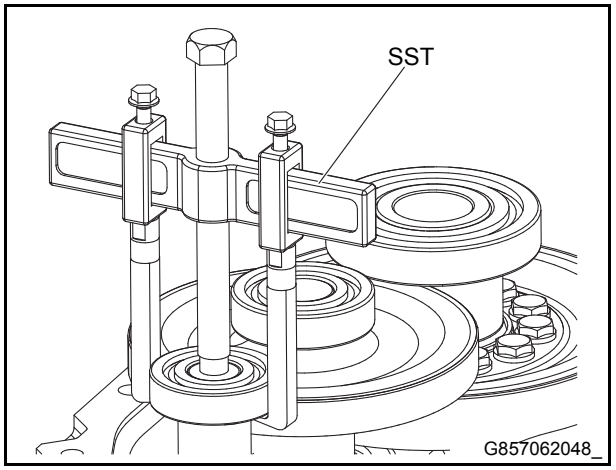
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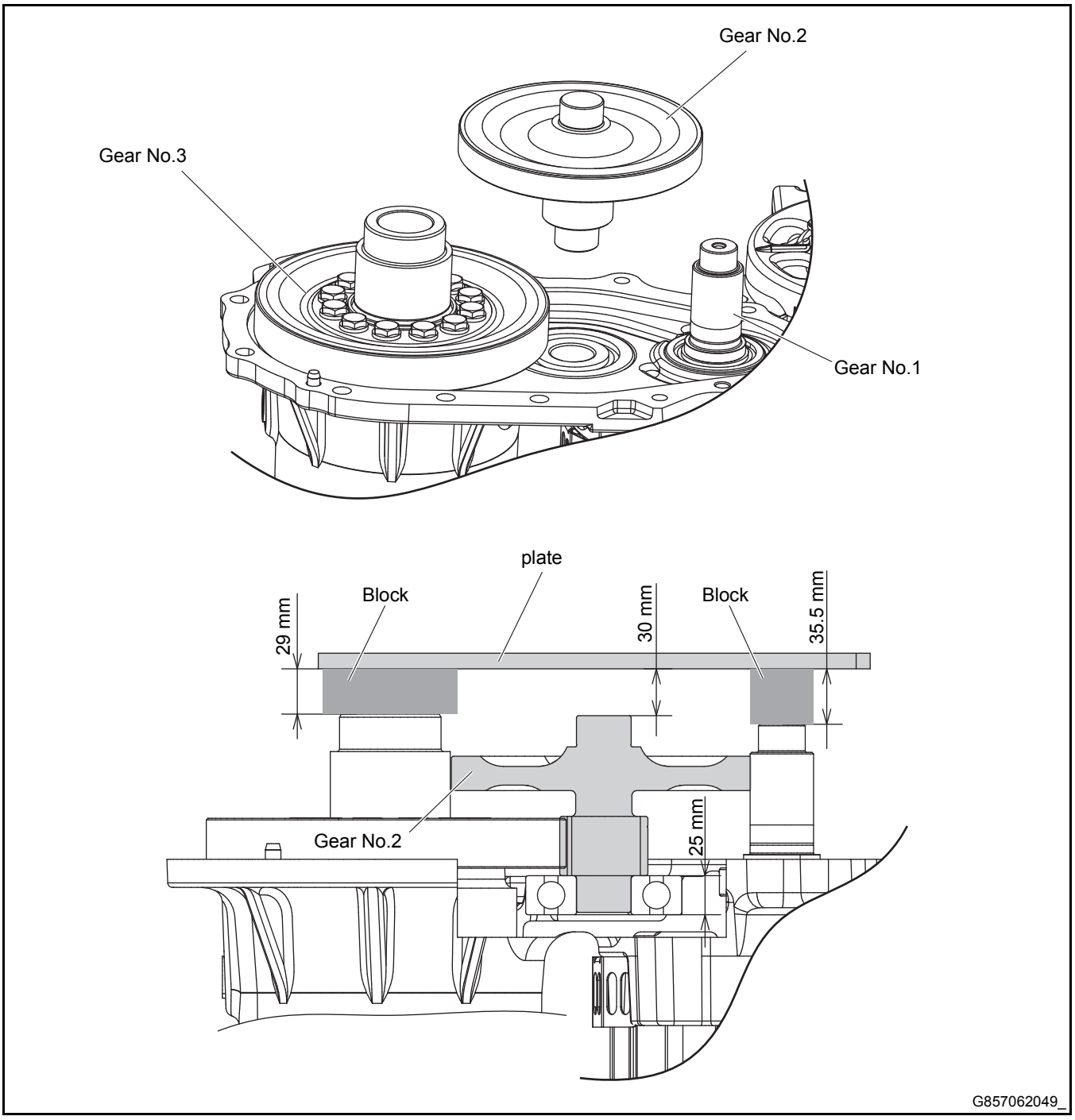
Note:
Be sure to remove the liquid gasket, which is applied on the surface A and B.



4 Remove the bearings.



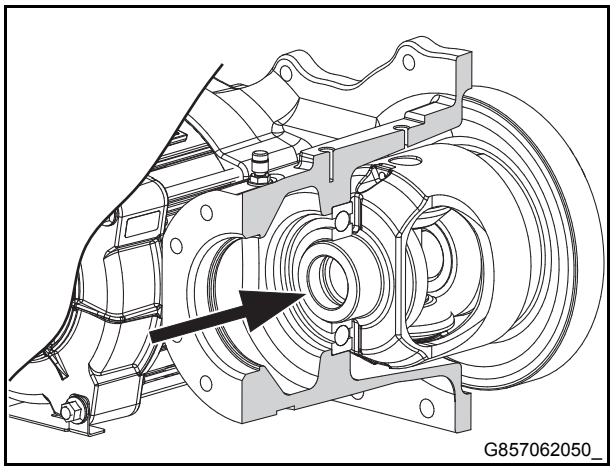
SST 09950-76014-71



5 Remove the gear No.2 by using the puller.

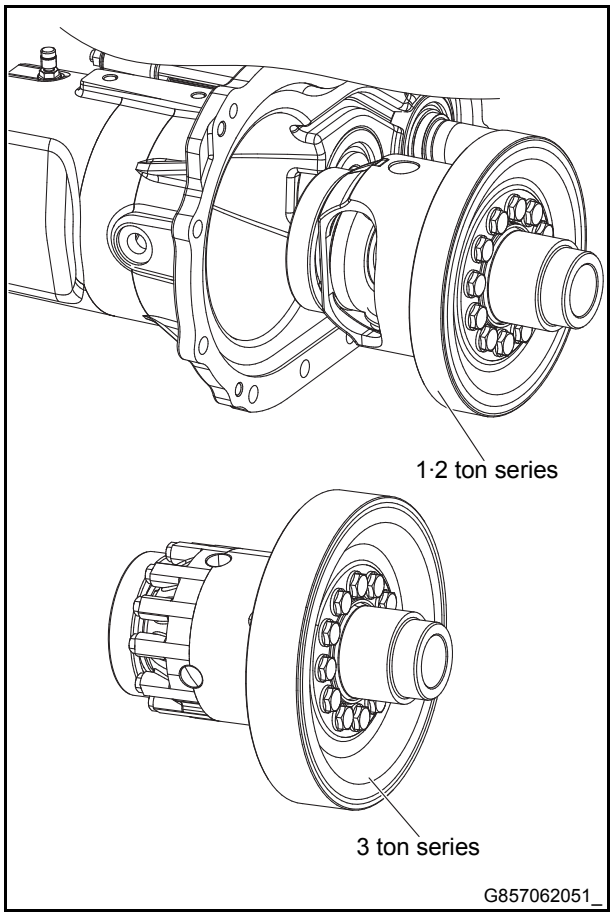
Note:
The gear No.2 must be lifted up for approx. 25mm in order to remove it, so put the plate as shown in the illustration and use the puller to remove it.

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6 Remove the differential.

Remove the differential in the direction of an arrow.

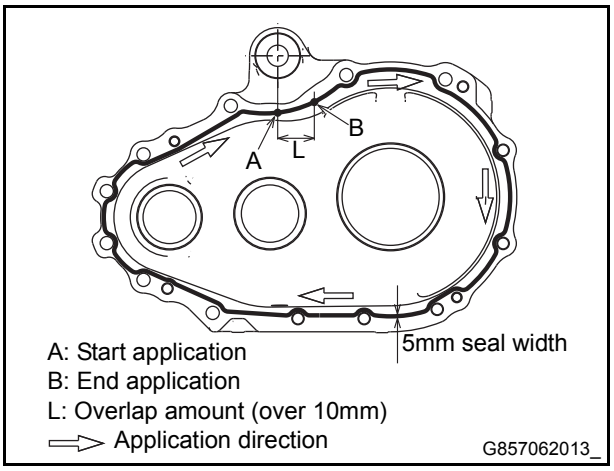


Weight of the differential

1 · 2 ton series: approx. 14 kg
3 ton series: approx. 16 kg

Reassembly Procedure

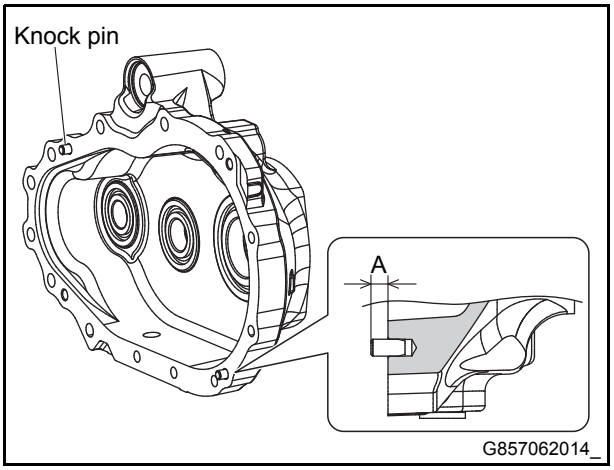
The reassembly procedure is the reverse of the disassembly procedure.



4 Apply liquid gasket to the surface to be in contact with the gear case.

Liquid gasket: ThreeBond #1281 or Locktite 5699

Caution:
The casing differs for each model but the application procedure is the same.



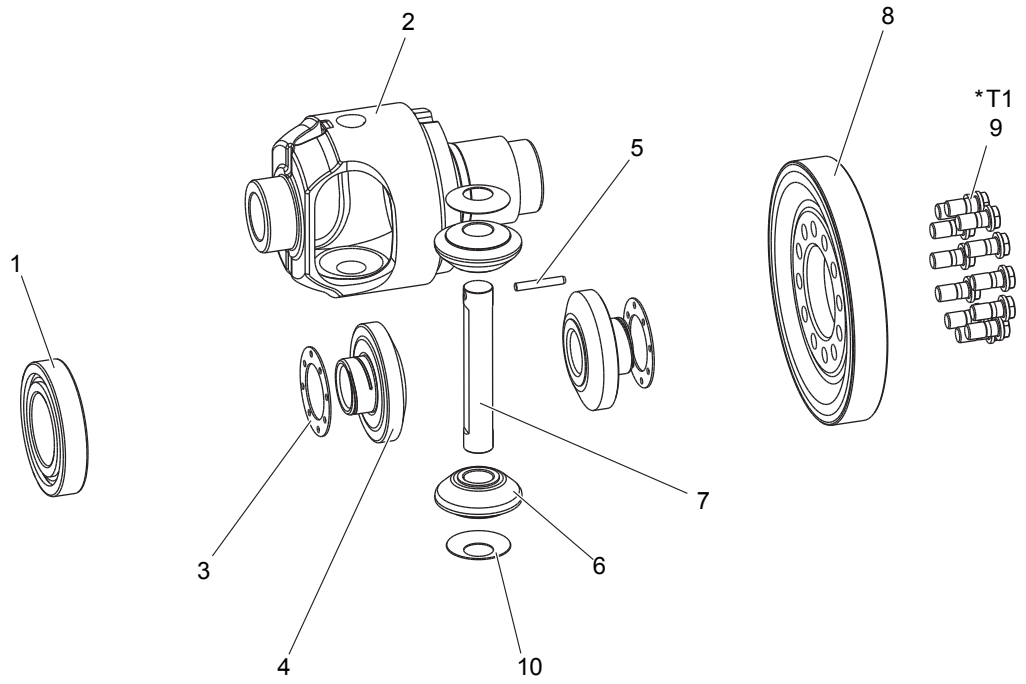
Insert the knock pin of the drive unit case to standard value A.

Standard A: 10.5 ~ 13.5 mm (0.413 ~ 0.531 in)

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DIFFERENTIAL CASE ASSY

DISASSEMBLY·INSPECTION·REASSEMBLY (1·2 TON SERIES)

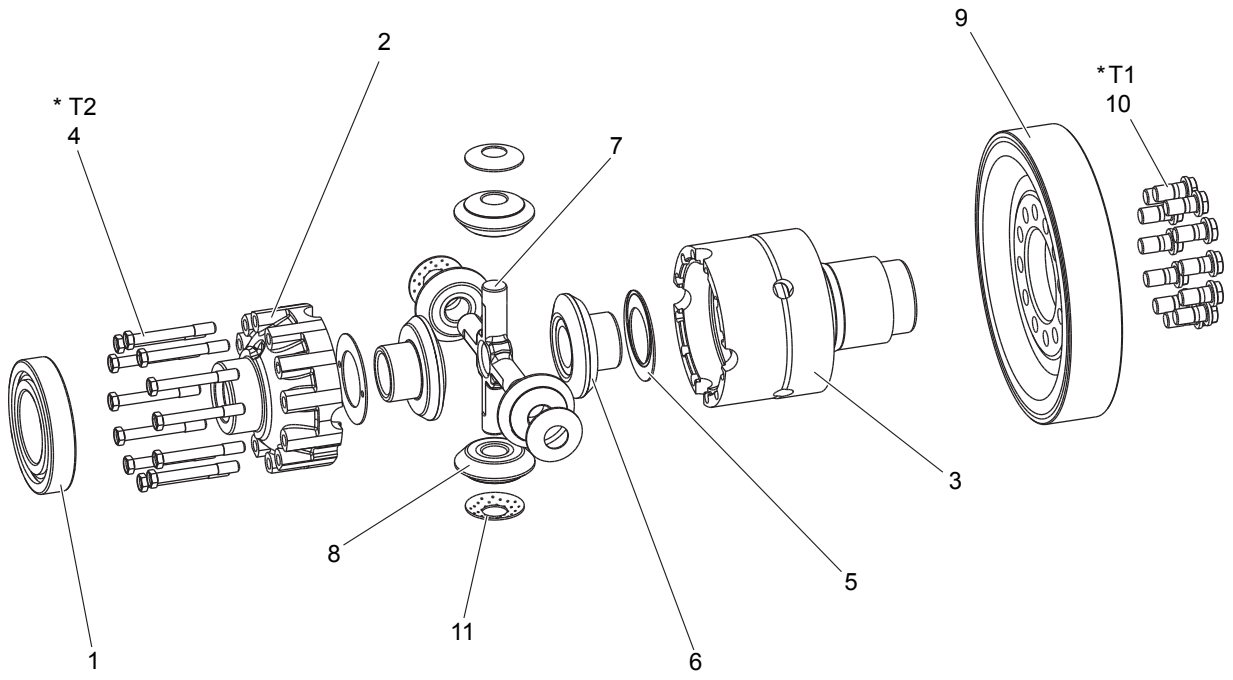


G857062052_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1=170 ~ 221 (1734 ~ 2254) [125.4 ~ 163.0]

No.	Parts name	QTY	No.	Parts name	QTY
1	Bearing	2	6	Pinion gear	2
2	Defferential case	1	7	Defferential shaft	1
3	Washer, side gear thrust	2	8	Gear No.3	1
4	Side gear	2	9	Bolt	12
5	Pin	1	10	Washer, deff pinion thrust	2

DISASSEMBLY·INSPECTION·REASSEMBLY (3 TON SERIES)



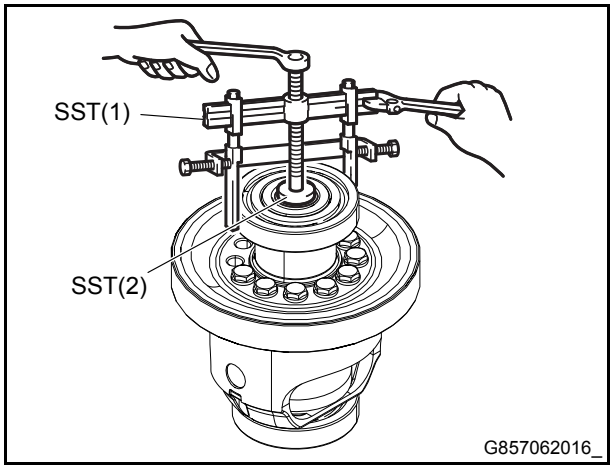
G857062053_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1=127.4 ~ 176.4 (1300 ~ 1800) [94.0 ~ 130.1]
T2=43.1 ~ 53.9 (423 ~ 549) [31.8 ~ 39.7]

No.	Parts name	QTY	No.	Parts name	QTY
1	Bearing	2	7	Defferential shaft	1
2	Defferential case (RH)	1	8	Pinion gear	4
3	Defferential case (LH)	1	9	Gear No.3	1
4	Set bolt	12	10	Bolt	12
5	Washer, side gear thrust	2	11	Washer, deff pinion thrust	4
6	Side gear	2			

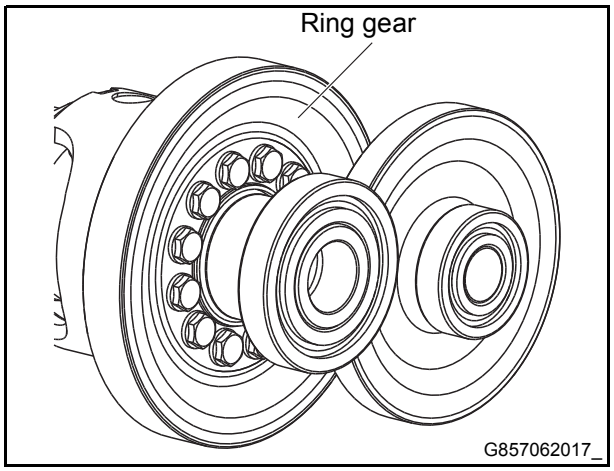
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Disassembly Procedure (1·2 ton series)

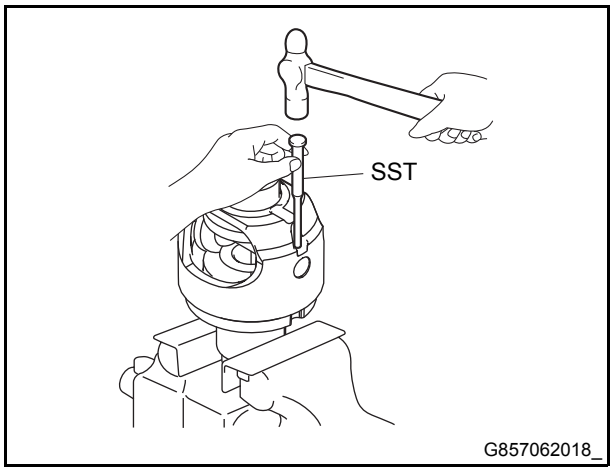


1 Remove the side bearing.

SST 09950-76014-71..... (1)
SST 09950-76018-71..... (2)



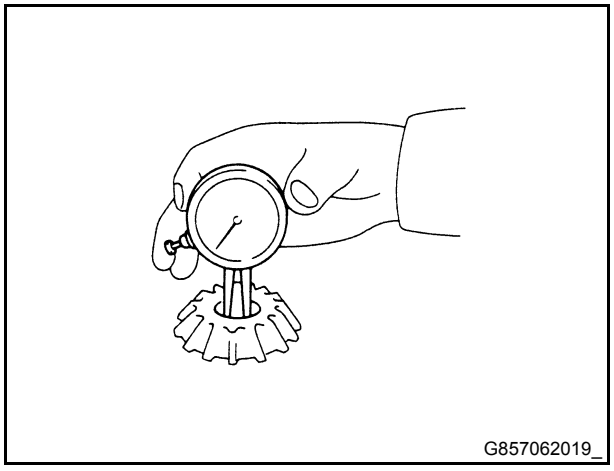
2 Remove the ring gear.



3 Remove the pinion shaft pin.

Unstake the differential case pin hole, and punch out the pin using the SST.

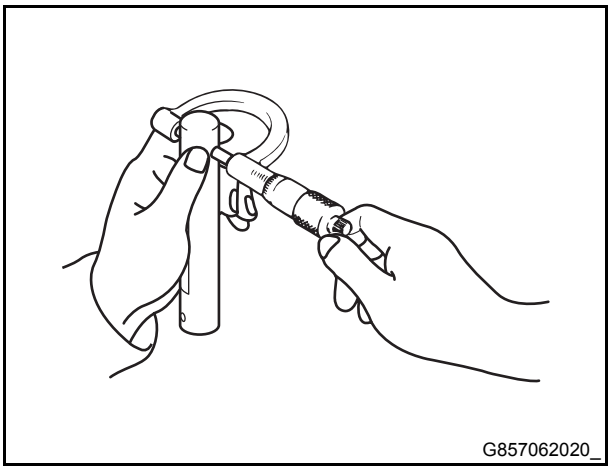
SST 09411-13330-71



4 Remove the side gear and pinion gear.

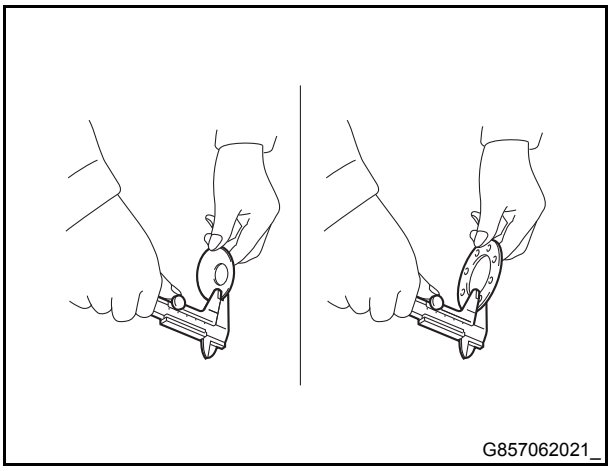
(1) Measure the differential pinion inside diameter.

Standard: 26.12 mm (1.028in)
Limit: 26.22 mm (1.032in)


G857062020_

(2) Measure the outside diameter of pinion shaft.

Standard: 26.00 mm (1.024in)
Limit: 25.75 mm (1.014in)


G857062021_

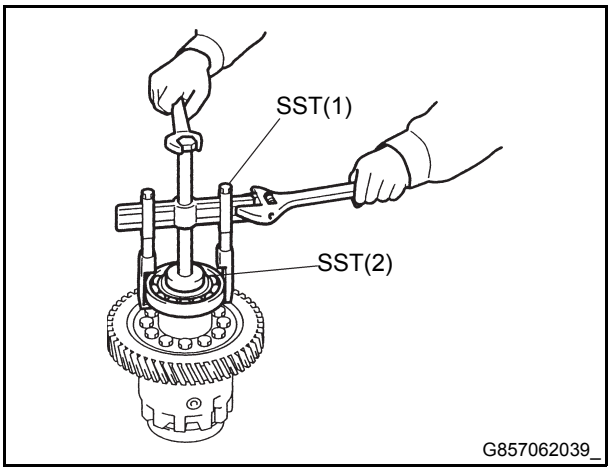
(3) Measure the thickness of the side gear thrust washer.

Standard: 1.6 mm (0.063in)
Limit: 1.3 mm (0.051in)

(4) Measure the thickness of the pinion thrust washer.

Standard: 1.0 mm (0.039in)
Limit: 0.7 mm (0.028in)

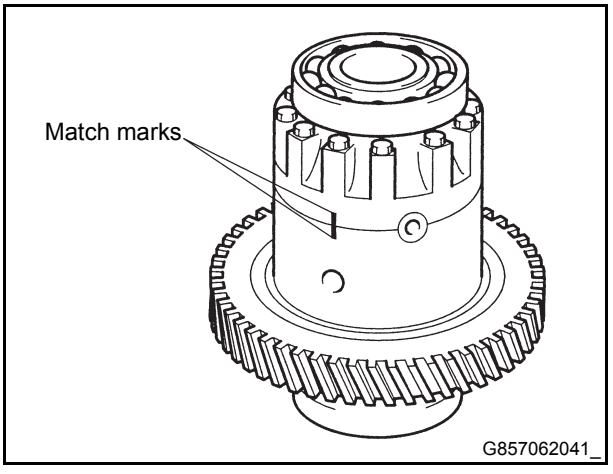
Disassembly Procedure (3 ton series)



G857062039_

1 Remove the side bearing.

SST 09950-76014-71 ..... (1)
SST 09950-76018-71 ..... (2)

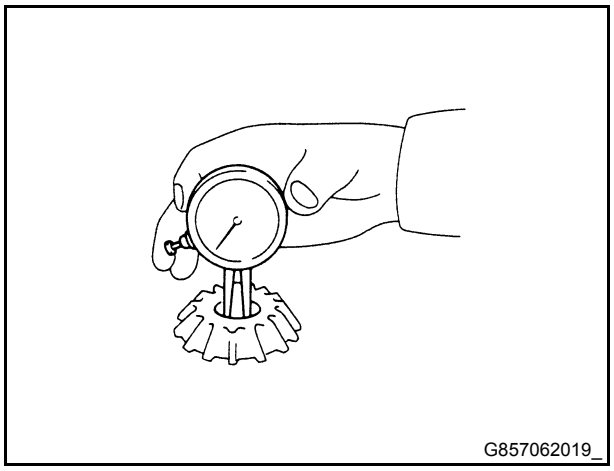


G857062041_

2 Remove the differential upper case.

Check the match marks.

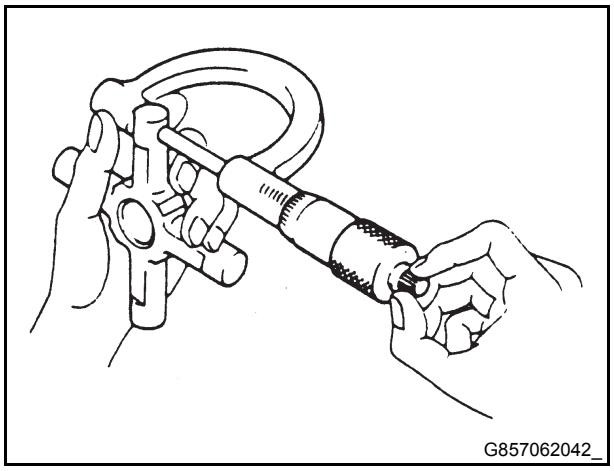
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G857062019_

3 Remove the side gear and pinion gear.

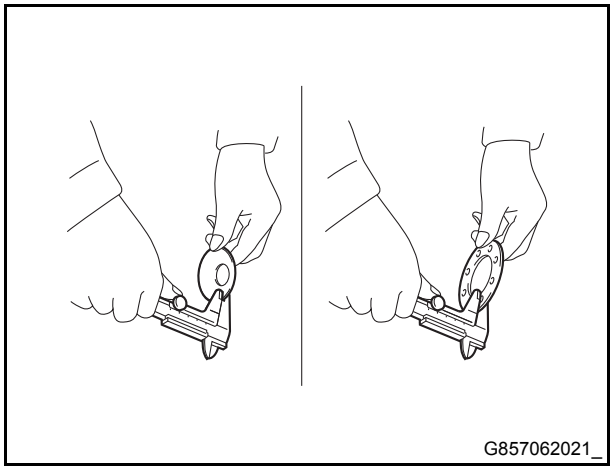
(1) Measure the differential pinion inside diameter.

Standard: 22.12 mm (0.871in)
Limit: 22.22 mm (0.875in)


G857062042_

(2) Measure the spider outside diameter.

Standard: 22.00 mm (0.866in)
Limit: 21.75 mm (0.856in)


G857062021_

(3) Measure the thickness of the side gear thrust washer.

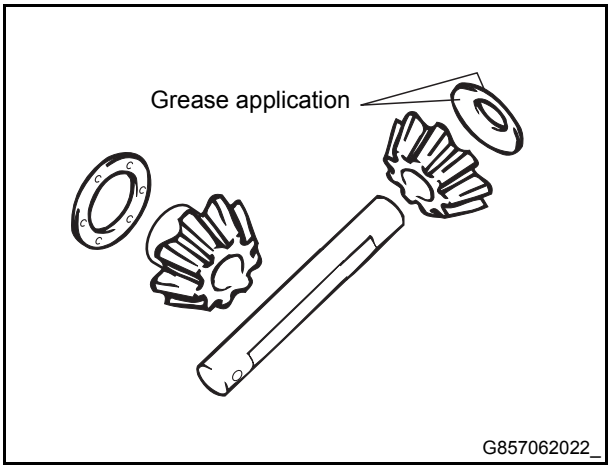
Standard: 1.6 mm (0.063in)
Limit: 1.3 mm (0.051in)

(4) Measure the thickness of the pinion thrust washer.

Standard: 1.6 mm (0.063in)
Limit: 1.0 mm (0.039in)

4 Remove the ring gear.

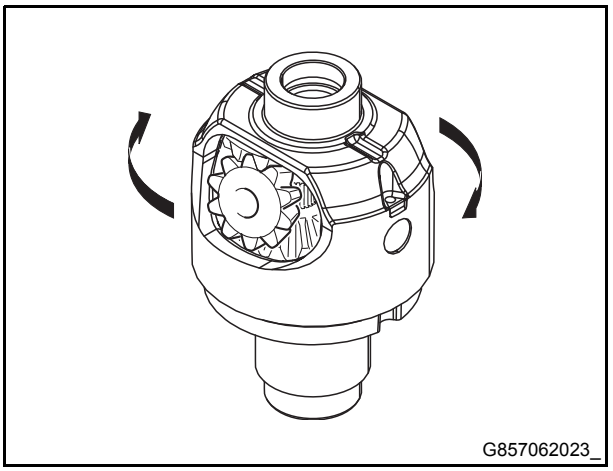
Reassembly Procedure (1·2 ton series)



1 Reassemble the side gear and pinion gear.

Reassemble the pinion thrust washer after evenly applying chassis grease special on both sides.

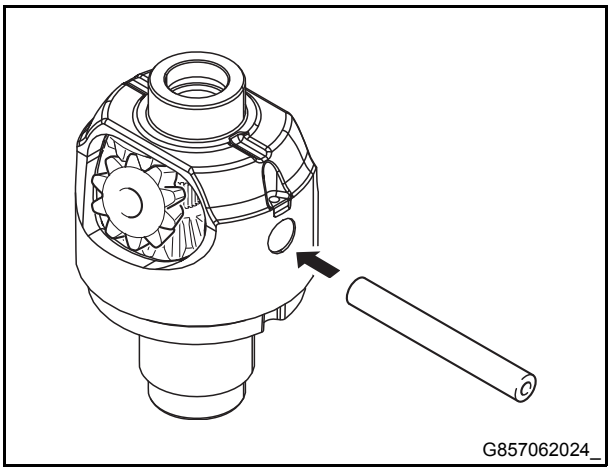
Note:
Apply MolykoteR321 evenly on the pinion thrust washer.
Molybdenum Disulfide Grease is also applicable as corresponding material.



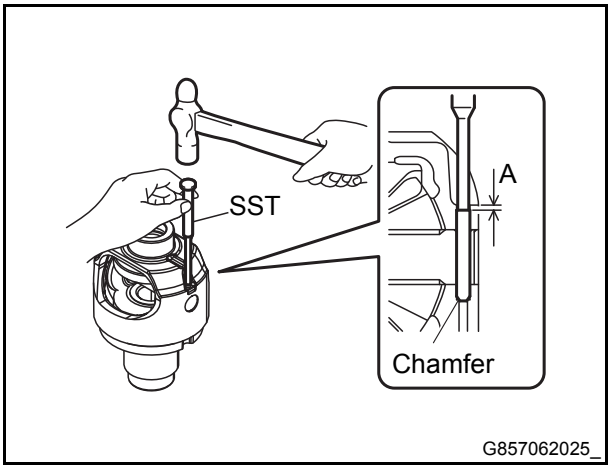
Reassembling procedures are as follows.

(1) Reassemble the side gear and pinion to differential case.

(2) Turn the pinion to the pinion shaft hole.



(3) Reassemble the pinion shaft.



2 Reassemble the pinion shaft pin.

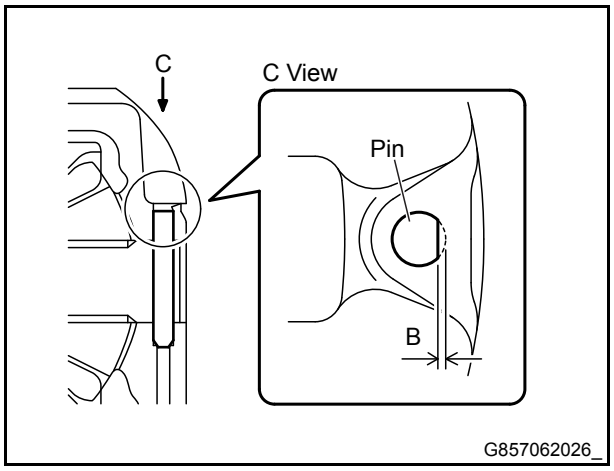
Tap the pin in the differential case pin hole using SST until it contacts the stepped section.

Reference value: A = 5 mm (0.20 in)

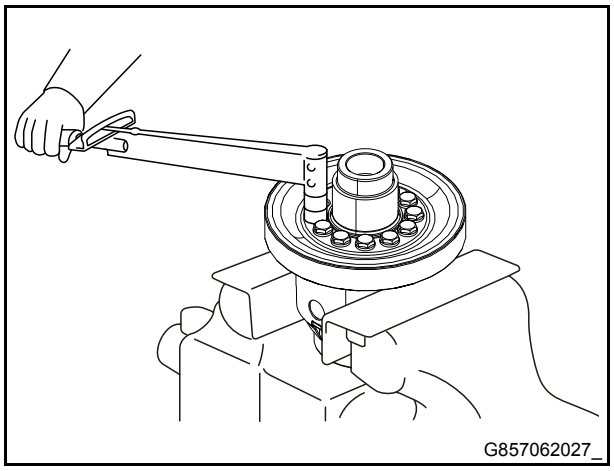
Tap the pin in with the chamfer side facing down.

SST 09411-13330-71

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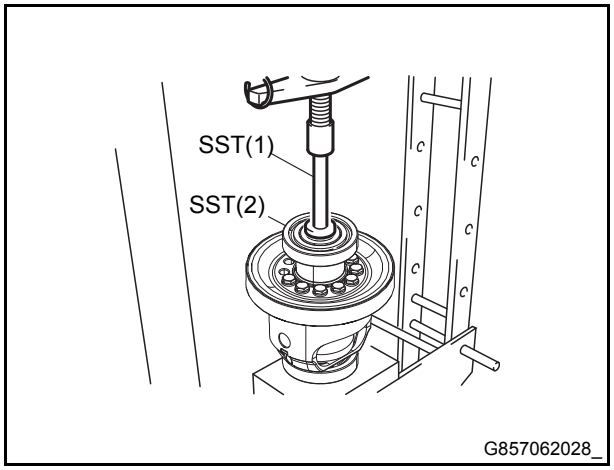


After tapping, stake the differential case pin hole with a chisel. Check that the staking allowance is B in the illustration = 1 mm (0.039 in) or more, and there should be no cracks.
After staking, check that the gear rotates smoothly.



3 Install the ring gear.

Apply thread tightener (08833-76001-71(08833-00070)) to the threaded portion of the set bolts. Gradually tighten them in the diagonal order, and finally tighten to the specified torque in the circular order.



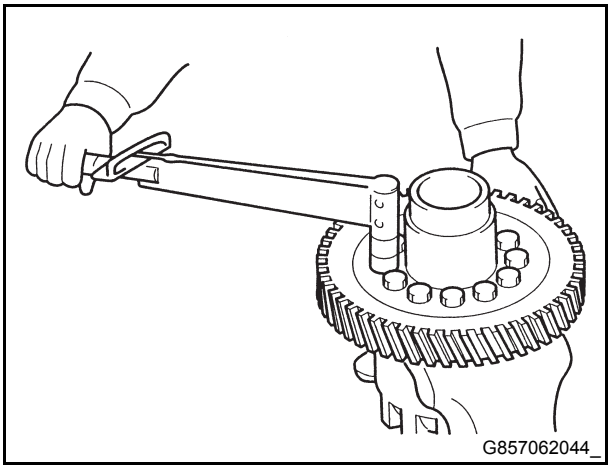
4 Install the side bearing.

(1) Reassemble the side bearing to the edge of the case using the SST and a press.

SST 09950-76019-71 ..... (1)
SST 09950-76020-71 ..... (2)

(2) Fully tap the side bearing in by using a striking driver.

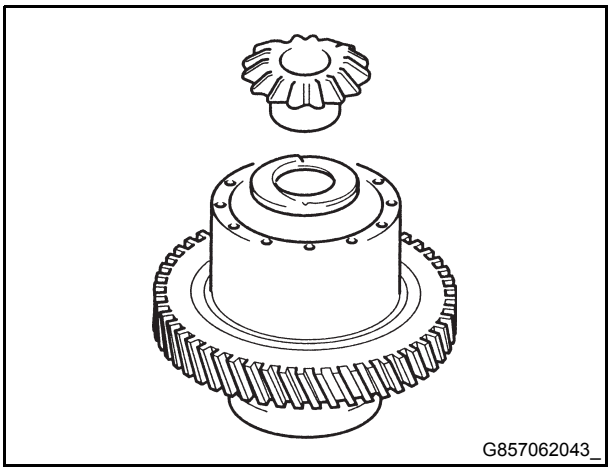
Reassembly Procedure (3 ton series)


G857062044_

1 Install the ring gear.

Apply locking agent (Locktite No. 271 or equivalent) on the threaded portion of the set bolts. Tighten them gradually first in the diagonal order, and finally tighten them in the circular order to the specified torque.

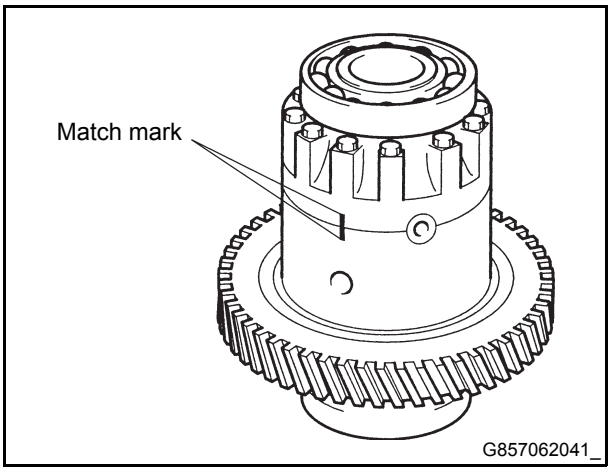
T = 127.5 ~ 176.5 N·m (1300 ~ 1800 kgf-cm)
[94.1 ~ 130.2 ft-lbf]


G857062043_

2 Reassemble the side gear and pinion gear.

Install the side gear thrust washer with its oil groove facing the tooth flank. Uniformly apply chassis grease (molybdenum disulfide grease) on both faces of the pinion gear thrust washer before installation.

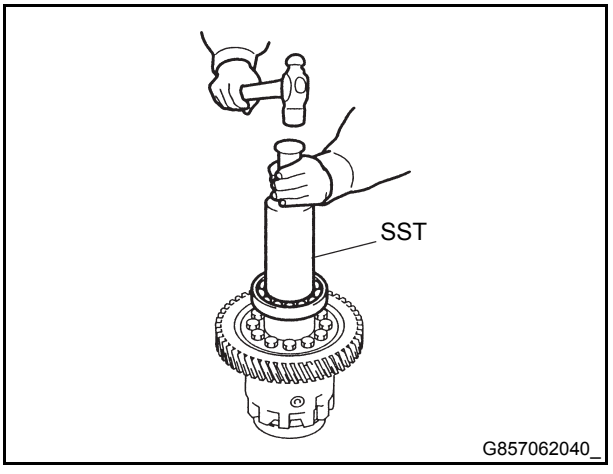
Note:
Apply MolykoteR321 evenly on the pinion thrust washer.
Molybdenum Disulfide Grease is also applicable as corresponding material.



G857062041_

3 Reassemble the differential upper case.

Check the match mark. Apply locking agent (Locktite No. 271 or equivalent) on the threaded portion of the set bolt.



G857062040_

4 Install the side bearing.

(1) Use the SST and install the side bearing up to the end face of the case.

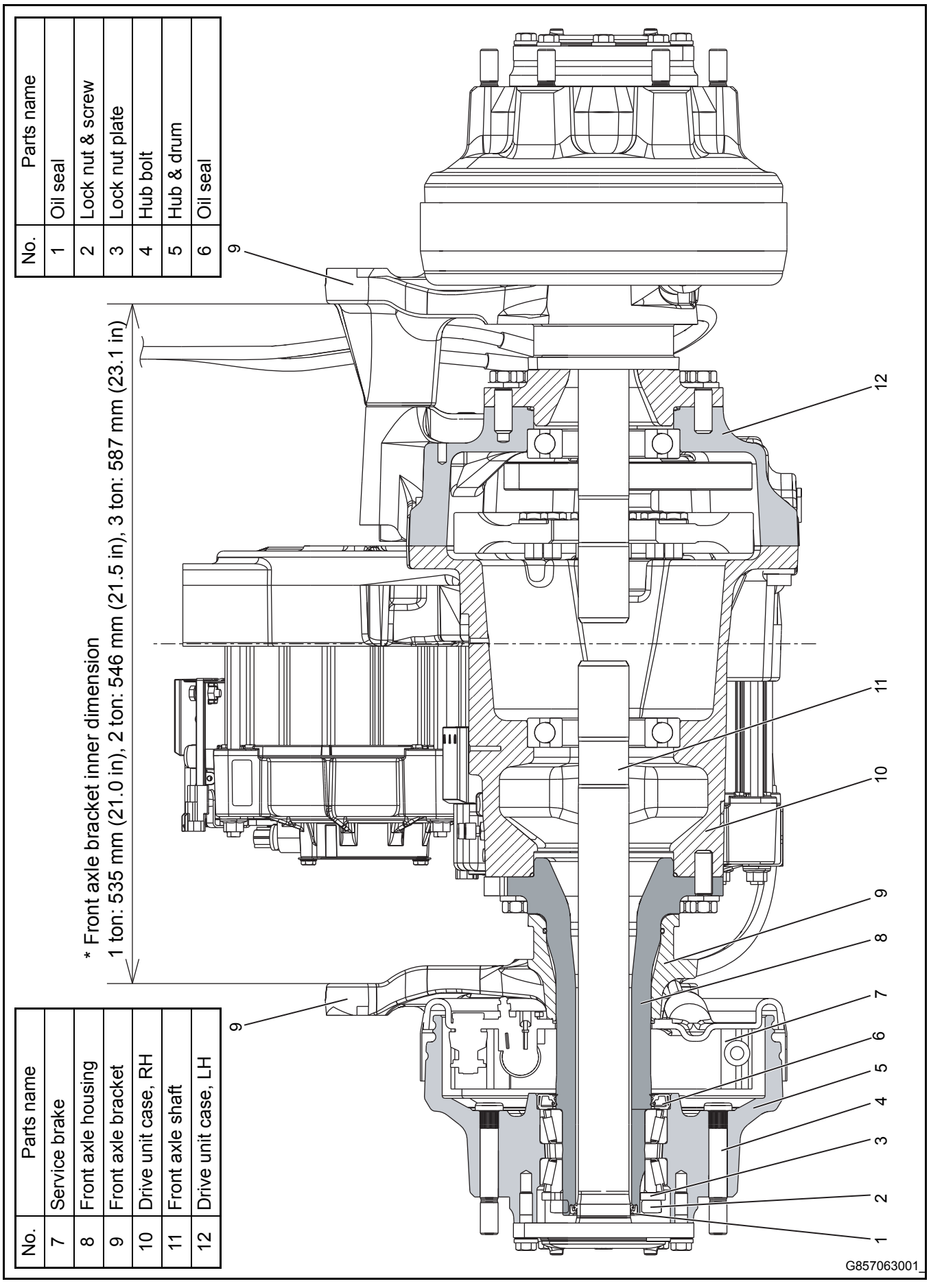
SST 09370-10410-71

(2) Use an appropriate tool and hammer to drive the bearing fully in.

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FRONT AXLE

GENERAL

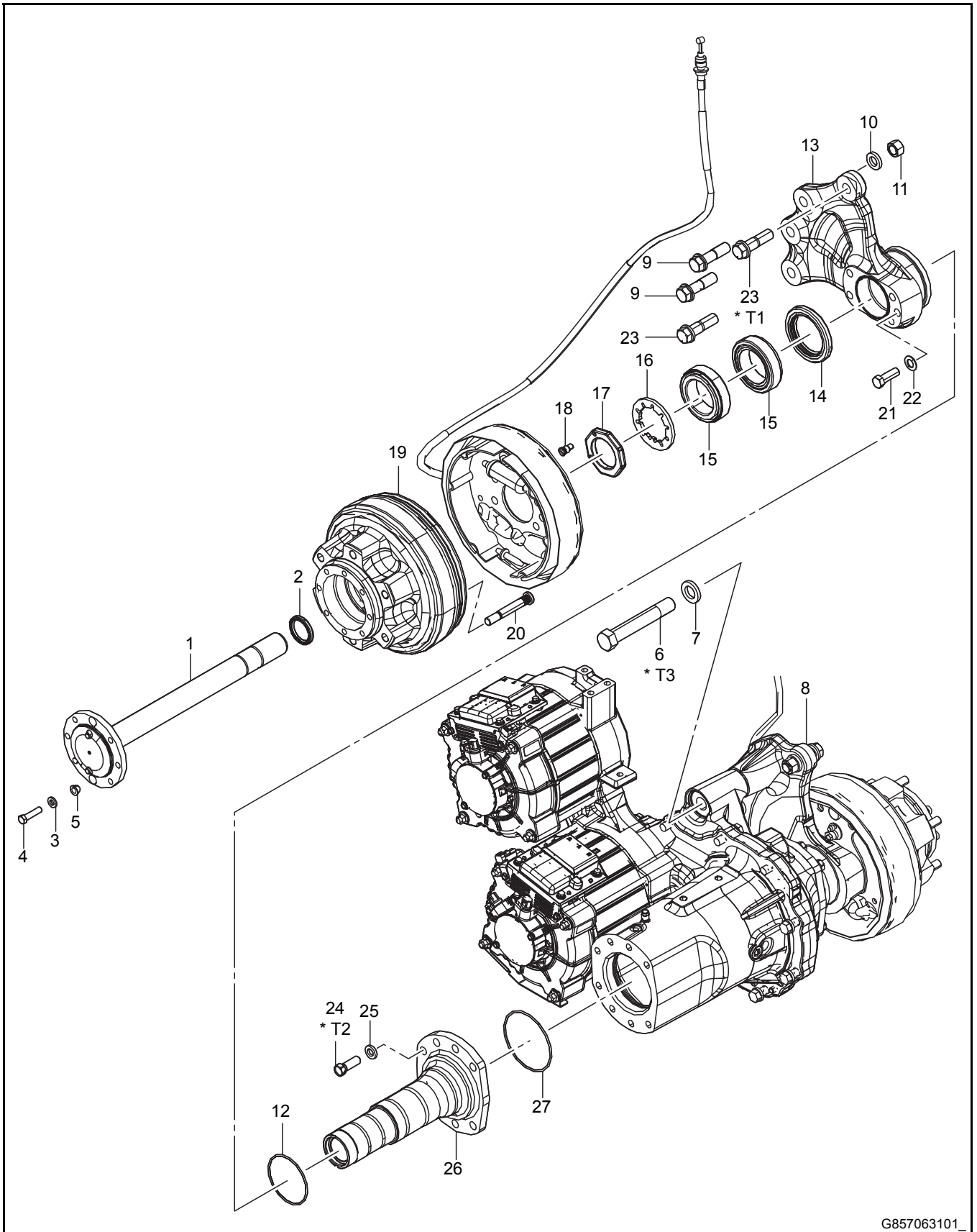


No.	Parts name
1	Oil seal
2	Lock nut & screw
3	Lock nut plate
4	Hub bolt
5	Hub & drum
6	Oil seal

No.	Parts name
7	Service brake
8	Front axle housing
9	Front axle bracket
10	Drive unit case, RH
11	Front axle shaft
12	Drive unit case, LH

COMPONENTS

1 ton series

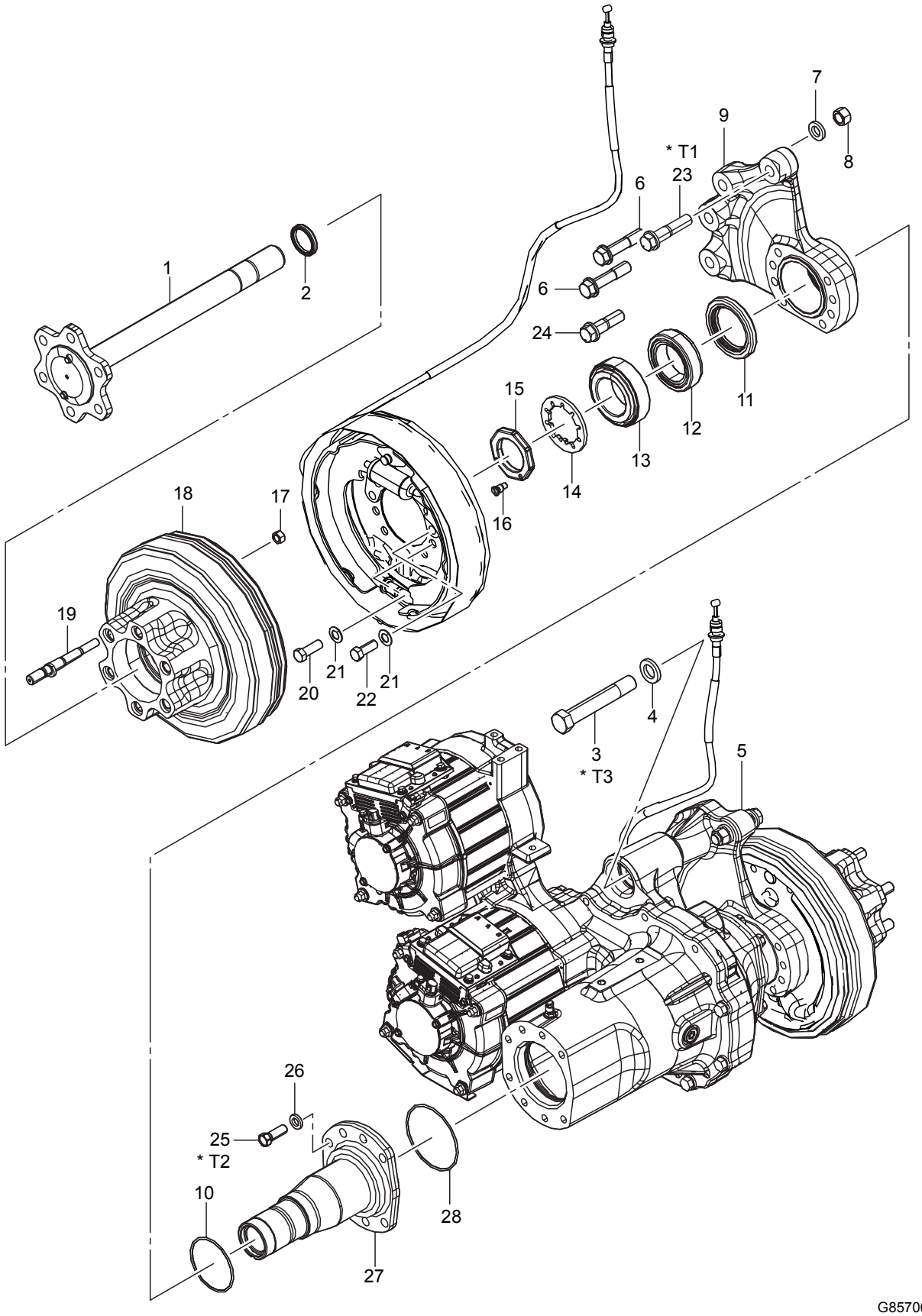


* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 235 ~ 294 (2396 ~ 2998) [173 ~ 217]
T2 = 108 ~ 159 (1101 ~ 1621) [79.7 ~ 117]
T3 = 294 ~ 343 (2998 ~ 3498) [217 ~ 253]

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No.	Parts name	QTY	No.	Parts name	QTY
1	Front axle shaft	2	15	Bearing	2
2	Seal, oil	2	16	Plate, lock nut	2
3	Washer spring	8	17	Nut, bearing lock	2
4	Bolt, front axle shaft	8	18	Screw	4
5	Washer, corn	2	19	Hub, front axle	2
6	Bolt, bracket set	1	20	Bolt, hub	12
7	Washer, spring	1	21	Bolt	10
8	Bracket, front axle, LH	1	22	Washer, CD spring	10
9	Bolt	4	23	Bolt	4
10	Washer, spring	8	24	Bolt	16
11	Nut	8	25	Washer, spring	16
12	Ring, O	2	26	Housing, front axle	2
13	Bracket, front axle, RH	1	27	Ring, O	2
14	Seal, oil	2			

2 ton series

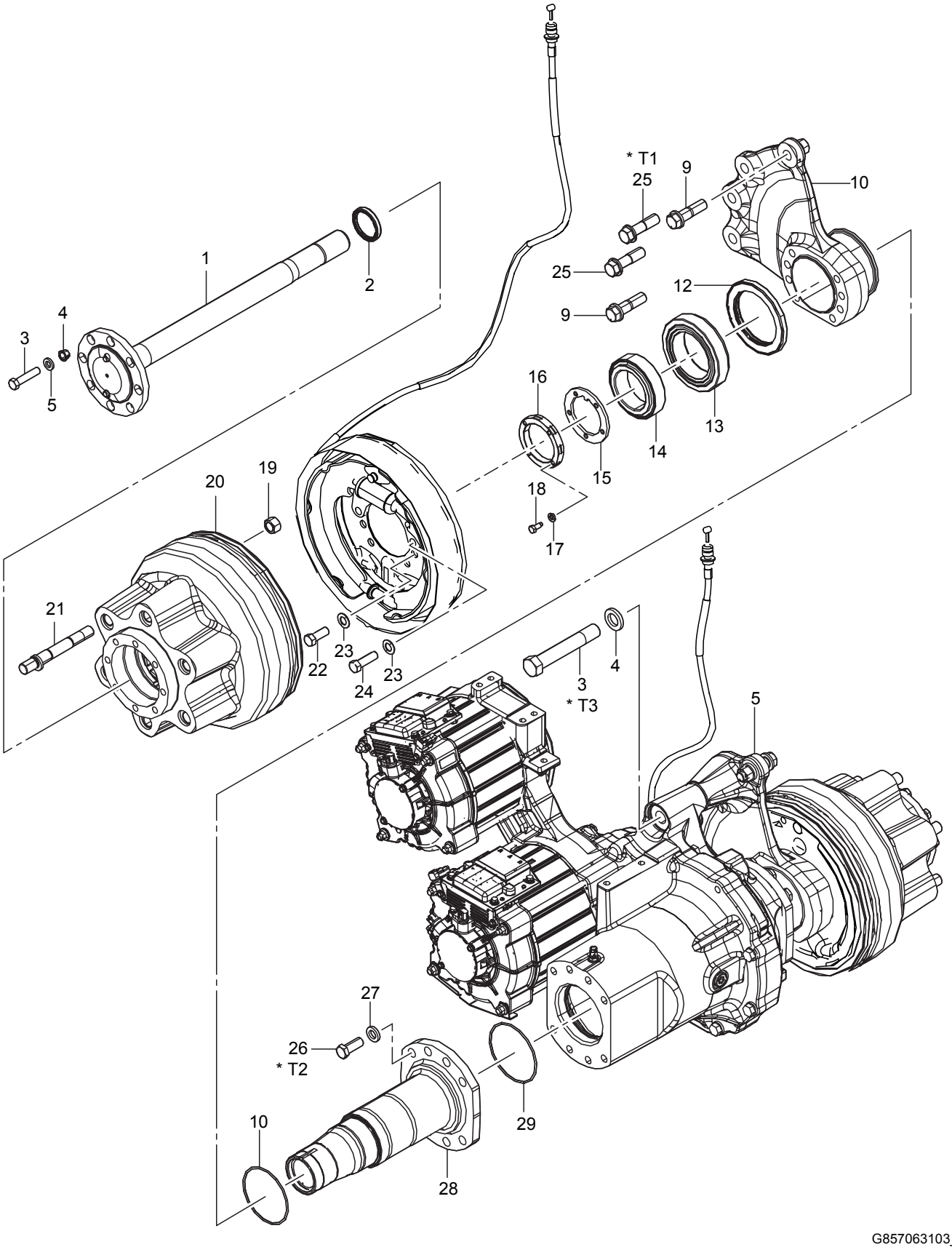


* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 235 ~ 294 (2396 ~ 2998) [173 ~ 217]
T2 = 108 ~ 159 (1101 ~ 1621) [79.7 ~ 117]
T3 = 294 ~ 343 (2998 ~ 3498) [217 ~ 253]

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No.	Parts name	QTY	No.	Parts name	QTY
1	Shaft, front axle	2	15	Nut, bearing lock	2
2	Seal, oil	2	16	Screw	2
3	Bolt, bracket set	1	17	Nut	12
4	Washer, spring	2	18	Hub, front axle	2
5	Bracket, front axle, LH	1	19	Bolt, hub	12
6	Bolt	4	20	Bolt	8
7	Washer, spring	8	21	Washer, CD spring	16
8	Nut	8	22	Bolt	8
9	Bracket, front axle, RH	1	23	Bolt	2
10	Ring, O	2	24	Bolt	2
11	Seal, oil	2	25	Bolt	16
12	Bearing	2	26	Washer, spring	16
13	Bearing	2	27	Housing, front axle	2
14	Plate, lock nut	2	28	Ring, O	2

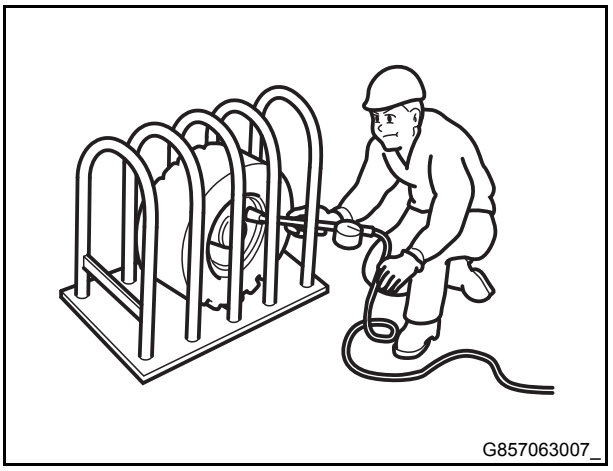
3 ton series



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 235 ~ 294 (2396 ~ 2998) [173 ~ 217]
T2 = 127 ~ 190 (1295 ~ 1937) [93.7 ~ 140]
T3 = 294 ~ 343 (2998 ~ 3498) [217 ~ 253]

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No.	Parts name	QTY	No.	Parts name	QTY
1	Shaft, front axle	2	16	Nut, bearing lock	2
2	Seal, oil	2	17	Washer, spring	8
3	Bolt, front axle shaft	16	18	Bolt	8
4	Washer, corn	16	19	Nut	6
5	Washer, spring	16	20	Hub, front axle	2
6	Bolt, bracket set	1	21	Bolt, hub	6
7	Washer, spring	1	22	Bolt	12
8	Bracket, front axle, LH	1	23	Washer, CD spring	16
9	Bolt	8	24	Bolt	4
10	Bracket, front axle, RH	1	25	Bolt	8
11	Ring, O	2	26	Bolt	16
12	Seal, oil	2	27	Washer, spring	16
13	Bearing	2	28	Housing, front axle	2
14	Bearing	2	29	Ring, O	2
15	Plate, lock nut	2			



TIRES·WHEELS

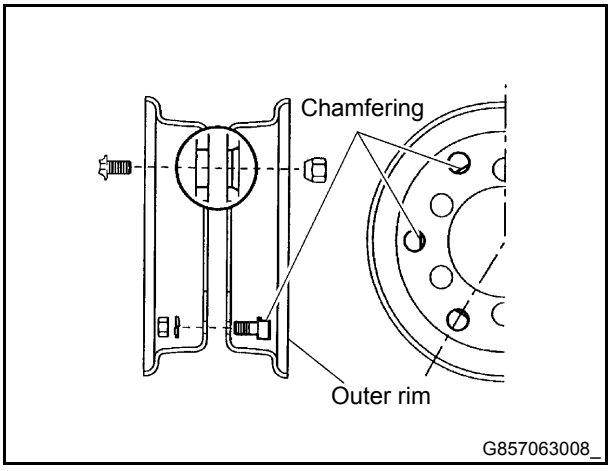
1 Adjusting the Inflating Pressure

Caution:
- **Do not inflate tires beyond the specified pressure because it may cause dangerous tire bursting.**
- **When inflating a tire removed from the vehicle, place it in a safety fence.**

Specified Inflating Pressure

Vehicle model	Specification	Tire size	Rim type	Inflating pressure kPa (kgf/cm^2) [psi]
1.5 ton model	STD	6.00-9-10PR	Divided rim	700 (7.00) [101.5]
	OS-S	6.50-10-10PR	Divided rim	775 (7.75) [112.4]
	SPL-S	21X8-9-14PR	Side ring	625 (6.25) [90.6]
		21X8-9-10PR		
1.6 to 1.8 ton model	STD	6.50-10-10PR	Divided rim	775 (7.75) [101.5]
	SPL-S	21X8-9-14PR	Side ring	625 (6.25) [90.6]
		21X8-9-10PR		
2.0 to 2.5 ton model	STD	21X8-9-14PR	Divided rim	900 (9.00) [130.5]
3 ton model	STD	28X9-15-14PR	Side ring	800 (8.00) [116.0]

Abbreviations used in the specification column:
STD = Standard, S-RING = Side ring, OS-S = Oversize single, SPL-S = Special single



2 Wheel Disassembly·Reassembly

Caution:
Always discharge air fully before disassembling the wheel. Otherwise, it is very dangerous since the rim may come off suddenly due to the internal pressure.

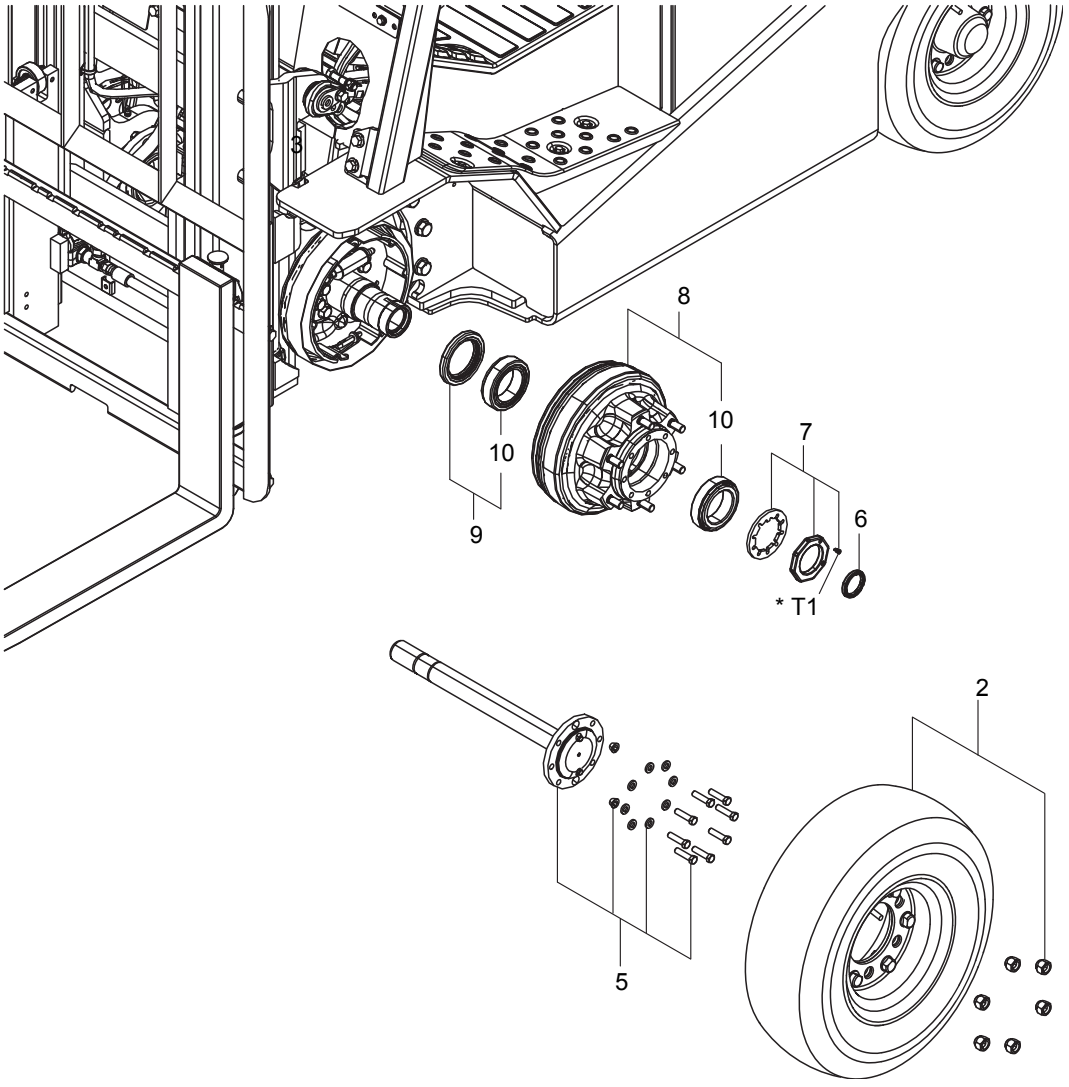
Note:
Install each divided rim set bolt with its head on the outer rim side and the chamfered portion facing the center of the wheel.

Tightening torque of divided rim set bolt:
T = N·m (kgf·cm) [ft·lbf]
1 ton series: T = 49.0 ~ 68.5 (500 ~ 700) [36.2 ~ 50.6]
2 ton series: T = 118.0 ~ 176.0 (1200 ~ 1800) [87.1 ~ 129.8]

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FRONT AXLE SHAFT·AXLE HUB

REMOVAL·INSTALLATION



G857063009_

Tightening torque of hub nut : T = N·m (kgf·cm) [ft·lbf]
T (1 ton series) = 118.0 ~ 196.0 (1200 ~ 2000) [87.1 ~ 144.6]
T (2 ton series) = 177.0 ~ 392.0 (1800 ~ 4000) [130.6 ~ 289.2]
T (3 ton series) = 294.0 ~ 588.0 (3000 ~ 6000) [216.9 ~ 433.8]

Tightening torque of axle shaft set bolt : T = N·m (kgf·cm) [ft·lbf]
T (1·2 ton series) = 68.6 ~ 98.0 (700 ~ 1000) [50.6 ~ 72.3]
T (3 ton series) = 107.0 ~ 140.0 (1100 ~ 1400) [78.9 ~ 103.3]

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 (1·2 ton series) = 2 ~ 5.2 (20~ 53) [1.4 ~ 3.8]
T1 (3 ton series) = 15 ~ 22 (153 ~ 224) [11.1 ~ 16.2]

Removal Procedure

1 Disconnect the battery plug.

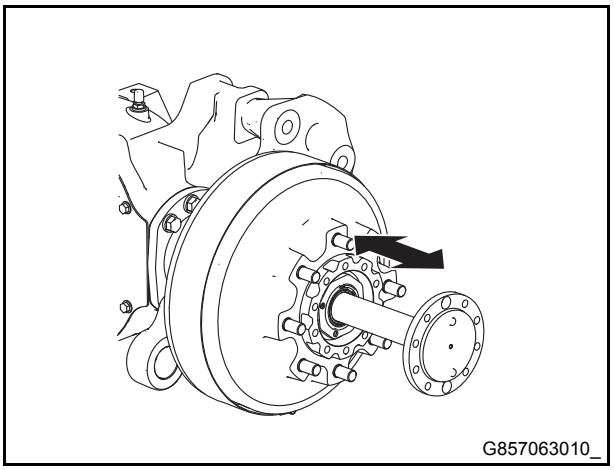
2 Jack up the vehicle and support it with a wooden block.

3 Remove the front wheels.

4 Drain drive unit oil.

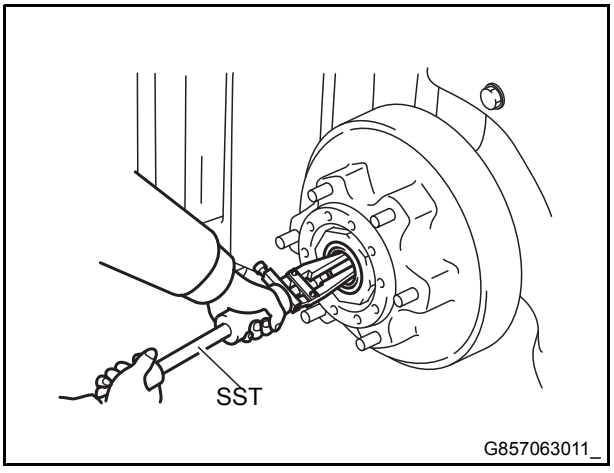
5 Remove the front axle shaft.

Caution:
Carefully operate so as not to damage the oil seal lip by contact with the axle shaft.


G857063010_

6 Remove the axle shaft oil seal.

SST 09320-23000-71



G857063011_

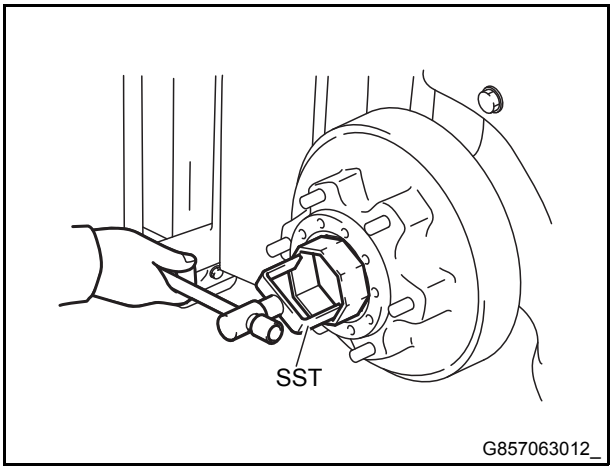
7 Remove the bearing lock nut and plate.

1·2 ton series:
SST 09509-76002-71 (09509-55020)
3 ton series:
SST 09509-76003-71 (09509-55030)

8 Remove the outer bearing roller and front axle hub.

9 Remove the oil seal and inner bearing roller. Use a screwdriver or the like to remove the oil seal.

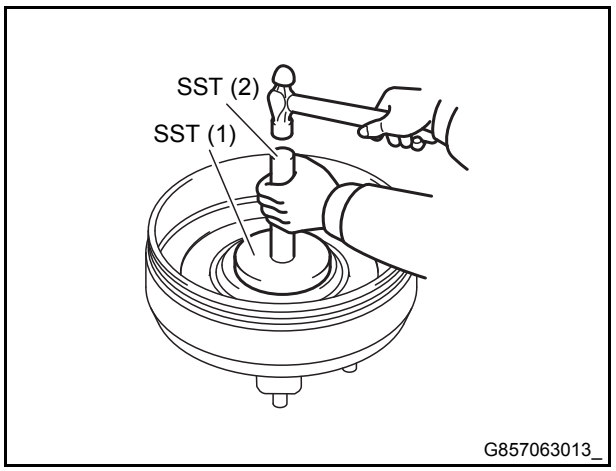
10 Remove the bearing outer race.



G857063012_

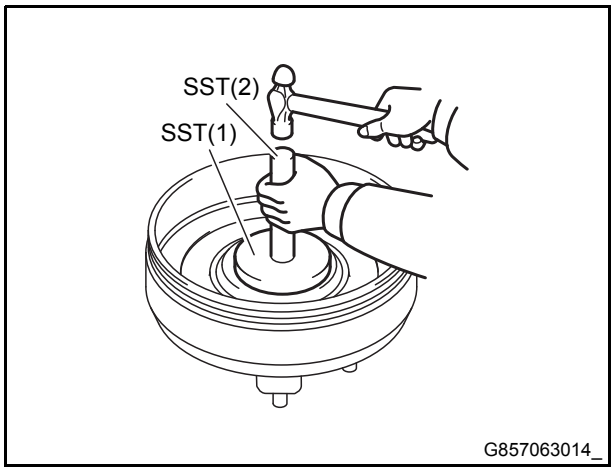
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Installation Procedure



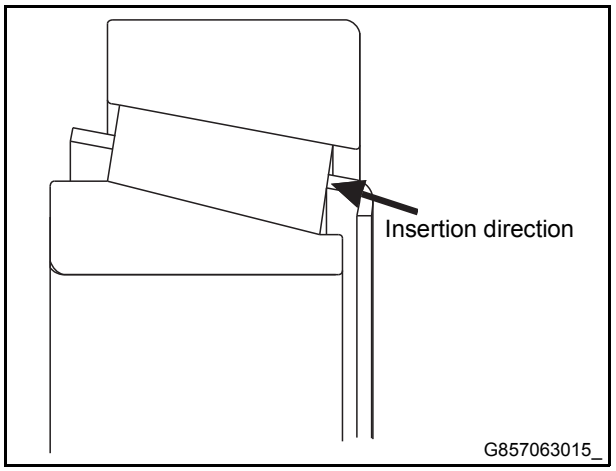
1 Install the bearing outer race to the front axle hub.

SST 09950-76019-71 (09950-60020) ..... (1)
SST 09950-76020-71 (09950-70010) ..... (2)



2 Install the oil seal and inner bearing roller to the front axle hub.

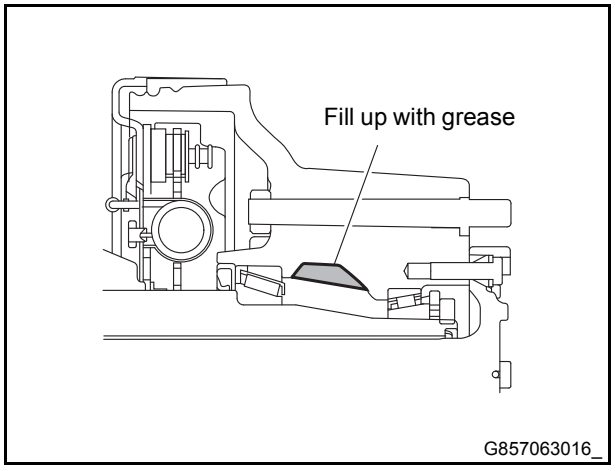
SST 09950-76019-71 (09950-60020) ..... (1)
SST 09950-76020-71 (09950-70010) ..... (2)



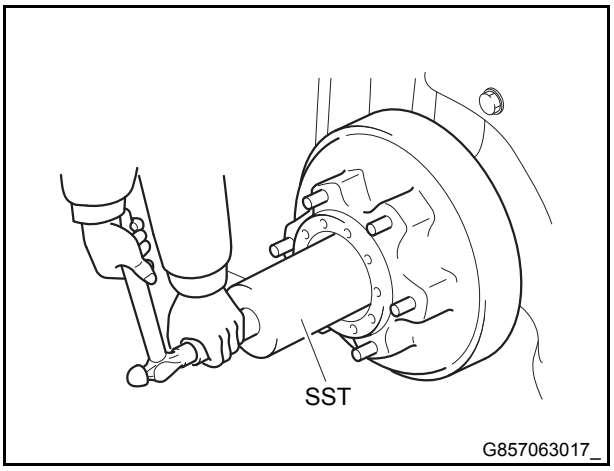
3 Install the outer bearing roller and front axle hub.

Insert grease in the direction of the arrow into the bearing and insert until it comes out the opposite end.

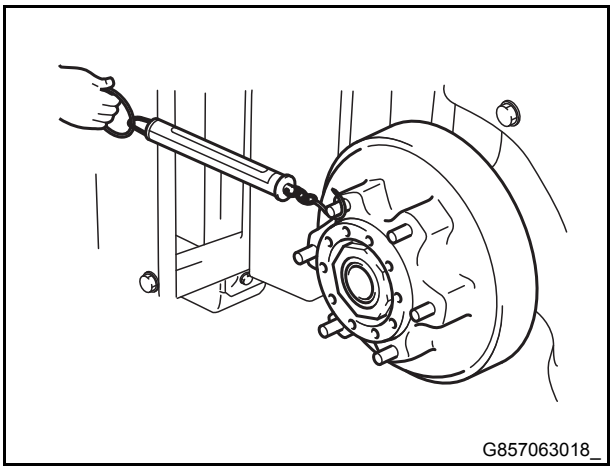
Grease: MP grease



Fill the part of the hub shown in the illustration with MP grease.



1·2 ton series
SST 09370-10410-71
3 ton series
SST 09421-33020-71



4 Install the bearing lock nut and plate, adjust the front axle hub starting force.

(1) Install the plate.

(2) Tighten the bearing lock nut to the specified torque and rotate the hub by 4 or 5 turns to fit the bearing.

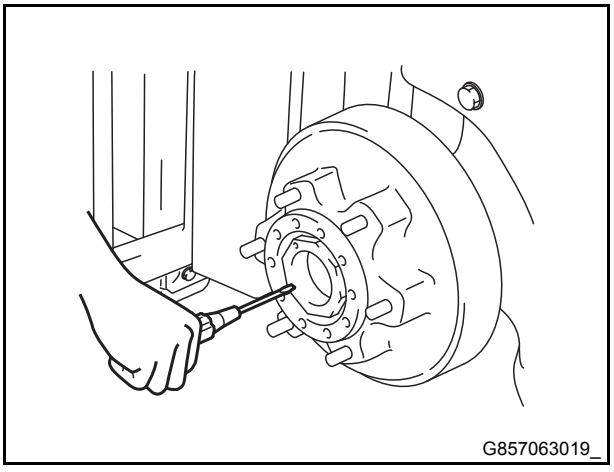
Standard:
294 ~ 343 N·m (2998 ~ 3498 kgf·cm)
[217 ~ 253 ft·lbf]

(3) Rotate the bearing lock nut back by 1/12 to 1/6 turn (30 to 60°) to align the stopper hole of the bearing with the thread hole of the lock nut. Rotate the hub 4 or 5 turns again.

(4) Set the spring scale to the hub bolt to measure the starting force.

Standard:
24.5 ~ 60.0 N (2.5 ~6.1 kgf) [5.5 ~ 13.5 lbf]

(5) If the measured value is not within the standard range, adjust it by tightening or loosening the bearing lock nut.

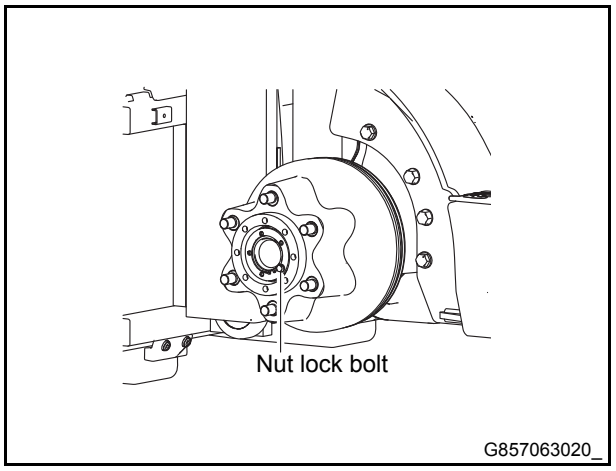


(6) Install the nut lock screw or nut lock bolt to the specified torque.

When reusing the nut lock screw (precoated screw), apply thread tightener (08833-76002-71 (08833-00080)) to the threaded portion.

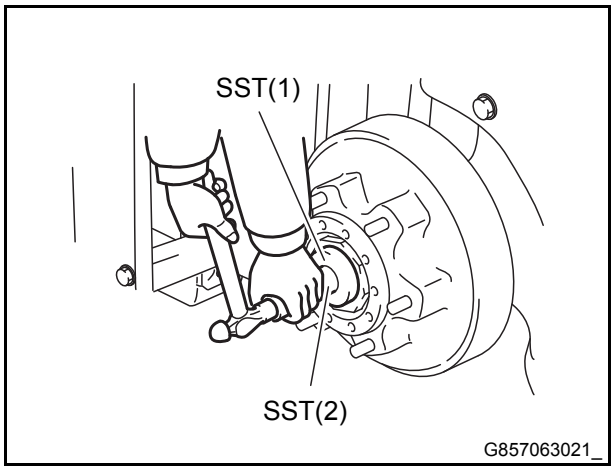
Tightening torque
1·2 ton series:
T = 2 ~ 5.2 N·m (20 ~ 53 kgf·cm) [1.4 ~ 3.5 ft·lbf]

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Apply thread tightener (08833-76001-71 (08833-00070)) to the nut lock bolt threaded portion and tighten it.

Tightening torque
3 ton series:
T = 15 ~ 22 N·m (153 ~ 224 kgf·cm)
[11 ~ 16 ft·lbf]



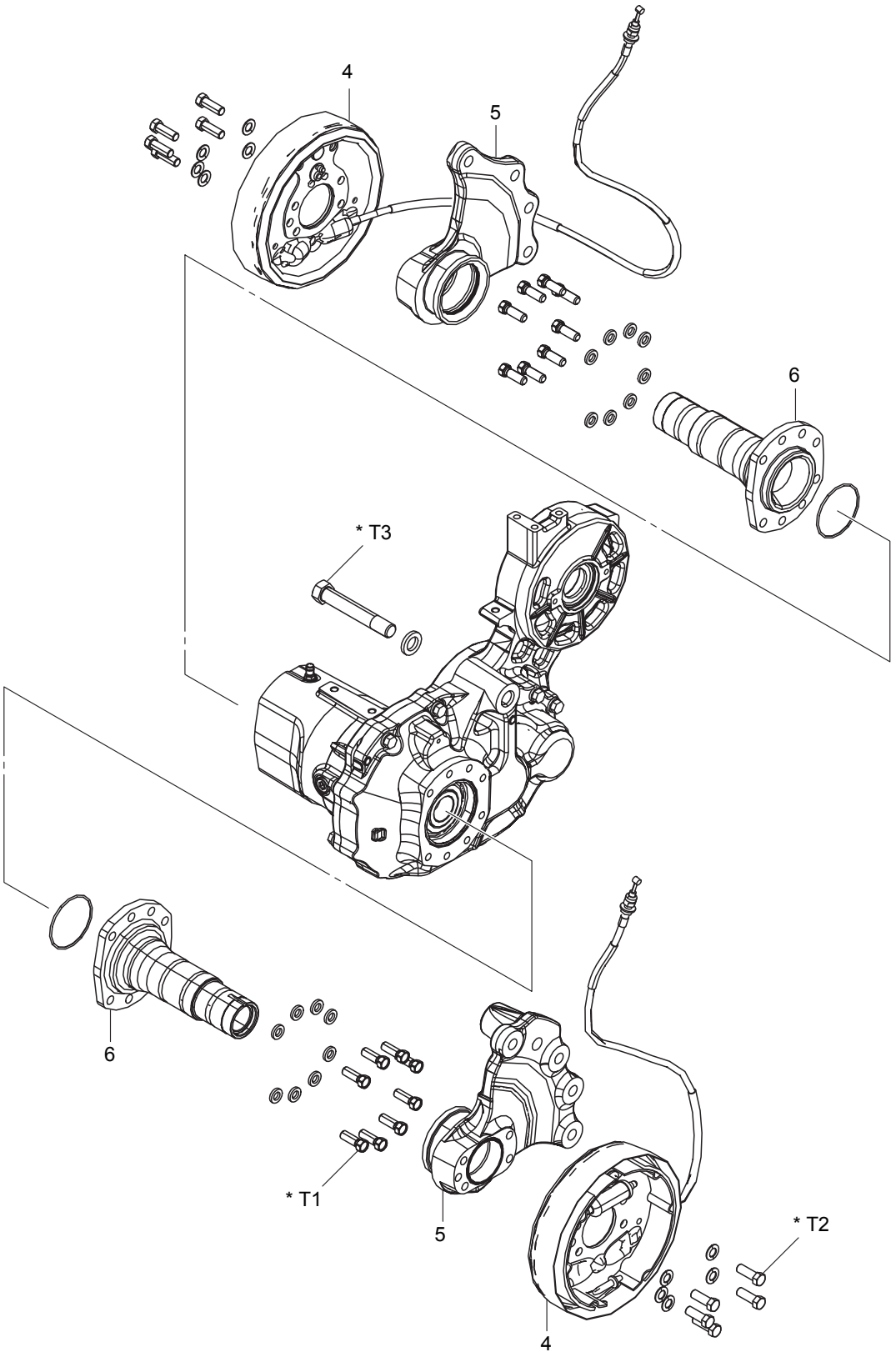
5 Install the axle shaft oil seal.

SST 09950-76018-71 (09950-60010) ..... (1)
SST 09950-76020-71 (09950-70010) ..... (2)

6 Install the front axle shaft.

FRONT AXLE BRACKET·AXLE HOUSING

REMOVAL·INSTALLATION



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 (1·2 ton series) = 108 ~ 159 (1100~ 1600) [80~ 117]
T1 (3 ton series) = 127 ~ 190 (1300 ~ 1900) [94 ~ 140]
T2 = 137 ~ 210 (1400~ 2100) [101~ 155]
T3 = 294 ~ 343 (3000 ~ 3500) [217 ~ 253]

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Removal Procedure

1 Remove the front module. (Refer to page 6-4)

2 Drain drive unit oil.

3 Remove the front axle shaft and axle hub. (Refer to page 6-58)

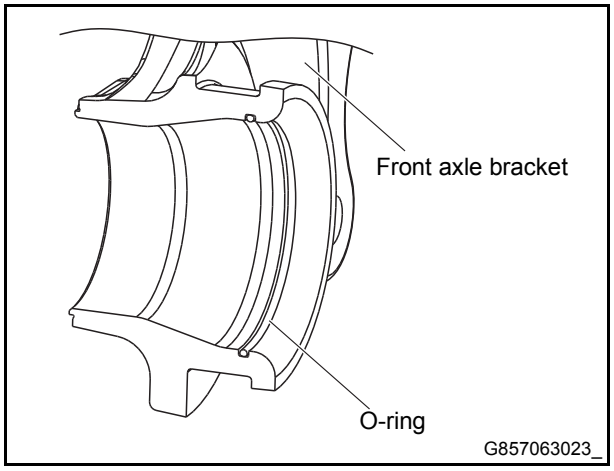
4 Remove the backing plate W/brake ASSY.

5 Remove the front axle bracket.

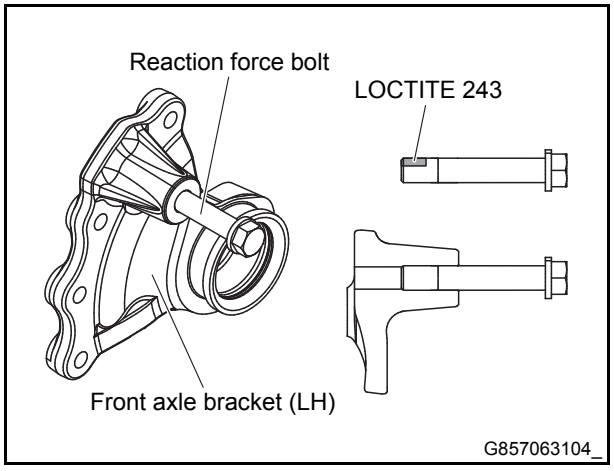
6 Remove the axle housing.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

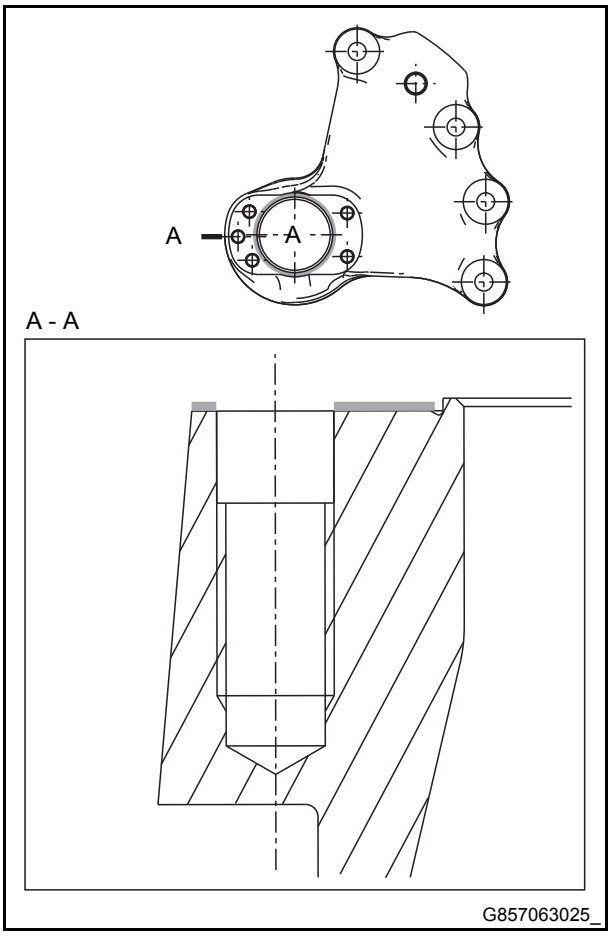


1 After putting the O-ring on to the front accelerator bracket, apply grease (autolex A) around the surface of the O-ring.



Apply a material to the surface to prevent the reaction force bolt from loosening.

Note:
Paste LOCTITE 243 thread length: 24mm MIN.



2 Apply sealing agent (08826-76002-71(08826-00090)) to the mating surfaces of the brake backing plate and front axle bracket before installation.

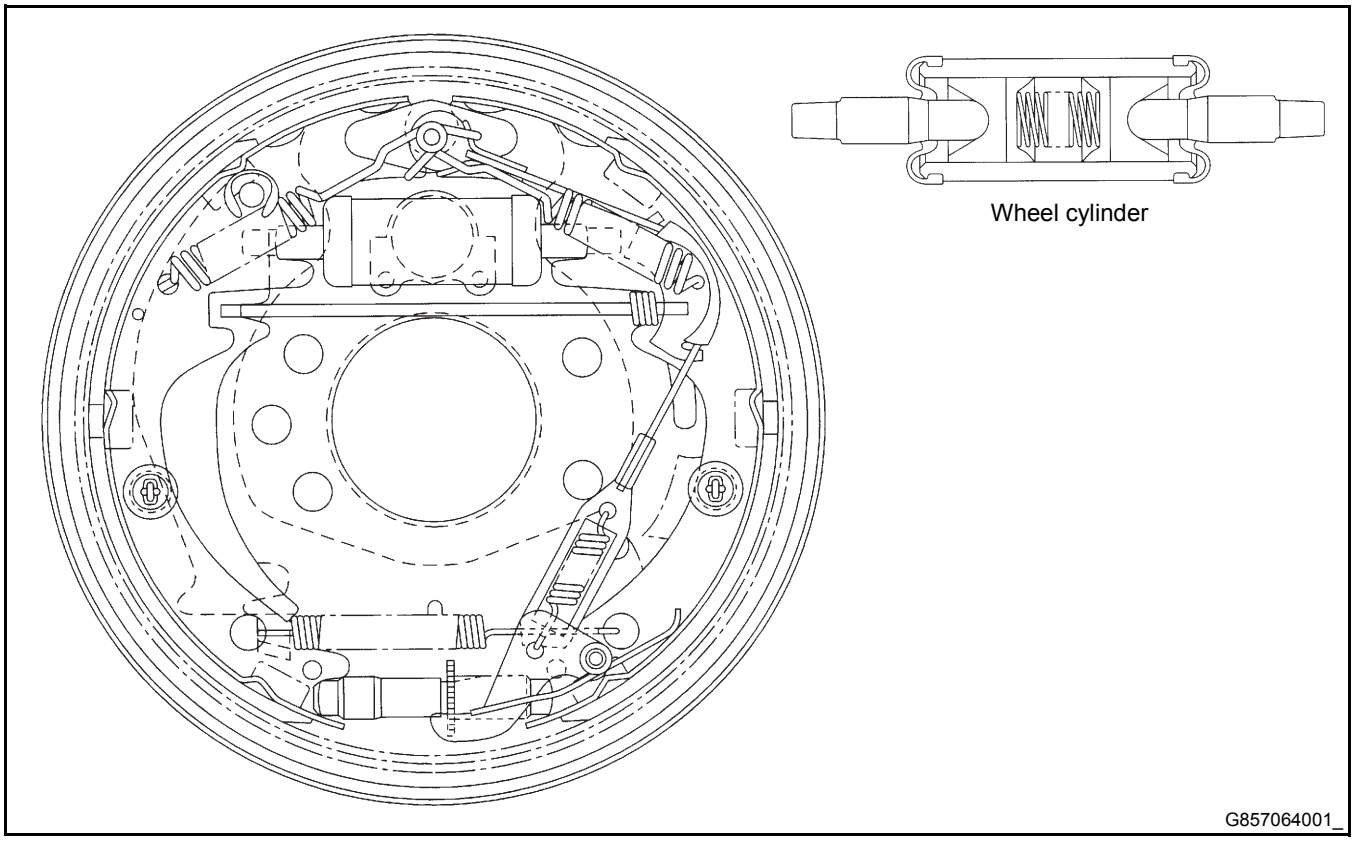
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FRONT BRAKE

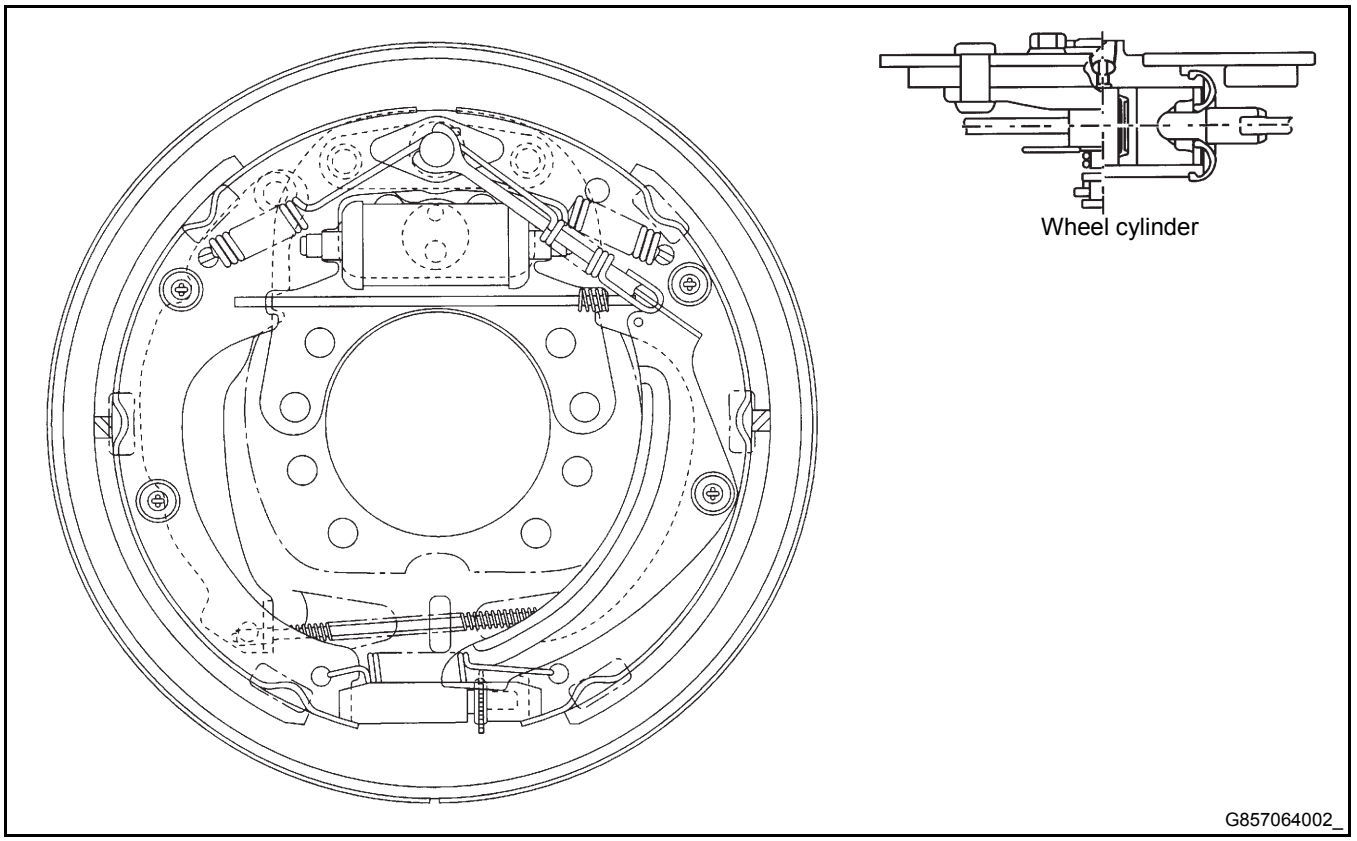
GENERAL

FRONT BRAKE

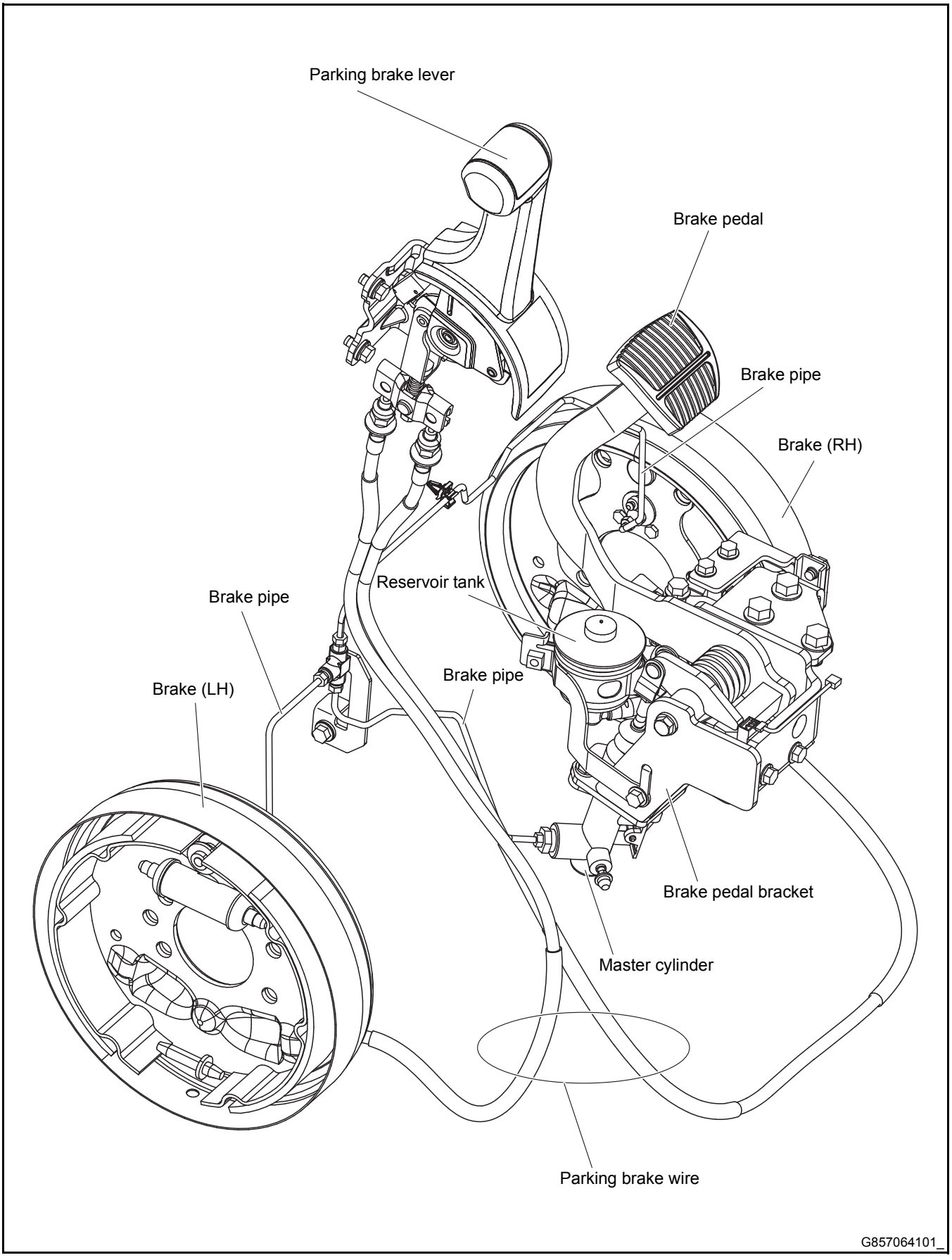
1 ton series



2・3 ton series

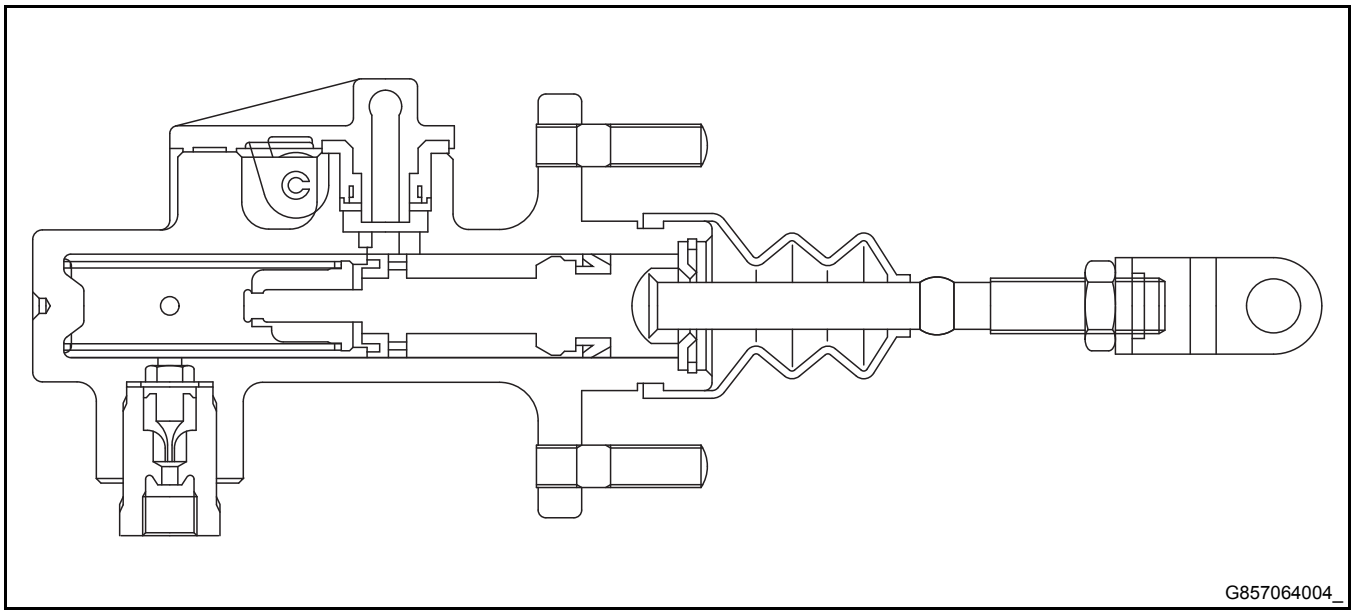


Parking brake



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Master cylinder

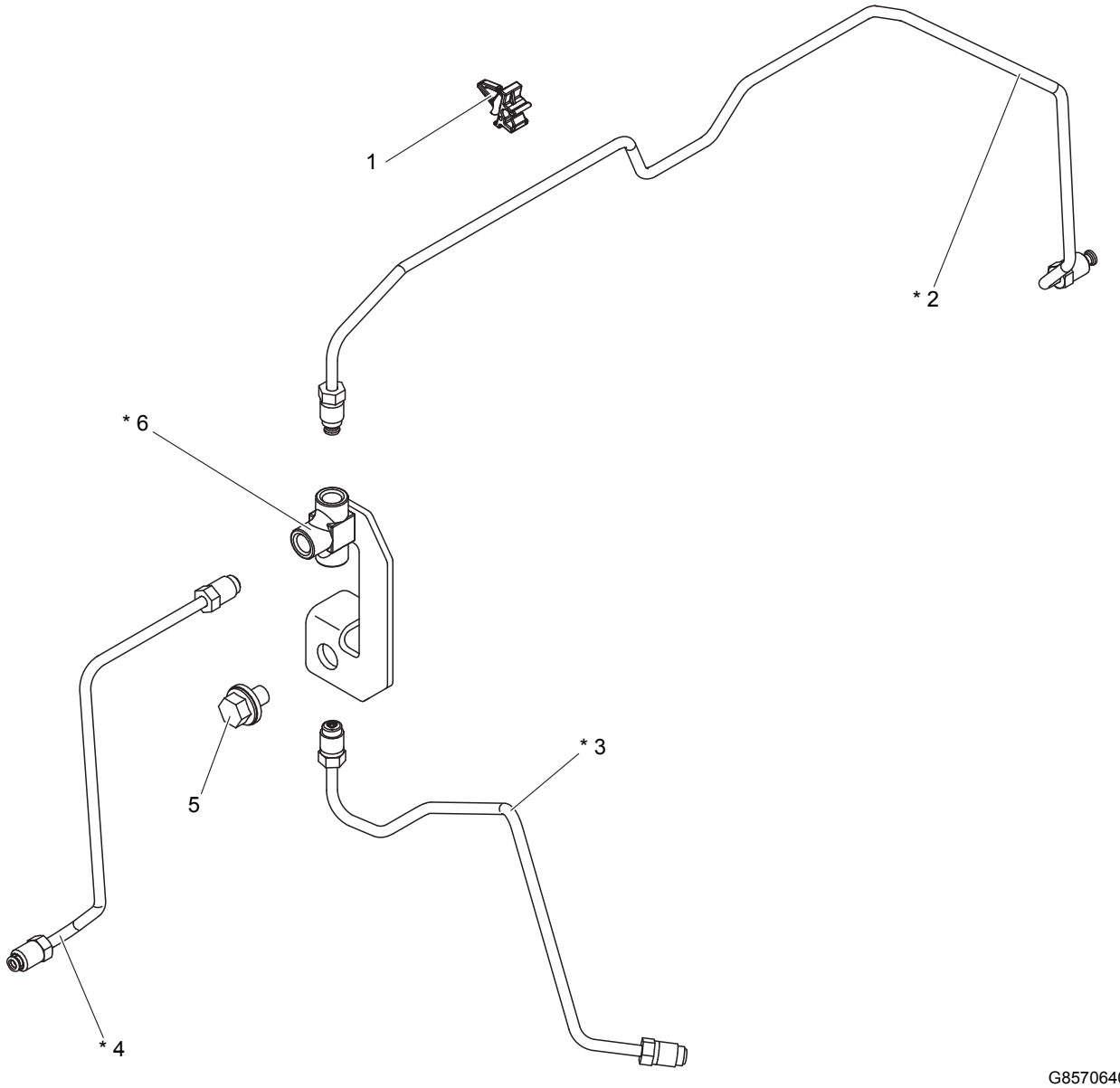


SPECIFICATIONS

Item \ Vehicle model		1 ton series	2 ton series	3 ton series
Foot brake type		Hydraulic internal expanding duo servo brake	←	←
Parking brake		Internal expanding mechanical brake	←	←
Brake drum inside diameter mm (in)		254 (10.0)	310 (12.2)	←
Brake lining	Material	Resin mold (asbestos-free)	←	←
	Dimensions Length x width x thickness mm (in)	279 x 48.5 x 5 (11.0 x 1.91 x 0.20)	323 x 60 x 7 (12.7 x 2.36 x 0.28)	343 x 60 x 7 (13.5 x 2.36 x 0.28)
Wheel cylinder bore mm (in)		22.2 (0.87)	28.5 (1.12)	←
Brake master cylinder	Bore mm (in)	19.05 (0.75)	←	←
	Stroke mm (in)	30 (1.18)	←	←
Applicable oil		SAE J-1703-DOT-3	←	←

COMPONENTS

Brake pipe

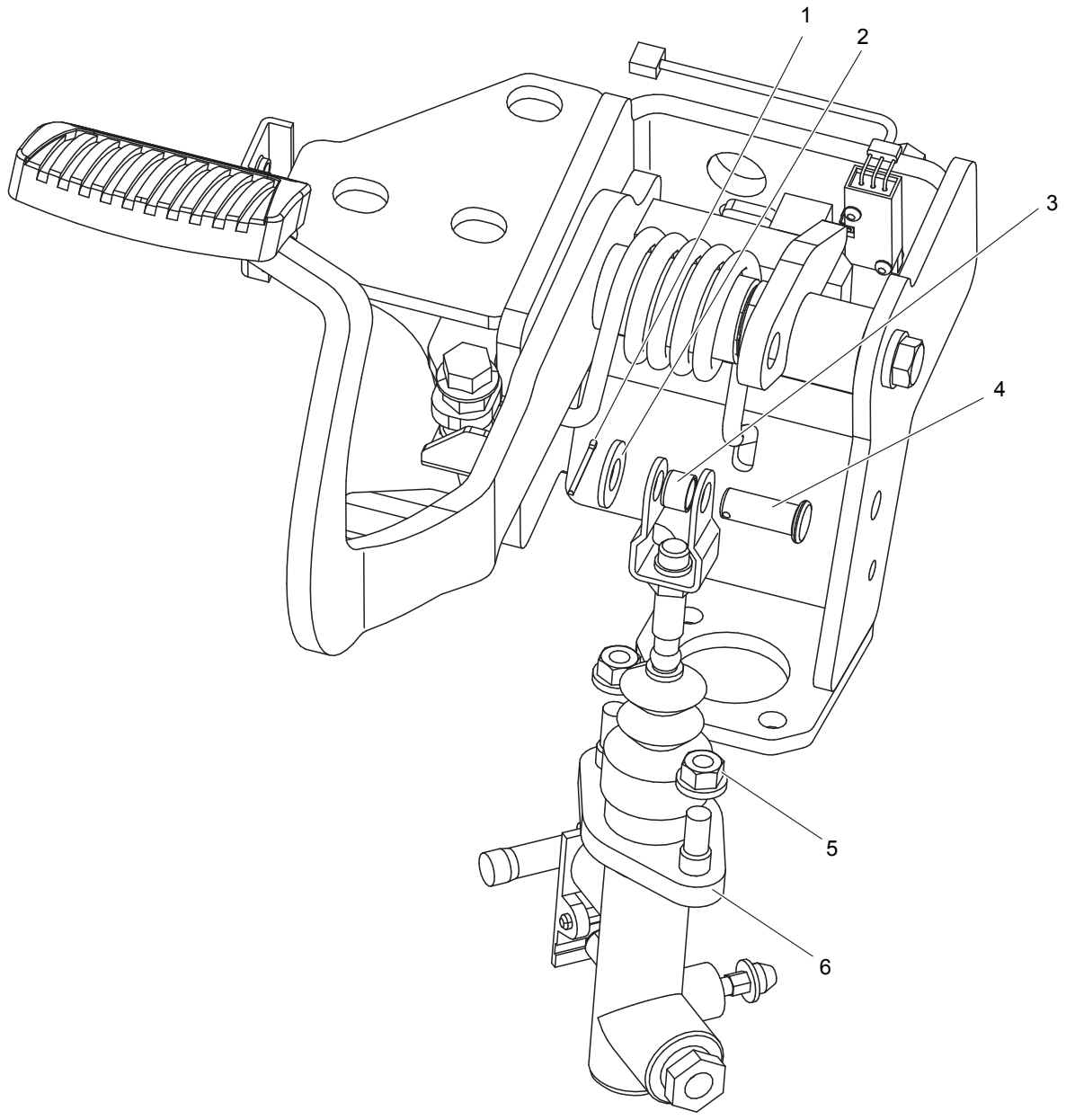


* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 15.2 (155) [11.21]

No.	Parts name	QTY	No.	Parts name	QTY
1	Clamp	1	4	Brake pipe (LH)	1
2	Brake pipe (RH)	1	5	Bolt	1
3	Brake pipe	1	6	3-way	1

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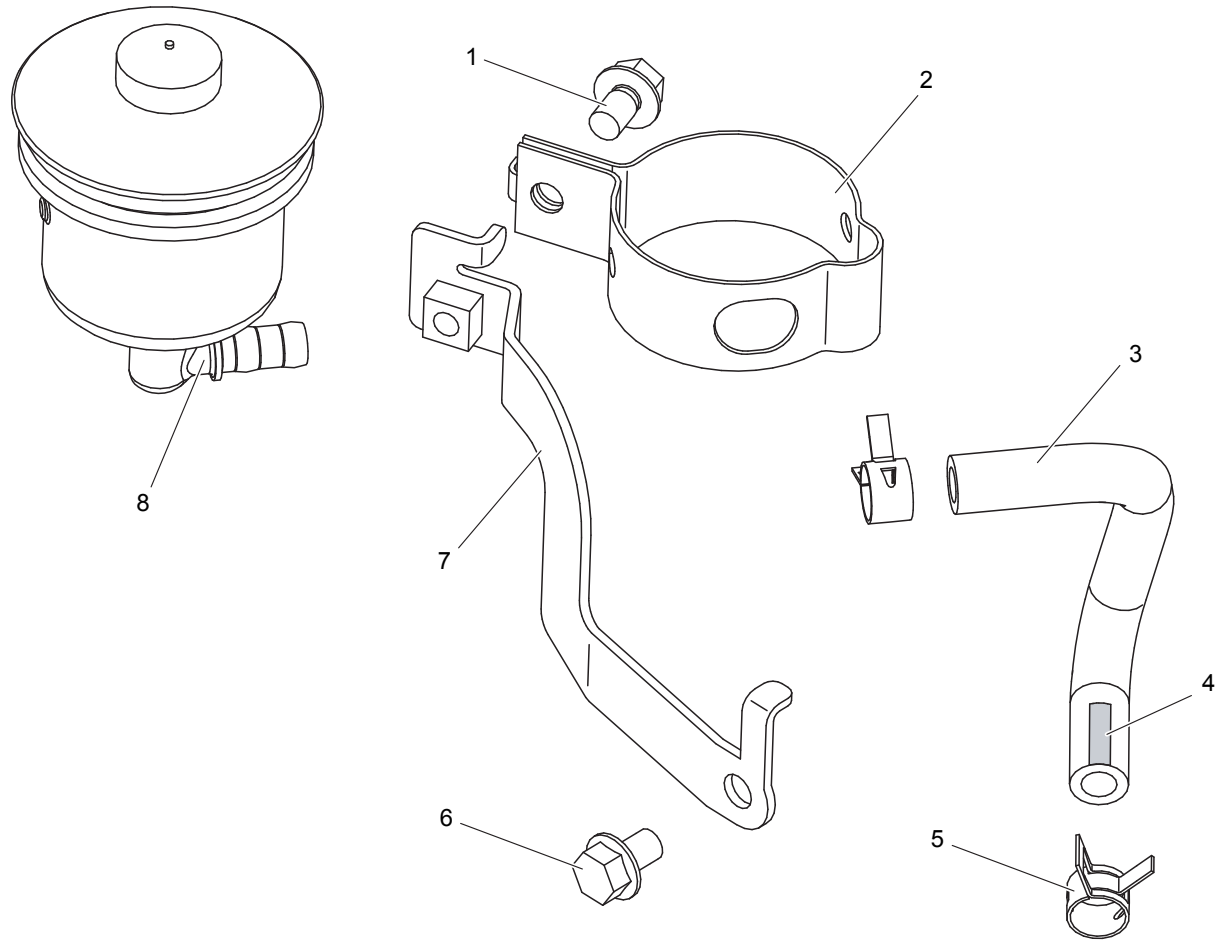
Brake master cylinder



G857064102_

No.	Parts name	QTY	No.	Parts name	QTY
1	Split pin	1	4	Pin	1
2	Plate washer	1	5	Nut	2
3	Collar	1	6	Master cylinder	1

Reservoir tank



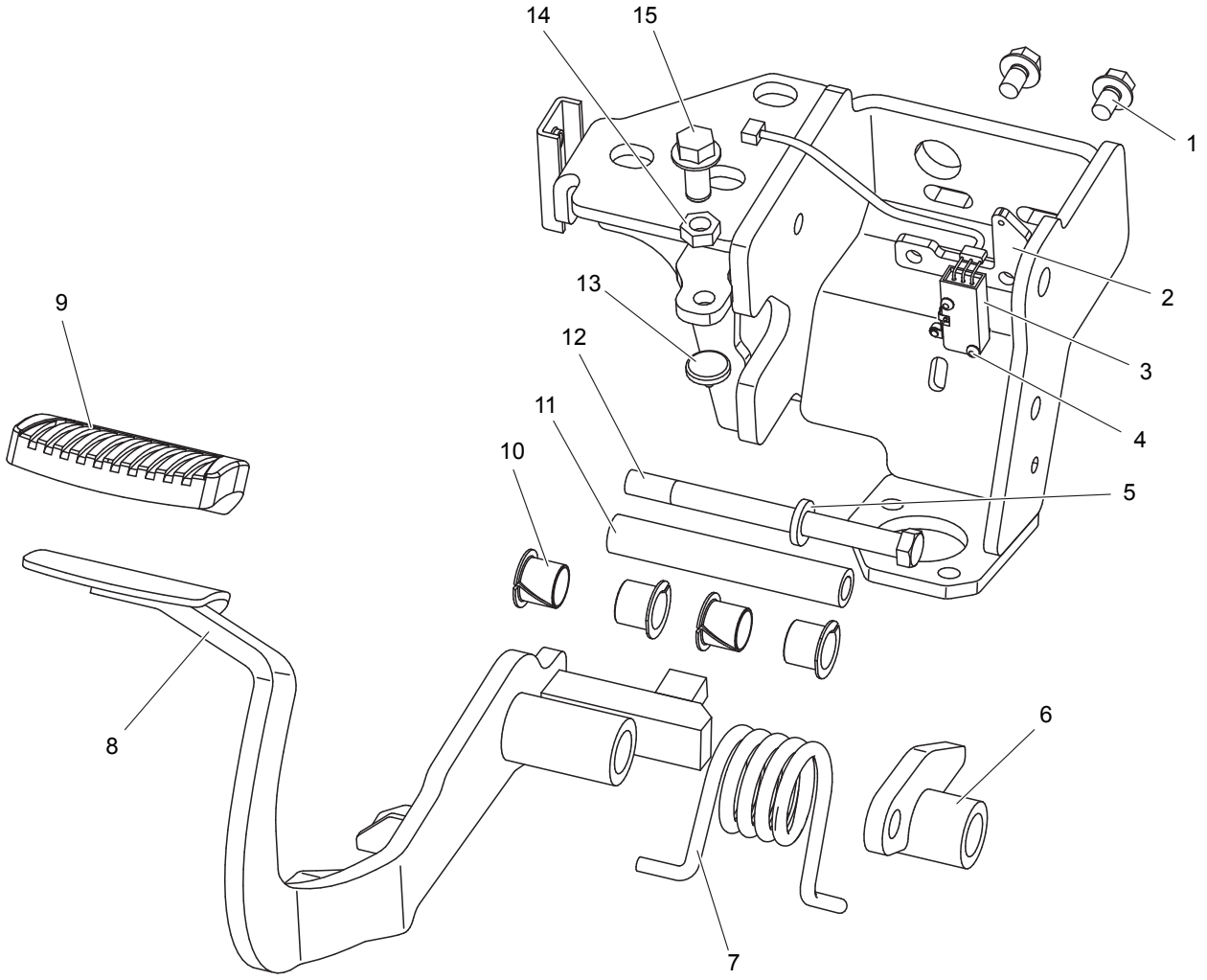
G857064007_

* The reservoir tank mark should go on the master cylinder side.

No.	Parts name	QTY	No.	Parts name	QTY
1	Bolt	1	5	Clip	2
2	Holder	1	6	Bolt	1
3	Reservoir hose	1	7	Bracket	1
4	Mark	1	8	Reservoir tank	1

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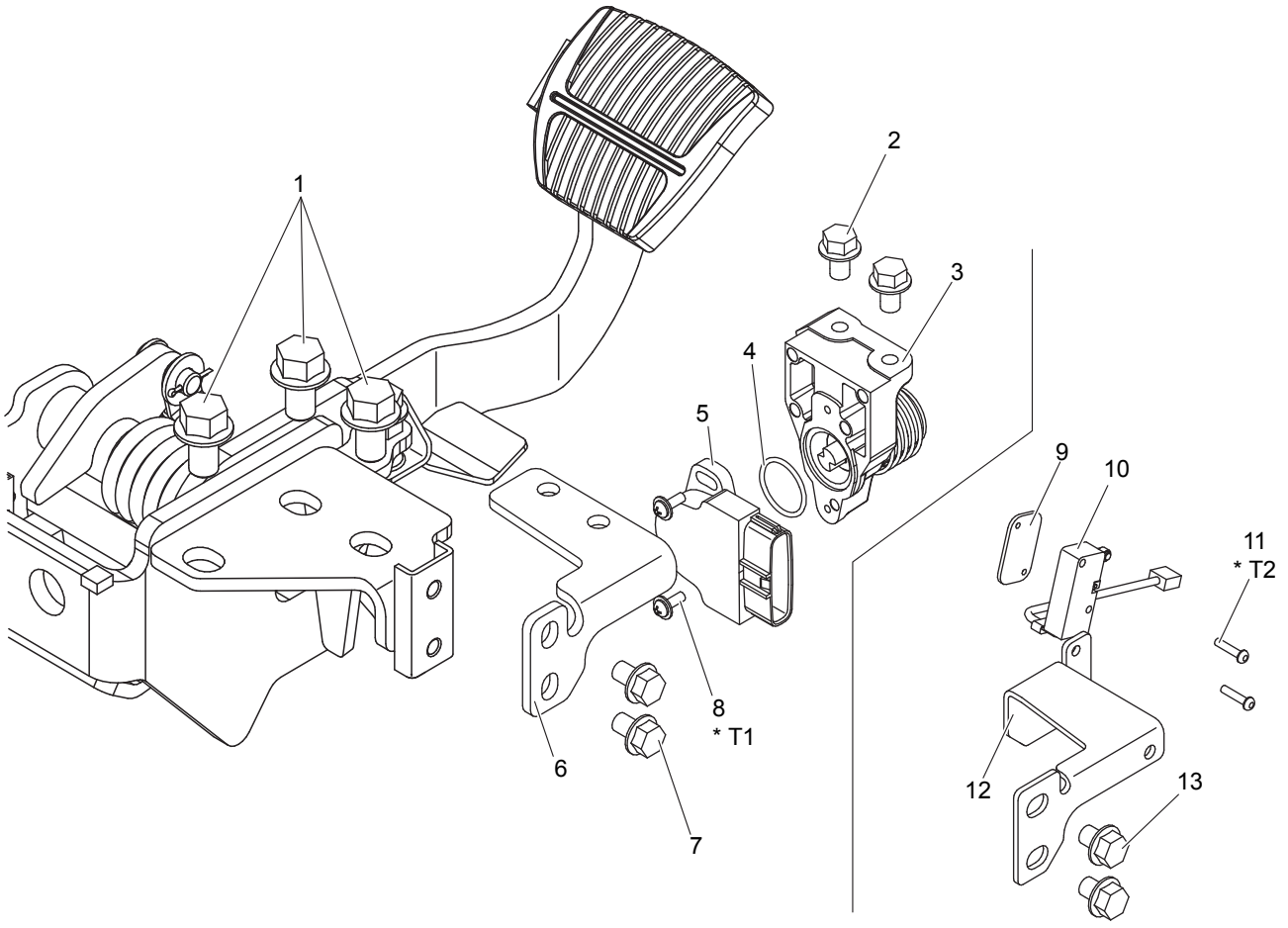
Brake pedal



G857064103_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bolt(OPT)	2	9	Pad	1
2	Plate(OPT)	1	10	Bush	4
3	Limit switch(OPT)	1	11	Spacer	1
4	Screw(OPT)	2	12	Bolt	1
5	Spring washer	1	13	Cushion rubber	1
6	Link	1	14	Lock nut	1
7	Return spring	1	15	Stopper bolt	1
8	Brake pedal	1			

Potentiometer type, limit switch type



Potentiometer type

Limit switch type

G857064009_

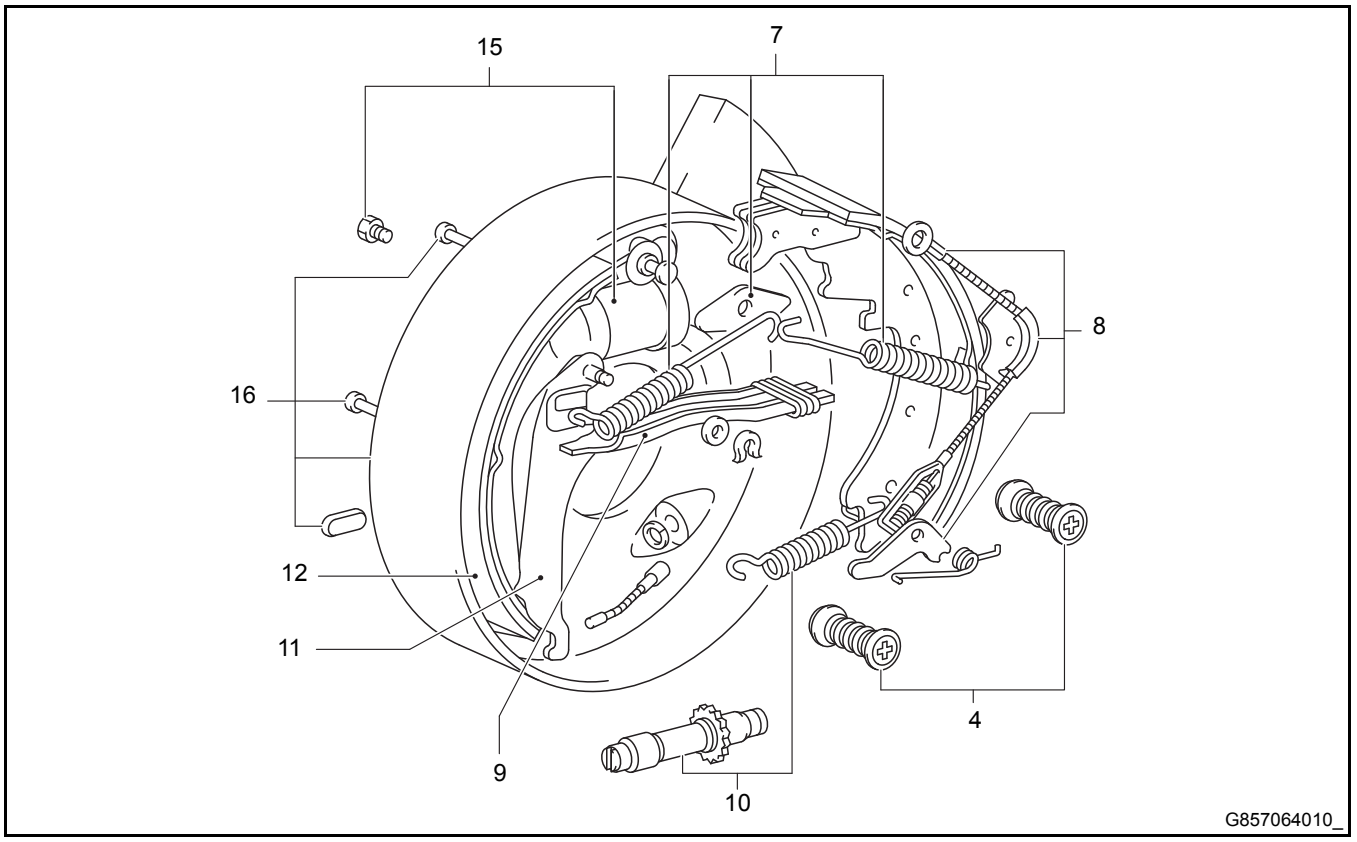
* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 1.57 ~ 2.35 (16.0 ~ 24.0) [1.16 ~ 1.74]
T2 = 0.4 ~ 0.85 (4.08 ~ 8.67) [0.296 ~ 0.627]

No.	Parts name	QTY	No.	Parts name	QTY
1	Bolt	3	8	Screw	2
2	Bolt	2	9	Plate	1
3	Link sub-assy, sensor	1	10	Switch assy	1
4	Ring, O	1	11	Screw	2
5	Sensor assy, rotary position	1	12	Bracket	1
6	Bracket	1	13	Bolt	2
7	Bolt	2			

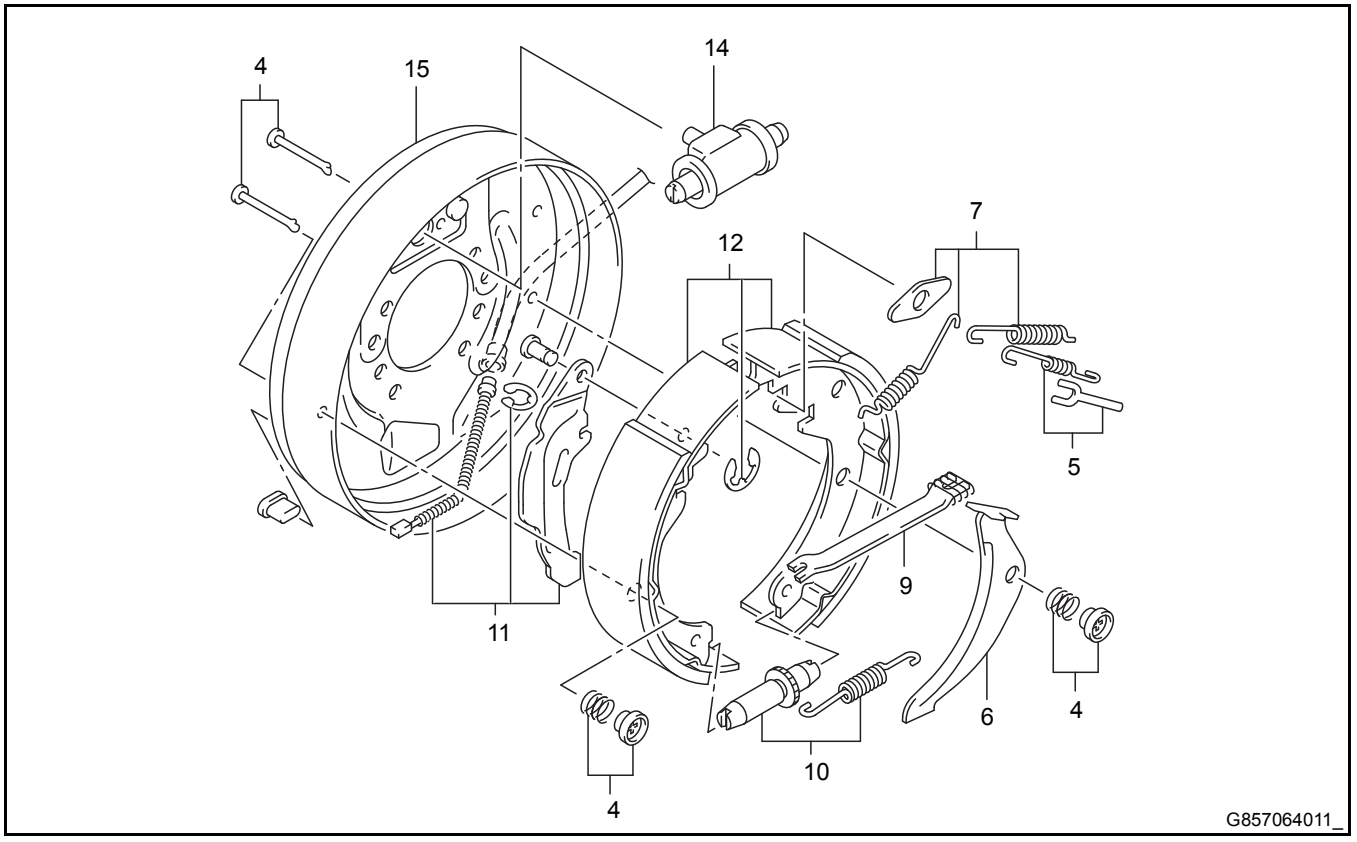
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DISASSEMBLY·INSPECTION·REASSEMBLY

1 ton series



2 · 3 ton series

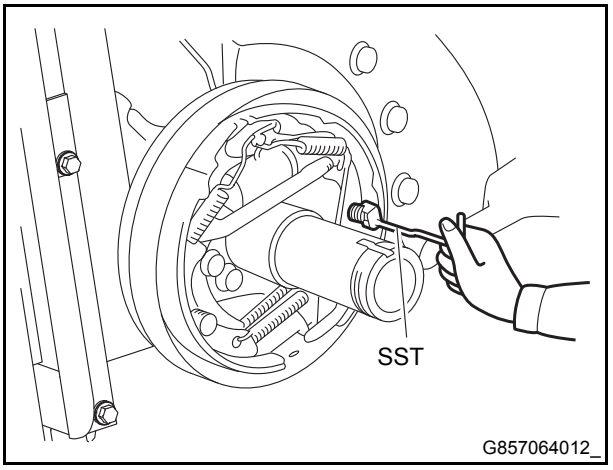


Disassembly Procedure

1 Drain brake fluid.

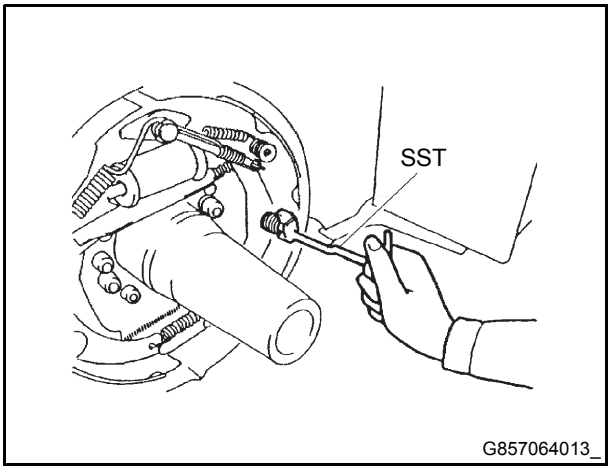
2 Remove the front wheel.

3 Remove the front axle shaft and front axle hub. (Refer to page 6-58)



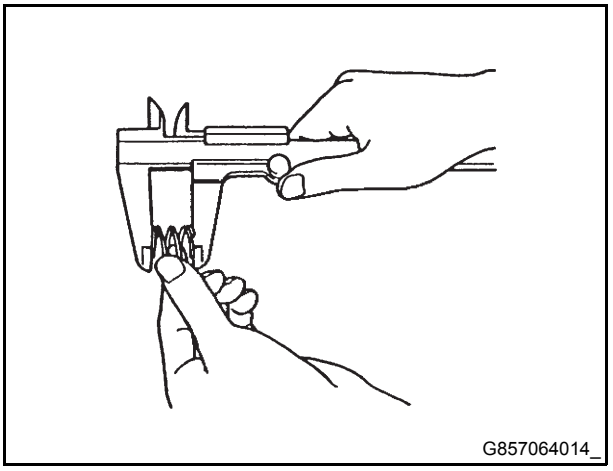
4 Remove the shoe hold down spring and cup. (1 ton series)

SST 09510-31960-71



Remove the shoe hold down spring and cup. (2 · 3 ton series)

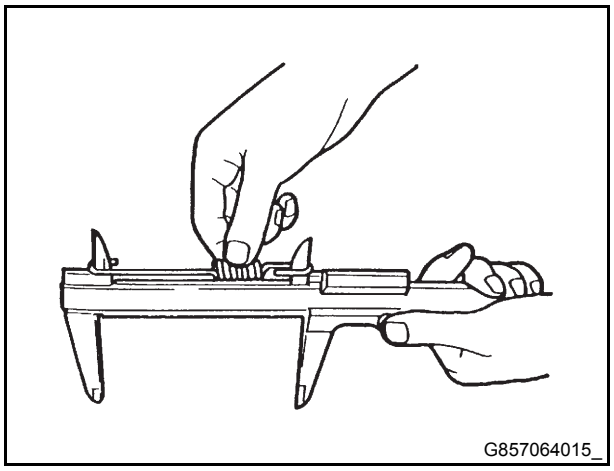
SST 09510-31960-71



Measure the free length of the hold down spring.

Standard:
1 ton series: 25.5 mm (1.004 in)
2 · 3 ton series: 32.3 mm (1.272 in)
Limit: 29.1 mm (1.146 in)

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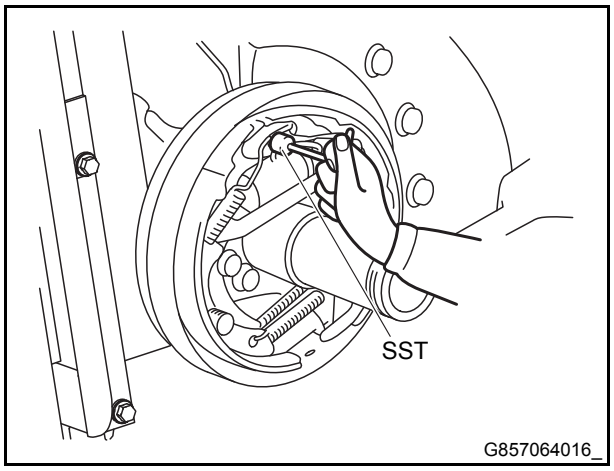

G857064015_

5 Remove the pawl lever stopper. (2 · 3 ton series)

Measure the free length of the actuator spring.

Standard: 124.5 mm (4.902 in)
Limit: No clearance between coil turns

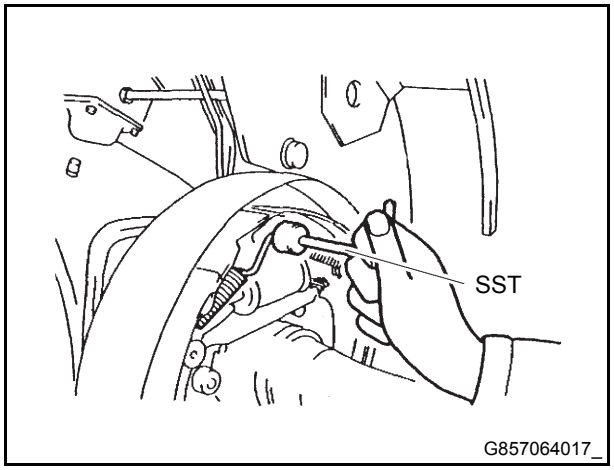
6 Remove the pawl lever. (2 · 3 ton series)



G857064016_

7 Remove the anchor to shoe spring and shoe guide plate. (1 ton series)

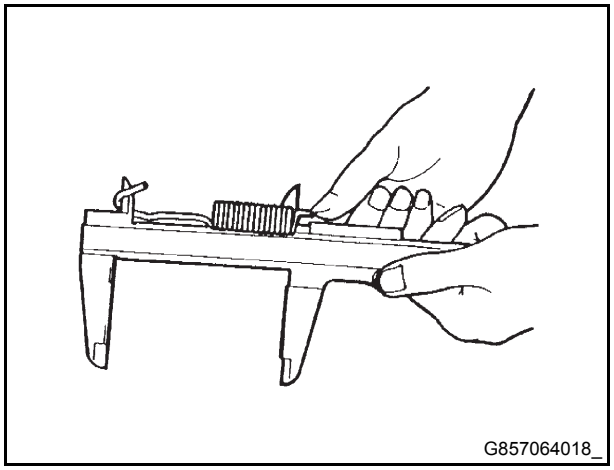
SST 09717-76001-71 (09717-20010)



G857064017_

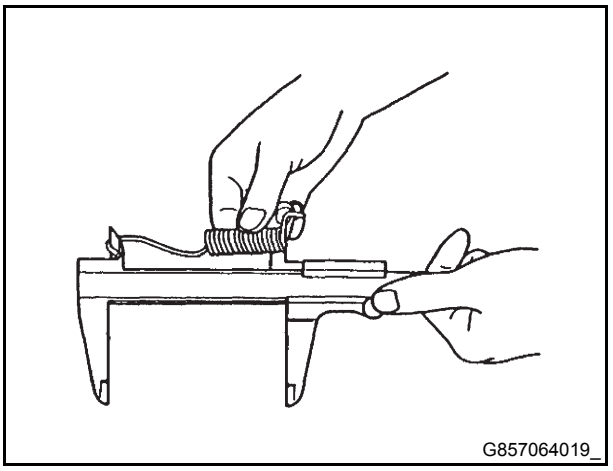
Remove the anchor to shoe spring and shoe guide plate. (2 · 3 ton series)

SST 09717-76001-71 (09717-20010)


G857064018_

Measure the free length of the anchor to shoe spring. (1 ton series)

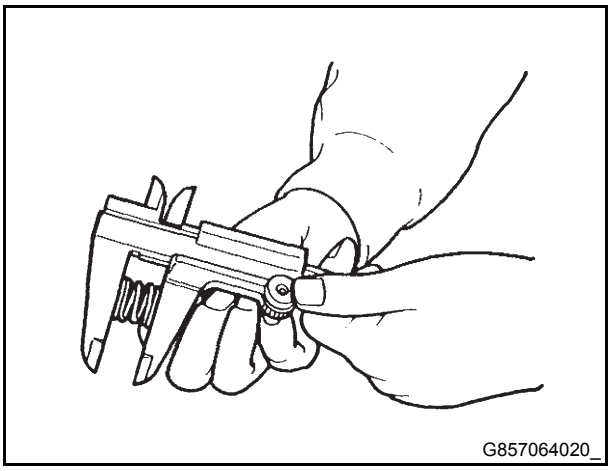
Standard:
1 ton series: 102.2 mm (4.024 in)
Limit: No clearance between coil turns


G857064019_

Measure the free length of the anchor to shoe spring. (2 · 3 ton series)

Standard:
2 · 3 ton series: 106 mm (4.173 in)
Limit: No clearance between coil turns

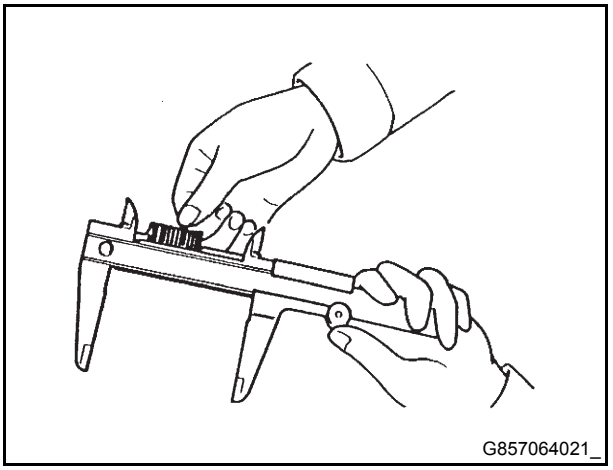
8 Remove the cable and cable guide. (1 ton series)


G857064020_

9 Remove the lever strut.

Measure the free length of the strut to shoe spring.

Standard:
1 ton series: 19.7 mm (0.776 in)
2 · 3 ton series: 23 mm (0.906 in)
Limit: 20 mm (0.787 in)

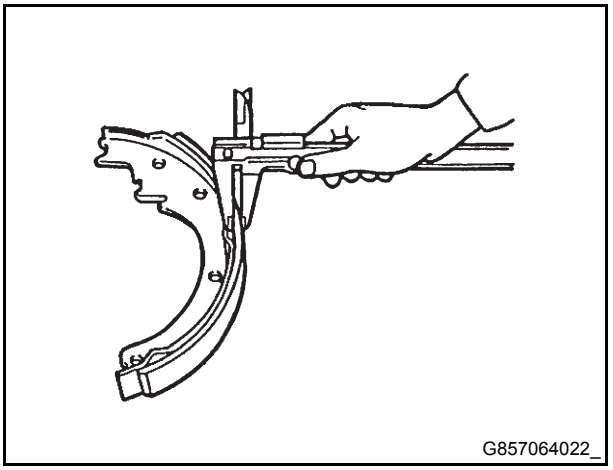

G857064021_

10 Remove the adjuster spring and adjusting screw.

Measure the free length of the adjuster spring.

Standard:
1 ton series: 99.4 mm (3.913 in)
2 · 3 ton series: 86 mm (3.386 in)
Limit: No clearance between coil turns

11 Disconnect the parking brake cable.


G857064022_

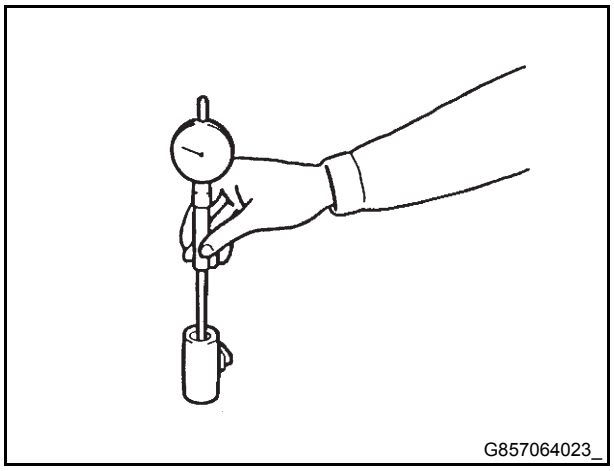
12 Remove the brake shoe.

Measure the brake lining thickness.

Standard:
1 ton series: 4.9 mm (0.193 in)
2 · 3 ton series: 7.0 mm (0.276 in)
Limit:
1 ton series: 1.0 mm (0.039 in)
2 · 3 ton series: 2.0 mm (0.079 in)

13 Disconnect the brake pipe.

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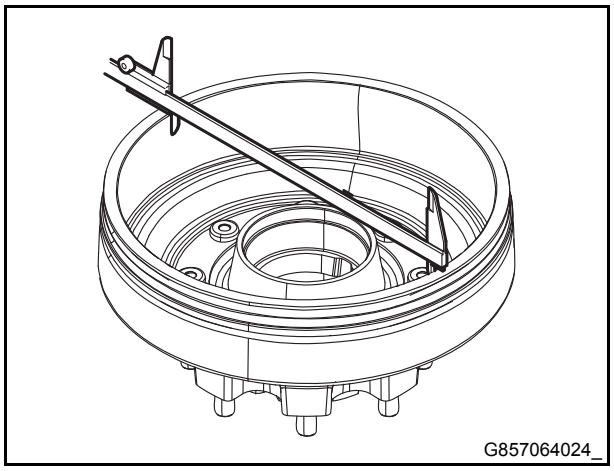

G857064023_

14 Remove the wheel cylinder ASSY.

Measure the clearance between the wheel cylinder and piston.

Limit:
1 ton series: 0.125 mm (0.00492 in)
2 · 3 ton series: 0.145 mm (0.00571 in)

15 Remove the backing plate.


G857064024_

16 Separate the brake drum from the front axle hub.

Measure the brake drum inside diameter.

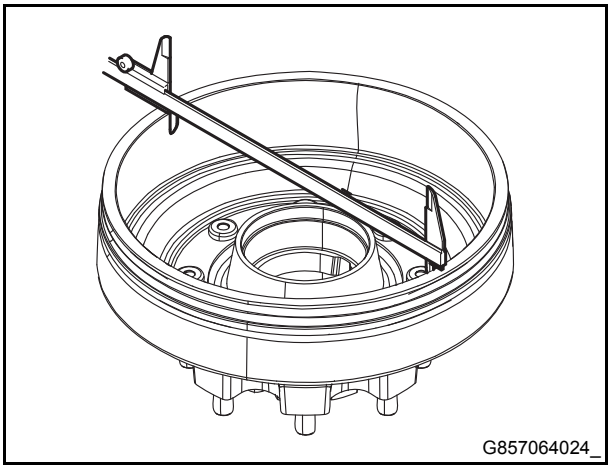
Standard:
1 ton series: 254 mm (10.0 in)
2 · 3 ton series: 310 mm (12.2 in)
Limit:
1 ton series: 256 mm (10.1 in)
2 · 3 ton series: 312 mm (12.3 in)

Reassembly Procedure

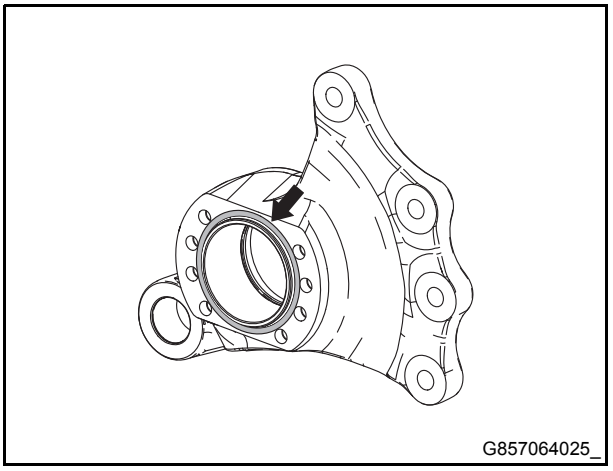
The reassembly procedure is the reverse of the disassembly procedure.

Note:

- **See that the brake lining and brake drum interior surface are free from grease or oil before installation.**
- **Before reassembly, decrease the brake drum outside diameter for installation to approx. 1 mm (0.04 in) less than the drum inside diameter by tightening the adjusting screw.**
- **After reassembly, perform brake air bleeding (See page 6-84) and braking force inspection (See page 6-85) .**


G857064024_

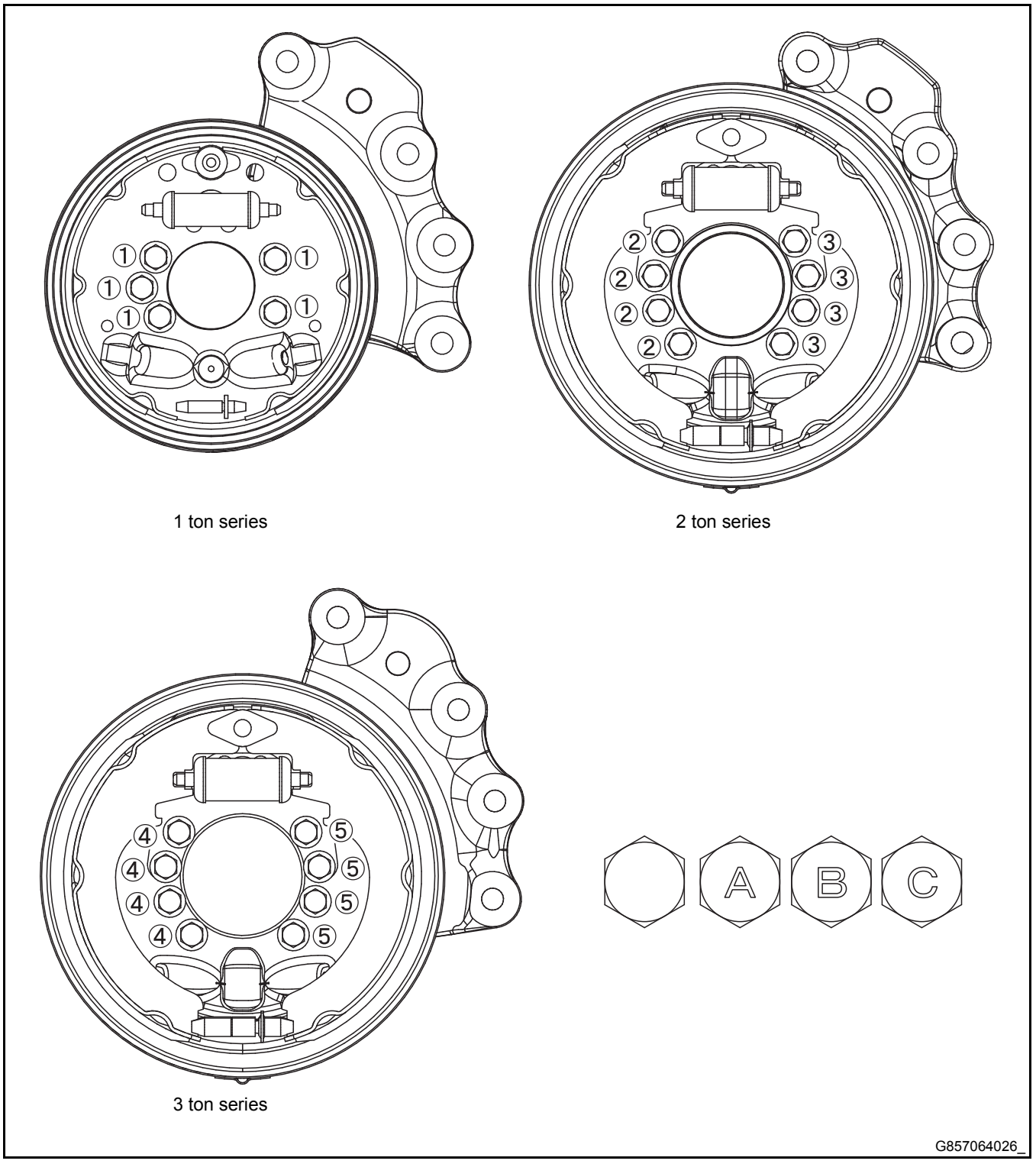
1 Apply thread tightener 08833-76001-71 (08833-00070) on the brake drum set nut before reassembly.


G857064025_

Apply liquid packing 08826-76002-71 (08826-00090) on the backing plate surface in contact with the front axle bracket to eliminate any clearance.

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2 Brake set bolts installation procedure

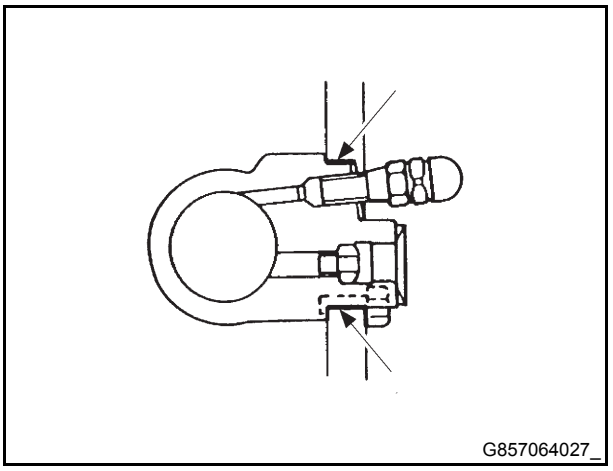


1 ton series

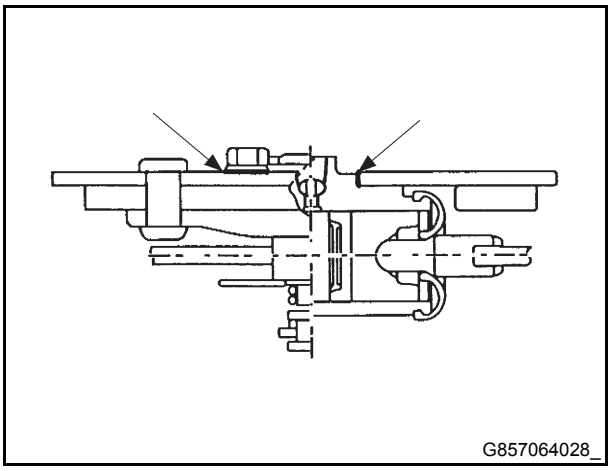
2 ton series

3 ton series

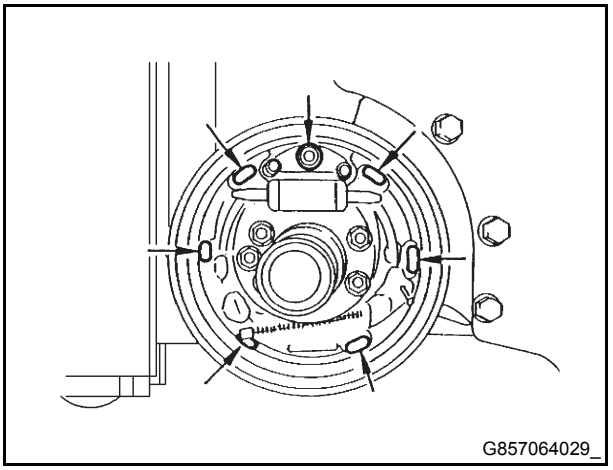
Bolt No.	(1)	(2)	(3)	(4)	(5)
Mark	No mark	B	A	C	A
Locking agent	LOCTITE 201 Color: Yellow	ThreeBond 2430 Color: Blue	LOCTITE 204 Color: Red	ThreeBond 2471 Color: Light green	LOCTITE 204 Color: Red
Tightening Torque N·m (kgf·cm) [ft·lbf]	137.0 ~ 210.0 (1397 ~ 2141) [101.1 ~ 154.9]	137.0 ~ 210.0 (1397 ~ 2141) [101.1 ~ 154.9]	137.0 ~ 210.0 (1397 ~ 2141) [101.1 ~ 154.9]	137.0 ~ 210.0 (1397 ~ 2141) [101.1 ~ 154.9]	137.0 ~ 210.0 (1397 ~ 2141) [101.1 ~ 154.9]



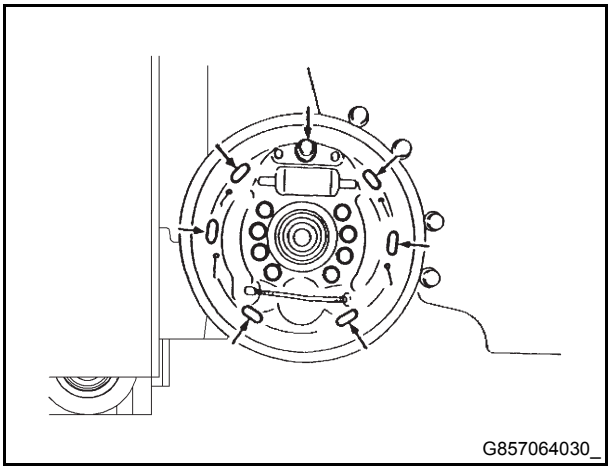
3 Apply liquid packing (08826-76001-71 (08826-00080)) to backing plate fitting portion of the wheel cylinder and on whole periphery of the set bolts to eliminate any clearance. (1 ton series)



Apply liquid packing (08826-76001-71 (08826-00080)) to backing plate fitting portion of the wheel cylinder and on whole periphery of the set bolts to eliminate any clearance. (2 · 3 ton series)

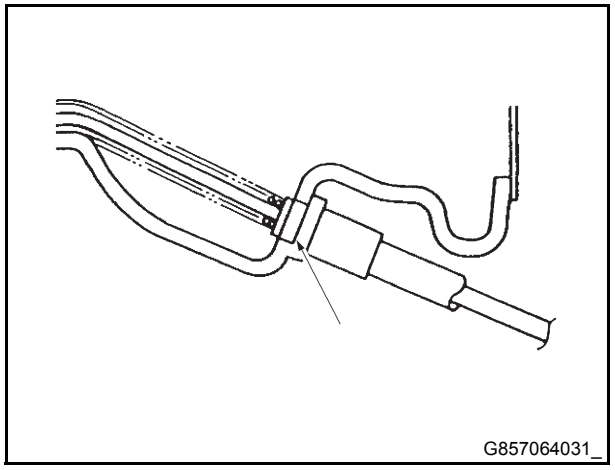


5 Before brake shoe installation, apply grease on illustrated portions of the backing plate (6 places in contact with the shoe rim and the anchor pin). (1 ton series)

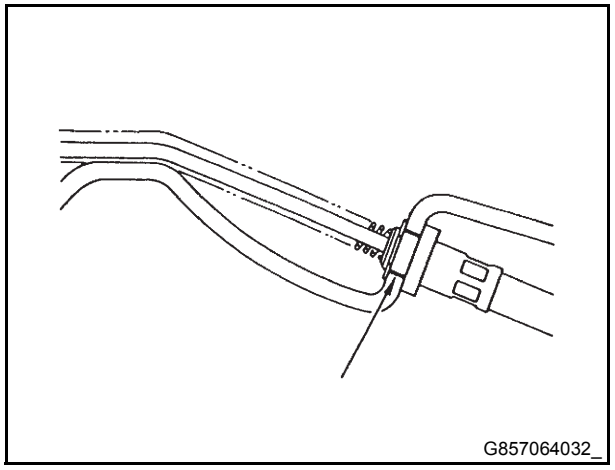


Before brake shoe installation, apply grease on illustrated portions of the backing plate (6 places in contact with the shoe rim and the anchor pin). (2 · 3 ton series)

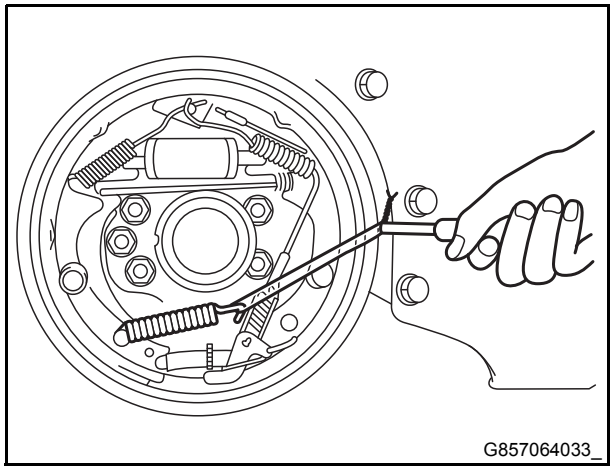
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G857064031_

6 Apply liquid packing 08826-76001-71 (08826-00080) on the parking brake cable outlet in the backing plate to eliminate any clearance. (1 ton series)


G857064032_

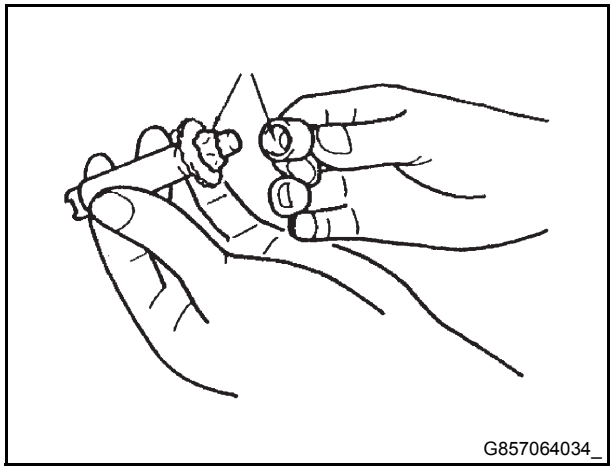
Apply liquid packing 08826-76001-71 (08826-00080) on the parking brake cable outlet in the backing plate to eliminate any clearance. (2 · 3 ton series)


G857064033_

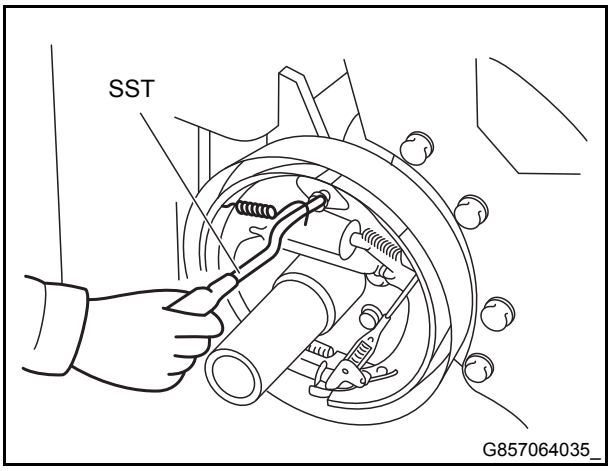
7 Install the adjusting spring and adjusting screw as instructed below.

(1) Apply grease on the adjusting screw threaded portion and fill grease in the cap.

(2) Tie a wire to the free end of the adjuster spring and set by pulling with a screwdriver. (1 ton series)

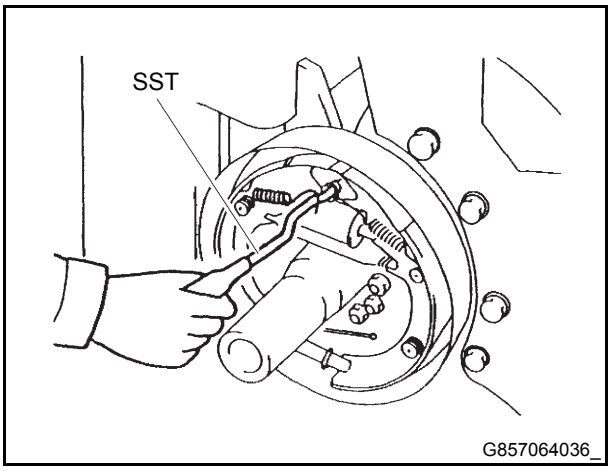

G857064034_

(2 · 3 ton series)



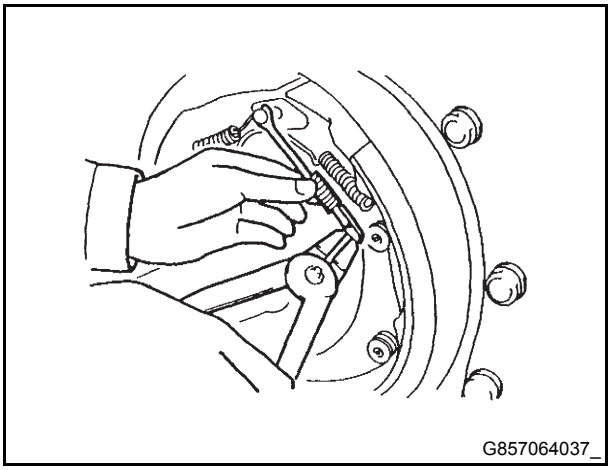
10 Install the anchor to shoe spring and shoe guide plate. (1 ton series)

SST 09718-76001-71 (09718-20010)

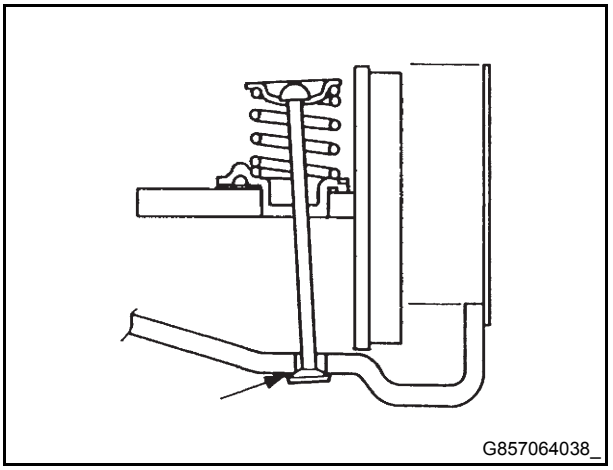


Install the anchor to shoe spring and shoe guide plate. (2 · 3 ton series)

SST 09718-76001-71 (09718-20010)



12 Use snap ring pliers and install the pawl lever stopper and actuator spring.

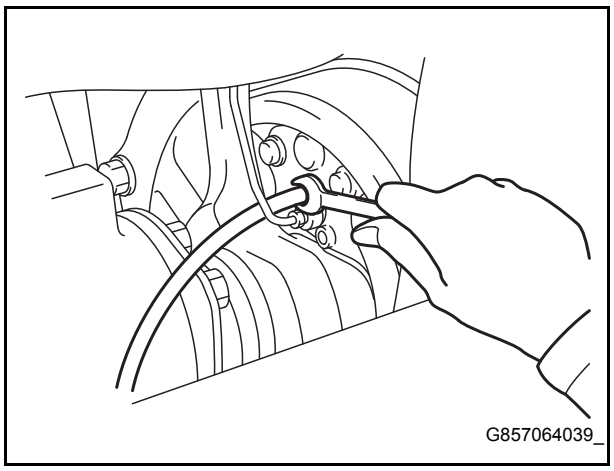


13 Apply liquid packing 08826-76001-71 (08826-00080) on the back side of the backing plate in contact with the shoe hold down spring to eliminate any clearance.

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BRAKE AIR BLEEDING

Note:
Add brake fluid to the reservoir tank during air bleeding to prevent it from becoming insufficient.


G857064039_

1 Bleed air from the brake master cylinder.

(1) Depress the brake pedal several times to compress the air in the piping, and hold that state.

(2) Loosen the bleeder plug to discharge air in the piping with the brake fluid, and tighten the plug immediately before the fluid stops coming out.

(3) Repeat steps (1) and (2) above until no air bubbles are seen in the discharged brake fluid.

2 Bleed air from wheel cylinders RH and LH.

(1) Operate as described in step 1 above for the RH and LH side at a time.

Bleeder plug
Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T = 6.90 ~ 8.80 (70.4 ~ 89.7) [5.091 ~ 6.492]

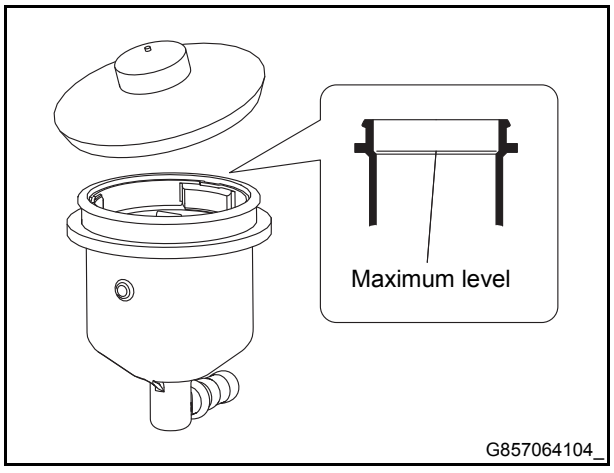
3 Add brake fluid to the specified level.

(1) Add brake fluid through the filter provided in the reservoir tank.

(2) Add brake fluid up to the specified level in the reservoir tank.

4 Table of brake oil type.

Specification	STD	COLD STORAGE (45S)
Brake fluid type	BRAKE FLUID SH-H (Same as BRAKE FLUID 2500H)	BRAKE FLUID ARCTIC



G857064104_

Note:
Add brake fluid up to the maximum line of reservoir tank.

BRAKING FORCE INSPECTION·ADJUSTMENT

1. Inspect the braking force using a brake tester or by traveling test.
   Braking distance (without load)

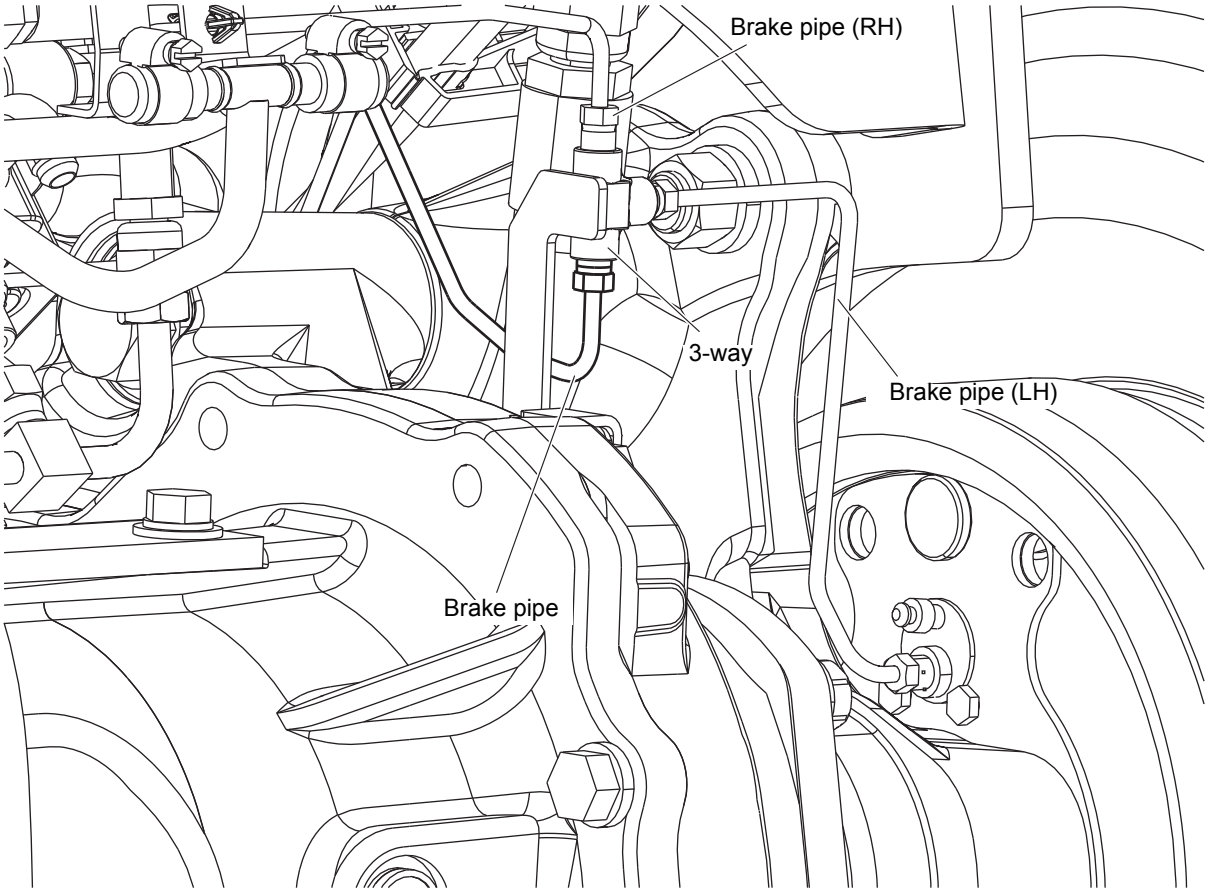
Initial speed of braking	km/h (mph)	Max. speed
Braking distance	m (ft)	5.0 (16.4) or less

2. Adjust the braking force.
   (1) Repeat traveling in the forward and reverse directions to adjust the brake shoe clearance.
   The adjusting screw adjusts the clearance automatically when the brake pedal is depressed in reverse traveling.
   (2) If the braking force is insufficient, adjuster malfunction, lining contact defect, foreign matter adhesion on the lining or brake fluid leakage is assumed, Remove and inspect the brake drum.
   (3) When the brake shoe is replaced with a new one, repeat traveling in the forward and reverse directions for running in.

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BRAKE MASTER CYLINDER

REMOVAL·INSTALLATION



Removal Procedure

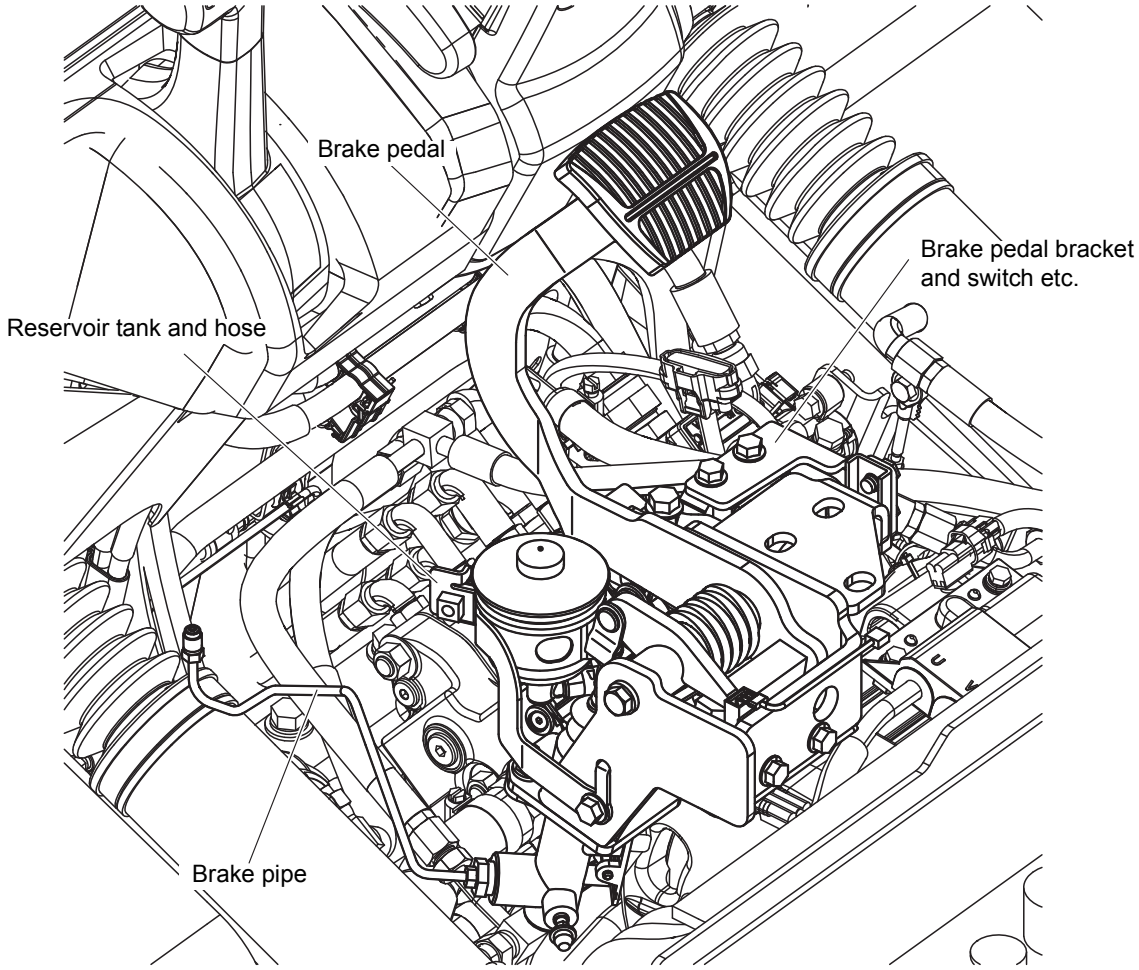
1 Tilt the mast fully forward.

2 Turn the key switch OFF and disconnect the battery plug.

3 Remove the floor mat.

4 Remove the toe board.

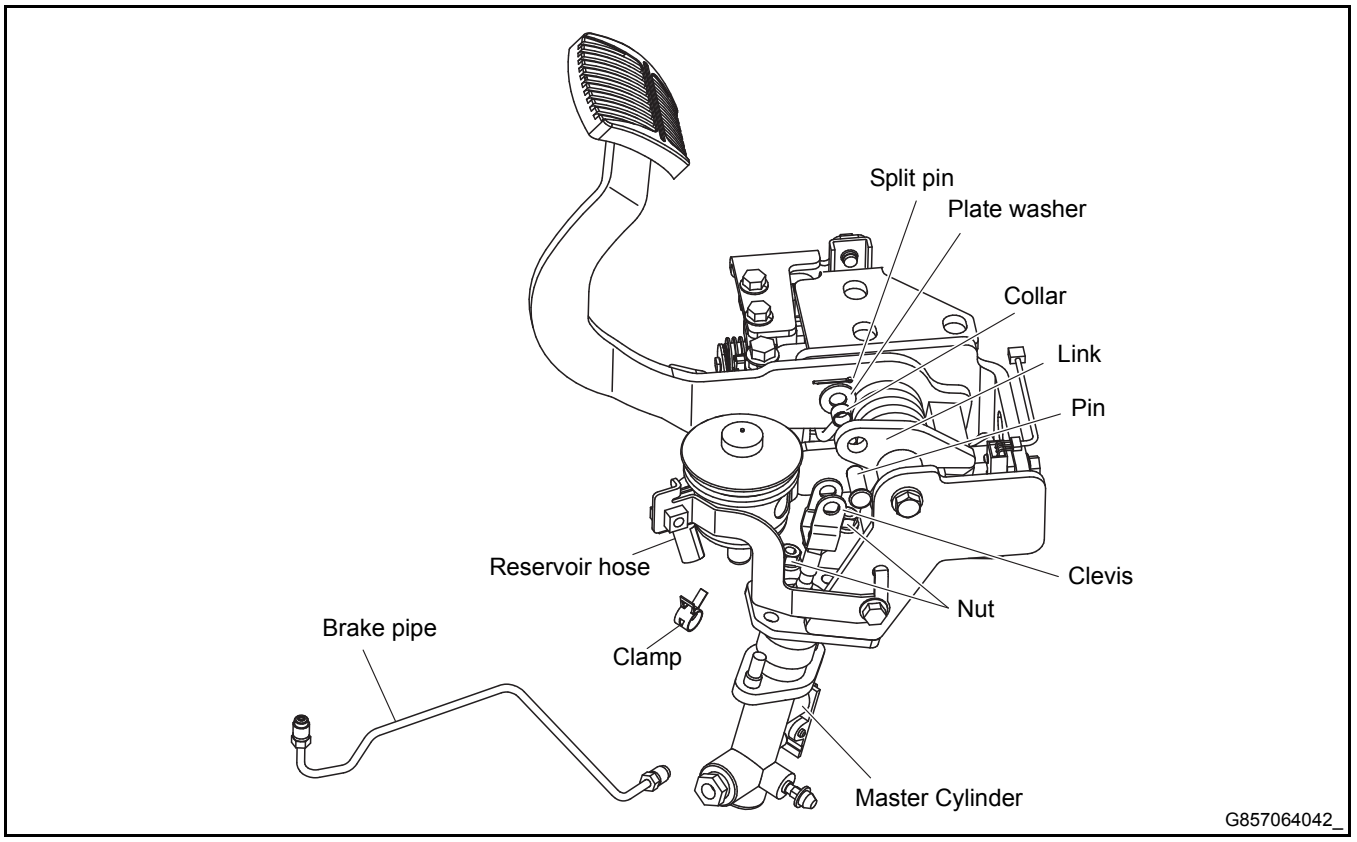
5 Disconnect the brake pipe from the 3-way.



6 Remove the brake pedal and brake pedal bracket.

Note:
Remove with the master cylinder, reservoir tank and brake pipe attached.

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7 Disconnect the brake pipe from the master cylinder.

8 Remove the clevis of the master cylinder from the link.

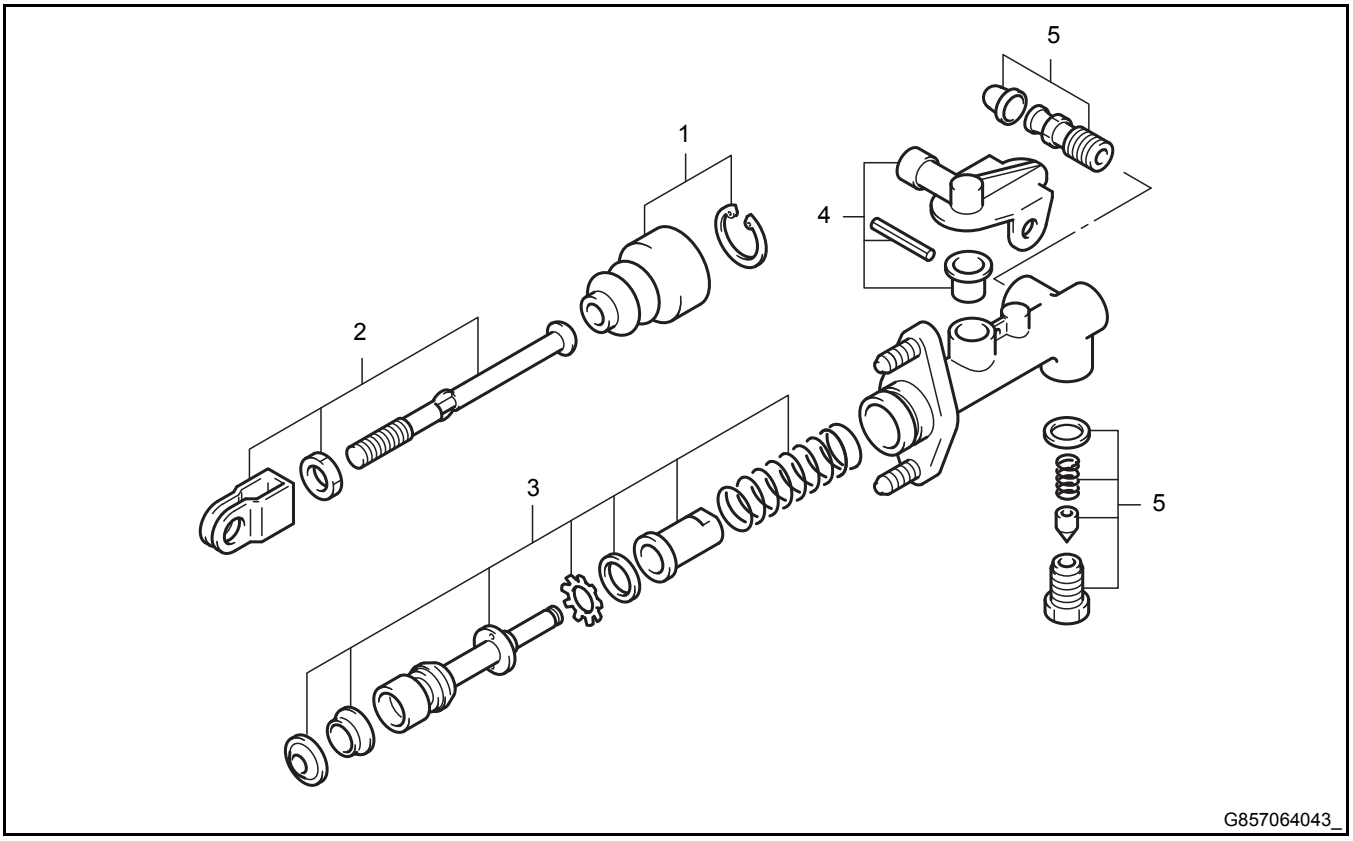
9 Remove the nut from the brake pedal bracket and disconnect the master cylinder.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Note:
After installation of the master cylinder, perform air bleeding.

DISASSEMBLY·INSPECTION·REASSEMBLY



Disassembly Procedure

1 Turn the boot up and remove the snap ring.

2 Remove the push rod.

3 Remove the piston.

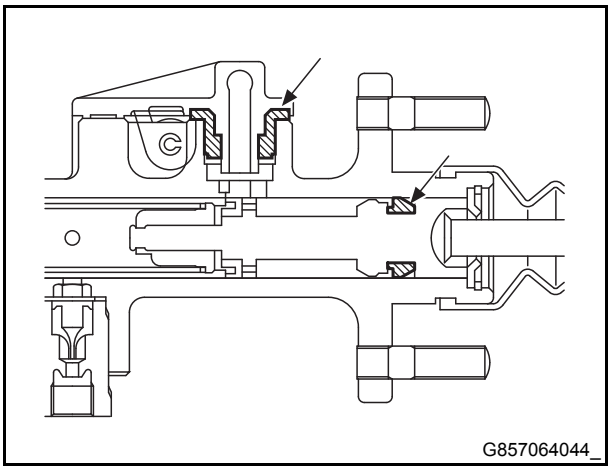
4 Remove the pin and the fluid inlet elbow.

5 Remove the outlet plug and valve.

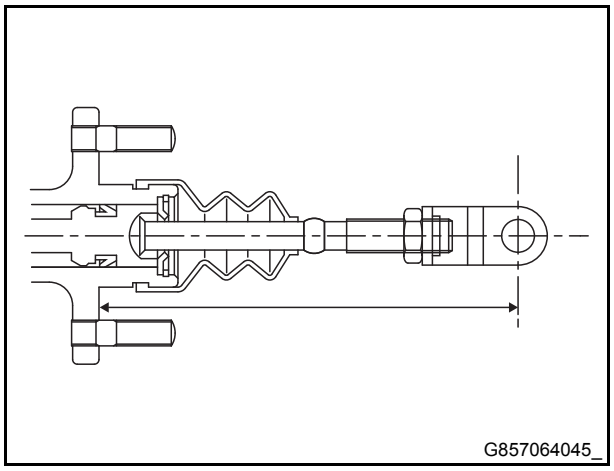
Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

3 Apply rubber grease on the piston cup and whole periphery of the cup before reassembly.



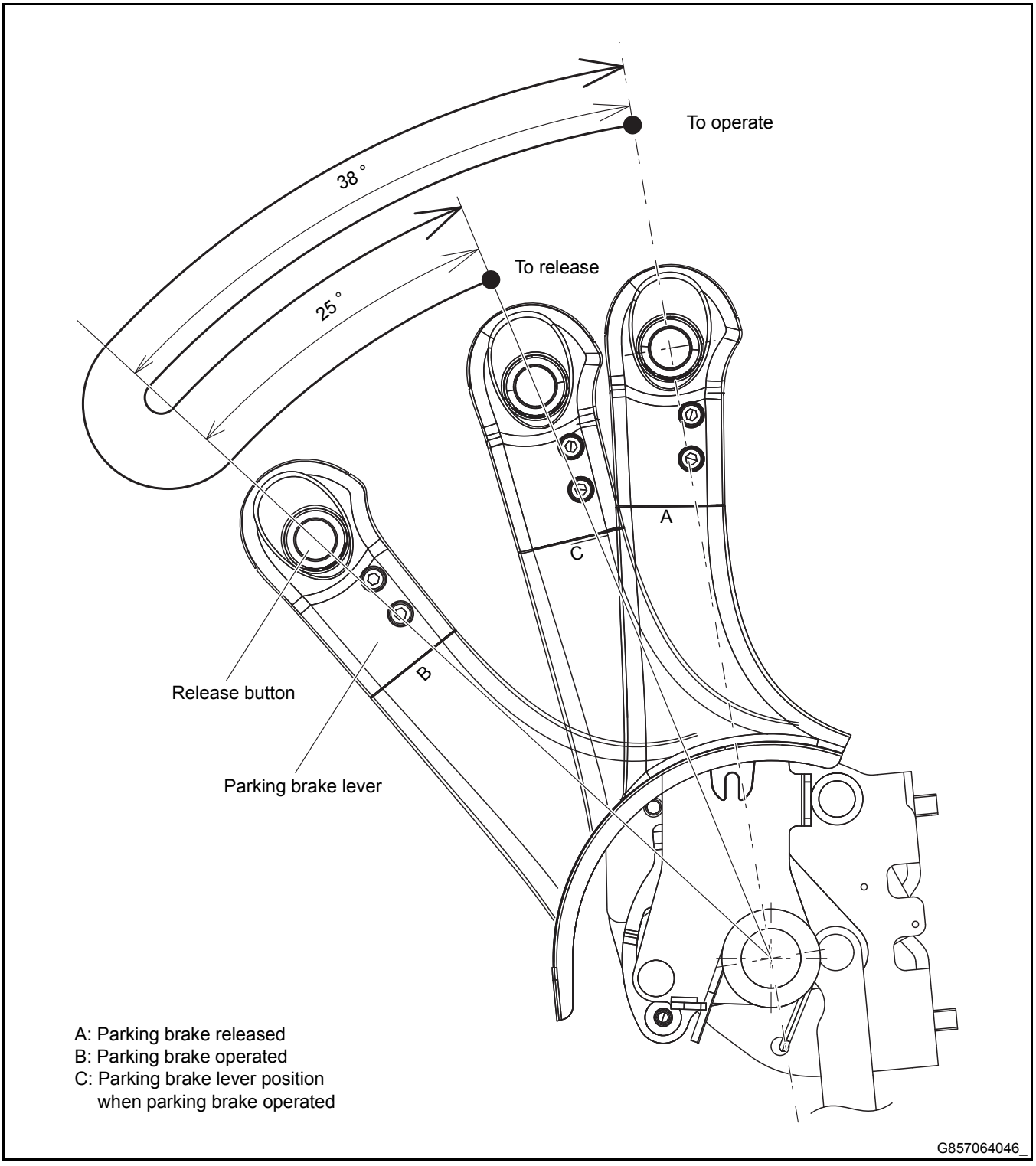
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4 Temporarily set the push rod length to the illustrated dimension, and make readjustment after installation.

PARKING BRAKE LEVER

GENERAL



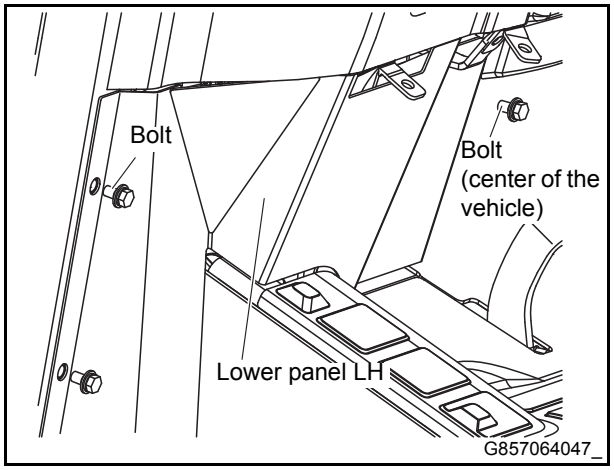
How to Operate the Parking Brake Lever

To activate the parking brake
- Move the parking brake from position A to position B.
- The parking brake lever will automatically move to position C when the parking brake is activated.
- When this happens, the indication lamp will come on in the combination meter (key switch ON).

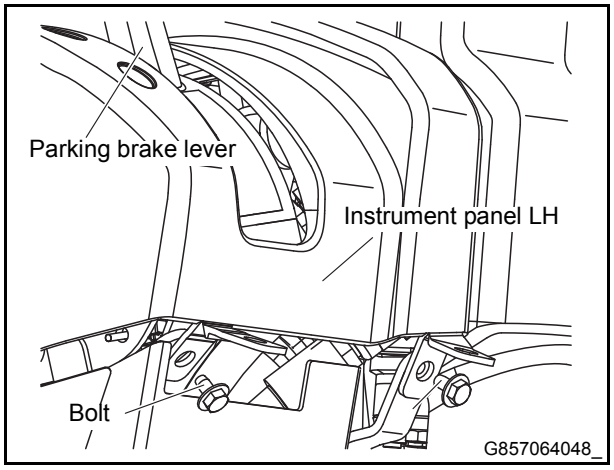
To release the parking brake
- Move the parking brake lever from position C to position B while holding the release button.
- Once the parking brake is released the parking brake lever will automatically move back to position A.

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PARKING BRAKE WIRE REMOVAL



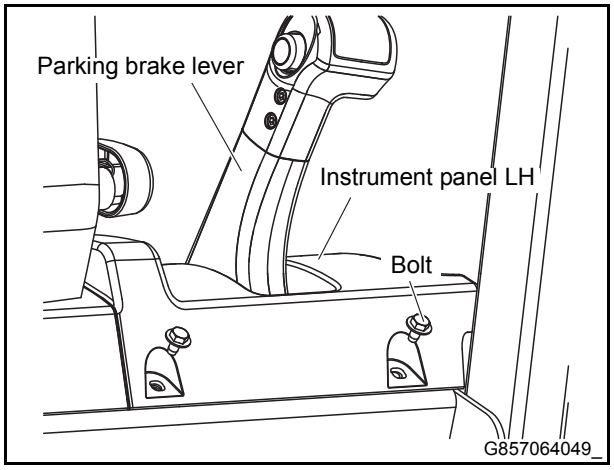
1 Remove the lower panel.

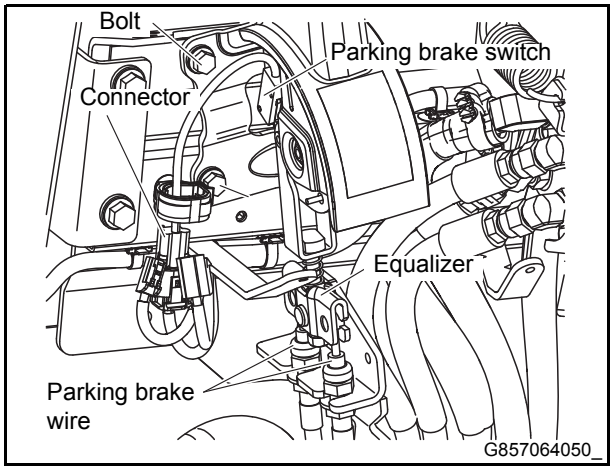


2 Remove the instrument panel LH.

Driver's seat side

Mast side



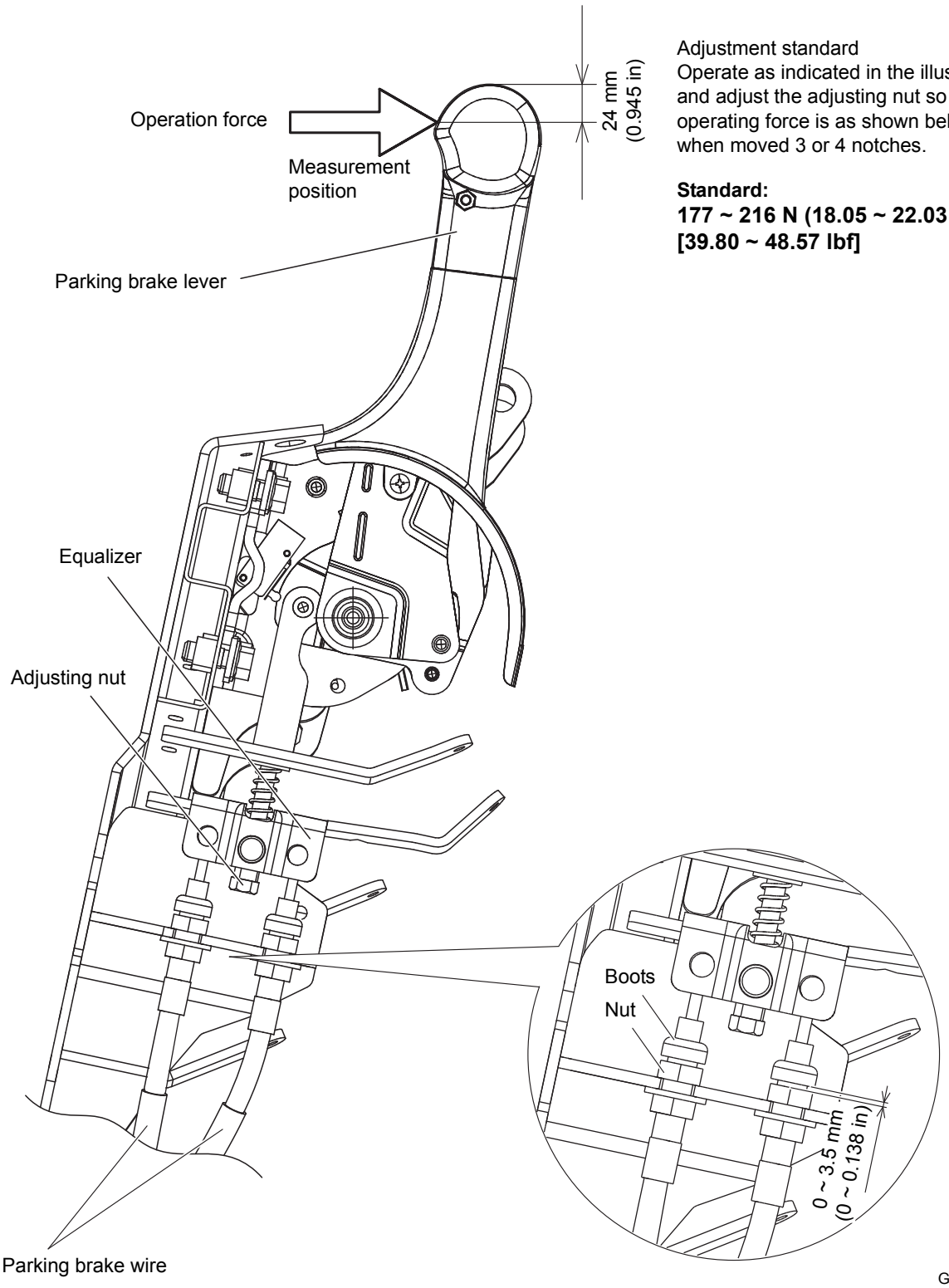


3 Disconnect the connector of the parking switch.

4 Remove the bolt of the parking brake lever.

5 Disconnect the parking brake wire from the equalizer.

PARKING BRAKE INSPECTION·ADJUSTMENT



Adjustment standard
Operate as indicated in the illustration and adjust the adjusting nut so that the operating force is as shown below when moved 3 or 4 notches.

Standard:
177 ~ 216 N (18.05 ~ 22.03 kgf) [39.80 ~ 48.57 lbf]

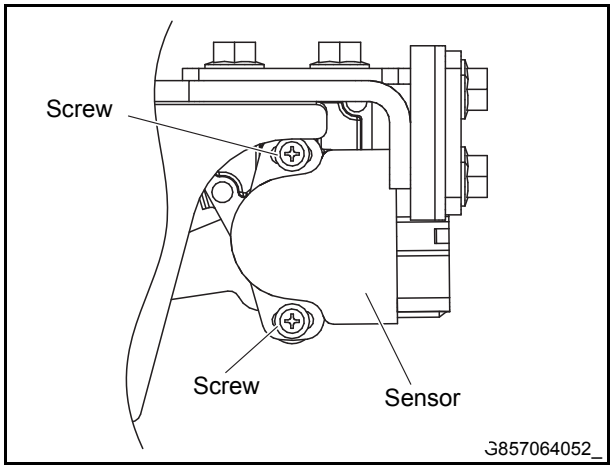
Note:
After adjusting, confirm that the vehicle stops with a load and 15% gradient.
If it does not stop, adjust where the brake makes contact and make sure it satisfies the above.

Caution:
When checking the parking brake force, turn OFF regenerative braking.

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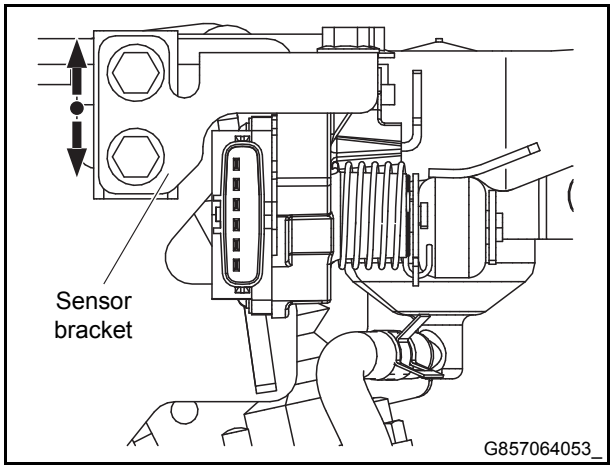
BRAKE SWITCH INSPECTION·ADJUSTMENT

Potentiometer type (8FBN15,16,18,20,25,30)

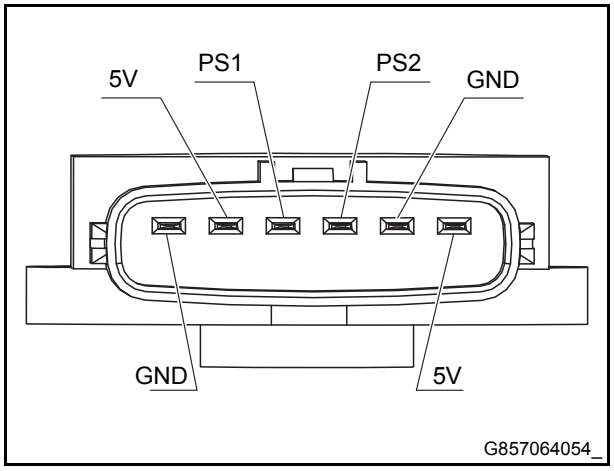


Assemble the sensor so that the hole to attach the screw comes in the center of the oblong sensor hole.

Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T = 1.57 ~ 2.35 (16.0 ~ 24.0) [1.158 ~ 1.736]

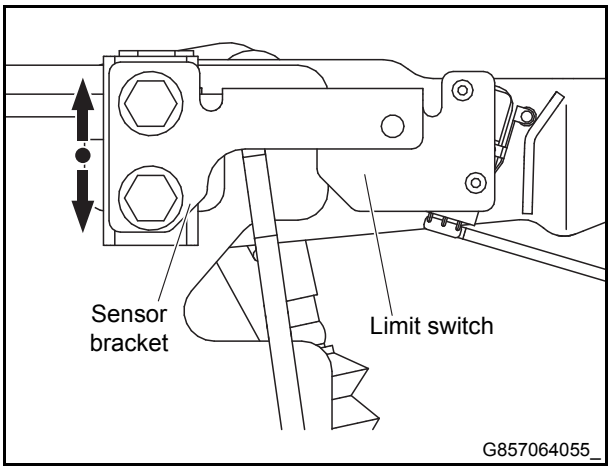


Adjust the sensor bracket position using the oblong hole so that the PS1 output value for the initial sensor position is 1.1 ± 0.1V on the display. (The applied voltage is 5.0 ± 0.1V.)



Note:

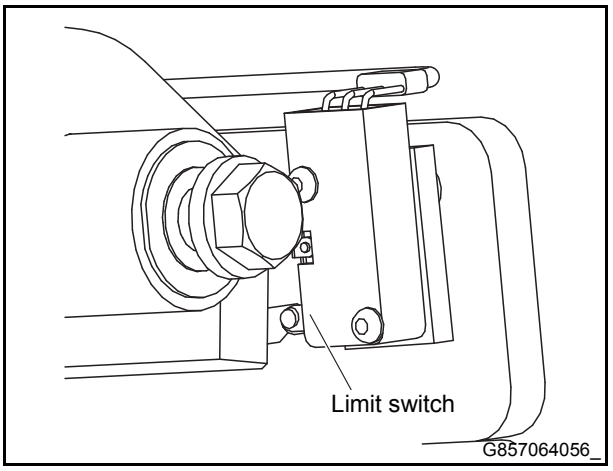
- **When the brake sensor is replaced, perform matching after installation. (Refer to section 13.)**



Limit switch type (50-8FBN15,18,20)

Adjust using the oblong hole so that there is no play in the brake pedal and the switch turns ON when it is depressed in the range of 3 to 10 mm.

Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T = 0.4 ~ 0.85 (4.08 ~ 8.67) [0.295 ~ 0.627]

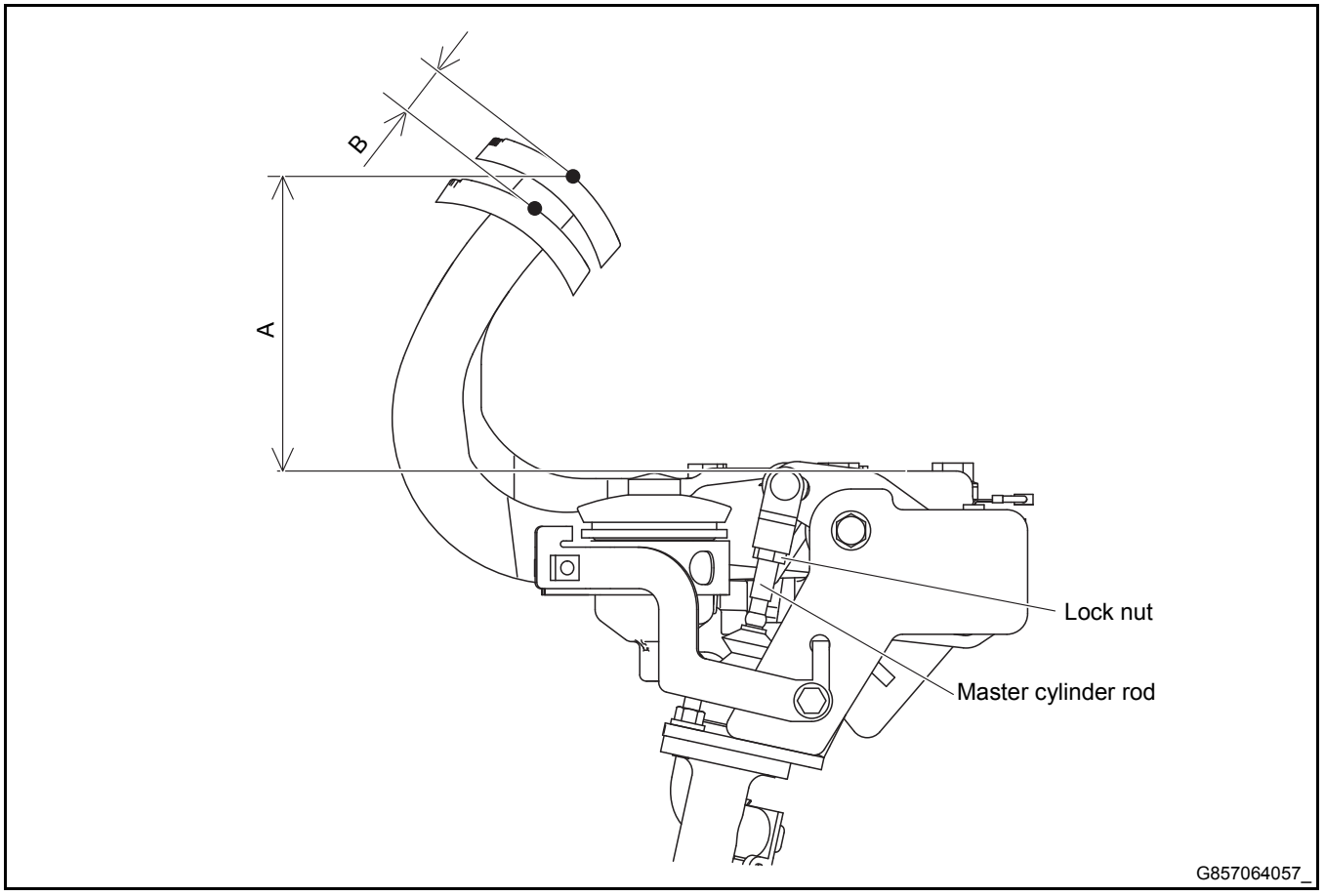


Stop lamp switch

Adjust using the oblong hole so that the switch turns ON when the brake pedal play is between 1 and 7mm.

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BRAKE PEDAL INSPECTION·ADJUSTMENT



1 Inspect brake pedal height A. (From brake pedal bracket to top of pedal)

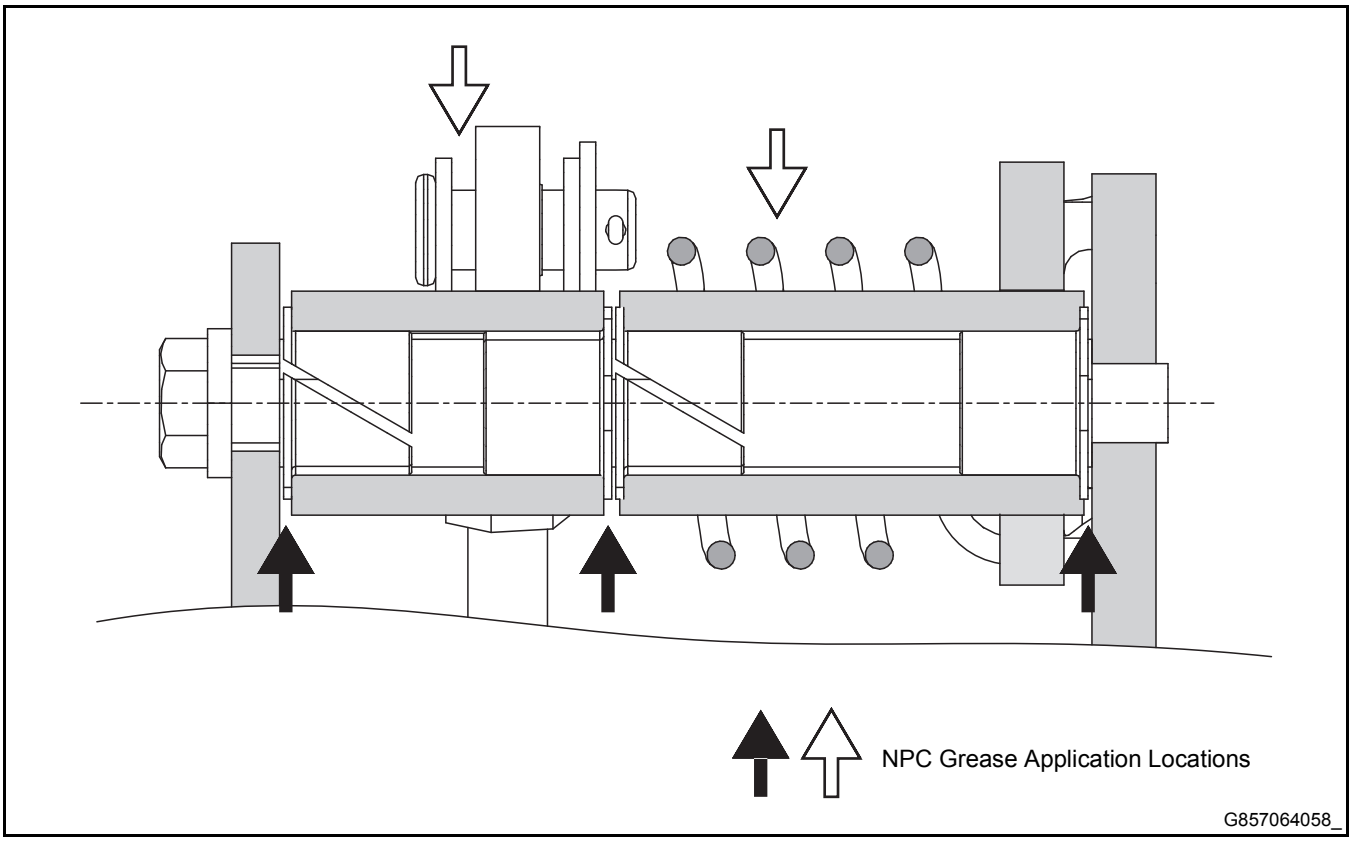
A = 144.5 ~ 149.5 mm (5.689 ~ 5.886 in) (with pedal pad)

If the standard is not satisfied, make adjustment by changing the stopper bolt protrusion.

2 Inspect brake pedal play B.

Potentiometer type (8FBN15,16,18,20,25,30):
B = 11 ~ 15 mm (0.43 ~ 0.59 in)

Limit switch type (50-8FBN15,18,20):
B = 3 ~ 7 mm (0.12 ~ 0.28 in)



3 When the pedal shaft is temporarily tacked, apply grease to the positions indicated above.

4 Move the pedal 2 or 3 times.

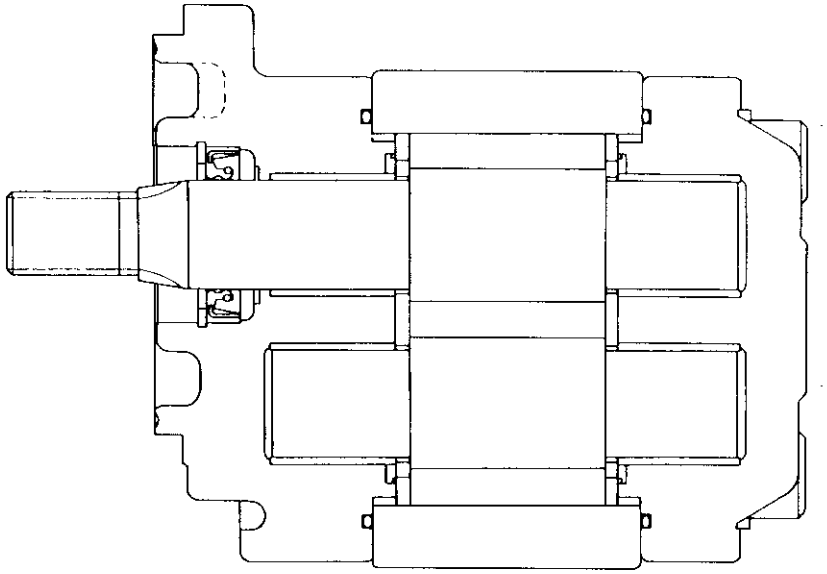
5 Fully tighten the pedal shaft.

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OIL PUMP

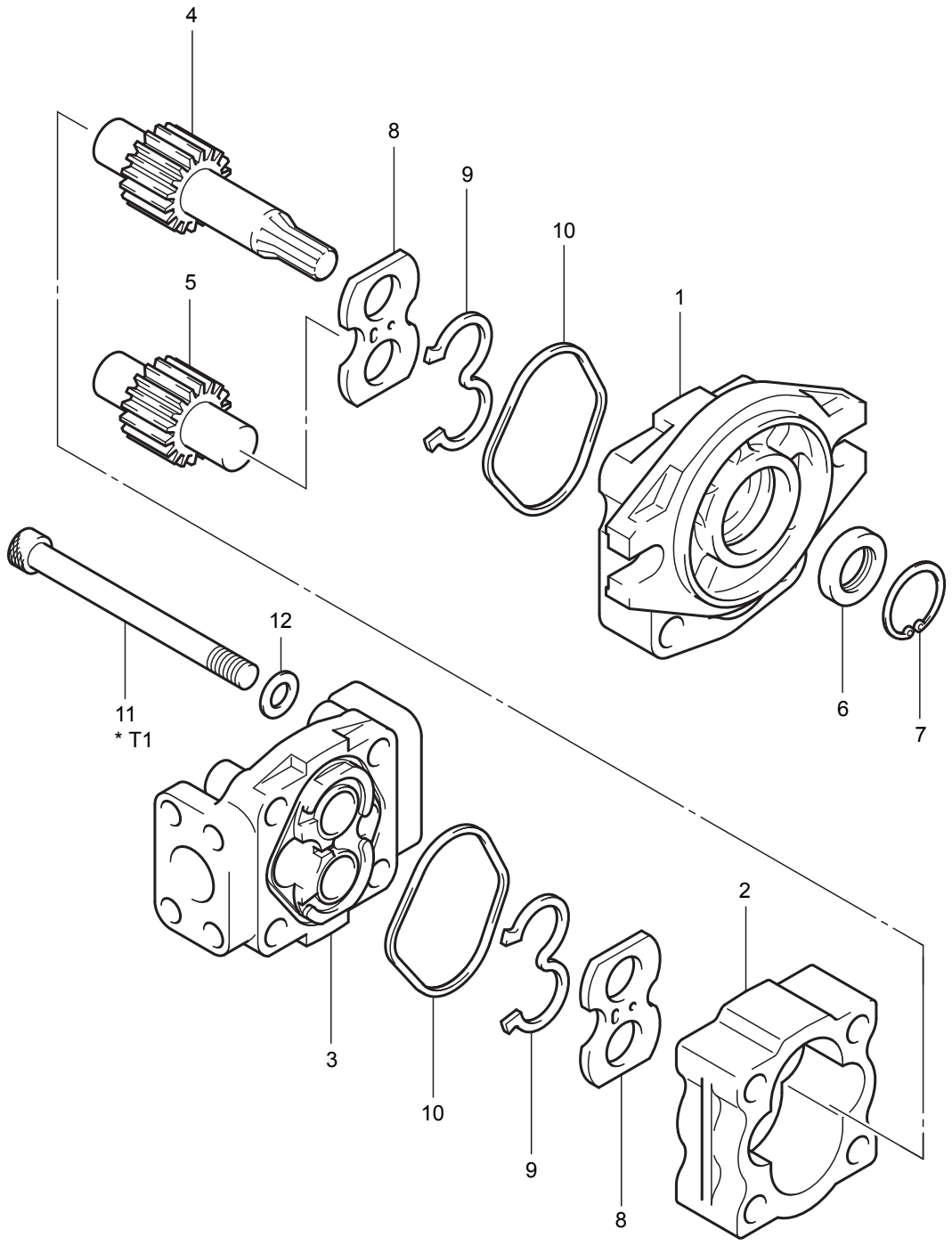
GENERAL

Single Gear Pump



G857065001_

COMPONENTS



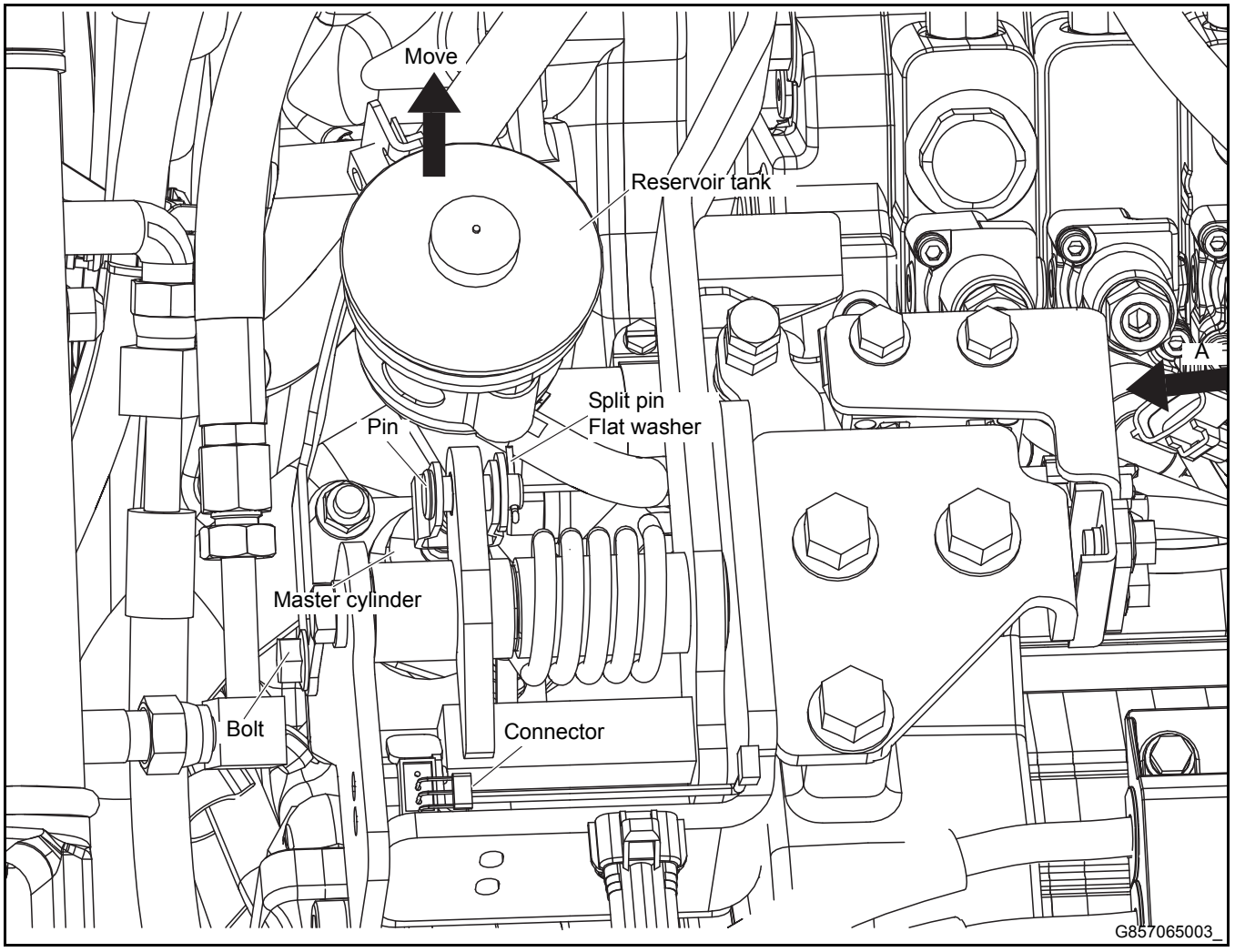
G857065002_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 88 ~ 98 (897.4 ~ 999.3) [64.9 ~ 72.3]

No.	Parts name	QTY	No.	Parts name	QTY
1	Cover, front	1	7	Ring, snap	1
2	Body, oil pimp	1	8	Plate	2
3	Cover, rear	1	9	Gasket	2
4	Gear, drive	1	10	Gasket	2
5	Gear, driven	1	11	Bolt	4
6	Sear, oil	1	12	Washer, plate	4

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REMOVAL·INSTALLATION



Removal Procedure

1 Turn the key switch OFF and disconnect the battery plug.

2 Remove the floor mat and toe board.

3 Remove the stay cover LH.

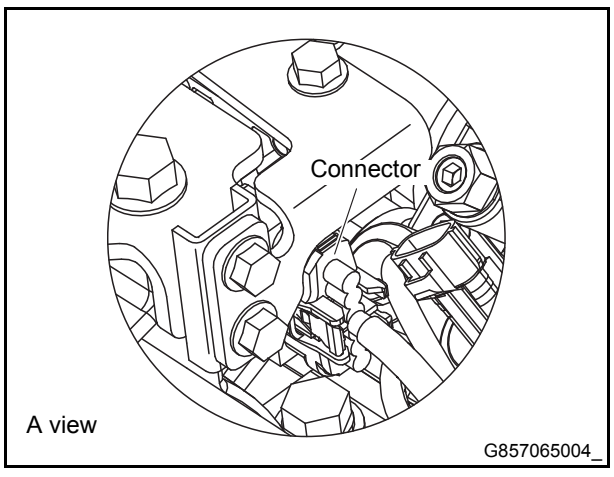
4 Remove the side step LH.

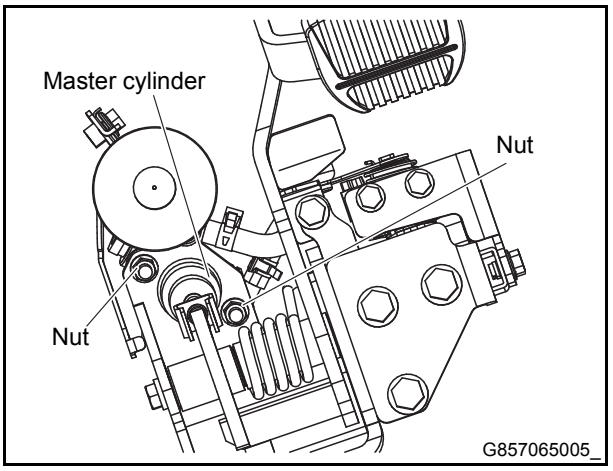
5 Remove the battery.

6 Disconnect the connectors of the pedal bracket (at two place).

7 Remove the bolt for the reservoir tank.

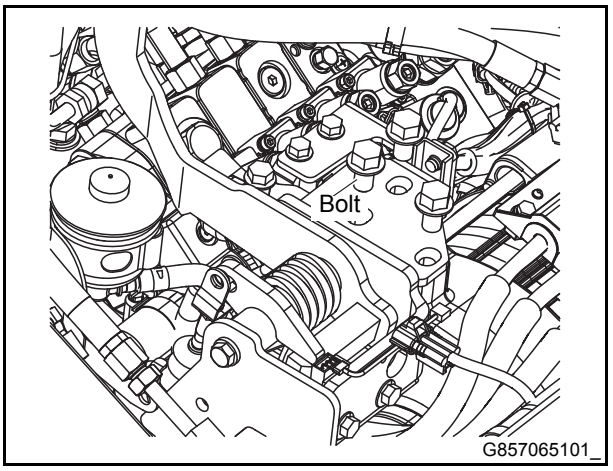
Caution:
Move the reservoir tank towards the front of the vehicle enough so that it does not disconnect the hose.



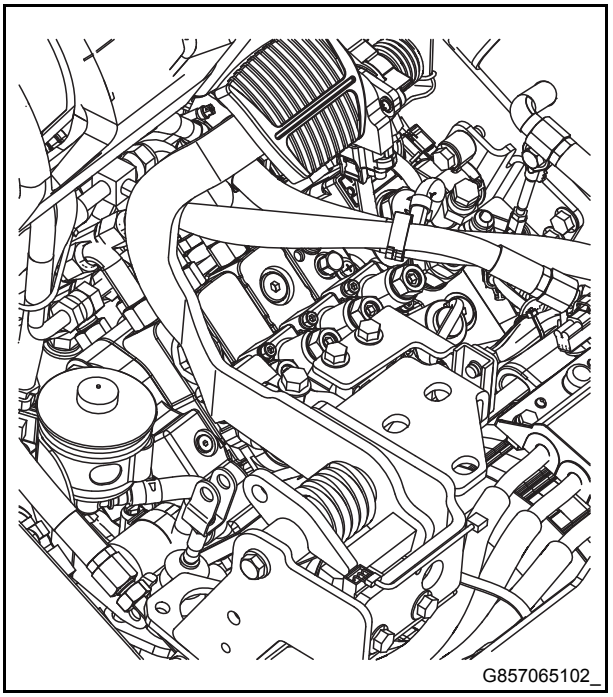


8 Remove the pin for the master cylinder.

9 Remove the nuts for the master cylinder.

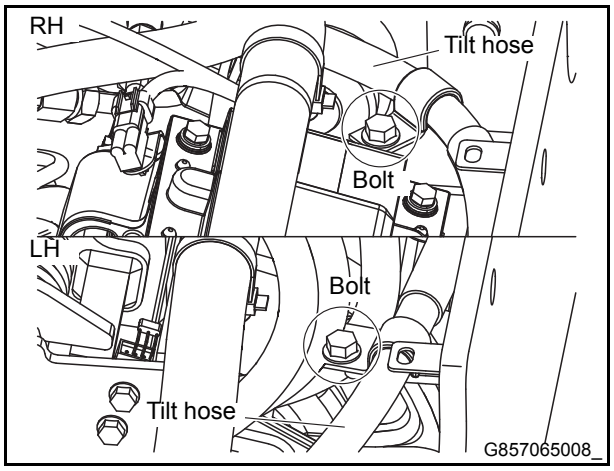


10 Remove the bolts for the bracket.

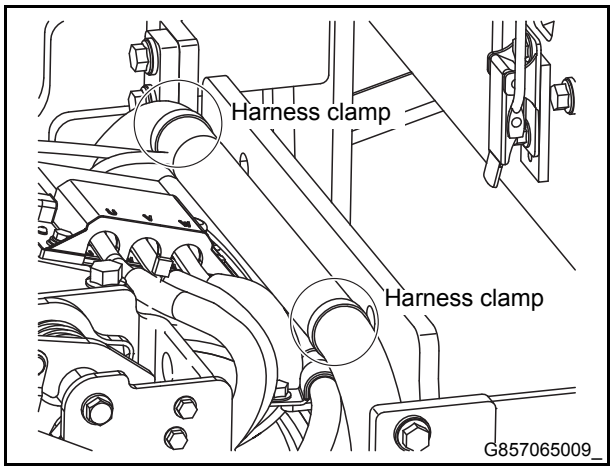


11 Remove the pedal bracket.

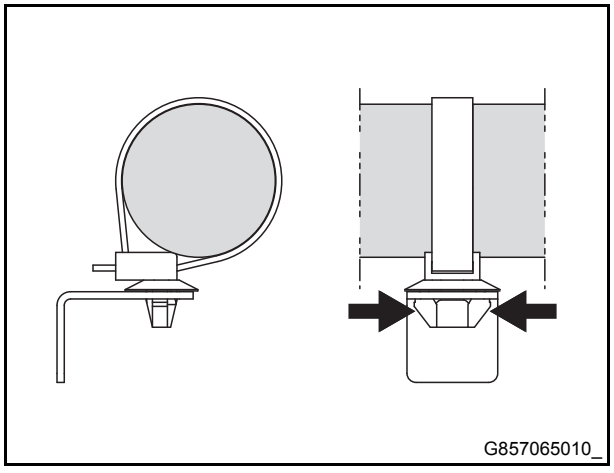
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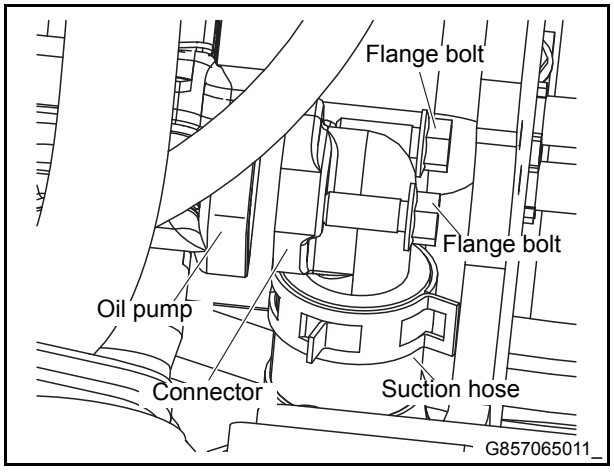
12 Remove the clamp for the tilt hose and harness.



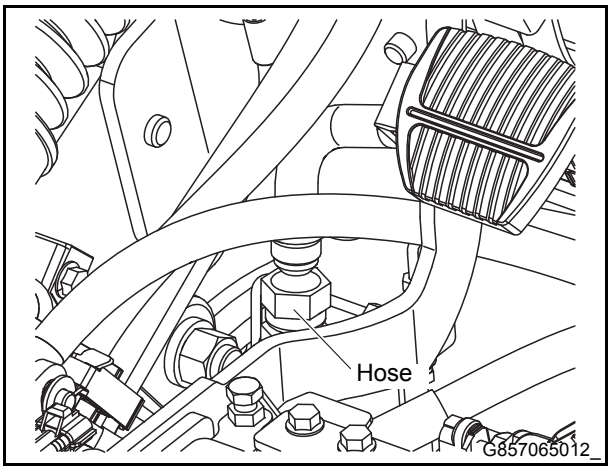
13 Remove the harness clamp.



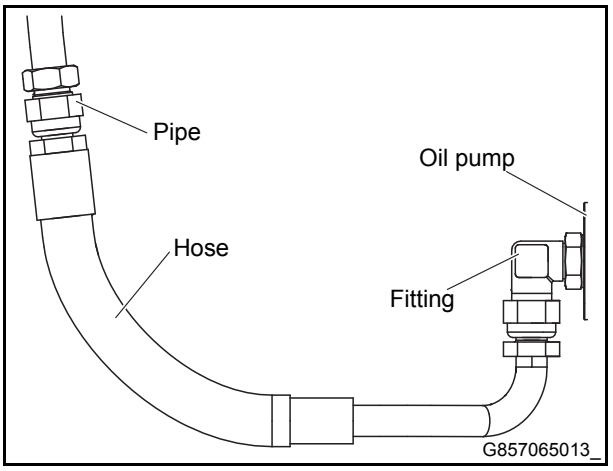
Note:
Pinch the arrows using pliers when removing the harness clamp.



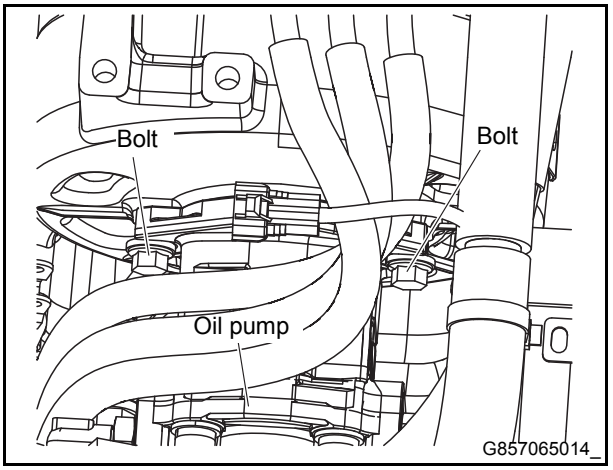
14 Disconnect the suction hose.



15 Disconnect the outlet hose.

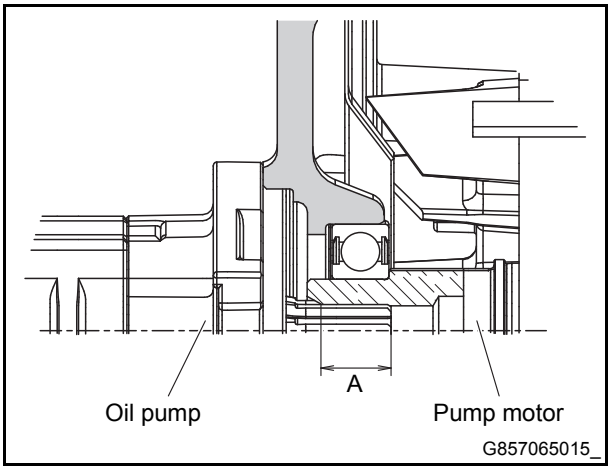


Caution:
The method differs depending on the vehicle model and specifications so either disconnect the outlet hose from the nipple side or pipe side.



16 Remove the bolt for the oil pump.

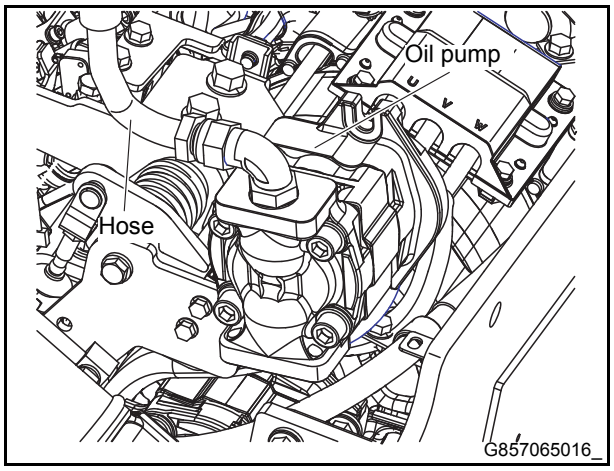
Caution:
Move the harness and tilt hose to an optimum position to make it easier for you to work.



Caution:
The following is the combined length of the oil pump and pump motor spline teeth.

A = 9.5 mm (0.37 in)

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17 Remove the oil pump.

Installation Procedure

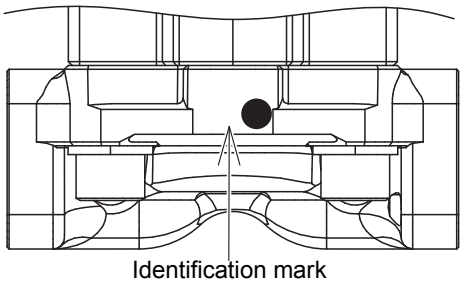
The installation procedure is the reverse of the removal procedure.

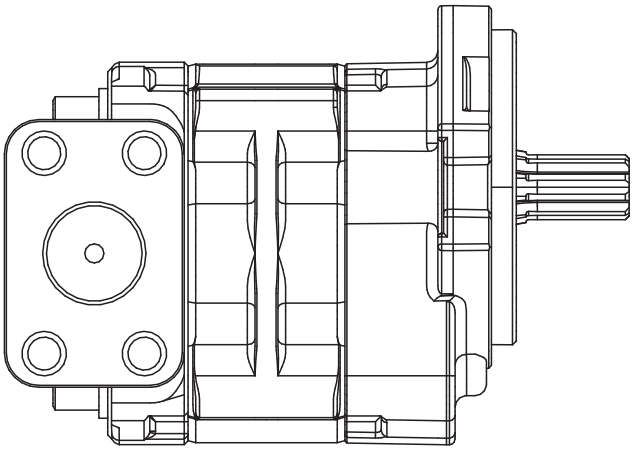
Note:

- **Apply grease on the spline portion of the pump before installation.**
- **Clean the fitting-mounting surface so as not to damage the O-ring.**

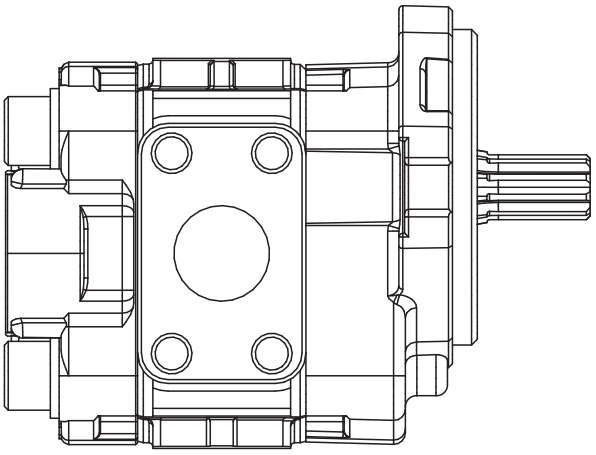
Caution for installation

Check the port type and whether or not there is an identification mark because the oil pump differs depending on the vehicle model and specifications.

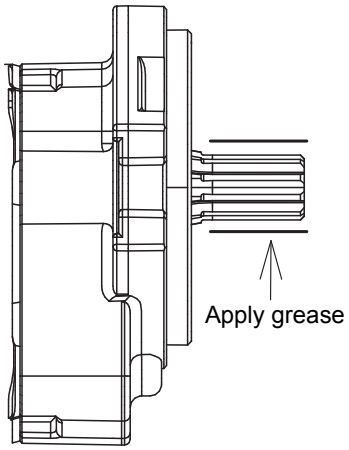


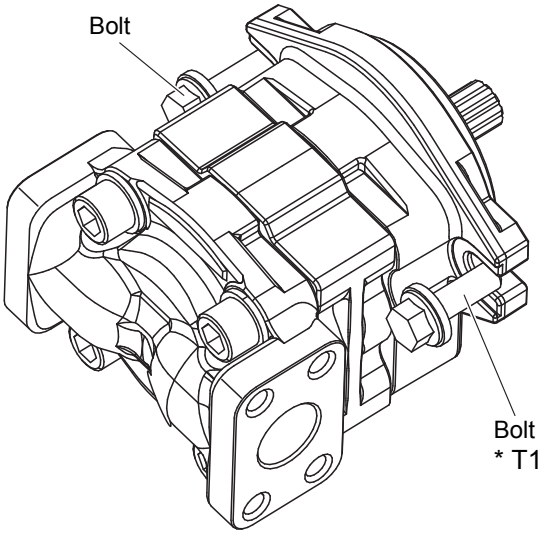


Rear port type



Body port type





G857065017_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 13.7 ~ 32.0 (140 ~ 326) [10.1 ~ 23.6]

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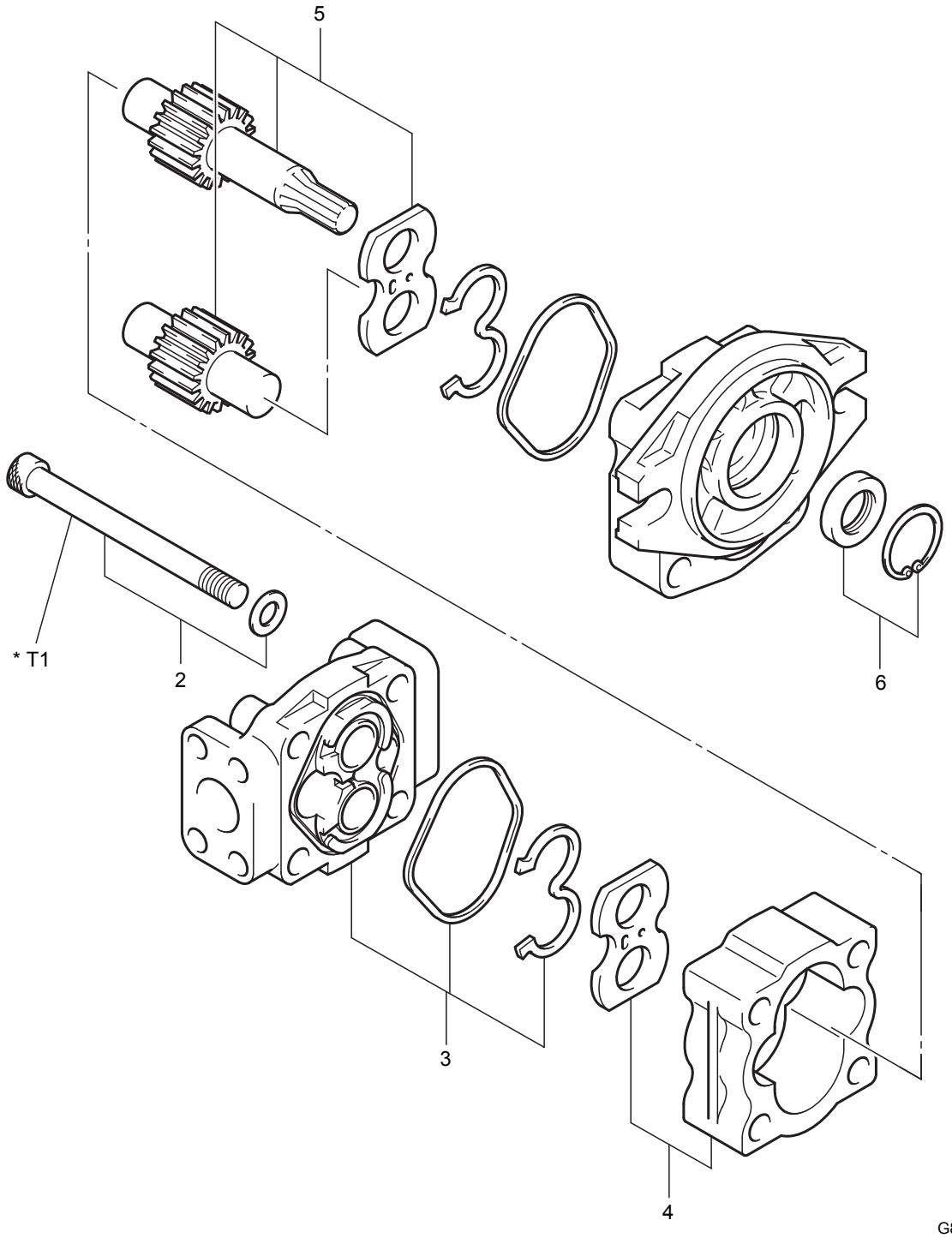
1. Oil pump used

Models	Port type	Identification mark	Displacement (cm^3/rev [in^3/rev])	Remarks
8FBN15, 16, 18, 20	Rear port	–	21.9 (1.34)	–
8FBN15, 16, 18, 20	Rear port	●	21.9 (1.34)	Cold storage model
8FBN30	Body port	–	24.5 (1.5)	–
8FBN30	Body port	●	24.5 (1.5)	Cold storage model
50-8FBN15, 18	Rear port	15	15.0 (0.92)	–
50-8FBN20	Rear port	18	18.9 (1.15)	–

2. How to apply grease

   Fill in the grooves of the oil pump splines with an appropriate amount of helme coat TX-168 of NIHON HERMETICS CO.,LTD.

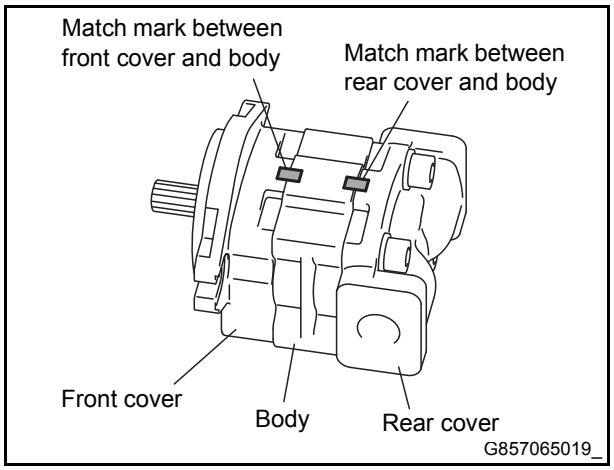
DISASSEMBLY·INSPECTION·REASSEMBLY



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 88 ~ 98 (897.4 ~ 999.3) [64.9 ~ 72.3]

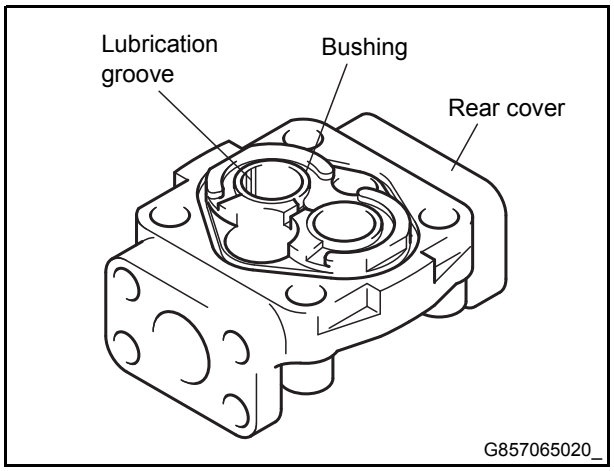
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Disassembly Procedure



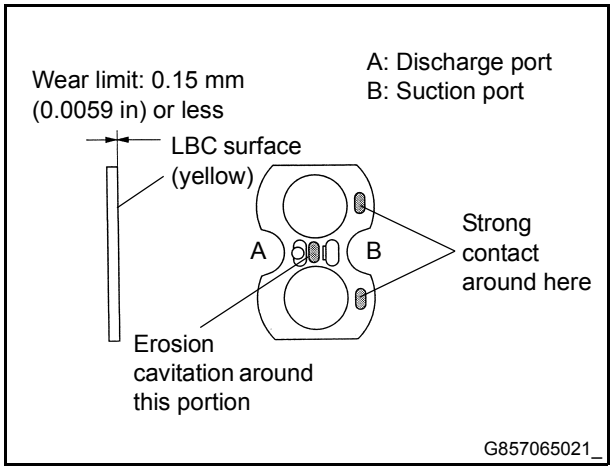
1 Put match marks between the front cover and body and between the rear cover and body.

2 Place the front cover to face downward, and remove the bolts (4 pcs.).



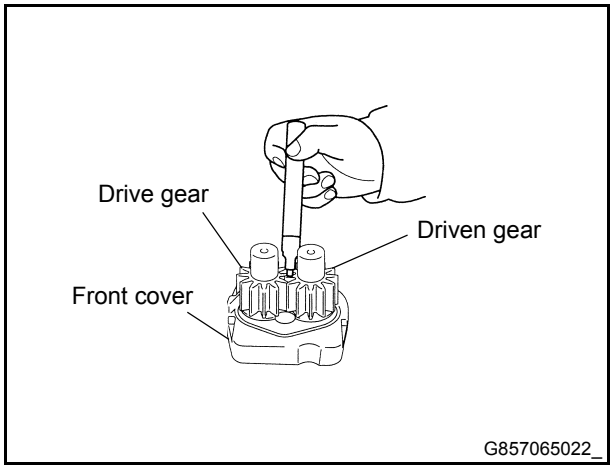
3 Remove the rear cover ASSY (rear cover, bushing, gasket and figure 3 gasket).

The bushing inner surface shall not be roughened and shall not be worn to make the metal on the rear side visible.



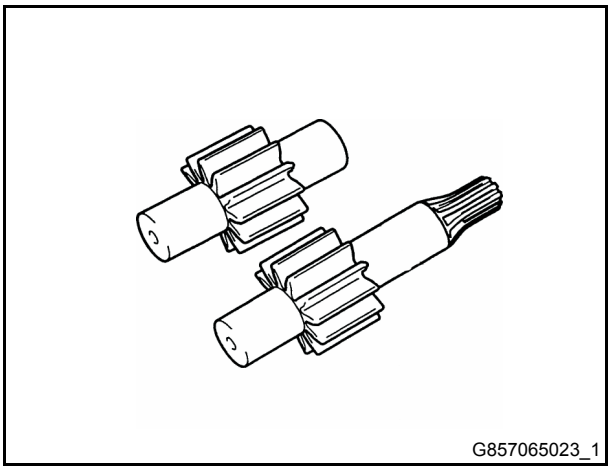
4 Remove the body and side plate.

The side plate surface (LBC surface) in contact with gears shall not be worn beyond the limit shown at left.



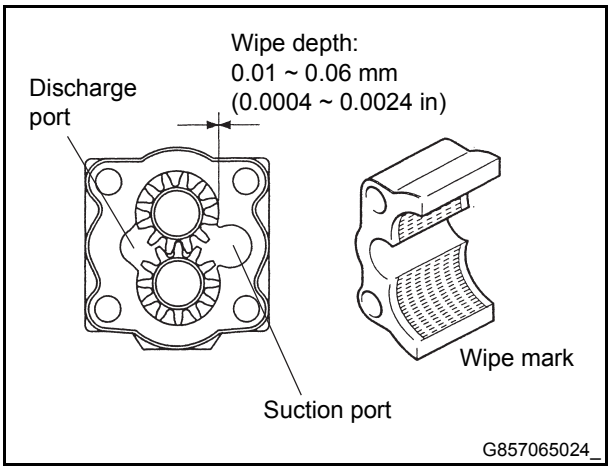
5 Remove the drive gear, driven gear and side plate.

Put a match mark on tooth flanks of the drive and driven gears.


G857065023_1

Check the gear side surface for no wear and the tooth flanks for no roughening.

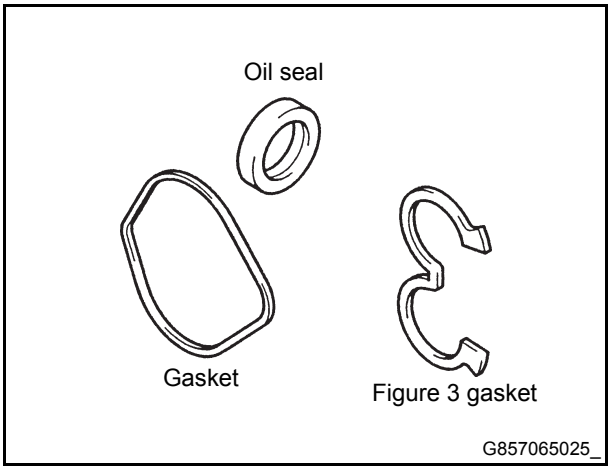
Check the shaft for no abnormal wear and change of color.



G857065024_

Inspect the body inner surface for the wipe mark.

Normal wipe depth:
0.01 ~ 0.06 mm (0.0004 ~ 0.0024 in)



G857065025_

6 Remove the oil seal.

Check the oil seal, figure 3 gasket and outward leak-preventing gasket as shown below.

(1) No wear (to make edge rounded portion invisible) or no damage shall exist at oil seal lip.

(2) The figure 3 gasket shall not be damaged.

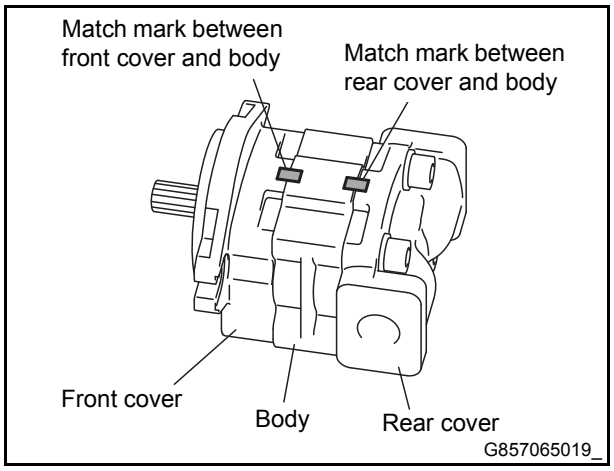
(3) The outward leak-preventing gasket shall not be damaged.

(4) Seals shall not be swelled.

Reassembly Procedure

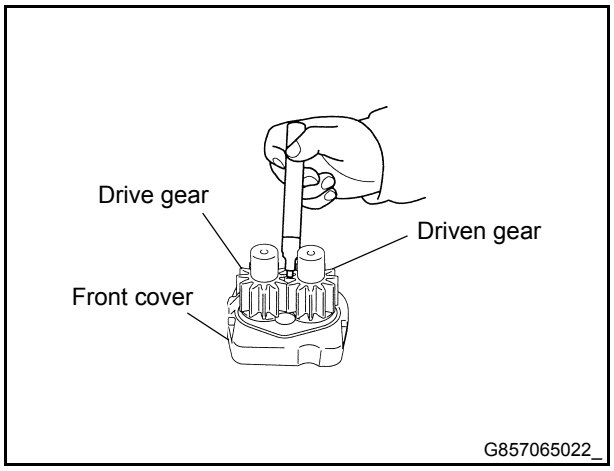
The reassembly procedure is the reverse of the disassembly procedure.

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Note:

- **Align match marks when reassembling.**



- **Reassembly the drive gear and driven gear with aligning match marks.**

- **Wash each part, blow compressed air and apply hydraulic oil before installation.**
- **Always use new seals for reassembly.**

TEST METHOD

Note:
Though a bench test should be conducted for strict testing, it is generally impossible in practical service operation. Install the oil pump on the actual vehicle and judge the oil pump discharge performance by means of the cylinder operation.

- **Check if the battery charge is sufficient by observing the battery charge indicators.**
- **Check if the oil control valve set relief pressure is as specified. (Refer to p. 6-152.)**
- **Measure the lift cylinder full stroke operation time when the hydraulic oil temperature is 50 ~55°C (122 ~ 131°F), and calculate the lifting speed.**
- **Because of the soft start by the material handling control, the lifting speed is 10 to 20 mm/sec (2.0 to 3.9 fpm) lower than the value obtained from the table below. The lifting speed can be calculated more accurately when measuring the full stroke operation time excluding the soft start period.**

If any defect is found in the inspection above, disassemble and inspect the oil pump again.

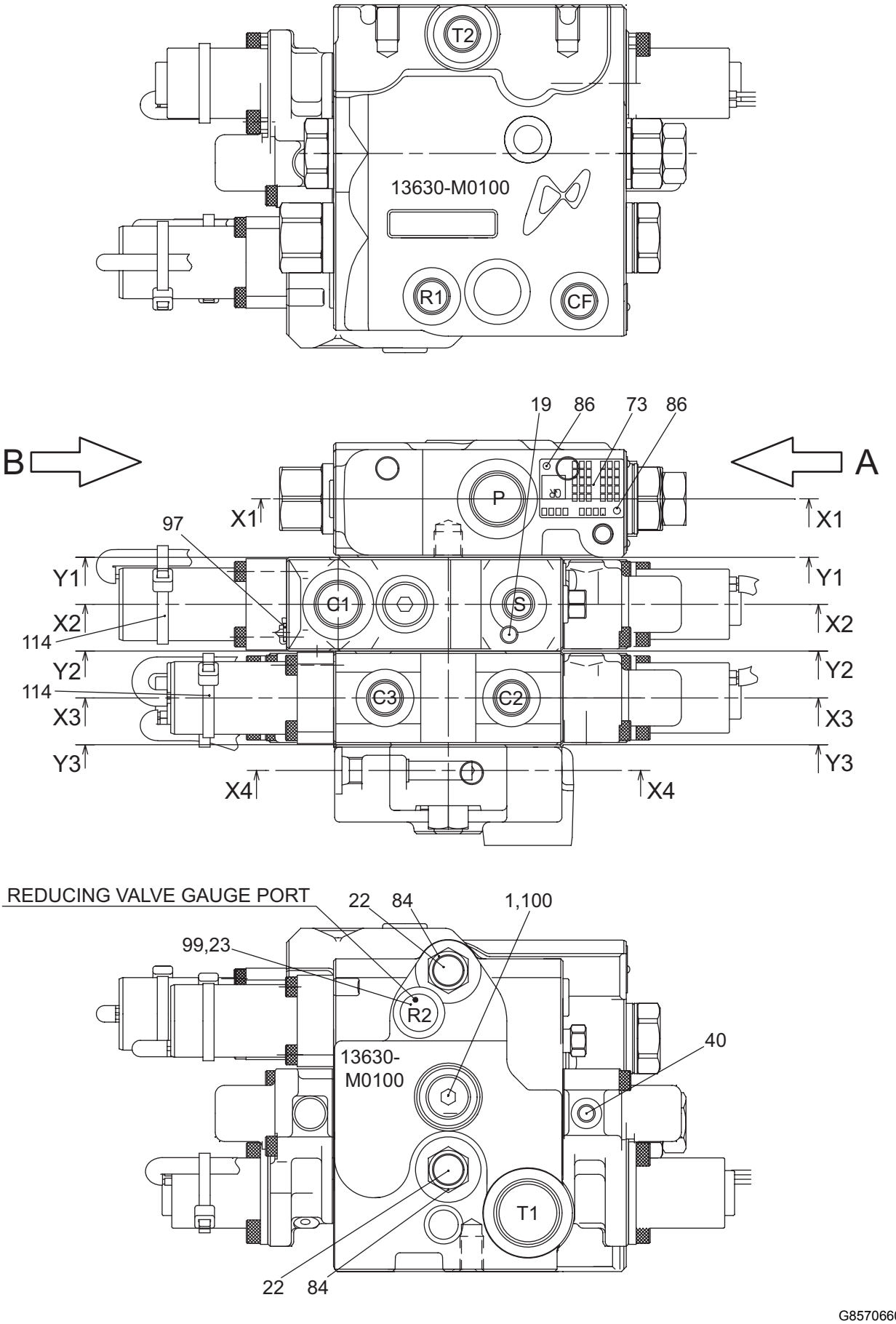
Lifting Speed Table

Vehicle model	Mode	V		FSV		FV	
		Lifting speed mm/s(fpm)		Lifting speed mm/s(fpm)		Lifting speed mm/s(fpm)	
		No-load	Loaded	No-load	Loaded	No-load	Loaded
8FBN15	H	650 (128)	420 (83)	590 (116)	415 (82)	585 (115)	410 (81)
	P, S	560 (110)	320 (63)	500 (98)	310 (61)	495 (97)	305 (60)
	E	535 (105)	300 (59)	485 (95)	295 (58)	490 (96)	285 (56)
50-8FBN15	H	440 (87)	290 (57)	420 (83)	275 (54)	415 (82)	270 (53)
	P, S						
	E						
8FBN16	H	650 (128)	400 (79)	590 (116)	410 (81)	585 (115)	400 (79)
	P, S	560 (110)	310 (61)	500 (98)	305 (60)	495 (97)	300 (59)
	E	535 (105)	285 (56)	485 (95)	290 (57)	490 (96)	280 (55)
8FBN18	H	650 (128)	370 (73)	590 (116)	395 (78)	585 (115)	375 (74)
	P, S	560 (110)	300 (59)	500 (98)	295 (58)	495 (97)	285 (56)
	E	535 (105)	265 (52)	485 (95)	280 (55)	490 (96)	270 (53)
50-8FBN18	H	440 (87)	240 (47)	420 (83)	255 (50)	415 (82)	245 (48)
	P, S						
	E						
8FBN20	H	600 (118)	360 (71)	565 (111)	375 (74)	560 (110)	370 (73)
	P, S	500 (98)	280 (55)	465 (92)	305 (60)	460 (91)	300 (59)
	E	465 (92)	245 (48)	440 (87)	245 (48)	445 (88)	240 (47)
50-8FBN20	H	465 (92)	300 (59)	455 (90)	310 (61)	455 (90)	320 (63)
	P, S						
	E						
8FBN25	H	600 (118)	340 (67)	565 (111)	355 (70)	560 (110)	330 (65)
	P, S	500 (98)	250 (49)	465 (92)	285 (56)	460 (91)	265 (52)
	E	465 (92)	220 (43)	440 (87)	235 (46)	445 (88)	215 (42)
8FBN30	H	550 (108)	320 (63)	505 (99)	340 (67)	490 (96)	335 (66)
	P, S	410 (81)	230 (45)	375 (74)	230 (45)	365 (72)	230 (45)
	E	355 (70)	210 (41)	325 (64)	210 (41)	335 (66)	210 (41)

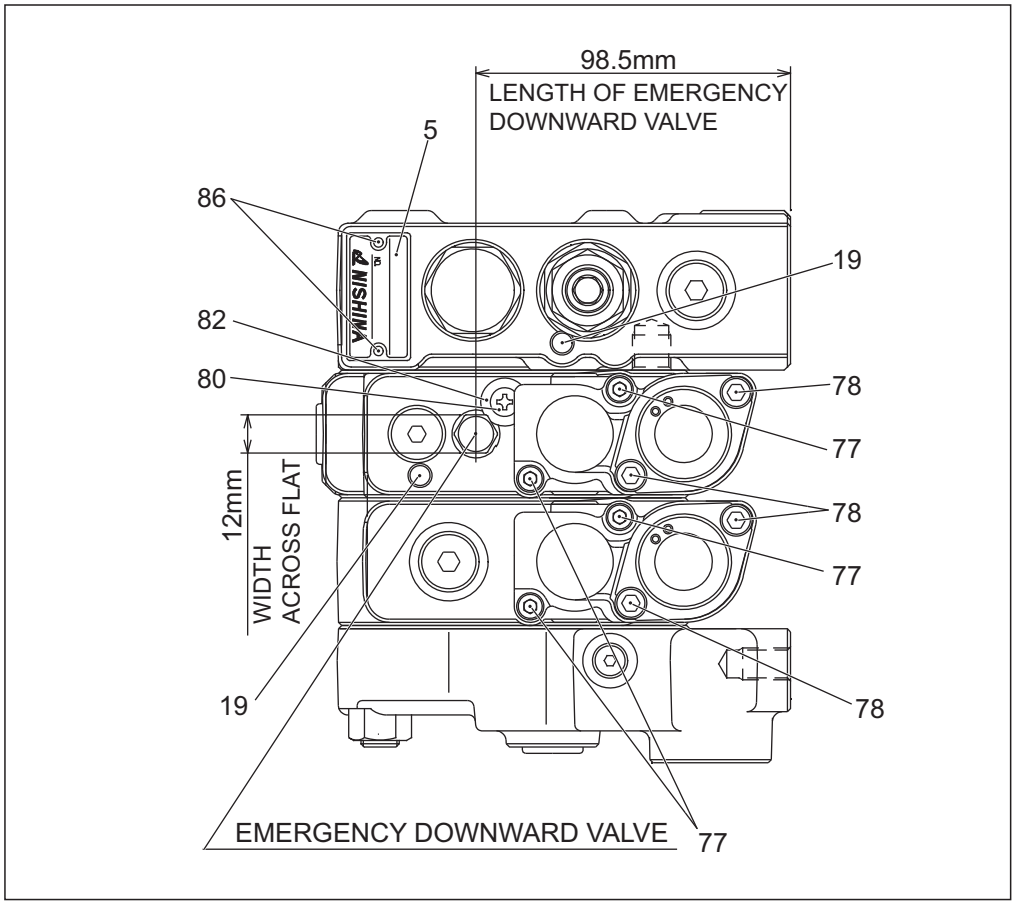
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OIL CONTROL VALVE ASSY

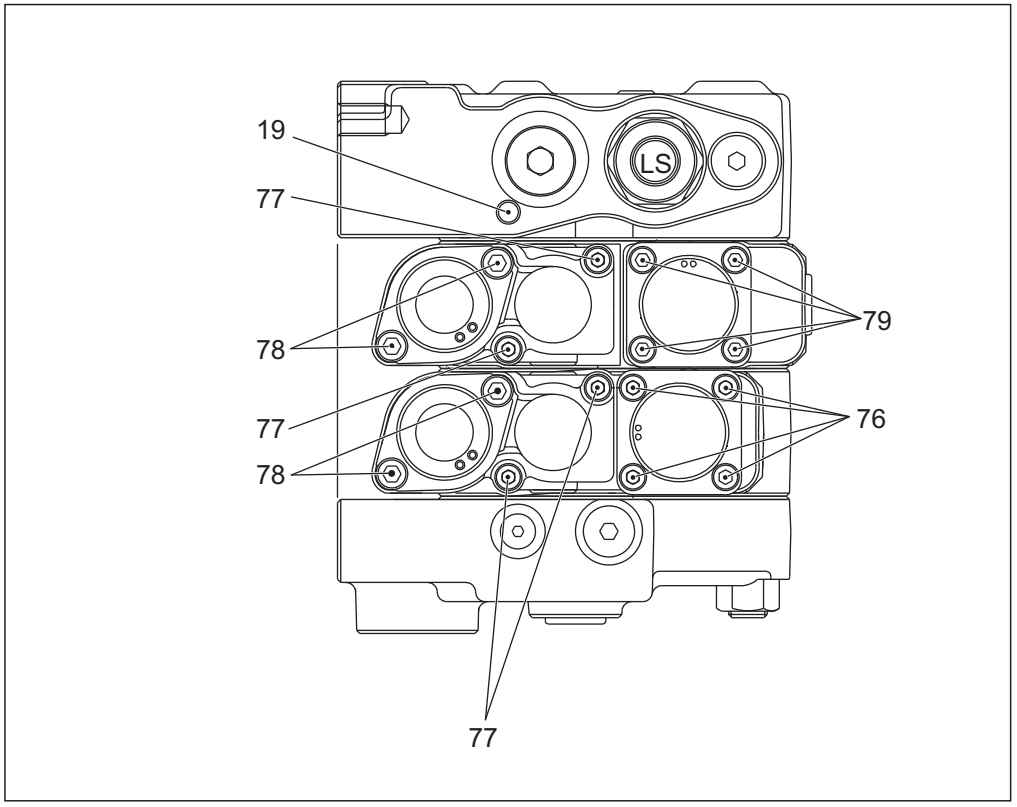
GENERAL (2-WAY)



A VIEW



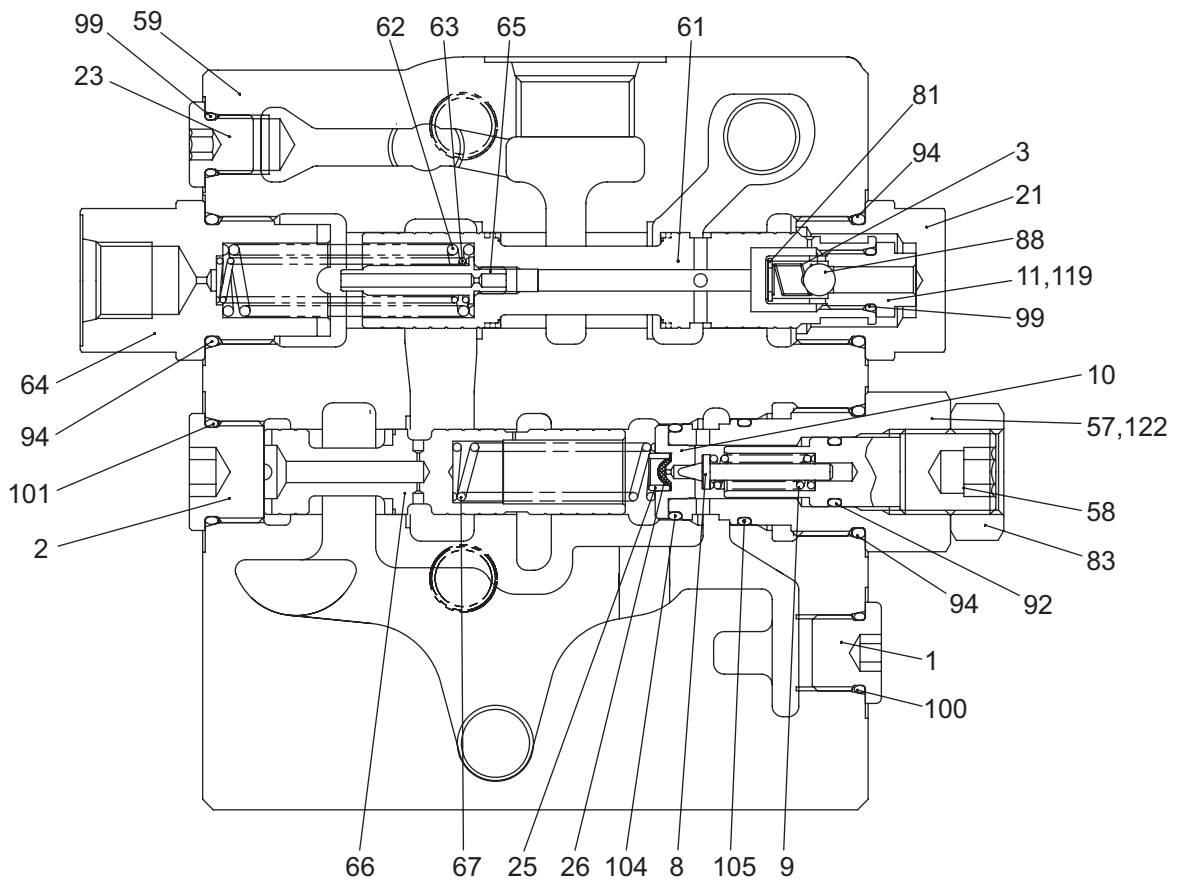
B VIEW



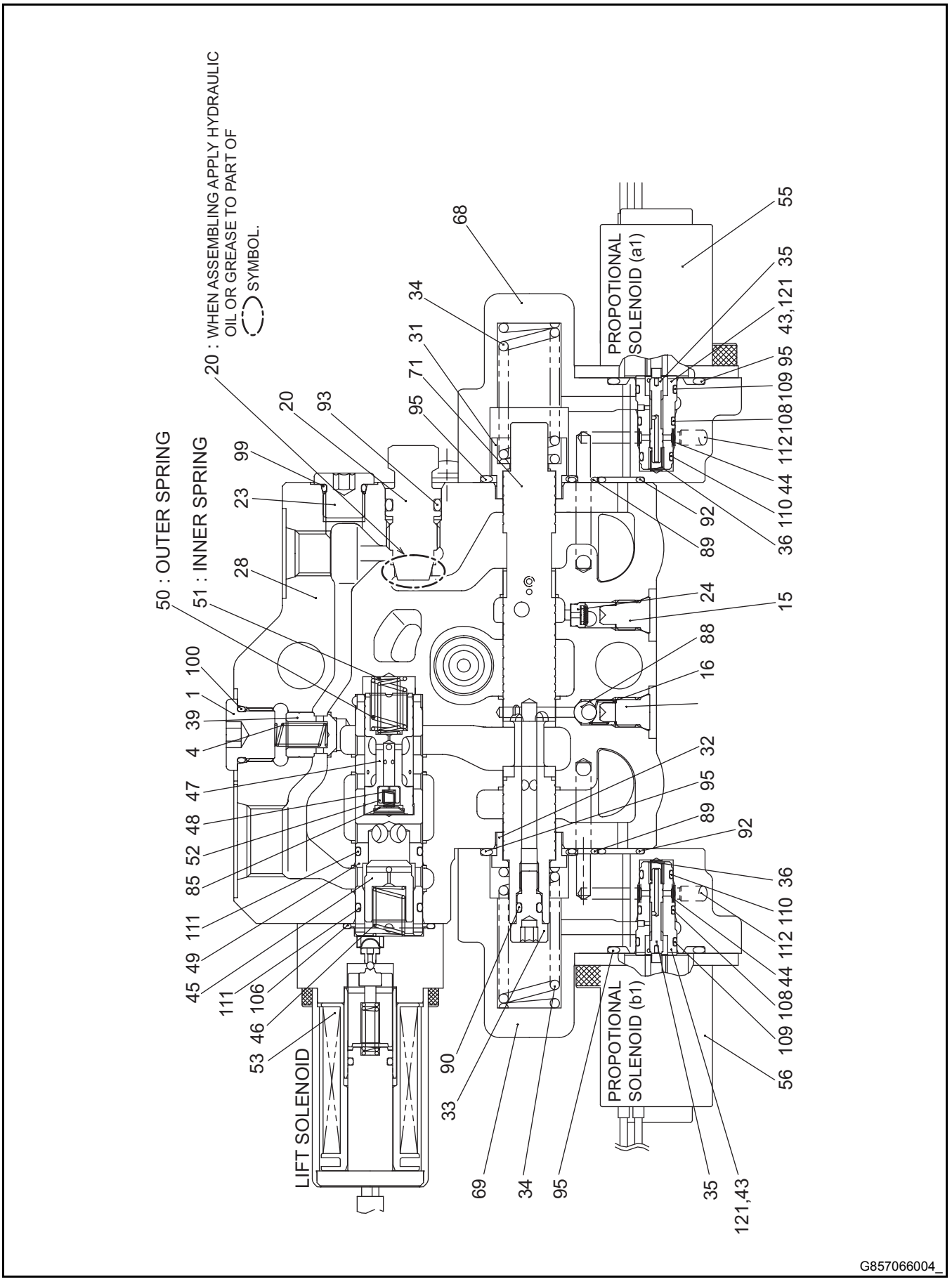
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X1-X1 section

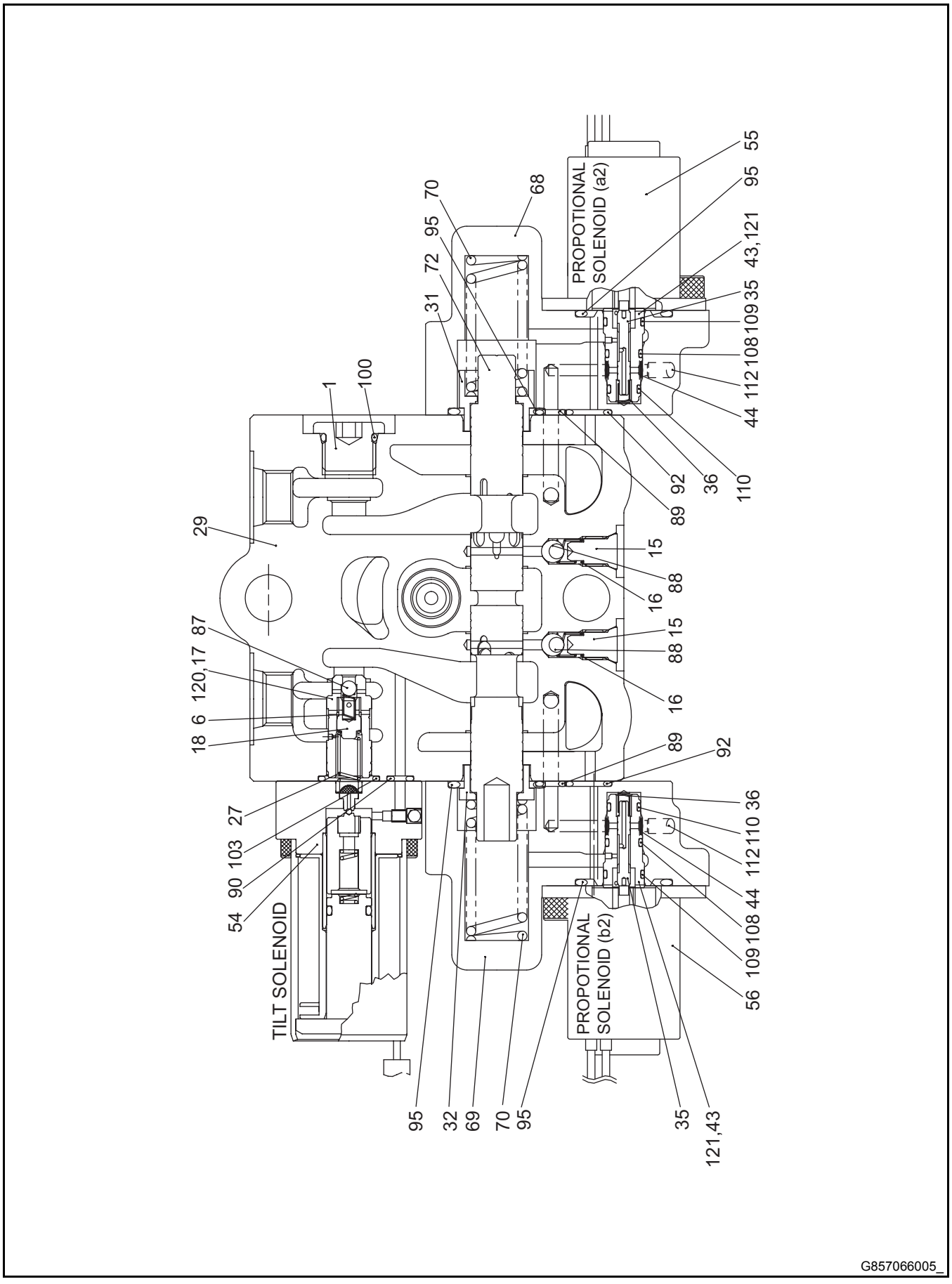


X2-X2 section

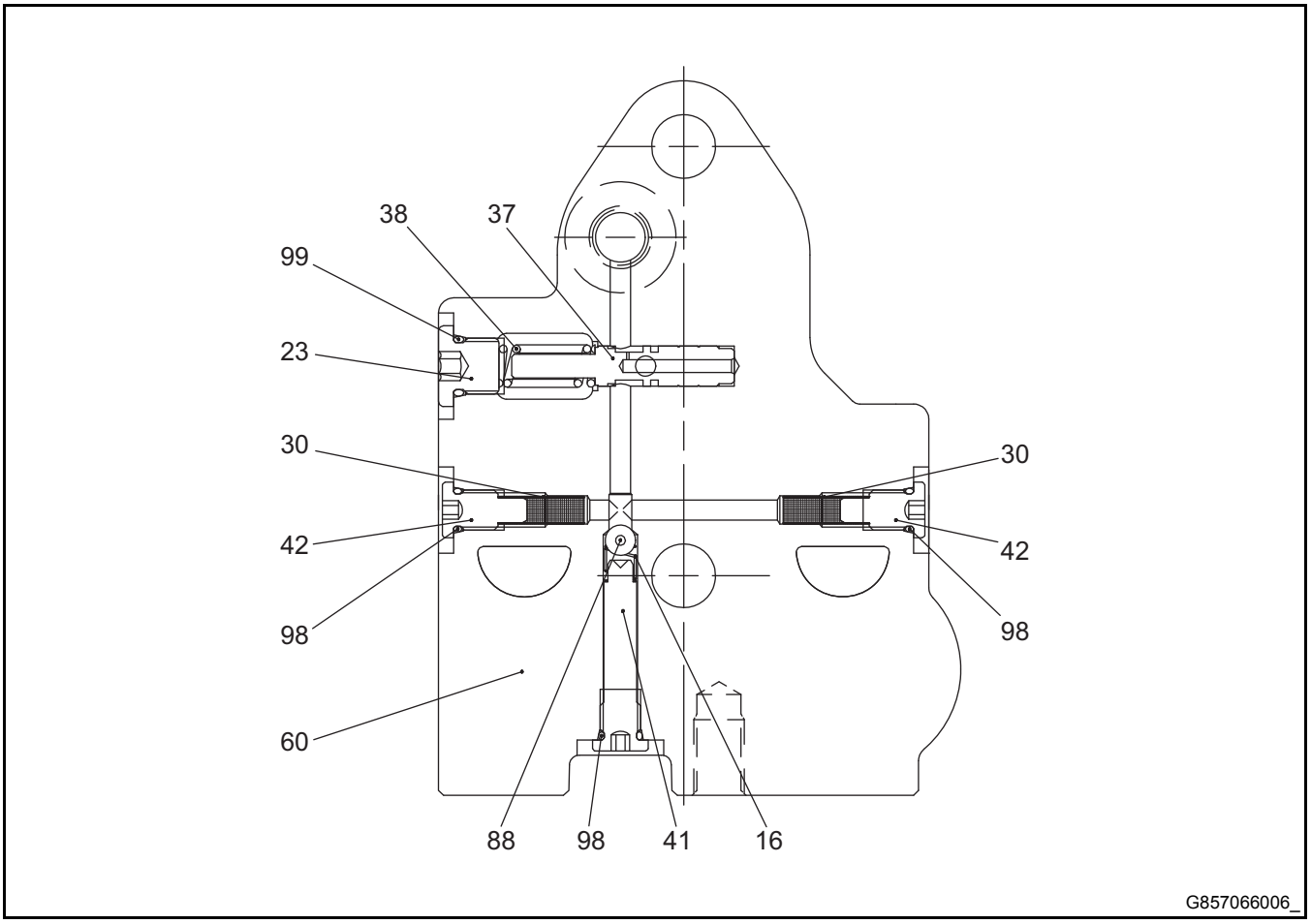


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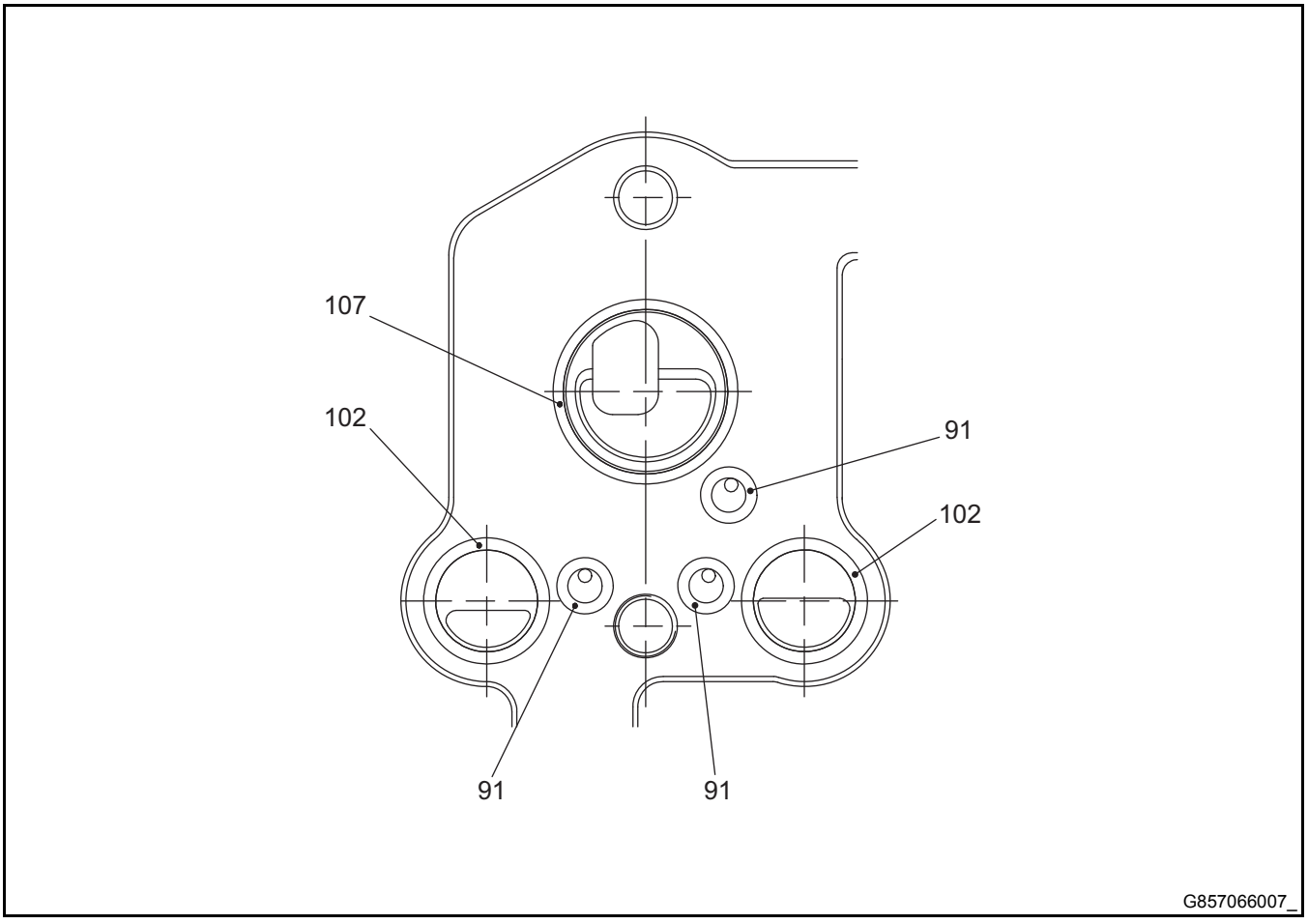
X3-X3 section



X4-X4 section

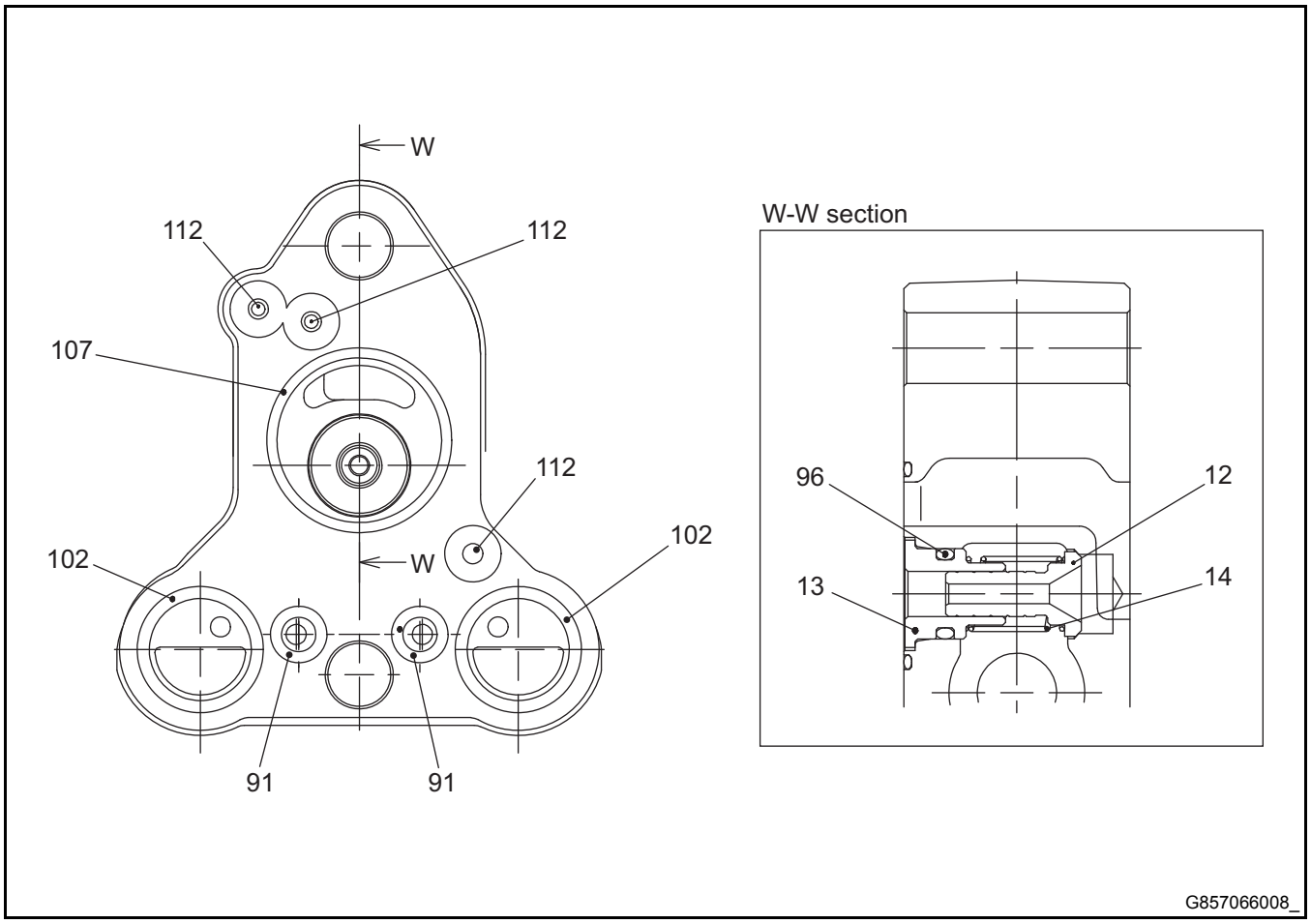


Y1-Y1 section (Inlet Side)

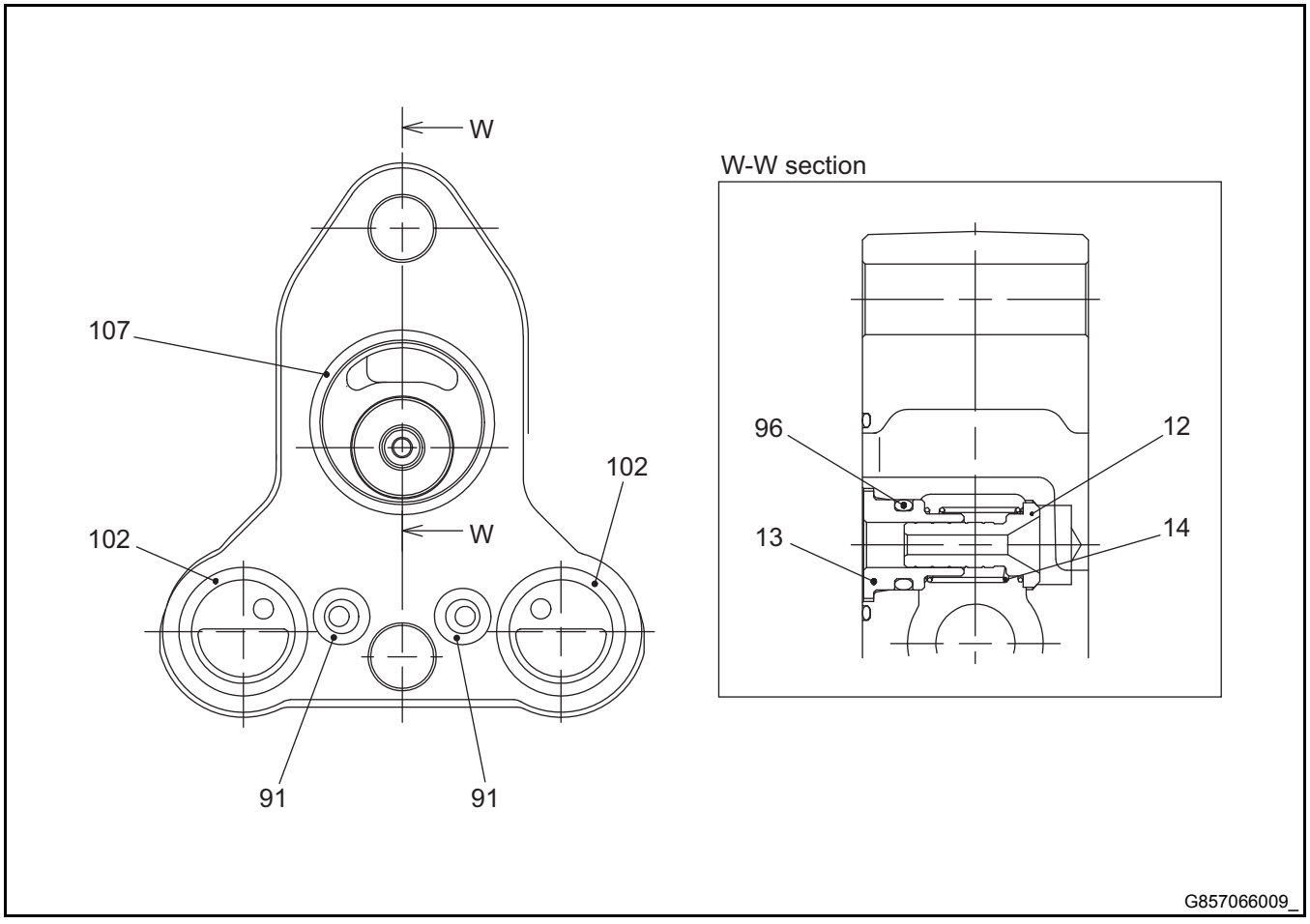


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Y2-Y2 section (Lift Side)

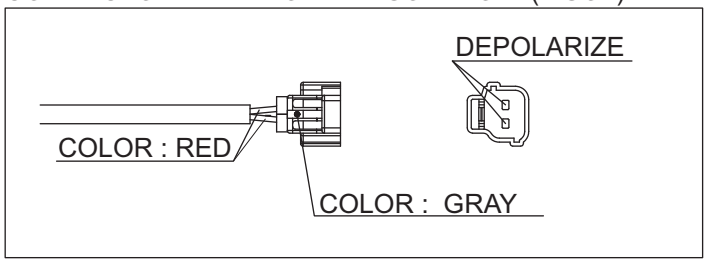


Y3-Y3 section (Tilt Side)

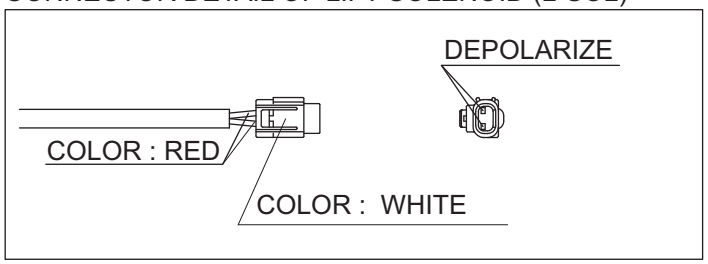


Solenoid Connector Diagram

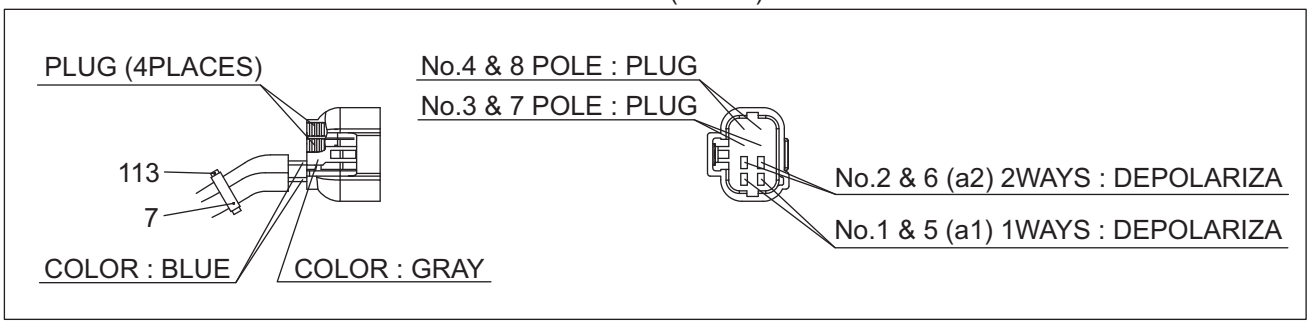
CONNECTOR DETAIL OF TILT SOLENOID (T-SOL)



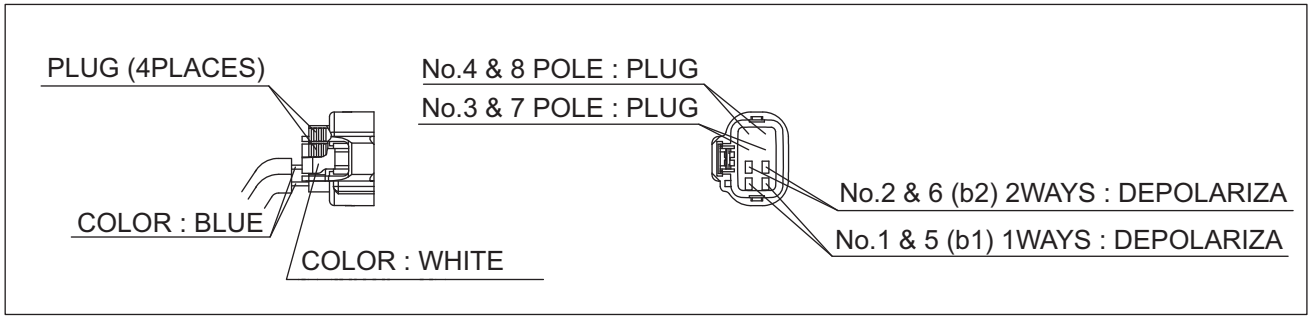
CONNECTOR DETAIL OF LIFT SOLENOID (L-SOL)



CONNECTOR DETAIL OF PROPOTIONAL SOLENOID (SOL-a)



CONNECTOR DETAIL OF PROPOTIONAL SOLENOID (SOL-b)



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Parts List

No	Name	No	Name
1	PLUG	46	COMPRESSION SPRING
2	PLUG	47	SPOOL
3	COMPRESSION SPRING	48	COMPRESSION SPRING
4	COMPRESSION SPRING	49	SLEEVE
5	NAME PLATE	50	COMPRESSION SPRING
6	COMPRESSION SPRING	51	COMPRESSION SPRING
7	MARKER	52	PISTON
8	NEEDLE VALVE	53	SOLENOID VALVE
9	COMPRESSION SPRING	54	SOLENOID VALVE
10	SEAT VALVE	55	SOLENOID
11	PLUG	56	SOLENOID
12	PLUNGER	57	SLEEVE
13	GUIDE	58	PLUG
14	COMPRESSION SPRING	59	INLET HOUSING
15	PLUG	60	OUTLET HOUSING
16	COMPRESSION SPRING	61	PISTON
17	PLUNGER	62	COMPRESSION SPRING
18	STOPPER	63	COMPRESSION SPRING
19	PLUG	64	STOPPER
20	PLUG	65	SPRING HOLDER
21	STOPPER	66	SPOOL
22	TIE-ROD	67	COMPRESSION SPRING
23	PLUG	68	SPRING COVER
24	FILTER	69	SPRING COVER
25	COLLAR	70	COMPRESSION SPRING
26	FILTER	71	LIFT SPOOL
27	COMPRESSION SPRING	72	TILT SPOOL
28	PLUNGER HOUSING	73	NAME PLATE
29	PLUNGER HOUSING	74	NAME PLATE
30	FILTER	75	————
31	SPRING HOLDER	76	HEXAGON BOLT
32	SPRING HOLDER	77	HEXAGON BOLT
33	SPOOL END	78	HEXAGON BOLT
34	COMPRESSION SPRING	79	HEXAGON BOLT
35	SPOOL	80	SCREW
36	COMPRESSION SPRING	81	PLATE WASHER
37	PISTON	82	PLATE WASHER
38	COMPRESSION SPRING	83	NUT
39	PLUNGER	84	NUT
40	PLUG	85	NUT
41	PLUG	86	SCREW
42	PLUG	87	BALL
43	SLEEVE	88	BALL
44	FILTER	89	O-RING
45	PLUNGER	90	O-RING

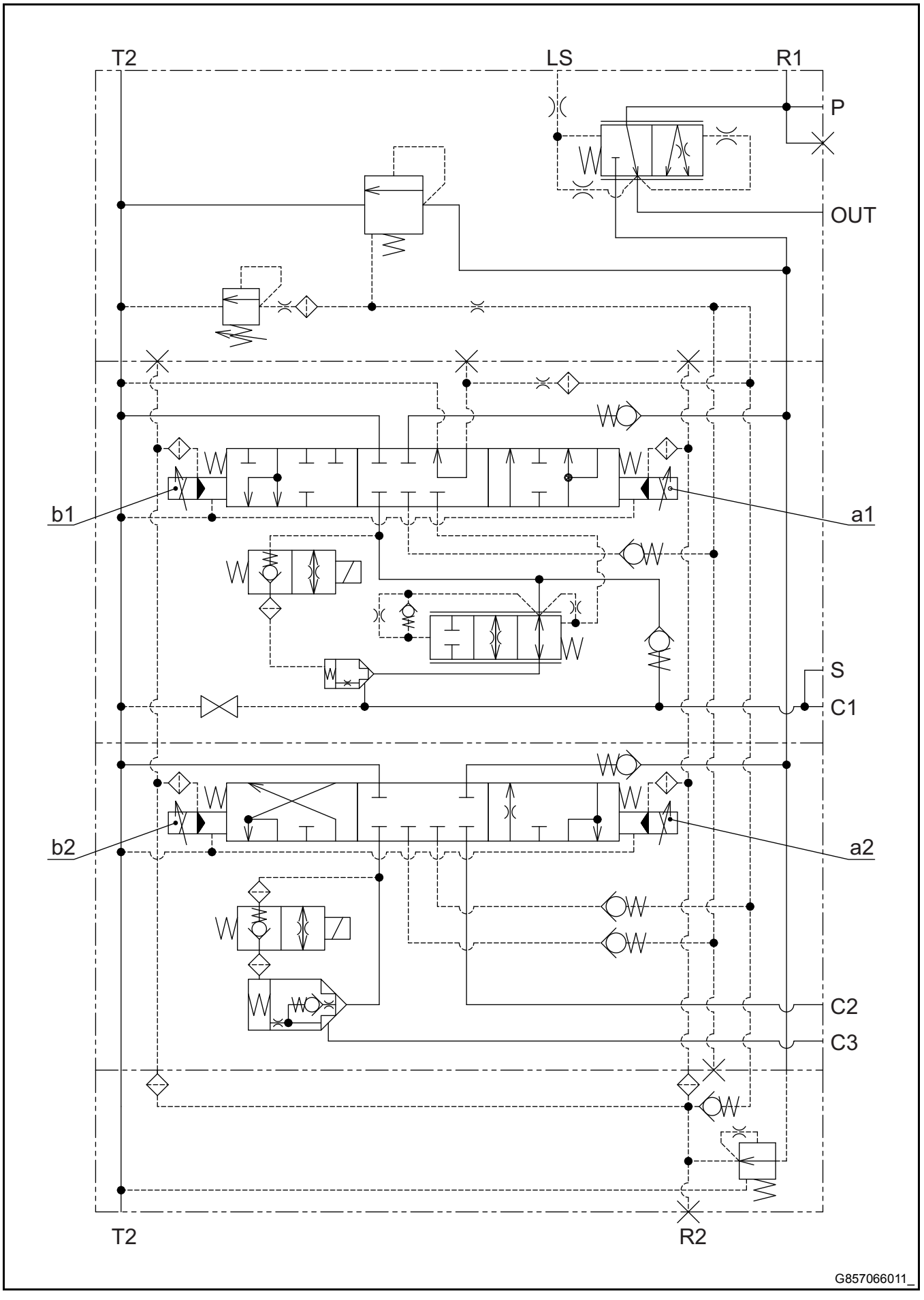
No	Name	No	Name
91	O-RING	107	O-RING
92	O-RING	108	O-RING
93	O-RING	109	O-RING
94	O-RING	110	O-RING
95	O-RING	111	O-RING
96	O-RING	112	EXPANDER
97	O-RING	113	BAND
98	O-RING	114	BAND
99	O-RING	115	PLUG
100	O-RING	116	CONNECTOR
101	O-RING	117	CONNECTOR
102	O-RING	118	————
103	O-RING	119	CHECK ASSY
104	O-RING	120	PLUNGER ASSY
105	O-RING	121	SLEEVE ASSY
106	O-RING	122	RELIEF ASSY

Tightening Torque List

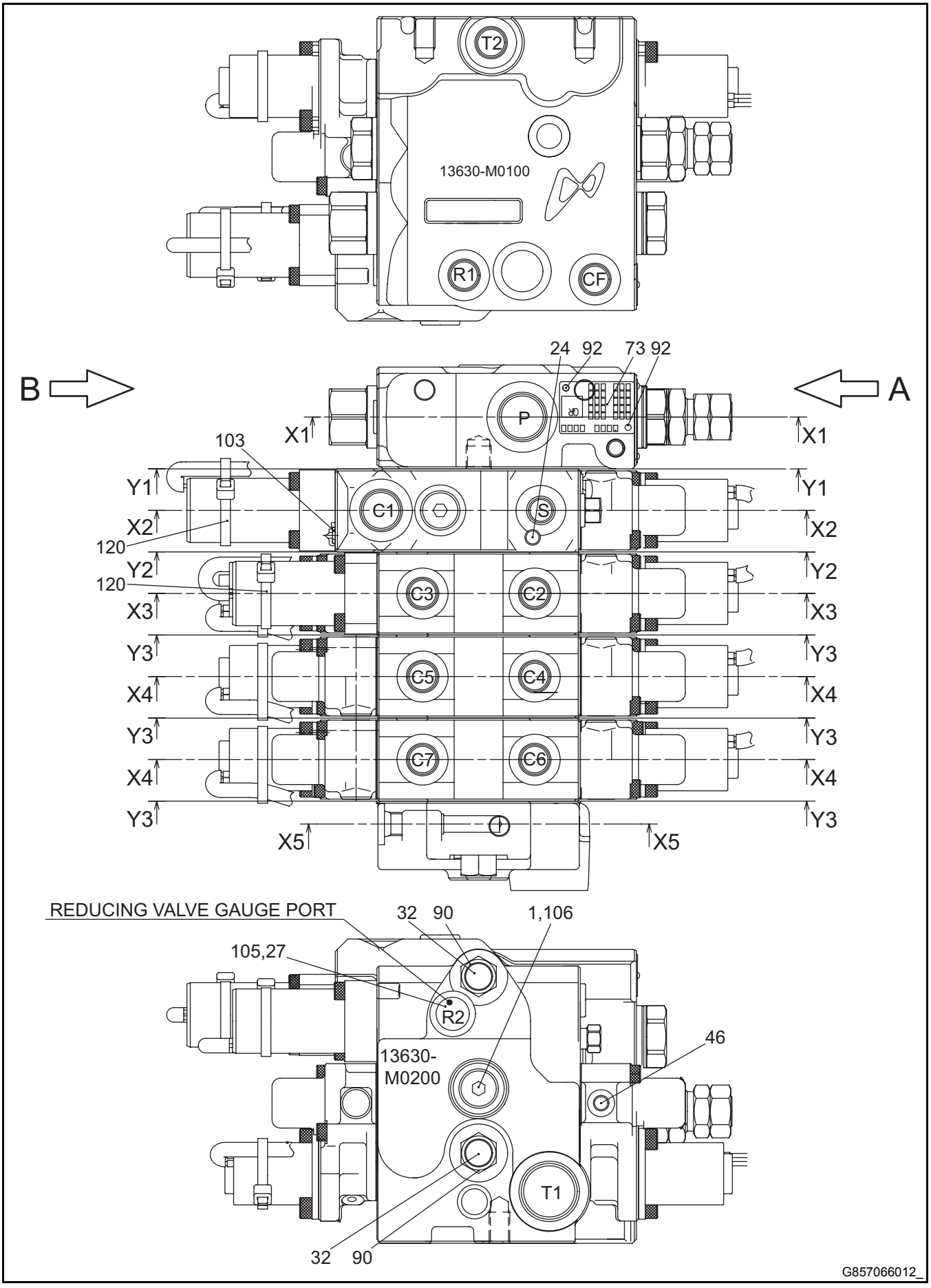
Screw size	No	Tightening torque(N·m)	Remarks
M5X0.8	33,65	2.16 ~ 2.64	LOCTITE 243 APPLICATION
	76,77,79,80	5.58 ~ 6.82	
M6X1.0	78	8.82 ~ 10.78	
M12X1.25	84	35.28 ~ 43.12	No.22 TIE ROD PART
M16X1.5	83	38.7 ~ 47.3	
M24X1.5	21,57,64	78.3 ~ 95.7	
5/16-24UNF	41,42	4.41 ~ 5.39	
7/16-20UNF	11,23	18.9 ~ 23.1	
9/16-18UNF	1,20	28.8 ~ 35.2	
3/4-16UNF	2	53.55 ~ 65.45	

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Hydraulic Circuit Diagram

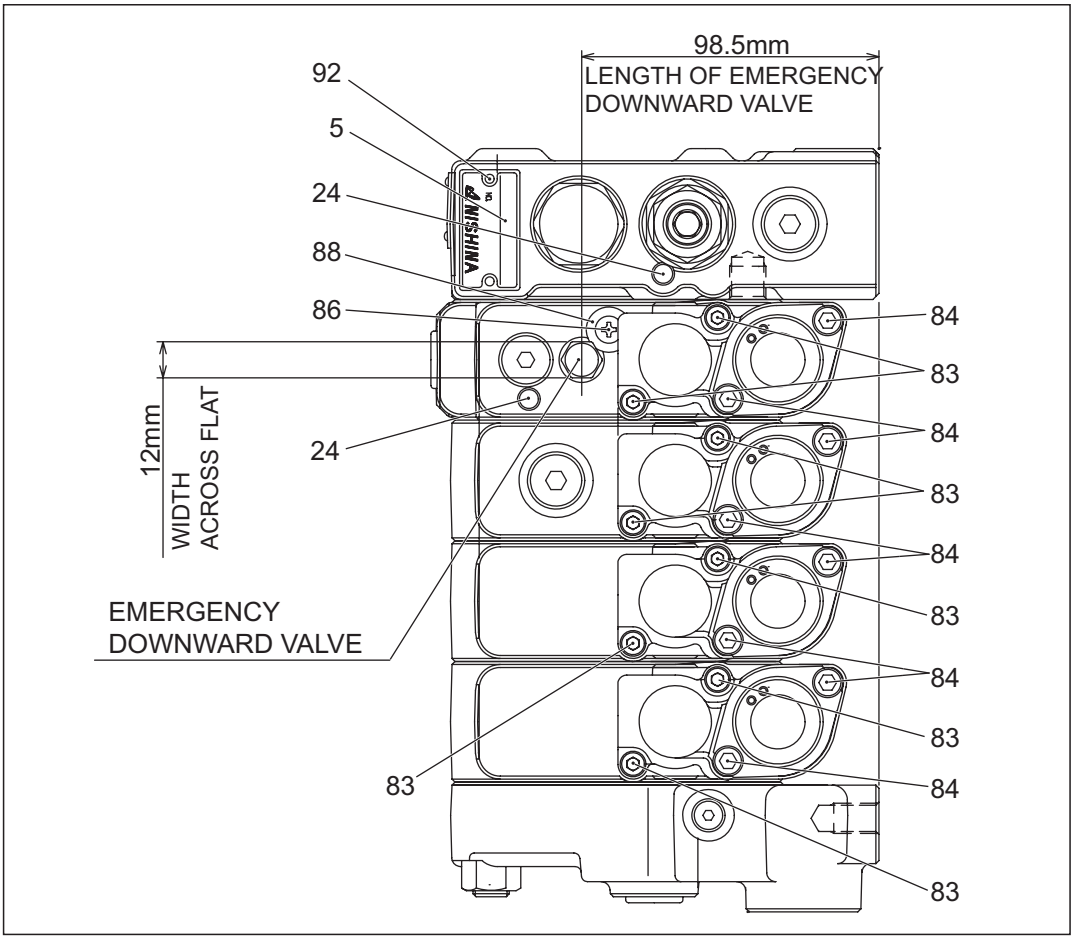


GENERAL (4-WAY STANDARD)

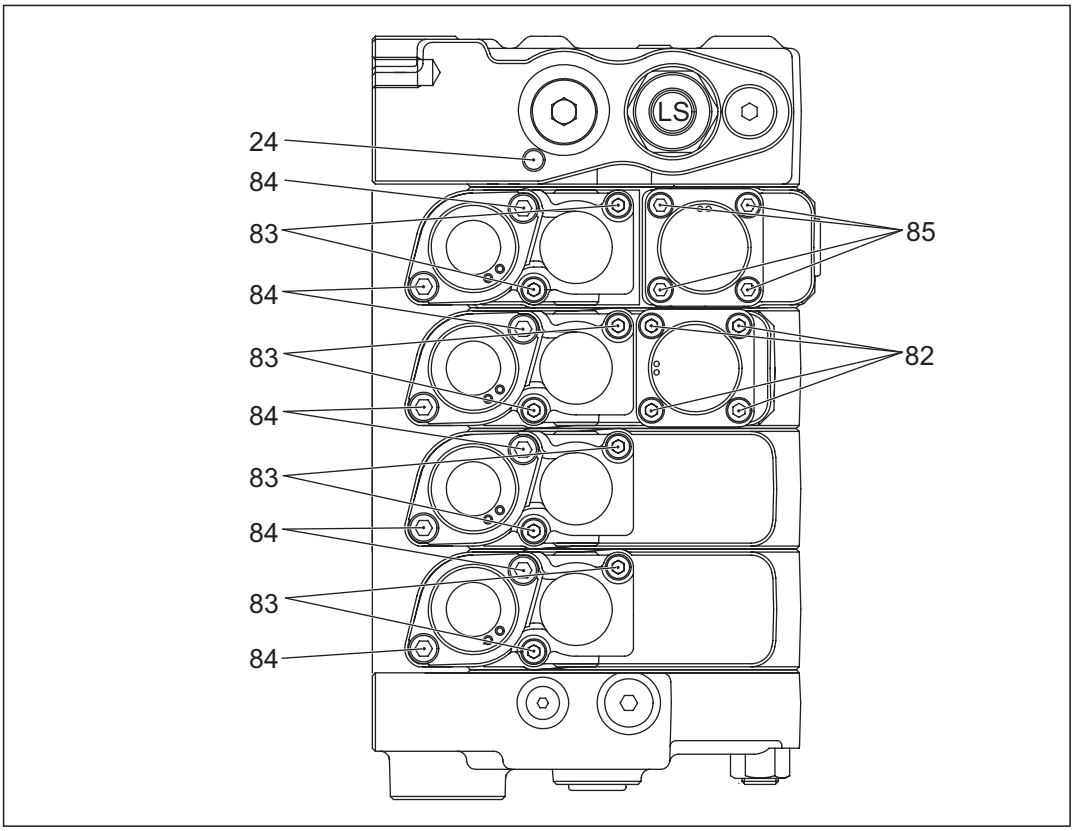


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A VIEW

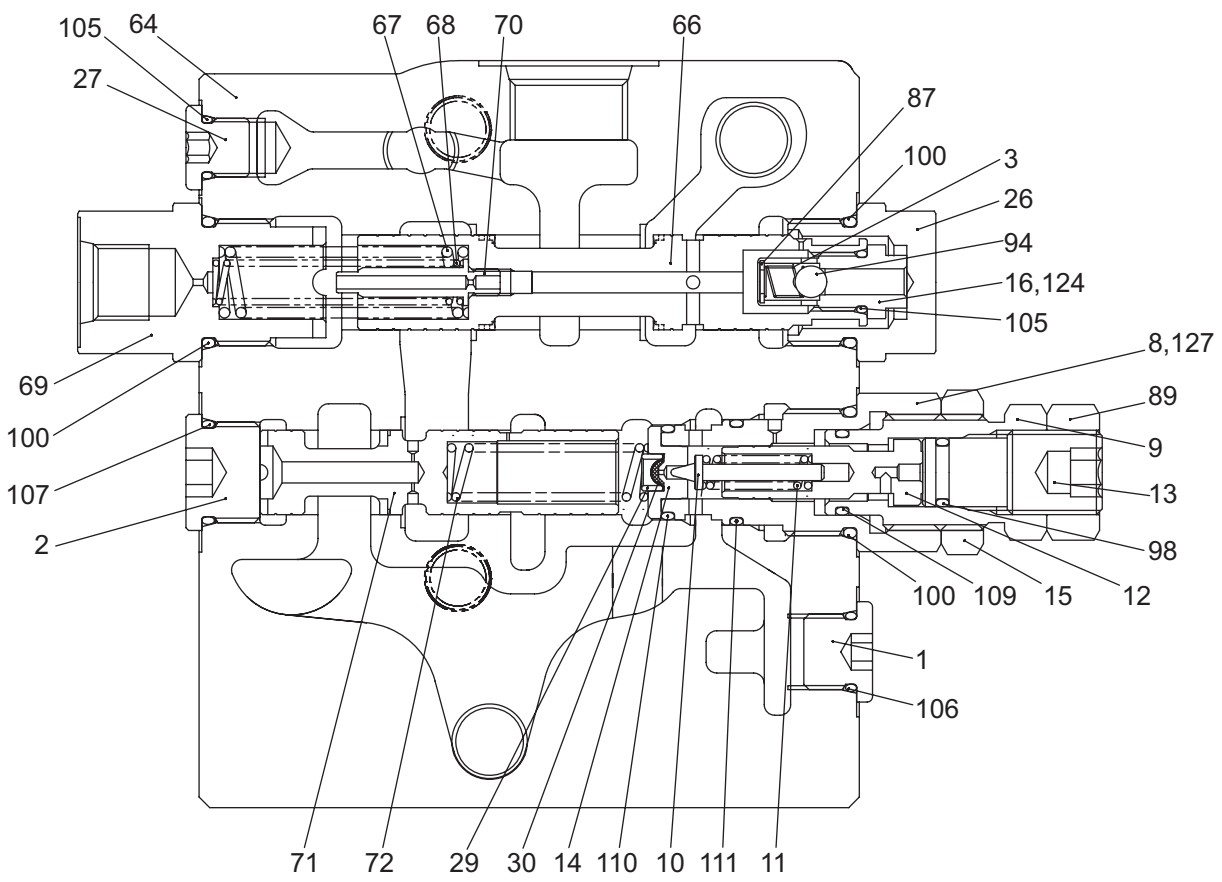


B VIEW



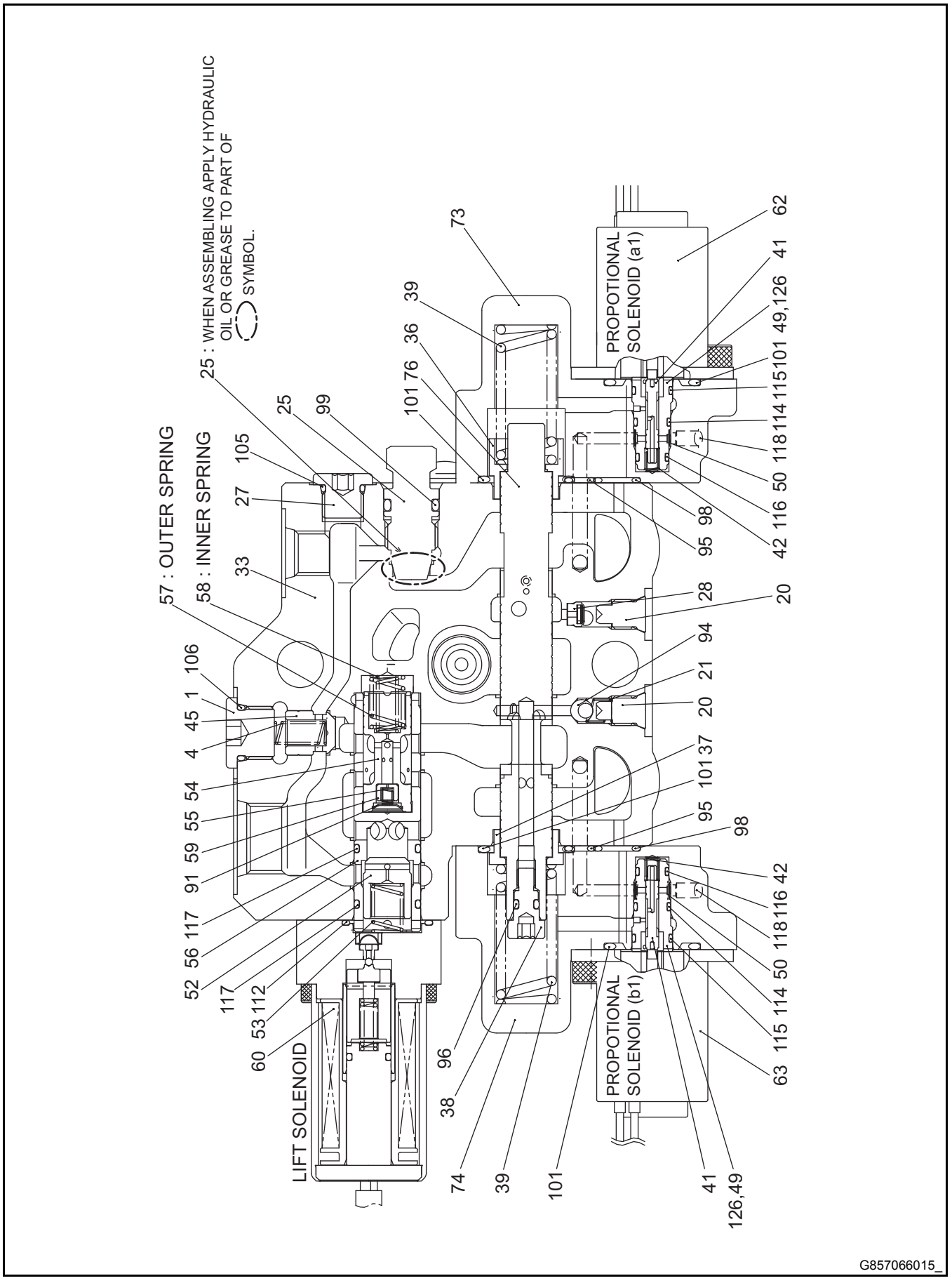
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X1-X1 section

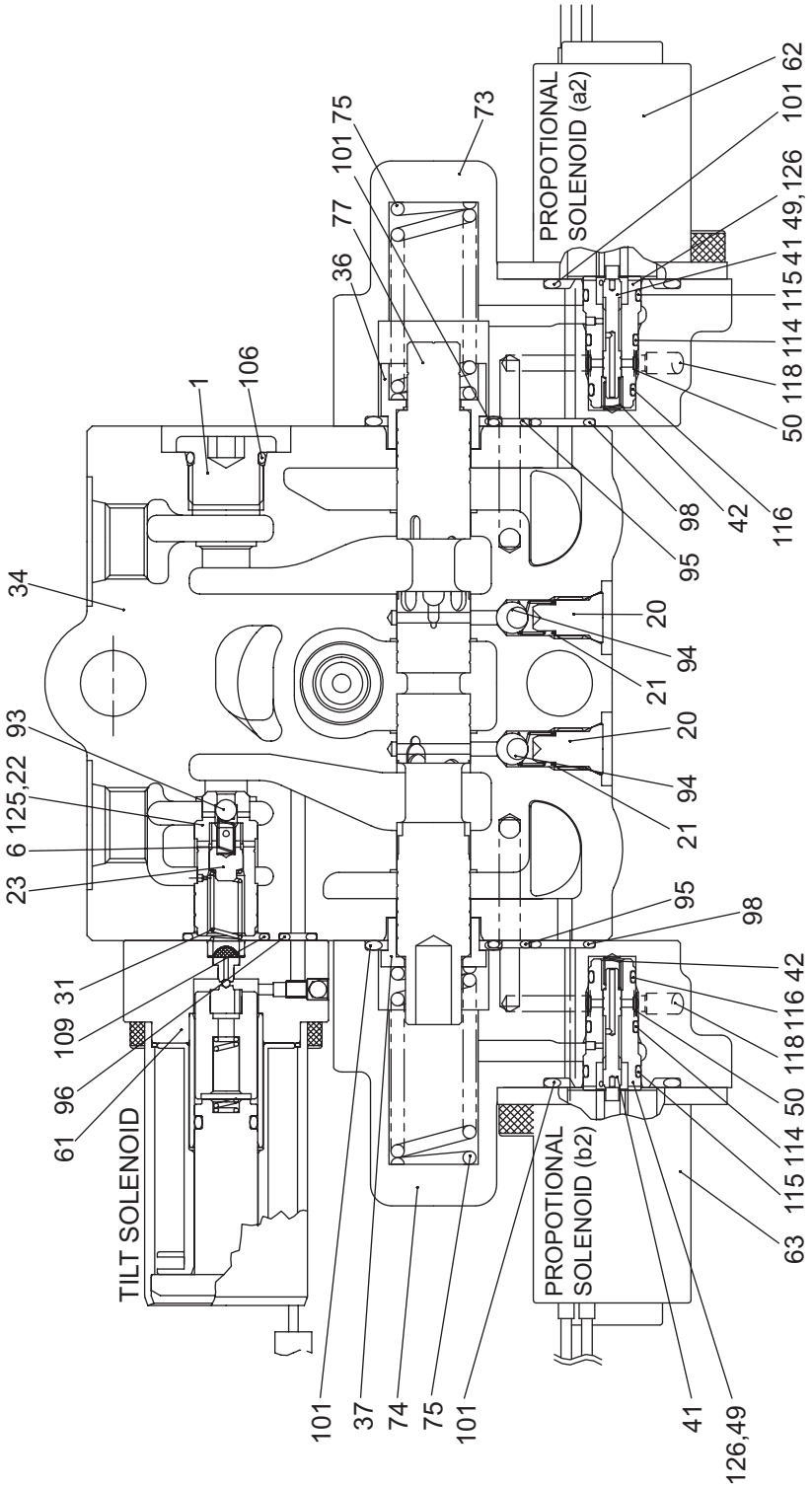


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X2-X2 section



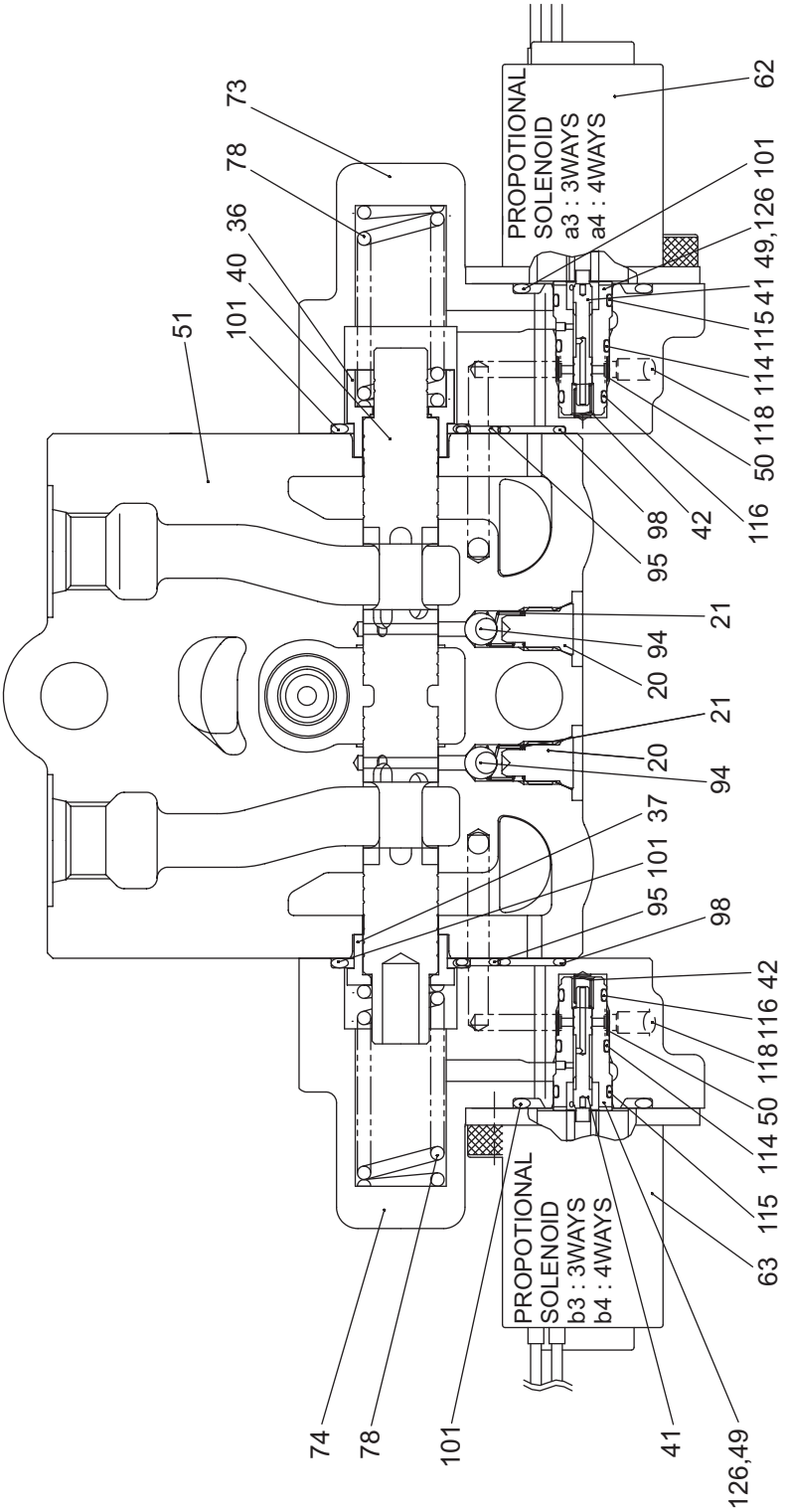
X3-X3 section



G857066016_

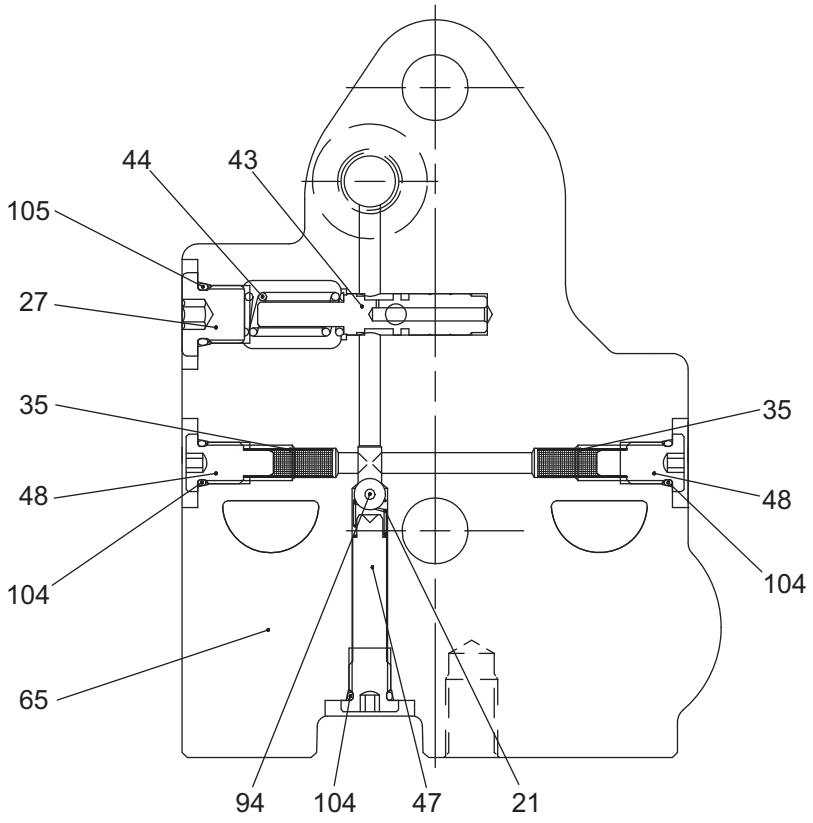
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X4-X4 section



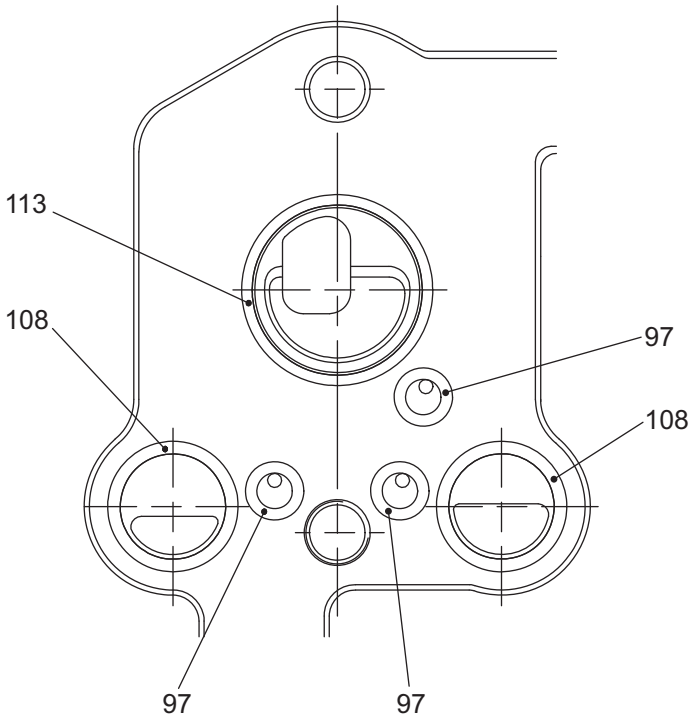
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X5-X5 section



G857066018_

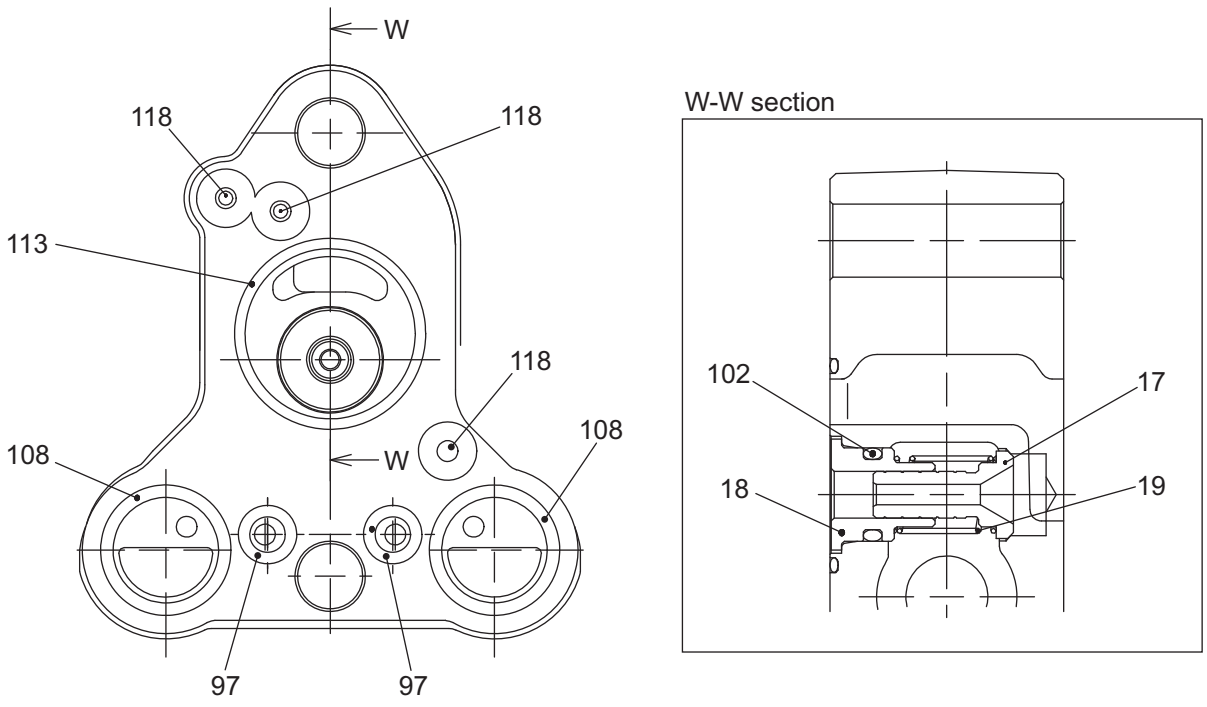
Y1-Y1 section (Inlet Side)



G857066019_

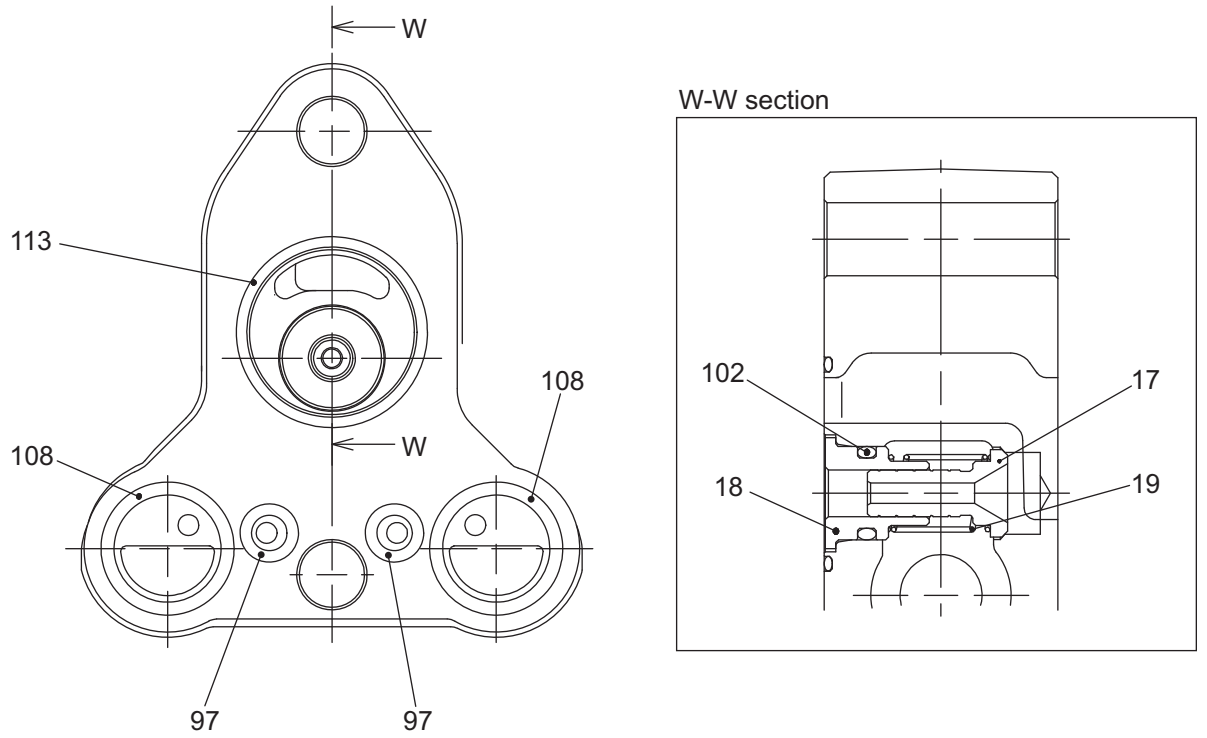
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Y2-Y2 section (Lift Side)



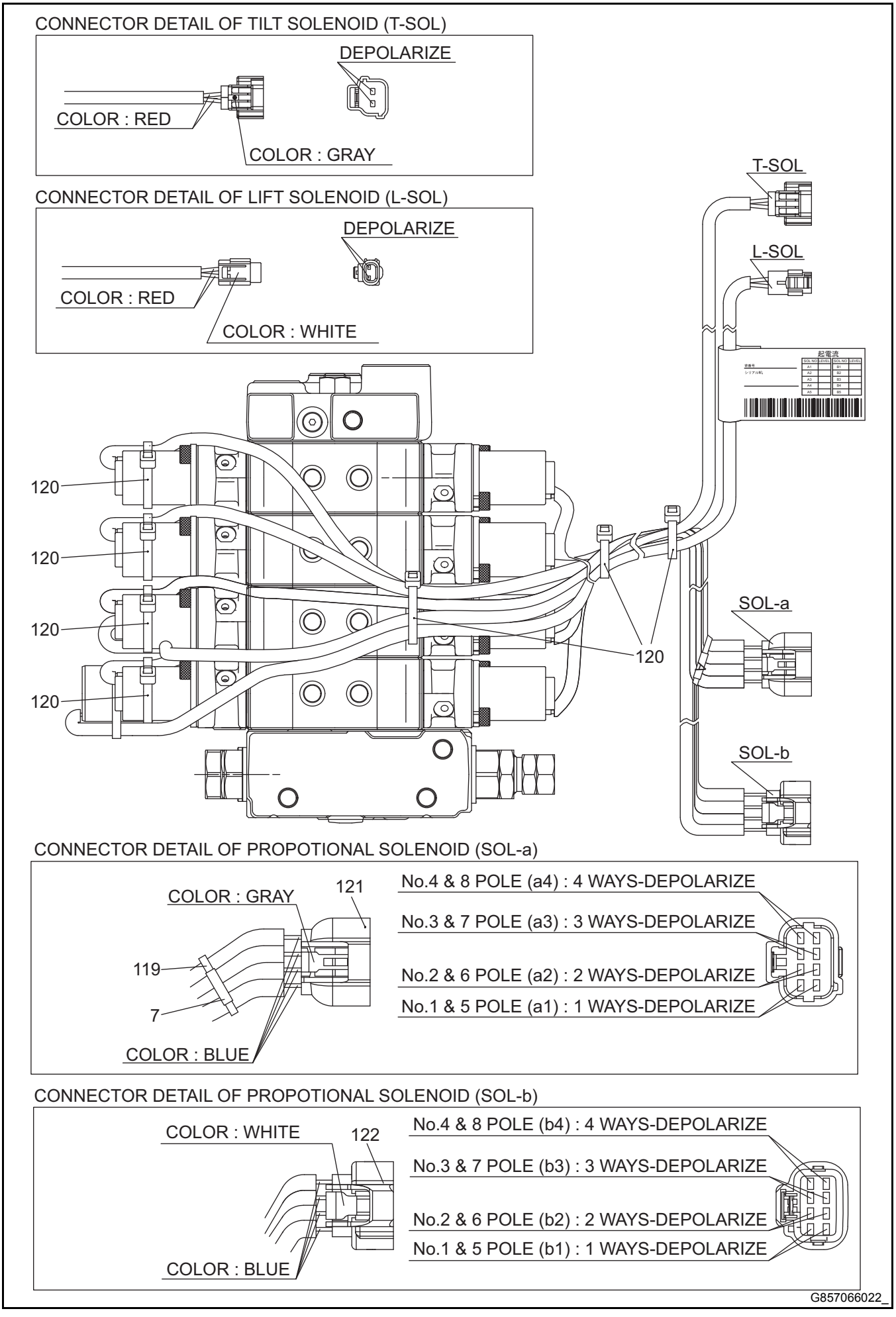
G857066020_

Y3-Y3 section (Tilt & Attachment Side)



G857066021_

Solenoid Connector Diagram



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Parts List

No	Name	No	Name
1	PLUG	46	PLUG
2	PLUG	47	PLUG
3	COMPRESSION SPRING	48	PLUG
4	COMPRESSION SPRING	49	SLEEVE
5	NAME PLATE	50	FILTER
6	COMPRESSION SPRING	51	PLUNGER HOUSING
7	MARKER	52	PLUNGER
8	SLEEVE	53	COMPRESSION SPRING
9	SLEEVE,PILOT	54	SPOOL
10	NEEDLE VALVE	55	COMPRESSION SPRING
11	COMPRESSION SPRING	56	SLEEVE
12	PISTON	57	COMPRESSION SPRING
13	PLUG	58	COMPRESSION SPRING
14	SEAT VALVE	59	PISTON
15	NUT	60	SOLENOID VALVE
16	PLUG	61	SOLENOID VALVE
17	PLUNGER	62	SOLENOID
18	GUIDE	63	SOLENOID
19	COMPRESSION SPRING	64	INLET HOUSING
20	PLUG	65	OUTLET HOUSING
21	COMPRESSION SPRING	66	PISTON
22	PLUNGER	67	COMPRESSION SPRING
23	STOPPER	68	COMPRESSION SPRING
24	PLUG	69	STOPPER
25	PLUG	70	SPRING HOLDER
26	STOPPER	71	SPOOL
27	PLUG	72	COMPRESSION SPRING
28	FILTER	73	SPRING COVER
29	COLLAR	74	SPRING COVER
30	FILTER	75	COMPRESSION SPRING
31	COMPRESSION SPRING	76	LIFT SPOOL
32	TIE-ROD	77	TILT SPOOL
33	PLUNGER HOUSING	78	COMPRESSION SPRING
34	PLUNGER HOUSING	79	NAME PLATE
35	FILTER	80	NAME PLATE
36	SPRING HOLDER	81	————
37	SPRING HOLDER	82	HEXAGON BOLT
38	SPOOL END	83	HEXAGON BOLT
39	COMPRESSION SPRING	84	HEXAGON BOLT
40	SPOOLDOUBLE	85	HEXAGON BOLT
41	SPOOL	86	SCREW
42	COMPRESSION SPRING	87	PLATE WASHER
43	PISTON	88	PLATE WASHER
44	COMPRESSION SPRING	89	NUT
45	PLUNGER	90	NUT

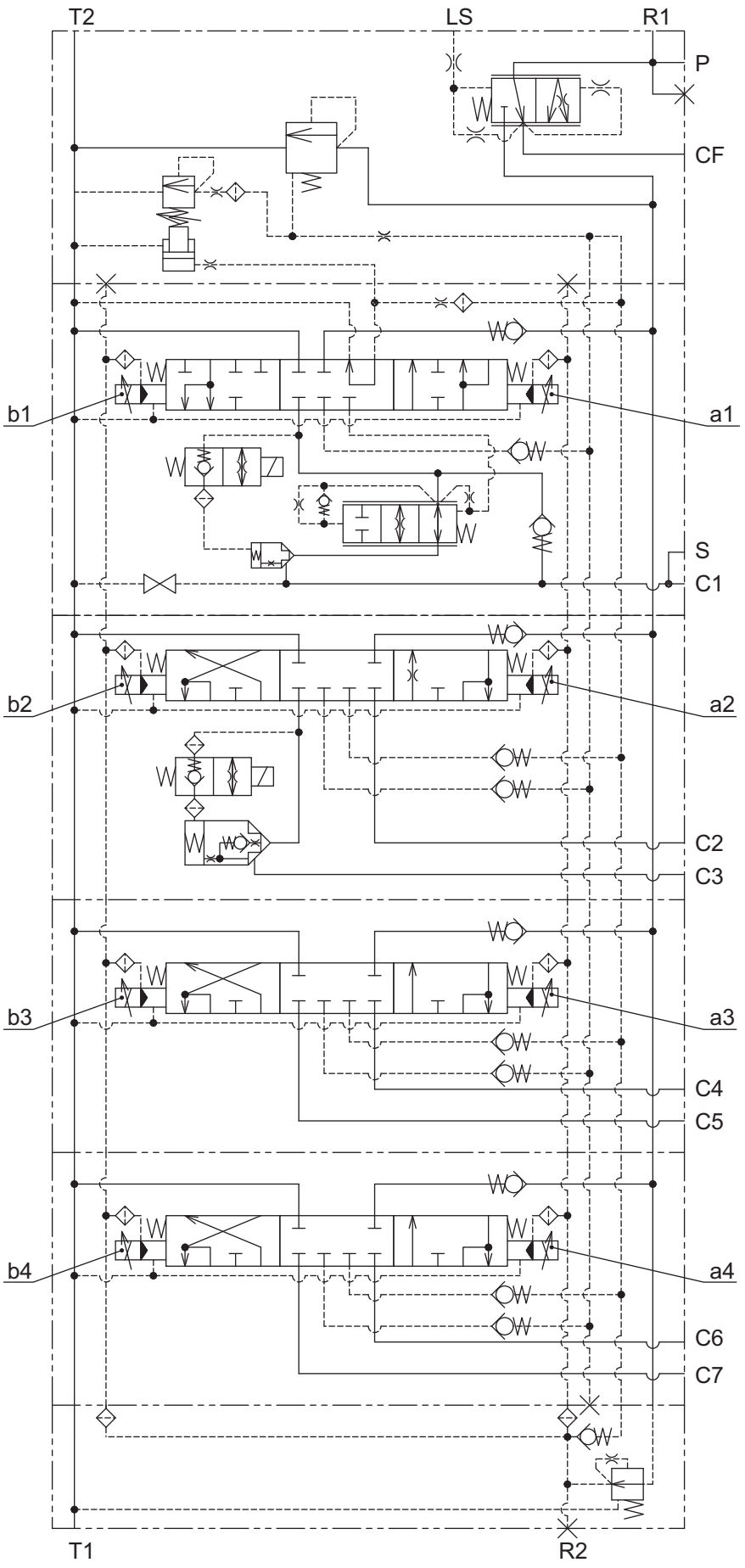
No	Name	No	Name
91	NUT	110	O-RING
92	SCREW	111	O-RING
93	BALL	112	O-RING
94	BALL	113	O-RING
95	O-RING	114	O-RING
96	O-RING	115	O-RING
97	O-RING	116	O-RING
98	O-RING	117	O-RING
99	O-RING	118	BAND
100	O-RING	119	EXPANDER
101	O-RING	120	BAND
102	O-RING	121	CONNECTOR
103	O-RING	122	CONNECTOR
104	O-RING	123	————
105	O-RING	124	CHECK ASSY
106	O-RING	125	PLUNGER ASSY
107	O-RING	126	SLEEVE ASSY
108	O-RING	127	RELIEF ASSY
109	O-RING		

Tightening Torque List

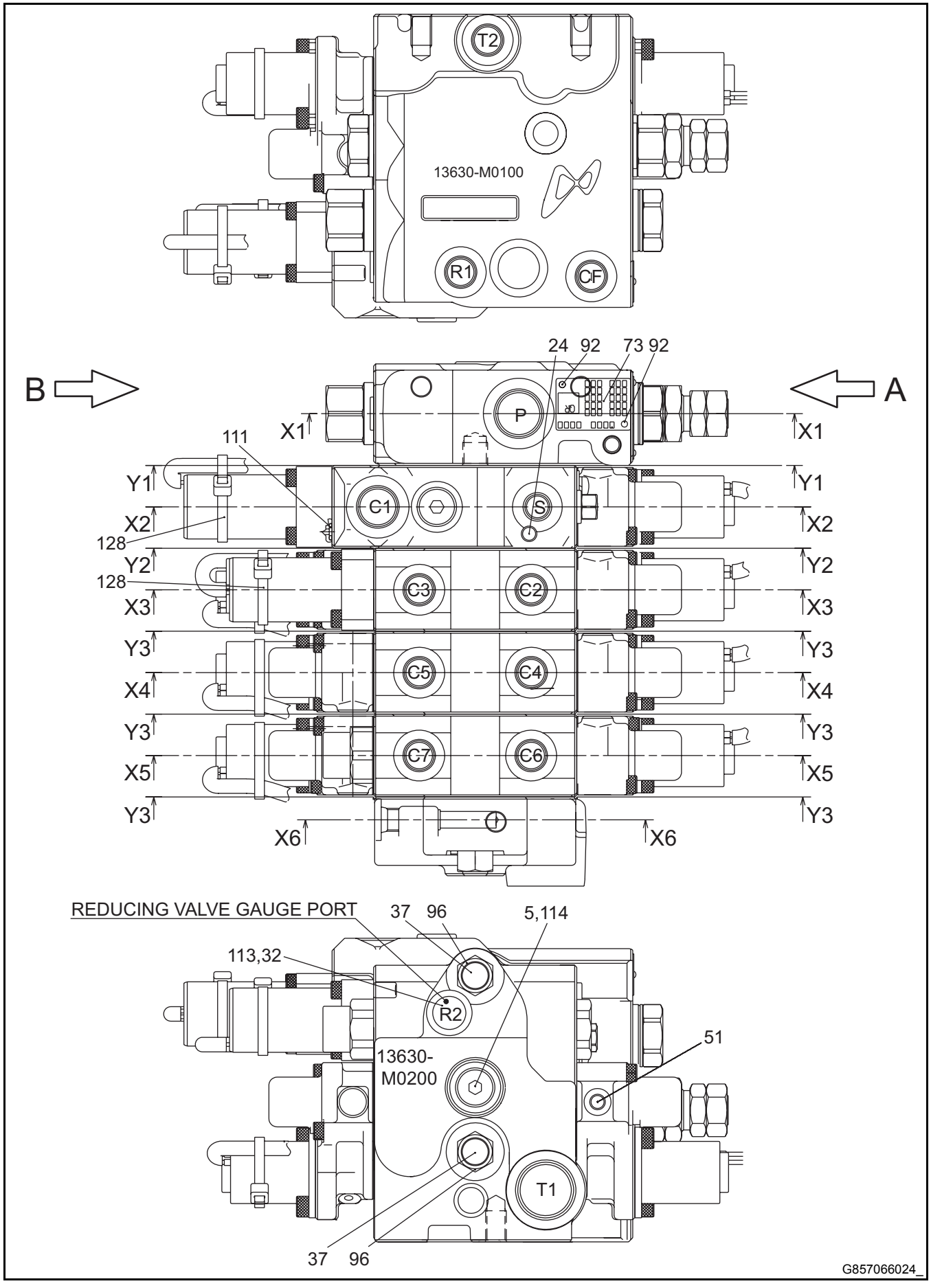
Screw size	No	Tightening torque(N·m)	Remarks
M5X0.8	38,70	2.16 ~ 2.64	LOCTITE 243 APPLICATION
	82,83,85,86	5.58 ~ 6.82	
M6X1.0	84	8.82 ~ 10.78	
M12X1.25	90	35.28 ~ 43.12	No.32 TIE ROD PART
M16X1.5	89	38.7 ~ 47.3	
M22X1.5	15	68.4 ~ 83.6	
M24X1.5	8,26,69	78.3 ~ 95.7	
5/16-24UNF	47,48	4.41 ~ 5.39	
7/16-20UNF	16,27	18.9 ~ 23.1	
9/16-18UNF	1,25	28.8 ~ 35.2	
3/4-16UNF	2	53.55 ~ 65.45	

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Hydraulic Circuit Diagram

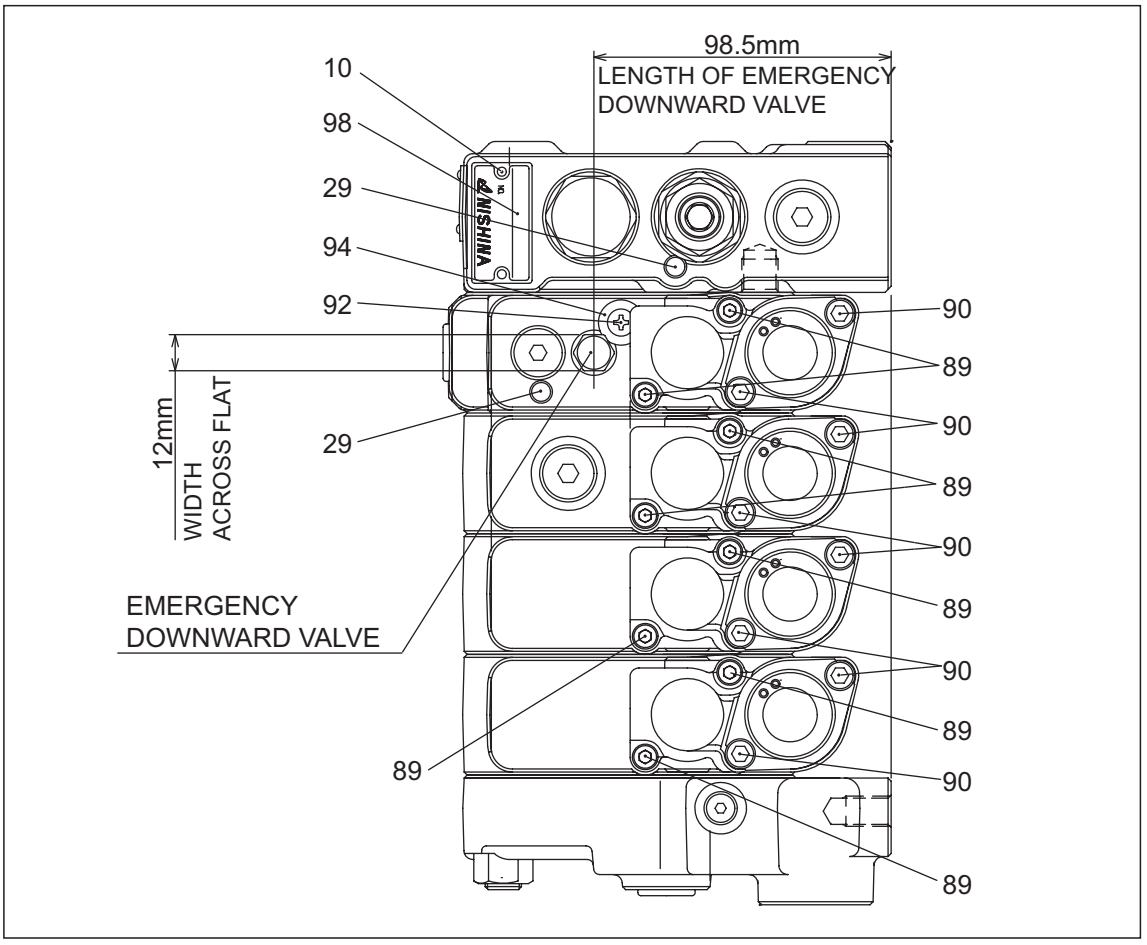


GENERAL (4-WAY PR)

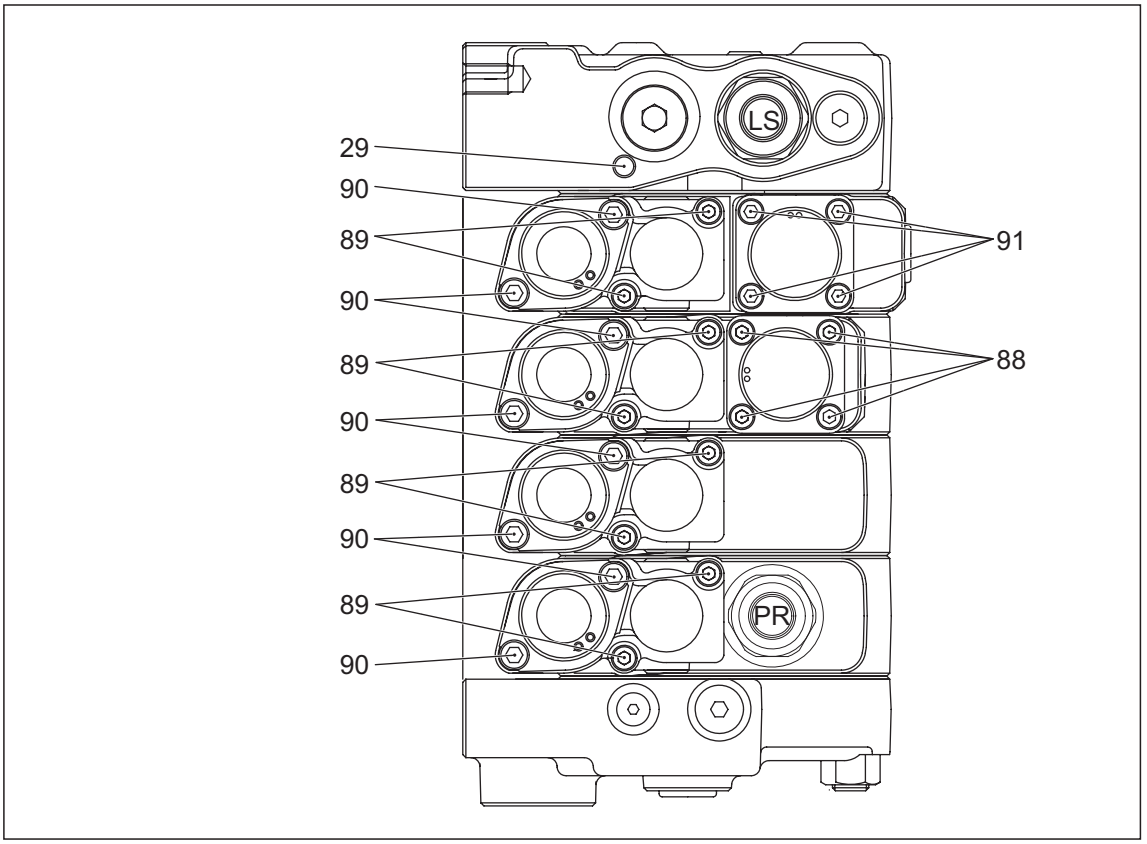


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A VIEW

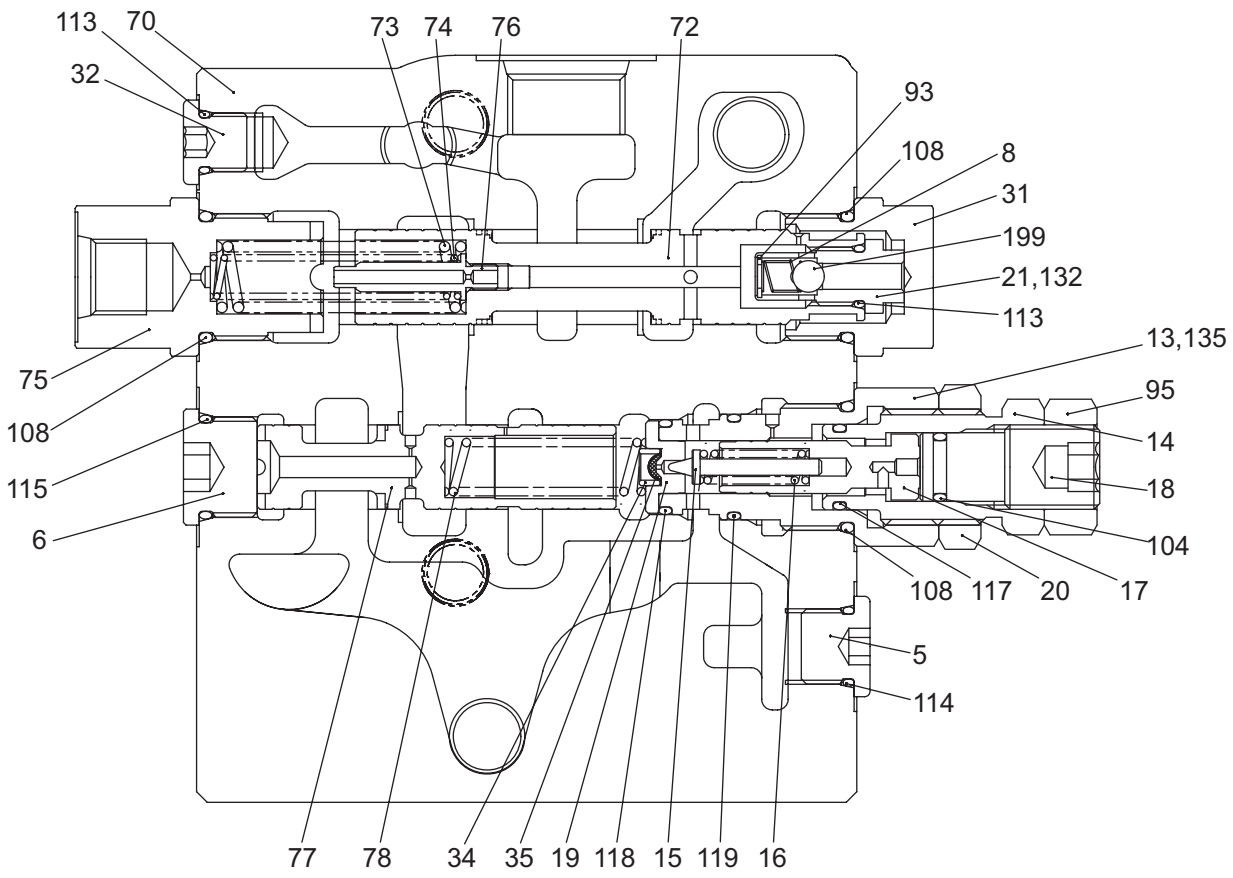


B VIEW



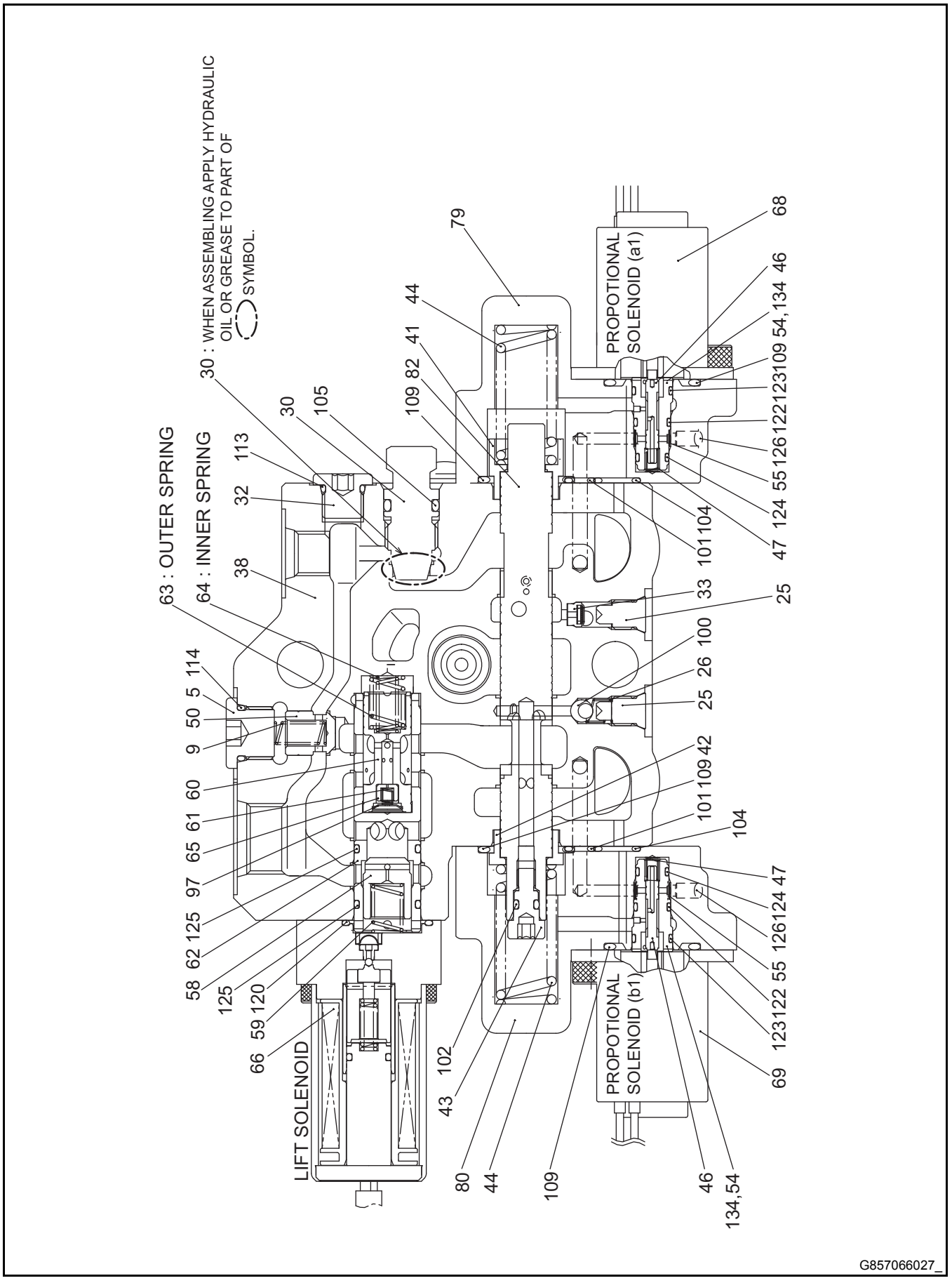
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X1-X1 section

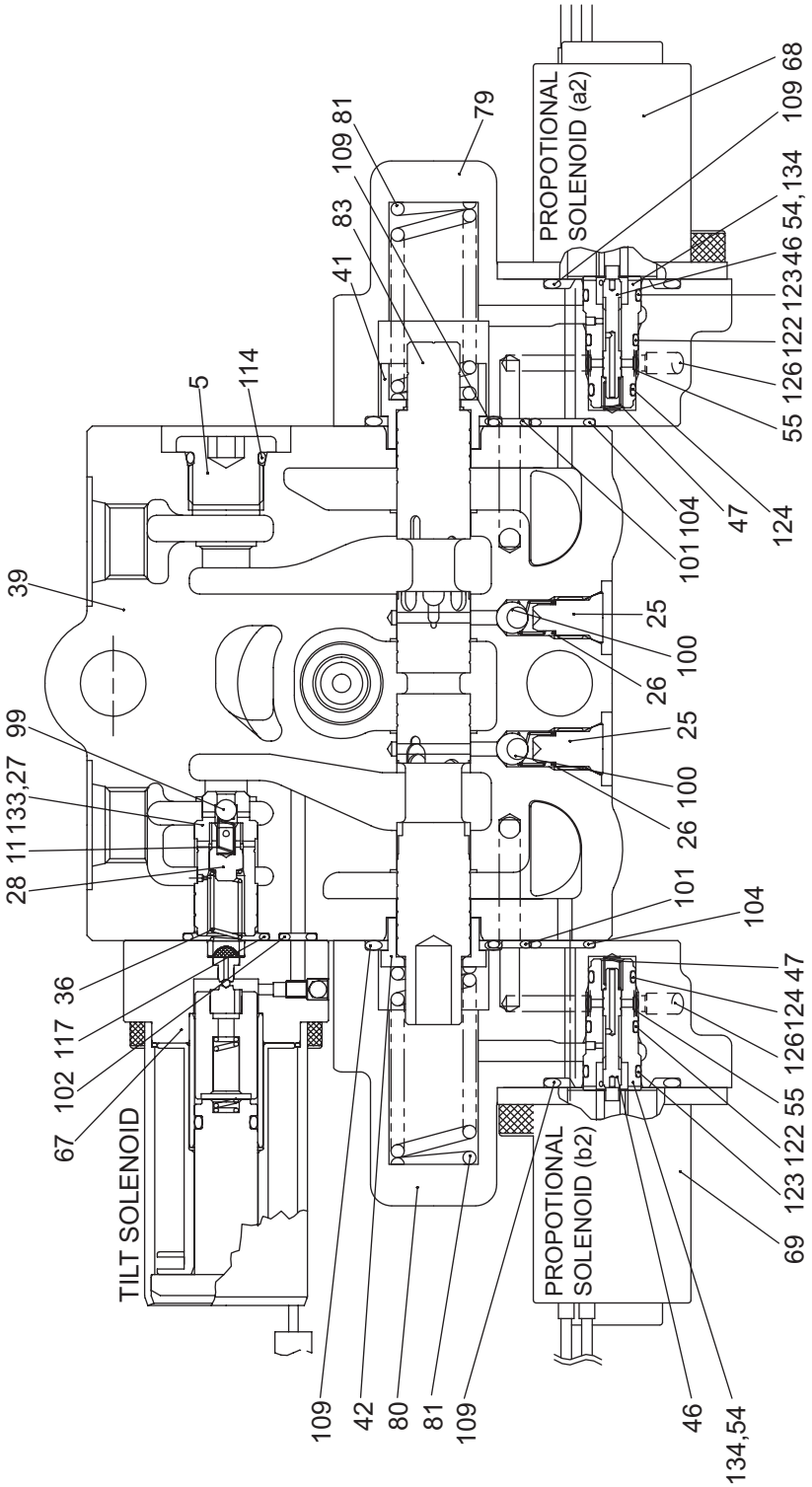


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X2-X2 section



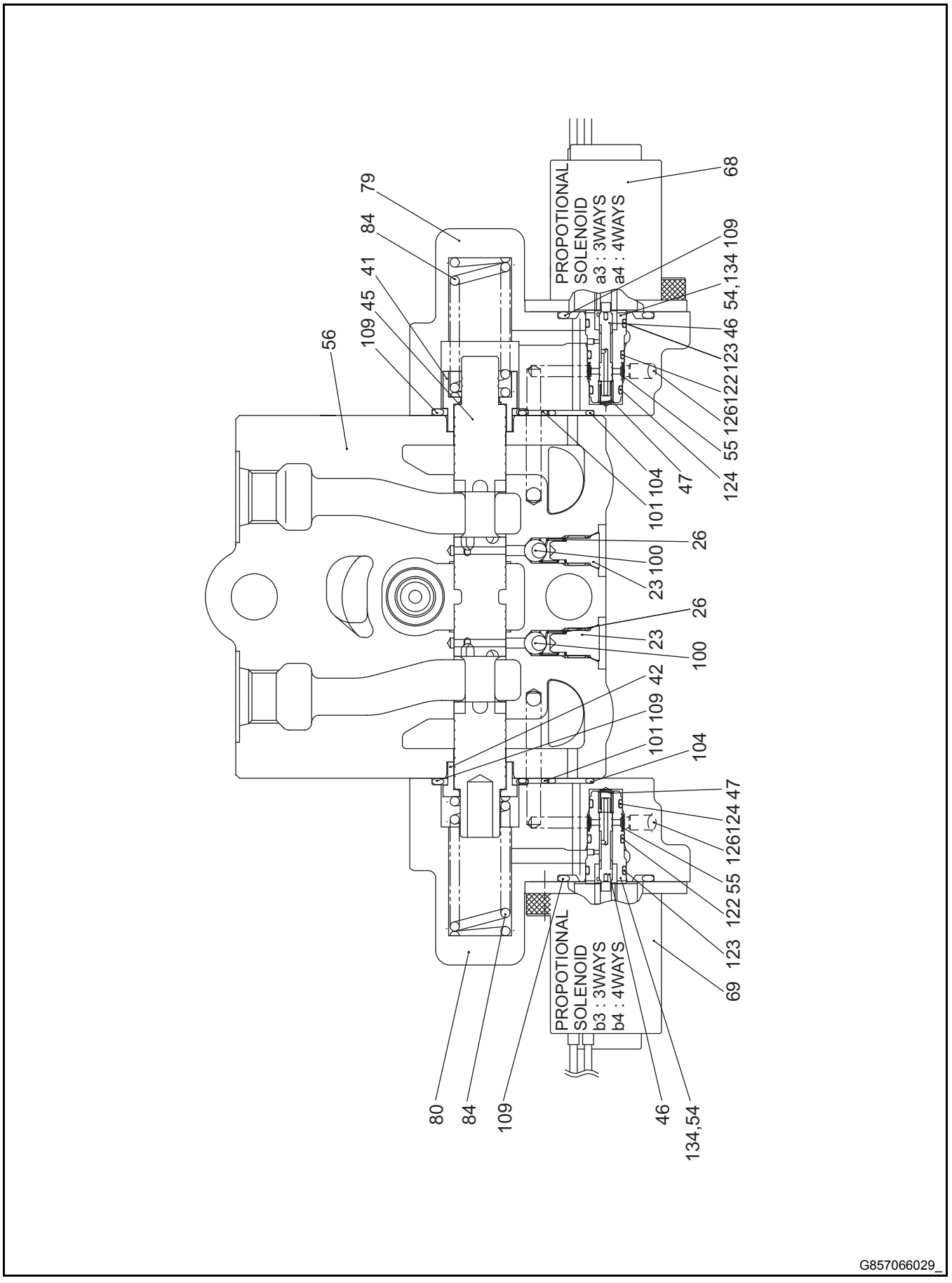
X3-X3 section



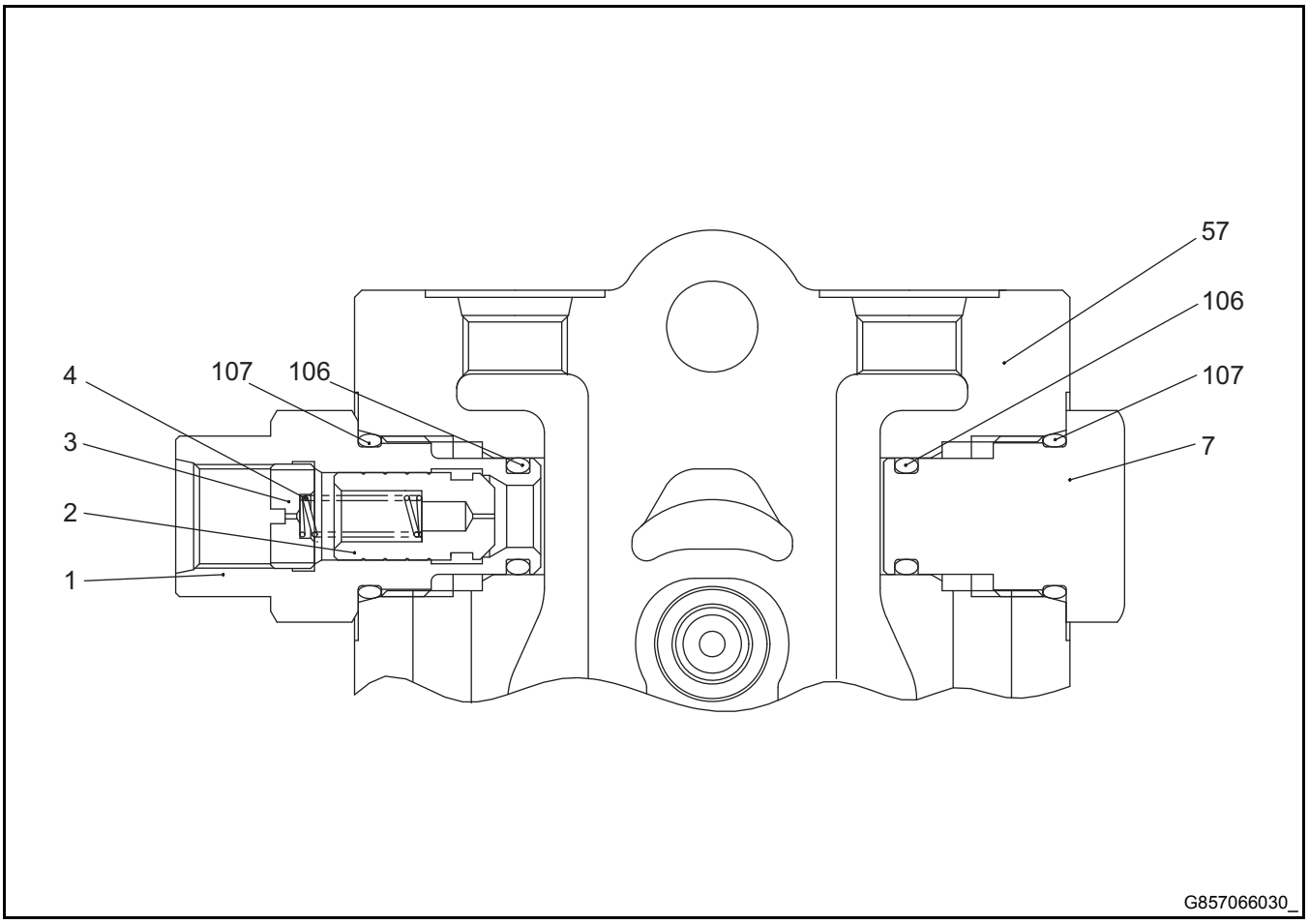
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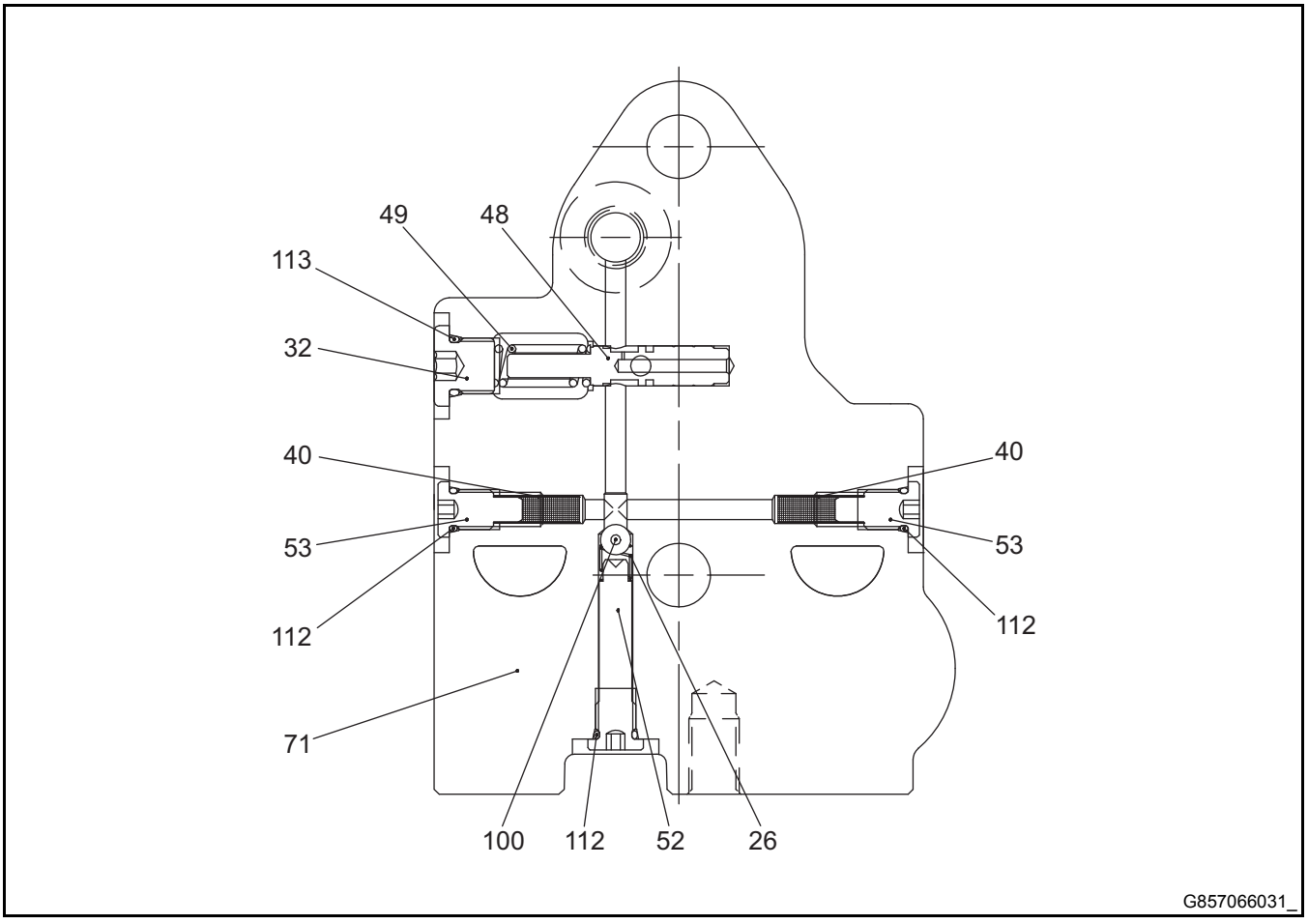
X4-X4 section



X5-X5 section

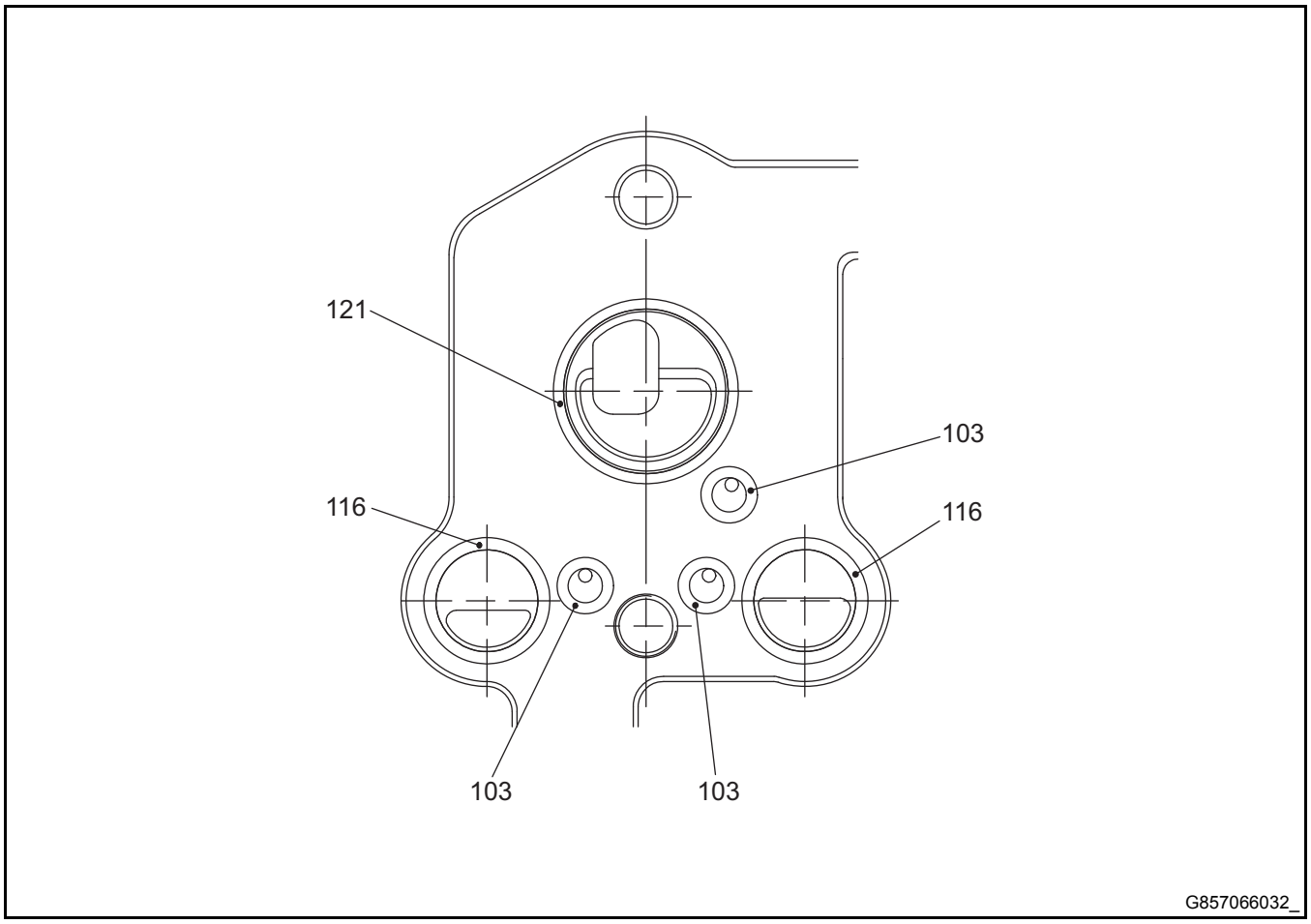


X6-X6 section

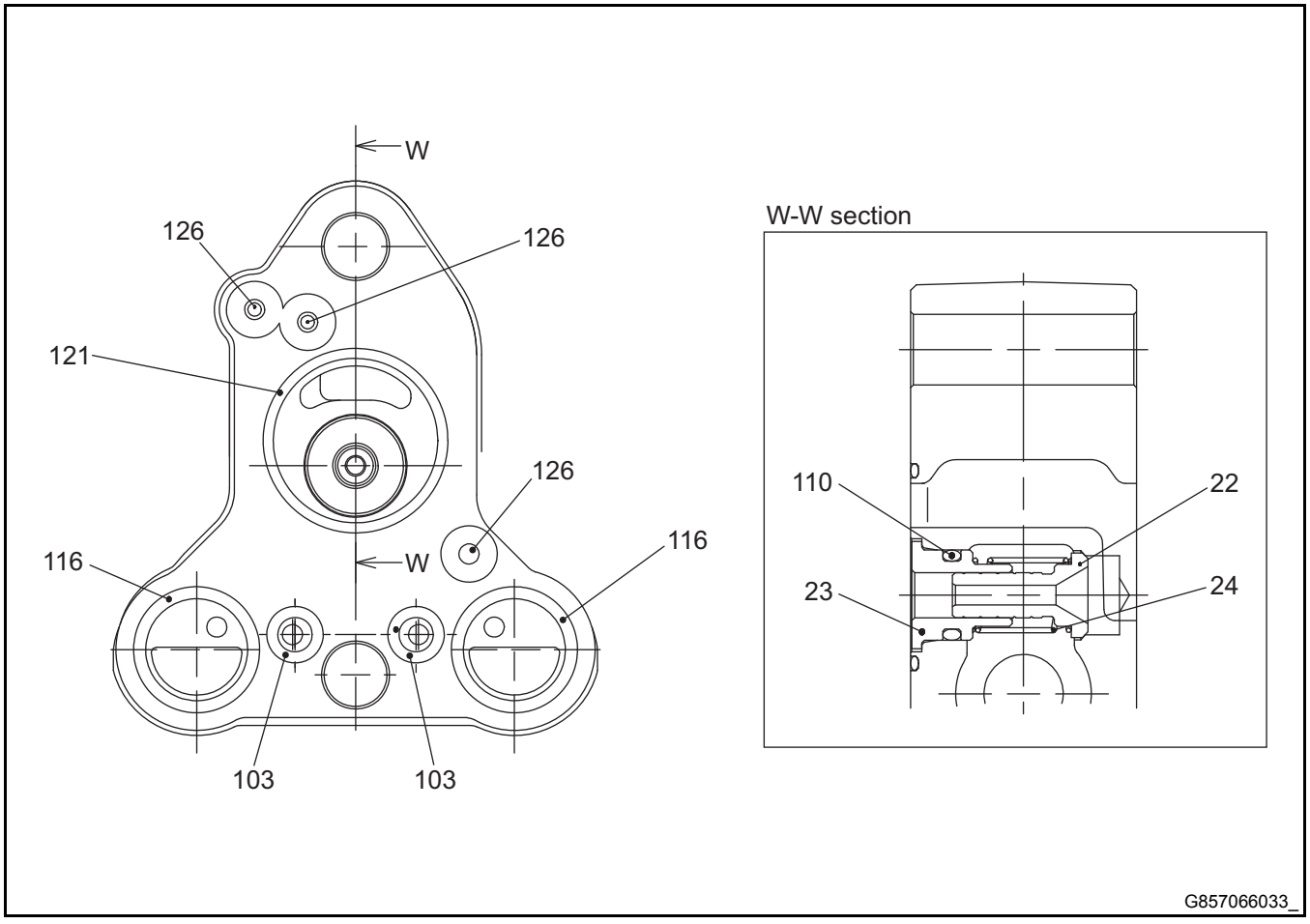


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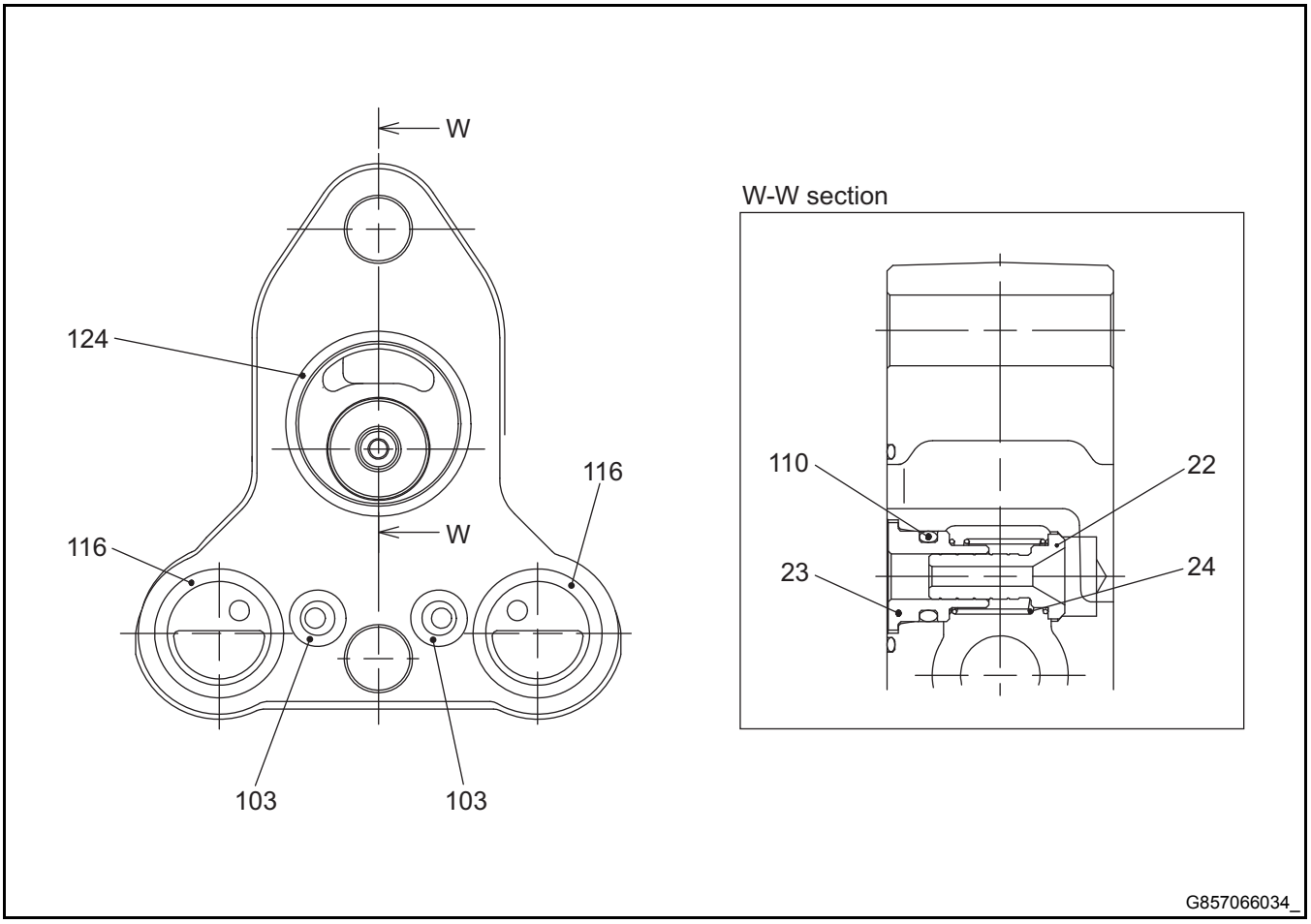
Y1-Y1 section (Inlet Side)



Y2-Y2 section (Lift Side)

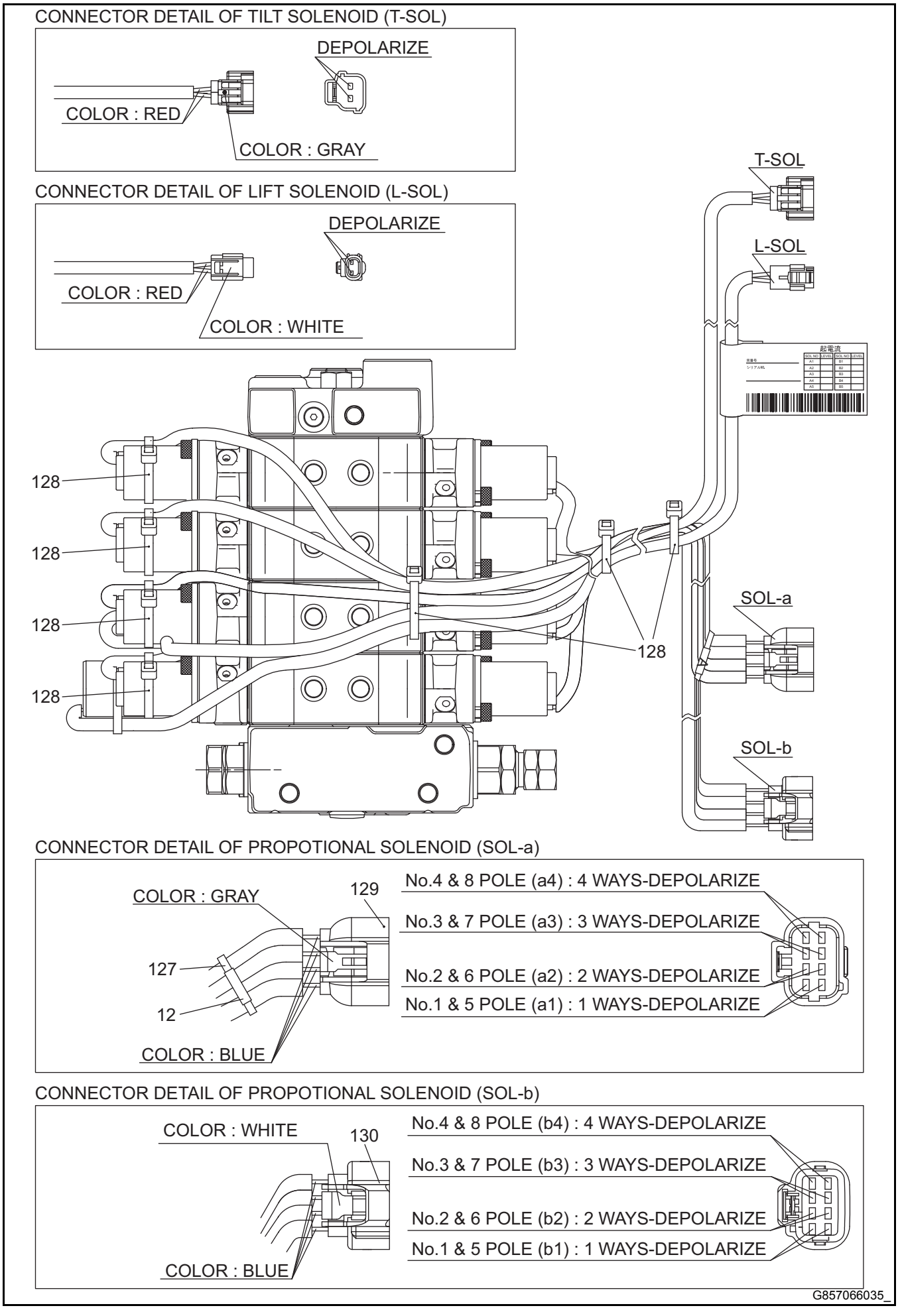


Y3-Y3 section (TILT & Attachment Side)



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Solenoid Connector Diagram



Parts List

No	Name	No	Name
1	CASE	46	SPOOL
2	PLUNGER	47	COMPRESSION SPRING
3	STOPPER	48	PISTON
4	COMPRESSION SPRING	49	COMPRESSION SPRING
5	PLUG	50	PLUNGER
6	PLUG	51	PLUG
7	PLUG	52	PLUG
8	COMPRESSION SPRING	53	PLUG
9	COMPRESSION SPRING	54	SLEEVE
10	NAME PLATE	55	FILTER
11	COMPRESSION SPRING	56	PLUNGER HOUSING
12	MARKER	57	PLUNGER HOUSING
13	SLEEVE	58	PLUNGER
14	SLEEVE,PILOT	59	COMPRESSION SPRING
15	NEEDLE VALVE	60	SPOOL
16	COMPRESSION SPRING	61	COMPRESSION SPRING
17	PISTON	62	SLEEVE
18	PLUG	63	COMPRESSION SPRING
19	SEAT VALVE	64	COMPRESSION SPRING
20	NUT	65	PISTON
21	PLUG	66	SOLENOID VALVE
22	PLUNGER	67	SOLENOID VALVE
23	GUIDE	68	SOLENOID
24	COMPRESSION SPRING	69	SOLENOID
25	PLUG	70	INLET HOUSING
26	COMPRESSION SPRING	71	OUTLET HOUSING
27	PLUNGER	72	PISTON
28	STOPPER	73	COMPRESSION SPRING
29	PLUG	74	COMPRESSION SPRING
30	PLUG	75	STOPPER
31	STOPPER	76	SPRING HOLDER
32	PLUG	77	SPOOL
33	FILTER	78	COMPRESSION SPRING
34	COLLAR	79	SPRING COVER
35	FILTER	80	SPRING COVER
36	COMPRESSION SPRING	81	COMPRESSION SPRING
37	TIE-ROD	82	LIFT SPOOL
38	PLUNGER HOUSING	83	TILT SPOOL
39	PLUNGER HOUSING	84	COMPRESSION SPRING
40	FILTER	85	NAME PLATE
41	SPRING HOLDER	86	NAME PLATE
42	SPRING HOLDER	87	————
43	PISTON	88	HEXAGON BOLT
44	COMPRESSION SPRING	89	HEXAGON BOLT
45	SPOOL,DOUBLE	90	HEXAGON BOLT

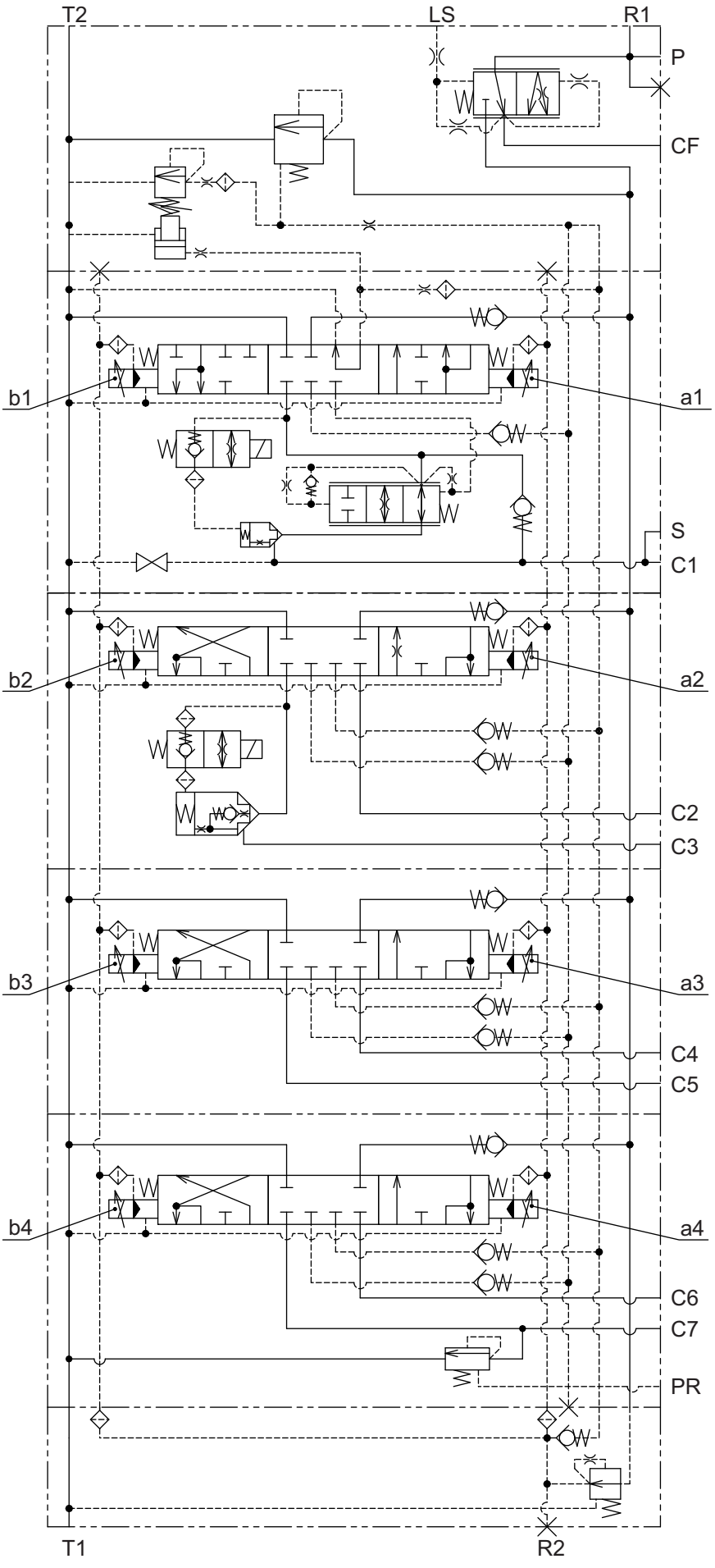
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No	Name	No	Name
91	HEXAGON BOLT	114	O-RING
92	SCREW	115	O-RING
93	PLATE WASHER	116	O-RING
94	PLATE WASHER	117	O-RING
95	NUT	118	O-RING
96	NUT	119	O-RING
97	NUT	120	O-RING
98	SCREW	121	O-RING
99	BALL	122	O-RING
100	BALL	123	O-RING
101	O-RING	124	O-RING
102	O-RING	125	O-RING
103	O-RING	126	EXPANDER
104	O-RING	127	BAND
105	O-RING	128	BAND
106	O-RING	129	CONNECTOR
107	O-RING	130	CONNECTOR
108	O-RING	131	————
109	O-RING	132	CHECK ASSY
110	O-RING	133	PLUNGER ASSY
111	O-RING	134	SLEEVE ASSY
112	O-RING	135	RELIEF ASSY
113	O-RING		

Tightening Torque List

Screw size	No	Tightening torque(N·m)	Remarks
M5X0.8	43,76	2.16 ~ 2.64	LOCTITE 243 APPLICATION
	88,89,91,92	5.58 ~ 6.82	
M6X1.0	90	8.82 ~ 10.78	
M12X1.25	96	35.28 ~ 43.12	No.37 TIE ROD PART
M16X1.5	95	38.7 ~ 47.3	
M22X1.5	1,7,20	68.4 ~ 83.6	
M24X1.5	13,31,75	78.3 ~ 95.7	
5/16-24UNF	52,53	4.41 ~ 5.39	
7/16-20UNF	21,32	18.9 ~ 23.1	
9/16-18UNF	5,30	28.8 ~ 35.2	
3/4-16UNF	6	53.55 ~ 65.45	

Hydraulic Circuit Diagram



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SPECIFICATIONS

2-WAY

Item \ Vehicle model	1.5 · 1.6 · 1.8 ton model	1.5 · 1.6 ton model for china	2.0 ton model	2.5 ton model	3.0 ton model
Relief set pressure Mpa (kgf/cm^2)[psi]	15.5 $^{+0.5}_{0}$ (158 $^{+5}_{0}$) [2248 $^{+73}_{0}$]	14.0 $^{+0.5}_{0}$ (143 $^{+5}_{0}$) [2030 $^{+73}_{0}$]	14.8 $^{+0.5}_{0}$ (151 $^{+5}_{0}$) [2146 $^{+73}_{0}$]	17.2 $^{+0.5}_{0}$ (175 $^{+5}_{0}$) [2494 $^{+73}_{0}$]	18.1 $^{+0.5}_{0}$ (185 $^{+5}_{0}$) [2625 $^{+73}_{0}$]
Lift cracking pressure Mpa (kgf/cm^2)[psi]	14.2 (145) [2059] or more	12.7 (130) [1842] or more	13.5 (138) [1958] or more	15.9 (162) [2306] or more	16.8 (171) [2436] or more
Controllable flow rate L/min (US gal/min)	50 $^{+7.3}_{-6.0}$ (13.2 $^{+1.9}_{-1.6}$)	50 $^{+7.3}_{-6.0}$ (13.2 $^{+1.9}_{-1.6}$)	60 $^{+10.7}_{-7.0}$ (15.8 $^{+2.8}_{-1.8}$)	60 $^{+10.7}_{-7.0}$ (15.8 $^{+2.8}_{-1.8}$)	75 $^{+10.5}_{-10.0}$ (19.8 $^{+2.8}_{-2.6}$)

4-WAY STANDARD

Item \ Vehicle model		1.5 · 1.6 · 1.8 ton model	1.5 · 1.6 ton model for china	2.5 ton model	3.0 ton model
Relief set pressure Mpa (kgf/cm^2)[psi]	Lift	15.5 $^{+0.5}_{0}$ (158 $^{+5}_{0}$) [2248 $^{+73}_{0}$]	14.0 $^{+0.5}_{0}$ (143 $^{+5}_{0}$) [2030 $^{+73}_{0}$]	17.2 $^{+0.5}_{0}$ (175 $^{+5}_{0}$) [2494 $^{+73}_{0}$]	18.1 $^{+0.5}_{0}$ (185 $^{+5}_{0}$) [2625 $^{+73}_{0}$]
	Tilt	11.8 $^{+0.5}_{0}$ (120 $^{+5}_{0}$) [1711 $^{+73}_{0}$]	11.8 $^{+0.5}_{0}$ (120 $^{+5}_{0}$) [1711 $^{+73}_{0}$]	15.7 $^{+0.5}_{0}$ (160 $^{+5}_{0}$) [2277 $^{+73}_{0}$]	15.7 $^{+0.5}_{0}$ (160 $^{+5}_{0}$) [2277 $^{+73}_{0}$]
Cracking pressure Mpa (kgf/cm^2)[psi]	Lift	14.2 (145) [2059] or more	12.7 (130) [1842] or more	15.9 (162) [2306] or more	16.8 (171) [2436] or more
	Tilt	10.8 (110) [1566] or more	10.8 (110) [1566] or more	14.7 (150) [2132] or more	14.7 (150) [2132] or more
Controllable flow rate L/min (US gal/min)		50 $^{+7.3}_{-6.0}$ (13.2 $^{+1.9}_{-1.6}$)	50 $^{+7.3}_{-6.0}$ (13.2 $^{+1.9}_{-1.6}$)	60 $^{+10.7}_{-7.0}$ (15.8 $^{+2.8}_{-1.8}$)	75 $^{+10.5}_{-10.0}$ (19.8 $^{+2.8}_{-2.6}$)

4-WAY PR

Item \ Vehicle model		1.5 · 1.6 · 1.8 ton model	1.5 · 1.6 ton model for china	2.5 ton model	3.0 ton model
Relief set pressure Mpa (kgf/cm^2)[psi]	Lift	15.5 $^{+0.5}_{0}$ (158 $^{+5}_{0}$) [2248 $^{+73}_{0}$]	14.0 $^{+0.5}_{0}$ (143 $^{+5}_{0}$) [2030 $^{+73}_{0}$]	17.2 $^{+0.5}_{0}$ (175 $^{+5}_{0}$) [2494 $^{+73}_{0}$]	18.1 $^{+0.5}_{0}$ (185 $^{+5}_{0}$) [2625 $^{+73}_{0}$]
	Tilt	11.8 $^{+0.5}_{0}$ (120 $^{+5}_{0}$) [1711 $^{+73}_{0}$]	11.8 $^{+0.5}_{0}$ (120 $^{+5}_{0}$) [1711 $^{+73}_{0}$]	15.7 $^{+0.5}_{0}$ (160 $^{+5}_{0}$) [2277 $^{+73}_{0}$]	15.7 $^{+0.5}_{0}$ (160 $^{+5}_{0}$) [2277 $^{+73}_{0}$]
Cracking pressure Mpa (kgf/cm^2)[psi]	Lift	14.2 (145) [2059] or more	12.7 (130) [1842] or more	15.9 (162) [2306] or more	16.8 (171) [2436] or more
	Tilt	10.8 (110) [1566] or more	10.8 (110) [1566] or more	14.7 (150) [2132] or more	14.7 (150) [2132] or more
Controllable flow rate L/min (US gal/min)		50 $^{+7.3}_{-6.0}$ (13.2 $^{+1.9}_{-1.6}$)	50 $^{+7.3}_{-6.0}$ (13.2 $^{+1.9}_{-1.6}$)	60 $^{+10.7}_{-7.0}$ (15.8 $^{+2.8}_{-1.8}$)	75 $^{+10.5}_{-10.0}$ (19.8 $^{+2.8}_{-2.6}$)

I-Q PLATE

The oil control valve installed on the vehicle requires setting of the starting current level.
The starting current is the current drawn by the oil control valve at the time when the main spool starts to move.
By setting the starting current level, it is possible to attain more smooth load handling movement.

For the standard setting value of the starting current, refer to the I-Q plate attached on the oil control valve or the label attached to the harness.

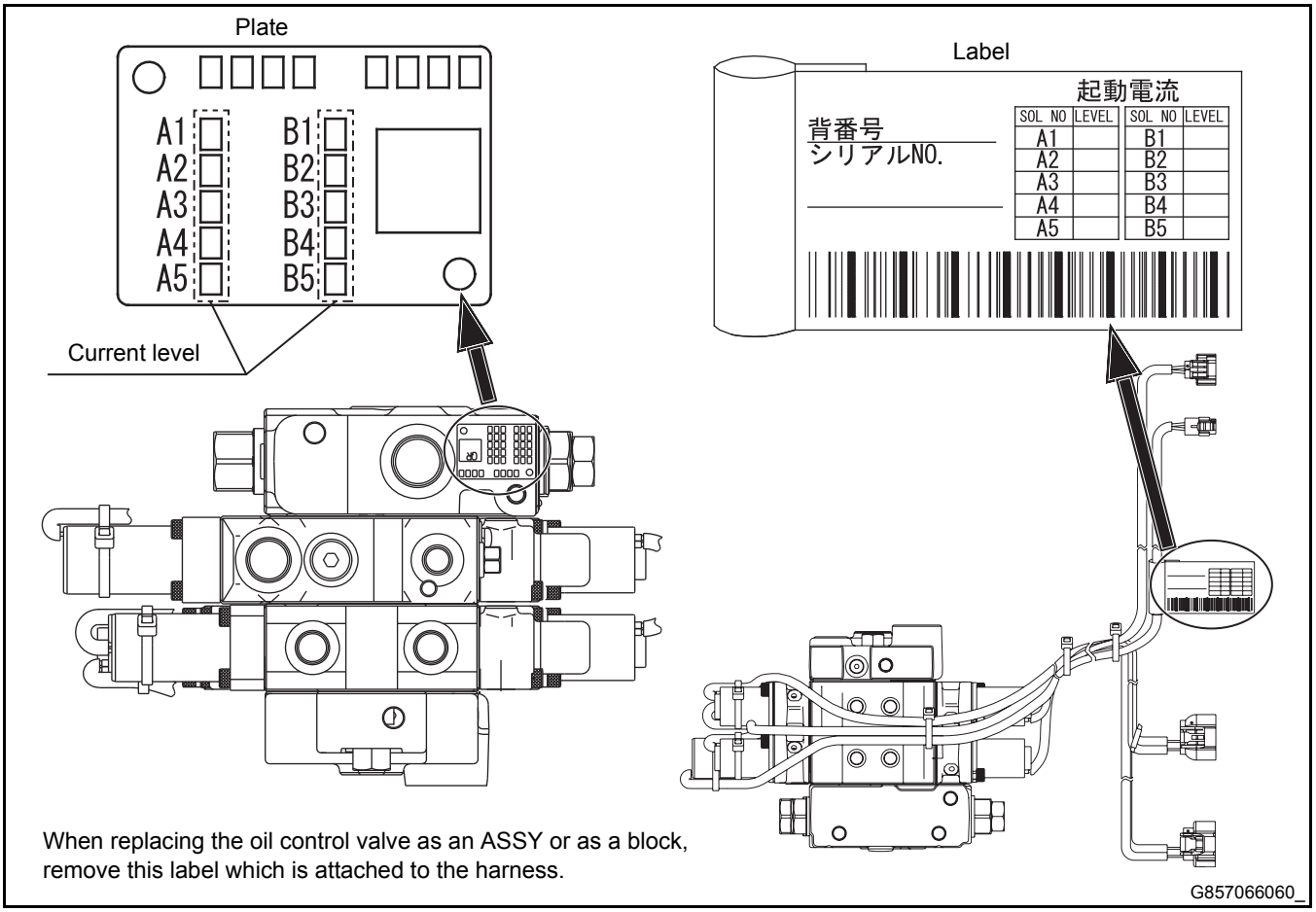
If there is no information about the standard setting value or if failed to attain smooth load handling movement after setting with certain setting value, decide the standard setting value as follows:

1. Set the starting current level to level 1.
2. Operate the load handling lever slowly.
3. Check the lever position where the mast or the attachment starts to move.
4. To make the play between that lever position and the neutral position smaller, raise the setting value.
5. Repeat the procedure 2~4.

For each of following cases, it is necessary to change the starting current level settings.

1. When replacing the oil control valve ASSY.
2. When replacing the oil control valve sections.
3. When disassembly, cleaning or parts replacement of the oil control valve.
4. When replacing the main controller.

Perform the setting using the display.
For detailed setting procedure, refer to page 4-67 and 4-152.

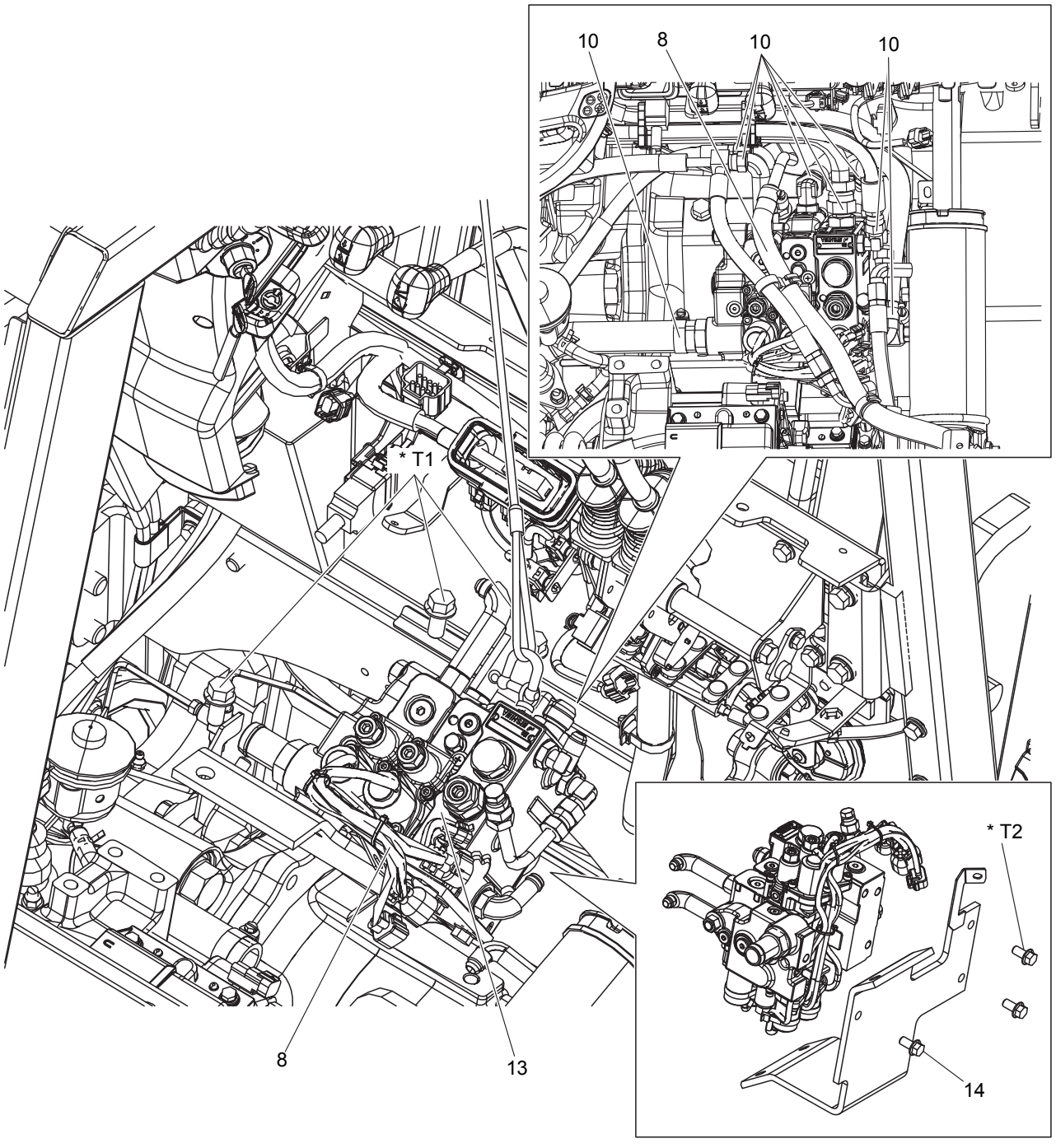


Note:

1. **If the level of I-Q starting current were not entered correctly, it would not provide its performance to the predetermined level.**
2. **When a new vehicle is delivered or the oil control valve is replaced, be sure to record the I-Q starting current level. The I-Q starting current level can be checked on the display, the I-Q plate or the I-Q label.**

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REMOVAL·INSTALLATION



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 25.0 ~ 58.0 (255 ~ 591) [18.4 ~ 42.8]
T2 = 16.2 ~ 37.8 (165.2 ~ 385.5) [12.0 ~ 27.9]

Removal Procedure

1 Turn the key switch OFF and disconnect the battery plug.

2 Remove the floor mat and the toe boards.

3 Disconnect the accelerator pedal connector.

4 Remove the lower panel cover RH.

5 Remove the instrument panel RH.

6 Remove the display.

7 Disconnect the solenoid valve connector of the oil control valve.

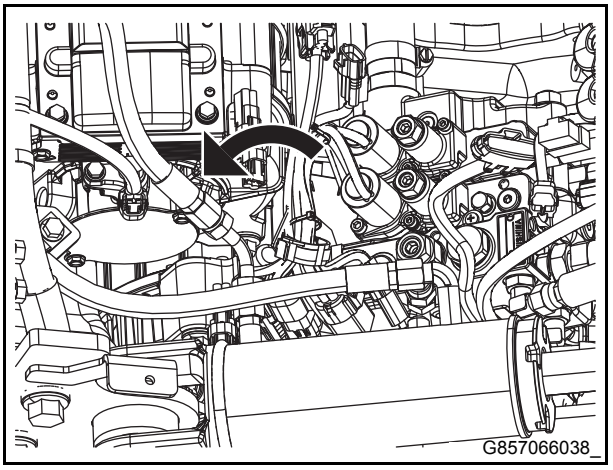
8 Disconnect the 3-way pipe w/overflow hose of the mast return hose at the oil tank side.

9 Remove the PS hose bracket.

10 Disconnect the all piping at the oil control valve side.

11 Loosen the inlet hose at the tilt cylinder side.

Turn the inlet hose in the direction shown in the figure and temporary tighten it.



12 Slightly hoist the oil control valve ASSY.

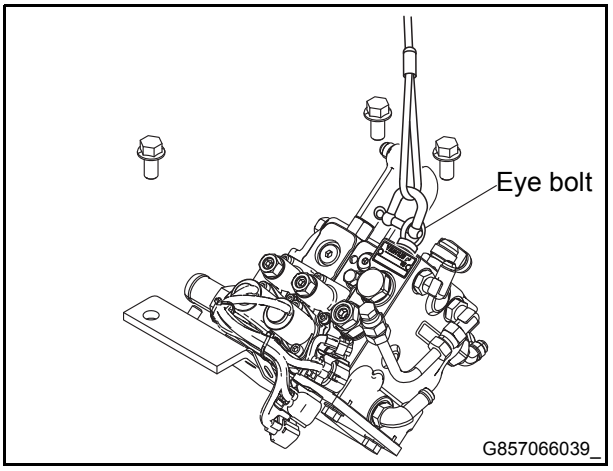
Eye bolt: M8 × 1.25

13 Remove the oil control valve ASSY W/ bracket.

14 Remove the oil control valve.

Note:
When installing the bolts, Apply threadlocker. (LOCTITE 243)

15 Remove the fitting and load sensor.



Installation Procedure

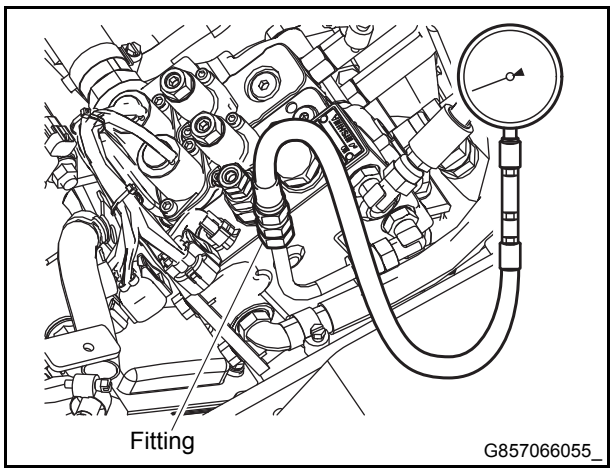
The installation procedure is the reverse of the removal procedure.

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RELIEF PRESSURE ADJUSTMENT

Note:

- **Since the relief valve is structured in two stages, be sure to adjust the lift (high pressure) side first and adjust the tilt (low pressure) side then. (If the lift side is normal and tilt side is abnormal as the result of relief pressure inspection, only the tilt side adjustment can be performed.)**
- **Always adjust the relief pressure as described below. Avoid hasty adjustment since it may cause high pressure generation that may result in damage to the oil pump and other hydraulic devices.**
- **Before starting adjustment, check if the no-load maximum rpm is as specified.**

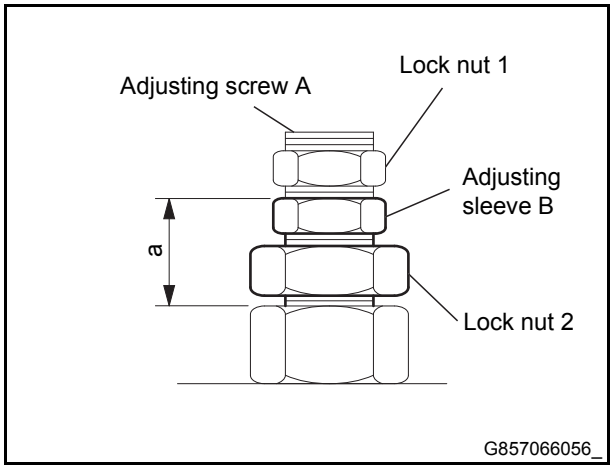


1 Open the battery hood.

2 Remove the lower panel and toe board.

3 Install an oil pressure gauge.
Remove the oil-pressure detecting plug installed on the left side of the oil control valve, and install the oil pressure gauge there.

Fitting size: 9/16-18UNF × PF1/4

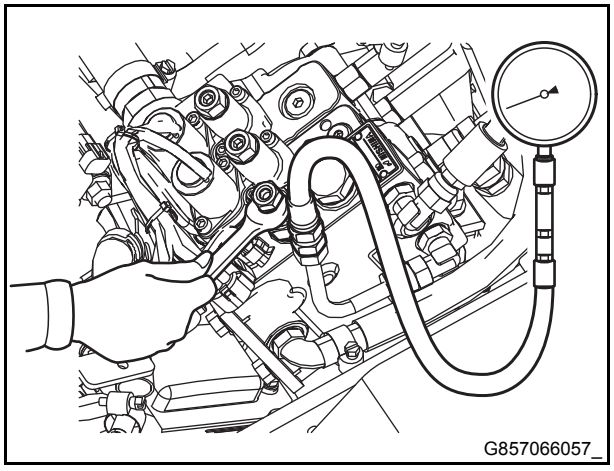


4 Set the adjusting screw A and adjusting sleeve B of the relief valve as described below.

(1) Loosen lock nut 1. After fully tightening· adjusting screw A once, loosen it by 1 to 2 turns.

(2) Loosen lock nut 2, and position adjusting sleeve B to the following dimension.

a = 27.0 mm (1.06 in)



5 Start the battery, and check for oil leaks and abnormal noise.

6 Install the toe board.

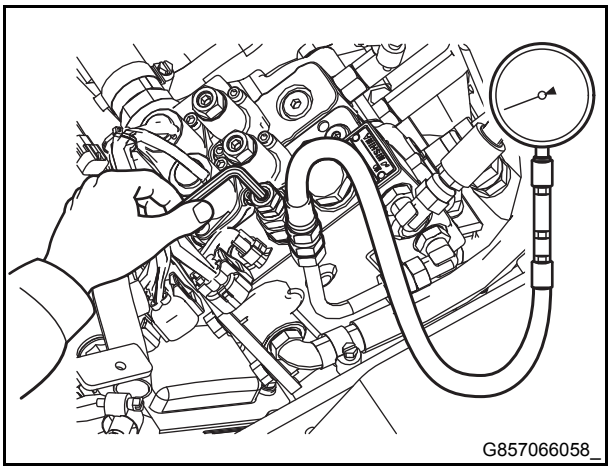
7 Close the battery hood.

8 Adjust the lift side relief pressure.

(1) Set the seat switch to ON. (Operate by two workers with one sitting on the seat.)

(2) Operate the lift lever to lift the fork fully.

(3) While running the battery at the maximum speed, operate the lift lever to the lifting side. Gradually tighten adjusting sleeve B to make the oil pressure in the relief state satisfy the standard in the table on the next page, and fix the sleeve position by tightening lock nut 2.



9 Adjust the tilt side relief pressure.

(1) Set the seat switch to ON. (Operate by two workers with one sitting on the seat.)

(2) Operate the tilt lever to tilt the mast fully backward.

(3) While running the battery at the maximum speed, operate the tilt lever to the backward side. Gradually tighten adjusting screw A to make the oil pressure in the relief state satisfy the standard in the table below, and fix the sleeve position by tightening lock nut 1.

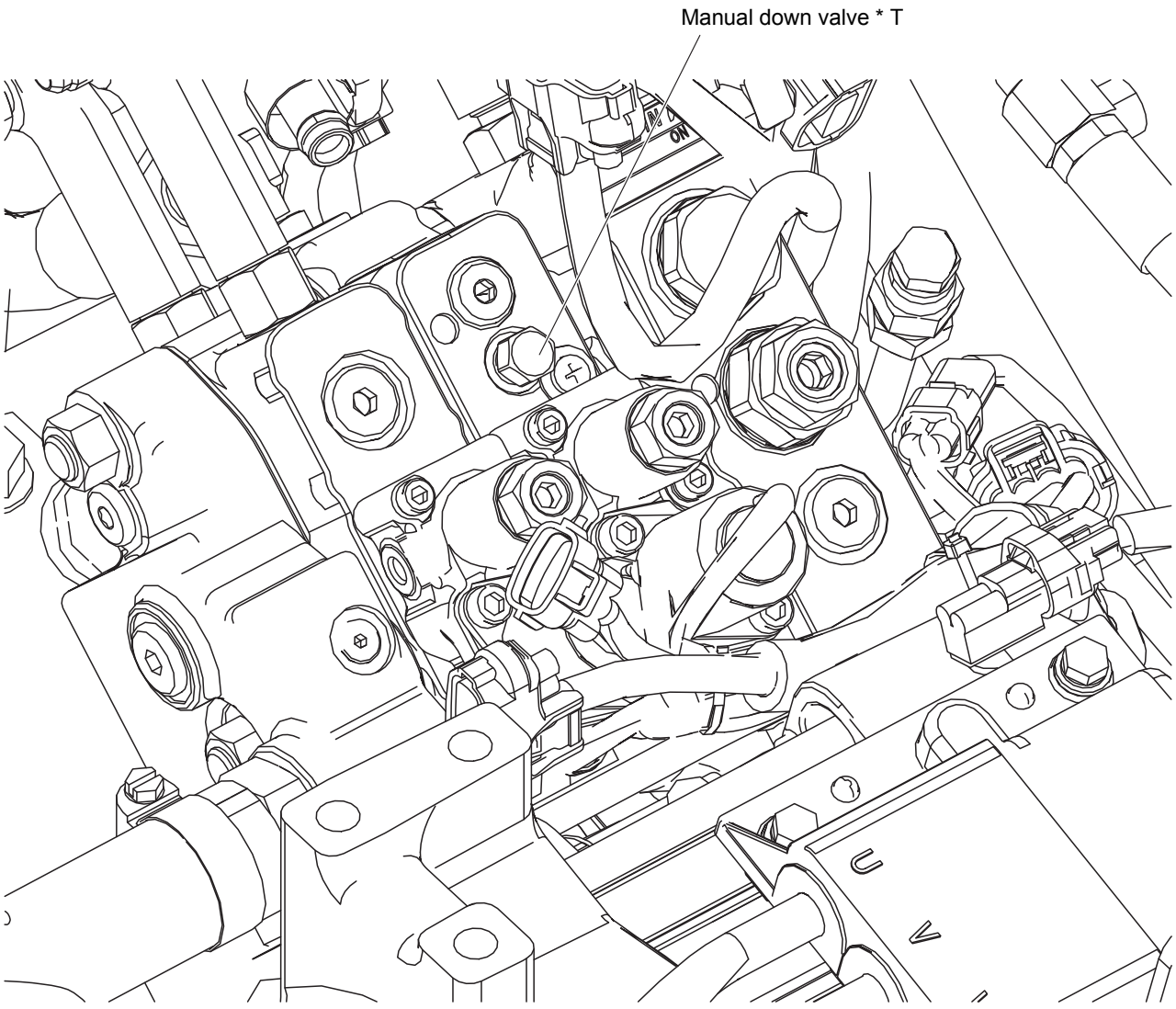
10 Turn the key switch OFF.

11 Remove the oil pressure gauge, and install and tighten the removed plug.

Standards: For specifications (Refer to P. 6-148)

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MANUAL DOWN VALVE



G857066059_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T = 32.0 (326) [23.59]

If the forks do not lower due to a malfunction or other cause, loosen the manual down valve to lower the forks in emergencies.
When loosening the manual down valve, do not rotate it more than one full turn.

After making repairs, tighten it securely.

Note:
For the positions of (1) ~ (31) in the table, refer to page 6-172 ~ 6-177.

Operation	Phenomenon	Probable cause	Inspection item
During steering operation	Cannot turn the steering	Priority valve piston seizure	• Check the priority valve piston removable. • Check the priority valve piston with no damage. • Check the priority valve piston without any foreign materials.
	Steering is heavy	Priority valve piston malfunction	• Check the priority valve piston with no damage. • Check the priority valve piston without any foreign materials.
		Insufficient spring force of the priority valve spring	• Check the priority valve spring without broken. • Check the seat surface of spring without worn out. • Check the seat surface of stopper without worn out.
		Foreign material is stuck in the priority valve orifice (3)	• Check the foreign materials clogging to the priority valve orifice.
During lift operation	Cannot lift	Relief valve main plunger stuck open	• Check the relief main plunger removable. • Check the relief main plunger with no damage. • Check the relief main plunger without any foreign materials.
		Insufficient setting pressure of the relief valve	• Check the relief setting pressure.
		Manual down valve is loose	• Check the manual down valve is tightened.
		Load pressure detection circuit check valve (2) stuck closed	• Not possible to inspect.
		Lift by-pass check valve (1) stuck closed and the lift lock plunger stuck closed	• Check the lift by-pass check valve and lift lock plunger removable. • Check the lift by-pass check valve and lift lock plunger with no damage. • Check the lift by-pass check valve and lift lock plunger without any foreign materials.
		Load check valve (12) stuck closed	• Check the load check valve removable. • Check the load check valve with no damage. • Check the load check valve without any foreign materials.
		Lift spool stuck closed	<Mini lever & Joy stick lever> • Check the lift spool removable. • Check the lift spool with no damage. • Check the lift spool without any foreign materials.

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Operation	Phenomenon	Probable cause	Inspection item
During lift operation	Cannot lift	Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (17) stuck closed	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL pilot circuit (18)	• Check the foreign materials clogging to the proportional SOL pilot circuit.
	Lift speed is slow	Relief valve main plunger malfunction	• Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.
		Insufficient spring force of the relief valve main plunger spring	• Check the relief valve main plunger spring without broken. • Check the seat surface of spring without worn out.
		Too small lap of relief main plunger	• Check any damage or chip on the relief main plunger
		Insufficient setting pressure of the relief valve	• Check the relief setting pressure.
		Manual down valve is loose	• Check the manual down valve is tightened.
		Foreign material is stuck in the load pressure detection circuit(2)	• Check the foreign materials clogging to the load pressure detection circuit.
		Load pressure detection circuit check valve (2) malfunction	• Not possible to inspect.
		Lift by-pass check valve (1) malfunction	• Check the lift by-pass check valve with no damage. • Check the lift by-pass check valve without any foreign materials.
		Lift lock plunger malfunction	• Check the lift lock plunger with no damage. • Check the lift lock plunger without any foreign materials.
		Load check valve (12) malfunction	• Check the load check valve with no damage. • Check the load check valve without any foreign materials.
		Lift spool malfunction	<Mini lever & Joy stick lever> • Check the lift spool with no damage. • Check the lift spool without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.

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Operation	Phenomenon	Probable cause	Inspection item
During lift operation	Lift speed is slow	Proportional SOL spool (17) malfunction	• Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL pilot circuit (18)	• Check the foreign materials clogging to the proportional SOL pilot circuit.
		Foreign material is stuck in the lift SOL filter	• Check the foreign materials clogging to the lift SOL filter.
		Incorrect setting of I-Q plate activating current level in the proportional SOL	• Check the I-Q plate activating current level (30) same level on shipping. Mask menu > Matching menu > OCV > B01X Check the value of X
		Incorrect setting of tuning general	• Check the material handling motor output level set to 5 on lift operation by tuning general. Mask menu > Tuning menu > GENERAL > No.26 > X Check the value of X
		Foreign material clogged on the orifice of priority valve (31)	• Check the orifice
	Cannot lower	Lift lock plunger stuck closed	• Check the lift lock plunger removable. • Check the lift lock plunger with no damage. • Check the lift lock plunger without any foreign materials.
		Foreign material is stuck in the lift lock plunger orifice (5)	• Check the foreign materials clogging to the lift lock plunger orifice.
		Lift lock SOL stuck closed	• Check the operation sound of lift lock SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > LIFT LWR SOL > ON - OFF (Lift lowering SOL forced operation)
		Lift spool stuck closed	<Mini lever & Joy stick lever> • Check the lift spool removable. • Check the lift spool with no damage. • Check the lift spool without any foreign materials.

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Operation	Phenomenon	Probable cause	Inspection item
During lift operation	Cannot lower	Lift spool stuck closed	<Conventional lever> • Check the lift spool operation. • Check the lift lever operation. <Mini lever & Joy stick lever> • Check the lift spool removable. • Check the lift spool with no damage. • Check the lift spool without any foreign materials.
		Lowering operation detection limit switch stuck open or damaged [Conventional lever]	• Limit switch continuity inspection.
		Foreign material is stuck in the lift lock valve pilot circuit (4)	• Check the foreign materials clogging to the lift lock valve pilot circuit.
		Flow regulator valve sleeve (14) or O-ring No.1 (15) wear or damaged	• Check the flow regulator valve sleeve or O-ring without worn out. • Check the flow regulator valve sleeve or O-ring with no damage.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (19) stuck closed	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL pilot circuit (20)	• Check the foreign materials clogging to the proportional SOL pilot circuit.
		Foreign material is stuck in the lift SOL filter	• Check the foreign materials clogging to the lift SOL filter.
	Lowering speed is slow	Lift lock plunger malfunction	• Check the lift lock plunger with no damage. • Check the lift lock plunger without any foreign materials.
		Foreign material is stuck in the lift lock plunger orifice (5)	• Check the foreign materials clogging to the lift lock plunger orifice.
		Lift lock SOL malfunction	• Check the operation sound of lift lock SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > LIFT LWR SOL > ON - OFF (Lift lowering SOL forced operation) • Check the foreign materials attached to the filter.

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Operation	Phenomenon	Probable cause	Inspection item
During lift operation	Lowering speed is slow	Lift spool malfunction	<Mini lever & Joy stick lever> • Check the lift spool with no damage. • Check the lift spool without any foreign materials.
		Foreign material is stuck in the lift lock valve pilot circuit (4)	• Not possible to inspect.
		Flow regulator valve piston malfunction	• Check the flow regulator valve with no damage. • Check the flow regulator valve without any foreign materials.
		Insufficient spring force of the flow regulator valve piston spring	• Check the flow regulator valve pistonspring without broken. • Check the seat surface (6) of spring without worn out.
		Flow regulator valve sleeve (14) or O-ring No.1 (15) wear or damaged	• Check the flow regulator valve sleeve or O-ring without worn out. • Check the flow regulator valve sleeve or O-ring with no damage.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (19) malfunction	• Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL pilot circuit (20)	• Check the foreign materials clogging to the proportional SOL pilot circuit.
		Foreign material is stuck in the lift SOL filter	• Check the foreign materials clogging to the lift SOL filter.
During tilt operation	Cannot tilt forward	Relief valve main plunger stuck open	• Check the relief valve main plunger removable. • Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.
		Insufficient setting pressure of the relief valve	• Check the relief setting pressure.
		Incorrect setting of I-Q plate activating current level on the proportional SOL	• Check the I-Q plate activating current level (30) same level on shipping. Mask menu > Matching menu > OCV > A01X Check the value of X

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Operation	Phenomenon	Probable cause	Inspection item
During tilt operation	Cannot tilt forward	Tilt control valve plunger stuck closed	• Check the tilt control valve plunger removable. • Check the tilt control valve plunger with no damage. • Check the tilt control valve plunger without any foreign materials.
		Foreign material is stuck in the tilt control valve plunger orifice (7)	• Check the foreign materials clogging to the tilt control valve plunger orifice.
		Tilt SOL stuck closed	• Check function of the operation sound of tilt SOL with lever operation after the key switch on. • Check the operation sound of tilt SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > TILT SOL > ON - OFF (Tilt SOL forced operation)
		Tilt spool stuck closed	<Mini lever & Joy stick lever> • Check the tilt spool removable. • Check the tilt spool with no damage. • Check the tilt spool without any foreign materials.
		Foreign material is stuck in the tilt control valve pilot circuit (8)	• Check the foreign materials clogging to the tilt control valve pilot circuit.
		Load pressure detection circuit check valve (9) stuck closed	• Not possible to inspect.
		Load check valve (13) stuck closed	• Check the load check valve removable. • Check the load check valve with no damage. • Check the load check valve without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (23) stuck closed	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL pilot circuit (24)	• Check the foreign materials clogging to the proportional SOL pilot circuit.
		Foreign material is stuck in the tilt SOL filter	• Check the foreign materials clogging to the tilt SOL filter.
	Forward tilt speed is slow	Relief valve main plunger malfunction	• Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.

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Operation	Phenomenon	Probable cause	Inspection item
During tilt operation	Forward tilt speed is slow	Insufficient spring force of the relief valve main plunger spring	• Check the relief valve main plunger spring without broken. • Check the seat surface of spring without worn out.
		Too small lap of relief main plunger	• Check any damage or chip on the relief main plunger
		Insufficient setting pressure of the relief valve	• Check the relief setting pressure.
		Tilt control valve malfunction	• Check the tilt control valve plunger with no damage. • Check the tilt control valve plunger without any foreign materials.
		Foreign material is stuck in the tilt control valve plunger orifice (7)	• Check the foreign materials clogging to the tilt control valve plunger orifice.
		Tilt SOL malfunction	• Check the operation sound of tilt SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > TILT SOL > ON - OFF (Tilt SOL forced operation) • Check the foreign materials attached to the filter.
		Tilt spool malfunction	<Mini lever & Joy stick lever> • Check the tilt spool with no damage. • Check the tilt spool without any foreign materials.
		Foreign material is stuck in the tilt control valve pilot circuit (8)	• Check the foreign materials clogging to the tilt control valve pilot circuit.
		Foreign material is stuck in the load pressure detection circuit (9)	• Check the foreign materials clogging to the load pressure detection circuit.
		Load pressure detection circuit check valve (9) malfunction	• Not possible to inspect.
		Load check valve (13) malfunction	• Check the load check valve with no damage. • Check the load check valve without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (23) malfunction	• Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL pilot circuit (24)	• Check the foreign materials clogging to the proportional SOL pilot circuit.
		Foreign material is stuck in the tilt SOL filter	• Check the foreign materials clogging to the tilt SOL filter.

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Operation	Phenomenon	Probable cause	Inspection item
During tilt operation	Forward tilt speed is slow	Incorrect setting of I-Q plate activating current level in the proportional SOL	• Check the I-Q plate activating current level (30) same level on shipping. Mask menu > Matching menu > OCV > A02X Check the value of X
		Incorrect setting of tuning general	• Check the material handling motor output level set to 5 on tilt operation by tuning general. Mask menu > Tuning menu > GENERAL > No.27 > X Check the value of X
	Cannot tilt backward	Relief valve main plunger stuck open	• Check the relief valve main plunger removable. • Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.
		Insufficient setting pressure of the relief valve	• Check the relief setting pressure.
		Tilt spool stuck closed	<Mini lever & Joy stick lever> • Check the tilt spool removable. • Check the tilt spool with no damage. • Check the tilt spool without any foreign materials.
		Load pressure detection circuit check valve (25) stuck closed	• Not possible to inspect.
		Load check valve (13) stuck closed	• Check the load check valve removable. • Check the load check valve with no damage. • Check the load check valve without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (21) stuck closed	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL spool pilot circuit (22)	• Check the foreign materials clogging to the proportional SOL pilot circuit.
		Foreign material is stuck in the tilt SOL filter	• Check the foreign materials clogging to the tilt SOL filter.
		Foreign material is stuck in the proportional SOL spool pilot circuit (8) [Mini lever & Joy stick lever]	• Check the foreign materials clogging to the proportional SOL spool pilot circuit.
	Backward tilt speed is slow	Relief valve main plunger malfunction	• Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.

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Operation	Phenomenon	Probable cause	Inspection item
During tilt operation	Backward tilt speed is slow	Insufficient spring force of the relief valve main plunger spring	• Check the relief valve main plunger spring without broken. • Check the seat surface of spring without worn out.
		Too small lap of relief main plunger	• Check any damage or chip on the relief main plunger
		Insufficient setting pressure of the relief valve	• Check the relief setting pressure.
		Tilt spool malfunction	<Mini lever & Joy stick lever> • Check the tilt spool with no damage. • Check the tilt spool without any foreign materials.
		Foreign material is stuck in the load pressure detection circuit (25)	• Check the foreign materials clogging to the load pressure detection circuit.
		Load pressure detection circuit check valve (25) malfunction	• Not possible to inspect
		Load check valve (13) malfunction	• Check the load check valve with no damage. • Check the load check valve without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (21) malfunction	• Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL spool pilot circuit (22)	• Check the foreign materials clogging to the proportional SOL spool pilot circuit.
		Foreign material is stuck in the tilt SOL filter	• Check the foreign materials clogging to the tilt SOL filter.
		Foreign material is stuck in the proportional SOL spool pilot circuit (8) [Mini lever & Joy stick lever]	• Check the foreign materials clogging to the proportional SOL spool pilot circuit.
		Incorrect setting of I-Q plate activating current level in the proportional SOL	• Check the I-Q plate activating current level (30) same level on shipping. Mask menu > Matching menu > OCV > B02X Check the value of X
		Incorrect setting of tuning general	• Check the material handling motor output level set to 5 on tilt operation by tuning general. Mask menu > Tuning menu > GENERAL > No.27 > X Check the value of X
Key switch OFF	Natural drop is big	Lift lock plunger seat malfunction	• Check the lift lock plunger seat with no damage. • Check the lift lock plunger seat without any foreign materials.

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Operation	Phenomenon	Probable cause	Inspection item
Key switch OFF	Natural drop is big	Lift lock plunger stuck open	• Check the lift lock plunger removable. • Check the lift lock plunger with no damage. • Check the lift lock plunger without any foreign materials.
		Insufficient spring force of the lift lock plunger spring	• Check the lift lock plunger spring without broken. • Check the seat surface of spring without worn out.
		Lift by-pass check valve seat defect	• Check the lift by-pass check valve seat with no damage. • Check the lift by-pass check valve seat without any foreign materials.
		Lift by-pass check valve plunger stuck open	• Check the lift by-pass check valve plunger removable. • Check the lift by-pass check valve plunger with no damage. • Check the lift by-pass check valve plunger without any foreign materials.
		Insufficient spring force of the lift by-pass check valve spring	• Check the lift by-pass check valve spring without broken. • Check the seat surface of spring without worn out.
		Manual down valve is loose	• Check the manual down valve is tightened.
		Lift lock SOL seat defect	• Not possible to inspect.
		Lift lock SOL stuck open	• Check the operation sound of lift lock SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > LIFT LWR SOL > ON - OFF (Lift lowering SOL forced operation)
		Wear or damage of the flow regulator valve sleeve (14) or O-ring No.2 (16)	• Check the flow regulator valve sleeve or O-ring without worn out. • Check the flow regulator valve sleeve or O-ring with no damage.
		Lift spool stuck open	<Mini lever & Joy stick lever> • Check the lift spool removable. • Check the lift spool with no damage. • Check the lift spool without any foreign materials.
	Natural forward tilt is big	Tilt control valve plunger seat defect	• Check the tilt control valve plunger seat with no damage. • Check the tilt control valve plunger seat without any foreign materials.
		Tilt control valve plunger stuck open	• Check the tilt control valve plunger removable. • Check the tilt control valve plunger with no damage. • Check the tilt control valve plunger without any foreign materials.

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Operation	Phenomenon	Probable cause	Inspection item
Key switch OFF	Natural forward tilt is big	Insufficient spring force of the tilt control valve plunger spring	• Check the tilt control valve plunger spring without broken. • Check the seat surface of spring without worn out.
		Tilt control valve check ball seat defect	• Not possible to inspect.
		Tilt control valve check ball stuck open	• Check the check ball stuck open.
		Insufficient spring force of the tilt control valve check ball spring	• Check the spring tension of the check by pushing.
		Tilt SOL seat defect	• Not possible to inspect.
		Tilt SOL stuck open	• Check the operation sound of tilt SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > TILT SOL > ON - OFF (Tilt SOL forced operation)
		Tilt spool stuck open	<Mini lever & Joy stick lever> • Check the tilt spool removable. • Check the tilt spool with no damage. • Check the tilt spool without any foreign materials.
Forward tilt automatic leveling stop	Does not stop automatically	Tilt control valve plunger seat defect	• Check the tilt control valve plunger seat with no damage. • Check the tilt control valve plunger seat without any foreign materials.
		Tilt control valve plunger stuck open	• Check the tilt control valve plunger removable. • Check the tilt control valve plunger with no damage. • Check the tilt control valve plunger without any foreign materials.
		Insufficient spring force of the tilt control valve plunger spring	• Check the tilt control valve plunger spring without broken. • Check the seat surface of spring without worn out.
		Tilt control valve check ball seat defect	• Not possible to inspect.
		Tilt control valve check ball stuck open	• Check the check ball stuck open.
		Insufficient spring force of the tilt control valve check ball spring	• Check the spring tension of the check by pushing.
		Tilt SOL seat defect	• Not possible to inspect.
		Tilt SOL stuck open	• Check the operation sound of tilt SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > TILT SOL > ON - OFF (Tilt SOL forced operation)

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Operation	Phenomenon	Probable cause	Inspection item
Backward tilting speed regulation	Speed is fast	Tilt control valve plunger malfunction	• Check the tilt control valve plunger with no damage. • Check the tilt control valve plunger without any foreign materials.
		Tilt control valve plunger stuck open	• Check the tilt control valve plunger removable. • Check the tilt control valve plunger with no damage. • Check the tilt control valve plunger without any foreign materials.
		Tilt SOL stuck closed	• Check the operation sound of tilt SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > TILT SOL > ON - OFF (Tilt SOL forced operation)
		Foreign material is stuck in the tilt control valve pilot circuit	• Check the foreign materials clogging to the tilt control valve pilot circuit.
During ATT operation	ATT does not move	Relief valve main plunger stuck open	• Check the relief valve main plunger removable. • Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.
		Insufficient setting pressure of the relief valve	• Check the relief setting pressure.
		ATT spool stuck closed	<Mini lever & Joy stick lever> • Check the ATT spool removable. • Check the ATT spool with no damage. • Check the ATT spool without any foreign materials.
		Load pressure detection circuit check valve (26) stuck closed	• Not possible to inspect.
		Load check valve (27) stuck closed	• Check the load check valve removable. • Check the load check valve with no damage. • Check the load check valve without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (28) stuck closed	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL spool pilot circuit (29)	• Check the foreign materials clogging to the proportional SOL spool pilot circuit.

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Operation	Phenomenon	Probable cause	Inspection item
During ATT operation	ATT movement is slow	Relief valve main plunger malfunction	• Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.
		Insufficient spring force of the relief valve main plunger spring	• Check the relief valve main plunger spring without broken. • Check the seat surface of spring without worn out.
		Too small lap of relief main plunger	• Check any damage or chip on the relief main plunger
		Insufficient setting pressure of the relief valve	• Check the relief setting pressure.
		ATT spool malfunction	<Mini lever & Joy stick lever> • Check the ATT spool with no damage. • Check the ATT spool without any foreign materials.
		Foreign material is stuck in the load pressure detection circuit (26)	• Check the foreign materials clogging to load pressure detection circuit.
		Load pressure detection circuit check valve (26) malfunction	• Not possible to inspect.
		Load check valve (27) malfunction	• Check the load check valve with no damage. • Check the load check valve without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (28) stuck closed	• Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
		Foreign material is stuck in the proportional SOL spool pilot circuit (29)	• Check the foreign materials clogging to the proportional SOL spool pilot circuit.
		Incorrect setting of activating current level in the proportional SOL	• Check the I-Q plate activating current level (30) same level on shipping. Mask menu > Matching menu > OCV > A03X, B02X Check the value of X A03X--A05X, B03X--B05X for multiple attachment
		Incorrect setting of tuning general	• Check the material handling motor output level set to 5 on attachments operation by tuning general. Mask menu > Tuning menu > GENERAL > No.27-No.30 > X Check the value of X ATT1=28, ATT2=29, ATT3=30

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Operation	Phenomenon	Probable cause	Inspection item
During OPS operation	Does not lift and stop	Relief valve main plunger stuck closed	• Check the relief valve main plunger removable. • Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.
		Main spool stuck open	• Check the main spool removable. • Check the main spool with no damage. • Check the main spool without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (17) stuck open	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
	Does not lower and stop	Lift lock plunger stuck open	• Check the lift lock plunger removable. • Check the lift lock plunger with no damage. • Check the lift lock plunger without any foreign materials.
		Lift lock SOL stuck open	• Check the operation sound of lift lock SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > LIFT LWR SOL > ON - OFF (Lift lowering SOL forced operation)
		Wear or damage of the flow regulator valve sleeve (14) or O-ring No.2 (16)	• Check the flow regulator valve sleeve or O-ring without worn out. • Check the flow regulator valve sleeve or O-ring with no damage.
		Lift by-pass check valve seat defect	• Check the lift by-pass check valve seat with no damage. • Check the lift by-pass check valve seat without any foreign materials.
		Lift by-pass check valve plunger stuck open	• Check the lift by-pass check valve plunger removable. • Check the lift by-pass check valve plunger with no damage. • Check the lift by-pass check valve plunger without any foreign materials.
		Lift lock SOL seat defect	• Not possible to inspect.
		Main spool stuck open	• Check the main spool removable. • Check the main spool with no damage. • Check the main spool without any foreign materials.

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Operation	Phenomenon	Probable cause	Inspection item
During OPS operation	Does not lower and stop	Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (19) stuck open	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
	Does not tilt forward and stop	Tilt control valve plunger seat defect	• Check the tilt control valve plunger seat with no damage. • Check the tilt control valve plunger seat without any foreign materials.
		Tilt control valve plunger stuck open	• Check the tilt control valve plunger removable. • Check the tilt control valve plunger with no damage. • Check the tilt control valve plunger without any foreign materials.
		Insufficient spring force of the tilt control valve plunger spring	• Check the tilt control valve plunger spring without broken. • Check the seat surface of spring without worn out.
		Tilt control valve check ball seat defect	• Not possible to inspect.
		Tilt control valve check ball stuck open	• Check the check ball stuck open.
		Insufficient spring force of the tilt control valve check ball spring	• Check the spring tension of the check by pushing.
		Tilt SOL seat defect	• Not possible to inspect.
		Tilt SOL stuck open	• Check the operation sound of tilt SOL by the following procedure. *MASK MENU > ANALYZER > ACTIVE TEST > TILT SOL > ON - OFF (Tilt SOL forced operation)
		Relief valve main plunger stuck closed	• Check the relief valve main plunger removable. • Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.
		Main spool stuck open	• Check the main spool removable. • Check the main spool with no damage. • Check the main spool without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.

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Operation	Phenomenon	Probable cause	Inspection item
During OPS operation	Does not tilt forward and stop	Proportional SOL spool (23) stuck open	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
	Does not tilt backward and stop	Relief valve main plunger stuck closed	• Check the relief valve main plunger removable. • Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.
		Main spool stuck open	• Check the main spool removable. • Check the main spool with no damage. • Check the main spool without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (21) stuck open	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
	ATT does not stop	Relief valve main plunger stuck closed	• Check the relief valve main plunger removable. • Check the relief valve main plunger with no damage. • Check the relief valve main plunger without any foreign materials.
		Main spool stuck open	• Check the main spool removable. • Check the main spool with no damage. • Check the main spool without any foreign materials.
		Proportional SOL malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Set the plug on SOL mounting portion.
		Proportional SOL spool (28) stuck open	• Check the proportional SOL spool removable. • Check the proportional SOL spool with no damage. • Check the proportional SOL spool without any foreign materials.
General material handling operation [Only Mini lever]	Can not operate material handling	Decompression valve piston stuck closed	• Check the decompression valve piston removable. • Check the decompression valve piston with no damage. • Check the decompression valve piston without any foreign materials.

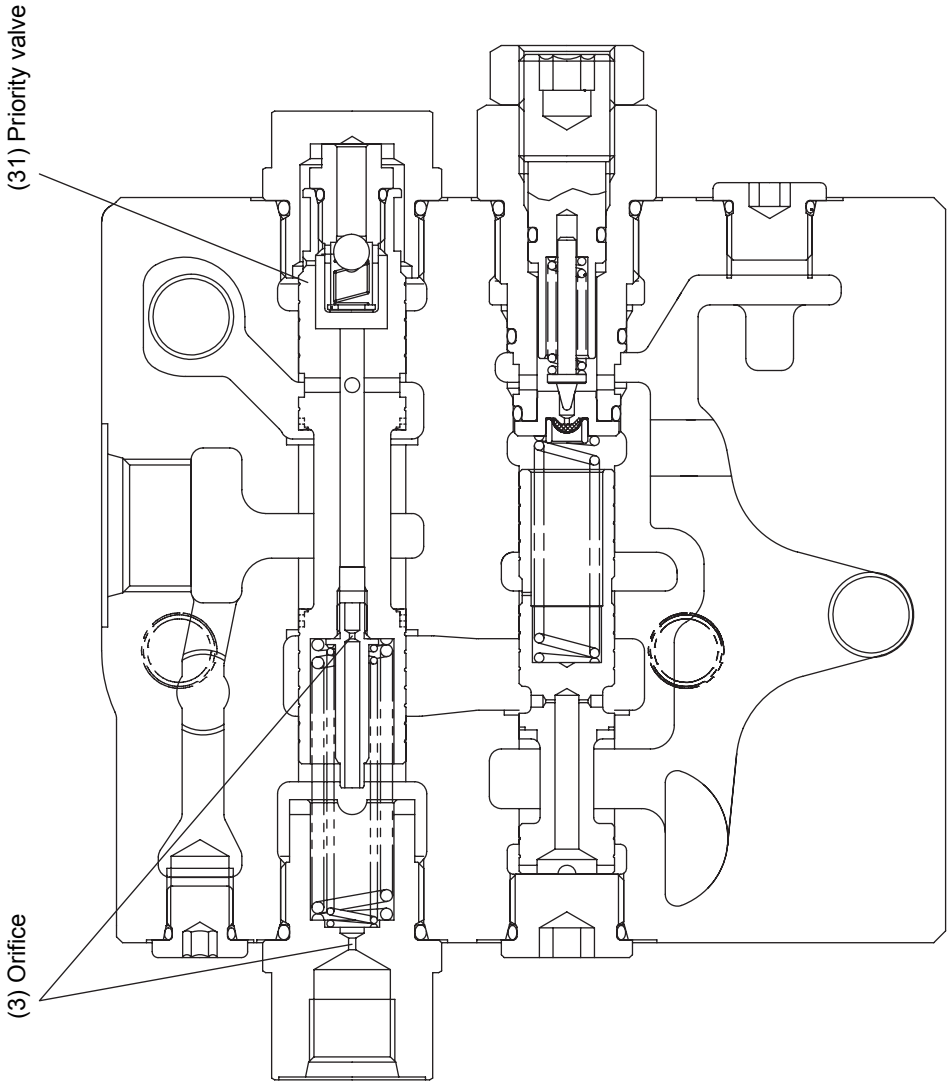
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Operation	Phenomenon	Probable cause	Inspection item
General material handling operation [Only Mini lever]	Material handling is slow	Decompression valve piston malfunction	• Check the decompression valve piston with no damage. • Check the decompression valve piston without any foreign materials.
Backward tilt automatic leveling stop [Only Mini lever]	Does not stop automatically	Proportional SOL valve piston stuck open	• Check the proportional SOL valve piston removable. • Check the proportional SOL valve piston with no damage. • Check the proportional SOL valve piston without any foreign materials.
		Proportional SOL valve malfunction	• Check function of the tip pin of proportional SOL with lever operation after removal. *Harness connecting condition
		Tilt spool stuck open	• Check the tilt spool removable. • Check the tilt spool with no damage. • Check the tilt spool without any foreign materials.

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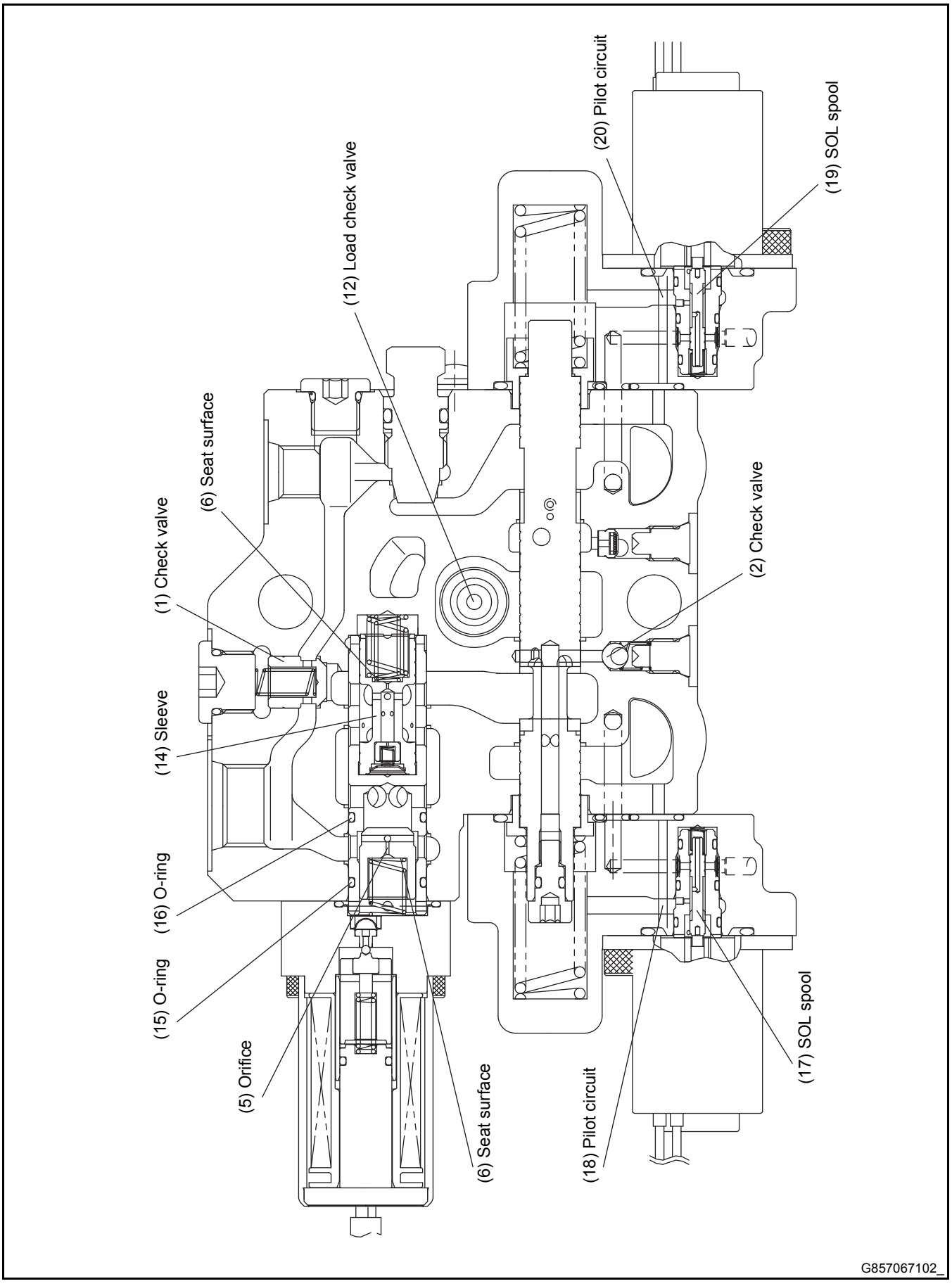
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INLET SECTION (X1-X1)



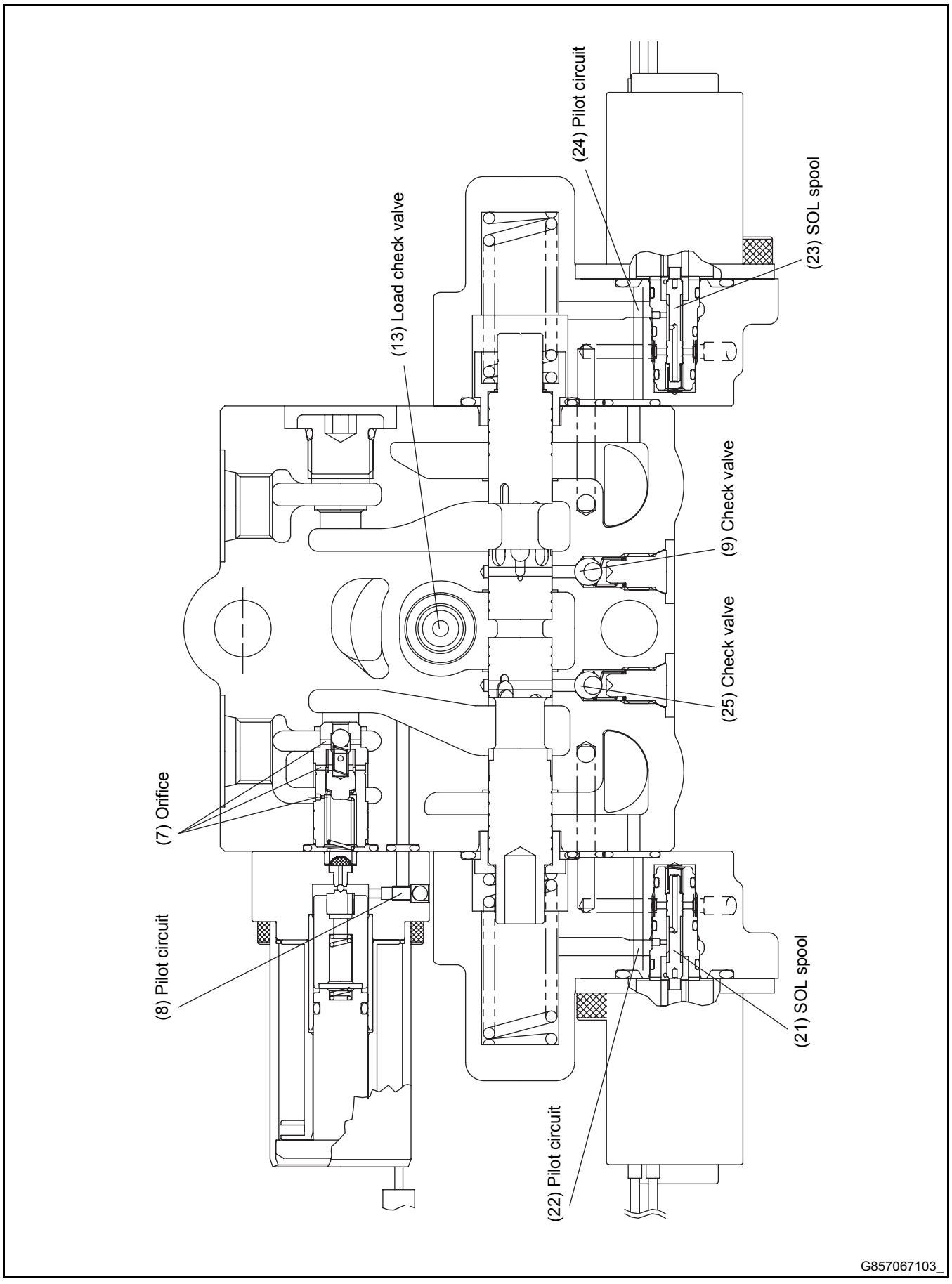
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LIFT SECTION (X2-X2)

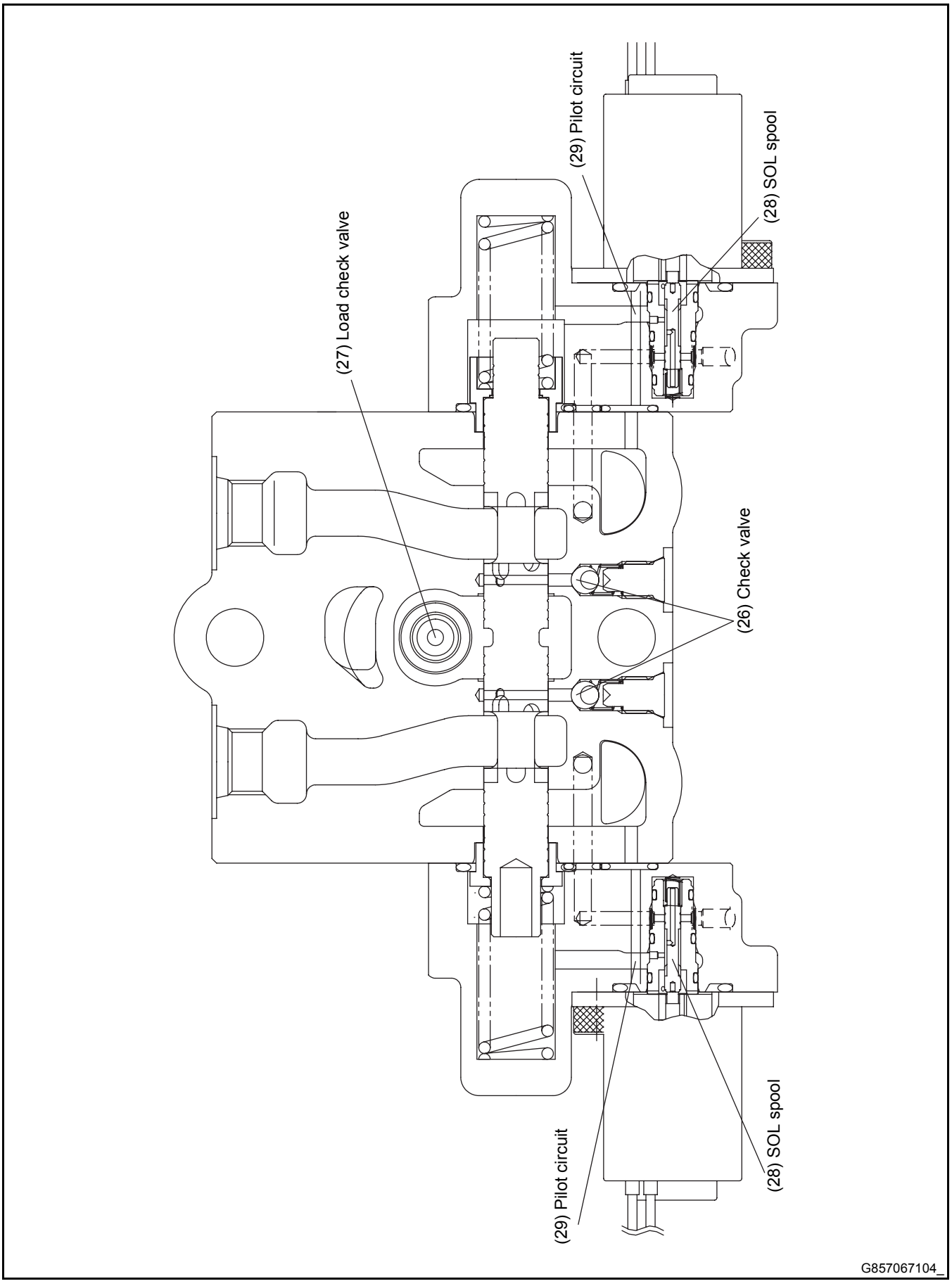


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TILT SECTION (X3-X3)

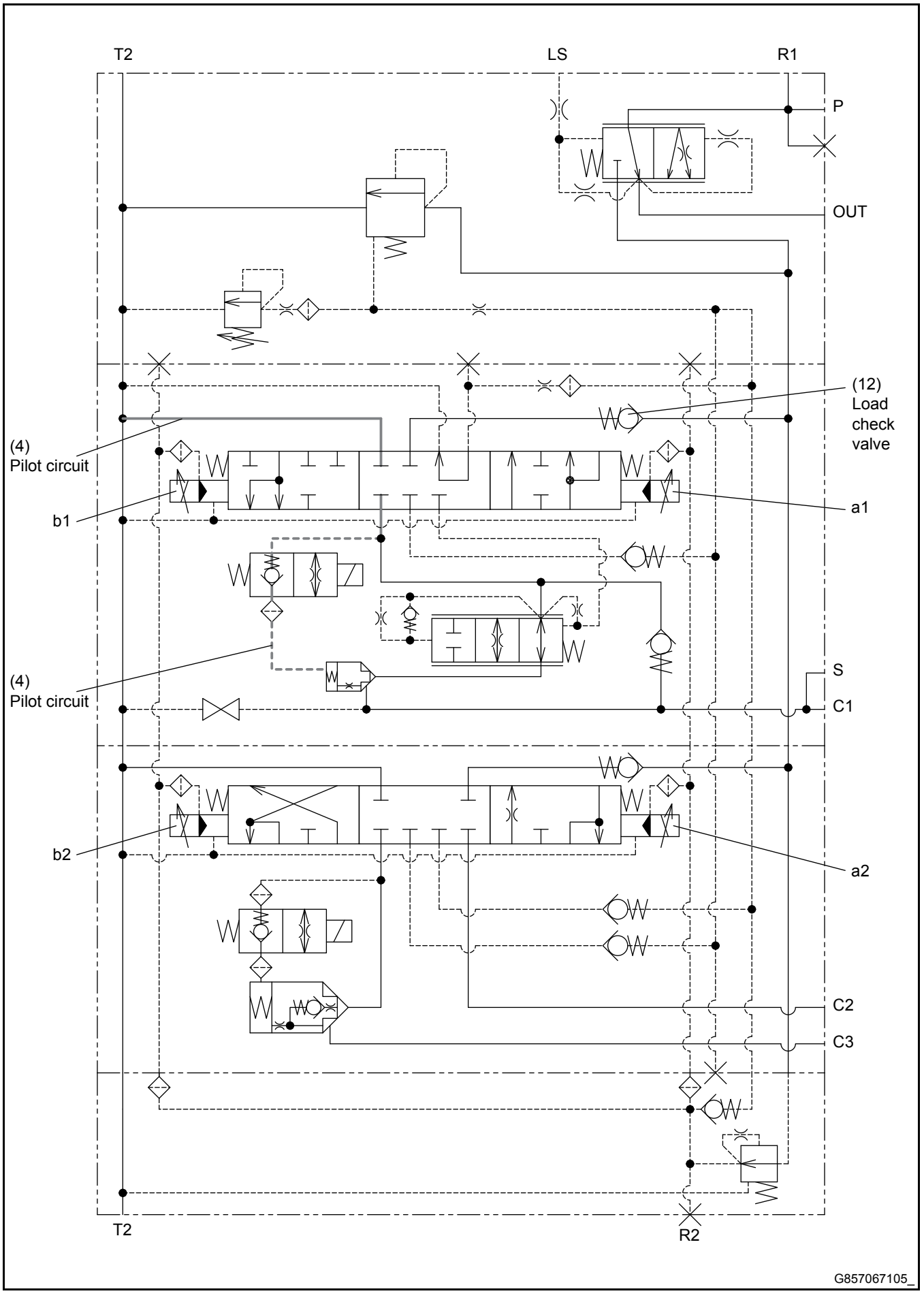


ATT SECTION (X4-X4)

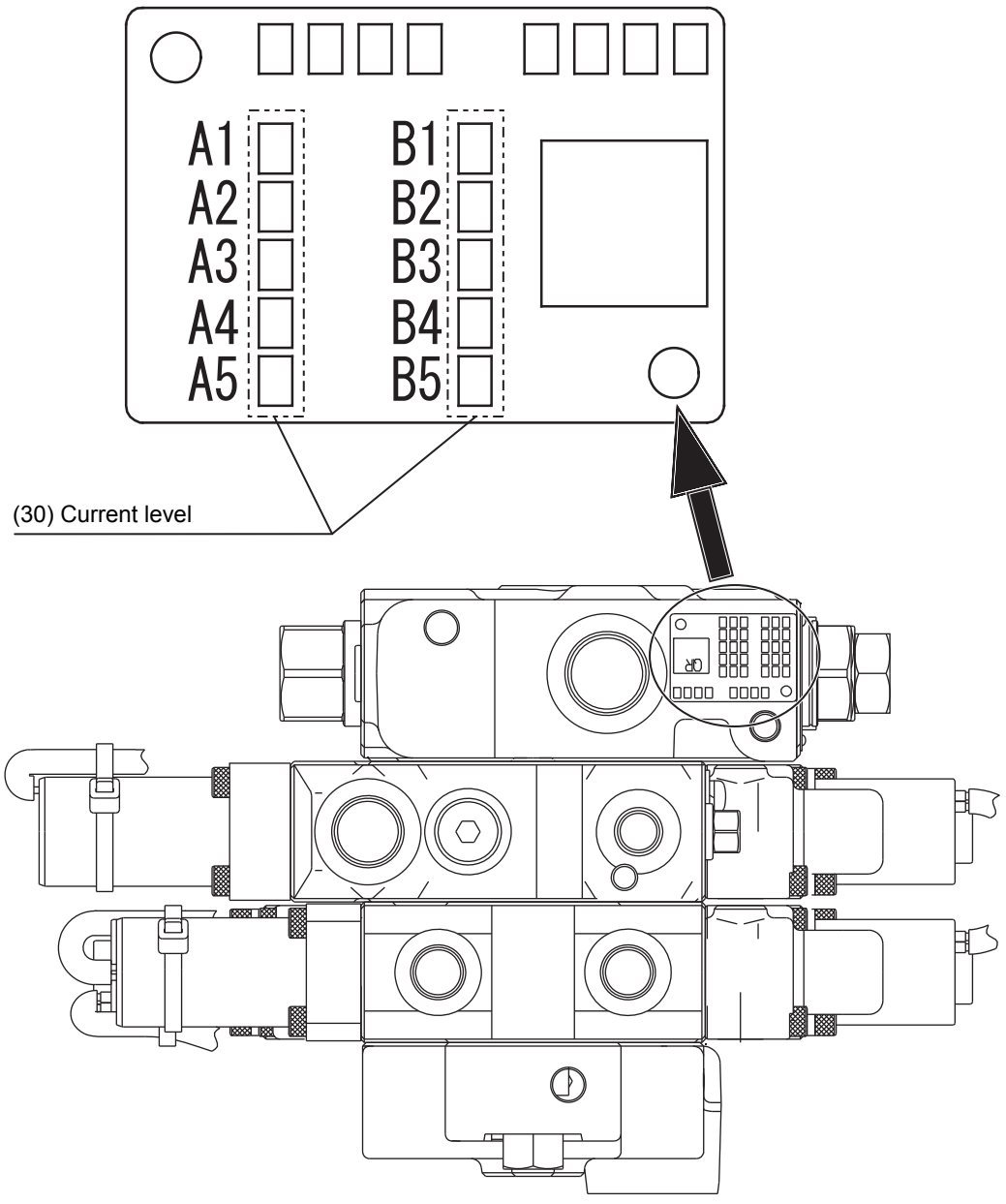


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Hydraulic Circuit Diagram



I-Q PLATE



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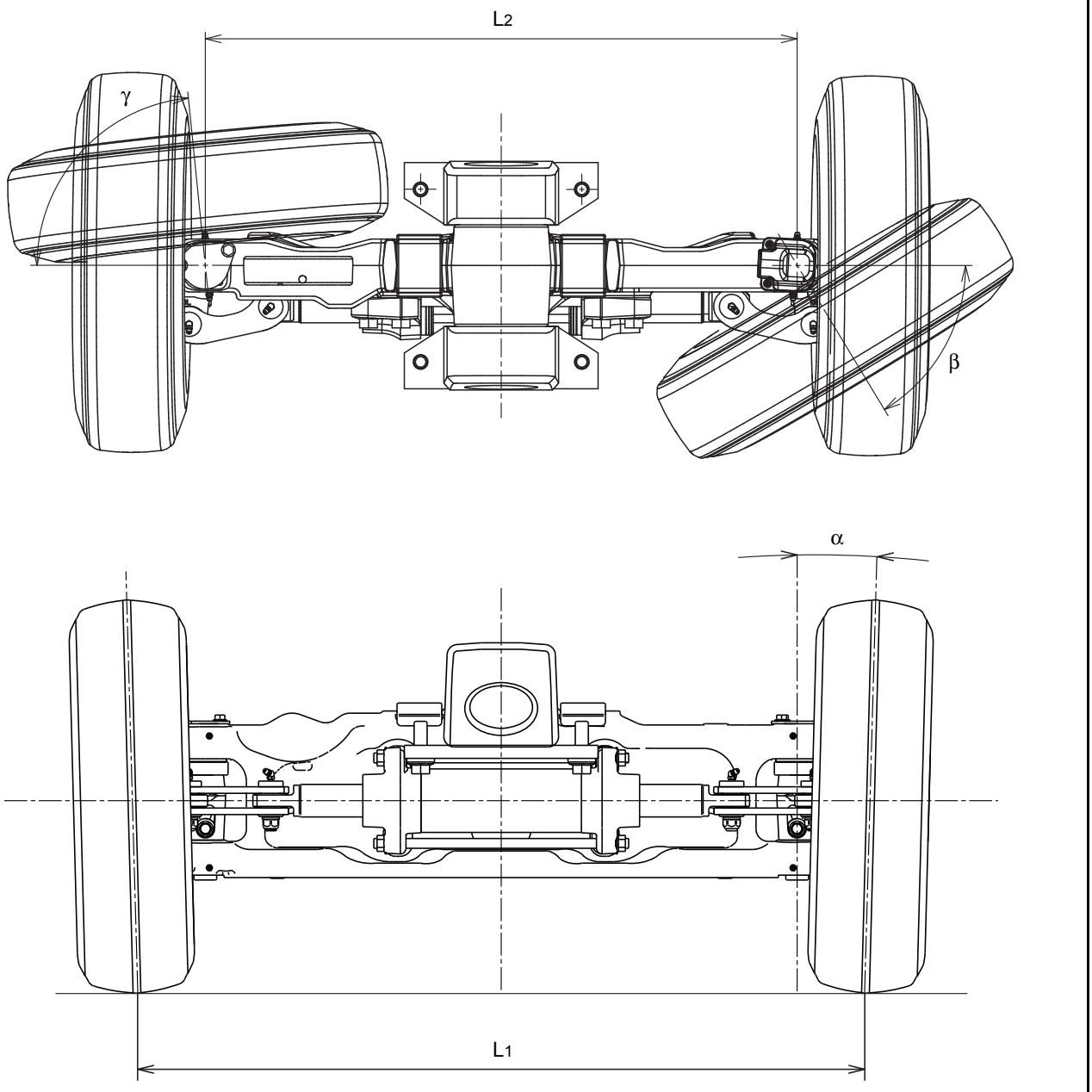
REAR AXLE

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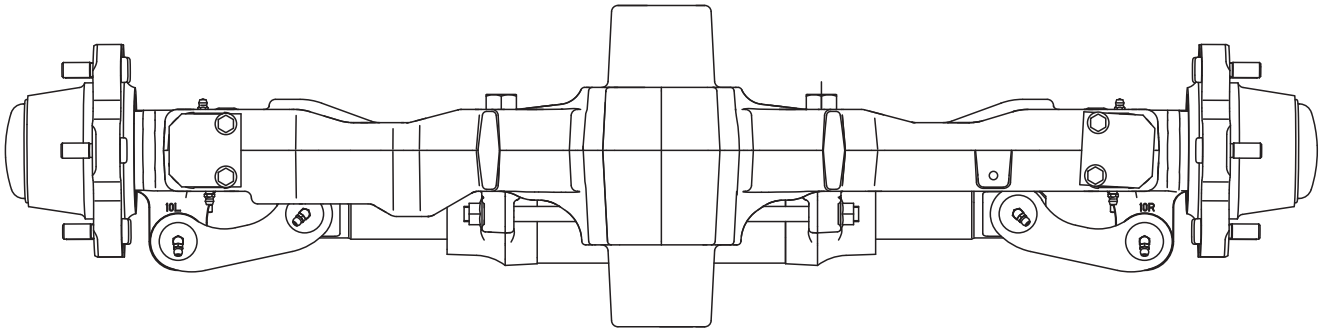
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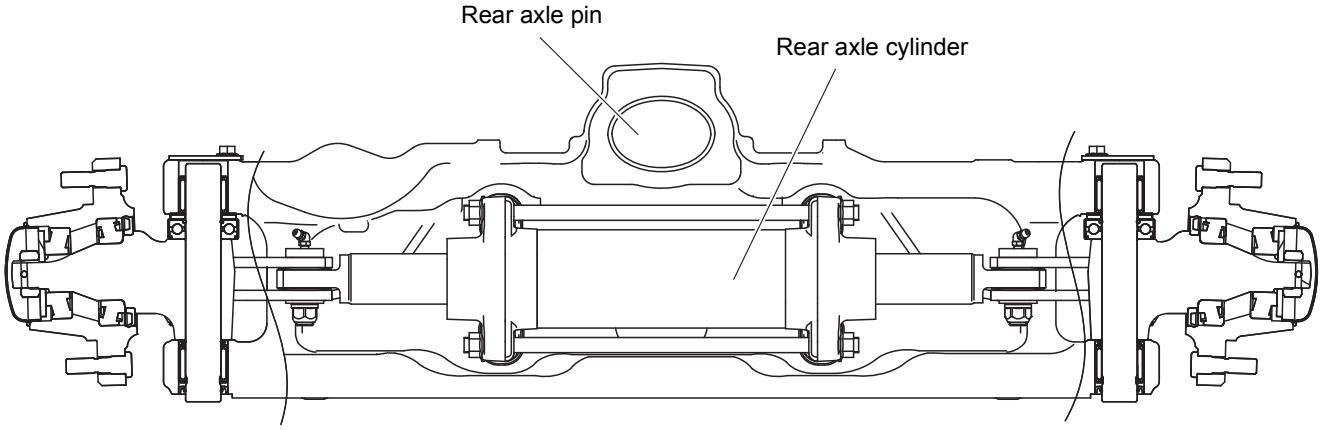
GENERAL



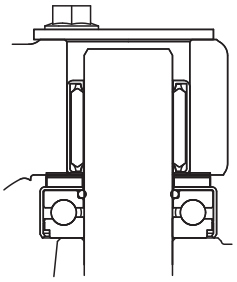
G85707001_

Symbol	Item		Measurement		
			1 ton series	2 ton series	3 ton series
L1	Tread	mm (in)	845 (33.3)	940 (37.0)	981 (38.6)
L2	Distance between king pins	mm (in)	727 (28.6)	←	795 (31.3)
α	Camber	degree	1.5°	←	←
β	Tire angle	degree	59°	←	56°
γ	Tire angle	degree	84°	←	81°

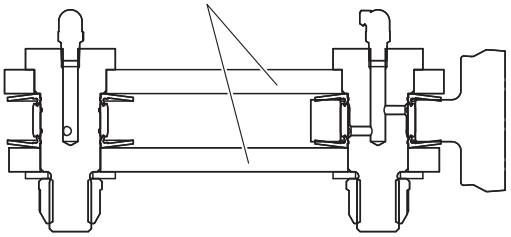




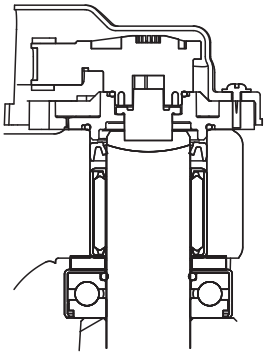
Without tire angle sensor



Tie-rod



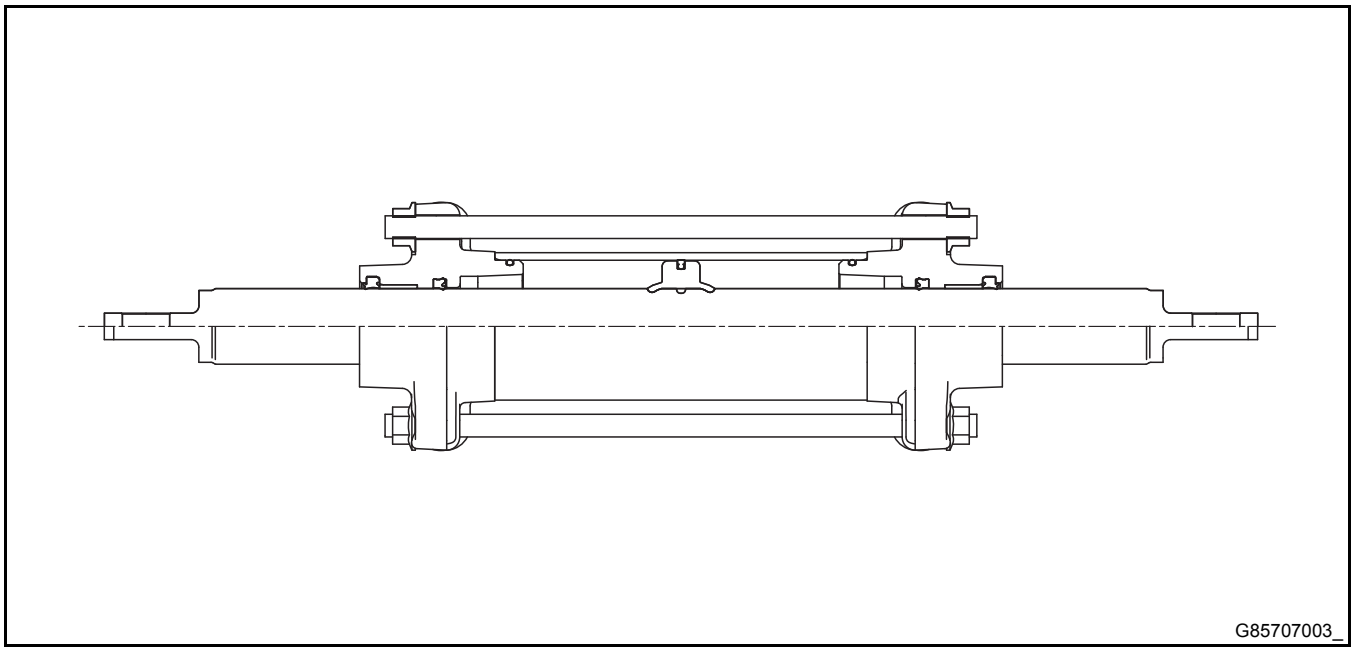
Tire angle sensor
(SAS/ Synchronized steering spec.)



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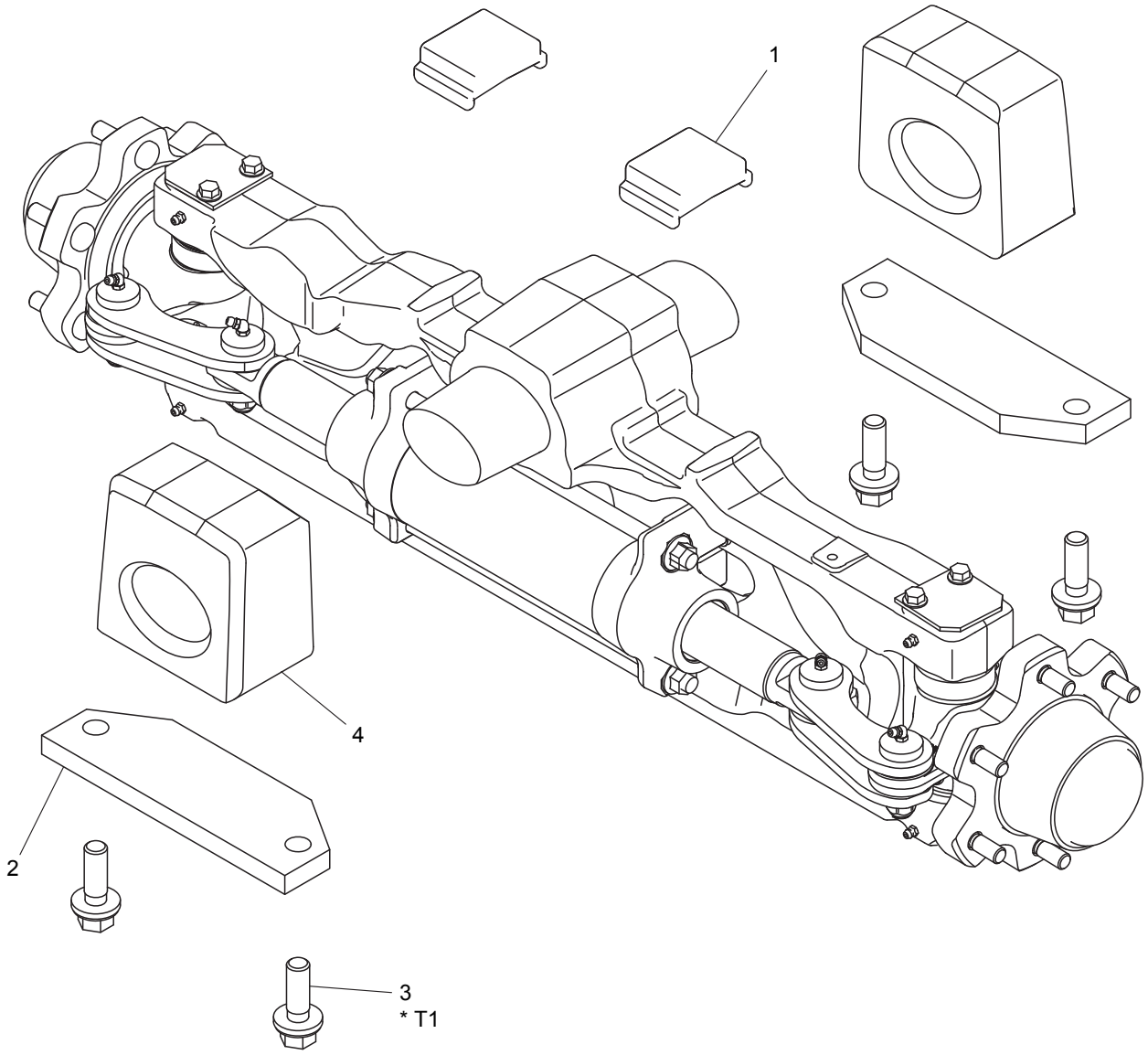
Rear Axle Cylinder



G85707003_

COMPONENTS

REAR AXLE SUPPORT



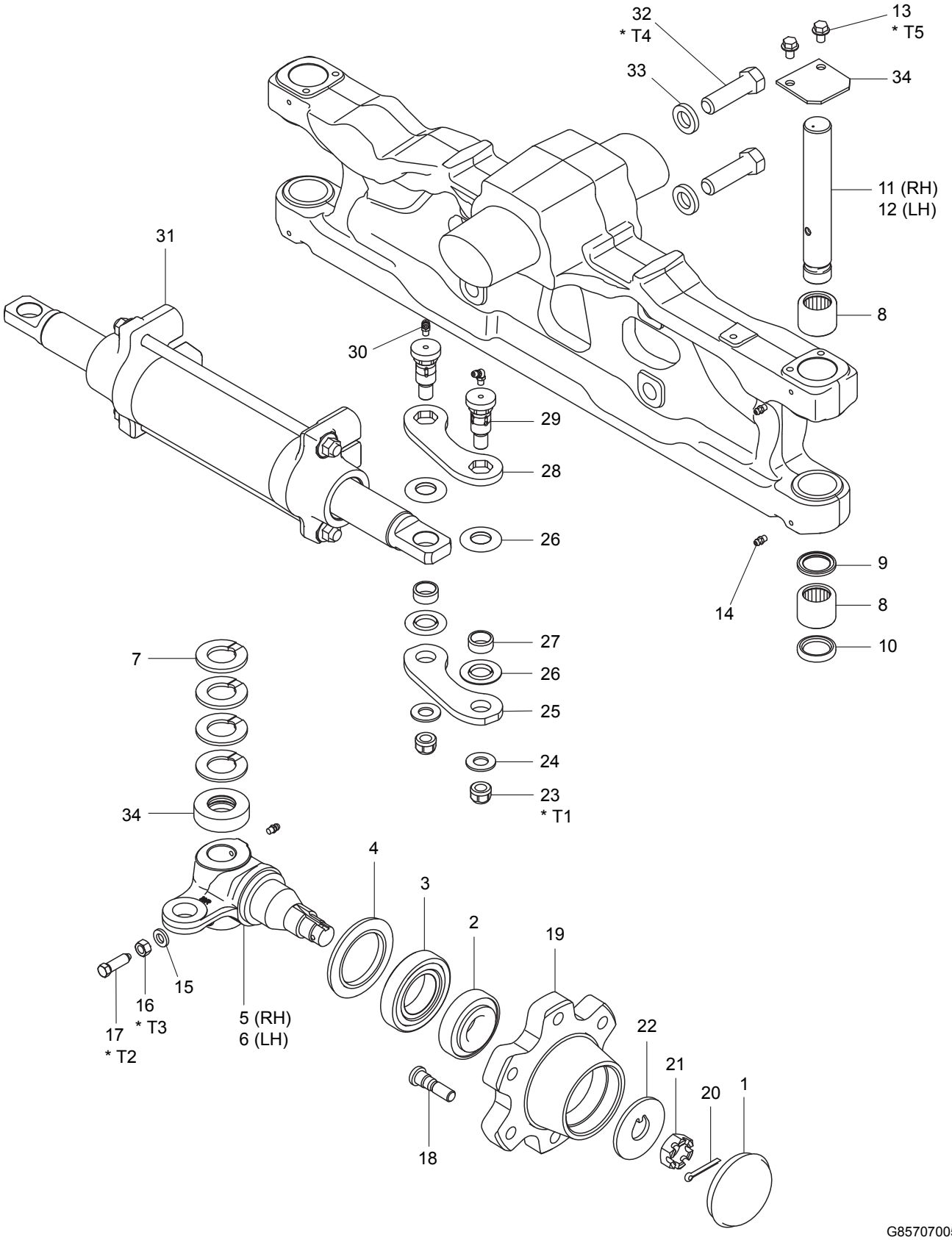
G85707004_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 160.0 ~ 240.0 (1632 ~ 2447) [118.0 ~ 177.1]

No.	Parts name	QTY	No.	Parts name	QTY
1	Damper, rear axle	2	3	Bolt, flange, w/ washer	4
2	Plate, rear axle support	2	4	Rubber, rear axle support	2

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STEERING KNUCKLE·KING PIN·TIE-ROD·HUB·REAR AXLE CYLINDER

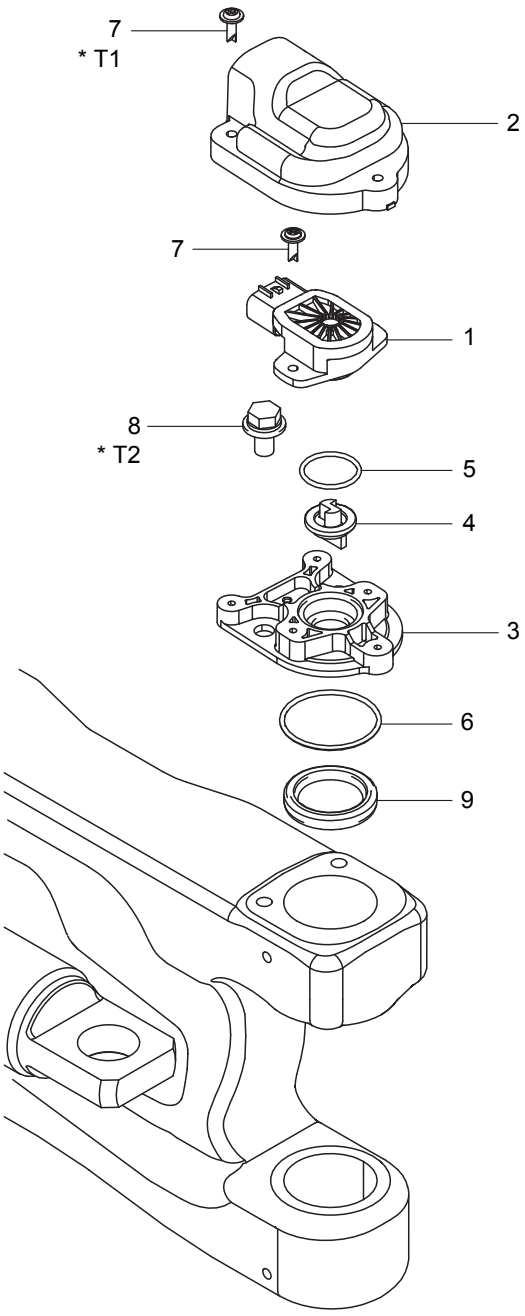


* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 49.0 ~ 73.5 (500 ~ 750) [36.2 ~ 54.2]
T2 = 44.1 ~ 53.9 (450 ~ 550) [32.5 ~ 39.8] (Bolts)
T3 = 35.0 ~ 52.0 (357 ~ 530) [25.8 ~ 38.4] (Nuts)
T4 = 166.7 ~ 245.2 (1700 ~ 2500) [123 ~ 181]
T5 = 17.4 ~ 40.6 (177 ~ 414) [12.8 ~ 30.0]

No.	Parts name	QTY	No.	Parts name	QTY
1	Cap, rear axle hub	2	19	Hub, rear axle	2
2	Bearing	2	20	Pin, cotter	2
3	Bearing	2	21	Nut	2
4	Seal, oil	2	22	Washer, claw	2
5	Knuckle, steering, RH	1	23	Nut	4
6	Knuckle, steering, LH	1	24	Washer, plate	4
7	Spacer	8	25	Tie-rod, lower	4
8	Bearing, needle	4	26	Washer, seal	8
9	Seal, oil	2	27	Collar	4
10	Seal, oil	2	28	Tie-rod, upper	2
11	Pin, king, steering knuckle, RH	1	29	Pin, cylinder end	4
12	Pin, king, steering knuckle, LH	1	30	Fitting, grease	4
13	Bolt, flange	8	31	Cylinder ASSY, rear axle	1
14	Fitting, grease	6	32	Bolt, flange	4
15	Washer, spring	2	33	Washer, spring	4
16	Nut, hexagon	2	34	Bearing, thrust, steering knuckle	2
17	Bolt, stopper	2	35	Plate	2
18	Bolt, hub	12			

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TIRE ANGLE SENSOR

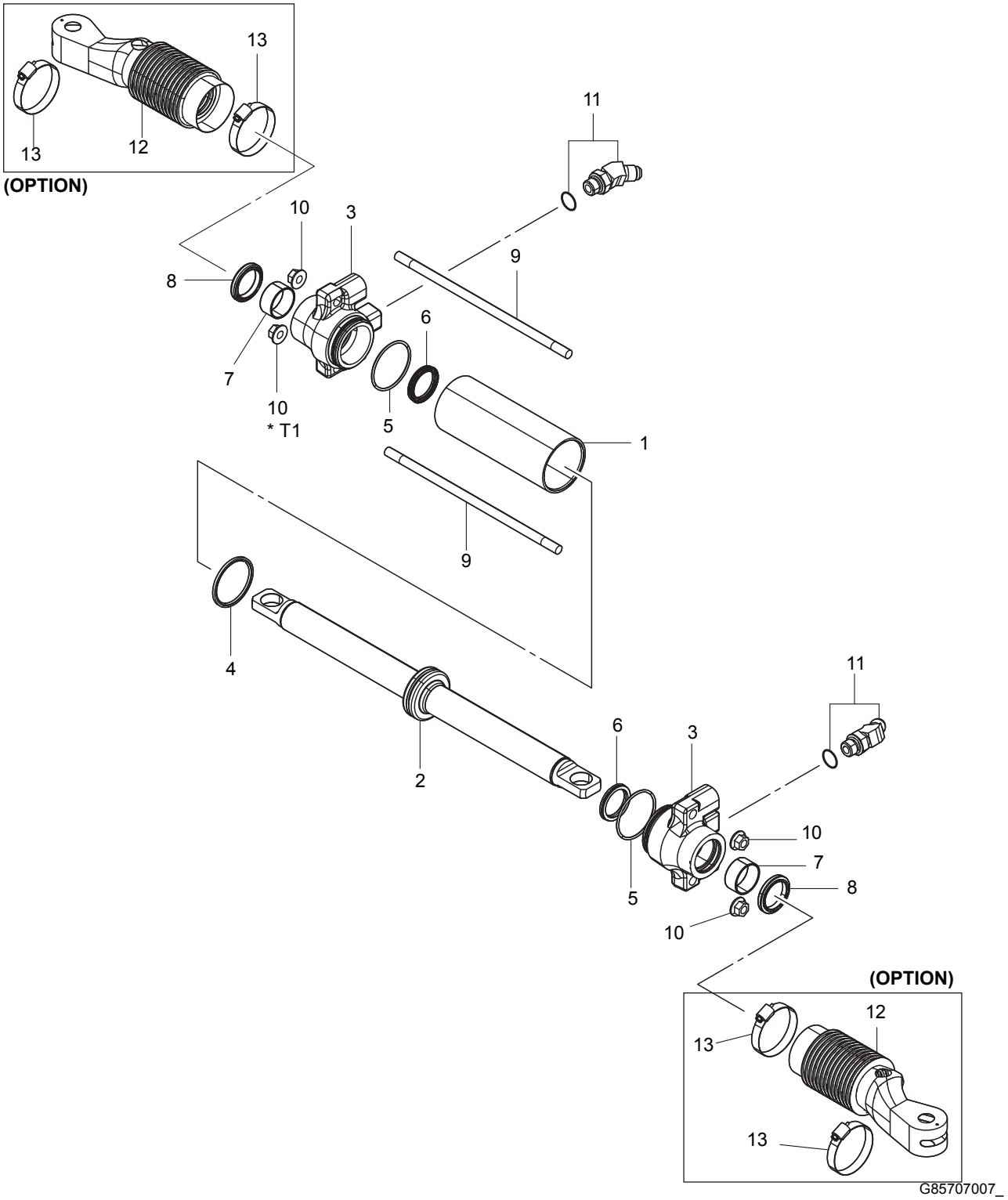


G85707006_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 1.4 ~ 1.6 (14.3 ~ 16.3) [1.03 ~ 1.19]
T2 = 10.0 ~ 16.0 (100 ~ 160) [7.38 ~ 11.8]

No.	Parts name	QTY	No.	Parts name	QTY
1	Sensor ASSY, tire angle	1	6	Ring, O	1
2	Cover, tire angle sensor	1	7	Screw, round tapping	5
3	Plate, tire angle sensor	1	8	Bolt, w/ washer	2
4	Joint, tire angle sensor	1	9	Seal, oil	1
5	Ring, O	1			

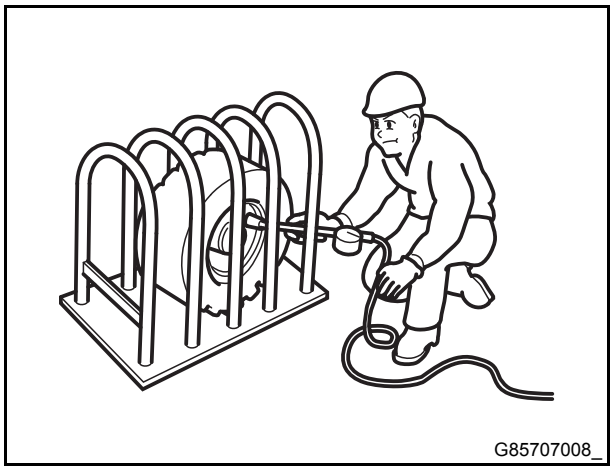
REAR AXLE CYLINDER



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 41.0 ~ 55.4 (418 ~ 565) [30.2 ~ 40.9]

No.	Parts name	QTY	No.	Parts name	QTY
1	Cylinder, rear axle	1	8	Seal, dust	2
2	Rod, rear axle cylinder	1	9	Bolt, stud	2
3	Guide, rear axle cylinder rod	1	10	Nut	4
4	Seal, ring	1	11	Fitting	2
5	Ring, O	2	12	Boot, cylinder	2
6	Packing, U	2	13	Band	4
7	Bushing, rod guide	2			

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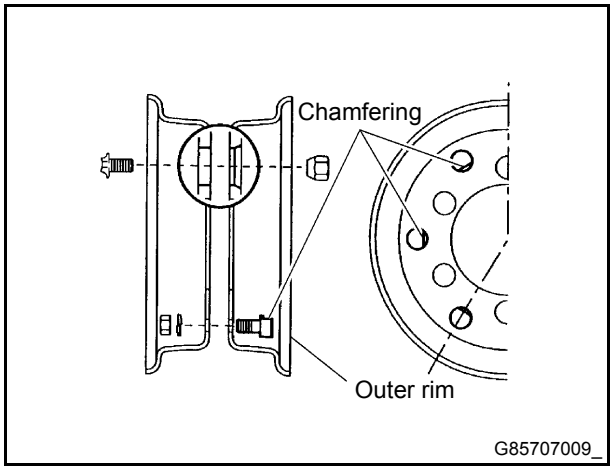
TIRES·WHEELS

1. Adjusting the Inflation Pressure

Caution:
- **Do not inflate tires beyond the specified pressure because it may cause dangerous tire bursting.**
- **When inflating a tire removed from the vehicle, place it in a safety fence.**

Specified Inflation Pressure

Vehicle model	Specification	Tire size	Rim type	Inflating pressure kPa (kgf/cm^2) [psi]
1 ton series	STD	5.00 - 8 - 10PR	Divided rim	800 (8.0) [116]
	OPT	5.00 - 8 - 8PR		
2 ton series	STD	18 x 7 - 8 - 16PR	Divided rim	750 (7.5) [107]
	OPT	18 x 7 - 8 - 14PR		
	OPT	18 x 7 - 8 - 10PR		
3 ton series	STD	18 x 7 - 8 - 16PR	Side ring rim	900 (9.0) [128]
	OPT	18 x 7 - 8 - 14PR		



2. Wheel Disassembly•Reassembly

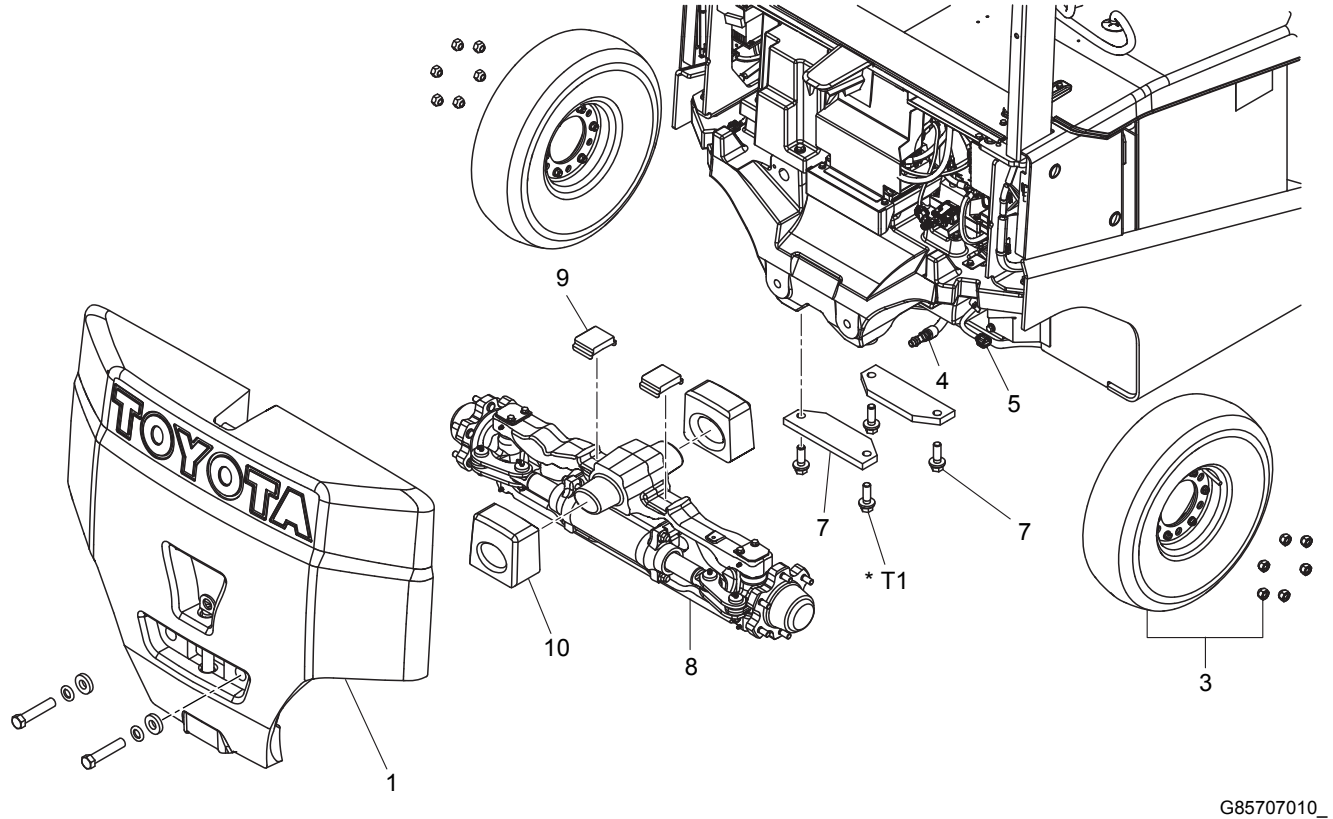
Caution:
Always discharge air fully before disassembling the wheel. Otherwise, it is very dangerous since the rim may come off suddenly due to the internal pressure.

Note:
Install each divided rim set bolt with its head on the outer rim side and the chamfered portion facing the center of the wheel.

Tightening torque of divided rim set bolt:
T = N·m (kgf·cm) [ft·lbf]
1 ton series: T = 29.5 ~ 44.0 (300 ~ 450) [21.8 ~ 32.5]
2 ton series: T = 78.5 ~ 117.5 (800 ~ 1200) [57.9 ~ 86.7]

REAR AXLE ASSY

REMOVAL·INSTALLATION



Tightening torque of hub nut : T = N·m (kgf·cm) [ft·lbf]
1 ton series:
T = 89.0 ~ 157.0 (900 ~ 1600) [65.66 ~ 115.8]
2·3 ton series:
T = 118.0 ~ 196.0 (1200 ~ 2000) [87.06 ~ 144.60]

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 160.0 ~ 240.0 (1632 ~ 2447) [118.0 ~ 177.1]

Removal Procedure

1 Remove the weight.

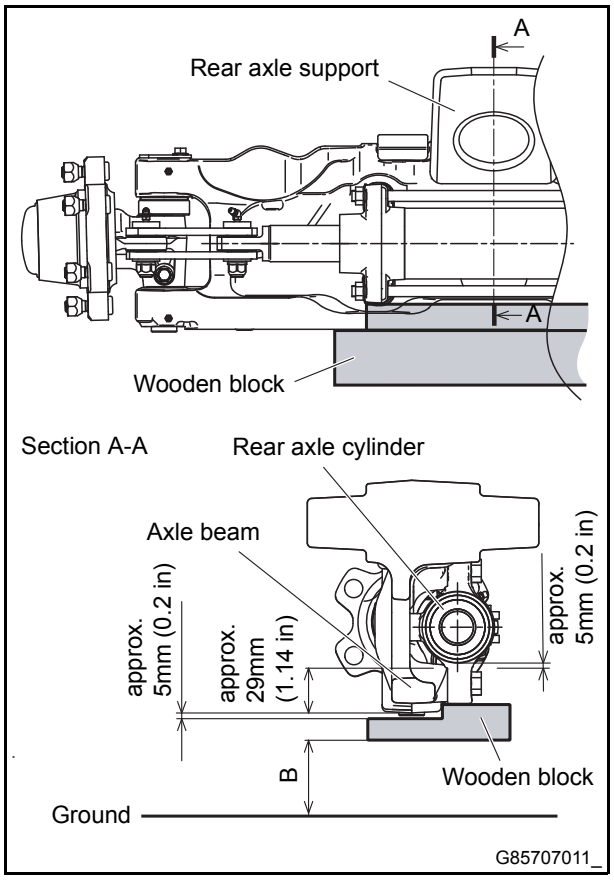
2 Jack up the vehicle and support it with a wooden block.

3 Remove the rear wheels.

4 Disconnect the rear axle cylinder hose and the fitting.

5 Disconnect the tire angle sensor connector (Vehicle W/ tire angle sensor).

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6 Support the rear axle ASSY with wooden blocks.

B = over [the height of rear axle support (approx. 28 mm) + the height of the jack]

Caution:

- **Be sure to support the rear axle ASSY with specified wooden blocks because the rear axle ASSY is unstable.**
- **Measure the height of the rear axle beam above the ground each time before starting operation as it varies with models and tire conditions.**

7 Remove the rear axle support bolts and the plates.

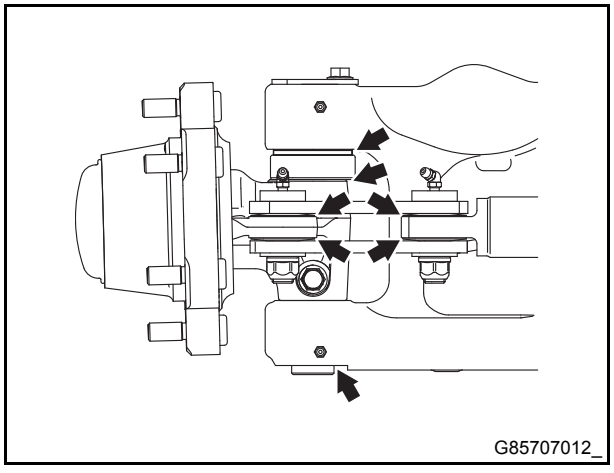
Caution:
The weight of one rear axle support plate is 2 kilograms. Take adequate care when removing the rear axle support bolts, as the plates are heavy.

8 Remove the rear axle ASSY from the rear frame.

9 Remove the rear axle support rubber mount and the rear axle damper.

Installation Procedure

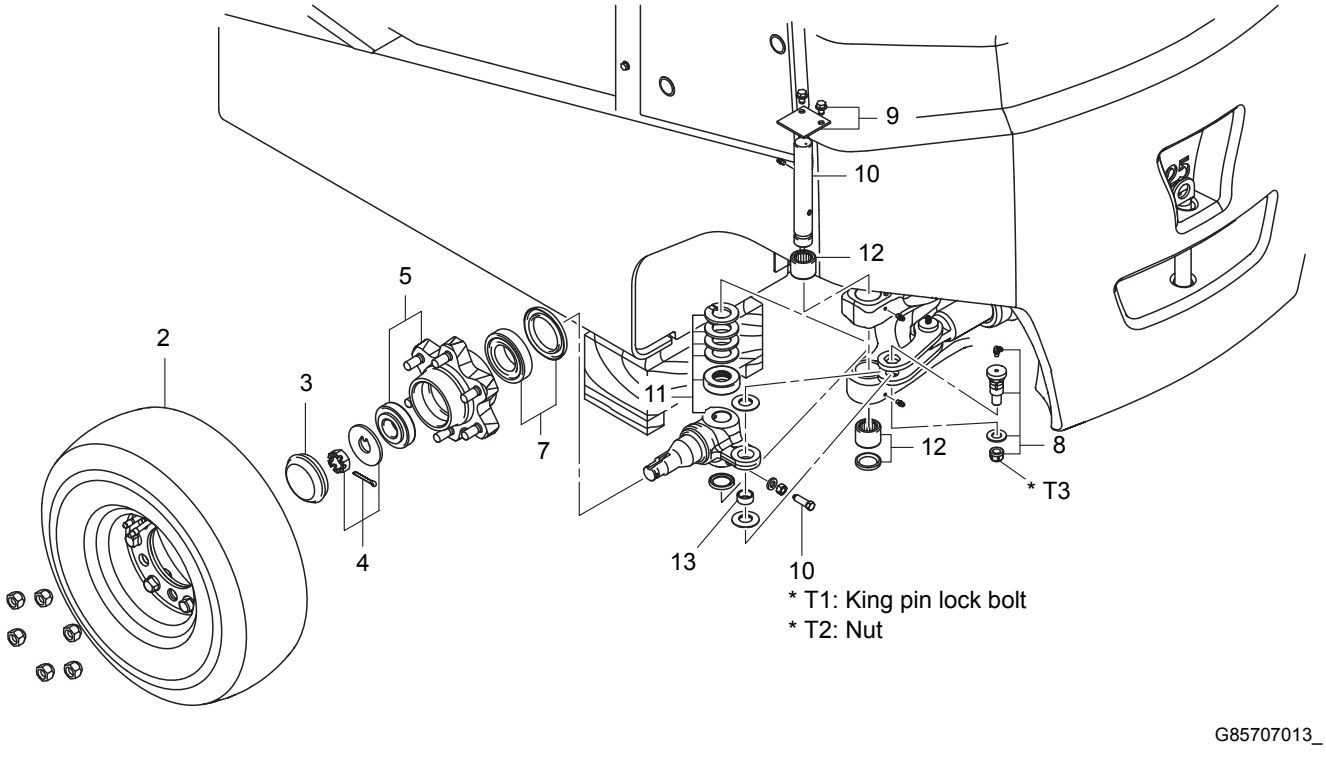
The installation procedure is the reverse of the removal procedure.



Note:
After installation, add MP grease through each grease fitting and make sure that the grease overflow from the parts indicated by arrows.

REAR AXLE HUB·STEERING KNUCKLE

REMOVAL·INSTALLATION



G85707013_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 44.1 ~ 53.9 (450 ~ 550) [32.6 ~ 39.8]
T2 = 35.0 ~ 52.0 (357 ~ 530) [26.6 ~ 58.4]
T3 = 49.0 ~ 73.5 (500 ~ 750) [36.2 ~ 54.2]

Removal Procedure

1 Jack up the vehicle and support it with a wooden block.

2 Remove the rear wheels.

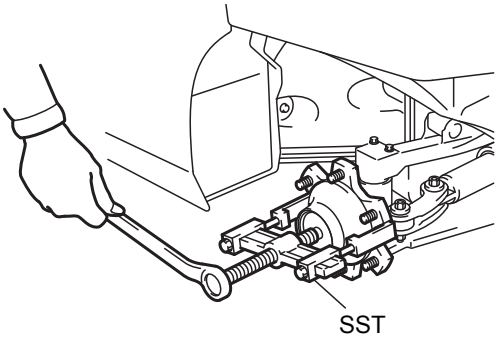
3 Remove the hub cap.

4 Remove the castle nut and claw washer.

5 Remove the outer bearing and axle hub.

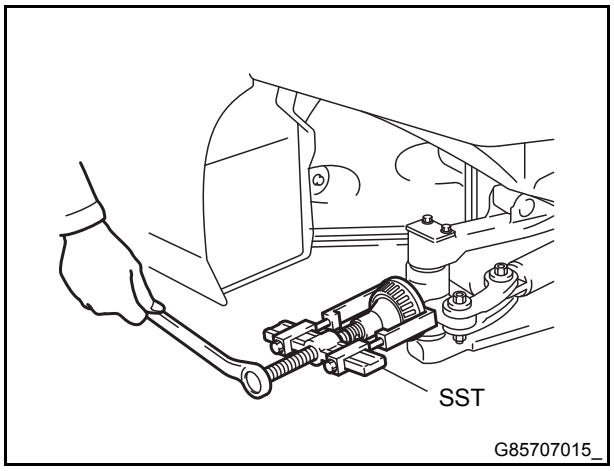
SST 09950-76014-71 (09950-40011)

6 Remove the bearing outer race from the axle hub, using the brass bar.



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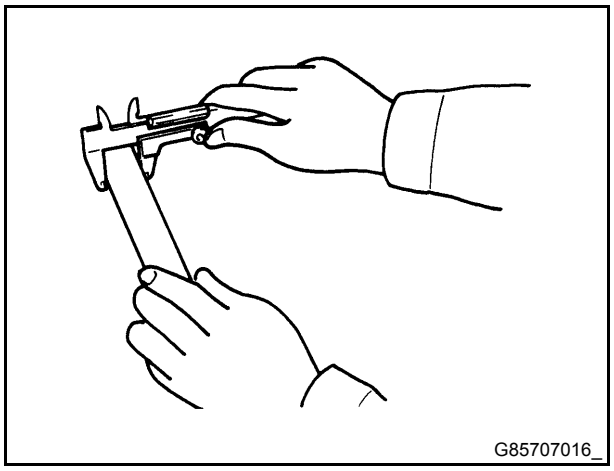


7 Remove the inner bearing roller and oil seal.

SST 09950-76014-71(09950-40011)

8 Disconnect the tie rod (on the knuckle side).

9 Remove the king pin cover (on the LH side) or the tire angle sensor (on the RH side) (Vehicle w/ tire angle sensor).

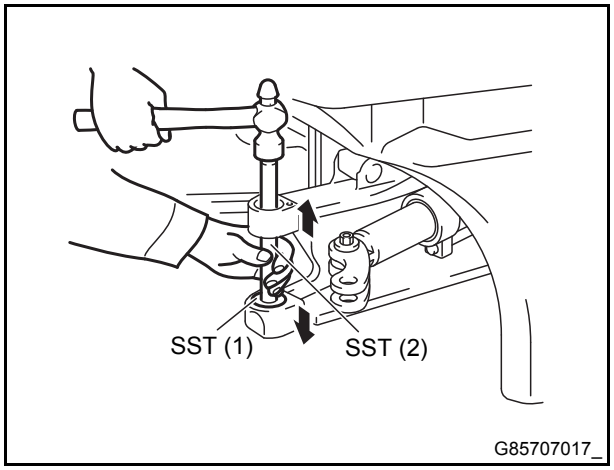


10 Remove the king pin lock bolt and king pin.

Measure the king pin outside diameter.

Limit: 27.8 mm (1.094 in)

11 Remove the thrust bearing, spacer and steering knuckle.



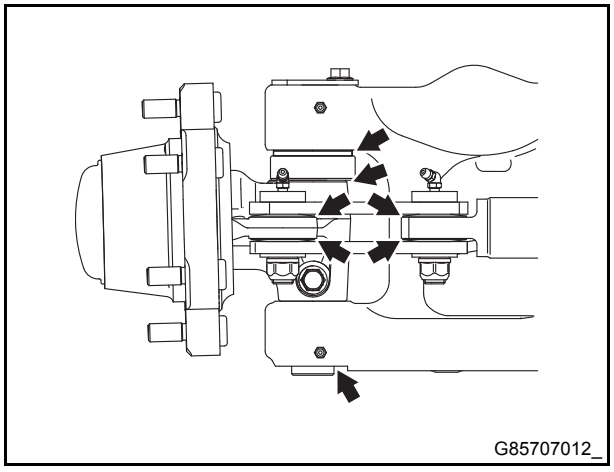
12 Remove the king pin oil seals and needle bearings according to the procedure below.

(1) Use a straight-edge screwdriver to remove the dust seal and oil seal.

(2) Use the SST to remove the needle roller bearings in the directions shown in the illustration.

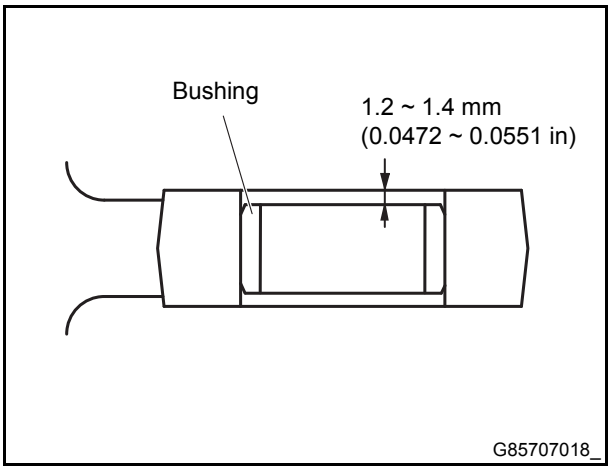
SST 09950-76018-71 (09950-60010) ..... (1)
SST 09950-76020-71 (09950-70010) ..... (2)

13 Remove the bushing from the steering knuckle.

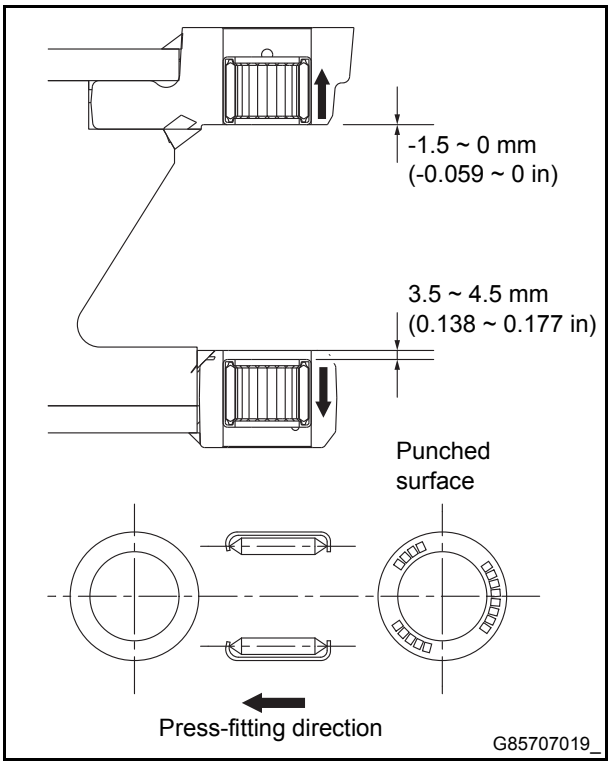


Installation Procedure

Note:
After installation, add MP grease through grease fittings and make sure that the grease overflow from the parts indicated by arrows.



1 Install the bushing to the steering knuckle. Press fit the bushing as shown in the illustration.



2 Install the king pin oil seals and needle bearings according to the procedure below.

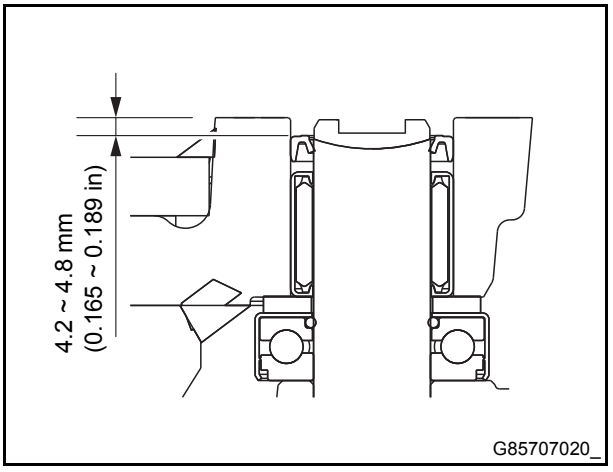
(1) Use the SST to install the needle bearing.
Check the needle roller bearing press-fitting surface, pressing direction and installation depth.

SST 09950-76018-71 (09950-60010) ..... (1)
SST 09950-76020-71 (09950-70010) ..... (2)

(2) Install the dust seal.

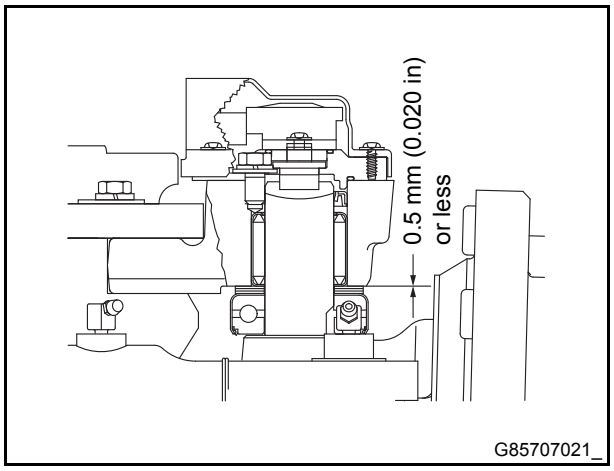
(3) Use the SST to install the oil seal.

SST 09950-76018-71 (09950-60010) ..... (1)
SST 09950-76020-71 (09950-70010) ..... (2)



(4) Install the RH upper oil seal as shown in the illustration. (Only for SAS/ Synchronized steering spec.)

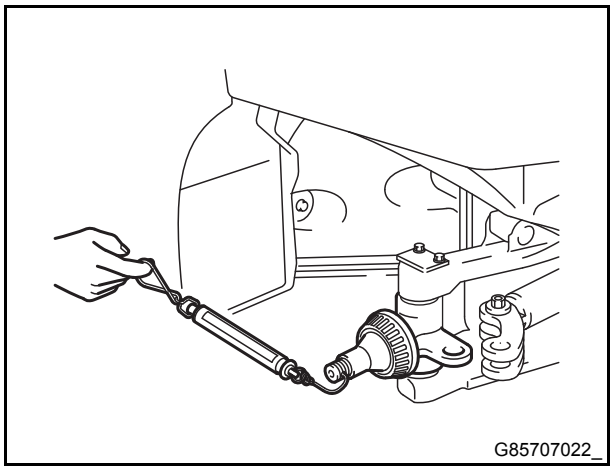
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3 Install the thrust bearing, spacer and steering knuckle. Measure the steering knuckle starting force according to the procedure below.

(1) Temporarily reassemble the king pin and king pin lock bolt. Select a spacer to adjust the vertical clearance of the steering knuckle to 0.5 mm (0.020 in) or less, and install it on the upper surface of the thrust bearing.

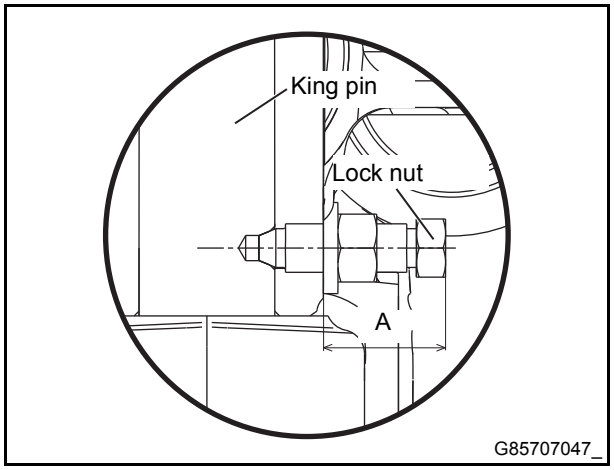
Spacer thickness:
3.0·3.5·4.0·4.5 mm (0.118·0.138·0.157·0.177 in)



(2) Set a spring scale to the tip end of the knuckle spindle, and measure the starting force.

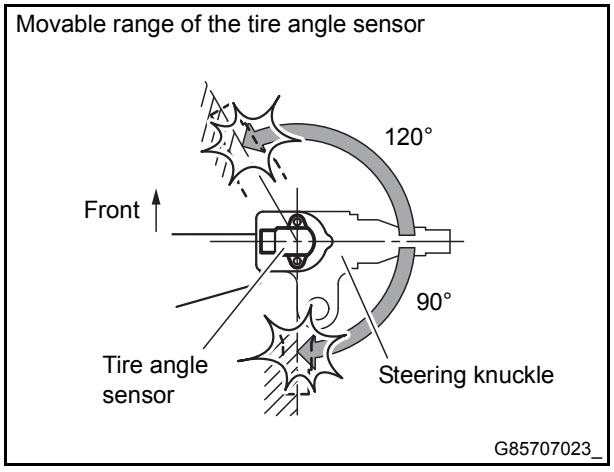
Standard: 19.3 N (2.0 kgf) [4.4 lbf] or less

(3) If the measured value exceeds the standard, check the king pin for bend, the needle bearing for damage and axle beam for deformation.



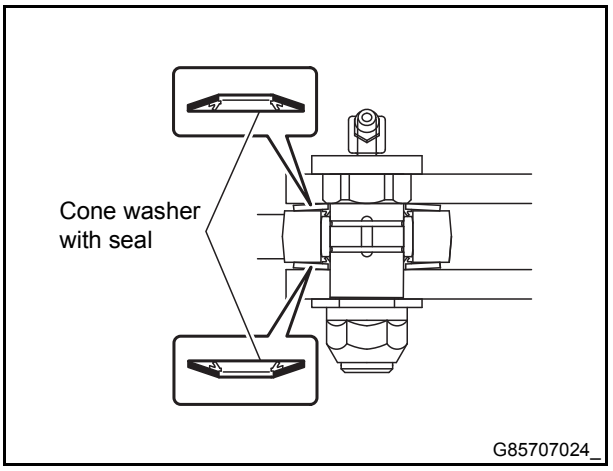
(4) Tighten the lock nut for the king pin lock bolt.

Standard: 23.9 ~ 26.5 mm (0.94 ~ 1.04 in)



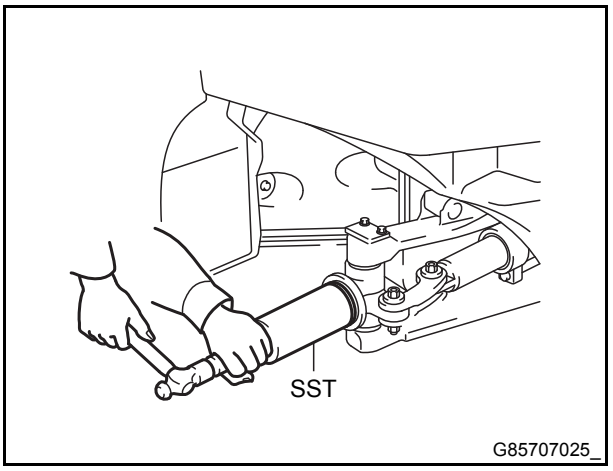
(5) When measuring the steering knuckle starting force with the tire angle sensor installed, measure it within the movable range of the tire angle sensor. If the range is exceeded, the sensor will be damaged. (Vehicle W/ tire angle sensor)

4 Install the king pin cover (on the LH side) or the tire angle sensor (on the RH side) (Vehicle w/ tire angle sensor).



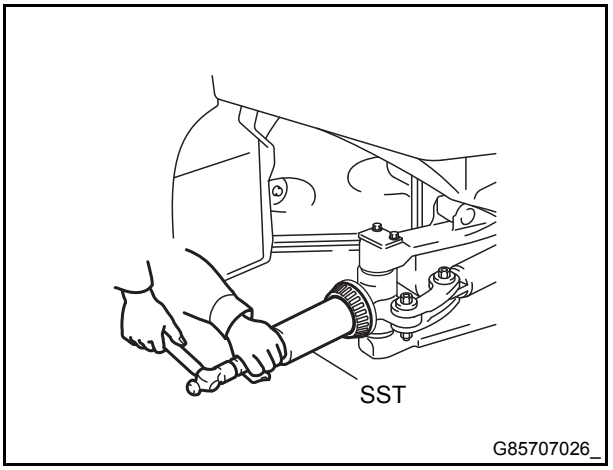
5 Connect the tie rod (on the knuckle side). To install the end pin lock nut, install each cone washer with seal in the direction shown in the illustration and tighten the nut to the specified torque.

Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T = 49.0 ~ 73.5 (500 ~ 750) [36.2 ~ 54.2]

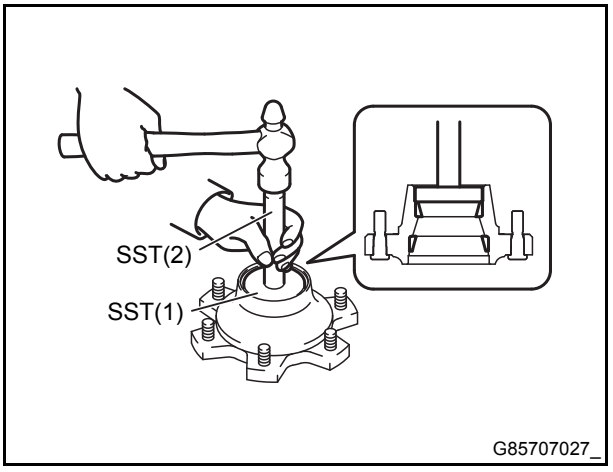


6 Install the inner bearing roller and oil seal.

SST 09370-10410-71



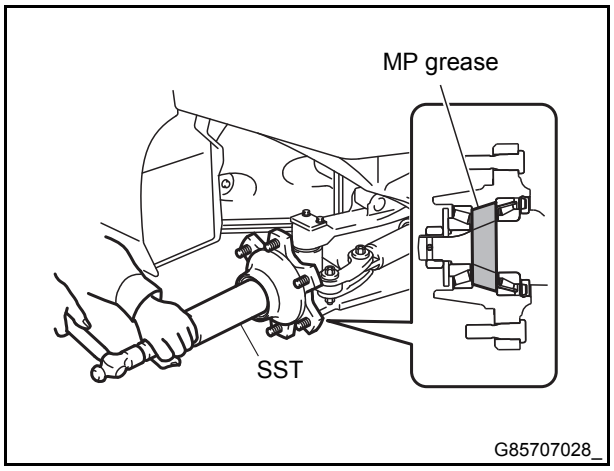
SST 09370-20270-71



7 Install the bearing outer race to the axle hub.

SST 09950-76019-71 (09950-60020)..... (1)
SST 09950-76020-71 (09950-70010)..... (2)

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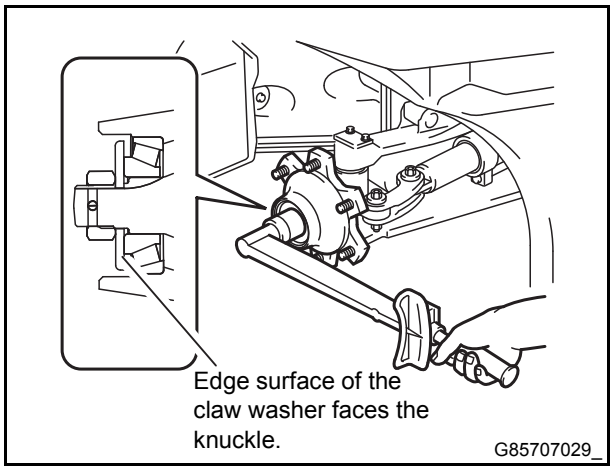
8 Install the rear axle hub and the outer bearing according to the procedure below.

(1) Apply MP grease to the axle hub and knuckle spindle.

(2) Install the axle hub.

(3) Use the SST to install the outer bearing roller.

SST 09370-20270-71



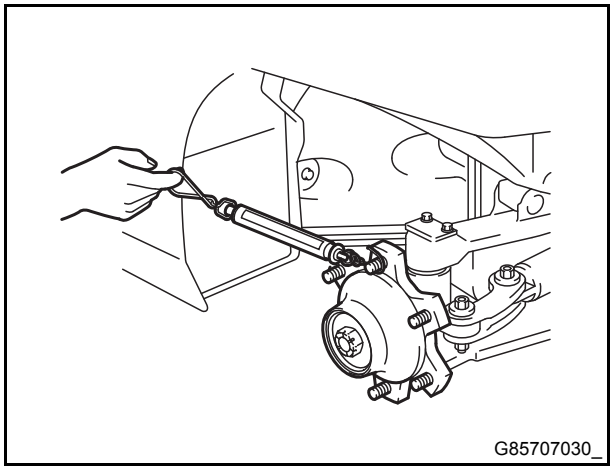
9 Install the castle nut and claw washer. Adjust the rear axle hub starting force as follows.

(1) Install the claw washer in the correct direction.

(2) Temporally tighten the castle nut.

Tightening torque: T = N·m (kgf·cm) [ft·lbf]
1 ton series:
T = 12 ~ 32 (122 ~ 330) [8.9 ~ 23.9]
2·3 ton series:
T = 15 ~ 44 (153 ~ 449) [11.1 ~ 32.5]

(3) Rotate the hub by 3 to 5 turns to fit in the bearing.



(4) Set a spring scale to a hub bolt, and measure the starting force.

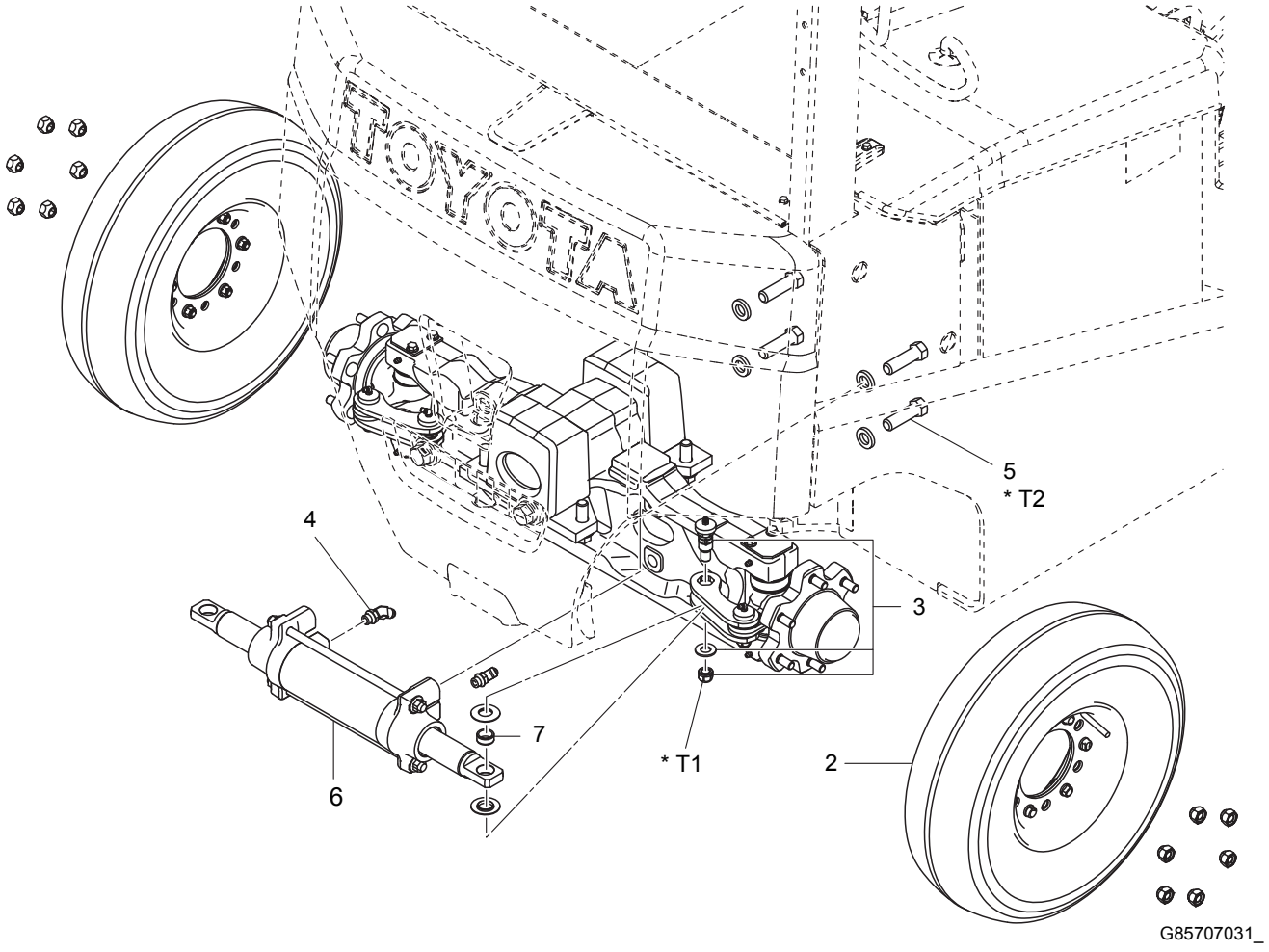
Standard:
1 ton series:
15 ~ 39 N (1.5 ~ 4.0 kgf) [3.3 ~ 8.5 lbf]
2·3 ton series:
20 ~ 58 N (2.0 ~ 5.9 kgf) [4.5 ~ 13.0 lbf]

(5) If the measured value does not satisfy the standard, adjust the castle nut tightening.

(6) Install a new cotter pin.

REAR AXLE CYLINDER

REMOVAL·INSTALLATION



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 49.0 ~ 73.5 (500 ~ 750) [36.2 ~ 54.2]
T2 = 170.0 ~ 230.0 (1734 ~ 2345) [125.4 ~ 169.7]

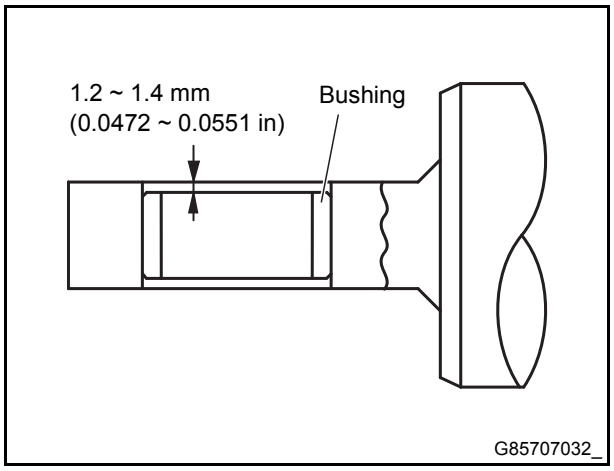
Removal Procedure

1 Jack up the vehicle and support it with a wooden block.
2 Remove the rear wheels.
3 Disconnect the tie rod (on the piston rod side).
4 Disconnect the rear axle cylinder hose and remove the fitting.
5 Remove the rear axle cylinder bolts.
6 Remove the rear axle cylinder.
7 Remove the bushing from the piston rod.

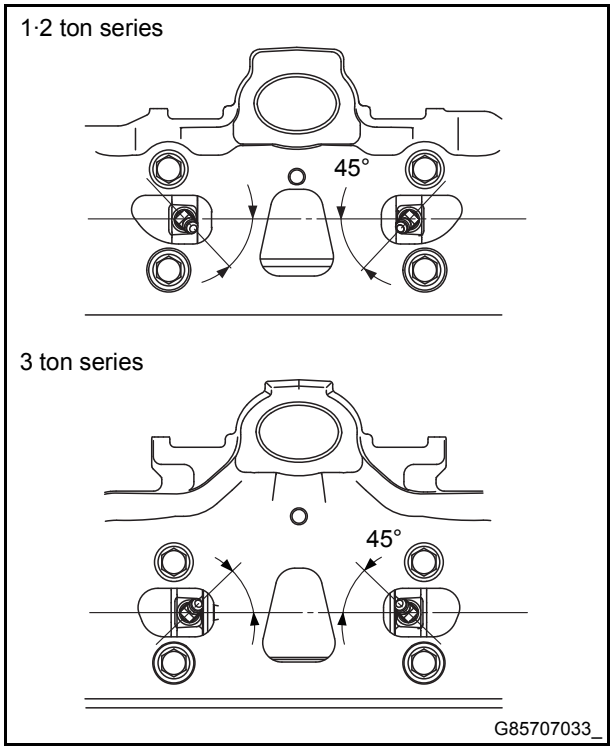
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Installation Procedure

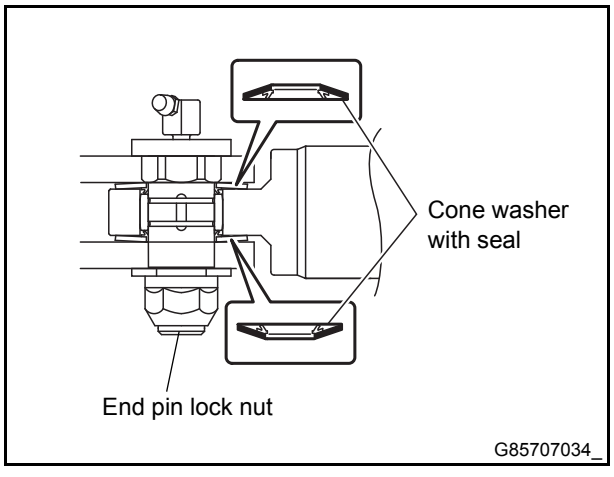
The installation procedure is the reverse of the removal procedure.



1 Press fit the bushing as shown in the illustration.



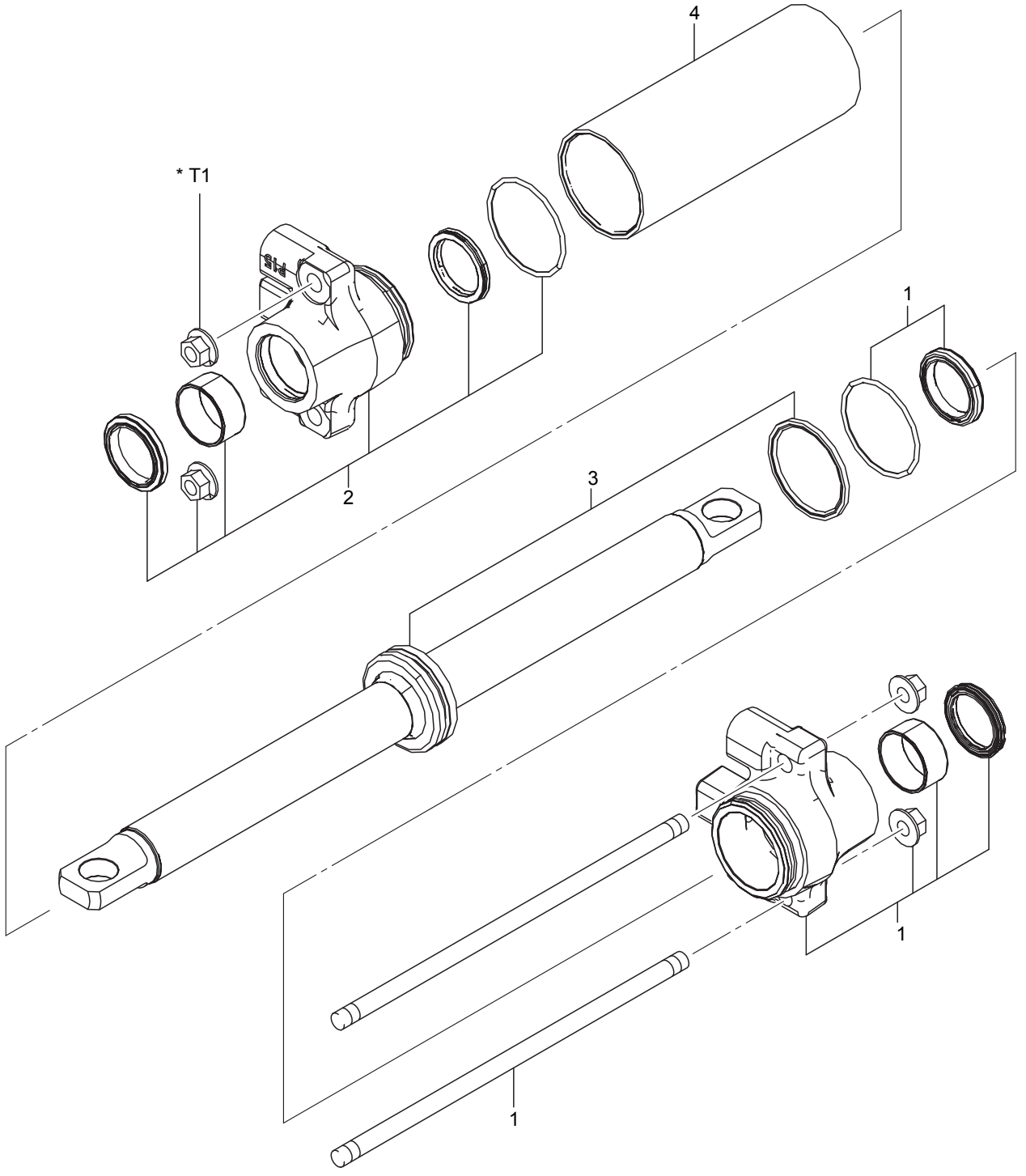
4 Install the fittings as shown in the illustration.



5 To install the end pin lock nut, install each cone washer with seal in the direction shown in the illustration and tighten the nut to the specified torque.

Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T = 49.0 ~ 73.5 (500 ~ 750) [36.2 ~ 54.2]

DISASSEMBLY·INSPECTION·REASSEMBLY



G85707035_

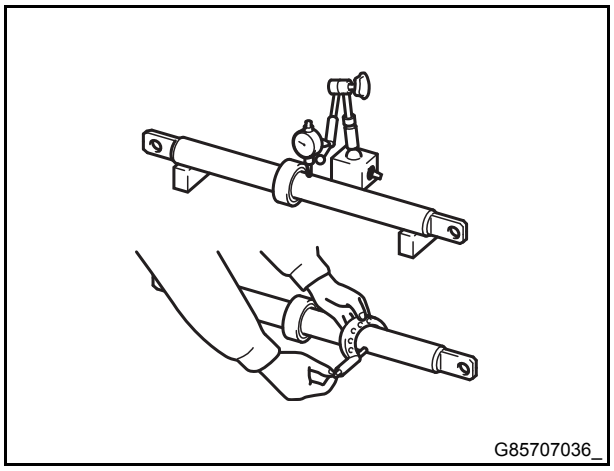
* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 41.0 ~ 55.4 (418 ~ 565) [30.2 ~ 40.9]
* The nut is treated with a friction stabilizer agent. Do not reuse.

Disassembly Procedure

1 Remove the through bolt.

2 Remove the piston rod guide.

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G85707036_

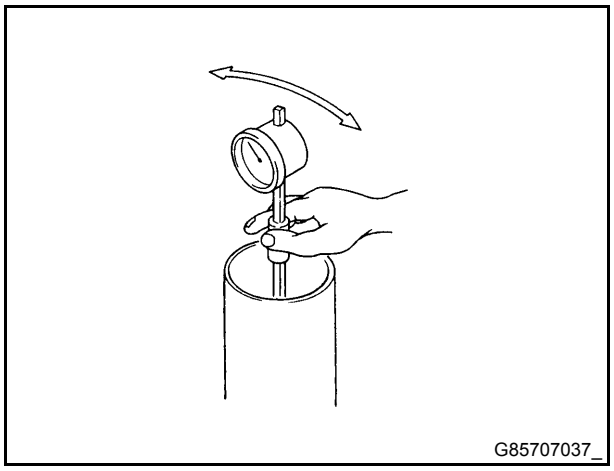
3 Remove the piston rod.

(1) Measure the piston rod outside diameter.

Limit:
1 ton series : 39.92 mm (1.5717 in)
2·3 ton series: 49.92 mm (1.9654 in)

(2) Measure the bend of the piston rod.

Limit: 0.5 mm (0.020 in)


G85707037_

4 Inspect the cylinder.

Measure the rear axle cylinder bore.

Limit:

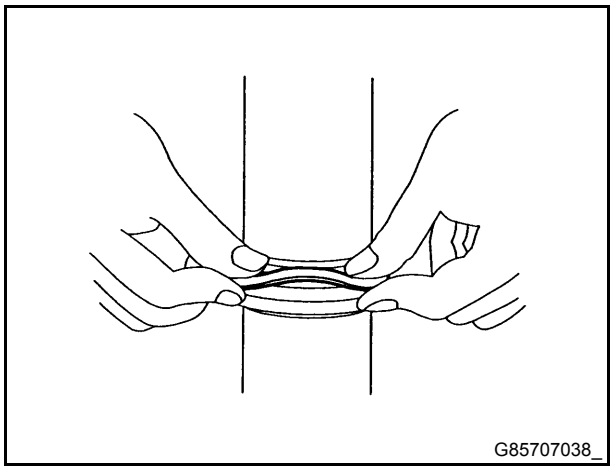
mm (in)

1.5 · 1.6 · 1.8 · 2.0 ton series	70.35 (2.7697)
2.5 ton series	76.35 (3.0059)
3.0 ton series	80.35 (3.1634)

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

Note:
Apply hydraulic oil before reassembly.


G85707038_

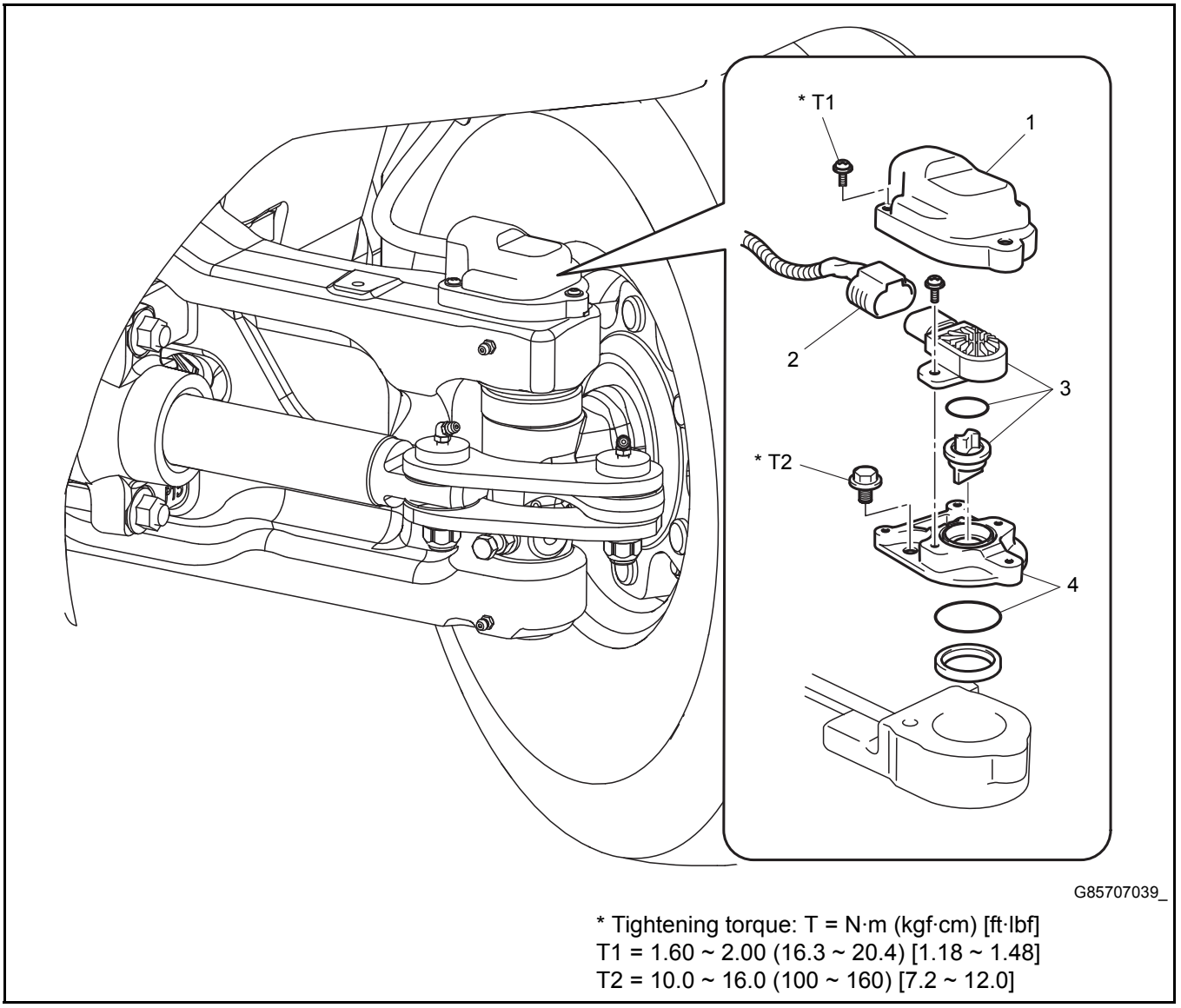
2 Before installing the seal ring, warm the seal ring to a little below 80°C (176°F) in hot oil or water.

Caution:
Operate carefully to avoid burn injury.

Note:
Do not stretch it excessively.

TIRE ANGLE SENSOR (SAS/ SYNCHRONIZED STEERING SPECIFICATION)

REMOVAL·INSTALLATION



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 1.60 ~ 2.00 (16.3 ~ 20.4) [1.18 ~ 1.48]
T2 = 10.0 ~ 16.0 (100 ~ 160) [7.2 ~ 12.0]

Removal Procedure

1 Remove the sensor cover.

2 Disconnect the tire angle sensor connector.

3 Remove the tire angle sensor and joint.

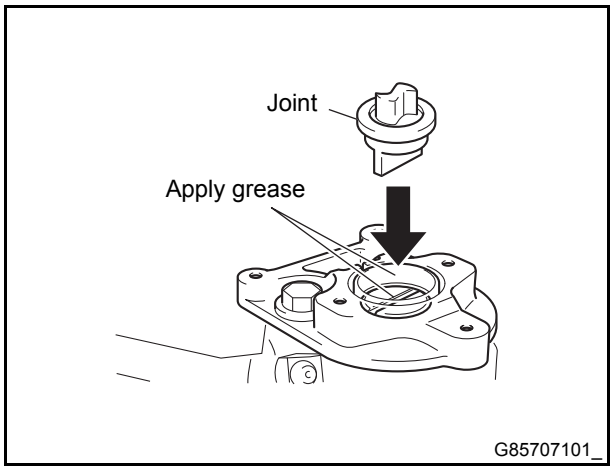
4 Remove the sensor plate.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Note:
When the tire angle sensor is removed/installed or replaced, proceed with the matching procedure.

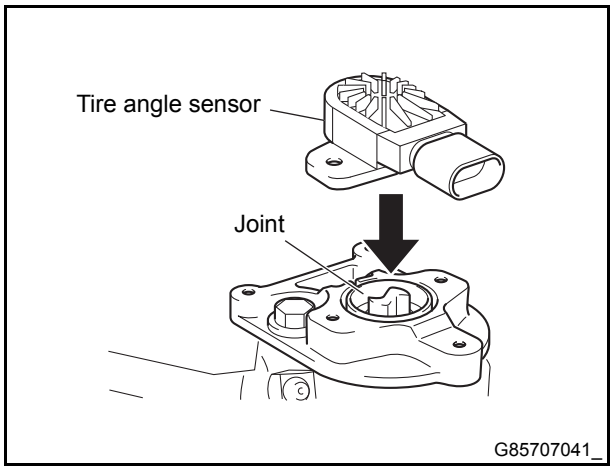
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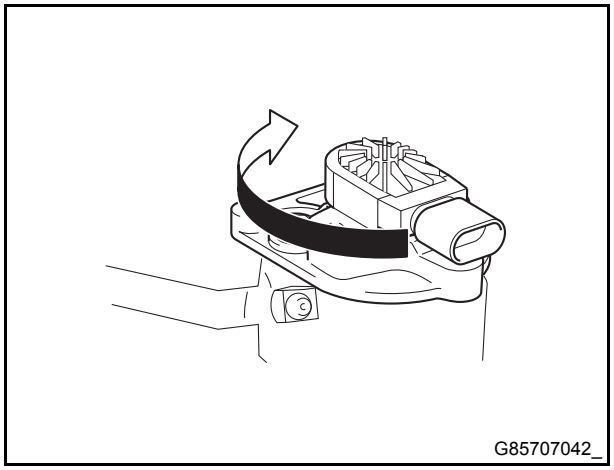
2 To install the tire angle sensor and the joint, follow the procedure below.

(1) Turn the steering wheel fully clockwise and hold it there.

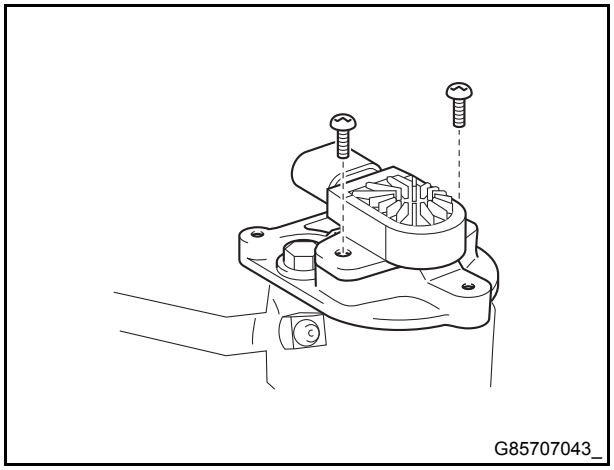
(2) Insert the joint into the kingpin groove. Apply a small amount of MP grease on the joint surface in contact with the king pin and sensor plate.



(3) Install the tire angle sensor by aligning it with the joint center axis.



(4) Turn the tire angle sensor until the tire angle sensor mounting hole is aligned with the sensor plate screw hole. (Approx. 180°)



(5) Fix by tightening the tapping screw after mounting hole alignment.

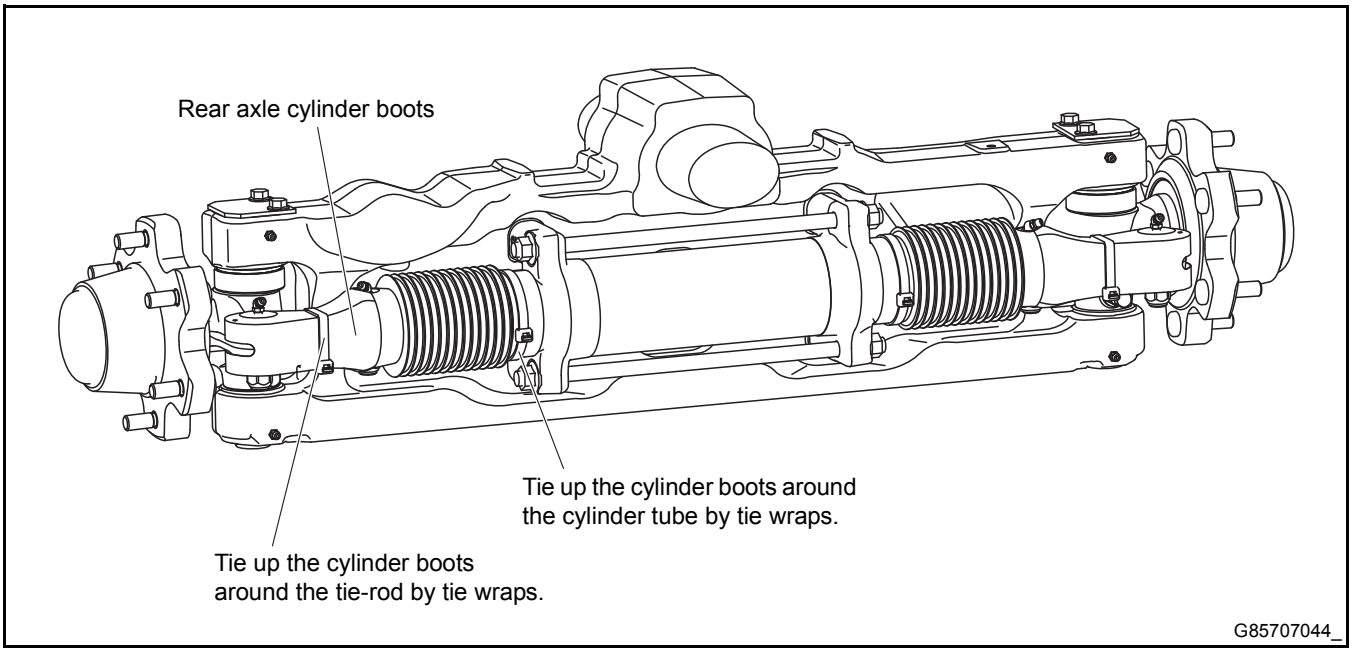
OPTIONS

Configuration options are shown below.

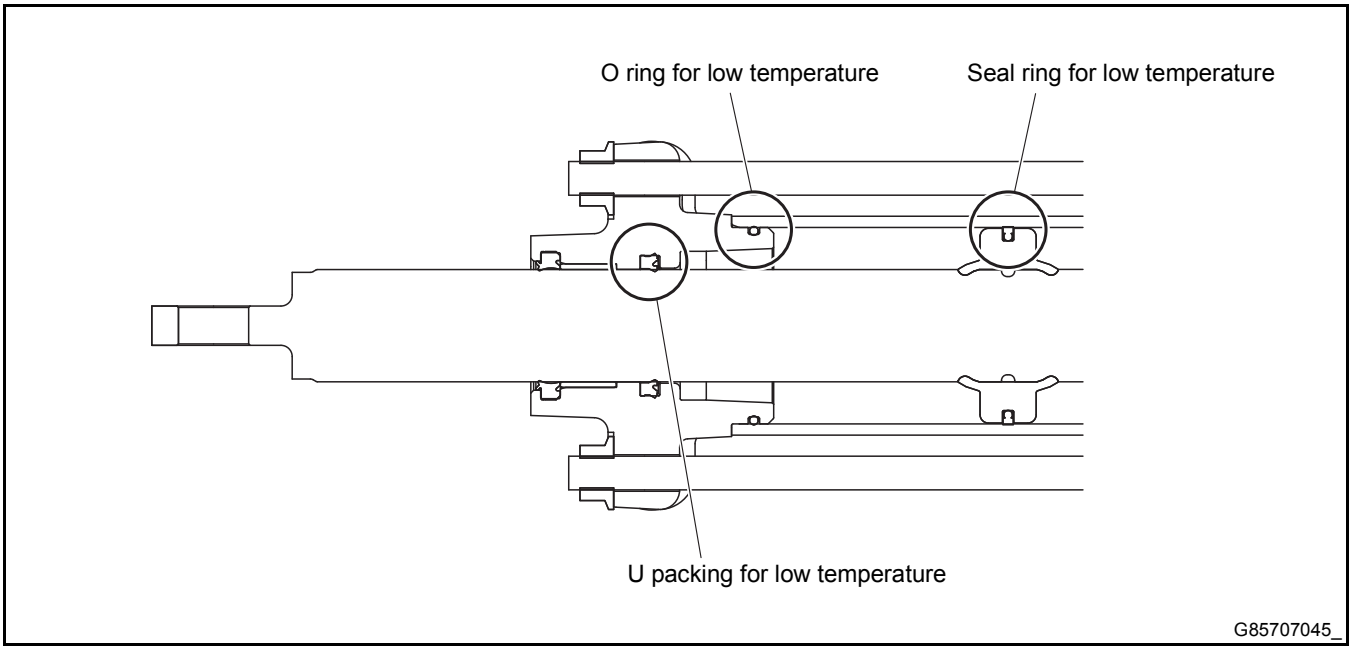
Option / Specification	Rear axle cylinder boots	Cold storage spec rear axle cylinder	Rust proof bolt	Tire angle sensor
Cold storage	○	○	○	–
Fisherman special	○	–	○	–
Cold storage-fisherman special	○	○	○	–
Rust proof	○	–	○	–
Rear axle cylinder boots	○	–	–	–
SAS/ Synchronized steering	–	–	–	○

○ : Available, –: Not available

Rear Axle Cylinder Boots

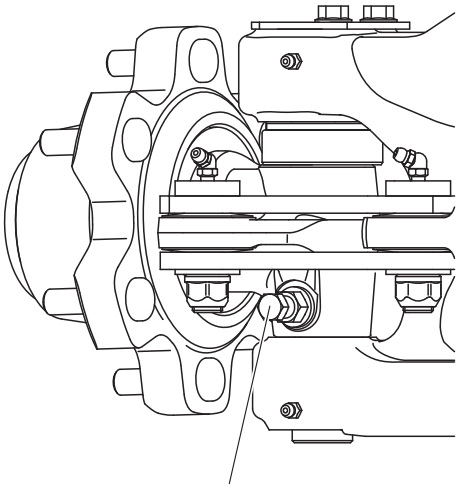


Rear axle cylinder for the cold storage specification



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Rust proof bolt



Steering knuckle stopper bolt
Rust proof bolt, rust proof nut and rust proof spring washer

G85707046_

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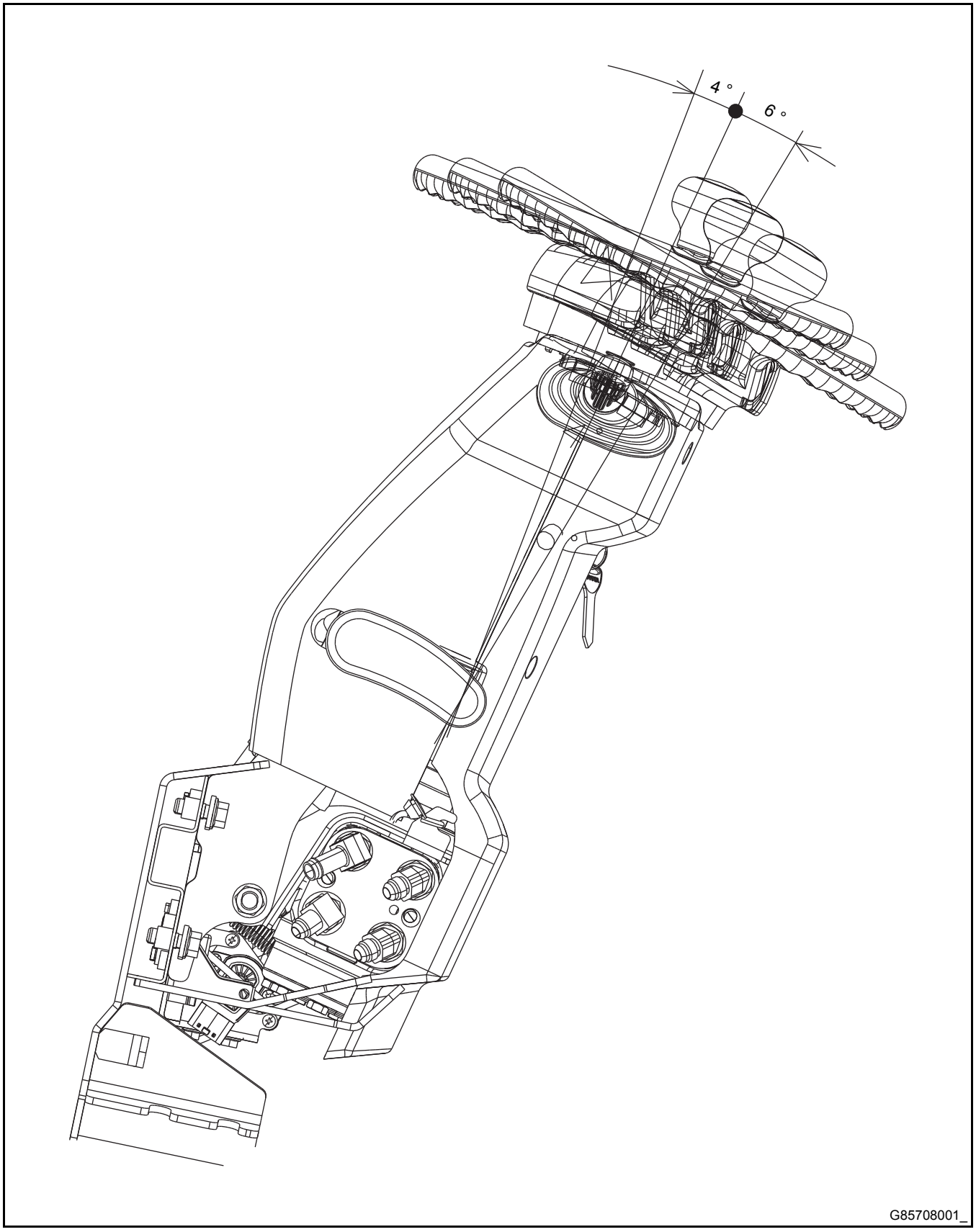
STEERING

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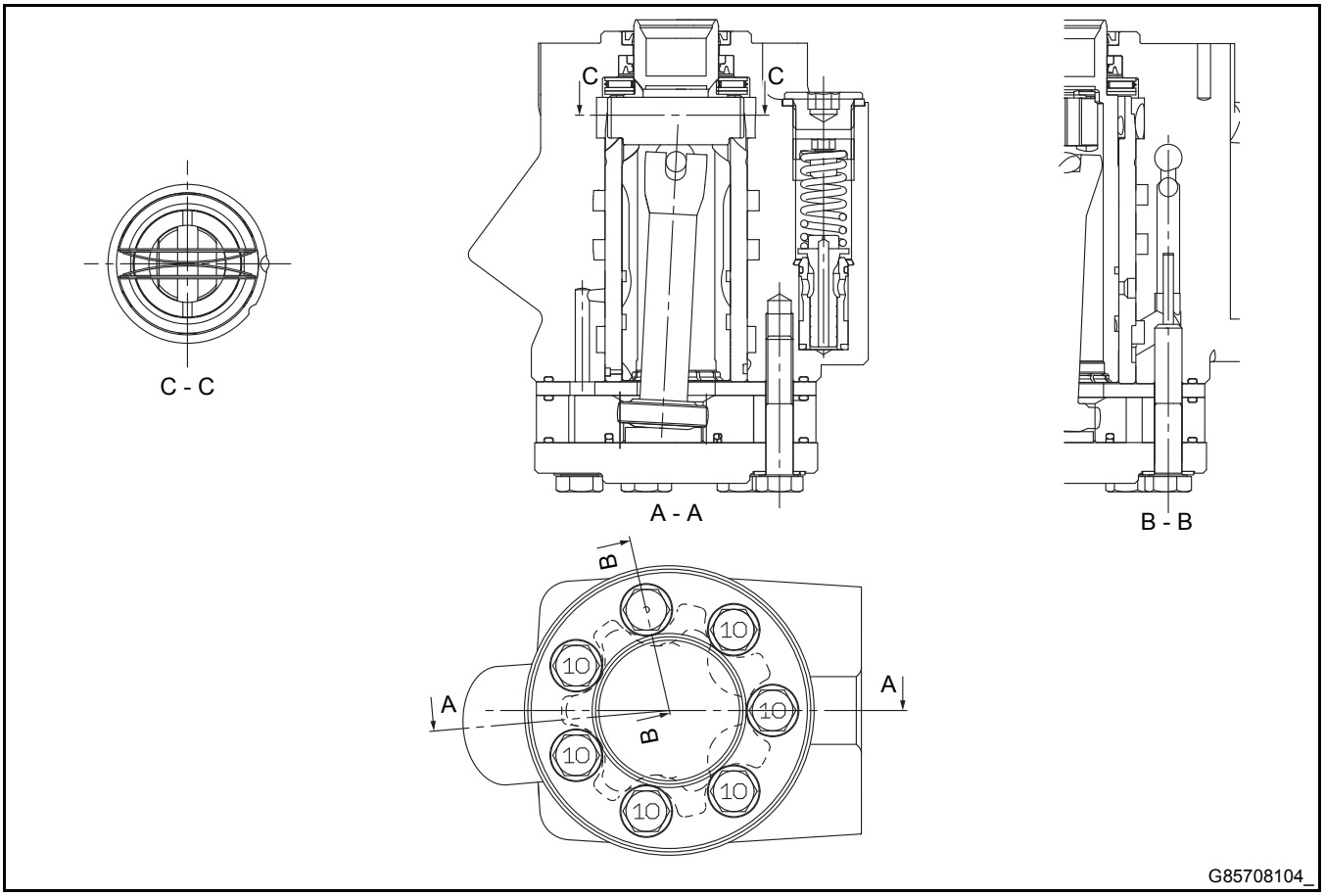
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GENERAL

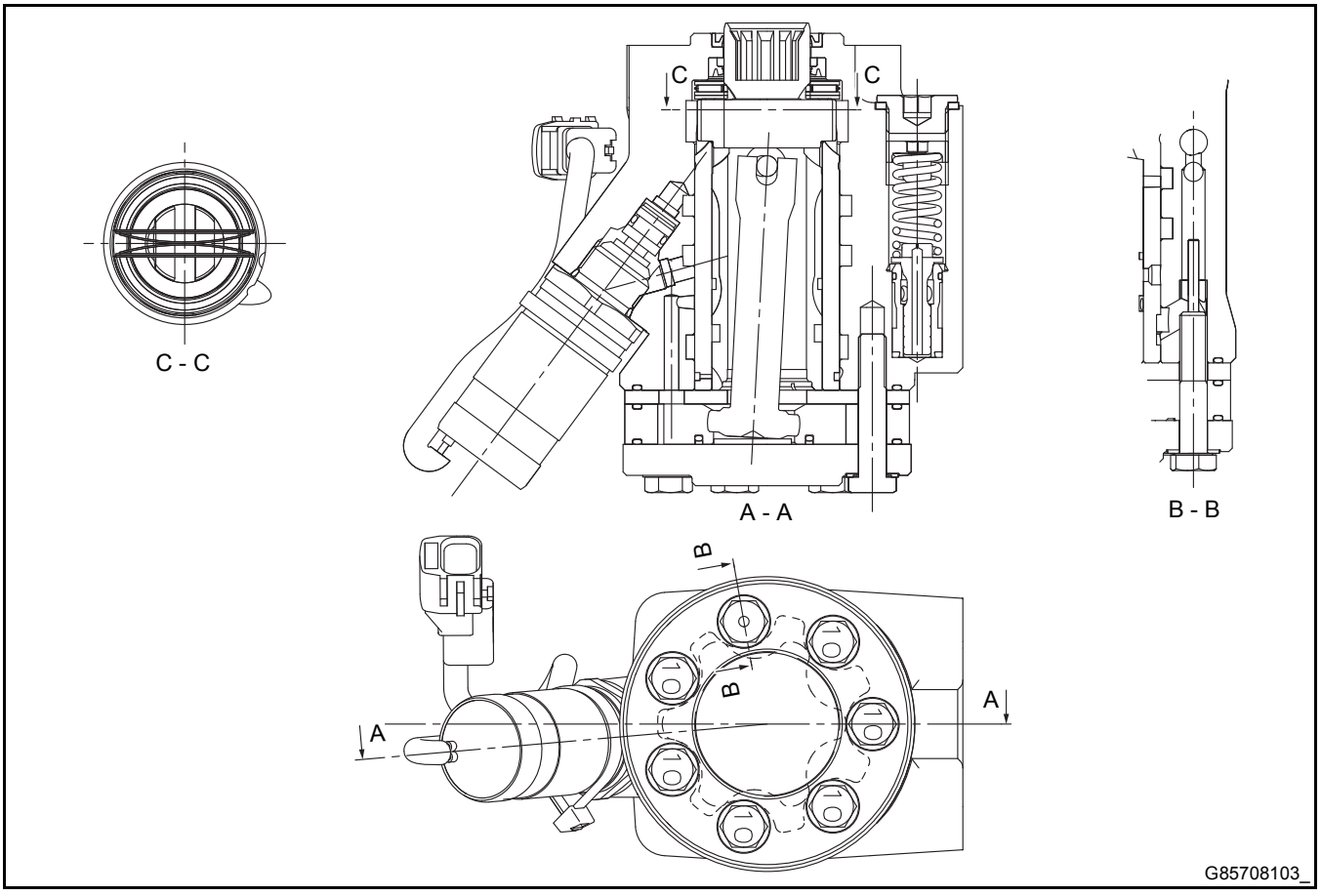


Hydrostatic Steering Valve

STD model



SAS · Synchronized steering model



8

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SPECIFICATIONS

STD · SAS · Synchronized steering model

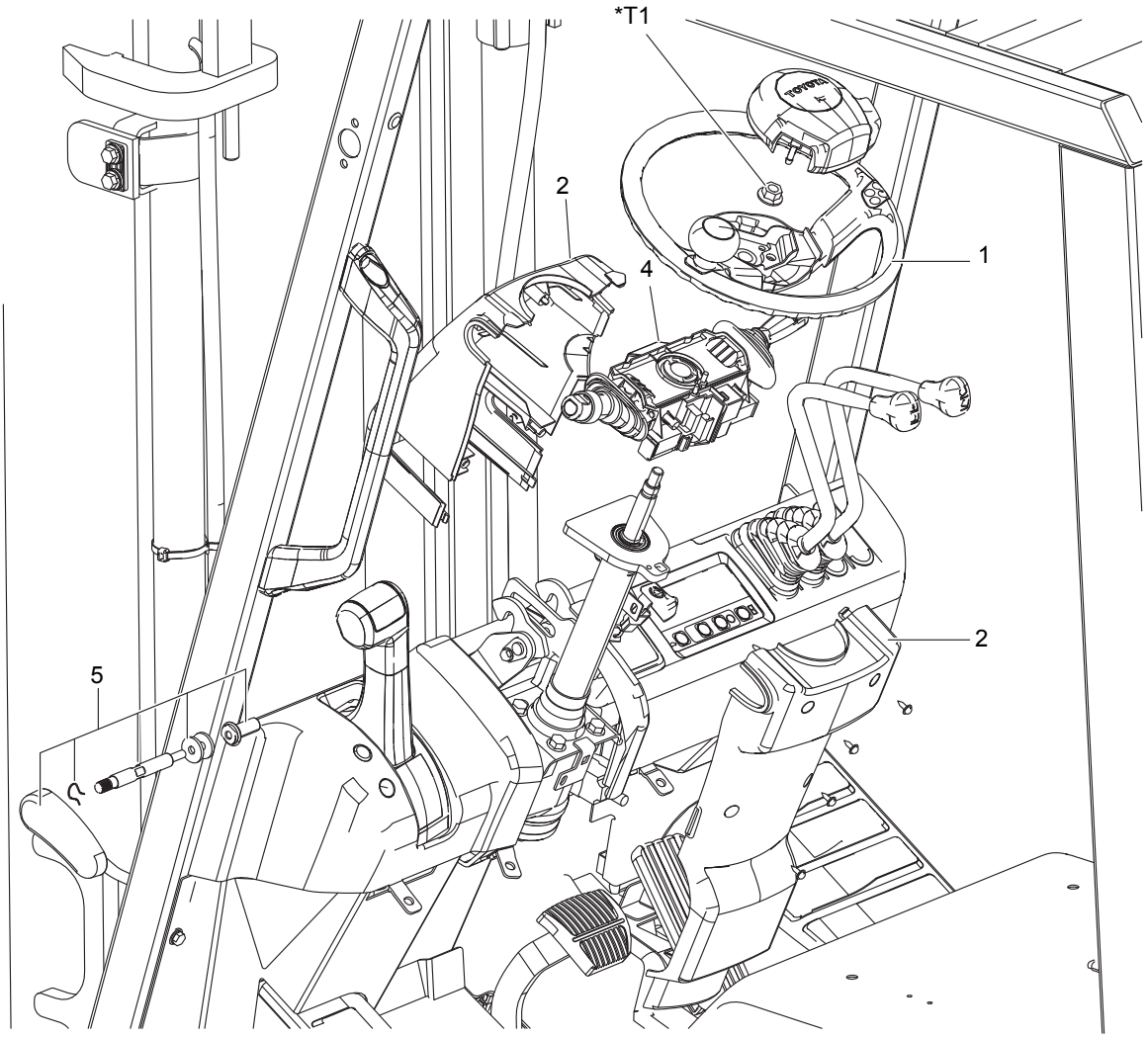
Item \ Vehicle series	1 · 2 ton	2.5 ton	3 ton
Delivery cm^3 (in^3)/rev	88 (5.37)	88 (5.37)	96 (5.86)
Relief set pressure MPa (kgf/cm^2) [psi]	7.4 ~ 7.9 (75.5 ~ 80.6) [1073 ~ 1146]	8.3 ~ 8.8 (84.6 ~ 89.7) [1204 ~ 1276]	9.8 ~ 10.3 (99.9 ~ 105.0) [1422 ~ 1494]

Cold-storage model

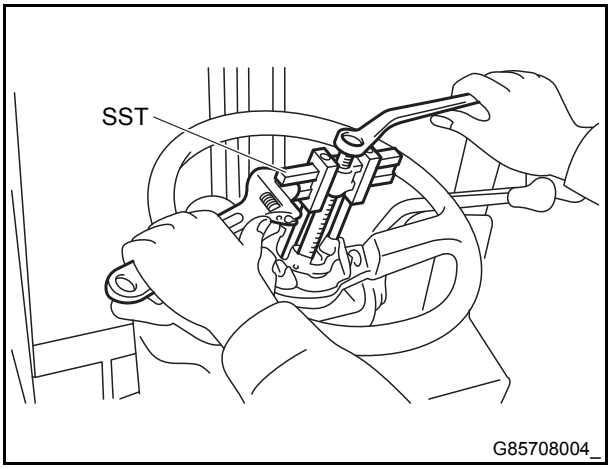
Item \ Vehicle series	1 · 2 · 2.5 ton	3 ton
Delivery cm^3 (in^3)/rev	88 (5.37)	96 (5.86)
Relief set pressure MPa (kgf/cm^2) [psi]	8.3 ~ 8.8 (84.6 ~ 89.7) [1204 ~ 1276]	9.8 ~ 10.3 (99.9 ~ 105.0) [1422 ~ 1494]

STEERING WHEEL·MAST JACKET

REMOVAL·INSTALLATION



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 35 (360) [26.1]



Removal Procedure

1 Remove the steering wheel.
SST 09950-76003-71

2 Remove the column cover.

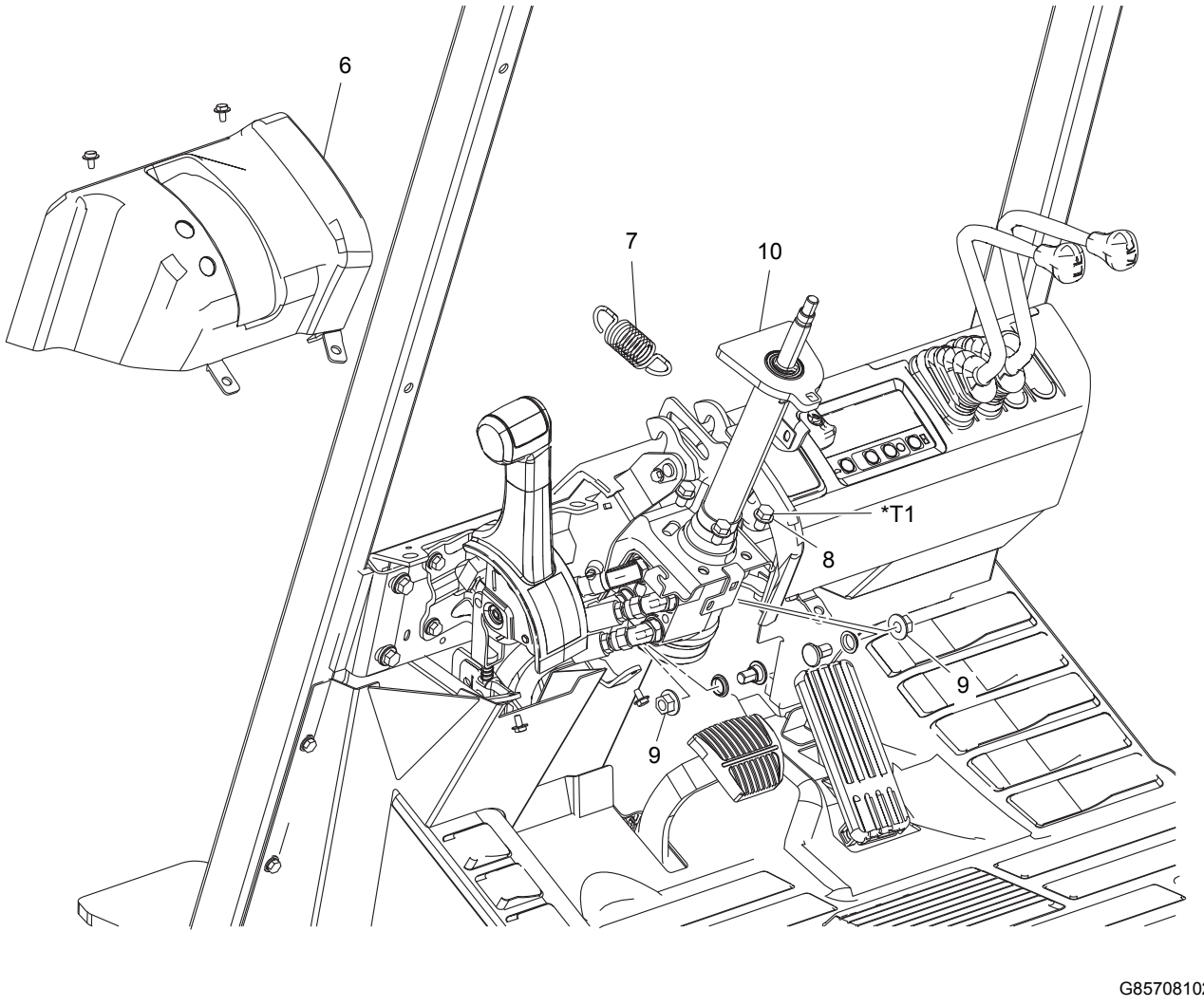
3 Disconnect the lever switch ASSY wiring.

4 Remove the lever switch ASSY.

5 Remove the tilt lock mechanism.

8

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G85708102_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 34.3 (350) [25.3]

6 Remove the instrument panel LH.

7 Remove the spring.

8 Remove the steering valve set bolts and keep the valve free.

9 Remove the nuts.

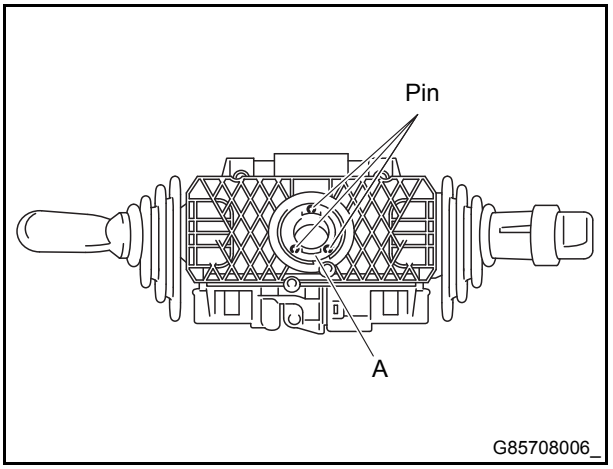
10 Remove the mast jacket ASSY.

Installation Procedure

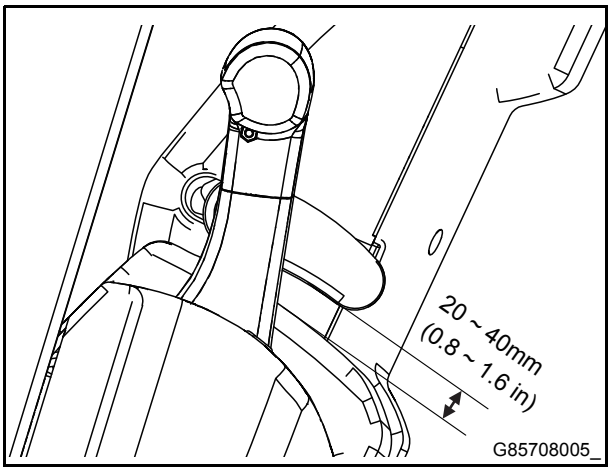
The installation procedure is the reverse of the removal procedure.

Note:

- **Apply MP grease to each sliding portion of the tilt lock mechanism and seat stand open mechanism.**
- **Fill MP grease at the coupling between the steering shaft and steering valve.**



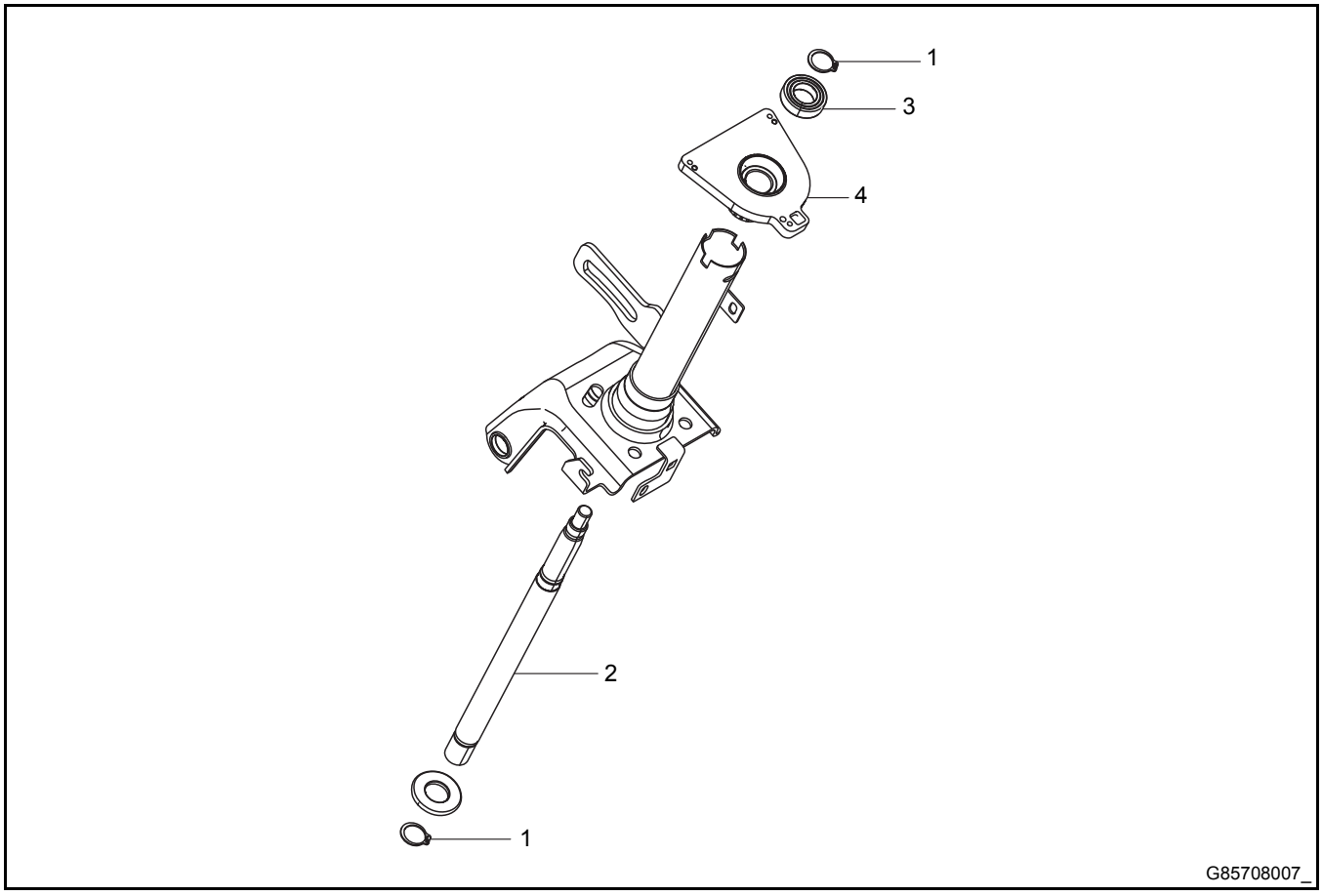
10 Apply rubber grease to the steering angle sensor sliding portion A of the lever switch, and install the steering wheel.
After installation, turn the steering wheel. When the steering wheel is turned, the three pins on the sensor will automatically engage in the pin holes on the steering wheel.



Install the tilt lever with adjusting the angle of the lever so that the clearance between the lock lever and the instrumental panel will be 20mm to 40mm.

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DISASSEMBLY·INSPECTION·REASSEMBLY



Disassembly Procedure

1 Remove the snap ring.

2 Remove the tilt steering shaft.

3 Remove the bearing.

4 Remove the lever switch ASSY bracket.

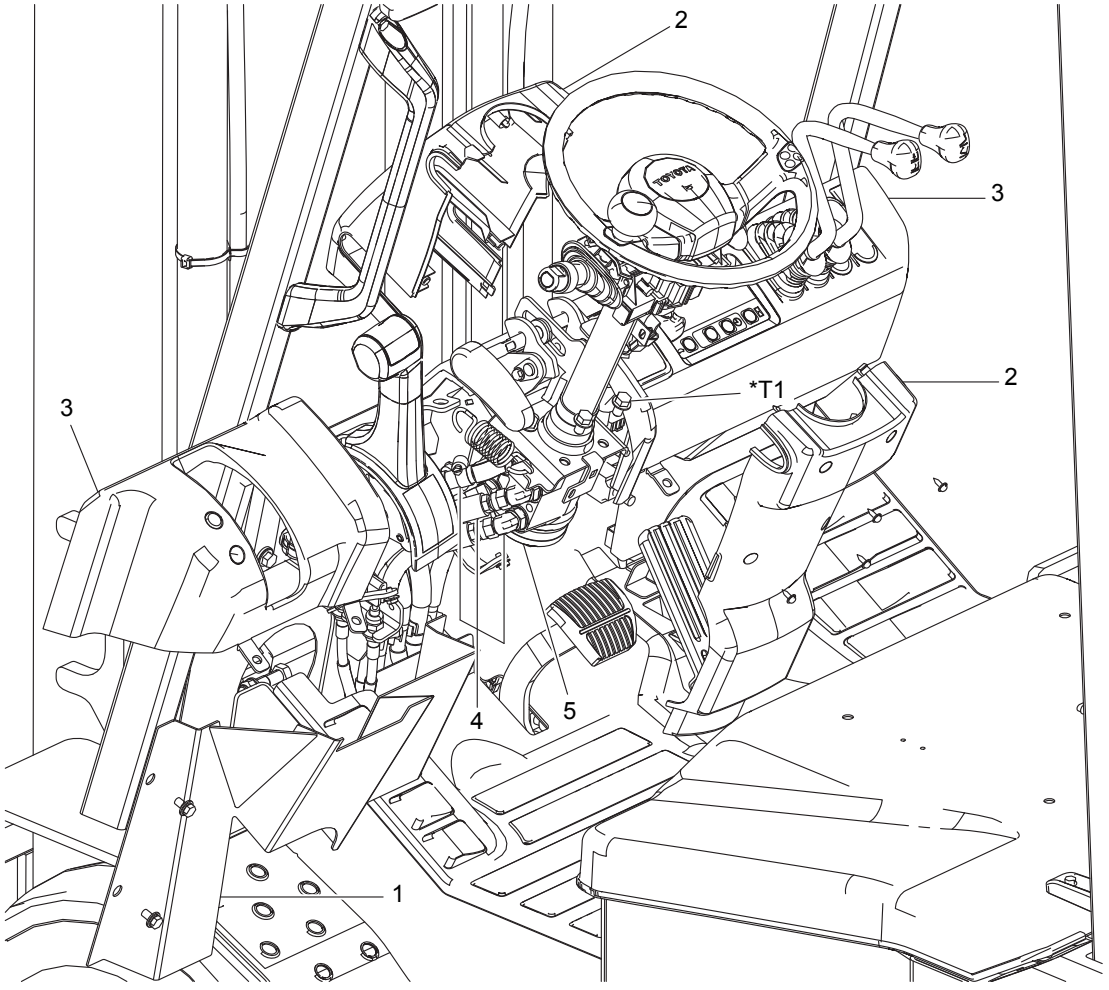
Installation Procedure

The reassembly procedure is the reverse of the disassembly procedure.

Note:
Apply rubber grease to each sliding portion of the lever switch ASSY.

STEERING VALVE ASSY

REMOVAL·INSTALLATION



G85708008_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 34.3 (350) [25.3]

Removal Procedure

1 Remove the lower panel LH.

2 Remove the column cover.

3 Remove the instrument panel.

4 Disconnect the piping.

5 Remove the steering valve ASSY.

6 Remove the fitting.

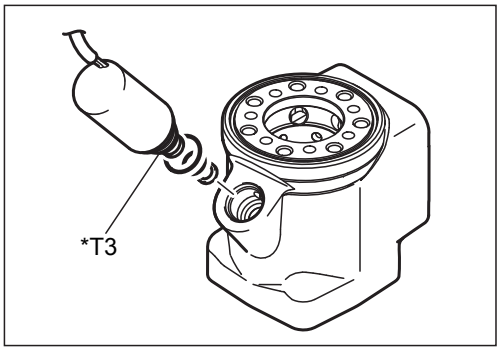
Installation Procedure

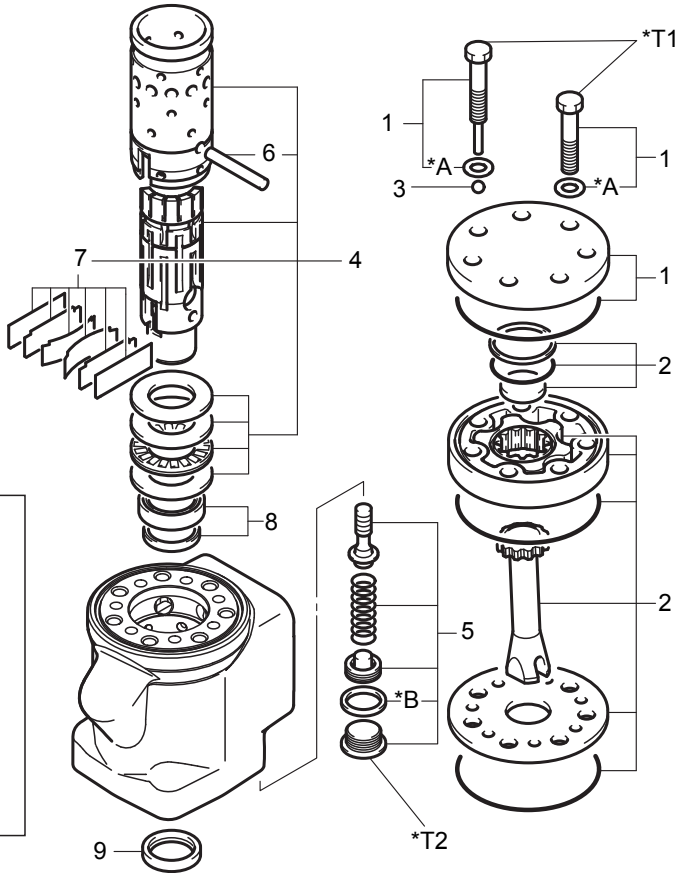
The installation procedure is the reverse of the removal procedure.

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DISASSEMBLY·INSPECTION·REASSEMBLY

SAS/SYNCHRONIZED STEERING SPEC.

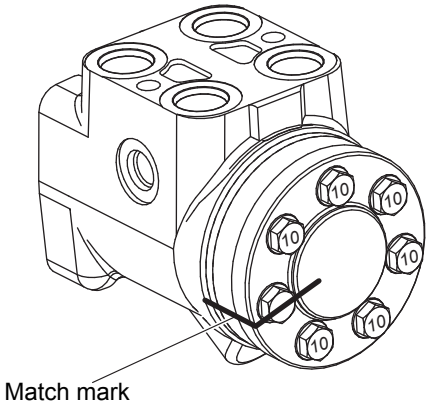




G85708107_

*A and B
Don't use the gaskets which was used once.

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 23 ~ 27 (235 ~ 275) [17.0 ~ 19.9]
T2 = 60 ~ 80 (612 ~ 816) [44.3 ~ 59.0]
T3 = 17.6 ~ 21.5 (179 ~ 219) [13.0 ~ 15.8]

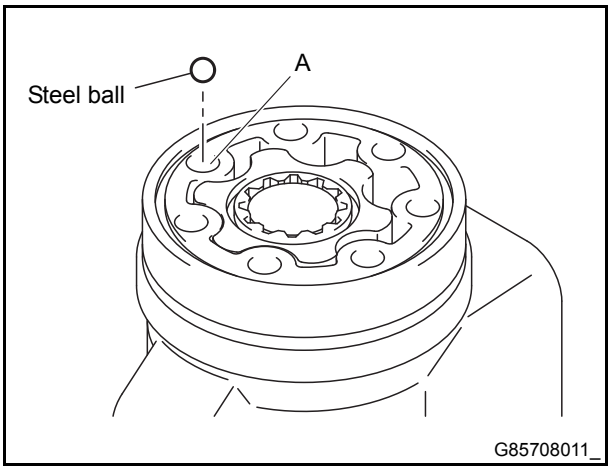


G85708010_

Disassembly Procedure

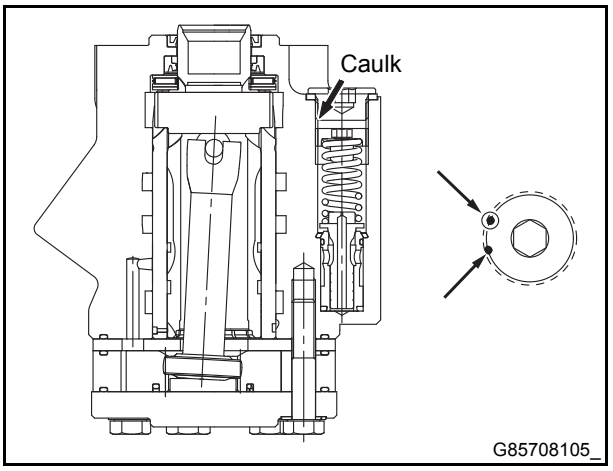
1 Remove the set bolt and end cover.
Make a match mark across the set bolt without any on the head, end cover, outer gear, and valve body.

2 Remove the gear wheel set, drive shaft, and distributor plate.



3 Remove the steel ball.
A steel ball is placed in portion A of the valve body. Keep it so as not to be lost.

4 Remove the sleeve W/spool and retaining bearing.



5 Remove the relief valve.
Measure the screwed-in depth of the adjust plug (depth to the plug end face), and record it on a memo.

6 Remove the pin from the sleeve W/spool.

7 Remove the center spring.

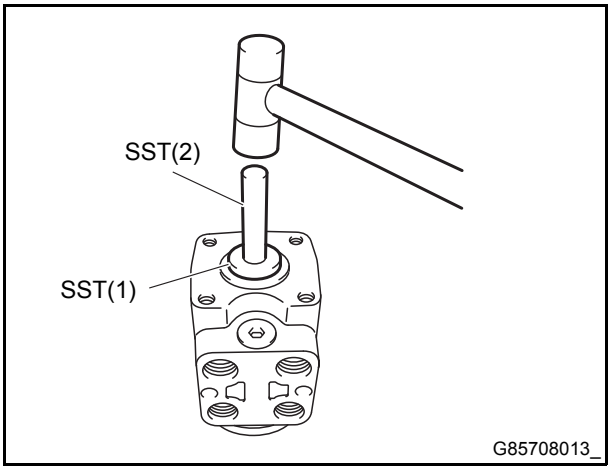
8 Remove the packing and ring.

9 Remove the dust seal.

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

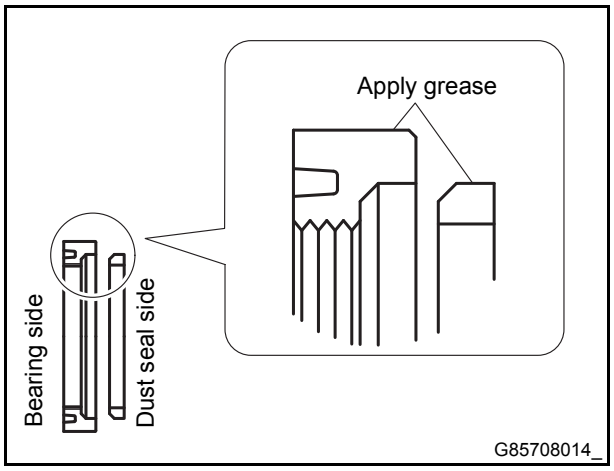
Note:
Clean each part by air blowing and apply hydraulic oil to each sliding portion before reassembly.



1 Install the dust seal.

SST 09950-76018-71 (09950-60010)..... (1)
SST 09950-76020-71 (09950-70010)..... (2)

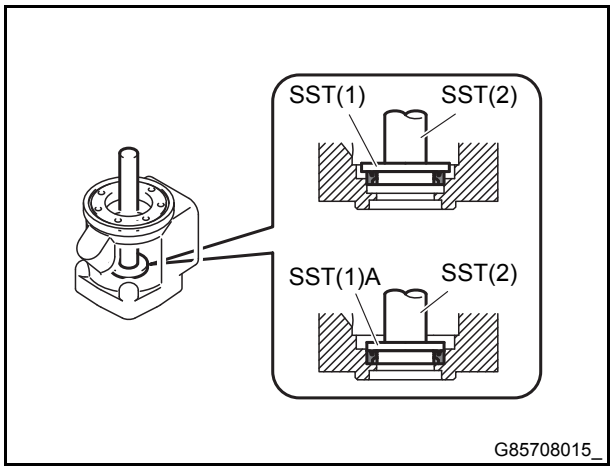
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2 Install the packing and ring as described below.

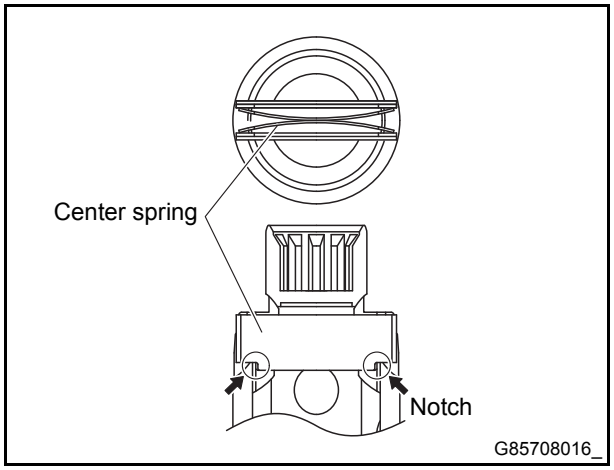
(1) The packing and ring shall be installed in the illustrated directions.

(2) Apply MP grease to the ring before assembling with the packing. Apply MP grease to the outer periphery of the packing.



(3) Guide the packing W/ring to the assembling portion in the valve body with a finger, and set them for insertion.

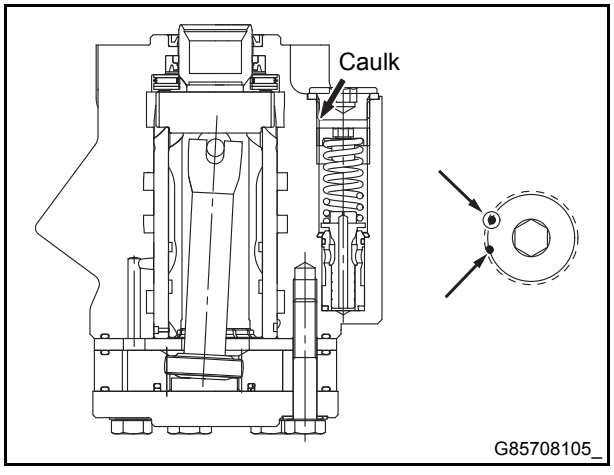
SST 09950-76018-71 (09950-60010) ..... (1)
SST 09950-76018-71 (09950-60010) .....(1)A
SST 09950-76020-71 (09950-70010) ..... (2)



3 Install the center spring as described below.

(1) Install the center spring as illustrated at left.

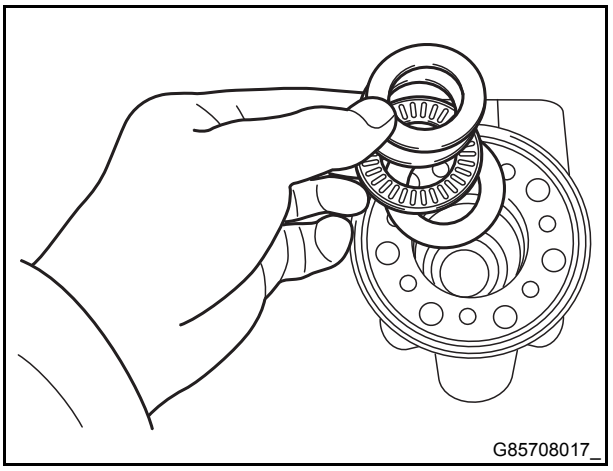
(2) After spool insertion into the sleeve, the notched portion of the spring shall securely set in the groove on the sleeve.



4 Install the relief valve as described below.

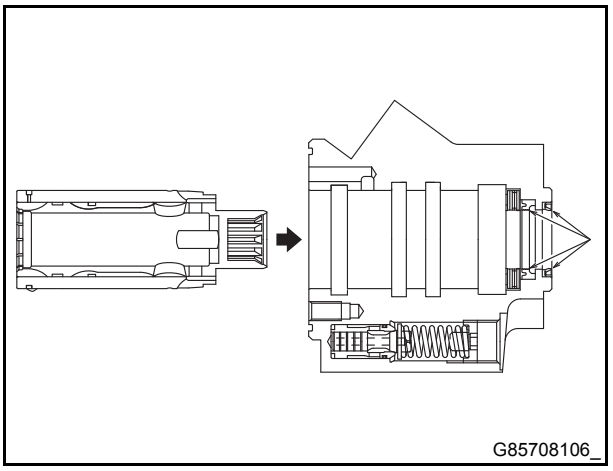
(1) Refer to the memo for the adjust plug screwed-in depth.

(2) Caulk two places on the circumference of the adjust plug after hydraulic pressure adjustment.

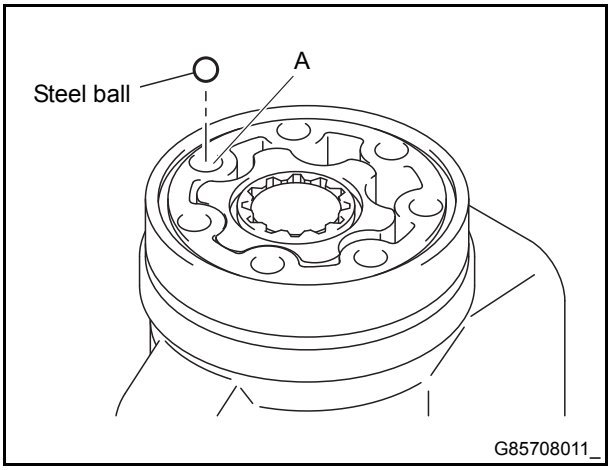

G85708017_

5 Install the sleeve W/spool and retaining bearing as described below.

(1) Install the retaining bearing as illustrated at left.
Install one plate, the thrust bearing, and two plates in this order from the depth.

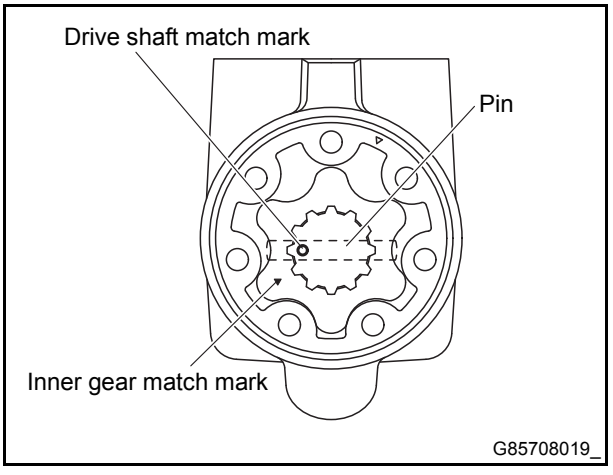

G85708106_

(2) When inserting the sleeve W/spool into the valve body, apply MP grease to the packing, ring inner surface (portion in sliding contact with the spool), and dust seal lip.



G85708011_

6 Install the steel ball.
Make sure to put the steel ball in portion A.

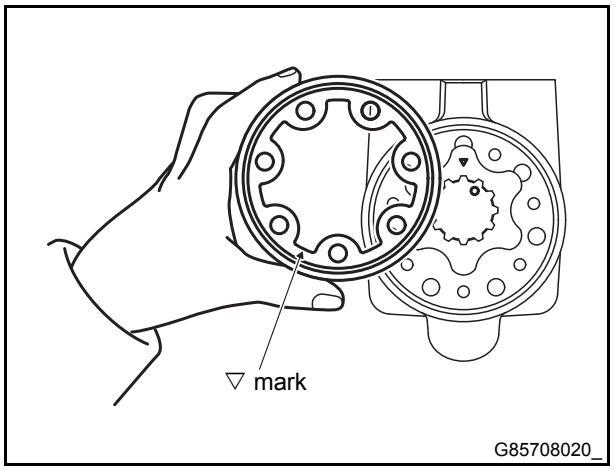


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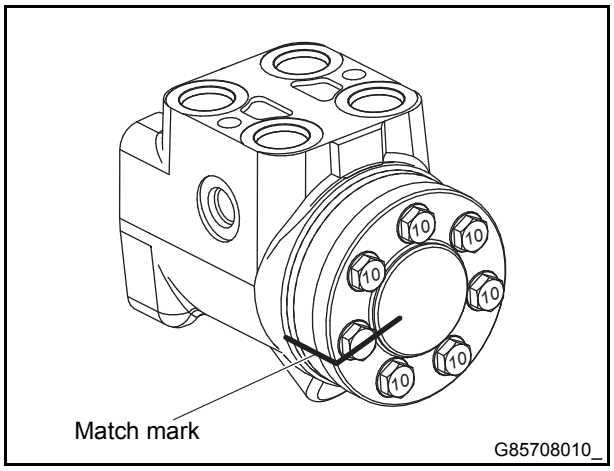
7 Install the gear wheel set, drive shaft, and distributor plate as described below.

(1) Install the drive shaft and inner gear in the illustrated relative positions.
The spool pin shall pass the slit in the drive shaft.

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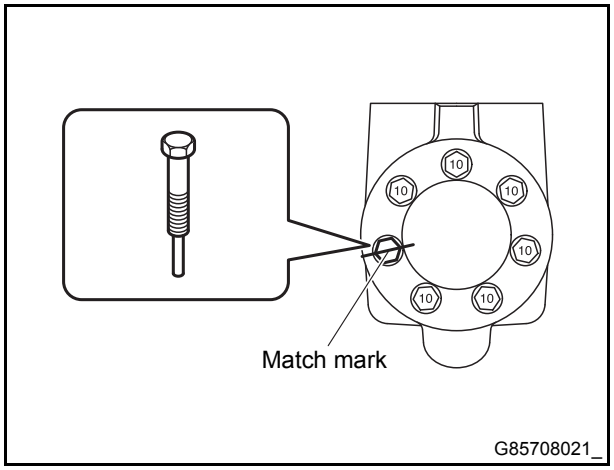


(2) Install the outer gear with its side having the ▽ mark facing the end cover side.



8 Install the set bolt and end cover as described below.

(1) Align the match marks made at the time of disassembly.

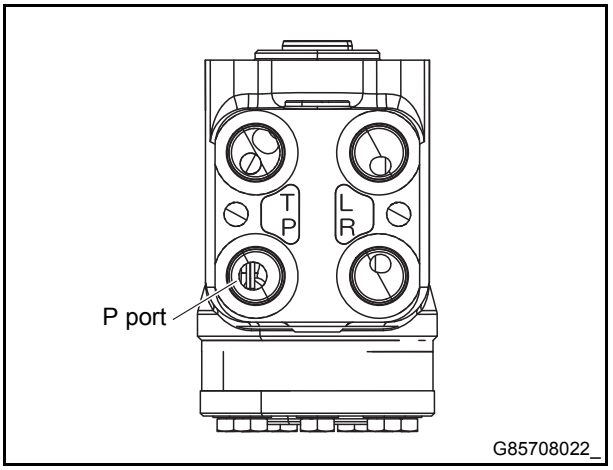


(2) Two types of set bolts are used.

- Set bolt with '10' mark on the head
- Set bolt without any mark on the head

Use a rod-tip bolt with no mark on its head at match mark.

RELIEF PRESSURE INSPECTION



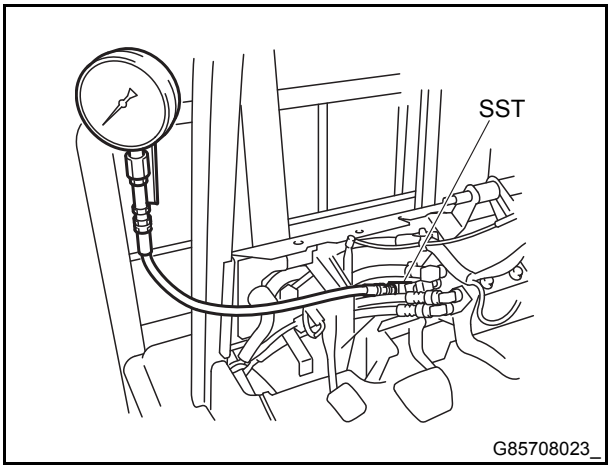
1 Install an oil pressure gauge.

(1) Disconnect the hose from the P port of the steering valve, and connect the SST (adapter).

SST 09450-23320-71

(2) Install the oil pressure gauge.

Plug size: PT1/8



2 Turn the key switch ON, rotate the steering wheel slowly clockwise and counterclockwise, and inspect the relief pressure at each stroke end.

Standard

MPa (kgf/cm^2) [psi]

Vehicle series	Relief pressure
1 · 2 ton	7.4 ~ 7.9 (75.5 ~ 80.6) [1073 ~ 1146]
2.5 ton	8.3 ~ 8.8 (84.6 ~ 89.7) [1204 ~ 1276]
3 ton	9.8 ~ 10.3 (99.9 ~ 105.0) [1422 ~ 1494]

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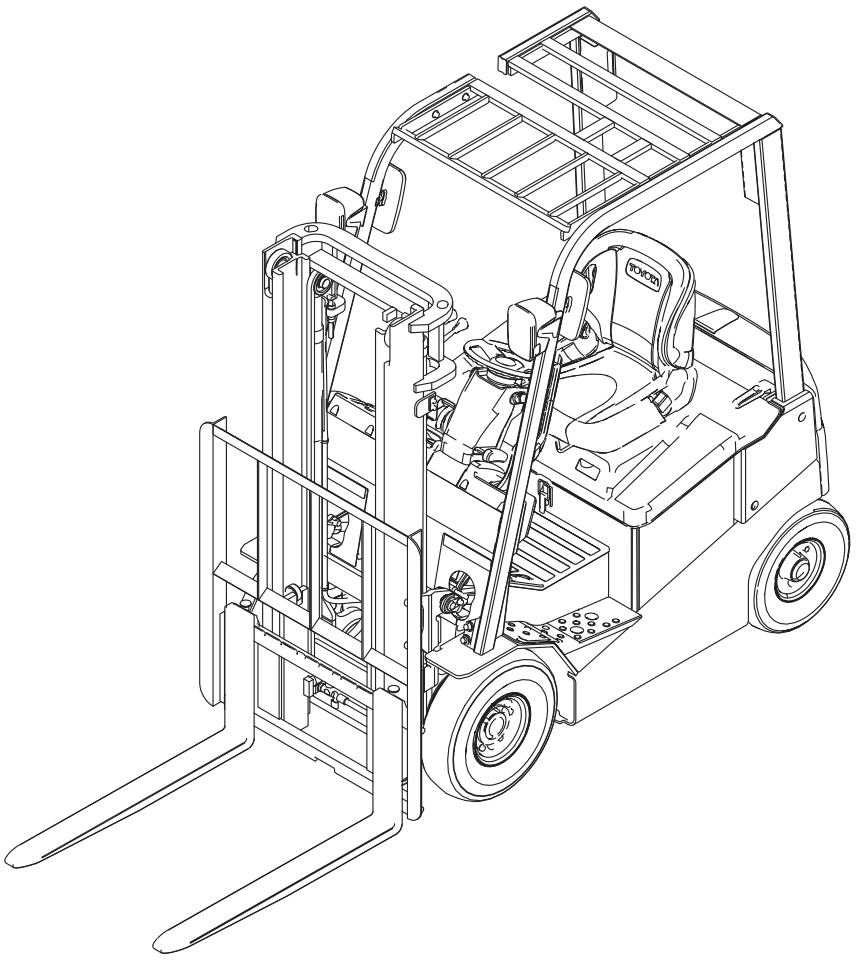
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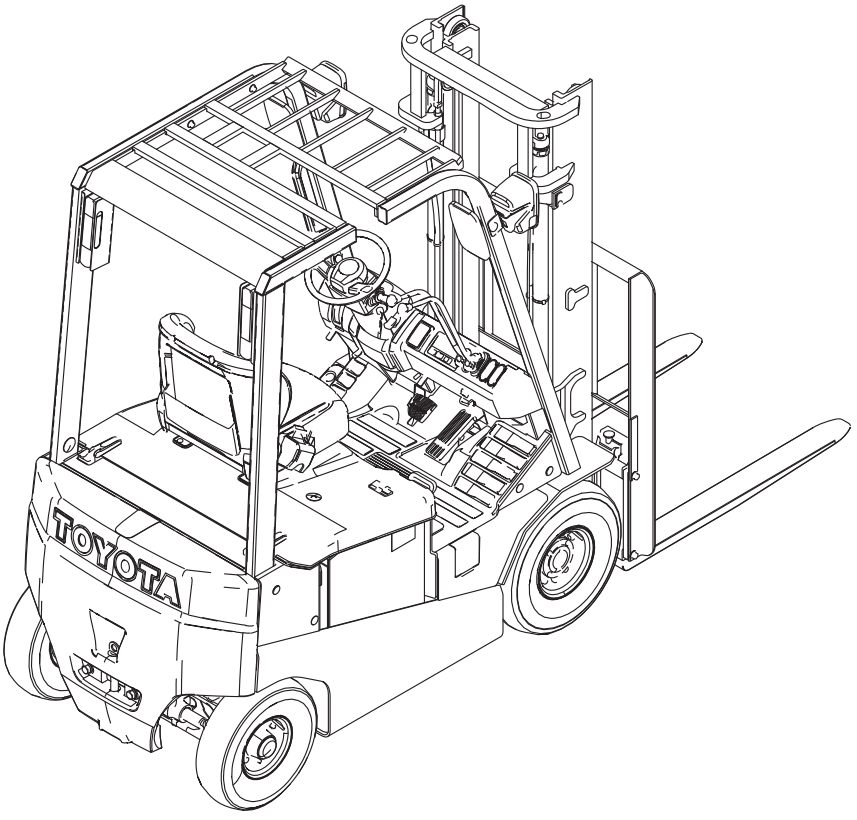
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EXTERIOR VIEWS



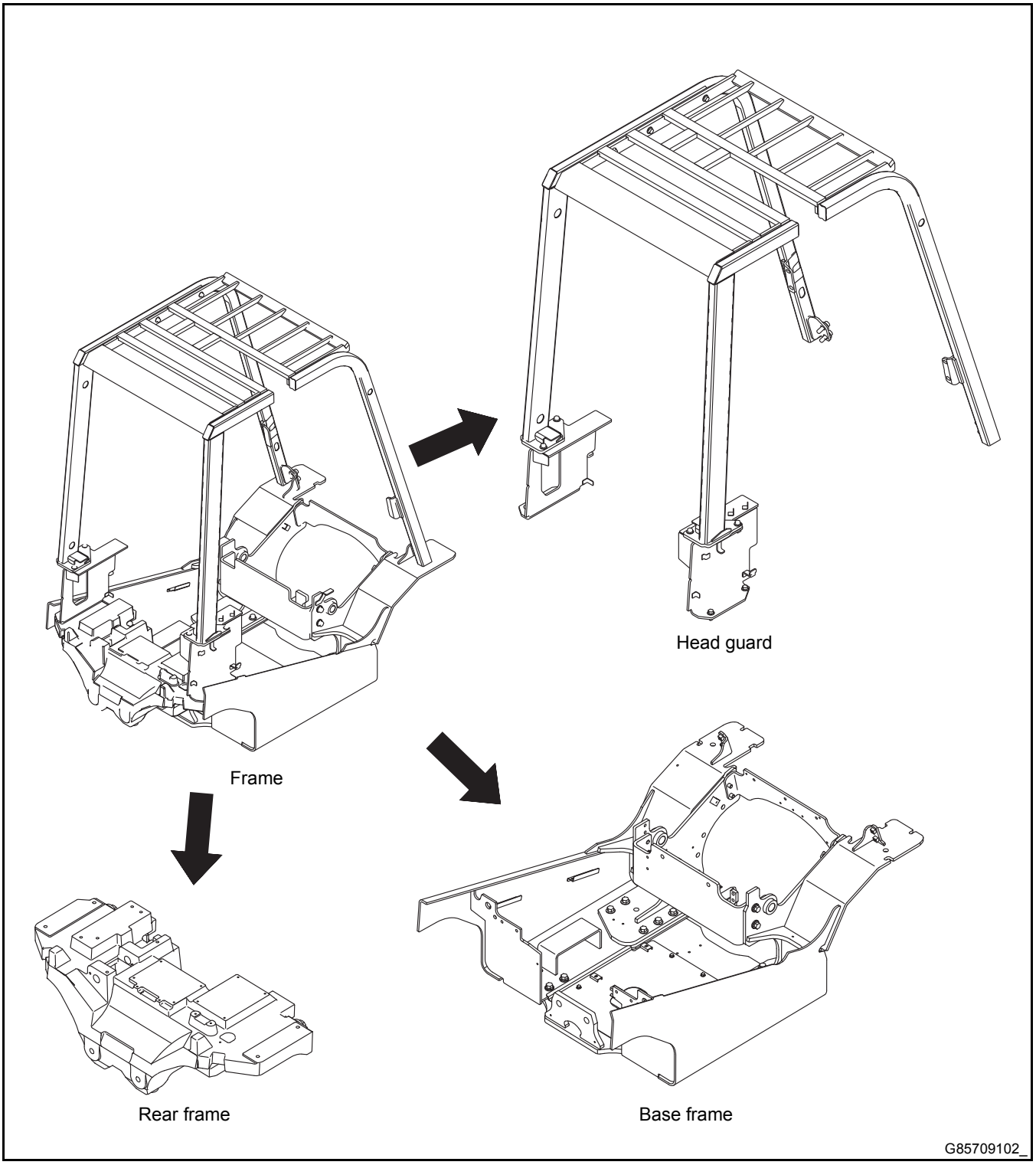


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FRAME

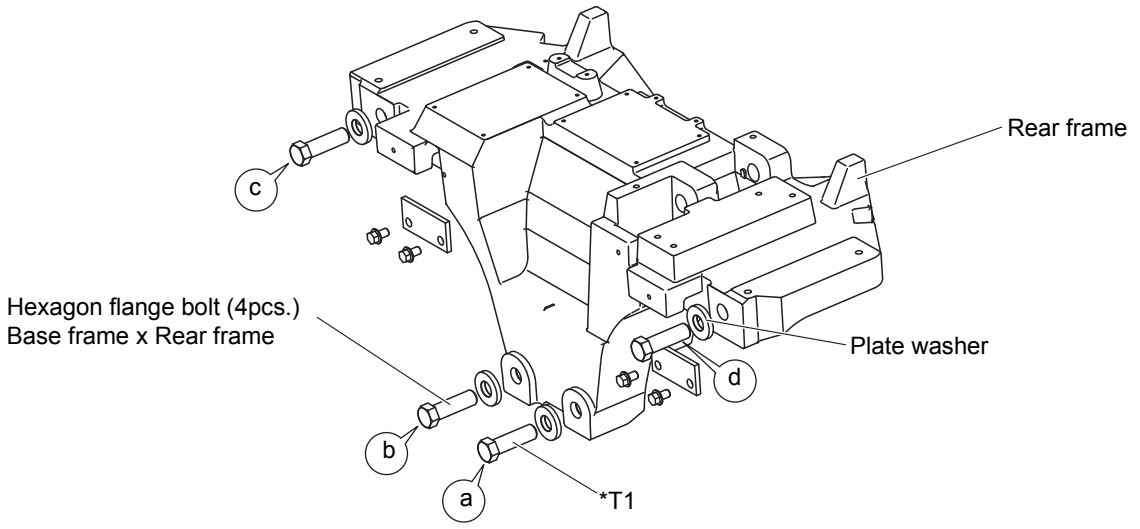
GENERAL

The frame construction has changed from the conventional single-weld construction to a three-component bolt on construction comprising the base frame, rear frame and head guard. However, the three component and various component parts cannot be resupplied. In addition, the loosening or removal of bolts is prohibited.



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Rear frame



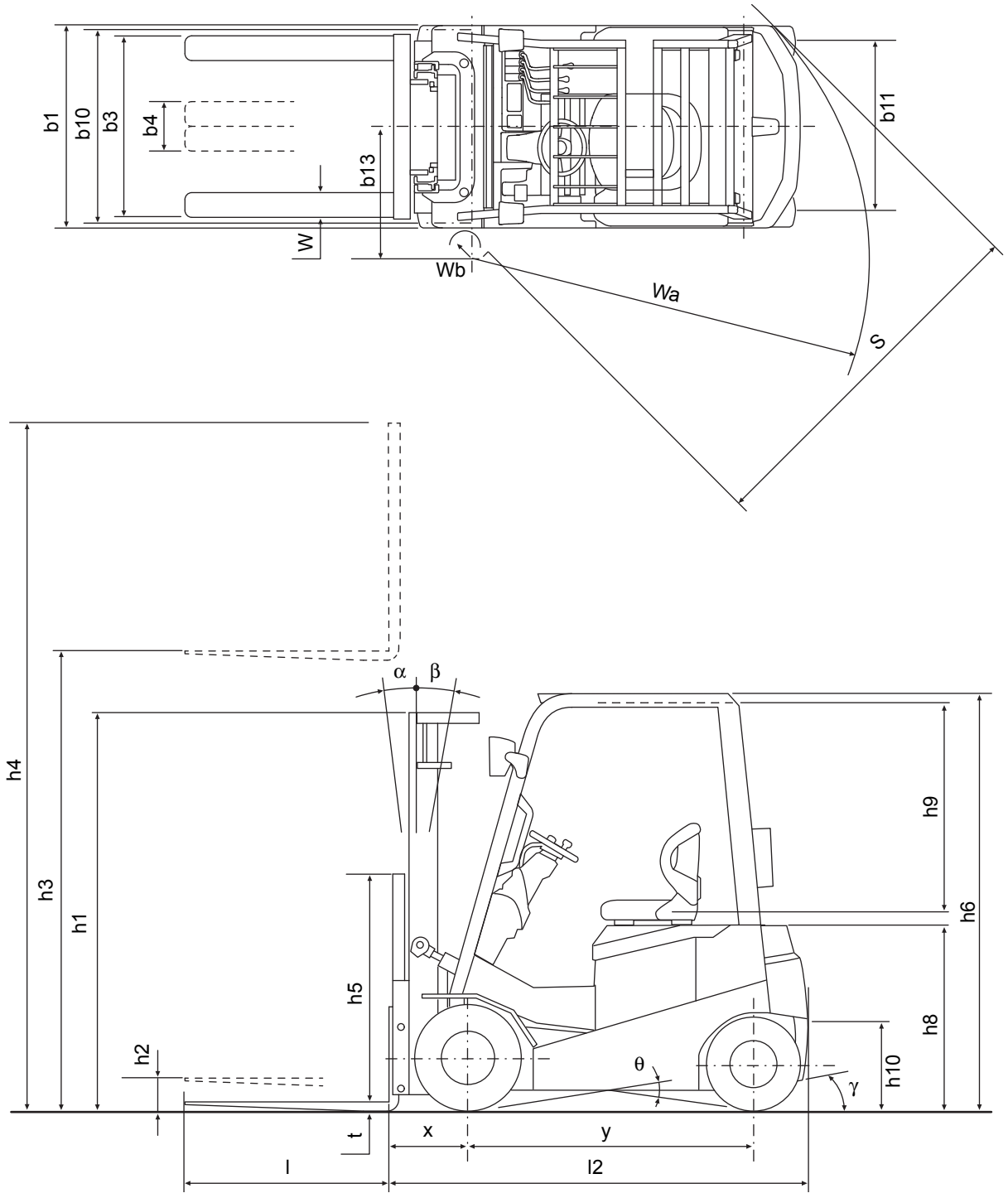
Note:

- **If the rear frame bolts come loose by any possibility, replace them with new bolts and install them. (4pcs.)**

  *** Tightening torque: T = N·m (kgf·cm) [ft·lbf]**
  T1 = 540 ~ 820 (5506 ~ 8362) [398.4 ~ 605.0]

- **Install the rear frame bolts in the following order: a → b → c → d**
- **Apply rust proofing agent (NOXUDOL 700) around the rear frame bolts (on uncoated part).**

VEHICLE SPECIFCATIONS



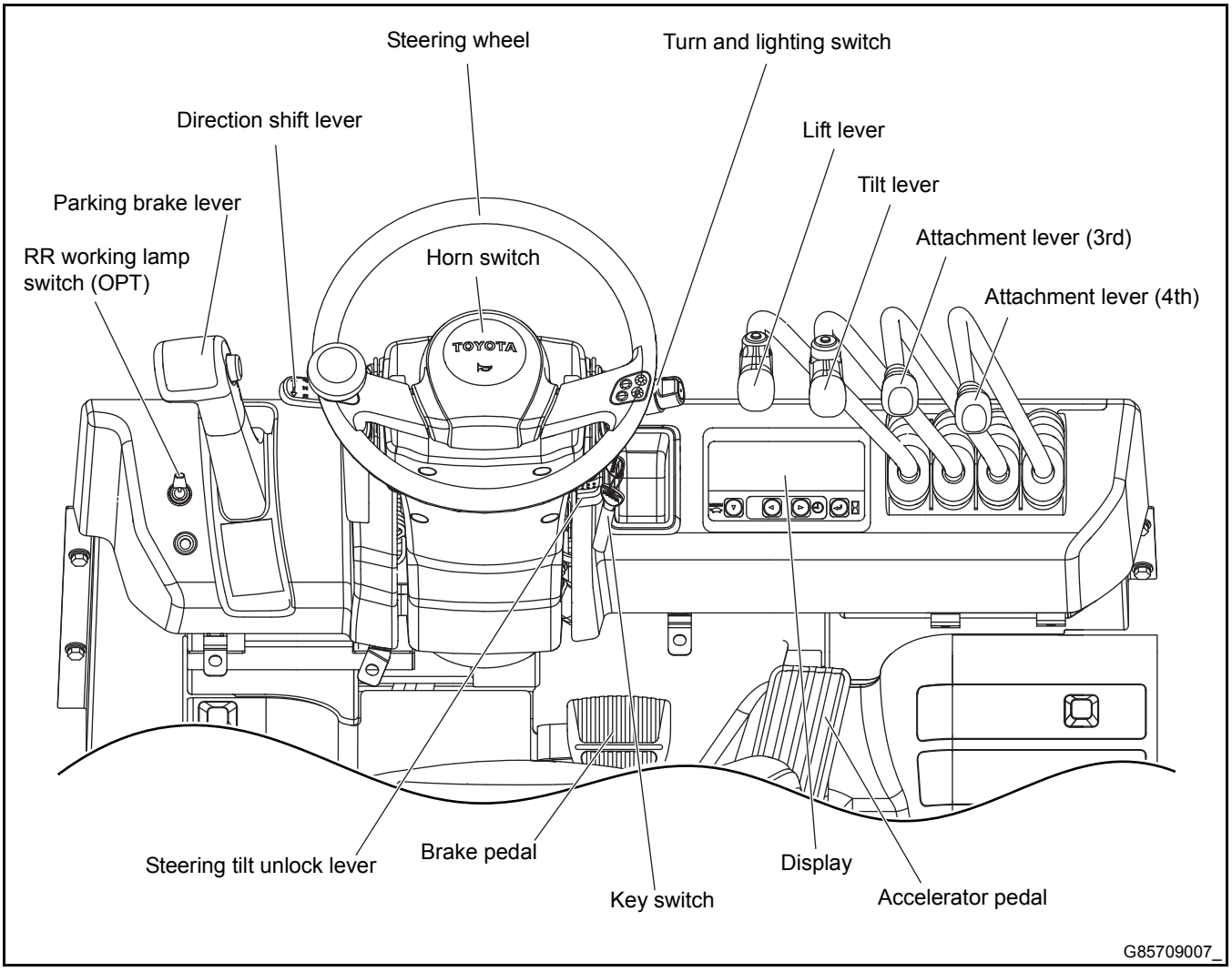
G85709103_

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mm (in)

	8FBN15 50-8FBN15	8FBN16	8FBN18 50-8FBN18	8FBN20 50-8FBN20	8FBN25	8FBN30
h3	3000 (118.1)	←	←	←	←	←
h2	145 (5.71)	←	←	125 (4.92)	←	135 (5.31)
t	35 (1.4)	←	←	40 (1.6)	←	45 (1.8)
w	100 (3.94)	←	←	←	122 (4.80)	←
l	1070 (42.13)	←	←	←	←	←
b3	920 (36.2)	←	←	1020 (40.15)	←	1070 (42.13)
b4	200 (7.87)	←	←	←	245 (9.65)	←
α/β (°)	7/10	6/11	←	7/10	←	←
l2	2080 (81.88)	←	2115 (83.26)	2250 (88.58)	2325 (91.53)	2485 (97.83)
b1	1060 (41.73)	1065 (41.92)	←	1180 (46.45)	←	1235 (48.62)
h1	1970 (77.55)	1995 (78.54)	←	1970 (77.55)	←	2015 (79.33)
h4	4250 (167.3)	←	←	←	←	4265 (167.9)
h6	2085 (82.08)	2095 (82.48)	←	2085 (82.08)	←	2255 (88.77)
Wa	1770 (69.68)	←	1780 (70.07)	1980 (77.95)	2000 (78.74)	2210 (87.01)
Wb	30 (1.18)	←	←	60 (2.36)	←	100 (3.94)
b13	560 (22.05)	←	←	650 (25.59)	←	730 (28.74)
x	405 (15.9)	←	←	430 (16.9)	←	485 (19.1)
S	1780 (70.08)	←	1795 (70.67)	1905 (75.0)	1920 (75.59)	2025 (79.72)
y	1410 (55.51)	←	←	1525 (60.03)	←	1675 (65.94)
b10	885 (34.8)	←	←	975 (38.4)	←	1010 (39.96)
b11	895 (35.2)	←	←	940 (37.0)	←	980 (38.6)
h5	1220 (48.03)	←	←	←	←	←
h9	1065 (41.92)	←	←	←	←	←
h8	940 (37.0)	←	←	←	←	1110 (43.70)
h10	355 (14.0)	←	←	←	350 (13.8)	415 (16.3)
θ (%)	34	36	←	30	←	41
γ (%)	45	←	40	39	34	35

DRIVER'S SEAT (Operating levers and switches)

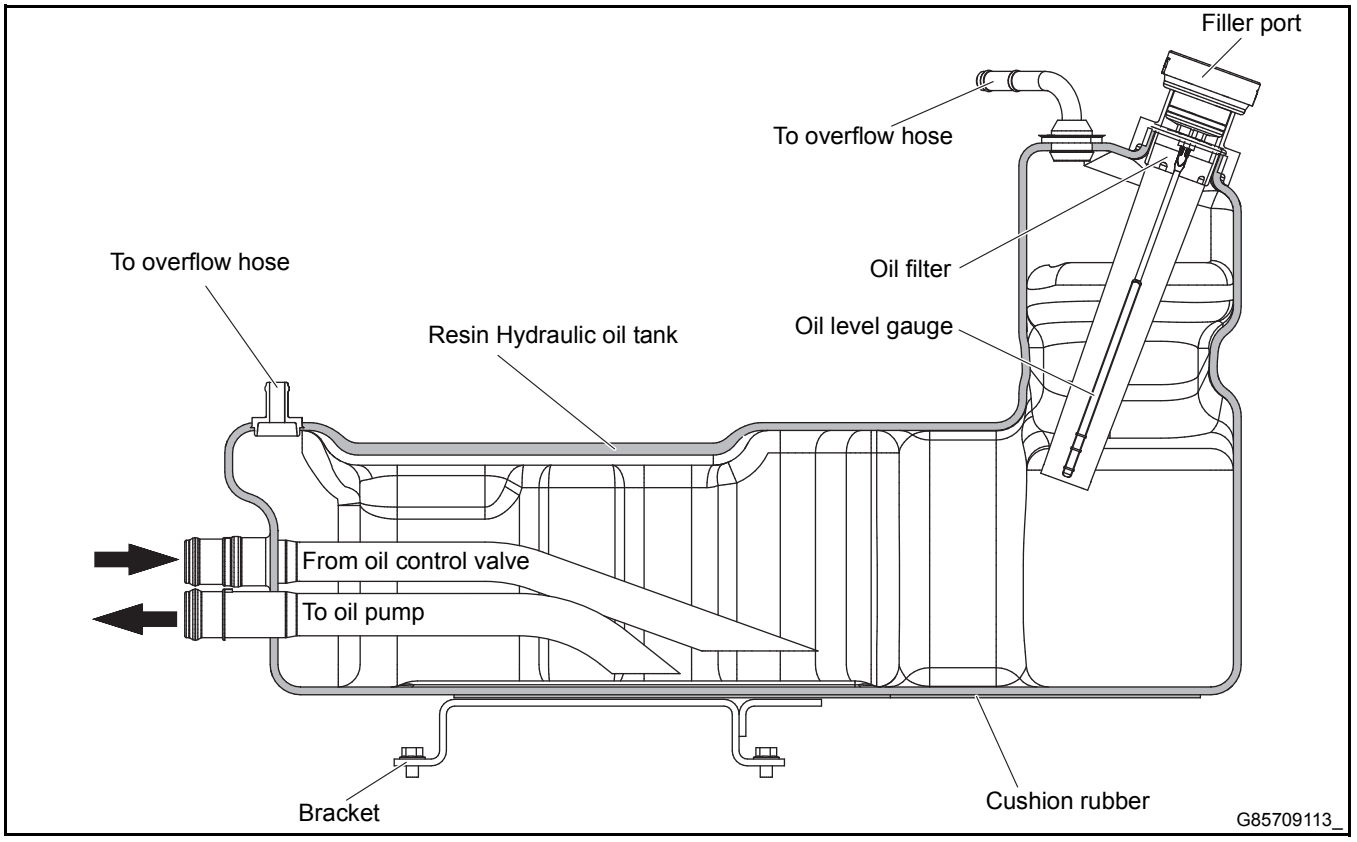


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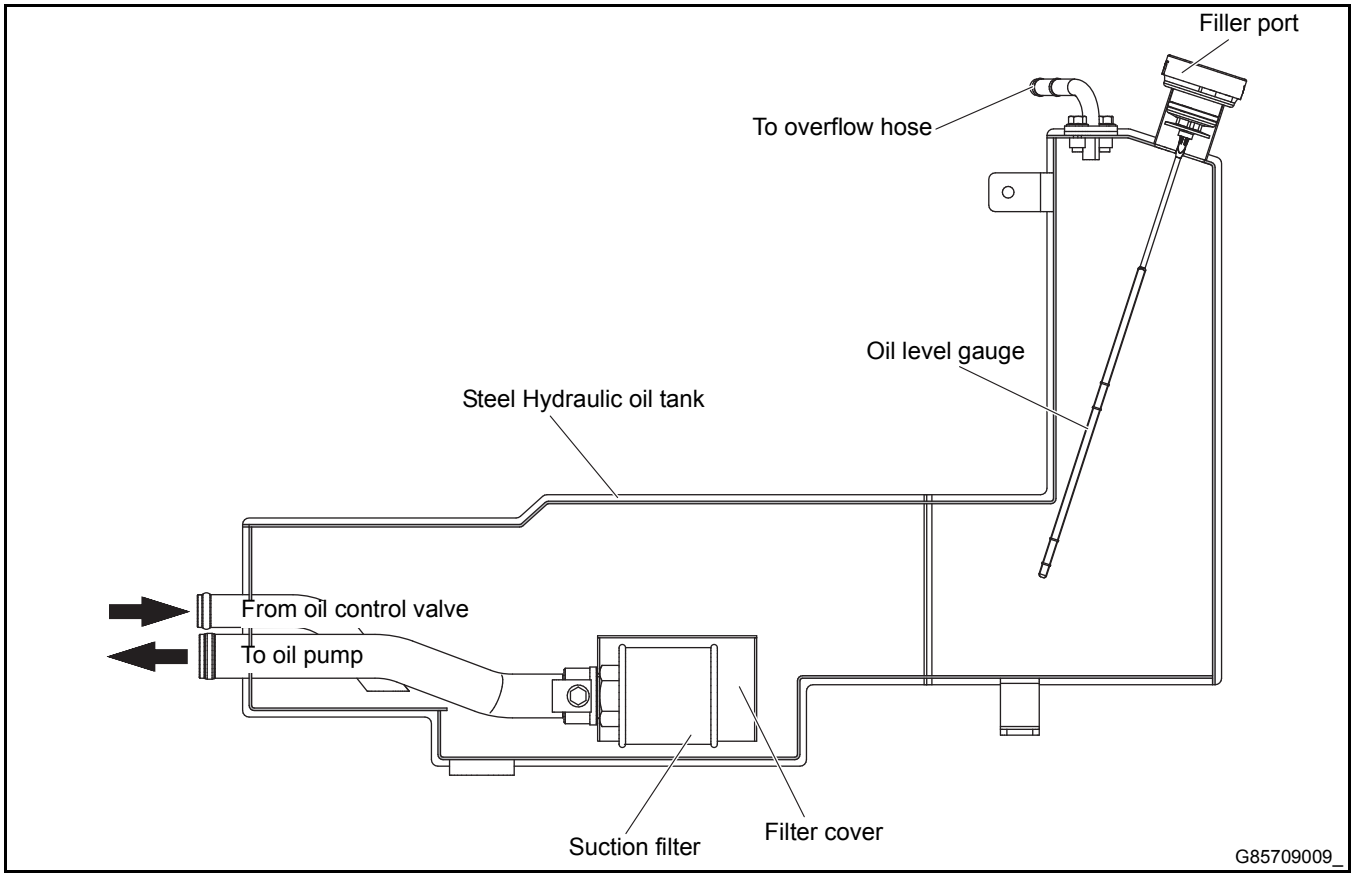
HYDRAULIC OIL TANK

STRUCTURAL SUMMARY

1 · 2 ton series

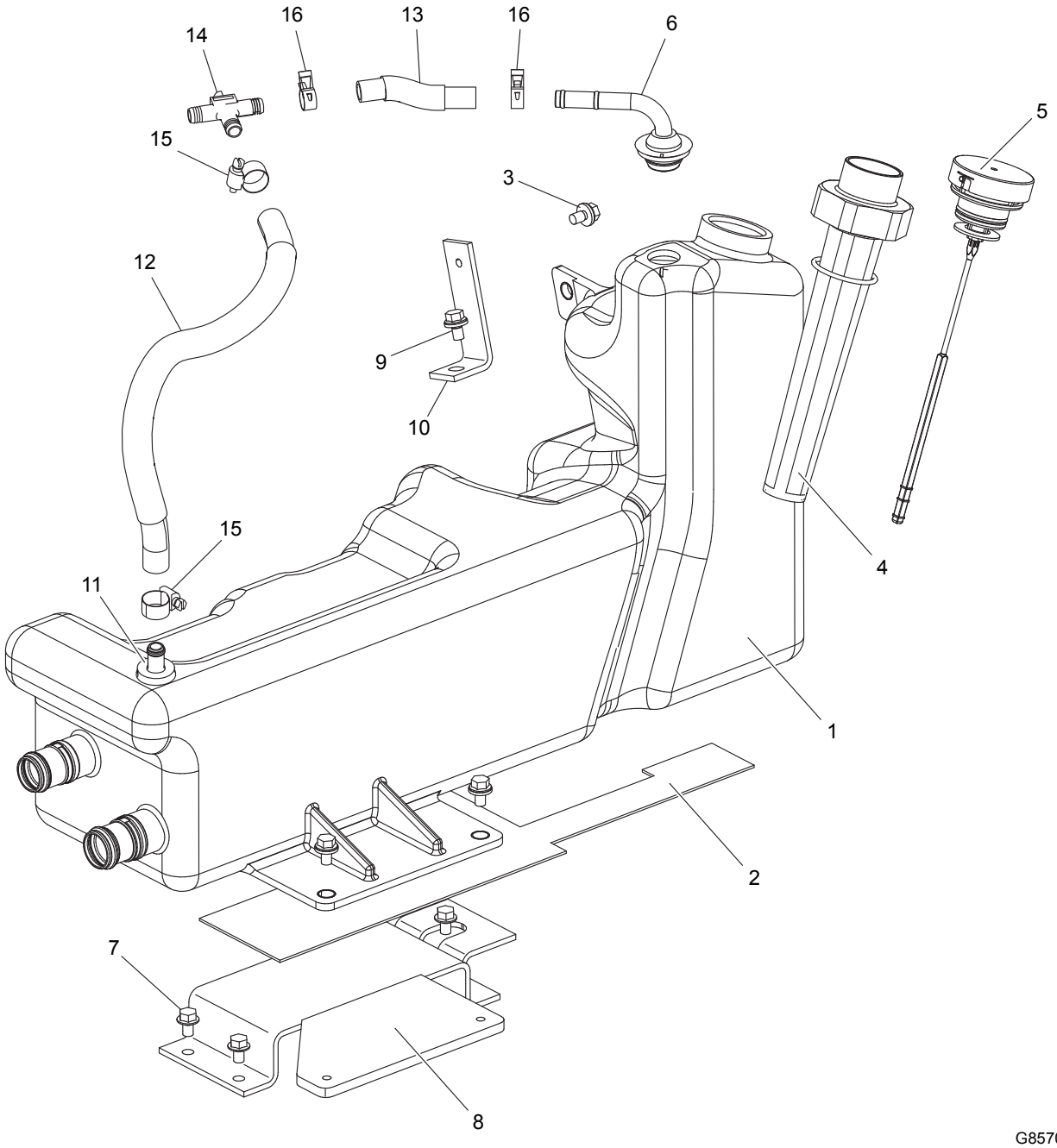


3 ton series



COMPONENTS

1 · 2 ton series

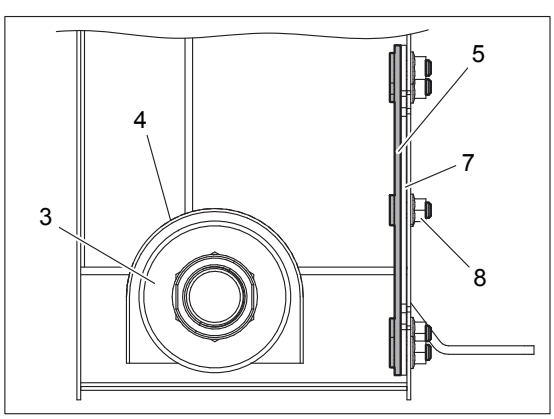


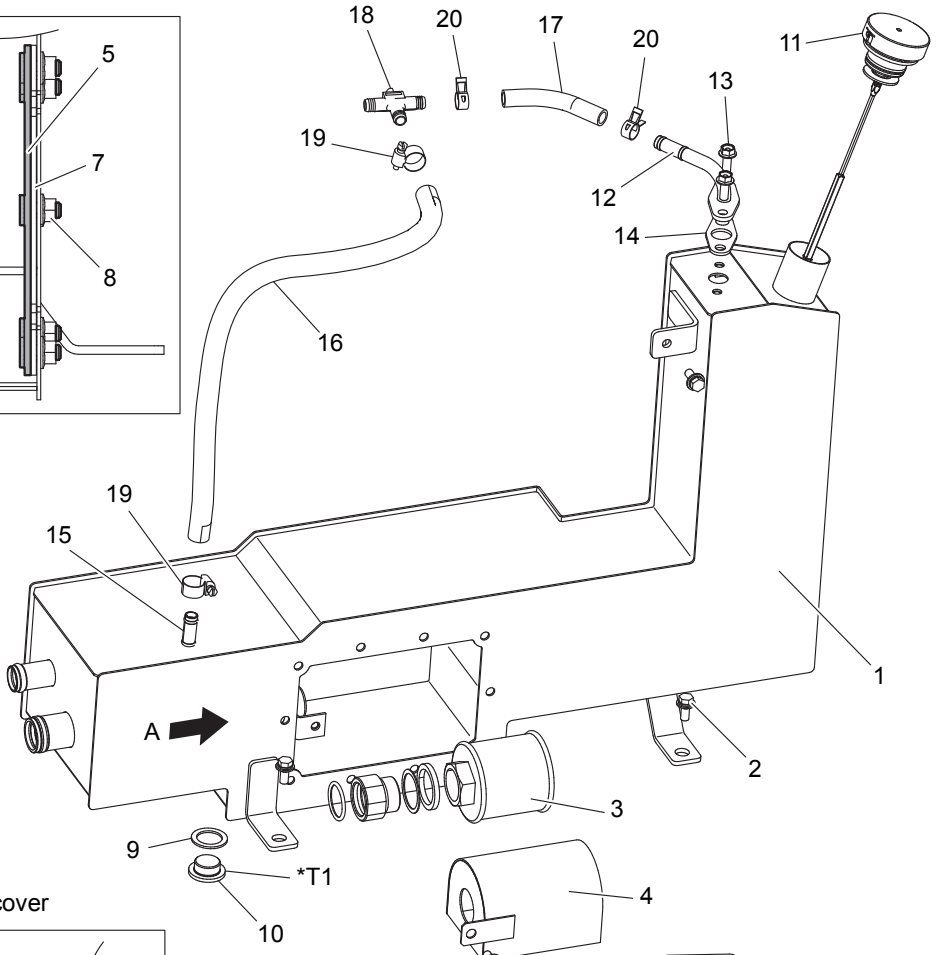
No.	Parts name	QTY	No.	Parts name	QTY
1	Oil tank	1	9	Bolt	1
2	Rubber	1	10	Bracket	1
3	Bolt	3	11	Pipe	1
4	Filter	1	12	Overflow hose	1
5	Cap	1	13	Hose	1
6	Overflow pipe	1	14	3-way pipe	1
7	Bolt	3	15	Clamp	2
8	Plate	1	16	Clamp	2

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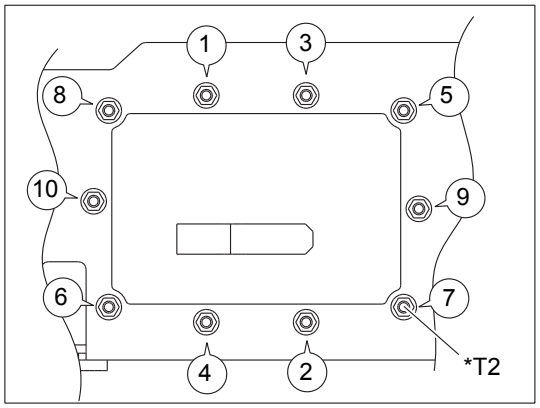
3 ton series

A View Tank cover installation





Order of tightening nut of oil tank cover



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 80 ~ 120 (816 ~ 1224) [59.0 ~ 88.5]
T2 = 9.8 ~ 14.7 (100 ~ 150) [7.2 ~ 10.8]

No.	Parts name	QTY	No.	Parts name	QTY
1	Oil tank	1	11	Cap	1
2	Bolt	3	12	Overflow pipe	1
3	Filter	1	13	Bolt	2
4	Filter cover	1	14	Plate	1
5	Tank cover	1	15	Pipe	1
6	Bolt	1	16	Overflow hose	1
7	Gasket	1	17	Hose	1
8	Nut	10	18	3-way pipe	1
9	Packing	1	19	Clamp	2
10	Drain plug	1	20	Clamp	2

REMOVAL·INSTALLATION (1 · 2 ton series)

Removal Procedure

1 Remove the battery ASSY.

2 Remove the floor mat and the toe boards.

3 Remove the side step LH and the tilt cylinder cover LH.

4 Remove the tilt cylinder cover RH (upper and lower).

5 Remove the oil filter from oil tank.

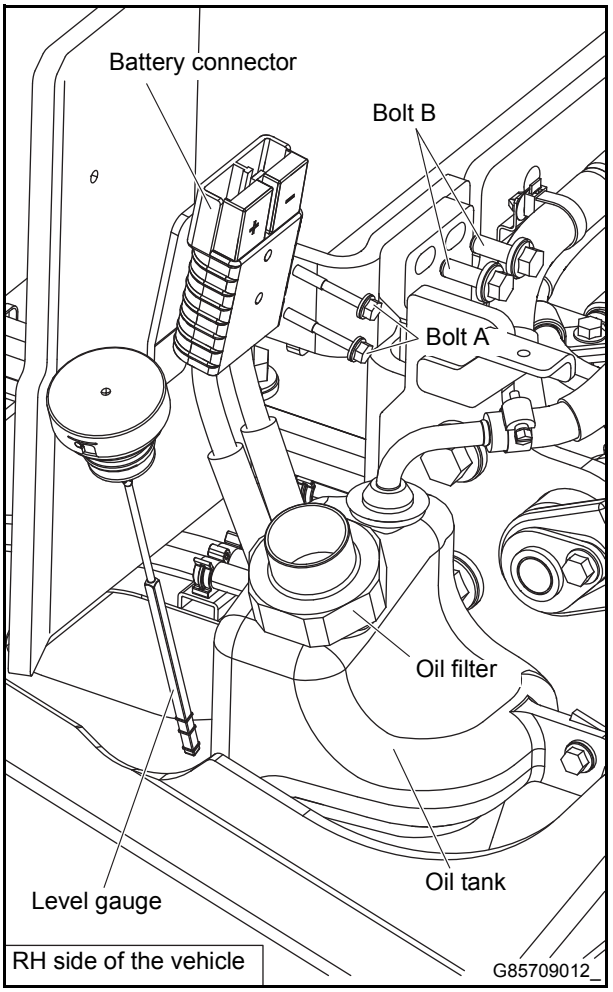
6 Drain hydraulic oil from the oil tank using a manual pump, etc.

7 Disconnect the suction hose and return hose from the oil tank.

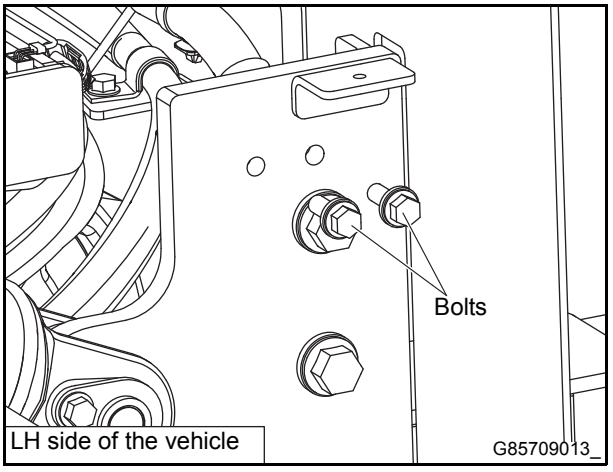
Note:
- **Prepare a waste cloth etc. to prevent oil from splashing.**
- **After draining the tank, attach a level gauge or cover it with another item to prevent foreign objects from entering the tank.**

8 Remove the bolt A of the battery connector.

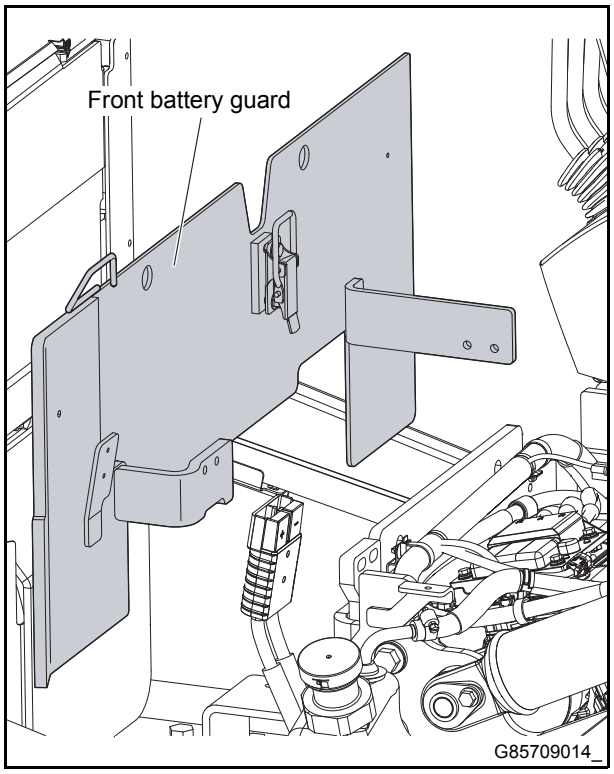
9 Remove the front battery guard bolt B.



10 Remove the front battery guard bolts.

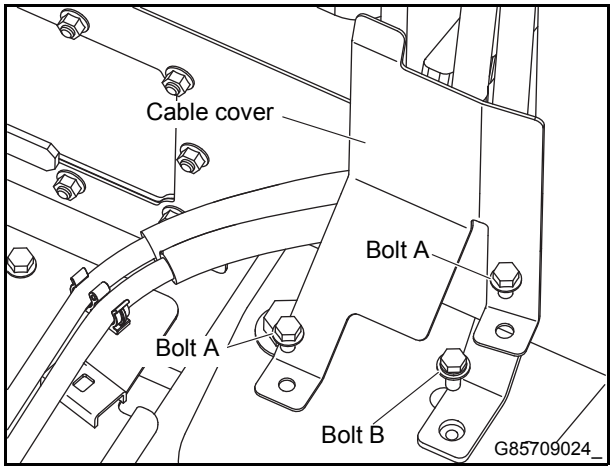


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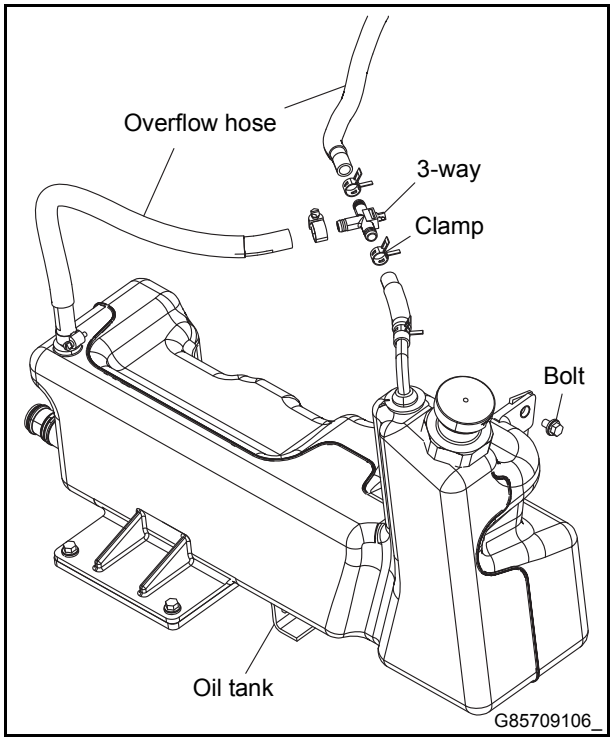
11 Remove the front battery guard.

Weight: Approx. 17 kg (37.5 lb)



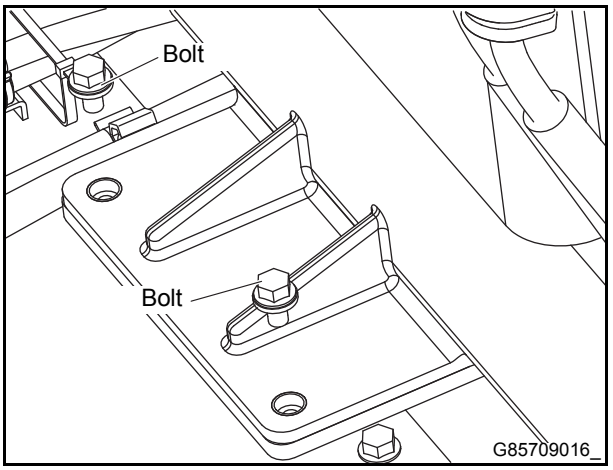
12 Remove the bolt A and remove the cable cover. (Only 2 ton series)

13 Remove the bolt B. (Only 2 ton series)

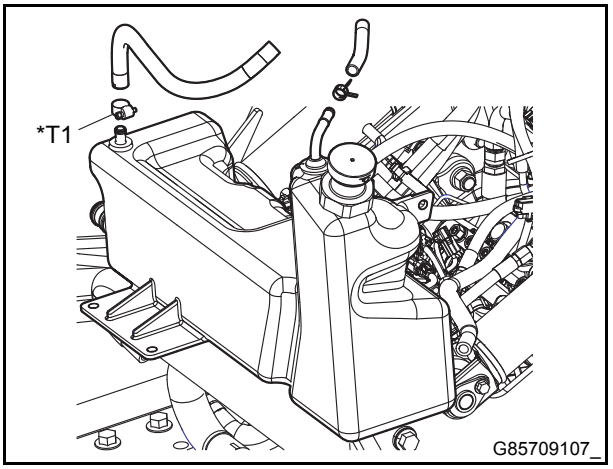


14 Disconnect the overflow hose from the 3-way.

15 Remove the oil tank bolt.



16 Remove the oil tank bolts inside the battery compartment.



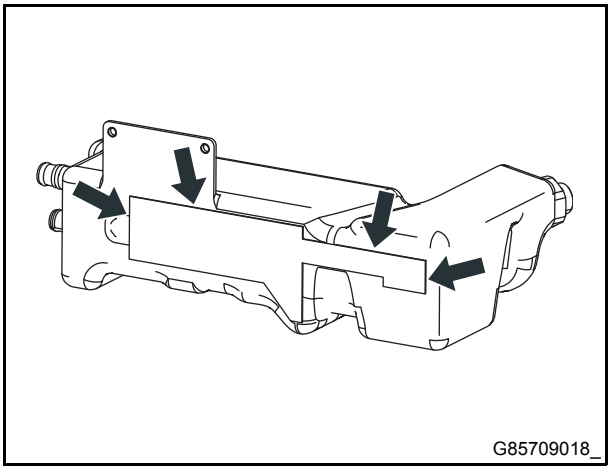
17 Remove the oil tank.

18 Disconnect the overflow hoses from the oil tank.

*** Tightening torque: T = N.m (kgf.cm) [ft.lbf]**
T1 = 1.5 ~ 2.5 (15 ~ 25) [1.0 ~ 1.8]

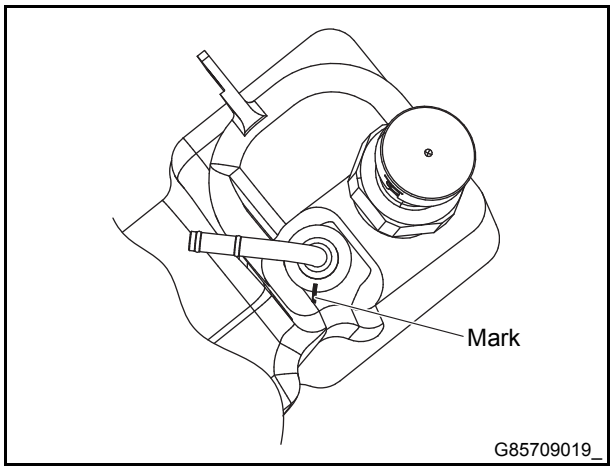
Installation Procedure

The installation procedure is the reverse of the removal procedure.



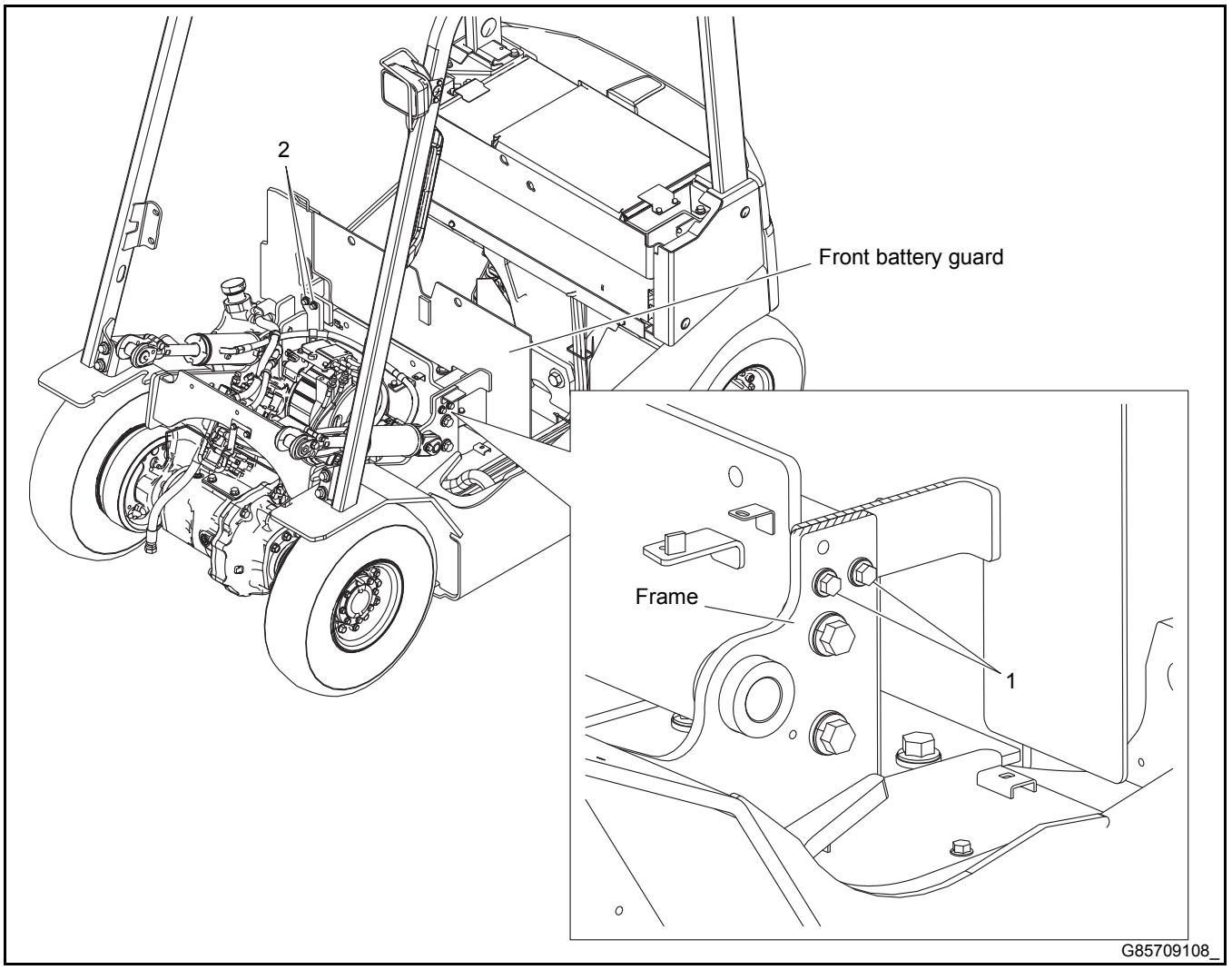
Note:
Line up the lines on the back of the tank when attaching the rubber.

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1 Connect the overflow pipe from the oil tank.

Note:
Align match marks on the tank and overflow pipe.



10 Install the front battery guard bolts.

Note:
Install the front battery guard bolts in order of 1-2.

Caution:
Assemble the upper edge face of front battery guard in parallel with the frame upper edge face.

REMOVAL·INSTALLATION (3 ton series)

Removal Procedure

1 Remove the battery ASSY.

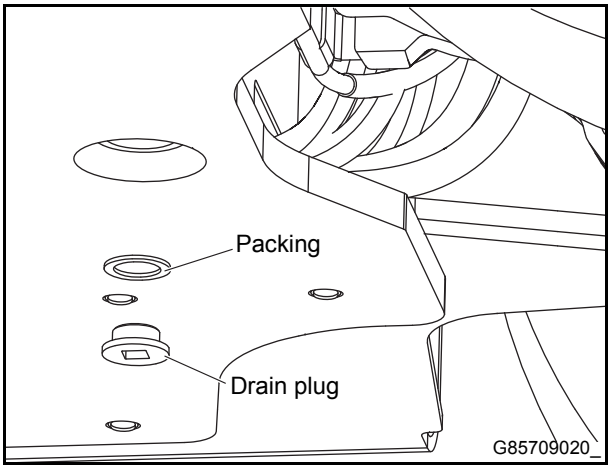
2 Remove the floor mat and the toe boards.

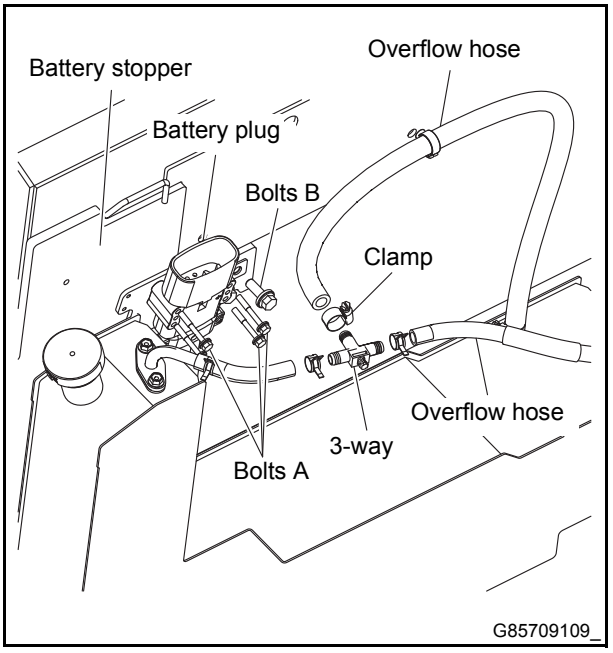
3 Remove the side step LH and the tilt cylinder cover LH.

4 Remove the tilt cylinder cover RH (upper and lower).

5 Drain hydraulic oil from the oil tank.

Caution:
After draining hydraulic oil, be sure to install the drain plug.



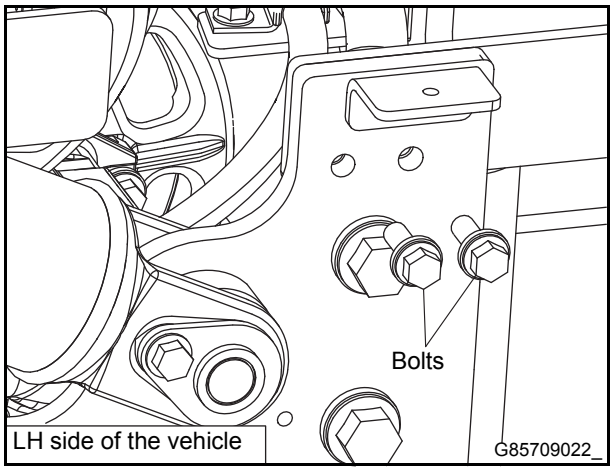


6 Remove the bolts A of the battery connector.

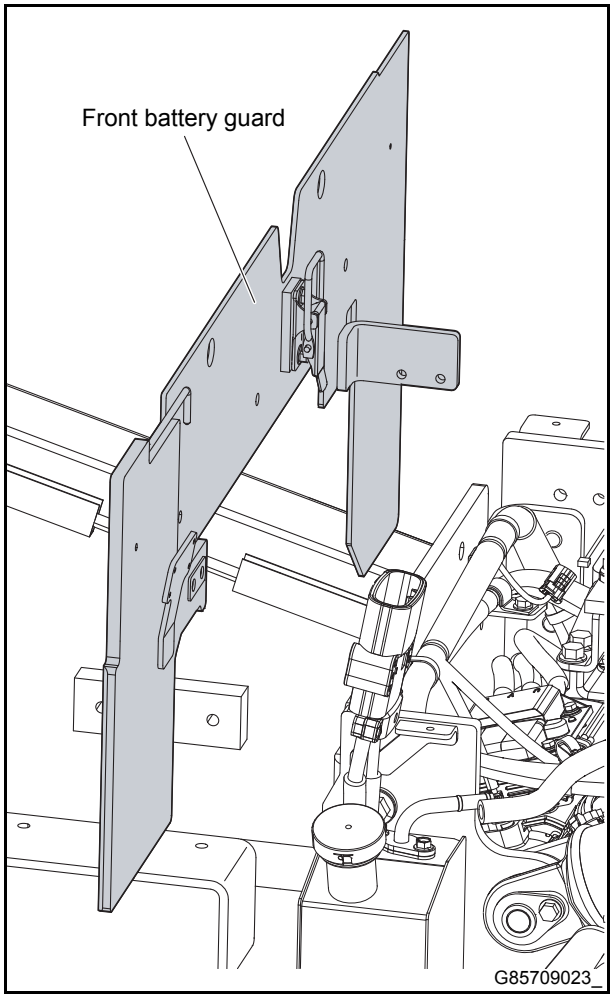
7 Disconnect the overflow hose from the 3-way.

8 Remove the front battery guard bolts B.

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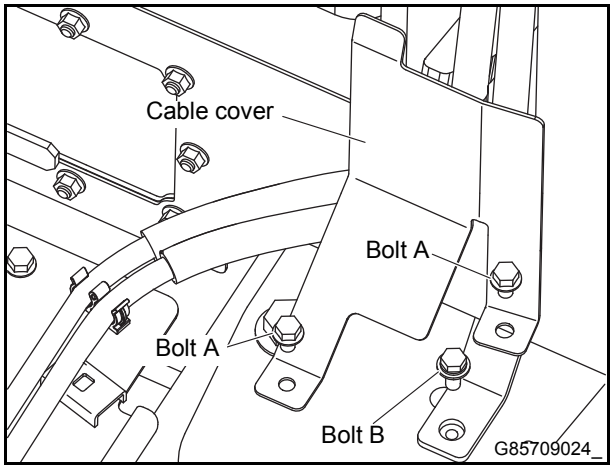


9 Remove the front battery guard bolts.



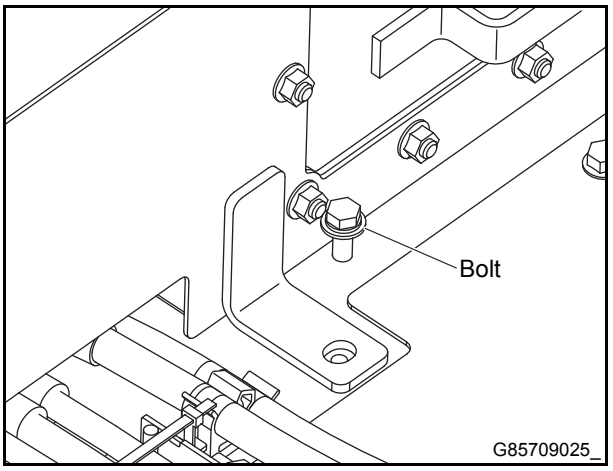
10 Remove the front battery guard.

Weight: Approx. 19 kg (41.9 lb)

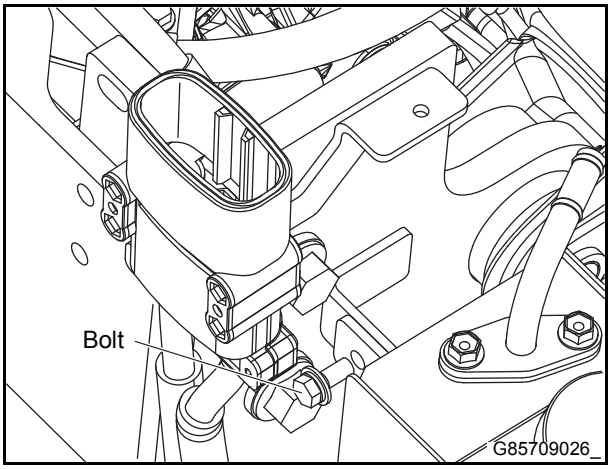


11 Remove the bolts A and the cable cover.

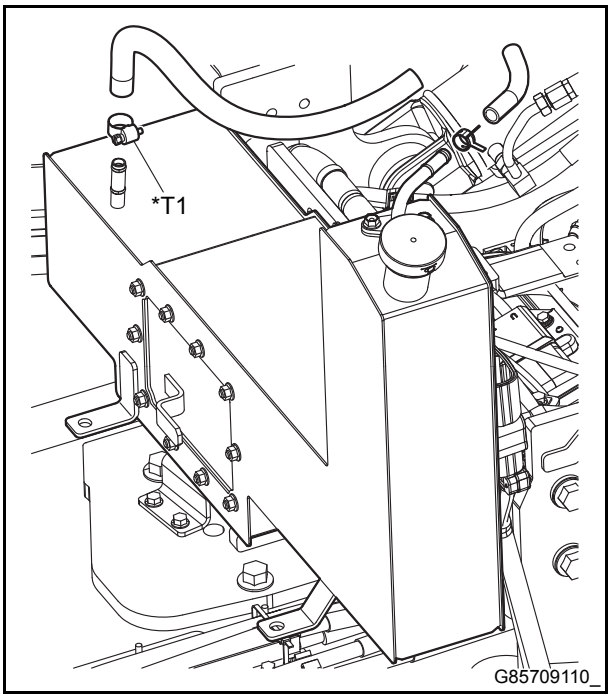
12 Remove the bolt B.



13 Remove the oil tank bolt.



14 Remove the oil tank bolt.



15 Remove the oil tank.

16 Remove the overflow hoses from the oil tank.

*** Tightening torque: T = N.m (kgf.cm) [ft.lbf]**
T1 = 1.5 ~ 2.5 (15 ~ 25) [1.0 ~ 1.8]

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Note:
Please refer to the same Note and Caution as the 1 · 2 ton series page 9-14.

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HYDRAULIC OIL

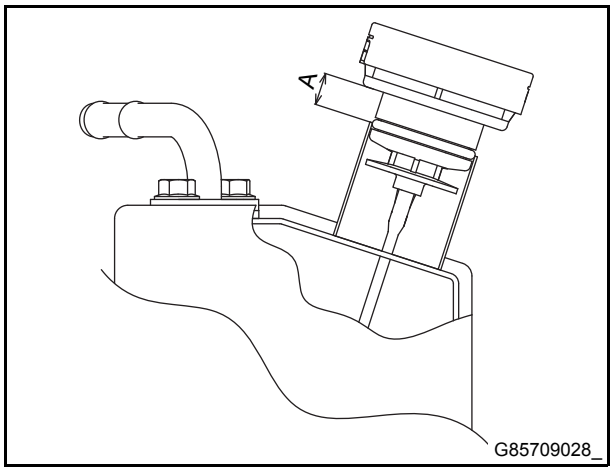
1 Hydraulic oil use

Specification	Hydraulic oil
Standard	Daphne super hydro 32AT
Cold storage	Daphne hydro GT-T

2 Hydraulic oil volume

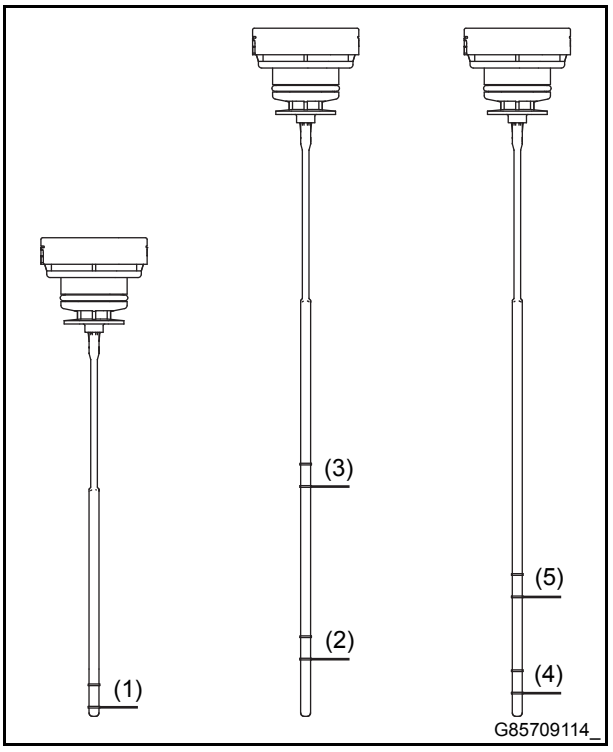
No.	Model series	Mast type	Mast lifting height Quantity mm (in)	Reference volume ℓ (US gal)
1	1 · 2 ton	V · FSV	3000 ~ 5500 (118~217)	17.5 (4.62)
		FV	3000 ~ 3500 (118~138)	
2		V	6000 (236)	18.9 (4.99)
		FV	4000 (157)	
		FSV	6000 (236)	21.4 (5.6)
3	3 ton	V · FSV	3000 ~ 4700 (118~185)	19.1 (5.04)
		FV	3000 (118)	
4		V · FSV	5000 ~ 6000 (197~236)	22.0 (5.8)
		FV	3500 (138)	

Caution:
The above oil amounts are just an estimate. Be sure to check the oil level gauge when finished.



3 Oil level gauge standard

Caution:
When adjusting the amount of oil using the oil level gauge, the oil level gauge measurement for A should be around 12 mm (0.47 in). This is where the O-ring catches on the opening.



4 Oil level adjustment standard

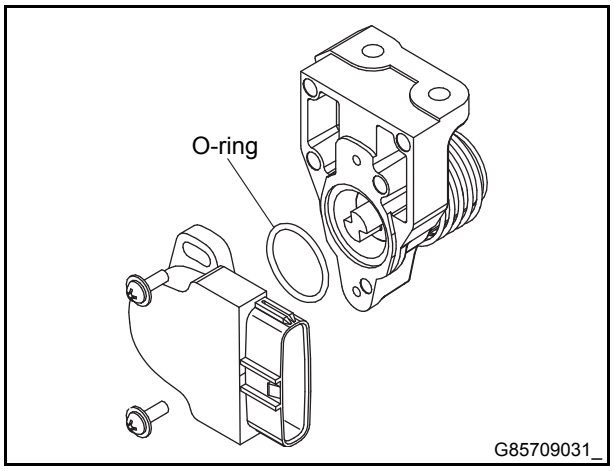
OIL LEVEL RANGE: 0 to +10mm

No.	Model series	Mast type	Mast height mm (in)	Remark
(1)	1 · 2 ton	V · FSV · FV	3000 ~ 6000 (118 ~ 236)	-
(2)	3 ton	V · FSV · FV	3000 ~ 4700 (118 ~ 185)	-
(3)		V · FSV	5000 ~ 6000 (197 ~ 236)	-
(4)		V · FSV	3000 ~ 4700 (118 ~ 185)	Rust proof model Cold-storage model
(5)		V · FSV	5000 ~ 6000 (197 ~ 236)	Rust proof model Cold-storage model

Caution:
When adjusting the oil level and adding additional oil, move the steering and load and unload multiple times to move the oil within the pipe.

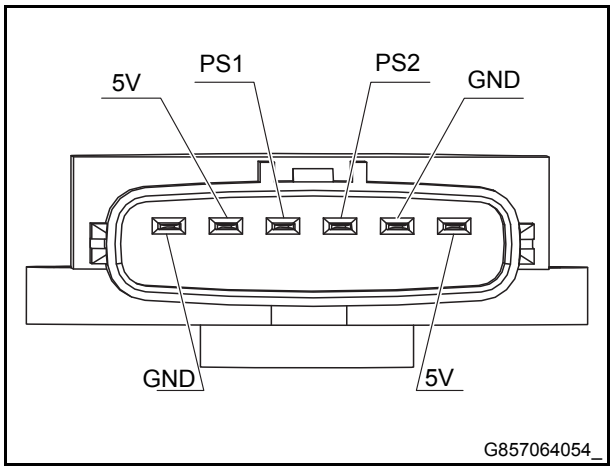
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ACCELERATOR PEDAL



Installation Procedure

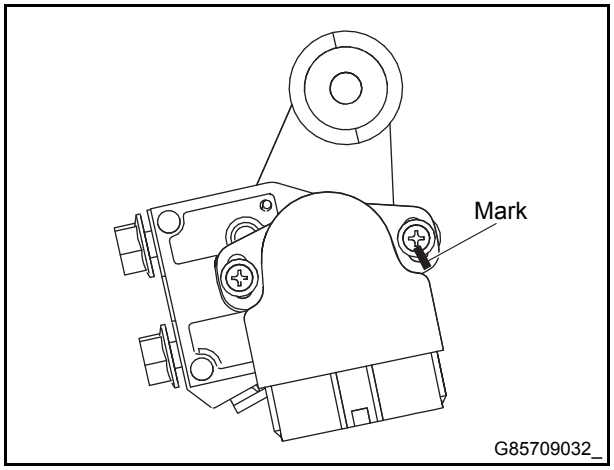
When assembling the accelerator sensor, turn the assembly 10 ° clockwise, fasten and install.



Adjustment

1 Adjust the PSI output so that it is 0.85 ± 0.1V when the accelerator sensor is in its initial position.

Refer to the <Display> section.



2 After adjustment, tighten the screws.

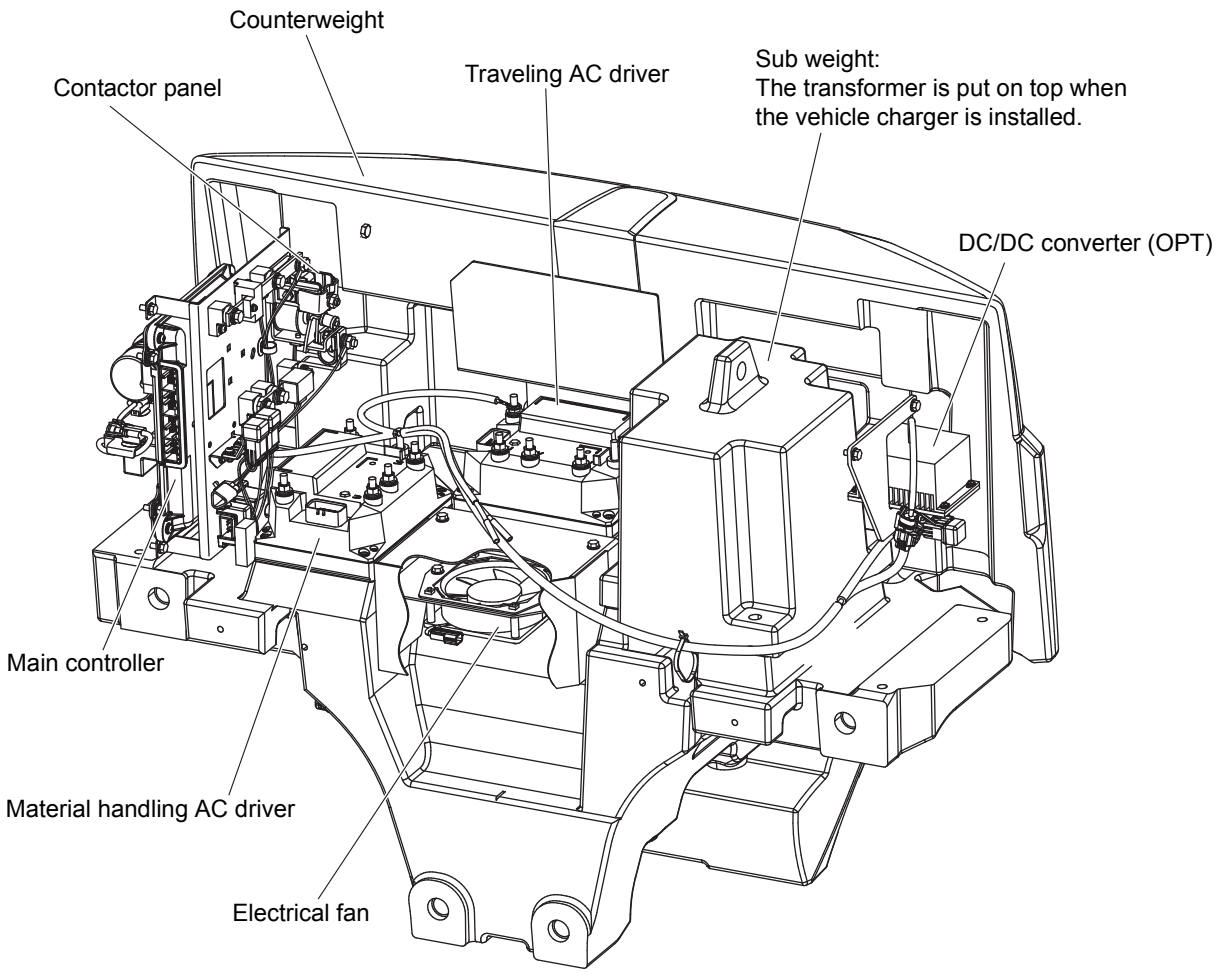
Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T = 1.57 ~ 2.35 (16 ~ 24) [1.16 ~ 1.74]

Note:
After tightening, put the I mark with yellow paint on the top of the screw.

Note:
If the accelerator sensor is removed, installed or replaced, matching is required to initialize the accelerator sensor voltage.
Refer to page 4-62 “MATCHING (1 DRIVE)” and 4-146 “DRIVE (MATCHING DRIVE)” and perform matching.

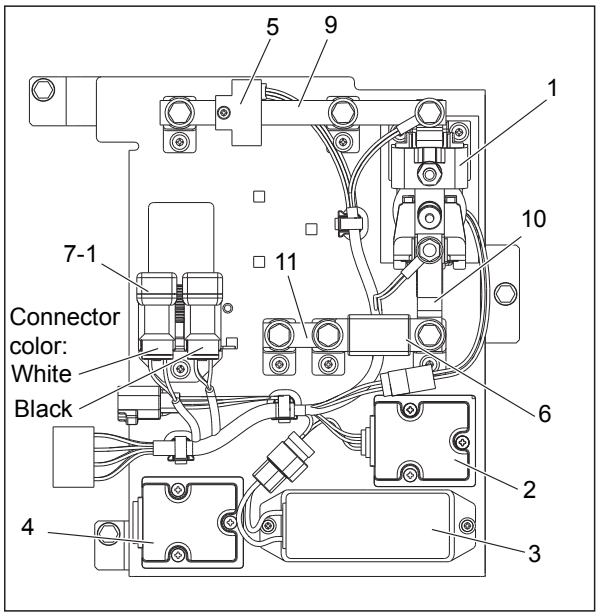
ELECTRICAL PARTS LAYOUT

The changes to how the electrical components are installed will make repairs and inspections more convenient by concentrating relating control parts in the upper rear frame. The driver, which produces a large amount of heat, was also attached directly to the rear frame, improving heat dissipation and reliability of the driver.

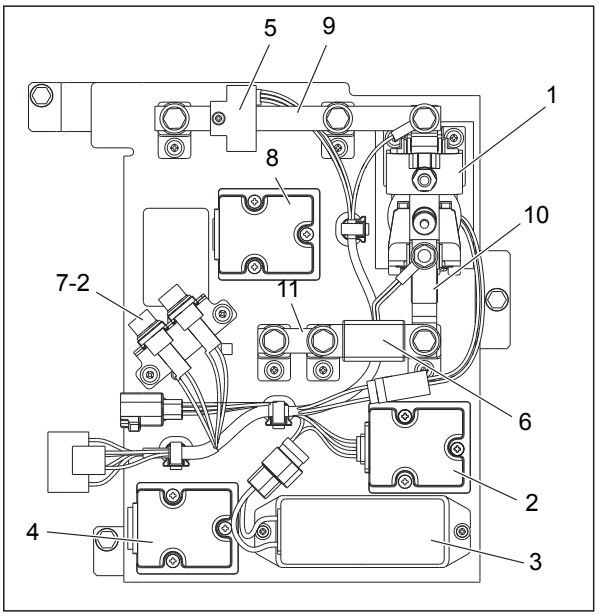


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Contactor panel (1 · 2 ton series)



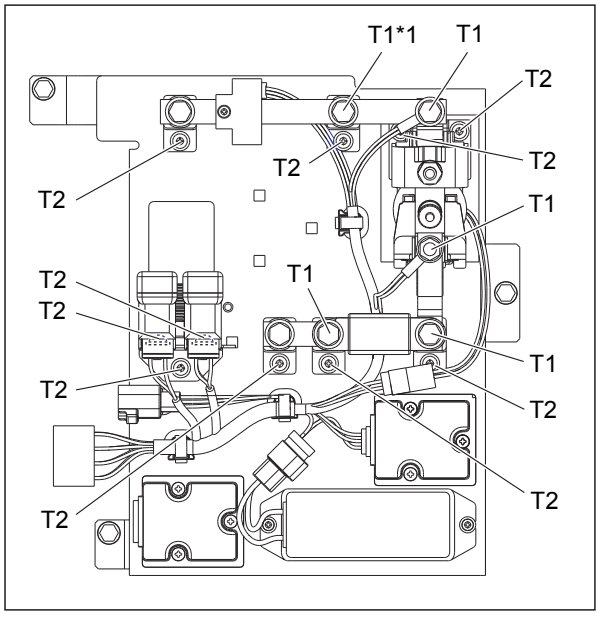
Contactor panel (3 ton series)



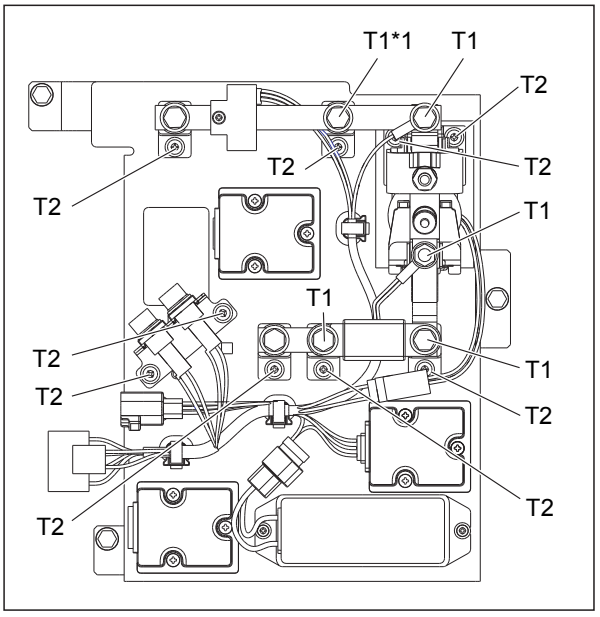
G85709112_

No.	Parts name	QTY	No.	Parts name	QTY
1	Contactor	1	7-1	Accessory fuse	4
2	PTC thermistor	1	7-2	Accessory fuse	4
3	Resistor	1	8	Power supply	1
4	Relay	1	9	Short bar	1
5	Current sensor	1	10	Short bar	1
6	F1 fuse	1	11	Short bar	1

Contactor panel (1 · 2 ton series)



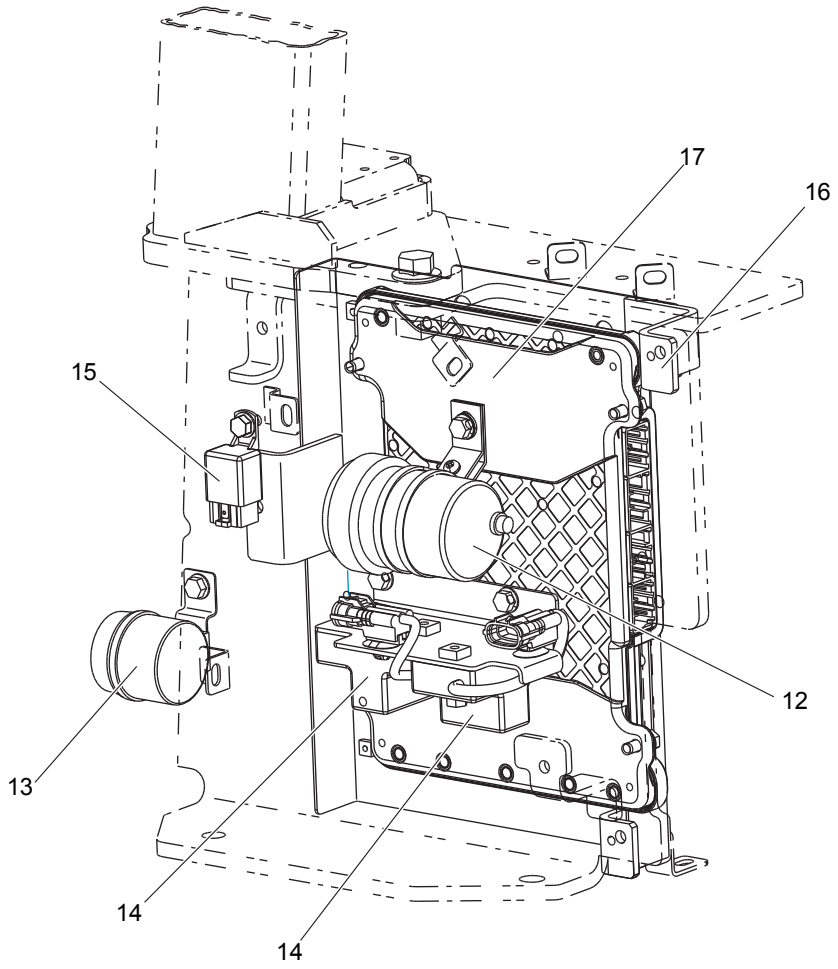
Contactor panel (3 ton series)



G85709044_

*1 Without in-vehicle charger.
When in-vehicle charger is equipped, cable is installed. For the tightening torque, refer to page 3-31.

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 7.8 ~ 11.8 (80 ~ 120) [5.8 ~ 8.71]
T2 = 2.0 ~ 3.0 (20 ~ 31) [1.5 ~ 2.2]

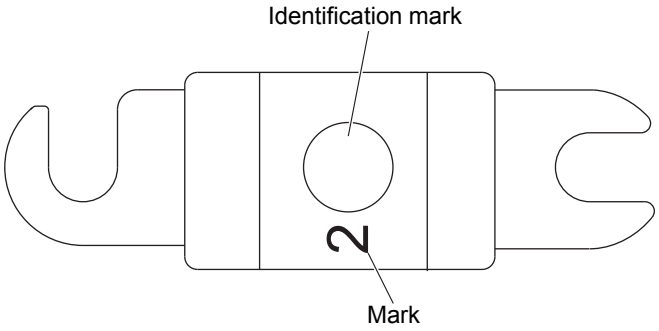


G85709035_

No.	Parts name	QTY	No.	Parts name	QTY
12	Chime	1	15	Horn relay (for assist grip)	1
13	Buzzer	1	16	Contactor panel	1
14	Shock sensor	2	17	Main controller	1

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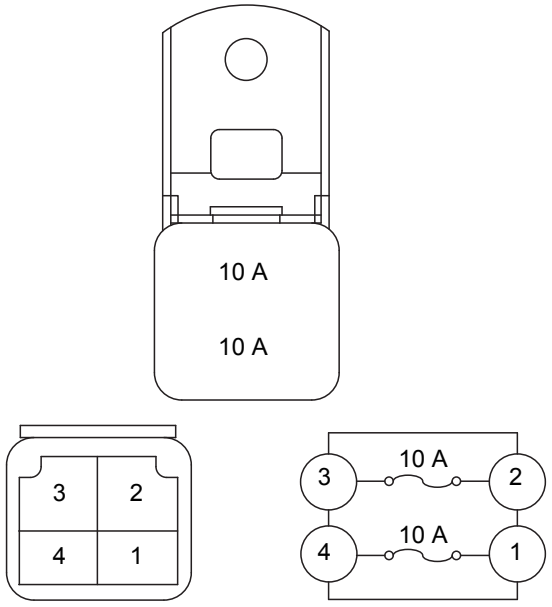
F1 Fuse



G85709036_

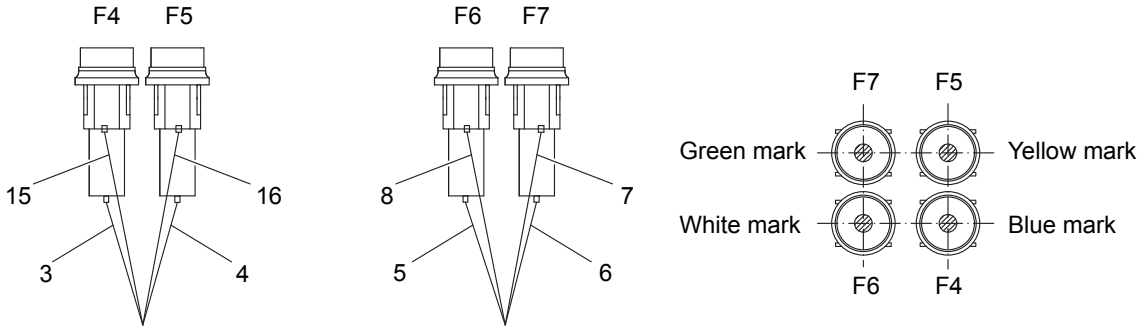
	1 · 3 ton series	2 ton series
Specification	DC 96V 500A	DC 96V 600A
Identification mark	Blue	Red
Mark	2	1

Accessory fuse (1 · 2 ton series)



G85709037_

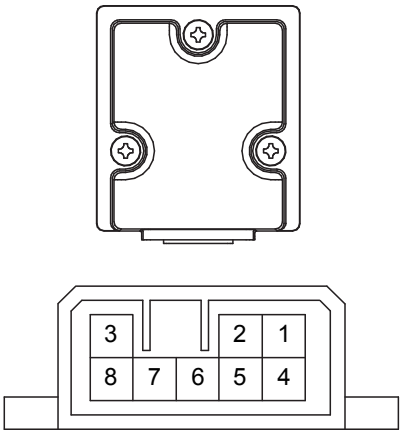
Accessory fuse (3 ton series)



G85709111_

No.	Color	No.	Color
3	G	7	W-B
4	Y	8	R-L
5	L	15	B
6	GR	16	B

Relay

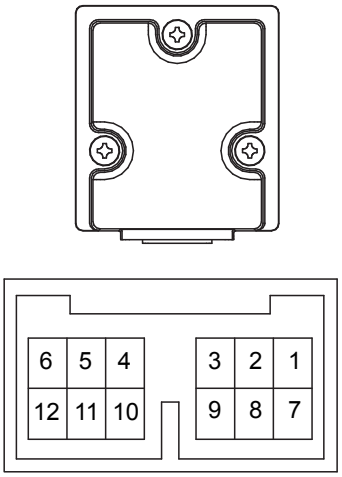


Connector diagram

G85709039_

No.	Terminal name	Remarks	No.	Terminal name	Remarks
1	-	-	5	-	-
2	FAN+	Coil +	6	VBMBSL	Contact point +
3	-	-	7	-	-
4	RY1	Coil -	8	SOLCOM	Contact point -

Power supply (3 ton series)



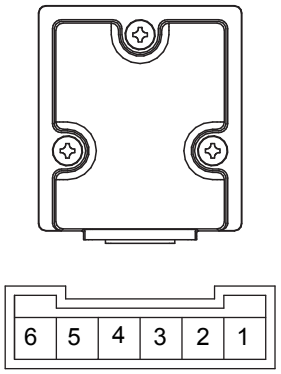
Connector diagram

G85709040_

No.	Terminal name	No.	Terminal name	No.	Terminal name
1	-	5	CBAT+	9	VBBA
2	MP-	6	CBAT+	10	VBBA
3	CBAT+	7	-	11	VBBA
4	CBAT+	8	VBBA	12	-

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PTC thermistor

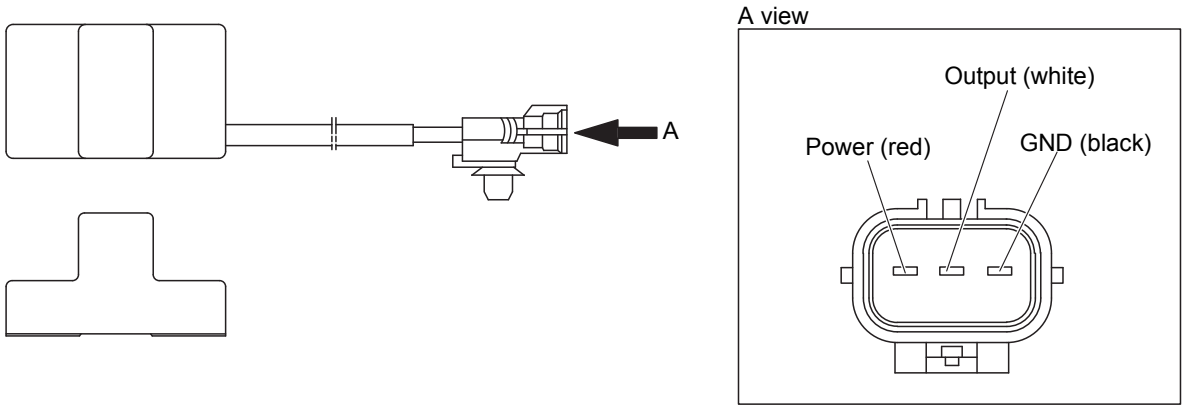


Connector diagram

G85709041_

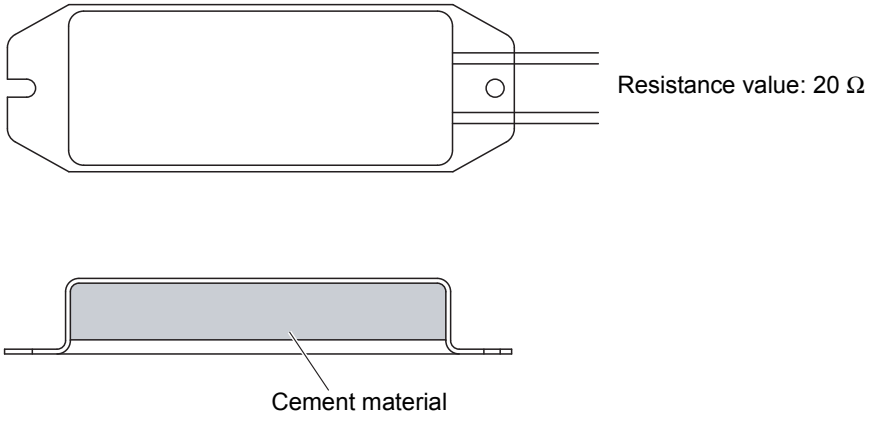
No.	Terminal name	Remarks	No.	Terminal name	Remarks
1	KYSAT		4	-	-
2	KYSAT		5	RCP	CPR
3	-	-	6	RCP	CPR

Accelerator sensor



G85709042_

Resistor



G85709043_

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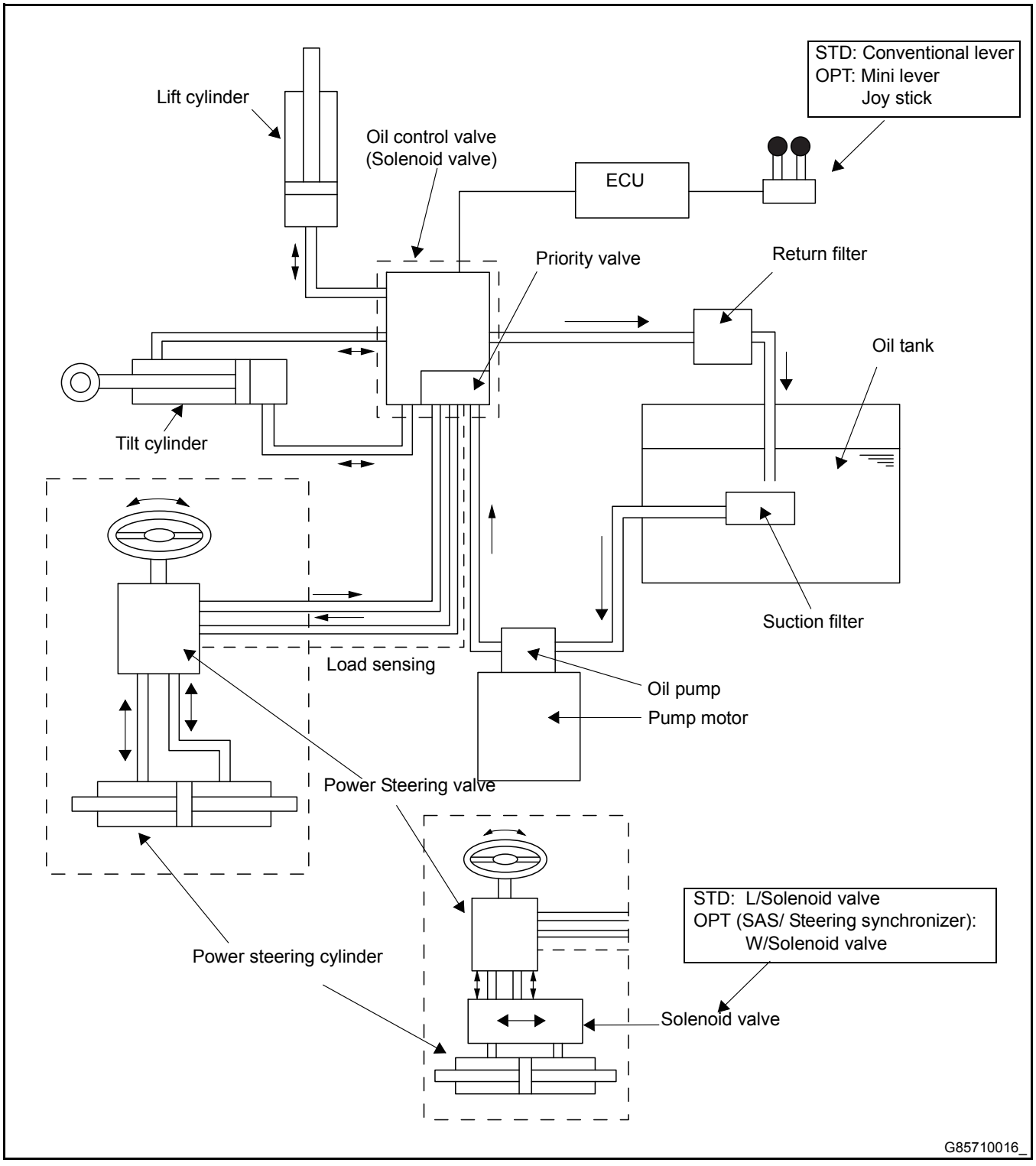
MATERIAL HANDLING SYSTEM

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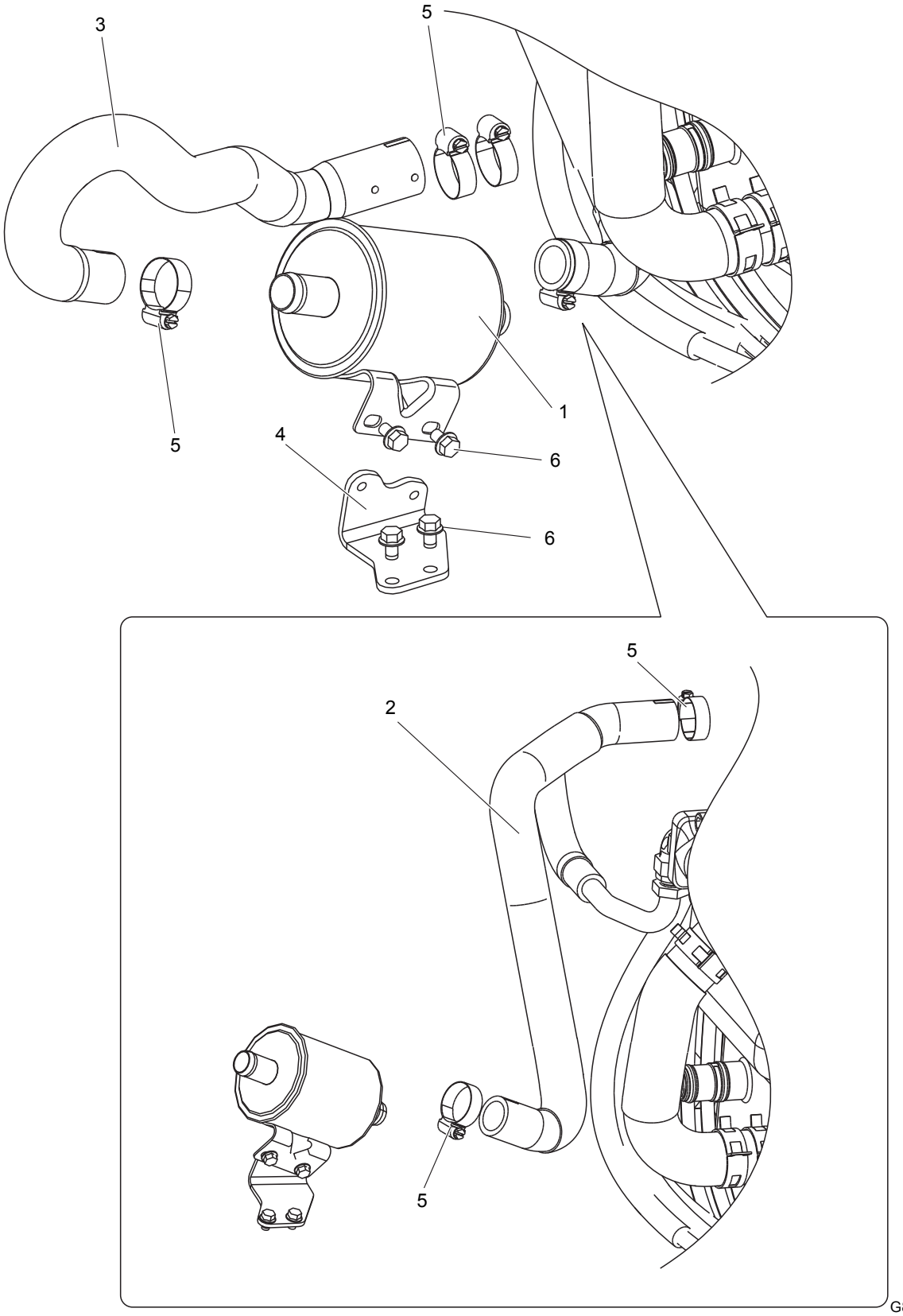
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HYDRAULIC CIRCUIT DIAGRAM



COMPONENTS

RETURN FILTER

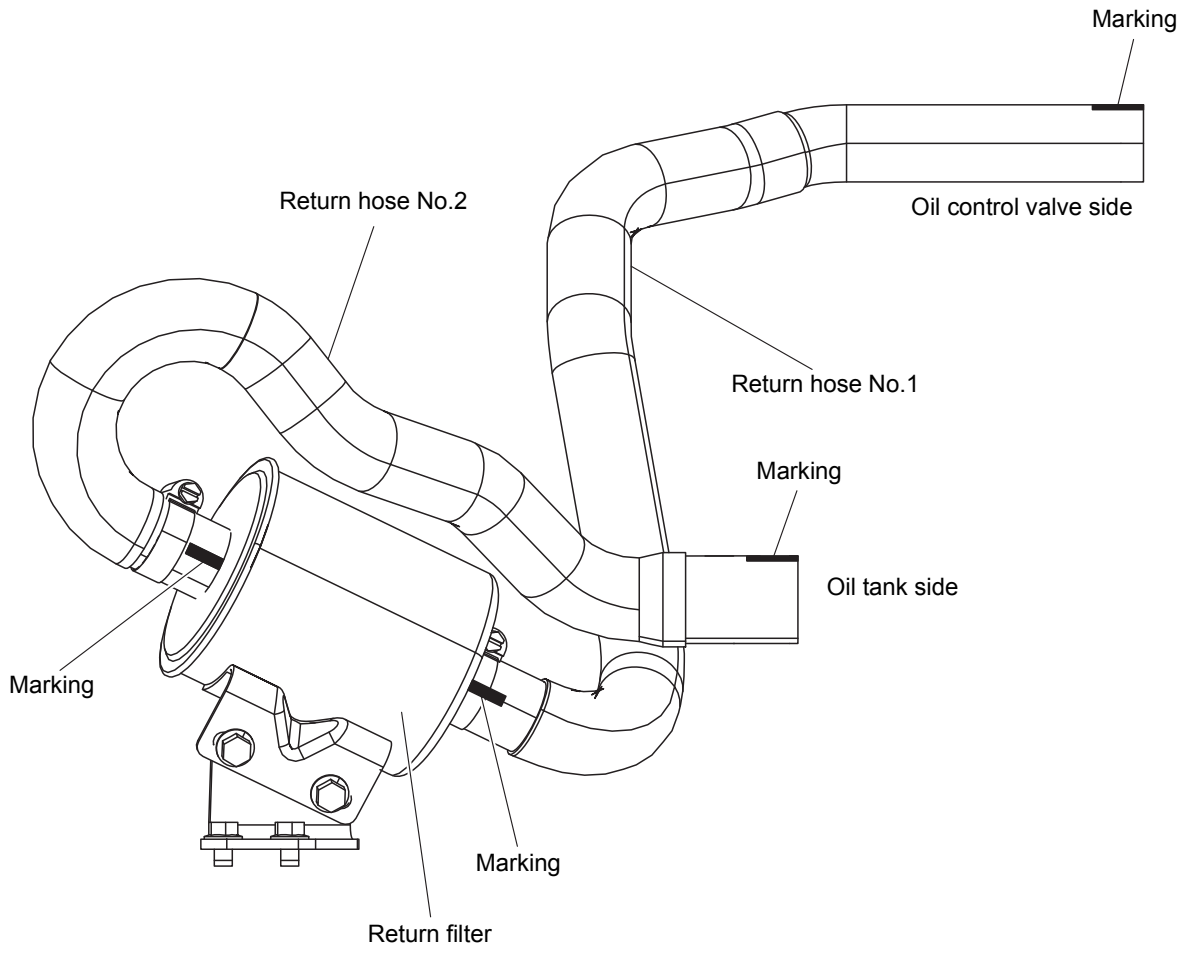


No.	Parts name	QTY	No.	Parts name	QTY
1	Return filter	1	4	Bracket	1
2	Return hose No.1	1	5	Clamp	5
3	Return hose No.2	1	6	Hexagon flange bolt	4

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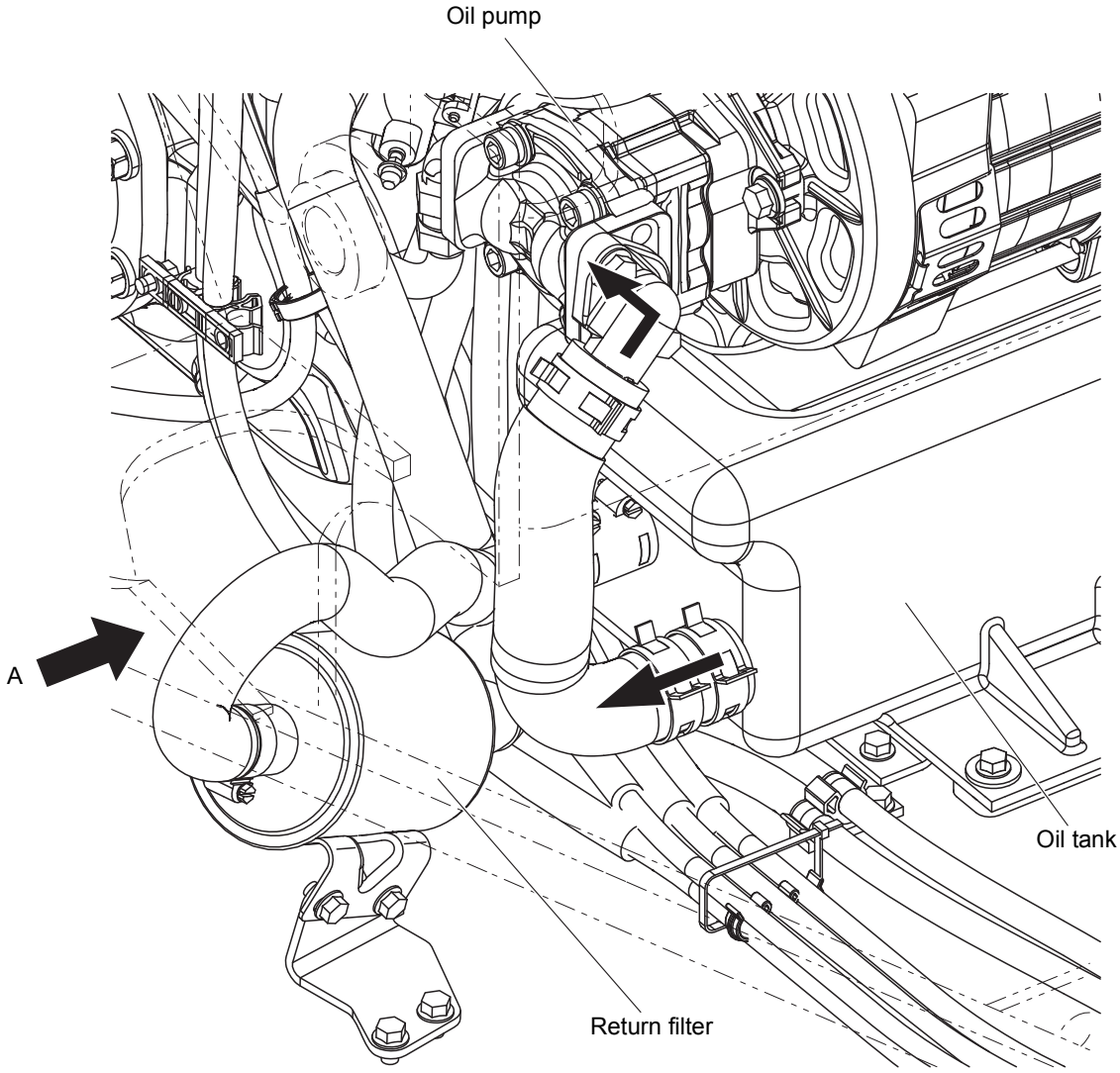
RETURN FILTER HOSE

IDENTIFICATION AND POSITIONING MARKING

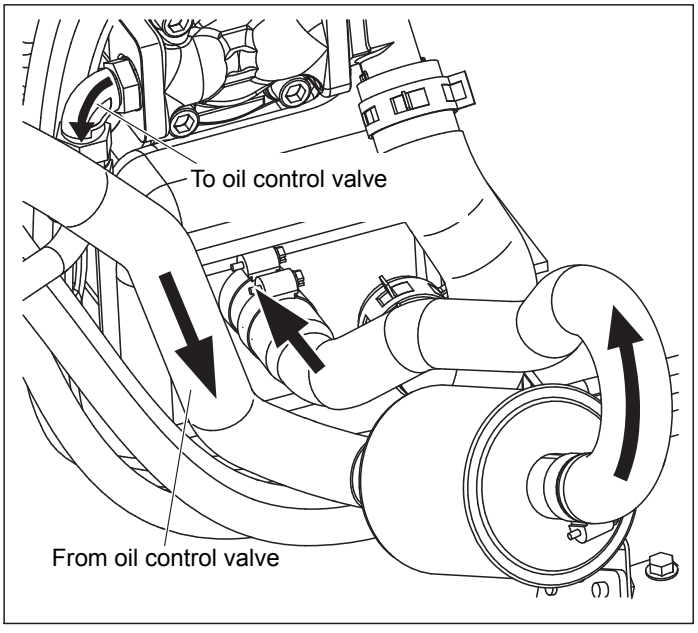


	Oil control valve	Oil control valve side (Color)	Return filter side (Color)
Return hose No.1	2-way	Red	Blue
	3-way	White	
	4-way	Yellow	
	Vehicle model	Oil tank side (Color)	Return filter side (Color)
Return hose No.2	1·2 ton series	White	Red
	3 ton series	Yellow	Blue

DIRECTION OF OIL FLOW



A view



Oil flow

G85710106_

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RETURN FILTER

REMOVAL·INSTALLATION

Removal Procedure

1 Disconnect the battery plug.

2 Remove the floor mat and the toe boards.

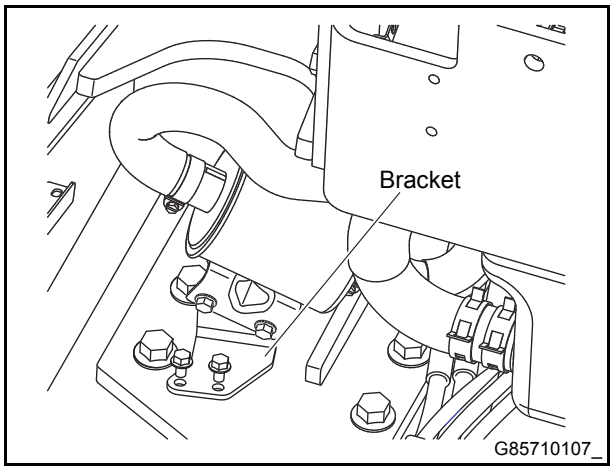
3 Remove the tilt upper cover RH and the tilt cover RH.

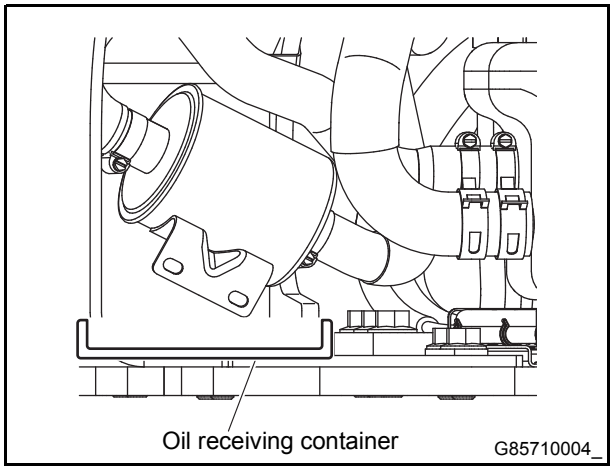
4 Drain hydraulic oil from the oil tank.

5 Remove the battery ASSY.

6 Remove the step and the tilt cover LH.

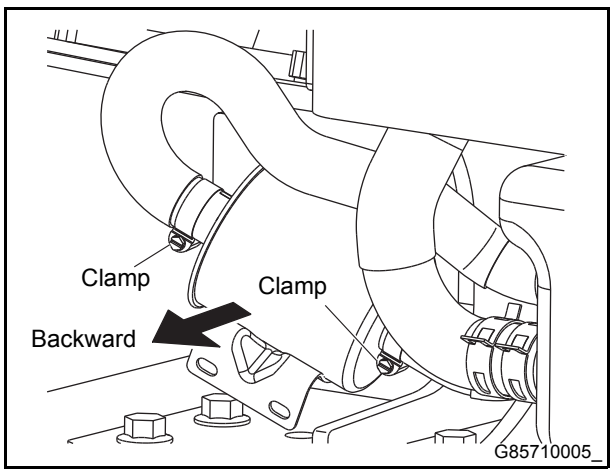
7 Remove the bolts on the bracket of the return filer.





Note:
Prepare an oil receiving container under the return filter hose. The hydraulic oil runs out approximately 2.0 ℓ (0.53 US gal).

8 Pull the return filter toward the rear a little and remove the clamp.



Installation Procedure

The installation procedure is the reverse of the removal procedure.

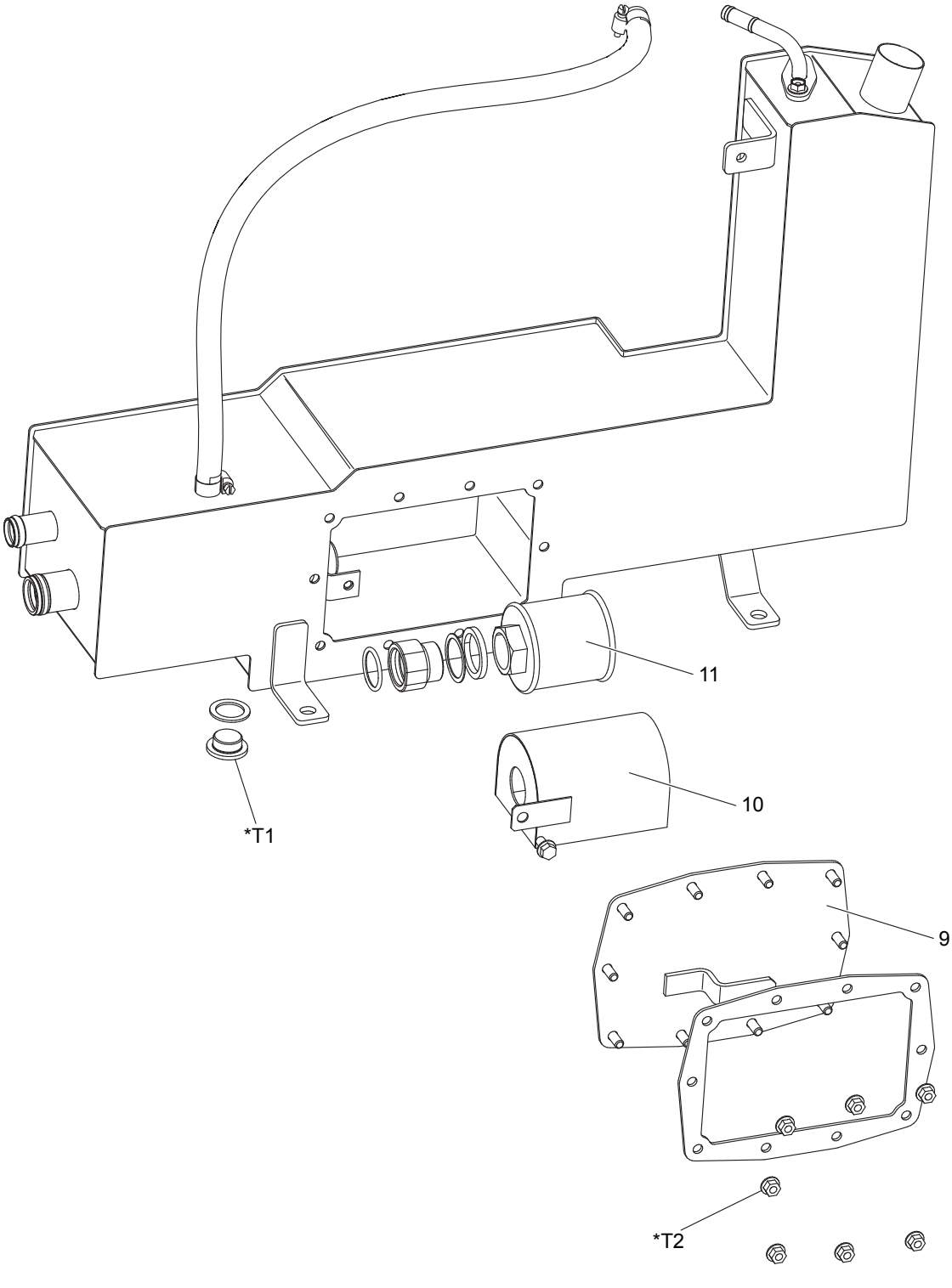
Note:

- **After installing the return filter, clean up an oil spill thoroughly with detergent, etc.**
- **Install with the marking on the hose facing upward. (Refer to page 10-4 .)**

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SUCTION FILTER (3 ton series)

REMOVAL·INSTALLATION



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 80 ~ 120 (816 ~ 1224) [59.0 ~ 88.5]
T2 = 9.8 ~ 14.7 (100 ~ 150) [7.2 ~ 10.9]

Removal Procedure

1 Disconnect the battery plug.

2 Remove the floor mat and the toe boards.

3 Remove the tilt upper cover RH and the tilt cover RH.

4 Remove the step and the tilt cover LH.

5 Remove the battery ASSY.

6 Remove the front battery guard.

7 Drain hydraulic oil from the oil tank.

8 Remove all hoses from the oil tank.

9 Remove the oil tank cover.

10 Remove the suction filter cover.

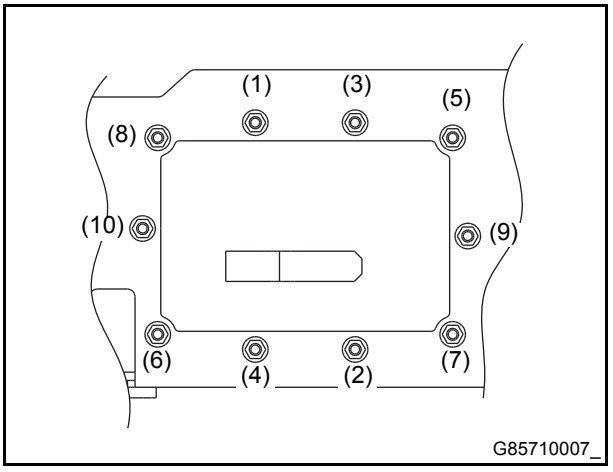
11 Remove the suction filter.

Installation Procedure

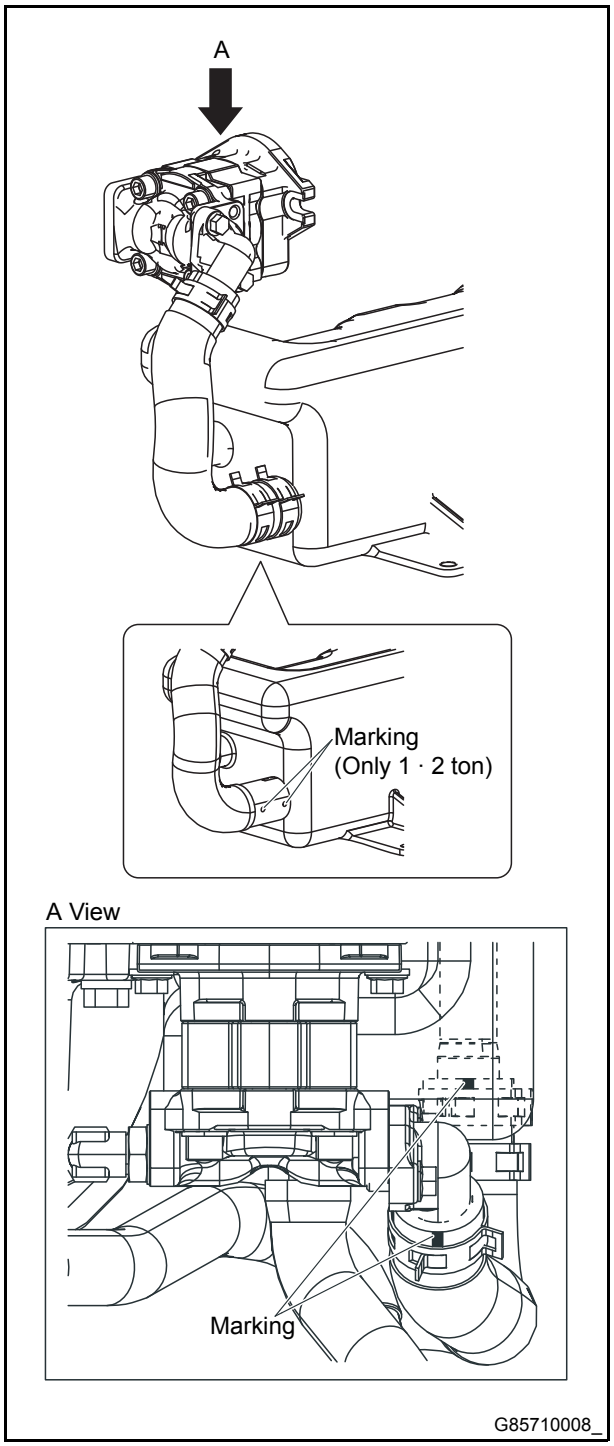
The installation procedure is the reverse of the removal procedure.

1 Install the oil tank cover with the screws in the illustrated order.

Order
(1)→ (2)→ (3)→ (4)→ (5)→ (6)→ (7)→ (8)→ (9)→ (10)



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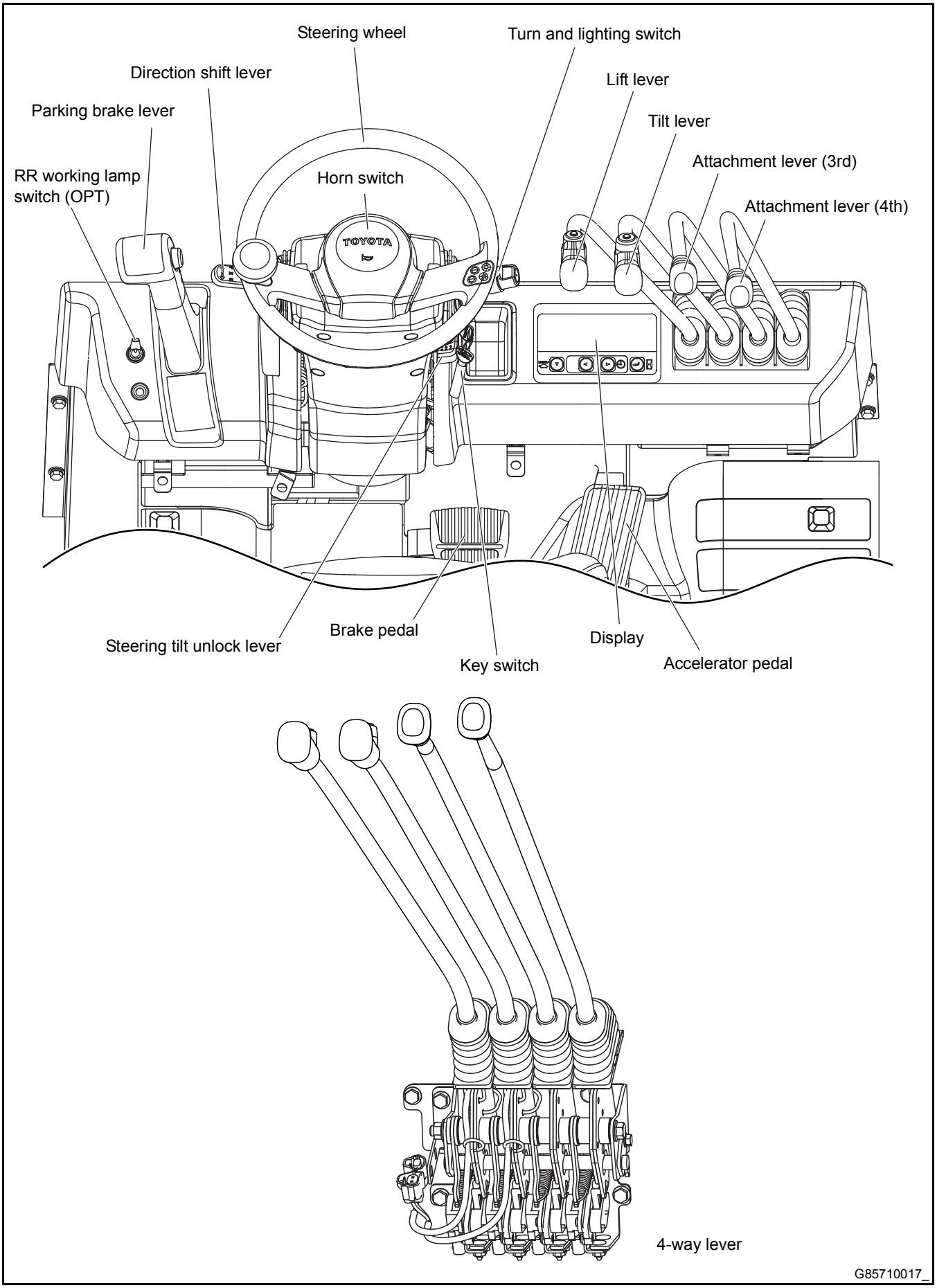
2 Connect all hoses to the oil tank.

Note:

- **Install with the marking on the hose facing upward. (Refer to page 10-4 .)**
- **Fasten it at the marks with a clamp.**

CONVENTIONAL LEVER ASSY

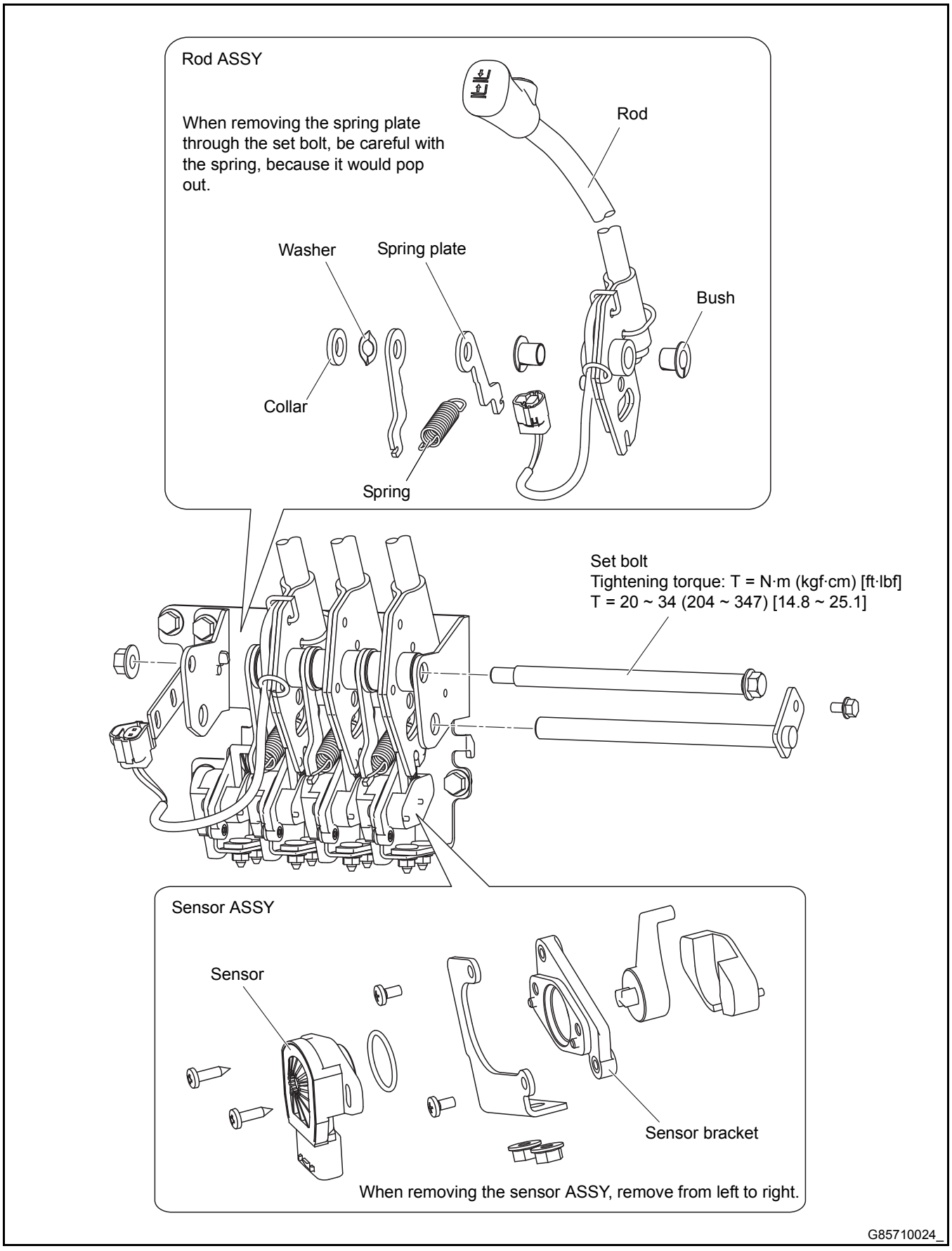
GENERAL



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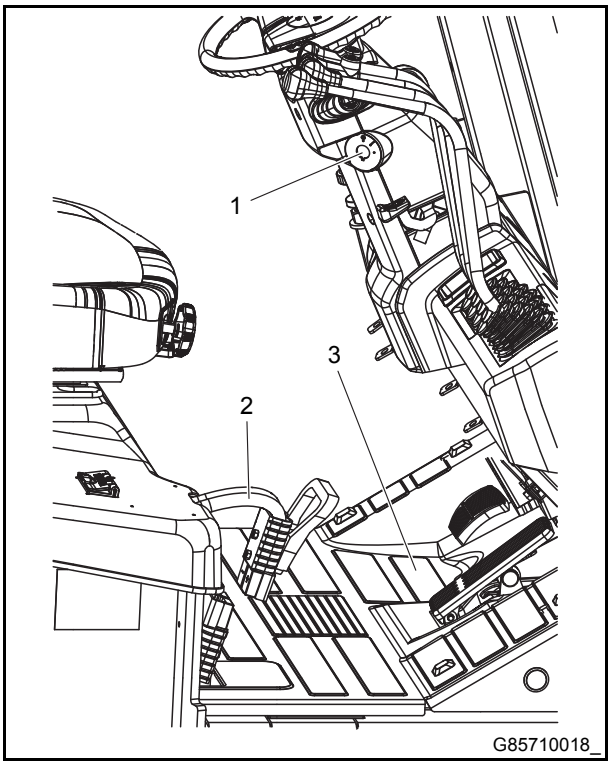
COMPONENTS

4-WAY LEVER, ROD ASSY · SENSOR ASSY



REMOVAL·INSTALLATION

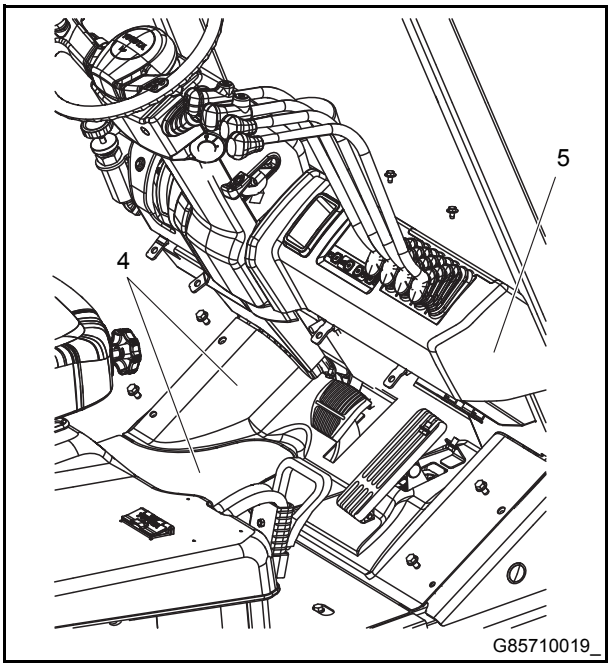
Removal Procedure



1 Turn off the key switch.

2 Remove the battery plug.

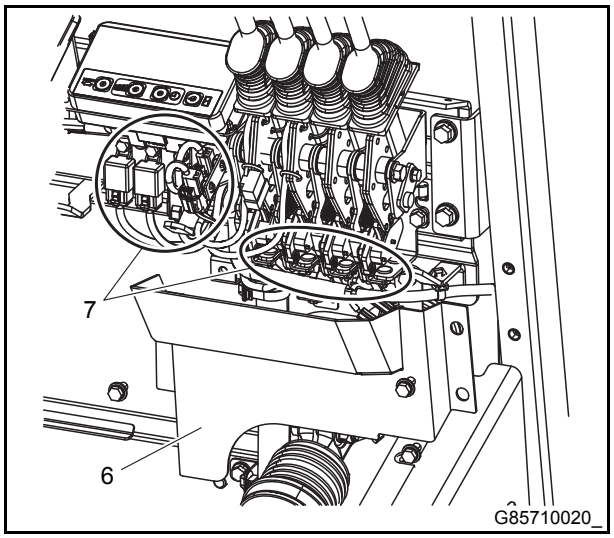
3 Remove the floor mat.



4 Remove the toe boards (FR and RR).

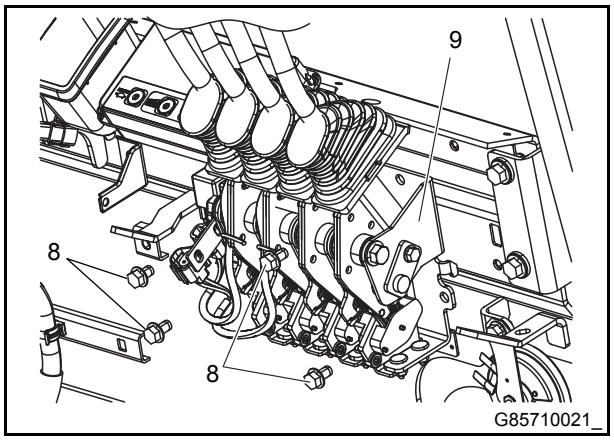
5 Remove the instrumental panel (RH).

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6 Remove the lower panel.

7 Remove the connector of knob switch, multifunction display.



8 Remove the bolts.

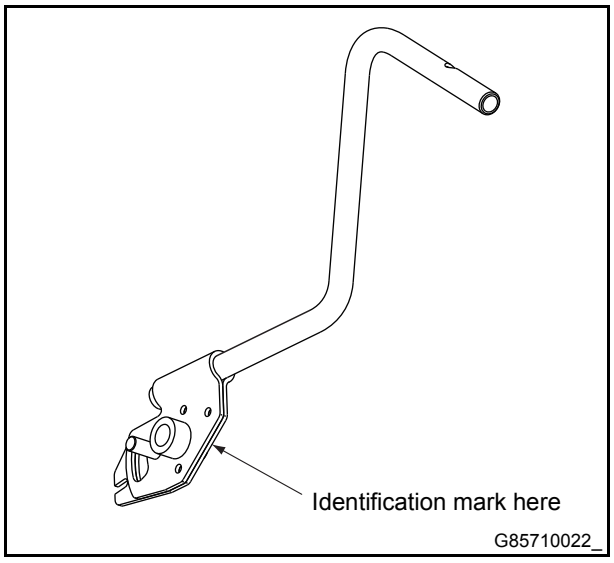
9 Remove the conventional lever ASSY.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

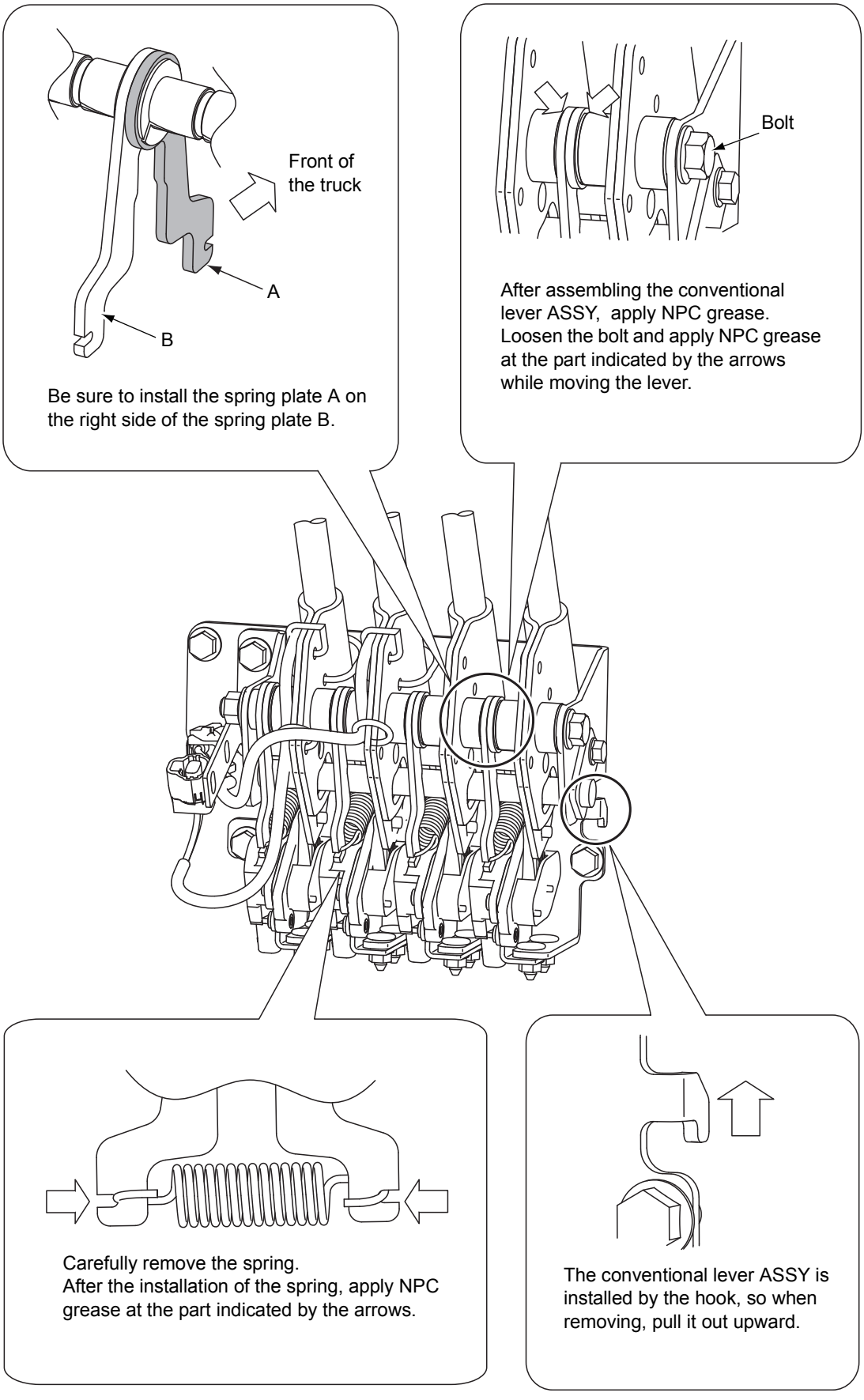
NOTES ON CONVENTIONAL LEVER REPLACEMENT

When replacing the conventional lever, check the identification mark on the surface of the lever.



Type	Identificaiton color
Lift lever (1st)	Red
Tilt lever (2nd)	White
ATT lever (3rd)	Yellow
ATT lever (4th)	Green

Note:

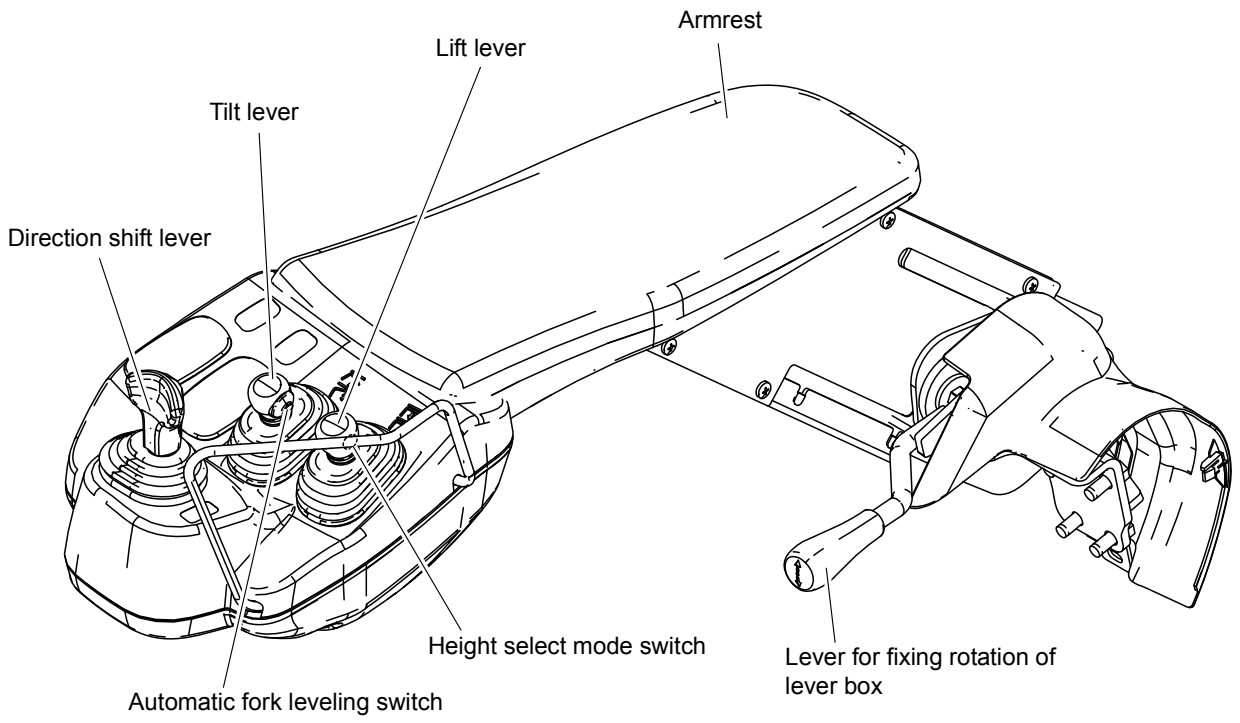

Front of the truck
A
B
Be sure to install the spring plate A on the right side of the spring plate B.
Bolt
After assembling the conventional lever ASSY, apply NPC grease. Loosen the bolt and apply NPC grease at the part indicated by the arrows while moving the lever.
Carefully remove the spring.
After the installation of the spring, apply NPC grease at the part indicated by the arrows.
The conventional lever ASSY is installed by the hook, so when removing, pull it out upward.
G85710023_

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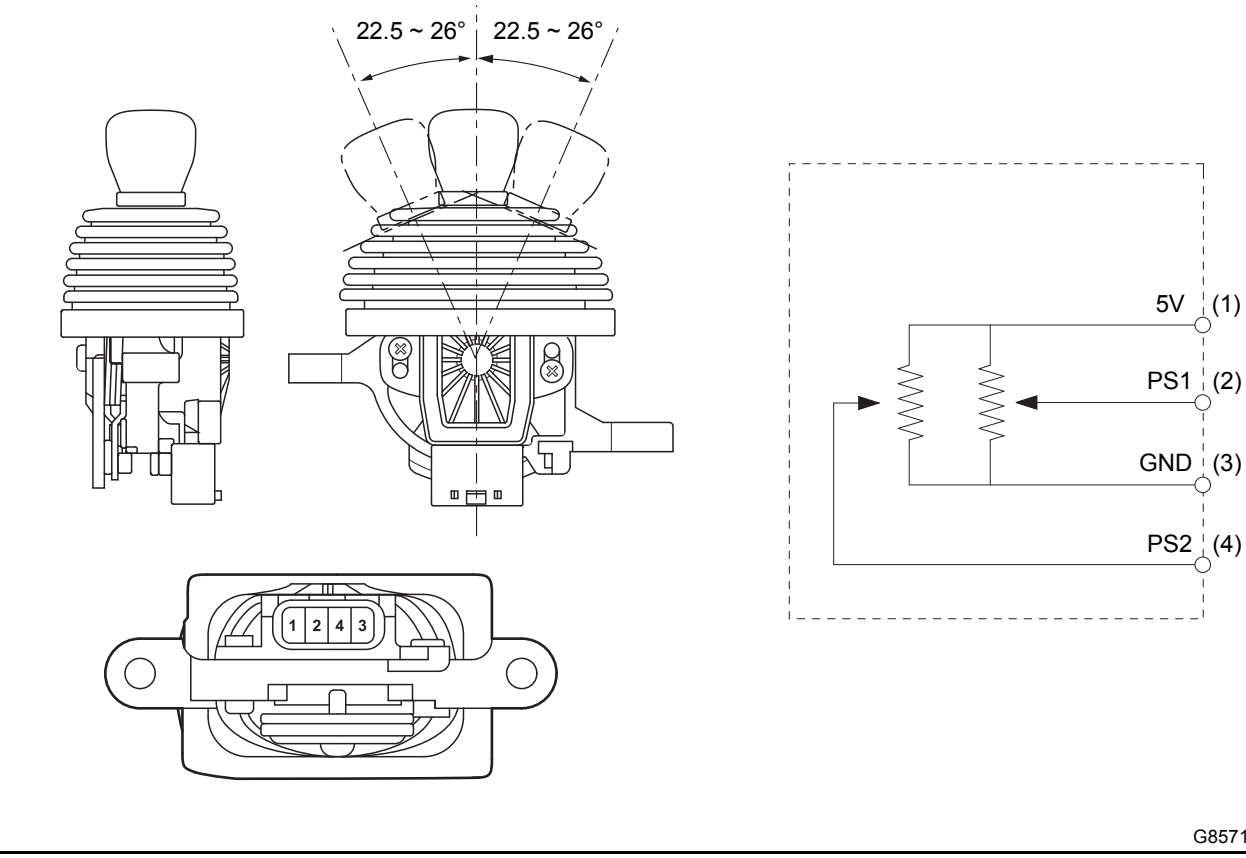
MINI LEVER·JOY STICK LEVER (OPT)

GENERAL

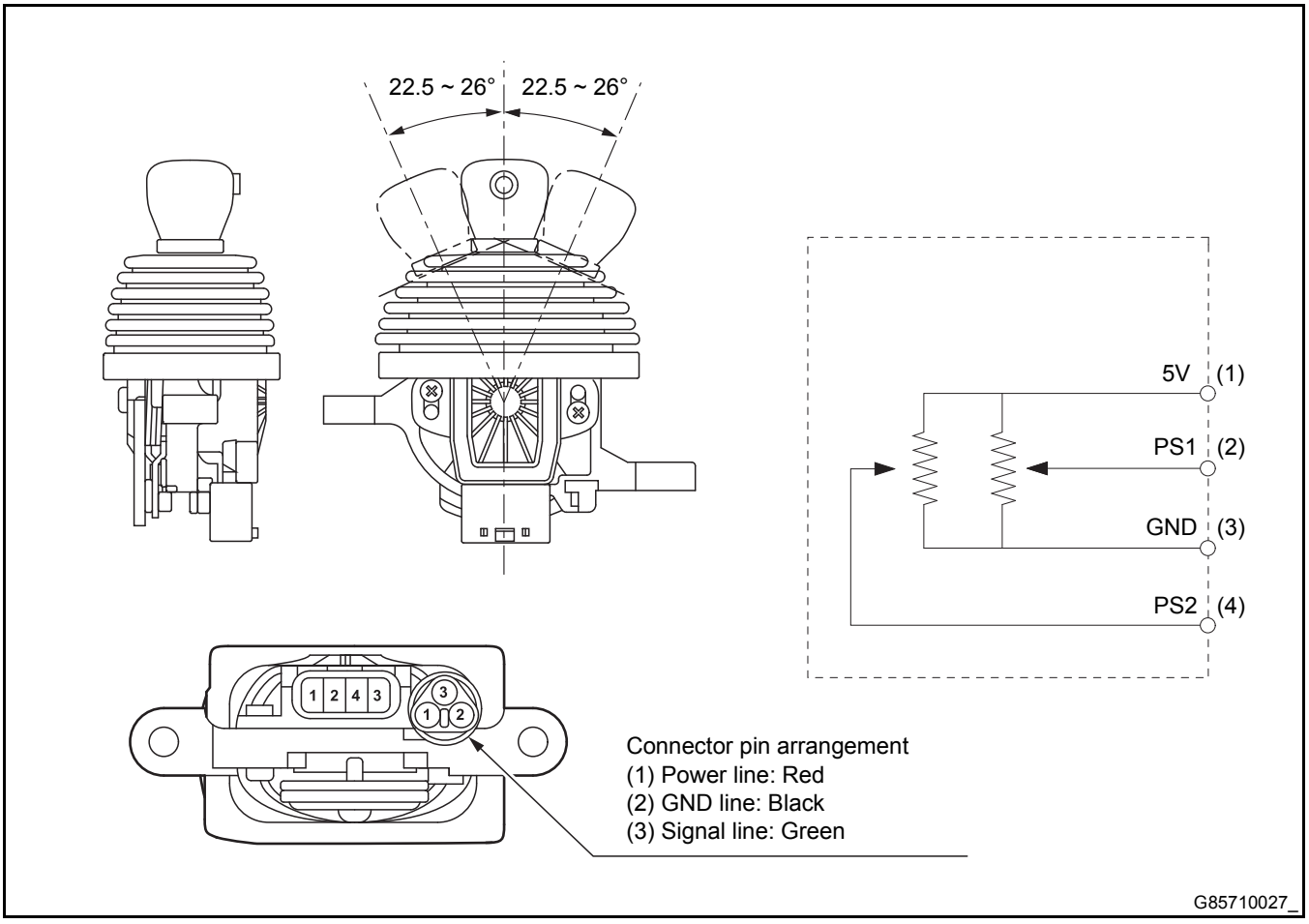
Mini lever (Direction shift lever located on the armrest)



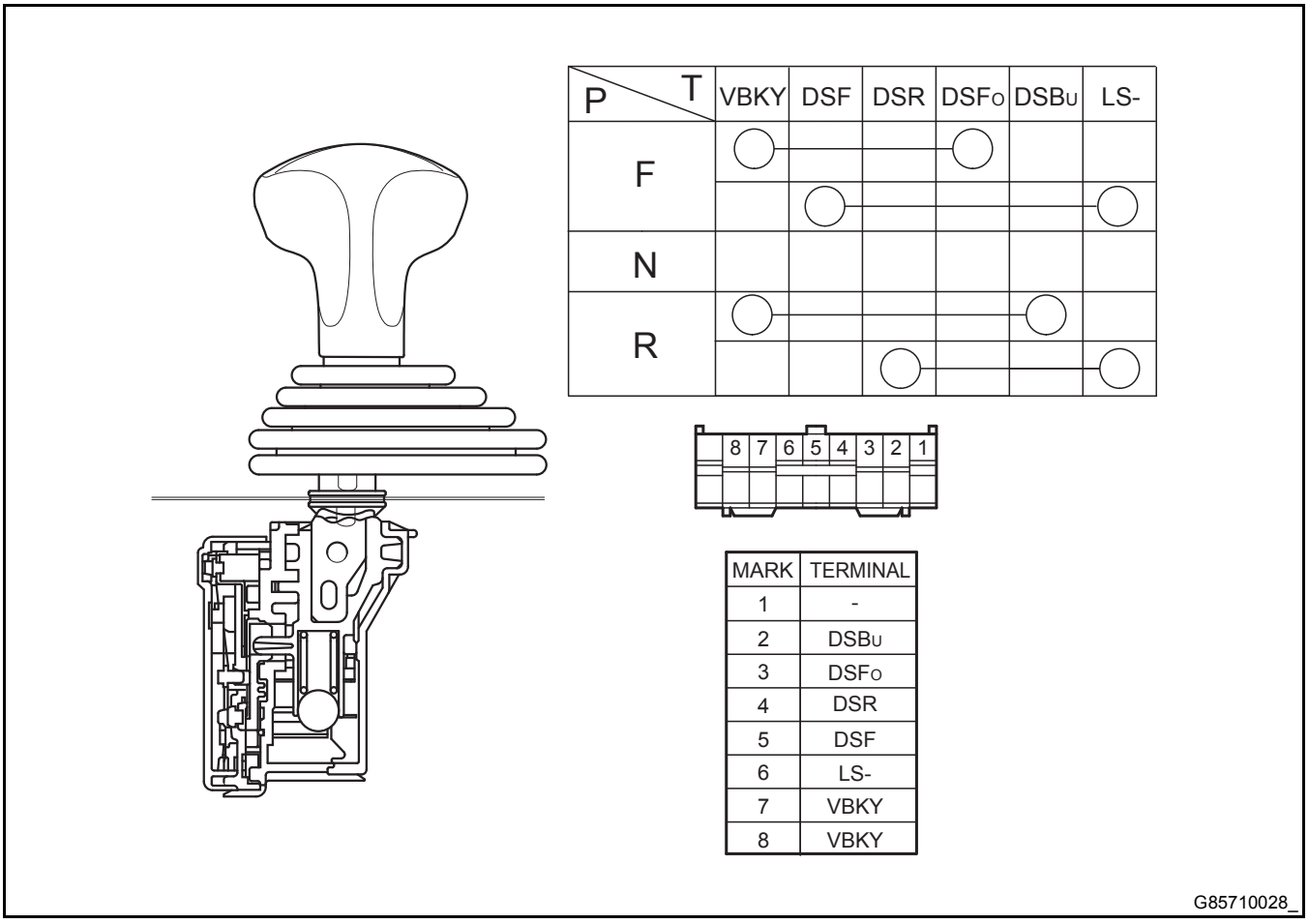
Lift Lever·Attachment Lever



Tilt Lever

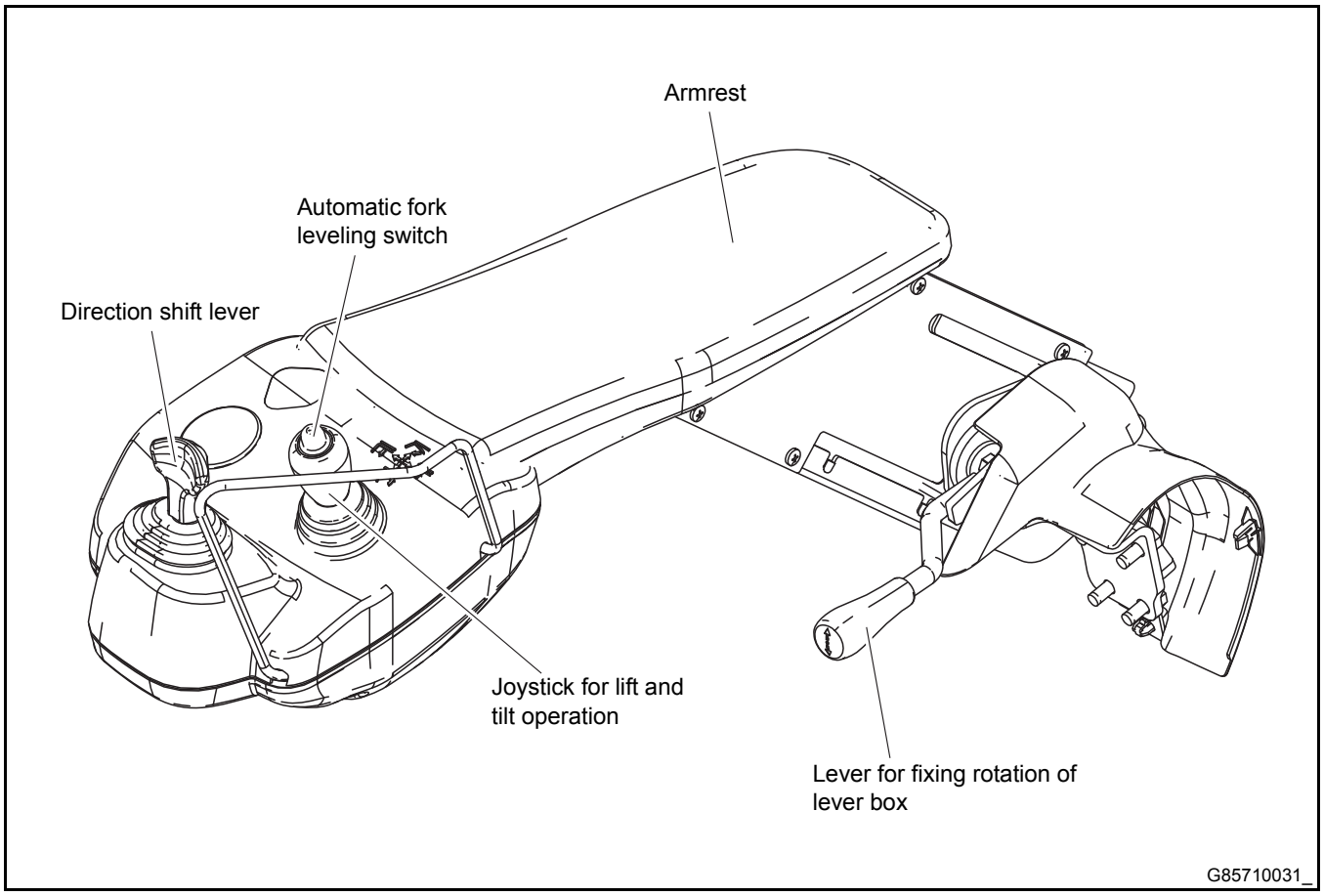


Direction Switch

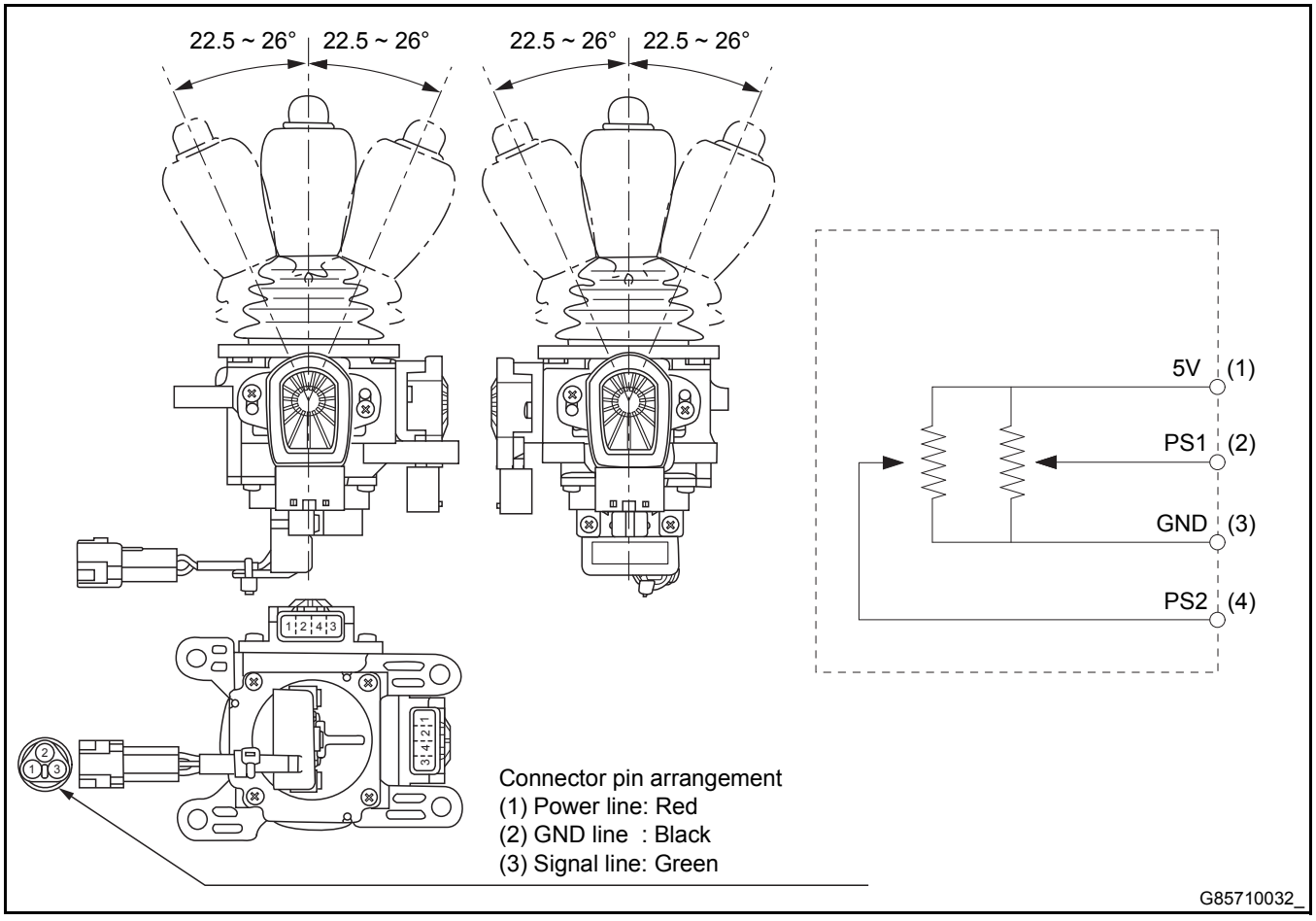


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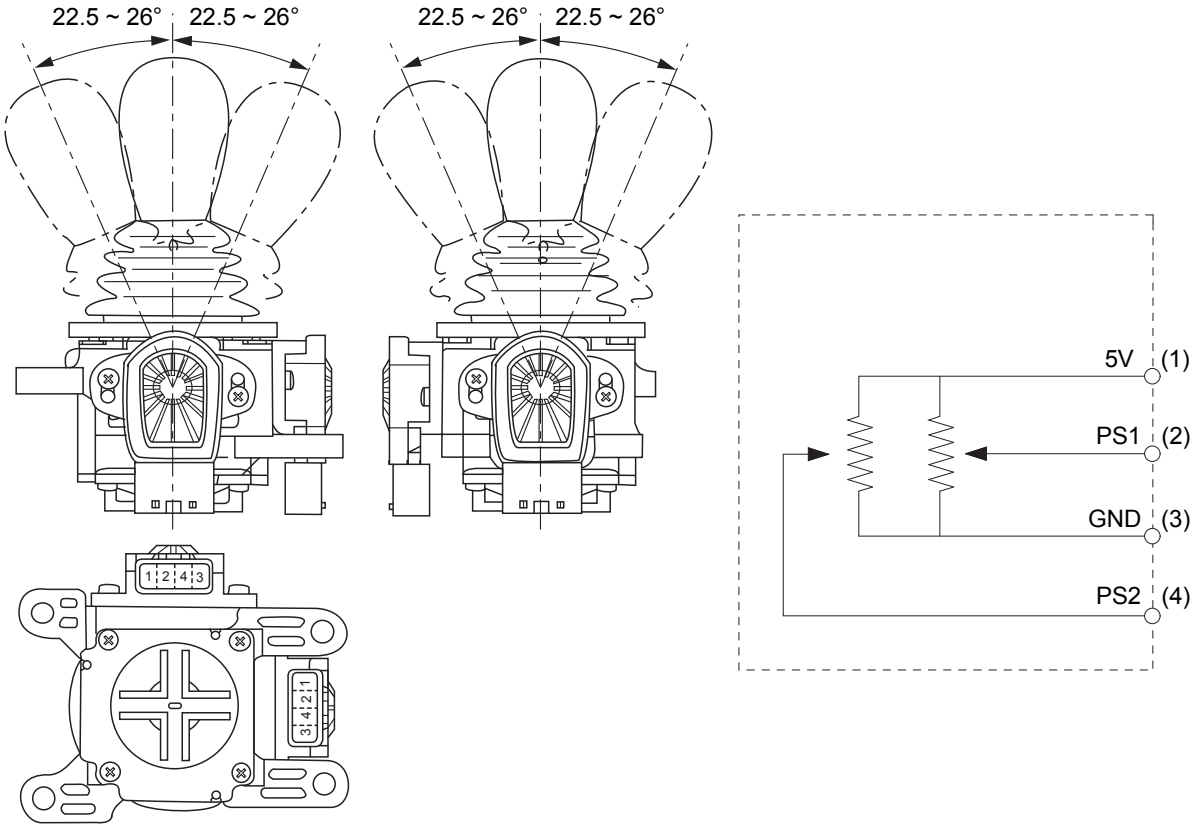
Joy stick lever (Direction shift lever located on the armrest)



Joystick for Lift and Tilt1 Operation

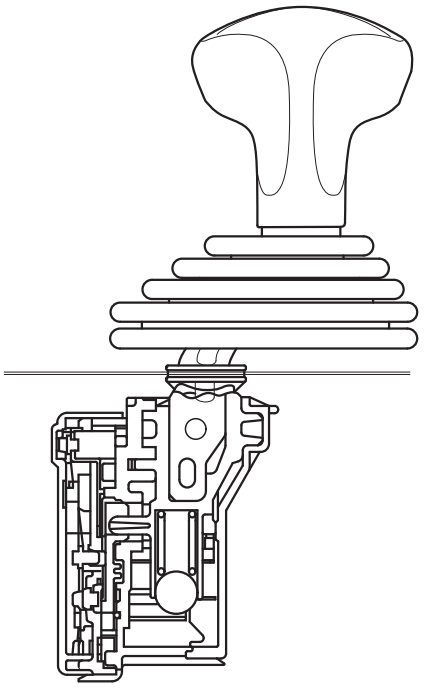


Joystick for Attachment Operation

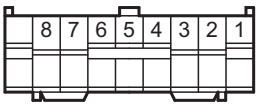


G85710033_

Direction Switch



P \ T	VBKY	DSF	DSR	DSFo	DSBu	LS-
F	○			○		
		○				○
N						
R	○				○	
			○			○

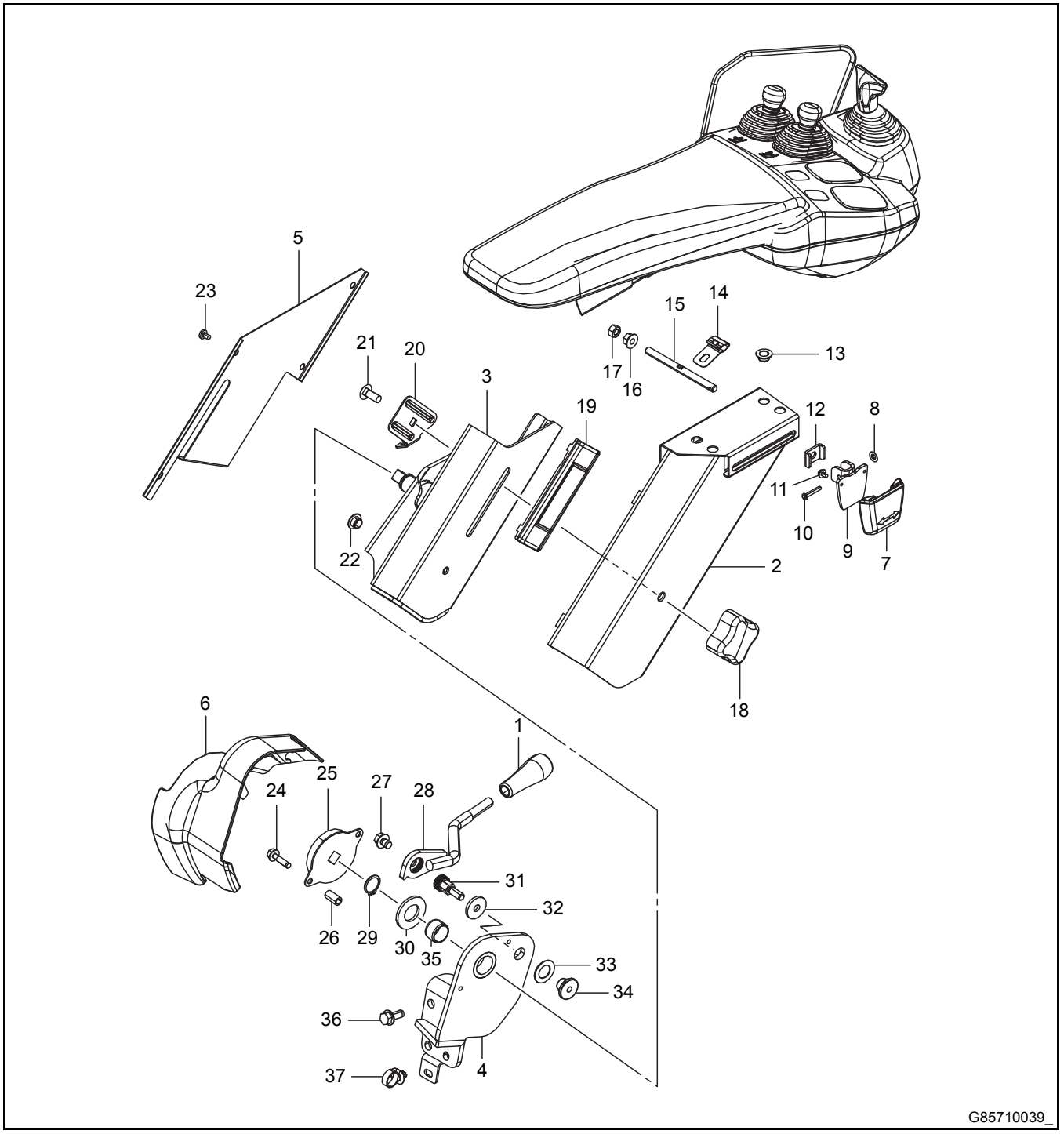


MARK	TERMINAL
1	-
2	DSBu
3	DSFo
4	DSR
5	DSF
6	LS-
7	VBKY
8	VBKY

G85710034_

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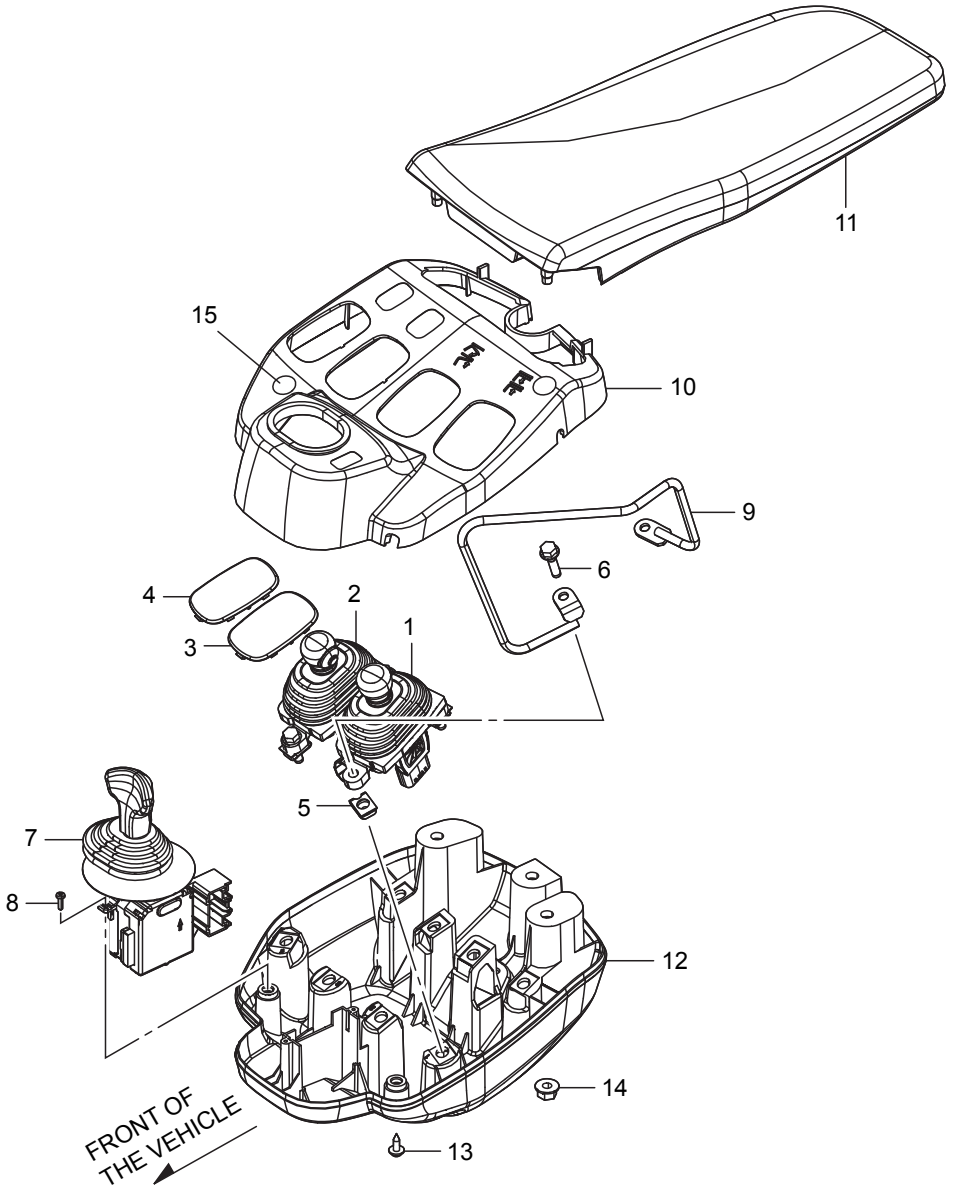
COMPONENTS



No.	Parts name	QTY	No.	Parts name	QTY
1	KNOB SUB-ASSY, ACCEL LEVER	1	20	PLATE	1
2	BRACKET SUB-ASSY, UPR	1	21	BOLT	1
3	BRACKET SUB-ASSY, LWR	1	22	BUSH	1
4	BRACKET SUB-ASSY	1	23	SCREW	4
5	COVER	1	24	BOLT, FLANGE	2
6	COVER	1	25	DAMPER ASSY, ROTARY	1
7	GRIP	1	26	SPACER	2
8	WASHER, PUSH	1	27	BOLT, FLANGE	1
9	PLATE SUB-ASSY, LEVER	1	28	LEVER, SUB-ASSY	1
10	PIN	1	29	RING, SHAFT SNAP	1
11	SCREW	2	30	WASHER, PLATE	1
12	RETAINER	1	31	BOLT, LOCK	1
13	BUSH	4	32	WASHER, PLATE	1
14	BRACKET, CLAMP	1	33	WASHER	1
15	BOLT	1	34	NUT, ADJUSTING	1
16	NUT, FLANGE	1	35	BUSH	1
17	NUT, HEXAGON	1	36	BOLT, FLANGE	4
18	KNOB	1	37	CLAMP	1
19	RAIL, SLIDE	2			

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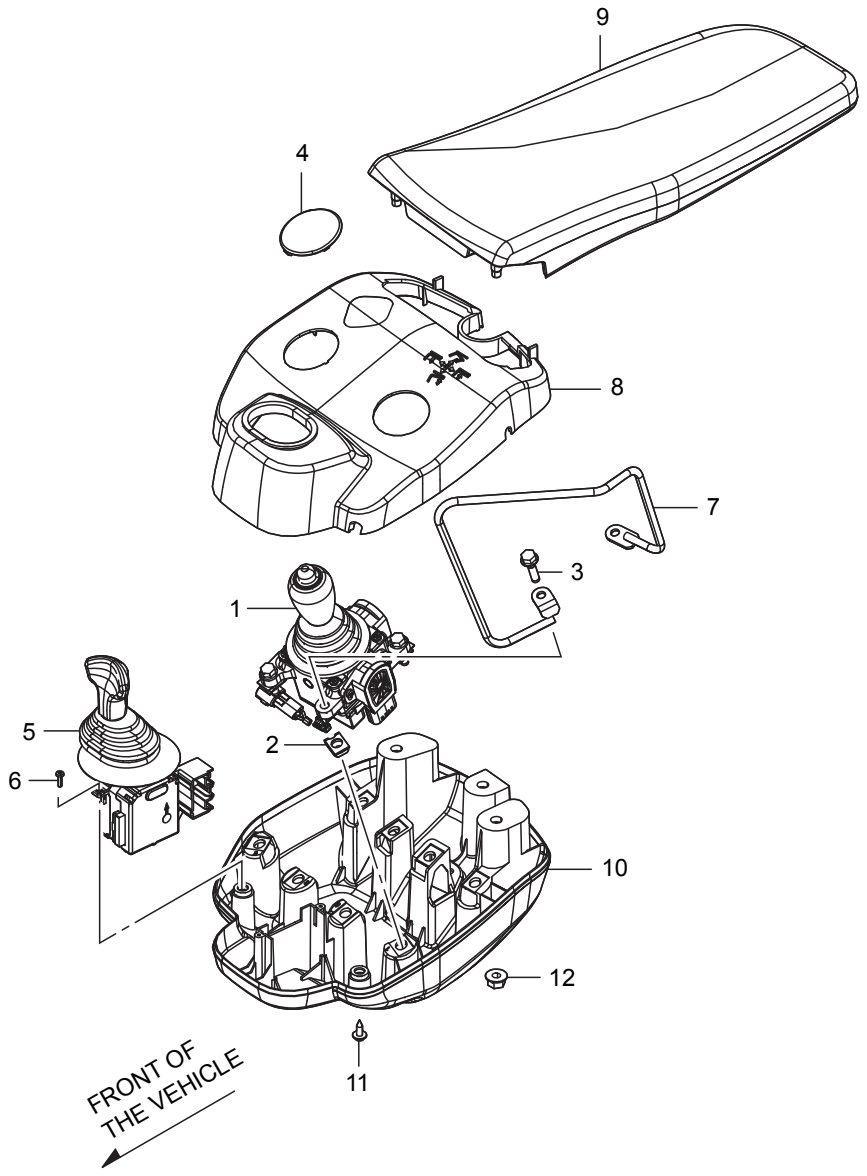
Mini Lever



G85710040_

No.	Parts name	QTY	No.	Parts name	QTY
1	LEVER ASSY, MINI	1	9	GUARD SUB-ASSY, MINI LEVER	1
2	LEVER ASSY, MINI, W/SWITCH	1	10	COVER, MINILEVER, W/SWITCH	1
3	PLUG, MINI LEVER	1	11	PAD ASSY, ARM	1
4	PLUG, MINI LEVER	1	12	BOX, LEVER	1
5	NUT, SPRING	4	13	SCREW, TAPPING	2
6	BOLT, FLANGE	4	14	NUT, FLANGE	3
7	SWITCH ASSY, DIRECTION	1	15	PLUG	1
8	SCREW, TAPPING	2			

JOYSTICK LEVER

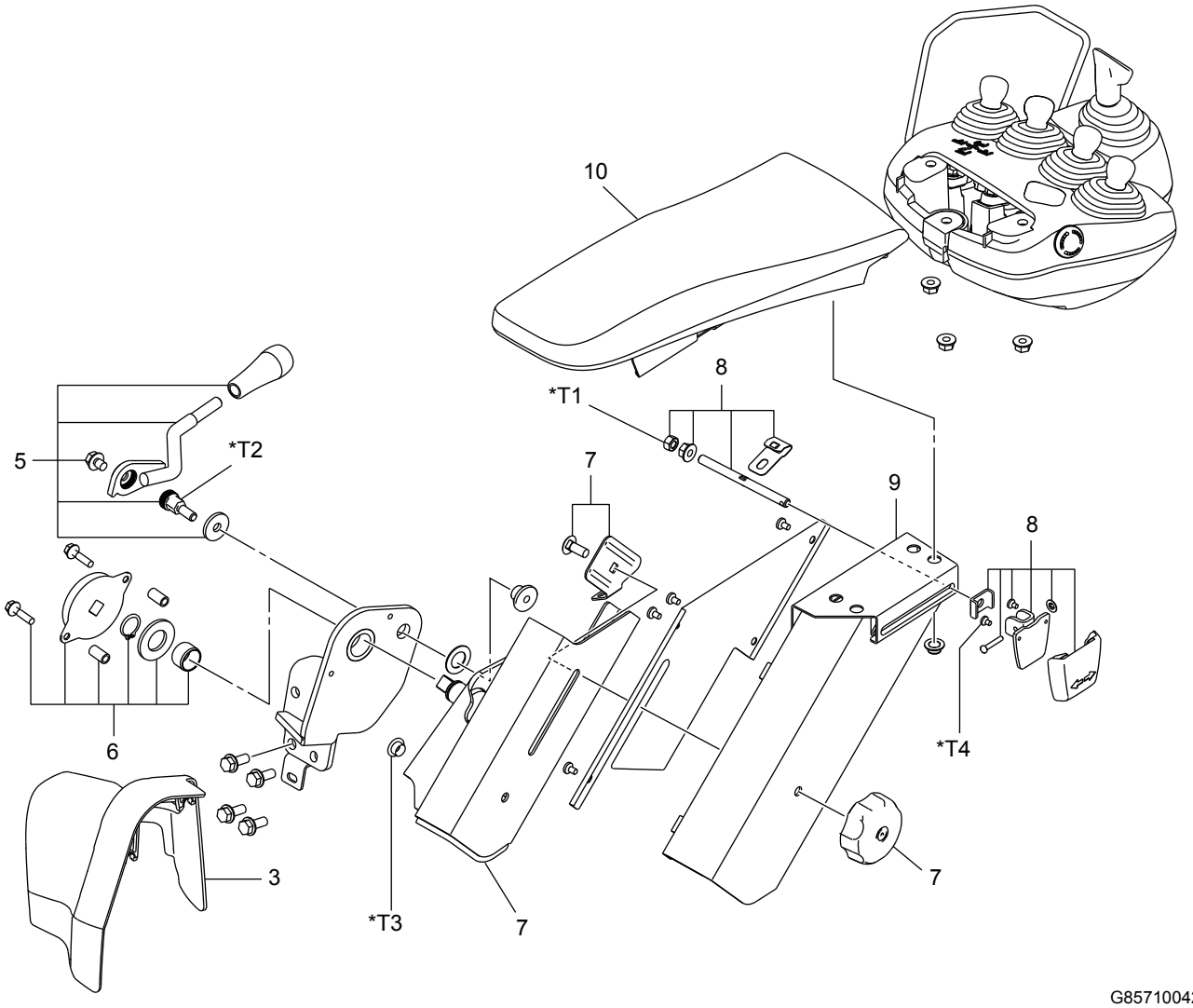


G85710041_

No.	Parts name	QTY	No.	Parts name	QTY
1	LEVER ASSY,JOYSTICK, W/SWITCH	1	7	GUARD SUB-ASSY, MINI LEVER	1
2	NUT, SPRING	4	8	COVER, MINILEVER, W/SWITCH	1
3	BOLT, FLANGE	4	9	PAD ASSY, ARM	1
4	PLUG, JOYSTICK	1	10	BOX, LEVER	1
5	SWITCH ASSY, DIRECTION	1	11	SCREW, TAPPING	2
6	SCREW, TAPPING	2	12	NUT, FLANGE	3

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REMOVAL·INSTALLATION



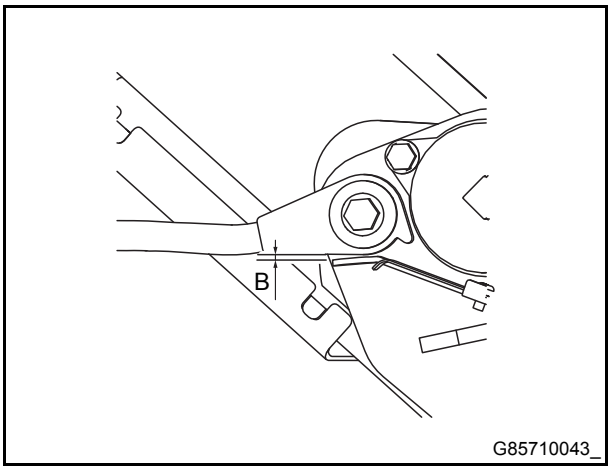
* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 14 (143) [10.3]
T2 = 35 ~ 40 (357 ~ 408) [26 ~ 30]
T3 = 2 ~ 4 (20.4 ~ 40.8) [1.5 ~ 3.0]
T4 = 2 ~ 4 (20.4 ~ 40.8) [1.5 ~ 3.0]

Removal Procedure

1 Open the battery hood and disconnect the connector.
2 Close the engine hood.
3 Remove the lever cover for setting rotation.
4 Remove the mini lever box W/ armrest and the armrest bracket.
5 Remove the lever for setting rotation.
6 Remove the rotary damper ASSY.
7 Remove the knob for fixing height and the lower bracket.
8 Remove the lever for setting forward and backward.
9 Remove the upper bracket.
10 Remove the armrest ASSY.

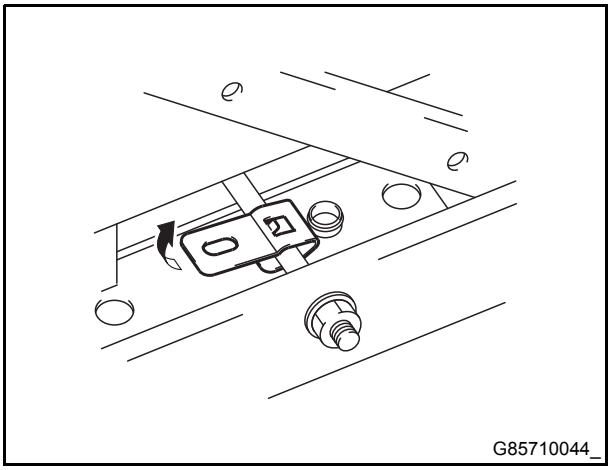
Installation Procedure

The installation procedure is the reverse of the removal procedure.

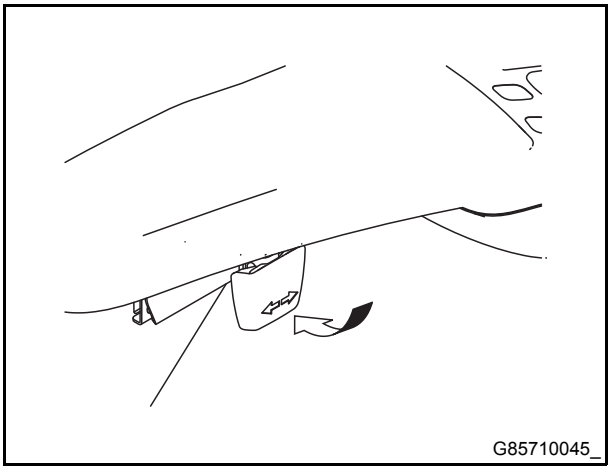


1 When installing the lever for setting rotation, set the dimension B shown in the illustration on the left 3 to 6 mm (0.118 to 0.236 in).

The part B moves 3.6 mm (0.142 in) with 1 notch of the serration.



2 When installing the lever for setting forward and backward, align the hole in the clamp bracket with the lever shaft protrusion to install, then turn as shown in the illustration on the left.

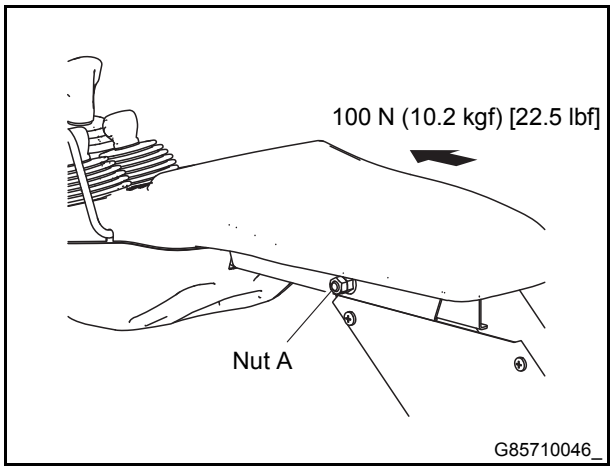


3 Follow the procedure below to install the forward-backward adjustment lever.

(1) Move the armrest to the rearmost part.

(2) Tighten the flange nut until the operating force at the top of the lever becomes 65 to 100 N (6.6 ~ 10.2 kgf) [14.6 ~ 22.5 lbf].

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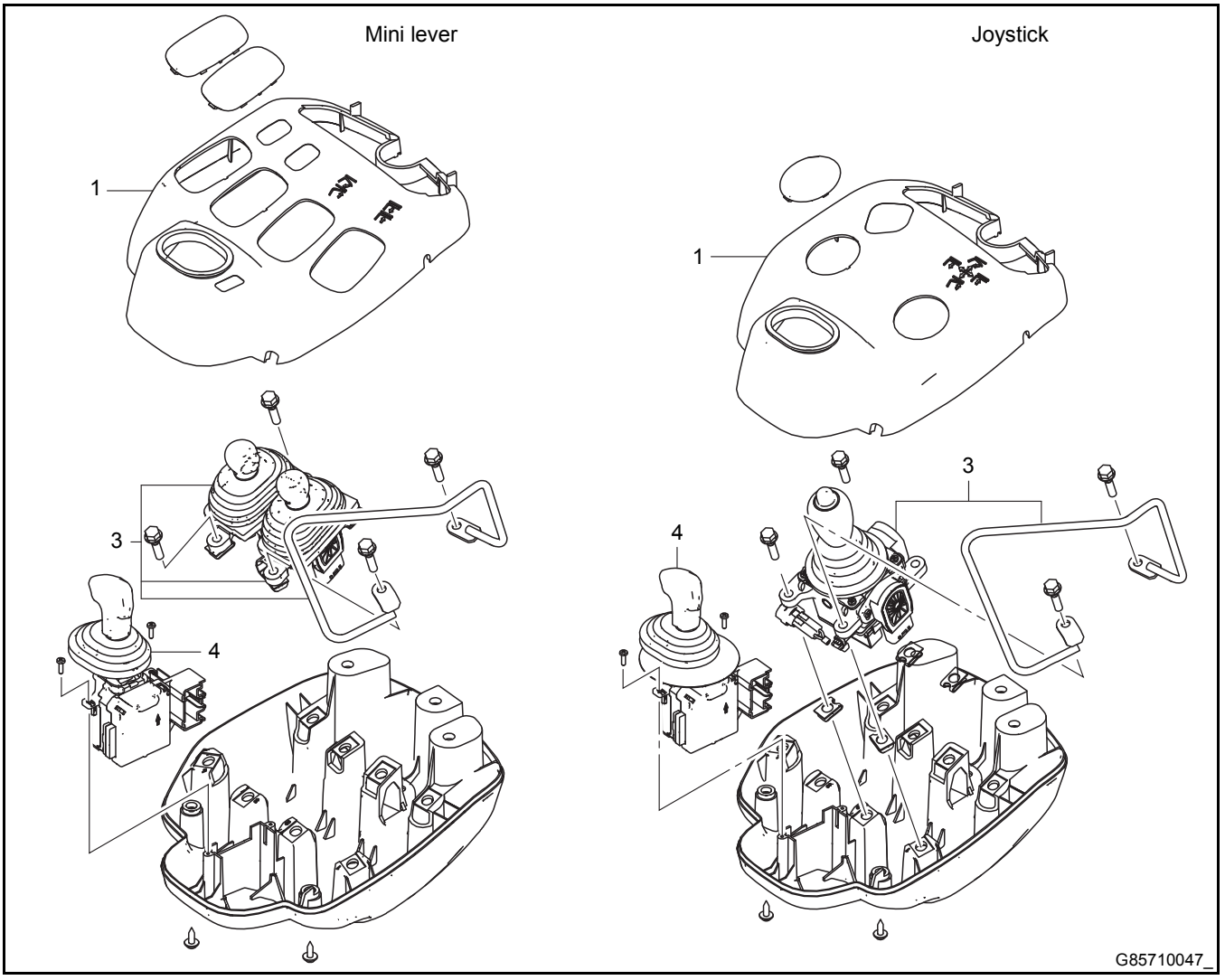


(3) Press the armrest forward with the force of 100 N (10.2 kgf) [22.5 lbf], and check that it doesn't move. If it moves, tighten the flange nut further.

(4) Tighten nut A to the specified torque.

T = 14 N·m (142.8 kgf·cm) [10.3 ft·lbf]

DISASSEMBLY·REASSEMBLY



Disassembly Procedure

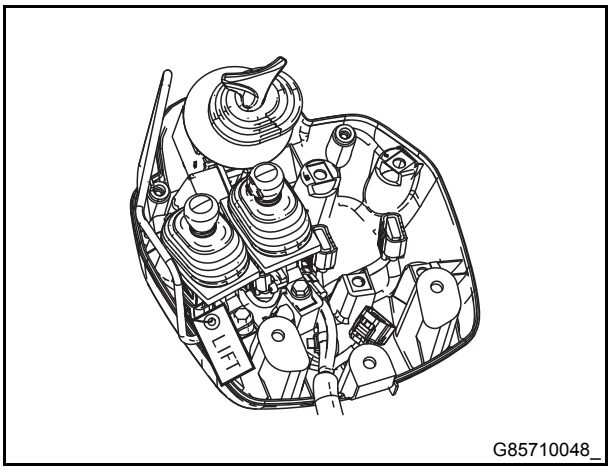
1 Remove the lever cover.

2 Disconnect the connector.

Always mark connectors with a tag etc. so that the connection points can be found during reassembly.

3 Remove each lever ASSY and guide.

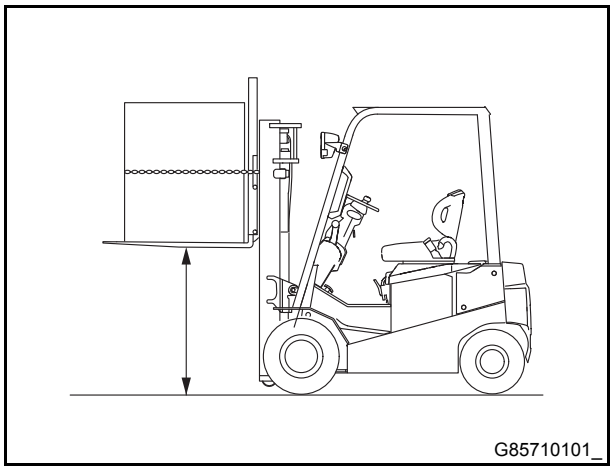
4 Remove the direction switch ASSY.



Reassembly Procedure

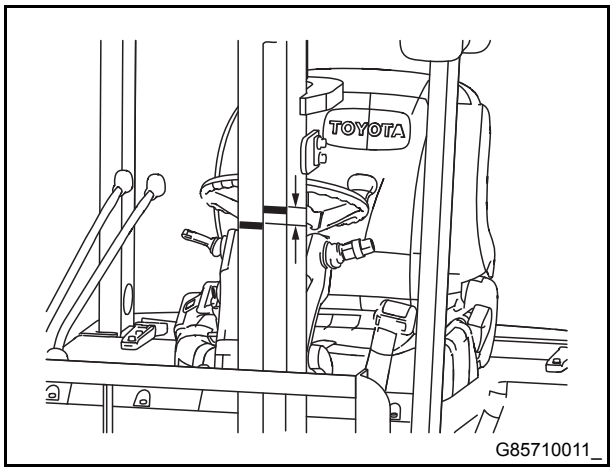
The reassembly procedure is the reverse of the disassembly procedure.

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G85710101_

NATURAL DROP TEST

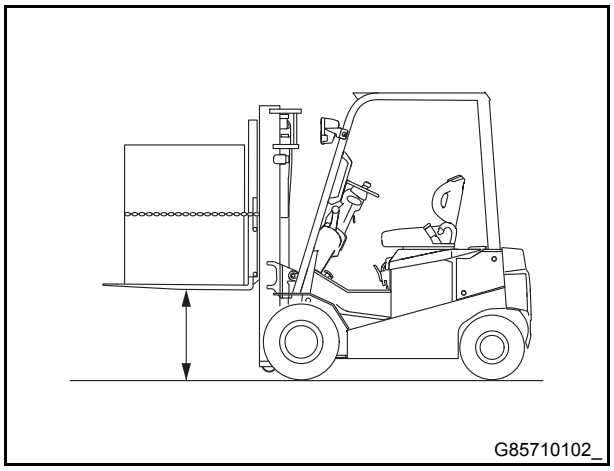
1 Set the mast vertical with the standard load on the fork. Lift the fork by 1 to 1.5 m (40 to 59 in), and turn the key switch OFF.



G85710011_

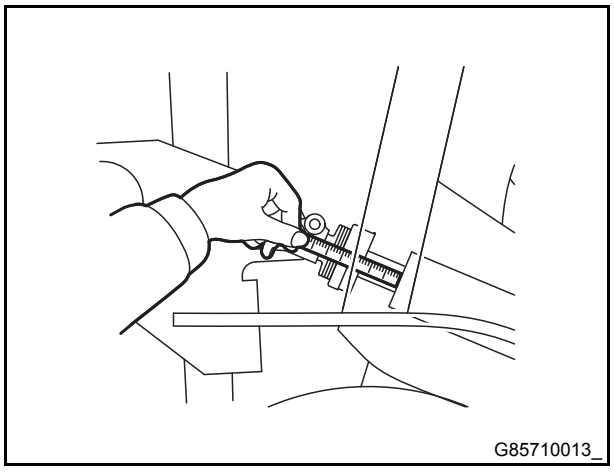
2 Draw datum lines on the inner and outer masts, and measure the drop in 15 minutes.

Limit: 45 mm (1.77 in)/ 15min


G85710102_

NATURAL FORWARD TILT TEST

1 Set the mast vertical with the standard load on the fork. Lift the fork by about 50 cm (19.7 in) and turn the key switch OFF.

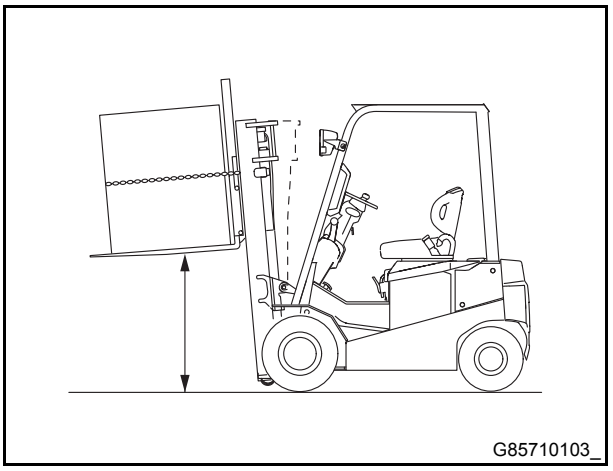

G85710013_

2 Measure the tilt cylinder rod extension in 15 minutes.

Vehicle models	Natural forward tilt amount mm (in) / 15min (Reference: degree / 15min)
1 ton series	15 (0.59) or less (1.7 or less)
2 ton series	20 (0.79) or less (1.7 or less)
3 ton series	25 (0.98) or less (1.7 or less)

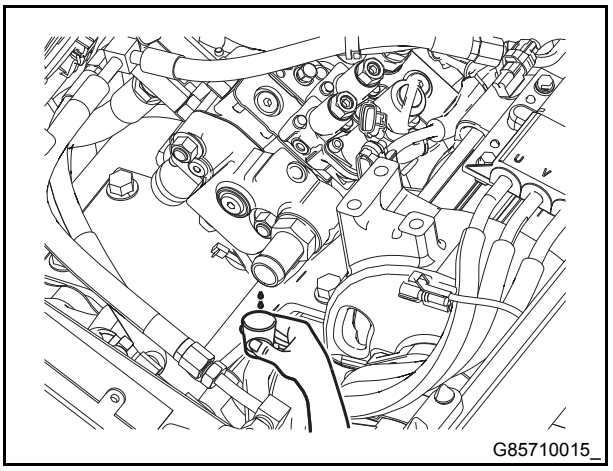
OIL LEAK TEST

LIFT CYLINDER


G85710103_

1 Set the mast vertical with the standard load on the fork. Lift the fork by 1 to 1.5 m (40 to 59 in).

2 Slowly tilt the mast fully forward, and turn the key switch OFF.

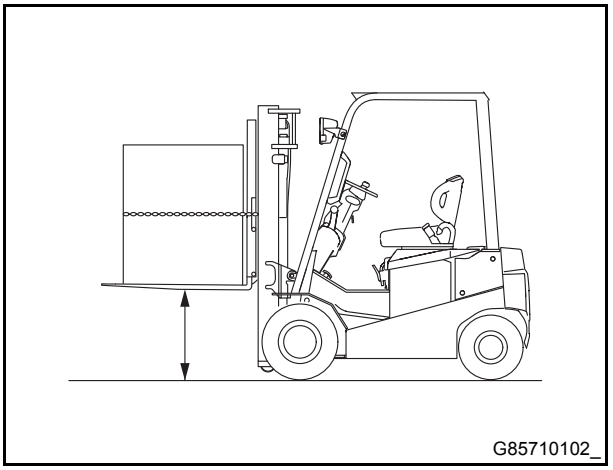

G85710015_

3 After 5 minutes, disconnect the oil control valve to oil tank hose. Place a measuring cylinder under the elbow and measure the amount of oil leaking in one minute.

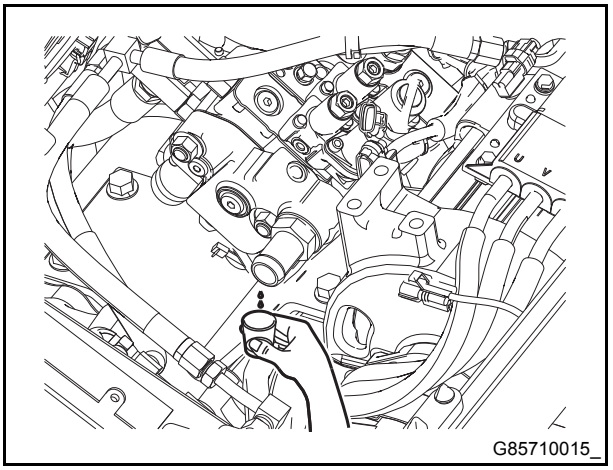
Standard (at lift port): 8 mm^3 (0.49 in^3) or less

Note:
If the natural drop is big even though the oil leak amount is within the standard, the lift cylinder packing is defective.

TILT CYLINDER


G85710102_

1 Set the mast vertical with the standard load on the fork. Lift the fork by about 50 cm (19.7 in) and turn the key switch OFF.


G85710015_

2 After 5 minutes, disconnect the oil control valve to oil tank hose. Place a measuring cylinder under the elbow and measure the amount of oil leaking in one minute.

Standard (total for lift and tilt):
16 mm^3 (0.98 in^3) or less

3 The leak amount at the tilt port is equal to the remainder when you subtract the leak amount at the lift port from the total leak amount of the lift and tilt cylinder.

Note:
If the natural forward tilt is great even though the oil leak amount is within the standard, either the tilt lock valve or the tilt cylinder packing is defective.

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MAST

Page

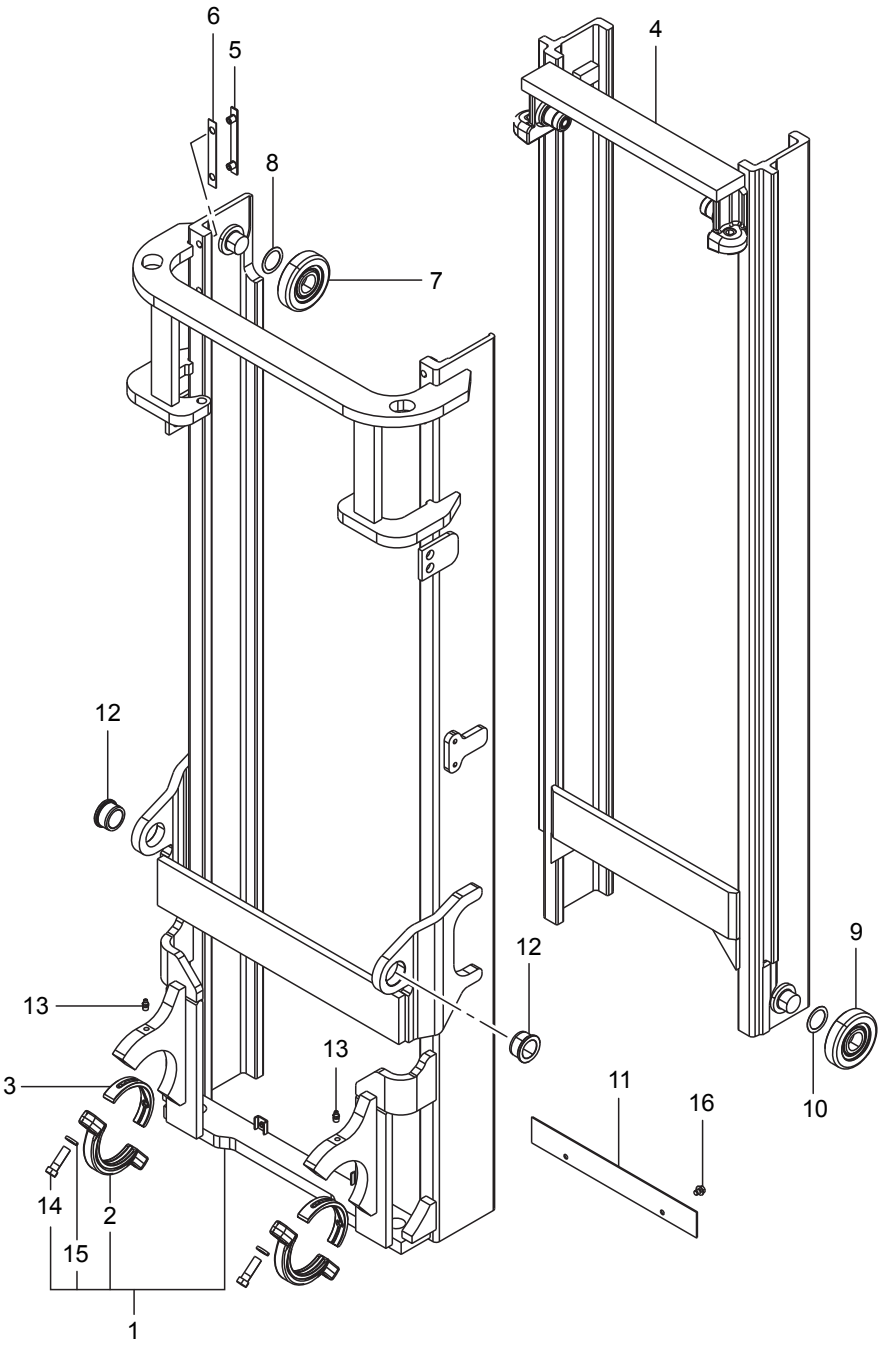
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COMPONENTS

V MAST

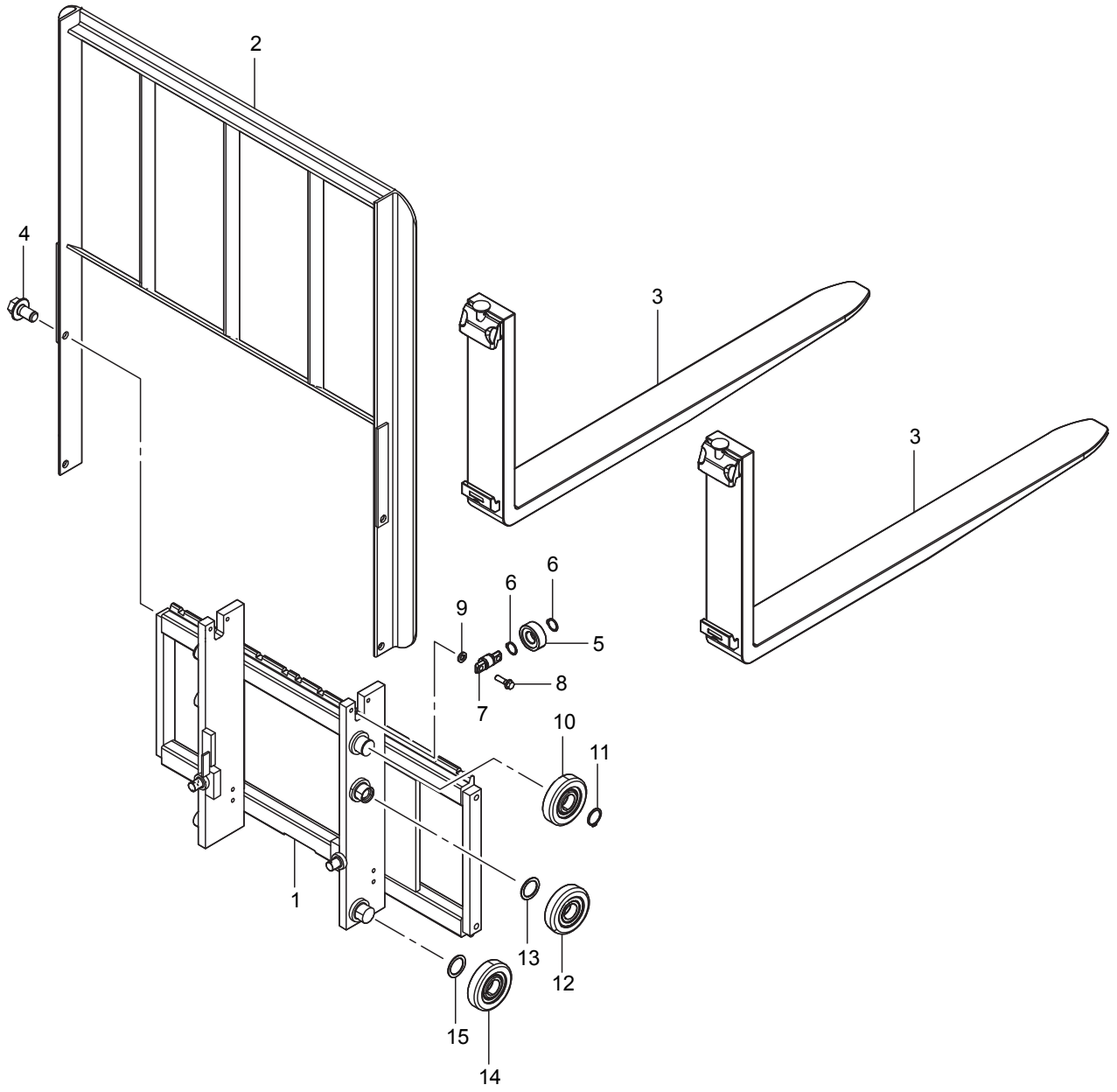
Mast



G85711001_

No.	Parts name	QTY	No.	Parts name	QTY
1	Mast sub-assy, outer	1	9	Roller, inner mast	2
2	Cap, mast support	2	10	Shim T=0.5, 1.0	99
3	Bushing, mast support	2	11	Plate, hose cover	1
4	Mast sub-assy, inner	1	12	Bushing, tilt cylinder support	2
5	Strip sub-assy, outer mast	2	13	Fitting, grease	2
6	Shim, outer mast strip	99	14	Bolt	4
7	Roller, outer mast	2	15	Washer, spring	4
8	Shim T=0.5, 1.0	99	16	Bolt	2

Lift Bracket (1 ton series)

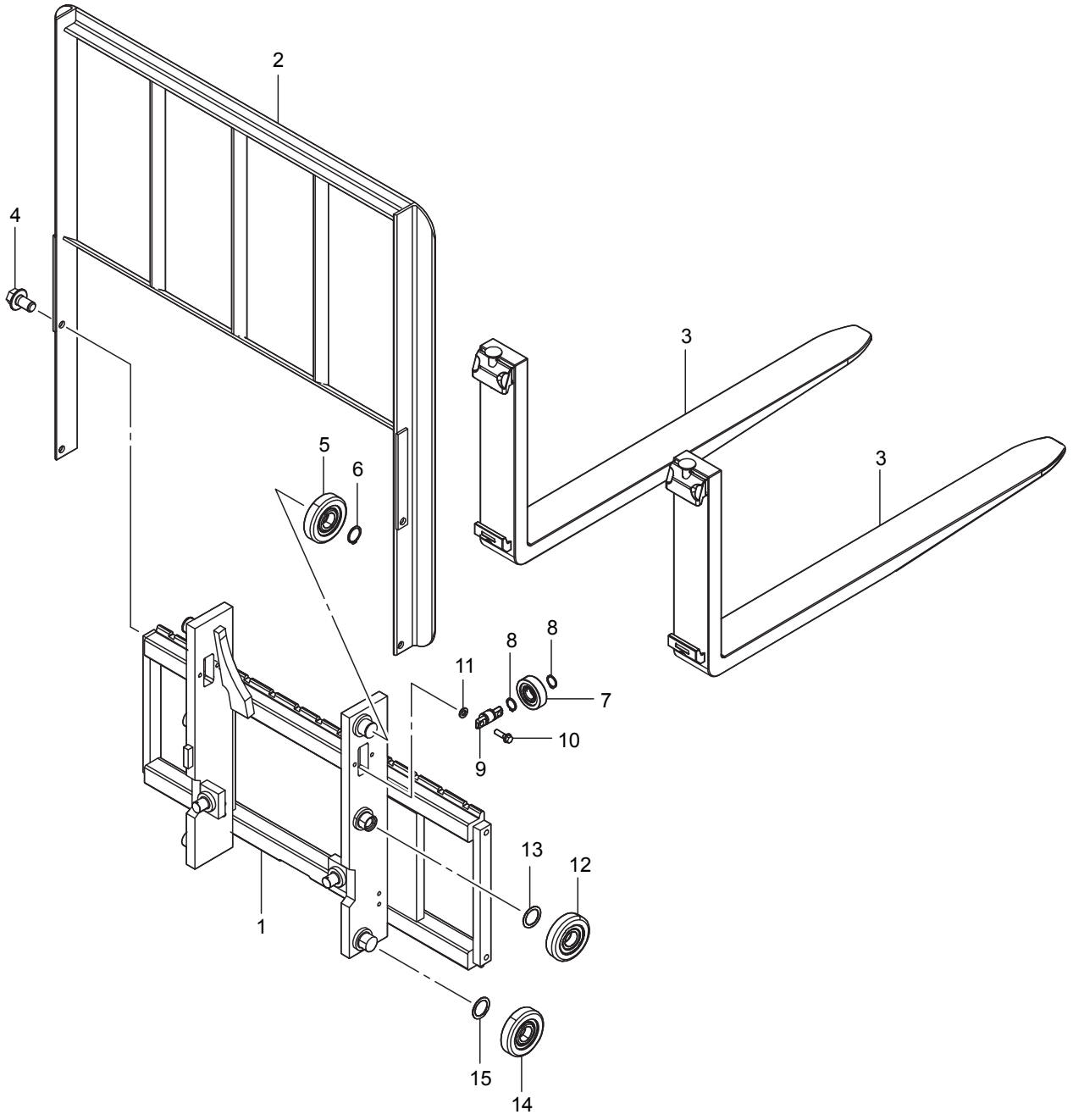


G85711002_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bracket sub-assy, lift	1	9	Shim T=0.5, 1.0, 3.2	99
2	Backrest sub-assy	1	10	Roller, lift	2
3	Fork sub-assy	2	11	Ring, shaft snap	2
4	Bolt	4	12	Roller, lift	2
5	Roller, side	2	13	Shim T=1.0	99
6	Ring, shaft snap	4	14	Roller, lift	2
7	Shaft, side roller	2	15	Shim T=0.5	99
8	Bolt	4			

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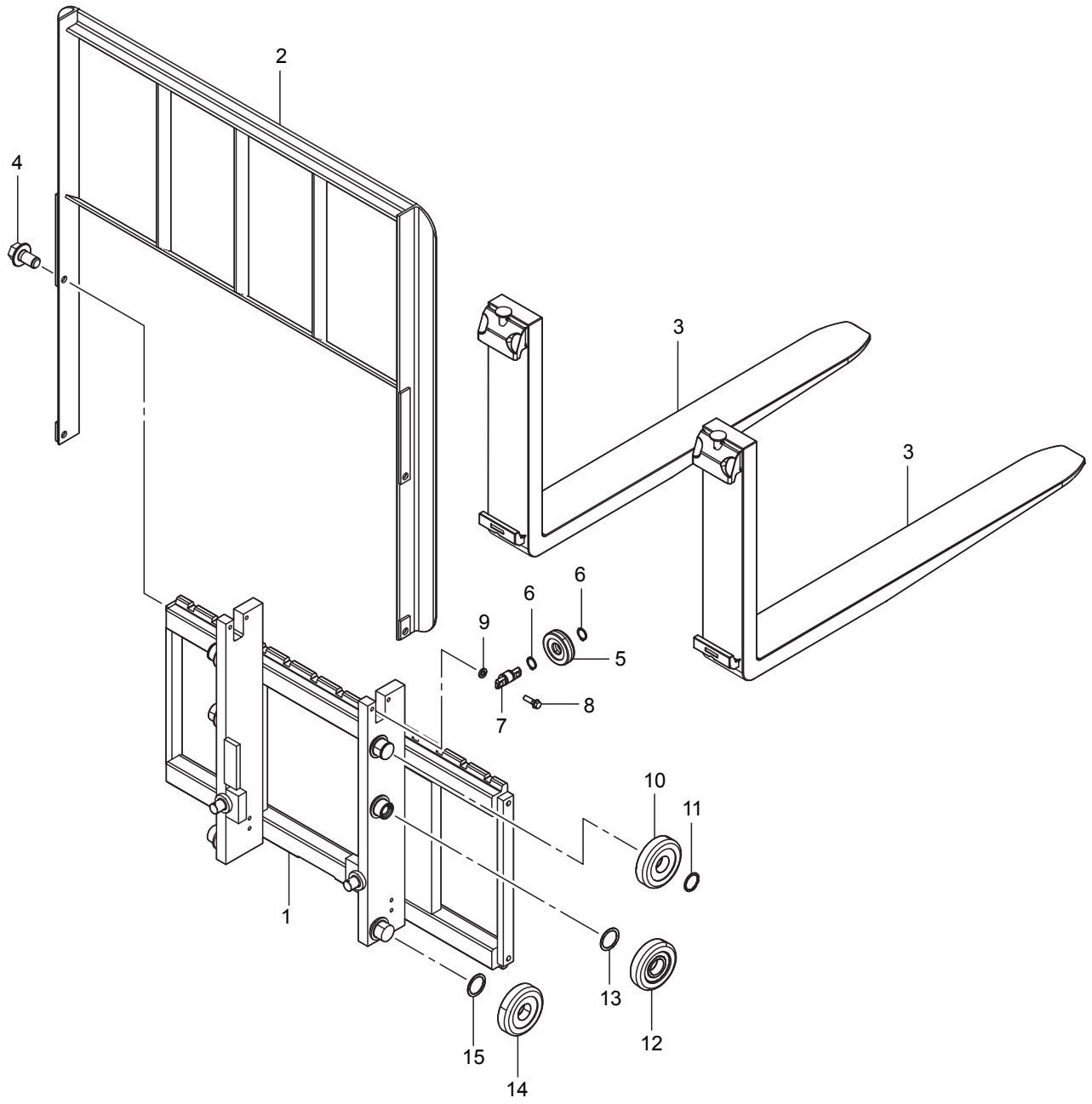
Lift Bracket (2 ton series)



G85711063_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bracket sub-assy, lift	1	9	Shaft, side roller	2
2	Backrest sub-assy	1	10	Bolt	4
3	Fork sub-assy	2	11	Shim T=0.5, 1.0, 3.2	99
4	Bolt	4	12	Roller, lift	2
5	Roller, lift	2	13	Shim T=1.0	99
6	Ring, shaft snap	2	14	Roller, lift	2
7	Roller, side	2	15	Shim T=0.5	99
8	Ring, shaft snap	4			

Lift Bracket (3 ton series)

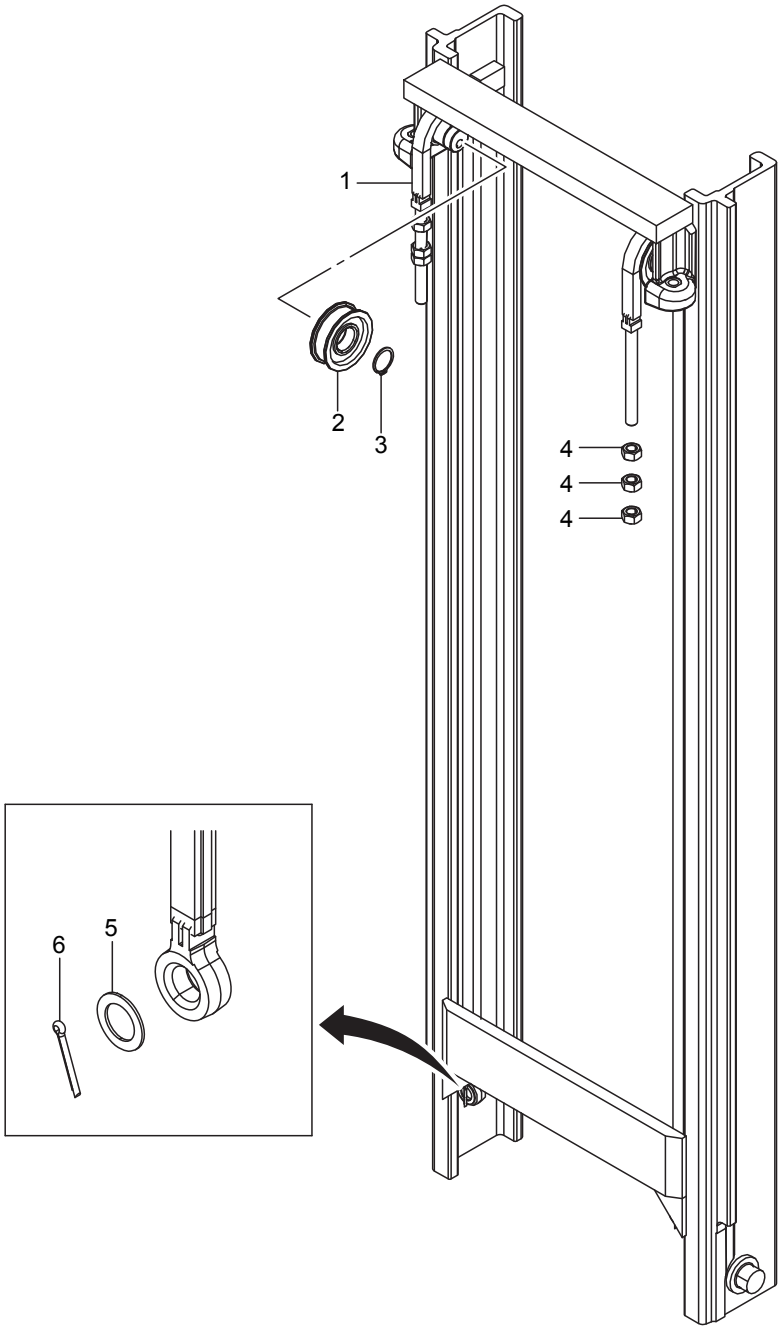


G85711064_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bracket sub-assy, lift	1	9	Shim T=0.5, 1.0, 3.2	99
2	Backrest sub-assy	1	10	Roller, lift	2
3	Fork sub-assy	2	11	Ring, shaft snap	2
4	Bolt	4	12	Roller, lift	2
5	Roller, side	2	13	Shim T=1.0	99
6	Ring, shaft snap	4	14	Roller, lift	2
7	Shaft, side roller	2	15	Shim T=0.5	99
8	Bolt	4			

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Chain

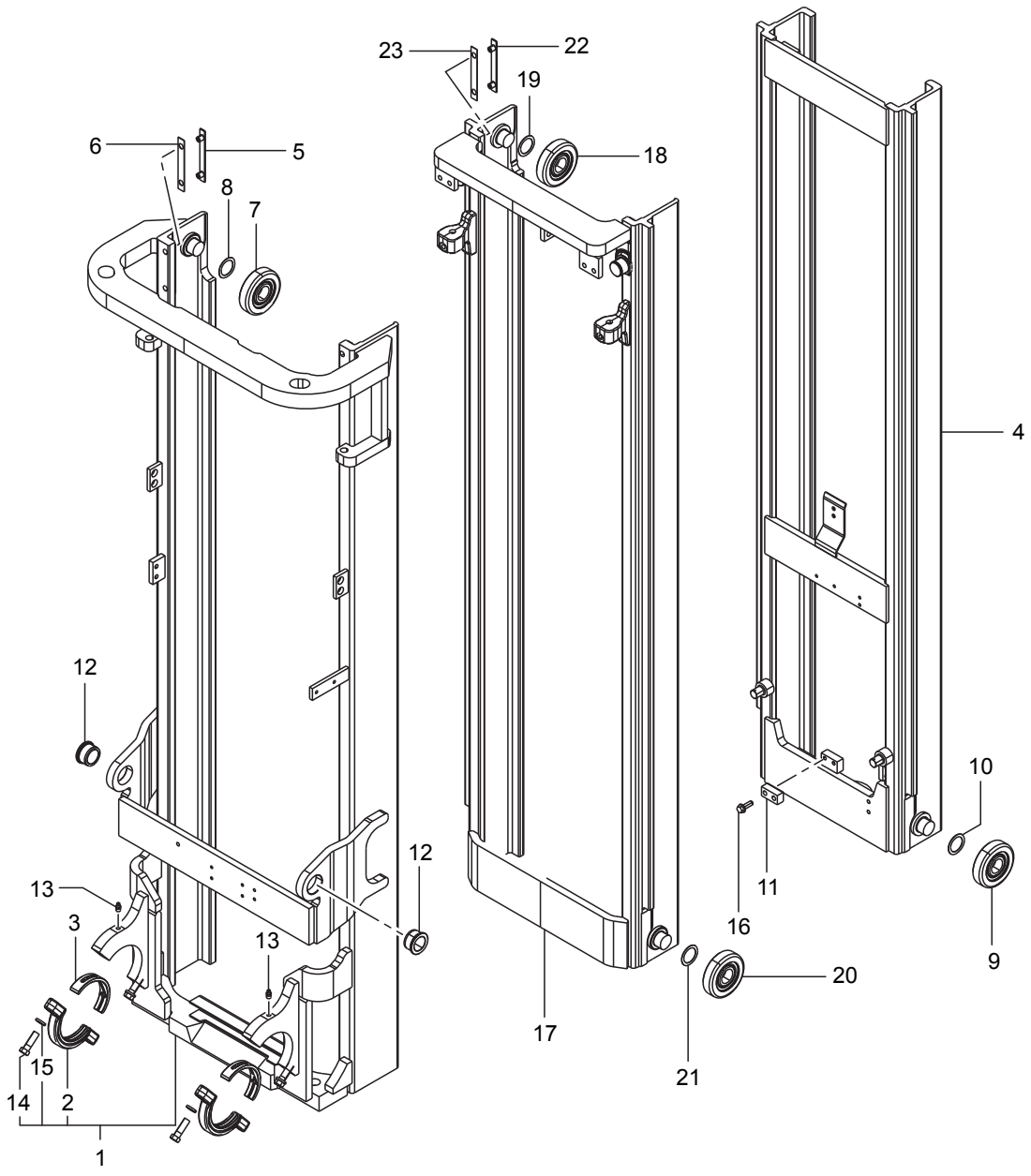


G85711003_

No.	Parts name	QTY	No.	Parts name	QTY
1	Chain sub-assy	2	4	Nut	6
2	Wheel, chain	2	5	Washer, chain special	2
3	Ring, shaft snap	2	6	Pin, cotter	2

FSV MAST

Mast

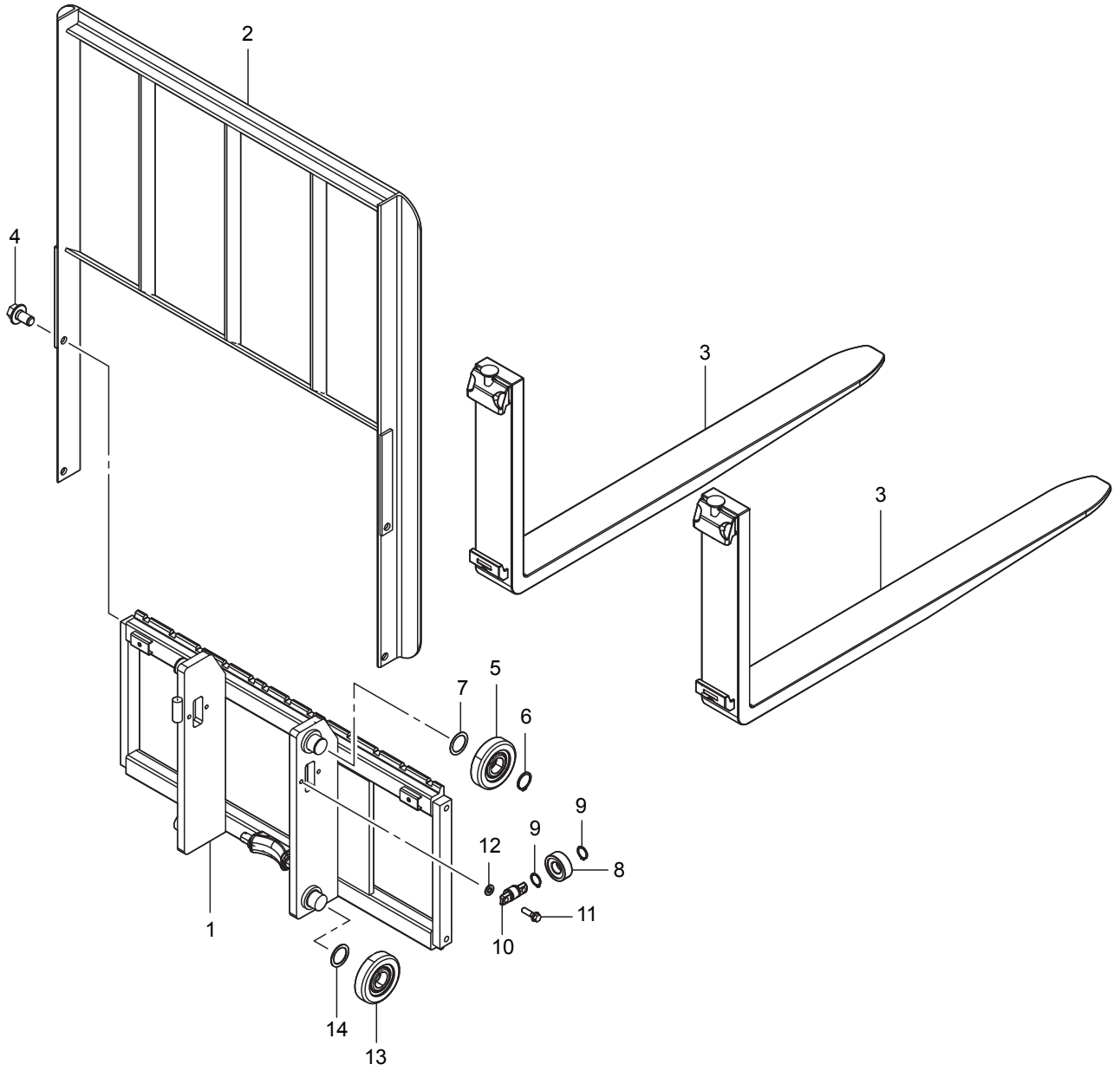


G85711004_

No.	Parts name	QTY	No.	Parts name	QTY
1	Mast sub-assy, outer	1	13	Fitting, grease	2
2	Cap, mast support	2	14	Bolt	4
3	Bushing, mast support	2	15	Washer, spring	4
4	Mast sub-assy, inner	1	16	Bolt	2
5	Strip sub-assy, outer mast	2	17	Mast sub-assy, middle	1
6	Shim T=0.5, 1.0	99	18	Roller, upper, middle mast	2
7	Roller, outer mast	2	19	Shim T=0.5, 1.0	99
8	Shim T=0.5, 1.0	99	20	Roller, lower, middle mast	2
9	Roller, inner mast	2	21	Shim T=0.5, 1.0	99
10	Shim T=0.5, 1.0	99	22	Strip sub-assy, middle mast	2
11	Plate	1	23	Shim T=0.5, 1.0	99
12	Bushing, tilt cylinder support	2			

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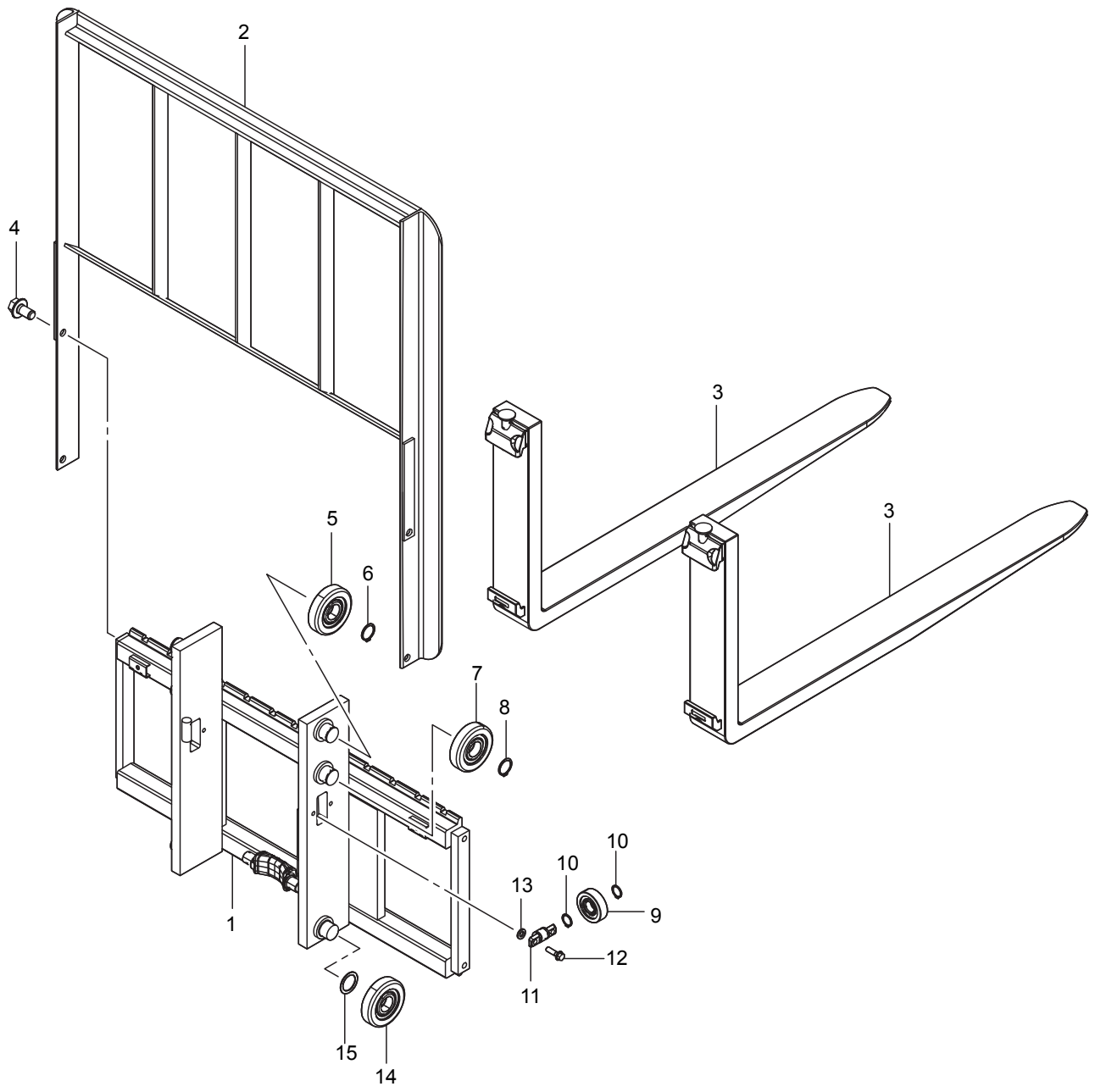
Lift Bracket (1 ton series)



G85711065_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bracket sub-assy, lift	1	8	Roller, side	2
2	Backrest sub-assy	1	9	Ring, shaft snap	4
3	Fork sub-assy	2	10	Shaft, side roller	2
4	Bolt	4	11	Bolt	4
5	Roller, lift	2	12	Shim T=0.5, 1.0, 3.2	99
6	Ring, shaft snap	2	13	Roller, lift	2
7	Shim T=1.0	99	14	Shim T=0.5, 1.0	99

Lift Bracket (2 ton series)

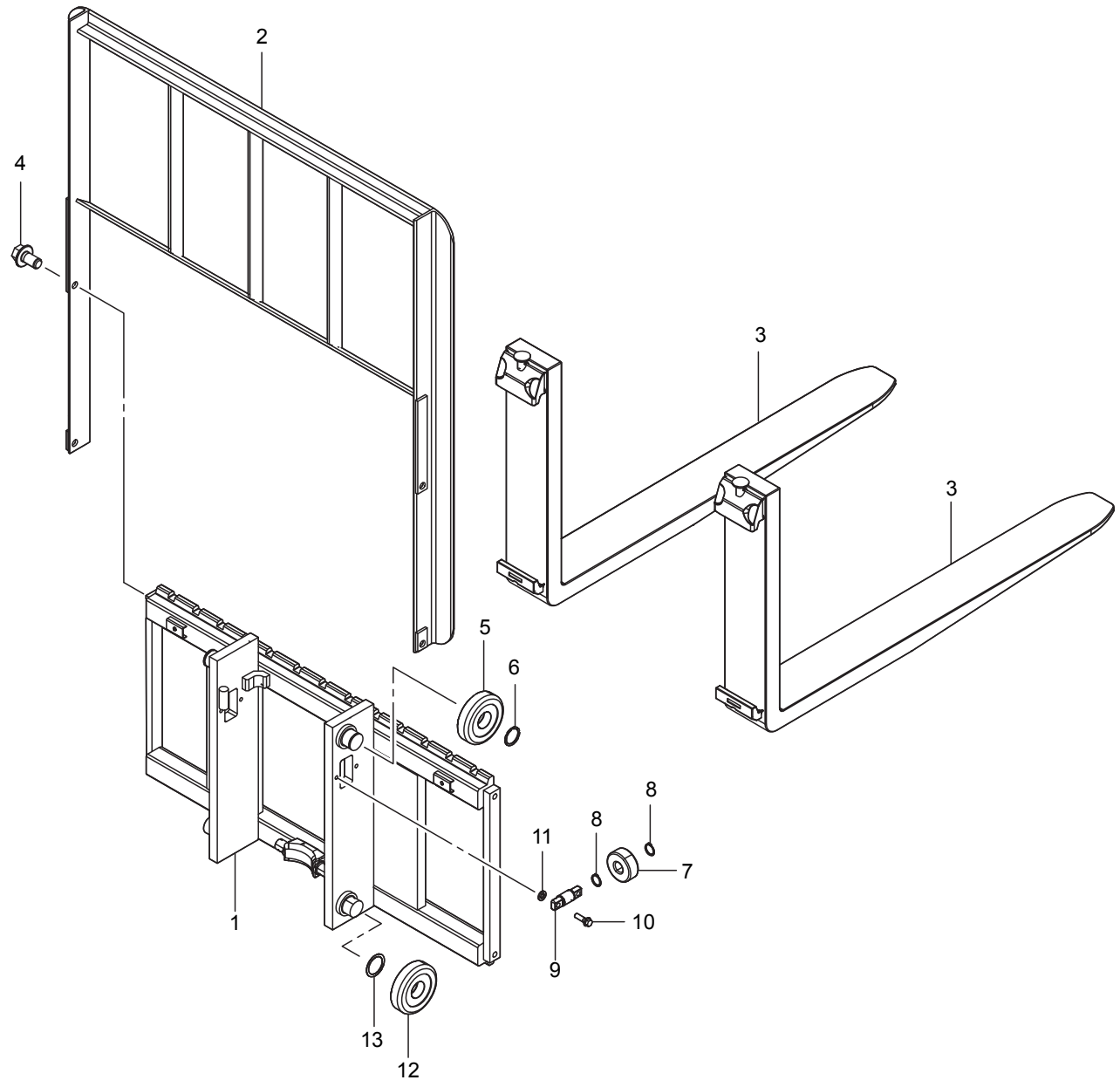


G85711066_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bracket sub-assy, lift	1	9	Roller, side	2
2	Backrest sub-assy	1	10	Ring, shaft snap	4
3	Fork sub-assy	2	11	Shaft, side roller	2
4	Bolt	4	12	Bolt	4
5	Roller, lift	2	13	Shim T=0.5, 1.0, 3.2	99
6	Ring, shaft snap	2	14	Roller, lift	2
7	Roller, lift	2	15	Shim T=0.5, 1.0	99
8	Ring, shaft snap	2			

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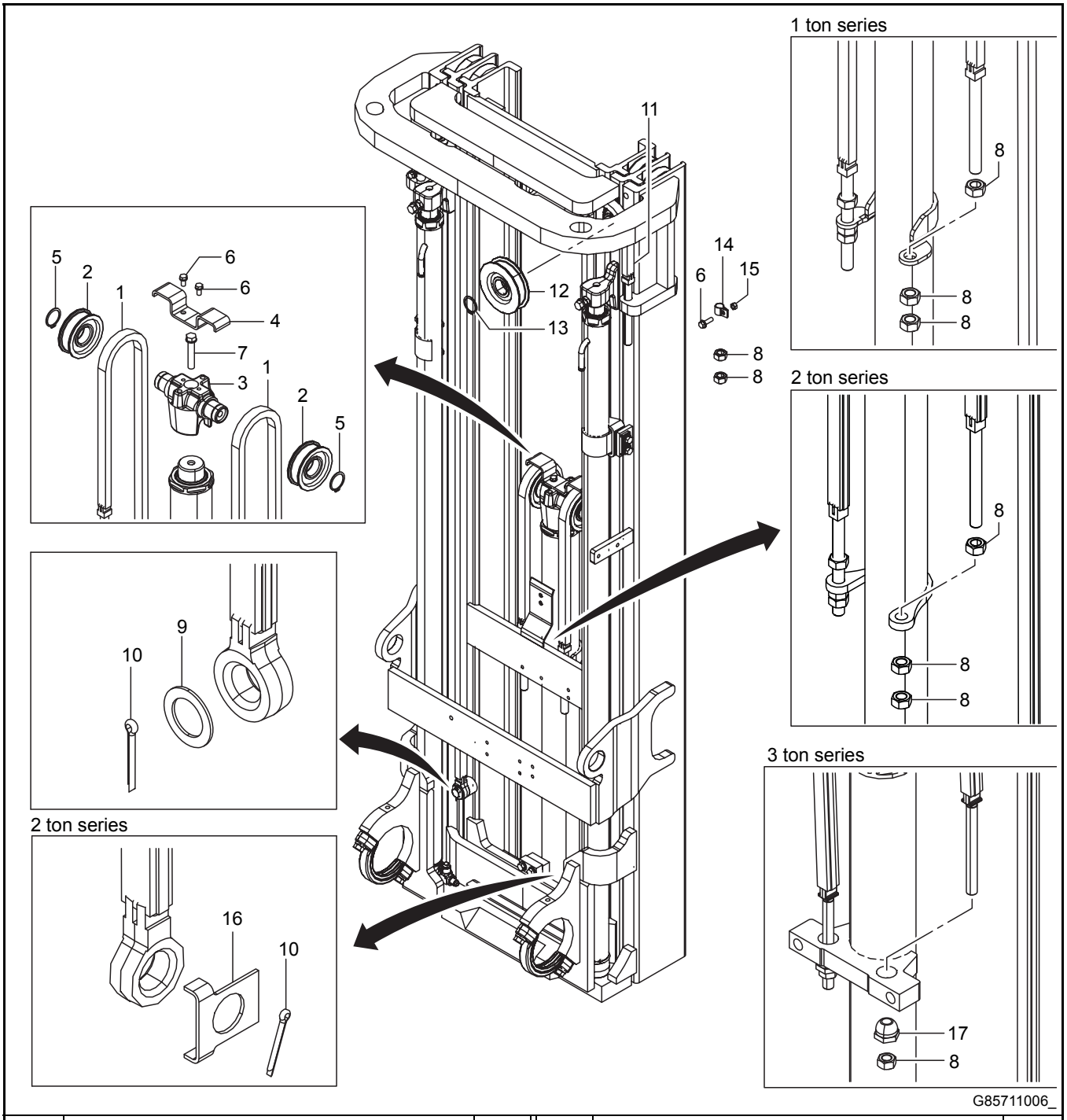
Lift Bracket (3 ton series)



G85711067_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bracket sub-assy, lift	1	8	Ring, shaft snap	4
2	Backrest sub-assy	1	9	Shaft, side roller	2
3	Fork sub-assy	2	10	Bolt	4
4	Bolt	4	11	Shim T=0.5, 1.0, 3.2	99
5	Roller, lift	2	12	Roller, lift	2
6	Ring, shaft snap	2	13	Shim T=0.5, 1.0	99
7	Roller, side	2			

Chain

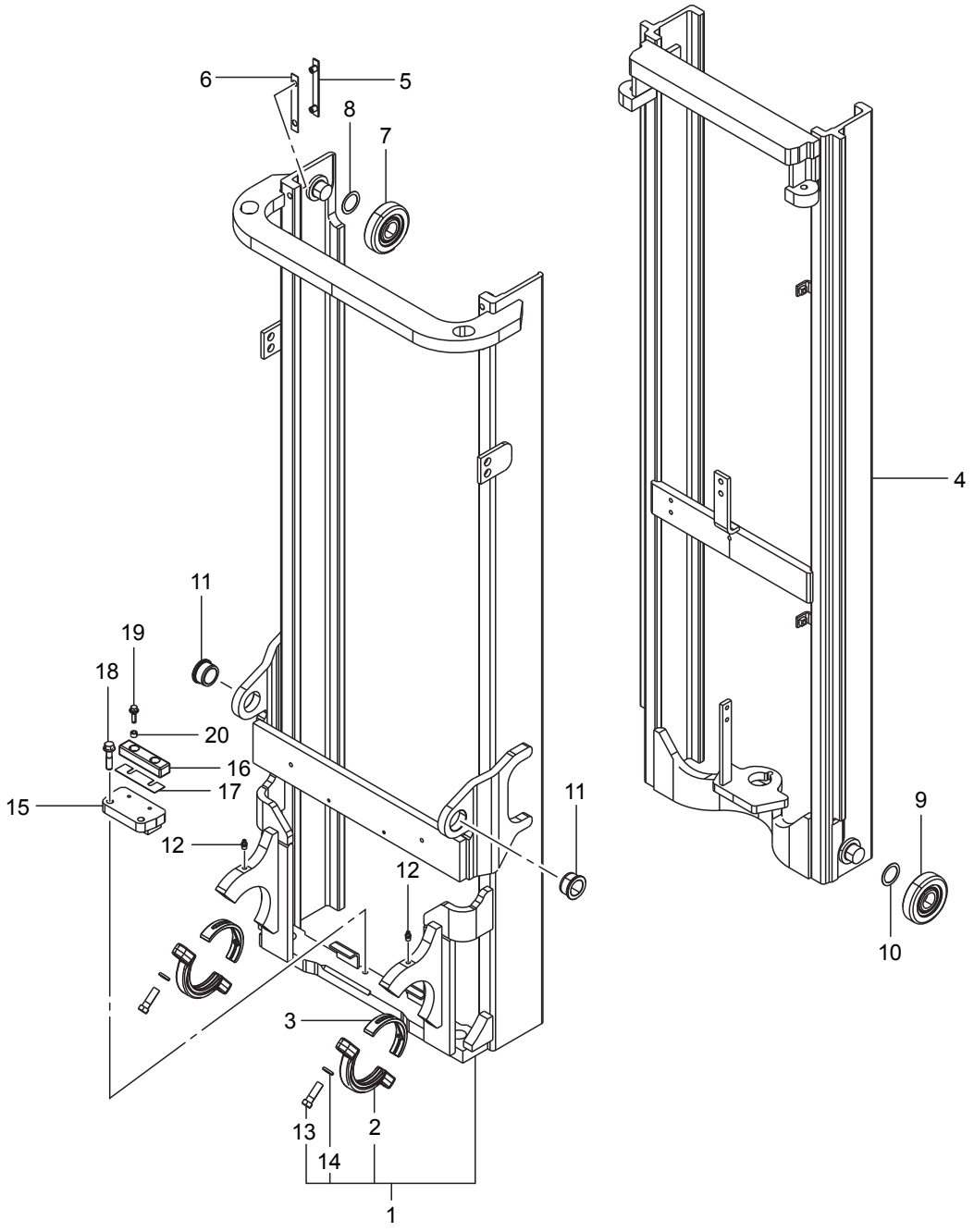


No.	Parts name	QTY	No.	Parts name	QTY
1	Chain sub-assy, front	2	10	Pin, cotter	4
2	Wheel, chain	2	11	Chain sub-assy, rear	2
3	Support, chain wheel	1	12	Wheel, chain	2
4	Stopper, chain	1	13	Ring, shaft snap	2
5	Ring, shaft snap	2	14	Clamp, chain anchor bolt	2
6	Bolt	2	15	Nut	2
7	Bolt	1	16	Plate, chain stopper	2
8	Nut	6-10	17	Nut, chain adjust	2
9	Washer, chain special	2-4			

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FV MAST

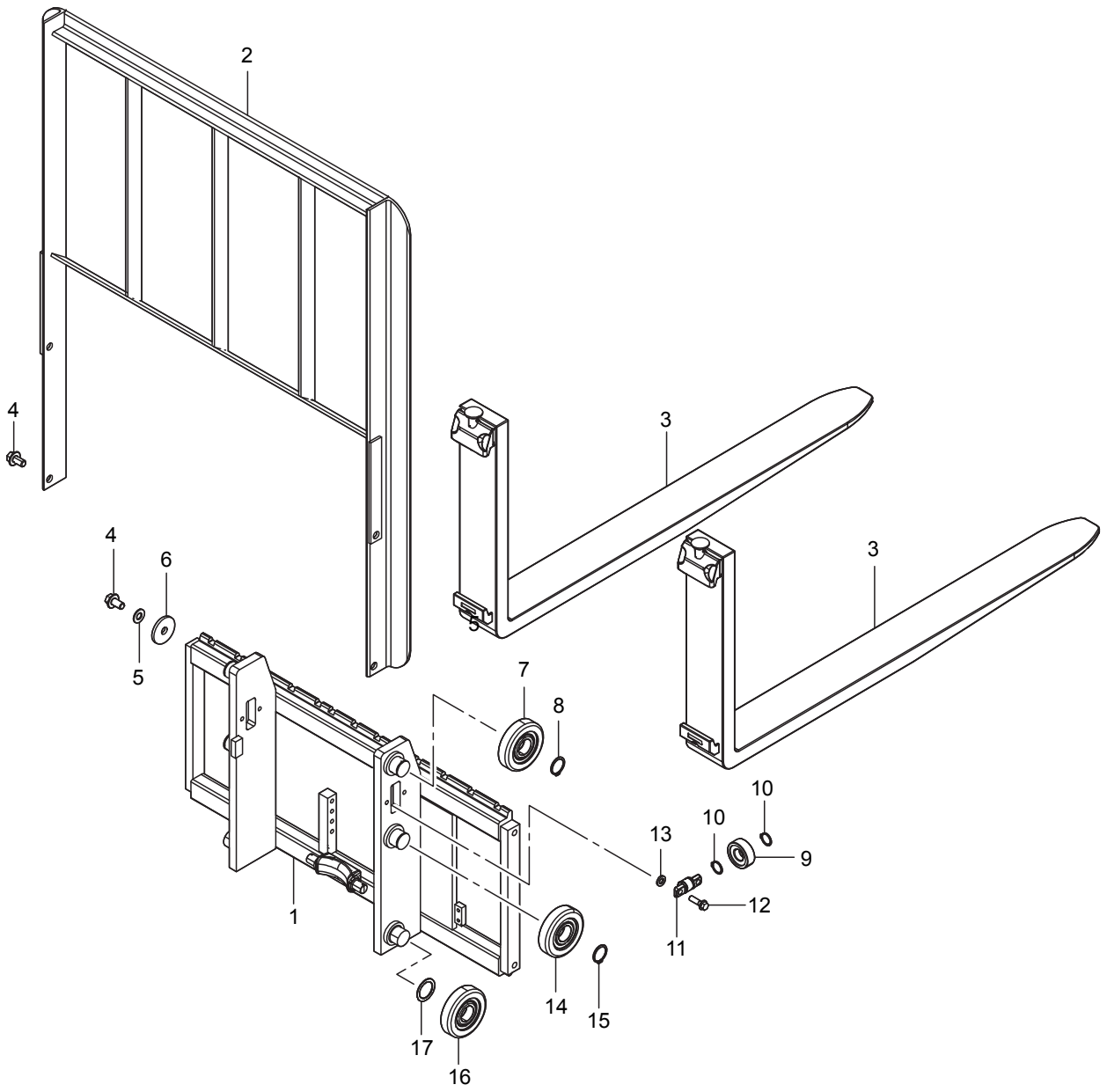
Mast



G85711007_

No.	Parts name	QTY	No.	Parts name	QTY
1	Mast sub-assy, outer	1	11	Bushing, tilt cylinder support	2
2	Cap, mast support	2	12	Fitting, grease	2
3	Bushing, mast support	2	13	Bolt	4
4	Mast sub-assy, inner	1	14	Washer, spring	4
5	Strip sub-assy, outer mast	2	15	Stopper	1
6	Shim T=0.5, 1.0	99	16	Cushion, inner mast	1
7	Roller, outer mast	2	17	Shim, stopper	99
8	Shim T=0.5, 1.0	99	18	Bolt	2
9	Roller, inner mast	2	19	Bolt	2
10	Shim T=0.5, 1.0	99	20	Collar	2

Lift Bracket (1 ton series)

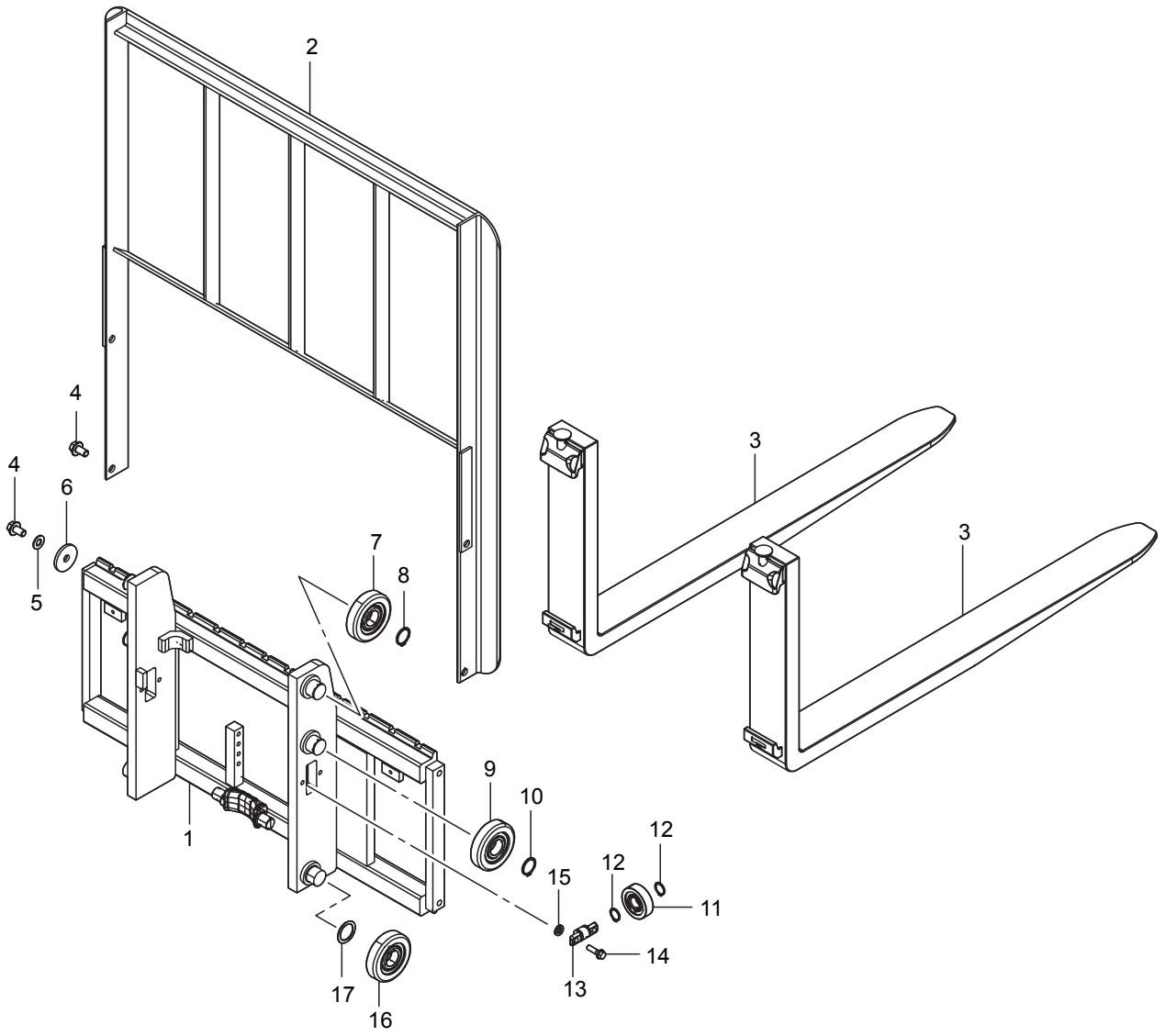


G85711068_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bracket sub-assy, lift	1	10	Ring, shaft snap	4
2	Backrest sub-assy	1	11	Shaft, side roller	2
3	Fork sub-assy	2	12	Bolt	4
4	Bolt	4	13	Shim T=0.5, 1.0, 3.2	99
5	Washer	2	14	Roller, lift	2
6	Washer	2	15	Ring, shaft snap	2
7	Roller, lift	2	16	Roller, lift	2
8	Ring, shaft snap	2	17	Shim T=0.5, 1.0	99
9	Roller, side	2			

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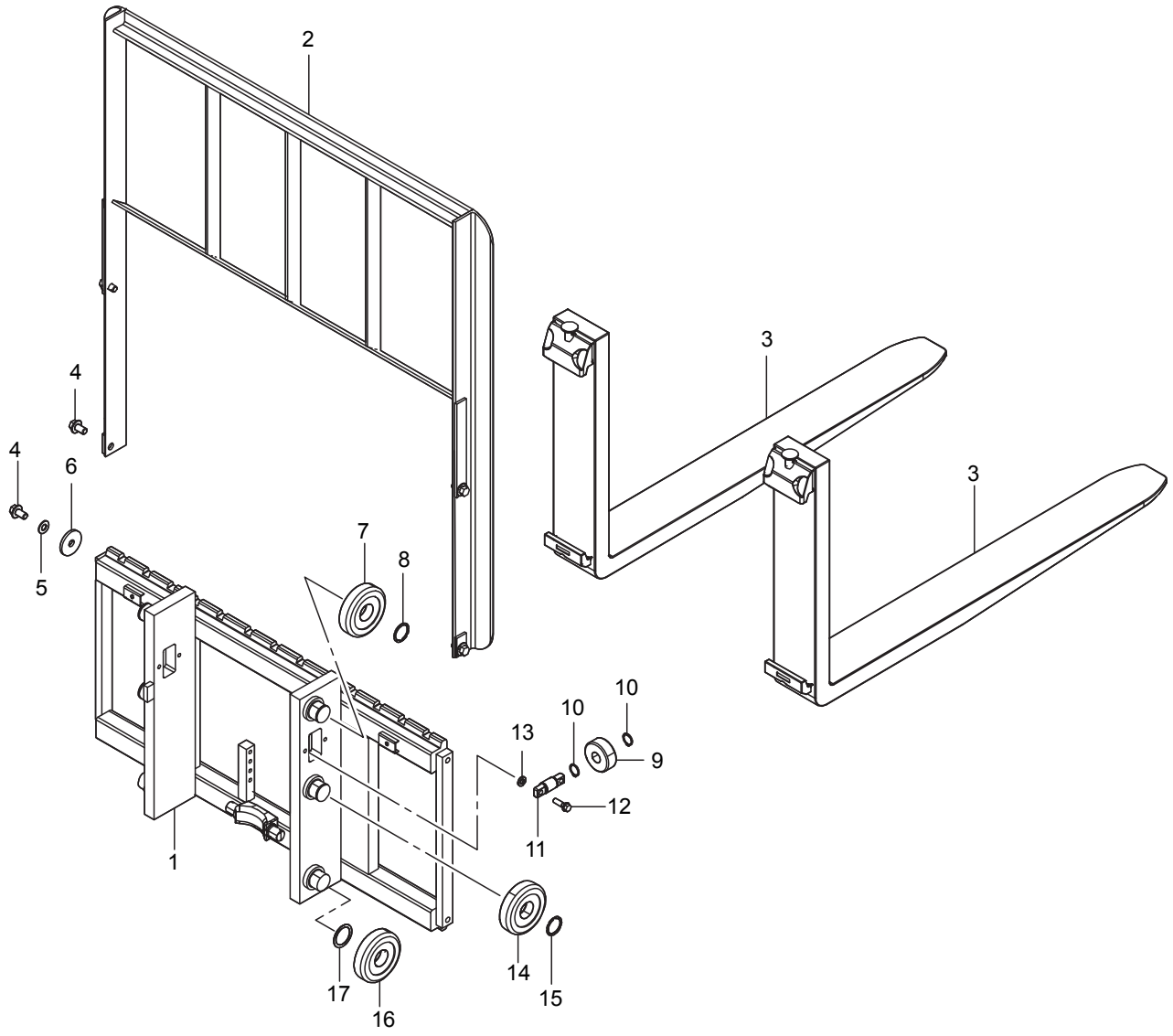
Lift Bracket (2 ton series)



G85711069_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bracket sub-assy, lift	1	10	Ring, shaft snap	2
2	Backrest sub-assy	1	11	Roller, side	2
3	Fork sub-assy	2	12	Ring, shaft snap	4
4	Bolt	4	13	Shaft, side roller	2
5	Washer	2	14	Bolt	4
6	Washer	2	15	Shim T=0.5, 1.0, 3.2	99
7	Roller, lift	2	16	Roller, lift	2
8	Ring, shaft snap	2	17	Shim T=0.5, 1.0	99
9	Roller, lift	2			

Lift Bracket (3 ton series)

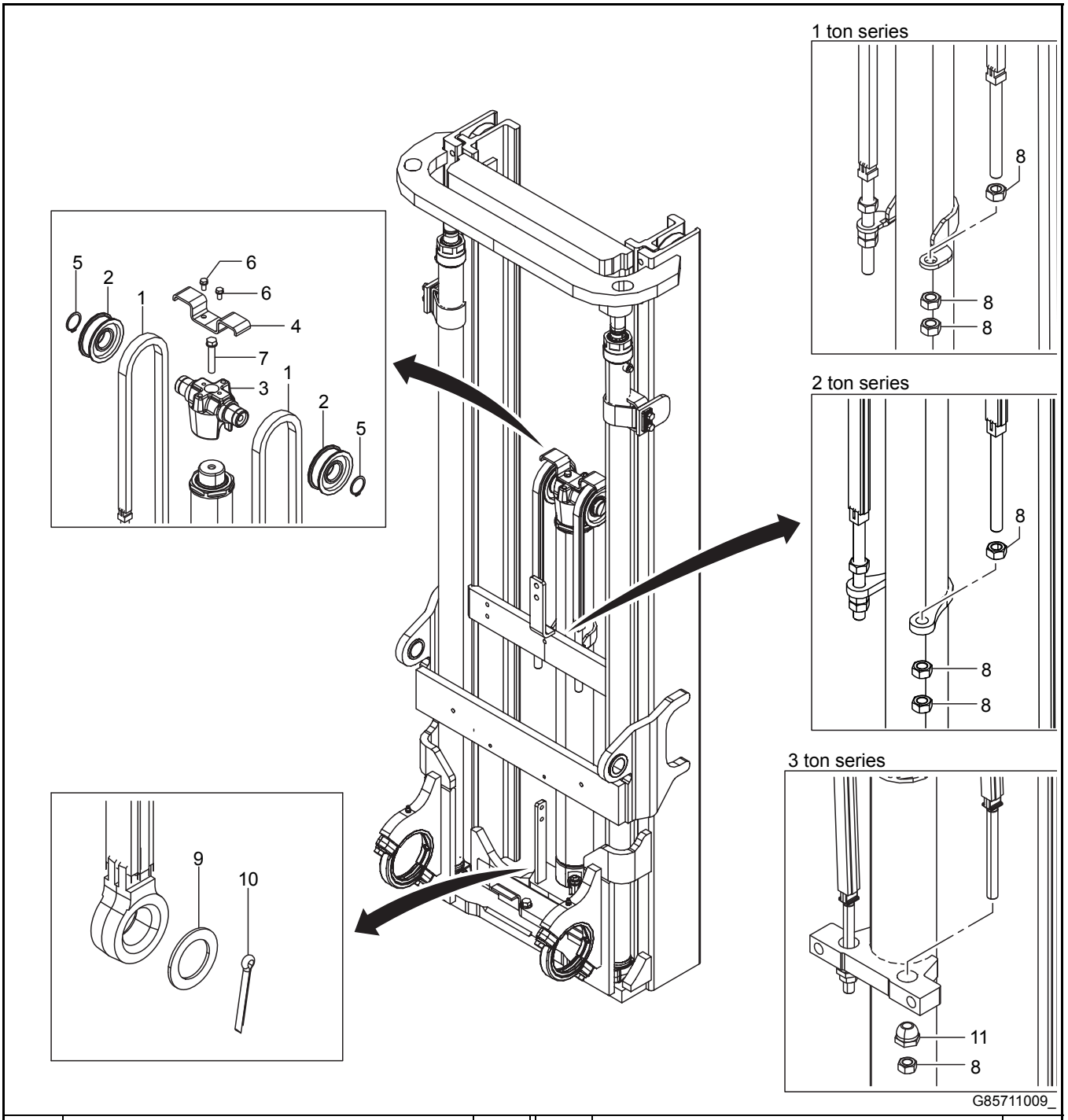


G85711070_

No.	Parts name	QTY	No.	Parts name	QTY
1	Bracket sub-assy, lift	1	10	Ring, shaft snap	4
2	Backrest sub-assy	1	11	Shaft, side roller	2
3	Fork sub-assy	2	12	Bolt	4
4	Bolt	4	13	Shim T=0.5, 1.0, 3.2	99
5	Washer	2	14	Roller, lift	2
6	Washer	2	15	Ring, shaft snap	2
7	Roller, lift	2	16	Roller, lift	2
8	Ring, shaft snap	2	17	Shim T=0.5, 1.0	99
9	Roller, side	2			

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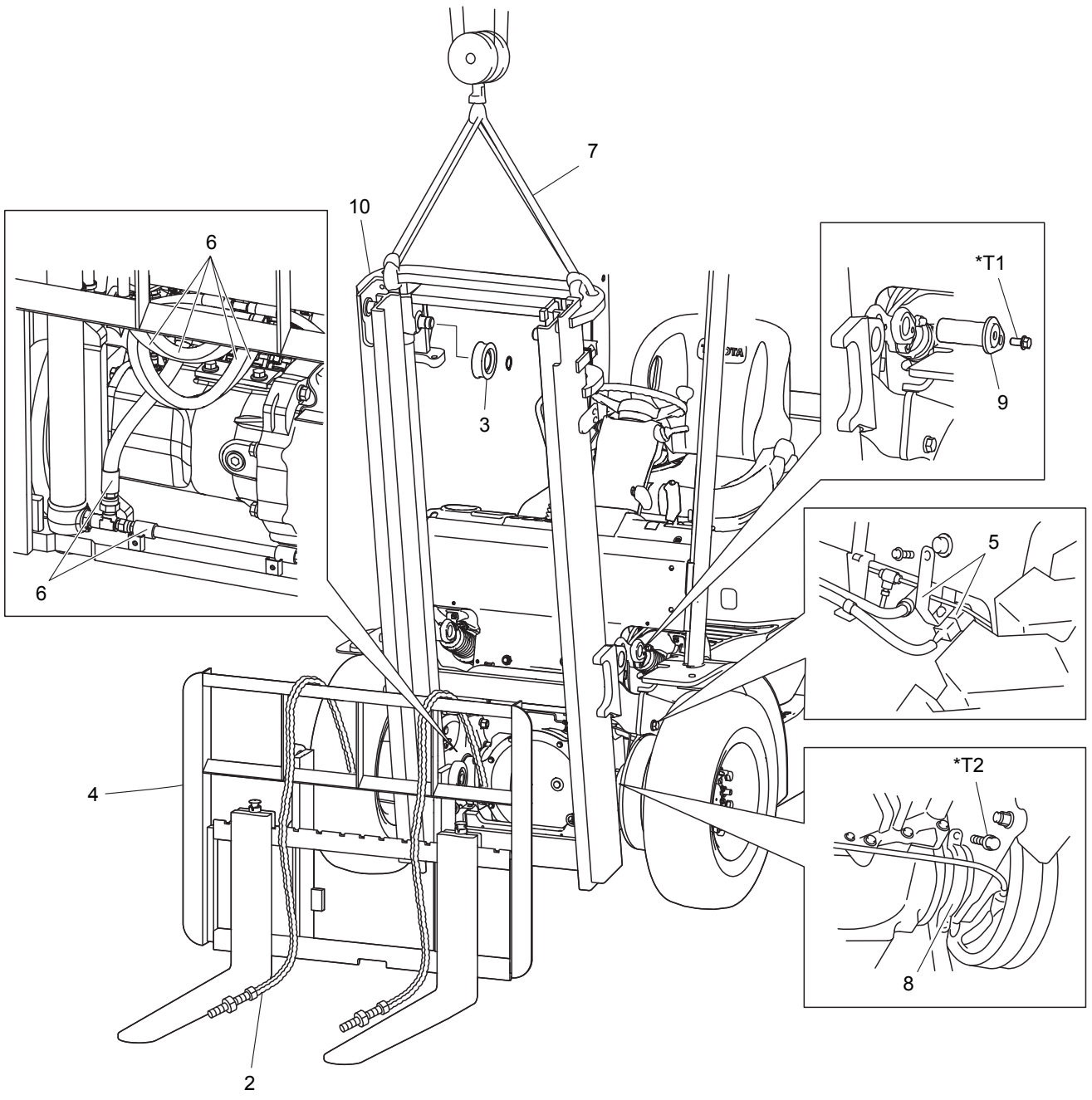
Chain



No.	Parts name	QTY	No.	Parts name	QTY
1	Chain sub-assy, front	2	7	Bolt	1
2	Wheel, chain	2	8	Nut	2-6
3	Support, chain wheel	1	9	Washer, chain special	2
4	Stopper, chain	1	10	Pin, cotter	2
5	Ring, shaft snap	2	11	Nut, chain adjust	2
6	Bolt	2			

MAST ASSY

REMOVAL·INSTALLATION (L/ LIFT BRACKET)



G85711010_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 76.8 ~ 115.0 (783 ~ 1173) [56.7 ~ 84.84]
T2 = 84.0 ~ 156.0 (857 ~ 1591) [62.0 ~ 115.1]

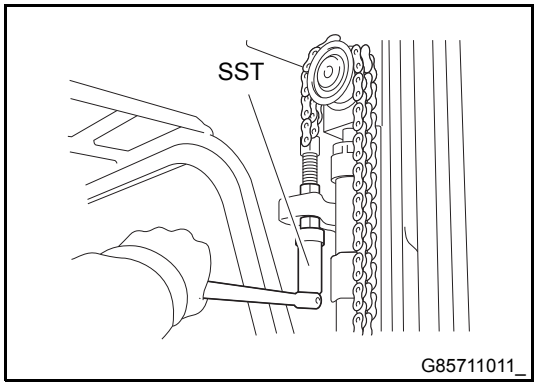
www.truck-freeworkshop.com

Removal Procedure

1 Set the mast vertical and fully lower the fork.

2 Disconnect the chain.

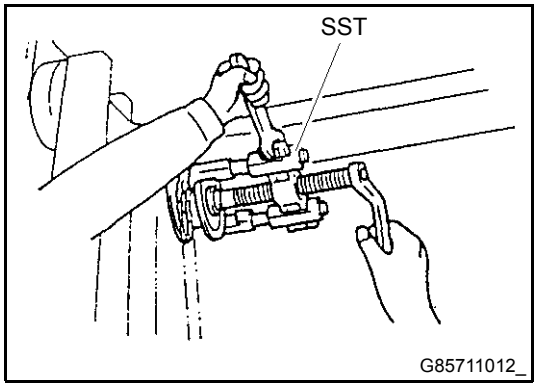
SST 09630-23600-71



3 Remove the chain wheel.

If the fitting is hard, use the SST for removal.

SST 09950-76014-71 (09950-40011)



4 Remove the lift bracket. (For lift bracket removal, raise the inner mast until the lift bracket comes off from the inner mast, and slowly run the vehicle backward to move away from the lift bracket.)

5 Remove the connector bracket, disconnect the connector of the fork height switch. (SAS spec.)

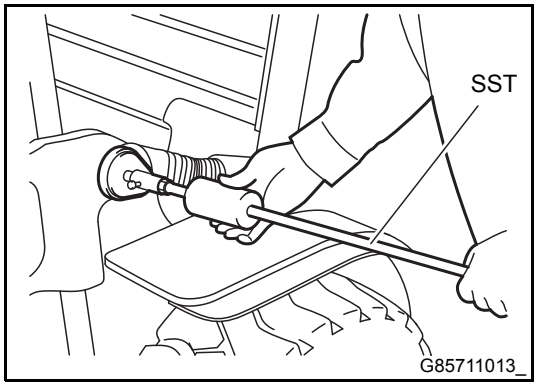
6 Disconnect the overflow hose and high pressure hose. (Before hose disconnection, fully lower the inner mast and operate the lift lever several times to release the residual pressure in the lift cylinder.)

7 Slightly hoist the mast.

8 Remove the mast support cap.

9 Remove the tilt cylinder front pin.

SST 09810-20172-71

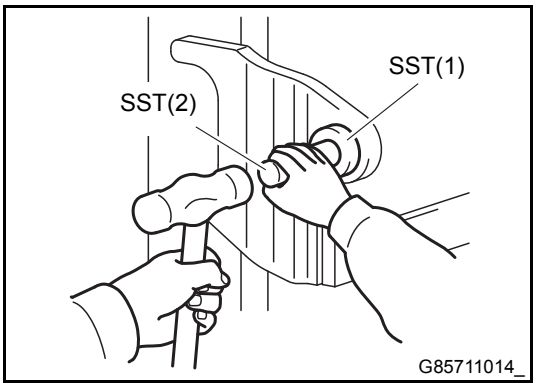


10 Remove the mast ASSY.

11 Remove the tilt bracket bushing from the mast.

Installation Procedure

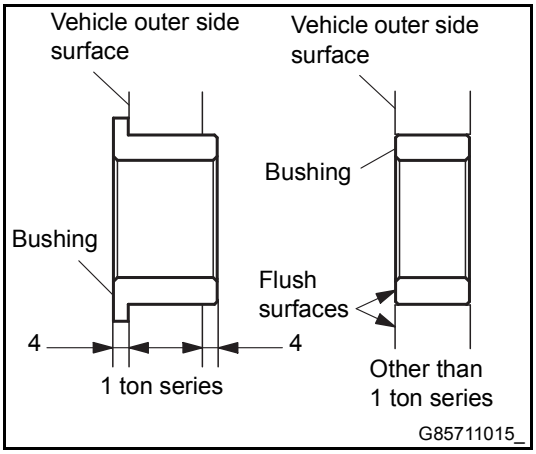
The installation procedure is the reverse of the removal procedure.



Note:

- **Install the tilt bracket bushing to the mast.**
  Use the SST to drive in the tilt bracket bushing from the mast outer side.

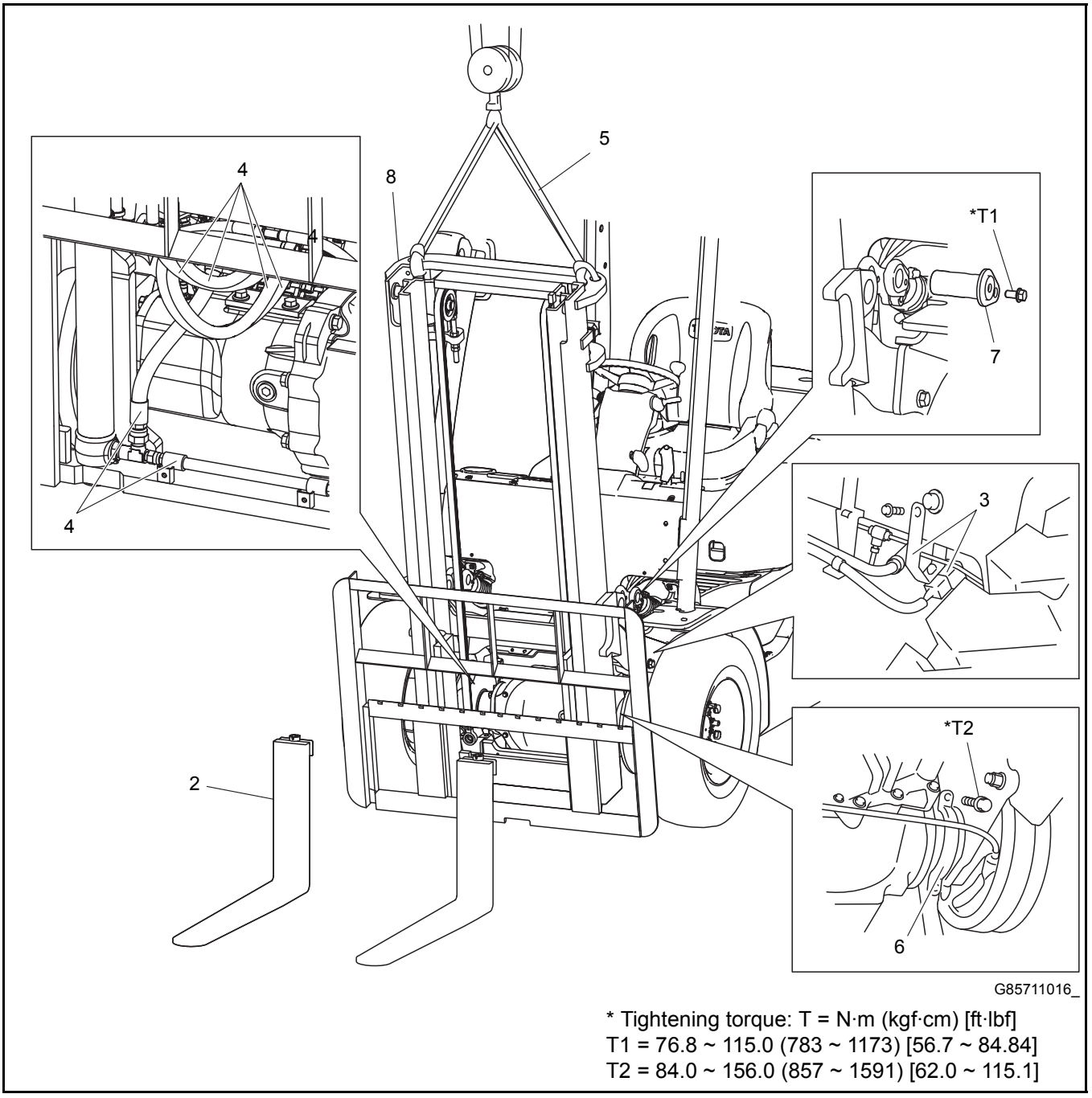
  SST 09950-76018-71 (09950-60010).....(1)
  SST 09950-76020-71 (09950-70010).....(2)



- **Apply molybdenum disulfide grease to the inner surface of the mast support bushing, the mast support section of the front axle, and the tilt cylinder front pin.**
- **After installation, apply molybdenum disulfide grease to the mast support section and add molybdenum disulfide grease through the grease nipple of the tilt cylinder front pin.**
- **Adjust lift cylinder uneven movement using shims when any of the mast ASSY, outer mast, inner mast or lift cylinder is replaced. (See page 11-43.)**
- **Adjust the chain tension after installation. (See page 11-29.)**
- **When the mast is replaced, perform SAS matching after installation. (SAS spec. only) (See section 4 and 14.)**

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REMOVAL·INSTALLATION (W/ LIFT BRACKET)



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 76.8 ~ 115.0 (783 ~ 1173) [56.7 ~ 84.84]
T2 = 84.0 ~ 156.0 (857 ~ 1591) [62.0 ~ 115.1]

Removal Procedure

1 Set the mast vertical.

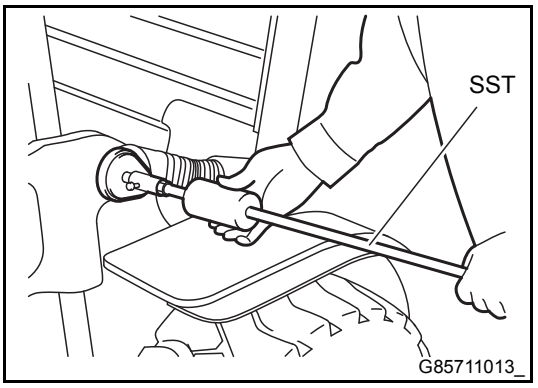
2 Remove the fork. (See page 11-30.)

3 Remove the connector bracket, disconnect the connector of the fork height switch. (SAS spec.)

4 Disconnect the overflow hose and high pressure hose. (Before hose disconnection, fully lower the inner mast and operate the lift lever several times to release the residual pressure from the lift cylinder.)

5 Slightly hoist the mast.

6 Remove the mast support cap.



7 Remove the tilt cylinder front pin.

SST 09810-20172-71

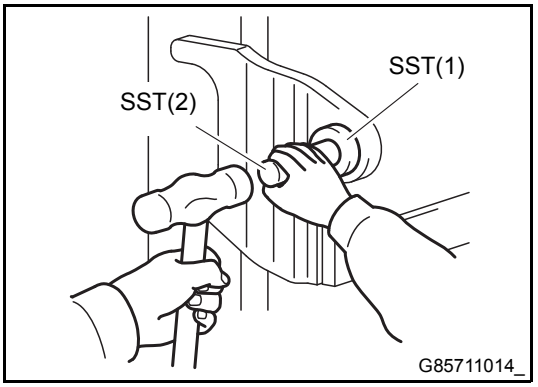
8 Remove the mast ASSY W/ lift bracket.

Caution:
Before removing the mast ASSY W/ lift bracket, be sure to hold the mast and lift bracket together with a fiber rope.

9 Remove the tilt bracket bushing from the mast.

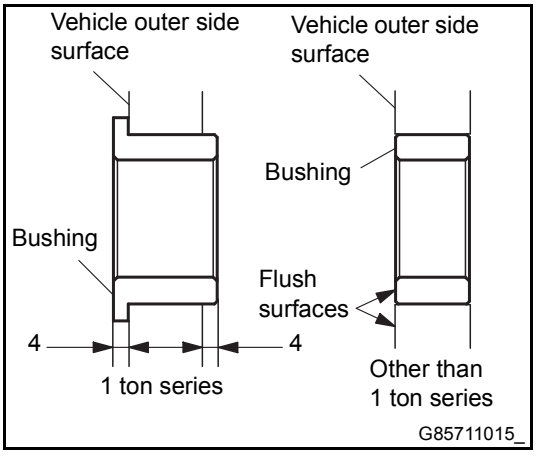
Installation Procedure

The installation procedure is the reverse of the removal procedure.



Note:
- **Install the tilt bracket bushing to the mast.**
  Use the SST to drive in the tilt bracket bushing from the mast outer side.

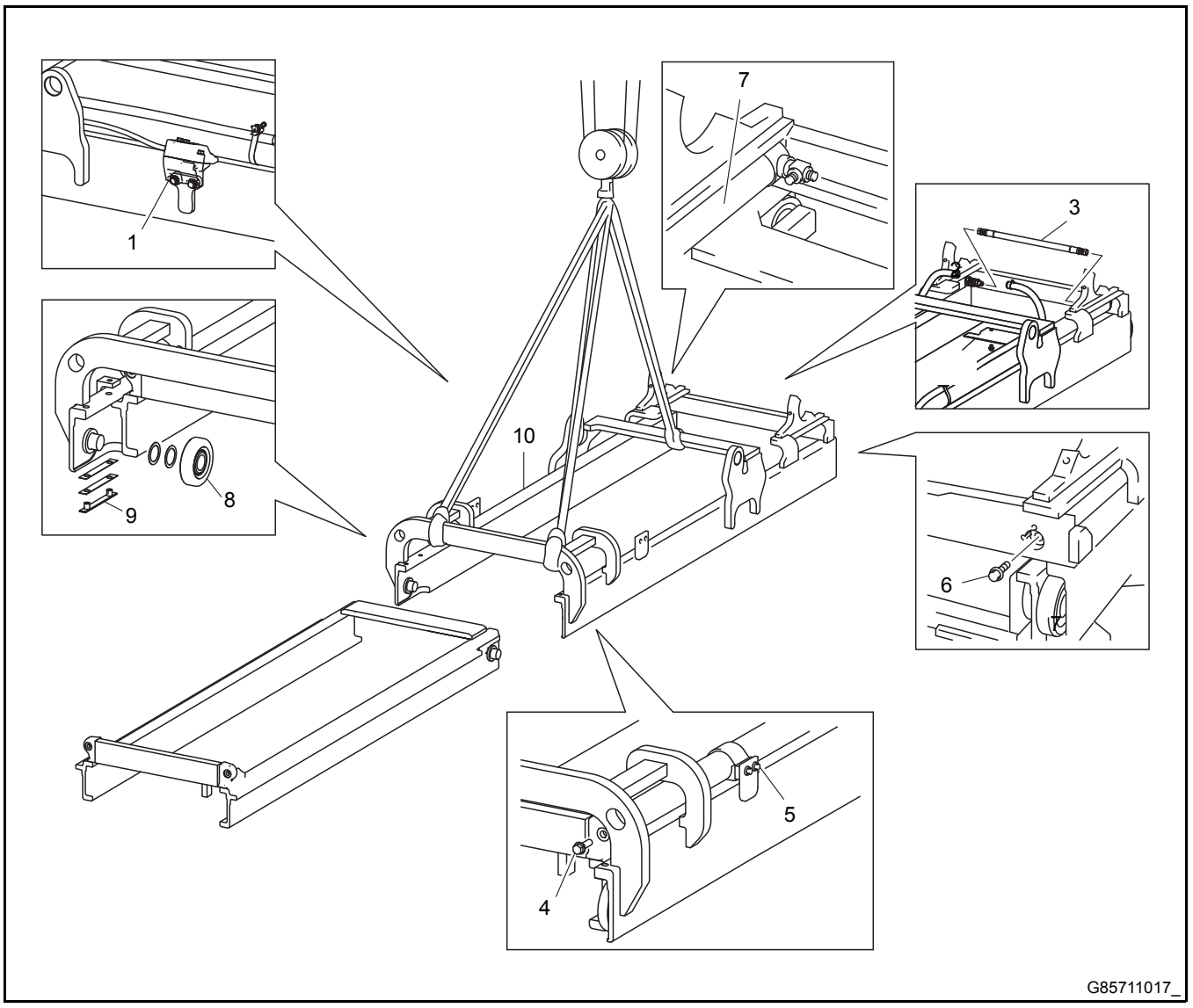
  SST 09950-76018-71 (09950-60010).....(1)
  SST 09950-76020-71 (09950-70010).....(2)



- **Apply molybdenum disulfide grease to the inner surface of the mast support bushing, the mast support section of the front axle, and the tilt cylinder front pin.**
- **After installation, apply molybdenum disulfide grease to the mast support section and add molybdenum disulfide grease through the grease nipple of the tilt cylinder front pin.**
- **Adjust lift cylinder uneven movement using shims when any of the mast ASSY, outer mast, inner mast or lift cylinder is replaced. (See page 11-43.)**
- **Adjust the chain tension after installation. (See page 11-29.)**
- **When the mast is replaced, perform SAS matching after installation. (SAS spec. only) (See section 4 and 14.)**

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DISASSEMBLY·INSPECTION·REASSEMBLY



Disassembly Procedure

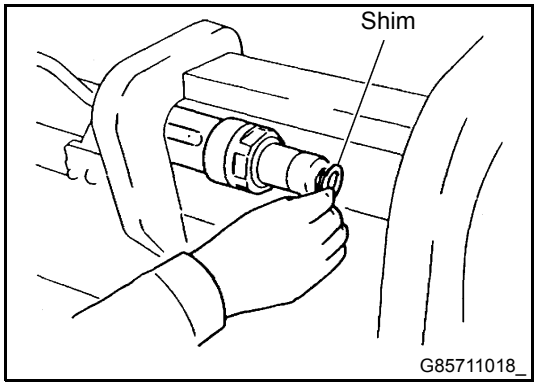
1 Remove the mast fork height switch. (SAS spec.)

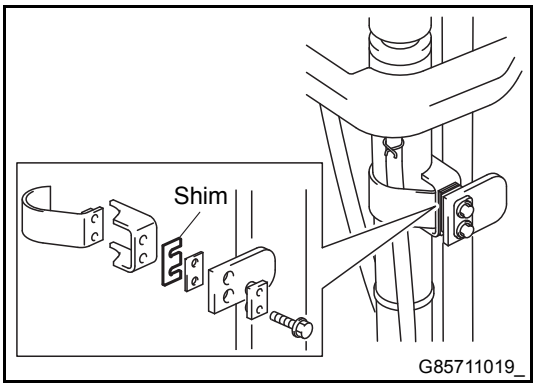
2 Remove the hose cover.

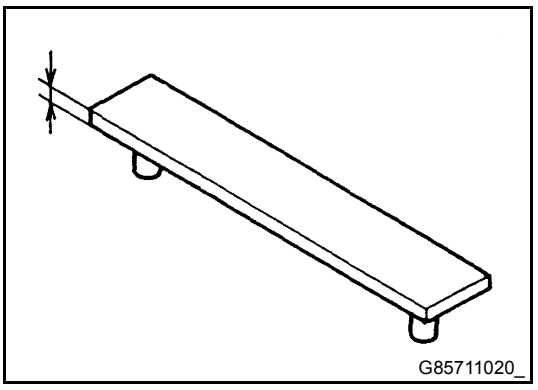
3 Disconnect the high pressure hose.

4 Remove each cylinder rod end set bolt.

Shim adjustment is made at the lift cylinder rod end to prevent uneven lifting by lift cylinders LH and RH.
Note the cylinder that was adjusted and the number of shims used.







5 Remove each cylinder support.

Take a note on the number of cylinder support shims in use. Make cylinder support shim adjustment if the mast or either cylinder is replaced.
With the cylinder rod end inserted to the inner mast, insert shim(s) between the cylinder support and outer mast to eliminate the clearance. The shim thickness should be slightly greater than the clearance.

6 Remove each cylinder bottom set bolt.

7 Slide the inner mast upward and remove the lift cylinders.

8 Slide the inner mast downward and remove the lift rollers.

9 Remove the mast strip.

Measure the mast strip thickness.

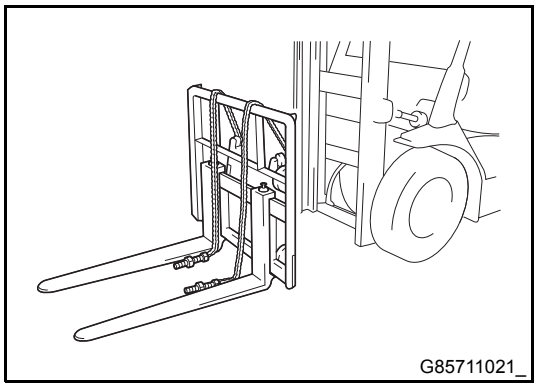
Limit: 1.5 mm (0.059 in)

10 Remove the outer mast.

Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

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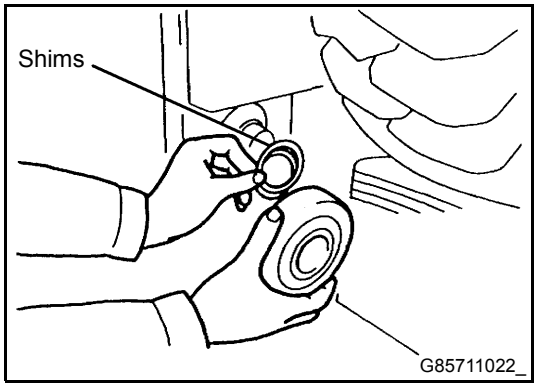


MAST ROLLER REMOVAL·INSTALLATION

1 Remove the lift bracket.
(Refer to page 11-25, procedures 1 ~ 4.)

2 Jack up the vehicle and support tires with wooden blocks. Chock the front and rear tires.

3 Remove the lift cylinders. (See page 12-11.)

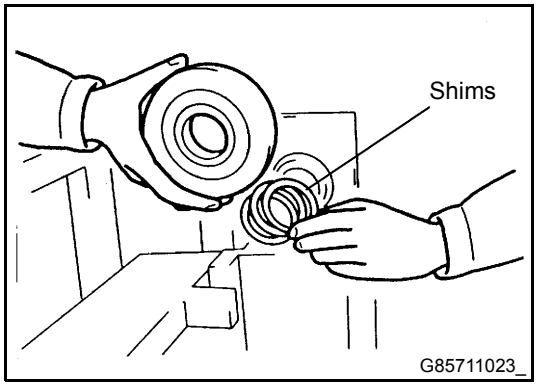


4 Remove mast rollers.

(1) Remove the wooden blocks under the inner mast and lower the hoisted inner mast slowly until the mast rollers appear.

(2) Support the bottom of the inner mast with wooden blocks.

(3) Remove the inner mast rollers and shims.



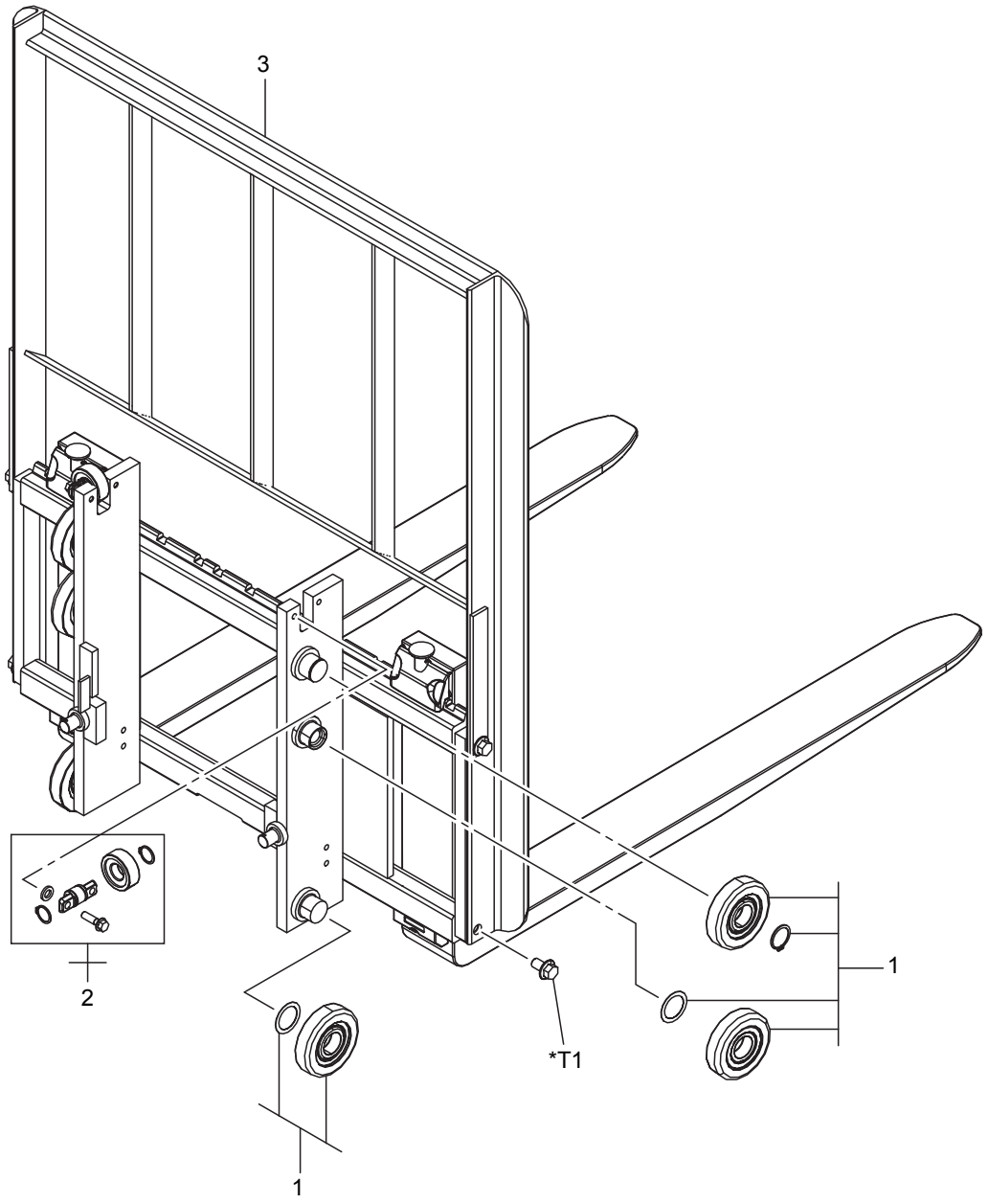
(4) Remove the inner mast rollers and shims.

5 The installation procedure is the reverse of the removal procedure.

6 Adjust the mast roller. (Refer to page 11-31.)

LIFT BRACKET

DISASSEMBLY·REASSEMBLY

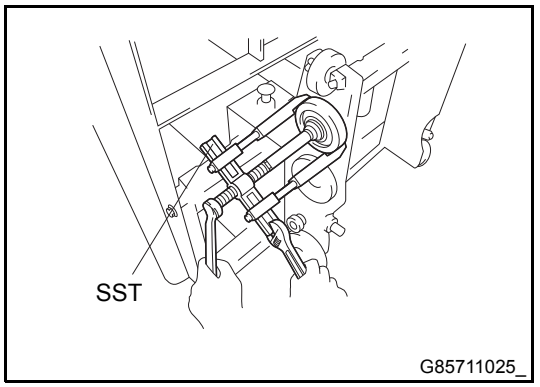


G85711024_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
Standard specification:
T1 = 168 ~ 312 (1713 ~ 3182) [123.9 ~ 230.2]
Rust proof and cold storage specification:
T1 = 98 ~ 312 (999 ~ 1856) [72.3 ~ 134.3]

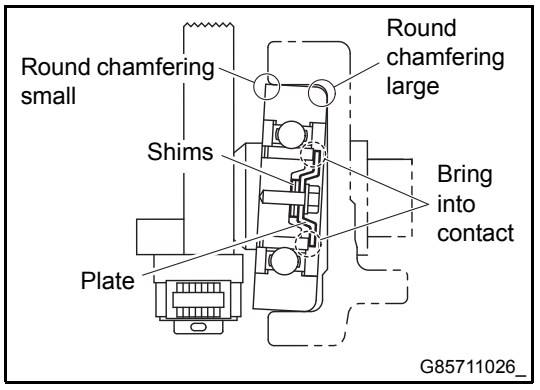
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Disassembly Procedure



1 Remove lift rollers.

SST 09950-76014-71 (09950-40011)



1·2·3 ton series, L/ side roller:

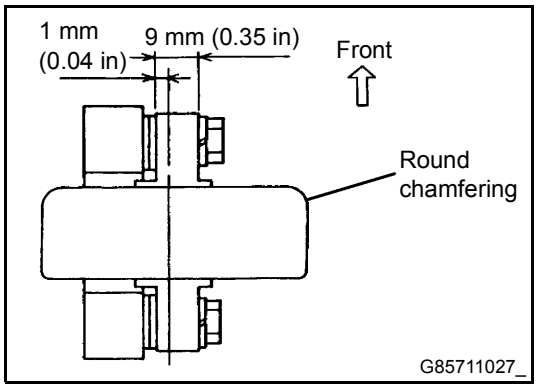
Remove the rollers after removing the roller stopper plate.

2 Remove side rollers.

3 Remove the backrest.

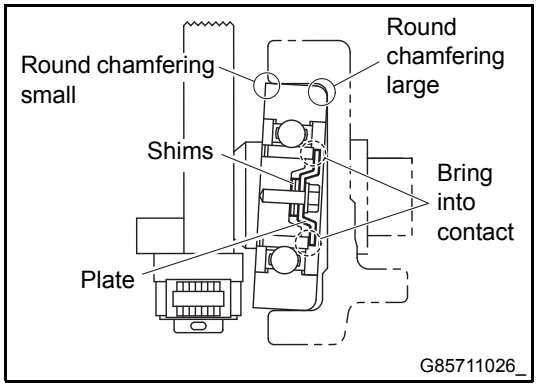
Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.



Note:

- **To Install side rollers, the side chamfered with larger radius of it shall face the front of the vehicle.**

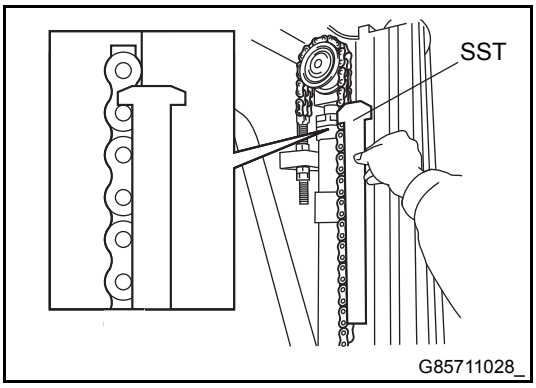


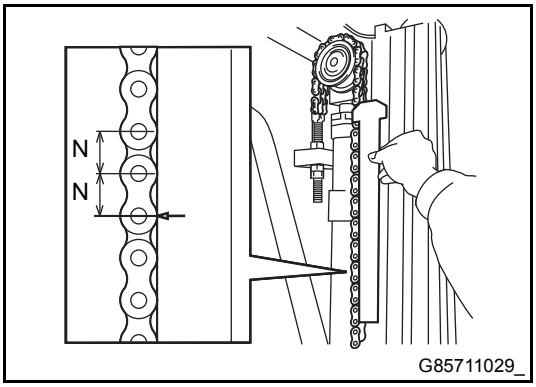
- **Install lift rollers on the 1·2·3 ton series vehicle without side roller according to the requirements below.**

  (1) Install each roller with the side chamfered with larger radius facing outward.

  (2) Bring the stopper plate into contact with the roller inner ring. Minimize the clearance between the plate and pin by shim insertion.

  Shim thickness:
  0.5 and 1.0 mm (0.020 and 0.039 in)





CHAIN

INSPECTION

Inspect the chain elongation according to the following procedure:

SST 09631-22000-71

1 Since the SST measurement line varies with the chain type, set the corresponding line on the chain as illustrated.

2 Check the number of the chain to be inspected, and check the pin center position.

If the pin center is at the arrow mark on the chain gauge, change the chain.

Chain Link Pitch Standard

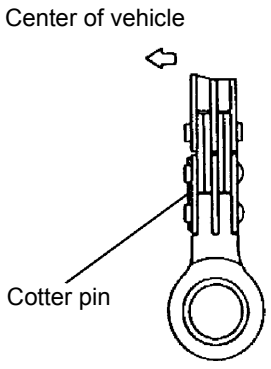
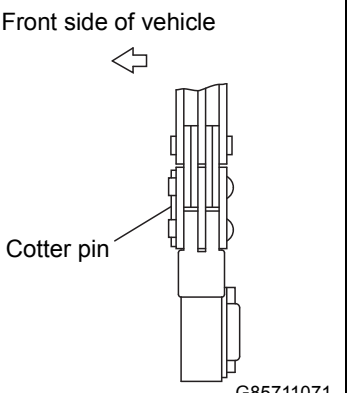
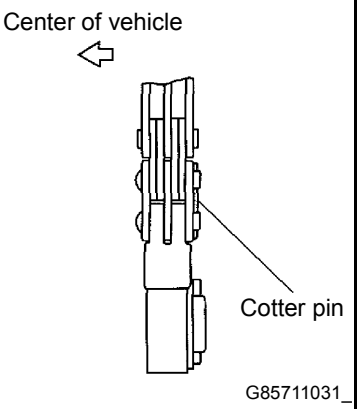
Vehicle model	Pitch mm (in)	Type	Chain No.	No. of links measured N
1 ton series	15.88 (0.6252)	BL534	50	15
2 ton series	19.05 (0.7500)	BL634	60	13
3 ton series	25.4 (1.0)	BL823	80	11

Note:
- **Perform measurement without removing the chain from the vehicle.**
- **Inspect elongation over the entire chain length since it varies with positions.**

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REASSEMBLY

1. Installing direction

Applicable mast	V	FSV	FSV, FV
Portion	Lift bracket	Inner mast	Lift bracket
Rough sketch			
Installing direction	Install the chain with the cotter pin facing the center of the vehicle.	Install the chain with the cotter pin facing the front side of the vehicle.	Install the chain with the cotter pin facing the outside of the vehicle.

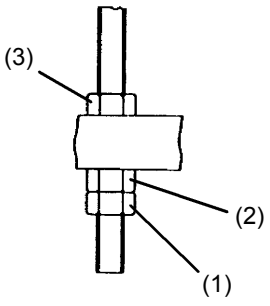
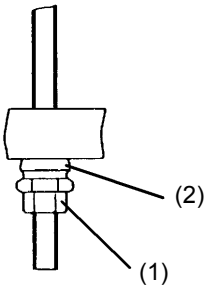
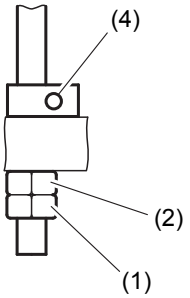
2. Chain adjusting nut tightening order

   (1) Tighten nuts (1) and (2).

   Tightening torque: T = N·m (kgf·cm) [ft·lbf]
   With forks: T = 55.2 ~ 82.8 (563 ~ 838) [40.8 ~ 60.6]

   (2) Tighten the nut (3) of the V outer mast part, 1·2 ton series FSV and FV front lift cylinder part.

   (3) Tighten the bolt (4) of the FSV front lift cylinder part, and fasten with a clamp.

Applicable mast	V	FSV (for front chains), FV	FSV (for front chains), FV	FSV (for rear chains)
Vehicle model	All models	1·2 ton series	3 ton series	All models
Portion	Outer mast	Front lift cylinder	Front lift cylinder	Outer mast
Rough sketch				

ADJUSTMENT

1 Incline the mast backwards and fully lower the forks.

2 Set the forks vertically and adjust the chain with the adjusting nut to remove slack in it.

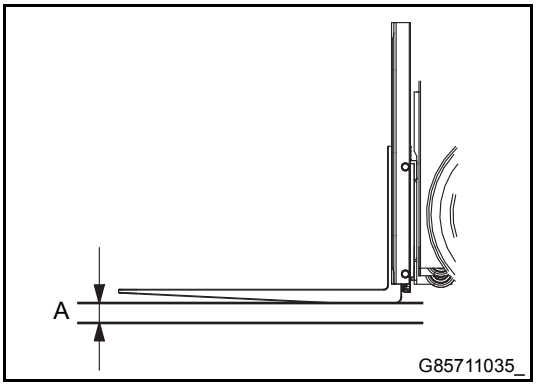
3 Check that the chain tension is equal on the left and right sides.

4 Check the chain for twist.

5 Check that the fork height is the standard.

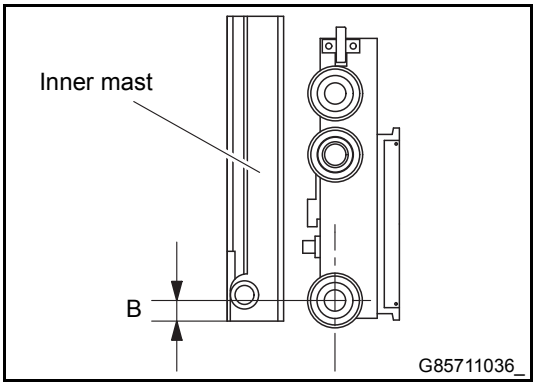
6 With the fork raised fully, check that the lift bracket stopper at the inner mast upper beam is not in contact with the lift bracket.

7



(1) (W/ fork) After adjusting the chain, check that the fork height is within the range below above the ground line .

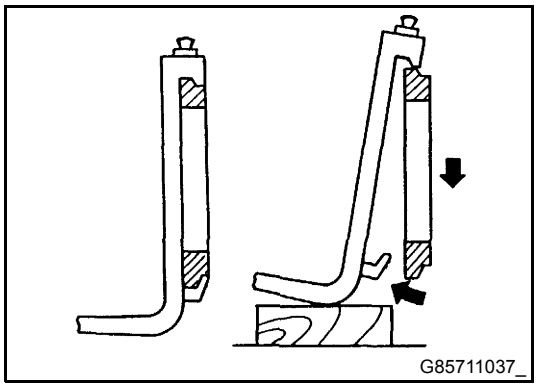
A = 0 ~ 5 mm (0 ~ 0.79 in)



(2) (L/ fork) After adjusting the chain, check that the distance from the center of the roller at the lower part of the lift bracket to the bottom end of the inner mast is within the range below.

B= 15 ~ 20 mm (0.59 ~ 0.79 in)

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FORK

REMOVAL·INSTALLATION

Removal Procedure

1 Set the fork at approx. 20 cm (7.9 in) above the ground.

2 Place a wooden block under the cutout portion of the fork rail.

3 Unlock the fork by lifting the fork stopper pin and shift the fork blades, one at a time, to the center.

4 Slowly lower the forks and remove them.

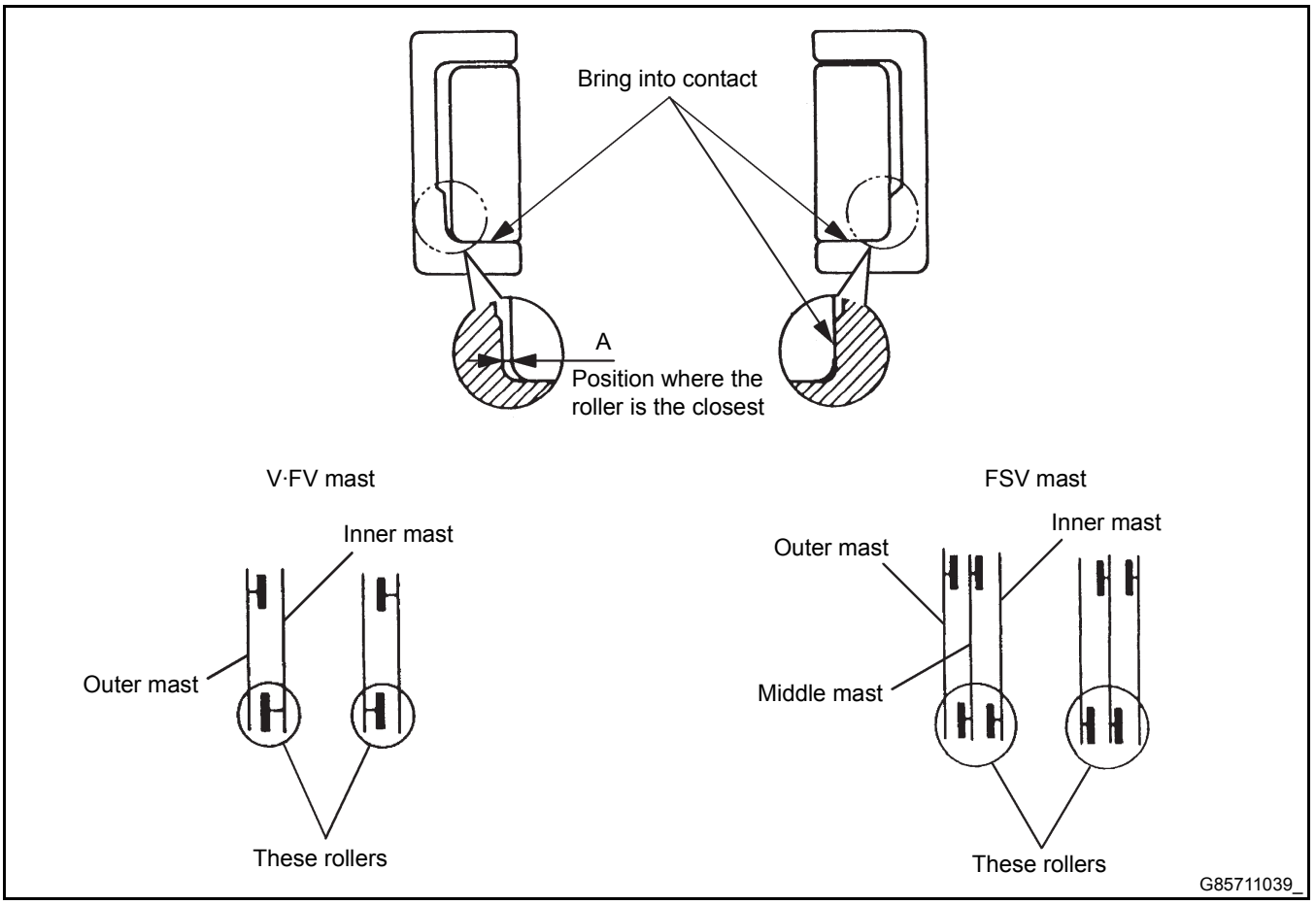
Installation Procedure

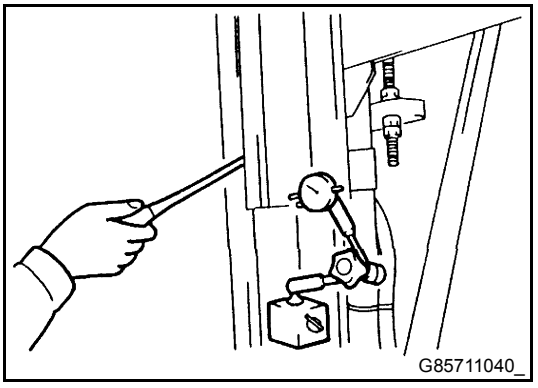
The installation procedure is the reverse of the removal procedure.

MAST ADJUSTMENT

LIFT ROLLER ADJUSTMENT AT MAST

Inner Mast Roller (V·FSV·FV) and Middle Mast Lower Roller (FSV) Clearance Adjustment





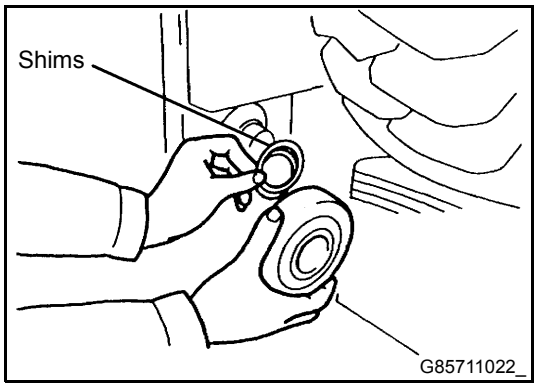
1. Adjust the mast overlap to approx. 450 mm (17.72 in).
2. Inspect and adjust the inner mast rollers (V·FSV·FV) and the middle mast lower rollers (FSV).

   Inner mast roller (V·FSV·FV):
   Shift the inner mast to one side to bring the roller into contact with the outer mast (or middle mast). Measure the clearance between the roller side face on the opposite side and outer mast (or middle mast) at the point where they are the closest.

   Middle mast lower roller (FSV):
   Shift the middle mast to one side to bring the roller into contact with the outer mast. Measure the clearance between the roller side face on the opposite side and outer mast at the point where they are the closest.

   Standard: A = 0 ~ 0.6 mm (0 ~ 0.024 in)

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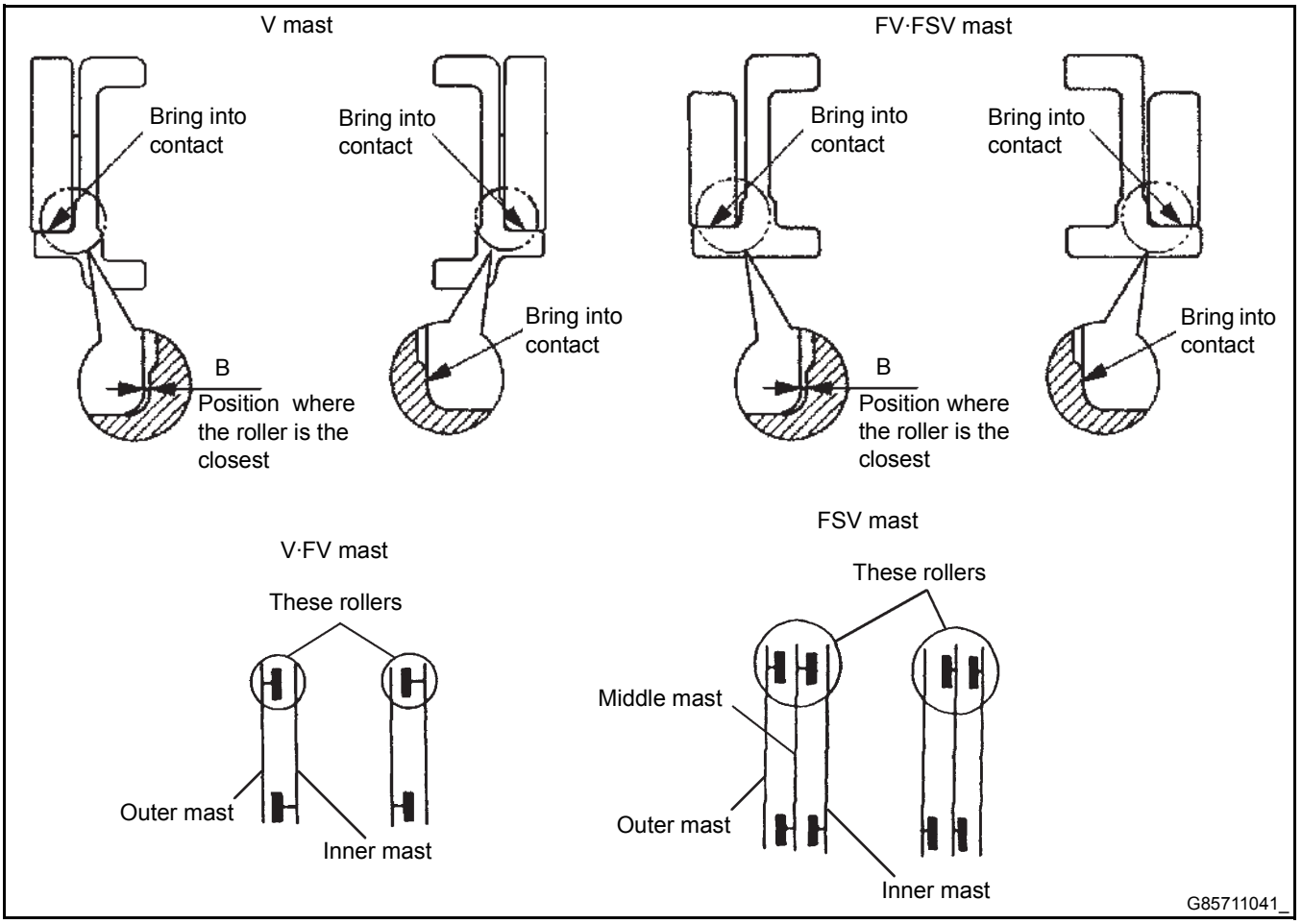


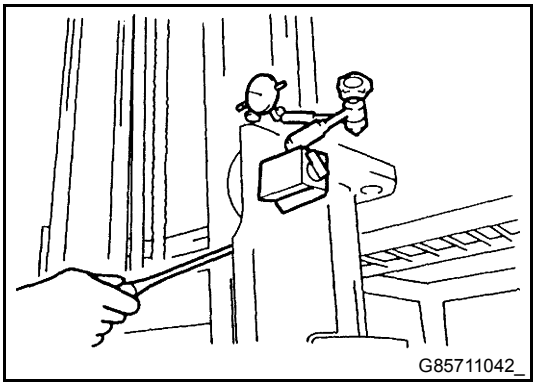
If the standard is not satisfied, make adjustment by changing the shim thickness. Distribute shims equally to the rollers on the left and right sides.
(See page 13-17 for the mast roller removal and installation.)

Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)

3. After the adjustment, check that the inner mast (or middle mast) moves smoothly in the outer mast (or middle mast).

Outer Mast Roller (V·FSV·FV) and Middle Mast Upper Roller (FSV) Clearance Adjustment





1. Adjust the mast overlap to approx. 450 mm (17.72 in).
2. Inspect and adjust the outer mast rollers (V·FSV·FV) and the middle mast upper rollers (FSV).

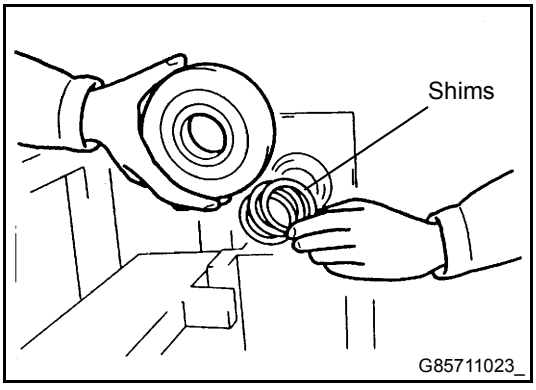
   Outer mast roller (V·FSV·FV):
   Shift the outer mast to one side to bring the roller into contact with the inner mast (or middle mast). Measure the clearance between the roller side face on the opposite side and inner mast (or middle mast) at the point where they are the closest.

   Middle mast upper roller (FSV):
   Shift the middle mast to one side to bring the roller into contact with the inner mast. Measure the clearance between the roller side face on the opposite side and inner mast at the point where they are the closest.

   Standard: B = 0 ~ 0.6 mm (0 ~ 0.024 in)

   If the standard is not satisfied, make adjustment by changing the shim thickness. Distribute shims equally to the rollers on the left and right sides.
   (See page 13-17 for the mast roller removal and installation.)

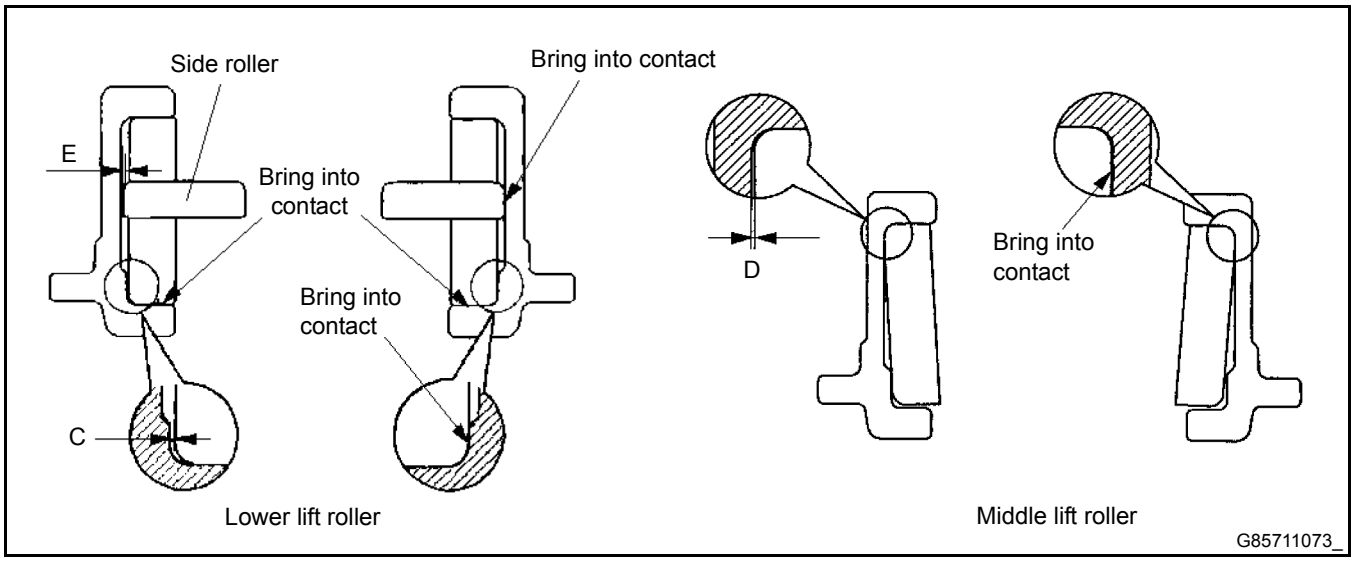
   Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)
3. After the adjustment, check that the inner mast (or middle mast) moves smoothly in the outer mast (or middle mast).

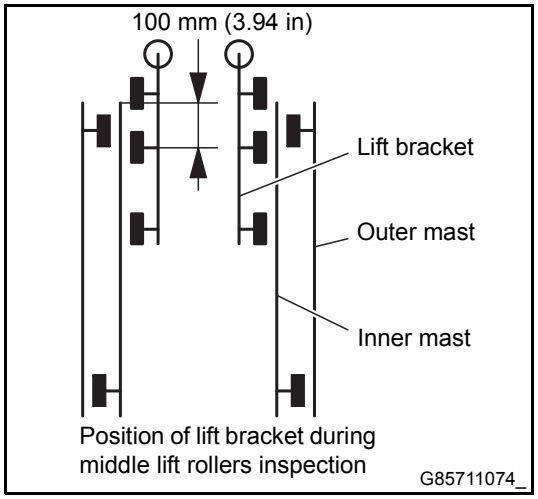


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ROLLER ADJUSTMENT AT LIFT BRACKET

V Mast (1·3 ton series)



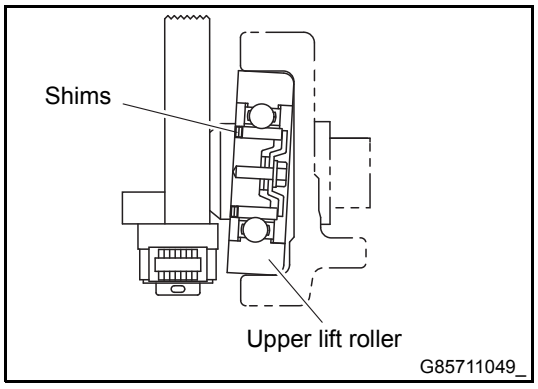


1. Hoist the lift bracket to the specified position to make the center of the middle lift rollers in the lift bracket to 100 mm (3.94 in) below the top of the inner mast.

2. Inspect and adjust the middle lift rollers.

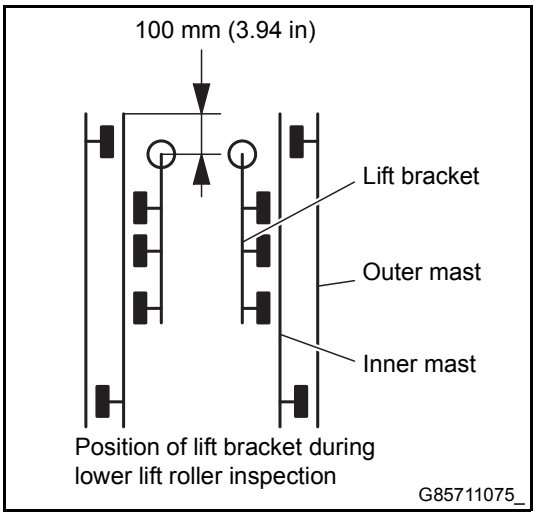
   Shift the lift bracket to one side to bring the roller into contact with the inner mast. Measure the lift roller clearance at the position on the opposite side where the roller side is closest to the mast.

   Standard: D = 0.6 ~ 0.8 mm (0.024 ~ 0.031 in)

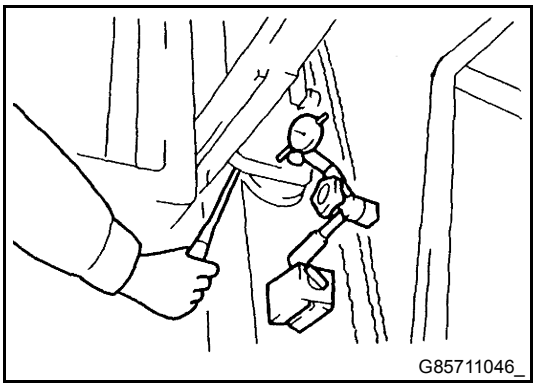


If the standard is not satisfied, make adjustment by changing the lift roller shim thickness. Distribute shims equally to the rollers on the right and left sides.
(Refer to "Lift bracket disassembly and reassembly", page 11-25.)

Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)



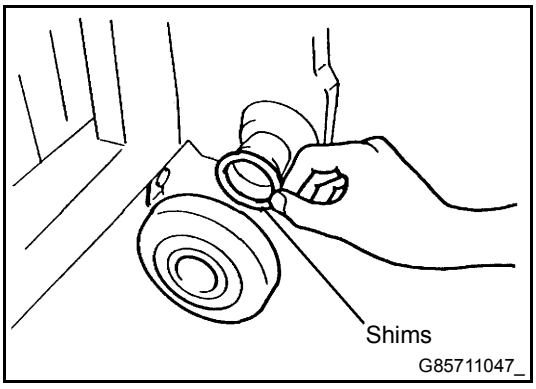
3. Lower the lift bracket to the specified position to make the center of the side rollers in the lift bracket to 100 mm (3.94 in) below the top of the inner mast.



4. Inspect and adjust the lower lift rollers.

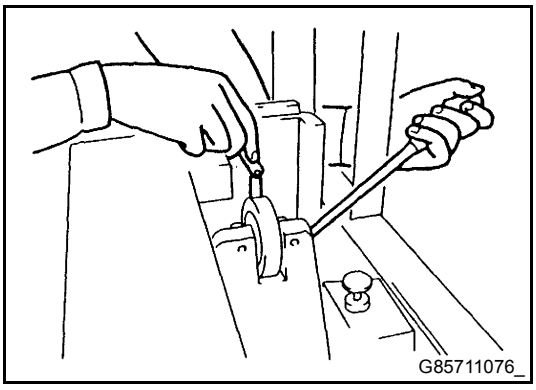
   Shift the lift bracket to one side to bring the roller into contact with the inner mast. Measure the lift roller clearance at the position on the opposite side where the roller side is closest to the mast.

   Standard: C = 0 ~ 0.6 mm (0 ~ 0.024 in)



   If the standard is not satisfied, make adjustment by changing the lift roller shim thickness. Distribute shims equally to the rollers on the right and left sides.

   Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)

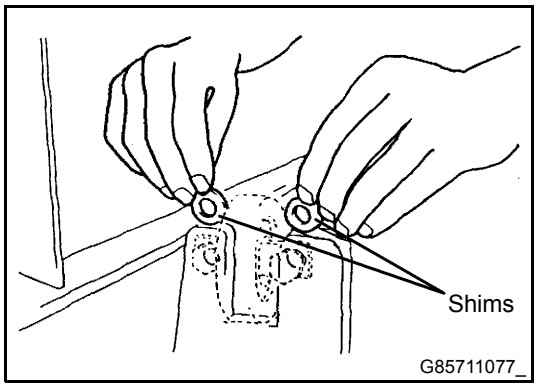


5. Inspect and adjust the side rollers.

   Shift the lift bracket to one side to bring the side roller into contact with the inner mast. Measure the side roller clearance at the position on the opposite side where the roller side is closest to the mast.

   Standard: E = 0 ~ 0.6 mm (0 ~ 0.024 in)

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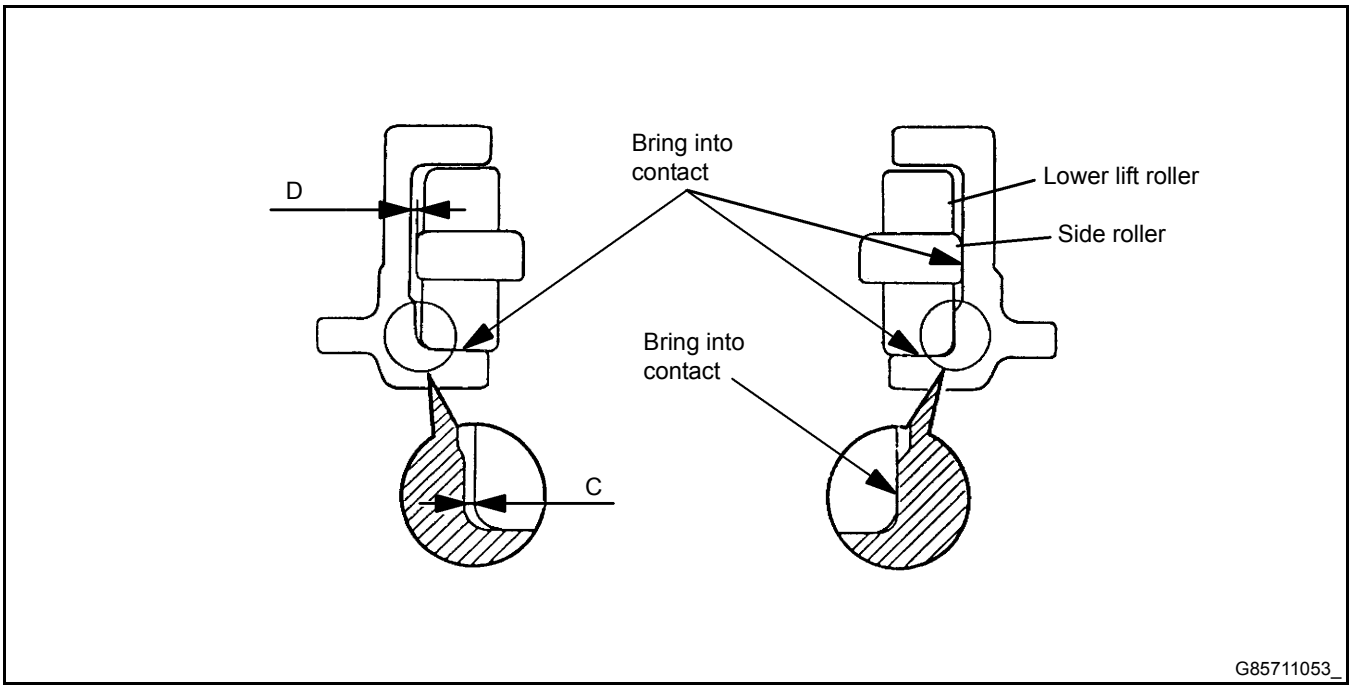


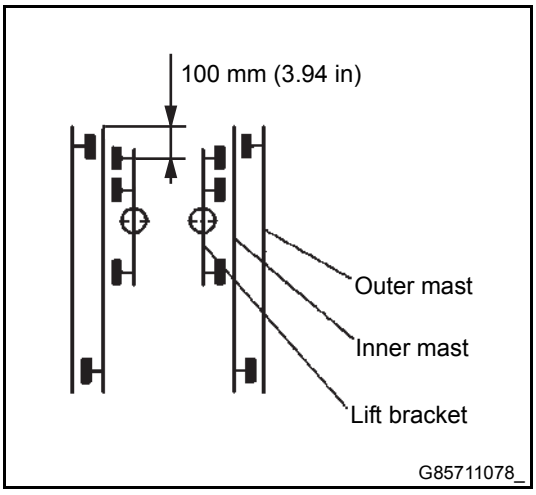
If the standard is not satisfied, make adjustment by changing the side roller shim thickness. Distribute shims equally to the rollers on the right and left sides.
(Refer to "Lift bracket disassembly and reassembly", page 11-25.)

Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)

6. After the adjustment, check that the lift bracket moves smoothly along the overall length of the mast.

V Mast (2 ton series)





1. Hoist the lift bracket to the specified position to make the center of the upper lift rollers in the lift bracket to 100 mm (3.94 in) below the top of the inner mast.

2. Inspect and adjust the lower lift rollers.

   Shift the lift bracket to one side to bring the roller into contact with the inner mast. Measure the lift roller clearance at the position on the opposite side where the roller side is closest to the mast.

   Standard: C = 0 ~ 0.6 mm (0 ~ 0.024 in)

   If the standard is not satisfied, make adjustment by changing the lift roller shim thickness. Distribute shims equally to the rollers on the right and left sides.

   Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)

3. Inspect and adjust the side rollers.

   Bring the side roller on one side into contact with mast side surface, measure on the opposite side the clearance between the side roller and the inner mast side surface where they are the closest.

   Standard: D = 0 ~ 0.6 mm (0 ~ 0.024 in)

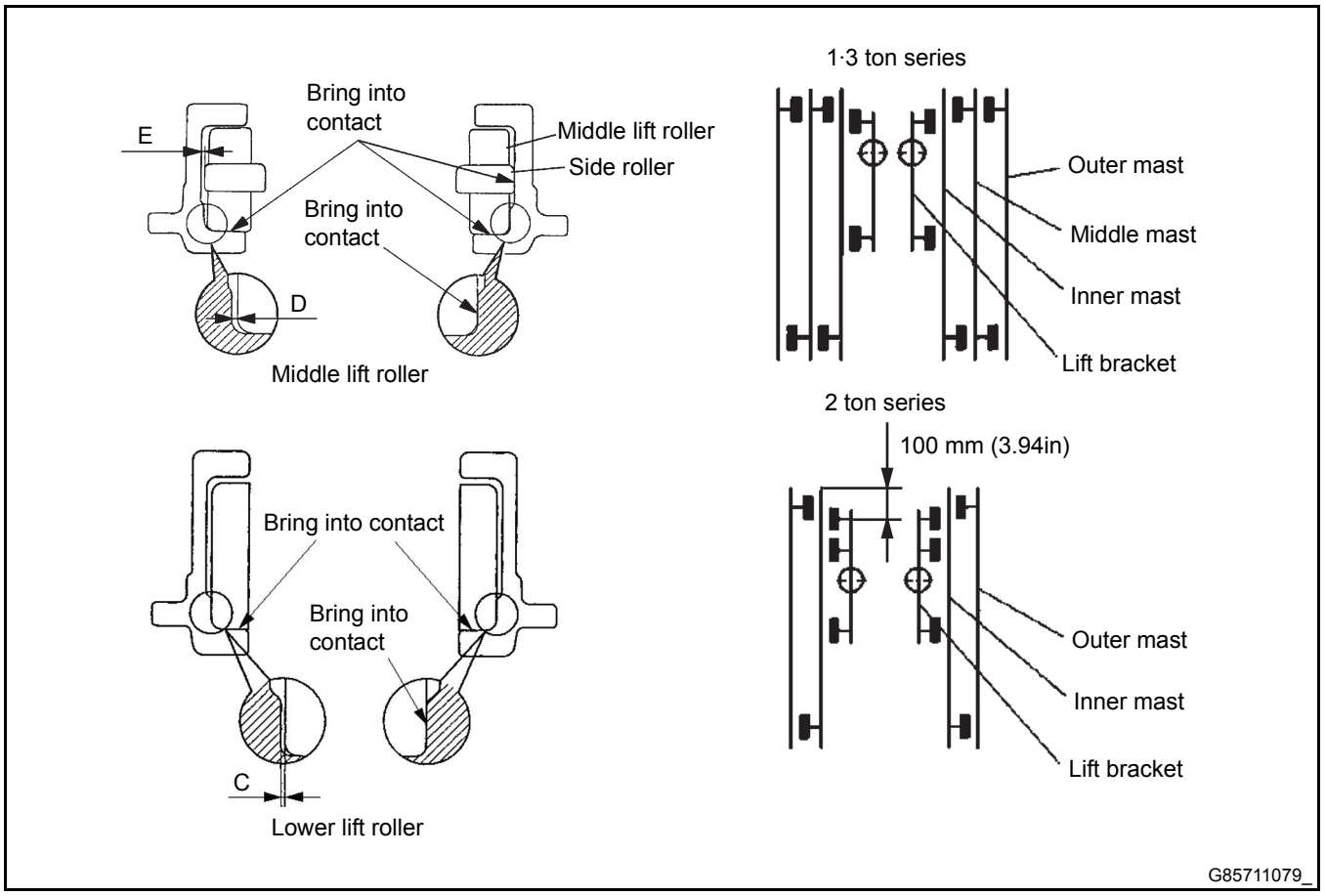
   If the standard is not satisfied, make adjustment by changing the lift roller shim thickness. Distribute shims equally to the rollers on the right and left sides.

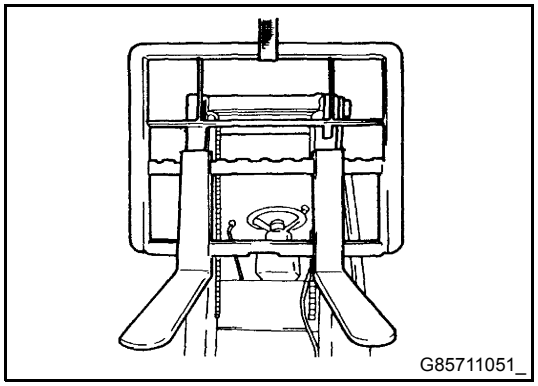
   Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)

4. After the adjustment, check that the lift bracket moves smoothly along the overall length of the mast.

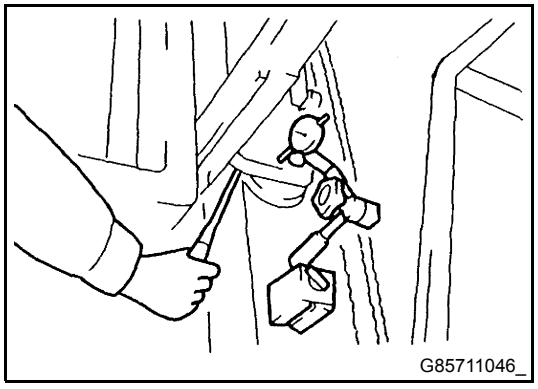
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FSV Mast





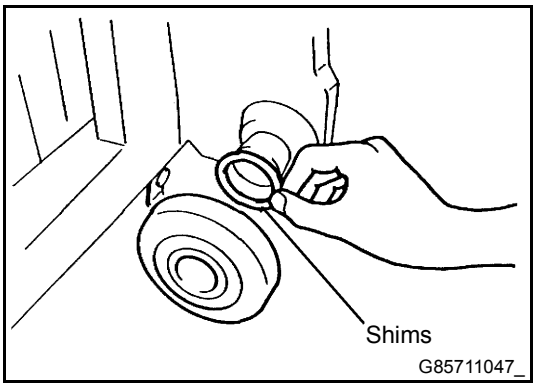
1. Raise the lift bracket to the uppermost position.



2. Inspect and adjust the lower lift rollers.

   Shift the lift bracket to one side to bring the roller into contact with the inner mast. Measure the lift roller clearance at the position on the opposite side where the roller side is closest to the mast.

   Standard: C = 0 ~ 0.6 mm (0 ~ 0.024 in)



If the standard is not satisfied, make adjustment by changing the lift roller shim thickness. Distribute shims equally to the left and right rollers.

Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)

3. Inspect and adjust the middle lift rollers.

   Shift the lift bracket to one side to bring the roller into contact with the inner mast. Measure the lift roller clearance at the position on the opposite side where the roller side is closest to the mast.

   Standard: D = 0.6 ~ 0.8 mm (0.024 ~ 0.031 in)

   If the standard is not satisfied, make adjustment by changing the lift roller shim thickness. Distribute shims equally to the left and right rollers.

   Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)

4. Inspect and adjust the side rollers.

   Shift the lift bracket to one side to bring the side roller into contact with the inner mast. Measure the side roller clearance at the position on the opposite side where the roller side is closest to the mast.

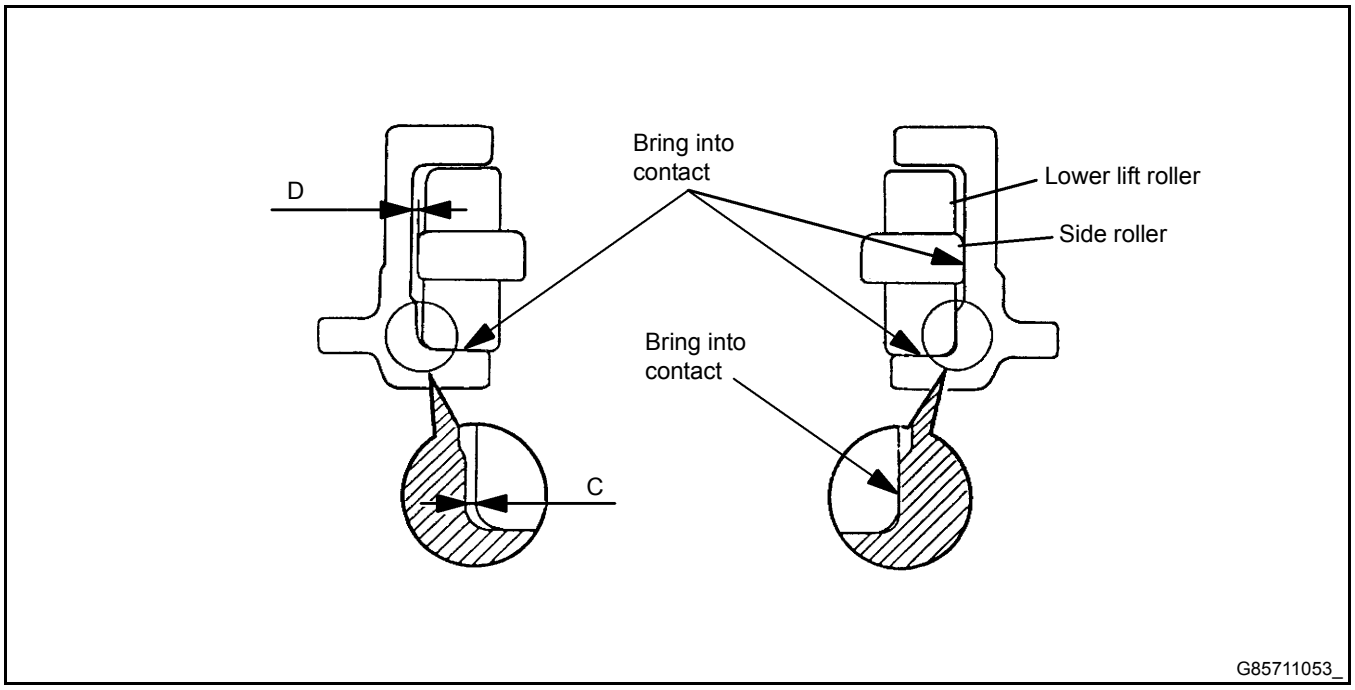
   Standard: E = 0 ~ 0.6 mm (0 ~ 0.024 in)

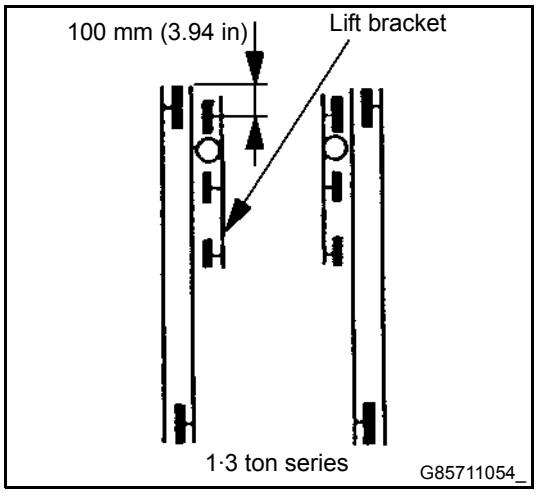
   If the standard is not satisfied, make adjustment by changing the side roller shim thickness. Distribute shims equally to the rollers on the right and left sides.

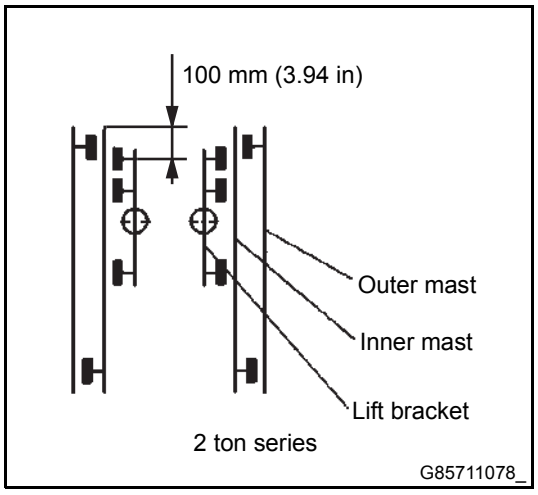
5. After the adjustment, check that the lift bracket moves smoothly along the overall length of the mast.

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FV Mast







1. Hoist the lift bracket to the specified position to make the center of the upper lift rollers in the lift bracket to 100 mm (3.94 in) below the top of the inner mast.

2. Inspect and adjust the lower lift rollers.

   Shift the lift bracket to one side to bring the roller into contact with the inner mast. Measure the lift roller clearance at the position on the opposite side where the roller side is closest to the mast.

   Standard: C = 0 ~ 0.6 mm (0 ~ 0.024 in)

   If the standard is not satisfied, make adjustment by changing the lift roller shim thickness. Distribute shims equally to the rollers on the right and left sides.

   Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)

3. Inspect and adjust the side rollers.

   Bring the side roller on one side into contact with mast side surface, measure on the opposite side the clearance between the side roller and the inner mast side surface where they are the closest.

   Standard: D = 0 ~ 0.6 mm (0 ~ 0.024 in)

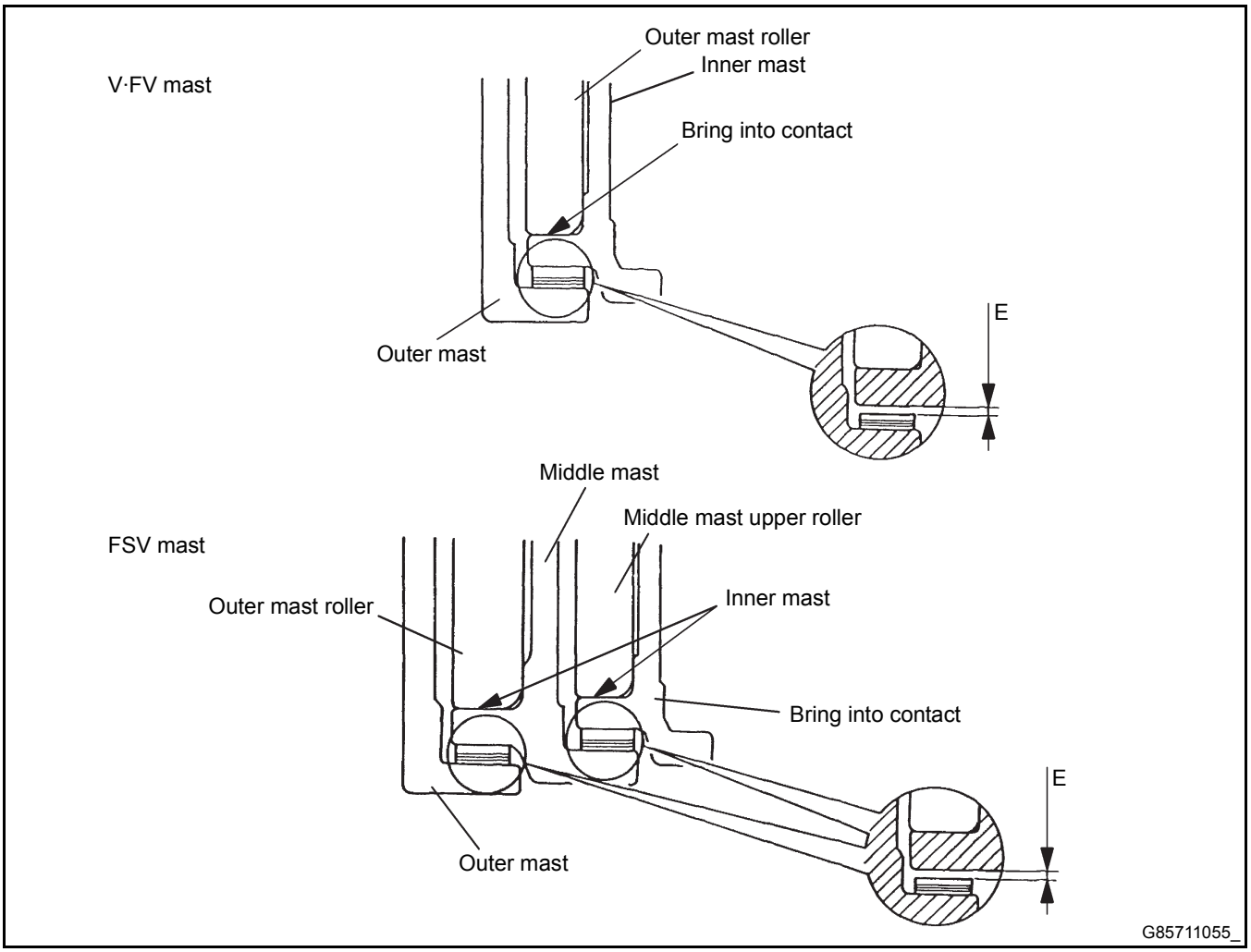
   If the standard is not satisfied, make adjustment by changing the lift roller shim thickness. Distribute shims equally to the rollers on the right and left sides.

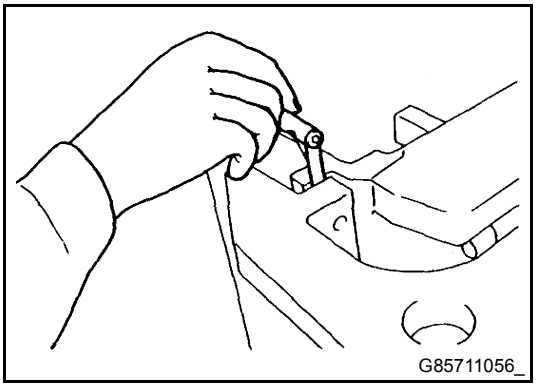
   Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)

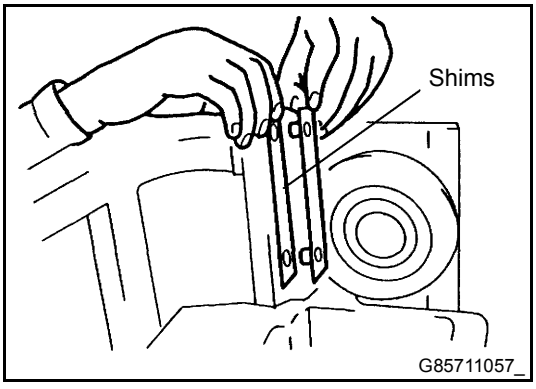
4. After the adjustment, check that the lift bracket moves smoothly along the overall length of the mast.

MAST STRIP ADJUSTMENT

Mast Strip Clearance Adjustment







1. Lower the inner mast (or middle mast) fully.
2. Inspect and adjust the clearance between the mast strip and the inner mast (or middle mast).

   V·FV mast:
   With the inner mast in contact with the outer mast rollers, measure the clearance between the mast strip and the mast.

   FSV mast:
   With the inner mast (or middle mast) in contact with the middle mast upper rollers (or outer mast rollers), measure the clearance between the mast strip and the mast.

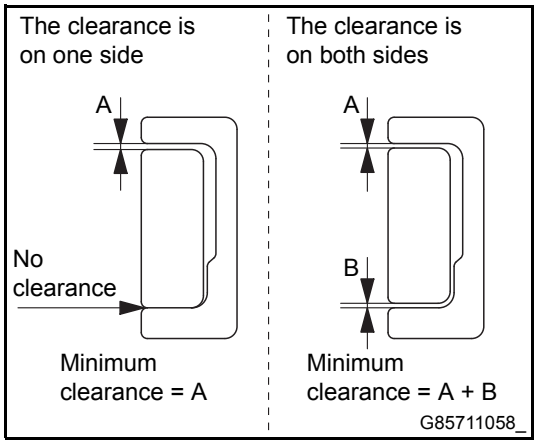
   Standard: E = 0 ~ 0.6 mm (0 ~ 0.024 in)

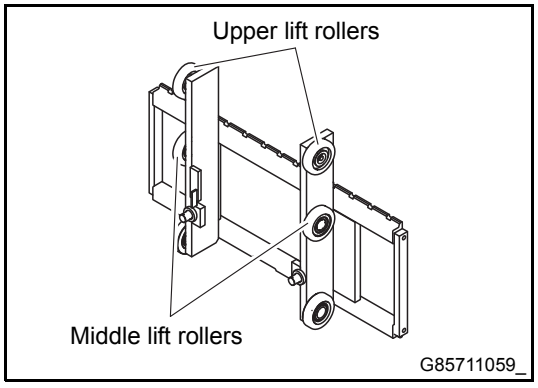
   If the standard is not satisfied, make adjustment by changing the shim thickness.

   Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)
3. After the adjustment, check the mast for smooth movement.

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STANDARD FOR SELECTING AN OVERSIZE ROLLER





1. Select the mast lower lift rollers and lift bracket upper and lower lift rollers.

   Select the appropriate rollers from the table below so that the minimum clearance between the mast or the lift bracket and the roller is from 0 to 1.0 mm (0 to 0.039 in).

   Unit: mm (in)

Outside diameter of the roller	
107.7 (4.240)	108.7 (4.280)
119.7 (4.713)	120.7 (4.752)

2. Select the middle lift rollers of the lift bracket.

   Select middle lift rollers to correspond to the lift rollers selected in 1. from the table below. (Use rollers of outer diameters 1 to 1.2 mm (0.04 to 0.047 in) smaller than those of the upper roller).

   Unit: mm (in)

Outside diameter of the roller	
Upper lift rollers	Middle lift rollers
107.7 (4.240)	106.5 (4.193)
108.7 (4.280)	107.7 (4.240)
119.7 (4.713)	118.5 (4.665)
120.7 (4.752)	119.7 (4.713)

Note:

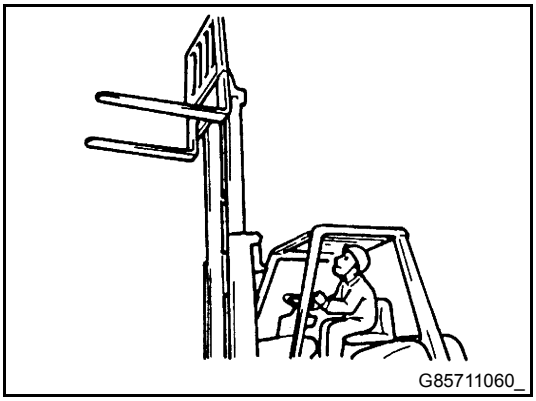
- **There is no selection for the upper lift rollers of the outer mast and middle mast, and for the side roller of the lift bracket.**
- **The outer diameter of the selected rollers may be different between right and left.**

LIFT CYLINDER ADJUSTMENT

V·FSV MAST

Note:

- **For left and right lift cylinders, inspection and adjustment are required to prevent uneven lifting on the left and right sides due to tolerances of parts, etc.**
- **The inspection and adjustment must be made when any of the following parts is replaced: Lift cylinder ASSY, lift cylinder rod SUB-ASSY, lift cylinder SUB-ASSY, mast ASSY, outer mast SUB-ASSY, and inner mast SUB-ASSY)**
- **Perform SAS matching after adjustment. (SAS spec. only) (See section 4 and 14.)**


G85711060_

1. Inspection method

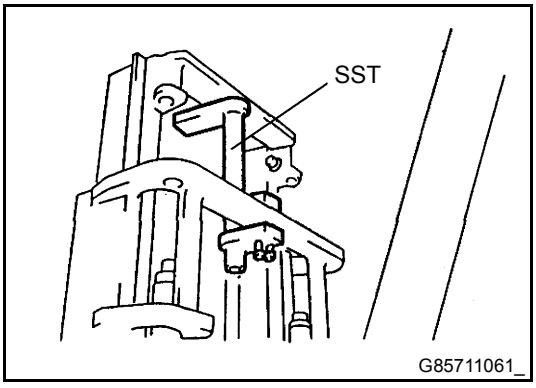
   Slowly raise the inner mast, and observe the stopping states of the left and right cylinder rods at the moment when the inner mast reaches the maximum height.

   (1) Normal case

   Both the left and right rods stop almost simultaneously with almost no shaking of the inner mast.

   (2) Abnormal case

   The rods stop with slight difference and the top of the inner mast shakes at the time of stopping. To correct this, add shims to the cylinder that stops first. (In case of FV mast, adjusting by increasing or decreasing shims on LH side.)



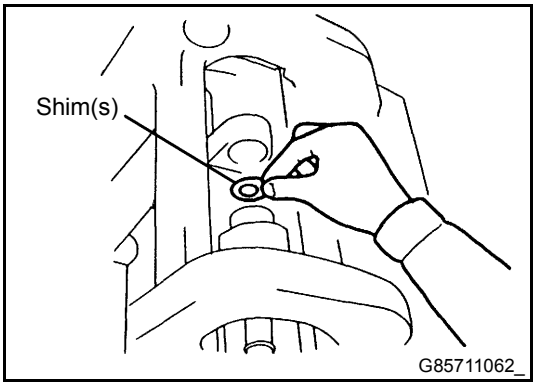
G85711061_

2. Adjustment method

   (1) Remove the left and right cylinder rod end set bolts.

   (2) Suspend the inner mast with a hoist, attach the SST to the outer mast tie beam, and lower the inner mast until it makes contact with the SST.

   SST 09610-22000-71



G85711062_

   (3) Place shim(s) on top of the cylinder rod end on the side to be adjusted, then slowly raise it and insert into the inner mast.

   Shim thickness:
   0.5·1.0·2.0·3.2 mm (0.020·0.039·0.079·0.126 in)

   (4) Reattach the left and right cylinder rod end set bolts.

   (5) Remove the SST.

   (6) Raise the inner mast for reinspection.

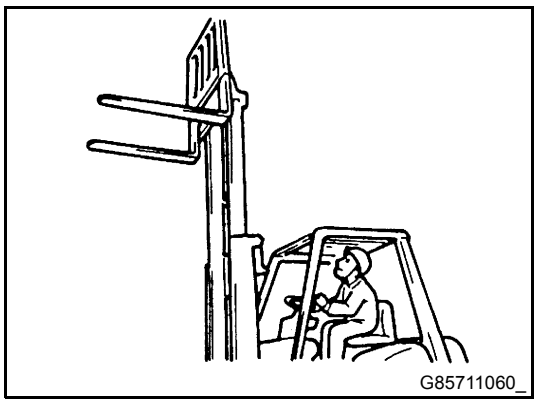
   (7) Repeat the inspection and adjustment until the number of shims is determined.

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FV MAST

Note:

- **For left and right lift cylinders, inspection and adjustment are required to prevent uneven lifting on the left and right sides due to tolerances of parts, etc.**
- **The inspection and adjustment must be made when any of the following parts is replaced: Lift cylinder ASSY, lift cylinder rod SUB-ASSY, lift cylinder SUB-ASSY, mast ASSY, outer mast SUB-ASSY, and inner mast SUB-ASSY**
- **Perform SAS matching after adjustment. (SAS spec. only) (See section 4 and 14.)**


G85711060_

1. Inspection method

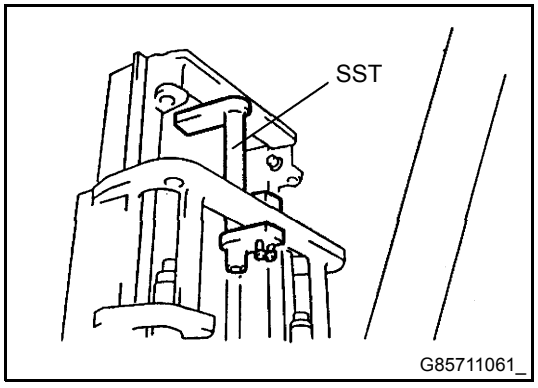
   Slowly raise the inner mast, and observe the stopping states of the left and right cylinder rods at the moment when the inner mast reaches the maximum height.

   (1) Normal case

   Both the left and right rods stop almost simultaneously with almost no shaking of the inner mast.

   (2) Abnormal case

   The rods stop with slight difference and the top of the inner mast shakes at the time of stopping. In this case, it is necessary to make a shim adjustment.



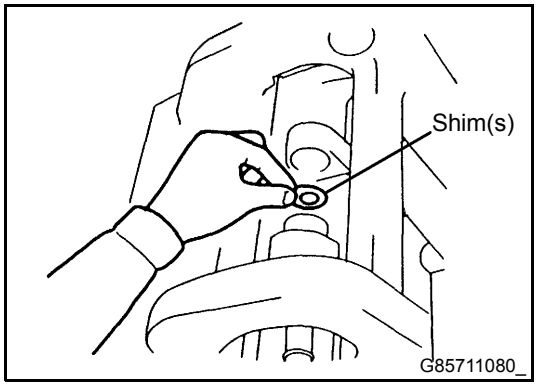
G85711061_

2. Adjustment method

   (1) Remove the left and right cylinder rod end set bolts.

   (2) Suspend the inner mast with a hoist, attach the SST to the outer mast tie beam, and lower the inner mast until it makes contact with the SST.

   SST 09610-22000-71



G85711080_

   (3) Place shim(s) on LH of the cylinder rod end, then slowly raise the cylinder rod end into the inner mast.

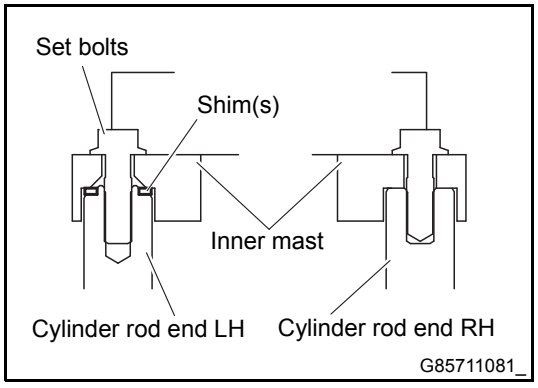
   Shim thickness:
   0.5·1.0·2.0·3.2 mm (0.020·0.039·0.079·0.126 in)

   (4) Reattach the left and right cylinder rod end set bolts.

   (5) Remove the SST.

   (6) Raise the inner mast for reinspection.

   (7) Repeat the inspection and adjustment until the number of shims is determined.



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CYLINDER

Page

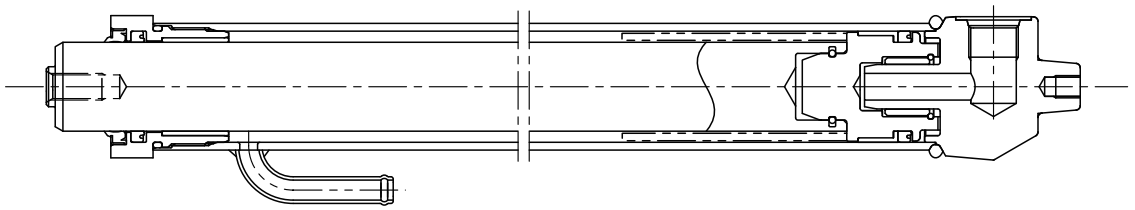
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LIFT CYLINDER (V)·REAR LIFT CYLINDER (FV·FSV)

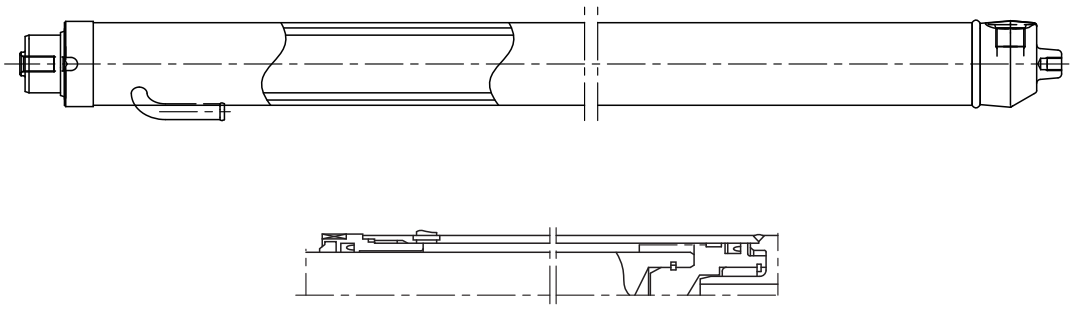
GENERAL

Lift Cylinder (V/ 1·2 ton series)·Rear Lift Cylinder (FSV/ 1·2 ton series)



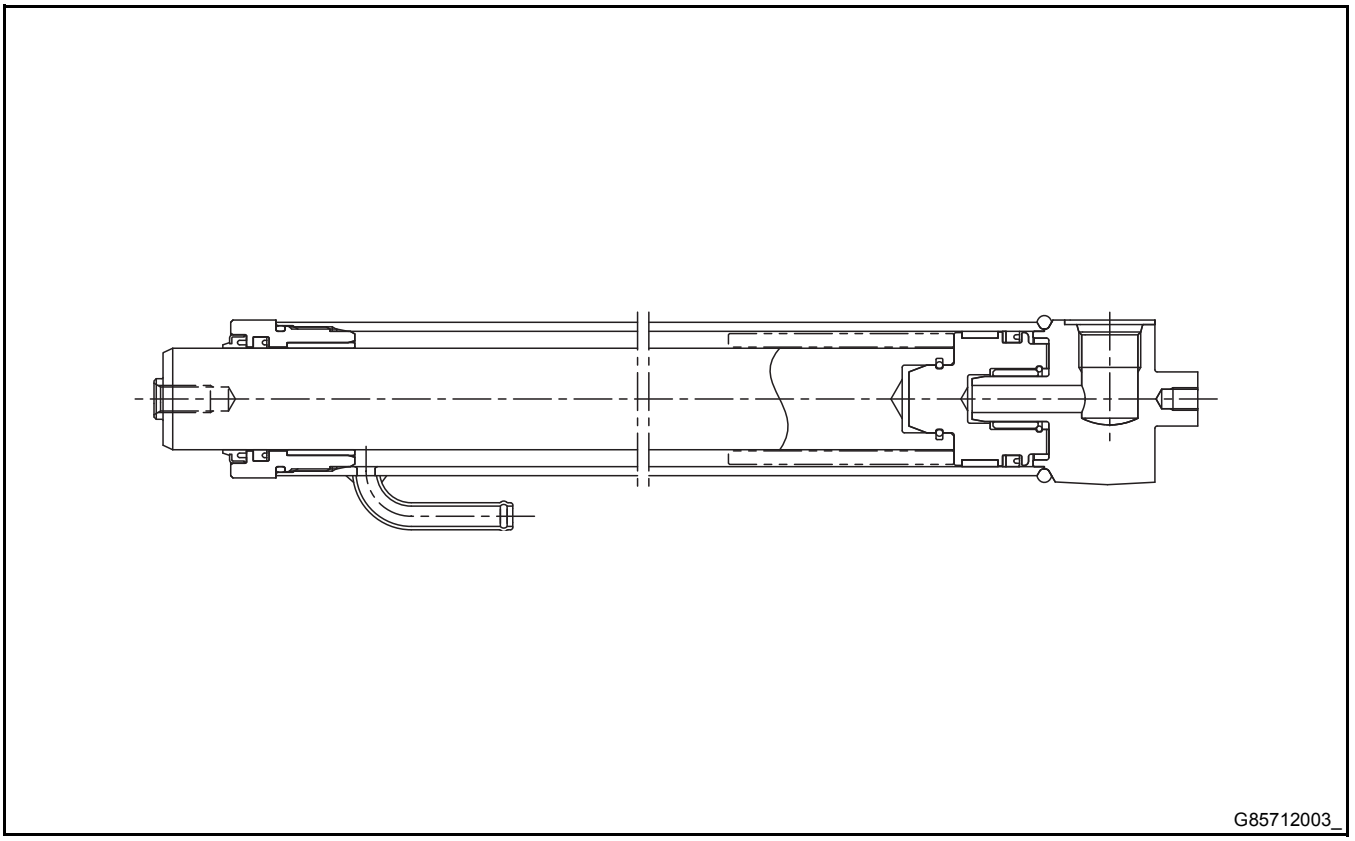
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Lift Cylinder (V/ 3 ton series)

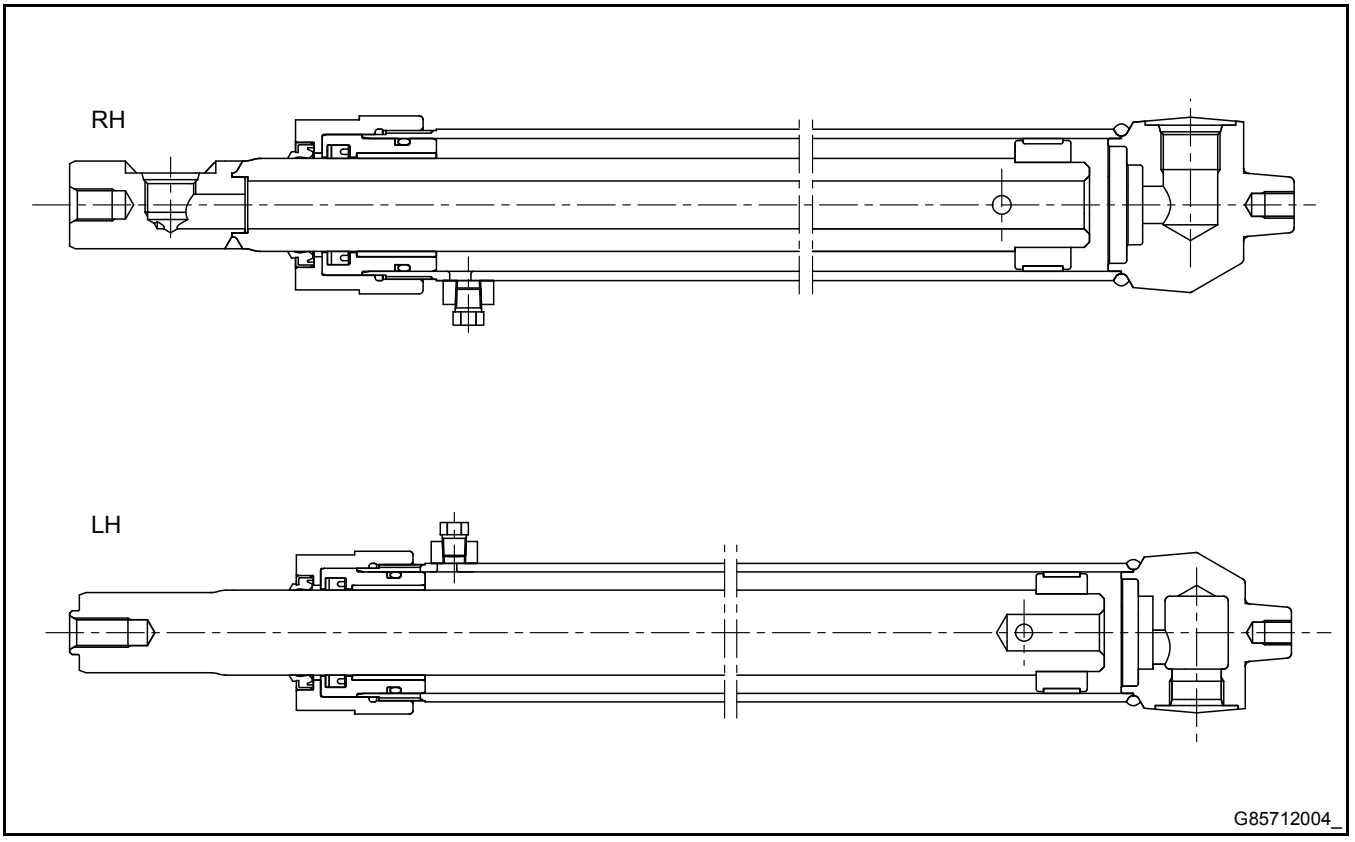


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Rear Lift Cylinder (FSV/ 3 ton series)



Rear Lift Cylinder (FV)



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SPECIFICATIONS

Lift Cylinder (V)

Item \ Vehicle model		1 ton series	2 ton series	3 ton series
Cylinder type		Single-acting type		
Cylinder bore	mm (in)	45 (1.77)	50 (1.97)	55 (2.17)
Piston rod outside diameter	mm (in)	35 (1.38)	40 (1.57)	45 (1.77)
Piston seal type		U packing		
Rod seal type		U packing		
Others		Built-in safety down valve (LH)		

Rear Lift Cylinder (FSV)

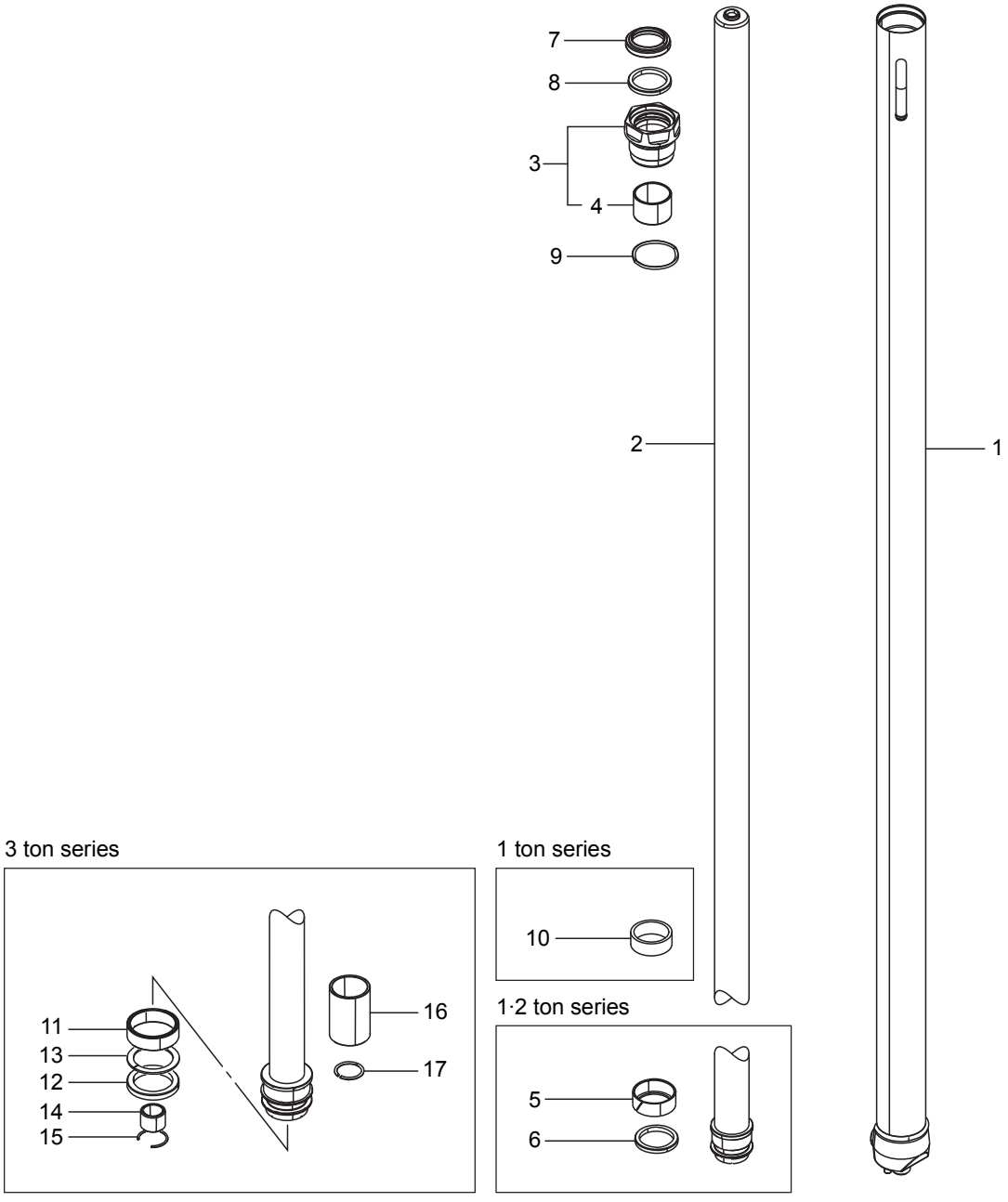
Item \ Vehicle model		1 ton series	2 ton series	3 ton series
Cylinder type		Single acting type		
Cylinder bore	mm (in)	45 (1.77)	50 (1.97)	55 (2.17)
Piston rod outside diameter	mm (in)	35 (1.26)	40 (1.57)	45 (1.77)
Piston seal type		U packing		
Rod seal type		U packing		
Others		Built-in safety down valve (RH)		

Rear Lift Cylinder (FV)

Item \ Vehicle model		1 ton series	2 ton series	3 ton series
Cylinder type		Single acting type		
Cylinder bore	mm (in)	45 (1.77)	50 (1.97)	55 (2.17)
Piston rod outside diameter	mm (in)	32 (1.26)	35 (1.38)	40 (1.57)
Rod seal type		U packing		
Others		Built-in safety down valve (LH)		

COMPONENTS

Lift Cylinder (V)

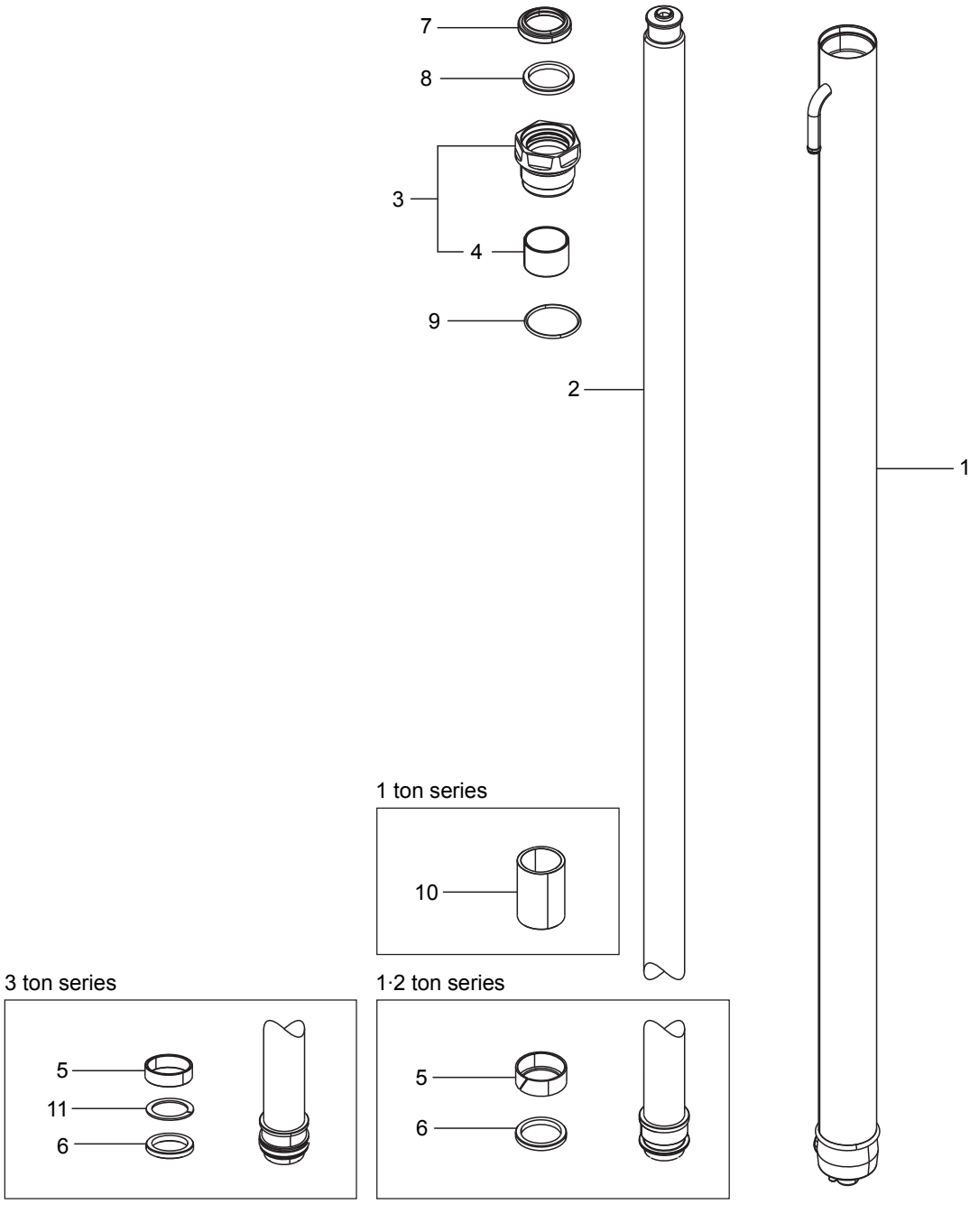


G85712005_

No.	Parts name	QTY	No.	Parts name	QTY
1	Cylinder sub-assy, lift	2	10	Collar (only for high lifting height model)	2
2	Rod sub-assy, lift cylinder	2	11	Bushing	2
3	Cover, lift cylinder	2	12	Packing, U	2
4	Sleeve, lift cylinder rod guide	2	13	Ring, back up	2
5	Ring, wear	2	14	Bearing, cushion	2
6	Packing, U	2	15	Ring	2
7	Seal, dust	2	16	Spacer	2
8	Packing, U	2	17	Ring, O	2
9	Ring, O	2			

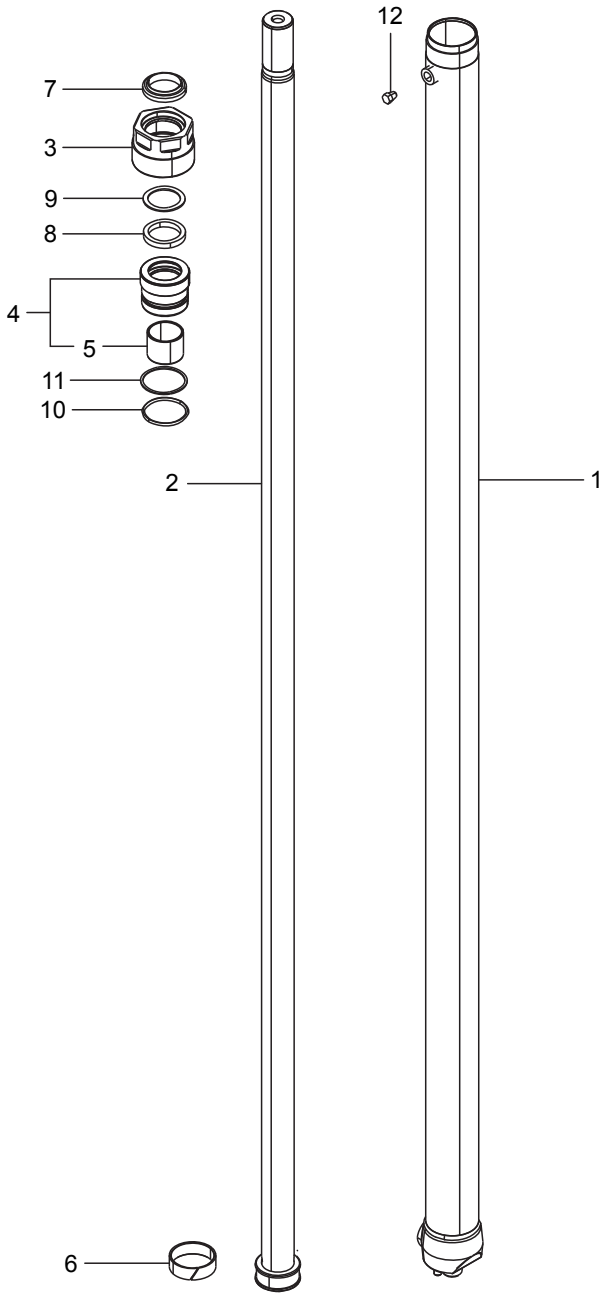
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Rear Lift Cylinder (FSV)



No.	Parts name	QTY	No.	Parts name	QTY
1	Cylinder sub-assy, lift	2	7	Seal, dust	2
2	Rod sub-assy, lift cylinder	2	8	Packing, U	2
3	Cover, lift cylinder	2	9	Ring, O	2
4	Sleeve, lift cylinder rod guide	2	10	Collar (only for high lifting height model)	2
5	Ring, wear	2	11	Ring, back up	2
6	Packing, U	2			

Rear Lift Cylinder (FV)

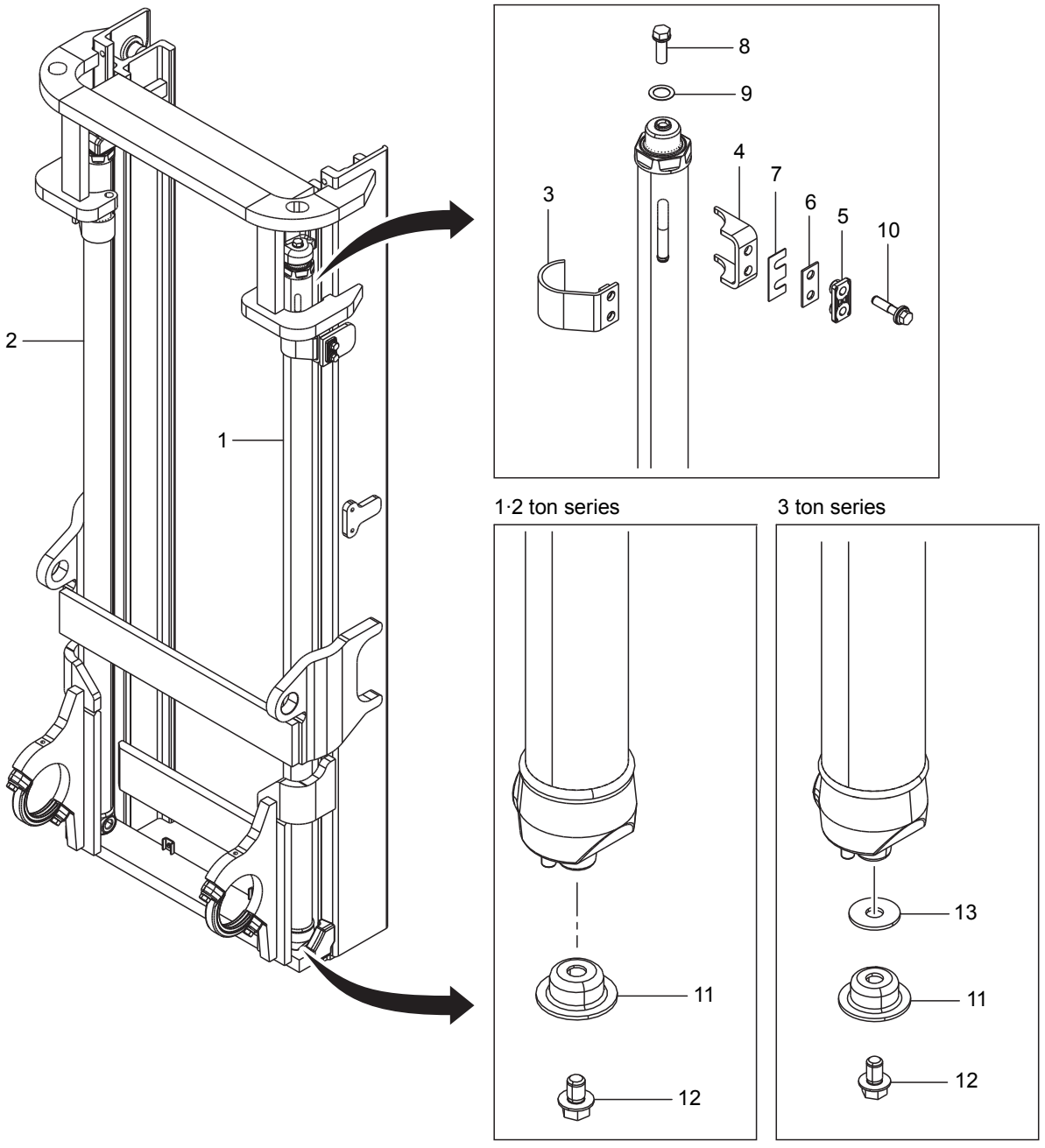


G85712007_

No.	Parts name	QTY	No.	Parts name	QTY
1	Cylinder sub-assy, lift	2	7	Seal, dust	2
2	Rod sub-assy, lift cylinder	2	8	Packing, U	2
3	Cover, lift cylinder	2	9	Ring, back up	2
4	Guide sub-assy, lift cylinder rod	2	10	Ring, O	2
5	Sleeve, lift cylinder rod guide	2	11	Ring, back up	2
6	Ring, wear	2	12	Plug	2

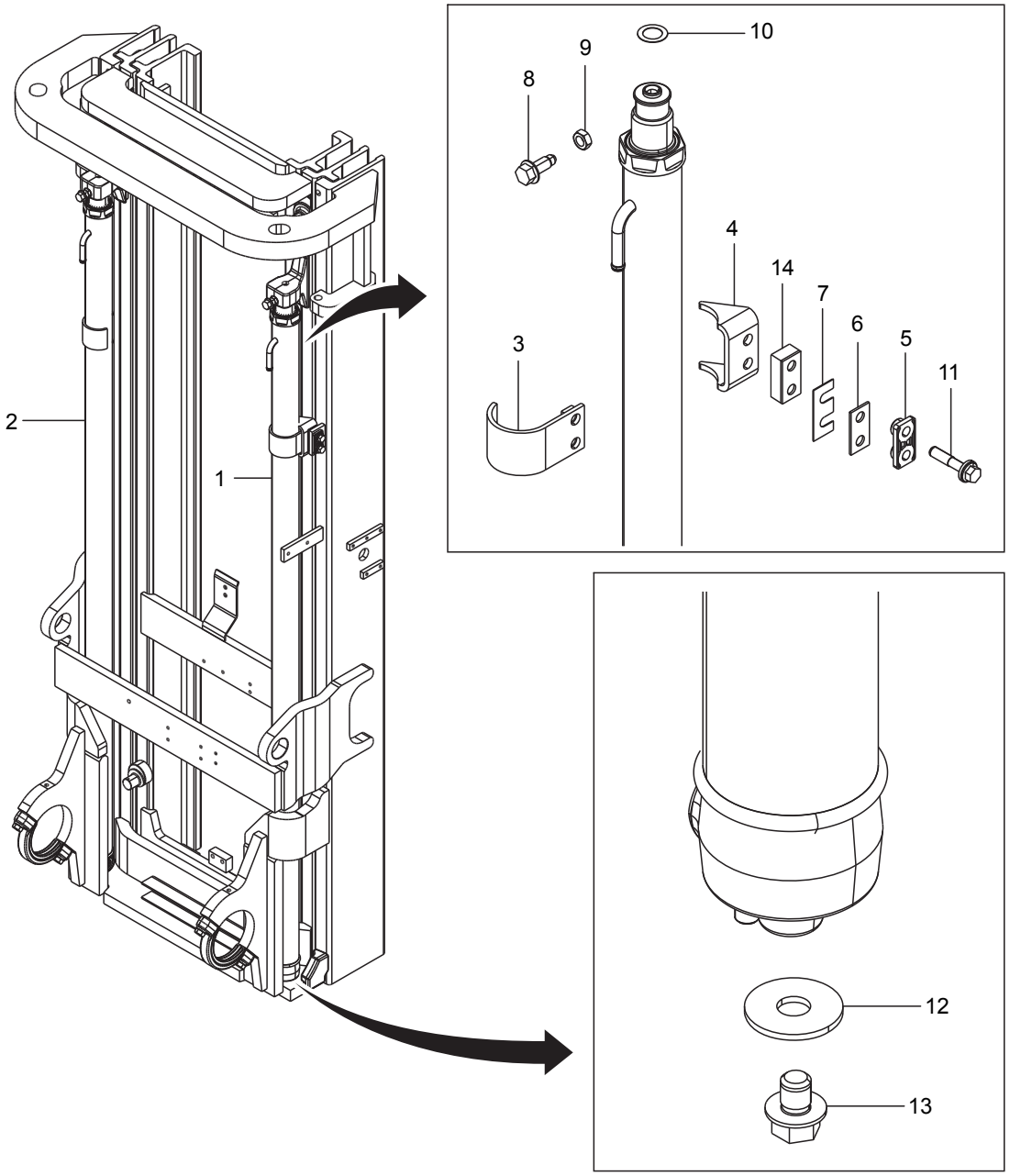
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Installation of Lift Cylinder (V)



No.	Parts name	QTY	No.	Parts name	QTY
1	Cylinder assy, lift, RH	1	8	Bolt	2
2	Cylinder assy, lift, LH	1	9	Shim	99
3	Support	2	10	Bolt	4
4	Plate	2	11	Plate	2
5	Bushing	2	12	Bolt	2
6	Plate	2	13	Washer	2
7	Shim	99			

Installation of Rear Lift Cylinder (FSV)

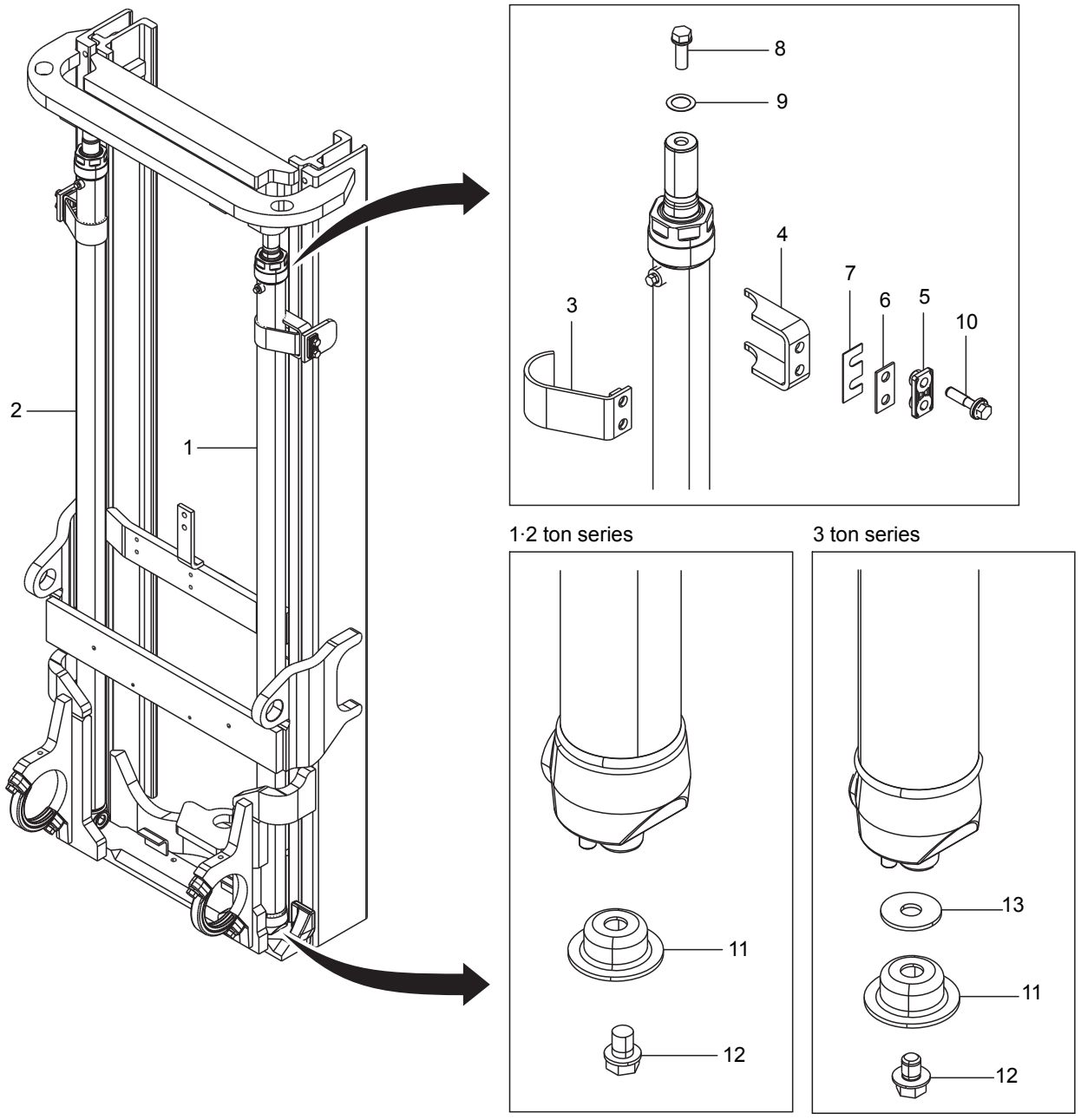


G85712009_

No.	Parts name	QTY	No.	Parts name	QTY
1	Cylinder assy, lift, rear, RH	1	8	Bolt	2
2	Cylinder assy, lift, rear, LH	1	9	Nut	2
3	Support	2	10	Shim	99
4	Plate	2	11	Bolt	4
5	Bushing	2	12	Plate	2
6	Plate	2	13	Bolt	2
7	Shim	99	14	Collar	2

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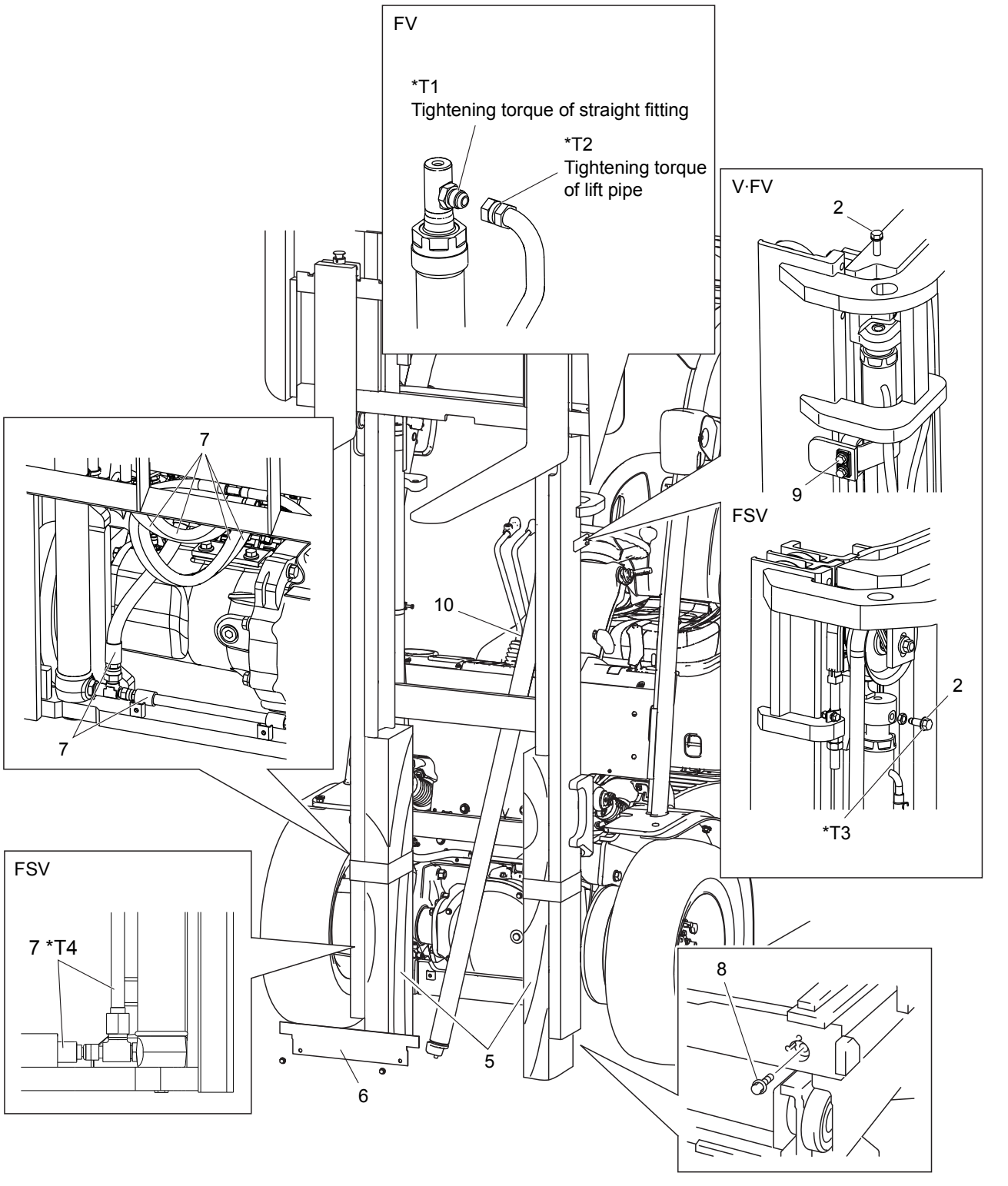
Installation of Rear Lift Cylinder (FV)



G85712010_

No.	Parts name	QTY	No.	Parts name	QTY
1	Cylinder assy, lift, rear, RH	1	8	Bolt	2
2	Cylinder assy, lift, rear, LH	1	9	Shim	99
3	Support	2	10	Bolt	4
4	Plate	2	11	Plate	2
5	Bushing	2	12	Bolt	2
6	Plate	2	13	Washer	2
7	Shim	99			

REMOVAL·INSTALLATION



G85712011_

* Tightening torque of pipe: T = N·m (kgf·cm) [ft·lbf]
T4 (1 ton series) = 56 ~ 62 (571 ~ 632) [41.3 ~ 45.7]
T4 (2·3 ton series) = 74 ~ 82 (755 ~ 836) [54.6 ~ 60.5]

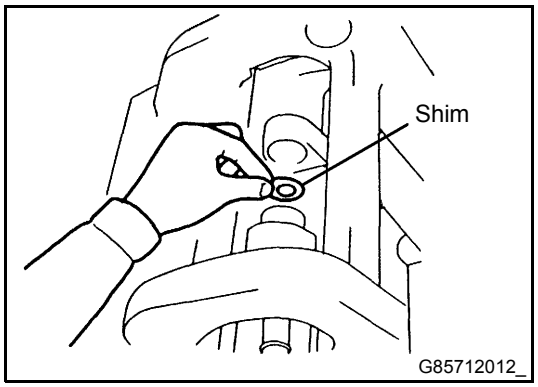
* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 59 ~ 73 (602 ~ 744) [43.5 ~ 53.9]
T2 (1 ton series) = 59 ~ 73 (602 ~ 74) [43.5 ~ 53.9]
T2 (2·3 ton series) = 88 ~ 128 (897 ~ 1305) [64.9 ~ 94.4]
T3 = 25.8 ~ 60.2 (263 ~ 614) [19.0 ~ 44.4]

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Removal Procedure

1 Set the mast vertical and lower the fork fully.

2 Remove the lift cylinder rod end set bolt.



3 Hoist the inner mast by slinging with a wire and disconnect the end of each lift cylinder rod.

Shim adjustment is made at the lift cylinder rod end to prevent uneven lifting by lift cylinders LH and RH. Note the cylinder that was adjusted and the number of shims used.

4 Hoist the inner mast further so that the lift cylinder ASSY can be removed toward the front of the vehicle.

5 Support the bottom of the inner mast with wooden blocks and fix the blocks by taping onto the outer mast.

6 Remove the hose cover.

7 Disconnect the low pressure hose and high pressure hose.

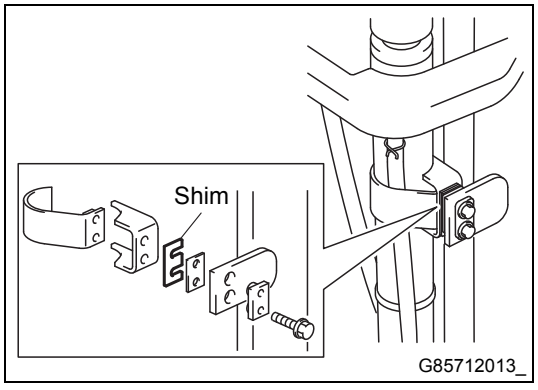
8 Remove the lift cylinder bottom end set bolt.

9 Remove the lift cylinder support.
Take a note on the number of cylinder support shims in use.

10 Remove the lift cylinder ASSY.

Installation Procedure

The installation procedure is the reverse of the removal procedure.



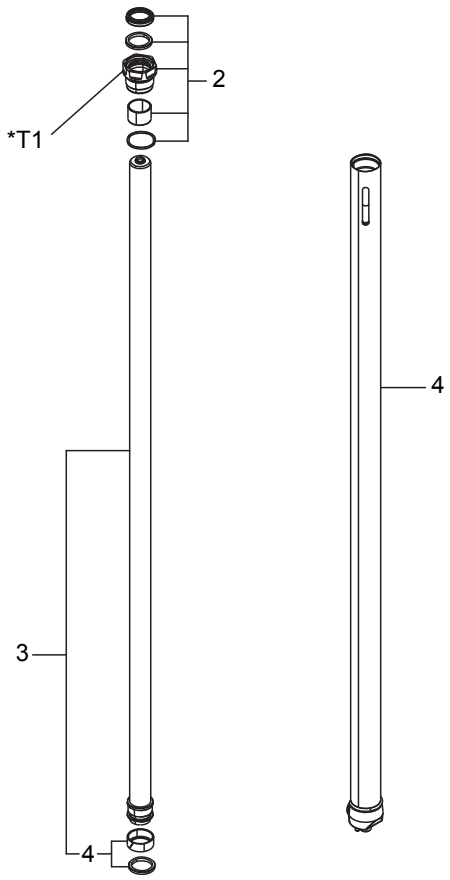
Note:

- **Make cylinder support shim adjustment if the mast or either cylinder is replaced.**
  With the cylinder rod end inserted to the inner mast, insert shim(s) between the cylinder support and outer mast to eliminate the clearance. The shim thickness should be slightly greater than the clearance.

- **After installing the lift cylinder, follow the steps below.**

  1. **Repeat full-stroke raising and lowering without load to bleed air and check normal functioning.**
  2. **Check the hydraulic oil level and add if insufficient.**
  3. **Inspect lift cylinders for uneven lifting, and make necessary adjustment. (See page 12-32.)**

DISASSEMBLY·INSPECTION·REASSEMBLY



Note: This illustration is for the V mast on the 2 ton series.

G85712014_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 (except 3 ton series V mast)= 282.4 ~ 423.6 (2880 ~ 4320) [208.3 ~ 312.5]
T1 (3 ton series V mast) = 213.2 ~ 336.8 (2174 ~3434) [157.3 ~ 248.5]

Disassembly Procedure

1 Remove the safety down valve (V·FV: LH, FSV: RH).

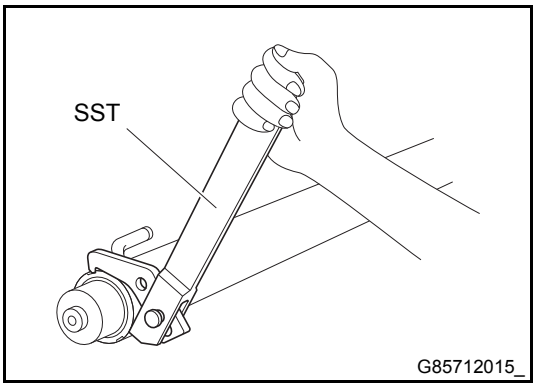
2 Remove the cylinder cover.

If the cylinder cover is a U-groove type, use the SST.

SST 09620-10100-71

3 Remove the piston rod.

4 Remove seals on the piston side.

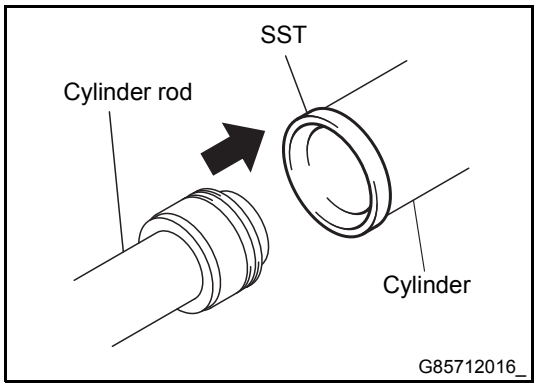


G85712015_

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Reassembly Procedure

The reassembly procedure is the reverse of the disassembly procedure.

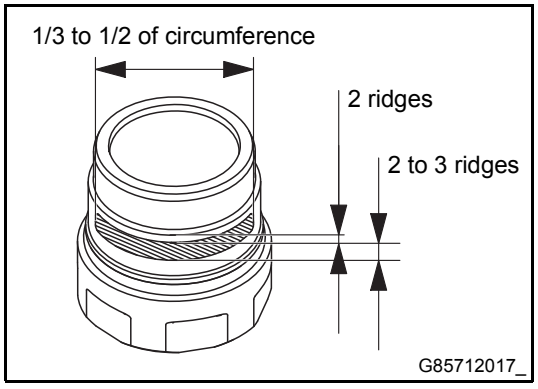


Note:

- **Use a cylinder rod insertion guide (SST) to reassemble.**

  1 ton series: SST 09651-26600-71
  2 ton series: SST 09652-26600-71
  3 ton series: SST 09653-26600-71

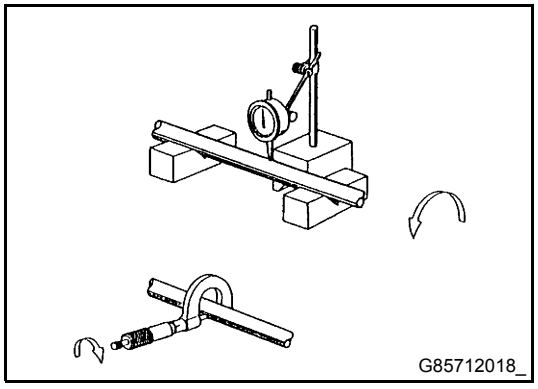
- **Apply MP grease or hydraulic oil to the packing, O-ring, and dust seal lip portion.**
- **Apply MP grease all around the inner surface of the cylinder cover (including the packing, dust seal, and bushing). After installation, wipe off any excess grease.**
- **Apply sealant (08833-76002-71 (08833-00080)) to the cylinder cover on the part shown in the illustration and reassemble it.**



Inspection Procedure

1 Inspect the piston rod.

(1) Measure the piston rod outside diameter.

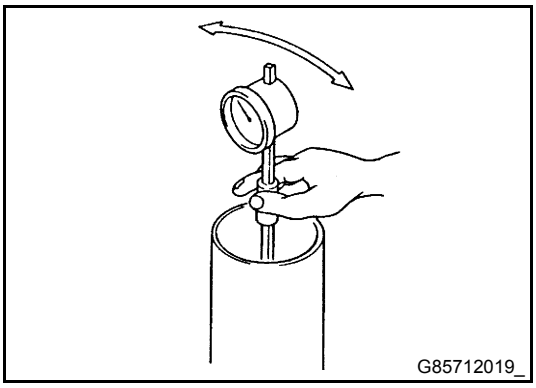


Unit: mm (in)

Vehicle model		Standard	Limit
V	1 ton series	35 (1.38)	34.92 (1.3748)
	2 ton series	40 (1.575)	39.92 (1.5717)
	3 ton series	45 (1.77)	44.92 (1.7685)
FV	1 ton series	32 (1.26)	31.92 (1.2567)
	2 ton series	35 (1.38)	34.92 (1.3748)
	3 ton series	40 (1.575)	39.92 (1.5717)
FSV	1 ton series	35 (1.38)	34.92 (1.3748)
	2 ton series	40 (1.575)	39.92 (1.5717)
	3 ton series	45 (1.77)	44.92 (1.7685)

(2) Measure the bend of the piston rod.

Limit: 2.0 mm (0.079 in)



2 Measure the lift cylinder bore.

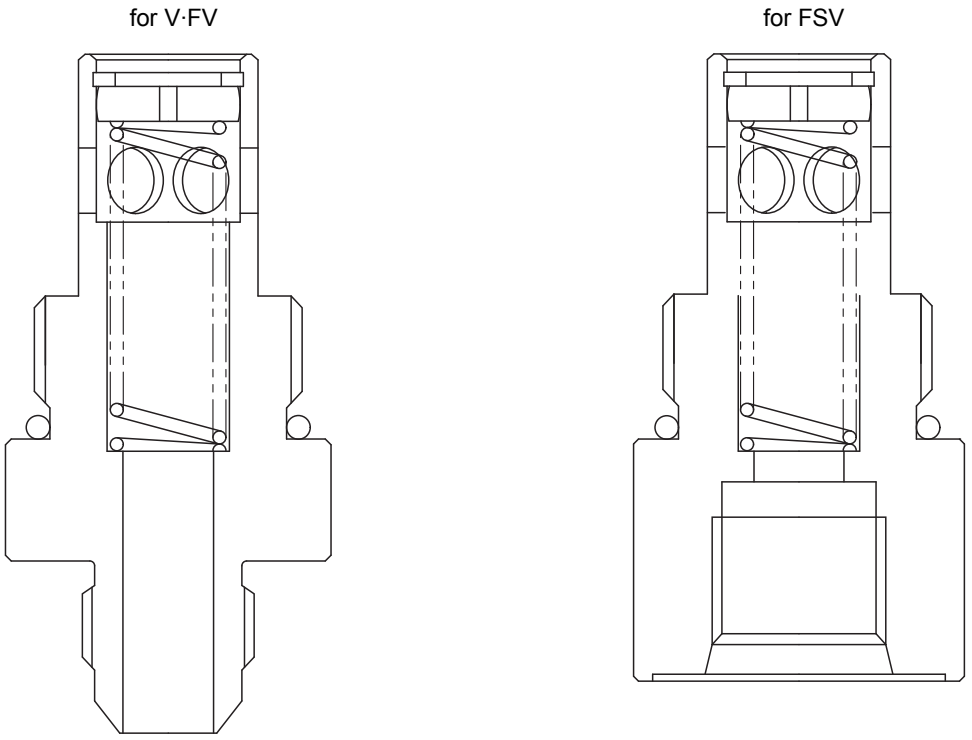
Unit: mm (in)

Vehicle model	Standard	Limit
1 ton series	45 (1.77)	45.20 (1.7795)
2 ton series	50 (1.97)	50.20 (1.9764)
3 ton series	55 (2.17)	55.35 (2.1791)

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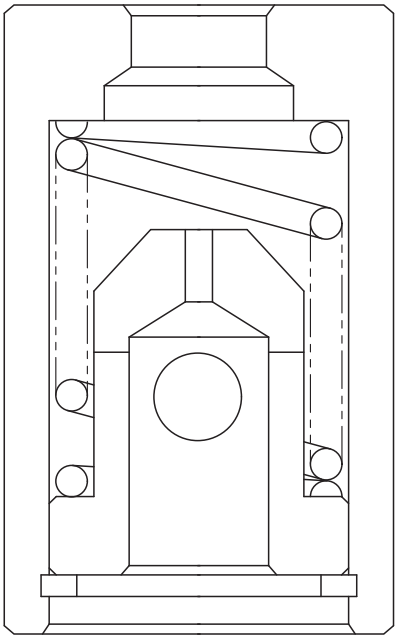
SAFETY DOWN VALVE

Safety Down Valve Sectional View (for V) (for FSV·FV Rear Lift Cylinder)



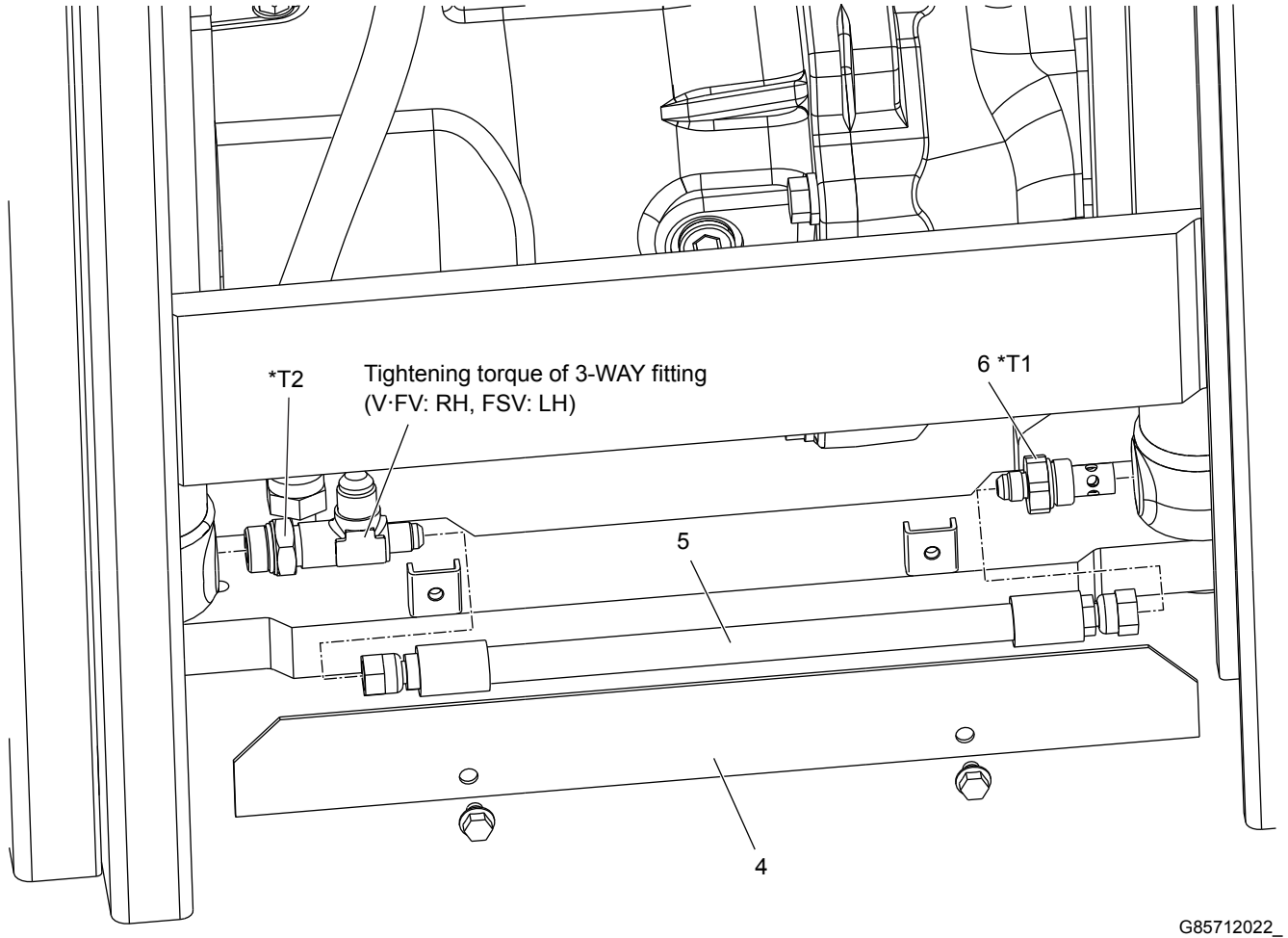
G85712020_

Safety Down Valve Sectional View (for FSV·FV Front Lift Cylinder)

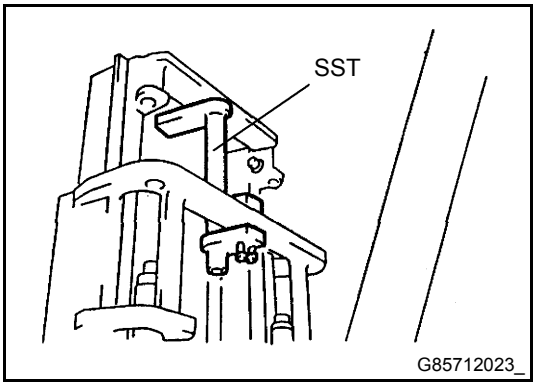


G85712021_

REMOVAL·INSTALLATION



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 29 ~ 39 (296 ~ 398) [21.4 ~ 28.8]
T2 = 59 ~ 73 (602 ~ 744) [43.5 ~ 53.9]



Removal Procedure

1 Hold the inner mast at an appropriate height.

Raise the inner mast, attach the SST to the outer mast tie beam, and lower the inner mast until it makes contact with the SST.

SST 09610-22000-71

2 Remove the lift cylinder rod end set bolt.

3 Fully lower the lift cylinder rod.

4 Remove the hose cover.

5 Disconnect the high pressure hose.

6 Remove the safety down valve.

Installation Procedure

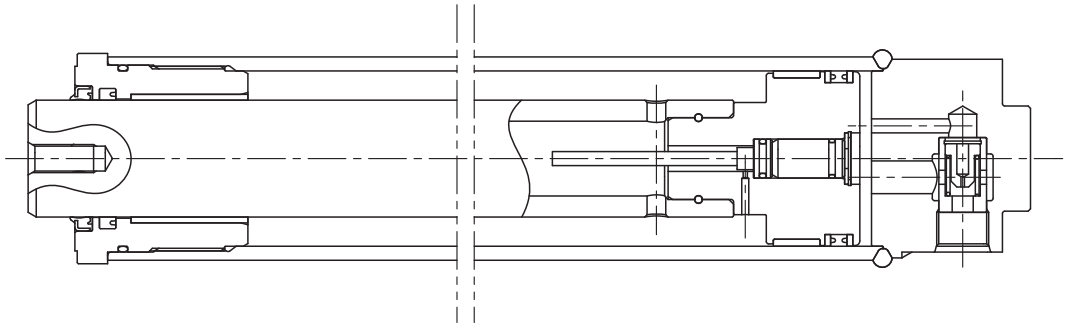
The installation procedure is the reverse of the removal procedure.

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FRONT LIFT CYLINDER (FSV·FV)

GENERAL

Front Lift Cylinder (FSV·FV)

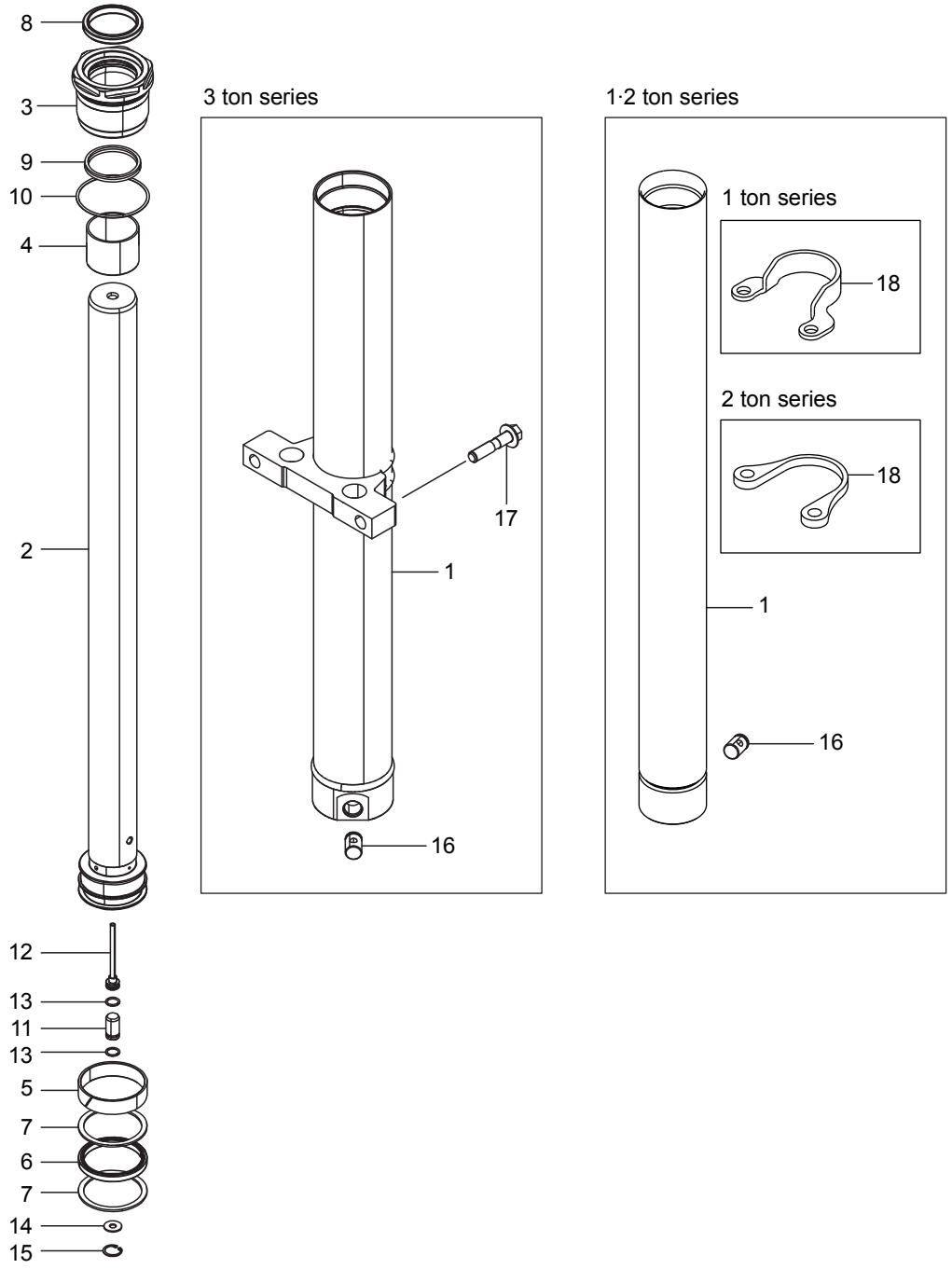


G85712024_

SPECIFICATIONS

Item \ Vehicle model		1 ton series	2 ton series	3 ton series
Cylinder type		Single acting type		
Cylinder bore	mm (in)	70 (2.76)	75 (2.95)	85 (3.25)
Piston rod outside diameter	mm (in)	50 (1.97)		60 (2.36)
Piston seal type		U packing		
Rod seal type		U packing		
Others		Built-in safety down valve		

COMPONENTS

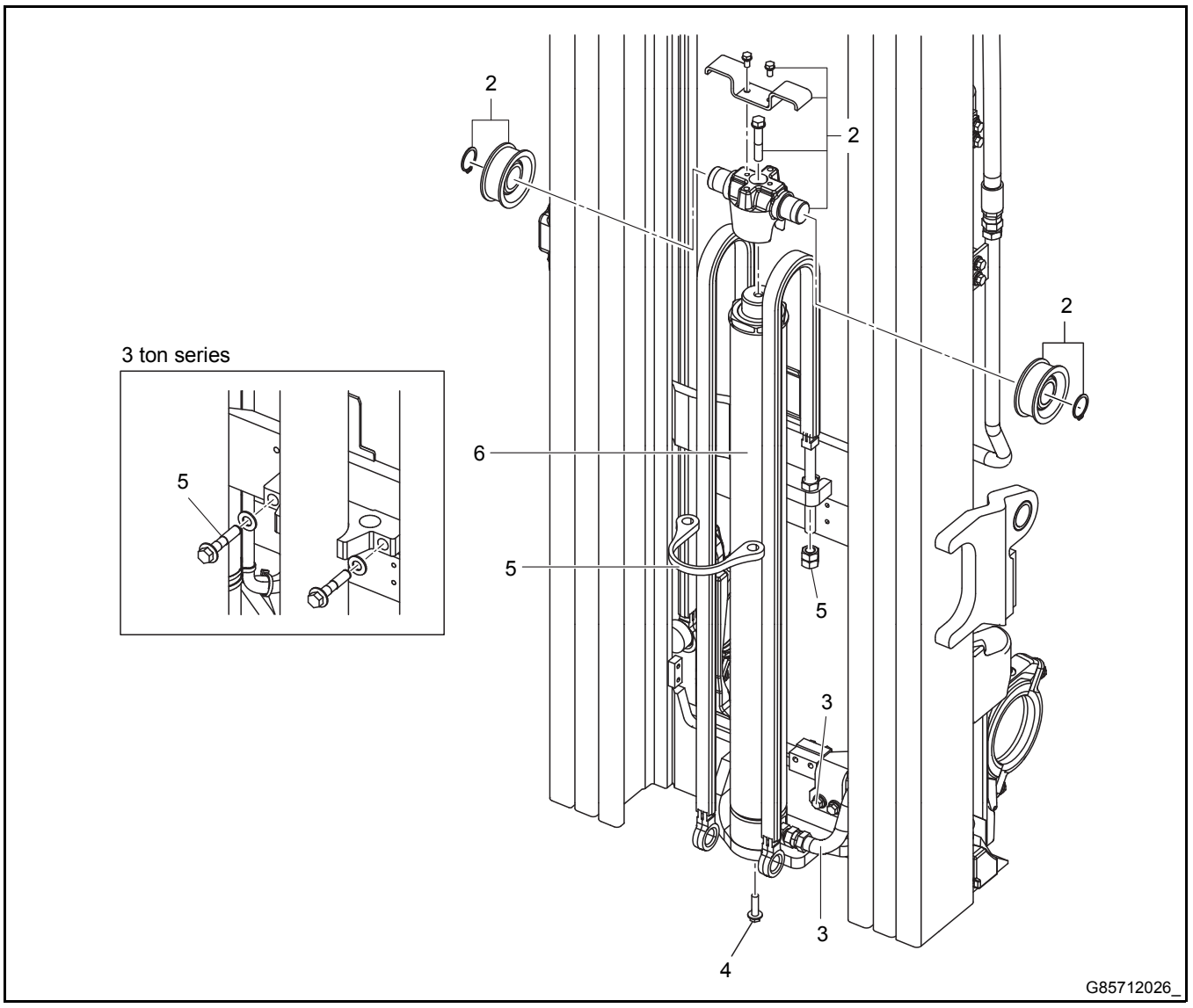


G85712025_

No.	Parts name	QTY	No.	Parts name	QTY
1	Cylinder sub-assy, lift	1	10	Ring, O	1
2	Rod sub-assy, lift cylinder	1	11	Valve, check	1
3	Guide, lift cylinder rod	1	12	Pipe	1
4	Sleeve, lift cylinder rod guide	1	13	Ring, O	2
5	Ring, wear	1	14	Washer, plate	1
6	Packing	1	15	Ring, snap	1
7	Ring, back up	2	16	Valve assy, safety down	1
8	Seal, dust	1	17	Bolt	2
9	Packing, U	1	18	Clamp	1

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REMOVAL·INSTALLATION



Removal Procedure

1 Remove the lift bracket W/ fork.

2 Remove the chain stopper and the chain wheel.

3 Disconnect the front lift cylinder pipe.

4 Remove the front lift cylinder lower bolt.

5 Remove the front lift cylinder clamp. (1·2 ton series)

Remove the front lift cylinder bolt. (3 ton series)

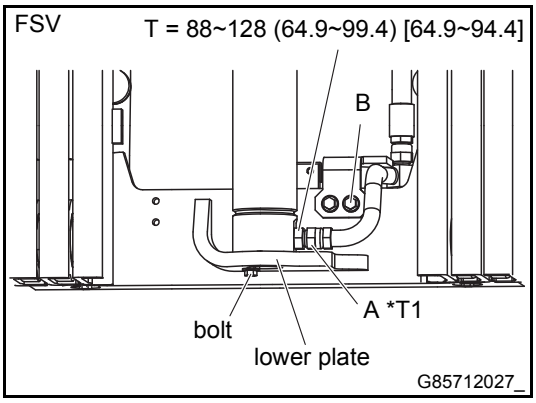
6 Remove the front lift cylinder.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Note:
- **Be careful not to drop the washer and the snap ring when removing the bolt of the hose guide.**
- **Be careful not to drop the cylinder clamp when removing the chain.**
- **After installing the lift cylinder, follow the steps below.**

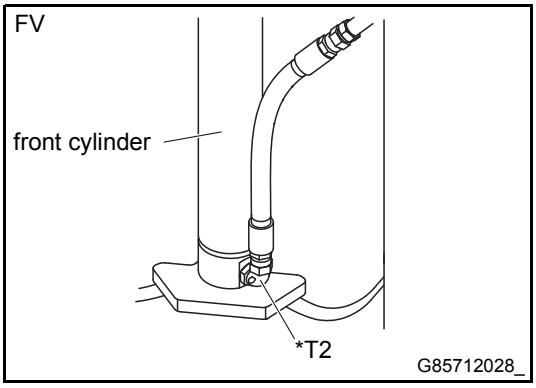
1. **Repeat full-stroke raising and lowering without load to bleed air and check normal functioning.**
2. **Check the hydraulic oil level, and add if insufficient.**
3. **Adjust the lift chain tension equally on the left and right sides.**



- **When tightening the main piping for FSV mast:**

  1. Hand-tighten the bolts in order of A–B.
  2. After hand-tightening, adjust the sheet face of pipe A.
  3. Tighten the bolt B.
  4. Tighten the bolt A at the defined torque.

  *** Tightening torque: T = N·m (kgf·cm) [ft·lbf]**
  T1 = 74.0 ~ 82.1 (755 ~ 837) [55.0 ~ 60.6]

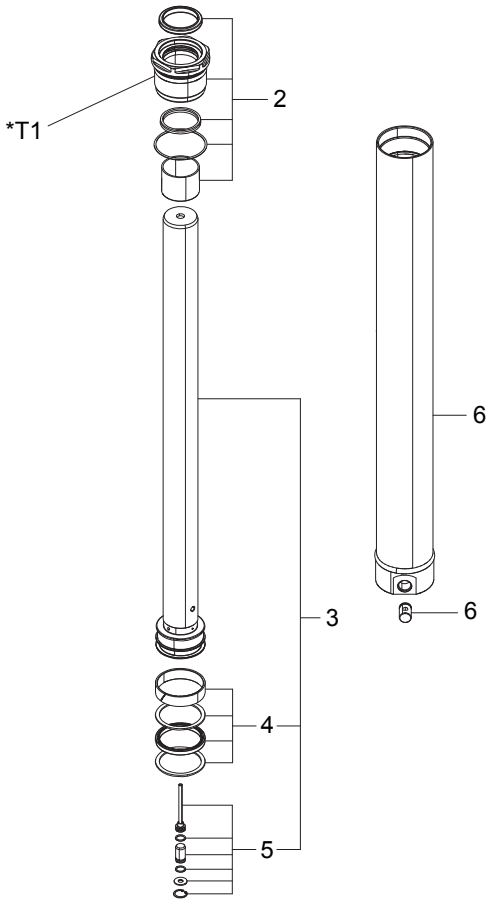


- **Tighten the main piping for FV mast:**

  *** Tightening torque: T = N·m (kgf·cm) [ft·lbf]**
  T2 = 59.0 ~ 73.0 (602 ~ 744) [43.5 ~ 53.9]

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DISASSEMBLY·INSPECTION·REASSEMBLY



G85712029_

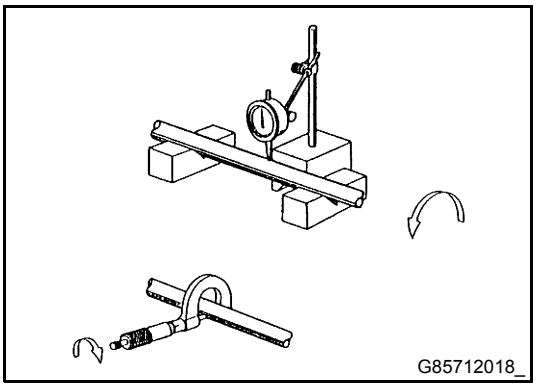
* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 341.0 ~ 443.0 (3477 ~ 4517) [252 ~ 327]

Disassembly Procedure

1 Remove the chain wheel support.

2 Remove the cylinder cover.

3 Remove the piston rod.



G85712018_

(1) Measure the piston rod outside diameter.

Unit: mm (in)

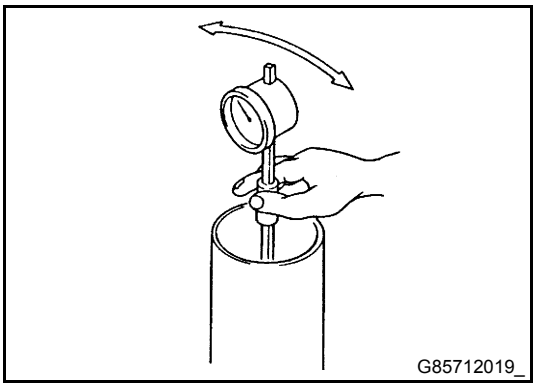
Vehicle model	Standard	Limit
1 ton series	50 (1.97)	49.92 (1.9654)
2 ton series	50 (1.97)	49.92 (1.9654)
3 ton series	60 (2.36)	59.91 (2.3587)

(2) Measure the bend of the piston rod.

Limit: 2.0 mm (0.079 in)

4 Remove the wear ring and U packing.

5 Remove the check valve.



6 Remove the safety down valve from the cylinder.

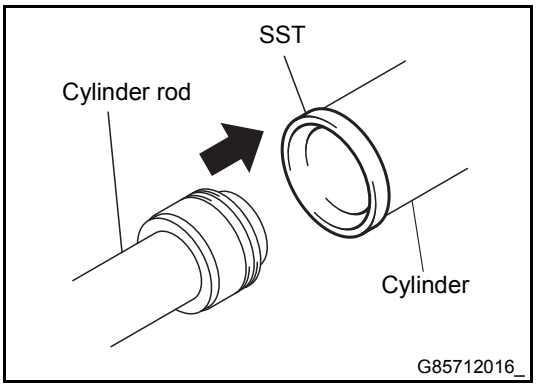
Measure the lift cylinder bore.

Unit: mm (in)

Vehicle model	Standard	Limit
1 ton series	70 (2.76)	70.35 (2.7697)
2 ton series	75 (2.95)	75.35 (2.9665)
3 ton series	85 (3.35)	85.40 (3.3622)

Reassembly Procedure

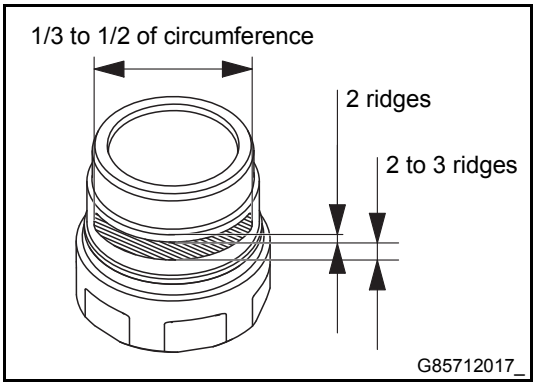
The reassembly procedure is the reverse of the disassembly procedure.



Note:

- **Use a cylinder rod insertion guide (SST) to reassemble.**

  1 ton series: SST 09655-26600-71
  2 ton series: SST 09656-26600-71
  3 ton series: SST 09657-26600-71



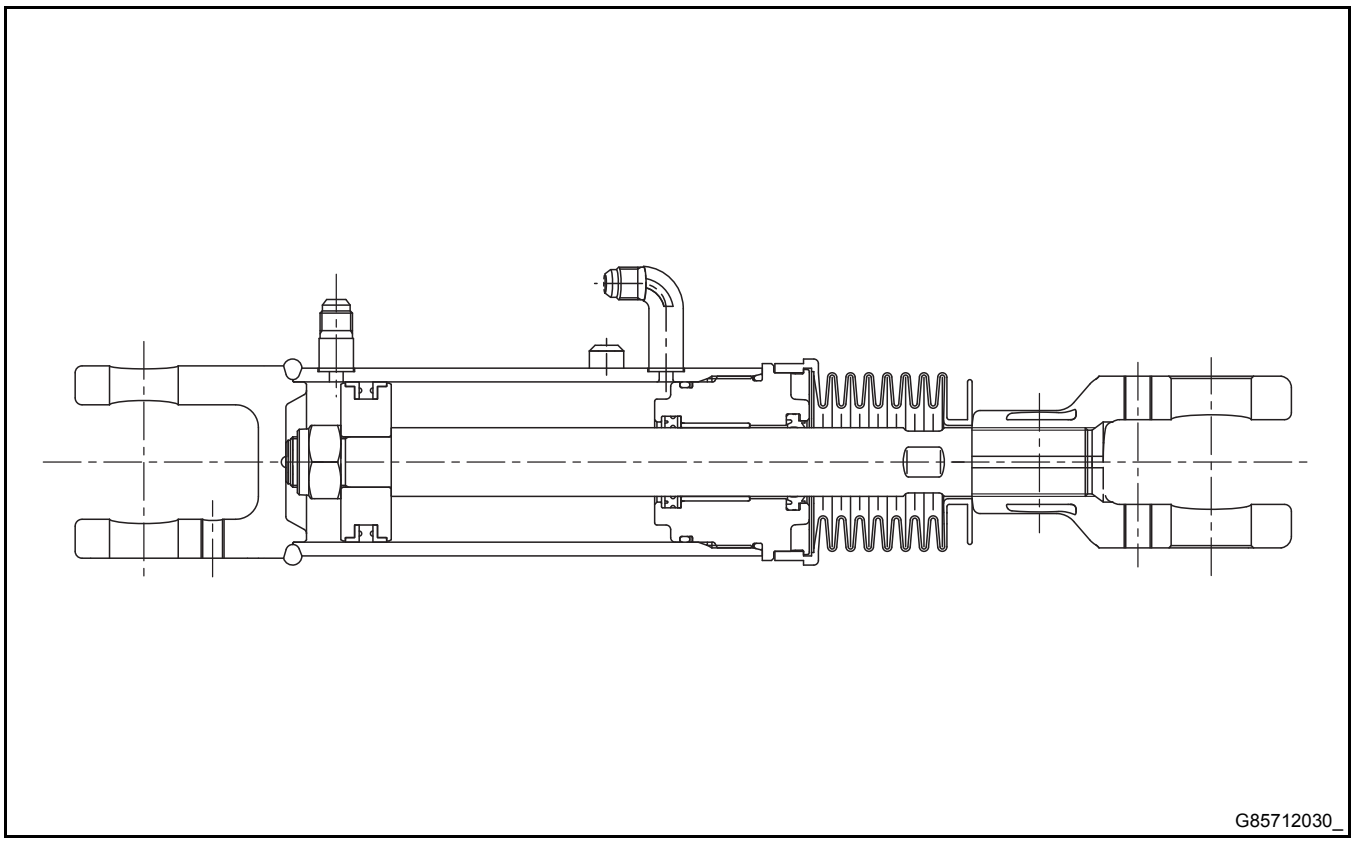
- **Apply MP grease or hydraulic oil to the packing, O-ring, and dust seal lip portion.**
- **Apply MP grease all around the inner surface of the cylinder cover (including the packing, dust seal, and bushing). After installation, wipe off any excess grease.**
- **Apply sealant (08833-76002-71 (08833-00080)) to the cylinder cover on the part shown in the illustration to reassemble it.**
- **Fill the cylinder with the specified amount of hydraulic oil through the cylinder top opening before installing the cylinder cover.**

Vehicle model	Filling amount cm^3 (in^3)
1 ton series	30 ~ 60 (1.83 ~ 3.66)
2 ton series	40 ~ 70 (2.44 ~ 4.27)
3 ton series	45 ~ 75 (2.75 ~ 4.58)

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TILT CYLINDER

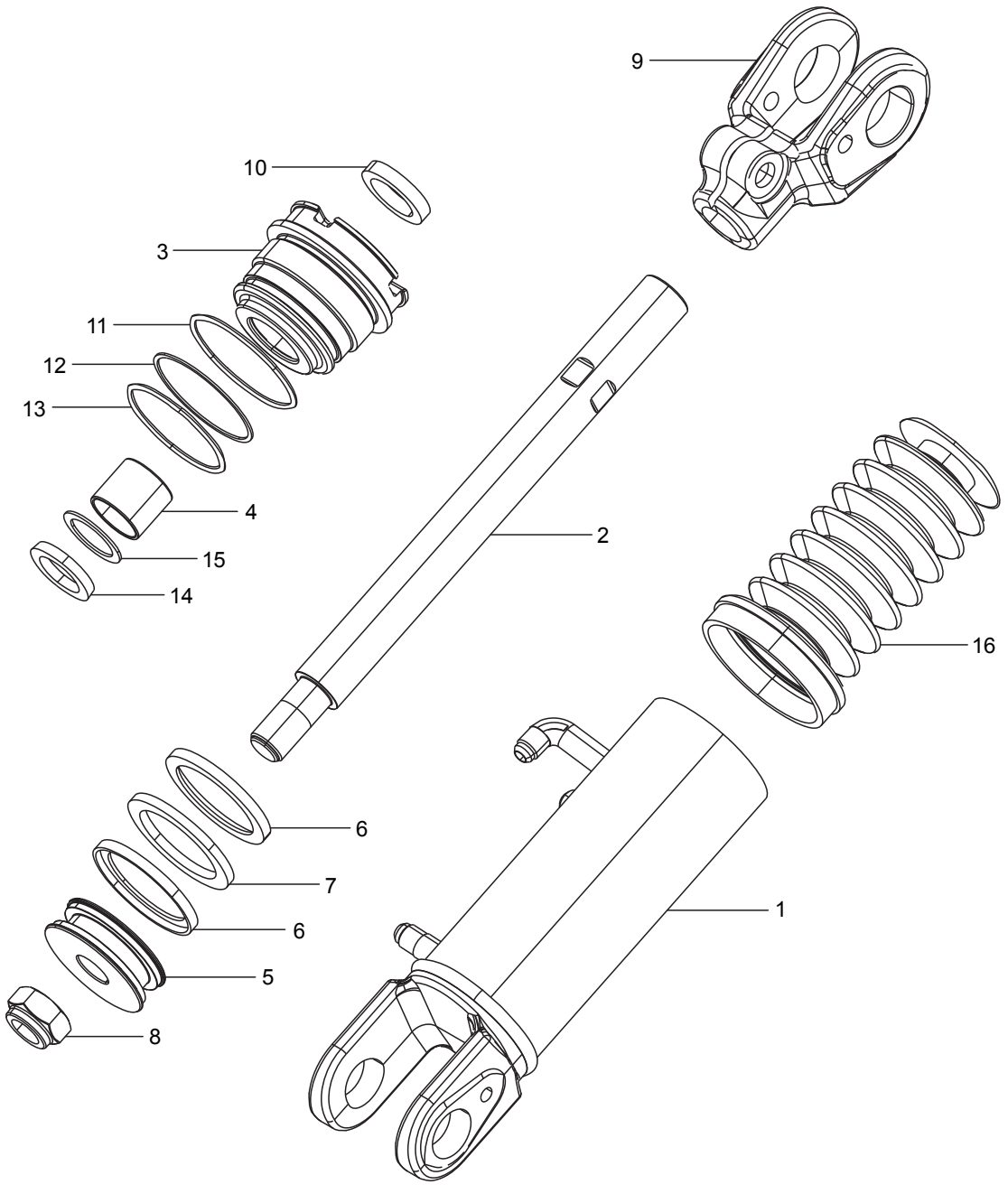
GENERAL



SPECIFICATIONS

Cylinder type		Double acting type	
Cylinder bore	mm (in)	1·2 ton series	70 (2.76)
		3 ton series	80 (3.15)
Piston rod outside diameter	mm (in)	1·2 ton series	30 (1.18)
		3 ton series	35 (1.38)
Piston seal type		U packing	
Rod seal type		U packing	

COMPONENTS



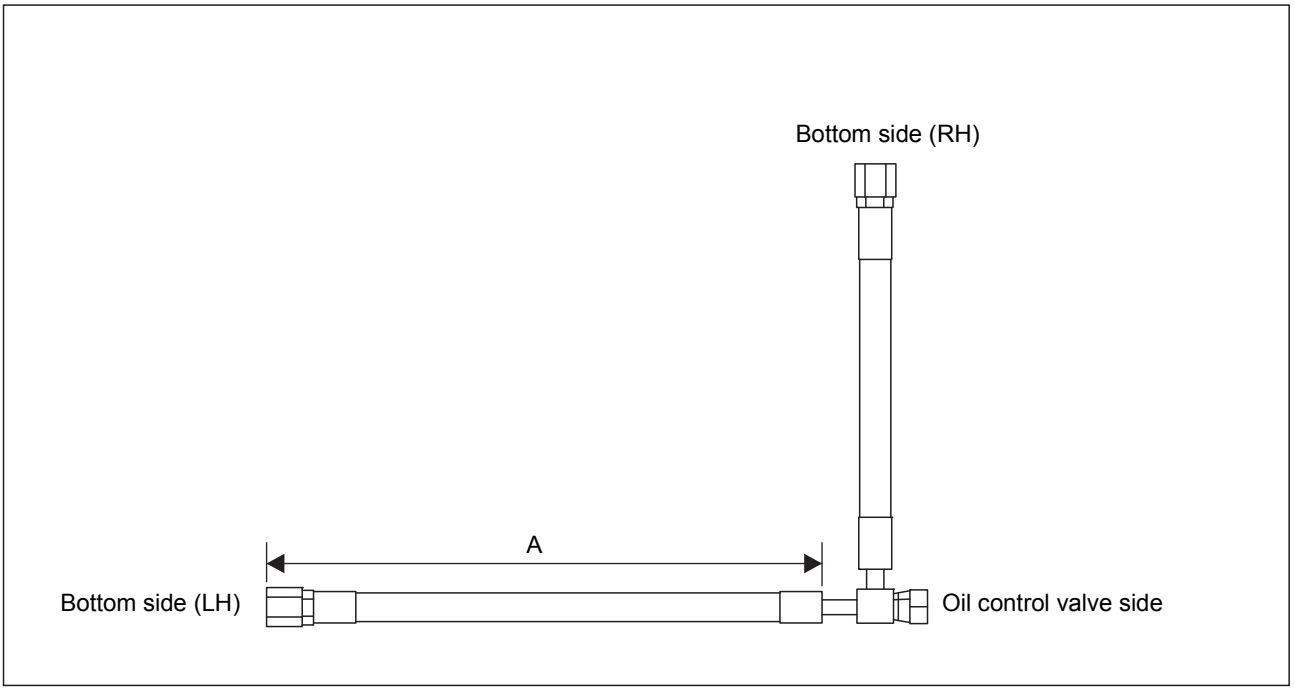
G85712031_

No.	Parts name	QTY	No.	Parts name	QTY
1	Cylinder sub-assy, tilt	2	9	Joint	2
2	Rod sub-assy, tilt cylinder	2	10	Seal, dust	2
3	Guide sub-assy, tilt cylinder rod	2	11	Ring, O	2
4	Sleeve, tilt cylinder rod guide	2	12	Ring, back up	2
5	Piston, tilt cylinder	2	13	Ring, O	2
6	Sleeve, piston	4	14	Packing, U	2
7	Packing, O	2	15	Ring, back up	2
8	Nut, lock	2	16	Boot, cylinder	2

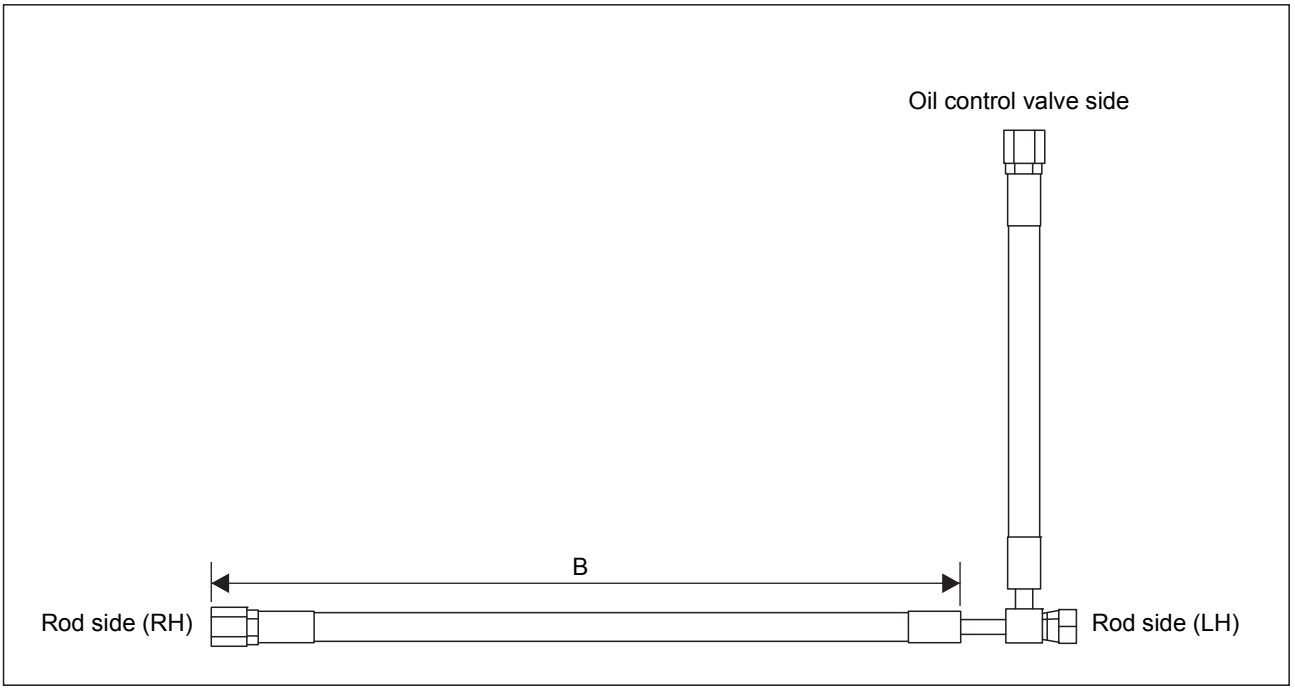
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TILT CYLINDER HOSE

Tilt hose (bottom side)



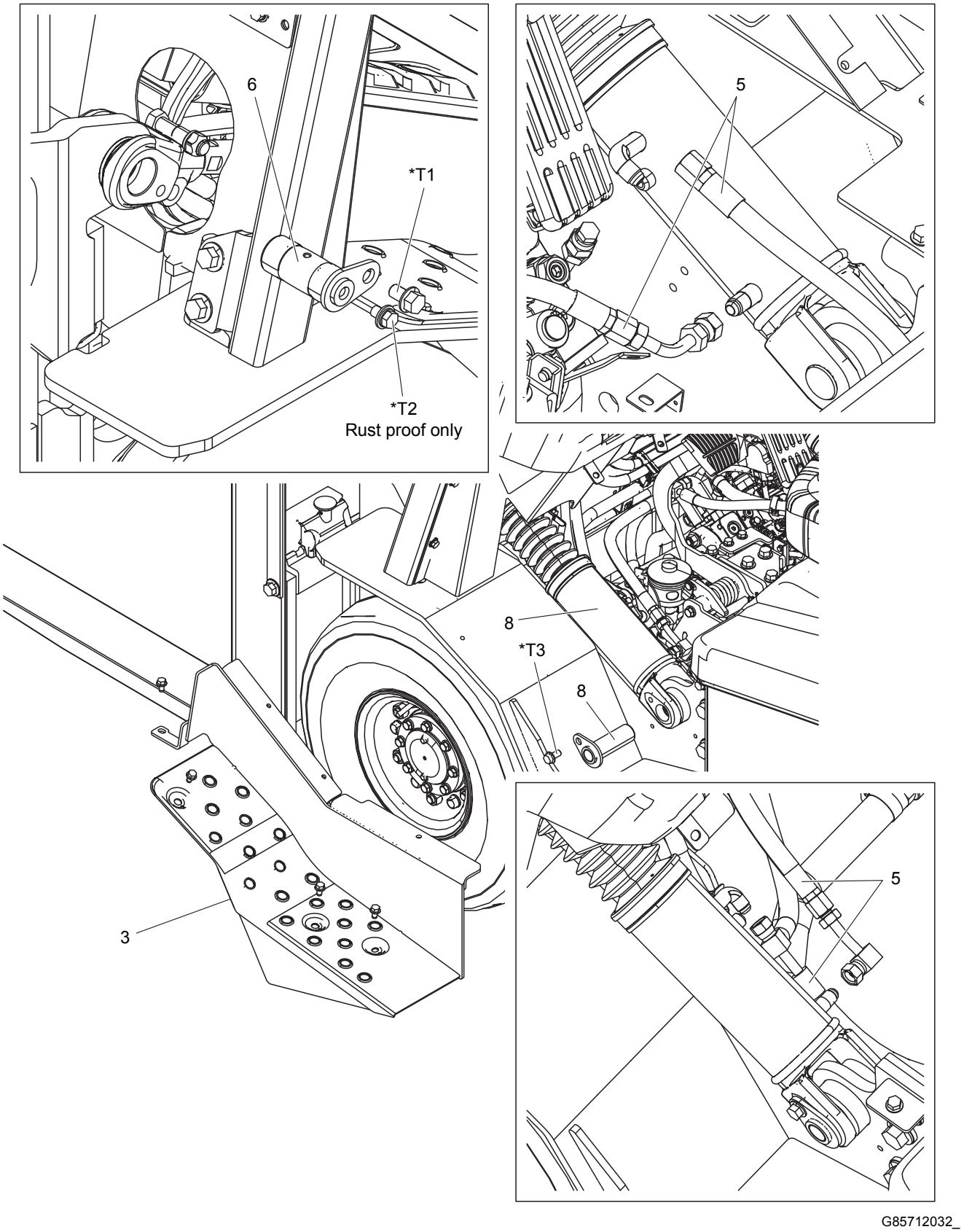
Tilt hose (rod side)



G85712042_

Applicable series	A mm (in)	B mm (in)
1 ton series	370 (14.57)	955 (37.60)
2 ton series	365 (14.37)	930 (36.61)
3 ton series	335 (13.19)	1095 (43.11)

REMOVAL·INSTALLATION



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 76 ~ 115 (783 ~ 1173) [56.7 ~ 84.8]
T2 = 14.4 ~ 33.6 (147 ~ 33.6) [10.6 ~ 24.8]
T3 = 43.2 ~ 79.2 (441 ~ 808) [31.9 ~ 58.4]

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Removal Procedure

1 Open the battery hood.

2 Remove the toe board and lower panel.

3 Remove the side cover W/ step.

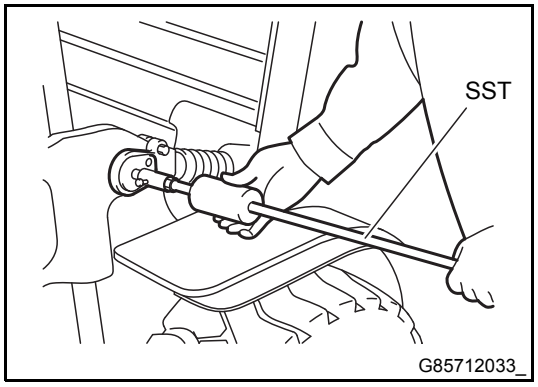
4 Hoist the mast temporarily.

5 Disconnect the hoses.

6 Disconnect the tilt angle sensor link (RH) (SAS spec.).

7 Remove the tilt cylinder front pin.

SST 09810-20172-71

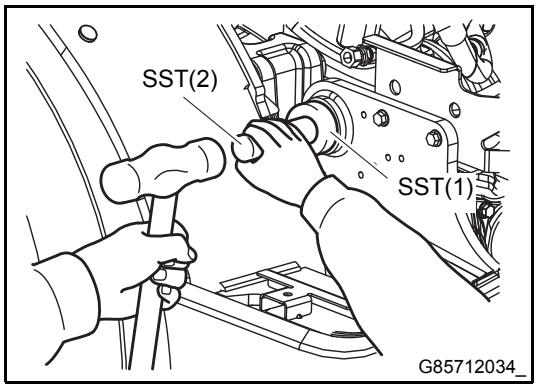


8 Remove the tilt cylinder rear pin.

9 Remove the tilt cylinder ASSY.

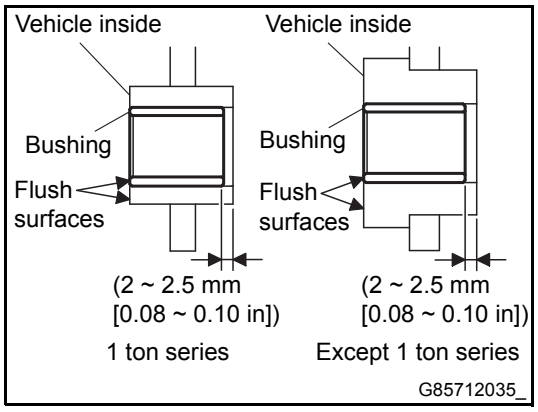
10 Remove the tilt cylinder rear bushing.

SST 09950-76018-71 (09950-60010) ..... (1)
09950-76020-71 (09950-70010) ..... (2)



Installation Procedure

The installation procedure is the reverse of the removal procedure.

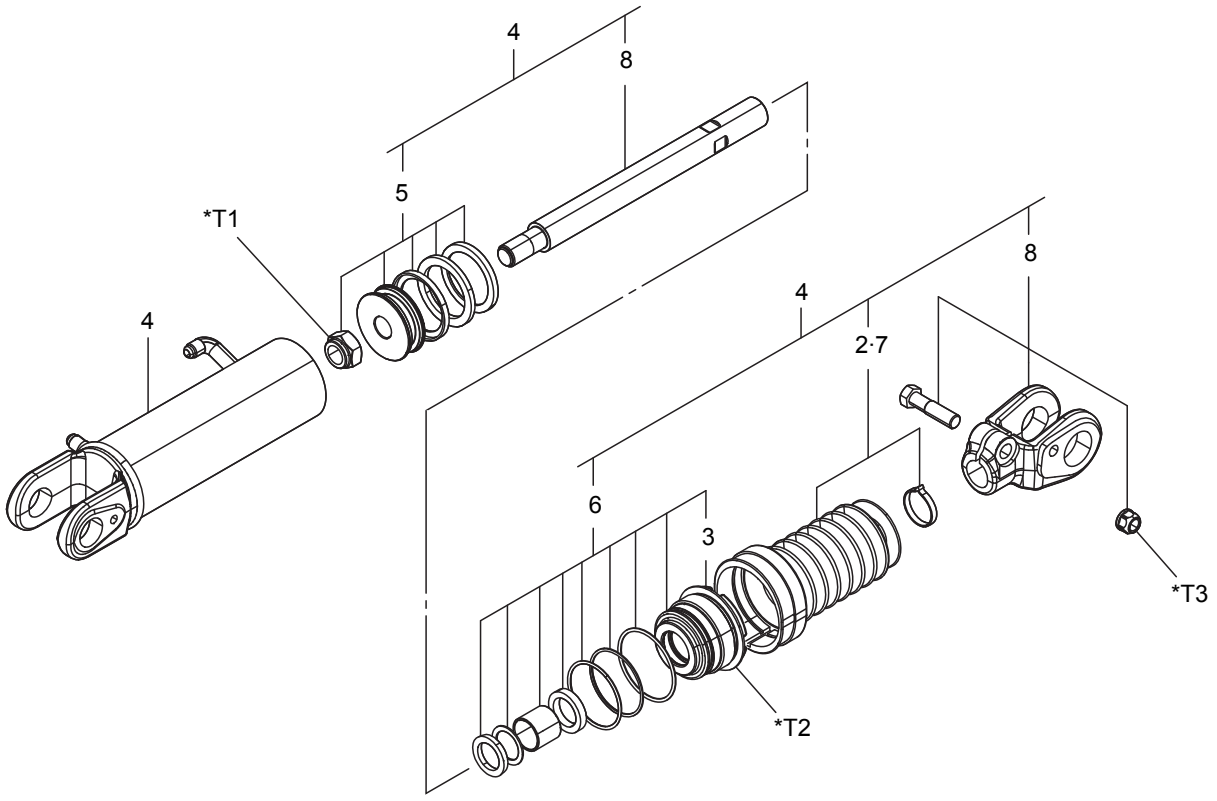


Note:

- **When installing, ensure that the end face of the tilt cylinder rear bushing is flush with the end face of the boss on the inside of the vehicle.**
- **Apply molybdenum disulfide grease on the portions for inserting tilt cylinder front and rear pins before installation.**
- **Pre-coated bolts are used for the tilt cylinder rear pin set bolt. When installing, either replace the set bolt with a new part or apply locking agent (08833-76001-71 (08833-00070)) to the threaded portion before tightening.**

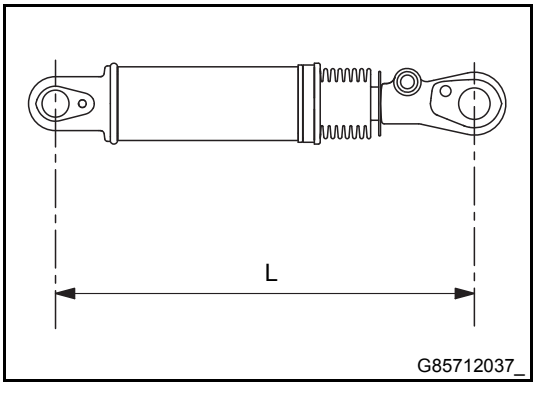
- **After installation, add molybdenum disulfide grease through the grease nipple to the tilt cylinder front pin.**
- **After installation, slowly tilt the mast forward and backward a few times to check normal functioning.**
- **Check the hydraulic oil level, and add if insufficient.**
- **After installation, perform SAS matching. (SAS spec. only) (See section 13.)**

DISASSEMBLY·INSPECTION·REASSEMBLY



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 (1·2 ton series) = 410 ~ 462 (4181 ~ 4711) [302.5 ~ 340.8]
T1 (3 ton series) = 682 ~ 769 (6954 ~ 7842) [503.1 ~ 567.3]
T2 (1·2 ton series) = 282 ~ 424 (2876 ~ 4324) [208.0 ~ 312.8]
T2 (3 ton series) = 341 ~ 443 (3477 ~ 4517) [251.6 ~ 326.8]
T3 = 88.0 ~ 132.0 (897 ~ 1346) [64.9 ~ 97.4]

Disassembly Procedure

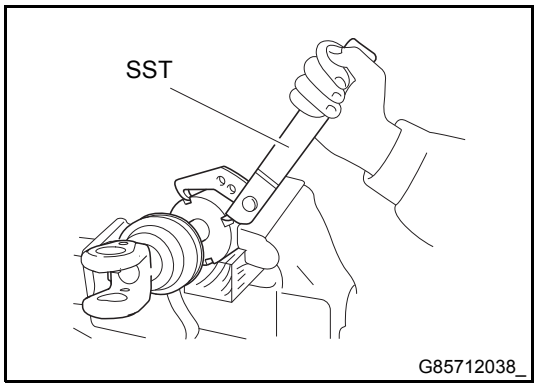


1 Before disassembling, measure the total length of the tilt cylinder when fully contracted, and make a note.

Check the total length L of the tilt cylinder when fully contracted.

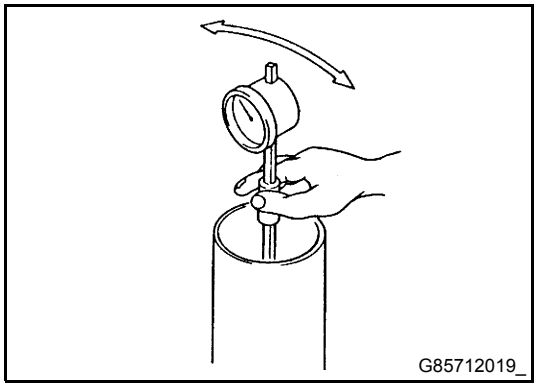
2 Disconnect the boot fitting on the cylinder side, and move it toward the joint side.

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3 Loosen the rod guide.

SST 09620-10100-71



4 Remove the piston rod W/ piston.

Measure the cylinder bore.

Unit: mm (in)

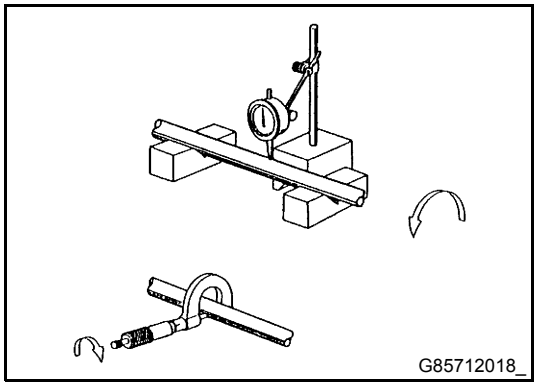
Vehicle model	Standard	Limit
1·2 ton series	70.0(2.76)	70.35 (2.770)
3 ton series	80.0 (3.15)	80.35 (3.163)

5 Remove the piston.

6 Remove the rod guide.

7 Remove the boot.

8 Remove the joint.



(1) Measure the piston rod outside diameter.

Unit: mm (in)

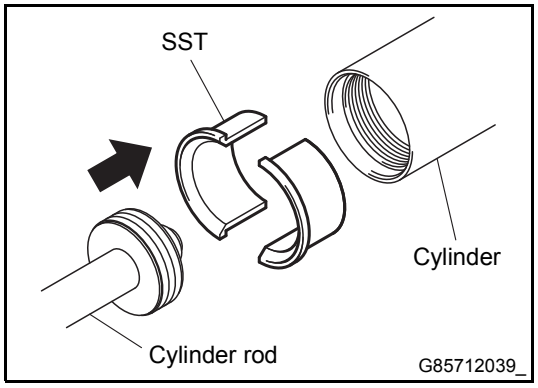
Vehicle model	Standard	Limit
1·2 ton series	30.0 (1.18)	29.92 (1.178)
3 ton series	35.0 (1.38)	34.92 (1.375)

(2) Measure the bend of the piston rod.

Limit: 0.5 mm (0.020 in)

Reassembly Procedure

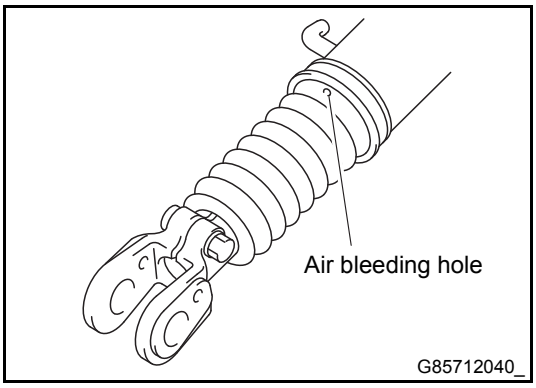
The reassembly procedure is the reverse of the disassembly procedure.



Note:

- **Use a cylinder rod insertion guide (SST) to reassemble.**

  1·2 ton series: 09659-26600-71
  3 ton series : 09660-26600-71



- **Assemble the boot to the vehicle with its air bleeding holes vertical.**

- **Apply MP grease or hydraulic oil to the packing, O-ring, and dust seal lip portion.**
- **Apply MP grease all around the inner surface of the rod guide (including the packing, dust seal, and bushing). After installation, wipe off any excess grease.**
- **Apply sealant (08833-76002-71 (08833-00080)) to the threaded portion of the rod guide before reassembly.**

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MAST FORWARD BACKWARD TILT ANGLE ADJUSTMENT (ADJUSTMENT OF UNEVEN TILTING)

INSPECTION METHOD

1 Inspect the forward and backward tilt angle and uneven lifting amount.

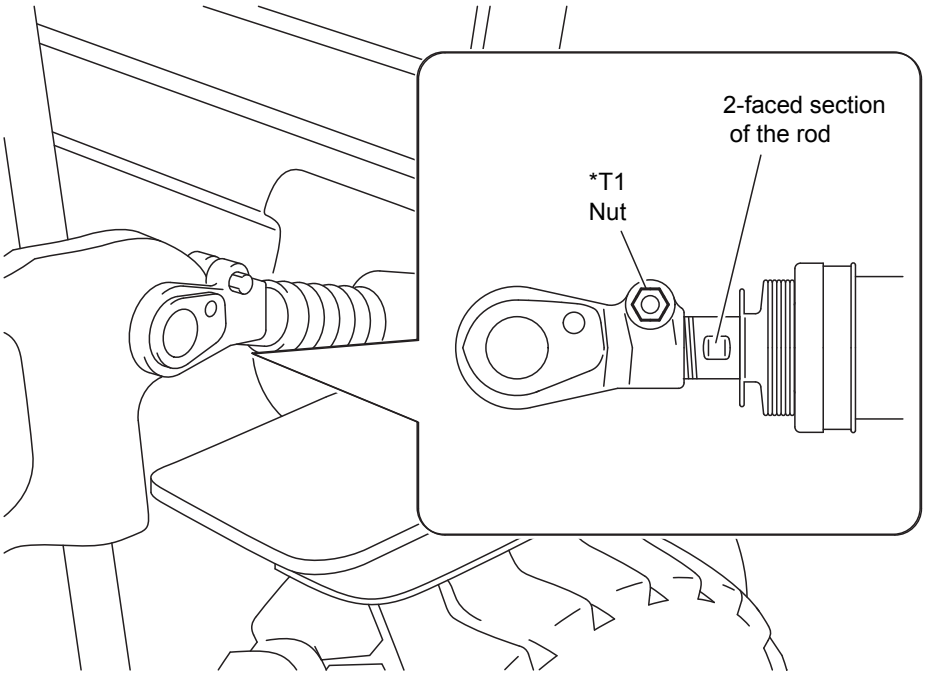
Standard
Mast forward tilt angle : Standard set angle 0° ~ +0.4°
Mast backward tilt angle: Standard set angle -0.7° ~ 0°
Uneven lifting amount :1 mm (0.04 in) or less

ADJUSTMENT METHOD

1 If the standard is not satisfied, adjust it.

Tilt the mast forwards, loosen the nut that holds the rod, then adjust the mast tilt angle and uneven lifting by adjusting the screw engagement margin between the rod and the joint. (To adjust the screw engagement margin, position a wrench to the 2-faced section on the rod and turn the rod.)

Note:
Do not turn the rod when it is in the forward most tilt position (or the backward most tilt position) (Turn it with the mast slightly before forward most tilt position).



G85712041_

* Tightening torque: T=N·m (kgf·cm) [ft·lbf]
T1 = 88.0 ~ 132.0 (897 ~ 1346) [64.9 ~ 97.4]

2 After adjusting, tighten the nut to fix the rod.

Note:
Perform SAS matching after adjustment. (SAS spec. only) (See section 13.)

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SAS/OPS

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GENERAL

SAS-ε (System of Active Stability-ε)

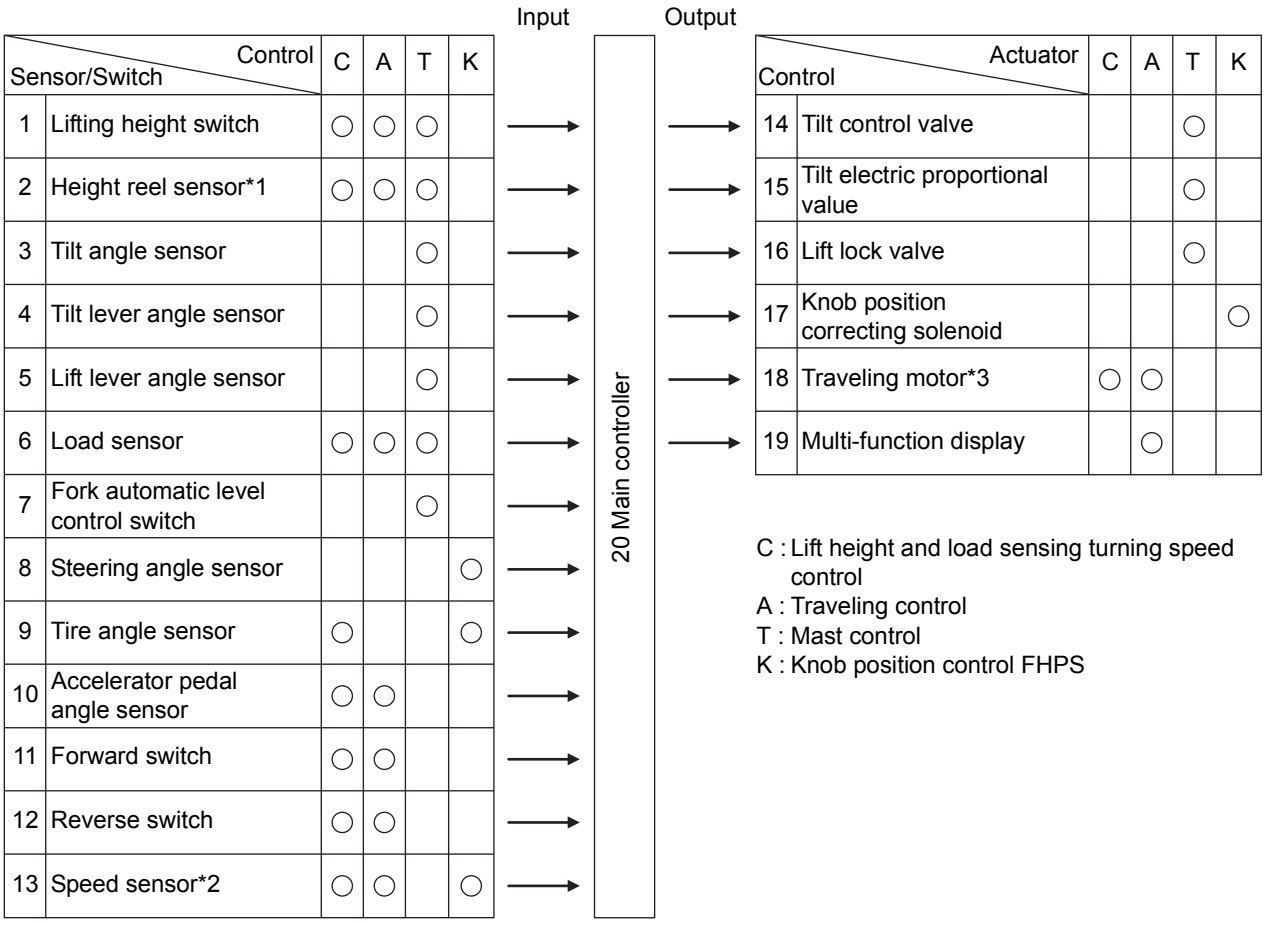
The “ε” in “SAS-ε” is affixed with the intention to distinguish the new SAS from the previous one, because there are some differences in functionality between the new and previous SAS.
A comparison between SAS-ε in the new model and SAS in previous models is shown in the table below.

Function		Previous model SAS	New model SAS-ε
Traveling stability control	Swing lock control	○ (For single tire models only)	–
	Lift height and load sensing turning speed control	–	○
	Traveling control (Lift height and load sensing vehicle speed-acceleration control)	–	○
Mast control	Tilt forward angle control	○	○
	Tilt forward speed control	○	○
	Tilt backward speed control	○	○
	Tilt forward automatic fork leveling control	○	○
	Tilt backward automatic fork leveling control	–	○
	Key-OFF lift lock	○	○
Knob position control FHPS		○	○
(High mount rear axle)		–	○

Lift height and load sensing turning speed control	To ensure lateral stability during turning, the lateral acceleration of the vehicle is limited by reducing the vehicle speed according to the turning radius and steering operation.
Traveling control (Lift height and load sensing vehicle speed-acceleration control)	To ensure longitudinal stability during driving, the maximum speed, acceleration and deceleration are limited automatically according to the detected lift height and the load according to the detected lift height and the load.
Mast control	(1)Improvement of back and forth directional stability with the mast tilt forward control (2)Decrease of possible load collapse with mast tilt forward/backward speed control (3)Improvement of operating efficiency with automatic fork leveling control (4)Key-OFF lift lock
Knob position control FHPS	Characteristics of turning and straight traveling are improved by FHPS with steering position control.

FHPS : Full Hydraulic Power Steering

System configuration



	Sensor/Switch \ Control	C	A	T	K
1	Lifting height switch	○	○	○	
2	Height reel sensor*1	○	○	○	
3	Tilt angle sensor			○	
4	Tilt lever angle sensor			○	
5	Lift lever angle sensor			○	
6	Load sensor	○	○	○	
7	Fork automatic level control switch			○	
8	Steering angle sensor				○
9	Tire angle sensor	○			○
10	Accelerator pedal angle sensor	○	○		
11	Forward switch	○	○		
12	Reverse switch	○	○		
13	Speed sensor*2	○	○		○

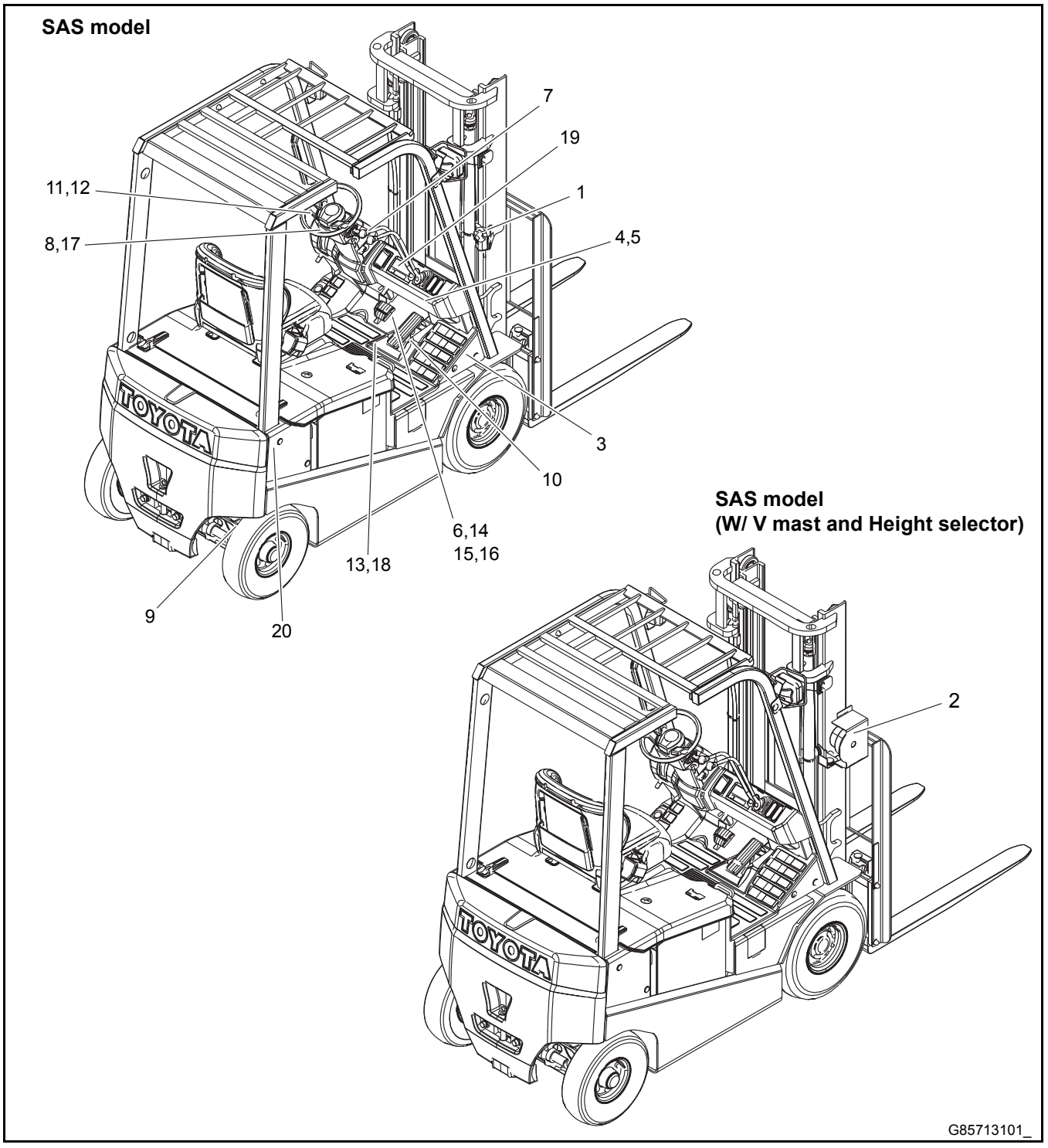
	Control \ Actuator	C	A	T	K
14	Tilt control valve			○	
15	Tilt electric proportional value			○	
16	Lift lock valve			○	
17	Knob position correcting solenoid				○
18	Traveling motor*3	○	○		
19	Multi-function display		○		

C : Lift height and load sensing turning speed control
A : Traveling control
T : Mast control
K : Knob position control FHPS

*1 :This sensor is provided in models with V-mast and Height selector instead of the lifting height switch.
*2 :The vehicle speed is detected by the motor speed sensors via the traveling motor driver.
*3 :The drive motor is operated through the motor driver.

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Name of each component



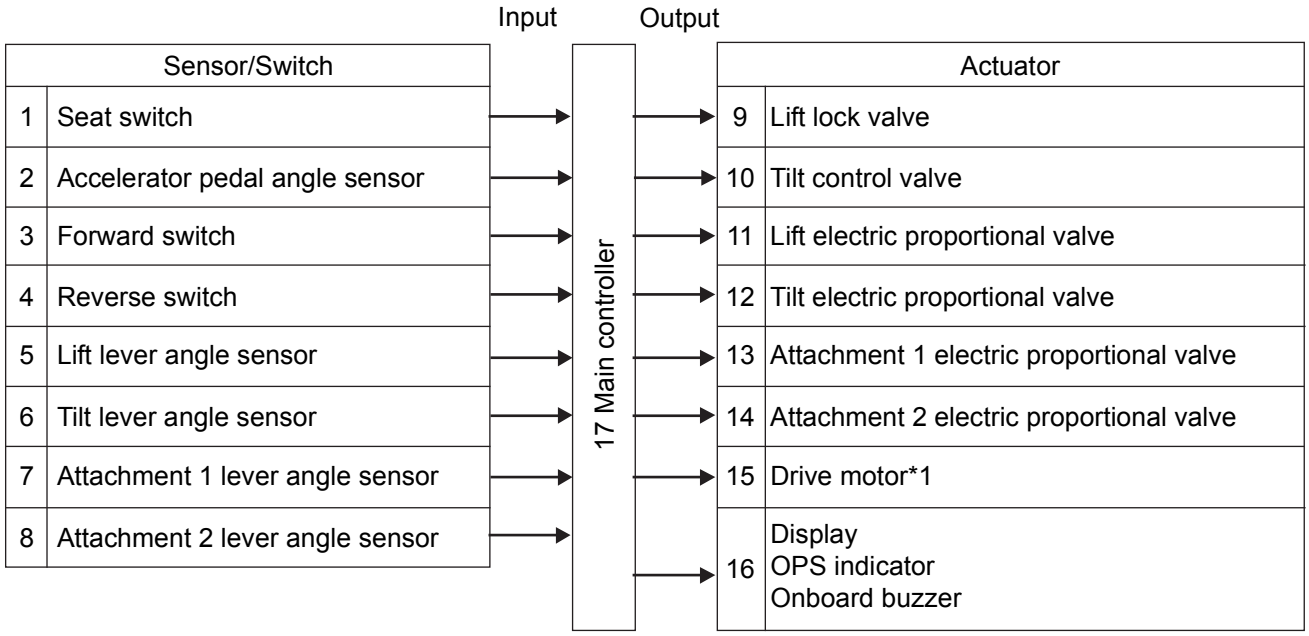
No.	Name	No.	Name
1	Lifting height switch	11	Forward switch
2	Height reel sensor	12	Reverse switch
3	Tilt angle sensor	13	Speed sensor
4	Tilt lever angle sensor	14	Tilt control valve
5	Lift lever angle sensor	15	Tilt electric proportional valve
6	Load sensor	16	Lift lock valve
7	Fork automatic level control switch	17	Knob position correcting solenoid
8	Steering angle sensor	18	Drive motor
9	Tire angle sensor	19	Multi-function display
10	Accelerator pedal angle sensor	20	Main controller

OPS

OPS system detects presence of the operator with the seat switch, and when the operator is not in the normal operating position, it interrupts traveling power and restricts load handling operation to prevent unintentional movements.
In this model change, a change has been made so that the load handling OPS system will be turned off if the operator is seated properly and all the load handling levers are in the neutral position.

Note:

Travel OPS is not a brake. There is a possibility that it cannot stop freewheeling sufficiently at a slope. Engage the parking brake all the time when leaving the forklift.

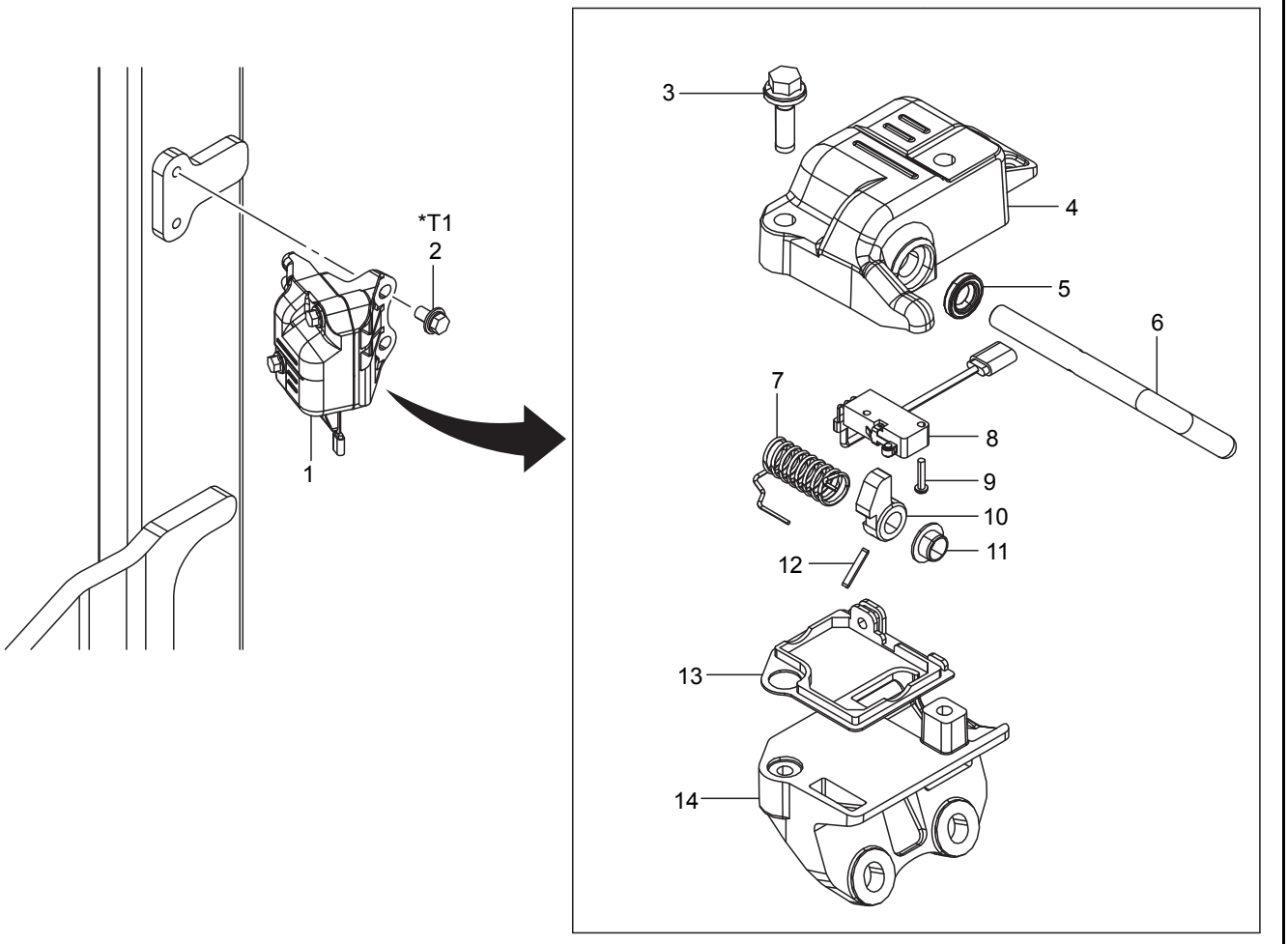


*1 : The drive motor is operated through the motor driver.

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COMPONENTS

LIFTING HEIGHT SWITCH (V MAST)

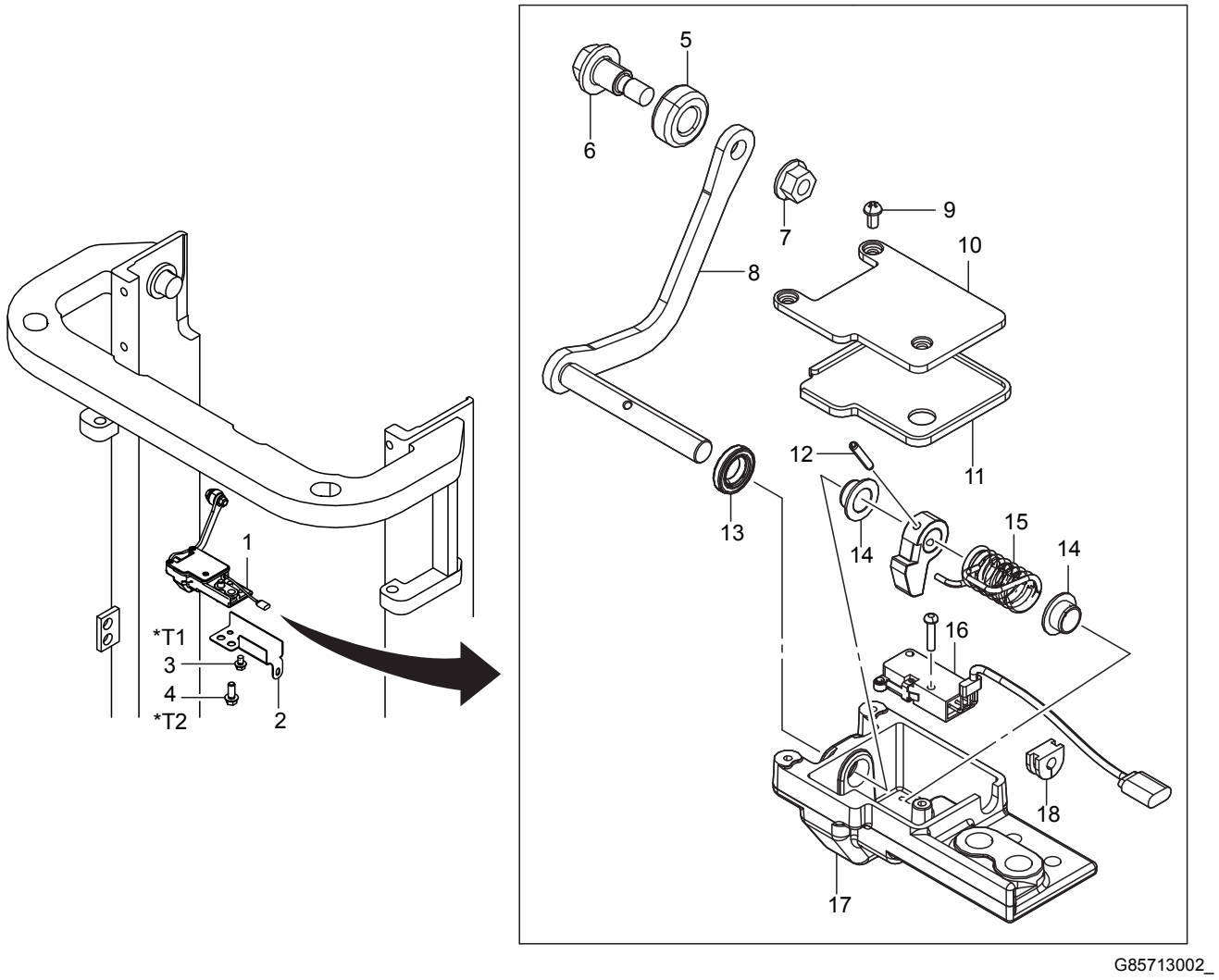


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* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 15.0 ~ 25.0 (152.96 ~ 254.92) [11.1 ~ 18.4]

No.	Parts name	QTY	No.	Parts name	QTY
1	Lifting height sensor	1	8	Switch	1
2	Bolt	2	9	Screw	2
3	Bolt	2	10	Plate	1
4	Height sensor bracket	1	11	Bushing	2
5	Oil seal	1	12	Pin	1
6	Lever	1	13	Seal	1
7	Spring	1	14	Height sensor bracket	1

LIFTING HEIGHT SWITCH (FSV, FV MAST)



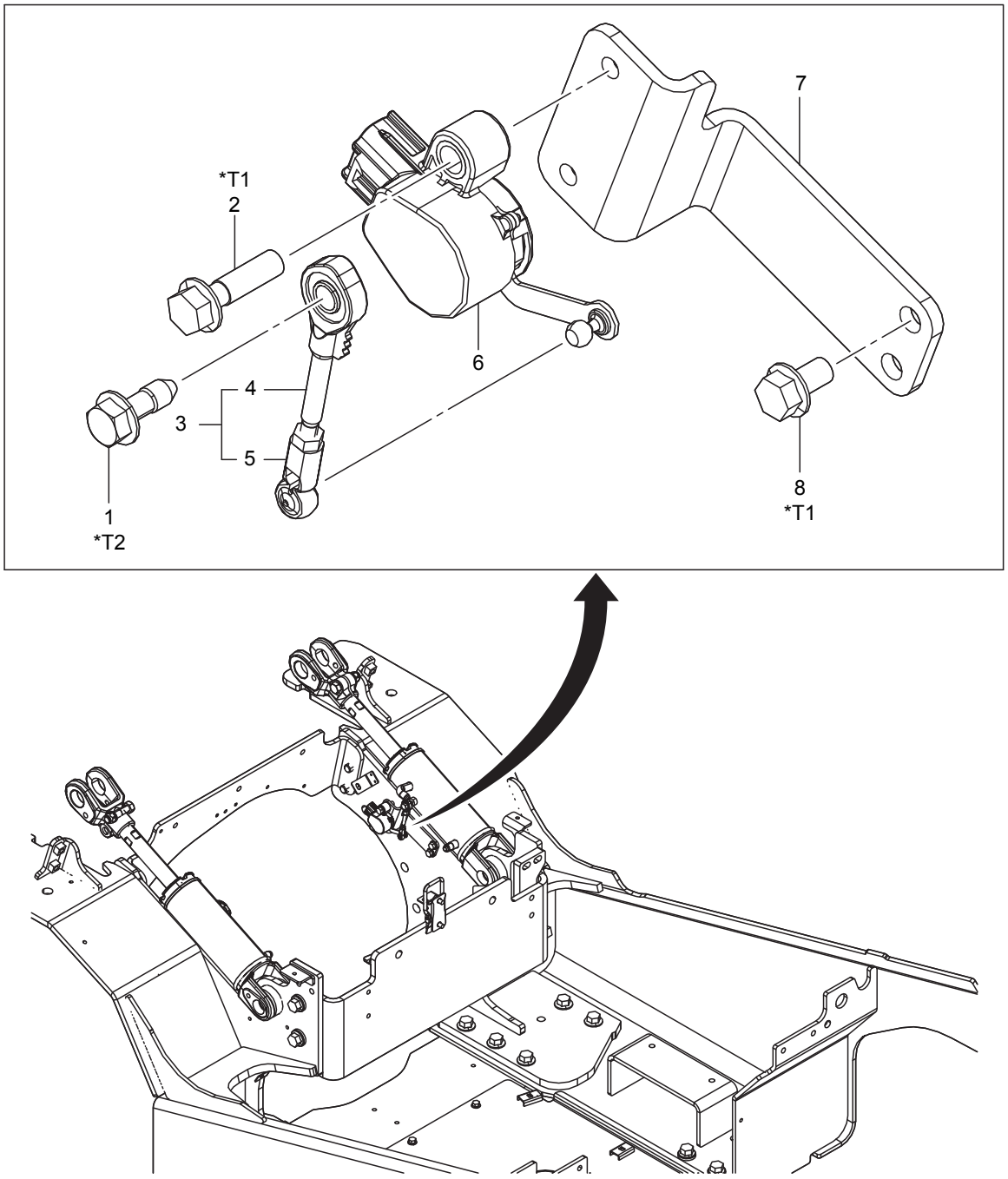
G85713002_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 7.8 ~ 18.2 (79.5 ~ 185.6) [5.75 ~13.4]
T2 = 16.2 ~ 37.8 (165.2 ~ 385.5) [12.0 ~ 27.9]

No.	Parts name	QTY	No.	Parts name	QTY
1	Lifting height sensor	1	10	Plate	1
2	Cover	1	11	Seal	1
3	Bolt	4	12	Spring pin	1
4	Bolt	2	13	Oil seal	1
5	Roller	1	14	Bushing	2
6	Shaft	1	15	Spring	1
7	Nut	2	16	Height switch	1
8	Lever	1	17	Height sensor box	1
9	Screw	3	18	Seal	1

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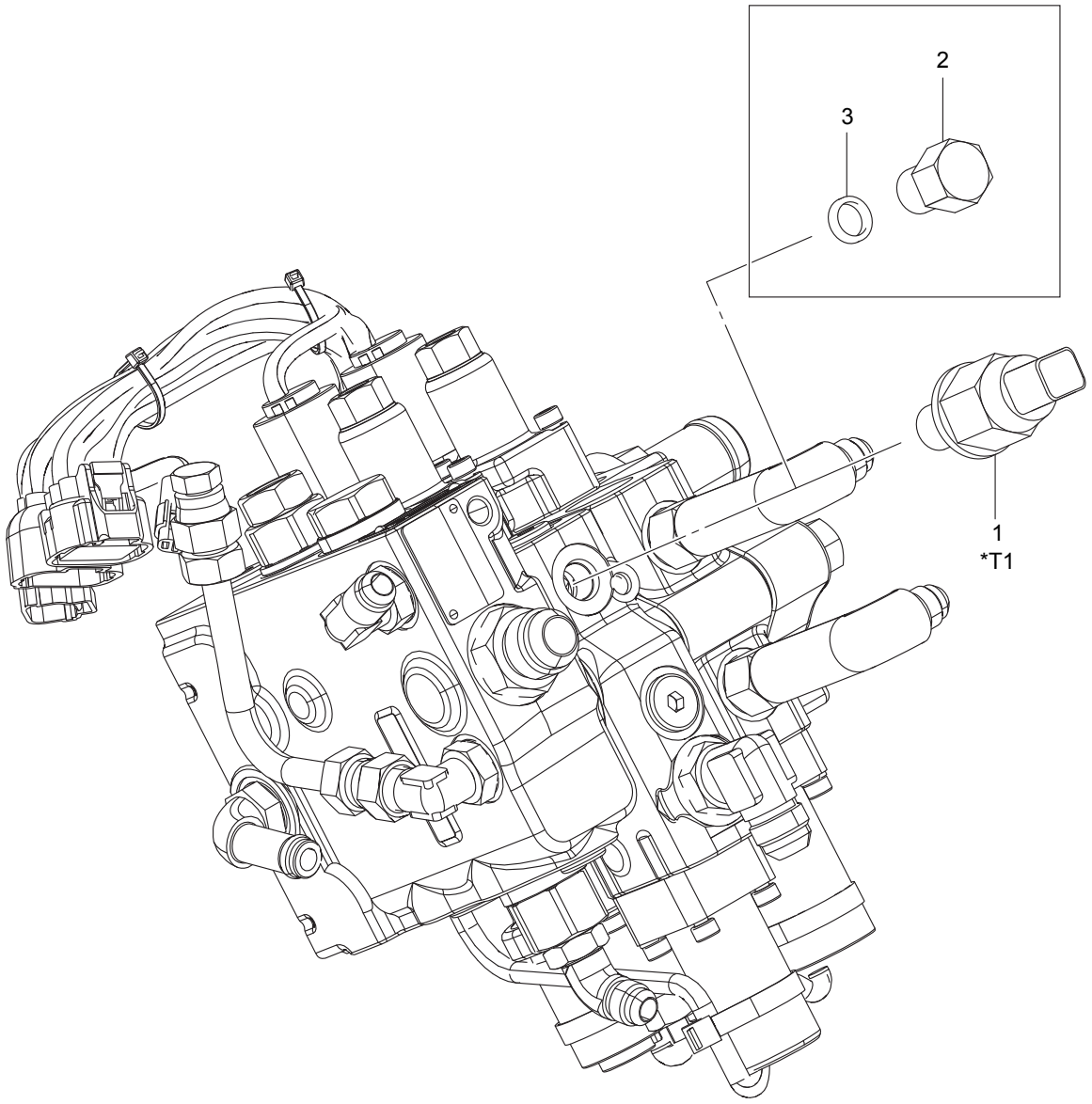
TILT ANGLE SENSOR



* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 7.8 ~ 18.2 (79.5 ~ 185.6) [5.75 ~13.4]
T2 = 7.8 ~ 18.2 (79.5 ~ 185.6) [5.75 ~13.4]

No.	Parts name	QTY	No.	Parts name	QTY
1	Bolt	1	5	Rod end	1
2	bolt	2	6	Rotary position sensor	1
3	Tilt sensor rod ASSY	1	7	Bracket	1
4	Rod	1	8	Bolt	2

LOAD SENSOR



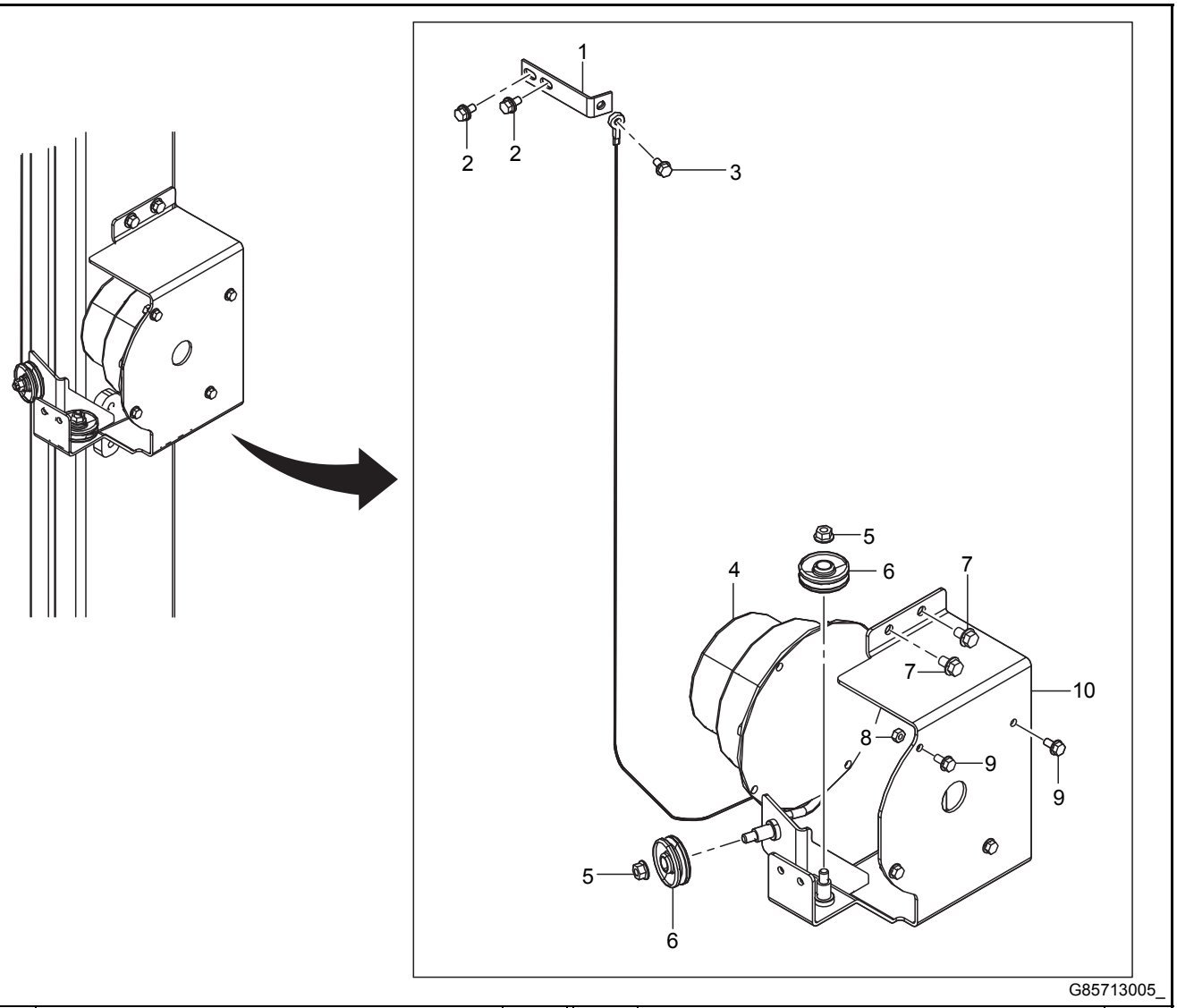
G85713102_

* Tightening torque: T = N·m (kgf·cm) [ft·lbf]
T1 = 22 ~ 26 (224.3 ~ 265.1) [16.2 ~ 19.2]

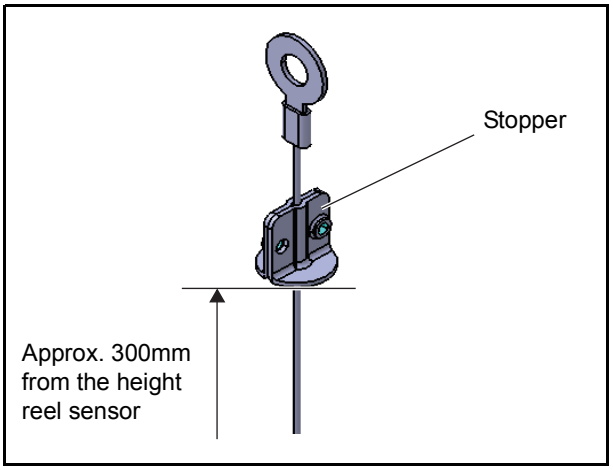
No.	Parts name	QTY	No.	Parts name	QTY
1	Pressure sensor	1	3	O-ring	1
2	Fitting	1			

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HEIGHT REEL SENSOR



No.	Parts name	QTY	No.	Parts name	QTY
1	Plate	1	6	Pulley	2
2	Bolt	2	7	Bolt	4
3	Bolt	5	8	Nut	4
4	Sensor	1	9	Bolt	5
5	Nut	2	10	Bracket	1



Note:

- **When removing the height reel sensor, lower the fork to its lowermost position and remove the stopper. Install the stopper at approx. 300mm from the height reel sensor and remove the height reel sensor.**
- **When installing the height reel sensor, install the stopper to its initial position.**

BEFORE STARTING REPAIR WORK

Before starting SAS repair, fully understand the SAS function.

1. Preparation for repairing

   (1) Avoid vehicle washing as far as possible. For cleaning, blow compressed air. If washing with water is required, avoid water jet washing. Always blow compressed air to remove water after washing.

   (2) Transport the main controller in packed state. Keep it packed until installation. Never transport it in exposed state. Full care should be taken not to drop the controller, allow contact with elsewhere or impact against it.

   (3) If matching is required, park the vehicle in a flat place in advance.

   (4) Provide necessary tools and instruments (analog tester), SST 09230-21440-71, SST 09240-23400-71, and SST 09230-13700-71.

2. During repair work

   (1) Never use an impact wrench for removing or installing the main controller. Full care should be taken not to drop main controller by mistake. Avoid impact from dropping that may damage parts inside.

   (2) Do not turn the key switch to ON or OFF carelessly when the sensor wiring is disconnected. Key switch ON in this state may cause an error and the error code will be stored in the controller. Error codes cannot be cleared and up to ten error codes can be stored. Beyond ten, older error codes will be eliminated sequentially.

   (3) During matching, SAS function will stop. Do not operate the vehicle.

   (4) If a vehicle is in tilted condition because of the repair of a flattened tire or other reasons, keep the key switch turned ON throughout from the start of jacking up, tire replacement and lowering to the ground.

   (5) When the hydraulic piping is disconnected, apply cover to the fitting and hose to prevent the dirt from entering.

   (6) If the lift unlock bolt of the oil control valve is loosened, tighten it to a prescribed torque and put it back into place after repair.

   (7) Tighten respective set bolts to a prescribed torque.

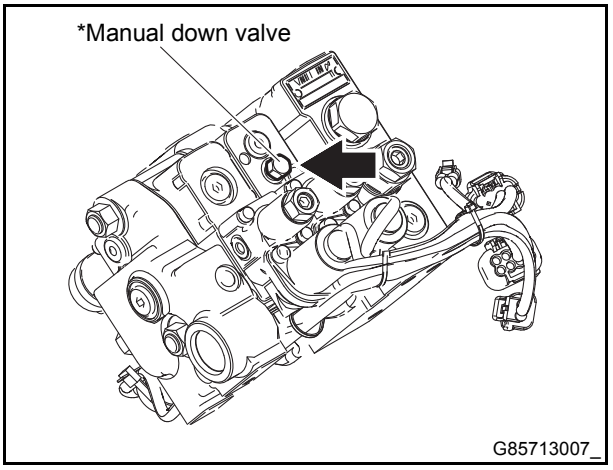
   (8) Respective sensors require no adjustment during installation. Make initialization during matching.

   (9) To disconnect a connector, do not pull it by the harness.

   (10) When inspecting the harness, carefully operate so as not to damage connector terminals.

   (11) Positioning of the low- and high-lifting heights described in the troubleshooting section are as follows:

   Low-lifting height: Height from the lowermost position to immediately before actuation of the fork lifting height switch MH1.
   High-lifting height: Height above the position where lifting height switch MH2-1 is actuated.



3. Emergency Action

   If the mast fails to be lowered during lowering operation for some reason, it can be lowered manually as follows:
   Loosen the manual down valve gradually until the mast starts to be lowered.
   After repair, do not forget to re-tighten the manual down valve. If forgotten, the lift speed becomes remarkably delayed.

   ***Tightening torque: T = N·m (kgf·cm) [ft·lbf]**
   T = 28.8 ~ 35.2 (288 ~ 359) [20.8 ~ 26.0]

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MATCHING

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BEFORE STARTING MATCHING 14-9

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GENERAL

- Each function is controlled by using the sensors and each signal voltage at standard vehicle condition stored in the controller at the time of shipment. Therefore, a matching (updating of the signal voltage of a sensor at standard vehicle condition) is required when performing maintenance on a section or replacing parts related to the sensor.
- For the accelerator sensor and brake sensor used for drive functions, the signal voltage values at accelerator fully released, accelerator fully closed, brake fully released and brake operation starting position are stored, respectively, in the controller to control based on these values. When servicing these sensors or replacing related parts, MATCHING (updating the sensor signal voltage value in the standard vehicle condition) is necessary.
- For tire angle sensor used for synchronized steering, the signal voltage value at standard vehicle condition is stored, in the controller to control based on this value. When servicing or replacing tire angle sensor, matching (updating the sensor signal voltage value in the standard vehicle condition) is necessary. On the other hand, matching is needed for the tire angle sensor when the tire angle sensor or related part is replaced.
- For the tilt angle, load and tire angle sensors used for SAS functions, the signal voltage values at standard vehicle condition are stored respectively, in the controller to control based on these values. When servicing or replacing these sensors, matching (updating the sensor signal voltage value in the standard vehicle condition) is necessary. Also, matching is needed for the tilt angle sensor when the vehicle posture has changed excessively, and for the load sensor when the load under no load condition (no load on fork) is changed because of addition or removal of any attachment or fork, replacement of mast or change of fork length. On the other hand, matching is needed for the tire angle sensor when the tire angle sensor or related part is replaced. (Multi-function display)
- Each lever angle sensor for load-handling lever function is controlled based on the memory of signal voltage values in the neutral position stored in the controller at the time of shipment. When servicing these sensors or replacing related parts, MATCHING (updating the sensor signal voltage value in the standard vehicle condition) is necessary.
- The oil control valve (OCV) starting current level is set at the factory for all the control valves together, and the settings are stored in the main controller memory. Therefore, the settings must be matched following maintenance or replacement of related parts.
- The load meter display is based on the mast specifications and unloaded load sensor signal voltage, which are stored in the multifunction display. Therefore, the settings must be matched following maintenance or replacement of the mast or load sensor. (Multi-function display)
- It is necessary to input the tire data to the controller according to the tire size, for optimizing the speedometer reading. Although the tire data is set to the value of new tires at the time of shipment, adjust it whenever the tire size or type is changed according to “TIRE DATA List”. (See page 4-70 and 4-156.)

Matching Items and Prerequisite for Implementation (Display)

1. DRIVE

No.	Indication	Description	Prerequisite for implementation
1	1 01	Accelerator sensor output value with fully opened accelerator position to the controller.	*1,*2
2	1 02	Accelerator sensor output value with fully stepped accelerator position to the controller.	*1,*2
3	1 03	Brake sensor output value with fully released brake position to the controller.	*1,*9
4	1 04	Brake sensor output value at the operation starting position of brake to the controller.	*1,*9

2. SAS

No.	Indication	Description	Prerequisite for implementation
1	2 01	Tire angle sensor output value while the vehicle is traveling straight to the controller.	*1, *3

3. LEVER

No.	Indication	Description	Prerequisite for implementation
1	3 01	Lift lever angle sensor output value in the lift lever neutral position is stored in the controller.	*1, *4
2	3 02	Tilt lever angle sensor output value in the tilt lever neutral condition is stored in the controller.	*1, *5
3	3 03	Attachment (1) lever angle sensor output value in the attachment (1) lever neutral position is stored in the controller.	*1, *6
4	3 04	Attachment (2) lever angle sensor output value in the attachment (2) lever neutral position is stored in the controller.	*1, *7

4. OCV

No.	Indication	Description	Prerequisite for implementation
1	4 A1	Control valve A01 starting current level	*1, *10
	4 A2	Control valve A02 starting current level	*1, *10
	4 A3	Control valve A03 starting current level	*1, *10
	4 A4	Control valve A04 starting current level	*1, *10
2	4 B1	Control valve B01 starting current level	*1, *10
	4 B2	Control valve B02 starting current level	*1, *10
	4 B3	Control valve B03 starting current level	*1, *10
	4 B4	Control valve B04 starting current level	*1, *10

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5. TIRE DATA

No.	Indication	Description	Prerequisite for implementation
1	5 01	The tire data according to the tire size is stored.	*1, *8

Prerequisite content for implementation
*1: When main controller replacement
*2: When removing/installing or replacing accelerator sensor
*3: When removing/installing or replacing tire angle sensor or sensor cover
*4: When replacing lift lever angle sensor
*5: When replacing tilt lever angle sensor
*6: When replacing attachment (1) lever angle sensor
*7: When replacing attachment (2) lever angle sensor
*8: When the tire size or type is changed.
*9: When removing/installing or replacing brake sensor, or adjusting the brake pedal height
*10: When replacing oil control valve

Matching Items and Prerequisite for Implementation (Multi-function display)

1. DRIVE

No.	Indication	Description	Prerequisite for implementation
1	ACCEL OFF	Accelerator sensor output value with fully opened accelerator position to the controller.	*1,*2
2	ACCEL ON	Accelerator sensor output value with fully stepped accelerator position to the controller.	*1,*2
3	BRAKE OFF	Brake sensor output value with fully released brake position to the controller.	*1,*16
4	BRAKE ACT	Brake sensor output value at the operation starting position of brake to the controller.	*1,*16

2. SAS

No.	Indication	Description	Prerequisite for implementation
1	TILT LEVEL	Tilt angle sensor output value with fork in the horizontal position to the controller.	*1, *3, *4, *7, *8, *9
2	TILT FWD LIMIT	Tilt angle sensor output value at the forward tilt limit position and the load sensor output value without load to the controller.	*1, *3, *4, *5, *7, *8, *9
3	TIRE POSITION	Tire angle sensor output value while the vehicle is traveling straight to the controller.	*1, *6
4	MAST TYPE	The mast type is stored.	*8, *14
5	HEIGHT SENSOR	With the forks at their lowest position, store the lift height sensor output value in the controller memory.	*1, *8, *18

3. LEVER

No.	Indication	Description	Prerequisite for implementation
1	LEVER1	Lift lever angle sensor output value in the lift lever neutral position is stored in the controller.	*1, *10
2	LEVER2	Tilt lever angle sensor output value in the tilt lever neutral condition is stored in the controller.	*1, *11
3	LEVER3	Attachment (1) lever angle sensor output value in the attachment (1) lever neutral position is stored in the controller.	*1, *12
4	LEVER4	Attachment (2) lever angle sensor output value in the attachment (2) lever neutral position is stored in the controller.	*1, *13

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4. OCV

No.	Indication	Description	Prerequisite for implementation
1	A01	Control valve A01 starting current level	*1, *17
	A02	Control valve A02 starting current level	*1, *17
	A03	Control valve A03 starting current level	*1, *17
	A04	Control valve A04 starting current level	*1, *17
2	B01	Control valve B01 starting current level	*1, *17
	B02	Control valve B02 starting current level	*1, *17
	B03	Control valve B03 starting current level	*1, *17
	B04	Control valve B04 starting current level	*1, *17

5. LOAD METER (Multi-function display DX only)

No.	Indication	Description	Prerequisite for implementation
1	MAST TYPE	The mast type is stored. V→SV→FSV→FV→FSW→FW→QFV→ 「 - 」(N/A)	*8, *14
2	CYL. SIZE1	Diameter of the lift cylinder is stored.	*8, *14
	CYL. SIZE2	Diameter of the lift cylinder is stored.	*8, *14
3	ZERO SET1	Zero point of the load meter is stored.	*5, *7, *8, *14
	ZERO SET2	Zero point of the load meter is stored.	*5, *7, *8, *14
4	COMPENSATION	The value of load meter compensation data is stored.	As requested by customer to adjust the accuracy

6. LEVER

No.	Indication	Description	Prerequisite for implementation
1	TIRE DATA	The tire data according to the tire size is stored.	*1, *15

Prerequisite content for implementation
*1: When main controller replacement
*2: When removing/installing or replacing accelerator sensor
*3: When removing/installing or replacing tilt angle sensor
*4: When length change or replacing of tilt angle sensor rod
*5: When removing/installing or replacing load sensor
*6: When removing/installing or replacing tire angle sensor or sensor cover
*7: When installing or changing attachment or fork
*8: When removing/installing or replacing mast
*9: When removing/installing or replacing tilt cylinder
*10: When replacing lift lever angle sensor
*11: When replacing tilt lever angle sensor
*12: When replacing attachment (1) lever angle sensor

*13: When replacing attachment (2) lever angle sensor
*14: When replacing multifunction display
*15: When the tire size or type is changed
*16: When removing/installing or replacing brake sensor, or adjusting the brake pedal height
*17: When replacing oil control valve
*18: When removing/installing or replacing height reel sensor

Before Starting Matching

Before performing matching, you must set the vehicle to “standard vehicle condition”.

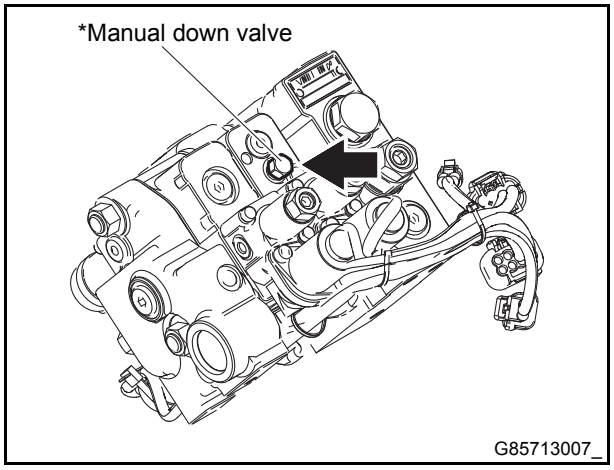
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BEFORE STARTING REPAIR WORK

Before starting SAS repair, fully understand the SAS function.

1. Preparation for repairing
   (1) Avoid vehicle washing as far as possible. For cleaning, blow compressed air. If washing with water is required, avoid water jet washing. Always blow compressed air to remove water after washing.
   (2) Transport the main controller in packed state. Keep it packed until installation. Never transport it in exposed state. Full care should be taken not to drop the controller, allow contact with elsewhere or impact against it.
   (3) If matching is required, park the vehicle in a flat place in advance.
   (4) Provide necessary tools and instruments (analog tester), SST 09230-21440-71, SST 09240-23400-71, and SST 09230-13700-71.

2. During repair work
   (1) Never use an impact wrench for removing or installing the main controller. Full care should be taken not to drop main controller by mistake. Avoid impact from dropping that may damage parts inside.
   (2) Do not turn the key switch to ON or OFF carelessly when the sensor wiring is disconnected. Key switch ON in this state may cause an error and the error code will be stored in the controller. Error codes cannot be cleared and up to ten error codes can be stored. Beyond ten, older error codes will be eliminated sequentially.
   (3) During matching, SAS function will stop. Do not operate the vehicle.
   (4) If a vehicle is in tilted condition because of the repair of a flattened tire or other reasons, keep the key switch turned ON throughout from the start of jacking up, tire replacement and lowering to the ground.
   (5) When the hydraulic piping is disconnected, apply cover to the fitting and hose to prevent the dirt from entering.
   (6) If the lift unlock bolt of the oil control valve is loosened, tighten it to a prescribed torque and put it back into place after repair.
   (7) Tighten respective set bolts to a prescribed torque.
   (8) Respective sensors require no adjustment during installation. Make initialization during matching.
   (9) To disconnect a connector, do not pull it by the harness.
   (10) When inspecting the harness, carefully operate so as not to damage connector terminals.
   (11) Positioning of the low- and high-lifting heights described in the troubleshooting section are as follows:
   Low-lifting height: Height from the lowermost position to immediately before actuation of the fork lifting height switch MH1.
   High-lifting height: Height above the position where lifting height switch MH2-1 is actuated.



3. Emergency Action

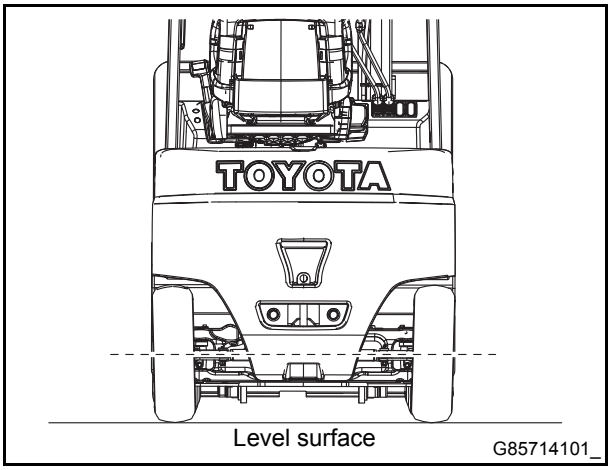
   If the mast fails to be lowered during lowering operation for some reason, it can be lowered manually as follows:
   Loosen the manual down valve gradually until the mast starts to be lowered.
   After repair, do not forget to re-tighten the manual down valve. If forgotten, the lift speed becomes remarkably delayed.

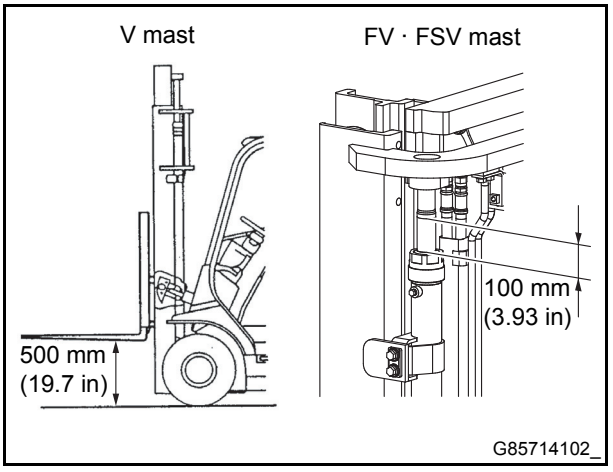
   ***Tightening torque: T = N·m (kgf·cm) [ft·lbf]**
   T = 28.8 ~ 35.2 (288 ~ 359) [20.8 ~ 26.0]

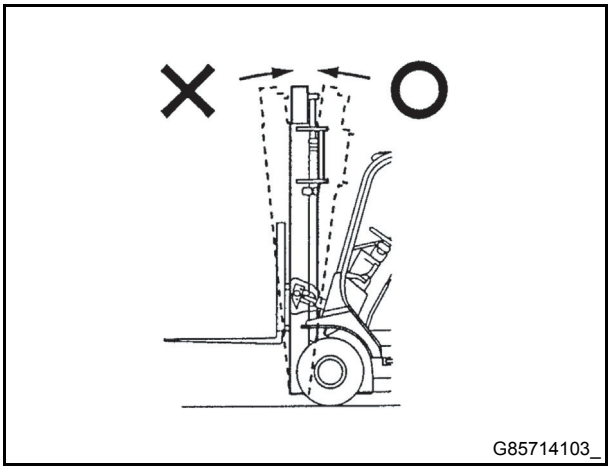
BEFORE STARTING MATCHING

Set the vehicle to “Standard vehicle condition” before starting matching.
“Standard vehicle condition” means that the vehicle satisfies the conditions described below.

If matching is conducted on an inclined or rough floor surface, errors in standard vehicle condition will occur, so perform matching on a flat, level surface (Inclination: within 0.5°).







Standard Vehicle Condition

Note:
- **Before carrying out matching for mini lever/joystick vehicles, move the armrest to the driving position and check the neutral state of the levers.**
- **In case of a detachable attachment, keep the attachment installed on the vehicle.**

1. Tire pressure check

   Adjust the tire pressure to the specified level. Matching will be inaccurate if the pressure is low, or if there are air pressure fluctuations between front and rear as well as left and right.

2. Surface levelness check

   If matching is conducted on an inclined or rough floor surface, errors in standard vehicle condition will occur, so perform matching on a flat, level surface (inclination: within 0.5°).

Note:
The finishing accuracy of the floors for factories, warehouses and buildings in general calls for the floor inclination to be 0.5° or under. Therefore, matching on these floors is not affected. Do not perform matching on a floor that is inclined for over 0.5° for draining purpose.

3. No-load vertical condition check

   Store the output voltage of the load sensor in no-load state in the controller. At this time, the following conditions must be satisfied:

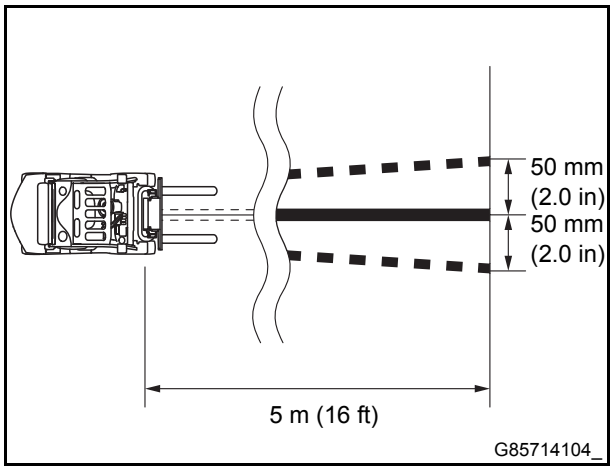
   (1) For the V mast, set the lifting height to about 500 mm (19.7 in) and use a goniometer to check that the mast is vertical.

   (2) For the FV/FSV mast, set the rear cylinder rod projection to about 100 mm (3.93 in) and use a goniometer to check that the mast is vertical.

   (3) On a vehicle with attachment, set the mast vertical with the attachment at a height of 500 mm (19.7 in) and perform relief at the topmost position.

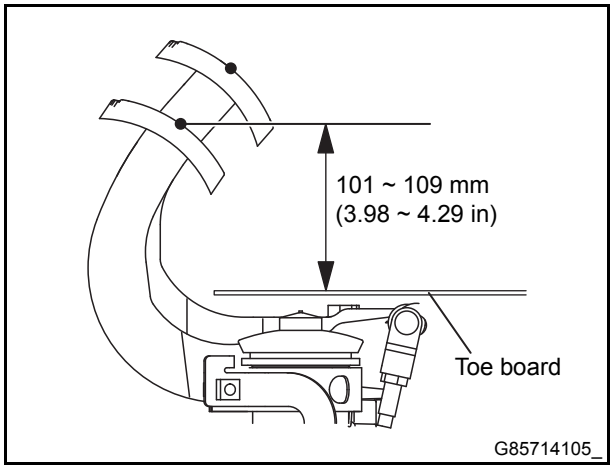
   (4) Set the mast in the vertical position from the backward tilted position by operating the tilt lever in the forward tilting direction (not from the forward tilted position).
   In case of a detachable attachment, keep the attachment installed on the vehicle.
   The angle measuring instrument should be put on the front or rear surface of the outer mast at height from 1200 to 1500 mm (47.2 to 59.1 in).

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4. Tire straight traveling position check

- Store the tire angle sensor output voltage in the controller in the condition of the vehicle traveling straight ahead.
- Condition of the vehicle traveling straight ahead means that the deviance to left or right is within 50 mm (2.0 in) when the vehicle travels for 5 meters (16 ft) with the steering being fixed.



5. Brake pedal position check

- The parking brake should be in the released (not applied) position.
- The brake pedal should be stepped on perpendicularly, and depress it from the upper surface of toe board to the center of the brake pedal until becoming 101 ~ 109 mm (3.98 ~ 4.29 in).

6. Loadmeter 0 set (0 set of the load meter) check

   For all the V/FV/FSV mast, the mast is to be vertical and the fork height is to be 500 mm (19.7 in).

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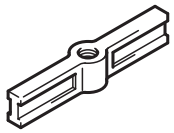
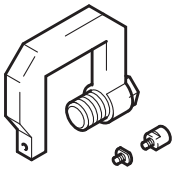
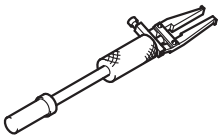
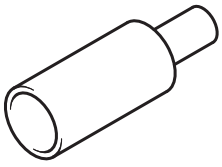
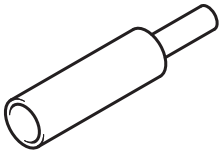
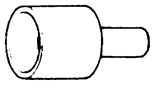
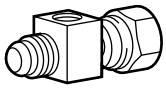
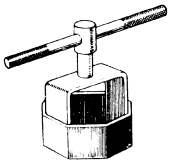
APPENDIX

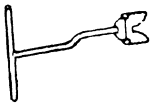
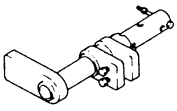
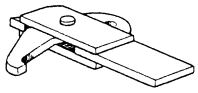
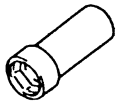
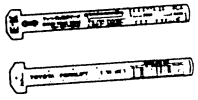
Page

SST LIST 15-2
SERVICE STANDARDS LIST 15-9
CONNECTOR DRAWING 15-18
CONNECTING DIAGRAM 15-31
WIRING DIAGRAM 15-32

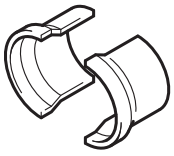
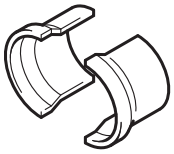
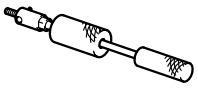
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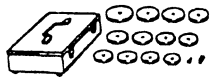
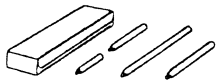
SST LIST

Illust	Part number	Part name	Section				
			6	7	8	11	12
	09140-10920-71	Puller B set extension tool	○				
	09310-23320-71	Reamer bolt remover	○				
	09320-23000-71	Bearing remover	○				
	09370-10410-71	Front axle bearing replacer	○	○			
	09370-20270-71	Drive pinion bearing replacer		○			
	09411-13330-71	Spring pin remover	○				
	09421-33020-71	Front axle hub replacer	○				
	09450-23320-71	Adapter			○		
	09509-76002-71 (09509-55020)	Rear wheel bearing nut wrench	○				

Illust	Part number	Part name	Section				
			6	7	8	11	12
	09509-76003-71 (09509-55030)	Rear wheel bearing nut wrench	○				
	09510-31960-71	Brake hold down spring remover and replacer	○				
	09610-22000-71	Inner mast stopper				○	○
	09620-10100-71	Cylinder cap remover and replacer					○
	09630-23600-71	Deep socket A				○	
	09631-22000-71	Wear scale chain				○	
	09651-26600-71	Piston rod insert guide					○
	09652-26600-71	Piston rod insert guide					○
	09653-26600-71	Piston rod insert guide					○
	09655-26600-71	Piston rod insert guide					○

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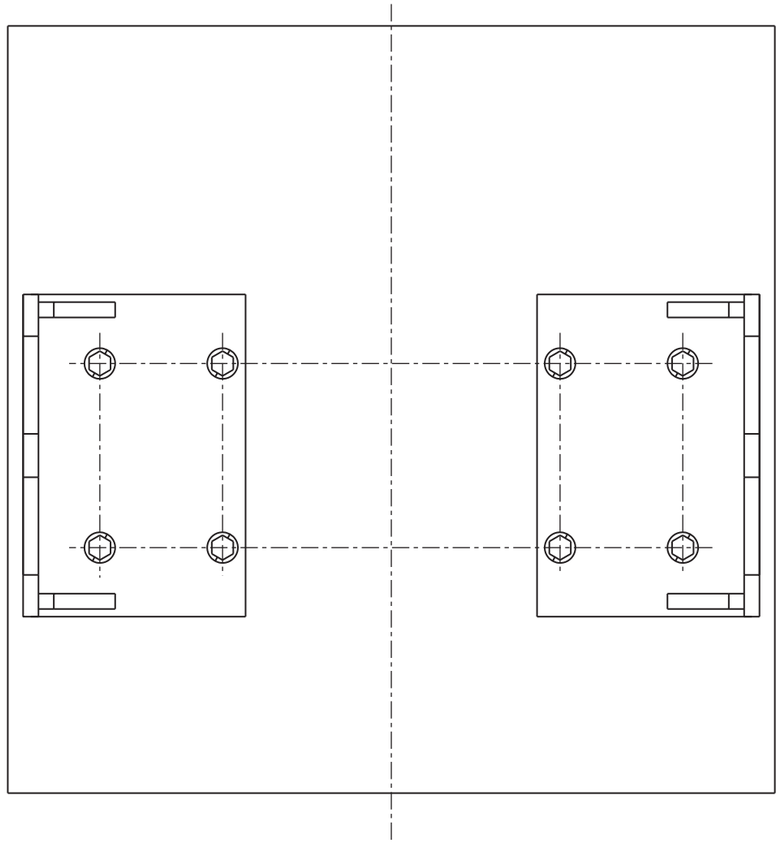
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			6	7	8	11	12
	09656-26600-71	Piston rod insert guide					○
	09657-26600-71	Piston rod insert guide					○
	09659-26600-71	Piston rod guide					○
	09660-26600-71	Piston rod guide					○
	09717-76001-71 (09717-20010)	Brake shoe return spring remover	○				
	09718-76001-71 (09718-20010)	Brake shoe return spring replacer	○				
	09810-20172-71	Joint pin remover				○	○
	09950-76003-71 (09950-50012)	Puller C set			○		
	09950-76014-71 (09950-40011)	Puller B set	○	○		○	
	09950-76018-71 (09950-60010)	Replacer set	○	○	○	○	○

Illust	Part number	Part name	Section				
			6	7	8	11	12
	09950-76019-71 (09950-60020)	Replacer set No. 2	○	○			
	09950-76020-71 (09950-70010)	Handle set	○	○	○	○	○

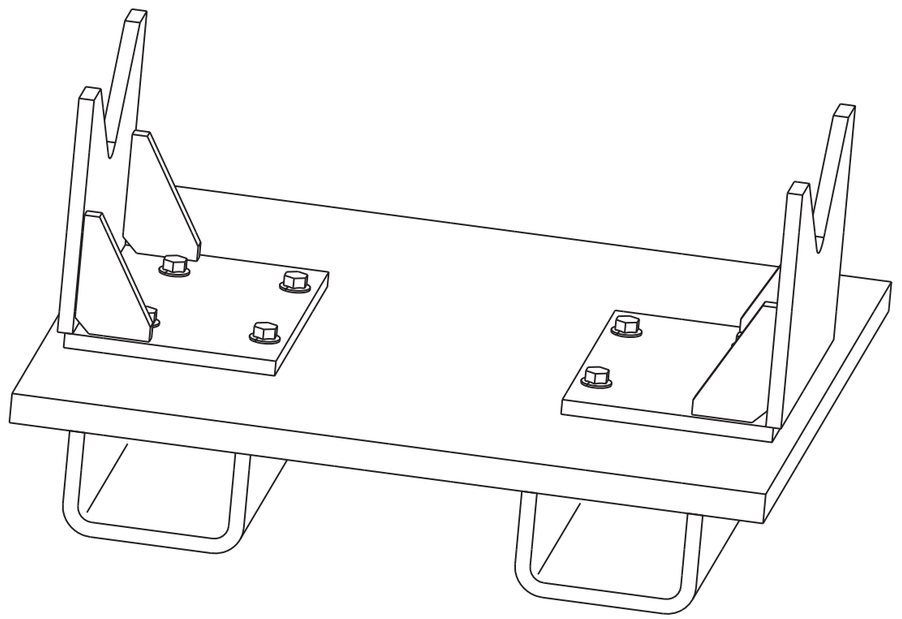
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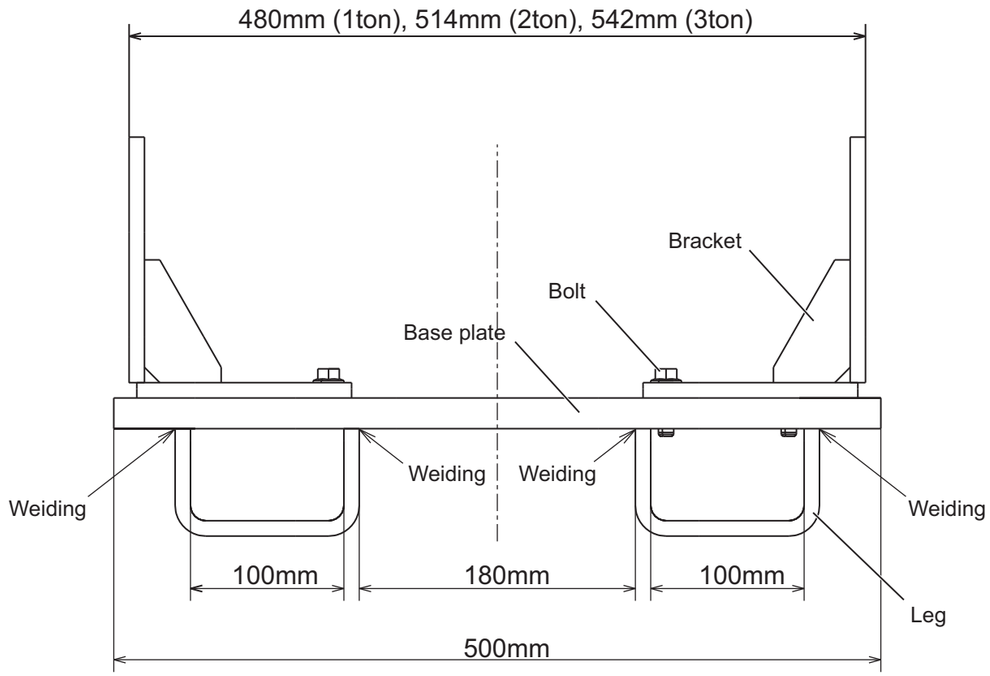
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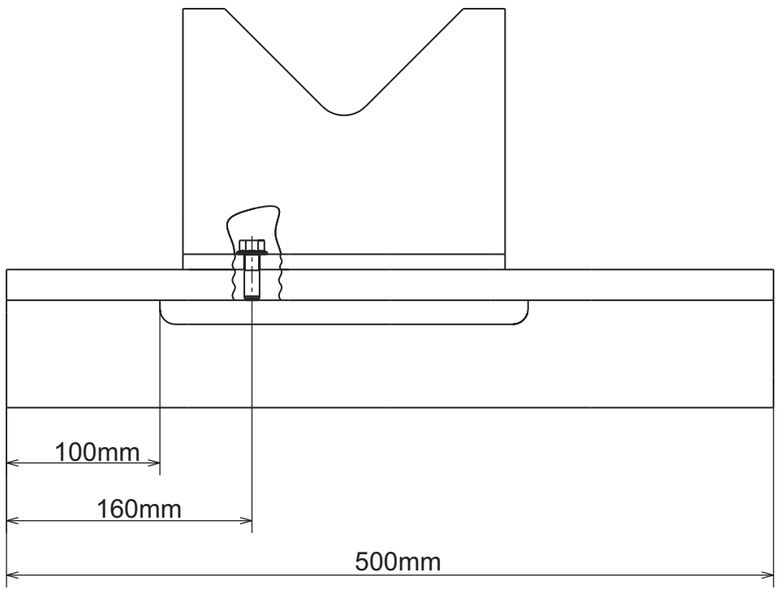
Drive unit tool



When removing or installing the front module,it is necessary to use the jig as shown.
Use an attached drawing as a reference and produce the jig when necessary.



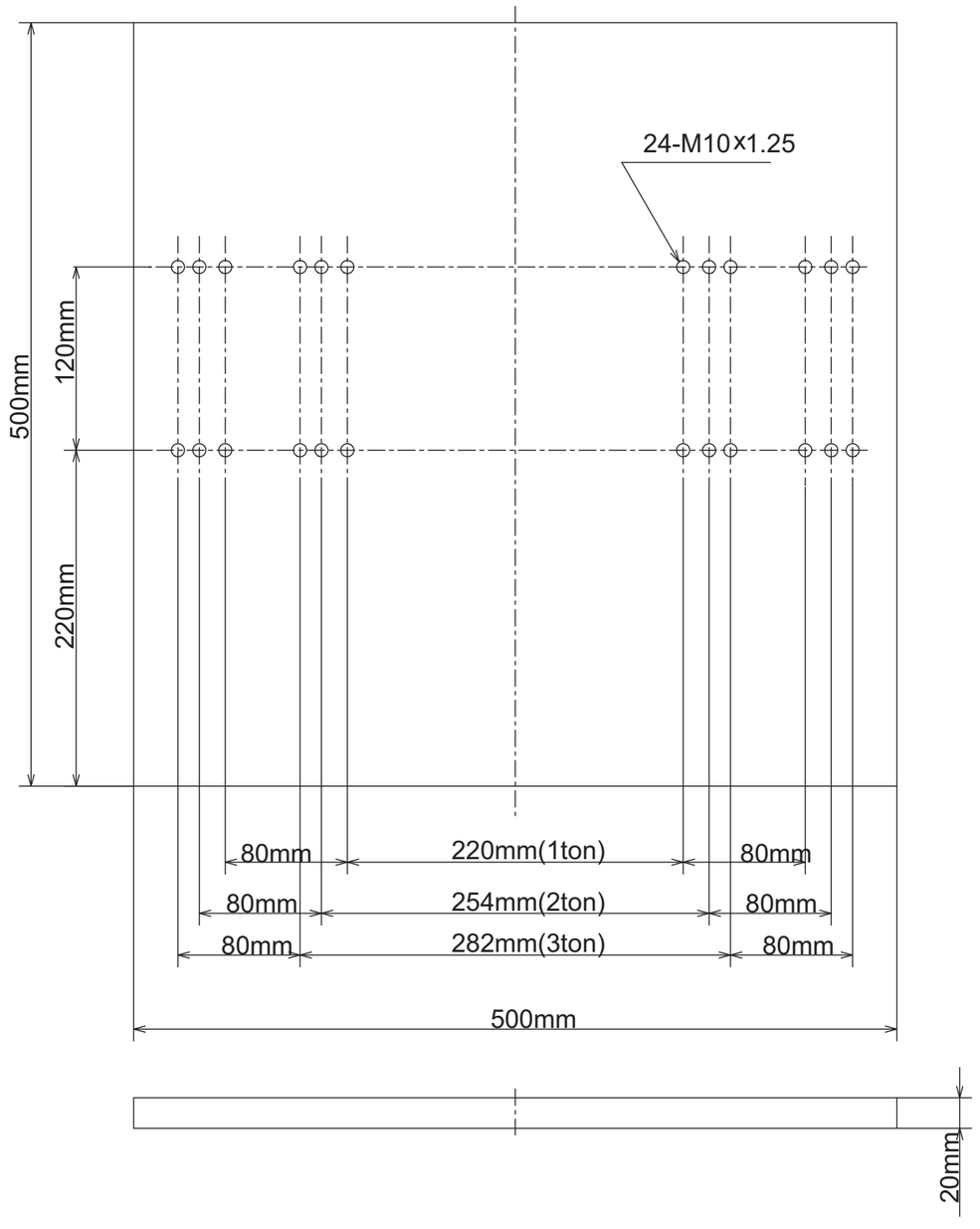




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BASE PLATE



BRACKET

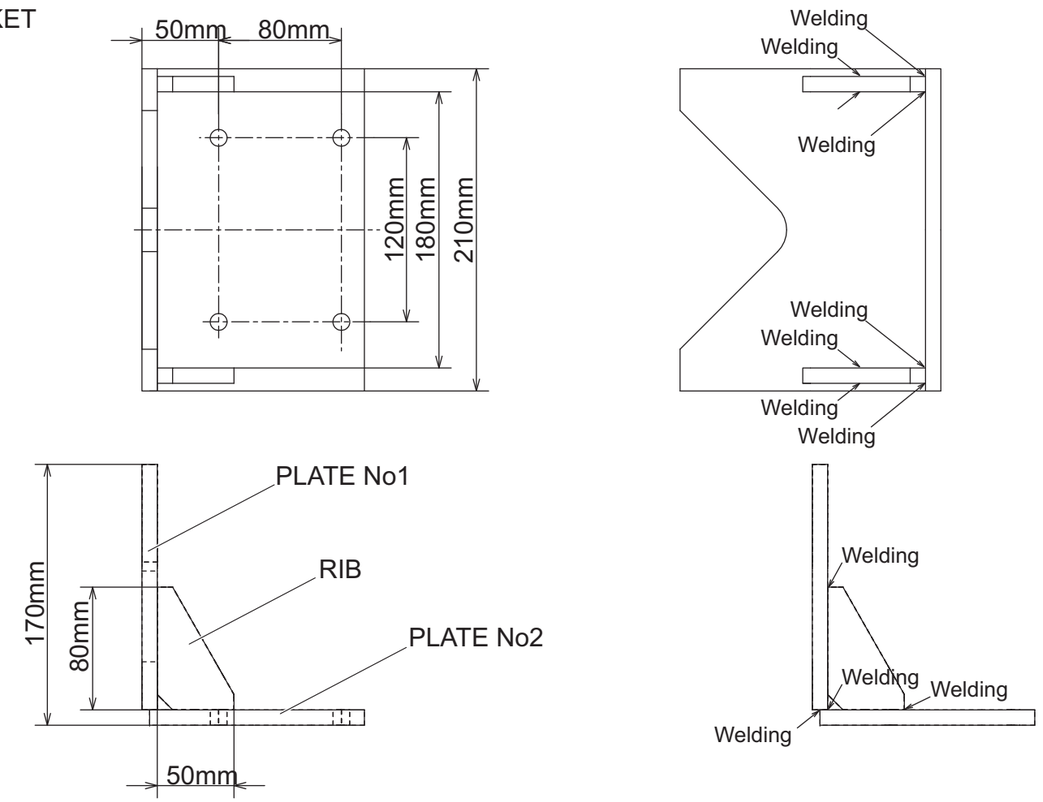


PLATE No1

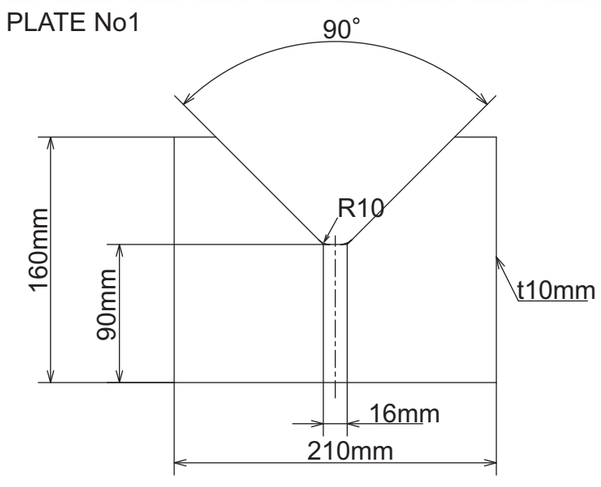
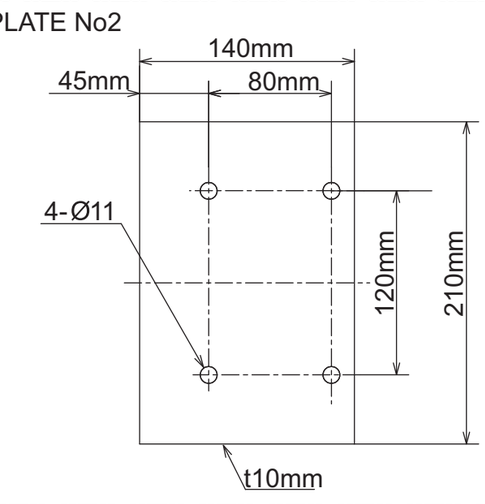
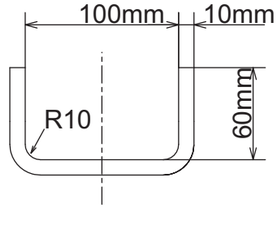


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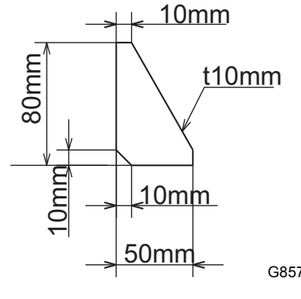


LEG





RIB



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SERVICE STANDARDS LIST

BATTERY

Specific gravity upon full charge			1.280 [20°C (68°C)]
Specific gravity upon end of discharge			1.150 [20°C (68°C)]
Discharge end voltage	48V	V	42.5
	80V	V	68.0
Insulation resistance		MΩ	1 or more

DRIVE MOTOR

Insulation resistance	MΩ	1 or more
Terminal continuity	Ω	0
Temperature sensor resistance	kΩ	Approx. 11~15
Tightening torque N·m (kgf-cm) [ft-lbf]		
Revolution sensor gear set bolt	Standard	13 (133) [9.59]
Sensor cover	Standard	5 (51) [3.69]
Terminal set bolt	Standard	5 (51) [3.69]
Stud bolt	Standard	18 (183) [13.2]
Revolution sensor	Standard	5 (51) [3.69]
Plate cover	Standard	5 (51) [3.69]

PUMP MOTOR

Insulation resistance	MΩ	1 or more
Terminal continuity	Ω	0
Temperature sensor resistance	kΩ	Approx. 11~15
Tightening torque N·m (kgf-cm) [ft-lbf]		
Revolution sensor gear set bolt	Standard	13 (133) [9.59]
Sensor cover	Standard	5 (51) [3.69]
Terminal set bolt	Standard	5 (51) [3.69]
Stud bolt	Standard	18 (183) [13.2]
Revolution sensor	Standard	5 (51) [3.69]
Plate cover	Standard	5 (51) [3.69]

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DRIVE UNIT

Differential pinion inside diameter mm (in)		1 ton series	Standard	26.12 (1.028)
			Limit	26.22 (1.032)
		2 ton series	Standard	28.12 (1.107)
			Limit	28.22 (1.111)
		3 ton series	Standard	22.12 (0.871)
			Limit	22.22 (0.875)
Pinion shaft outside diameter mm (in)		1 ton series	Standard	26.00 (1.024)
			Limit	25.75 (1.014)
		2 ton series	Standard	28.00 (1.102)
			Limit	27.75 (1.093)
Spider outside diameter mm (in)		3 ton series	Standard	22.00 (0.866)
			Limit	21.75 (0.856)
Side gear thrust washer thickness mm (in)			Standard	1.6 (0.063)
			Limit	1.3 (0.051)
Pinion gear thrust washer thickness mm (in)		1 ton series	Standard	1.0 (0.039)
			Limit	0.7 (0.063)
		2·3 ton series	Standard	1.6 (0.028)
			Limit	1.3 (0.051)
Tightening torque N·m (kgf-cm) [ft-lbf]				
Drive unit cap			Standard	60.8~113.8 (620~1160) [44.9~84.0]
Gear case cover			Standard	60.8~113.8 (620~1160) [44.9~84.0]
Breather			Standard	15~22 (153~224) [11.1~16.2]
Oil plug			Standard	20~31 (204~316) [14.8~22.9]
Ring gear set bolt			Standard	127~176 (1295~1795) [93.7~129.8]

FRONT AXLE

Front axle hub			
Front axle bearing starting force	N (kgf) [lbf]	Standard	24.5~60.0 (2.5~6.1) [5.5~13.5]
Tightening torque	**N·m (kgf-cm) [ft-lbf]**		
Divided rim set bolt	1 ton series	Standard	49.0~68.5 (500~700) [36.2~50.6]
	2 ton series	Standard	118.0~176.0 (1200~1800) [87.1~129.8]
Front wheel hub nut	1 ton series	Standard	118.0~196.0 (1200~2000) [87.1~144.6]
	2 ton series	Standard	177.0~392.0 (1800~4000) [130.6~289.2]
	3 ton series	Standard	294.0~588.0 (3000~6000) [216.9~433.8]
Axle shaft set bolt	1·2 ton series	Standard	68.6~98.0 (700~1000) [50.6~72.3]
	3 ton series	Standard	107.0~140.0 (1100~1400) [78.9~103.3]
Nut lock screw	1·2 ton series	Standard	2.0~5.2 (20~53) [1.4~3.8]
	3 ton series	Standard	15.0~22.0 (153~224) [11.1~16.2]
Front axle reactive force bolt		Standard	294~343 (3000~3500) [217~253]
Front axle ASSY set bolt	1·2 ton series	Standard	108~159 (1100~1600) [80~117]
	3 ton series	Standard	127~190 (1300~1900) [94~140]
Brake ASSY set bolt		Standard	137~210 (1400~2100) [101~155]
Axle bracket		Standard	294~343 (3000~3500) [216.9~253.1]
Axle bracket set bolt (through bolt)		Standard	235~294 (2400~3000) [173.4~216.9]
Axle bracket set bolt (reamer bolt)		Standard	235~294 (2400~3000) [173.4~216.9]
Axle housing set bolt	1·2 ton series	Standard	108~137 (1100~1400) [79.6~101.3]
	3 ton series	Standard	127~210 (1400~2100) [101~155]

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REAR AXLE

Rear axle hub and steering knuckle			
Rear axle hub starting force N (kgf) [lbf]	1 ton series	Standard	15~39 (1.5~4.0) [3.3~8.5]
	2·3 ton series	Standard	15~44 (1.5~4.5) [3.3~9.9]
King pin outside diameter mm (in)		Limit	27.8 (1.094)
Steering knuckle starting force N (kgf) [lbf]		Standard	19.3 (2.0) [4.4] or less
Rear axle cylinder			
Rear axle cylinder piston rod outside diameter mm (in)	1 ton series	Limit	39.92 (1.5717)
	2·3 ton series	Limit	49.92 (1.9654)
Rear axle cylinder piston rod bend mm (in)		Limit	0.5 (0.020)
Rear axle cylinder inside diameter mm (in)	1 ton series	Limit	70.35 (2.7697)
	2 ton series	Limit	80.35 (3.1634)
	3 ton series	Limit	84.40 (3.3228)
Tightening torque N·m (kgf-cm) [ft-lbf]			
Axle bracket cap set bolt		Standard	160.0~240.0 (1632~2447) [118.0~177.1]
King pin lock bolt		Standard	44.1~53.9 (450~550) [32.5~39.8]
King pin lock nut		Standard	35.0~52.0 (357~530) [25.8~38.4]
Steering knuckle tie rod end pin lock nut		Standard	49.0~73.5 (500~750) [36.2~54.2]
Rear axle cylinder set bolt		Standard	170.0~230.0 (1734~2345) [125.4~169.7]
Rear axle cylinder rod guide set nut		Standard	41.0~55.4 (418~565) [30.2~40.9]
Divided rim set bolt	1 ton series	Standard	29.5~44.0 (300~450) [21.8~32.5]
	2 ton series	Standard	78.5~117.5 (800~1200) [57.9~86.7]
Hub nut	1 ton series	Standard	89.0~157.0 (900~1600) [65.66~115.8]
	2·3 ton series	Standard	118.0~196.0 (1200~2000) [87.06~144.60]
Tie rod end pin lock nut		Standard	49.0~73.5 (500~750) [36.2~54.2]

STEERING

Hydrostatic steering valve ASSY			
Relief pressure MPa (kgf/cm^2) [psi]	1~2 ton series	Standard	7.35~7.94(75~81) [1073~1146]
	2.5 ton series	Standard	8.33~8.82(85~90) [1204~1276]
	3 ton series	Standard	9.80~10.3 (100~105) [1421~1494]
Tightening torque N·m (kgf-cm) [ft-lbf]			
Steering wheel set nut		Standard	35 (360) [26.1]
Steering valve ASSY set bolt		Standard	34.3 (350) [25.3]
Steering valve end cap set screw		Standard	23~27 (235~275) [17.0~19.9]

BRAKE

Front brake (1 ton series)			
Hold down spring free length	mm (in)	Standard	25.5 (1.004)
Anchor to shoe spring free length	mm (in)	Standard	102.2 (4.024)
		Limit	No clearance between coil turns
Strut to shoe spring free length	mm (in)	Standard	19.7 (0.776)
Adjuster spring free length	mm (in)	Standard	99.4 (3.913)
		Limit	No clearance between coil turns
Brake lining length	mm (in)	Standard	4.9 (0.193)
		Limit	1.0 (0.039)
Wheel cylinder to piston clearance	mm (in)	Limit	0.125 (0.00492)
Brake drum inside diameter	mm (in)	Standard	254.0 (10.00)
		Limit	256.0 (10.08)
Front brake (2·3 ton series)			
Hold down spring free length	mm (in)	Standard	32.3 (1.272)
		Limit	29.1 (1.146)
Actuator spring free length	mm (in)	Standard	124.5 (4.902)
		Limit	No clearance between coil turns
Anchor to shoe spring free length	mm (in)	Standard	106 (4.173)
		Limit	No clearance between coil turns
Strut to shoe spring free length	mm (in)	Standard	23 (0.906)
		Limit	20 (0.787)
Adjuster spring free length	mm (in)	Standard	86 (3.386)
		Limit	No clearance between coil turns
Brake lining thickness	mm (in)	Standard	7.0 (0.276)
		Limit	2.0 (0.079)
Wheel cylinder to piston clearance	mm (in)	Limit	0.145 (0.00571)
Brake drum inside diameter	mm (in)	Standard	310.0 (12.20)
		Limit	312.0 (12.28)
Tightening torque	**N·m (kgf-cm) [ft-lbf]**		
Backing plate set bolt		Standard	137.0~210.0 (1397~2141) [101.1~154.9]

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MATERIAL HANDLING SYSTEM

Natural drop test			
Natural drop	mm (in)/ 15min	Limit	45 (1.77)
Natural forward tilt test			
Natural forward tilt °/ 15min(mm,in)	1 ton series	Standard	1.7 (15,0.59)
	2 ton series	Standard	1.7 (20,0.79)
	3 ton series	Standard	1.7 (25,0.98)
Oil leak test			
Lift cylinder oil leak amount	cm^3 (in^3)	Standard	8 (0.49) or less
Tilt cylinder oil leak amount (total for lift and tilt)	cm^3 (in^3)	Standard	16 (0.98) or less
Tightening torque	**N·m (kgf-cm) [ft-lbf]**		
Tank cover		Standard	9.81~14.7 (100~150) [7.24~10.9]
Lever set bolt		Standard	20~34 (204~347) [14.8~25.1]

MAST

Mast adjustment (V mast)			
Inner mast roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Outer mast roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Middle lift roller clearance	mm (in)	Standard	0.6~0.8 (0.024~0.031)
Upper and lower lift roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Side roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Mast strip to inner mast clearance	mm (in)	Standard	0~0.6 (0~0.024)
Mast adjustment (FV·FSV mast)			
Inner mast roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Middle mast lower roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Outer mast roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Middle mast upper roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Upper and lower lift roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Side roller clearance	mm (in)	Standard	0~0.6 (0~0.024)
Mast strip to inner mast clearance	mm (in)	Standard	0~0.6 (0~0.024)
Tightening torque	**N·m (kgf-cm) [ft-lbf]**		
Mast support cap set bolt		Standard	84~156 (857~1591) [62.0~115.1]
Tilt cylinder front pin		Standard	76.8~115.0 (783~1753) [56.7~84.84]
Lift bracket set bolt		STD	168~312 (1713~3182) [123.9~230.2]
		Rust proof	98~182 (999~1856) [72.3~134.3]

CYLINDER

Lift cylinder (V)				
Piston rod outside diameter mm (in)		1 ton series	Standard	35 (1.38)
			Limit	34.92 (1.3748)
		2 ton series	Standard	40 (1.57)
			Limit	39.92 (1.5717)
		3 ton series	Standard	45 (1.77)
			Limit	44.92 (1.7685)
Cylinder bore mm (in)		1 ton series	Standard	45 (1.77)
			Limit	45.20 (1.7795)
		2 ton series	Standard	50 (1.97)
			Limit	50.20 (1.9764)
		3 ton series	Standard	55 (2.17)
			Limit	55.35 (2.1791)
Piston rod bend mm (in)			Limit	2.0 (0.079)
Rear lift cylinder (FV·FSV)				
Piston rod outside diameter mm (in)	1 ton series	FV	Standard	32 (1.26)
			Limit	31.92 (1.2567)
		FSV	Standard	35 (1.38)
			Limit	34.92 (1.3748)
	2 ton series	FV	Standard	35 (1.38)
			Limit	34.92 (1.3748)
		FSV	Standard	40 (1.57)
			Limit	39.92 (1.5717)
	3 ton series	FV	Standard	40 (1.57)
			Limit	39.92 (1.5717)
		FSV	Standard	45 (1.77)
			Limit	44.92 (1.7685)
Cylinder bore mm (in)		1 ton series	Standard	45 (1.77)
			Limit	45.20 (1.7685)
		2 ton series	Standard	50 (1.97)
			Limit	50.20 (1.9764)
		3 ton series	Standard	55 (2.17)
			Limit	55.35 (2.1791)
Piston rod bend mm (in)			Limit	2.0 (0.079)
Front lift cylinder (FV·FSV)				
Piston rod outside diameter mm (in)		1 ton series	Standard	50 (1.97)
			Limit	49.92 (1.9654)
		2 ton series	Standard	50 (1.97)
			Limit	49.92 (1.9654)
		3 ton series	Standard	60 (2.36)
			Limit	59.91 (2.3587)

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Cylinder bore mm (in)		1 ton series	Standard	70 (2.76)
			Limit	70.35 (2.7697)
		2 ton series	Standard	75 (2.95)
			Limit	75.35 (2.9665)
		3 ton series	Standard	85 (3.35)
			Limit	85.40 (3.3622)
Piston rod bend mm (in)			Standard	2.0 (0.079)
Tilt cylinder				
Cylinder bore mm (in)		1·2 ton series	Standard	70.0 (2.76)
			Limit	70.35 (2.770)
		3 ton series	Standard	80.0 (3.15)
			Limit	80.35 (3.163)
Piston rod outside diameter mm (in)		1·2 ton series	Standard	30.0 (1.18)
			Limit	29.92 (1.178)
		3 ton series	Standard	35.0 (1.38)
			Limit	34.92 (1.375)
Piston rod bend mm (in)			Limit	0.5 (0.020)
Tightening torque N·m (kgf-cm) [ft-lbf]				
Lift cylinder cover	V	1 ton series	Standard	282.4~423.6 (2880~4320) [208.3~312.5]
		2 ton series	Standard	282.4~423.6 (2880~4320) [208.3~312.5]
		3 ton series	Standard	282.4~423.6 (2880~4320) [208.3~312.5]
	FV	1 ton series	Standard	282.4~423.6 (2880~4320) [208.3~312.5]
		2 ton series	Standard	282.4~423.6 (2880~4320) [208.3~312.5]
		3 ton series	Standard	282.4~423.6 (2880~4320) [208.3~312.5]
	FSV	1 ton series	Standard	282.4~423.6 (2880~4320) [208.3~312.5]
		2 ton series	Standard	282.4~423.6 (2880~4320) [208.3~312.5]
		3 ton series	Standard	282.4~423.6 (2880~4320) [208.3~312.5]
Front lift cylinder cover			Standard	341.0~443.0 (3477~4517) [252~327]
Tilt cylinder joint set nut			Standard	88.0~132.0 (897~1346) [64.9~97.4]
Tilt cylinder cover		1·2 ton series	Standard	282~424 (2876~4324) [208.0~312.8]
		3 ton series	Standard	341~443 (3477~4517) [251.6~326.8]
Tilt cylinder front pin set bolt			Standard	76~115 (783~1173) [56.7~84.8]
Tilt cylinder rear pin set bolt			Standard	43.2~79.2 (441~808) [31.9~58.4]

OIL PUMP

Oil pump ASSY			
Shaft diameter mm (in)		Limit	21.997 (0.86602)
Tightening torque N·m (kgf-cm) [ft-lbf]			
Oil pump ASSY set bolt		Standard	13.7~32.0 (140~326) [10.1~23.6]

OIL CONTROL VALVE

Oil control valve				
Relief pressure MPa (kgf/cm^2) [psi]	2-way		1.5·1.6·1.8 model ton	15.5 $^{+0.5}_{}$ (158 $^{+5}_{0}$) [2248 $^{+73}_{0}$]
			1.5·1.6 ton model for China	14.0 $^{+0.5}_{}$ (143 $^{+5}_{0}$) [2030 $^{+73}_{0}$]
			2 ton model	14.8 $^{+0.5}_{}$ (151 $^{+5}_{0}$) [2146 $^{+73}_{0}$]
			2.5 ton model	17.2 $^{+0.5}_{}$ (175 $^{+5}_{0}$) [2494 $^{+73}_{0}$]
			3 ton model	18.1 $^{+0.5}_{}$ (185 $^{+5}_{0}$) [2625 $^{+73}_{0}$]
	4-way (STD)	Lift	1.5·1.6·1.8 model ton	15.5 $^{+0.5}_{}$ (158 $^{+5}_{0}$) [2248 $^{+73}_{0}$]
			1.5·1.6 ton model for China	14.0 $^{+0.5}_{}$ (143 $^{+5}_{0}$) [2030 $^{+73}_{0}$]
			2.5 ton model	17.2 $^{+0.5}_{}$ (175 $^{+5}_{0}$) [2494 $^{+73}_{0}$]
			3 ton model	18.1 $^{+0.5}_{}$ (185 $^{+5}_{0}$) [2625 $^{+73}_{0}$]
		Tilt	1.5·1.6·1.8 model ton	11.8 $^{+0.5}_{}$ (120 $^{+5}_{0}$) [1711 $^{+73}_{0}$]
			1.5·1.6 ton model for China	11.8 $^{+0.5}_{}$ (120 $^{+5}_{0}$) [1711 $^{+73}_{0}$]
			2.5 ton model	15.7 $^{+0.5}_{}$ (160 $^{+5}_{0}$) [2277 $^{+73}_{0}$]
			3 ton model	15.7 $^{+0.5}_{}$ (160 $^{+5}_{0}$) [2277 $^{+73}_{0}$]
	4-way (PR)	Lift	1.5·1.6·1.8 model ton	15.5 $^{+0.5}_{}$ (158 $^{+5}_{0}$) [2248 $^{+73}_{0}$]
			1.5·1.6 ton model for China	14.0 $^{+0.5}_{}$ (143 $^{+5}_{0}$) [2030 $^{+73}_{0}$]
			2.5 ton model	17.2 $^{+0.5}_{}$ (175 $^{+5}_{0}$) [2494 $^{+73}_{0}$]
			3 ton model	18.1 $^{+0.5}_{}$ (185 $^{+5}_{0}$) [2625 $^{+73}_{0}$]
		Tilt	1.5·1.6·1.8 model ton	11.8 $^{+0.5}_{}$ (120 $^{+5}_{0}$) [1711 $^{+73}_{0}$]
			1.5·1.6 ton model for China	11.8 $^{+0.5}_{}$ (120 $^{+5}_{0}$) [1711 $^{+73}_{0}$]
			2.5 ton model	15.7 $^{+0.5}_{}$ (160 $^{+5}_{0}$) [2277 $^{+73}_{0}$]
			3 ton model	15.7 $^{+0.5}_{}$ (160 $^{+5}_{0}$) [2277 $^{+73}_{0}$]
Tightening torque N·m (kgf-cm) [ft-lbf]				
Oil control valve ASSY set bolt			Standard	25.0~58.0 (255~591) [18.4~42.8]
Manual down valve			Standard	32.0 (326) [23.59]

SAS

Tightening torque N·m (kgf-cm) [ft-lbf]				
Height sensor set bolt	V	Standard	15.0~25.0 (153~255) [11.1~18.4]	
	FSV·FV	Standard	L=12	13.0 (133) [9.6]
		Standard	L=25	27.0 (275) [19.9]
Tilt angle sensor set bolt		Standard	13.0 (133) [9.6]	
Load sensor		Standard	22.0~26.0 (224~265) [16.2~19.2]	
Shock sensor set bolt		Standard	8.0~18.0 (82~184) [5.9~13.3]	
Shock sensor bracket set bolt		Standard	3.0~6.8 (30.6~69.3) [2.2~5.0]	

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CONNECTOR DRAWING

CN2:BRAKE SW



TAB

NO	P	C	J
1	51	B	J9
2	-	-	-
3	65	Y	CN104-23(48V)

REC

NO	P	C	J
1	51	-	LS-
2	-	-	-
3	65	-	SWA

CN3:HORN SW



TAB

NO	P	C	J
1	41	-	HO+
2	48	-	HO-

REC

NO	P	C	J
1	41	G	J19
2	48	L-O	J27

CN4:KEY SW



TAB

NO	P	C	J
1	41	-	AM
2	-	-	-
3	-	-	-
4	43	-	IG

REC

NO	P	C	J
1	41	G	J19
2	-	-	-
3	-	-	-
4	43	B-Y	J18

CN5:STOP LP SW



TAB

NO	P	C	J
1	101	GR	J28
2	111	R-L	J5
3	-	-	-

REC

NO	P	C	J
1	101	-	LS-
2	111	-	SH1
3	-	-	-

CN6:BRAKE SSR



TAB

NO	P	C	J
1	72	-	VRB1+
2	51	-	POT-
3	73	-	VRB2
4	71	-	VRB1
5	74	-	VRB2+
6	50	-	VRA-

REC

NO	P	C	J
1	72	L-O	CN101-34
2	51	G	J1
3	73	Y-R	CN102-25
4	71	Y-B	CN102-33
5	74	BR-R	CN101-33
6	50	B-O	J2

CN7:TURN&LT SW(LH DIR)



TAB

NO	P	C	J
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-
7	116	-	BT
8	115	-	BH
9	N2	-	T
10	-	-	-
11	N2	-	EL
12	109	-	TL
13	110	-	TB
14	108	-	TR

REC

NO	P	C	J
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-
7	116	LG	CN46-3
8	115	P	CN45-3
9	N2	W-B	J25
10	-	-	-
11	N2	W-B	J25
12	109	G-Y	J32
13	110	L-O	CN12-2
14	108	R-Y	J31

CN8:TURN&LT SW(RH DIR)



TAB

NO	P	C	J
1	-	-	-
2	-	-	-
3	-	-	-
4	108	-	TR
5	-	-	-
6	109	-	TL
7	116	-	BT
8	115	-	BH
9	N2	-	T
10	-	-	-
11	N2	-	EL
12	-	-	-
13	110	-	TB
14	-	-	-

REC

NO	P	C	J
1	-	-	-
2	-	-	-
3	-	-	-
4	108	R-Y	J31
5	-	-	-
6	109	G-Y	J32
7	116	LG	CN46-3
8	115	P	CN45-3
9	N2	W-B	J25
10	-	-	-
11	N2	W-B	J25
12	-	-	-
13	110	L-O	CN12-2
14	-	-	-

CN9:DIRECTION SW(RH DIR)



TAB

NO	P	C	J
1	-	-	-
2	43	-	VBKY
3	43	-	VBKY
4	51	-	LS-
5	45	-	DSF
6	46	-	DSR
7	119	-	DSFO
8	103	-	DSBU
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	-	-	-
18	-	-	-

REC

NO	P	C	J
1	-	-	-
2	43	B-Y	J18
3	43	B-Y	J18
4	51	BR	J10
5	45	GR-R	CN104-26
6	46	B-O	CN104-19
7	119	Y-R	CN24-1
8	103	R-W	CN23-1
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	-	-	-
18	-	-	-

CN10:DIRECTION SW(LH DIR)



TAB

NO	P	C	J
1	-	-	-
2	103	-	DSBU
3	119	-	DSFO
4	46	-	DSR
5	45	-	DSF
6	51	-	LS-
7	43	-	VBKY
8	43	-	VBKY
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	-	-	-
18	-	-	-

REC

NO	P	C	J
1	-	-	-
2	103	R-W	CN23-1
3	119	Y-R	CN24-1
4	46	B-O	CN104-19
5	45	GR-R	CN104-26
6	51	BR	J10
7	43	B-Y	J18
8	43	B-Y	J18
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	-	-	-
18	-	-	-

CN11:HS SW



TAB

NO	P	C	J
1	68	P-L	CN104-28
2	51	BR	J10

REC

NO	P	C	J
1	68	-	SHS+
2	51	-	SHS-

CN12:FLASHER RELAY



TAB

NO	P	C	J
1	N2	-	FRY-
2	110	-	FRY
3	-	-	-
4	43	-	FRY+



REC

NO	P	C	J
1	N2	W-B	J26
2	110	L-O	CN7-13,CN8-13
3	-	-	-
4	43	B-Y	J18

CN13:FR STAY RH



TAB

NO	P	C	J
1	N2	W-B	H/L-,CN18-5
2	102	R-G	H/L+,CN18-3
3	N2	W-B	CN18-1
4	108	G-Y	CN18-4
5	104	G-R	CN18-2
6	-	-	-



REC

NO	P	C	J
1	N2	W-B	J25
2	102	R-G	CN45-4
3	N2	W-B	J25
4	108	R-Y	J31
5	104	G-R	J29
6	-	-	-

CN15:PKB SW



TAB

NO	P	C	J
1	66	-	SPB
2	-	-	-
3	51	-	SPB



REC

NO	P	C	J
1	66	G-W	CN104-20
2	-	-	-
3	51	B	J9

CN17:FR STAY LH



TAB

NO	P	C	J
1	N2	W-B	H/L-,CN18-5
2	102	R-G	H/L+,CN18-3
3	N2	W-B	CN18-1
4	109	G-Y	CN18-4
5	104	G-R	CN18-2
6	-	-	-



REC

NO	P	C	J
1	N2	W-B	J25
2	102	R-G	CN45-4
3	N2	W-B	J25
4	109	G-Y	J32
5	104	G-R	J29
6	-	-	-

CN18:FR COMBI LH



TAB

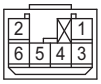
NO	P	C	J
1	N2	-	GND
2	104	-	LC-L
3	102	-	LH-L
4	109	-	LF-L
5	N2	-	GND
6	-	-	-



REC

NO	P	C	J
1	N2	W-B	CN13-3,CN17-3
2	104	G-R	CN13-5,CN17-5
3	102	R-G	CN13-2,CN17-2
4	109	G-Y	CN13-4,CN17-4
5	N2	W-B	CN13-1,CN17-1
6	-	-	-

CN19:STEERING SSR



TAB

NO	P	C	J
1	311	-	SSTR+
2	51	-	LS-
3	312	-	SSTR1
4	313	-	SSTR2
5	314	-	SSTRC
6	-	-	-



REC

NO	P	C	J
1	311	P-L	CN103-13
2	51	B	J9
3	312	B-Y	CN104-30
4	313	L-W	CN104-31
5	314	G-Y	CN104-24
6	-	-	-

CN23:BACK BUZZER



TAB

NO	P	C	J
1	103	-	BZ+
2	N2	-	BZ-



REC

NO	P	C	J
1	103	R-W	CN9-8,CN10-2,CN77-14,J30
2	N2	W-B	J26

CN24:FWD CHIME



TAB

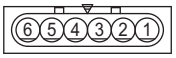
NO	P	C	J
1	119	-	CHI+
2	N2	-	CHI-



REC

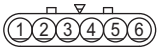
NO	P	C	J
1	119	Y-R	CN9-7,CN10-3,CN30-1,CN77-3
2	N2	W-B	J26

CN26:ACCEL SSR



TAB

NO	P	C	J
1	55	-	VRA2+
2	51	-	POT-
3	54	-	VRA2
4	52	-	VRA1
5	53	-	VRA1+
6	50	-	VRA-



REC

NO	P	C	J
1	55	GR-R	CN101-26
2	51	G	J1,CN101-32
3	54	BR-Y	CN102-32
4	52	BR-R	CN102-30
5	53	BR-W	CN101-27
6	50	B-O	J2

CN30:RR UPR RH1



TAB

NO	P	C	J
1	119	Y-R	CN24-1
2	103	R-W	J30
3	N2	W-B	J26
4	107	R-B	J33



REC

NO	P	C	J
1	119	Y-R	CN63
2	103	R-W	CN62
3	N2	W-B	LR-
4	107	R-B	LW+

CN32:RR HORN SW



TAB

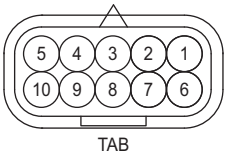
NO	P	C	J
1	N2	W-B	CN37-1
2	118	L-Y	CN37-2



REC

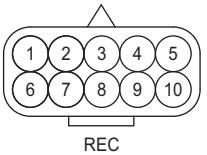
NO	P	C	J
1	N2	W-B	HRS-
2	118	L-Y	HRS+

CN33:TEN KEY



TAB

NO	P	C	J
1	160	-	ITKY1
2	161	-	ITKY2
3	162	-	ITKY3
4	165	-	OTKY2
5	167	-	LEDTKY1
6	163	-	IPSTKY1
7	169	-	TGND
8	164	-	OTKY1
9	166	-	OTKY3
10	168	-	LEDTKY2



REC

NO	P	C	J
1	160	B-Y	CN70-8
2	161	R-B	CN70-20
3	162	G	CN70-6
4	165	R-Y	CN70-10
5	167	G-Y	CN70-12
6	163	W-L	CN70-21
7	169	GR-R	CN70-3
8	164	L-O	CN70-11
9	166	GR-L	CN70-9
10	168	L-B	CN70-19

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CN34:RR COMBI RH



TAB

NO	P	C	J
1	104	-	TL
2	-	-	-
3	111	-	STL+
4	103	-	DSBU
5	108	-	TRN
6	N2	-	E



REC

NO	P	C	J
1	104	G-R	CN170-2
2	-	-	-
3	111	R-L	CN170-1
4	103	R-W	CN170-5
5	108	R-Y	CN170-4
6	N2	W-B	CN170-3

CN35:LQD LVL SSR



TAB

NO	P	C	J
1	140	-	SLLT



REC

NO	P	C	J
1	140	V-Y	CN70-26

CN37:RR UPR RH2



TAB

NO	P	C	J
1	N2	W-B	J26
2	118	L-Y	CN40-3



REC

NO	P	C	J
1	N2	W-B	CN32-1
2	118	L-Y	CN32-2

CN40:HORN RELAY



TAB

NO	P	C	J
1	41	-	COIL+
2	41	-	SW+
3	118	-	COIL-
4	48	-	SW-



REC

NO	P	C	J
1	41	G	J19
2	41	G	J19
3	118	L-Y	CN37-2
4	48	L-O	J27

CN43:SEAT



TAB

NO	P	C	J
1	51	L-O/B	CN44-2
2	67	BR/B	CN44-1



REC

NO	P	C	J
1	51	BR	J10
2	67	L-O	CN104-18

CN44:SEAT SW



TAB

NO	P	C	J
1	51	-	SDM-
2	67	-	SDM+



REC

NO	P	C	J
1	51	BR	J10
2	67	L-O	CN104-18

CN45:HEAD LP RELAY



TAB

NO	P	C	J
1	101	-	COIL+
2	101	-	SW+
3	115	-	COIL-
4	102	-	SW-



REC

NO	P	C	J
1	101	GR	J28
2	101	GR	J28
3	115	P	CN7-8,CN8-8
4	102	R-G	CN13-2,CN17-2

CN46:TAIL LP RELAY



TAB

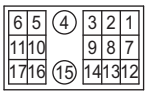
NO	P	C	J
1	101	-	COIL+
2	101	-	SW+
3	116	-	COIL-
4	104	-	SW-



REC

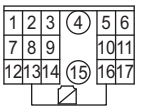
NO	P	C	J
1	101	GR	J28
2	101	GR	J28
3	116	LG	CN7-7,CN8-7
4	104	G-R	J29

CN47:DIAGNOSIS



TAB

NO	P	C	J
1	-	-	-
2	-	-	-
3	N2	-	GND
4	43	-	FLP
5	-	-	-
6	-	-	-
7	-	-	-
8	145	-	CAN1H
9	146	-	CAN1L
10	-	-	-
11	-	-	-
12	334	-	PSACC+
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	-	-	-



REC

NO	P	C	J
1	-	-	-
2	-	-	-
3	N2	W-B	J26
4	43	B-Y	J18
5	-	-	-
6	-	-	-
7	-	-	-
8	145	R-L	CN200-8
9	146	L-Y	CN200-11
10	-	-	-
11	-	-	-
12	334	L-O	CN104-14
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	-	-	-

CN49:WIPER



TAB

NO	P	C	J
1	43	B-Y	J18
2	N2	W-B	J25



REC

NO	P	C	J
1	43	B-Y	CN155-2
		R-L	CN155-4
2	N2	W-B	J34

CN52:DM TEMP RH



TAB

NO	P	C	J
1	87	-	STDM
2	86	-	STDM+



REC

NO	P	C	J
1	87	R-W	CN110-22
2	86	GR-R	CN110-23

CN53:DM SPD SSR1



TAB

NO	P	C	J
1	79	-	SSD1
2	78	-	SSD+



REC

NO	P	C	J
1	79	LG-B	CN110-4
2	78	LG	CN200-1

CN54:DM SPD SSR2



TAB

NO	P	C	J
1	80	-	SSD2
2	78	-	SSD+



REC

NO	P	C	J
1	80	LG-R	CN110-3
2	78	LG	CN200-2

CN55:PM TEMP SSR



TAB

NO	P	C	J
1	89	-	STPM
2	88	-	STPM+



REC

NO	P	C	J
1	89	R-W	CN111-22
2	88	GR-R	CN111-23

CN56:PM SPD SSR



TAB

NO	P	C	J
1	82	-	SSP1
2	81	-	SSP+



REC

NO	P	C	J
1	82	R-B	CN111-4
2	81	GR-G	CN111-6

CN68:THERMO SW(TRANS)



TAB

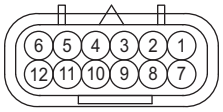
NO	P	C	J
1	139	-	SWTT
2	14	-	DGND



REC

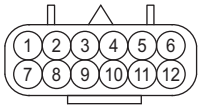
NO	P	C	J
1	139	P	CN70-28
2	14	W-G	J12

CN69:CHG SW BOX



TAB

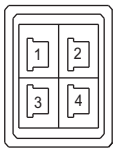
NO	P	C	J
1	132	-	CHGMS
2	129	-	CHGAC
3	130	-	CHGGND
4	128	-	CHG7V
5	121	-	SW3
6	122	-	SW2
7	123	-	SW1
8	124	-	LED4
9	125	-	LED3
10	126	-	LED2
11	127	-	LED1
12	-	-	-



REC

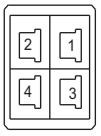
NO	P	C	J
1	132	G-W	CN70-33
2	129	G-R	CN70-25
3	130	BR	CN70-2
4	128	R	CN70-1
5	121	G	CN70-24
6	122	Y	CN70-23
7	123	O	CN70-22
8	124	Y-P	CN70-32
9	125	Y-G	CN70-29
10	126	Y-B	CN70-30
11	127	Y-R	CN70-31
12	-	-	-

CN61:TRANS



TAB

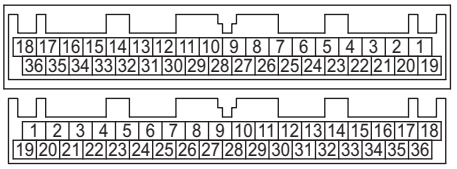
NO	P	C	J
1	U	W	THR
2	V	R	THR
3	-	-	-
4	W	B	THR



REC

NO	P	C	J
1	U	-	TRANS
2	V	-	TRANS
3	-	-	-
4	W	-	TRANS

CN70:DISPLAY



TAB

NO	P	C	J
1	128	-	CHG7V
2	130	-	CHGND
3	169	-	TGND
4	14	-	DGND
5	16	-	D7V
6	162	-	ITKY3
7	-	-	-
8	160	-	ITKY1
9	166	-	OTKY3
10	165	-	OTKY2
11	164	-	OTKY1
12	167	-	LEDTKY1
13	-	-	-
14	-	-	-
15	146	-	CAN1L
16	145	-	CAN1H
17	-	-	-
18	43	-	48V
19	168	-	LEDTKY2
20	161	-	ITKY2
21	163	-	IPSTKY1
22	123	-	SW1
23	122	-	SW2
24	121	-	SW3
25	129	-	CHGAC
26	140	-	SLLT
27	-	-	-
28	139	-	SWTT
29	125	-	LED3
30	126	-	LED2
31	127	-	LED1
32	124	-	LED4
33	132	-	CHGMS
34	-	-	-
35	-	-	-
36	N2	-	GND

REC

NO	P	C	J
1	128	R	CN69-4
2	130	BR	CN69-3
3	169	GR-R	CN33-7
4	14	W-G	J12
5	16	Y-B	CN103-14
6	162	G	CN33-3
7	-	-	-
8	160	B-Y	CN33-1
9	166	GR-L	CN33-9
10	165	R-Y	CN33-4
11	164	L-O	CN33-8
12	167	G-Y	CN33-5
13	-	-	-
14	-	-	-
15	146	W-L	CN201-7
16	145	L-R	CN201-10
17	-	-	-
18	43	B-Y	J18
19	168	L-B	CN33-10
20	161	R-B	CN33-2
21	163	W-L	CN33-6
22	123	O	CN69-7
23	122	Y	CN69-6
24	121	G	CN69-5
25	129	G-R	CN69-2
26	140	V-Y	CN35-1
27	-	-	-
28	139	P	CN68-1
29	125	Y-G	CN69-9
30	126	Y-B	CN69-10
31	127	Y-R	CN69-11
32	124	Y-P	CN69-8
33	132	G-W	CN69-1
34	-	-	-
35	-	-	-
36	N2	W-B	J25

CN73:WORK SW



TAB

NO	P	C	J
1	107	-	SW-
2	101	-	SW+



REC

NO	P	C	J
1	107	R-B	J33
2	101	GR	J28

CN75:RR WORK PILOT



TAB

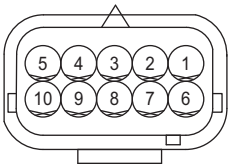
NO	P	C	J
1	107	-	RR WORK PILOT+
2	N2	-	RR WORK PILOT-



REC

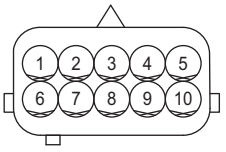
NO	P	C	J
1	107	R-B	J33
2	N2	W-B	J25

CN76:HOOD1



TAB

NO	P	C	J
1	29	R-Y	CN101-28
2	22	R-W	CN102-23
3	51	GR	J4
4	23	R-L	CN102-22
5	24	R-B	CN102-21
6	25	P-L	CN102-20
7	26	P-B	CN102-29
8	31	P-G	CN101-30
9	27	L-Y	CN102-28
10	30	R-G	CN101-29

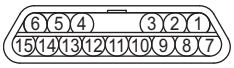


REC

NO	P	C	J
1	29	R-Y	CN163-4
2	22	R-W	CN163-3
3	51	GR	J8
4	23	R-L	CN163-2
5	24	R-B	CN164-3
6	25	P-L	CN164-2
7	26	P-B	CN165-3
8	31	P-G	CN165-4
9	27	L-Y	CN165-2
10	30	R-G	CN164-4

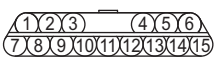
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CN77:HOOD2



TAB

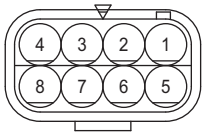
NO	P	C	J
1	43	B-Y	J18
2	43	B-Y	J18
3	119	Y-R	CN24-1
4	21	V-G	CN103-18
5	20	V-R	CN103-26
6	28	V-W	CN101-25
7	60	P-L	CN104-15
8	68	B-R	CN104-28
9	67	L-O	CN104-18
10	221	R-B	CN103-25
11	45	GR-R	CN104-26
12	46	B-O	CN104-19
13	51	BR	J10
14	103	R-W	CN23-1
15	70	B-L	CN103-32



REC

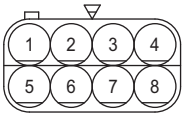
NO	P	C	J
1	43	B-Y	CN166-8
2	43	B-Y	CN166-7
3	119	Y-R	CN166-3
4	21	V-G	CN162-2
5	20	V-R	CN162-3
6	28	V-W	CN162-4
7	60	P-L	J17
8	68	B-R	CN160-3
9	67	L-O	CN168-2
10	221	R-B	CN167-2
11	45	GR-R	CN166-5
12	46	B-O	CN166-4
13	51	BR	J11
14	103	R-W	CN166-2
15	70	B-L	J16

CN78:C/V PULL SOL



TAB

NO	P	C	J
1	10	B-Y	CN101-17
2	33	W-G	CN101-12
3	36	W-R	CN101-10
4	39	Y-B	CN101-14
5	9	G-W	J6
6	32	L	J7
7	32	L	J7
8	9	G-W	J6



REC

NO	P	C	J
1	10	-	SLPL-
2	33	-	STPL-
3	36	-	SA1PL-
4	39	-	SA2PL-
5	9	-	SLLA2+
6	32	-	SLTA1+
7	32	-	SLTA1+
8	9	-	SLLA2+

CN85:NTRL TILT SW



TAB

NO	P	C	J
1	51	BR	J10
2	70	B-L	CN103-32



REC

NO	P	C	J
1	51	-	LS-
2	70	-	STK

CN86:TILT ANGLE SSR



TAB

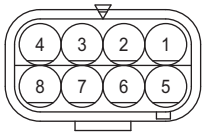
NO	P	C	J
1	57	-	VRTA+
2	56	-	VRTA
3	51	-	POT-



REC

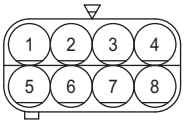
NO	P	C	J
1	57	L-Y	CN101-20
2	56	Y-R	CN103-17
3	51	G	J1

CN87:C/V PUSH SOL



TAB

NO	P	C	J
1	11	B-W	CN101-16
2	34	W-L	CN101-13
3	37	G-B	CN101-11
4	40	B-R	CN101-15
5	9	G-W	J6
6	32	L	J7
7	32	L	J7
8	9	G-W	J6



REC

NO	P	C	J
1	11	-	SLPS-
2	34	-	STPS-
3	37	-	SA1PS-
4	40	-	SA2PS-
5	9	-	SLLA2+
6	32	-	SLTA1+
7	32	-	SLTA1+
8	9	-	SLLA2+

CN88:LIFT SOL



TAB

NO	P	C	J
1	4	B-Y	CN102-16
2	3	V	CN101-1



REC

NO	P	C	J
1	4	-	SLLL-
2	3	-	SOLLU+

CN89:TILT SOL



TAB

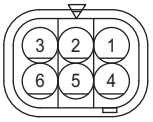
NO	P	C	J
1	7	W	CN102-19
2	6	Y-R	CN101-2



REC

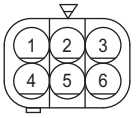
NO	P	C	J
1	7	-	SLTFL-
2	6	-	SLTFB+

CN90:MAST



TAB

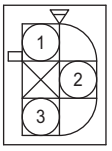
NO	P	C	J
1	51	G	CN93-1
2	220	R-W	CN93-3
3	90	L	CN92-2
4	51	BR	CN92-1
5	91	L-B	CN92-3
6	219	BR-Y	CN93-2



REC

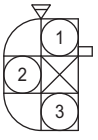
NO	P	C	J
1	51	G	J1
2	220	R-W	CN103-28
3	90	R	CN104-22
4	51	B	J9
5	91	W	CN103-24
6	219	BR-Y	CN101-24

CN91:PRESS SSR



TAB

NO	P	C	J
1	58	-	SPLF+
2	59	-	SPLF
3	51	-	POT-



REC

NO	P	C	J
1	58	Y-R	CN104-12
2	59	Y-G	CN103-29
3	51	G	J1

CN92:HEIGHT SW



TAB

NO	P	C	J
1	51	BR	CN90-4
2	90	L	CN90-3
3	91	L-B	CN90-5



REC

NO	P	C	J
1	51	-	LS-
2	90	-	SH1
3	91	-	SH2-1

CN93:HS SSR



TAB

NO	P	C	J
1	51	-	POT-
2	219	-	VRH+
3	220	-	VRH
4	-	-	-



REC

NO	P	C	J
1	51	G	CN90-1
2	219	BR-Y	CN90-6
3	220	R-W	CN90-2
4	-	-	-

CN94:RR LWR



TAB

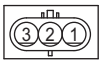
NO	P	C	J
1	51	GR	CN97-1
2	317	L-R	CN97-2
3	316	L-W	CN97-3



REC

NO	P	C	J
1	51	GR	J3,J4
2	317	L-R	CN102-31
3	316	L-W	CN101-23

CN97:TIRE ANGLE SSR



TAB

NO	P	C	J
1	51	-	POT-
2	317	-	VRTRA
3	316	-	VRTRA+



REC

NO	P	C	J
1	51	GR	CN94-1
2	317	L-R	CN94-2
3	316	L-W	CN94-3

CN98:STEERING SOL



TAB

NO	P	C	J
1	330	-	SLS-
2	329	-	SLS+



REC

NO	P	C	J
1	330	W-L	CN102-14
2	329	R	CN102-7

CN113:INV FAN



TAB

NO	P	C	J
1	1	-	FAN+
2	98	-	FNDC



REC

NO	P	C	J
1	1	B-W	J23,CN128-3
2	98	V-Y	J21,CN128-10

CN114:CHG FAN



TAB

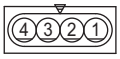
NO	P	C	J
1	1	-	CBAT+
2	98	-	FNDC



REC

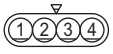
NO	P	C	J
1	1	B-W	J23,CN128-4
2	98	V-Y	J21,CN128-8

CN115:LIFT LVR



TAB

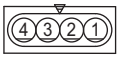
NO	P	C	J
1	51	-	POT-
2	20	-	VRL1
3	21	-	VRL2
4	28	-	VRL+



REC

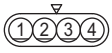
NO	P	C	J
1	51	GR	J3
2	20	V-R	CN103-26
3	21	V-G	CN103-18
4	28	V-W	CN101-25

CN116:TILT LVR



TAB

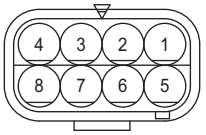
NO	P	C	J
1	51	-	POT-
2	22	-	VRT1
3	23	-	VRT2
4	29	-	VRT+



REC

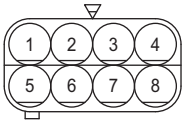
NO	P	C	J
1	51	GR	J3
2	22	R-W	CN102-23
3	23	R-L	CN102-22
4	29	R-Y	CN101-28

CN117:COWL



TAB

NO	P	C	J
1	-	-	-
2	24	R-B	CN102-21
3	30	R-G	CN101-29
4	25	P-L	CN102-20
5	51	GR	J3
6	26	P-B	CN102-29
7	31	P-G	CN101-30
8	27	L-Y	CN102-28



REC

NO	P	C	J
1	-	-	-
2	24	R-B	CN119-2
3	30	R-G	CN119-4
4	25	P-L	CN119-3
5	51	GR	J15
6	26	P-B	CN120-2
7	31	P-G	CN120-4
8	27	L-Y	CN120-3

CN118:HL SW



TAB

NO	P	C	J
1	51	-	SHL-
2	221	-	SHL+

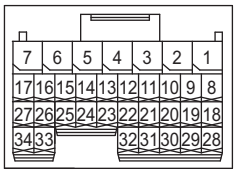


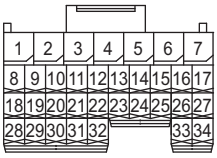
REC

NO	P	C	J
1	51	BR	J10
2	221	R-B	CN103-25

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CN101:CPU1(48V)





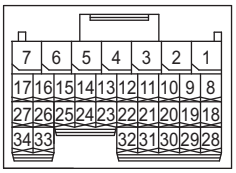
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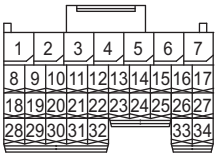
NO	P	C	J
1	3	-	SOLLU+
2	6	-	SLTFB+
3	97	-	FAN+
4	41	-	VBBT
5	9	-	SLLA2+
6	32	-	SLTA1+
7	-	-	-
8	-	-	-
9	-	-	-
10	36	-	SA1PL-
11	37	-	SA1PS-
12	33	-	STPL-
13	34	-	STPS-
14	39	-	SA2PL-
15	40	-	SA2PS-
16	11	-	SLPS-
17	10	-	SLPL-
18	-	-	-
19	43	-	VBKY
20	57	-	VRTA+
21	-	-	-
22	50	-	VRA-
23	316	-	VRTRA+
24	219	-	VRH+
25	28	-	VRL+
26	55	-	VRA2+
27	53	-	VRA1+
28	29	-	VRT+
29	30	-	VRAT1+
30	31	-	VRAT2+
31	-	-	-
32	51	-	POT-
33	74	-	VRB2+
34	72	-	VRB1+

REC

NO	P	C	J
1	3	V	CN88-2
2	6	Y-R	CN89-2
3	97	R-W	CN127-2
4	41	G	J19
5	9	G-W	J6
6	32	L	J7
7	-	-	-
8	-	-	-
9	-	-	-
10	36	W-R	CN78-3
11	37	G-B	CN87-3
12	33	W-G	CN78-2
13	34	W-L	CN87-2
14	39	Y-B	CN78-4
15	40	B-R	CN87-4
16	11	B-W	CN87-1
17	10	B-Y	CN78-1
18	-	-	-
19	43	B-Y	J18
20	57	L-Y	CN86-1
21	-	-	-
22	50	B-O	J2
23	316	L-W	CN94-3
24	219	BR-Y	CN90-6
25	28	V-W	CN77-6,CN115-4
26	55	GR-R	CN26-1
27	53	BR-W	CN26-5
28	29	R-Y	CN76-1,CN116-4
29	30	R-G	CN76-10,CN117-3
30	31	P-G	CN76-8,CN117-7
31	-	-	-
32	51	G	CN26-2,J1
33	74	BR-R	CN6-5
34	72	L-O	CN6-1

CN101:CPU1(80V)





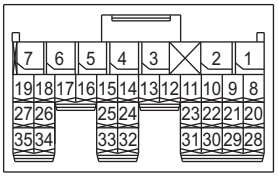
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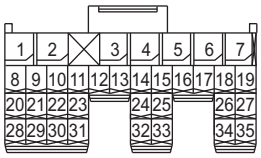
NO	P	C	J
1	3	-	SOLLU+
2	6	-	SLTFB+
3	97	-	FAN+
4	41	-	VBBT
5	9	-	SLLA2+
6	32	-	SLTA1+
7	-	-	-
8	-	-	-
9	-	-	-
10	36	-	SA1PL-
11	37	-	SA1PS-
12	33	-	STPL-
13	34	-	STPS-
14	39	-	SA2PL-
15	40	-	SA2PS-
16	11	-	SLPS-
17	10	-	SLPL-
18	99	-	VBBA
19	43	-	VBMB
20	57	-	VRTA+
21	-	-	-
22	50	-	VRA-
23	316	-	VRTRA+
24	219	-	VRH+
25	28	-	VRL+
26	55	-	VRA2+
27	53	-	VRA1+
28	29	-	VRT+
29	30	-	VRAT1+
30	31	-	VRAT2+
31	-	-	-
32	51	-	POT-
33	74	-	VRB2+
34	72	-	VRB1+

REC

NO	P	C	J
1	3	V	CN88-2
2	6	Y-R	CN89-2
3	97	R-W	CN127-2
4	41	G	J19
5	9	G-W	J6
6	32	L	J7
7	-	-	-
8	-	-	-
9	-	-	-
10	36	W-R	CN78-3
11	37	G-B	CN87-3
12	33	W-G	CN78-2
13	34	W-L	CN87-2
14	39	Y-B	CN78-4
15	40	B-R	CN87-4
16	11	B-W	CN87-1
17	10	B-Y	CN78-1
18	99	V-Y	CN128-9
19	43	B-Y	J18
20	57	L-Y	CN86-1
21	-	-	-
22	50	B-O	J2
23	316	L-W	CN94-3
24	219	BR-Y	CN90-6
25	28	V-W	CN77-6,CN115-4
26	55	GR-R	CN26-1
27	53	BR-W	CN26-5
28	29	R-Y	CN76-1,CN116-4
29	30	R-G	CN76-10,CN117-3
30	31	P-G	CN76-8,CN117-7
31	-	-	-
32	51	G	CN26-2,J1
33	74	BR-R	CN6-5
34	72	L-O	CN6-1

CN102:CPU2





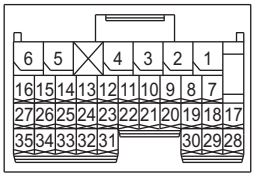
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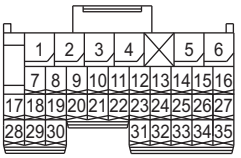
NO	P	C	J
1	-	-	-
2	-	-	-
3	19	-	VBMBSL
4	19	-	VBMBSL
5	17	-	SOLCOM
6	17	-	SOLCOM
7	329	-	SLS+
8	-	-	-
9	-	-	-
10	51	-	LS-
11	-	-	-
12	-	-	-
13	335	-	RY1
14	330	-	SLS-
15	-	-	-
16	4	-	SLLL-
17	-	-	-
18	-	-	-
19	7	-	SLTFL-
20	25	-	VRA12
21	24	-	VRA11
22	23	-	VRT2
23	22	-	VRT1
24	304	-	CSBAT
25	73	-	VRB2
26	51	-	POT-
27	-	-	-
28	27	-	VRA22
29	26	-	VRA21
30	52	-	VRA1
31	317	-	VRTRA
32	54	-	VRA2
33	71	-	VRB1
34	-	-	-
35	305	-	CSBAT-

REC

NO	P	C	J
1	-	-	-
2	-	-	-
3	19	Y-B	J20
4	19	Y-B	J20
5	17	G-W	J22
6	17	G-W	J22
7	329	R	CN98-2
8	-	-	-
9	-	-	-
10	51	BR	J10
11	-	-	-
12	-	-	-
13	335	LG	CN127-4
14	330	W-L	CN98-1
15	-	-	-
16	4	B-Y	CN88-1
17	-	-	-
18	-	-	-
19	7	W	CN89-1
20	25	P-L	CN76-6,CN117-4
21	24	R-B	CN76-5,CN117-2
22	23	R-L	CN76-4,CN116-3
23	22	R-W	CN76-2,CN116-2
24	304	L-O	CN137-3
25	73	Y-R	CN6-3
26	51	GR	J3,J4
27	-	-	-
28	27	L-Y	CN76-9,CN117-8
29	26	P-B	CN76-7,CN117-6
30	52	BR-R	CN26-4
31	317	L-R	CN94-2
32	54	BR-Y	CN26-3
33	71	Y-B	
34	-	-	-
35	305	B-O	CN137-2

CN103:CPU3





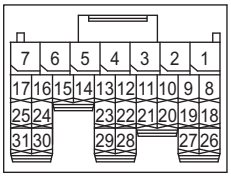
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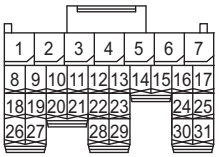
NO	P	C	J
1	-	-	-
2	-	-	-
3	14	-	DGND
4	42	-	KYSAT
5	N2	-	N2
6	51	-	LS-
7	-	-	-
8	300	-	IPL+
9	-	-	-
10	-	-	-
11	145	-	CAN1H
12	146	-	CAN1L
13	311	-	SSTR+
14	16	-	D7V
15	-	-	-
16	-	-	-
17	56	-	VRTA
18	21	-	VRL2
19	302	-	IPL2
20	-	-	-
21	-	-	-
22	-	-	-
23	-	-	-
24	91	-	SH2-1
25	221	-	SHL
26	20	-	VRL1
27	-	-	-
28	220	-	VRH
29	59	-	SPLF
30	301	-	IPL1
31	-	-	-
32	70	-	STK
33	-	-	-
34	-	-	-
35	-	-	-

REC

NO	P	C	J
1	-	-	-
2	-	-	-
3	14	W-G	J12
4	42	R-Y	CN136-7
5	N2	W-B	J14
6	51	B	J9
7	-	-	-
8	300	L-B	CN201-7
9	-	-	-
10	-	-	-
11	145	GR-R	CN201-1
12	146	P-B	CN200-10
13	311	P-L	CN19-1
14	16	Y-B	CN70-5
15	-	-	-
16	-	-	-
17	56	Y-R	CN86-2
18	21	V-G	CN77-4,CN115-3
19	302	V-Y	CN129-2
20	-	-	-
21	-	-	-
22	-	-	-
23	-	-	-
24	91	W	CN90-5
25	221	R-B	CN77-10,CN118-2
26	20	V-R	CN77-5,CN115-2
27	-	-	-
28	220	R-W	CN90-2
29	59	Y-G	CN91-2
30	301	W-L	CN130-2
31	-	-	-
32	70	B-L	CN77-15,CN85-2
33	-	-	-
34	-	-	-
35	-	-	-

CN104:CPU4(48V)





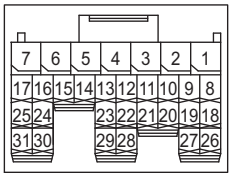
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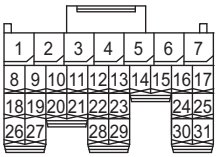
NO	P	C	J
1	41	-	B48V
2	44	-	VBMB
3	1	-	CBAT+
4	N2	-	N2
5	N2	-	N2
6	N2	-	N2
7	-	-	-
8	98	-	FNDC
9	2	-	CBAT-
10	303	-	CSBAT+
11	-	-	-
12	58	-	SPLF+
13	-	-	-
14	334	-	PSACC+
15	60	-	PSSW+
16	-	-	-
17	-	-	-
18	67	-	SDM
19	46	-	DSR
20	66	-	SPB
21	-	-	-
22	90	-	SH1
23	65	-	SWBK
24	314	-	SSTRC
25	-	-	-
26	45	-	DSF
27	-	-	-
28	68	-	SHS
29	-	-	-
30	312	-	SSTR1
31	313	-	SSTR2

REC

NO	P	C	J
1	41	G	J19
2	44	R-B	CN136-5
3	1	B-W	J23
4	N2	W-B	J14
5	N2	W-B	J13
6	N2	W-B	J13
7	-	-	-
8	98	V-Y	J21,CN128-2
9	2	LG-B	CN136-3
10	303	GR-L	CN137-1
11	-	-	-
12	58	Y-R	CN91-1
13	-	-	-
14	334	L-O	CN47-12
15	60	P-L	CN77-7
16	-	-	-
17	-	-	-
18	67	L-O	CN77-9,CN43-2
19	46	B-O	CN77-12,CN10-4,CN9-6
20	66	G-W	CN15-1
21	-	-	-
22	90	R	CN90-3
23	65	Y	CN2-3
24	314	G-Y	CN19-5
25	-	-	-
26	45	GR-R	CN77-11,CN10-5,CN9-5
27	-	-	-
28	68	B-R/P-L	CN77-8,CN11-1
29	-	-	-
30	312	B-Y	CN19-3
31	313	L-W	CN19-4

CN104:CPU4(80V)





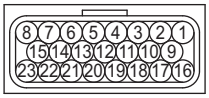
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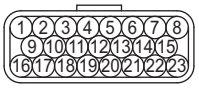
NO	P	C	J
1	18	-	B80V
2	19	-	VBMB
3	1	-	CBAT+
4	N2	-	N2
5	N2	-	N2
6	N2	-	N2
7	-	-	-
8	98	-	FNDC
9	2	-	CBAT-
10	303	-	CSBAT+
11	-	-	-
12	58	-	SPLF+
13	-	-	-
14	334	-	PSACC+
15	60	-	PSSW+
16	-	-	-
17	-	-	-
18	67	-	SDM
19	46	-	DSR
20	66	-	SPB
21	-	-	-
22	90	-	SH1
23	-	-	-
24	314	-	SSTRC
25	-	-	-
26	45	-	DSF
27	-	-	-
28	68	-	SHS
29	-	-	-
30	312	-	SSTR1
31	313	-	SSTR2

REC

NO	P	C	J
1	18	R-B	CN136-5
2	19	Y-B	J20
3	1	B-W	J23
4	N2	W-B	J14
5	N2	W-B	J13
6	N2	W-B	J13
7	-	-	-
8	98	V-Y/B-L	J21,CN128-2
9	2	LG-B	CN136-6
10	303	GR-L	CN137-1
11	-	-	-
12	58	Y-R	CN91-1
13	-	-	-
14	334	L-O	CN47-12
15	60	P-L	CN77-7
16	-	-	-
17	-	-	-
18	67	L-O	CN77-9,CN43-2
19	46	B-O	CN77-12,CN10-4,CN9-6
20	66	G-W	CN15-1
21	-	-	-
22	90	R	CN90-3
23	-	-	-
24	314	G-Y	CN19-5
25	-	-	-
26	45	GR-R	CN77-11,CN10-5,CN7-5
27	-	-	-
28	68	B-R/P-L	CN11-1,CN77-8
29	-	-	-
30	312	B-Y	CN19-3
31	313	L-W	CN19-4

CN110:DRIVE INV LH





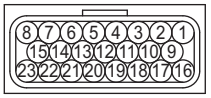
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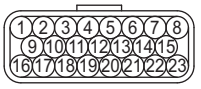
NO	P	C	J
1	-	-	-
2	14	-	CANGND
3	80	-	SSD2
4	79	-	SSD1
5	-	-	-
6	78	-	SSD+
7	-	-	-
8	42	-	KYSAT
9	-	-	-
10	146	-	CAN1L
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	145	-	CAN1H
18	-	-	-
19	-	-	-
20	-	-	-
21	-	-	-
22	87	-	STDM
23	86	-	STDM+

REC

NO	P	C	J
1	-	-	-
2	14	W-G	J12
3	80	LG-R	CN54-1
4	79	LG-B	CN53-1
5	-	-	-
6	78	LG	CN201-5
7	-	-	-
8	42	R-Y	J24
9	-	-	-
10	146	P-G	CN201-8
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	145	GR-G	CN201-11
18	-	-	-
19	-	-	-
20	-	-	-
21	-	-	-
22	87	R-W	CN52-1
23	86	GR-R	CN52-2

CN111:PUMP INV





TAB

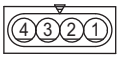
NO	P	C	J
1	-	-	-
2	14	-	CANGND
3	-	-	-
4	82	-	SSP1
5	-	-	-
6	81	-	SSP+
7	-	-	-
8	42	-	KYSAT
9	-	-	-
10	146	-	CAN1L
11	152	-	STEP-
12	152	-	STEP1
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	145	-	CAN1H
18	-	-	-
19	-	-	-
20	-	-	-
21	-	-	-
22	88	-	STPM
23	89	-	STPM+

REC

NO	P	C	J
1	-	-	-
2	14	W-G	J12
3	-	-	-
4	82	R-B	CN56-1
5	-	-	-
6	81	GR-G	CN56-2
7	-	-	-
8	42	R-Y	J24
9	-	-	-
10	146	V	CN200-12
11	152	BR-R	CN111-12
12	152	BR-R	CN111-11
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	145	P	CN200-9
18	-	-	-
19	-	-	-
20	-	-	-
21	-	-	-
22	89	R-W	CN55-1
23	88	GR-R	CN55-2

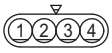
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CN119:ATT1 LVR



TAB

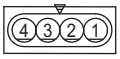
NO	P	C	J
1	51	-	POT-
2	24	-	VRA11
3	25	-	VRA12
4	30	-	VRAT1+



REC

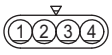
NO	P	C	J
1	51	GR	J15
2	24	R-B	CN117-2
3	25	P-L	CN117-4
4	30	R-G	CN117-3

CN120:ATT2 LVR



TAB

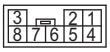
NO	P	C	J
1	51	-	POT-
2	26	-	VRA21
3	27	-	VRA22
4	31	-	VRAT2+



REC

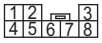
NO	P	C	J
1	51	GR	J15
2	26	P-B	CN117-6
3	27	L-Y	CN117-8
4	31	P-G	CN117-7

CN127:RY1



TAB

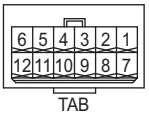
NO	P	C	J
1	-	-	-
2	97	-	FAN+
3	-	-	-
4	335	-	RY1
5	-	-	-
6	19	-	VBMBSL
7	-	-	-
8	17	-	SOLCOM



REC

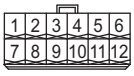
NO	P	C	J
1	-	-	-
2	97	R-W	CN101-3
3	-	-	-
4	335	LG	CN102-13
5	-	-	-
6	19	Y-B	J20
7	-	-	-
8	17	G-W	J22

CN128:FAN RESISTER(3ton)



TAB

NO	P	C	J
1	-	-	-
2	98	-	FNDC
3	1	-	MB+
4	1	-	MB+
5	1	-	MB+
6	-	-	-
7	-	-	-
8	98	-	VBBA
9	99	-	VBBA
10	98	-	VBBA
11	-	-	-
12	-	-	-



REC

NO	P	C	J
1	-	-	-
2	98	B-L	CN104-8
3	1	B-W	CN113-1
4	1	B-W	CN114-1
5	1	B-W	J23
6	-	-	-
7	-	-	-
8	98	V-Y	CN114-2
9	99	V-Y	CN101-18(80V)
10	98	V-Y	CN113-2
11	-	-	-
12	-	-	-

CN129:IMPACT SSR2



TAB

NO	P	C	J
1	51	-	POT-
2	302	-	IPL2
3	300	-	IPL+



REC

NO	P	C	J
1	51	G	J1
2	302	V-Y	CN103-19
3	300	L-B	CN200-5

CN130:IMPACT SSR1



TAB

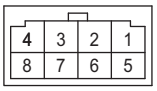
NO	P	C	J
1	51	-	POT-
2	301	-	IPL1
3	300	-	IPL+



REC

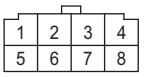
NO	P	C	J
1	51	G	J1
2	301	W-L	CN103-30
3	300	L-B	CN200-6

CN136:CONTACTOR PANEL



TAB

NO	P	C	J
1	101	GR	J28
2	41	G	J19
3	2	LG-B	CN104-9
4	1	B-W	J23
5	44	R-B	CN104-2(48V)
5	18	R-B	CN104-1(80V)
6	19	Y-B	J20
7	42	R-Y	CN103-4
8	42	R-Y	J24



REC

NO	P	C	J
1	101	-	FLP
2	41	-	B48V
3	2	-	CBAT-
4	1	-	CBAT+
5	44	-	VBMB(48V)
5	18	-	VBMB(80V)
6	19	-	VBMBSL
7	42	-	KYSAT
8	42	-	KYSAT

CN137:CURRENT SSR



TAB

NO	P	C	J
1	303	-	CSBAT+
2	305	-	CSBAT-
3	304	-	CSBAT



REC

NO	P	C	J
1	303	GR-L	CN104-10
2	305	B-O	CN102-35
3	304	L-O	CN102-24

CN141:CONTACTOR PANEL(3ton)



TAB

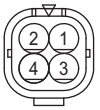
NO	P	C	J
1	PO	-	+48V
2	PO	-	+48V



REC

NO	P	C	J
1	PO	B	PO
2	PO	B	PO

CN144:DC/DC



TAB

NO	P	C	J
1	233	-	IN-
2	232	-	IN+
3	235	-	OUT-
4	234	-	OUT+



REC

NO	P	C	J
1	233	W-R	N2
2	232	L-R	CN145-2
3	235	B	OV
4	234	R-W	CN145-3

CN145:F8&F9 FUSE



TAB

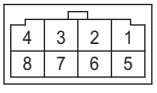
NO	P	C	J
1	231	-	F8
2	232	-	F8
3	234	-	F9
4	236	-	F9



REC

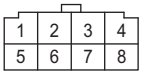
NO	P	C	J
1	231	Y-R	P2
2	232	L-R	CN144-2
3	234	R-W	CN144-4
4	236	R	12V

CN150:WIPER SW



TAB

NO	P	C	J
1	185	R-L	SW+
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-
7	188	R	SW-
8	-	-	-



REC

NO	P	C	J
1	185	R-L	J35
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-
7	188	R	CN154-2
8	-	-	-

CN154:WIPER MTR



TAB

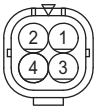
NO	P	C	J
1	-	-	-
2	188	-	+
3	N2	-	N2
4	185	-	+



REC

NO	P	C	J
1	-	-	-
2	188	R	CN150-7
3	N2	W-B	J34
4	185	R-L	J35

CN155:WIPER



TAB

NO	P	C	J
1	187	R-L	-
2	185	R-L	+
3	186	R-L	-
4	187	R-L	+



REC

NO	P	C	J
1	187	R-L	J35
2	185	R-L	CN49-1
3	186	R-L	SW+
4	187	R-L	CN49-1

CN160:LOAD SW



TAB

NO	P	C	J
1	60	-	PSSW+
2	51	-	SLM-
3	68	-	SLM



REC

NO	P	C	J
1	60	P-L	J17
2	51	BR	J11
3	68	B-R	CN77-8

CN161:NTRL TILT SW



TAB

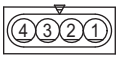
NO	P	C	J
1	60	-	IG
2	51	-	E
3	70	-	P1



REC

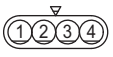
NO	P	C	J
1	60	P-L	J17
2	51	BR	J11
3	70	B-L	J16

CN162:LIFT LVR



TAB

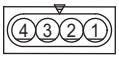
NO	P	C	J
1	51	-	POT-
2	21	-	VRL2
3	20	-	VRL1
4	28	-	VRL+



REC

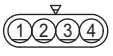
NO	P	C	J
1	51	GR	J8
2	21	V-G	CN77-4
3	20	V-R	CN77-5
4	28	V-W	CN77-6

CN163:TILT LVR



TAB

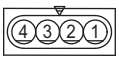
NO	P	C	J
1	51	-	POT-
2	23	-	VRT2
3	22	-	VRT1
4	29	-	VRT+



REC

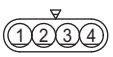
NO	P	C	J
1	51	GR	J8
2	23	R-L	CN76-4
3	22	R-W	CN76-2
4	29	R-Y	CN76-1

CN164:ATT1 LVR



TAB

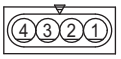
NO	P	C	J
1	51	-	POT-
2	25	-	VRA12
3	24	-	VRA11
4	30	-	VRAT1+



REC

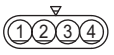
NO	P	C	J
1	51	GR	J8
2	25	P-L	CN76-6
3	24	R-B	CN76-5
4	30	R-G	CN76-10

CN165:ATT2 LVR



TAB

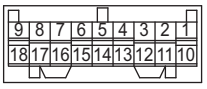
NO	P	C	J
1	51	-	POT-
2	27	-	VRA22
3	26	-	VRA21
4	31	-	VRAT2+



REC

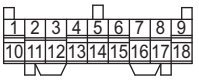
NO	P	C	J
1	51	GR	J8
2	27	L-Y	CN76-9
3	26	P-B	CN76-7
4	31	P-G	CN76-8

CN166:DIRECTION SW(ARMREST)



TAB

NO	P	C	J
1	-	-	-
2	103	-	DSBU
3	119	-	DSFO
4	46	-	DSR
5	45	-	DSF
6	51	-	LS-
7	43	-	VBKY
8	43	-	VBKY
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	-	-	-
18	-	-	-



REC

NO	P	C	J
1	-	-	-
2	103	R-W	CN77-14
3	119	Y-R	CN77-3
4	46	B-O	CN77-12
5	45	GR-R	CN77-11
6	51	BR	J11
7	43	B-Y	CN77-2
8	43	B-Y	CN77-1
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-
17	-	-	-
18	-	-	-

CN167:HS SW



TAB

NO	P	C	J
1	51	-	SHL-
2	221	-	SHL+



REC

NO	P	C	J
1	51	BR	J11
2	221	R-B	CN77-10

CN168:SEAT SW



TAB

NO	P	C	J
1	51	-	SDM-
2	67	-	SDM+



REC

NO	P	C	J
1	51	BR	J11
2	67	L-O	CN77-9

CN169:JOYSTICK SHORT CONNECTOR



TAB

NO	P	C	J
1	-	-	-
2	-	-	-
3	70	B-L	J16



REC

NO	P	C	J
1	-	-	-
2	-	-	-
3	70	B-L	CN160-3

CN170:RR UPR RH



TAB

NO	P	C	J
1	111	R-L	J5
2	104	G-R	J29
3	N2	W-B	J26
4	108	R-Y	J31
5	103	R-W	J30
6	-	-	-



REC

NO	P	C	J
1	111	R-L	CN34-3
2	104	G-R	CN34-1
3	N2	W-B	CN34-6
4	108	R-Y	CN34-5
5	103	R-W	CN34-4
6	-	-	-

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CN171:RR UPR LH



TAB

NO	P	C	J
1	111	R-L	J5
2	104	G-R	J29
3	N2	W-B	J26
4	109	G-Y	J32
5	-	-	-
6	-	-	-



REC

NO	P	C	J
1	111	R-L	CN34-3
2	104	G-R	CN34-1
3	N2	W-B	CN34-6
4	109	R-Y	CN34-5
5	-	-	-
6	-	-	-

CN180:WASHER MTR



TAB

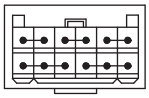
NO	P	C	J
1	N2	-	WSR-
2	189	-	WSR+



REC

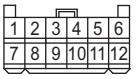
NO	P	C	J
1	N2	W-B	J34
2	189	B-Y	SW-

CN200:CAN J/C1-1



TAB

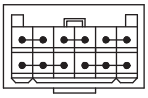
NO	P	C	J



REC

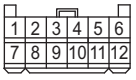
NO	P	C	J
1	78	LG	CN53-2
2	78	LG	CN54-2
3	-	-	-
4	-	-	-
5	300	L-B	CN129-3
6	300	L-B	CN130-3
7	145	GR-R	CN103-11
8	145	R-L	CN47-8
9	145	P	CN111-17
10	146	P-B	CN103-12
11	146	L-Y	CN47-9
12	146	V	CN111-10

CN201:CAN J/C1-2



TAB

NO	P	C	J

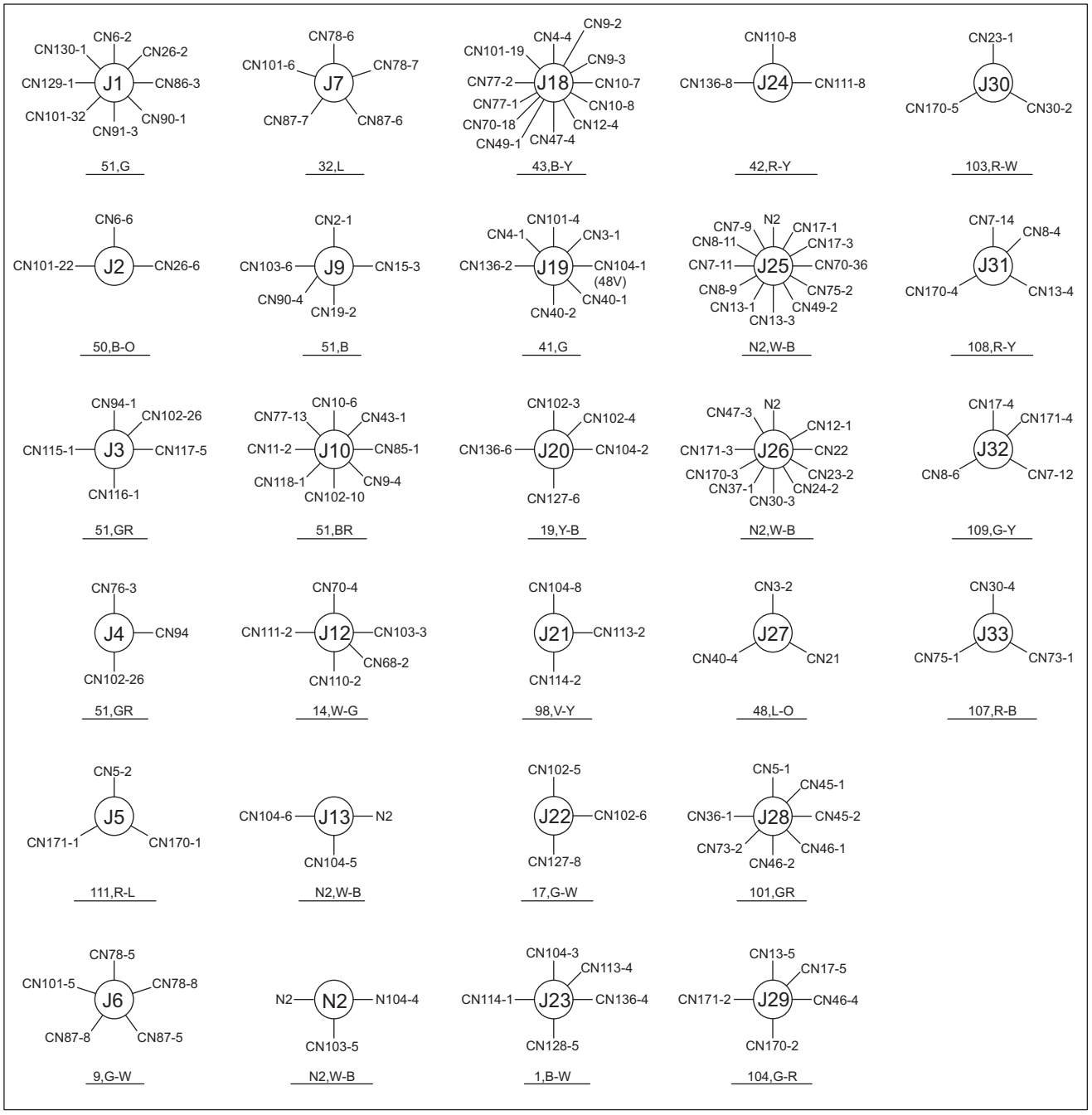


REC

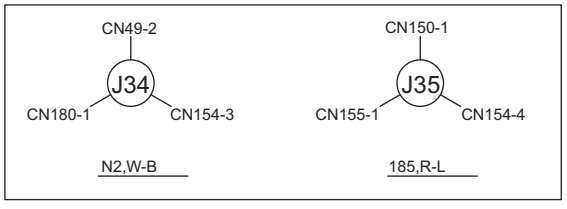
NO	P	C	J
1	300	L-B	CN103-8
2	-	-	-
3	-	-	-
4	-	-	-
5	78	LG	CN110-6
6	-	-	-
7	146	W-L	CN70-15
8	146	P-G	CN110-10
9	-	-	-
10	145	L-R	CN70-16
11	145	GR-G	CN110-17
12	-	-	-

JOINT

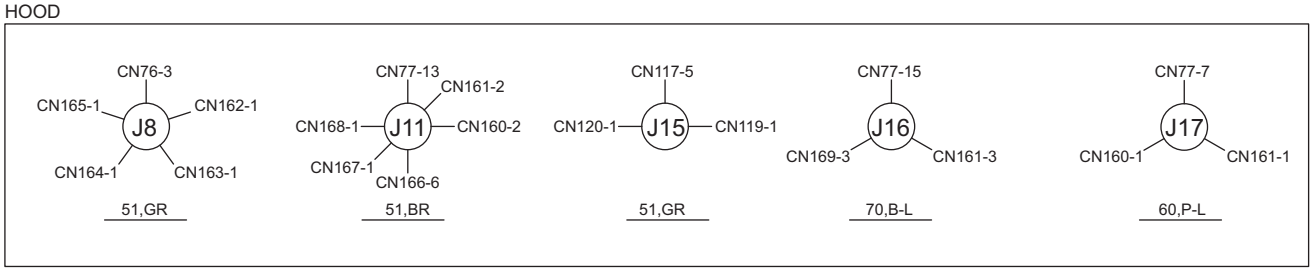
BODY MAIN



WIPER



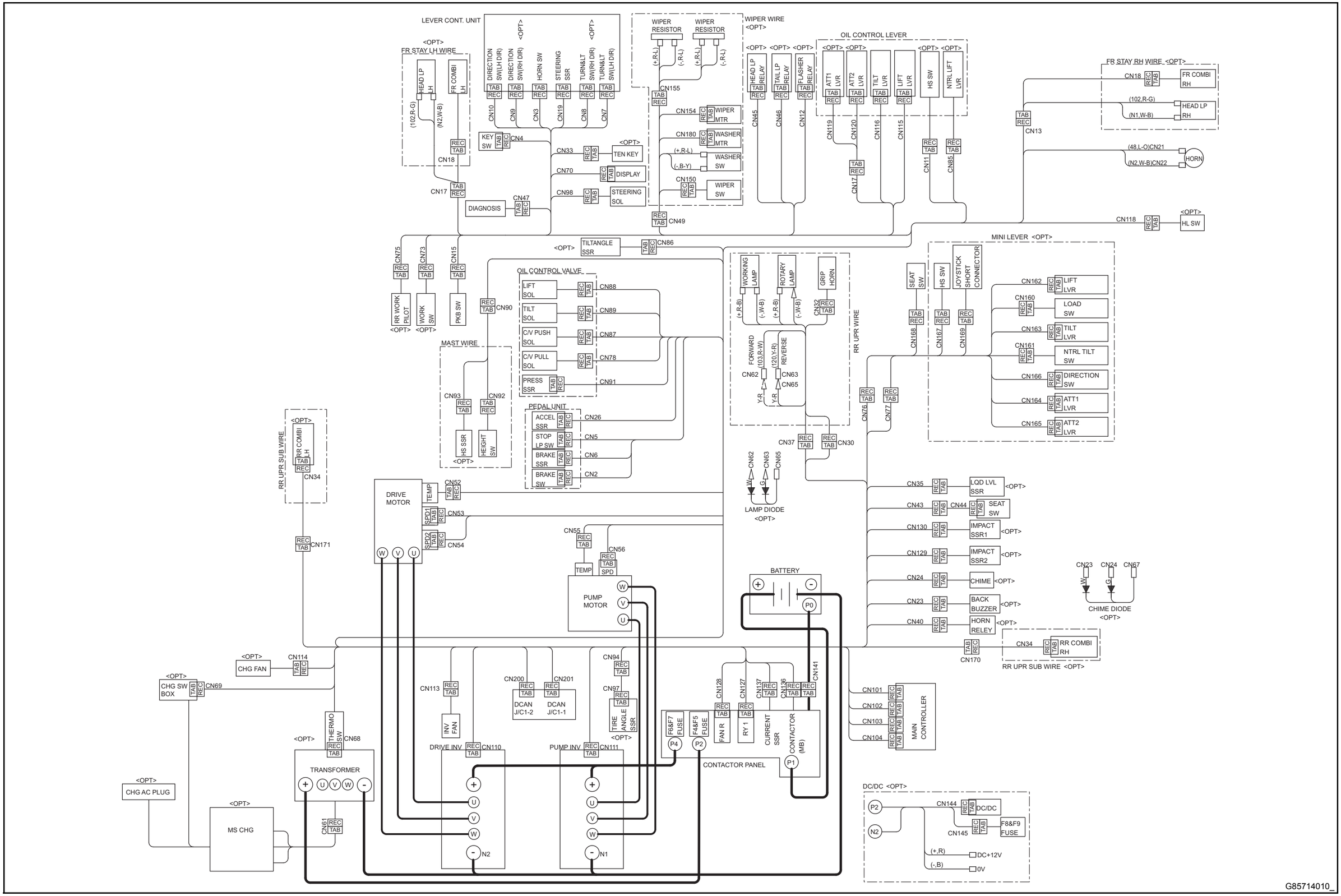
HOOD



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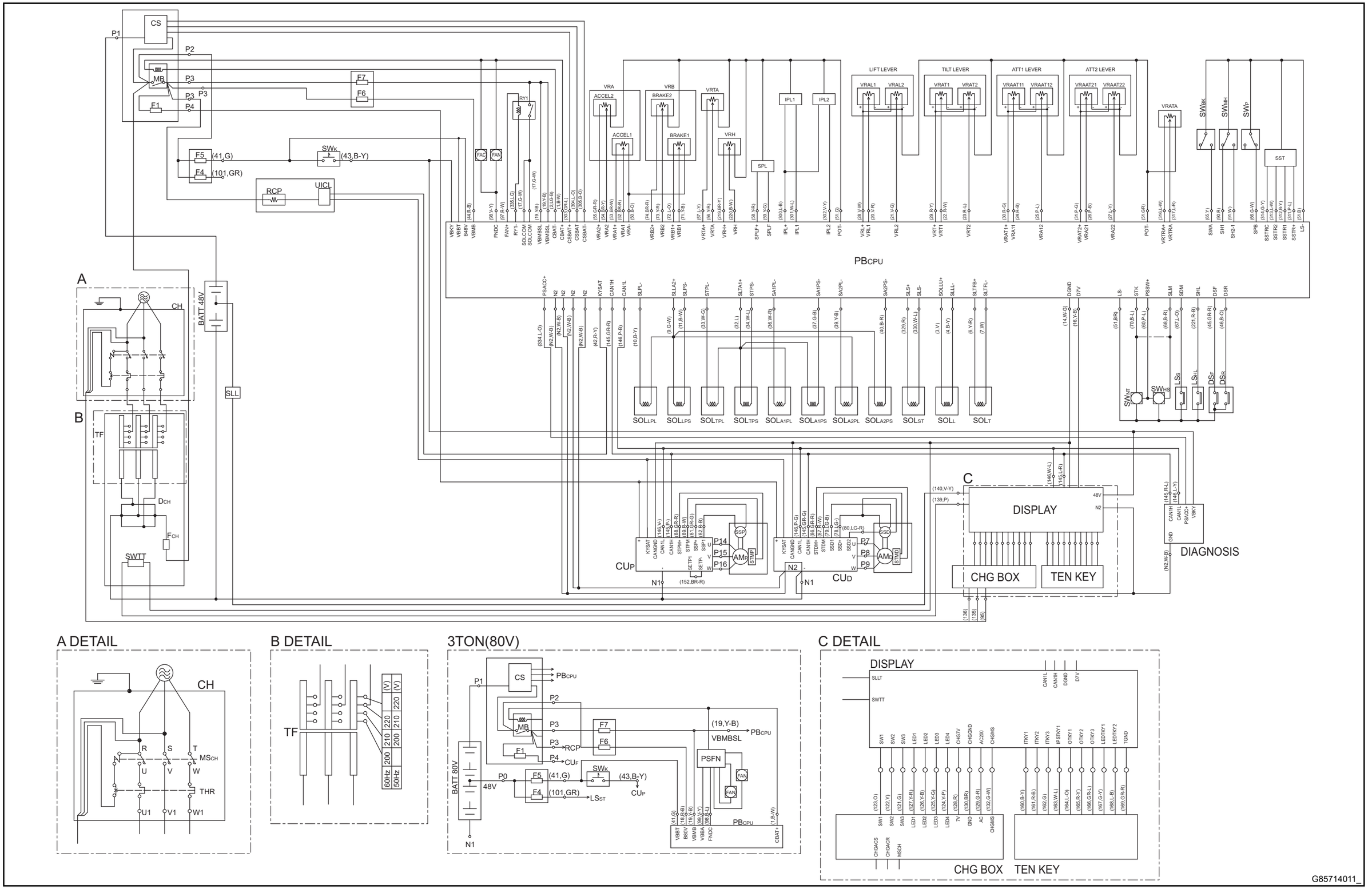
CONNECTING DIAGRAM



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WIRING DIAGRAM

WIRING DIAGRAM No. 1



A DETAIL

B DETAIL

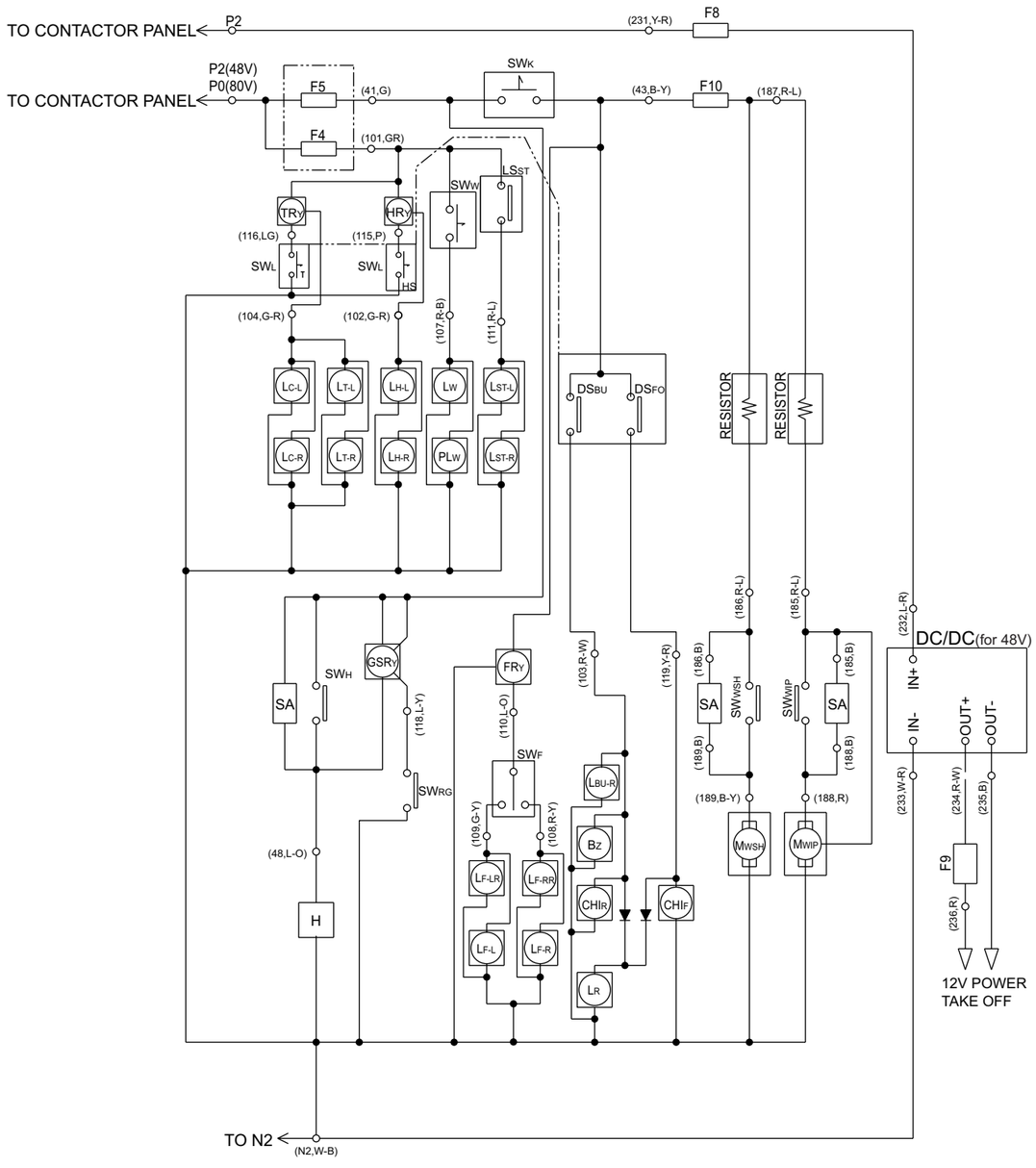
3TON(80V)

C DETAIL

G85714011_

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WIRING DIAGRAM No.2



WIRING DIAGRAM No.3

CH	CHARGER
TF	TRANSFORMER
MSCH	MAGNET SWITCH,CHARGER
DCH	DIODE,CHARGER
FCH	FUSE,CHARGER
SWTT	SWITCH,TRANS,THERMO
BATT	BATTERY
F1	FUSE,DRIVE
F4	FUSE,LAMP
F5	FUSE,CONTROL CIRCUIT
F6	FUSE,CONTROL CIRCUIT
F7	FUSE
AMD	MOTOR,DRIVE
AMP	MOTOR,PUMP
SOLLPL	SOLENOID,LIFT PULL
SOLLPS	SOLENOID,LIFT PUSH
SOLTPL	SOLENOID,TILT PULL
SOLTPS	SOLENOID,TILT PUSH
SOLA1PL	SOLENOID,ATT1 PULL
SOLA1PS	SOLENOID,ATT1 PUSH
SOLA2PL	SOLENOID,ATT2 PULL
SOLA2PS	SOLENOID,ATT2 PUSH
SOLST	SOLENOID,STEERING
SOLL	SOLENOID,LIFT
SOLT	SOLENOID,TILT
VRAL1	VARI-OHM,LIFT,NO.1
VRAL2	VARI-OHM,LIFT,NO.2
VRAT1	VARI-OHM,TILT,NO.1
VRAT2	VARI-OHM,TILT,NO.2
VRAAT11	VARI-OHM,ATTACHMENT1,NO.1
VRAAT12	VARI-OHM,ATTACHMENT1,NO.2
VRAAT21	VARI-OHM,ATTACHMENT2,NO.1
VRAAT22	VARI-OHM,ATTACHMENT2,NO.2
CUD	CONTROL UNIT,DRIVE
CUP	CONTROL UNIT,PUMP
SLL	SENSOR,LIQUID LEVEL
PBCPU	PRINT BOARD,COMPUTER
MB	CONTACTOR,BATTERY
SST	SENSOR,STEERING
SPL	SENSOR,PRESSURE LIFT
IPL1	SENSOR,IMPACT,NO.1
IPL2	SENSOR,IMPACT,NO.2
VRATA	VARI-OHM,TTIRE ANGLE
VRH	VARI-OHM,HEIGHT
VRTA	VARI-OHM,TILT ANGLE
VRB	VARI-OHM,BRAKE
VRA	VARI-OHM,ACCEL
SSP	SENSOR,SPEED,PUMP
SSD	SENSOR,SPEED,DRIVE
STMP	SENSOR,TEMPERATURE PUMP
STDM	SENSOR,TEMPERATURE DRIVE
CS	SENSOR,CURRENT

DSR	DIRECTION SWITCH,REVERSE
DSF	DIRECTION SWITCH,FOWARD
LSHL	LIMIT SWITCH,HEIGHT LIMIT
LSS	LIMIT SWITCH,SEAT
SWBK	SWITCH,BRAKE
SWP	SWITCH,PARKING BRAKE
SWMH	SWITCH,MAST HEIGHT
SWHS	SWITCH,HEIGHT SELECTOR
SWNT	SWITCH,NEUTRAL TILT
SWK	SWITCH,KEY
RCP	RESISTOR,CURRENT PROTECT
UICL	UNIT,INRUSH PROTECT
PSFN	POWER SOURCE,FAN(80V)
DSBU	DIRECTION SWITCH,BACK-UP
DSFO	DIRECTION SWITCH,FOWARD(OPT)
LSST	LIMIT SWITCH,STOP LAMP
SWRG	SWITCH,HORN,REAR ASSIST GRIP
SWH	SWITCH,HORN
SWL	SWITCH,LIGHT
SWF	SWITCH,FLASHER
SWW	SWITCH,WORKING LAMP
SWWIP	SWITCH,WIPER
SWWSH	SWITCH,WASHER
MWIP	MOTOR,WIPER
MWSH	MOTOR,WASHER
PLW	PILOT LAMP,WORKING
LW	LAMP,WORKING
LR	LAMO,ROTARY
CHIF	CHIME,FORWARD
CHIR	CHIME,REVERSE
BZ	BUZZER
DC/DC	DC/DC CONVERTER
LR-R	LAMP,BACK-UP RH
LST-R	LAMP,STOP RH
LST-L	LAMP,STOP LH
LF-R	LAMP,FLASHER RHG
LF-RR	LAMP,FLASHER RH REAR
LF-L	LAMP,FLASHER LH
LF-LR	LAMP,FLASHER LH REAR
LT-R	LAMP,TAIL RH
LT-L	LAMP,TAIL LH
LH-R	LAMP,HEAD RH
LH-L	LAMP,HEAD LH
LC-R	LAMP,CLEARANCE RH
LC-L	LAMP,CLEARANCE LH
H	HORN
SA	SURGE ABSORBER
HRY	RELAY,HEAD LAMP
TRY	RELAY,TAIL LAMP
FRY	RELAY,FLASHER
GSRY	RELAY,GRIP SWITCH

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