



Front 5-reel Fairway mower

LM2700

Service manual

Introduction

This service manual has indicated the data for the procedure of the maintenance, troubleshooting and repair of the 5-front reel mower LM2700.

The content has explained the typical maintenance and repair systematically. Please serve the machine after checking the content of each chapter.

KYOEISYA Incorporated

[PRECAUTION]

- This book has indicated the technical specification as of January 2008.
- The contents of this manual may be modified for improvement without preliminary notice.
- In order to have the safety work at the time of the maintenance and repair, please handle after fully understanding the Operation Manual.
- Please maintain the machine to be fully able to demonstrate and maintain the performance of the machine.
- When you change the parts, please be sure to use the genuine parts or the parts of our specification.
- Responsibility cannot be taken about the fault produced using the other parts.

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Chapter 1

Servicing data

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1. Servicing data

[1] Specifications (this machine)

Model		LM2700
Drive type		4-wheel drive
Dimensions	Total length	290 cm
	Total width	320 cm (when being moved 228 cm)
	Total height	220 cm (handle 150 cm)
	Wheelbase	155 cm
Total weight		1.750 kgf
Speed	2-wheel drive	0 - 22 km/h
	4-wheel drive	0 - 14 km/h
Wheel	Front wheels	26.5x14.00-12
	Rear wheels	20x12.00-10
Engine	Model	KubotaV2203-M Vertical type water-cooled four-cycle diesel
	Number of cylinders	4
	Displacement	2.197 L (2.187 cm ³)
	Rating power output	32.7 kW (44.5 PS) / 2,600 rpm
	Engine RPM	975 - 2,600 rpm (without load) *1
	Fuel consumption (at 2,500 rpm)	250g/kWh (185g/PSh)
Battery		105D31R
Mowing height		8 - 45mm *2
Mowing width		277cm
Reel cutter		9 blades, 66cm x 5 (reel diameter 16.3cm)

*1 Factory setting of the maximum engine rpm is 2,600 rpm.

*2 For 10 mm or less, the optional bed knife is required

[2] Specifications (reel unit)

Number of reel unit: 5	* Share five units, when having no groomer.
Reel dimensions	66cmx5 (reel diameter 16.3cm)
Reel rpm	Approximately 1500 rpm (Max.)
Number of blades	9
Mowing width	Approximately 277 cm
Mowing height	8 - 45mm
Front roller	Roller with slot (ball bearing)
Rear roller	Stick roller (ball bearing)
Groomer	Option 5 blades, thickness 1.2 mm, pitch 25.8 mm (23 blades). Rotation: reel rpm x 1.05
Grass catcher	Option

[3] Specifications (maintenance schedule)

The suitable tools should be used for the required maintenance.

	Before maintenance	Before application	Every 50 hours	Every 100 hours	Every 200 hours	Every 500 hours	Every 6 months
Engine	Inspection of engine oil	○					
	Change of engine oil		○ (Initial time)	○			
	Replace of oil filter		○ (Initial time)	○			
	Cleaning of radiator and oil cooler	○					
	Inspection of coolant	○					
	Inspection and cleaning of air filter	○					
	Replace of air filter element					○	
	Inspection of fan belt	○					
	Inspection of Battery liquid						○
	Replace of fuel filter						○
Main body	Inspection of tires	○					
	Inspection of fuel	○					
	Inspection of hydraulic fluid	○		○ (Initial time)		○	
	Replace of hydraulic fluid			○ (Initial time)		○	
	Replace of oil filter						
	Inspection of brake	○					
	Oil leakage of each part	○					
	Inspection of slack or damage on each part	○					
	Grease up (rear wheel and mower)			○			
	Inspection of grease in the hydraulic motor housing					○	
	Adjustment of the blades on reel cutter	○					

[4] Tightening torque and screw lock application summary

Position		Parts (Parts catalogue number)	Quantity	Tightening torque Nm (Classification)	Remark
Front wheel	Motor housing	K0014160402 (4-8) 16 Heat-treated bolt 40P1.5 (11T)	8	152~188 (8T)	
	Motor	K0013140502 (4-16) 14 Heat-treated bolt 50 (11T)	8	100	
	Wheel fitting	Slotted nut with hydraulic motor (-) 1-1/4-18UNF	2	200	
	Brake disk	K0024080401 (4-5) 8 Bolt with hexagon socket 40	12	28~38	
	Wheel	K0014120652 (4-1) 12 Heat-treated bolt 65P1.5 (11T)	12	67~85	
	Wheel fitting	K0138240002 (5-7) 24 Slotted high nut P1.5	2	180~200	
	Wheel	K0014120652 (4-1) 12 Heat-treated bolt 65P1.5 (11T)	12	67~85	
Front axle	K00152200702 (4-22) 20 Heat-treated bolt 70P1.5 (11T)	4	370~450		
Brake assembly	K1720000190 Accessories (-) 12 Heat-treated bolt P1.75	4	150±15	Screw lock (moderate strength) application	
Engine	K0012120352 (11-13) 12 Heat-treated bolt 35P1.25 (11T)	15	67~134 (8T~11T)		
	K0011100302 (11-29) 10 Heat-treated bolt 30P1.25 (11T)	1	45~76 (8T~11T)		
	K0013121102 (11-20) 12 Heat-treated bolt 110 (11T)	4	67~134 (8T~11T)		
Joining device	K0024100401 (11-7) 10 Bolt with hexagon socket 40	1	80		
	K0010140302 (11-9) 14 Heat-treated bolt 30 (11T)	3	106~188 (8T~11T)		
	K0013100352 (11-8) 10 Heat-treated bolt 35 (11T)	6	45~76 (8T~11T)	Screw lock (moderate strength) application	
Kingpin stopper	K0013120552 (5-23) 12 Heat-treated bolt 55 (11T)	2	Locknut 52~67 (4T)		
Tension bolt:	K1610000020 (-) Slotted nut of the tie rod end right assembly	1	45		
	K1611000020 (-) Slotted nut of the tie rod end left assembly	1	45		

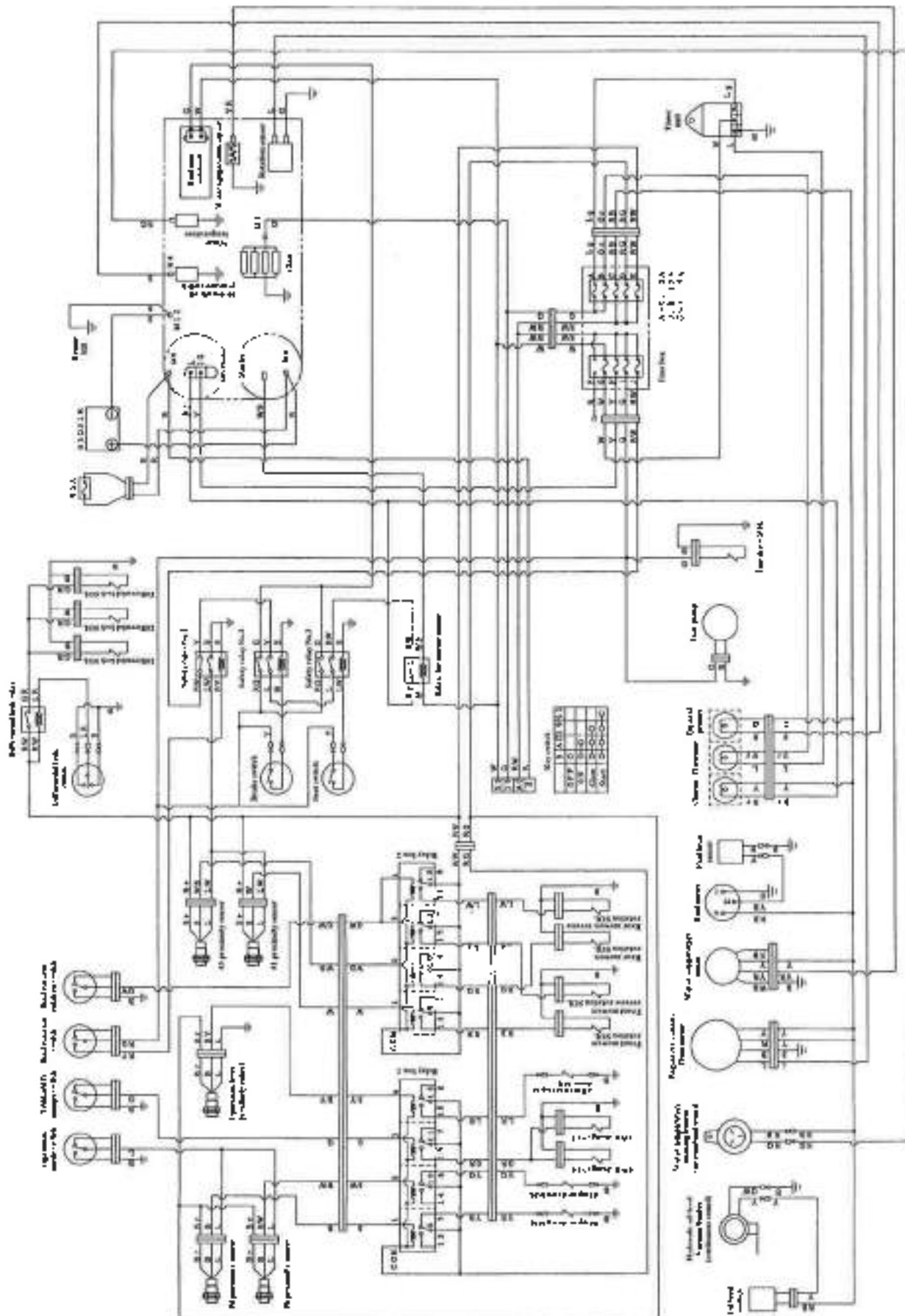
Position	Parts (Parts catalogue number)	Quantity	Tightening torque Nm (Classification)	Remark
Piston pump	K0013120502 (12-15) 12 Heat-treated bolt 50 (11T)	2	67-134 (8T-11T)	
Bed knife	K0071000092 (22-8 others) 10 Heat-treated flat head screw 20	30	29-38 (4T)	
Mower rotation metal	K0011100302 (21-14) 10 Heat-treated bolt 30P1.25 (11T)	2	Locknut 29-38 (4T)	
Pedal stopper	K0010100702 (6-8) 10 Heat-treated bolt 70 (11T)	1	Locknut 29-38 (4T)	
Rotation sensor	K0015120351 (11-13) 12 Heat-treated bolt 35P1.25 (11T)	1	67-134 (8T-11T)	
Gear pump flange	K0024080601 (12-25) 8 Bolt with hexagon socket 60	7	24.5	
	K0024080251 (12-7) 8 Bolt with hexagon socket 25	12	24.5	
Gear pump flange with engine	K0024080251 (15-37) 8 Bolt with hexagon socket 25	2	24.5	
Gear motor flange	Port flange attached bolt (-) 6 Bolt with hexagon socket	8	10.8	
Differential lock valve	K0021100151 (13-17) 10 Bolt with hexagon socket 15	1	29-38 (4T)	

[5] Tightening torque for the general standard screws

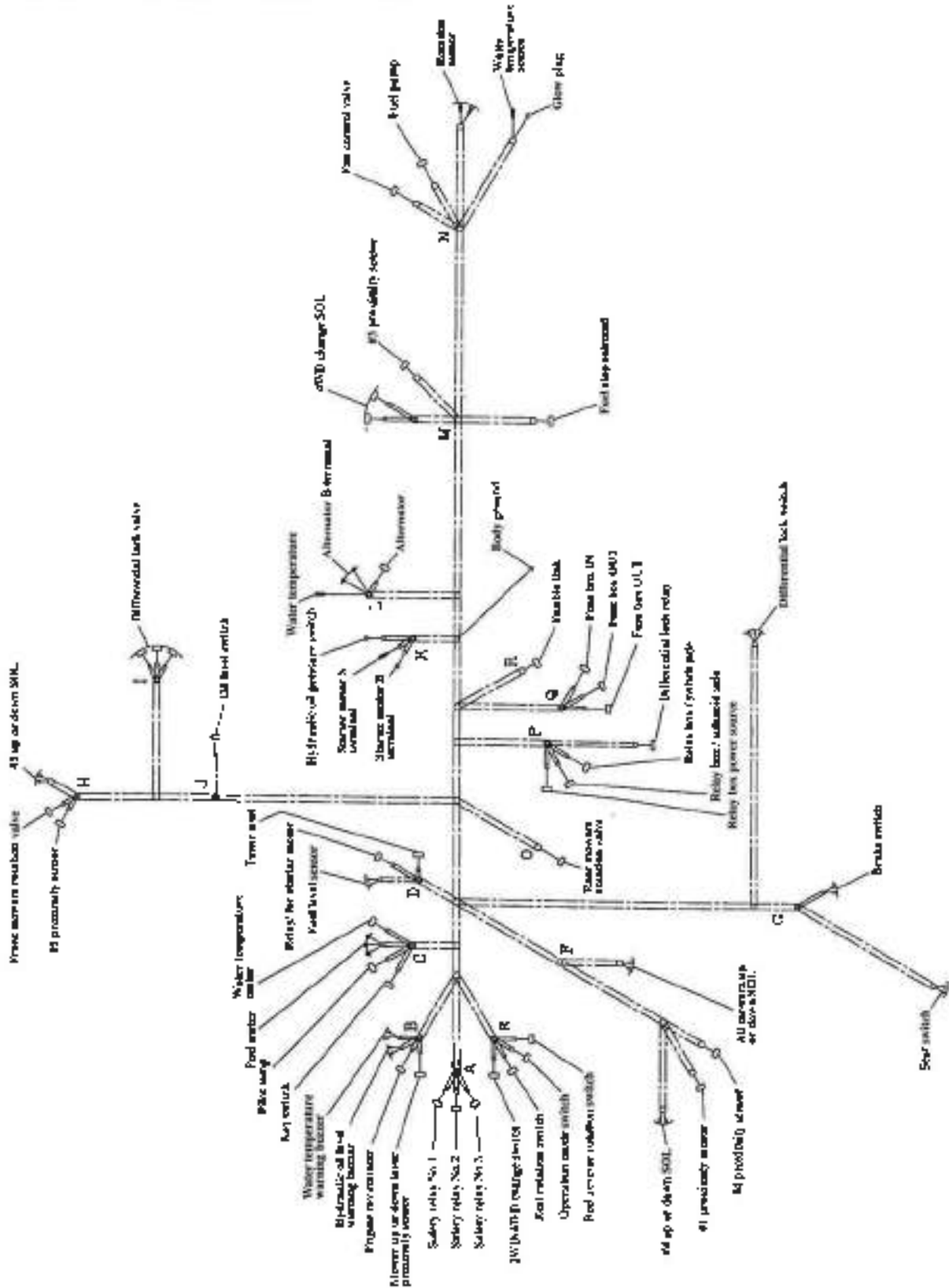
Nominal diameter	General standard bolt Hardness classification 4.8	Heat-treated bolt Hardness classification 10.9
M6	7-9 (70-90)	14-18 (140-180)
M8	14-19 (140-190)	28-38 (280-380)
M10	29-36 (290-380)	58-76 (580-760)
M12	52-67 (520-670)	104-134 (1040-1340)
M14	70-94 (700-940)	140-188 (1400-1880)
M16	88-112 (880-1120)	210-260 (2100-2600)
M18	116-144 (1160-1440)	280-340 (2800-3400)
M20	147-183 (1470-1830)	370-450 (3700-4500)

Proper tightening torque N·m (kg·f·cm)

[6] Wiring diagram

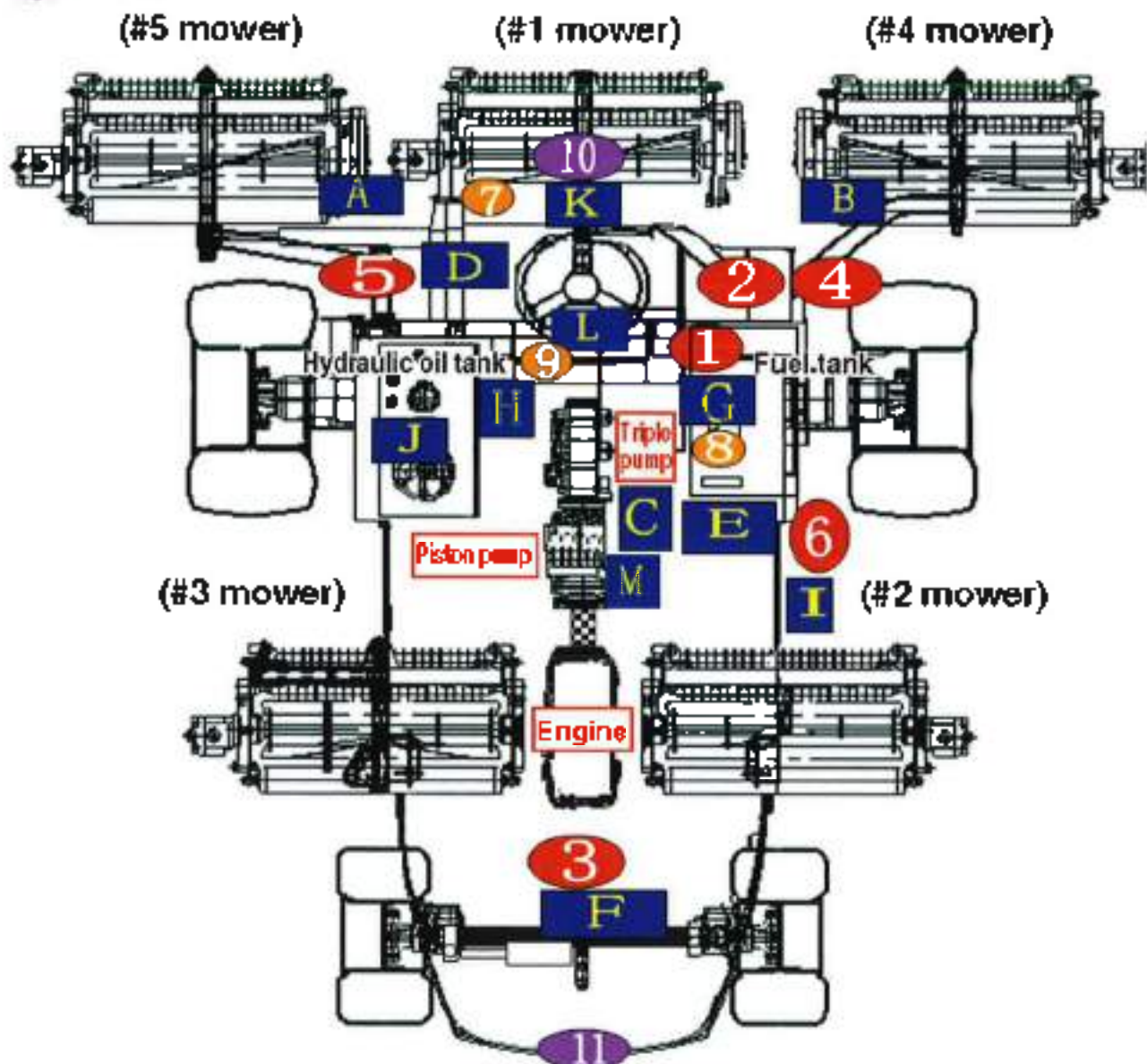


Electrical Wiring Information



[7] LM2700 part plot plan drawing

- (Proximity sensor)
- 1 For prevent on from drop
- 2 #1#4#5 for reel rotation
- 3 #2#3 for reel rotation
- 4 Raise a little
- 5 Raise a little
- 6 Electrical-equipment relay
- (Safety switch)
- 7 Brake pedal
- 8 Reel rotation sw tch
- 9 Inside of the seat
- (Towing position)
- 10 Front towing position (at the flame and the front steering cover removed)
- 11 Rear towing position (at the rear bumper)
- (Electromagnet check valve)
- A #5 Raise a little
- B #4 Raise a little
- C For prevention from drop of all the mower(s)
- (Each parts)
- D #1#4#5 Valve for reel rotation
- E #2#3 Valve for reel rotation
- F Change valve of two-wheel drive or four-wheel drive
- G Vower unit raise/lower valve
- H Cartridge filter
- I Fuel filter
- J Suction filter
- K Orbitrol
- L Differential lock valve
- M Unload valve



Chapter 2

Electrical equipment

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[2] Electrical equipment (this unit section)	2-3

[1] Electrical equipment (engine section)



- Hydraulic pressure switch
- Starter (Starter motor)



- Electromagnet signal generator (engine-speed sensor)



- Thermostat unit (water temperature sensor)



- Solenoid assembly (solenoid for the engine stop)
- V belt (V-belt RPF3400 for water pump, alternator)



- Alternator (regulator built-in)
- Thermostat
- Thermostatic switch (sensor for overheating warning buzzers)

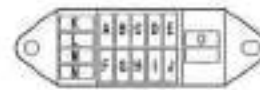
[2] Electrical equipment (this unit section)



- Each relay (wiring diagram 6)
(from Left to Right)
Mower 4 up or down solenoid
Mower 5 up or down solenoid
2WD-4WD change valve
All mowers up or down solenoid
Mowers rotation 1, 4 and 5
Mowers rotation 2 and 3
Mowers reverse rotation 1, 4 and 5
Mowers reverse rotation 2 and 3

- Overheating warning buzzer (upper left, for the radiator)
 - Oil level warning buzzer (upper left, hydraulics oil tank)
 - Reel switch
 - Seat switch
 - Brake switch
 - ① Mower part
 - ② Brake part
 - ③ Seat part
- Starter relay for the engine starting up
- Safety relay (refer to wiring diagram)

- Fuse box



A	5A	Timer
B	5A	Clutch lamp
C	5A	12C sensor, fuel meter, water temperature meter, 12A lamp, hydraulic lamp, water temperature warning buzzer, hydraulic fluid warning buzzer
D	15A	Relay box 1
E	15A	Relay box 2, differential lock
F	-	
G	5A	Timer
H	5A	Alternator
I	5A	Fuel pump, cooling fan solenoid, safety relay, stop sensor
J	5A	Relay (Starter motor)
K	5A	
L	5A	
M	15A	Spare
N	15A	
O		Fuse replacement tool

<Mini blade fuse for vehicles>

- Fusible link (right side of the relay for reel mower)

- Plug-in fuse (50A)

2. Electrical equipment



- Differential lock relay (wing diagram 6)
- Battery (105D31R)



- Starter relay (Starter motor)



- Timer unit (engine, glow plug)



- Oil level switch (hydraulics oil tank)
- If the oil level goes down 13mm (about 2L) from the center of the gauge, it will warn with buzzer sound (continuous sound)



- Fuel gauge (tank unit)
- Full -- 51L
- Residual quantity is 7L with the fuel meter E line



• Fuel pump



• Electromagnet check valve (plot plan drawing C)
(For prevention from drop of the mower #1, #2, #3, #4, #5)



• Electromagnet check valve, for raising the mower a little
(plot plan drawing A) Mower #5
(plot plan drawing B) Mower #4



• Proximity sensor
For prevention from drop of the mower (plot plan drawing 1)



• Proximity sensor
• #1 #4 #5 Reel rotation (plot plan drawing 2)

2. Electrical equipment



- Proximity sensor
#2 #3 Reel rotation (plot plan drawing 3)



- Proximity sensor
To raise the mower #4 a little (plot plan drawing 4)



- Proximity sensor
To raise the mower #5 a little (plot plan drawing 5)

Chapter 3

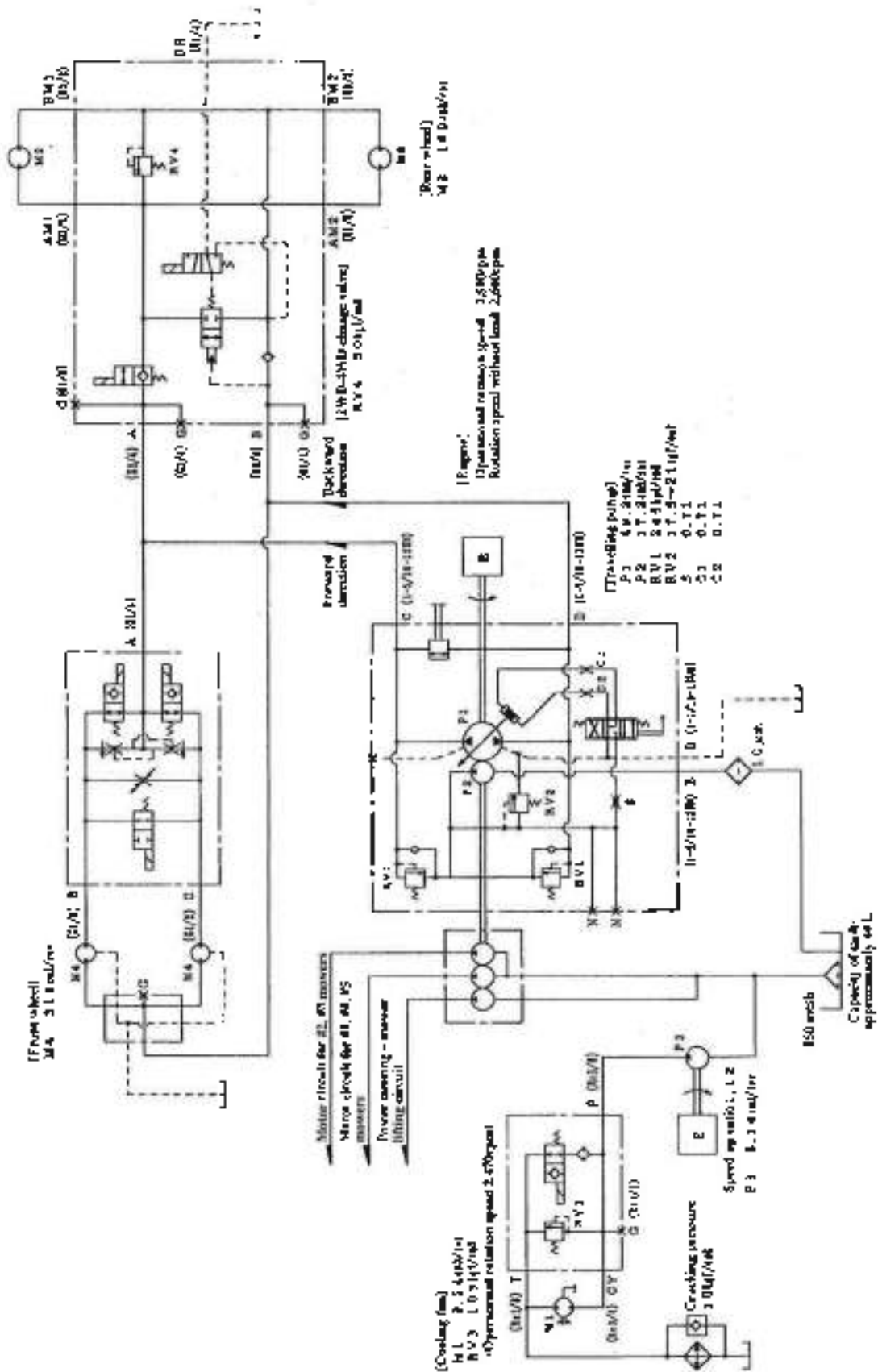
Oil hydraulics (travelling section)

3

- [1] Hydraulic circuit diagram (travelling section, cooling fan section) ... 3-2
- [2] Hydraulic equipment (for travelling) 3-3
- [3] Hydraulic equipment (cooling fan, unload valve)..... 3-6

3. Oil hydraulics (travelling section)

[1] Hydraulic circuit diagram (travelling section, cooling fan section)



[2] Hydraulic equipment (for travelling)



- Hydraulic oil tank
Shell Tellus #46 approximately 44L



- Oil drain plug



- Piston pump for travelling (type 72400)



- Suction filter for gear pump (inside the oil tank)
(Plot plan drawing H)



- For piston pump Cartridge filter
(Plot plan drawing J)

3. Oil hydraulics (travelling section)



- Front wheel motor (4-330)



- Rear wheel motor (2-160)



- Change valve between two-wheel drive and four-wheel drive (V4205) (Plot plan drawing F)
With travelling hydraulic pressure measurement port



- Operate with the switch ON and OFF in the meter panel
(Changing two-wheel drive or four-wheel drive)



- Orbit roll for power steering (Plot plan drawing K)



- Hydraulic cylinder for power steering



- Differential lock valve (V4200) (plot plan drawing L)



- Differential lock switch at steering section
- Shifting the switch to upper or lower to operate, releasing the switch to turn off.

[3] Hydraulic equipment (cooling fan, unload valve)



- Gear motor for cooling fan



- Gear pump for cooling fan
(Left side of the engine)



- Cooling fan valve
(With relief valve)
(With pressure testing port)



- Unload valve
(Travelling is possible)



- Unloading slide (turn 90 degrees) (Plot plan drawing M)
(Release of travelling hydraulic oil pressure)

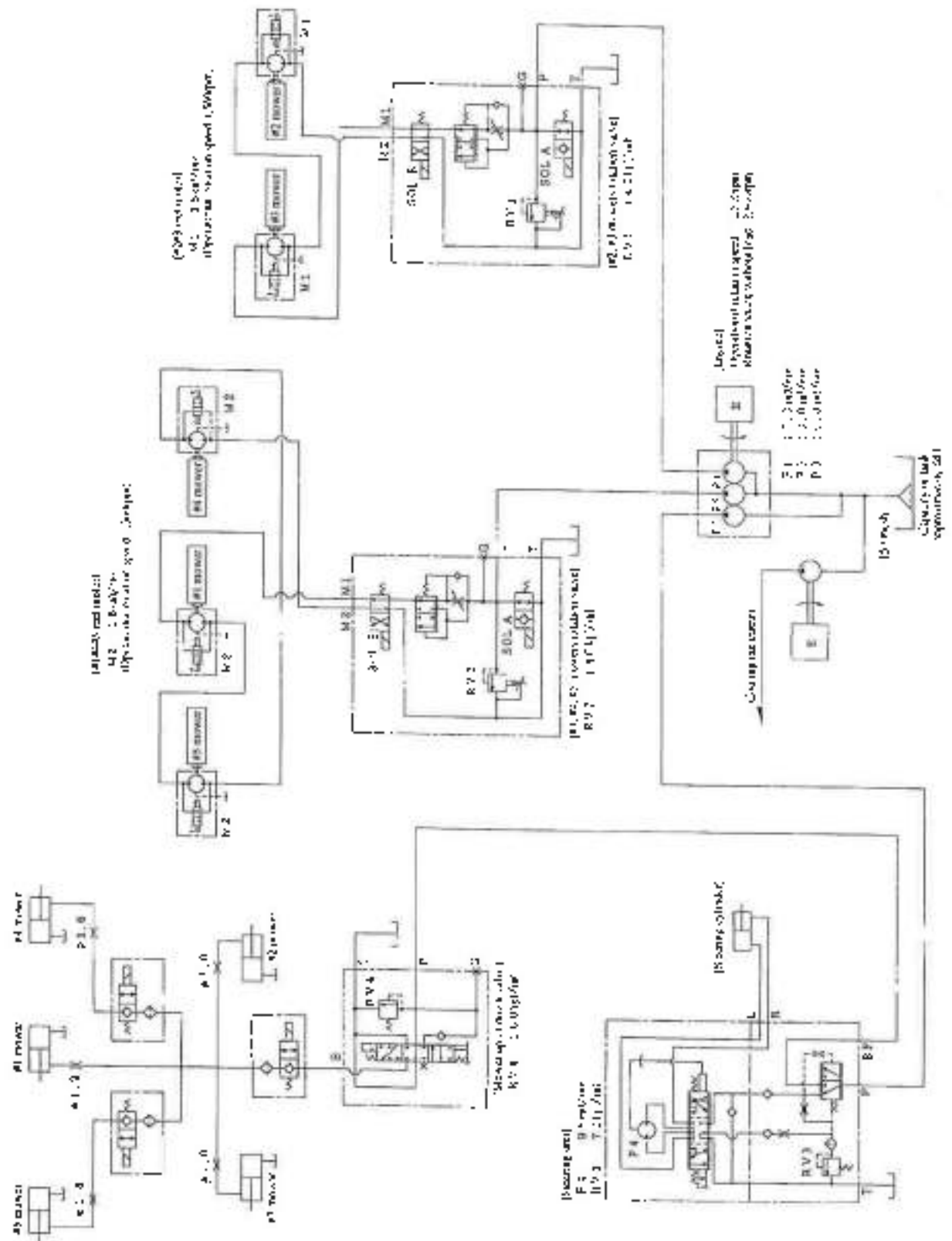
Chapter 4

Oil hydraulics (mower section)

- [1] Hydraulic circuit diagram (mower section, steering section) ... 4-2
- [2] Hydraulic equipment (for mowers) 4-3

4. Oil hydraulics (mower section)

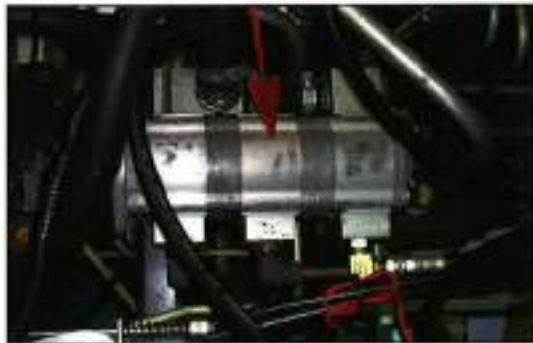
[1] Hydraulic circuit diagram (mower section, steering section)



[2] Hydraulic equipment (for mowers)



- Gear pump (3 sets)
(Seat lower part)
For the mower up-and-down cylinder
For the power steering



- Gear pump (3 sets)
#1 #4 #5 for mower rotation



- Gear pump (3 sets)
#2 #3 for mower rotation



- Solenoid valve (Plot plan drawing D)
{#1 #4 #5 for reel mower }
With hydraulic pressure measurement port
• Lapping rotation adjustment dial



- Solenoid valve (Plot plan drawing E)
{#2 #3 for reel mower }
With hydraulic pressure measurement port
• Lapping rotation adjustment dial

4. Oil hydraulics (mower section)



- Valve for up-and-down operation (Pilot plan drawing G)
Mower unit up-and-down operation



- Reel motor

Chapter 5

Oil hydraulics (measurement)

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- [2] Measurement method of reel motor pressure 5-4
- [3] Measurement method of mower unit lifting pressure 5-5
- [4] Measurement method of radiator fan motor 5-6
- [5] Measurement of piston pump charging pressure 5-7

[1] Measurement method of travelling pump pressure



Forward direction oil pressure meter installation method

Required tools

- Oil pressure meter which can measure more than 30MPa (300kgf/cm²), hydraulic hose



Forward direction pressure measurement port

Remove this closing plug and set an oil pressure meter,
(Forward direction)



Travelling pump



Install the oil pressure meter.



Backward direction pressure measurement port

Required tools

- Oil pressure meter used for the forward direction.

Remove this closing plug and set an oil pressure meter.
(Backward direction)



Install the oil pressure meter.

Measurement method

Attach the oil pressure meter and make the engine rotation 2,000 - 2,500rpm.

Fix the main body

The value is 24.1 MPa (245kgf/cm²) at that time.

Caution

Be sure to check that people are not in the surroundings. Apply parking braking and work safely during the test. (Plot plan drawing F)

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[2] Measurement method of reel motor pressure



Required tools

- Oil pressure meter which can measure more than 20MPa (200kgf/cm²)
- Hydraulic hose

Remove the closing plug and attach the meter as shown in the photo. (Plot plan drawing E)

(This photo shows the rear unit #2 and #3)



Remove the closing plug and attach the meter as shown in the photo. (Plot plan drawing D)

(This photo shows the rear unit: #1, #4 and #5.)



Measurement method

- Attach an oil pressure meter to the measuring port as shown in the photo.
- In order to stop rotation of the reel cutter and to perform measurement at the time of hydraulic pressure measurement, insert a piece of wood in each reel cutter.
- Idle the engine, and turn the reel rotation switch to "ON", then increase the engine speed to 2,000 - 2,500 rpm. It is normal if the pressure at that time is 13.7MPa (140kgf/cm²).

⚠ Caution

Be sure to check that people are not in the surroundings. Apply parking braking and work safely during the test. (Plot plan drawing D)



[3] Measurement method of mower unit lifting pressure



Install the oil pressure meter hose.

Measurement method

Measure by the method as shown in the photograph.

The value is 9.8MPa (100kg/cm²) at that time.

[4] Measurement method of radiator fan motor



Remove the closing plug.



Cooling fan pump



Install the closing plug to the fan gear motor.
(Solenoid side)



Measurement method

Set the oil pressure meter as shown in the photo.

The value is 10.3 MPa (105kgf/cm²) at that time.

Operate the engine at 2,000 - 2,500rpm

Caution

Be sure to check that people are not in the surroundings. Apply parking braking and work safely during the test.

[5] Measurement of piston pump charging pressure**Required tools**

- Oil pressure meter (measuring capability of 1.7-2.1MPa (50kgf/cm²))
- 8mm of hexagon-head wrenches which remove the plug with hole
- Hydraulic hose
- Adapter 1013-6
- Special bushing 3 / 4-16UNFPT1/4



On the left-hand side of the piston pump of the central main body

**Measurement method**

Set the oil pressure meter to the pump as shown in photograph.

Put the engine into operation and run at 2,000-2,500 rpm. It is normal if the value of the oil pressure meter is between 1.7MPa - 2.1MPa (17.5 - 21 kgf/cm²).

Caution

Be sure to check that people are not in the surroundings. Apply parking braking and work safely during the test.

Chapter 6

Piston pump

- [1] Adjustment of the piston pump neutral position for travelling.... 6-2

[1] Adjustment of the piston pump neutral position for travelling



1) Put 2WD-4WD changeover switch into '2WD'.

2) Jack up all the four wheels after warm-up.
(Set the horse jack and the rigid rack)

3) Raise the seat.



4) Make the connection of the seat safety switch in direct coupling

5) Check the surrounding safety and start the engine

6) Step on the forward pedal. ⇨ Release
Step on the backward pedal. ⇨ Release



<Faulty case (when the tire rotates)>

1) Loosen the locknut of the both rod ends at the upper right of the pump.



2) Turn the rod and fasten the locknut of the both ends in the position that the rotation of the tire stops.

3) Step on the pedal after adjustment, and check that the tire on either side stops when you release the pedal.

<Adjustment completed>

• Take down the machine from the horse jack and rigid rack, move forward and backward, and test the neutral position

• Check the bearing part, slack of each support, grease-up, etc

• Spring setting (neutral position)
Adjust the spring length to 5.5cm.

• After the completion of the setting, return the seat safety switch in normal connection.



Chapter 7

Brake

- [1] Removal of the brake part (when the wheel motor is removed) .. 7-2
- [2] Exploded diagram7-4
- [3] Installation of the brake.7-6
- [4] Adjustment of the brake.7-6
- [5] Maintenance of the brake.....7-7
- [6] Replace of the stainless steel ball and cam.....7-8
- [7] Replace of the lining pad assembly7-9

[1] Removal of the brake part (when the wheel motor is removed)



- Removal of the tire after jack up



- Removal of the hexagon headed bolt



- Removal of the brake wire



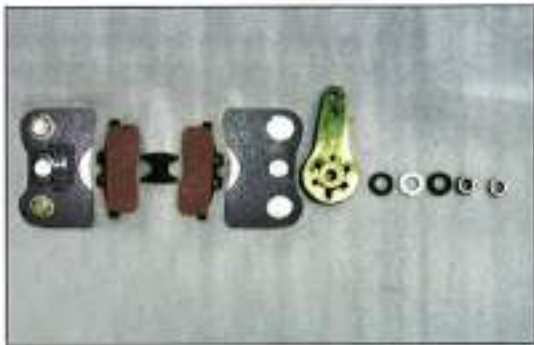
- Removal of the flat spring



- Removal of the brake lever

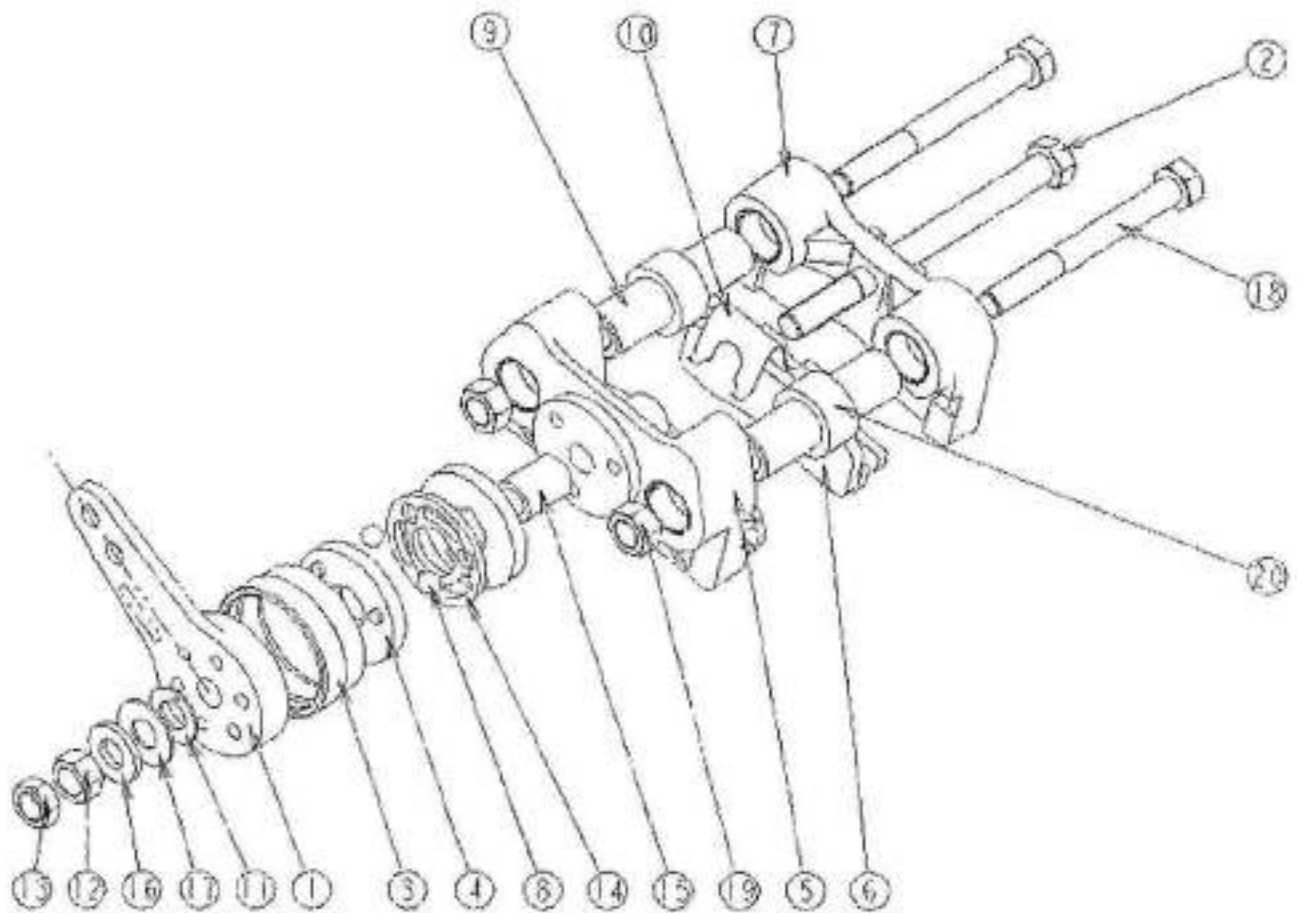


- Removal of the torque plate



- Brake pad

[2] Exploded diagram



⚠ Caution

- Please find the part number from the parts list with reference to the exploded view.
There are parts which cannot be sold as a single part. Those parts are indicated in the parts kit table.
please purchase them as a kit.

1. Parts list

Catalogue number	Code number	Part name	Quantity	Remark
①	83-2009	Lever	1	
②	43-2027	Hexagon headed bolt 1/2-20	1	
③	77-7215	Boot	1	
④	112-7030	Cam	2	
⑤	4-2015	Torque plate assembly	1	
⑥	244-7845	Lining pad assembly	2	
⑦	4-2025	Torque plate assembly	1	
⑧	130J7002	Stainless steel ball	3	
⑨	54-2004	Sleeve	2	
⑩	40-2030	Flat spring	1	
⑪	111-7000	Thrust bearing	1	
⑫	63-611	Adjust nut 1/2-20	1	
⑬	63-7631	Jam nut 1/2-20	1	
⑭	56-7948	Retainer	1	
⑮	68-8436	ID seal	1	
⑯	60-7836	Flat washer (hardening)	1	
⑰	43-9060	Flat washer (stainless steel)	1	
⑱	43-2126	Hexagon headed bolt M12x1.75	2	
⑲	63-2103	Hexagonal nut M12x1.75	2	
㉑	77-2011	OD seal	2	

2. Parts kit

Catalogue number	Code number	Part name	Quantity	Remark
—	304-2221	Repair kit for RT brake	1	
⑤	244-7845	Lining pad assembly	2	
⑩	40-2030	Flat spring	1	
③	77-7215	Boot	1	
⑮	68-8436	ID seal	1	
⑪	111-7000	Thrust bearing	1	
㉑	77-2011	OD seal	2	
—	585-2136	Instruction sheet	1	
—	328-2845	Pad kit for RT brake	1	
⑥	244-7845	Lining pad assembly	2	
⑩	40-2030	Flat spring	1	
—	585-2136	Instruction sheet	1	
—	304J7024	Cam kit	1	
④	112-7030	Cam	2	
⑧	130J7002	Stainless steel ball	3	
⑩	56-7948	Retainer	1	
—	398-5	Grease	1	

[3] Installation of the brake

3-1 Insert the hexagon-headed-bolt (a) to shaft-sleeve (b), then fasten to the hexagonal-nut (c). At this time, hexagonal-nut (c) should not make it stick with shaft-sleeve (b), but should have 0.25 to 1.52mm clearance. (It is adjusted and Locktite is applied at the time of shipping from JPB)
Hold the brake disc so that the disk may be caught at the installed place.

3-2 Screw the hexagon-headed-bolt (a) into the brake attachment bracket. Tighten the hexagonal nut (c) with the specified torque.

Tightening torque 150±15 Nm (DRY)

3-3 Perform the clearance adjustment of the brake based on the procedure of "[4] Adjustment of the brake".

[4] Adjustment of the brake

4-1 Loosen the adjustment nut (a) and jam nut (b).

4-2 Screw in the adjustment nut (a) until friction material contacts the disk surface.

Tightening torque 13.6Nm±0.6 Nm

Caution

- Check whether the lever is held in the open position (neutral) at this time.

4-3 Loosen the adjustment nut (a) 120 degrees and check that the disk rotates freely.

Warning

- If operation is continued while the clearance between the disk and lining pad assembly (c) has not been enough, there is possibility of generating heat or fire.

4-4 Tighten the jam nut (b) with double nut tightening method while the adjustment nut (a) is held in position.

Tightening torque 67.8Nm±6.8 Nm

Warning

- If the tightening torque is insufficient, the jam nut (b) will loosen and causing poor operation of the brake system. Be sure to use a torque wrench to tighten securely.

[5] Maintenance of the brake

⚠ Caution

- This brake system has a configuration that many parts are exposed. Check brake effectiveness condition by everyday starting-up test. By the periodical test (the clearance setting of disk and lining pad assembly ① especially), be sure to maintain always in good state to the following points, and perform maintenance and repair.

5-1 Inspection of the circumference of the brake system

When the mud and oil, etc. have adhered around the brake unit, since it may have the bad influence on brake performance, remove with the brushes or cloth etc.

5-2 Appearance inspection of lining pad assembly ①

When crack or separation, etc. have occurred in friction material, replace the lining pad assembly. (Refer to [7] "Replace of the lining pad assembly")

5-3 Inspection of the remaining thickness of lining pad assembly ①

The wear limit of the friction material (except for the corner) of lining pad assembly is 3mm. In case the wear limit is 3mm or less, exchange the lining pad assembly (Refer to [7] "Replace of the lining pad assembly")

5-4 Lubricating the movable parts <stainless steel ball ② and cam ③>

Although the lubricating grease is fully applied in the factory, carry out inspection of the stainless steel ball and the cam parts for every year or every maintenance, and replace the lubricating grease.

When the worn out parts are found at the time of inspection, exchange stainless steel ball ②, cam ③, and retainer ④ as a set.

(Refer to [6] "Replace of the stainless steel ball and cam")

5-5 Replace of the rubber parts

At the time of yearly maintenance and repair, replacement of the boot ⑤, ID seal ⑥, and OD seal ⑦ is recommended.

⚠ Caution

- Since there is a possibility of becoming the cause of the accident, use the genuine parts (repair kit) when the parts are replaced.

[6] Replace of the stainless steel ball and cam

- 6-1 Loosen and remove the jam nut (13) and adjust nut (12).
- 6-2 Remove flat washer (8), (9), thrust bearing (11), and lever (1). (If the outside cam (4) may separate with the lever, remove them together.)
- 6-3 Remove the boot (3), ID seal (15), retainer (14), stainless steel ball (9), and inside cam (2).
Next, install the replacement parts.
- 6-4 Pass the ID seal (15) through the hexagon-headed-bolt (2) and push in until it contacts the torque plate assembly (5)
- 6-5 Assemble the cam assembly in advance.
Assemble in order of the inside cam (2), retainer (14), stainless steel ball (9), and outside cam (4). Put the stainless steel balls (9) into the hollow parts prepared in the cam. (Fully apply grease to the stainless steel ball, the retainer, and the hollow parts of the cam) It will become cam assembly when the boot (3) is installed together.

⚠ Caution

- Check that the stainless steel balls (9) are contained in the ramp (hollow) parts prepared in inside and outside cam (4).

- 6-6 Install the cam assembly into the torque plate assembly (5). (The side with the small diameter of the boot is to the torque plate assembly side) Align the hole of the lever with the three protruding portions of the cam.
- 6-7 Install the lever (1). Align the hole of the lever with the three protruding portions of outside cam (4). (At this time, install the lever with the position according to the state at the time of the brake-disc disengaging)
- 6-8 Install the flat washer (thrust bearing (11) and (8), (9)), adjusting nut (12) and jam nut (13).

⚠ Caution

- There is the back and front side in thrust bearing (11). The side which has coated the resin is on the flat washer (stainless steel) (8) side.

- 6-9 Perform the clearance adjustment of the brake based on the procedure of "[4] Adjustment of the brake".

[7] Replace of the lining pad assembly

▲ Warning

- If grease and other oil adhere to the friction material surface during lining pad assembly (6) replacement work, there is possibility that the original performance of friction material may no longer be obtained, and brake performance may fall. Please work carefully.

7-1 Loosen the adjust nut (12) and jam nut (11) about 10mm, and move the torque plate assembly (5). This is for securing the clearance required for detaching the lining pad assembly (6). (It is not necessary to remove the adjust nut.)

7-2 Remove the flat spring (10).

▲ Caution

- If the procedure of 7-1 is neglected, the flat spring may jump out strongly. Please ensure this work.

7-3 Shift the torque plate assembly (5) and (7) in the direction away from the disk. Shift the torque plate assembly (7) of the back side, and the torque plate assembly (5) of the front side in order, and remove lining pad assembly (6) of each side at a time. Then, install the replacement parts.

▲ Warning

- Be sure to check that the frictional surface of lining pad assembly (6) faces the disk side in attachment of lining pad assembly (6). There is possibility that the original performance of friction material may no longer be obtained, and brake performance may fall. Please work carefully.

7-4 Insert the lining pad assembly (6) in the slot of the torque plate assembly (5) and (7) securely.

7-5 Insert the leg (height) of flat spring (10) in the hole of the lining pad assembly (6). Check that the leg of the flat spring is certainly inserted in the hole.

7-6 Perform the clearance adjustment of the brake based on the procedure of "[4] Adjustment of the brake".

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Chapter 8

Other inspection, adjustment

[1] Other inspection, adjustment8-2

[1] Other inspection, adjustment



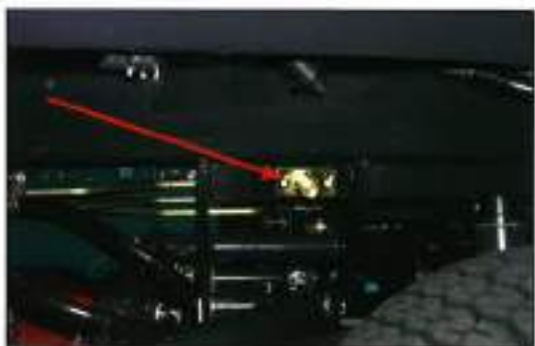
- Radiator, coolant, water
Check whether there is any clogging, crack, damage of radiator heat sink, or leak of coolant etc.



- Hydraulic oil cooler, hydraulics oil
Check whether there is any clogging, crack, damage of oil cooler heat sink, or leak of hydraulic oil etc.



- Coolant capacity 12L (1L in the reserve tank including)



- Coolant drain plug

- JIS standardized goods Long life coolant (LLC)
About the consistency and the freezing point

Freezing point	LLC consistency (volume %)
Up to -10 °C	20%
Up to -15 °C	30%
Up to -20 °C	35%
Up to -25 °C	40%

- Tire pressure

Tire pressure	
Front wheel	150kPa (1.5kgf/cm ²)
Rear wheel	140kPa (1.4kgf/cm ²)



- Vacuum pressure indicator

The red ring appears with fouling etc. of the air filter element, and tells the time of the maintenance.



- Inspection of air filter element

When the air filter element is dirty, clean it by tapping lightly, or spray air from the inner side. Be careful not to damage the element. Replace the air filter element every 200 hours.



- Fan belt

~ Amount of bending 7-9mm (6kgf - 7kgf)

Check whether there are crack, damage, or wear-out. Replace the fan belts, if bad condition.



- Throttle wire adjusted position (lever side)



Engine side (maximum engine speed is 2,600rpm)

8. Other inspection, adjustment



- Safety switch
Seat part



- Brake part
- Safety switch



- Air omission button (full admission)



- Fuel filter (plot plan drawing 1)
(Replace every 500 hours)



- Engine oil element
Initial 50 hours
After 2nd time replace every 100 hours



- Oil level gauge
(MAX:9.7L, MIN:7.0L)

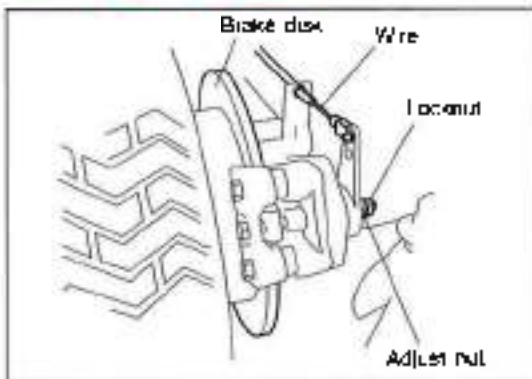
Please use the lubricating oil higher than the API service classification CD class.



- Brake wire
Brake side



Foot lever side



- Adjustment of brake

Carry out the clearance adjustment, if the clearance between the brake disk and the pad becomes large and effectiveness of the brake disc worsens.

The space will become small, if the lock nut is loosened and the adjust nut is tightened.

When it adjusts to the proper clearance, tighten the lock nut securely.

The fine adjustment can be performed with the wire. Be sure to adjust so that effectiveness of the brake on either side becomes the same.

8. Other Inspection, adjustment

— MEMO —

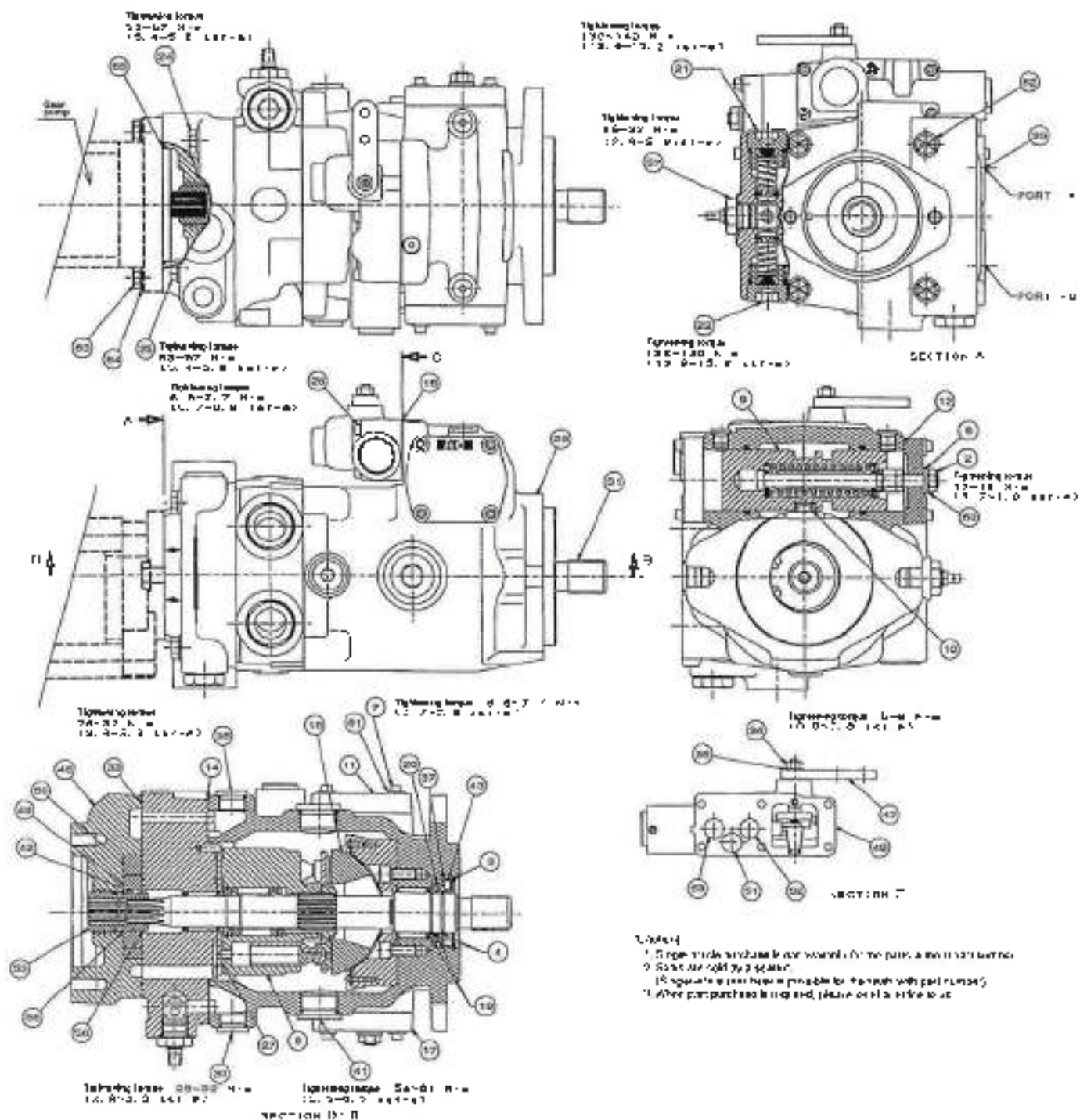
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Chapter 9

Reference information

[1]	Piston pump (for Travelling)	9-2
[2]	Wheel motor (front)	9-4
[3]	Wheel motor (rear).....	9-6
[4]	Solenoid valve (for travelling) V4200	9-8
[5]	Solenoid valve (for switching 2WD or 4WD) V4205	9-9
[6]	Gear pump (triple pump) PBBBB222	9-10
[7]	Solenoid valve (for the reel rotation) V5259A.....	9-11
[8]	Gear motor (for Reel rotation) MB4KA379.....	9-12
[9]	Stack valve (mower unit upper and lower sides) SV3-1191...	9-13
[10]	Solenoid valve (for cooling fan) V4209.....	9-14
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[12]	Relay lamp (lights at normal time)	9-16
[13]	Operation panel	9-18

[1] Piston pump (for Travelling)



- Notes:
1. Tighten the piston and ring assembly in the order of 1 to 4.
 2. Do not use oil on the piston and ring assembly.
 3. Do not use force on the piston and ring assembly.
 4. After purchased the pump, please do not use it.

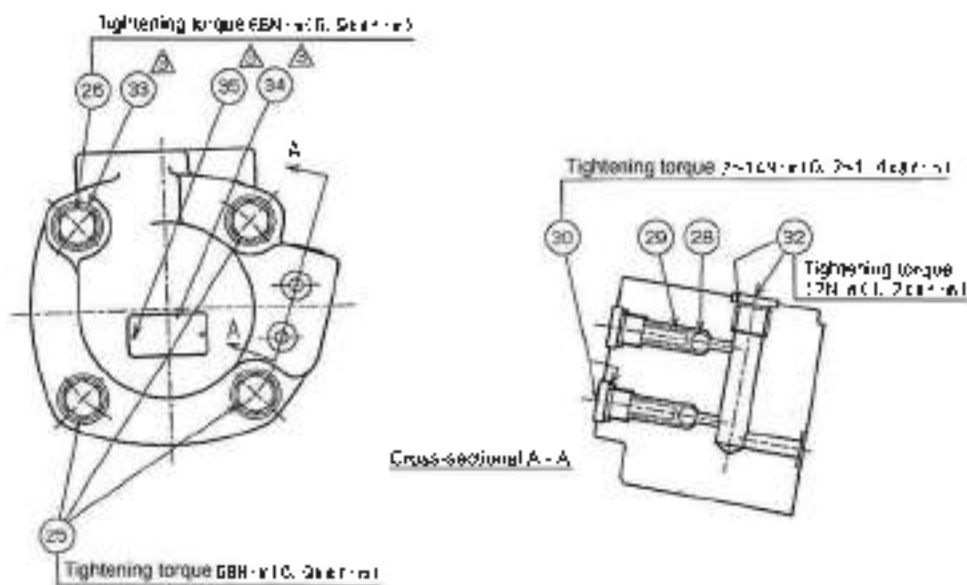
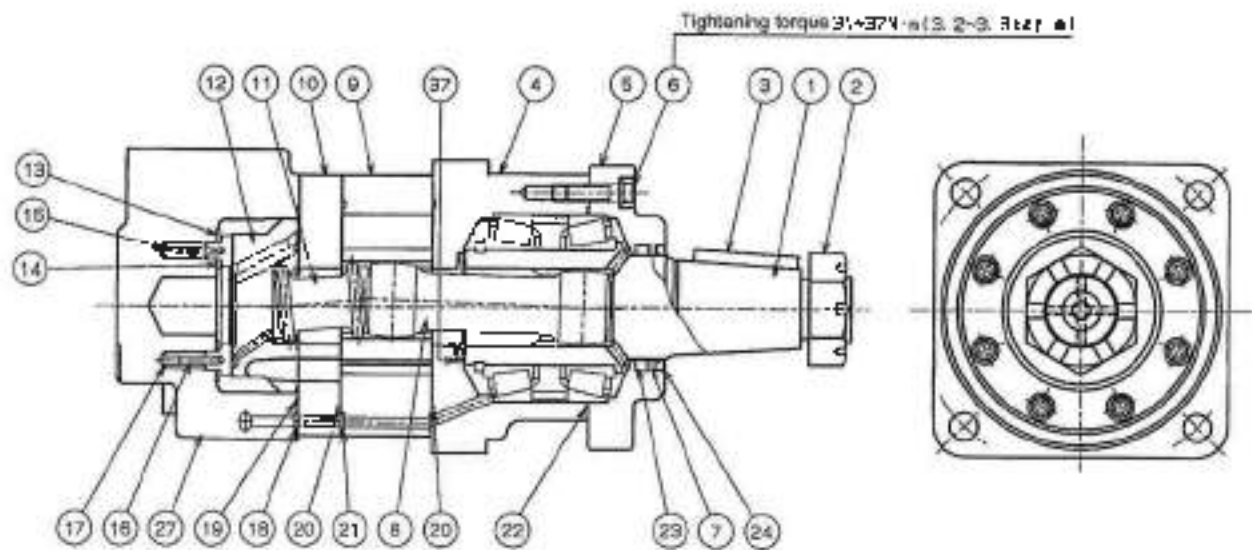
Parts list

Catalogue number	Code number	Part name	Quantity	Remark
①	AE0315A	Shaft bearing kit	1	1-5/8" taper axis
②	14230	Nut	1	
③	14394-007	Square key	1	
④	23170-004	Bearing housing	1	
⑤	AE0312B	Front retainer	1	
⑥	16292-100	Screw	8	
* ⑦	AE0314A	Back-up ring	1	
⑧	AE0258C	Drive	1	
⑨	8464-1201	??? Roller assembly ???	1	
⑩	8504	Valve plate	1	
⑪	8510	Valve drive	1	
⑫	85005-2	Valve	1	
○ ⑬	8962	Outer face seal	1	
○ ⑭	8961	Inner face seal	1	
⑮	6203S	Spring	2	
⑯	21256	Balancing ring	1	
⑰	14416-2	Pin	2	
○ ⑱	15006	O-ring	1	AS568-011
○ ⑲	9022S-7	O-ring	1	AS568-042
○ ㉑	9022S-8	O-ring	2	AS568-043
○ ㉒	250001-010	O-ring	2	AS568-010
* ㉓	9022S-8	O-ring	1	AS568-043
* ㉔	AD1070A	X-ring	1	
* ㉕	AE0313A	Dust seal	1	
㉖	14386-007	Bolt	3	
㉗	14386-009	Bolt	1	
㉘	23382-003	Valve housing	1	1-1/16" 12UN O-ring hole
㉙	18026	Ball	2	
㉚	8464	Spring	2	
㉛	8350	Check plug	2	
○	250003-903	O-ring	2	AS568-903
㉜	9072-003	Plug	1	
○		O-ring	1	AS568-904
㉝	AE0239A	Flat washer	4	
㉞		Name plate	1	
㉟		Rivet	2	
* ㊱	6993	Shaft face seal	1	
○	○ 81234S	Seal kit		Rear side
*	* AE0325A			Shaft side

Seals are sold by a seal kit.

Single article purchase of the parts without part number is not available.

[2] Wheel motor (front)



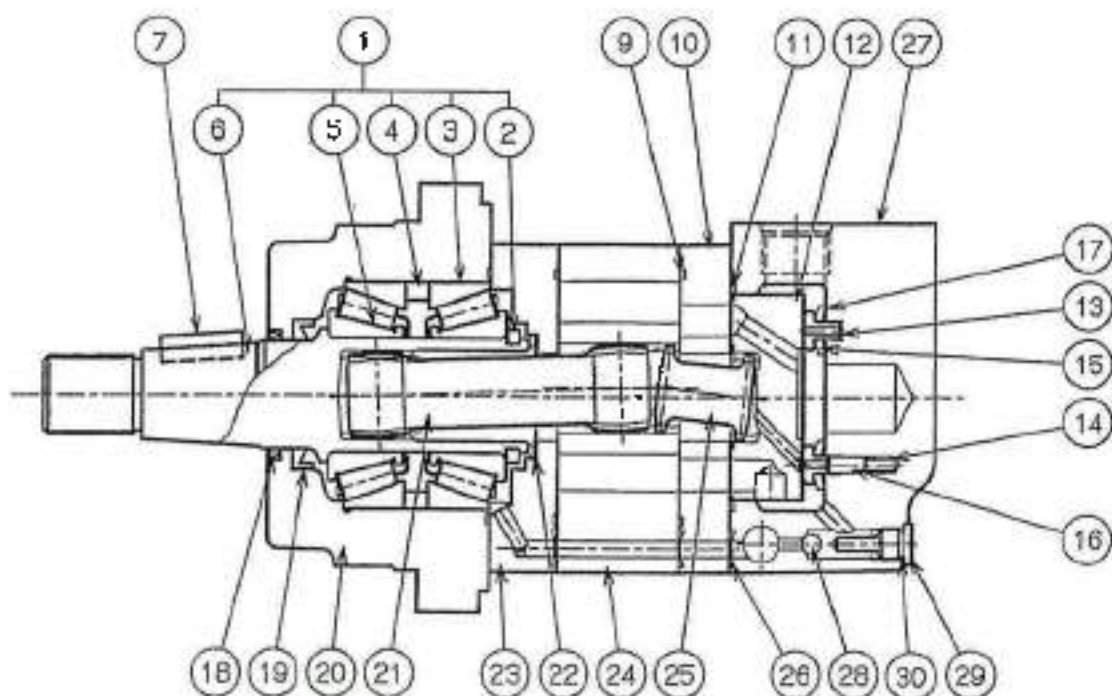
Parts list

Catalogue number	Code number	Part name	Quantity	Remark
①	AE0315A	Shaft bearing kit	1	1-5/8" taper axis
②	14230	Nut	1	
③	14394-007	Square key	1	
④	23170-004	Bearing housing	1	
⑤	AE0312B	Front retainer	1	
⑩	16292-100	Screw	8	
* ⑦	AE0314A	Back-up ring	1	
⑧	AE0258C	Drive	1	
⑨	8464-1201	???? Roller assembly ????	1	
⑪	8504	Valve plate	1	
⑫	8510	Valve drive	1	
⑬	8500S-2	Valve	1	
○ ⑭	6962	Outer face seal	1	
○ ⑮	6961	Inner face seal	1	
⑯	6203S	Spring	2	
⑰	21266	Balancing ring	1	
⑱	14416-2	Pin	2	
○ ⑲	15006	O-ring	1	AS568-011
○ ⑳	9022S-7	O-ring	1	AS568-042
○ ㉑	9022S-8	O-ring	2	AS568-043
○ ㉒	250001-010	O-ring	2	AS568-010
* ㉓	9022S-6	O-ring	1	AS568-043
* ㉔	AD1070A	X-ring	1	
* ㉕	AE0313A	Dust seal	1	
㉖	14386-007	Bolt	3	
㉗	14386-009	Bolt	1	
㉘	23382-003	Valve housing	1	1-1/16" 12UN O-ring hole
㉙	18026	Ball	2	
㉚	6464	Spring	2	
㉛	8350	Check plug	2	
○	250003-903	O-ring	2	AS568-903
㉜	9072-003	Plug	1	
○		O-ring	1	AS568-904
㉝	AE0239A	Flat washer	4	
㉞		Name plate	1	
㉟		Rivet	2	
* ㊱	6993	Shaft face seal	1	
○	○ 61234S	Seal kit		Rear side
*	* AE0325A			Shaft side

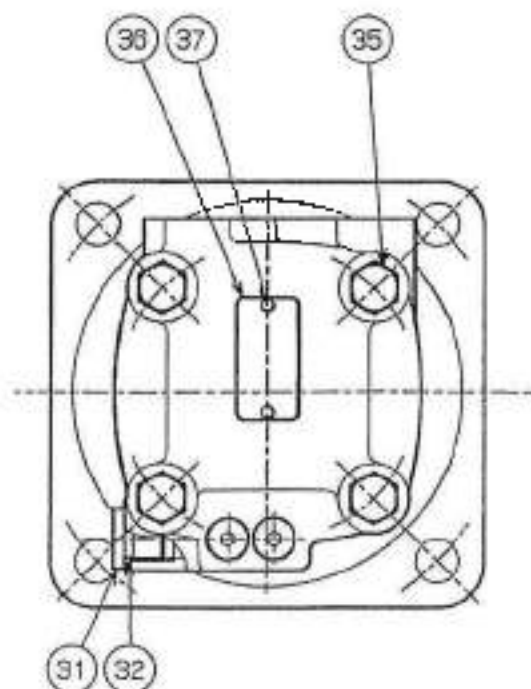
Seals are sold by a seal kit.

Single article purchase of the parts without part number is not available.

[3] Wheel motor (rear)



Tightening torque $4\sim 3\text{N}\cdot\text{m}$ (0.4~0.8kgf·m)



Tightening torque $10\sim 15\text{N}\cdot\text{m}$ (1.0~1.5kgf·m)

Parts list

Catalogue number	Code number	Part name	Quantity	Remark
①	Shaft bearing kit	74045-2B	1	ø1.1/4" taper axis
②	Retaining ring	7384	(1)	
③	Bearing cup	9047	(2)	
④	Bearing spacer	7376	(1)	
⑤	Bearing cone	9048	(2)	
⑥	Shaft output	AD0696A	(1)	
⑦	Key	14349	1	5/16"x5/16"x1"
○ ⑧	O-ring	9022S-6	3	AS568-041
⑩	Valve plate	8432	1	
○ ⑪	O-ring	9022S-2	1	AS568-038
⑫	Valve	8435S-8	1	
⑬	Balancing plate	8915	1	
⑭	Spring	7383	2	
○ ⑮	Inner face seal	9135-001	1	
⑯	Pin	14351	2	
○ ⑰	Outer face seal	9135-002	1	
○ ⑱	Dust seal	9044-1	1	
○ ⑲	Oil seal	9075-1	1	
⑳	Bearing housing	7389	1	4 Bolt flange
㉑	Drive	8434S-1	1	
○ ㉒	Shaft face seal	9050	1	
㉓	Wear plate	7390	1	
㉔	??? Roller assembly ????	7403-4	1	
㉕	Valve drive	8433	1	
○ ㉖	O-ring	9022S-12	3	AS568-011
㉗	Valve housing	8356S-1	1	
㉘	Ball	18026	2	
㉙	Plug	8350	2	
○ ㉚	O-ring	250303-903	2	AS568-903
㉛	Plug	14236S	1	
○ ㉜	O-ring	15073S	1	P11
㉝	Bolt	14303	4	3/8-24UNF
㉞	Name plate		1	3/8-24UNF
㉟	Rivet		2	3/8-24UNF
○	Seal kit	61091S/61090S		

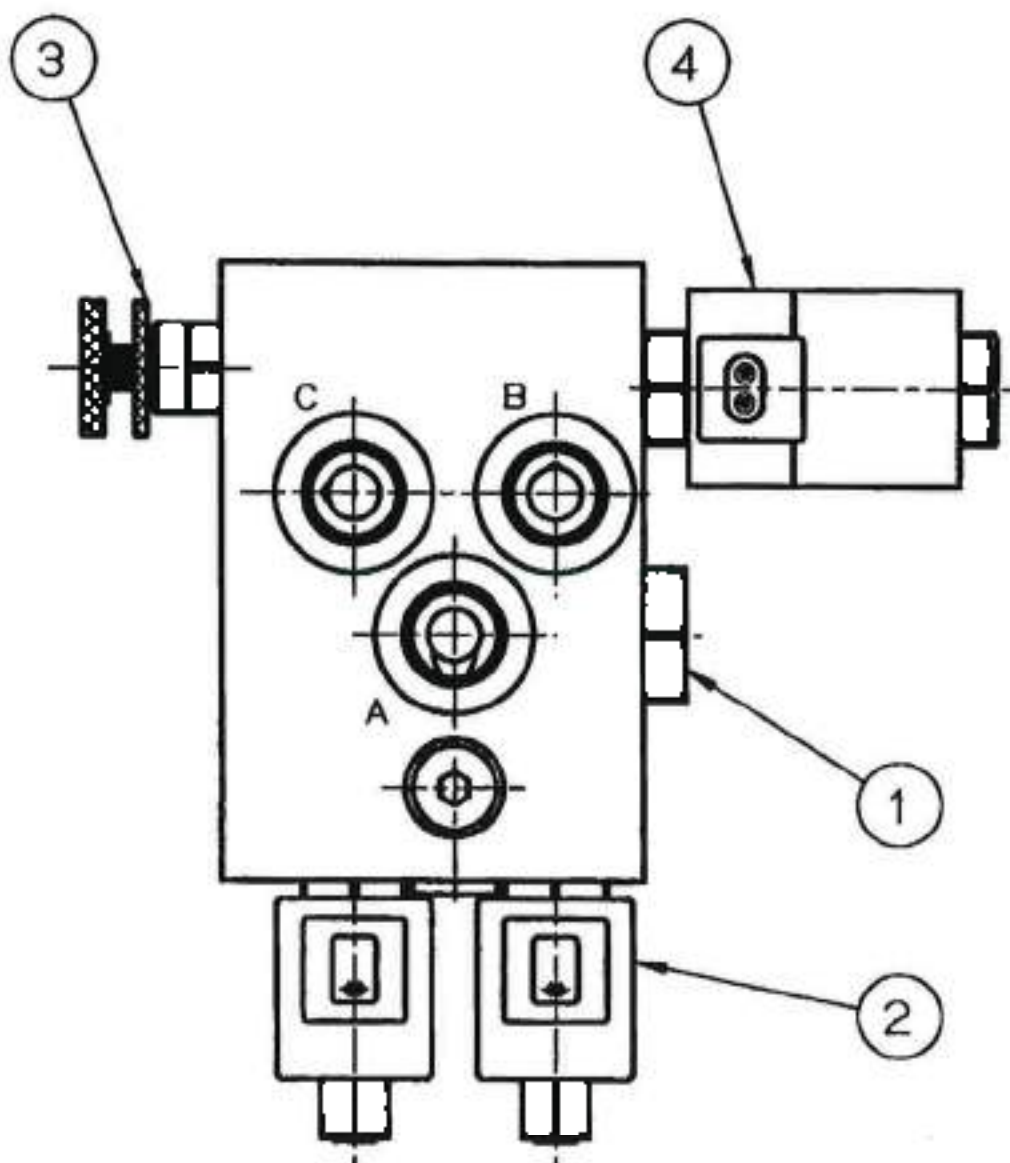
Seals are sold by a seal kit.

Single article purchase of the parts without part number is not available.

[4] Solenoid valve (for travelling) V4200

Parts list

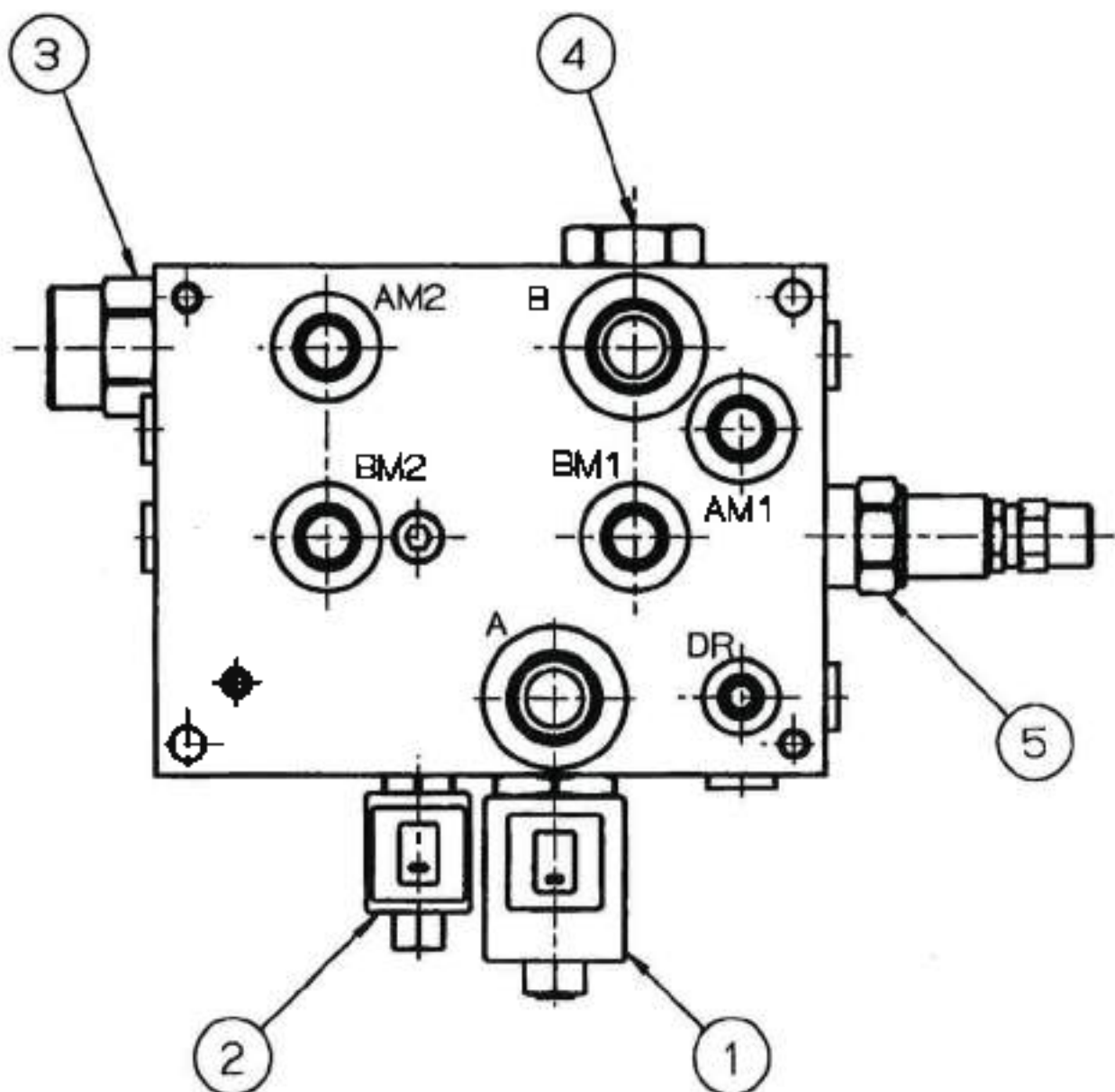
Catalogue number	Code number	Part name	Quantity	Remark
①	Flow dividing valve	FD16-40-0-N-55	1	Seal kit SK16-4N-MMT
②	Electro magnetic valve	SV12-23-0-N-12DL	2	Coil 6352012 Seal kit SK12-2N-T
③	Needle valve	NV08-208-0-N	1	Seal kit SK08-2N-M
④	Electro magnetic valve	SV12-25-0-N-12EL	1	Coil 6852012 Seal kit SK12-2N-M



[5] Solenoid valve (for switching 2WD or 4WD) V4205

Parts list

Catalogue number	Code number	Part name	Quantity	Remark
①	Electro magnetic valve	SV16-22-0-N-12DL	1	Coil 6352012 Seal kit SK16-2N-T
②	Electro magnetic valve	SV08-30-0-N-12DL	1	Coil 6302012 Seal kit SK08-3N-MM
③	Direction change valve	PD16-44-0-N-110	1	Seal kit SK16-4N-MMM
④	Check valve	CV16-20-0-N-5	1	Seal kit SK16-2N-T
⑤	Relief valve	RV12-26C-0-N-15/	1	Seal kit SK12-2N-B



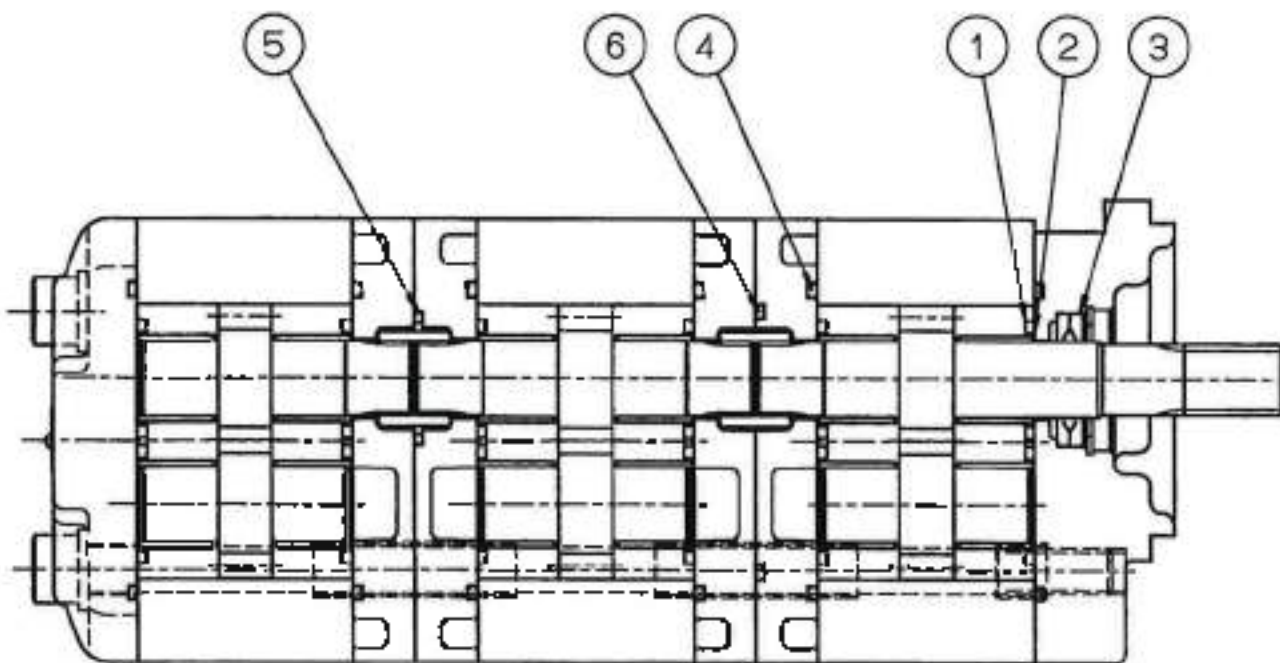
[6] Gear pump (triple pump) PBBB222

Parts list

Catalogue number	Code number	Part name	Quantity	Remark
①	Balance seal	41-29246	6	PG-32
②	Back-up seal	42-10145	6	PB-33-1
③	Oil seal	41-72455	1	PB-21
④	O-ring		6	NSP522-149
⑤	O-ring		1	C401-1AXG30
⑥	O-ring		1	C401-1AXG65

Note

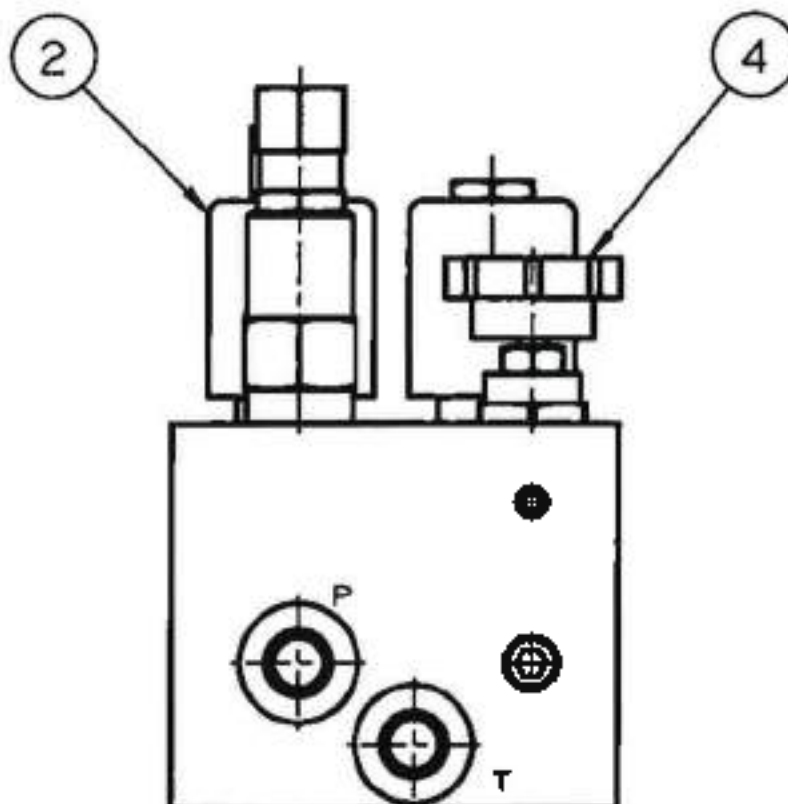
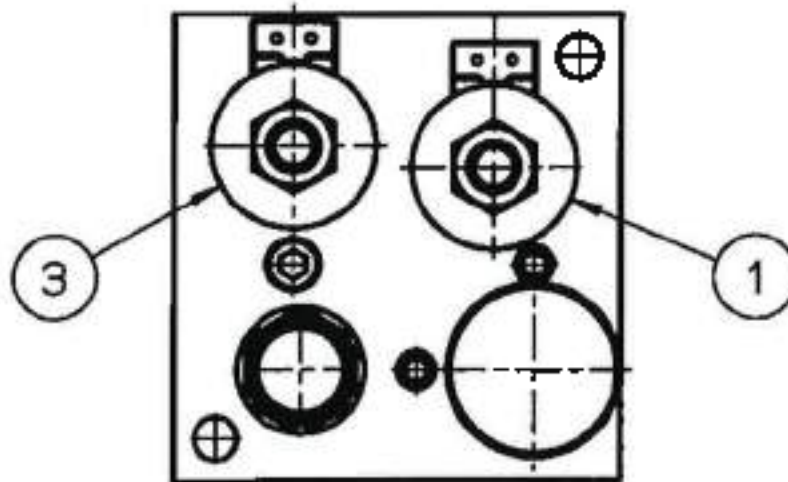
- 1) It can supply only with the repair kit (CG0041A) of the part No.①②③④⑤⑥.
- 2) Single article purchase of the parts No.①②③④⑤⑥ is not available.



[7] Solenoid valve (for the reel rotation) V5259A

Parts list

Catalogue number	Code number		Part name	Quantity	Remark
①	Electro magnetic valve	Cartridge	SV1-10-4-0-00	1	Seal kit 889625
		Coil	MCSCJ012DW0B0010		
②	Relief valve		RV5-10-C-0-35/	1	Seal kit 565803
③	Electro magnetic valve	Cartridge	SV3-10-0-0-00	1	Seal kit 565803
		Coil	MCSCJ012DW0B0010		
④	Flow regulator		FR10-39E-0-N	1	Seal kit SK10-3N-MM

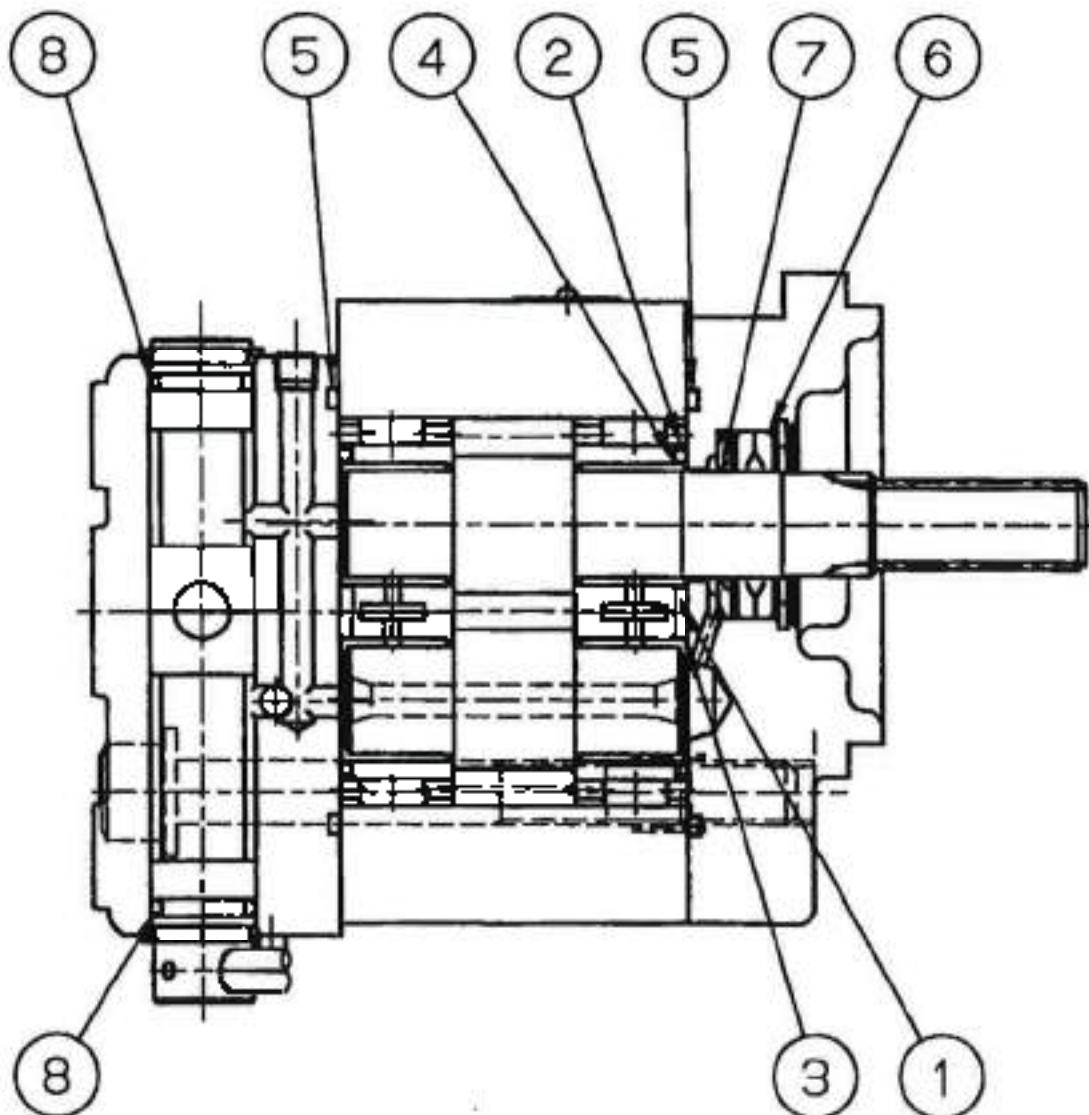


[8] Gear motor (for Reel rotation) MB4KA379**Parts list**

Catalogue number	Code number	Part name	Quantity	Remark
①	Balance seal C	41-70220	4	PB-32-4
②	Balance seal D	41-70221	4	PB-32-5
③	Back-up seal C	41-70222	4	PB-33-4
④	Back-up seal D	41-70223	4	PB-33-5
⑤	O-ring		2	NSP522-149
⑥	Oil seal	41-27980	1	JD-21-2
⑦	Back-up ring		1	C403-T3XP20
⑧	O-ring		2	C401-1BXP16

Note

- 1) It can supply only with the repair kit (CG0038A) of the part No.①②③④⑤⑥⑦⑧.
- 2) Single article purchase of the parts No.①②③④⑤⑥⑦⑧ is not available.



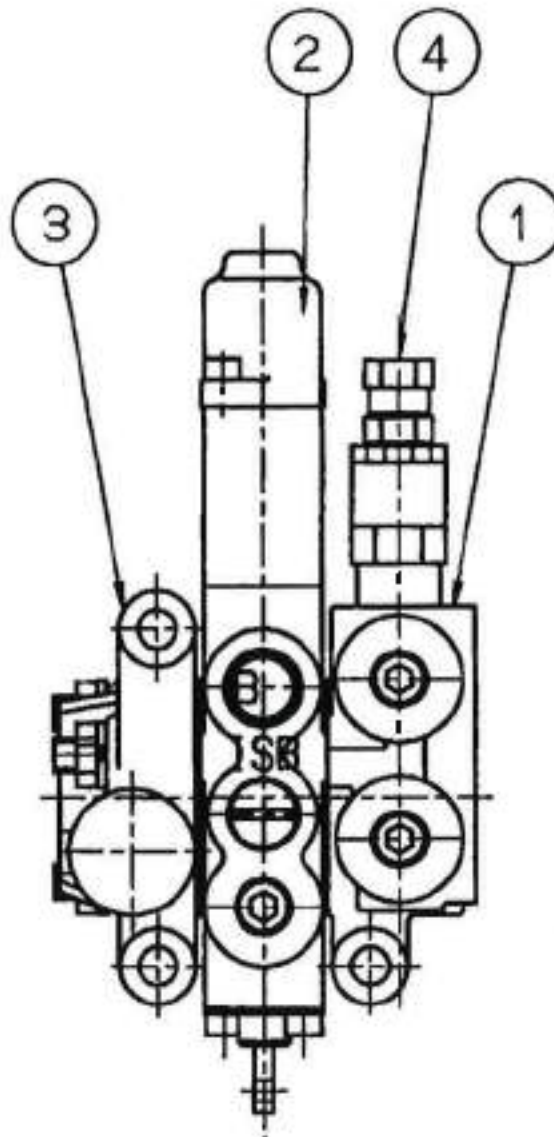
[9] Stack valve (mower unit upper and lower sides) SV3-1191

Parts list

Catalogue number	Code number	Part name	Quantity	Remark
①	Inlet cover ASS'Y	SV3-1C23*	1	Set pressure separately indicated
②	ISB section ASS'Y	SV3-1SB221G	1	With O ring keep
③	End cover	SV3-13*	1	
④	Relief valve ASS'Y	OLV3B*	1	9.8 MPa at 25L set pressure separately indicated

Note

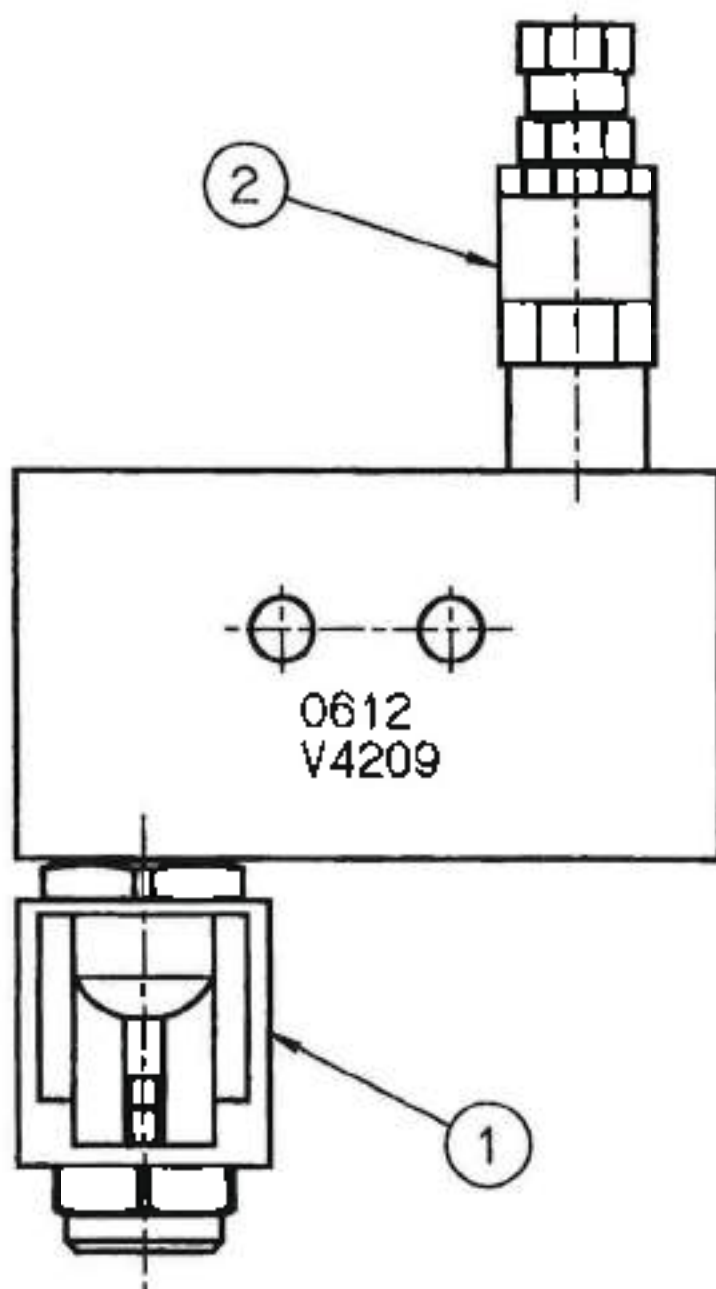
- 1) Part No.④ Relief valve ASS'Y is contained in Part No.①.
- 2) When required a relief valve ASS'Y only, please place an order in OLV3B*.



[10] Solenoid valve (for cooling fan) V4209

Parts list

Catalogue number	Code number	Part name	Quantity	Remark
①	Electro magnetic valve	SV08-21S-0-N-12EY	1	Coil 4303412 Seal kit SK08-2N-T
②	Relief valve	OLV3B'	1	10.3 MPa at 21 L/min Set pressure is separately indicated

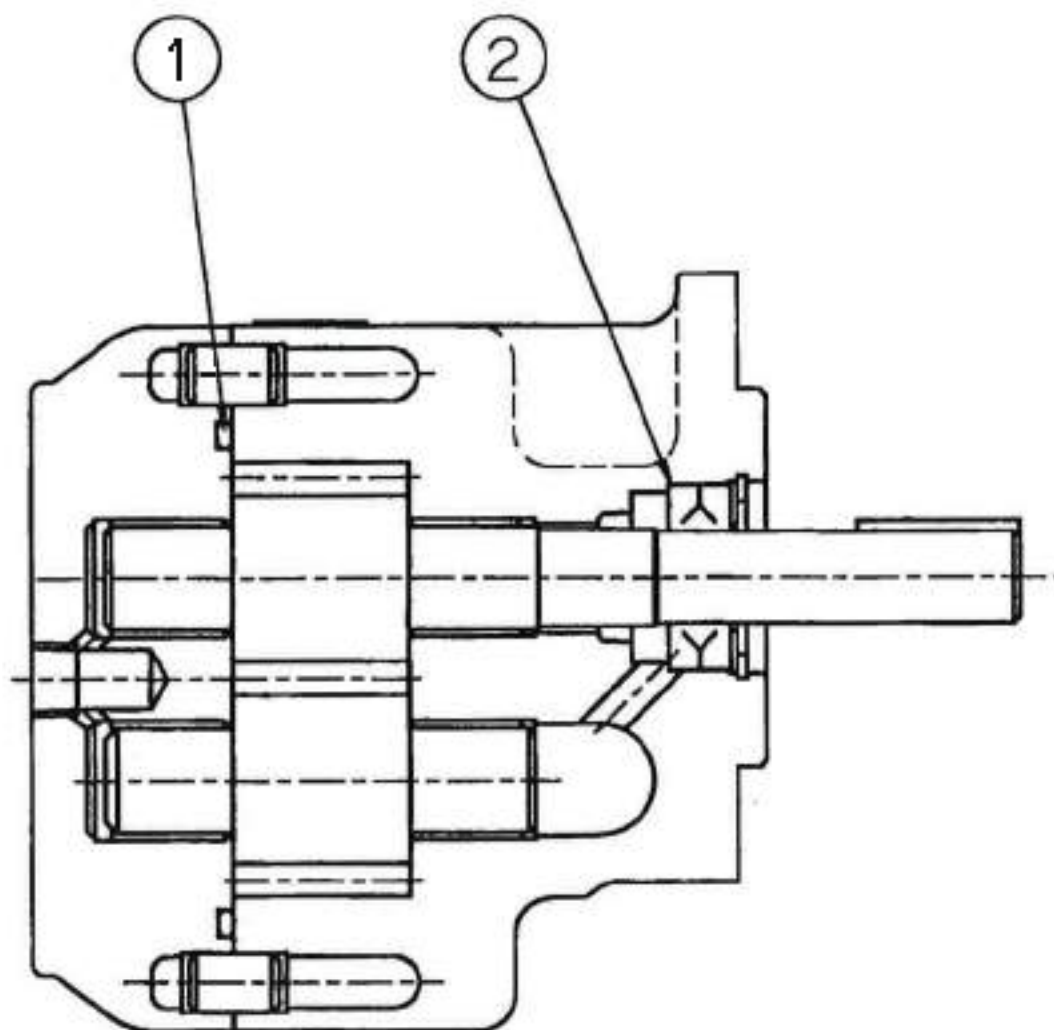


[11] Gear motor (for cooling fan) MA7AD661**Parts list**

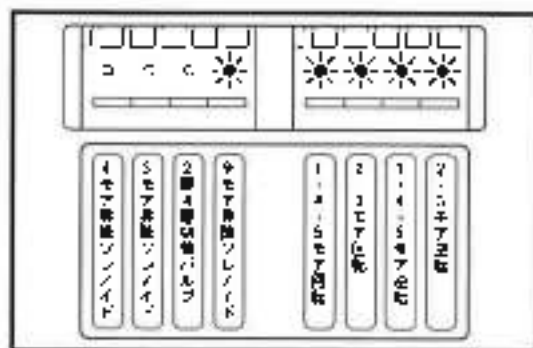
Catalogue number	Code number	Part name	Quantity	Remark
①	O-ring		1	NSP522-139
②	Oil seal	41-60922	1	PA-21-4

Note

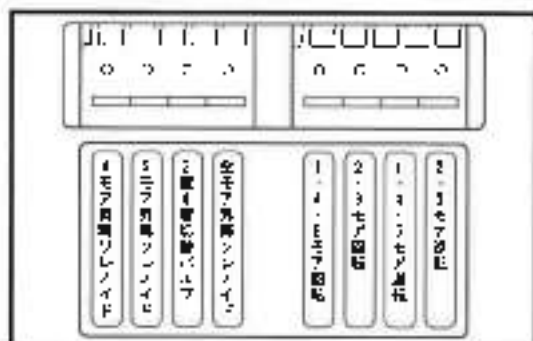
- 1) It can supply only with the repair kit (61-25070) of the part No.①②.
- 2) Single article purchase of the parts No.①② is not available.



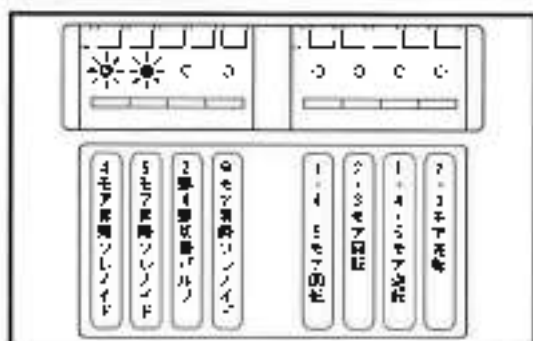
[12] Relay lamp (lights at normal time) * with main switch ON, engine operating



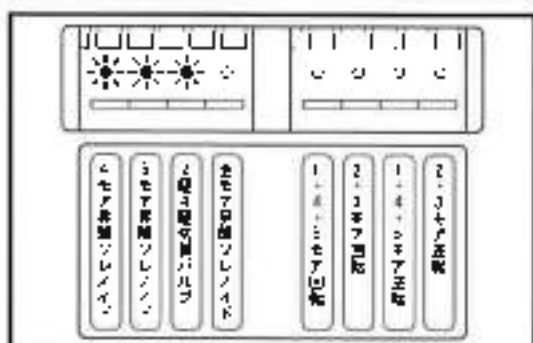
- <At the time of lapping>
- Each switch
 - 2WD
 - Reel rotation: Rotation
 - Lapping
 - Travelling + • Operation - both correspond
 - Up or down shift lever
 - Down (operation)



- <2WD: travelling>
- Each switch
 - 2WD
 - Reel rotation: Stop
 - ◆ Mowing
 - Travelling + • Operation - both correspond
 - Up or down shift lever
 - P + • Neutral - both correspond



- <2WD: Raise a little and travelling>
- Each switch
 - 2WD
 - Reel rotation, Stop or rotation - both correspond
 - Mowing
 - Operation
 - Up or down shift lever
 - Neutral: Being raised a little (#4, #5)



- <4WD: Raise a little and travelling>
- Each switch
 - 4WD
 - Reel rotation: Stop or rotation - both correspond
 - Mowing
 - Operation
 - Up or down shift lever
 - Neutral: Being raised a little (#4, #5)

(From Left to Right)

Mower 4 up or down solenoid

Mower 5 up or down solenoid

2WD-4WD change valve

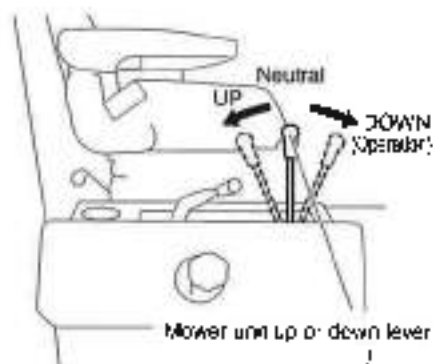
All mowers up or down solenoid

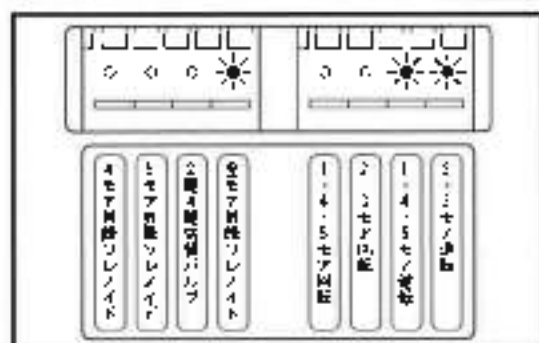
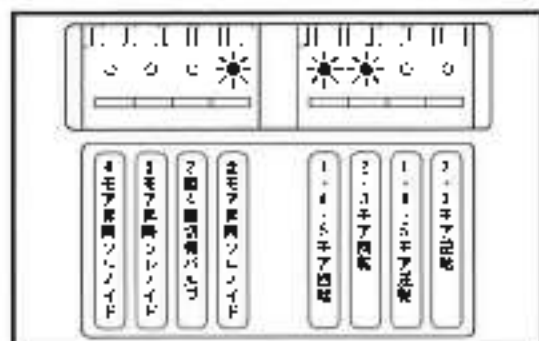
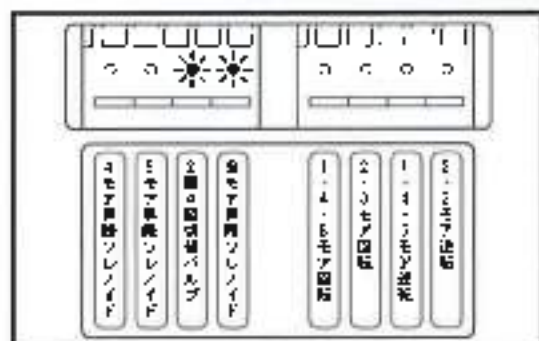
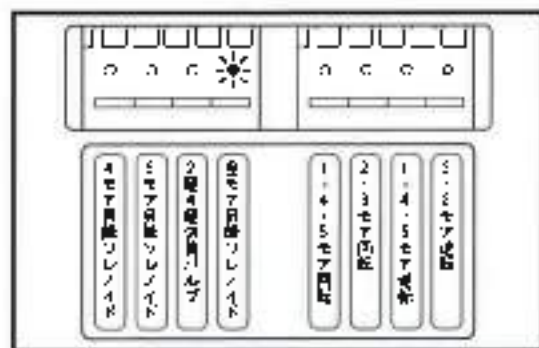
Mowers rotation 1, 4 and 5

Mowers rotation 2 and 3

Mowers reverse rotation 1, 4 and 5

Mowers reverse rotation 2 and 3





(from Left to Right)

Mower 4 up or down solenoid

Mower 5 up or down solenoid

2WD-4WD change valve

All mowers up or down solenoid

Mowers rotation 1, 4 and 5

Mowers rotation 2 and 3

Mowers reverse rotation 1, 4 and 5

Mowers reverse rotation 2 and 3

<2WD: Standby state for mowing work>

- Each switch
 - 2WD
 - Reel rotation: Stop
 - Mowing
 - Travelling + + Operation - both correspond
- Up or down shift lever
 - Down (operation)

<4WD: Standby state for mowing work>

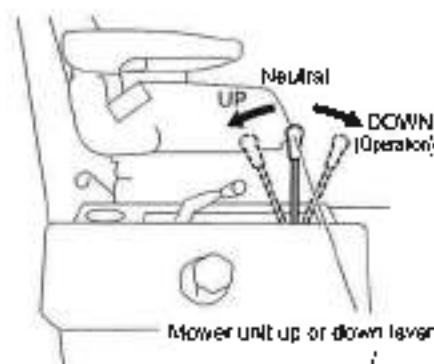
- Each switch
 - 4WD
 - Reel rotation: Stop
 - Mowing
 - Travelling + + Operation - both correspond
- Up or down shift lever
 - Down (operation)

<2WD: Under mowing work>

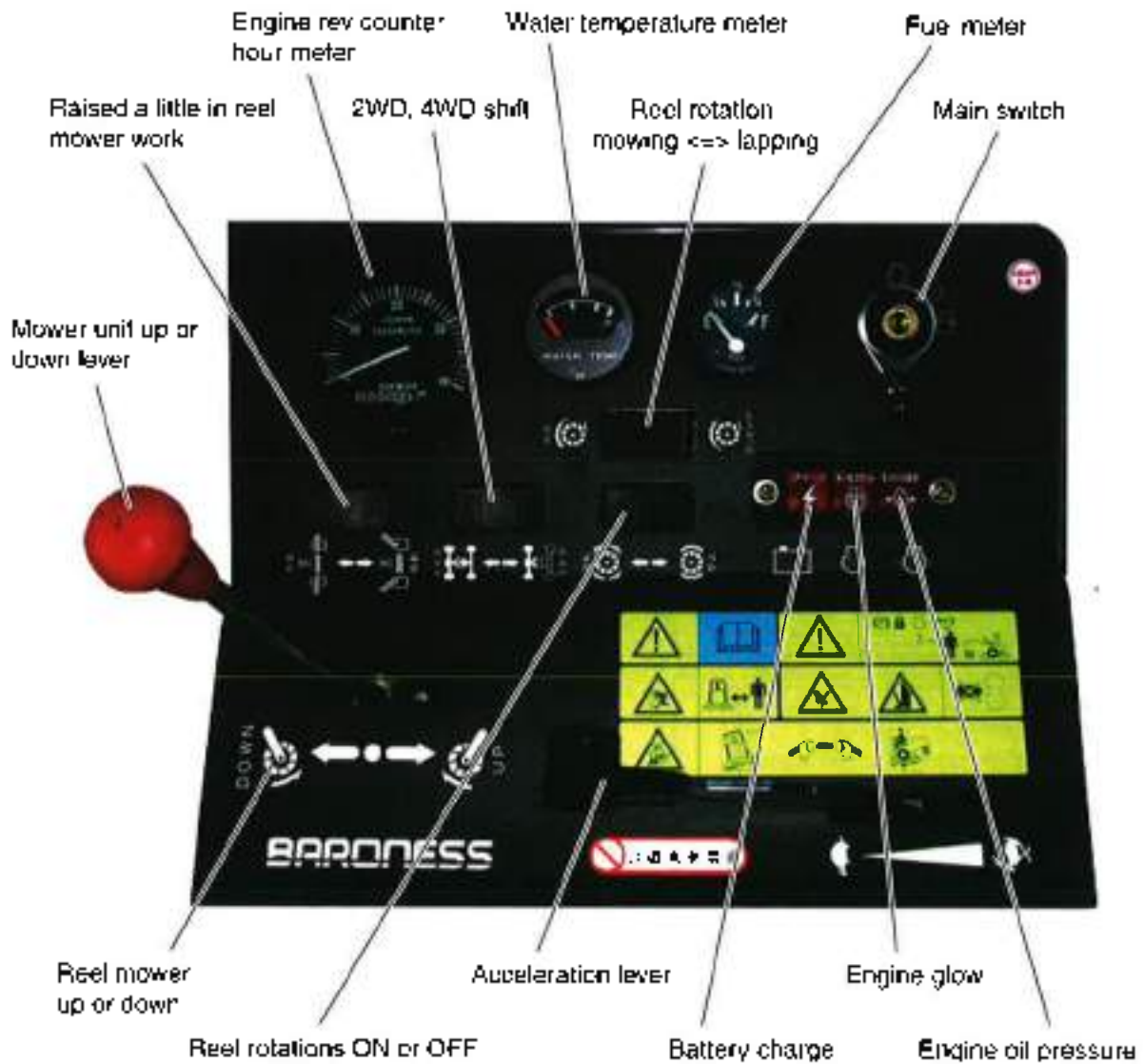
- Each switch
 - 2WD
 - Reel rotation: Rotation
 - Mowing
 - Travelling + + Operation - both correspond
- Up or down shift lever
 - Down (operation)

<Standby state for lapping>

- Each switch
 - 2WD
 - Reel rotation: Stop
 - Lapping
 - Travelling + + Operation - both correspond
- Up or down shift lever
 - Down (operation)



[13] Operation panel



Chapter 10

Reel unit

[1]	Disassembly / Assembly (Groomer).....	10-2
[2]	Disassembly / Assembly (Reel, Bad knife).....	10-4
[3]	Disassembly / Assembly (Front roller, Rear roller).....	10-6
[4]	Assembly and adjustment	10-8
[5]	Cutting height adjustment	10-10
[6]	Groomer, Reel cover.....	10-11

[1] Disassembly / Assembly (Groomer)



- Remove the mower unit from this machine.



- Remove the stop bolt.
(Gear case side, two upper and lower sides)



- Loosen the groomer adjusting nut.



- Remove flange nut 10, which secures the rod holder.



- Remove the groomer housing filling 10U nut.



- Remove the groomer assembly.



- Disassembly of the groomer gear case
(Be cautious of the washer position)



- Each parts within the groomer case



- Groomer housing parts



- Groomer gear case parts

[2] Disassembly / Assembly (Reel, Bed knife)



- Removal of the reel nut (30 small diameter, special nut P.2) While making the reel lock with a handle of wood hammer etc. using a box reel housing right-and-left wrench 41mm, remove the nut by turning it to the left.
- Remove after opening space between the Reel and bed knife.



- Removal of the reel nut (30 small diameter, special nut P.2)



- Remove the bed-knife mount assembly.



- Bed-knife mount assembly.



- Loosen the cutter adjusting nut.



- Remove the right and left reel housing.



- Reel housing section parts



- Reel housing inside parts



- Remove the reel cutter.

[3] Disassembly / Assembly (Front roller, Rear roller)



- Removal of the slotted roller assembly



- Loosen and remove the lock with two 46mm spanners.



- The bolt type and nut type



- The slotted roller assembly one side has been removed.



- Installation work
- Lock firmly by a 46mm spanner with the reverse of removal procedure.



- Removal of the rear roller assembly



- Disassembly of the rear roller assembly



- The oil seal is in the roller inner side.
 - Apply grease to every required part.
- Perform the assembly work in the reverse procedure of removal.