KIOTI

CS2530 SERIES SUB-COMPACT TRACTOR

WORKSHOP MANUAL

daedong

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PREFACE

This manual is intended to provide service personnel with information on general specifications, service instructions, operating principles, troubleshooting, part removal and installation procedures for the CS2530 series sub-compact tractor.

All information in this manual is based on the latest technical information available at the time of publication. Therefore, some of the information in this manual may differ from your machine.

KIOTI's principle is to update the manual whenever there is revised information. However, **KIOTI** has no obligation to immediately update the contents of this manual if the manual has already been distributed or published. The latest updated information can be found in **KIOTI**'s Online Electronic Manual System (DPCS).

If there are typos, incorrect information, or questions in this manual, please contact **KIOTI** at any time.

April 2025

Daedong mobility

IMPORTANT

- **If you use non-genuine KIOTI sub-compact tractor parts or lubricants, the product may be damaged. In this case, the warranty does not apply.**

REMARK

- **We reserve the right to change the entire contents of the manual at any time without prior notice.**

TABLE OF CONTENTS

CHAPTER 1 SAFETY FIRST

CHAPTER 2 GENERAL

CHAPTER 3 ENGINE

CHAPTER 4 TRANSMISSION

CHAPTER 5 HST

CHAPTER 6 REAR AXLE

CHAPTER 7 BRAKE

CHAPTER 8 FRONT AXLE

CHAPTER 9 STEERING SYSTEM

CHAPTER 10 HYDRAULIC SYSTEM

CHAPTER 11 ELECTRIC SYSTEM

CHAPTER 12 CABIN

CHAPTER 13 AIR-CON & HEATER

CHAPTER 14 INDEX

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CS2530CH
CS2530CH-EU

SAFETY FIRST

CHAPTER 1

TABLE OF CONTENTS

1. FOR SAFETY 1-2

1.1 Alert symbols.....1-2

2. SAFETY TIPS.....1-3

2.1 Safety gear.....1-3

2.2 Work place 1-3

2.3 Safety instructions when preparing tractor.....1-4

2.4 Avoid fires 1-4

2.5 Cautions when handling the battery.....1-5

2.6 Cautions for high pressure hoses 1-5

2.7 Use of appropriate tools and equipment...1-6

2.8 Handling of hazardous materials.....1-6

2.9 Handling of rotating blade, shaft and driving belt.....1-7

2.10 Prevention of scald.....1-7

2.11 Disposal of environmental waste 1-8

2.12 Cautions when handling tires 1-8

3. SAFETY DECALS 1-9

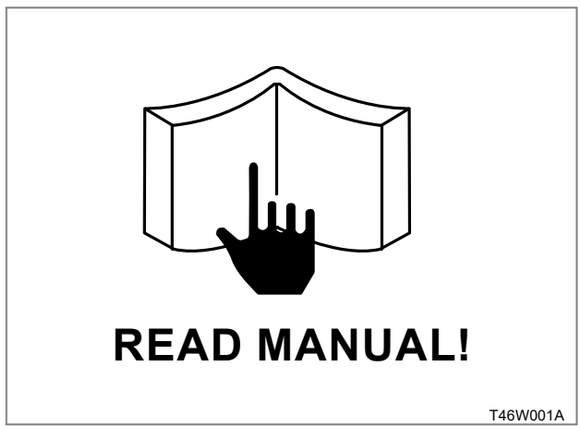
3.1 Location of decals 1-9

3.2 Safety decal locations 1-14

3.3 Care of safety decals 1-14

1. FOR SAFETY

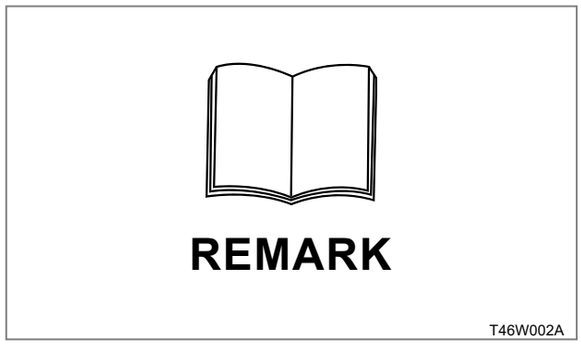
- Most accidents can be avoided by following basic safety guidelines and regulations. Always follow safety rules to prevent accidents.
- Inspecting or servicing the sub-compact tractor without sufficient knowledge may result in unexpected injury. Before servicing, read the service manual carefully and follow the service and maintenance instructions to avoid injury.



1.1 ALERT SYMBOLS

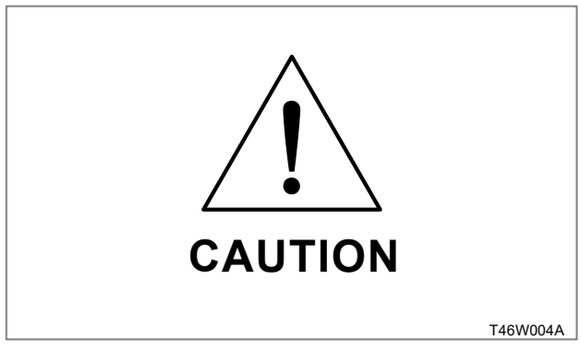
In this manual, the following safety-alert symbols are used. Their meanings are as follows:

▶ REMARK



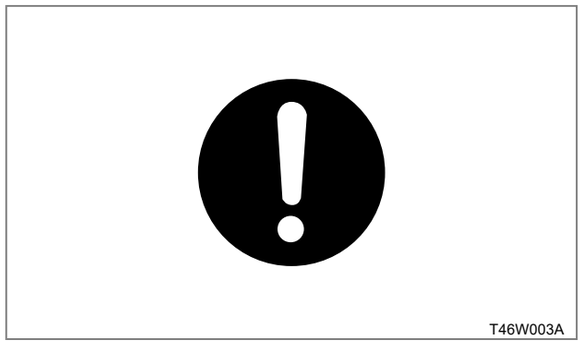
- Be sure to read the service manual carefully to perform optimal service.

▶ CAUTION



- This mark indicates potentially hazardous situation which, if not observed, may result in serious injury.

▶ IMPORTANT



- This sign indicates that the sub-compact tractor may not operate after servicing if not carefully observed during servicing.

▶ WARNING

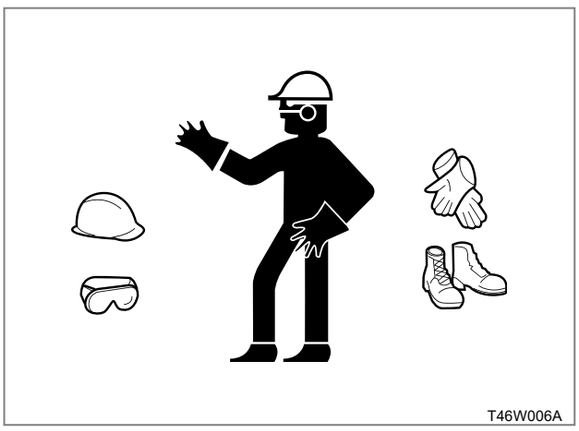


- This mark indicates hazardous situation which, if not observed, may result in death or injury.

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2. SAFETY TIPS

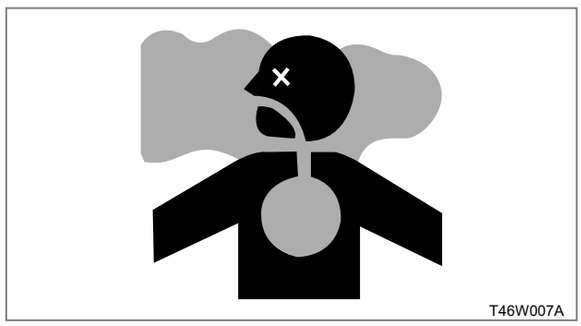
2.1 SAFETY GEAR



T46W006A

Wear safety gloves, safety shoes, ear protection, safety glasses, and a hard hat when working with a sub-compact tractor. Avoid wearing loose clothing or ties that could get caught in the machine.

2.2 WORK PLACE



T46W007A

A. VENTILATING SYSTEM

Service must be performed in a well-ventilated area. If the engine must be run in a closed place, exhaust gas ventilating system must be installed and operated in the workshop.

⚠ WARNING

- **California Proposition 65 Warning**

  Inhaling exhaust gas can cause cancer or damage the generative function leading to infertility.

B. SAFE WORKING PLACE



T46W008A

Make sure your work area is wide and level to prevent slips and falls.

C. ILLUMINATION

The workplace must be well lit. Use a work light when working in the dark or under the mower. Work lights must be covered with safety covers.

D. SAFETY EQUIPMENT

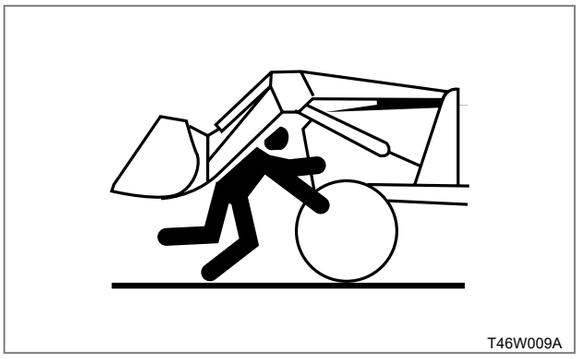
Always keep first aid kit and fire extinguisher nearby.

E. CLEAN WORKING AREA

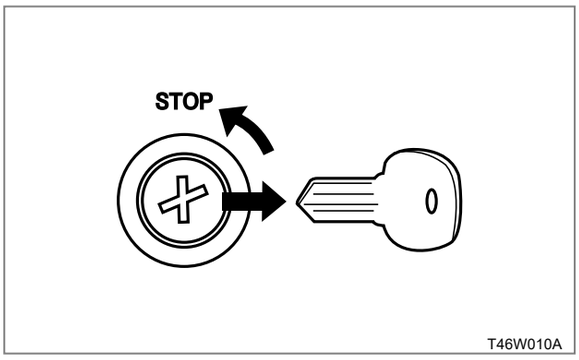
Keep your work area clean before and during work. Oil or fuel spills must be cleaned up immediately.

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2.3 SAFETY INSTRUCTIONS WHEN PREPARING TRACTOR


T46W009A

- Lower the implement on to the ground.



T46W010A

- If necessary, attach a “Do Not Operate” sign to your sub-compact tractor.

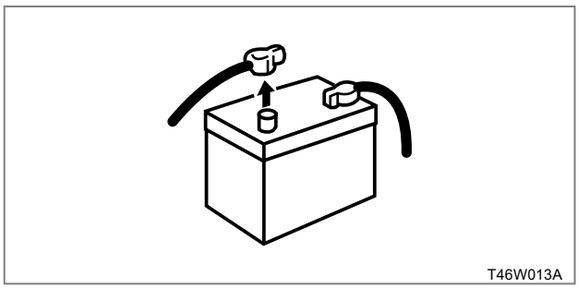
2.4 AVOID FIRES


T46W011A

- Never smoke in the workplace. Do not allow any open flames, especially when servicing the fuel system.


T46W012A

- No open flames allowed to the spray paint or fuel tank.


T46W013A

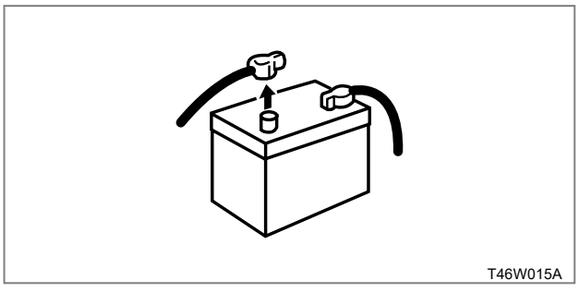
- Always disconnect the battery cable before servicing.
- Be extra cautious of fire when welding.


T46W014A

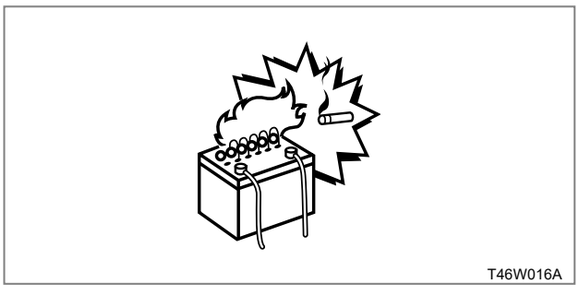
- Always keep a fire extinguisher in workshop.

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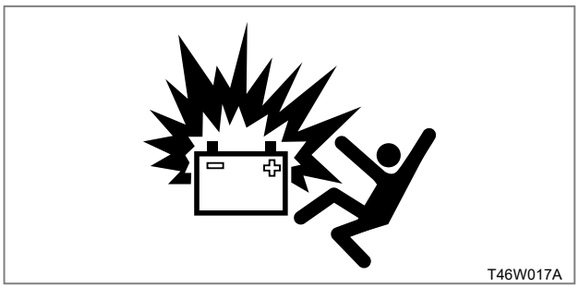
2.5 CAUTIONS WHEN HANDLING THE BATTERY


T46W015A

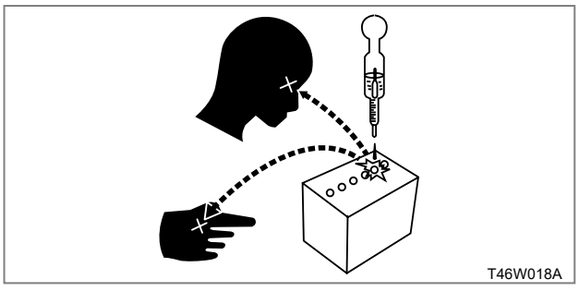
- Always disconnect the negative battery cable first and reconnect it last to avoid sparks from an accidental short circuit. You can get injured or fire may break out.


T46W016A

- Do not charge the frozen battery. Charging the frozen battery can cause explosion. Let the battery warmed up to ambient temperature (16°C, 60°F) before charging.

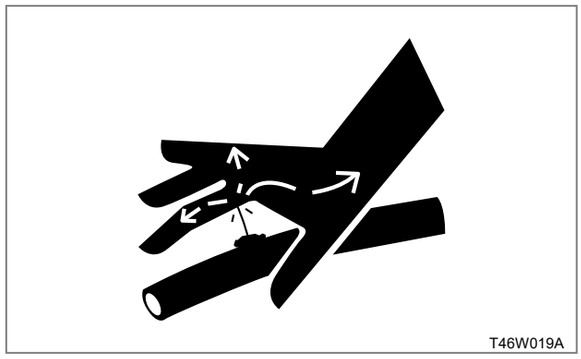

T46W017A

- Keep sparks and flames (match, lighter) away from the battery. The battery can explode due to the battery fluid.
- Never connect the battery's negative and positive cables with metal for test. Use only tester when checking the battery voltage.

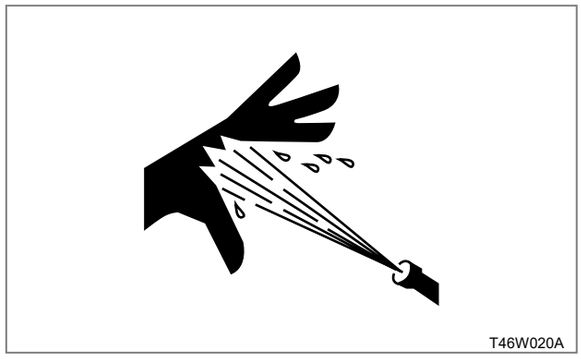

T46W018A

- The battery contains the acid that can burn you. When it contacts with your eyes, you may lose your sight.

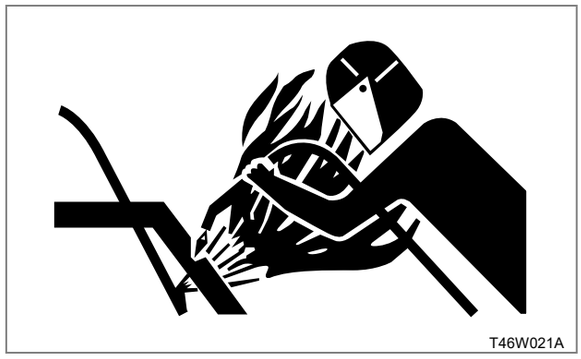
2.6 CAUTIONS FOR HIGH PRESSURE HOSES


T46W019A

- The hydraulic fluid leaked from high pressure hoses or pipes can penetrate your skin.


T46W020A

- Before connecting a high pressure hose or pipe, stop the engine and depressurize it by valve.
- Check the bolts for tightness before starting the engine after servicing the hydraulic system.
- Use a cardboard or plank when checking leakage.


T46W021A

- Never weld the high pressure pipe or the surrounding area. The pipe or hose can be heated and explode which can lead to fire or burn.

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2.7 USE OF APPROPRIATE TOOLS AND EQUIPMENT

- Use the air impact wrench only when unscrewing the bolts or nuts. Such wrench should not be used when assembly precisely machined parts which its tightening torque should be strictly observed.



T46W022A

- When lifting the tractor using a hydraulic jack or hoist, secure it firmly and install an auxiliary support. Do not work under the tractor unless both auxiliary supports and a hydraulic jack (or hoist) are installed.
- When using a hydraulic jack or hoist, do not exceed the load limit of the hydraulic jack, hoist, or lifting belt.
- Before using the hydraulic jack, make sure the hydraulic lock is working properly. Failure to do so may cause a serious accident.
- Check the buttons and operating direction of the hoist before using it. Improper operation can cause a serious accident.
- Do not use wooden blocks or bricks as support under the tractor. As the tractor's weight is continuously applied to them, they can be broken or collapsed.

2.8 HANDLING OF HAZARDOUS MATERIALS

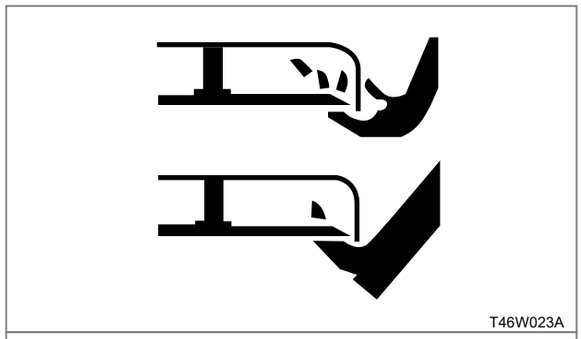
- Do not blow out hazardous substances such as clutch dust with compressed air. It is harmful to health if inhaled.

REMARK

- **All KIOTI's genuine parts contain no asbetos.**

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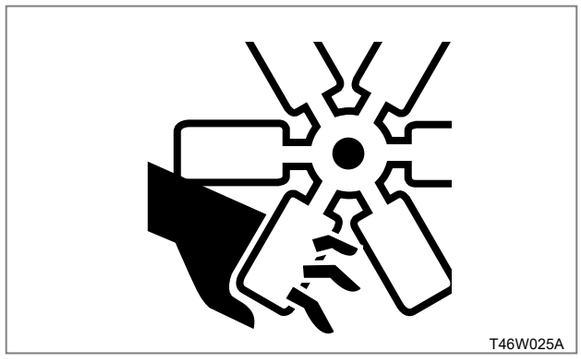
2.9 HANDLING OF ROTATING BLADE, SHAFT AND DRIVING BELT


T46W023A

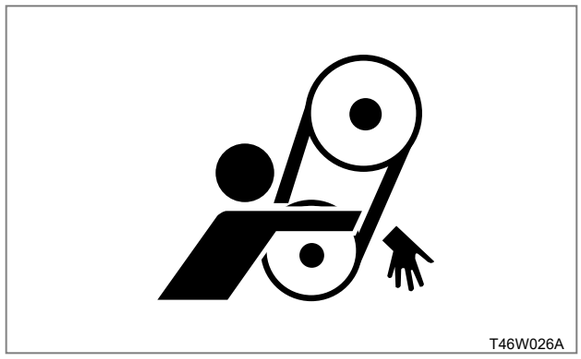

T46W024A

- Do not put your hands or feet into rotating parts such as blades or drive belts.

  Be extra careful when you wear loose-fitting clothes.

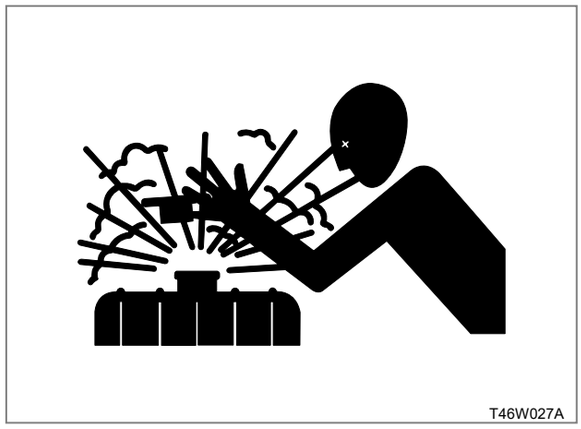

T46W025A

- Be careful not to get caught by the rotating engine cooling fan.

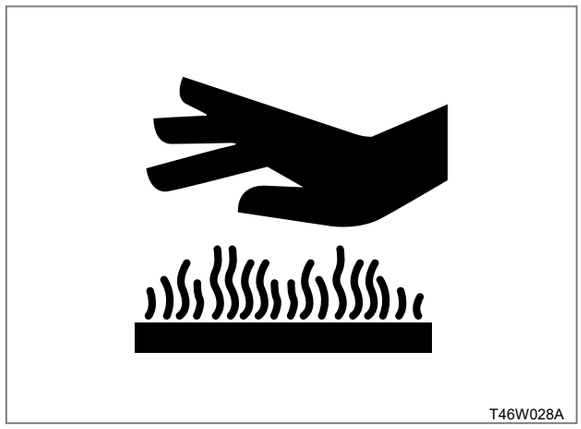

T46W026A

- You can be seriously injured if your hand or clothes is caught by the rotating fan belt or A/C belt.

2.10 PREVENTION OF SCALD


T46W027A

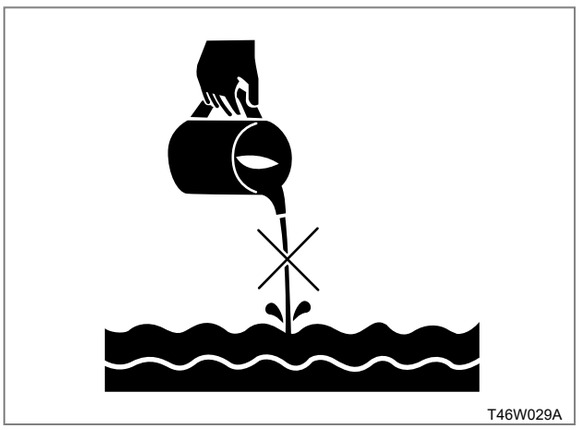
- Do not open the radiator cap when the radiator is hot. Hot coolant or steam can be surged leading to a serious scald.


T46W028A

- Check the surface temperature of the container before draining the engine oil, transmission fluid, coolant, etc. If it is hot, let it cool down before draining it. There is danger of burning.
- Perform any service on the engine parts (muffler, exhaust manifold, turbocharger, etc.) only when they are not hot.

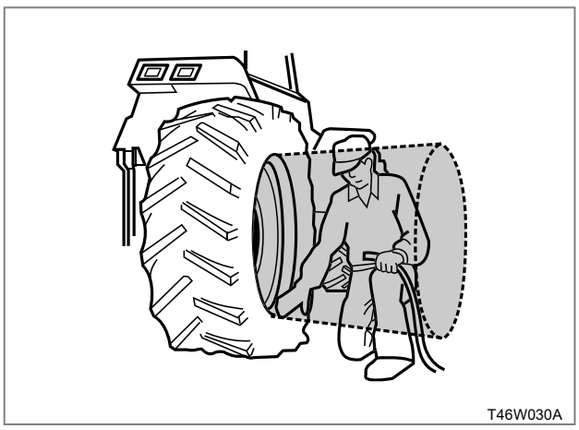
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2.11 DISPOSAL OF ENVIRONMENTAL WASTE

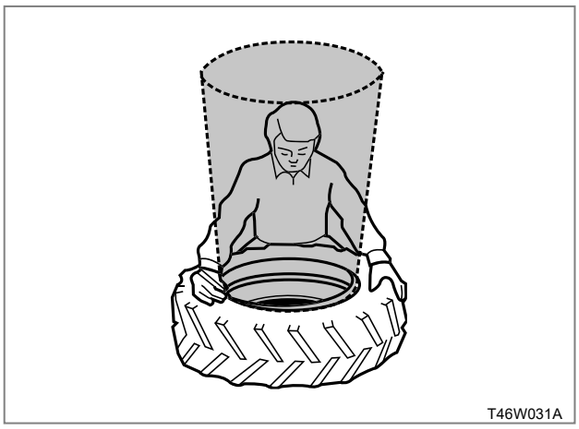

T46W029A

- Store used engine oil, transaxle oil, oil filters, etc. safely in a designated location in accordance with environmental protection regulations, and dispose of them at a designated collection agency. Careless disposal may result in severe penalties under environmental laws.

2.12 CAUTIONS WHEN HANDLING TIRES


T46W030A

- Since the tire may explode while inflating air, check for damage to the side of the tire and the appropriate air pressure before inflating. Stay out of the danger zone as shown in the picture.


T46W031A

- Since the tire may explode while inflating air, check for damage to the side of the tire and the appropriate air pressure before inflating.
- Check the tire for damage and wear, and check the tightening torque of the wheel bolts/nuts.

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3. SAFETY DECALS

- When replacing parts, be sure to install the appropriate safety decal as well. Otherwise, the customer's safety will be threatened.
- If a decal is damaged or detached, always replace with the appropriate decal.
- The decal and its attaching location are as follows.
- Part numbers appear at the bottom of decals.

3.1 LOCATION OF DECALS



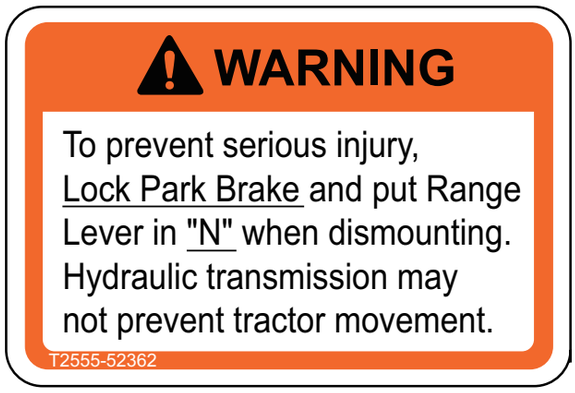
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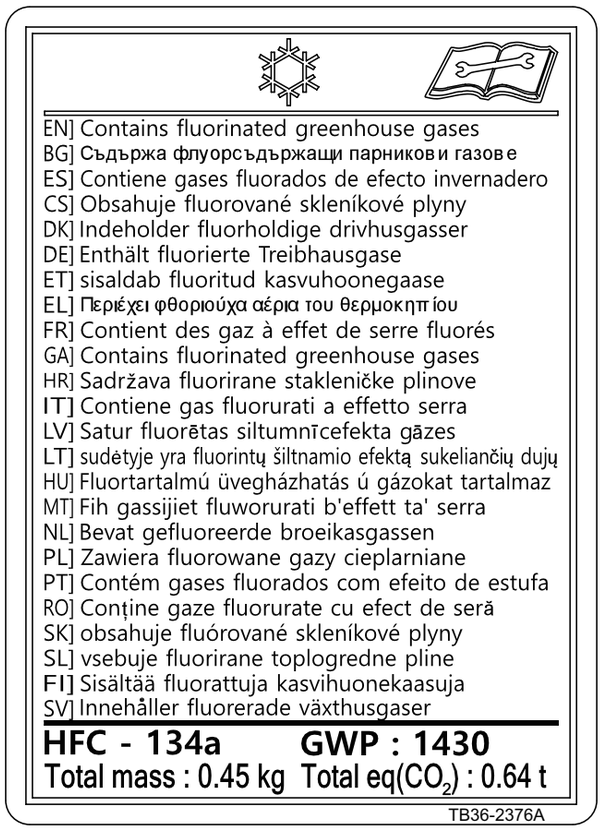


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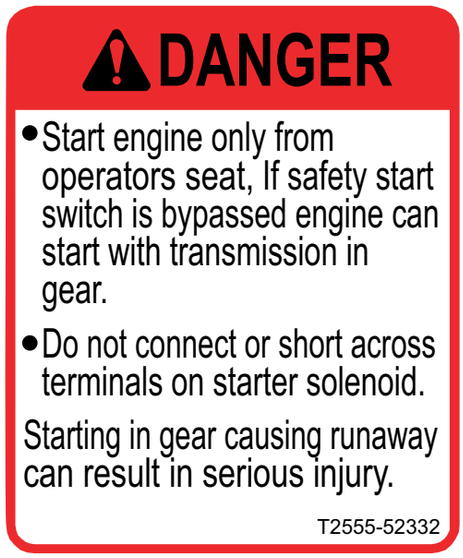
(1) Part No. : T2555-52362



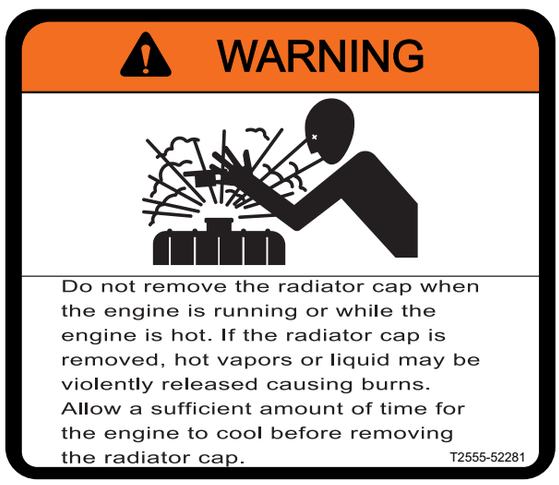
(2) Part No. : TB36-2376A (EU Only)



(3) Part No. : T2555-52332



(4) Part No. : T2555-52281

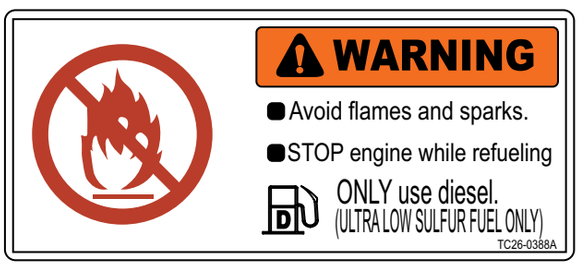


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(5) Part No. : T4625-52351



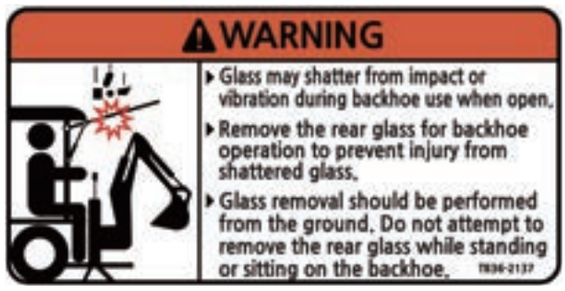
(6) Part No. : TC26-0388A



(7) Part No. : TF26-1786A (EU Only)

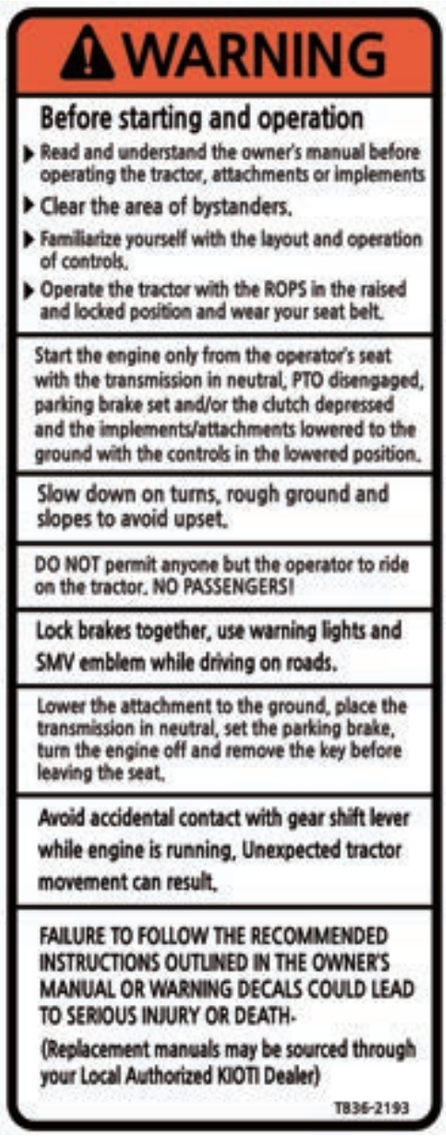


(8) Part No. : TB36-2137

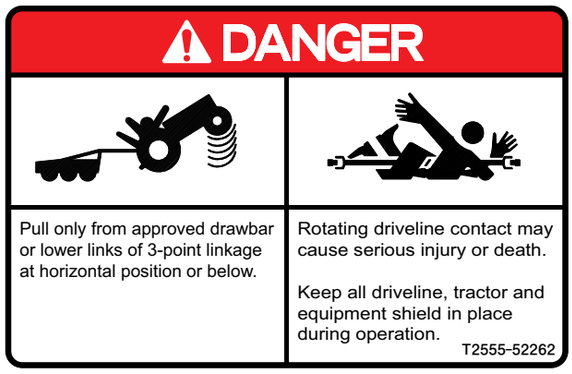


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(9) Part No. : TB36-2193



(10) Part No. : T2555-52262



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3.2 SAFETY DECAL LOCATIONS

IMPORTANT

- **Warning decals are visible when getting on backhoe. Refer to the left and right hands used in this manual, It's the position of the operator when seated in the operating position of backhoe.**

3.3 CARE OF SAFETY DECALS

1. Keep safety decals clean and free of obstructing material.
2. Clean safety decals with soap and water and dry with a soft cloth.
3. Replace damaged or missing safety decals with new decals from your Kioti Dealer.
4. If a component with a safety decal(s) affixed is replaced with a new part, make sure new safety decal(s) are attached in the same location(s) as the replaced components.
5. Mount new safety decals by applying on a clean dry surface and pressing air bubbles to outside edges.

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GENERAL

CHAPTER 2

TABLE OF CONTENTS

1. IDENTIFICATION NUMBER.....2-2
- 1.1 Tractor serial number location.....2-2
- 1.2 Engine serial number location.....2-2
- 1.3 Transmission number.....2-2

2. DIMENSIONS 2-3

3. SPECIFICATIONS.....2-4

4. POWER FLOW.....2-6

5. DRIVING SPEED.....2-7
- 5.1 Gear arrangement.....2-7
- 5.2 Speed ratio (engine vs. rear axle).....2-10
- 5.3 Rear tire rolling circumference 2-10
- 5.4 Calculation of driving speed 2-10
- 5.5 Driving speed table 2-11
- 5.6 Reverse driving speed 2-11

6. RELATIVE SPEED RATIO OF FRONT WHEELS 2-12
- 6.1 Calculation for relative speed ratio of front wheels.....2-12
- 6.2 How to measure the actual rolling circumference.....2-15

7. MAINTENANCE 2-16
- 7.1 Maintenance schedule chart 2-16
- 7.2 Lubrication list 2-18

8. TIRES 2-19
- 8.1 Specified inflation pressure 2-19
- 8.2 Tightening torque for tire bolts.....2-19

9. TIGHTENING TORQUE 2-20
- 9.1 General use screws, bolts and nuts 2-20
- 9.2 Stud bolts 2-20
- 9.3 American standard screws, bolts and nuts with UNC or UNF threads.....2-21

10. PART NUMBER ASSIGNMENT STANDARD FOR KIOTI BOLTS AND NUTS 2-22
- 10.1 Bolts 2-22
- 10.2 Nuts.....2-23

11. UNIT CONVERSION TABLE.....2-24

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 1 2025-03-21 오후 2:52:13

1. IDENTIFICATION NUMBER

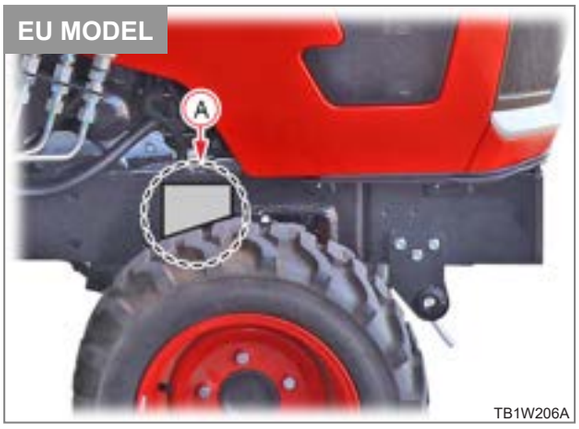
1.1 TRACTOR SERIAL NUMBER LOCATION

US MODEL



TB1W201A

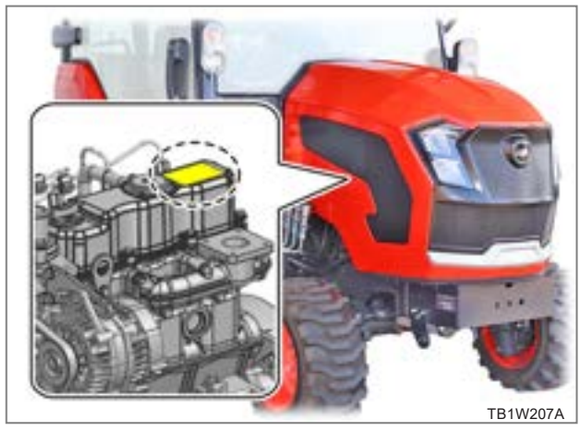
EU MODEL



TB1W206A

The tractor's serial number plate (A) is located on the right side of front axle frame.

1.2 ENGINE SERIAL NUMBER LOCATION

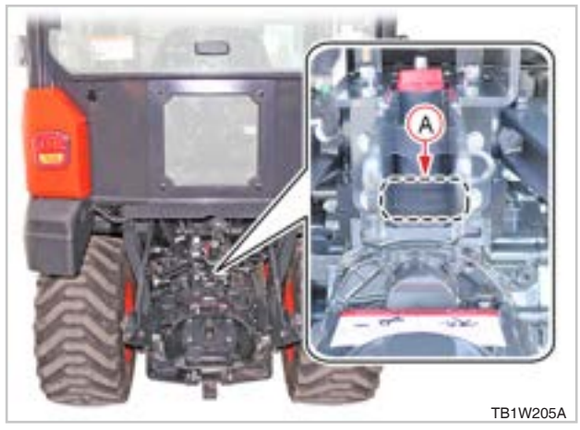

TB1W207A

The engine number is engraved on the cylinder head cover.

REMARK

- **For detailed information on how the engine number is assigned, refer to chapter "Engine".**

1.3 TRANSMISSION NUMBER

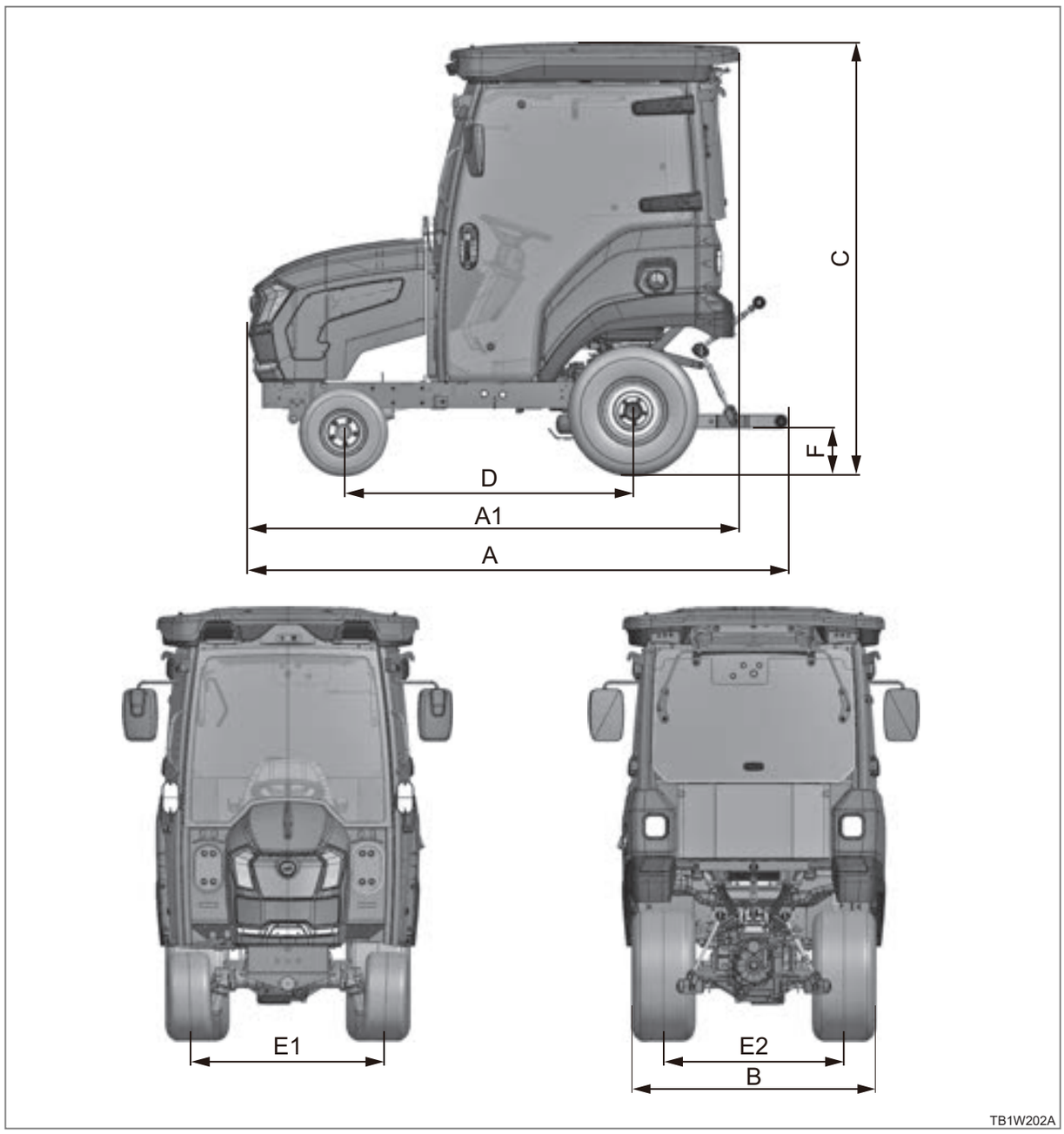


TB1W205A

The transmission number (A) is stamped on the rear side of hydraulic cylinder.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 2 2025-03-21 오후 2:52:14

2. DIMENSIONS



mm (in.)

ITEM		CS2530CH / CS2530CH-EU
A : Overall length		2,720 (107.09)
A1: Overall length		2,385 (93.9)
B : Overall width		1,228 (48.3)
C : Overall height		2,100 (82.7)
D : Wheel base		1,400 (55.1)
E : Tread	E1: Front	923 (36.3)
	E2: Rear	924 (36.4)
F : Min. ground clearance		162 (6.4)

※ Applied with IND. tire

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 3 2025-03-21 오후 2:52:14

3. SPECIFICATIONS

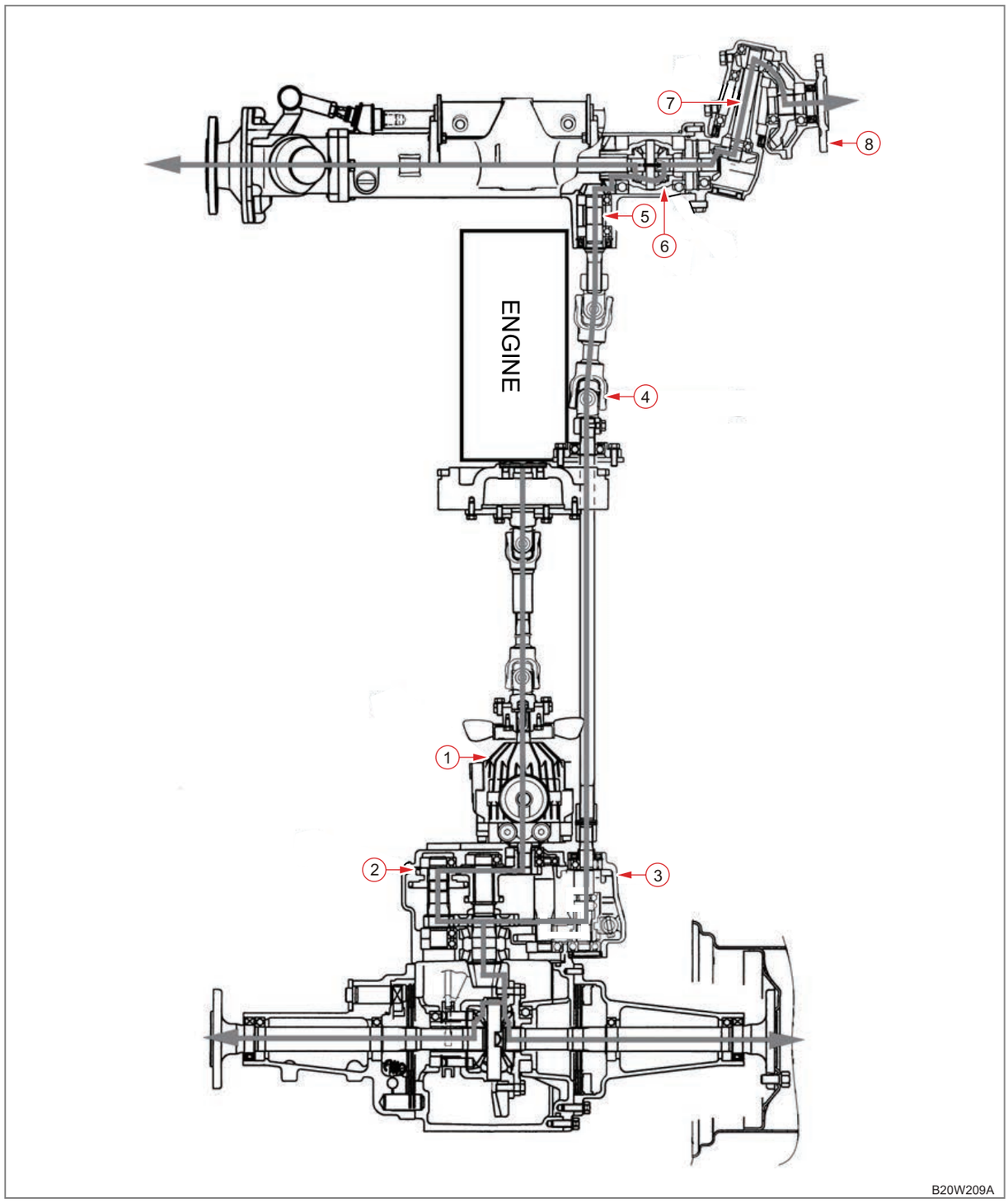
MODEL			CS2530CH/ CS2530CH-EU
Engine	Model		3L123-TH4A
	Number of cylinders		3
	Total displacement cc(cu in.)		1,233 (75.17)
	Bore and stroke mm (in.)		75 X 76 (2.95 X 2.99)
	Engine gross power HP (kw)		24.5 (18.3)
	Rated revolution rpm		3,000
Capacities	Engine crankcase(included filter) ℓ (u.s.gal)		3.7 (0.98)
	Engine coolant ℓ (u.s.gal)		3.5 (0.92)
	Fuel tank capacity ℓ (u.s.gal)		25.5 (6.7)
	Transmission case ℓ (u.s.gal)		10.4 (2.75)
	Front axle ℓ (u.s.gal)		2.0 (0.53)
Drive train	Clutch		None
	Transmission	Type	HST
		Main	Infinite
		Range	2 range (High/Low)
		Speeds	CVT
	Ground speed (Tire for IND, Agr) km/h (mph)	Forward	0 ~ 23.29 (0 ~ 14.47)
		Reverse	0 ~ 15.93 (0 ~ 9.9)
	4-wheel drive		Mechanical with shift lever
	Brake		Wet multiple discs
	Differential lock		Rear standard
Tires	Turf	Front	18x8.5-10 R3 (8PR)
		Rear	26x12.00-12 R3 (8PR)
	Industrial	Front	18x8.5-10 R4 (8PR)
		Rear	26x12.00-12 R4 (8PR)
Hydraulic system	Pump capacity ℓ/min (gpm)		26.4 (6.97)
	Steering		Power Steering
	Hydraulic lift control		Inching
	3-point hitch		SAE Category I
	Max. lifting capacity kg (lbs.)	24in.Behind	449 (990)
		Lift link end	669 (1,475)
PTO	Rear	Type	Independent
		PTO shaft	1-3/8″ 6 splines
		Speed (PTO rpm/ engine rpm)	559 / 3,000 (540 / 2,903)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 4 2025-03-21 오후 2:52:14

MODEL			CS2530CH/	CS2530CH-EU
PTO	Mid (optional)	PTO shaft	16/32″ 15 splines	
		Speed (PTO rpm/ engine rpm)	2,040 / 3,000 (2,100 / 3,088)	
Battery			X	Standard
Min. turning radius (with one rear wheel braked) m (feet)			2.54 (8.33)	
Weight (with Cabin) kg (lbs.)			1,090 (2,403)	
Remote hydraulic valve with front or rear couplers EA			1 (Option)	

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 5 2025-03-21 오후 2:52:14

4. POWER FLOW



(1) HST (HST model)
Middle case (Mechanical model)
(2) Range slide gear
(3) FWD case
(4) FWD joint
(5) Sprial pinion
(6) Differential assembly
(7) Bevel gear case
(8) Front axle

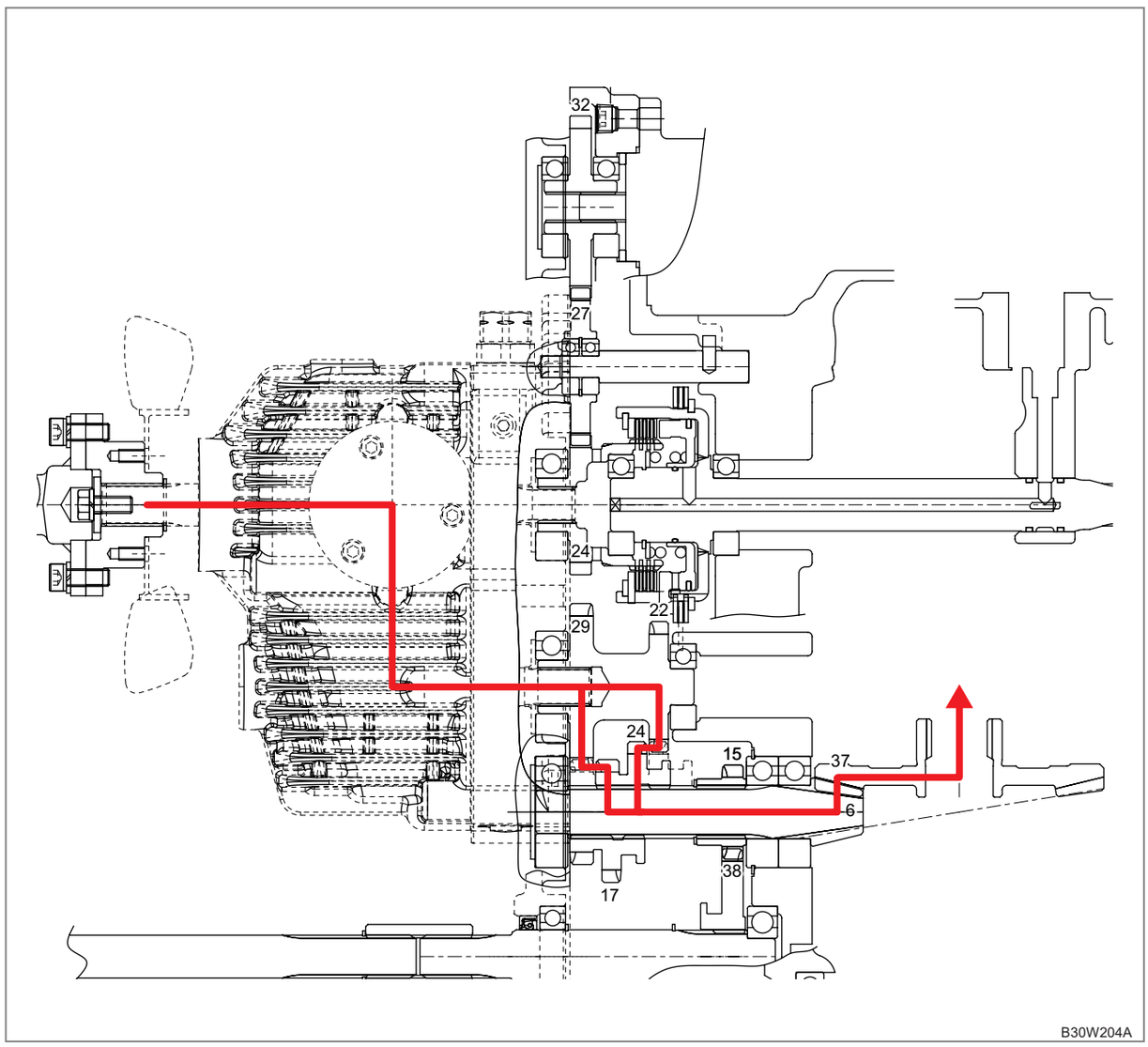
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 6 2025-03-21 오후 2:52:14

5. DRIVING SPEED

5.1 GEAR ARRANGEMENT

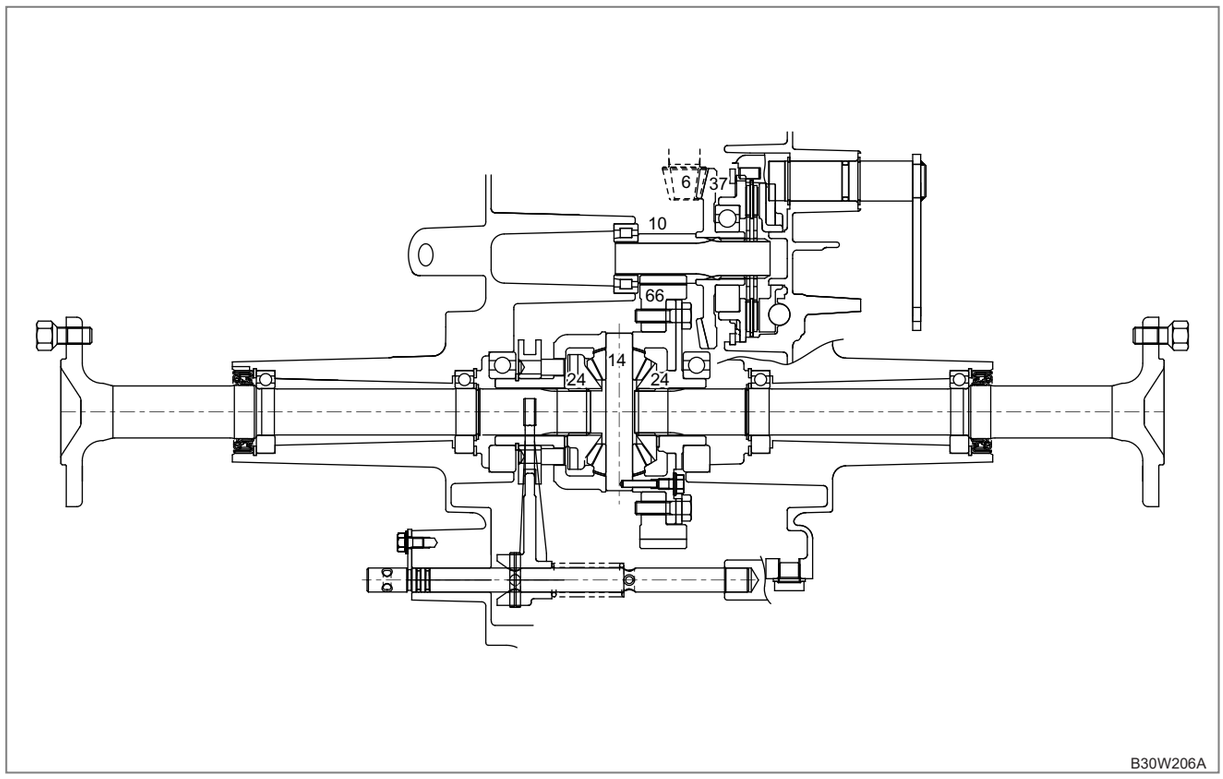
To calculate the driving speed, the rotating ratios for each gear should be calculated based on the gear arrangement of the transmission and the rear axle beforehand.

GEAR ARRANGEMENT OF TRANSMISSION



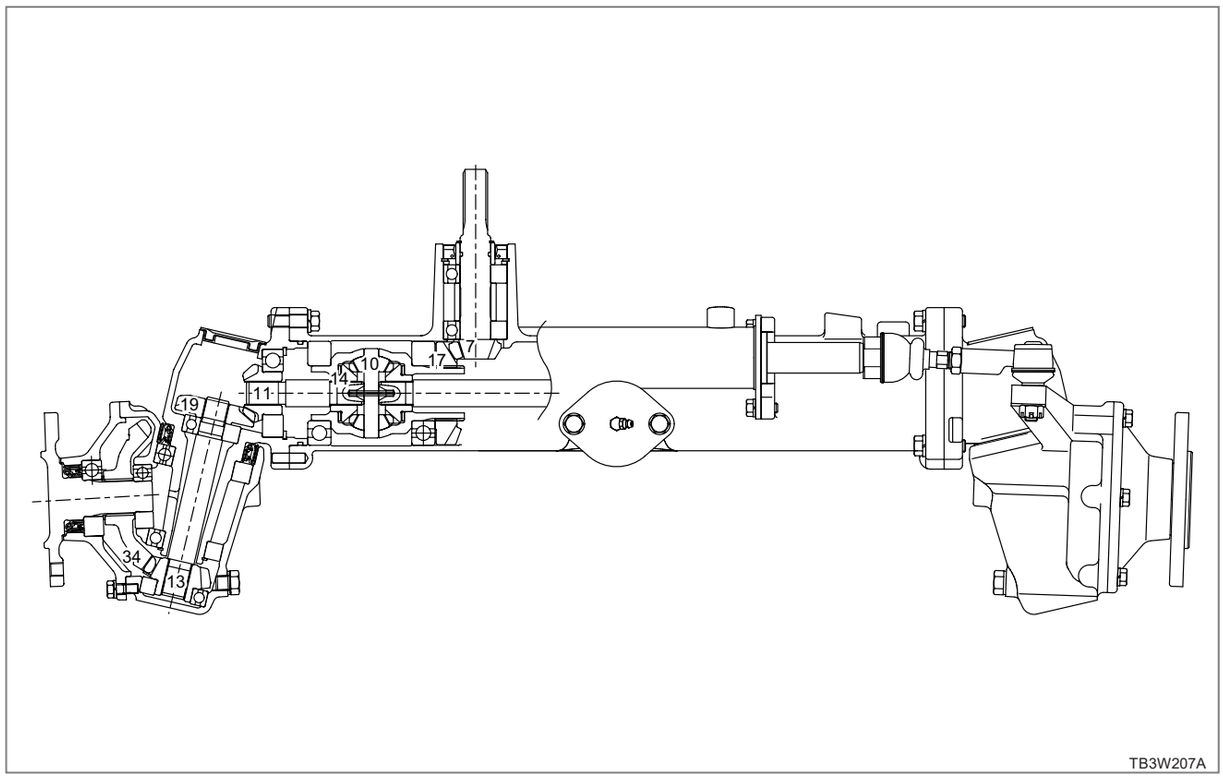
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 7 2025-03-21 오후 2:52:14

GEAR ARRANGEMENT OF REAR AXLE



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 8 2025-03-21 오후 2:52:15

GEAR ARRANGEMENT OF FRONT AXLE



ARRANGEMENT OF MAIN SHIFT GEAR AND REAR AXLE GEARS

HST (Transfer efficiency)*	Range shift	Spiral bevel	Idler
0.85 / 1	H: 29 / 17	6 / 37	10 / 66
	L: 22 / 24		

* The minimum transfer efficiency of HST is 85%.

• Example for calculating the rotating speed ratio of rear axle (forward, high speed)

HST		High speed		Spiral bevel pinion		Idler		
0.85 / 1	x	29 / 17	x	6 / 37	x	10 / 66	=	0.03563

= Rotating speed of rear axle / engine rpm

Example) Rotating speed of rear axle (at engine speed of 3,200 rpm): 3,200 x 0.03563 = 114 rpm

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 9 2025-03-21 오후 2:52:15

5.2 SPEED RATIO (ENGINE VS. REAR AXLE)

Speed	Gear	Speed ratio
Low range	Max. speed of HST	0.01914
High range	Max. speed of HST	0.03563

5.3 REAR TIRE ROLLING CIRCUMFERENCE

Tire	Rear tire specification	Rolling circumference	
		Inch	m
Turf Ind.	26x12.00-12 R3 (8PR)	74	1.880
Ind.	26x12.00-12 R4 (8PR)	94.4	2.398

- The rear tire specifications and tire circumference are specified by the tire manufacturer based on the inflation pressure of the standard tire and the standard load application. Therefore, the actual circumference may be different depending on conditions and it is recommended to measure the actual circumference (Refer to 6.2 of this chapter).
- Incase there is no rolling circumference suggested by tire manufacturer, 95% of tire out-diameter is generally accepted as a rolling circumference.

5.4 CALCULATION OF DRIVING SPEED

$$\text{Driving speed (km/h)} = \text{Rear axle rpm} \times \text{Rolling circumference of rear wheels} \times \frac{60}{1000}$$

$$= \text{Engine rpm} \times \text{Rotating speed ratio of rear axle} \times \text{Rolling circumference of rear wheels} \times \frac{60}{1000}$$

Example 1) What is the speed for the forward, high speed at 3,200 rpm with TURF tires of HST model?

Answer: $\text{Driving speed} = 3{,}200 \times 0.03563 \times 1.88 \times \frac{60}{1000}$

$= 12.86 \text{ km/h} = 7.99 \text{ MPH}$

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 10 2025-03-21 오후 2:52:15

5.5 DRIVING SPEED TABLE

FORWARD DRIVING SPEED TABLE (AT 3,200 RPM)

Speed and gear		Turf / Ind. 26x12.00-12 R3 (8PR)	
		km/h	MPH
Low speed	HST Full speed	7.56 / 7.77	4.70 / 4.83
High speed	HST Full speed	14.06 / 14.47	8.74 / 8.99

5.6 REVERSE DRIVING SPEED

Speed and gear		Turf / Ind. 26x12.00-12 R3 (8PR)	
		km/h	MPH
Low speed	HST Full speed	5.22 / 5.37	3.24 / 3.34
High speed	HST Full speed	9.71 / 9.99	6.03 / 6.21

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 11 2025-03-21 오후 2:52:15

6. RELATIVE SPEED RATIO OF FRONT WHEELS

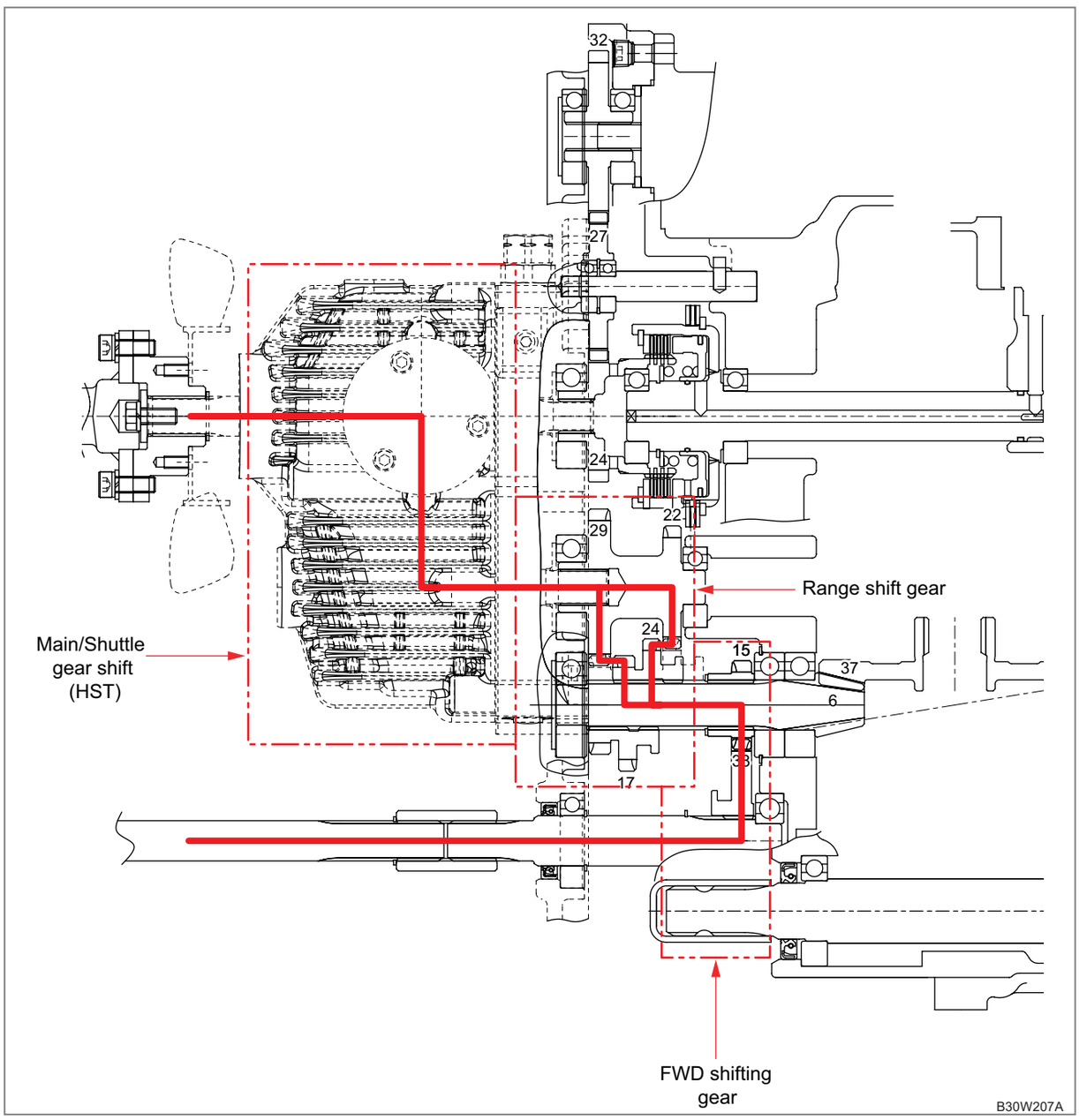
It is ideal to set the speed of the front wheels is 1 ~ 5% faster than the rear wheels when the front wheel drive is in operation. However, some tires may not fulfill this condition. Therefore, DAEDONG allows -1 ~ 7% of the relative speed ratio for front wheels.

If this relative speed ratio is not proper during driving with front wheel drive, the tractor may not be driven straight forward and the mechanical shift system may not be disengaged. Also, the durable life of front tire, the gears for front axle or the drive train system for front axle may be affected.

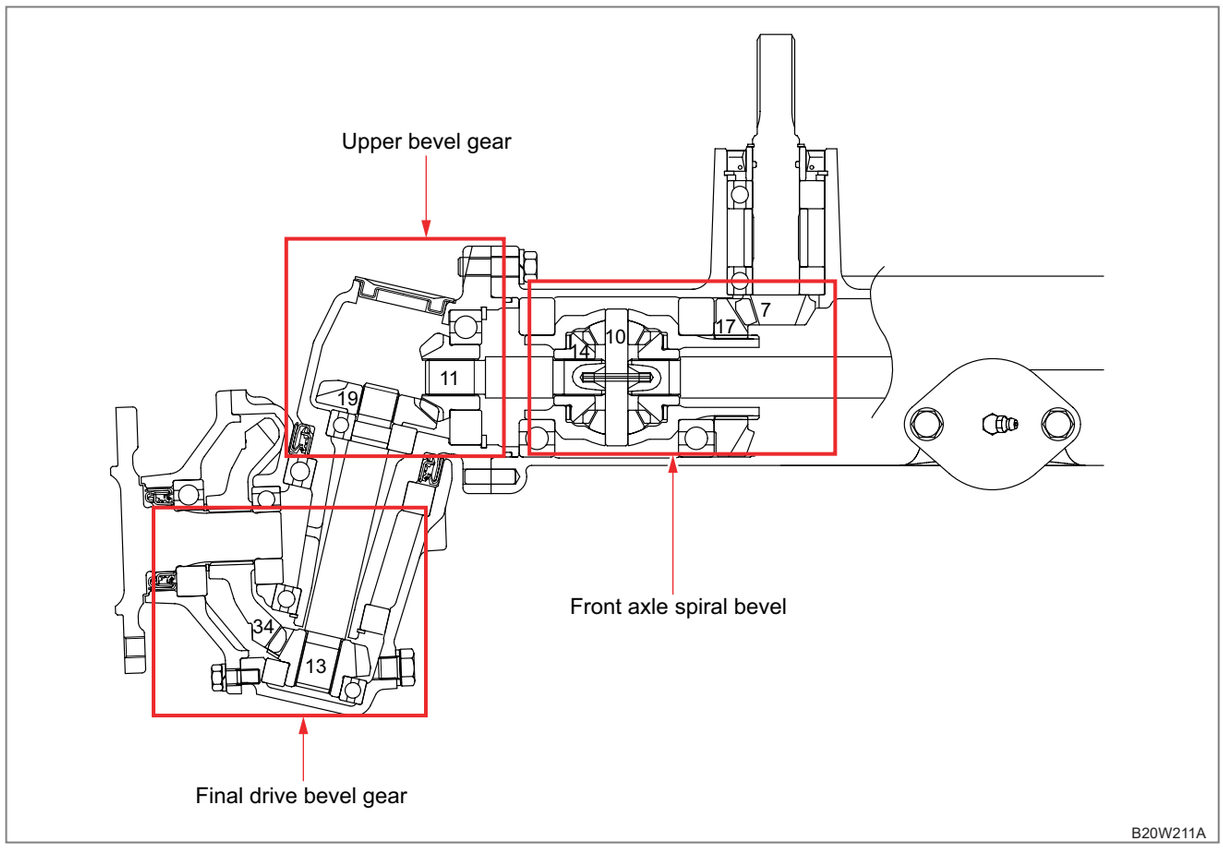
6.1 CALCULATION FOR RELATIVE SPEED RATIO OF FRONT WHEELS

The relative speed ratio for front wheel is calculated as follows:

The speed ratio between the front axle and the rear axle is calculated with the gear arrangement of the transmission and the front axle.



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 12 2025-03-21 오후 2:52:15



▶ **FIRSTLY, CALCULATE THE SPEED REDUCTION RATIO OF THE FRONT AXLE REFERRING TO THE ARRANGEMENT TABLE OF THE MAIN GEAR SHIFT AND FRONT AXLE GEAR.**

MAIN GEAR SHIFT - ARRANGEMENT OF FRONT AXLE GEARS

HST (transfer efficiency)*	Range shift	FWD shifting	Front axle spiral bevel	Upper bevel	Final drive bevel gear
$\frac{0.85}{1}$	H: $\frac{29}{17}$	$\frac{15}{38}$	$\frac{7}{17}$	$\frac{11}{19}$	$\frac{13}{34}$
	L: $\frac{22}{24}$				

Example) What is the speed ratio of the front axle for high speed?

$$\frac{0.85}{1} \times \frac{29}{17} \times \frac{15}{38} \times \frac{7}{17} \times \frac{11}{19} \times \frac{13}{34} = 0.05217$$

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 13 2025-03-21 오후 2:52:15

▶ CALCULATE THE GEAR REDUCTION RATIO OF THE REAR AXLE REFERRING TO THE ARRANGEMENT TABLE OF THE MAIN GEAR SHIFT AND REAR AXLE GEARS IN PAGE 2-9.

Example) What is the speed ratio of the rear axle for high speed? (0.03835 based on the table in page 2-9)

Since

$$\frac{\text{Front wheel rotating ratio}}{\text{Rear wheel rotating ratio}} = \frac{\text{Front axle speed reduction ratio}}{\text{Rear axle speed reduction ratio}}$$ is,

$$\frac{0.05217}{0.03563} = 1.4642$$

Therefore, the relative speed ratio for front wheel = (speed of front wheels ÷ speed of rear wheels)

$$= \frac{\text{Rolling circumference of front wheels x rotating ratio}}{\text{Rolling circumference of rear wheels}}$$

Example) What is the relative speed ratio of the front wheels based on the above formula?

Answer) Rotating ratio between the front and rear wheels = 1.4642

Circumference of front wheel = 53 in.

Circumference of rear wheel = 74 in.

$$\frac{53 \times 1.4642}{74} = 1.049 \rightarrow$$ The front wheels rotate 4.9% faster than the rear wheels.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 14 2025-03-21 오후 2:52:15

6.2 HOW TO MEASURE THE ACTUAL ROLLING CIRCUMFERENCE

The tire rolling circumference in the tire catalogue supplied by the manufacturer may differ from the actual rolling circumference. Therefore, follow below procedures to measure the actual rolling circumference.

1. Adjust the inflation pressure of the front and rear tires to the specified pressure.
2. Park the tractor on a firm and level ground.
3. Disengage the front wheel drive.
4. Mark on the rear tire and the ground where they meet.
5. Move the tractor until the marks on the tire meet ground again. Be sure to move the tractor straight.
6. Make a second mark on the ground where the mark of tire meets.
7. Measure the distance between two marks on the ground.
8. The rolling circumference for the front tires can be measured with the same method. However, the front wheel drive function should be disengaged.
9. Calculate the relative speed ratio of the front wheels based on the measured rolling circumference value as follows:

$$\frac{\text{Front wheel rolling circ. x speed ratio}}{\text{Rear wheel rolling circ.}}$$

10. If necessary, install the most frequently used implement or a weight and repeat the same test.
11. If the relative speed ratio of the front wheels is over the specified value, check the tires for inflation pressure, deformation and specifications.
    - Specified relative speed ratio for front wheels: 1 ~ 5%
    - Allowable relative speed ratio for front wheels: -1 ~ 7%

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 15 2025-03-21 오후 2:52:15

7. MAINTENANCE

7.1 MAINTENANCE SCHEDULE CHART

No.	Item \ Maintenance interval		Run hour									Run age		Remarks	
			50	100	200	250	400	600	800	1500	3000	1 year	2 years		
1	Engine oil	Change	⊙			●						●			
		Check	◉												
2	Engine oil filter	Change	⊙			●						●			
		Check	◉												
3	Transmission oil filter	Replace	⊙		●										
4	HST oil filter	Replace	⊙		●										
5	Transmission fluid	Change					●								
6	Front axle oil	Change	⊙				●								
7	Front axle pivot	Adjust						●							
8	Engine start system	Check	●												
9	Greasing	Apply	●												
10	Wheel bolt torque	Check	●												
11	Battery condition	Check		●										*3	
12	Air cleaner element	Clean		●										*1	#
		Replace										●		*2	
13	Fuel filter element	Replace			●										#
14	Fan belt/Air con belt	Adjust		●										*3	
15	Brake pedal free play	Adjust		●											
16	Radiator hose and clamp	Check			●										
		Replace											●		
17	Power steering hose and oil line	Check			●										
		Replace											●		
18	Fuel line	Check		●											#
		Replace											●		
19	Intake air hose	Check			●										
		Replace											●	*3	
20	Toe-in	Adjust			●										
21	Engine valve clearance	Adjust							●						
22	Fuel injection nozzle injection pressure	Check								●					#
23	Injection pump	Check									●				#
24	Cooling system	Clean											●		

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 16 2025-03-21 오후 2:52:16

No.	Item	Maintenance interval	Run hour									Run age		Remarks	
			50	100	200	250	400	600	800	1500	3000	1 year	2 years		
25	Coolant	Replace											●		
26	Fuel system	Check												*3	
27	Fuse	Replace												*3	
28	Light LED	Replace												*3	
29	Tire pressure	Check												*3	
30	Cabin filter	Replace										●			

IMPORTANT

ENGINE OIL & ENGINE OIL FILTER

● Replace: Replace every (replace) hours or every years (whichever comes first)
◉ Check & Refueling: Check every 50 hours and refueling if required.

IMPORTANT FOR INTERVAL

- **O must be performed after the initial 50 hours of operation.**
  ***1 The air cleaner should be cleaned more frequently a in dusty condition than in a normal condition.**
  ***2 Every year or every 5 times of cleaning.**
  ***3 Replace only if necessary.**
- **The items listed above (# marked) are registered as emission related critical parts by KIOTI in the U.S.EPA exhaust emission standards non-road emission regulation.**
  As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 17 2025-03-21 오후 2:52:16

7.2 LUBRICATION LIST

NO.	ITEM	CAPACITY	LUBRICANTS
1	Fuel	25.5 ℓ (6.73 u.s. gal.)	Ultra-low sulfur diesel (Sulfur content: 15 ppm or less)
2	Coolant	3.5 ℓ (0.92 u.s. gal.)	An antifreezing solution(Ethylene glycol) + Pure water (50:50)
3	Engine oil (Included filter)	3.7 ℓ (0.98 u.s. gal.)	Oil Viscosity : SAE 15W-40, API CK-4 class or higher
4	Transmission oil	10.4 ℓ (2.75 u.s. gal.)	DAEDONG: UTF55 Shell: DONAX-TD Exxonmobil: Mobilfluid 424 Exxon Hydraul 560 BP: Tractran UTH
5	Front axle oil	2.0 ℓ (0.53 U.S.gal.)	SAE 90 gear oil or better, or same as T/M oil
6	Grease • Front axle Support • Brake pedal • Brake lever • Top link holder • Control lever	Until grease comes out from gaps except grease nipple	SAE multi-purpose type grease

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 18 2025-03-21 오후 2:52:16

8. TIRES

8.1 SPECIFIED INFLATION PRESSURE

Tires	Turf		Industrial	
	Front	Rear	Front	Rear
Type	18x8.5-10 R3 (8PR)	26x12.00-12 R3 (8PR)	18x8.5-10 R4 (8PR)	26x12.00-12 R4 (8PR)
Inflation pressure	1.5 kgf/cm^2 150 kPa 22 psi	1.4 kgf/cm^2 140 kPa 20 psi	1.5 kgf/cm^2 150 kPa 22 psi	1.4 kgf/cm^2 140 kPa 20 psi

REMARK

- **Maintain the maximum pressure in front tires, if using a front loader.**

8.2 TIGHTENING TORQUE FOR TIRE BOLTS

WHEEL BOLTS



TB1W203A



TB1W204A

A. TIGHTENING TORQUE

Item		Tightening torque
Front wheel	wheel bolt (1)	88 Nm 8.98 kgf-m 64.6 lb-ft
Rear wheel	wheel bolt (2)	122 Nm 12.45 kgf-m 89.6 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 19 2025-03-21 오후 2:52:16

9. TIGHTENING TORQUE

9.1 GENERAL USE SCREWS, BOLTS AND NUTS

If the tightening torques are not specified for some screws, bolts and nuts in this manual, tighten them according to the table below.

Mark on bolt head	4 No-grade or 4T						7 7T						9 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Code \ Unit	Nm	kgf-m	lb-ft	Nm	kgf-m	lb-ft	Nm	kgf-m	lb-ft	Nm	kgf-m	lb-ft	Nm	kgf-m	lb-ft
M6 (6 mm, 0.24 in.)	7.85 ~ 9.31	0.80 ~ 0.95	5.79 ~ 6.87	7.85 ~ 8.82	0.80 ~ 0.90	5.79 ~ 6.50	9.81 ~ 11.2	1.00 ~ 1.15	7.24 ~ 8.31	7.85 ~ 8.82	0.80 ~ 0.90	5.79 ~ 6.50	12.3 ~ 14.2	1.25 ~ 1.45	9.05 ~ 10.4
M8 (8 mm, 0.31 in.)	17.7 ~ 20.5	1.8 ~ 2.1	13.1 ~ 15.1	16.7 ~ 19.6	1.7 ~ 2.0	12.3 ~ 14.4	23.6 ~ 27.4	2.4 ~ 2.8	17.4 ~ 20.2	17.7 ~ 20.5	1.8 ~ 2.1	13.1 ~ 15.1	29.5 ~ 34.3	3.0 ~ 3.5	21.7 ~ 25.3
M10 (10 mm, 0.39 in.)	39.3 ~ 45.1	4.0 ~ 4.6	29.0 ~ 33.2	31.4 ~ 34.3	3.2 ~ 3.5	23.2 ~ 25.3	48.1 ~ 55.8	4.9 ~ 5.7	35.5 ~ 41.2	39.3 ~ 44.1	4.0 ~ 4.5	29.0 ~ 32.5	60.9 ~ 70.6	6.2 ~ 7.2	44.9 ~ 52.0
M12 (12 mm, 0.47 in.)	62.8 ~ 72.5	6.4 ~ 7.4	46.3 ~ 53.5				77.5 ~ 90.2	7.9 ~ 9.2	57.2 ~ 66.5	62.8 ~ 72.5	6.4 ~ 7.4	46.3 ~ 53.5	103 ~ 117	10.5 ~ 12.0	76.0 ~ 86.7
M14 (14 mm, 0.55 in.)	108 ~ 125	11.0 ~ 12.8	79.6 ~ 92.5				124 ~ 147	12.6 ~ 15.0	91.2 ~ 108				167 ~ 196	17.0 ~ 20.0	123 ~ 144
M16 (16 mm, 0.63 in.)	167 ~ 191	17.0 ~ 19.5	123 ~ 141				197 ~ 225	20.0 ~ 23.0	145 ~ 166				260 ~ 304	26.5 ~ 31.0	192 ~ 224
M18 (18 mm, 0.71 in.)	246 ~ 284	25.0 ~ 29.0	181 ~ 209				275 ~ 318	28.0 ~ 32.5	203 ~ 235				344 ~ 402	35.0 ~ 41.0	254 ~ 296
M20 (20 mm, 0.79 in.)	334 ~ 392	34.0 ~ 40.0	246 ~ 289				368 ~ 431	37.5 ~ 44.0	272 ~ 318				491 ~ 568	50.0 ~ 58.0	362 ~ 419

9.2 STUD BOLTS

Material of opponent part	Ordinariness			Aluminum		
Diameter \ Unit	Nm	kgf-m	lb-ft	Nm	kgf-m	lb-ft
M8 (8 mm, 0.31 in.)	11.6 ~ 15.6	1.2 ~ 1.6	8.68 ~ 11.5	8.82 ~ 11.6	0.90 ~ 1.2	6.51 ~ 8.67
M10 (10 mm, 0.39 in.)	24.6 ~ 31.3	2.5 ~ 3.2	18.1 ~ 23.1	19.7 ~ 25.4	2.0 ~ 2.6	14.5 ~ 18.8
M12 (12 mm, 0.47 in.)	29.5 ~ 49.0	3.0 ~ 5.0	21.7 ~ 36.1	31.4	3.2	23.1

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 20 2025-03-21 오후 2:52:16

9.3 AMERICAN STANDARD SCREWS, BOLTS AND NUTS WITH UNC OR UNF THREADS

Grade / Unit / Diameter	SAE GR.5			SAE GR.5		
	Nm	kgf-m	lb-ft	Nm	kgf-m	lb-ft
5/16	23.1 ~ 27.8	2.35 ~ 2.84	17.0 ~ 20.5	32.5 ~ 39.3	3.31 ~ 4.01	24.0 ~ 29.0
3/8	47.5 ~ 57.0	4.84 ~ 5.82	35.0 ~ 42.0	61.0 ~ 73.2	6.22 ~ 7.47	45.0 ~ 54.0
1/2	108.5 ~ 130.2	11.07 ~ 13.29	80.0 ~ 96.0	149.2 ~ 179.0	15.22 ~ 16.27	110.0 ~ 132.0
9/16	149.2 ~ 179.0	15.22 ~ 18.27	110.0 ~ 132.0	217.0 ~ 260.4	22.14 ~ 26.57	160.0 ~ 192.0
5/8	203.4 ~ 244.1	20.75 ~ 24.91	150.0 ~ 180.0	298.3 ~ 358.0	30.44 ~ 36.53	220.0 ~ 264.0

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 21 2025-03-21 오후 2:52:16

10. PART NUMBER ASSIGNMENT STANDARD FOR KIOTI BOLTS AND NUTS

10.1 BOLTS

0 1 1 3 3 - 5 1 0 5 5

Length: 55 mm

※ In case the bolt length is over 100 mm:

100	105	110	115	120	125	....	Calculation: If the length is 130 mm
00	01	02	03	04	05	....	(130 - 100) ÷ 5 = 06

Bolt size: M10

Plating

5	MFZn5-C (Electric zinc)
6	MFZn5-G (Green chromate)
0	No plating

Hardness

0	4T	Partial thread (bolt)	* Hardness is shown on the head of bolt.
2	4T	Full thread (set screw)	
3	7T	Partial thread (bolt)	
5	7T	Full thread (set screw)	
6	9T	Partial thread (bolt)	

Spring washer and pitch

No.	Spring washer	Pitch	M5	M6	M8	M10	M12	M14	M16	M18	M20
2	Yes	Regular	0.8	1	1.25	1.5	1.75	2	2	2.5	2.5
3	Yes	Fine	-	-	1	1.25	1.25	1.5	1.5	1.5	1.5
5	No	Regular	0.8	1	1.25	1.5	1.75	2	2	2.5	2.5
7	No	Fine	-	-	1	1.25	1.25	1.5	1.5	1.5	1.5

Head size (mm)

No.	Type	M5	M6	M8	M10	M12	M14	M16	M18	M20
0	Regular	8	10	13	17	19	22	24	27	30
1	Small	-	-	12	14	17	19	22	24	27

Part name (bolt)

Example) 01120-50850

This is 4T set screw which its spring washer thread pitch is 1.25 mm, head size is 12 mm, diameter is 8 mm and length is 50 mm.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 22 2025-03-21 오후 2:52:16

10.2 NUTS

0 2 1 1 4 - 5 0 0 8 0

- Size: M8
- Plating

5	MFzn5-C (Electric zinc plated)
6	MFzn5-GR (Electric flat chrome plated)
0	No Plating

- Hardness, pitch, width

Item	Hardness	Thread	Height	Remarks
54	4T	Regular	Type 2	Height - Type 2 : longer - Type 3 : shorter Hardness - For 6T nut, its hardness is indicated in number or chronometric method. - For 4T nut, its hardness is not usually indicated.
52	4T	Regular	Type 3	
74	4T	Fine	Type 2	
72	4T	Fine	Type 3	
14	4T	Regular	Type 2	
12	4T	Regular	Type 3	
56	6T	Regular	Type 2	
18	4T	Fine	Type 2	
16	4T	Fine	Type 3	
76	6T	Fine	Type 2	

- Cross distance

0	Regular
1	Small

- Part name: nut

NUT SPECIFICATION STANDARD TABLE

Item		No.	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22
Pitch	Regular	–	1	1	1.25	1.5	1.75	2	2	2.5	2.5	2.5
	Fine	–	–	–	1	1.25	1.25	1.5	1.5	1.5	1.5	1.5
Cross distance	Regular	0	8	10	13	17	19	22	24	27	30	32
	Small	1	–	–	12	14	17	19	22	24	27	30
Height	Type 2	–	4	5	6.5	8	10	11	13	15	16	18
	Type 3	–	3	3.6	5	6	7	8	10	11	12	13

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11. UNIT CONVERSION TABLE

Torque			Length		Volume		Pressure			Temperature	
Kgf-m	Nm	lb-ft	Inch	mm	ℓ	U.S.gal	kgf/cm²	kPa	PSI	°C	°F
1	9.8	7.2	1	25.4	1	0.26418	1	98	14.22	-20	-4
2	19.6	14.5	2	50.8	2	0.5	10	980	142.2	-15	5
3	29.4	21.7	3	76.2	4	1.1	20	1960	284.4	-10	14
4	39.2	28.9	4	101.6	6	1.6	30	2940	426.6	-5	23
5	49	36.2	5	127	8	2.1	40	3920	568.8	0	32
6	58.8	43.4	6	152.4	10	2.6	50	4900	711	5	41
7	68.6	50.6	7	177.8	12	3.2	60	5880	853.2	10	50
8	78.4	57.9	8	203.2	14	3.7	70	6860	995.4	15	59
9	88.2	65.1	9	228.6	16	4.2	80	7840	1137.6	20	68
10	98	72.3	10	254	18	4.8	90	8820	1279.8	25	77
11	107.8	79.6	11	279.4	20	5.3	100	9800	1422	30	86
12	117.6	86.8	12	304.8	22	5.8	110	10780	1564.2	35	95
13	127.4	94.0	13	330.2	24	6.3	120	11760	1706.4	40	104
14	137.2	101.3	14	355.6	26	6.9	130	12740	1848.6	45	113
15	147	108.5	15	381	28	7.4	160	15680	2275.2	50	122
16	156.8	115.7	16	406.4	30	7.9	170	16660	2417.4	55	131
17	166.6	123.0	17	431.8	32	8.5	180	17640	2559.6	60	140
18	176.4	130.2	18	457.2	34	9.0	190	18620	2701.8	65	149
19	186.2	137.4	19	482.6	36	9.5	200	19600	2844	70	158
20	196	144.7	20	508	38	10.0	225	22050	3199.5	75	167
21	205.8	151.9	21	533.4	40	10.6	250	24500	3555	80	176
22	215.6	159.1	22	558.8	42	11.1	275	26950	3910.5	85	185
23	225.4	166.4	23	584.2	44	11.6	300	29400	4266	90	194
24	235.2	173.6	24	609.6	46	12.2	325	31850	4621.5	95	203
25	245	180.8	25	635	48	12.7	350	34300	4977	100	212

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_02_일반사항.indd 24 2025-03-21 오후 2:52:16

KIOTI

CS2530CH
CS2530CH-EU

ENGINE

CHAPTER 3

TABLE OF CONTENTS

1. GENERAL INFORMATION 3-3
- 1.1 Engine views 3-3
- 1.2 Engine identification 3-3

2. SPECIFICATIONS 3-4
- 2.1 Engine dimensions 3-4
- 2.2 Engine performance curve 3-5
- 2.3 General specifications 3-6
- 2.4 Service specifications 3-7
  - 2.4.1 Cylinder head 3-7
  - 2.4.2 Valves 3-7
  - 2.4.3 Valve timing 3-7
  - 2.4.5 Valve springs 3-8
  - 2.4.6 Valve rocker arms 3-8
  - 2.4.7 Camshaft 3-8
  - 2.4.8 Piston rings 3-9
  - 2.4.9 Pistons 3-9
  - 2.4.10 Crankshaft 3-10
  - 2.4.11 Fuel system 3-10
  - 2.4.12 Oil pump 3-11
  - 2.4.13 Radiator 3-11
  - 2.4.14 Thermostat 3-11
  - 2.4.15 Fan belt 3-11
  - 2.4.16 Tightening torque 3-12

3. OPERATING PRINCIPLE 3-13
- 3.1 Body and powertrain 3-13
  - 3.1.1 Cylinder head 3-13
  - 3.1.2 Cylinder block 3-13
  - 3.1.3 Mls cylinder head gasket 3-13
  - 3.1.4 Cylinder honing 3-14
  - 3.1.5 Crankshaft 3-14
  - 3.1.6 Piston and piston ring 3-14
  - 3.1.7 Connecting rod 3-14
  - 3.1.8 Camshaft 3-15
  - 3.1.9 Fuel camshaft 3-15
  - 3.1.10 Rocker arm assembly 3-15
  - 3.1.11 Intake and exhaust valves 3-16
  - 3.1.12 Timing gear 3-16
  - 3.1.13 Flywheel 3-16
- 3.2 Lubrication system 3-17
  - 3.2.1 Engine oil flow 3-17
  - 3.2.2 Engine oil flow chart 3-18
  - 3.2.3 Function of lubricating system 3-19
- 3.3 Coolant flow route 3-22
- 3.4 Fuel system 3-25
  - 3.4.1 Fuel flow route 3-25
  - 3.4.2 Fuel filter 3-26
  - 3.4.3 Bleeding the fuel system 3-26
  - 3.4.4 Fuel feed pump 3-27
  - 3.4.5 Fuel injection pump 3-27
  - 3.4.6 Injection nozzle 3-30
- 3.5 Governor and stop system 3-31
  - 3.5.1 Basic principle of governor system 3-31
  - 3.5.2 Operation of governor 3-32

4. PCV VALVE 3-33

5. TROUBLESHOOTING 3-34

6. MEASUREMENT AND ADJUSTMENT 3-36
- 6.1 Air intake hose assembly tips 3-36
- 6.2 Fan belt tension adjust 3-37

TABLE OF CONTENTS

6.3 Piston compression pressure measurement...3-37
6.4 Valve clearance.....3-38
6.5 Injection timing measurement and adjustment.....3-39
6.6 Engine oil pressure 3-40
6.7 Injection nozzle inspection 3-41
6.8 Bubble test for radiator.....3-41

7. DISASSEMBLY, SERVICE AND ASSEMBLY 3-42

7.1 Engine removal 3-42
7.2 Engine mounting assembly tips 3-49
7.3 Engine component disassembly and assembly 3-50
7.3.1 Cylinder head.....3-50
7.4 Cylinder head check.....3-52
7.4.1 Cylinder head surface flatness....3-52
7.4.2 Cylinder head valve recess.....3-53
7.4.3 Cylinder bore check 3-53
7.5 Fuel injection pump 3-54
7.6 Speed control lever plate and governor spring 3-55
7.7 Fuel camshaft (Gear case).....3-57
7.8 Oil pump.....3-59
7.9 Valve camshaft.....3-60
7.10 Valve camshaft gear side clearance 3-61
7.11 Valve camshaft oil clearance measurement...3-61
7.12 Valve camshaft deflection check 3-62
7.13 Valve cam height measurement.....3-62
7.14 Flywheel deflection and crankshaft end play check 3-63
7.15 Oil pan.....3-64
7.16 Timing gear 3-65
7.16.1Timing gear setting.....3-65
7.16.2Timing gear backlash 3-65
7.17 Idle gear side clearance 3-66
7.18 Idle gear oil clearance measurement 3-66
7.19 Oil pump check 3-67
7.20 Piston, flywheel and crankshaft.....3-67
7.21 Crankshaft check 3-72
7.21.1 Crankshaft deflection 3-72
7.21.2 Oil clearance between crankshaft journal and crankshaft metal 2....3-72
7.21.3 Oil clearance between crank pin and connecting rod big end bearing.....3-73
7.22 Engine component disassembly and assembly 3-73
7.22.1 Rocker arm 3-73
7.22.2 Rocker arm assembly check.....3-74
7.22.3 Intake and exhaust valves 3-74
7.22.4 Valve spring inspection (length, tension and squareness).....3-75
7.22.5 Valve spring squareness (tilt).....3-76
7.22.6 Injection nozzle 3-76
7.22.7 Piston assembly 3-77
7.22.8 Piston pin bore 3-77
7.22.9 Clearance between piston pin and bushing 3-78
7.22.10 Piston ring end gap 3-78
7.22.11 Piston ring clearance 3-79
7.22.12 Thermostat.....3-81
7.22.13 Water pump.....3-82
7.22.14 Injection pump gear assembly (fuel camshaft gear).....3-83

8. EXPLODED VIEW.....3-84

8.1 EL1-G111001 Cylinder block group.....3-84
8.2 EL1-G113001 Cylinder head group.....3-85
8.3 EL1-G114001 Gear case group 3-86
8.4 EL1-G116001 Cylinder head cover group...3-87
8.5 EL1-G121001 Crank shaft group 3-88
8.6 EL1-G122001 Piston connecting rod group...3-89
8.7 EL1-G123001 Camshaft group 3-90
8.8 EL1-G124001 Idle gear group.....3-91
8.9 EL1-G125001 Rocker arm valve group.3-92
8.10 EL1-G126004 Flywheel group 3-93
8.11 EL1-G142001 Oil pan group 3-94
8.12 EL1-G151001 Fuel equipment group....3-95
8.13 EL1-G152001 Fuel camshaft group 3-96
8.14 EL1-G153002 Speed control lever group...3-97
8.15 EL1-G154001 Engine stop lever group...3-98
8.16 EL1-G155001 Governor group.....3-99
8.17 EL1-G163001 Water pump group 3-100
8.18 EL1-G191001 Glow plug group.....3-101
8.19 EL1-G192001 Engine electrical group 3-102
8.20 EL1-G193007 Electrical group 3-103

1. GENERAL INFORMATION

1.1 ENGINE VIEWS


TB1W354A

1.2 ENGINE IDENTIFICATION


TB1W332A

▶ ENGINE EPA PLATE


TB1W333A

This plate is attached on the engine cylinder head cover. This provides the information such as model number, displacement, rated output, valve clearance, injection timing, etc.

This plate represents that this engine is in compliance with the U.S.EPA and California (CARB) exhaust emission regulation.

▶ ENGINE NUMBER

The engine number is engraved on the cylinder head cover.

IMPORTANT

The engine number is required for warranty registration. This must be filled out on the warranty form along with the tractor number and operating hours.

Engine model code assignment standard

3 L 1 2 3 T H 4 B

- B: A: 21 KP, B: 24.5 HP
- 4: Tier 4 type
- H: Appl[catipn code
- 123: Displacement

123	1,233 cc

- L: Stroke

A	92.4 mm (3.638 in.)
B	102.4 mm (4.031 in.)
C	76.0 mm (2.992 in.)
L	86.0 mm (3.386 in.)

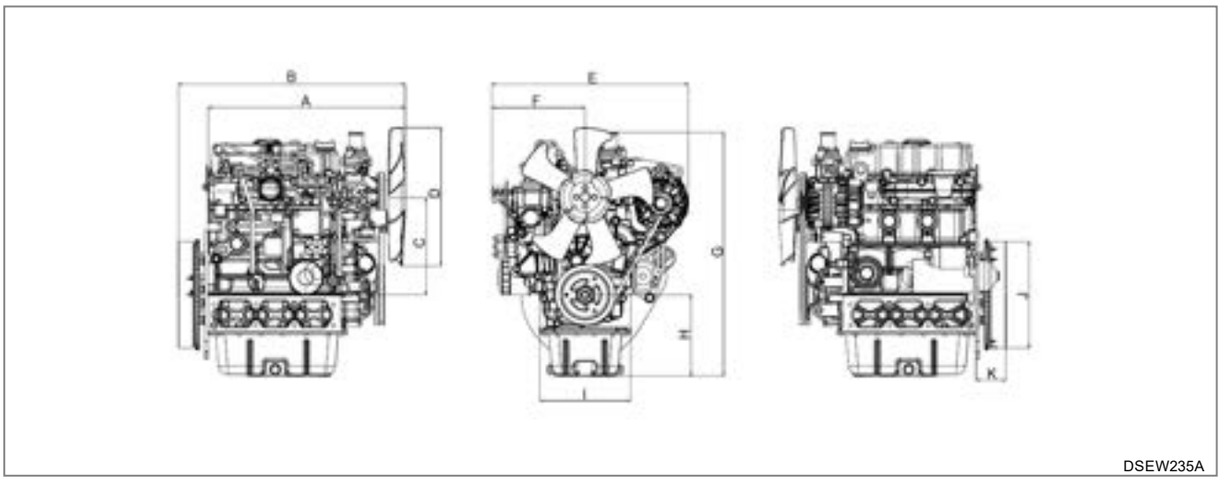
- 3: Number of cylinders

3	3 cylinders

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 3 2025-04-08 오전 9:28:53

2. SPECIFICATIONS

2.1 ENGINE DIMENSIONS

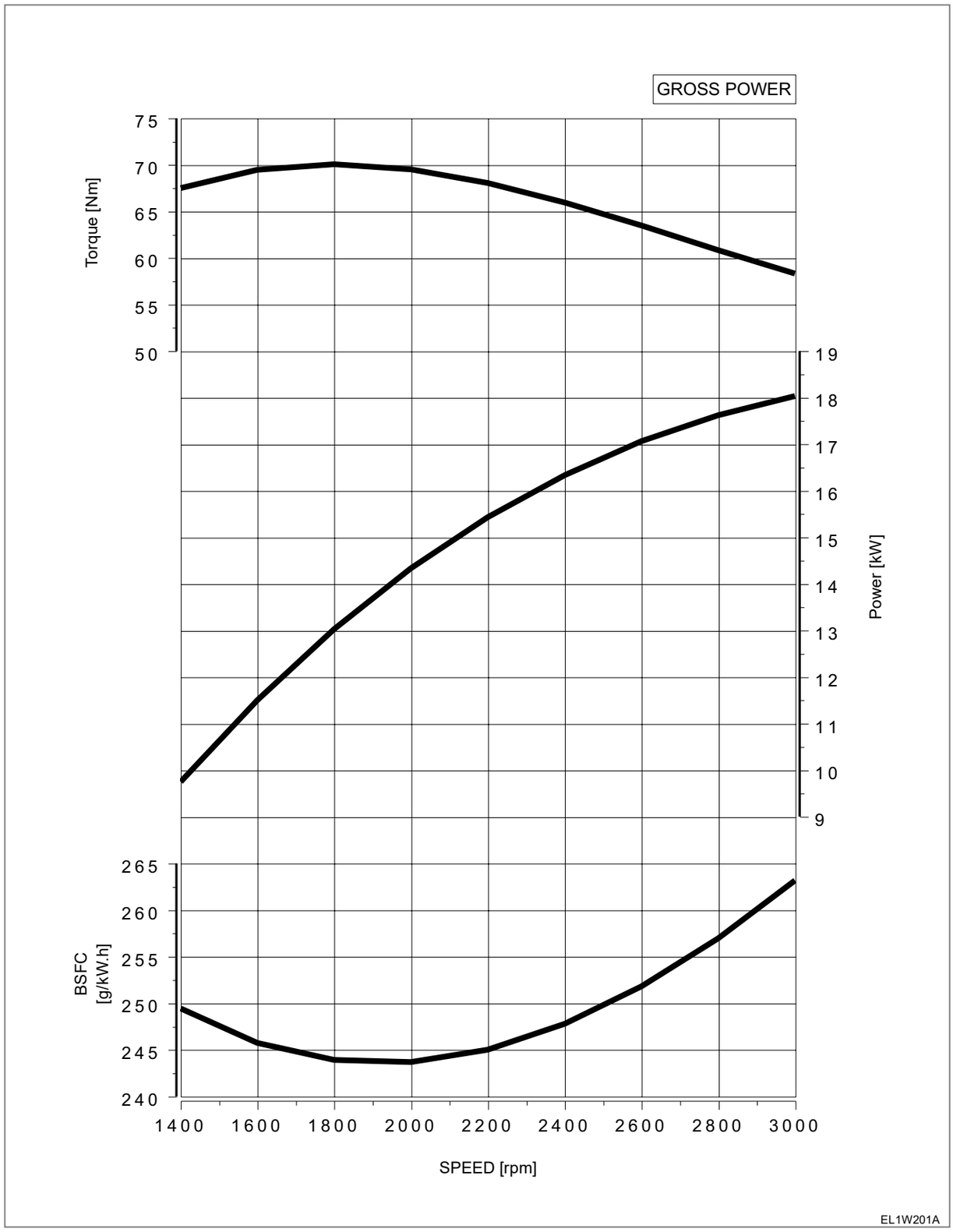


(in./mm)

	A	B	C	D	E	F	G	H	I	J	K
3L123	17.9	20.6	8.8	12.4	17.8	8.5	22.1	7.4	8.3	9.6	2.7
	454	523	223	315	453	216	561	187	210	245	69

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 4 2025-04-08 오전 9:28:53

2.2 ENGINE PERFORMANCE CURVE



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 5 2025-04-08 오전 9:28:54

2.3 GENERAL SPECIFICATIONS

Engine model		3L123-TH4A
Engine type		4 cycle, water-cooled, vertical, diesel
Bore I.D. × Stroke		Ø 78×86 mm (Ø 3.070 x 3.386 in.)
Honing		Plateau honing
Number of cylinders		3
Ignition sequence		1 - 2 - 3
Displacement	cc (cu)	1,233 (75.24)
Rated revolution	rpm	3,000
Max./Min. speed	rpm	3,200 ± 50 / 1,200 ± 50
Gross power	HP (kW)	24.5 (18.3)
Max. torque		57.3 N·m (5.8 kgf·m) / 2,500 rpm ± 100
Compression ratio		23.7 : 1
Combustion chamber type		Indirect injection type (Vortex chamber type)
Valve type		OHV
Injection timing (BTDC)		18.5°
Fuel injection system		Mechanical PFR-CTD type, IDI
Injection pressure		150~160 Kgf/cm² (2,133~2,275 psi)
Engine oil capacity		3.7 ℓ (0.98 U.S. gal.)
Engine oil specification		SAE 15W-40, API CK-4 class or higher
Coolant capacity		2.0 ℓ (0.53 U.S. gal.)
Anti-freeze		Ethylene glycol 50% with anti-corrosive agent
Aspiration		N/A
Emission (EPA Tier4 final)		NOx+HC : 7.5 g/kW-hr, CO : 6.6 g/kW-hr, PM : 0.4 g/kW-hr
Fuel consumption at Max power		Below 264 g/kW-hr
Torque rise		Over 20%
Cold start		-20°C with Pre-heat
Noise		90 dBA

- The engine gross power is measured without cooling fan and generator.
- The cylinder number for ignition sequence is given from the cylinder on the engine cooling fan side.
- If the coolant level drops due to evaporation, add water only. If the coolant level drops due to leakage, add coolant mixed with anti-freeze.
- The freezing point of the 50% coolant mixture is -37°C (-34°F) in a normal condition.
- If the coolant needs to be changed with another type, the cooling system should be flushed thoroughly before its use.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 6 2025-04-08 오전 9:28:54

2.4 SERVICE SPECIFICATIONS

2.4.1 CYLINDER HEAD

Item	Specification	Allowable Limit
Cylinder head surface flatness	-	0.05 mm / 100 mm 0.002 in. / 3.94 in.
Gasket Thickness	When tightened 1.040 ~ 1.240 mm (0.041 ~ 0.049 in.)	-
T.D.C clearance	0.650 ~ 0.943 mm (0.0256 ~ 0.0371 in.)	-
Tightness of head bolts	Refer to Note of 2-13 page.	-

2.4.2 VALVES

Item	Specification		Allowable Limit
Valve seat width	IN : 1.465 mm 0.05768 in.	EX : 1.490 mm 0.05866 in.	-
Valve seat angle (intake, exhaust)	1.047, 0.785 rad. 60°, 45°		-
O.D. of valve stems (intake, exhaust)	6.960 ~ 6.975 mm 0.2740 ~ 0.2746 in.		-
I.D. of valve guides (intake, exhaust)	7.000 ~ 7.015 mm 0.2756 ~ 0.2762 in.		-
Clearance between valve stems and guides	0 ~ 0.4 mm 0 ~ 0.01575 in.		0.11 mm 0.0043 in.
Valve recessing	0.2 mm 0.0079 in.		0.7 mm 0.0276 in.
Valve clearance (intake, exhaust) cold	0.15 mm 0.006 in.		-

2.4.3 VALVE TIMING

Intake Valve	Open	16 ° before TDC
	Close	44 ° after BDC
Exhaust Valve	Open	50 ° before BDC
	Close	10 ° after TDC

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 7 2025-04-08 오전 9:28:54

2.4.5 VALVE SPRINGS

Item	Specification	Allowable Limit
Free length	39.14 ~ 39.64 mm 1.541 ~ 1.561 in.	38.7 mm 1.524 in.
Fitted length	32 mm 1.260 in.	-
Load to compress to fitted length	130 N / 32 mm 13.3 kgf / 32 mm 29.2 lbs / 1.26 in.	121.5 N / 32 mm 12.4 kgf / 32 mm 27.3 lbs / 1.26 in.
Squareness	1.1 mm 0.043 in.	-

2.4.6 VALVE ROCKER ARMS

Item	Specification	Allowable Limit
O.D. of rocker arm shafts	16.960 ~ 16.980 mm 0.6677 ~ 0.6685 in.	-
I.D. of rocker arm bushings	17.00 ~ 17.02 mm 0.6693 ~ 0.6701 in.	-
Clearance between rocker arm shafts and bushings	0.02 ~ 0.06 mm 0.0008 ~ 0.0024 in.	0.1 mm 0.0039 in.

2.4.7 CAMSHAFT

Item		Specification	Allowable Limit
O.D. of camshaft bearing journal		39.934 ~ 39.950 mm 1.5722 ~ 1.5728 in.	-
I.D. of camshaft bearing		40.000 ~ 40.025 mm 1.5748 ~ 1.5758 in.	-
Clearance between camshaft bearing journals and bearings		0.050 ~ 0.091 mm 0.0020 ~ 0.0036 in.	0.15 mm 0.0020 in.
Alignment of camshaft		-	0.05 mm 0.0020 in.
Cam height	Intake	33.293 mm 1.3107 in.	33.268 mm 1.3098 in.
	Exhaust	33.6 mm 1.3228 in.	33.575 mm 1.3219 in.
Gear backlash		0.062 ~ 0.198 mm 0.0024 ~ 0.0078 in.	0.2 mm 0.0079 in.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 8 2025-04-08 오전 9:28:54

2.4.8 PISTON RINGS

Item		Specification	Allowable Limit
Ring gap	Top ring	0.15 ~ 0.25 mm 0.0059 ~ 0.0098 in.	1.25 mm 0.0492 in.
	2nd ring	0.30 ~ 0.45 mm 0.0118 ~ 0.0177 in.	1.25 mm 0.0492 in.
	Oil ring	0.20 ~ 0.35 mm 0.0079 ~ 0.0138 in.	1.25 mm 0.0492 in.
Side clearance of ring in groove	Top ring	-	-
	2nd ring	0.04 ~ 0.08 mm 0.0016 ~ 0.0031 in.	-
	Oil ring	0.02 ~ 0.06 mm 0.0008 ~ 0.0024 in.	-

2.4.9 PISTONS

Item	Specification	Allowable Limit
I.D. of piston bosses	20.007 ~ 20.012 mm 0.7877 ~ 0.7879 in.	20.03 mm 0.7885 in.
O.D. of piston pin	20.002 ~ 20.007 mm 0.7875 ~ 0.7877 in.	-
I.D. of connecting rod small end bushings (fitted)	20.025 ~ 20.040 mm 0.7884 ~ 0.7890 in.	-
Clearance between piston pin and small end bushings	0.018 ~ 0.038 mm 0.0007 ~ 0.0015 in.	0.15 mm 0.0059 in.
Connecting rod alignment	0.02 mm 0.0008 in.	0.05 mm 0.0020 in.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 9 2025-04-08 오전 9:28:54

2.4.10 CRANKSHAFT

Item	Specification	Allowable Limit
Crankshaft alignment	0.02 mm 0.0008 in.	0.08 mm 0.0031 in.
O.D. of crankshaft journals	47.934 ~ 47.950 mm 1.8872 ~ 1.8878 in.	-
I.D. of crankshaft bearing 2	47.980 ~ 48.025 mm 1.8890 ~ 1.8907 in.	-
Connecting rod and journal alignment	0.118 ~ 0.204 mm 0.0046 ~ 0.0080 in.	0.20 mm 0.0079 in.
Clearance between crankshaft journals and bearing 2	0.030 ~ 0.091 mm 0.0012 ~ 0.0036 in.	0.20 mm 0.0079 in.
O.D. of crankpins	39.959 ~ 39.975 mm 1.5732 ~ 1.5738 in.	-
I.D. of crankpin bearings	39.994 ~ 40.020 mm 1.5746 ~ 1.5756 in.	-
Clearance between crankpins and bearings	0.019 ~ 0.061 mm 0.0007 ~ 0.0024 in.	0.20 mm 0.0079 in.
End play of crankshaft	0.15 ~ 0.31 mm 0.0059 ~ 0.0122 in.	0.5 mm 0.0197 in.

2.4.11 FUEL SYSTEM

Item		Specification	Allowable Limit
Fuel injection pump	Injection timing (BTDC)	18.5°	-
Injection Nozzle	Fuel injection pressure	15 ~ 16 MPa 153 ~ 163 kgf/cm^2 2,177 ~ 2,322 psi	-
	Tightness of nozzle valve seat	No fuel leak at 130 kgf/cm^2 (12.75 MPa, 1,849 psi)	-

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 10 2025-04-08 오전 9:28:54

2.4.12 OIL PUMP

Item		Specification	Allowable Limit
Oil pressure	At rated speed	2.5 ~ 4.5 kgf/cm^2 245 ~ 441 kPa, 36 ~ 64 psi	2.5 kgf/cm^2 245 kPa, 36 psi
	At idle speed	Over 0.5 kgf/cm^2 49 kPa, 7.11 psi	-
Rotor type	Clearance between rotor rod	0.06 ~ 0.10 mm 0.0024 ~ 0.0039 in.	0.15 mm 0.0059 in.
	Radial clearance between outer rotor and pump body	0.100 ~ 0.175 mm 0.0039 ~ 0.0069 in.	0.225 mm 0.0089 in.
End clearance between rotor and cover		0.025 ~ 0.080 mm 0.00098 ~ 0.00315 in.	0.13 mm 0.0051 in.

2.4.13 RADIATOR

Item	Specification	Allowable Limit
Opening pressure of cap	0.9 kgf/cm^2 88.3 kPa, 12.8 psi	-
Test pressure	0.9 kgf/cm^2 88.3 kPa, 12.8 psi	-

2.4.14 THERMOSTAT

Item		Specification	Allowable Limit
Opening temperature cap	Beginning	69.5°C ~ 72.5°C 157.1°F ~ 162.5°F	-
	Full-open	85°C 185°F	-
Distance of lift		8 mm 0.3150 in.	-

2.4.15 FAN BELT

Item	Specification	Allowable Limit
Belt sag under load of 78.5 N (8 kgf, 17.6 lbs.)	8 mm (0.32 in.)	-

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 11 2025-04-08 오전 9:28:54

2.4.16 TIGHTENING TORQUE

Indicate the bolts with ■ mark and manually tighten first.

Item		Nm	kgf-m	lb-ft
Head bolt		Refer to "NOTE" below		
■ Bearing case bolt 1		20.0 ~ 24.0	2.0 ~ 2.4	15.0 ~ 17.0
■ Bearing case bolt 2		29.4 ~ 34.3	3.0 ~ 3.5	21.7 ~ 25.3
■ Flywheel bolt		53.9 ~ 58.8	5.5 ~ 6.0	39.7 ~ 43.4
■ Connecting rod bolt		26.5 ~ 30.4	2.7 ~ 3.1	19.5 ~ 22.4
Rocker arm bracket sink bolt		23.5 ~ 27.5	2.4 ~ 2.8	17.4 ~ 20.3
Idle gear shaft bolt		7.8 ~ 9.8	0.8 ~ 1.0	5.7 ~ 7.2
Glow plug (No lubrication)		19.6 ~ 24.5	2.0 ~ 2.5	14.4 ~ 18.1
Waste oil plug		32.4 ~ 37.3	3.3 ~ 3.8	23.9 ~ 27.5
Nozzle holder		49.0 ~ 68.6	5.0 ~ 7.0	36.1 ~ 50.5
Overflow pipe nut		29.4 ~ 34.3	3.0 ~ 3.5	21.7 ~ 25.3
Oil switch	Bis	1.4 ~ 1.9	0.14 ~ 0.20	1.0 ~ 1.4
	Taper screw	14.7 ~ 19.6	1.5 ~ 2.0	10.8 ~ 14.5
Fuel supply limit cap nut		27.5 ~ 34.3	2.8 ~ 3.5	20.3 ~ 25.3
Idle limit mounting nut		13.7 ~ 15.7	1.4 ~ 1.6	10.1 ~ 11.5
Injection pipe nut		24.5 ~ 34.3	2.5 ~ 3.5	18.0 ~ 25.3
Crankshaft nut		137.2 ~ 156.9	14 ~ 16	101.2 ~ 115.7

⚠ CAUTION

- **For ■ maked bolts on the table, apply engine oil to their threads and seats before tightening.**

NOTE

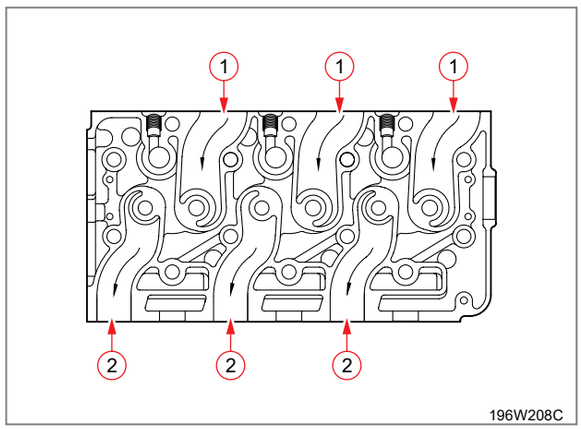
- **Tightening torque for cylinder head bolts**
  Tightening order (using the angle controlled tightening method)
  1st step: Tighten the bolts to 2.5 kgf-m (24.5 Nm, 18.0 lb-ft)
  2nd step: Rotate the bolts additional 90°
  3rd step: Rotate the bolts additional 70°
- **For more details, refer to 6.2.1 “Cylinder head disassembly and assembly.”**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 12 2025-04-08 오전 9:28:54

3. OPERATING PRINCIPLE

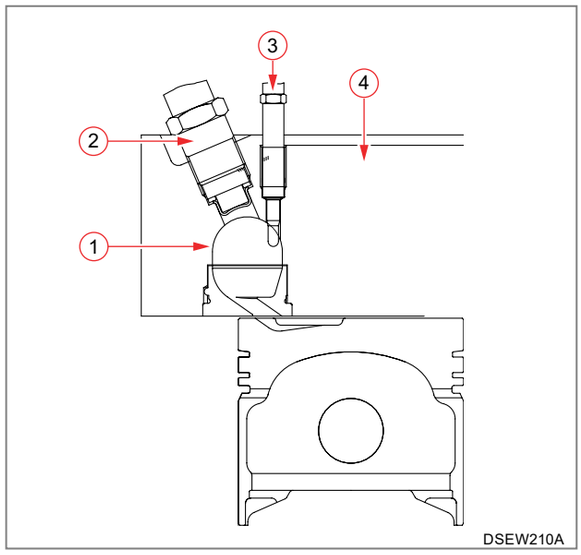
3.1 BODY AND POWERTRAIN

3.1.1 CYLINDER HEAD



(1) Intake port (2) Exhaust port

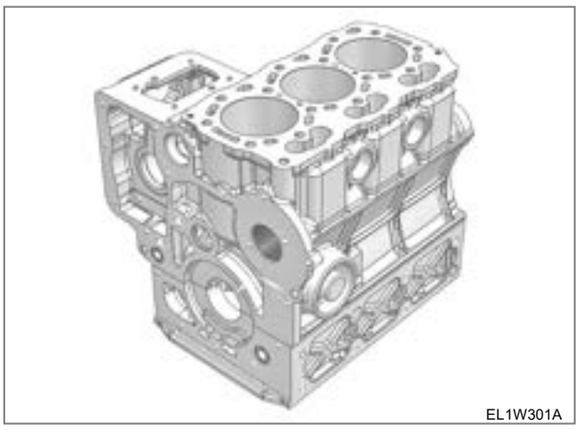
The cylinder head is made of special alloy cast iron which can resist high temperature and pressure caused by combustion. The intake and exhaust ports are arranged cross-flow type to get high combustion efficiency by protecting the suction air from being heated and expanded by heated exhaust air.



(1) Combustion chamber (3) Glow plug
(2) Injection nozzle (4) Cylinder head

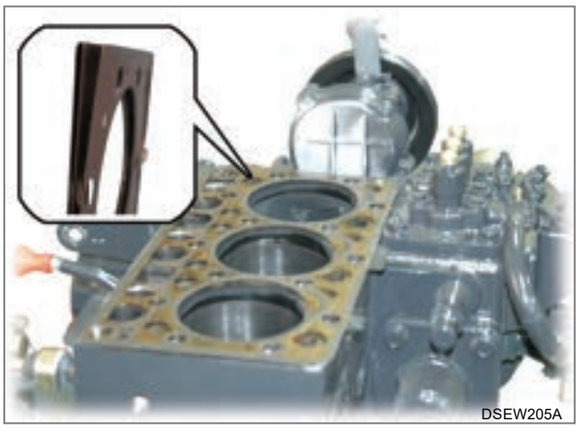
The DAEDONG swirl type combustion chamber is designed for high combustion efficiency and reducing fuel consumption. The glow plug helps to start the engine even at -20°C (-4°F).

3.1.2 CYLINDER BLOCK



The cylinder block is a ladder frame-type and it features superior serviceability and low vibration and noise compared to the conventional tunnel type.

3.1.3 MLS CYLINDER HEAD GASKET



The MLS (Multi Layer Steel) cylinder head gasket has a triple-layered steel structure complemented with non-asbestos gasket features.

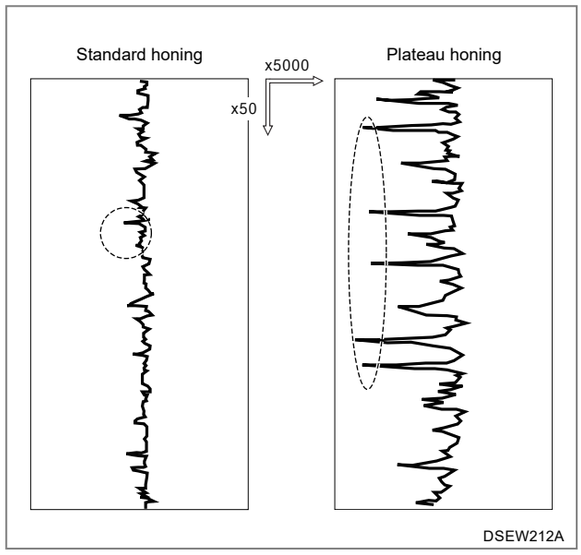
The top clearance variation is minimized and the thermal load is reduced while increasing durability.

⚠ CAUTION

- **When disassembling the cylinder head, its gasket should be replaced with a new one.**
- **Be sure that there is no scratch or foreign material between the cylinder head and the surface of the block.**

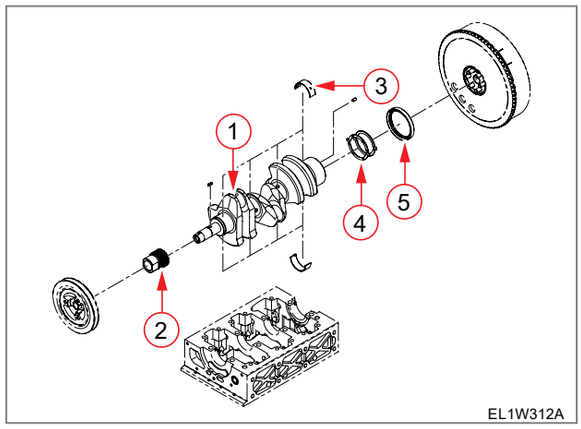
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3.1.4 CYLINDER HONING



The DAEDONG engine has adopted the plateau honing in manufacturing to enhance the oil tightness of the cylinder bore and the durability of the cylinder for the longer engine life time.

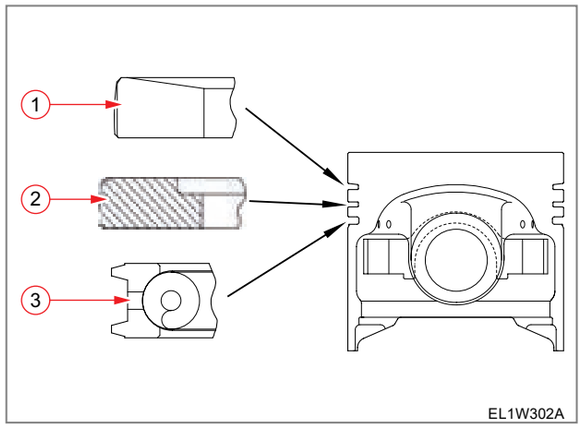
3.1.5 CRANKSHAFT



(1) Crankshaft
(2) Gear, crankshaft
(3) Metal 2, crankshaft
(4) Thrust bearing(Side metal)
(5) Oil seal

The crankshaft is made of forged steel and the journals, the crankpins and the bearing surface for the oil seal are induction-hardened to increase wear resistance. Each crankshaft journal is supported by the cylinder block. The crankshaft, crankshaft metal 2 (3) have oil holes for lubricant.

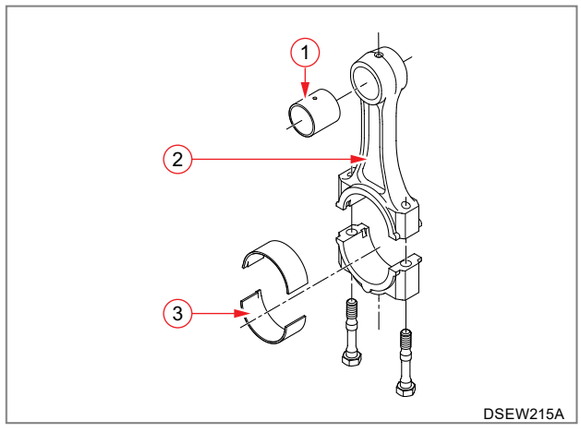
3.1.6 PISTON AND PISTON RING



(1) Top ring
(2) 2nd ring
(3) Oil ring

The piston is made of an aluminum alloy that is temperature and pressure resistant. Three rings are installed in the grooves of the piston. The top ring (1) is a keystone type, which can withstand heavy loads, and the barrel face on the ring fits well to the cylinder wall. The second ring (2) is an undercut type, which prevents the oil from being carried up. The oil ring (3) has chamfered faces and an expander ring, which increase the pressure of the oil ring against the cylinder wall to scrape the oil. The top ring is plated with hard chrome to increase wear resistance.

3.1.7 CONNECTING ROD

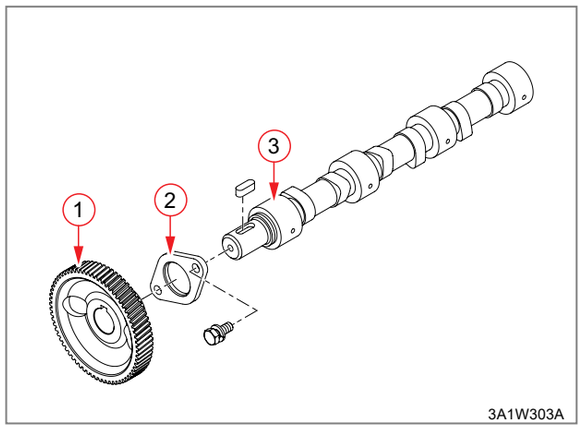


(1) Small end bushing
(2) Connecting rod
(3) Crank pin bearing

The connecting rod (2), which converts the reciprocating motion of the pistons caused by the fuel combustion into the rotating motion of the crankshaft, is made of hard forged steel. The connecting rod has bearings at both ends. The small end has a cylinder type bearing (small end bushing (2)) and the big end has a split type bearing (crank pin bearing (3)).

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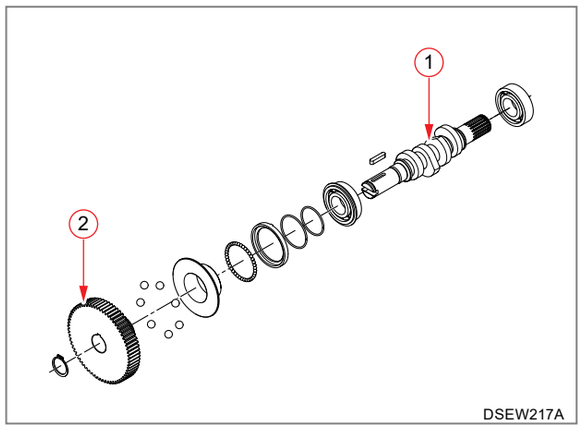
3.1.8 CAMSHAFT



(1) Cam gear
(2) Camshaft stopper
(3) Camshaft

The camshaft (3) is made of forged steel and its journal and cams are hardened to increase wear resistance. The cams on the camshaft open and close the intake and exhaust valves with the push rods and rocker arms. The journals and their bearings are force-lubricated.

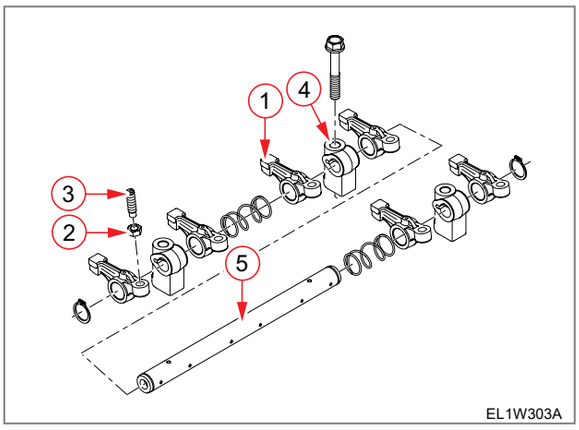
3.1.9 FUEL CAMSHAFT



(1) Fuel camshaft
(2) Fuel camshaft gear

This fuel camshaft is made of forged steel and its cams are hardened and tempered to increase wear resistance. The cams on the fuel camshaft (1) drive the fuel injection pump and the fuel feed pump. The governor balls are installed on the fuel camshaft gear (2) to control the engine speed.

3.1.10 ROCKER ARM ASSEMBLY

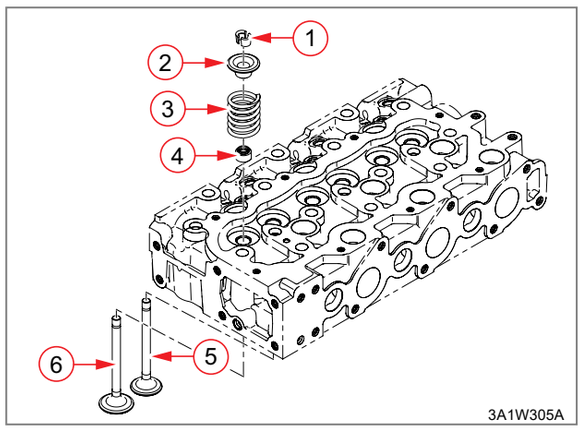


(1) Rocker arm
(2) Lock nut
(3) Adjusting screw
(4) Rocker arm bracket
(5) Rocker arm shaft

The rocker arm assembly includes the rocker arms (1) and an adjusting screw (3), which is at the end of rocker arm and rests on the push rod, rocker arm brackets (4) and rocker arm shaft (5). The rocker arms are activated by the reciprocating movement of the push rods and open or close the intake and exhaust valves. The rocker arm and other parts are lubricated through the drilled holes of the brackets and the rocker arm shaft.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 15 2025-04-08 오전 9:28:58

3.1.11 INTAKE AND EXHAUST VALVES



(1) Valve spring stopper
(2) Valve spring retainer
(3) Valve spring
(4) Valve stem seal
(5) Exhaust valve
(6) Intake valve

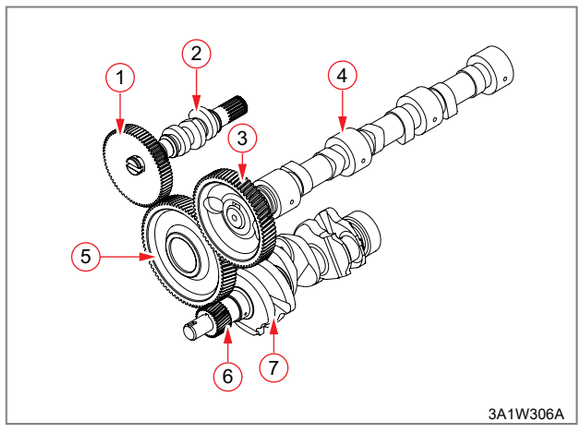
The valve and its guide of the intake are different from those for the exhaust. Other parts, such as the spring, spring retainers, valve spring stoppers, valve stem seals are the same for both the intake and the exhaust.

The diameter of the intake valve is always larger than the that of the exhaust valve. The intake valve is located prior to exhaust valve when seeing them from the cooling fan side.

NOTES

3C Series engines are arranged as follows, starting from the cooling fan: exhaust, intake, exhaust, intake.

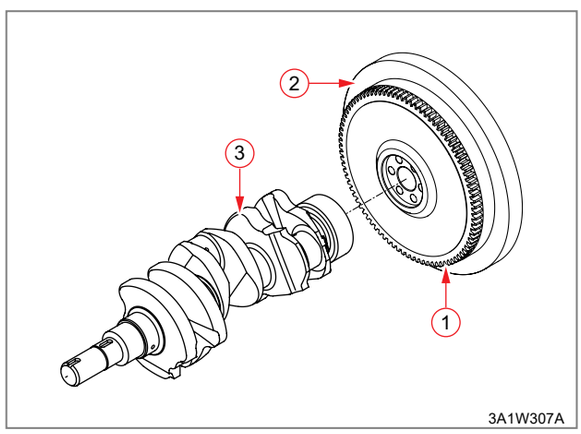
3.1.12 TIMING GEAR



(1) Fuel camshaft gear
(2) Fuel camshaft
(3) Valve camshaft gear
(4) Valve camshaft
(5) Idle gear
(6) Crankshaft gear
(7) Crankshaft

The crankshaft drives the camshaft and the idle gear engaged with fuel camshaft. The timings for opening and closing the valves is extremely important to achieve the effective air intake and sufficient gas exhaust. When assembling, the appropriate timing can be obtained by aligning the mark on the crankshaft gear (6) with idle gear (5), idle gear with camshaft gear, and idle gear with fuel injection pump gear.

3.1.13 FLYWHEEL



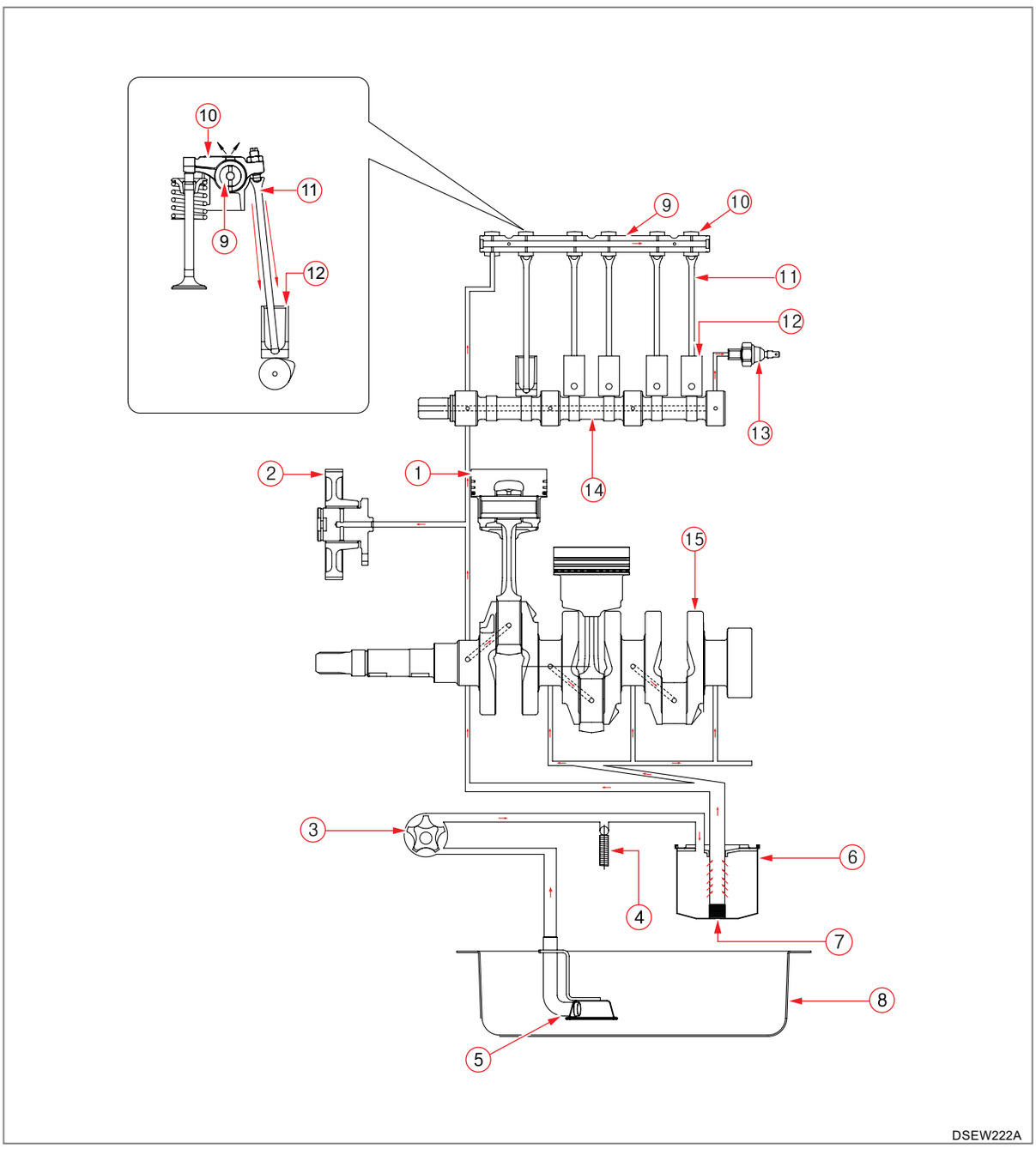
(1) Ring gear
(2) Flywheel
(3) Crankshaft

The ring gear (1) for connecting the start motor is compressed in the flywheel. Therefore, it cannot be replaced separately.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 16 2025-04-08 오전 9:29:00

3.2 LUBRICATION SYSTEM

3.2.1 ENGINE OIL FLOW

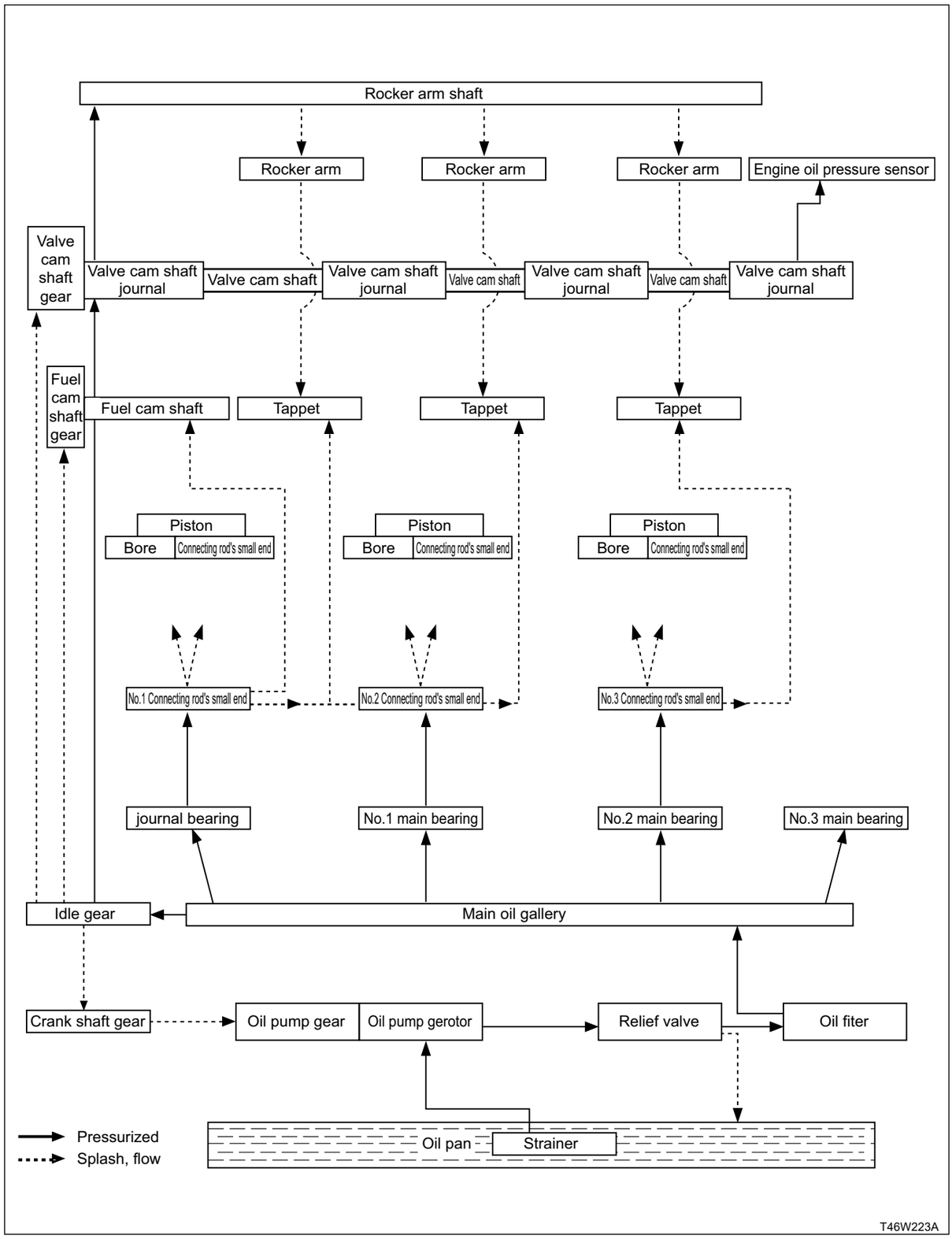


COMPONENTS

(1) Piston
(2) Idle gear
(3) Oil pump
(4) Relief valve
(5) Oil strainer
(6) Oil filter
(7) Bypass valve
(8) Oil pan
(9) Rocker arm shaft
(10) Rocker arm
(11) Push rod
(12) Tappet
(13) Oil pressure gauge
(14) Camshaft
(15) Crankshaft

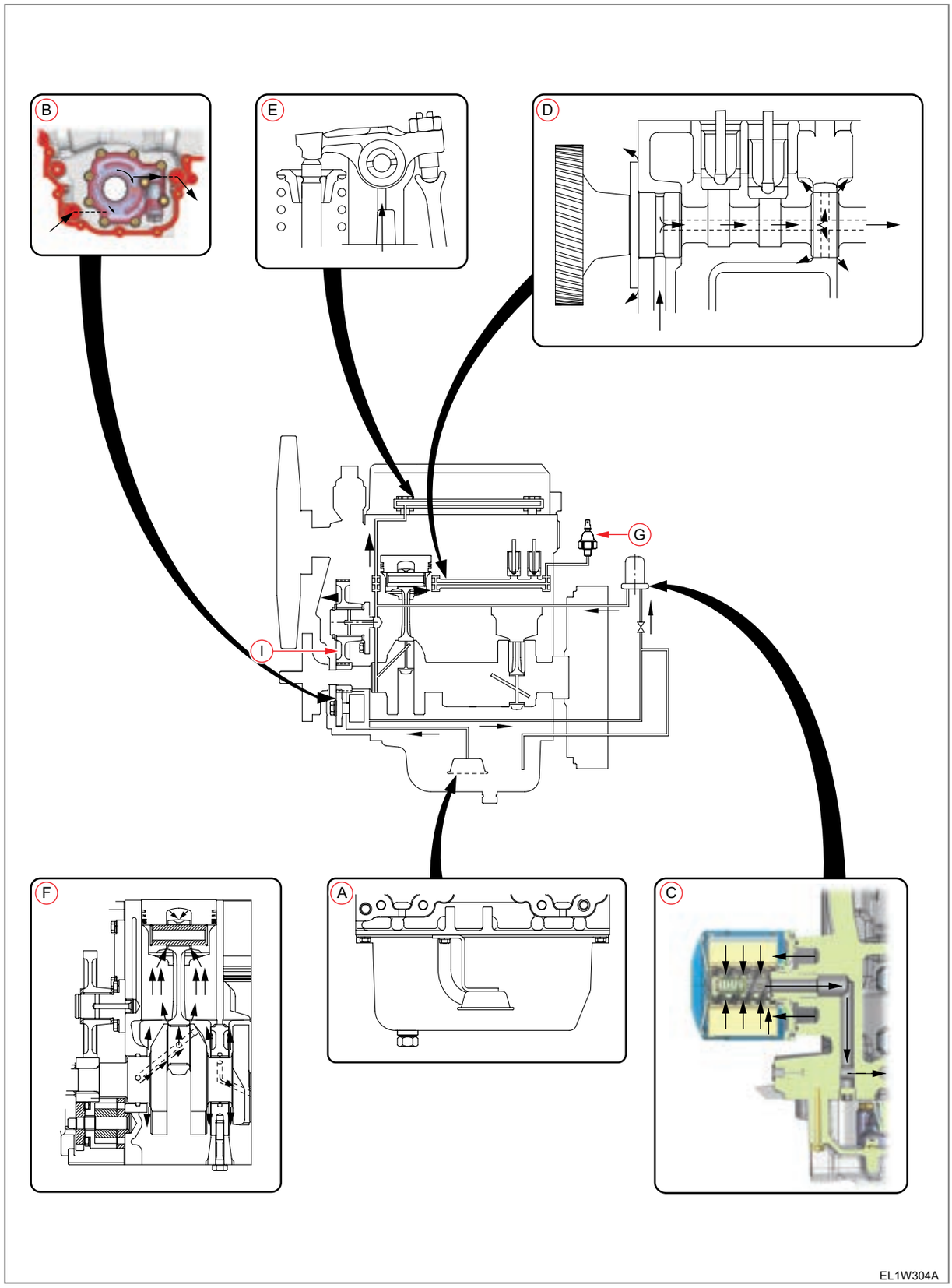
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3.2.2 ENGINE OIL FLOW CHART



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 18 2025-04-08 오전 9:29:00

3.2.3 FUNCTION OF LUBRICATING SYSTEM



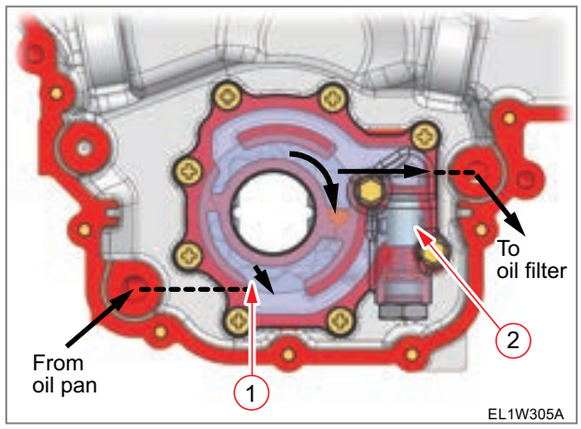
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A. OIL STRAINER

(REFER TO FIGURE (A) ON PAGE 3-8)

B. OIL PUMP AND RELIEF VALVE

(REFER TO FIGURE (B) ON PAGE 3-8)



(1) Oil pump (2) Relief valve

OIL PUMP

Type : Gerotor type

Oil: SAE 15W-40, API CK-4 class or higher

Standard oil temperature: 80°C

Discharge pressure: 4.5 kg/cm^2

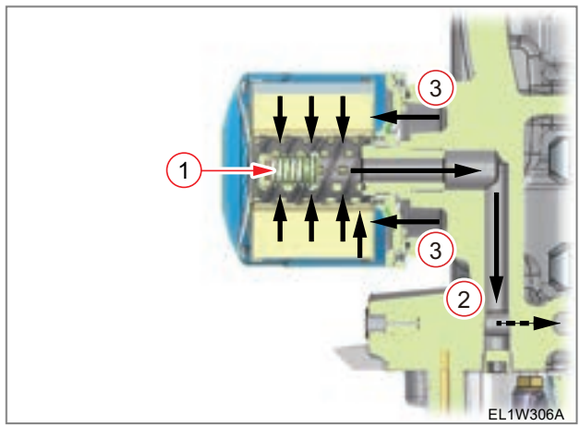
Displacement: Over 7.51 ℓ/min (1,000 rpm)
Over 15.5 ℓ/min (2,000 rpm)

Drive gear speed ratio (crankshaft gear/pump gear) = 1 (All-in-one)

RELIEF VALVE

Opening pressure : 4.5 ~ 5.4 kgf/cm^2
(64 ~ 75 psi)

C. OIL FILTER



(1) Bypass valve (3) Oil filter inlet
(2) Oil filter outlet

Filter paper fineness: Max.: 99 ± 5 microns,
Average: 75 ± 5 microns

Filtered area: 1060 cm^2

Bypass valve opening pressure (pressure difference between inner and outer side of filter paper):
1 ± 0.2 kgf/cm^2

D. VALVE CAMSHAFT

(REFER TO FIGURE (D) PAGE 3-8)

The oil enters the first journal bearing of the valve camshaft and is sent to each journal through the oil holes in the center of the camshaft. Then, it is sent to the oil pressure sensor through the last journal.

E. ROCKER ARM SHAFT

(REFER TO FIGURE (E) PAGE 3-8)

The oil from the valve camshaft comes through the hole in the support bracket of rocker arm, supplied to each rocker arm through the hole in the center of rocker arm shaft. The oil drained from the hole on top of the rocker arm is used in lubrication on the contact surface of the valve and the rocker arm. Then, it flows along the push rod to lubricate the contact surface between the push rod and the tappet and between the tappet and the valve cam.

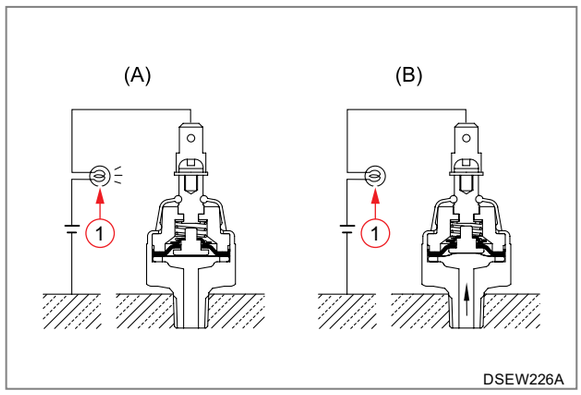
F. OIL FLOW

(REFER TO FIGURE (E) PAGE 3-8)

The oil in the oil gallery flows to the crankshaft metal 2 and then to the connecting rod big end journal bearing. The oil flows out of the gap of the connecting rod big end journal bearing is sprayed to the connecting rod small end (piston pin), piston interior and cylinder bore as the crankshaft rotates.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 20 2025-04-08 오전 9:29:01

G. OIL PRESSURE SWITCH (REFER TO FIGURE (G) PAGE 3-8)



The oil pressure switch is installed on the cylinder block at the end of the valve camshaft and leads to the oil passage which is passing through the valve camshaft.

When the oil pressure falls below the specified value, the circuit is connected by the diaphragm in the switch to turn on the warning lamp (1) on the instrument panel.

When the key switch is turned to the "ON" position with the engine stopped, the warning lamp comes on. When the oil pressure rises, this lamp goes off.

Oil switch operating pressure (min.):

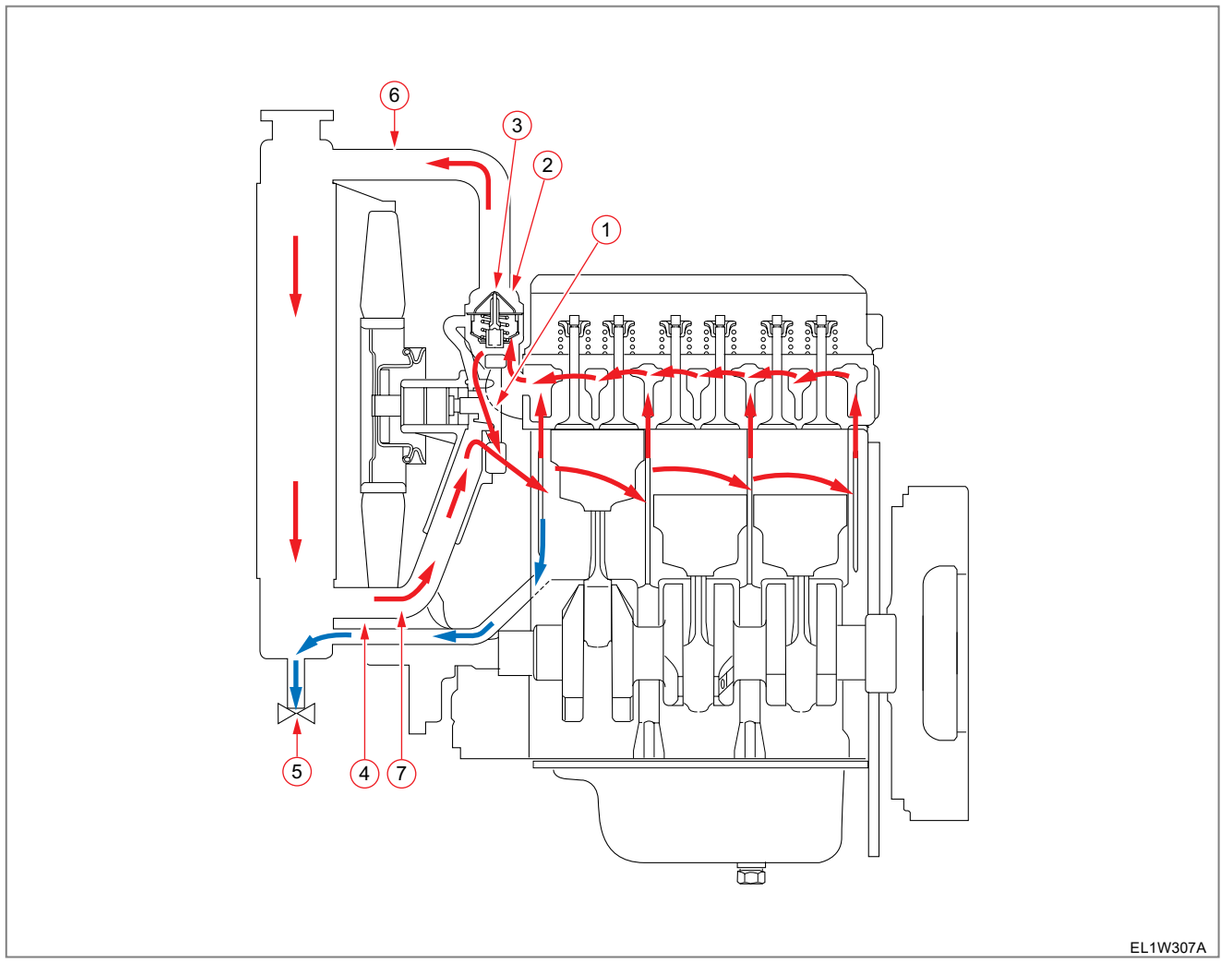
0.5 ± 0.1 kgf/cm^2

0.0007 ± 0.0001 psi

0.0049 ± 0.0009 kPa

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3.3 COOLANT FLOW ROUTE



When the centrifugal water pump (1) connected to the cooling fan shaft rotates, the coolant in the cylinder block flows from the No. 1 cylinder to the No. 3 and No. 4 cylinders through the No. 2 cylinder, and also flows to the cylinder head (from lower to upper side). In the cylinder head, the coolant flows from the No. 4 cylinder to the No. 1 cylinder through the No. 2 and No. 3 cylinders (from rear to front side).

The coolant collected in the coolant flange (2) flows to the inlet of the water pump impeller through the return hole in the water pump, and then returns to the cylinder block through the outlet of the impeller.

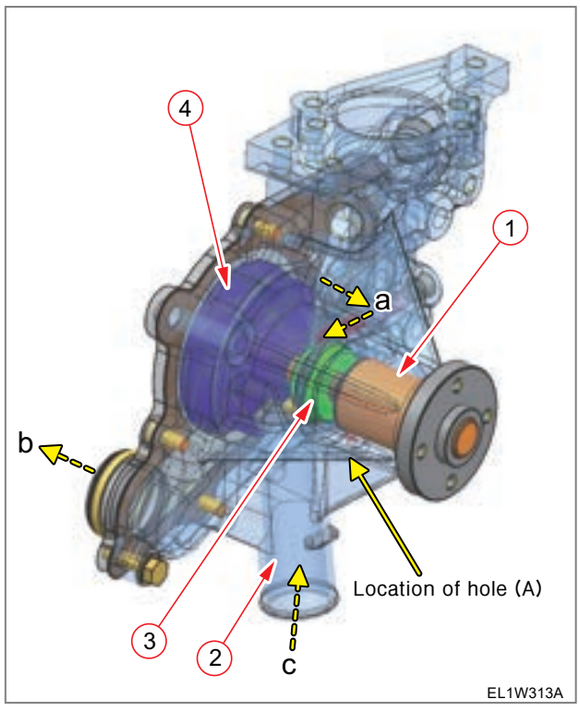
When the coolant temperature rises over 71°C (160°F), the thermostat (3) opens and most coolant flows to the radiator through the thermostat. The coolant flowed to the top of the radiator through the top hose (6) is cooled down by the cooling air and sinks. Then, it flows to the inlet of the water pump impeller through the radiator lower hose (7) to return to the cylinder block.

The drain hose (4) is to completely drain the coolant in the cylinder block when opening the radiator lower cock (5).

Also, engines equipped with an oil cooler, reduce the temperature of engine oil by connecting the cylinder block drain line (4) to the engine oil cooler.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 22 2025-04-08 오전 9:29:02

A. WATER PUMP



(a) From water pump head
(b) To cylinder block
(c) From radiator

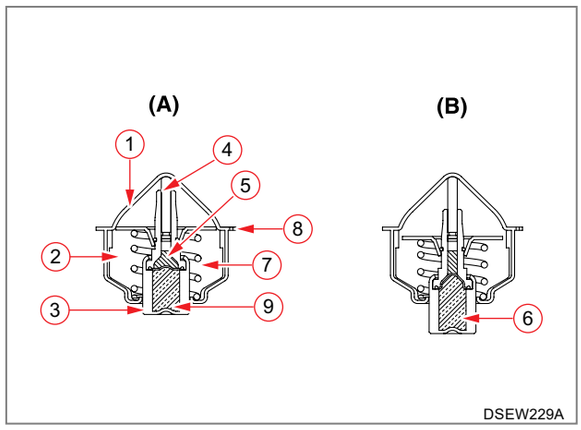
(1) Bearing
(2) Pump body
(3) Mechanical seal
(4) Pump impeller

The water pump sucks the cooled water, forces it into the cylinder block and draws out the hot water to the radiator repeatedly. The mechanical seal (3) prevents the water from entering into the bearing (1).

NOTES

If the coolant is leaked from hole (A), it means that the mechanical seal is damaged. Therefore, the water pump assembly should be replaced.

B. THERMOSTAT



(1) Seat
(2) Valve
(3) Pellet
(4) Spindle
(5) Synthetic rubber
(6) Wax (Solid)
(7) Spring
(8) Leak hole
(9) Wax (Liquid)

The thermostat is wax pellet type, which controls the flow of the cooling water to the radiator to keep the proper temperature. The case has a seat (1) and the pellet has a valve (2). The spindle attached to the case is inserted into the synthetic rubber in the pellet. The pellet is charged with wax.

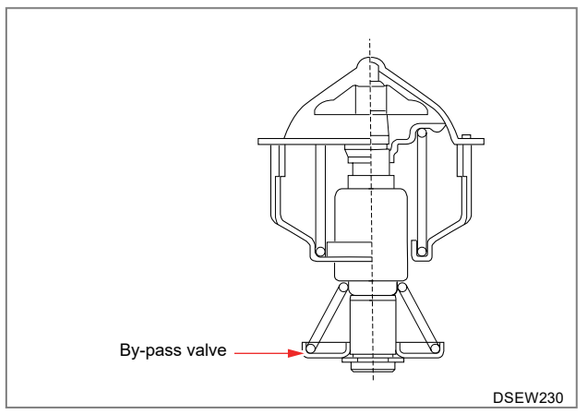
(A) At low temperature: below 71°C (160°F)

The valve (2) is seated by the spring (7) and the cooling water circulates in the engine through the water return pipe but does not enter the radiator.

(B) At high temperature: over 71°C (160°F)

As the water temperature rises, the wax in the pellet (3) becomes liquid and it pushes out the spindle.

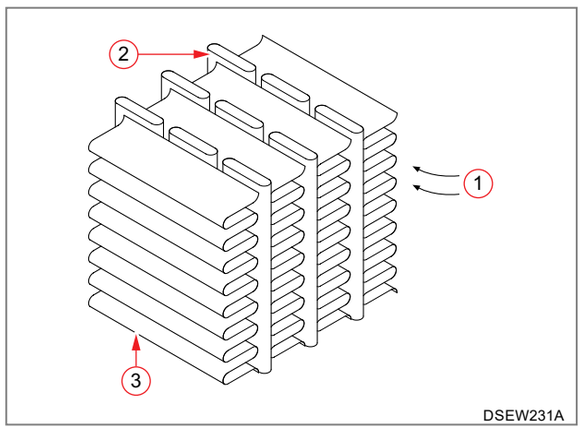
The pellet lowers and the valve (2) opens to send the cooling water to the radiator.



The thermostat is equipped with the bypass valve. Therefore, the cooling efficiency is enhanced as all coolant passes through the radiator since the internal circulation circuit is blocked as soon as the thermostat opens.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 23 2025-04-08 오전 9:29:02

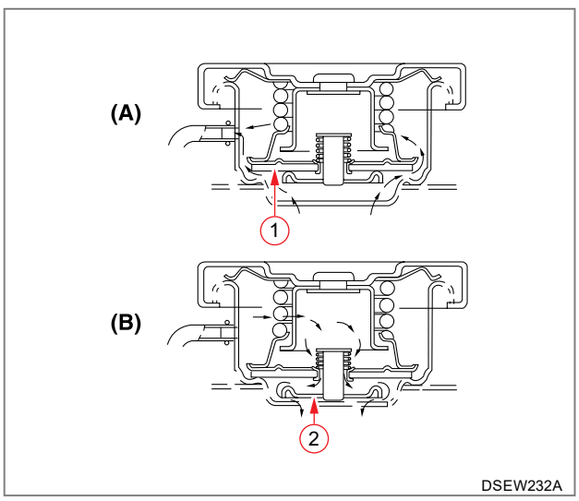
C. RADIATOR



(1) Cooling air
(2) Tube
(3) Pin

The radiator core consists of water tubes (2) with fin (3) at a right angle to it. The water in the radiator is cooled down by the air flowing between the tube wall and the fin.

D. RADIATOR CAP



(1) Pressure valve
(2) Vacuum valve

The radiator cap is equipped with the pressure valve (1) and vacuum valve (2).

(A) At High Pressure - Over 88 kPa (0.9 kgf/cm², 13 psi)

When the water temperature rises and the pressure in the radiator increases above the specified value, the pressure valve (1) opens to drain the coolant to the reservoir tank to reduce the internal pressure.

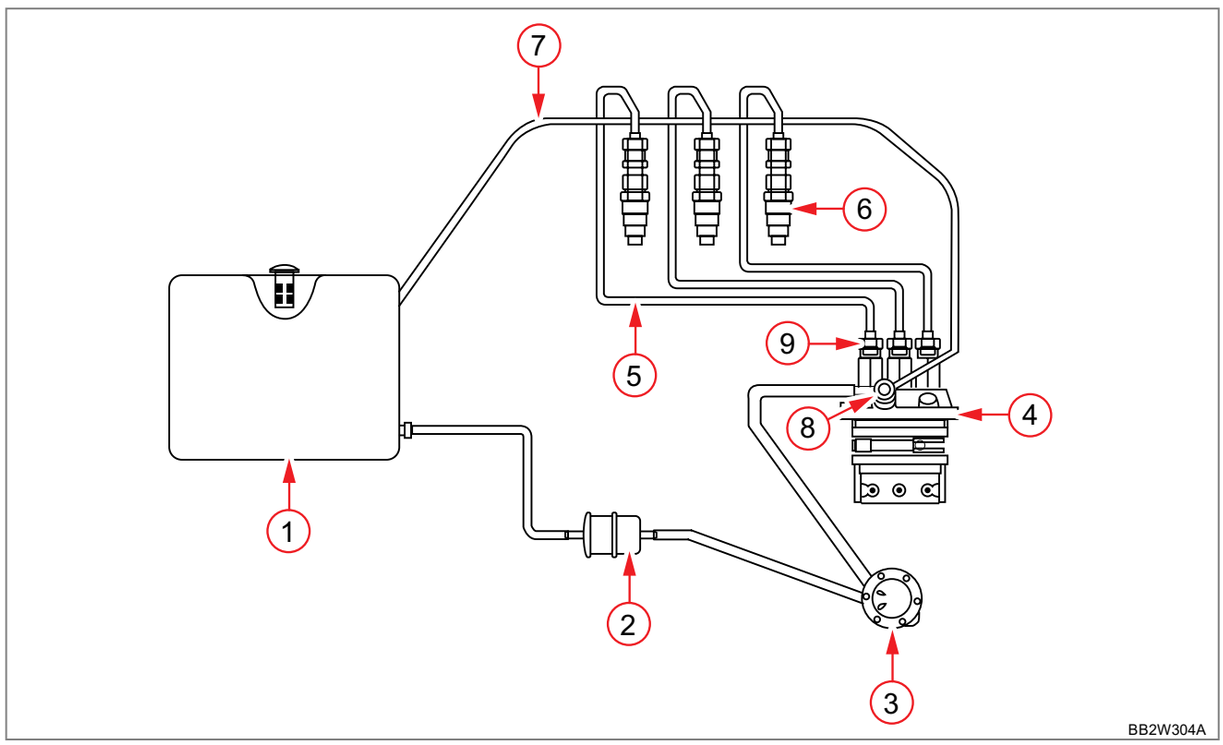
(B) At Low Pressure

When the water temperature drops down and a vacuum is generated in the radiator, the vacuum valve (2) opens to allow the coolant in the reservoir tank to enter into the radiator.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 24 2025-04-08 오전 9:29:03

3.4 FUEL SYSTEM

3.4.1 FUEL FLOW ROUTE



COMPONENTS

(1) Fuel tank
(2) Fuel filter
(3) Fuel feed pump
(4) Injection pump
(5) Injection pipe
(6) Injection nozzle
(7) Fuel overflow pipe
(8) Air bleed bolt
(9) Nozzle holder nut

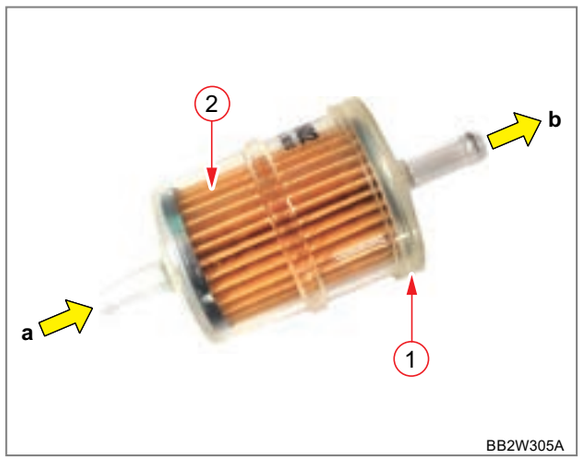
The fuel is fed from the fuel tank (1) through the fuel filter (2) to the injection pump (4) by the fuel feed pump (3). The injection pump force-feeds the fuel through the injection nozzles (6), which inject the fuel into the cylinders for combustion. Any excessive fuel from the injection pump to the injection nozzles is collected in the fuel overflow pipes (7) and returns to the fuel tank.

NOTES

For air bleeding, see the next page.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 25 2025-04-08 오전 9:29:03

3.4.2 FUEL FILTER



(a) From fuel tank
(b) To fuel feed pump
(1) Filter bowl
(2) Filter element

The fuel from fuel tank enters into the filter bowl through the port (a) and passes through the filter element. Then, it is drawn out through the port (b) and supplied to the fuel feed pump.

3.4.3 BLEEDING THE FUEL SYSTEM

1. Make sure that the amount of fuel in the fuel tank is sufficient.
2. If there is air in the fuel filter, wait until the fuel filter bowl is filled with the fuel. (The bowl can be filled with the fuel by head pressure when the fuel tank is full.)

⚠ CAUTION

- **The bleeding process could be skipped if filling the fuel bowl with fuel before installing it.**

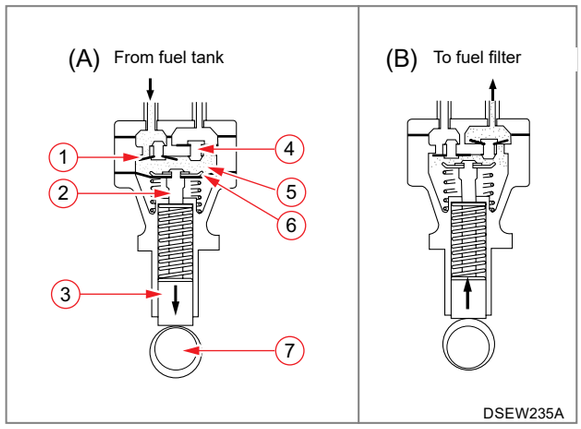
NOTES

Do not operate the start motor for more than 10 sec. continuously, instead operate it for several times within 10 sec. each time.

3. Loosen the bleeding bolt (8) shown in the figure (3.4.1), and crank the engine to bleed air. Then, tighten the bolt again.
4. If the engine still cannot be started, loosen 1 or 2 injection pipe holder nuts (9) (figure 3.4.1) and crank the engine to bleed air.
5. When the air bubbles are not seen anymore in the drained fuel, tighten the loose parts and start the engine.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 26 2025-04-08 오전 9:29:03

3.4.4 FUEL FEED PUMP



(1) Intake valve
(2) Push rod
(3) Tappet
(4) Exhaust Valve
(5) Chamber
(6) Diaphragm
(7) Fuel camshaft

The diaphragm (6) is linked to the tappet (3) with the push rod (2). The tappet is reciprocated by the eccentric cam on the fuel camshaft (7).

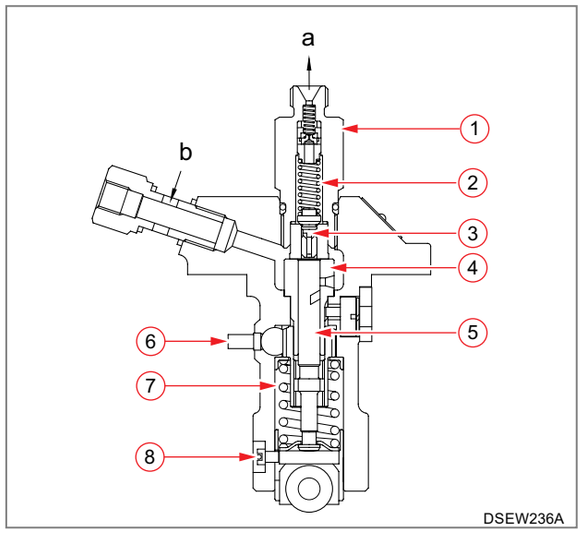
(A) Intake stroke

When the diaphragm is pulled down by the spring, vacuum in the chamber (5) causes the exhaust valve (4) to close and the atmospheric pressure in the fuel tank to force the fuel into the chamber, opening the intake valve (1).

(B) Scavenging stroke

When the diaphragm is pushed up by the cam, the pressure in the chamber causes the intake valve to close and forces out the fuel, opening the exhaust valve.

3.4.5 FUEL INJECTION PUMP



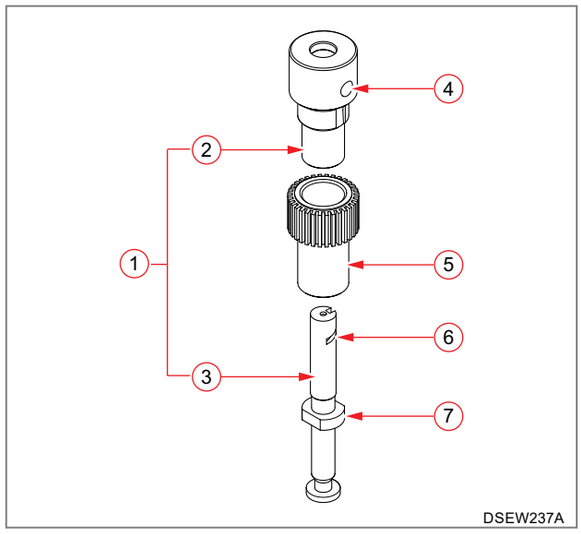
(a) To injection nozzle
(b) From fuel filter

(1) Delivery valve holder
(2) Delivery valve spring
(3) Delivery valve
(4) Cylinder
(5) Plunger
(6) Control rack
(7) Plunger spring
(8) Tappet

This fuel injection pump is Bosch K type fuel injection pump. It features a compact and light weight design.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 27 2025-04-08 오전 9:29:04

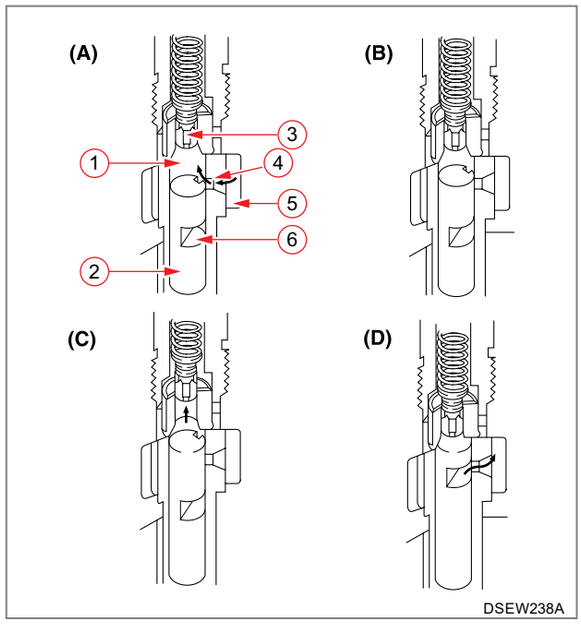
PUMP ELEMENT



(1) Pump element
(2) Cylinder
(3) Plunger
(4) Feed hole
(5) Control sleeve
(6) Control groove
(7) Sliding surface

The pump element (1) consists of a plunger (3) and cylinder (2) which their sliding surfaces are finely machined to maintain the fuel tightness. The plunger (3) is installed in the control sleeve (5) and the sleeve is engaged with the control rack that rotates the plunger in the cylinder to control the amount of fuel delivered.

OPERATION OF PUMP ELEMENT



(1) Delivery chamber
(2) Plunger
(3) Delivery valve
(4) Feed hole
(5) Fuel chamber
(6) Control groove

(A) Before Delivery

As the plunger (2) lowers, fuel is drawn into the delivery chamber (1) through the feed hole (4) from the fuel chamber (5).

(B) Beginning of Delivery

When the plunger is pushed up by the cam and the head of the plunger closes the feed hole (4), the pressure in the delivery chamber (1) rises to push the delivery valve (3) open.

(C) Delivery

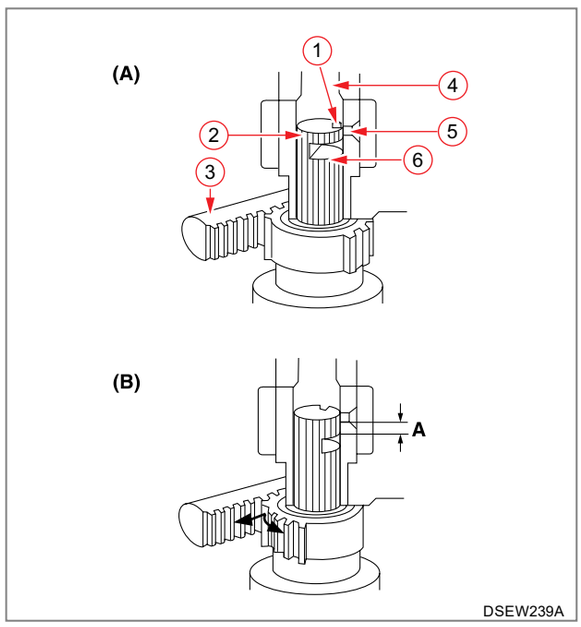
While the plunger (2) is rising, delivery of fuel continues.

(D) End of Delivery

When the plunger rises further and the control groove (6) on its periphery meets the feed hole, the injection stops because the pressure in the delivery chamber (1) is reduced to the opening pressure.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 28 2025-04-08 오전 9:29:04

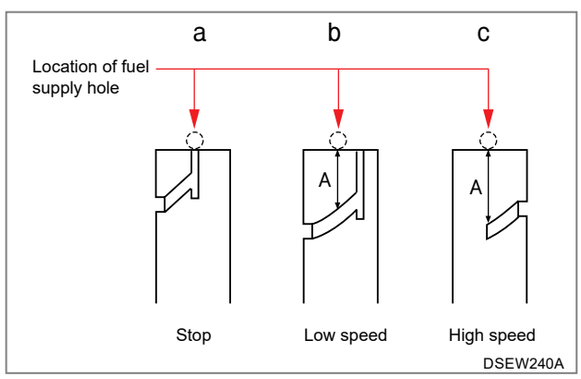
AMOUNT OF FUEL DELIVERY



(1) Slot
(2) Plunger
(3) Control rack
(4) Delivery chamber
(5) Feed hole
(6) Control groove

(A) No Fuel Delivery

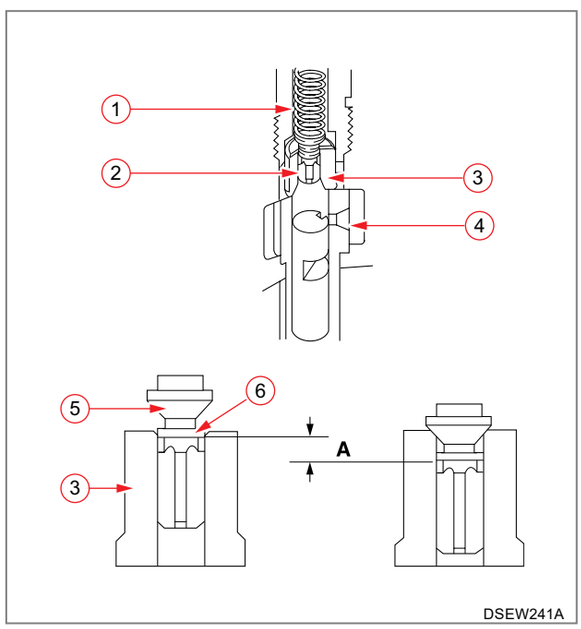
When the control rack (3) is at the engine stop position, the lengthwise slot (1) on the plunger (2) aligns with the feed hole (5). The pressure in the delivery chamber does not build up and no fuel is forced to the injection nozzle since the delivery chamber (4) is opened to the feed hole during the entire stroke of the plunger.



(B) Fuel Delivery

The plunger is rotated by the control rack and the feed hole is not aligned with the lengthwise slot. When the plunger is pushed up, the feed hole is closed by the plunger. The pressure in the delivery chamber builds up and forces the fuel to the injection nozzle until the control groove (6) meets the feed hole. The amount of the fuel to be forced into the nozzle corresponds to distance A. In the above figure, the amount of injected fuel in (c) is larger than the amount of injected fuel in (b).

DELIVERY VALVE



(1) Valve spring
(2) Delivery valve
(3) Valve seal
(4) Fuel chamber
(5) Valve face
(6) Relief plunger

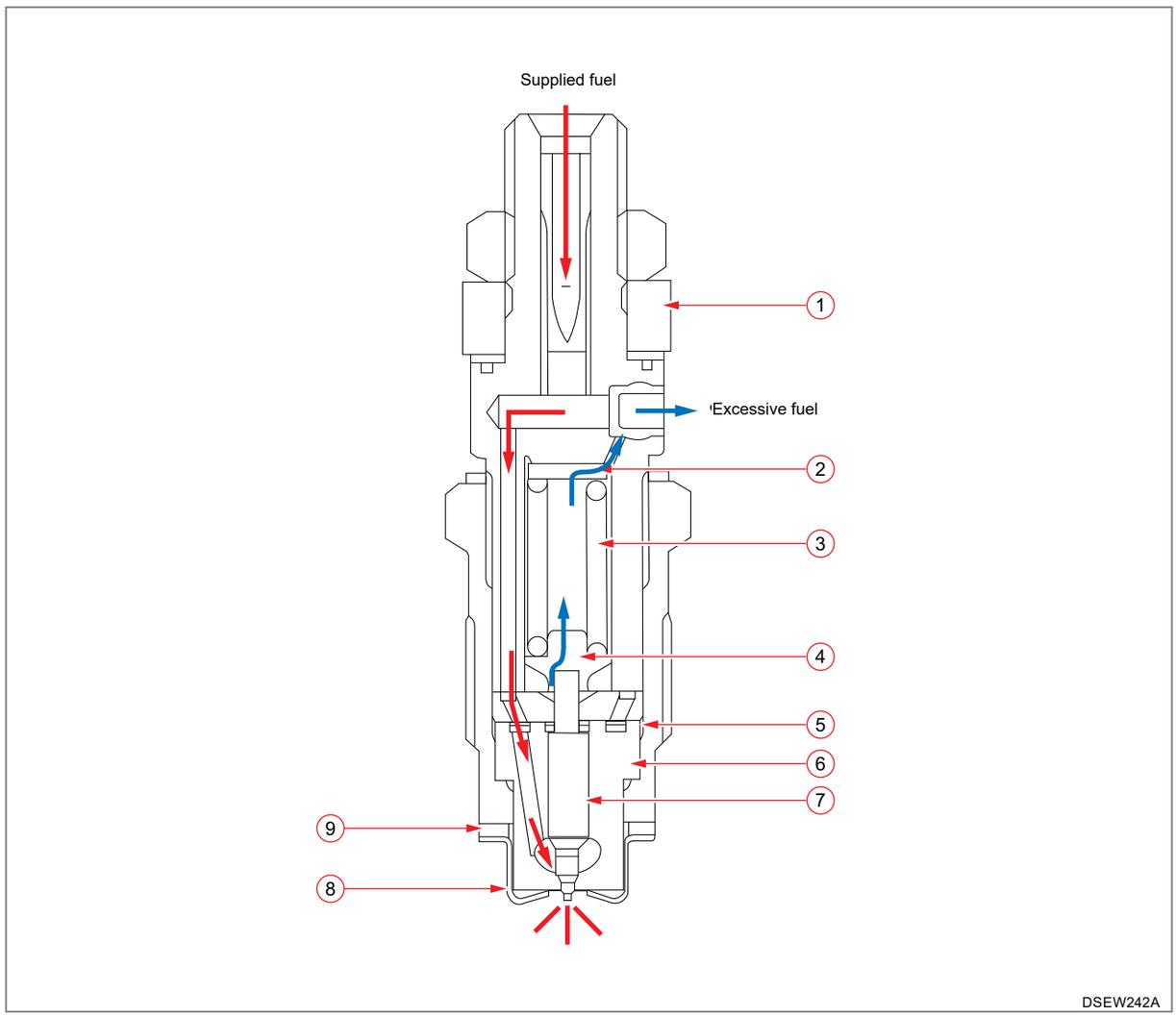
The delivery valve (2) prevents the fuel in the injection pipe from flowing back into the delivery chamber and the fuel in the injection nozzle from dribbling after injection.

The relief plunger (6) sucks the fuel back from the injection pipe to prevent the leakage dribbling and unnecessary subsequent injection after the major injection.

The stroke of A corresponds to the amount of fuel sucked back (35 mm^3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 29 2025-04-08 오전 9:29:05

3.4.6 INJECTION NOZZLE



COMPONENTS

(1) Nozzle holder assembly
(2) Adjusting washer
(3) Nozzle spring
(4) Push rod
(5) Lock nut
(6) Nozzle body
(7) Needle valve
(8) Heat seal
(9) Packing

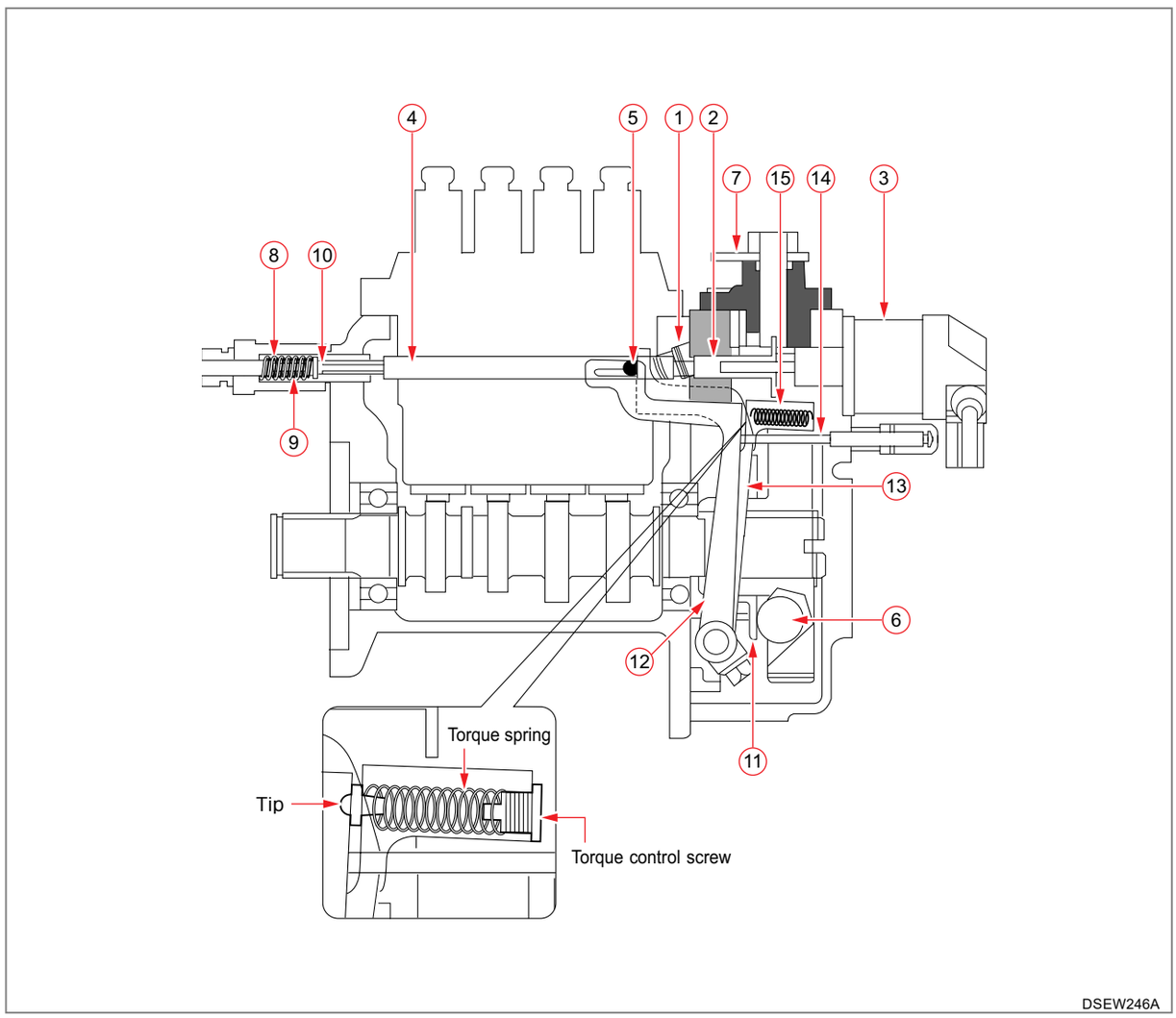
This injection nozzle is throttle type nozzle. It features the low fuel consumption and works well with DAEDONG combustion chamber. The nozzle valve opening pressure is about 15 ~ 16 MPa (153 ~ 163 kgf/cm^2, 2,177 ~ 2,322 psi). When the pressure overcomes the counterforce of nozzle valve spring (3), the pressure pushes up the needle valve (7) constantly and then the proper amount of fuel is injected into the swirling air in the combustion chamber for combustion.

The opening pressure can be adjusted by adding or reducing the washer (2). A washer of 0.1 mm corresponds to 980 kPa (10 kgf/cm², 142 psi) change in opening pressure. The heat seal (8) is adopted to improve the durability and reliability of the nozzle.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 30 2025-04-08 오전 9:29:05

3.5 GOVERNOR AND STOP SYSTEM

3.5.1 BASIC PRINCIPLE OF GOVERNOR SYSTEM



COMPONENTS

(1) Governor spring 1, 2
(2) Solenoid guide
(3) Stop solenoid
(4) Pump rack
(5) Rack pin
(6) Steel ball
(7) Governor lever
(8) Idle spring
(9) Start spring
(10) Idle control shaft
(11) Governor sleeve
(12) Fork lever 2
(13) Fork lever 1
(14) Fuel limit bolt
(15) Torque spring

As shown in the above figure, the steel ball (6) in the fuel camshaft gear is supported by the governor sleeve (11) to prevent from coming out. The sleeve pushes the fork lever 1 (13) to transfer the power to the fuel injection pump pin (5).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 31 2025-04-08 오전 9:29:05

3.5.2 OPERATION OF GOVERNOR

1. WHEN STOPPED

The fuel is blocked since the solenoid (3) pushes the injection pump control rack (4) of the injection pump to the left.

2. KEY ON

When the electromagnet in the stop solenoid operates and the pin is retracted, the speed rack (4) of the fuel injection pump is pushed to the right by the start spring (9) and the start shaft (10) to supply the sufficient amount of fuel to start the engine.

3. WHEN STA RTING THE ENGINE AND RUNNING THE ENGINE AT LOW IDLE SPEED

When the engine is started, the steel ball (6) pushes the governor sleeve (11) to the left as the centrifugal force of the steel ball increases. Therefore, the governor fork lever 1 (13) pushes the pump rack (4) to the left to reduce the amount of fuel supplied.

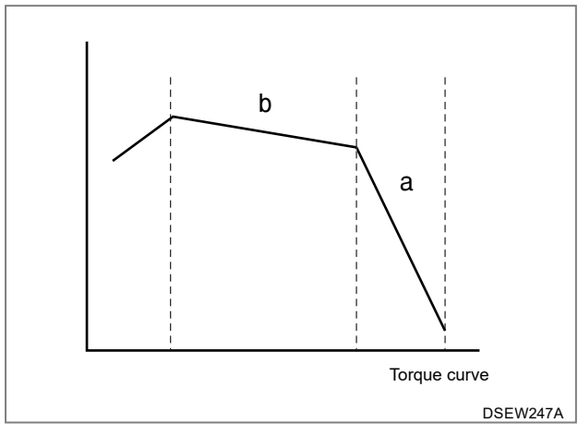
As the control rack is stopped by the idle spring (8), it keeps the balance with the centrifugal force of the steel ball so that at least minimum amount of fuel is delivered for stable engine running at idle speed.

4. ACCELERATION AND DECELERATION

When depressing the accelerator pedal, the governor spring (1) pulls the fork lever 2 (12) to the right and then pushes the fork lever 1 (13) to the right. The fork lever (13) is stopped by the governor sleeve(11).

When the centrifugal force of the steel ball (6) that is proportional to the engine speed is balanced with the tension of the governor spring (1) that is determined by the driver, the stable speed is maintained.

5. LOAD INCREASE AT HIGH SPEED



When a load is applied to the engine running at a high speed, the centrifugal force of steel ball (6) decreases as the engine speed drops. Also, the fork lever 2 (12) is pulled to the right by the governor spring until it contacts the fuel limit bolt (14). Until then, the amount of injected fuel per one stroke of the injector plunger and the torque increase.

This range (a) is between the max. speed point with no load and the max. power point of the torque curve.

When the fork lever 2 is blocked by the fuel limit bolt (14) and does not move any more and the load is increased, the centrifugal force of steel ball drops further and the torque spring (15) compressed between the fork lever 1 and 2 is loosened. Then, the fork lever 2 moves to the right until the torque spring is free, and the amount of fuel supplied and the torque increase simultaneously.

This range (b) is between the max. power and the max. torque point in the torque curve.

IMPORTANT

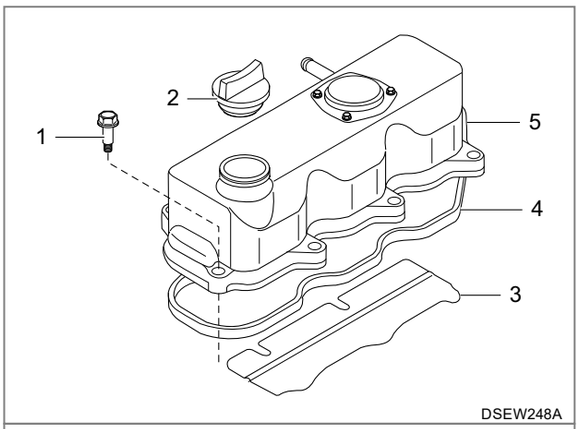
- **The fuel limit bolt (14), idle spring (9) and max. rpm setting bolt are set at factory. Unauthorized adjustment of such components can negatively effect the performance of the engine. Therefore, never adjust them without permission from DAEDONG. Such action violates the EPA regulation and also can void the warranty.**

6. WHEN STOPPED

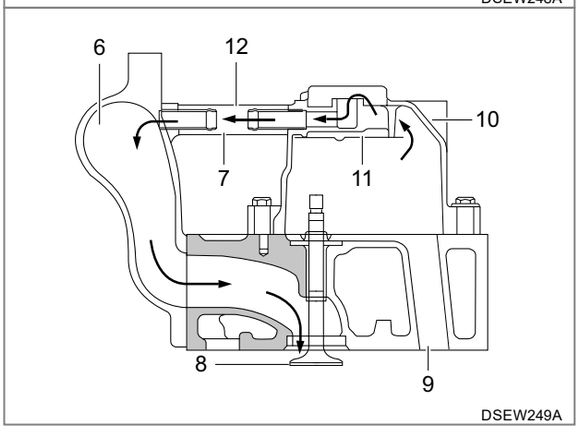
When the key switch is moved to the "OFF" position, the stop solenoid power is cut off to release the electromagnet. Therefore, the stop pin comes off by the return force of the spring and pushes the solenoid guide (2) and fuel injection pump rack to the stop position to stop the engine.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 32 2025-04-08 오전 9:29:06

4. PCV VALVE



DSEW248A



DSEW249A

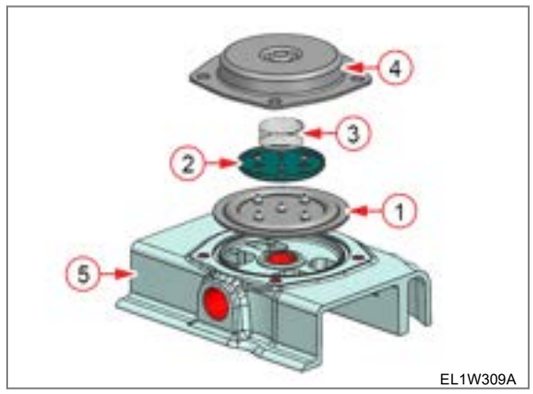
(1) Head cover bolt
(2) Fuel feeding Flange
(3) Oil baffle plate
(4) Head cover gasket
(5) Cylinder head cover
(6) Intake manifold
(7) Bleeding pipe
(8) Intake valve
(9) Cylinder head
(10) Cylinder head cover
(11) Oil baffle plate
(12) Bleeding pipe connection

PCV(Positive Crankcases Ventilation):

The PCV system is a system that prevents air pollution by returning the blow-by gas to the intake manifold through the bleeding pipe of the cylinder head cover for recirculation of the gas. (However, the turbo charged engine has the open crankcase type that discharges the blow-by gas to the air.)

NOTES

There is a diaphragm between the cylinder head cover and valve cover to control the pressure.



EL1W309A

No.	Name	Remark	
1	Diaphragm	Lift height	0.5 ~ 1.0 mm
2	Cap	-	-
3	Spring	Wire Gauge	Ø 0.6 mm
		Free Length	11.58 mm
		Loaded Height	7.7 mm
		Spring Load	0.0162 kgf
		Displacement	3 mm
4	Cover	-	-
5	Head cover	-	-

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 33 2025-04-08 오전 9:29:06

5. TROUBLESHOOTING

Symptom	Cause	Solution
Engine does not start	• No fuel	• Add fuel
	• Air in fuel system	• Bleed air
	• Water in fuel system	• Change fuel and repair or flush fuel system
	• Clogged fuel pipe	• Clean
	• Clogged fuel filter	• Clean or replace
	• Excessively high viscosity of fuel or engine oil at low temperature	• Use the specified fuel or engine oil
	• Fuel with low cetane number	• Use the specified fuel
	• Fuel leak due to loose injection pipe mounting nut	• Tighten nut
	• Incorrect injection timing	• Adjust
	• Clogged injection nozzle	• Clean or replace
	• Defective fuel injection pump	• Repair or replace
	• Defective fuel transfer pump	• Repair or replace
	• Defective piston, cylinder bore or bearing	• Repair or replace
	• Compression leak from cylinder	• Replace head gasket, tighten cylinder head bolts, glow plug and nozzle holder
	• Improper valve seating, damaged valve spring, valve seized	• Repair or replace
	• Improper valve timing	• Correct or replace timing gear
	• Worn piston ring and bore	• Repair or replace
	• Excessive valve clearance	• Adjust
Start motor does not run	• Discharged battery	• Charge
	• Defective start motor	• Repair or replace
	• Defective key switch	• Repair or replace
	• Disconnected wiring	• Connect
Engine running is not smooth	• Clogged or dirty fuel filter	• Clean or replace
	• Clogged air cleaner	• Clean or replace
	• Fuel leak due to loose injection pipe mounting nut	• Tighten nut
	• Defective fuel injection pump	• Repair or replace
	• Incorrect nozzle opening pressure	• Adjust or replace
	• Seized or clogged nozzle	• Repair or replace
	• Clogged fuel overflow pipe	• Clean or replace
	• Defective governor	• Repair or replace
Either white or blue exhaust smoke is produced	• Excessive engine oil	• Reduce to the specified level
	• Worn piston ring and bore or seized piston ring	• Repair or replace
	• Incorrect injection timing	• Adjust
	• Insufficient compression pressure	• Adjust valve clearance

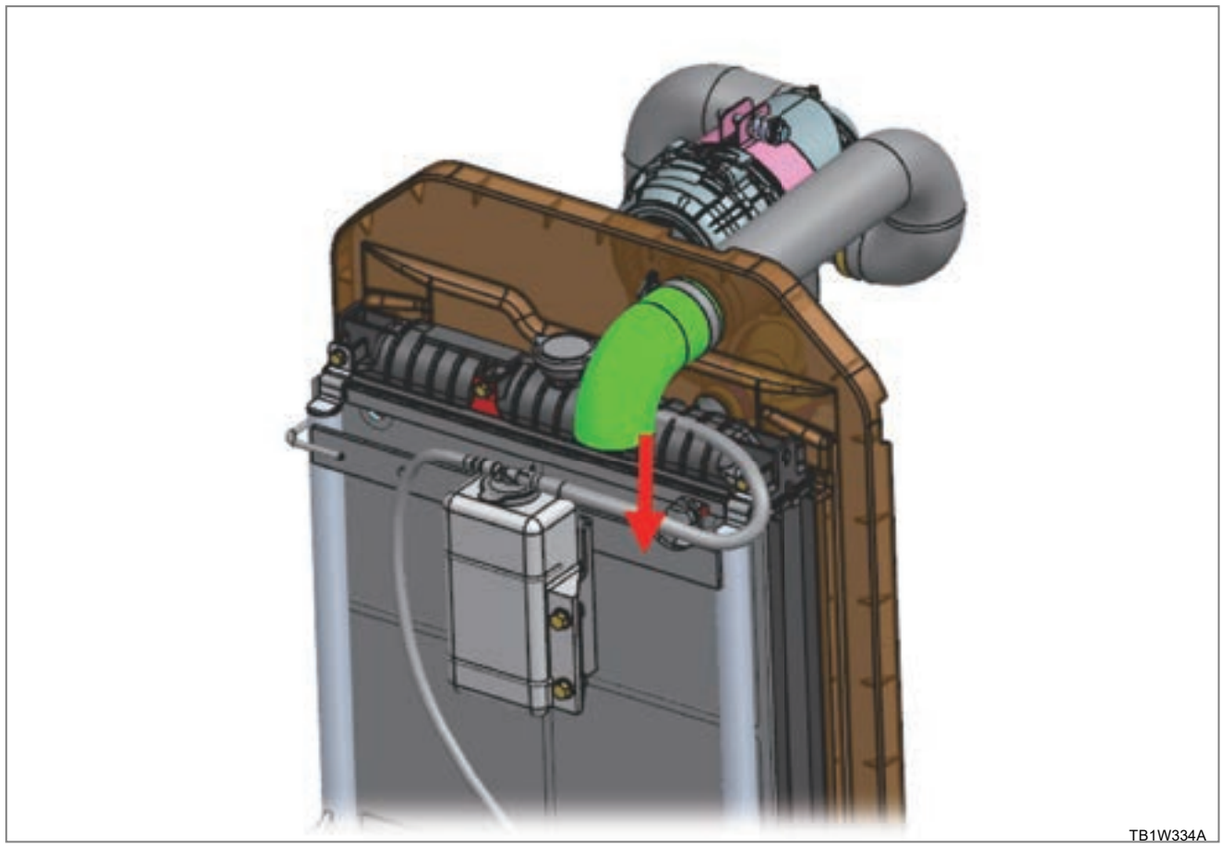
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Symptom	Cause	Solution
Either black or dark gray exhaust smoke is produced	• Overheat or overload • Low grade fuel used • Clogged fuel filter • Clogged air cleaner	• Reduce load • Use the specified fuel • Clean or replace • Clean or replace
Insufficient power	• Incorrect injection timing • Seized engine components • Uneven fuel injection • Insufficient nozzle injection • Compression pressure leak	• Adjust • Repair or replace • Repair or replace the fuel injection pump • Repair or replace the nozzle • Replace head gasket, check tightness of cylinder head bolts, glow plugs and nozzle holders.
Hard to start in cold weather	• Not enough pre-heating • Defect on pre-heating system • No winter diesel fuel • Excess valve clearance • Low battery charge level • T/M oil viscosity too high	• Give enough pre-heating time • Repair or replace pre-heating components • Use winter diesel fuel • Adjust valve clearance • Charge of replace battery • Use low viscosity oil as specified

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 35 2025-04-08 오전 9:29:06

6. MEASUREMENT AND ADJUSTMENT

6.1 AIR INTAKE HOSE ASSEMBLY TIPS



Assemble the air intake hose so that its inlet is facing vertically downward to the ground, as shown in the picture.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 36 2025-04-08 오전 9:29:07

6.2 FAN BELT TENSION ADJUST


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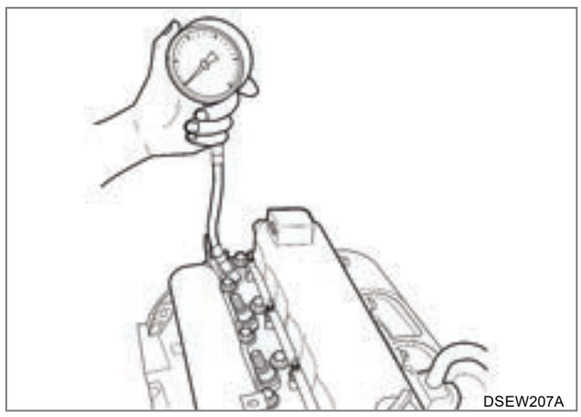
EL1W440A

Measure belt tension using a DENSO BTG-2 belt tension gauge at the midpoint of the alternator and fan drive pulley.

When attaching the tension gauge to timing belt type, make sure that the hook of the BTG-2 touches the protrusion on the inside of the belt, not the groove.

The tension of the fan belt should be 25 ~ 35 kgf at the midpoint between the alternator and the fan drive pulley.

6.3 PISTON COMPRESSION PRESSURE MEASUREMENT


DSEW207A

1. Run the engine until warm.
2. Stop the engine and remove the air cleaner, the muffler and all nozzle holders.
3. Set a compression tester to the adaptor installed in the nozzle holder hole and fixed with the locating screw.
4. Pull the stop lever to cut the fuel and run the engine with the starter at 200 to 300 rpm for 5 to 10 seconds. Measure the maximum pressure while running, several times.

- For the test, use a fully charged battery and the specified valve clearance.
- If the pressure does not reach the allowable limit, apply a small amount of oil to the cylinder wall through the nozzle holder hole and measure the pressure again.

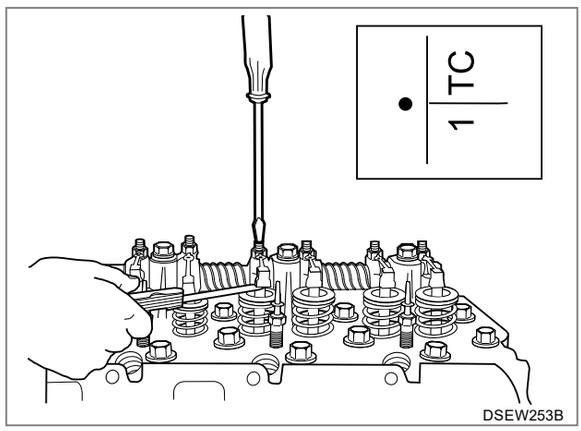
▶ JUDGMENT

- If the pressure raises after applying oil, check the cylinder wall and piston rings.
- If the pressure still low, check the top clearance, valve clearance and cylinder head.
- If the compression differs more than 10% among the cylinders, trace the cause of pressure variation and take corrective measures.

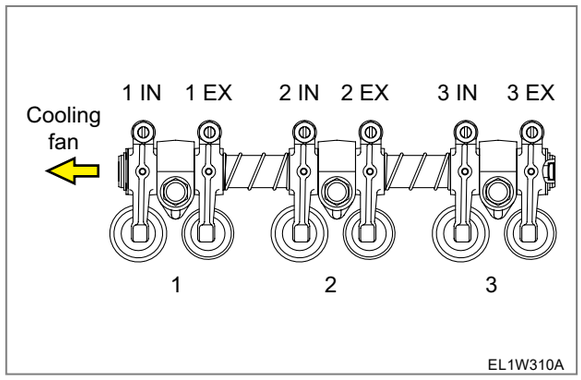
Item	Factory spec.	Allowable lower limit
Compression pressure	3.1 ~ 3.5 MPa 31.6 ~ 35.7 kgf/cm^2 449.8 ~ 507.9 psi	2.62 MPa 26.7 kgf/cm^2 380 psi
Pressure difference between two cylinders	-	10 %

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 37 2025-04-08 오전 9:29:07

6.4 VALVE CLEARANCE



DSEW253B



EL1W310A

1. Remove the cylinder head cover.
2. Turn the flywheel and align the 1TC mark with the timing mark of the rear end plate to position the 1st cylinder piston at the top dead center of its compression cycle. (At this time, both valves of 1st cylinder are closed to allow the gap between rocker arms and valves and Ex. valve of 2nd cylinder and IN. valve of 3rd cylinder are open, and moving at the same time.)
3. Measure the clearance at the valves marked with in the table below with a feeler gauge.

When the No. 1 cylinder is at T.D.C.

Cooling fan	1		2		3		Flywheel
	IN	EX	IN	EX	IN	EX	
	●	●	○	●	●	○	

●: Closed, ○: Open

4. If the clearance is not within the factory specifications, adjust.

   After adjusting valve clearance, be sure to tighten the lock nut of each valve securely.

5. Turn the flywheel just one turn to position the 1st cylinder piston at top dead center. (At this time, two valves are in their over lap position without any gab between rocker arms and valves.)

   After adjusting valve clearance, be sure to tighten the lock nut of each valve securely.

After one turn

Cooling fan	1		2		3		Flywheel
	IN	EX	IN	EX	IN	EX	
	○	○	●	○	○	●	

●: Closed, ○: Open

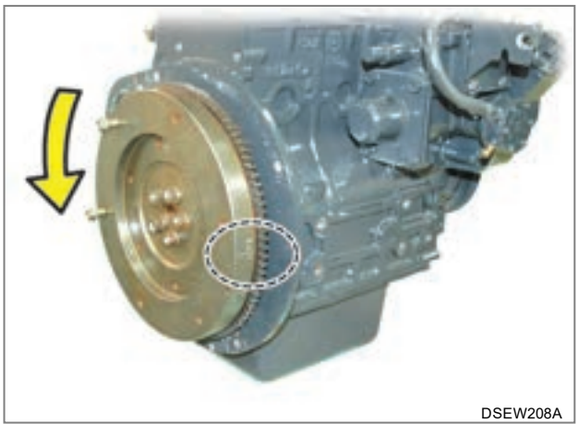
6. Measure the clearance at the valves marked with in the table below with a feeler gauge.
7. If the clearance is not within the factory specifications, adjust.

   After adjusting valve clearance, be sure to tighten the lock nut of each valve securely.

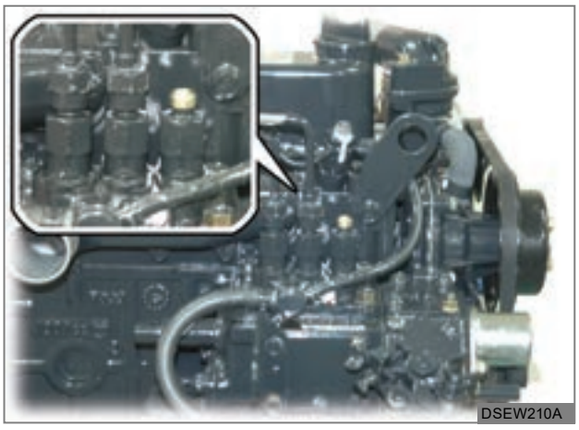
Item	Factory spec.
Valve clearance	0.15 mm 0.006 in.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 38 2025-04-08 오전 9:29:08

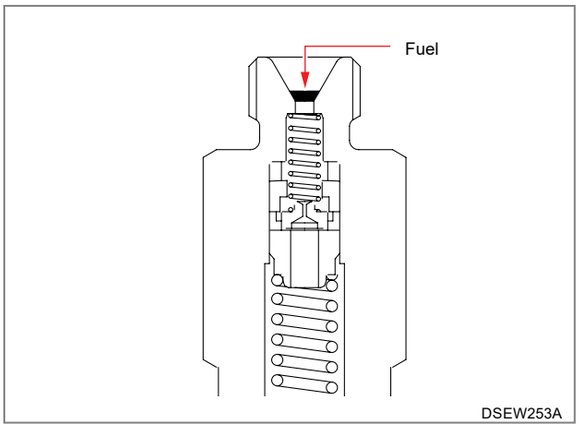
6.5 INJECTION TIMING MEASUREMENT AND ADJUSTMENT


DSEW208A

1. Find the compression T.D.C while turning the flywheel counterclockwise. Make sure the mark “1 TC” on the side of the flywheel is aligned with the reference mark on top of the rear plate of the flywheel.
2. Then, turn the flywheel clockwise for approx. 30°.


DSEW210A

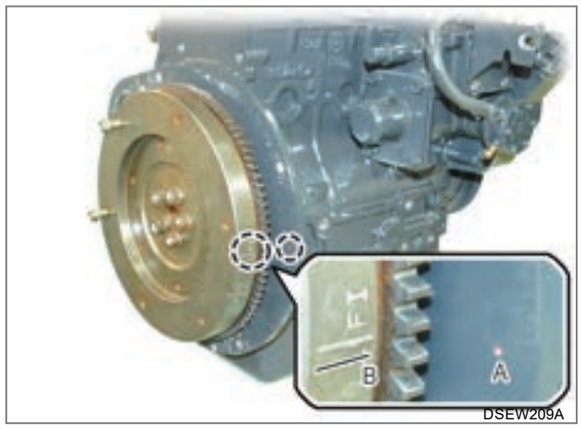
3. Remove the No. 1 high pressure pipe.
4. Unscrew the nozzle holder slightly and tighten it when it is filled with fuel.



DSEW253A

5. Remove the fuel in the nozzle holder with clean cloth and leave only small amount of fuel.
6. Observe the fuel of the nozzle holder while turning the crankshaft clockwise (when looking at the front of the engine) slowly.
7. When the amount of the fuel in the nozzle holder increases abruptly, that moment is the injection timing.
   - If the fuel increases too much, it means that the injection timing is passed already.
   - If the fuel does not increase, it means that it is the exhaust cycle. Therefore, turn the crankshaft 360° to find the compression cycle and repeat the above procedures.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 39 2025-04-08 오전 9:29:08



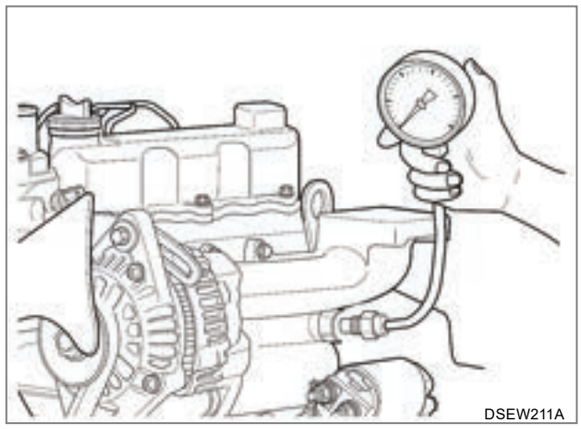
DSEW209A

8. When the injection timing is measured, stop the flywheel and mark the position (B) for the injection timing on the flywheel where it is aligned with the reference mark (A).
9. Measure the distance between the measured injection timing mark (B) and the previous mark “1FI” to check if the injection timing has been changed.
10. To advance the injection timing, reduce the amount of shims. To delay the injection timing, increase the amount of shims.

Injection timing	Diameter of flywheel	Flywheel circumference for 1°	Amount of shims to adjust 1°
BTDC 18.5°	245 mm (9.6 in.)	2.13 mm (0.084 in.)	0.1 mm (0.004 in.)

※ BTDC : Before Top Dead Center

6.6 ENGINE OIL PRESSURE


DSEW211A

1. Remove the oil pressure switch and install adaptors and pressure tester.
2. Start the engine and run it until it is warmed up, and measure the oil pressure both at idling and rated speed.
3. If the oil pressure is less than the allowable limit, check the amount of oil, oil filter, oil pump relief valve, oil passages and oil clearances.

Engine oil pressure	At idle speed	Specified value	Above 49 kPa 0.5 kgf/cm² 7.11 psi
	At rated speed	Specified value	245 ~ 441 kPa 2.5 ~ 4.5 kgf/cm² 35.6 ~ 64.0 psi
		Allowable limit (lower limit)	245 kPa 2.5 kgf/cm² 35.6 psi

Oil pressure switch
Tightening torque ..... 14.7 ~ 19.6 Nm
1.5 ~ 2.0 kgf-m
10.8 ~ 14.5 lb-ft

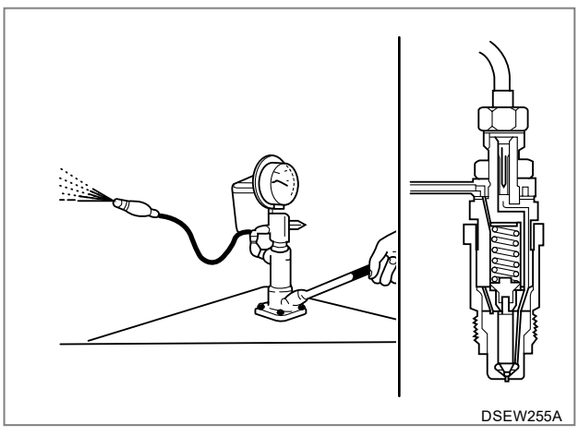
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 40 2025-04-08 오전 9:29:08

6.7 INJECTION NOZZLE INSPECTION

CAUTION

- **Never contact with spraying diesel under pressure. It may penetrate the skin and cause the serious injury.**
- **Be sure nobody is in direction of the spray.**

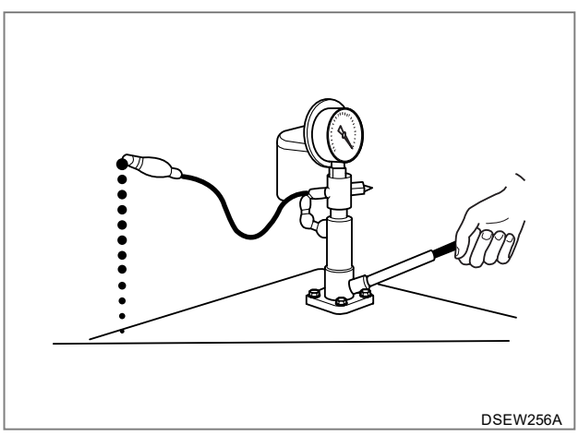
A. FUEL INJECTION PRESSURE


DSEW255A

1. Set the injection nozzle to the nozzle tester.
2. Measure the injection pressure.
3. If the measurements are not within the specified range, replace the injection nozzle

Specified value of
fuel injection pressure ... 15.00 ~ 15.98 MPa
153 ~ 163 kgf/cm²
2,176 ~ 2,318 psi

B. FUEL TIGHTNESS OF NEEDLE VALVE SEAT


DSEW256A

1. Set the injection nozzle to the nozzle tester.
2. Apply 140 kgf/cm²(13.72 MPa, 1,991 psi) of pressure consistently for 10 seconds and check if the fuel is leaked from the nozzle.
3. If the fuel is leaked, replace the nozzle.

6.8 BUBBLE TEST FOR RADIATOR

NOTES

Checking if air is leaked through the crack on the cylinder wall

1. Check the coolant level of the radiator and the reservoir tank. Add the coolant if necessary.
2. Start the engine with the radiator cap closed and the reservoir tank cap open.
3. Check if any bubble can be seen in the overflow hose on the bottom of the reservoir tank around 5 minutes later.
4. If any bubble can be seen, remove the engine cylinder head to check the head gasket for damage, the cylinder bore for crack and the cylinder head for crack. Replace the components if necessary.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 41 2025-04-08 오전 9:29:08

7. DISASSEMBLY, SERVICE AND ASSEMBLY

7.1 ENGINE REMOVAL

1. Park the tractor on level ground, stop the engine and apply the parking brake.



2. Open the hood and disconnect the negative (-) battery cable (1).



3. Open the coolant drain cock (1) and drain the coolant.





4. Disconnect the hood wiring connector (1), gas cylinder (2) and unscrew the hood support mounting bolts (3) to remove the hood (4).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 42 2025-04-08 오전 9:29:09



5. Remove the engine front battery holder bracket (1), disconnect the "+" cable (3), and remove the battery (3).

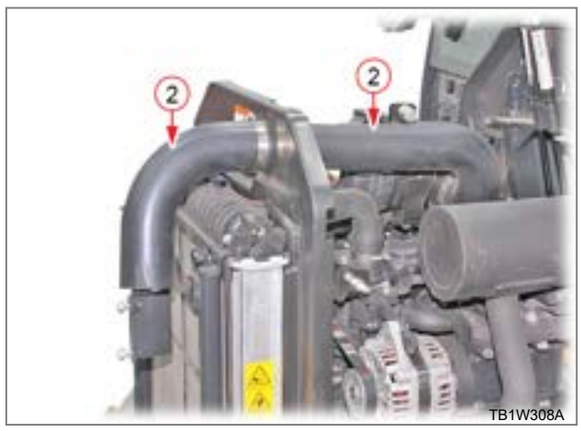
REMARK

- **When disconnecting the cables, disconnect the negative (-) cable first and then disconnect the positive (+) cable. When connecting them, connect the positive cable first and then the negative cable later.**



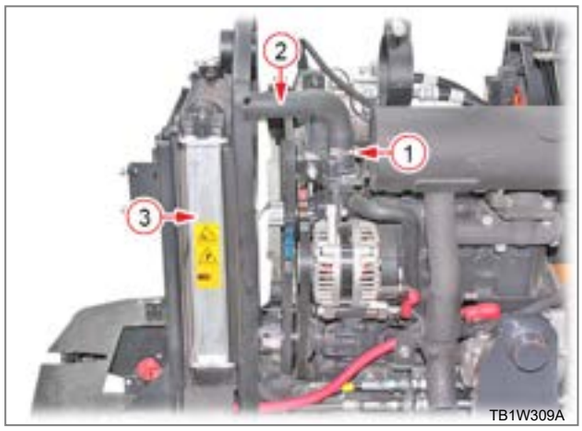
6. Remove the reservoir tank (1) from the radiator support.

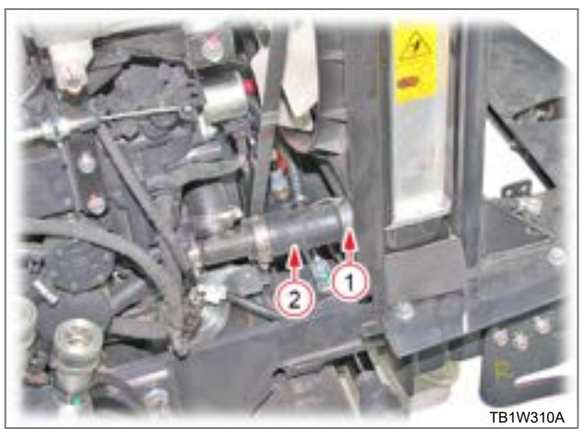




7. Remove the air cleaner (1), intake hose (2).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 43 2025-04-08 오전 9:29:09





8. Loosen the coolant hose band (1), disconnect the coolant hose (2), and then remove the radiator (3).





9. Remove the radiator support (2) and shroud (3) from the radiator (1).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 44 2025-04-08 오전 9:29:09

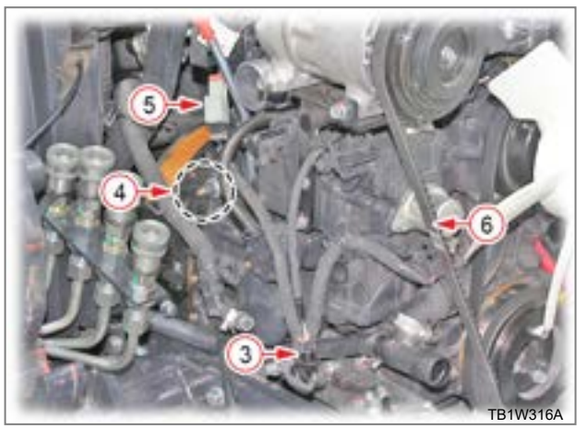


10. Disconnect the air conditioner hose (1), sensor connector (2), and ground wire (3).



11. Disconnect the throttle cable (1), fuel hose (2), fuel hose (3), and air cleaner (4).







12. Disconnect all connectors of the internal parts of the engine connected to the main wiring. [Start motor (1) alternator (2), coolant temperature sensor (3), oil pressure switch (4), glow plug (5), engine stop solenoid (6), ground island (7)]

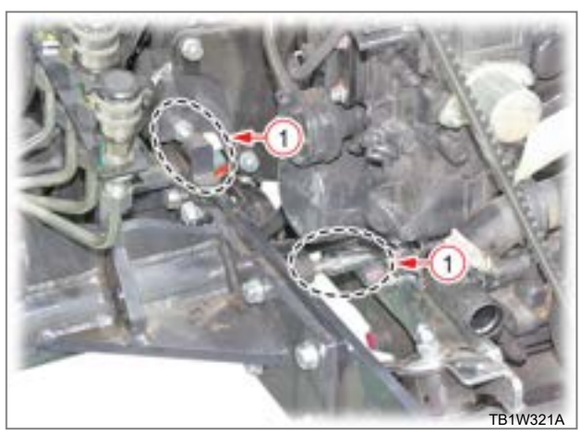
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13. Disconnect the heater hoses (1, 2) from the left and right sides of the engine.



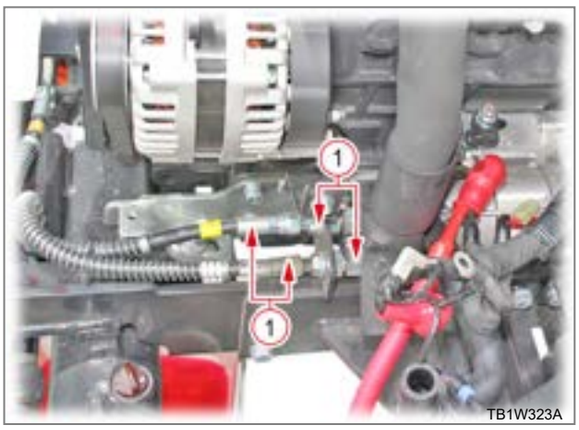


14. Unscrew the four tension bolts (1) from the left and right sides of the engine.



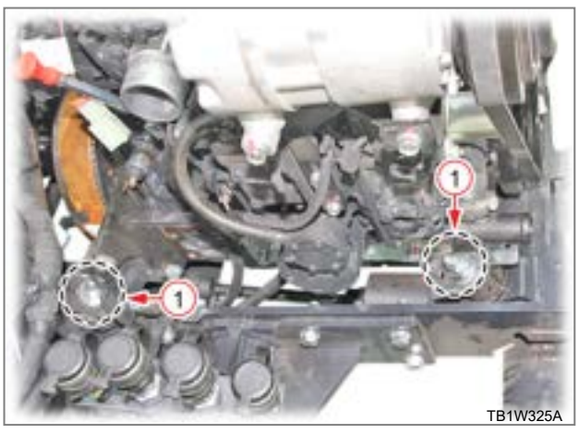
15. Unscrew the main shaft joint lock bolt (1) and separate the main shaft joint (2) from the flywheel.

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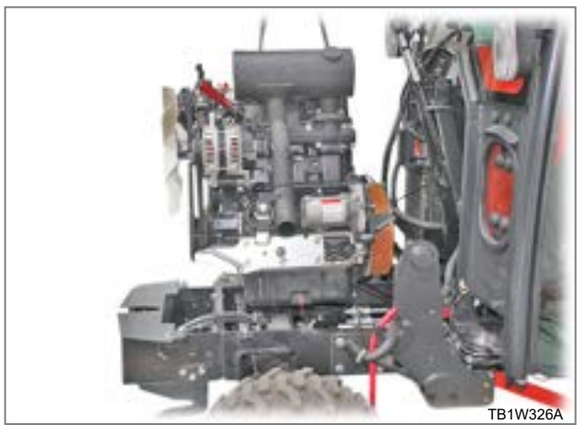


16. Disconnect the hydraulic pipe (1) for connecting the steering cylinder.





17. Hang the hoist to the engine and unscrew the four engine mounting nuts (1).





18. Slowly lift the hoist and remove the engine assembly from a safe place.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 47 2025-04-08 오전 9:29:11


TB1W328A


TB1W329A



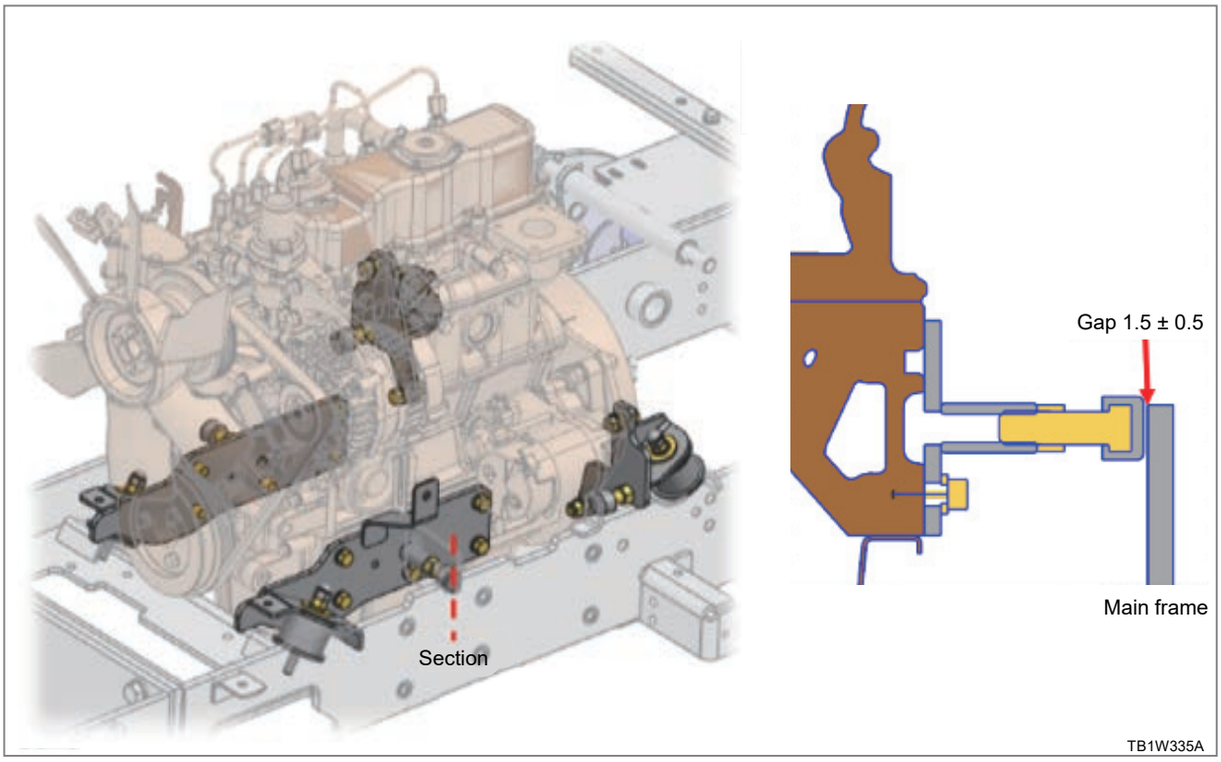
TB1W330A


TB1W331A

19. Remove the damper (1) from the engine assembly.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 48 2025-04-08 오전 9:29:11

7.2 ENGINE MOUNTING ASSEMBLY TIPS



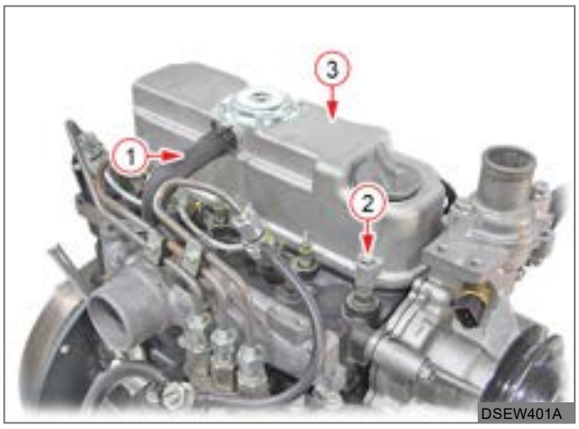
The gap between the engine mount cushion rubber (4 places) and the main frame should be 1.5 ±0.5mm.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 49 2025-04-08 오전 9:29:11

7.3 ENGINE COMPONENT DISASSEMBLY AND ASSEMBLY

7.3.1 CYLINDER HEAD

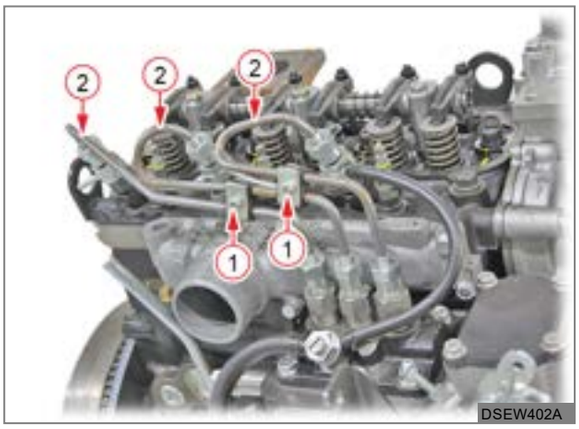
1. Set the engine on level surface and unscrew the drain plug under the oil pan to drain the engine oil.
2. Remove the alternator or other components if necessary.



DSEW401A

3. Undo and remove the PCV hose band (1) and unscrew the seven cylinder head cover bolts (M6, 2) to remove the cylinder head cover (3).

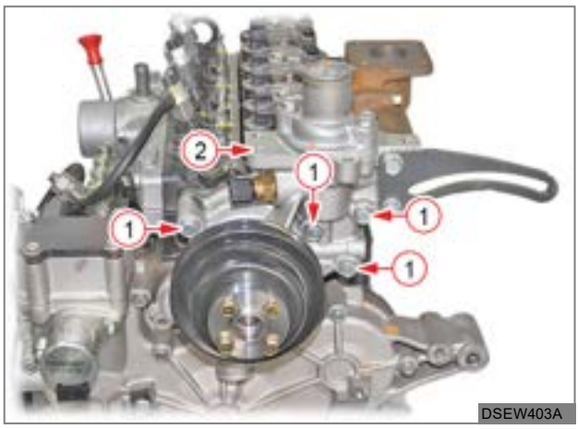
Bolt
tightening torque.....10 ~ 11 Nm
1.0 ~ 1.1 kgf-m
7.3 ~ 8.1 lb-ft



DSEW402A

4. Unscrew the high-pressure pipe lock screw (1) and the nut on the injection pump and injection nozzle holder connection to disconnect the high-pressure pipe (2) in order.

Nut
tightening torque.....25 ~ 35 Nm
2.6 ~ 3.6 kgf-m
18.4 ~ 25.7 lb-ft

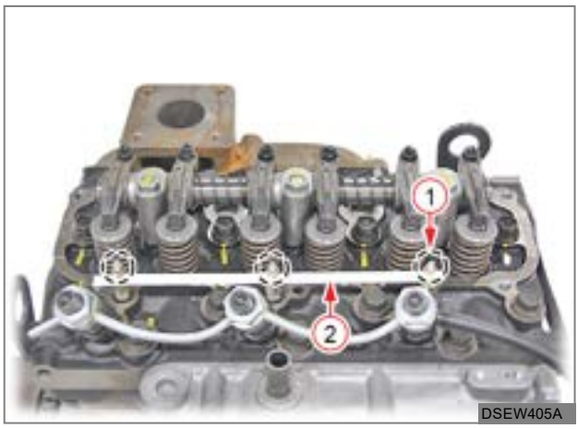


DSEW403A



DSEW404A

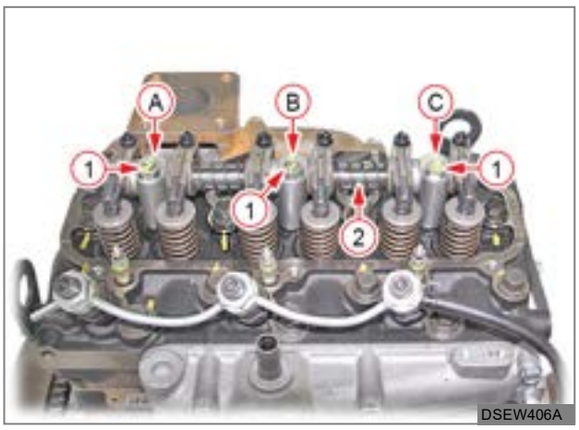
5. Unscrew the four water pump mounting bolts (M8, 1) and remove the water pump assembly



DSEW405A

6. Unscrew the glow plug cord nut (1) and to disconnect the glow plug cord (2).

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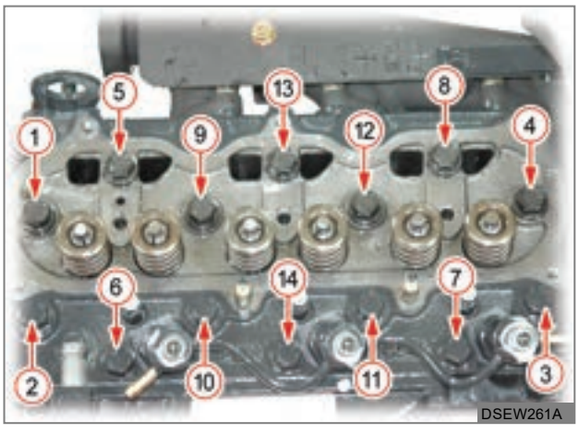


DSEW406A

7. Unscrew the three rocker arm shaft mounting bolts (M8, 1) to remove the rocker arm shaft assembly (2) using the 12 mm socket wrench.
   Keep the push rods in removal order to install them to their correct positions later.
   Remove the bolts in order of C, A and B. When installing the bolts, install them in reverse order of removal, i.e. B, A and C, and tighten them evenly in several steps.

   Mounting bolt (M8)

   tightening torque .....24 ~ 28 Nm
   2.4 ~ 2.9 kgf-m
   17.6 ~ 20.6 lb-ft



DSEW261A

8. Unscrew the 14 cylinder head bolts (M10) in order using the 13 mm socket wrench and remove the cylinder head.
   When removing the bolts, unscrew them in the numerical order. When installing them, tighten them in reverse of the numerical order evenly in several steps.

REMARK

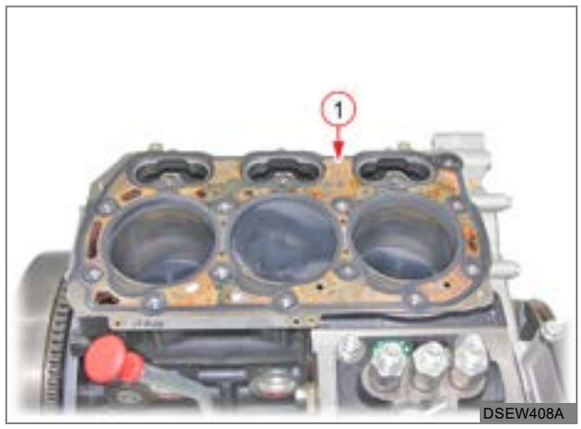
- **Cylinder head bolt tightening torque**


DSEW407A


DSEW256A

- **When installing the cylinder head, install the cylinder head bolts in reverse of installation order in several steps. Tighten all bolts to 2.5 kgf-m and tighten them 90 degrees further in the same order. Finally, tighten them 70 degrees further.**
  Therefore, the bolts should be tightened evenly in 3 steps.
- **When using the angle wrench, install it to the head bolt and set the angle dial. Then, tighten the bolt to the necessary angle observing the amount of the needle movement.**

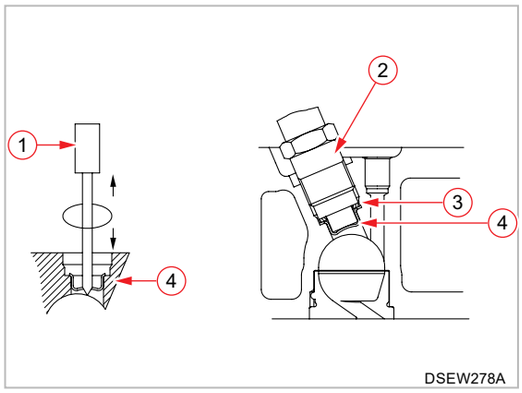
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9. Remove and replace the cylinder head gasket (1).
10. If necessary, remove the injection nozzle holder assembly.

REMARK

- **Removal of heat seal**



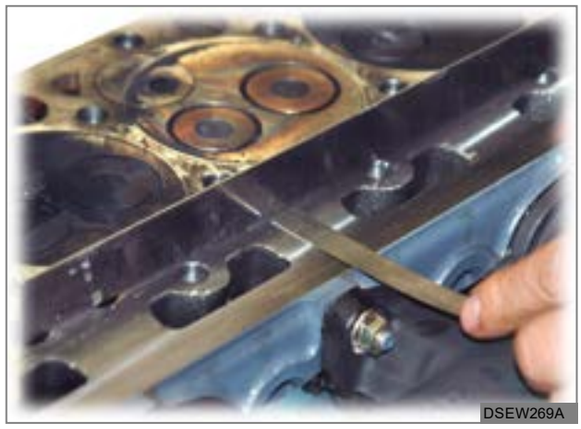
(1) Philips-head screwdriver
(2) Nozzle
(3) Injection nozzle gasket
(4) Heat seal

a. Drive the Philips-head screwdriver lightly into the heat seal hole.
b. Turn the Philips-head screwdriver three or four times each way.
c. While turning the Philips-head screwdriver, slowly pull out the heat seal together with the injection nozzle gasket. If the heat seal drops, repeat the above procedure.
d. The heat seal and injection nozzle gasket must be replaced once the injection nozzle has been removed for cleaning or service.

- **Use a Philips screwdriver with the size of ø 6.0 mm. This is slightly larger than the hole diameter of the heat seal (1/4 in).**

7.4 CYLINDER HEAD CHECK

7.4.1 CYLINDER HEAD SURFACE FLATNESS



1. Thoroughly clean the cylinder head surface.
2. Place a straight edge on the cylinder head and measure the clearance with a feeler gage as shown in the figure.
3. If the measured value exceeds the allowable limit, replace the cylinder head.

IMPORTANT

Do not place the straight edge on the combustion chamber.

Allowable limit .....0.05 mm (0.0019 in.)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 52 2025-04-08 오전 9:29:13

7.4.2 CYLINDER HEAD VALVE RECESS



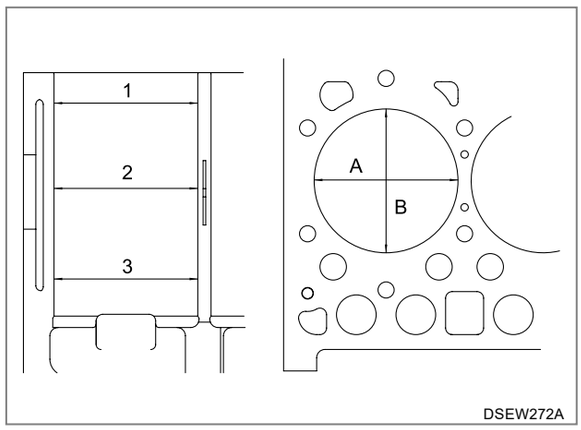
1. Clean the cylinder head, the valve face and the valve seat.
2. Insert the valve into the guide.
3. Measure the valve recess with a depth gauge.
4. If the recess value exceeds the allowable limit, replace the valve and check the valve seat.

Valve recess	Specified value	0 ~ 0.4 mm 0 ~ 0.0157 in.
	Allowable limit	0.7 mm 0.0276 in.

7.4.3 CYLINDER BORE CHECK

1. Check the worn condition of the honing groove on the bore.
2. Check the bore for scuffing or scoring.





(A) Axial direction (B) Transverse direction

1,2,3 Measuring Points

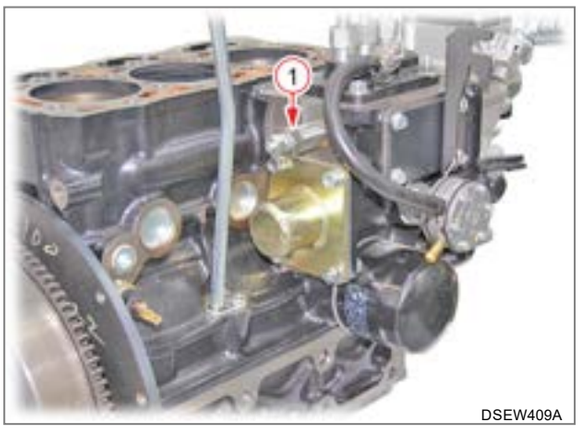
3. Measure the cylinder liner I.D. at six locations as shown in the figure to find the largest worn area.

Specified cylinder I.D.	78.015 ~ 78.035 mm (3.0715 ~ 3.0722 in.)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 53 2025-04-08 오전 9:29:13

7.5 FUEL INJECTION PUMP

- **DISASSEMBLY**



1. Unscrew and pull out the idle adjusting screw shaft (1).



2. Remove the engine stop solenoid (1).



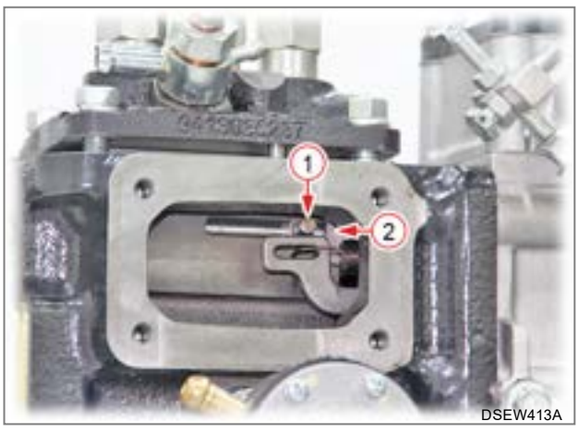


3. Unscrew the two injection pump mounting bolts (M8, 1) and two nuts (M8, 2) to remove the injection pump assembly. (12mm)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 54 2025-04-08 오전 9:29:13

- **ASSEMBLY**

1. Apply the liquid gasket (Three bond 1215, 1104 or equivalent) on the pump installation surface of the cylinder block.
2. Install the shims same as the previous state.



3. When installing the fuel injection pump, the pump control rack (1) should be on the side of the fork lever 1 (2).



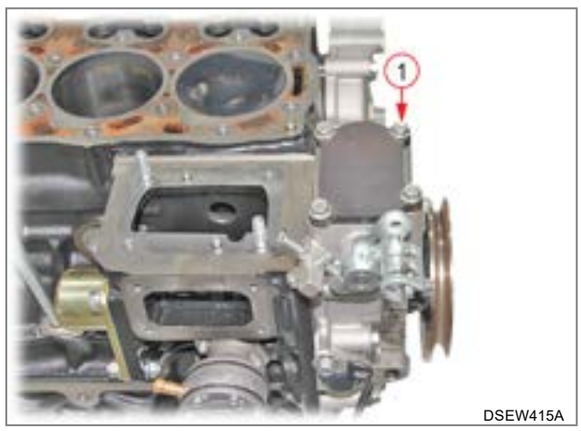
4. The fuel injection pump mounting bolts and nuts should be tightened in order as shown in the figure to the specified torque in several steps.

Bolt and nut

tightening torque.....24 ~ 28 Nm
2.4 ~ 2.9 kgf-m
17.6 ~ 20.6 lb-ft

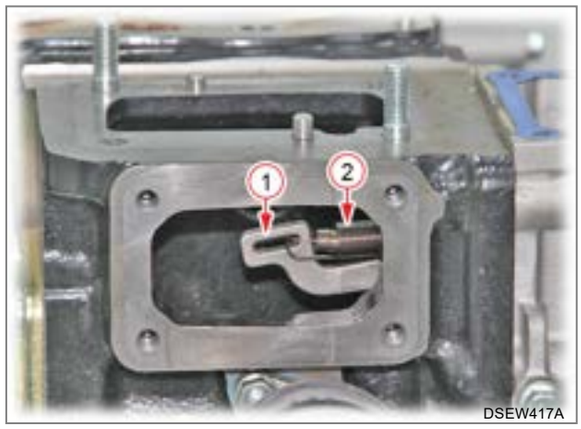
7.6 SPEED CONTROL LEVER PLATE AND GOVERNOR SPRING

- **DISASSEMBLY**





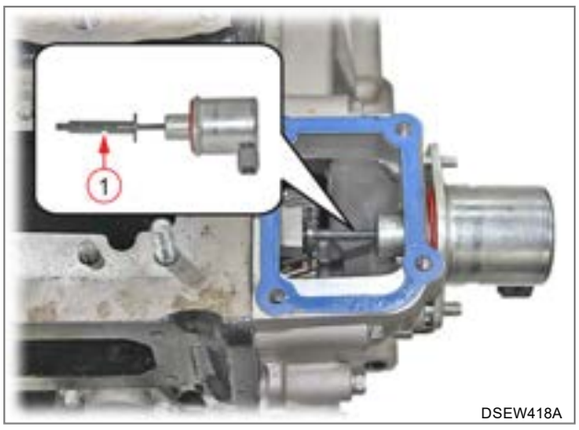
1. Unscrew the four top cover mounting bolts (M6, 1) of the speed control lever. Then, with the cover open, remove the governor spring (2).



2. Remove the injection pump cover to check the condition of the governor fork lever (1) and spring (2).

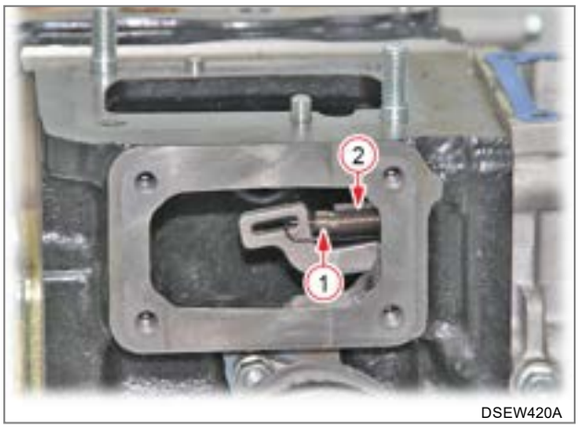
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 55 2025-04-08 오전 9:29:14

- **ASSEMBLY**



1. Be careful not to drop the engine stop solenoid guide (1) when installing the stop solenoid.





2. When installing the governor spring, make sure that the governor spring 2 (1) is installed on the inside of the governor spring 1 (2).

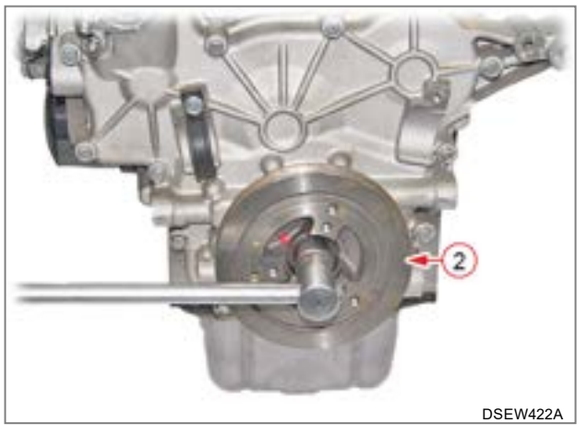
⚠ CAUTION

- **Be careful of the direction of the governor spring 1. The longer side should face the governor fork.**
- **If the governor spring is dropped during the installation, the crank case should be disassembled again. Therefore, use a hook to avoid dropping the governor spring.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 56 2025-04-08 오전 9:29:15

7.7 FUEL CAMSHAFT (GEAR CASE)





1. Unscrew the crankshaft mounting bolt (1), and remove the fan drive pulley (2).(19mm)

Mounting bolt
tightening torque.....142.1 Nm
14.5 kgf-m
104.7 lb-ft

REMARK

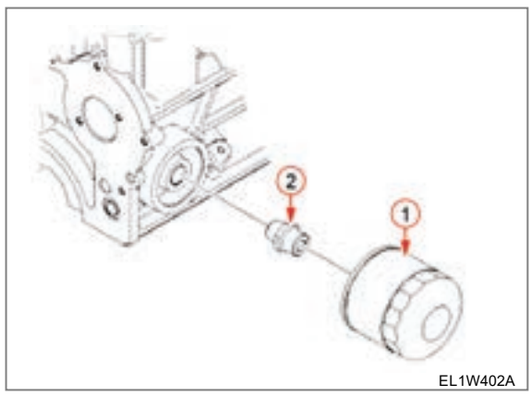
- **Apply LOCTITE 242 or equivalent to the threads and tighten it to the specified torque when retighten the fan drive pulley mounting bolt.**

REMARK

DISASSEMBLING & ASSEMBLING ENGINE OIL FILTER







(1) Oil filter (2) Connection tube

- Use a cup type oil filter wrench (80 mm, 15 degree) to turn the engine oil filter counterclockwise and remove it.
- When connecting the oil filter connecting tube (2) to the block, apply dry adhesive (LOCTITE 271 or equivalent) on the block in advance.
- Install the O-ring of the engine oil filter (1) on the cylinder block after applying a sufficient amount of oil on it. (Standard for installation: Tighten it 4/5 turns further after the packing touches the mounting surface.)
  Tightening torque..... 11.8 ~ 15.7 Nm
  1.2 ~ 1.6 kgf-m
  8.6 ~ 11.5 lb-ft
- Start the engine and check for oil leakage.

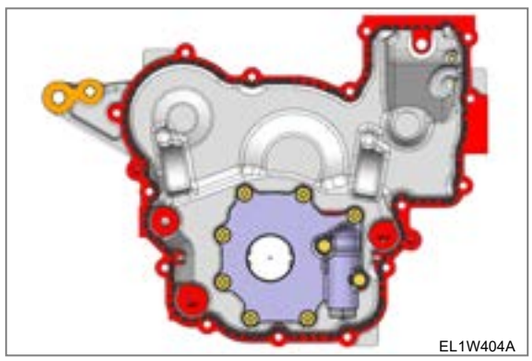
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 57 2025-04-08 오전 9:29:16



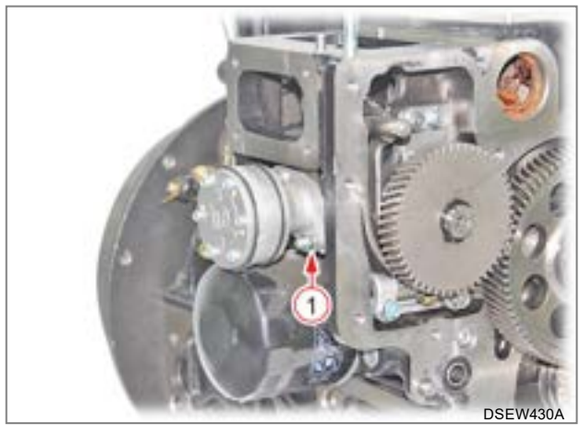


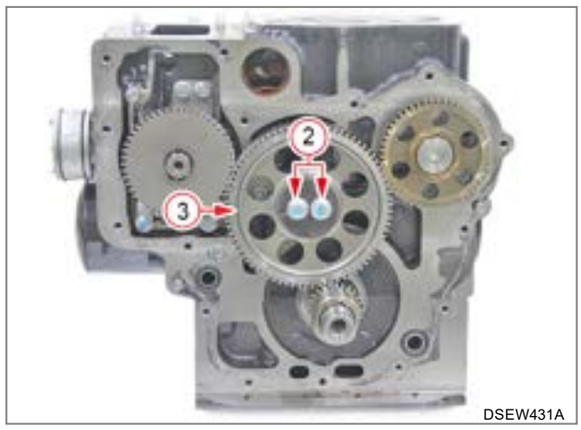
2. Unscrew the 15 gear case mounting bolts (M6, 1) and remove the gear case using the 10 mm socket wrench and T type socket wrench.

REMARK

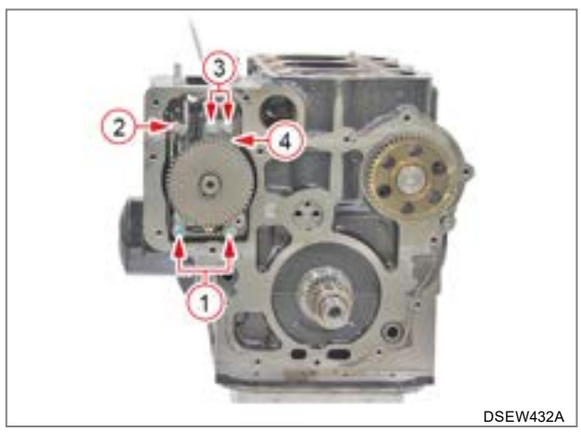


- Before re-installing the gear case, remove any remaining gasket material or sealant on the block mating surface thoroughly with a scraper and apply the specified gasket (LOCTITE5902 or equivalent) as shown in the figure.
- Make sure that two O-rings are fitted on the specified positions of the gear case and O-ring surface and oil seal lip are applied with a sufficient amount of grease before installation.





3. Unscrew the two fuel supply pump mounting nuts (M6, 1) to remove the fuel supply pump. Then, unscrew the two idle gear mounting bolts (2) and remove the idle gear (3). (12mm)



4. Unscrew the two governor fork lever mounting bolts (M6, 1) to remove the fork lever (2). Then, unscrew the two stopper mounting bolts (M6, 3) to remove the stopper (4). (10mm)

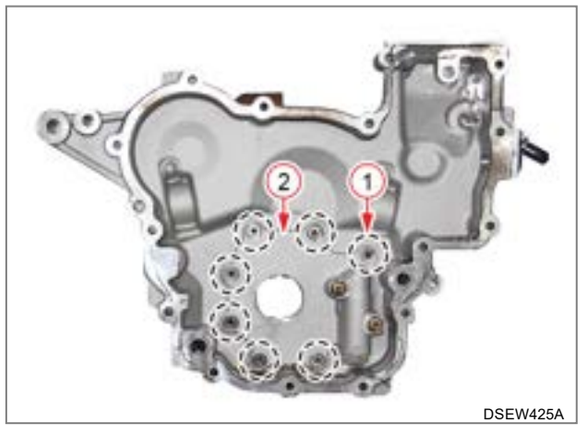
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 58 2025-04-08 오전 9:29:16





5. Pull out the fuel camshaft assembly (1) as one unit.

7.8 OIL PUMP



1. Unscrew the seven small Phillips head screws (1) on the gear case and remove the oil pump cover (2).





2. Remove the inner rotor (1) and outer rotor (2) from the gear case.

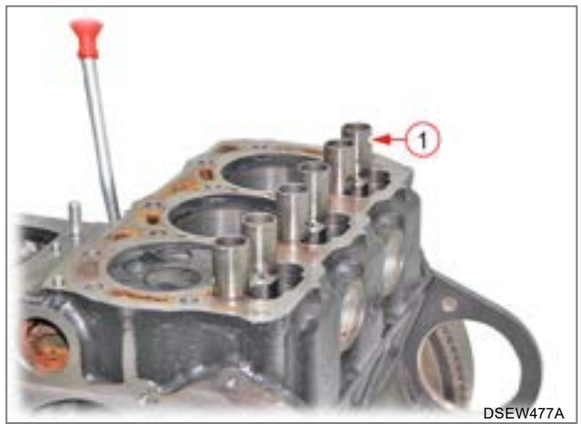
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 59 2025-04-08 오전 9:29:17



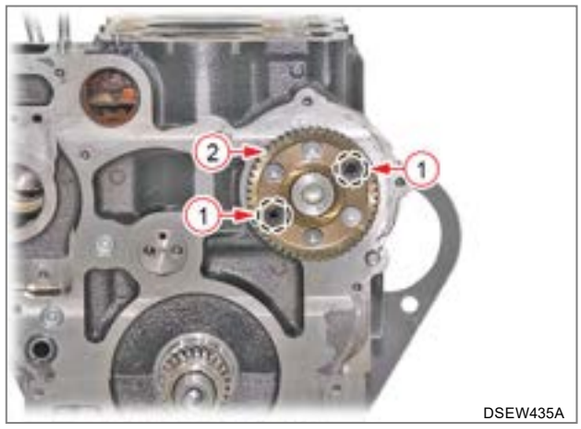


3. Remove the relief valve (1) from the cover.

7.9 VALVE CAMSHAFT



1. Pull out the tappets (1) for each cylinder in order.



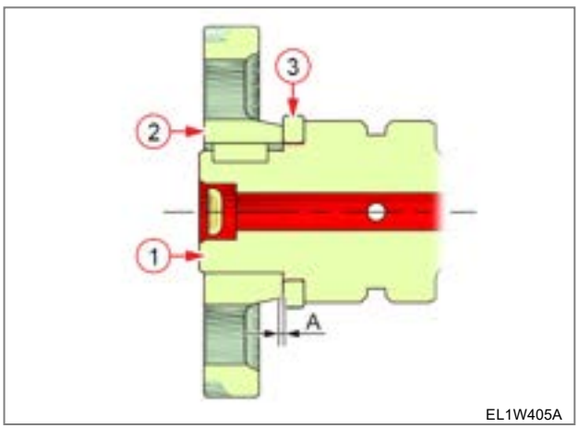


2. Unscrew the two camshaft gear stopper wrench bolts (1) to remove the camshaft assembly (2). (5mm L wrench)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 60 2025-04-08 오전 9:29:17

7.10 VALVE CAMSHAFT GEAR SIDE CLEARANCE


DSEW437A



EL1W405A

(1) Camshaft
(2) Camshaft gear
(3) Camshaft stopper

1. Pull the cam gear (2) forward.
2. Measure the clearance (A) between cam gear (2) and camshaft stopper (3).
3. If the clearance exceeds the allowable limit, replace the camshaft stopper (3).

Side clearance	Specified value	0.05 ~ 0.20 mm 0.0020 ~ 0.0079 in.
	Allowable limit	0.3 mm 0.0118 in.

7.11 VALVE CAMSHAFT OIL CLEARANCE MEASUREMENT


DSEW438A


DSEW439A

1. Measure the O.D. of the camshaft journal with an outside micrometer.
2. Measure the I.D. of the camshaft bore on the crankcase with an inside micrometer or cylinder gauge.
3. If the clearance exceeds the allowable limit, replace the shaft.

Oil clearance	Specified value	0.050 ~ 0.091 mm 0.0020 ~ 0.0036 in.
	Allowable limit	0.15 mm 0.0059 in.
Journal O.D.	Specified value	39.934 ~ 39.950 mm 1.5722 ~ 1.5728 in.
Bore I.D.	Specified value	40.000 ~ 40.025 mm 1.5748 ~ 1.5758 in.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 61 2025-04-08 오전 9:29:17

7.12 VALVE CAMSHAFT DEFLECTION CHECK


DSEW440A

1. Place the camshaft on V blocks with its journals supported and set a dial indicator with its tip on the intermediate journal.
2. Measure the eccentricity (half of the measured value) while turning the camshaft on the V blocks.
3. If the eccentricity exceeds the allowable limit, replace the camshaft.

Eccentricity	Allowable limit	0.08 mm 0.0031 in.

7.13 VALVE CAM HEIGHT MEASUREMENT


DSEW441A

1. Measure the height of the camshaft lobe at largest O.D. with an outside micrometer.
2. If the measured value is below the allowable limit, replace the camshaft.

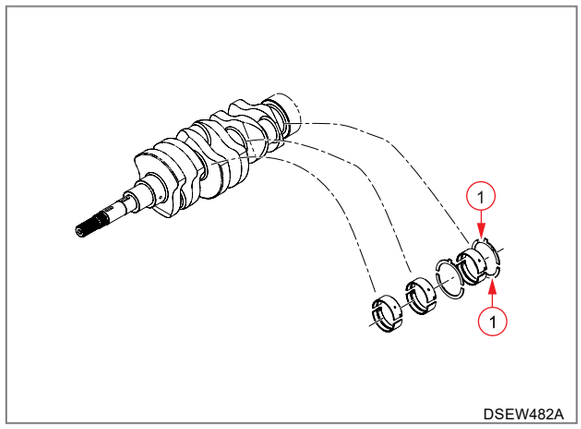
		Intake	Exhaust
Cam height	Specification	33.293 mm (1.3107 in.)	33.600 mm (1.3228 in.)
	Allowable limit	33.268 mm (1.3098 in.)	33.575 mm (1.3219 in.)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 62 2025-04-08 오전 9:29:18

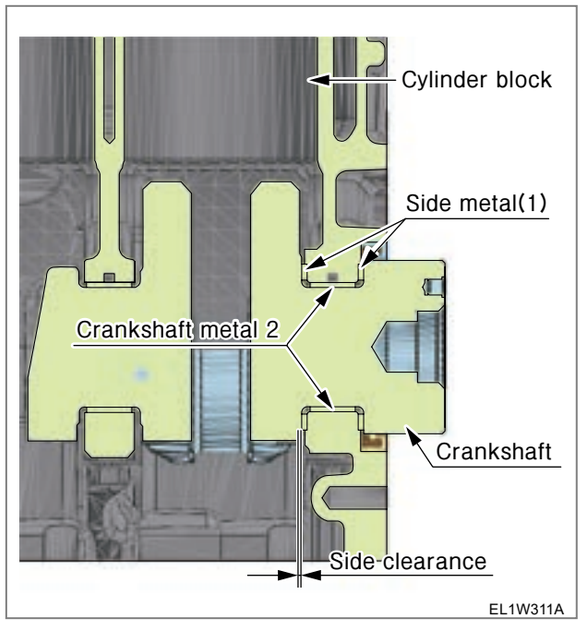
7.14 FLYWHEEL DEFLECTION AND CRANKSHAFT END PLAY CHECK


DSEW442A

1. Install a dial gauge on the engine mounting plate near the flywheel and align its indicator with the edge surface of the flywheel.
2. Turn the flywheel to measure the deflection or the uneven wear.
3. If the measured value exceeds the allowable limit, remove the flywheel and check the mating faces of the crankshaft and flywheel.
4. Measure the end play while moving the crankshaft with the flywheel back and forth to each end.



DSEW482A



EL1W311A

5. If the end play exceeds the allowable limit, replace the side metal bearing (1) .

Deflection	Allowable limit	0.05 mm (0.0020 in.)
End play (Side clearance)	Specified value	0.15 ~ 0.35 mm (0.0059 ~ 0.0138 in.)
	Allowable limit	0.5 mm (0.020 in.)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 63 2025-04-08 오전 9:29:18

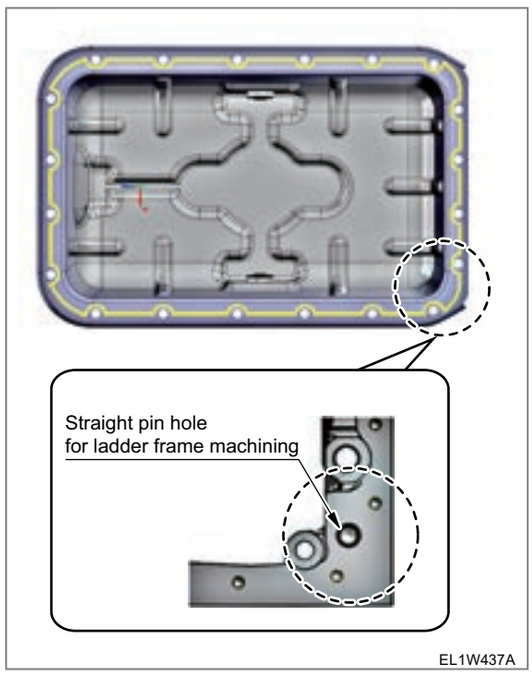
7.15 OIL PAN



1. Unscrew the 20 oil pan mounting bolts (M6, 1) to remove the oil pan. (10mm)

REMARK

APPLICATION SECTION OF LIQUID GASKET

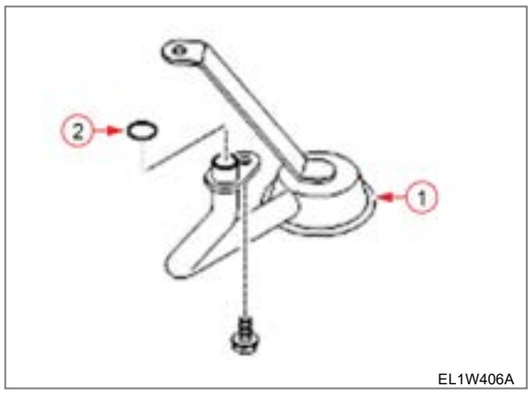


- **Apply while taking the straight pin hole on the rear corner section into account.**
- **When re-installing the oil pan on the ladder frame section of the cylinder block, and after cleaning the mating surface thoroughly with a scraper, apply LOCTITE 5902 or equivalent liquid gasket on the mating surfaces.**



2. Unscrew the two engine oil strainer mounting bolts (M6, 1) to remove the engine oil strainer (2). (10mm)

REMARK



- **When installing the oil strainer (1), apply engine oil on the O-ring (2) section in advance.**

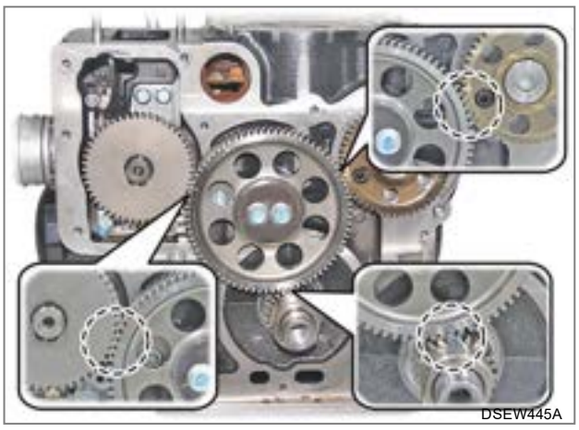
REMARK

- **During the break-in period, add oil up to the lower limit level before driving.**
  (It is to confirm that the O-ring of the oil strainer assembly is firmly mounted and check if air is sucked in.)
- **When installing the oil strainer, start with its flange bolt.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 64 2025-04-08 오전 9:29:19

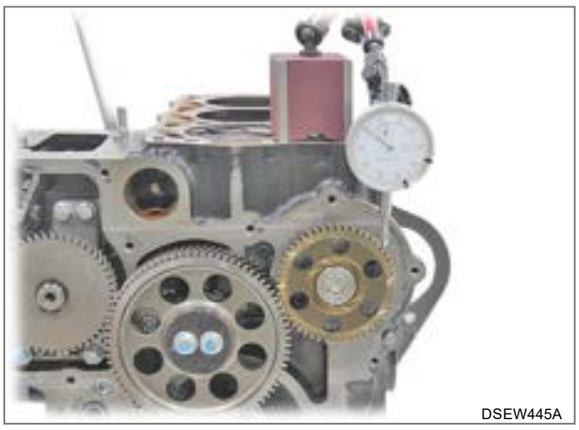
7.16 TIMING GEAR

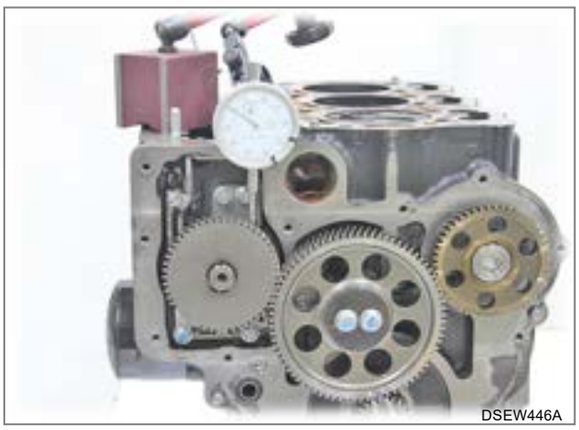
7.16.1 TIMING GEAR SETTING


DSEW445A

- The crankshaft gear drives the valve camshaft gear and fuel camshaft gear by driving idle gear. The timings for opening and closing the valves is very important to achieve the effective air intake and gas exhaust. When assembling, the appropriate timing can be obtained by aligning the mark on the crankshaft gear with idle gear, idle gear with camshaft gear, and idle gear with fuel camshaft gear.

7.16.2 TIMING GEAR BACKLASH


DSEW445A

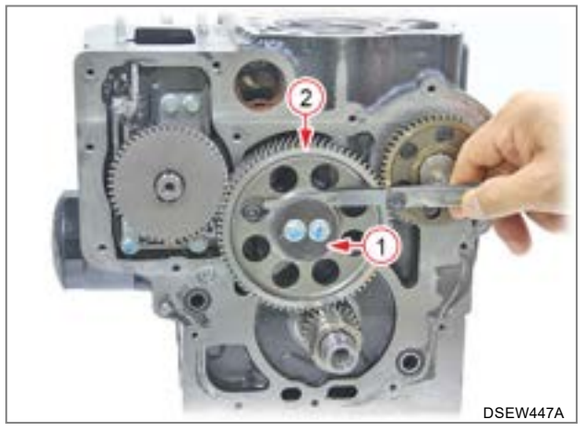

DSEW446A

1. Set a dial indicator (lever type) with its tip on the gear tooth.
2. Move the timing gear to measure its backlash while holding the engaged gear to it.
3. If the backlash exceeds the allowable limit, check the oil clearance of the shafts and the gear.
4. If the oil clearance is proper but the backlash is over the allowable limit, replace the gear.

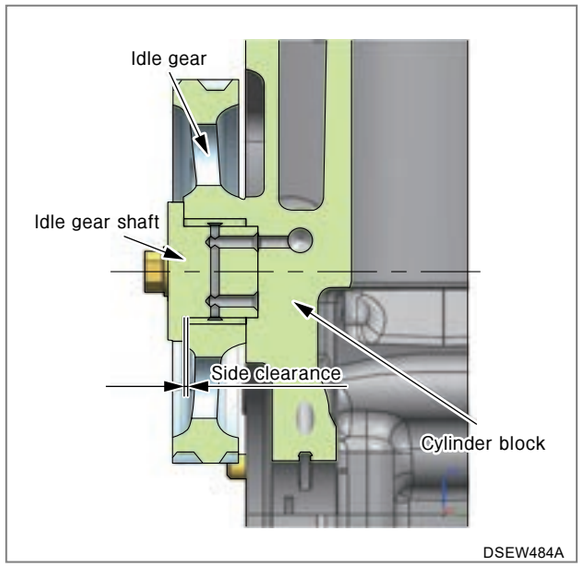
Backlash	Specified value	Idle gear ↔ Crankshaft gear	0.056 ~ 0.183 mm 0.0022 ~ 0.0072 in.
		Idle gear ↔ Camshaft gear	0.062 ~ 0.198 mm 0.0024 ~ 0.0078 in.
		Idle gear ↔ Fuel camshaft gear	0.062 ~ 0.198 mm 0.0024 ~ 0.0078 in.
	Allowable limit		0.2 mm 0.0079 in.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 65 2025-04-08 오전 9:29:20

7.17 IDLE GEAR SIDE CLEARANCE



DSEW447A



DSEW484A

1. Pull the idle gear collar 2 (1) and push the idle gear (2) at its end.
2. Measure the clearance (A) between idle gear and idle gear collar 2 with a feeler gauge.
3. If the clearance exceeds the allowable limit, replace the idle gear(2).

Side clearance	Specified value	0.20 ~ 0.51 mm 0.0079 ~ 0.0201 in.
	Allowable limit	0.9 mm 0.035 in.

7.18 IDLE GEAR OIL CLEARANCE MEASUREMENT


DSEW449A


DSEW450A

1. Measure the idle gear shaft O.D. with an outside micrometer.
2. Measure the I.D. of the idle gear bushing with an inside micrometer or cylinder gauge.
3. If the clearance exceeds the allowable limit, replace the bushing.

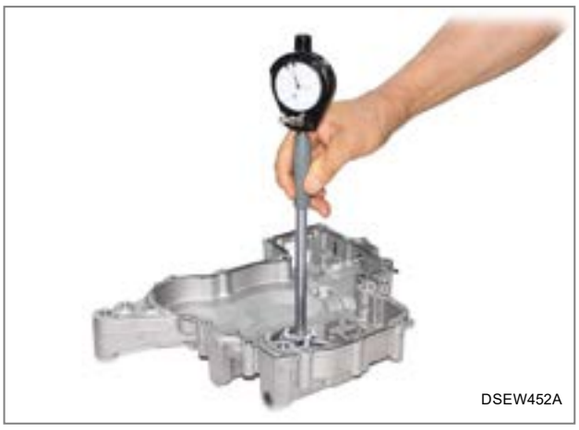
Oil clearance	Specified value	0.020 ~ 0.054 mm 0.00079 ~ 0.00213 in.
	Allowable limit	0.1 mm 0.004 in.
Shaft O.D.	Specified value	29.967 ~ 29.980 mm 1.1798 ~ 1.1803 in.
Bushing I.D.	Specified value	30.000 ~ 30.021 mm 1.1811 ~ 1.1819 in.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 66 2025-04-08 오전 9:29:21

7.19 OIL PUMP CHECK

▶ CLEARANCE BETWEEN ROTOR AND LOBE OF OIL PUMP


DSEW451A


DSEW452A


DSEW453A

1. Measure the clearance between the outer rotor and inner rotor with a feeler gauge.
2. Measure the clearance between the outer rotor and the housing using a cylinder gauge and a micrometer.

Clearance between outer rotor and inner rotor	Specified value	0.06 ~ 0.10 mm (0.0024 ~ 0.0039 in.)
	Allowable limit	0.15 mm (0.0059 in.)
Clearance between outer rotor and housing	Specified value	0.100 ~ 0.175 mm (0.0039 ~ 0.0069 in.)
	Allowable limit	0.225 mm (0.0089 in.)

7.20 PISTON, FLYWHEEL AND CRANKSHAFT

• DISASSEMBLY



DSEW454A


DSEW455A

1. Unscrew the connecting rod mounting bolts (1) of the cylinder piston from the oil pan side and push the connecting rod toward the head to pull out the piston assembly. At this time, mark the pistons' numbers according to their corresponding cylinders in order to install them into their original positions later.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 67 2025-04-08 오전 9:29:22



DSEW456A

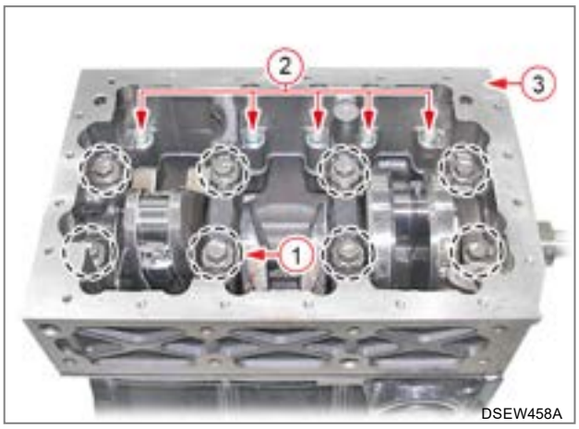
2. Unscrew the six flywheel mounting bolts (M10, 1) and pull the flywheel to remove it. (14mm)

Bolts (M10)
tightening torque ..... 58.8 ~ 62.7 Nm
6.0 ~ 6.4 kgf-m
43.2 ~ 46.1 lb-ft



DSEW457A

3. Unscrew the nine engine mounting plate mounting bolts (M10, 1) and remove the engine mounting plate (2).



DSEW458A


DSEW459A

4. Unscrew the eight main bearing bolts (1) and ten ladder frame mounting bolts (M8, 2) in order to remove the ladder frame (3) from the cylinder block.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 68 2025-04-08 오전 9:29:23





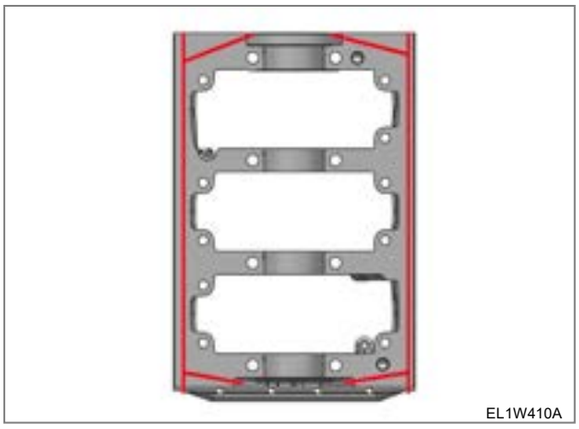
5. Lift up the crankshaft assembly (1) to remove it.



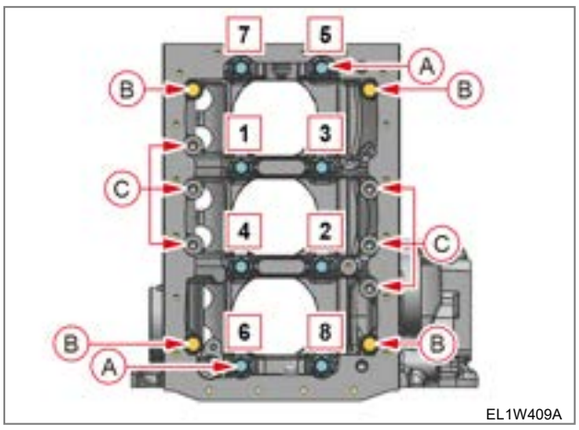
6. And remove the crankshaft metal 2(1) and side metal(2).

• ASSEMBLY

1. Install in the reverse order of removal.



2. When installing the cylinder block and ladder frame, clean their mating surfaces thoroughly with a scraper and apply liquid gasket (LOCTITE 5902 or equivalent) on them as shown in the figure.



3. After assembling the cylinder block and ladder frame, use the eight old main bearing bolts (A), four old flange bolts (B) and six new flange bolts (C) and tighten them evenly in the correct order as shown in the figure.

Flange bolt (M8)
tightening torque.....24 ~ 28 Nm
2.4 ~ 2.9 kgf-m
17.6 ~ 20.6 lb-ft

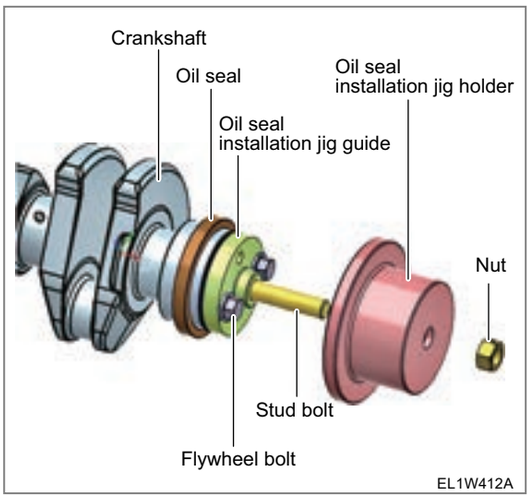
Main bearing bolt (M10)
tightening torque.....58.8 ~ 63.7 Nm
6.0 ~ 6.5 kgf-m
43.2 ~ 46.8 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 69 2025-04-08 오전 9:29:23

IMPORTANT

CYLINDER BLOCK OIL SEAL INSTALLATION PROCEDURE


EL1W411A



EL1W412A

- Install the oil seal on the crankshaft. (Make sure to apply engine oil to the oil seal rib in advance to prevent its damage during installation.)
- Install the oil seal installation jig guide on the crankshaft using the flywheel bolts.
- Install the oil seal installation jig holder on the guide.
- Tighten the central nut (M14x1.5) until the installation jig holder comes into contact with the cylinder block. Then, press on the oil seal to complete the assembly.


EL1W413A


EL1W414A

4. When installing the flywheel, and after aligning the straight pin of the crankshaft with the mating hole on the flywheel and assembling them, and tighten the flywheel mounting bolts to the specified torque after applying a small amount of oil to them.

Flywheel bolt tightening torque ..... 58.8 ~ 62.7 Nm
6.0 ~ 6.4 kgf-m
43.2 ~ 46.1 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 70 2025-04-08 오전 9:29:24


DSEW464A


DSEW465A

5. When installing the piston into the cylinder block, begin pushing the connecting rod from the head side into the block, and completely push the piston into the cylinder block after compressing the piston ring using a compressor. Refer to the figure for assembled view.


DSEW466A

6. Apply oil onto the connecting rod cover bolts, and tighten them to the specified torque using a torque wrench.

Connecting rod bolt
Specified torque .....28.4 ~ 32.3 Nm
2.9 ~ 3.3 kgf-m
20.9 ~ 23.8 lb-ft

IMPORTANT

- **Mark the cylinder number on the piston and connecting rod to prevent them from interchanging.**
- **Be careful not to damage the chrome-plate area on the piston ring when pressing the piston into the cylinder block.**
- **It is very important that the number carved on the big end of the connecting rod faces the injection pump during installation.**
- **Make sure that the mark caved on the big end of the connecting rod and the arrow mark on the piston face the same direction during installation.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 71 2025-04-08 오전 9:29:24

7.21 CRANKSHAFT CHECK

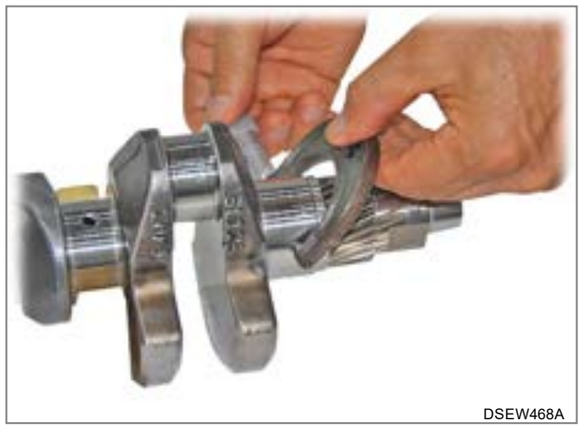
7.21.1 CRANKSHAFT DEFLECTION

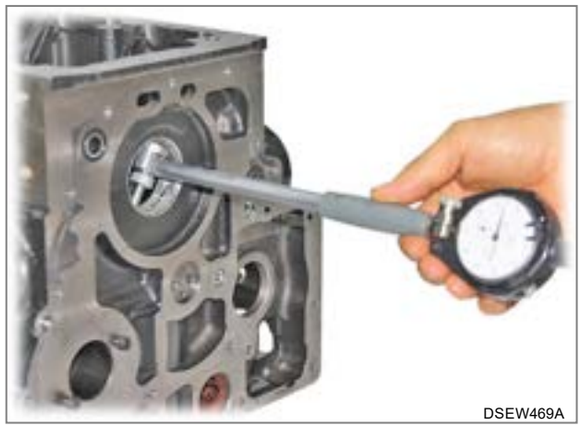

DSEW467A

1. Place the crankshaft on V blocks with its journals supported and set a dial indicator with its tip on the intermediate journal.
2. Measure the eccentricity (half of the measured value) while turning the crankshaft on the V blocks.
3. If the eccentricity exceeds the allowable limit, replace the crankshaft.

Eccentricity	Specified value	0.02 mm (0.0008 in.)
	Allowable limit	0.08 mm (0.0031 in.)

7.21.2 OIL CLEARANCE BETWEEN CRANKSHAFT JOURNAL AND CRANKSHAFT METAL 2


DSEW468A

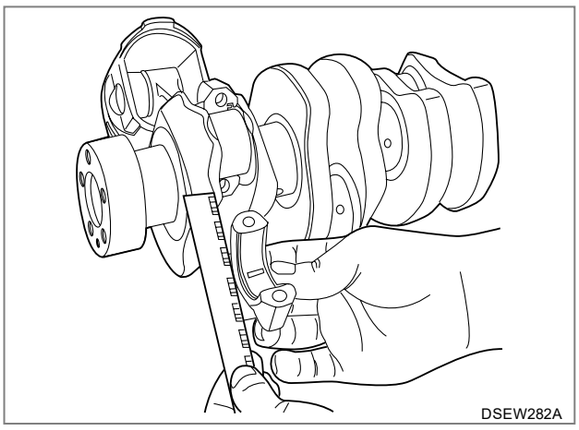

DSEW469A

1. Measure the O.D. of the crankshaft journal with an outside micrometer.
2. Measure the I.D. of the crankshaft metal 2 with an inside micrometer.
3. If the clearance exceeds the allowable limit, replace the crankshaft metal bearing.

Oil clearance	Specified value	0.030 ~ 0.091 mm (0.0012 ~ 0.0036 in.)
	Allowable limit	0.20 mm (0.0079 in.)
Journal O.D.	Specified value	47.934 ~ 47.950 mm (1.8872 ~ 1.8878 in.)
Metal 2 I.D.	Specified value	47.980 ~ 48.025 mm (1.8890 ~ 1.8907 in.)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 72 2025-04-08 오전 9:29:25

7.21.3 OIL CLEARANCE BETWEEN CRANK PIN AND CONNECTING ROD BIG END BEARING


DSEW282A

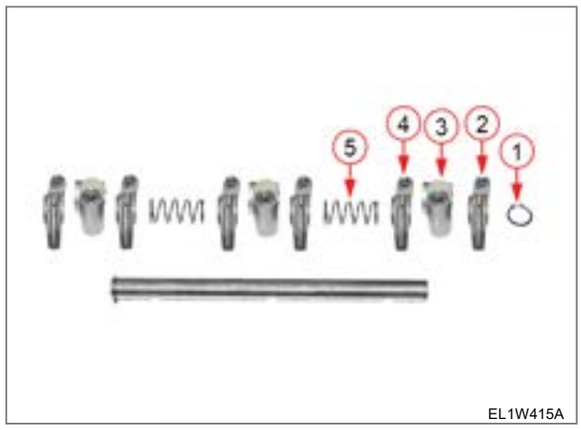
1. Place a plasti gauge in lengthwise on the center of the crank pin.
2. Install the connecting rod, tighten the bolts to the specified torque once and remove the cap again.
3. Measure the amount of the flatness with the scale and get the oil clearance.
4. If the clearance exceeds the allowable limit, replace the big end bearing.

Oil clearance	Specified value	0.019 ~ 0.061 mm (0.0007 ~ 0.0024 in.)
	Allowable limit	0.20 mm (0.0079 in.)

Connecting rod cap bolt tightening torque .....28.4 ~ 32.3 N.m
2.90 ~ 1.27 kgf.m
20.87 ~ 23.73 lb-ft

7.22 ENGINE COMPONENT DISASSEMBLY AND ASSEMBLY

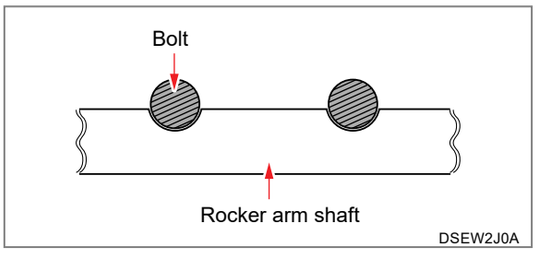
7.22.1 ROCKER ARM



EL1W415A

1. Pull out the snap ring (1) at the end from the rocker arm assembly and disassemble the rocker arm (2), rocker arm support (3), rocker arm (4) and spring (5) in order.
2. Reinstall the rocker arm assembly. And then, adjust the valve clearance.
(Refer to 2.3 VALVE CLEARANCE)

IMPORTANT



DSEW2J0A

- **To tighten the rocker arm support bolt, the groove on the rocker arm shaft should face the bolt.**

Rocker arm support bolt tightening torque .....24 ~ 28 N.m
2.4 ~ 2.9 kgf.m
17.6 ~ 20.6 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 73 2025-04-08 오전 9:29:25

7.22.2 ROCKER ARM ASSEMBLY CHECK


EL1W416A


EL1W417A

1. Measure the rocker arm shaft O.D. with an outside micrometer.
2. Measure the rocker arm I.D. with a cylinder gauge.
3. If the clearance exceeds the allowable limit, replace the rocker arm.
4. If the clearance still exceeds the allowable limit after replacing the rocker arm, replace the rocker arm shaft.

Clearance	Specified value	0.020 ~ 0.070 mm (0.0008 ~ 0.0027 in.)
	Allowable limit	0.10 mm (0.0039 in.)
Rocker arm shaft O.D.	Specified value	12.955 ~ 12.980 mm (0.5100 ~ 0.5110 in.)
Rocker arm I.D.	Specified value	13.000 ~ 13.025 mm (0.5118 ~ 0.5128 in.)

7.22.3 INTAKE AND EXHAUST VALVES



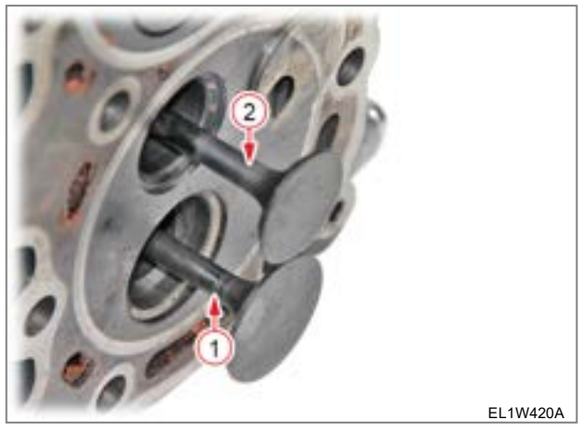
EL1W418A

1. Remove the valve spring stopper (1) with screw driver while pushing down the valve spring retainer with a ring spanner.



EL1W419A

2. Remove the valve spring (2) and its retainer (3).



EL1W420A

3. Push the intake (1) and exhaust valve (2) out from the upper head part.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 74 2025-04-08 오전 9:29:26

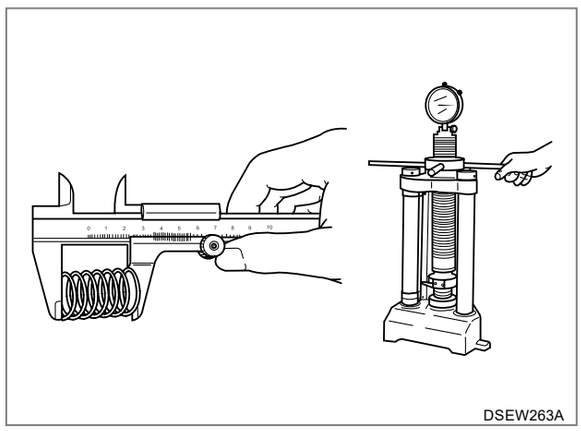


4. Remove the valve stem seal (1).
5. Install in the reverse order of removal.
5. When installing the valve, apply oil to the valve stem and install in the cylinder head.
7. Lubricate the valve and its related parts after installation.

IMPORTANT

- **Do not re-use valve stem seal.**
- **Be careful not to interchange the valves and related components.**
- **Mark the cylinder numbers to the related components to prevent them from interchanging.**

7.22.4 VALVE SPRING INSPECTION (LENGTH, TENSION AND SQUARENESS)



1. Measure the free length of the spring with vernier calipers.

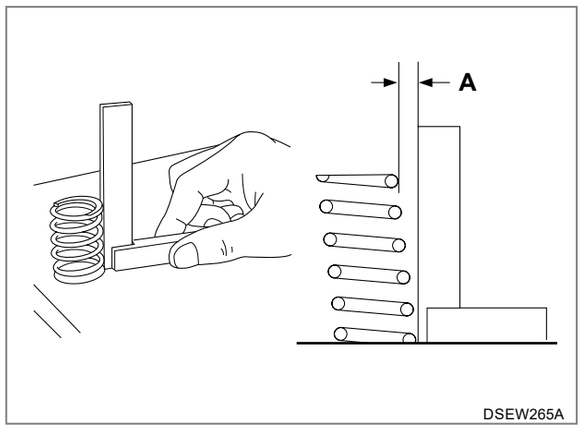


2. Place the spring on a spring compression tester and compress to the specified length to measure the tension.
3. If the measured value is less than the allowable limit, replace the valve spring.

Tension	Specified value	130 N / 32 mm 13.3 kgf / 32 mm 29.2 lbs / 1.26 in.
	Allowable limit	121.5 N / 32 mm 12.4 kgf / 32 mm 27.3 lbs / 1.26 in.
Free length	Specified value	39.14 ~ 39.64 mm 1.54 ~ 1.56 in.
	Allowable limit	38.7 mm 1.52 in

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 75 2025-04-08 오전 9:29:26

7.22.5 VALVE SPRING SQUARENESS (TILT)



1. Place the spring on a flat plate and then put a square at its side.

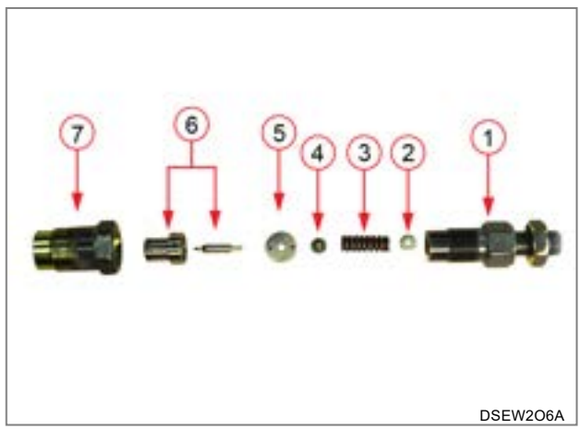


2. Measure the maximum distance "A" while rotating the spring.
3. If the measurement exceeds the allowable limit, replace the spring.

Valve spring squareness	Allowable limit	1.3 mm 0.051 in.

7.22.6 INJECTION NOZZLE

1. Fix the nozzle nut and unscrew it to remove it.



2. Remove the nozzle holder (1), adjusting washer (2), nozzle spring (3), push rod (4), distance piece (5), nozzle (6) and nozzle nut (7) in order.
3. Install in the reverse order of removal.

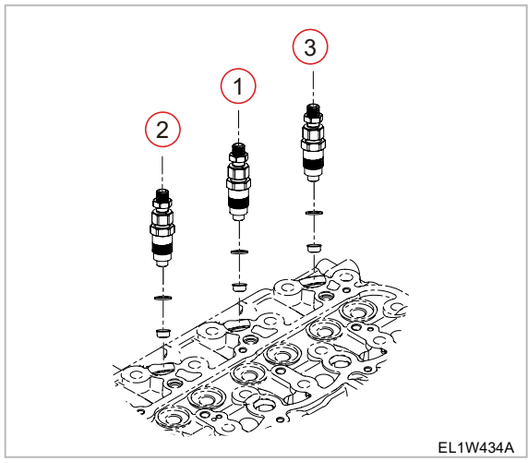
Nozzle holder

tightening torque ..... 49.0 ~ 68.6 Nm
5.0 ~ 7.0 kgf-m
36.1 ~ 50.6 lb-ft

Nozzle nut

tightening torque ..... 37 ~ 41 Nm
3.8 ~ 4.2 kgf-m
27.3 ~ 30.3 lb-ft

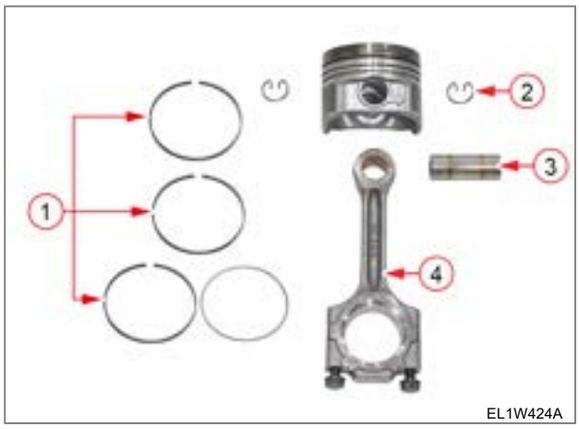
REMARK



- **When re-installing the injector nozzles on the cylinder head, start from the nozzle in the middle and tighten the evenly in order.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 76 2025-04-08 오전 9:29:28

7.22.7 PISTON ASSEMBLY



1. Remove the piston rings (1) using a removal tool.
2. Take out the piston pin springs (2) using pliers and remove the piston pin (3).
3. Remove the connecting rod (4) and bushing.
4. Install in the reverse order of removal.
5. After heating the piston to approx. 80~100°C, lubricate and assemble it with the connecting rod.

REMARK

- **Piston ring removal tool**



7.22.8 PISTON PIN BORE



1. Measure the I.D. of the piston pin bore (lengthwise and widthwise of the piston) with a cylinder gauge.
2. If the measured value exceeds the allowable limit, replace the piston.

Piston pin bore I.D.	Specified value	20.007 ~ 20.012 mm (0.7877 ~ 0.7879 in.)
	Allowable limit	20.03 mm (0.7886 in.)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 77 2025-04-08 오전 9:29:29

7.22.9 CLEARANCE BETWEEN PISTON PIN AND BUSHING


EL1W427A


EL1W428A

1. Measure the piston pin O.D. with an outside micrometer.
2. Measure the piston pin busing I.D. with a cylinder gauge.
3. If the clearance still exceeds the allowable limit after replacing the bushing with a new one, replace the piston pin.

Clearance between piston pin and bushing	Specified value	0.018 ~ 0.038 mm (0.0007 ~ 0.0015 in.)
	Allowable limit	0.15 mm (0.0059 in.)
Piston pin O.D.	Specified value	20.002 ~ 20.007 mm (0.7875 ~ 0.7877 in.)
Bushing I.D.	Specified value	20.007 ~ 20.012 mm (0.7877 ~ 0.7879 in.)

7.22.10 PISTON RING END GAP


EL1W429A

1. Place the piston ring to be measured on the top face of the piston in the cylinder block and slightly push in the piston and piston ring. (Do not put the piston ring on the carbon layer.)
2. Measure the ring end gap with a feeler gauge.
3. If the gap exceed the allowable limit, replace the piston ring.

Item		Factory spec.	Allowable limit
Piston ring gap	Top ring	0.15 ~ 0.25 mm 0.0059 ~ 0.0098 in.	1.25 mm 0.0492 in.
	2nd ring	0.30 ~ 0.45 mm 0.0118 ~ 0.0177 in.	1.25 mm 0.0492 in.
	Oil ring	0.20 ~ 0.35 mm 0.0079 ~ 0.0138 in.	1.25 mm 0.0492 in.

4. If the gap is still over the allowable limit with even new ring, measure the diameter of bore. (Refer to page 4-15)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 78 2025-04-08 오전 9:29:29

7.22.11 PISTON RING CLEARANCE



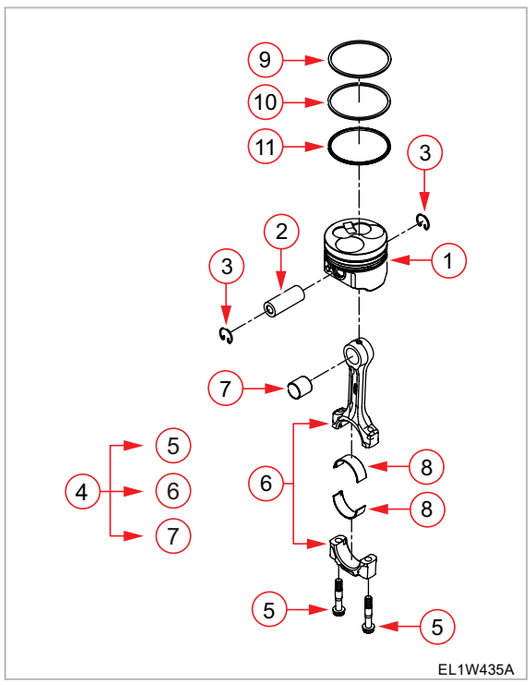
1. Clean the piston ring and piston ring grooves, and install each ring in its groove.
2. Measure the clearance between the piston ring and the ring groove with a feeler gauge.
3. If the clearance exceeds the allowable limit, replace the piston ring.
4. If the clearance still exceeds the allowable limit after replacing the ring with new one, replace the piston.

Piston ring clearance	Second ring (compression ring)	Specified value	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in.)
	Oil ring	Specified value	0.020 ~ 0.060 mm (0.0008 ~ 0.0024 in.)

- **ASSEMBLY**

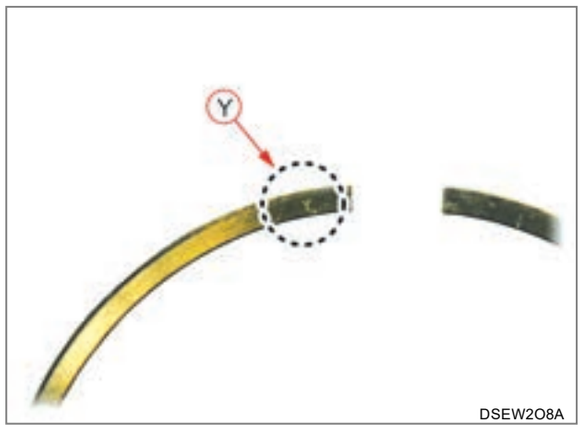
1. Install in the reverse order of removal.

⚠ CAUTION

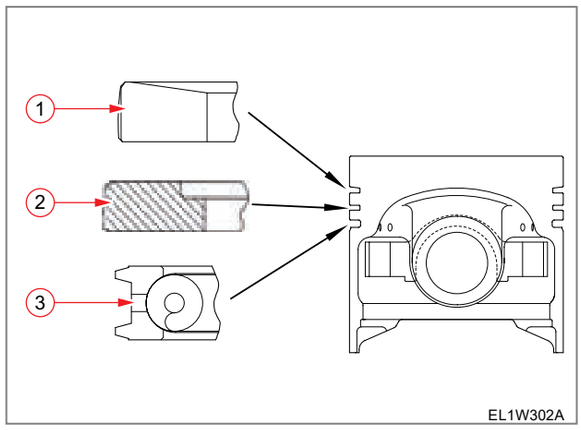


1. Before installing the piston pin (2), clean the small end bushing (7), piston pin and piston pin hole thoroughly and apply oil on them. (Make sure that they do not lean to one side.)
2. Make sure to fit the piston pin snap ring (3) into the groove of the piston.
3. Before assembling the piston and connecting rod (6) and mounting them on the cylinder block, apply engine oil on the connecting rod bearing (8) and cylinder wall.
4. Align the marks on the connecting rod and connecting rod cap before installation. These marks should face the intake manifold.
5. After applying engine oil on the connecting rod bolt (5), turn it gently with a hand to set its seat against the surface of the connecting rod cap tightly and then tighten it to the specified torque (2.9 - 3.3 kgf·m). However, if the bolt cannot be tightened smoothly, clean its threads. If it is still hard to tighten it, replace the bolt with a new one.

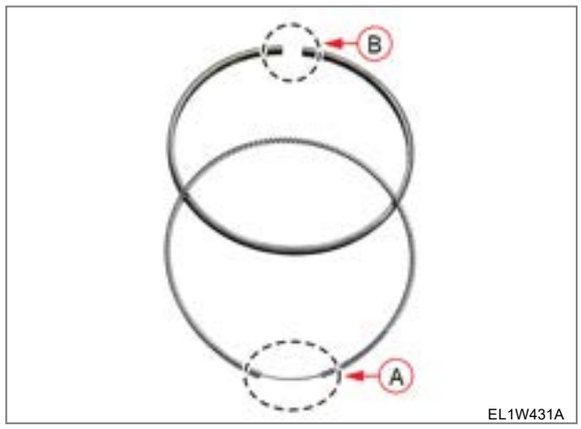
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 79 2025-04-08 오전 9:29:30

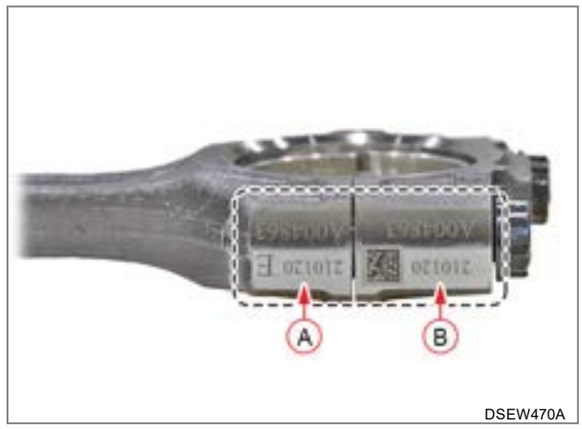


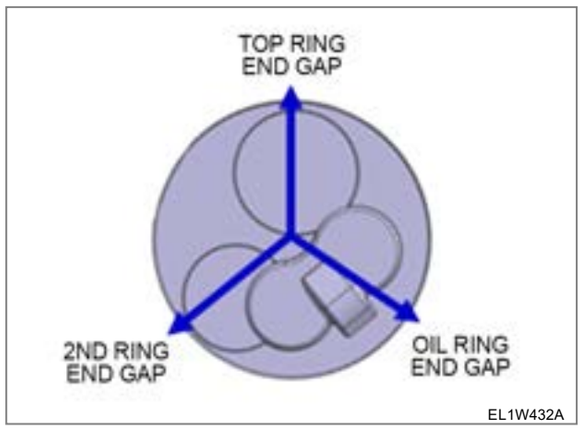
2. Install the top ring with its manufacturer mark (Y) to the top of the piston.



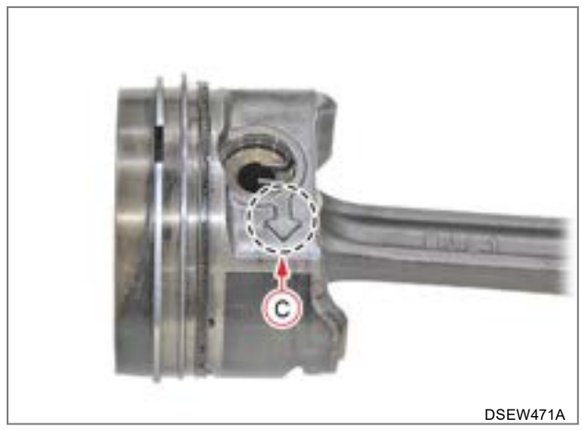
4. Assemble the second ring undercut to be facing down.







3. The cutout of expander (A) of the oil ring should face the opposite side of the oil ring end gap (B), and the end gaps of the second ring and oil ring should be 120° away from the top ring end gap. When doing so, place the top ring end gap on the opposite side of the combustion chamber.



5. The mark (A) of the connecting rod on the top should be aligned with the bottom portion (B). Install the connecting rod with the piston so that it faces the injection pump(intake manifold) along with the arrow mark (C) on the piston.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 80 2025-04-08 오전 9:29:30

7.22.12 THERMOSTAT

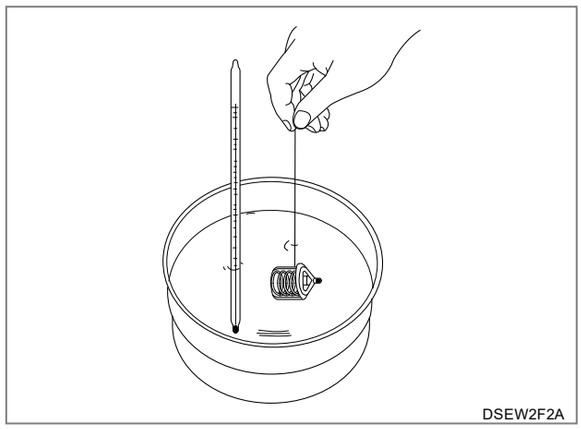


1. Remove the two thermostat cover bolts (M8, 1) from the coolant flange.



2. Pull out the thermostat (2).
3. During reassembly, discard the old gasket and clean the gasket mating surface thoroughly. Then, apply Three Bond 1215 or equivalent to the new gasket surface and install the gasket.

- **OPENING TEMPERATURE OF THERMOSTAT VALVE**



1. Suspend the thermostat in the water by a string.
2. While heating the water slowly, read the temperatures when the valve starts to open and when the valve opens for approx. 8 mm(0.315 in.).
3. If the measurements are not within the factory specifications, replace the thermostat.

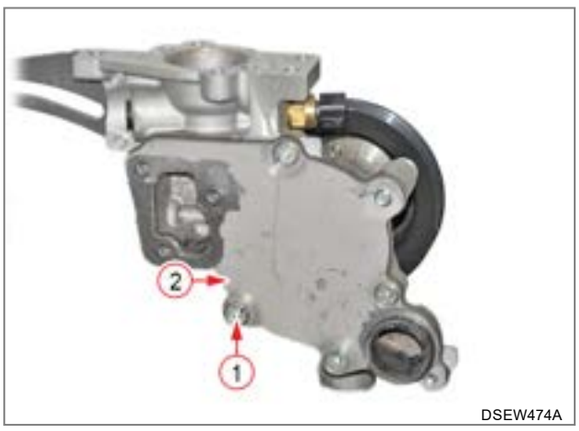
Opening temperature	Specified value	Initial opening temperature: 71 ± 1.5 °C (159.8 ± 2.7 °F)
		Below 85 °C (185 °F) when opening by 8 mm (0.315 in.)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 81 2025-04-08 오전 9:29:31

7.22.13 WATER PUMP



1. Unscrew the four water pump body bolts (M8, 1) tightened to the cylinder head to remove the water pump assembly(2).



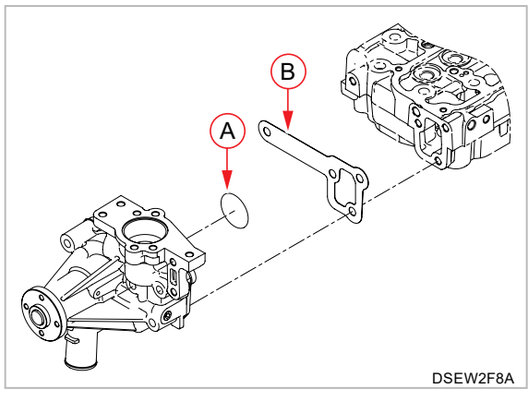


2. Remove the water pump plate (2) after unscrewing its mounting screw (1).
3. Pull out the fan pulley and installation flange with a puller. Then, pull out the water pump bearing, impeller and mechanical seal.
4. Install in the reverse order of removal.
5. If the mechanical seal is removed, replace it with a new one.

⚠ CAUTION

- **The water pump components are firmly pressed in and can be disassembled only with a special tool. Therefore, it is recommended to replace the water pump assembly as a whole unit.**

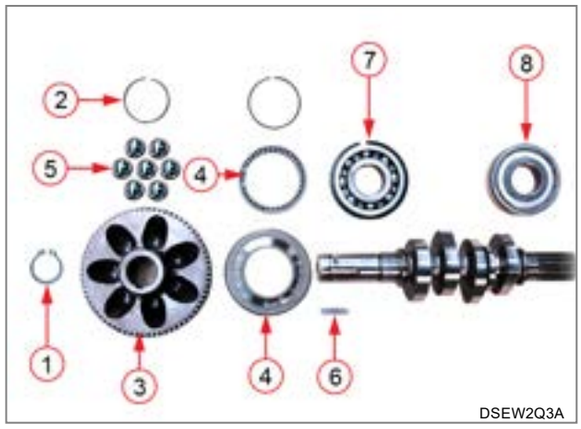
REMARK



- **For the O-ring (A) that is engaged with the cylinder head during installation, apply engine oil on its surface in advance to prevent its damage.**
- **Also, replace the gasket (B) with a new one after its removal and clean its mating surface thoroughly with a scraper before its re-installation.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 82 2025-04-08 오전 9:29:31

7.22.14 INJECTION PUMP GEAR ASSEMBLY (FUEL CAMSHAFT GEAR)



1. Pull out the snap ring (1) and remove the injection pump gear assembly. This assembly is forcibly pressed into the shaft, so a special device may be used for its disassembly.
2. Remove the clip (2) to separate the gear (3) and the bearing (4).
3. Take out the ball (5).
4. Take out the key (6) and remove the #6305 bearing (7) and #6305Z bearing (8).
5. Install in the reverse order of removal.
6. When installing the injection pump gear, heat it to approx. 80°C (176°F) and fit it to the camshaft.

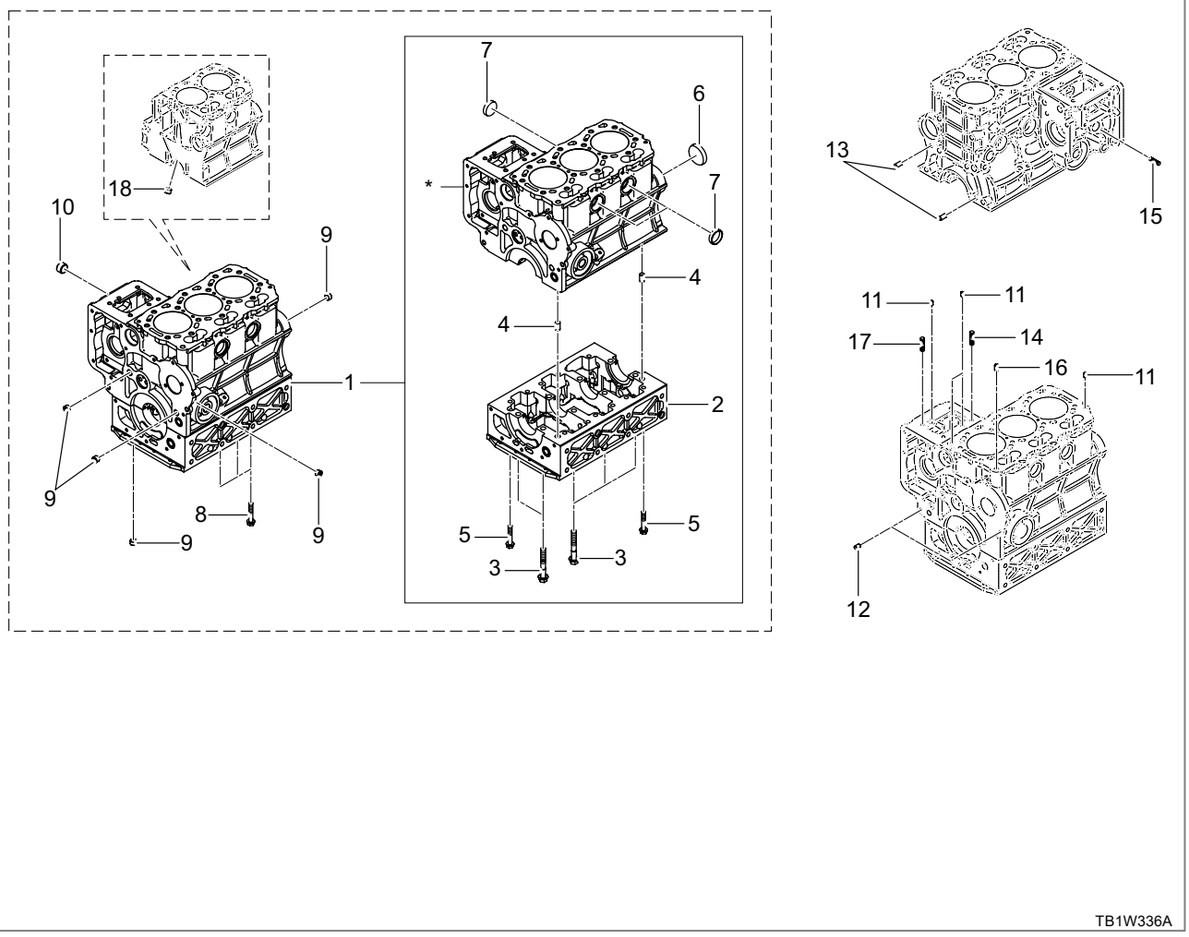
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 83 2025-04-08 오전 9:29:32

8. EXPLODED VIEW

NOTES

- **The manufacturing parts are subject to change without notice. Therefore, check the parts catalog or electronic manual for latest information.**

8.1 EL1-G111001 CYLINDER BLOCK GROUP



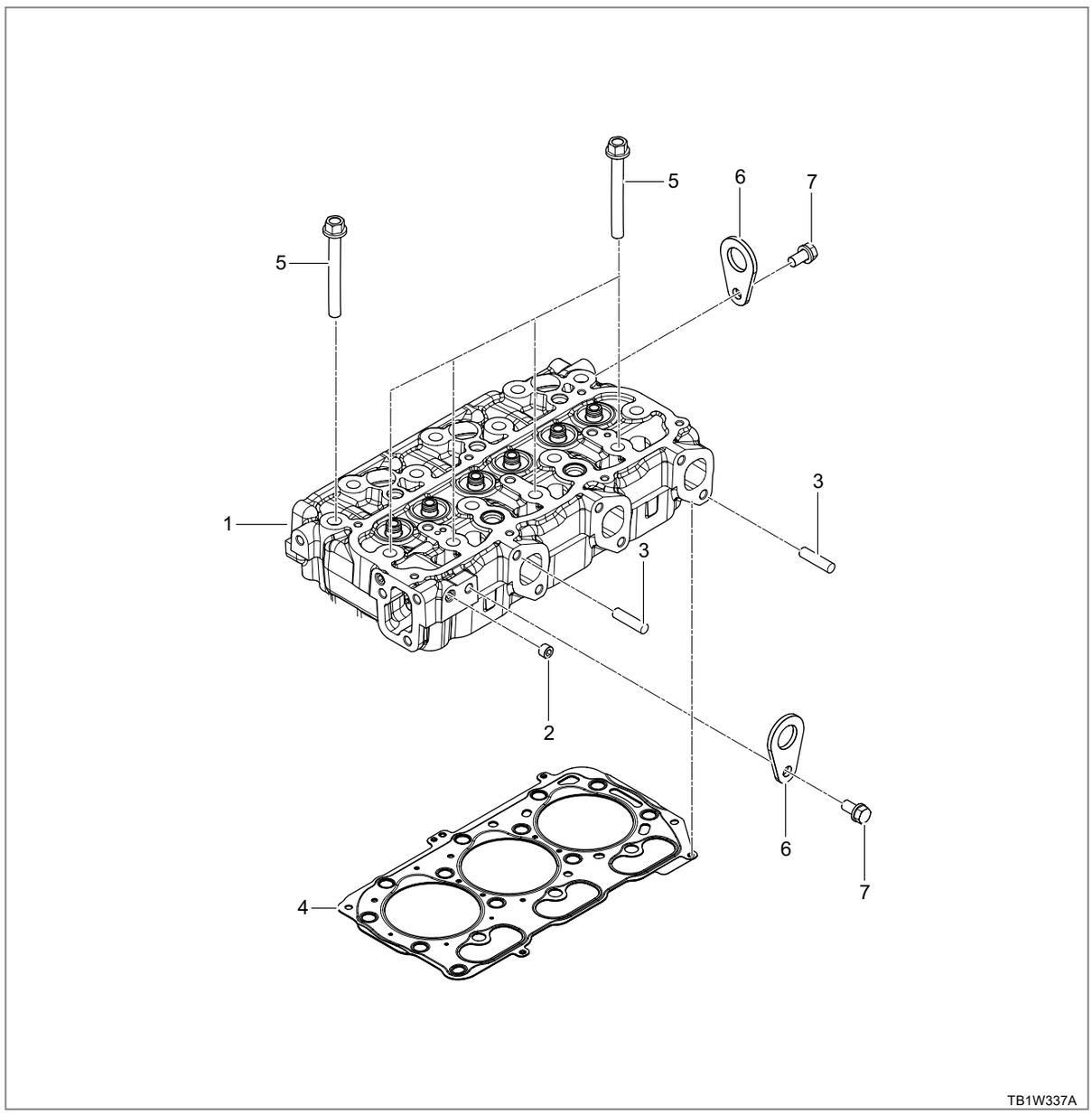
TB1W336A

COMPONENTS

(1) Sub assy block, Cyl
(2) Frame, Ladder
(3) Bolt, Main bearing
(4) Pin, Parallel
(5) Bolt, Flange
(6) Cap
(7) Cap
(8) Bolt, Flange
(9) Plug
(10) Plug
(11) Pin, parallel
(12) Pin, Straight
(13) Pin, Parallel
(14) Stud
(15) Stud
(16) Pin
(17) Bolt, Stud
(18) Plug-cooling jet

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 84 2025-04-08 오전 9:29:32

8.2 EL1-G113001 CYLINDER HEAD GROUP

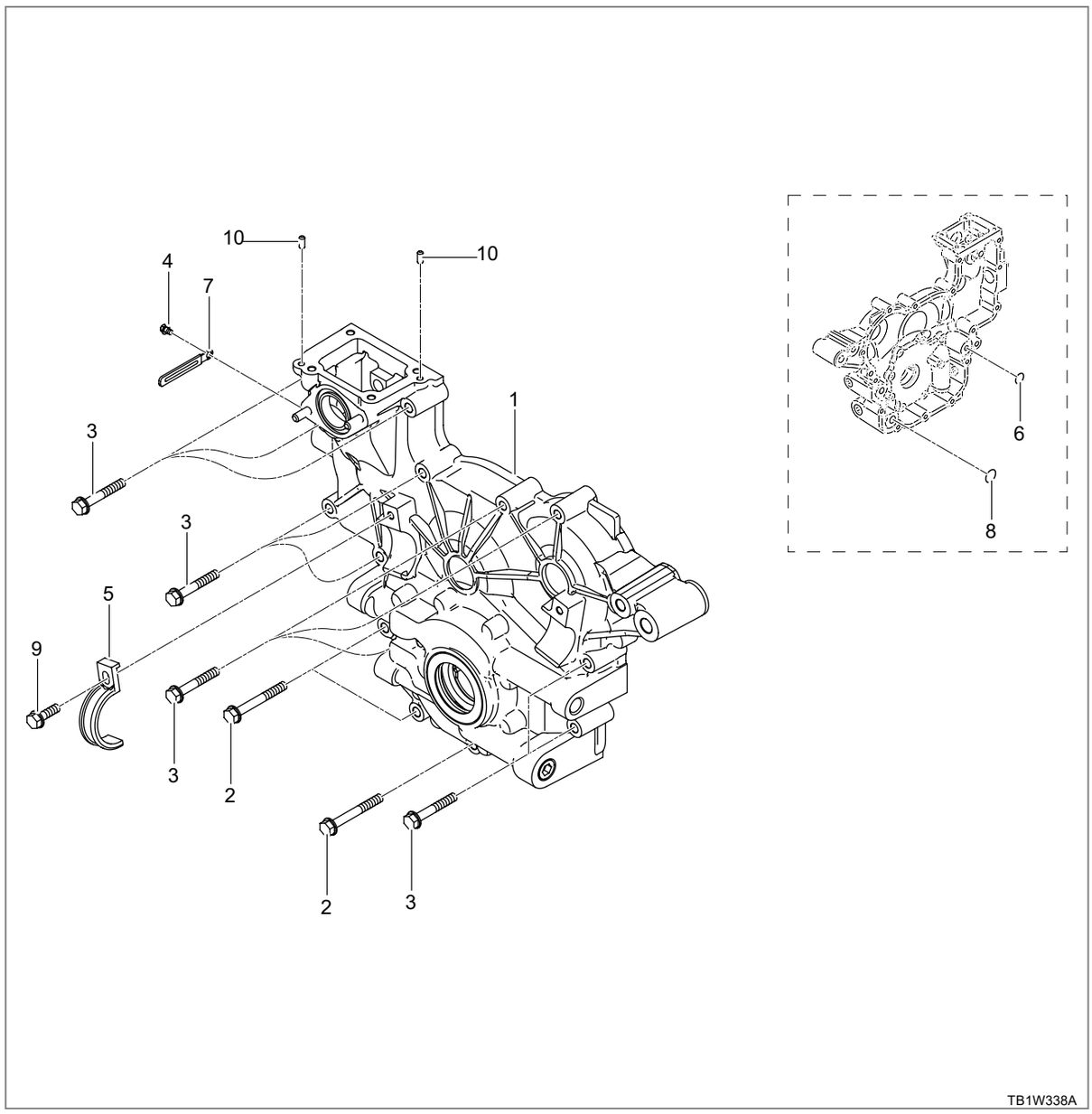


COMPONENTS

(1) Sub assy head, CYL
(2) Stud
(3) Gasket, CYL head
(4) Bolt, Cylinder head
(5) Engine hook
(6) Bolt, Washer

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 85 2025-04-08 오전 9:29:33

8.3 EL1-G114001 GEAR CASE GROUP



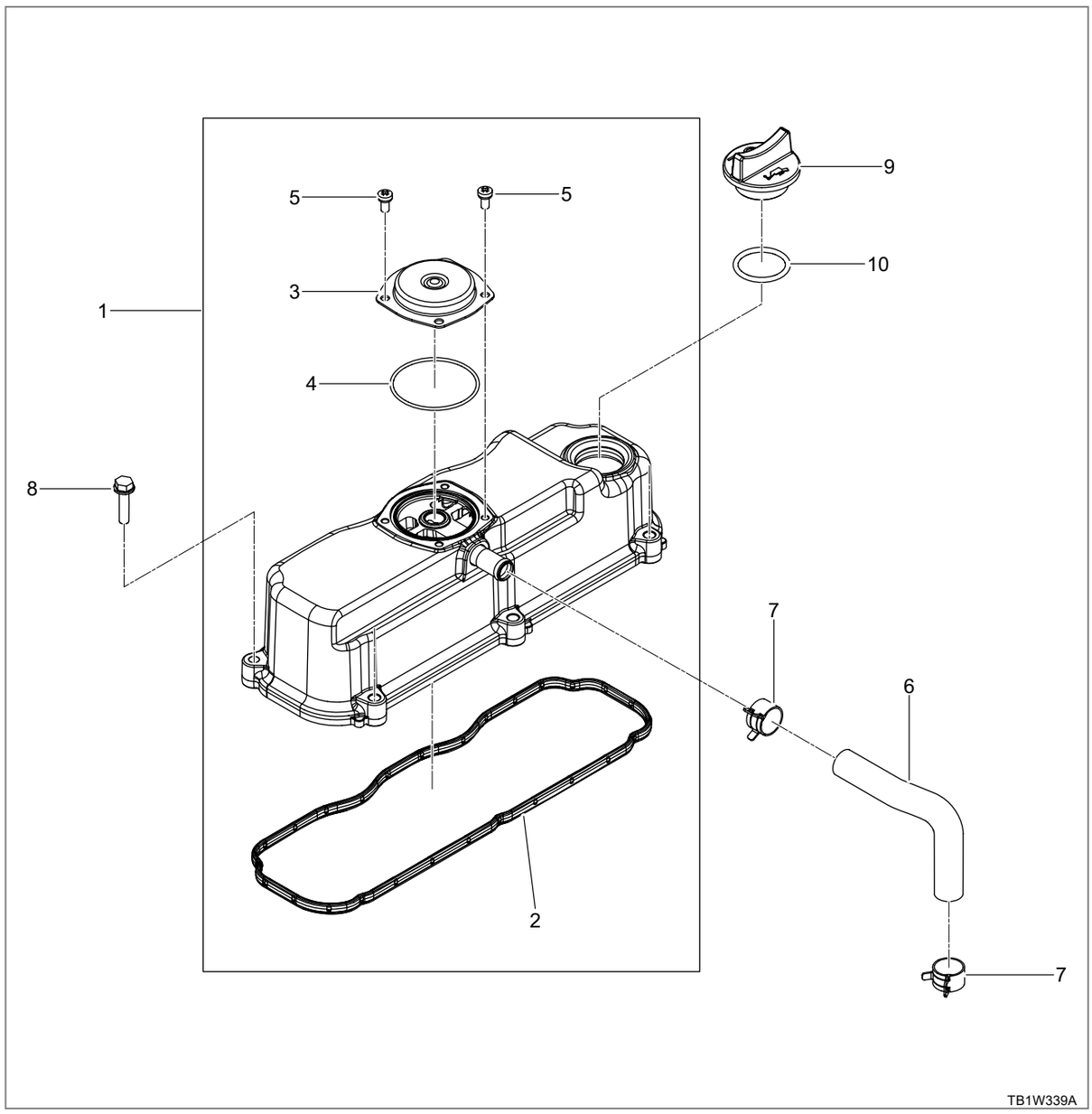
TB1W338A

COMPONENTS

(1) Assy gear case
(2) Bolt, Flange
(3) Flange bolt
(4) Flange bolt
(5) Holder, hose
(6) O ring
(7) Clamp, Cord
(8) O ring
(9) Bolt, Flange
(10) Straight pin

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 86 2025-04-08 오전 9:29:33

8.4 EL1-G116001 CYLINDER HEAD COVER GROUP

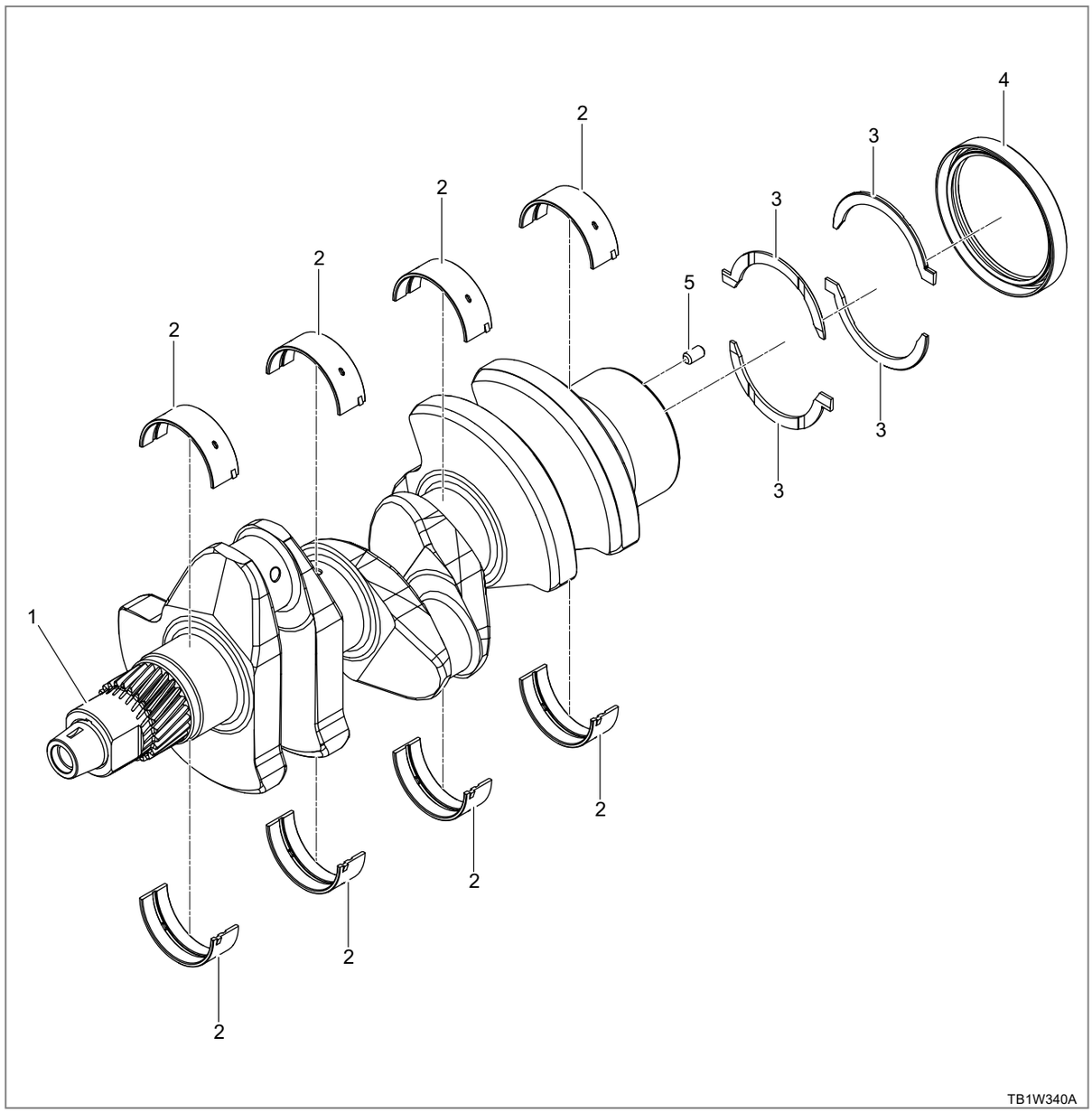


COMPONENTS

(1) Assy cover, CLY head
(2) Gasket, CYL head cover
(3) Cover, Valve
(4) O ring
(5) Screw, Washer
(6) Hose, Air breather
(7) Clamp, Hose
(8) Bolt, Flange
(9) Assy plug, Oil filler
(10) O ring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 87 2025-04-08 오전 9:29:33

8.5 EL1-G121001 CRANK SHAFT GROUP

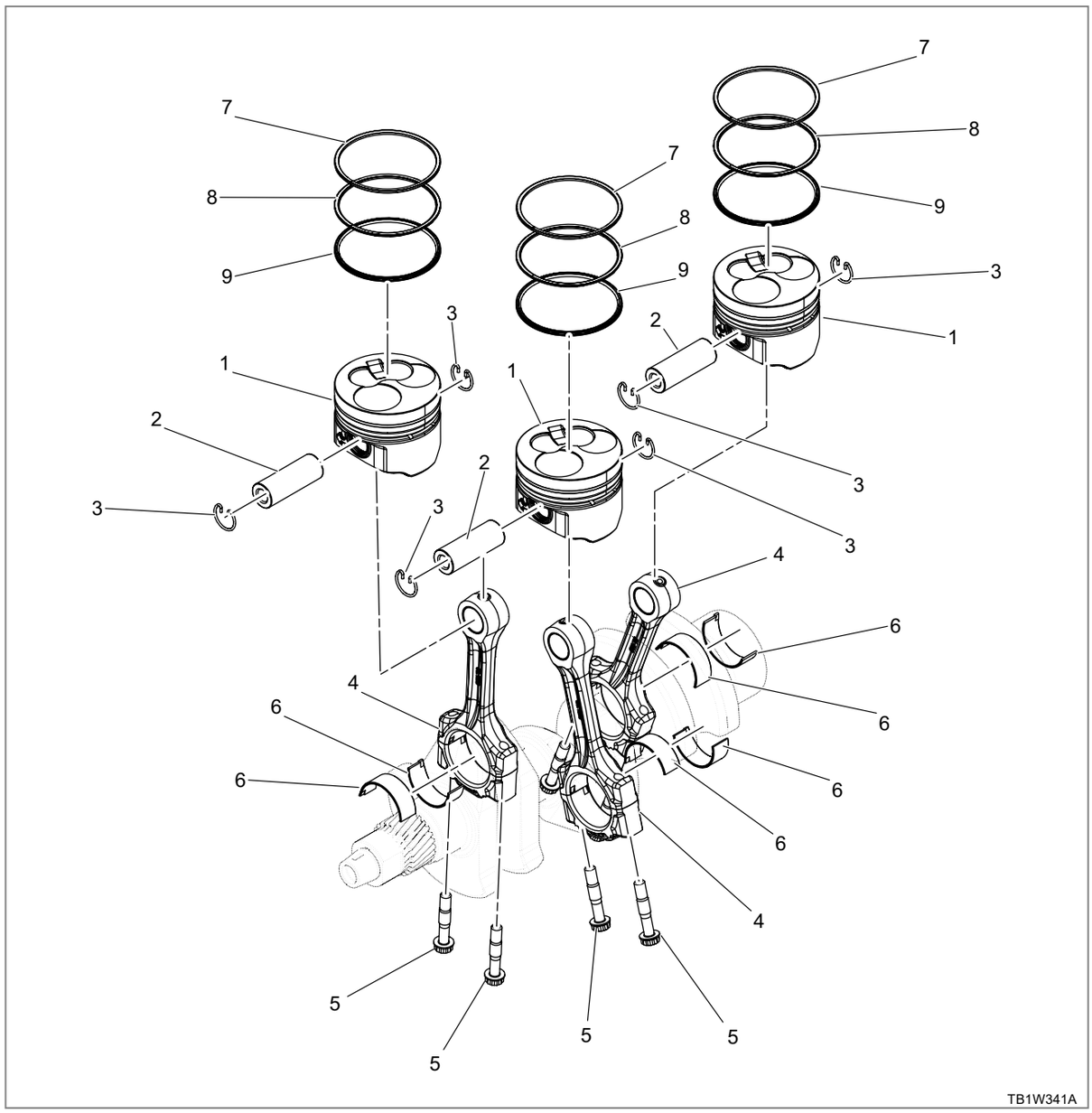


COMPONENTS

(1) Assy crankshaft
(2) Metal 2, Crankshaft
(3) Metal, Side
(4) Seal, Oil
(5) Pin, Parallel

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 88 2025-04-08 오전 9:29:33

8.6 EL1-G122001 PISTON CONNECTING ROD GROUP

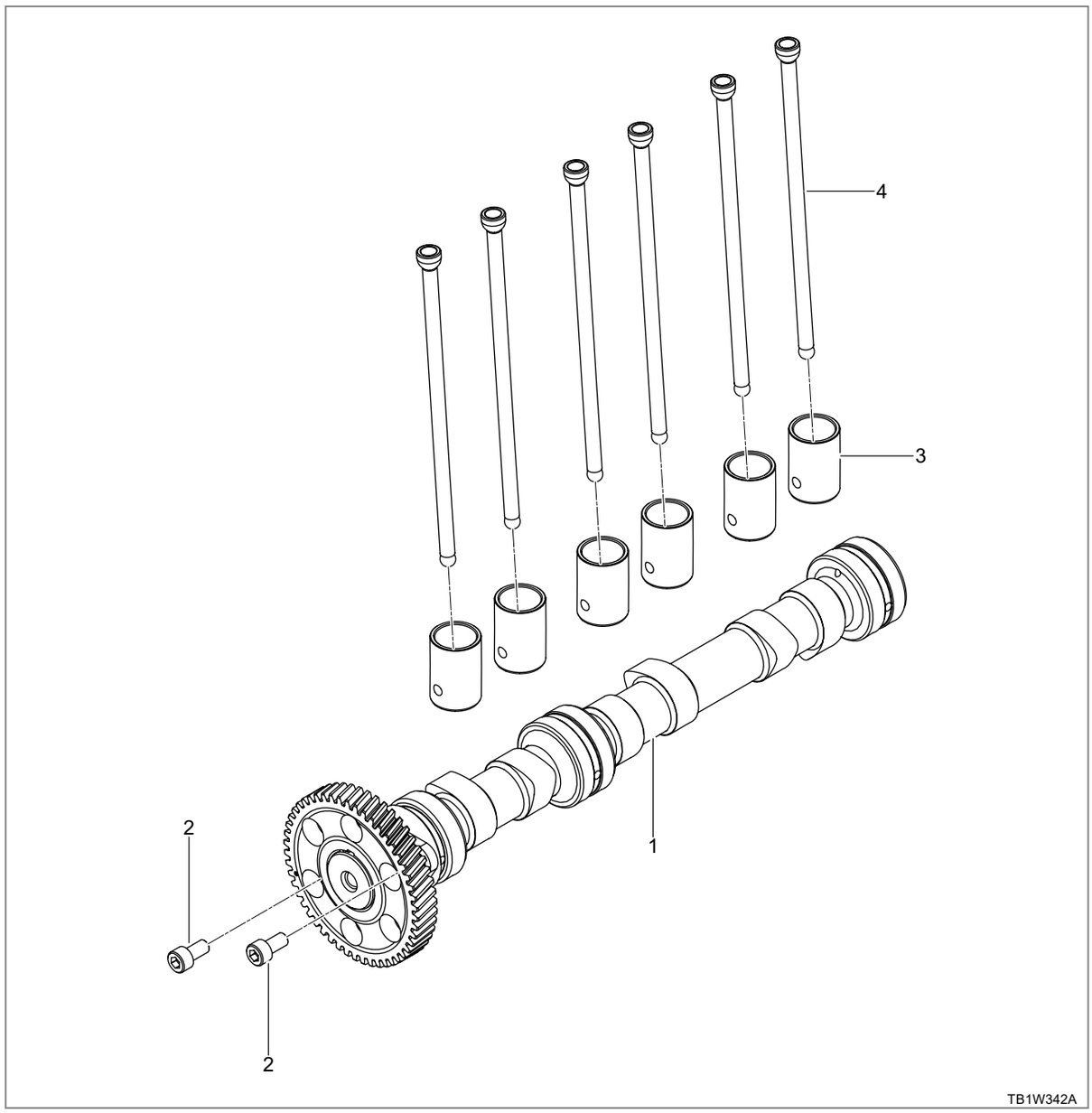


COMPONENTS

(1) Piston
(2) Pin, Piston
(3) Ring, Snap
(4) Assy rod, Connecting
(5) Bolt, Connecting rod
(6) Bearing, Connecting rod
(7) Ring, Piston-top
(8) Ring, Piston-2nd
(9) Assy ring, Oil

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 89 2025-04-08 오전 9:29:33

8.7 EL1-G123001 CAMSHAFT GROUP

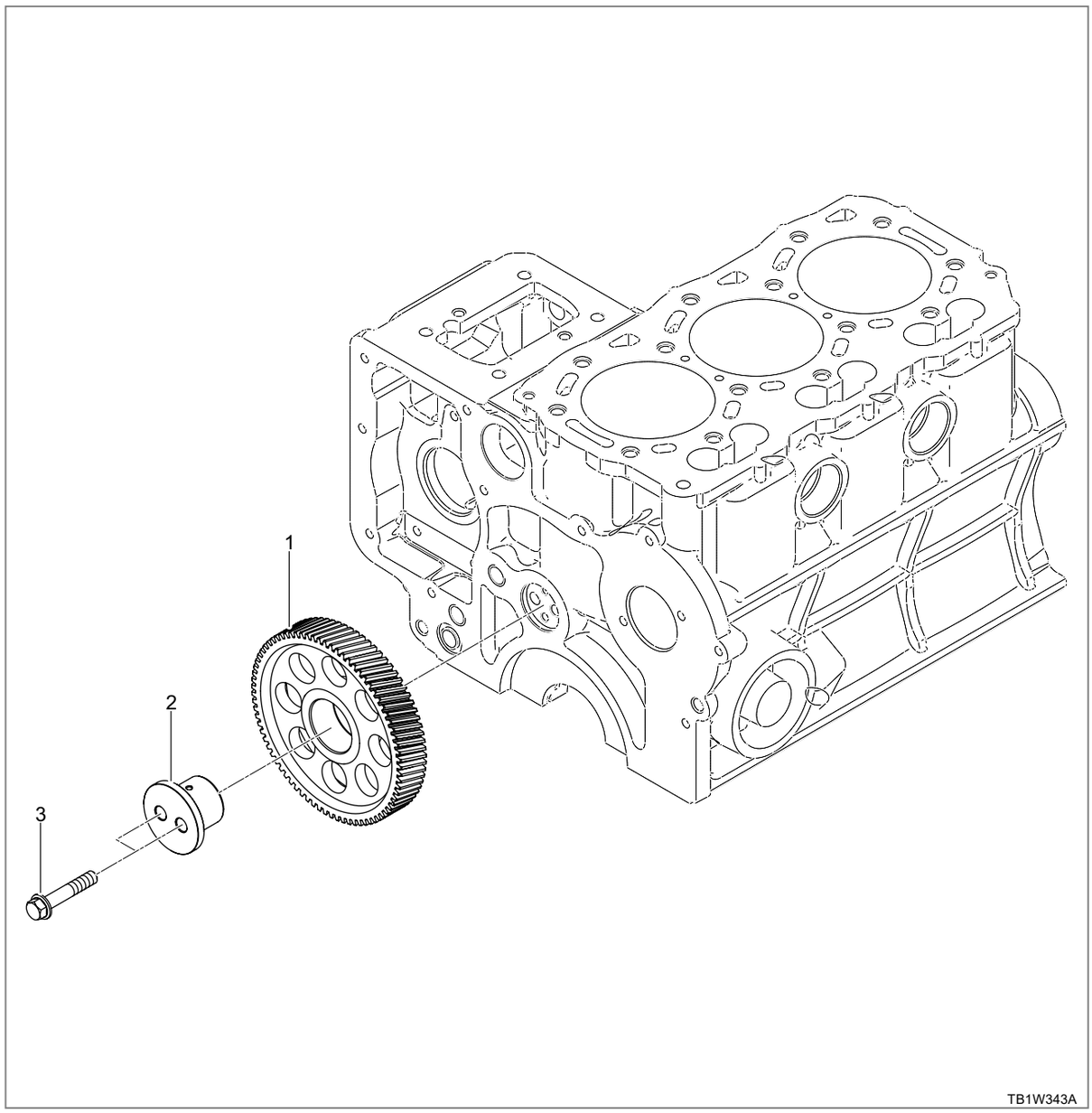


COMPONENTS

(1) Assy camshaft
(2) Assy camshaft
(3) Bolt, Wrench
(4) Tappet
(5) Rod, Push

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 90 2025-04-08 오전 9:29:34

8.8 EL1-G124001 IDLE GEAR GROUP

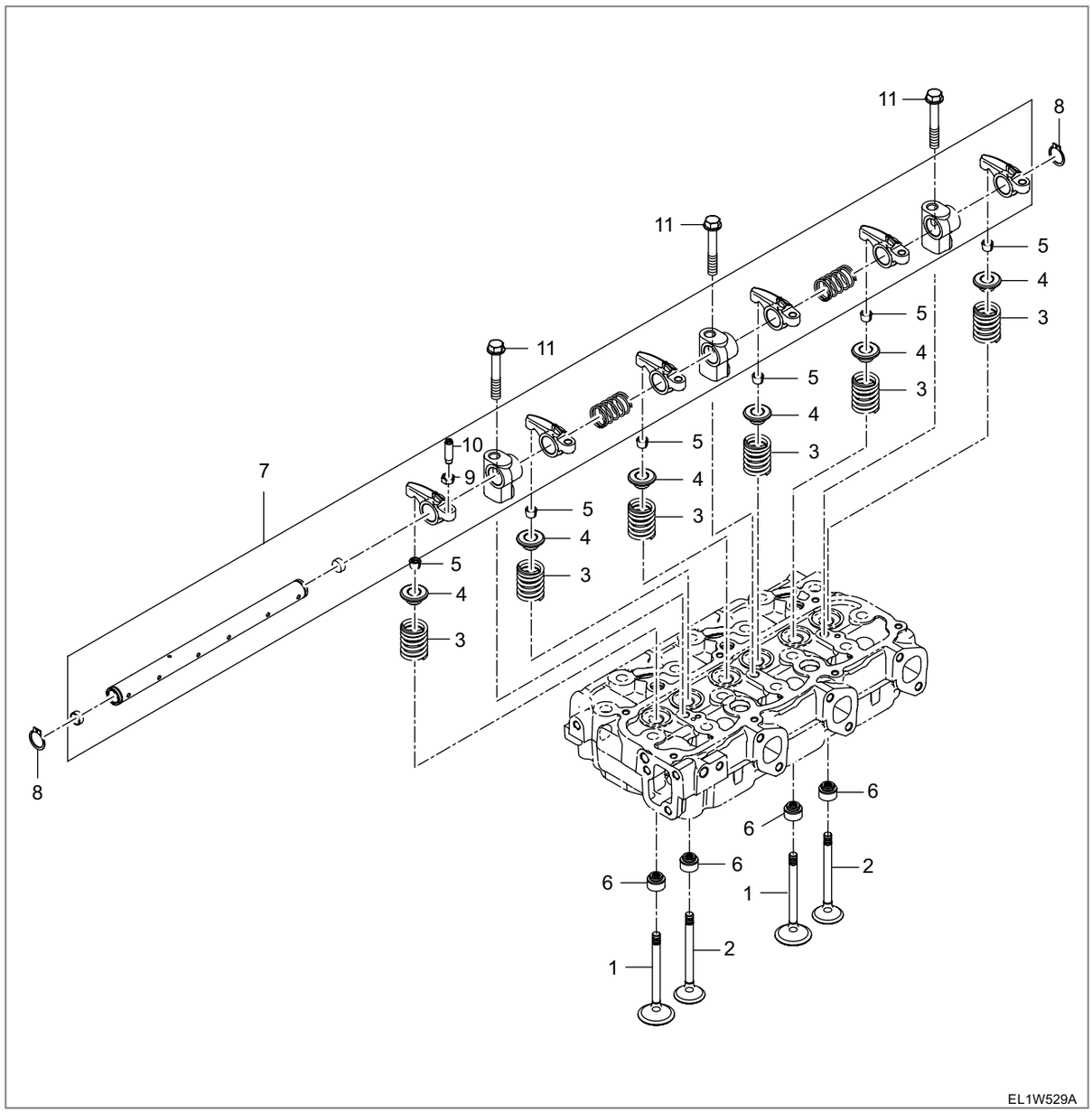


COMPONENTS

(1) Assy gear, Idle
(2) Shaft, Idle gear
(3) Bolt,Flange

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 91 2025-04-08 오전 9:29:34

8.9 EL1-G125001 ROCKER ARM VALVE GROUP

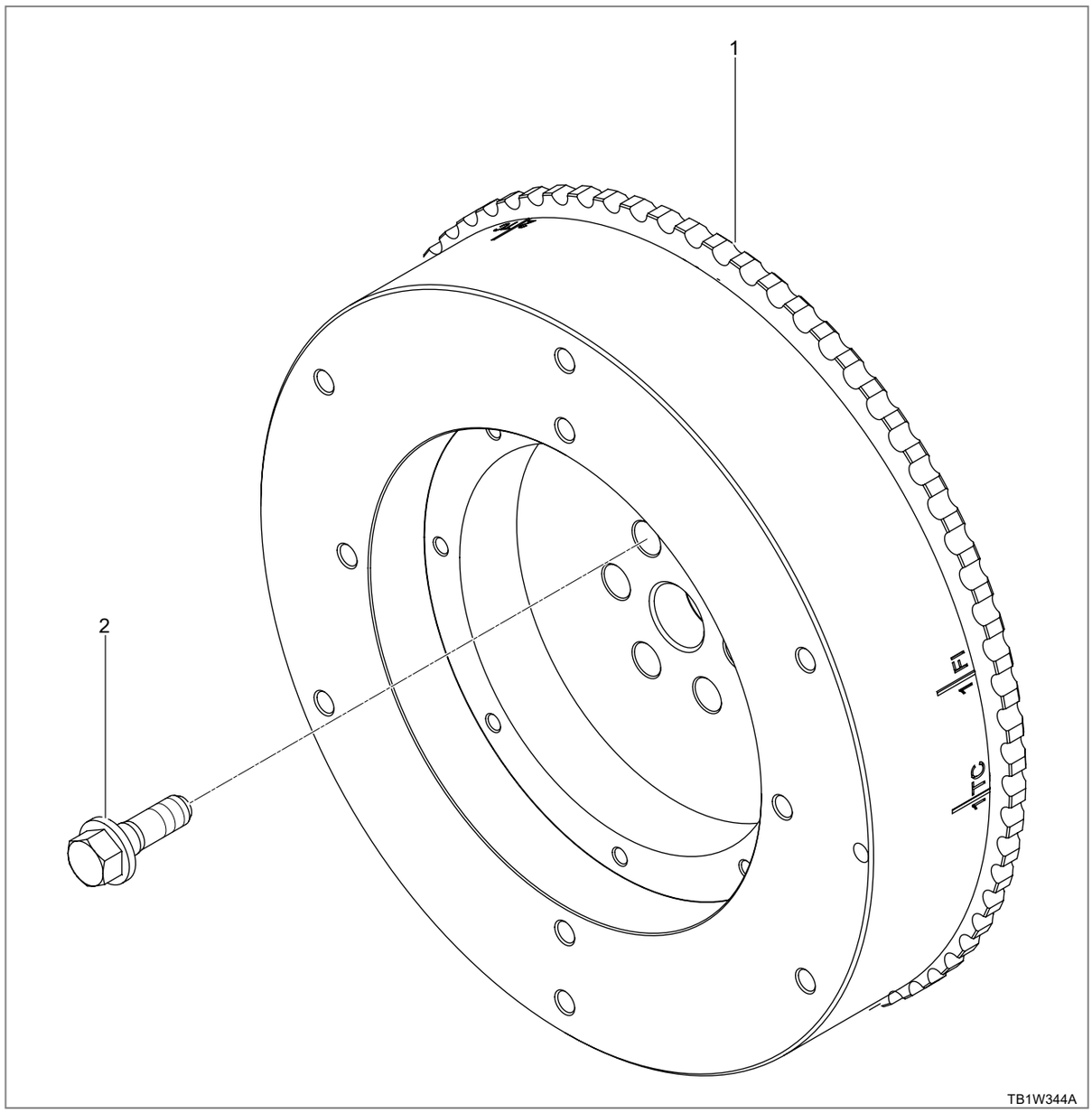


COMPONENTS

(1) Valve, Intake
(2) Valve, Exhaust
(3) Spring, Valve
(4) Retainer, Velve spring
(5) Collet, Valve spring
(6) Seal, Valve stem
(7) Assy shaft, Rocker arm
(8) Snap ring
(9) Nut, Adjusting
(10) Screw, Adjusting
(11) Bolt, Rocker arm support

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 92 2025-04-08 오전 9:29:34

8.10 EL1-G126004 FLYWHEEL GROUP

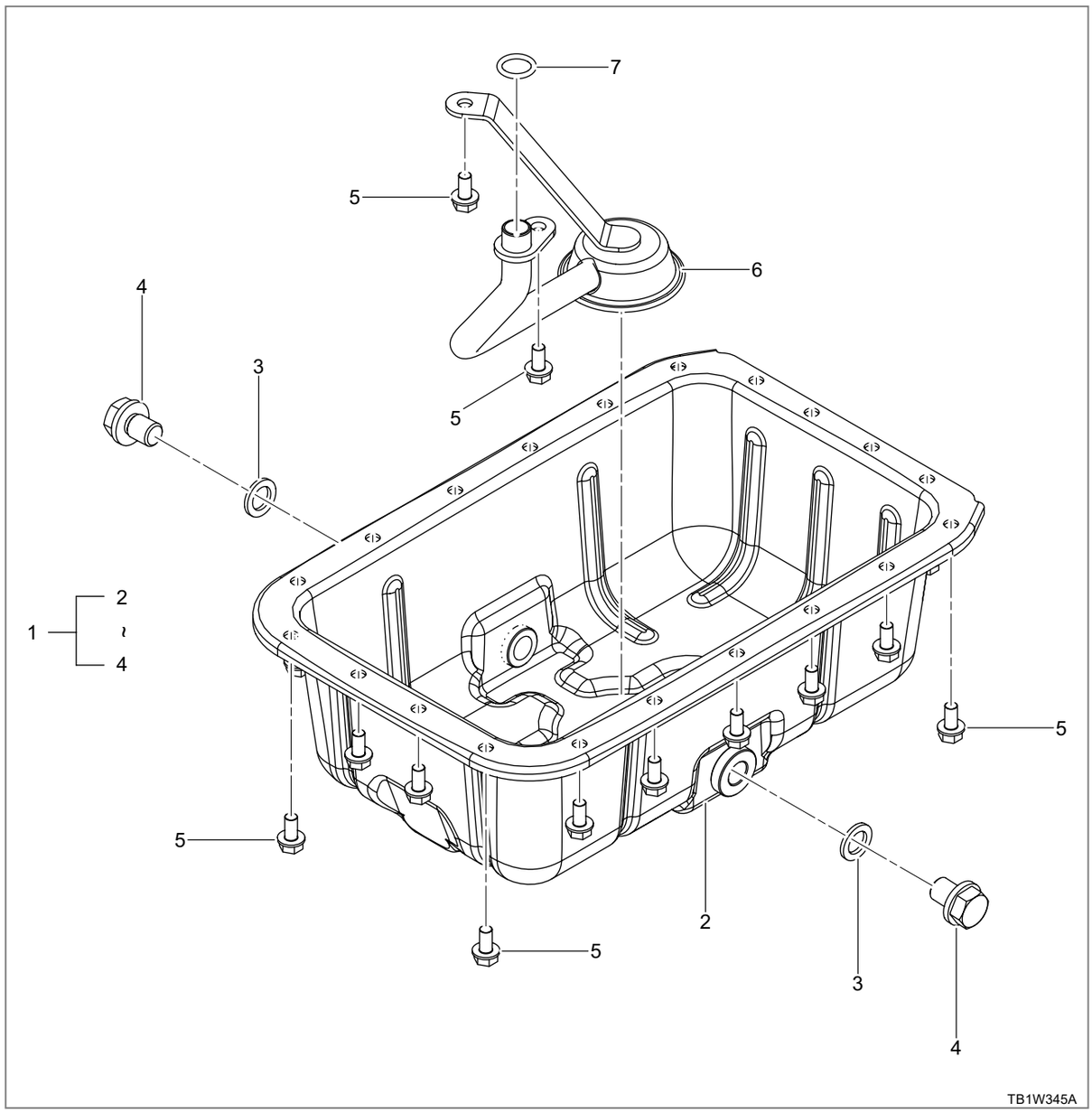


COMPONENTS

(1) Assy flywheel -HST
(2) Bolt, Flywheel

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 93 2025-04-08 오전 9:29:34

8.11 EL1-G142001 OIL PAN GROUP

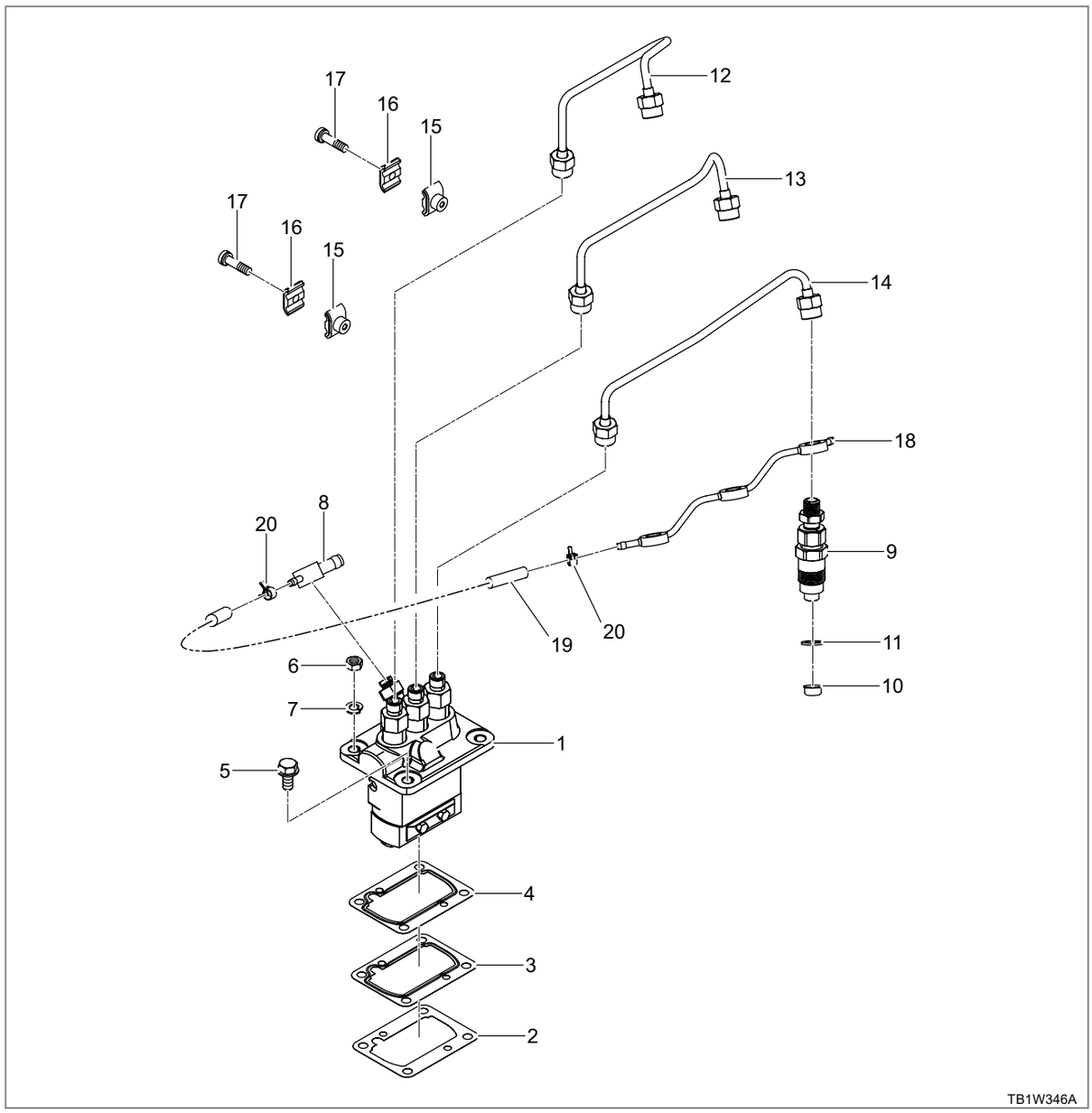


COMPONENTS

(1) Assy Pan, Oil
(2) Sub assy pan, Oil
(3) Gasket
(4) Plug
(5) Bolt, Flange
(6) Strainer, Oil
(7) O ring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 94 2025-04-08 오전 9:29:35

8.12 EL1-G151001 FUEL EQUIPMENT GROUP

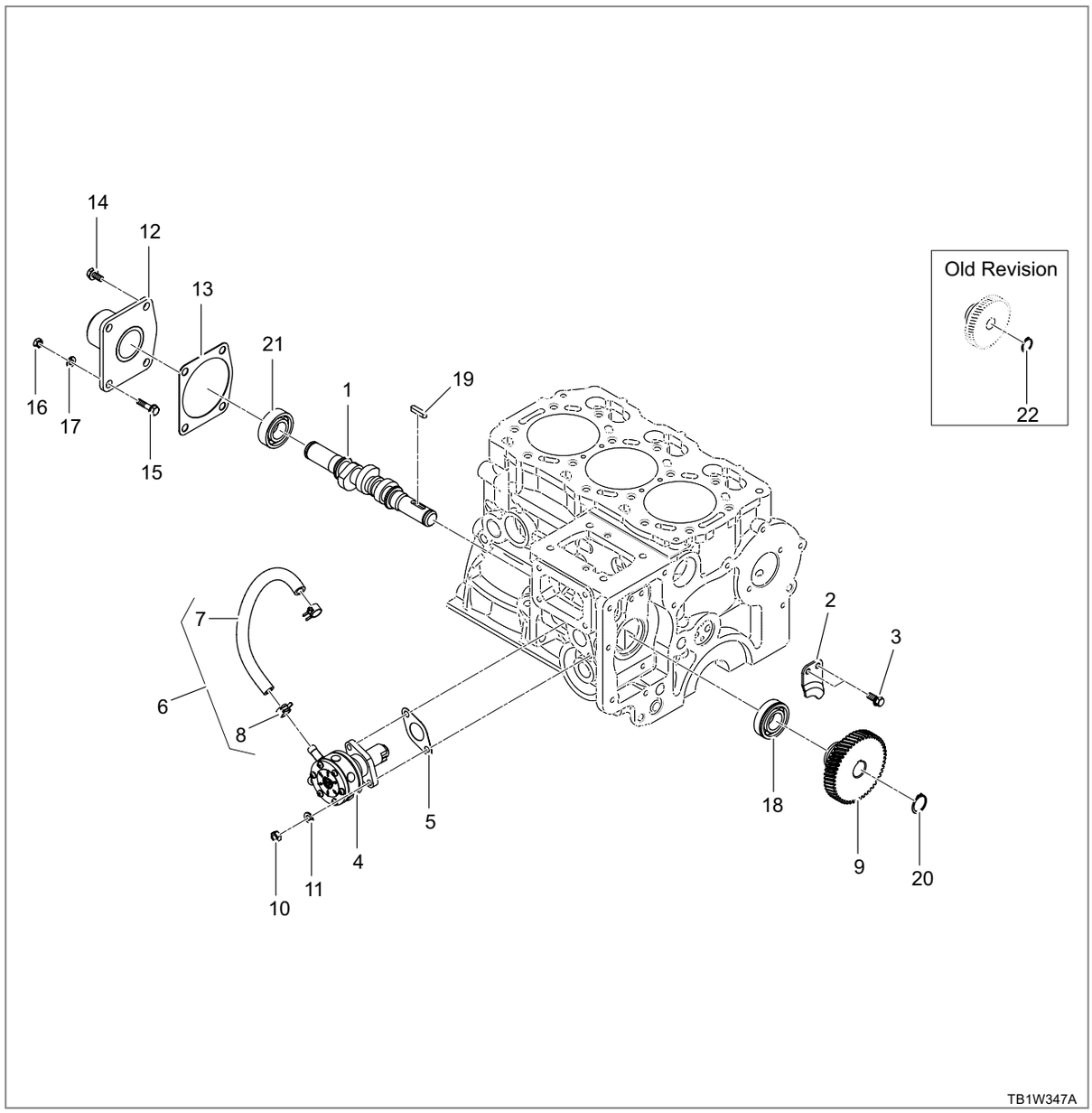


COMPONENTS

(1) Injection pump
(2) Shim 3, Injection pump
(3) Shim, Injection pump
(4) Shim, Injection pump
(5) Bolt, Washer
(6) Nut
(7) Spring washer
(8) Joint, Fuel pipe
(9) Assy nozzle, Holder
(10) Seal, Heat shield
(11) Gasket
(12) Assy pipe, Injection-1
(13) Assy pipe, Injection-2
(14) Assy pipe, Injection-3
(15) Clamp 1, Tube
(16) Holder, Tube
(17) Screw, Washer
(18) Assy hose, Fuel overflow
(19) Hose, Fuel
(20) Clamp, Hose

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 95 2025-04-08 오전 9:29:35

8.13 EL1-G152001 FUEL CAMSHAFT GROUP

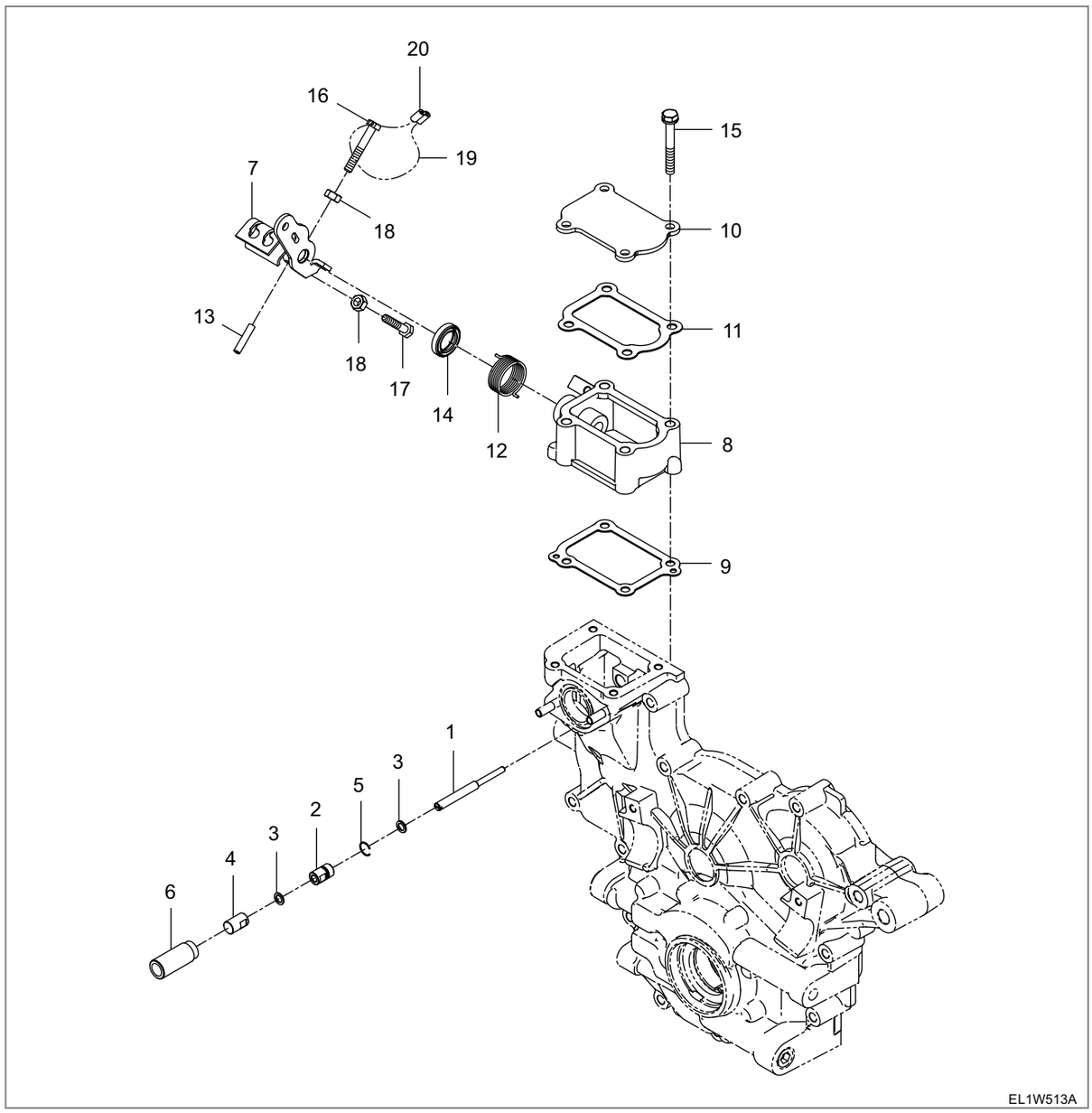


COMPONENTS

(1) Engine machining assy/camshaft
(2) Stopper, Fuel camshaft
(3) Bolt, Washer
(4) Fuel pump assy
(5) Gasket, Fuel pump
(6) Assy hose, fuel
(7) Hose 1, Fuel
(8) Clip, Tube
(9) Assy gear, Injection pump
(10) Nut
(11) Washer, Spring
(12) Cover, Camshaft
(13) Gasket, Fuel camshaft cover
(14) Bolt, Washer
(15) Bolt, Washer
(16) Nut
(17) Spring washer
(18) Ball bearing
(19) Key, Round
(20) Snap ring
(21) Ball bearing
(22) Snap ring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 96 2025-04-08 오전 9:29:35

8.14 EL1-G153002 SPEED CONTROL LEVER GROUP

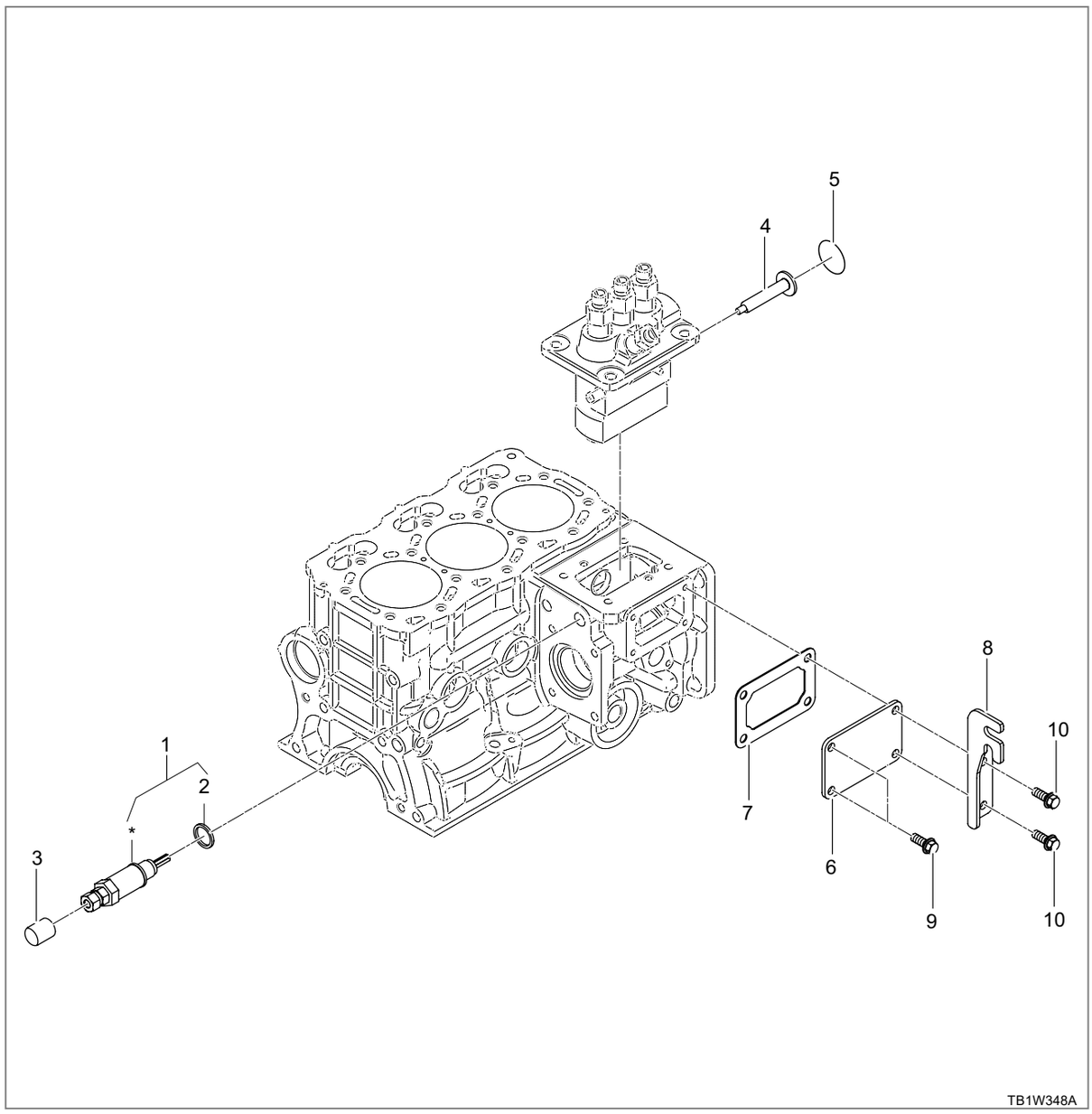


COMPONENTS

(1) Bolt, fuel adjusting
(2) Nut
(3) Gasket
(4) Cap nut
(5) Snap ring
(6) Cap
(7) Lever, Speed control
(8) Plate, Speed control
(9) Gasket, Speed control plate
(10) Cover, Engine stop lever
(11) Gasket, cover-speed control plate
(12) Spring-lever, Speed control
(13) Spring pin
(14) Seal, Oil
(15) OB-bolt
(16) Screw, Stopper
(17) Screw, Stopper
(18) Nut
(19) Wire
(20) Cap, Sealing

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 97 2025-04-08 오전 9:29:35

8.15 EL1-G154001 ENGINE STOP LEVER GROUP

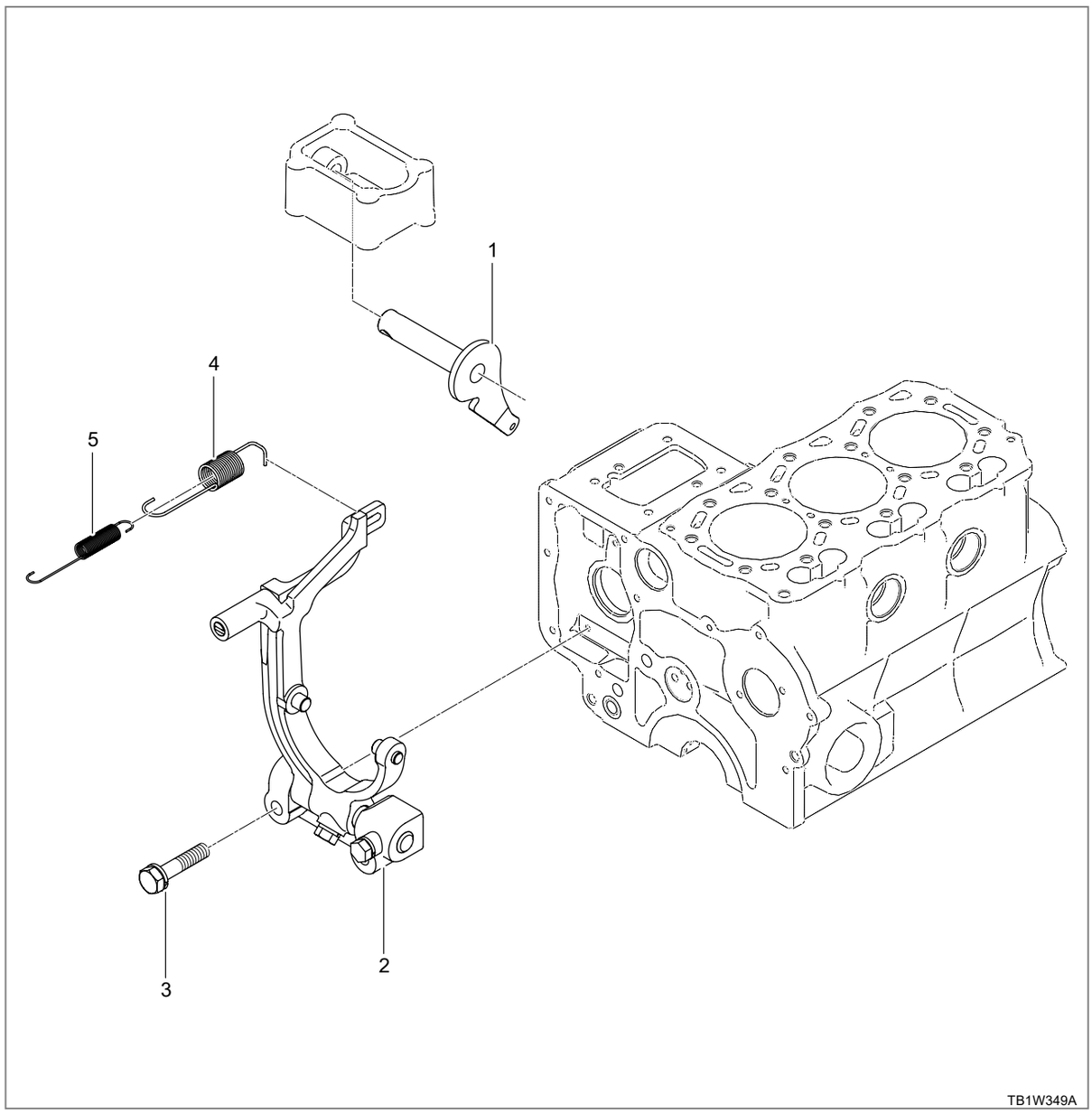


COMPONENTS

(1) Idle apparatus assy
(2) Packing
(3) Cap
(4) Guide, Engine stop solenoid
(5) O ring
(6) Cover, injection pump
(7) Gasket-cover, Injection pump
(8) Bracket, Cable
(9) Bolt, Flange
(10) Bolt, Flange
(11) Packing

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 98 2025-04-08 오전 9:29:36

8.16 EL1-G155001 GOVERNOR GROUP

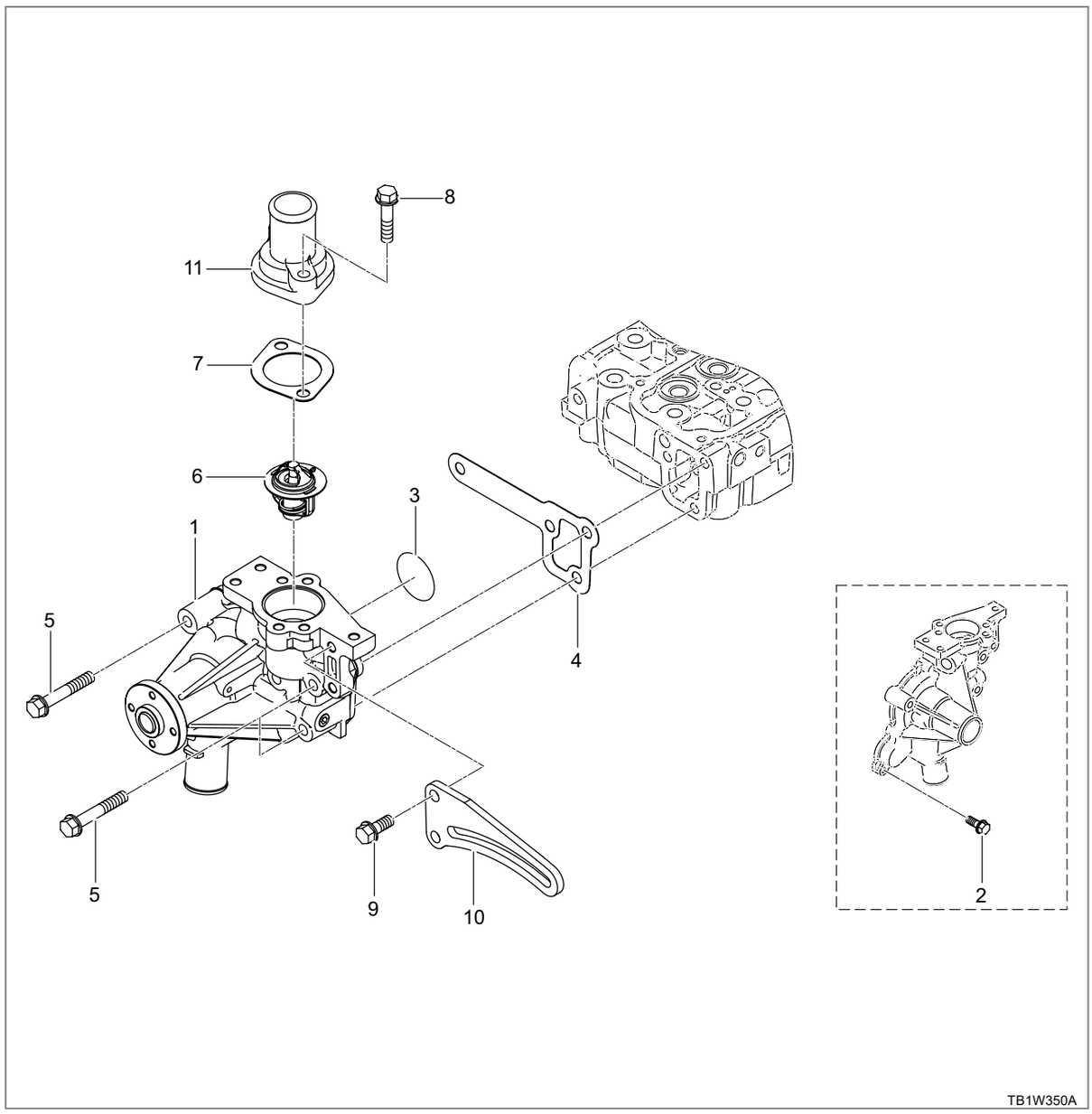


COMPONENTS

(1) Assy lever, Governor
(2) Assy lever, Fork
(3) Bolt, Washer
(4) Spring, Governor-1
(5) Spring, Governor-2

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 99 2025-04-08 오전 9:29:36

8.17 EL1-G163001 WATER PUMP GROUP

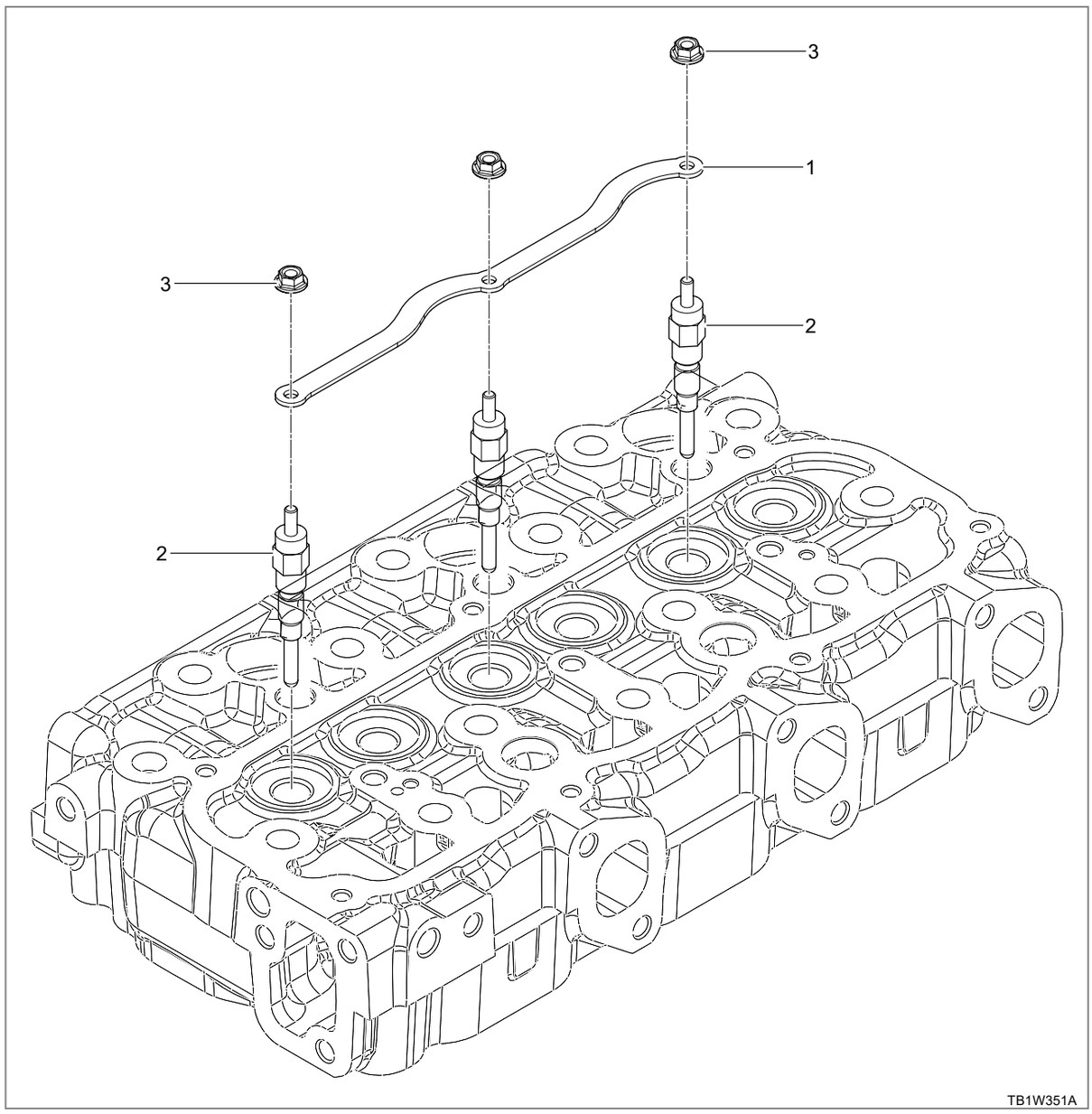


COMPONENTS

(1) Assy pump, Water
(2) Flange bolt
(3) O ring
(4) Gasket, Water Pump
(5) Flange bolt
(6) Thermostat assy
(7) Gasket
(8) Bolt
(9) Flange bolt
(10) Support, Generator
(11) Cover, Thermostat

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 100 2025-04-08 오전 9:29:36

8.18 EL1-G191001 GLOW PLUG GROUP

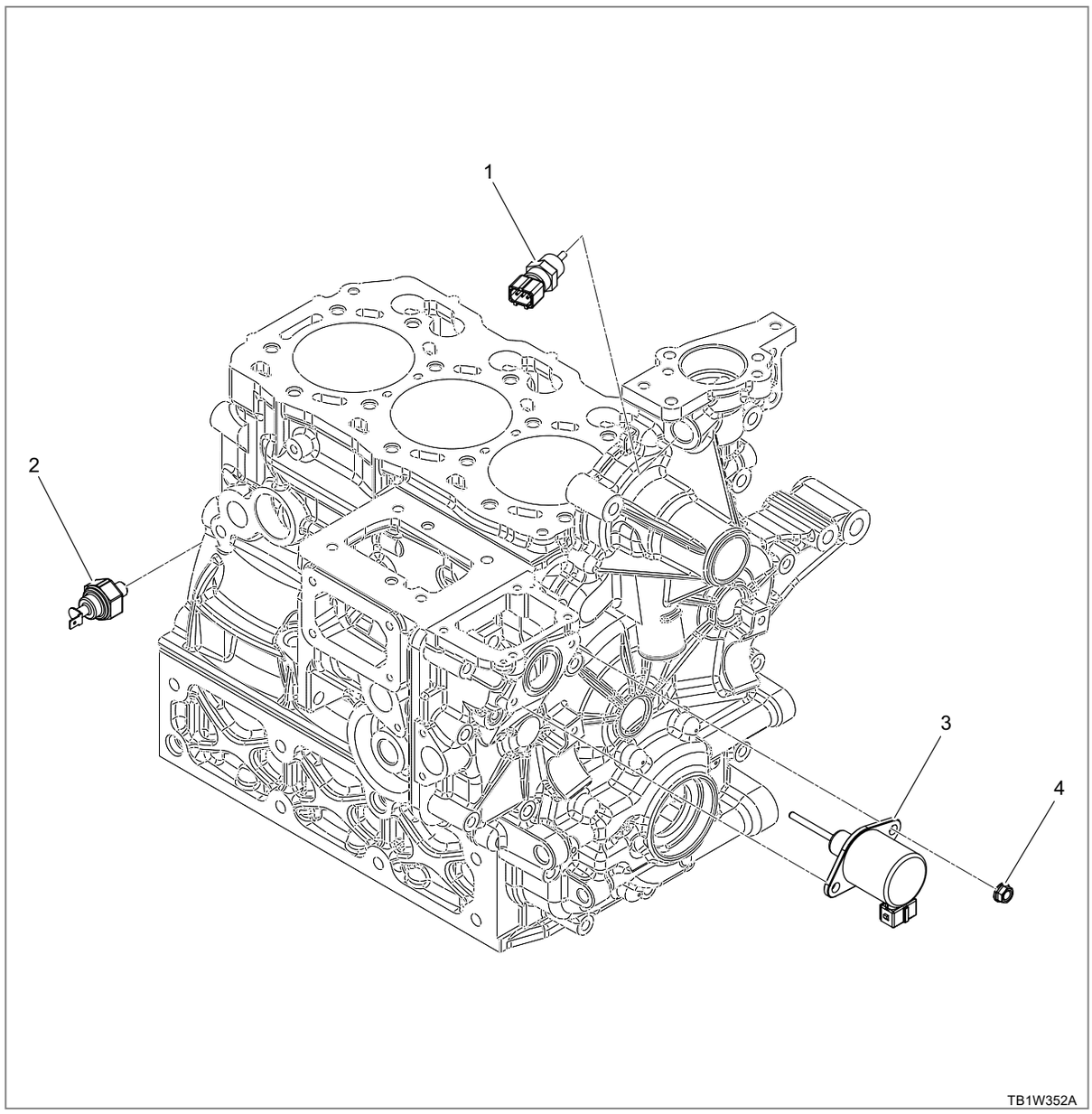


COMPONENTS

(1) Cord, Glow plug
(2) Glow plug
(3) Nut, Flange

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 101 2025-04-08 오전 9:29:36

8.19 EL1-G192001 ENGINE ELECTRICAL GROUP

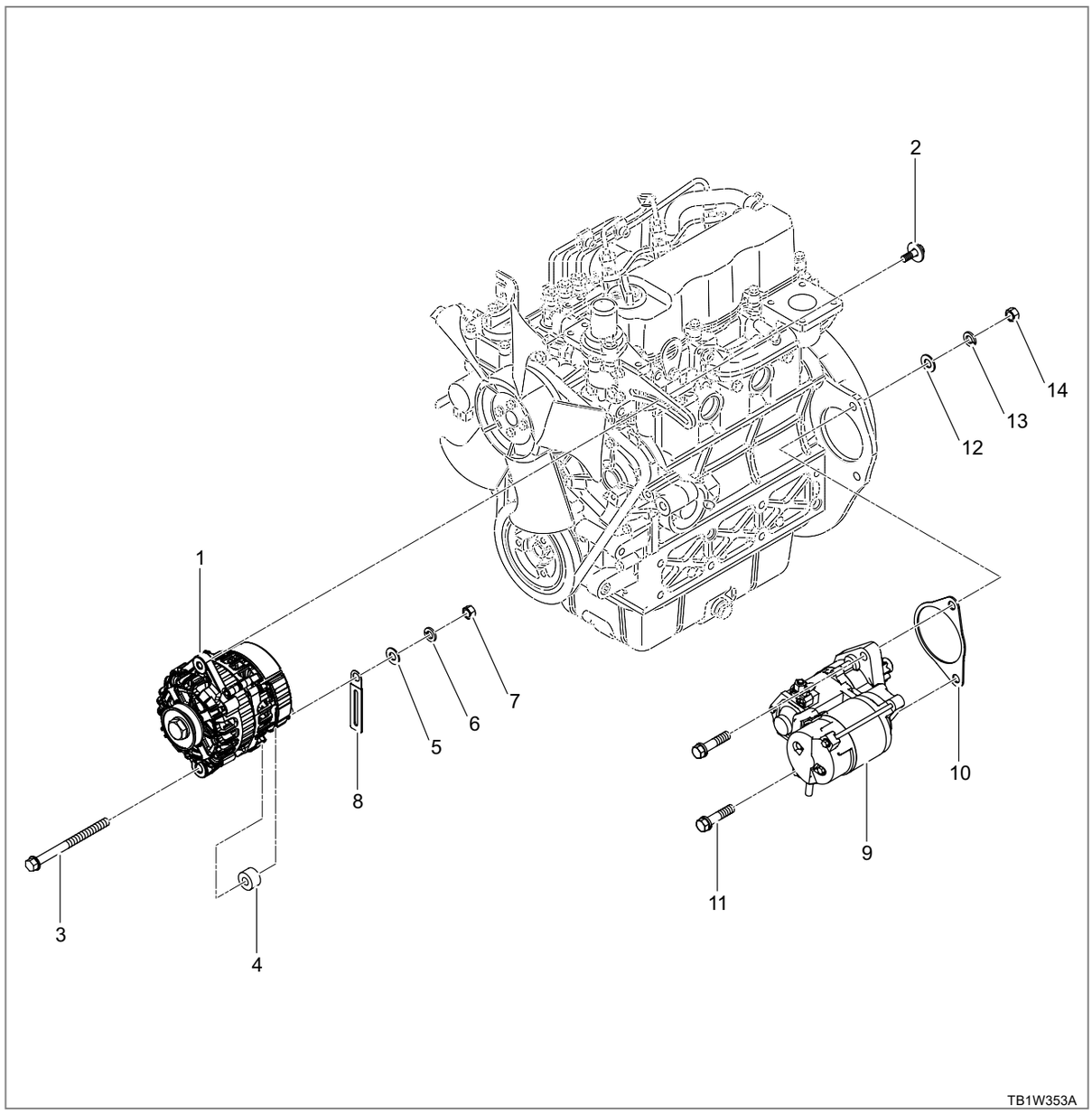


COMPONENTS

(1) Temperature sensor assy
(2) Switch, Oil
(3) Solenoid, Engine stop
(4) Flange nut

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 102 2025-04-08 오전 9:29:37

8.20 EL1-G193007 ELECTRICAL GROUP



COMPONENTS

(1) Assy alternator-75A, 4PK
(2) Bolt
(3) Flange bolt
(4) Spacer
(5) Washer, Plain
(6) Washer, Spring
(7) Nut
(8) Clamp,Cord
(9) Assy motor, Starter-1.4kw
(10) Collar
(11) Bolt, Washer
(12) Washer, Plain
(13) Washer, Spring
(14) Nut

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_03_엔진.indd 103 2025-04-08 오전 9:29:37

MEMO



KIOTI

CS2530CH
CS2530CH-EU

TRANSMISSION

CHAPTER 4

TABLE OF CONTENTS

1. SPECIFICATIONS 4-2

1.1 General specifications 4-2

1.2 Tightening torque for major components ...4-2

1.3 Sealant and adhesive specifications 4-3

2. STRUCTURE AND OPERATING PRINCIPLE.....4-4

2.1 Structure.....4-4

2.2 Main gear shift & shuttle system 4-5

2.3 Range shift section.....4-6

2.4 PTO.....4-7

2.4.1 PTO clutch pack.....4-8

2.4.2 Calculation for rear PTO and mid PTO.....4-8

2.5 Front wheel drive.....4-9

3. TROUBLESHOOTING 4-10

4. EXPLODED VIEW.....4-11

4.1 TB3-G2B1003 Front wheel drive shaft...4-11

4.2 TB3-G2B2001 Front wheel drive fork....4-12

4.3 TB3-G2C1008 PTO input shaft 4-13

4.4 TB3-G2C3003 PTO clutch 4-14

4.5 TB3-G2C4007 PTO shaft.....4-15

4.6 TB3-G2C5004 PTO shift fork 4-16

4.7 TB3-G2F1007 Mid PTO Shaft.....4-17

4.8 TB3-G211001 Clutch.....4-18

4.9 TB3-G271003 Range shift shaft.....4-19

4.10 TB3-G272003 Range shift fork 4-20

5. SERVICING 4-21

5.1 Transmission removal 4-21

5.2 Other component removal.....4-31

5.3 Transmission case - components disassembly 4-33

5.4 Lift cylinder ass'y and transmission case assembly tips 4-43

5.5 Mid PTO disassembly (if equipped) 4-44

5.6 Rear and Mid PTO parts reassembly tips 4-46

5.7 PTO clutch assembly tips 4-47

5.8 4WD case removal.....4-48

5.9 Gear shaft removal.....4-49

5.10 PTO drive section.....4-51

5.11 PTO shift fork assembly tip 4-54

5.12 PTO cover and transmission docking tips.....4-55

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 1 2025-04-08 오전 9:32:53

1. SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

1. Type ..... Hydrostatic transmission
2. Number of gears ..... Forward 2, Reverse 2
3. Transmission oil capacity (including rear axle oil) ..... 10.4 ℓ (2.75 u.s. gal.)
4. Clutch ..... None
5. Front wheel drive type ..... Lever operation, sliding gear type by shifting
6. Brake ..... Wet discs
7. PTO specifications

Type	Model	Independent PTO with hydraulic clutch
Rear	PTO shaft size	SAE I – 3/8”, 6 splines
	Speed (PTO rpm/engine rpm)	540 / 3,186
Mid [If equipped]	PTO shaft size	16/32” involute splines
	Speed (PTO rpm/engine rpm)	2,200 / 3,235

1.2 TIGHTENING TORQUE FOR MAJOR COMPONENTS

Location	Specification	Tightening torque
Main frame and transmission case mounting bolt	M12 Bolt	77.0 ~ 89.0 Nm 7.85 ~ 9.15 kgf-m 57.0 ~ 65.0 lb-ft
Main shaft joint mounting bolt	M8 Bolt	29.4 ~ 34.3 Nm 3.0 ~ 3.5 kgf-m 21.6 ~ 25.2 lb-ft
Each bearing case, rear axle case	M10 bolt	48.0 ~ 55.9 Nm 4.9 ~ 5.7 kgf-m 35.4 ~ 41.2 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 2 2025-04-08 오전 9:32:53

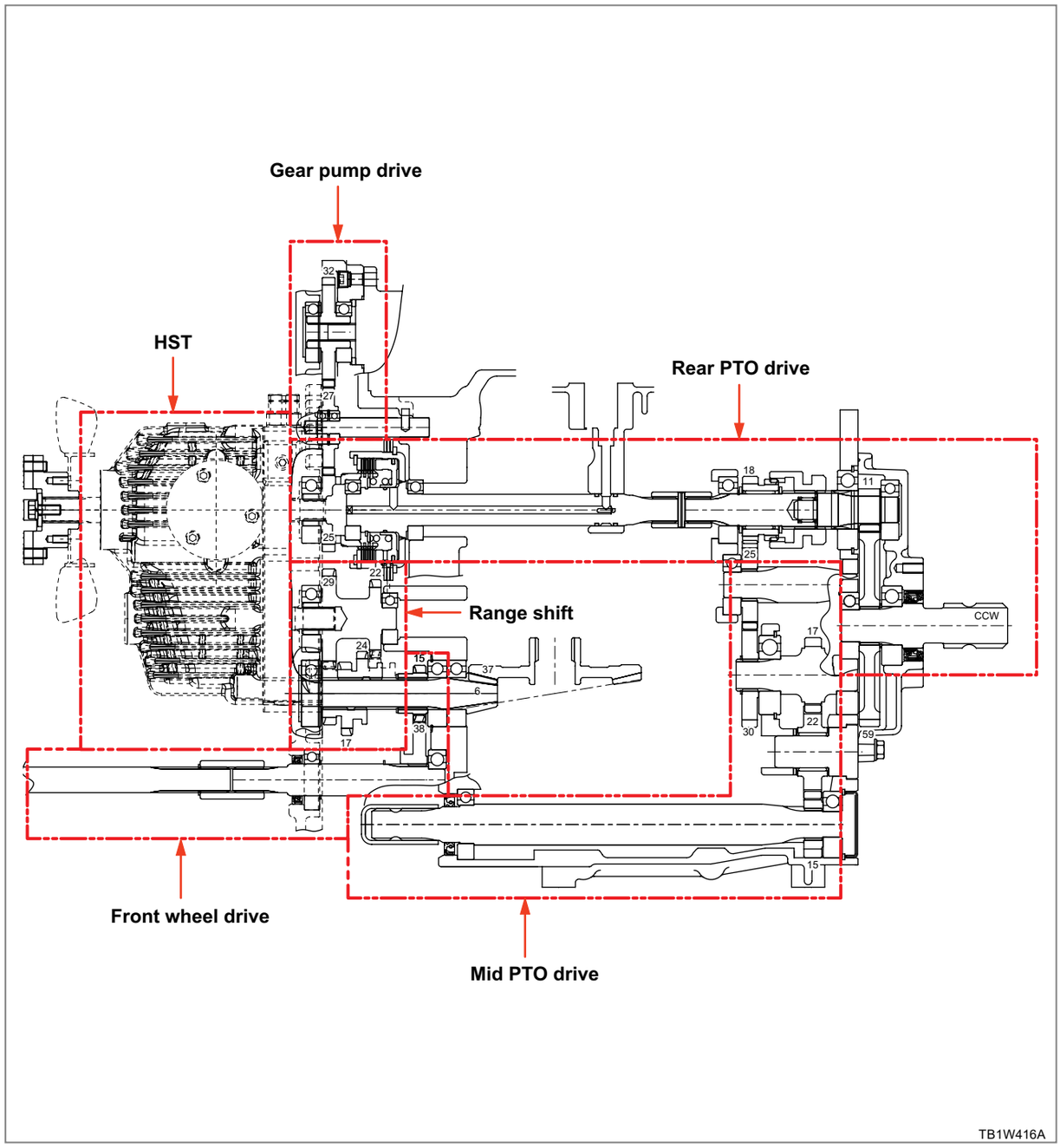
1.3 SEALANT AND ADHESIVE SPECIFICATIONS

Location	Item	Specification
PTO cover and transmission case	Sealing and adhesion	LOCTITE 5060
Front cover and transmission case	Liquid gasket	LOCTITE 5060
Rear axle case and ring gear mounting bolt	Adhesion	LOCTITE 271
Differential pinion, side gear, differential and pinion gear shafts	Initial lubrication, sticking prevention	Three Bond 1901
Transmission and rear axle case	Sealing and adhesion	LOCTITE 5060
Hydraulic cylinder docking section`s stud bolt Transmission case	Adhesive for prevent bolt	LOCTITE 271

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 3 2025-04-08 오전 9:32:53

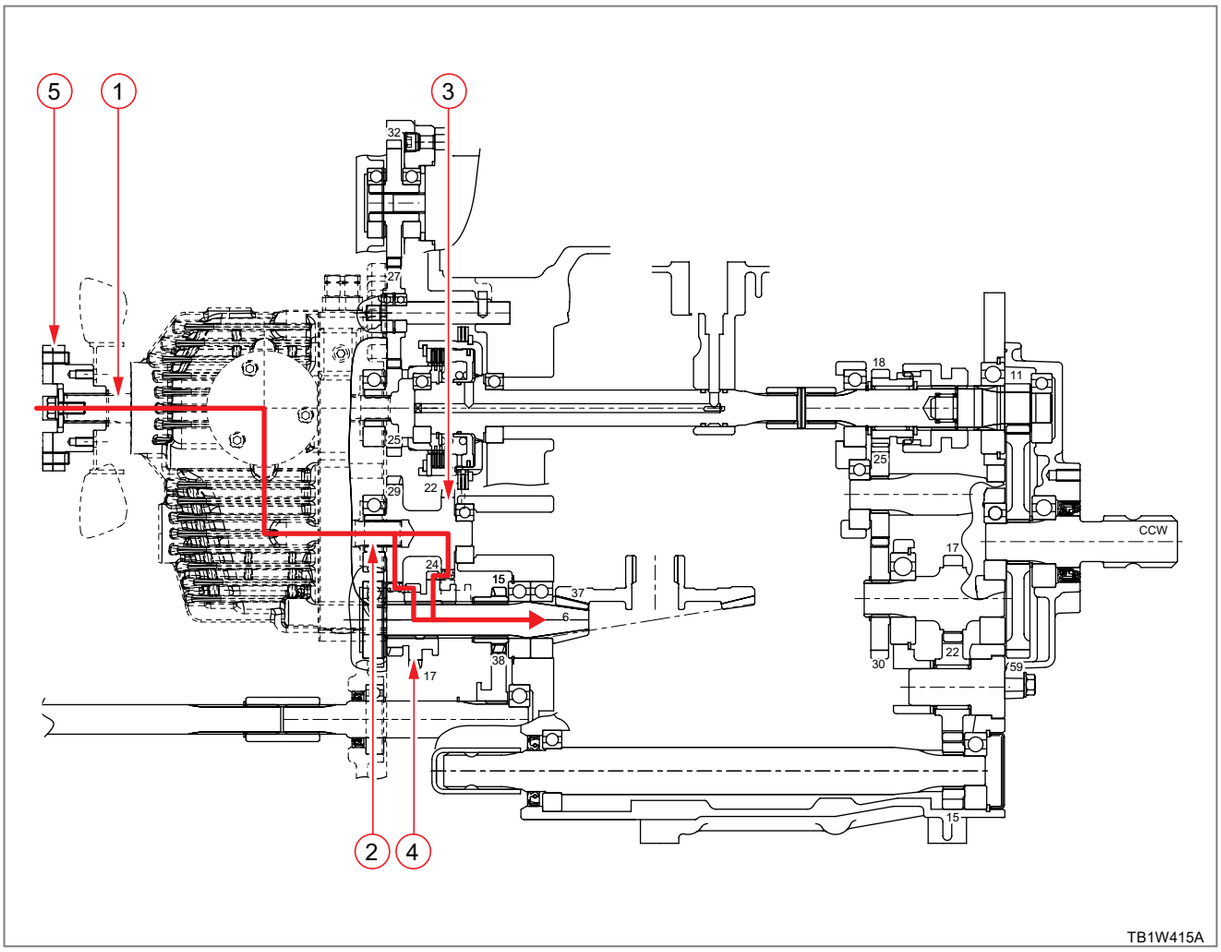
2. STRUCTURE AND OPERATING PRINCIPLE

2.1 STRUCTURE



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 4 2025-04-08 오전 9:32:53

2.2 MAIN GEAR SHIFT & SHUTTLE SYSTEM

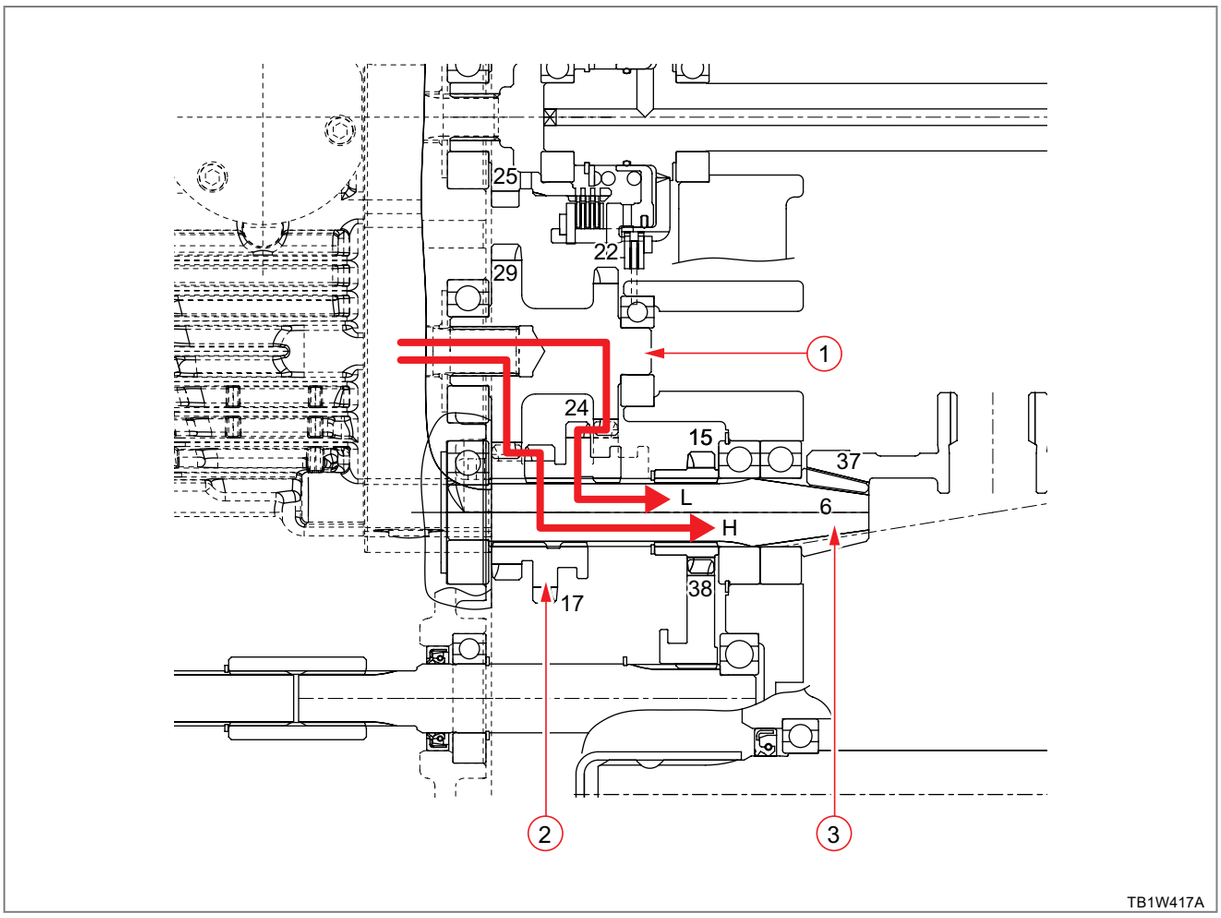


As the joint connector (5) on pump shaft (1) is connected to the engine flywheel through universal joint shaft, the engine rotates the HST pump shaft (1). Then, the internal oil of the HST pump section is supplied to the HST motor section and rotates the motor shaft (2).

When the driver shifts the range lever to HI or LO position, the 17-24 sliding gear (4) moves to the left or right side on the 6 spiral bevel shaft as shown in the picture. Then the 29 gear or 22 gear engaged to 17 gear or 24 gear, creates two different speed ratios (HI and LO).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 5 2025-04-08 오전 9:32:53

2.3 RANGE SHIFT SECTION



When driver pushes the range gear to HI, 17-24 sliding gear (2) moves to the left as shown in the picture, then 29 gear of HST motor drives 17 gear, creating high speed, when driver shifts the range gear to LO, the 17-24 sliding gear (2) moves to the right in the picture, then 22 gear of HST motor drives 24 gear, creating low speed. Of course, these two speeds can be varied steplessly from 0 to full speed and from 0 to medium speed through the HST pedal.

▶ HIGH SPEED (H)

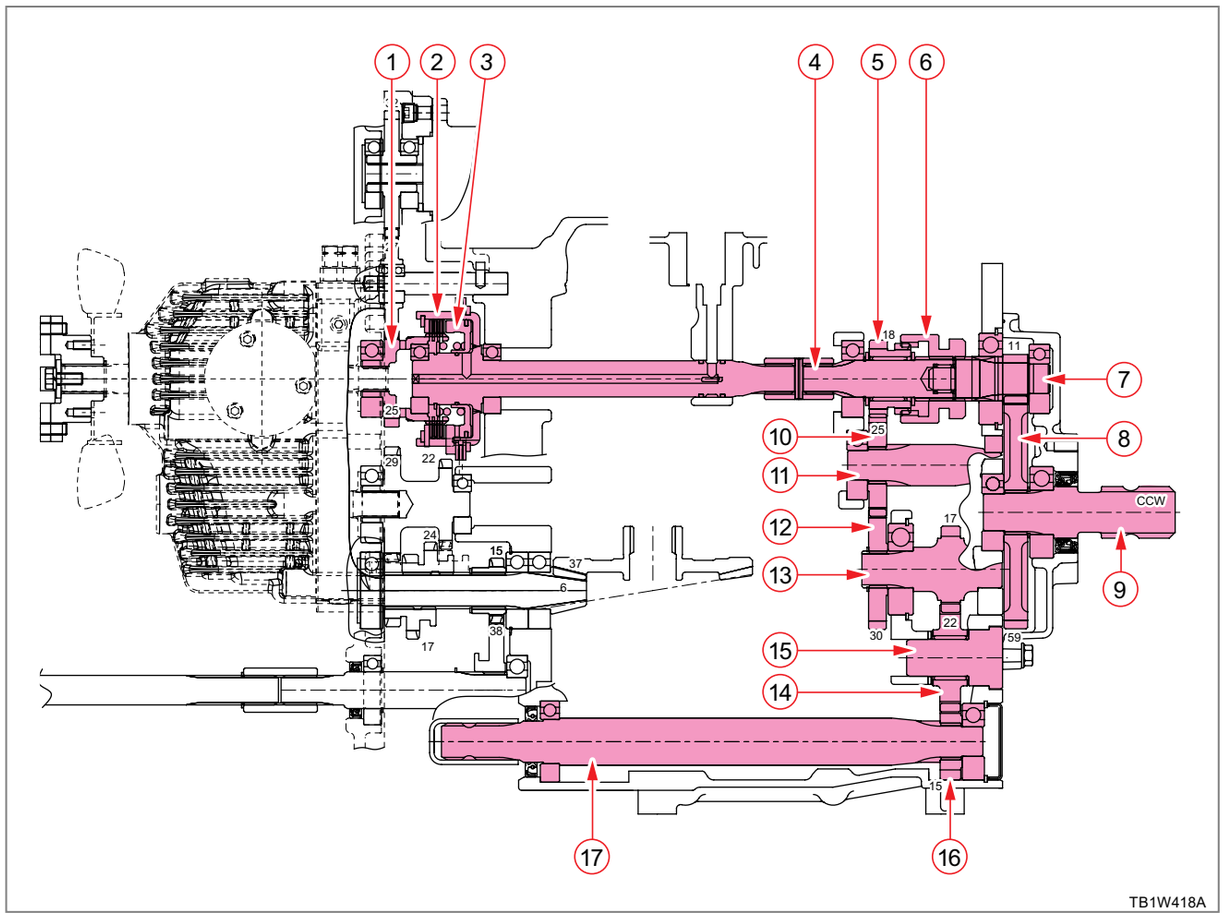
22-29 gear (29 gear) → 17-24 gear (17 gear) → Pinion shaft

▶ LOW SPEED (L)

22-29 gear (22 gear) → 17-24 gear (24 gear) → Pinion shaft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 6 2025-04-08 오전 9:32:54

2.4 PTO



REAR PTO

As the HST pump shaft is supplied with rotating force from the engine, it rotates the 24 gear (1) and PTO clutch disc continuously.

When pushing the PTO clutch switch to the "ON" position, the piston (3) pushes the pressure plate of the PTO clutch (2), so the pressure plate in the clutch is compressed against the clutch disc. Therefore, the clutch body rotates and the PTO drive shaft (4), which is connected to the clutch body with coupling, rotates as well.

When the driver shifts the PTO lever to Rear PTO position, the shifter (6) moves all the way to the right as shown in the picture, engages the PTO drive shaft (4) and PTO counter shaft (7). Then the PTO drive shaft (4) rotates PTO countershaft (7), 10 gear on PTO counter shaft (7), 59 gear(8) on the PTO shaft (9) and eventually PTO shaft(9).

▶ **POWER TRANSFER**

PTO clutch (2) → PTO drive shaft (4) → PTO shifter (6) → PTO countershaft (7) → 59 gear (8)→ PTO shaft(9)

MID PTO

At this time, the 18 gear(5) is idling on the drive shaft(4) due to the needle bearings of it. So the MID PTO section is not rotating while the REAR PTO is rotating.

When the driver shifts the PTO lever to MID PTO position, the shifter(6) moves all the way to the left as shown in the picture, engages the PTO drive shaft(4) and 18 gear(5). Then 18 gear(4) rotates 25 gear(10), 30 gear(12), 17 gear shaft(13), 22 gear(14), 15 gear(16) simultaneously and eventually rotates the MID PTO shaft(17).

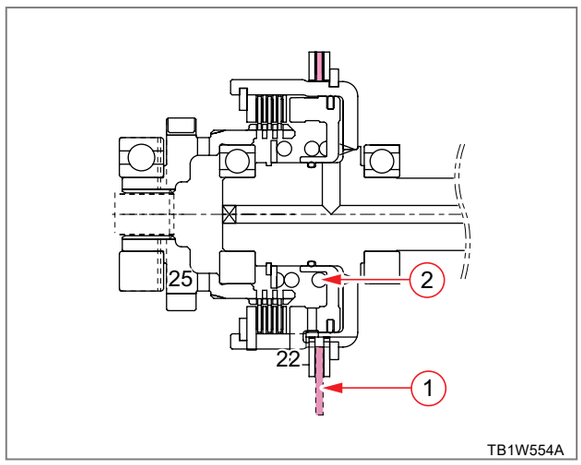
When the driver shifts the PTO lever to the middle of REAR and MID PTO position, the shifter (6) engages both of PTO countershaft (7) and 18th gear (5) to drive shaft (4), so that the MID PTO and the REAR PTO rotate simultaneously.

▶ **POWER TRANSFER**

PTO clutch (2) → PTO drive shaft (4) → PTO shifter (6) → 18 gear (5) → 25 gear (10) → 30 gear (12) → Countershaft (13) → 22 gear (14) → 15 gear (16) → Mid PTO shaft (17)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 7 2025-04-08 오전 9:32:54

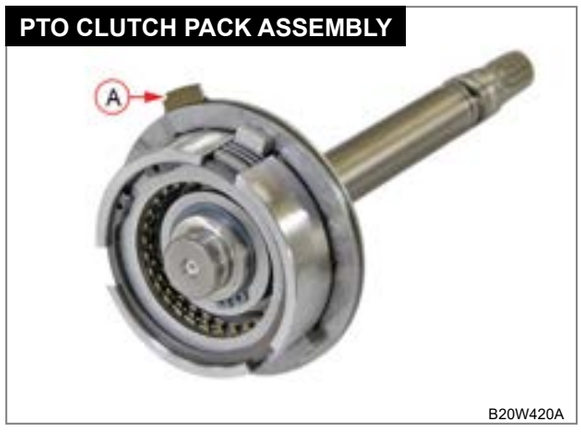
2.4.1 PTO CLUTCH PACK



The PTO brake disc (1) is assembled on the opposite side of the clutch disc. When the PTO clutch is disengaged, the brake disc is compressed by the return spring (2).

If the PTO clutch is disengaged during the PTO operation, the implement may continue to rotate due to the inertia, which may cause an accident. However, the brake disc is engaged as soon as the PTO clutch is disengaged so that the implement can be stopped to avoid any accident. Also, the brake disc prevents the PTO from rotating due to the friction between discs even when the PTO clutch is disengaged.

PTO CLUTCH PACK ASSEMBLY



The protruded parts (A) on the brake plate is designed to interfere in the sloted parts of the transmission housing to perform its brake function.

2.4.2 CALCULATION FOR REAR PTO AND MID PTO

The followings are formulas to calculate the speed reduction ratio for the rear and mid PTO based on their gear lines (refer to 2.4).

Rear PTO: $\frac{11}{59} = 0.1864$

Mid PTO: $\frac{18}{25} \times \frac{25}{30} \times \frac{17}{22} \times \frac{22}{15} = 0.68$

According to the formulas, each PTO revolution at engine rated rpm (3,000 rpm) is as follows:

Rear: 3,000 x 0.1864 = 559 rpm

Mid: 3,000 x 0.68 = 2,040 rpm

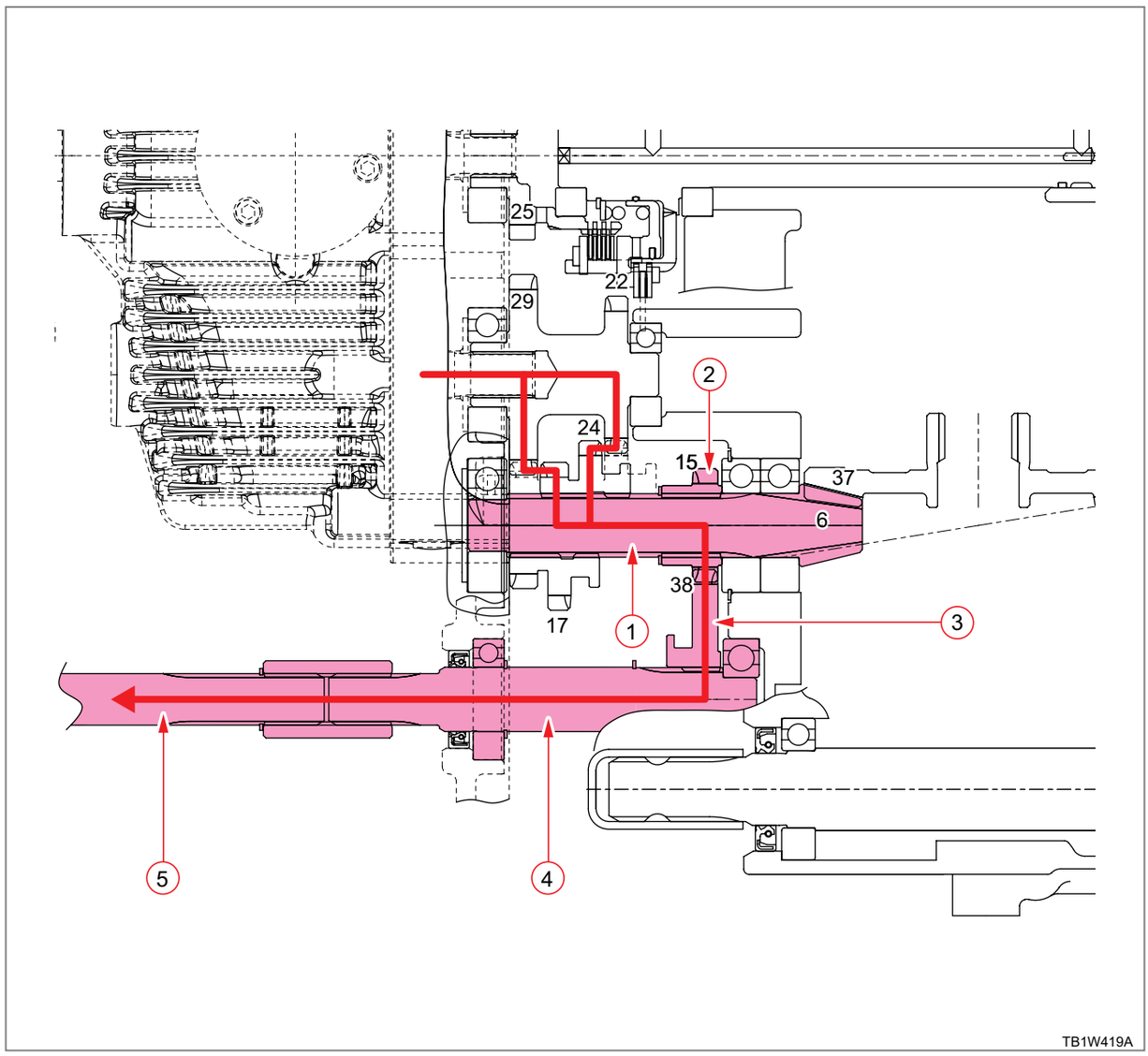
Reversely, engine rpm with the rear PTO revolution at 540 rpm and the mid PTO revolution 2200 rpm is as follows:

Rear: 540 ÷ 0.16949 = 3,186 rpm (Engine)

Mid: 2200 ÷ 0.68 = 3,235 rpm (Engine)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 8 2025-04-08 오전 9:32:55

2.5 FRONT WHEEL DRIVE



When the range shift lever is engaged to its HI or LO position, the 6 spiral bevel gear shaft (1) and 15 gear (2) rotate together. If the driver engages the 4WD lever, the 38 sliding gear(3) moves all the way to the right as shown in the picture and engaged with 15 gear (2). Then the 38 gear rotates the front wheel drive shaft (4) and the propeller shaft (5), which eventually drives the front axle.

▶ POWER TRANSFER

- 6 Spril bevel pinion → 15 gear → 38 gear → Front wheel drive shaft → Coupling → Propeller shaft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 9 2025-04-08 오전 9:32:55

3. TROUBLESHOOTING

Problem	Possible cause	Remedy
Oil leakage	• Excessive oil • Loose bolt • Damaged oil seal, O-ring or gasket • Cracked transmission housing	• Adjust the oil level. • Retighten the bolt. • Replace the damaged parts. • Replace the damaged parts.
Abnormal noise	• Insufficient oil • Improper gear backlash • Worn gear • Worn bearing • Improper gear engagement	• Top up the level. • Adjust the backlash or replace the related part. • Replace • Replace • Repair
Gear popped out	• Worn or bent shift fork • Abnormally worn shift gear teeth • Weak detent ball spring	• Replace
Difficult gear shift	• Worn or bent shift fork	• Repair or replace the related parts.

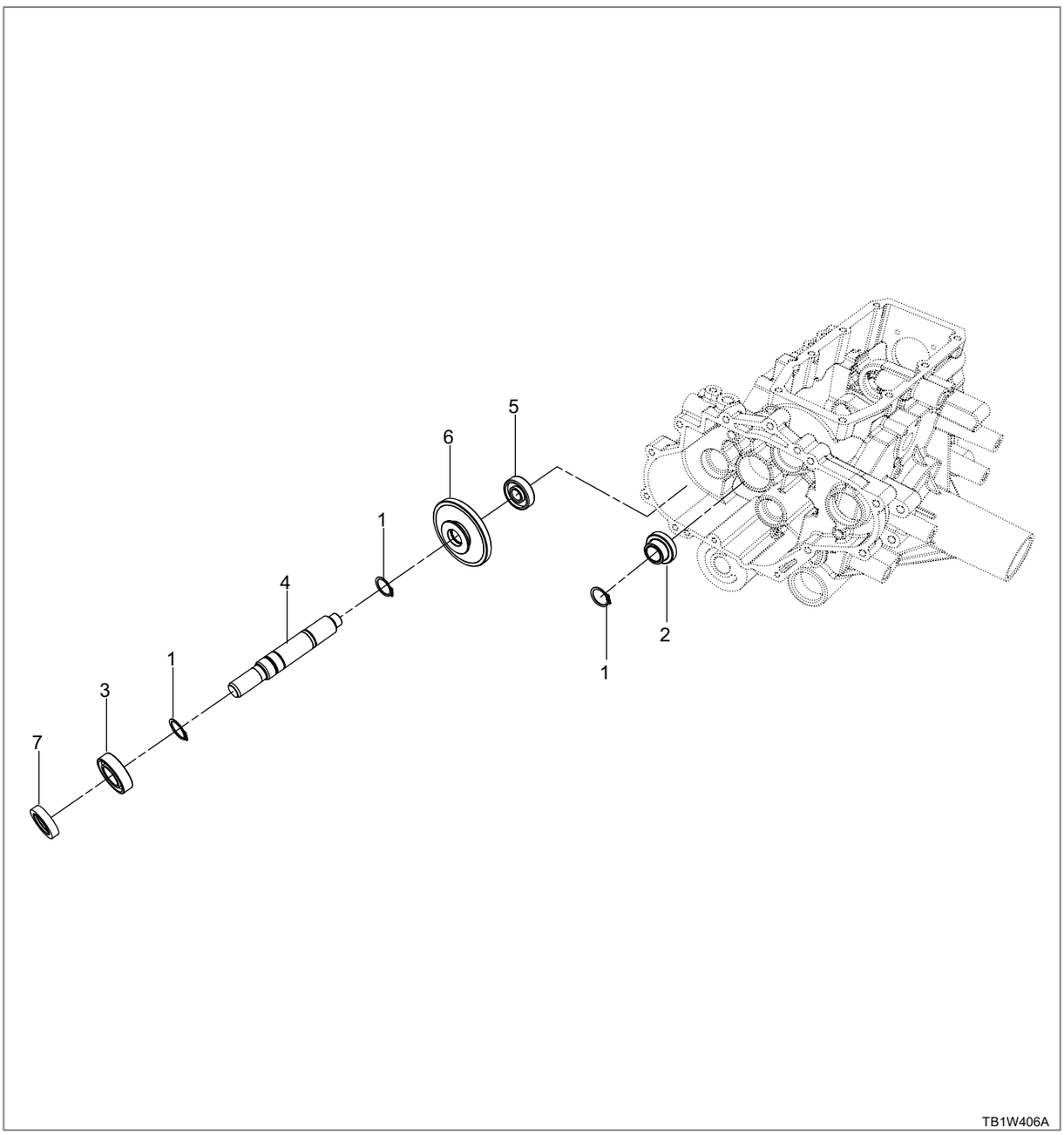
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 10 2025-04-08 오전 9:32:55

4. EXPLODED VIEW

REMARK

The part numbers and shapes of the following components are subject to change without notice for improvement of the product. If necessary, refer to the DAEDONG electronic manual, DPCS.

4.1 TB3-G2B1003 FRONT WHEEL DRIVE SHAFT



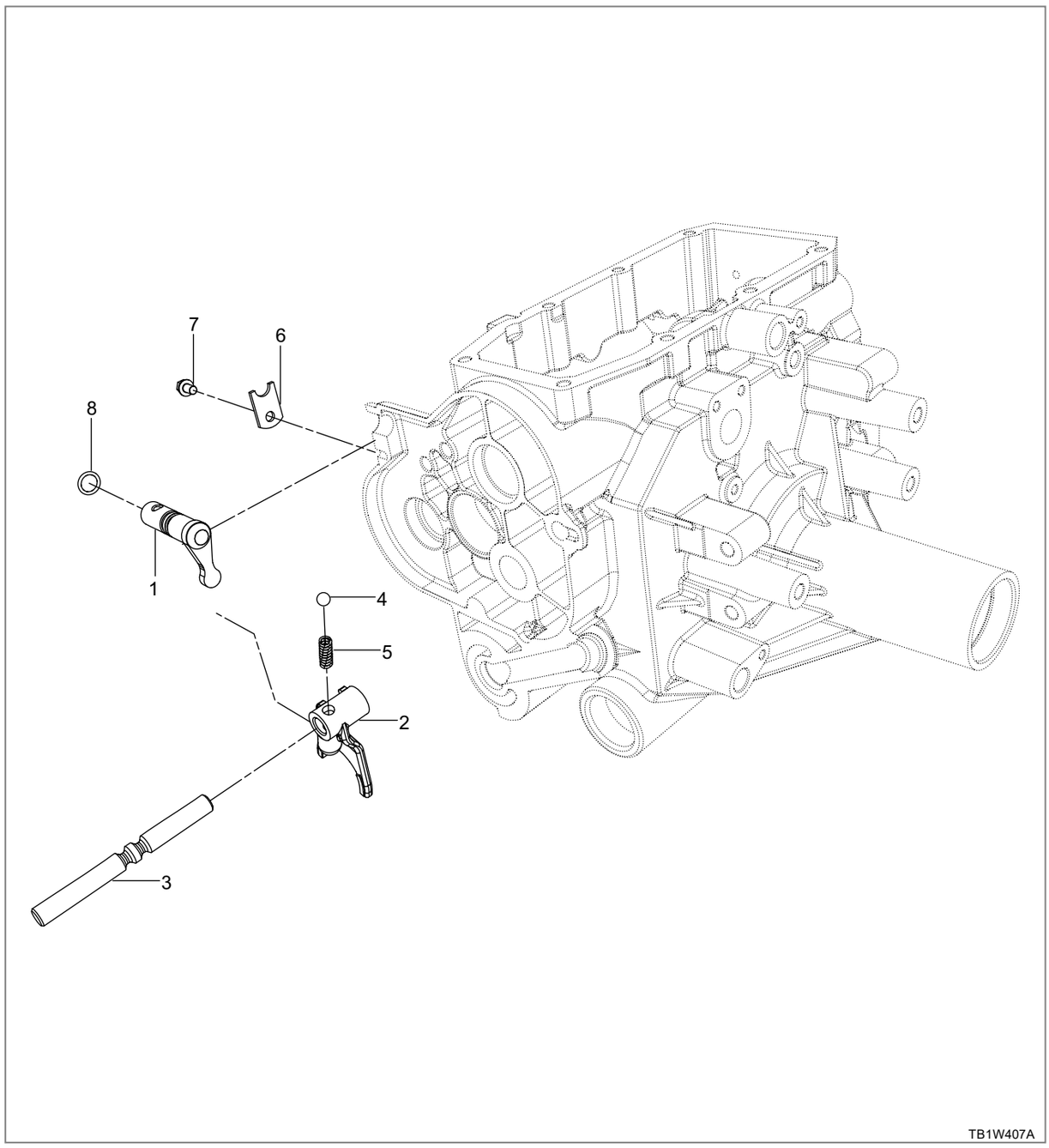
TB1W406A

COMPONENTS

(1) Snap ring
(2) Gear-15
(3) Ball Bearing
(4) Shaft, 4WD
(5) Ball bearing
(6) Gear-38
(7) Seal, Oil

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 11 2025-04-08 오전 9:32:55

4.2 TB3-G2B2001 FRONT WHEEL DRIVE FORK

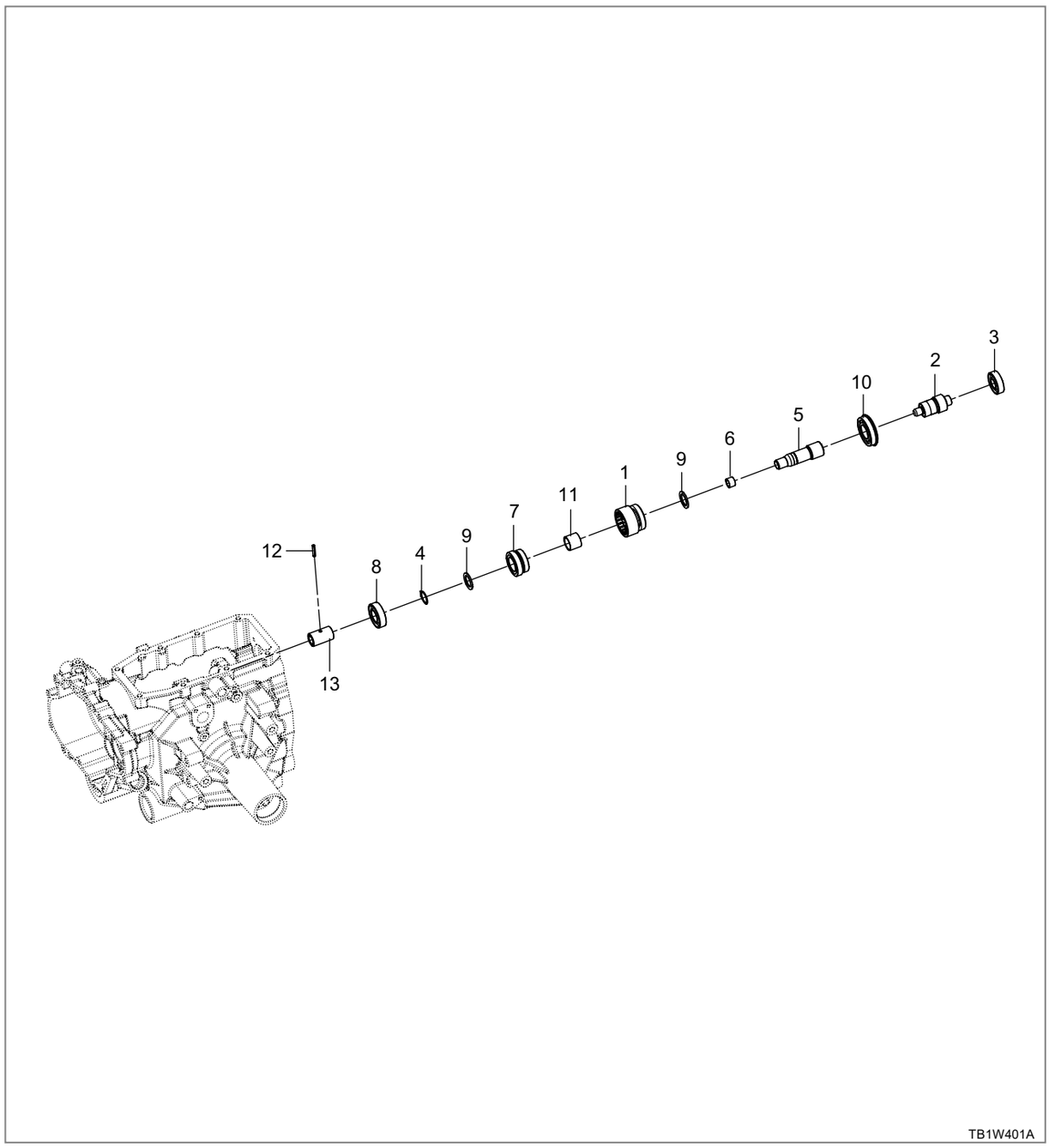


COMPONENTS

(1) Arm, 4Wd Shift
(2) Fork, Front Wheel Drive
(3) Fork Rod, Front Wheel Drive
(4) Ball,Steel
(5) Spring
(6) Stopper
(7) Bolt, Flange
(8) O Ring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 12 2025-04-08 오전 9:32:55

4.3 TB3-G2C1008 PTO INPUT SHAFT

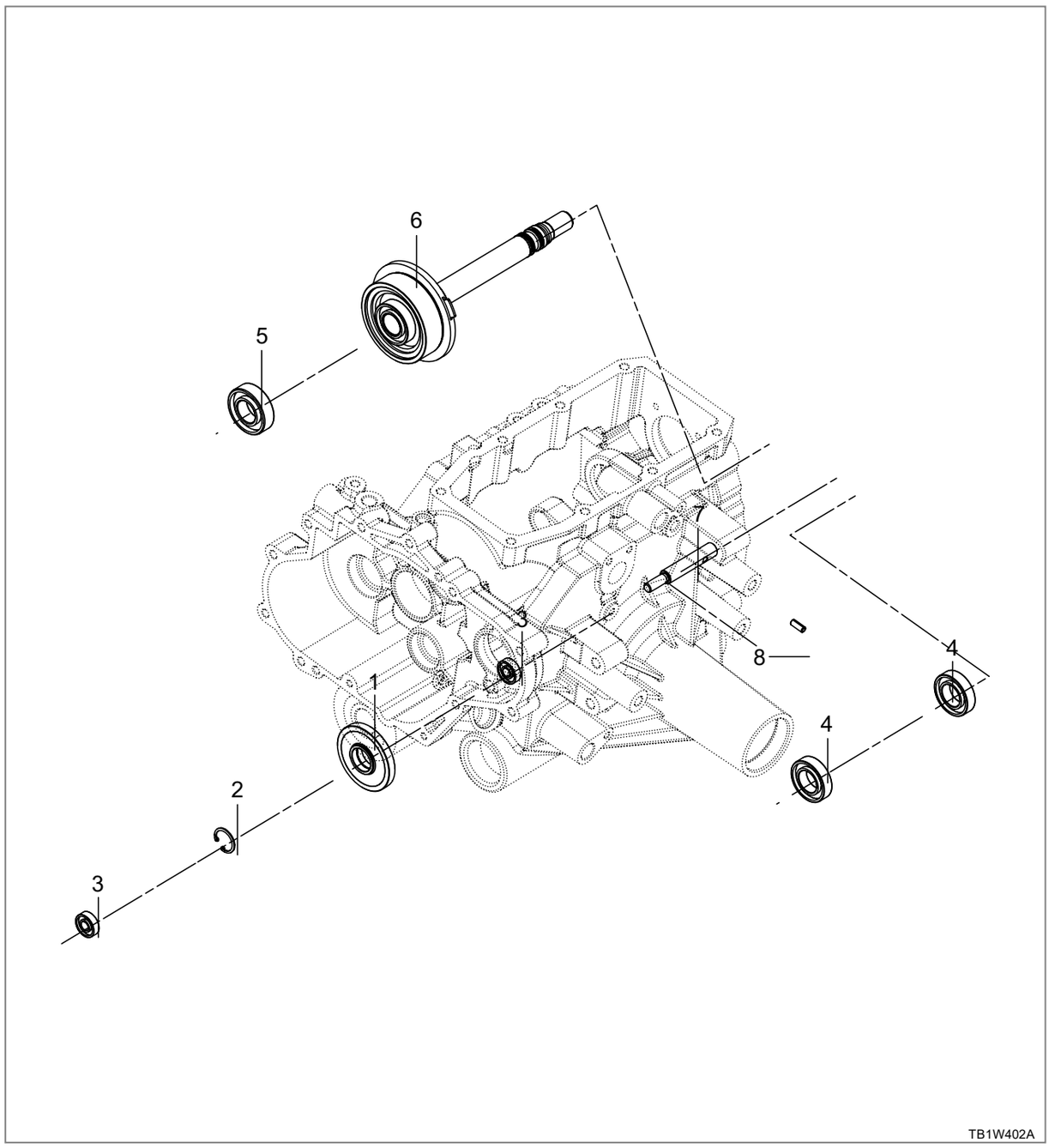


COMPONENTS

(1) Gear, Sliding
(2) Gear-18
(3) Ball Bearing
(4) Snap ring
(5) Shaft, Drive PTO
(6) Bearing, Needle
(7) Gear-18
(8) Ball Bearing
(9) Collar, Thrust
(10) Ball Bearing
(11) Bearing, Niddle
(12) Pin,Spring
(13) Coupling

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 13 2025-04-08 오전 9:32:56

4.4 TB3-G2C3003 PTO CLUTCH

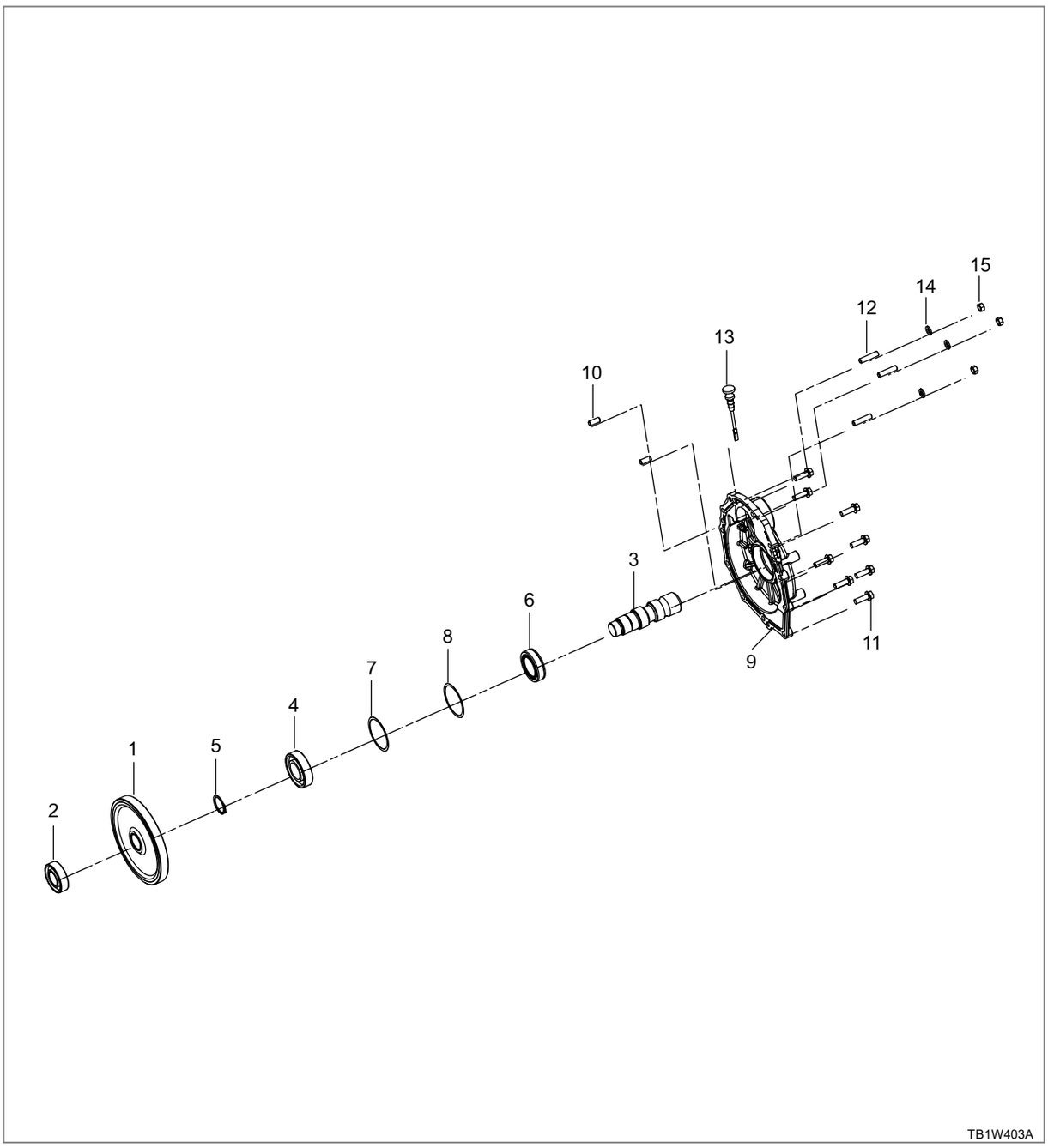


COMPONENTS

(1) Gear-27
(2) Snap ring
(3) Ball bearing
(4) Ball bearing
(5) Ball Bearing
(6) Assy clutch, PTO
(7) Shaft, Idle
(8) Pin, Spring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 14 2025-04-08 오전 9:32:56

4.5 TB3-G2C4007 PTO SHAFT

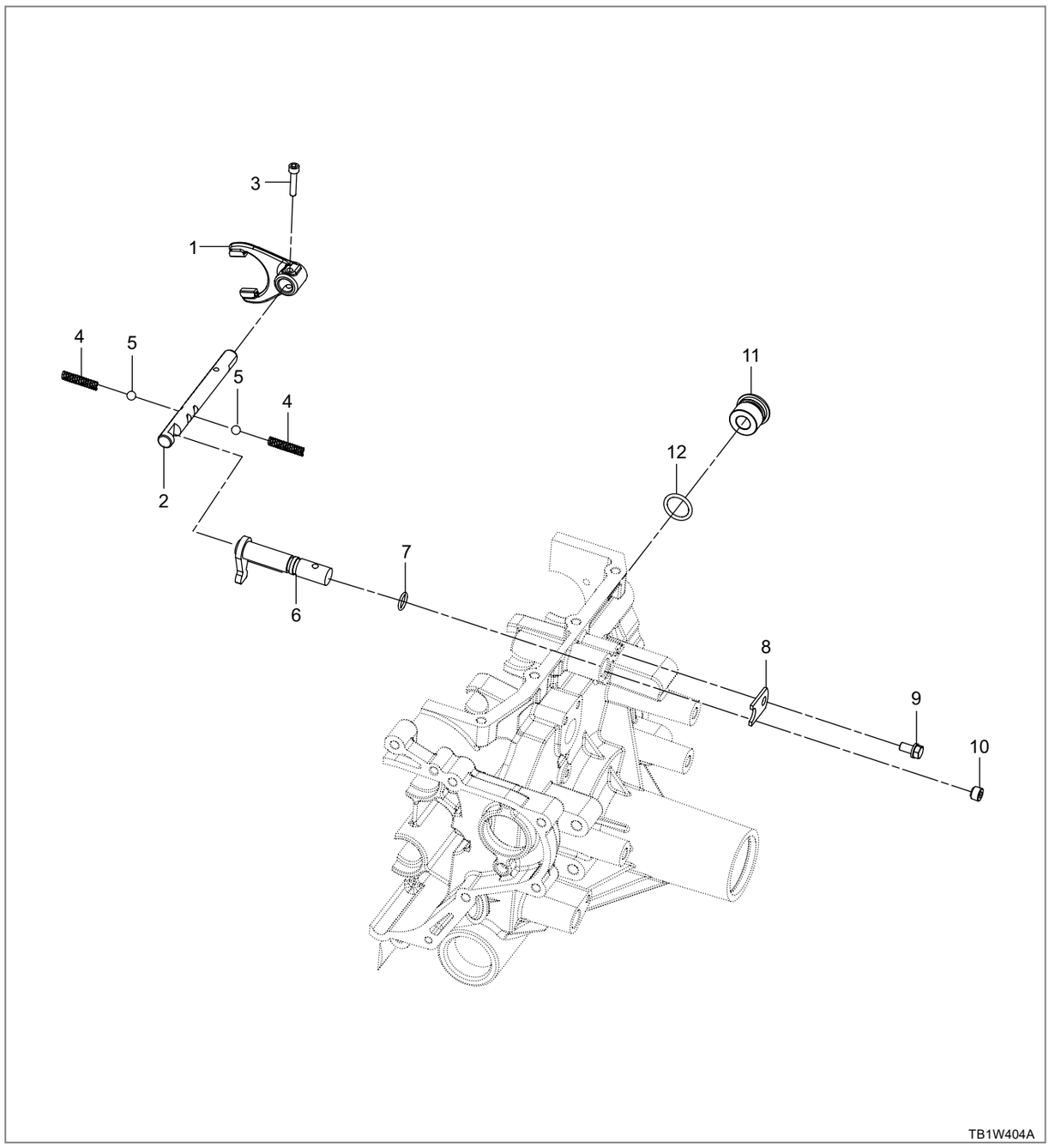


COMPONENTS

(1) Gear, PTO-59
(2) Ball bearing
(3) Shaft, PTO Output
(4) Ball bearing
(5) Snap ring
(6) Oil seal
(7) Shim 0.10
(8) Shim 0.20
(9) Cover, PTO
(10) Pin, Parallel
(11) Bolt, Flange
(12) Stud
(13) Gauge
(14) Spring Washer
(15) Nut

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 15 2025-04-08 오전 9:32:56

4.6 TB3-G2C5004 PTO SHIFT FORK

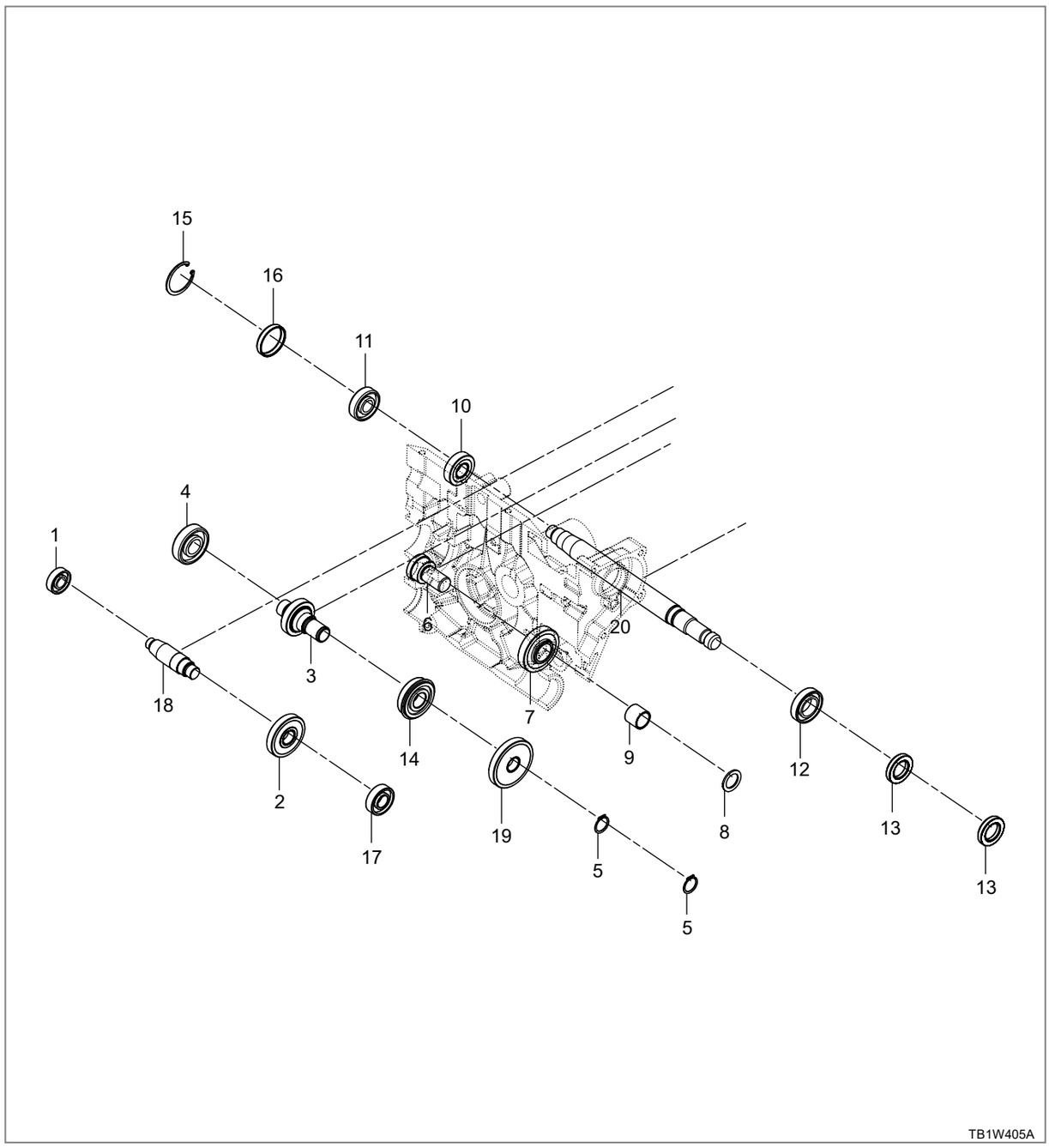


COMPONENTS

(1) Fork
(2) Rod, PTO shift
(3) Wrench bolt
(4) Friction spring
(5) Steel ball
(6) Shift arm
(7) O ring
(8) Stopper
(9) Bolt, Washer
(10) Plug
(11) Spacer
(12) O ring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 16 2025-04-08 오전 9:32:56

4.7 TB3-G2F1007 MID PTO SHAFT

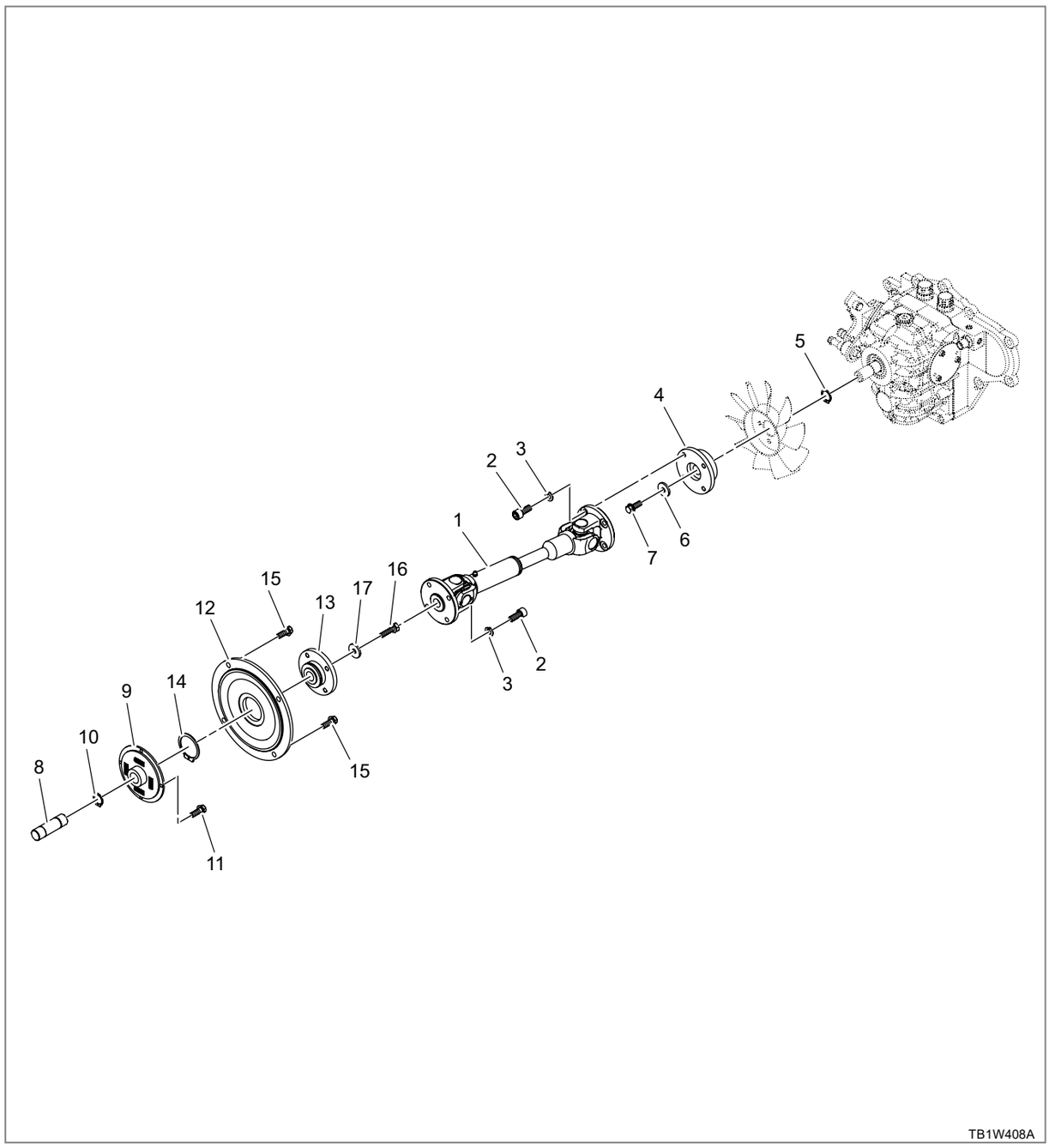


COMPONENTS

(1) Ball bearing
(2) Gear-25
(3) Shaft
(4) Ball bearing
(5) Snap ring
(6) Shaft gear, Idle
(7) Shaft, Counter
(8) Collar, Thrust
(9) Bearing, Needle
(10) Gear
(11) Ball bearing
(12) Ball bearing
(13) Oil seal
(14) Ball bearing
(15) Snap ring
(16) Cover, Seal
(17) Ball bearing
(18) Drive shaft
(19) Gear-30
(20) Shaft, PTO

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 17 2025-04-08 오전 9:32:56

4.8 TB3-G211001 CLUTCH

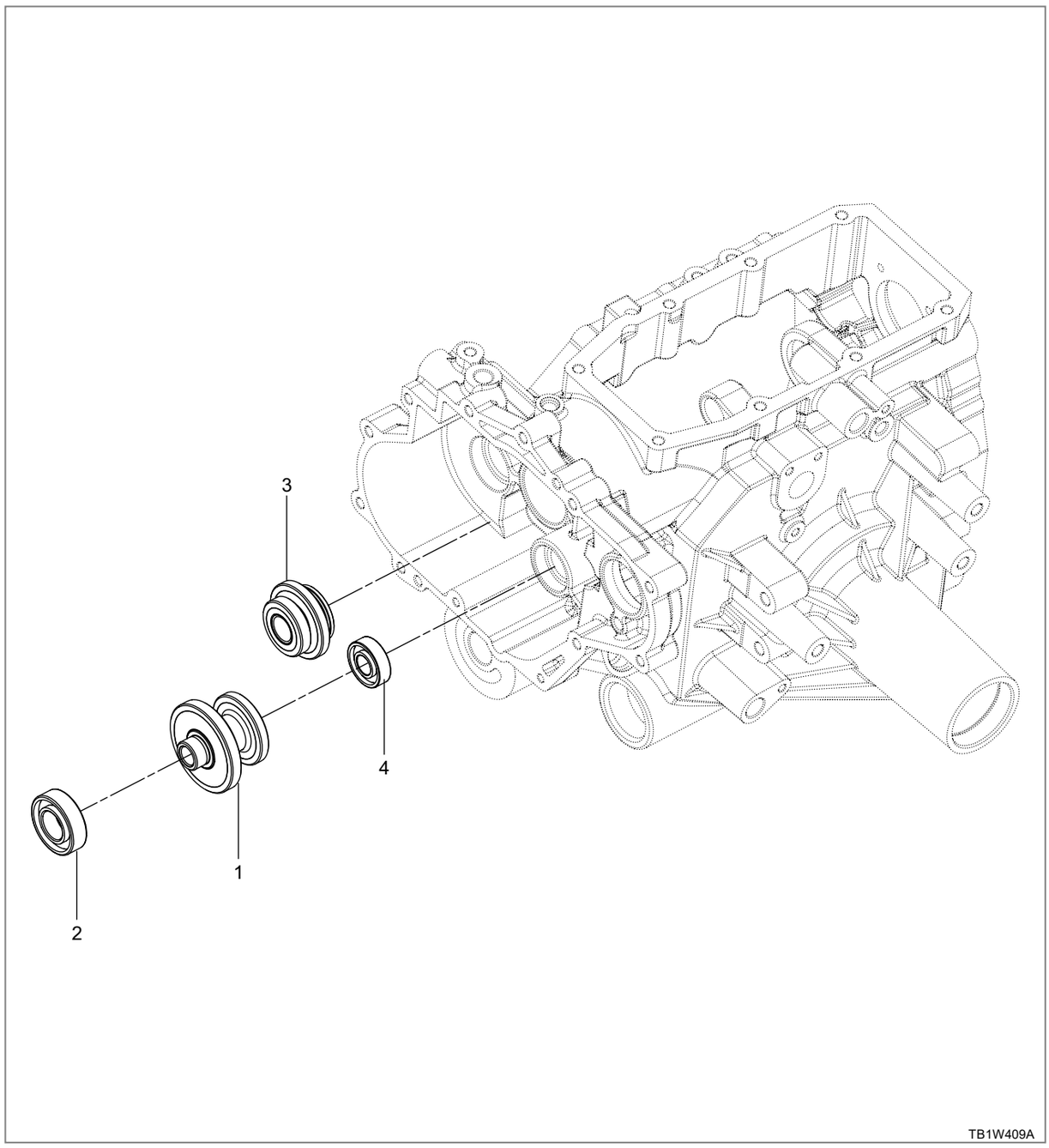


COMPONENTS

(1) Joint
(2) Bolt, Hexagon Socket
(3) Spring Washer
(4) Joint Hub
(5) Snap Ring
(6) Washer
(7) Bolt, Washer
(8) Shaft
(9) Assy,Demper
(10) Snap Ring
(11) Lench Bolt
(12) Joint Holder
(13) Joint Hub
(14) Ring,Snap
(15) Bolt, Washer
(16) Bolt With Washer
(17) Washer

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 18 2025-04-08 오전 9:32:56

4.9 TB3-G271003 RANGE SHIFT SHAFT

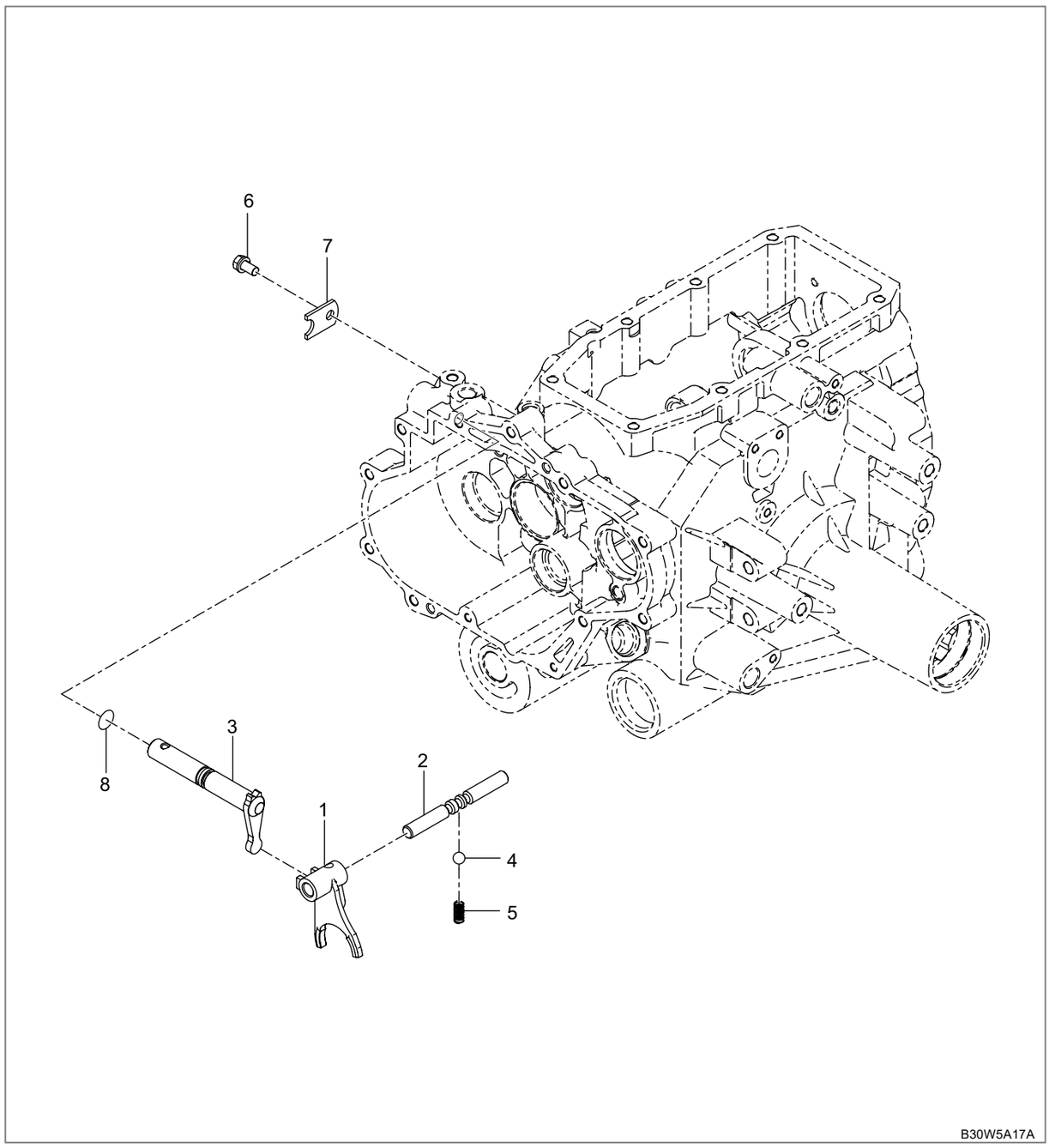


COMPONENTS

(1) Gear-29-22
(2) Bearing Ball
(3) Gear-17-24
(4) Ball Bearing

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 19 2025-04-08 오전 9:32:56

4.10 TB3-G272003 RANGE SHIFT FORK



COMPONENTS

(1) Fork, Range shift
(2) Rod, Range shift
(3) Arm, Range shift
(4) Ball, Steel
(5) Spring
(6) Hex head cap screw
(7) Stopper
(8) O ring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 20 2025-04-08 오전 9:32:57

5. SERVICING

5.1 TRANSMISSION REMOVAL

1. Park the tractor on level ground, stop the engine and apply the parking brake.
2. Remove the cabin assembly.

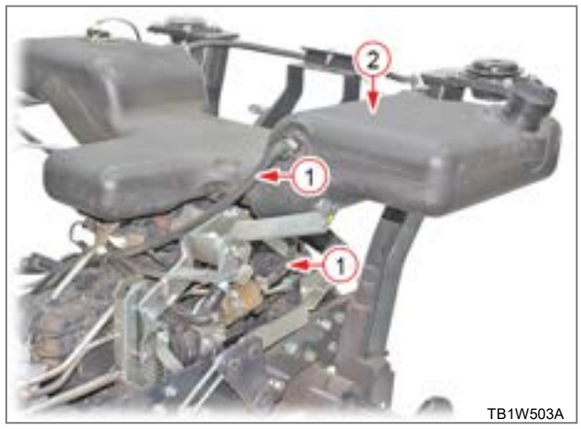


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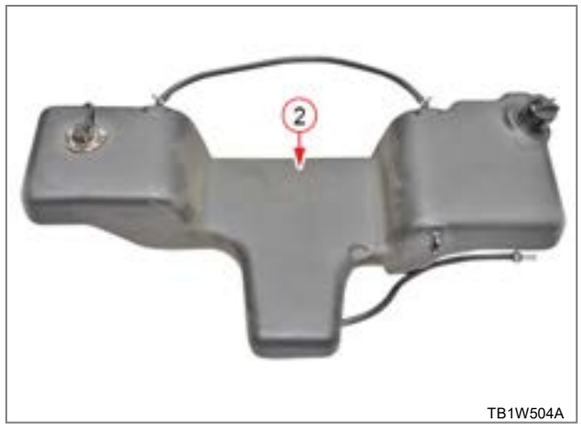


TB1W502A

3. Unscrew the fuel tank support bracket mounting nuts (1) to remove the support bracket (2).



TB1W503A

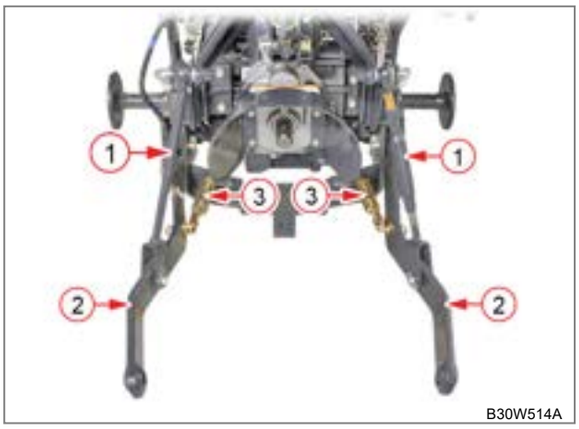


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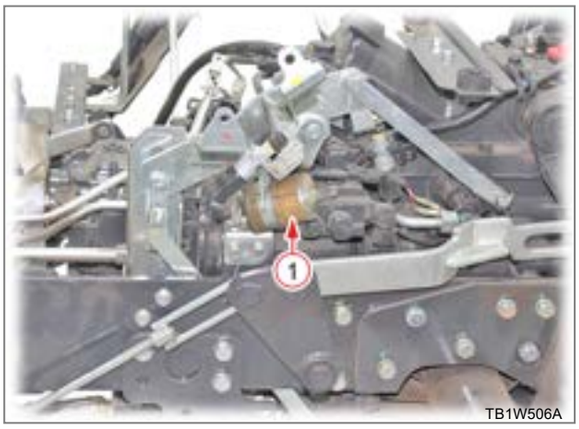

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4. Disconnect the fuel hose (1) from the fuel tank. Then, remove the fuel tank (2).

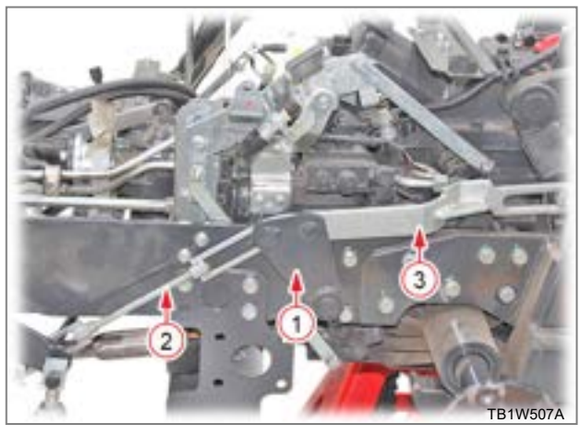
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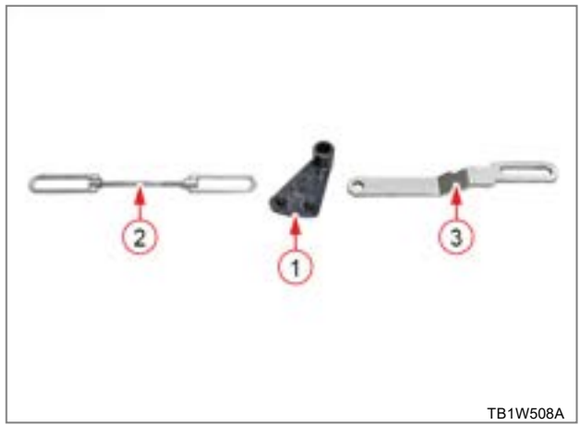


5. Remove the lift rod (1), lower link (2) and check link (3).



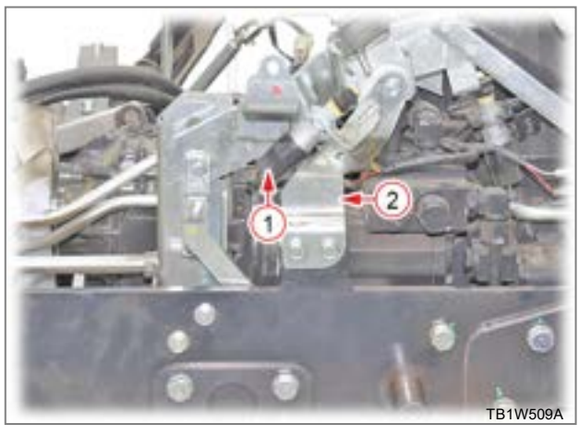
6. Remove the fuel filter (1).

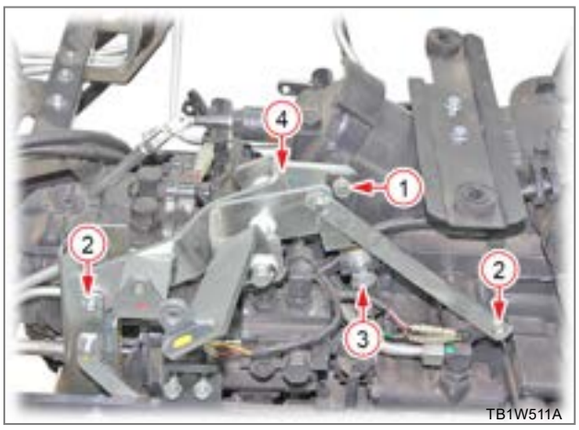


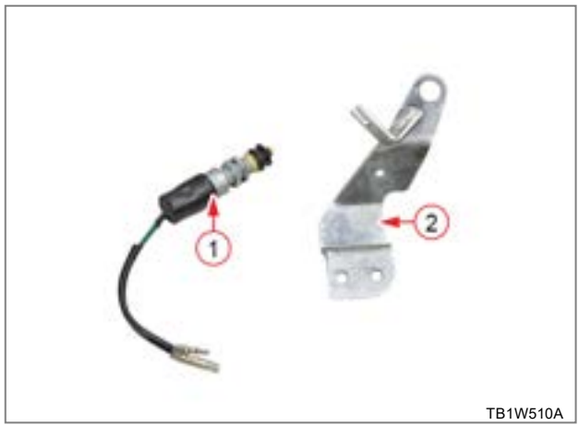


7. Remove the mower connecting plate (1), mower lift rod assembly (2), and mower connecting plate (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 22 2025-04-08 오전 9:32:57







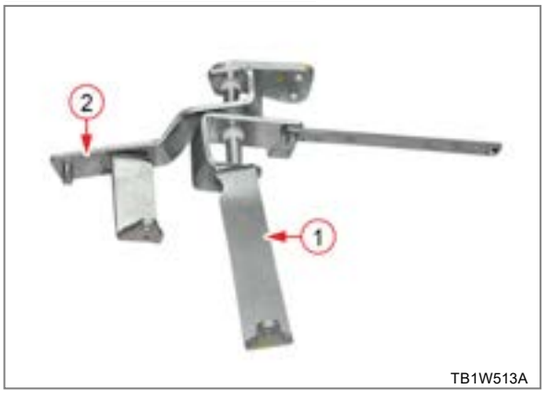


8. After removing the safety switch (1), remove the fuel filter grip plate (2).

9. Remove the mounting bolt (1) and split pin (2) from the lever sub assembly, and remove the lever sub assembly (3) and PTO safety switch (4) at the same time.

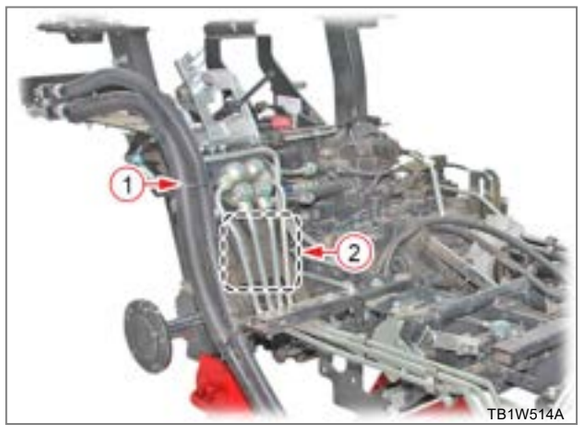
REMARK

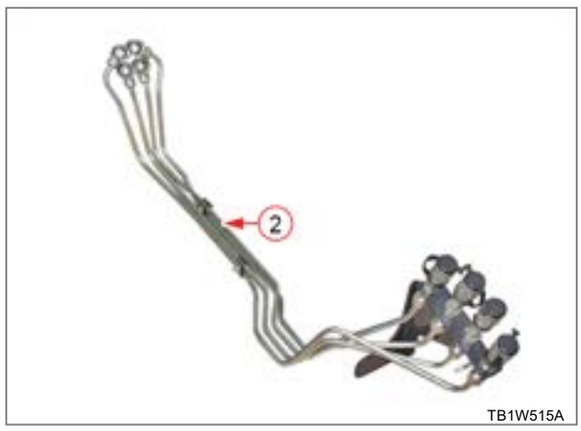
LEVER SUB ASSEMBLY



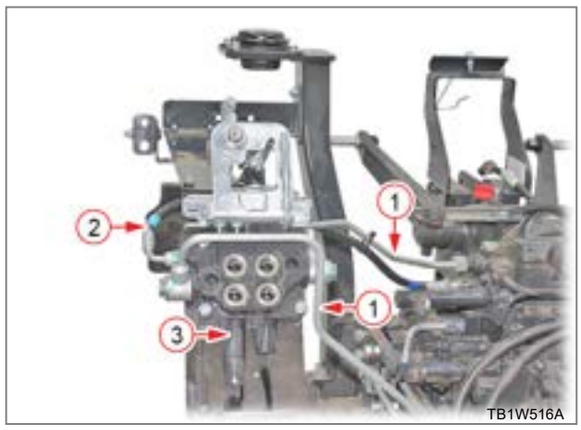
(1) PTO lever bracket
(2) More Deck Adjustment Bracket

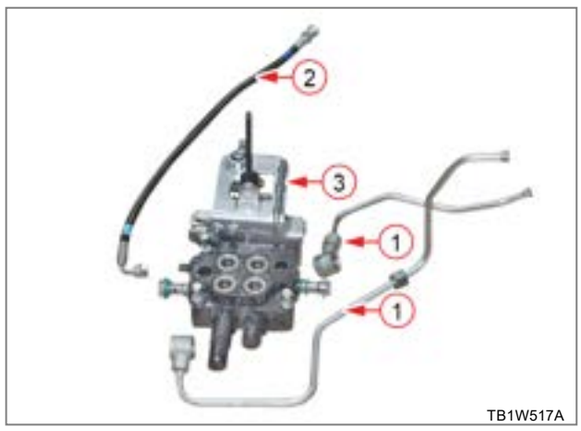
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 23 2025-04-08 오전 9:32:58





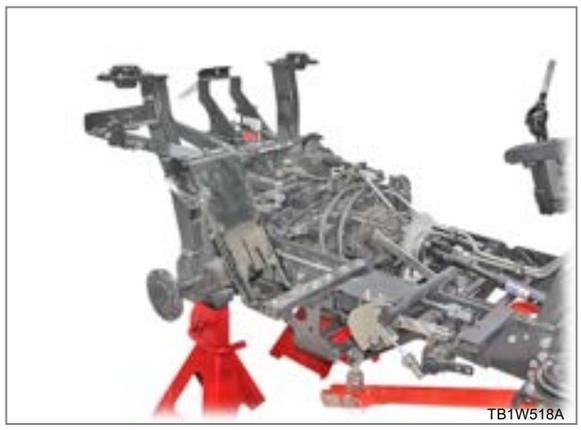
10. Disconnect the joystick hydraulic pipes (1), joystick hydraulic pipe (2).





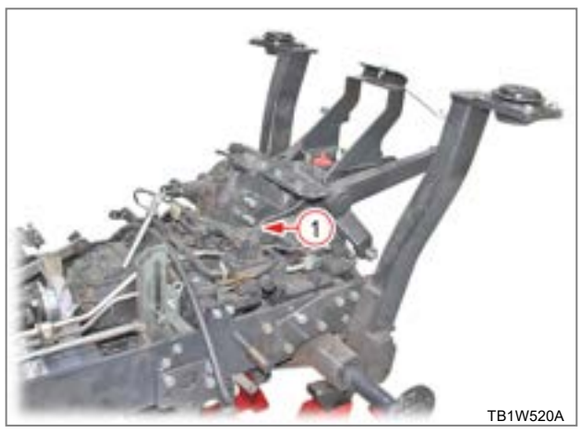
11. Disconnect the hydraulic pipes (1) and hydraulic hose (2) from the joystick valve to remove the joystick valve assembly (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 24 2025-04-08 오전 9:32:58


TB1W518A

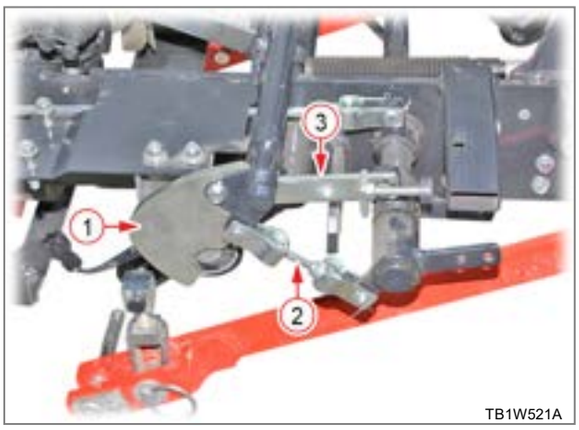
12. Remove the joystick connection assembly (1).


TB1W519A



TB1W520A

13. Remove the wiring harness (1) from the transmission.



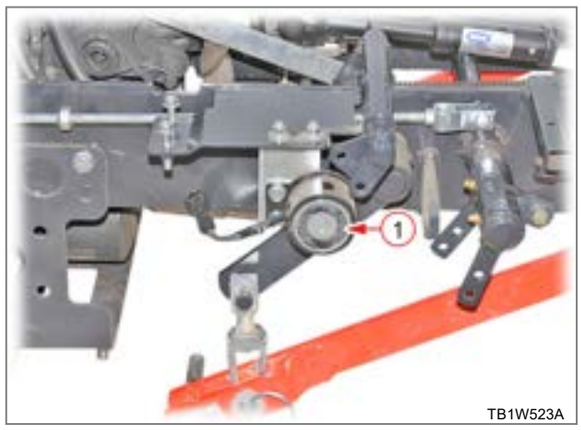
TB1W521A

14. Remove the cruise plate (1), rod assembly (2), and connection plate 2 (3).

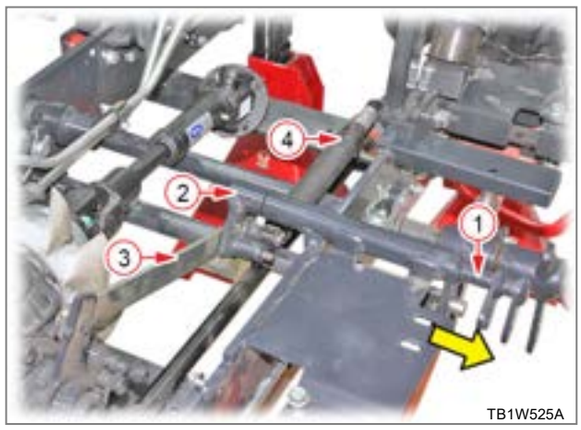


TB1W522A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 25 2025-04-08 오전 9:32:58

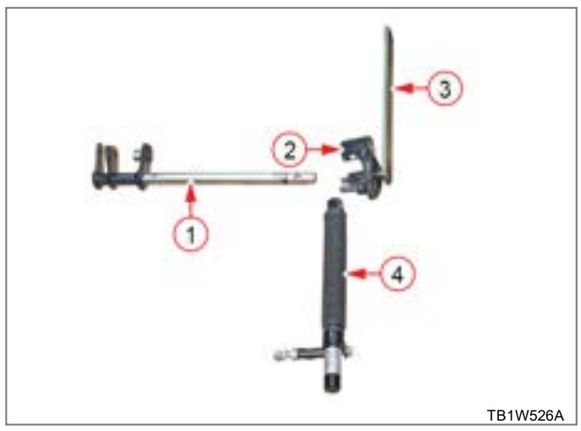


15. Remove the cruise magnet(1).

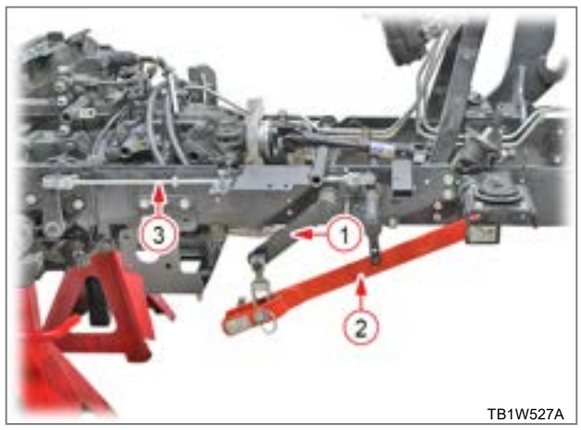


16. Remove HST pedal rod(1), pedal arm 3(2) and connecting plate1(3).



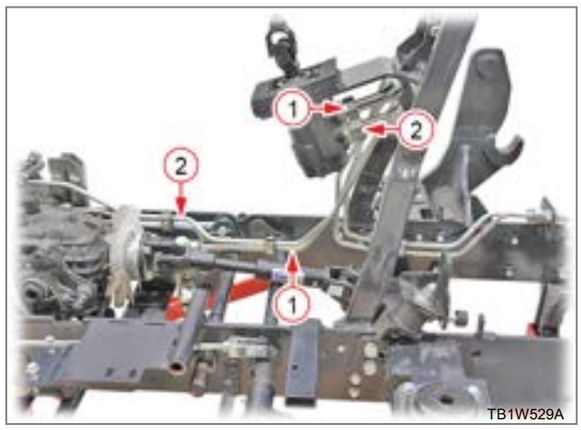


WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 26 2025-04-08 오전 9:32:59

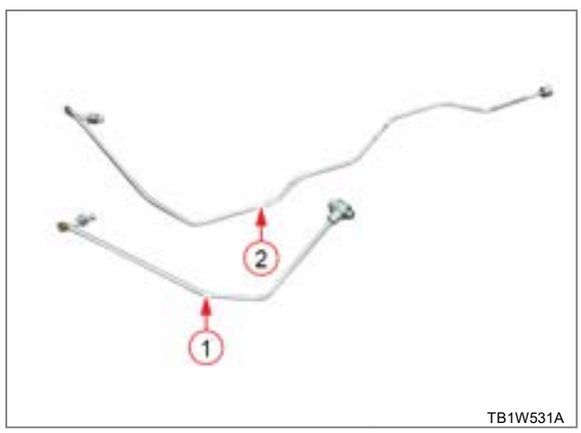




17. Remove mower deck arm(1), mower deck conneting plate(2) and mower deck(3).

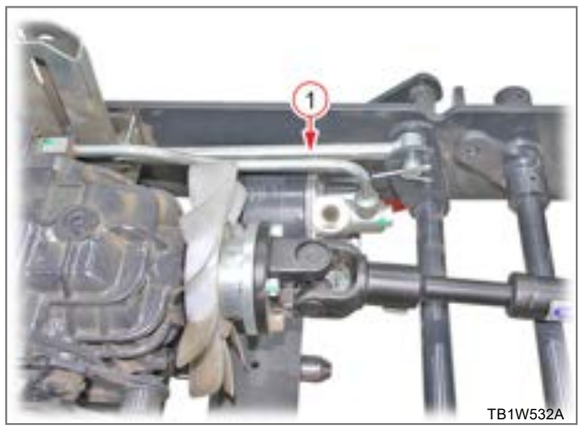


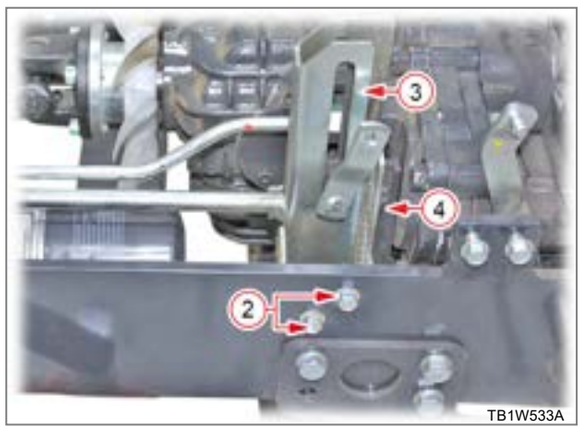


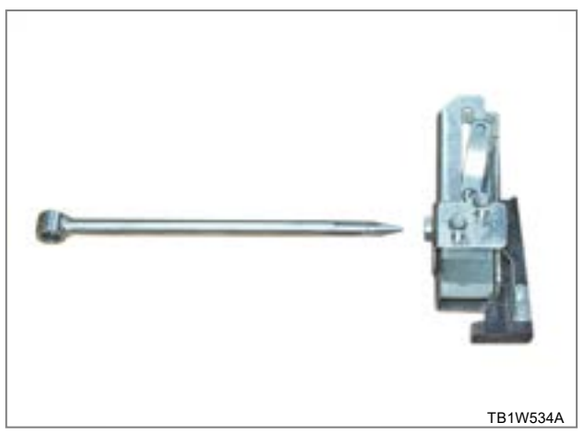


18. Remove hydraulic tube P(1) and hydraulic tube T(2) from the power steering unit.

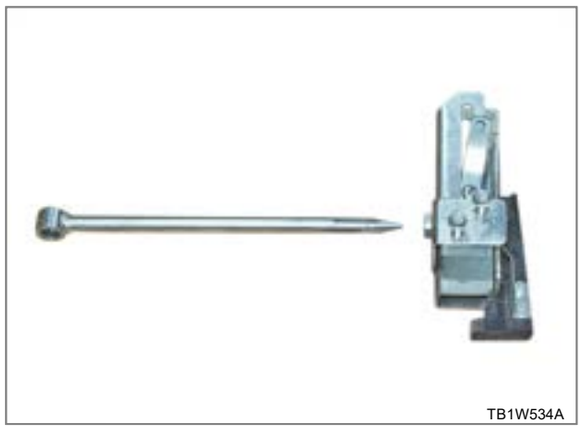
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 27 2025-04-08 오전 9:32:59

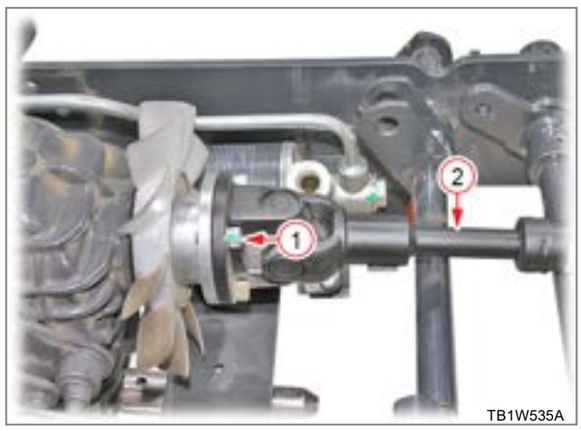






19. Remove rod (1), bolts (2), bracket (3) and plate (4).





20. Unscrew the Allen bolt (1) and remove the joint shaft(2). When reassembling, apply Loctite 271 or equivalent on the thread of bolts.

Tightening torque.....28.4~34.3 Nm
3.0~3.5 kgf.m
21.7 ~ 25.3 lb-ft

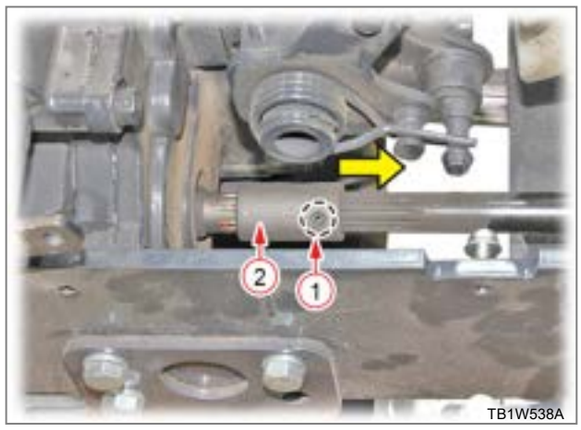


21. Remove the lift arm (1).

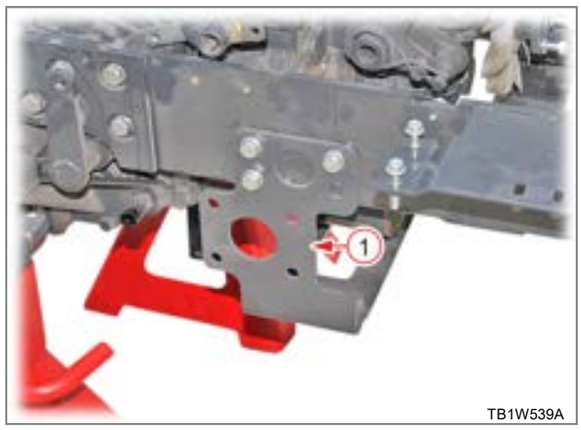
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 28 2025-04-08 오전 9:33:00

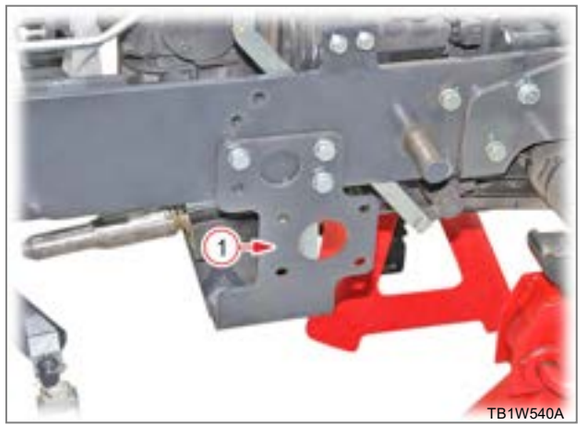


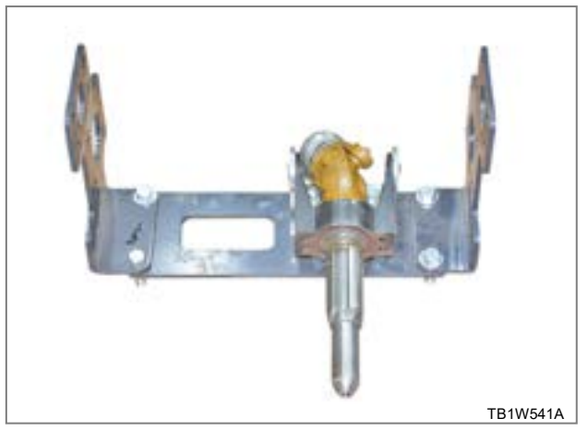
22. Remove hydraulic tube for charge from the HST filter bracket



23. Remove spring pin(1) from the coupling and slide the coupling to remove propeller shaft.

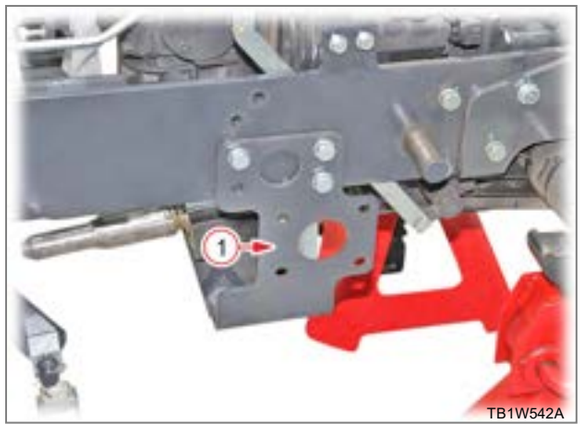




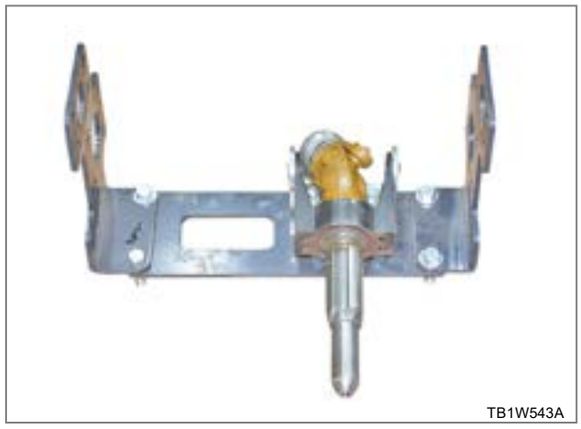


24. Remove plate1(LH, RH) and auto joint kit(2) from the main frame.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 29 2025-04-08 오전 9:33:00



TB1W542A


TB1W543A


B30W536A

25. Remove bolts(1), cabin support and transmission. .

Mounting bolt
Tightening torque .....77.0 ~ 89.0 Nm
7.85 ~ 9.1 kgf-m
57.0 ~ 65.0 lb-ft

REMARK

INSPECTION FOR ENGINE STARTING PERFORMANCE AFTER REASSEMBLY

Set the range shift lever and PTO lever in the neutral position.

Start the engine on the seat.

If the engine cannot be started check the followings:

- **Range shift neutral safety switch**
- **Seat switch**
- **Ignition relay**
- **Engine stop solenoid**
- **Fuse (F3: 10A engine)**
- **Wiring**

INSPECTION

- **Check if the fuel pump operates with the ignition switch in the ON position.**
- **Check if the engine stops when removing yourself from the seat.**
- **If not, check that the seat switch becomes OFF when leaving from the seat.**

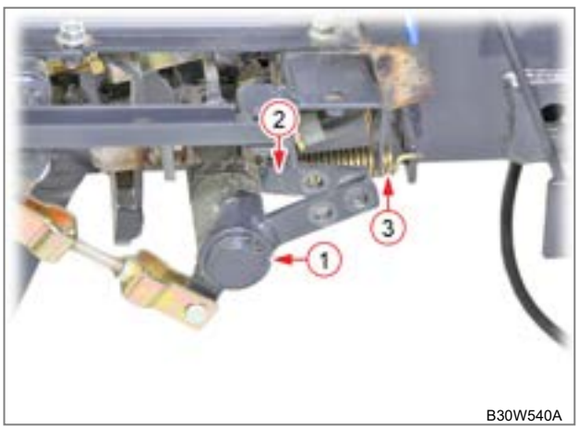
※ For detailed information of its location and function, refer to Chapter 12, Electric System.

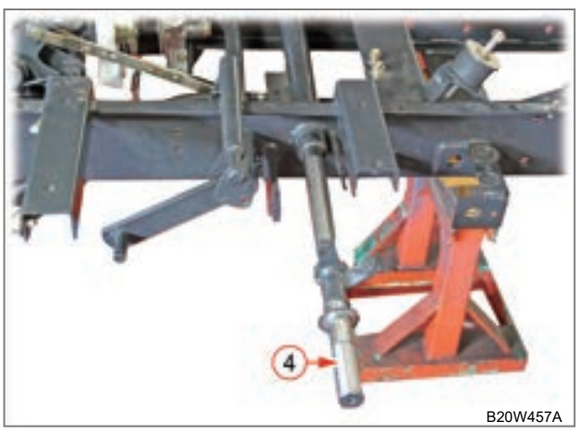
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 30 2025-04-08 오전 9:33:00

5.2 OTHER COMPONENT REMOVAL

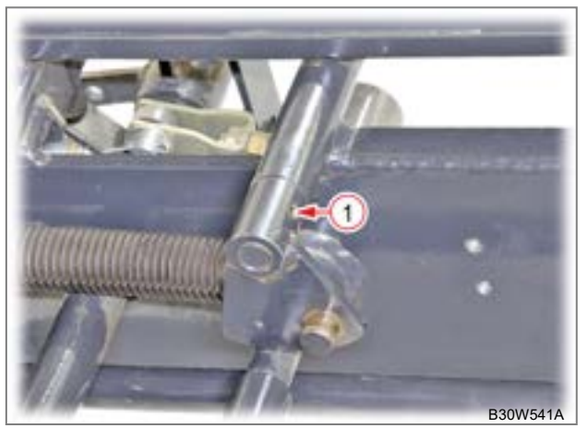


1. Unscrew the steering column assembly mounting bolts (1) to remove the steering column assembly (2).



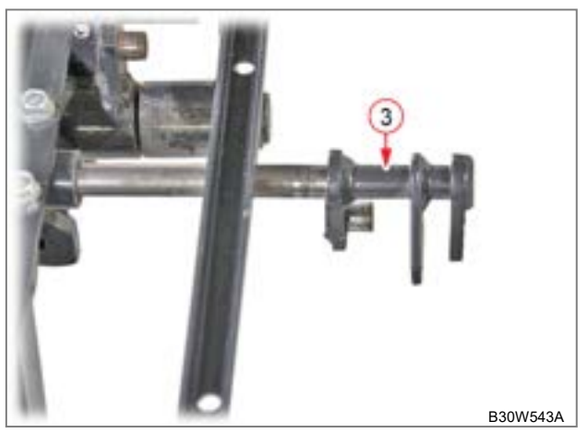


2. Remove the HST arm 1 (1) and arm 2 (2) and separate the spring (3) to remove the brake shaft (4).



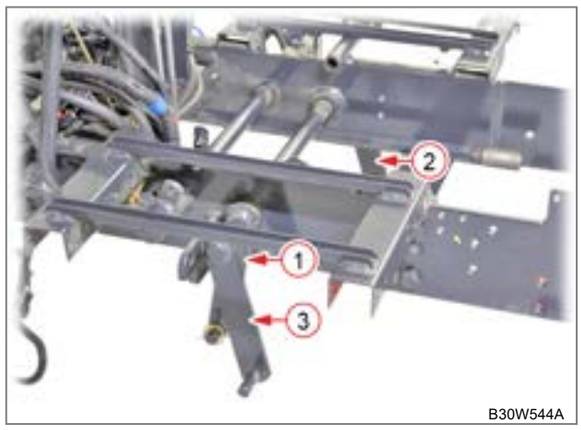
3. Pull out the spring pin (1) from the HST arm 3.



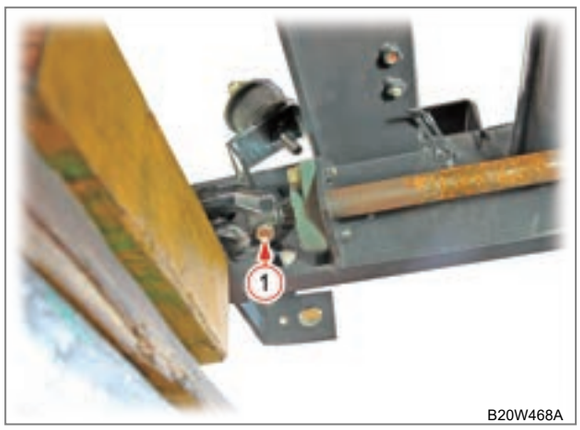


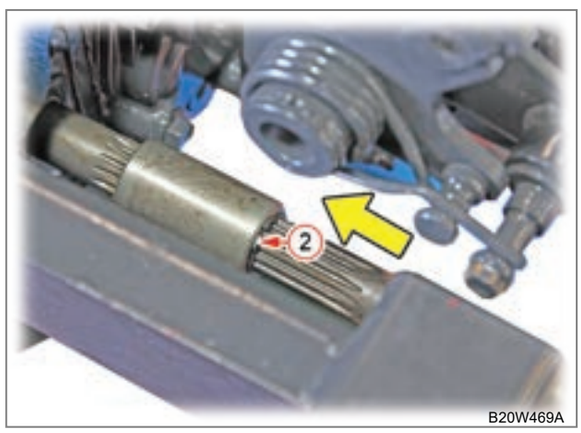
4. Unscrew the HST damper mounting bolt (1) to separate the damper (2). Then, remove the HST pedal shaft (3) by pulling it.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 31 2025-04-08 오전 9:33:01



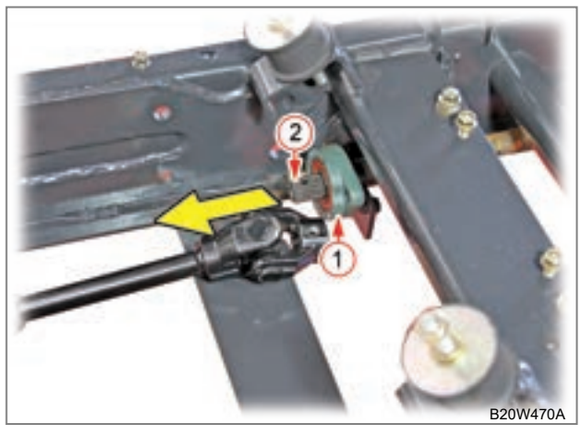
5. Pull out the split pin of the lift arm (1) and adjusting arm (2) to remove the lift arm shaft (3).





6. Unscrew the front wheel joint mounting bolt (1) and push the snap ring (2) of the propeller shaft to the back. Then, separate the front wheel joint by pulling the propeller shaft to the rear side.

Mounting bolt
Tightening torque .....22.5 ~ 28.4 Nm
2.3 ~ 2.9 kgf-m
16.6 ~ 20.9 lb-ft



7. Remove the ball bearing unit (1). Then, remove the propeller shaft (2) by pulling it.

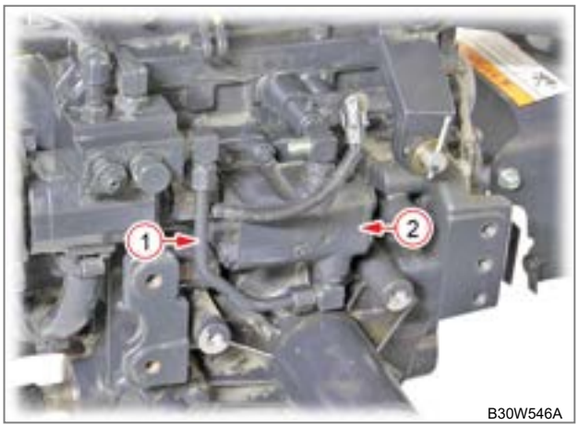
REMARK

- **Apply a sufficient amount of grease to the splines of the front wheel joint connection and propeller shaft coupling.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 32 2025-04-08 오전 9:33:01

5.3 TRANSMISSION CASE - COMPONENTS DISASSEMBLY


B30W545A

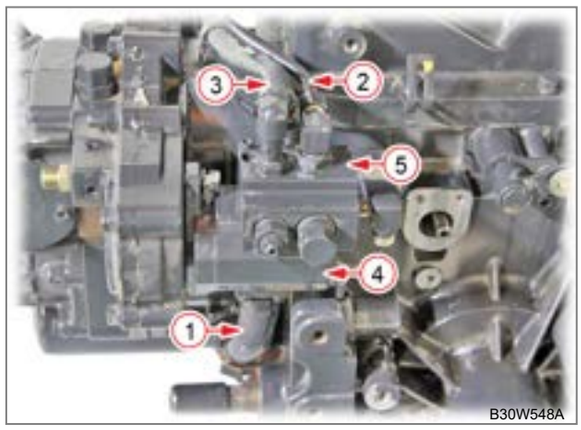


B30W546A



B30W547A

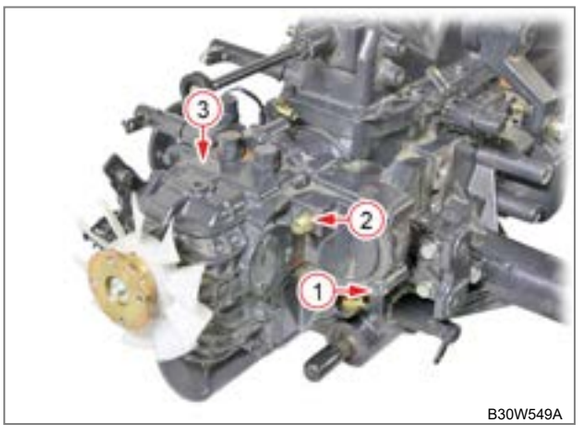
1. Disconnect hydraulic pipe (1) from the modulator valve and remove modulator valve (2). Then, remove internal connecting tube (3).

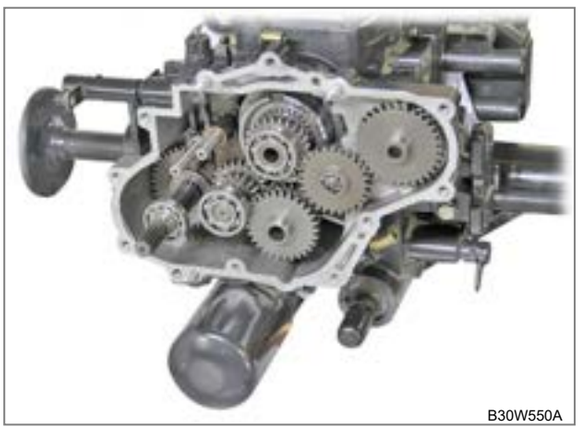


B30W548A

2. Disconnect the hydraulic hose (1), hydraulic pipe (2), and return hose (3) from the priority valve. Then, remove the gear pump (4) and priority valve (5) together.

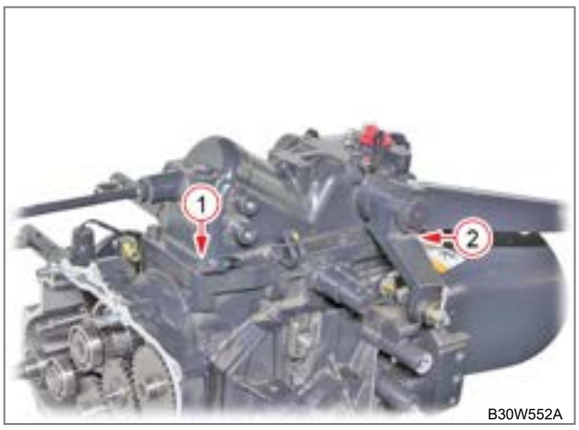
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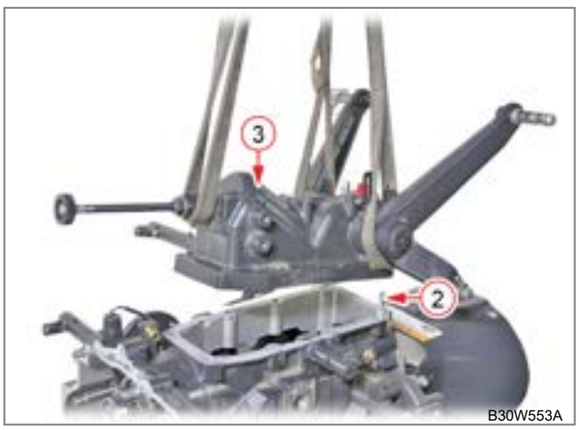






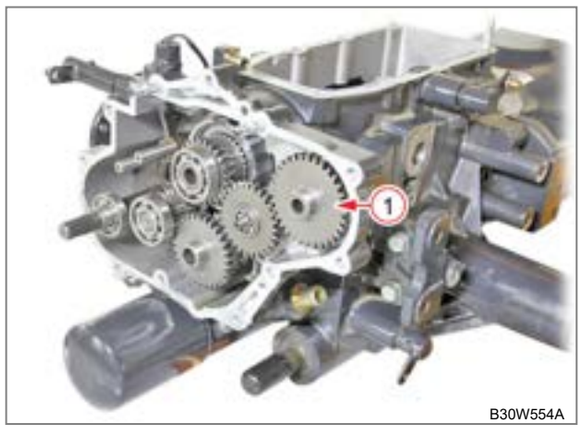
3. Unscrew the HST mounting bolts (1) (9 EA) and nuts (2) (2 EA) to remove the HST assembly (3).





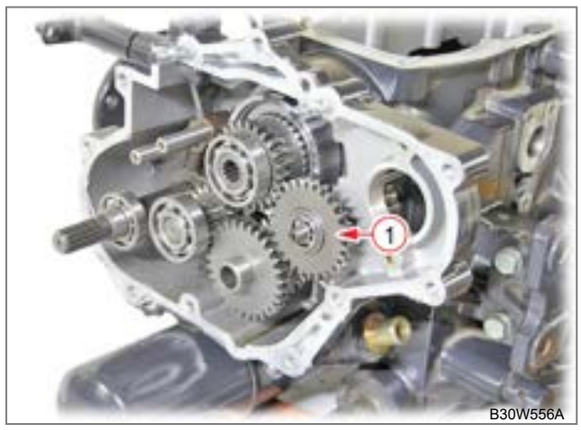
4. Unscrew the hydraulic cylinder case mounting bolts (1) (6 EA) and nuts (2) (2 EA) to remove the hydraulic cylinder case assembly (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 34 2025-04-08 오전 9:33:02

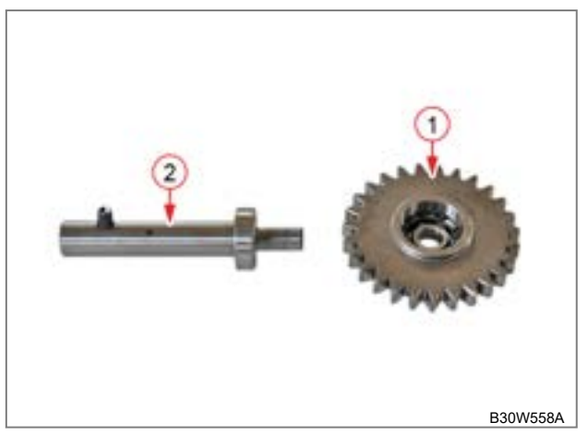




5. Remove the 32 gear (1) from the transmission case.

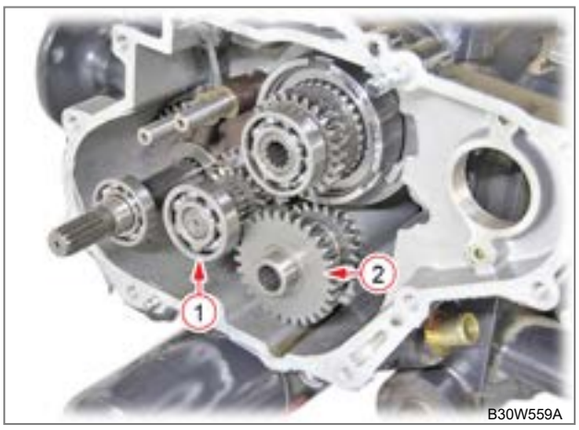






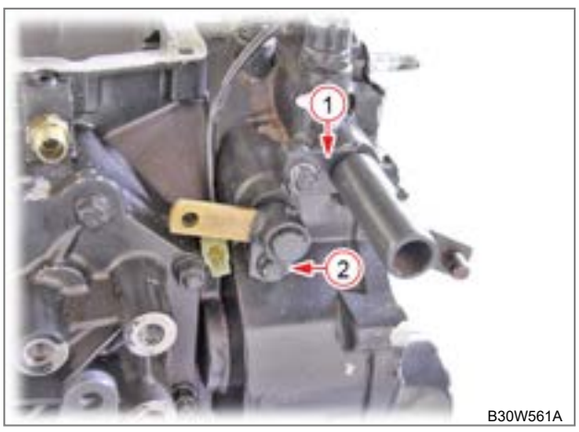
6. Remove the 27 gear (1) and idler shaft (2).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 35 2025-04-08 오전 9:33:02

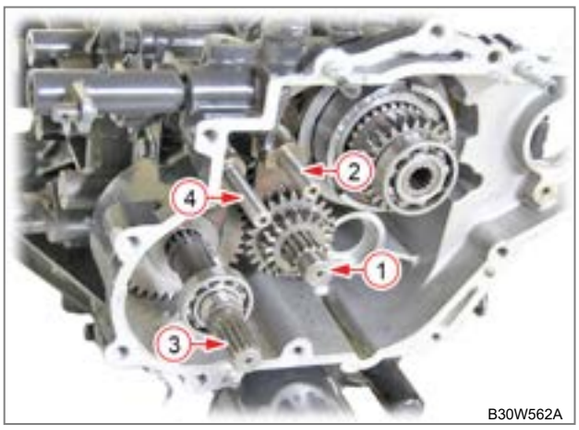


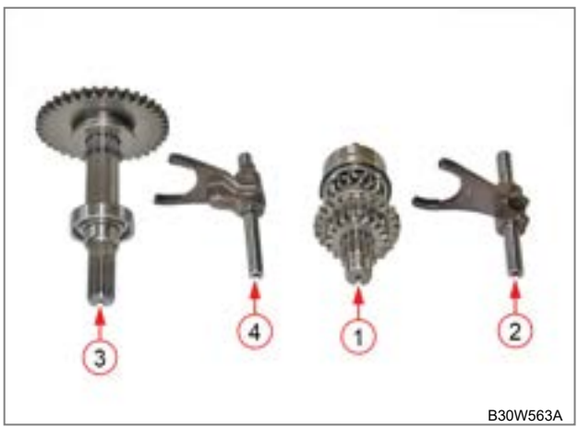


7. Pull out the ball bearing (1) and remove the 29-22 gear (2).



8. Remove the range shift arm stopper (1) and 4WD shift arm stopper (2). Then, remove the shift arm from the shift fork groove.



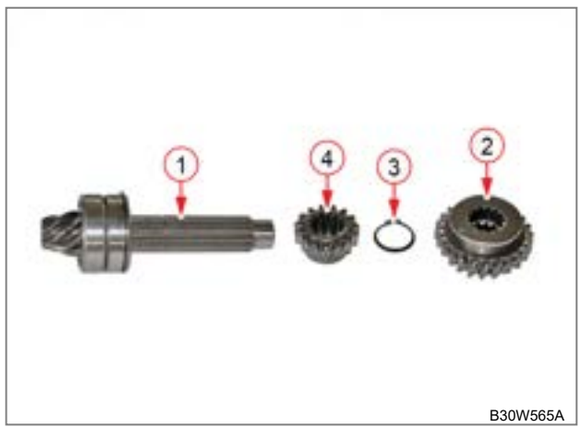


9. Remove the spiral bevel pinion shaft assembly (1), range shift fork assembly (2), 4WD shaft assembly (3), and 4WD shift fork assembly (4).

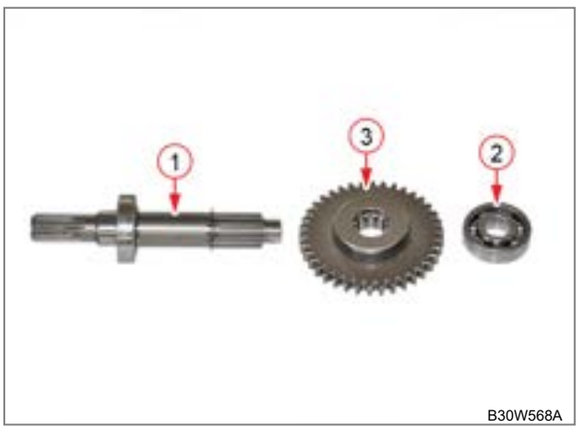
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 36 2025-04-08 오전 9:33:02



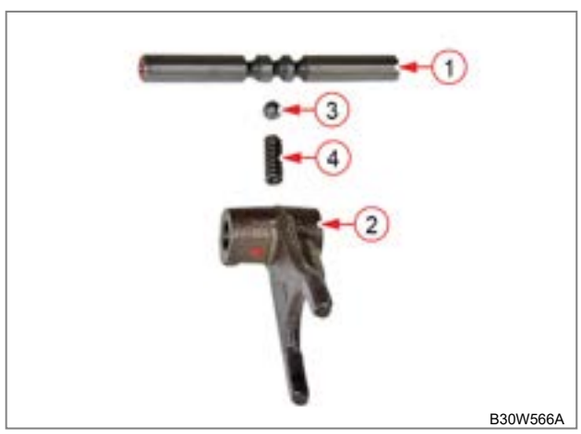




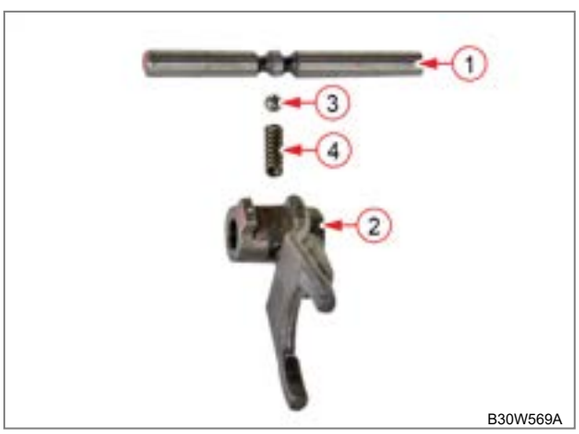
10. Remove the 17-24 gear (2), snap ring (3), and gear 15 from the spiral bevel pinion shaft (1) in order.



12. Remove the ball bearing (2) and gear 38 (3) from the 4WD shaft (1).



11. Remove the range shift fork (2), steel ball (3), and spring (4) from the range shift rod (1).



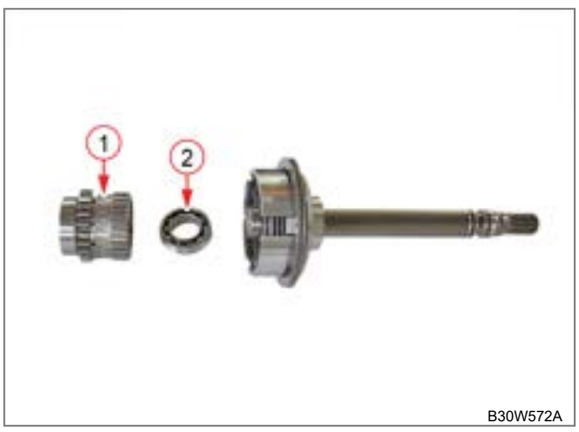
13. Remove the 4WD shift fork (2), steel ball (3), and spring (4) from the 4WD fork rod (1).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 37 2025-04-08 오전 9:33:03



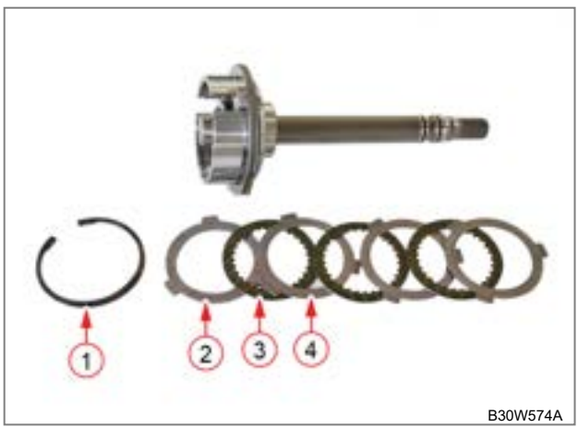


14. Remove the PTO clutch assembly (1).



15. Remove the 24 gear (1) and ball bearing (2) from the PTO clutch assembly.

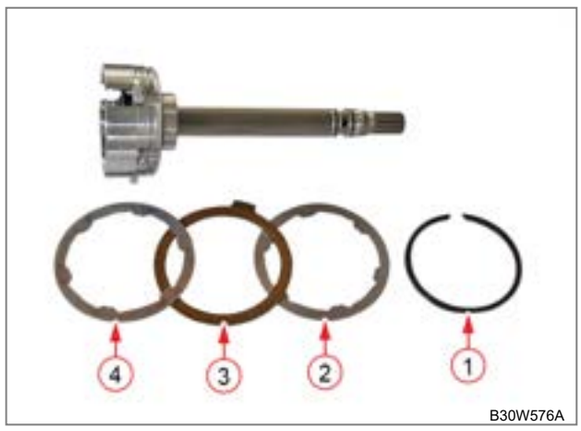




16. Pull out the snap ring (1) from the PTO clutch assembly. Then, remove the pressure plates (2), discs (3), and divider plates (4) in order.

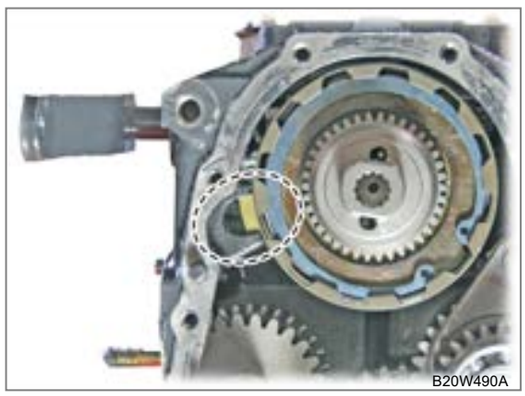
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 38 2025-04-08 오전 9:33:03





17. Pull out the stop ring (1) from the PTO clutch body. Then, remove the back ring (2), brake plate (3), and pressure plate (4) in order.

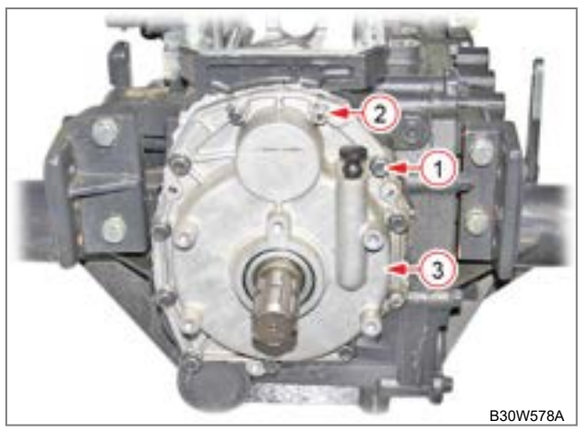
IMPORTANT



- **When installing the PTO clutch, its protrusion (brake plate) should be inserted into the groove of the transmission case.**



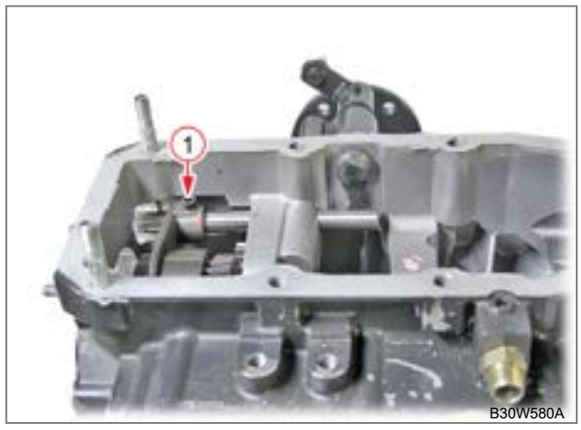
18. After removing PTO shift arm stopper (1), remove the shift arm from the shift fork groove. Then, unscrew the plug (2) and remove the internal spring and steel ball.



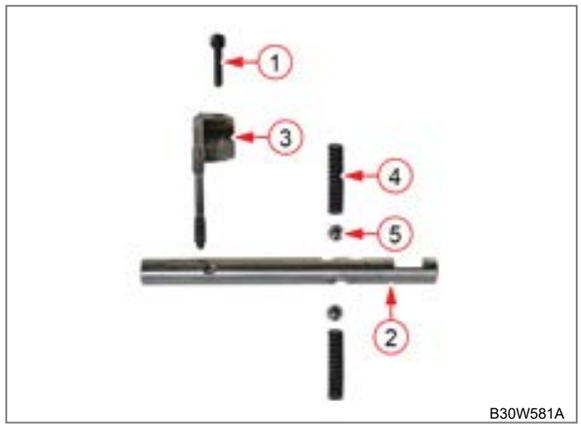


19. Unscrew the PTO shaft cover mounting bolts (1) and nuts (2), and remove the PTO shaft cover assembly (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 39 2025-04-08 오전 9:33:04







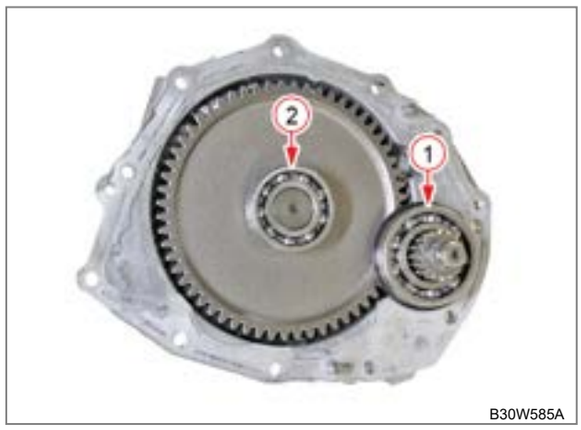


20. Unscrew the PTO shift fork mounting wrench bolt (1). Then, remove the PTO shift rod (2), PTO shift fork (3), spring (4), and steel balls (5).

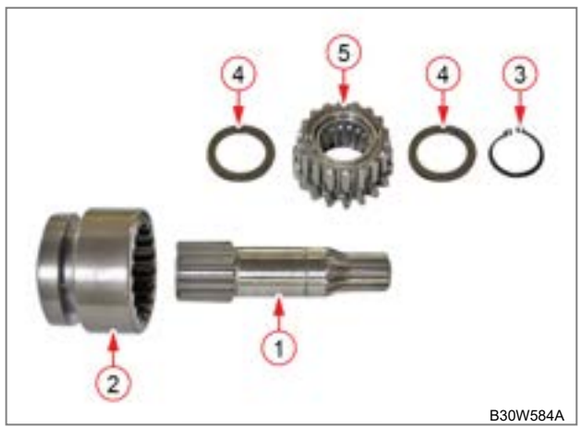
21. Remove the PTO drive shaft assembly (1).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 40 2025-04-08 오전 9:33:04


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B30W585A



B30W584A

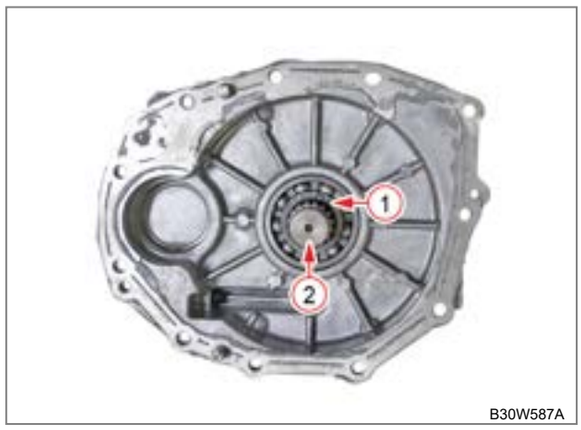


B30W586A

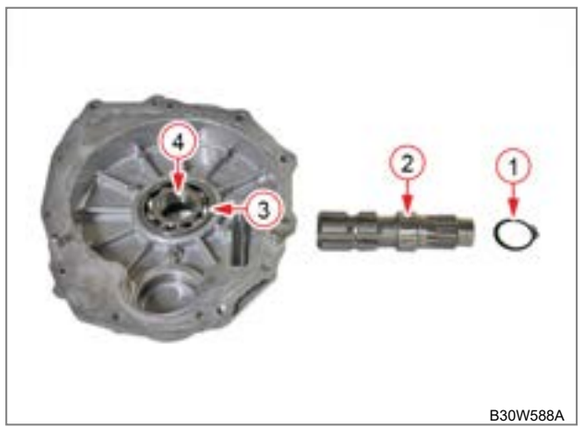
22. After removing the sliding gear (2) from the PTO drive shaft (1), pull out the snap ring (3), and remove the thrust collar (4) and 18 gear (5) in order.

23. Remove the PTO gear shaft 10 ball bearing (1) and PTO shaft ball bearing (2) from the PTO cover. Then, remove the PTO 59 gear (3) and PTO gear shaft 10 (4).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 41 2025-04-08 오전 9:33:04



B30W587A

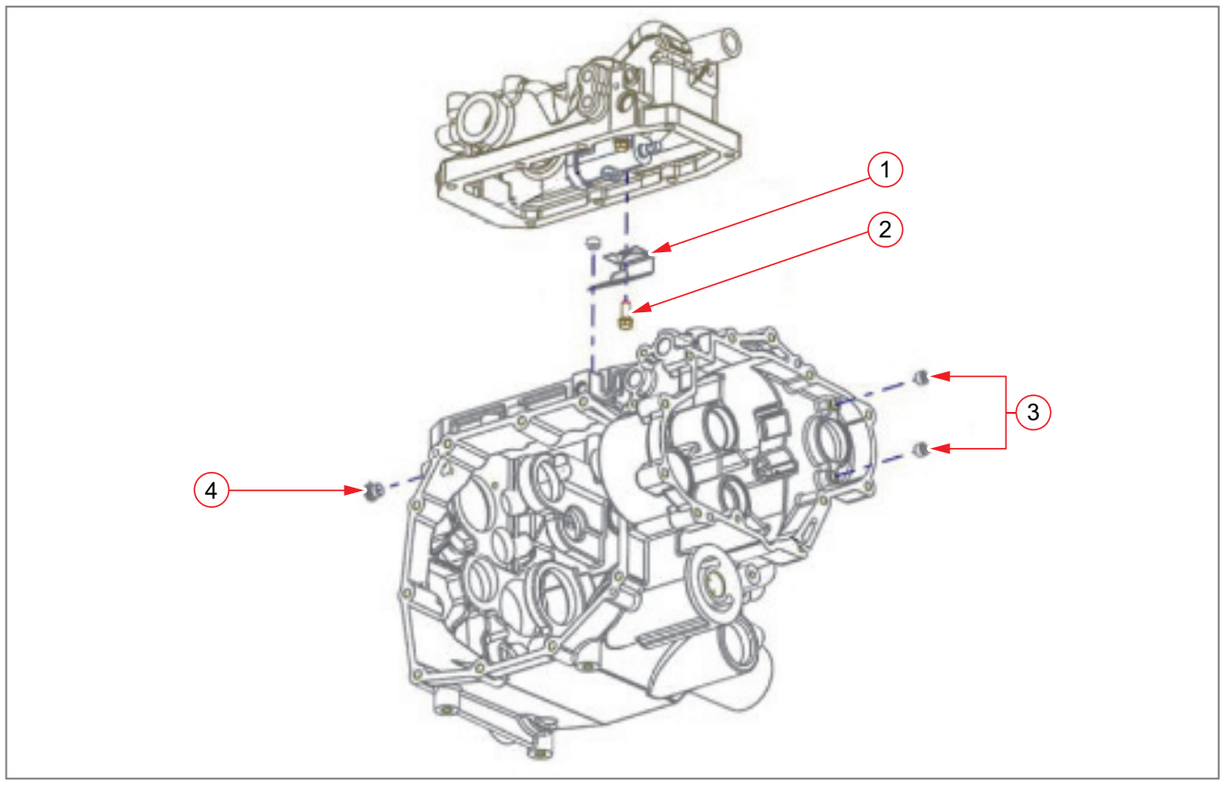


B30W588A

24. Pull out the snap ring (1) from the PTO shaft. Then, remove the PTO shaft (2), ball bearing (3), and oil seal (4) from the PTO cover.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 42 2025-04-08 오전 9:33:04

5.4 LIFT CYLINDER ASS'Y AND TRANSMISSION CASE ASSEMBLY TIPS



TB1W413A

(1) Plate
(2) Washer bolt
(3) PT1/4 plug
(4) PF3/8 plug(1/2)ft

1. When assembling the plate (1), remove the washer bolt (2) of the lifting control valve, insert the plate (1) in the same position, apply thread glue to the washer bolt, and then reassemble. Otherwise, it may cause loosening or malfunction.

   Thread glue: LOCTITE 271 or equivalent

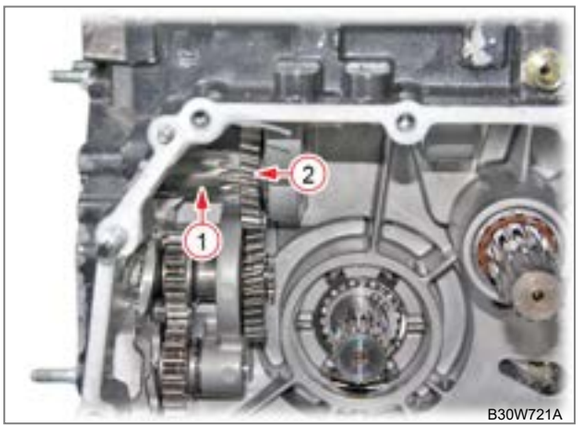
   M8 bolt tightening torque : 23.5~27.5 Nm (2.4~2.8kgf.m, 17.4~20.1 lb.ft)
2. When assembling the PT1/4 plug (3), wrap sealing tape or apply sealant before assembling. Otherwise, it may cause oil leak.

   Sealant : LOCTITE 572 or equivalent
3. When assembling the PF3/8 plug (4), grease the O-ring and assemble it carefully to avoid damage. Otherwise, it may cause oil leak.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 43 2025-04-08 오전 9:33:05

5.5 MID PTO DISASSEMBLY (IF EQUIPPED)

1. Remove the rear differential assembly.



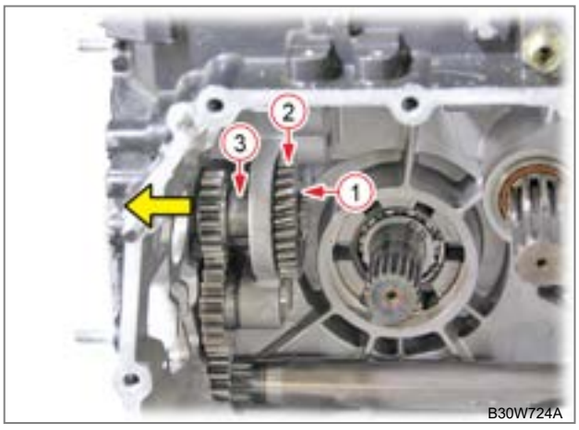


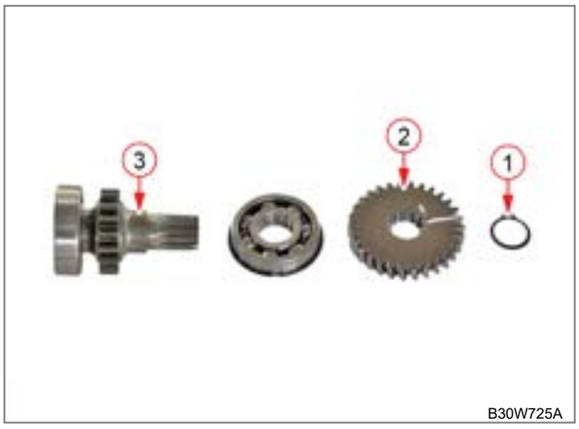
2. Remove the PTO gear shaft (1) and 25 gear (2).

IMPORTANT



- **Assemble the boss (A) of gear 25 as shown in the figure.**





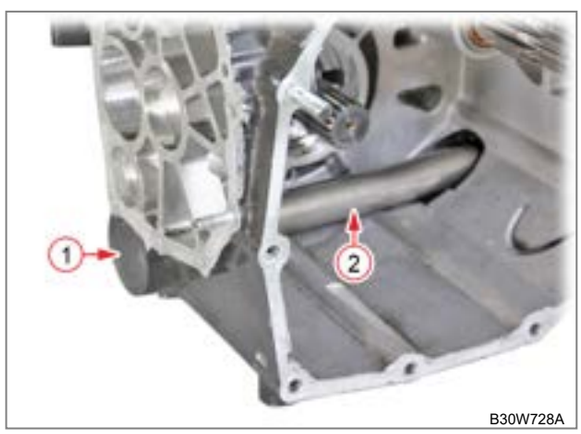
3. First, remove the snap ring (1) and 30 gear (2) from the PTO countershaft. Then, remove the countershaft (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 44 2025-04-08 오전 9:33:05





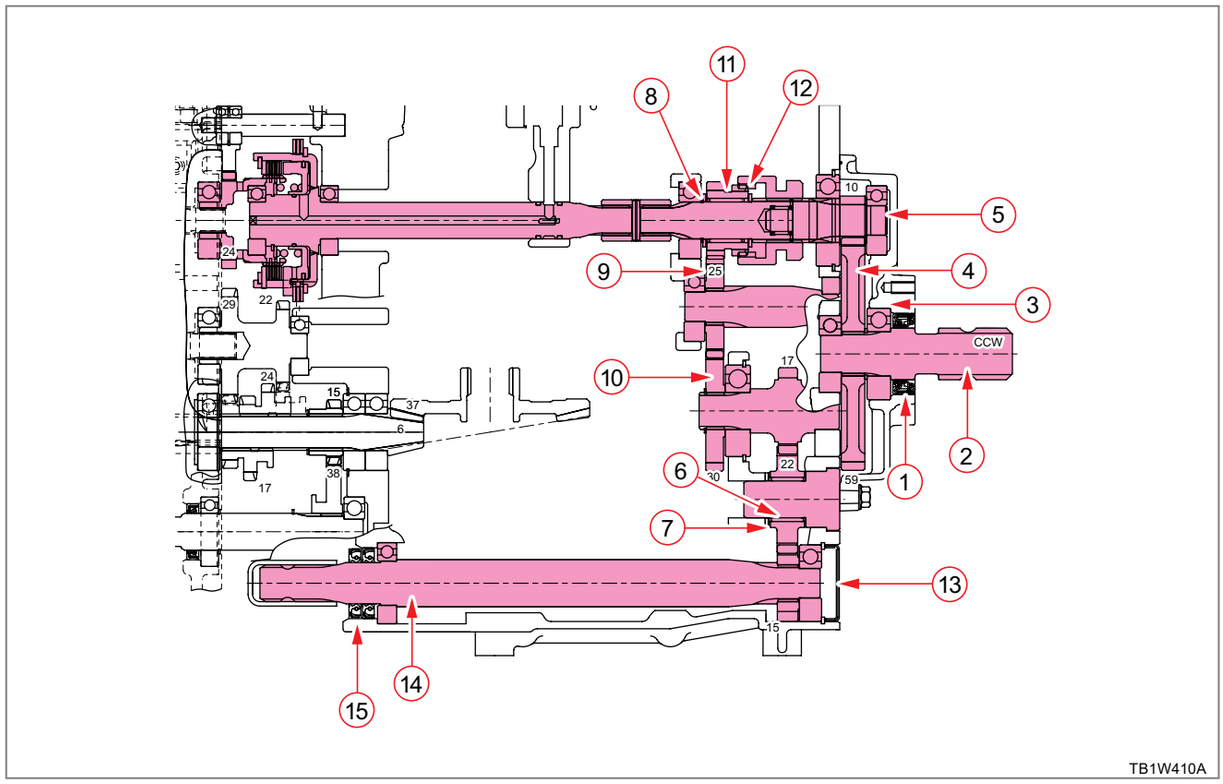
4. Remove the idler shaft 22 gear (1), idler shaft (2), and thrust collar (3).



5. Pull out the front plug (1) and remove the mid PTO shaft (2).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 45 2025-04-08 오전 9:33:05

5.6 REAR AND MID PTO PARTS REASSEMBLY TIPS



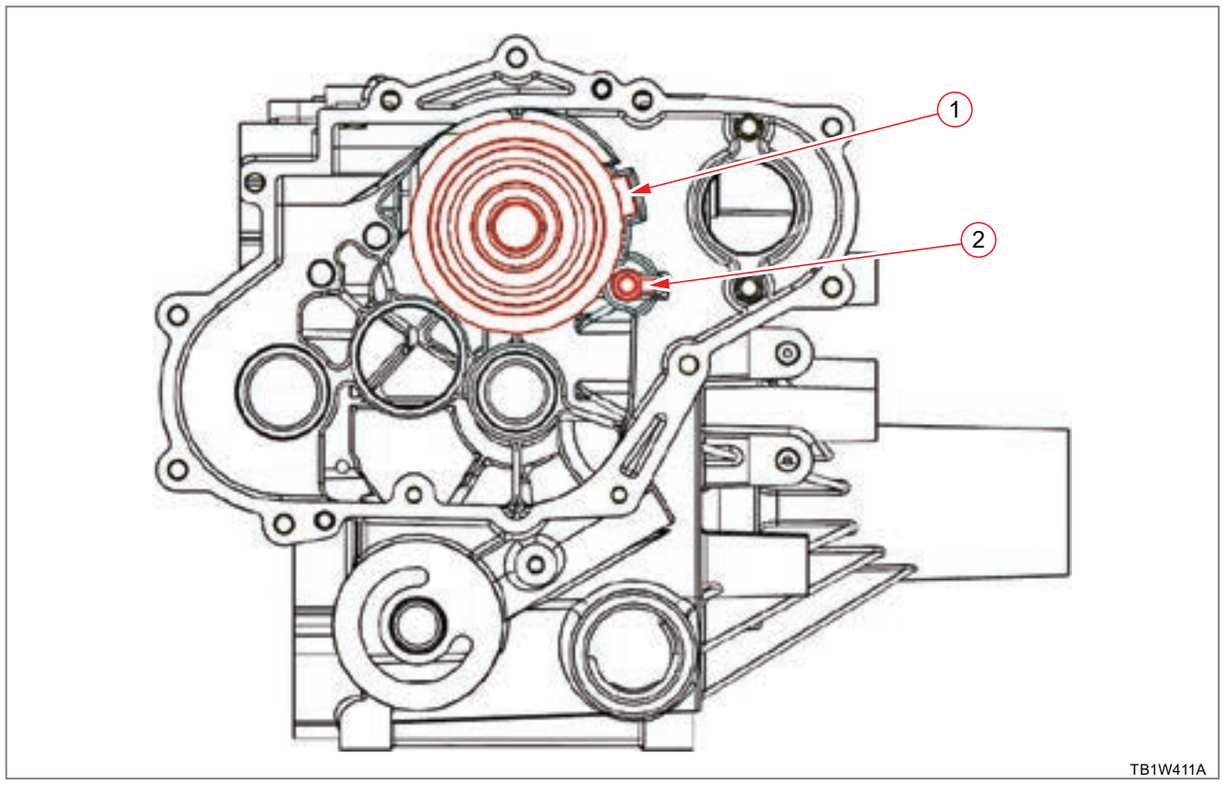
(1) Oil seal 1
(2) Rear PTO shaft
(3) Shims
(4) 59 gear
(5) PTO cover
(6) Thrust collar1
(7) Needle bearing1
(8) Thrust collar2
(9) 25 gear
(10) 30 gear
(11) Needle bearing2
(12) Thrust collar3
(13) Seal cover
(14) Mid PTO shaft
(15) Oil seal 2

1. For oil seal 1, pay attention to the assembly direction so that the steel plate faces outward. Otherwise, it may cause oil leakage.
2. Use shims to adjust the axial clearance of the REAR PTO shaft to be less than 0.3mm. Otherwise, it may cause noise or malfunction.
3. When assembling the PTO cover and transmission case, apply sealant to the contact surfaces. Failure to apply appropriate sealant may result in oil leaks.

   Sealant: LOCTITE 1206D or equivalent
4. When assembling the seal cover, use an appropriate hammering tool. Otherwise, it may cause oil leakage due to damage.
5. After assembly, rotate the REAR PTO shaft and MID PTO shaft to check if they rotate smoothly

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 46 2025-04-08 오전 9:33:05

5.7 PTO CLUTCH ASSEMBLY TIPS



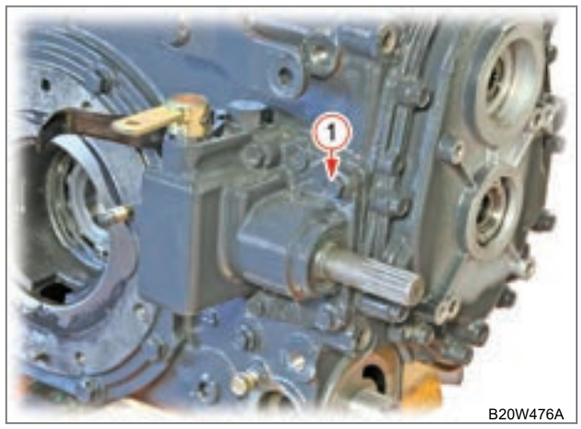
(1) Correct position of protrusion

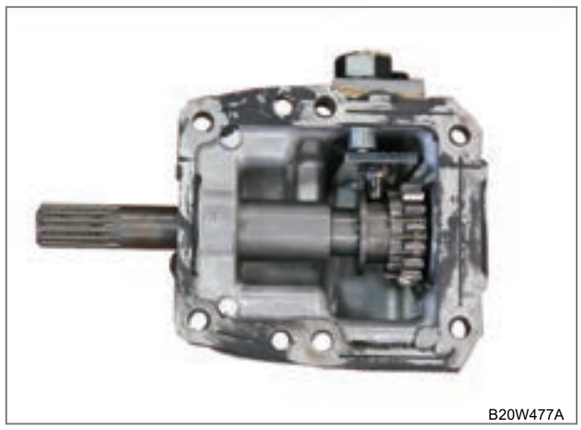
(2) Correct position of spring pin in the shaft

1. Pay attention to the assembly direction so that the brake plate protrusion of the clutch assembly is in the slot of the housing as shown in the picture. Otherwise, it may cause noise or malfunction.
2. Pay attention to the assembly direction so that the idle shaft spring pin is as shown in the picture below. Otherwise, it may cause malfunction.

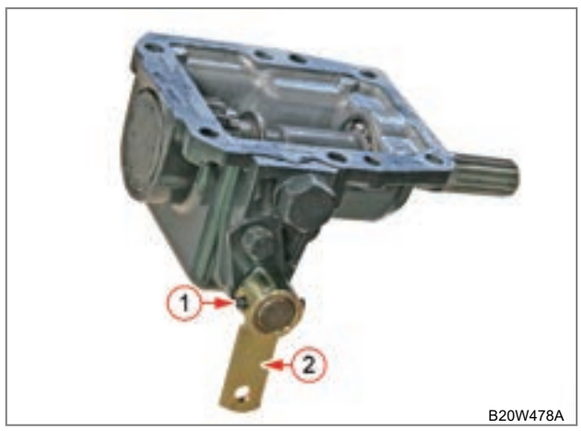
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 47 2025-04-08 오전 9:33:06

5.8 4WD CASE REMOVAL

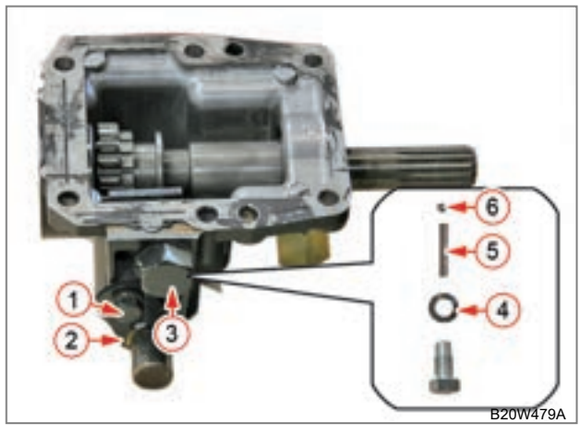




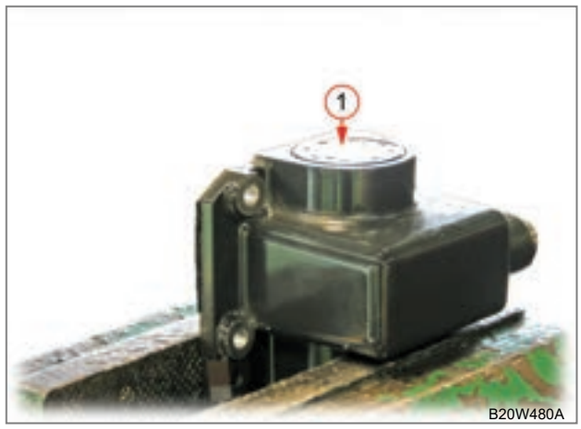
1. Unscrew the 4WD case mounting bolts (1) to remove the 4WD case.



2. Pull out the 4WD arm spring pin (1) and remove the 4WD arm (2).

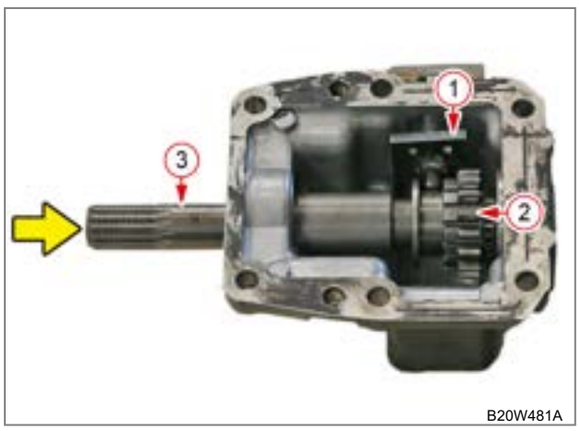


3. Unscrew the 4WD arm stopper bolt (1) to remove the stopper (2). Then, unscrew the bolt (3) to remove the seal washer (4), spring (5) and steel ball (6).

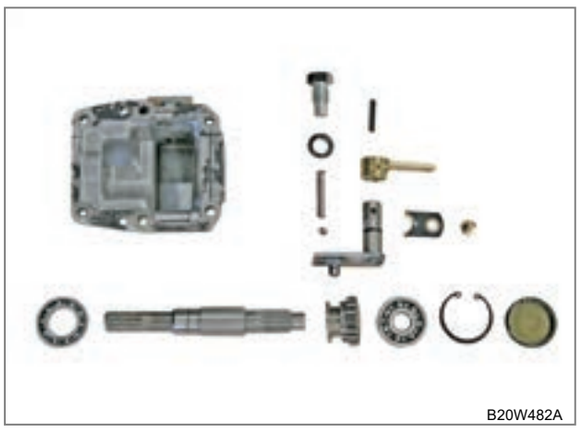


4. Fix the 4WD case in a vise to pull out the seal cover (1) and remove its internal snap ring.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 48 2025-04-08 오전 9:33:06



B20W481A

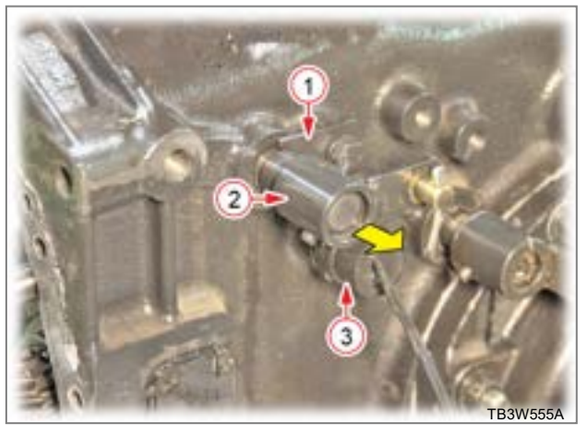

B20W482A

5. Pull the shift arm (1) toward the outside to separate it from the sliding gear A (2). Then, tap the drive shaft (3) to remove it with its ball bearing.

REMARK

- **The oil seal in the 4WD case should be replaced with a new one after disassembly. Make sure to install it in the correct direction.**
- **Apply a proper amount of grease to the oil seal mating surface.**

5.9 GEAR SHAFT REMOVAL

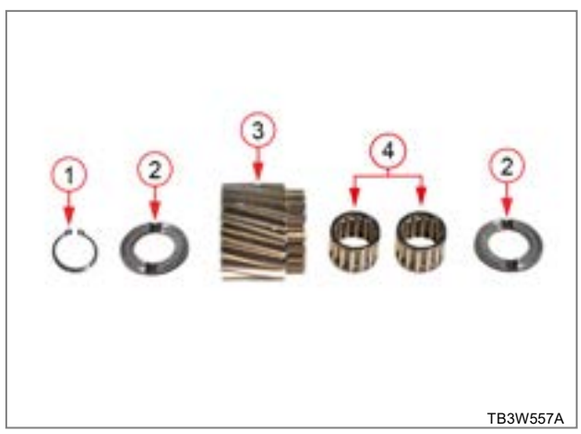


TB3W555A

1. Remove the range shift arm stopper (1) and pull out the range shift arm (2) forward. Then, remove the safety switch (3).



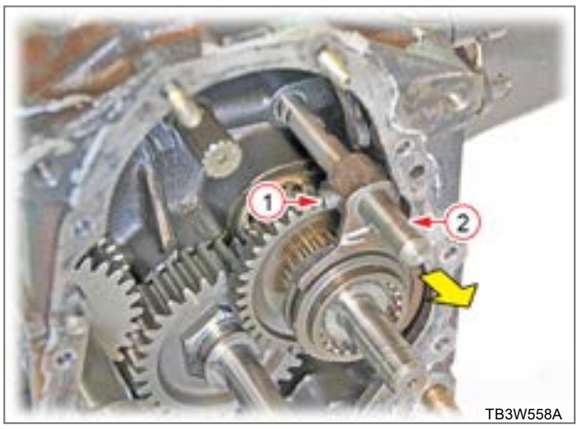
TB3W556A

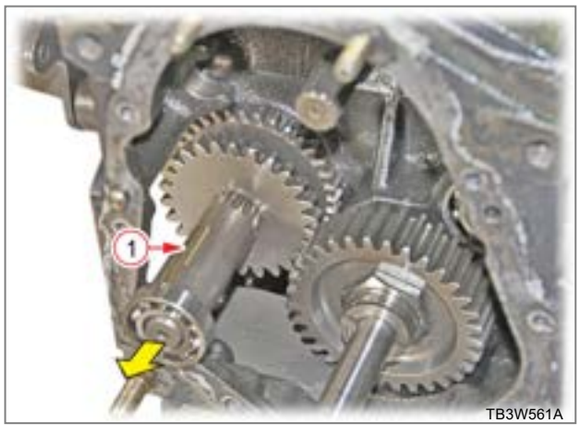


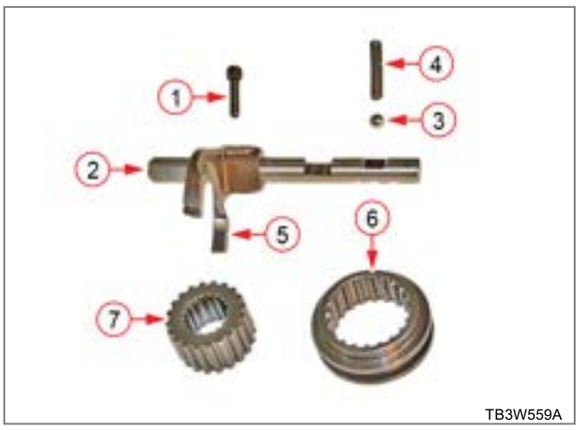
TB3W557A

2. Pull out the snap ring (1) from the 12 gear shaft to remove the collar (2), 17 gear (3) and needle bearing (4) in order.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 49 2025-04-08 오전 9:33:07



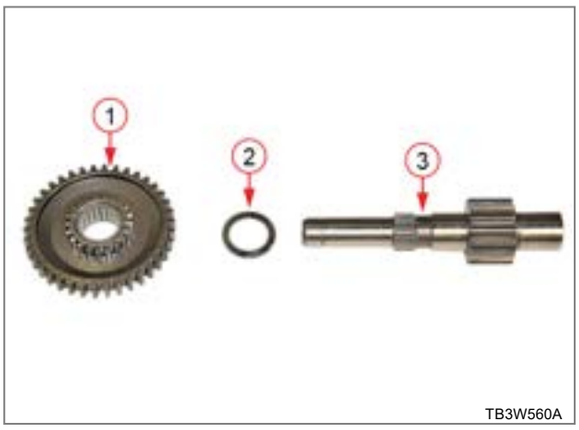






3. Unscrew the range shift fork mounting bolt (1), pull out the fork rod (2) and remove the steel ball (3) and spring (4) from the transmission case. Then, remove the shift fork (5), connector (6) and shifter (7) from the 12 gear shaft.

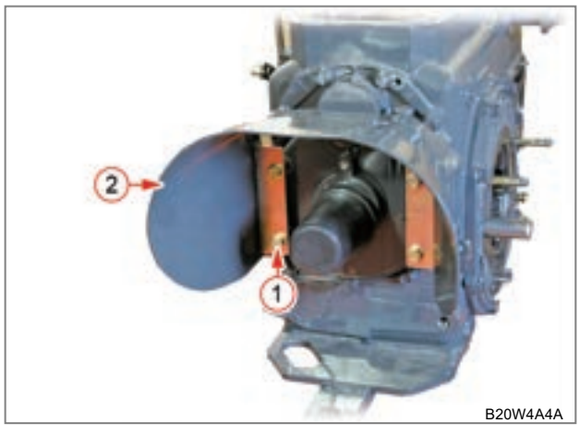
5. Remove the front wheel counter shaft (1) and disassemble the 34 gear A (2), spacer (3), 26 gear A (4) from the counter shaft.



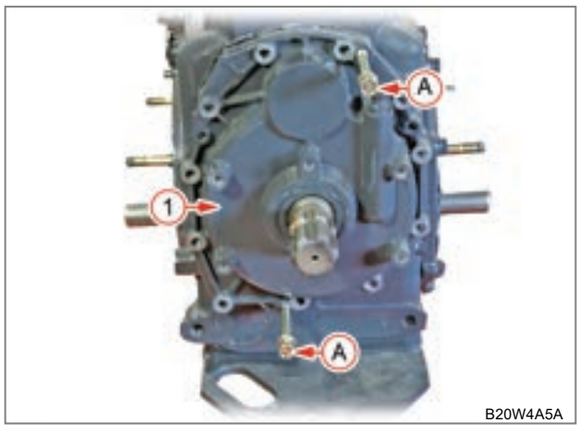
4. Remove the 38 gear (1), thrust collar (2) and 12 gear shaft (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 50 2025-04-08 오전 9:33:07

5.10 PTO DRIVE SECTION



1. Unscrew the PTO protective cover mounting bolt (1) to remove the PTO protective cover (2).



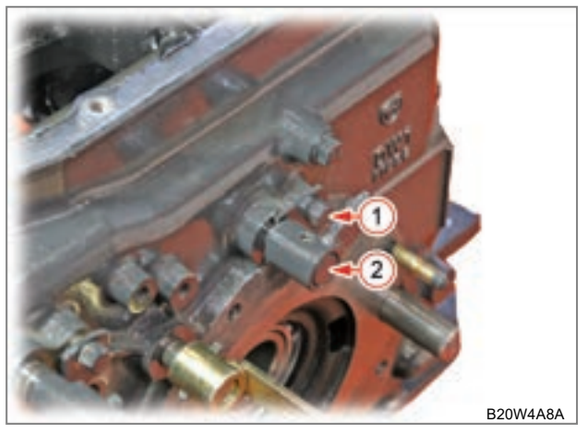
2. Insert service bolts (A) into the holes for PTO cover removal. Then, remove the PTO cover (1) while turning the service bolts for the same amount.

REMARK

When reinstalling the PTO cover, clean its mating surface thoroughly and apply adhesive (LOCTITE 5060 or equivalent) to its mating surface.

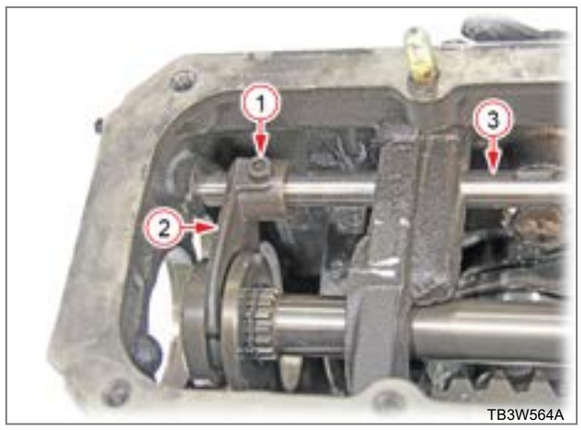


3. Remove the snap ring (1) of the PTO drive shaft.



4. Unscrew the stopper mounting bolt (1) of the range shift lever 1 and pull the PTO shift arm (2) out of the case to separate it from the PTO shift fork.

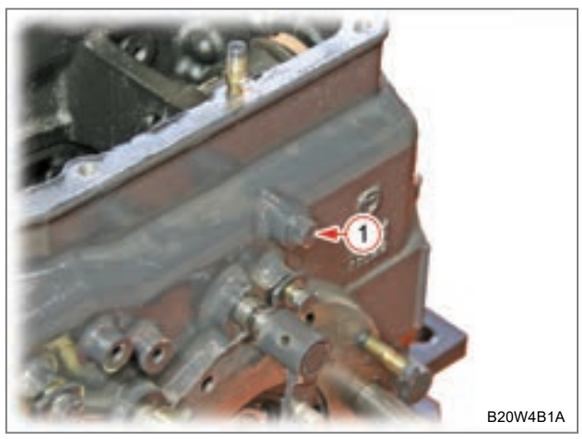
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_04_트랜스미션.indd 51 2025-04-08 오전 9:33:07



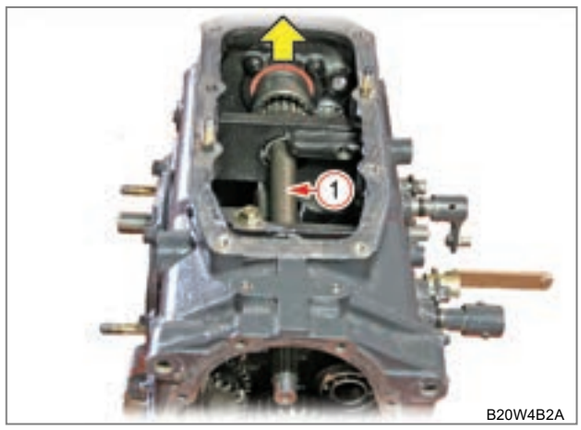
5. Unscrew the PTO shift fork mounting bolt (1) and remove the PTO shift fork (2) and shift rod (3).

REMARK

The PTO clutch fork mounting bolt should be installed after applied with LOCTITE 271 or equivalent.

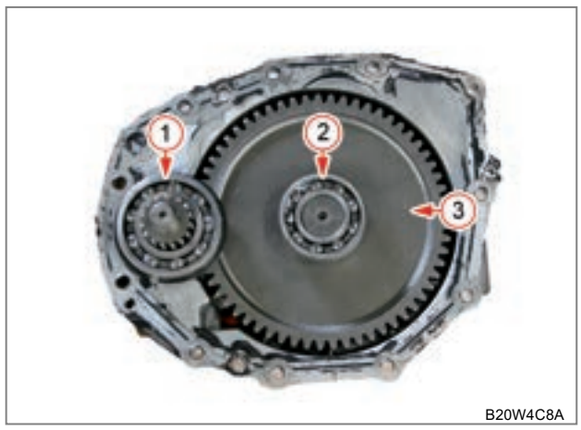


6. Unscrew the rail bolt (1) and remove the steel ball and spring from inside.

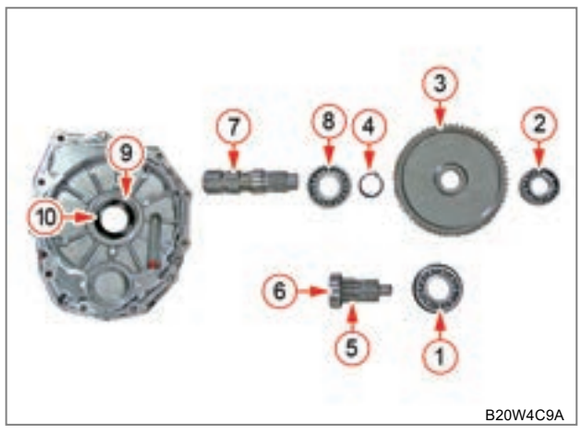


7. Tap the PTO drive shaft (1) to remove it from the back of the transmission case.

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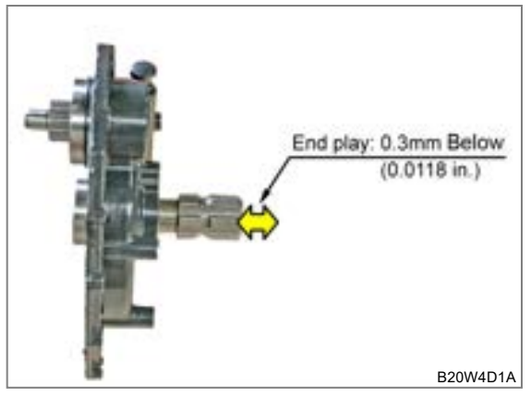
B20W4C8A



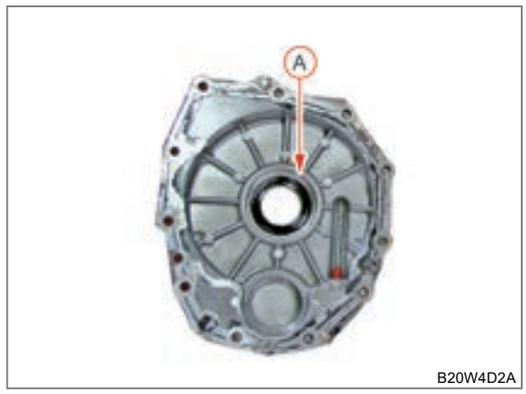
B20W4C9A

8. Remove the ball bearing(1) of the PTO countershaft and ball bearing (2) of the PTO shaft from the PTO cover. Then, remove the mounting gear A (3) and pull out the PTO shaft snap ring (4). Remove the PTO countershaft (5) and ball bearing (6) and tap the PTO shaft to remove the PTO shaft (7), ball bearing (8), shim (9) and oil seal (10).

IMPORTANT



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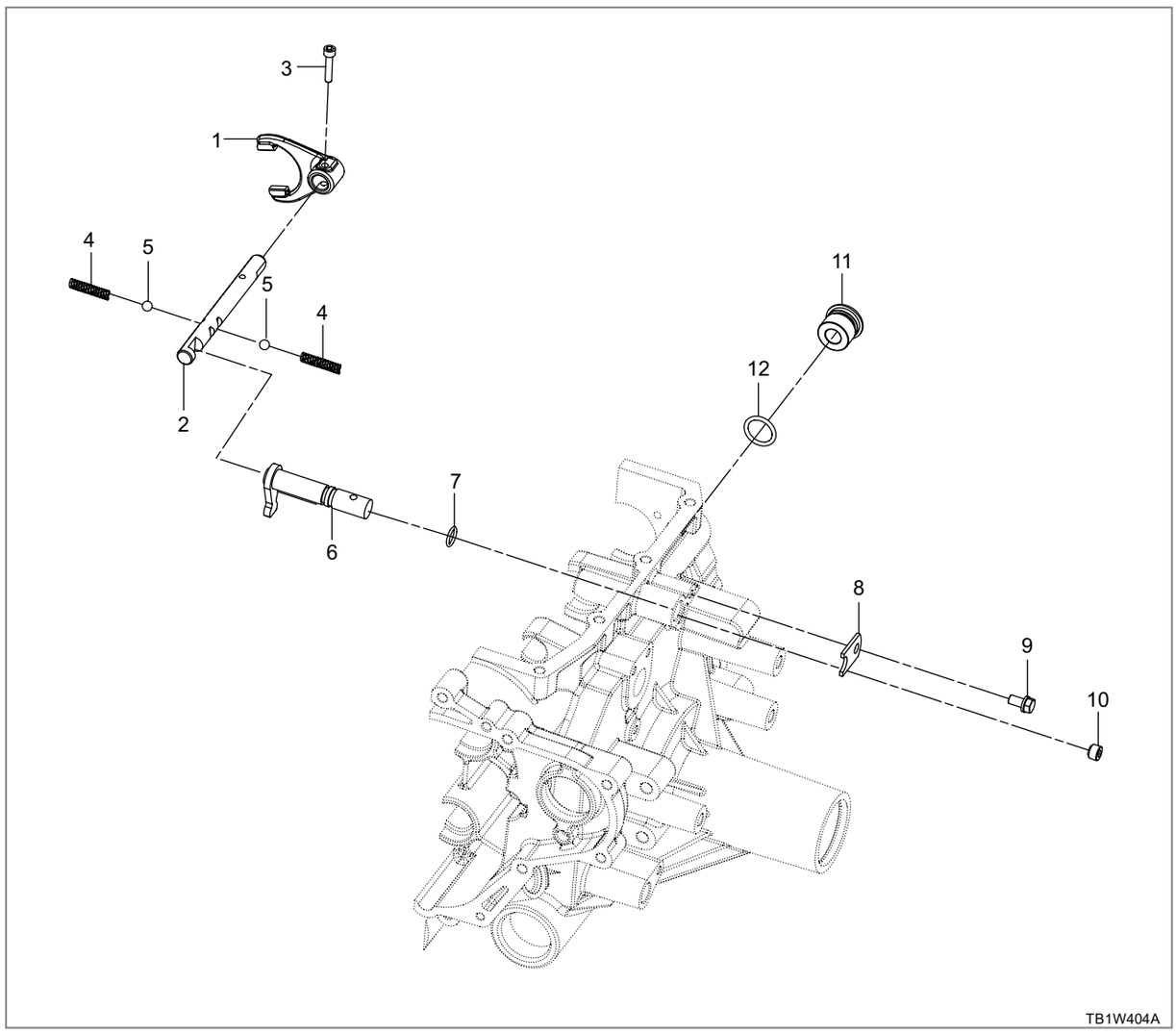


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When installing the PTO shaft to the PTO cover, set the axial play to 0.3 mm (0.0118 in.) using a shim (A).

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5.11 PTO SHIFT FORK ASSEMBLY TIP



(1) Fork
(2) Rod, PTO shift
(3) Wrench bolt
(4) Friction spring
(5) Steel ball
(6) Shift arm
(7) O ring
(8) Stopper
(9) Bolt, Washer
(10) Plug
(11) Spacer
(12) O ring

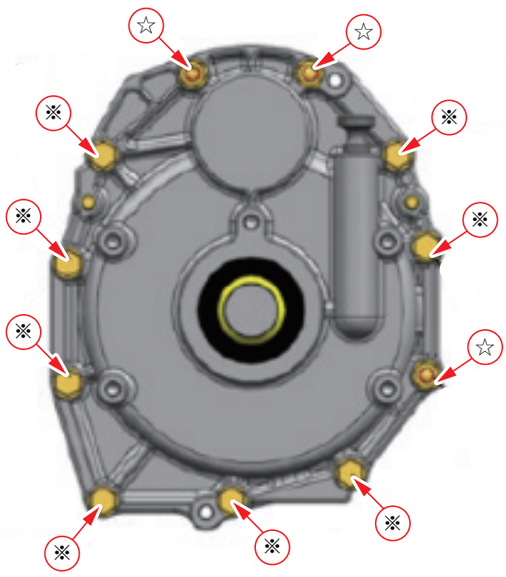
1. When assembling the Allen wrench bolt (3), apply the specified thread glue. Otherwise, it may cause loosening or malfunction.

   Thread glue: LOCTITE 271 or equivalent

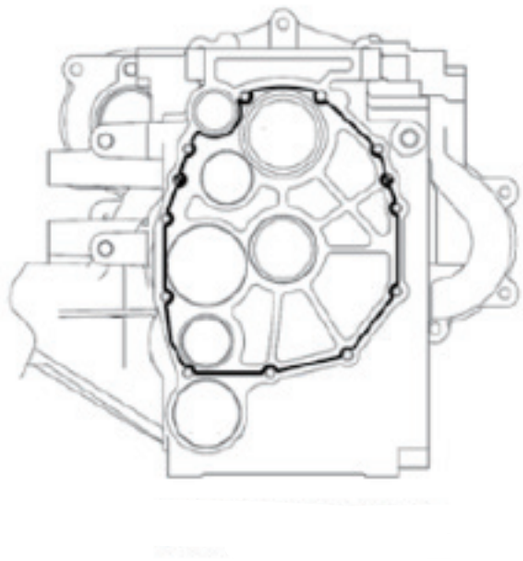
2. Apply grease to each O-ring before assembly. Otherwise, it may cause oil leakage, rusting or malfunction.

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5.12 PTO COVER AND TRANSMISSION DOCKING TIPS



< Assembly location marks >



Sealant application pattern

TB1W412A

1. Apply specified sealant to the contact surface of the transmission case. Follow the sealant application pattern as shown in the picture. Otherwise, it may cause oil leak.

   Sealant: ThreeBond 1206D or or equivalent

2. Check the assembly locations of bolts and studs and tighten them in diagonal order. Otherwise, it may cause loosening or oil leak.

   Tightening torque and location

   - 01754-50825 (Flange bolt, M8) : 8 EA, 23.5 Nm (2.4kgf.m, 17.4 lb.ft)
   - 01513-50825 (Stud, M8) : 3 EA, 11.8 Nm (1.2 kgf.m, 8.7 lb.ft)

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HST

CHAPTER 5

TABLE OF CONTENTS

1. SPECIFICATIONS 5-2
- 1.1 General 5-2
- 1.2 HST 5-2
- 1.3 Major tightening torque 5-2

2. OPERATING PRINCIPLE.....5-3

3. STRUCTURE AND FUNCTION 5-6
- 3.1 Powertrain 5-6
- 3.2 HST components 5-7
- 3.3 Major HST component structure and function.....5-8
  - 3.3.1 Circuit Diagram 5-8
  - 3.3.2 Charge relief valve 5-9
  - 3.3.3 High pressure relief valve 5-10
- 3.4 Operation of HST 5-12
  - 3.4.1 Neutral status.....5-12
  - 3.4.2 Forward driving 5-14
  - 3.4.3 Reverse driving 5-16

4. INSPECTION AND ADJUSTMENT 5-18
- 4.1 HST neural position setting 5-18
- 4.2 HST pedal assembly tips (1) 5-19
- 4.3 Pressue testing 5-20
  - 4.3.1 High pressure relief valves.....5-20

5. TROUBLESHOOTING 5-23

6. EXPLODED VIEW OF HST.....5-25
- 6.1 TB3-G211001 Clutch.....5-25
- 6.2 TB3-G647503 HST pedal.....5-26
- 6.3 TB3-G422002 HST assy 5-27

7. SERVICING 5-28
- 7.1 Damper plate assembly tips 5-28
- 7.2 Main joint shaft assembly tips 5-29
- 7.3 HST ass'y and transmission docking tips ...5-30
- 7.4 HST removal 5-31
- 7.5 HST components disassembly.....5-32

1. SPECIFICATIONS

1.1 GENERAL

1. Hydraulic oil specifications..... DAEDONG (UTF55)
   Exxon (Mobilfluid 423 or 424)
   BP (Tractran UTH)
   Shell (DONAX-TD)
2. Oil capacity
   (Including transmission fluid) ..... 10.4 ℓ (2.75 u.s. gal.)

1.2 HST

1. HST type..... Variable piston pump
2. Pump capacity
   (Based on input shaft of 3,100 rpm) ..... 0 ~ 23.0 cm^3/rev
   0 ~ 1.40 cu in./rev
3. Motor capacity
   (Based on input shaft of 3,100 rpm) ..... 23.0 cm^3/rev
   1.40 cu in./rev
4. Relief valve pressure ..... 19.6 MPa
   200 kgf/cm^2
   2,844 psi
5. Charge relief pressure ..... 0.49 ~ 0.78 MPa
   5 ~ 8 kgf/cm^2
   71.1 ~ 113.7 psi
6. Charge pump flow rate ..... 7 ℓ/min
7. Angle of swash plate in pump..... -15° ~ +15°
8. Angle of swash plate in motor..... 15°
9. Neutral range
   (At rated rpm)..... 0.3° ~ 0.8°

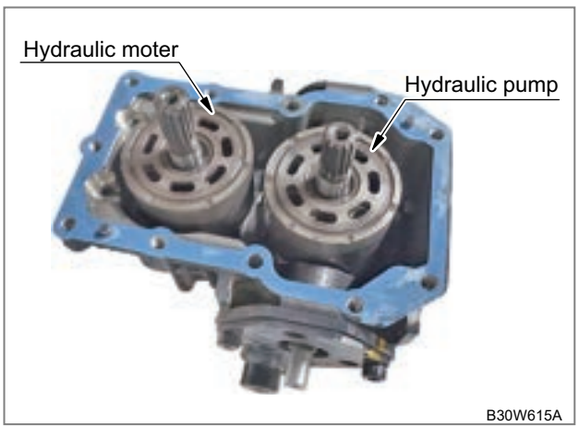
1.3 MAJOR TIGHTENING TORQUE

1. Relief valve plugs..... 31.3 ~ 37.3 Nm
   3.20 ~ 3.81 kgf-m
   23.1 ~ 27.6 lb-ft
2. Charge relief valve plug ..... 22.0 ~ 27.0 Nm
   2.25 ~ 2.75 kgf-m
   16.3 ~ 20.0 lb-ft
3. Port block bolts ..... 22.0 ~ 27.0 Nm
   2.25 ~ 2.75 kgf-m
   16.3~ 20.0 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 2 2025-04-09 오후 2:08:32

2. OPERATING PRINCIPLE


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HST (Hydrostatic Transmission) mainly consists of a hydraulic pump and hydraulic motor.

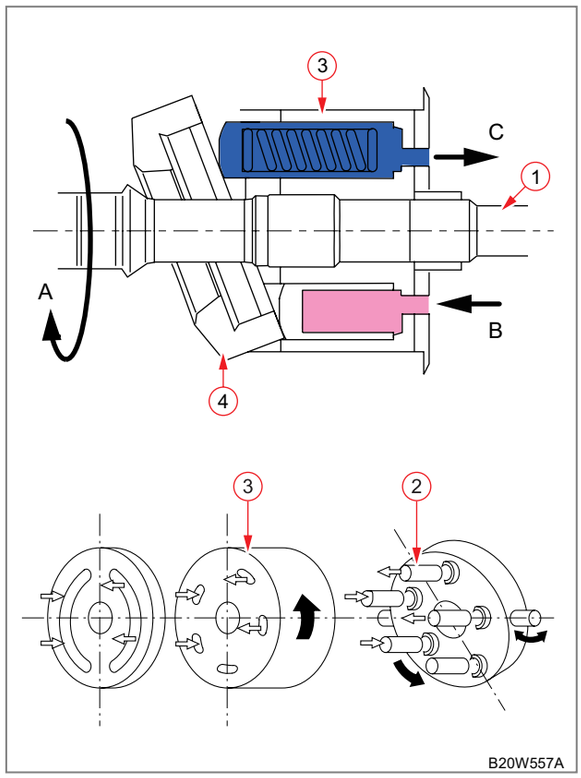
The HST pump is driven by the engine and supplies hydraulic oil to the HST motor.

The HST pump converts the rotational kinetic energy received from the engine into fluid energy. The fluid energy supplied by the pump is converted back into rotational kinetic energy in the HST motor.

The recovered rotational kinetic energy is accelerated and decelerated by the range gear set connected to the rear of the HST, and then finally decelerated by the spiral bevel gear set to drive the rear wheels through the differential.

By adjusting the tilt angle of swash plate, the driver can control the discharge flow rate and flow direction of the HST pump through the HST pedal to change the rotation speed and direction of the HST motor output shaft.

HST PUMP



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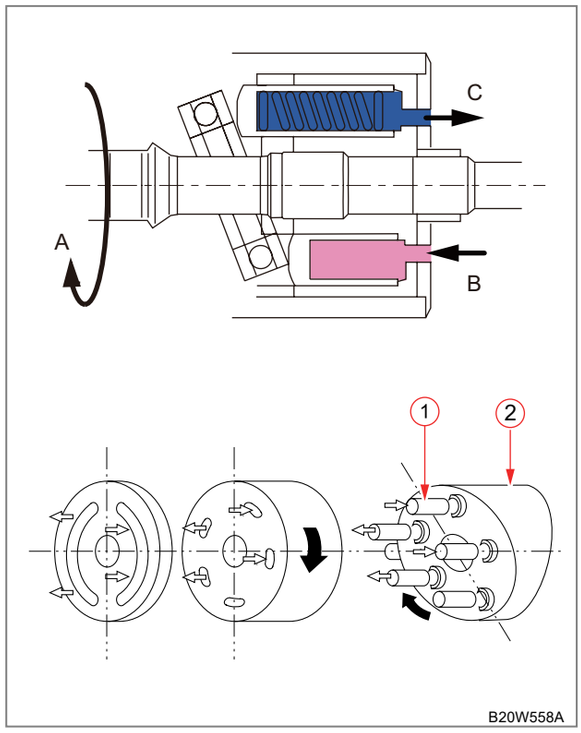
The HST pump mainly consists of a cylinder block, an adjustable swash plate and seven pistons. Each piston is loaded in one cylinder with spring and pressed against the swash plate. As the cylinder block rotating, each piston rotates and slides along the swash plate. When the swash plate (4) is tilted, the piston rotates and reciprocates simultaneously to generate the hydraulic pressure.

When the cylinder rotates one turn, each piston reciprocates one time. Thus, some pistons in the half of cylinder accomplish the compression process while the other pistons in the other half of the cylinder accomplish the suction process

If the swash plate is tilted to the opposite direction, the compression and suction process are switched each other and the direction of the fluid flow is changed. The tilt angle of the swash plate is adjusted between -15° and +15° and it determines the forward and reverse driving direction and speed.

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HST MOTOR



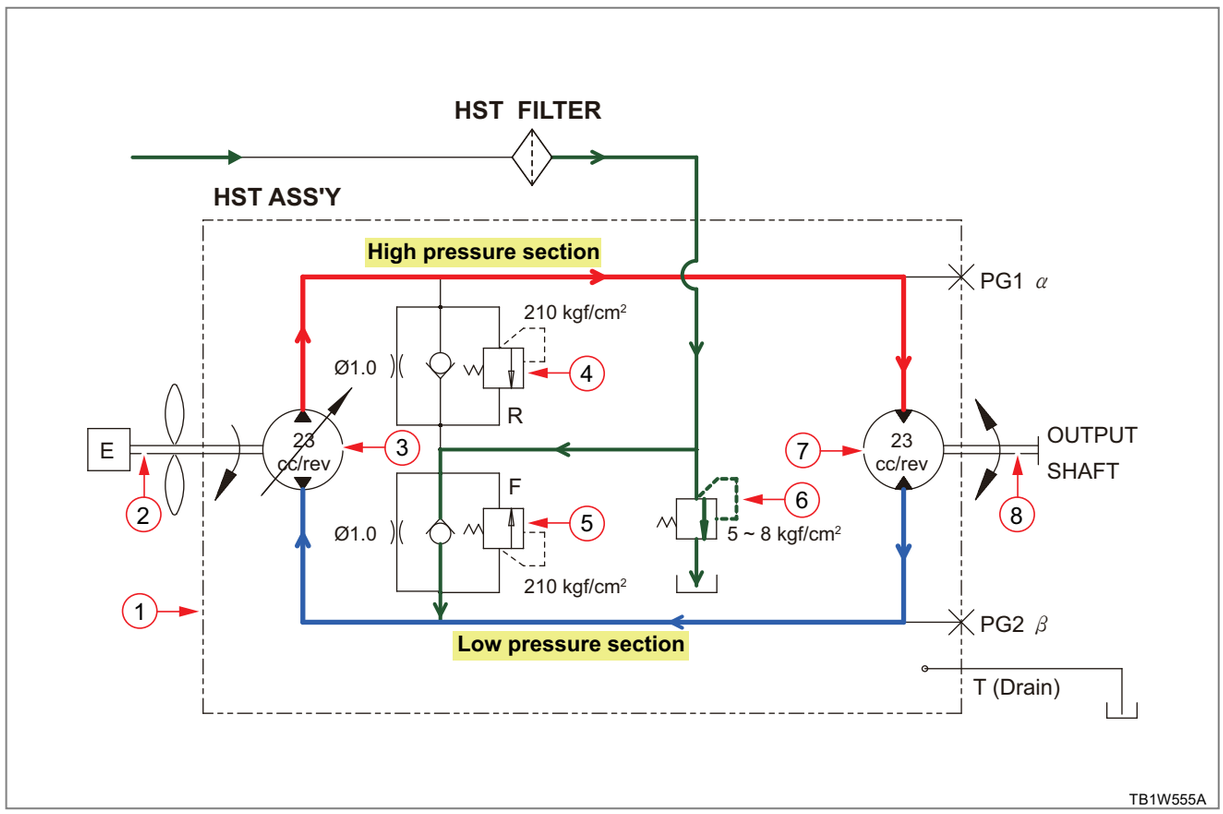
The operating fluid compressed in the pump is sent to the HST motor to rotate the motor.

The HST motor consists of a cylinder block, a fixed swash plate and seven pistons. When the operating fluid from the pump flows into pistons in the half of cylinder in HST motor, these pistons extend and try to push out the swash plate. However, since the swash plate is fixed, pistons slide to radial direction to generate rotation power of cylinder block.

The pistons in the motor are extended during half of turning and are retracted during the other half of turning. The fluid for extending pistons of motor is supplied by the compressing pistons of pump while the fluid from retracted pistons of motor is returned to the suctioning pistons of pump to complete a cycle in hydraulic circuit of the HST.

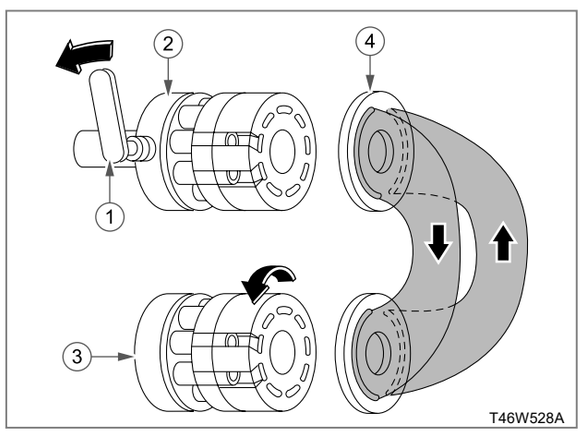
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HIGH OR LOW PRESSURE SECTION



(1) HST
(2) Input shaft
(3) HST pump
(4) Relief valve(R)
(5) Relief valve(F)
(6) Charge relief valve
(7) HST motor
(8) Output shaft

When driving the tractor forward or backward, the high pressure section is formed in the circuit by the compression process of pump and extension process of motor and the low pressure section is formed in the circuit by the suction process in pump and retraction process of motor. As the driving direction is changed (forward/reverse), the high pressure section and the low pressure section are switched each other.

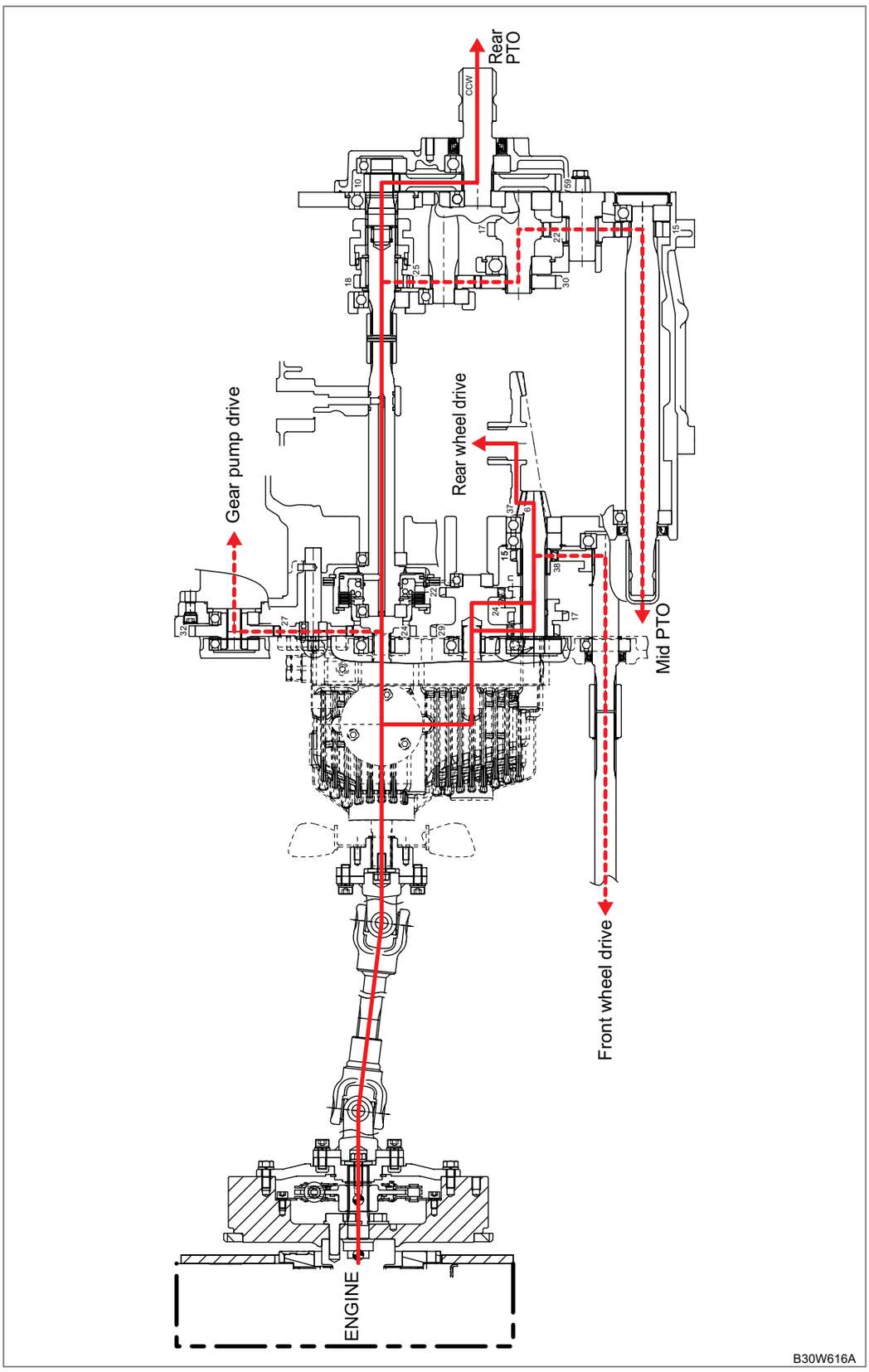


(1) Control lever
(2) HST pump
(3) HST motor
(4) Valve plate

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3. STRUCTURE AND FUNCTION

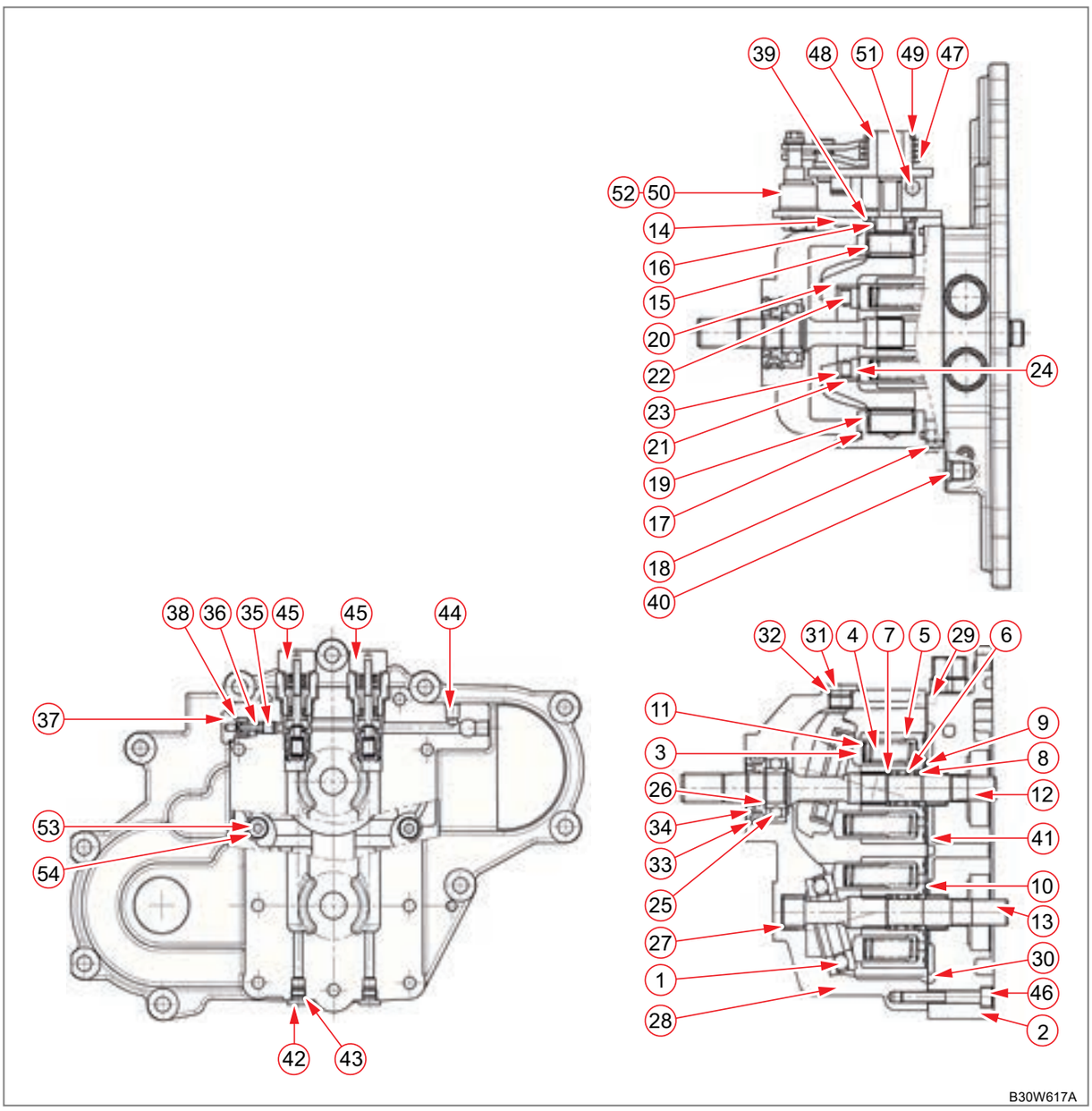
3.1 POWERTRAIN



The above figure shows the installation location of the HST in the transmission. The HST has the same functions as the main gear shift system in the mechanical tractor. It takes over the functions of the clutch, main gear shift and shuttle. The HST tractor changes the speed and switches the direction by changing the angle of the swash plate in the HST hydraulic pump. Therefore, the HST is the continuously variable transmission and does not need the clutch and the shuttle shift system. However, it needs the range shift to achieve the high torque in low speed. Also, the power loss is more significant than the mechanical type due to the hydraulic pressure loss.

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3.2 HST COMPONENTS

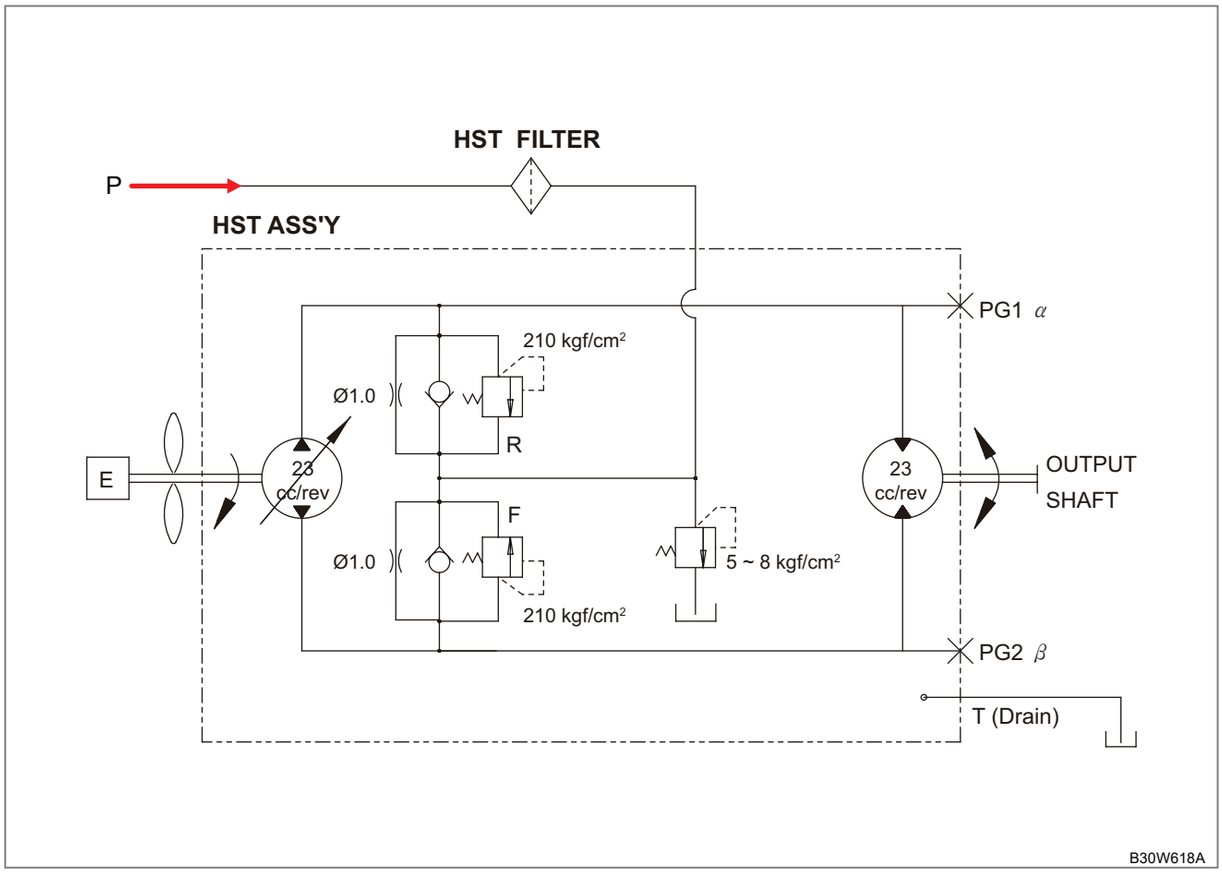


(1) Main casing
(2) Valve block
(3) Piston
(4) Spring piston
(5) Cylinder block
(6) Spring CYL'D block
(7) Spring seat
(8) Snap ring
(9) Valve plate(P)
(10) Valve plate(M)
(11) Shim piston
(12) Shaft(P)
(13) Shaft(M)
(14) Cover(A)
(15) DX bearing
(16) Oil seal
(17) O-ring
(18) Wrench bolt
(19) Cover(B)
(20) Swash plate(P)
(21) Du bush
(22) Thrust bearing
(23) B/R plate(A)
(24) B/R plate(B)
(25) Ball bearing
(26) Snap ring
(27) Needle bearing
(28) Thrust ball bearing
(29) Pin
(30) Gasket
(31) Plug
(32) O-ring
(33) Snap ring
(34) Bearing cover
(35) Check
(36) Spring
(37) Plug_check
(38) O-ring
(39) Snap ring
(40) Plastic plug
(41) Pin
(42) Plug
(43) O-ring
(44) Plug
(45) Relief valve assy(orifice)
(46) Wrench bolt
(47) Torsion spring
(48) Lever assy
(49) Snap ring
(50) Lever guide assy
(51) Wrench bolt
(52) Wrench bolt
(53) Wrench bolt
(54) Washer

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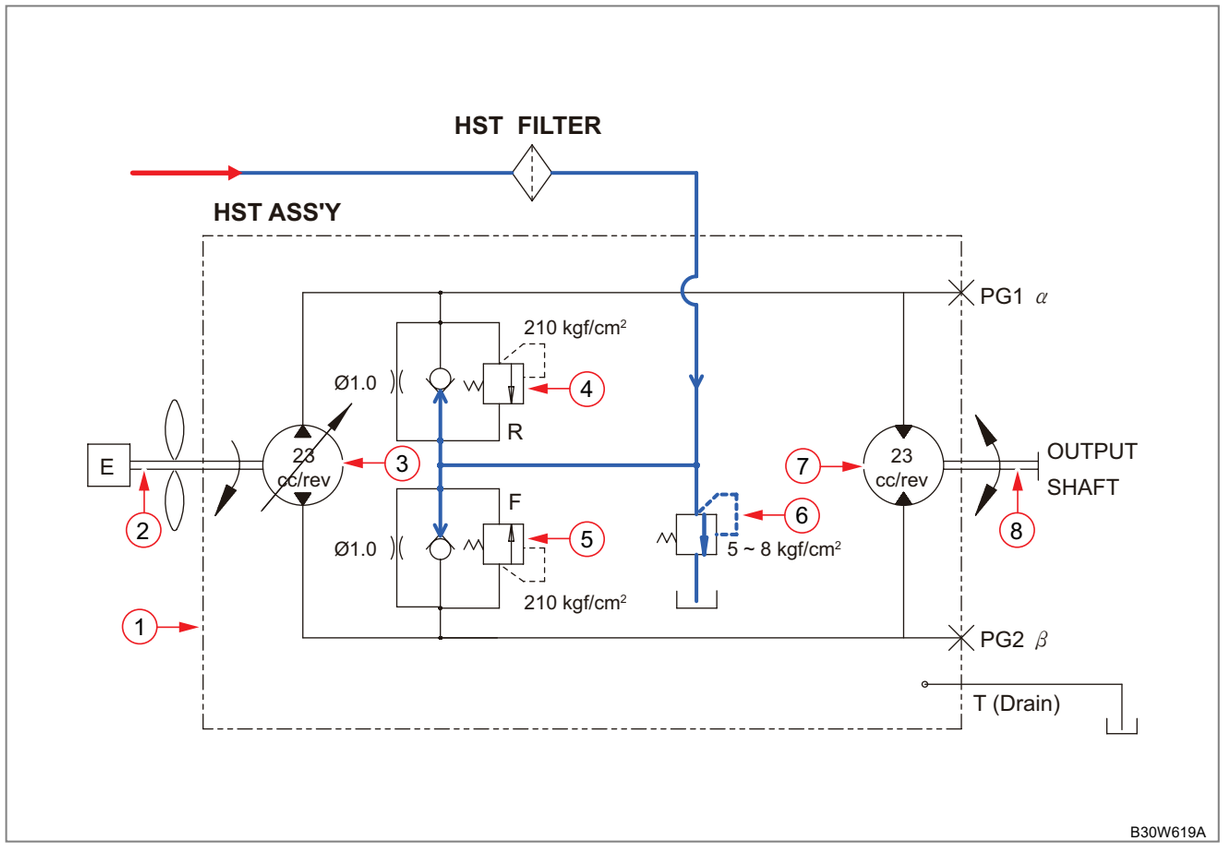
3.3 MAJOR HST COMPONENT STRUCTURE AND FUNCTION

3.3.1 CIRCUIT DIAGRAM



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3.3.2 CHARGE RELIEF VALVE



(1) HST
(2) Input shaft
(3) HST pump
(4) Relief valve(R)
(5) Relief valve(F)
(6) Charge relief valve
(7) HST motor
(8) Output shaft

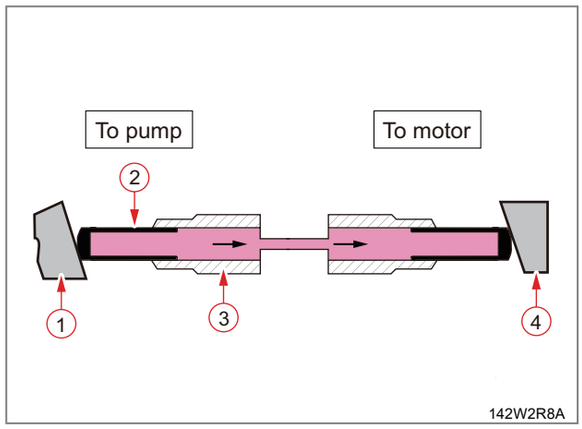


To replenish the leaked oil, it should be supplied or charged continually from the outside of HST inner-circuit. Therefore, we use the gear pump of tractor as HST charge pump. This gear pump not only for HST but for steering system, implement system and ETC.

The quantity of charge oil should be always more than possible maximum leak oil. Therefore we need charge relief valve which can return the excessive charge oil back out of HST during normal operating time. The charge relief valve is set to be open when the hydraulic pressure goes over 5 ~ 8 kgf/cm² (71 ~ 114 psi).

Charge oil can be replenished only to the low pressure section through the check valve as show in the circuit diagram, not to the high pressure section because the charge oil pressure is higher than that of only low pressure section.

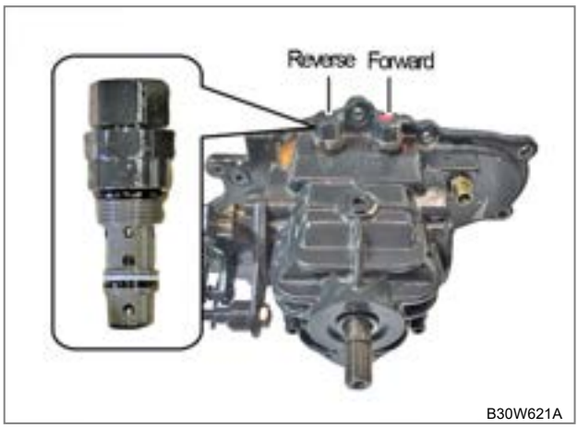
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(1) Variable swash plate
(2) Piston
(3) Cylinder
(4) Fixed swash plate

The oil in the circuit is necessarily leaks through the gap between pistons and cylinders especially in the high pressure section. It also leaks through the lubrication holes in the head of each piston. These holes are prepared for lubrication between swash plates and pistons in both of pump and motor.

3.3.3 HIGH PRESSURE RELIEF VALVE

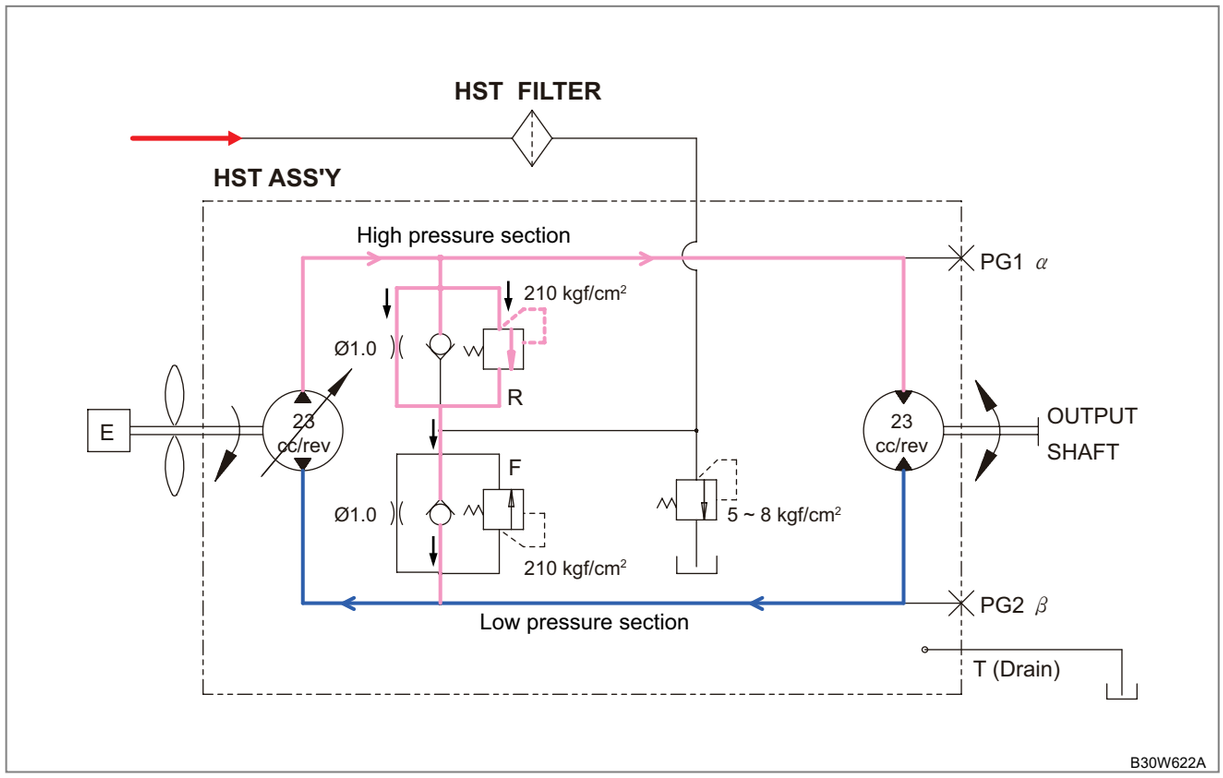


HST has two relief valves to protect circuit during forward and reverse driving. If excessive tractional load is applied to the tractor, the motor in the HST slows down or stops while the HST pump keeps rotating with engine. In this case, abnormally high pressure can build up and damage the internal parts of HST.

The relief valve prevents internal pressure from rising above 210 kgf/cm^2 (2,986 psi).

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EXAMPLE FOR OPERATION OF HIGH PRESSURE RELIEF VALVE



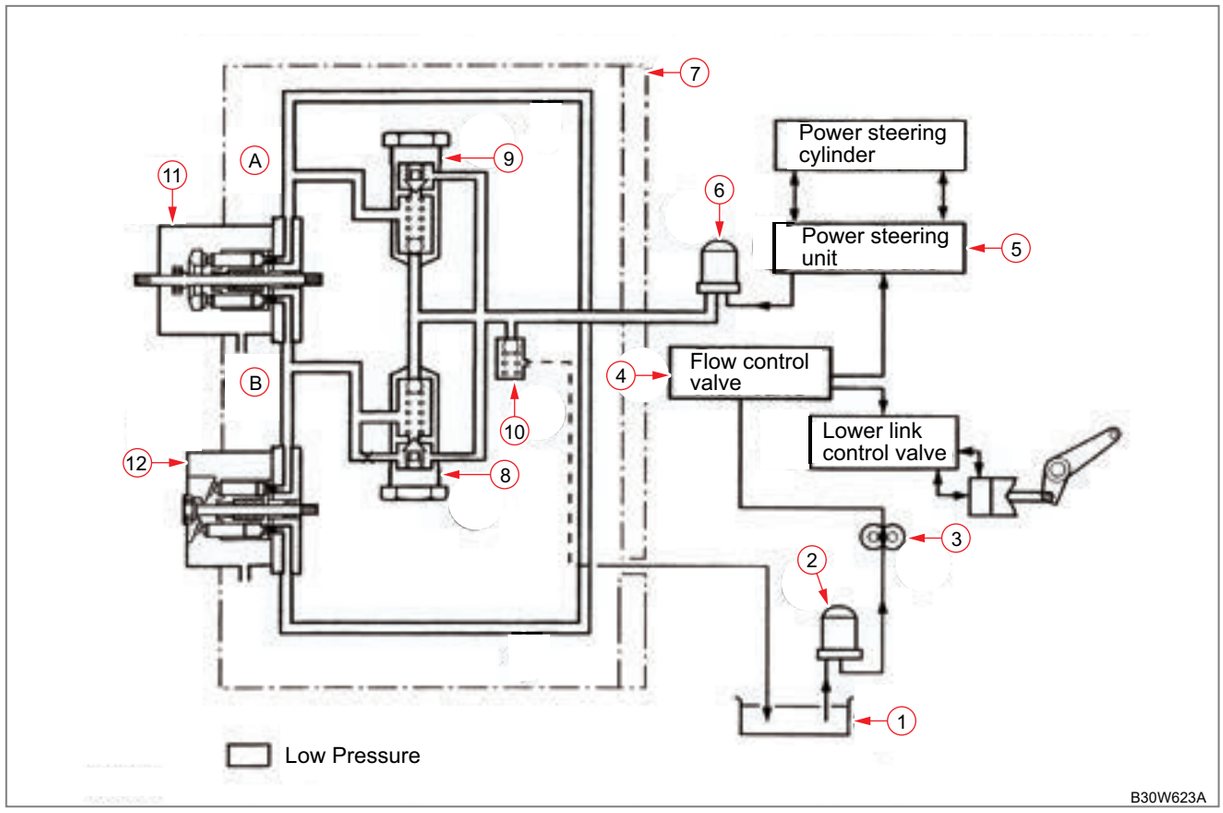
When one of relief valve opens, the fluid from high pressure section escapes through this relief valve and goes to low pressure section trough the check valve of the other relief valve or drains through the charge relief valve.

The open relief valve among two high relief valves will be switched for each forward and reverse driving.

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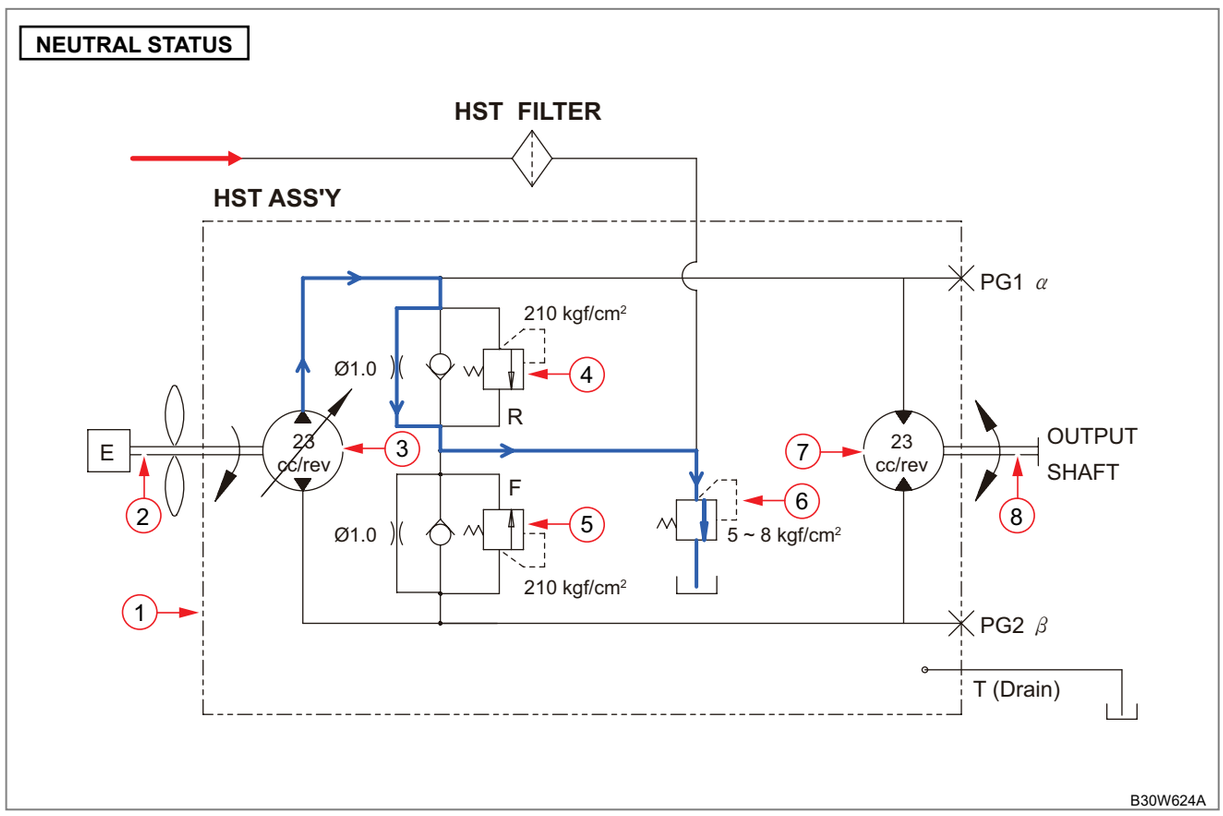
3.4 OPERATION OF HST

3.4.1 NEUTRAL STATUS



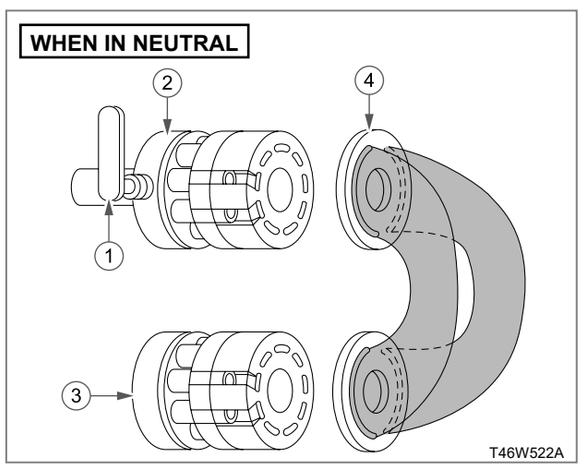
When the driver is releasing HST pedals all the way while the engine is running, in other word during the neutral state, the angle of the swash plate will almost be parallel (0°) to the cylinder of pump. If there is no neutral orifice in HST, even with almost 0° swash plate, the pump intends to supply a little amount of oil to the motor as the swash plate of pump never be true 0°. In this case the tractor intends to keep creeping.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 12 2025-04-09 오후 2:08:35



(1) HST
(2) Input shaft
(3) HST pump
(4) Relief valve(R)
(5) Relief valve(F)
(6) Charge relief valve
(7) HST motor
(8) Output shaft

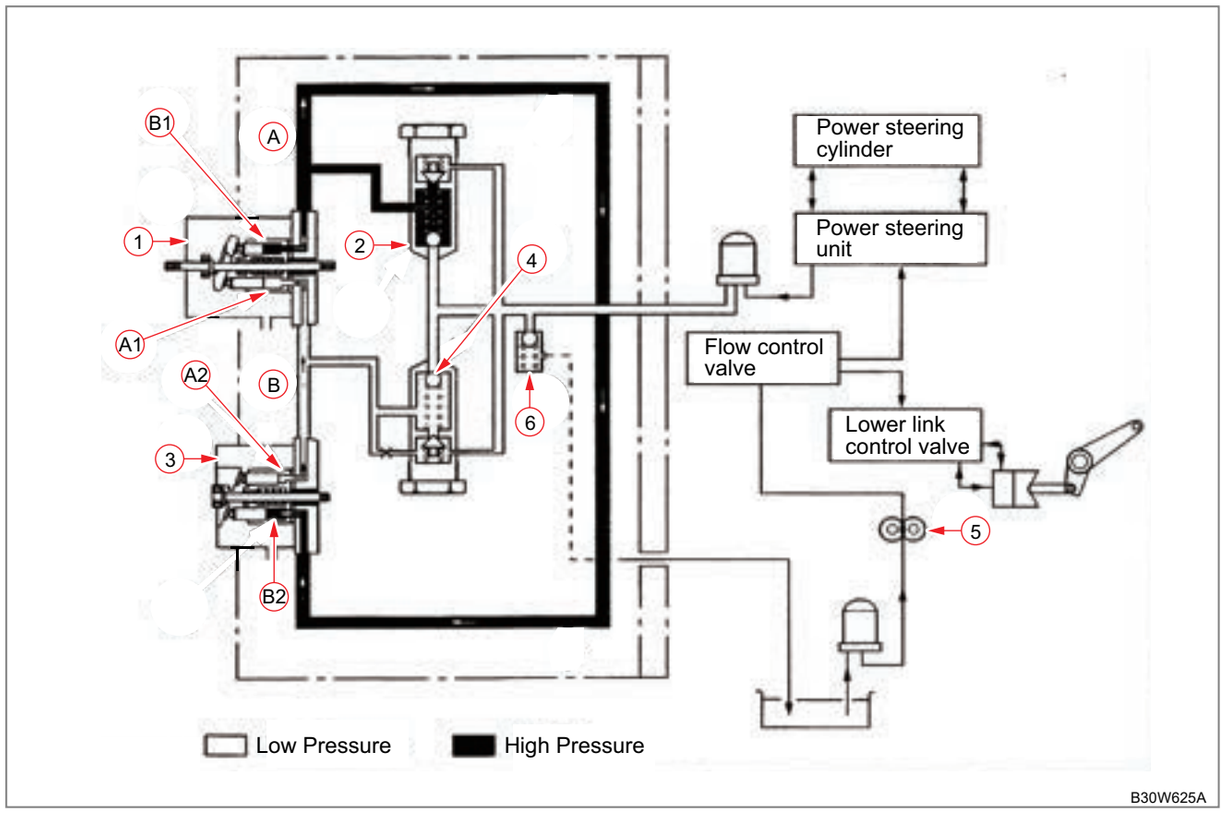
To prevent this phenomenon, a neutral orifice (A) is provided for each relief valve as shown in the circuit diagram. Now a small flow of oil supplied by the pump is discharged through this orifice hole. However, if the oil flow from the pump becomes more than the orifice can hold, the remaining oil feeds the motor and causes it to rotate.



(1) Control lever
(2) HST pump
(3) HST motor
(4) Valve plate

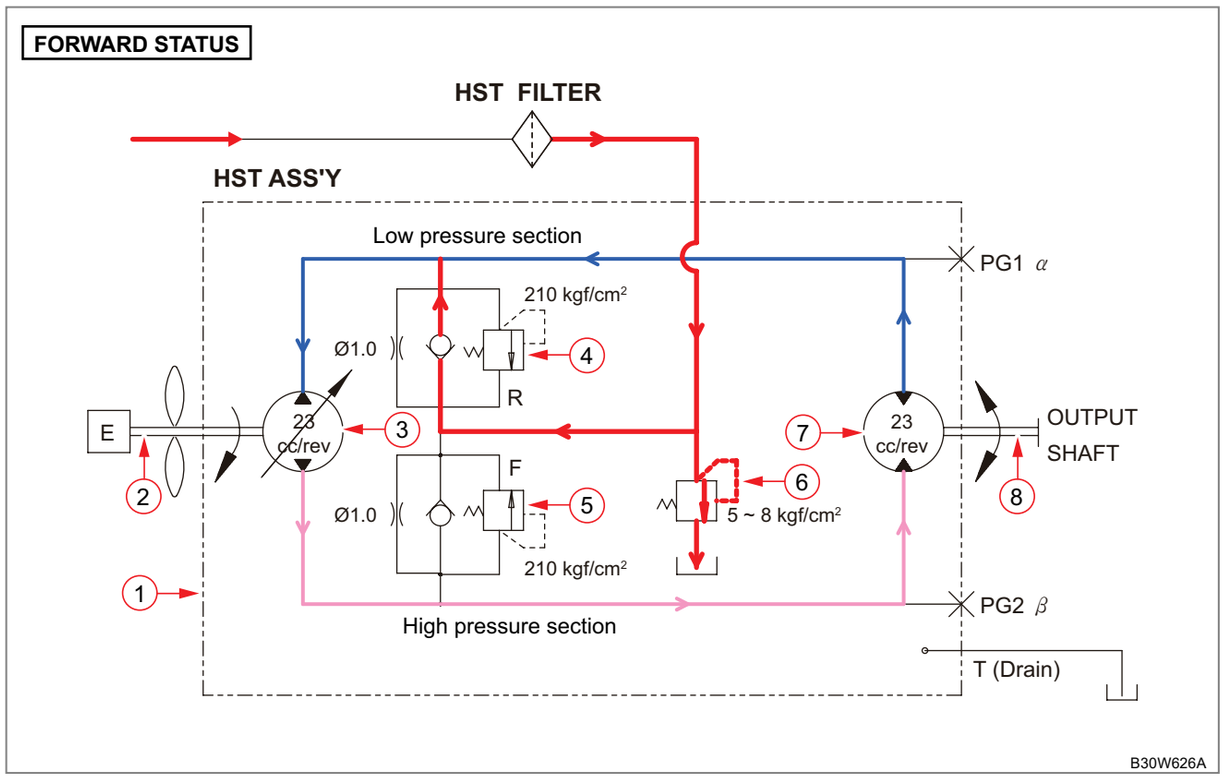
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3.4.2 FORWARD DRIVING



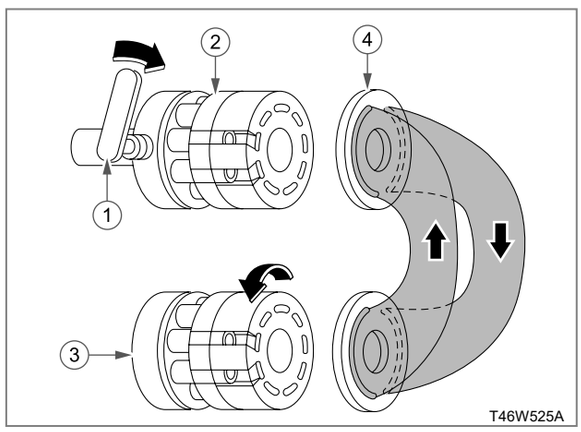
When the driver is pressing forward HST pedals while the engine is running, in other word during the forward state, the angle of the swash plate will be 0° to 15 ° to HST pump cylinder. From pistons of one half of pump, the oil will be supplied to the pistons of one half of motor. These half of pump and motor make the high pressure section. From the other half of pistons in motor, the oil come and return to the pistons in the other half of pump cylinder. These make low pressure section in the HST circuit.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 14 2025-04-09 오후 2:08:36



(1) HST
(2) Input shaft
(3) HST pump
(4) Relief valve(R)
(5) Relief valve(F)
(6) Charge relief valve
(7) HST motor
(8) Output shaft

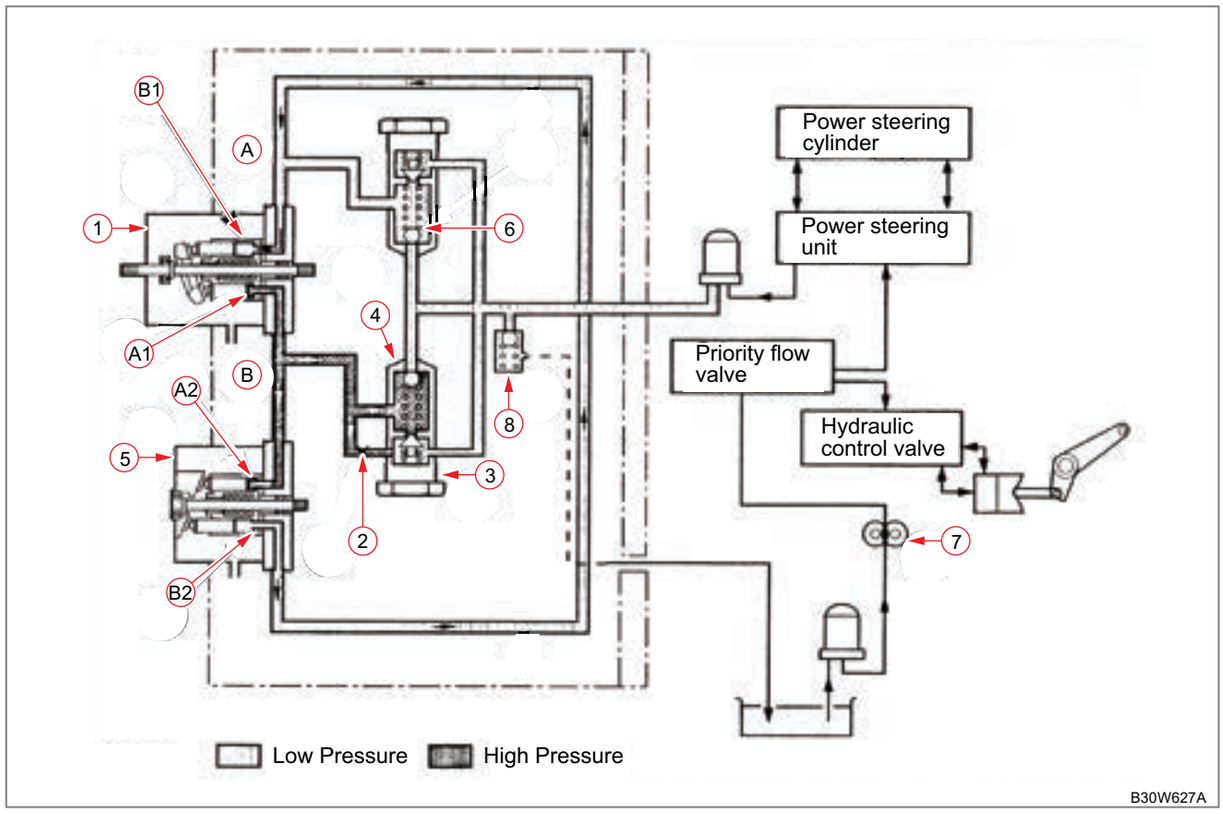
In the high pressure section, the over pressurized oil can be escaped through the relief valve to prevent engine stall or damage in the HST. In the low pressure section, the charge oil can be added through the check circuit of relief valve.



(1) Control lever
(2) HST pump
(3) HST motor
(4) Valve plate

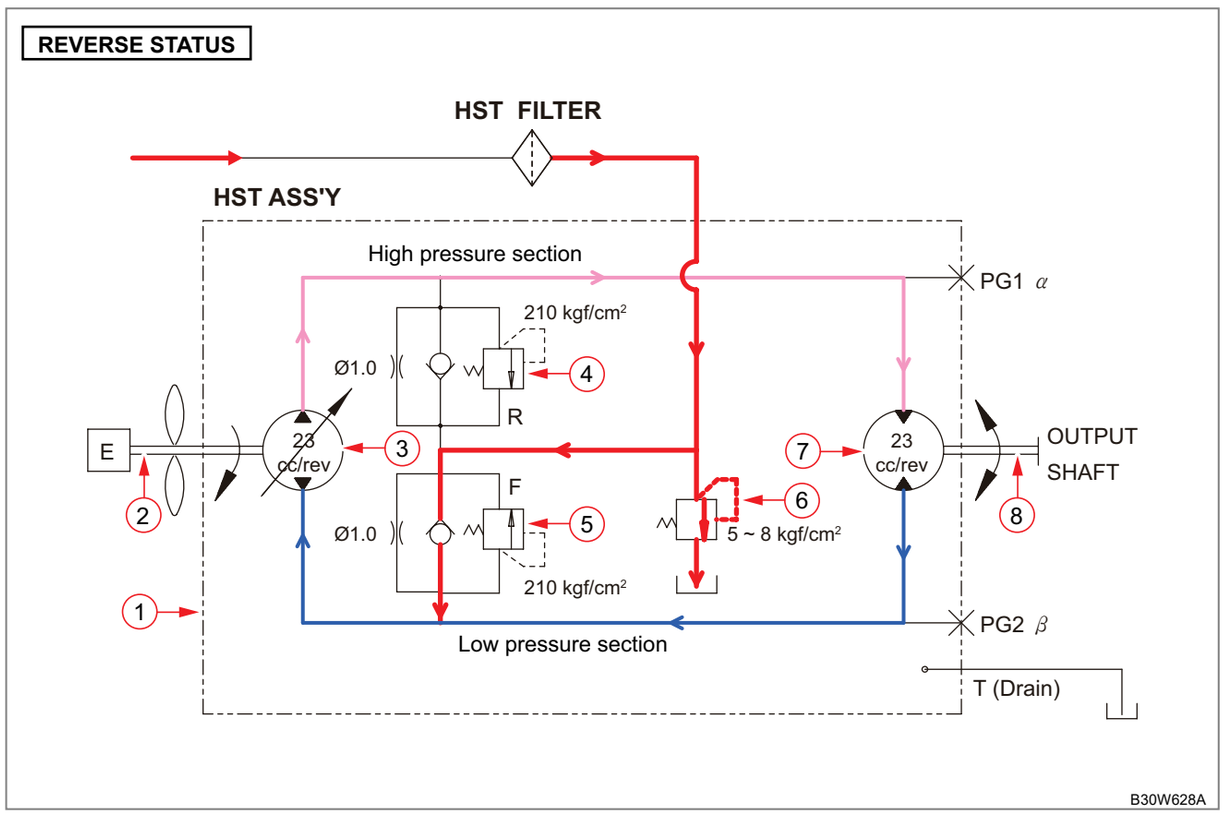
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3.4.3 REVERSE DRIVING



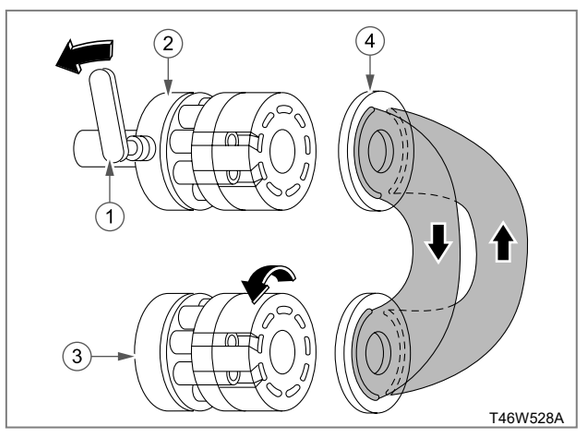
All operations of the HST in the reverse state are completely identical to those in the forward state, except for the position of the high- and low-pressure sections, which switch between each other.

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(1) HST
(2) Input shaft
(3) HST pump
(4) Relief valve(R)
(5) Relief valve(F)
(6) Charge relief valve
(7) HST motor
(8) Output shaft

To reduce the reverse speed a little, for safety, compare to forward speed, the maximum revers swash angle can be limited to less than 15 ° by the link devices such as HST reverse pedal.



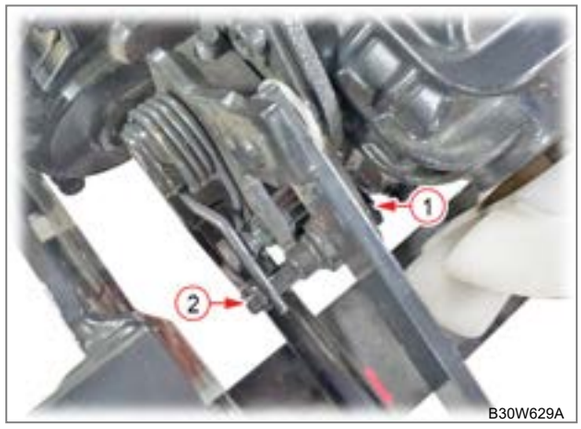
(1) Control lever
(2) HST pump
(3) HST motor
(4) Valve plate

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 17 2025-04-09 오후 2:08:37

4. INSPECTION AND ADJUSTMENT

4.1 HST NEURAL POSITION SETTING

1. Park the vehicle on level ground and stop the engine.
2. Raise the vehicle off the ground using a hydraulic jack and keep the vehicle horizontal. (Make sure that all four wheels are clear off the ground.)
3. Remove the floor and HST pedal.
4. Start the engine and shift the range shift lever to the low speed position at a low speed.



5. Unscrew the mounting nut (1) of the neutral position adjusting bolt of the HST lever guide. Then, turn the neutral position adjusting bolt (2) clockwise or counterclockwise until it meets the neutral position (stationary rear wheels). When, the neutral position is confirmed, fix the bolt by tightening its nut.

REMARK

- **When turning the neutral position adjusting bolt clockwise, the rear wheels are rotated in the forward direction. When turning it counterclockwise, the rear wheels are rotated in the backward direction.**

6. When HST neutral position adjustment is completed, stop the engine and install the HST pedal and floor.

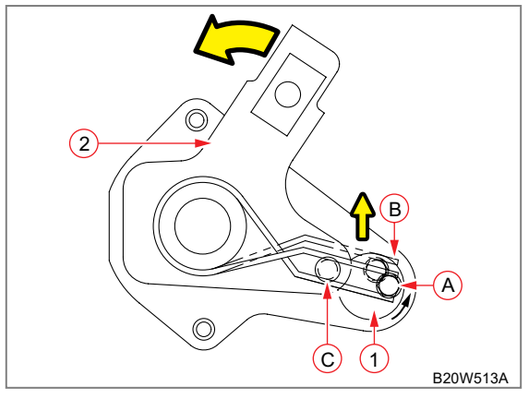
WARNING

When lifting the vehicle off the ground to adjust the neutral position, install the hydraulic jack stand carefully so that it does not interfere with each tire. When adjusting the neutral position, be careful not to overthrow the vehicle. Especially, be careful not to damage the HST cooling fan as the engine is running.

7. Lower the tractor onto the ground, sit on the seat and start the engine.
8. Check if the tractor is moved forward and backward when revving up the engine to the full speed with the forward/reverse driving pedal released and range shift lever in the low speed position.

REMARK

OPERATING PRINCIPLE OF NEUTRAL POSITION ADJUSTING BOLT



When unscrewing the mounting nut and turning the neutral position adjusting bolt (1) counterclockwise, the head of the adjusting bolt (A) in the eccentric position from the center of the bolt rises along its high trace, pushing up the upper section of the torsion spring (B).

Then, the upper section of the torsion spring supported by the protruding pin (C) of the HST control lever is raised up apart from the protruding pin and the lower section pushes up the protruding pin (C) of the HST control lever by tension. As a result, the HST control lever is rotated counterclockwise, enabling reverse driving operation.

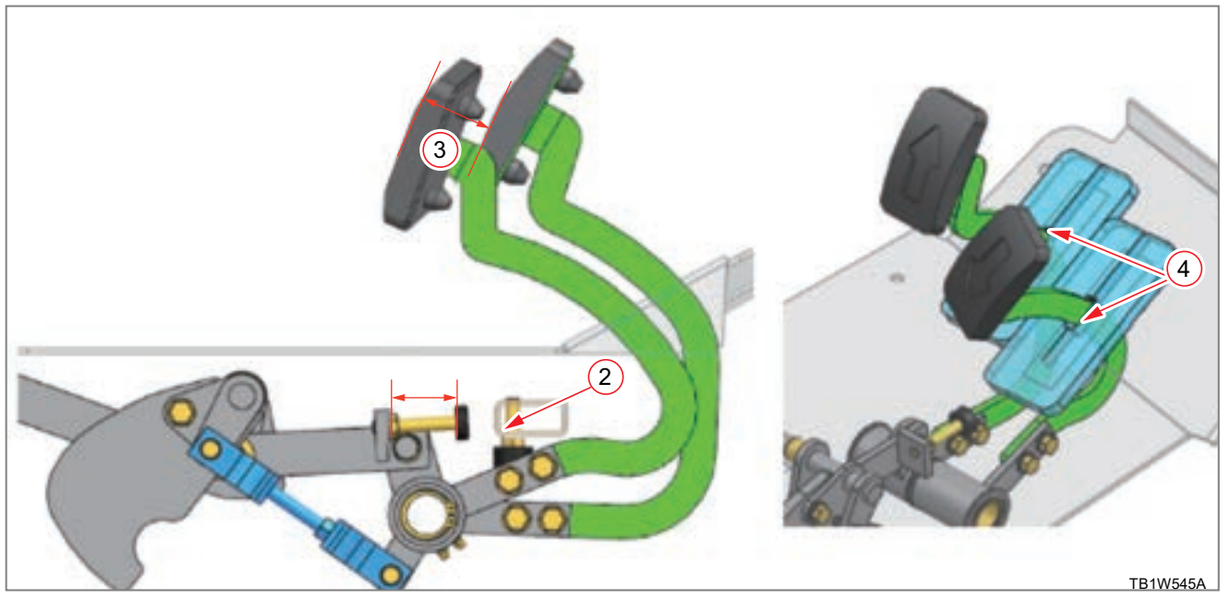
On the other hand, when turning the neutral position adjusting bolt clockwise, the head of the adjusting bolt moves downward along its high trace, pushing the lower section of the torsion spring which is then separated from the protruding part of the HST control lever.

Therefore, the protrusion of the HST control lever is pressed clockwise by tension from the upper section of the torsion spring, so the HST control lever is rotated clockwise, enabling forward driving operation.

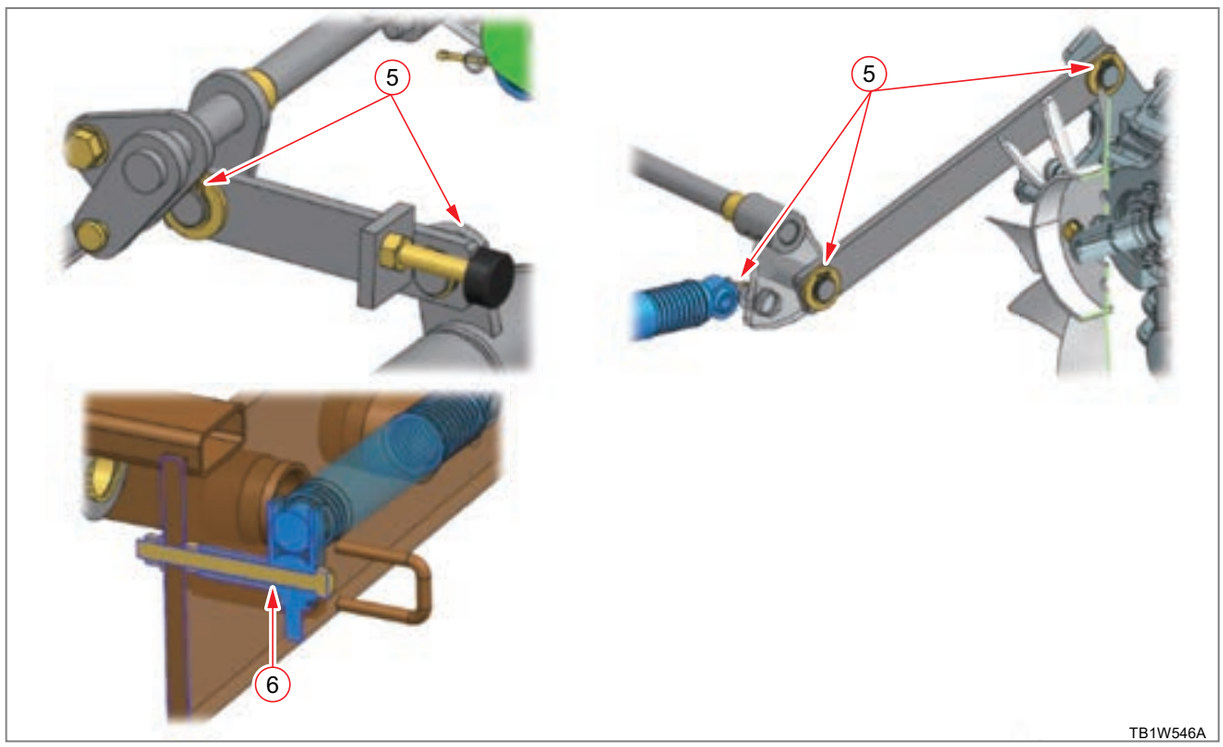
Likewise, set the neutral section by turning the neutral position adjusting bolt clockwise or counterclockwise properly.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 18 2025-04-09 오후 2:08:37

4.2 HST PEDAL ASSEMBLY TIPS (1)



1. Adjust the forward pedal stopper so that its thread length is 41mm.
2. Operate the reverse pedal stopper as short as possible.
3. Adjust the reverse pedal approximately 20mm higher than the forward pedal.
4. Attach the sponges to the HST pedal slots.



5. Apply grease to the pivot pins of links.
6. Make sure the gap between the space collar and the damper is 1~2mm to prevent the damper from getting caught.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 19 2025-04-09 오후 2:08:38

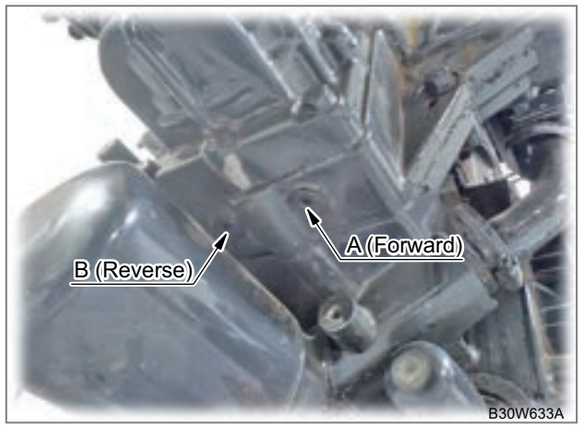
4.3 PRESSUE TESTING

⚠ CAUTION

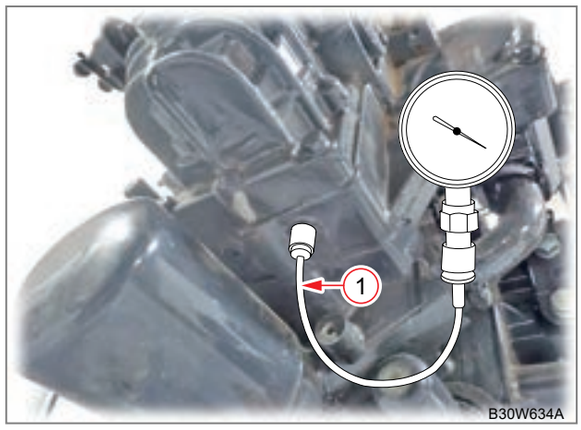
Use a floor jack to raise the tractor off the ground. Support the tractor with jack stands. Be sure all four wheels are off the ground, and jack stands do not interfere with the tires.

4.3.1 HIGH PRESSURE RELIEF VALVES

FORWARD TESTING



B30W633A

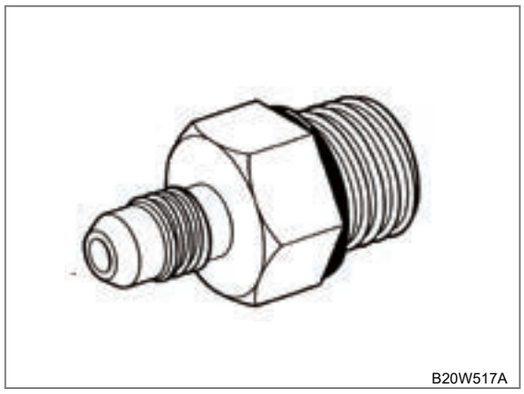


B30W634A

1. Remove the plug from port "A" (forward) and install test fitting and a hydraulic test hose (1) with a 90° end. Then attach a 0 ~ 245 bar (0 ~ 24.5 MPa, 0 ~ 250 kgf/cm², 0 ~ 3,555 psi) gauge to the hose.

REMARK

Test Fitting


B20W517A

- **size : PT 1/8 (With O-ring) x 7/16 - 20 UNF**

REMARK

Port "A" is used to check the high pressure relief valve for forward travel of the HST.

2. Start the engine and place the range shift lever in the "High" range position.
3. Apply and hold the master brake pedal.
4. Depress the "Forward" pedal 1/3 of the way down.
5. Increase the engine speed to full throttle.
6. Observe the pressure gauge. Within 2 ~ 3 seconds, the pressure reading should be approximately 206 bar (20.6 MPa, 210 kgf/cm², 2,986psi).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 20 2025-04-09 오후 2:08:39

WARNING

- **Perform the test in a open and broad area. The tractor may move unexpectedly and cause an accident.**
- **Never let anyone other than the driver get near the front and rear side of the tractor. Any observer can be hit by a tractor during the test and he/she can seriously get injured.**

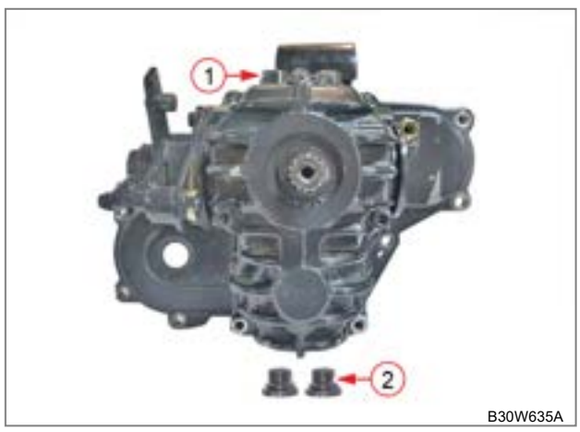
CAUTION

- **Check the transmission fluid level with the dipstick before the test and replenish the fluid if necessary. If the fluid is insufficient, it can cause damage in the HST.**

IMPORTANT

- **Do not open the relief valve for over 30 seconds to avoid the chance of oil overheating.**

7. Stop the engine.



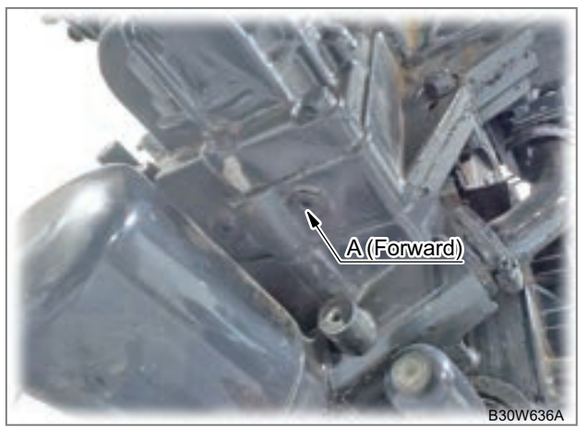
8. If the pressure reading is not at the specified value, replace the reverse high pressure relief valve (1).
9. Tighten the relief valve (1) to 31.3 - 37.3 Nm (3.2 ~ 3.8 kgf-m, 23.1 ~ 27.6 lb-ft).

REMARK

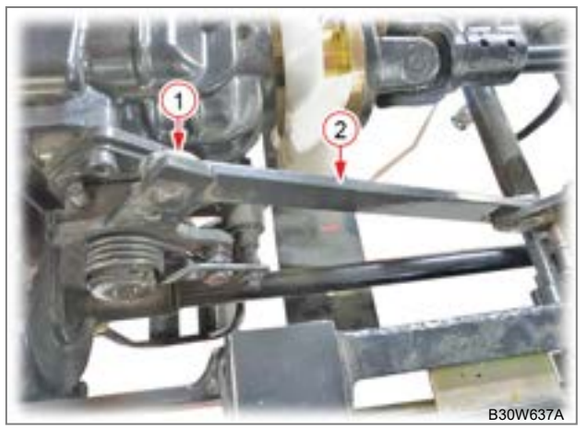
The forward and reverse, high pressure relief valves are not interchangeable.

10. Remove the gauge and install the port "B" plug (2)
11. Tighten the plug to 12.2 - 17.2 Nm (1.2 ~ 1.8 kgf-m, 9.0 ~12.7 lb-ft).

LOW (CHARGE) PRESSURE RELIEF VALVE

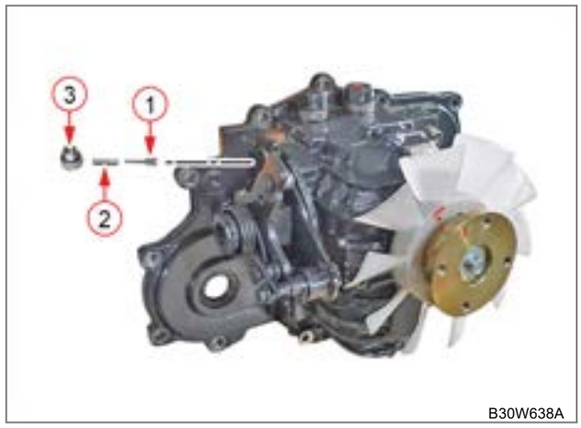


1. Remove the plug "A" from the port block.
2. Install test fitting and a 0 ~ 34.5 bar (0 ~ 3.43 MPa, 0 ~ 35 kgf/cm^2, 0 ~ 500 psi) pressure gauge in the open "A" port.



3. Remove the snap ring (1) and disconnect the HST shift link (2) from the HST unit.
4. Place the range gear shift lever in the "Neutral" position.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 21 2025-04-09 오후 2:08:40



5. Increase the engine speed to 1500 rpm and read the pressure on the gauge. The low pressure relief setting is 5.0 ~ 8.0 bar (490 ~ 784 kPa, 5 ~ 8 kgf/cm^2, 71.3 ~ 113 psi). If the pressure is different from the standard value, replace the valve (1) and spring (2).
6. To change the relief valve and spring, stop the engine and remove the plug (3).
7. Install a new valve and spring and replace the plug.
8. Tighten the plug to 12.2 ~ 17.2 Nm (1.2 ~ 1.8 kgf-m, 9.0 ~ 12.7 lb-ft).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 22 2025-04-09 오후 2:08:40

5. TROUBLESHOOTING

Symptom	Possibe cause	Remedy
Tractor fails to move when tractor directional pedal is depressed (HST output shaft does not rotate)	• Parking brake is engaged	• Release parking brake
	• Improper HST linkage adjustment or broken linkage	• Inspect linkage adjust or repair as necessary
	• Damaged hydraulic pump	• Replace hydraulic pump
	• Charge pressure is low	• Test charge pressure circuit and valve and repair or replace parts as necessary
	• High pressure relief/check valve(s) malfunctioning	• Check high pressure relief/check valves and springs, replace as necessary
	• Charge pressure relief valve mal-functioning	• Inspect charge pressure relief valve and spring for proper operation
	• Air is mixing with hydraulic oil	• Check hydraulic oil level and fluid line connections for possible air leakage
	• Mechanical failure	• Inspect tractor drive train
Tractor does not stop moving when directional pedal is released (Output shaft fails to stop rotating when directional pedal is released)	• Directional pedal linkage or HST linkage not adjusted properly or is excessively dirty	• Adjust linkage or clean as neces-sary
	• High pressure relief/check valve(s) malfunctioning	• Check high pressure relief/check valves and springs, replace as necessary
	• High pressure relief/check valve seat(s) worn or damaged	• Inspect valve seats in port block
Low Power (HST output shaft not turning at full capacity)	• Hydraulic oil level incorrect	• Check fluid level and add or re-move hydraulic oil as needed
	• Hydraulic oil flow is restricted by clogged HST filter	• Replace HST hydraulic filter
	• Air is mixing with hydraulic oil	• Check hydraulic oil level and line connections for possible air leakage
	• Hydraulic oil temperature too high or too low	• Check oil temp and condition, let cool or warm as necessary.
	• Internal HST components worn or damaged causing high pressure fluid leakage	• Change fluid as needed
		• Clean HST outer case cooling fins and check cooling fan for blade damage
		• Clean and inspect internal HST components such as the valve plates, housing, and valves
	• High reliefs open at lower pressure than specified	• Replace high relief valves.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 23 2025-04-09 오후 2:08:40

Symptom	Possibe cause	Remedy
Abnormal internal sound emanating from the HST unit.	• Hydraulic oil flow is restricted by clogged HST oil filter	• Replace HST hydraulic filter
	• Air is mixing with hydraulic oil	• Check hydraulic oil and line connections for possible air leakage
	• Hydraulic oil temperature too high or too low	• Check oil temp and condition; let cool or warm as necessary. • Change oil as needed
	• Internal HST components worn or damaged causing high pressure fluid leakage	• Clean HST outer case cooling fins and check cooling fan for blade damage • Clean and inspect internal HST components such as the valve plates, housing, and valves
	• Directional pedal linkage or HST linkage not adjusted properly	• Adjust linkage as necessary
Hydraulic oil leaking out of HST seal(s)	• Possible damaged O ring or oil seal	• Inspect oil seals and o rings and replace as necessary
	• Internal pressure in HST housing too high	• Inspect hydraulic pump and motor for wear and replace parts as necessary. HST housing internal pressure should not exceed 0.1 MPa (1.0 kgf/cm^2)
	• Hydraulic fluid return to sump tube clogged	• Remove tube and inspect for obstructions
Machine keeps creeping or slow HST pedal return	• Incorrect neutral setting pedal link binding weak return spring on the pedal link.	• Correct the neutral settings on the HST. • Replace the pedal return spring.
	• Bad damper cylinder.	• Replace the damper cylinder.

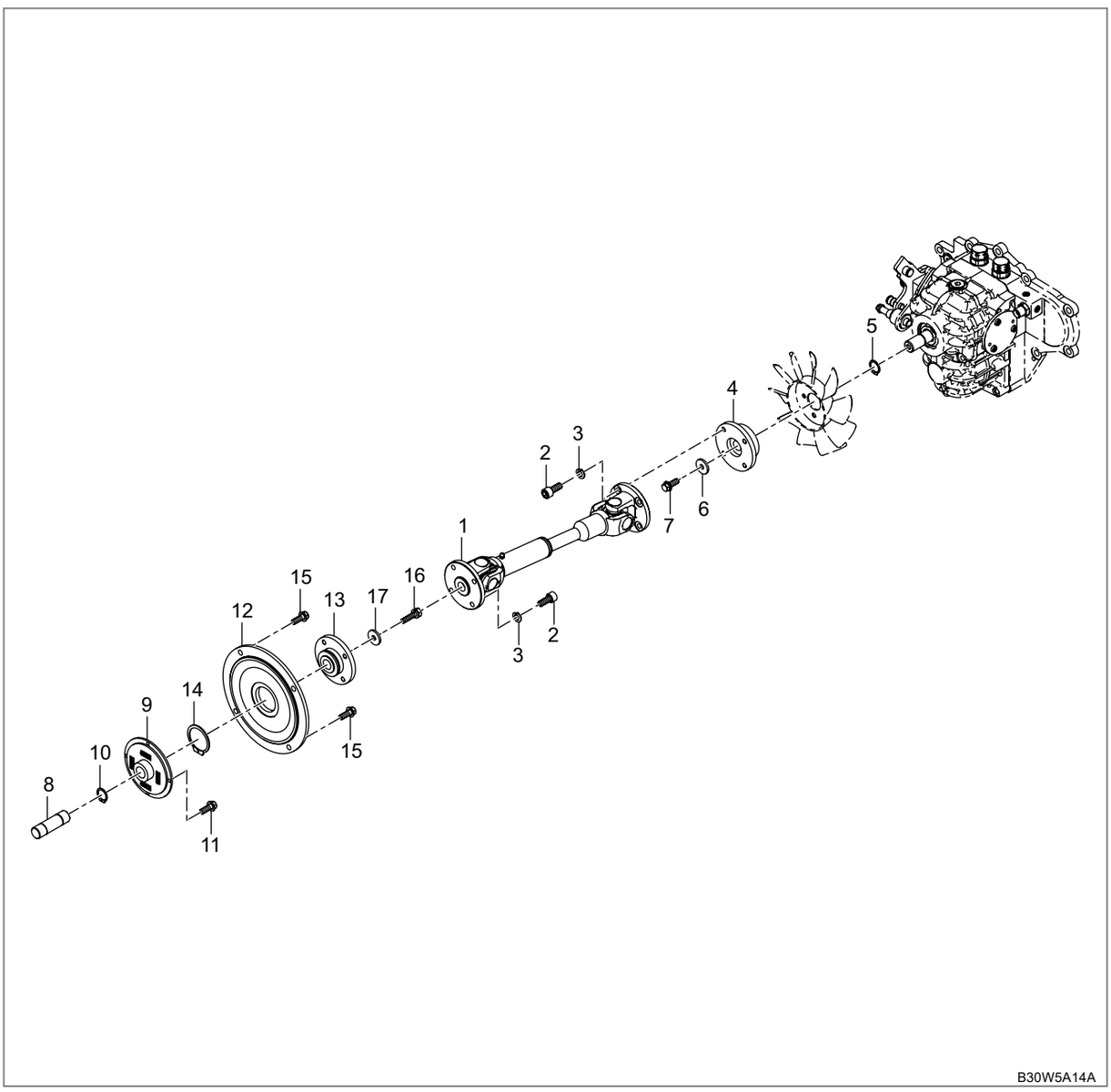
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6. EXPLODED VIEW OF HST

REMARK

The part numbers and shapes of the following components are subject to change without notice for improvement of the product. If necessary, refer to the DAEDONG electronic manual, DEMSS.

6.1 TB3-G211001 CLUTCH

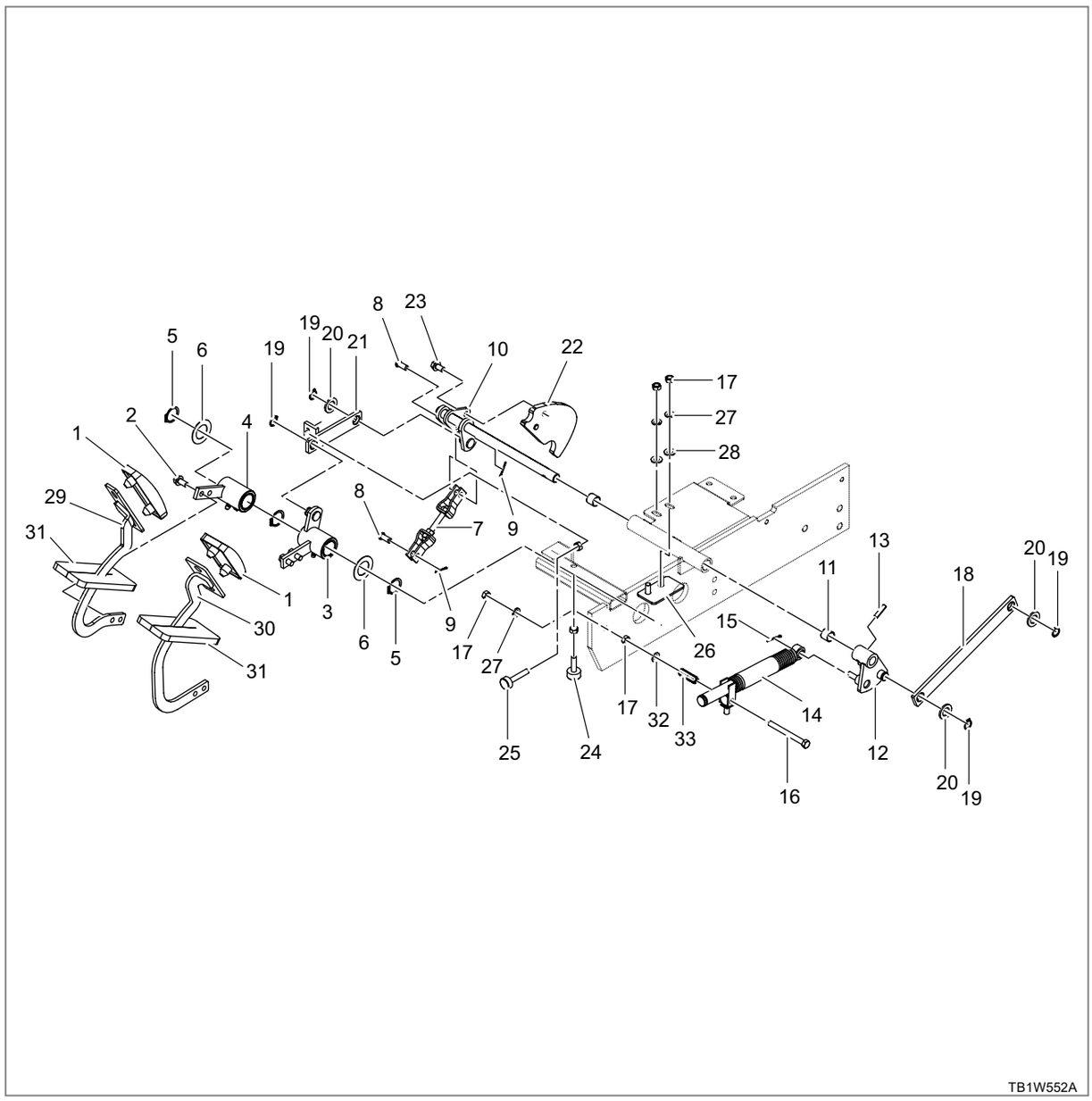


COMPONENTS

(1) Joint
(2) Bolt, Hexagon Socket
(3) Spring Washer
(4) Joint Hub
(5) Snap Ring
(6) Washer
(7) Bolt, Washer
(8) Shaft
(9) Assy,Demper
(10) Snap Ring
(11) Lench Bolt
(12) Joint Holder
(13) Joint Hub
(14) Ring,Snap
(15) Bolt, Washer
(16) Bolt With Washer
(17) Washer

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 25 2025-04-09 오후 2:08:40

6.2 TB3-G647503 HST PEDAL

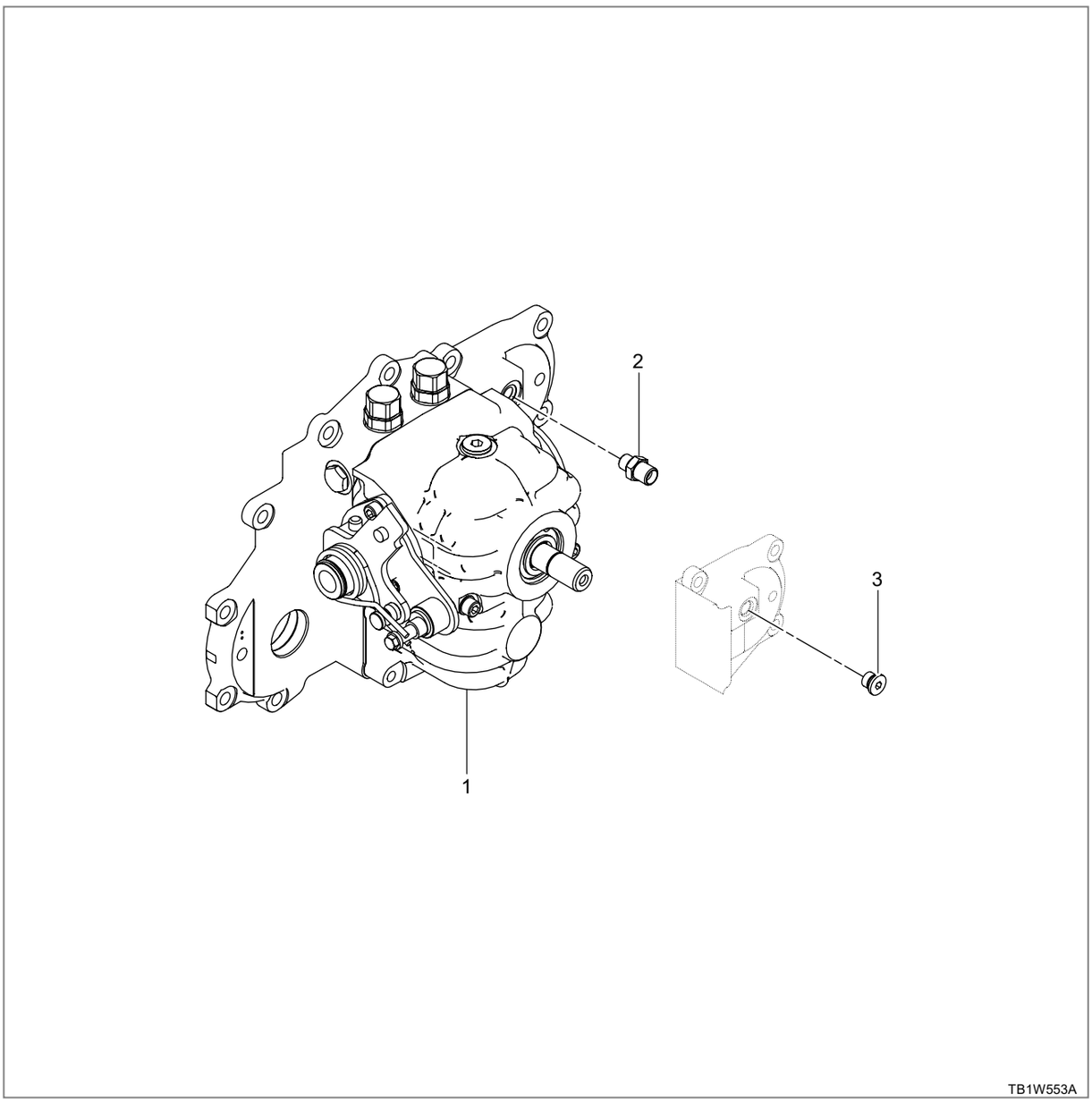


COMPONENTS

(1) Rubber, Pedal
(2) Bolt, Flange
(3) Assy arm, HST pedal-LH
(4) Assy arm-RH
(5) Snap ring
(6) Spacer
(7) Rod assy, HST
(8) Joint pin
(9) Pin, Split
(10) Shaft, HST pedal linkage
(11) Bush
(12) Arm, HST pedal-3
(13) Pin, Spring
(14) Assy, Damper
(15) Pin, Split
(16) Bolt
(17) Nut
(18) Plate, Connecting-1
(19) Snap ring
(20) Washer, Plain
(21) Plate, Connecting-2
(22) Plate-cruise
(23) Flange bolt
(24) Bolt, Adjusting
(25) Bolt, Cushion
(26) Bracket, Cruise
(27) Spring washer
(28) Washer
(29) Bracket, HST pedal-reverse
(30) Bracket, HST pedal-forward
(31) Sponge HST pedal
(32) Sponge HST pedal
(33) Washer
(34) Spring damper

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 26 2025-04-09 오후 2:08:41

6.3 TB3-G422002 HST ASSY



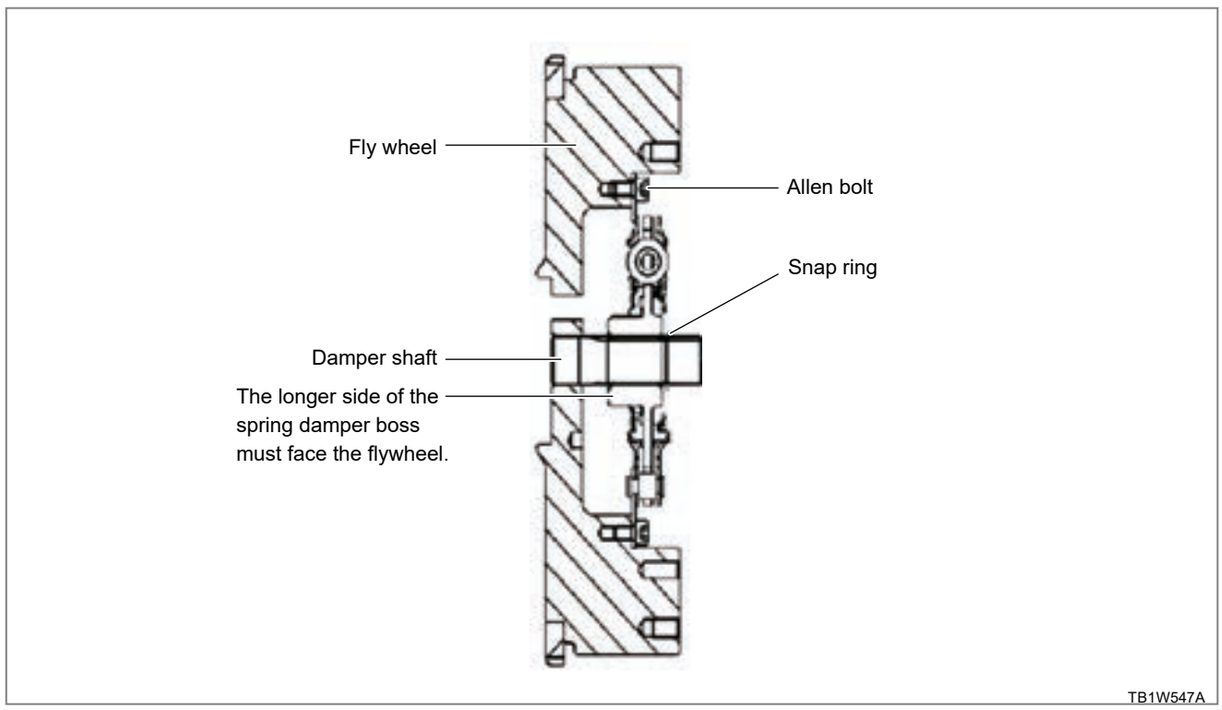
COMPONENTS

(1) HST Assembly
(2) Connector
(3) Plug

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 27 2025-04-09 오후 2:08:41

7. SERVICING

7.1 DAMPER PLATE ASSEMBLY TIPS

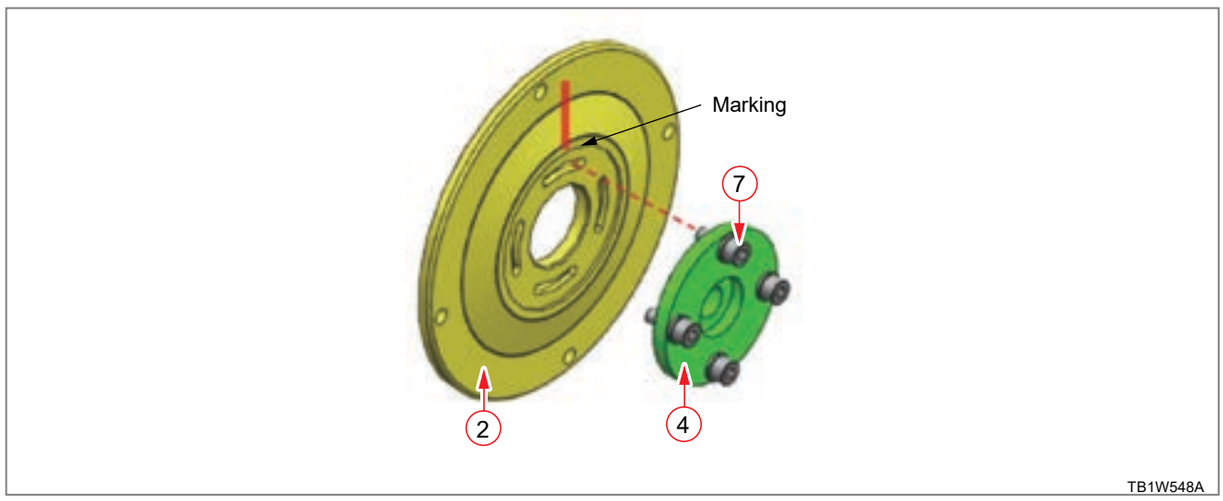


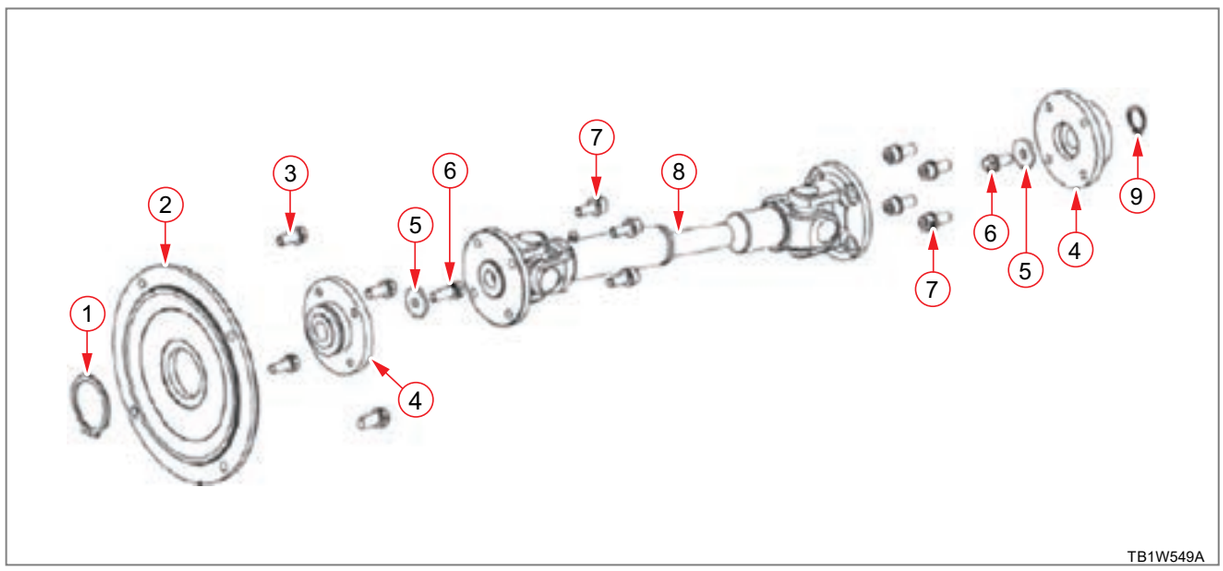
When assembling the spring damper to the flywheel, assemble it in the exact center using the damper shaft (8) as a guide. To assemble the bolts evenly, apply torque step by step in a diagonal order.

• Tightening torque : M6(Allen bolt)..... 10.79 ~ 11.28 Nm
1.10~1.15kgf.m
7.96 ~ 8.32 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 28 2025-04-09 오후 2:08:41

7.2 MAIN JOINT SHAFT ASSEMBLY TIPS





(1) Snap ring
(2) Joint holder
(3) Washer bolt
(4) Jount hub
(5) Flat washer
(6) Allen bolt
(7) Main joint shaft

When assembling the joint hub (4), apply grease to the inner spline.

When assembling the Allen bolt (7) and washer bolt (6), apply Loctite and assemble with the specified torque.

• LOCTITE 271 or equivalent

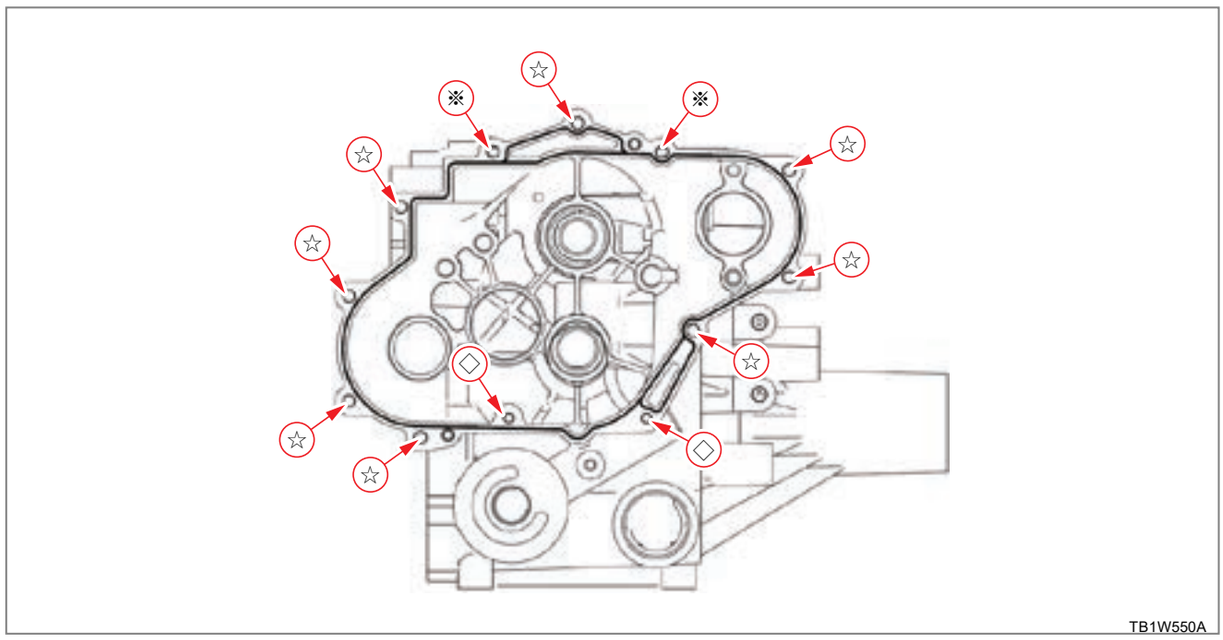
• Allen bolt (7) tightening torque..... 29.4 ~ 34.3 Nm
3.0~3.5kgf.m
21.7 ~ 25.3 lb-ft

• Washer bolt (3, 6) tightening torque..... 23.5 ~ 27.5 Nm
2.4~2.8kgf.m
17.4 ~ 20.3 lb-ft

When assembling the joint holder (2) and joint hub (4), mark the center of the long hole as shown in the picture and then assemble it so that the bolt of the joint hub is at the marked position.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 29 2025-04-09 오후 2:08:41

7.3 HST ASS'Y AND TRANSMISSION DOCKING TIPS



1. Apply sealant to the contact surfaces of the HST ass'y and transmission case. Follow the sealant application pattern as shown in the picture. Otherwise, it may cause oil leak.
   - **Sealant : ThreeBond 1206D or equivalent**

   Check the assembly locations of bolts, studs and nuts and tighten them in diagonal order. Otherwise, it may cause loosening or oil leak.

Location and tightening torque for bolts and studs

- ※ 01517-51030 (stud, M10) : 2 EA, 2.5 kgf.m
- ☆ 01133-51040 (washer bolt, M10): 8 EA, 4.9 kgf.m
- ◇ 01123-50885 (washer bolt, M8): 2 EA, 2.4 kgf.m

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 30 2025-04-09 오후 2:08:41

7.4 HST REMOVAL

1. Park the tractor on firm level ground, stop the engine and apply the parking brake.
2. Open the hood and disconnect the negative battery cable.
3. Remove the floor, ROPS, seat and fender.
4. Remove the transmission assembly.

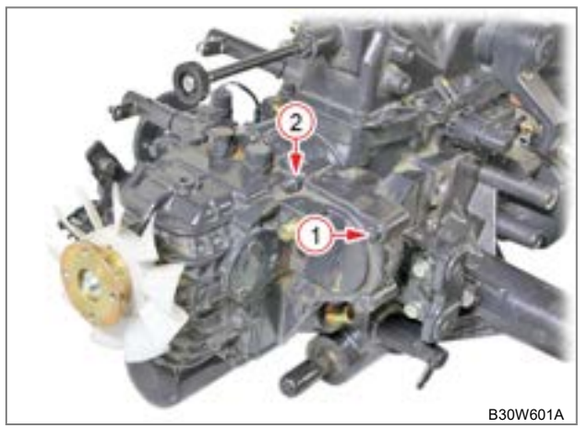
REMARK

- **The O-rings on the joint bolt mounting section of the HST charge tube (3) and hydraulic pipe (2) should be installed to the upper and lower sections respectively after applied with grease.**

  Joint bolt
  tightening torque ..... 39.2 ~ 44.1 Nm
  4.0 ~ 4.5 kgf-m
  28.8 ~ 32.4 lb-ft

- **When installing the HST filter (4), apply a thin film of grease onto the rubber ring and tighten it with a hand firmly.**

  HST filter bracket
  mounting bolt
  tightening torque ..... 23.5 ~ 27.4 Nm
  2.4 ~ 2.8 kgf-m
  17.3 ~ 20.2 lb-ft

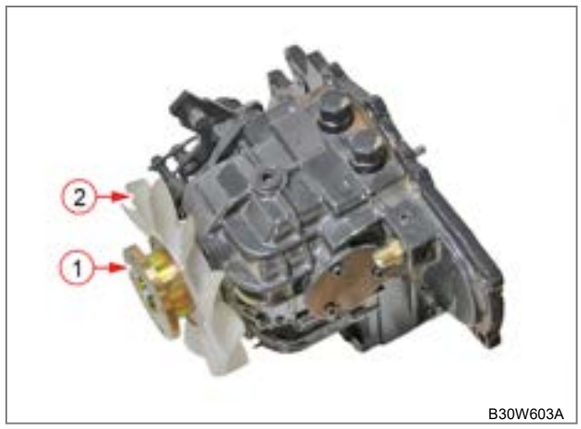


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5. Unscrew the HST mounting bolts (1) and nuts (2) to remove the HST.

   HST mounting bolt
   tightening torque ..... 15.7 ~ 20.6 Nm
   1.6 ~ 2.1 kgf-m
   12.0 ~ 15.0 lb-ft



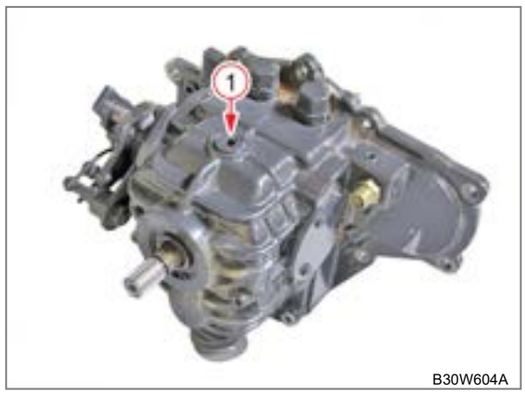
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6. Remove the joint hub (1) and HST cooling fan (2).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 31 2025-04-09 오후 2:08:41

7.5 HST COMPONENTS DISASSEMBLY

REMARK

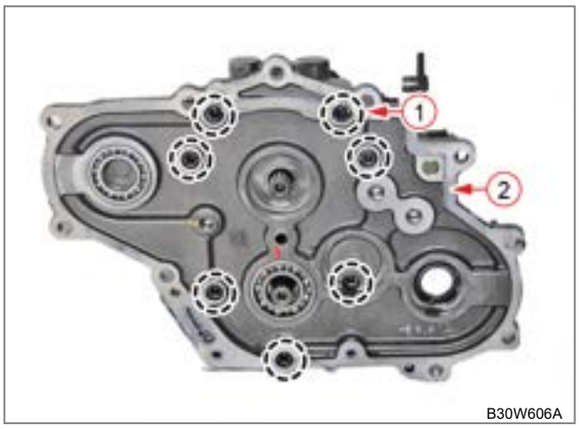


• Before removing the HST, unscrew the drain plug (1) and drain transmission fluid.



1. Remove the side lever assembly (1).

Lever guide mounting bolt
Tightening torque .....25.0 Nm
2.55 kgf-m
18.4 lb-ft



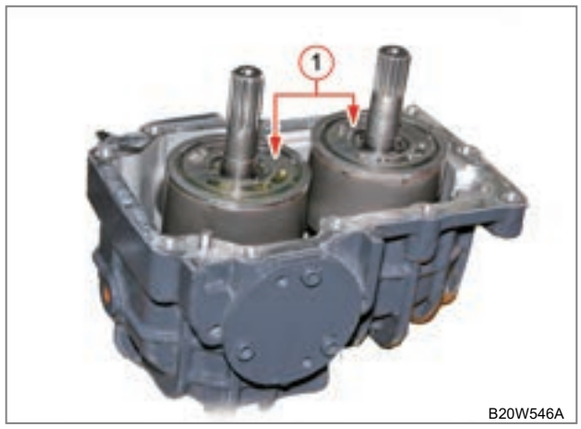




2. Unscrew the mounting bolts (1) from the HST main casing to separate the HST valve block (2).

Mounting bolt
Tightening torque .....25.0 Nm
2.55 kgf-m
18.4 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 32 2025-04-09 오후 2:08:42



3. Remove the valve plates (1).

REMARK

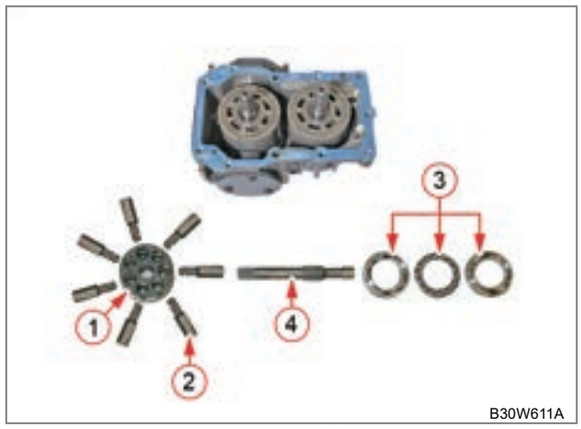
VALVE PLATE MOUNTING IDENTIFICATION



- **For pump : No oil groove.**



- **For motor : Oil grooves are formed only in one end.**



4. Remove the cylinder block (motor) (1), piston assembly (2), thrust bearing (3) and motor shaft (4) from the HST main casing in order.



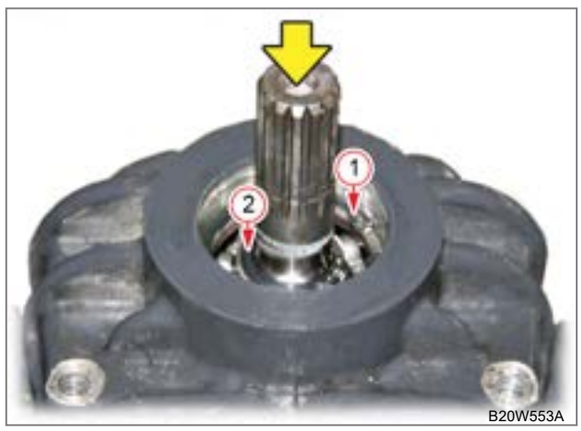
5. Remove the cylinder block (pump) (1), piston assembly and thrust bearing from the HST main casing.

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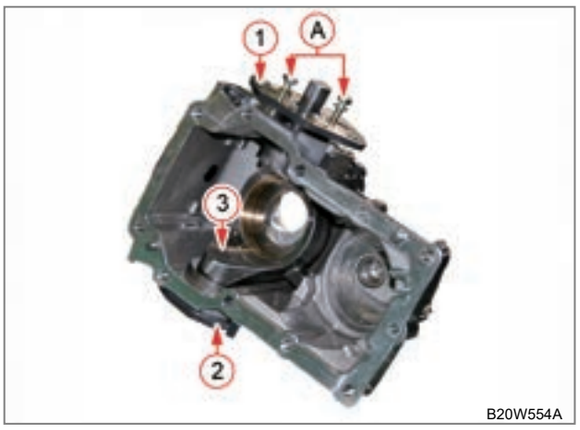




6. Remove the snap ring (1), bearing cover (2) and oil seal (3) from the pump shaft.



7. Remove the pump shaft mounting snap rings (1 & 2) and tap the pump shaft to remove the pump shaft and ball bearing simultaneously.

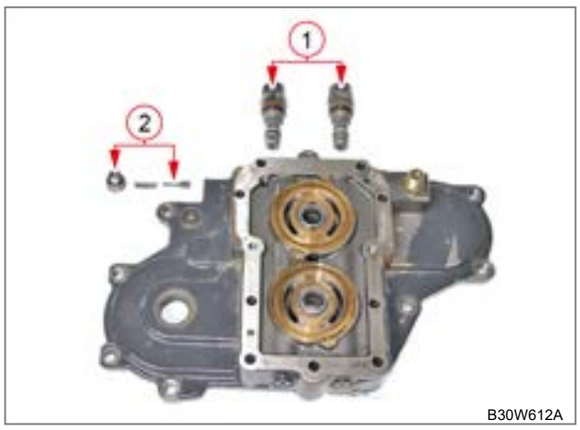


8. Remove the upper and lower covers (1), (2) from the main casing. Then, remove the swash plate (3).

REMARK

- **When removing the covers (Upper & Lower), install service bolts (A) to the holes for removal and turn them for the same amount to remove the covers.**

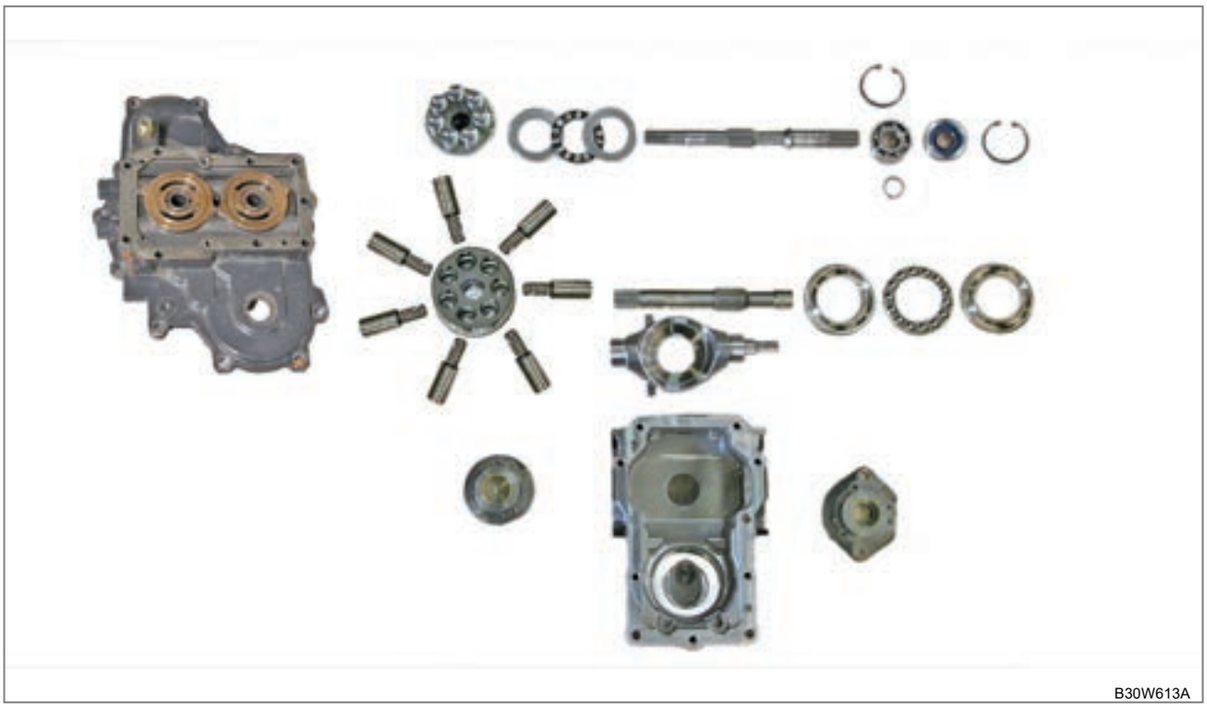
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 34 2025-04-09 오후 2:08:43



9. Remove the high-pressure shuttle relief valves (1) and charge relief valve plug (2) from the valve block.

Shuttle relief valve
Tightening torque .....35.0 Nm
3.57 kgf-m
25.7 lb-ft

Charge relief valve
Tightening torque .....25.0 Nm
2.55 kgf-m
18.4 lb-ft



10. Assemble in the reverse order of disassembly.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_05_HST.indd 35 2025-04-09 오후 2:08:43

MEMO



KIOTI

CS2530CH
CS2530CH-EU

REAR AXLE

CHAPTER 6

TABLE OF CONTENTS

1. SPECIFICATIONS 6-2

1.1 Transmission fluid 6-2

1.2 Tightening torques.....6-2

2. OPERATING PRINCIPLE.....6-3

2.1 Powertrain of rear axle 6-3

2.2 Principle of differential system 6-4

2.3 Differential lock system 6-5

3. TROUBLESHOOTING 6-6

4. MEASUREMENT AND ADJUSTMENT.....6-7

4.1 Backlash for differential pinion and side gear 6-7

4.2 Backlash for spiral bevel pinion and ring gear 6-7

4.3 Tooth contact of spiral bevel.....6-8

5. EXPLODED VIEW.....6-10

5.1 TB3-G2A1004 Rear axle.....6-10

5.2 TB3-G281003 Spiral bevel pinion shaft...6-11

5.3 TB3-G282005 Rear differential 6-12

5.4 TB3-G283003 Rear diff lock.....6-13

6. SERVICING 6-14

6.1 Rear differential assembly tips 6-14

6.2 Spiral bevel pinion and spiral bevel gear assembly tips 6-15

6.3 Rear axle removal 6-16

6.4 Differential system disassembly.....6-18

6.5 Differential system - Components disassembly 6-19

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 1 2025-04-08 오전 9:37:47

1. SPECIFICATIONS

1.1 TRANSMISSION FLUID

1. Hydraulic oil ..... DAEDONG (UTF55)
   Exxon (Mobilfluid 423 or 424)
   BP (Tractran UTH)
   Shell (DONAX-TD)
2. Oil capacity ..... 10.4 ℓ (2.75 u.s. gal.)

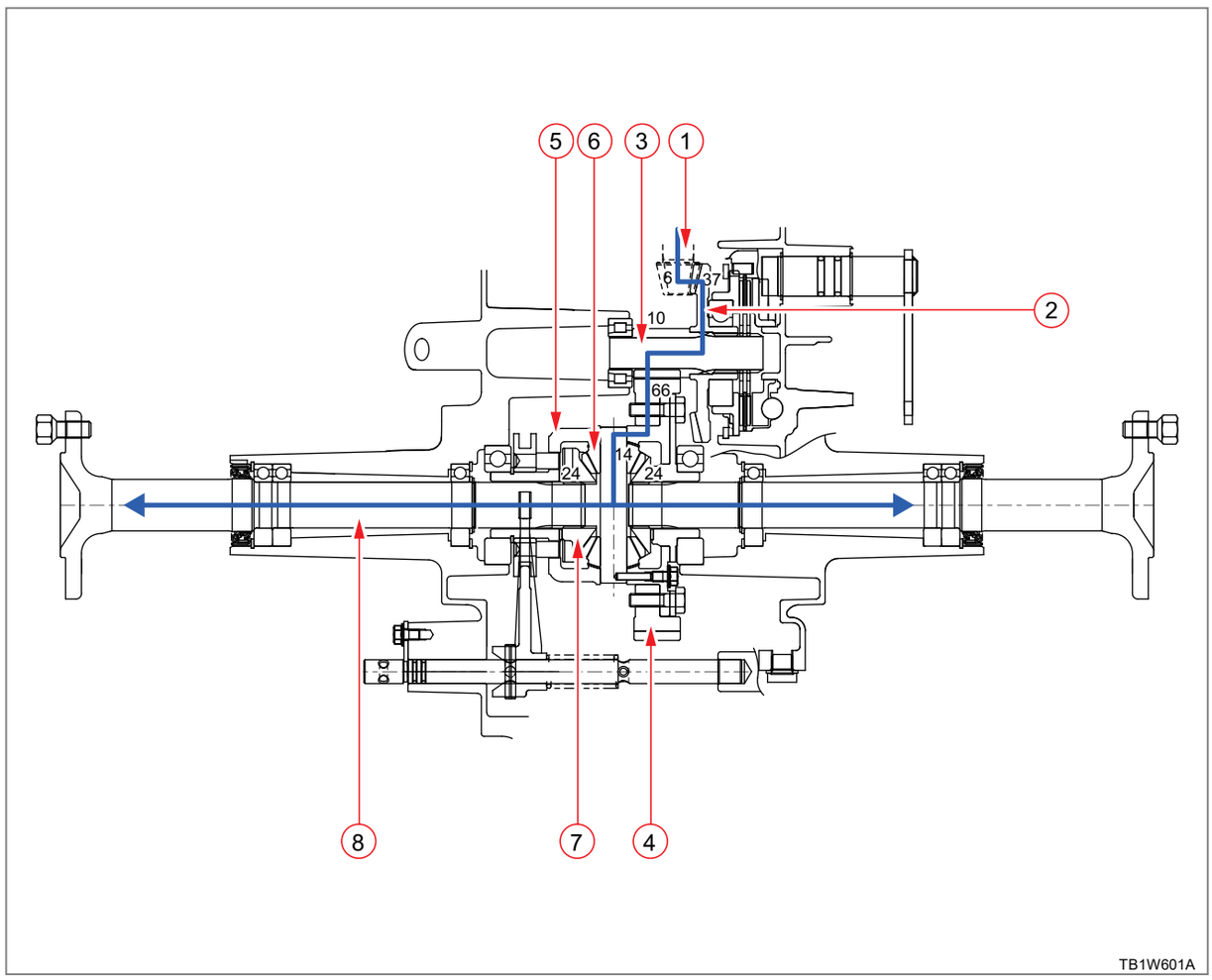
1.2 TIGHTENING TORQUES

1. Rear axle case
   mounting bolt (M10) ..... 48 ~ 55.9 Nm
   4.9 ~ 5.7 kgf-m
   35.4 ~ 41.2 lb-ft
2. Rear wheel bolt (1/2-20 UNF) ..... 122 Nm
   12.45 kgf-m
   89.6 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 2 2025-04-08 오전 9:37:47

2. OPERATING PRINCIPLE

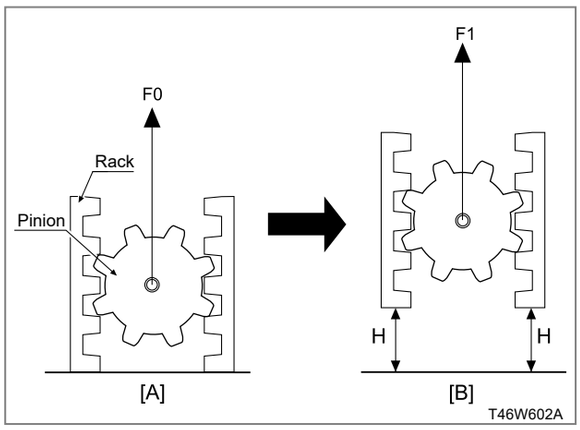
2.1 POWERTRAIN OF REAR AXLE



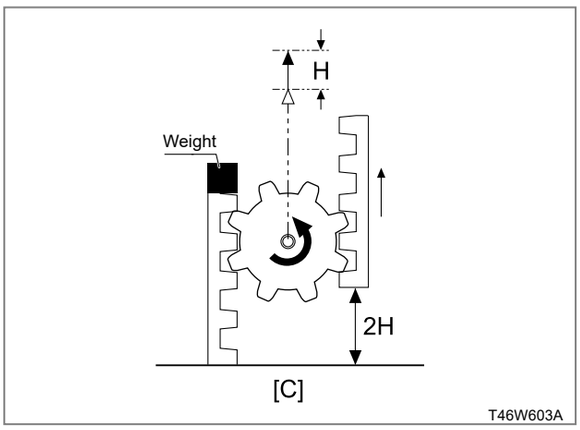
As the 6-spiral bevel pinion shaft (1) is rotated by the range shift gear, 37 spiral bevel gears (2), 10 gear shafts (3), 66 ring gears (4), and differential case (5) rotate at the same time. As the differential case rotates, the differential pinion shaft and differential pinion (6) rotate the differential side gears (7, L, R) and the rear axle (8, L, R).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 3 2025-04-08 오전 9:37:47

2.2 PRINCIPLE OF DIFFERENTIAL SYSTEM

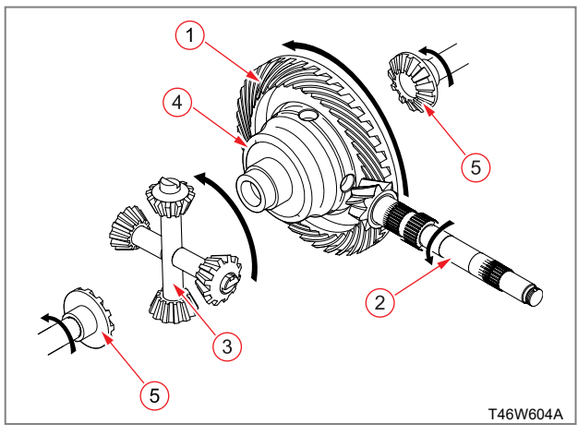


If two racks with same weight are set between the pinion as shown in the figure (A) and the pinion is lifted by pulling up the string attached to it as shown in the figure (B), the pinion does not rotate and the pinion and both racks are lifted in the same height (H).



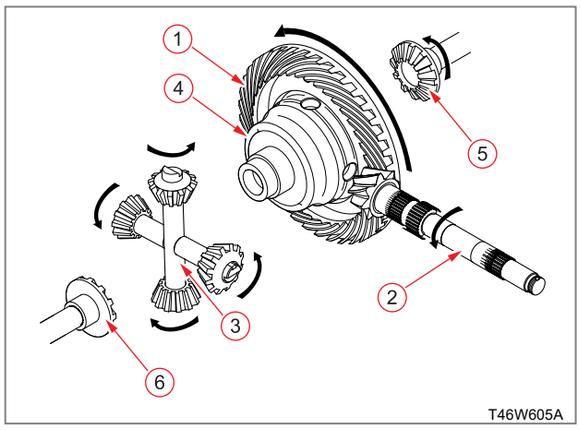
However, if putting a weight only on one rack and lifting the pinion, the pinion rises as it rotates as shown in the figure (C). The rack with a weight keeps its position and the other rack without a weight rises in the amount of the height that the pinion moves and the pinion pushes up the rack. Therefore, this rack rises in double amount of the height that the pinion moves (2H).

In this case, both racks refer to the differential side gears and the pinion refers to the differential pinion. Also, the force that pulls up the pinion is the rotating force of the ring gear.



If the tractor moves forward and the loads on the both wheels are same, the differential pinion (3) idles with the differential case (4) to run the differential side gear (5). In this case, the rotating speed of the ring gear (1), differential case (4) and the both side gears (5) is same.

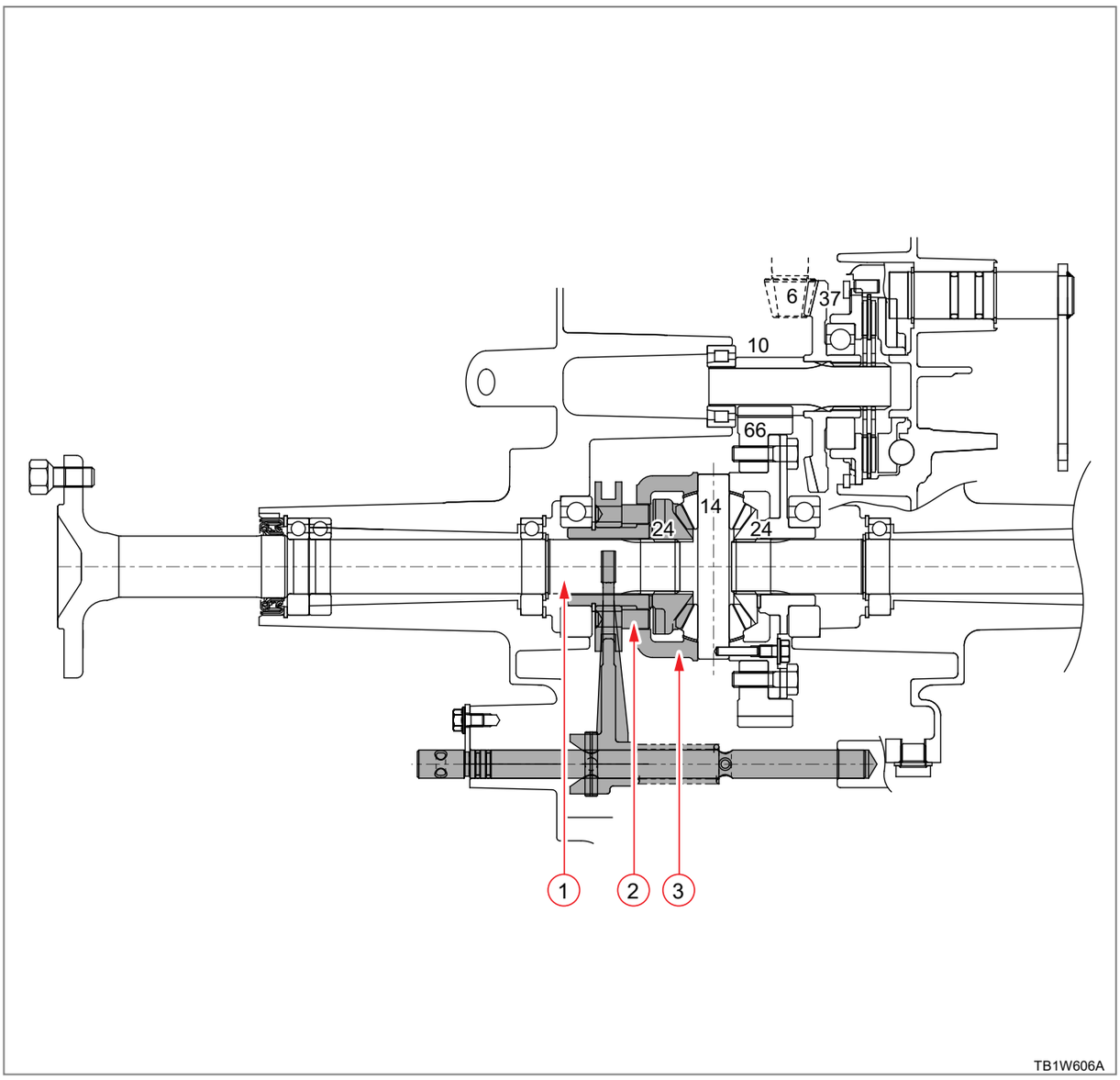
When cornering, the load applied to the both differential side gears are different since the outer wheels should rotate faster than the inner wheels. Therefore, the differential pinion rotates and idles simultaneously to operate the side gear with low load faster and the side gear with high load slower for comfort cornering.



However, if the wheels on one side are on the slippery road, the load difference between both differential side gears remarkably increases and the self-rotating speed of differential pinion (3) considerably increases too. Therefore, the side gear (5) with very low load rotates at twice the speed and the side gear (6) with comparatively high load does not rotate at all. In other words, it is not possible to escape the pit since the wheel on ice with no friction rotates at twice the speed and the wheel on road with friction does not rotate.

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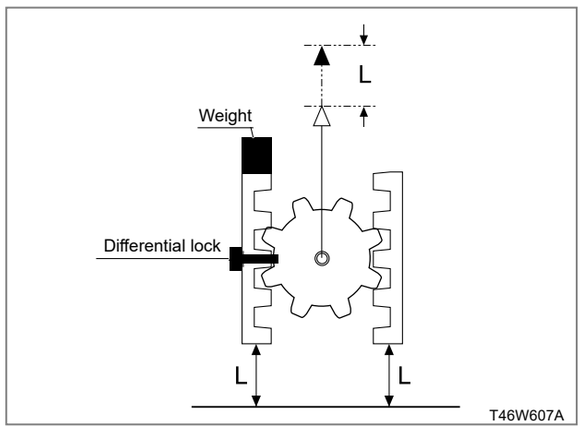
2.3 DIFFERENTIAL LOCK SYSTEM



The differential lock system is to solve such problems as described on the previous page. The differential lock is designed to operate the differential lock shift pin (2) to lock the differential case (3) and one differential shaft (1).

As the differential case (3) and one differential shaft (1) rotate at the same speed, the other differential shaft rotates at the same speed. When depressing the differential lock pedal for differential lock operation, the differential lock pedal is moved downward, pivoting from its support clockwise.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 5 2025-04-08 오전 9:37:48



When one rack is fixed to the pinion and the pinion is lifted, the other rack is lifted in the same height (L) as shown in the figure on the left.

If the differential lock system is unnecessarily used on the road with sufficient friction, excessive load is applied to the differential side gears or the differential pinion and the internal gears or the components of the differential lock system can be damaged unless the tractor is moving straight forward.

Therefore, the steering wheel should be set to the middle position when using the differential lock system.

3. TROUBLESHOOTING

1. Impossible to disengage the differential lock system
   → Insufficient lubrication or damaged differential lock links

2. Creaking noise from tires while driving
   → Loose wheel bolts.

3. No driving force for rear wheels when differential lock is deactivated (however, driving force exists in rear wheels when differential lock is activated)
   → Damaged differential pinion, side gear, differential shaft or gears related to differential shaft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 6 2025-04-08 오전 9:37:48

4. MEASUREMENT AND ADJUSTMENT

4.1 BACKLASH FOR DIFFERENTIAL PINION AND SIDE GEAR

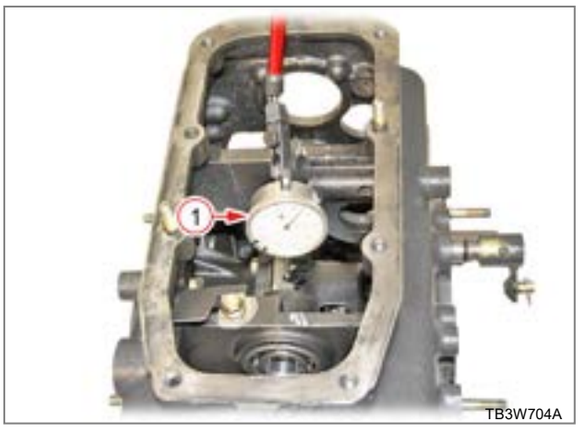

TB1W602A

1. Insert the rear axle to the the differential lock shift side and set the device as shown in the figure. Then, touch the tip of the tooth of the differential pinion with the indicator of the dial gauge gently.
2. Measure the backlash of the differential side gear and the differential pinion.
   - Standard: 0.15 ~ 0.30 mm (0.006 ~ 0.012 in.)

IMPORTANT

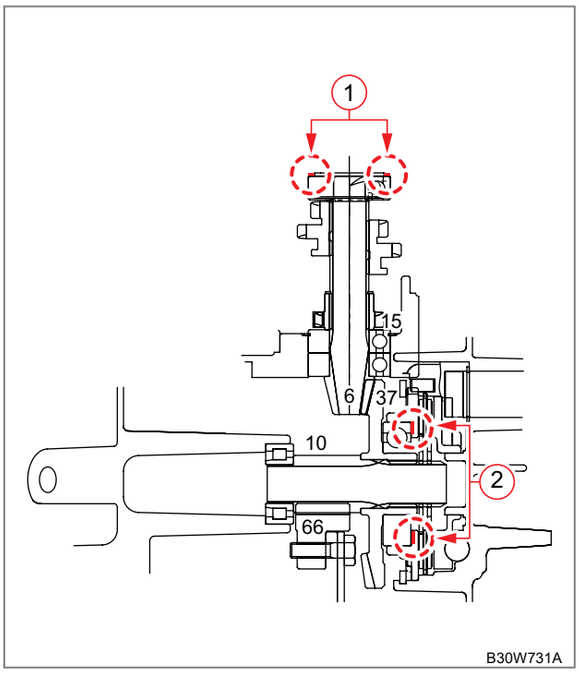
- **Replace the differential washer with another type when adjusting the backlash.**
- **The both differential washers should be equal in thickness.**
- **Size : Differential washer : 2.0 mm(0.0787 in.)**
  Differential pinion washer : 1.2 mm(0.0472 in.)

4.2 BACKLASH FOR SPIRAL BEVEL PINION AND RING GEAR



TB3W704A

1. Set the lever type dial gauge (1) as shown in the figure.
2. Measure the backlash by shaking the gear with the pinion secured.
   - Standard backlash: 0.13 ~ 0.18 mm(0.005 ~ 0.007 in.)
3. Adjust the backlash to the specification using the shim (1) (0.1T and 0.2T) and shim (2) (0.1T and 0.2T).



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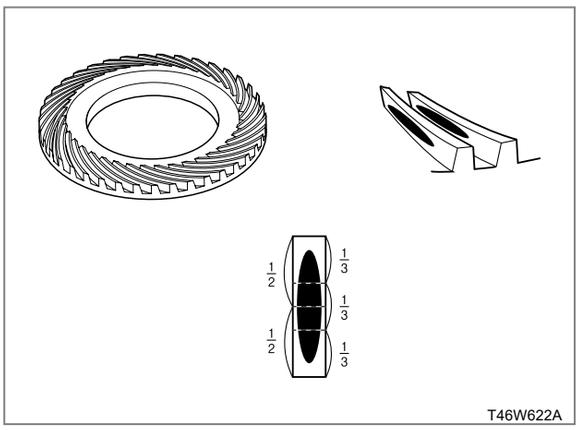
(1) Shim (0.1T and 0.2T)
(2) Shim (0.1, 0.2T and 0.4T)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 7 2025-04-08 오전 9:37:48

4.3 TOOTH CONTACT OF SPIRAL BEVEL


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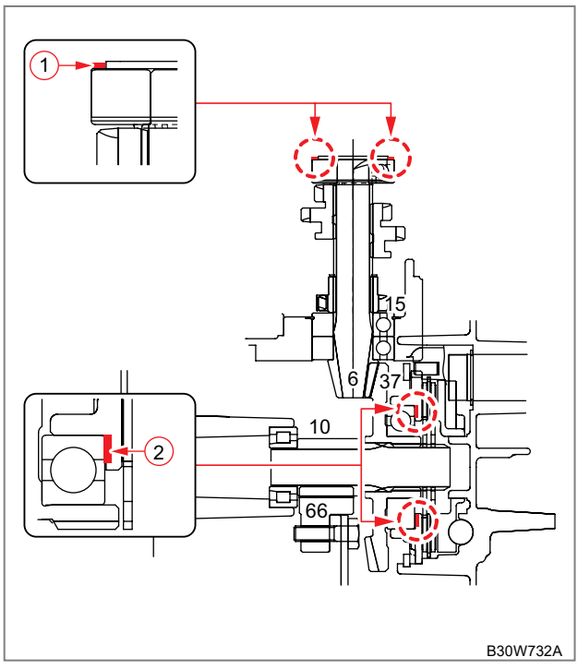
1. Coat all the teeth of the spiral pinion with contact grease.
2. Turn the pinion shaft for 5 ~ 6 rounds and check the contact area by a contact mark on the ring gear teeth.



T46W622A

- The contact area should be over 35 % of the entire teeth area and the center of the contact mark should be close to the center of the pinion in height. Also, the center of the contact mark should be located on the 1/3 spot from the toe of the teeth to the center of the teeth in length.

SHIMMING FOR SPIRAL BEVEL

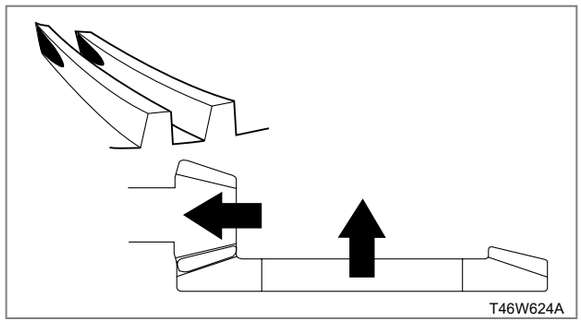


B30W732A

(1) 6 spiral bevel shaft shims
(2) Sprial bevel gear shims

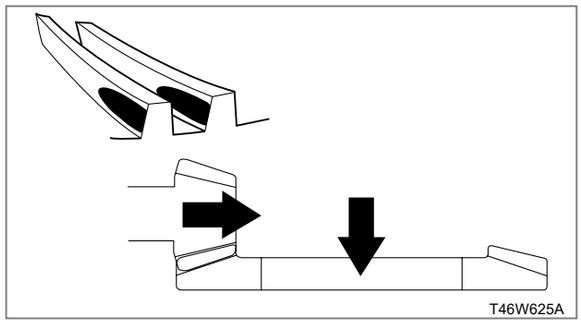
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A. TOE CONTACT



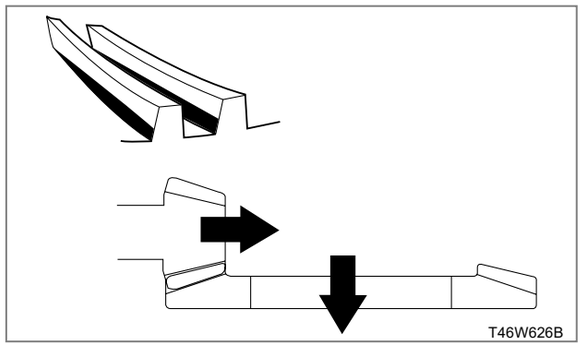
If the center of the contact mark is too close to the toe of the tooth, decrease the amount of shims (1) to push back the pinion shaft and increase the amount of shims(2) to push in the ring gear to the pinion direction so that the back lash is maintained. Then, measure the backlash.

B. HEEL CONTACT



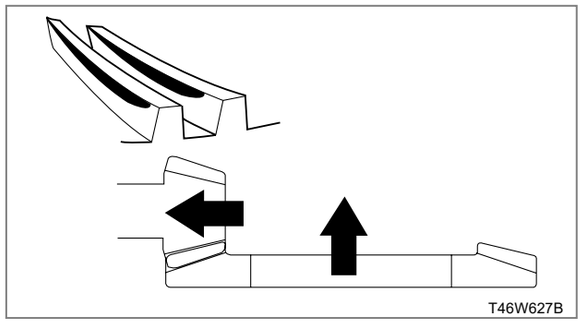
If the contact mark is close to the heel of the ring gear teeth, increase the amount shims(1) to push the pinion shaft and decrease the amount of shims(2) to push the ring gear away from the pinion so that the backlash is maintained. Then, measure the backlash.

C. DEEP CONTACT



If the contact mark is deep into the ring gear teeth, decrease the amount of shims(2) to push the ring gear away from the pinion and increase the amount of shims (1) to push the pinion into the ring gear (if necessary). Then, measure the backlash for the final time.

D. TIP CONTACT



If the contact mark is on the tip of the ring gear teeth, increase the amount of shims(2) to push the ring gear toward the pinion and decrease the amount of shims (1) to pull the pinion shaft back (if necessary). Then, measure the backlash for the final time.

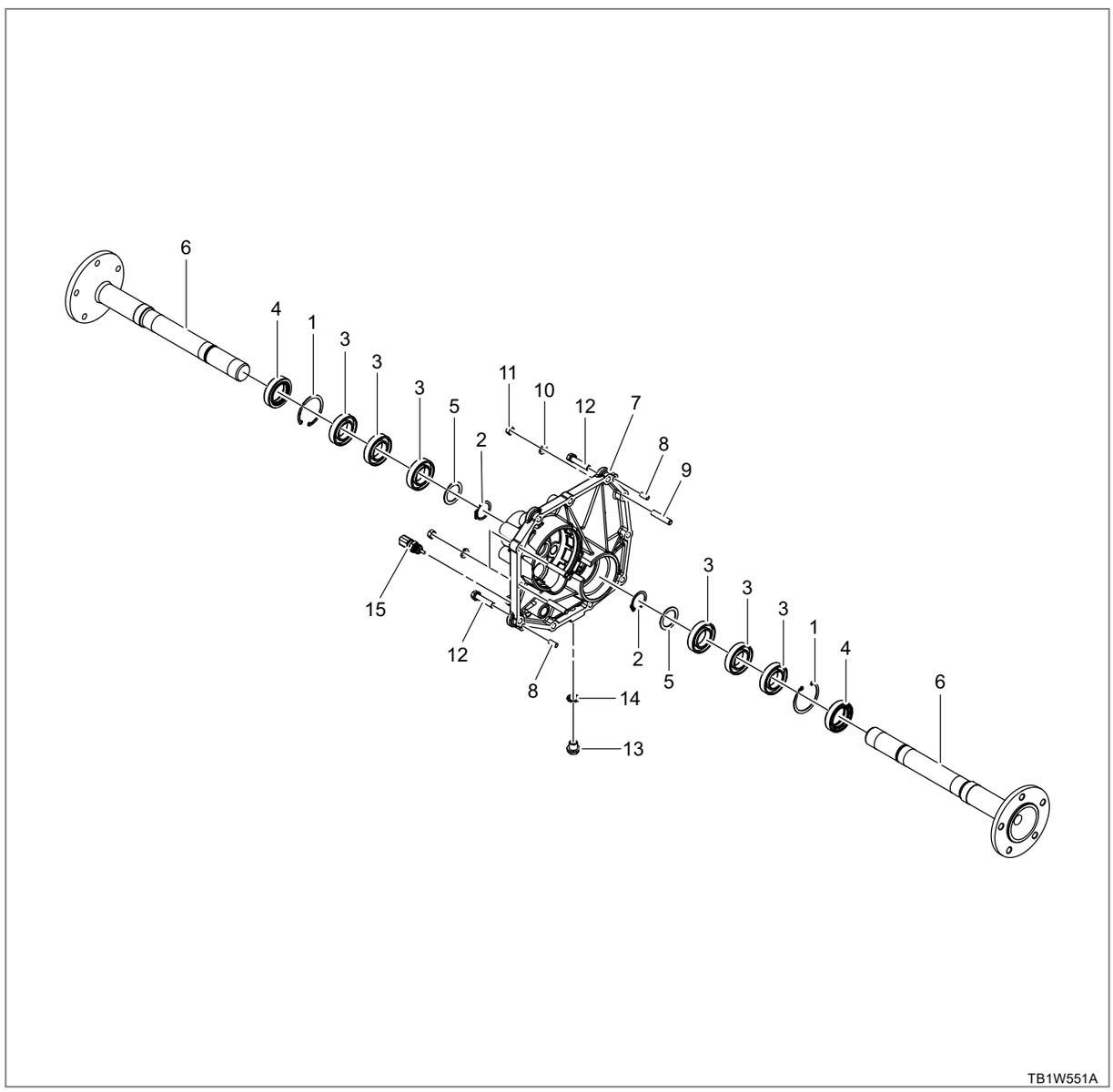
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5. EXPLODED VIEW

REMARK

The part numbers and shapes of the following components are subject to change without notice for improvement of the product. If necessary, refer to the DAEDONG electronic manual, DPCS.

5.1 TB3-G2A1004 REAR AXLE



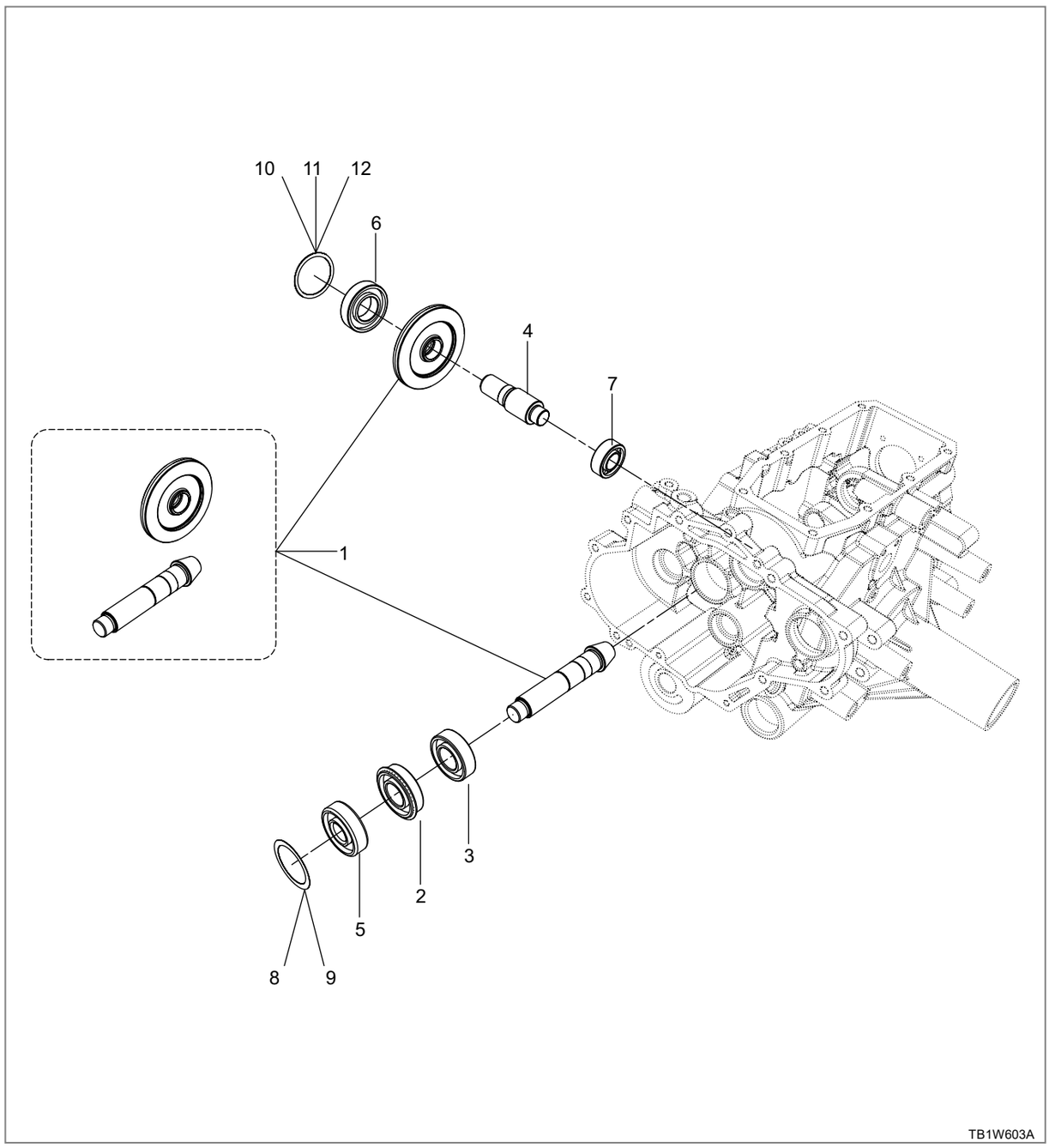
TB1W551A

COMPONENTS

(1) Ring, Stopper
(2) Snap ring
(3) Ball bearing
(4) Oil seal
(5) Collar
(6) Axle, Rear
(7) Case, Rear axle
(8) Pin, Parallel
(9) Stud
(10) Washer, Spring
(11) Nut
(12) Bolt, Washer
(13) Plug M16 P 1.25
(14) Washer, Seal
(15) Oil thermometer sensor

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 10 2025-04-08 오전 9:37:49

5.2 TB3-G281003 SPIRAL BEVEL PINION SHAFT

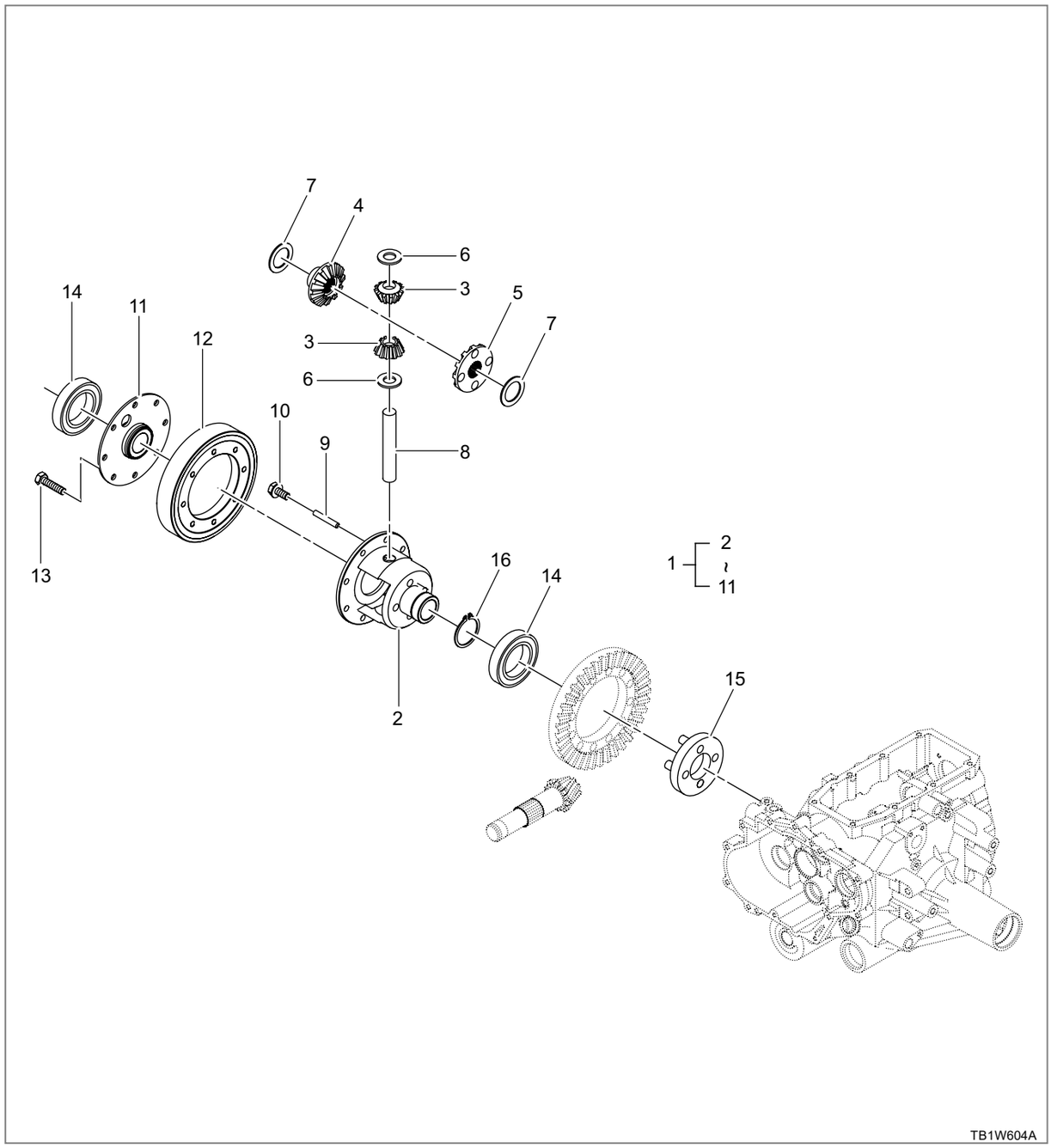


COMPONENTS

(1) Assy gear, Bevel spiral
(2) Bearing, Ball
(3) Ball bearing
(4) Shaft, Gear-10
(5) Ball bearing
(6) Ball bearing
(7) Bearing, Roller-nj2205
(8) Shim 0.20
(9) Shim 0.10
(10) Shim, 0.1
(11) Shim, 0.2
(12) Shim, 0.4

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 11 2025-04-08 오전 9:37:49

5.3 TB3-G282005 REAR DIFFERENTIAL

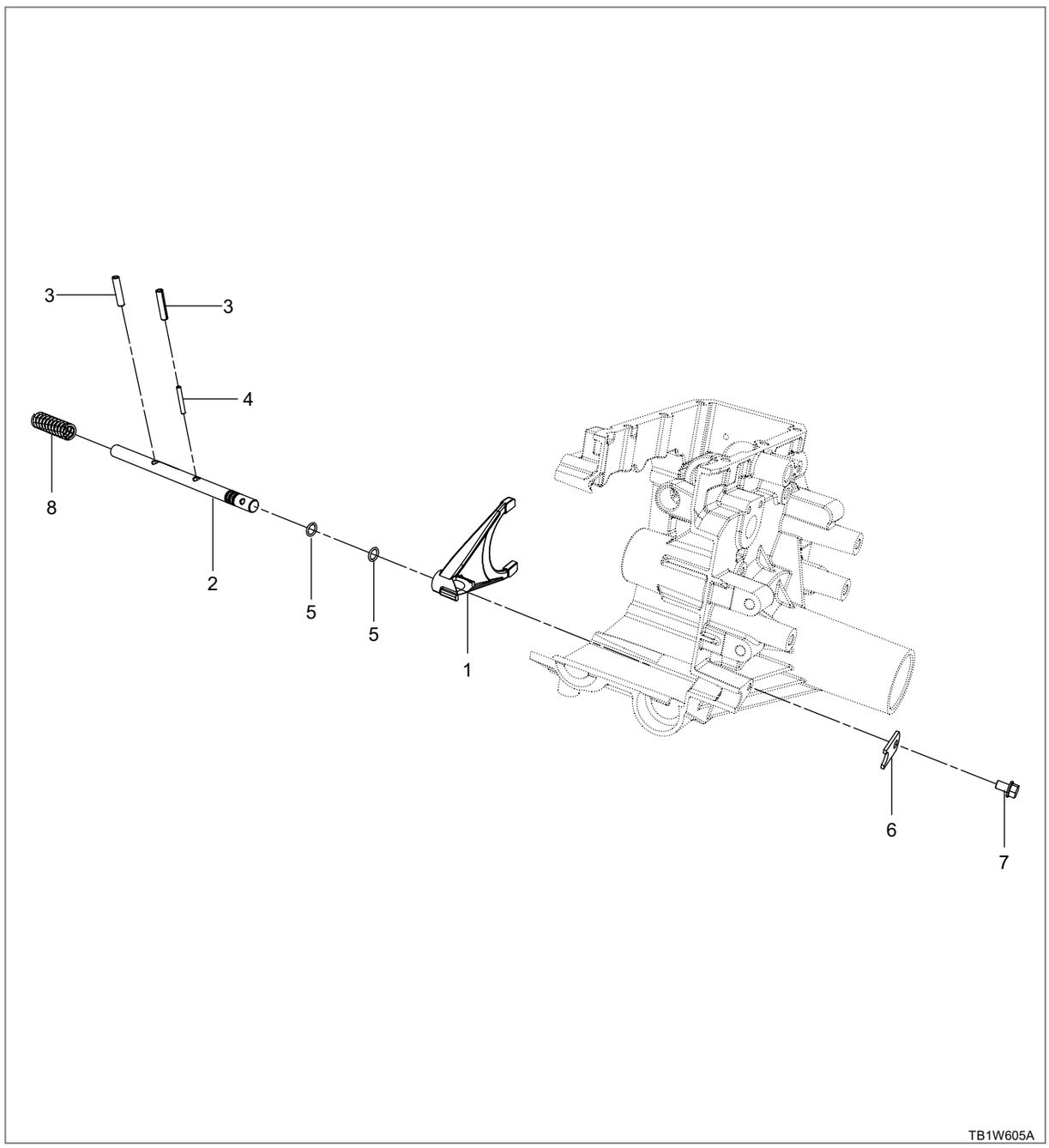


COMPONENTS

(1) Assy Device, Diff-Rr
(2) Case, Rear Diff
(3) Pinion
(4) Gear,Diff. Side
(5) Gear,Diff. Side
(6) Washer
(7) Washer,Thrust
(8) Shaft,Pinion
(9) Pin, Dowel
(10) Bolt, Flange
(11) Cover, Diff Case
(12) Gear-66
(13) Bolt
(14) Bearing, Ball
(15) Shaft, Diff. Lock
(16) Snap Ring
(17) Bolt

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5.4 TB3-G283003 REAR DIFF LOCK



COMPONENTS

(1) Fork, Diff Lock
(2) Rod, Fork Diff
(3) Pin, Spring
(4) Pin,Spring
(5) O ring
(6) Stopper
(7) Bolt, Flange
(8) Friction spring

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6. SERVICING

6.1 REAR DIFFERENTIAL ASSEMBLY TIPS

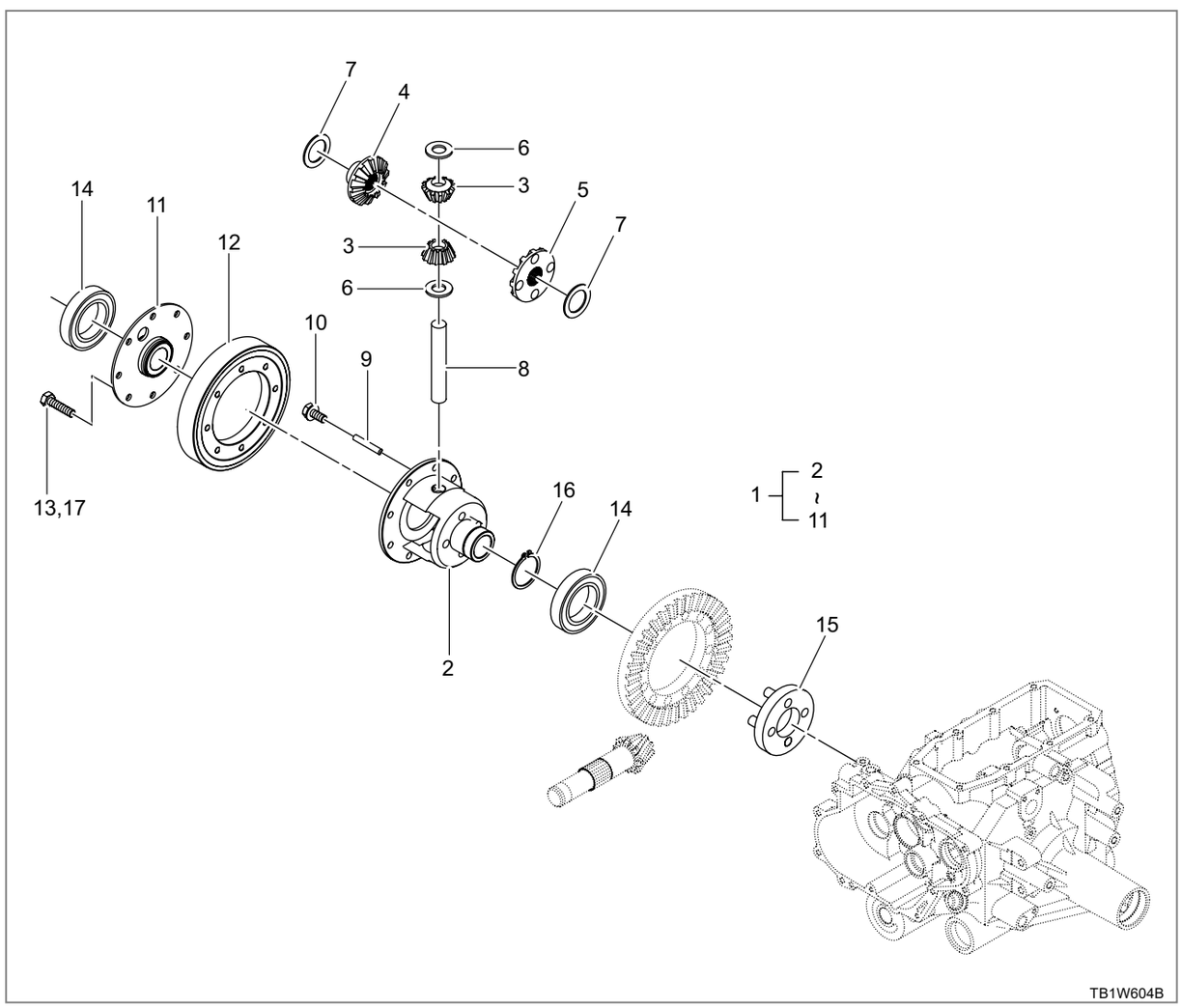
1. Apply the suggested lubricant (molybdenum disulphide) to each operating part of the differential.

   Lubricant : Three Bond 1901 or equivalent

2. Apply thread glue to bolt(13, 17) when assembling the ring gear(12) into rear differential case(1).

   Thread glue: LOCTITE 271 or equivalent

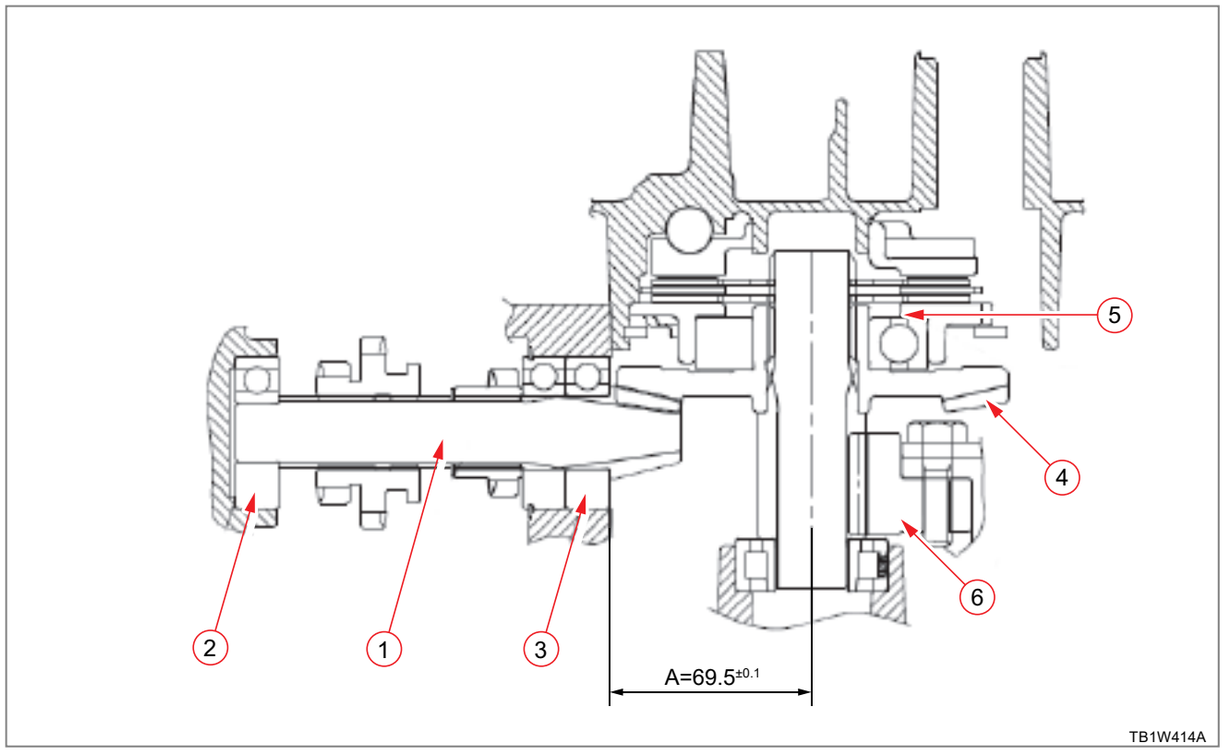
   Bolt tightening torque : 49.0 ~ 62.8 Nm
   5.0 ~ 6.4 kgf-m
   36.1 ~ 46.3 lb-ft



(1) Assy Device, Diff-Rr
(2) Case, Rear Diff
(3) Pinion
(4) Gear,Diff. Side
(5) Gear,Diff. Side
(6) Washer
(7) Washer,Thrust
(8) Shaft,Pinion
(9) Pin, Dowel
(10) Bolt, Flange
(11) Cover, Diff Case
(12) Gear-66
(13) Bolt
(14) Bearing, Ball
(15) Shaft, Diff. Lock
(16) Snap Ring
(17) Bolt

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6.2 SPIRAL BEVEL PINION AND SPIRAL BEVEL GEAR ASSEMBLY TIPS



(1) Pinion
(2) Shim
(3) Inner bearing
(4) Gear
(5) Shim
(6) 66 Gear

1. The distance from the center of spiral bevel gear shaft to inner bearing(3) of spiral bevel pinion shaft should be A as shown in the picture.
2. Check the tooth contact pattern and back lash for gear(4)and pinion(1).

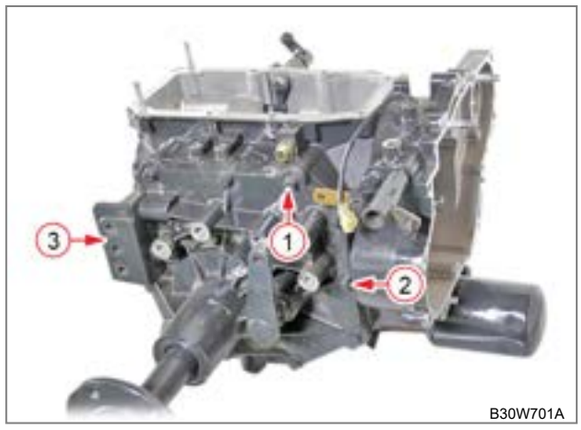
   Allowable back lash: 0.006~0.008 in. (0.15~0.20mm)
3. How to check gear back lash: Hold the pinion and rotate the gear while measuring with dial gauge. Measure it at more than 2 teeth. Remove 66 gear(6) before measuring if needed.
4. How to check tooth contact pattern: Apply stamping ink to three places at equal intervals around the gear's circumference, then rotate the pinion while lightly loading the gear and check the tooth contact pattern.

   ※ Good tooth contact pattern: The contact area should be more than 35% of tooth face area and the center of pattern should be at 1/3~1/2 distance of tooth length from the toe of tooth.

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6.3 REAR AXLE REMOVAL

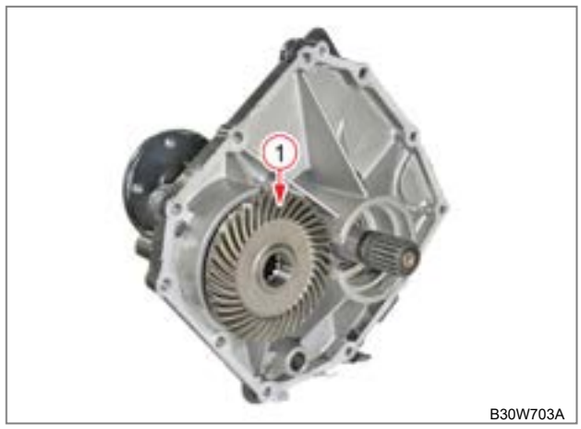
1. Remove the transmission assembly.
2. Remove the hydraulic cylinder case.



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3. Unscrew the rear axle case mounting bolts (1) (8 EA) and nuts (2) (3 EA), and remove the rear axle case assembly (3).



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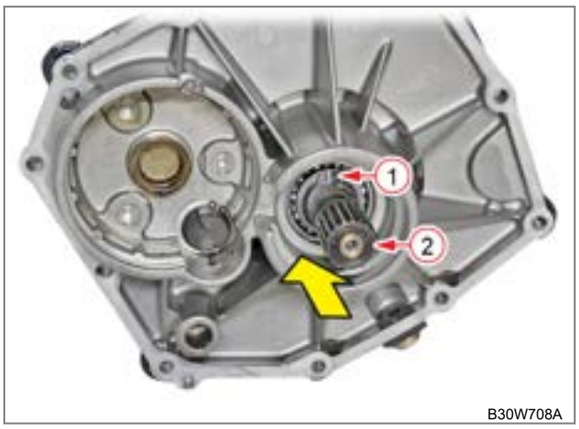


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4. Remove the spiral bevel gear (1) and adjusting shim (2) from the rear axle case.

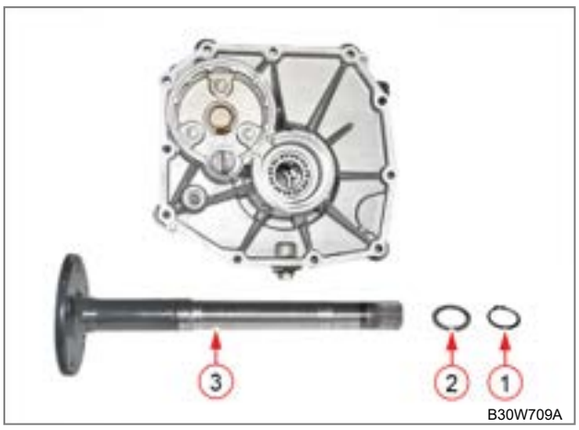
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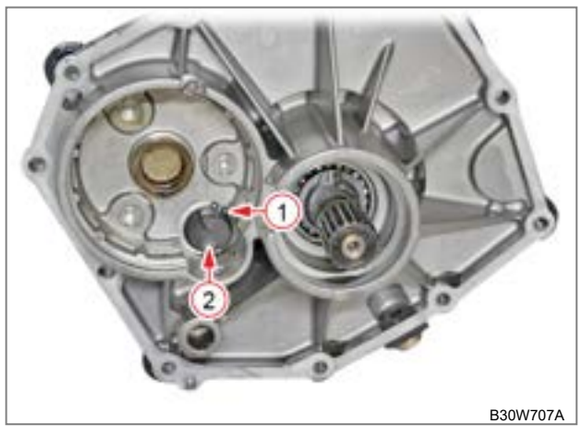




5. Pull out the brake mounting snap ring (1). Then, remove the bearing holder (2), friction plate (3), pressure plate (4), actuator (5), and steel ball (6) in order.



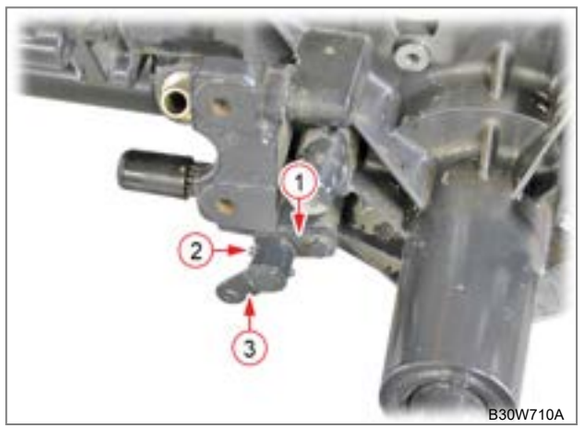
7. Remove the rear axle mounting snap ring (1) and spacing plate (2). Then, remove the rear axle (3) from the rear axle case.



6. Pull out the brake lever snap ring (1), and remove the brake lever (2) from the rear axle case.

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6.4 DIFFERENTIAL SYSTEM DISASSEMBLY



1. Remove the differential fork rod stopper (1) and spring pin (2). Then, remove the differential lever (3).







2. Remove the differential assembly (1) and differential fork rod assembly (2) together from the transmission case.

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6.5 DIFFERENTIAL SYSTEM - COMPONENTS DISASSEMBLY



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B30W715A



B30W718A



B30W716A

1. Pull out the ball bearing (1) and snap ring (2) from the rear differential, and remove the differential mounting shifter (3).

2. Unscrew the differential case cover mounting bolts (1). Then, remove the differential case cover (2) and 66 gear (3) from the rear differential case.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 19 2025-04-08 오전 9:37:51



B30W719A



B30W720A

3. Unscrew the flange bolt (1) from the differential case assembly, and Pull out the parallel pin (2).
4. Remove the differential pinion shaft (3), differential pinion (4), differential pinion washer (5), differential side gear (RH) (6), differential washer (7), differential side gear (LH) (8), and differential washer (7) in order.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_06_뒷차축.indd 20 2025-04-08 오전 9:37:51

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CS2530CH-EU

BRAKE

CHAPTER 7

TABLE OF CONTENTS

1. SPECIFICATIONS 7-2

2. BASIC OPERATING PRINCIPLE 7-2

2.1 Braking force forward/reverse driving 7-2

3. TROUBLESHOOTING 7-3

4. INSPECTION AND ADJUSTMENT.....7-4

4.1 Brake pedal free play 7-4

4.2 Brake switch setting 7-5

4.3 Brake cam lever free play 7-5

4.4 Brake components inspection 7-6

5. EXPLODED VIEW.....7-7

5.1 TB3-G293006 Brake 7-7

5.2 TB3-G646508 Brake pedal 7-8

6. SERVICING 7-9

6.1 Brake pedal assembly tips 7-9

1. SPECIFICATIONS

Brake type .....wet multi-plate disc

Brake pedal free play.....25 ~ 30 mm
(0.984 ~ 1.181 in.)

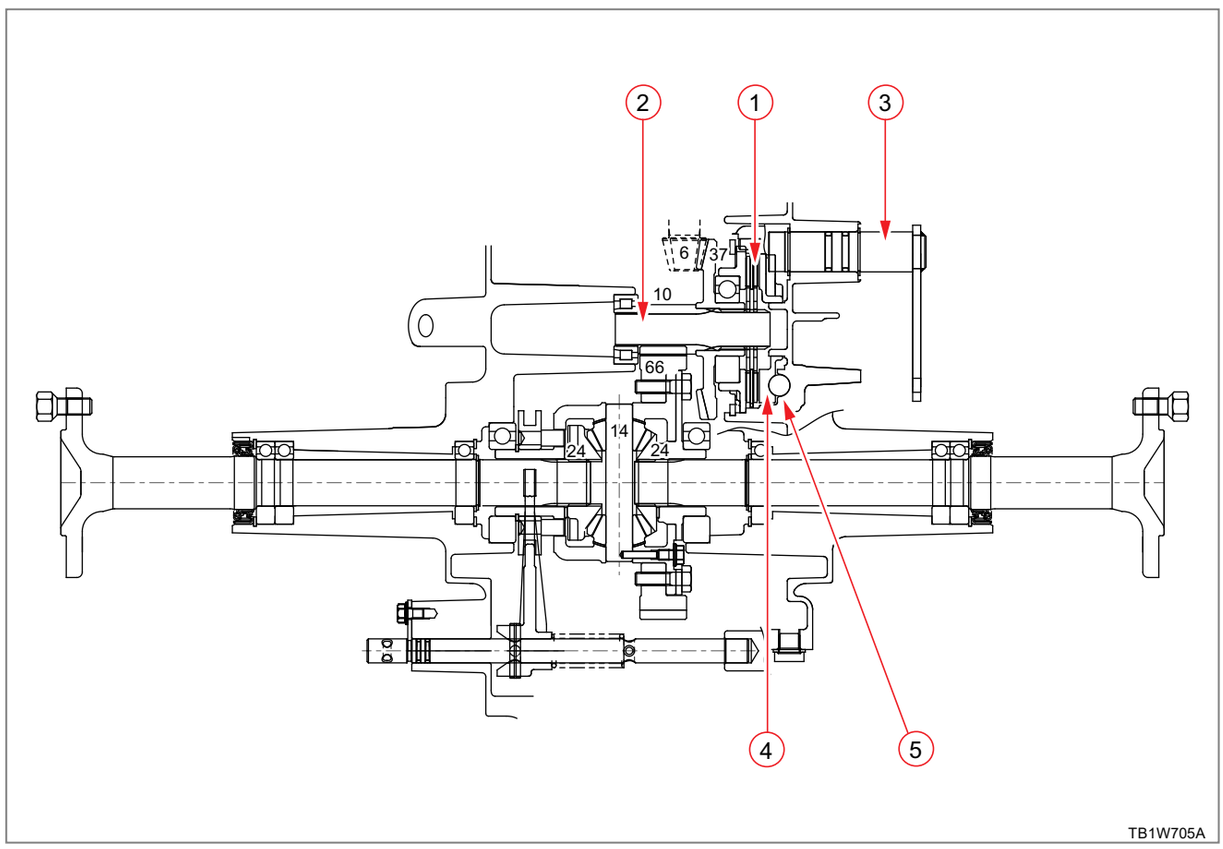
Brake disc lining depth groove
Min. allowable thickness...0.05 mm
(0.00197 in.)

Brake plate
level difference
Max. allowable value .....0.1 mm
(0.0039 in.)

2. BASIC OPERATING PRINCIPLE

2.1 BRAKING FORCE FORWARD/REVERSE DRIVING

Since the HST functions as a brake, this tractor installed the brakes inside the transmission rather than on the rear axles. Although the capacity, number, and size of the brake discs are more compact than those of a manual transmission, the speed reduction ratio at the brake installation location is higher than that of a manual transmission, so it exhibits relatively strong braking power.



The oval-shaped steel ball pockets(5) are formed on the rear of the brake plate(4), so when the plate rotates, thrust is generated by the reaction force from the steel balls(5) and compresses the brake discs(1).

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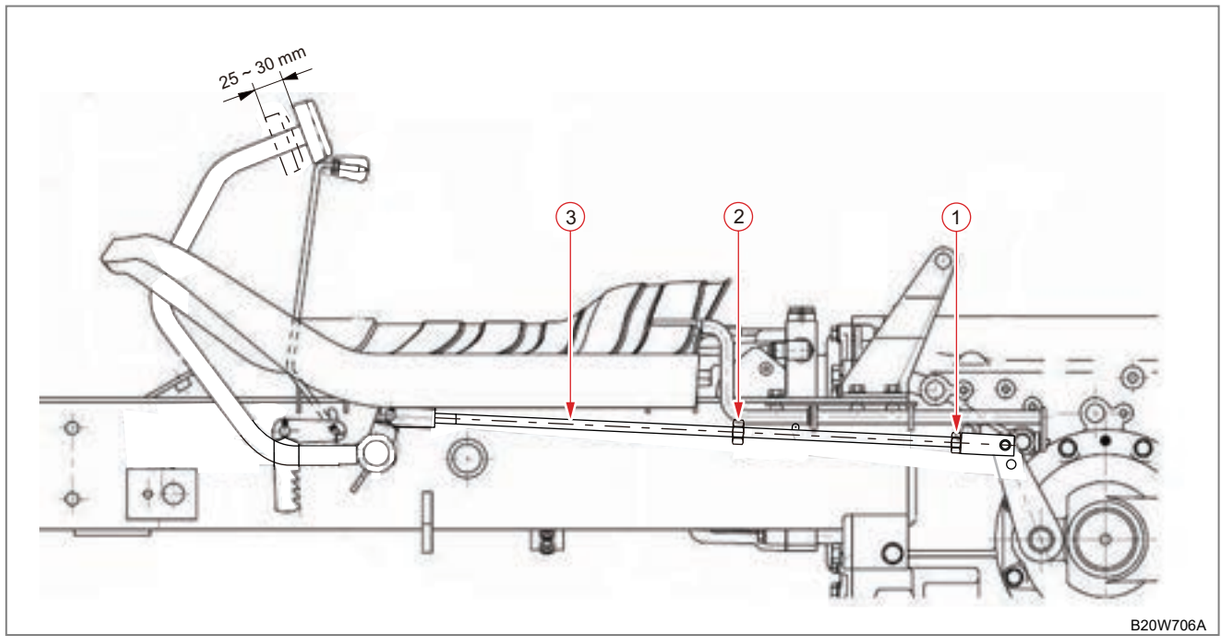
3. TROUBLESHOOTING

Symptom	Possible cause	Remedy
Insufficient braking force	• Improperly adjusted brake free play	• Adjust the free play.
	• Excessively worn brake disc or plate	• Replace the part.
	• Worn brake cam / brake lever	• Replace the part.
	• Worn steel ball or cam plate / actuator	• Replace the part.
	• Damaged parts related to brake rod	• Replace the part.
Braking noise	• Worn or hardened brake disc lining	• Replace the part.

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4. INSPECTION AND ADJUSTMENT

4.1 BRAKE PEDAL FREE PLAY



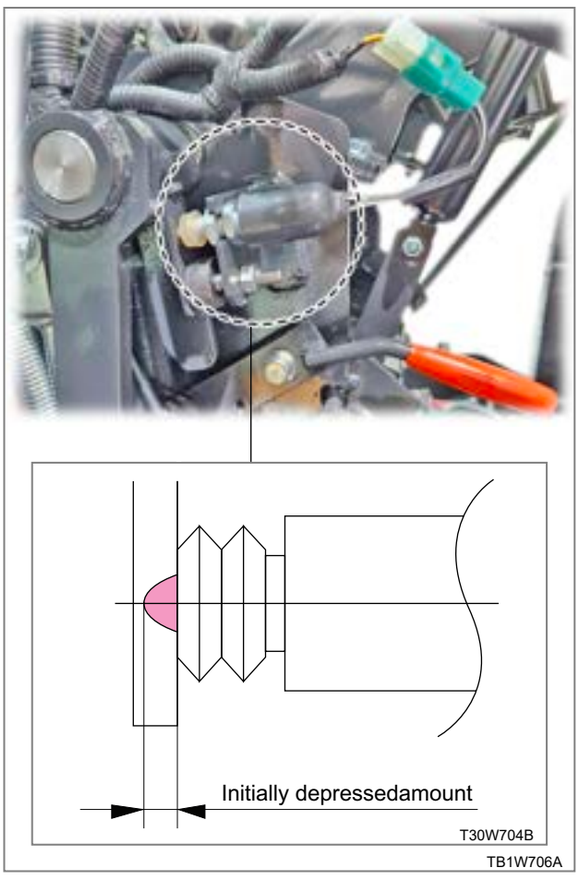
1. Slightly depress the pedal and measure the free travel at the top of the pedal stroke.
2. If the free play is not within the specified range (25 ~ 30 mm (0.984 ~ 1.181 in.), adjust the free play.
3. If the free play needs to be adjusted, unscrew the lock nut (1) and rotate the weld nut(2) for the brake rod(3).
4. If the free play is checked to be correct by depressing the brake pedal 5 ~ 6 times with a foot, install the lock nut (1).

Brake rod lock nut.....48.0 ~ 55.9 Nm
4.9 ~ 5.7 kgf-m
35.3 ± 41.0 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_07_브레이크.indd 4 2025-02-11 오후 5:17:48

4.2 BRAKE SWITCH SETTING

1. Set the brake pedal to its initial position.



2. Adjust the depression of the brake switch (1) to 2 to 4 mm (0.0787 to 0.1575 in.) using the brake switch adjusting nut.

4.3 BRAKE CAM LEVER FREE PLAY

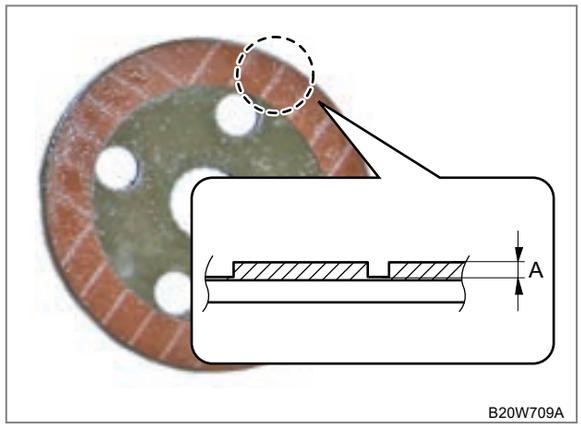


1. Assemble the brake (cam) lever.
2. Move the brake (cam) lever left and right to check if the free play is correct.
   Free play of lever end (A) : 20 ~ 30 mm
   (0.787 ~ 1.181 in.)

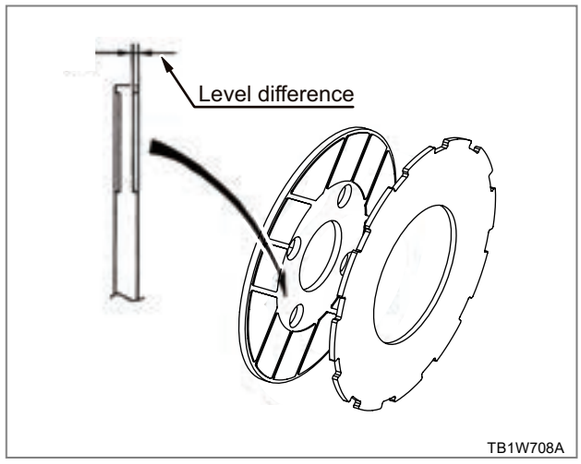
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4.4 BRAKE COMPONENTS INSPECTION

1. Clean the axle components in a suitable solvent and allow to air dry.
2. Inspect the bearings and the axle shaft for excessive wear or damage.



3. Inspect the brake discs and for excessive wear or damage. Replace the discs if the lining depth groove(A) is not within the allowable limit 0.05 mm(0.00197 in.) allowable, 0.3 mm(0.01181 in.) normal.



4. Inspect the brake plates for excessive wear or damage. use a micrometer to measure the level difference of the brake plates. Replace the brake plates if the level difference is more than 0.1 mm(0.00394 in.) or if the brake plates contact surfaces show signs of scoring or damage.
5. Check the axle housing, the steel balls, the brake springs, the brake(cam) lever, and the brake (cam) plate for excessive wear or damage. Replace any or all parts as necessary.

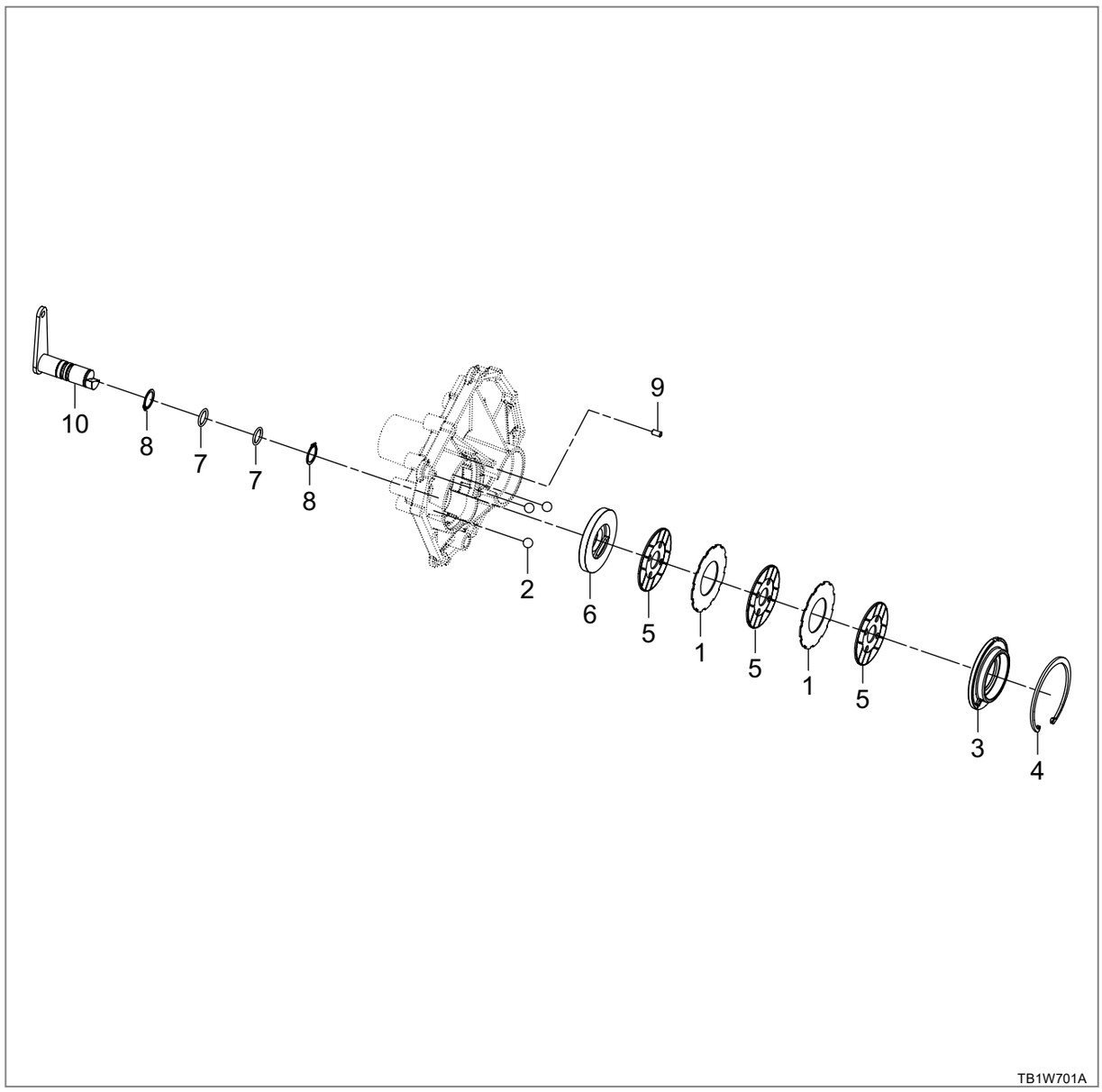
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5. EXPLODED VIEW

REMARK

The part numbers and shapes of the following components are subject to change without notice for improvement of the product. If necessary, refer to the DAEDONG electronic manual, DPCS.

5.1 TB3-G293006 BRAKE



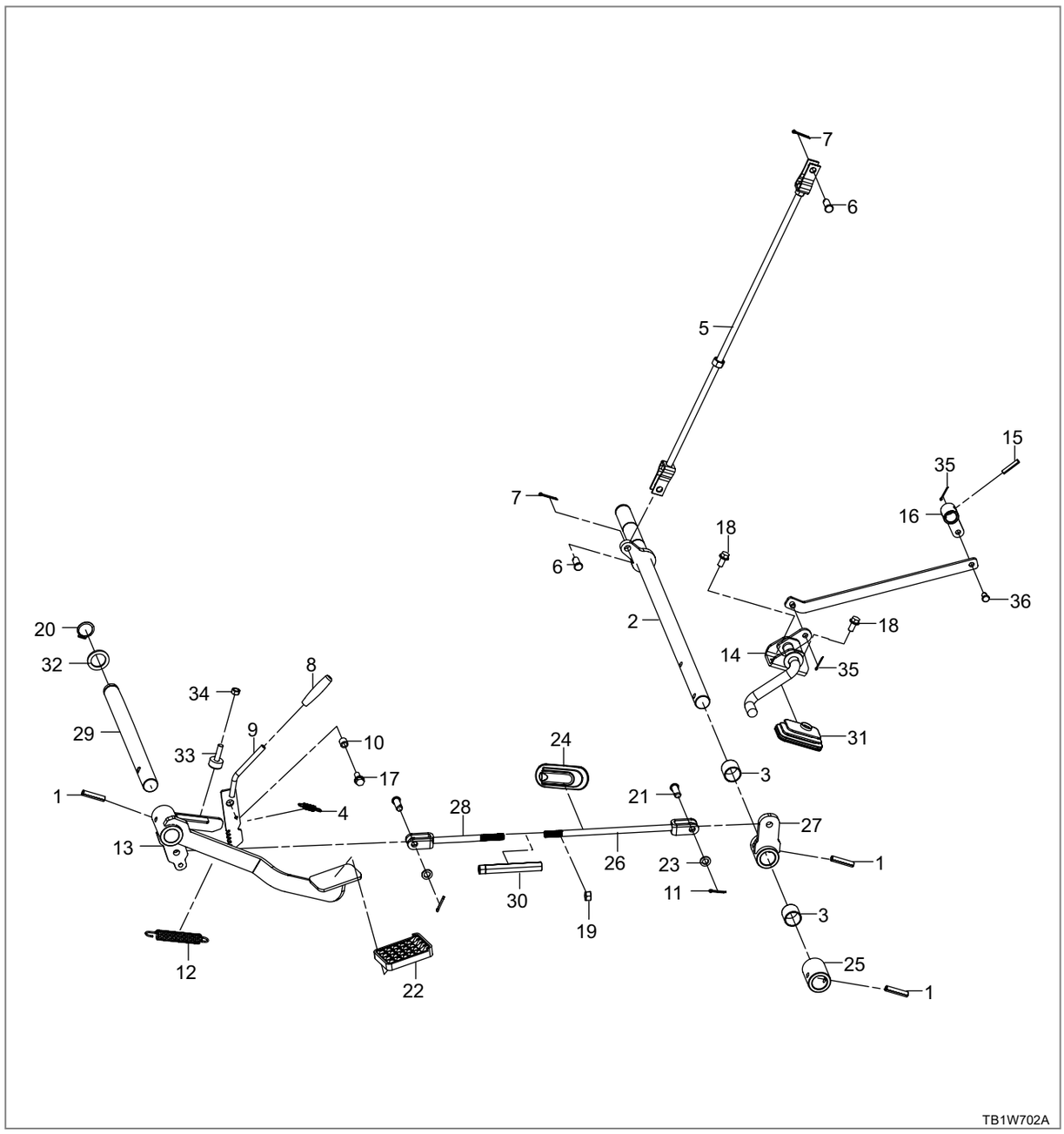
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COMPONENTS

(1) Plate, Press
(2) Ball, steel
(3) Holder, Bearing
(4) Ring, Snap
(5) Plate, Friction
(6) Actuator
(7) O ring
(8) Snap ring
(9) Pin, Parallel
(10) Lever, Brake-310

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_07_브레이크.indd 7 2025-02-11 오후 5:17:48

5.2 TB3-G646508 BRAKE PEDAL



COMPONENTS

(1) Pin, Spring
(2) Shaft, Brake
(3) Bush
(4) Spring, Return
(5) Rod assy, Brake
(6) Joint pin
(7) Pin, Split
(8) Grip, Parking brake
(9) Plate, Parking brake support
(10) Spacer-parking brake
(11) Split pin
(12) Spring, Brake
(13) Pedal, Brake
(14) Assy bracket, Diff
(15) Pin, Spring
(16) Lever, Diff
(17) Flange bolt
(18) Bolt, Flange
(19) Nut
(20) Snap ring
(21) Joint pin
(22) Cover, Pedal
(23) Washer-1
(24) Bellows, Brake rod
(25) Arm-brake 1
(26) Rod, Brake-lwr
(27) Pipe, Brake-LWR LH
(28) Assy rod, Brake-UPR
(29) Shaft-brake pedal
(30) Turnbuckle
(31) Bellows
(32) Collar
(33) Bolt, Adjusting
(34) Nut
(35) Pin, Split
(36) Plate-Diff

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_07_브레이크.indd 8 2025-02-11 오후 5:17:49

6. SERVICING

6.1 BRAKE PEDAL ASSEMBLY TIPS

1. Remove the transmission assembly.
2. Remove the hydraulic cylinder case.



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3. Unscrew the rear axle case mounting bolts (1) (8 EA) and nuts (2) (3 EA), and remove the rear axle case assembly (3).



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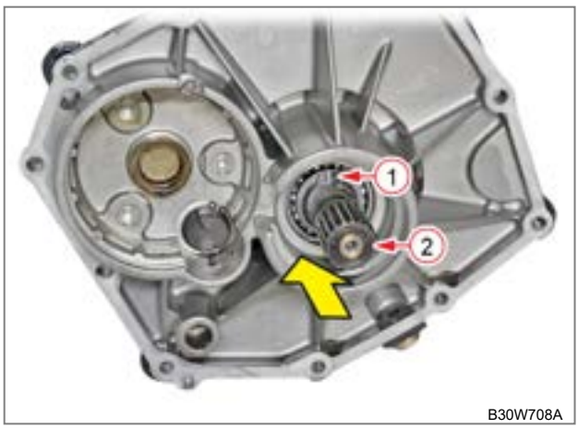


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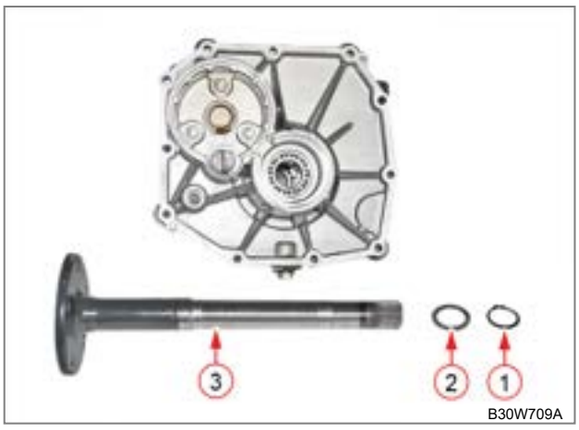
4. Remove the spiral bevel gear (1) and adjusting shim (2) from the rear axle case.

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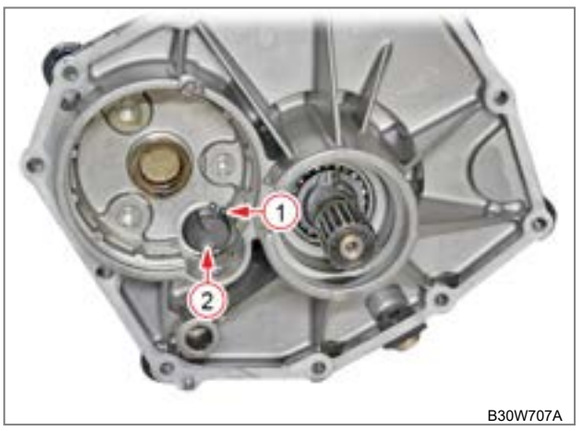






5. Pull out the brake mounting snap ring (1). Then, remove the bearing holder (2), friction plate (3), pressure plate (4), actuator (5), and steel ball (6) in order.

7. Remove the rear axle mounting snap ring (1) and spacing plate (2). Then, remove the rear axle (3) from the rear axle case.



6. Pull out the brake lever snap ring (1), and remove the brake lever (2) from the rear axle case.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_07_브레이크.indd 10 2025-02-11 오후 5:17:49

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CS2530CH-EU

FRONT AXLE

CHAPTER 8

TABLE OF CONTENTS

1. SPECIFICATIONS 8-2

1.1 General specifications 8-2

1.2 Sealant and adhesive 8-2

1.3 Tightening torque for major components...8-3

2. OPERATING PRINCIPLE.....8-4

2.1 Power transfer system for front axle 8-4

2.2 Differential system.....8-4

2.3 Load transfer 8-5

3. TROUBLESHOOTING 8-6

4. MEASUREMENT AND ADJUSTMENT.....8-7

4.1 Toe-in 8-7

4.2 Backlash for spiral bevel pinion and 17 spiral bevel gear.....8-7

4.3 Tooth contact of spiral bevel gear 8-8

5. EXPLODED VIEW.....8-9

5.1 TB3-G312001 Front diff system 8-9

5.2 TB3-G313001 Bevel pinion shaft 8-10

5.3 TB3-G314001 Bevel gear case.....8-11

5.4 TB3-G315001 Bevel gear shaft.....8-12

5.5 TB3-G316001 Front axle case 8-13

5.6 TB3-G317001 Front axle.....8-14

5.7 TB3-G321002 Steering cylinder.....8-15

5.8 TB3-G331005 Propeller shaft 8-16

5.9 TB3-G332001 Front axle bracket.....8-17

6. SERVICING 8-18

6.1 Front wheel drive joint shaft assembly tips.....8-18

6.2 Front axle removal 8-19

6.3 Front axle disassembly and assembly ..8-21

6.3.1 Steering cylinder removal 8-21

6.3.2 Front axle cover disassembly 8-22

6.3.3 Bevel gear case disassembly 8-23

6.3.4 Front differential system disassembly 8-24

6.3.5 Bevel pinion shaft removal.....8-26

1. SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

1. Fluid.....SAE 90 gear oil or transmission fluid
   - Transmission fluid specification: DAEDONG (UTF55)
     Exxon (Mobilfluid 423 or 424)
     BP (Tractran UTH)
     Shell (DONAX-TD)

IMPORTANT

- **The same DAEDONG transmission fluid is filled in the front axle in the factory for easy manufacturing process. The SAE90 gear oil mentioned above is the permissible lowest grade oil that cannot be used in the transmission and any hydraulic system. If such oil is used in the transmission, it can cause the abnormal noise and damage the hydraulic system components.**

2. Oil capacity for front axle.....2.0 ℓ
   0.528 u.s.gal
3. Toe-in.....2 ~ 8 mm
   (0.079 ~ 0.315 in.)

1.2 SEALANT AND ADHESIVE

- Sealing and adhesive for front axle case lower plug.....LOCTITE 5060 or equivalent

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 2 2025-02-11 오후 5:20:29

1.3 TIGHTENING TORQUE FOR MAJOR COMPONENTS

Component	Bolt/nut specifications	Tightening torque
Front axle cover (final drive cover)	M8 bolt	23.5 ~ 27.5 Nm 2.4 ~ 2.8 kgf-m 17.4 ~ 20.3 lb-ft
Axle case support (rear bracket)	M12 bolt	65.7 ~ 83.3 Nm 6.7 ~ 8.5 kgf-m 48.2 ~ 61.2 lb-ft
Front wheel bolt	7/16-20 UNF	88 Nm 8.98 kgf-m 64.6 lb-ft
Ball joint end lock nut	Lock nut	78.5 ~ 117.7 Nm 8 ~ 12 kgf-m 57.9 ~ 86.8 lb-ft
Castle nut for ball joint end	Castle nut	28.4 ~ 36.3 Nm 2.9 ~ 3.7 kgf-m 20.9 ~ 26.6 lb-ft

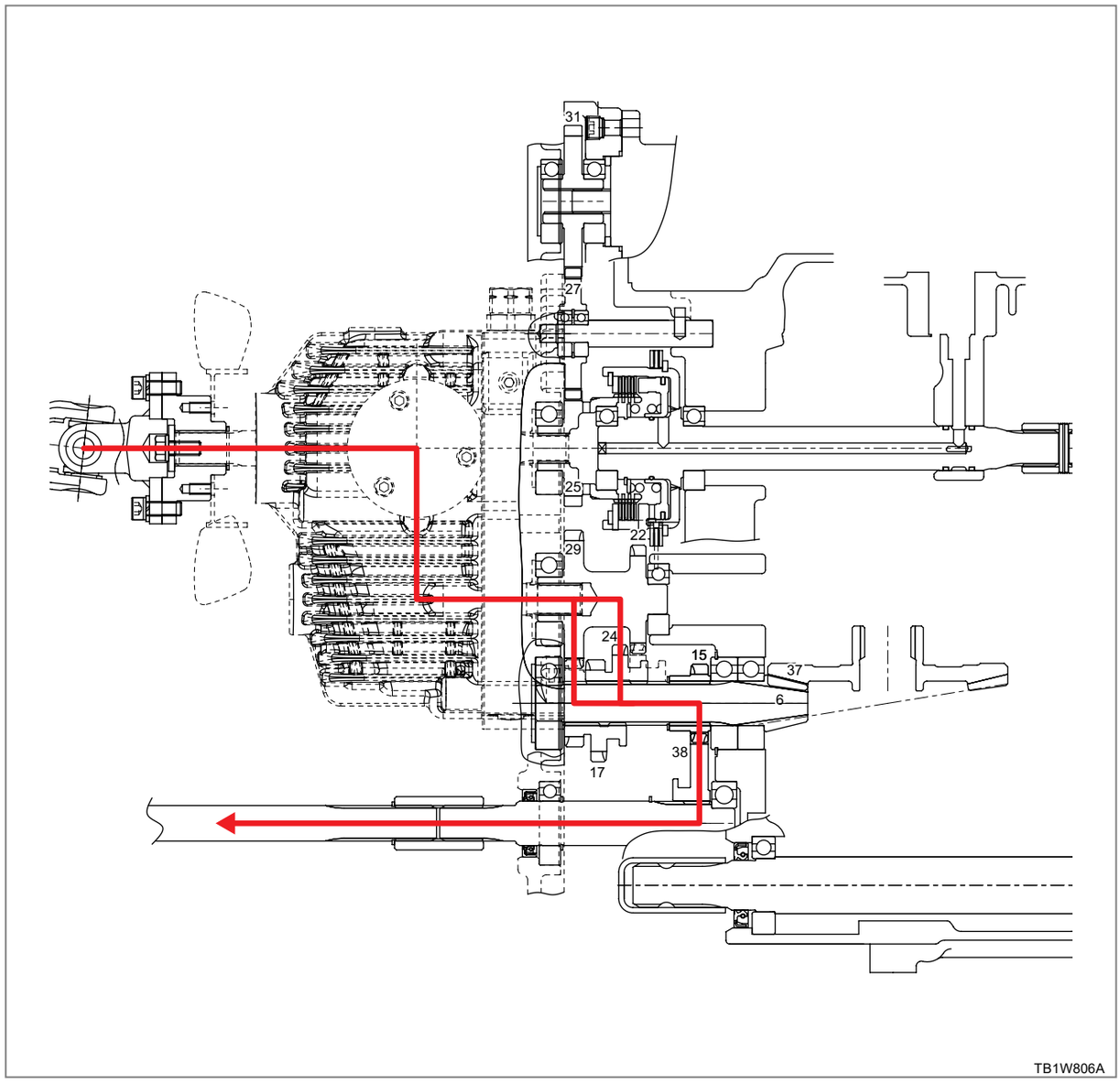
* **Tightening method of castle nut**

1. Tighten the nut until the tightening torque is sharply increased, and tighten it further until the next pin hole is shown. Insert the split pin at this point.
2. Bend the split pin so that it does not come off.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 3 2025-02-11 오후 5:20:29

2. OPERATING PRINCIPLE

2.1 POWER TRANSFER SYSTEM FOR FRONT AXLE



* For detailed power transfer description, refer to the chapter, "Transmission".

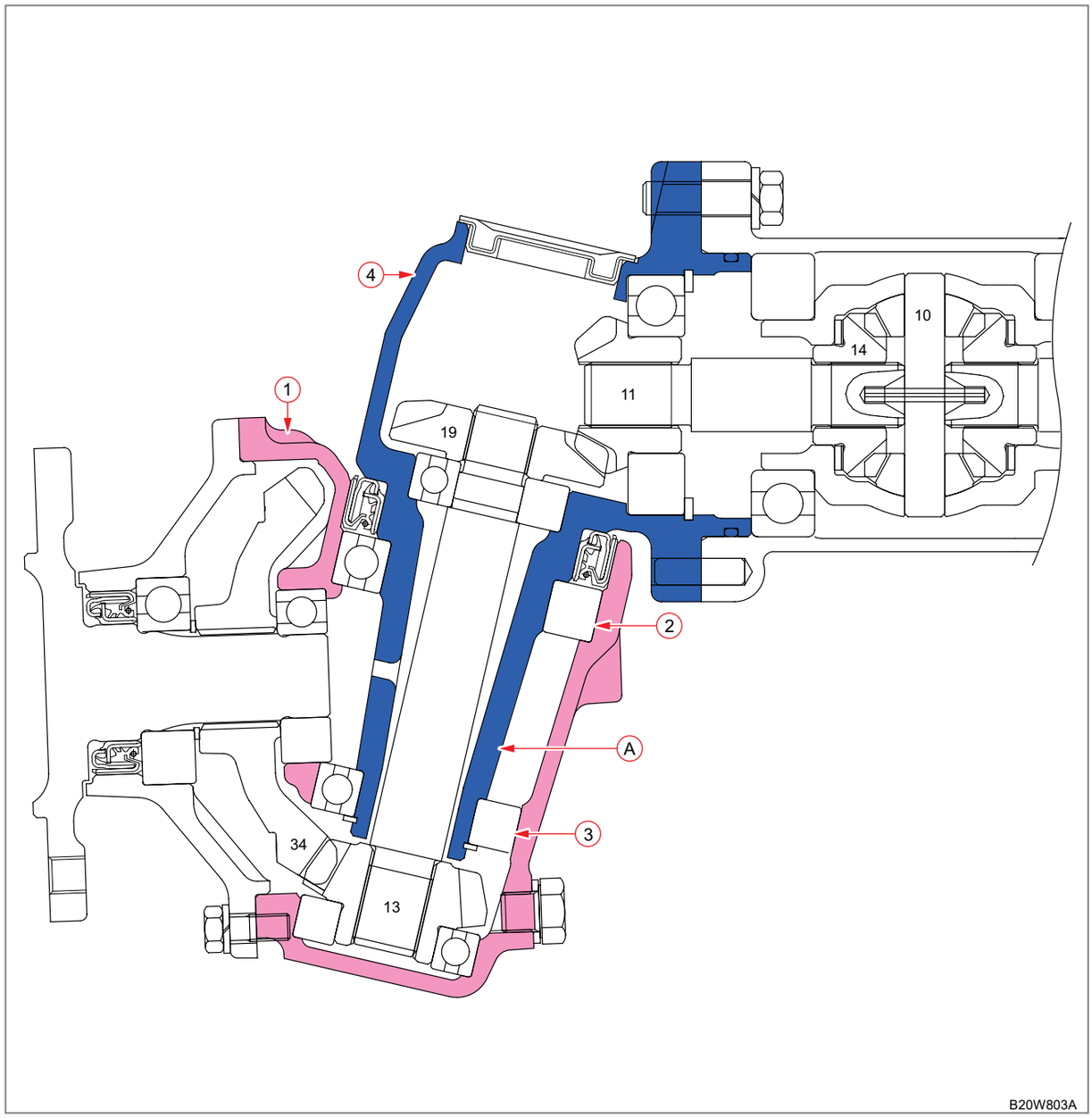
2.2 DIFFERENTIAL SYSTEM

The differential pinion idles or rotates simultaneously as well as rotates both differential side gears at the same or different speed depending on the condition of road or the tractor's moving direction. It is the main principle of the differential system.

For detail of differential system, please refer to 2.2 in chapter “Rear axle” (p. 6-4).

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2.3 LOAD TRANSFER



When the steering system is operated, the front axle case rotates around the pivot shaft (A) of the bevel gear case.

Vertical and horizontal load passed on to the front axle case (1) from the front wheels is transferred to the bevel gear case (4) through the upper ball bearing (2) and lower ball bearing (3).

In other words, the front axle supports vertical load and horizontal load with the upper and lower ball bearings doubly (2-point support type).

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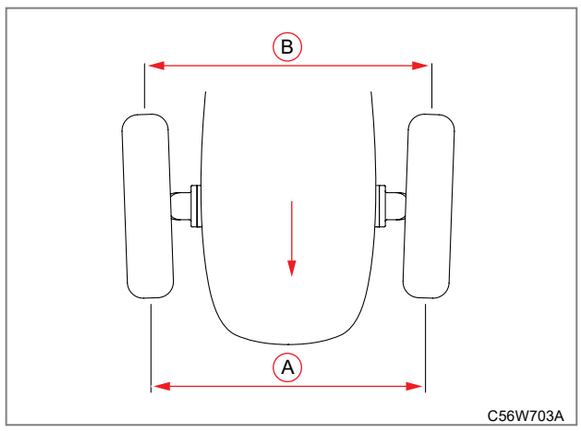
3. TROUBLESHOOTING

Symptom	Possible cause	Action
Front wheel drive is not available	• Damaged parts in FWD case	• Check and replace the part.
	• Damaged drive line	• Replace the part.
	• Damaged spiral pinion shaft and 17 bevel gear	• Replace
	• Damaged differential pinion and differential side gear	• Replace
	• Damaged upper bevel gear	• Replace, check oil level.
	• Damaged lower bevel gear and final drive bevel gear	• Check and replace the bearing.
	• Damaged front axle	• Replace
Abnormal noise from front axle	• Insufficient oil	• Change and replenish oil
	• Damaged gears	• Replace the damaged part.
	• Damaged bearings	• Replace the damaged part.
	• Abnormal backlash	• Adjust the backlash.
Leakage on front axle	• Excessively filled oil	• Add up proper amount of oil.
	• Damaged O-rings	• Replace the O-ring.
	• Damaged seal	• Replace
	• Damaged ball bearing	• Replace
	• Damaged seal of spiral pinion shaft	• Replace
	• Damaged ball bearing of spiral bevel pinion shaft	• Replace
Damaged front axle	• Improper front tire installed	• Check the specified tire speed (refer to "GENERAL").
	• Deformed front/rear tires	• Check the specified tire speed (refer to "GENERAL").
	• Abnormal front/rear wheel drive ratio	• Check the specified tire speed (refer to "GENERAL").
	• Improper front end loader installed (excessively large bucket)	• Use the loader with appropriate capacity.
	• Improper tire inflation pressure	• Keep the specified tire inflation pressure
Improper steering	• Abnormal toe-in (tractor cannot move straight forward)	• Adjust
	• Different inflation pressure between left and right tires	• Adjust or replace.
	• Damaged steering cylinder ball joint end pin	• Repair and replace
	• Abnormal hydraulic pressure related to steering sytem	• Refer to "Steering system".

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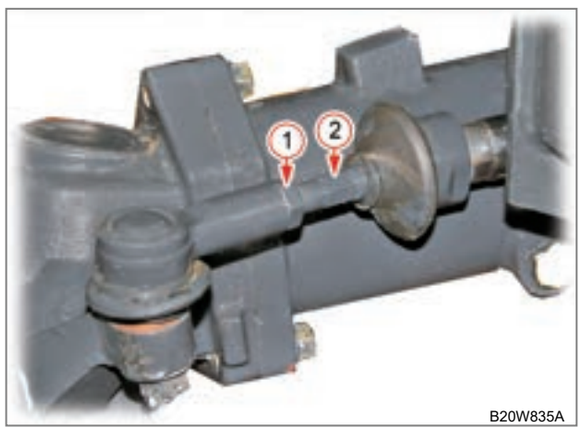
4. MEASUREMENT AND ADJUSTMENT

4.1 TOE-IN



MEASUREMENT OF TOE-IN

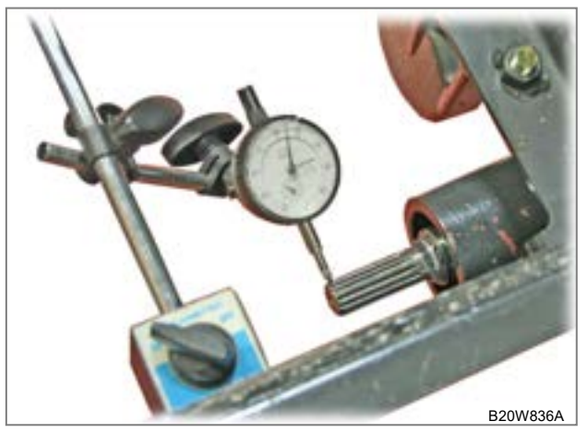
1. Park the tractor on level ground and apply the parking brake.
2. Lift the front tires from the ground using a hydraulic jack.
3. Turn the steering wheel so the front wheels are in the straight ahead position. Keep the balance of the axle.
4. Measure the front width (A) and the rear width (B) between the front wheels.
5. Measure this distance 2~3 times after turning the tires.
6. Get the average value of this distance.
7. Adjust the toe-in so that the distance between the front(A) is 2 ~ 8 mm (0.079 ~ 0.315 in.) shorter than the distance between the rear(B).



8. Unscrew the lock nuts (1) on both ball joint ends.
9. Turn the ball joint ends (2) to adjust the toe-in and tighten the lock nuts (1) securely.

Lock nut .....367.5 ~ 431.2 Nm
37.5 ~ 44.0 kgf-m
270.0 ~ 316.8 lb-ft

4.2 BACKLASH FOR SPIRAL BEVEL PINION AND 17 SPIRAL BEVEL GEAR



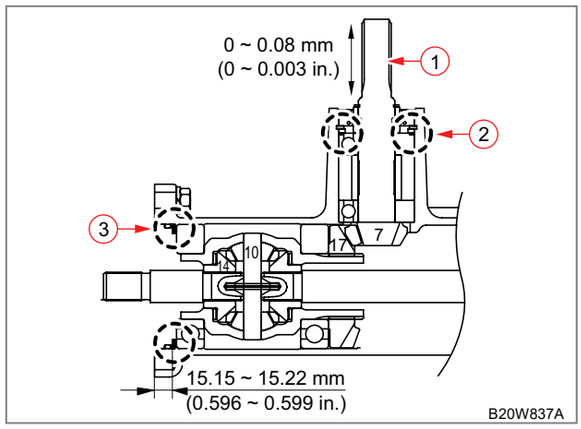
1. Assemble the spiral bevel pinion shaft, 17 bevel gear, differential case and differential gear shaft.
2. Set the lever type dial indicator so that it contacts with the spline of the spiral bevel pinion shaft as shown in the figure.
3. With both differential gear shaft fixed, measure the backlash by moving the spiral bevel pinion shaft by hand lightly.
   - **Backlash**

     Standard spline: 0.08 ~ 0.11 mm (0.003 ~ 0.004 in.)

     Standard gear teeth : 0.13 ~ 0.18 mm (0.005 ~ 0.007 in.)
   - **Calculation of standard backlash for spline**

$$= \frac{\text{Standard backlash for gear teeth x spline radius}}{\text{Center line radius of teeth contact}}$$

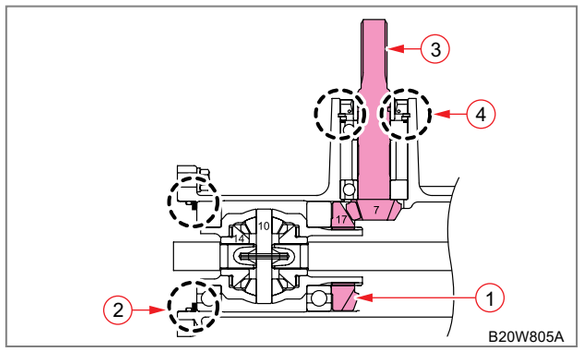
$$= \frac{0.13 \sim 0.18 \text{ mm} \times 10 \text{ mm}}{17 \text{ mm}} = 0.08 \sim 0.11 \text{ mm } (0.003 \sim 0.004 \text{ in.})$$



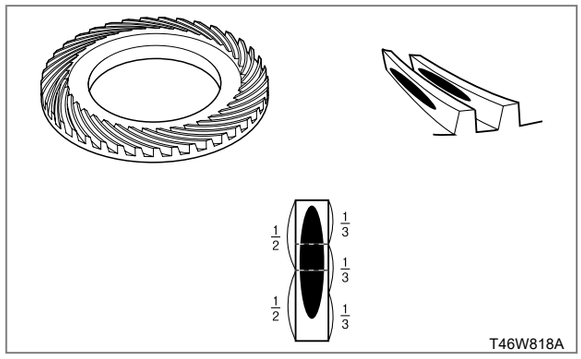
4. Adjust the bevel pinion shaft (1) with the shim (0.1T and 0.2T) (2) so that it has almost no axial play.
5. Adjust the distance between the cross section of the front support and the cross section of ball bearing outer wheel to 15.15 to 15.22 mm (0.596 to 0.599 in.) with the shim (0.1T and 0.2T) (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 7 2025-02-11 오후 5:20:30

4.3 TOOTH CONTACT OF SPIRAL BEVEL GEAR

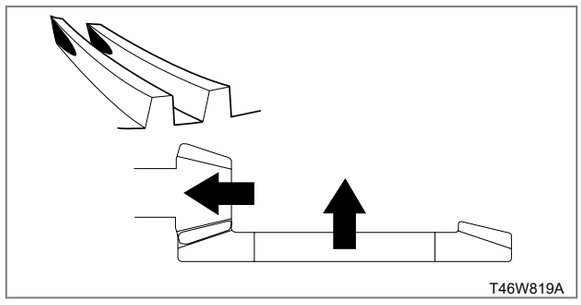


1. Clean the teeth after removing the spiral pinion shaft (3) and the ring gear (1).
2. Coat all the teeth of the pinion shaft (3) with contact grease and reassemble it.
3. Turn the pinion shaft for approx. 10 turns and check the dimension of contact area by measuring the dimension with contact grease on the teeth of the ring gear (1).



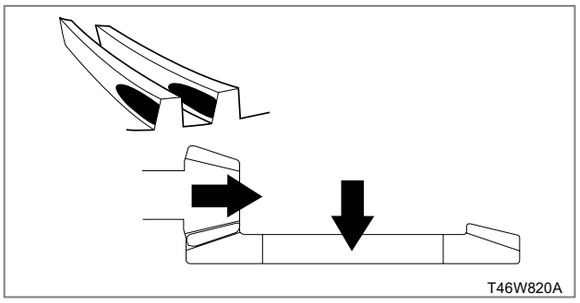
- The contact area should be over 35 % of the entire teeth area and the center of the contact mark should be close to the center of the pinion in height. Also, the center of the contact mark should be located on the 1/3 spot from the toe of the teeth to the center of the teeth in length.

A. TOE CONTACT



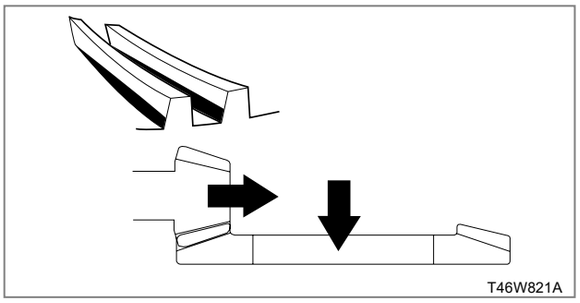
- If the center of the contact mark is too close to the toe of the tooth, push back the pinion shaft and push in the ring gear to the pinion direction so that the back lash is maintained. Then, measure the backlash.

B. HEEL CONTACT



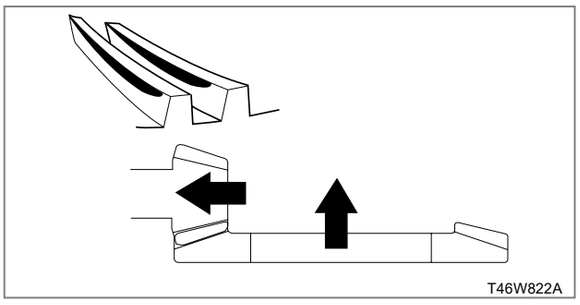
- If the contact mark is close to the heel of the ring gear teeth, push the pinion shaft toward the ring gear and push the ring gear away from the pinion so that the backlash is maintained. Then, measure the backlash.

C. DEEP CONTACT



- If the contact mark is on the deep of the ring gear teeth, push the ring gear away from the pinion and push the pinion into the ring gear (if necessary) to maintain the backlash. Then, measure the backlash for the final time.

D. TIP CONTACT



- If the contact mark is on the deep of the ring gear teeth, pull the ring gear toward the pinion and pull out the pinion from the ring gear (if necessary) to maintain the backlash. Then, measure the backlash for the final time.

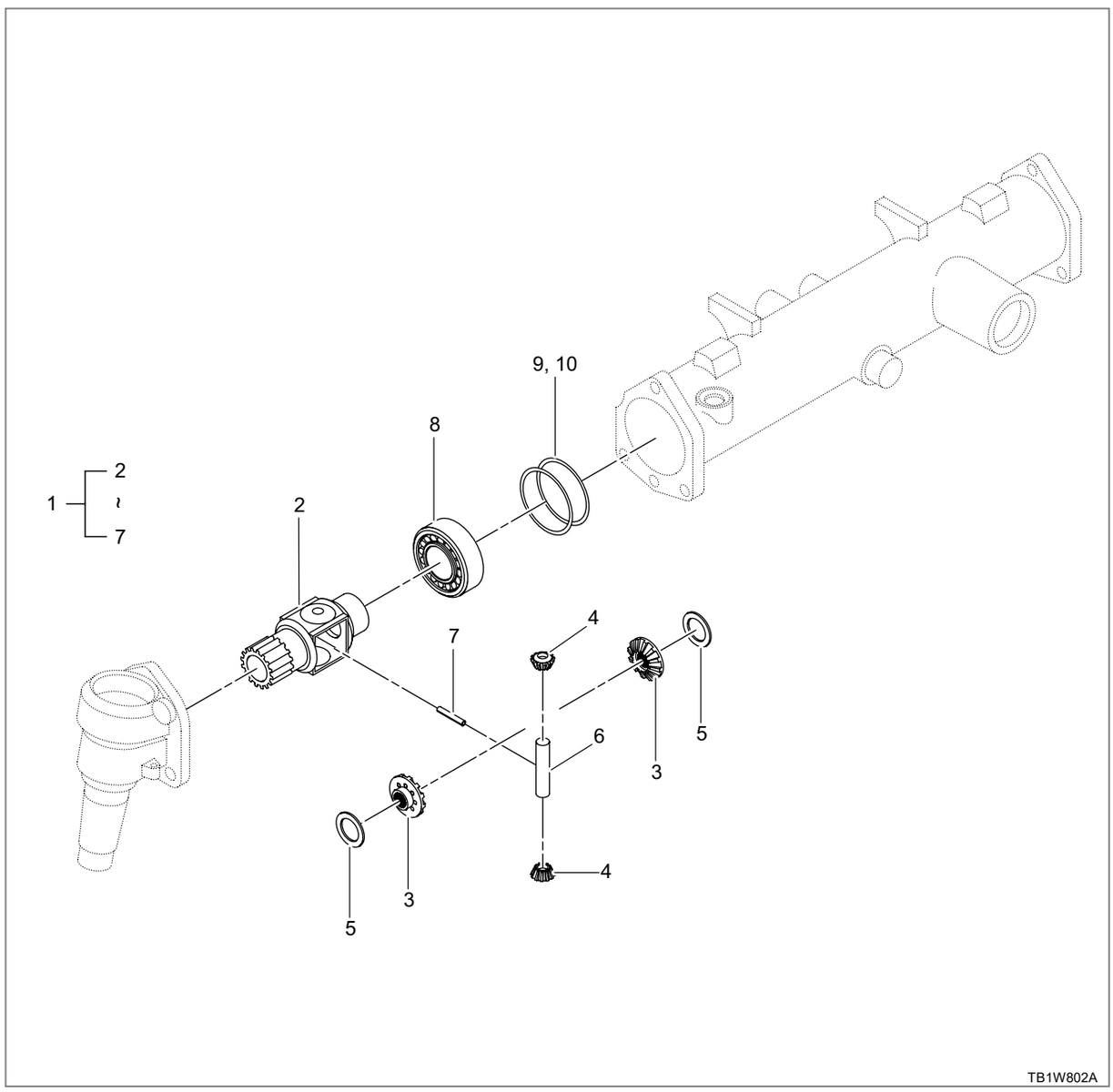
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 8 2025-02-11 오후 5:20:30

5. EXPLODED VIEW

REMARK

The part numbers and shapes of the following components are subject to change without notice for improvement of the product. If necessary, refer to the DAEDONG electronic manual, DPCS.

5.1 TB3-G312001 FRONT DIFF SYSTEM

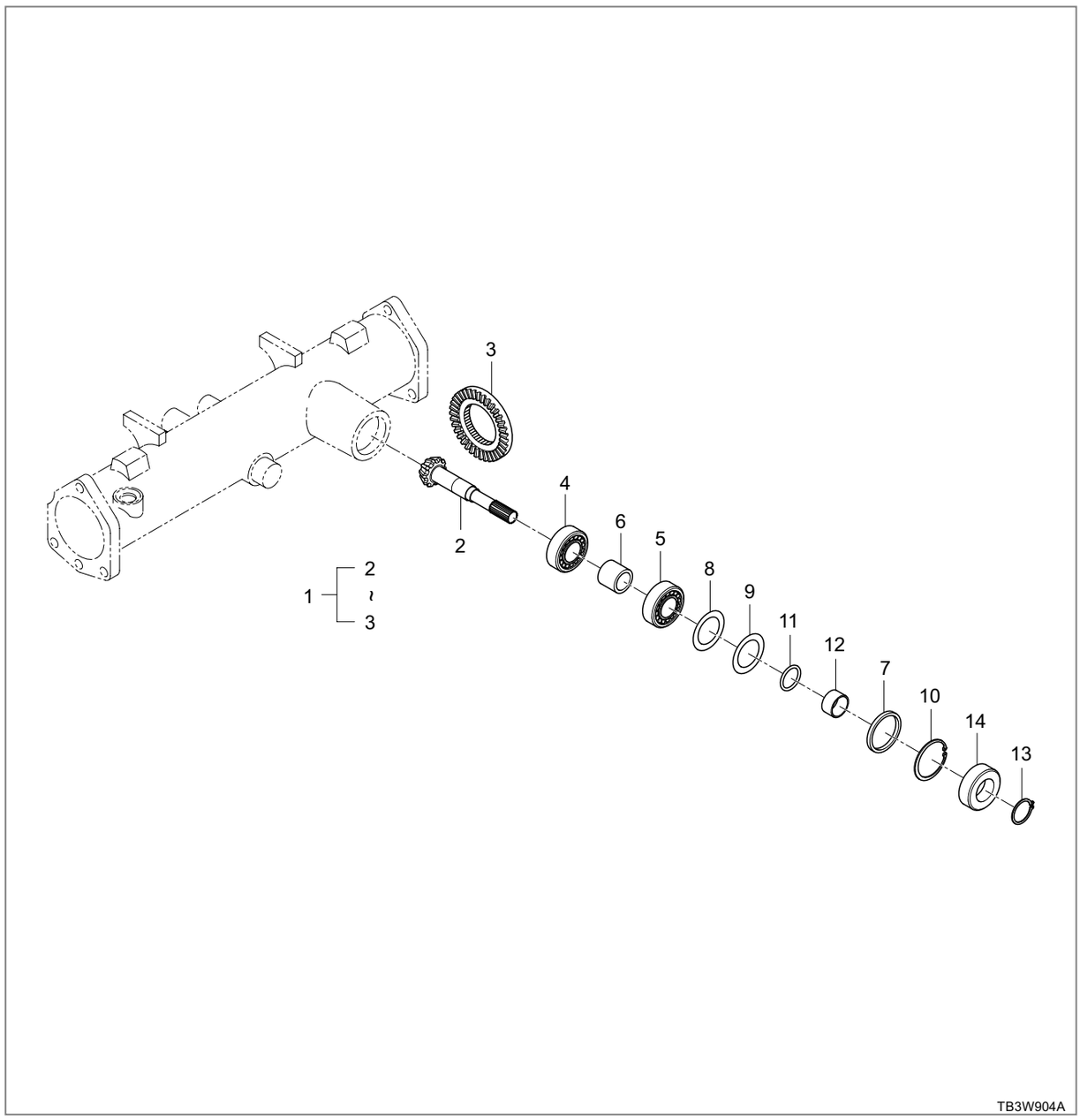


COMPONENTS

(1) Front Differential Assembly
(2) Case, Front Diff
(3) Pinion
(4) Gear, Diff. Side
(5) Washer, Thrust
(6) Shaft, Pinion
(7) Pin, Spring
(8) Ball Bearing
(9) Shim 0.10
(10) Shim 0.20

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 9 2025-02-11 오후 5:20:30

5.2 TB3-G313001 BEVEL PINION SHAFT

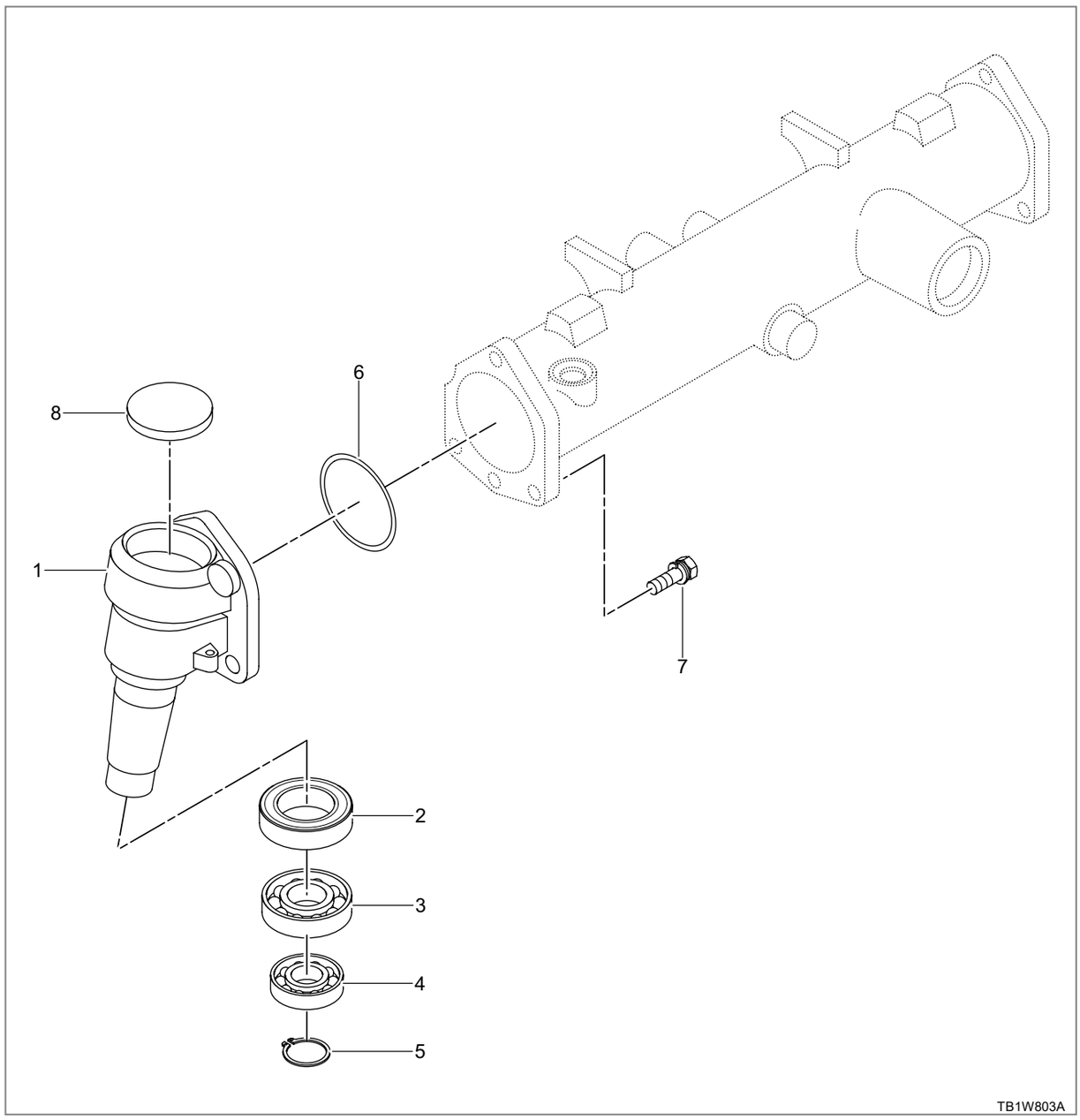


COMPONENTS

(1) Assy, Bevel Gear
(2) Pinion, Bevel 2
(3) Gear, Bevel 17
(4) Ball bearing
(5) Ball bearing
(6) Bushing
(7) Collar
(8) Shim 0.10
(9) Shim 0.20
(10) Snap ring
(11) O ring
(12) Bushing
(13) Snap ring
(14) Oil seal

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 10 2025-02-11 오후 5:20:30

5.3 TB3-G314001 BEVEL GEAR CASE

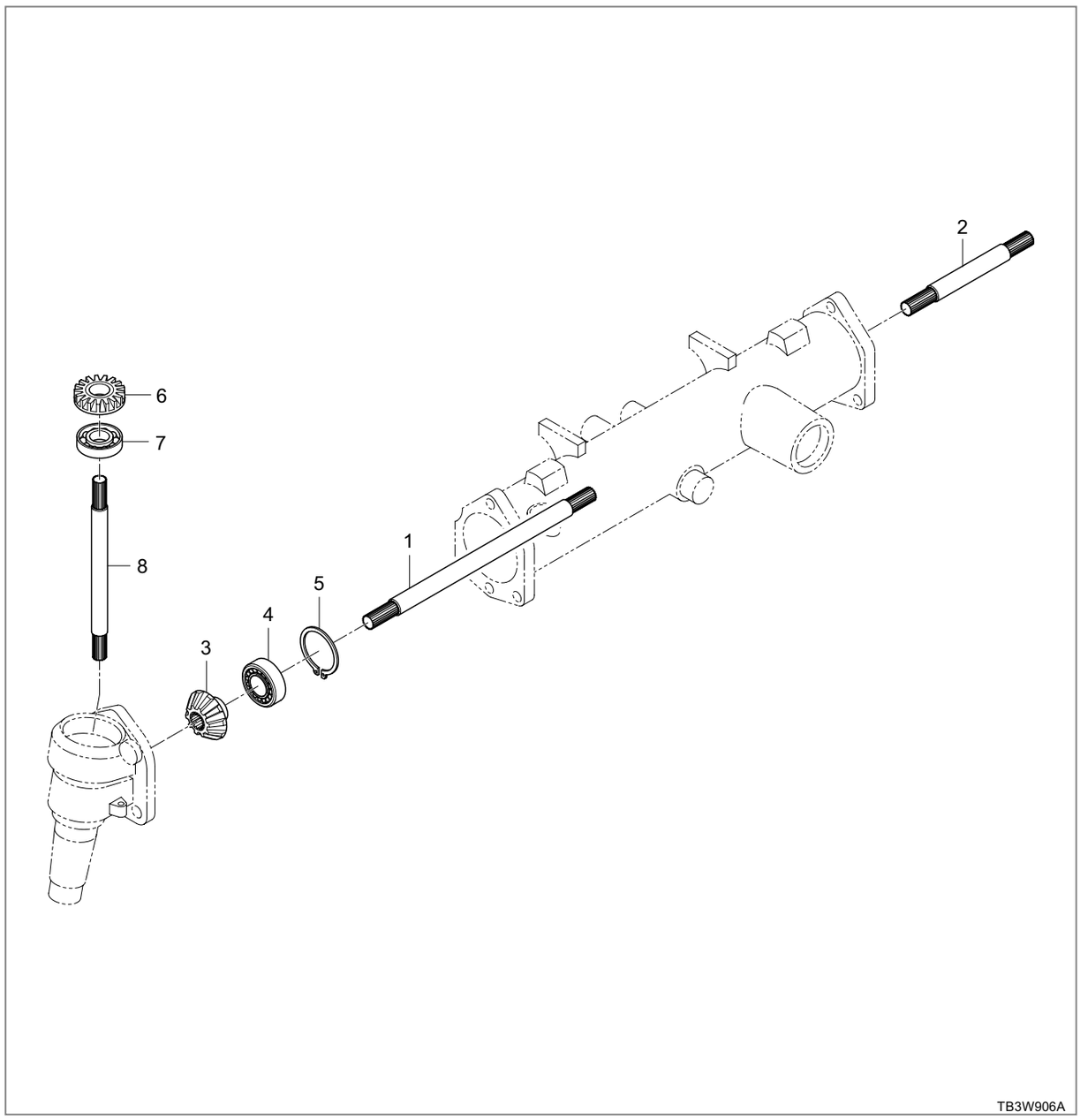


COMPONENTS

(1) Bevel gear case
(2) Oil seal
(3) Ball bearing
(4) Ball bearing
(5) Snap ring
(6) O ring
(7) Bolt, Washer
(8) Cover, Seal

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 11 2025-02-11 오후 5:20:31

5.4 TB3-G315001 BEVEL GEAR SHAFT

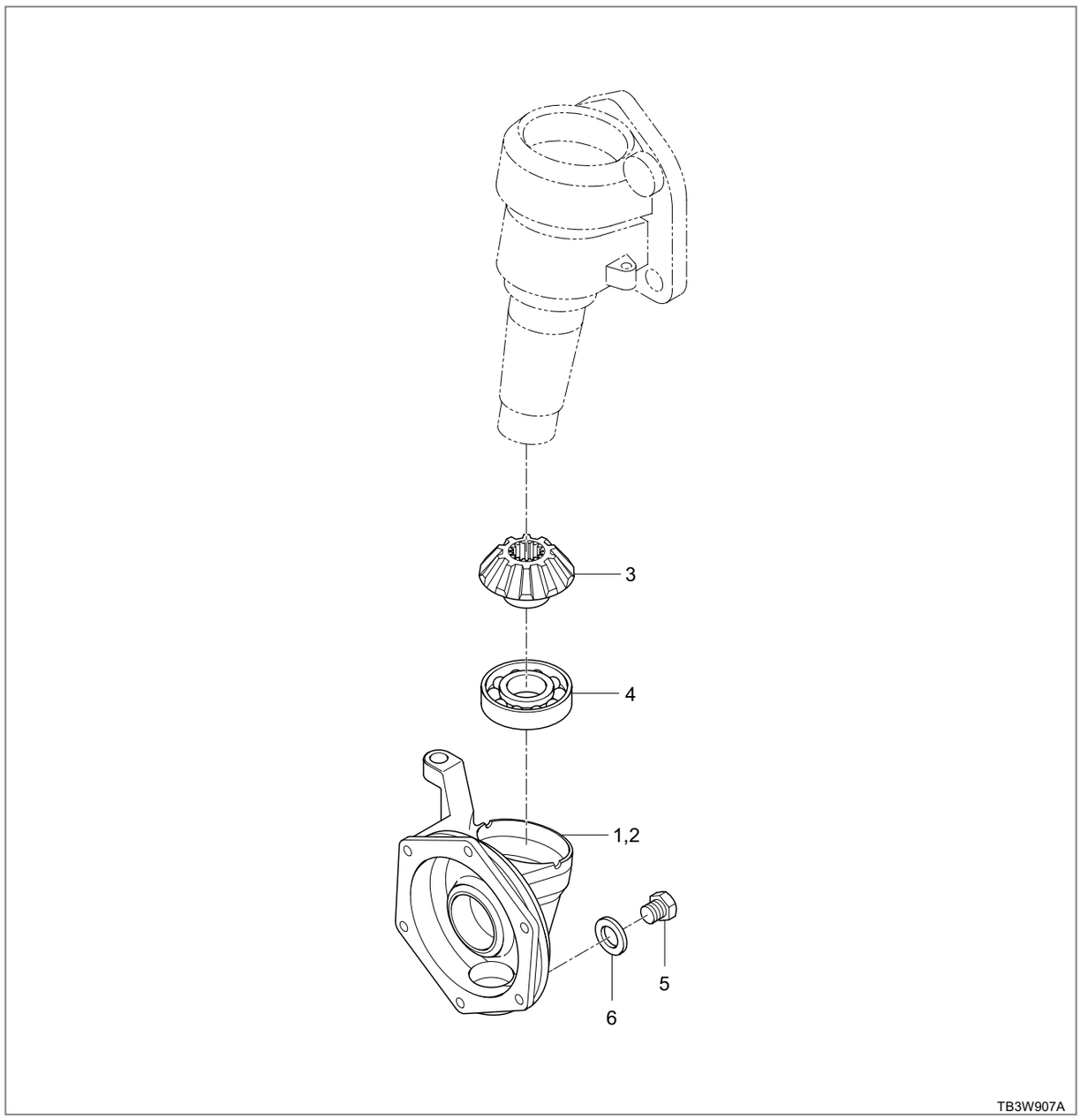


COMPONENTS

(1) Shaft, Diff. gear LH
(2) Shaft, Diff. gear RH
(3) Gear, 11 bevel
(4) Ball bearing
(5) Ring, Snap
(6) Gear 19, Bevel
(7) Ball bearing
(8) Bevel gear shaft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 12 2025-02-11 오후 5:20:31

5.5 TB3-G316001 FRONT AXLE CASE

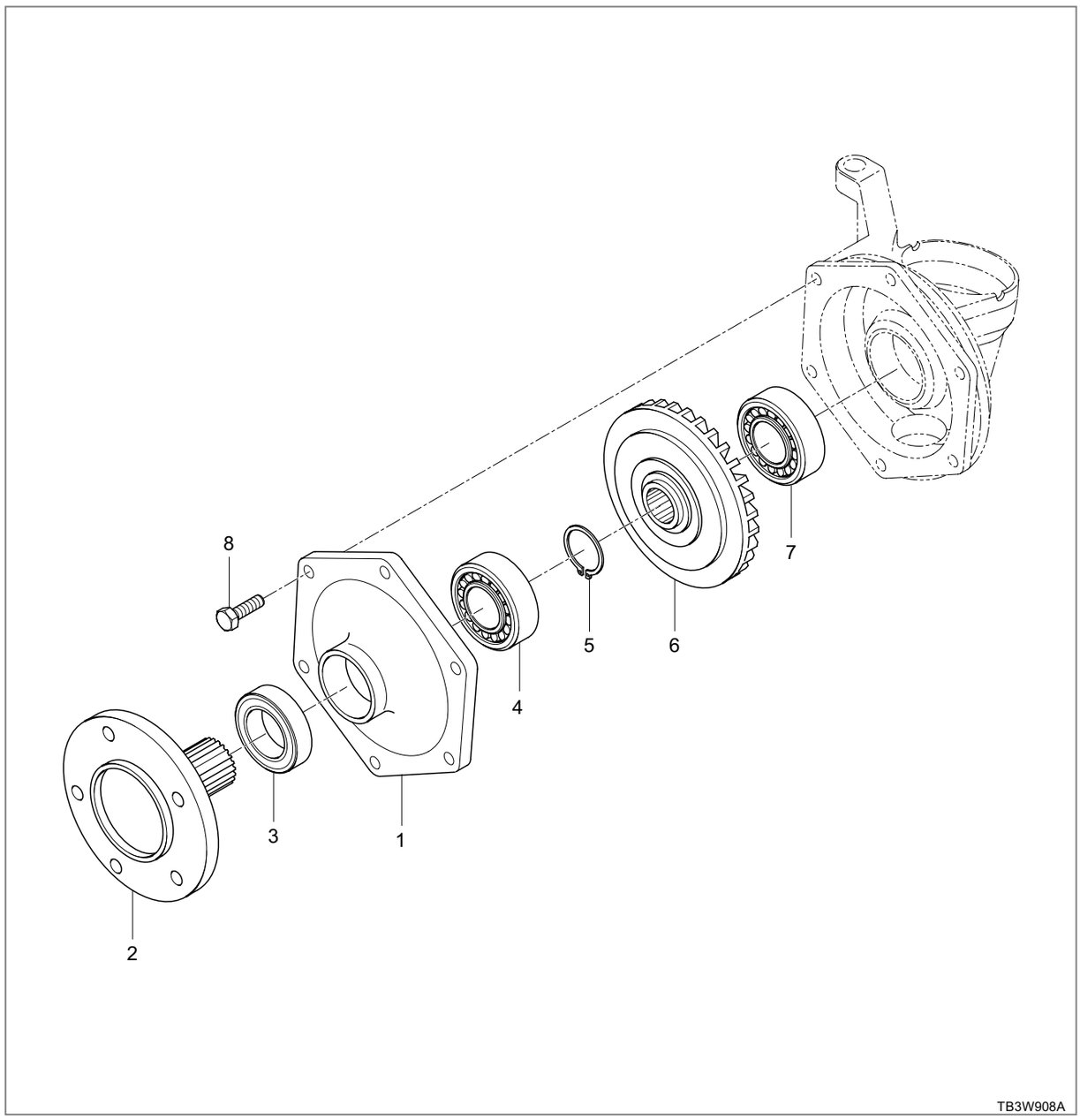


COMPONENTS

(1) Case, Front axle LH
(2) Case, Front axle RH
(3) Gear, Bevel
(4) Ball bearing
(5) Plug
(6) Washer, Seal

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 13 2025-02-11 오후 5:20:31

5.6 TB3-G317001 FRONT AXLE

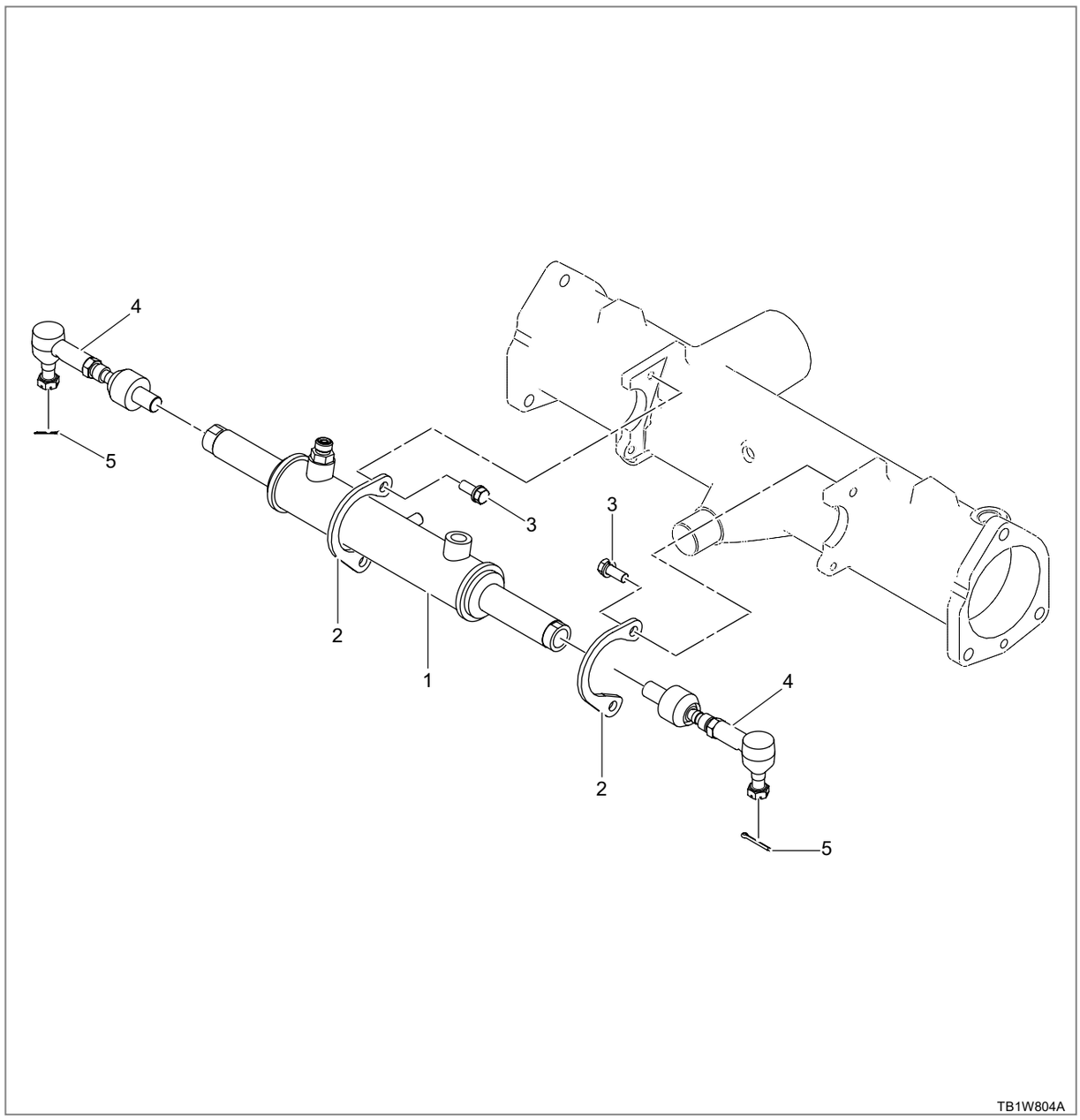


COMPONENTS

(1) Cover, Front axle
(2) Axle, Front
(3) Oil seal
(4) Ball bearing
(5) Snap ring
(6) Gear, 34 bevel
(7) Ball bearing
(8) Bolt, Washer

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 14 2025-02-11 오후 5:20:31

5.7 TB3-G321002 STEERING CYLINDER

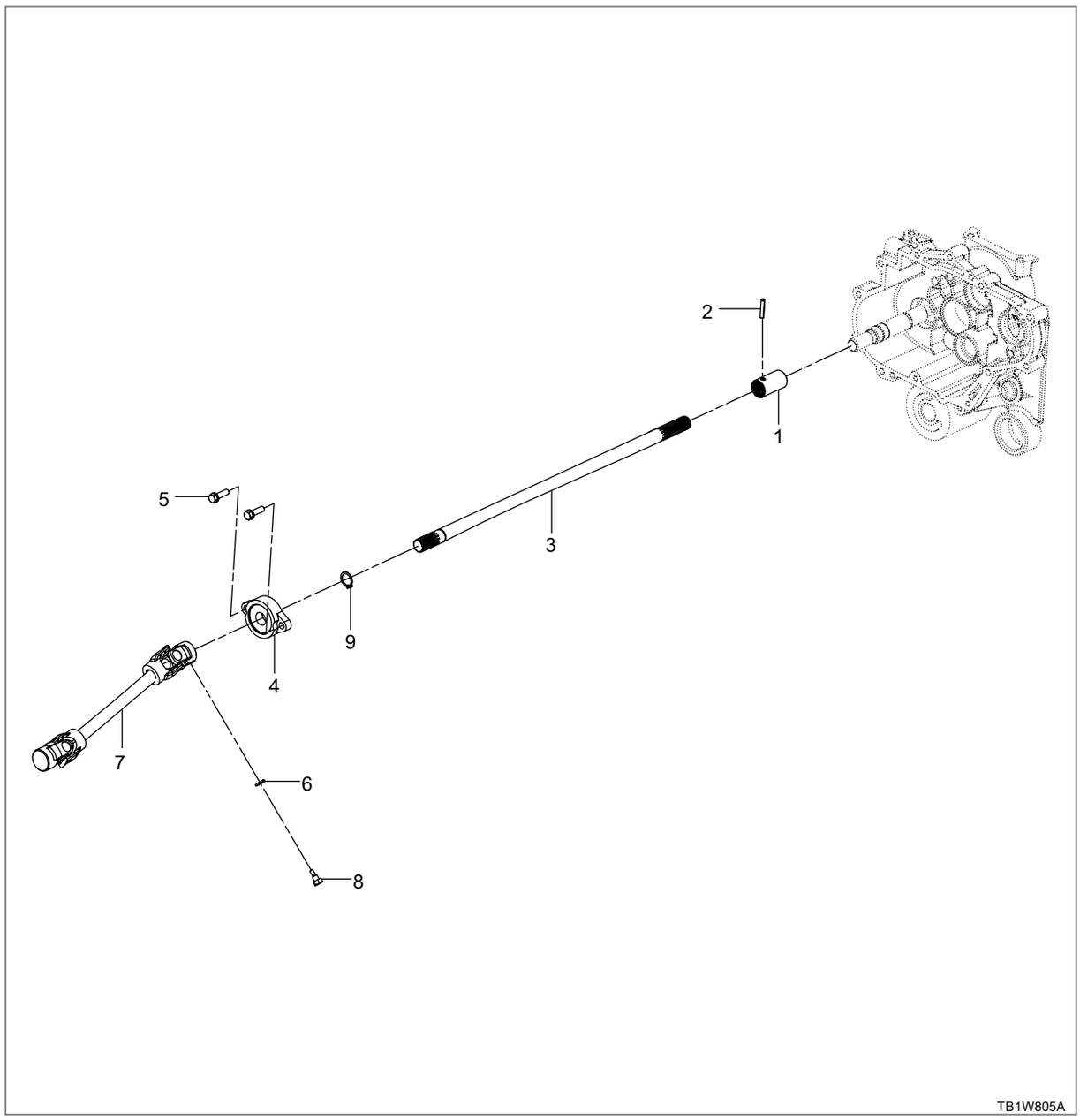


COMPONENTS

(1) Cylinder, Steering
(2) Bracket, Cylinder
(3) Bolt, Washer
(4) Ball joint assy
(5) Rack end assy
(6) Tie-rod assy
(7) Pin, Split

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 15 2025-02-11 오후 5:20:31

5.8 TB3-G331005 PROPELLER SHAFT

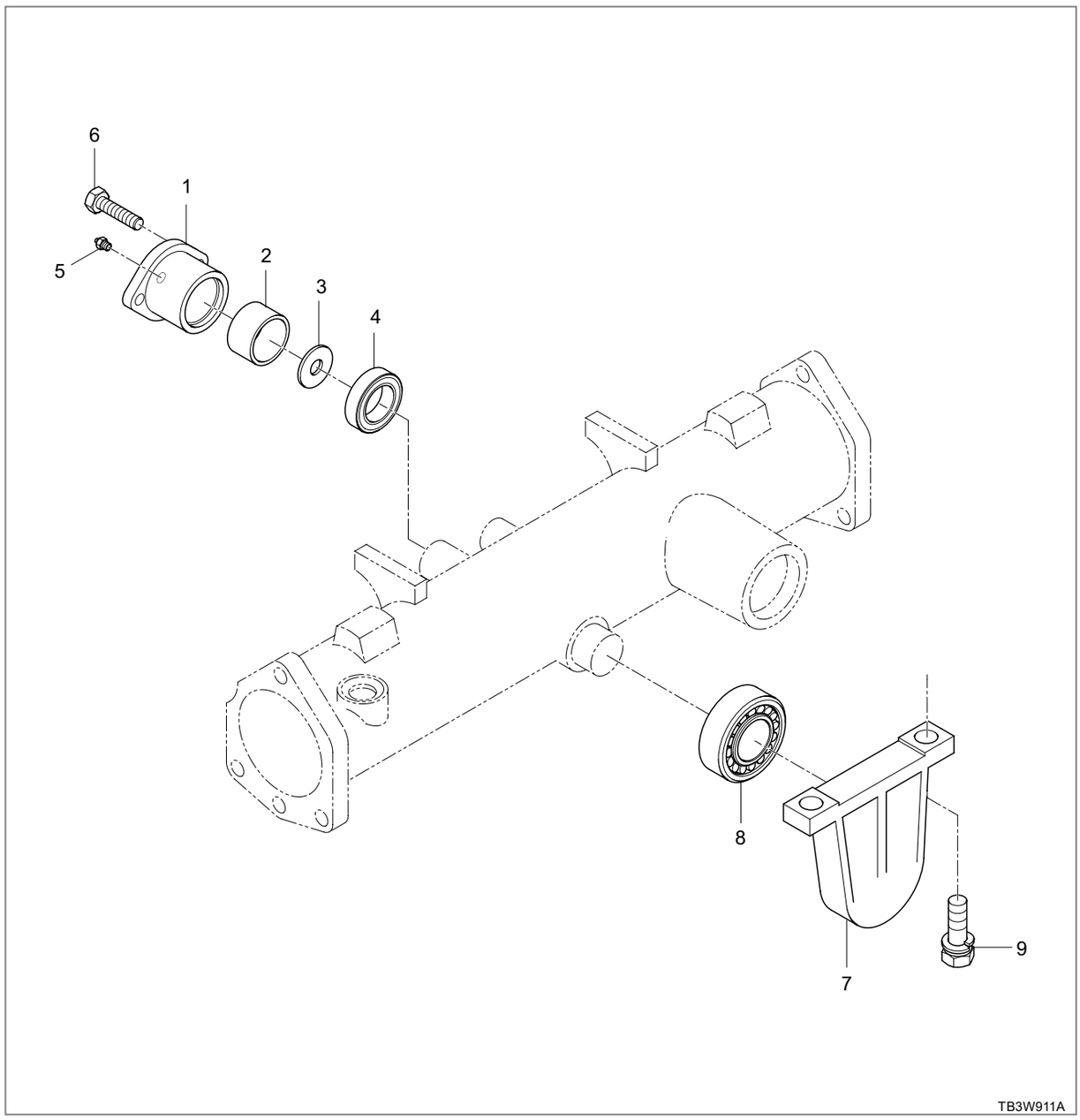


COMPONENTS

(1) Coupling
(2) Pin, Spring
(3) Shaft, Propeller
(4) Bearing unit, Flange ball
(5) With washer bolt
(6) Spring washer
(7) Joint
(8) Bolt, Holder
(9) Ring, Snap

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 16 2025-02-11 오후 5:20:31

5.9 TB3-G332001 FRONT AXLE BRACKET



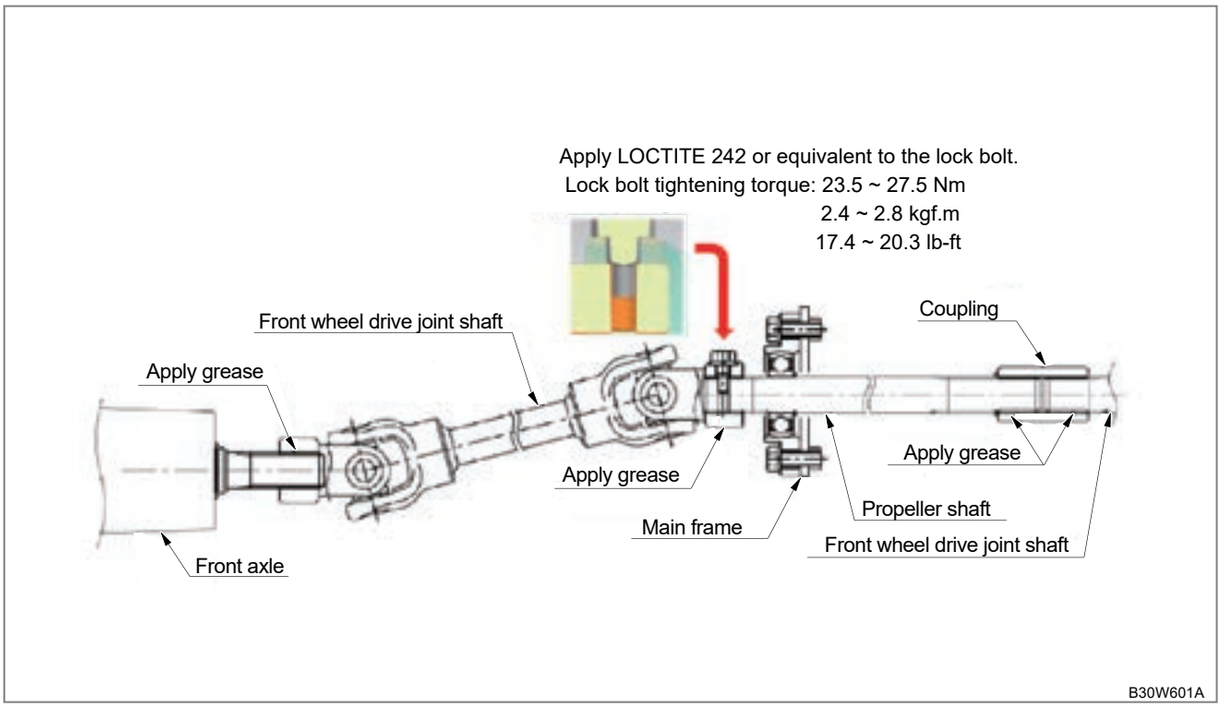
COMPONENTS

(1) Cover, Rolling axle
(2) Bush
(3) Collar
(4) Oil seal
(5) Nipple, Grease
(6) Bolt, Washer
(7) Bracket, Rear
(8) Ball bearing
(9) Bolt, Washer

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 17 2025-02-11 오후 5:20:31

6. SERVICING

6.1 FRONT WHEEL DRIVE JOINT SHAFT ASSEMBLY TIPS



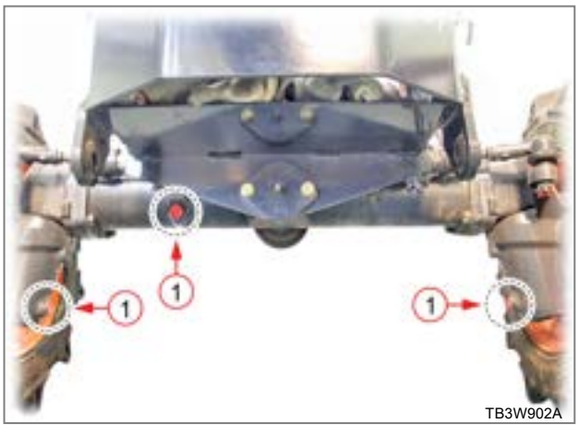
Apply grease to each spline.

After confirming that the coupling slides smoothly, assemble the bearing unit to the main frame.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 18 2025-02-11 오후 5:20:31

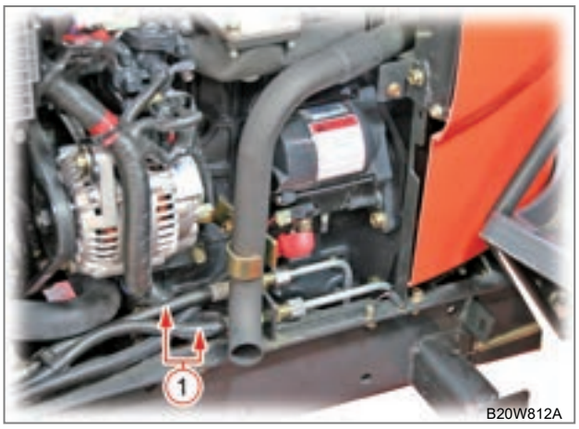
6.2 FRONT AXLE REMOVAL

1. Park the tractor on firm level ground, stop the engine and apply the parking brake.
2. Open the hood and disconnect the negative battery cable.



TB3W902A

3. Unscrew the drain plug (1) to drain oil.
4. Place a stand under the front axle or support the front axle with a hoist. Then, remove the left and right wheels.

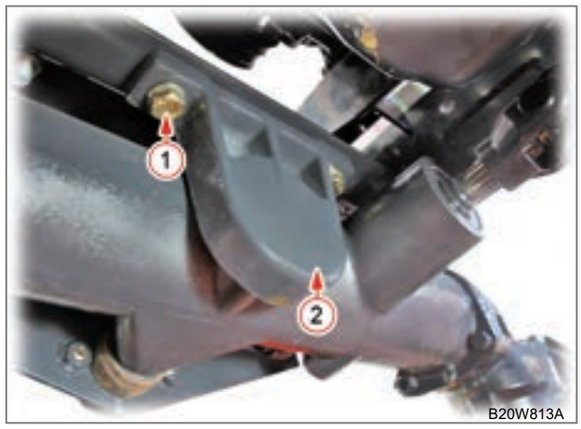


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5. Disconnect the steering cylinder hydraulic hose (1).

REMARK

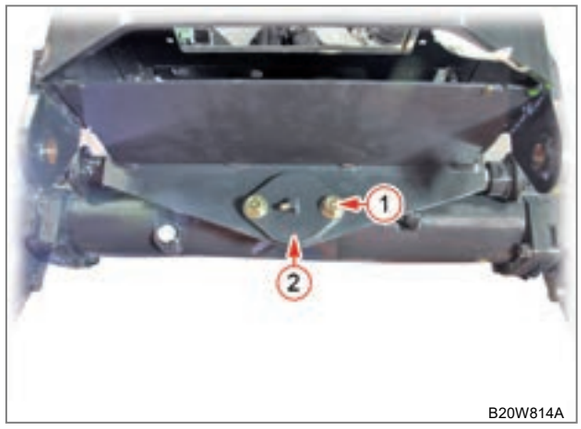
When disconnecting the hydraulic hose, hydraulic oil flows out of it. Therefore, place an empty container under the hose to collect oil.



B20W813A

6. Unscrew the front wheel rear bracket mounting bolts (1) to remove the front wheel rear bracket (2).

Mounting bolt
Tightening torque ..... 65.7 ~ 83.3 Nm
6.7 ~ 8.5 kgf-m
48.2 ~ 61.2 lb-ft

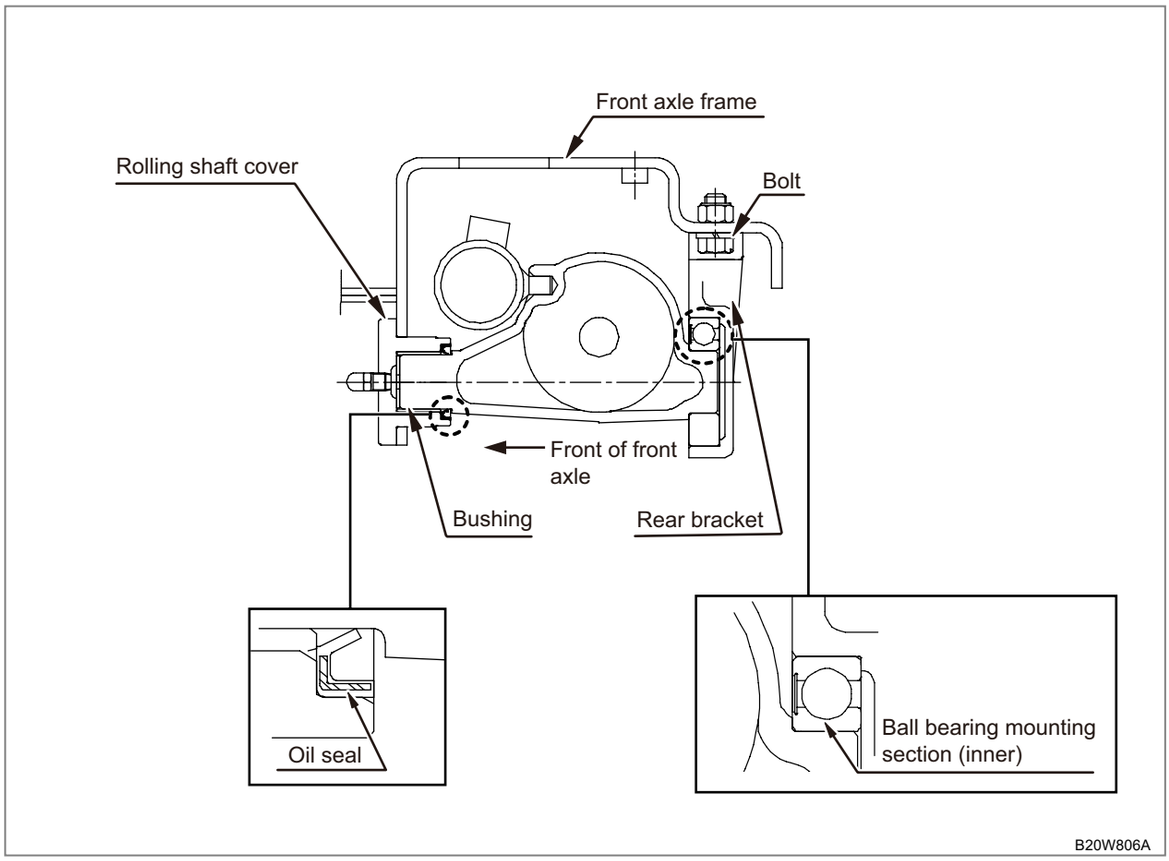


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7. Unscrew the rolling shaft cover mounting bolts (1) to remove the rolling shaft cover (2).

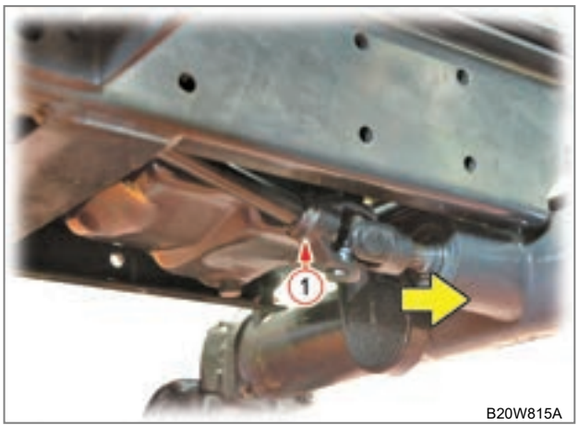
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 19 2025-02-11 오후 5:20:32

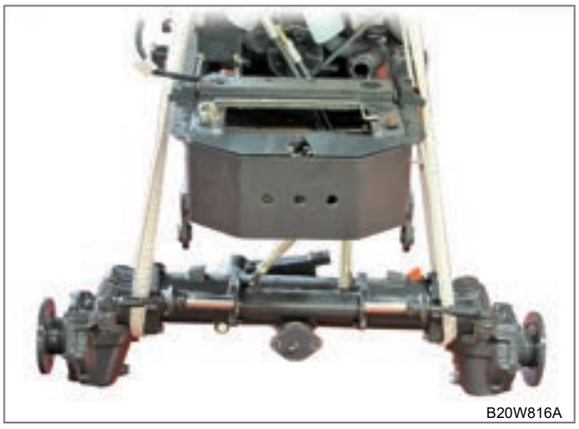
IMPORTANT



- **When replacing the oil seal of the rolling shaft cover, install it in the correct direction. When tapping the inner bushing to fit it into the place, be careful not to damage it.**
- **When installing the rear bracket, install the ball bearing (6207Z) in the correct direction and fill it with grease.**
- **When installing the front axle frame and rear bracket, tighten their bolts with the front axle assembly pulled forward as hard as possible to remove play in the forward and backward directions.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 20 2025-02-11 오후 5:20:32



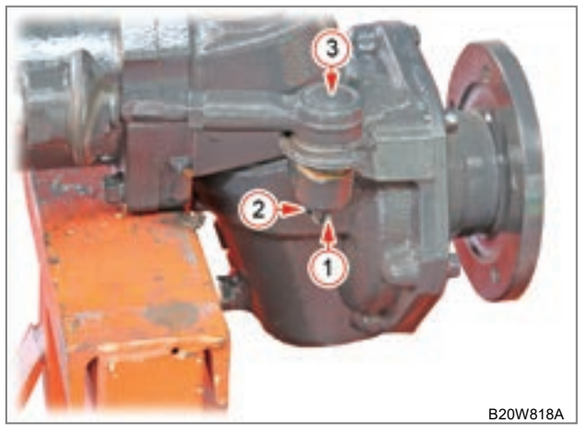




8. Lower the front axle assembly onto the ground slowly using a hoist while disconnecting the front wheel joint.

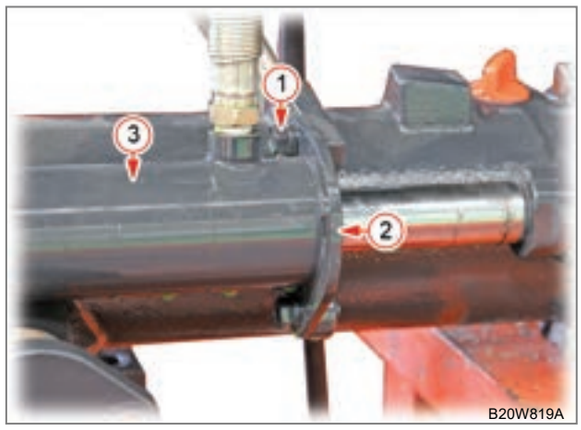
6.3 FRONT AXLE DISASSEMBLY AND ASSEMBLY

6.3.1 STEERING CYLINDER REMOVAL



1. Pull the split pin (1) of the ball joint end and unscrew the slotted nut (2) to separate the ball joint end (3).

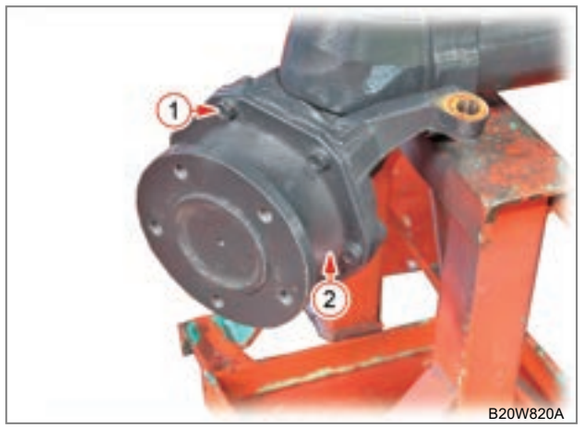
   Slotted nut
   tightening torque .....28.4 ~ 36.3 Nm
   2.9 ~ 3.7 kgf-m
   20.9 ~ 26.6 lb-ft



2. Unscrew the cylinder bracket mounting bolts (1) to remove the bracket (2) with the steering cylinder assembly (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 21 2025-02-11 오후 5:20:32

6.3.2 FRONT AXLE COVER DISASSEMBLY





1. Unscrew the front axle cover mounting bolts (1) and tap the front axle gently to remove the front axle cover (2) assembly.

⚠ CAUTION

When removing the front axle cover assembly, be careful not to drop and get hurt by it.



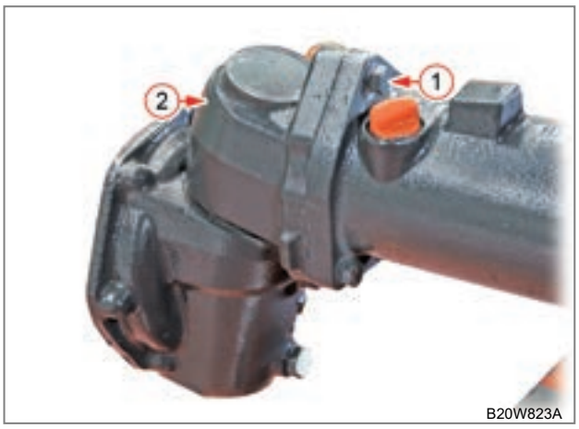
2. Remove the front axle (1), oil seal (2), front axle cover (3), ball bearing (4), snap ring (5), 34 bevel gear (6) and ball bearing (7) in order.

REMARK

- **When installing the front axle, be careful not to miss the snap ring. When installing the front axle cover, apply liquid gasket (LOCTITE 5060 or equivalent) to its mating surface.**
- **When installing the oil seal, have its steel plate side face outward.**

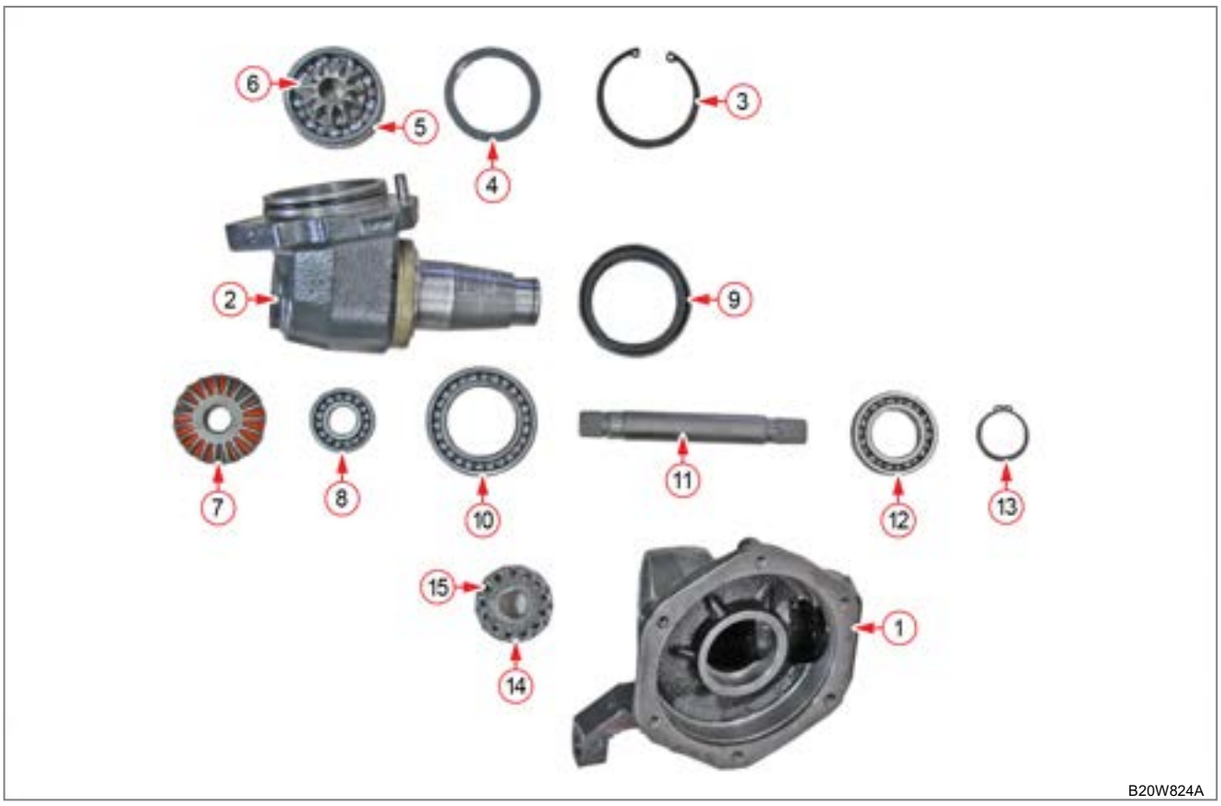
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6.3.3 BEVEL GEAR CASE DISASSEMBLY



REMARK
When installing the bevel gear case to the front axle support, apply liquid gasket (LOCTITE 5060 or equivalent) to its mating surface.

1. Unscrew the bevel gear case mounting bolt to remove the bevel gear case (2) assembly.

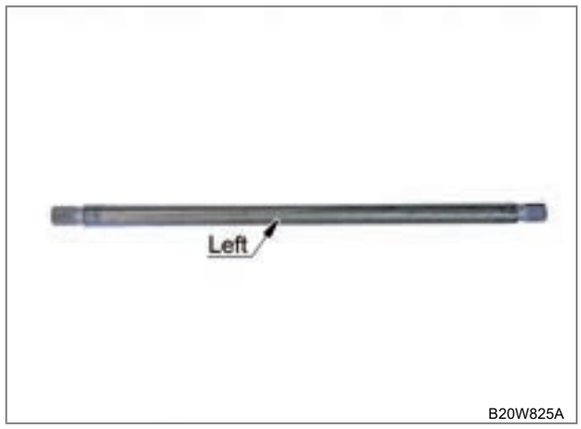


2. Pull the front axle case (1) to separate it from the bevel gear case (2). Then, remove the snap ring (3), shim (4), ball bearing (5) and 11 bevel gear (6) from the bevel gear case. Then, remove the 19 bevel gear (7), oil seal (9), ball bearing (10), bevel gear shaft (11), ball bearing (12) and snap ring (13).
   Also, remove the 13 bevel gear (14) and ball bearing (15) from the front axle case.
3. Assemble in the reverse order of disassembly.

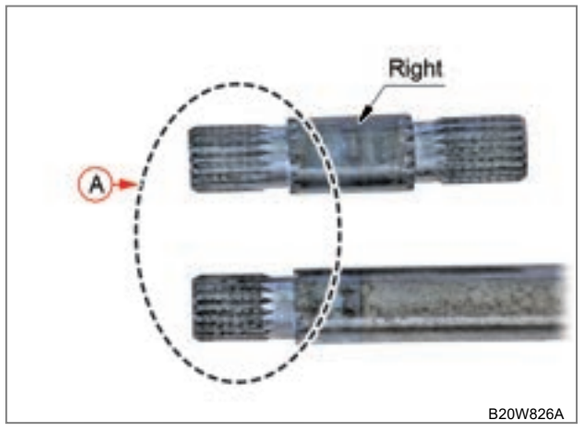
REMARK
Apply a proper amount of grease to the surface of the O-ring of the bevel gear case before installing it.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 23 2025-02-11 오후 5:20:33

6.3.4 FRONT DIFFERENTIAL SYSTEM DISASSEMBLY



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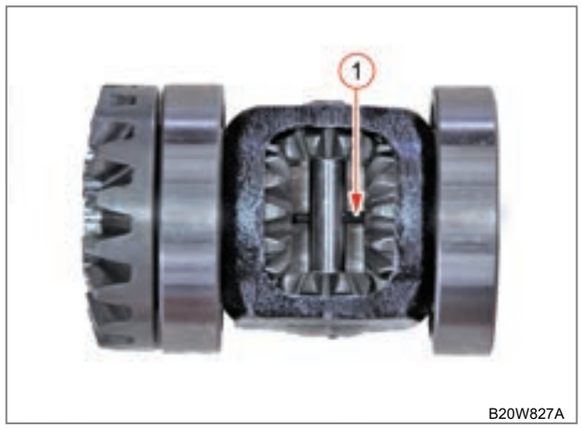


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1. Remove the differential shaft to the left and right of the front axle support.

REMARK

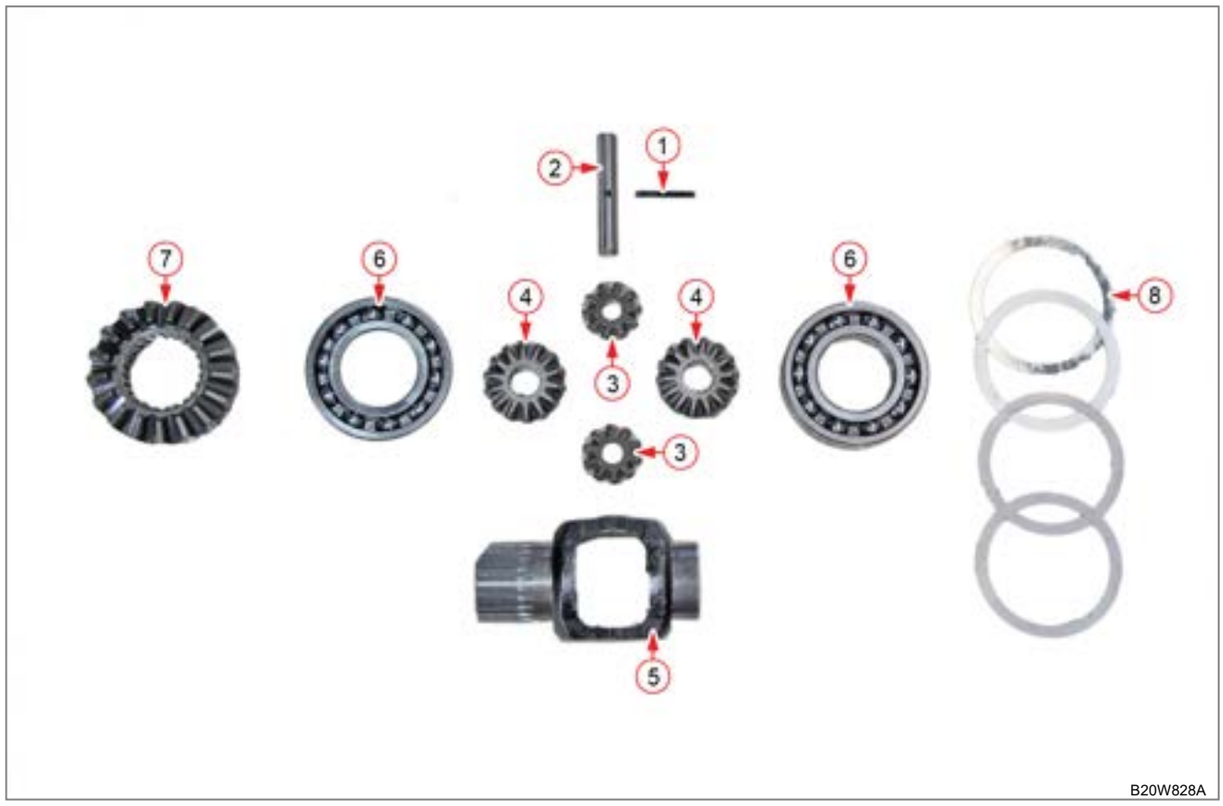
The shorter machined spline section of the differential shaft should be toward the differential side gear during installation.



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2. Separate the front differential system through the right of the front axle support and remove the left and right ball bearings. Then, pull out the spring pin (1) of the differential pinion shaft.

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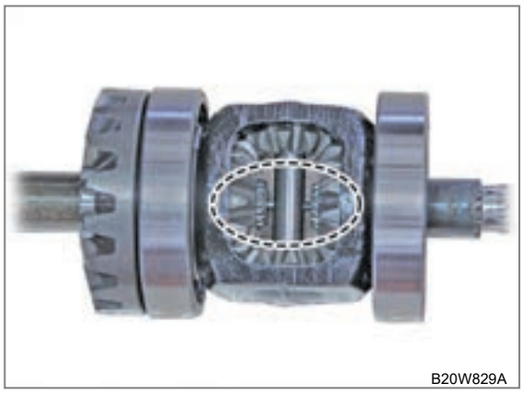


3. Remove the differential pinion shaft (2), differential pinion (3), differential side gear (4), differential case (5), ball bearing (6) and ring gear (7) from the front differential system.

REMARK

- **When removing the front differential system, check the amount of the shims (8) to install the same amount of the shims during assembly.**
- **When installing the ring gear, install it tightly against the ball bearing. The thrust washer between the side gear and front differential case should be installed with its oil groove facing the side gear.**
- **Apply lubricant (Three Bond 1901 or equivalent) to each moving part of the differential system.**

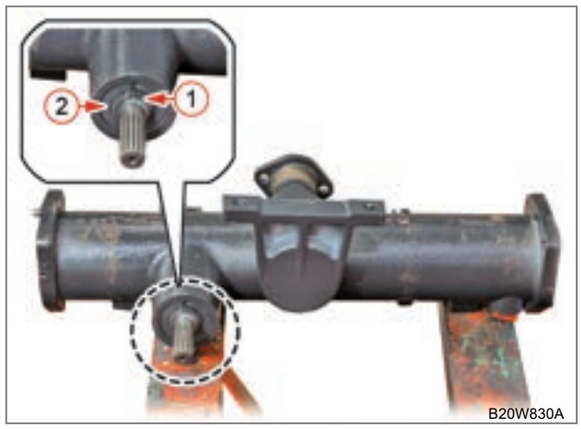
REMARK



- **The spring pin of the differential pinion shaft should be inserted into the hole of the differential gear shaft.**

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6.3.5 BEVEL PINION SHAFT REMOVAL

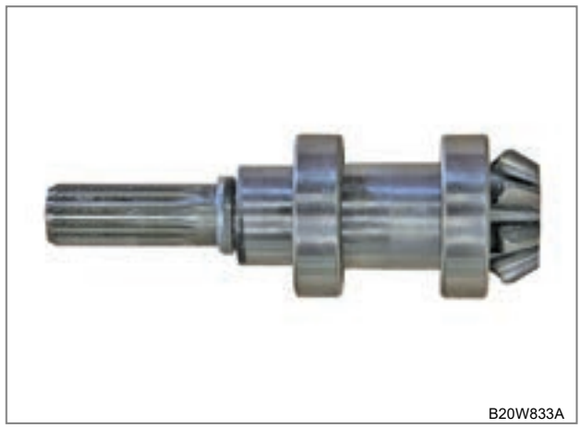


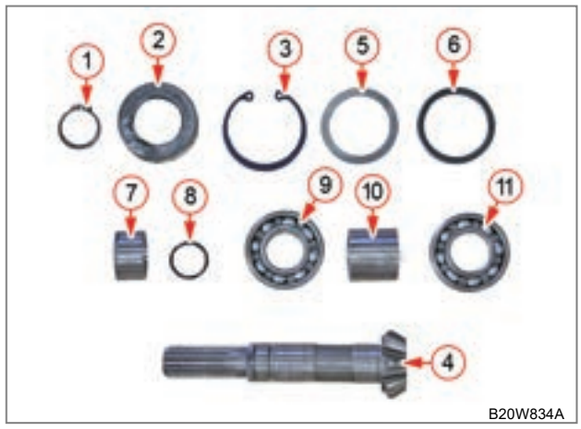
1. Remove the snap ring (1) from the front of the bevel pinion shaft and pull out the oil seal (2).





2. Remove the snap ring (3) and pull the bevel pinion shaft (4) assembly to remove it.





3. Remove the spacer (5), shim (6), spacer (7), O-ring (8), ball bearing (9), spacer (10), ball bearing (11) and bevel pinion shaft (4) from the bevel pinion shaft assembly in order.
4. Assemble in the reverse order of disassembly.

REMARK

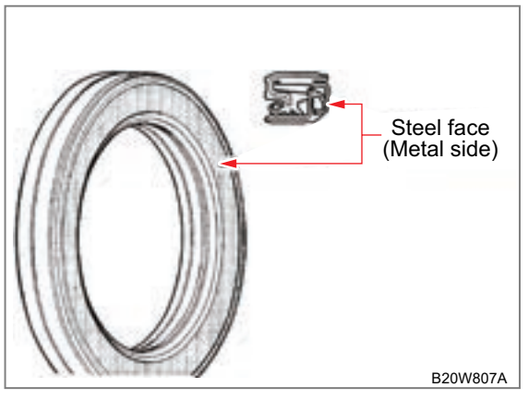
The ball bearings (9 and 11) should be installed to their correct position respectively. Also, the ball bearing (6205R) (11) should be installed to the bevel pinion shaft first.

REMARK

Observe the quantity and size of the shims(6) located between the spacer(7) and bearing(9) for assembly. Shim sizes are 0.1 mm and 0.2mm.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_08_앞차축.indd 26 2025-02-11 오후 5:20:33

REMARK



- **When installing the new seal, be sure to properly orient the seal in the cover. The metal side of the seal should face outward when properly installed in the cover.**
- **The oil seal should be replaced with a new one and install it with a tool.**

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STEERING SYSTEM

CHAPTER 9

TABLE OF CONTENTS

1. SPECIFICATIONS 9-2

1.1 Steering cylinder 9-2

1.2 Steering unit 9-2

1.3 Tightening torque for main components ...9-2

2. OPERATING PRINCIPLE.....9-3

2.1 Hydraulic circuit for steering operation 9-3

2.2 Operating principle 9-4

2.2.1 Overviews 9-4

2.2.2 Operation 9-5

2.3 Structure.....9-8

3. TROUBLESHOOTING 9-11

4. INSPECTION AND ADJUSTMENT.....9-12

4.1 Steering relief opening pressure 9-12

4.2 Relief valve pressure adjustment 9-13

5. EXPLODED VIEW.....9-15

5.1 TB3-G431004 Power steering unit.....9-15

5.2 TB3-G653004 Steering column.....9-16

6. SERVICING 9-17

6.1 Steering column 9-17

6.2 Steering cylinder 9-19

6.3 Steering unit removal 9-21

6.3.1 Disassembly of power steering unit components.....9-21

6.3.2 Inspection.....9-25

6.3.3 Installation.....9-25

6.4 Steering hydraulic tube location 9-29

1. SPECIFICATIONS

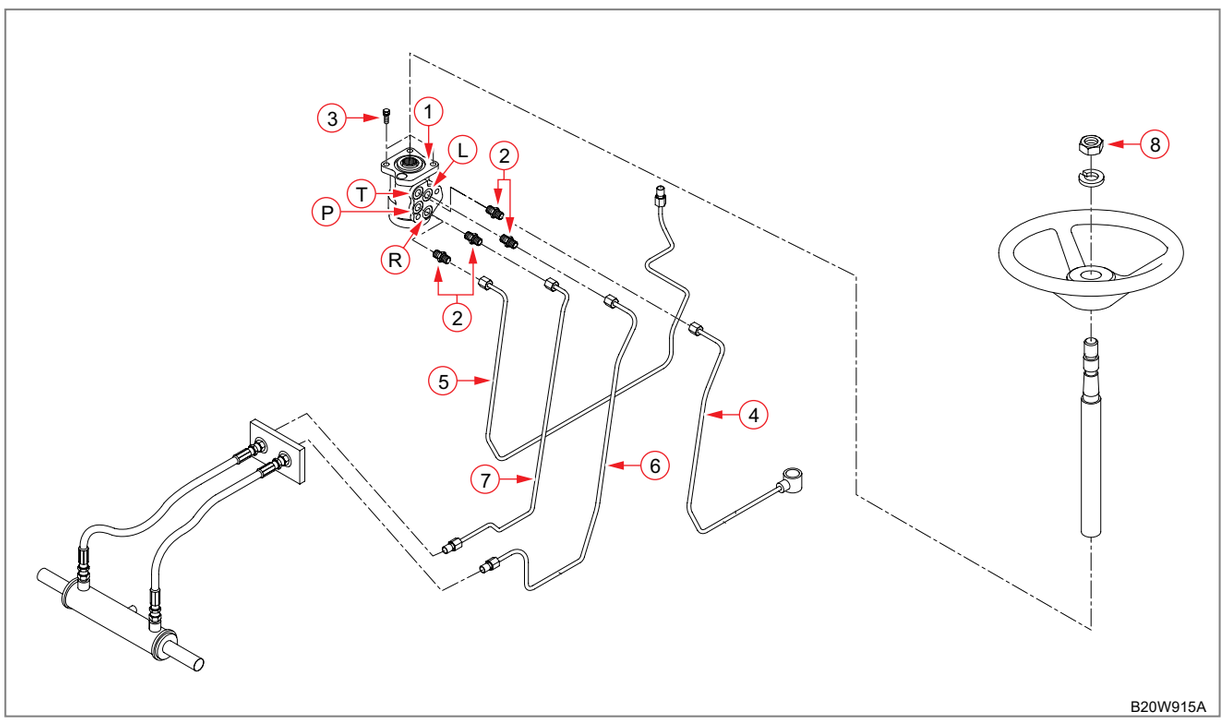
1.1 STEERING CYLINDER

1. Type.....Dual-rod double acting cylinder
2. Cylinder O.D. .....50 mm (1.97 in.)
3. Cylinder I.D. .....40 mm (1.57 in.)
4. Rod O.D.....25 mm (0.98 in.)
5. Cylinder stroke.....140 mm (5.51 in.)

1.2 STEERING UNIT

1. Type.....Non-load reaction type
2. Steering output flow rate.....Mechanical model: 50 cc/rev, HST Model: 51 cc/rev
3. Relief valve pressure .....120 kgf/cm^2 (11.8 MPa, 1,707 psi)
4. Rated input flow rate.....8 ℓ/min (2.1 gpm)
5. Pump capacity .....11.00 cc/rev. [HST model]
   10.00 cc/rev. [Mechanical model]

1.3 TIGHTENING TORQUE FOR MAIN COMPONENTS

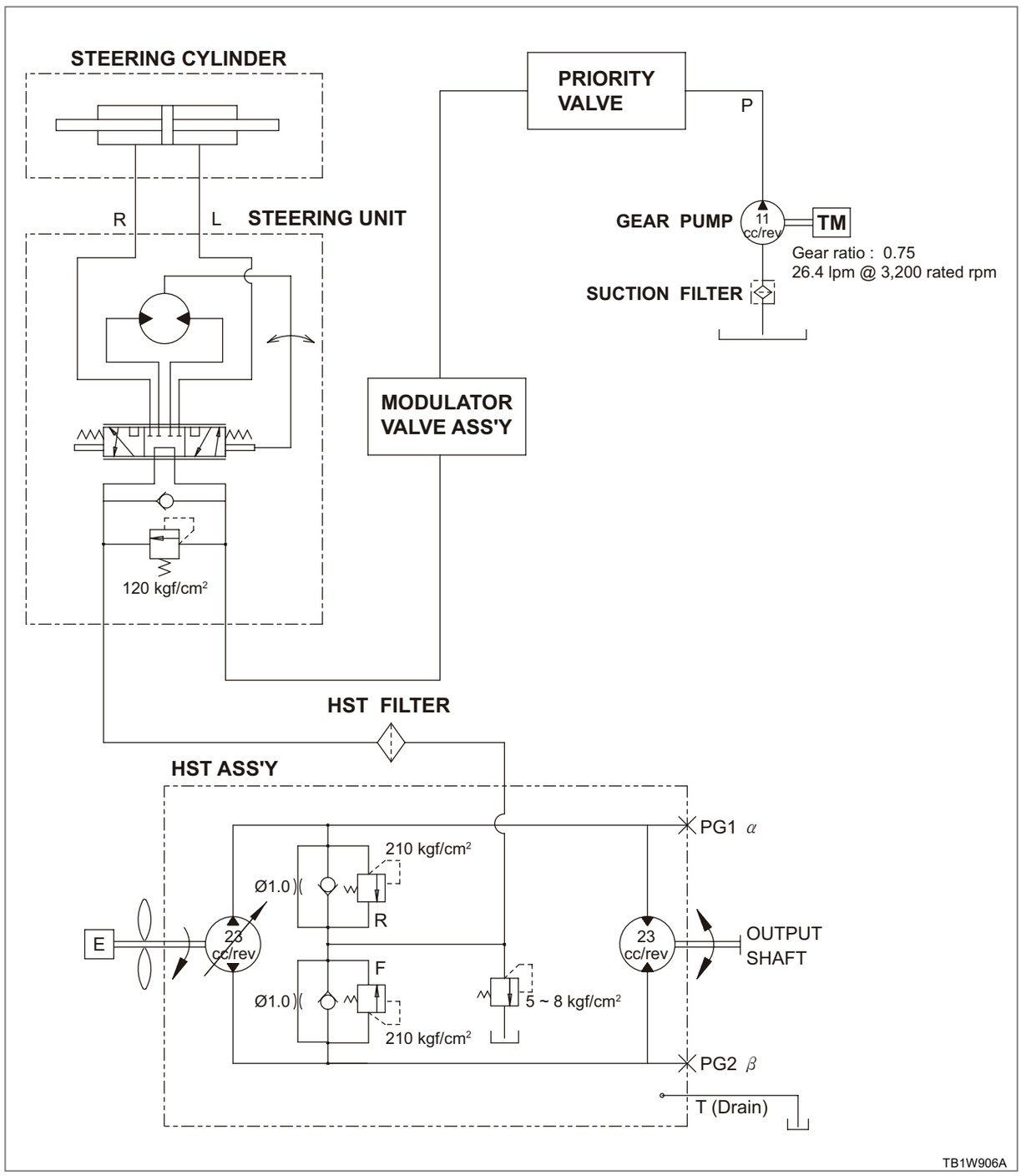


1. Connectors (2) that are connected to each port (T, P, L, R) of steering unit (1).....44.1 ~ 53.9 Nm, 4.5 ~ 5.5 kgf-m, 32.4 ~ 39.6 lb-ft
2. Mounting bolts (3) between steering unit and column support .....34.3 ~ 44.1 Nm, 3.3 ~ 4.5 kgf-m, 25.2 ~ 32.4 lb-ft
3. When tightening the hydraulic tubes (4, 5, 6 and 7) to the connector, tighten them to the point of rapid increasing torque. Then, tighten them further for 1/6 to 1/3 turns.
4. Mounting nut (8) for steering wheel.....25.5 ~ 33.3 Nm, 2.6 ~ 3.4 kgf-m, 18.7 ~ 24.5 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 2 2025-02-11 오후 5:20:38

2. OPERATING PRINCIPLE

2.1 HYDRAULIC CIRCUIT FOR STEERING OPERATION



Oil supplied from the gear pump flows to the steering system through the priority valve and modulator valve. Depending on the direction of rotation of the steering wheel, oil flows into the right or left port of the steering cylinder. Return oil from the steering cylinder or bypass oil from the steering unit passes through the HST filter and flows into the HST.

* For more information about priority valve and modulator valve, see the Hydraulics chapter.
* For more information about the HST, see the HST chapter.

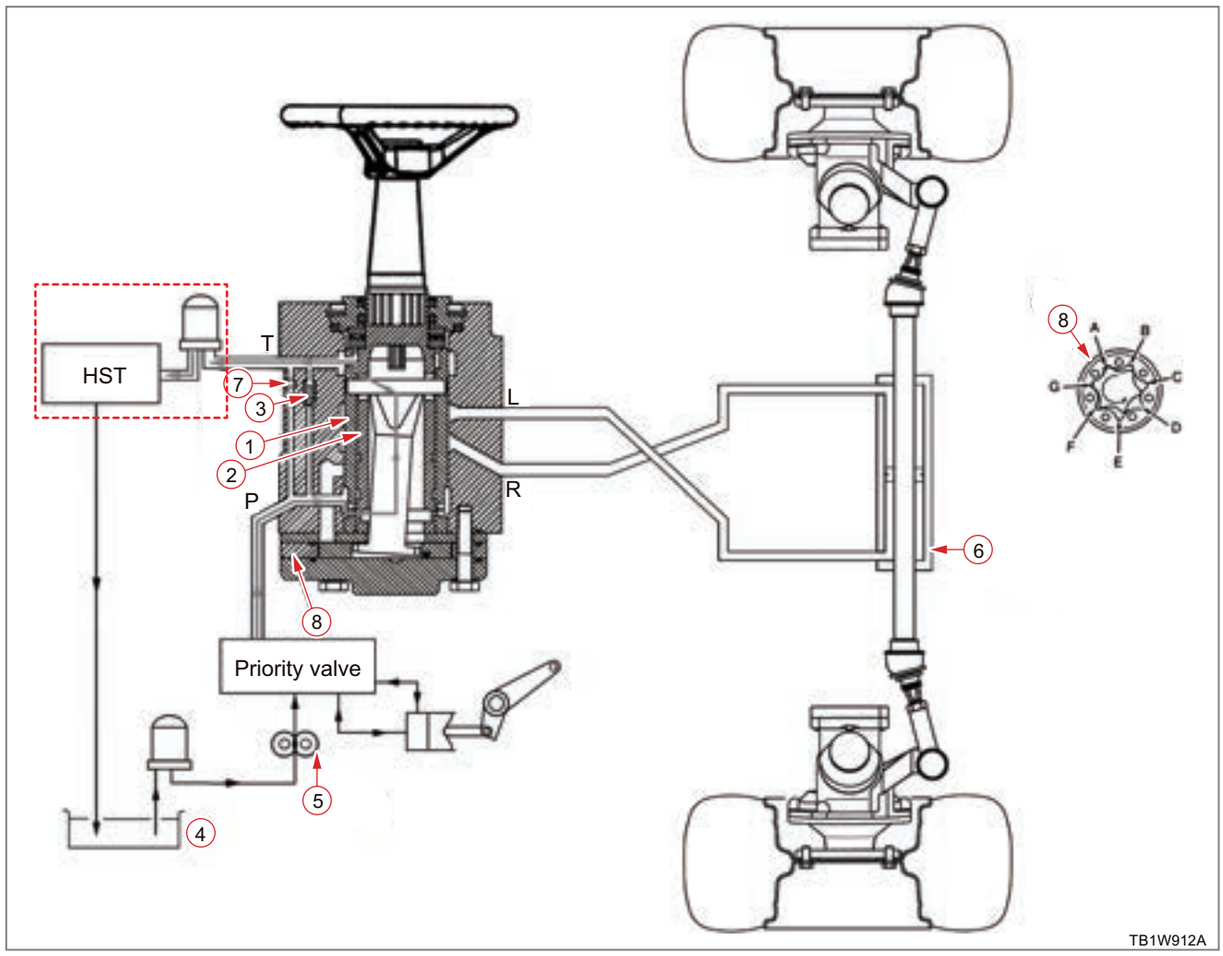
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2.2 OPERATING PRINCIPLE

2.2.1 OVERVIEWS

This tractor has a fully hydraulic steering system. Fully hydraulic steering system does not have mechanical devices such as drag links, pitman arms, or rack & pinions to transmit steering force. Therefore, while this system has the advantage of being simple, it has the disadvantage that the angle of the steering wheel does not match the angle of the front wheels and can change at any time. Therefore, it is mainly used in low-speed vehicles such as tractors and construction equipment rather than high-speed vehicles such as cars.

STEERING MECAHNISM OVERVIEW



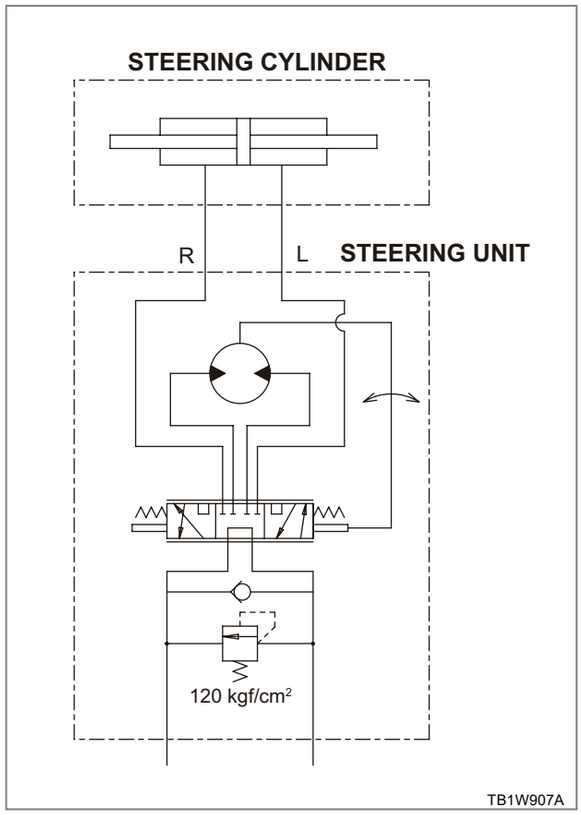
(1) Sleeve
(2) Spool
(3) Relief valve
(4) Reservoir
(5) Gear pump
(6) Steering cylinder
(7) Check valve assy.
(8) Gerotor pump

Thanks to the priority valve, only 7 liters per minute of oil is supplied to the steering unit, regardless of engine speed. Therefore, steering force or performance does not change depending on engine RPM.

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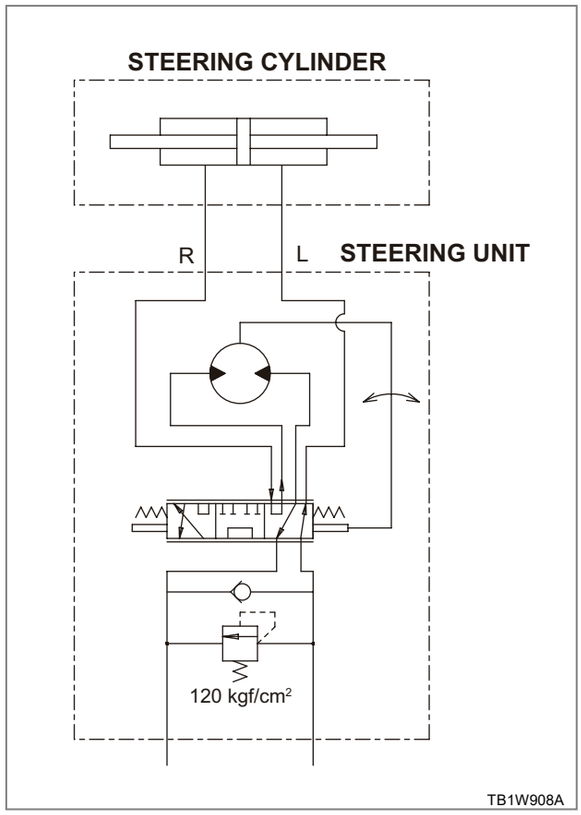
2.2.2 OPERATION

NEUTRAL POSITION



If the driver does not turn the steering wheel or holds it at a certain angle, the steering valve can be considered to be in neutral phase. In neutral phase, the oil supplied from the priority valve bypasses the spool valve and comes out directly at the drain port (T port). At this time, the oil in the steering cylinder is confined within the cylinder because the spool valve is closed. Therefore, the front wheels of the vehicle maintain a certain angle.

LEFT TURN

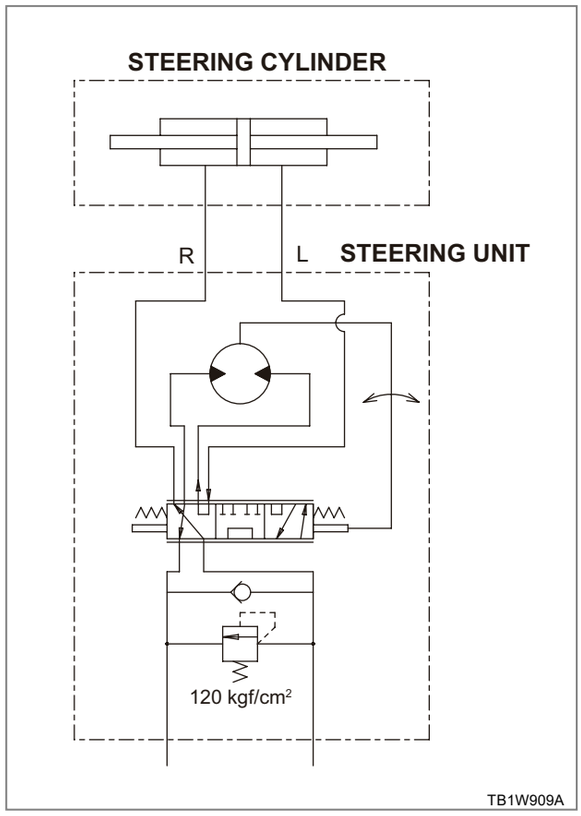


While the driver turns the steering wheel CCW, a left turn circuit is formed in the steering system. During left turn phase, the oil supplied to the steering valve is sent to the L port which located on the right side of the steering cylinder. This increases the volume of the chamber on the right side of the steering cylinder, moves the piston to the left, and eventually expands the left rod of the steering cylinder. At the same time, the oil in the left chamber of the steering cylinder returns to the steering valve, goes to the gerotor pump, comes back to steering valve and exits through the T port of the steering unit and is supplied to the HST system.

The moment the driver stops turning the steering wheel, the neutral phase begins again.

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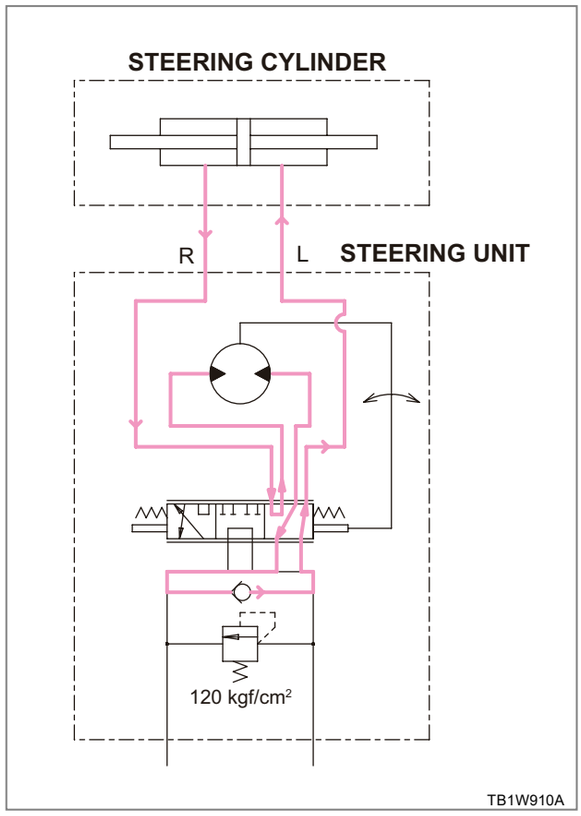
RIGHT TURN



While the driver turns the steering wheel CW, a right turn circuit is formed in the steering system. During right turn phase, the oil supplied to the steering unit is sent to the R port which is on the right side of the steering cylinder. This increases the volume of the chamber on the left side of the steering cylinder, moves the piston to the right, and eventually expands the right rod of the steering cylinder. At the same time, the oil in the right chamber of the steering cylinder returns to steering valve, goes to the gerotor pump, comes back to steering valve and exits through the T port of the steering unit and is supplied to the HST system.

The moment the driver stops turning the steering wheel, the neutral phase begins again.

MANUAL OPERATION (EMERGENCY)

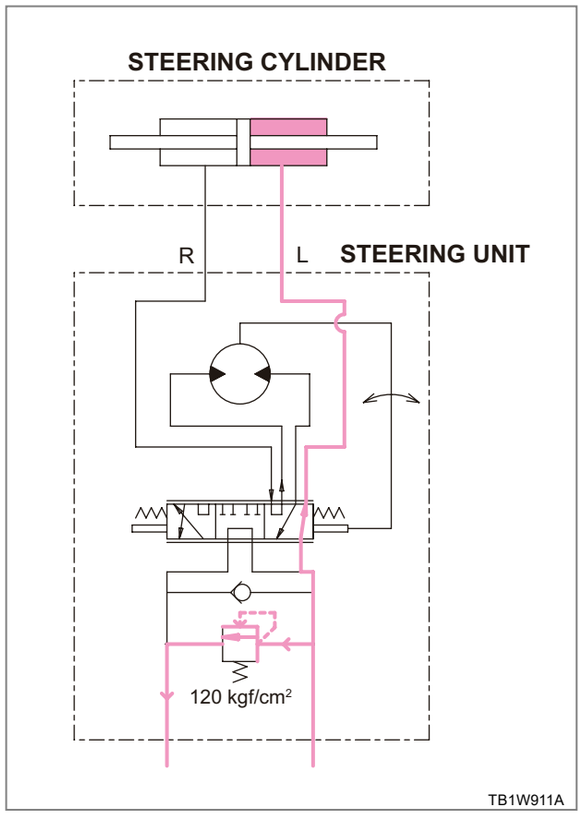


Although this steering system is fully hydraulic without mechanical linkage, manual steering is possible in emergency situations such as engine stop. The gerotor pump at the bottom of steering unit and check valve make this possible.

When the driver turns the steering wheel in case there is no oil from outside the steering system, the oil in the steering circuit is manually circulated by the gerotor pump. When the driver turns the steering wheel, the gerotor pump sends the oil to the steering valve, and then to the check valve and eventually to the steering cylinder. The oil in the chamber on the other side of the steering cylinder returns to the steering valve, goes to the gerotor pump, comes back to the steering valve, exits through the T port.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 6 2025-02-11 오후 5:20:39

STEERING RELIEF OPEN

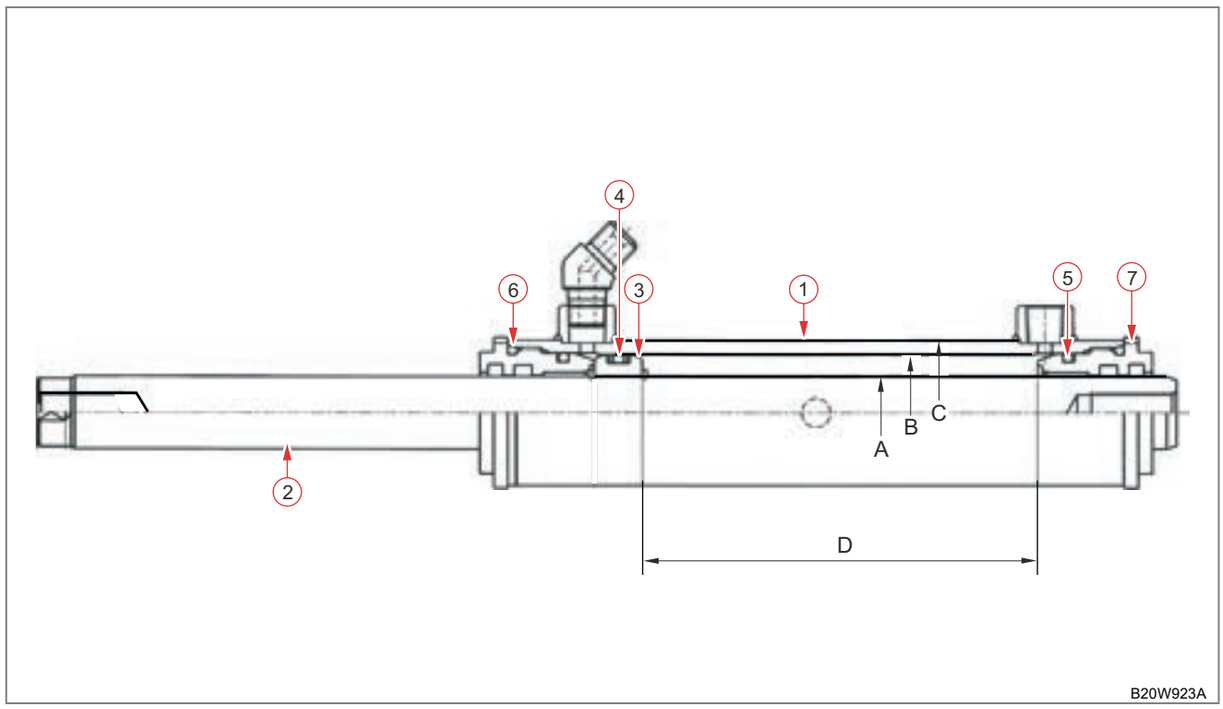


The steering unit is equipped with a 120 bar relief valve. If excessive load is applied to the front wheels or when the steering rod is fully extended, the relief valve opens and the steering does not operate, protecting the steering system even if the driver turns the steering wheel.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 7 2025-02-11 오후 5:20:39

2.3 STRUCTURE

STEERING CYLINDER



(1) Tube
(2) Rod
(3) Piston
(4) Piston ring
(5) O-ring
(6) O-ring
(7) Head cover
(A) Rod O.D
(B) Tube I.D
(C) Tube O.D
(D) Stroke

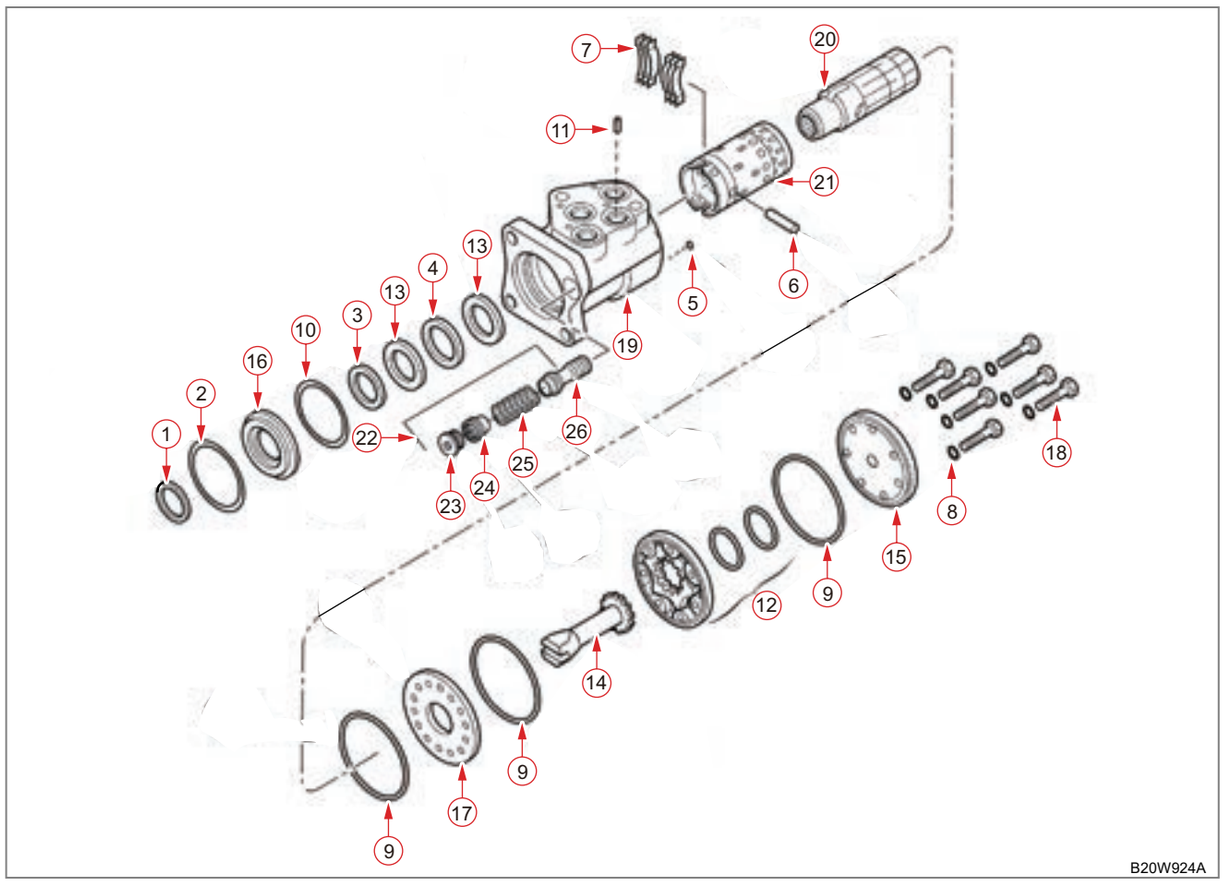
The steering system is a double acting type cylinder which has a piston (3) in center and two hydraulic chambers on sides of the piston.

When the steering wheel is turned to a certain degree, to reduce the steering force from the driver, the hydraulic oil is supplied to the steering system through the port (LH or RH). And, there is not any differences in the number of turnings in both directions.

Tube O.D. (C)	Tube I.D. (B)	Rod O.D (A)	Stroke (D)
Ø 50 (1.97 in.)	Ø 40 (1.57 in.)	Ø 25 (0.98 in.)	140 mm (5.51 in.)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 8 2025-02-11 오후 5:20:39

STEERING UNIT



(1) Dust Seal
(2) Retaining ring
(3) Quad ring
(4) Thrust bearing
(5) Ball
(6) Pin
(7) Centering springs
(8) Washer
(9) O-ring
(10) O-ring
(11) Spring pin
(12) Gerotor assembly
(13) Race bearing
(14) Rotor drive shaft
(15) End cap
(16) Gland bushing
(17) Plate
(18) Cap screw
(19) Valve housing
(20) Spool
(21) Sleeve
(22) Relief valve assembly
(23) Relief adjust plug
(24) Adjuster screw
(25) Spring
(26) Relief valve poppet

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 9 2025-02-11 오후 5:20:39

A. SPOOL AND SLEEVE

1. The spool (20) and sleeve (21) consist of the rotary valve to selectively switch the fluid passage as well as the direction of the fluid flow. There are three types of fluid passage;Neutral, Right turn, and Left turn.
2. The spool is fitted to be rotatable within the sleeve, which fitted into the bore of the valve body. The spool and sleeve are mechanically interconnected.
3. The springs (7) are installed through the spool (20) and sleeve (21) to maintain the relative position of the spool and the sleeve.

   The position corresponds to the neutral state, and is kept as long as the steering wheel is not turning.
4. The spool (20) is driven by steering wheel as they are splineded. Spool turns now sleeve (21) and rotor drive shaft (14) with the pin (6).
5. However, when the spool is rotated by steering wheel, the sleeve starts to rotate a little later (10°) than spool due to the clearance between the pin hole on the spool and pin.
6. At this moment the spool and sleeve make the right or left turn oil passage. When the shaft and sleeve stop turning, the spool turns a little more by the spring to make the neutral oil passage.

B. ROTOR DRIVE SHAFT (DRIVER)

1. The rotor drive shaft (14) is slightly tilted off the spool axis, as it is splined to the rotor which is turning off set from the gerotor (12) pump center axis.
2. In the event of loss of fluid pressure, turning the steering wheel drives the gerotor through this shaft to operate the steering manually.

C. GEROTOR PUMP

The gerotor (12) pump provides the steering system with a back-up device for steering, and operates as previously described.

D. CHECK VALVE

The check valve normally remains closed, which prevents the fluid from flowing from its inlet side to its outlet side directly. When the steering system is manually operated, this valve forms the fluid passage so that the fluid returned from the steering cylinder flows to the gerotor pump for recirculation.

E. RELIEF VALVE

The relief valve (22) prevents excessive hydraulic pressure from building up in steering pump and circuit. In other words, it protects the circuit when the steering cylinder stroke is completed or the steering is not possible due to the outer force.

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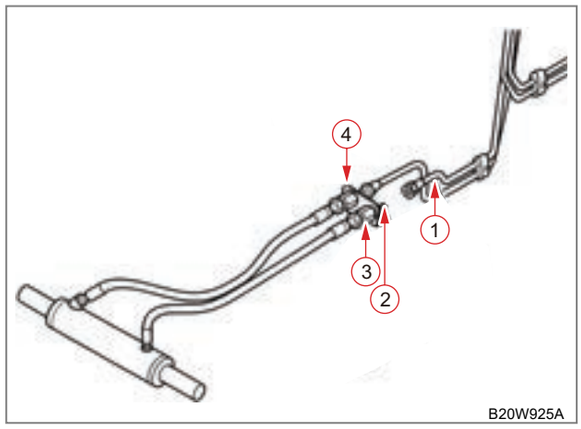
3. TROUBLESHOOTING

Problem	Cause	Remedy
Tractor pulls to right or left	• Improper tire size, inflation pressure or shape	• Adjust inflation pressure or replace the tire
	• Worn or damaged ball joint end	• Replace
	• Improper toe in, damaged steering cylinder rod	• Replace
	• Damaged inner area of front axle	• Replace
Excessive steering wheel reaction	• Worn or damaged ball joint end	• Replace
	• Improper toe in	• Adjust
	• Damaged front axle	• Replace
	• Low relief pressure of steering unit	• Adjust
	• Excessive leakage in steering unit	• Replace
Locked steering wheel	• Stuck steering unit	• Replace
	• Stuck steering wheel or deflected rod	• Replace
Fluid leakage	• Leakage in steering hose	• Replace hose
	• Leakage in steering unit	• Repair or replace
	• Leakage in hose connection	• Retighten and replace O-ring
	• Damaged steering cylinder oil seal	• Replace steering cylinder
Vibration of steering wheel	• Abnormally worn tire lug, abnormal size or deflection insufficient inflation pressure	• Repair and replace
	• Damaged axle bearing and gear	• Replace
Steering wheel free play	• Loose steering wheel mounting nut	• Retighten
	• Leakage in steering unit or damaged steering unit	• Replace
	• Leakage in steering cylinder	• Replace
	• Air in steering system or no hydraulic fluid	• Replenish and repair
	• Air in hydraulic system or no hydraulic fluid	• Replenish and repair
Abnormal noise	• Leakage in steering unit	• Replace the unit
	• Prematurely opened steering relief valve	• Increase the relief pressure

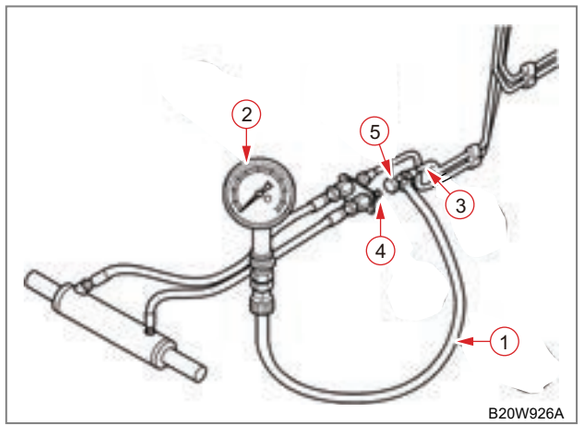
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4. INSPECTION AND ADJUSTMENT

4.1 STEERING RELIEF OPENING PRESSURE



1. With the tractor engine stopped, disconnect one of the hydraulic lines (1) that run to the steering cylinder.



2. Connect a 0 ~ 20 MPa (200 kgf/cm^2)pressure gauge (2) to the end of the line from the steering unit (3) and cap the line to the steering cylinder.
3. Start the tractor engine, and set engine speed to 3,000 RPM. Observe the pressure gauge. It should indicate a 0 MPa reading.
4. Turn the steering wheel so the line that the gauge is connected to receive steering pump fluid pressure intended for the steering cylinder. For example, if the gauge is connected to the left side of the cylinder, as viewed from the operator's seat, turn the wheel to the right. Observe the gauge and the following:

TEST RESULT

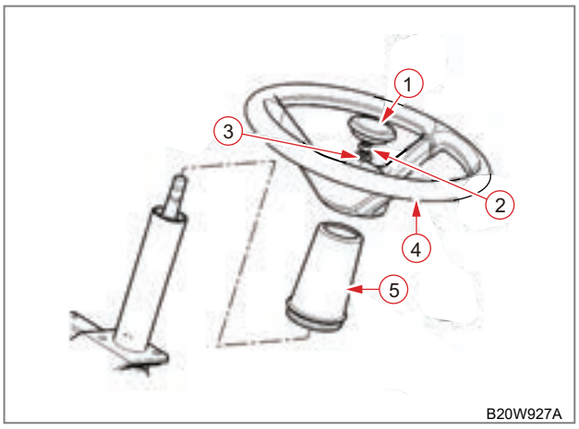
1. If the pressure gauge reading rises before the steering wheel is turned, it indicates that the steering valve is not functional and must be disassembled and inspected
2. If the pressure gauge reading is near the relief valve setting of 11.8 MPa (120 kgf/cm^2), when the steering wheel is turned, the steering valve relief valve is working properly.
3. If the pressure gauge reading is below the relief valve setting, it may indicate that the relief valve is not working properly, or relief setting is not correct.
4. Stop the tractor engine.
5. If relief valve setting is incorrect refer to adjustment procedure as follows:

REMARK

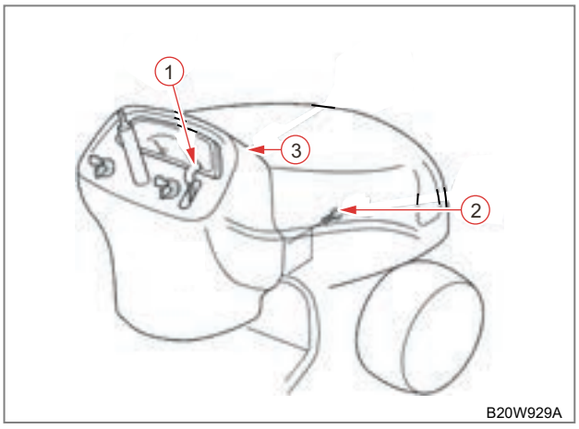
The steering system relief valve is located on the top side of the steering valve and steering valve must be removed from the tractor to adjust the line pressure.

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4.2 RELIEF VALVE PRESSURE ADJUSTMENT



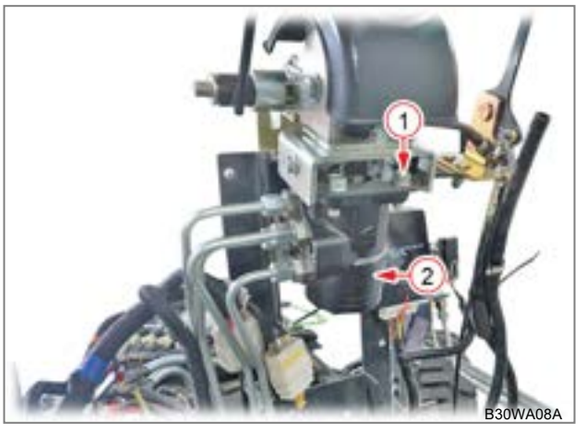
1. Remove the steering wheel center cap (1).
2. Remove the nut (2) and lock washer (3).
3. Using a suitable puller, remove the steering wheel (4) and cover (5).



4. Remove the knob (1) on the engine speed control lever. remove the side panel retaining bolts (2) and slightly raise up the hood. disconnect the tachometer cable and wire connectors under the dashboard.
5. Remove the hood.
6. Remove the left side panel below the engine hood to gain access to the hydraulic lines.



7. Disconnect the pressure tube (2), return tube (3), left turn tube (4) and right turn tube (5) from the steering unit (1) and move them clear of the unit.



8. Remove the three steering unit mounting bolts (1)
9. Carefully lower and remove the steering unit from the tractor.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 13 2025-02-11 오후 5:20:40



10. Remove the relief valve cap (1) by turning counterclockwise, the relief valve is located underneath the cap. Using a 6 mm allen wrench, turn relief valve clockwise to increase pressure and counterclockwise to decrease pressure.

REMARK

One complete revolution of the relief valve plug equals to an increase or decrease of 2.74±0.34 MPa (28±3.5 kgf/cm^2).

IMPORTANT

Before removing relief valve from the valve body, mark top of the relief valve plug, then count the number of revolutions that it takes to remove relief valve. Use this revolution count for your initial relief valve setting during reassembly.

11. Disassemble relief valve remove external cap (1) adjuster screw (2) spring (3) and poppet (4).
    Check seat on poppet and valve body for contamination or scoring.
    Reassemble relief valve, set adjuster screw the number of revolutions recorded during disassembly.
    Stake adjuster screw in place with center punch and insert external cap into valve body.

REMARK

It may be necessary to remove and adjust this valve several times to obtain the correct pressure gauge reading. Make sure that all fittings are tight and that the system is operating at the specified line pressure before reinstalling the components that ere removed to gain access to the valve and testing components.

12. Once the correct line pressure results are obtained, reinstall the valve, hood, steering wheel, etc. in the reverse order that they were removed.

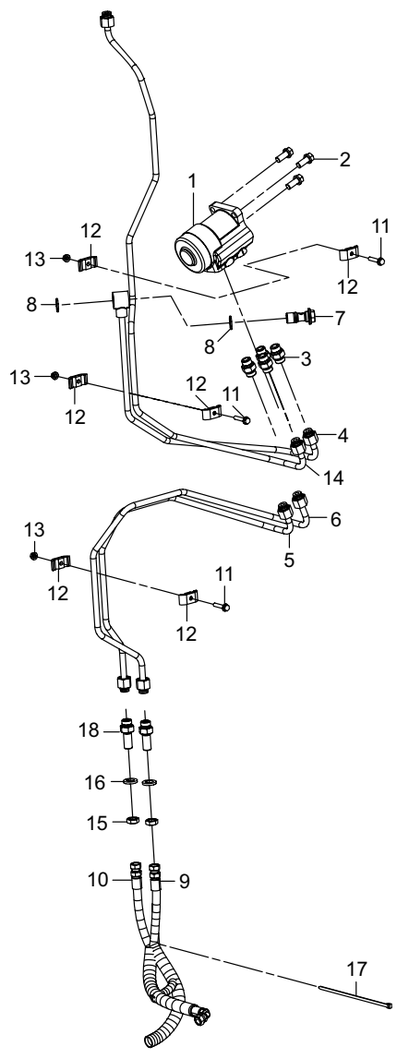
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5. EXPLODED VIEW

REMARK

The part numbers and shapes of the following components are subject to change without notice for improvement of the product. If necessary, refer to the DAEDONG electronic manual, DPCS.

5.1 TB3-G431004 POWER STEERING UNIT



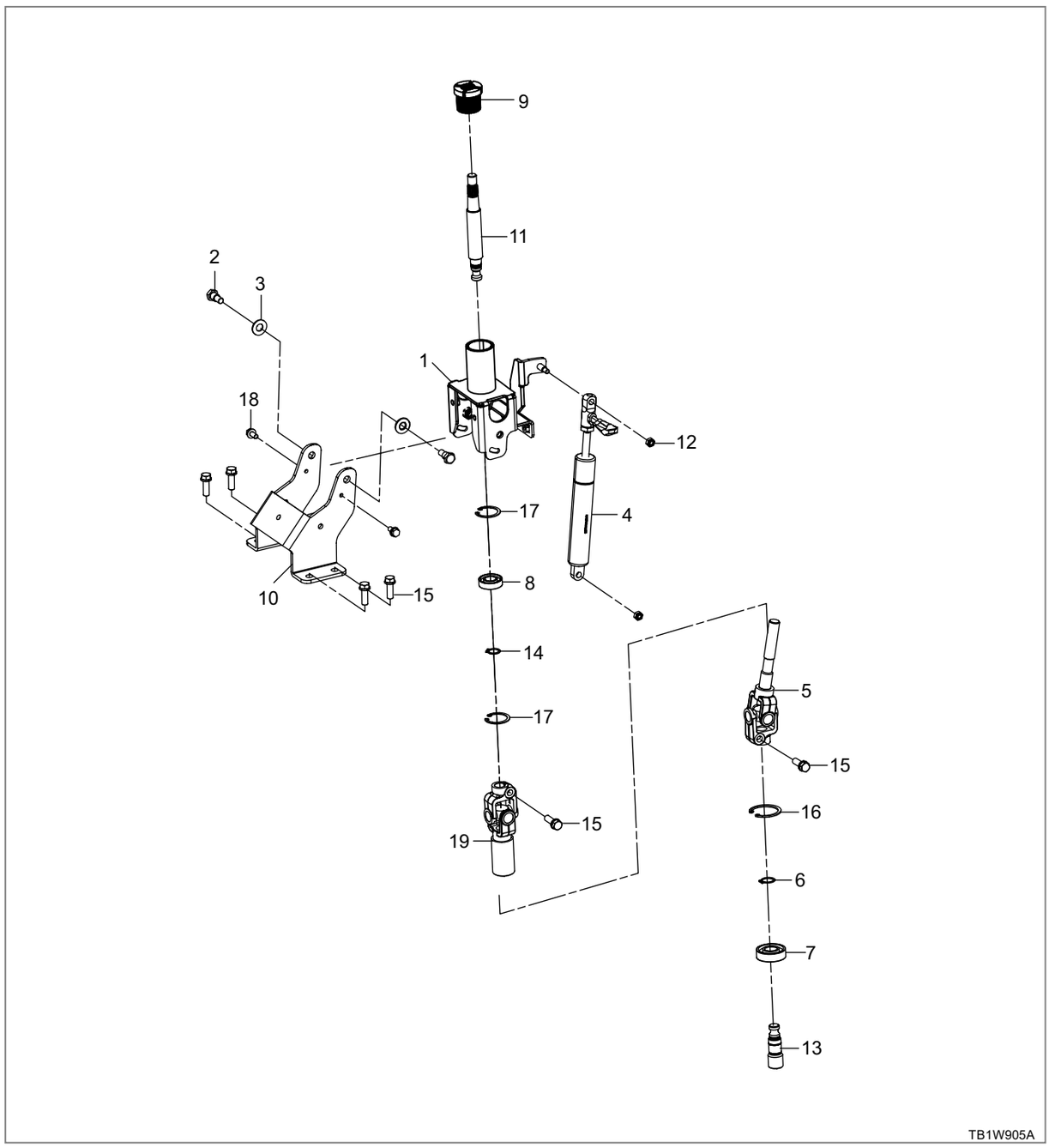
TB1W904A

COMPONENTS

(1) Unit, Power steering
(2) With washer bolt
(3) Connection
(4) Tube T, Hydraulic
(5) Tube R, Hydraulic
(6) Tube L, Hydraulic
(7) Bolt, Joint
(8) O ring
(9) Hose, Steering L
(10) Hose, Steering R
(11) Flange bolt
(12) Holder, Tube
(13) Nut, Flange
(14) Tube, Hyd-P
(15) Nut
(16) Washer, Spring
(17) Band,Cord
(18) Connector

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 15 2025-02-11 오후 5:20:40

5.2 TB3-G653004 STEERING COLUMN



COMPONENTS

(1) Assy support, Steering column
(2) Bolt
(3) Washer, Plain
(4) Air cylinder assy, Tilting
(5) Assy shaft, Handle-LWRr
(6) Snap ring
(7) Ball bearing
(8) Ball bearing
(9) Cushion-rubber
(10) Plate, Steering support
(11) Shaft, Steering
(12) Lock nut
(13) Steering shaft
(14) Snap ring
(15) Bolt, Washer
(16) Ring, Stopper
(17) Snap ring
(18) Bolt, Flange

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 16 2025-02-11 오후 5:20:40

6. SERVICING

6.1 STEERING COLUMN



1. Pull out the steering cap (1) and remove the steering wheel (2).



2. Remove the steering covers (1: Upper, 2: Lower).





3. Remove the hand throttle knob (1) and the instrument panel cover assembly (2).”

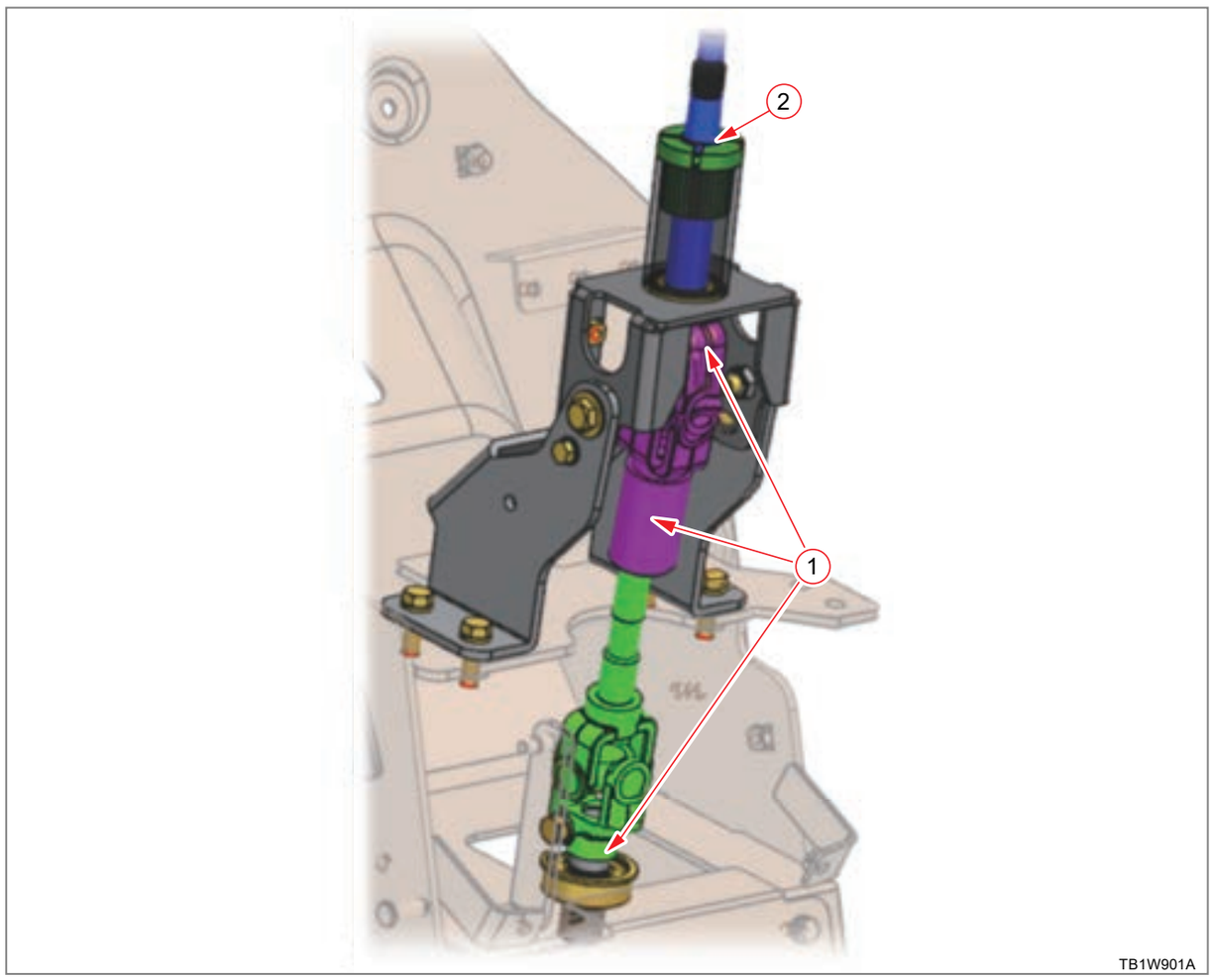
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4. Remove the tilting air cylinder (1). Then, unscrew the steering plate mounting bolts (2)(4EA) to remove the steering column support assembly (3).

STEERING COLUMN ASSEMBLY TIPS



1. Apply grease to the spline part.
2. Apply grease to the inner diameter of the rubber collar.

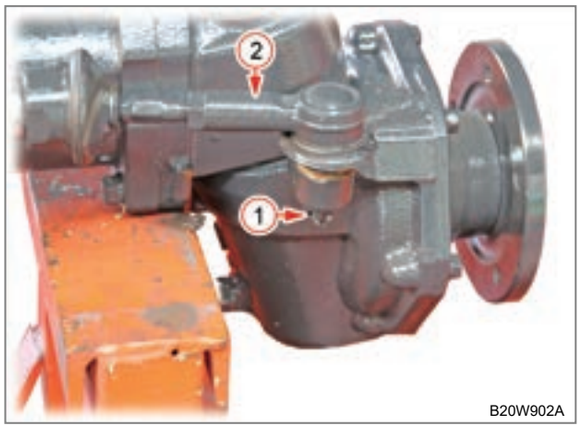
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6.2 STEERING CYLINDER

1. Park the tractor on level ground, stop the engine and apply the parking brake.



2. Disconnect the steering cylinder hydraulic hose (1).



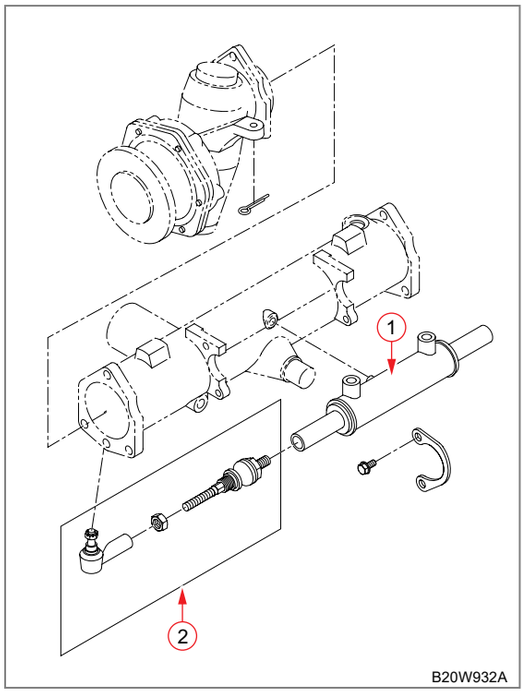
3. Pull out the lower split pin of the ball joint end support pin and undo the slotted nut (1) to remove the ball joint end (2).

Slotted nut
Tightening torque ..... 28.4 ~ 36.3 Nm
2.9 ~ 3.7 kgf-m
20.9 ~ 26.6 lb-ft

REMARK

The slotted nut should be tightened to the specified torque. Then, tighten it further until aligned with the mounting hole of the split pin.

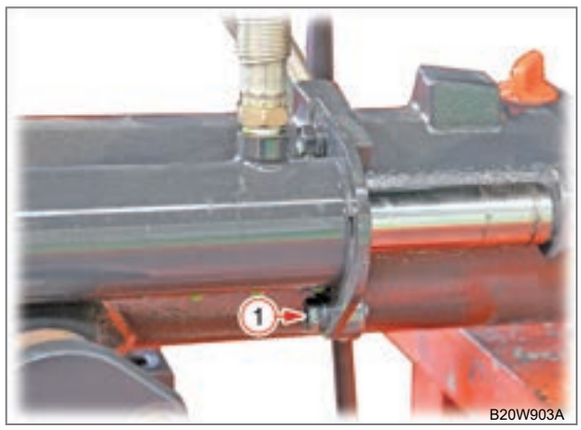
REMARK



When installing the ball joint assembly (1) to the steering cylinder, apply adhesive (LOCTITE 271 or equivalent) to its threads and tighten it to the specified torque.

Tightening torque ..... 156.8 ~ 192.1 Nm
16.0 ~ 19.6 kgf-m
115.2 ~ 141.1 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 19 2025-02-11 오후 5:20:41

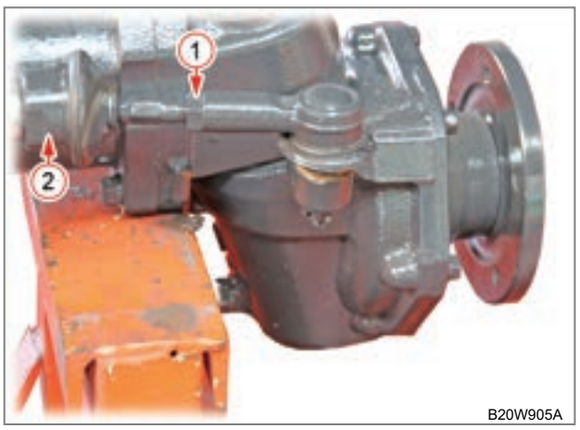




4. Unscrew the steering cylinder mounting bolts (LH/RH) (1) to remove the steering cylinder.
5. Assemble in the reverse order of disassembly.

REMARK

When installing the cylinder bracket (2), mount it firmly to the steering cylinder to remove any free play.



6. After installing the steering cylinder assembly, adjust the cylinder rod so that its projected portion is the same on the left and right. Then, unscrew the ball joint end assembly mounting nut (1) and rotate the ball joint end (2) to adjust the toe-in.

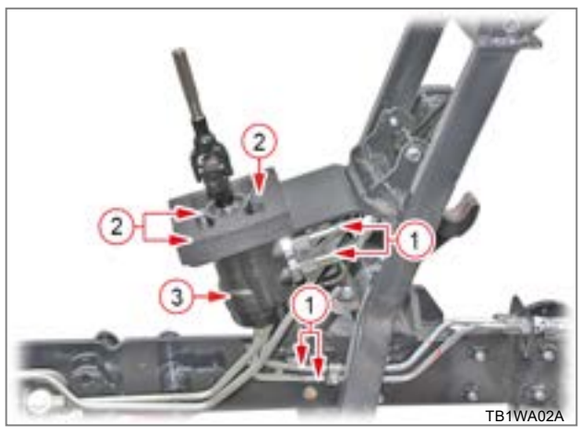
REMARK

- **The steering cylinder cannot be replaced independently. If there is any fault, such as oil leakage, replace the whole assembly.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 20 2025-02-11 오후 5:20:41

6.3 STEERING UNIT REMOVAL

1. Park the tractor on level ground, stop the engine and apply the parking brake.
2. Open the hood and disconnect the negative battery cable.
3. Remove the steering wheel. Then, remove the dash board and instrument panel.
   (For detailed removal instructions, refer to the instruction for engine removal in chapter 3.)



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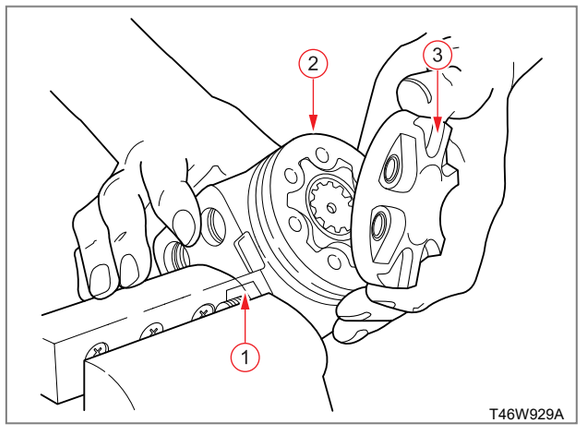

B30WA11A

4. Disconnect all hydraulic pipes (1) from the steering unit and unscrew the steering unit mounting bolts (2) from the steering column to remove the steering unit (3).

Mounting bolt
Tightening torque .....34.3 ~ 44.1 Nm
3.5 ~ 4.5 kgf-m
25.2 ~ 32.4 lb-ft

REMARK
When reinstalling the steering unit, apply a sufficient amount of grease to the splines of the steering shaft.

6.3.1 DISASSEMBLY OF POWER STEERING UNIT COMPONENTS

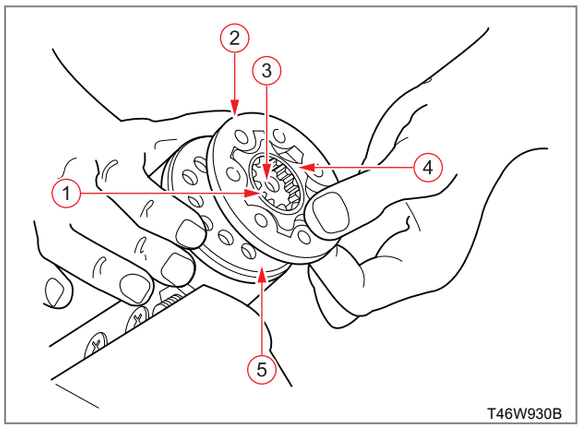


T46W929A

(1) Connector
(2) Control motor
(3) End cap

1. Turn over the control motor (2) and set it in a vise. Tighten the vise just enough to hold the motor using soft-faced jaws. Otherwise, the pressure could jam the components against one another.
2. Remove the seven bolts from the end cap (3) and remove the O-ring.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 21 2025-02-11 오후 5:20:42



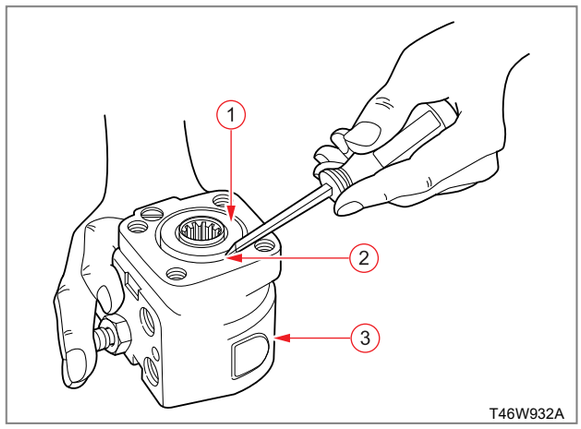
(1) Sealing (3) Drive shaft (5) Spacer
(2) Stator (4) Rotor

3. Slide the gerotor motor (rotor (4), and stator (2)) from the spacer (5). Remove the large O-ring from the stator (2), stator plate, small O-ring, seal ring (1) in rotor (4), and cap.

⚠ CAUTION

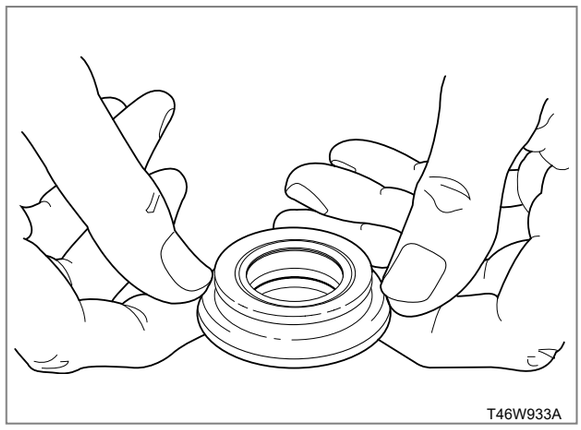
- **The inner rotor is easily removed from the outer pump body rotor. Therefore, be careful not to drop any component. Otherwise, such component could be damaged.**

4. Lift the drive shaft (3) and spacer (5) from the housing. Remove the O-ring under the spacer.
5. Remove the steering motor from the vise.



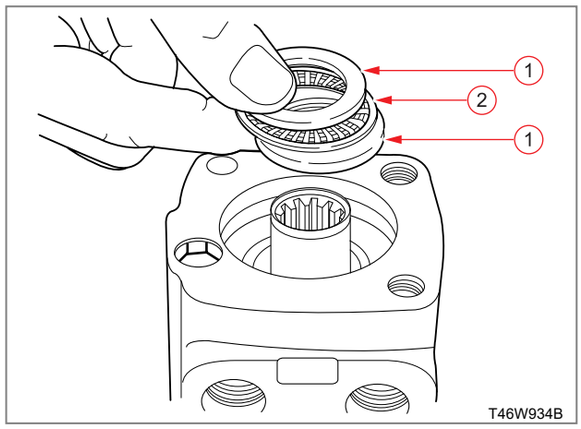
(1) Gland bushing (3) Steering housing
(2) Retainer ring

6. Using a screwdriver, remove the retaining ring (2) from the top of the steering housing (3). Then, remove the gland bushing (1).



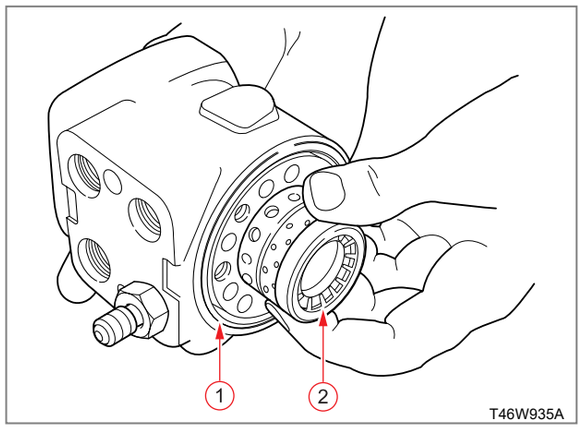
7. Remove the oil seal (1), dust seal (2) and O-ring seal (3) from the gland bushing.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 22 2025-02-11 오후 5:20:42



(1) Bearing race (2) Thrust bearing

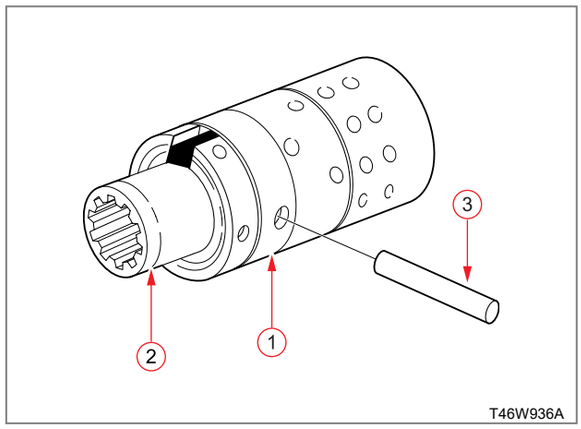
8. Remove the thrust bearing (2) and two bearing races (1) from the body.



(1) Motor housing (2) Sleeve

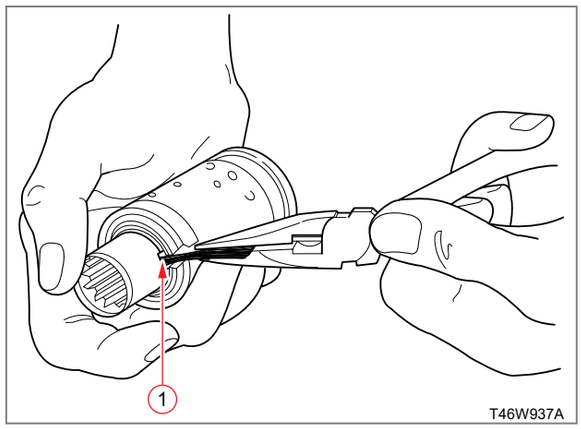
9. Pull the sleeve and spool (2) from the bottom of the motor housing (1). The sleeve is a sealed unit in steering motor housing and should be rotated slightly during removal.

   Install the sleeve and spool while turning them in the housing supported by pin. At this time, keep them horizontal as much as possible. This helps prevent the pin from sliding out of its hole and catching in the housing. Pull the sleeve out as straight as possible to prevent it from becoming jammed.



(1 Sleeve (3) Pin
(2) Spool

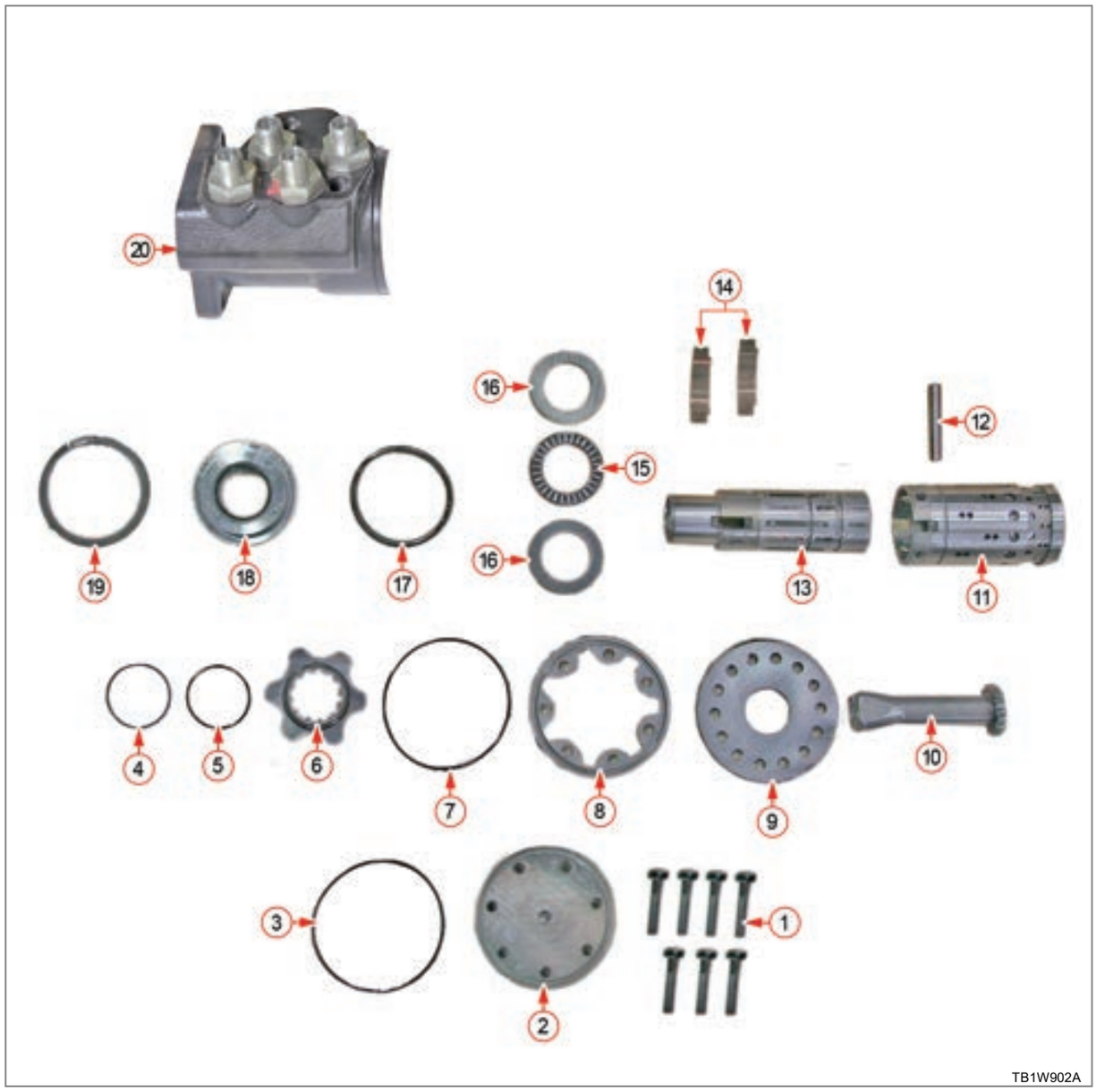
10. Remove the pin (3) from the sleeve (1) and spool (2) assembly.



(1) Centering spring

11. Push the spool upward out of the sleeve slightly and pull the centering springs (1) outward. Then remove the spool from the bottom side of the sleeve.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 23 2025-02-11 오후 5:20:42



(1) Retainer blot
(2) End cap
(3) O-ring
(4) Seal ring
(5) O-ring
(6) Rotor
(7) O-ring
(8) Stator
(9) Spacer
(10) Drive shaft
(11) Sleeve
(12) Pin
(13) Spool
(14) Centering spring
(15) Thrust bearing
(16) Bearing rase
(17) O-ring
(18) Grand bushing (Oil seal+Dust seal)
(19) Retaining ring
(20) Motor housing

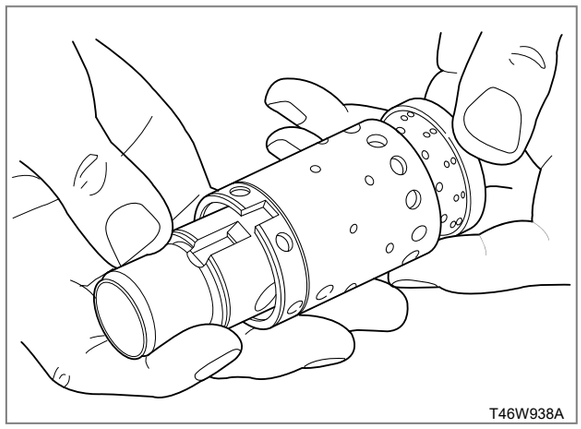
12. Assemble in the reverse order of disassembly.

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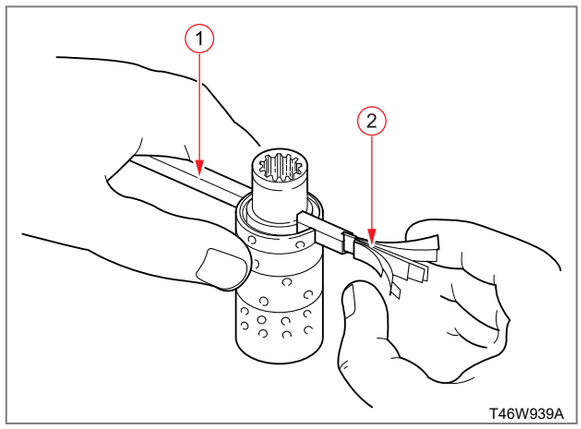
6.3.2 INSPECTION

1. Check the spool and sleeve for evidence of sticking, scuff marks and any other damage. If defective, replace the spool and sleeve as a set.
2. Check the pin for damage and check the internal teeth on the spool for damage.
3. Check the inside surfaces of the motor housing for wear or damage.
4. Inspect the gerotor pump stator and rotor for wear. Make sure that the rotor turns freely in stator.
5. Check the drive shaft for wear or damage.
6. Check the thrust bearing for wear or damage.
7. Check the centering springs for distortion. Centering springs without tension should be replaced.

6.3.3 INSTALLATION


T46W938A

1. Slide the spool into the sleeve. Position the spool so that the centering spring slots on the spool and sleeve are aligned in order for the centering springs to be installed.

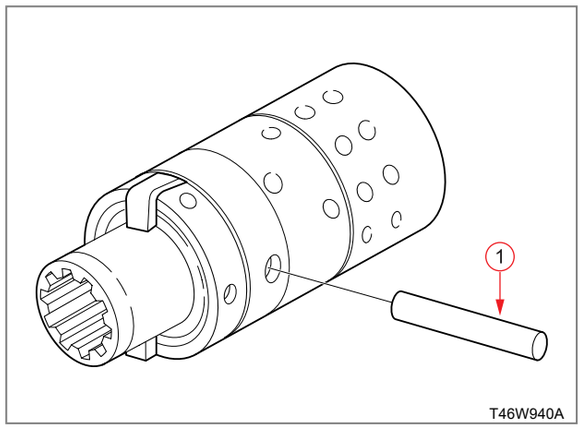


T46W939A

(1) Special tool (2) Centering spring

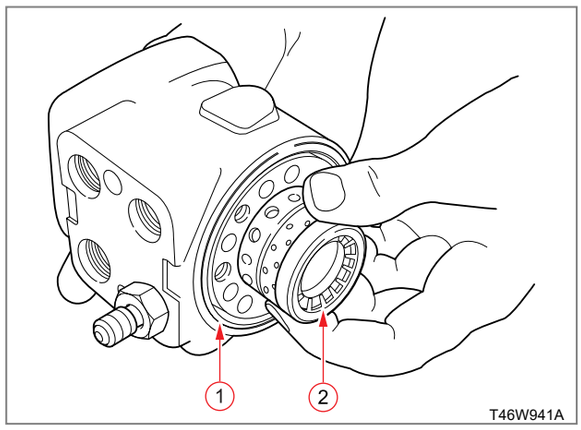
2. With the centering spring slots aligned, insert the special tool (1) in the slots.
3. Assemble the centering springs (2), two flat springs, and two convex springs. Make sure the notched edge of the spring faces downward. And, position the assembly into the notched groove of the installation tool.
4. While holding the outer edge of the centering spring assembly and maintaining pressure against the tool, slide in the tool from the assembly. At this moment, do not remove the spring from the slot.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 25 2025-02-11 오후 5:20:42



(1) Pin

5. Position the spool and sleeve so that their ends are at the same height and insert the pin (1) through the assembly until its ends are below the surfaces of the sleeve.

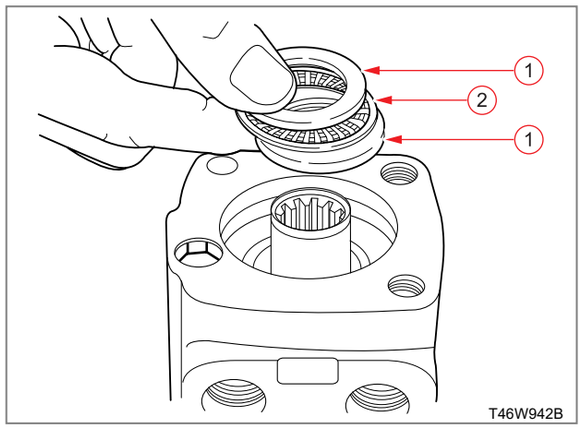


(1) Steering motor housing (2) Sleeve

6. Place the spool and sleeve (2) so that the pin is parallel with the bench and carefully insert the assembly into the bottom of the steering motor housing (1).

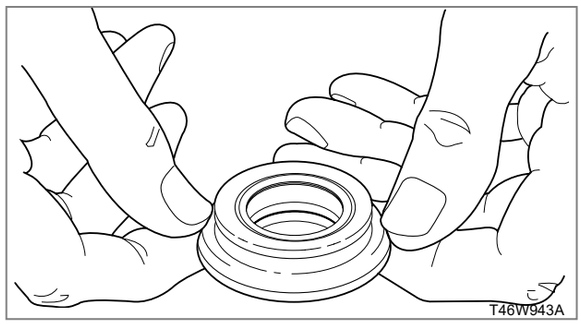
   Rotate the assembly slightly while inserting it for ease installation.

   Position the spool and sleeve so that their ends are flush with the bottom of steering motor housing (1) and make sure that the assembly can turn freely in the housing.

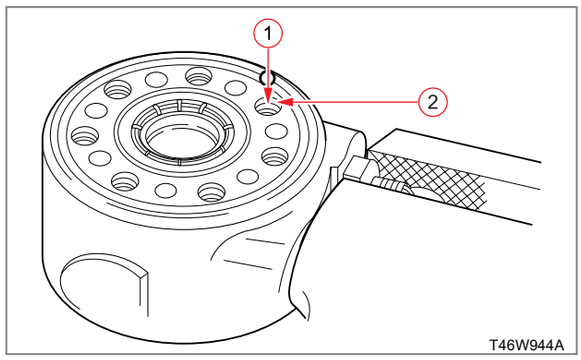


(1) Thrust bearing race (2) Thrust bearing

7. Insert the thrust bearing race (1) and the thrust bearing (2) and make sure that the opposite thrust bearing race (1) is seated on the sleeve and spool.



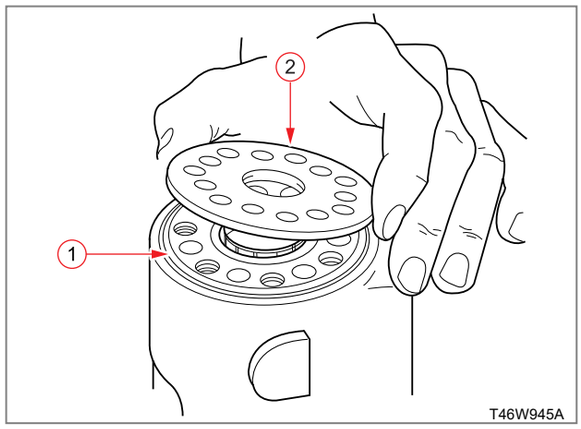
8. Install a new O-ring, dust seal and oil seal in the gland bushing, and then insert the bushing into the housing while rotating it.
9. Install the retaining ring in the housing groove.



(1) Check valve ball (2) Retainer bolt hole

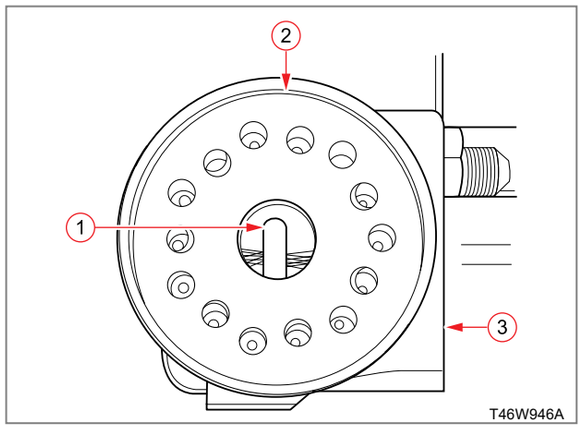
10. Grip the bottom end of steering motor housing with a vise. To avoid damaging the steering motor, use soft-faced jaw and do not apply excessive force.
11. Position the spool and sleeve assembly below the bottom face of the motor housing, and then install the check valve ball (1) into its retainer bolt hole (2).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 26 2025-02-11 오후 5:20:43



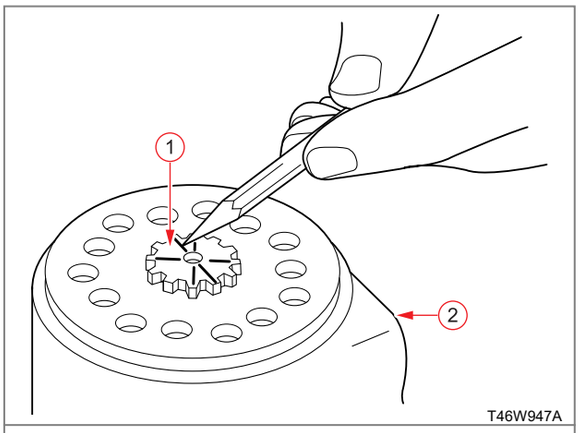
(1) O-ring (2) Spacer

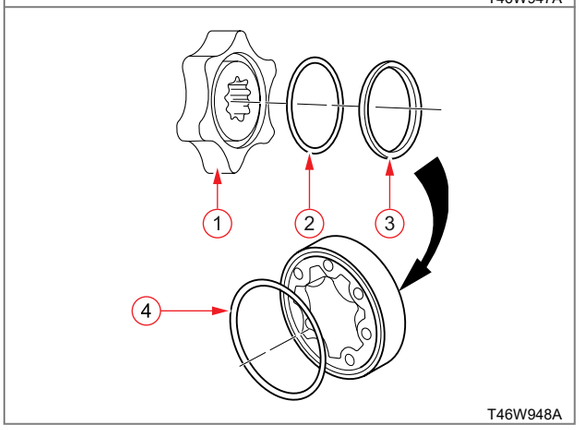
12. Install a new O-ring (1) in the housing and position the spacer (2) on the O-ring so that the holes are aligned with the holes in housing.



(1) Pin (3) Steering port side
(2) Spacer

13. Position the spool and sleeve so that the pin (1) is parallel with the steering port face (3) of the steering motor housing.





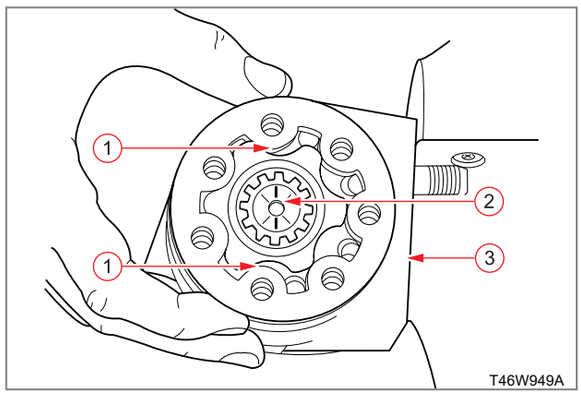
(1) Motor (3) Seal
(2) O-ring (4) O-ring

14. Insert the drive shaft (1) into the motor so that its slotted end engages with the pin in the spool and sleeve. Mark a line (2 places) on the face of the drive shaft so that the pin is parallel with the port face of the steering motor housing (3).
15. Coat a new O-ring (2) and seal ring (3) with clean hydraulic fluid and install them on the rotor (1). Install a new O-ring (4) in the groove of the stator, and then fit the rotor and stator together so that their O-rings are on opposite sides.

⚠ CAUTION

- **The orientation of the rotor and stator on the drive shaft will determine valve timing in the steering motor. These parts must be installed as described.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 27 2025-02-11 오후 5:20:43

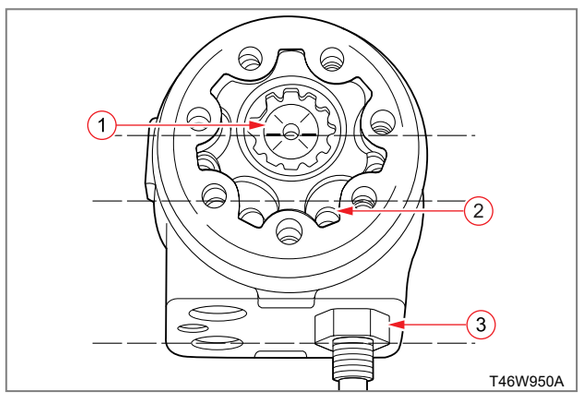


(1) Valley (3) Steering port side
(2) Mark

16. Position the rotor and stator on the steering motor. Align the holes in the spacer and stator. Before connecting the drive shaft splines with the rotor, align mark (2) on the end of the drive shaft so that of the line is extended across the rotor and stator and it would cross two grooves of the rotor.

⚠ CAUTION

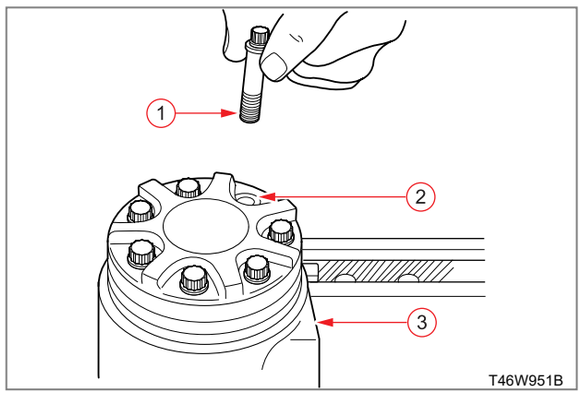
- **A sign that the rotor is positioned correctly is that the tip of one rotor lobe is resting halfway between the groove in stator directly above the port face side of the steering motor (3) and on the opposite side a lobe is resting in the bottom of stator groove.**



(1) Line (2) Pin (3) Port face

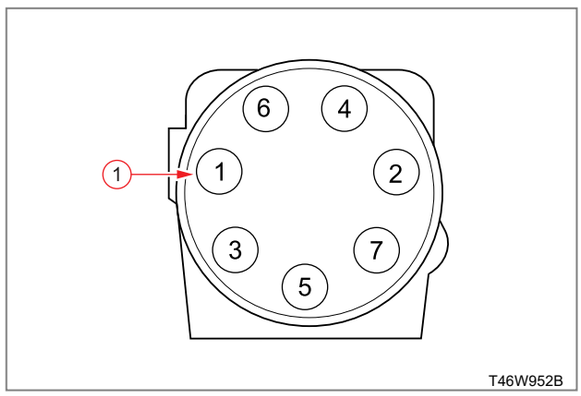
17. When installing the steering motor, the following should be aligned for correct installation:
    a. The port face (3) of the steering motor housing
    b. The pin (2) through the spool and sleeve
    c. The line drawn on the drive shaft
    d. The middle of the two grooves in the rotor

    If any of these components are not aligned, the steering motor will not operate properly.



(1) Retainer bolt (3) Steering motor
(2) Hole

18. Replace the O-ring with new one. Position the end cap on the steering motor (3) and align its bolt holes with the holes on the stator.

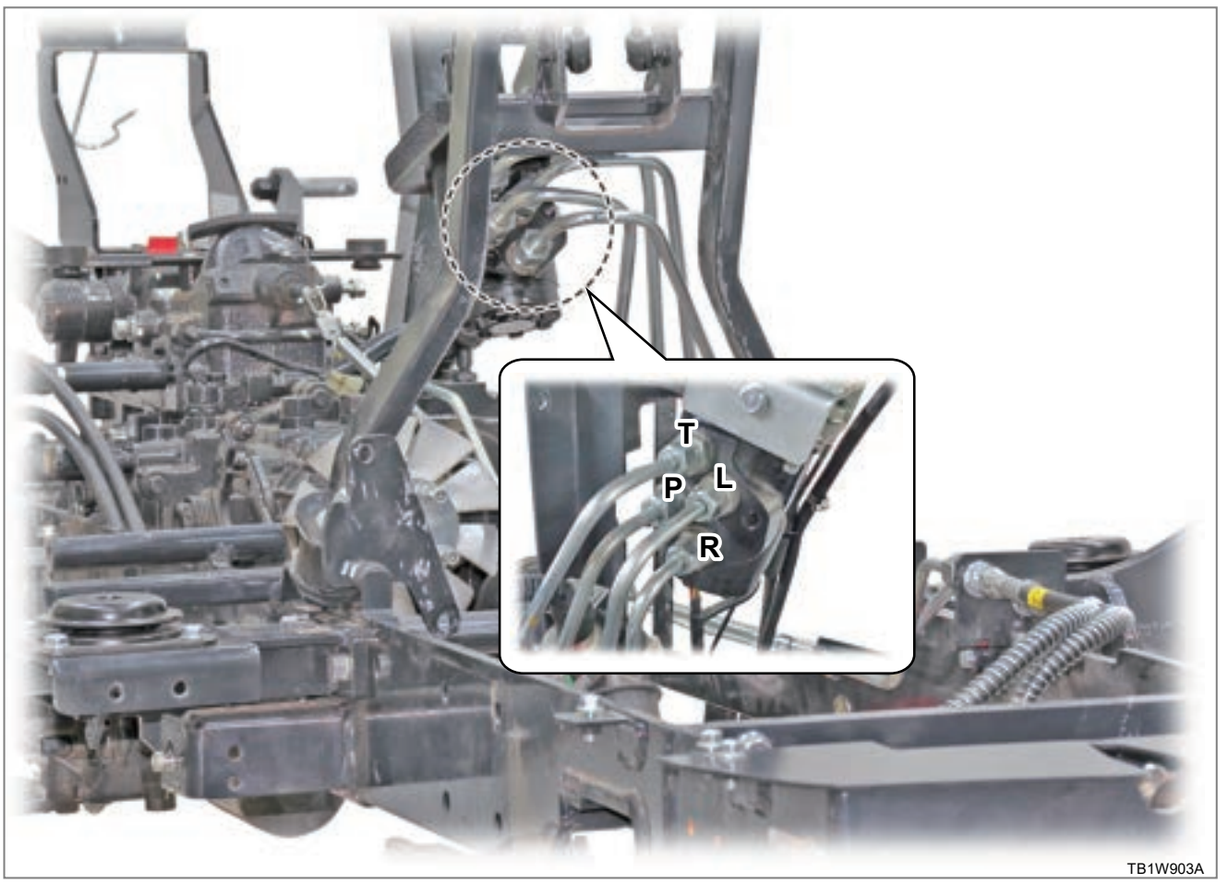


19. Tighten the end cap retainer bolts (1), in the sequence shown in figure in two stages. At first, tighten them to approx. 10.8 Nm (1.1 kgf-m, 8 lb-ft) and then to 28.4 Nm (2.9 kgf-m, 21 lb-ft).

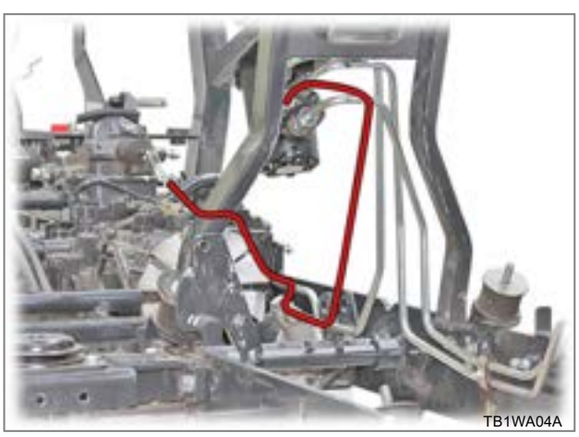
    After tightening the bolts, check that the spool turns freely in the motor.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 28 2025-02-11 오후 5:20:43

6.4 STEERING HYDRAULIC TUBE LOCATION

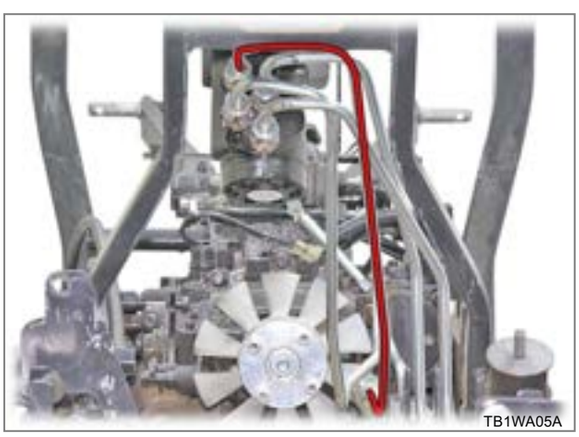


P (PUMP)



This is the hydraulic supply tube installed between modulator valve and steering unit.

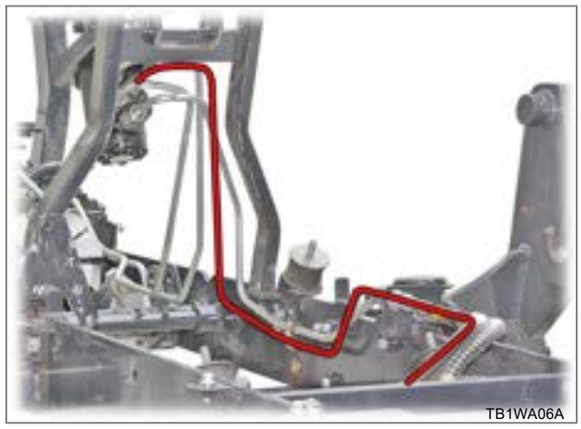
T (RETURN)



This is the return tube which is connected from steering unit to HST filter. The fluid which is passed through the oil filter flows to the HST system.

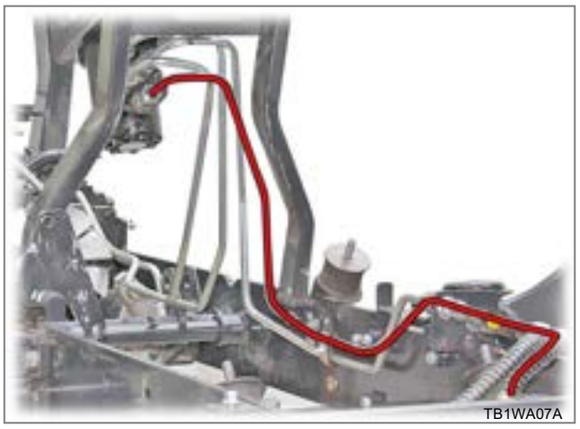
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L (LEFT TURN)



This hose is installed between steering unit and right port of the steering cylinder.

R (RIGHT TURN)



This hose is installed between steering unit and left port of the steering cylinder.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_09_스티어링.indd 30 2025-02-11 오후 5:20:44

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HYDRAULIC SYSTEM

CHAPTER 10

TABLE OF CONTENTS

1. SPECIFICATIONS 10-2

2. OPERATING PRINCIPLE.....10-3

2.1 Schematic and circuit diagram 10-3

2.1.1 Hydraulic schematic and basic operation 10-3

2.1.2 Circuit diagram.....10-5

2.2 Components.....10-7

2.2.1 Hydraulic pump 10-7

2.2.2 Main oil filter.....10-9

2.2.3 Auxiliary double acting valve (optional remote hyd. valve).....10-11

2.2.4 Modulator valve.....10-17

2.2.5 Joystick valve.....10-20

2.2.6 Lift control valve 10-23

2.2.7 Priority valve 10-24

2.2.8 Mower lift linkage 10-25

3. TROUBLESHOOTING 10-26

4. INSPECTION AND ADJUSTMENT.....10-27

4.1 Main relief valve 10-27

4.2 Aux. Double acting valve pressure (optional remote hyd.) 10-27

4.3 Steering unit relief valve.....10-28

4.4 Modulator relief valve 10-28

5. EXPLODED VIEW.....10-29

5.1 TB3-G411001 Suction line 10-29

5.2 TB3-G412004 Gear pump.....10-30

5.3 TB3-G421002 Modulate valve 10-31

5.4 TB3-G423002 HST hydraulic line 10-32

5.5 TB3-G441003 Joystick valve 10-33

5.6 TB3-G461001 Lift control valve.....10-34

5.7 TB3-G463004 Hydraulic cylinder 10-35

5.8 TB3-G463502 Lift cylinder 10-36

6. SERVICING 10-37

6.1 Hydraulic cylinder removal & disassembly 10-37

6.2 Double acting valve (optional) removal disassembly 10-40

6.3 Gear pump disassembly (with priority valve).....10-41

6.4 Lift control valve disassembly 10-44

6.5 Lift cylinder ass'y and transmission case assembly tips 10-45

6.6 Modulator valve disassembly 10-46

6.7 Joystick valve removal & disassembly 10-47

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 1 2025-02-11 오후 5:20:49

1. SPECIFICATIONS

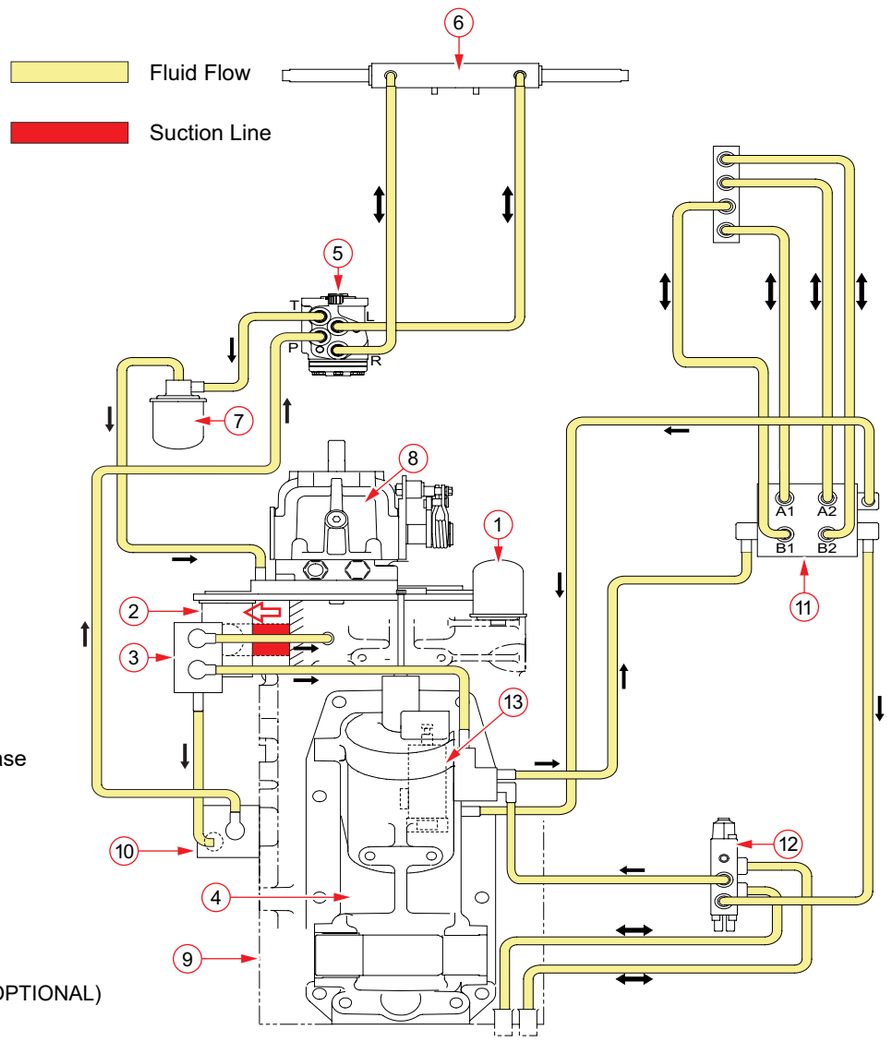
Description		Specification
Hydraulic oil	Manufacturer and brand	DAEDONG UTF55 Exxon Mobilfluid 423 or 424 BP Tractran TH Shell DONAX-TD
	Capacity	10.4 ℓ (2.75 u.s gal.)
Main pump	Type	Gear pump
	Displacement	11.00 cc/rev (0.671 cu in./rev)
	Flow capacity (Engine rated speed: 3,000 rpm)	26.4 ℓ/min (6.97 gpm)
HST	Type	Shoeless
	Pump displacement	0 ~ 23 cc/rev (0 ~ 1.403 cu in./rev)
	Motor displacement	23 cc/rev (1.403 cu in./rev)
	Relief valve setting pressure	20.6 MPa (210 kgf/cm^2)(2,986 psi)
	Charge relief valve setting pressure	490 ~ 784 kPa (5 ~ 8 kgf/cm^2)(71.1 ~ 113.8 psi)
Steering unit	Displacement	51 cc/rev (3.112 cu in./rev)
	Relief valve setting pressure	120 kgf/cm^2 [11.8 MPa, 1,707 psi)
	Rated flow	8 ℓ/min (2.11 gpm)
Position control valve (Lift)	Relief valve setting pressure	12.7 ~ 13.2 MPa (130 ~ 135 kgf/cm^2)(1,849 ~ 1,920 psi)
	Safety relief pressure	17.6 MPa(180 kgf/cm^2)(2,560 psi)
	Flow capacity	26.4 ℓ/min (6.97 gpm)
	Priority flow	7.7 ℓ/min (2.03 gpm)
Modulator valve	Sequence valve pressure	2.35 ~ 2.65 MPa (24 ~27 kgf/cm^2)(341 ~ 384 psi)
	Reducing valve pressure	1.86 ~ 2.06 MPa (19 ~ 21 kgf/cm^2)(270 ~ 299 psi)
Joystick valve	Nominal flow	45 lpm (15.88 gpm)
	Nominal pressure	315 bar
Remote control valve (Double acting valve) (OPTIONAL)	Rated flow capacity	18 ℓ/min (4.75 gpm)
	Max. Pressure	13.7 MPa (140 kgf/cm^2)(1,991 psi)
Hydraulic cylinder	Lowering time	Adjustable

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 2 2025-02-11 오후 5:20:49

2. OPERATING PRINCIPLE

2.1 SCHEMATIC AND CIRCUIT DIAGRAM

2.1.1 HYDRAULIC SCHEMATIC AND BASIC OPERATION



(1) Hydraulic filter
(2) Gear pump
(3) Priority valve
(4) Hydraulic cylinder case
(5) Steering unit
(6) Steering cylinder
(7) HST filter
(8) HST
(9) Transmission case
(10) Modulator valve
(11) Joystice valve
(12) Double acting valve(OPTIONAL)
(13) Lift control valve

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The 26.6 lpm of oil is supplied to the priority valve (3) by the gear pump (2) and then, 7.0 lpm of oil is supplied to the steering unit (5) via modulator valve (10) by the priority valve while the remainder is sent to the joystick valve (11) to be used for front loader and is sent to the lift control valve (13) to be used for lifting and lowering operation through the double acting valve (12) if equipped.

Oil sent to the steering unit is supplied to the left port or right port, oil in the other port is returned to the steering unit and is drawn back to the HST filter (7) through the port T.

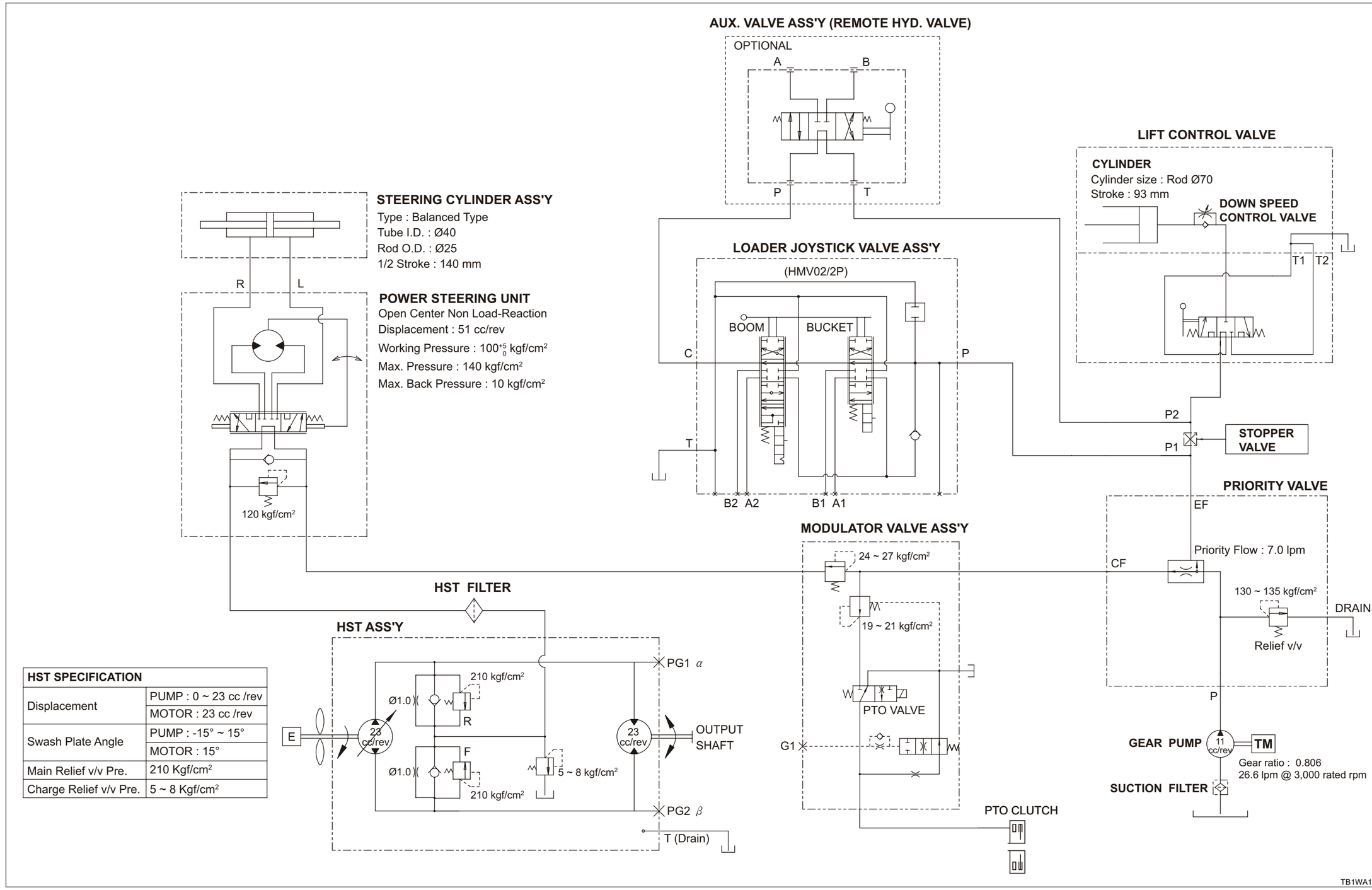
After oil is filtered by the HST filter again, it is fed to the HST (8) through the HST inlet port to produce rotating force by the pump and motor in the HST for forward and reverse driving.

Finally, oil drained from the HST is sent to the transmission and it is sent to the gear pump through the oil filter again, making one complete cycle.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 3 2025-02-11 오후 5:20:49

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2.1.2 CIRCUIT DIAGRAM



HST SPECIFICATION	
Displacement	PUMP : 0 ~ 23 cc /rev
	MOTOR : 23 cc /rev
Swash Plate Angle	PUMP : -15° ~ 15°
	MOTOR : 15°
Main Relief v/v Pre.	210 Kgf/cm²
Charge Relief v/v Pre.	5 ~ 8 Kgf/cm²

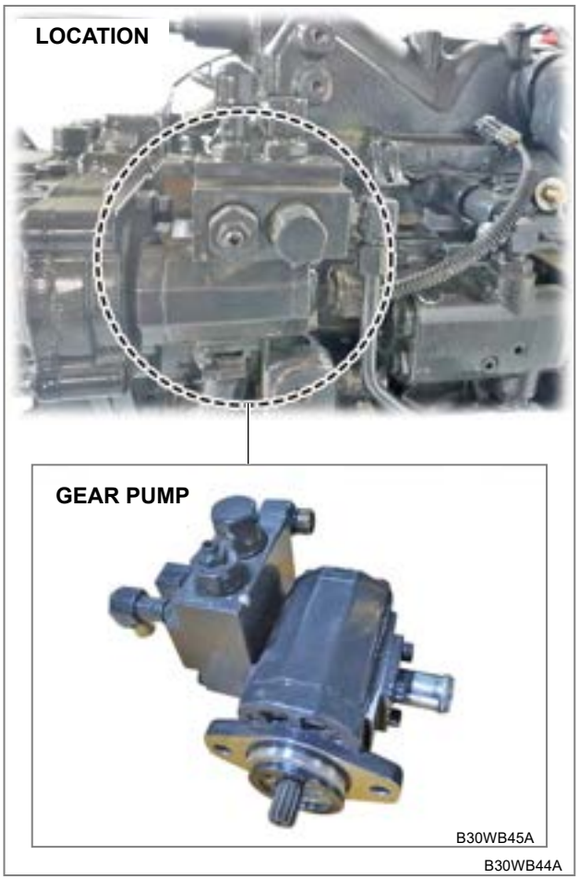
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2.2 COMPONENTS

2.2.1 HYDRAULIC PUMP

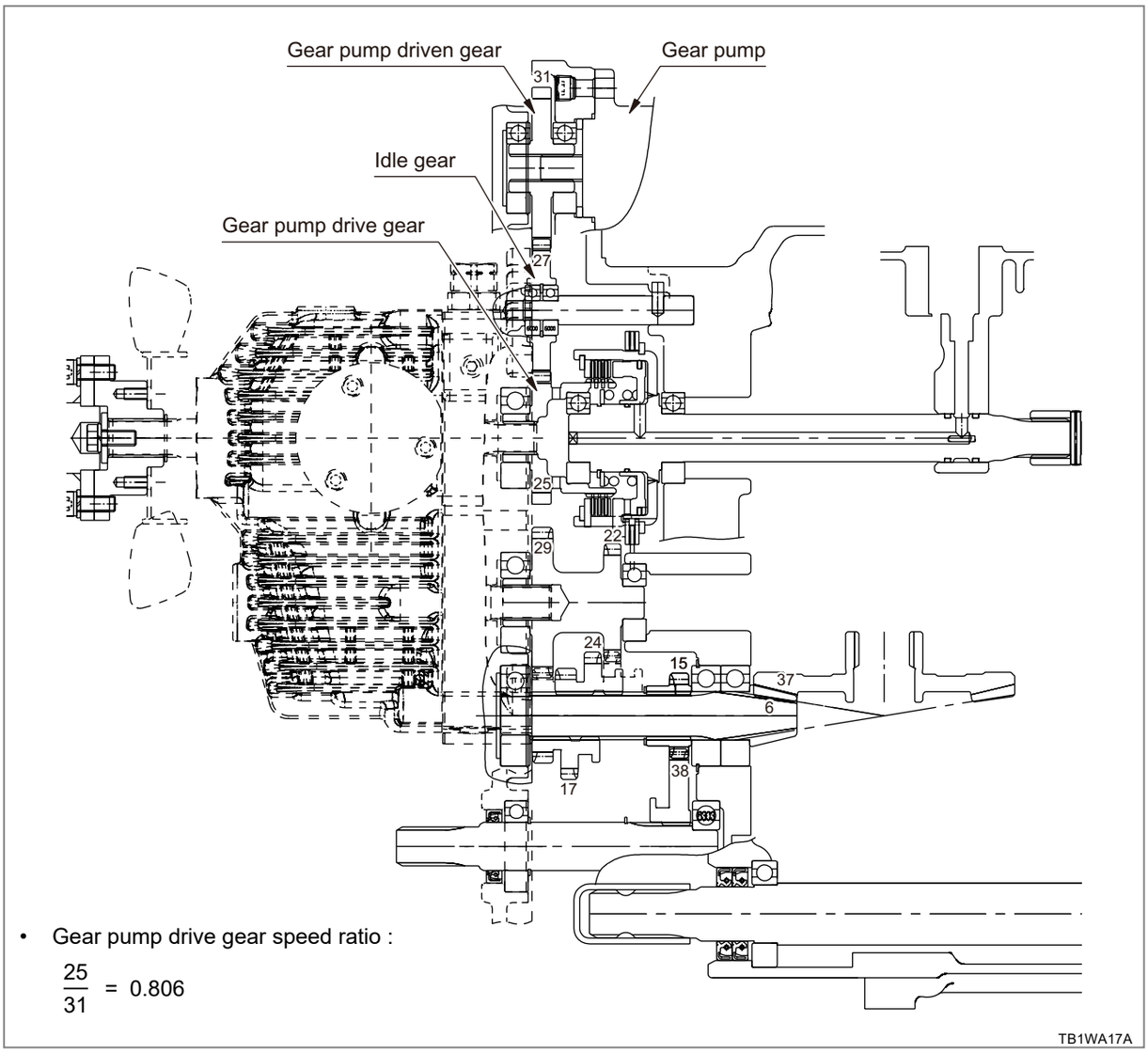
LOCATION AND STRUCTURE OF GEAR PUMP



The gear pump is mounted on the transmission case. The gear pump is driven by an idler gear and drive gear engaged with the HST pump shaft connected directly to the engine power.

This hydraulic pressure is used for steering, PTO clutch, front loader, auxiliary hydraulic, 3-point link lifting/lowering, operation.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 7 2025-02-11 오후 5:20:50



- Gear pump drive gear speed ratio :

$$\frac{25}{31} = 0.806$$

HYDRAULIC PUMP SPECIFICATIONS

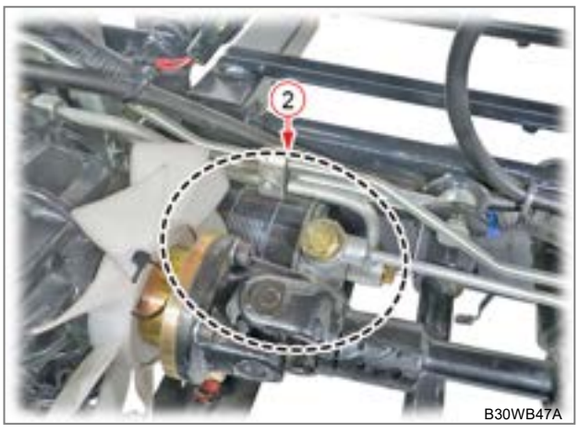
ITEM	SPEC.
Displacement	11 cc/rev
Max. continuous pressure	150 kgf/cm^2
Speed (Max.)	3,000 rpm

- Engine: 3,000 rpm
- Speed ratio of
  engine and gear pump : 0.806
- Displacement : 3,000 rpm x 0.806 x 11 cc/rev
  = 26,598 cc/rev
  = 26.6 lpm

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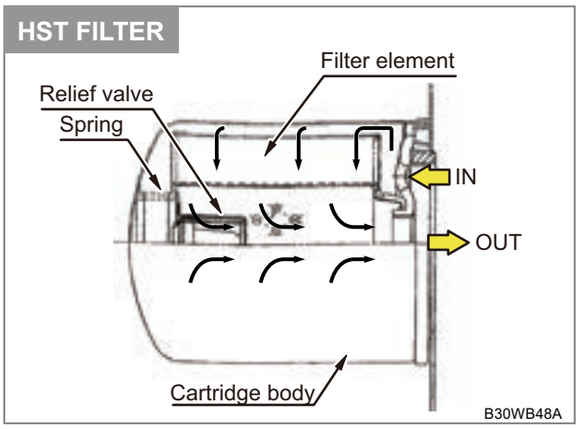
2.2.2 MAIN OIL FILTER



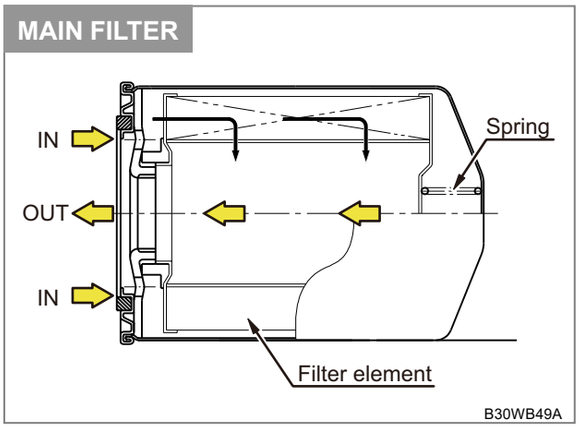


The Main Filter (1) is installed in the suction line before the gear pump, and HST Filter (2) is installed before the HST.

HST FILTER



MAIN FILTER



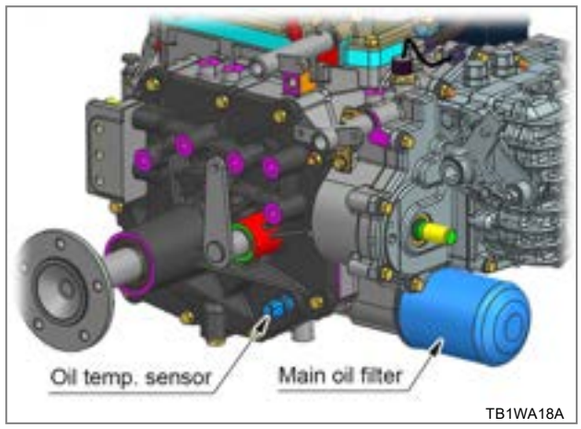
When the fluid flows into the filter, it passes from the outer side of the filter element to the inner side of it.

The filter element is a paper type and is not reusable.

- **Change interval:** Initial change after 50 hours, then change at every 200 hours
- **Filter specifications**

	Main filter	HST filter
Filtered dimension	2,890 cm^2 ± 10%	1,215 cm^2 ± 10%
Number of folds	69	62
Rated flow	25 lpm	17.4 lpm
Relief valve opening pressure	-	2.5 ±0.3 kgf/cm^2
Element pressure durability	14 kgf/cm^2 (MAX)	0.7 MPa (MIN)
Max. fineness	91 microns	56.6 microns
Average fineness	71 microns	41.3 microns

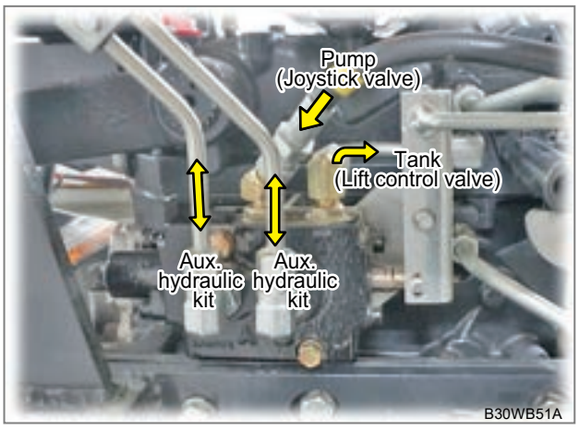
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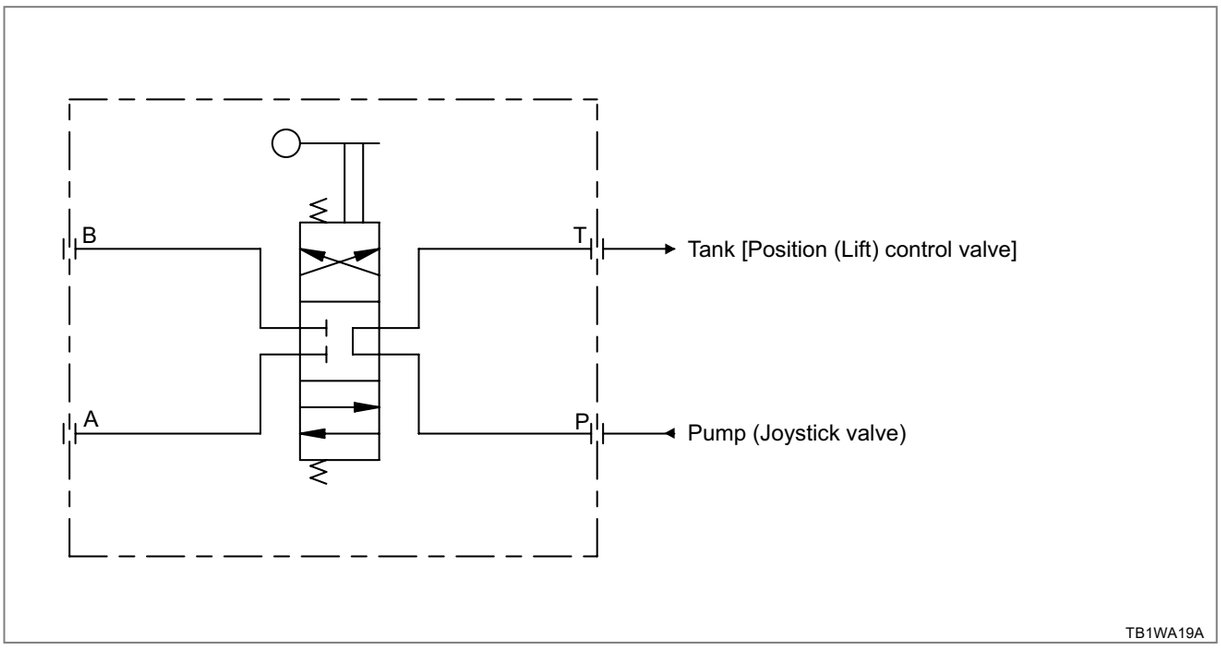


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2.2.3 AUXILIARY DOUBLE ACTING VALVE (OPTIONAL REMOTE HYD. VALVE)

LOCATION AND FUNCTION





The optional double acting valve (remote hyd. valve) is installed under the floor deck on the right side.

Hydraulic oil for the double acting valve is supplied through the joystick valve from the gear pump.

As shown in the figure above, oil supplied through the port P is returned to the port T when the double acting valve is in the neutral state.

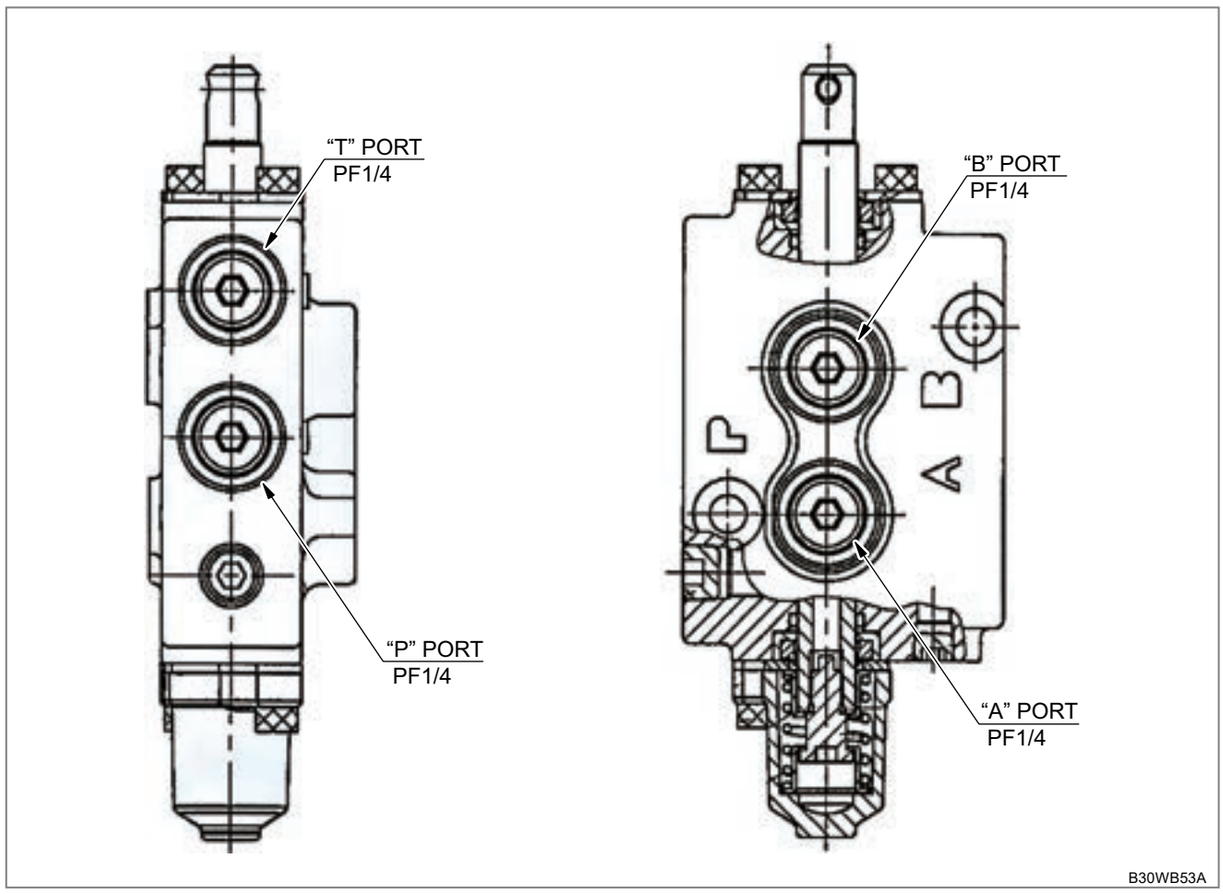
If the double acting lever is moved up or down, oil supplied through the port P is sent to an external implement through the port A or port B.

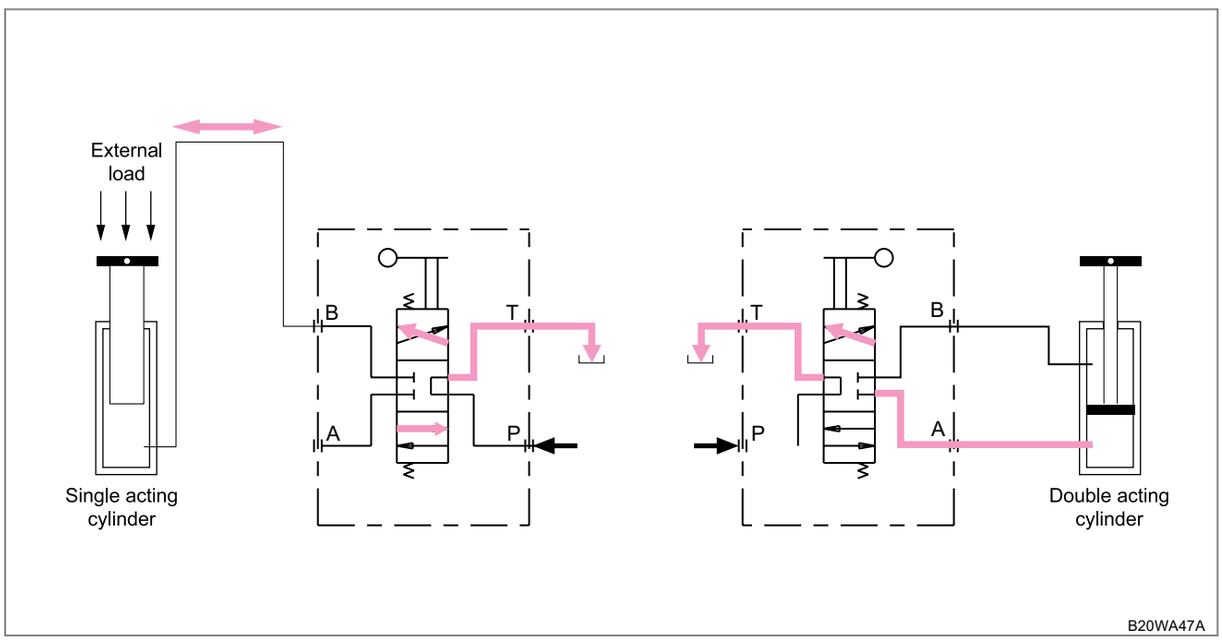
As a result, hydraulic oil is supplied to one port of the external implement through the port A or B while oil in the other port of the external implement is returned back to the tank through the port B or A.

SPECIFICATION

Rated flow	18 lpm (4.75 gpm)
Oil temperature range	-20°C ~ 80°C (-4°F ~ 176°F)
Max. operating pressure	140 kgf/cm^2 (13.72 MPa, 1991 psi)

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WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 12
2025-02-11 오후 5:20:56



This valve is the double acting (remote hydraulic) valve, but it can be used in the single acting cylinder.

When the hose of the single acting cylinder is installed to the rear quick coupler (only one), this valve operates like single acting valve.

In this case, if the spool operating direction of the valve is same to the fluid flow direction to the connected coupler, the cylinder is correctly expanded. If the spool operating direction is reversed, the pressure in the hose rises since no hose is connected to the quick coupler. Then, the main relief valve which located in priority valve opens and the fluid from the pump is drained to the transmission. As the single acting cylinder is lowered by the outer load, the fluid in the cylinder flows to the transmission through the drain spool of the valve.

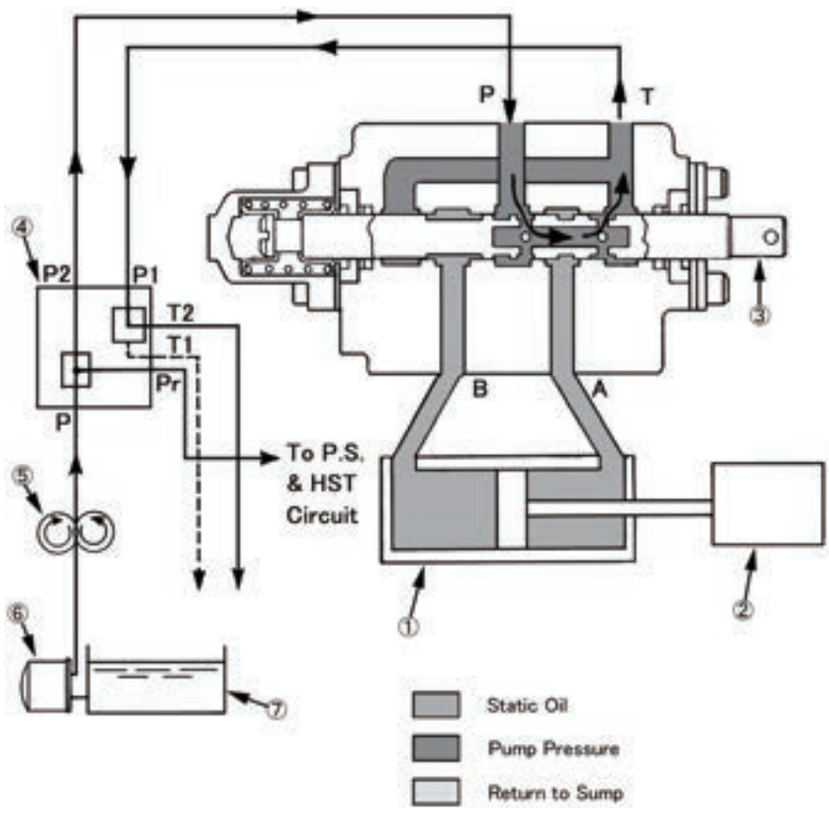
⚠ CAUTION

If the double acting valve is used in the single acting cylinder, the hydraulic fluid can be overheated as the main relief valve opens at every cylinder contraction.

Therefore, it is not recommended to use an implement that has the single acting cylinder with harsh work load.

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NEUTRAL POSITION



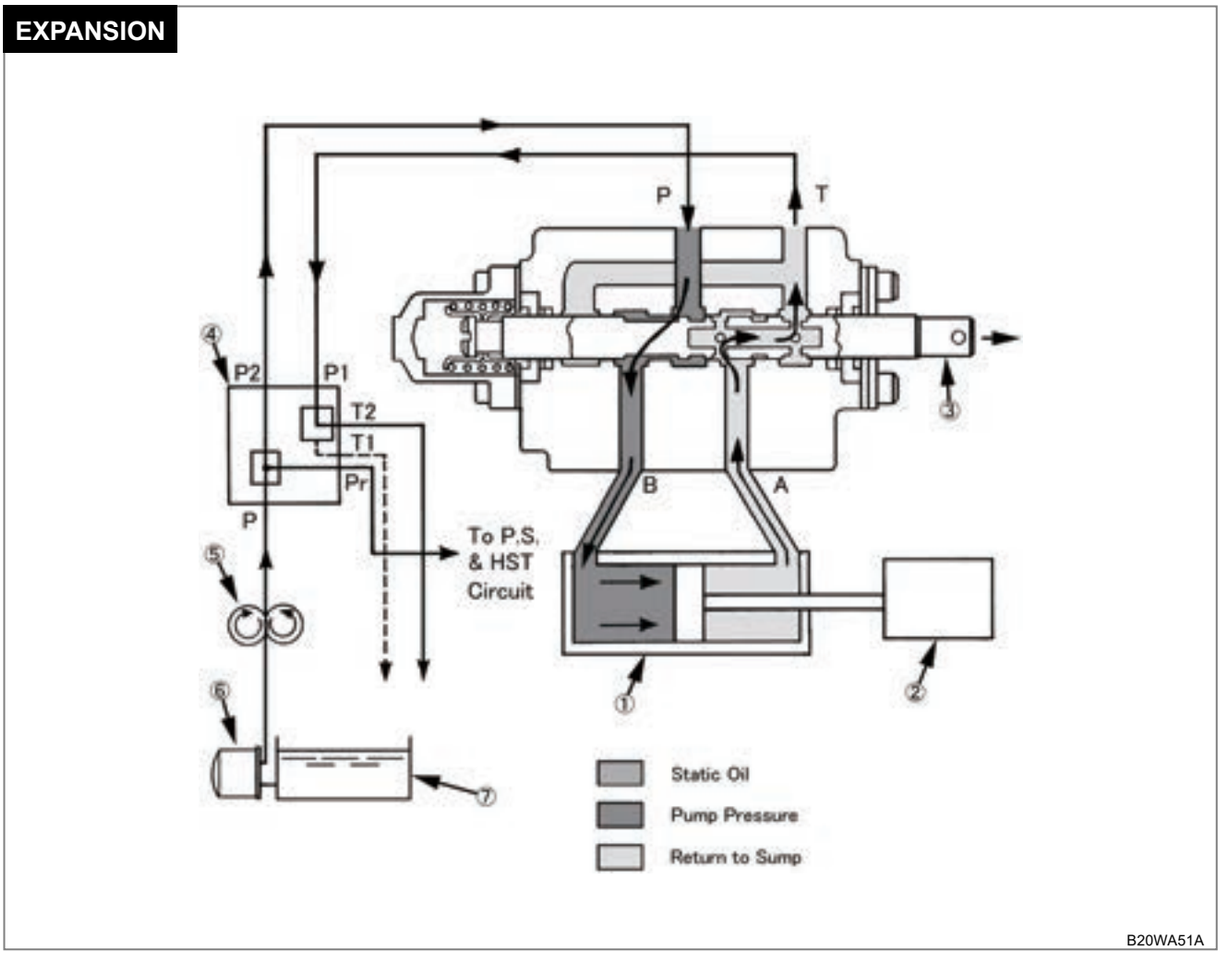
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(1) Implement Cylinder
(2) Implement
(3) Remote Valve Spool
(4) Position (Lift) control valve
(5) Hydraulic Pump
(6) Filter
(7) Reservoir
(A) To cylinder (Rod end)
(B) To cylinder (Piston end)
(P) From Pump
(T) Return to tank

When the remote hyd. valve is in the “neutral” position, the valve spool (3) is centered in the valve body. In this position, passages “A” and “B” to/from the implement cylinder are blocked by the spool, trapping the oil in the implement cylinder and holding the cylinder in a fixed position. Pump pressure oil supplied at “P” flows through valve through the tank port “T2”, and returns to sump via the “P1” port on the position (lift) control valve.

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EXPANSION



(1) Implement Cylinder
(2) Implement
(3) Remote Valve Spool
(4) Position (Lift) control valve
(5) Hydraulic Pump
(6) Filter
(7) Reservoir
(A) To cylinder (Rod end)
(B) To cylinder (Piston end)
(P) From Pump
(T) Return to tank

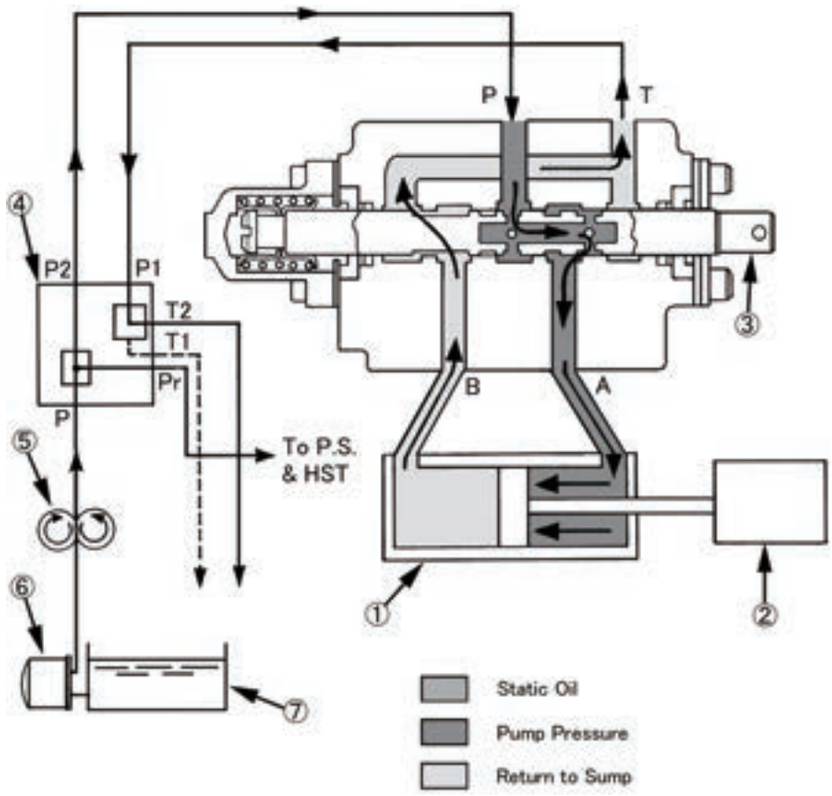
When the remote hyd. valve lever is moved to the “raise” position, the valve spool is moved outward. The pump pressure oil supplied at “P” is directed by the spool to the piston side of the cylinder through passage “B”, causing the implement to rise.

Cylinder oil contained on the rod side is forced back through passage “A”, leaves the remote valve through the tank port “T2”, and returns to sump via the “P1” port on the position (lift) control valve.

Whenever the remote cylinder pressure exceeds 12.74 MPa (130 kgf/cm^2), the main system relief valve, mounted in priority valve opens and returns high pressure oil to the sump.

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CONTRACTION



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(1) Implement cylinder
(2) Implement
(3) Remote valve spool
(4) Position (Lift) control valve
(5) Hydraulic pump
(6) Filter
(7) Reservoir
(A) To cylinder (Rod end)
(B) To cylinder (Piston end)
(P) From Pump
(T) Return to tank

When the remote hyd. valve lever is moved to the “lower” position, the valve spool is moved inward.

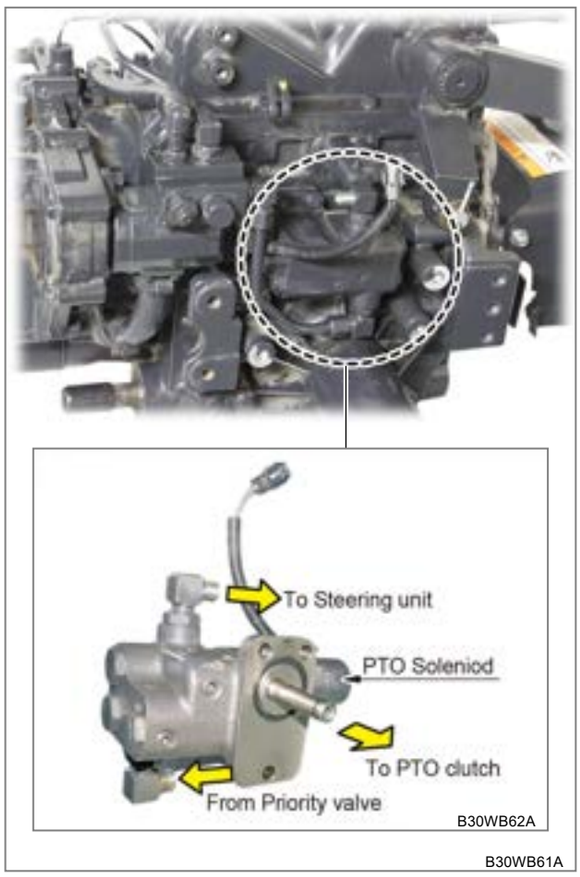
The pump pressure oil supplied at “P” is directed by the spool to the rod side of the cylinder through passage “A”, causing the implement to lower.

Cylinder oil passage “B”, leaves the remote valve through the tank port “T2”, and returns to sump via the “P1” port on the position (lift) control valve.

Whenever the remote cylinder pressure exceeds 12.74 MPa (130 kgf/cm^2), the main system relief valve, pressure oil to the sump.

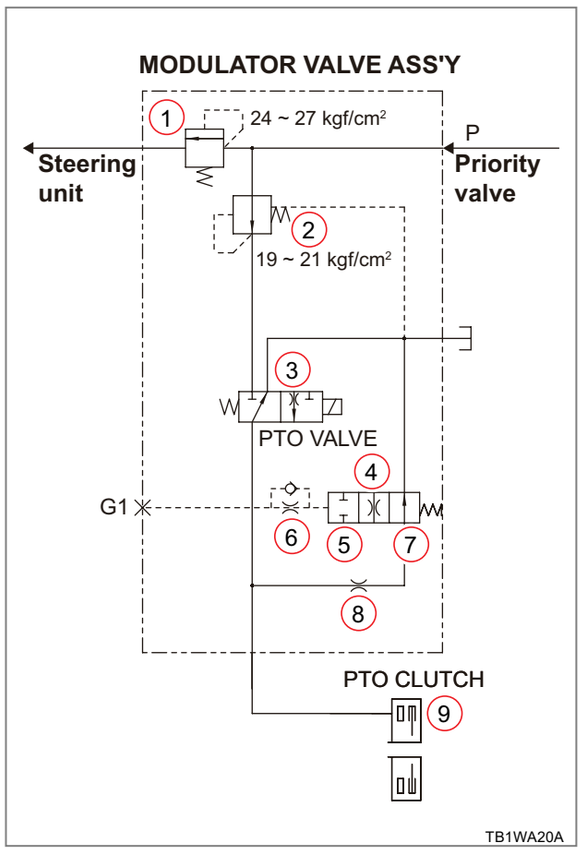
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2.2.4 MODULATOR VALVE



The hydraulic fluid from the gear pump is supplied to the modulator valve through the priority valve with 7.0 lpm capacity

The modulator valve is to control the operation of the PTO clutch.



The hydraulic fluid generated in the gear pump passes through the modulator valve. The modulator valve supplies the PTO clutch. The bypassed oil is supplied to steering unit and HST.

1. SEQUENCE VALVE

Oil from the priority valve enters the modulator valve through the P port and reaches the sequence valve (1). The sequence valve is closed by spring force until the pressure increases. When the pressure builds up to 24~27kgf/cm^2, the spring contracts and the valve opens. The sequence valve opens and closes continuously to maintain the pressure in the circuit before the sequence valve. This helps provide sufficient pressure to the PTO system.

2. REDUCING VALVE

Oil with built-up pressure passes through the reducing valve (2). The reducing valve is normally held open by the spring. When the pressure after the reducing valve exceeds 19~21kgf/cm2, the reducing valve closes to maintain the pressure of the PTO system within 19~21kgf/cm2. This repeated opening and closing maintains the pressure of the PTO system and protects the PTO system from peak pressure.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 17 2025-02-11 오후 5:20:57

3. PTO ON

When the operator turns on the PTO switch, the magnetic force of the PTO solenoid opens the PTO valve (3). The open line of the PTO valve has an orifice passage. This helps with smooth PTO engagement.

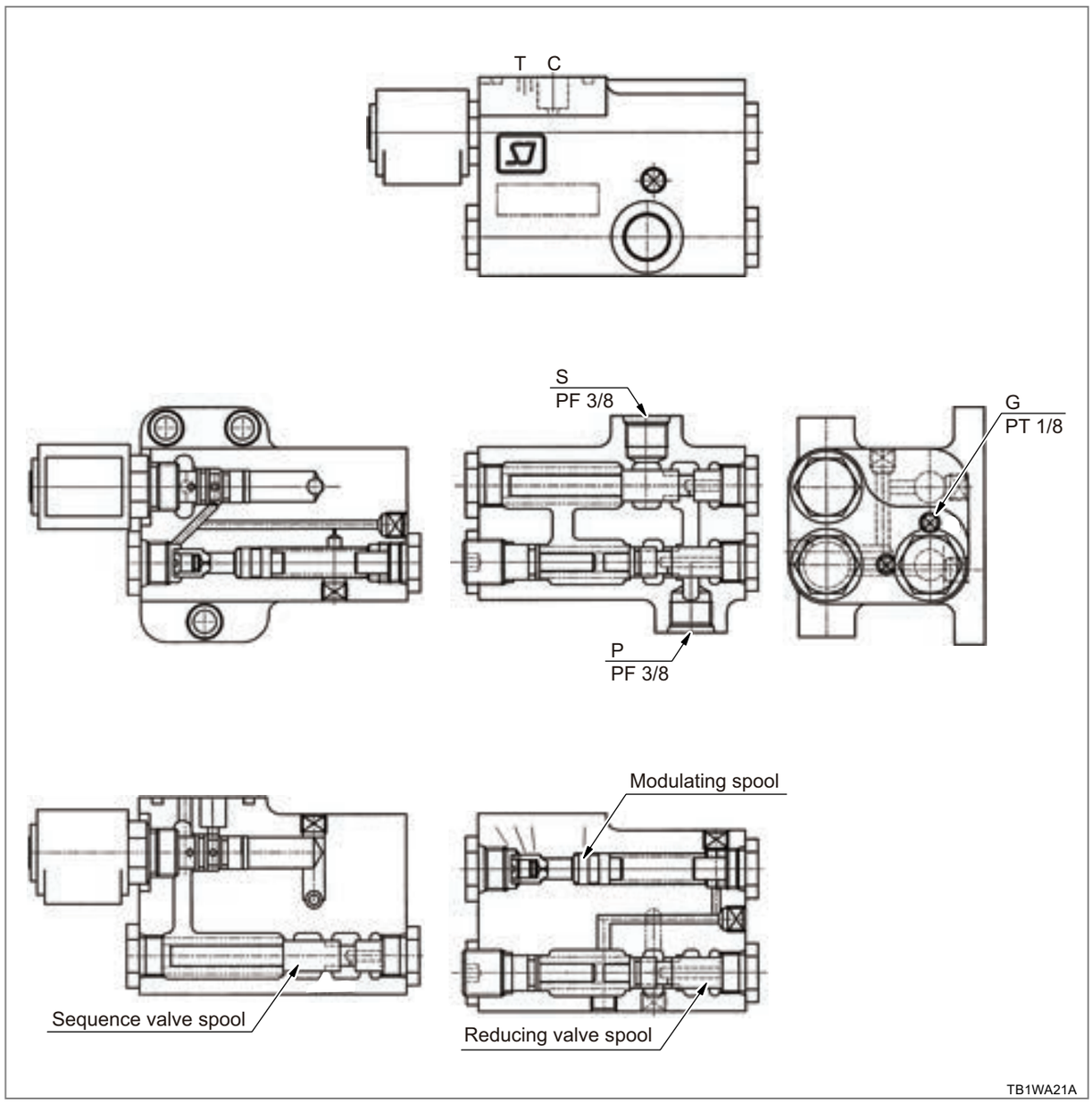
4. Modulating system

For smoother PTO engagement, the modulator valve has a modulating system (4 to 8). Immediately after PTO ON, as the drain line orifice (8) and spool valve (7) are open toward the sump, the oil supplied through the PTO valve does not reach the PTO clutch. After a few seconds, the pressure in the modulator inlet orifice (6) increases due to the drain line orifice (8) and pushes the modulator spool closed. The drain line is then partially closed for a second by the orifice (4) of the modulating spool and eventually completely closed by the closing valve (5) of the modulating spool.

5. PTO OFF

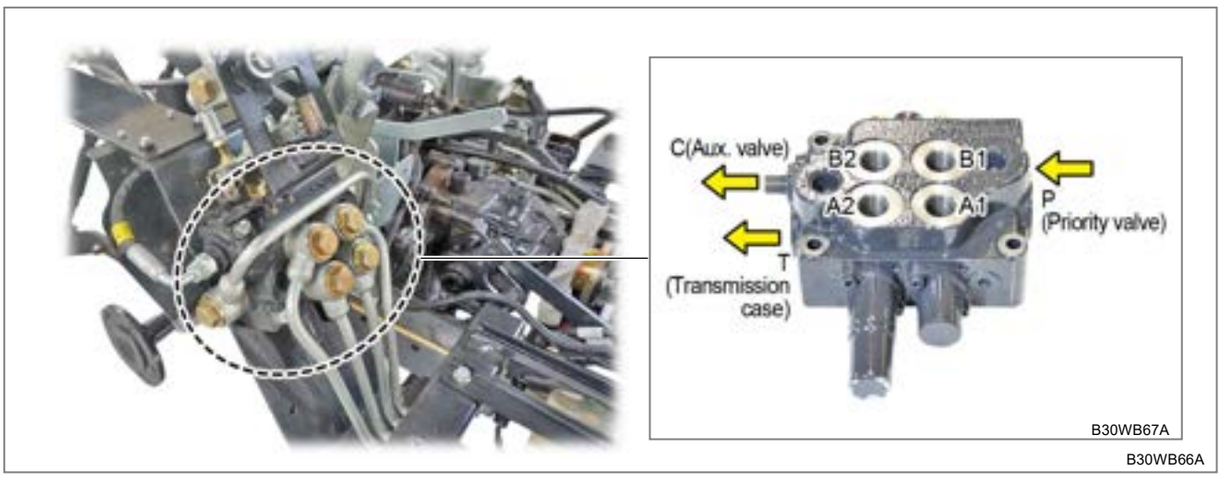
When the PTO valve (3) is closed, hydraulic pressure (or flow) from the PTO clutch (9) is discharged to the sump. A check ball line next to the inlet orifice (6) reduces back pressure on the spool, making it easier for the regulating spool to return to the its open position.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 18 2025-02-11 오후 5:20:57

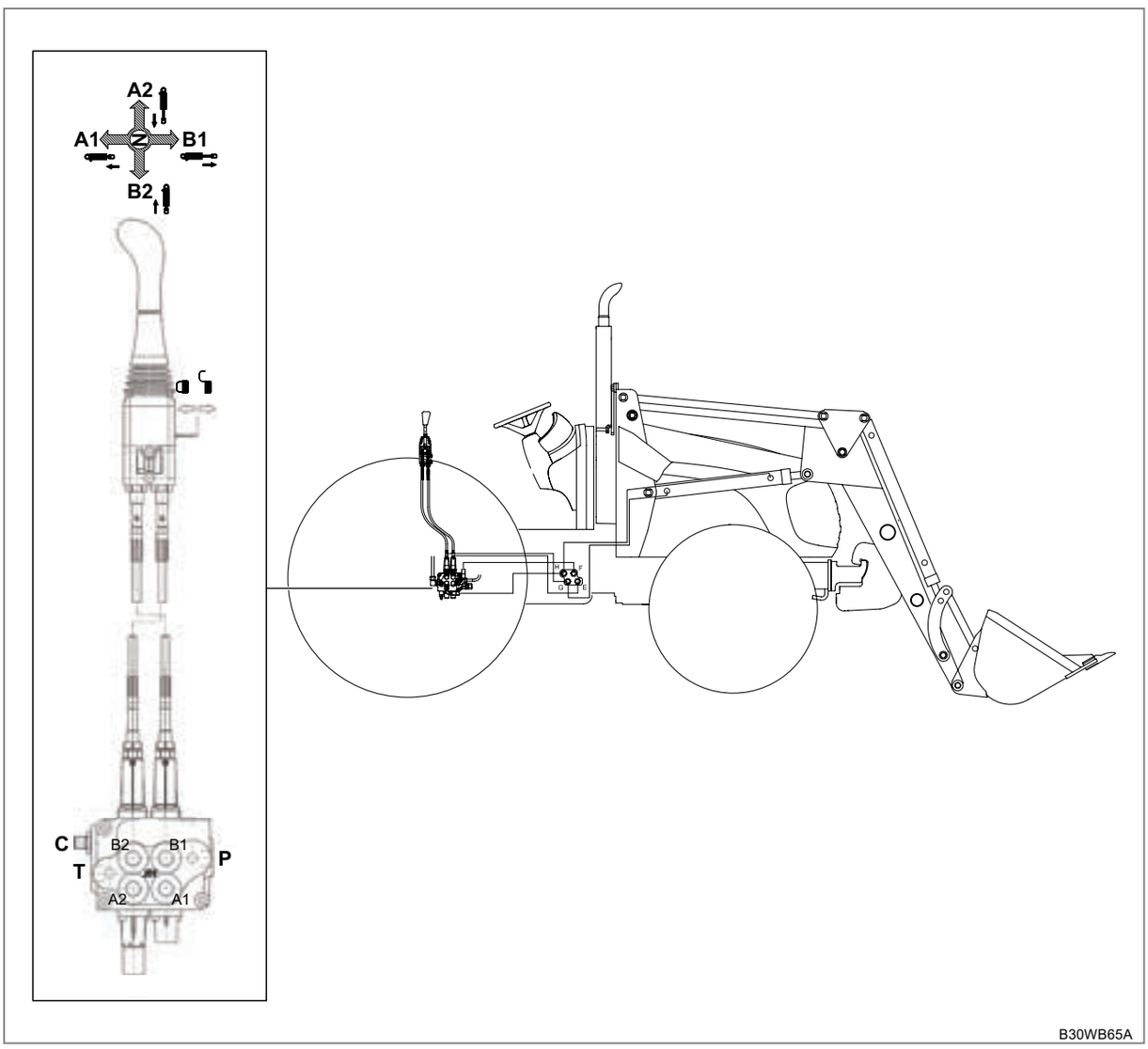


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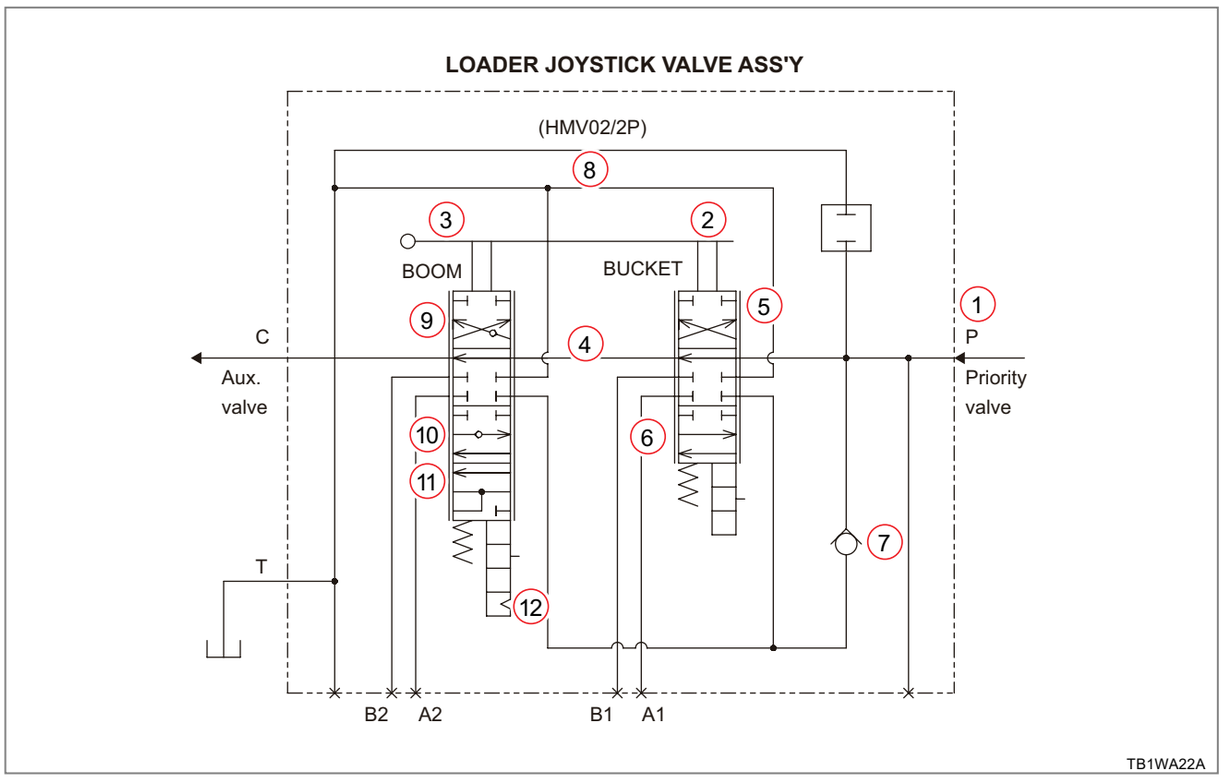
2.2.5 JOYSTICK VALVE



B30WB66A



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 20 2025-02-11 오후 5:20:58



Neutral

19.6 LPM (at the rated engine speed = 3,000RPM) of oil from the priority valve enters the loader joystick valve through P port (1). When the bucket spool (2) or boom spool (3) is in the neutral position, oil bypasses spools through carry over line (4) and C port to the remote hydraulic valve.

Bucket roll back or dump

When the operator moves the joystick lever left or right, the roll back (5) or dump (6) line of the bucket spool (2) opens and the carry over line(4) closes. Hydraulic oil for bucket roll-back or dump is supplied via the supply line with check ball (7). The return oil from the bucket cylinders is eventually drained into the sump (transmission case) through the drain line(8) and the T port.

Boom up or down

If the operator pulls or pushes the joystick lever, boom spool (3) up (9) or down (10) line open and the carry-over line(4) closes. Oil for boom up or down is supplied through the supply line with check ball (7). The return oil from the boom cylinders is eventually drained into the sump(transmission case) through the drain line (8) and T port.

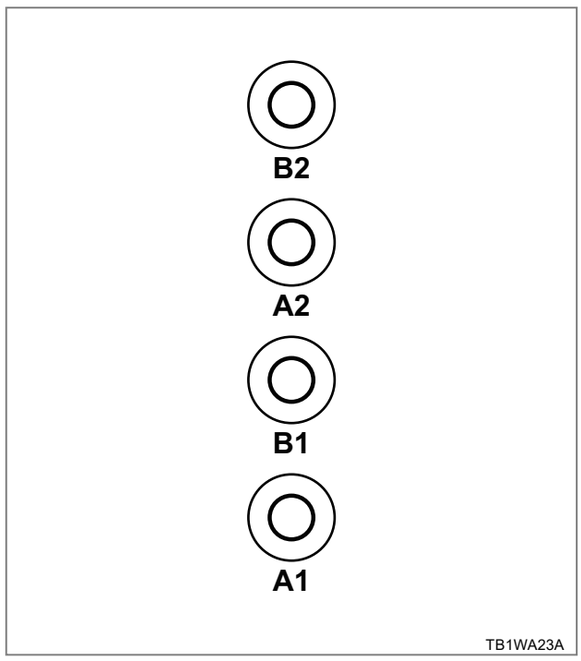
The check balls in the supply line and boom spool protect the hydraulic circuit from peak external loads that may be caused by gravity or the heavy weight of the boom and full bucket.

Boom floating

If the operator pushes the joystick lever further, now the boom floating (11) line is open. In this operation the boom moves freely along the ground contour as the boom up and down line are connected each other while the carry over line is open. Only during this time of floating operation, the boom spool remains in the floating position until canceled by the operator due to a detent steel ball in the valve system. The V-notch symbol (12) in the circuit diagram indicates the detent function.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 21 2025-02-11 오후 5:20:58

▶ QUICK COUPLER (FRONT OUTLET PORT) LOCATION



Joystick lever operating direction	Valve port	Hydraulic hose tag color	Loader operation
Pull	B2	Red	Boom up
Push	A2	White	Boom down
Push further	-	-	Boom floating
Left	B1	Green	Bucket roll-back
Right	A1	Yellow	Bucket dump

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 22 2025-02-11 오후 5:20:58

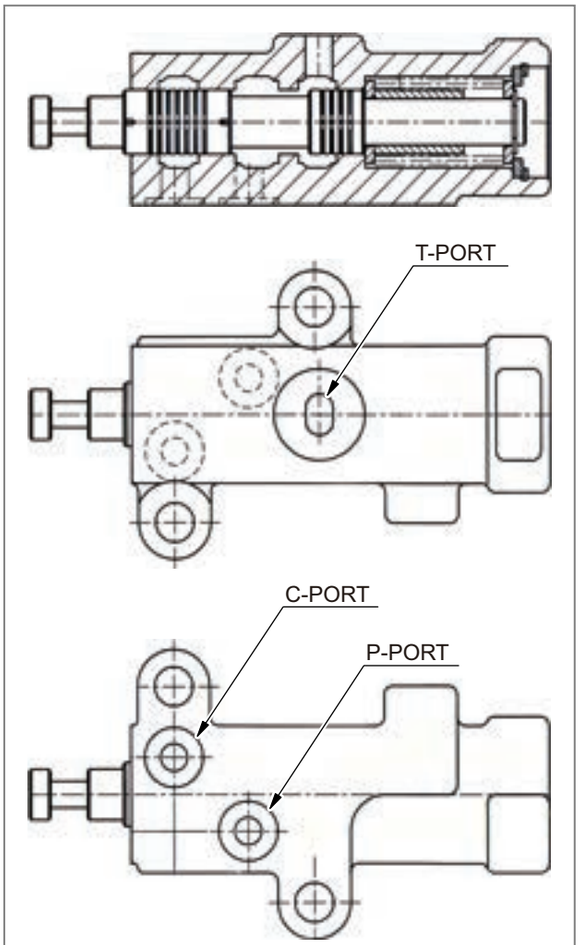
2.2.6 LIFT CONTROL VALVE



The lift control valve is mounted in the lift cylinder housing. When the operator pulls the lift control lever, the spool of the lift control valve moves and the up-line (2) opens. The hydraulic fluid from remote hydraulic valve then flows through up-line (2), check ball line (4) and eventually to the lift cylinder.

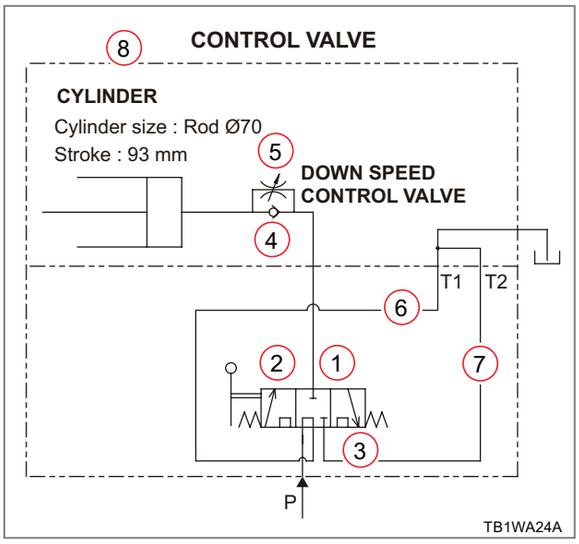
When the operator pushes the lift control lever, the spool in the valve moves and the down-line (3) opens. Then, the hydraulic fluid in the lift cylinder returns by gravity of implement, through down-speed orifice (5), down-line of the spool and T2 (7) drain line and is drained into the sump(transmission case). The down speed orifice (5) is adjustable so that the down-speed of lift system can be adjusted according to the weight of implement on the 3 point hitch.

While the lift control valve is in the neutral position, the supplied oil is guided by neutral line (1) on spool to the return line (6) and drained into the sump (transmission case).



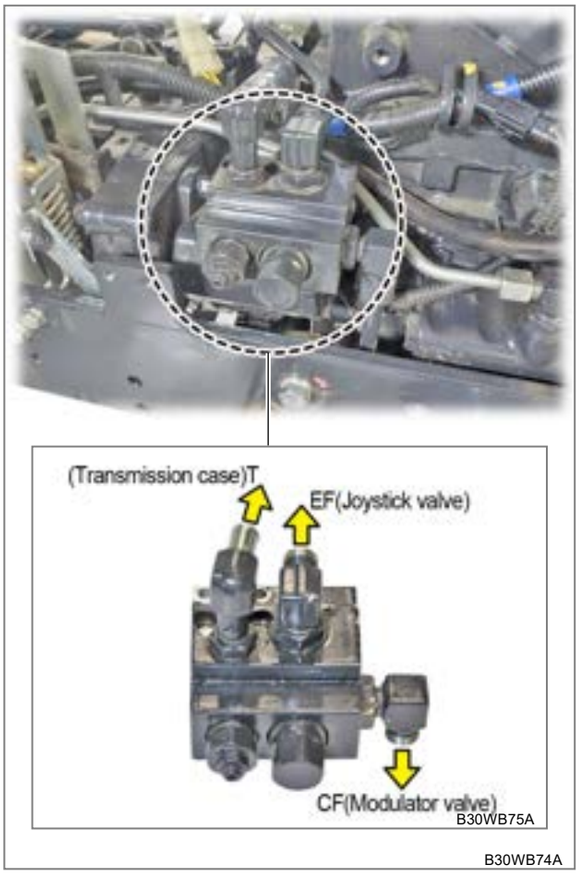
Fluid flow	16 lpm
Normal Pressure	145 kgf/cm^2
Max. Pressure	210 kgf/cm^2

B30WB72A



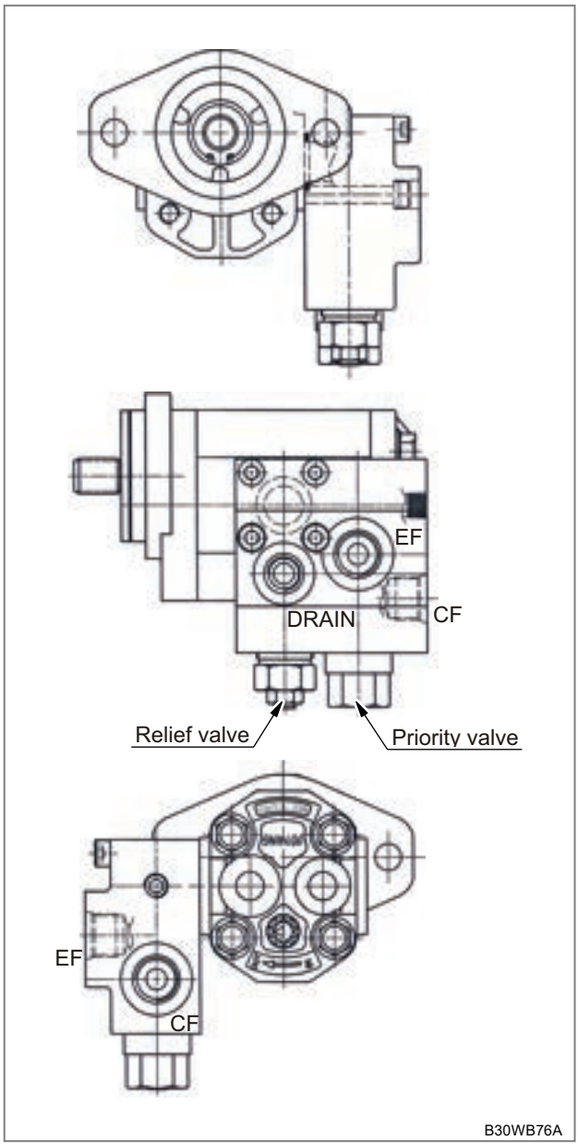
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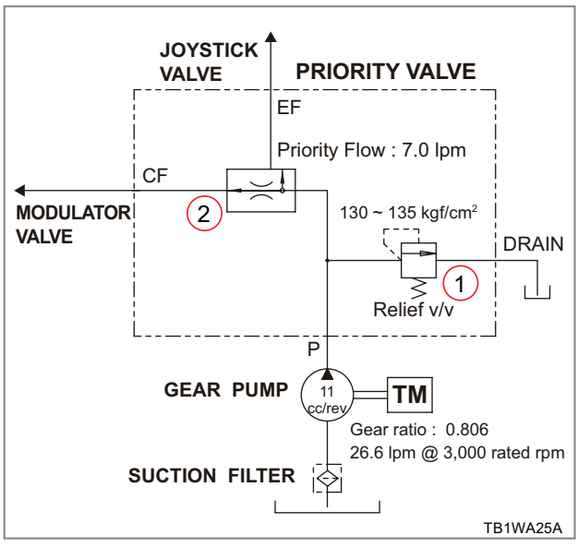
2.2.7 PRIORITY VALVE



The priority valve first receives all hydraulic fluid from the gear pump through the P port. The main relief valve (1) is installed in the priority valve. The main relief valve protects all hydraulic circuits and hydraulic components of the tractor from the outer impact such as heavy implement weight or gravity. It opens around 130~135 kgf/cm^2 and drains fluid into the sump(transmission case) under the over load conditions.

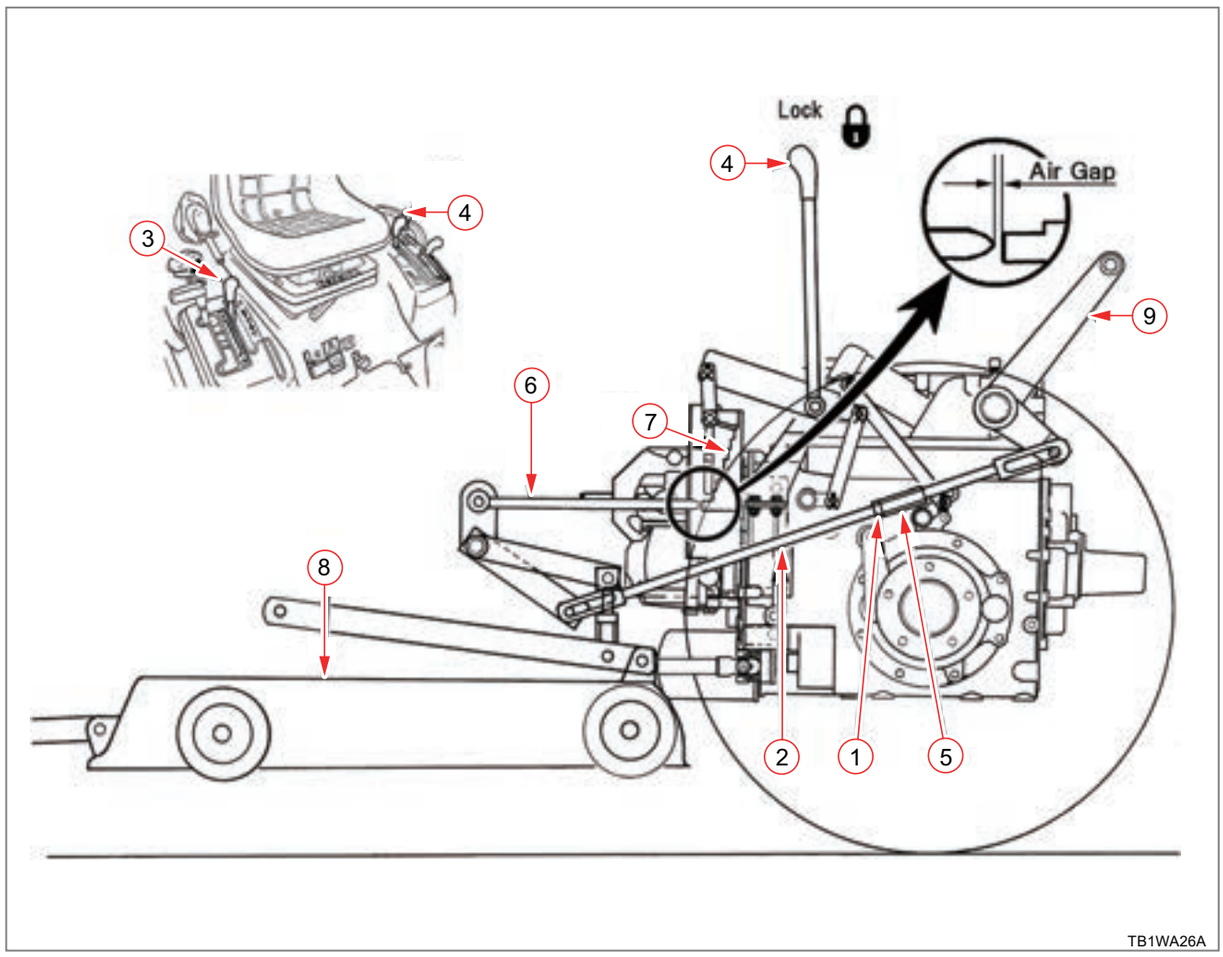
The priority spool (2) directs, regardless of engine speed, only 7 LPM of flow to modulator valve and steering. It directs the remainder of flow to the joystick valve, remote hydraulic valve and lift control valve. Therefore, steering performance and PTO clutch modulating performance are not affected by engine speed. However, the operating speed and power of front-end loader, remote hydraulics and lifting system depend on engine speed.





WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 24 2025-02-11 오후 5:20:59

2.2.8 MOWER LIFT LINKAGE



The mower deck (8) is raised to its highest position when the position control lever (3) is in the “raise” position.

When the mower cutting height lever (4) is in the “locked” position (lever fully rearward), the mower deck height is locked, and the position control system can be freely used without affecting the mower deck.

To establish a cutting height, move the cutting height control lever (4) to the desired position. This slides the stop plate (7) downward, which changes the travel limit on the deck height stop rod (6).

Note that, with the position control lever (3) still in the “raise” position, the lift arm linkage holds the mower deck at its maximum height while the cutting height adjustment is mode.

When the hydraulic control lever (1) is lowered, and the oil in the hydraulic cylinder returns to reservoir, the lift arm (9) rotates to the ‘lowered’ position, and the mower deck (8) descends until the stop rod (6) touches the stop plate (7) in its preset position.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 25 2025-02-11 오후 5:20:59

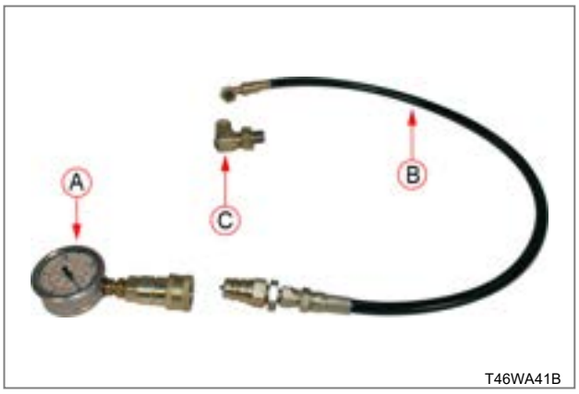
3. TROUBLESHOOTING

Problem	Possibe cause	Remedy
Implement fails to rise when lever is in raised position (or implement falls too quickly when engine is stopped)	• Relief valve setting too low • Faulty safety valve • O-ring failure on piston or on control valve connection to hydraulic cylinder case cover	• Perform system relief valve pressure test • Repair or replace safety valve • Replace seal, piston, or cylinder as required
Implement rises too slowly	• Excessive leakage past piston seal • Faulty safety valve • Faulty oil pump • Restricted filter • Defective priority valve	• Inspect cylinder and piston; Repair or replace • Repair or replace safety valve • Perform flow test and replace Pump as required • Replace filter • Repair or replace control valve
Implement will not descend when control lever is in the lowering position	• Flow control valve in closed position	• Open flow control valve
Implement does not rise to full height	• Feedback plate on the lift arm shaft out of adjustment	• Adjust feedback plate position
Oil overheats	• Faulty pump • Faulty HST • Restricted filter	• Replace pump • Replace HST • Replace filter
Relief valve operates when implement is in full raised position	• Feedback plate on the lift arm shaft out of adjustment	• Adjust feedback plate position
Oil not supplied to double acting valve(OPTIONAL)	• Poppet not installed control valve • Improper hydraulic line routing between control valve and remote valve.	• Install poppet • Check line routing according to repair manual, correct if necessary.
Low oil at double acting valve(OPTIONAL)	• Restricted hydraulic filter • Faulty hydraulic pump • Faulty male or female hydraulic coupler • Remove valve spool not moving enough for proper flow to desired port • Low hydraulic oil level in tractor reservoir	• Replace Filter • Test pump for proper flow, replace if necessary. • Check coupler for damage, replace if necessary. • Check valve linkage for wear or damage, repair as necessary • Check hydraulic oil level add oil if necessary
Low hydraulic pressure at double acting valves(OPTIONAL)	• Faulty system relief valve, located in position control valve	• Test system relief pressure setting, clean

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 26 2025-02-11 오후 5:20:59

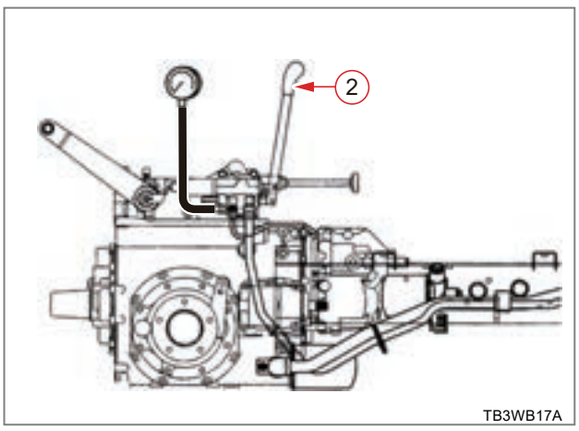
4. INSPECTION AND ADJUSTMENT

4.1 MAIN RELIEF VALVE



1. Prepare the pressure gauge (A) over 200 kgf/cm^2 (20 MPa) of measuring pressure, hydraulic hose (B) and PF1/4 connector (C).



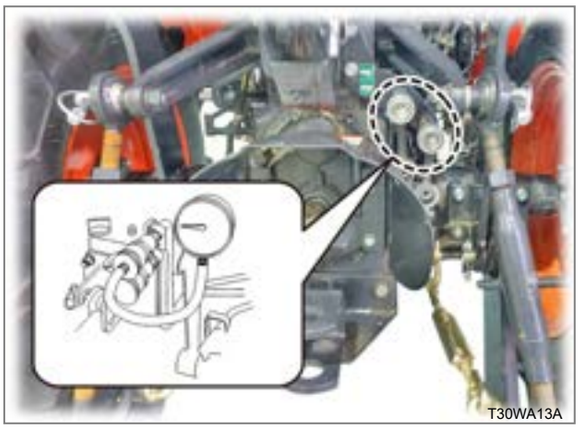


2. Disconnect the hydarulic tube (1) between the priority valve and joystick valve and install the PF 1/4 connector (C) to set the pressure gauge same before one.

4.2 AUX. DOUBLE ACTING VALVE PRESSURE (OPTIONAL REMOTE HYD.)

⚠ CAUTION

- **Check the fluid level and add it before the test. If the test is performed when the oil level is low, the hydraulic system could be damaged.**



1. Prepare the pressure gauge over 200 kgf/cm^2(20 MPa) of measuring pressure with quick coupler (male). [3/8"]
2. Set the gauge to one of the quick couplers of the rear auxiliary hydraulic port.

REMARK

- **For easy quick coupler fixing, stop the engine and move the valve control lever back and forth to eliminate the pressure in the hydraulic line.**

⚠ CAUTION

- **Make sure that the quick coupled is securely locked.**

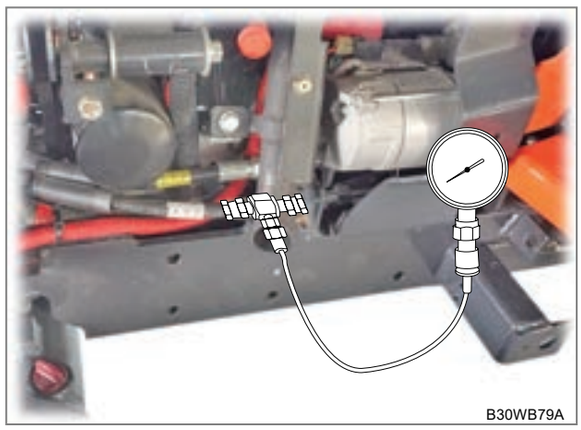
3. Set the HST, range shift to the neutral position and start the engine.
4. Run the engine at 3,000 rpm speed.
5. Operate the valve control lever and set the lever where the pointer of the gauge moves.
6. Since the main relief valve is open, measure the pressure within 20 ~ 30 seconds and return the valve control lever to the neutral position to finish the test.

   *** Specified pressure ..... 12.7 ~ 13.2 MPa**
   130 ~ 135 kgf/cm^2
   1,849 ~ 1,920 psi

   If the pressure of the main relief valve is below the specified value, improper setting of the main relief valve, damage or low efficiency of the gear pump or clogged hydraulic filter could be the causes.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 27 2025-02-11 오후 5:21:00

4.3 STEERING UNIT RELIEF VALVE


B30WB79A

1. Disconnect the steering cylinder connecting hose from the joint bracket.
2. Attach the connecting adapter (PF1/4) and connect the pressure gauge (200 kgf/cm^2 or higher) and hydraulic hose as shown in the figure.
3. Start the engine. Then, turn the steering wheel to the right and left to its full travel and check the pressure.

A. TEST CONDITION

- Engine RPM ..... 3,000 rpm
- Transmission fluid temperature ..... 45 ~ 55ºC
- Relief set pressure ..... 120 kgf/cm^2

4. If the measured value is out of the standard, adjust the relief valve of the steering unit to the specification.

REMARK

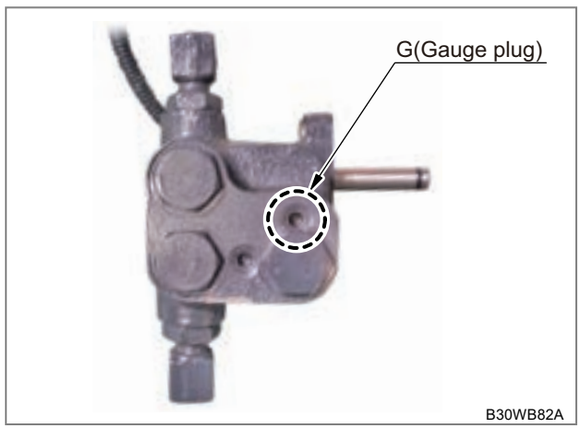
RELIEF PRESSURE ADJUSTMENT



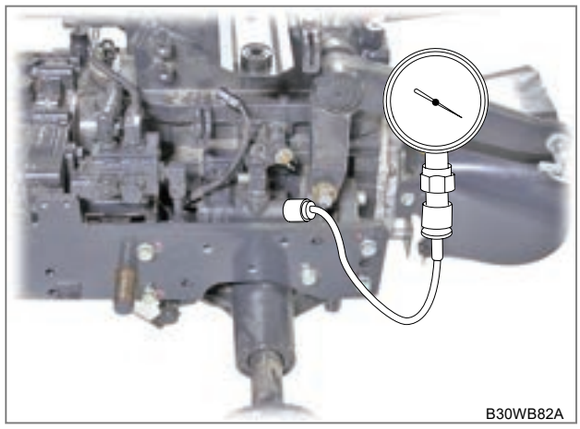
B30WB81A

- **Turn the plug (A) for setting the relief valve 90˚ and measure the steering relief pressure. Repeat this until the desired pressure is obtained.**
- **To increase the pressure, turn the plug clockwise. After setting is completed, caulk the plug so that it does not get loose.**

4.4 MODULATOR RELIEF VALVE



B30WB82A


B30WB82A

1. Unscrew the modulator valve's test port [G1(GP)] and attach the adapter (PT1/8) as shown in the figure.
2. Connect the pressure gauge (50 kgf/cm^2 or higher).
3. Start the engine and operate the switches to run the PTO. Then, check the pressure.

A. TEST CONDITION

- Engine RPM ..... 3,000 rpm
- Transmission fluid temperature ..... 45 ~ 55ºC
- Relief set pressure ..... 19 ~ 21 kgf/cm^2 (Pressure loss occurs by pipe resistance)

4. If necessary, clean or replace the sequence valve spool. (Refer to "2.2.5 Modulator valve.")

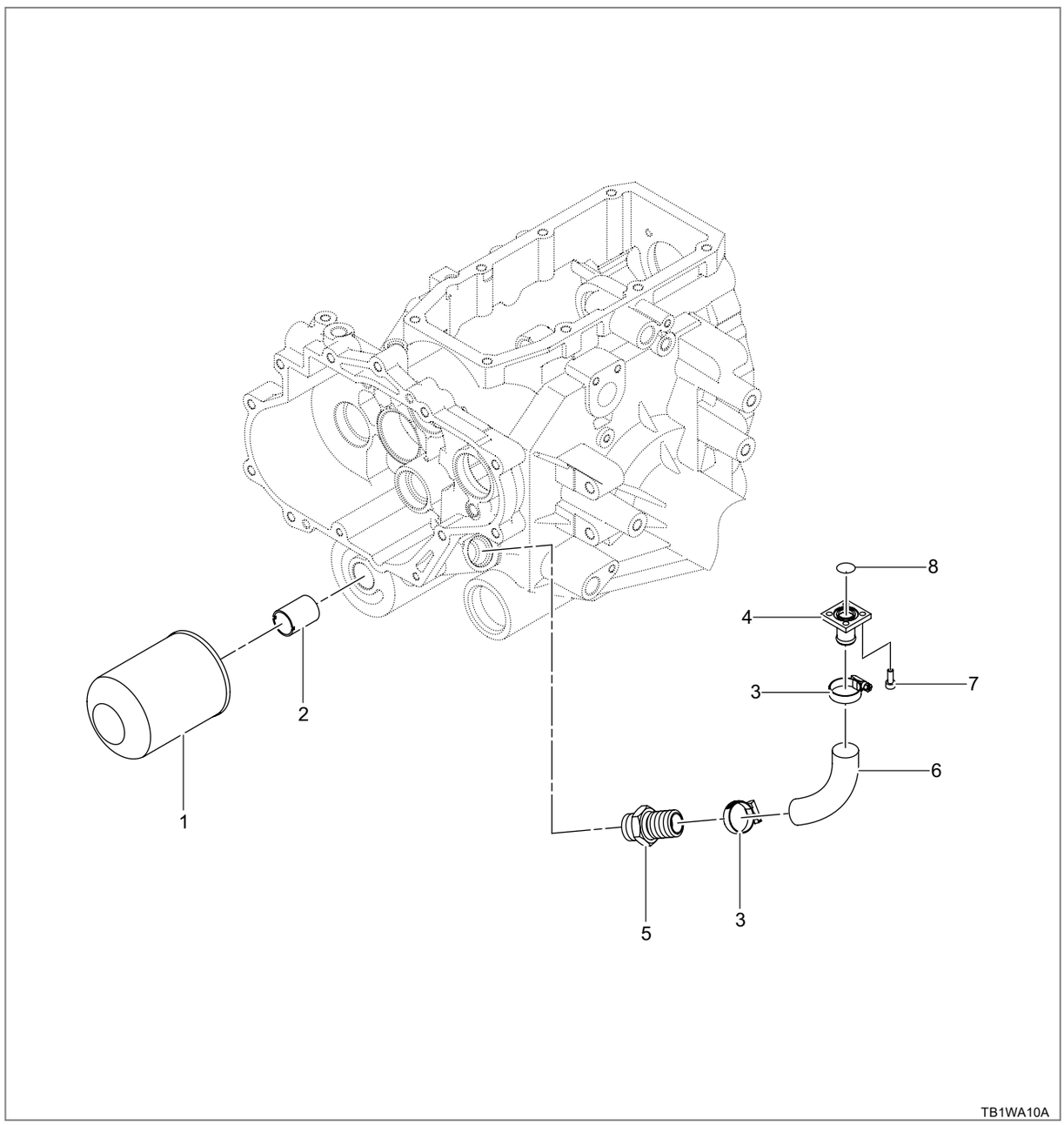
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5. EXPLODED VIEW

REMARK

The part numbers and shapes of the following components are subject to change without notice for improvement of the product. If necessary, refer to the DAEDONG electronic manual, DPCS.

5.1 TB3-G411001 SUCTION LINE



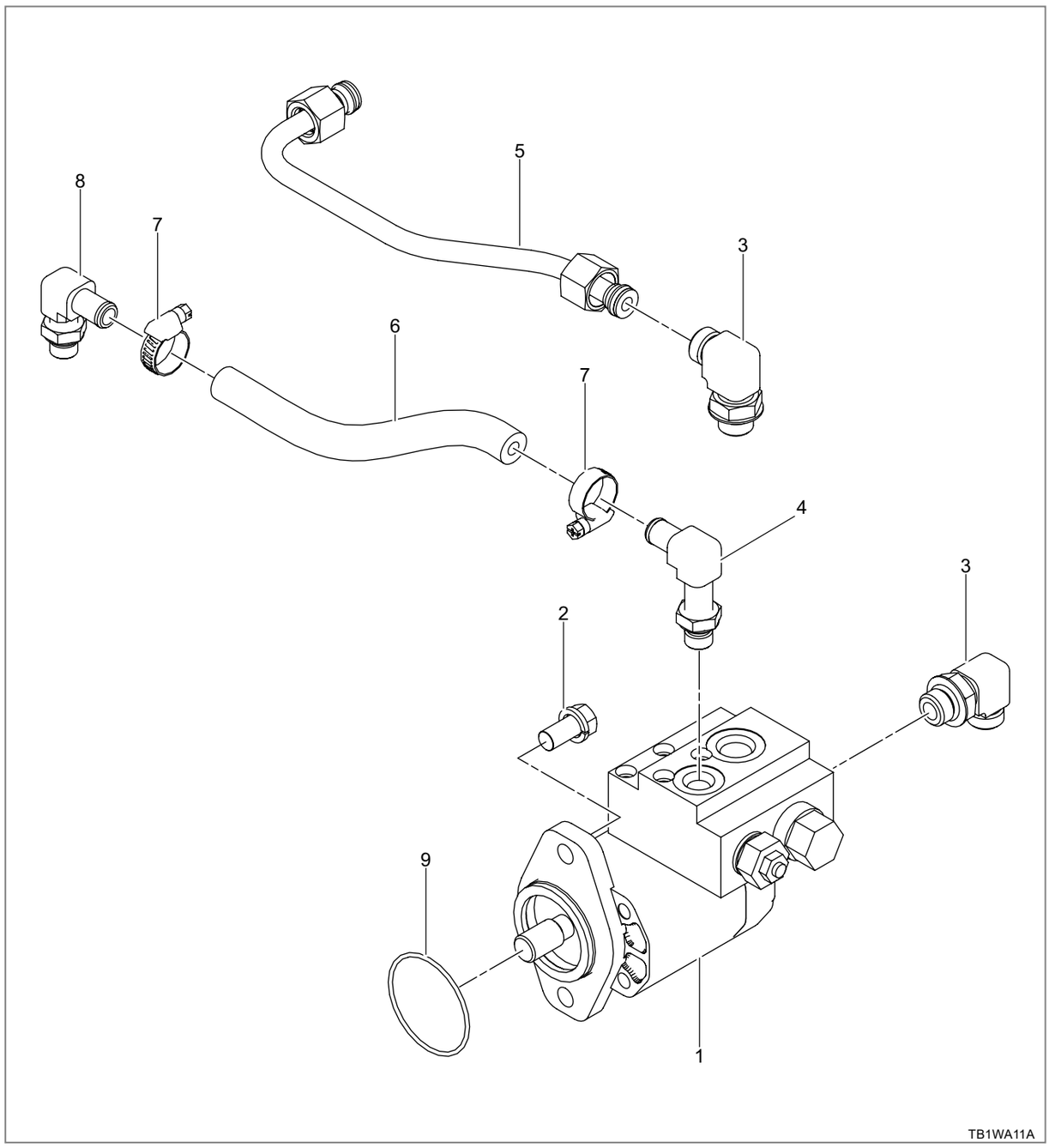
TB1WA10A

COMPONENTS

(1) Filter, Oil
(2) Connection
(3) Band, Hose
(4) Tube, Suction
(5) Adapter
(6) Hose, Suction
(7) Bolt.hexagon socket
(8) O ring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 29 2025-02-11 오후 5:21:01

5.2 TB3-G412004 GEAR PUMP

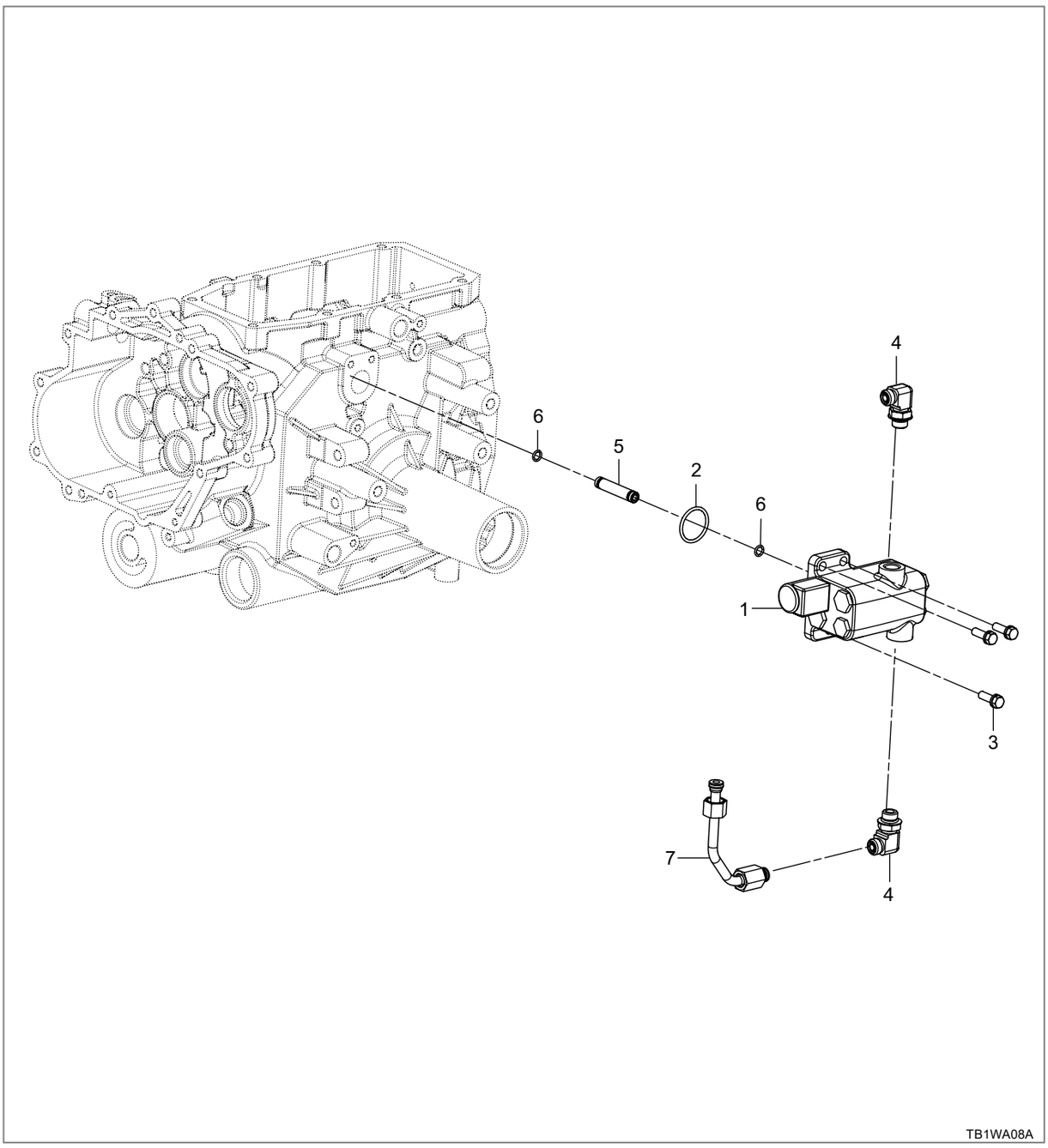


COMPONENTS

(1) Assy pump, Gear
(2) Block, Washer
(3) Elbow
(4) Elbow
(5) Tube-P
(6) Hose, Hyd-t
(7) Band, Hose
(8) Elbow
(9) O ring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 30 2025-02-11 오후 5:21:01

5.3 TB3-G421002 MODULATE VALVE

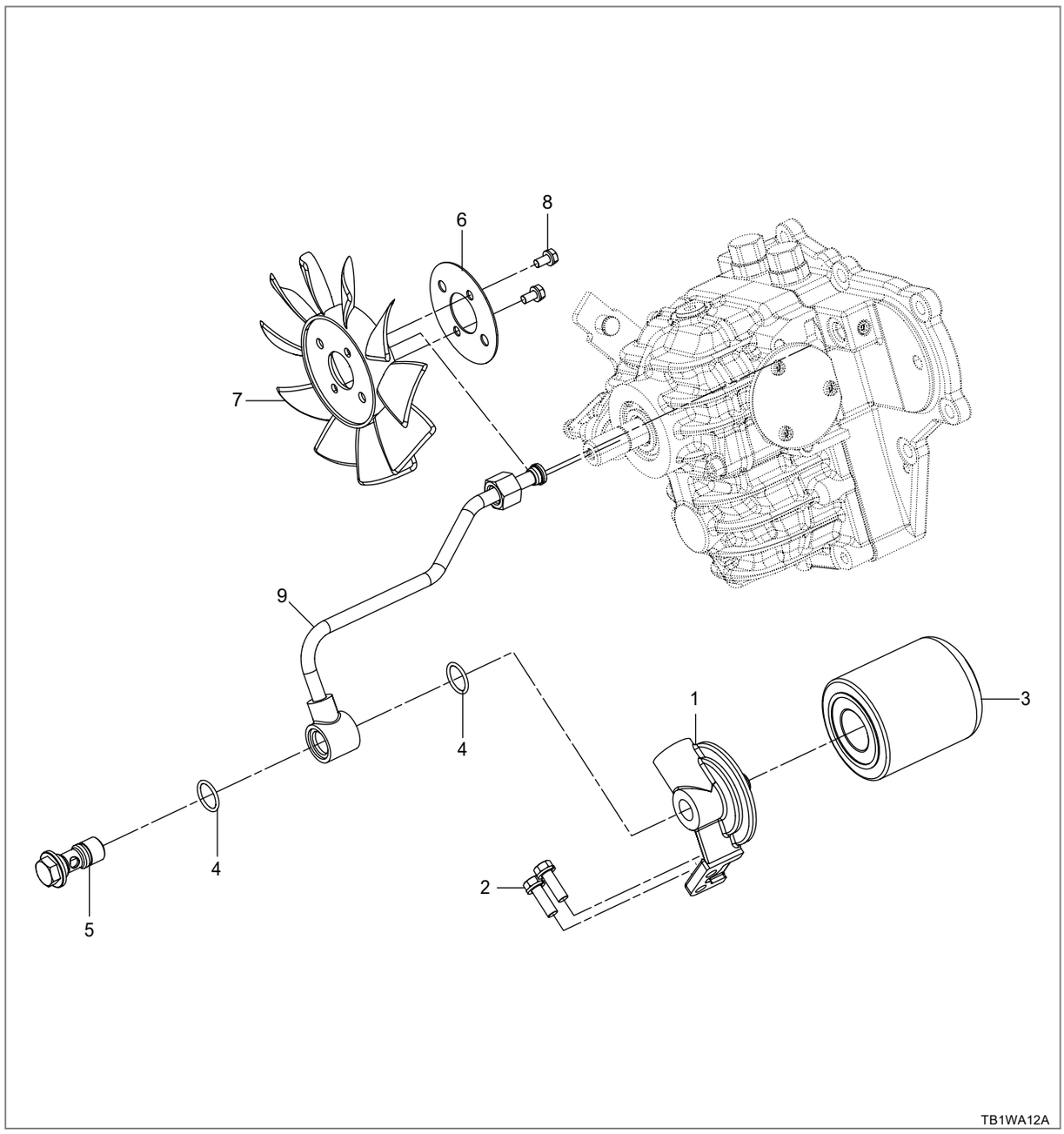


COMPONENTS

(1) Ass'y, Mod. Valve
(2) O ring
(3) Bolt, Washer
(4) Elbow
(5) Tube, Connecting
(6) O ring
(7) Tubem Hyd-PTO

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 31 2025-02-11 오후 5:21:01

5.4 TB3-G423002 HST HYDRAULIC LINE

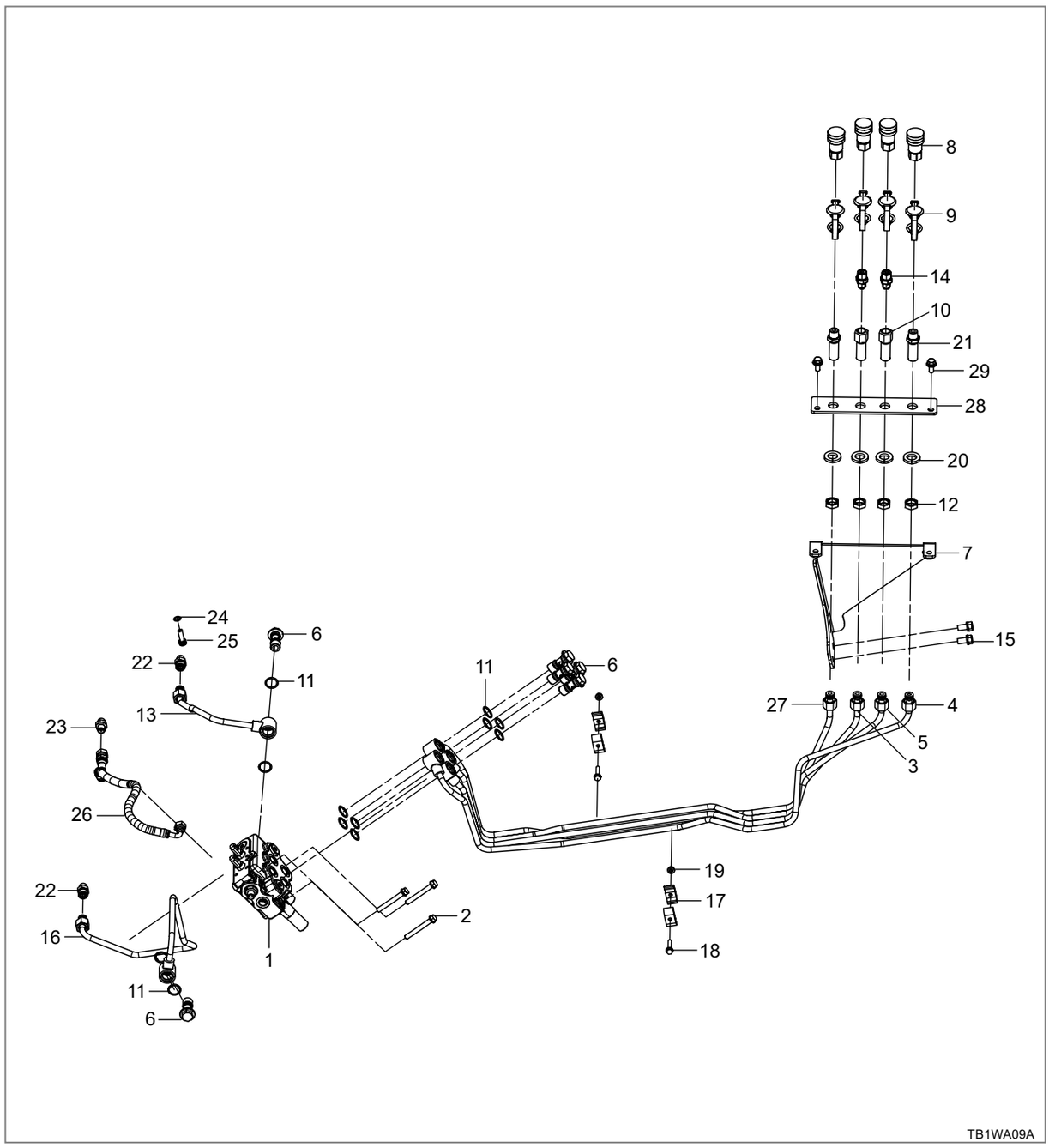


COMPONENTS

(1) Bracket; Hst filter
(2) Bolt, Washer
(3) HST filter
(4) O ring
(5) Bolt, Joint
(6) Plate
(7) Cooling fan
(8) Bolt, Washer
(9) Tube, HST charge

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 32 2025-02-11 오후 5:21:01

5.5 TB3-G441003 JOYSTICK VALVE

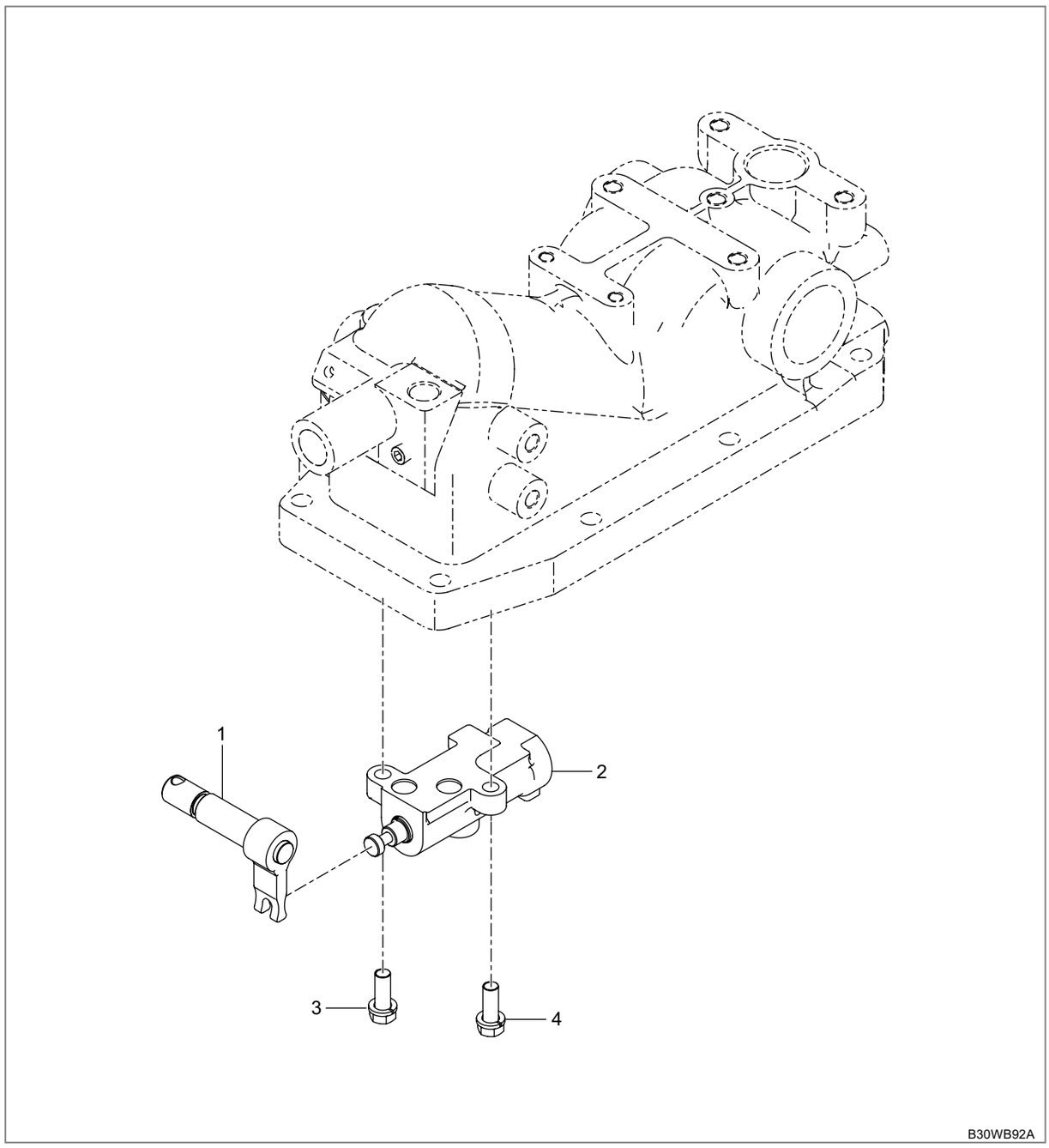


COMPONENTS

(1) Valve, Joystick
(2) Bolt, Washer
(3) Tube, External Hyd E
(4) Tube, External Hyd F
(5) Tube, External Hyd G
(6) Joint Bolt
(7) Support, Socket
(8) Coupler, Quick-PT3/8
(9) Cap, Coupler socket-3/8
(10) Connection
(12) Nut
(13) Tube, Hyd-J1
(14) Connection
(15) Bolt, Washer
(16) Tube, Hyd-JT
(17) Holder, Tube
(18) Flange bolt
(19) Nut, Flange
(20) Washer, Spring
(21) Connector
(22) Connector
(23) Tube, Connecting
(24) O ring
(25) Valve
(26) Tube, Hyd-j2
(27) Tube, External Hyd-H
(28) Plate
(29) Bolt, Washer

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 33 2025-02-11 오후 5:21:01

5.6 TB3-G461001 LIFT CONTROL VALVE

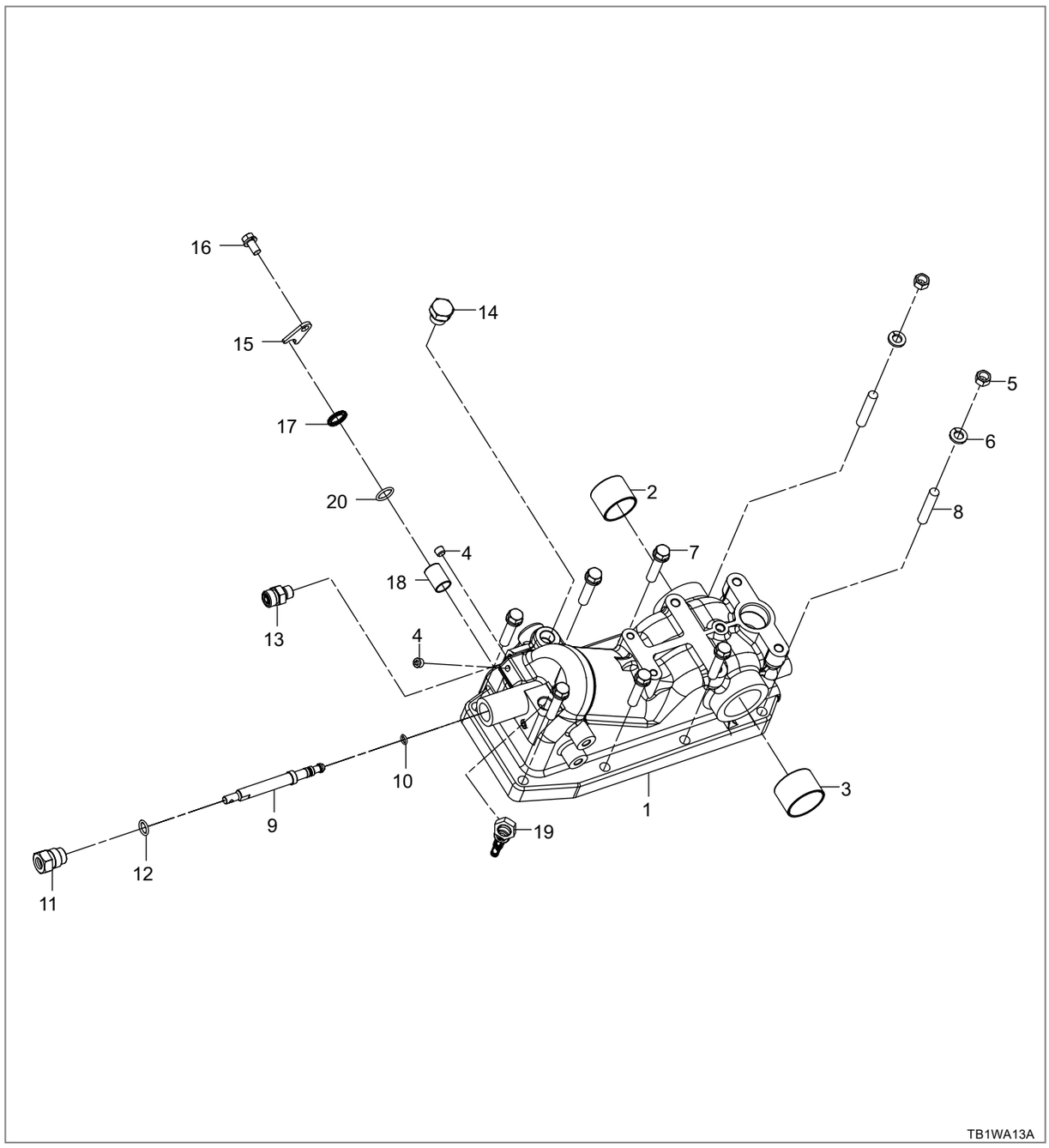


COMPONENTS

(1) Arm, Control position lever
(2) Valve, Control lift
(3) Bolt, Washer
(4) Bolt, Washer

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 34 2025-02-11 오후 5:21:02

5.7 TB3-G463004 HYDRAULIC CYLINDER

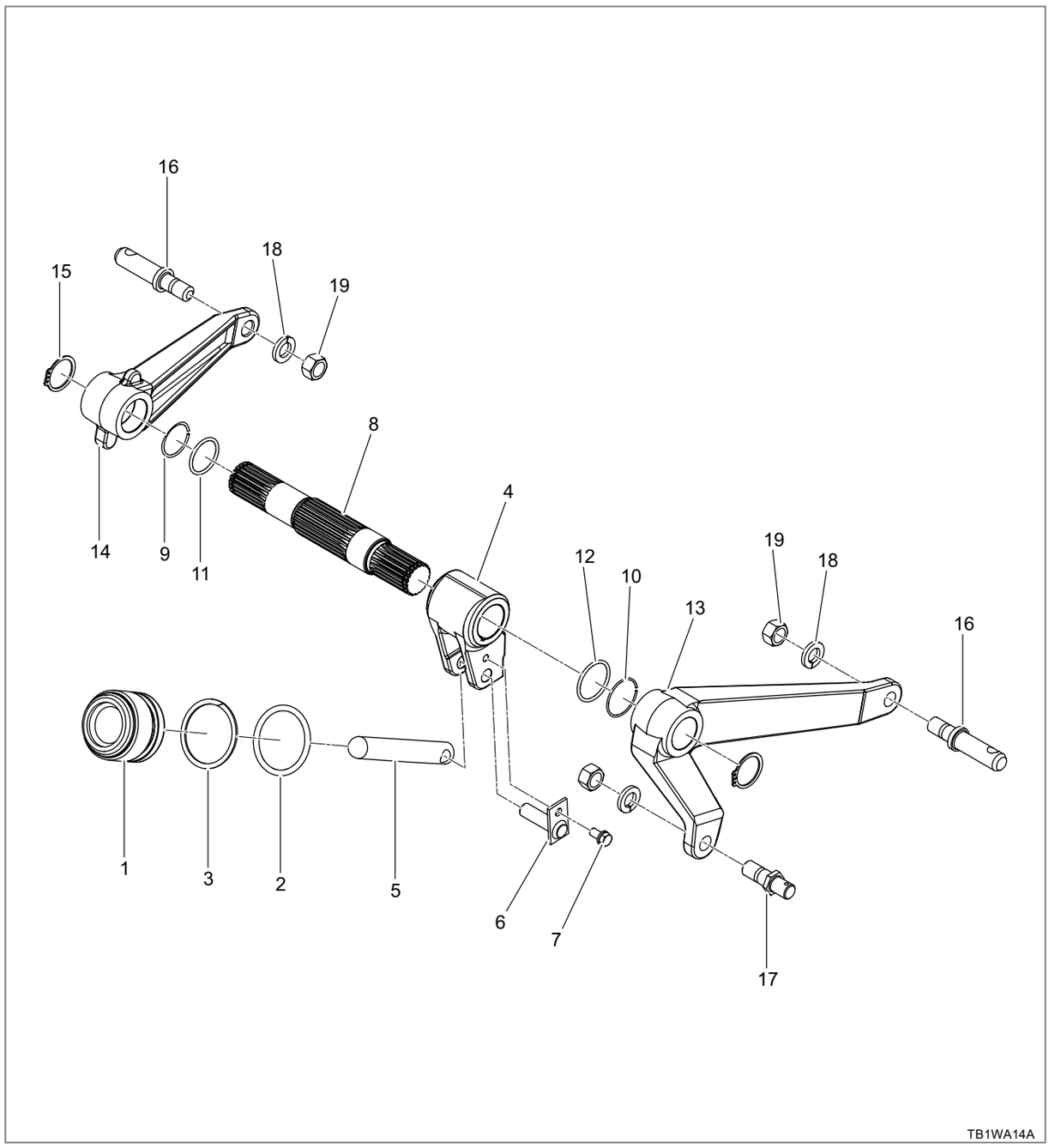


COMPONENTS

(1) Body, Hyd Cyl
(2) Bush
(3) Bush, Du
(4) Plug
(5) Nutv
(6) Washer, Spring
(7) Bolt, Washer
(8) Stud
(9) Valve, Flow control
(10) O ring
(11) Guide
(12) O ring
(13) Connector
(14) Plug
(15) Plate, Fixing draft
(16) Bolt, Washer
(17) Seal, Oil
(18) Bush
(19) Valve, Check
(20) O ring

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 35 2025-02-11 오후 5:21:02

5.8 TB3-G463502 LIFT CYLINDER



COMPONENTS

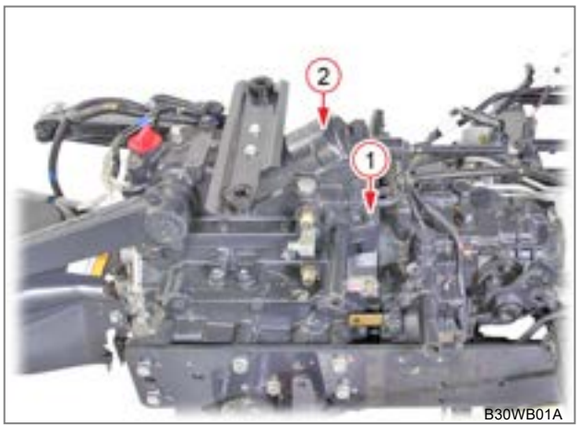
(1) Piston
(2) O ring
(3) Back-up ring
(4) Crank
(5) Connecting rod
(6) Pin
(7) Bolt, Washer
(8) Shaft Hyd arm
(9) Friction spring
(10) Friction spring
(11) O ring
(12) O ring
(13) Arm-Lift (L)
(14) Arm-Lift (R)
(15) Snap ring
(16) Pin
(17) Pin
(18) Washer, Spring
(19) Nut

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 36 2025-02-11 오후 5:21:02

6. SERVICING

6.1 HYDRAULIC CYLINDER REMOVAL & DISASSEMBLY

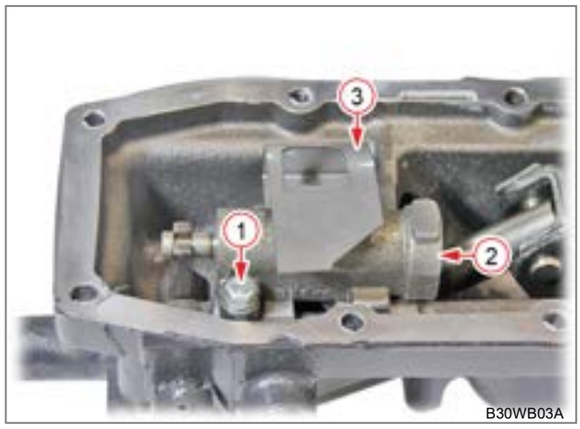
1. Park the tractor on firm level ground, stop the engine and apply the parking brake.
2. Open the hood and disconnect the negative battery cable.
3. Remove the Cabin, fuel tank and 3-point link.
4. Disconnect all links, wirings and hydraulic pipes around the hydraulic cylinder case. (For detailed disassembly procedures, refer to the instructions for transmission disassembly in chapter 4.)



B30WB01A

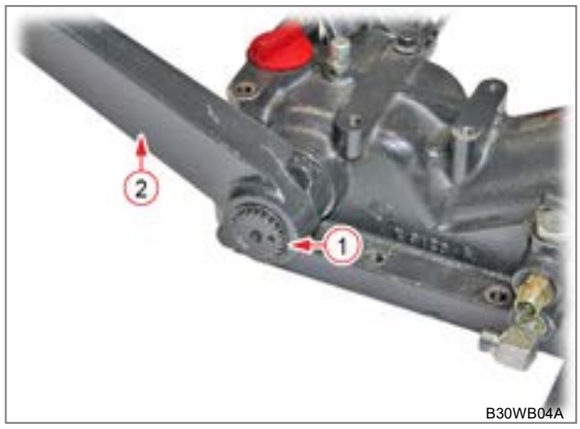

B30WB02A

5. Unscrew the hydraulic cylinder case mounting bolts (1) and nuts to remove the hydraulic cylinder case assembly (2) with a hoist.



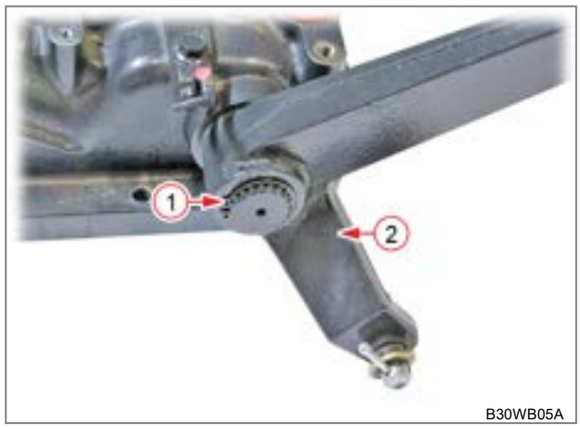
B30WB03A

6. Unscrew the control valve mounting bolt (1) from the hydraulic cylinder case to remove the control valve assembly (2) and cover (3).



B30WB04A

7. Remove the snap ring (1) from the side of the lift arm and disconnect the lift arm (RH) (2).



B30WB05A

8. Remove the snap ring (1) on the other side and disconnect the lift arm (LH) (2).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 37 2025-02-11 오후 5:21:02



9. Tap the hydraulic arm shaft (1) with a rubber hammer in the arrow direction to remove it from the hydraulic cylinder case.



10. Unscrew the pin mounting bolt (1) to remove the hydraulic arm (2) and hydraulic rod (3).

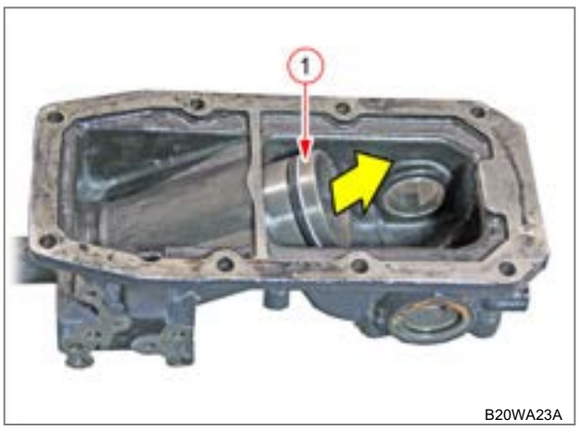
IMPORTANT



- **During reinstallation, align the marks on the hydraulic arm and hydraulic arm shaft.**

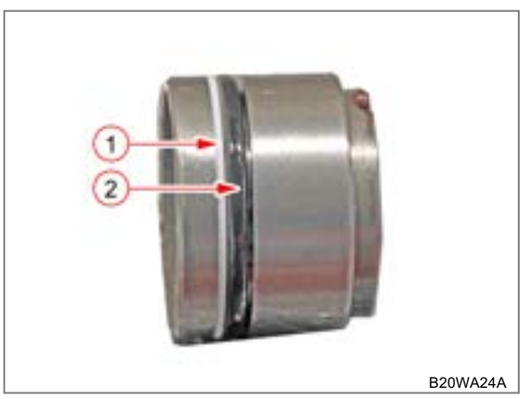


11. Remove the flow control valve.



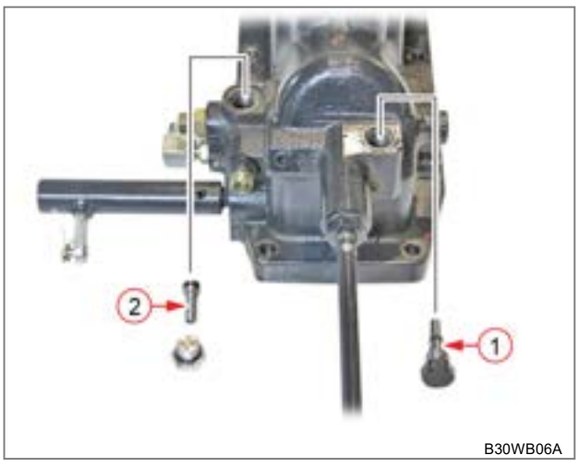
12. Remove the piston (1) from the hydraulic cylinder case.

REMARK



- **Check the condition of the backup ring (1) and O-ring (2) of the piston. If any of them is faulty, replace it with a new one.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 38 2025-02-11 오후 5:21:03

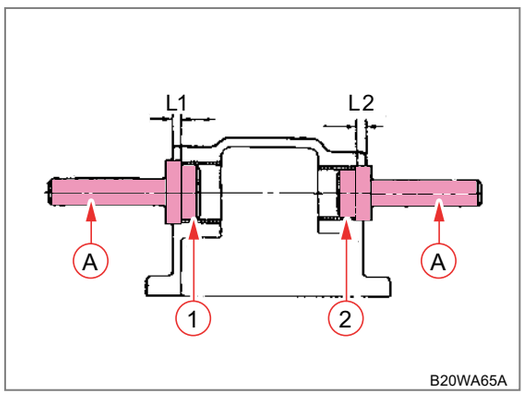


13. Remove the check valve (1) and safety valve (2).



14. Assemble in the reverse order of disassembly.

REMARK



- **When pressing in the hydraulic arm shaft bushings (1 & 2), make sure to use their installation tool (A). Also, apply a proper amount of grease to the inner side of the bushings.**
- **Bushing installation distance**
  L1 = 6.0 mm(0.236 in.)
  L2 = 6.5 mm(0.256 in.)

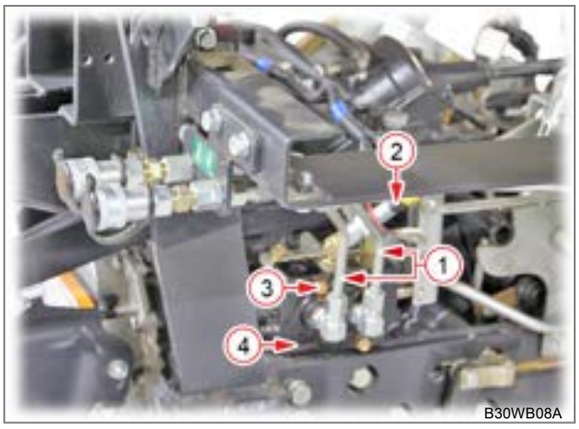
REMARK

- **When reinstalling the hydraulic cylinder, apply a proper amount of grease to splines and O-rings of the hydraulic arm, hydraulic arm shaft and lift arm.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 39 2025-02-11 오후 5:21:03

6.2 DOUBLE ACTING VALVE (OPTIONAL) REMOVAL DISASSEMBLY

1. Remove the seat, from the vehicle. (Refer to the instructions for transmission disassembly in chapter 5.)



B30WB08A

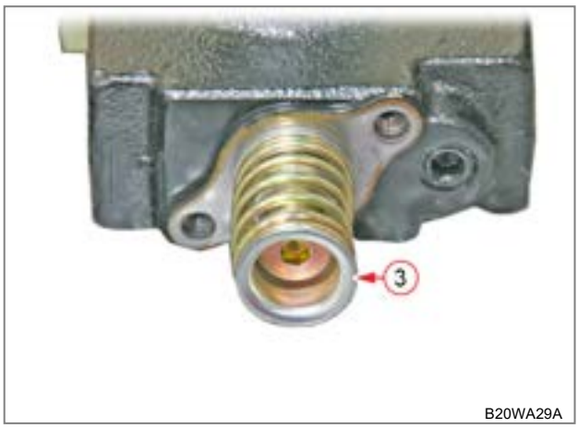

B30WB09A

2. Disconnect the hydraulic pipe (1) and hydraulic hose (2) of the double acting valve. Then, unscrew the mounting bolts (3) to remove the double acting valve (4).



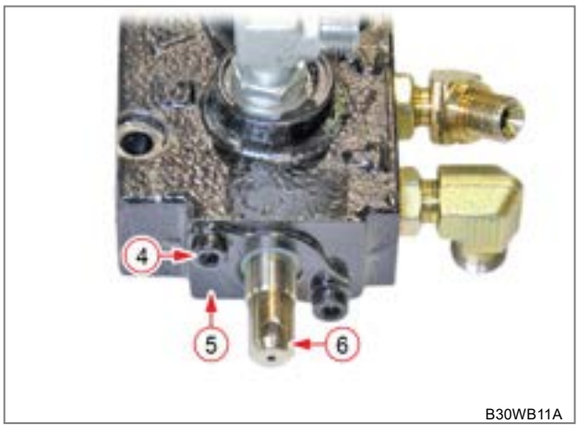
B30WB10A

3. Unscrew the mounting bolts (1) on the side of the cover to remove the cover (2).



B20WA29A

4. Remove the spring (3).

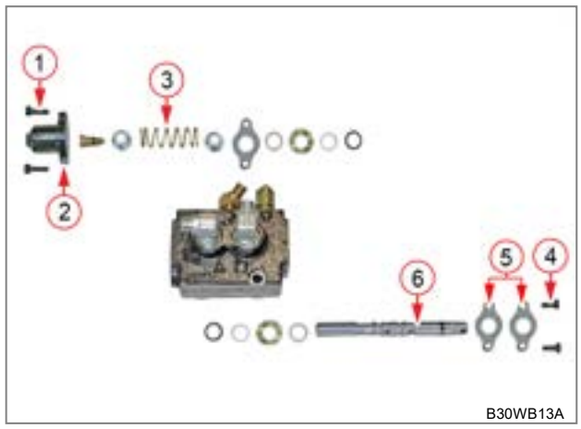


B30WB11A


B30WB12A

5. Unscrew the spool valve holder bolts (4) and remove the holder (5). Then, pull out the spool (6).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 40 2025-02-11 오후 5:21:03

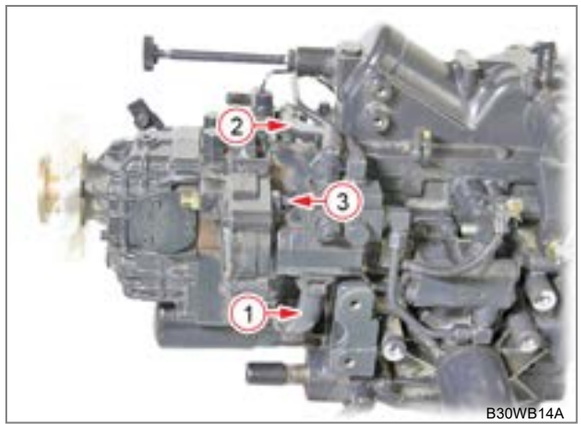


B30WB13A

6. Assemble in the reverse order of disassembly.

6.3 GEAR PUMP DISASSEMBLY (WITH PRIORITY VALVE)

1. Remove the transmission assembly.



B30WB14A


B30WB15A

2. Disconnect the suction hose (1) and discharge hose (2) from the gear pump and unscrew the gear pump mounting bolts (3) to remove the gear pump and valve block.

Mounting bolt
Tightening torque .....23.5 ~ 27.4 Nm
2.4 ~ 2.8 kgf-m
17.3 ~ 20.2 lb-ft

REMARK

- **Place an oil container to collect leaking oil.**

REMARK

- **Elbow**
  Tightening torque .....44.1 ~ 53.9 Nm
  4.5 ~ 5.5 kgf-m
  32.4 ~ 39.6 lb-ft
- **Hydraulic hose nut**
  Tightening torque .....44.1 ~ 53.9 Nm
  4.5 ~ 5.5 kgf-m
  32.4 ~ 39.6 lb-ft

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 41 2025-02-11 오후 5:21:03





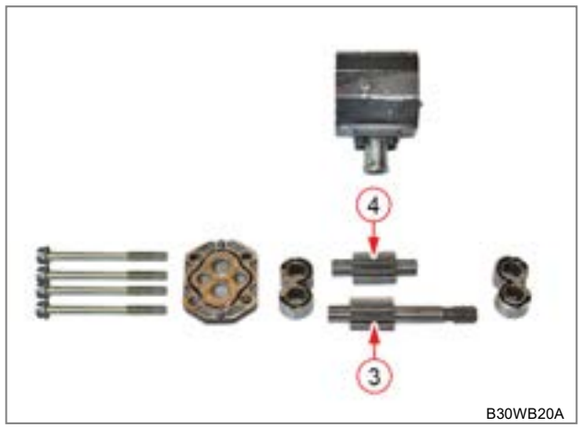




3. Remove the valve block (1) from the gear pmp.

4. Unscrew the end cover mounting bolts (1) from the rear of the gear pump to remove the end cover (2).

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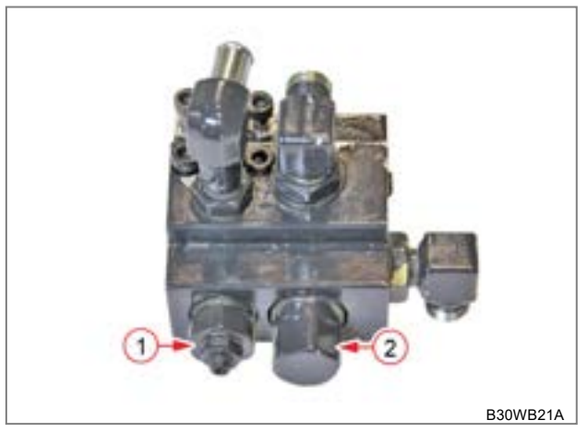


5. Remove the drive gear (3) and driven gear (4) from the gear pump housing.

IMPORTANT

- **Make sure to install the gear pump cover in the correct orientation.**

PRIORITY VALVE DISASSEMBLY





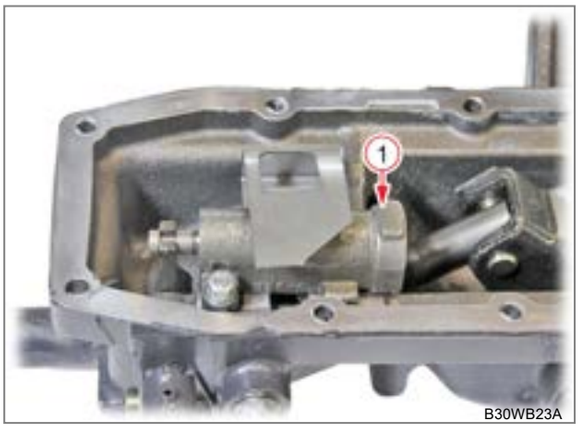
1. Remove the relief valve (1) and priority valve (2).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 43 2025-02-11 오후 5:21:04

6.4 LIFT CONTROL VALVE DISASSEMBLY

1. Remove the cabin from the vehicle. (Refer to the instructions for transmission disassembly in chapter 5.)
2. Remove the hydraulic cylinder case.


B30WB02A



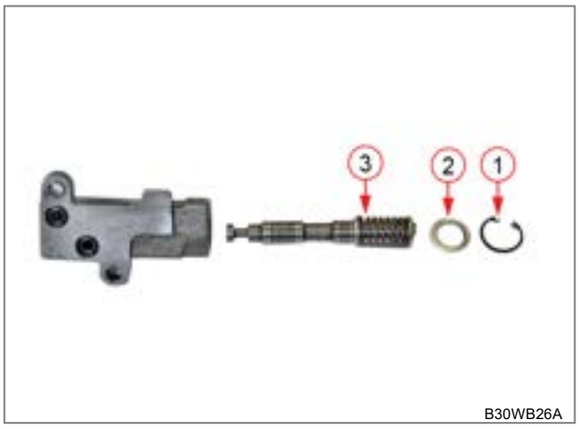
B30WB23A


B30WB24A

3. Remove the lift control valve (1) in the hydraulic cylinder.



B30WB25A

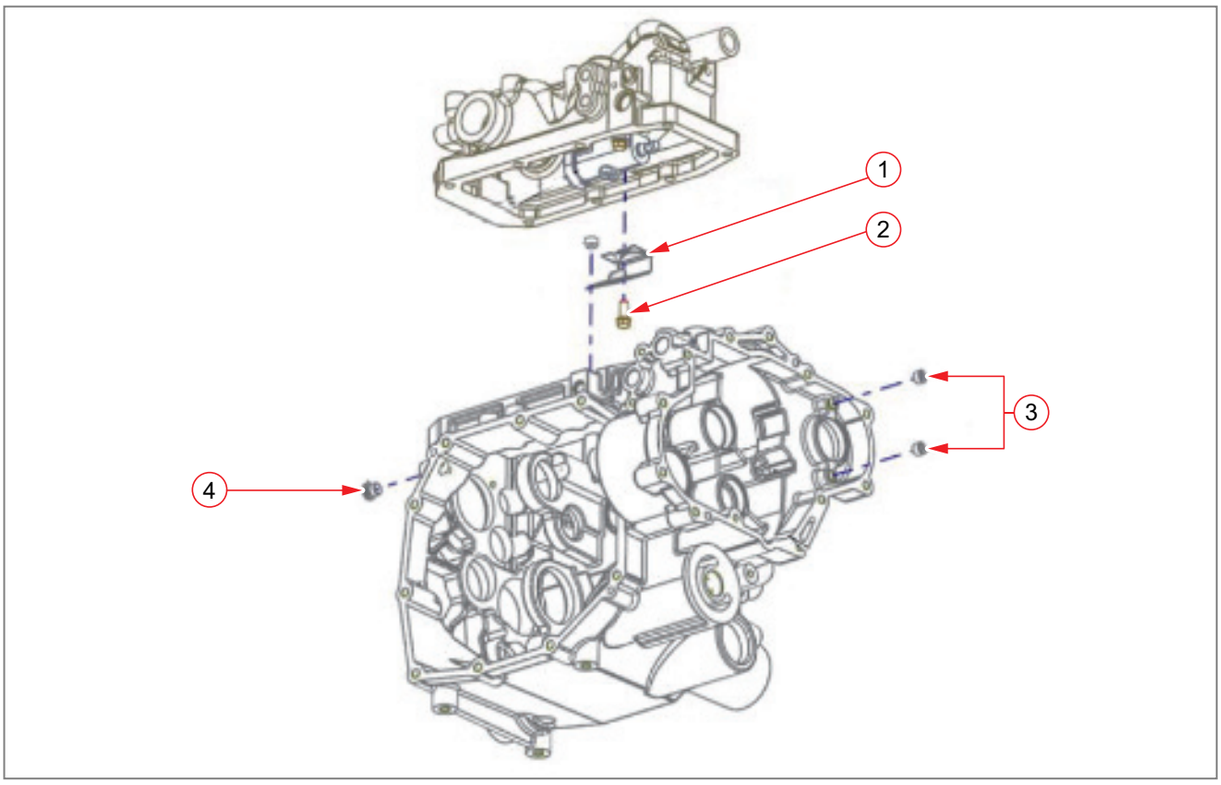


B30WB26A

4. Pull out the snap ring (1) from the valve body and remove the washer (2) and spool (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 44 2025-02-11 오후 5:21:04

6.5 LIFT CYLINDER ASS'Y AND TRANSMISSION CASE ASSEMBLY TIPS



TB1W413A

(1) Plate
(2) Washer bolt
(3) PT1/4 plug
(4) PF3/8 plug(1/2)ft

1. When assembling the plate (1), remove the washer bolt (2) of the lifting control valve, insert the plate (1) in the same position, apply thread glue to the washer bolt, and then reassemble. Otherwise, it may cause loosening or malfunction.

   Thread glue: LOCTITE 271 or equivalent

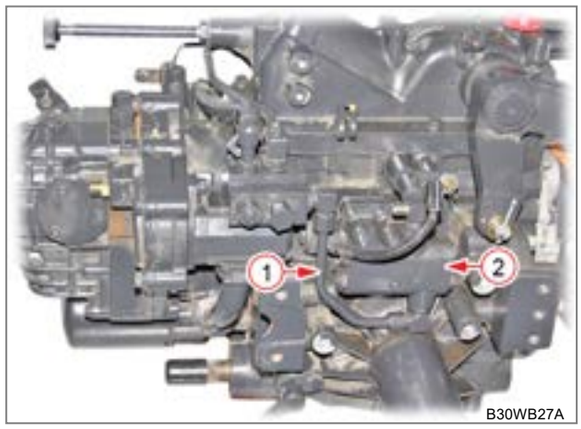
   M8 bolt tightening torque : 23.5~27.5 Nm (2.4~2.8kgf.m, 17.4~20.1 lb.ft)
2. When assembling the PT1/4 plug (3), wrap sealing tape or apply sealant before assembling. Otherwise, it may cause oil leak.

   Sealant : LOCTITE 572 or equivalent
3. When assembling the PF3/8 plug (4), grease the O-ring and assemble it carefully to avoid damage. Otherwise, it may cause oil leak.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 45 2025-02-11 오후 5:21:04

6.6 MODULATOR VALVE DISASSEMBLY

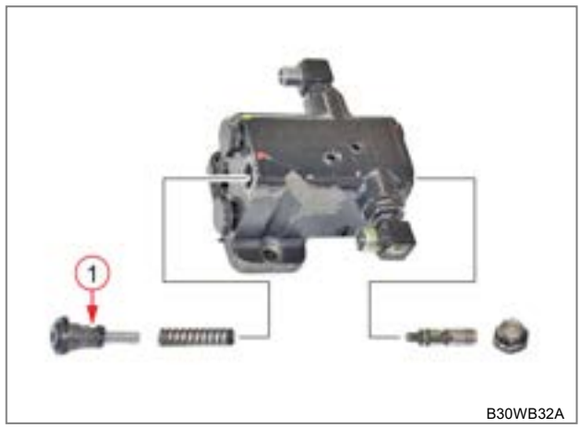
1. Remove the transmission assembly.



B30WB27A

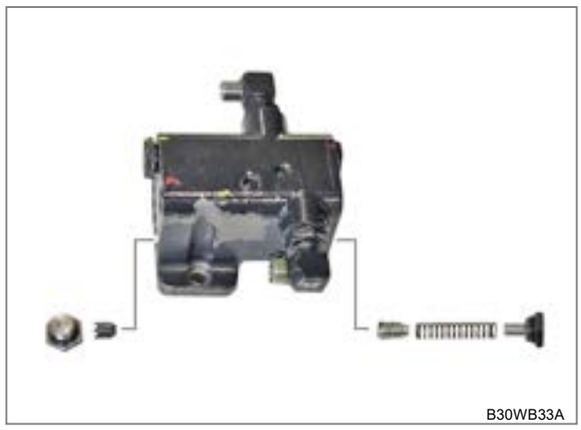

B30WB28A

2. Disconnect the hydraulic pipe (1) from the modulator valve to remove the modulator valve (2).

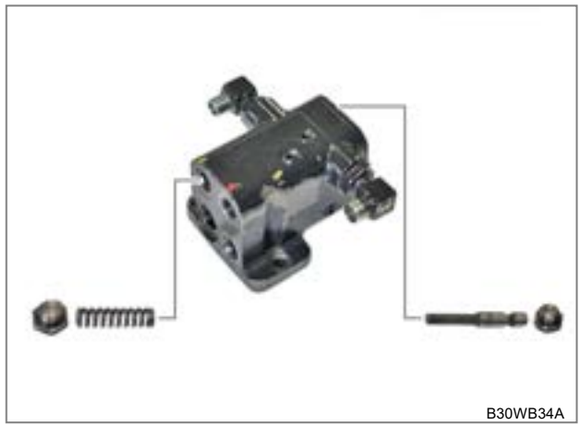


B30WB32A

3. Remove the relief valve (1).


B30WB33A

4. Remove the orifice check valve.

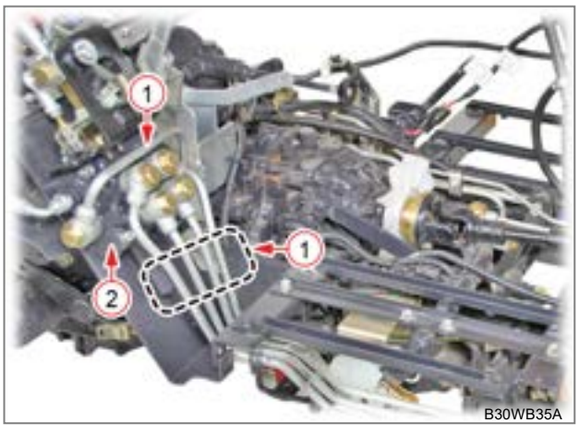

B30WB34A

5. Remove the sequence valve.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 46 2025-02-11 오후 5:21:05

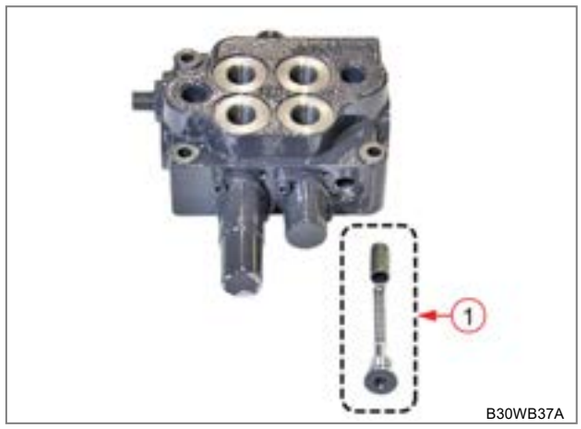
6.7 JOYSTICK VALVE REMOVAL & DISASSEMBLY

1. Remove the fender.

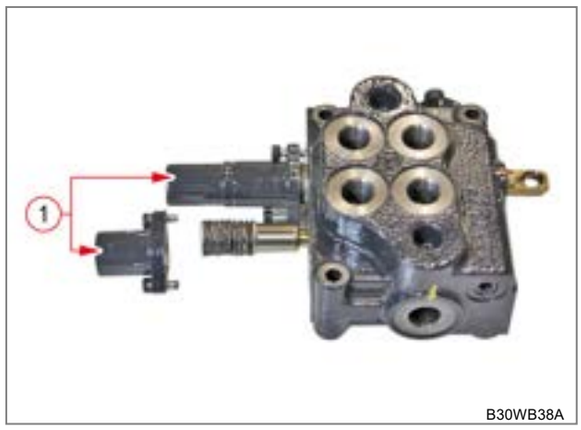




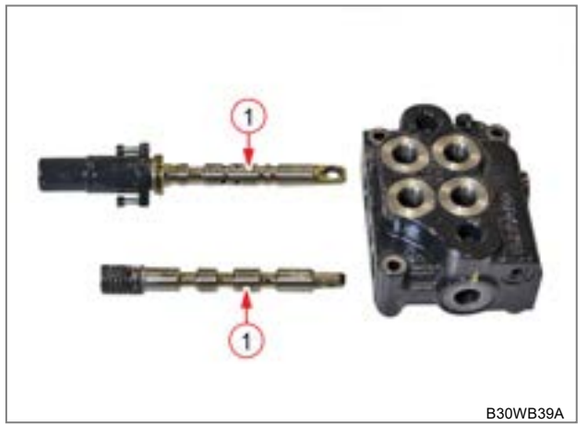
2. Disconnect all hydraulic pipes (1) from the joystick valve to remove the joystick valve (2).



3. Remove the check valve (1).



4. Unscrew the bolts and remove the cover (1).



5. Remove the spool (1).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_10_유압장치.indd 47 2025-02-11 오후 5:21:05

MEMO



KIOTI

CS2530CH
CS2530CH-EU

ELECTRIC SYSTEM

CHAPTER 11

TABLE OF CONTENTS

1. SPECIFICATIONS 11-3

2. WIRING IDENTIFICATION 11-4

2.1 Wiring color identification 11-4
2.2 Cross sectional area of wiring 11-5
2.3 Symbols for electric components 11-5

3. GENERAL INFORMATION 11-7

3.1 Location of sensors and electric components 11-7
3.2 Overall circuit diagram 11-9

4. OPERATING PRINCIPLE 11-11

4.1 Start and stop 11-11
4.1.1 Key Stop (Battery direct) 11-12
4.1.2 ACC 11-14
4.1.3 Key on (M) 11-15
4.1.4 Manual glow (G) 11-16
4.1.5 Automatic pre-heating 11-17
4.1.6 Key Start (ST) 11-18
4.1.7 Start motor 11-20
4.1.8 Engine stop solenoid 11-21
4.2 Cluster 11-23
4.2.1 Lay-out of cluster assembly 11-23
4.2.2 Lay-out of connectors 11-27
4.2.3 Operating details for each pin 11-29
4.2.4 Symbols (ISO 7000 Graphical Symbol, DAEDONG Symbol) 11-33
4.2.5 Other specs 11-34
4.2.6 OPC (Operator Presence Control) 11-35
4.2.7 Pre-heating 11-37
4.2.8 Buzzer 11-38
4.2.9 Gauges 11-39
4.2.10 LCD display 11-42
4.2.11 Operation detail of LCD 11-43
4.2.12 Warning POP-UP 11-45
4.2.13 Welcoming / Closing 11-46
4.2.14 TMS communication status 11-46
4.2.15 CAN communication 11-47
4.2.16 DTC 11-48
4.3 Charging system 11-49
4.4 PTO system 11-52
4.5 Cruise control 11-54
4.6 Flasher unit 11-56
4.6.1 Turn signal lamp with flasher unit 11-56
4.6.2 Flasher lights 11-58
4.6.3 Sequence lights with flasher unit 11-59
4.6.4 CAN communication with flasher unit 11-60
4.7 Combination switch 11-61
4.7.1 Horn 11-61
4.7.2 Turn signa 11-61
4.7.3 Head lights low beam 11-62
4.7.4 Other lights(Tail/Side/Number plate/7 pin socket/AC controller light 11-64
4.7.5 Head light High beam 11-66
4.8 Wipers and washer pumps 11-68
4.8.1 Front wiper 11-68
4.8.2 Rear wiper 11-71
4.8.3 Front windshield washer pump 11-73
4.8.4 Rear windshield washer pump 11-74
4.9 Defogger 11-75

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 1 2025-04-08 오전 9:40:46

TABLE OF CONTENTS

4.10 Front work lights 11-77
4.11 Beacon 11-79
4.12 Air conditioner 11-80
4.12.1 Condenser 11-80
4.12.2 AC Controller 11-82
4.12.3 AC controller light 11-82
4.13 Telematics unit (TMU) 11-83
4.14 3rd function valve 11-84
4.15 Stereo /AUX AMP/USB charger 11-85
4.15.1 AUX-AMP_USB charger unit ... 11-87
4.16 Stereo (optional) 11-88
4.17 Brake lights/LED on the cluster 11-90
4.18 7 Pin socket 11-91
4.19 Courtesy light 11-92
4.20 Sensors and switches 11-93
4.20.1 Rear PTO lever switch 11-95
4.20.2 Neutral switch 11-95
4.20.3 Mid PTO lever switch 11-96
4.20.4 Parking lever switch 11-96
4.20.5 Fuel sender 11-96
4.20.6 Coolant temperature sensor 11-96
4.20.7 Engine oil pressure sensor 11-97
4.20.8 Seat switch 11-97
4.20.9 PTO control switch 11-98
4.20.10 Hour meter 11-98
4.20.11 Water in fuel sensor 11-98
4.21 Rear camera (option) 11-99
4.22 Power outlet 11-100
4.23 Main Fuse (Slow-blow fuse) 11-101
4.24 Power Fuse 11-101
4.25 Glow Plug 11-102
4.26 Fuel Sender 11-103
4.27 Alternator 11-103

5. TROUBLESHOOTING 11-104

6. WIRING HARNESS ASSEMBLY TIPS 11-107
6.1 Cluster assembly tips 11-107
6.2 Head light assembly tips 11-107
6.3 Engine wire harness assembly tip 11-108

7. WIRING HARNESSES ROUTING AND WIRE DRAWING 11-109
7.1 Overall wire harness routing 11-109
7.2 Head light wire and engine wire routing... 11-110
7.3 Main wire harness routing 11-112
7.4 Cabin wire harness routing 11-115
7.5 Panel wire harness routing 11-119
7.6 Frame wire harness drawing 11-122
7.7 Fender wire(L) drawing 11-123
7.8 Fender wire(R) drawing 11-124

8. EXPLODED VIEW 11-125
8.1 TB3-G513507 Battery 11-125
8.2 TB3-G514503 Glow control 11-126
8.3 TB3-G515007 Start control 11-127
8.4 TB3-G525005 Light control 11-128
8.5 TB3-G527002 Power socket 11-129
8.6 TB3-G531018 Wire harness 11-130
8.7 TB3-G531301 Cabin wire harness 11-131
8.8 TB3-G532502 Head lamp wire harness... 11-132
8.9 TB3-G533009 Display control 11-133
8.10 TB3-G533501 Fuel sender 11-134
8.11 TB3-G534003 PTO control 11-135
8.12 TB3-G534501 Horn 11-136
8.13 TB3-G537701 Speaker antenna 11-137
8.14 TB3-G538001 Stereo 11-138
8.15 TB3-G538201 Wiper(front) control 11-139
8.16 TB3-G539601 Telematics 11-140
8.17 TB3-G539701 Rear glass defogger... 11-141
8.18 TB3-G539903 HST cruise 11-142

1. SPECIFICATIONS

ITEM		SPECIFICATIONS	LOCATION
Battery		US MODEL : 12V 55Ah EU MODEL : 12V 45Ah	
Main Fuse		60A	
Power Fuse		40A	
Main Fuse Box 1,2	Flasher	15A	Flasher unit pin #1, Hazard SW
	Horn	5A	Horn
	Safety	10A	13: Seat SW, PTO SW, Brake SW 13J: Parking SW
	Engine	25A	14: Pull coil relay 14A: Alternator
	Combi-lamp	20A	Combi SW, Twin relay, Flasher unit dial 2
	Cluster	15A	16: Cluster_A14 16A: Hour meter, TMU_Pin#6
	Cruise	10A	Cruise SW, Cruise relay
	Customer	10A	3rd function valve
	Stereo-back up	10A	Stereo
	Working lamp	20A	Work lamp relay, Work lamp SW
	Defogger	25A	Defogger relay
	AC power	25A	AC Controller
	Beacon lamp	20A	Beacon SW/Relay
	Power socket	20A	Power socket
	Condenser	15A	AC Controller 27A: Condenser relay
	Wiper	15A	Wiper 15A washer pump, Wiper motor, Wiper SW
	Aux-stereo	10A	Stereo-AUX SW
	USB socket	5A	USB-socket 5A, AUX_AMP, USB charger_Pin#12
AC Compressor		12V, 6 Cylinder, 48W Lubrication: PAG oil 120cm^2	In the engine room

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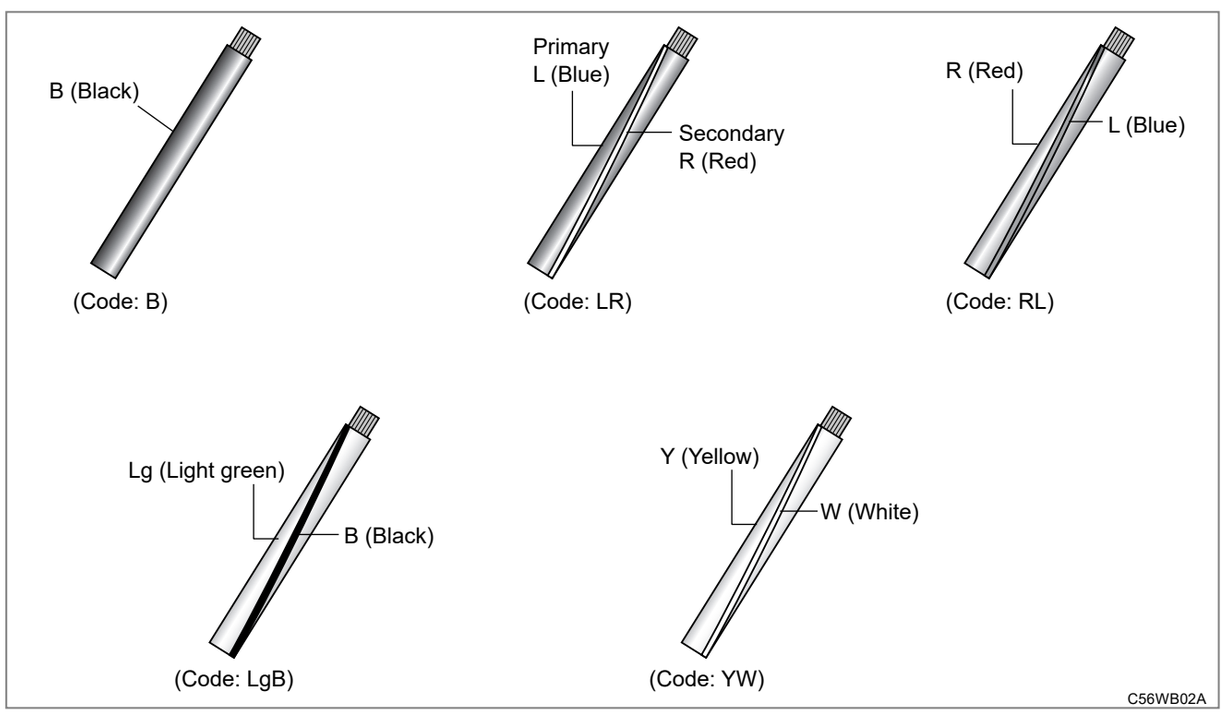
2. WIRING IDENTIFICATION

2.1 WIRING COLOR IDENTIFICATION

The color codes in the following table are marked on every wiring in the wiring diagrams.

Code	Color	Code	Color
B	Black	R	Red
Lg	Light Green	Gr	Gray
W	White	G	Green
L	Blue	Y	Yellow
P	Pink	Br	Brown
Or	Orange	BR	Black/Red
BW	Black/White	BG	Black/Green
BY	Black/Yellow	RB	Red/Black
RW	Red/White	RG	Red/Green
RL	Red/Blue	RY	Red/Yellow
LgB	Light Green/Black	LgR	Light Green/Red
LgW	Light Green/White	LgY	Light Green/Yellow
GrY	Gray/Yellow	WB	White/Black
WR	White/Red	WL	White/Blue
WY	White/Yellow	GR	Green/Red
GW	Green/White	GL	Green/Blue
GOr	Green/Orange	LW	Blue/White
LY	Blue/Yellow	YB	Yellow/Black
YR	Yellow/Red	YW	Yellow/White
YG	Yellow/Green	YL	Yellow/Blue
YBr	Yellow/Brown	PB	Pink/Black
BrR	Brown/Red	BrW	Brown/White

The following figures are examples for colors according to the codes.



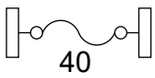
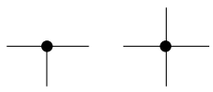
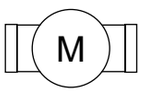
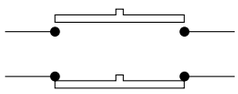
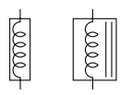
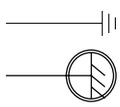
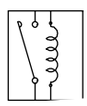
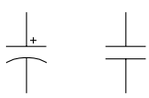
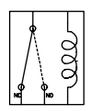
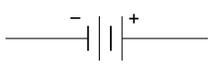
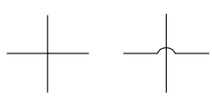
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2025-04-08 오전 9:40:47

2.2 CROSS SECTIONAL AREA OF WIRING

All wirings in circuit diagrams are marked with their colors and cross sectional area so that mechanics can understand wiring thickness with ease.

For example, "5.0 R" refers to a red wiring with 5 mm² of cross sectional area. Therefore, the diameter of the wiring with 5 mm² of the cross sectional area is 2.523 mm.

2.3 SYMBOLS FOR ELECTRIC COMPONENTS

Symbol	Description	Symbol	Description
	Main Fuse(Slow-blow fuse)		Connected wire
	Motor		Diode
	Switch (Normally Open Type) Switch (Normally Close Type)		Solenoid
	Ground (Wire) Ground (Chassis)		4P Relay
	Condenser/Capacitor		5P Relay
	Resistor		Switch
	Coil		Sensor
	Battery		Disconnected wire

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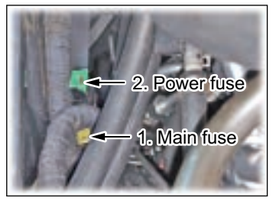
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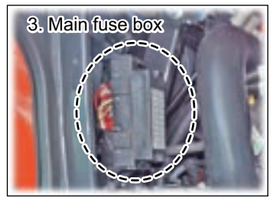
3. GENERAL INFORMATION

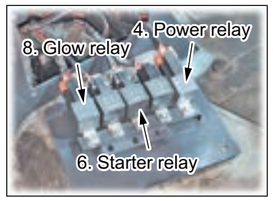
3.1 LOCATION OF SENSORS AND ELECTRIC COMPONENTS

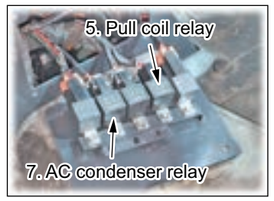
Location index

In the engine room	1, 2, 3, 9, 10, 11
Inside of relay window Under the steering wheel	4, 5, 6, 7, 8
Under the floor deck	12, 14, 15
Under the dash cover	16, 17, 18, 19, 20, 21, 22
Under the cup holders	23 ,24, 25, 26
On top of the roof	27, 28, 29, 30

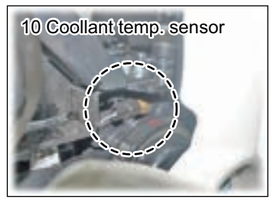


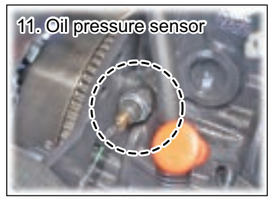


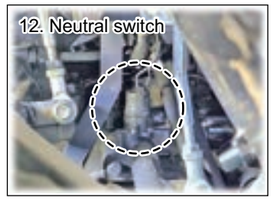


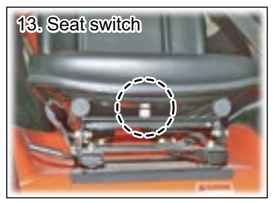


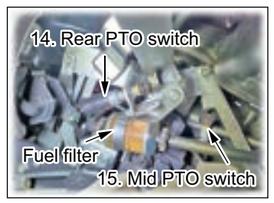


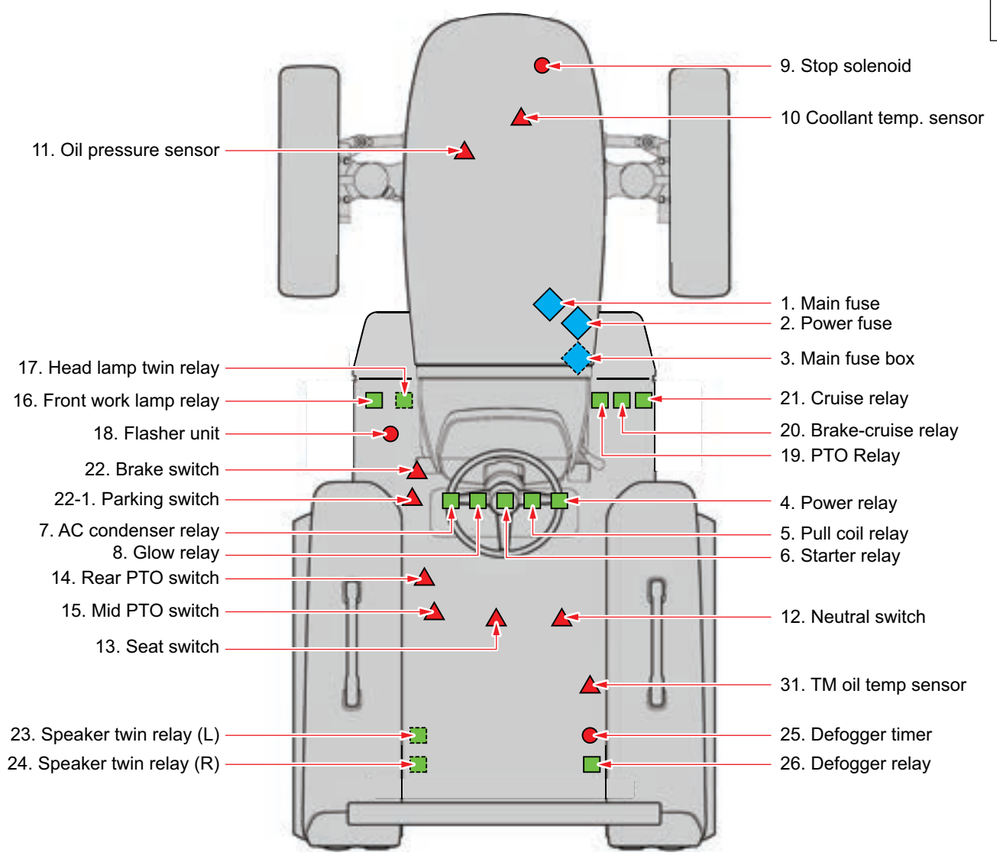


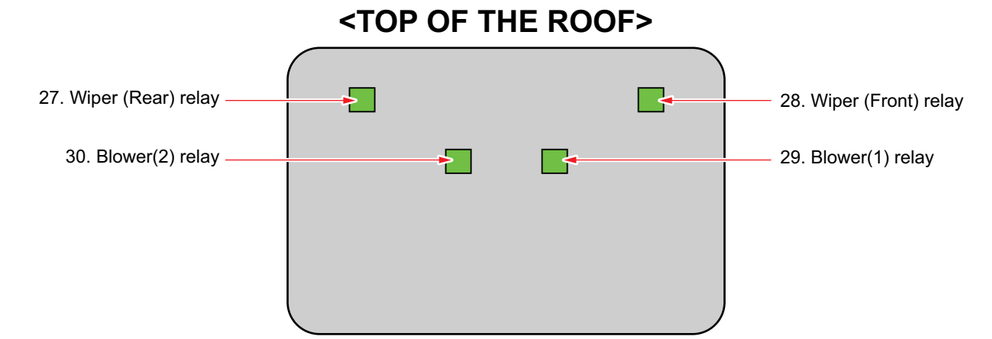


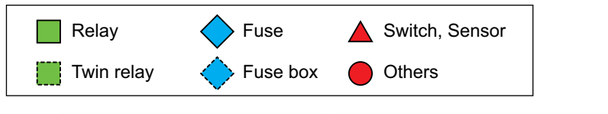


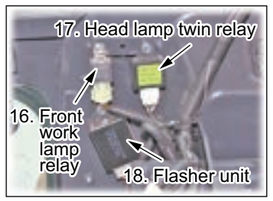


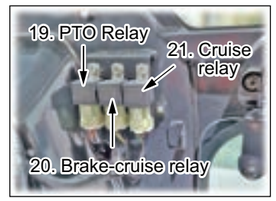


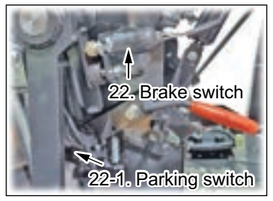


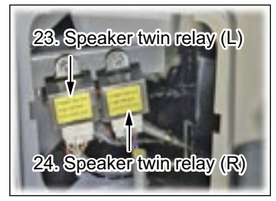


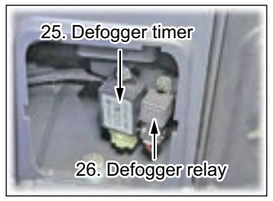


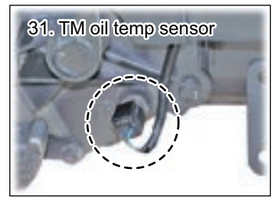


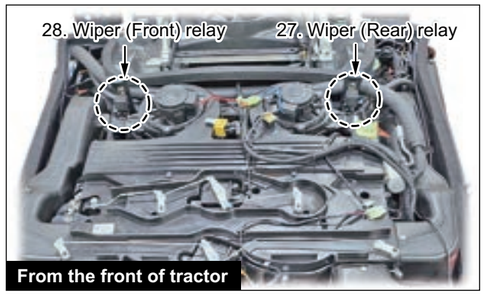


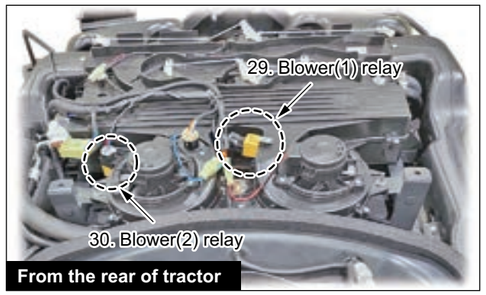










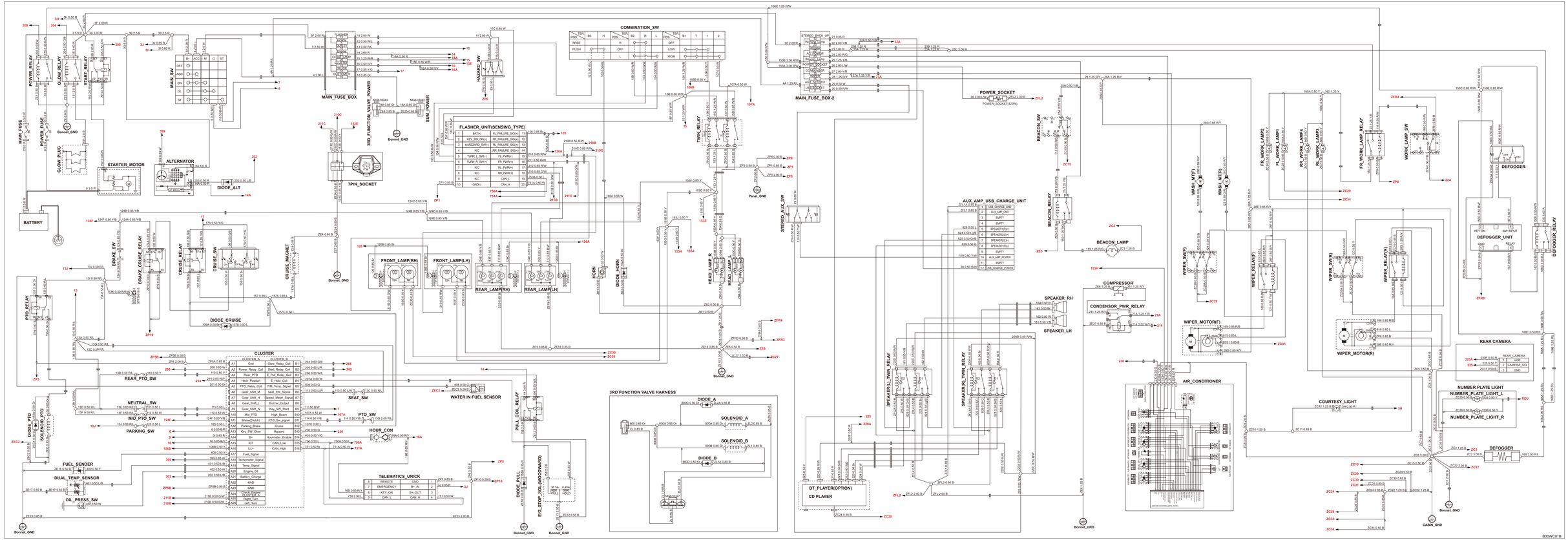


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3.2 OVERALL CIRCUIT DIAGRAM

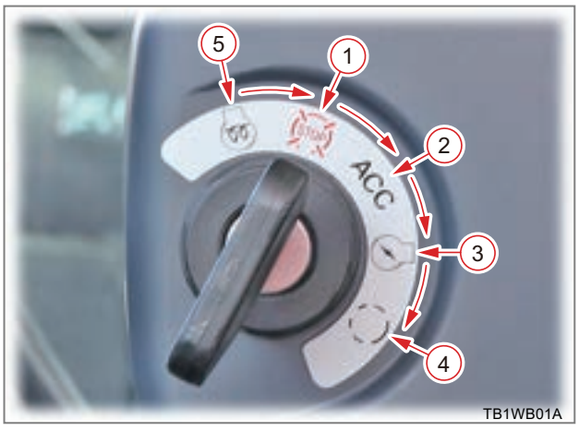


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WM_TBS10(CS2530CH,CS2530CH-EU)_EN_US.EU_11_전기장치.indd 10 2025-04-08 오전 9:40:51

4. OPERATING PRINCIPLE

4.1 START AND STOP



1	OFF	STOP
2	Accessory	ACC
3	Key On	
4	Start	
5	Pre-heat	

When the driver turns the key clockwise one step at a time from OFF position, it operates in the order of ACC, ON, and Start. When it is turned counterclockwise, Manual-Glow operates.

In the ACC and ON positions, the key stops by itself, and in the Start position and Manual-glow positions, when the driver releases his or her finger, the key spring returns.

If the driver holds the key in the middle of ON and ST positions, the Manual-glow operates.

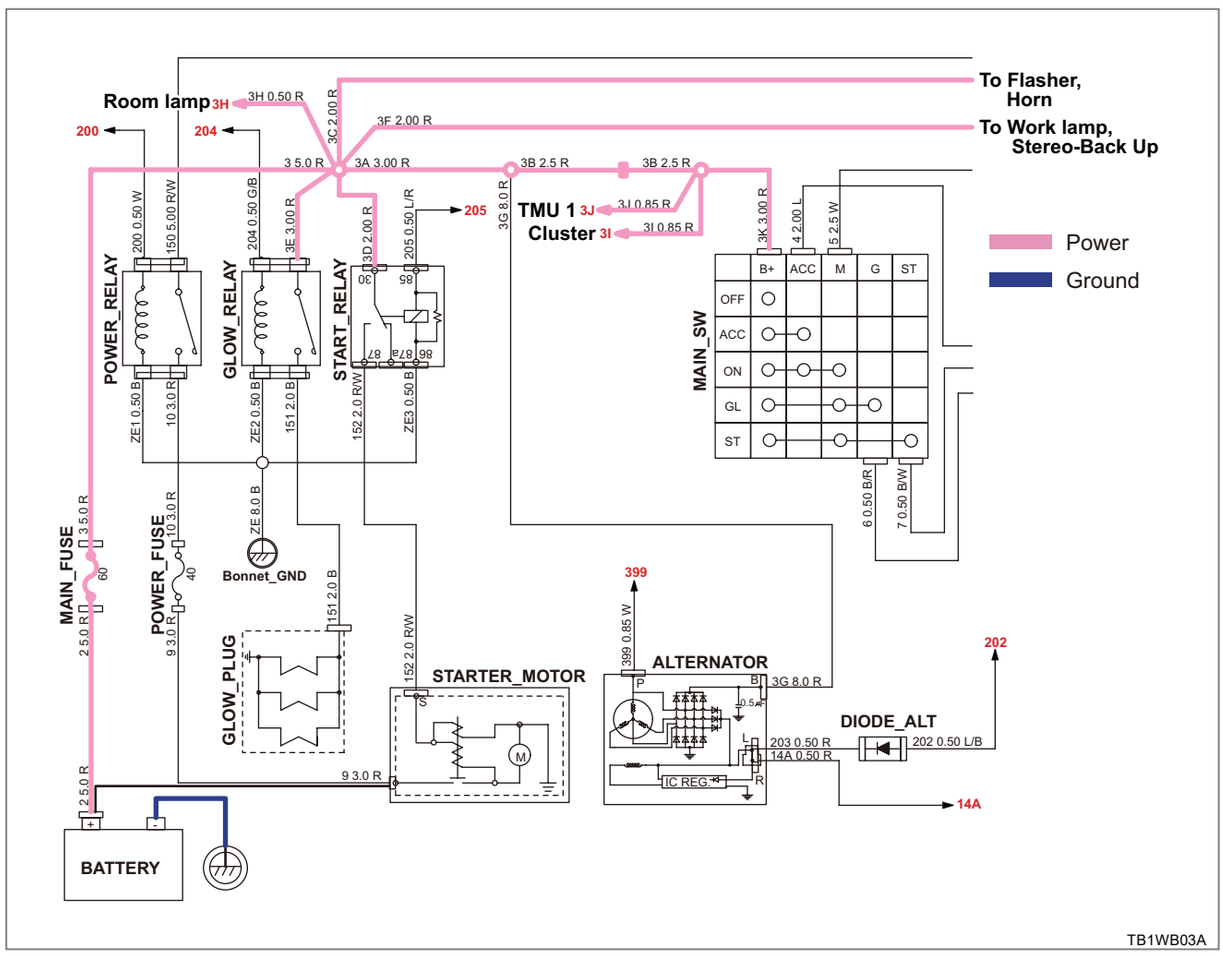
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4.1.1 KEY STOP (BATTERY DIRECT)

The B+ terminal of the key switch is directly connected to the positive pole of the battery via 60A main fuse.

Even if the key is in the stop position, the hazard lamp, horn, work lamp, stereo back-up and interior light works as they are directly connected to + pole of battery through 60A main fuse.





WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 12
2025-04-08 오전 9:40:52

- Hazard lamp: Battery + → 60A main fuse → (3.5 red) → wire branched → (2.0 red) → flasher fuse(15A)_main fuse box 1 → (2.0 white) → hazard SW→ (blue) → Pin#3_Flasher unit → Pin# 15~18_Flasher unit→(green/white) or (blue/white) → Front(Rear) LH(RH) turn signal lamp

- Horn : Same as above → horn fuse(5A)_main fuse box1 → (white/blue) → Terminal B3_combination SW_H → (white) → horn (with reverse current prevention diode)

- Work lights(stand by power): Battery + → 60A main fuse → (3.5 red) → wire branched → (2.0 red) →work lamp fuse(20A)_main fuse box 2 → (yellow/black) →work lamp relay_stand-by → (yellow) → work lamps

- Work light relay coil signal: Same as above → work lamp fuse(20A)_main fuse box 2 → (yellow/black) →work lamp SW → (red/white) → work lamp relay_coil signal

- Stereo back-up: Same as above → stereo back-up fuse(10A)_ main fuse box 2 → (red) → CD player

- Other direct connections to the battery include terminal A14 (3I) of the cluster and terminal 3 (3J) of the TMU (telematic unit).

- Cluster: Battery + → 60A main fuse → (3.5 red) →wire branched → (2.5 red) → wire branched →(0.85 red) → 3I → Pin A14_Cluster

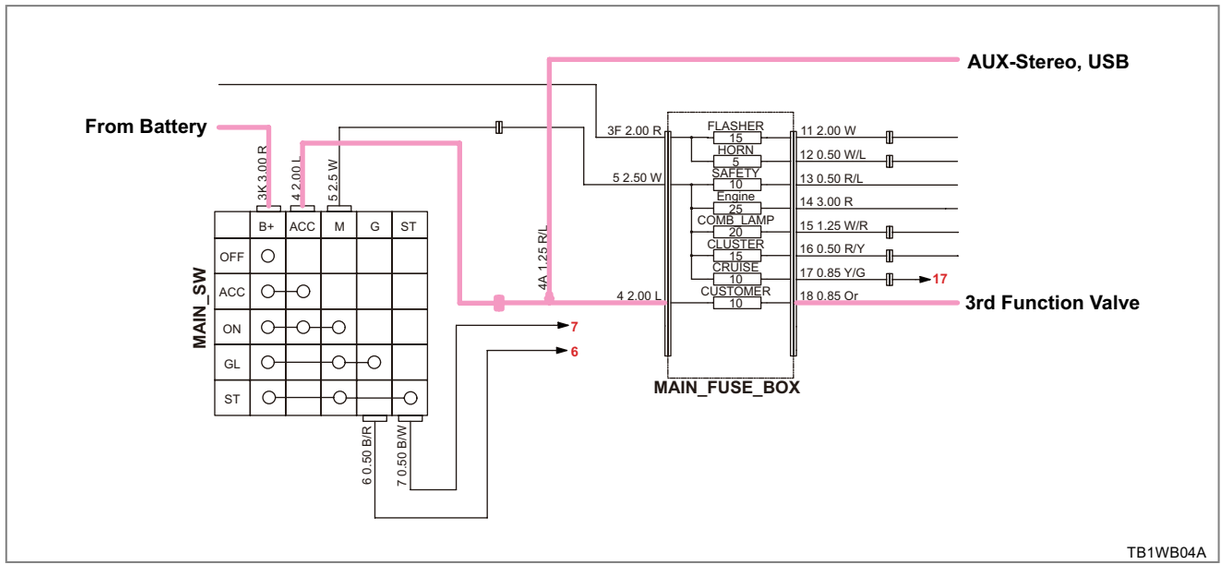
- Telematic unit: Battery + → 60A main fuse → (3.5 red) → wire branched → (2.5 red) → wire branched → (0.85 red) → 3J → Telematic unit_terminal 3

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 13 2025-04-08 오전 9:40:52

4.1.2 ACC

When the driver turns the key to the ACC position, the 12Vs from battery is supplied to the 3rd function valve (optional), stereo (optional), USB charging socket and rear camera(optional) through the ACC terminal.





- 3rd function valve(option) : Battery+ → (Red) → B+_key → ACC_key → (Blue) → Main fuse box1_Custormer10A → (Orange) → 3rd function valve(option)

- Stereo(option) : Same as above → ACC_key → (Blue) → Wire branched → (Red/Blue)→ Main fuse box2_Aux-stereo → (White) → Stereo-Aux SW → (Red/White) → Wire branched→ (Red/White) → 2nd pin(0.85 R/W)_CD player

- USB charging socket: Same as above → Stereo-Aux SW → (Yellow/White) → Pin# 10(AUX AMP PWR) of AUX_AMP_ USB_CHARGE_UNIT

- Rear camera(option): Same as above → Stereo-Aux SW → (Red/White) → Wire branched → (Red/White) → Wire branched → (Red) → 220A → Pin#1_VCC of Rear_camera

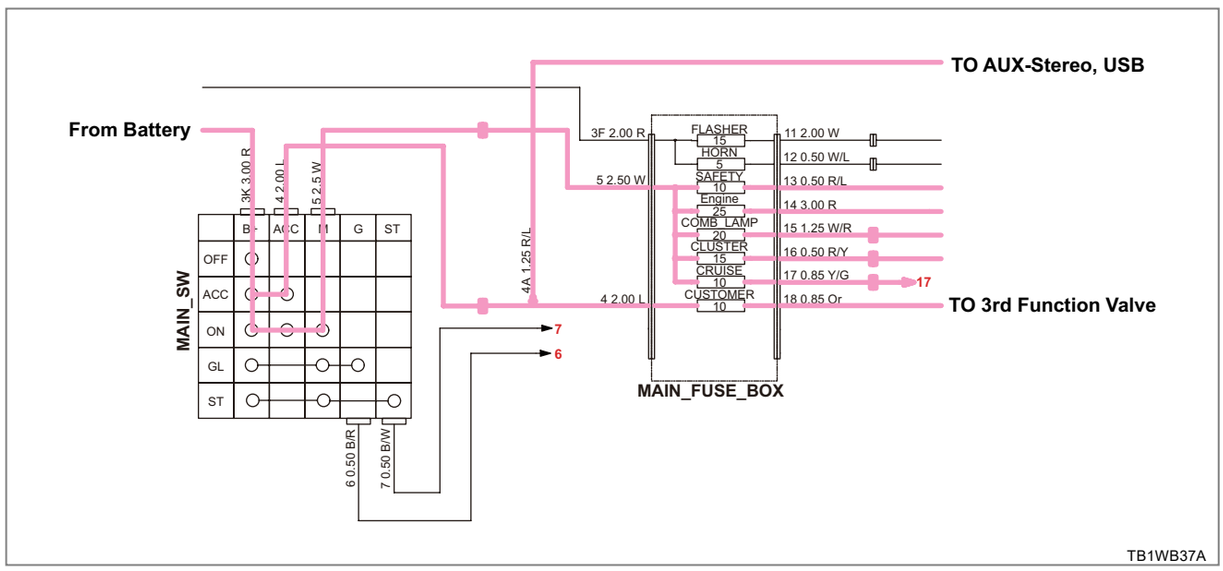
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4.1.3 KEY ON (M)

When the key is turned on, the M terminal of key switch outputs 12Vs to Safety fuse(10A), Engine fuse(25A), Combination lamp fuse(20A), Cluster fuse(15A), Cruise fuse(10A) in the main fuse box 1.

For more information, see each of operation principal.

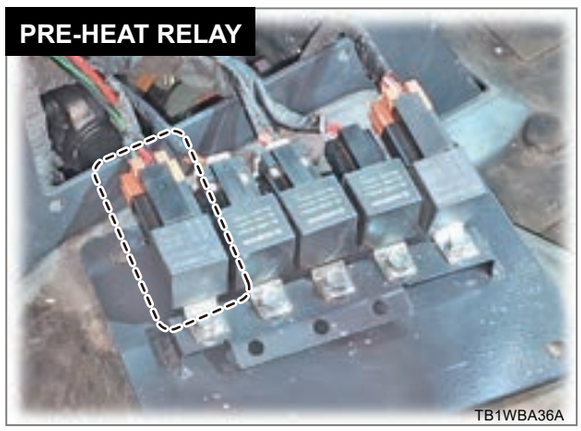
During key on, all of ACC related components also work.

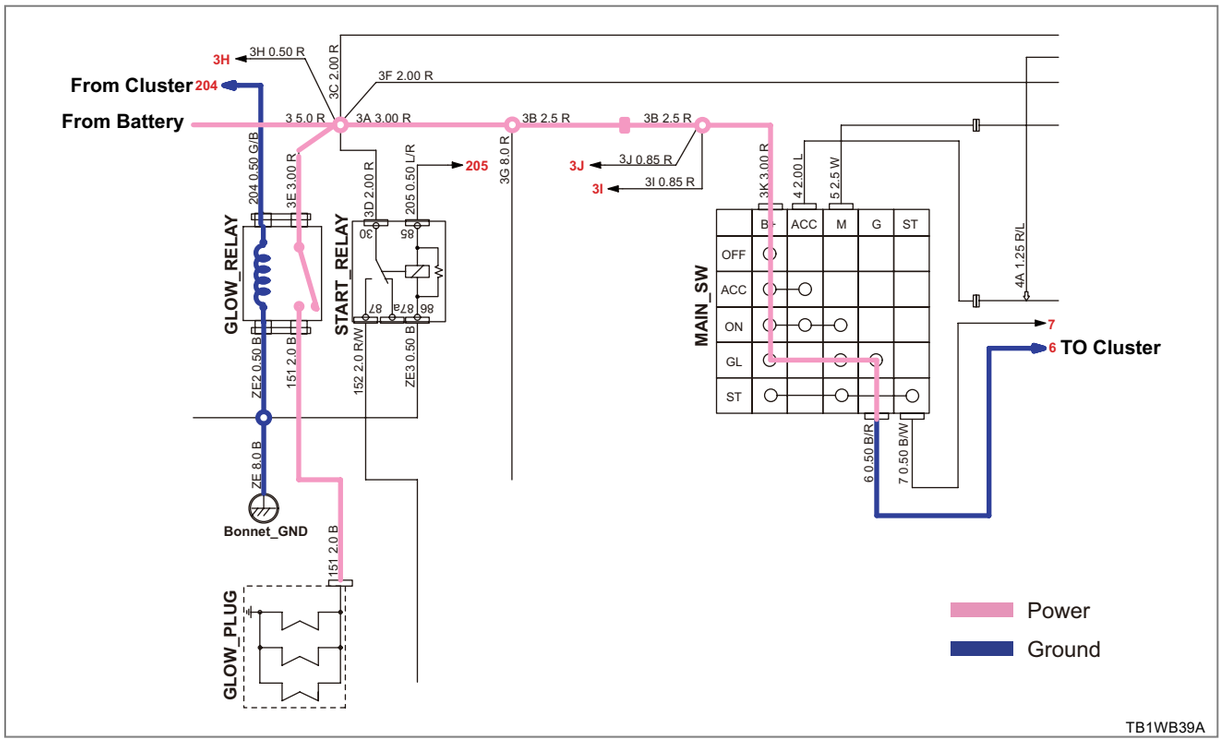


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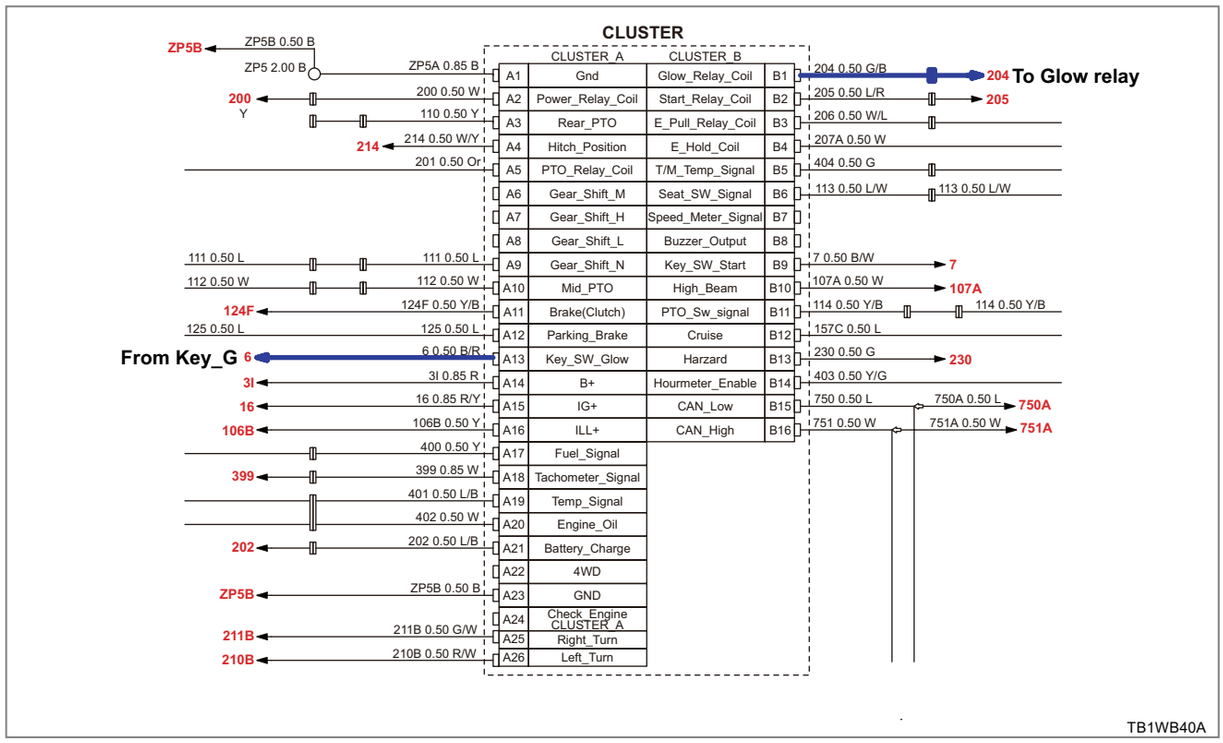
4.1.4 MANUAL GLOW (G)

When the operator turn the key to G(manual glow) position and hold it, the manual glow is activated.





WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 16 2025-04-08 오전 9:40:53



- Manual glow relay(coil): Same as above → G terminal_Key SW → Black/Red → 6 → A13_Cluster → B1_Cluster → (Green/Black) → 204 → Glow relay_coil

- Manual glow relay(stand-by): Battery + → 60A main fuse → (3.5 red) → wire branched → (3.0 red) → Glow relay_Stand by → (2.0 Red) → Glow plugs on the engine

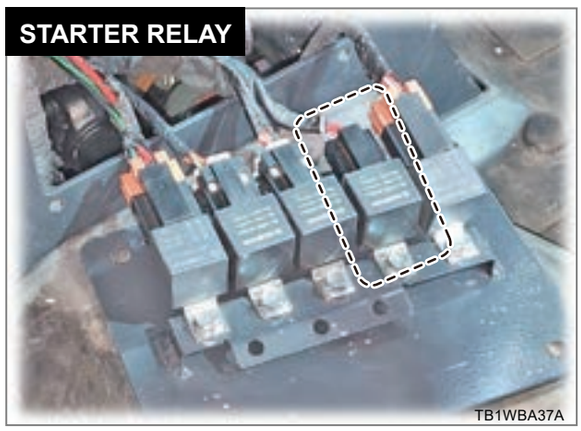
4.1.5 AUTOMATIC PRE-HEATING

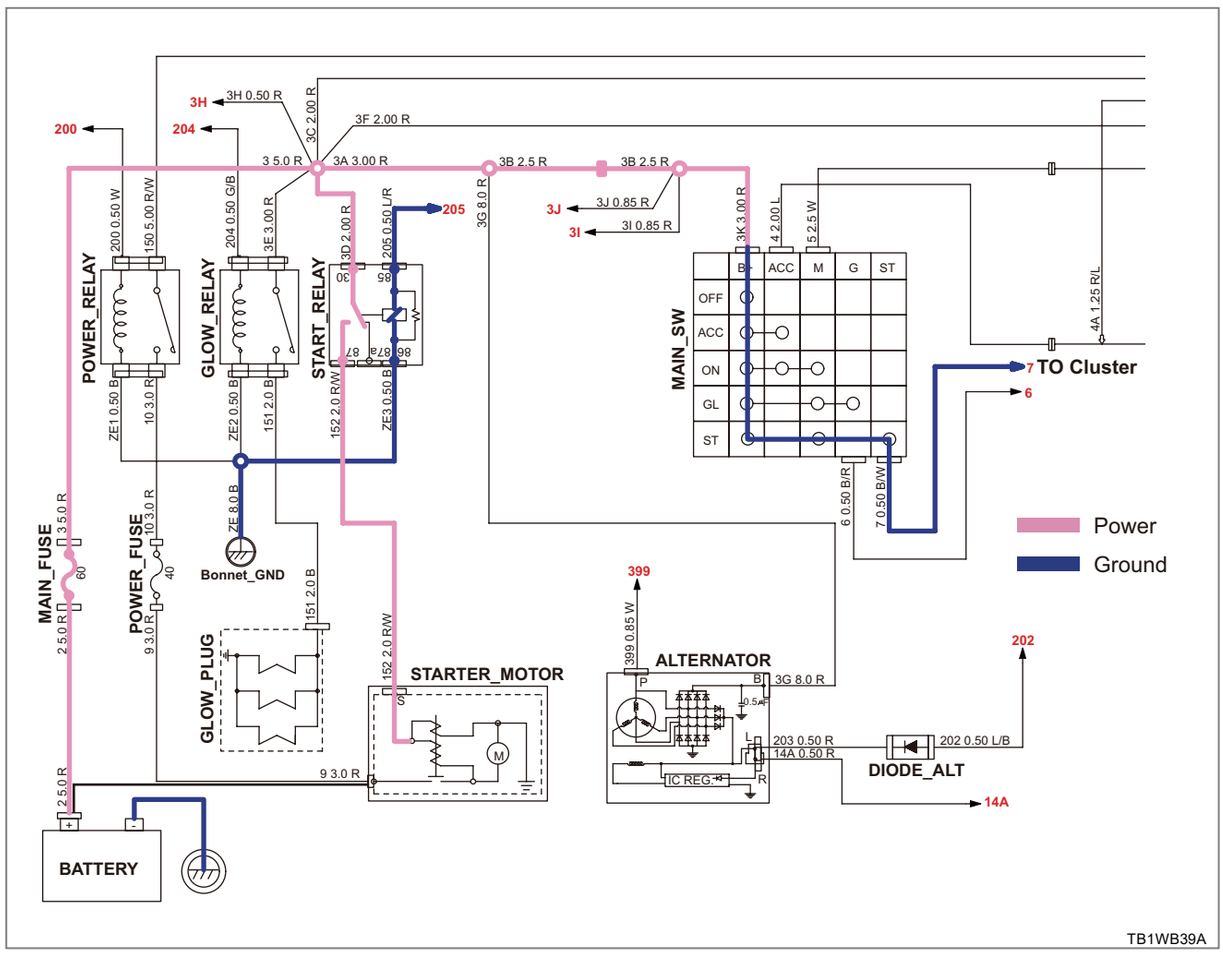
The automatic glow(pre-heating) is activate when the key is in on position. For more information about automatic pre-heating, see chapter 4.2.7.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 17 2025-04-08 오전 9:40:53

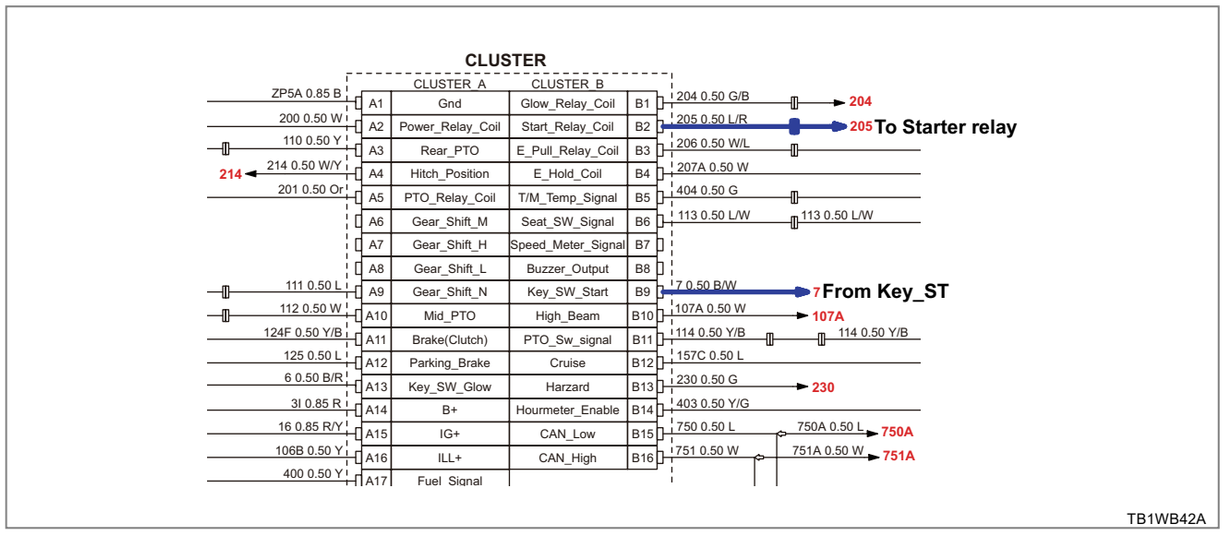
4.1.6 KEY START (ST)

While the operator turn the key to ST position and hold it, cranking starts.





WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 18 2025-04-08 오전 9:40:53



TB1WB42A

- Start relay(coil): Battery + → 60A main fuse → (3.5 red) → wire branched → (3.0 red) → ST_key → (Black/White) → 7 → B9_Cluster → B2_Cluster → (Blue/Red) → 205 → Start relay_Coil

- Start relay(stand-by): Battery + → 60A main fuse → (3.5 red) → wire branched → (2.0 red) → Starter motor_S terminal

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 19 2025-04-08 오전 9:40:53

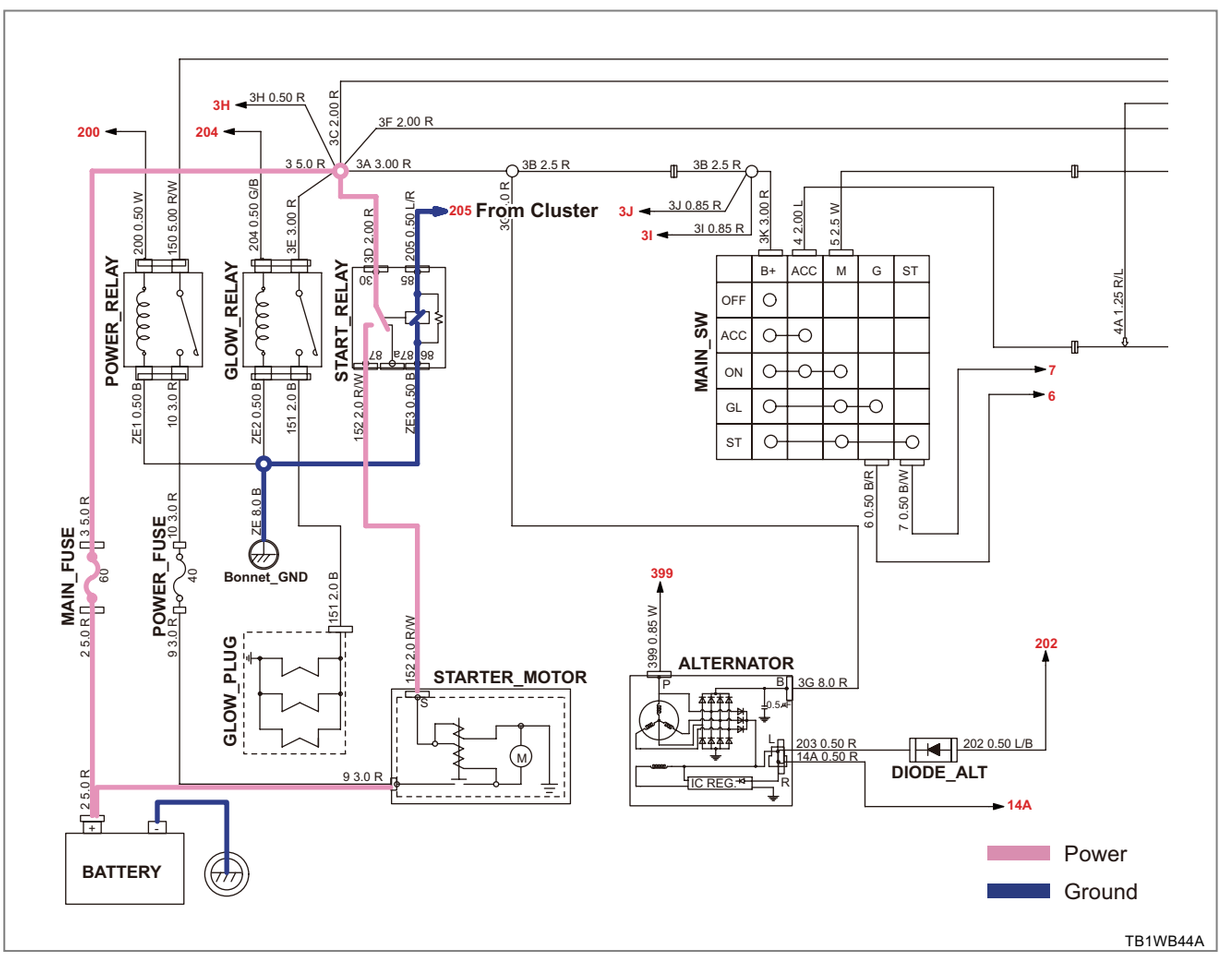
4.1.7 START MOTOR

When the key is turned to ST position, the battery power from the starter relay is supplied to the magnetic switch in the start motor and then, as the magnetic switch is engaged, the big current of battery power is supplied to start motor through the battery cable(+).

START MOTOR



TB1WB43A



TB1WB44A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 20
2025-04-08 오전 9:40:54

4.1.8 ENGINE STOP SOLENOID

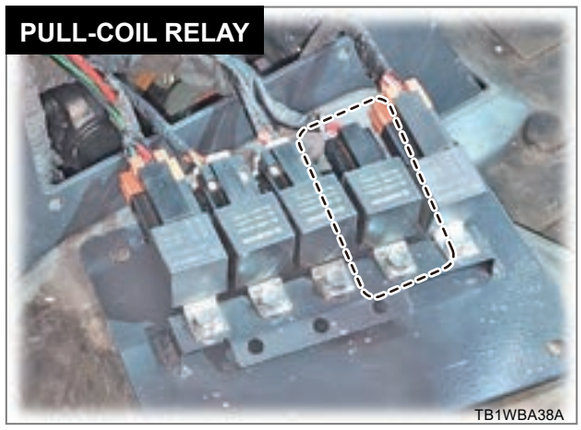
Engine stop solenoid is consist of Pull coil and Hold coil. When the key is OFF, the rack of injection pump is pushed to its fuel stop position by the extended pin of stop solenoid. When the key is turned to ON, the pull coil magnetic pulls the stop solenoid pin to retract so that it releases the injection pump rack. Then the rack of injection pump moves to its fuel open position by the start spring in the governor system. At the same time, the hold coil holds the stop solenoid pin to maintain the pulling status. The pull coil activated only a few seconds and released as the hold coil can hold the stop solenoid pin in the pulled position. This mechanism can save the current and also protects the stop solenoid because the pull coil needs big current.

ENGINE STOP SOLENOID

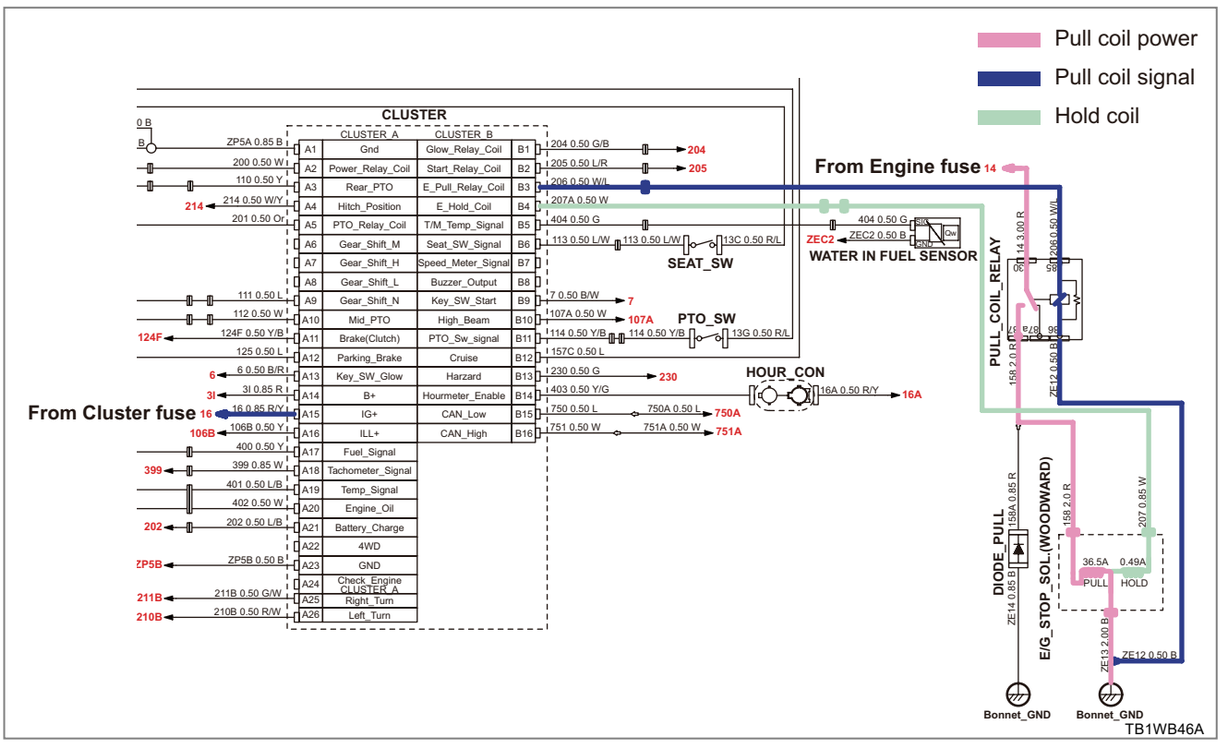


TB1WB45A

PULL-COIL RELAY



TB1WBA38A



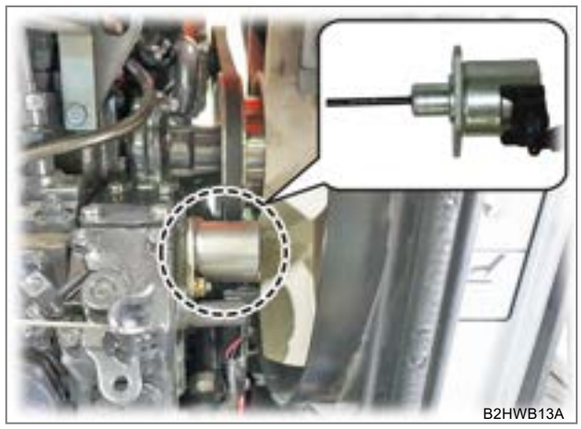
TB1WB46A

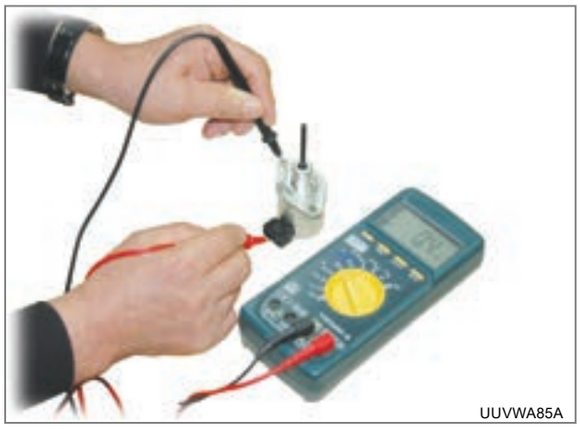
- Stop solenoid hold coil : Key_ON_M → (White) → Cluster fuse(15A)_Main fuse box1 → (White/Red) → 16 → A15_Cluster_IG+ → Cluster_hold coil_B4 → (White) → Hold coil(0.49A)_Stop solenoid

- Stop solenoid pull coil(relay signal): Key_ON_M → (White) → Cluster fuse(15A)_Main fuse box1 → (White/Red) → 16 A15_Cluster_IG+ → Cluster_pull coil_B3 → (White/Blue) → Pull coil relay_signal

- Stop solenoid pull coil(relay stand by): Key_ON_M → (White) → Engine fuse(25A)_Main fuse box 1 → (Red) → 14 → Pull coil relay_stand by → (2.0 Red) → 36.5A_Pull coil_Stop solenoid(with Reverse current blocking diode)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 21 2025-04-08 오전 9:40:54


B2HWB13A


UUVWA85A

There are two types of coil installed in the engine stop solenoid. Pull coil pulls the plunger to open the fuel line just for a second.

Hold coil holds the plunger not to return to its closed position .Their resistances are as follows:

Hold coil	Approx. 13.8 Ω
Pull coil	Approx. 0.4 Ω

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 22 2025-04-08 오전 9:40:54

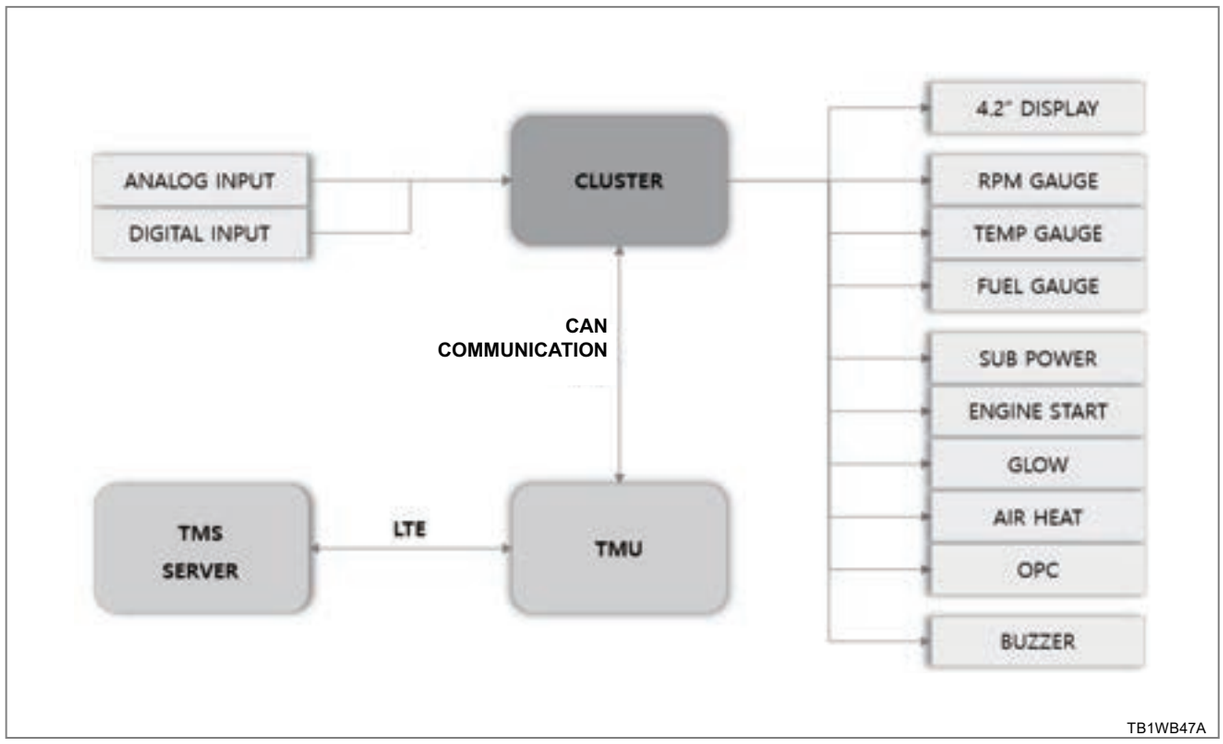
4.2 CLUSTER

4.2.1 LAY-OUT OF CLUSTER ASSEMBLY

▶ COMMUNICATION LAY-OUT OF CLUSTER

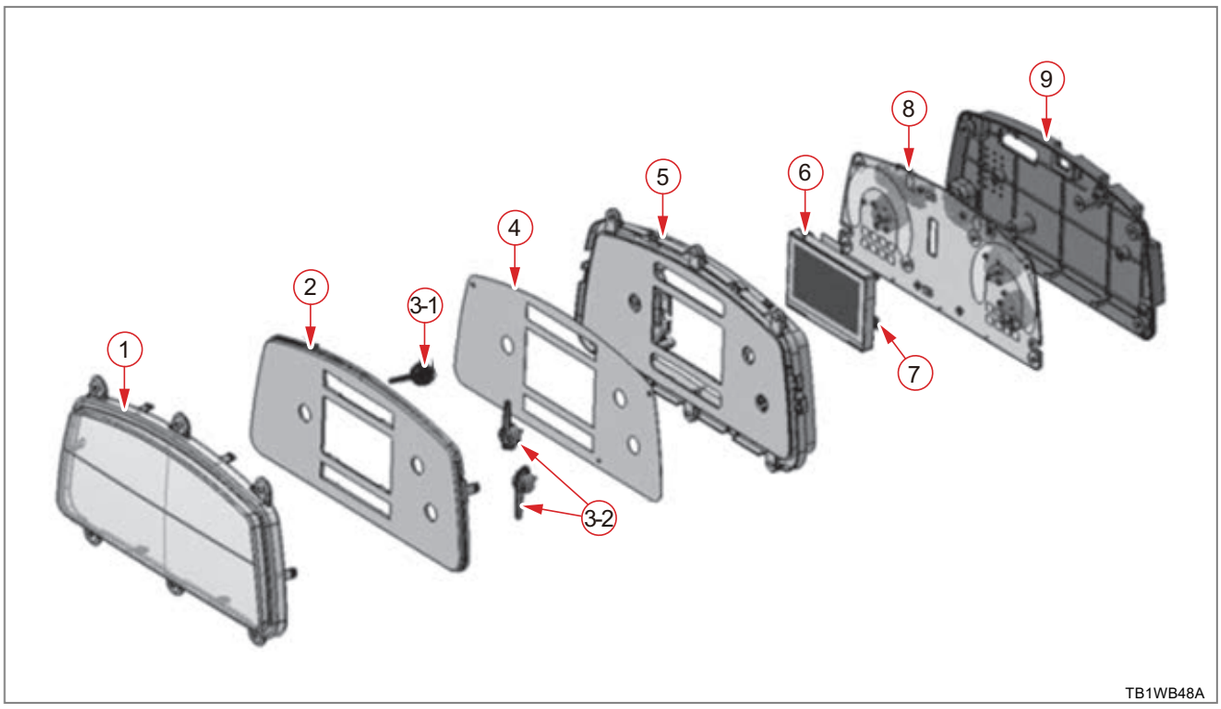
CLUSTER displays the information on the LCD or indication lamps on the dash board according to the signals from sensors of tractor and CAN communication message of TMU which communicate with TMS server .

The communication lay-out of cluster is as follows;



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 23 2025-04-08 오전 9:40:55

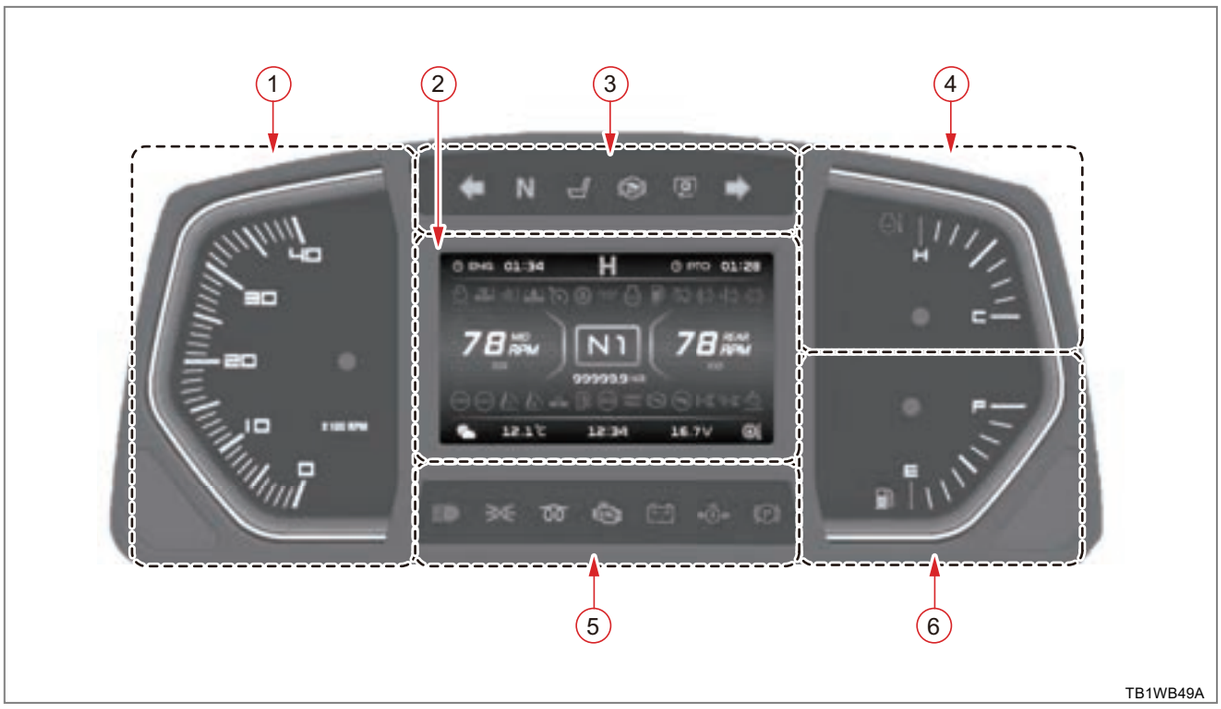
▶ ASSEMBLY STRUCTURE OF CLUSTER



(1) Front Panel
(2) Plate Cover
(3-1) Gauge Pointer A
(3-2) Gauge Pointer B
(4) Front Dial
(5) Main Body
(6) 4.2inch LCD TFT
(7) LCD Bracket
(8) PCB Ass`y
(9) Rear Cover

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 24 2025-04-08 오전 9:40:55

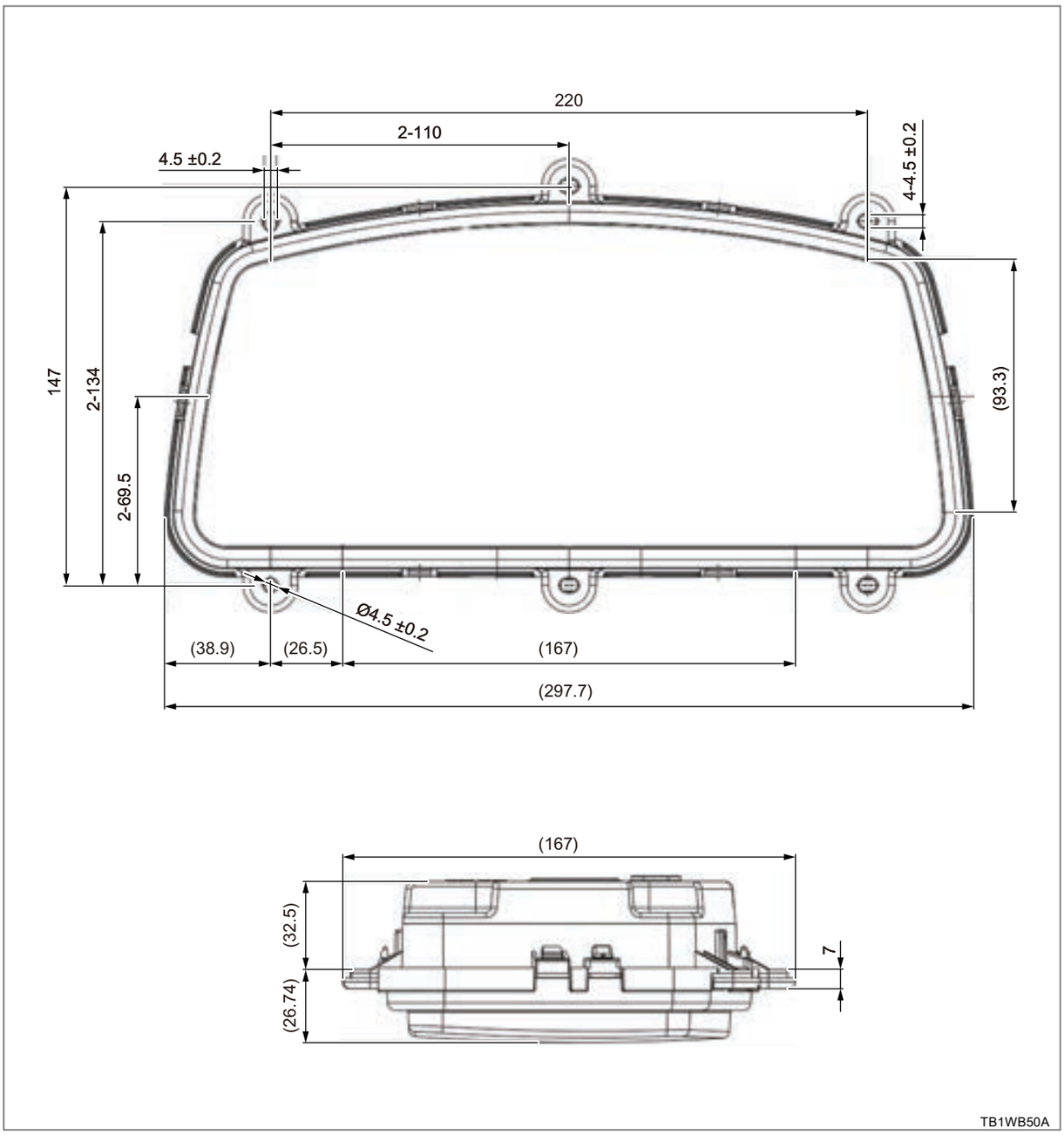
▶ DISPLAY LAY-OUT OF CLUSTER



(1) RPM Gauge
(2) LCD
(3) Top Symbol
(4) Engine Temp Gauge
(5) Bottom Symbol
(6) Fuel Gauge

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 25 2025-04-08 오전 9:40:55

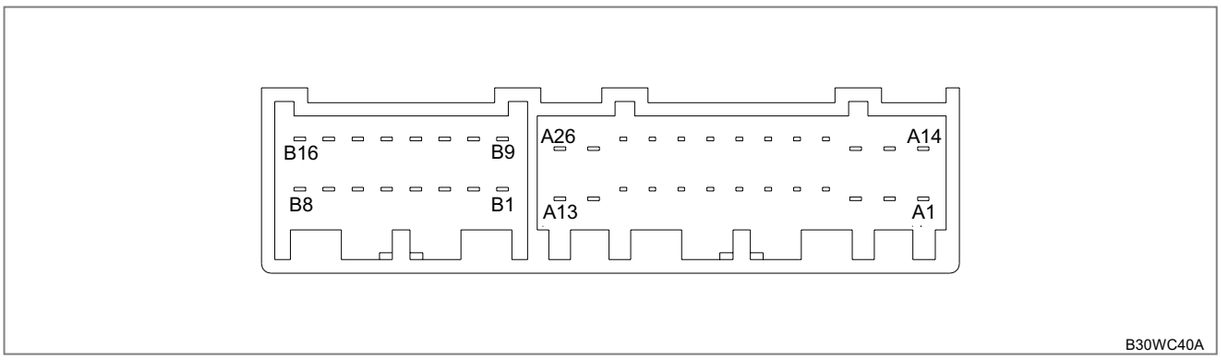
▶ DIMENSION OF CLUSTER



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 26 2025-04-08 오전 9:40:55

4.2.2 LAY-OUT OF CONNECTORS

▶ **CONNECTORS LAY-OUT**



▶ **SPECS OF PINS(B CONNECTOR)**

B-Side(Matching Connector : KET MG611332)

Pin No.	Pin Name	Pin Type	Description	Remark
B1	GLOW_RELAY	Digital Output	External relay drive output:+12V. Capacity: 0.2A	
B2	ST_RELAY	Digital Output	External relay drive output:+12V. Capacity: 0.2A	
B3	PULL COIL_RELAY	Digital Output	External relay drive output:+12V. Capacity: 0.2A	
B4	HOLD_COIL	Digital Output	External relay drive output:+12V. Capacity: 1A	
B5	T/M_TEMP_SIG	Analog Input		
B6	SEAT_SW	Digital Input	High Activity	
B7	SPEED_SIG	Pulse	Spare	
B8	BUZ_OUT	Digital Output		
B9	KEY_SW_ST	Digital Input	High Activity	
B10	HIGH_BEAM	Digital Input	High Activity	
B11	PTO_SW	Digital Input	High Activity	
B12	CRUISE_SW	Digital Input	High Activity	
B13	AIRCON_SW	Digital Input	High Activity	
B14	HOURMETER	Digital Input	High Activity	
B15	CAN_L	CAN	CAN communication Low	
B16	CAN_H	CAN	CAN communication High	

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 27 2025-04-08 오전 9:40:55

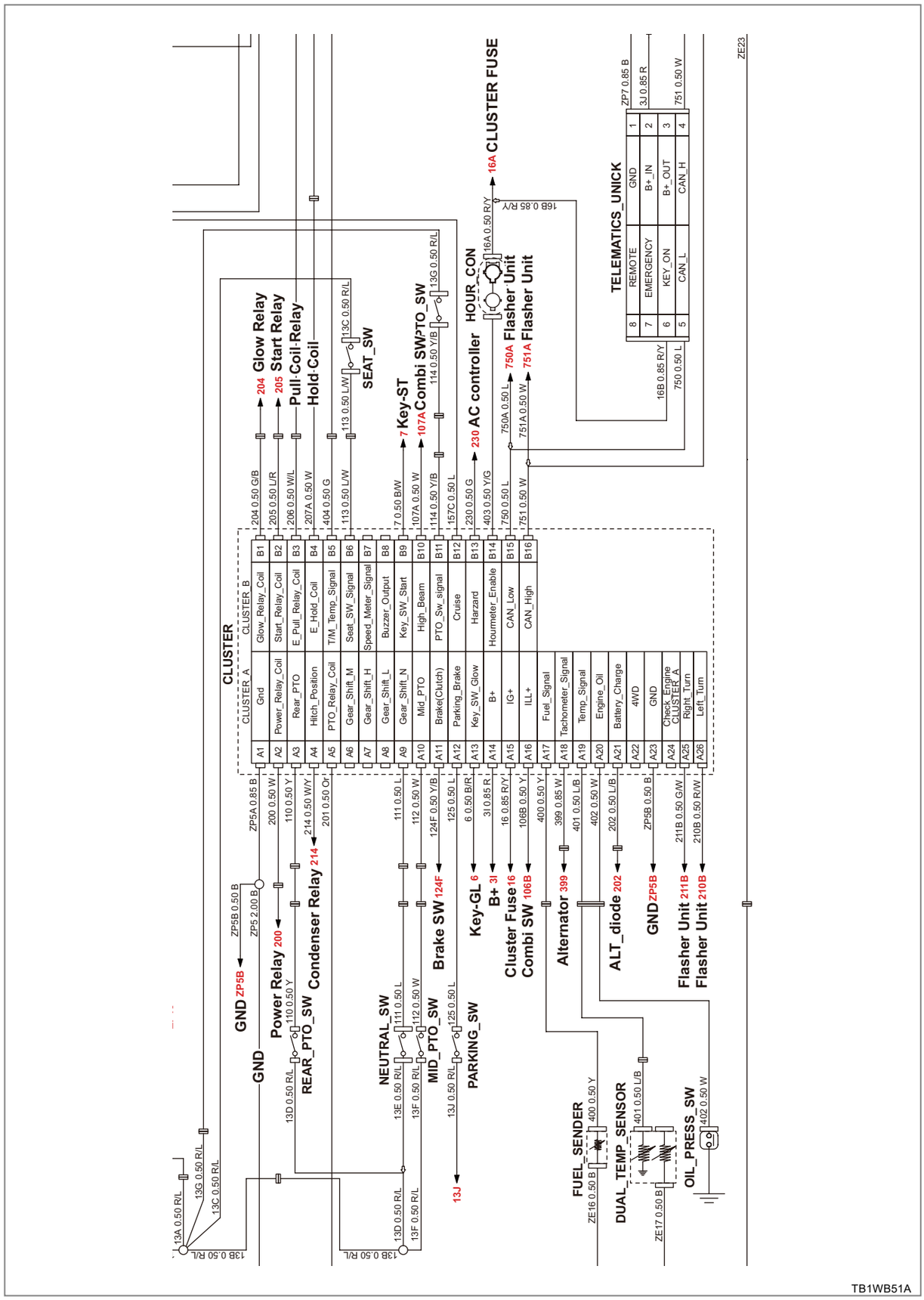
▶ SPECS OF PINS(A CONNECTOR)

A-Side(Matching Connector : KET MG611336)

Pin No.	Pin Name	Pin Type	Description	Remark
A1	GND	GND	Battery Ground	
A2	PWR_RELAY	Digital Output	External relay drive output:+12V. Capacity: 0.2A	
A3	REAR_PTO_SW	Digital Input	High Activity	
A4	CONDEN_RYL	Digital Output	External relay drive output:+12V. Capacity: 0.2A	
A5	PTO_RYL_COIL	Digital Output	External relay drive output:+12V. Capacity: 0.2A	
A6	GEAR_M	Digital Input	Low Activity	N/A
A7	GEAR_H	Digital Input	Low Activity	N/A
A8	GEAR_L	Digital Input	Low Activity	N/A
A9	GEAR_N	Digital Input	High Activity	
A10	MID_PTO_SW	Digital Input	High Activity	
A11	BRAKE_SW	Digital Input	High Activity	
A12	PARKING_SW	Digital Input	Low Activity	
A13	KEY_SW_GLOW	Digital Input	High Activity	
A14	B+	12V	Battery 12V	
A15	IG+	Digital Input	High Activity	
A16	ILL+	Digital Input	High Activity	
A17	FUEL_SIG	Analog Input		
A18	TACH_SIG	Pulse	Engine Tachometer Pulse	
A19	ENG_TEMP_SIG	Analog Input		
A20	ENG_OIL_SW	Digital Input	Low Activity	
A21	BAT_CHAR	Digital Input	Low Activity	
A22	4WD	Digital Input	Low Activity	
A23	GND	GND	Battery Ground	
A24	CHK_ENG	Digital Input	Low Activity	
A25	TURN_R	Digital Input	High Activity	
A26	TURN_L	Digital Input	High Activity	

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 28 2025-04-08 오전 9:40:56

4.2.3 OPERATING DETAILS FOR EACH PIN



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 29 2025-04-08 오전 9:40:56

• Pin Number. A1 (GND)

- BATTERY GND

• Pin Number. A2 (PWR_RELAY_COIL)

- When Key Off, no voltage output.
- When A15 (IG+) On(High Active), outputs 12V.
- In case of short circuit or over loaded, the circuit protection function is activated.

• Pin Number. A3 (REAR_PTO_SW)

- When the PTO SW Off, deactivates REAR PTO indicator on the LCD.
- When both of A3(REAR_PTO_SW), A10(MID_PTO_SW) are Off(Open), deactivates MID_PTO_RPM and REAR_PTO_RPM on the LCD.
- When one of them are On(High Active), displays REAR or MID PTO RPM on the LCD.

  The REAR PTO RPM = Engine RPM * 0.186

  The MID PTO RPM = Engine RPM * 0.68

• Pin Number A4 (CONDEN_RYL_COIL)

- When air-conditioner SW(B13) is on while engine is running, outputs 12Vs to condenser relay. It firstly , accomplish pre-running and then keep on running for better lubrication in the compressor.
- Pre-Running cycle : 2s ON -> 10s OFF -> 2s ON -> 10s OFF -> 5s ON -> 10s OFF -> ON
- In case of short circuit or over loaded, the circuit protection function is activated.

• Pin Number A5 (PTO_RELAY_COIL)

- When A15(KEY_ON) and B11(PTO_SW) ON, outputs 12Vs to PTO relay.
- When PTO OPC(See chapter 4.2.6) is not met, turns it Off.
- To restart PTO with PTO relay, operator should turn PTO SW(at B11) off and then turn it On.
- In case of short circuit or over loaded, the circuit protection function is activated.

• Pin Number A6 (GEAR_M)

- Not applied.

• Pin Number A7 (GEAR_H)

- Not applied.

• Pin Number A8 (GEAR_L)

- Not applied

•Pin Number A9 (GEAR_N)

- When On(Low Active), LCD displays “N”.

• Pin Number A10 (MID_PTO_SW)

- When MID PTO switch(A10) and PTO switch(B11) signal are received, Mid PTO RPM displays on the LCD(= Engine rpm * 0.68)

• Pin Number A11 (BRAKE_SW)

- When it is Off(Open, pedal is not depressed), BRAKE_LED lamp displays before engine start.
- After engine start and Brake pedal is depressed, BRAKE_LED is turned OFF

• Pin Number A12 (PARKING_SW)

- When it is Off(Parking is not applied), PARKING_LED is turned OFF.
- When it is On(Parking is applied), PARKING_LED ON displays.

• Pin Number A13 (KEY_SW_GLOW)

- When the key is turned to manual Glow (A13 On), GLOW lamp displays.

• Pin Number A14 (B+)

- Directly connected to + pole of battery. See 3J(0.5 RED) line in the circuit diagram near the key switch B+ terminal.
- Reverse voltage protection circuit applied.

• Pin Number A15 (IG+)

- When Key ON, the cluster Wakes Up.
- Reverse voltage protection circuit applied.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 30 2025-04-08 오전 9:40:56

• Pin Number A16 (ILL+)

- When head lamp and tail/side lamp On, TAIL_ LAMP_LED displays.

• Pin Number A17 (FUEL_SIG)

- Analog Input from Fuel gauge(See chapter 4.2.2 for more information)

• Pin Number A18 (TACH_SIG)

- Analog Input from Alternator(See chapter 4.2.2 for more information)

• Pin Number A19 (ENG_TEMP_SIG)

- Analog Input from engine coolant temperature gauge(See chapter 4.2.2 for more information)

• Pin Number A20 (ENG_OIL)

- When the engine oil sensor On signal is received, ENG_OIL_LED displays.
- If it continues for more than 5 second after engine start, displays LCD pop-up warning, sounds buzzer.
- Alarm signals that occur within 1 minute after engine start are ignored and DTC(see 5-2) is not generated.

• Pin Number A21 (BAT_CHAR)

- BAT_CHAR_LED displays before engine start and turns off after engine start.
- When the key is ON before engine running, the Alternator does not generate power then, the electrical current from cluster flows to Diode to turn on the charge warning lamp on the cluster.
- After the engine start, if the battery voltage is read 12.5V or below, displays BAT_CHAR_LED.
- Alarm signals that occur within 1 minute after engine start are ignored and DTC(see 5-2) is not generated.

• Pin Number A22 (4WD_SW)

- When 4WD is On, displays 4WD_LED.

• Pin Number A23 (GND)

- Battery GND

• Pin Number A24 (CHK_ENG)

- When the engine check signal is received, displays CHK_ENG_LED.
- If it persists after engine start, displays LCD pop-up warning.

• Pin Number A25 (TURN_R)

- When right turn signal is received, displays TURN_R_LED.

• Pin Number A26 (TURN_L)

- When left turn signal is received, displays TURN_L_ LED.

• Pin Number B1 (GLOW_RELAY_COIL)

- When manual glow signal is received at A13 for more than 0.5s, outputs 12Vs to glow relay.
- When Key On signal is received, outputs 12Vs to glow relay according to pre-heating algorism(See chapter 4.2.2 for more information)

• Pin Number B2 (ST_RELAY_COIL)

- When safety start OPC condition(See chapter 4.2.6), outputs 12Vs.

• Pin Number B3 (PULL_RELAY_COIL)

- When key start signal is received at A15(IG+) and B4(HOLD_COIL) is off, output 12Vs for 1s.

• Pin Number B4 (HOLD_COIL)

- When safety start OPC condition(See chapter 4.2.6), outputs 12Vs.

• Pin Number B5 (TM_TEMP_SIG)

- Analog Input from T/M temperature sensor(See chapter 4.2.2).

• Pin Number B6 (SEAT_SW)

- When not seated, displays SEAT_LED on.
- When seated, turns SEAT_LED off.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 31 2025-04-08 오전 9:40:56

• Pin Number B7 (SPEED_SIG)

- SPARE

• Pin Number B8 (BUZ_OUT)

- Buzzer output(See chapter 4.2.3 for buzzer working condition) .

• Pin Number B9 (KEY_SW_ST)

- Key start signal is received at this pin

• Pin Number B10 (HI_BEAM)

- When head light high beam signal from combination switch is received, displays HI_BEAM_LED.

• Pin Number B11 (PTO_SW)

- When PTO switch signal is received, displays PTO_ LED.

• Pin Number B12 (CRUISE_SW)

- When cruise control switch signal is received, displays CRUISE_LED on the LCD.

• Pin Number B13 (CON_SW)

- When AC turning on signal is received , outputs 12Vs to AC condenser relay trough A4.

• Pin Number B14 (HOURMETER_EN)

- When HOUR METER switch signal received, displays HOUR METER and activate it.

• Pin number. B15, B16 (CAN_H, L)

- Specification: CAN2.0B, Baud rate-250kbps, sampling point-75%

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 32 2025-04-08 오전 9:40:56

4.2.4 SYMBOLS (ISO 7000 GRAPHICAL SYMBOL, DAEDONG SYMBOL)

▶ **LED SYMBOLS ON TOP OF CLUSTER**

SYMBOL		N				
NAME	Turn L	Gear N	Seat	Pedal Brake	PTO	Turn R
COLOR	Green	Green	Amber	Amber	Amber	Green

▶ **LED SYMBOLS IN THE BOTTOM OF CLUSTER**

SYMBOL							
NAME	High Beam	Tail Lamp	Glow	Charge	Engine Oil	Parking Brake	Check Engine
COLOR	Blue	Green	Amber	Red	Red	Red	Amber

▶ **SYMBOL OF ENGINE TEMP GAUGE (LED)**

SYMBOL	
NAME	High Temp Warning
COLOR	Red

▶ **SYMBOL OF FUEL GAUGE (LED)**

SYMBOL	
NAME	Low Fuel
COLOR	Amber

▶ **LCD SYMBOLS**

SYMBOL		N		
NAME	Cruise	Gear N	ECO	4WD
COLOR	Green	Black	Green	Amber

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 33 2025-04-08 오전 9:40:56

4.2.5 OTHER SPECS

ITEM	DESCRIPTION
WOW function	IG+(=key) ON → WAKE UP Engine start(RPM≥500) → POINTER : MIN -> MAX -> MIN -> Back to its value Engine stop → Start again before entering SLEEP MODE, WOW function not activated.
LCD OPENING	IG+ ON → OPENING IG+ OFF → CLOSE (If IG+ OFF before entering basic screen mode, not activates) TMS OPENING / CLOSING display condition: Restarting engine in 20 seconds cancels OPENING and displays basic screen.
CAN Activation condition	CAN activation condition : IG+ ON CAN 2.0B 250Kbps
Illumination color	LCD, DIAL : White LED Pointer : Red LED
Illuminous intensity	IG+ ON, ILL+(Head light low beam) On → 70% of illuminous intensity.
Needle of GAUGEs rotation direction	RPM GAUGE : CW FUEL/TEMP GAUGE : CCW

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 34 2025-04-08 오전 9:40:56

4.2.6 OPC (OPERATOR PRESENCE CONTROL)

▶ OPC ACTIVATION SPECS

OPCS	OPC CONDITIONS	OPC CONTROL
Park Brake OPC	▪ During the parking brake not applied, operator gets off seat	Visual and auditory warning
PTO OPC	▪ During PTO in operation, operator gets off seat	PTO Off
Stationary PTO OPC	▪ During rear PTO in operation, range gear in neutral, parking applied, operator gets off seat	Remained with PTO On
Safety Start OPC	▪ Operator seated / PTO Off / range gear in neutral / brake applied, key is turned to ST position	Outputs to start motor

▶ PARK BRAKE OPC

INPUT		LOGIC	OUTPUT
B19 (PARKING_SW)	Off (not applied)	B19 & B6	- PARKING_LED flashes for 10secs - Buzzer sounds for 10secs with 1s interval (1s On, 1s Off) - After 10s , LED and buzzer turn off
B6 (SEAT_SW)	Off(not seated for more than 10sec)		

▶ PTO OPC

INPUT		LOGIC	OUTPUT
B6 (SEAT_SW)	On → Off (for more than 1sec)	(B6 & A3) or (B6 & B19) or (B6 & A11) or (B6 & A9)	- A5 (PTO_RELAY_COIL) Off(PTO stop) - Buzzer sounds for 3 sec and then stop
A3 (REAR_PTO_SW)	Off		
B19 (PARKING_SW)	Off (not applied)		
A11 (BRAKE_SW)	Off (not applied) or On less than 3sec		
A9 (GEAR_N)	Off (range gear engaged)		

▶ STATIONARY PTO OPC

INPUT		LOGIC	OUTPUT
B19 (PARKING_SW)	On (applied)	B6 & B11 & A3 & A9 & (B19 or A11)	- A5(PTO_RELAY_COIL) On(PTO maintains in operation)
B6 (SEAT_SW)	Off (not seated)		
A3 (REAR_PTO_SW)	On		
A9 (GEAR_N)	On (range gear in neutral)		
A11 (BRAKE_SW)	Off → On(for more than 3sec)		
B11 (PTO_SW)	On		

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 35 2025-04-08 오전 9:40:56

▶ SAFETY START OPC

INPUT		LOGIC	OUTPUT
B9 (KEY_SW_ST)	On	B9 & (A9 & A11 & B6 & B11)	- B2 (ST_RELAY_COIL) outputs 12Vs to starter relay
B6 (SEAT_SW)	On (seated)		
B11 (PTO _SW)	Off		
A9 (GEAR_N)	On (range gear engaged)		
A11 (BRAKE_SW)	On (applied)		
A15 (IG+)	ST -> On (Key released from ST to ON)	A15	- B4 (HOLD_COIL) outputs 12Vs to hold coil of stop solenoid and keep holding it.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 36 2025-04-08 오전 9:40:56

4.2.7 PRE-HEATING

▶ **PRE-HEATING ACTIVATION CONDITIONS**

INPUT			LOGIC	OUTPUT
Manual GLOW	A13 (KEY_SW_ GLOW)	Off -> On (more than 0.5sec)	A13 On	- B1 outputs 12Vs to preheating relay. - Turns GLOW_LED_ON lamp on
Pre-heating	A15 (KEY_ON)	On	A15 On	- B1 outputs 12Vs to preheating relay. - Turns GLOW_LED_ON lamp on. - After pre-heating period, turns it off.
Post-heating	A15 (KEY_ON)	On	A15 && B9 && A21	- B1 outputs 12Vs to preheating relay. - GLOW_LED OFF - When the generated voltage is 16±0.9Vs or more or after set post-heating period, turns it off
	B9 (KEY_SW_ST)	On -> Off (5sec later)		
	A21 (BAT_CHAR)	12Vs or more for 80ms to alternator diode		

▶ **PRE-HEATING, POST HEATING AND MAX. CRANKING TIME(SECONDS, FOR 3L123 ENGINE)**

ENGINE COOLANT TEMP. SENSOR	GLOW_LED_ON	PRE-HEATING	MAX. CRANKING	POST HEATING
-15°C or lower	12 ±1	15 ±1	10 ±1	45 ±1
-15°C ~ 40°C	5 ±1	8 ±1	10 ±1	15 ±1
40°C or higher	0	0	1	15 ±1

※ No glow plug heating during cranking.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 37 2025-04-08 오전 9:40:56

4.2.8 BUZZER

▶ BUZZER OPERATION CONDITION

ITEMS	DESCRIPTION
Engine oil pressure warning	If 500RPM or higher engine rpm detected and ENGINE OIL LED is on for more than 3s, then buzzer sounds with 1s cycle(1s On, 1s Off) (Cancelation condition : Less than 500RPM of engine rpm or ENGINE OIL LED is off)
OPC warning	PARK: SEAT_SW is off for 10s or more and PARKING_SW is off, buzzer sounds for 10s with 1s cycle. PTO: SEAT_SW is Off for 1s or more and PTO_SW is on and Range GEAR_N is off, then buzzer sounds for 3s.
Engine overheat warning	When HIGH TEMP WARNING LED flashes, buzzer sounds for 30s with 0.5s cycle (Cancelation condition : HIGH TEMP WARNING LED is off)
Parking brake warning	When PARKING_SW is on and vehicle speed sensor signal is 20±3Hz or more for more than 1s, then buzzer sounds with 1s cycle (Cancelation condition : PARKING_SW is off or no signal from vehicle speed sensor)
Out of fuel warning	When LOW FUEL WARNING LED flashes, buzzer sounds for 6s with 1s cycle (Cancelation condition : LOW FUEL WARNING LED is off)
Roll-over warning (CAN communication)	When roll-over risk increases with CAN message protocol(See chapter 4.2.12), buzzer sounds for 30s with 1s cycle.

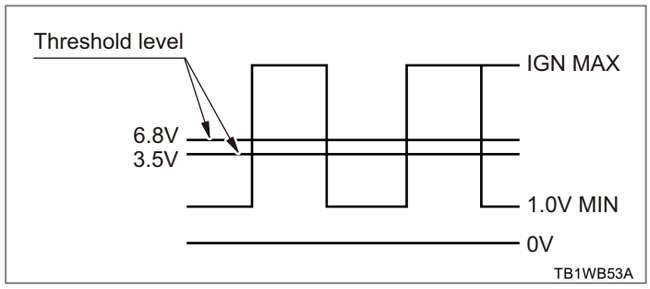
▶ PRIORITY ORDER OF BUZZER WARNING

Roll-over → Engine oil pressure → OPC(PTO > PARK) → Engine over heat → Parking → Out of fuel

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 38 2025-04-08 오전 9:40:56

4.2.9 GAUGES

▶ **RPM GAUGE**

ITEMS	CONDTION
TYPE	Step Motor
Operation Range	XXX°
Scale Range	0 ~ 4,000 RPM
Input Signal	H/W, Pulse
Design	 TB1WB52A
Indication spec	 TB1WB53A

RPM	1000	2000	3000	4000
Frequency(Hz)	247	494	741	988
Tolerance	±50	±80	±100	±100

*1Hz = 4.05 RPM.

- When KEY is on, illuminates the gauge
- When head lights and other lights are on, reduces illuminous intensity to its 70

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 39 2025-04-08 오전 9:40:57

▶ ENGINE TEMP GAUGE

ITEMS	CONDTION
TYPE	Step Motor
Operation Range	90°
Scale Range	60℃ ~ 125℃
Input Signal	H/W
Design	
Indication spec	

	C	C1	C2	C3	M	M1	M2	M3	H
Temp.(℃)	60	68.1	76.3	84.4	92.5	100.6	108.8	116.9	125
Resistance(Ω)	125.05	92.05	67.61	50.22	37.77	30.06	24.81	20.38	15.30

1 ℃ = -0.0001236(resistance)^3 + 0.0313*(Resistance)^2 - 2.787*(Resistance) + 160.562

- Needle Indication Responsivity : Right after key on(A15), should indicate in 3sec.
- The needle should move from 55℃ to 125℃ or from 125℃ to 55℃ within 22s
- When ENG_TEMP_SIG(A19) resistance is less than 25Ω for more than 5secs, ENG_TEMP_ LED flashes by 0.5s cycle
- When KEY is on, illuminates the gauge
- When head lights and other lights are on, reduces illuminous intensity to its 70%

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 40 2025-04-08 오전 9:40:57

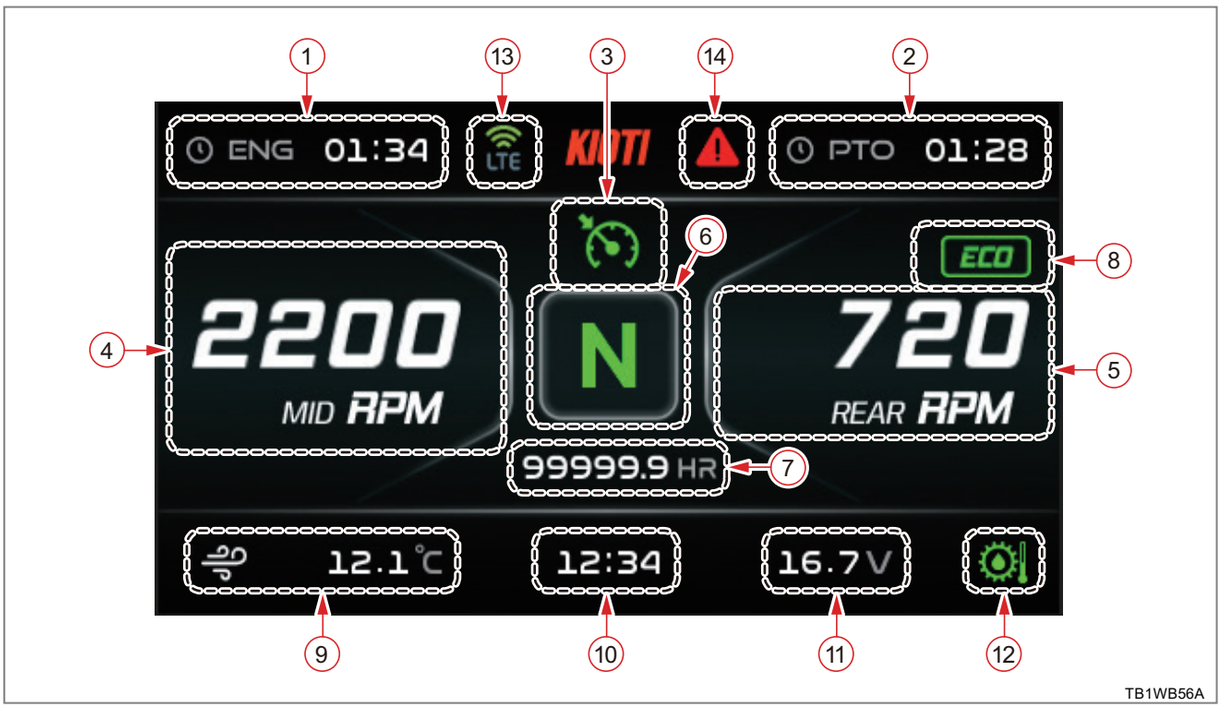
▶ FUEL GAUGE

ITEMS	CONDTION
TYPE	Step Motor
Operation Range	90°
Scale Range	E ~ F
Input Signal	H/W
Design	
Indication spec	<table><tr><td></td><td>C</td><td>C1</td><td>C2</td><td>C3</td><td>M</td><td>M1</td><td>M2</td><td>M3</td><td>H</td></tr><tr><td>Quantity(L)</td><td>5.00</td><td>7.7</td><td>10.4</td><td>13.1</td><td>15.8</td><td>18.5</td><td>21.2</td><td>23.9</td><td>26.6</td></tr><tr><td>Resistance(Ω)</td><td>108.6</td><td>95.7</td><td>70</td><td>57.1</td><td>44.3</td><td>57.1</td><td>31.4</td><td>18.6</td><td>5.8</td></tr></table>*Fuel quantity(L) = -0.21*Resistance(Ω) + 27.8 - Needle Indication Responsivity : 3 sec or less when KEY_ON(A15). -. When key is on(A15) and RPM is less than 500, the needle indication responsivity should be 20s or less from 'E' to 'F'. -. When key is on(A15) and RPM is 500 or higher, the needle indication responsivity should be 5 minutes or less from 'E' to 'F'. - If resistance at A17(FUEL_SIG) is 108Ω or higher for more than 20s, FUEL_LED flashes for 30s by 1s cycle and turns on. - If resistance at A17(FUEL_SIG) is 90Ω or less, -. IG+ is on & RPM is less than 500 for 5s or more, turns off the FUEL-LED -. IG+ is on & RPM is 500 or higher for 5s or more, turns it off - When KEY is on, illuminates the gauge - When head lights and other lights are on, reduces illuminous intensity to its 70%

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 41 2025-04-08 오전 9:40:57

4.2.10 LCD DISPLAY

▶ LAY-OUT OF LCD DISPLAY



No.	DESCRIPTION	REMARK
1	Engine run hour from the latest engine start to engine stop.	Pulse
2	PTO run hour from the latest PTO start to PTO stop.	H/W
3	Cruise Symbol	H/W
4	Mid PTO RPM	Pulse
5	Rear PTO RPM	Pulse
6	Range gear shifting status	H/W
7	Hour Meter	H/W
8	Rear PTO ECO Mode	Pulse
9	Local temperature	CAN
10	Current time	CAN
11	Battery voltage	H/W
12	Transmission oil temperature	A/D
13	TMS communication status	CAN
14	Warning	CAN

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 42 2025-04-08 오전 9:40:57

4.2.11 OPERATION DETAIL OF LCD

▶ ENGINE RUN HOUR

Accumulates time from Engine Start(500RPM or higher) to Engine Stop.

If the driver turns the key off and then back on, it starts from the beginning.

▶ PTO RUN HOUR

Accumulates time from the PTO start(A5, PTO_RELAY_COIL) during engine running. If you turn the key off and then back on, it starts again from the beginning.

f you turn the PTO switch off and then back on, it starts from current accumulated time.

▶ MID PTO RPM

Mid PTO RPM = Engine RPM * 0.68

▶ REAR PTO RPM

Rear PTO RPM = Engine RPM * 0.186

▶ GEAR STATUS

Among the Range gears of L/M/H/N, only N(neutral) is applied for HST tractor.

▶ HOUR METER

If B14(HOUR_METER) is on, accumulates the time from engine Start to engine stop

Maximum displayed hour is 99999.9 and 0.1 hours is 6minutes.

Stops and holds at 99999.9 (cannot be reset).

Maintain accumulated time even when battery is removed (EEPROM memory storage)

▶ REAR PTO ECO MODE

When Engine RPM is 3,000 ±50 with Rear PTO RPM activated, the symbol is activated in green.

▶ LOCAL WHETHER

Displays weather information and current temperature through TMU's CAN message protocol (See chapter 4.2.15)

						
Sunny	Cloudy	Rains	Snows	Thunder	Windy	Foggy

Temperature is displayed as -60.0 to 80.0°C (=-76.0°F to 176.0°F), and temperature units vary depending on CAN data.

▶ CURRENT TIME

Cluster displays time based on information received through TMU's CAN message protocol (See chapter 4.2.12)

Express it as HH:MM.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 43 2025-04-08 오전 9:40:57

▶ TRANSMISSION OIL TEMPERATURE

Convert the resistance value to temperature according to the equation below, and transmit the temperature data (°C) to the TMU via CAN.

$$T(R) = 2.6925 \times (\ln(R))^2 - 66.5993 \times \ln(R) + 375.265$$

Transmission oil temperature symbol on LCD

STATUS	NORMAL	CAUTION	WARNING
Symbol			
Color	Green	Amber	Red
Temp.(°C)	~ 70	70 ~ 85	85 ~
R.(Ω)	435 ~	285 ~ 435	285 ~

Warning level displays warning pop-up on the LCD.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 44 2025-04-08 오전 9:40:57

4.2.12 WARNING POP-UP



TB1WD48A

The warning pop-up appears in the center of LCD for 3 seconds or until termination and is subject to the conditions below.

NORMAL	CAUTION	WARNING	NORMAL
Background color	Black	Black	Black
Font/border color	White	Amber	Red

ITEMS	PHRASE	LEVEL	COLOR	ALARMING TIME
Engine overheating	ENGINE OVERHEATED	Warning	Red	Until termination
Transmission overheating	TRANSMISSION OVERHEATED	Warning	Red	3 seconds
Engine oil pressure	OIL PRESSURE	Warning	Red	Until termination
Out of fuel	LOW FUEL LEVEL	Caution	Amber	3 seconds
Check engine	CHECK ENGINE	Caution	Amber	3 seconds
Roll-over warning	OVERTURN WARNING	Caution	Amber	3 seconds (Re-alarm when the status is maintained for 3 minutes)
DTC	DTC WARNING	Caution	Amber	3 seconds
Consumable replacement notification	PART REPLACEMENT NEEDED	Others	White	3 seconds

Do not display any other information while the pop-up is displayed.

Rollover caution refers to a state in which the vehicle is tilted more than 15° to the left or right for more than 5 seconds.

After rollover pop-up, the symbol at position 14 in the display layout (see chapter 4.2.10) is turned on and turned off when the event ends.

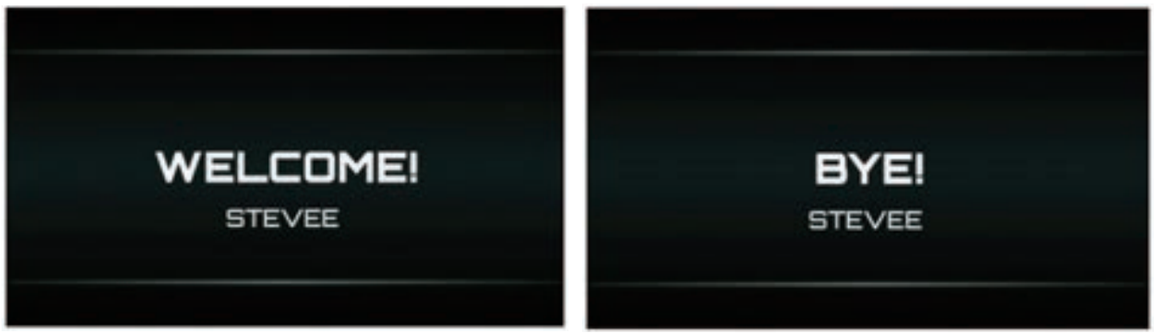
When pop-ups occur simultaneously, pop-ups are displayed in the following order: Warning>Caution>Others.

If pop-ups at the same level occur simultaneously, the pop-ups switch to appear every 3 seconds.

When the key is turned to manual glow(A13, KEY_SW_GLOW) while the engine is running, the current alarm reappears for 3 seconds.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 45 2025-04-08 오전 9:40:58

4.2.13 WELCOMING / CLOSING



TB1WB58A

MESSAGE	DESCRIPTION
Welcoming	- After key on(IG+ ON), displays 'Welcoming' for 3 seconds. - Displays "WELCOME !" and "Nick name". - "Nick name" information comes from TMU, displays maximum 6 letters. - "Nick name" information is saved in the memory(one recent nick name only). - In case of no "Nick name" saved, it is not displayed. - When restarting in 20 seconds after engine stop, does not display welcoming, just displays basic screen.
Closing	- After key off(IG+ OFF), displays CLOSING for 2 seconds. (If the key is turned off before entering into basic screen, CLOSING does not activate) - Displays "BYE !" and "Nick name". - "Nick name" information comes from TMU, displays maximum 6 letters. - "Nick name" information is saved in the memory(one recent nick name only). - In case of no "Nick name" saved, it is not displayed.

4.2.14 TMS COMMUNICATION STATUS

STATUS	CONNECTED	NOT CONNECTED
Symbol	LTE	-
Color	Green	-
CAN ID	0x18FF8A1B	0x18FF8A1B
DATA	0x01	0x00

It is displayed at 13 of display layout(See chapter 4.2.10) according to TMS connection status.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 46 2025-04-08 오전 9:40:58

4.2.15 CAN COMMUNICATION

▶ CAN COMMUNICATION SPECS

- CAN Message Format : Extended CAN
- CAN Transfer Rate : 250 kbps
- Longitudinal resistance 120 Ohm included.

▶ CAN OPERATION

- The TMU connection status is determined depending on whether STATUS1 MSG is received, and if INFO1 or INFO2 MSG is not received within 30 seconds, RQST MSG is sent once.
- RQST MSG follows J1939 Standard Protocol.
- When receiving NULL User Name data from the TMU, the User Name will not be displayed. When receiving FF, the User Name will be displayed only when there is a saved User Name. (NULL: No data, FF: TMS not connected)

▶ CAN MESSAGE PROTOCOL

NAME	CAN ID	CYCLIC TIME (MS}	BYTE	BIT	SIGNAL NAME	LENGTH (BIT)	RX / TX	DESCRIPTION
EEC1	0xCF00414	Engine Speed Dependent	4	1	Engine Speed	16	TMU / Cluster	0.125 RPM/bit 0 offset
ET1	0x18FEEE14	1000	1	1	Engine Coolant Temperature	8	TMU / Cluster	1 deg C/bit, -40 deg C offset
HOURS	0x18FEE514	1000	1	1	Engine Total Hours of Operation	32	TMU / Cluster	0.05 hr/bit, 0 offset
VEP	0x18FEF714	1000	5	1	Electrical Potential (Voltage)	16	TMU / Cluster	0.05 V/bit, 0 offset
TRF1	0x18FEF814	1000	5	1	Transmission Oil Temperature	8	TMU / Cluster	1 deg C/bit, -40 deg C offset
HOURS	0x18FEE514	1000	5	1	PTO Total Hours of Operation	32	TMU / Cluster	0.05 hr/bit, 0 offset
DTC	0x0CFFE914	1000	1	1	Diagnosis Trouble Code	8	TMU / Cluster	0 : Normal Bit1 (1) : Engine Oil Pressure Bit 2 (1) : Engine Check Bit 3 (1) : Battery Charge Bit 4 (1) : HRS Disconnected
RQST	0x18EA1B14	1000	1	1	Retransmission Request	64	TMU / Cluster	Follows the REQUEST & RESPONSE of J1939 STANDARD PROTOCOL.
INFO1	0x18FFDC1B	When booting first time in a day	1	1	User Name	64	Cluster / TMU	ASCII, 6 Capital letters
INFO2	0x18FFDD1B	Every 30 minutes	1	1	Time(hh:mm:ss)	24	Cluster / TMU	0~7 bit : ss 8~15 bit : mm 16~23 bit : hh
INFO2	0x18FFDD1B	Every 30 minutes	4	1	Temperature	16	Cluster / TMU	0~11bit : Temp. range 12bit : 0 Celsius, 1 Fahrenheit Resolution : 0.1 / bit Offset : -76.0

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 47 2025-04-08 오전 9:40:58

NAME	CAN ID	CYCLIC TIME (MS}	BYTE	BIT	SIGNAL NAME	LENGTH (BIT)	RX / TX	DESCRIPTION
INFO2	0x18FFDD1B	Every 30 minute	6	1	Weather Information	4	Cluster / TMU	0 : Sunny 1: Cloudy 2 : Rain 3 : Snow 4 : Thunder 5 : Windy 6: Foggy
ALARM1	0x0CFFE61B	1000	1	1	Rollover Detected 2	2	Cluster / TMU	1 : Rollover caution 3 : Rolled over Others : Normal
ALARM2	0x0CFFE71B	Notify 3 times with 100ms interva	1	1	Part Replacement Alarm	16	Cluster / TMU	0 : Normal 1 : Replacement needed
STATUS1	0x18FF8A1B	1000	2	1	Server Connect Status	1	Cluster / TMU	0 : disconnected 1: connected

4.2.16 DTC

▶ DTC LIST

- Engine Oil Pressure Error (CLUSTER)
- Engine Check Error (CLUSTER)
- Battery Charge Error (CLUSTER)
- HRS Disconnected Error (CLUSTER)
- CAN Error (TMU:Telematics unit)

▶ DTC OCCURRING CONDITION

- Engine Oil Pressure Error :
  When oil pressure drops and ENG_OIL_SW(A20) is on.
- Engine Check Error:
  When engine trouble occurs and ENG_CHK(A24) is on.
- Battery Charge Error:
  When the battery is not charged and BAT_CHAR_LED is on while engine is running.
- HRS Disconnected Error:
  When hour meter switch is not connected and HRS_EN(B14) is open.
- CAN Error / TMU CAN communication Error:
  When there is no message from CLUSTER with Source Address 14

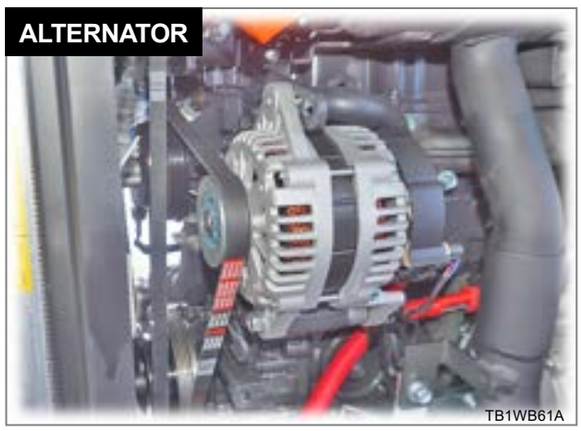
▶ DTC WARNING METHOD

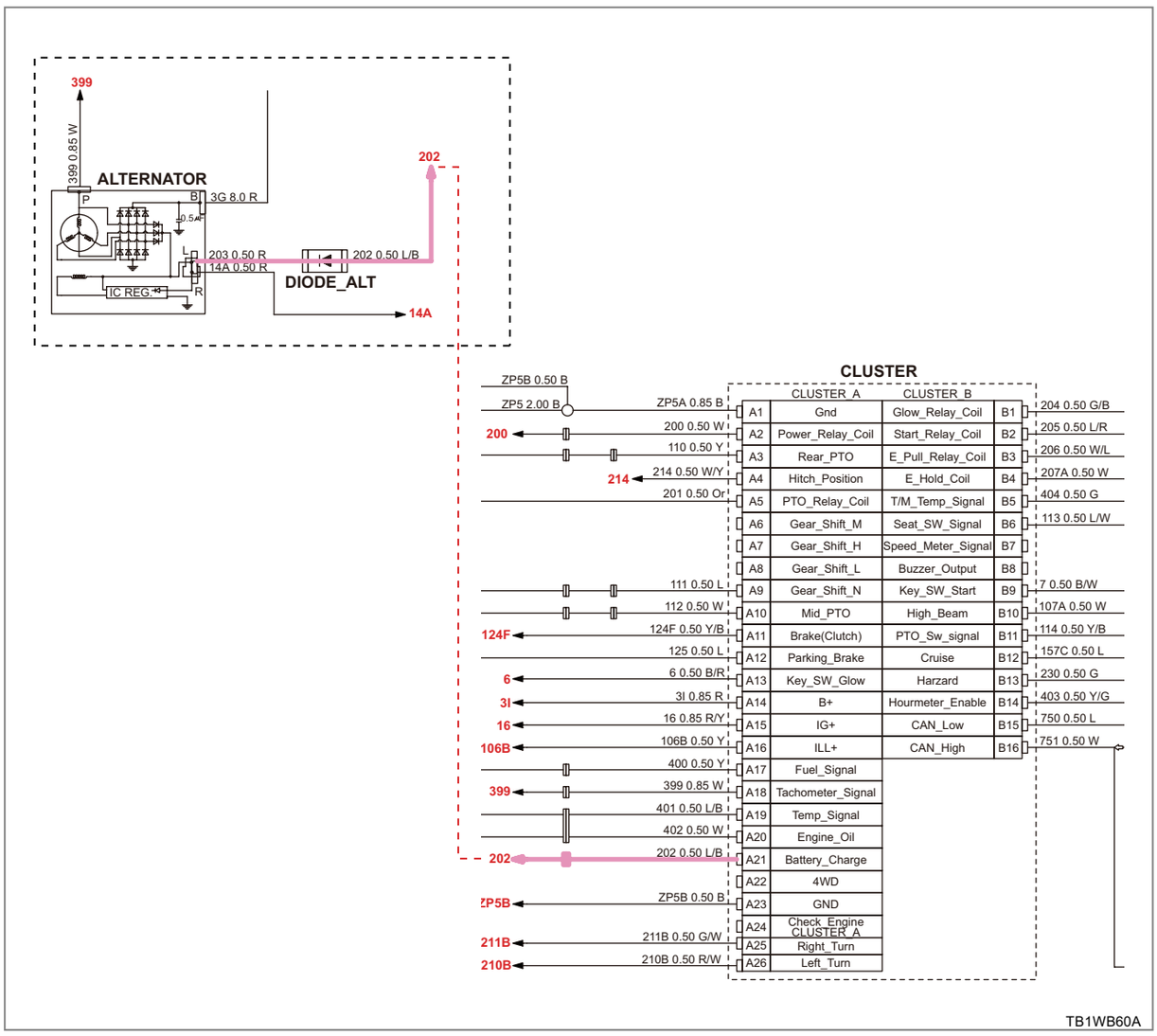
- DTCs generated from CLUSTER appear as a pop-up in the display. (CAN Error DTCs do not appear)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 48 2025-04-08 오전 9:40:58

4.3 CHARGING SYSTEM

When the key is ON before engine running, the Alternator does not generate power then, the electrical current from cluster flows to Diode to turn on the charge warning lamp on the cluster.

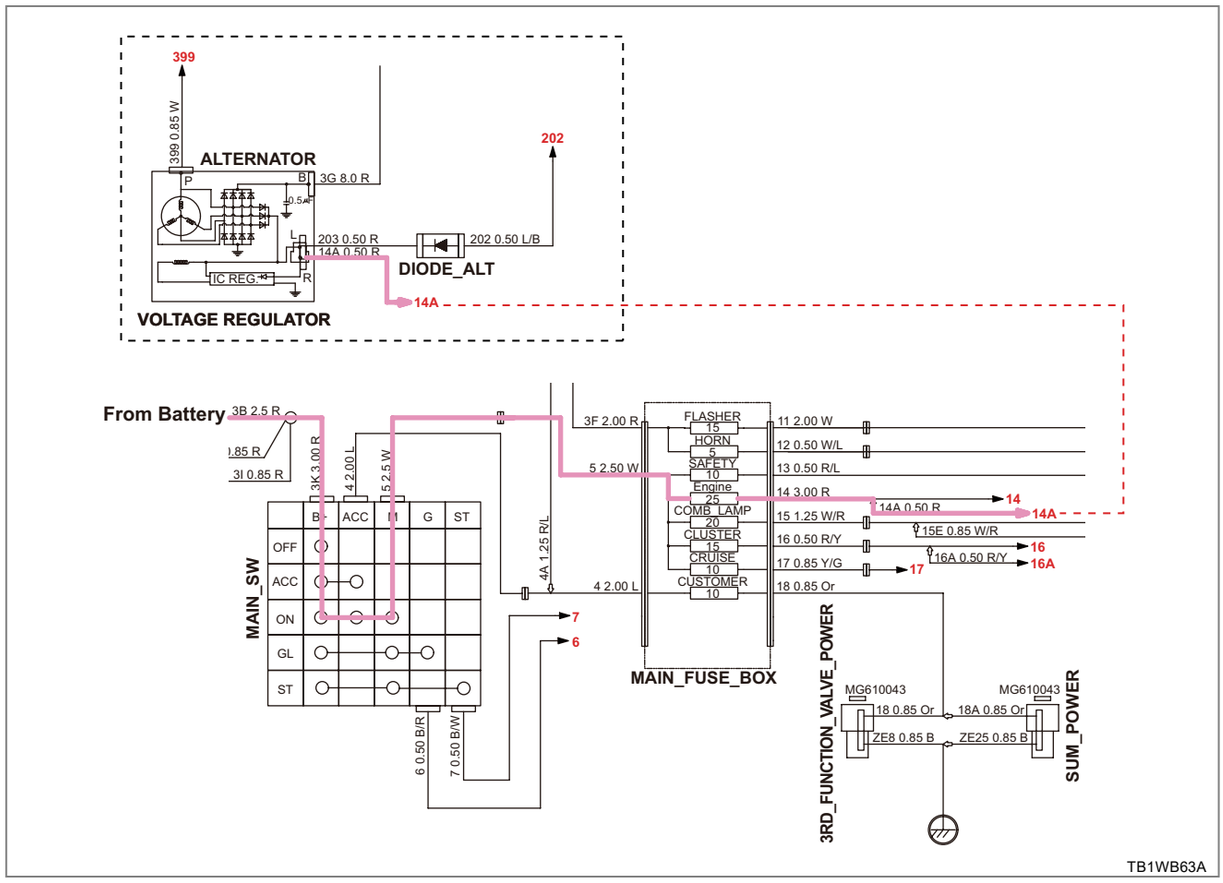




• Charging lamp: A21_Cluster → (Blue/Black) → 202 → Diode → Alternator

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 49 2025-04-08 오전 9:40:59

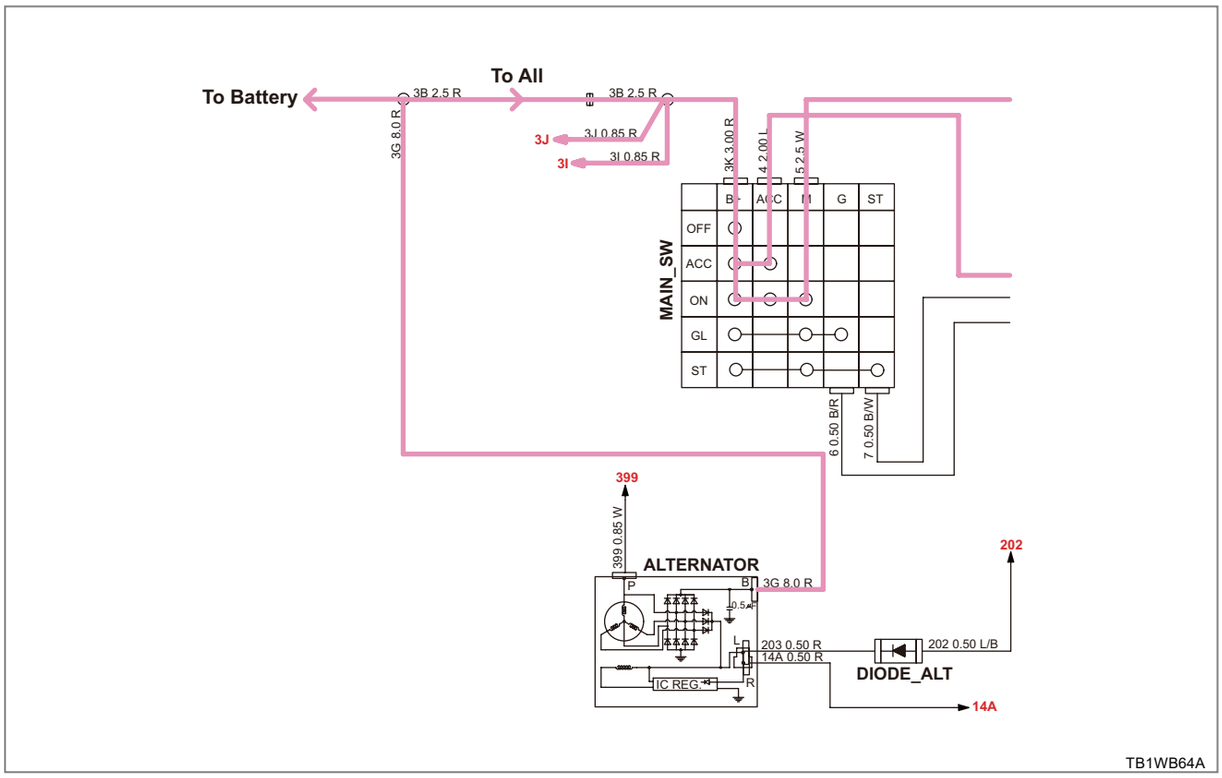
When the key is in ON position , Key_ON power supplied to the voltage regulator in the Alternator then it changes the AC to DC while the Alternator is running.



• Voltage regulator: M_Key → (2.5 White) → Engine fuse(25A)_Main fuse box 1 → (3.0 Red) → Wire branched → 14A → (0.5 Red) → IC Regulator_Alternator

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 50 2025-04-08 오전 9:40:59

After the engine running, the Alternator starts generating current, supplies it to battery and all the circuit of the tractor.



• Generated current: Alternator → (Red) → Wire branched → (3.5 Red) → Battery or all other components.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 51 2025-04-08 오전 9:40:59

4.4 PTO SYSTEM

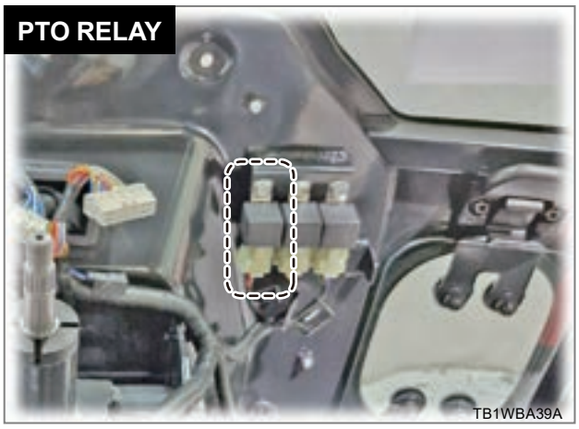
When the operator turns on the PTO SW, the cluster transmits the signal to the PTO relay. For safe PTO operation, some safety conditions should be met. For more information see 4.2(cluster).

PTO SW

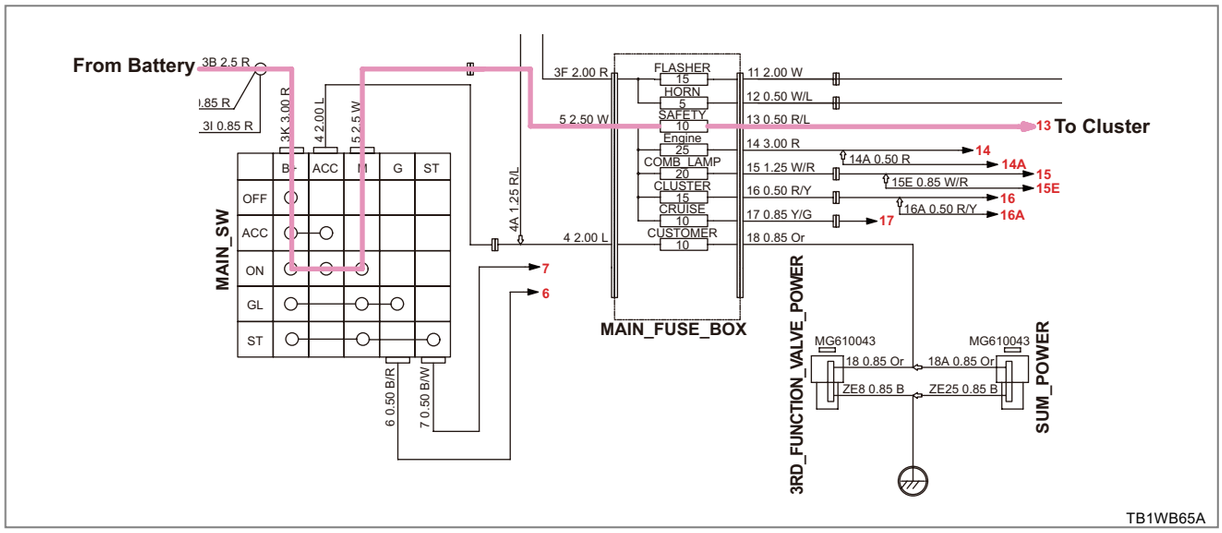


TB1WB81A

PTO RELAY

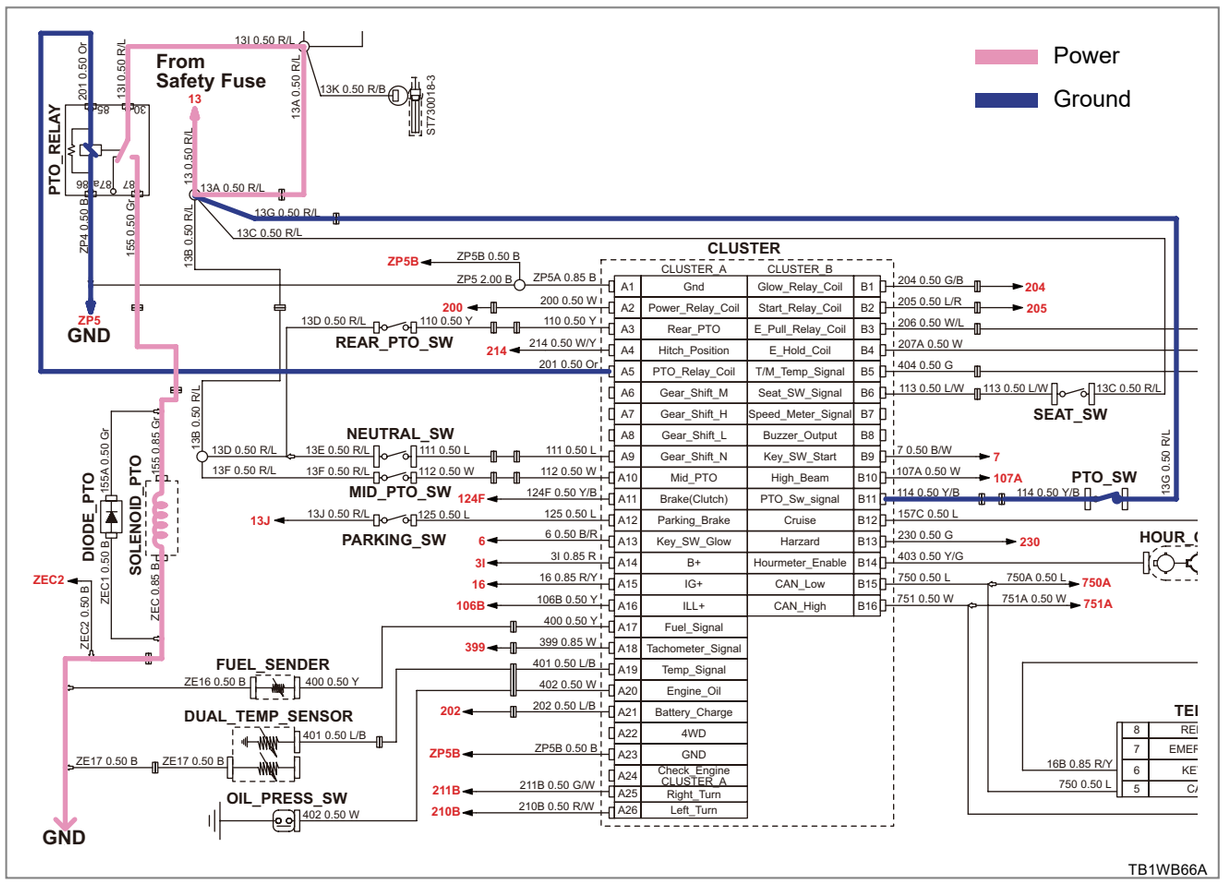


TB1WBA39A



TB1WB65A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 52 2025-04-08 오전 9:41:00



• PTO relay(signal for coil): Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (Red/Blue) → PTO SW → (Yellow/Black) → B11_Cluster → Cluster_A5 → (Orange) → PTO relay coil

• PTO relay(power stand-by): Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (Red/Blue) → Wire branched → (Red/Blue) → PTO relay_stand-by → (Green) → PTO Solenoid(with reverse current blocking diode)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 53 2025-04-08 오전 9:41:00

4.5 CRUISE CONTROL

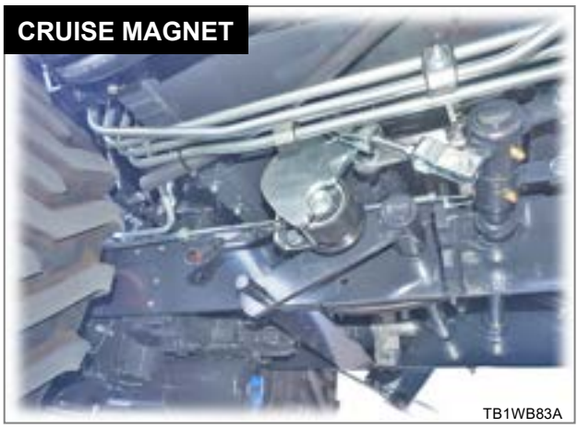
Cruise control should be canceled when the driver presses the brake pedal. Therefore, in addition to Cruise_relay and Cruise_SW, Brake_cruise_relay is also installed.

CRUISE SW



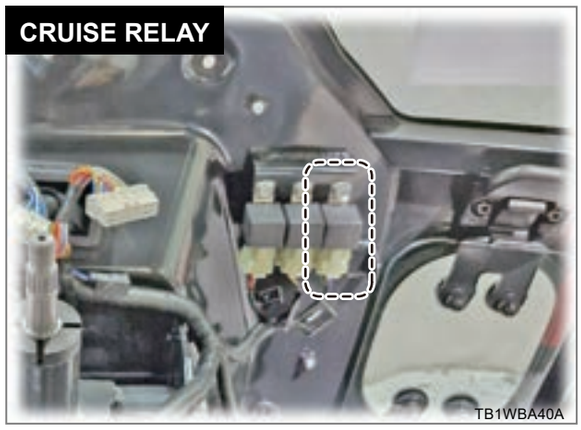
TB1WB82A

CRUISE MAGNET



TB1WB83A

CRUISE RELAY

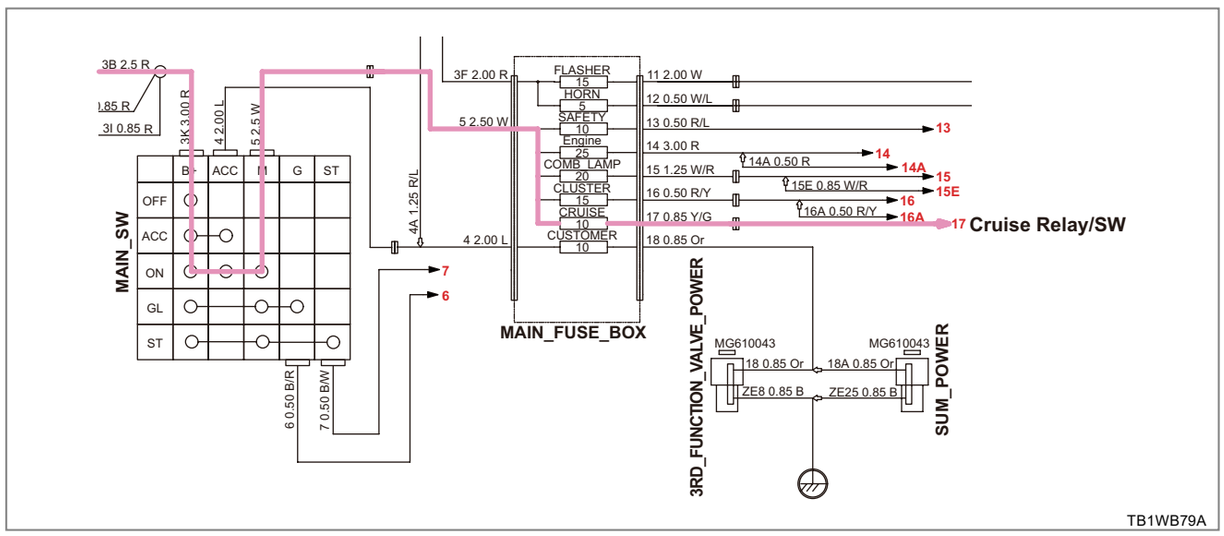


TB1WBA40A

BRAKE CRUISE RELAY

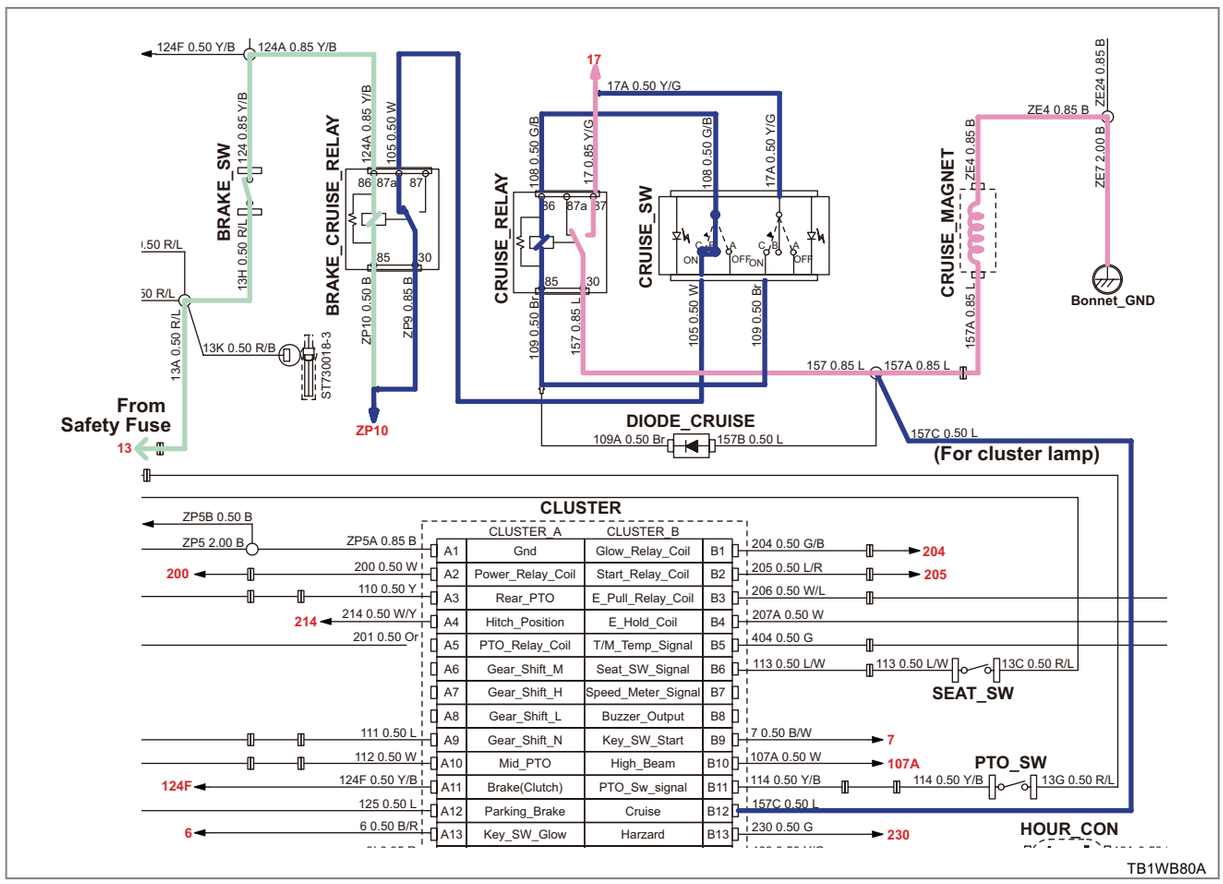


TB1WBA41A



TB1WB79A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 54 2025-04-08 오전 9:41:01



- Cruise relay signal: Key ON_M → (White) → Cruise fuse(15A)_main fuse box1 → (0.85 Yellow/Green) → 17 → Wire branched → (0.5 Yellow/Green) → Cruise_SW → (Brown) → Cruise relay_coil → (Green/Black) → Cruise_SW → (White) → Brake_cruise relay_stand-by

- Cruise relay_power stand-by : Key ON_M → (White) → Cruise fuse(15A)_main fuse box1 → (0.85 Yellow/Green) → 17 → Cruis relay_stand-by → (0.85 Blue) → Cruise magnet(with reverse blocking diode), → Wire branched → (0.5 Blue) → B12_cluster_cruise LED

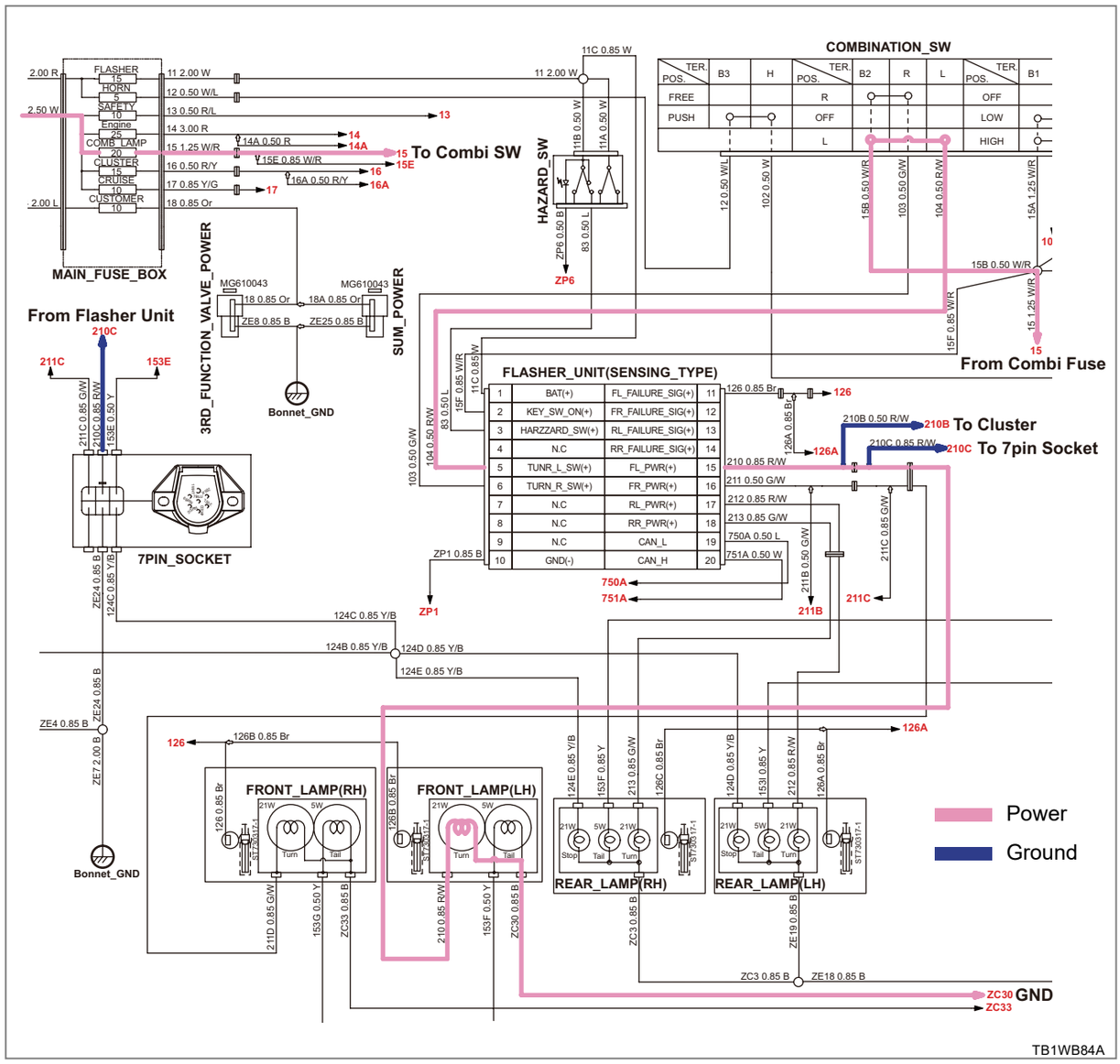
- Brake_cruise relay_ coil signal: Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (Red/Blue) → Brake_SW → (Yellow/Black) → Wire branched → (Yellow/Black) → Brake_Cruise relay_coil signal

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 55 2025-04-08 오전 9:41:01

4.6 FLASHER UNIT

4.6.1 TURN SIGNAL LAMP WITH FLASHER UNIT

The flasher unit functions to cause the left and right turn signal lamps to blink instead of staying on when the driver signals a left or right turn.



- Turn signal lamp(LEFT FRONT): Key ON_M → (White) → Comb-lamp fuse(15A)_main fuse box1 → (1.25 White/Red) → 15 → Wire branched → (0.85 White/Red) → B2_CombSW_Turn_L → (0.5 Red/White) → Pin#5_Flasher Unit_Pin#15 → (Red/White) → Turn signal lamp(front left)

- Turn signal lamp(LEFT REAR): Same as above → Pin#5_Flasher Unit_Pin#17 → (Red/White) → Turn signal lamp(LEFT REAR)

- Turn signal lamp signal to Cluster(LEFT): Key ON_M → (White) → Comb-lamp fuse(15A)_main fuse box1 → (1.25 White/Red) → 15 → Wire branched → (0.85 White/Red) → B2_CombSW_Turn_L → (0.5 Red/White) → Pin#5_Flasher Unit_Pin#15 → (0.85 Red/White) → Wire branched → 210B → (0.5 Red/White) → A26_Cluster

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 56 2025-04-08 오전 9:41:01

• Turn signal lamp to 7 pin socket(LEFT): Key ON_M → (White) → Comb-lamp fuse(15A)_main fuse box1 → (1.25 White/Red) → 15 → Wire branched → (0.85 White/Red) → B2_CombSW_Turn_L → (0.5 Red/White) → Pin#5_Flasher Unit_Pin#15 → (0.85 Red/White) → Wire branched → 210C → (0.85 Red/White) → 7 pin socket

COMBI SW



TB1WB85A

TAIL LIGHTS



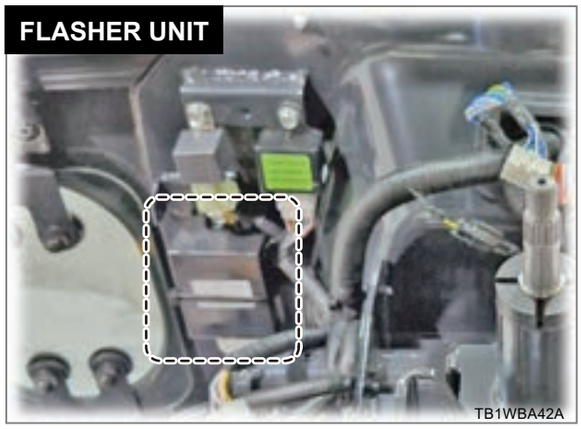
TB1WB86A

SIDE LIGHTS



TB1WB87A

FLASHER UNIT



TB1WBA42A

• Turn signal lamp(RIGHT FRONT): Key ON_M → (White) → Comb-lamp fuse(15A)_main fuse box1 → (1.25 White/Red) → 15 → Wire branched → (0.85 White/Red) → B2_CombSW_Turn_R → (0.5 Green/White) → Pin#6_Flasher Unit_Pin#16 → (Red/White) → Turn signal lamp(front right)

• Turn signal lamp(RIGHT REAR): Same as above → Pin#6_Flasher Unit_Pin#18 → (Green/White) → Turn signal lamp(RIGHT REAR)

• Turn signal lamp signal to Cluster(RIGHT): Key ON_M → (White) → Comb-lamp fuse(15A)_main fuse box1 → (1.25 White/Red) → 15 → Wire branched → (0.85 White/Red) → B2_CombSW_Turn_R → (0.5 Green/White) → Pin#6_Flasher Unit_Pin#16 → (0.85 Green/White) → Wire branched → 211B → (0.5 Green/White) → A25_Cluster

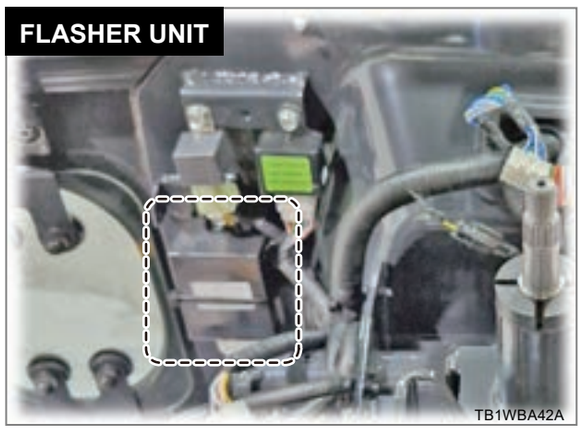
• Turn signal lamp to 7 pin socket(RIGHT):): Key ON_M → (White) → Comb-lamp fuse(15A)_main fuse box1 → (1.25 White/Red) → 15 → Wire branched → (0.85 White/Red) → B2_CombSW_Turn_R → (0.5 Green/White) → Pin#6_Flasher Unit_Pin#16 → (0.85 Green/White) → Wire branched → 211C → (0.85 Green/White) → 7 pin socket

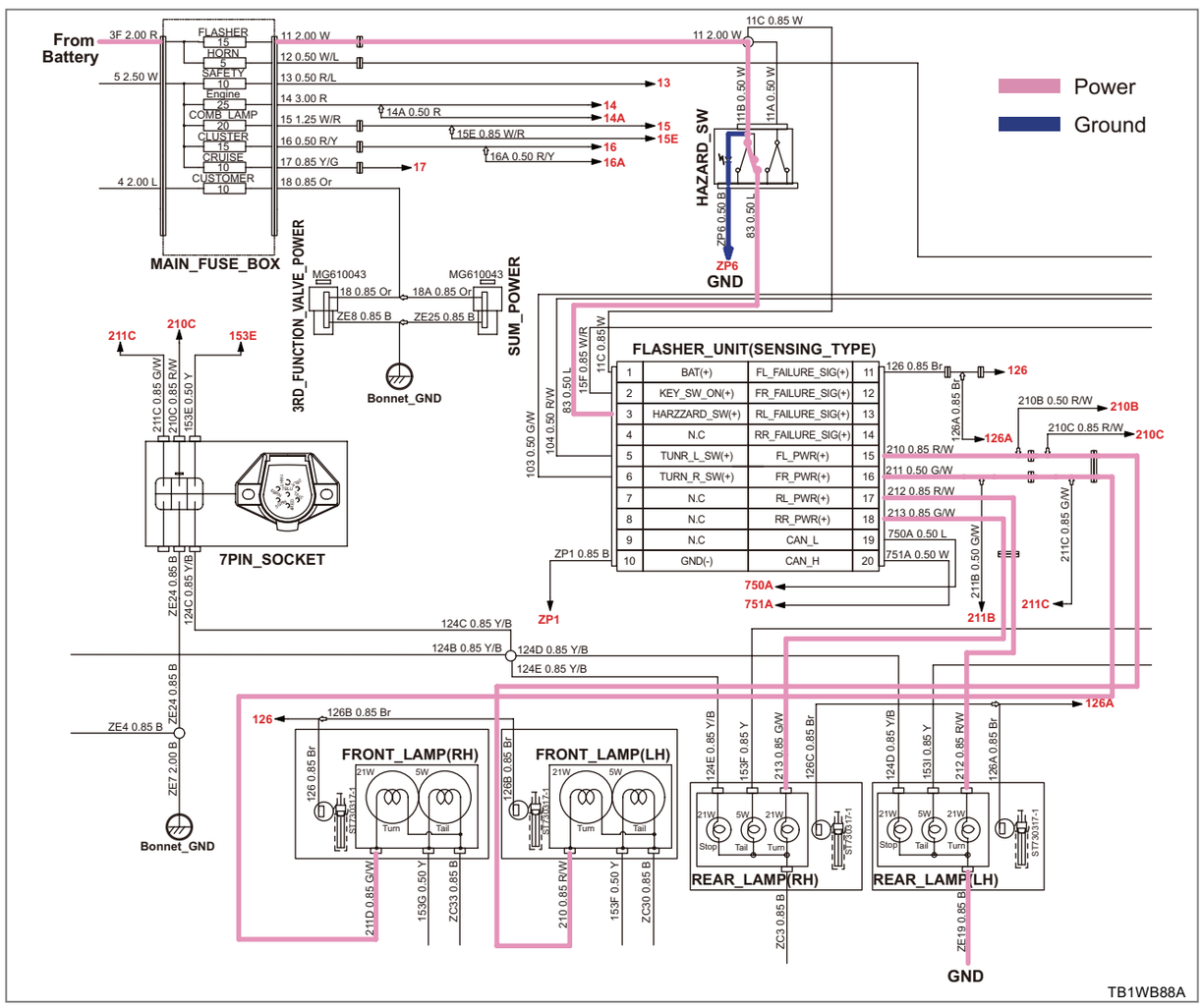
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 57 2025-04-08 오전 9:41:02

4.6.2 FLASHER LIGHTS

It also operates the left and right turn signal lights to blink simultaneously when the driver turns on the emergency flasher switch. This works while the key is off







- Flasher activation signal and power: Bettery+ → 60A main fuse → (3.0 Red) → Flasher fuse(15A)_main fuse box1 → (2.0 White) → Wire branched → (0.5 White) → Flasher SW → (Blue) → Pin#3_Flasher Unit → Flasher Unit_Pin#15~18 → (Red/White for front or Green/White for rear) → Turn signal lamps

- Flasher SW lamp : Battery+ → 60A main fuse → (3.0 Red) → Flasher fuse(15A)_main fuse box1 → (2.0 White) → Wire branched → (0.5 White) → Flasher SW_SW lamp → (Black) → ZP2 → Ground

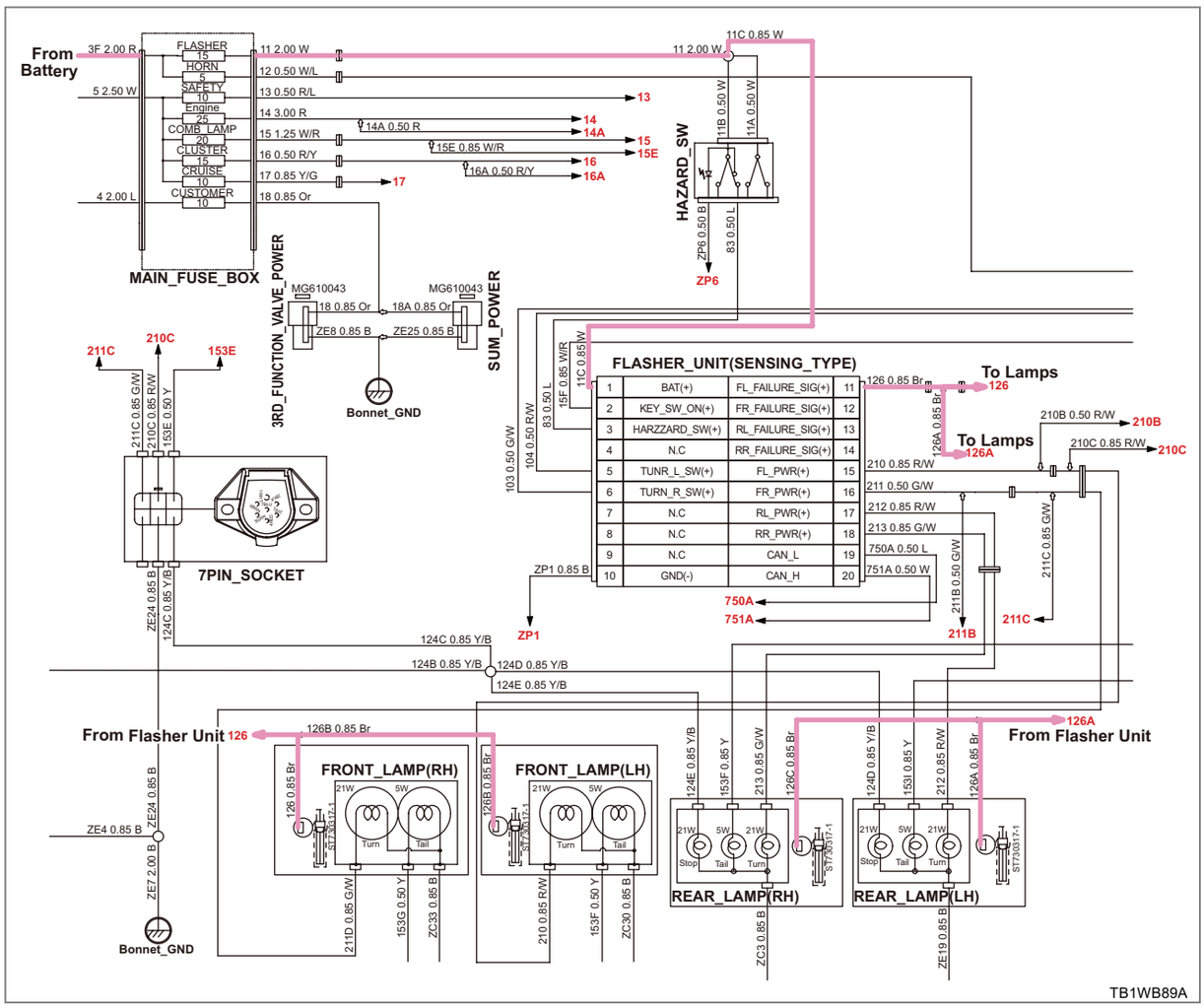
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 58 2025-04-08 오전 9:41:02

4.6.3 SEQUENCE LIGHTS WITH FLASHER UNIT

It also supports a sequence light function.





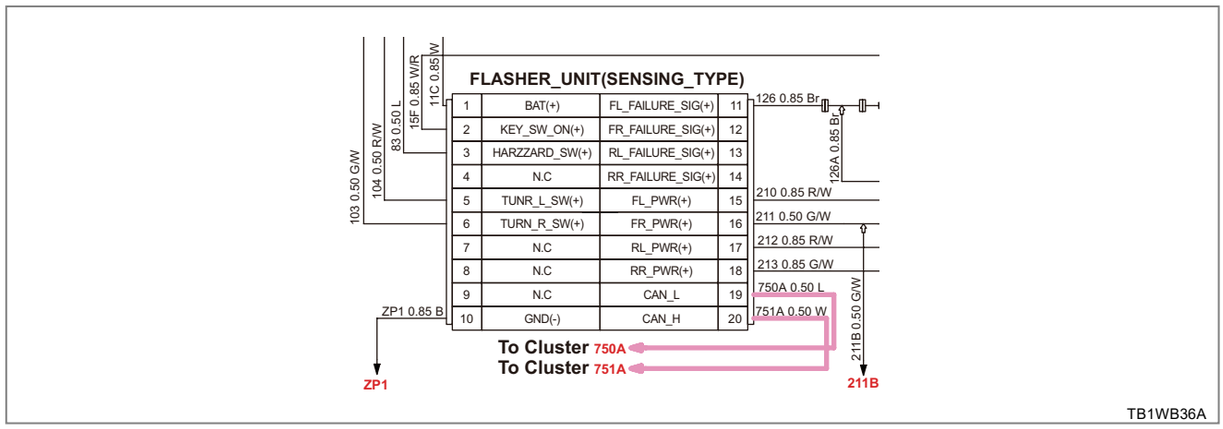


• Flasher unit_Failure signal: Bettery+ → 60A main fuse → (3.0 Red) → Flasher fuse(15A)_main fuse box 1 → (2.0 White) → Wire branched → (0.85 White) → Pin#1_Flasher Unit_Pin#11 → (Brown) → 126 and 126A → Front daylights and Rear daylights

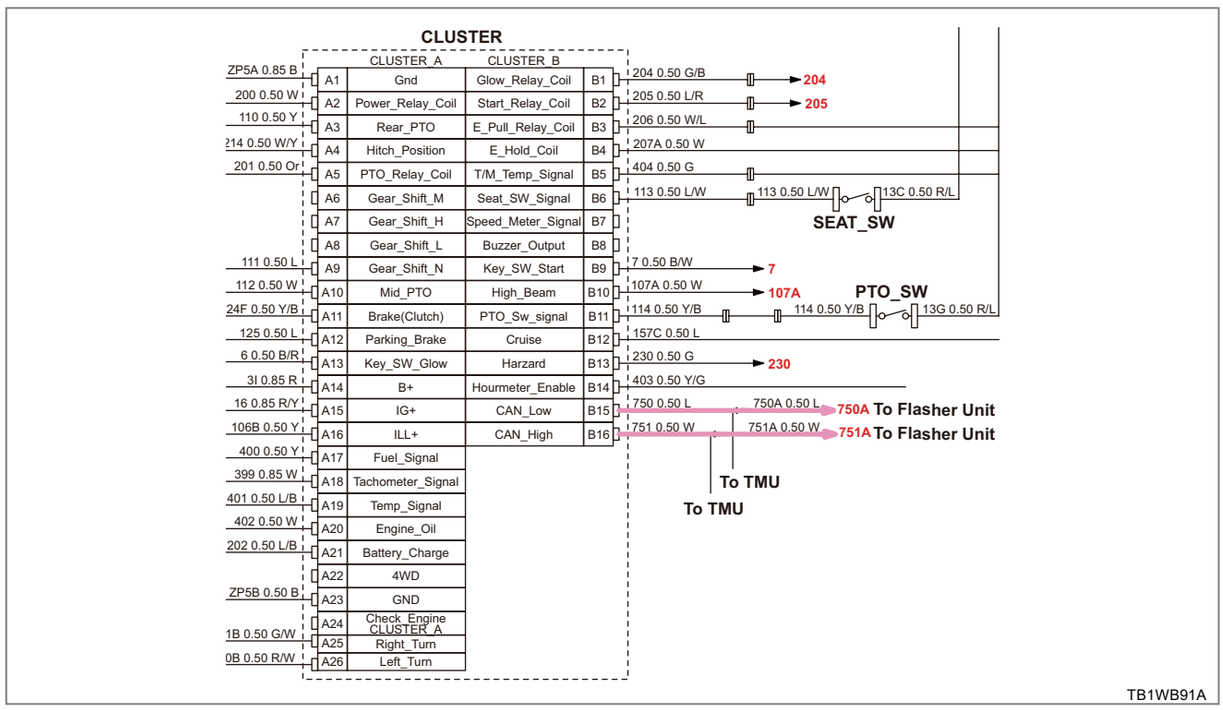
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 59 2025-04-08 오전 9:41:03

4.6.4 CAN COMMUNICATION WITH FLASHER UNIT

Flasher unit communicates with Cluster via CAN communication channels so that the flasher lights activated while CAN communication.



TB1WB36A



TB1WB91A

• CAN communication with Cluster(LEFT): Flasher unit_Pin#19 → (Blue) → 750A → B15_Cluster_CAN L

• CAN communication with Cluster(RIGHT): Flasher unit_Pin#20 → (White) → 751A → B16_Cluster_CAN R

• CAN communication indication lights: Same as flasher light operation(See 4.6.2)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 60 2025-04-08 오전 9:41:03

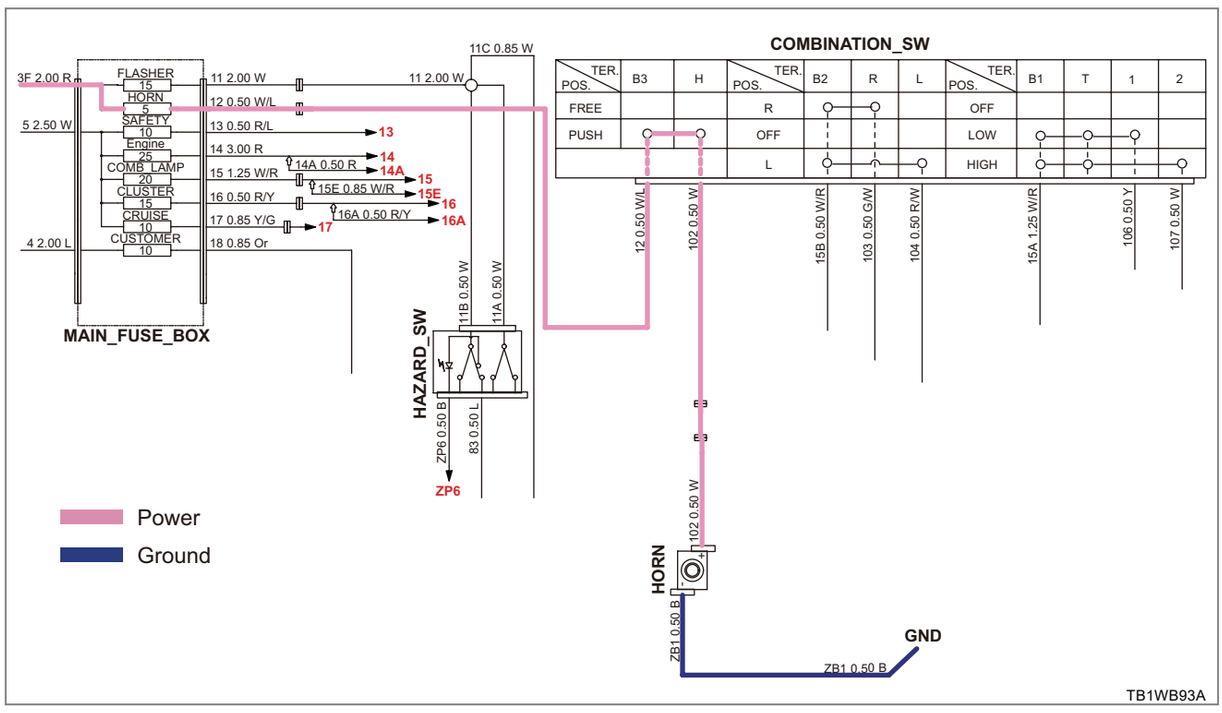
4.7 COMBINATION SWITCH

4.7.1 HORN

When the driver presses the horn button on the combination switch, the horn sounds even if the key is turned off.







• Horn : Bettery+ → 60A main fuse → (3.0 Red) → Horn fuse(5A)_main fuse box1 → (White/Blue) → B3_Horn button_Combination SW_H → (White) → Horn(with reverse current blocking diode)

4.7.2 TURN SIGNA

See 4.6.1 Turn signal lamp with flasher unit

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 61 2025-04-08 오전 9:41:04

4.7.3 HEAD LIGHTS LOW BEAM

When the operator turns the lighting lever of the combination switch one step, the headlight low beams turn on.

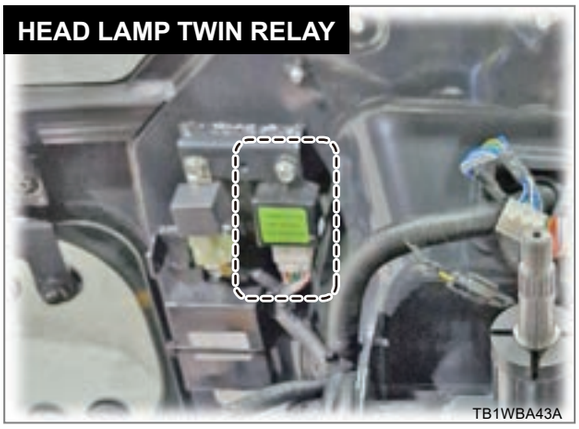
HEAD LAMP



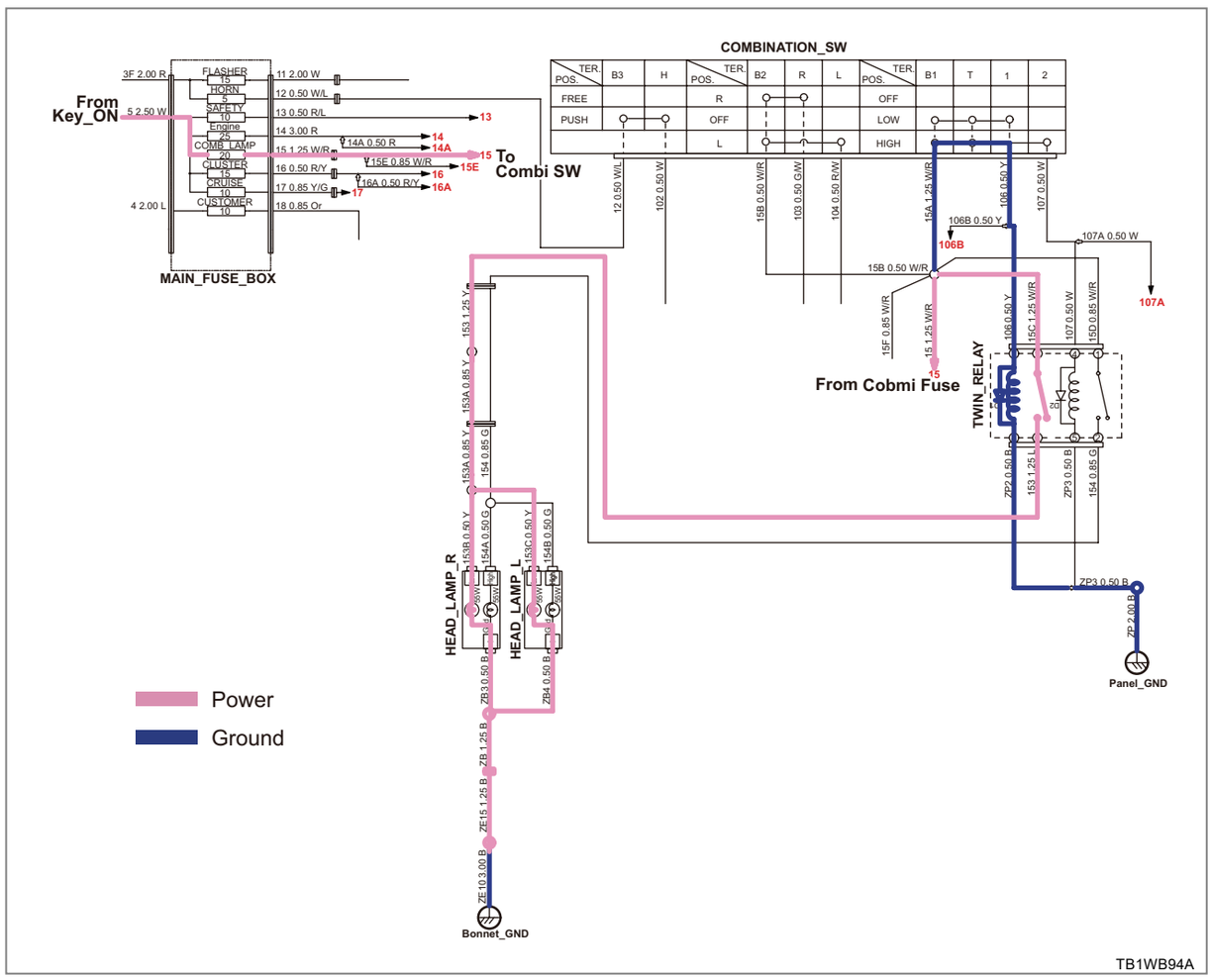
FUSE BOX 1, 2



HEAD LAMP TWIN RELAY



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 62 2025-04-08 오전 9:41:04



• Head lights(low beam signal) : Key on_M → (2.5 White) → ComB_Lamp fuse(20A) → (1.25 White/Red) → 15 → Wire branched → (1.25 White/Red) → B1_Cpmbination_SW_Pin#1 → (0.5 Yellow) → Twin relay_coil

• Head lights(low beam signal to Cluster) : Same as above → B1_Cpmbination_SW_Pin#1 → (0.5 Yellow) → Wire branched → (Yellow) → 106B → A16_cluster_ILL+

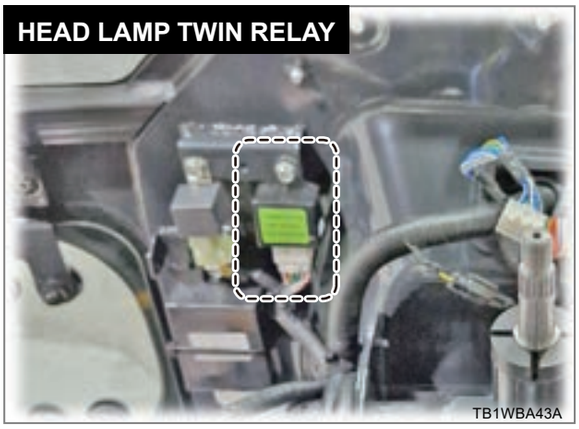
• Head lights(low beam power stand-by) : Key on_M → (2.5 White) → ComB_Lamp fuse(20A) → (1.25 White/Red) →15 → Wire branched → (1.25 White/Red) → Twin relay_Stand-by → (Yellow) → Head lamp(LH), Head lamp(RH)

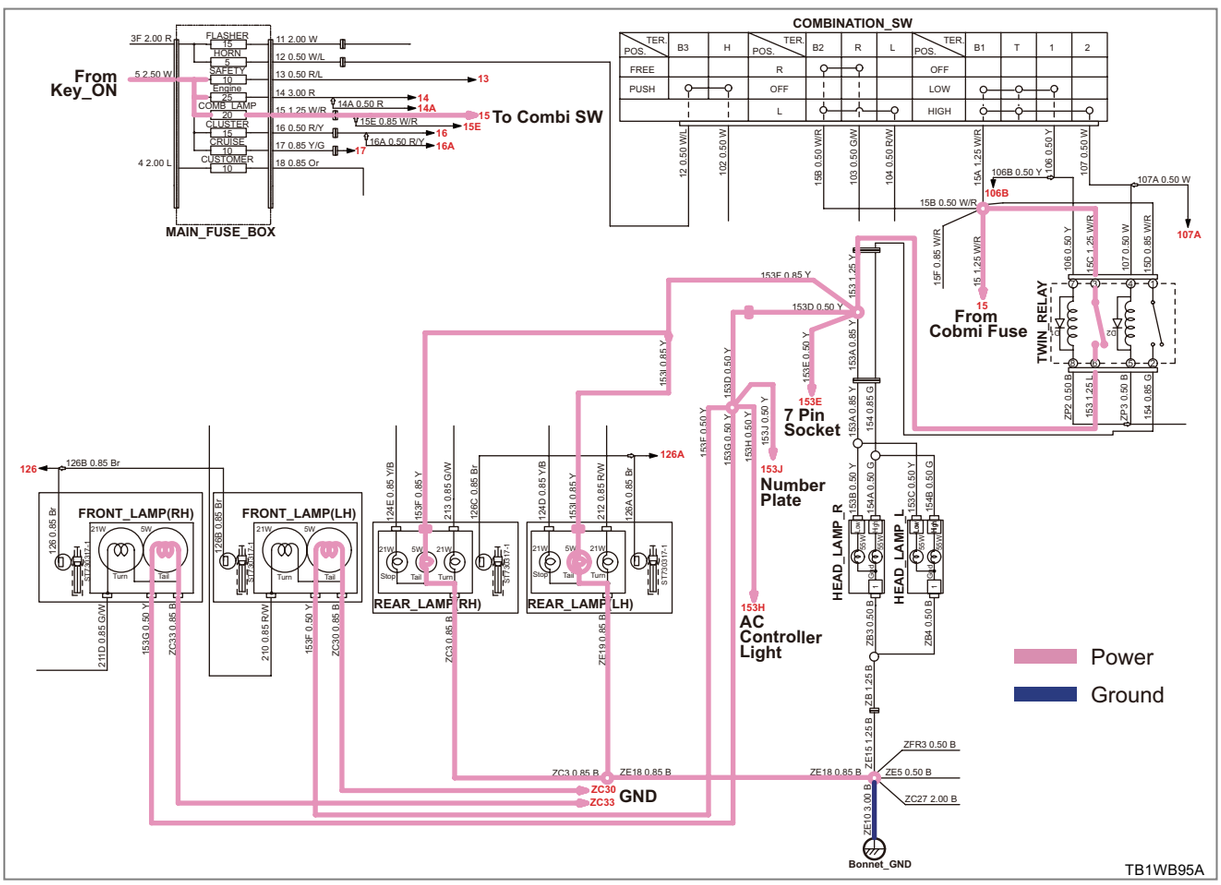
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 63 2025-04-08 오전 9:41:05

4.7.4 OTHER LIGHTS(TAIL/SIDE/NUMBER PLATE/7 PIN SOCKET/AC CONTROLLER LIGHT

When the operator turns the lighting lever of the combination switch one step, the tail lights, side lights, number plate lights, air conditioner control panel light turn on simultaneously.

HEAD LAMP TWIN RELAY


TB1WBA43A



TB1WB95A

- Tail/Side lights (power stand-by) : Key on_M → (2.5 White) → ComB_Lamp fuse(20A) → (1.25 White/Red) → 15 → Wire branched → (1.25 White/Red) → Twin relay_Stand-by → (1.25 Yellow) → Wire branched → (0.5 Yellow) → Wire branched → (0.5 Yellow) → Tail lamps(LH/RH), Side lamps(LH/RH)

- Light power to 7 pin socket: Same as above → Twin relay_Stand-by → (1.25 Yellow) → Wire branched → (0.5 Yellow) Wire branched → (0.5 Yellow) → 153C → 7 pin socket

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 64 2025-04-08 오전 9:41:05

• Number plate: Same as above → Twin relay_Stand-by → (1.25 Yellow) → Wire branched → (0.5 Yellow) → Wire branched → (0.5 Yellow) → 153J → Number plate light L, Number plate light R

• AC controller light: Same as above → Twin relay_Stand-by → (1.25 Yellow) → Wire branched → (0.5 Yellow) → Wire branched → (0.5 Yellow) → 153H → Pin#6_AC controller

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 65 2025-04-08 오전 9:41:05

4.7.5 HEAD LIGHT HIGH BEAM

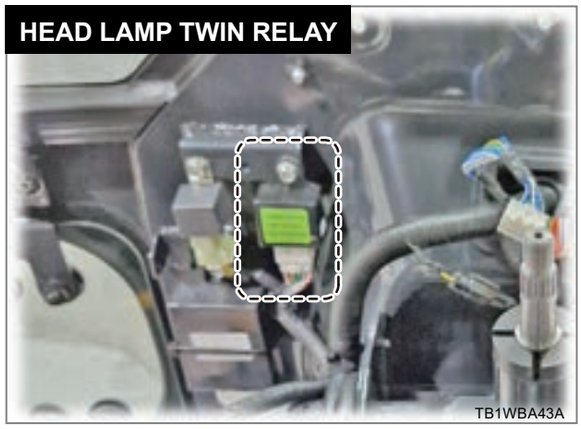
When the operator turns the lighting lever of the combination switch two steps, the headlight high beam turn on.

FUSE BOX 1, 2

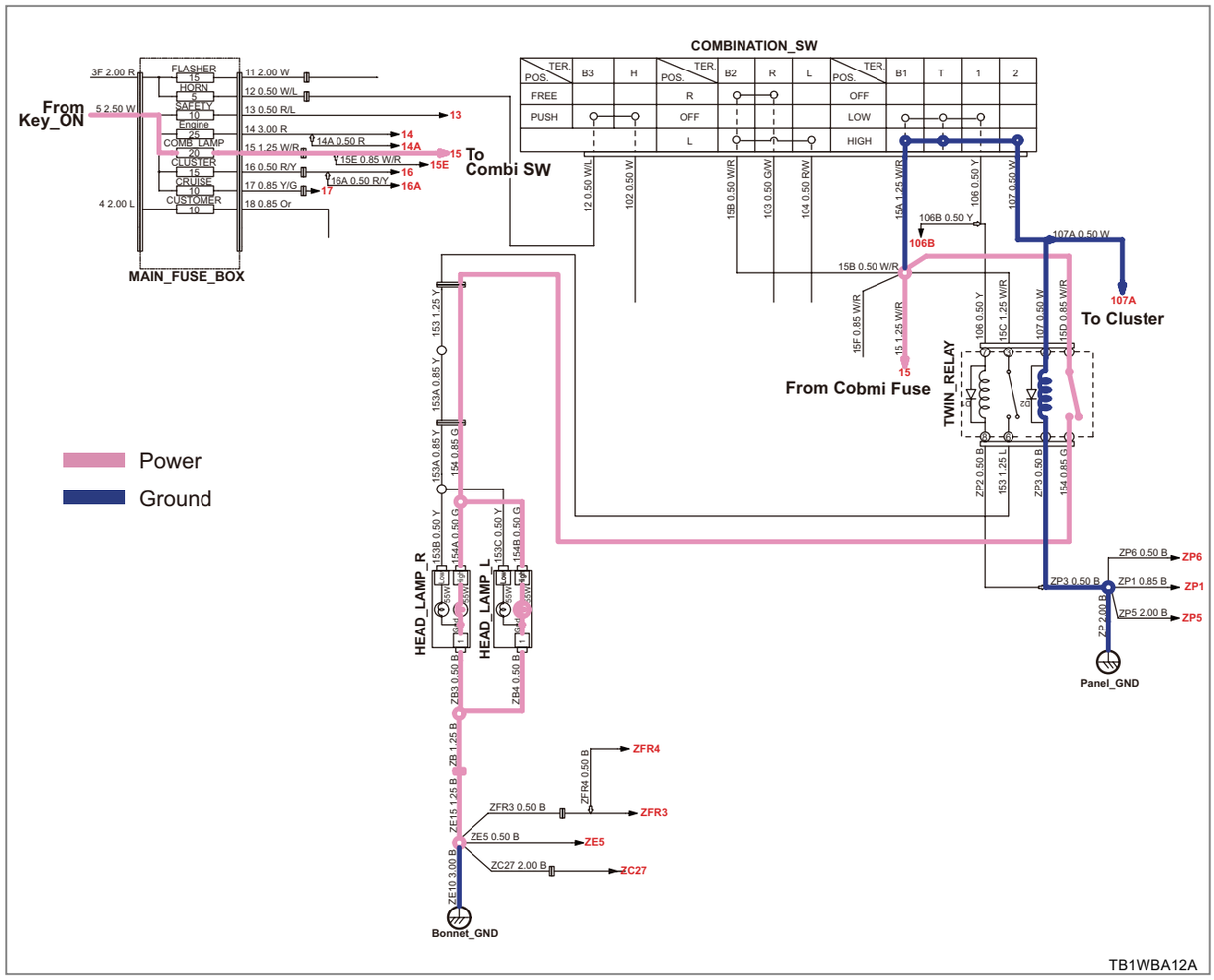


TB1WBA11A

HEAD LAMP TWIN RELAY



TB1WBA43A



• Head lights(high beam signal) : Key on_M → (2.5 White) → ComB_Lamp fuse(20A) → (1.25 White/Red) → 15 → Wire branched → (1.25 White/Red) → B1_Cpmbination_SW_Pin#2 → (0.5 White) → Twin relay_coil

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 66 2025-04-08 오전 9:41:06

• Head lights(high beam signal to Cluster) : Same as above → B1_Cpmbination_SW_Pin#2 → (0.5 White) → Wire branched → (White) → 107A → B10_cluster_high beam

• Head lights(high beam power stand-by) : Key on_M → (2.5 White) → ComB_Lamp fuse(20A) → (1.25 White/Red) → 15 → Wire branched → (1.25 White/Red) → Twin relay_Stand-by → (Green) → Head lamp(LH), Head lamp(RH)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 67 2025-04-08 오전 9:41:06

4.8 WIPERS AND WASHER PUMPS

4.8.1 FRONT WIPER

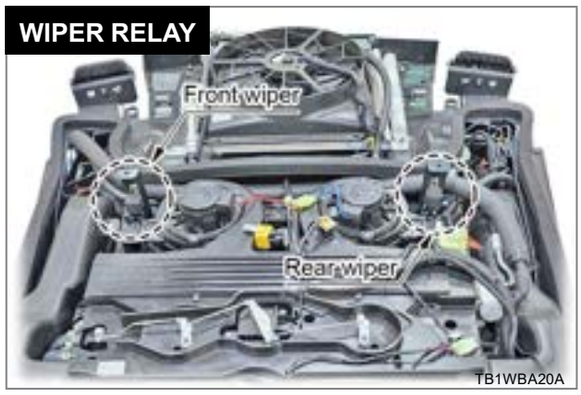
Front and rear wipers are equipped with each washer motors. When the key is on, the cluster sends signal to power relay, then it transmits the battery power to wiper, defogger, AC condenser, cigar jack power socket, beacon lamp, and ETC.

POWER RELAY

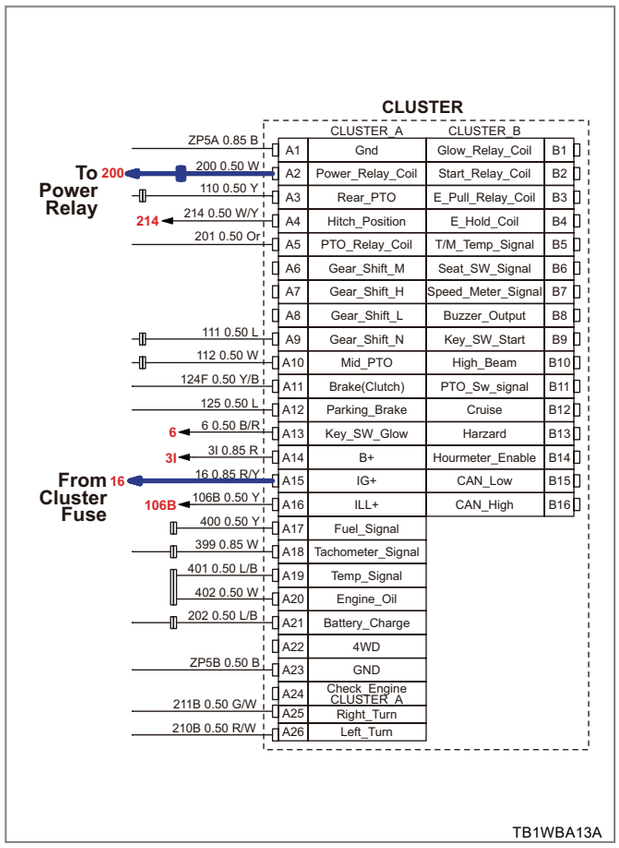


TB1WBA19A

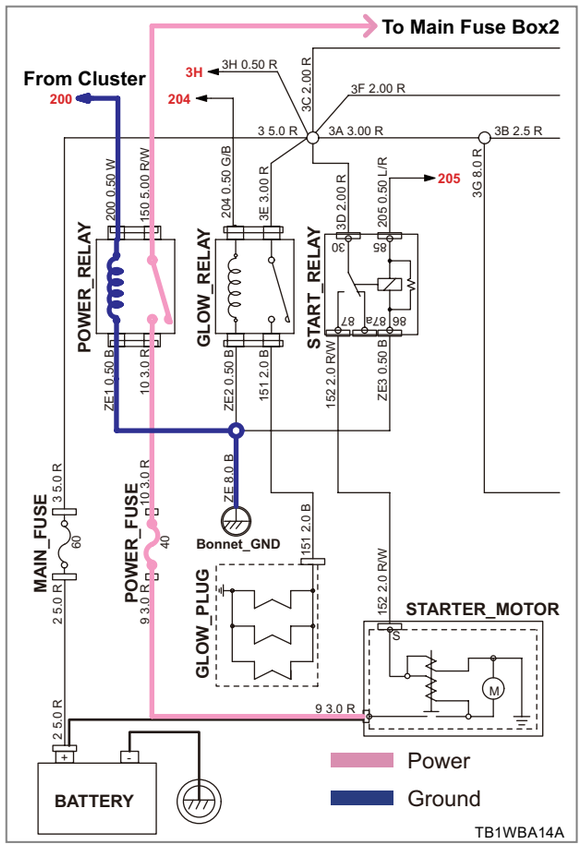
WIPER RELAY



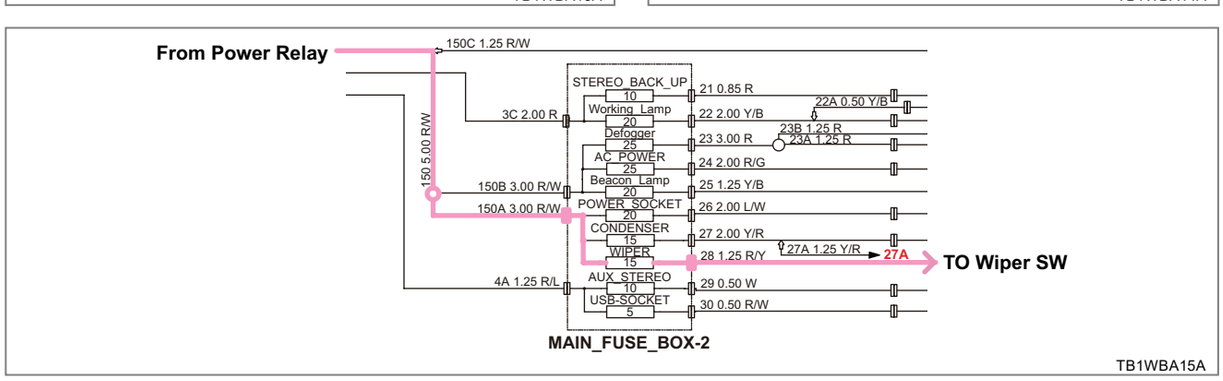
TB1WBA20A



TB1WBA13A



TB1WBA14A

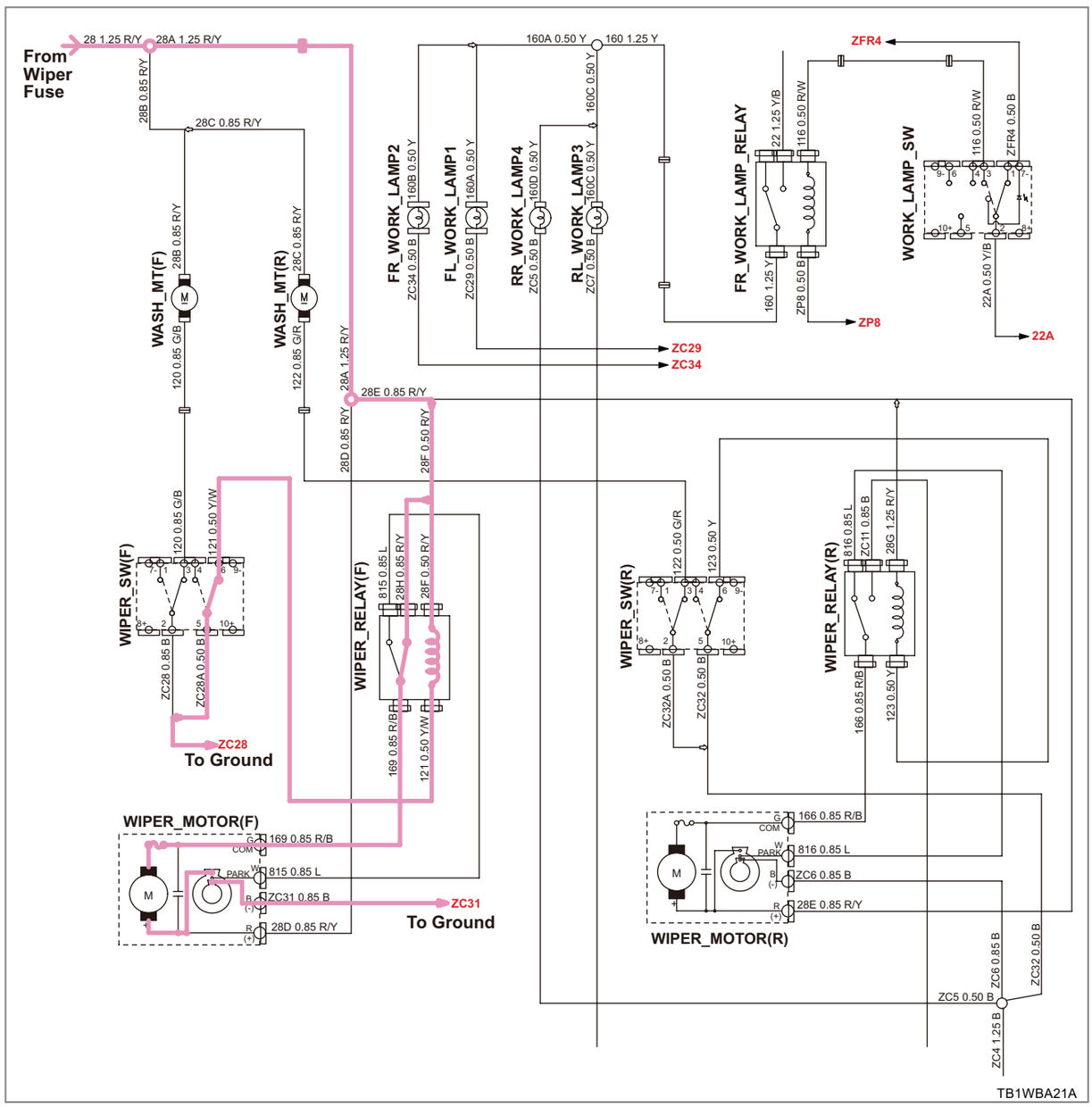


TB1WBA15A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 68 2025-04-08 오전 9:41:06

• Power relay (Signal): Key-on_M → (2.5 White) → Cluster fuse(15A)_main fuse box1 → (0.85 Red/Yellow) → 16 → A15_Cluster_A2 → (0.5 White) → Power relay_coil

▶ FRONT WIPER NORMAL OPERATION



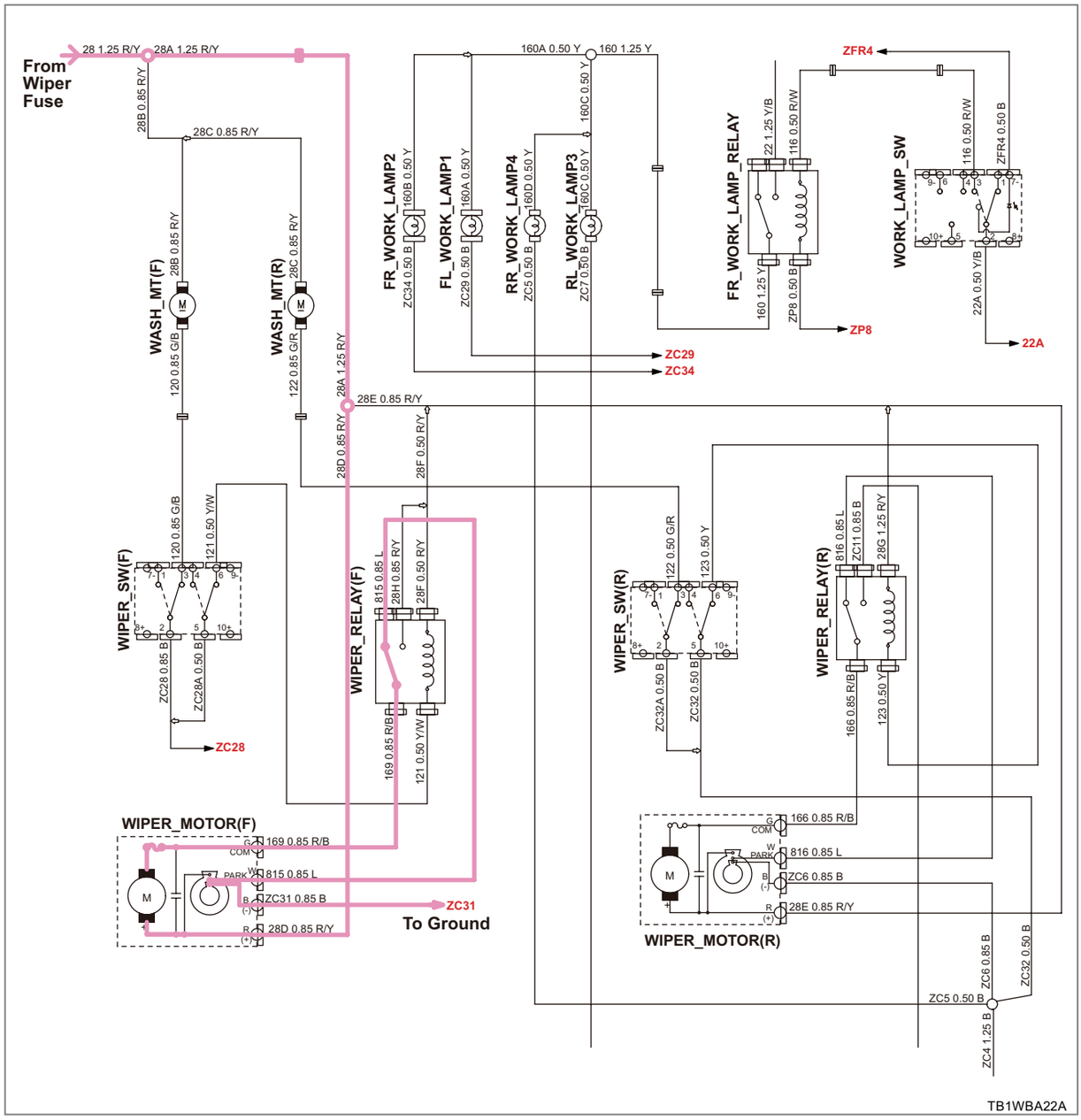
• Front wiper(coil signal): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Wiper fuse(15A)_main fuse box 2 → (1.25 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Front wiper relay_coil → (0.5 Yellow/White) → Front wiper SW

• Front wiper(Stand-by power): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Wiper fuse(15A)_main fuse box 2 → (1.25 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Front wiper relay(F)_power stand-by → (0.85 Red/Black) → Wiper motor(F) → (0.85 Black) → ZC31 (Ground)

Even if the driver turns off the wiper switch when the wiper is in the center of the windshield, the wiper always returns to its initial position. Here, we will call this the wiper return circuit.31 (Ground)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 69 2025-04-08 오전 9:41:07

▶ FRONT WIPER RETURN OPERATION



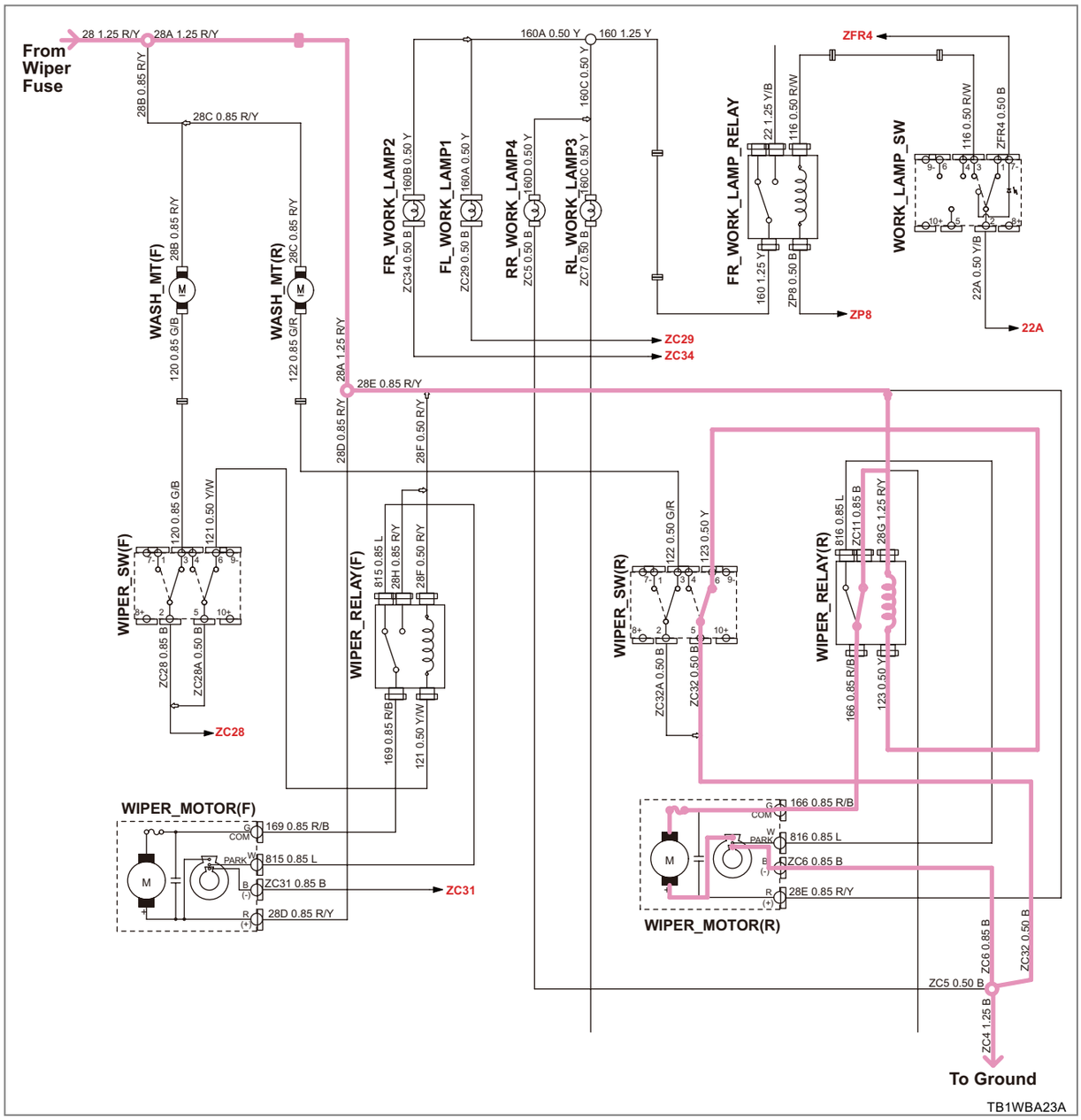
• Front wiper(Return circuit in operation): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Wiper fuse(15A)_main fuse box 2 → (1.25 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Wiper motor(F) → (0.85 Blue) → Wiper relay(F)_Stand-by2 → (0.85 Red/Black) → Wiper motor(F) → (0.85 Black) → ZC31 (Ground)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 70 2025-04-08 오전 9:41:07

4.8.2 REAR WIPER

The rear wiper is also composed of a separate, independent circuit, but operates in the same way as the front wiper.

▶ REAR WIPER NORMAL OPERATION

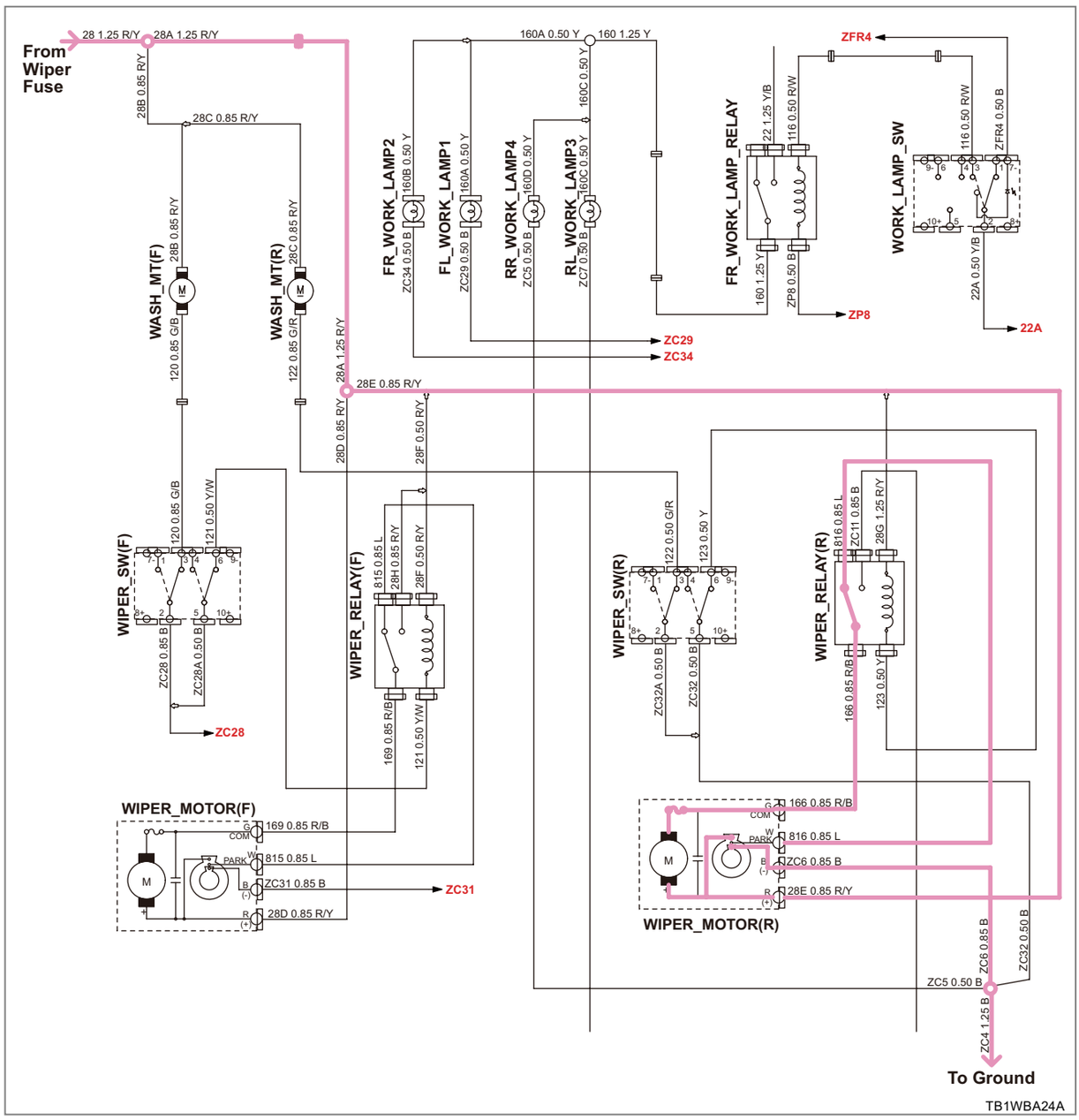


- Rear wiper(coil signal): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Wiper fuse(15A)_main fuse box 2 → (1.25 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Rear wiper relay_coil → (0.5 Yellow) → Rear wiper SW

- Rear wiper(Stand-by power): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Wiper fuse(15A)_main fuse box 2 → (1.25 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Rear wiper relay_power stand-by → (0.85 Red/Black) → Wiper motor(R) → (0.85 Black) → (Ground)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 71 2025-04-08 오전 9:41:07

▶ REAR WIPER RETURN OPERATION



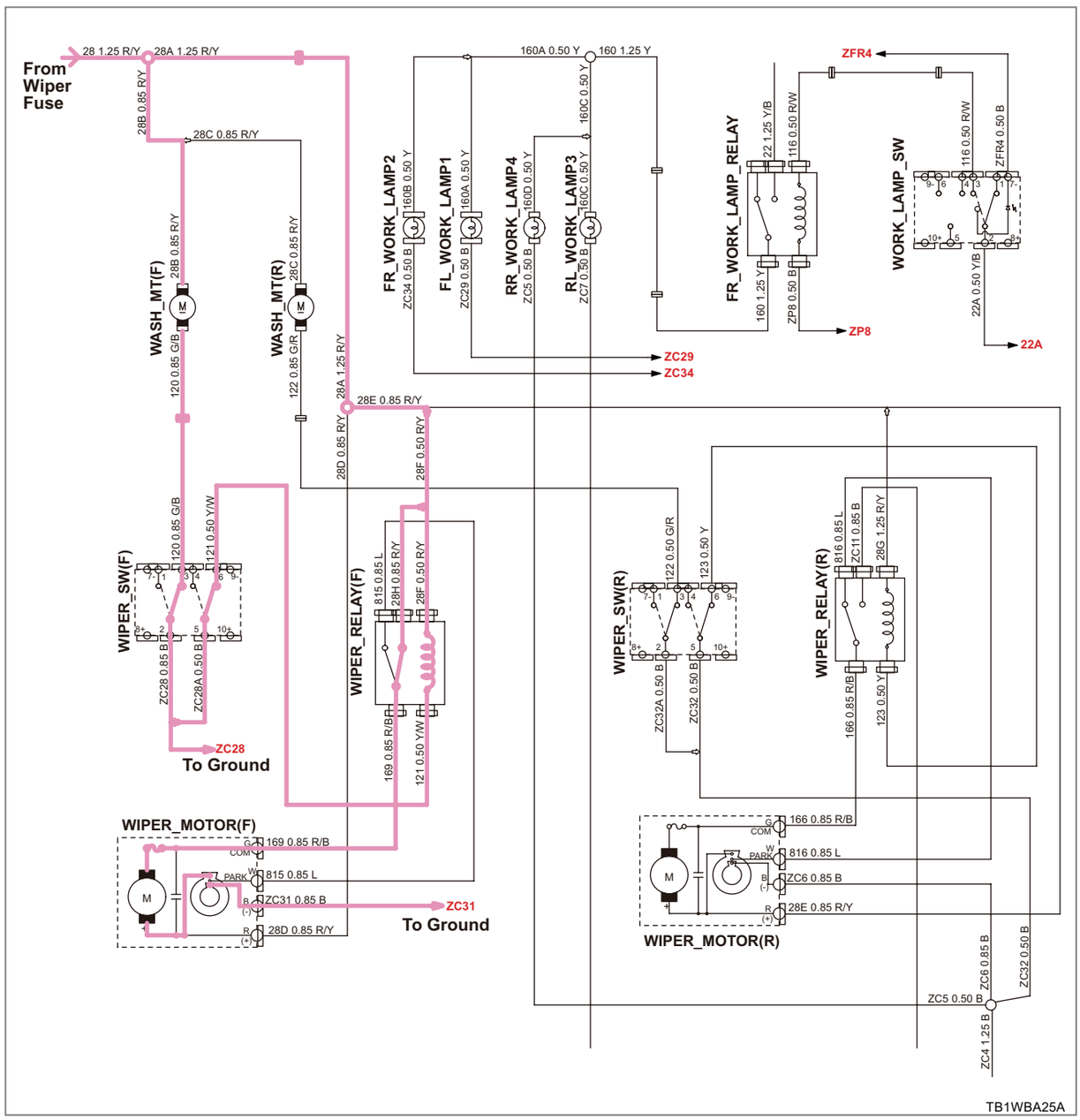
• Rear wiper(Return circuit in operation): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Wiper fuse(15A)_main fuse box 2 → (1.25 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Wiper motor(R) → (0.85 Blue) → Wiper relay(R)_Stand-by2 → (0.85 Red/Black) → Wiper motor(R) → (0.85 Black) → (Ground)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 72 2025-04-08 오전 9:41:08

4.8.3 FRONT WINDSHIELD WASHER PUMP

The windshield washer pump operates while the wiper switch is pressed hard, and the circuit is configured so that the wiper operates at the same time as the washer fluid is sprayed.

▶ **FRONT WIPER AND WASHER PUMP WORKING AT THE SAME TIME**



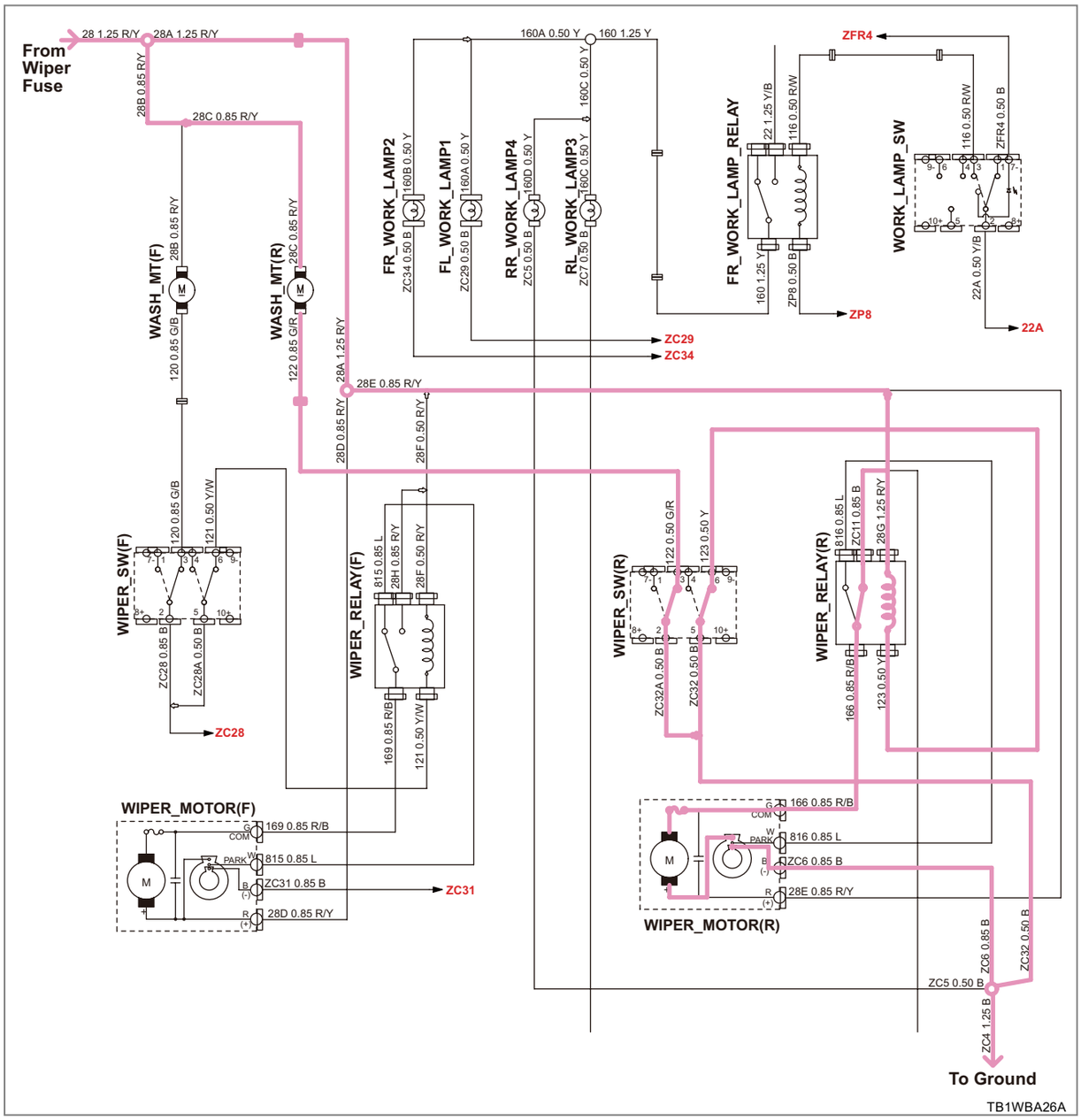
• Front washer pump: Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Wiper fuse(15A)_main fuse box 2 → (1.25 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Washer motor(R) → (0.85 Green/Black) → Front wiper SW → ZC20(Ground)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 73 2025-04-08 오전 9:41:08

4.8.4 REAR WINDSHIELD WASHER PUMP

The rear windshield washer pump is also composed of a separate, independent circuit, but operates in the same way as the front washer pump.

▶ **REAR WIPER AND WASHER PUMP WORKING AT THE SAME TIME**



- Rear washer pump: Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Wiper fuse(15A)_main fuse box 2 → (1.25 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Washer motor(F) → (0.85 Green/Red) → Rear wiper SW → (Ground)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 74 2025-04-08 오전 9:41:08

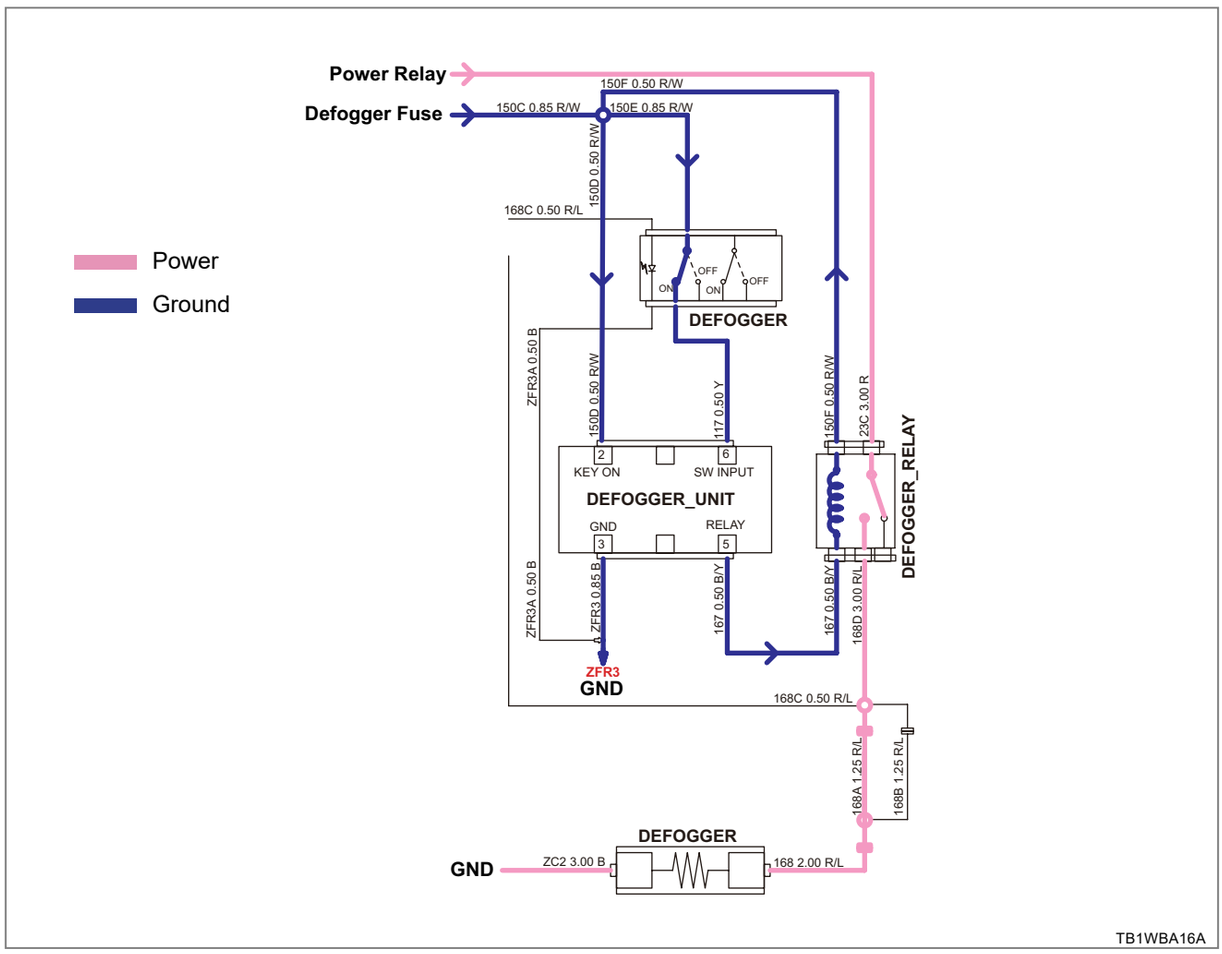
4.9 DEFOGGER

The defogger system on the rear windshield is equipped with a timer unit so that it can automatically stop operating after a certain period of time.

DEFOGGER TIMER AND RELAY



TB1WBA17A



TB1WBA16A

• Defogger(signal): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (1.25 Red/White) → (0.85 Red/White) → Defogger SW → (0.5 Yellow) → Pin#6_Defogger unit_ Pin#5 → (0.5 Black/Yellow) → Defogger relay_coil → (0.5 Red/White) → pin#2_Defogger unit_pin#3 → Ground.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 75 2025-04-08 오전 9:41:09

- Defogger(stand-by power): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Defogger fuse(25A)_main fuse box 2 → (1.25 Red, Dual wires) → Wire merged → (3.0 Red) → Defogger relay_stand-by power → (3.0 Red/Blue) → (1.25 Red/Blue, Dual wires) → Wire merged → (2.0 Red/Blue) → Defogger → (Ground)

- Defogger SW lamp: Same as above → Defogger relay_stand-by power → (3.0 Red/Blue) → Wire branched (0.5 Red/Blue) → Defogger SW_LED lamp → Ground

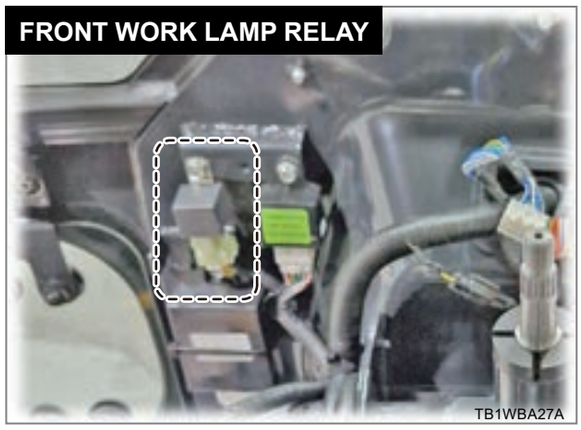
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 76 2025-04-08 오전 9:41:09

4.10 FRONT WORK LIGHTS

Front work lamps are standard and rear work lamps are optional. The rear work lamp switch shares the front one, so you only need to buy and install the optional rear walk lamp kit.

Since the work lamp is directly connected to the battery, it can be turned on without turning on the key.

FRONT WORK LAMP RELAY



TB1WBA27A

WORK LAMPS



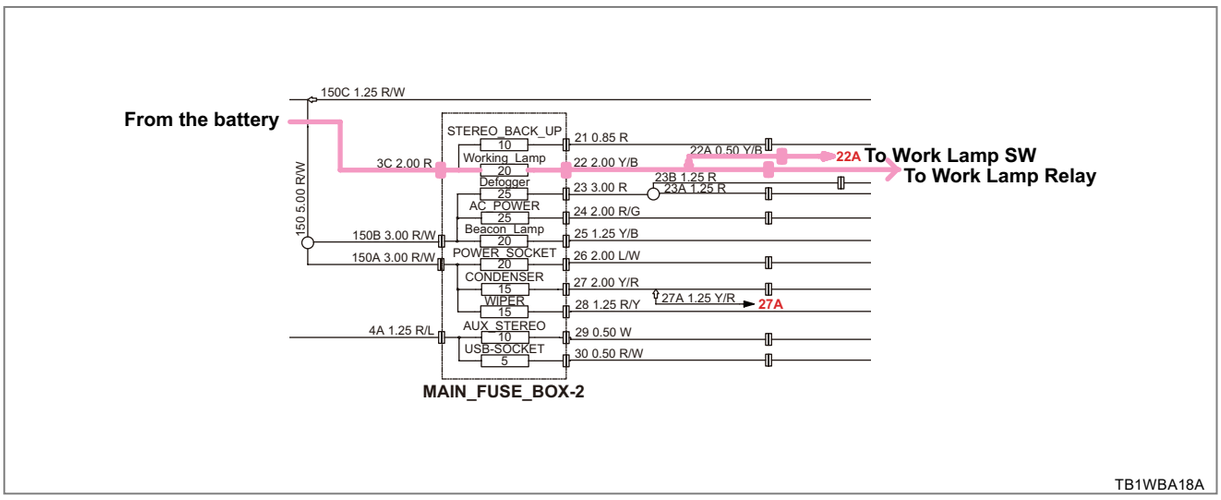
TB1WBA28A

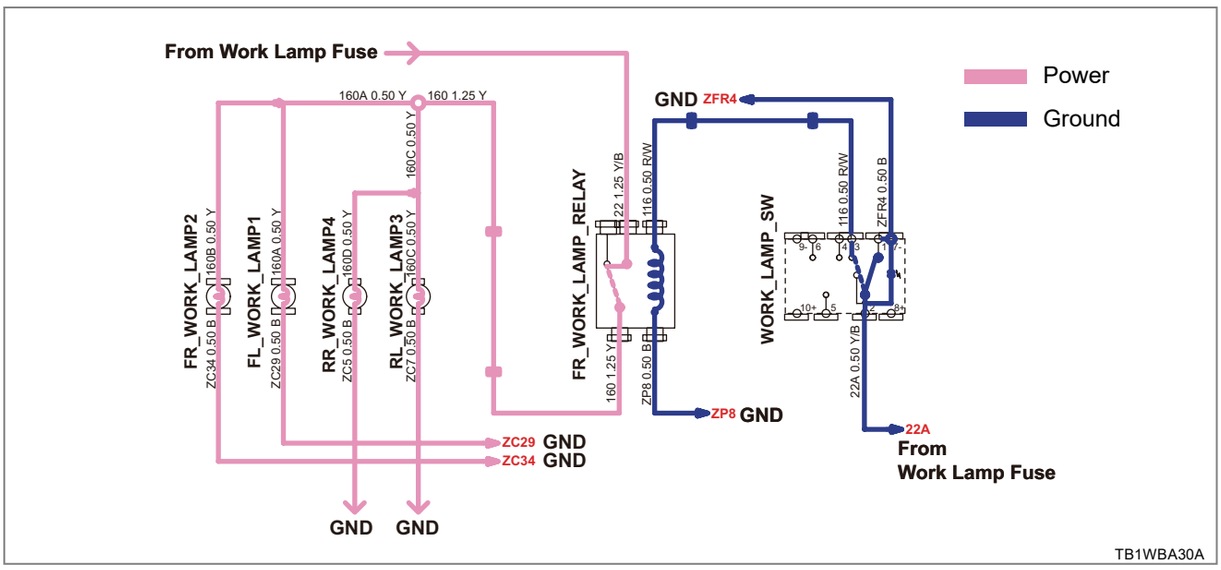
WORK LAMPS SW



TB1WBA29A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 77 2025-04-08 오전 9:41:09





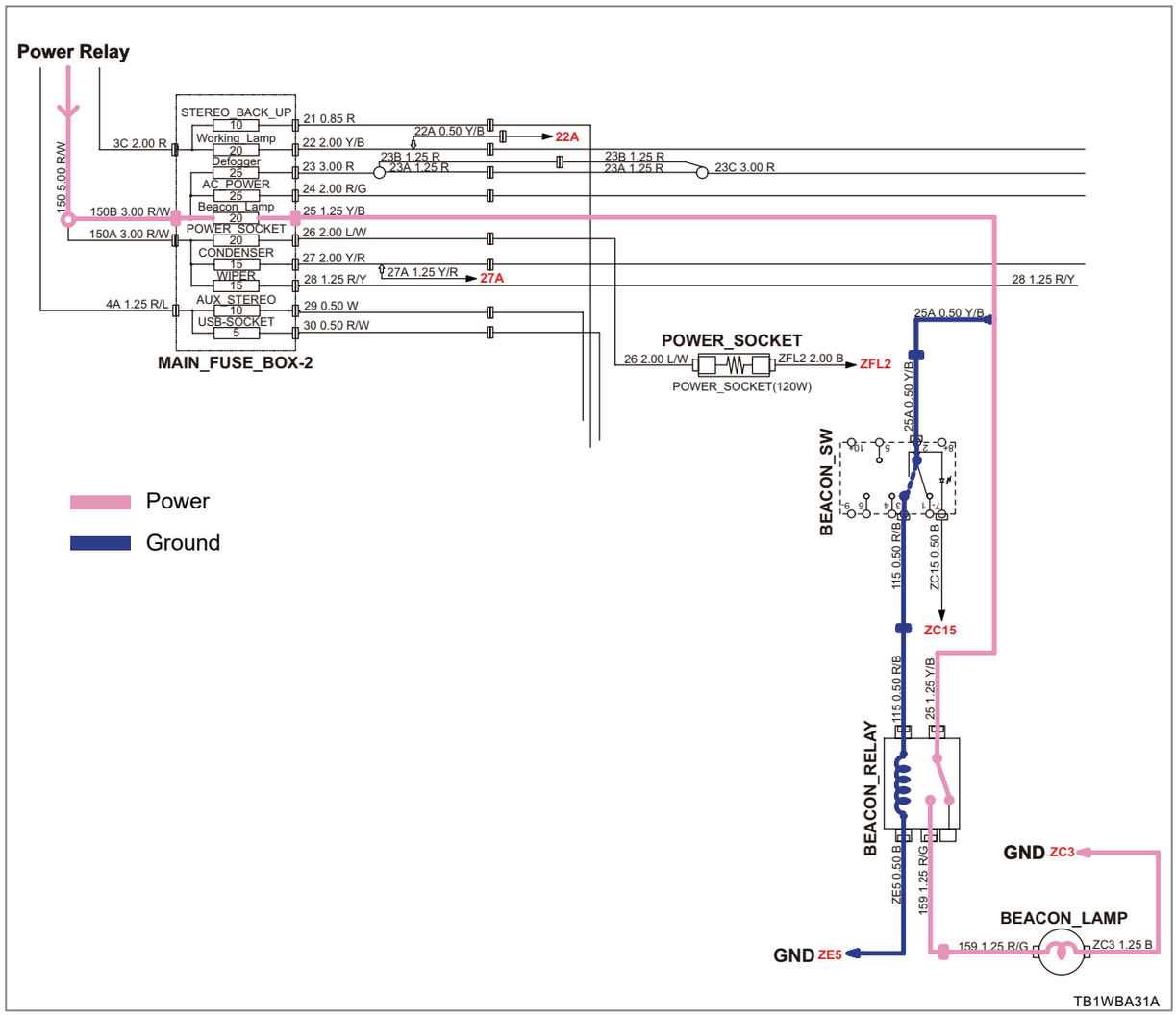
• Front work lamp(signal): Battery+ → (2.5 Red) → 60A main fuse → (3.5 Red) → Wire branched → (2.0 Red) → Working lamp fuse(20A)_main fuse box2 → (2.0 Yellow/Black) → Wire branched → (0.5 Yellow/Black) → 22A → Work lamp SW → (0.5 Red/White) → Work lamp relay_coil → ZP8(Ground)

• Front work lamp(stand-by power): Battery+ → (2.5 Red) → 60A main fuse → (3.5 Red) → Wire branched → (2.0 Red) → Working lamp fuse(20A)_main fuse box2 → (2.0 Yellow/Black) → Work lamp relay_stand-by → (1.25 Yellow) → Wire branched → FR_work lamp, FL_work lamp, RR_work lamp, RL_work lamp

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 78 2025-04-08 오전 9:41:10

4.11 BEACON

Beacon kit is optional.



- Beacon(signal): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Beacon lamp (20A)_main fuse box 2 → (1.25 Yellow/Black) → Wire branched → (0.5 Yellow/Black) → Beacon SW → (0.5 Red/Black) → Beacon relay_coil → ZE5(Ground)

- Beacon(stand-by power): Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Beacon lamp (20A)_main fuse box 2 → (1.25 Yellow/Black) → Beacon relay_stand-by → (1.25 Red/Green) → Beacon lamp → ZC3(Ground)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 79 2025-04-08 오전 9:41:10

4.12 AIR CONDITIONER

4.12.1 CONDENSER

The condenser power is suppled through the 40A power fuse and power relay which activated by key_on signal. The signal for the condenser relay is transmitted via the cluster.

AC CONTROLLER



TB1WBA32A

COMPRESSOR



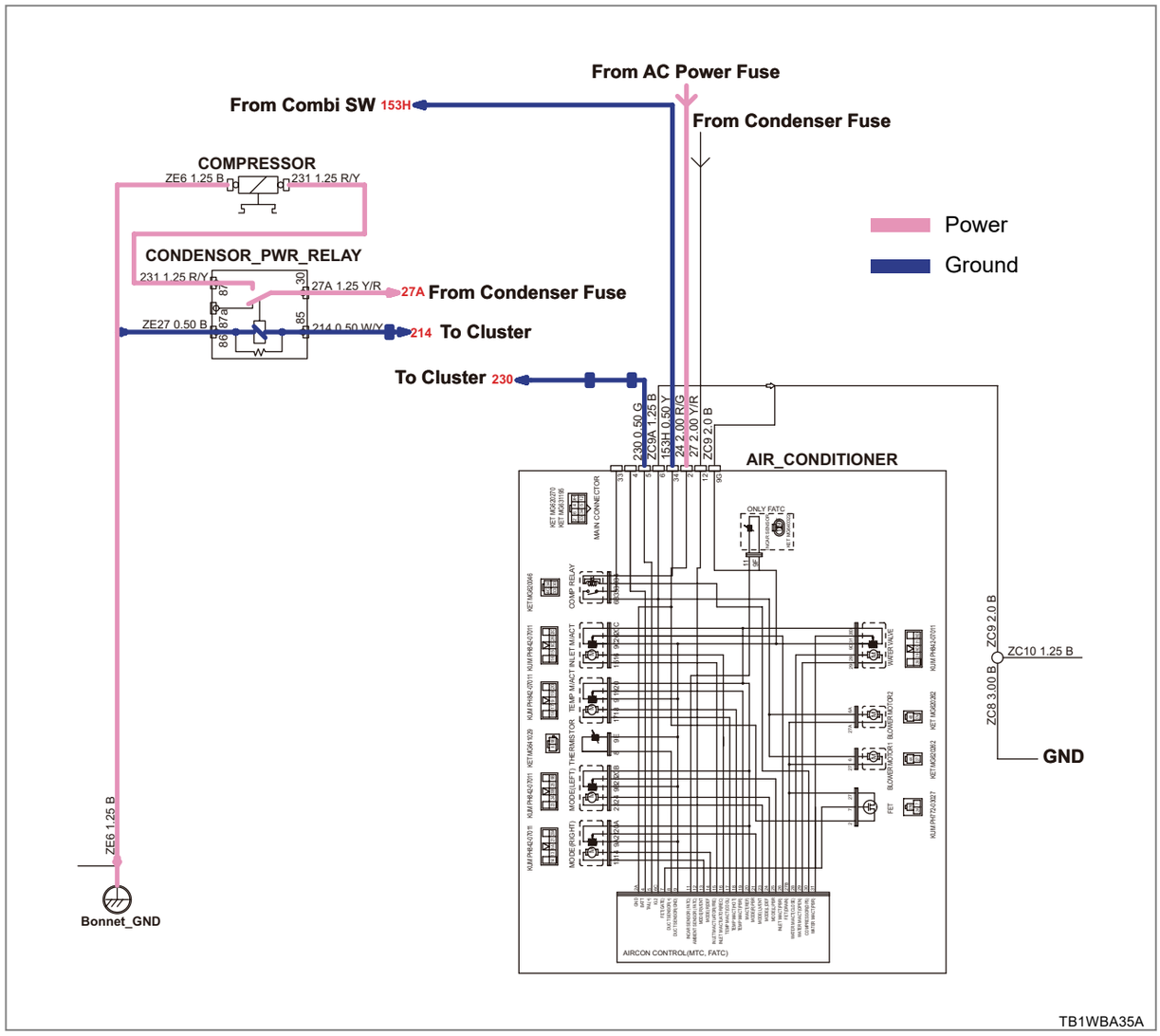
TB1WBA33A

AC CONDENSER RELAY



TB1WBA34A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 80 2025-04-08 오전 9:41:11



• Condenser relay(signal) : Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Condenser fuse(15A)_main fuse box2 → (2.0 Yellow/Red) → Pin#12_Air CON_contrller_Pin#5 → (0.5 Green) → 230 → B13_Cluster_A4 → 214 → (1.25 White/Yellow) → Condenser relay_coil → (Ground)

• Condenser relay(stand-by): : Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Condenser fuse(15A)_main fuse box2 → (2.0 Yellow/Red) → Wire branched → (1.25 Yellow/Red) → 27A → Condenser relay_stand-by → (1.25 Red/Yellow) → Compressor → Ground

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 81 2025-04-08 오전 9:41:12

4.12.2 AC CONTROLLER

The AC power is suppled through the 40A power fuse and power relay which activated by key_on signal.

• AC power : Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → AC power fuse(25A)_main fuse box2 → (2.0 Red/Green) → Pin#2_AC controller

4.12.3 AC CONTROLLER LIGHT

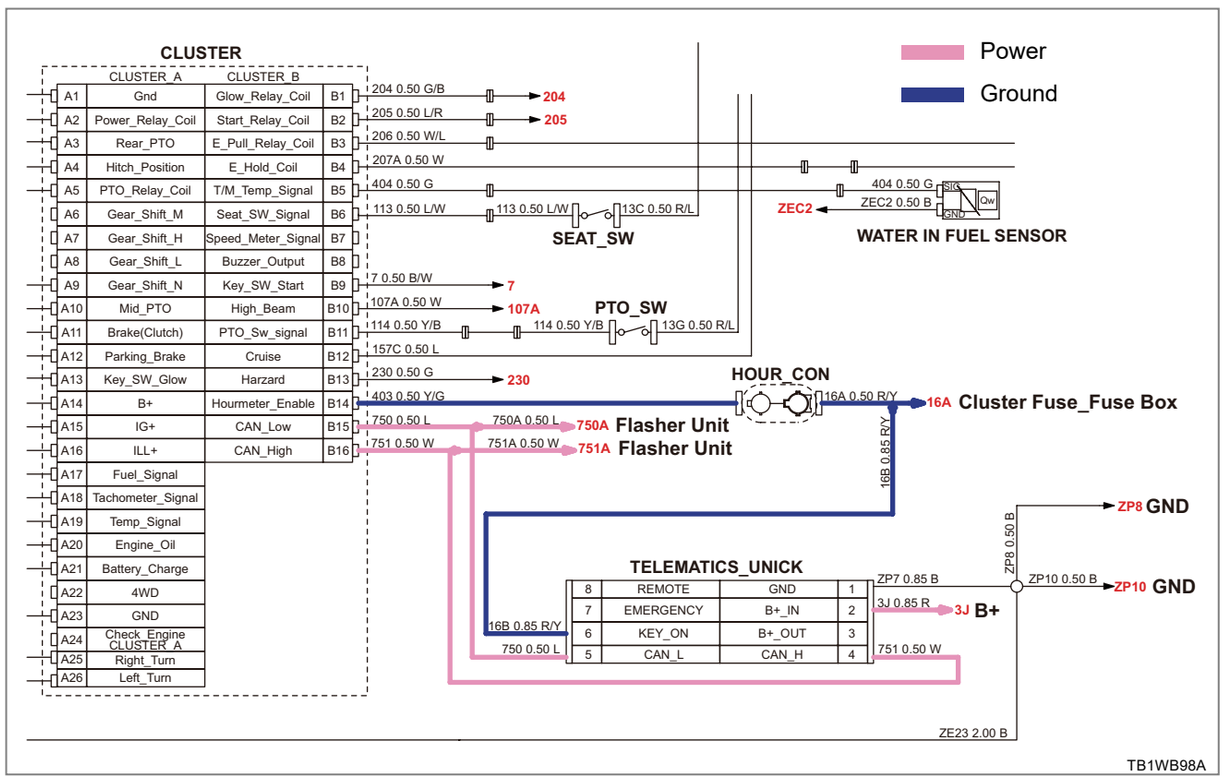
The controller light is turned on by the power from combination switch operation.

• AC controller light: Key on_M → (2.5 White) → ComB_Lamp fuse(20A) → (1.25 White/Red) → 15 → Wire branched → (1.25 White/Red) → Twin relay_Stand-by → (1.25 Yellow) → Wire branched → (0.5 Yellow) → Wire branched → (0.5 Yellow) → 153H → Pin#6_AC controller

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 82 2025-04-08 오전 9:41:12

4.13 TELEMATICS UNIT(TMU)

The telematics unit supports CAN communication with cluster and gives various information to operator such as current weather, temperature, roll-over risk warning, consumable parts replacement time, operator nick name for welcoming screen and ETC. During CAN communication, the telematics unit gives signal to flasher unit so that it operates flasher lamps as necessary.



• Pin# 1_GND : Ground

• Pin# 2_B+ IN : Battery + → (2.5 Red) → 60A main fuse → (3.5 Red) → Wire branched → (3.0 Red) → (2.5 Red)→ Wire branched → 3J → (0.58 Red) → P#2_Telematics unit

• Pin# 4_CAN_H : Telematics unit_Pin# 4 → B16_Cluster, 751A → (0.5 White) → Pin#20_Flasher unit

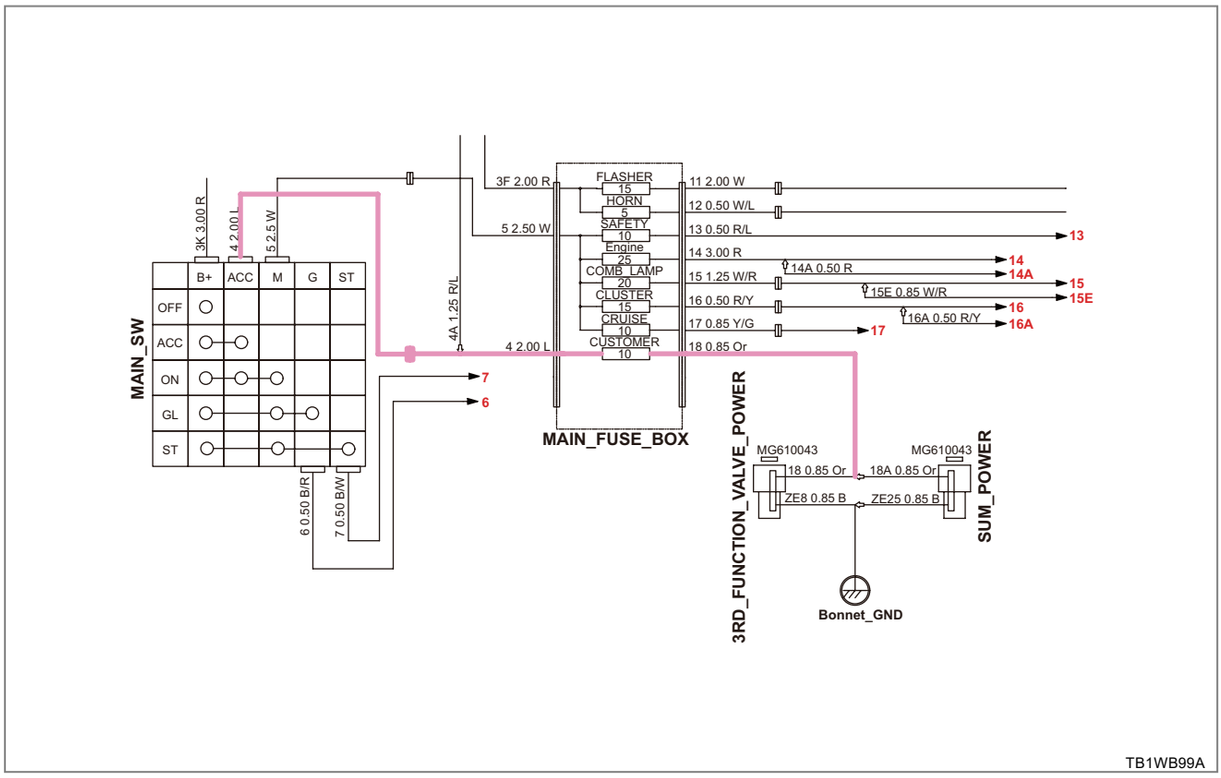
• Pin# 5_CAN_L : Telematics unit_Pin# 5 → B15_Cluster, 750A → (0.5 Blue) → Pin#19_Flasher unit

• Pin# 6_Key_on_signal: Key ON_M → (White) → Cluster fuse(15A)_main fuse box1 → (0.5 Red/Yellow) → Wire branched → 16A → (0.5 Red/Yellow) → Wire branched → (0.85 Red/Yellow) → Pin# 6_Telematics unit

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 83 2025-04-08 오전 9:41:12

4.14 3RD FUNCTION VALVE

The 3rd function valve is available as an option. It can be operated while the key in ACC or ON position.



• 3rd function valve power: Battery+ → (Red) → B+_key → ACC_key → (Blue) → Customer fuse(10A)_main fuse box1 → (Orange) → 3rd function valve(option)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 84 2025-04-08 오전 9:41:12

4.15 STEREO /AUX AMP/USB CHARGER

If the optional stereo is not installed, the operator can connect the mobile device to the earphone holder and then turn on the auxiliary amplifier by switching the STERO-AUX switch to the AUX position to hear the sound from the mobile device loudly through the indoor speakers.

If the optional Bluetooth stereo is installed, the operator can hear sound from the stereo or Bluetooth by switching this STERO-AUX switch to the STEREO position.

AUX_AMP_USB Charger unit, two twin relays and a seesaw-type stereo-AUX switch make this possible.

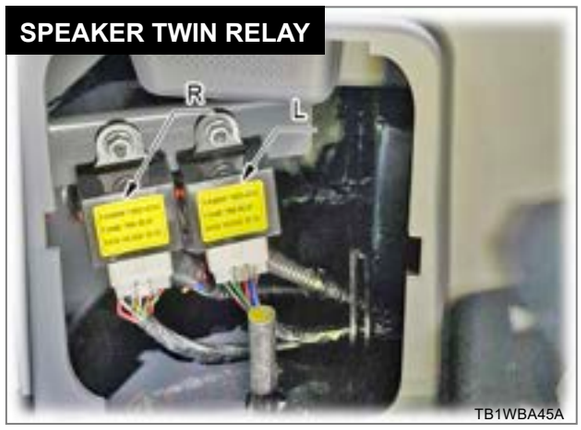
Regardless of the Stereo-AUX SW, the USB charger can be used when the key is ON or ACC.

AMP / USB CHARGER



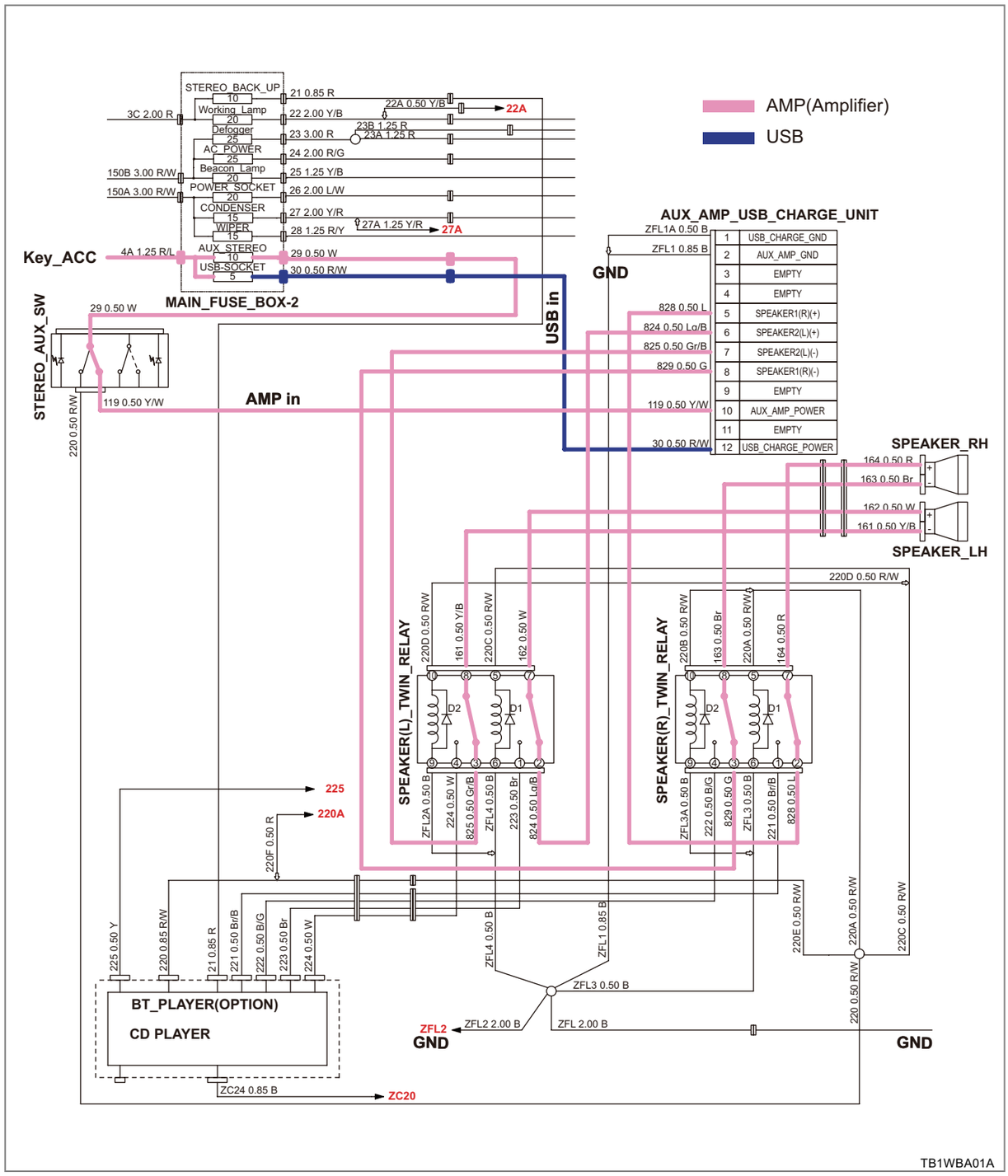
TB1WB36A

SPEAKER TWIN RELAY



TB1WBA45A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 85 2025-04-08 오전 9:41:13



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 86 2025-04-08 오전 9:41:13

4.15.1 AUX-AMP_USB CHARGER UNIT

• Pin#1: USB charger ground

• Pin#2: AUX_AMP ground

• Pin#5_Speaker(R)(+): AUX-AMP_USB charger unit_Pin#5 → (0.5 Blue) → Speaker(R)_twin relay → Speaker_RH(+)

• Pin#6_Speaker(L)(+): AUX-AMP_USB charger unit_Pin#6 → (0.5 Light green/Black) → Speaker(L)_twin relay → Speaker_LH(+)

• Pin#7_Speaker(L)(-): AUX-AMP_USB charger unit_Pin#7 → (0.5 Green/Black) → Speaker(L)_twin relay → Speaker_LH(-)

• Pin#8_Speaker(R)(-): AUX-AMP_USB charger unit_Pin#8 → (0.5 Green) → Speaker(R)_twin relay → Speaker_RH(-)

• Pin#10_AUX_AMP Power: Key_ACC → (2.0 Blue) → Wire branched → (1.25 Red/Blue) → AUX_STEREO fuse(10A) → (0.5 White) → STERO-AUX SW_AUX terminal → (0.5 Yellow/White) → Pin#10_ AUX-AMP_USB charger unit

• Pin#12_USB_Charger power: Key_ACC → (2.0 Blue) → Wire branched → (1.25 Red/Blue) → USB_Socket fuse (5A) → (0.5 Red/White) → Pin#12_ AUX-AMP_USB charger unit

• Speaker(R)_Twin relay(signal): Key_ACC → (2.0 Blue) → Wire branched → (1.25 Red/Blue) → AUX_STEREO fuse(10A) → (0.5 White) → STERO-AUX SW_STEREO terminal → (0.5 Red/White) → Wire branched → (0.5 Red/White) → Speaker(R)_Twin relay_Coil 1 and 2

• Speaker(L)_Twin relay(signal): Key_ACC → (2.0 Blue) → Wire branched → (1.25 Red/Blue) → AUX_STEREO fuse(10A) → (0.5 White) → STERO-AUX SW_STEREO terminal → (0.5 Red/White) → Wire branched → (0.5 Red/White) → Speaker(L)_Twin relay_Coil 1 and 2

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 87 2025-04-08 오전 9:41:13

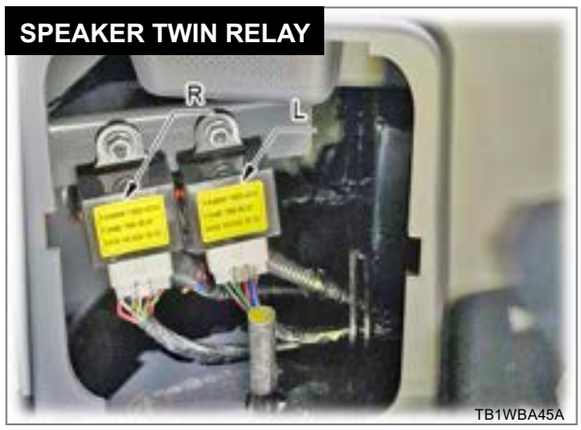
4.16 STEREO (OPTIONAL)

STEREO PLACE

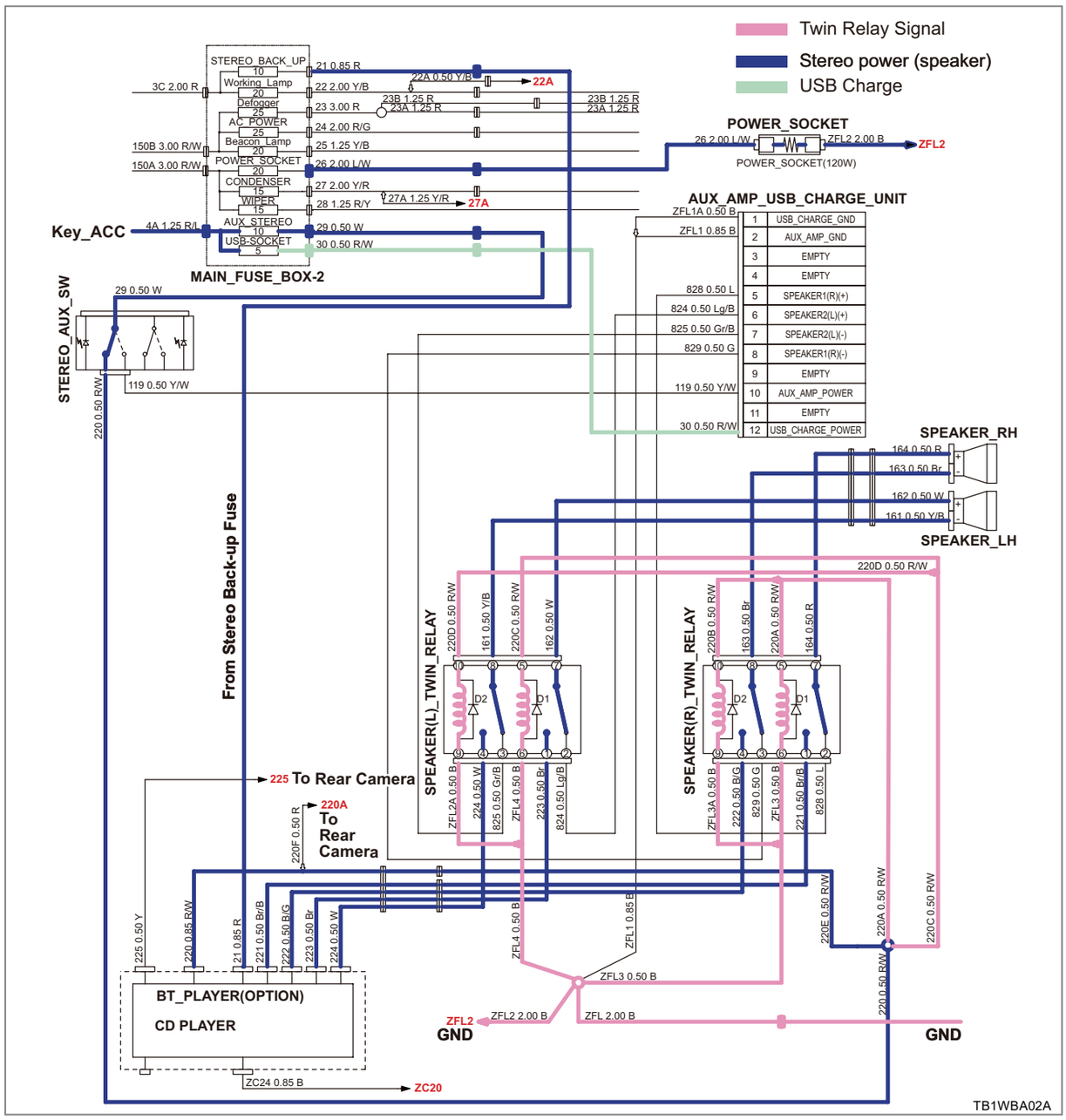


TB1WBA07A

SPEAKER TWIN RELAY



TB1WBA45A



TB1WBA02A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 88 2025-04-08 오전 9:41:14

- Stereo 1st top pin from left side(from rear camera) : Pin#2_Camera signal_Rear camera → 225 → (0.5 Yellow) → 1st pin_Bluetooth Stereo

  (The wire that receives the rear camera signal is connected to the stereo mounting terminal and is used when installing the rear camera. See Rear Camera chapter for more information.)

- Stereo 2ndpin(power from SW): Key_ACC → (2.0 Blue) → Wire branched → (1.25 Red/Blue) → AUX_STEREO fuse(10A) → (0.5 White) → STERO-AUX SW_STEREO terminal → (0.5 Red/White) → Wire branched → (0.5 Red/White) → 2nd pin_ Bluetooth_Stereo

- Stereo 3rd pin(Back-up power for stereo): Battery+ → (2.5 Red) → 60A main fuse → (3.5 Red) → Wire branched → (2.0 Red) → Stereo_back-up fuse(10A)_main fuse box2 → (0.85 Red) → 3rd pin_Stereo

- Stereo 4th pin → (0.5 Brown/Black) → Speaker(R)_twin relay → (0.5 Red) → Speaker RH(+)

- Stereo 5th pin → (0.5 Brown/Green) → Speaker(R)_twin relay → (0.5 Brown) → Speaker RH(-)

- Stereo 6th pin → (0.5 Brown) → Speaker(L)_twin relay → (0.5 White) → Speaker LH(+)

- Stereo 7th pin → (0.5 White) → Speaker(L)_twin relay → (0.5 Yellow/Black) → Speaker LH(-)

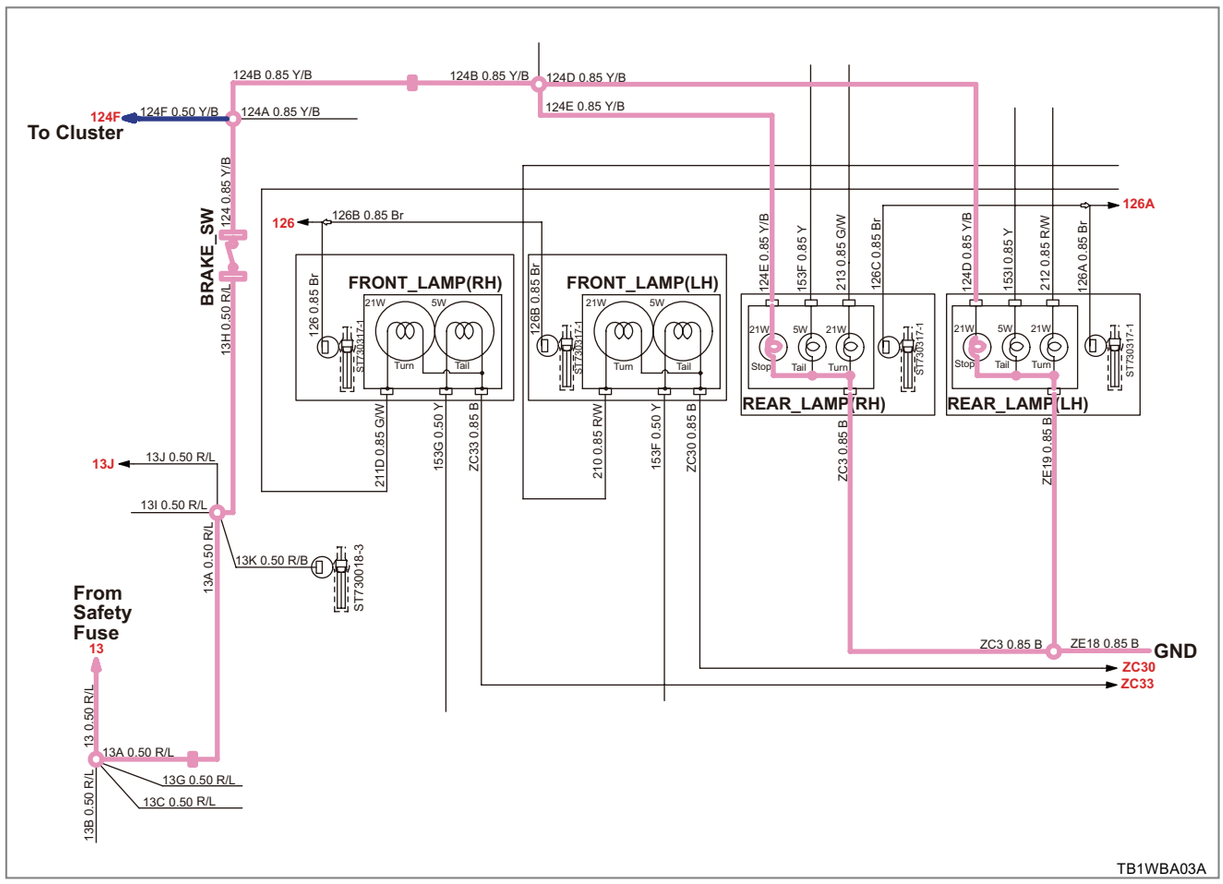
- Speaker(R)_Twin relay(signal): Key_ACC → (2.0 Blue) → Wire branched → (1.25 Red/Blue) → AUX_STEREO fuse(10A) → (0.5 White) → STERO-AUX SW_STEREO terminal → (0.5 Red/White) → Wire branched → (0.5 Red/White) → Speaker(R)_Twin relay_Coil 1 and 2

- Speaker(L)_Twin relay(signal): Key_ACC → (2.0 Blue) → Wire branched → (1.25 Red/Blue) → AUX_STEREO fuse(10A) → (0.5 White) → STERO-AUX SW_STEREO terminal → (0.5 Red/White) → Wire branched → (0.5 Red/White) → Speaker(L)_Twin relay_Coil 1 and 2

- Stereo bottom pin: → (0.58 Black) → ZC20 → Ground

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 89 2025-04-08 오전 9:41:14

4.17 BRAKE LIGHTS/LED ON THE CLUSTER



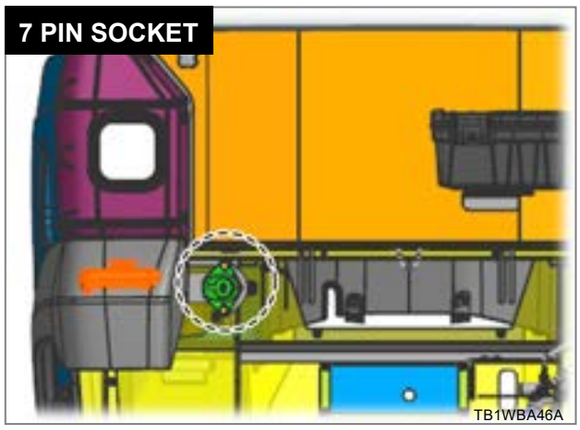
- Brake lights: Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (Red/Blue) → Brake_SW → (Yellow/Black) → Wire branched → (0.85 Yellow/Black) → Stop lamp_rear lamp(RH), → Stop lamp_rear lamp(LH)

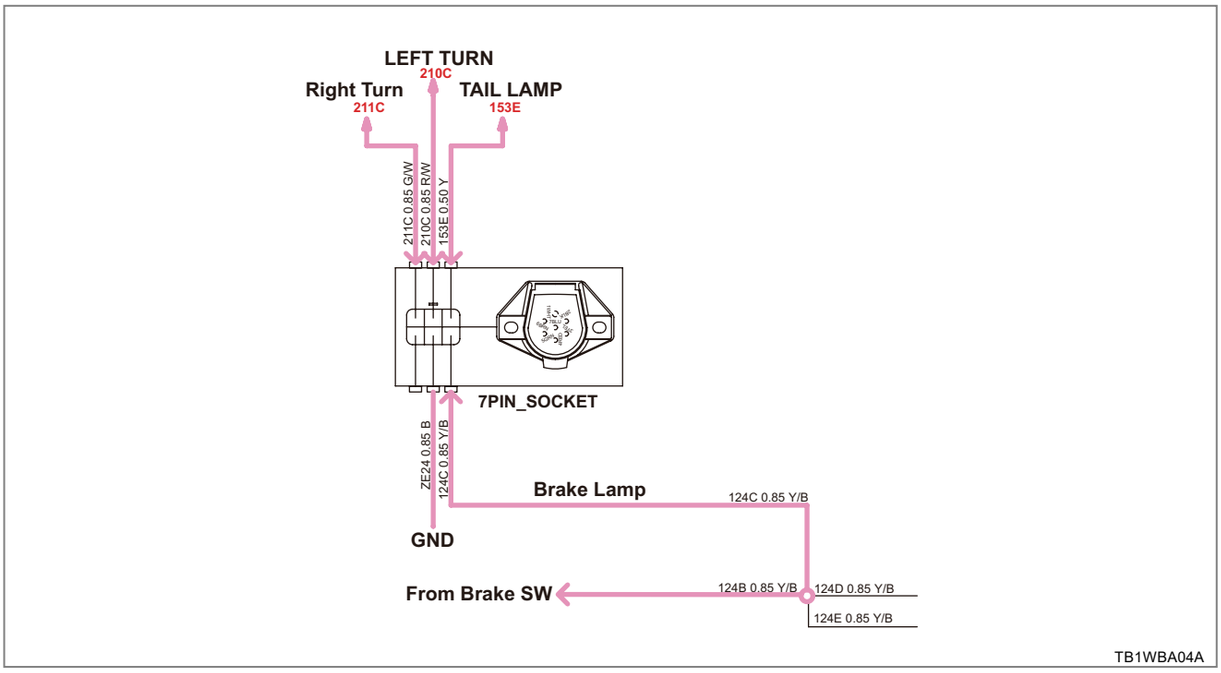
- Brake LED on Cluster: Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (Red/Blue) → Brake_SW → (Yellow/Black) → Wire branched → (0.5 Yellow/Black) → 124F → A11_Cluster

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 90
2025-04-08 오전 9:41:15

4.18 7 PIN SOCKET

The 7 pin socket is to supply the power for turn signal lamp(LH, RH), tail lights, brake lights, ground to trailer.
For more information, refer to each related chapter.





- Brake lights power to 7 pin socket: Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (Red/Blue) → Brake_SW → (Yellow/Black) → Wire branched → (0.85 Yellow/Black) → 7 pin socket

- Left turn signal power to 7 pin socket: Key ON_M → (White) → Comb-lamp fuse(15A)_main fuse box1 → (1.25 White/Red) → 15 → Wire branched → (0.85 White/Red) → B2_CombSW_Turn_L → (0.5 Red/White) → Pin#5_Flasher Unit_Pin#15 → (0.85 Red/White) → Wire branched → 210C → (0.85 Red/White) → 7 pin socket

- Right turn signal power to 7 pin socket : Key ON_M → (White) → Comb-lamp fuse(15A)_main fuse box1 → (1.25 White/Red) → 15 → Wire branched → (0.85 White/Red) → B2_CombSW_Turn_R → (0.5 Green/White) → Pin#6_Flasher Unit_Pin#16 → (0.85 Green/White) → Wire branched → 211C → (0.85 Green/White) → 7 pin socket

- Tail light power to 7 pin socket: Key on_M → (2.5 White) → ComB_Lamp fuse(20A) → (1.25 White/Red) → 15 → Wire branched → (1.25 White/Red) → Twin relay_Stand-by → (1.25 Yellow) → Wire branched → (0.5 Yellow) → Wire branched → (0.5 Yellow) → 153C → 7 pin socket

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 91 2025-04-08 오전 9:41:15

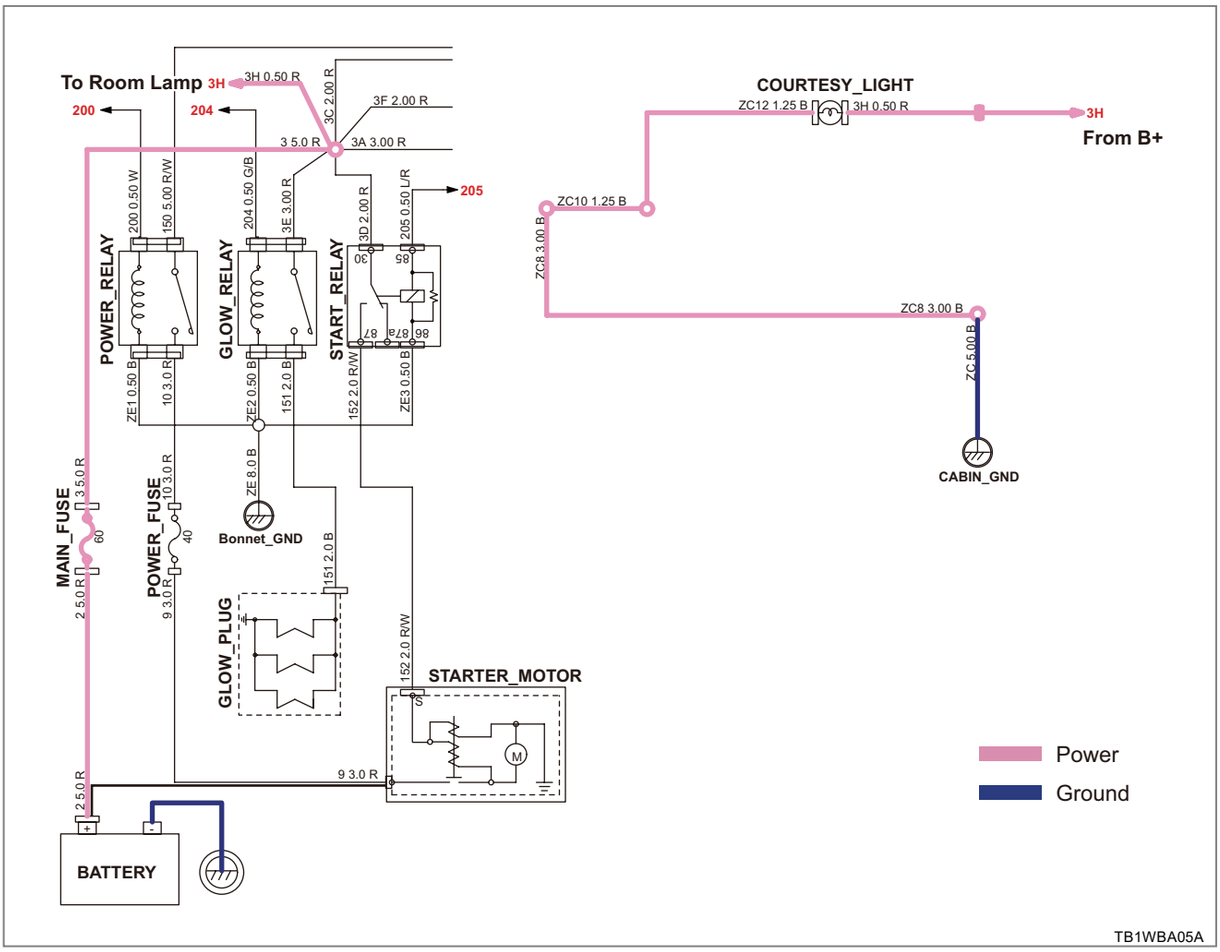
4.19 COURTESY LIGHT

The courtesy light includes a sliding switch and does not have a separate ON-OFF switch.

ROOM LAMP



TB1WBA06A



TB1WBA05A

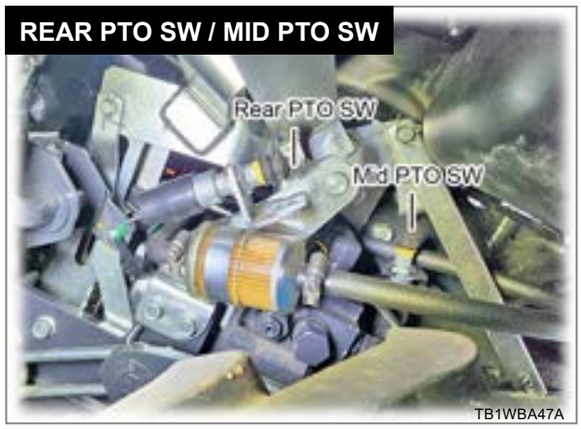
- Battery + → (2.5 Red) → 60A main fuse → (3.5 Red) → Wire branched → (0.5 Red) → 3H → Courtesy_light → (1.25 Black) → Ground

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 92 2025-04-08 오전 9:41:16

4.20 SENSORS AND SWITCHES

Other sensors and switches are arranged to be connected to the cluster.

REAR PTO SW / MID PTO SW



TB1WBA47A

ENGINE OIL PRESSURE SW



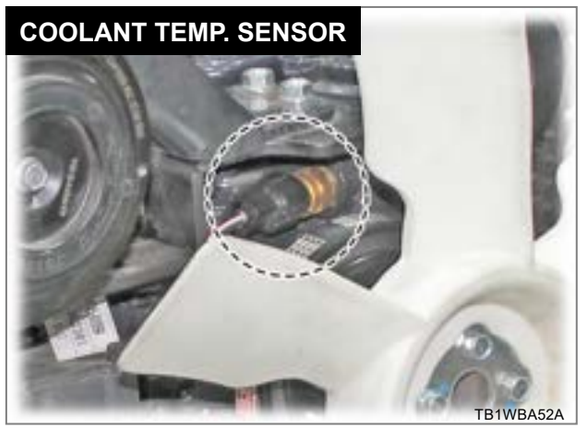
TB1WBA50A

NEUTRAL SW



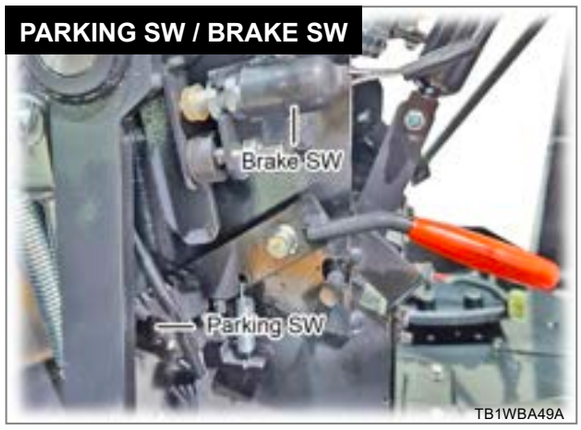
TB1WBA48A

COOLANT TEMP. SENSOR



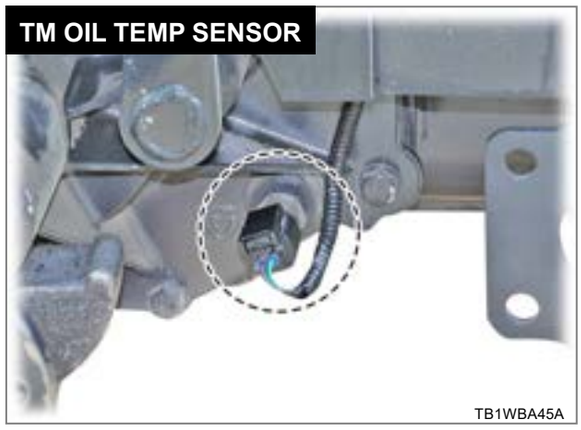
TB1WBA52A

PARKING SW / BRAKE SW



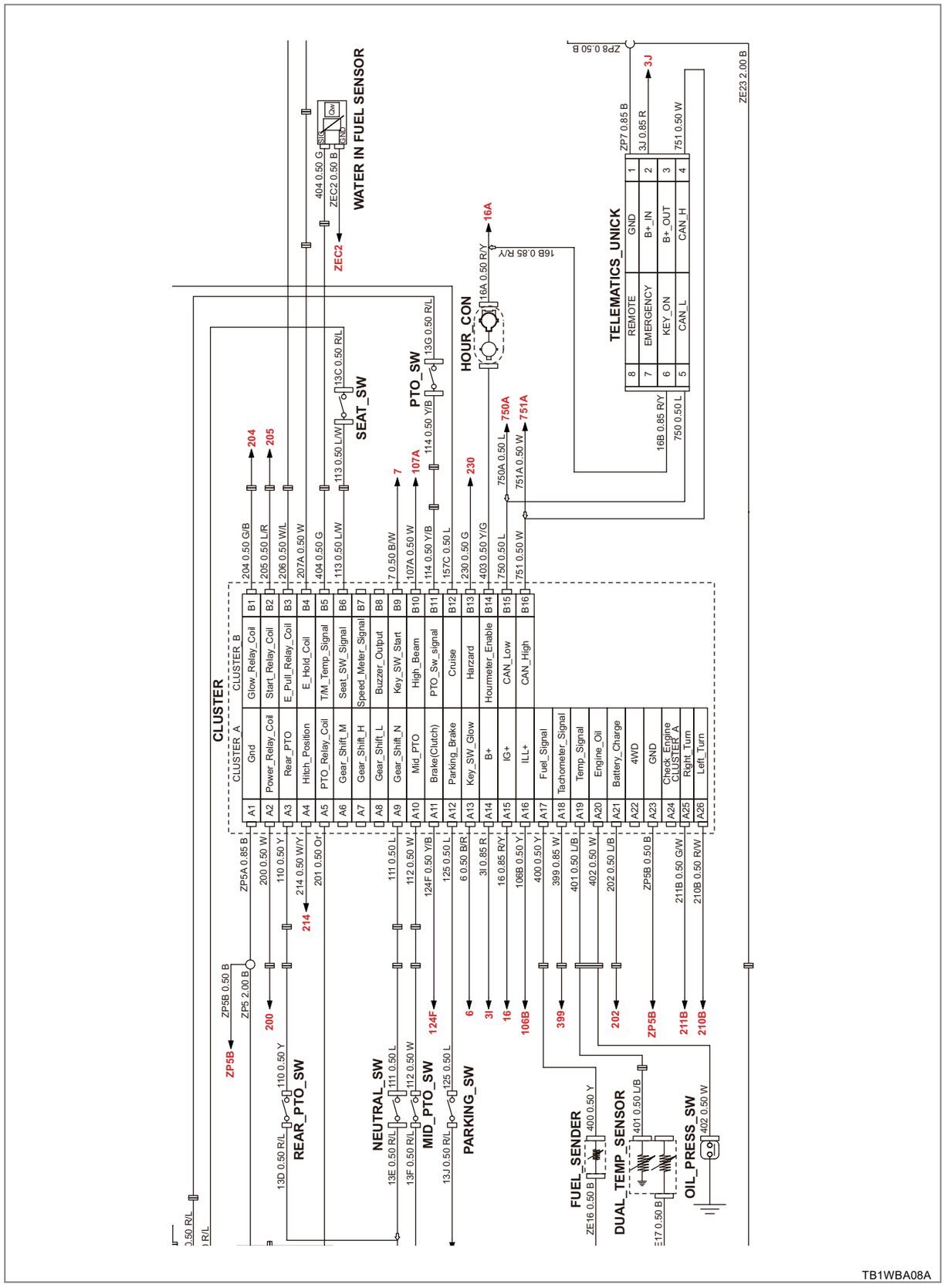
TB1WBA49A

TM OIL TEMP SENSOR



TB1WBA45A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 93 2025-04-08 오전 9:41:16



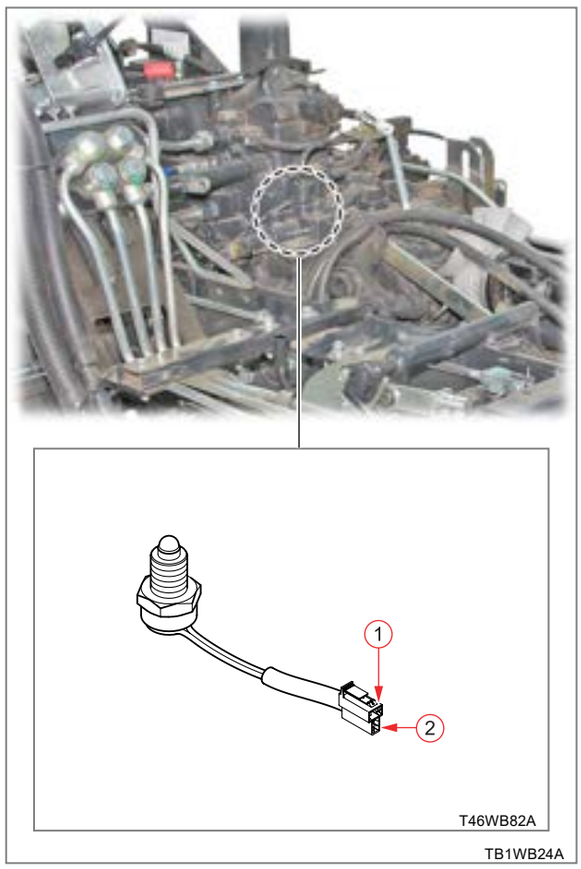
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 94 2025-04-08 오전 9:41:17

4.20.1 REAR PTO LEVER SWITCH

• Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (0.5 Red/Blue) → Wire branched → (0.5 Red/Blue) → Wire branched → (0.5 Red/Blue) → Rear_PTO_SW → (0.5 Yellow) → A3_Cluster

4.20.2 NEUTRAL SWITCH

• Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (0.5 Red/Blue) → Wire branched → (0.5 Red/Blue) → Neutral_SW → (0.5 Blue) → A9_Cluster



The neutral switch is in contact with the range shift fork rod. When the range shift lever is in the neutral position, the sensor is pressed, making continuity, so the engine can be started.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 95 2025-04-08 오전 9:41:17

4.20.3 MID PTO LEVER SWITCH

• Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (0.5 Red/Blue) → Wire branched → (0.5 Red/Blue) → Mid_PTO_SW → (0.5 White) → A10_Cluster

4.20.4 PARKING LEVER SWITCH

• Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (0.5 Red/Blue) → 13J → (0.5 Blue) → A12_Cluster

4.20.5 FUEL SENDER

• Cluster_A17 → (0.5 Yellow) → Fuel_Sender → (0.5 Black) → Ground

4.20.6 COOLANT TEMPERATURE SENSOR

• Cluster_A19 → (0.5 Blue/Black) → Dual_Temp_Sensor → (0.5 Black) → Ground



This temperature switch is installed on the coolant flange.

COOLANT TEMPERATURE SENSOR

Temperature(°C)	Resistance(kΩ)
-40	(48.14)
-20	15.48 ± 1.35
0	(5.790)
20	2.45 ± 0.14
40	(1.148)
60	(0.5865)
80	(0.3222)
100	(0.1884)
110	0.1471 ± 0.002
120	(0.1163)

* ( ): reference value

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 96 2025-04-08 오전 9:41:18

4.20.7 ENGINE OIL PRESSURE SENSOR

• Cluster_A20 → (0.5 White) → Oil_press_SW → Ground



The oil pressure switch is installed on the cylinder block.

This switch sends a signal to the instrument panel when the pressure of 0.5 ± 0.1 kg/cm² (7 psi ± 1.4 psi) is generated in the engine oil system.

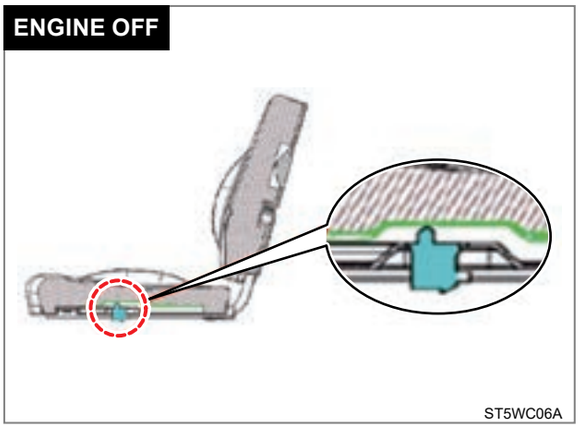
4.20.8 SEAT SWITCH

• Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (0.5 Red/Blue) → Seat_SW → (0.5 Blue/White) → B6_Cluster

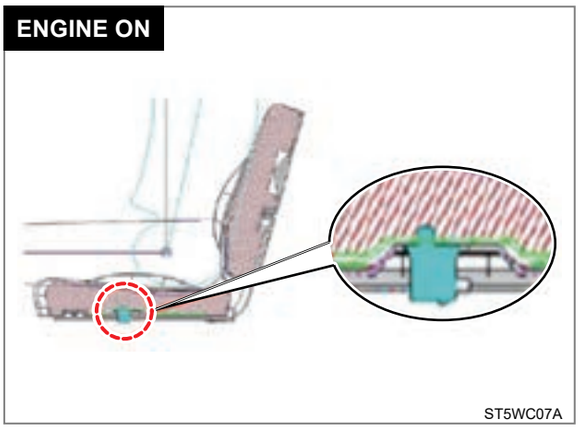


The seat switch is mounted inside of the seat bottom. When the driver is seated or not seated on the seat, the switch plunger is actuated to start the engine or to stop the engine. In addition, the engine stops automatically when the driver is not seated on the seat and it exceeds 3 seconds during driving.

ENGINE OFF



ENGINE ON



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 97 2025-04-08 오전 9:41:19

4.20.9 PTO CONTROL SWITCH

• Key ON_M → (White) → Safety fuse(10A)_main fuse box1 → (Red/Blue) → 13 → Wire branched → (0.5 Red/Blue) → PTO_SW → (0.5 Yellow/Black) → B11_Cluster

4.20.10 HOUR METER

• Key ON_M → (White) → Cluster fuse(15A)_main fuse box1 → (0.5 Red/Yellow) → Wire branched → 16A → (0.5 Red/Yellow) → Hour meter → (0.5 Yellow/Green) → B14_Cluster

4.20.11 WATER IN FUEL SENSOR

• Transmission oil temperature sensor → (0.5 Green) → B5_Cluster

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 98 2025-04-08 오전 9:41:19

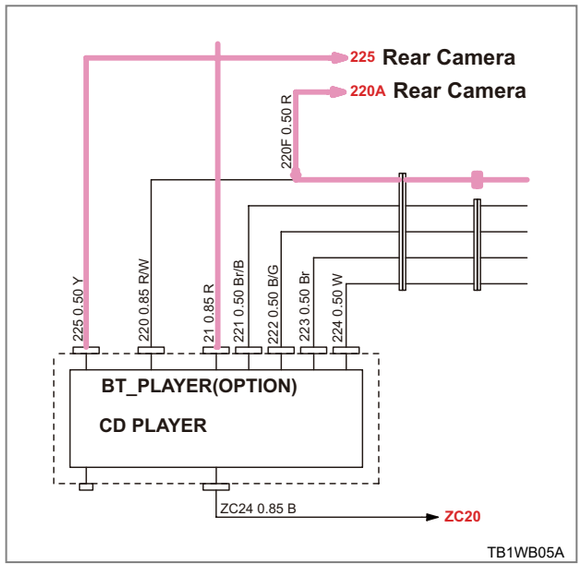
4.21 REAR CAMERA (OPTION)

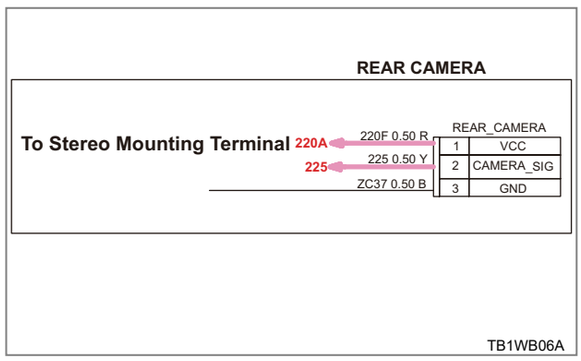
The wire that receives the rear camera signal is connected to the stereo mounting terminal and is used when installing the rear camera.



- Rear camera signal: Pin#2_Camera_sig_Rear camera → 225 → (0.5 Yellow) → 1st pin_Bluetooth Stereo

- Rear camera power: Key_ACC → (2.0 Blue) → Wire branched → (1.25 Red/Blue) → AUX_STEREO fuse(10A) → (0.5 White) → STERO-AUX SW_STEREO terminal → (0.5 Red/White) → Wire branched → 220A → Pin#1_VCC_Rear_camera

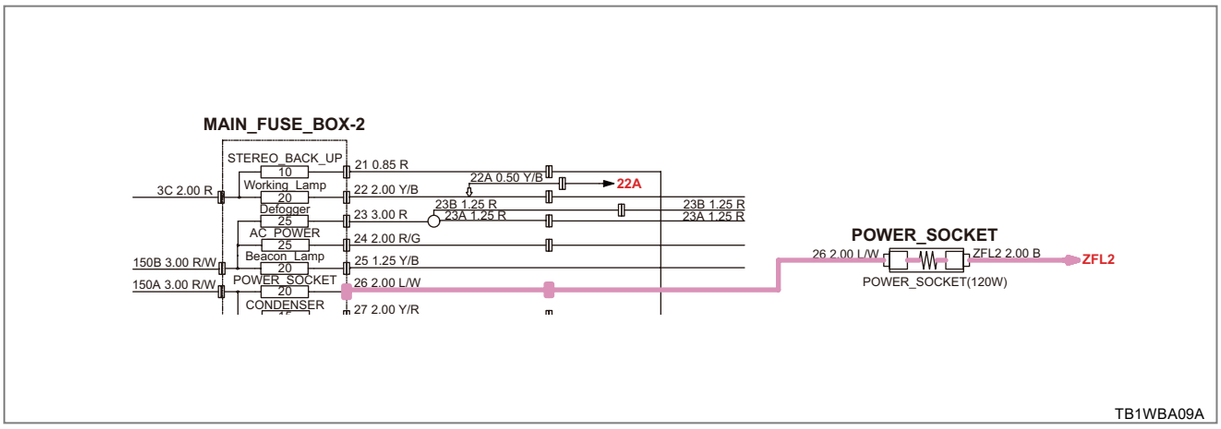




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4.22 POWER OUTLET





• Power outlet: Battery + → + Cable → Starter terminal → (3.0 Red) → 40A power fuse → Power relay_stand-by → (5.0 Red/White) → Wire branched → (3.0 Red/White) → Power socket fuse(20A)_main fuse box 2 → (2.0 Blue/White) → Power_Socket → ZFL2(Ground)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 100 2025-04-08 오전 9:41:20

4.23 MAIN FUSE (SLOW-BLOW FUSE)



The main fuse (slow-blow fuse(1) is installed on the wiring in the engine wire harness and its capacity is 60 A.

If the slow-blow fuse is blown, all electric systems in the tractor stop their operation.

If any electric system does not operate while the battery operates properly, the slow-blow fuse should be checked.

If the fuse is blown repeatedly, it is probable that B+ line (battery power) has a short circuit to body.

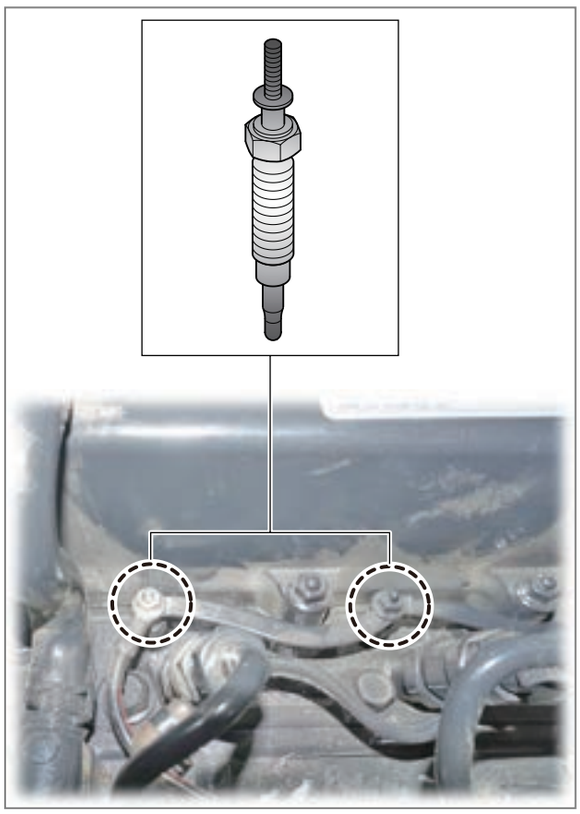
4.24 POWER FUSE



The power fuse (40A) is equipped separately for accessories such as wiper, AC condenser, cigar jack power outlet, beacon, air conditioner and defogger with power relay.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 101 2025-04-08 오전 9:41:20

4.25 GLOW PLUG

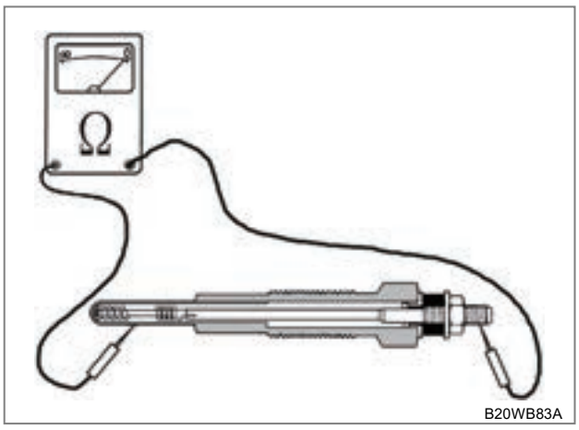


The glow plug is installed on the engine cylinder head.

1. Clean carbon from the sheath end of the glow plug.

REMARK

Do not test resistance using the glow plug sheath.



2. Using an ohmmeter, touch one test probe to the glow plug body.
3. Observe the ohmmeter. A resistance reading of 1.0 ohms maximum is normal for the ST tractor, glow plug. If the resistance is too high, the glow plug is defective and needs replaced.

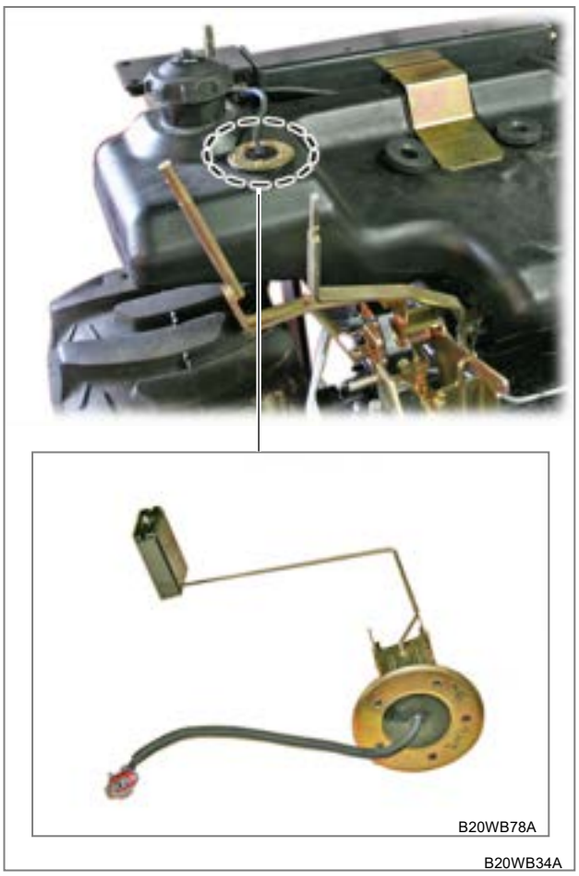
INSTALLATION

1. Thread the glow plugs into the engine cylinder head.

   Glow flug
   Tightening torque ..... 15.0 ~ 20.0 Nm
   1.53 ~ 2.04 kgf-m
   11.0 ~ 14.7 lb-ft
2. Install the electrode bar and the washers onto the glow plugs. Secure with the three (3) nuts.
3. Connect the negative (-) battery cable to the battery.

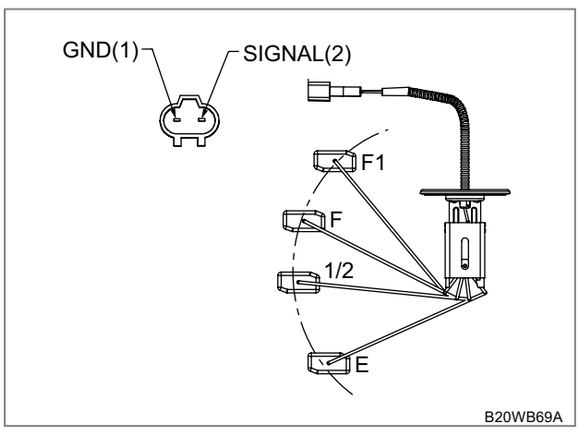
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 102 2025-04-08 오전 9:41:21

4.26 FUEL SENDER



The fuel sender is installed on the top of the fuel tank.

The sensor float moves along the fuel level in the fuel tank changing resistance in the ground circuit of the fuel gauge.

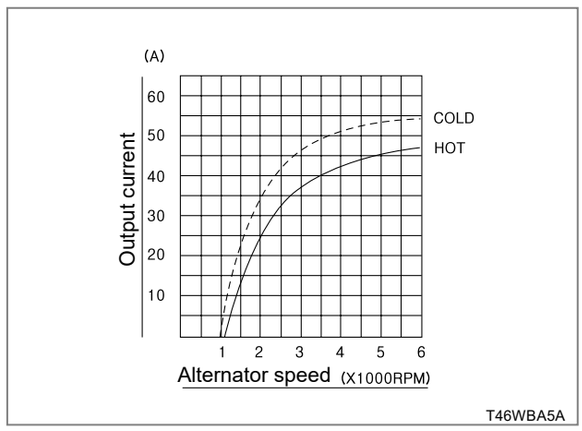


Level	Point F1	Point F	1/2 Point	Point E
Resistance (Ω)	3	3	(32.5)	110
Tolerance (Ω)	± 2	± 2	-	± 7

4.27 ALTERNATOR



- **PERFORMANCE CURVE OF ALTERNATOR**



As shown in the performance curve on the figure, the alternator does not generate the power until its speed reaches 1,200 rpm.

This minimum revolution speed is called "Cut In Speed".

If the alternator's speed is below the cut in speed, the alternator does not generate the power and the charge warning lamp does not go off.

Also, the output performance changes as the output current (A) changes according to the coil's temperature (cold and hot). Therefore, the average curve for the cold and hot conditions is presented as guaranteed performance.

In general, the alternator's pulley ratio is determined to maximize the alternator output in the rated maximum output of the engine.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 103 2025-04-08 오전 9:41:22

5. TROUBLESHOOTING

MAIN TROUBLE	DIAGNOSIS	ACTTIONS/CHECK POINTS	REMARKS
Engine cranking is impossible.	• Check the battery cable contact at both poles of the battery, ground point, and connection to the starter motor.	• a. Retighten loosen cables • b. Remove rust if necessary on the ground point	
	• Check the 60A main-fuse is blown.	• Replace the main fuse.	See 4.1.6
	• Check the starter relay input and output voltage.	• Replace the starter relay if necessary.	See 4.1.6
	• Check the cluster fuse in the fuse box is blown.	• Replace the cluster fuse(15A).	See 4.1.6
	• Check the input voltage at pin # B9 of cluster and output voltage at pin# B2	• Wire color: • B9: Black/White • B2: Blue/Red	See 4.1.6
	• Check the key_ST output voltage.	• Wire color: Blue/Red	See 4.1.6
	• Check the Neutral switch is stuck open and safety fuse(5A) is burn.	• Current flow: Safety fuse(10A) → Red/Blue wire → Neutral SW → Blue wire → A9_Cluster	See 4.20 and 4.20.2
	• Check if the brake switch is stuck open.	• Wire colors: Brake SW in: Bed/Blue out: Yellow/ Black	See 4.17
	• Check the stop solenoid hold coil, pull coil, pull coil relay or their fuse is burn	• Pull coil fuse: Engine fuse(25A), • Cluster pin#: A15(key ON), B3(output to pull coil relay)	See 4.1.8
	• Check the stop solenoid reverse current blocking diode.	• Wire color: Diode in: Red, diode put: Black	See 4.1.8
Engine cranking is weak and the battery is easy to be discharged.	• Check alternator drive belt(fam belt) tension.	• It may affect the generating performance.	
	• Compare the alternator output voltage at B terminal(8.0 red wire) when engine is running and stop.	• Alternator output voltage when the engine is running should always be higher than when the engine is stopped.	
	• Check the IC regulator input voltage at R terminal(0.8 Red wire) when the key is on while the engine is stopped.	-	See 4.3
	• Check the engine fuse(15A) if the voltage to IC regulator is low.	-	
If the battery discharges frequently	• The battery has reached the end of its life and should be replaced.	• If the battery discharges even though it is new, check the charging system.	

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 104 2025-04-08 오전 9:41:22

MAIN TROUBLE	DIAGNOSIS	ACTTIONS/CHECK POINTS	REMARKS
If the charge warning light continues to come on even though the charging system is normal	• Check the diode in the generator	-	See 4.3
If the engine cranks well but does not start or white smoke comes out.	• Allow sufficient preheating time or perform manual preheating.	-	See 4.2.6 or 4.1.4
	• Check the safety fuse (10A) in the main fuse box.	-	
	• Check the signal voltage and standby voltage on the preheating relay.	-	
	• Check the cluster output voltage to pre-heating relay.	• B1_Cluster(Green/Black wire)	
	• Check the input voltage to glow plugs and check for glow plugs short circuit.	-	
	• Check whether the cetane number of the fuel is suitable for cold weather. If necessary, use additives for cold weather.	-	
If the PTO is not working.	• Check the safety fuse(10A) in the main fuse box.	-	See 4.4
	• Check the seat switch.	• Safety fuse(10A) • B6_cluster	See 4.20.8
	• Check the PTO relay signal voltage and standby voltage.	• Safety fuse(10A) • B11_cluster(Yellow/Black)	
	• Check the PTO switch.	• Red/Blue to the Switch	
	• Check the cluster output voltage to PTO relay.	• A5_cluster(Orange)	See 4.4
	• Check the PTO solenoid input voltage, its short circuit and reverse current blocking diode	• Green wire from relay to solenoid.	
	• Check the hydraulic system and clutch assembly.	-	
If only stationary PTO is not working	• Check the parking switch.	-	See 4.20.4 See 4.2.5
If the PTO is keep running when the operator gets off the seat.	• Check the seat switch.	-	See 4.20.8

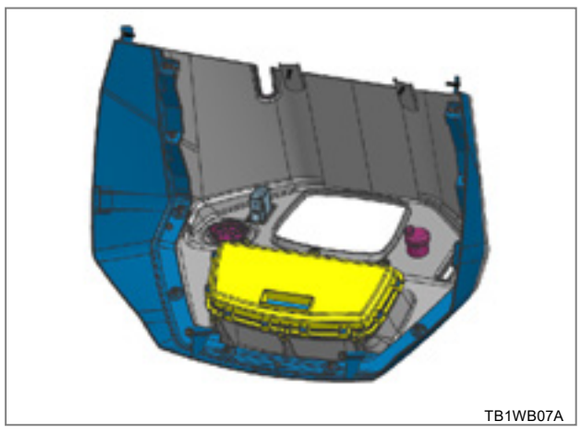
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 105 2025-04-08 오전 9:41:22

MAIN TROUBLE	DIAGNOSIS	ACTTIONS/CHECK POINTS	REMARKS
If the cruise control is not engaged.	• Check the cruise fuse(15A) in the main fuse box.	-	See 4.5
	• Check the cruise switch.	-	
	• Check the cruise relay signal voltage from cluster and standby voltage.	• Brown wire from cruise SW to cruise relay signal. • Yellow/Green wire from cruise fuse(15A) to cruise relay standby.	
	• Check the brake-cruise relay signal voltage and standby voltage.	• White wire from cruise SW to Brake-Cruise relay signal. • Yellow/Black wire from bake SW to Brake-Cruise relay standby.	See 4.5
	• Check the cruise magnet input voltage, its short circuit and reverse current blocking diode.	• Blue wire from cruise relay to cruise magnet.	
If the air conditioner is not working	• Check 40A power fuse.	-	
	• Check the AC power fuse(25A) in the main fuse box.	-	See 4.12
	• Check the condenser fuse(15A) in the main fuse box.	-	
	• Check the power relay signal voltage and standby voltage	-	
	• Check the AC controller input voltage.	Yellow/Red wire to AC controller	See 4.12
	• Check the condenser input voltage.	A4_Cluster	
	• Check if the refrigerant is leaking or not sufficient or too much.	-	
	• Check if the compressor is stuck due to lack of lubrication.	-	See chapter 1. Specifications

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 106 2025-04-08 오전 9:41:22

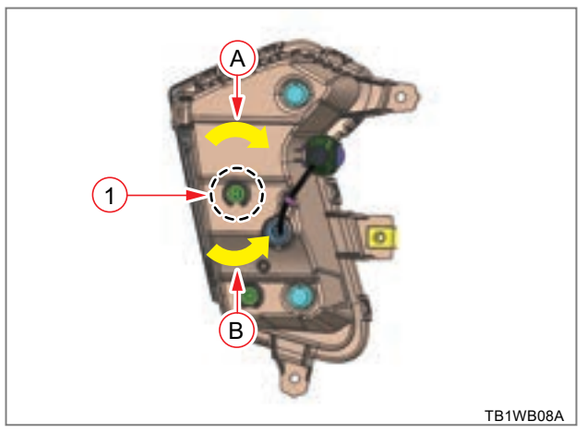
6. WIRING HARNESS ASSEMBLY TIPS

6.1 CLUSTER ASSEMBLY TIPS


TB1WB07A

Do not place the cluster upside down after disassembling or before assembling it.

6.2 HEAD LIGHT ASSEMBLY TIPS

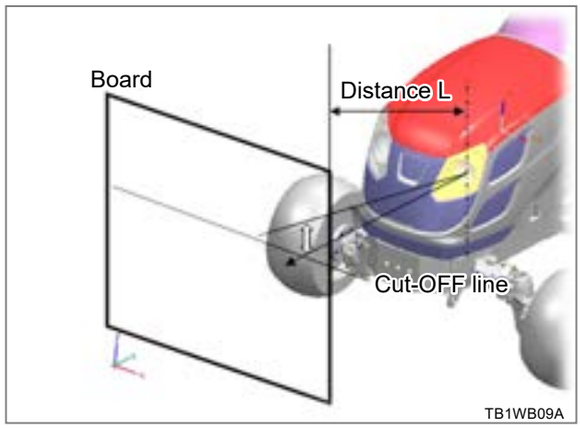


TB1WB08A

(1) Aiming bolt upper/lower adjistment

(A) Upward adjustment (B) Downward adjustment

After assembling the head light, adjust the lighting angle.



TB1WB09A

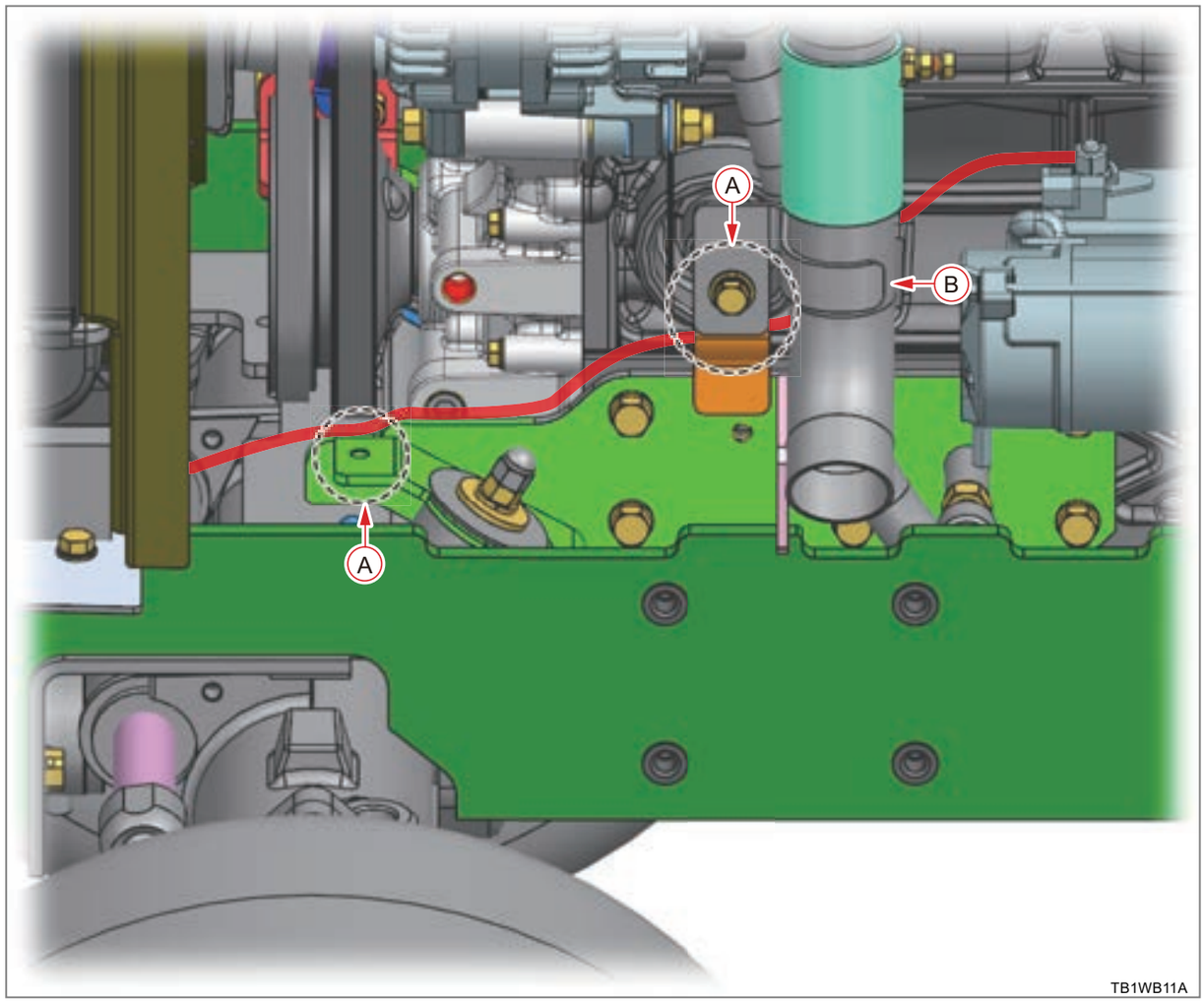
1. Park the tractor on the leveled ground.
2. Place the cut off line board 1 m away from the head lights.
3. Turn on the head light high beam while the engine is running.
4. Open the hood to adjust the lighting angle by adjusting the aiming screw.
5. The height of cut off line should be lower than height of head lamp by 4~5%.

- Recommended cut off line height : 836~845mm
- Head light height with standard tire: 890mm
- Cut off line: Horizontal line which cut through the center of lighting focuses

  (Aiming bolt, upper/lower adjustment : Aiming screw, upward adjustment : Higher(CW), downward adjustment : Lower(CCW), L distance : L=Distance)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 107 2025-04-08 오전 9:41:22

6.3 ENGINE WIRE HARNESS ASSEMBLY TIP



(A) Tie band point

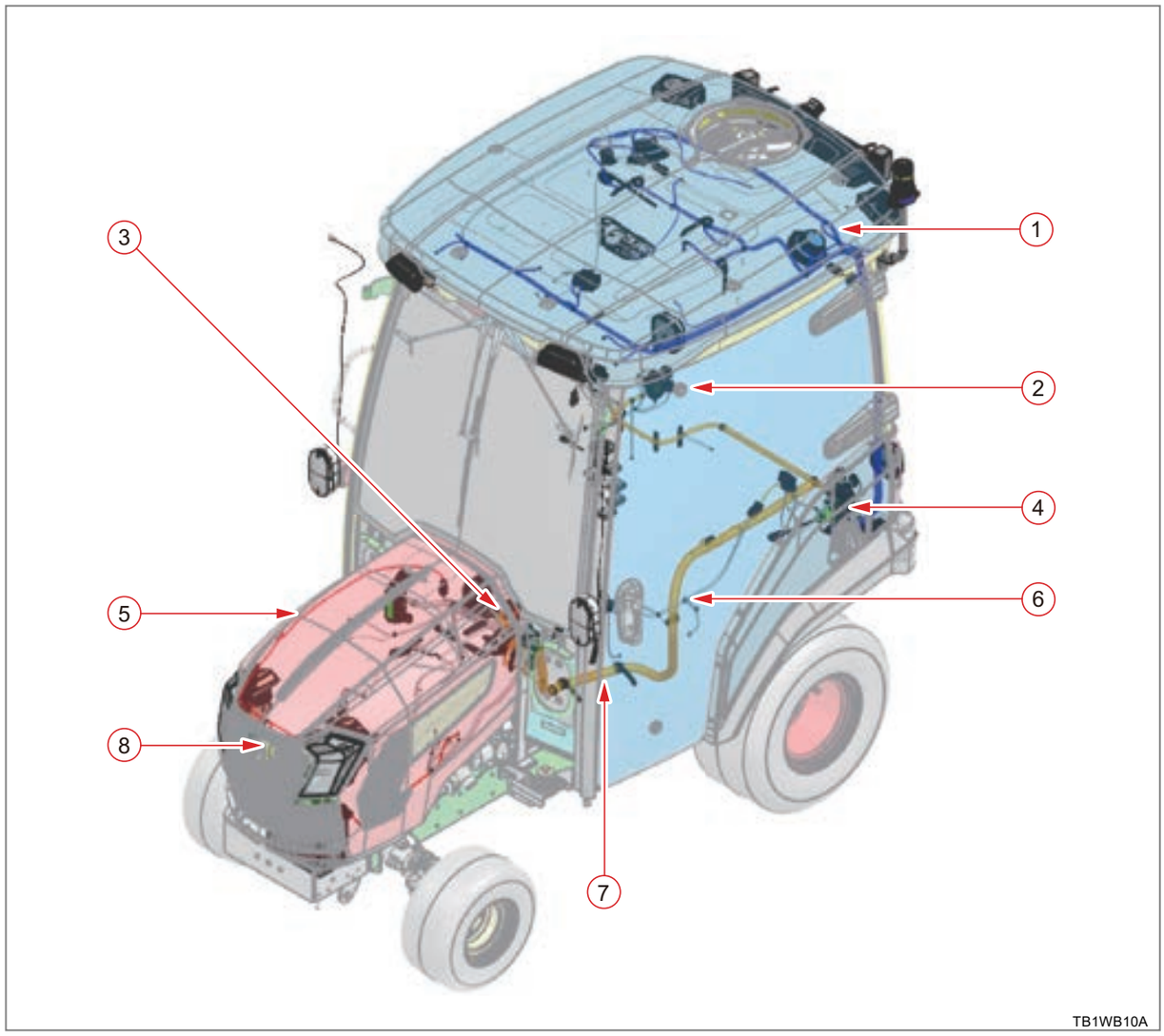
(B) Avoid interfere with exhaust pipe

Tie down the wire well to avoid interference with exhaust pipe.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 108 2025-04-08 오전 9:41:23

7. WIRING HARNESSES ROUTING AND WIRE DRAWING

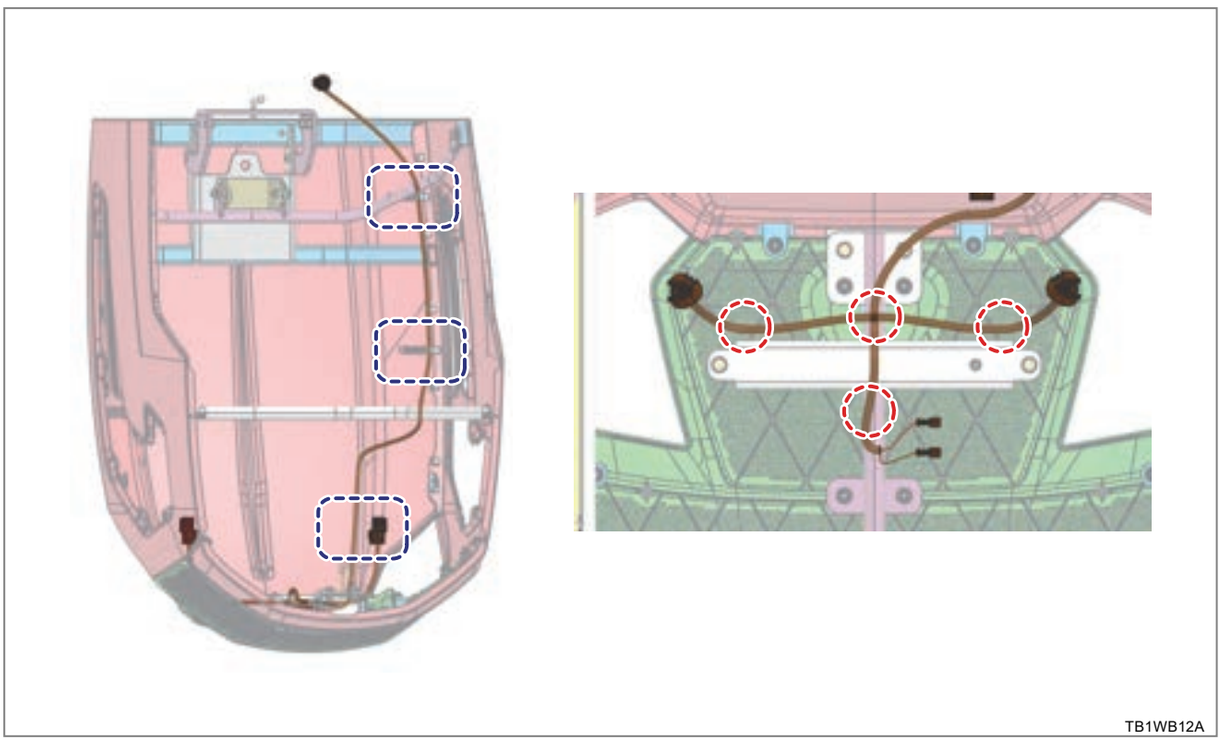
7.1 OVERALL WIRE HARNESS ROUTING



(1) Cabin wire harness
(2) Fender wire (R)
(3) Panel wire harness
(4) Fender wire (L)
(5) Head light wire
(6) Fender wire
(7) Main wire harness
(8) Engine wire

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 109 2025-04-08 오전 9:41:23

7.2 HEAD LIGHT WIRE AND ENGINE WIRE ROUTING



TB1WB12A

Blue square : Wire clamps, Red circle: Tie bands

▶ ENGINE WIRE DRAWING

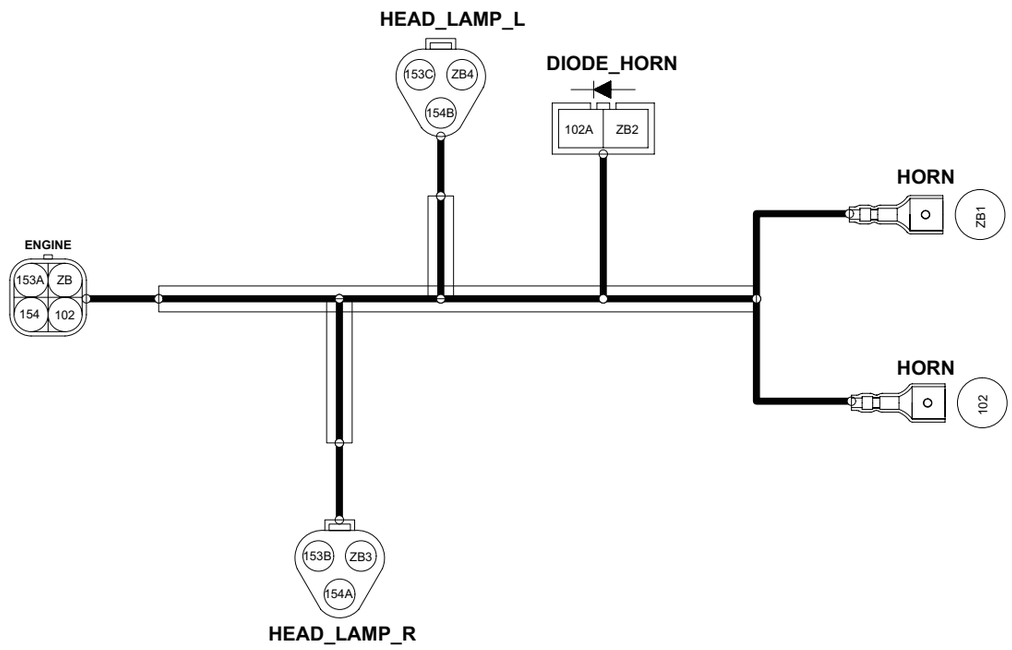


Wire Label	Color	From	To
401	W/R	ENGINE	DUAL_TEMP_SENSOR
ZE17	B	DUAL_TEMP_SENSOR	ENGINE

TB1WB14A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 110 2025-04-08 오전 9:41:24

▶ HEAD LIGHT WIRE DRAWING

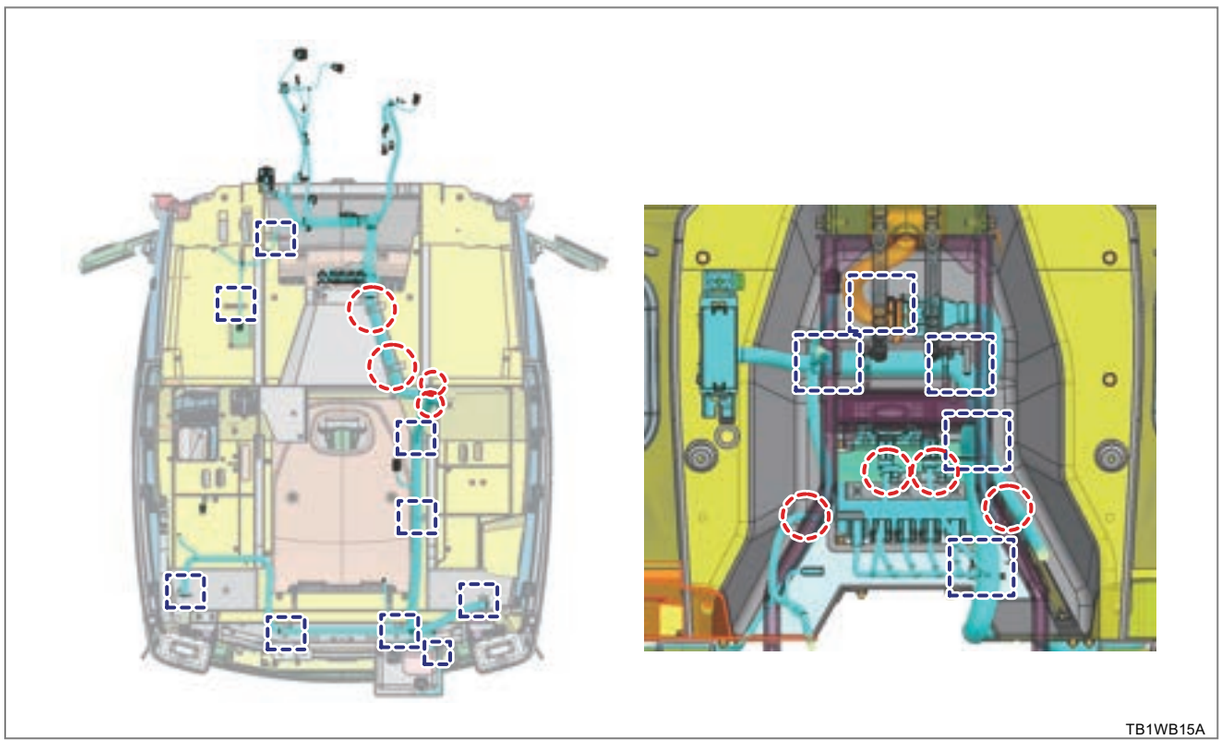


Wire Label	Color	From	To
102	W	HORN	ENGINE
102A	W	DIODE_HORN	102
153A	L	ENGINE	FK_153A
153B	L	FK_153A	HEAD_LAMP_R
153C	L	HEAD_LAMP_L	FK_153A
154	G	ENGINE	FK_154
154A	G	FK_154	HEAD_LAMP_R
154B	G	HEAD_LAMP_L	FK_154
ZB	B	FK_ZB	ENGINE
ZB1	B	HORN	FK_ZB
ZB2	B	DIODE_HORN	FK_ZB
ZB3	B	HEAD_LAMP_R	FK_ZB
ZB4	B	HEAD_LAMP_L	FK_ZB

TB1WB13A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 111 2025-04-08 오전 9:41:24

7.3 MAIN WIRE HARNESS ROUTING

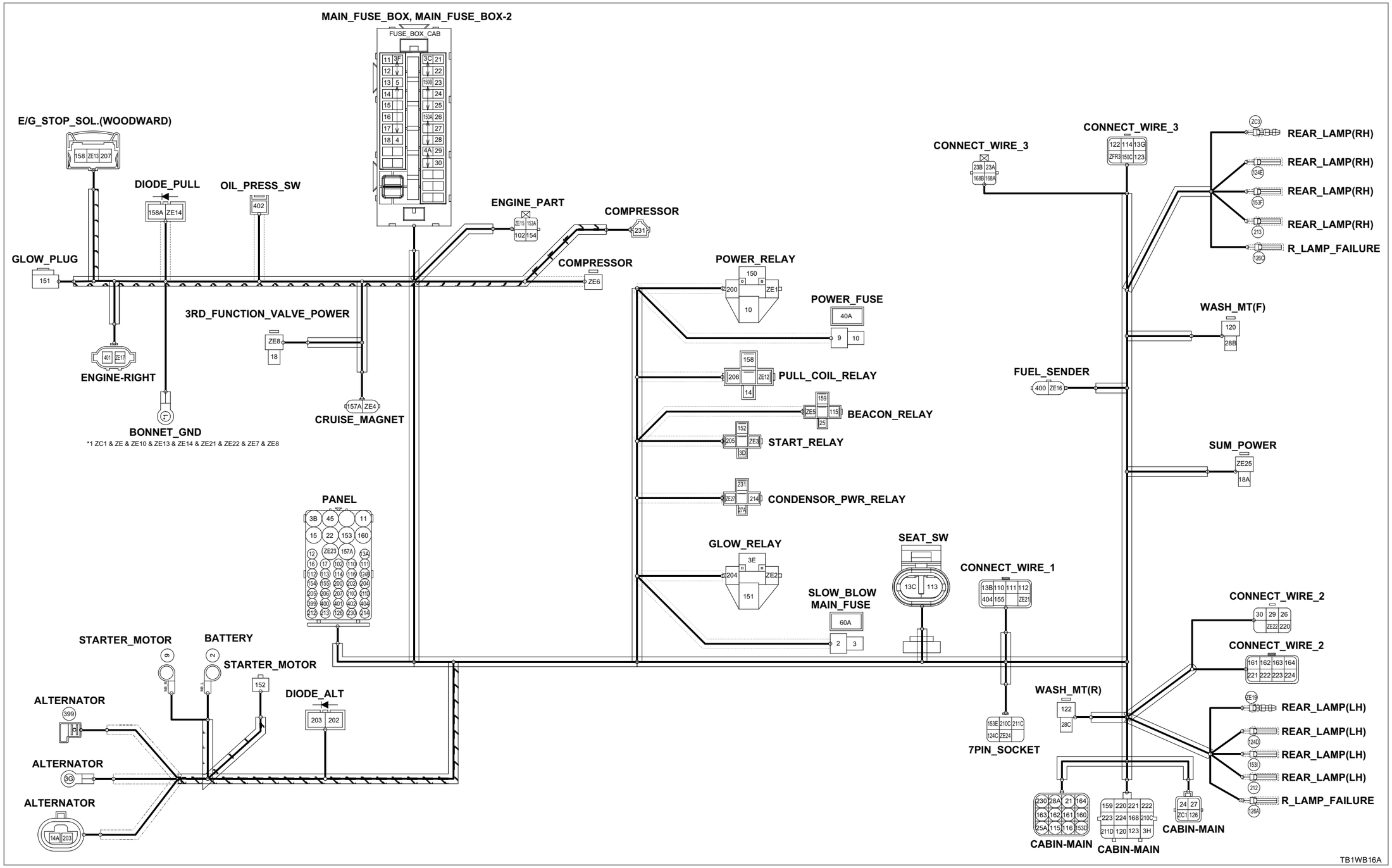


Blue square : Wire clamps

Red circle: Tie bands

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 112 2025-04-08 오전 9:41:24

▶ MAIN WIRE HARNESS DRAWING



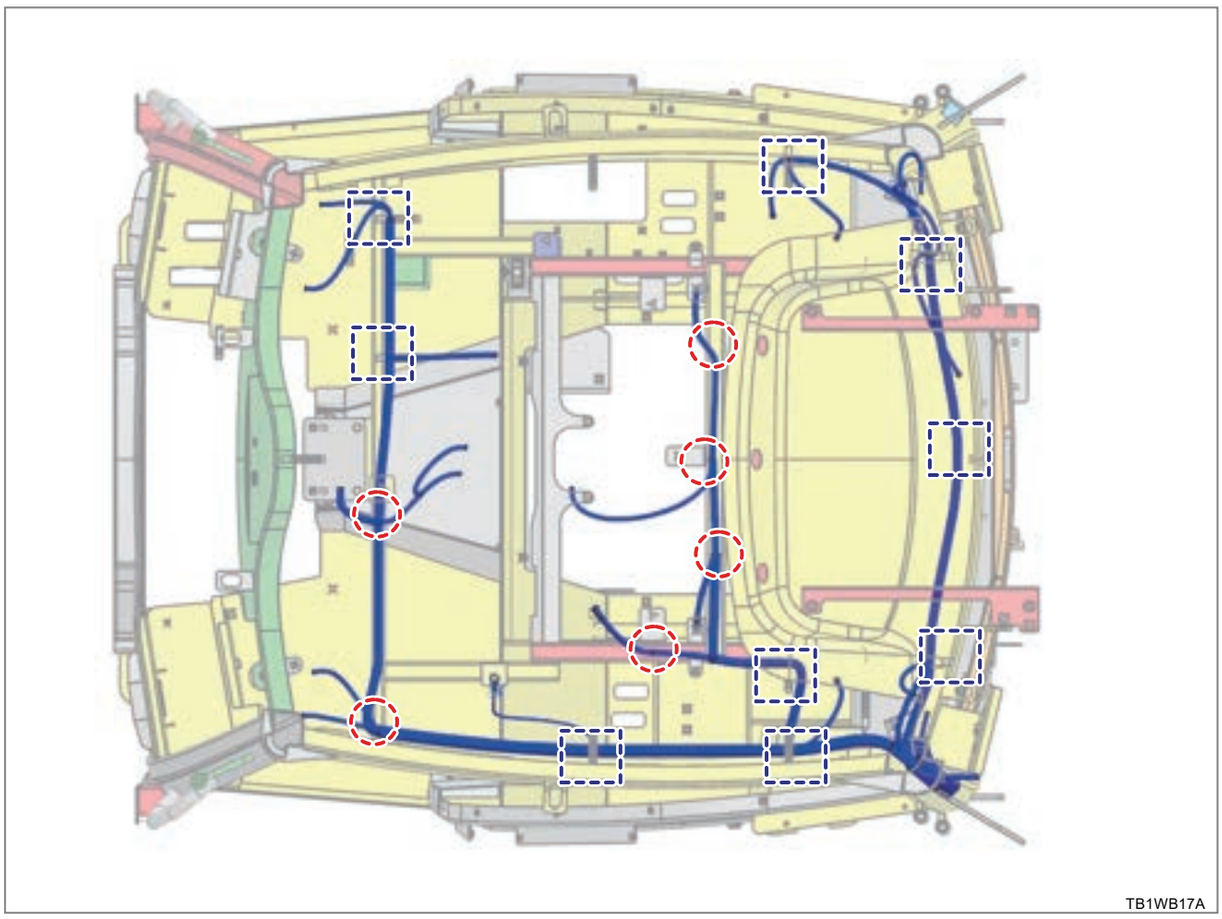
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 113 2025-04-08 오전 9:41:24

Wire Label	Color	From	To
2	R	MAIN_FUSE	BATTERY
3	R	MAIN_FUSE	FK_3
3A	R	FK_3	FK_3B
3B	R	FK_3B	PANEL
3C	R	FK_3	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
3D	R	FK_3	START_RELAY
3E	R	GLOW_RELAY	FK_3
3F	R	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	FK_3
3G	R	FK_3B	ALTERNATOR
3H	R	FK_3	CABIN-MAIN
4	R/L	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	PANEL
4A	R/L	4	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
5	W	PANEL	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
9	R	STARTER_MOTOR	POWER_FUSE
10	R	POWER_FUSE	POWER_RELAY
11	W	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	PANEL
12	W/L	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	PANEL
13	R/L	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	FK_13
13A	R/L	PANEL	FK_13
13B	R/L	CONNECT_WIRE_1	FK_13
13C	R/L	SEAT_SW	FK_13
13G	R/L	CONNECT_WIRE_3	FK_13
14	R/W	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	PULL_COIL_RELAY
14A	R/W	14	ALTERNATOR
15	W/R	PANEL	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
16	R/Y	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	PANEL
17	Y/G	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	PANEL
18	Or	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	3rd_function_valve_power
18A	Or	Sum_Power	18
21	R	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	CABIN-MAIN
22	Y/B	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	PANEL
23	R	FK_23	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
23A	R	CONNECT_WIRE_3	FK_23
23B	R	CONNECT_WIRE_3	FK_23
24	R/G	CABIN-MAIN	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
25	Y/B	Beacon_Relay	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
25A	Y/B	CABIN-MAIN	25
26	L/W	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	CONNECT_WIRE_2
27	Or	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	CABIN-MAIN
27A	Or	27	CONDENSOR_PWR_RELAY
28	Or	FK_28	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
28A	Or	CABIN-MAIN	FK_28
28B	Or	Wash_MT(F)	FK_28
28C	Or	Wash_MT(R)	28B
29	W	CONNECT_WIRE_2	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
30	R/W	CONNECT_WIRE_2	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2
102	W	ENGINE_PART	PANEL
110	Y	CONNECT_WIRE_1	PANEL
111	L	PANEL	CONNECT_WIRE_1
112	W	CONNECT_WIRE_1	PANEL
113	L/W	PANEL	SEAT_SW
114	Y/B	CONNECT_WIRE_3	PANEL
115	R/B	Beacon_Relay	CABIN-MAIN
116	R/W	PANEL	CABIN-MAIN
120	G/B	CABIN-MAIN	Wash_MT(F)
122	G/R	CONNECT_WIRE_3	Wash_MT(R)
123	Y	CONNECT_WIRE_3	CABIN-MAIN
124B	Y/B	PANEL	FK_125
124C	Y/B	7Pin_socket	FK_125
124D	Y/B	Rear_Lamp(LH)	FK_125
124E	Y/B	Rear_Lamp(RH)	FK_125
126	Br	PANEL	CABIN-MAIN
126A	Br	126	R_LAMP_FAILURE
126C	Br	R_LAMP_FAILURE	126A
150	R/W	POWER_RELAY	FK_150
150A	R/W	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	FK_150
150B	R/W	MAIN_FUSE_BOX,MAIN_FUSE_BOX-2	FK_150
150C	R/W	CONNECT_WIRE_3	150
151	B	GLOW_PLUG	GLOW_RELAY
152	R/W	START_RELAY	STARTER_MOTOR
153	L	PANEL	FK_153
153A	L	FK_153	ENGINE_PART
153D	Y	FK_153	CABIN-MAIN
153E	Y	7Pin_socket	FK_153
153F	Y	Rear_Lamp(RH)	FK_153
153I	Y	Rear_Lamp(LH)	153F
154	G	PANEL	ENGINE_PART
155	Gr	PANEL	CONNECT_WIRE_1
157A	L	PANEL	CRUISE_MAGNET
158	R	PULL_COIL_RELAY	E/G_STOP_SOL.(WOOD-WARD)
158A	R/L	DIODE_PULL	158
159	R/G	Beacon_Relay	CABIN-MAIN
160	Y	CABIN-MAIN	PANEL
161	Y/B	CONNECT_WIRE_2	CABIN-MAIN
162	W	CABIN-MAIN	CONNECT_WIRE_2
163	Br	CONNECT_WIRE_2	CABIN-MAIN
164	R	CONNECT_WIRE_2	CABIN-MAIN
168	R/L	FK_168	CABIN-MAIN
168A	R/L	CONNECT_WIRE_3	FK_168
168B	R/L	CONNECT_WIRE_3	FK_168
200	W	POWER_RELAY	PANEL
202	P	DIODE_ALT	PANEL
203	L	DIODE_ALT	ALTERNATOR
204	G/B	GLOW_RELAY	PANEL
205	L/R	START_RELAY	PANEL
206	W/L	PULL_COIL_RELAY	PANEL
207	L	E/G_STOP_SOL.(WOOD-WARD)	PANEL
210C	R/W	210C,CABIN-MAIN	7Pin_socket,PANEL
211C	G/W	211D	7Pin_socket
211D	G/W	CABIN-MAIN	PANEL
212	R/W	Rear_Lamp(LH)	PANEL
213	G/W	Rear_Lamp(RH)	PANEL
214	W/Y	PANEL	CONDENSOR_PWR_RELAY
220	R/W	CABIN-MAIN	CONNECT_WIRE_2
221	Br/B	CABIN-MAIN	CONNECT_WIRE_2
222	B/G	CABIN-MAIN	CONNECT_WIRE_2
223	Br	CABIN-MAIN	CONNECT_WIRE_2
224	W	CABIN-MAIN	CONNECT_WIRE_2
230	G	CABIN-MAIN	PANEL
231	R/Y	CONDENSOR_PWR_RELAY	Compressor
399	W/R	ALTERNATOR	PANEL
400	Y	FUEL_SENDER	PANEL
401	W/R	PANEL	ENGINE-RIGHT
402	Gr	OIL_PRESS_SW	PANEL
404	G	CONNECT_WIRE_1	PANEL
ZC1	B	CABIN-MAIN	Bonnet_GND
ZC3	B	Rear_Lamp(RH)	FK_ZC3
ZE	B	Bonnet_GND	FK_ZE2
ZE1	B	POWER_RELAY	FK_ZE2
ZE2	B	FK_ZE2	GLOW_RELAY
ZE3	B	START_RELAY	FK_ZE2
ZE4	B	CRUISE_MAGNET	FK_ZE1
ZE5	B	Beacon_Relay	FK_ZE3
ZE6	B	ZE22	Compressor
ZE7	B	FK_ZE1	Bonnet_GND
ZE8	B	3rd_function_valve_power	Bonnet_GND
ZE10	B	Bonnet_GND	FK_ZE3
ZE12	B	PULL_COIL_RELAY	ZE13
ZE13	B	E/G_STOP_SOL.(WOOD-WARD)	Bonnet_GND
ZE14	B	DIODE_PULL	Bonnet_GND
ZE15	B	ENGINE_PART	FK_ZE3
ZE16	B	FUEL_SENDER	ZE21
ZE17	B	ENGINE-RIGHT	ZE21
ZE18	B	FK_ZC3	FK_ZE3
ZE19	B	FK_ZC3	Rear_Lamp(LH)
ZE21	B	CONNECT_WIRE_1	Bonnet_GND
ZE22	B	CONNECT_WIRE_2	Bonnet_GND
ZE23	B	PANEL	ZE21
ZE24	B	7Pin_socket	FK_ZE1
ZE25	B	Sum_Power	ZE8
ZE27	B	CONDENSOR_PWR_RELAY	ZE6
ZFR3	B	CONNECT_WIRE_3	FK_ZE3

TB1WB16A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 114 2025-04-08 오전 9:41:25

7.4 CABIN WIRE HARNESS ROUTING



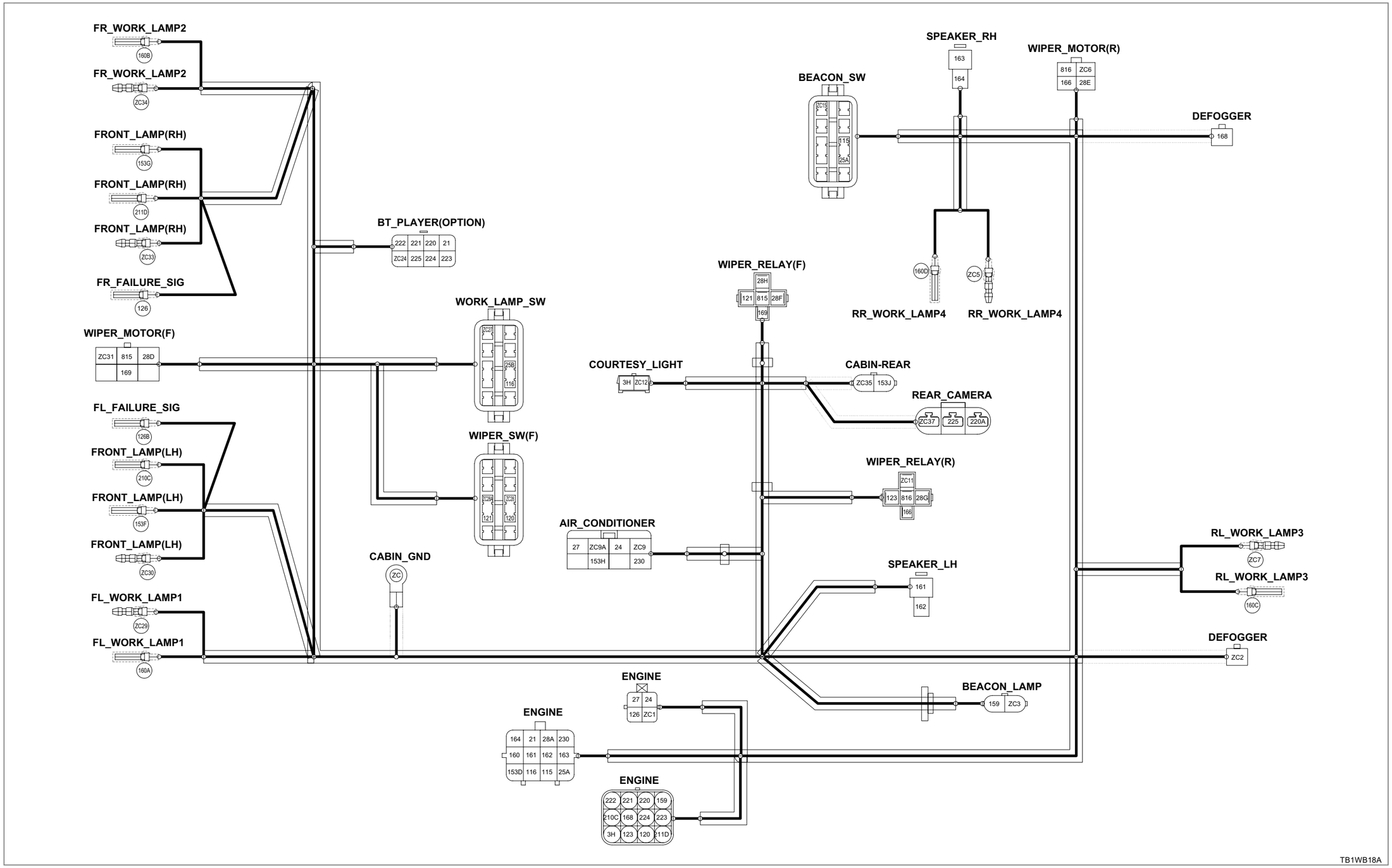
Blue square : Wire clamps

Red circle: Tie bands

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 115 2025-04-08 오전 9:41:25

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 116 2025-04-08 오전 9:41:25

▶ CABIN WIRE HARNESS DRAWING



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 117 2025-04-08 오전 9:41:25

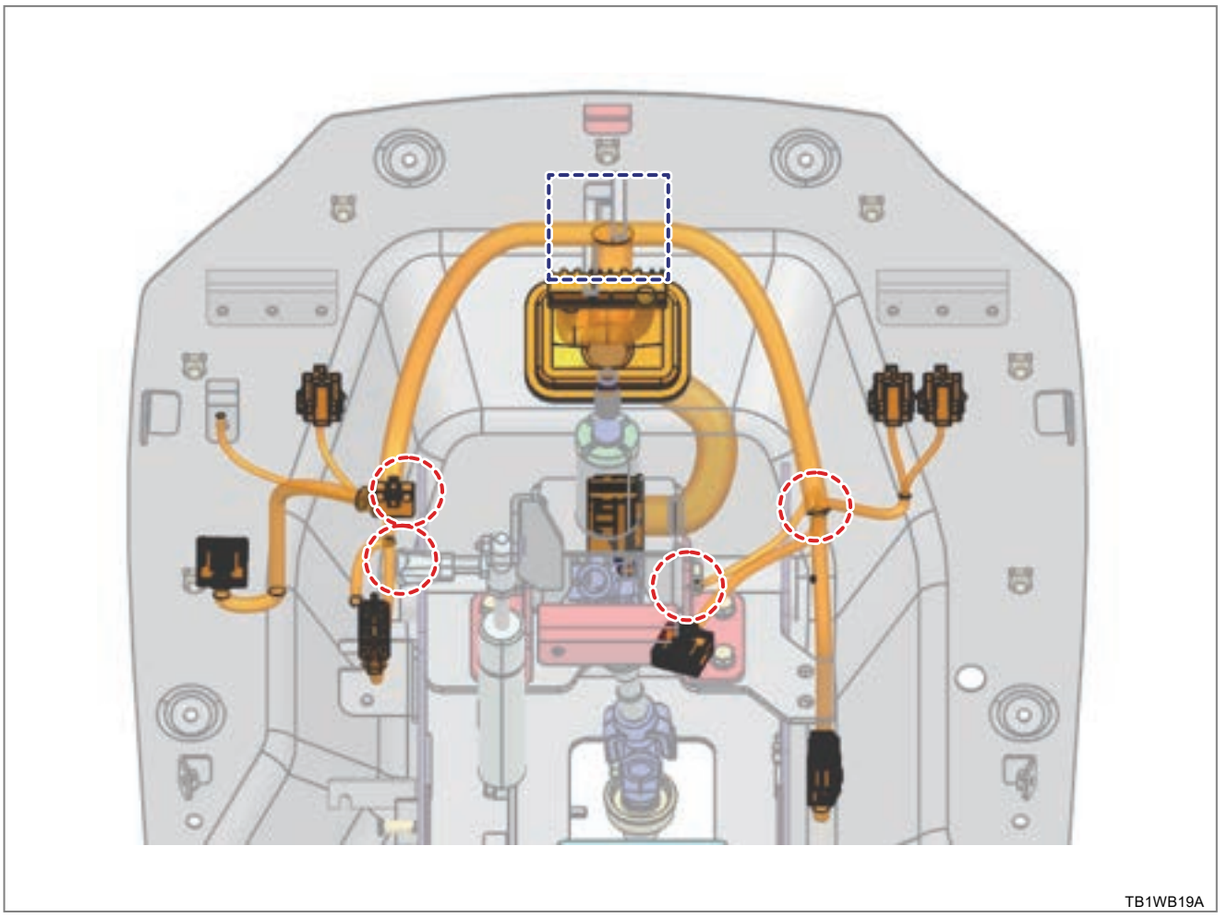
Wire Label	Color	From	To
3H	R	ENGINE	Courtesy_Light
21	R	ENGINE	BT_Player(OPTION)
24	R/G	Air_Conditioner	ENGINE
25A	Y/B	Beacon_SW	ENGINE
25B	Y/B	25A	Work_Lamp_SW
27	Or	ENGINE	Air_Conditioner
28A	Or	ENGINE	FK_28A
28D	Or	Wiper_Motor(F)	FK_28A
28E	Or	FK_28A	Wiper_Motor(R)
28F	Or	Wiper_Relay(F)	28E
28G	Or	28E	Wiper_Relay(R)
28H	Or	Wiper_Relay(F)	28F
115	R/B	ENGINE	Beacon_SW
116	R/W	ENGINE	Work_Lamp_SW
120	G/B	Wiper_SW(F)	ENGINE
121	Y/W	Wiper_SW(F)	Wiper_Relay(F)
123	Y	ENGINE	Wiper_Relay(R)
126	Br	ENGINE	FR_FAILURE_SIG
126B	Br/Y	FL_FAILURE_SIG	126
153D	Y	ENGINE	FK_153D
153F	Y	Front_Lamp(LH)	FK_153D
153G	Y	FK_153D	FRONT_LAMP(RH)
153H	Y	FK_153D	Air_Conditioner
153J	Y	FK_153D	CABIN-REAR
159	R/G	Beacon_Lamp	ENGINE
160	Y	FK_160	ENGINE
160A	Y	FL_Work_Lamp1	FK_160
160B	Y	FR_Work_Lamp2	160A
160C	Y	RL_Work_Lamp3	FK_160
160D	Y	RR_Work_Lamp4	160C
161	Y/B	ENGINE	Speaker_LH
162	W	Speaker_LH	ENGINE
163	Br	ENGINE	Speaker_RH
164	R	ENGINE	Speaker_RH
166	R/B	Wiper_Relay(R)	Wiper_Motor(R)
168	R/L	Defogger	ENGINE
169	R/B	Wiper_Relay(F)	Wiper_Motor(F)
210C	R/W	Front_Lamp(LH)	ENGINE

Wire Label	Color	From	To
211D	G/W	FRONT_LAMP(RH)	ENGINE
220	R/W	BT_Player(OPTION)	ENGINE
220A	R	REAR_CAMERA	220
221	Br/B	BT_Player(OPTION)	ENGINE
222	B/G	BT_Player(OPTION)	ENGINE
223	Br	BT_Player(OPTION)	ENGINE
224	W	BT_Player(OPTION)	ENGINE
225	Y	REAR_CAMERA	BT_Player(OPTION)
230	G	Air_Conditioner	ENGINE
815	L	Wiper_Motor(F)	Wiper_Relay(F)
816	L	Wiper_Relay(R)	Wiper_Motor(R)
ZC	B	CABIN_GND	FK_ZC
ZC1	B	FK_ZC	ENGINE
ZC2	B	Defogger	FK_ZC
ZC3	B	Beacon_Lamp	FK_ZC
ZC4	B	FK_ZC4	FK_ZC
ZC5	B	RR_Work_Lamp4	FK_ZC4
ZC6	B	Wiper_Motor(R)	FK_ZC4
ZC7	B	RL_Work_Lamp3	FK_ZC
ZC8	B	FK_ZC	FK_ZC8
ZC9	B	Air_Conditioner	FK_ZC8
ZC9A	B	ZC9	Air_Conditioner
ZC10	B	FK_ZC10	FK_ZC8
ZC11	B	Wiper_Relay(R)	FK_ZC10
ZC12	B	FK_ZC10	Courtesy_Light
ZC15	B	Beacon_SW	FK_ZC
ZC22	B	FK_ZC22	ZC
ZC24	B	BT_Player(OPTION)	FK_ZC22
ZC27	B	ZC28	Work_Lamp_SW
ZC28	B	ZC24	Wiper_SW(F)
ZC28A	B	Wiper_SW(F)	ZC28
ZC29	B	ZC22	FL_Work_Lamp1
ZC30	B	ZC22	Front_Lamp(LH)
ZC31	B	FK_ZC22	Wiper_Motor(F)
ZC33	B	FRONT_LAMP(RH)	FK_ZC22
ZC34	B	ZC33	FR_Work_Lamp2
ZC35	B	CABIN-REAR	FK_ZC
ZC37	B	REAR_CAMERA	ZC35

TB1WB18A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 118 2025-04-08 오전 9:41:25

7.5 PANEL WIRE HARNESS ROUTING

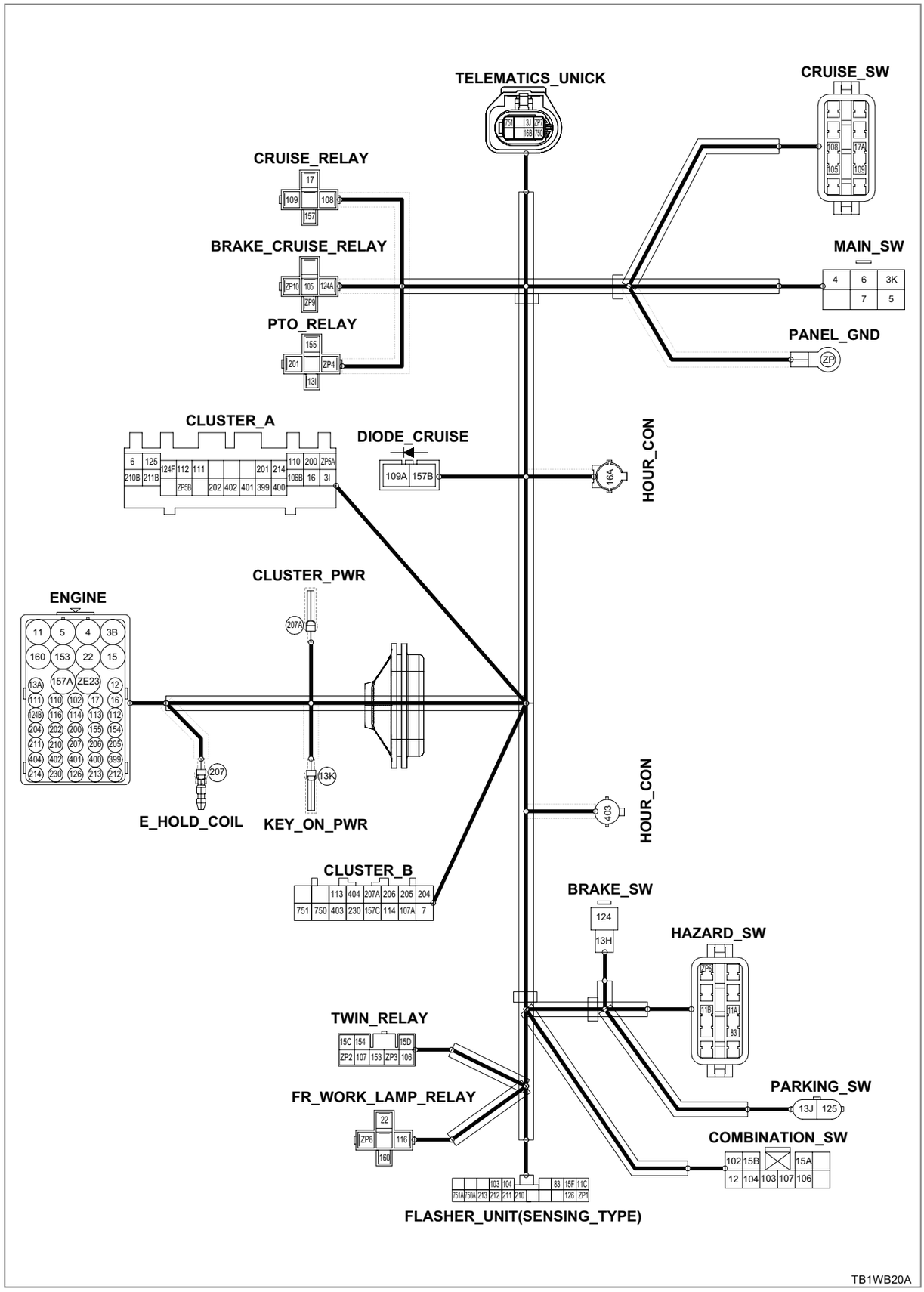


Blue square : Wire clamps

Red circle: Tie bands

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 119 2025-04-08 오전 9:41:25

▶ PANEL WIRE HARNESS DRAWING



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 120 2025-04-08 오전 9:41:26

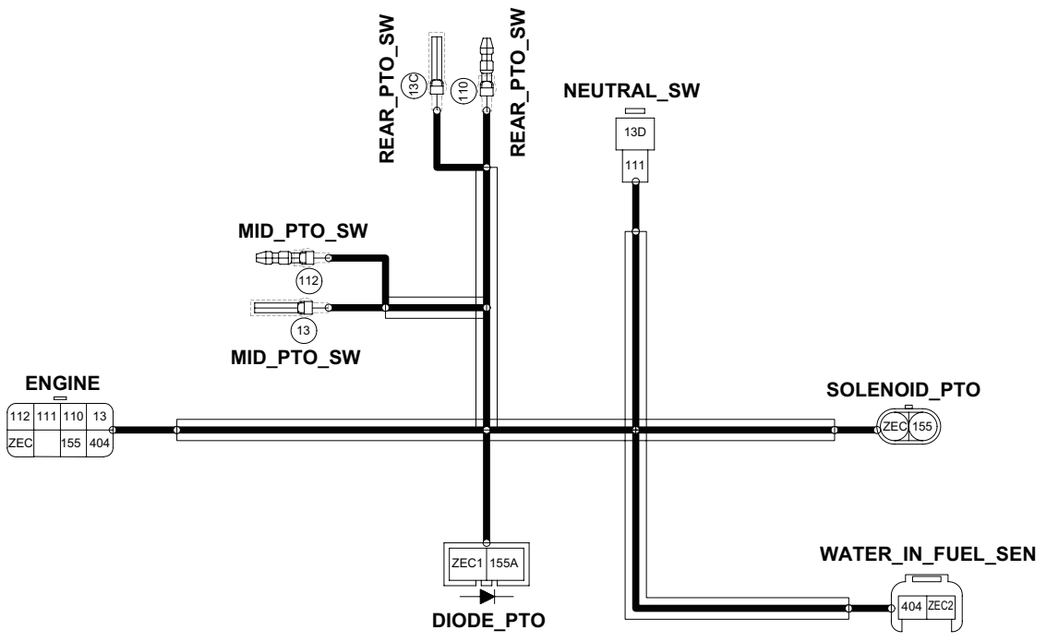
Wire Label	Color	From	To
3B	R	FK_3B	ENGINE
3I	R	CLUSTER_A	FK_3B
3J	R	Telematics_UNICK	FK_3B
3K	R	FK_3B	MAIN_SW
4	R/L	MAIN_SW	ENGINE
5	W	MAIN_SW	ENGINE
6	B/R	MAIN_SW	CLUSTER_A
7	B/W	CLUSTER_B	MAIN_SW
11	W	ENGINE	FK_11
11A	W	HAZARD_SW	FK_11
11B	W	HAZARD_SW	FK_11
11C	W	FK_11	FLASHER_UNIT (SENSING_TYPE)
12	W/L	ENGINE	COMBINATION_SW
13A	R/L	FK_13A	ENGINE
13H	R/L	BRAKE_SW	FK_13A
13I	R/L	PTO_RELAY	FK_13A
13J	R/L	FK_13A	PARKING_SW
13K	R/B	FK_13A	KEY_ON_PWR
15	W/R	ENGINE	FK_11
15A	W/R	FK_11	COMBINATION_SW
15B	W/R	COMBINATION_SW	FK_11
15C	W/R	Twin_Relay	FK_11
15D	W/R	Twin_Relay	FK_11
15F	W/R	FLASHER_UNIT(-SENSING_TYPE)	FK_11
16	R/Y	ENGINE	CLUSTER_A
16A	R/Y	16	HOUR_CON
16B	R/Y	Telematics_UNICK	16A
17	Y/G	CRUISE_RELAY	ENGINE
17A	Y/G	CRUISE_SW	17
22	Y/B	ENGINE	FR_Work_Lamp_Relay
83	L	HAZARD_SW	FLASHER_UNIT (SENSING_TYPE)
102	W	ENGINE	COMBINATION_SW
103	G/W	COMBINATION_SW	FLASHER_UNIT (SENSING_TYPE)
104	R/W	COMBINATION_SW	FLASHER_UNIT (SENSING_TYPE)
105	W	BRAKE_CRUISE_RELAY	CRUISE_SW
106	Y	COMBINATION_SW	Twin_Relay
106B	Y	CLUSTER_A	106
107	W	Twin_Relay	COMBINATION_SW
107A	W	CLUSTER_B	107
108	G/B	CRUISE_SW	CRUISE_RELAY
109	Br	CRUISE_RELAY	CRUISE_SW
109A	Br	DIODE_CRUISE	109
110	Y	ENGINE	CLUSTER_A
111	L	CLUSTER_A	ENGINE
112	W	ENGINE	CLUSTER_A
113	L/W	CLUSTER_B	ENGINE
114	Y/B	ENGINE	CLUSTER_B
116	R/W	FR_Work_Lamp_Relay	ENGINE
124	Y/B	BRAKE_SW	FK_124
124A	Y/B	FK_124	BRAKE_CRUISE_RELAY
124B	Y/B	ENGINE	FK_124
124F	Y/B	FK_124	CLUSTER_A

Wire Label	Color	From	To
125	L	CLUSTER_A	PARKING_SW
126	Br	FLASHER_UNIT (SENSING_TYPE)	ENGINE
153	L	Twin_Relay	ENGINE
154	G	Twin_Relay	ENGINE
155	Gr	PTO_RELAY	ENGINE
157	L	CRUISE_RELAY	
157A	L		ENGINE
157B	L	DIODE_CRUISE	
157C	L	CLUSTER_B	
160	Y	ENGINE	FR_Work_Lamp_Relay
200	W	ENGINE	CLUSTER_A
201	Or	CLUSTER_A	PTO_RELAY
202	P	ENGINE	CLUSTER_A
204	G/B	ENGINE	CLUSTER_B
205	L/R	ENGINE	CLUSTER_B
206	W/L	ENGINE	CLUSTER_B
207	L	ENGINE	E_HOLD_COIL
207A	L	CLUSTER_PWR	CLUSTER_B
210	R/W	ENGINE	FLASHER_UNIT (SENSING_TYPE)
210B	R/W	CLUSTER_A	210
211	G/W	ENGINE	FLASHER_UNIT (SENSING_TYPE)
211B	G/W	CLUSTER_A	211
212	R/W	FLASHER_UNIT (SENSING_TYPE)	ENGINE
213	G/W	FLASHER_UNIT (SENSING_TYPE)	ENGINE
214	W/Y	CLUSTER_A	ENGINE
230	G	CLUSTER_B	ENGINE
399	W/R	CLUSTER_A	ENGINE
400	Y	ENGINE	CLUSTER_A
401	W/R	CLUSTER_A	ENGINE
402	Gr	ENGINE	CLUSTER_A
403	Y/G	HOUR_CON	CLUSTER_B
404	G	ENGINE	CLUSTER_B
750	L	Telematics_UNICK	CLUSTER_B
750A	L	FLASHER_UNIT (SENSING_TYPE)	750
751	W	CLUSTER_B	Telematics_UNICK
751A	W	FLASHER_UNIT (SENSING_TYPE)	751
ZE23	B	ENGINE	FK_ZP9
ZP	B	Panel_GND	FK_ZP1
ZP1	B	FLASHER_UNIT (SENSING_TYPE)	FK_ZP1
ZP2	B	Twin_Relay	ZP3
ZP3	B	Twin_Relay	FK_ZP1
ZP4	B	PTO_RELAY	ZP5
ZP5	B	FK_ZP5	FK_ZP1
ZP5A	B	CLUSTER_A	FK_ZP5
ZP5B	B	FK_ZP5	CLUSTER_A
ZP6	B	HAZARD_SW	FK_ZP1
ZP7	B	FK_ZP9	Telematics_UNICK
ZP8	B	FR_Work_Lamp_Relay	FK_ZP9
ZP9	B	BRAKE_CRUISE_RELAY	ZP10
ZP10	B	FK_ZP9	BRAKE_CRUISE_RELAY

TB1WB20A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 121 2025-04-08 오전 9:41:26

7.6 FRAME WIRE HARNESS DRAWING

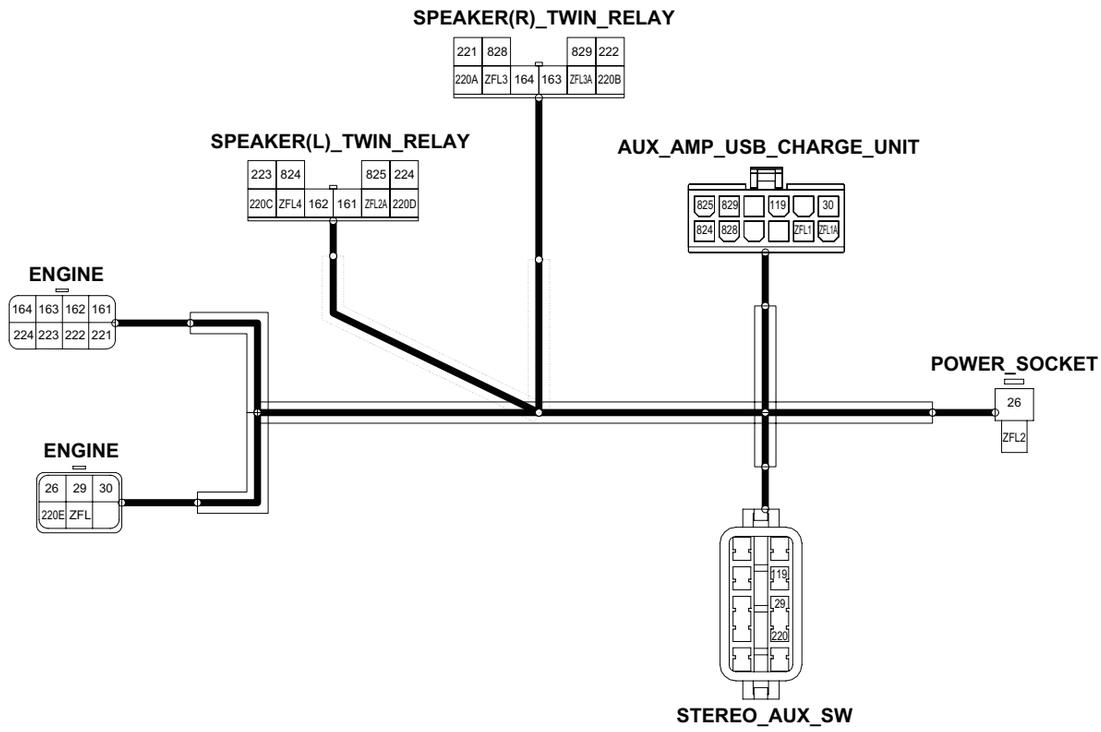


Wire Label	Color	From	To
13	R/W	MID_PTO_SW	ENGINE
13C	R/W	REAR_PTO_SW	13
13D	R/W	NEUTRAL_SW	13
110	Y	REAR_PTO_SW	ENGINE
111	L	ENGINE	NEUTRAL_SW
112	W	MID_PTO_SW	ENGINE
155	Gr	ENGINE	SOLENOID_PTO
155A	Gr	DIODE_PTO	155
404	G	Water_In_Fuel_Sen	ENGINE
ZEC	B	SOLENOID_PTO	ENGINE
ZEC1	B	DIODE_PTO	ZEC
ZEC2	B	ZEC	Water_In_Fuel_Sen

TB1WB21A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 122 2025-04-08 오전 9:41:26

7.7 FENDER WIRE(L) DRAWING

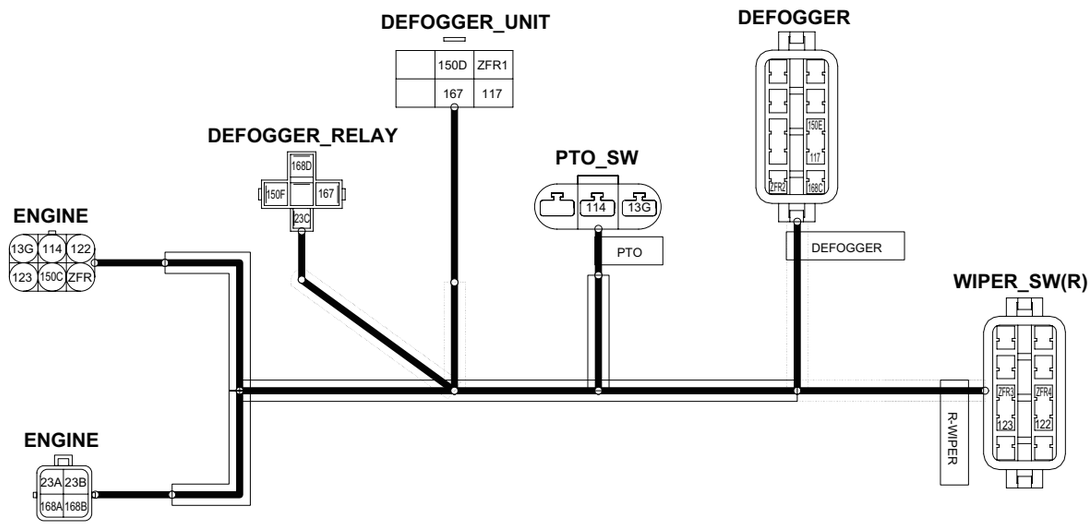


Wire Label	Color	From	To
26	L/W	ENGINE	POWER_SOCKET
29	W	STEREO_AUX_SW	ENGINE
30	R/W	AUX_AMP_USB_CHARGE_UNIT	ENGINE
119	Y/W	STEREO_AUX_SW	AUX_AMP_USB_CHARGE_UNIT
161	Y/B	SPEAKER(L)_TWIN_RELAY	ENGINE
162	W	ENGINE	SPEAKER(L)_TWIN_RELAY
163	Br	SPEAKER(R)_TWIN_RELAY	ENGINE
164	R	SPEAKER(R)_TWIN_RELAY	ENGINE
220	R/W	STEREO_AUX_SW	FK_220
220A	R/W	SPEAKER(R)_TWIN_RELAY	FK_220
220B	R/W	SPEAKER(R)_TWIN_RELAY	220A
220C	R/W	SPEAKER(L)_TWIN_RELAY	FK_220
220D	R/W	SPEAKER(L)_TWIN_RELAY	220C
220E	R/W	ENGINE	FK_220
221	Br/B	ENGINE	SPEAKER(R)_TWIN_RELAY
222	B/G	ENGINE	SPEAKER(R)_TWIN_RELAY
223	Br	ENGINE	SPEAKER(L)_TWIN_RELAY
224	W	ENGINE	SPEAKER(L)_TWIN_RELAY
824	Lg/B	AUX_AMP_USB_CHARGE_UNIT	SPEAKER(L)_TWIN_RELAY
825	Gr/B	AUX_AMP_USB_CHARGE_UNIT	SPEAKER(L)_TWIN_RELAY
828	L	AUX_AMP_USB_CHARGE_UNIT	SPEAKER(R)_TWIN_RELAY
829	G	AUX_AMP_USB_CHARGE_UNIT	SPEAKER(R)_TWIN_RELAY
ZFL	B	FK_ZFL	ENGINE
ZFL1	B	AUX_AMP_USB_CHARGE_UNIT	FK_ZFL
ZFL1A	B	AUX_AMP_USB_CHARGE_UNIT	ZFL1
ZFL2	B	POWER_SOCKET	FK_ZFL
ZFL2A	B	SPEAKER(L)_TWIN_RELAY	ZFL4
ZFL3	B	SPEAKER(R)_TWIN_RELAY	FK_ZFL
ZFL3A	B	SPEAKER(R)_TWIN_RELAY	ZFL3
ZFL4	B	SPEAKER(L)_TWIN_RELAY	FK_ZFL

TB1WB22A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 123 2025-04-08 오전 9:41:26

7.8 FENDER WIRE(R) DRAWING



Wire Label	Color	From	To
13G	R/L	PTO_SW	ENGINE
23A	R	ENGINE	FK_23C
23B	R	ENGINE	FK_23C
23C	R	Defogger_Relay	FK_23C
114	Y/B	PTO_SW	ENGINE
117	Y	DEFOGGER	DEFOGGER_UNIT
122	G/R	Wiper_SW(R)	ENGINE
123	Y	Wiper_SW(R)	ENGINE
150C	R/W	FK_150C	ENGINE
150D	R/W	DEFOGGER_UNIT	FK_150C
150E	R/W	DEFOGGER	FK_150C
150F	R/W	Defogger_Relay	FK_150C
167	B/Y	Defogger_Relay	DEFOGGER_UNIT
168A	R/L	FK_168	ENGINE
168B	R/L	FK_168	ENGINE
168C	R/L	DEFOGGER	FK_168
168D	R/L	Defogger_Relay	FK_168
ZFR	B	FK_ZFR	ENGINE
ZFR1	B	DEFOGGER_UNIT	FK_ZFR
ZFR2	B	DEFOGGER	ZFR1
ZFR3	B	FK_ZFR	Wiper_SW(R)
ZFR4	B	Wiper_SW(R)	ZFR3

TB1WB23A

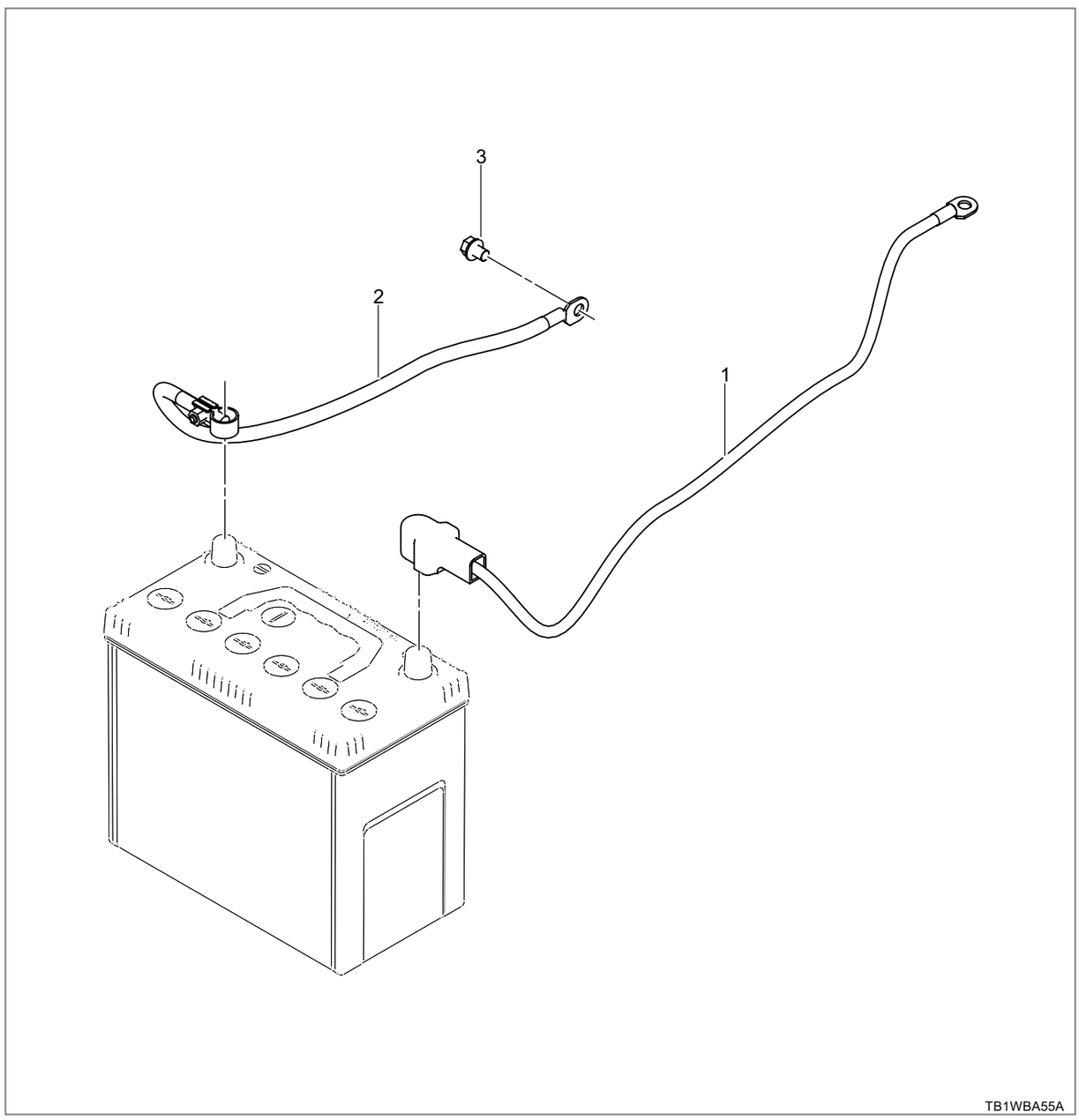
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 124 2025-04-08 오전 9:41:26

8. EXPLODED VIEW

REMARK

The part numbers and shapes of the following components are subject to change without notice for improvement of the product. If necessary, refer to the DAEDONG electronic manual, DPCS.

8.1 TB3-G513507 BATTERY

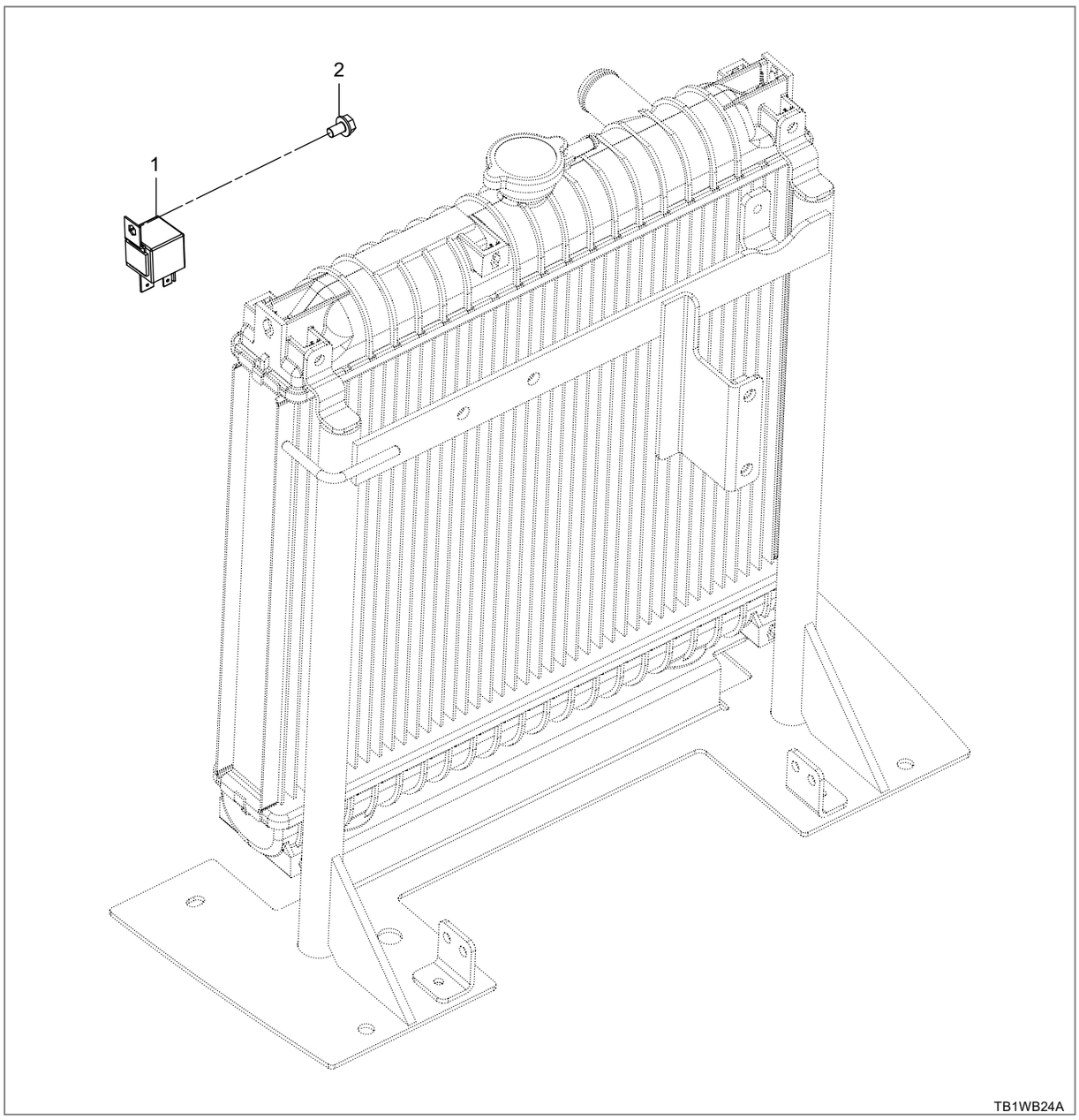


COMPONENTS

(1) Assy wire harness, Battery pos
(2) Assy wire harness, Battery earth
(3) Bolt, Flange

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 125 2025-04-08 오전 9:41:27

8.2 TB3-G514503 GLOW CONTROL

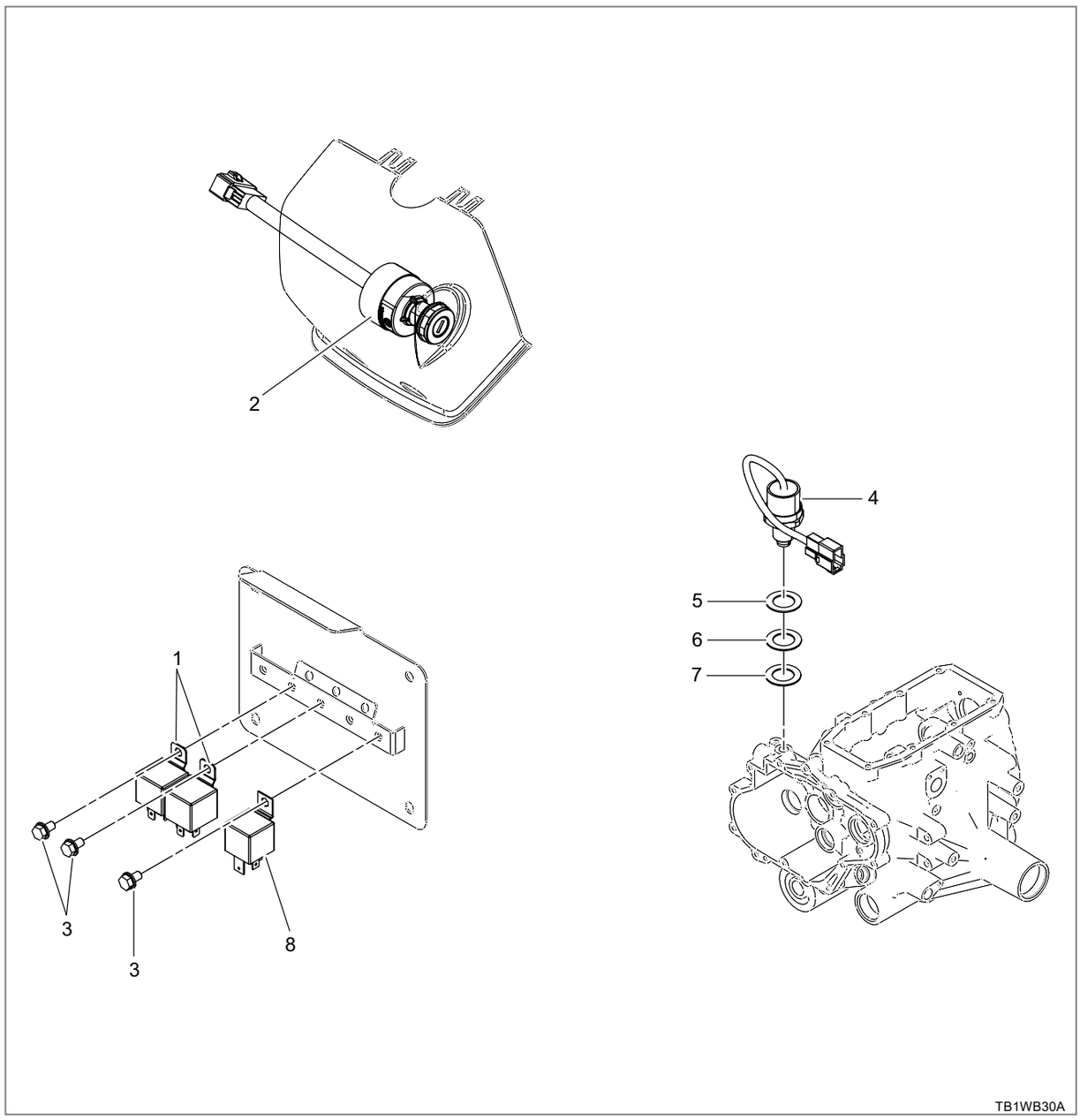


COMPONENTS

(1) Relay 4P
(2) Bolt, Flange

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 126 2025-04-08 오전 9:41:27

8.3 TB3-G515007 START CONTROL

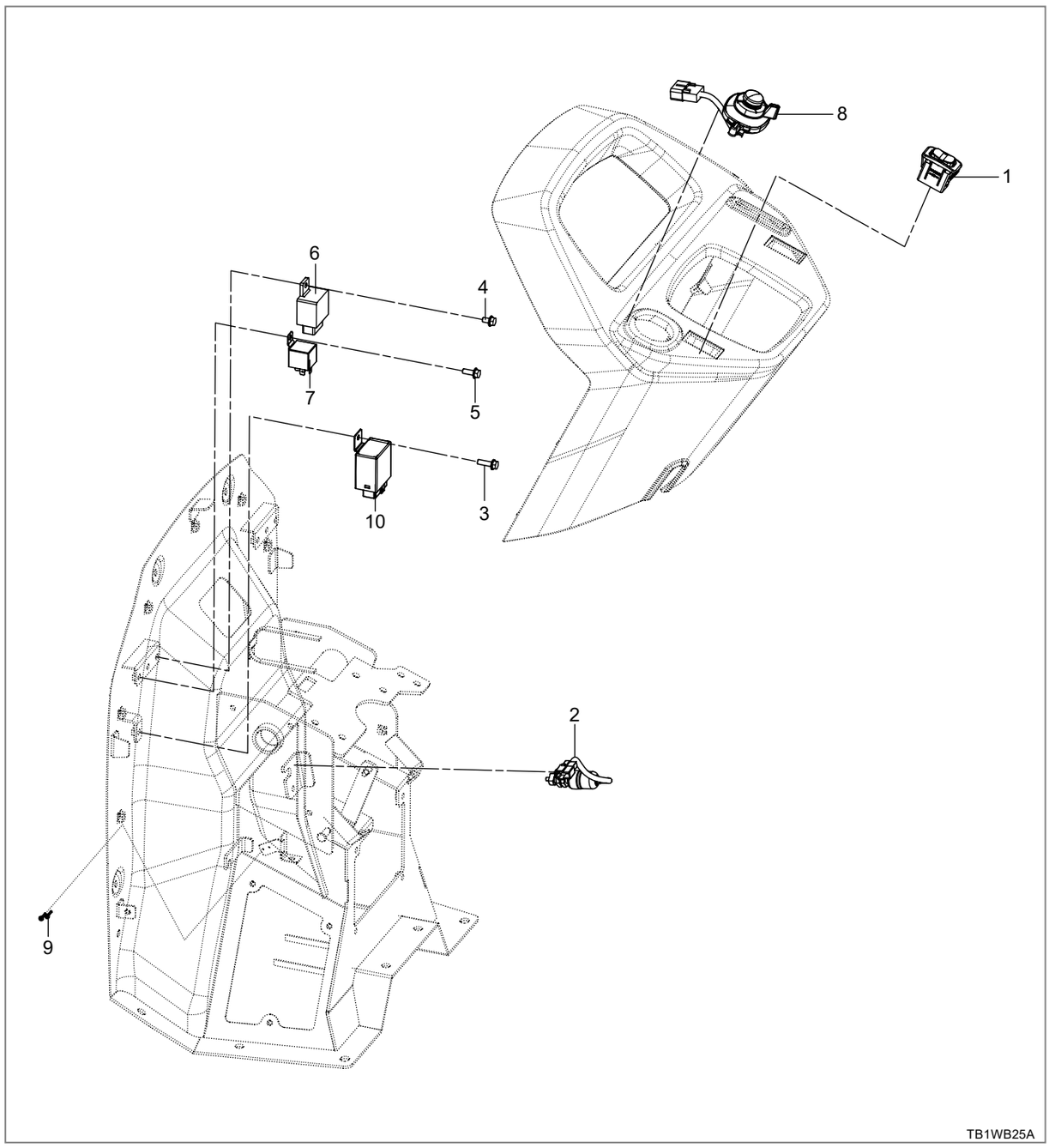


COMPONENTS

(1) Relay (5P)
(2) Assy switch, Starter
(3) Flange bolt
(4) Assy switch safety
(5) Collar 1.0T, Adjusting
(6) Collar 1.2T, Adjusting
(7) Collar 1.8T, Adjusting
(8) Relay (4P)

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 127 2025-04-08 오전 9:41:27

8.4 TB3-G525005 LIGHT CONTROL

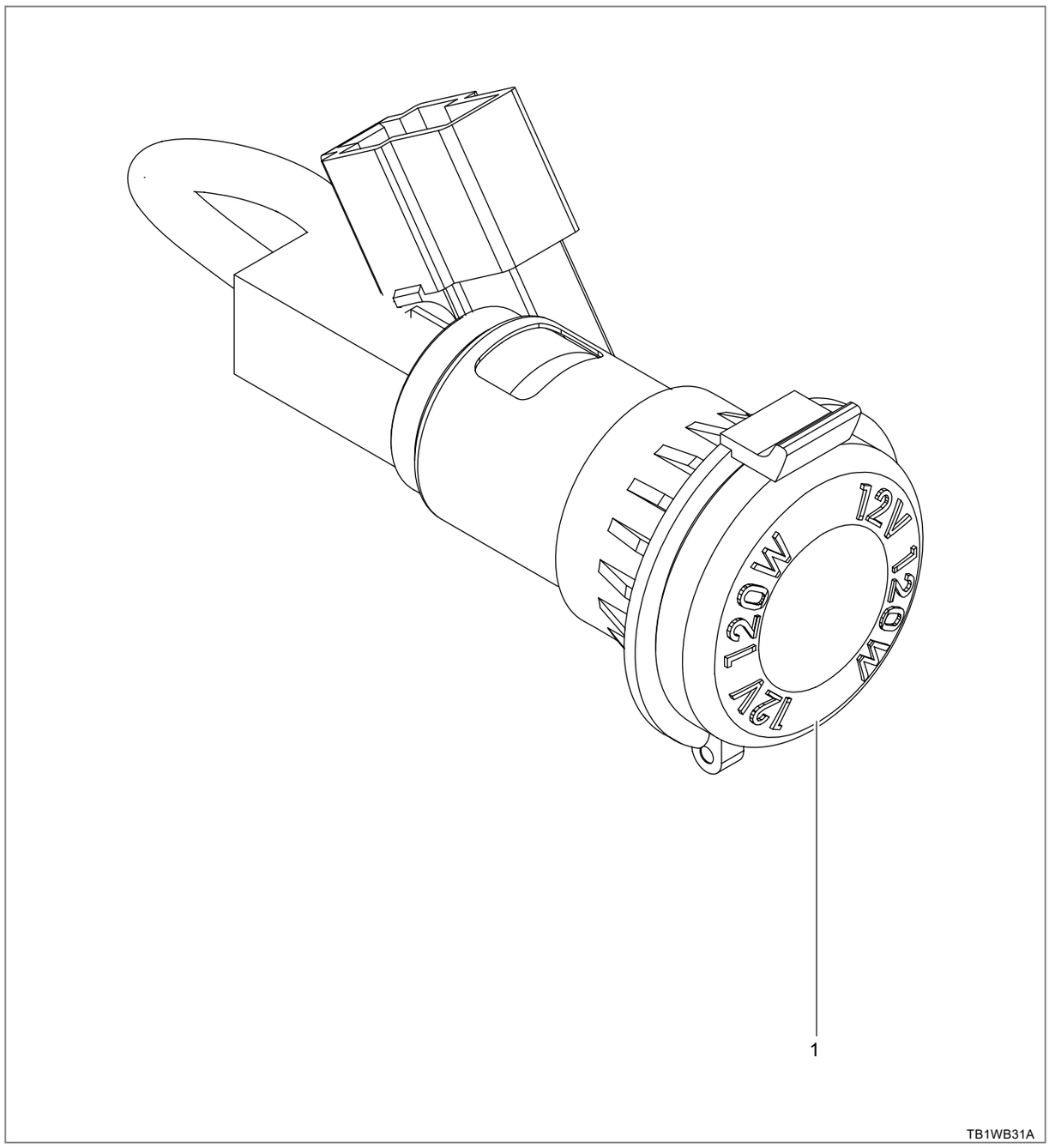


COMPONENTS

(1) Switch, Warning hazard
(2) Ass'y switch, Stop
(3) Bolt, Flange
(4) Bolt, Flange
(5) Bolt, Flange
(6) Twin relay
(7) Relat (5P)
(8) Assy combination switch
(9) Bolt
(10) Unit, Flasher sensor

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 128 2025-04-08 오전 9:41:27

8.5 TB3-G527002 POWER SOCKET

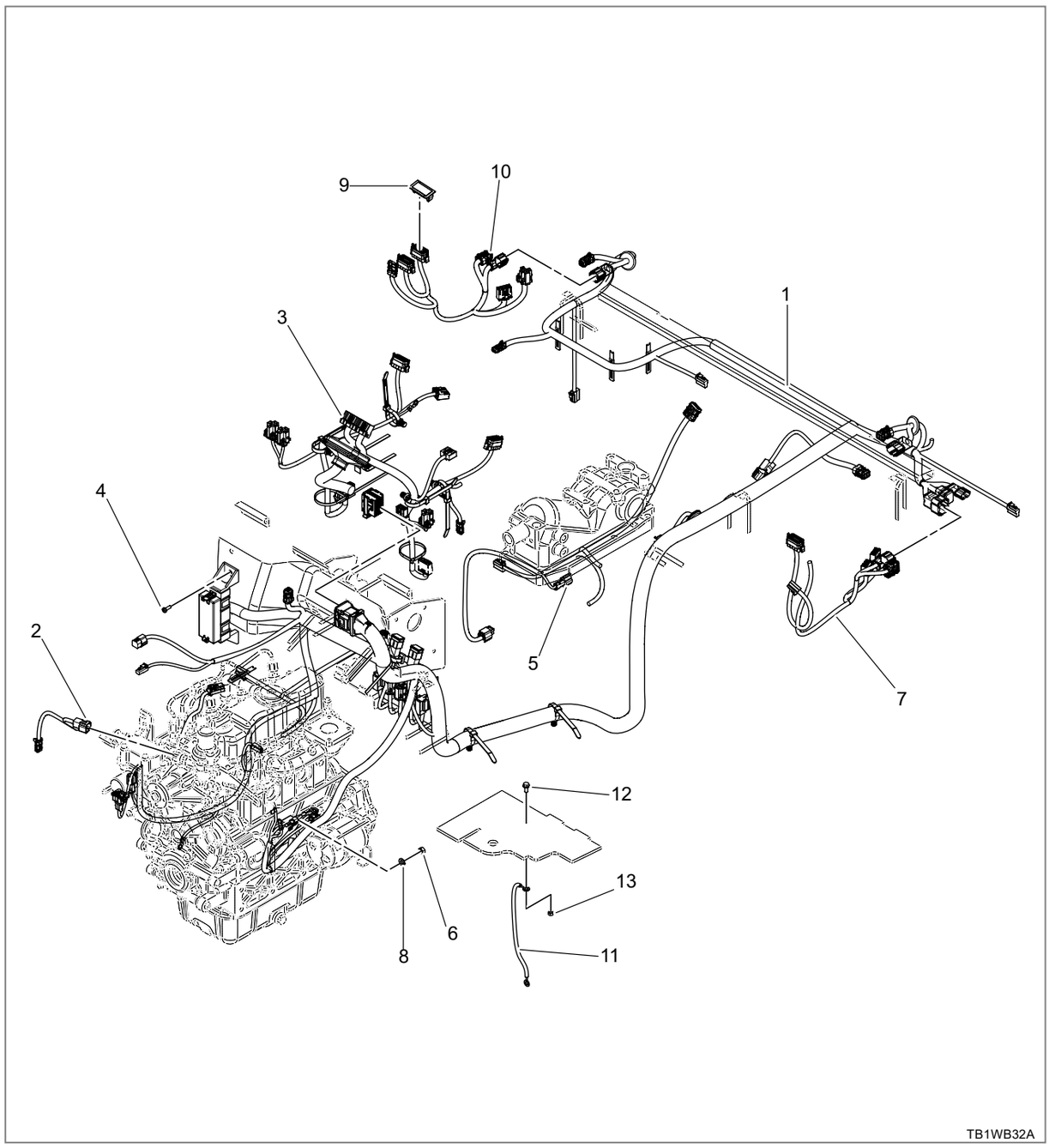


COMPONENTS

(1) Socket

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 129 2025-04-08 오전 9:41:27

8.6 TB3-G531018 WIRE HARNESS

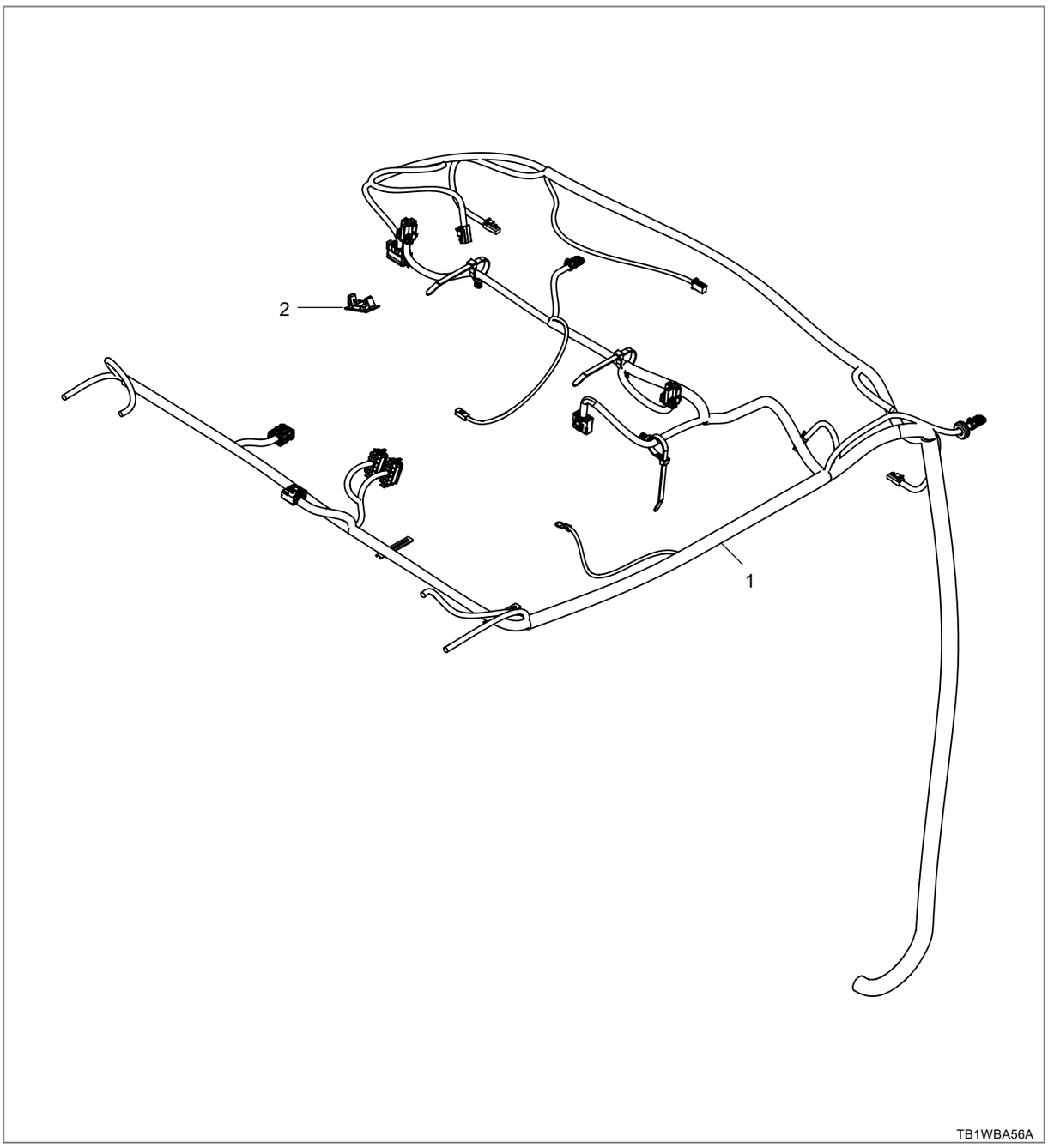


COMPONENTS

(1) Assy wire harness, Main-USA
(2) Assy wire harness, Connecting-engine
(3) Assy wire harness, Panel
(4) Screw
(5) Assy wire harness, Connecting-frame
(6) Nut
(7) Assy wire harness, Connecting-fender L
(8) Spring washer
(9) Cover
(10) Assy wire harness, Connecting-fender R
(11) Wire harness, Earth-cabin
(12) Bolt, Flance
(13) Nut

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 130 2025-04-08 오전 9:41:29

8.7 TB3-G531301 CABIN WIRE HARNESS

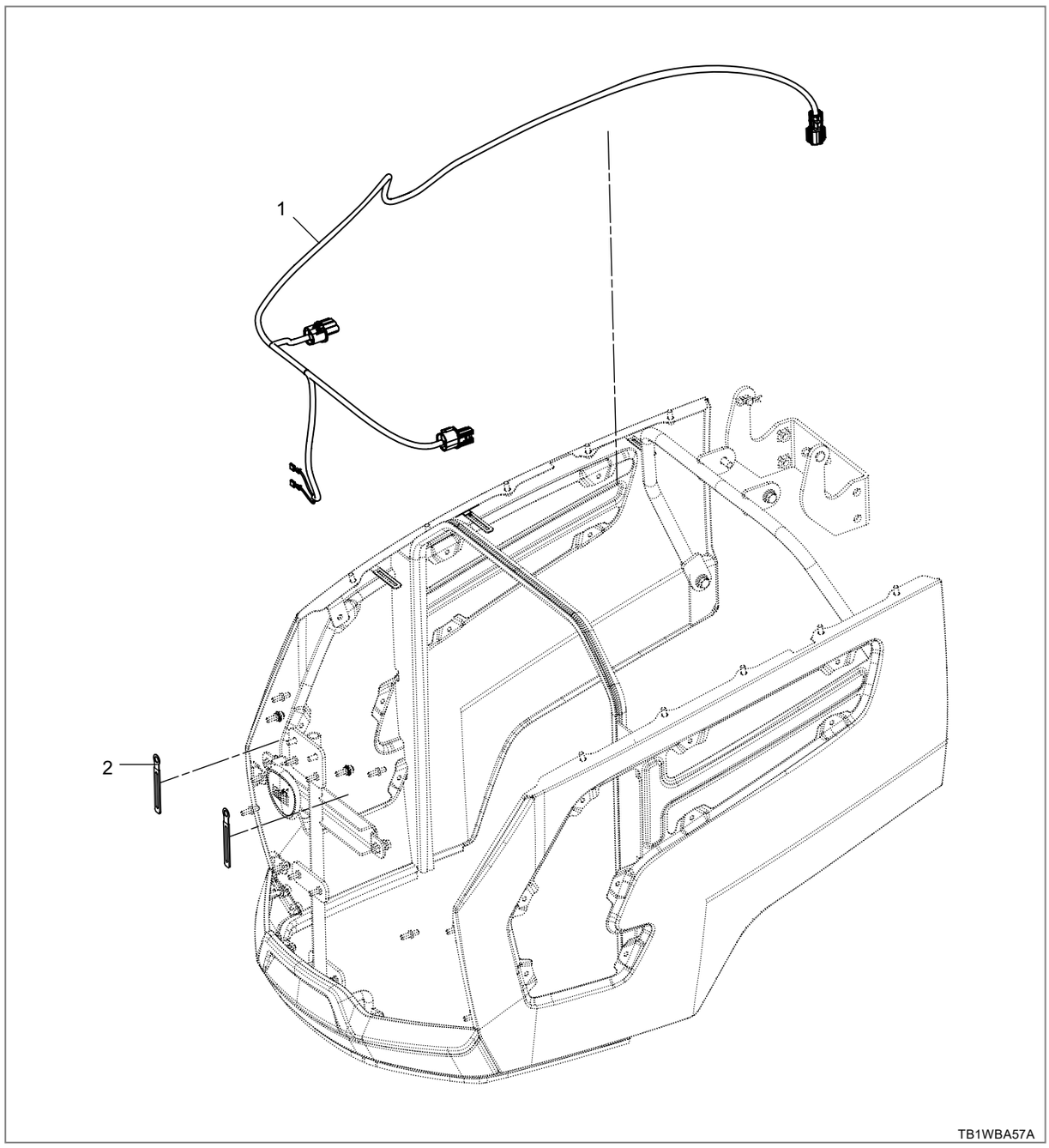


COMPONENTS

(1) Assy wire harness, Cabin
(2) Cover

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 131 2025-04-08 오전 9:41:29

8.8 TB3-G532502 HEAD LAMP WIRE HARNESS

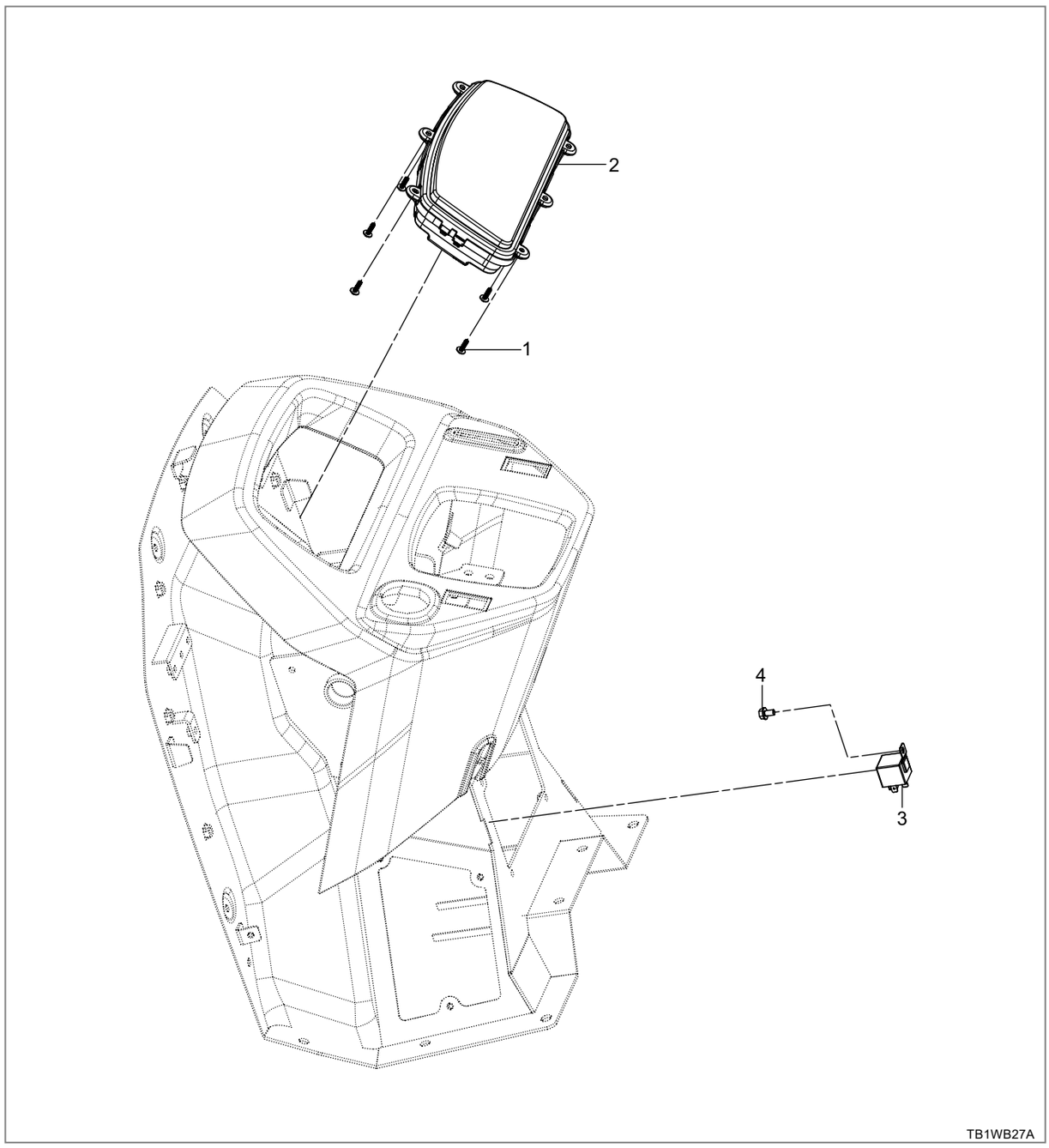


COMPONENTS

(1) Assy wire harness, Headlamp
(2) Clamp

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 132 2025-04-08 오전 9:41:30

8.9 TB3-G533009 DISPLAY CONTROL

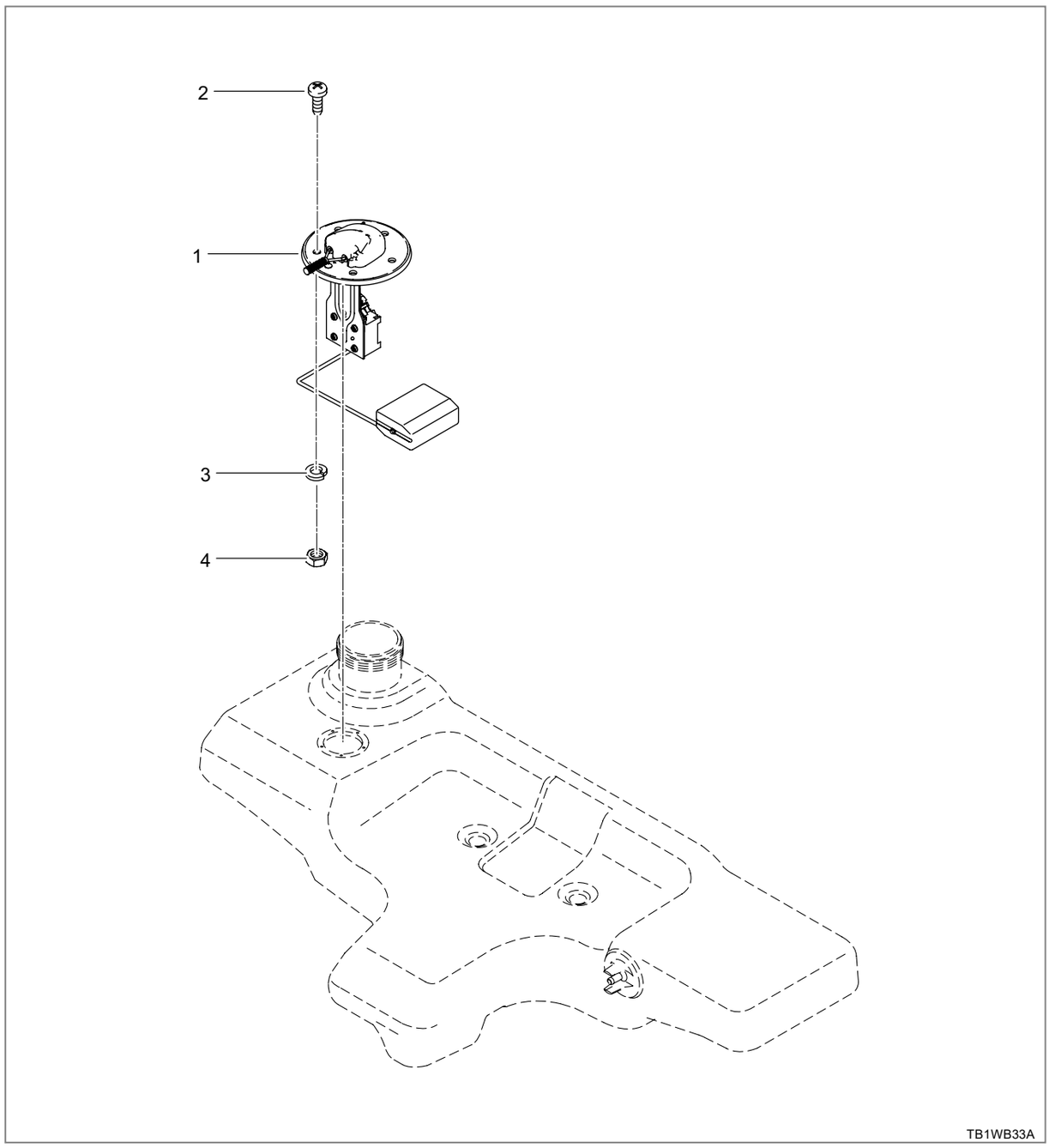


COMPONENTS

(1) Screw
(2) Assy panel, Instrument
(3) Relay (5P)
(4) Flange bolt

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 133 2025-04-08 오전 9:41:30

8.10 TB3-G533501 FUEL SENDER

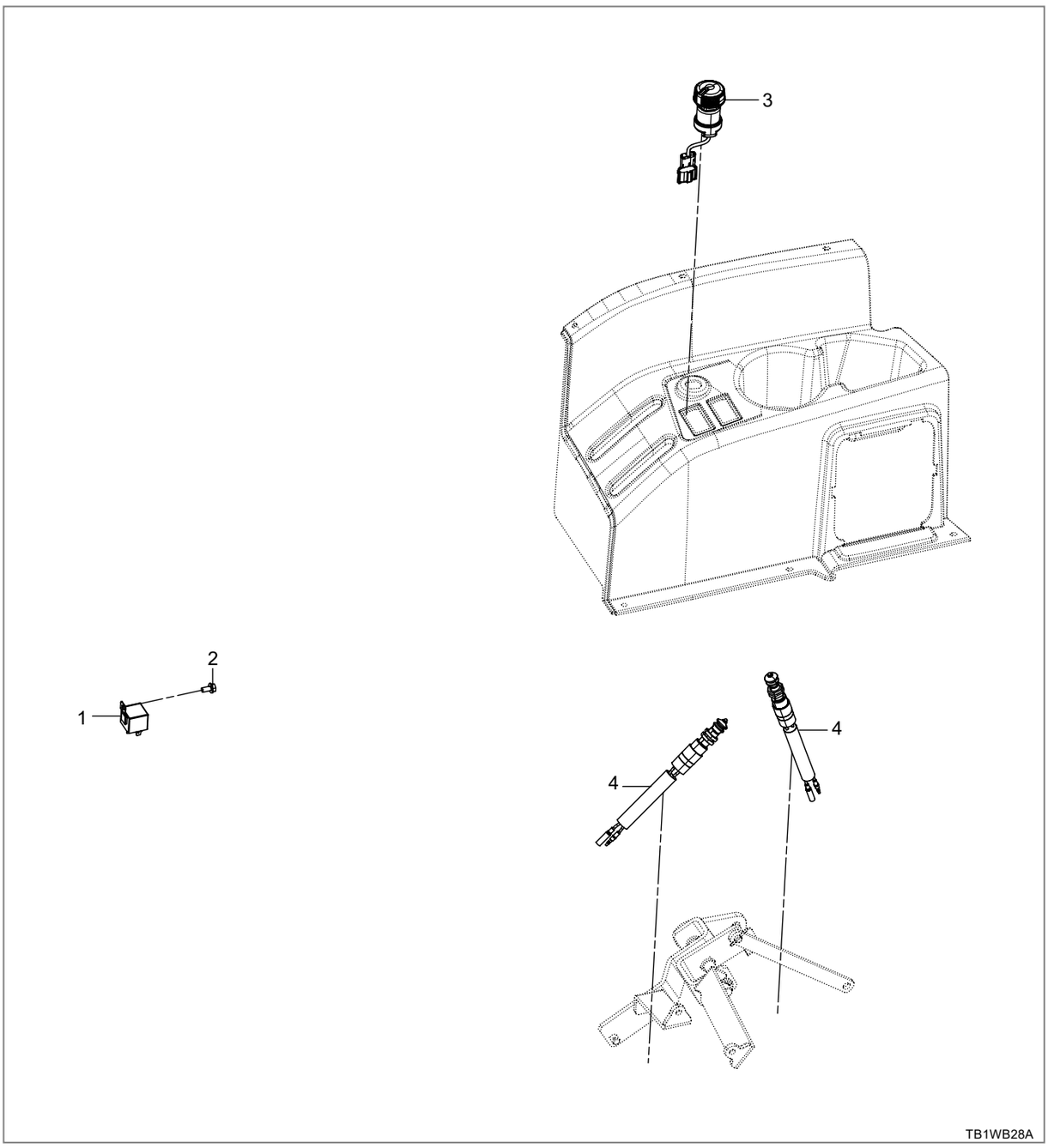


COMPONENTS

(1) Assy Sender, Fuel
(2) Screw with washer
(3) Washer, Spring
(4) Nut

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 134 2025-04-08 오전 9:41:30

8.11 TB3-G534003 PTO CONTROL

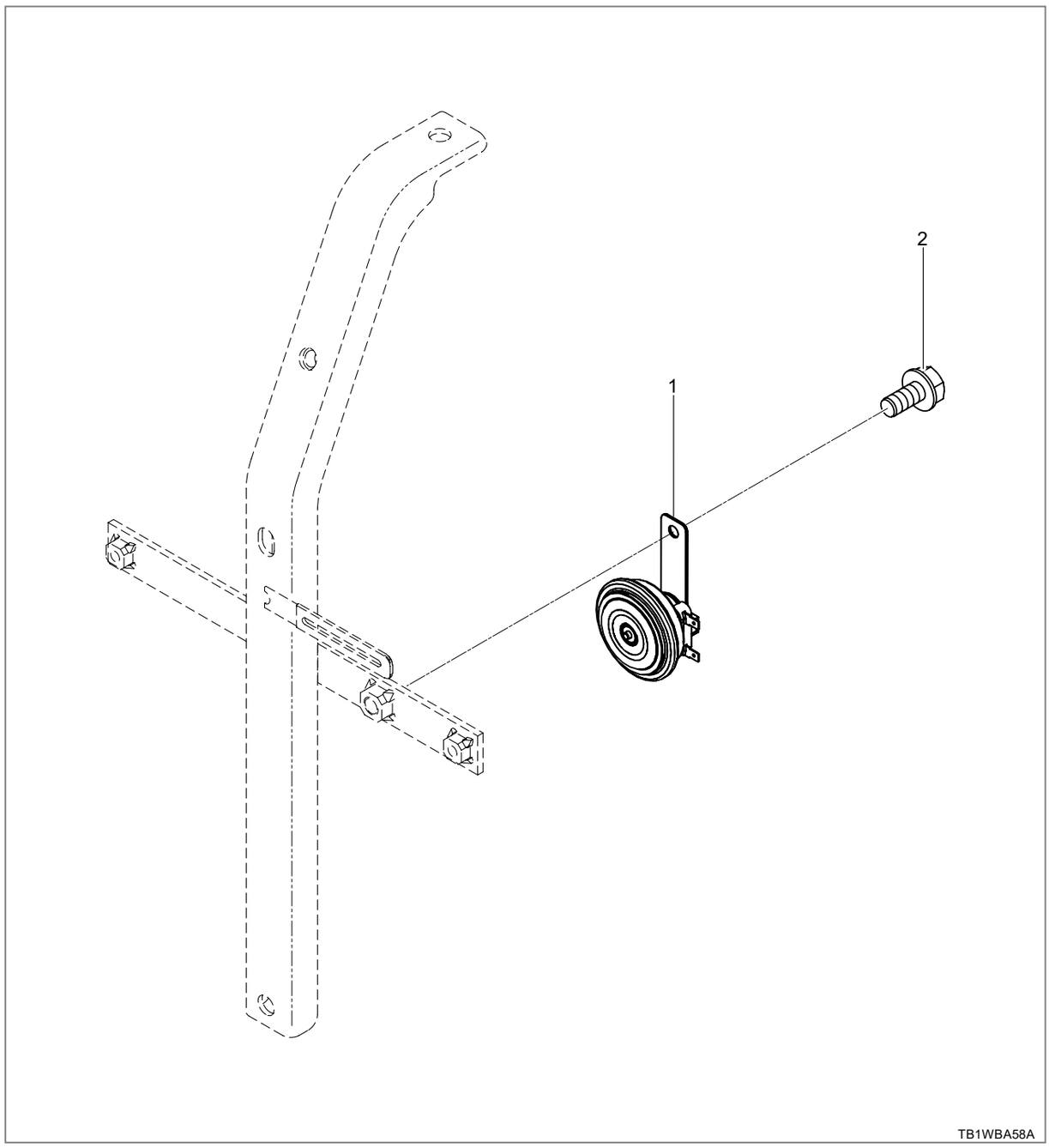


COMPONENTS

(1) Relay 5P
(2) Bolt, Flange
(3) PTO Switch
(4) Assy switch, Light

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 135 2025-04-08 오전 9:41:30

8.12 TB3-G534501 HORN

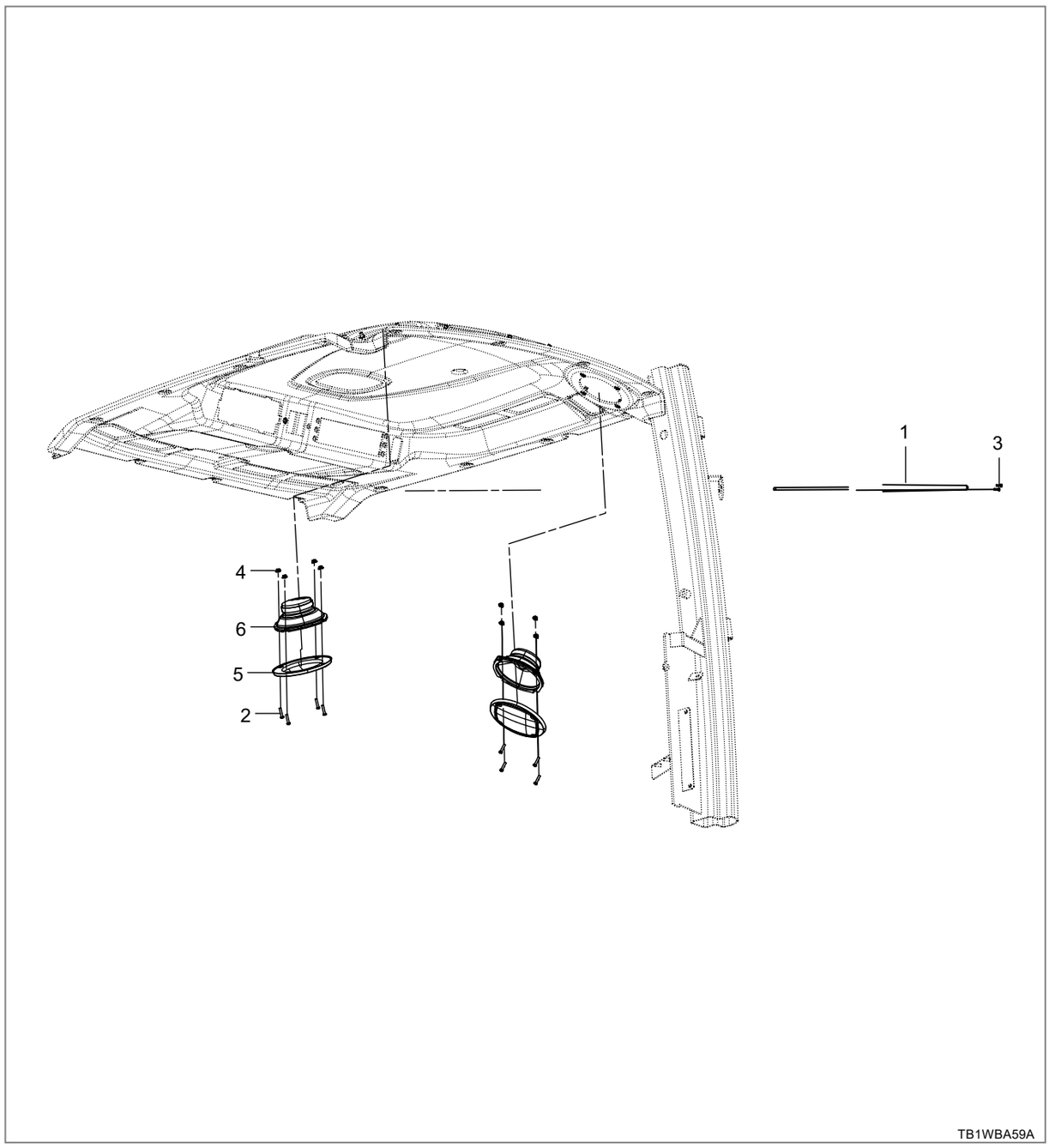


COMPONENTS

(1) Assy Horn
(2) Flange bolt

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 136 2025-04-08 오전 9:41:30

8.13 TB3-G537701 SPEAKER ANTENNA

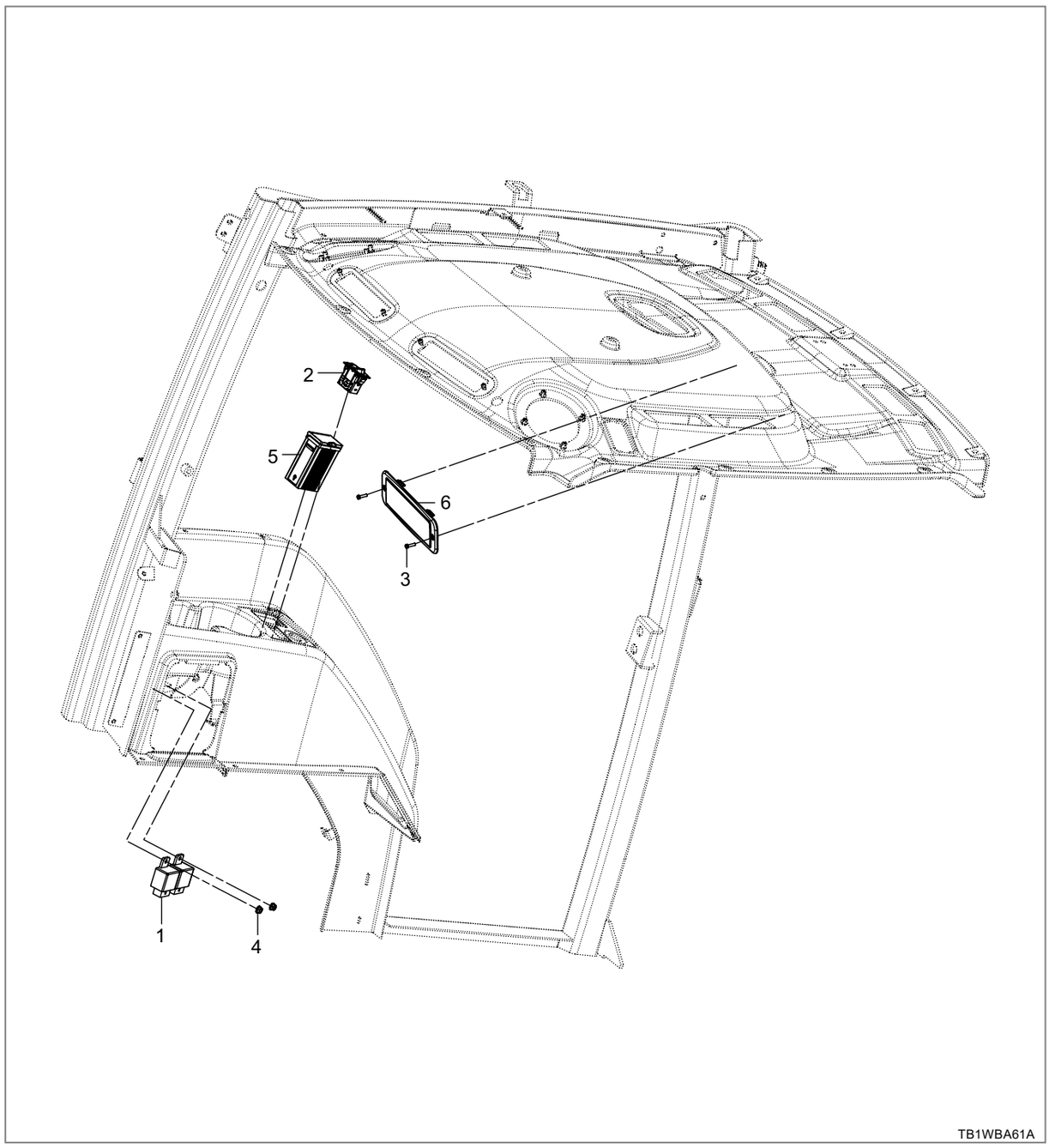


COMPONENTS

(1) Antenna
(2) Cross-recessed head machine screw
(3) Cross-recessed head machine screw
(4) Nut, Flange
(5) Grill speaker
(6) Assy speaker

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 137 2025-04-08 오전 9:41:31

8.14 TB3-G538001 STEREO

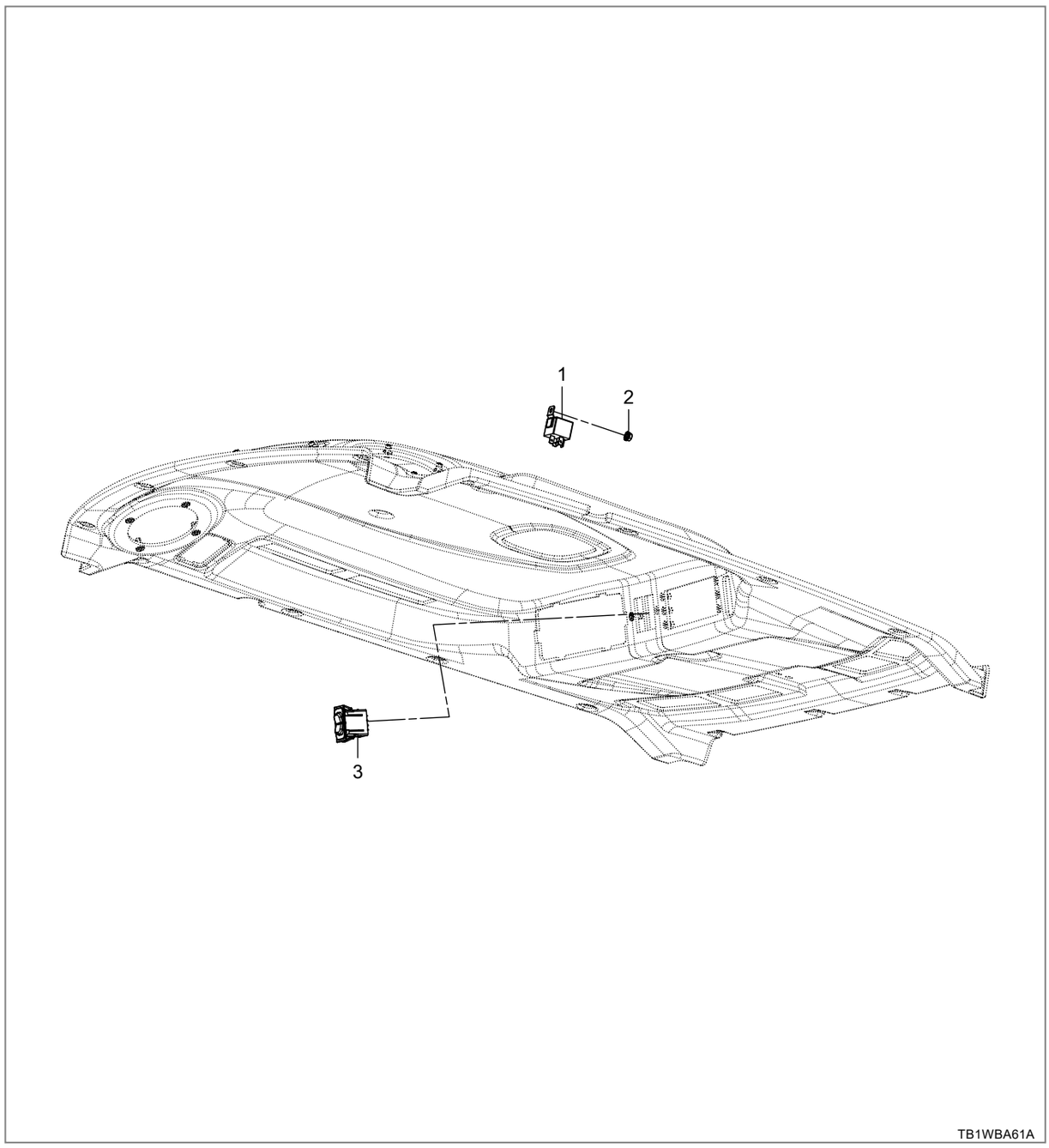


COMPONENTS

(1) Twin relay, Motor
(2) Switch-stereo, Aux
(3) Bolt, Washer
(4) Flange nut
(5) Assy unit-aux, AMP, USB
(6) Cover stereo

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 138 2025-04-08 오전 9:41:31

8.15 TB3-G538201 WIPER(FRONT) CONTROL

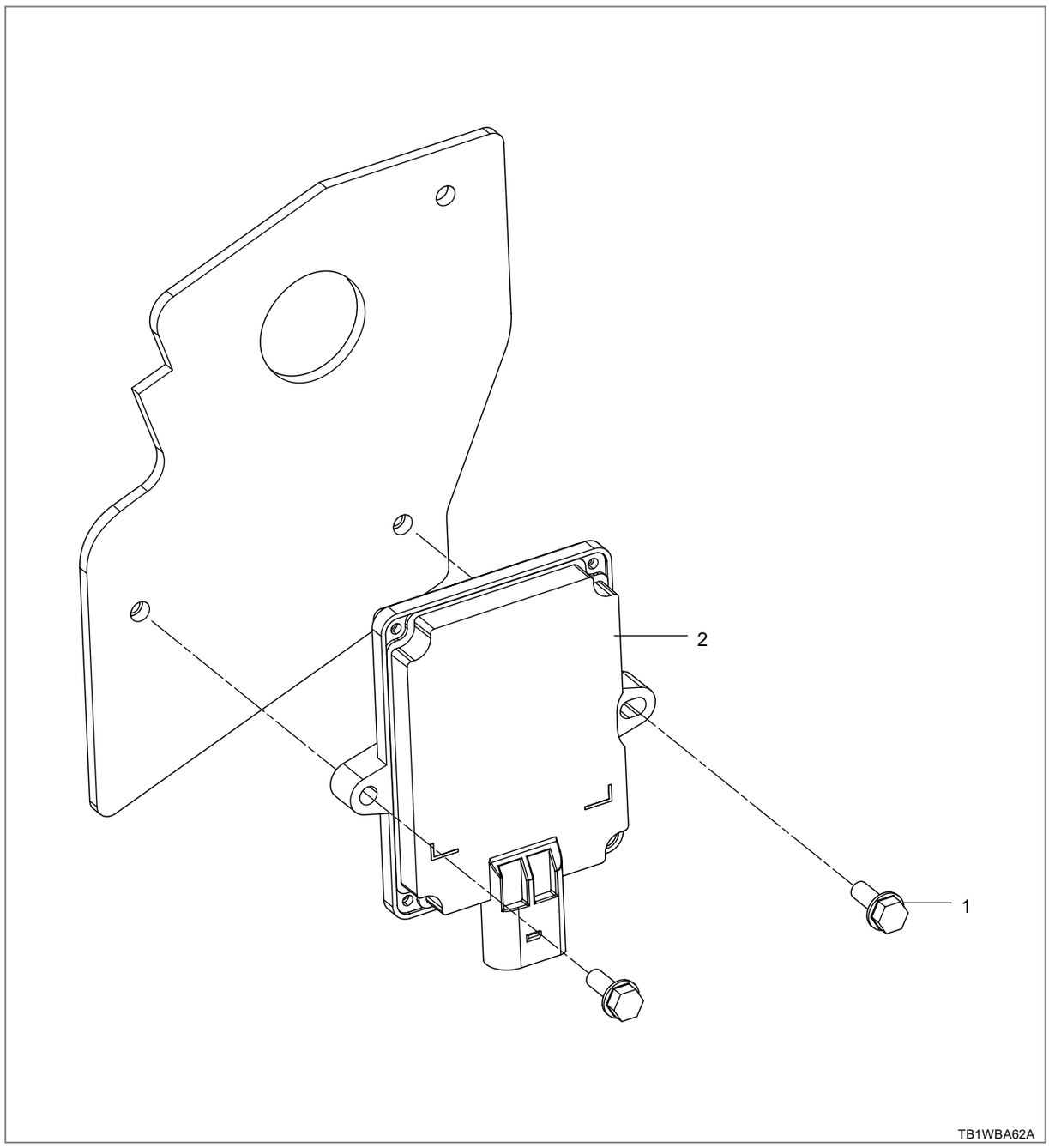


COMPONENTS

(1) Relay (5P)
(2) Flange nut
(3) Switch, Wiper, FR

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 139 2025-04-08 오전 9:41:31

8.16 TB3-G539601 TELEMATICS

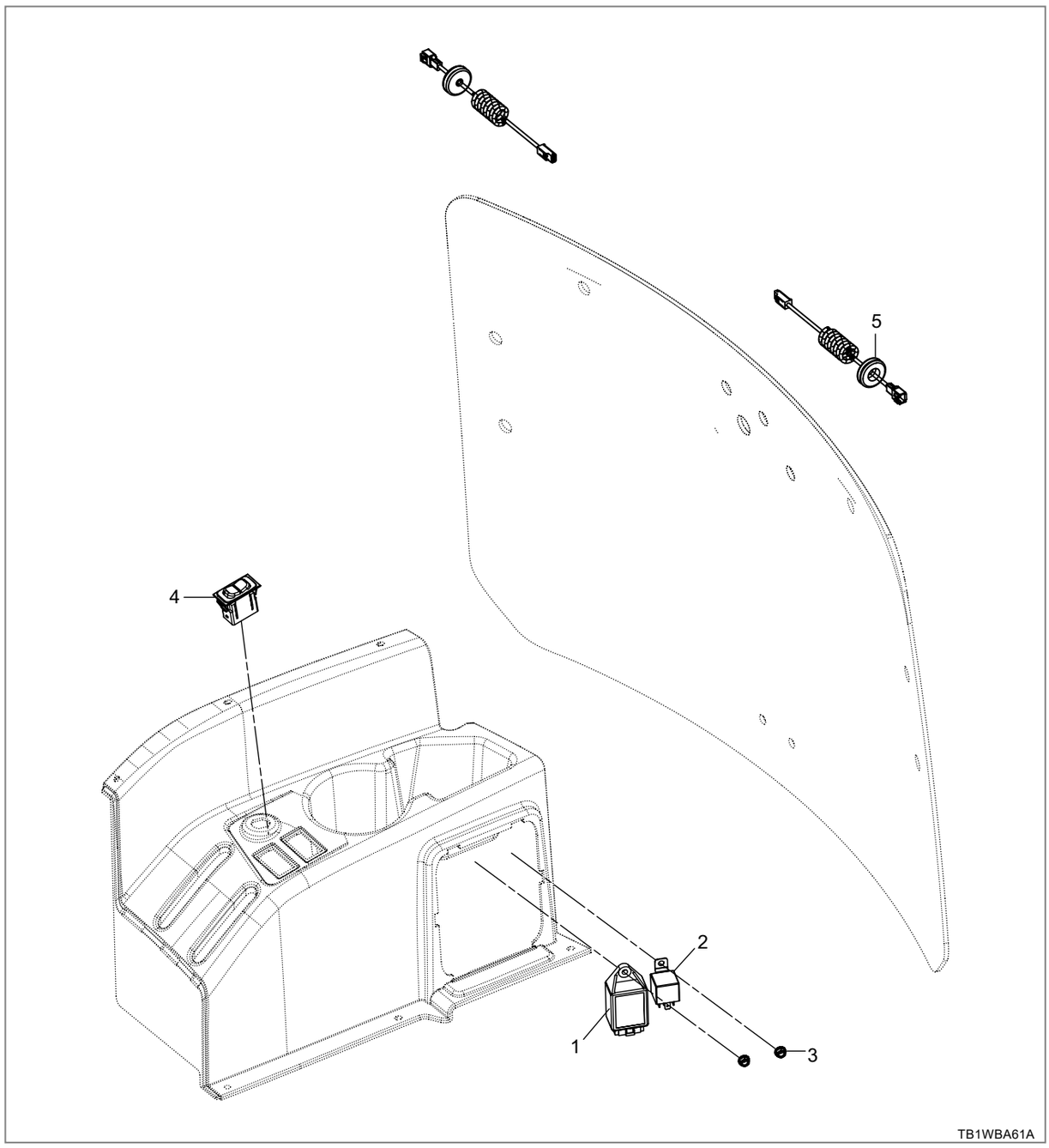


COMPONENTS

(1) Bolt, Flange
(2) Assy controller-telematics

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 140 2025-04-08 오전 9:41:31

8.17 TB3-G539701 REAR GLASS DEFOGGER

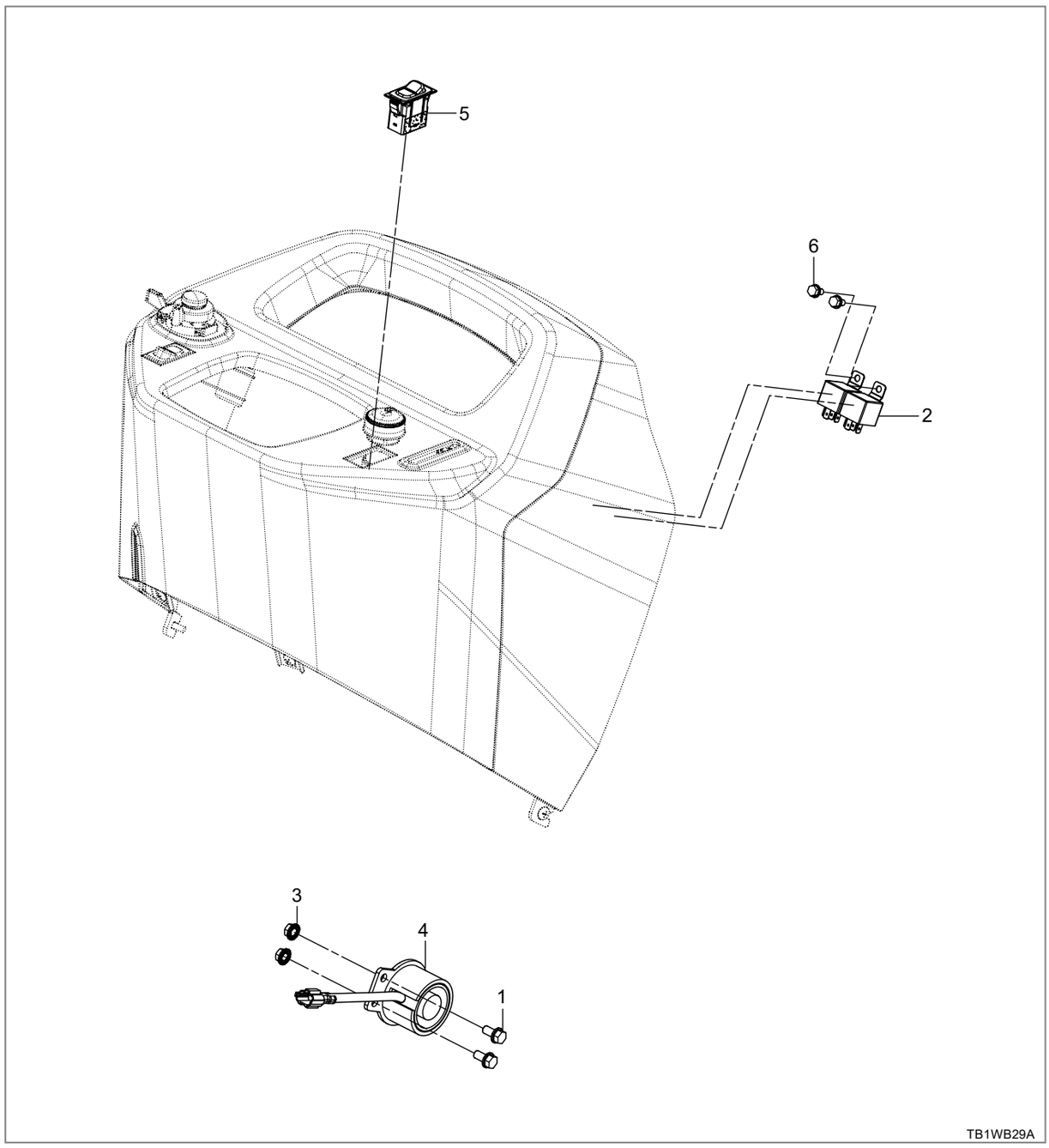


COMPONENTS

(1) Timer, Heat wire
(2) Relay(5P)
(3) Flange nut
(4) Switch, Heat wire
(5) Wire harness, Connecting glass heat wire

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 141 2025-04-08 오전 9:41:31

8.18 TB3-G539903 HST CRUISE



COMPONENTS

(1) Bolt, Flange
(2) Relay (5P)
(3) Flang nut
(4) Magnet, Cruise
(5) Assy switch, Cruise
(6) Flange bolt

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_11_전기장치.indd 142 2025-04-08 오전 9:41:31

KIOTI

CS2530CH
CS2530CH-EU

CABIN

CHAPTER 12

TABLE OF CONTENTS

1. COMPONENTS 12-2

1.1 Interior devices 12-2
1.1.1 A/C controller 12-4
1.1.2 Interior lamp 12-4
1.1.3 Air vent 12-5
1.1.4 Sun visor 12-5
1.1.5 Switch panel 12-6
1.1.6 Wiper motor (front) 12-6
1.1.7 Door latch assembly 12-6
1.1.8 Rear door handle 12-7
1.1.9 Air cylinder 12-7
1.1.10 Speaker 12-7
1.2 External devices 12-8
1.2.1 Exterior filter assembly 12-9
1.2.2 Front work lamp 12-9
1.2.3 Rear combination lamp 12-9
1.2.4 Front wipers 12-9
1.2.5 Washer fluid tank 12-10
1.2.6 7-Pin socket (if equipped) 12-10
1.2.7 Rear view mirror 12-10
1.2.8 Antenna 12-10
1.2.9 Front combination lamp 12-10

2. EXPLODED VIEW 12-11

2.1 TB3-G6C0502 Cabin frame 12-11
2.2 TB3-G6C1001 Lever guide (Cab) 12-12
2.3 TB3-G6C2504 Roof 12-13
2.4 TB3-G6C4002 Door 12-14
2.5 TB3-G6C4502 Front glass 12-15
2.6 TB3-G6C5503 Rear glass 12-16
2.7 TB3-G6C6502 Wiper (Front) 12-17
2.8 TB3-G6G1901 Wiper (Rear) 12-18

3. CABIN DISASSEMBLY AND ASSEMBLY 12-19

3.1 Grips assembly tips 12-19
3.2 Cabin removal 12-20
3.3 Component removal 12-28
3.2.1 Seat 12-28
3.2.2 Door 12-28
3.2.3 Door glass 12-29
3.2.4 Rear glass handle 12-30
3.2.5 Room mirror 12-30
3.2.6 Washer fluid tank 12-30
3.2.7 Interior lamp 12-31
3.2.8 Lever guide (LH) 12-31
3.2.8 Lever guide (RH) 12-32
3.2.9 Front wiper/motor 12-33
3.2.11 Antenna 12-34

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 1 2025-04-08 오전 9:43:30

1. COMPONENTS

1.1 INTERIOR DEVICES



TB1WB67A

(1) Hand throttle lever
(2) Brake pedal
(3) Parking brake lock lever
(4) HST forward pedal
(5) HST reverse pedal
(6) Range gear shift lever
(7) Lift position control lever
(8) PTO select lever
(9) Mower deck lever
(10) Cruise control switch
(11) Joystick lever
(12) Joystick lock lever
(13) PTO ON/OFF switch
(14) Defrost ON/OFF switch
(15) Stereo/aux switch (if equipped)
(16) USB charge port
(17) Power socket



TB1WB68A

(1) Differential lock pedal
(2) Lowering speed control knob
(3) 4WD lever
(4) Seat cushion adjustment lever

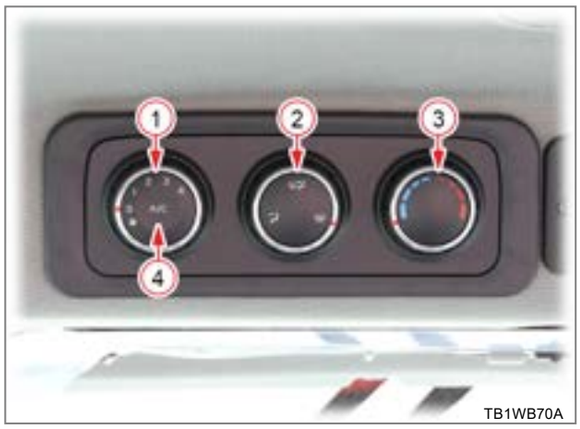
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 2 2025-04-08 오전 9:43:31



(1) Heater/air conditioner switch
(2) Room lamp
(3) Air vent (IN)
(4) Air vent (OUT)
(5) Speaker
(6) Air recirculation and fresh air mode lever
(7) Work light switch
(8) Wiper switch

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 3 2025-04-08 오전 9:43:31

1.1.1 A/C CONTROLLER



It is installed to the left section of the ceiling in the cabin.

1. Fan speed control switch
   It can be used to adjust the fan speed in 4 steps.
2. Mode switch

- : Air blows towards the windshield. Air blows out of four front vents to defrost the windshield.
- : Air blows towards driver's face. Air blows out of four side vents.
- : Air blows towards driver's face and windshield. Air blows out of four front vents and four side vents.

3. Temperature control switch
   It is used to select the desired temperature with operation of the A/C or heater.
4. A/C switch
   Press the switch to turn on the A/C.

1.1.2 INTERIOR LAMP



The Interior lamp (1) is installed to the middle section of the ceiling in the cabin.

Press the ON section of the switch to turn on the lamp. Press the OFF section of the switch to turn off the lamp.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 4 2025-04-08 오전 9:43:31

1.1.3 AIR VENT



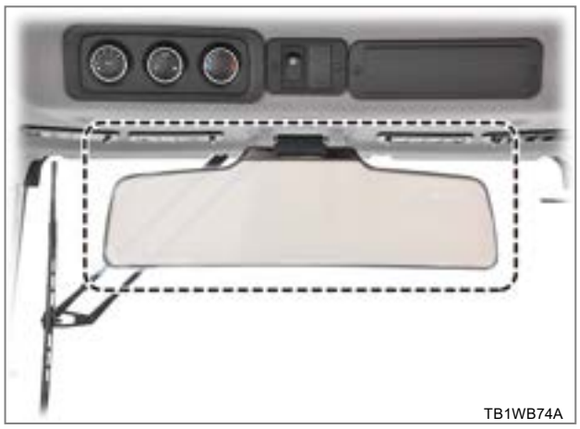
TB1WB72A



TB1WB73A

- The air vents (1) are installed to the rear section of the ceiling in the cabin.
- When pushing the lever (2) backward, the grill is closed to draw fresh air from the outside into the cabin. When pulling it forward, the grill is open to circulate air in the cabin.

1.1.4 SUN VISOR


TB1WB74A

- It is installed to the front section of the ceiling in the cabin.

  It is used to block sunlight to secure driver's visibility.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 5 2025-04-08 오전 9:43:32

1.1.5 SWITCH PANEL

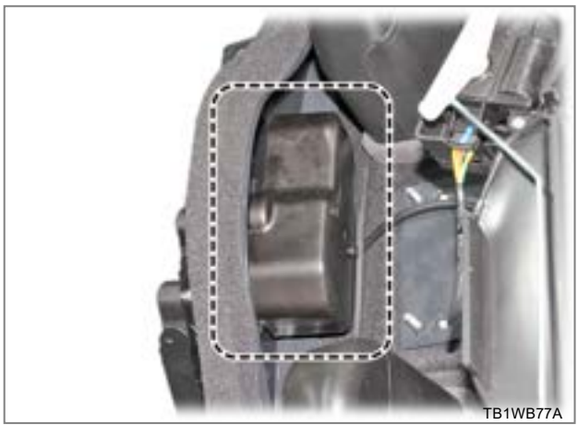




It is attached to the right side from the seat in the cabin.

1. Washer fluid switch : Pressing the switch to spray washer fluid on the glass.
2. Work lamp switch : Pressing the switch turns on the front and rear work lamps.
3. Defogger switch : Pressing the switch to defrost the rear glass.
   - Press 1 time : ON
     Press 2 times : OFF

1.1.6 WIPER MOTOR (FRONT)



- It is located on the upper section of the cabin windshield, and it is attached in the roof.

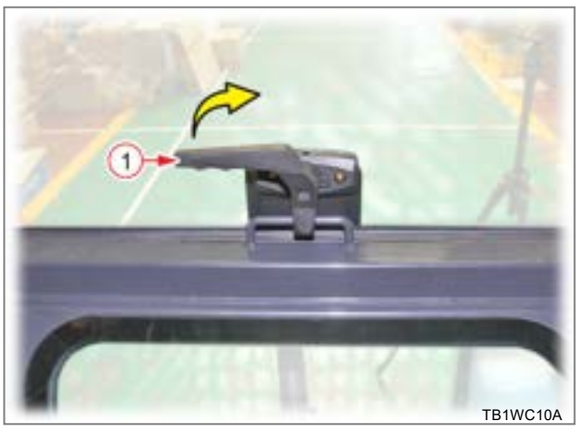
1.1.7 DOOR LATCH ASSEMBLY



- It is installed under the door handle cover.
- Push the lever (1) in the cabin to open the door.

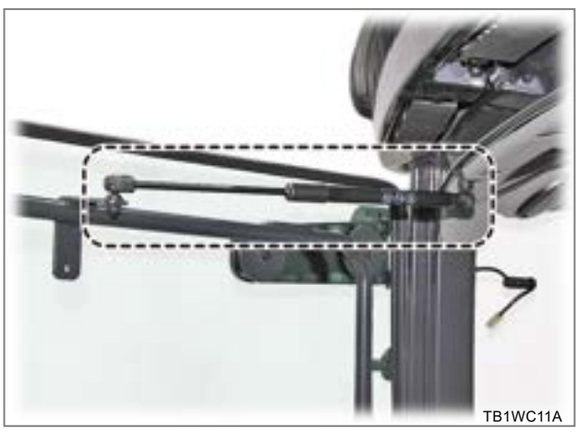
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 6 2025-04-08 오전 9:43:32

1.1.8 REAR DOOR HANDLE



- It is installed to the rear window of the cabin.
- Turn the lever (1) to clockwise to open the window.

1.1.9 AIR CYLINDER



- They are attached to the doors (LH/RH) and the rear window

1.1.10 SPEAKER



- These are installed to the front left and right sides of the cabin ceiling plate.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 7 2025-04-08 오전 9:43:32

1.2 EXTERNAL DEVICES



(1) Working lamp (FRT/RR)
(2) Wiper
(3) Rear view mirror
(4) Turn signal lamp (FRT/RR)
(5) Bonnet
(6) Head lamp



(7) Top link
(8) Lift rod
(9) Lower link
(10) Hitch
(11) Tail lamp
(12) PTO shaft
(13) Washer fluid tank

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 8 2025-04-08 오전 9:43:33

1.2.1 EXTERIOR FILTER ASSEMBLY



- Two assemblies are installed on each left and right side of the cabin roof in a row.

1.2.2 FRONT WORK LAMP



- Four work lamps are installed to the front and back of the cabin roof.

1.2.3 REAR COMBINATION LAMP



- These lamps are installed to the left and right sides of the rear fender.

1.2.4 FRONT WIPERS



- The wipers (1), (2) are installed to the windshield and rear window.

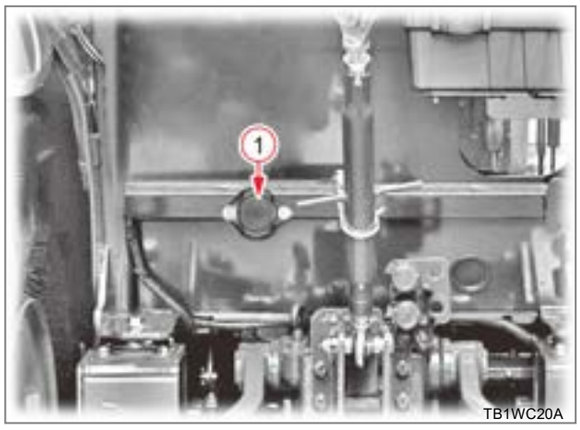
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 9 2025-04-08 오전 9:43:33

1.2.5 WASHER FLUID TANK



- The washer fluid tank (1) is installed to the side of the fender on the rear left side of the cabin.

1.2.6 7-PIN SOCKET (IF EQUIPPED)



- The 7-pin socket (1) is installed to the side of the rear left fender. It connects the socket to turn on the trailer lamps during towing a trailer.

1.2.7 REAR VIEW MIRROR



- This is installed on the left and right upper external grip of the cabin.

1.2.8 ANTENNA



- It is installed to the rear right side of the cabin frame.

1.2.9 FRONT COMBINATION LAMP



- This is installed on the front left and right frame of the cabin.

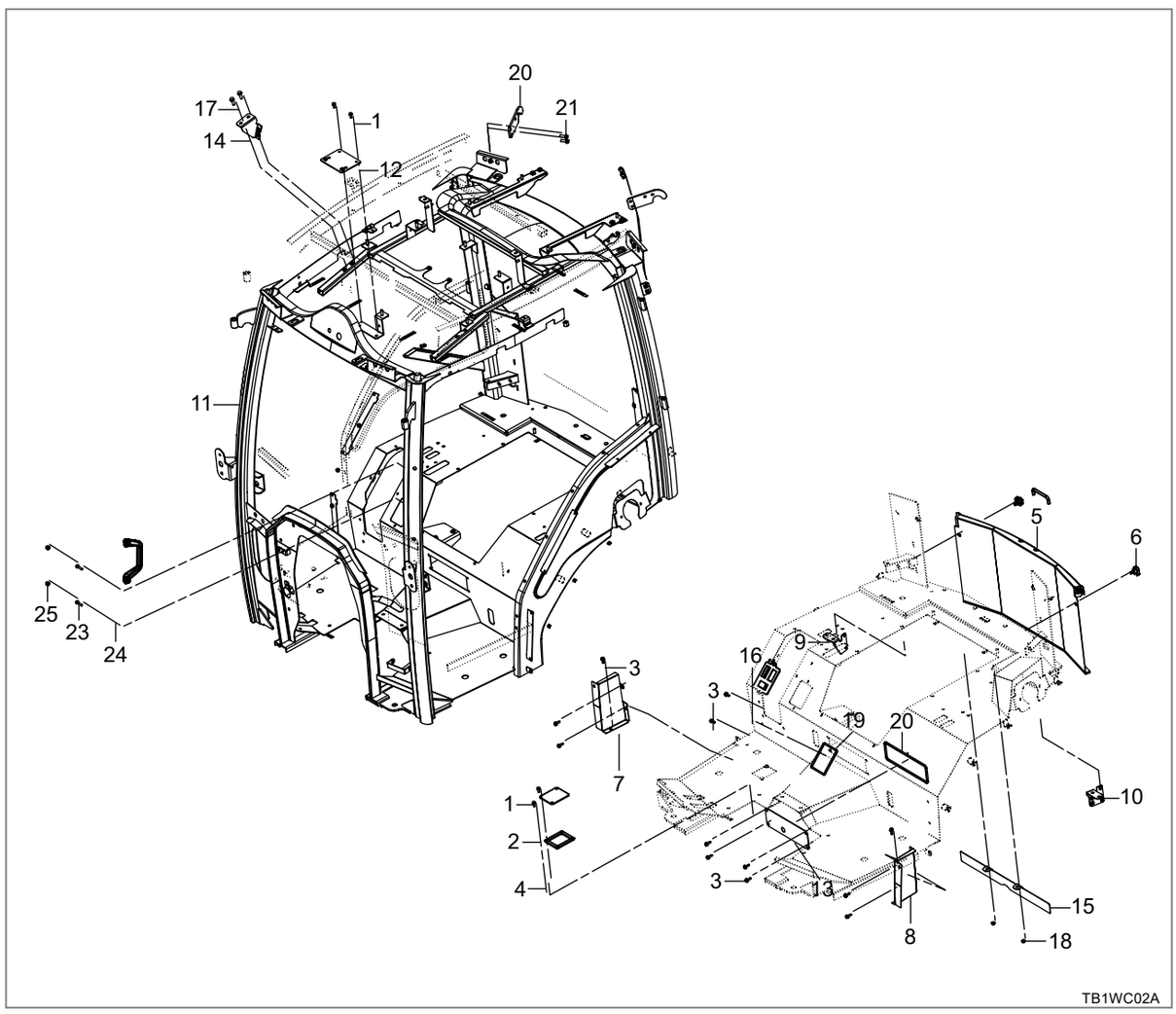
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 10 2025-04-08 오전 9:43:34

2. EXPLODED VIEW

NOTES

- The manufacturing parts are subject to change without notice. Therefore, check the parts catalog or electric manual for recent information.

2.1 TB3-G6C0502 CABIN FRAME

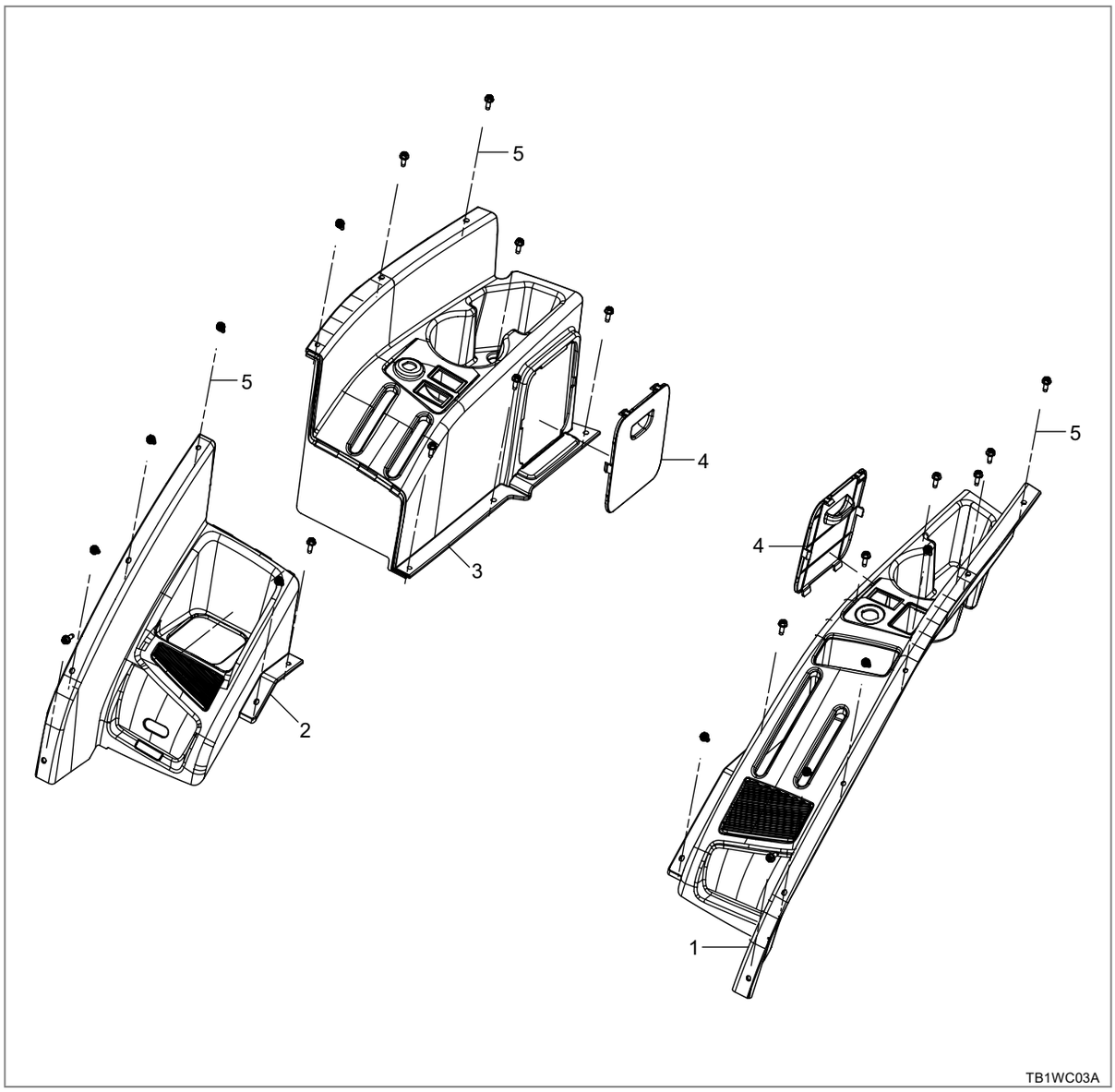


COMPONENTS

(1) Bolt, Flange
(2) Frame
(3) Bolt, Flange
(4) Sponge
(5) Plate, Cut off-RR
(6) Grip, Lock
(7) Bracket, Lever guide-RH
(8) Bracket, Lever guide-LH
(9) Bracket, Fender clamping-RR RH
(10) Bracket, Fender clamping-RR LH
(11) Assy frame, Cabin
(12) Bracket-room lamp
(13) Window, Maintenance-Hyd lever
(14) Bracket, Monitor
(15) Bracket-harness
(16) Bracket, Switch
(17) Flange bolt
(18) Flange nut
(19) Sponge-switch
(20) Sponge-maintance
(21) Bolt, Flange
(22) Bracket-cabin
(23) Flange bolt
(24) Grip-cabin
(25) Cap nut, M6

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 11 2025-04-08 오전 9:43:35

2.2 TB3-G6C1001 LEVER GUIDE (CAB)

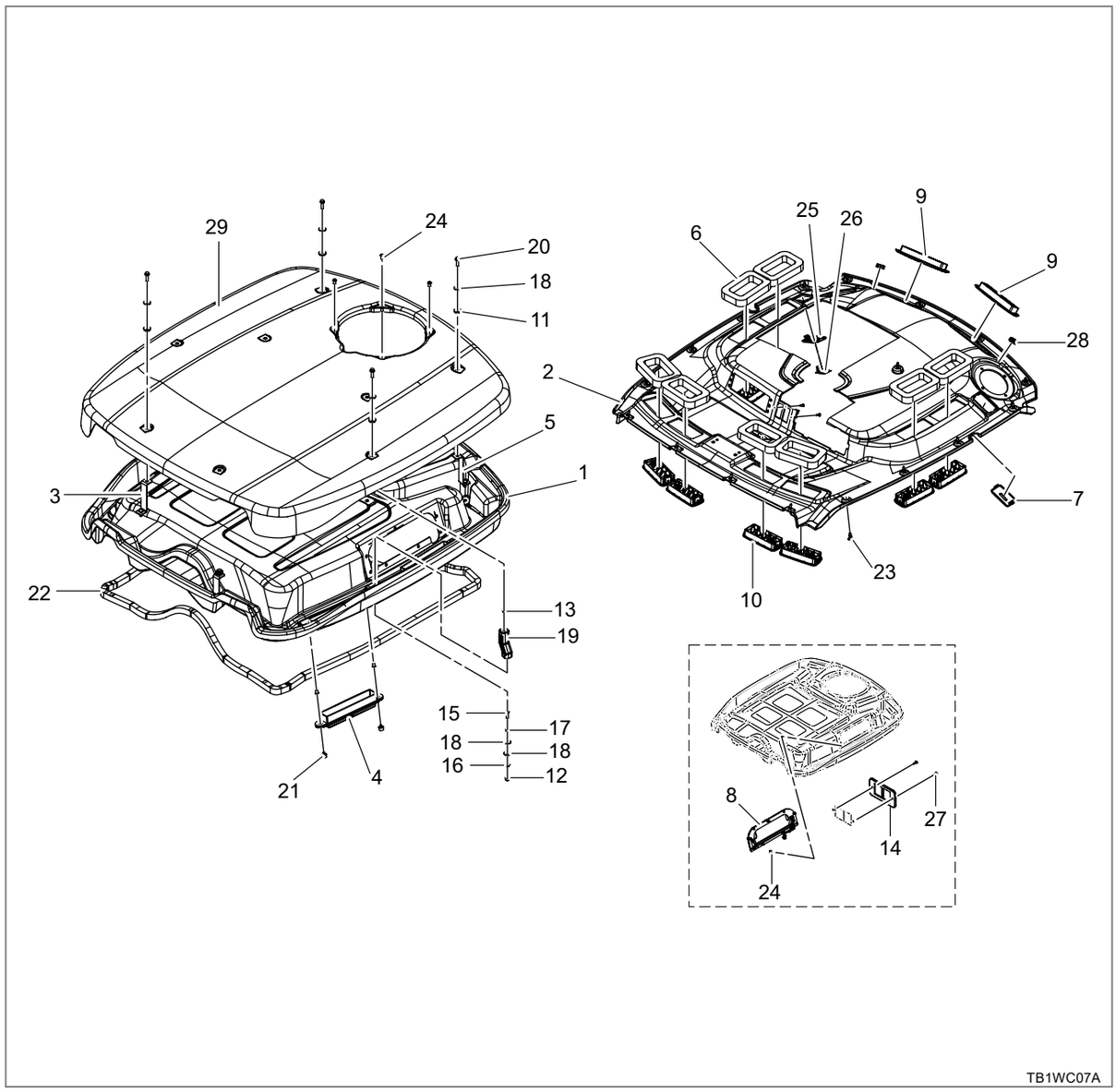


COMPONENTS

(1) Guide, Lever-LH
(2) Guide, Lever-RH FR
(3) Guide, Lever-RH RR
(4) Guide, Lever-RR LH
(5) Bolt, Flange

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 12 2025-04-08 오전 9:43:35

2.3 TB3-G6C2504 ROOF



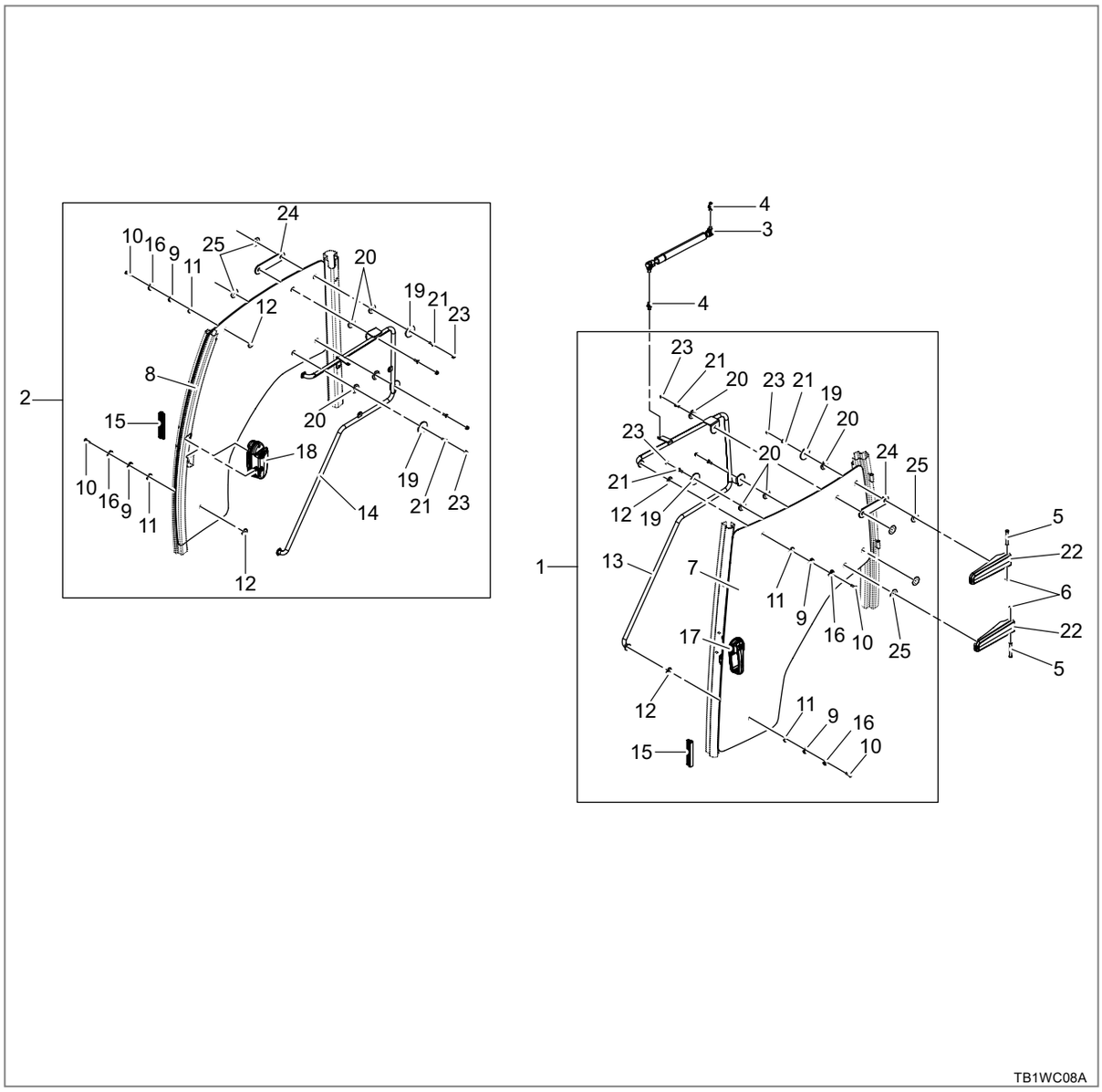
TB1WC07A

COMPONENTS

(1) Roof-In
(2) Ceiling
(3) Bracket, Roof fixing-1
(4) Filter, External air
(5) Bracket, Roof fixing-2
(6) Sponge
(7) Cover-lever
(8) Bracket
(9) Grille, A/C-in, Out
(10) Grill, Air conditioner
(11) Washer
(12) Nut
(13) Nut
(14) Switch panel 2
(15) Bolt
(16) Flang nut
(17) Bushing
(18) Washer, Plain
(19) Spacer
(20) Bolt, Flange
(21) Bolt
(22) Sponge, Roof
(23) Bolt, Special
(24) Nut
(25) Panel, Switch
(26) Cover
(27) Bolt, Washer
(28) Grommet
(29) Roof-Ext

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 13 2025-04-08 오전 9:43:36

2.4 TB3-G6C4002 DOOR

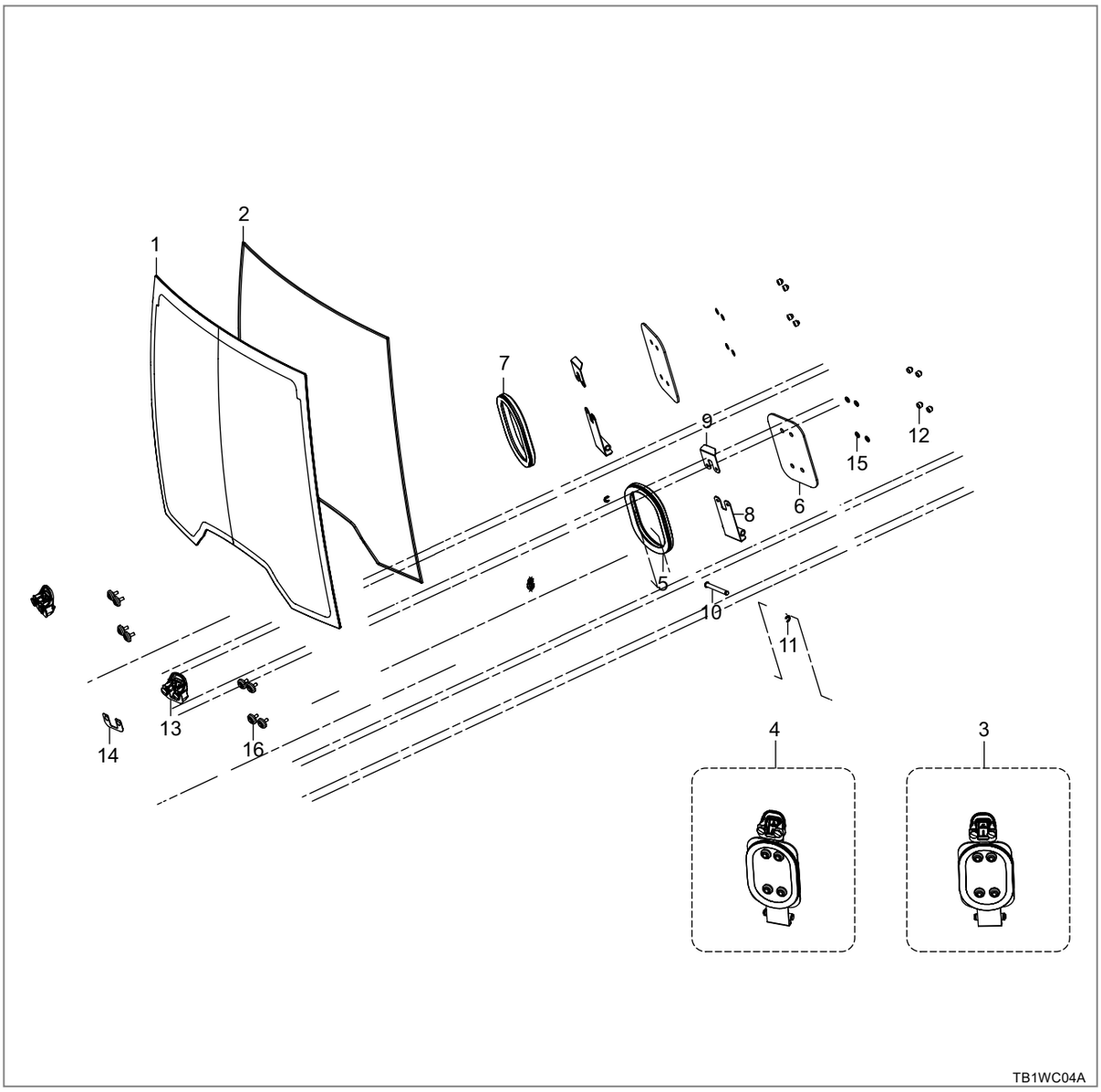


COMPONENTS

(1) Assy door, Cabin-LH
(2) Assy door, Cabin-RH
(3) Cylinder, Air door
(4) Ball-nut
(5) Pin
(6) Snap ring
(7) Glass, Door entrance-LH
(8) Glass, Door entrance-RH
(9) Collar
(10) Screw
(11) Cushion, A
(12) Cushion, B
(13) Support, Door-LH
(14) Support, Door-RH
(15) Weatherstrip, Door
(16) Cap, Sealing
(17) Assy, Handle (LH)
(18) Assy, Handle (RH)
(19) Plate, Holding door frame
(20) Cushion
(21) Bolt, Flange
(22) Bracket, Side frame
(23) Nut
(24) Packing, Hinge
(25) Washer

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 14 2025-04-08 오전 9:43:36

2.5 TB3-G6C4502 FRONT GLASS

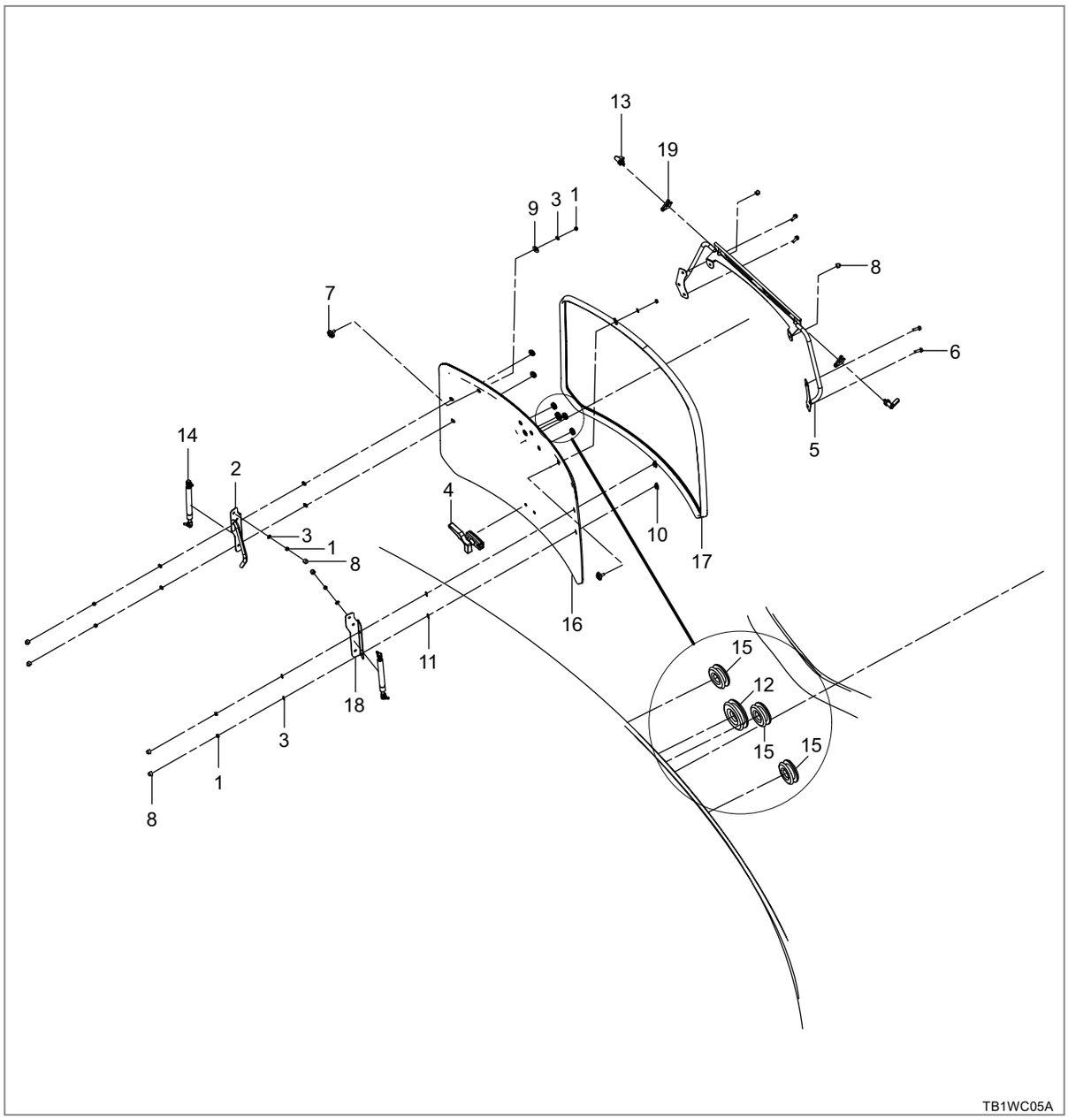


COMPONENTS

(1) Glass, Windshield
(2) Sponge-glass
(3) Sub assy glass, Windshield-LH
(4) Sub assy glass, Windshield-RH
(5) Weatherstrip, Glass-FR
(6) Glass, Windshield-LH LWR
(7) Glass, Windshield-RH LWR
(8) Bracket, Hinge bonnet-front glass, LWR
(9) Bracket, Glass lock-FR
(10) Pin
(11) Snap ring
(12) Nut
(13) Latch-frt glass
(14) Collar-catch
(15) Packing
(16) Bolt, Cushion

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 15 2025-04-08 오전 9:43:36

2.6 TB3-G6C5503 REAR GLASS



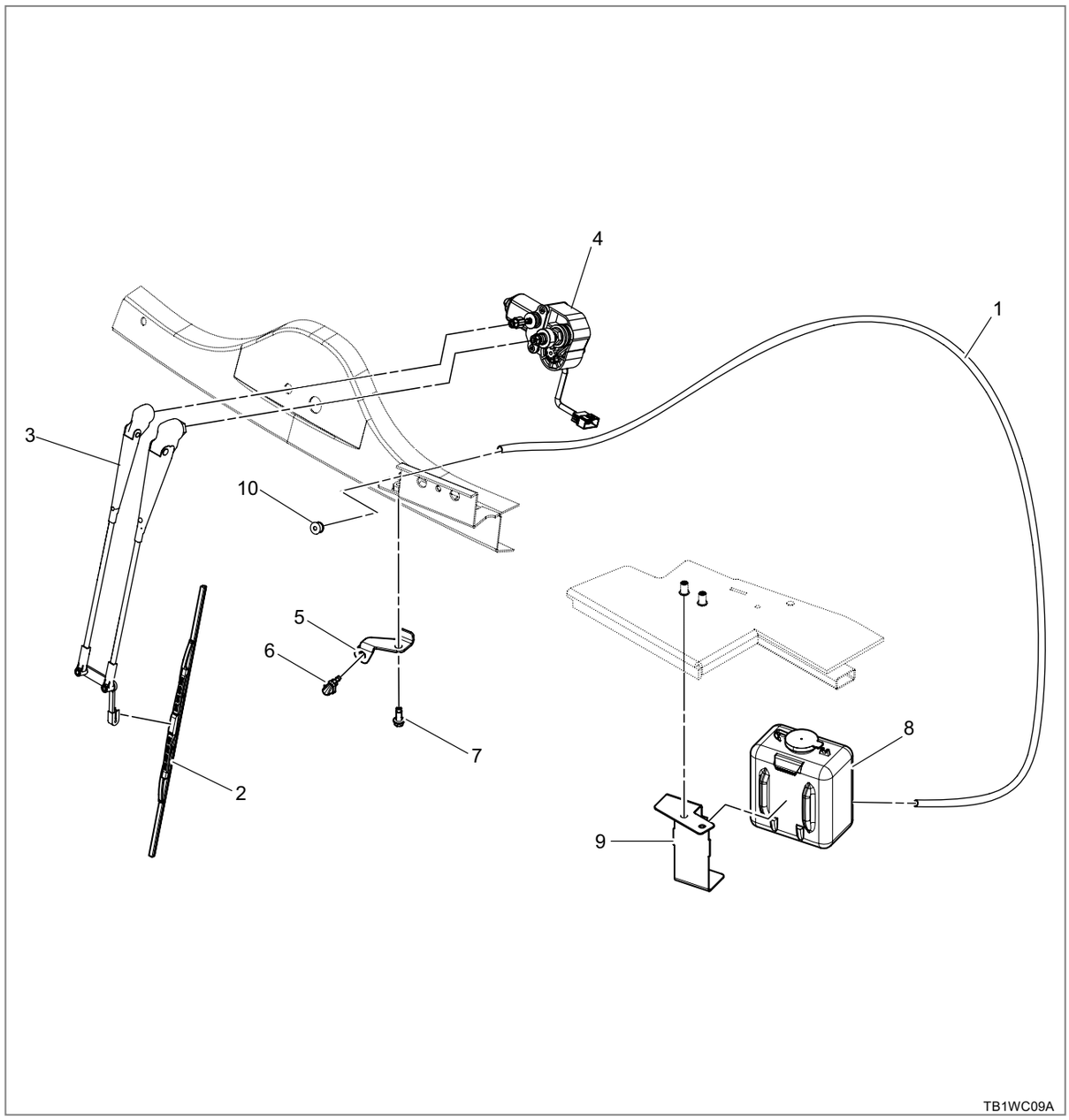
TB1WC05A

COMPONENTS

(1) Nut
(2) Bracket, Holder-RH air
(3) Spring_washer
(4) Assy grip
(5) Hinge, Rear door
(6) Flange bolt
(7) Bolt, Cushion
(8) Nut
(9) Packing, 1
(10) Washer
(11) Packing
(12) Grommet
(13) Pin, Fixing rear glass hinge
(14) Cylinder, Air-RR
(15) Grommet
(16) Glass, Rear (Heat)
(17) Weatherstrip, Glass-RR
(18) Bracket, Holder air cylinder
(19) Bracket ,Hinge mount

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 16 2025-04-08 오전 9:43:37

2.7 TB3-G6C6502 WIPER (FRONT)

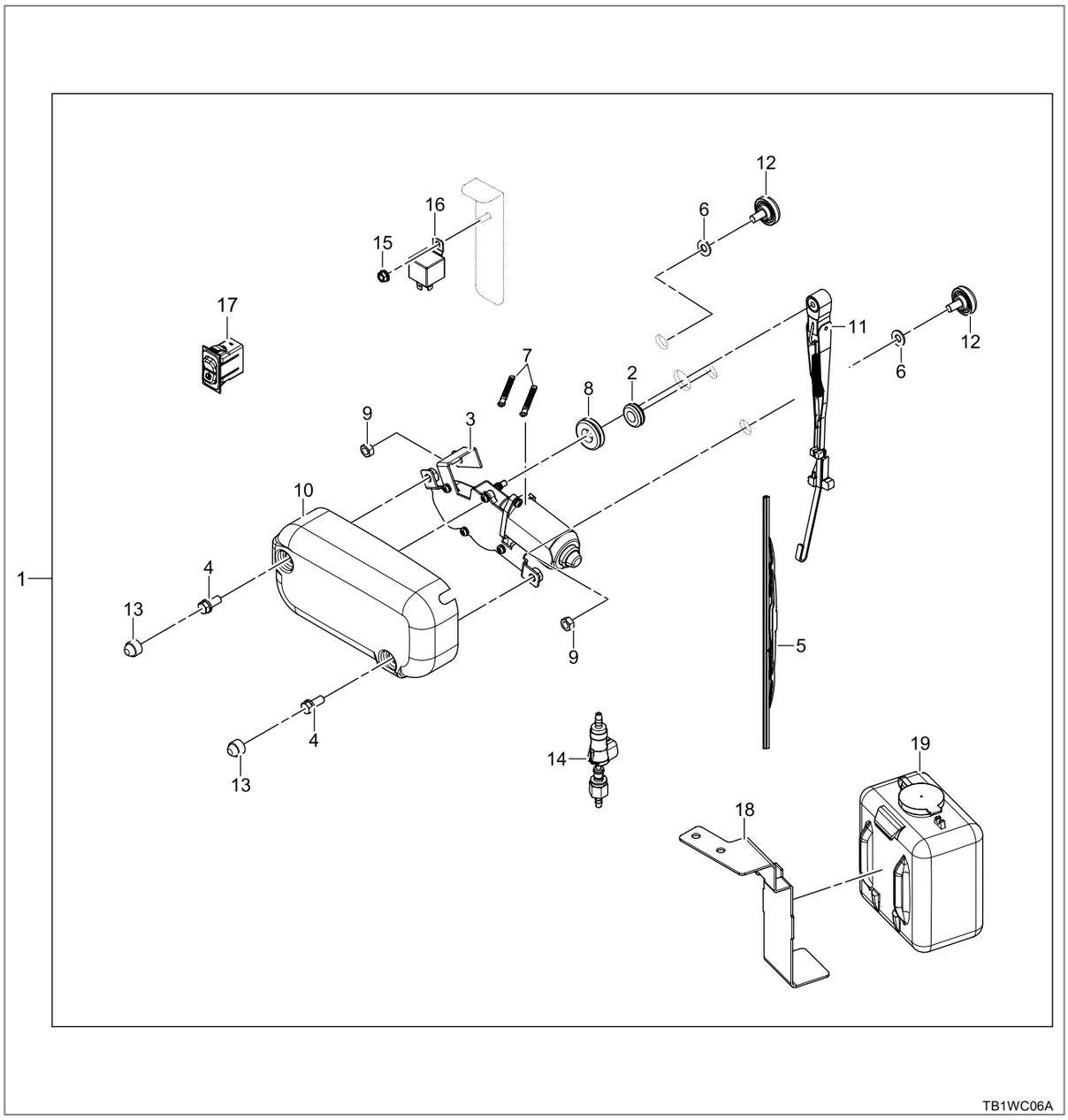


COMPONENTS

(1) Hose, Wiper-FR
(2) Window brush-18”
(3) Blade, Wiper double arm
(4) Motor, Wiper double arm
(5) Holder, Nozzle
(6) Nozzle, Wiper mist
(7) Flange bolt
(8) Assy tank
(9) Bracket, Washer tank-RH
(10) Grommet

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 17 2025-04-08 오전 9:43:37

2.8 TB3-G6G1901 WIPER (REAR)



TB1WC06A

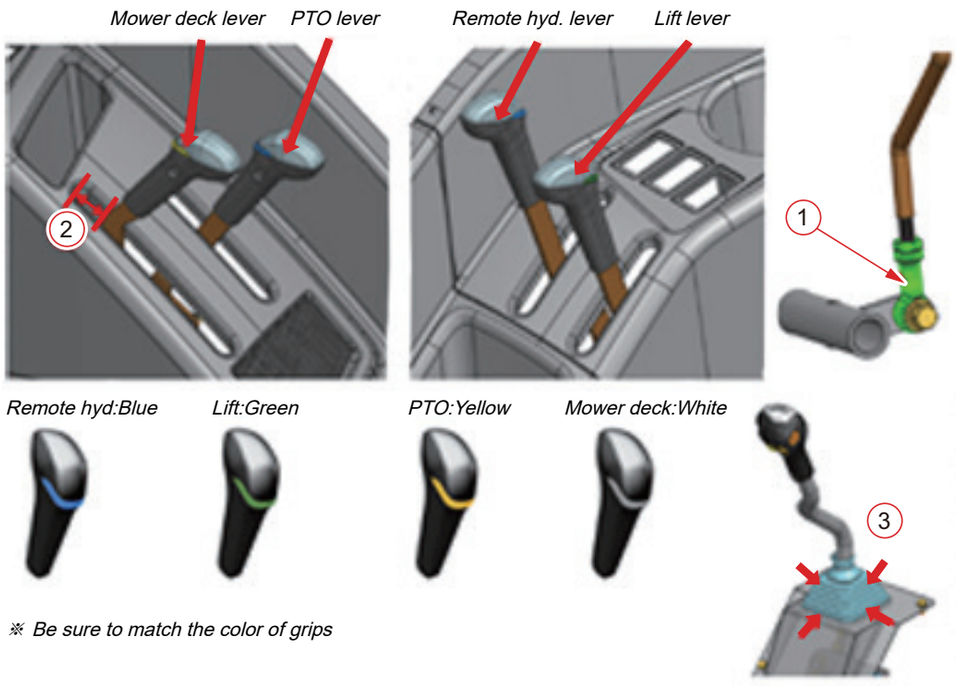
COMPONENTS

(1) Option kit, Windshield wiper assy kit
(2) Grommet
(3) Assy motor, Wiper
(4) Bolt, Washer
(5) Brush 12'
(6) Packing
(7) Clamp, Wire
(8) Grommet
(9) Nut
(10) Cover
(11) Arm, Wire-RR
(12) Bolt, Cushion
(13) Nut
(14) Valve-one way
(15) Flange nut
(16) Relay (5P)
(17) Switch, Wiper, RR
(18) Bracket, Washer tank-LH
(19) Assy tank

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 18 2025-04-08 오전 9:43:37

3. CABIN DISASSEMBLY AND ASSEMBLY

3.1 GRIPS ASSEMBLY TIPS

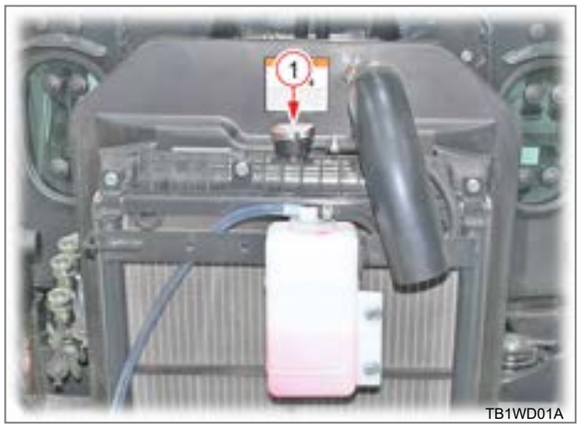


1. Adjust the rod end so that the PTO, remote hyd., and lift lever are located in the center of the lever guide slot.
2. Adjust the rod end of the mower deck lever so that the gap from the rear end of the lever guide slot is approximately 15mm when the deck is raised.
3. After assembling the joystick lever corrugated rubber, apply glue (Loctite 401) to 4 locations. However, the glue should not flow out

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 19 2025-04-08 오전 9:43:37

3.2 CABIN REMOVAL

1. Park the tractor on level ground, stop the engine and apply the parking brake.



TB1WD01A



TB1WD02A

2. Open the hood, open the radiator cap (1) and remove the drain cock (2) from the left rear of the radiator to drain coolant.

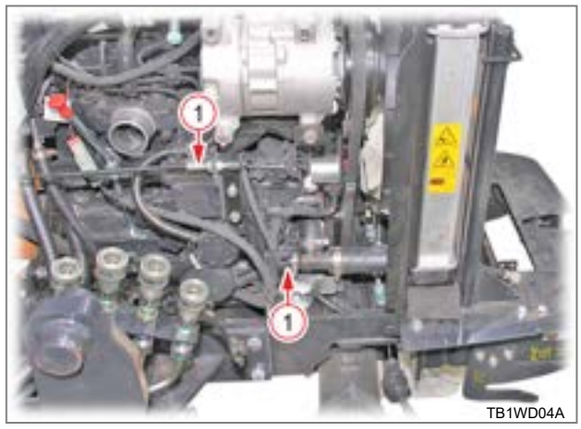
⚠ WARNING

- **When opening the radiator cap, make sure to open it after the engine is sufficiently cooled down. Otherwise, you can get burnt by hot coolant. Also, unscrew the cap a little to release the internal pressure before removing the cap completely.**

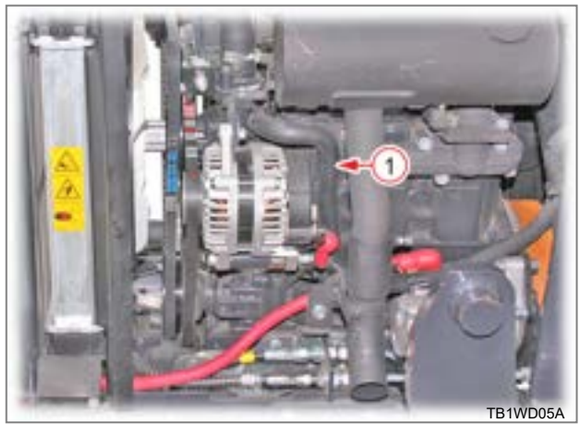


TB1WD03A

3. Disconnect the negative battery cable (1).



TB1WD04A

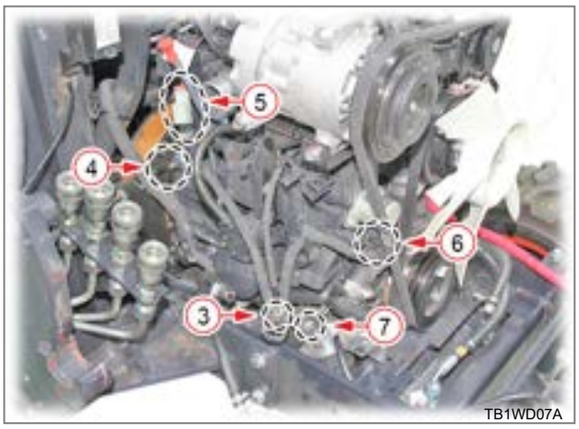


TB1WD05A

4. Disconnect the accelerator cable (1), heater hose (2, 3).

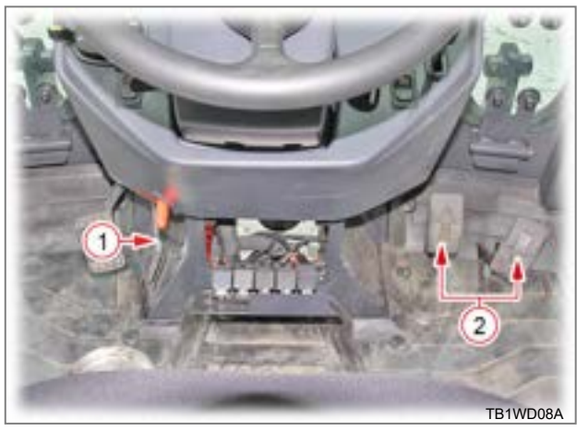
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 20 2025-04-08 오전 9:43:38


TB1WD06A



TB1WD07A

5. Disconnect all connectors of internal engine components connected to the main wiring. [Starter motor (1), alternator (2), coolant temperature sensor (3), oil pressure switch (4), glow plug (5), engine stop solenoid (6), ground wire (7)]



TB1WD08A

6. Remove the brake rod (1) and left and right HST pedals (2) from inside the driver's seat of the cabin.



TB1WD09A

7. After removing the central instrument panel frame cover (1), separate the steering wheel axle assembly from the power steering unit.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 21 2025-04-08 오전 9:43:38



8. Remove the right front (1) of the lever guide.



9. Remove the handle (1) and remove the joystick maintenance window cover bracket (2).





WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 22 2025-04-08 오전 9:43:39



TB1WD14A



TB1WD16A


TB1WD15A


TB1WD17A

10. Unscrew the joystick lever mounting bolt (1) and remove the joystick lever assembly (2) and lever fixing rod (3).

11. Remove the auxiliary fender (1) from the left rear of the tractor.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 23 2025-04-08 오전 9:43:39



TB1WD18A


TB1WD19A

12. Remove the fuel tank filler cap mounting bolt (1), the fuel hose fixing band (2), and remove the fuel tank filler cap and hose assembly (3) from the fuel tank.



TB1WD20A

13. Remove the PTO lever (1), mower deck adjustment lever rod (2), and differential lock rod (3).



TB1WD21A

14. Disconnect the wiring connector (1) and fuel tank gauge connector (2) from the rear of the tractor.



TB1WD22A

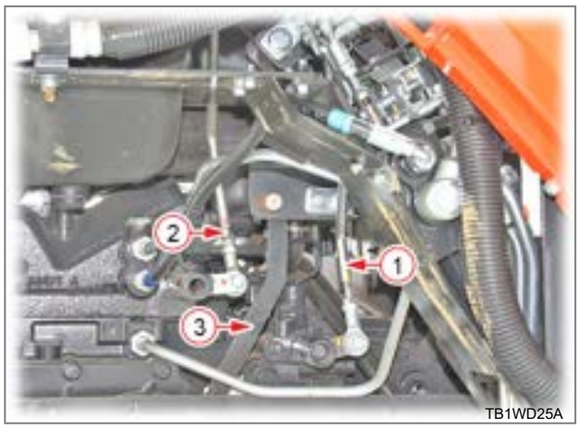

TB1WD23A

15. Remove the auxiliary fender (1) from the right rear of the tractor.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 24 2025-04-08 오전 9:43:40



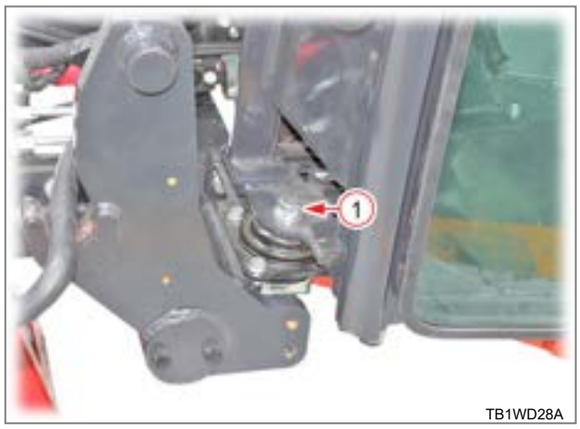
16. Disconnect the air conditioner high pressure hose (1) and low pressure hose (2).





17. Remove the range shift lever (1), position draft adjustment lever (2), front wheel drive plate (3), and MLS port (4).









WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 25 2025-04-08 오전 9:43:41


TB1WD31A


TB1WD32A

18. Install a disassembly jig on the top of the cabin. Unscrew the mounting bolts (1) from the left and right of the cabin support at the front of the cabin. Open the fuse box cover (2) from the left and right of the lever guide inside the cabin and unscrew the mounting bolts (1) attached to the support. Use equipment Safely remove the cabin assembly using equipment such as hoists.

REMARK

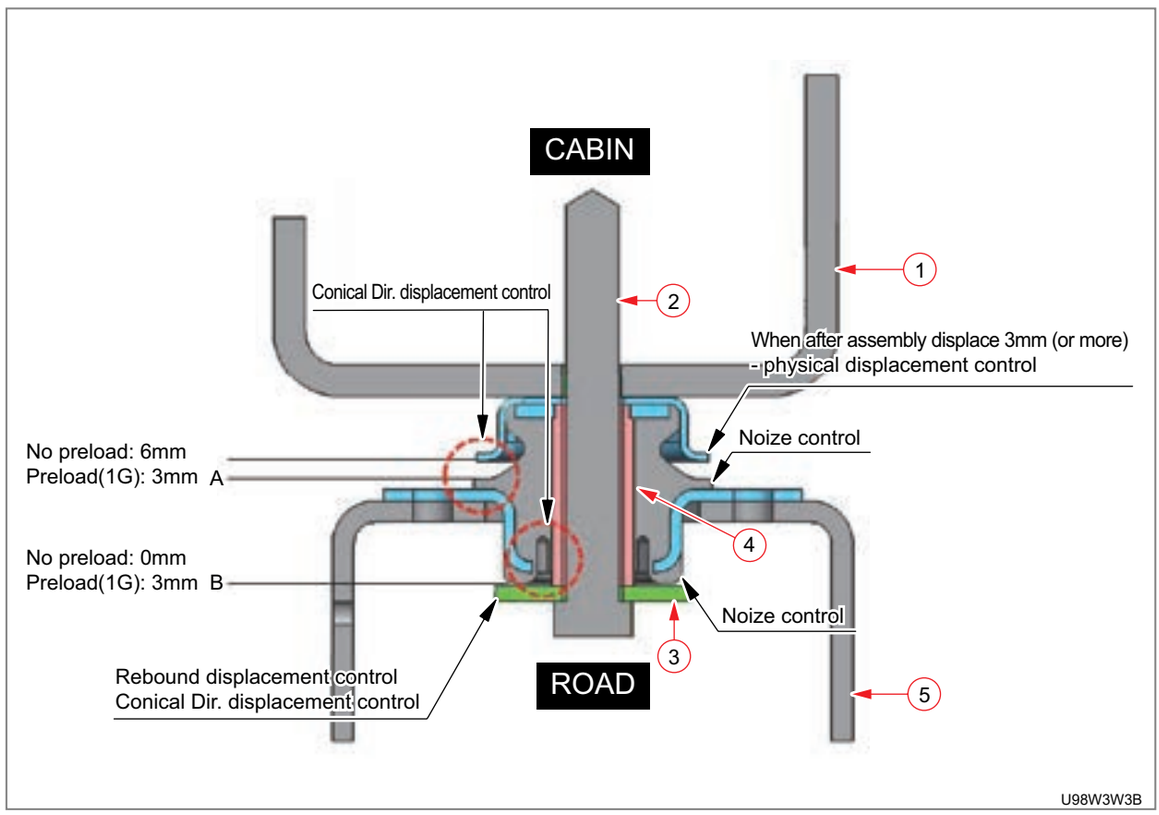

R68WD54A

- **When removing the cabin, lift it with a hoist slowly checking nothing is interfered with or caught by any part. After removing it, place it in a safe place. Also, make sure there is no one around the work area.**

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 26 2025-04-08 오전 9:43:42

REMARK

RUBBER MOUNTING STRUCTURE & CHARACTERISTICS



- Basically, the cabin frame (1), mounting bolt (2), plain washer (3) and spacer (4) form a unit and they are separated from the frame (5) on the road side by the rubber mounting. In a normal condition, the bottom gap (B) of the rubber mounting is 0 mm. However, when preload is transferred to the frame from the road surface, this gap becomes 3 mm. In other words, when the frame on the road side is vibrated by its displacement in the conical direction or rebounding motion, a preload gap (A & B) is created in the rubber mounting to attenuate shock transferred to the upper frame.
- Therefore the structural separation by the rubber mounting attenuates shock and noise transferred from the road surface for superior vibration and noise reduction.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 27 2025-04-08 오전 9:43:42

3.3 COMPONENT REMOVAL

3.2.1 SEAT



TB1WC80A



TB1WC81A

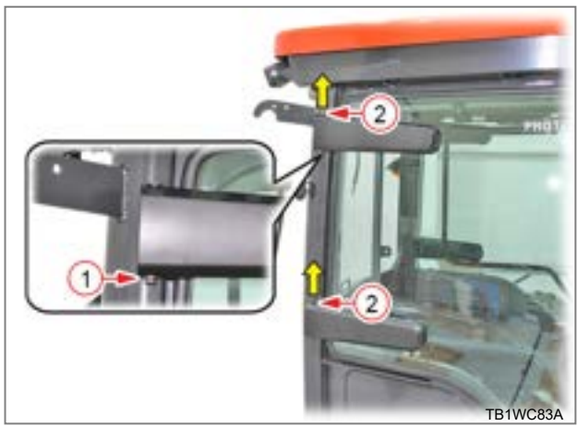
1. Disconnect the seat safety switch connector (1), then unscrew the seat mounting bolts and nuts (2: Front bolts 2EA, 3: Rear nuts 2EA) and remove the seat assembly (4).

3.2.2 DOOR



TB1WC82A

1. Push the air cylinder mounting clip (1) upward to separate the air cylinder from the door.



TB1WC83A

2. Remove the E-rings (1) from the upper and lower hinge pins of the door, and pull out the head pins (2). Then, lift up the door to remove it.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 28 2025-04-08 오전 9:43:42

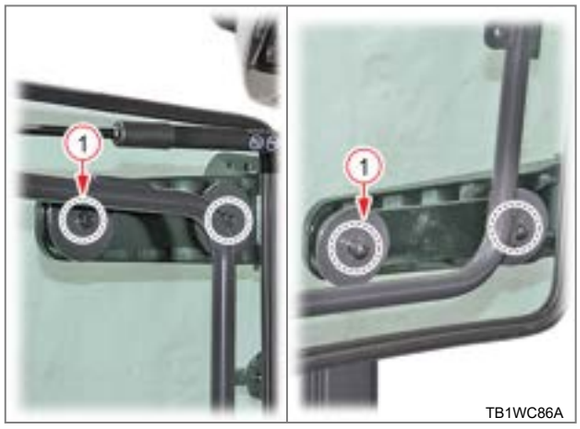
3.2.3 DOOR GLASS

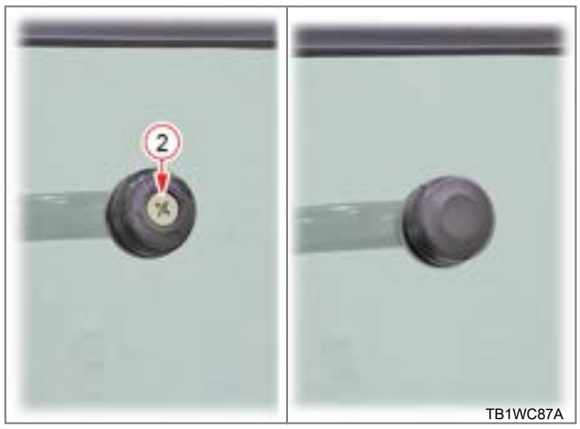


1. Remove the latch handle (1) and unscrew the latch cover screws (2) to remove the cover.



2. Unscrew the latch mounting bolts (1)(3EA) to separate the door handle and bracket.





3. Pull out the cap from the door mounting bracket to unscrew the mounting bolts (1)(4EA) and screws (2)(2EA).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 29 2025-04-08 오전 9:43:43

3.2.4 REAR GLASS HANDLE



1. Unscrew the mounting screws (1) from inside the cabin to remove the handle.

3.2.5 ROOM MIRROR



1. Remove the room mirror by turning room mirror handle (1) counterclockwise.

3.2.6 WASHER FLUID TANK



1. Remove the right fender (1).



2. Disconnect the washer fluid tank connector (1) and remove the washer fluid tank (2).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_12장_캐빈.indd 30 2025-04-08 오전 9:43:43

3.2.7 INTERIOR LAMP


TB1WD49A

1. Fit a flat-bladed screwdriver into the edge of the indoor lamp and pry off the indoor lamp cover.
2. Remove the indoor lamp by pulling it up. Install a new one.

3.2.8 LEVER GUIDE (LH)



TB1WC91A

1. Remove the PTO lever grip (1) and the deck lever grip (2).



TB1WC92A

2. Unscrew the lever guide mounting bolts (1)(11EA).

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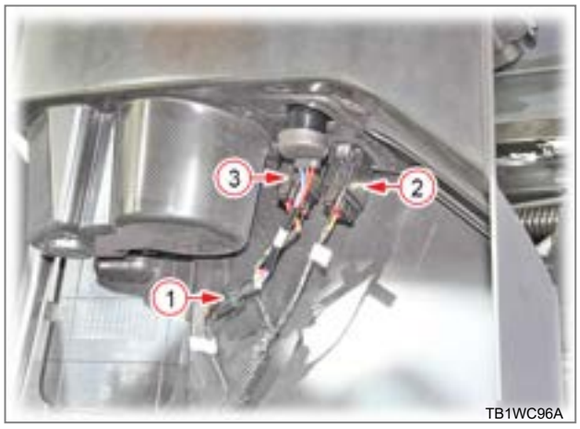


3. Disconnect the power socket connector (1) and USB socket connector (2), then remove the left lever guide (3).

3.2.8 LEVER GUIDE (RH)



1. Remove the hydraulic lever grip (1), then unscrew the mounting bolts (2)(7EA) to remove the lever guide (3).





2. Lift the lever guide, disconnect the PTO connector (1), work lamp connector (2), and heated seat connector (3), then remove the right lever guide (4) completely.

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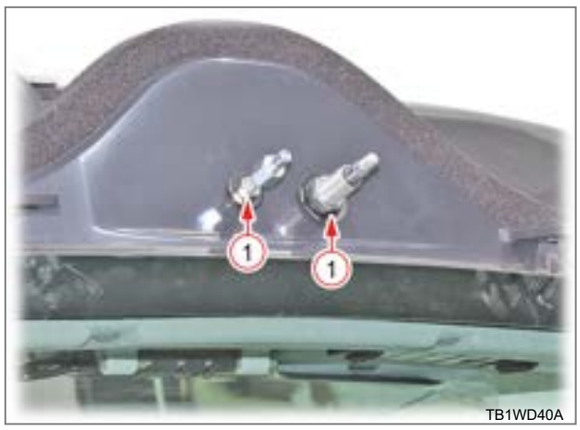
3.2.9 FRONT WIPER/MOTOR



1. Unscrew the mounting nuts (1)(6EA) and remove the roof (2).



2. Open the wiper cap and unscrew the internal mounting nut (1) and E-ring (2) to remove the wiper (2).

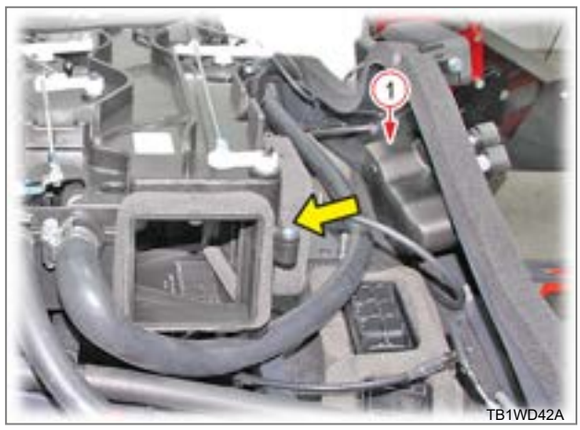


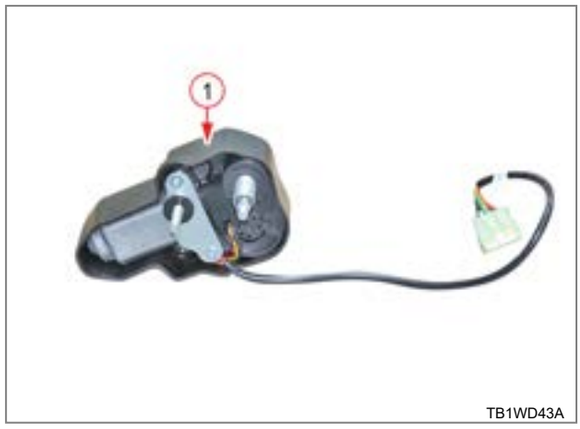
3. Unscrew the nuts (1).



4. Disconnect the wiper motor connector (1).

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5. Pull the wiper motor (1) from the driver's seat into the cabin to remove it.

3.2.11 ANTENNA



1. Unscrew the antenna body screw (1) to remove the antenna assembly.

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CS2530CH
CS2530CH-EU

A/C AND HEATER

CHAPTER 13

TABLE OF CONTENTS

1. SPECIFICATION 13-2

1.1 Air-con/Heater main spec.....13-2

2. PRINCIPLE OF COOLING SYSTEM 13-3

2.1 System flow.....13-3
2.2 Compressor.....13-5
2.3 Receiver-drier.....13-6
2.4 Condenser.....13-6
2.5 Expansion valve 13-7
2.6 Evaporator.....13-7
2.7 Heater core 13-8
2.8 Air conditioner/heater system.....13-9
2.9 Cooling system.....13-12

3. CHECK AND ADJUSTMENT 13-16

3.1 Troubleshooting by gauge.....13-16
3.2 Normal condition 13-17
3.3 Insufficient refrigerant.....13-17
3.4 Excessive refrigerant, poor condenser cooling.....13-17
3.5 Air intrusion into cycle 13-18
3.6 Defective expansion valve 13-18
3.7 Poor compression 13-19
3.8 Moisture intrusion into cooling cycle 13-19
3.9 Poor recirculation of refrigerant 13-20
3.10 Inspection and adjustment for cabin system.....13-20

4. TROUBLESHOOTING 13-24

4.1 Visual inspection 13-24
4.2 Diagnosis by symptom 13-25
4.3 Troubleshooting for poor cooling/heating performance 13-26

5. EXPLODED VIEW.....13-29

5.1 TB3-G6C2504 Roof 13-29
5.2 TB3-G6C3503 Air conditioner heater group 13-30

6. A/C RELATED COMPONENT DISASSEMBLY AND ASSEMBLY 13-31

6.1 A/C filter removal.....13-31
6.2 A/C assembly removal 13-31
6.4 Compressor removal.....13-36
6.5 Compressor installation.....13-37
6.6 Conderser removal.....13-38

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 1 2025-03-21 오후 1:47:17

1. SPECIFICATION

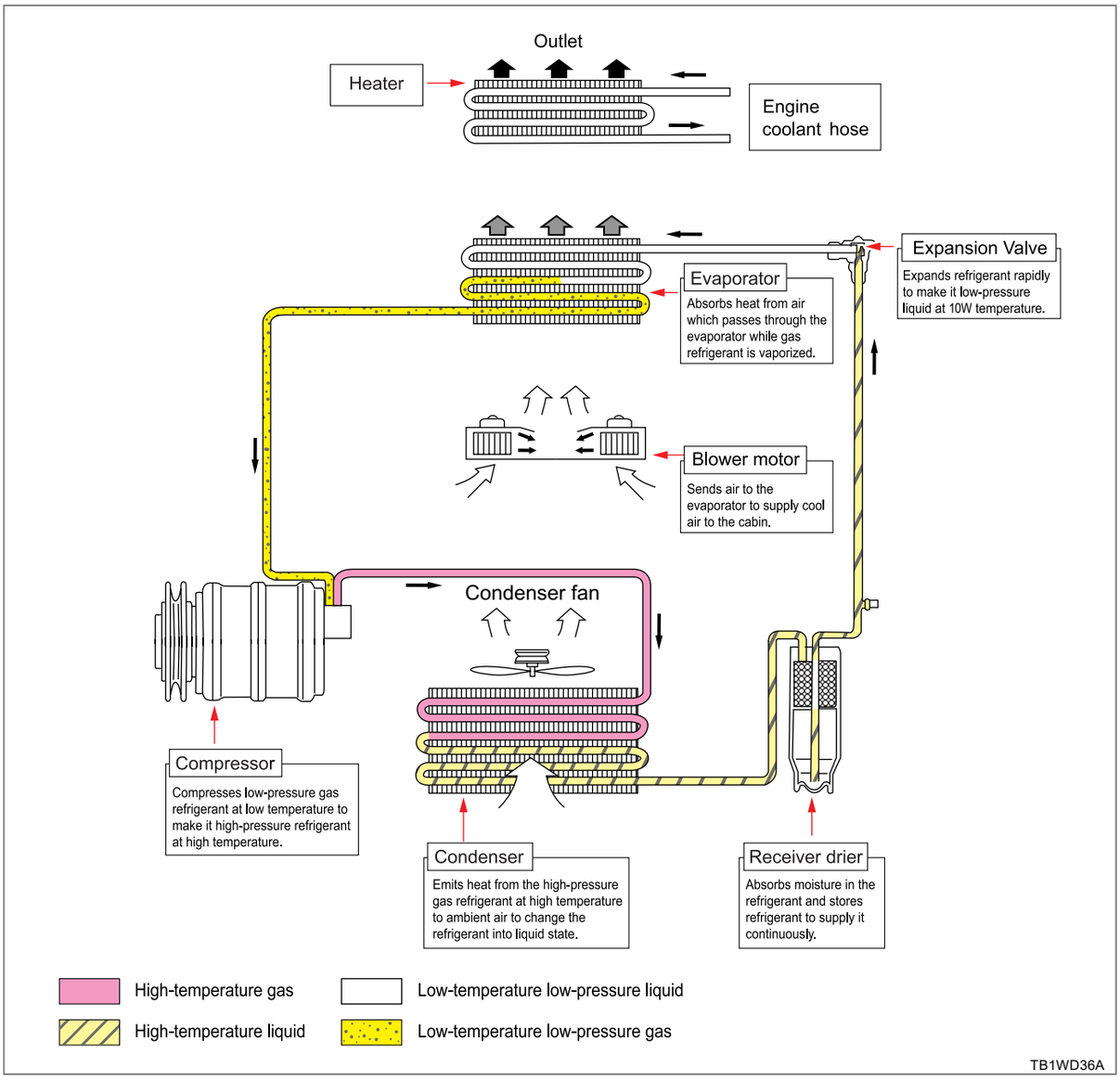
1.1 AIR-CON/HEATER MAIN SPEC

ITEM	SPECIFICATION	REMARKS
Cooler	Standard cooling performance : 3,120 kcal/h - 5% min Standard blower capacity : 400 m^3/h Refrigerant : R-134a Refrigerant capacity : 550 g (1.21 lbs) Expansion valve In : 15.7 kgf/cm^2 Evaporator Out : 2.0 kgf/cm^2	
Heater	Heating performance : 4,800 kcal/h - 5% or more Standard blower capacity : 400 m^3/h	
Compressor	Displacement : 90 cc/rev Lubricant : Pag oil, 120 ± 10 cm^3 Number of cylinders : 6	
Condenser	Heat radiated : 6,000 kcal/h ± 10 % Standard flow speed : 5 m/s Integrated with receiver-drier	
A/C / Heater controller	Mechanical (Motor type rotary switch) • Air direction control: Electrical (VENT, VENT/DEF, DEF) • Temperature control: Mechanical (COOL ↔ HOT) • Blower capacity control: Electrical (1st ↔ 4th) • A/C switch: Electrical (ON/OFF)	

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 2 2025-03-21 오후 1:47:17

2. PRINCIPLE OF COOLING SYSTEM

2.1 SYSTEM FLOW



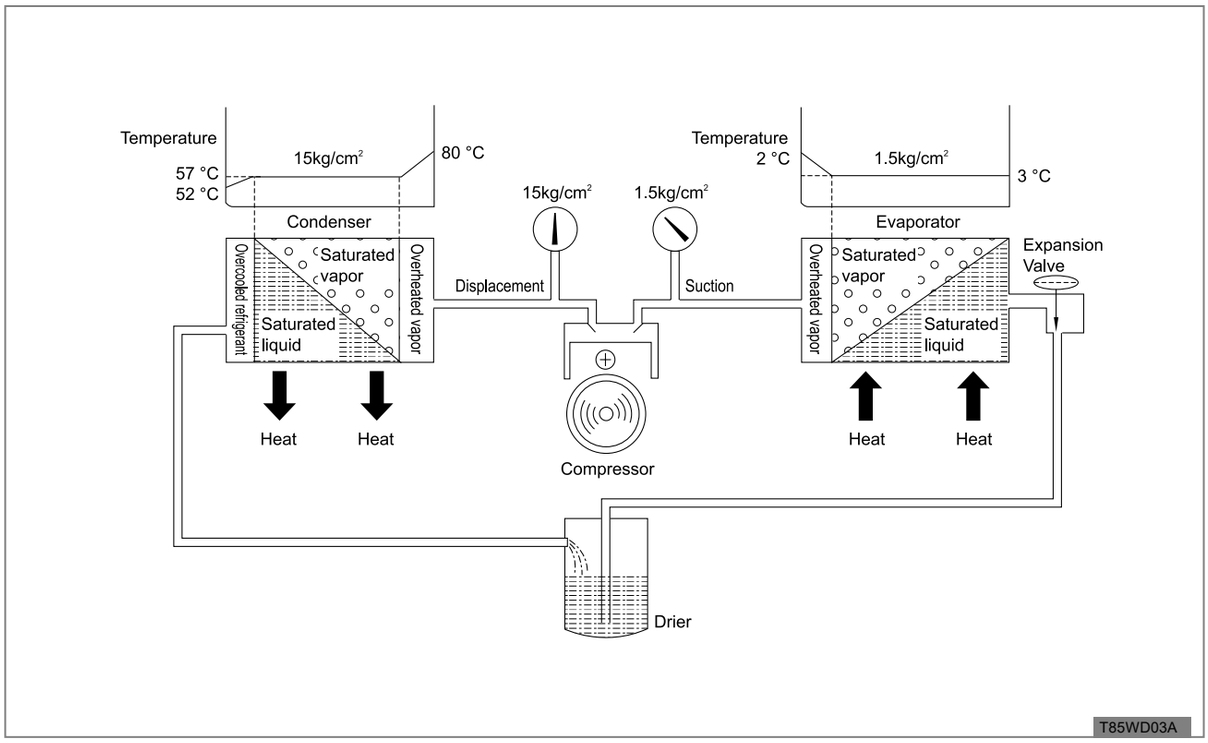
The cooling system operates by circulating refrigerant R134a through the processes of compression, condensation,heat dissipation, evaporation, and heat absorption.

1. As the refrigerant passes through the evaporator, it turns into gas. Then, it enters the compressor and is compressed. As the refrigerant gas passes through the condenser, it releases its heat to the surrounding air and condenses into liquid.
2. Then the refrigerant liquid passes through the receiver-drier which then removes particles and dries the refrigerant.
3. R134, liquid refrigerant under high pressure is led to the expansion valve controlling the flow rate, and its pressure will fall down here radically to vaporizable state.
4. This low-temperature liquid refrigerant cools the evaporator because it absorbs surrounding heat during the evaporation process. Hot and humid air in the cabin is drawn into the evaporator by the fan, cooled down and then flows to the cabin again.

   Moisture in the air is condensed on the evaporator, and discharged in the state of liquid through the drainage hose attached to the A/C assembly, resulting in the reduction of humidity in the cabin.
5. Gaseous refrigerant returns to the compressor, which now completes one cycle.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 3 2025-03-21 오후 1:47:17

2.1.1 COOLING CYLCE



The refrigerant circulates through the lines and components in closed circuit.

As the refrigerant circulates in the circuit, it is evaporated to gas and then is condensed into liquid repeatedly.

The refrigerant gas is sucked and compressed in the compressor and escapes under high pressure at high temperature (80°C, 15 kg/cm^2).

Then, as this refrigerant enters the condenser and is cooled by the cooling fan of the engine, it loses its latent heat and is liquefied. When this happens, the temperature of the refrigerant is 50°C.

The liquefied refrigerant enters the receiver-drier which removes the moisture and dust from the refrigerant. Then the refrigerant flows into the expansion valve. The refrigerant under high pressure is expanded and vaporized into gas rapidly in the expansion valve. Then, it flows into the evaporator at low temperature under low pressure (-3°C, 1.5 kg/cm^2). This refrigerant absorbs its latent heat from air drawn into the evaporator. Then, as the air is cooled, the refrigerant is vaporized to gas and drawn into the compressor again. As the refrigerant continuously circulates the cooling cycle, the cooling process is repeated.

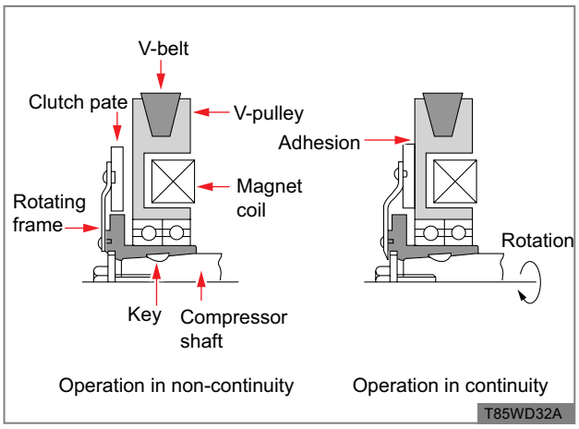
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2.2 COMPRESSOR


TB1WC56A

The compressor rotates by it clutch pulley as the rotating force is transferred from the engine crankshaft pulley via the drive belt.

As the compressor shaft rotates, the compressor compresses the refrigerant gas under low pressure which then turns into the state of high temperature and high pressure.



If the magnetic clutch is not supplied with electric power, the compressor clutch pulley rotates itself, not rotates with the compressor shaft. When the magnetic clutch is supplied with electric power, the clutch plate and the hub move back and are connected to the pulley. Then, the clutch plate is engaged with the pulley by magnetic force to rotate the compressor shaft.

When the compressor shaft rotates, the pistons reciprocate and compress the refrigerant.

2.2.1 INSPECTION



TB1WC57A

(1) Electro-magnetic clutch coil
(2) Coil connector
(3) High pressure valve
(4) Low pressure valve

It is possible to check if the amount of refrigerant is proper by comparing the temperature and the pressure. If the refrigerant loss is excessive, the oil level in the system should be checked.

1. The malfunction of the compressor can be divided into four categories; noise, seizure, leakage and poor compression. If irregular or vibrating noise is heard, apart from sympathetic sound, it could be because of excessive clearance due to a broken part or wear.
2. To check if the compressor is seized, cut off power supply to the clutch and check if the clutch driving plate rotates freely. If it does not rotate, it means that the compressor is seized.
3. Poor compression is due to the damaged seal in the compressor or clogged compressor. Also, its cause can be insufficient refrigerant or clogged circuit. Therefore, these should be checked before servicing the compressor.
4. If the compressor operates properly and is not seized, check if the current going to the electro-magnetic clutch coil meets the standard.
5. When checking oil level of the compressor, remove the check plug first.
6. If the oil is too dirty, change it with new oil.
7. To check the amount of oil for each part, turn on the air conditioner and set the fan speed to the maximum level. Run the engine at 1,000 rpm for over 20 minutes to set the system in normal operating condition. In this condition, check the amount of oil for each component.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 5 2025-03-21 오후 1:47:19

2.3 RECEIVER-DRIER


TB1WC58A

STORING FUNCTION

It stores the liquid refrigerant which is sent to the evaporator depending on heat load.

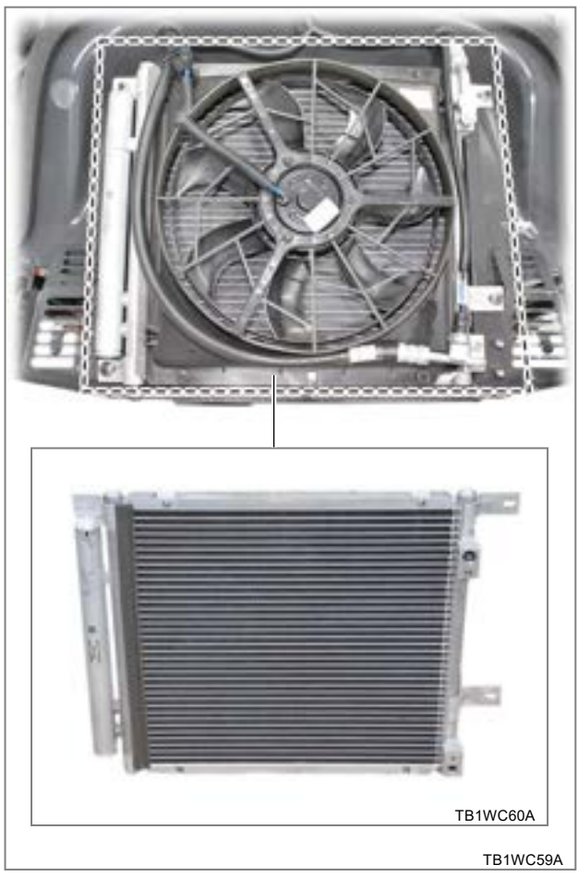
BUBBLE SEPARATION FUNCTION

The bubbles are separated from the liquid refrigerant and only the liquid refrigerant is sent to the expansion valve.

WATER SEPARATION FUNCTION

It removes moisture and foreign material from the refrigerant.

2.4 CONDENSER



The condenser is installed in front of the radiator. When the refrigerant arrives from the compressor, the condenser changes the refrigerant from a gas state into a liquid by discharging heat from the refrigerant.

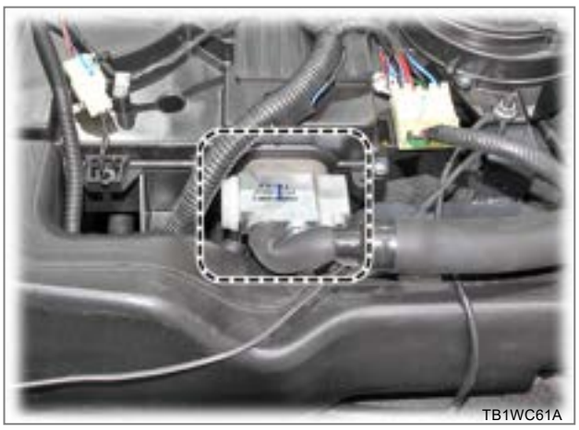
The performance of the condenser directly affects the cooling performance of the cooler. The refrigerant in the condenser is cooled down by the air flow from the cooling fan of the engine.

2.4.1 INSPECTION

1. If the core grill of the condenser is clogged by foreign material or the fin is deformed or damaged, the amount of air flow is decreased and the pressure in the condenser rises to an abnormally high level. Therefore, it should always be kept clean and the fin should be straight.
2. There are two causes for the condenser malfunction: leakage and clogging. If some patrs of the condenser is clogged, the refrigerant expands as it passes through the clogged portion and frost or ice may form on that part. If air passing through the condenser or the radiator is blocked, the output pressure is increased abnormally.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 6 2025-03-21 오후 1:47:19

2.5 EXPANSION VALVE


TB1WC61A

When the A/C system is in normal operation, the refrigerant is drawn into the expansion valve as a cool, high-pressure liquid. As it passes through the orifice valve, it becomes in a liquid state at low temperature and low pressure. Then, this liquid refrigerant absorbs heat around the evaporator and vaporizes into gas.

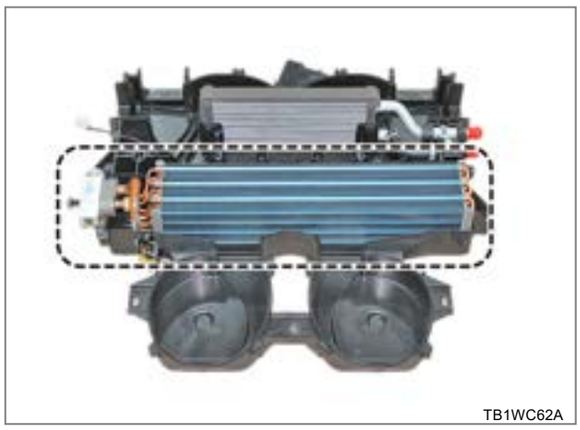
The amount of liquid refrigerant passing through the expansion valve depends on the temperature and pressure of the refrigerant.

The expansion valve controls the amount of refrigerant supplied to the evaporator as necessary.

2.5.1 INSPECTION

- If the expansion valve is malfunctioning, the inlet pressure and the outlet pressure increase as well as poor cooling performance. In this case, check the changes of the pressure using the pressure gauge.

2.6 EVAPORATOR


TB1WC62A

As the refrigerant passes through the expansion valve, it becomes low-pressure liquid. When this liquid refrigerant passes through the tube of the evaporator, it is evaporated by air blown from the blower fan. At this moment, as the tube fin is cooled down, the interior air is cooled down. Also, moisture in the air is condensed to a liquid and drained with dust, etc. to outside through the drain hose.

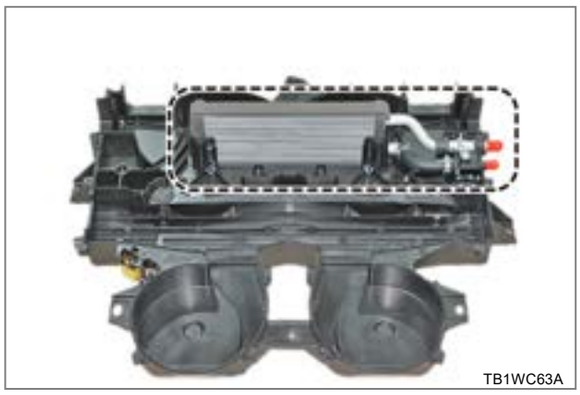
When warm air contacts with the fin, this air is cooled down below the dew point and water is formed on the fin. If the temperature of the fin is below 0°C in this case, this water can be frozen or moisture in the air can forms frost on the fin which can lead to poor cooling performance. To prevent the evaporator from freezing, the temperature controller controls the expansion valve.

2.6.1 INSPECTION

- If the core grill of the evaporator is deformed or accumulated with dust or foreign material, it can decrease air flow. Also check if the drain hose is not bent or clogged since it is to drain water from the evaporator.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 7 2025-03-21 오후 1:47:19

2.7 HEATER CORE


TB1WC63A


TB1WC64A

The heater core is to supply warm air into the cabin by transferring heat from hot engine coolant to the air.

The amount of coolant passing through the heater core is controlled by the temperature switch of the controller. When this switch is set to “HOT” position, the max. amount of coolant flows.

2.7.1 INSPECTION

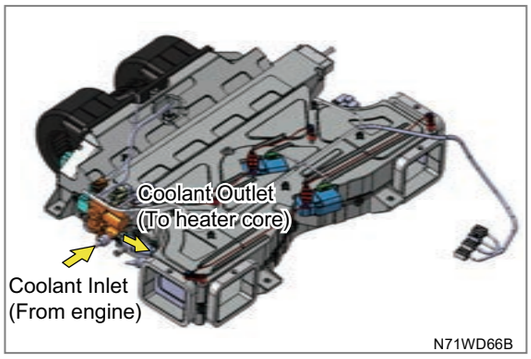
- If the surface of the heater core is deformed or accumulated with dust or foreign material, it can decrease air flow resulting in poor heating performance.

REMARK

- When the heater is in operation, the temperature is controlled mainly by the temp. controller in the A/C assembly, but it is also additionally controlled by the water valve by controlling the hot water flow to the heater.

REMARK

WATER VALVE



N71WD66B

- The water valve is installed onto the pipe inlet of the heater core and acts as a switching valve to regulate the coolant inflow.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 8 2025-03-21 오후 1:47:20

2.8 AIR CONDITIONER/HEATER SYSTEM

2.8.1 AIR INLET AND VENT



(1) Air recirculation inlet
(2) Side vent (LH)
(3) Side vent (RH)
(4) Front vent
(5) Air source control lever

The air source control lever can be operated to keep the cabin pleasant and comfortable.

(1) Air source control lever in ambient air position (pushing the lever backward): Outside air comes in through the filter.

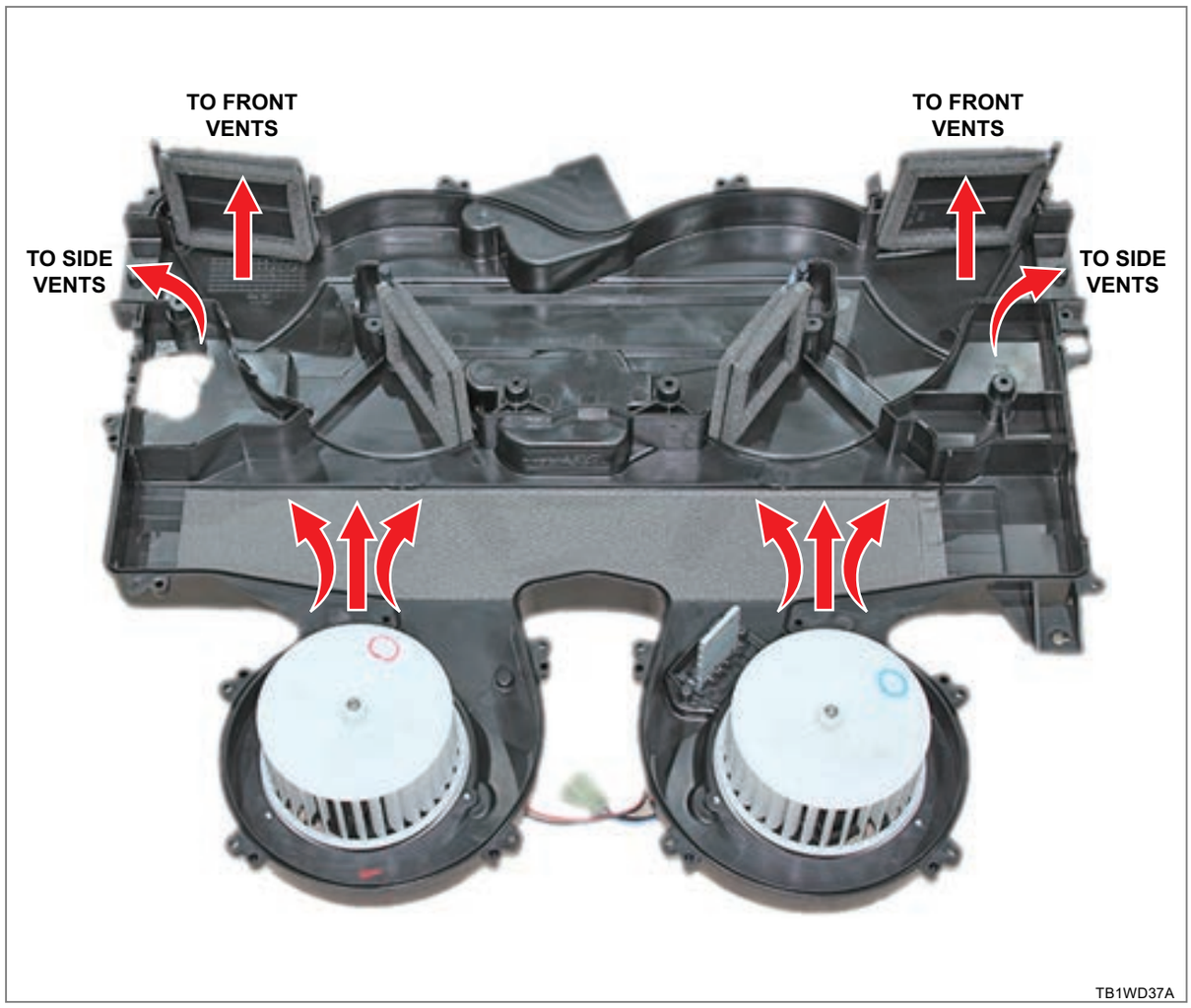
(2) Air source control lever in recirculation position (pulling the lever forward): Inside air recirculates along with some of outside air.



(1) Air filter for outside air

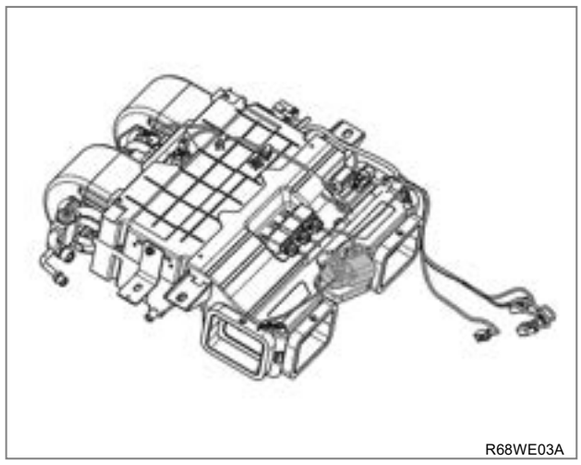
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2.8.2 AIR FLOW



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 10 2025-03-21 오후 1:47:20

2.8.3 ACTUATOR


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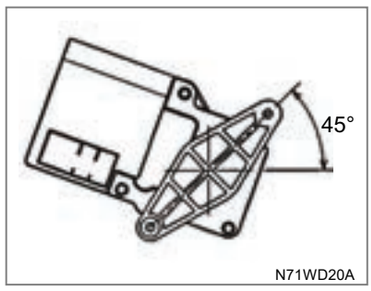
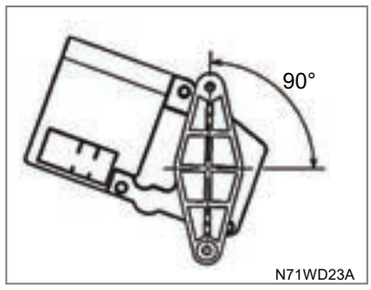
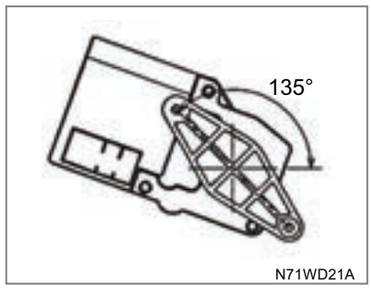
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(1) Mode actuator

ACTUATOR WORKING MODE

▶ **MODE ACTUATOR**

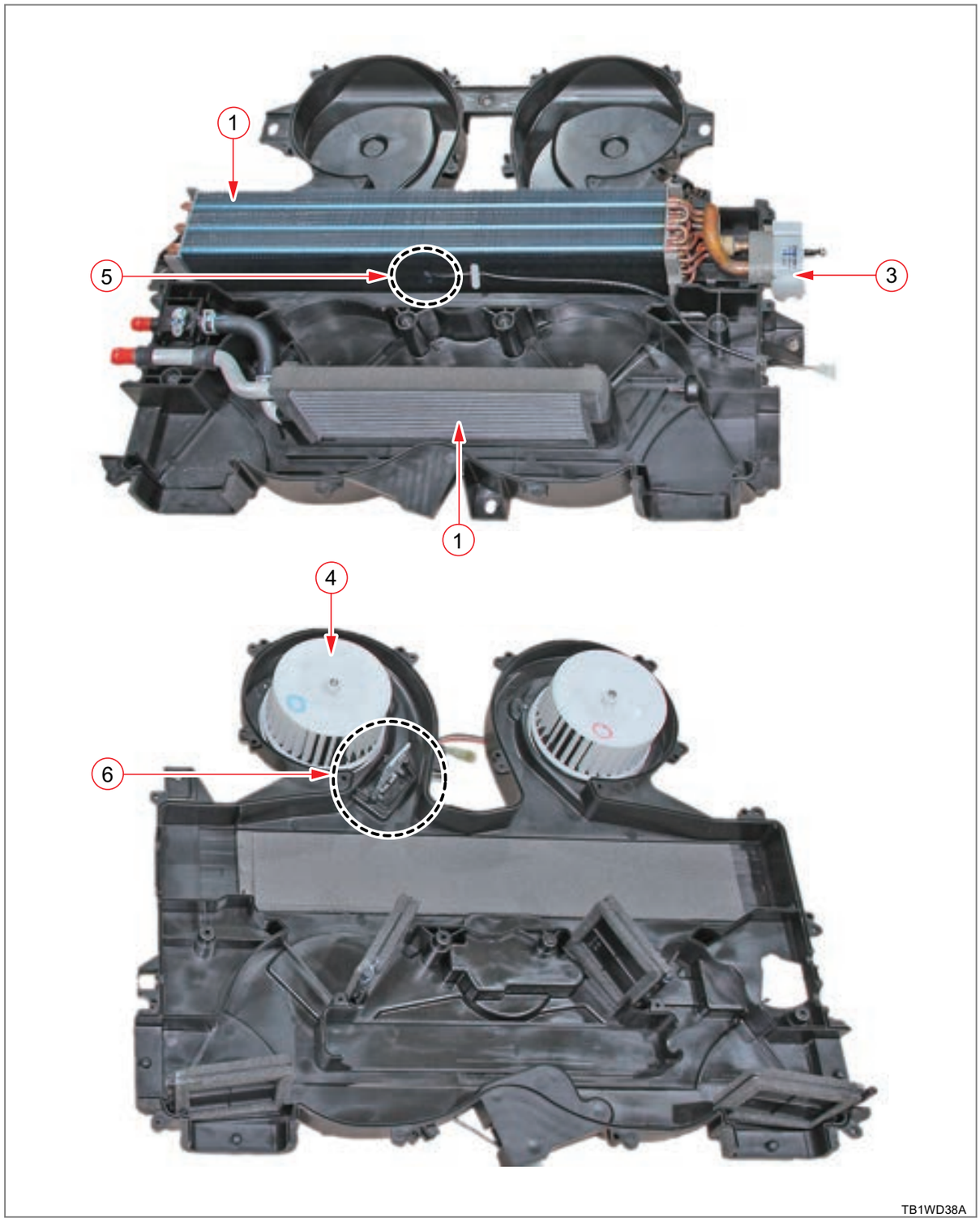

N71WD22A

ITEM	ACTUATING RADIUS
DEF mode	 N71WD20A
DEF/FACE mode	 N71WD23A
FACE mode	 N71WD21A

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 11 2025-03-21 오후 1:47:21

2.9 COOLING SYSTEM

2.9.1 A/C ASSEMBLY



(1) Heater core
(2) Evaporator
(3) Expansion valve
(4) Blower motor
(5) Thermocon
(6) Resistor

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 12 2025-03-21 오후 1:47:22

2.9.2 A/C ELECTRICAL CONNECTOR



(1) Resistor
(2) A/C relay
(3) Blower motor connector
(4) Mode actuator

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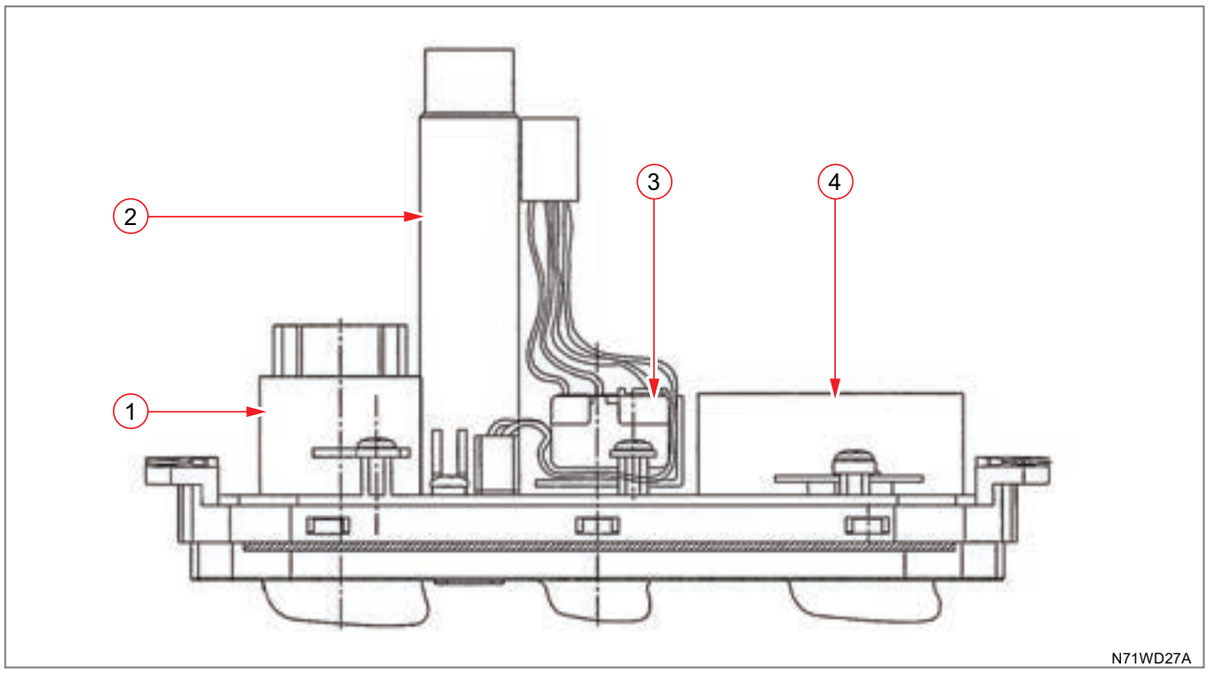
2.9.3 A/C CONTROLLER

FRONT VIEW



(1) Blower switch
(2) A/C switch
(3) Mode switch
(4) Temperature control switch

BACK VIEW



(1) Blower switch
(2) A/C switch
(3) Mode switch
(4) Temperature control switch

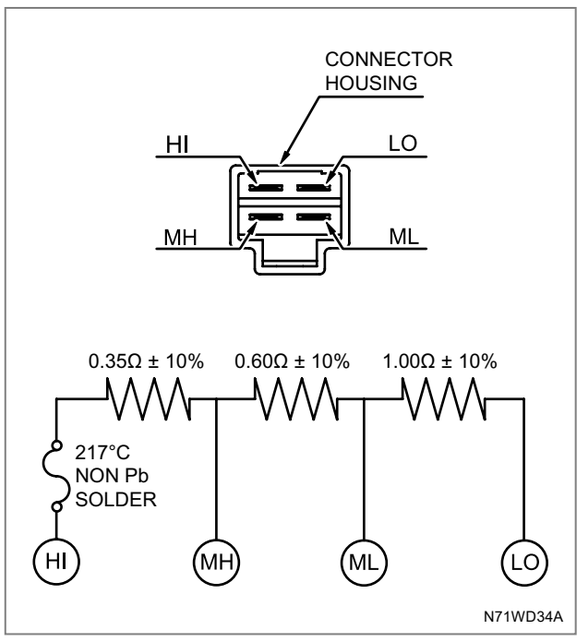
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2.9.4 RESISTOR



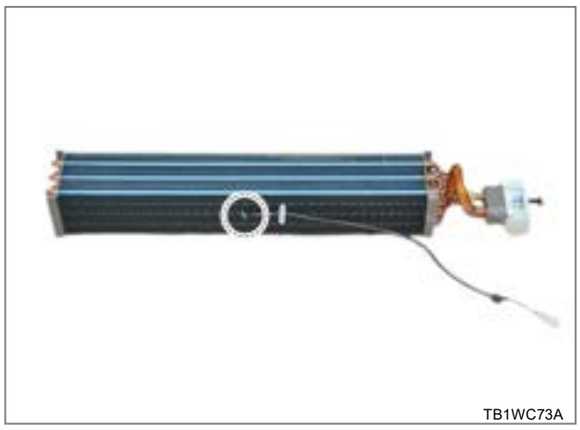
It is attached to the front of the A/C blower fan. It is used to adjust the blower motor speed according to the speed set by the blower switch (1st to 3rd stage). It changes the voltage applied to the blower motor by its resistance values which are set by each stage. However, the battery voltage is directly applied regardless of the resistor when the blower switch is set to the 4th stage.

CIRCUIT AND TERMINAL ARRANGEMENT



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 15 2025-03-21 오후 1:47:23

2.9.5 THERMOCON


TB1WC73A

The thermocon is installed to the evaporator to prevent evaporator from freezing and A/C system damage by detecting the temperature of the evaporator core. It is equipped with a minus degree coefficient (NTC) thermistor. As the temperature goes down, its resistance increases and vice versa.

OPERATION CHARACTERISTICS

Characteristics	Condition
OFF : +1.0 -0.5°C ON-OFF difference : 1.3 ± 0.5°C	• Operation voltage : DC 10 ~ 15V • Temperature : 25°C±5°C (77°F±41°F) • Humidity : 65 ± 20% • Load : A/C relay

3. CHECK AND ADJUSTMENT

3.1 TROUBLESHOOTING BY GAUGE

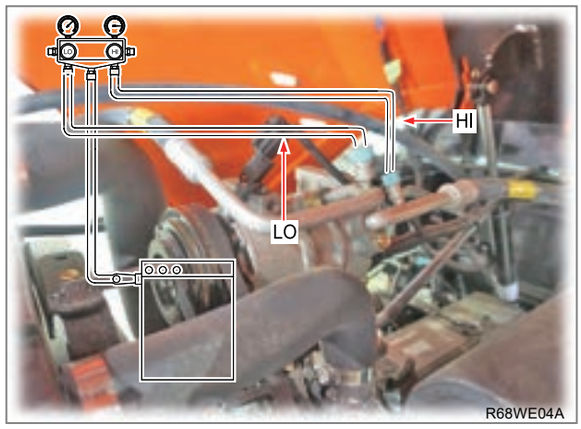
⚠ CAUTION

- Park the tractor on level ground, apply the parking brake and chock the wheels.
- Place all levers to the neutral position.

IMPORTANT

- The values measured by the manifold gauge are drawn under certain conditions as belows. Therefore, the measured value may vary depending on the ambient temperature.

- Doors: open.
- Air source: recirculation
- Engine rpm: approx. 1,500 rpm
- Fan speed: maximum
- A/C switch: ON
- Temperature switch: lowest temperature
- Ambient temperature: 30°C~ 35°C

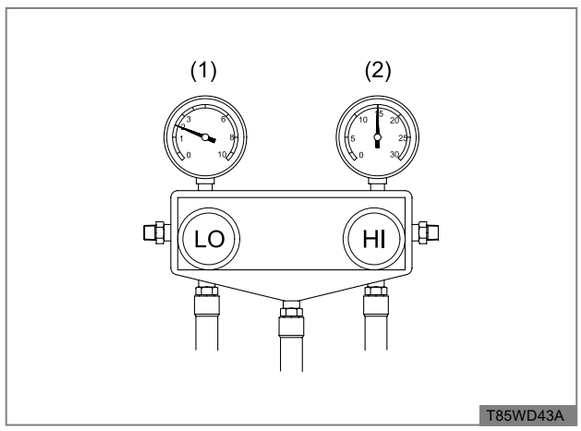


R68WE04A

1. Open the hood.
2. Tighten up the valves on the high pressure and low pressure valves of the manifold gauge and install the gauge to the service valve.
3. Unscrew the low pressure valve a little to discharge air from the hose and tighten the valve. Repeat this for the high pressure valve.
4. Start the engine and run it at approx. 1,500 rpm.
5. Turn the A/C switch ON and set the fan speed to max. speed and the temperature to the lowest temperature using fan speed switches and temperature switches.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 16 2025-03-21 오후 1:47:23

3.2 NORMAL CONDITION

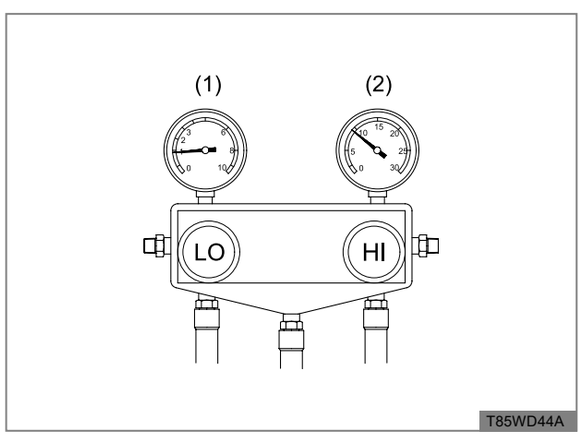


In a normal condition with A/C operated, the pressure shown on the gauges is as follows:

Low pressure side (blue) (1): 1 ~ 3 kg/cm^2

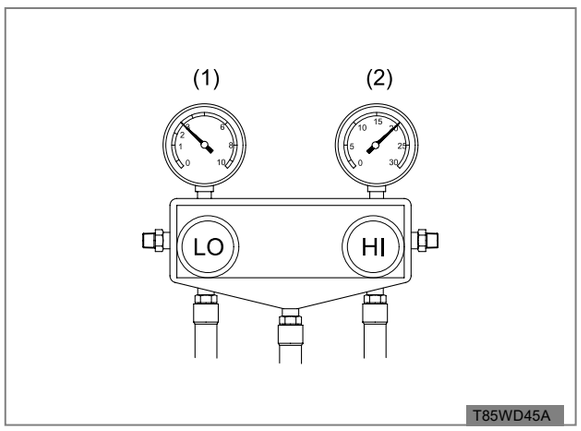
High pressure side (red) (2): 15 ~ 20 kg/cm^2

3.3 INSUFFICIENT REFRIGERANT



1. Status: Not cool
2. Symptoms:
   - The pressure of high/low pressure side is low.
     Low pressure side (blue) (1): Below 0.8 kg/cm^2
     High pressure side (red) (2): 8 ~ 9 kg/cm^2
   - Air blown through the vent does not get cold.
3. Cause: Refrigerant leakage
4. Action: Check with gas leak tester, repair the leaking part and add refrigerant to specified level.

3.4 EXCESSIVE REFRIGERANT, POOR CONDENSER COOLING



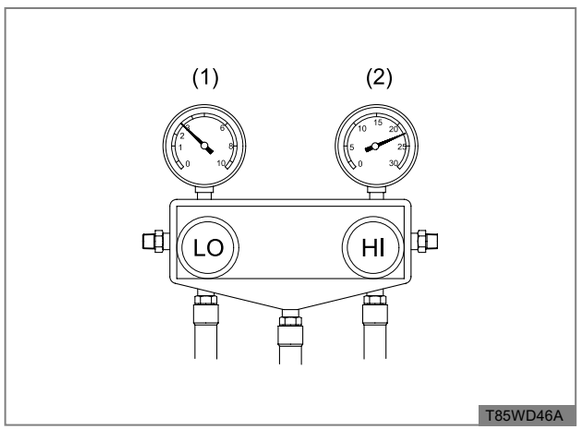
1. Status: Not cool
2. Symptoms: The pressure of high/low pressure side is high.
3. Cause:
   - Increased pressure due to excessive charging of the refrigerant
     Low pressure side (blue) (1): 2.5 kg/cm^2
     High pressure side (red) (2): 20 kg/cm^2
   - Poor cooling performance of condenser
   - Loosened A/C belt & fan belt
4. Action:
   - Clean the condenser
   - Check and adjust the fan belt and condenser motor
   - Check the refrigerant level

⚠ CAUTION

- Discharge the refrigerant slowly from the low pressure side of the manifold gauge while checking the refrigerant level by monitoring the pressure gauge.
- This may caused by contamination of radiator.

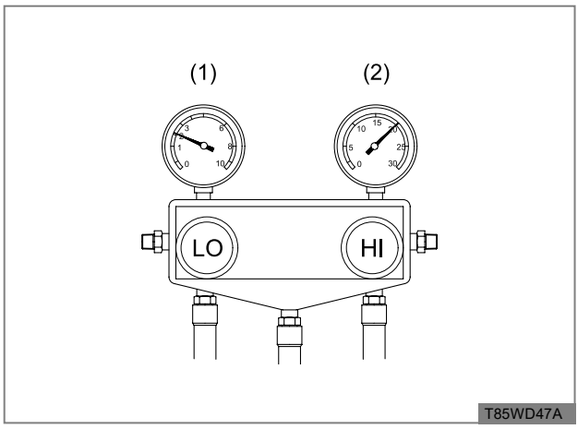
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 17 2025-03-21 오후 1:47:23

3.5 AIR INTRUSION INTO CYCLE



1. Status: Not cool
2. Symptoms:
   - The pressure of high/low pressure side is high.
     Low pressure side (blue) (1): 2.5 kg/cm^2
     High pressure side (red) (2): 23 kg/cm^2
   - The low pressure pipe is not cold.
3. Cause: Air intrusion into cooling cycle
   The measured value is shown as in the above figure if vacuuming is not done.
4. Action:
   - Read the measured value in charging process while vacuuming.
   - Replace the receiver-drier after long operation with air intruded.
   - Check the contamination of refrigerant and oil.

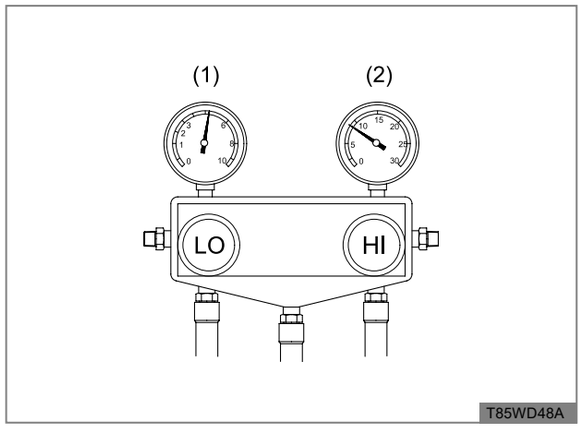
3.6 DEFECTIVE EXPANSION VALVE



1. Status: Not cool
2. Symptoms: The pressure of high/low pressure side is high.
   Low pressure side (blue) (1): 2.5 kg/cm^2
   High pressure side (red) (2): 19 ~ 20 kg/cm^2
3. Cause: Defective expansion valve, poor refrigerant flow control due to improper assembly of thermal case
4. Action: Check the assembled conditions, position and adiabatic in thermal case. if normal, replace the expansion valve.

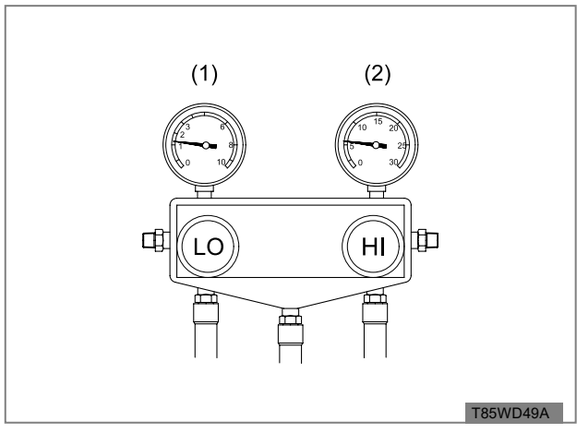
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 18 2025-03-21 오후 1:47:23

3.7 POOR COMPRESSION



1. Status: Not cool
2. Symptoms:
   - The pressure of low pressure side is high while the pressure of high pressure side is very low.
     Low pressure side (blue) (1): 4 ~ 6 kg/cm^2
     High pressure side (red) (2): 7 ~ 10 kg/cm^2
   - When stopping the operation, the pressure of high/low pressure shall be the same immediately.
3. Cause: Poor compressor performance caused by the defective compressor gasket and the broken suction valve.
4. Action:
   - Disassemble and repair the compressor.
   - Replace the compressor assembly.

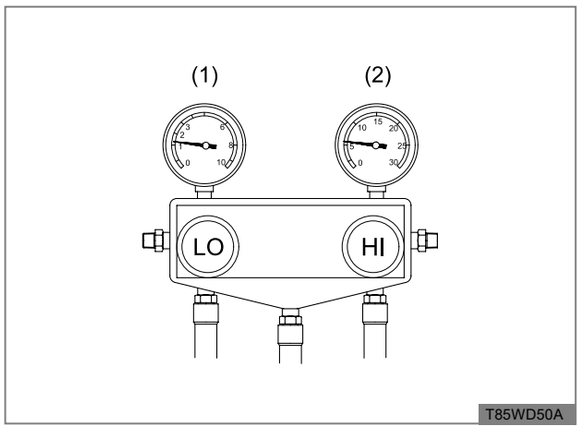
3.8 MOISTURE INTRUSION INTO COOLING CYCLE



1. Status: Sometimes cool, sometimes not cool
2. Symptoms: The pressure of low pressure side is sometimes negative or sometimes returning to normal.
   Low pressure side (blue) (1): 0.5 ~ 1.5 kg/cm^2
   High pressure side (red) (2): 7 ~ 15 kg/cm^2
3. Cause: The moisture inside cooling cycle is frozen which makes the cycle closed in the expansion valve. The condition is back to normal when ice is melt.
4. Action: Replace the receiver-drier.
   Repeat vacuuming for 2 ~ 3 times.
   Add the proper amount of refrigerant.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 19 2025-03-21 오후 1:47:24

3.9 POOR RECIRCULATION OF REFRIGERANT



1. Status: Not cool (sometimes cool)
2. Symptoms:
   - The pressure of low pressure side is negative and the pressure of high pressure side shows the pressure 5 ~ 6 kg/cm^2.

     Low pressure side (blue) (1): 0.76 kg/cm^2

     High pressure side (red) (2): 6 kg/cm^2
   - Frost or dew is formed in the receiver-drier or the front/rear pipe connecting section of expansion valve.
3. Cause:
   - The cycle is closed by frost or dust in cooling cycle.
   - The cycle is blocked due to the defective thermal case of expansion valve.
4. Action:
   - Stop the operation to check if the system is clogged by moisture or dust.
   - If moisture has been found, perform the vacuuming.
   - Detach the expansion valve and remove the dust by compressed air.
   - Replace the receiver-drier.

3.10 INSPECTION AND ADJUSTMENT FOR CABIN SYSTEM

WARNING

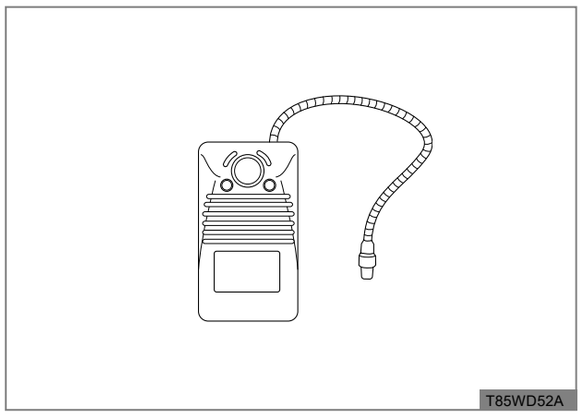
- Do not discharge the refrigerant to outside.
- Refilling work of air conditioner gas deals with high pressure gas, and for safety, it should only be performed by trained mechanics.
- To prevent accidents like the loss of sight during work, you must wear protective glasses, gloves etc.
- Store the service container in a cool and dry place, and do not drop or knock it.
- The air conditioner and equipment must exclusively use HFC-134a, and never use R12.
- Use the PAG oil or or equivalent compressor oil.
- Do not work in a poor ventilated area.
- Air conditioner gas is non-hazardous and non-toxic, but if it is left at high temperature it breaks down and forms harmful substances.
- Over refilling of gas is a cause for poor cooling performance, overheating, etc.
- Do not turn the service container up side down.
- Each refill hose connections must be firmly attached by a hand. (Do not attach with pliers)
- When you connect the refill hose to the service container, check for damages in the packing.

IMPORTANT

- When disconnecting the pipe or hose of the cooler, plug or cap it to prevent gas leakage and dust penetration. When connecting the pipe, compressor oil must be applied to the O-ring.
- When replacing the condenser, evaporator, receiver-dryer, etc., the compressor oil must be replenished.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 20 2025-03-21 오후 1:47:24

A. LEAKAGE TEST



1. Using a gas detector, check for leakages in each section.
2. If a gas leakage is detected, repair the leakage section as instructed.

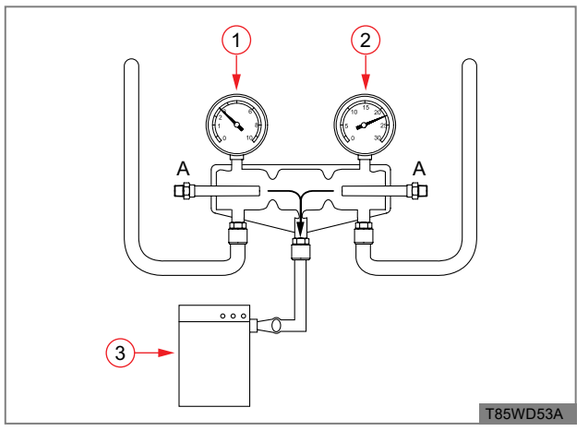
IMPORTANT

When disassembling, the parts must be thoroughly cleaned and sealed.

B. ASSEMBLY

- Apply compressor oil to the O-rings of the connections.
- For gas vacuuming and refilling, refer to the next page “Charging” section and perform as outlined, and after checking for leakages complete the refilling.

• DISCHARGING SYSTEM



(1) Low pressure
(2) High pressure
(3) Vacuum pump
(A) Air

IMPORTANT

- Do not discharge the refrigerant to outside.
- HFC-134a equipments must be used exclusively.
- Check if the service hose is properly connected.

WARNING

You must wear protective glasses and gloves.

1. Attach the manifold gauge and the recycling machine to the refrigerant lines as shown.

CAUTION

Be careful not to switch the connections for the low and high pressure valves.

2. Open the high pressure valve slowly to release the refrigerant to the recycling machine.

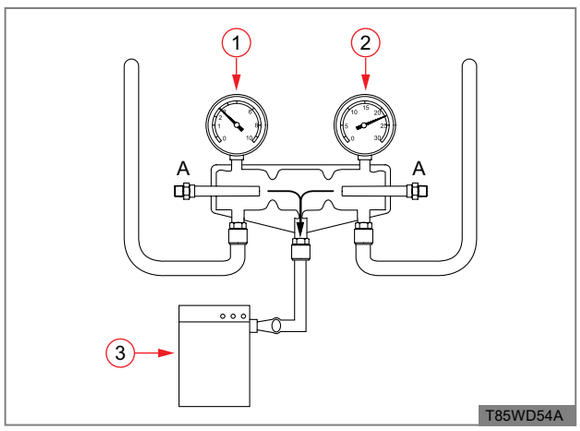
CAUTION

Open the valve slowly, while checking to see that refrigerant is not leaking out.

3. When the value shown on the manifold gauge dial falls below 3.5 kg/cm^2 (50 psi), slowly open the low pressure valve.
4. Open both the high and low pressure valves slowly until the manifold gauge dials indicates 0 kg/cm^2 (0 psi).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 21 2025-03-21 오후 1:47:25

• VACUUMING



(1) Low pressure
(2) High pressure
(3) Vacuum pump
(A) Air

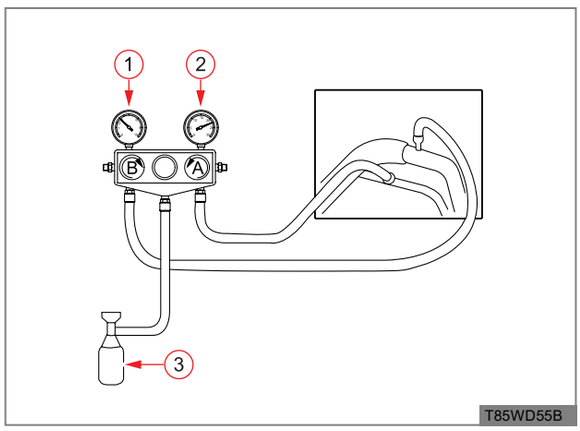
1. Connect the manifold low pressure service hose (blue) and the high pressure service hose (red) to the compressor low pressure end and high pressure end of the service valve.
2. Connect the manifold center hose (green) to the vacuum pump.
3. Open the low pressure & high pressure valves and operate the vacuum pump in accordance with the instructions to perform vacuuming.
4. Perform vacuuming for about 15 minutes. When the low pressure gauge indicates the lowest safe vacuum level (711.2 ~ 736.2 mmHg), stop the vacuum pump, close the manifold low pressure and high pressure valves, leave it for at least 5 minutes and check that the gauge does not reach 0.
   - The above vacuum level is obtained at sea level. As the altitude increases by 340 m (1000 feet), the vacuum level decreases by 25.4 mm (1 inch).

     Example) If the altitude is 1524 m (5000 feet), perform vacuuming until the vacuum level reaches 584.2 ~ 609.7 mmHg.
5. If the gauge reaches close to 0, there is a leak somewhere. Therefore, after checking and repairing the pipe connections, re-perform the vacuuming and check that there are no gas leakages.

⚠ CAUTION

When vacuum is built, tighten the high/low pressure gauge valves and stop the vacuum pump before disconnecting the hoses. If disconnecting the hoses earlier, foreign material can be sucked in.

• CHARGING



(1) Low pressure gauge
(2) High pressure gauge
(3) Refrigerant
(A) High pressure (open)
(B) Low pressure (close)

⊕ IMPORTANT

- Refill the gas after gas has been released and vacuuming has been performed.
- When refilling gas, do not start the engine and perform from the high pressure end first, and then start the engine and put in the prescribed amount.

⚠ WARNING

When refilling gas on the high pressure end, do not start the engine. This could cause rupture from the back flow and as there are no refrigerants it could cause damage to the compressor.

1. Open the high pressure valve and put in about 550g of refrigerant.
2. Close the high pressure valve and check for any gas leakages.

⚠ WARNING

When replacing the service can, release the air from the charging hose (green).

3. After checking that the high pressure valve is closed, start the engine and take it to about 2000 rpm.
4. Open the interior door and adjust the temperature control lever to cool, and the fan speed switch to high speed.
5. Open the low pressure valve and add refrigerant .
6. When the refrigerant has been filled, close the low pressure valve and stop the engine.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 22 2025-03-21 오후 1:47:25

7. Perform the refrigerant leakage test.
   - Refrigerant charging quantity: 550 g (1.21 lbs)
   - Manifold gauge pressure (when the exterior temperature in 30°C (86°F))
   - High pressure: 15 ~ 20 kgf/cm^2 (1.47 ~ 1.96 Mpa, 213.3 ~ 284.4 psi)
   - Low pressure: 1 ~ 3 kgf/cm^2 (0.098 ~ 0.294 Mpa, 14.22 ~ 42.66 psi)

• REFRIGERANT LEVEL CHECK

⚠ CAUTION

- Park the tractor on level ground and chock the wheels.
- Place the forward/reverse, main gear shift and PTO levers to the neutral position.

The refrigerant level can be checked by observing the pressure on the gauge.

Therefore, the A/C system should be inspected under the following conditions.

1. Operate air conditioner with the following status.
   - Ambient temperature: 20°C or more
   - Engine rpm: approx. 1500 rpm
   - Temperature control lever: at the point of maximum cooling temperature
   - Fan speed switch: High
   - Air conditioner switch: ON
2. Open the hood and check temperature difference between the high-pressure pipe and the low-pressure pipe.
   - Normal:

     There is significant temperature difference between the high-pressure pipe and the low-pressure pipe. (The high-pressure pipe is hot and the low-pressure pipe is cold.)
   - Abnormal:
     - There is almost no temperature difference between the high-pressure and low-pressure pipes - There is little or no refrigerant
     - There is significant temperature between the high temperature pipe (too hot) and the low temperature pipe (too cold) - There is too much refrigerant
   - Action:

     Bleed the system if there is almost no refrigerant. Add the refrigerant and check for leakage. If excessive amount of the refrigerant is in the system, drain some to keep the specified volume.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 23 2025-03-21 오후 1:47:25

4. TROUBLESHOOTING

4.1 VISUAL INSPECTION

NOISE CAUSED BY LOOSENED V-BELT

When the friction noise is generated by loosened or worn out V-belt, adjust the belt tension. Replace the worn belt.

ABNORMAL NOISE AROUND COMPRESSOR

Check if the compressor bolts and mounting bracket bolts are loosened and retighten them if needed.

ABNORMAL NOISE FROM COMPRESSOR

The abnormal noise inside the compressor results from the broken suction valve. Disassemble, Repair, or replace it.

MUD OR DUST ADHERED TO THE CONDENSER

As mud or dust reduces the radiation performance remarkably which affects the cooling capacity, it is required to wash out the mud or dust with water. Make sure not to damage the condenser fins.

CONTAMINATION ON THE CONNECTING AREA OF PIPES AND COMPRESSOR

The contaminated area by oil indicates the refrigerant leaks with the compressor oil. If a contaminated area is found, check with leak tester and retighten or replace the part as necessary. Carefully check the gasket, O-ring, and shaft seal in condenser.

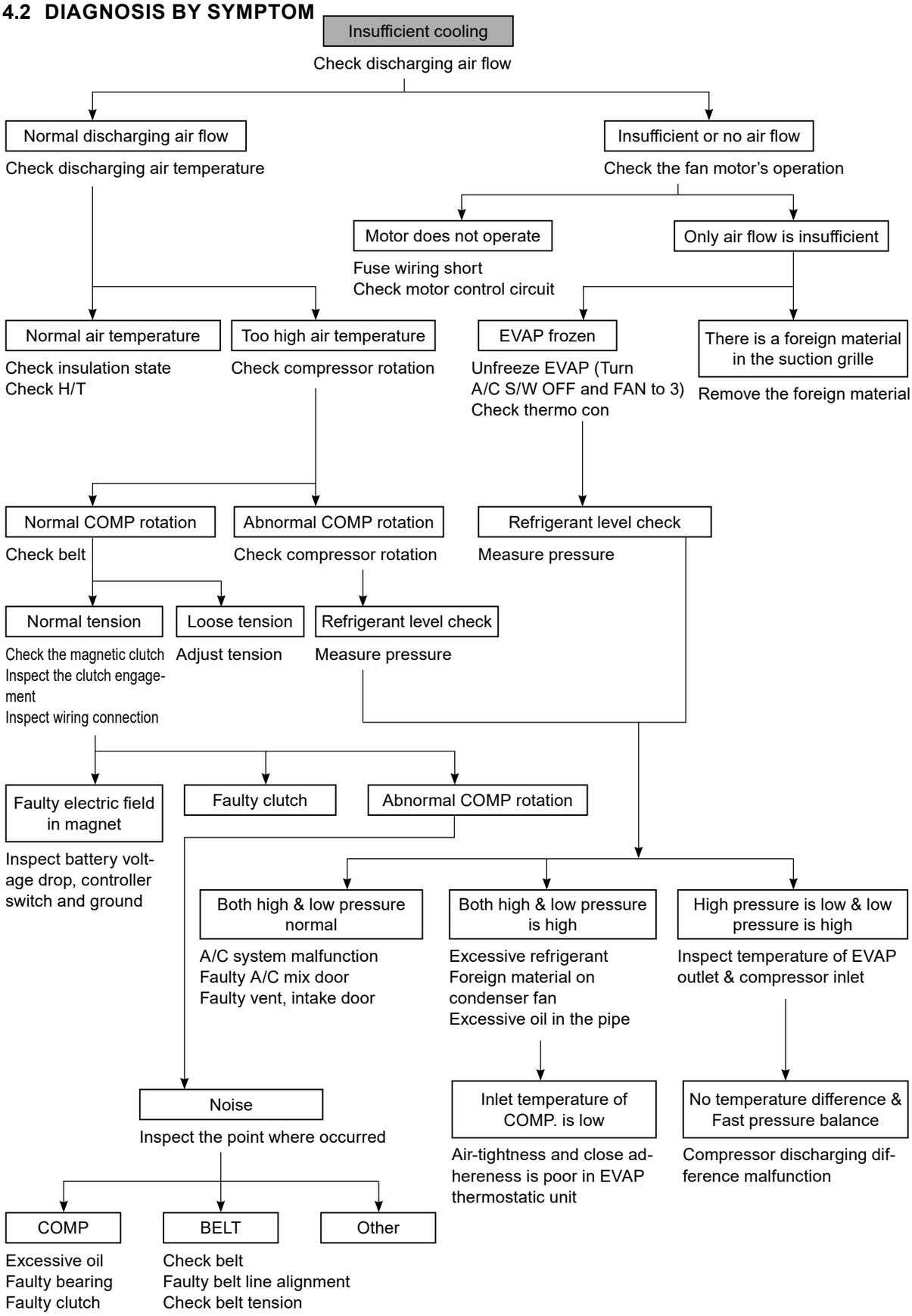
NOISE FROM BLOWER FAN MOTOR

If the fan blower motor generates the noise or does not rotate properly, replace it with new one.

Foreign materials inside the blower or insufficient tightening may cause this noise; so carefully check before starting repair work.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 24 2025-03-21 오후 1:47:25

4.2 DIAGNOSIS BY SYMPTOM



WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 25 2025-03-21 오후 1:47:25

4.3 TROUBLESHOOTING FOR POOR COOLING/HEATING PERFORMANCE

4.3.1 POOR COOLING

FAN MOTOR DOESN'T ROTATE

Causes	Checking methods	Action
Blown fuse	Check the A/C fuse	Replace
Open wiring or poor contact	Check its ground and missing key boss	Repair the failure or connect properly
Defective fan motor	Check two leads from motor with circuit tester. Defective if no current is detected.	Replace
Defective power transistor	Check the continuity of resistor with circuit tester.	Replace
Defective fan switch	Check the fan revolution in each stage by operating the fan speed switch.	Replace

FAN MOTOR IS NORMAL BUT AIR FLOW IS NOT SUFFICIENT

Causes	Checking methods	Action
Obstacles in the inlet of suction of evaporator	Contamination of evaporator	Remove obstacles and clean
Air leakage	Check the assembly status of cooling unit case	Modify or adjust
Defective thermistor	Check whether the evaporator is frozen with a circuit tester	Replace

THE COMPRESSOR DOES NOT ROTATE OR HARD TO ROTATE

Causes	Checking methods	Action
Loosened belt	Belt vibrated too much	Adjust tension
Internal failure of compressor	Slippery belt	Repair or replace
Battery voltage drop	Slipping when rotating	Charge the battery
Layer short of coil	Slipping when rotating	Replace magnetic clutch
Oil intrusion into clutch surface	Slipping due to contaminated magnetic clutch area	Replace or clean the clutch surface
Too large clearance between clutch plate and clutch wheel	Contact with each other when pushing the clutch plate	Adjust the clearance or replace
Open coil	Does not contact when pushing the clutch and circuit tester doesn't indicate any value when checking the lead of ports.	Replace compressor
Open wiring or poor contact to ground	Cannot contact regardless of operation Check the ground and connecting area	Repair
Check the wiring parts	Check the continuity of pressure switch, thermistor and relay.	Replace

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 26 2025-03-21 오후 1:47:26

AIR FLOW IS SUFFICIENT AND COMPRESSOR RUNS NORMALLY BUT COOLING IS POOR

Causes		Checking methods	Action
Excessive/insufficient refrigerant		Touch the high and low pressure pipes by hand after 5~10 minutes after turning on A/C.	
Insufficient refrigerant		The difference of temperature between high and low pressure sides is too small.	Repair the leakage area and charge to specified level.
Excessive refrigerant		The high pressure side is too high and condenser is not cooled down when cooling it with water.	Correct refrigerant amount
Abnormal pressure on inlet or outlet of compressor		Normal pressure High pressure: 15 ~ 20 kg/cm^2 Low pressure: 1 ~ 3 kg/cm^2 Ambient temperature: 30 ~ 35 °C, Engine speed: approx. 2000 rpm	
Low pressure is too high	Defective thermistor	Magnetic clutch is disengaged before the extracted air temperature fully falls down.	Adjust or replace
	Defective compressor gasket or valve	When magnetic clutch is off, the high and low gauge pressure is balanced immediately.	Repair and replace the compressor.
	Poor contact of thermal case in expansion valve	Frost is formed on connecting area of compressor and its temperature is lower than that of outlet pipe.	Adhere the thermal case to low pressure pipe.
	Too widely open expansion valve	Same as above or, No changes in pressure regardless of thermal case's existence.	Replace
	Clogged compressor suction filter	The low pressure hose is not cold and only connecting area of compressor is cold.	Clean filter
Low pressure is too low	Insufficient refrigerant	Refer to "Insufficient Refrigerant".	Add refrigerant
	Clogged receiver-drier	The difference of temperature between outlet ports is significant. Frost is formed on the tank.	Replace receiver-drier
	Clogged expansion valve	The inlet port of expansion valve is cold and frost is formed.	Replace expansion valve
	Gas leaks from thermal case in expansion valve	The outlet port of expansion valve is not cold and low pressure gauge indicates vacuum.	Replace expansion valve
	Clogged and deformed pipings	When the pipings are clogged, low pressure may be low or the gauge may indicate negative pressure.	Clean or replace pipings
	Faulty thermistor	Frozen evaporator	Add refrigerant
The high pressure is too high	Poor cooling of condenser	Contaminated or clogged condenser, defective cooling fan	Wash, repair or replace the fan
	Excessive refrigerant	Blown fuse, open wiring and poor contact	Adjust refrigerant level
	Air intrusion into cycle	Refer to "Excessive Refrigerant".	Vacuuming, recharge refrigerant
The high pressure is too low	Insufficient refrigerant	Refer to "Insufficient Refrigerant".	Add refrigerant

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 27 2025-03-21 오후 1:47:26

4.1.2 POOR HEATING

FAN MOTOR DOESN'T ROTATE

FAN MOTOR IS NORMAL BUT AIR FLOW IS NOT SUFFICIENT

Causes	Checking methods	Action
Too large ventilation resistance	Check if the duct is clogged or damaged	Correct
Air leaks at duct connecting area	Check the duct connecting area Check the duct seal and assembled conditions	Correct

AIR FLOW IS SUFFICIENT BUT HOT AIR CANNOT BE GENERATED

Causes	Checking methods	Action
Too low coolant temperature	Check the coolant temperature after heating operation	Replace thermostat
Too low coolant level	Check the coolant level in radiator	Add coolant
Too small coolant circulating volume	Check if the coolant pipings and heater cut-valve are clogged	Bleed air correct
No air passing through heater core	Check the operation of air mix door and seal condition	Adjust or replace control cable, check the seal

WATER DROPS

Causes	Checking methods	Action
Faulty seal	Check the leaks from heater core, core connecting area, hose, and pipings	Replace or repair
Too large play in connecting area	Same as above	Replace or repair
Porous heater core	Check heater core	Replace

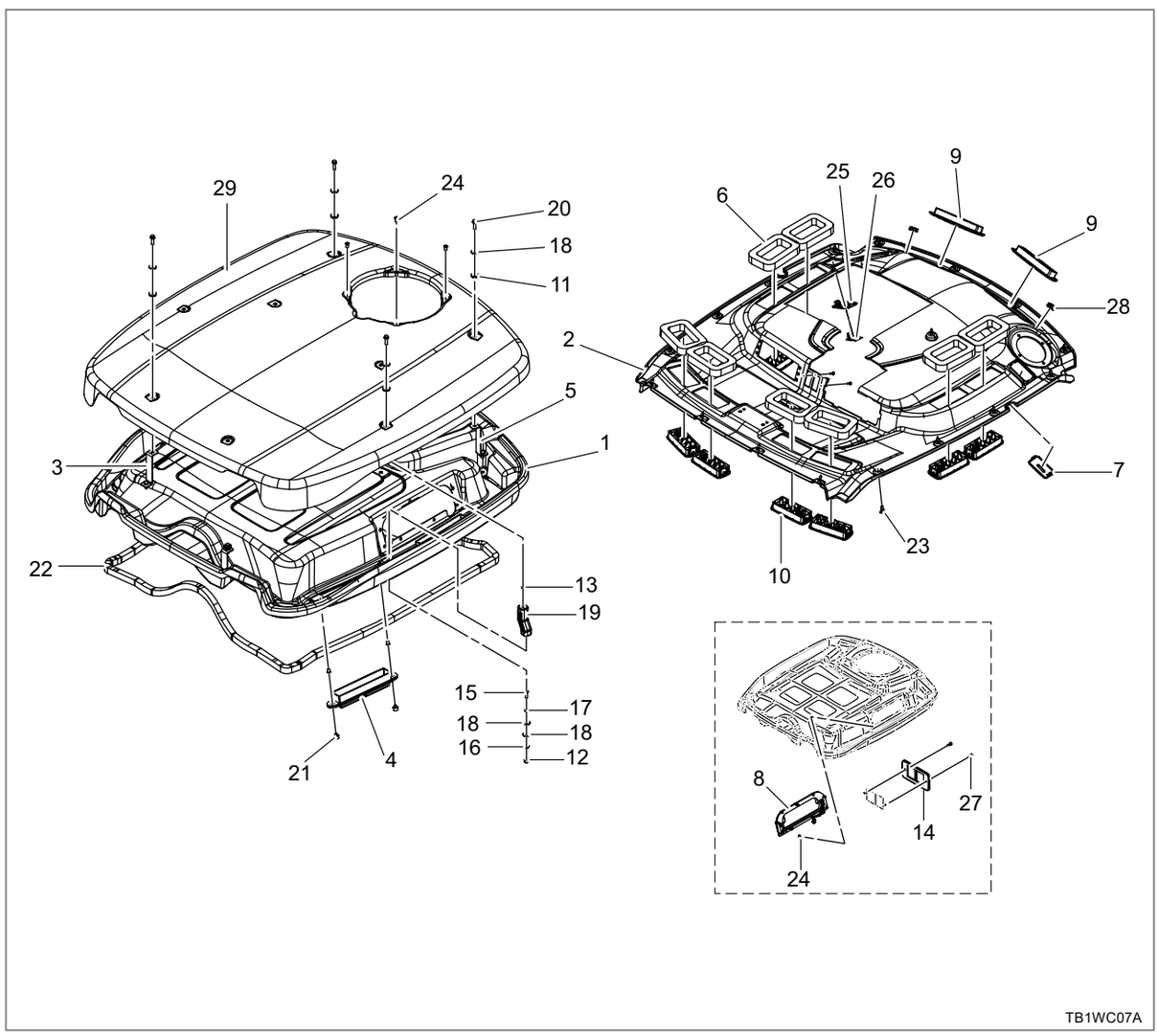
WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 28 2025-03-21 오후 1:47:26

5. EXPLODED VIEW

NOTES

- The manufacturing parts are subject to change without notice. Therefore, check the parts catalog or electric manual for recent information.

5.1 TB3-G6C2504 ROOF



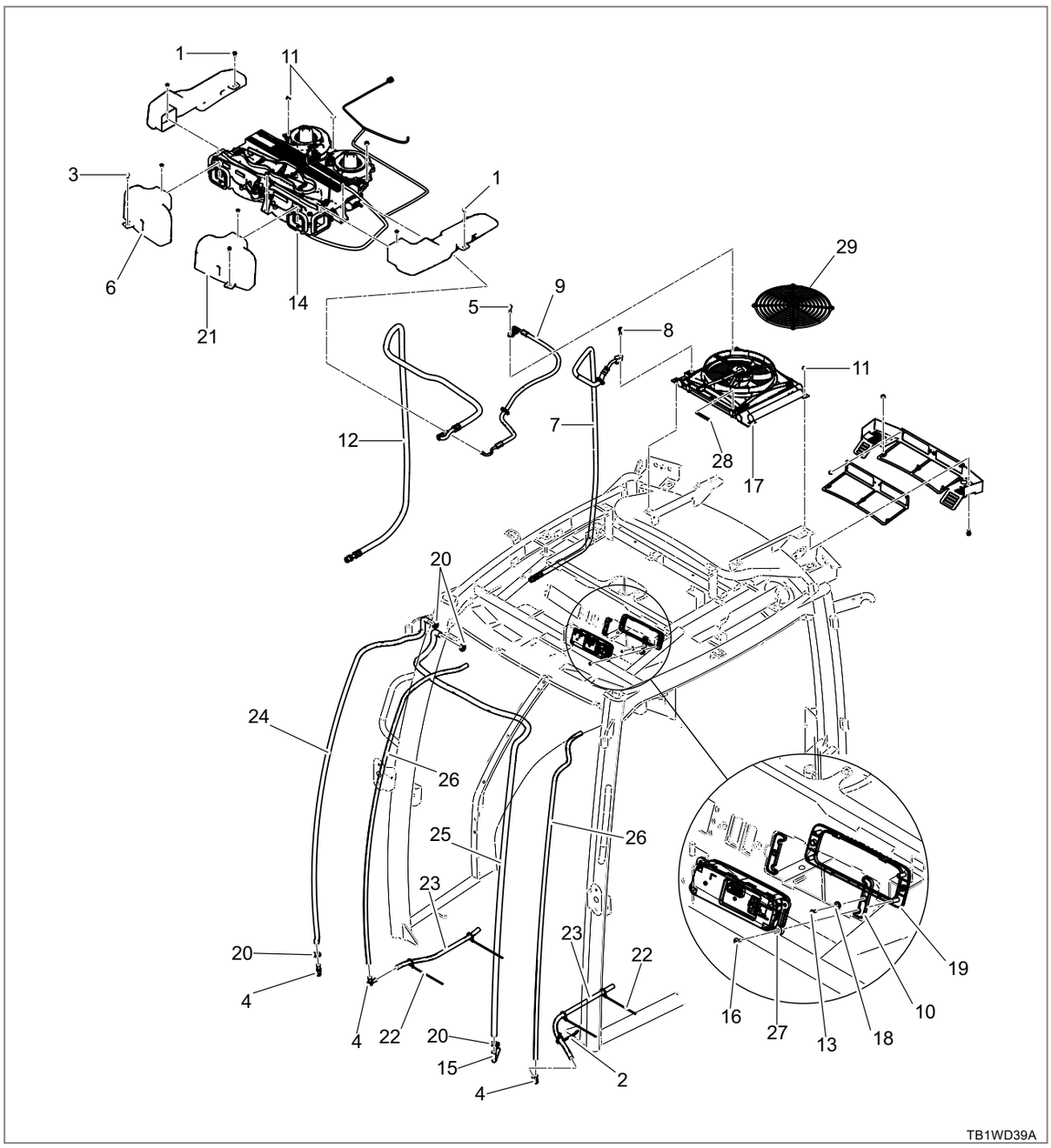
TB1WC07A

COMPONENTS

(1) Roof-In
(2) Ceiling
(3) Bracket, Roof fixing-1
(4) Filter, External air
(5) Bracket, Roof fixing-2
(6) Sponge
(7) Cover-lever
(8) Bracket
(9) Grille, A/C-in, Out
(10) Grill, Air conditioner
(11) Washer
(12) Nut
(13) Nut
(14) Switch panel 2
(15) Bolt
(16) Flang nut
(17) Bushing
(18) Washer, Plain
(19) Spacer
(20) Bolt, Flange
(21) Bolt
(22) Sponge, Roof
(23) Bolt, Special
(24) Nut
(25) Panel, Switch
(26) Cover
(27) Bolt, Washer
(28) Grommet
(29) Roof-Ext

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 29 2025-03-21 오후 1:47:27

5.2 TB3-G6C3503 AIR CONDITIONER HEATER GROUP



COMPONENTS

(1) Bolt, Washer
(2) Band
(3) Bolt, Flange
(3) Bolt, Flange
(4) Connector
(5) Flange_bolt
(6) Duct, A/C-FR RH
(7) Hose, A/C HP-Condensor
(8) Bolt Flange
(9) Hose, A/C HP-Condensor
(10) Collar
(11) Flange Nut 8mm x 1.25p
(12) Hose, A/C LP
(13) Cross-Recessed Head Machine Screw
(14) Assy Air Conditioner
(15) Connector, 1
(16) Screw, Bolt
(17) Condenser
(18) Washer, Plain
(19) Cover, A/C
(20) Band, Hose
(21) Duct, A/C-FR LH
(22) Code_band
(23) Hose, Drain-LWR
(24) Hose, Heater-IN
(25) Hose, Heater-OUT
(26) Hose, Drain
(27) Controller, A/C
(28) Clamp, Cord
(29) Cover, Condenser-UPR

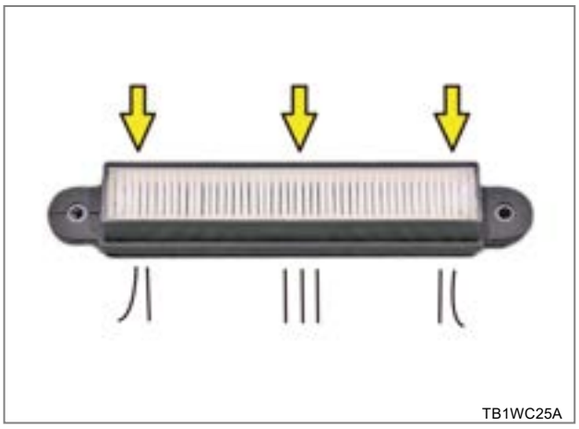
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6. A/C RELATED COMPONENT DISASSEMBLY AND ASSEMBLY

6.1 A/C FILTER REMOVAL



1. Unscrew the A/C filter mounting bolts (1) on the side of the cabin roof and remove the filter assembly.
2. Repeat the above procedure to remove the two filter assemblies on the left and right sides of the cabin roof.



3. To clean the filter, blow air from inner side to outer side to remove foreign materials (in the arrow direction)

6.2 A/C ASSEMBLY REMOVAL

6.2.1 A/C ASSEMBLY DISASSEMBLY

1. Disconnect the negative battery cable.
2. Drain the A/C refrigerant as well as the coolant as necessary to disconnect heater hose in the later step.



3. Unscrew the cabin roof mounting nuts (6EA)(1) to remove the cabin roof.



4. Unscrew the duct mounting bolts, nuts and screws to remove the duct. (Front ducts (1)(2EA) / Side ducts (2)(2EA).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 31 2025-03-21 오후 1:47:29



5. Unscrew the mounting nut (1) on the expension valve side, and disconnect the A/C hoses (2).



6. Disconnect the heater hoses (1) on the other side.





7. Disconnect all of the wiring connectors (1) on the A/C assembly. Then, unscrew the mounting nut (2) to remove the A/C assembly (3).

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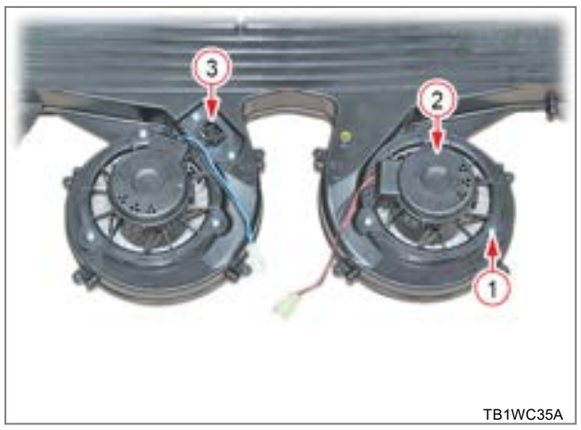
6.2.2 A/C ASSEMBLY COMPONENTS DISASSEMBLY



TB1WC32A


TB1WC34A


TB1WC33A



TB1WC35A



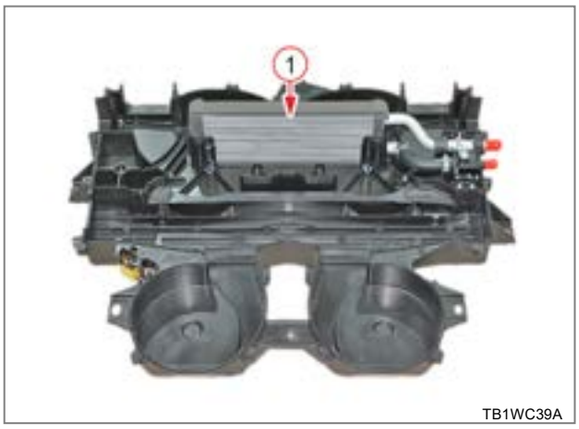
TB1WC36A

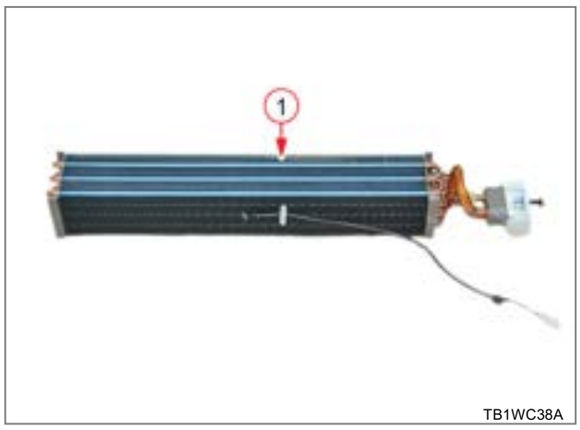
1. Unscrew the A/C assembly cover mounting screws (22EA) to separate the upper and lower covers.

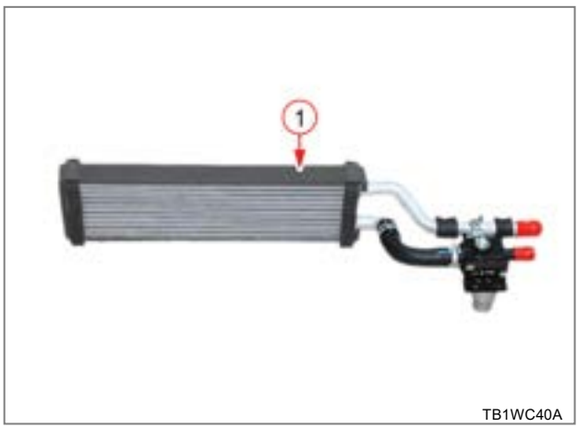
2. Place the blower fan upside down and unscrew the blower fan motor mounting screws (1) to remove the motor (2). If necessary, remove the resistor (3).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 33 2025-03-21 오후 1:47:30









3. Remove the evaporator (1) from its cover.

4. Remove the heater (1) from the evaporator cover.

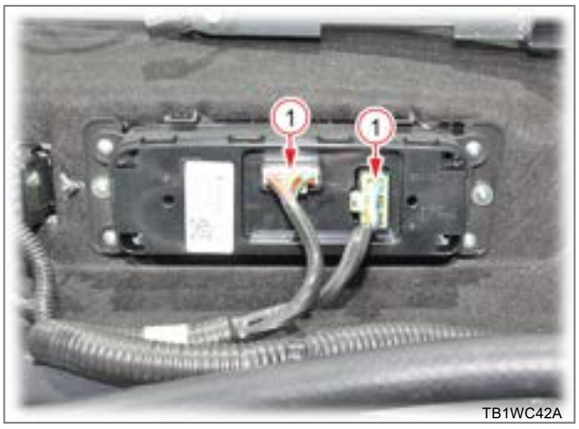
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6.2.3 A/C CONTROLLER DISASSEMBLY

1. Remove the roof on the cabin.



2. Lift the A/C assembly (1) slightly.



3. Disconnect the A/C controller switch connectors (1).



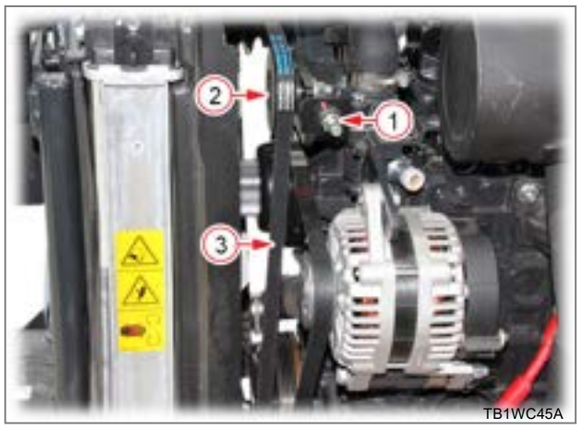


4. Unscrew the A/C controller mounting screws (1) (4EA) to remove the A/C controller (2).

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 35 2025-03-21 오후 1:47:30

6.4 COMPRESSOR REMOVAL

1. Lift the hood and open the engine room.
2. Disconnect the negative battery cable and drain the refrigerant.



TB1WC45A

3. Unscrew the nut (1) and loosen the tension pulley (2) to remove the A/C belt (3).



TB1WC46A

4. Disconnect the high/low pressure A/C hoses by unscrewing their tightening bolt (1) to remove the connector (2).


TB1WC47A

5. Remove the four compressor bracket mounting bolts to remove the compressor.

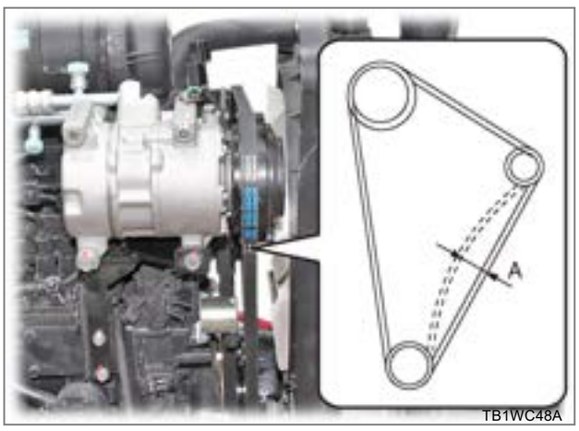
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6.5 COMPRESSOR INSTALLATION

1. Install the compressor to the compressor bracket and tighten the bolts.

   Bolt tightening torque.....23.5 ~ 26.8 Nm
   2.4 ~ 2.74 kgf-m
   17.3 ~ 19.8 lbf-ft

   - When replacing the compressor with a new one, check if it is filled with oil and make sure its oil level is same to the one of the removed compressor.
   - Oil type and capacity: Pag oil or equivalent 125 cc



2. Install the A/C belt and adjust the tension bolt to set the correct tension.

Proper tension (A)	Belt deflection when pressing middle point 10 ~ 12 mm (0.394 ~ 0.472 in.)

3. Fit the high/low pressure pipes.
   - Apply compressor oil to the O-ring when installing it.
   - Make sure that foreign material or water does not enter the system.

   Bolt tightening torque.....7.8 ~ 11.7 Nm
   0.8 ~ 1.2 kgf-m
   5.7 ~ 8.6 lbf-ft

4. Connect the connector to the compressor.
5. Connect the negative battery cable.
6. Charge the system with the refrigerant and check the system for leakage.
7. Close the hood.

⚠ CAUTION

- Various types of compressor oil with different chemical characteristics are used in different compressors. Therefore, use the same type of oil that were used in the used oil compressor when replacing.

IMPORTANT

- If the compressor oil is insufficient, it can affect the compressor durability and lead to malfunction. If the compressor oil is excessively charged, the cooling performance drops.
- The compressor oil circulates through the components of the A/C system as the system operates. Therefore, when replacing a component, replenish the component with a proper amount of compressor oil before charging system with the refrigerant.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 37 2025-03-21 오후 1:47:31

6.6 CONDERSER REMOVAL

1. Remove the roof on the cabin.
2. Disconnect the negative battery cable and drain the refrigerant.



3. Disconnect the condenser cooling fan connector (1) and the high-pressure hose pressure sensor connector (2).



4. Disconnect the A/C high-pressure hose (1: IN, 2: OUT).





5. Unscrew the condenser mounting nuts (1)(4EA) to remove the condenser assembly (2) from the cabin roof frame.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 38 2025-03-21 오후 1:47:31



TB1WC53A



TB1WC54A


TB1WC55A

6. Remove the electric cooling fan (1) from the condenser.

⚠ CAUTION

- Apply a thin film of A/C oil to the surface of a new O-ring before installation.
- Be careful not to let any foreign material enter the hose when disconnecting or connecting the hose.

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_13장_에어컨.indd 39 2025-03-21 오후 1:47:32

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CS2620CH-EU

INDEX

CHAPTER 14

NUMBER

3rd function valve 11-84
4WD case removal 4-48
7 Pin socket 11-91
7-Pin socket (if equipped) 12-10

A

A/C assembly removal 13-31
A/C controller 12-4
A/C filter removal 13-31
A/C related component disassembly and assembly 13-31
AC Controller 11-82
AC controller light 11-82
ACC 11-14
Air conditioner 11-80
Air conditioner/heater system 13-9
Air cylinder 12-7
Air intake hose assembly tips 3-36
Air intrusion into cycle 13-18
Air vent 12-5
Air-con/Heater main spec 13-2
Alert symbols 1-2
Alternator 11-103
American standard screws, bolts and nuts with UNC or UNF threads 2-21
Antenna 12-34
Antenna 12-10
Automatic pre-heating 11-17
Aux. Double acting valve pressure (optional remote hyd.) 10-27
AUX-AMP_USB charger unit 11-87
Auxiliary double acting valve (optional remote hyd. valve) 10-11
Avoid fires 1-4

B

Backlash for differential pinion and side gear 6-7
Backlash for spiral bevel pinion and 17 spiral bevel gear 8-7
Backlash for spiral bevel pinion and ring gear 6-7
Basic operating principle 7-2
Basic principle of governor system 3-31
Beacon 11-79
Bevel gear case disassembly 8-23
Bevel pinion shaft removal 8-26
Bleeding the fuel system 3-26
Body and powertrain 3-13
Bolts 2-22
Brake cam lever free play 7-5
Brake components inspection 7-6
Brake lights/LED on the cluster 11-90
Brake pedal assembly tips 7-9
Brake pedal free play 7-4
Brake switch setting 7-5
Braking force forward/reverse driving 7-2
Bubble test for radiator 3-41
Buzzer 11-38

C

Cabin disassembly and assembly 12-19
Cabin removal 12-20
Cabin wire harness routing 11-115
Calculation for rear PTO and mid PTO 4-8
Calculation for relative speed ratio of front wheels 2-12
Calculation of driving speed 2-10
Camshaft 3-8
Camshaft 3-15
CAN communication 11-47
CAN communication with flasher unit 11-60
Care of safety decals 1-14
Cautions for high pressure hoses 1-5
Cautions when handling the battery 1-5
Cautions when handling tires 1-8
Charge relief valve 5-9
Charging system 11-49
Check and adjustment 13-16
Circuit Diagram 5-8
Circuit diagram 10-5
Clearance between piston pin and bushing 3-78
Cluster 11-23
Cluster assembly tips 11-107
Combination switch 11-61

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_14_색인.indd 2 2025-04-09 오후 2:03:26

Component removal 12-28
Components 10-7
Components 12-2
Compressor 13-5
Compressor installation 13-37
Compressor removal 13-36
Condenser 11-80
Condenser 13-6
Conderser removal 13-38
Connecting rod 3-14
Coolant flow route 3-22
Coolant temperature sensor 11-96
Cooling system 13-12
Courtesy light 11-92
Crankshaft 3-10
Crankshaft 3-14
Crankshaft check 3-72
Crankshaft deflection 3-72
Cross sectional area of wiring 11-5
Cruise control 11-54
Cylinder block 3-13
Cylinder bore check 3-53
Cylinder head 3-7
Cylinder head 3-13
Cylinder head 3-50
Cylinder head check 3-52
Cylinder head surface flatness 3-52
Cylinder head valve recess 3-53
Cylinder honing 3-14

D

Damper plate assembly tips 5-28
Defective expansion valve 13-18
Defogger 11-75
Diagnosis by symptom 13-25
Differential lock system 6-5
Differential system 8-4
Differential system - Components disassembly ... 6-19
Differential system disassembly 6-18
Dimensions 2-3
Disassembly of power steering unit components ... 9-21
Disassembly, service and assembly 3-42
Disposal of environmental waste 1-8
Door 12-28
Door glass 12-29
Door latch assembly 12-6
Double acting valve (optional) removal disassembly 10-40
Driving speed 2-7
Driving speed table 2-11
DTC 11-48

E

Engine component disassembly and assembly ... 3-50
Engine component disassembly and assembly ... 3-73
Engine dimensions 3-4
Engine identification 3-3
Engine mounting assembly tips 3-49
Engine oil flow 3-17
Engine oil flow chart 3-18
Engine oil pressure 3-40
Engine oil pressure sensor 11-97
Engine performance curve 3-5
Engine removal 3-42
Engine serial number location 2-2
Engine stop solenoid 11-21
Engine views 3-3
Engine wire harness assembly tip 11-108
Evaporator 13-7
Excessive refrigerant, poor condenser cooling ... 13-17
Expansion valve 13-7
Exploded view 3-84
EL1-G111001 Cylinder block group 3-84
EL1-G113001 Cylinder head group 3-85
EL1-G114001 Gear case group 3-86
EL1-G116001 Cylinder head cover group ... 3-87
EL1-G121001 Crank shaft group 3-88
EL1-G122001 Piston connecting rod group ... 3-89
EL1-G123001 Camshaft group 3-90
EL1-G124001 Idle gear group 3-91
EL1-G125001 Rocker arm valve group 3-92
EL1-G126004 Flywheel group 3-93

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_14_색인.indd 3 2025-04-09 오후 2:03:26

EL1-G142001 Oil pan group 3-94
EL1-G151001 Fuel equipment group 3-95
EL1-G152001 Fuel camshaft group 3-96
EL1-G153002 Speed control lever group ... 3-97
EL1-G154001 Engine stop lever group 3-98
EL1-G155001 Governor group 3-99
EL1-G163001 Water pump group 3-100
EL1-G191001 Glow plug group 3-101
EL1-G192001 Engine electrical group 3-102
EL1-G193007 Electrical group 3-103
Exploded view 4-11
TB3-G2B1003 Front wheel drive shaft 4-11
TB3-G2B2001 Front wheel drive fork 4-12
TB3-G2C1008 PTO input shaft 4-13
TB3-G2C3003 PTO clutch 4-14
TB3-G2C4007 PTO shaft 4-15
TB3-G2C5004 PTO shift fork 4-16
TB3-G2F1007 Mid PTO Shaft 4-17
TB3-G211001 Clutch 4-18
TB3-G271003 Range shift shaft 4-19
TB3-G272003 Range shift fork 4-20
Exploded view of hst 5-25
TB3-G211001 Clutch 5-25
TB3-G647503 HST pedal 5-26
TB3-G422002 HST assy 5-27
Exploded view 6-10
TB3-G2A1004 Rear axle 6-10
TB3-G281003 Spiral bevel pinion shaft 6-11
TB3-G282005 Rear differential 6-12
TB3-G283003 Rear diff lock 6-13
Exploded view 7-7
TB3-G293006 Brake 7-7
TB3-G646508 Brake pedal 7-8
Exploded view 8-9
TB3-G312001 Front diff system 8-9
TB3-G313001 Bevel pinion shaft 8-10
TB3-G314001 Bevel gear case 8-11
TB3-G315001 Bevel gear shaft 8-12
TB3-G316001 Front axle case 8-13
TB3-G317001 Front axle 8-14
TB3-G321002 Steering cylinder 8-15
TB3-G331005 Propeller shaft 8-16
TB3-G332001 Front axle bracket 8-17
Exploded view 9-15
TB3-G431004 Power steering unit 9-15
TB3-G653004 Steering column 9-16
Exploded view 10-29
TB3-G411001 Suction line 10-29
TB3-G412004 Gear pump 10-30
TB3-G421002 Modulate valve 10-31
TB3-G423002 HST hydraulic line 10-32
TB3-G441003 Joystick valve 10-33
TB3-G461001 Lift control valve 10-34
TB3-G463004 Hydraulic cylinder 10-35
TB3-G463502 Lift cylinder 10-36
Exploded view 11-125
TB3-G513507 Battery 11-125
TB3-G514503 Glow control 11-126
TB3-G515007 Start control 11-127
TB3-G525005 Light control 11-128
TB3-G527002 Power socket 11-129
TB3-G531018 Wire harness 11-130
TB3-G531301 Cabin wire harness 11-131
TB3-G532502 Head lamp wire harness ... 11-132
TB3-G533009 Display control 11-133
TB3-G533501 Fuel sender 11-134
TB3-G534003 PTO control 11-135
TB3-G534501 Horn 11-136
TB3-G537701 Speaker antenna 11-137
TB3-G538001 Stereo 11-138
TB3-G538201 Wiper(front) control 11-139
TB3-G539601 Telematics 11-140
TB3-G539701 Rear glass defogger 11-141
TB3-G539903 HST cruise 11-142
Exploded view 12-11
TB3-G6C0502 Cabin frame 12-11
TB3-G6C1001 Lever guide (Cab) 12-12
TB3-G6C2504 Roof 12-13
TB3-G6C4002 Door 12-14
TB3-G6C4502 Front glass 12-15

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_14_색인.indd 4 2025-04-09 오후 2:03:26

TB3-G6C5503 Rear glass 12-16
TB3-G6C6502 Wiper (Front) 12-17
TB3-G6G1901 Wiper (Rear) 12-18
Exploded view 13-29
TB3-G6C2504 Roof 13-29
TB3-G6C3503 Air conditioner heater group ... 13-30
Exterior filter assembly 12-9
External devices 12-8

F

Fan belt 3-11
Fan belt tension adjust 3-37
Fender wire(L) drawing 11-123
Fender wire(R) drawing 11-124
Flasher lights 11-58
Flasher unit 11-56
Flywheel 3-16
Flywheel deflection and crankshaft end play check 3-63
For safety 1-2
Forward driving 5-14
Frame wire harness drawing 11-122
Front axle cover disassembly 8-22
Front axle disassembly and assembly 8-21
Front axle removal 8-19
Front combination lamp 12-10
Front differential system disassembly 8-24
Front wheel drive 4-9
Front wheel drive joint shaft assembly tips 8-18
Front windshield washer pump 11-73
Front wiper 11-68
Front wiper/motor 12-33
Front wipers 12-9
Front work lamp 12-9
Front work lights 11-77
Fuel camshaft 3-15
Fuel camshaft (Gear case) 3-57
Fuel feed pump 3-27
Fuel filter 3-26
Fuel flow route 3-25
Fuel injection pump 3-27
Fuel injection pump 3-54
Fuel sender 11-96
Fuel Sender 11-103
Fuel system 3-25
Fuel system 3-10
Function of lubricating system 3-19

G

Gauges 11-39
Gear arrangement 2-7
Gear pump disassembly (with priority valve) ... 10-41
Gear shaft removal 4-49
General 5-2
General information 3-3
General information 11-7
General specifications 3-6
General specifications 4-2
General specifications 8-2
General use screws, bolts and nuts 2-20
Glow Plug 11-102
Governor and stop system 3-31
Grips assembly tips 12-19

H

Handling of hazardous materials 1-6
Handling of rotating blade, shaft and driving belt ... 1-7
Head light assembly tips 11-107
Head light High beam 11-66
Head light wire and engine wire routing 11-110
Head lights low beam 11-62
Heater core 13-8
High pressure relief valve 5-10
High pressure relief valves 5-20
Horn 11-61
Hour meter 11-98
How to measure the actual rolling circumference 2-15
HST 5-2
HST ass'y and transmission docking tips 5-30
HST components 5-7
HST components disassembly 5-32
HST neural position setting 5-18

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_14_색인.indd 5 2025-04-09 오후 2:03:26

HST pedal assembly tips (1) 5-19
HST removal..... 5-31
Hydraulic circuit for steering operation 9-3
Hydraulic cylinder removal & disassembly 10-37
Hydraulic pump..... 10-7
Hydraulic schematic and basic operation..... 10-3

I

Identification number 2-2
Idle gear oil clearance measurement 3-66
Idle gear side clearance 3-66
Injection nozzle..... 3-30
Injection nozzle..... 3-76
Injection nozzle inspection..... 3-41
Injection pump gear assembly (fuel camshaft gear) 3-83
Injection timing measurement and adjustment 3-39
Inspection 9-25
Inspection and adjustment..... 7-4
Inspection and adjustment..... 9-12
Inspection and adjustment..... 10-27
INSPECTION and adjustment 5-18
Inspection and adjustment for cabin system 13-20
Installation 9-25
Insufficient refrigerant 13-17
Intake and exhaust valves 3-16
Intake and exhaust valves 3-74
Interior devices 12-2
Interior lamp..... 12-4
Interior lamp..... 12-31

J

Joystick valve 10-20
Joystick valve removal & disassembly 10-47

K

Key on (M)..... 11-15
Key Start (ST) 11-18
Key Stop (Battery direct) 11-12

L

Lay-out of cluster assembly 11-23
Lay-out of connectors 11-27
LCD display 11-42
Lever guide (LH)..... 12-31
Lever guide (RH) 12-32
Lift control valve..... 10-23
Lift control valve disassembly..... 10-44
Lift cylinder ass'y and transmission case assembly tips 4-43
Lift cylinder ass'y and transmission case assembly tips 10-45
Load transfer 8-5
Location of decals 1-9
Location of sensors and electric components 11-7
Lubrication list..... 2-18
Lubrication system..... 3-17

M

Main Fuse (Slow-blow fuse) 11-101
Main gear shift & shuttle system..... 4-5
Main joint shaft assembly tips..... 5-29
Main oil filter 10-9
Main relief valve..... 10-27
Main wire harness routing 11-112
Maintenance 2-16
Maintenance schedule chart..... 2-16
Major HST component structure and function 5-8
Major tightening torque..... 5-2
Manual glow (G) 11-16
Measurement and adjustment..... 3-36
Measurement and adjustment..... 6-7
Measurement and adjustment..... 8-7
Mid PTO disassembly (if equipped)..... 4-44
Mid PTO lever switch..... 11-96
Mls cylinder head gasket..... 3-13
Modulator relief valve 10-28
Modulator valve 10-17
Modulator valve disassembly 10-46
Moisture intrusion into cooling cycle..... 13-19
Mower lift linkage 10-25

N

Neutral status 5-12
Neutral switch 11-95
Normal condition..... 13-17
Nuts 2-23

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_14_색인.indd 6 2025-04-09 오후 2:03:26

O

Oil clearance between crank pin and connecting rod big end bearing 3-73
Oil clearance between crankshaft journal and crankshaft metal 2 3-72
Oil pan 3-64
Oil pump 3-11
Oil pump 3-59
Oil pump check 3-67
OPC (Operator Presence Control) 11-35
Operating details for each pin 11-29
Operating principle 3-13
Operating principle 5-3
Operating principle 6-3
Operating principle 8-4
Operating principle 9-3
Operating principle 9-4
Operating principle 10-3
Operating principle 11-11
Operation 9-5
Operation detail of LCD 11-43
Operation of governor 3-32
Operation of HST 5-12
Other component removal 4-31
Other lights(Tail/Side/Number plate/7 pin socket/AC controller light 11-64
Other specs 11-34
Overall circuit diagram 11-9
Overall wire harness routing 11-109
Overviews 9-4

P

Panel wire harness routing 11-119
Parking lever switch 11-96
Part number assignment standard for KIOTI bolts and nuts 2-22
Pcv valve 3-33
Piston and piston ring 3-14
Piston assembly 3-77
Piston compression pressure measurement 3-37
Piston pin bore 3-77
Piston ring clearance 3-79
Piston ring end gap 3-78
Piston rings 3-9
Piston, flywheel and crankshaft 3-67
Pistons 3-9
Poor compression 13-19
Poor recirculation of refrigerant 13-20
Power flow 2-6
Power Fuse 11-101
Power outlet 11-100
Powertrain 5-6
Powertrain of rear axle 6-3
Power transfer system for front axle 8-4
Pre-heating 11-37
Pressue testing 5-20
Prevention of scald 1-7
Principle of cooling system 13-3
Principle of differential system 6-4
Priority valve 10-24
PTO 4-7
PTO clutch assembly tips 4-47
PTO clutch pack 4-8
PTO control switch 11-98
PTO cover and transmission docking tips 4-55
PTO drive section 4-51
PTO shift fork assembly tip 4-54
PTO system 11-52

R

Radiator 3-11
Range shift section 4-6
Rear and Mid PTO parts reassembly tips 4-46
Rear axle removal 6-16
Rear camera (option) 11-99
Rear combination lamp 12-9
Rear differential assembly tips 6-14
Rear door handle 12-7
Rear glass handle 12-30
Rear PTO lever switch 11-95
Rear tire rolling circumference 2-10
Rear view mirror 12-10
Rear windshield washer pump 11-74

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_14_색인.indd 7 2025-04-09 오후 2:03:26

Rear wiper 11-71
Receiver-drier 13-6
Relative speed ratio of front wheels 2-12
Relief valve pressure adjustment 9-13
Reverse driving 5-16
Reverse driving speed 2-11
Rocker arm 3-73
Rocker arm assembly 3-15
Rocker arm assembly check 3-74
Room mirror 12-30

S

Safety Decal Locations 1-14
Safety decals 1-9
Safety gear 1-3
Safety instructions when preparing tractor 1-4
Safety TIPS 1-3
Schematic and circuit diagram 10-3
Sealant and adhesive 8-2
Sealant and adhesive specifications 4-3
Seat 12-28
Seat switch 11-97
Sensors and switches 11-93
Sequence lights with flasher unit 11-59
Service specifications 3-7
Servicing 4-21
Servicing 5-28
Servicing 6-14
Servicing 7-9
Servicing 8-18
Servicing 9-17
Servicing 10-37
Speaker 12-7
Specification 13-2
Specifications 2-4
Specifications 3-4
Specifications 4-2
Specifications 5-2
Specifications 6-2
Specifications 7-2
Specifications 8-2
Specifications 9-2
Specifications 10-2
Specifications 11-3
Specified inflation pressure 2-19
Speed control lever plate and governor spring 3-55
Speed ratio (engine vs. rear axle) 2-10
Spiral bevel pinion and spiral bevel gear assembly tips 6-15
Start and stop 11-11
Start motor 11-20
Steering column 9-17
Steering cylinder 9-2
Steering cylinder 9-19
Steering cylinder removal 8-21
Steering hydraulic tube location 9-29
Steering relief opening pressure 9-12
Steering unit 9-2
Steering unit relief valve 10-28
Steering unit removal 9-21
Stereo (optional) 11-88
Stereo /AUX AMP/USB charger 11-85
Structure 4-4
Structure 9-8
Structure and function 5-6
Structure and operating principle 4-4
Stud bolts 2-20
Sun visor 12-5
Switch panel 12-6
Symbols (ISO 7000 Graphical Symbol, DAEDONG Symbol) 11-33
Symbols for electric components 11-5
System flow 13-3

T

Telematics unit (TMU) 11-83
Thermostat 3-11
Thermostat 3-81
Tightening torque 2-20
Tightening torque 3-12
Tightening torque for main components 9-2
Tightening torque for major components 4-2
Tightening torque for major components 8-3

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_14_색인.indd 8 2025-04-09 오후 2:03:26

Tightening torque for tire bolts 2-19
Tightening torques 6-2
Timing gear 3-16
Timing gear 3-65
Timing gear backlash 3-65
Timing gear setting 3-65
Tires 2-19
TMS communication status 11-46
Toe-in 8-7
Tooth contact of spiral bevel 6-8
Tooth contact of spiral bevel gear 8-8
Tractor serial number location 2-2
Transmission case - components disassembly 4-33
Transmission fluid 6-2
Transmission number 2-2
Transmission removal 4-21
Troubleshooting 3-34
Troubleshooting 4-10
Troubleshooting 5-23
Troubleshooting 6-6
Troubleshooting 7-3
Troubleshooting 8-6
Troubleshooting 9-11
Troubleshooting 10-26
troubleshooting 11-104
Troubleshooting 13-24
Troubleshooting by gauge 13-16
Troubleshooting for poor cooling/heating performance 13-26
Turn signa 11-61
Turn signal lamp with flasher unit 11-56

U

Unit conversion table 2-24
Use of appropriate tools and equipment 1-6

V

Valve cam height measurement 3-62
Valve camshaft 3-60
Valve camshaft deflection check 3-62
Valve camshaft gear side clearance 3-61
Valve camshaft oil clearance measurement 3-61
Valve clearance 3-38
Valve rocker arms 3-8
Valve spring inspection (length, tension and squareness) 3-75
Valve spring squareness (tilt) 3-76
Valve springs 3-8
Valve timing 3-7
Valves 3-7
Visual inspection 13-24

W

Warning POP-UP 11-45
Washer fluid tank 12-10
Washer fluid tank 12-30
Water in fuel sensor 11-98
Water pump 3-82
Welcoming / Closing 11-46
Wiper motor (front) 12-6
Wipers and washer pumps 11-68
Wiring color identification 11-4
Wiring harness assembly tips 11-107
Wiring harnesses routing and wire drawing 11-109
Wiring identification 11-4
Work place 1-3

WM_TB310(CS2530CH,CS2530CH-EU)_EN_US,EU_14_색인.indd 9 2025-04-09 오후 2:03:26

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