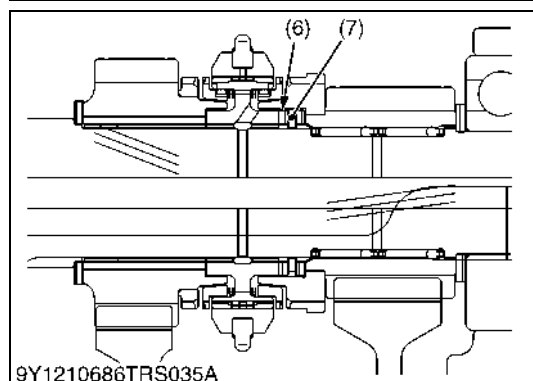
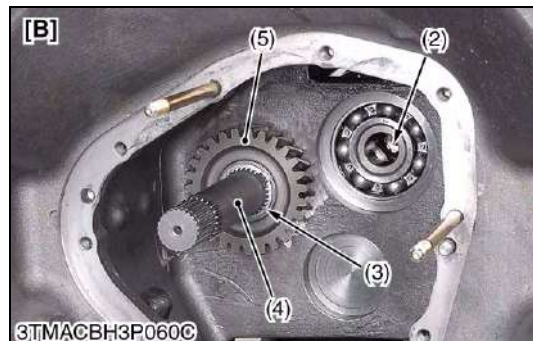
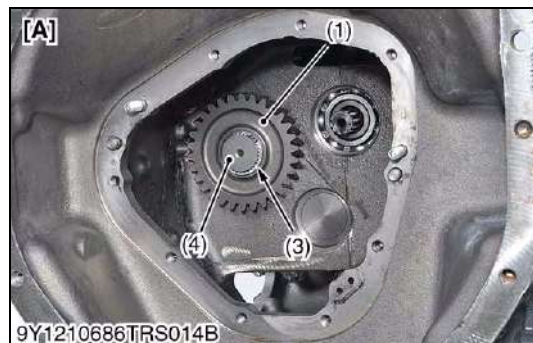


[8] DISASSEMBLING CLUTCH HOUSING CASE

(1) Removing 1st Shaft, 2nd Shaft and 3rd Shaft



30T Gear (27T Gear)

1. Remove the external circlip 1 (3).
2. Remove the 30T gear (1) or 27T gear (5).

(When reassembling)

- Adjust the side clearance of 1st-2nd gears on the 1st shaft by adjusting collar (6).

(Reference)

- Thickness of adjusting collar (7):
 2.6 mm (0.10 in.) [Code No. 3C151-28490]
 2.8 mm (0.11 in.) [Code No. 3C151-28440]
 3.0 mm (0.12 in.) [Code No. 3C151-28410]
 3.2 mm (0.13 in.) [Code No. 3C151-28420]

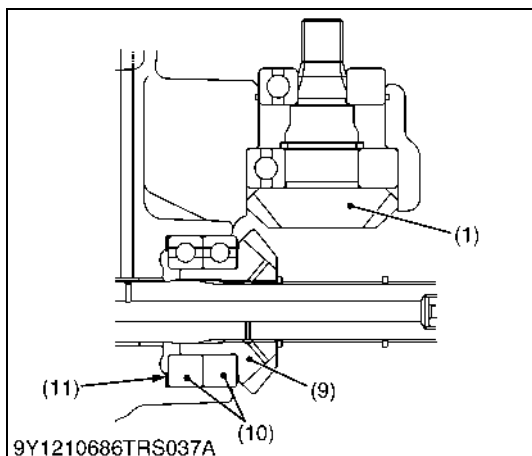
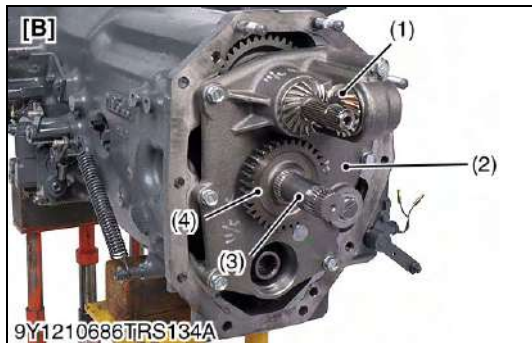
Clearance "L" between external circlip and collar on 1st shaft	Factory specification	Less than 0.2 mm 0.008 in.
--	-----------------------	-------------------------------

- (1) 30T Gear (F8/R8 and F12/R12 Speed Transmission Model)
- (2) PTO Propeller Shaft
- (3) External Circlip 1
- (4) 1st Shaft
- (5) 27T Gear (F24/R24 Speed Transmission Model)
- (6) Adjusting Collar
- (7) External Circlip 2

[A] F8/R8 and F12/R12 Speed Transmission Model

[B] F24/R24 Speed Transmission Model

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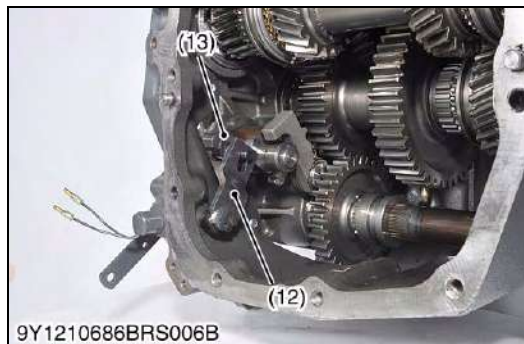
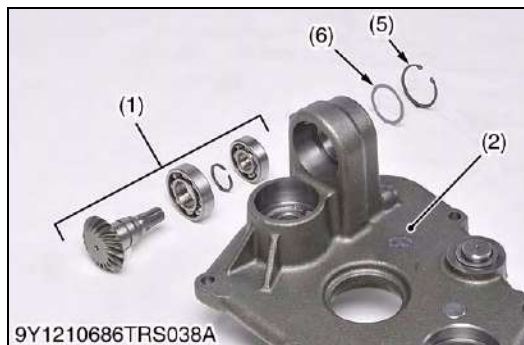


PTO Propeller Shaft, Bearing Holder and Pump Gear

1. Remove the internal circlip (5), shim 1 (6) and slide the 18T spiral bevel gear assembly (1).
2. Tap out the PTO propeller shaft (7) frontward and then remove the external circlip (8), 19T spiral bevel gear (9), bearing (10) and shim 2 (11).
3. Remove the external circlip and 33T gear (4). (F24/R24 speed transmission model)
4. Remove the bearing holder mounting screws, and draw out the bearing holder (2).
If the 3rd shaft (3) comes out with bearing holder, tap in the 3rd shaft (3) during draw out the bearing holder (2).

(When reassembling)

- Check the backlash between 18T spiral bevel gear (1) and 19T spiral bevel gear (9). (See page 2-S108.)
- Be sure to fix the parking brake arm (12) and parking cam lever (13).



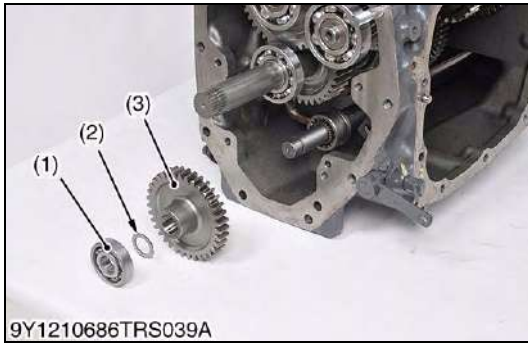
- (1) 18T Spiral Bevel Gear Assembly
- (2) Bearing Holder
- (3) 3rd Shaft
- (4) 33T Gear
- (5) Internal Circlip
- (6) Shim 1
- (7) PTO Propeller Shaft
- (8) External Circlip
- (9) 19T Spiral Bevel Gear

- (10) Bearing
- (11) Shim 2
- (12) Parking Cam Lever
- (13) Parking Brake Arm

[A] F8/R8 and F12/R12 Speed Transmission Model

[B] F24/R24 Speed Transmission Model

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**4WD Gear (F8/R8 and F12/R12 Speed Transmission Model)**

1. Remove the bearing (1), thrust collar (2), 35T gear (3).

(When reassembling)

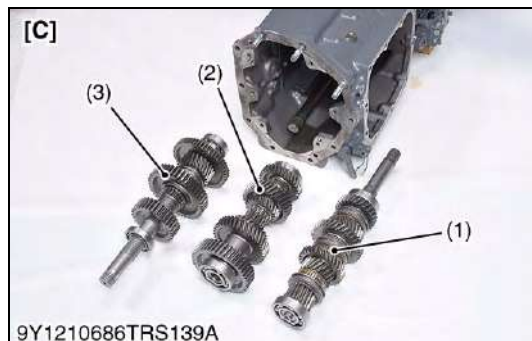
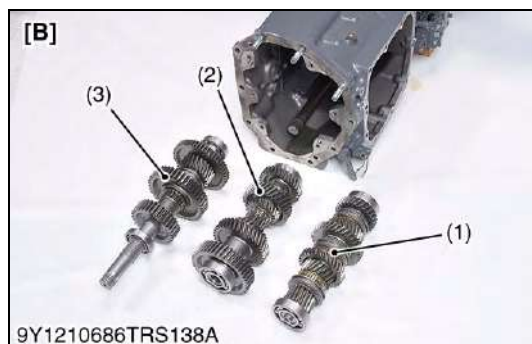
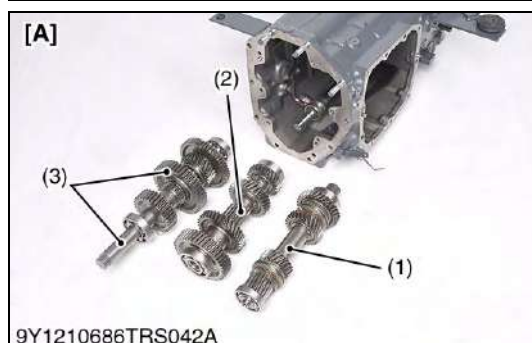
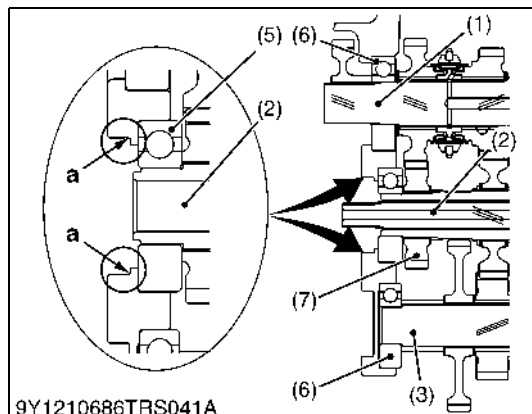
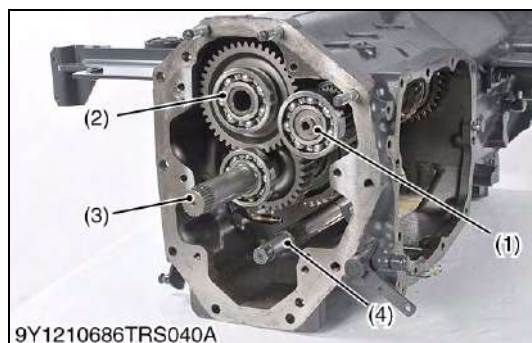
- Face the grooved side of thrust collar (2) to the 35T gear (3).

(1) Bearing

(3) 35T Gear

(2) Thrust Collar

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1st Shaft, 2nd Shaft and 3rd Shaft

1. Slowly draw out the three shafts with gears together by step by step.
2. Take out the three shafts from clutch housing case.

■ IMPORTANT

- Do not fall down the shaft when removing the shafts with gears.
- Do not tap the bearing stop part (a) of clutch housing case, it cause break a part of clutch housing case. Be sure to tap at the inner race of bearing 1 (5) or 2nd shaft when remove the 2nd shaft assembly (2).

(When reassembling)

- For easily assemble, stand the clutch housing case and assemble the 1st shaft assembly (1) expect bearing 2 (6), 2nd shaft assembly (2) expect bearing 1 (5) and 43T gear (7) and 3rd shaft assembly (3) expect bearing 2 (6) at same time, and then assemble the bearing (5), (6) and 43T gear (7) into those shafts.

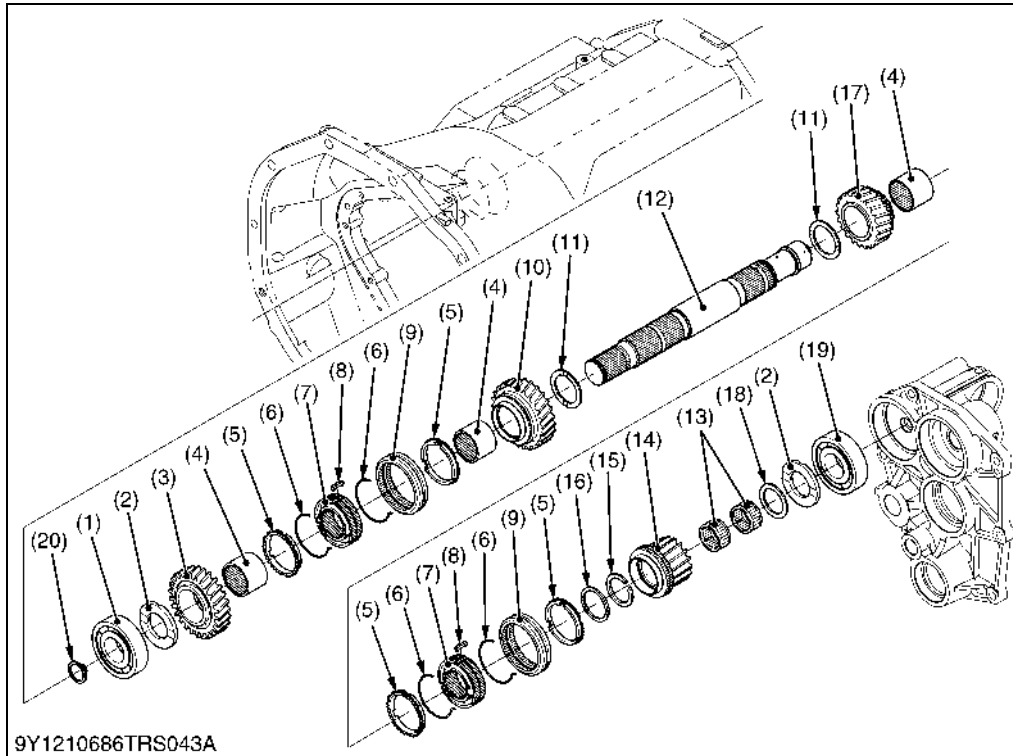
- (1) 1st Shaft Assembly
- (2) 2nd Shaft Assembly
- (3) 3rd Shaft Assembly
- (4) 4WD Propeller Shaft
- (5) Bearing 1
- (6) Bearing 2
- (7) 43T Gear

- a: Bearing Stop Part
- [A] F8/R8 Speed Transmission Model
- [B] F12/R12 Speed Transmission Model
- [C] F24/R24 Speed Transmission Model

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(2) 1st Shaft

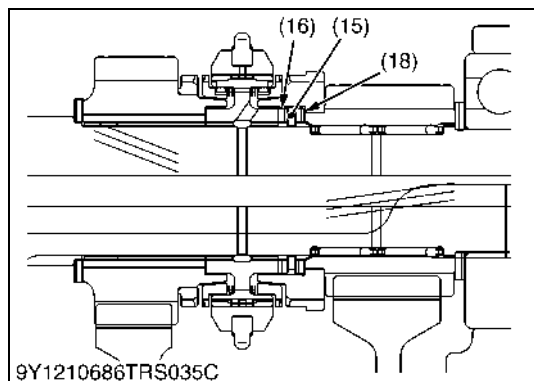
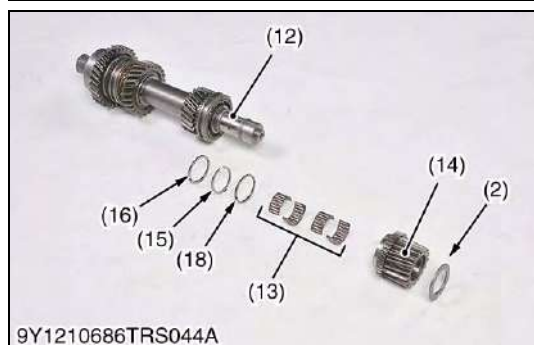
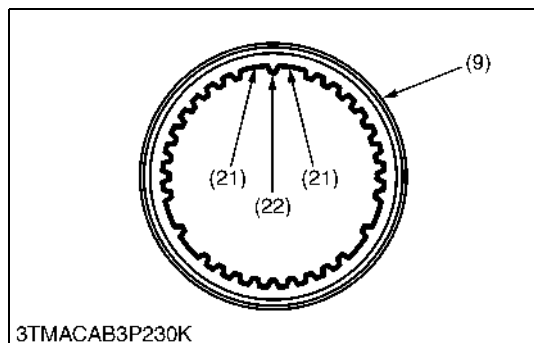
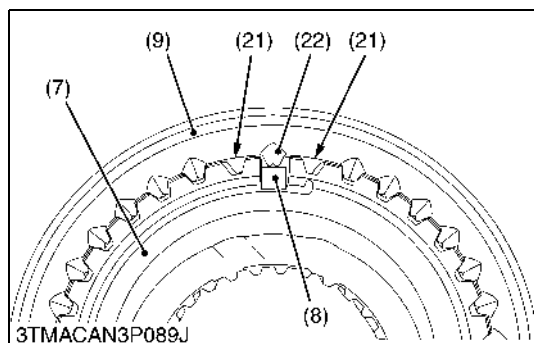
1st Shaft (F8/R8 Speed Transmission Model)



- (1) Bearing
- (2) Thrust Collar
- (3) 31T Gear
- (4) Inner Race
- (5) Synchronizer Ring
- (6) Spring
- (7) Coupling
- (8) Synchronizer Key
- (9) Shifter
- (10) 26T Gear
- (11) Thrust Collar
- (12) 1st Shaft
- (13) Split Type Needle Bearing
- (14) 17T Gear
- (15) External Circlip
- (16) Adjusting Collar
- (17) 21T Gear
- (18) Thrust Collar
- (19) Bearing
- (20) External Circlip

(To be continued)

(Continued)



1. Remove the bearing (19).
2. Draw out the 1st-2nd synchronizer unit and gears.
3. Remove the bearing (1).
4. Draw out the 3rd-4th synchromesh gears.

(When reassembling)

- Be sure to assemble the synchronizer unit, set the teeth (22) on the shifter (9) to the key (8) as shown in the figure.
- Apply transmission fluid to synchronizer unit.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner race (4).
- Face the grooved side of thrust collar (2) and (11) to the gear side. (The thrust collar (11) have each two collars.)
- Set the adjusting collar (16). Face the needle side to the 17T gear (14).
- Set the split type needle bearing (13) on the 1st shaft, then install the 17T gear (14).
- Do not confuse the adjusting collar (16) and thrust collar (18).
- Adjust the side clearance of the 1st-2nd gears on the 1st shaft by adjusting collar (16). Check the clearance between external circlip (15) and adjusting collar (16).
- Replace the external circlip (15) with new one.

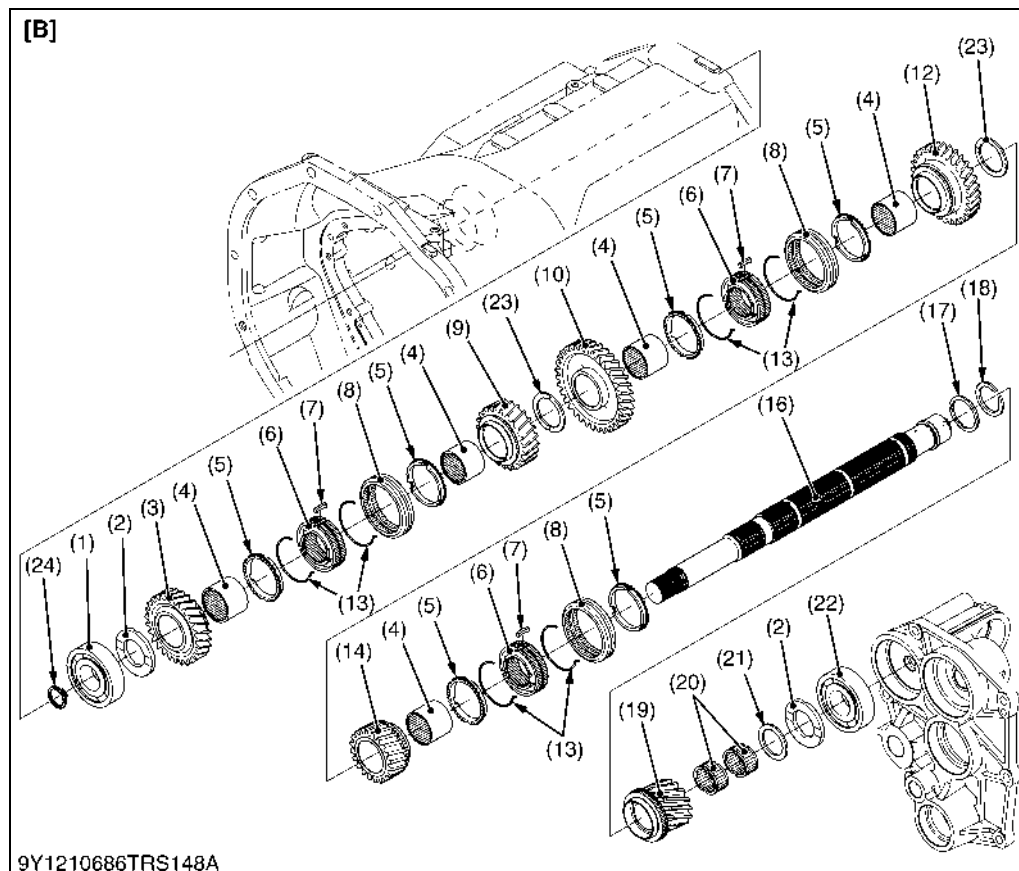
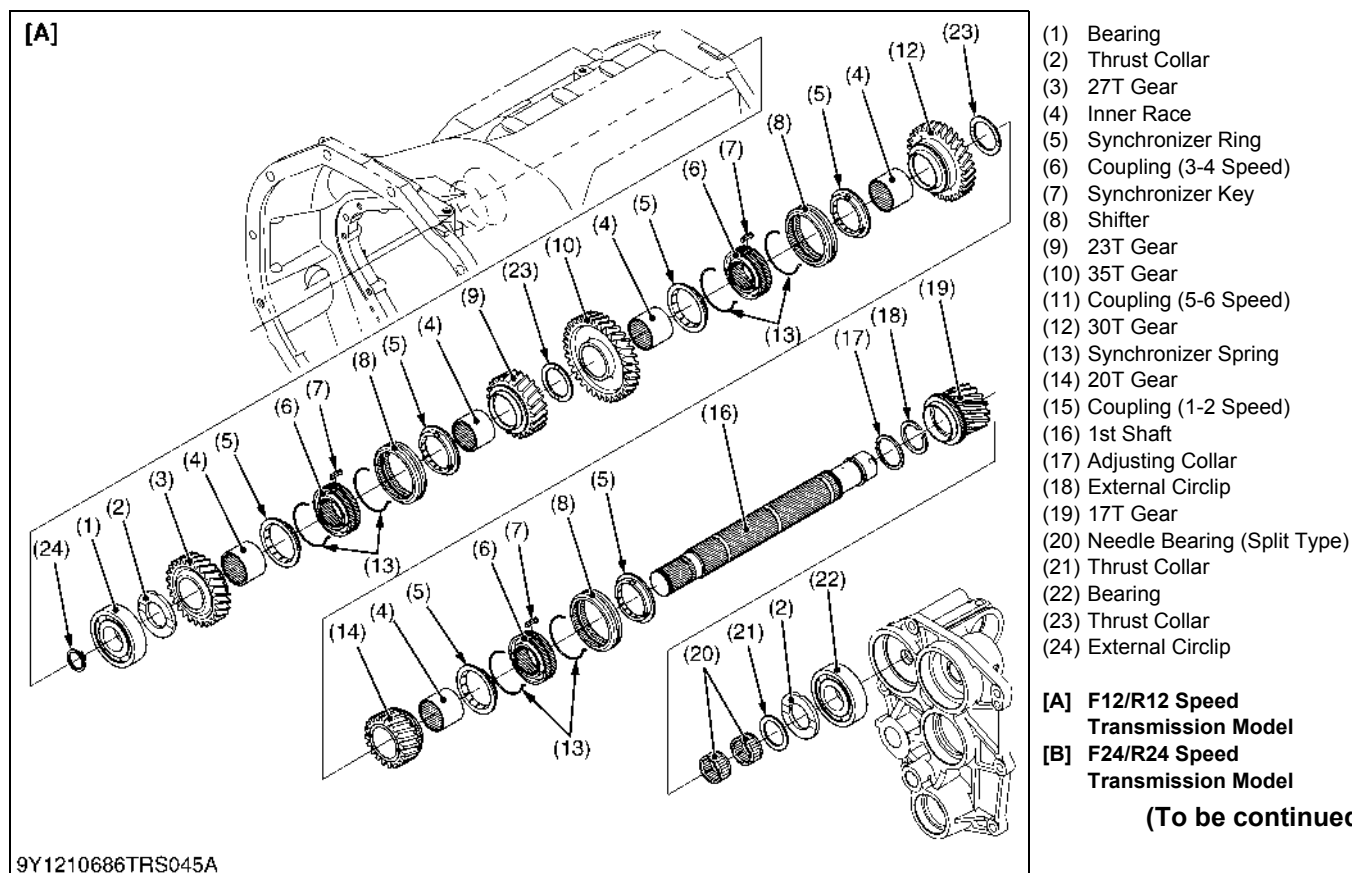
Clearance "L" between external circlip and collar on 1st shaft	Factory specification	Less than 0.2 mm 0.008 in.
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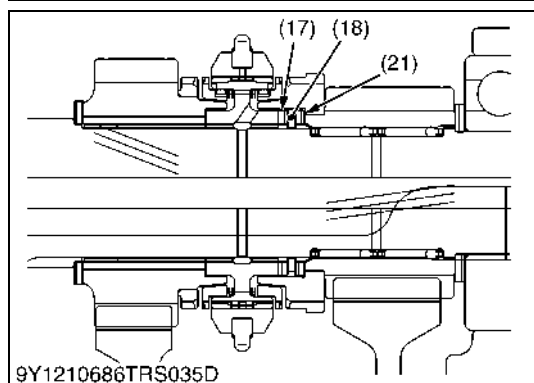
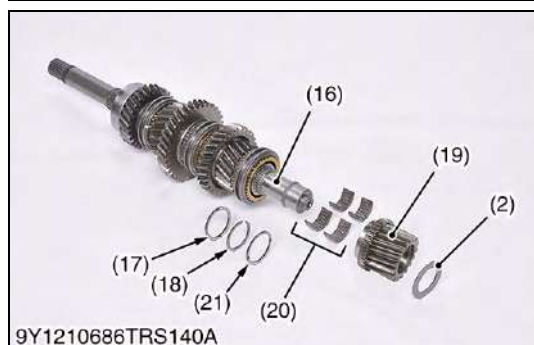
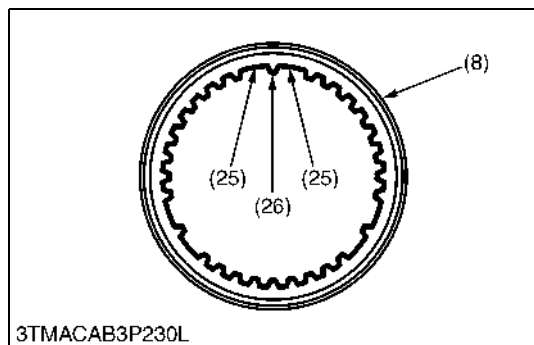
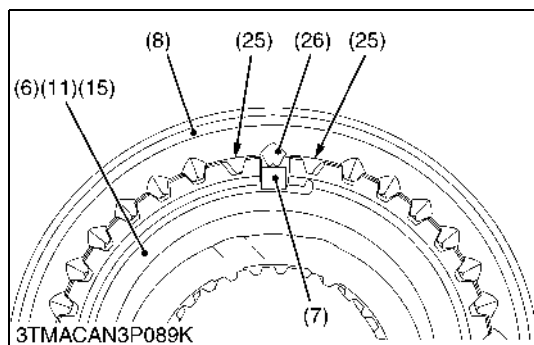
(Reference)

- Thickness of adjusting collar (16) :
 - 2.6 mm (0.10 in.) [Code No. 3C151-28490]
 - 2.8 mm (0.110 in.) [Code No. 3C151-28440]
 - 3.0 mm (0.118 in.) [Code No. 3C151-28410]
 - 3.2 mm (0.126 in.) [Code No. 3C151-28420]

- | | |
|-----------------------|--------------------------------|
| (1) Bearing | (12) 1st Shaft |
| (2) Thrust Collar | (13) Split Type Needle Bearing |
| (3) 31T Gear | (14) 17T Gear |
| (4) Inner Race | (15) External Circlip |
| (5) Synchronizer Ring | (16) Adjusting Collar |
| (6) Spring | (17) 21T Gear |
| (7) Coupling | (18) Thrust Collar |
| (8) Synchronizer Key | (19) Bearing |
| (9) Shifter | (20) External Circlip |
| (10) 26T Gear | (21) Without Teeth |
| (11) Thrust Collar | (22) Teeth |

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1st Shaft (F12/R12 and F24/R24 Speed Transmission Model)

(Continued)

1. Remove the bearing (22).
2. Draw out the all synchronizer units and gears.

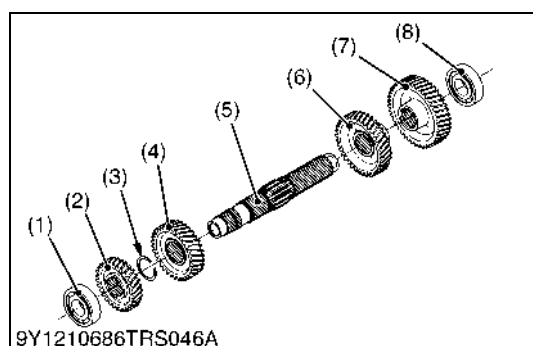
(When reassembling)

- Be sure to assemble the synchronizer unit, set the teeth (26) on the shifter (8) to the key (7) as shown in the figure.
- Apply transmission fluid to synchronizer unit.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner races (4).
- The thrust collar between 23T gear (9) and 35T gear (10) have two collars.
- Set the thrust needle bearing (20) and thrust collar (21). Toward the needle side to the 17T gear (19).
- Set the split type needle bearing (20) on the 1st shaft, then install the 17T gear (19).
- Replace the external circlip (18) with new one.

- | | |
|---------------------------|----------------------------------|
| (1) Bearing | (14) 20T Gear |
| (2) Thrust Collar | (15) Coupling (1-2 Speed) |
| (3) 27T Gear | (16) 1st Shaft |
| (4) Inner Race | (17) Adjusting Collar |
| (5) Synchronizer Ring | (18) External Circlip |
| (6) Coupling (3-4 Speed) | (19) 17T Gear |
| (7) Synchronizer Key | (20) Needle Bearing (Split Type) |
| (8) Shifter | (21) Thrust Collar |
| (9) 23T Gear | (22) Bearing |
| (10) 35T Gear | (23) Thrust Collar |
| (11) Coupling (5-6 Speed) | (24) External Circlip |
| (12) 30T Gear | (25) Without Teeth |
| (13) Synchronizer Spring | (26) Teeth |

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(3) 2nd Shaft and 3rd Shaft

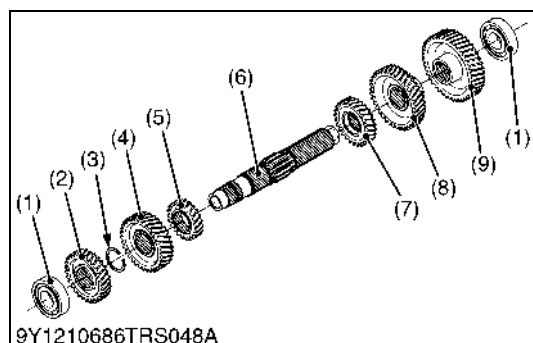


2nd Shaft (F8/R8 Speed Transmission Model)

1. Remove the bearing (1), (8).
2. Draw out the gears.

- | | |
|----------------------|---------------|
| (1) Bearing | (5) 2nd Shaft |
| (2) 25T Gear | (6) 35T Gear |
| (3) External Circlip | (7) 43T Gear |
| (4) 30T Gear | (8) Bearing |

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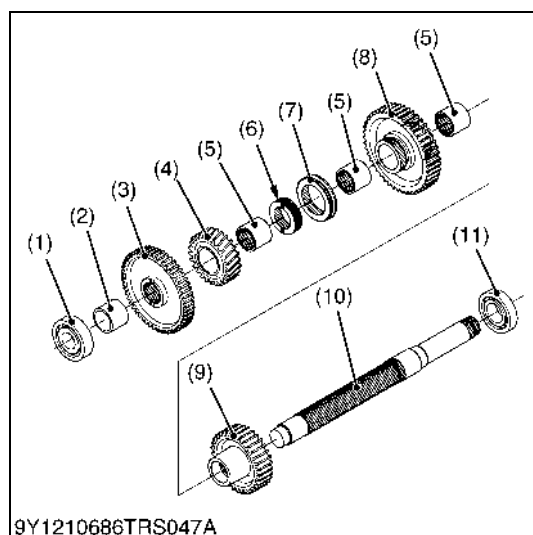


2nd Shaft (F12/R12 and F24/R24 Speed Transmission Model)

1. Remove the bearing (1).
2. Draw out the gears.

- | | |
|----------------------|---------------|
| (1) Bearing | (6) 2nd Shaft |
| (2) 30T Gear | (7) 27T Gear |
| (3) External Circlip | (8) 37T Gear |
| (4) 33T Gear | (9) 43T Gear |
| (5) 22T Gear | |

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3rd Shaft (F8/R8 Speed Transmission Model)

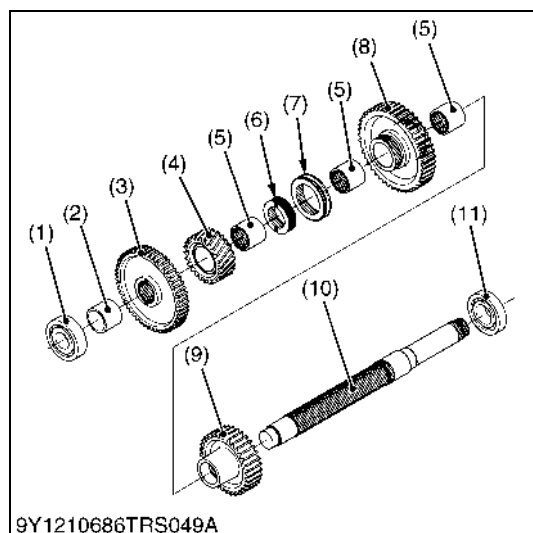
1. Remove the bearing (1).
2. Draw out the gears.

(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner races (5).

- | | |
|----------------|------------------|
| (1) Bearing | (7) Shifter |
| (2) Collar | (8) 45T-22T Gear |
| (3) 53T Gear | (9) 33T Gear |
| (4) 25T Gear | (10) 3rd Shaft |
| (5) Inner Race | (11) Bearing |
| (6) Hub | |

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3rd Shaft (F12/R12 and F24/R24 Speed Transmission Model)

1. Remove the bearing (1).
2. Draw out the gears.

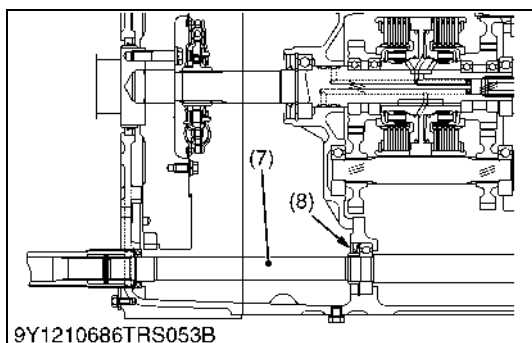
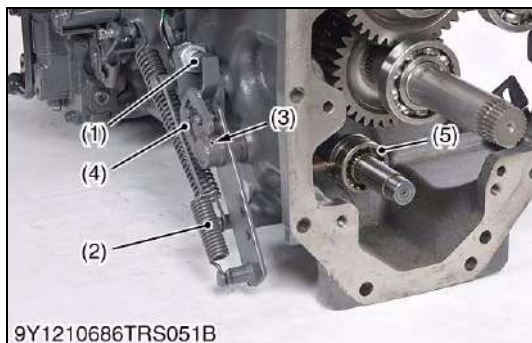
(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner races (5).

- | | |
|-----------------|------------------|
| (1) Bearing | (7) Shifter |
| (2) Collar | (8) 45T-22T Gear |
| (3) 53T Gear | (9) 33T Gear |
| (4) 24T Gear | (10) 3rd Shaft |
| (5) Inner Race | (11) Bearing |
| (6) Spline Boss | |

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(4) 4WD Propeller Shaft



4WD Shift Lever and 4WD Propeller Shaft (F8/R8, F12/R12 Speed Transmission Model)

1. Remove the 4WD safety switch (1).
2. Remove the spring (2).
3. Tap out the roll pin (3) and remove the 4WD shift lever 2 (4).
4. Remove the shift arm mounting screw, then pull the shift arm (6).
5. Draw out the 4WD shifter (5).
6. Tap out the 4WD propeller shaft (7) rearward.

(When reassembling)

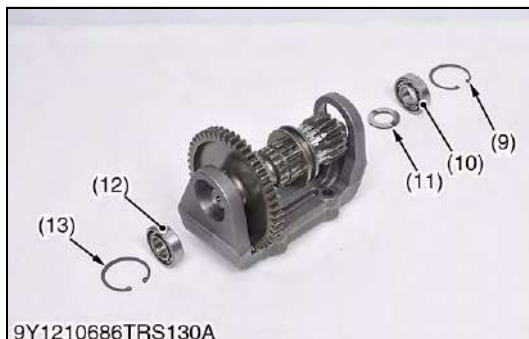
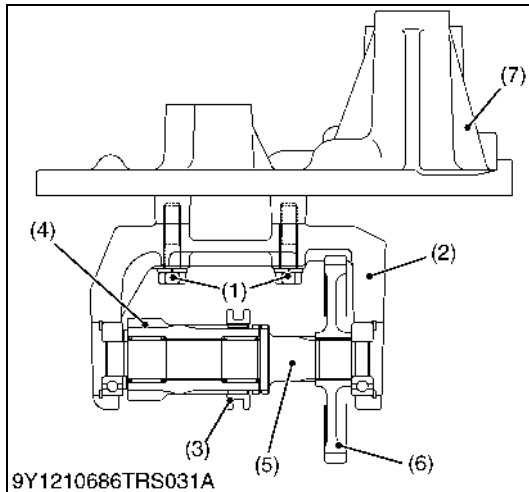
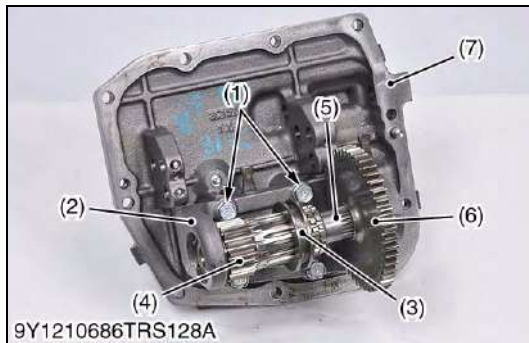
■ NOTE

- Check the 4WD safety switch (see page 8-S39).
- Apply transmission fluid to the shift arm (6).
- Be sure to fix the O-rings on the shift arm (6).
- Apply grease to the oil seals (8).

- | | |
|-----------------------|-------------------------|
| (1) 4WD Safety Switch | (5) 4WD Shifter |
| (2) Spring | (6) Shift Arm |
| (3) Roll Pin | (7) 4WD Propeller Shaft |
| (4) 4WD Shift Lever 2 | (8) Oil Seal |

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(5) Creep Gear (If Equipped)

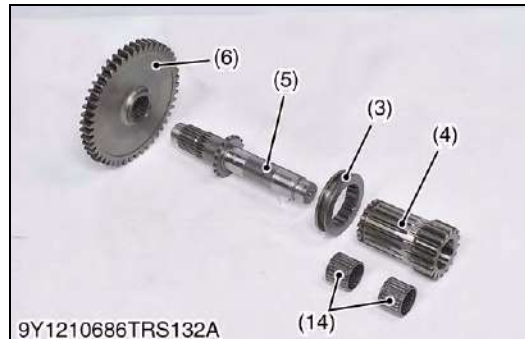


Creep Gear and Shaft (If Equipped)

1. Remove the creep holder mounting screw (1) and the creep gear assembly.
2. Remove the external circlips (9), (13) and the bearings (10), (12).
3. Slide the creep shaft (5) with 17T gear (4) to 48T gear (6) side and then take out the creep shaft with 17T gear (4) from the creep holder (2).
4. Disassemble the creep shaft with 17T gear (4).

(When reassembling)

- Apply oil to needle bearings (14) and thrust collar (11).
- Replace the internal circlip (9), (13) with new one.

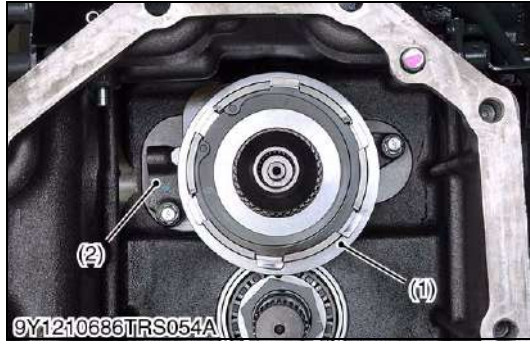


- | | |
|---------------------------------|--------------------------|
| (1) Creep Holder Mounting Screw | (8) Creep Shaft Assembly |
| (2) Creep Holder | (9) Internal Circlip |
| (3) Shifter | (10) Bearing |
| (4) 17T Gear | (11) Thrust Collar |
| (5) Creep Shaft | (12) Bearing |
| (6) 48T Gear | (13) Internal Circlip |
| (7) Shift Cover | (14) Needle Bearing |

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[9] DISASSEMBLING TRANSMISSION CASE

(1) Removing PTO Clutch Pack



Removing PTO Clutch Pack and Holder

1. Remove the PTO clutch holder mounting screws.
2. Remove the PTO clutch (1) with holder (2).

(When reassembling)

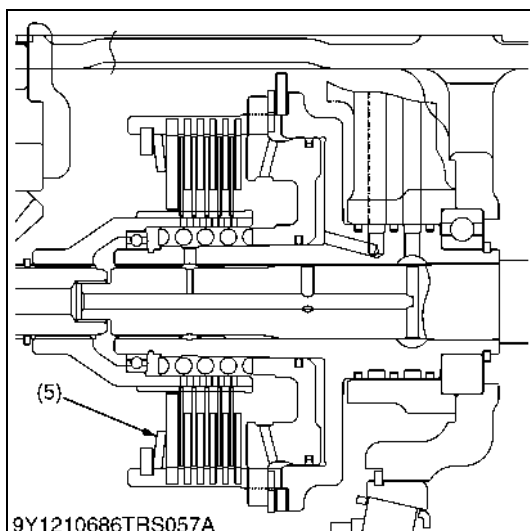
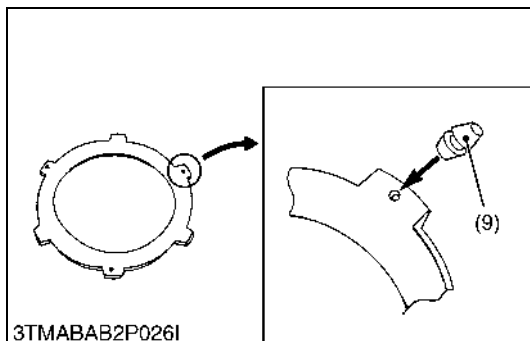
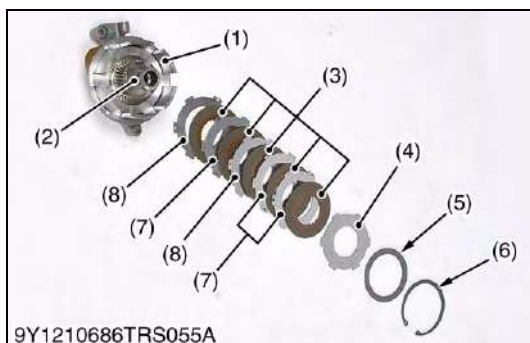
Tightening torque	PTO clutch holder mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
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(1) PTO Clutch

(2) Holder

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(2) Disassembling PTO Clutch Pack



Clutch Hub and Clutch Disks

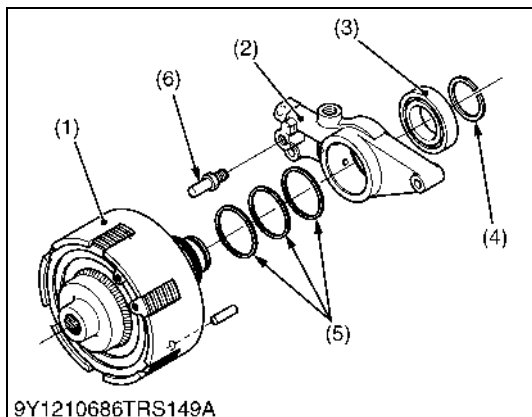
1. Remove the internal circlip (6), and then take out the clutch disks (3), belleville washer (cupped spring washer) (5), back plate (4), steel plates (7), (8) and the hub (2).

(When reassembling)

- Install the clutch disks (3) and steel plates (7), (8) alternately. (Refer to figure below.)
- Do not confuse the two types steel plates. One is steel plate with plug rubber (9), the other is steel plate without plug rubber (9).
- Do not confuse the back plate (4) and steel plates. The back plate (4) is thicker than the steel plates.
- Assemble the plug rubbers portion of the two steel plates (7) are same positions while assembling them. (Refer to figure below.)
- Apply enough transmission fluid to the disks (3).
- Confirm the moving of the piston (11) smoothly when pressure air at 0.30 to 0.39 MPa (3.0 to 4.0 kgf/cm², 43 to 56 psi) is sent to clutch pack. (Refer to the photo.)
- Assemble the steel plates with rubber (7) and steel plates without rubber (8) alternately, and steel plates are built in so that the part of rubber is not corresponding to the part of the hole.
- Be sure to assemble the belleville washer (cupped spring washer) (5) as shown in the figure.

- | | |
|--|--|
| (1) Clutch Case | (7) Steel Plate (With Plug Rubbers) |
| (2) Hub | (8) Steel Plate (Without Plug Rubbers) |
| (3) Clutch Disks | (9) Plug Rubber |
| (4) Back Plate | (10) Bearing |
| (5) Belleville Washer (Cupped Spring Washer) | (11) Piston |
| (6) Internal Circlip | (12) Spring |

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Clutch Case and Clutch Holder

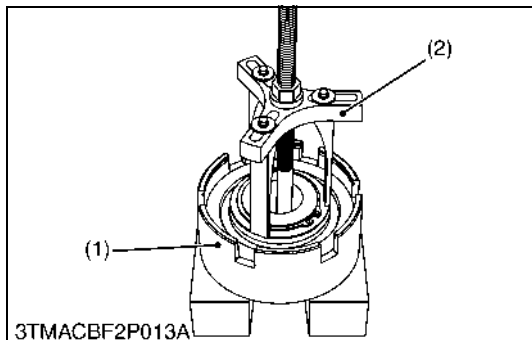
1. Remove the external circlip (4).
2. Remove the clutch holder (2).

(When reassembling)

- Apply small amount of grease to the seal rings (8).
- Apply liquid lock (Three Bond 1324N or equivalent) to the thread part of pin (6).

- | | |
|-------------------|----------------------|
| (1) Clutch Case | (4) External Circlip |
| (2) Clutch Holder | (5) Seal Ring |
| (3) Bearing | (6) Pin |

9Y1210686TRS0103US0



Piston

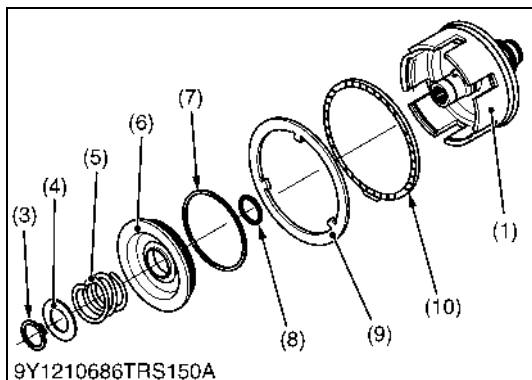
1. Press the washer (4) lightly by the hand press, using the hydraulic clutch spring compressor. (See page G-72.)
2. Remove the external circlip (3).
3. Remove the piston (6), the brake plate (9) and the brake disk (10).

(When reassembling)

- Apply enough transmission fluid to seal ring (7) and (8).

- | | |
|--|-----------------|
| (1) Clutch Case | (6) Piston |
| (2) Hydraulic Clutch Spring Compressor | (7) Seal Ring |
| (3) External Circlip | (8) Seal Ring |
| (4) Washer | (9) Brake Plate |
| (5) Spring | (10) Brake Disk |

9Y1210686TRS0104US0



(3) Removing 4WD Clutch (Dual Speed Model)



4WD Clutch

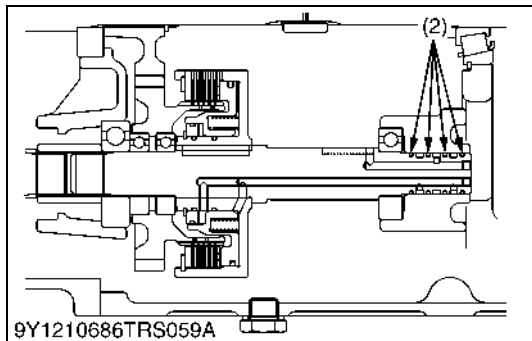
1. Remove the 4WD clutch (1).

(When reassembling)

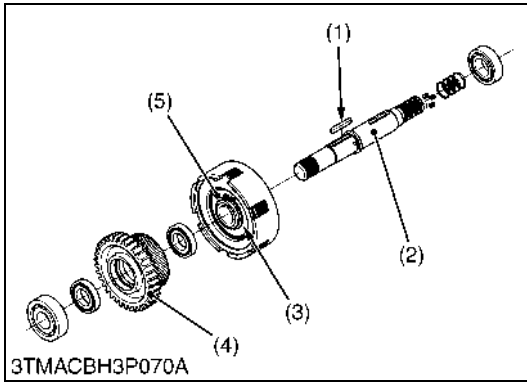
- Replace the seal rings (2) with new one.
- Apply grease to the seal rings (2) when reassembling.

- | | |
|----------------|---------------|
| (1) 4WD Clutch | (2) Seal Ring |
|----------------|---------------|

9Y1210686TRS0105US0



(4) Disassembling 4WD Clutch Pack



4WD Hydraulic Pack

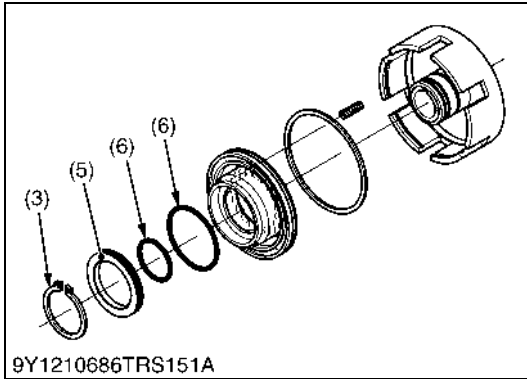
1. Tap and remove the 4WD shaft (2) to rearward.
2. Remove the 35T gear (4) from the clutch pack.
3. Remove the external circlip (3) and cylinder case (5).

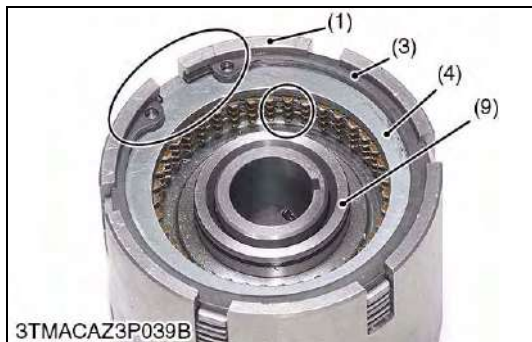
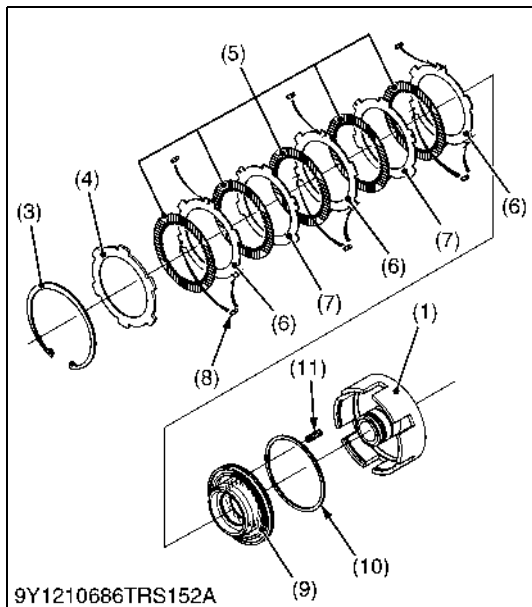
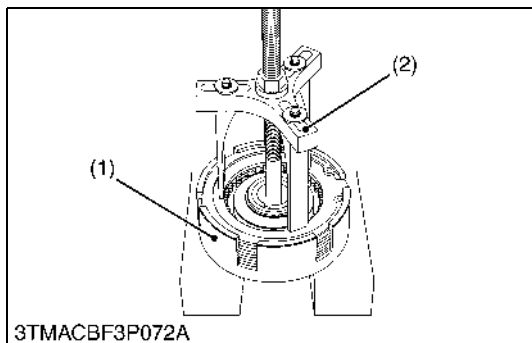
(When reassembling)

- Align the key (1) and groove.
- Apply transmission fluid to the O-ring (6).

- | | |
|----------------------|-------------------|
| (1) Key | (4) 35T Gear |
| (2) 4WD Shaft | (5) Cylinder Case |
| (3) External Circlip | (6) O-ring |

9Y1210686TRS0106US0





4WD Piston

1. Press the pressure plate (4) to press down the 4WD piston (9), using jig (see page G-72), and remove the internal circlip (3).
2. Remove the disks (5), steel plates (6), (7) and pressure plates (4).

NOTE

- 19 springs (outer) for 4WD piston.
- 5 disks and 5 steel plates for 4WD clutch side.

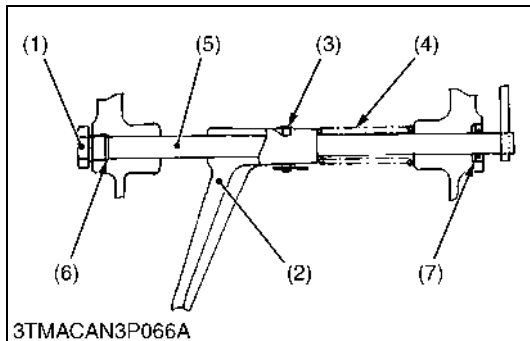
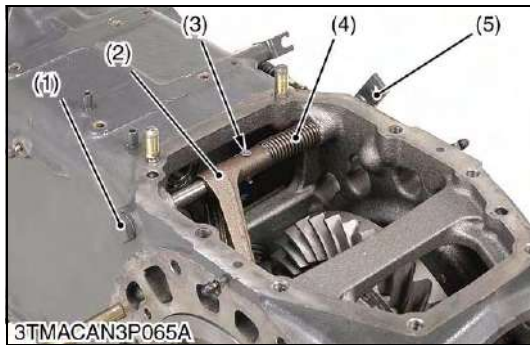
(When reassembling)

- Apply transmission fluid to D-ring (10), then install the 4WD piston (9) with springs (11).
- Install the clutch disks (5) and steel plate (6), (7) mutually.
- Apply enough transmission fluid to the disks (5).
- Do not confuse the two types of steel plates. The steel plate with plug rubbers (6) and without rubbers (7).
- Two steel plates match the position of rubber (8) from the piston side, and one remaining steel plate is not matched.
- Do not confuse the pressure plates (4) and steel plate (7). The pressure plate (4) is thicker than the steel plate.
- When installing the internal circlip (3) to the clutch case (1), press the pressure plate (4) using a jig and align its split portion to the notched portion of clutch case (1) as shown in photo.
- When installing the internal circlip (3), temporary align the spline and teeth of clutch disks using the 35T gear.

- | | |
|--|--------------------------------|
| (1) Clutch Case | (6) Steel Plate with Rubber |
| (2) Hydraulic Clutch Spring Compressor | (7) Steel Plate without Rubber |
| (3) Internal Circlip | (8) Rubber |
| (4) Pressure Plate | (9) 4WD Piston |
| (5) Disk | (10) D-ring (Outer) |
| | (11) Spring |

9Y1210686TRS0107US0

(5) Removing Differential Gear and Bevel Pinion Shaft



Differential Lock Fork (F8/R8 and F12/R12 Speed Transmission Model)

1. Remove the clevis pin (3) and plug (1).
2. Remove the differential lock shaft (5).
3. Take out the differential lock shift fork (2) and spring (3).

(When reassembling)

- Apply grease to the oil seal.

- | | |
|----------------------------------|-----------------------------|
| (1) Plug | (5) Differential Lock Shaft |
| (2) Differential Lock Shift Fork | (6) Shim |
| (3) Clevis Pin | (7) Oil Seal |
| (4) Spring | |

9Y1210686TRS0108US0

Differential Lock Device (F24/R24 Speed Transmission Model)

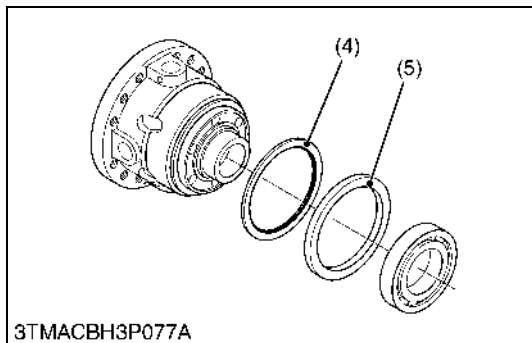
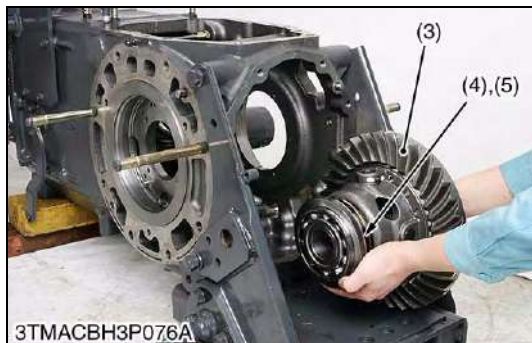
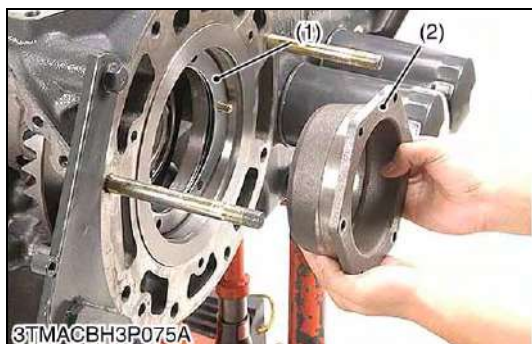
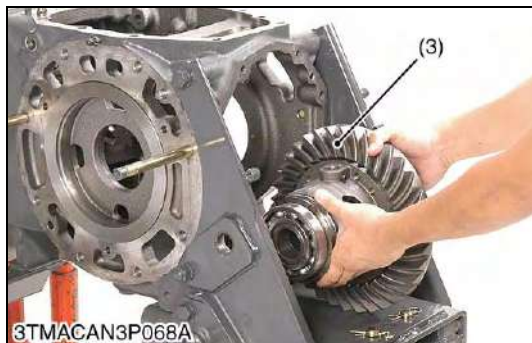
1. Remove the differential lock support (1) with piston (5).
2. Remove the pins (4).

(When reassembling)

- Apply transmission fluid to the O-ring (2).
- Align the oil passage.

- | | |
|------------------------------|------------|
| (1) Differential Lock Holder | (4) Pin |
| (2) O-ring | (5) Piston |
| (3) Oil Passage | |

9Y1210686TRS0109US0



Differential Gear Assembly (F8/R8 and F12/R12 Speed Transmission Model)

1. Remove the differential support (2), noting the number of shims (1).
2. Take out the differential gear assembly (3) from transmission case.

(When reassembling)

- Be sure to adjust the turning torque of spiral bevel pinion shaft (see page 2-S109).
- Be sure to adjust the backlash and tooth contact between the spiral bevel gear and spiral bevel pinion shaft (see page 2-S110).

Tightening torque	Differential bearing support mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
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(1) Shim

(3) Differential Gear Assembly

(2) Differential Support

9Y1210686TRS0110US0

Differential Gear Assembly (F24/R24 Speed Transmission Model)

1. Remove the differential support (2), noting the number of shims (1).
2. Take out the differential gear assembly (3) from transmission case.
3. Remove the differential lock collar (5) and thrust bearing (4).

(When reassembling)

- Be sure to adjust the turning torque of spiral bevel pinion shaft (see page 2-S109).
- Be sure to adjust the backlash and tooth contact between the spiral bevel gear and spiral bevel pinion shaft (see page 2-S110).

Tightening torque	Differential bearing support mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	---	---

(1) Shim

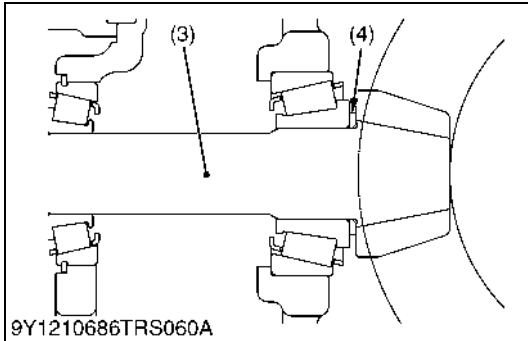
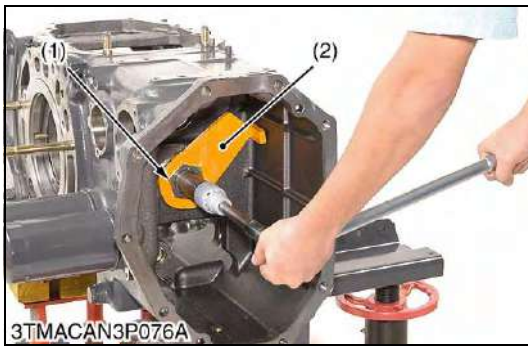
(4) Thrust Bearing

(2) Differential Support

(5) Differential Lock Collar

(3) Differential Gear Assembly

9Y1210686TRS0111US0



(6) Differential Gear



Spiral Bevel Pinion Shaft

1. Remove the stake of staking nut (1).
2. Set the staking nut locking wrench (2).
3. Set the spiral bevel pinion shaft turning wrench.
4. Turn the spiral bevel pinion shaft turning wrench to the counterclockwise, then remove it.
5. Tap out the shaft to the rear.

(When reassembling)

- Replace the staking nut with a new one, and be sure to adjust the turning torque of spiral bevel pinion shaft itself (see page 2-S109).
- Stake the staking nut after installing the differential gear assembly.

Tightening torque	Spiral bevel pinion shaft staking nut	93.2 to 102 N·m 9.5 to 10.5 kgf·m 68.8 to 75.9 lbf·ft
-------------------	--	---

- (1) Staking Nut
(2) Locking Wrench
(3) Spiral Bevel Pinion Shaft
(4) Collar

9Y1210686TRS0112US0

Spiral Bevel Gear

1. Remove the spiral bevel gear (1).

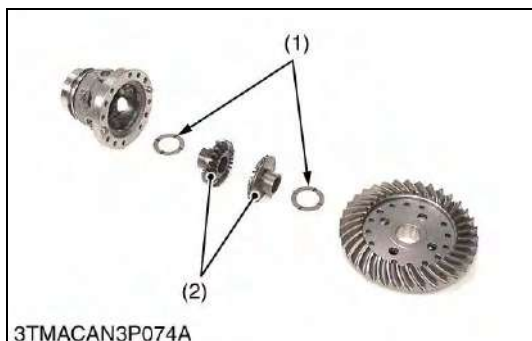
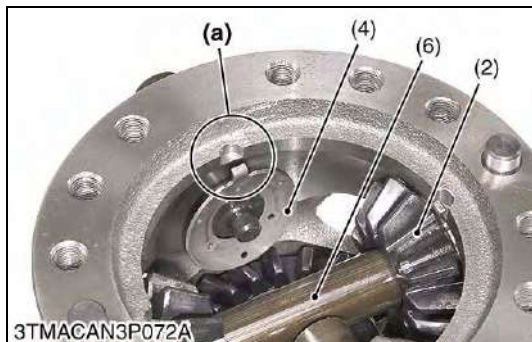
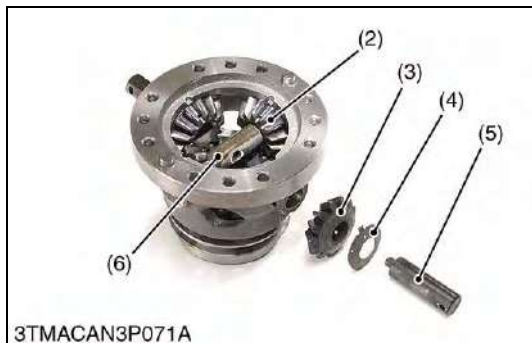
(When reassembling)

- Check the spiral bevel gear for wear or damage. If it is no longer serviceable, replace it. Then, also replace the spiral bevel pinion shaft.
- Apply liquid lock (Three Bond 1324N or equivalent) to the spiral bevel gear mounting UBS screws.

Tightening torque	Spiral bevel gear mounting UBS screw	143 to 161 N·m 14.5 to 16.5 kgf·m 105 to 119 lbf·ft
-------------------	---	---

- (1) Spiral Bevel Gear

9Y1210686TRS0113US0



Differential Pinion Shaft and Differential Pinion Gear

1. Tap out the roll pin (1).
2. Draw out the differential pinion shaft 2 (5), and take out the differential pinion gear (3) and differential pinion washer (4).
3. Draw out the differential pinion shaft 1 (6), and take out the differential pinion gear (2) differential pinion washer (4).

■ NOTE

- Arrange the parts to know their original position.

(When reassembling)

- Check the differential pinion gear (2), (3), and pinion shaft (6), (5) for excessive wear. If these parts are damaged or excessively worn, replace their parts they are in mesh with, or they sliding on.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential pinions.
- Install the parts to their original position.
- Install the differential pinion washer (4), noting its groove position (a).

- (1) Roll Pin
(2) Differential Pinion Gear
(3) Differential Pinion Gear
(4) Differential Pinion Washer

- (5) Differential Pinion Shaft 2
(6) Differential Pinion Shaft 1

(a) Fitting Groove

9Y1210686TRS0114US0

Differential Side Gear

1. Take out the differential side gear (2) and differential side gear washer (1).

(When reassembling)

- Check the thrust and bearing surface of both differential side gears (2). If they are worn or damaged, bores in the differential case may also be damaged. Be sure to replace their parts.

- (1) Differential Side Gear Washer (2) Differential Side Gear

9Y1210686TRS0115US0

(7) Differential Lock Piston (Dual Speed Model)



Piston

1. Remove the piston (1) from the differential lock support (2).

(When reassembling)

- Apply transmission fluid to the O-rings (3).

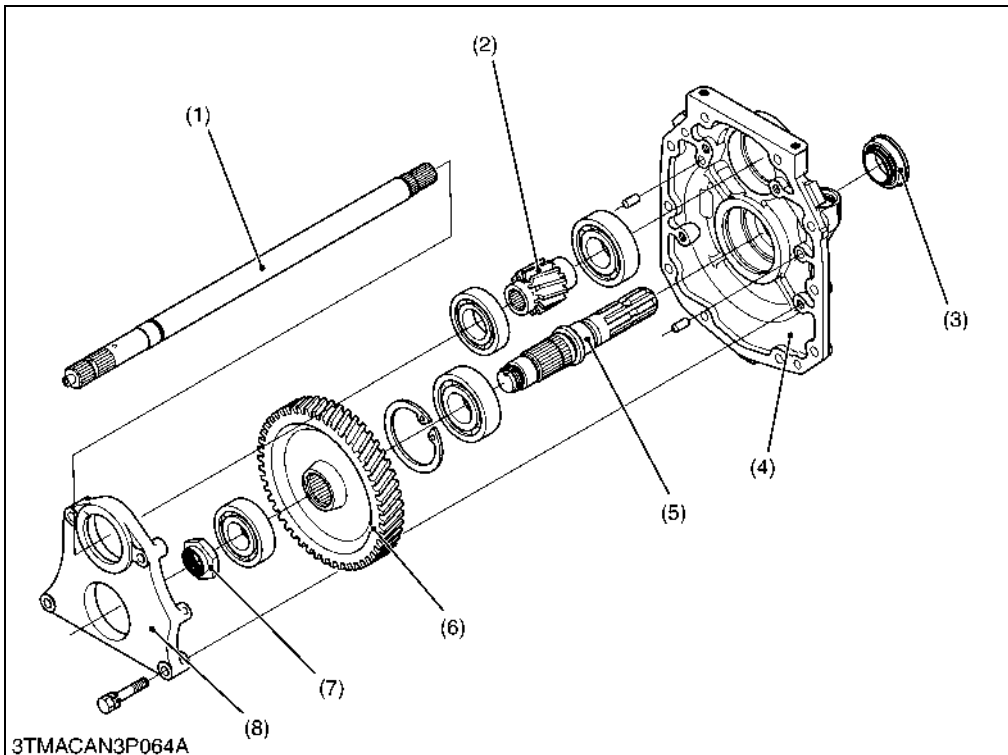
- (1) Piston
(2) Differential Lock Support

(3) O-ring

9Y1210686TRS0116US0

[10] PTO GEAR CASE

(1) 540 Type



- (1) PTO Propeller Shaft 2
(2) 12T PTO Gear
(3) Oil Seal
(4) Gear Case
(5) PTO Shaft
(6) 49T PTO Gear
(7) Staking Nut
(8) PTO Case Cover

1. Remove the PTO propeller shaft 2 (1).
2. Remove the PTO case cover mounting screws and then remove the PTO case cover (8).
3. Remove the staking nut (7).
4. Tap out the PTO shaft (5) to the rear side.

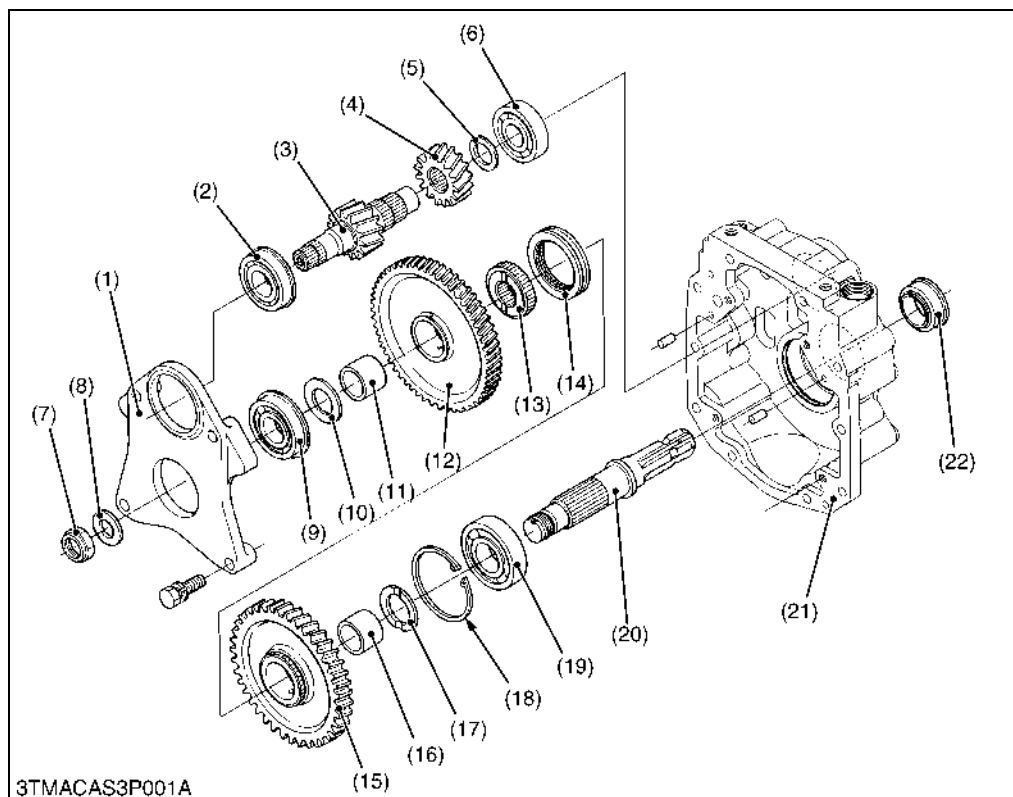
(When reassembling)

- Replace the PTO shaft staking nut (7) with new one, and stake it firmly after tightening.
- Apply grease to the oil seal (3).

Tightening torque	PTO shaft staking nut	226 to 264 N·m 23.0 to 27.0 kgf·m 167 to 195 lbf·ft
	PTO case cover mounting screw and reamer bolt	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

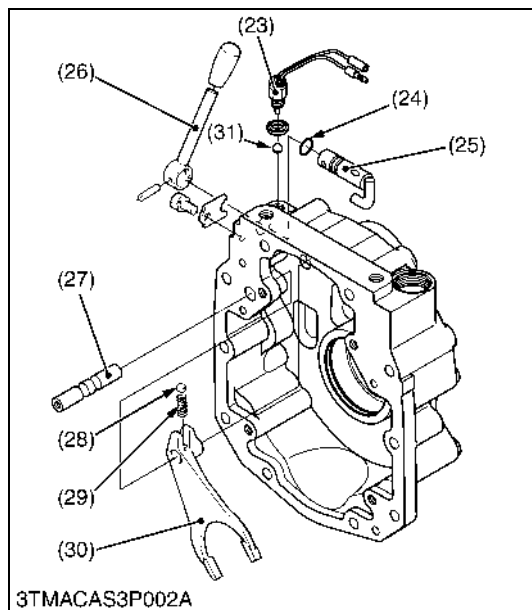
9Y1210686TRS0117US0

(2) 540/540E Shift Type (If Equipped)



3TMACAS3P001A

- (1) PTO Gear Case Cover
- (2) Ball Bearing
- (3) PTO Drive Gear Shaft
- (4) Gear
- (5) Collar
- (6) Ball Bearing
- (7) Stake Nut
- (8) Washer
- (9) Ball Bearing
- (10) Thrust Collar
- (11) Inner Ring
- (12) Gear
- (13) Hub
- (14) Shifter
- (15) Gear
- (16) Inner Ring
- (17) Thrust Collar
- (18) Internal Circlip
- (19) Ball Bearing
- (20) PTO Shaft
- (21) PTO Gear Case
- (22) Oil Seal
- (23) PTO Change Switch
- (24) O-ring
- (25) PTO Shift Arm
- (26) PTO Shift Lever
- (27) Shift Rod
- (28) Ball (Detent)
- (29) Spring
- (30) PTO Shift Fork
- (31) Ball



3TMACAS3P002A

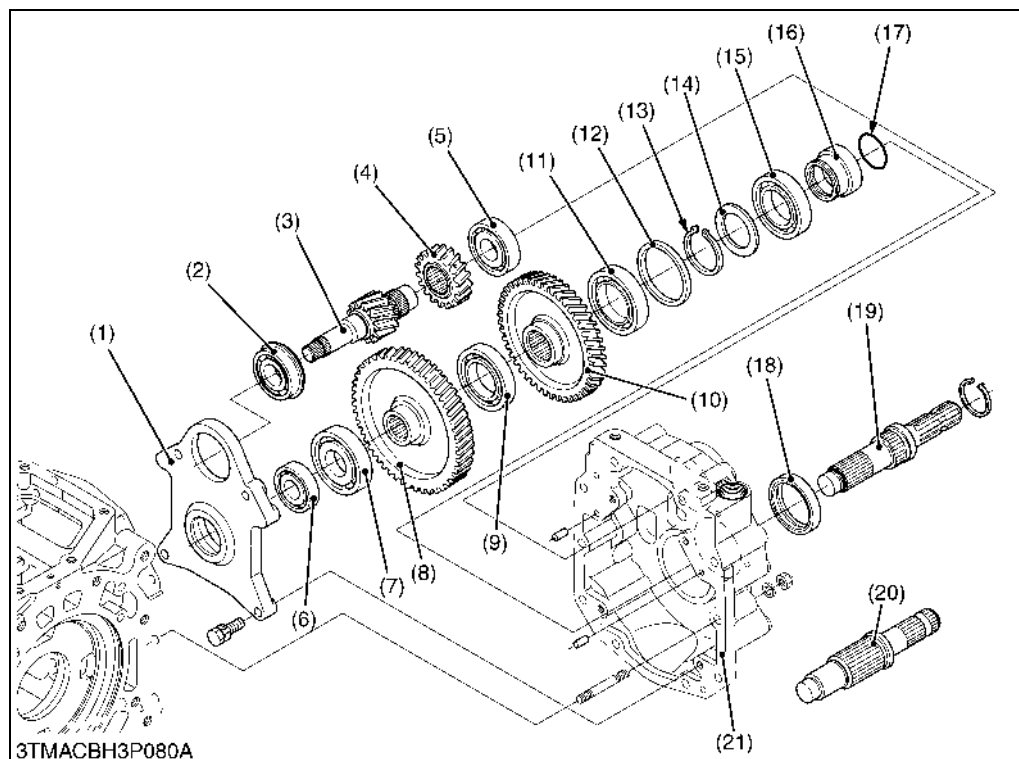
1. Remove the PTO change switch (23) and ball (31).
2. Remove the PTO case cover mounting screws and then remove the PTO gear case cover (1).
3. Remove the stake of the staking nut (7), and then remove it.
4. Remove the bearing (9) by using the bearing puller.
5. Tap out the PTO shaft (20) to the rear side.
6. Remove the gears (12), (15), thrust collars (10), (17), inner rings (11), (16), hub (13) and shifter (14).
7. Pull out the PTO drive gear shaft (3) as a unit.
8. Remove the PTO shift fork parts and PTO shift lever parts.

(When reassembling)

- Direct the grooves of thrust collars (10), (17) to the inner rings (11), (16) sides.
- Replace the PTO shaft staking nut (7) with new one, and stake it firmly after tightening.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner rings (11) and (16).
- Apply grease to the oil seal (22) and O-ring (24).
- Do not loose the ball (28) and (31).

Tightening torque	PTO shaft staking nut	226 to 264 N·m 23.0 to 27.0 kgf·m 167 to 195 lbf·ft
	PTO case cover mounting screws	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

9Y1210686TRS0118US0

(3) 540/1000 Interchangeable Type (If Equipped)

- (1) PTO Gear Case Cover
- (2) Ball Bearing
- (3) PTO Drive Gear Shaft
- (4) 18T Gear
- (5) Ball Bearing
- (6) Ball Bearing
- (7) Bearing
- (8) 49T Gear
- (9) Bearing
- (10) 43T Gear
- (11) Bearing
- (12) Spacer
- (13) External Circlip
- (14) Washer
- (15) Bearing
- (16) Holder
- (17) O-ring
- (18) Oil Seal
- (19) PTO Shaft (6 Spline)
- (20) PTO Shaft (21 Spline)
- (21) PTO Gear Case

1. Remove the PTO shaft (19) or (20).
2. Remove the PTO case cover mounting screws and then remove the PTO gear case cover (1).
3. Remove the gears (8) and (10) as a unit.
4. Pull out the PTO drive gear shaft (3) as a unit.

(When reassembling)

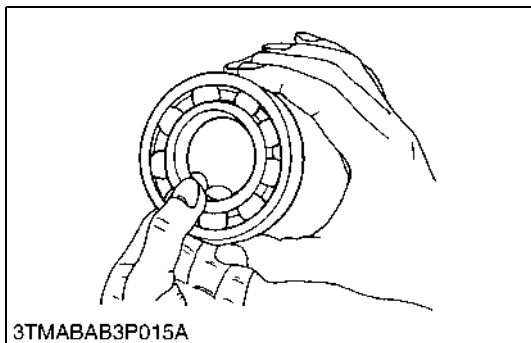
- Apply grease to the oil seal (18) and O-ring (17).

Tightening torque	PTO gear case mounting screws	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
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9Y1210686TRS0119US0

6. SERVICING

[1] BEARING



3TMABAB3P015A

Ball Bearing

1. Hold the inner race, push and pull the outer race in all directions to check for wear and roughness.
2. Apply transmission fluid to the bearing, and hold the inner race. Then, turn the outer race to check rotation.
3. If there is any defect, replace it.

9Y1210686TRS0133US0

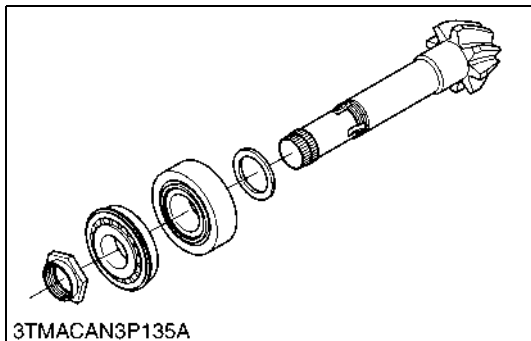


9Y1210686TRS140B

Split Type Needle Bearing

1. Check the split type needle bearing for abrasion, color change or other damage.
2. If there is any doubt as to the condition of a needle bearing, replace it.

9Y1210686TRS0134US0



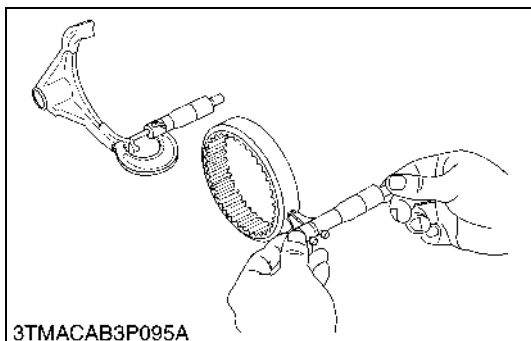
3TMACAN3P135A

Taper Roller Bearing

1. Check the bearing for abrasion, color change or other damage.
2. If there is any doubt as to the condition of a taper roller bearing, replace it.

9Y1210686TRS0135US0

[2] SHIFT FORK AND SYNCHRONIZER



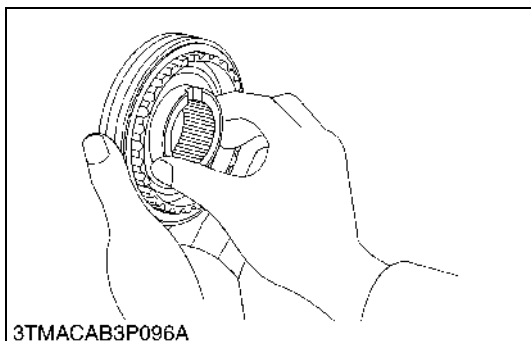
3TMACAB3P095A

Clearance between Shift Fork and Shifter Groove

1. Measure the width of shift fork.
2. Measure the shifter groove width, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

Clearance between shift fork and shift groove for main change section and range section	Factory specification	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.80 mm 0.031 in.

9Y1210686TRS0136US0

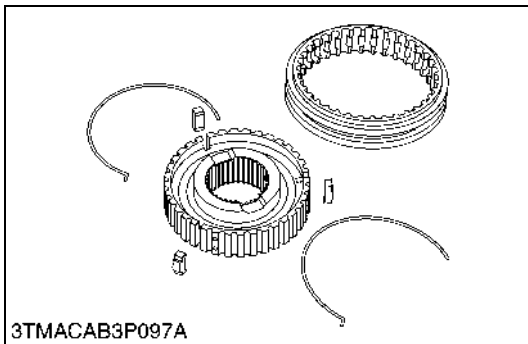


3TMACAB3P096A

Checking Contact between Coupling and Shifter

1. Check to see if there is flaw or wear on the spline of the coupling and shifter, and the key groove on the coupling.
2. Engage the shifter with the coupling, and check that they slide smoothly.
3. Similarly, check that there is any flaw or wear on the gear splines.
4. If there is any defect, replace them.

9Y1210686TRS0137US0



Flaw on Synchronizer Key and Spring

1. Check the projection in the center of the synchronizer key for wear.
2. Check the spring for fatigue or wear on the area where the spring contacts with the keys.
3. If there is any defect, replace them.

9Y1210686TRS0138US0

[3] TRAVELING CLUTCH



Backlash between Damper Disk Boss and Shaft

1. Mount the damper disk to the input shaft.
2. Hold the shaft so that it does not turn.
3. Rotate disk lightly and measure the displacement around the disk edge.
4. If the measurement exceeds the allowable limit, replace the damper disk.

Displacement around disk edge	Allowable limit	2.0 mm 0.079 in.
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9Y1210686TRS0139US0



Shuttle Lever and Inching Lever Bushing

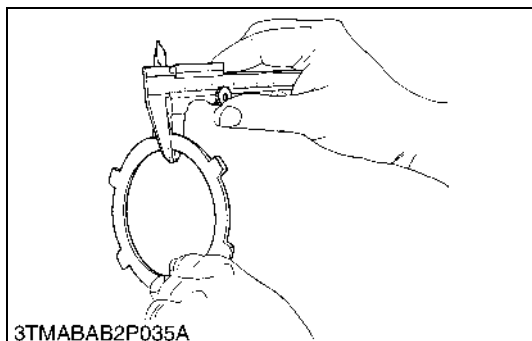
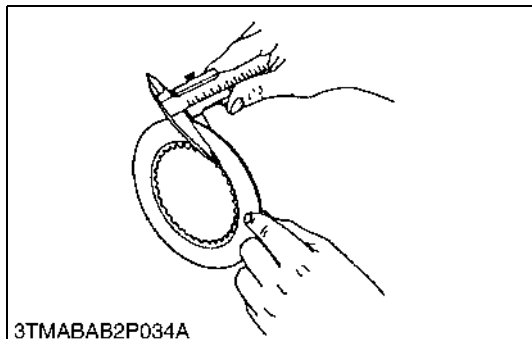
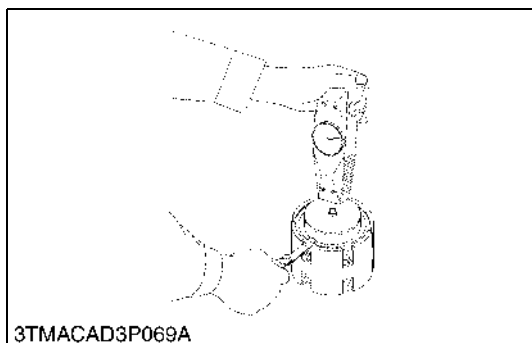
1. Measure the lever pin O.D. with an outside micrometer.
2. Measure the lever bushing I.D. with an inside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace it.

Clearance between lever pin and lever bushing	Factory specification	0.0490 to 0.156 mm 0.00193 to 0.00614 in.
	Allowable limit	0.5 mm 0.02 in.

Lever pin O.D.	Factory specification	13.957 to 13.984 mm 0.54959 to 0.55055 in.
Lever Bushing I.D.	Factory specification	14.033 to 14.113 mm 0.55248 to 0.55562 in.

9Y1210686TRS0140US0

[4] SHUTTLE CLUTCH PACK



Clearance between Internal Circlip and Belleville Washer (Cupped Spring Washer)

1. Measure the clearance between internal circlip and belleville washer (cupped spring washer) with a feeler gauge while applying specified force.
Specified force: 177 to 294 N (18.0 to 30.0 kgf, 39.7 to 66.1 lbf)
2. 3-points are measured, and the smallest value is assumed to be clearance.
3. If the clearance exceeds the allowable limit, measure the thickness of clutch disk and steel plate with vernier calipers.
4. If the thickness is less than the allowable limit, replace them.
5. Remeasure to confirm the correct clearance.

■ NOTE

- Clearance between internal circlip and belleville washer (cupped spring washer) is adjusted by two kinds of clutch disks with different thickness. Therefore, use the one of the same thickness when you change clutch disk.

Clearance between internal circlip and belleville washer (cupped spring washer)	Factory specification	1.8 to 2.0 mm 0.071 to 0.078 in.
	Allowable limit	3.6 mm 0.14 in.

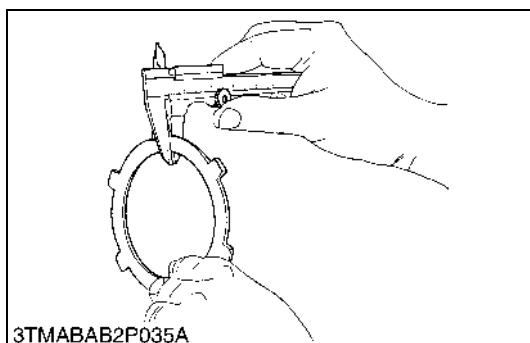
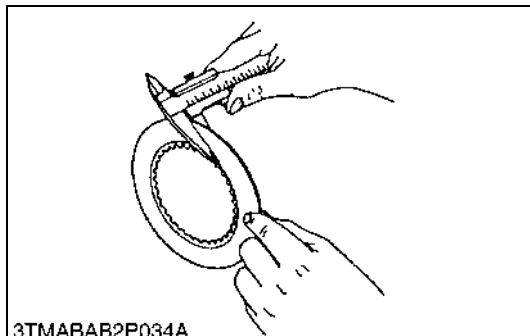
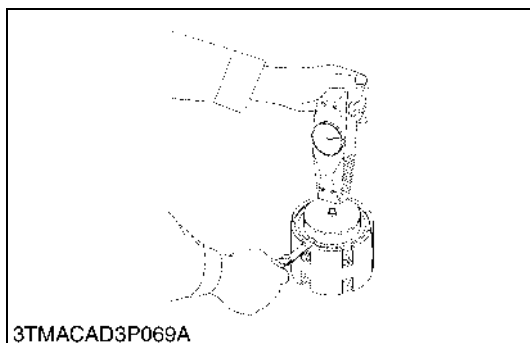
(Reference)

- There are two kinds of thickness of clutch disks.
- Thickness of plate and disk.

Steel plate	Factory specification	3.10 to 3.30 mm 0.122 to 0.129 in.
Pressure plate	Factory specification	4.42 to 4.58 mm 0.174 to 0.180 in.
Clutch disk (3C151-23131)	Factory specification	3.15 to 3.25 mm 0.124 to 0.127 in.
Clutch disk (3C151-23031)	Factory specification	3.30 to 3.40 mm 0.130 to 0.133 in.

9Y1210686TRS0141US0

[5] DUAL SPEED CLUTCH PACK



Clearance between Internal Circlip and Pressure Plate

1. Measure the clearance between internal circlip and pressure plate with a feeler gauge while applying specified force.
Specified force: 177 to 294 N (18.0 to 30.0 kgf, 39.7 to 66.1 lbf)
2. 3-points are measured, and the smallest value is assumed to be clearance.
3. If the clearance exceeds the allowable limit, measure the thickness of clutch disk and steel plate with vernier calipers.
4. If the thickness is less than the allowable limit, replace them.
5. Remeasure to confirm the correct clearance.

Clearance between internal circlip and pressure plate	Factory specification	1.3 to 1.7 mm 0.052 to 0.066 in.
	Allowable limit	2.0 mm 0.079 in.

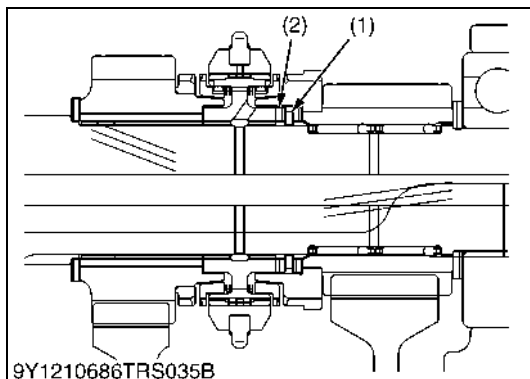
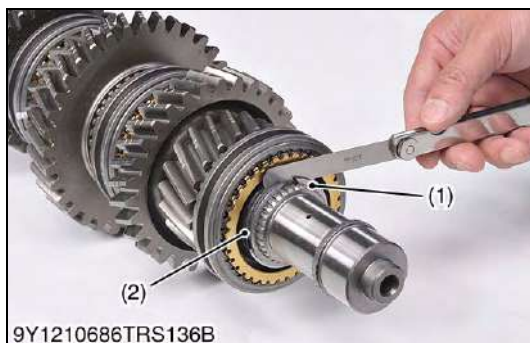
(Reference)

- Thickness of plate, disk and piston.

Steel plate	Factory specification	1.55 to 1.65 mm 0.0611 to 0.0649 in.
Pressure plate	Factory specification	3.92 to 4.08 mm 0.155 to 0.160 in.
Clutch disk	Factory specification	2.12 to 2.28 mm 0.0835 to 0.0897 in.

9Y1210686TRS0142US0

[6] SHAFT AND GEAR



Side Clearance of 1st Shaft

1. Measure the side clearance "L" between the external circlip (1) and thrust collar (2).
2. If clearance "L" exceeds the factory specification, adjust the clearance using adjusting collar (2).

(Reference)

- Thickness of adjusting collar (2)
 - 2.6 mm (0.10 in.) [Code No.: 3C151-28490]
 - 2.8 mm (0.11 in.) [Code No.: 3C151-28440]
 - 3.0 mm (0.12 in.) [Code No.: 3C151-28410]
 - 3.2 mm (0.12 in.) [Code No.: 3C151-28420]
 - 3.4 mm (0.13 in.) [Code No.: 3C151-28430]

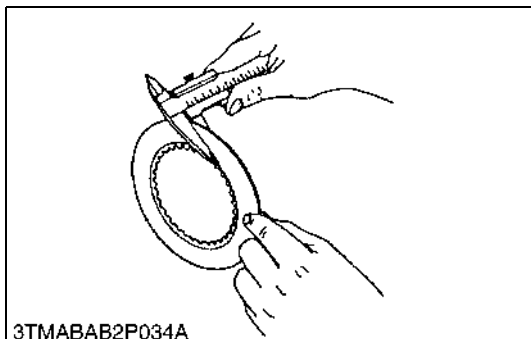
Clearance "L" between external circlip and collar on 1st shaft	Factory specification	Less than 0.2 mm 0.008 in.
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- (1) External Circlip
(2) Adjusting Collar

L: Clearance

9Y1210686TRS0143US0

[7] PTO CLUTCH PACK

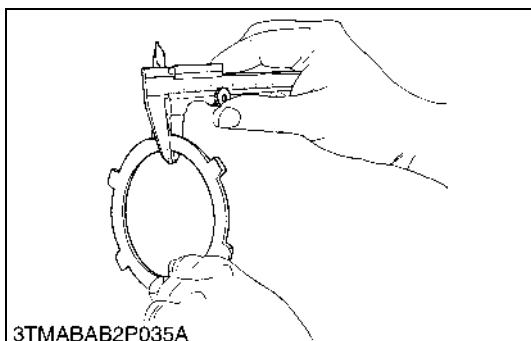


PTO Clutch Disk Wear

1. Measure the thickness of PTO clutch disk with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of PTO clutch disk	Factory specification	2.5 to 2.7 mm 0.098 to 0.106 in.
	Allowable limit	2.1 mm 0.083 in.

9Y1210686TRS0144US0



PTO Steel Plate Wear

1. Measure the thickness of PTO steel plate with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of PTO steel plate	Factory specification	1.93 to 2.07 mm 0.0760 to 0.0814 in.
	Allowable limit	1.80 mm 0.0709 in.

9Y1210686TRS0145US0

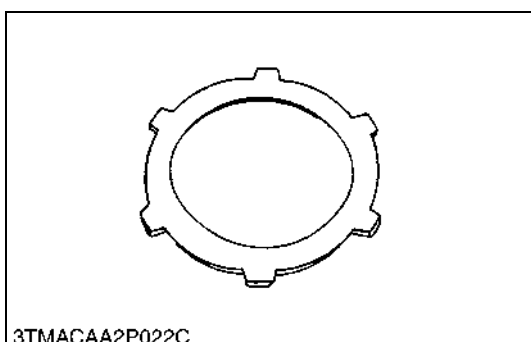


Flatness of PTO Piston and PTO Steel Plate

1. Place the part on a surface plate.
2. Try to insert a feeler gauge (allowable limit size) underneath it at least four points.
3. If the gauge can be inserted, replace it.

Flatness of PTO piston	Allowable limit	0.15 mm 0.0059 in.
Flatness of PTO steel plate	Allowable limit	0.30 mm 0.012 in.

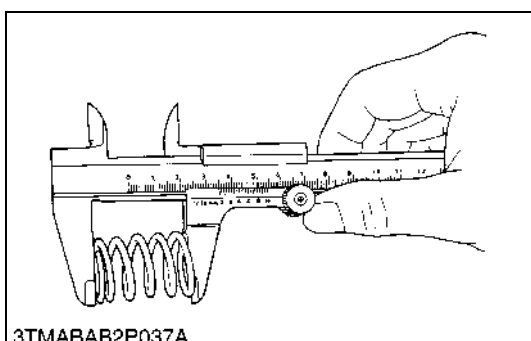
9Y1210686TRS0146US0



Plate

1. Check the contact surface to belleville washer (cupped spring washer).
2. If the back plate has deformed or is scratched and/or scared, replace it.

9Y1210686TRS0147US0

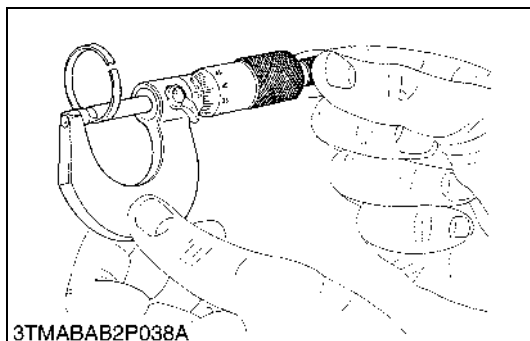


Piston Return Spring Free Length

1. Measure the free length of spring with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

PTO return spring free length	Factory specification	46.0 mm 1.81 in.
	Allowable limit	37.5 mm 1.48 in.

9Y1210686TRS0148US0



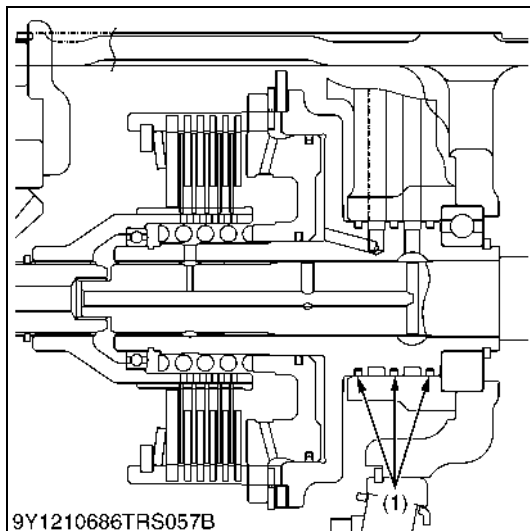
Thickness of Seal Ring

1. Measure the thickness of seal rings (1) with an outside micrometer.
2. If the measurement is less than the allowable limit, replace it.

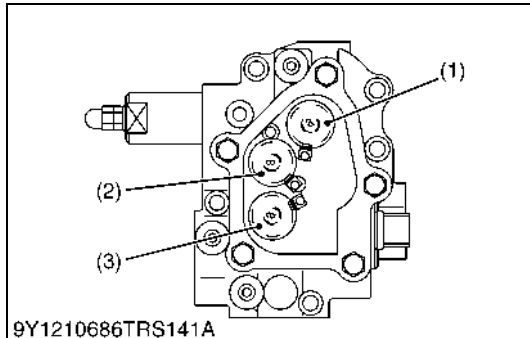
Thickness of seal ring	Factory specification	2.45 to 2.50 mm 0.096 to 0.098 in.
	Allowable limit	2.0 mm 0.079 in.

(1) Seal Ring

9Y1210686TRS0149US0



[8] SOLENOID VALVE



Solenoid Valve

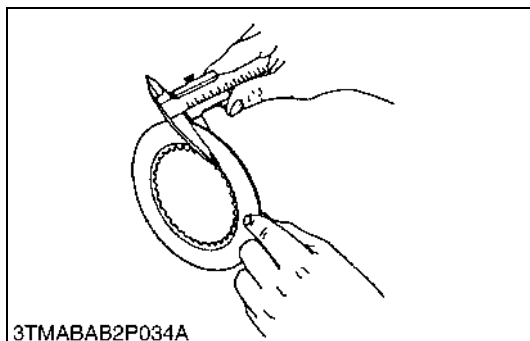
- See page 2-S29.

(1) PTO Solenoid Valve
(2) Differential Lock Solenoid

(3) 4WD Solenoid Valve

9Y1210686TRS0150US0

[9] 4WD CLUTCH PACK

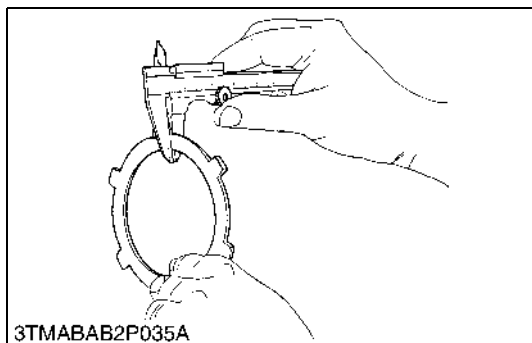


Clutch Disk Wear

1. Measure the thickness of clutch disk with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of clutch disk	Factory specification	2.1 to 2.3 mm 0.083 to 0.090 in.
	Allowable limit	1.9 mm 0.075 in.

9Y1210686TRS0151US0



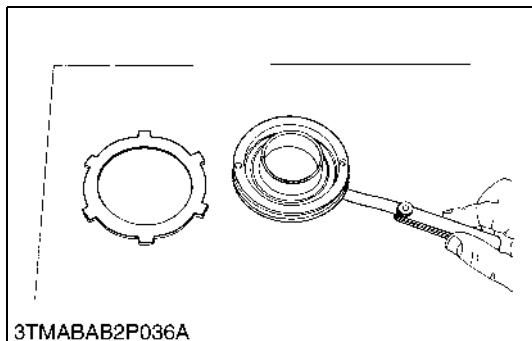
Steel Plate and Pressure Plate Wear

1. Measure the thickness of steel plate and pressure plate with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of steel plate	Factory specification	1.67 to 1.83 mm 0.0658 to 0.0720 in.
	Allowable limit	1.3 mm 0.051 in.

Thickness of pressure plate	Factory specification	4.42 to 4.58 mm 0.174 to 0.180 in.
	Allowable limit	3.7 mm 0.15 in.

9Y1210686TRS0152US0

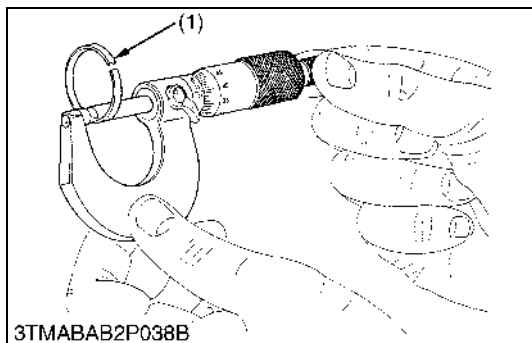


Flatness of Piston, Steel Plate and Pressure Plate

1. Place the part on a surface plate and check it unable to insert a feeler gauge (allowable limit size) underneath it (at least four points).
2. If the gauge can be inserted, replace it.

Flatness of piston	Allowable limit	0.15 mm 0.006 in.
Flatness of steel plate	Allowable limit	0.40 mm 0.016 in.
Flatness of pressure plate	Allowable limit	0.30 mm 0.012 in.

9Y1210686TRS0153US0



Thickness of Seal Ring

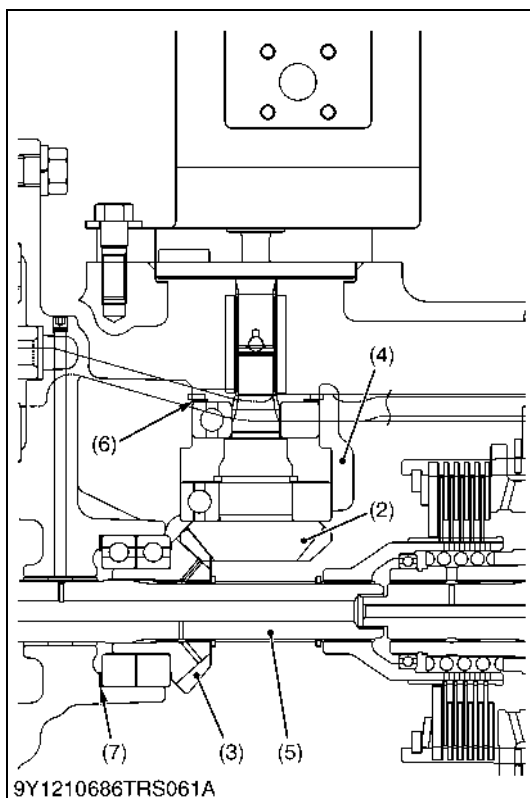
1. Measure the thickness of seal rings (1) with an outside micrometer.
2. If the measurement is less than the allowable limit, replace it.

Thickness of seal ring	Factory specification	2.39 to 2.44 mm 0.0941 to 0.0960 in.
	Allowable limit	2.0 mm 0.079 in.

(1) Seal Ring

9Y1210686TRS0154US0

[10] HYDRAULIC PUMP DRIVE GEAR



Backlash between 18T Bevel Gear and 19T Bevel Gear

1. Hold the fuse (1) in place with grease.
2. Assemble the 18T spiral bevel gear (2) to the bearing holder (4).
(See page 2-S79.)
3. Turn the PTO propeller shaft (5) using a damper disk or clutch disk.
4. Take out the fuse (1) and measure the thickness of pressed fuse.
5. If the measurement is not within the factory specification, adjust with shims (6), (7).

Backlash between 18T bevel gear and 19T bevel gear	Factory specification	0.15 to 0.30 mm 0.0059 to 0.011 in.
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(Reference)

- Thickness of 18T bevel gear shim:
1.0 mm (0.039 in.) [Code No. K5820-38130]
- Thickness of 19T bevel gear shim:
0.5 mm (0.02 in.) [Code No. 70180-51180]

- | | |
|---------------------------|-----------------------------------|
| (1) Fuse | (5) PTO Propeller Shaft |
| (2) 18T Spiral Bevel Gear | (6) Shim for 18T Bevel Gear Shaft |
| (3) 19T Spiral Bevel Gear | (7) Shim for 19T Bevel Gear |
| (4) Bearing Holder | |

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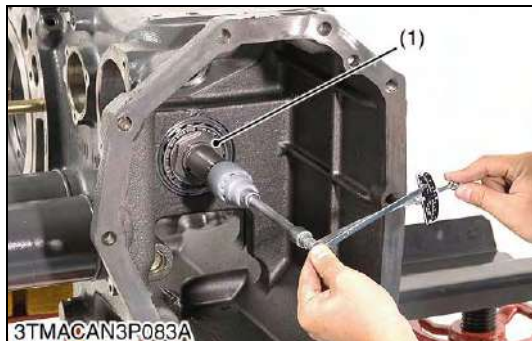
[11] DIFFERENTIAL GEAR

(1) Spiral Bevel Pinion Shaft

■ IMPORTANT

- When reassembling spiral bevel pinion shaft and differential assembly, be sure to adjust the following.
- Turning torque of spiral bevel pinion shaft only.
- Backlash and tooth contact between spiral bevel pinion shaft and spiral bevel gear.

9Y1210686TRS0156US0



Turning Torque of Spiral Bevel Pinion Shaft Only

1. Reassemble the spiral bevel pinion shaft and tighten the staking nut (1) with locking wrench and turning wrench.
2. After tapping the bevel pinion shaft to the front and rear, retighten the staking nut (1) to specified torque.
3. Measure the turning torque of spiral bevel pinion shaft.
4. If the measurement is not within the factory specifications, adjust the tightening torque of staking nut (1).

Turning torque of spiral bevel pinion shaft only	Factory specification	3.2 to 3.6 N·m 0.32 to 0.37 kgf·m 2.4 to 2.6 lbf·ft
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(Reference)

Tightening torque	Staking nut	93.2 to 102 N·m 9.50 to 10.5 kgf·m 68.8 to 75.9 lbf·ft
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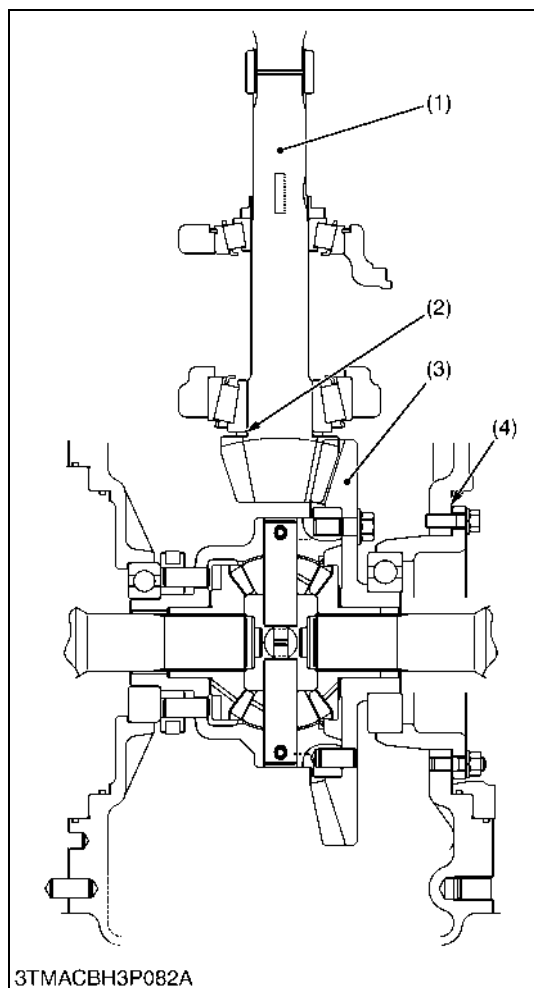
■ NOTE

- Stake the staking nut after performing adjustment described in the following pages.

(1) Staking Nut

9Y1210686TRS0157US0

(2) Backlash and Tooth Contact



Backlash and Tooth Contact between Spiral Bevel Gear and Spiral Bevel Pinion Shaft

1. Set the dial indicator (lever type) with its finger on the tooth surface.
2. Measure the backlash by fixing the spiral bevel pinion shaft (1) and moving the spiral bevel gear (3) by hand.
3. When the backlash is too large, decrease the number of shims (4).
When the backlash is too small, increase the number of shims (4).
4. Adjust the backlash properly by repeating the above procedure.
5. Apply red lead lightly over several teeth at three positions equally spaced on the spiral bevel gear.
6. Turn the spiral bevel pinion shaft, while pressing a wooden piece against the periphery on the spiral bevel gear.
7. Check the tooth contact. If not proper, adjust according to the instructions next page.

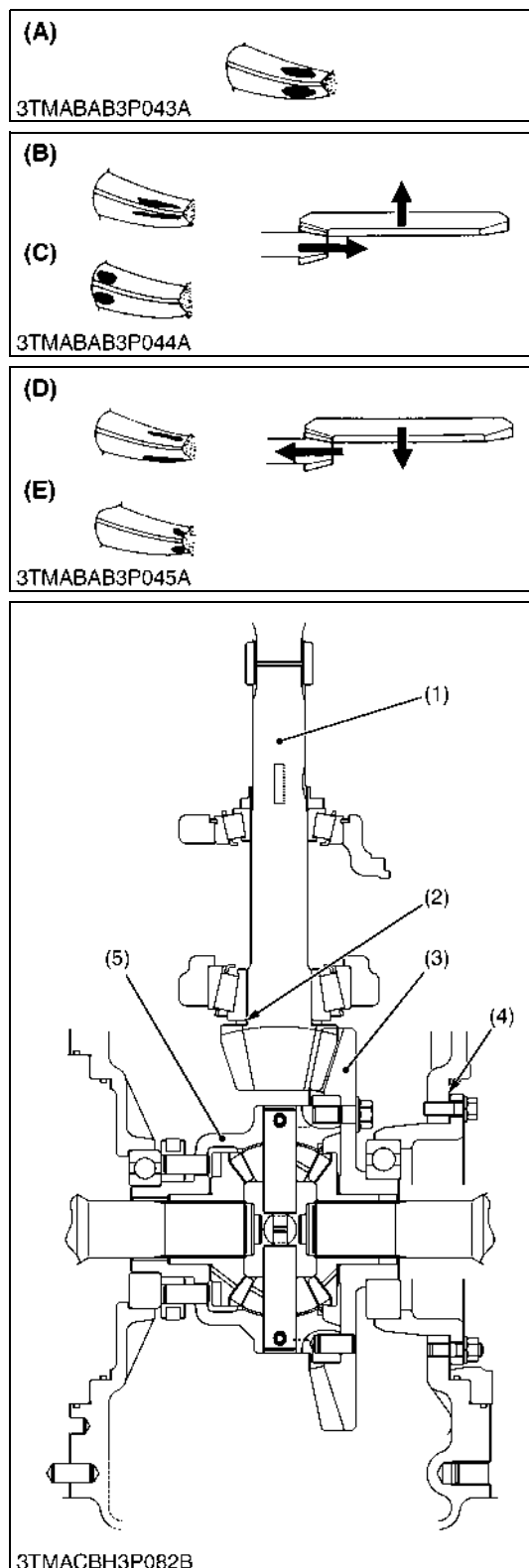
Backlash between spiral bevel gear and spiral bevel pinion shaft	Factory specification	0.2 to 0.3 mm 0.008 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

(Reference)

- Thickness of adjusting shim (4)
0.1 mm (0.004 in.) [Code No. 3C081-32130]
0.3 mm (0.012 in.) [Code No. 3C081-32140]
0.5 mm (0.020 in.) [Code No. 3C081-32150]
- Thickness of adjusting collar (2)
0.8 mm (0.031 in.) [Code No. 36200-32610]
1.0 mm (0.039 in.) [Code No. 36200-32630]
1.2 mm (0.047 in.) [Code No. 36200-32650]
1.4 mm (0.055 in.) [Code No. 36200-32670]
1.6 mm (0.063 in.) [Code No. 36200-32690]

- | | |
|-------------------------------|-----------------------|
| (1) Spiral Bevel Pinion Shaft | (3) Spiral Bevel Gear |
| (2) Adjusting Collar | (4) Shim |

(To be continued)

(Continued)

- **Proper Contact**

More than 35 % red lead contact area on the gear tooth surface.
The center of tooth contact at 1/3 of the entire width from the small end.

- **Shallow or Heel Contact**

Replace the adjusting collar (2) with thicker one to move the spiral bevel pinion shaft backward.

And reduce the shim (4) to move the spiral bevel gear rightward.

Repeat above until the proper tooth contact and backlash are achieved.

- **Deep or Toe Contact**

Replace the adjusting collar (2) with a thinner one to move the spiral bevel pinion shaft forward.

And increase the shim (4) to move the spiral bevel gear leftward.

Repeat above until the proper tooth contact and backlash are achieved.

- (1) Spiral Bevel Pinion Shaft
- (2) Adjusting Collar
- (3) Spiral Bevel Gear
- (4) Shim
- (5) Differential Case

- (A) **Proper Contact**
- (B) **Shallow Contact**
- (C) **Heel Contact**
- (D) **Deep Contact**
- (E) **Toe Contact**

9Y1210686TRS0158US0

(3) Differential Case Differential Pinion Gear and Differential Side Gear



Clearance between Differential Case Bore (35T Bevel Gear Bore) and Differential Side Gear Boss

1. Measure the bore I.D. of the differential case and 35T bevel gear.
2. Measure the differential side gear boss O.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

Clearance between differential case bore and differential side gear boss	Factory specification	0.0700 to 0.189 mm 0.00276 to 0.00744 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case bore I.D.	Factory specification	49.07 to 49.15 mm 1.932 to 1.9354 in.
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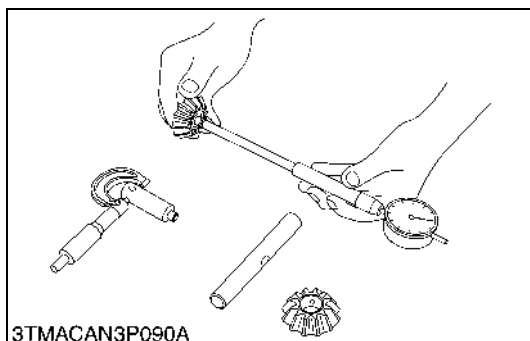
Differential side gear boss O.D.	Factory specification	48.961 to 49.066 mm 1.9276 to 1.9317 in.
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Clearance between 35T bevel gear bore and differential side gear boss	Factory specification	0.0700 to 0.189 mm 0.00276 to 0.00744 in.
	Allowable limit	0.35 mm 0.014 in.

35T bevel gear bore I.D.	Factory specification	49.07 to 49.15 mm 1.932 to 1.935 in.
--------------------------	-----------------------	---

Differential side gear boss O.D.	Factory specification	48.961 to 49.066 mm 1.9276 to 1.9317 in.
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9Y1210686TRS0159US0



Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinion shaft O.D.
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceed the allowable limit, replace them.

Clearance between differential pinion shaft and differential pinion	Factory specification	0.0600 to 0.102 mm 0.00237 to 0.00401 in.
	Allowable limit	0.25 mm 0.010 in.

Differential pinion shaft O.D.	Factory specification	22.959 to 22.980 mm 0.90390 to 0.90472 in.
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Differential pinion I.D.	Factory specification	23.040 to 23.061 mm 0.90709 to 0.90791 in.
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9Y1210686TRS0160US0



Backlash between Differential Pinion and Differential Side Gear

1. Set a dial indicator (lever type) on the tooth of the differential pinion.
2. Hold the differential side gear and move the differential pinion to measure the backlash.
3. If the measurement is not within the factory specifications, adjust with the differential side gear washer.

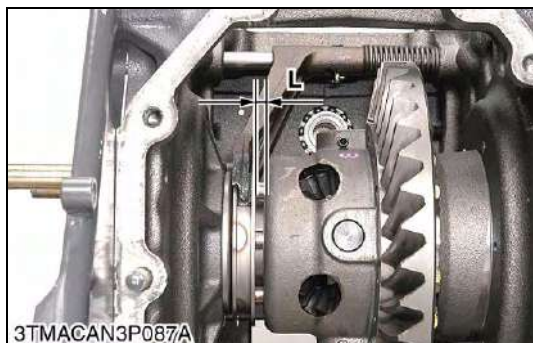
Backlash between differential pinion and differential side gear	Factory specification	0.15 to 0.30 mm 0.0059 to 0.011 in.
	Allowable limit	0.4 mm 0.02 in.

(Reference)

- Thickness of differential side gear washer:
1.5 mm (0.059 in.) [Code No. 33740-32760]
1.6 mm (0.063 in.) [Code No. 33740-32780]
1.7 mm (0.067 in.) [Code No. 33740-32790]

(1) Side Gear Washer

9Y1210686TRS0161US0



Clearance of Differential Lock Shifter (F8/R8 and F12/R12 Speed Transmission Model)

1. Measure the clearance (L) between differential lock shifter and differential case when the differential lock pedal **OFF** position.
2. If the measurement is not within the factory specifications, adjust with adjusting shim (2).

Clearance (L)	Factory specification	6.0 to 8.0 mm 0.24 to 0.31 in.
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(Reference)

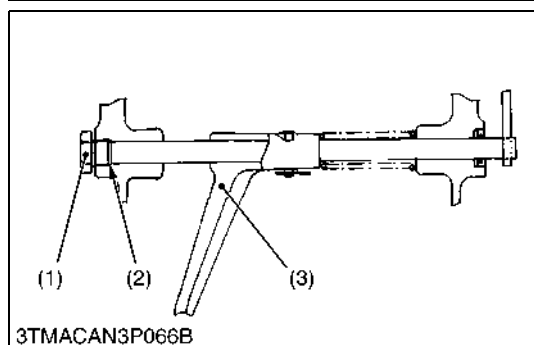
- 0.5 mm (0.02 in.) [Code No. 36200-32950]
1 mm (0.03 in.) [Code No. 36330-32970]

(1) Plug

(3) Shift Fork

(2) Adjusting Shim (0.5 mm, 0.02 in.)

9Y1210686TRS0162US0



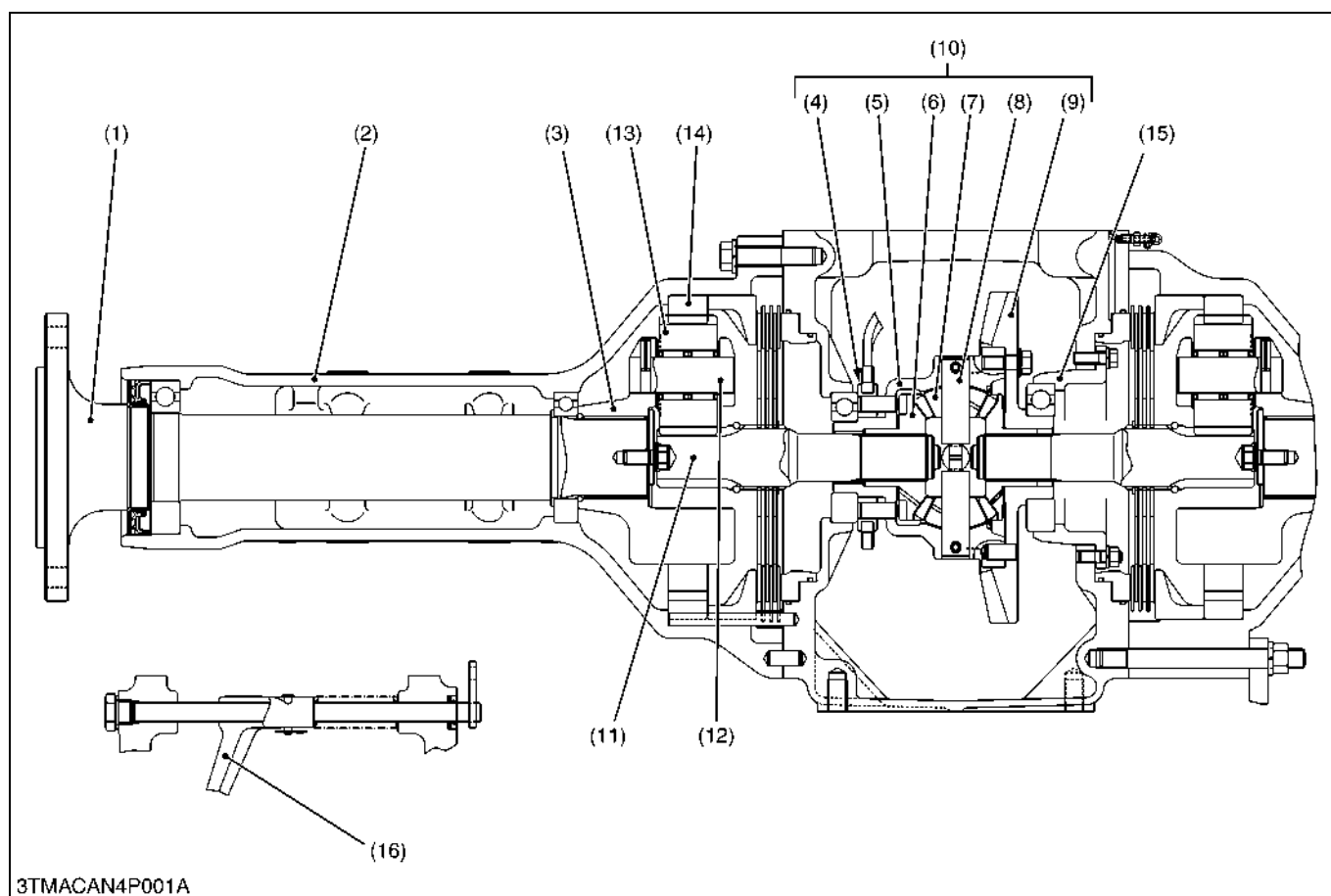
3 REAR AXLE

MECHANISM

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1. FEATURES.....	3-M1
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1. FEATURES



- | | | | |
|-------------------------------|-------------------------------|-----------------------------|-----------------------------------|
| (1) Rear Axle | (5) Differential Case | (9) 35T Bevel Gear | (13) 27T Planetary Gear |
| (2) Rear Axle Case | (6) Differential Side Gear | (10) Differential Gear | (14) 66T Internal Gear |
| (3) Planetary Gear Support | (7) Differential Pinion Gear | (11) Brake Shaft (12T Gear) | (15) Differential Bearing Support |
| (4) Differential Lock Shifter | (8) Differential Pinion Shaft | (12) Planetary Gear Pin | (16) Differential Lock Shift Fork |

The rear axles are the final mechanism which transmit power from the transmission to the rear wheels. Direction of power transmitted is changed at a right angle by the differential gear (10) and, at the same time, speed is reduced. It is further reduced by the planetary gear to drive the rear axles.

The rear axles (1) are semi-floating type with the ball bearing between the rear axle (1) and rear axle case (2), which support the rear wheel load as well as transmitting power to the rear wheel. They withstand all the forces caused by tire rotation and side skidding.

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SERVICING

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1. TROUBLESHOOTING.....	3-S1
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[1] PREPARATION FOR DISASSEMBLING AND ASSEMBLING VALVE	3-S4
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[2] PLANETARY GEAR	3-S16

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive or Unusual Noise at All Time	Improper backlash between planetary gear and internal gear	Replace	3-S16
	Bearing worn	Replace	3-S16
	Insufficient or improper type of transmission fluid used	Replace	G-12

9Y1210686RAS0002US0

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Internal Gear to Planetary Gear	Backlash	0.2 to 0.4 mm 0.008 to 0.01 in.	0.5 mm 0.02 in.
Thrust Collar	Thickness	1.55 to 1.65 mm 0.0611 to 0.0649 in.	1.2 mm 0.047 in.
Planetary Gear to Planetary Gear Shaft	Clearance	0.0090 to 0.048 mm 0.00036 to 0.0018 in.	0.3 mm 0.01 in.
• Planetary Gear Shaft	O.D.	29.991 to 30.000 mm 1.1808 to 1.1811 in.	—
• Planetary Gear	I.D.	42.009 to 42.025 mm 1.6539 to 1.6545 in.	—
• Needle	O.D.	5.994 to 6.000 mm 0.2360 to 0.2362 in.	—

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3. TIGHTENING TORQUES

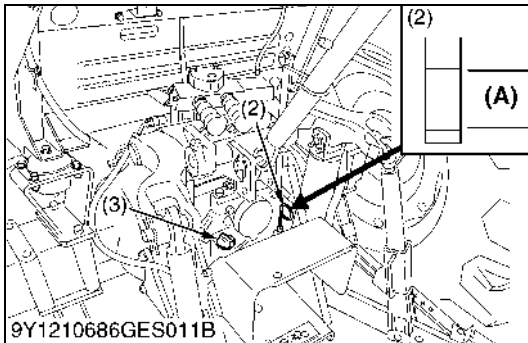
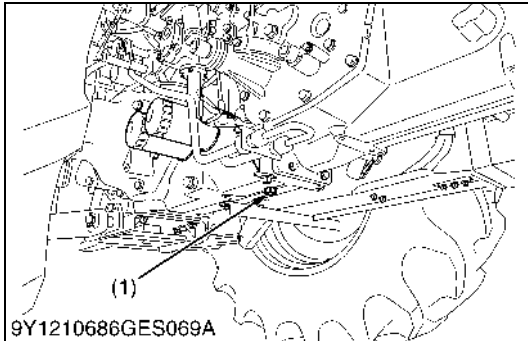
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : Refer to G-14.)

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting nut	344 to 392	35.0 to 40.0	254 to 289
ROPS under frame mounting screw (M16, 9T)	260 to 304	26.5 to 31.0	192 to 224
Rear axle case mounting screw and nut	197 to 225	20.0 to 23.0	145 to 166
Stabilizer bracket mounting screw (M16, 9T)	260 to 304	26.5 to 31.0	192 to 224
Cabin mounting bolt and nut (M14, 7T)	124 to 147	12.6 to 15.0	91.2 to 108
Retainer mounting screw	89.3 to 103	9.10 to 10.6	65.9 to 76.6

9Y1210686RAS0004US0

4. DISASSEMBLING AND ASSEMBLING

[1] PREPARATION FOR DISASSEMBLING AND ASSEMBLING VALVE



Draining Transmission Fluid

1. Place oil pan underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid.
4. Reinstall the drain plugs (1).

(When reassembling)

- Fill up from filling port (2) after removing the filling plug up to the upper notch on the dipstick (3).
- After running the engine for a few minutes, stop it and check the fluid level again, add the fluid to prescribed level if it is not correct level.

Transmission fluid	Capacity	60.0 L 63.4 U.S.qts 52.7 Imp.qts
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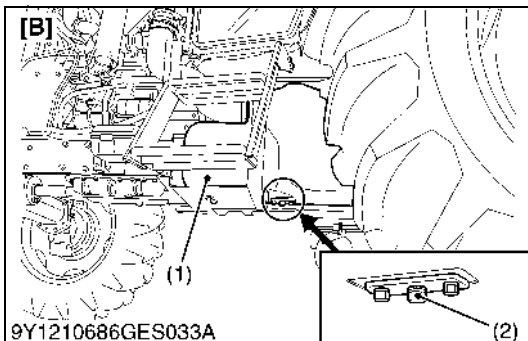
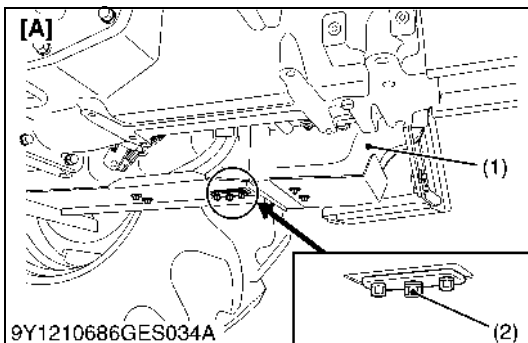
■ IMPORTANT

- Use only KUBOTA SUPER UDT fluid. Use of other oil may damage the transmission or hydraulic system. (Refer to G-12.)
- Do not mix different brands fluid together.

- (1) Drain Plug
(2) Dipstick
(3) Filling Port

(A) Oil level is acceptable with this range.

9Y1210686TRS0014US0



Draining Fuel

1. Place oil pans under the right side fuel tank.
2. Remove the drain cover (2) at the bottom of side fuel tank (1).
3. Drain the fuel.
4. Reinstall the drain cover (2) on the fuel tank (1).

(When reassembling)

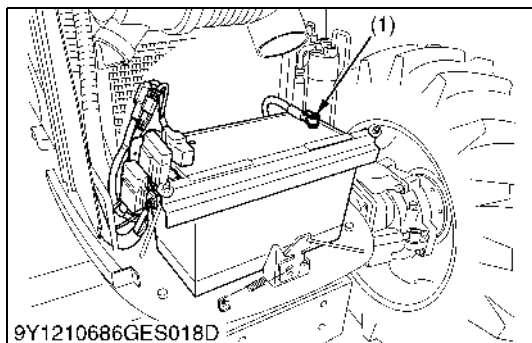
- Be sure to fix the O-ring is in position on the drain cover (2).

Fuel tank	Capacity	ROPS	90.0 L 23.8 U.S.gals 19.8 Imp.gals
		CABIN	110 L 29.1 U.S.gals 24.2 Imp.gals

- (1) Fuel Tank
(2) Drain Cover

[A] ROPS Model
[B] CABIN Model

9Y1210686TRS0120US0



Disconnecting battery negative terminal

1. Open the bonnet
2. Disconnect the battery negative terminal (1)

(1) Negative terminal

9Y1210686TRS0166US0



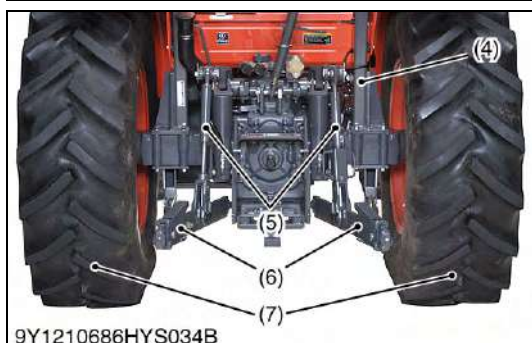
Front Axle Rocking Restrictor

1. Chock the wheels and install the front axle rocking restrictor (1) to the front axle bracket on both sides. (See page G-68)

(1) Front Axle Rocking Restrictor

9Y1210686TRS0026US0

[2] SEPARATING REAR AXLE (ROPS MODEL)



ROPS, Lower Link, Lift Rod and Rear Wheel

1. Loosen the ROPS under frame (4) mounting screws. (Do not remove screws.)
2. Remove the ROPS upper frame (1).
3. Remove the lift rod (5) and lower link (6).
4. Chock the front wheels and place the disassembling stand under the transmission case.
5. Remove the both rear wheels (7) and then place the disassembling stand under the rear axle case.

(When reassembling)

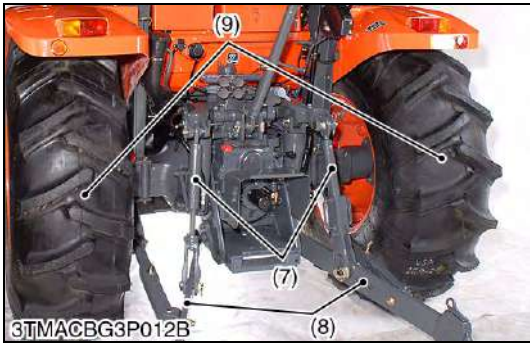
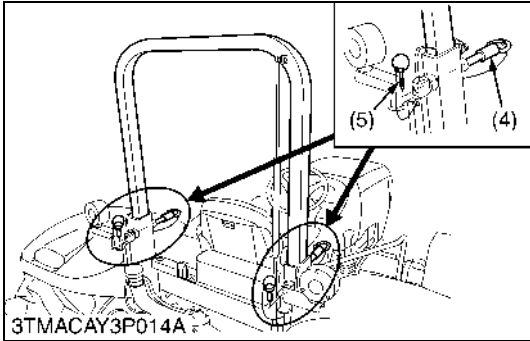
- To assemble the ROPS, fix the upper frame with screw (2) and pin (3) temporarily, then tighten the under frame screws evenly with specified torque.
- Adjust the upper frame does not fall down with screw (2).

Tightening torque	Rear wheel mounting nut	344 to 392 N·m 35.0 to 40.0 kgf·m 254 to 289 lbf·ft
	ROPS under frame mounting screw (M16, 9T)	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 lbf·ft
ROPS upper frame lift up force at center of upper frame	Reference value	246 to 284 N 25.0 to 29.0 kgf 55.2 to 63.9 lbf

- (1) ROPS Upper Frame
(2) Screw
(3) Pin
(4) ROPS Under Frame

- (5) Lift Rod
(6) Lower Link
(7) Rear Wheel

9Y1210686TRS0044US0



ROPS, Lower Link, Lift Rod and Rear Wheel (Low Profile Model)

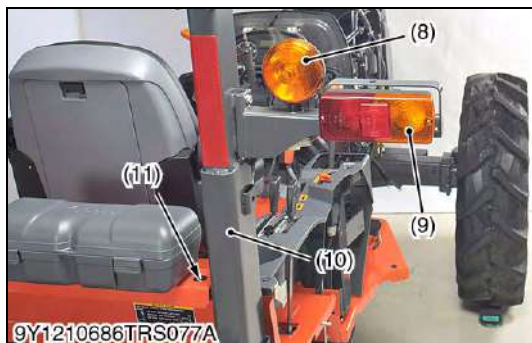
- 1. Hook the upper frame (1).
- 2. Remove the damper mounting nut (2).
- 3. Remove the lynch pin (5) and set bolt (4).
- 4. Remove the upper frame (1) using a hoist.
- 5. Remove the external position control rod (6).
- 6. Remove the lift rod (7) and lower link (8).
- 7. Place the disassembling stand under the transmission case.
- 8. Remove the rear wheels (9).

(When reassembling)

Tightening torque	Rear wheel mounting nut	344 to 392 N·m 35.0 to 40.1 kgf·m 254 to 289 lbf·ft
-------------------	-------------------------	---

- | | |
|-----------------|-----------------------------------|
| (1) Upper Frame | (6) External Position Control Rod |
| (2) Nut | (7) Lift Rod |
| (3) Damper | (8) Lower Link |
| (4) Set Bolt | (9) Rear Wheel |
| (5) Lynch Pin | |

9Y1210686TRS0169US0



Fender (R.H.) and ROPS Under (R.H.)

1. Remove the cover (1) and then disconnect **3P** connector for PTO clutch control switch.
2. Loosen the retaining nut (2).
3. Remove the pin (3) and then disconnect the auxiliary control valve wire (4).
4. Remove the auxiliary control valve wire cover (5).
5. Remove the screws (6) and then the fender (R.H.) (7).
6. Disconnect the **4P** connector and two **1P** connectors for combination lamp (9) and hazard lamp (8).
7. Remove the screw (11) and then remove the ROPS under (10).

(When reassembling)

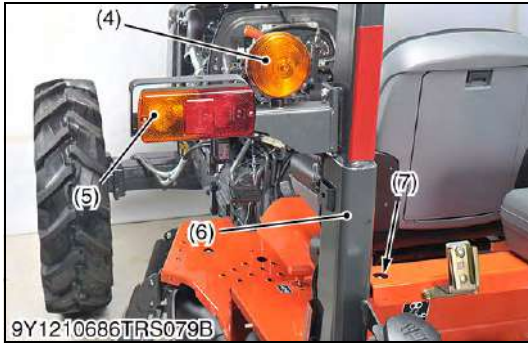
- Tighten the screw (6) with the cushion rubber.
- Be sure to connect the connectors.
- Be sure to reroute the OPC buzzer harness.

■ NOTE

- After assembling, check the auxiliary control system (see page 7-S17).

- | | |
|--|----------------------------------|
| (1) Cover (Auxiliary Control Valve Lever and PTO Switch) | (6) Fender (R.H.) Mounting Screw |
| (2) Retaining Nut | (7) Fender (R.H.) |
| (3) Pin | (8) Hazard Lamp |
| (4) Wire (Auxiliary Control Valve) | (9) Combination Lamp |
| (5) Auxiliary Wire Cover | (10) ROPS Under (R.H.) |
| | (11) Screw |

9Y1210686TRS0045US0



Fender (L.H.) and ROPS Under (L.H.)

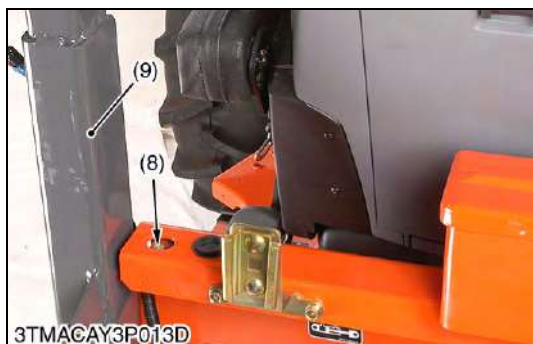
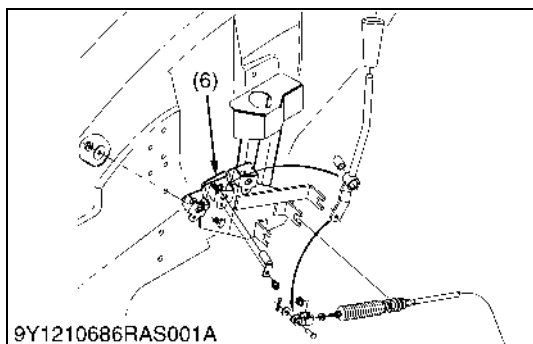
1. Remove the fuel filling port (1) fixing screw.
2. Unscrew the fender mounting screws (2) and then remove the fender (3).
3. Disconnect the **4P** connector and two **1P** connectors for combination lamp (5) and hazard lamp (4).
4. Remove the screw (7) and the ROPS under (6).

(When reassembling)

- Tighten the screw (2) with the cushion rubber.
- Be sure to connect the connectors.
- Be sure to fix the breather hose.

- | | |
|-----------------------|-----------------------|
| (1) Fuel Filling Port | (5) Combination Lamp |
| (2) Screw | (6) ROPS Under (L.H.) |
| (3) Fender (L.H.) | (7) Screw |
| (4) Hazard Lamp | |

9Y1210686RAS0025US0



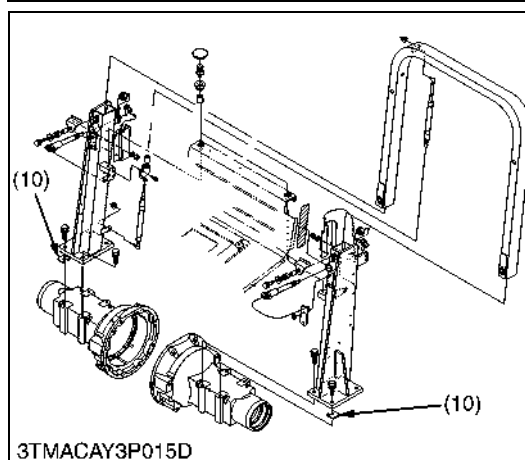
Fender and ROPS Under (Low Profile Model)

1. Remove the fuel filling port (1) fixing screw.
2. Remove the harness cover (2) and disconnect the **4P** connector (3) and **1P** connector (4) and remove the wire harness from ROPS under.
3. Remove the auxiliary lever bracket (6).
4. Remove the both fenders (5).
5. Remove the screw (8) on both sides then take out the ROPS under L.H. (9) and R.H. (7).

(When reassembling)

- Be sure to assemble the fender to the original height.
- If the adjusting shim (10) uses between the ROPS under and rear axle case, assemble the shim to the original position.
- Be sure to check the ROPS slides smoothly, after assembling. If ROPS does not slide smoothly, adjust with shim (10).

Tightening torque	ROPS under frame mounting screw (M16, 9T)	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 lbf·ft
-------------------	---	---



- | | |
|-------------------------|-----------------------------|
| (1) Fuel Filling Port | (6) Auxiliary Lever Bracket |
| (2) Harness Cover | (7) ROPS Under R.H. |
| (3) 4P Connector | (8) Screw |
| (4) 1P Connector | (9) ROPS Under L.H. |
| (5) Fender | (10) Shim |

9Y1210686RAS0026US0



Removing Rear Axle Assembly

1. Remove the cylinder support (1).
2. Remove the rear axle case mounting screws and nuts.
3. Support the rear axle case with nylon lift strap and hoist.
4. Separate the rear axle case from transmission case.

(When reassembling)

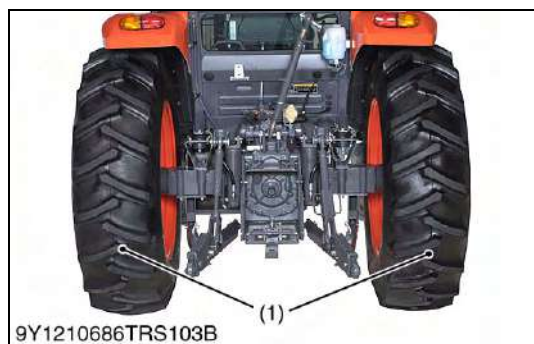
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and transmission case, after eliminate the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting screw and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
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(1) Cylinder Support

9Y1210686RAS0009US0

[3] SEPARATING REAR AXLE (CABIN MODEL)



Rear Wheel

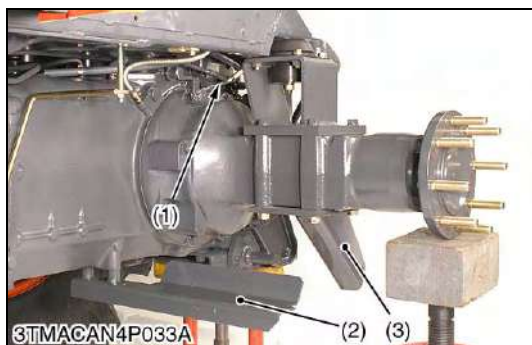
1. Place the disassembling stand under the transmission case.
2. Remove rear wheels.

(When reassembling)

Tightening torque	Rear wheel mounting nut	344 to 392 N·m 35.0 to 40.0 kgf·m 254 to 289 lbf·ft
-------------------	-------------------------	---

(1) Rear Wheel

9Y1210686RAS0013US0



Auxiliary Step and Fuel Tank

1. Unscrew the cover mounting screws (1).
2. Unscrew the fuel filling port mounting screw (2).
3. Remove the auxiliary step (3) and disconnect the wire harness from fuel level sensor (4).
4. Remove the fuel hose cover (5) and the both fuel tank band (6).
5. Draw out the fuel tank and disconnect the breather hoses (7) and (8).
6. Disconnect the fuel hose (9) and return hose (10).

(When reassembling)

- Be sure to connect the fuel sensor connector.
- Be sure to fix the fuel hoses and breather hose.

- | | |
|--------------------------------------|---------------------------|
| (1) Under Cover Mounting Screw | (6) Fuel Tank Band |
| (2) Fuel Filling Port Mounting Screw | (7) Breather Hose (Front) |
| (3) Auxiliary Step | (8) Breather Hose (Rear) |
| (4) Fuel Lever Sensor | (9) Fuel Hose |
| (5) Fuel Hose Cover | (10) Fuel Return Hose |

9Y1210686RAS0001US0

Fuel Tank Stay, Position Feedback and Stabilizer Bracket

1. Support the cabin frame.
2. Remove the fuel tank stay (2).
3. Remove the position feedback rod (1).
4. Remove the stabilizer bracket (3).

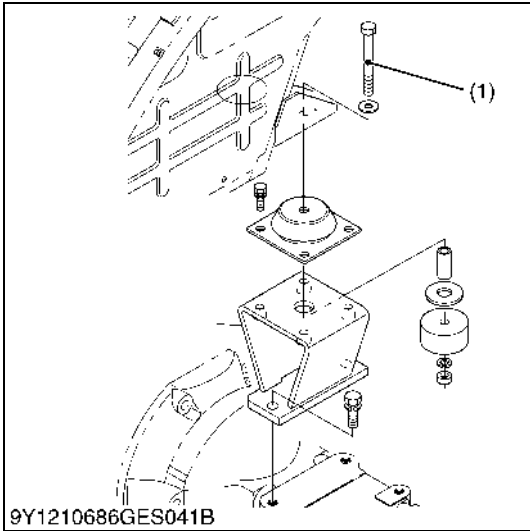
(When reassembling)

- After assembling check and adjust the position feedback rod (see page 7-S9).

Tightening torque	Stabilizer bracket mounting screw (M16, 9T)	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 lbf·ft
-------------------	---	---

- | | |
|----------------------------|------------------------|
| (1) Position Feedback Stay | (3) Stabilizer Bracket |
| (2) Fuel Tank Stay | |

9Y1210686RAS0012US0



Removing Rear Axle Assembly

1. Remove the cylinder support (2).
2. Support the cabin and remove the cabin mounting bolt (1).
3. Remove the rear axle case mounting screws and nuts.
4. Support the rear axle case with nylon lift strap and hoist.
5. Separate the rear axle case from transmission case.

IMPORTANT

- Be sure to support the rear axle and make sure the balance for support position.
- Hoist up and support the rear axle underneath as shown in the photo.

(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and transmission case, after eliminate the water, oil and stuck liquid gasket.
- Be sure to assemble the cabin mount as shown figure.

Tightening torque	Cabin mounting bolt and nut (M14, 7T)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
	Rear axle case mounting screw and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft

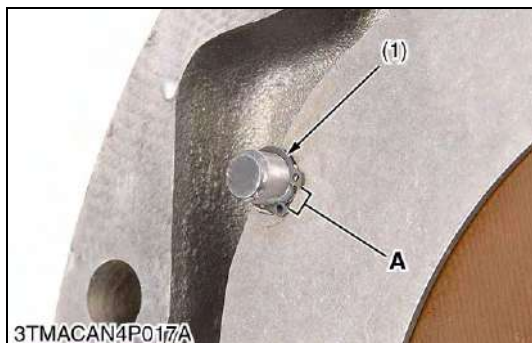
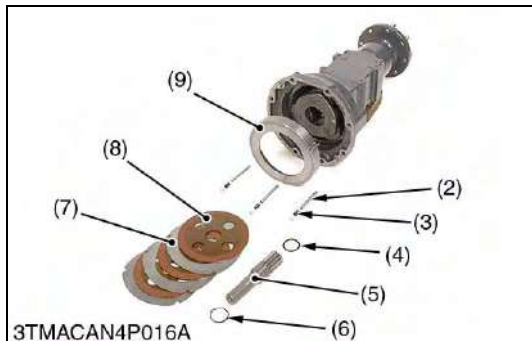
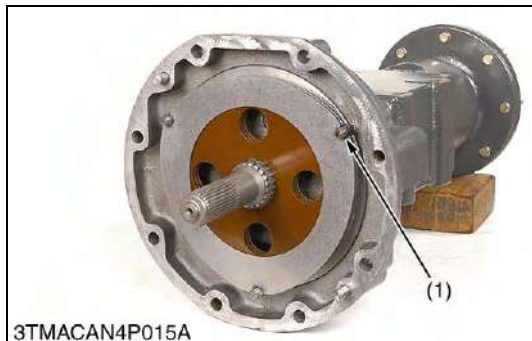
(1) Cabin Mounting Bolt

(2) Cylinder Support

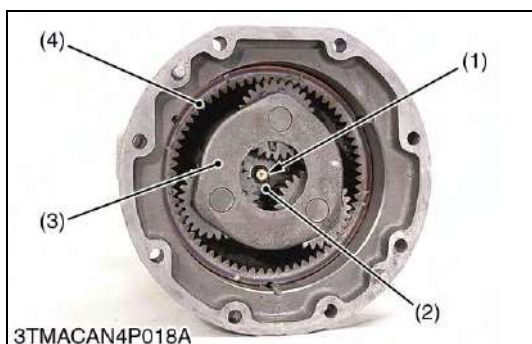
9Y1210686RAS0014US0

[4] DISASSEMBLING REAR AXLE

(1) Brake Section



(2) Rear Axle Case



Brake Shaft, Brake Disk, Steel Plate and Brake Plate

1. Remove the external circlip (1).
2. Draw out the brake shaft (5) with brake disk (8) and steel plates (7).
3. Remove the external circlip (6).
4. Remove the brake plate (9), collar (3) and pin (2).

(When reassembling)

- Place the brake disks (8) so that the holes aligned to next holes.
- The pin (2) does not have groove for external circlip (1).
- Face the external circlip (1) gap to brake shaft.

- (1) External Circlip
- (2) Pin
- (3) Collar
- (4) O-ring
- (5) Brake Shaft
- (6) External Circlip

- (7) Steel Plate
- (8) Brake Disk
- (9) Brake Plate

A : Gap

9Y1210686RAS0015US0

Planetary Gear Support

1. Remove the retainer mounting screw (1),
2. Carefully remove the planetary gear support (3).
3. Remove the internal gear (4).

(When reassembling)

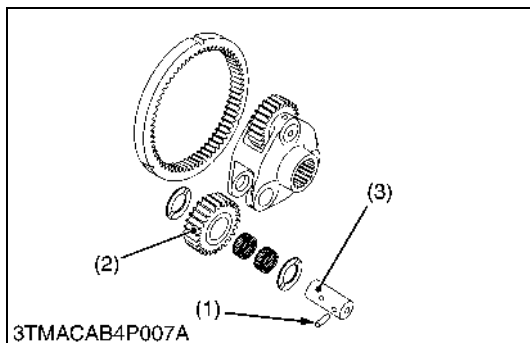
- Be sure to insert the retainer plate (2).

Tightening torque	Retainer mounting screw	89.3 to 103 N·m 9.10 to 10.6 kgf·m 65.9 to 76.6 lbf·ft
-------------------	-------------------------	--

- (1) Retainer Mounting Screw
- (2) Retainer Plate

- (3) Planetary Gear Support
- (4) Internal Gear

9Y1210686RAS0016US0



Planetary Gear

1. Tap out roll pin (1) into the planetary gear shaft (3).
2. Draw out the planetary gear shaft (3), and remove the planetary gear (2).
3. Tap out the roll pin from the planetary gear shaft.

(When reassembling)

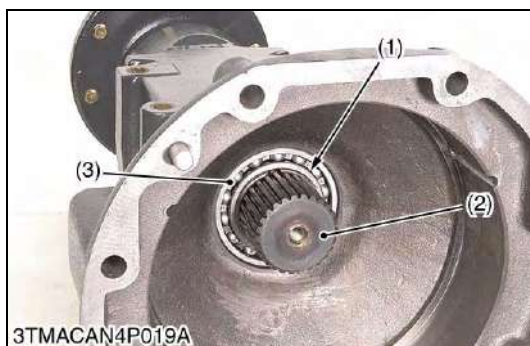
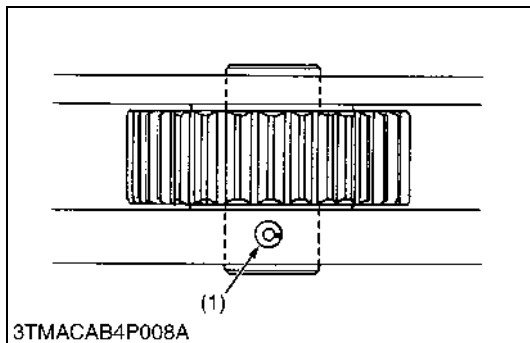
- Apply transmission fluid to the inner surface of planetary gear (2).
- Tap out the roll pin (1) as shown in the figure.

(1) Roll Pin

(3) Planetary Gear Shaft

(2) Planetary gear

9Y1210686RAS0017US0



Rear Axle

1. Remove the external circlip (1).
2. Tap out the rear axle (2) half way.
3. Remove the ball bearing (3) and external circlip (4) from rear axle.
4. Tap out the rear axle (2).
5. Tap out the ball bearing (5) and oil seal (6) together.

(1) External Circlip

(4) External Circlip

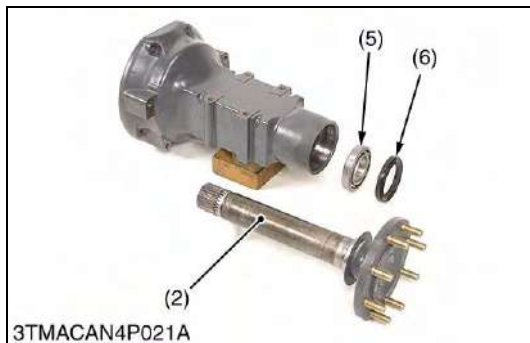
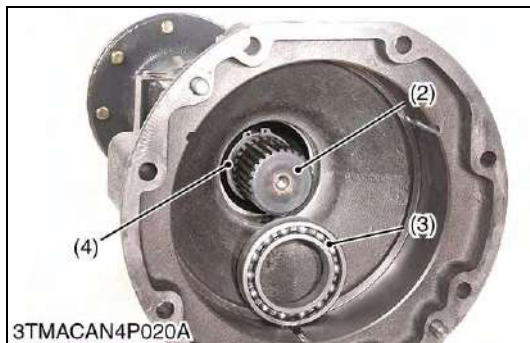
(2) Rear Axle

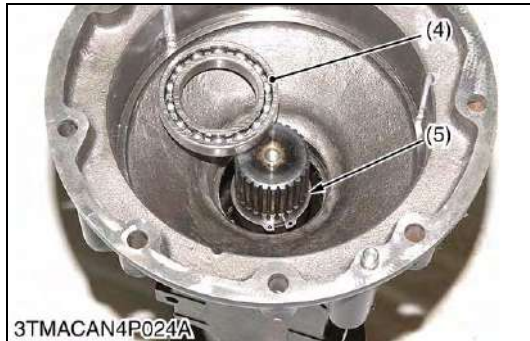
(5) Ball Bearing

(3) Ball Bearing

(6) Oil Seal

9Y1210686RAS0018US0





Assembling Procedure for Rear Axle

1. Assemble the ball bearing (2) to the rear axle case.
2. Assemble the oil seal 1 (1), face the seal lip to outside.
3. Assemble the oil seal 2 (3) to the rear axle.
4. Assemble the rear axle to rear axle case.
5. Assemble the external circlip (5) then tap in the ball bearing (4) to the rear axle shaft.

(When reassembling)

- Apply transmission fluid to the oil seal when insert the rear axle to rear axle case.

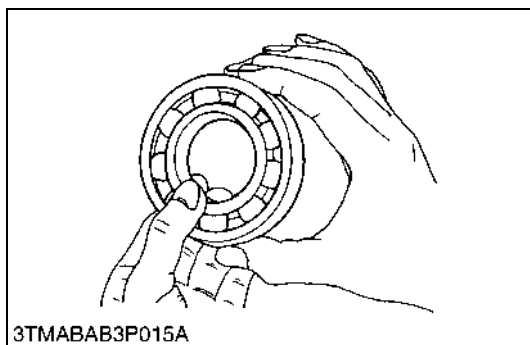
- (1) Oil Seal 1
(2) Ball Bearing
(3) Oil Seal 2

- (4) Ball Bearing
(5) External Circlip

9Y1210686RAS0019US0

5. SERVICING

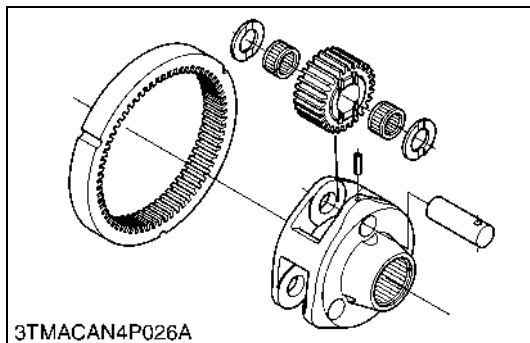
[1] BEARING



Ball Bearing

1. Hold the inner race, push and pull the outer race in all directions to check for wear and roughness.
2. Apply transmission fluid to the bearing, and hold the inner race. Then, turn the outer race to check rotation.
3. If there is any defect, replace it.

9Y1210686RAS0020US0



Needle Bearing

1. Check the needle bearing for abrasion, color change or other damage.
2. If there is any doubt as to the condition of a needle bearing, replace it.

9Y1210686RAS0021US0

[2] PLANETARY GEAR

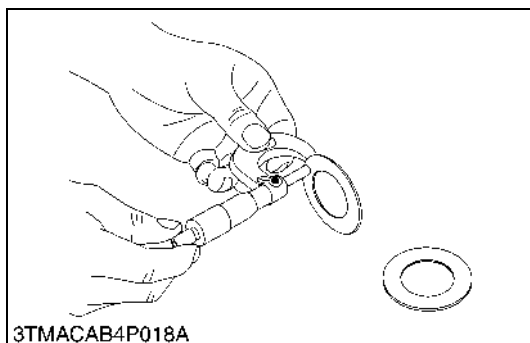


Backlash between Internal Gear and Planetary Gear

1. Set a dial indicator (lever type) on the tooth of the planetary gear.
2. Hold the planetary gear support and move only the planetary gear to measure the backlash.
3. If the measurement exceeds the allowable limit, check the planetary gear and planetary shaft.

Backlash between internal gear and planetary gear	Factory specification	0.2 to 0.4 mm 0.008 to 0.01 in.
	Allowable limit	0.5 mm 0.02 in.

9Y1210686RAS0022US0

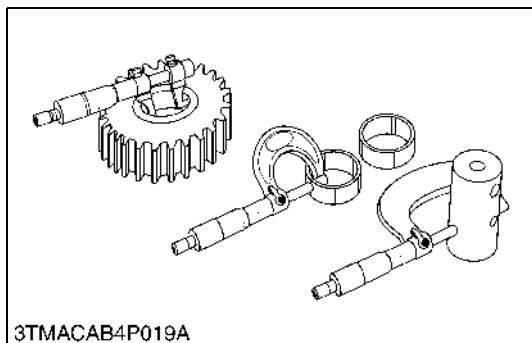


Thrust Collar Thickness

1. Measure the thickness of the thrust collar.
2. If the measurement is less than the allowable limit, replace it.

Thrust collar thickness	Factory specification	1.55 to 1.65 mm 0.0611 to 0.0649 in.
	Allowable limit	1.2 mm 0.047 in.

9Y1210686RAS0023US0



Clearance between Planetary Gear and Planetary Gear Shaft

1. Measure the planetary gear shaft O.D. (rubbing surface).
2. Measure the planetary gear I.D. (rubbing surface).
3. Measure the O.D. of the two needles installed diagonally in the needle bearing.
4. Calculate the clearance.
5. (Clearance = Planetary gear I.D. - {(2 × Needle O.D.) + Planetary gear shaft O.D.}).
6. If the clearance exceeds the allowable limit, replace them.

Clearance between planetary gear and planetary gear shaft	Factory specification	0.0090 to 0.048 mm 0.00036 to 0.0018 in.
	Allowable limit	0.3 mm 0.01 in.

Planetary gear shaft O.D.	Factory specification	29.991 to 30.000 mm 1.1808 to 1.1811 in.
Planetary gear I.D.	Factory specification	42.009 to 42.025 mm 1.6539 to 1.6545 in.
Needle O.D.	Factory specification	5.994 to 6.000 mm 0.2360 to 0.2362 in.

9Y1210686RAS0024US0

4 BRAKES

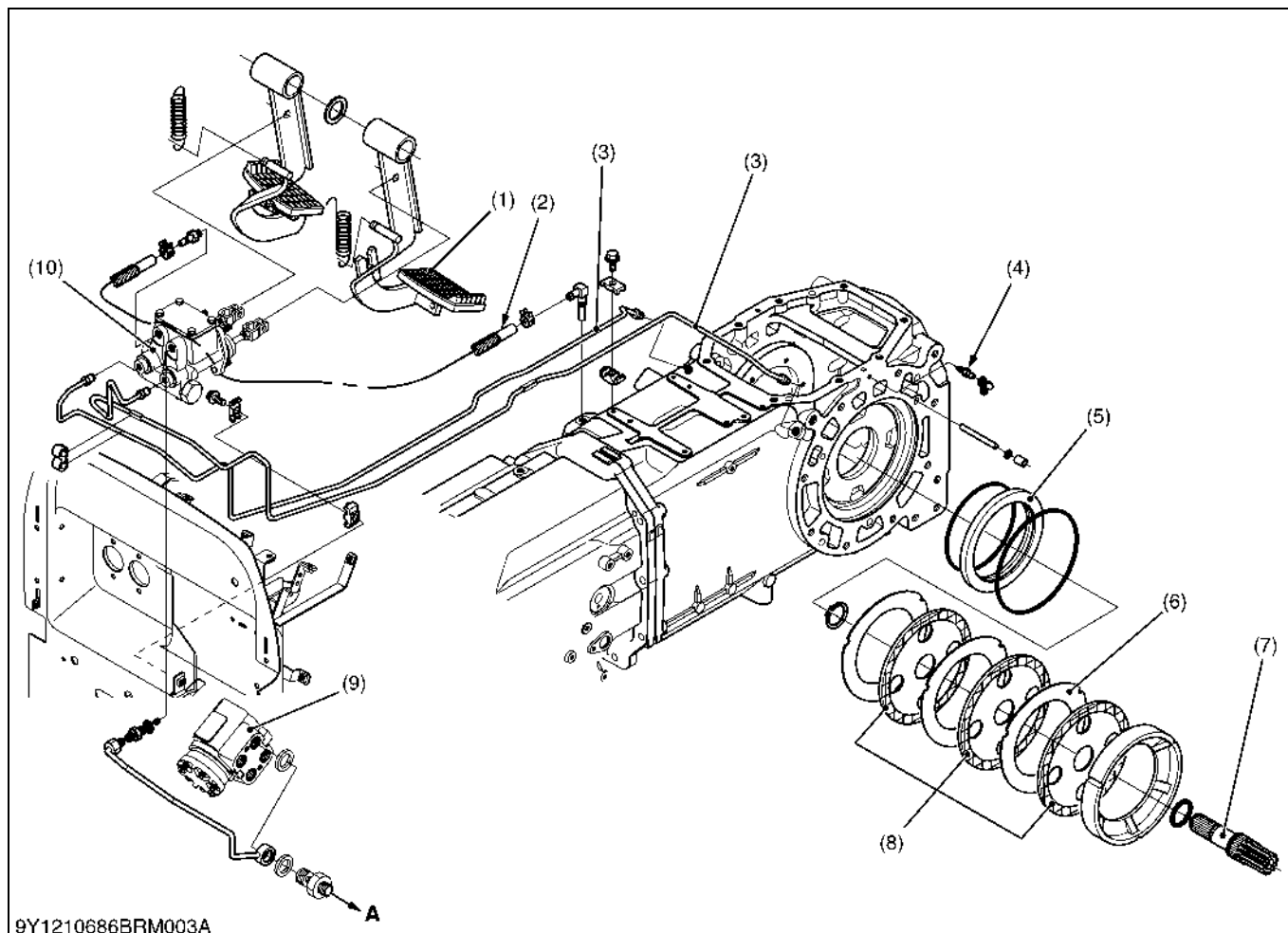
MECHANISM

CONTENTS

1. TRAVELING BRAKE	4-M1
[1] STRUCTURE	4-M1
[2] MASTER CYLINDER ASSEMBLY	4-M2
2. PARKING BRAKE	4-M3
[1] STRUCTURE	4-M3
[2] RESTRICTION DEVICE	4-M4

1. TRAVELING BRAKE

[1] STRUCTURE



- | | | | |
|-----------------|------------------|-------------------------------|-------------------------|
| (1) Brake Pedal | (4) Bleeder | (7) Brake Shaft | (10) Master Cylinder |
| (2) Return Hose | (5) Brake Piston | (8) Brake Disk | |
| (3) Brake Pipe | (6) Brake Plate | (9) Power Steering Controller | A: To Oil Cooler |

The traveling brake is a hydraulic wet disk type, which consists of the master cylinder (10), brake pipe (3), brake piston (5) and others. This type provides high and stable braking effect and requires almost no adjustment.

The master cylinder (10) is one piece type which including equalizer and oil reservoir.

While the machine operates 2WD travelling mode, the hydraulic 4WD clutch is kept 2WD mode. When the both brake pedal depressed at same time, 2-brake pedal switches energize the 4WD solenoid valve to switch the 4WD travelling mode. Therefore, all 4-wheels are put on brakes to provide for greater braking effect.

■ NOTE

- Refer to "5. BRAKES" section in the workshop manual of tractor mechanism (Code No. 9Y021-18200).

The brake oil provided forcibly, the oil after through the power steering controller (9), oil line separate for oil cooler and master cylinder (10). The master cylinder (10) saves oil and surplus oil return to the clutch housing case through the return hose (2).

This system makes free maintenance for brake oil level check.

9Y1210686BRM0001US0

[2] MASTER CYLINDER ASSEMBLY

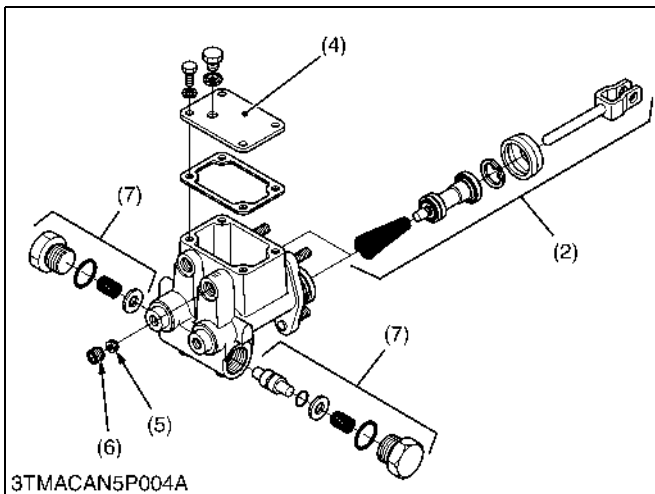
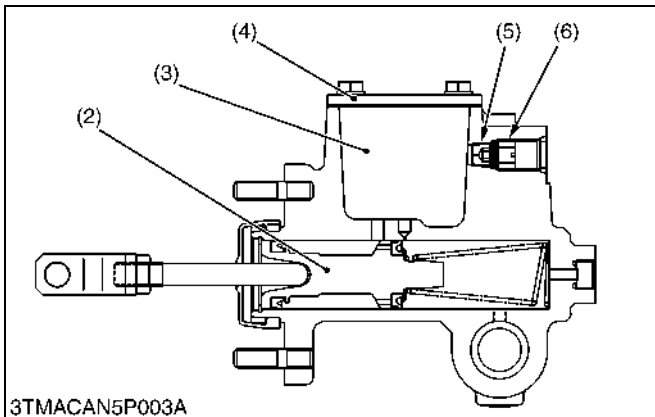


The master cylinder is one piece type which including oil tank (3), master cylinder (2) and equalizer (7).

(The function for each parts, refer to "5. BRAKES" section in the workshop manual of tractor mechanism (Code No. 9Y021-18200).)

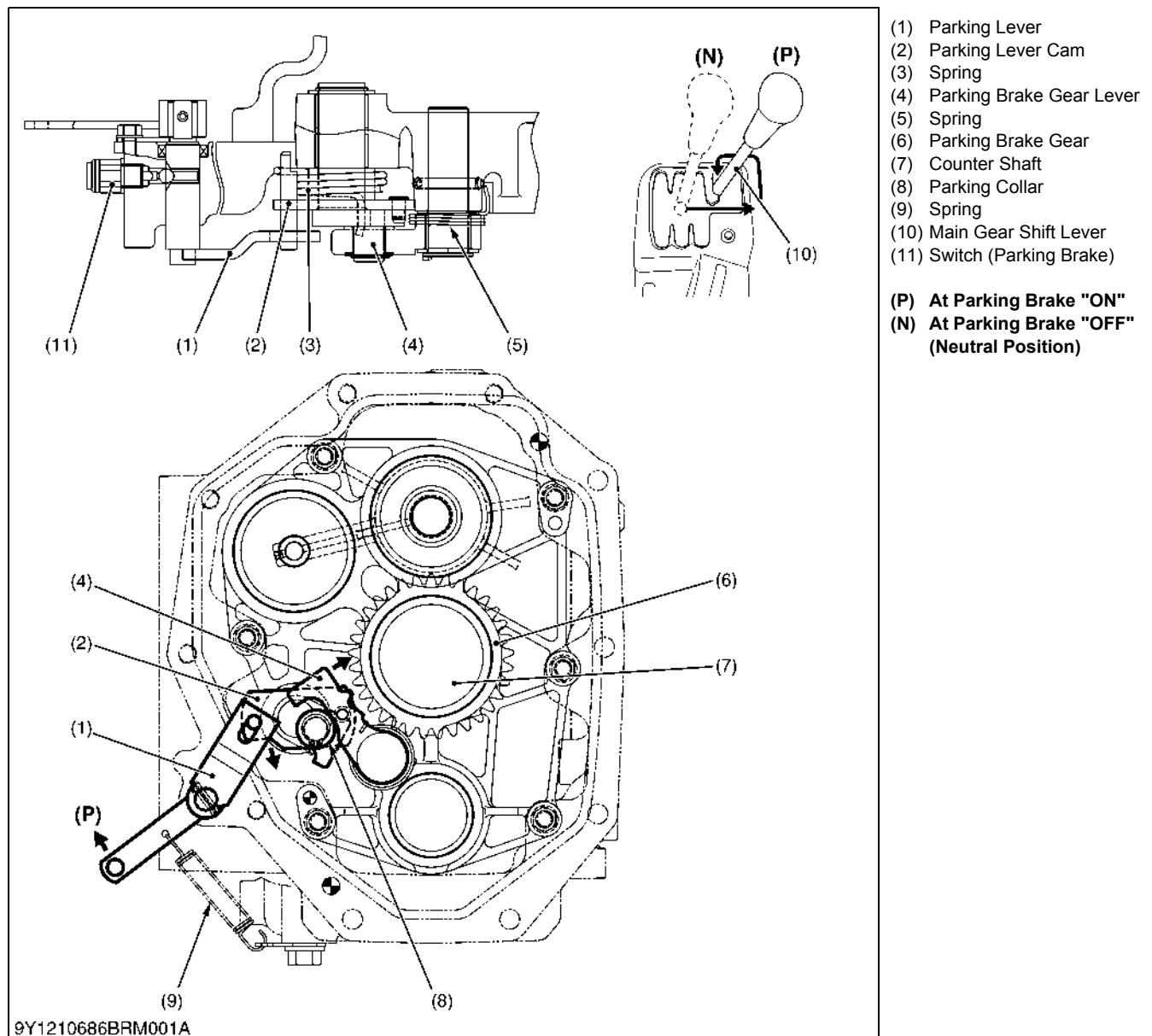
- | | |
|------------------------------|---------------|
| (1) Master Cylinder Assembly | (5) Orifice |
| (2) Master Cylinder | (6) Filter |
| (3) Tank | (7) Equalizer |
| (4) Tank Cover | |

9Y1210686BRM0002US0



2. PARKING BRAKE

[1] STRUCTURE



The parking brake is gear lock type.

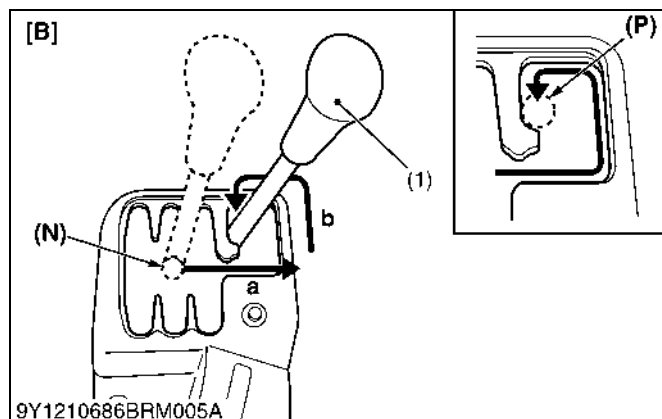
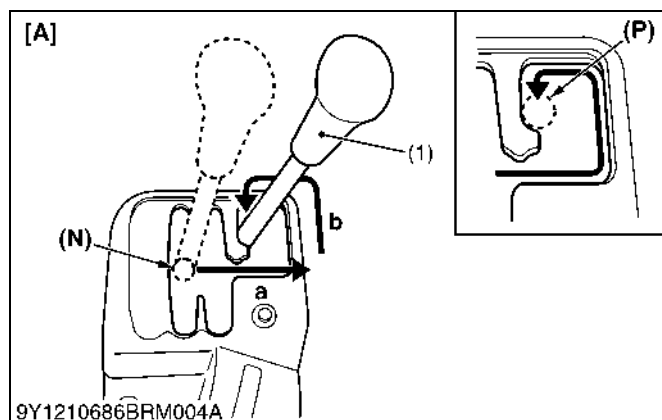
The parking gear brake lever is combined with the main gear shift lever (10). When the main gear shift lever (10) is in **"ON"** position (P), the parking lever (1) pushes down the parking lever cam (2).

The parking collar pushes the parking brake gear lever (4) to engage and lock the parking brake gear (6) on the counter shaft (7).

When the main gear shift lever (10) is in **"OFF"** position (N), parking brake gear lever (4), parking lever cam (2) and parking lever (1) are returned by return springs (3), (5) and (9).

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[2] RESTRICTION DEVICE



The parking gear brake lever is combined with the main gear shift lever 1 (1) so the parking gear brake and main gear shift can not be operated at the same time.

When the main gear shift lever 1 (1) is shifted in the selecting direction "a", the main gear shift lever 2 (2) is selected as the parking brake lever 1 (3) and the main gear shift lever 2 (2) oblong hole fits into the pin (4) of the parking brake lever 1 (3) in selecting direction "c".

- (1) Main Gear Shift Lever 1
- (2) Main Gear Shift Lever 2
- (3) Parking Brake Lever 1
- (4) Pin
- (5) Brake Rod
- (6) Parking Brake Lever 2
- (7) Parking Brake Lock Plate
- (8) Parking Brake Plate

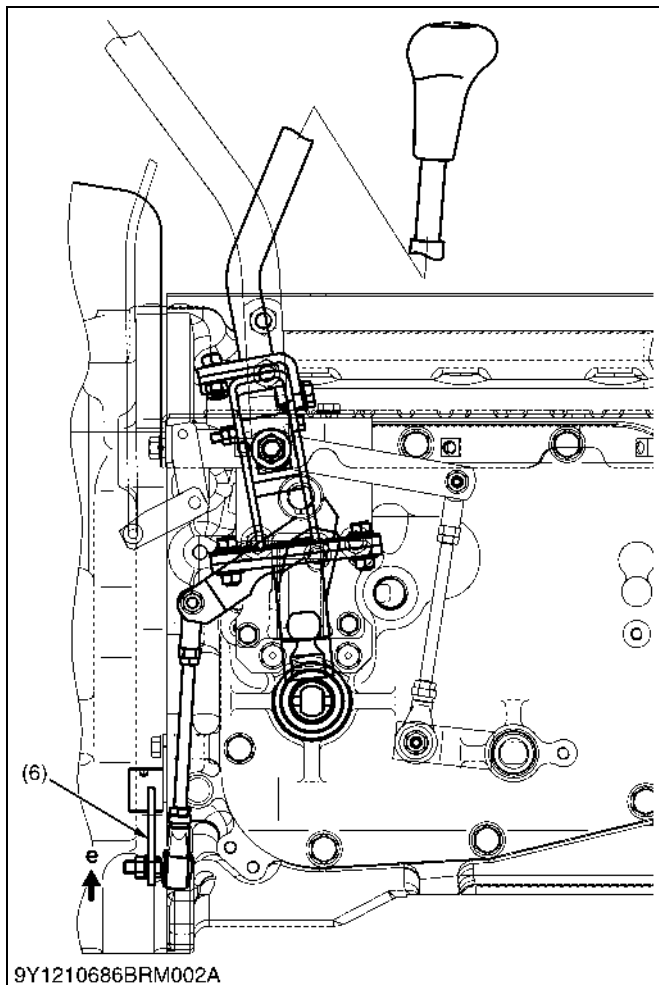
- a: Selecting Direction (Main Gear Shift Lever 1)
- b: Shifting Direction (Main Gear Shift Lever 1)
- c: Selecting Direction (Main Gear Shifting Lever 2)
- d: Shifting Direction (Parking Brake Lever 1)
- e: Parking Brake "ON" Direction

[A] F8/R8 Speed Transmission Model

[B] F12/R12 and F24/R24 Speed Transmission Model

(To be continued)

(Continued)



Next, when the main gear shift lever 1 (1) is moved in the shift direction "b", the parking brake lever 1 (3) moves in the shifting direction "d" via the parking brake lever 1 (3) and then the parking brake lever (6) is moved in the shift direction "e" via the brake rod (5), and the main gear shift lever 1 (1) is moved in the shifting direction "b" until the parking brake lock plate (7) is locked the parking brake plate (8), so the gear lock brake is set to "ON" position.

When the main gear shift lever 1 (1) is operated, the main gear shift lever 2 (2) does not slide to the parking brake lever 1 (3) side so the parking brake lever 2 (6) is not moved and the parking gear brake enters "OFF" position.

- | | |
|------------------------------|---|
| (1) Main Gear Shift Lever 1 | a: Selecting Direction (Main Gear Shift Lever 1) |
| (2) Main Gear Shift Lever 2 | b: Shifting Direction (Main Gear Shift Lever 1) |
| (3) Parking Brake Lever 1 | c: Selecting Direction (Main Gear Shifting Lever 2) |
| (4) Pin | d: Shifting Direction (Parking Brake Lever 1) |
| (5) Brake Rod | e: Parking Brake "ON" Direction |
| (6) Parking Brake Lever 2 | [A] F8/R8 Speed Transmission Model |
| (7) Parking Brake Lock Plate | [B] F12/R12 and F24/R24 Speed Transmission Model |
| (8) Parking Brake Plate | |

(P) At Parking Brake "ON"
(N) At Parking Brake "OFF" (Neutral Position)

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SERVICING

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Poor Braking Force	Brake pedal free travel excessive	Adjust	4-S4
	Brake disk worn	Replace	4-S17, 4-S20
	Brake piston warped	Replace	4-S16, 4-S20
	Brake oil leakage from brake pipes, bleeder, master cylinder or equalizer	Repair or replace	–
	Master cylinder or equalizer malfunctioning	Repair or replace	4-S13, 4-S14, 4-S15
Uneven Braking Force	Brake pedal free travel improper adjusted	Adjust	4-S4
	Brake disk worn	Replace	4-S17, 4-S20
	Brake piston warped	Replace	4-S16, 4-S20
	Brake oil leakage from brake pipes, bleeder, master cylinder or equalizer	Repair or replace	–
	Master cylinder or equalizer malfunctioning	Repair or replace	4-S13, 4-S14, 4-S15
Brake Drags	Brake pedal free travel too small	Adjust	4-S4
	Master cylinder return spring weaken or broken	Replace	4-S15
	Master cylinder malfunctioning	Repair or replace	4-S15
	Brake seal failure	Replace	4-S16
	Brake lines clogged	Clean	–
	Brake pedal return spring weaken or broken	Replace	4-S16
Spongy Brake Pedal	Air in brake system	Bleed air	4-S6
Brake Oil Consumed Excessively	Brake seal failure	Replace	4-S16
	Brake oil leakage in brake lines	Repair or replace	–
Parking Brake Drags	Parking brake dose not work properly free play excessive	Adjust	4-S7
	Main gear shift lever (parking brake lever shifts properly) free play too small	Adjust	4-S7

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2. SERVICING SPECIFICATIONS

TRAVELING BRAKE

Item		Factory Specification	Allowable Limit
Brake Pedal R.H. and L.H.	Free Travel	7 to 14 mm 0.3 to 0.6 in.	—
	Stroke	100 mm 3.9 in.	—
Equalizer Working Level	Level Difference between Both Pedals	Over 5 mm 0.2 in.	—
Brake Pedal Bushing to Pedal Shaft	Clearance	0.0300 to 0.246 mm 0.00119 to 0.00968 in.	0.5 mm 0.02 in.
• Brake Pedal Bushing	I.D.	25.030 to 25.146 mm 0.98544 to 0.99000 in.	—
• Pedal Shaft	O.D.	24.9 to 25.0 mm 0.981 to 0.984 in.	—
Brake Piston	Flatness	—	0.3 mm 0.01 in.
Brake Disk	Thickness	4.15 to 4.35 mm 0.164 to 0.171 in.	3.3 mm 0.13 in.
Brake Plate	Thickness	2.1 to 2.5 mm 0.083 to 0.098 in.	1.5 mm 0.059 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to G-14.)

Item	N·m	kgf·m	lbf·ft
Bleeder	6.5 to 6.8	0.66 to 0.70	4.8 to 5.0
Brake pipe retaining nut	16 to 24	1.6 to 2.5	12 to 18
Master cylinder pipe and return pipe retaining nut	49 to 68	5.0 to 7.0	37 to 50
Master cylinder hose and return hose retaining nut	23 to 27	2.3 to 2.8	17 to 20
Plug	98.1 to 117	10.0 to 12.0	72.4 to 86.7

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4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

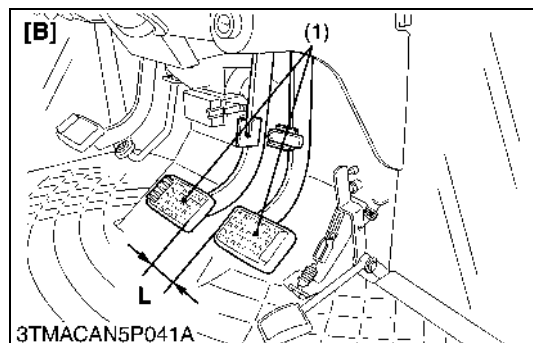
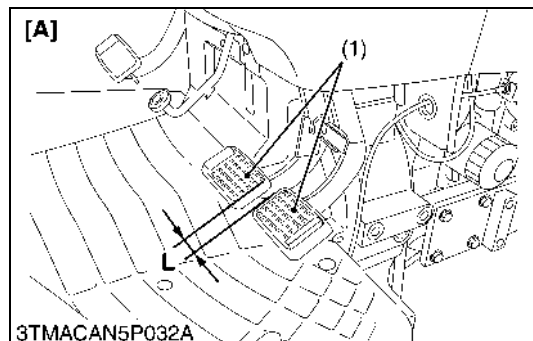


CAUTION

- When checking, park the tractor on flat ground, and stop the engine.

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(1) Traveling Brake



Adjusting Brake Pedal

1) Brake Pedal Free Travel

- Set the parking brake.
- Slightly depress the brake pedals and measure free travel at the top of pedal stroke.
- If the measurement is not within the factory specifications, adjust the free travel by the push rod (2).
- After adjustment, tighten the lock nut firmly.

■ IMPORTANT

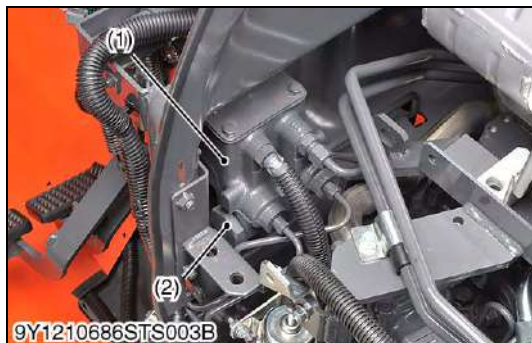
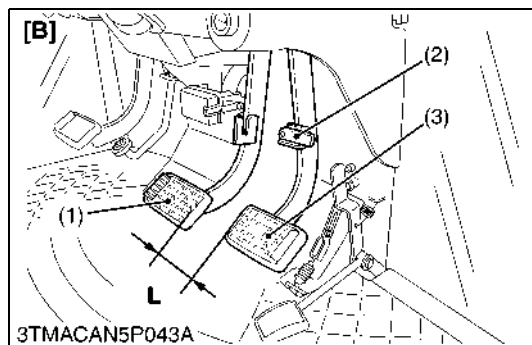
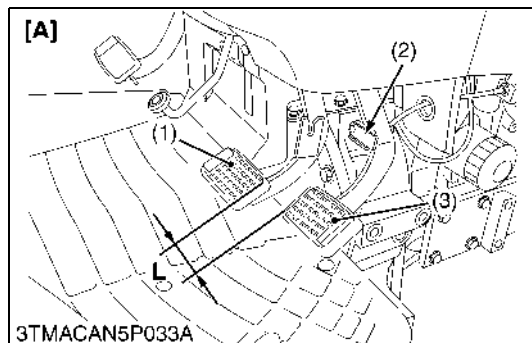
- Keep the free travel in the right and left brake pedals equal.

Brake pedal free travel "L"	Factory specification	7 to 14 mm 0.3 to 0.6 in.
		Keep the free travel in the both brake pedal equal

- (1) Brake Pedal
(2) Push Rod

L : Free Travel
[A] ROPS Model
[B] CABIN Model

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2) Brake Pedal Stroke

1. Disengage the brake pedal lock (2).
2. Depress the brake pedal several time.
3. Step on either side brake pedal and measure the level difference (pedal stroke) between right and left pedals.
4. Do the same for the other side.
5. If the pedal stroke (**L**) exceeds the factory specification, check the air bleeding, master cylinder, equalizer or brake case.

Brake pedal stroke (L) (each pedal)	Factory specification	100 mm 3.9 in.
---	-----------------------	-------------------

- (1) Brake Pedal L.H.
(2) Brake Pedal Lock
(3) Brake Pedal R.H.

L : Pedal Stroke
[A] ROPS Model
[B] CABIN Model

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3) Equalizer Working Level (Anti-imbalance device)

1. Gently step on both the right and left pedals at once.
2. Further step on the right pedal (the left pedal slightly rises itself) and measure the level difference between the pedals.
3. Do the same for left pedal.
4. If the measurement is not within the factory specification, check the equalizer (2).

Level difference between both pedals	Factory specification	Over 5 mm 0.2 in.
---	-----------------------	-------------------------

(1) Master Cylinder

(2) Equalizer

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Brake Test

1. Remove the bleeder (1) from the brake case and set the hydraulic brake adaptor (see page G-80), joint (Code No. 07916-50401), cable (Code No. 07916-50331) and pressure gauge (Code No. 07916-52961).
2. Set the pedal fixing plate between the pedal and pedal stopper after depressing the brake pedal to reach the pressure between 3.0 to 3.2 MPa (30 to 33 kgf/cm², 430 to 460 psi).
3. Read the pressure **P** after one minute.
4. After reading the pressure **P**, wait another five minutes to read the pressure **P** and check the pressure drop. The pressure drop should be within $P \times 0.01$ MPa ($P \times 0.1$ kgf/cm², $P \times 1$ psi).
5. If the pressure drop is too big, attach the pressure gauge to equalizer (brake pipe rear end) and master cylinder (brake pipe front end) to find out the problem area.



CAUTION

- If the air is in the master cylinder, brake pipe and case bleed the air completely.

Tightening torque	Bleeder	6.5 to 6.8 N·m 0.66 to 0.70 kgf·m 4.8 to 5.0 lbf·ft
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(1) Bleeder

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Brake Bleeding Air

■ IMPORTANT

- The shuttle lever and main change lever are shift in "NEUTRAL" position.
- Set the parking brake lever to "ON" position.
- Fill the transmission fluid to the equalizer and master cylinder when overhaul the master cylinder assembly.



CAUTION

- Take care to hot part such a muffler and rotating part of engine during air bleeding procedure.

■ NOTE

- While bleeding, run the engine at low speed to keep enough oil in the master cylinder assembly.

1. Disconnect the brake pipes (1) from the master cylinder.
2. Move the brake pedal up and down by hand. At this time, when raising the pedal, close the master cylinder outlet by a finger, and when lowering, release the finger.
Repeat this operation several times. (Prepare the oil can.)
3. After bleeding the master cylinder, install the front brake pipes.
4. After installing the vinyl pipe (2) to the bleeder loosen the bleeder two turns.
5. Move the brake pedal up and down.
Repeat this motion until air bubble in brake oil disappears.
After bleeding, tighten the bleeders firmly.

Tightening torque	Brake pipe retaining nut	16 to 24 N·m 1.6 to 2.5 kgf·m 12 to 18 lbf·ft
	Bleeder	6.5 to 6.8 N·m 0.66 to 0.70 kgf·m 4.8 to 5.0 lbf·ft

(Reference : Importance of Bleeding)

- If the air mixes in the brake hydraulic circuit, poor or no braking force is obtained due to compress the air even when the brake pedal is pressed.
Accordingly whenever the hydraulic brake system is disassembled, be sure to bleed after reassembling.

(1) Brake Pipe

(2) Vinyl Pipe

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(2) Parking Brake



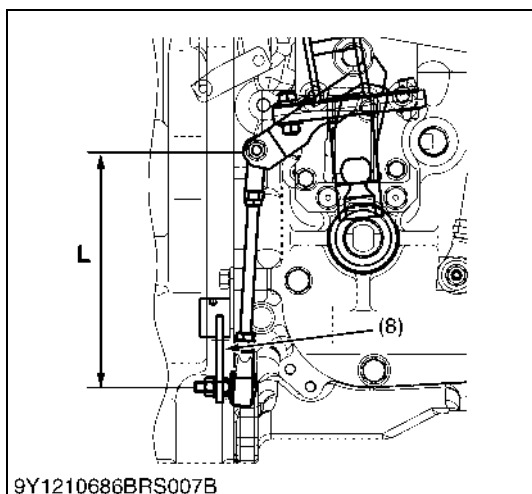
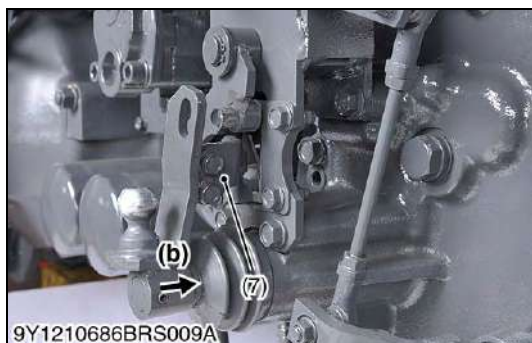
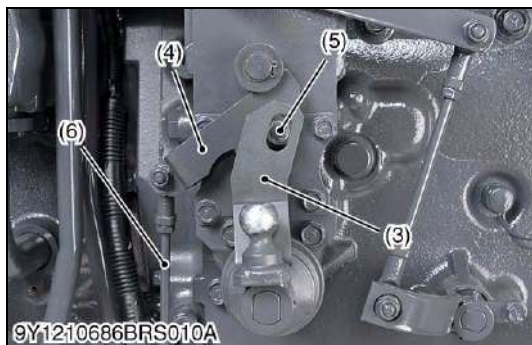
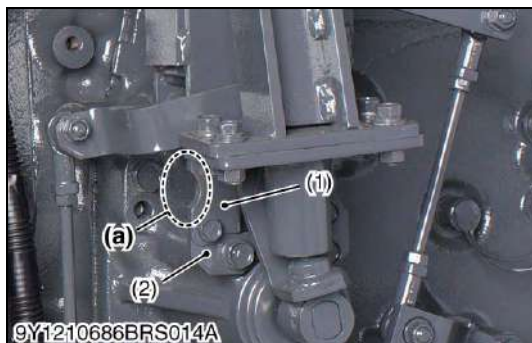
Checking Parking Brake Lever

1. Check the main shift lever (1) shifts to (P) position.
2. If the shifting is abnormal, adjust the main shift lever (1) following "Adjusting Parking Brake Lever".

(1) Main Shift Lever

(P) At Parking Brake "ON"
(N) At Parking Brake "OFF"
(Neutral Position)

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Adjusting Parking Brake Lever

1. Make sure that the parking brake lever 2 (8) is set to **"OFF"** position.
2. Make sure that the notches (a) in the parking brake plate (1) and main shift lever bracket (2) are aligned. If these are not aligned, loosen the bolts and adjust the parking brake plate (1) so that the notch in the parking brake plate (1) is aligned with the notch in the main shift lever bracket (2).
3. Adjust the parking brake rod (6) so that the main shift lever (3) oblong hole is aligned with the position of the parking brake lever pin (5) of the parking brake lever 1 (4).
4. Slide the main shift lever (3) in the selecting direction (b) to make sure that the parking brake lock plate (7) does not touch or the parking brake plate (1). If it does touch, loosen the bolts and adjust the parking brake lock plate (7).
5. Operate the main shift lever (3) and make sure that the force required to operate increases just before the main shift lever (3) shifts the parking position (P).
6. With the main shift lever shifted to the parking position (P), make sure that the parking brake lever 2 (8) should have play and be heavy when shifting up it.

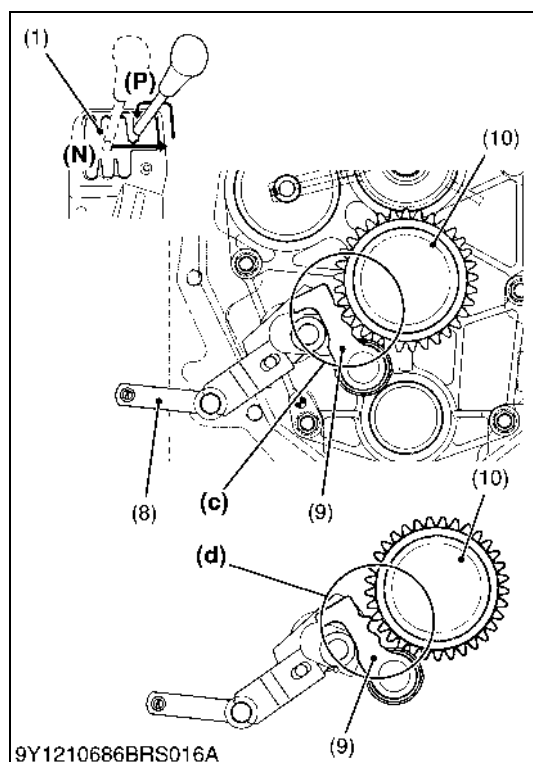
Length of brake rod (L)	Reference value	Approx. 184 mm 7.01 in.
-------------------------	-----------------	-------------------------------

- (1) Parking Brake Plate
- (2) Main Shift lever Bracket
- (3) Main Shift Lever
- (4) Parking Brake Lever 1
- (5) Parking Brake Lever Pin
- (6) Parking Brake Rod
- (7) Parking Brake Lock Plate
- (8) Parking Brake Lever 2
- (9) Parking Brake Gear Lever
- (10) Parking Brake Gear

- (11) Bush

- (a) : Notch (Parking Brake Plate and Main Shift Lever Bracket)
- (b) : Selecting Direction
- (c) : Gears Mesh with Each Other
- (d) : Gears Not Mesh with Each Other
- (P) : At Parking Brake "ON"
- (N) : At Parking Brake "OFF" (Neutral Position)

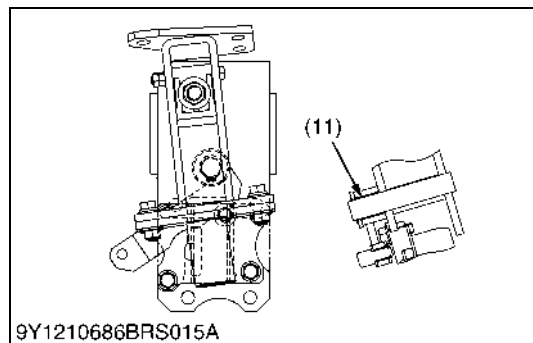
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7. If the operation force does not increase or it is not possible to move as far as the parking position **(P)**, shake the tractor back and forward and readjust after achieving meshing of the parking brake gear lever (9) and gear (8).
8. If the parking operation can not be performed smoothly, apply grease to the inner circumference of the parking brake lever 1 bushing (11), as shown in the figure.
9. Make sure the parking brake lever (4) moves correctly following the "Checking Parking Brake Lever" section.

- (1) Parking Brake Plate
- (2) Main Shift lever Bracket
- (3) Main Shift Lever
- (4) Parking Brake Lever 1
- (5) Parking Brake Lever Pin
- (6) Parking Brake Rod
- (7) Parking Brake Lock Plate
- (8) Parking Brake Lever 2
- (9) Parking Brake Gear Lever
- (10) Parking Brake Gear

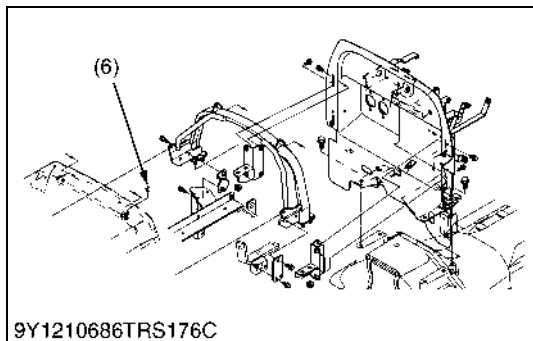
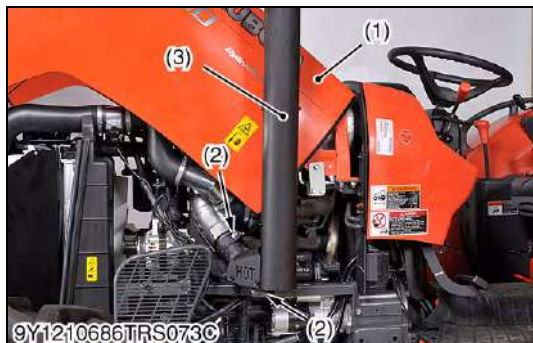
- (11) Bush

- (a) : Notch (Parking Brake Plate and Main Shift Lever Bracket)
 (b) : Selecting Direction
 (c) : Gears Mesh with Each Other
 (d) : Gears Not Mesh with Each Other
 (P) : At Parking Brake "ON"
 (N) : At Parking Brake "OFF" (Neutral Position)

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[2] DISASSEMBLING AND ASSEMBLING

(1) Preparation for Disassembling Master Cylinder and Brake Pedal (ROPS Model)



Bonnet

1. Open the bonnet (1) and disconnect the battery negative terminal.
2. Remove the muffler pipe mounting screws (2) and muffler pipe (3).
3. Disconnect the **3P** connector (4) for head lights.
4. Close the bonnet (1) and remove the plug.
5. Pull out the snap pin (6) and then remove the bonnet (1).
6. Remove the bonnet support mounting screws (7), nuts (8) on both sides and the bonnet support (9).

IMPORTANT

- When disconnecting the battery cables, disconnect the grounding cable first. When connecting, positive cable first.
- When assembling the bonnet damper (5), make sure that the rod part of bonnet damper (5) is on the backside.

- | | |
|--------------------------------------|-----------------------------------|
| (1) Bonnet | (6) Snap Pin |
| (2) Muffler Pipe Mounting Screw | (7) Bonnet Support Mounting Screw |
| (3) Muffler Pipe | (8) Bonnet Support Mounting Nut |
| (4) 3P Connector (Head Light) | (9) Bonnet Support |
| (5) Bonnet Damper | |

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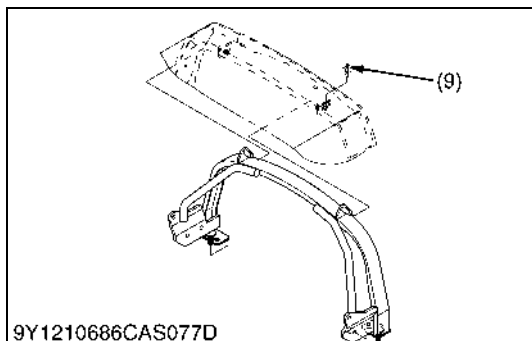
Cover

1. Remove the rubber sheet (1) and steering support under cover (2).
2. Remove the steering (3).
3. Remove the steering post cover (4) and rear bonnet (5).

- | | |
|----------------------------------|-------------------------|
| (1) Rubber Sheet | (4) Steering Post Cover |
| (2) Steering Support Under Cover | (5) Rear Bonnet |
| (3) Steering | |

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(2) Preparation for Disassembling Master Cylinder and Brake Pedal (CABIN Model)



Bonnet

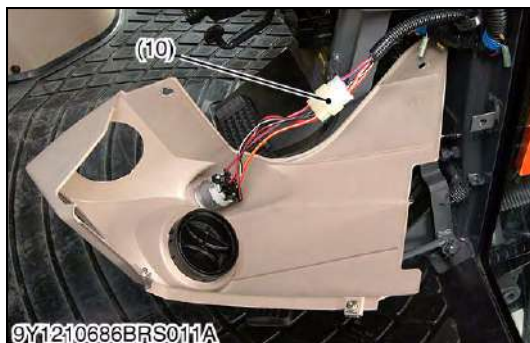
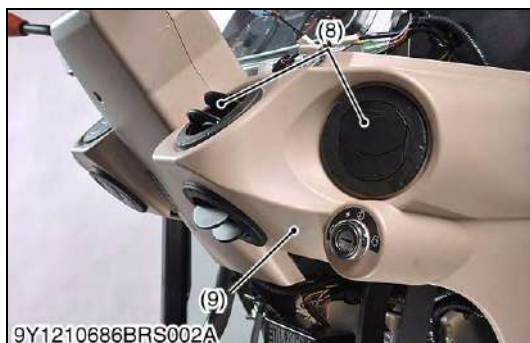
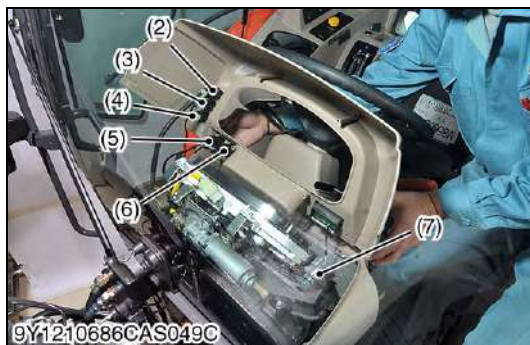
1. Open the bonnet (1) and disconnect the battery (2) negative terminal.
2. Remove the muffler pipe mounting screws 1 (6) and the muffler pipe (5).
3. Remove the side panel (3) and the side cover guide (4) on both sides.
4. Disconnect the **3P** connector (7) for head light and remove the bonnet damper (8).
5. Close the bonnet (1) and remove the plug.
6. Pull out the snap pin (9), and then remove the bonnet (1).
7. Remove the bonnet support mounting screw 2 (10), the bonnet mounting nut (11) on both side, and the bonnet support (12).

■ IMPORTANT

- When disconnecting the battery cables, disconnect the negative cable first. When connecting, connect the positive cable first.
- When assembling the bonnet damper (8), Make sure that the rod part of bonnet damper (8) is on the backside.

- | | |
|-----------------------------------|--------------------------------------|
| (1) Bonnet | (7) 3P Connector (Head Light) |
| (2) Battery | (8) Bonnet Damper |
| (3) Side Panel | (9) Snap Pin |
| (4) Side Cover Guide | (10) Bonnet Support Mounting Screw 2 |
| (5) Muffler Pipe | (11) Bonnet Support Mounting Nut |
| (6) Muffler Pipe Mounting Screw 1 | (12) Bonnet Support |

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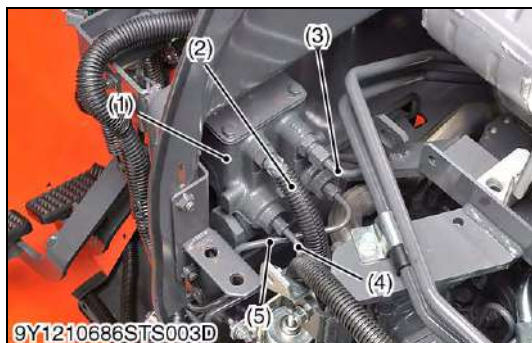
Panel Cover and Panel Under Cover

1. Remove the panel cover (1).
2. Disconnect the **6P** connector (2) from constant RPM management switch.
3. Disconnect the **6P** connector (3) from parked regeneration switch.
4. Disconnect the **6P** connector (4) from auto regeneration switch.
5. Disconnect the **6P** connector (5) from hazard light switch.
6. Disconnect the **6P** connector (6) from horn button.
7. Disconnect the **3P** connector (7) from display switch.
8. Remove the air outlet (8) and panel under cover R.H. (9).
9. Disconnect the **4P** connector (10) from main key switch.

- | | |
|--|---|
| (1) Panel Cover | (5) 6P Connector (Hazard Light Switch) |
| (2) 6P Connector (Constant RPM Management Switch) | (6) 6P Connector (Horn Button) |
| (3) 6P Connector (Parked Regeneration Switch) | (7) 3P Connector (Display Switch) |
| (4) 6P Connector (Auto Regeneration Switch) | (8) Air Outlet |
| | (9) Panel Under Cover R.H. |
| | (10) 4P Connector (Main Key Switch) |

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(3) Removing Master Cylinder (ROPS Model)



Brake Pipes and Master Cylinder Pipes

1. Remove the panel cover.
2. Remove the master cylinder pipe (3) and master cylinder return pipe (2) from the master cylinder assembly (1).
3. Remove the brake pipe L.H. (5) and R.H. (4).

Tightening torque	Brake pipe retaining nut	16 to 24 N·m 1.6 to 2.5 kgf·m 12 to 18 lbf·ft
	Master cylinder pipe and return pipe retaining nut	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft

- (1) Master Cylinder Assembly (4) Brake Pipe R.H.
 (2) Master Cylinder Return Hose (5) Brake Pipe L.H.
 (3) Master Cylinder Pipe

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Master Cylinder Rod and Master Cylinder

1. Remove the master cylinder snap pin (1) from brake pedal (2).
2. Remove the master cylinder mounting nuts (3).
3. Remove the master cylinder assembly.

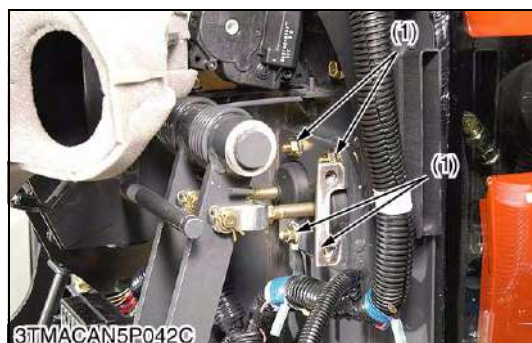
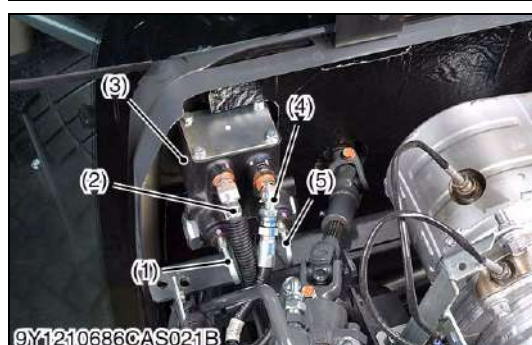
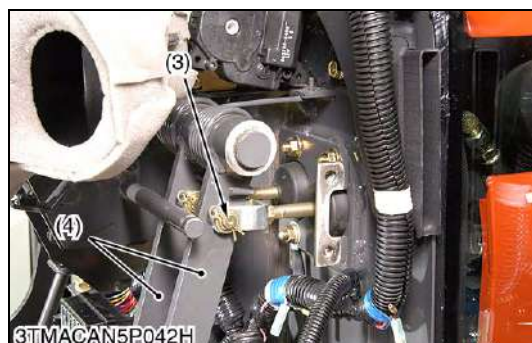
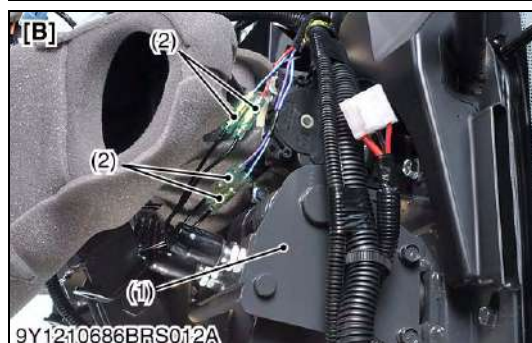
(When reassembling)

- After mounting the master cylinder assembly, be sure to bleed air. (See page 4-S6.)

- (1) Snap Pin (3) Cylinder Mounting Nut
 (2) Brake Pedal

9Y1210686BRS0012US0

(4) Removing Master Cylinder (CABIN Model)



Master Cylinder Rod

1. Remove the pedal shaft support (1).
2. Disconnect the 1P connectors (2).
3. Remove the master cylinder snap pins (3) from brake pedals (4).

- (1) Pedal Shaft Support
(2) 1P Connector (Brake Switch)
(3) Snap Pin
(4) Brake Pedal

[A] F8/R8 and F12/R12 Speed
Transmission Model

[B] F24/R24 Speed Transmission
Model

9Y1210686BRS0016US0

Brake Pipes and Master Cylinder Hoses

1. Remove the master cylinder hose (4) and cylinder return hose (2) from the master cylinder assembly (3).
2. Remove the brake pipe R.H. (1) and L.H. (5).

Tightening torque	Brake pipe retaining nut	16 to 24 N·m 1.6 to 2.5 kgf·m 12 to 18 lbf·ft
	Master cylinder hose and return hose retaining nut	23 to 27 N·m 2.3 to 2.8 kgf·m 17 to 20 lbf·ft

- (1) Brake Pipe R.H. (4) Master Cylinder Hose
(2) Master Cylinder Return Hose (5) Brake Pipe L.H.
(3) Master Cylinder Assembly

9Y1210686BRS0017US0

Master Cylinder

1. Remove the master cylinder mounting nuts (1).
2. Remove the master cylinder assembly.

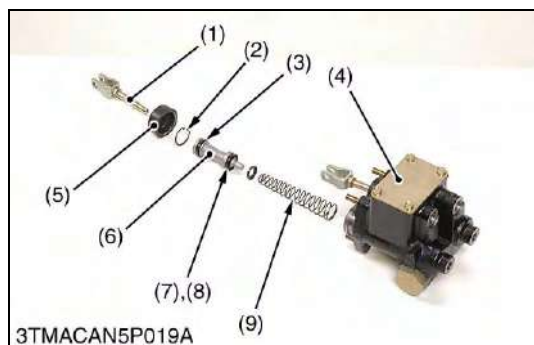
(When reassembling)

- After mounting the master cylinder assembly, be sure to bleed air. (See page 4-S6.)

- (1) Cylinder Mounting Nut

9Y1210686BRS0018US0

(5) Master Cylinder



Master Cylinder

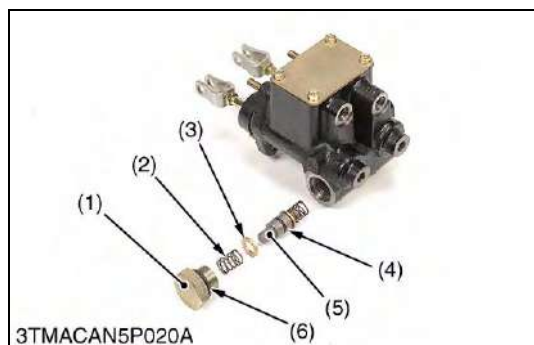
1. Drain the brake oil from the master cylinder assembly (4).
2. Remove the push rod (1) and boot (5) from the master cylinder.
3. Remove the internal circlip (2), and pull out the piston (6) and return spring (9).

(When reassembling)

- Install the outlet valve, noting its direction.
- Install the piston, taking care not to damage the cylinder cup lip.

- | | |
|------------------------------|----------------------------|
| (1) Push Rod | (6) Piston |
| (2) Internal Circlip | (7) Secondary Cylinder Cup |
| (3) Primary Cylinder Cup | (8) Spacer (Shim) |
| (4) Master Cylinder Assembly | (9) Return Spring |
| (5) Boot | |

9Y1210686BRS0019US0



Equalizer

1. Drain the brake oil from the equalizer.
2. Secure the equalizer in a vise, remove the both plug (1) to pull out the piston (5).

(When reassembling)

- Install the piston and plug, noting the O-ring.

Tightening torque	Plug	98.1 to 117 N·m 10.0 to 12.0 kgf·m 72.4 to 86.7 lbf·ft
-------------------	------	--

- | | |
|------------|------------|
| (1) Plug | (4) O-ring |
| (2) Spring | (5) Piston |
| (3) Washer | (6) O-ring |

9Y1210686BRS0020US0

(6) Brake Pedal



Brake Pedal (ROPS Model)

1. Remove the panel cover.
2. Remove the springs (2) and master cylinder snap pin (3).
3. Remove the pedal shaft (1) mounting screw.
4. Draw out the pedal shaft (1) and brake pedal.

(When reassembling)

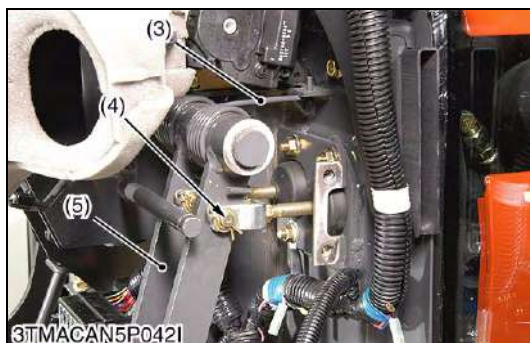
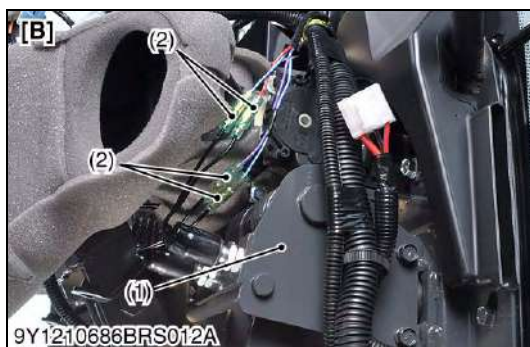
- Apply grease to the pedal shaft.

■ IMPORTANT

- After reassembling the brake pedal, be sure to adjust the brake pedal free travel.

- | | |
|-----------------|--------------|
| (1) Pedal Shaft | (3) Snap Pin |
| (2) Spring | |

9Y1210686BRS0021US0



Brake Pedal (CABIN Model)

1. Remove the pedal shaft support (1).
2. Disconnect the **1P** connector (2).
3. Remove the master cylinder snap pins (4) from brake pedals (5).
4. Unhook the springs (3).
5. Draw out the brake pedals (5).

(When reassembling)

- Apply grease to the pedal shaft.

■ IMPORTANT

- **After reassembling the brake pedal, be sure to adjust the brake pedal free travel.**

- (1) Pedal Shaft Support
- (2) **1P** Connector (Brake Pedal)
- (3) Spring
- (4) Snap Pin
- (5) Brake Pedal

[A] F8/R8 and F12/R12 Speed Transmission Model

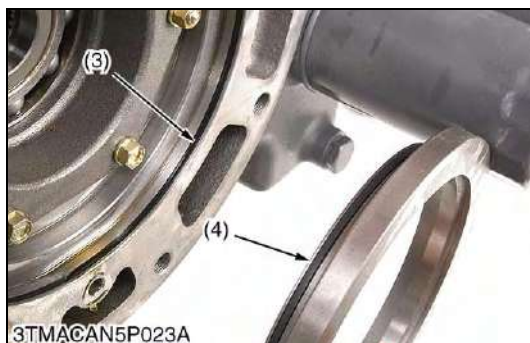
[B] F24/R24 Speed Transmission Model

9Y1210686BRS0022US0

(7) Brake Piston

- Separating rear axle case from transmission case, refer to 3-S10, 3-S12.

9Y1210686BRS0023US0



Brake Piston

1. Remove the bleeder.
2. Remove the brake piston with compressed air. (Slowly inject an air from bleeder hole (1).)

(When reassembling)

- Replace the brake seal 1 and 2 with new one.
- Install the brake seal so as not to twist.
- Take care not to enter the foreign matter into the seal groove of inside brake case.
- When installing the brake piston, apply silicon grease to the brake seals, and tap it in evenly and lightly using a soft hammer.

- (1) Bleeder Hole
- (2) Brake Piston

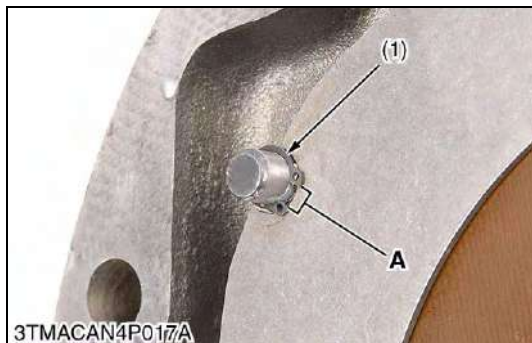
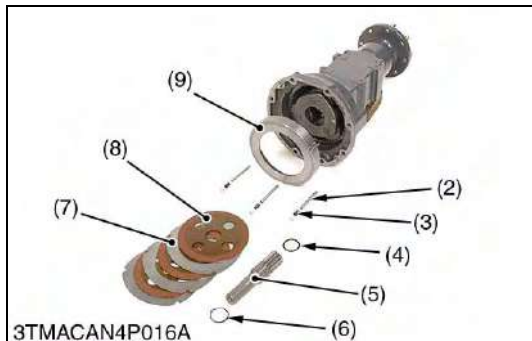
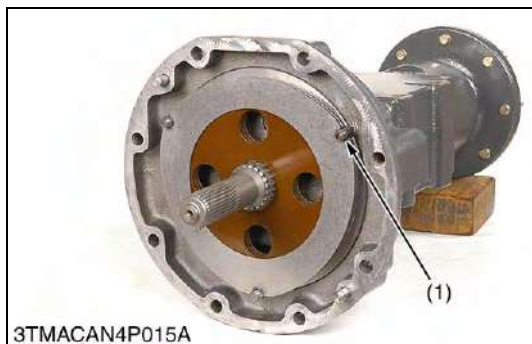
- (3) Brake Seal 1
- (4) Brake Seal 2

9Y1210686BRS0024US0

(8) Brake Disk and Plate

- Separating rear axle case from transmission case, refer to 3-S10, 3-S12.

9Y1210686BRS0039US0

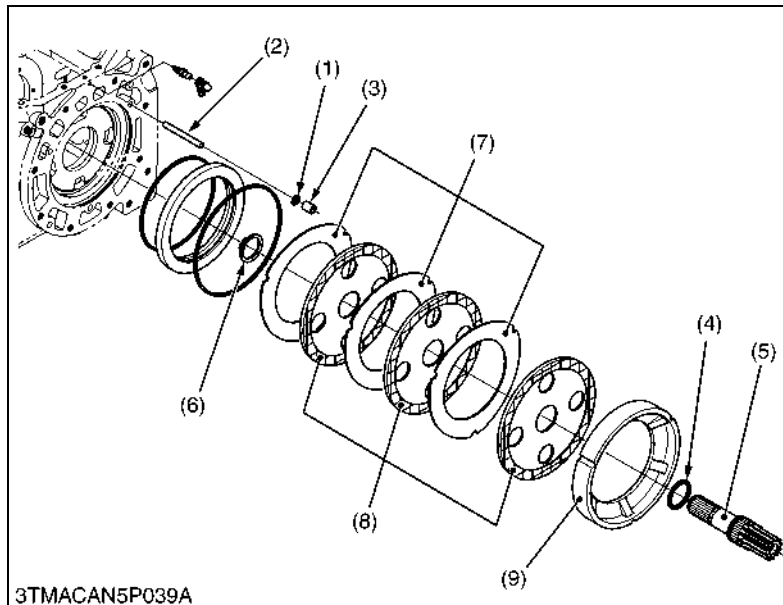


Brake Shaft, Brake Disk, Steel Plate and Brake Plate

- Remove the external circlip (1).
- Draw out the brake shaft (5) with brake disk (8) and steel plates (7).
- Remove the external circlip (6).
- Remove the brake plate (9), collar (3) and pin (2).

(When reassembling)

- Place the brake disks (8) so that the holes aligned to next holes.
- The pin (2) does not have groove for external circlip (1).
- Face the external circlip (1) gap to brake shaft.



- (1) External Circlip
(2) Pin
(3) Collar
(4) O-ring
(5) Brake Shaft
(6) External Circlip

- (7) Steel Plate
(8) Brake Disk
(9) Brake Plate

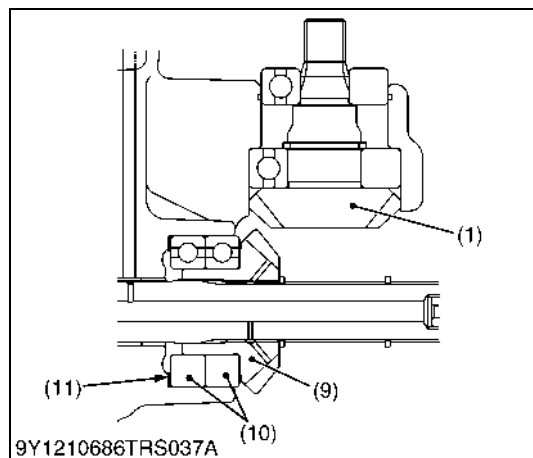
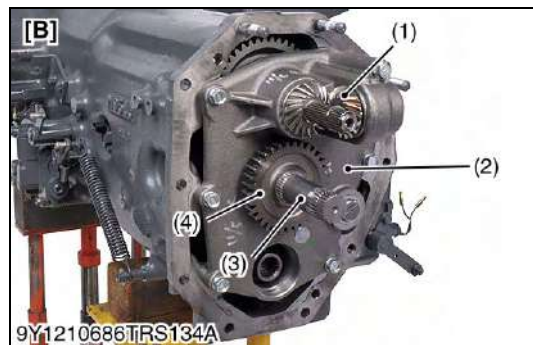
A : Gap

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(9) Parking Brake Gear

- Separating transmission case and clutch housing case, refer to 2-S56.

9Y1210686BRS0026US0

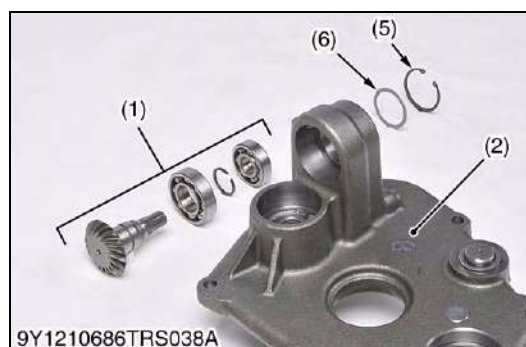


PTO Propeller Shaft, Bearing Holder and Pump Gear

1. Remove the internal circlip (5), shim 1 (6) and slide the 18T spiral bevel gear assembly (1).
2. Tap out the PTO propeller shaft (7) frontward and then remove the external circlip (8), 19T spiral bevel gear (9), bearing (10) and shim 2 (11).
3. Remove the external circlip and 33T gear (4). (F24/R24 speed transmission model)
4. Remove the bearing holder mounting screws, and draw out the bearing holder (2).
If the 3rd shaft (3) comes out with bearing holder, tap in the 3rd shaft (3) during draw out the bearing holder (2).

(When reassembling)

- Check the backlash between 18T spiral bevel gear (1) and 19T spiral bevel gear (9). (See page 2-S108.)
- Be sure to fix the parking brake arm (12) and parking cam lever (13).

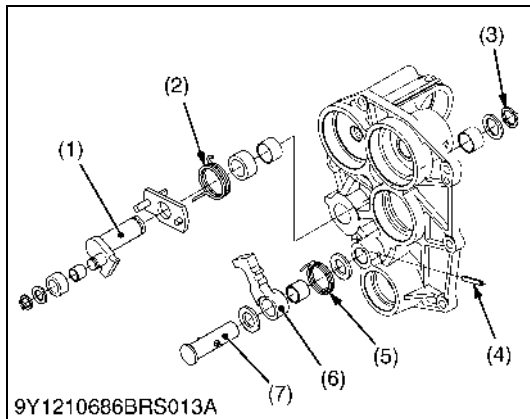


- | | |
|------------------------------------|------------------------|
| (1) 18T Spiral Bevel Gear Assembly | (10) Bearing |
| (2) Bearing Holder | (11) Shim 2 |
| (3) 3rd Shaft | (12) Parking Cam Lever |
| (4) 33T Gear | (13) Parking Brake Arm |
| (5) Internal Circlip | |
| (6) Shim 1 | |
| (7) PTO Propeller Shaft | |
| (8) External Circlip | |
| (9) 19T Spiral Bevel Gear | |

[A] F8/R8 and F12/R12 Speed Transmission Model

[B] F24/R24 Speed Transmission Model

9Y1210686TRS0088US0



Parking Gear

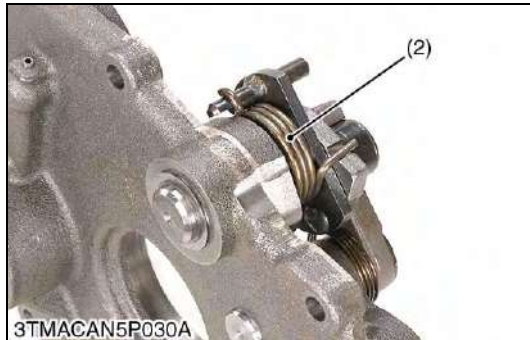
1. Remove the external circlip (3) and draw out the parking cam shaft (1).
2. Remove the roll pin (4) and remove the parking gear pin (7) and parking gear (6).

(When reassembling)

- Be sure to hook the springs (2), (5) as shown photo.

- | | |
|------------------------|-------------------------|
| (1) Parking Cam Shaft | (5) Parking Gear Spring |
| (2) Parking Cam Spring | (6) Parking Gear |
| (3) External Circlip | (7) Parking Gear Pin |
| (4) Roll Pin | |

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[3] SERVICING

(1) Brake Pedal



Brake Pedal Bushing

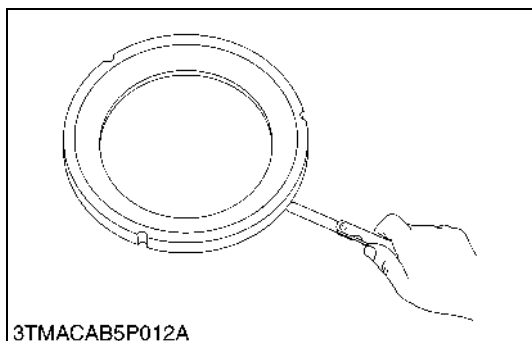
1. Measure the brake pedal bushing I.D. with inside micrometer.
2. Measure the pedal shaft O.D. with outside micrometer and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace it.

Clearance between brake pedal bushing and pedal shaft	Factory specification	0.0300 to 0.246 mm 0.00119 to 0.00968 in.
	Allowable limit	0.5 mm 0.02 in.

Brake pedal bushing I.D.	Factory specification	25.030 to 25.146 mm 0.98544 to 0.99000 in.
Pedal shaft O.D.	Factory specification	24.9 to 25.0 mm 0.981 to 0.984 in.

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(2) Traveling Brake

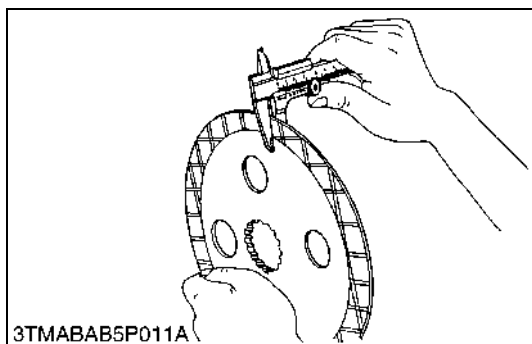


Brake Plate and Brake Piston Flatness

1. Place the brake plate / brake piston on the surface plate.
2. Measure the flatness of brake plate / brake piston with a feeler gauge at four points on a diagonal line.
3. If the measurement exceeds the allowable limit, replace it.

Brake plate flatness	Allowable limit	0.3 mm 0.01 in.
----------------------	-----------------	--------------------

9Y1210686BRS0030US0



Brake Disk Wear

1. Measure the brake disk thickness with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Brake disk wear	Factory specification	4.15 to 4.35 mm 0.164 to 0.171 in.
	Allowable limit	3.3 mm 0.13 in.

9Y1210686BRS0031US0



Brake Plate Wear

1. Measure the brake plate thickness with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Brake plate wear	Factory specification	2.1 to 2.5 mm 0.083 to 0.098 in.
	Allowable limit	1.5 mm 0.059 in.

9Y1210686BRS0032US0

5 FRONT AXLE

MECHANISM

CONTENTS

1. STRUCTURE.....	5-M1
[1] 2 WHEEL DRIVE	5-M1
[2] 4 WHEEL DRIVE	5-M2
[3] LIMITED SLIP DIFFERENTIAL (LSD).....	5-M3

1. STRUCTURE

The front axle supports the front of tractor and facilitates steering.

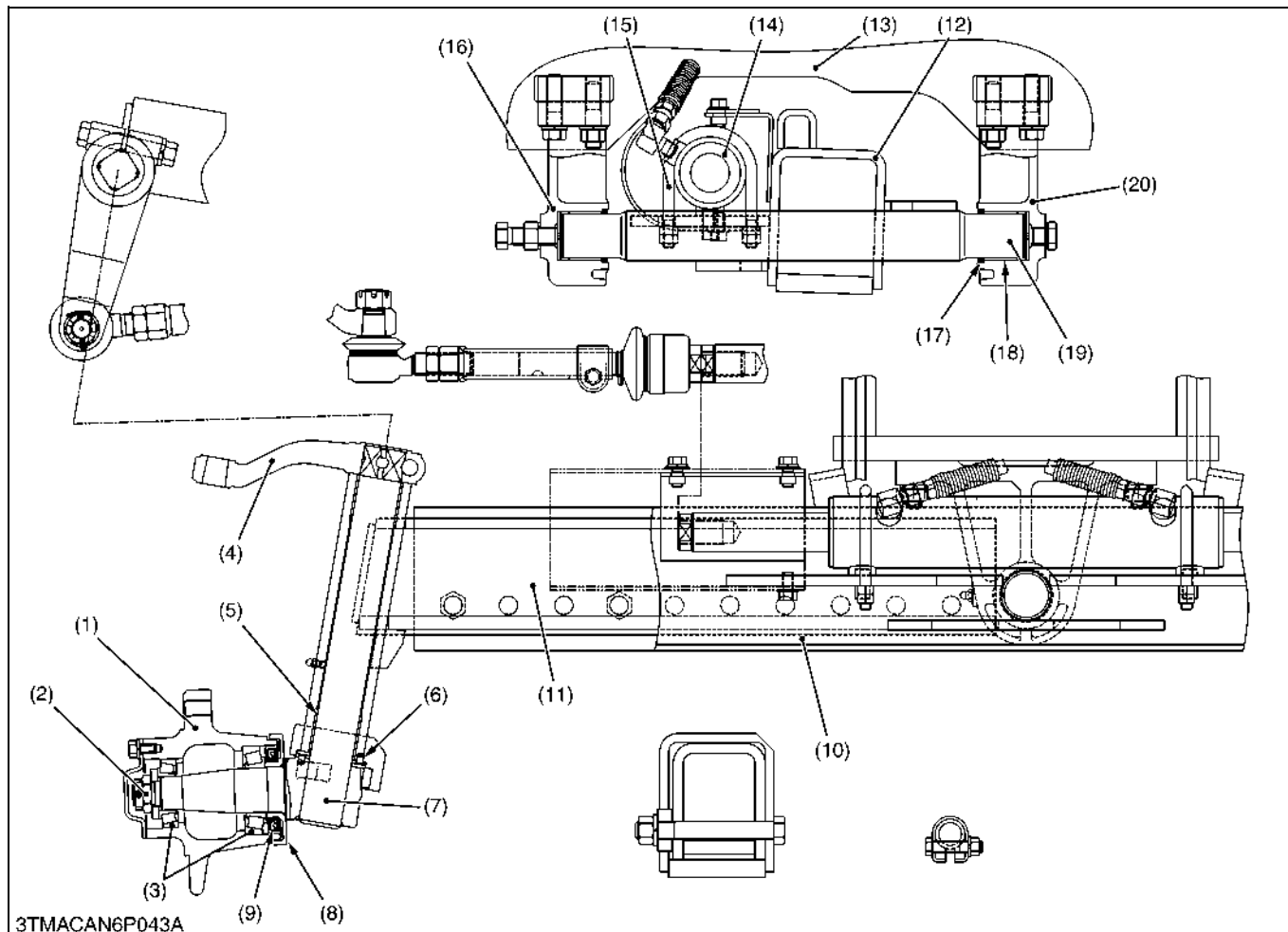
The four-wheel drive axle has powered front wheels.

■ NOTE

- Refer to "6. FRONT AXLE" section in the workshop manual of tractor mechanism (Code No. 9Y021-18200).

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[1] 2 WHEEL DRIVE



- | | | | |
|-----------------------------|------------------------------|--------------------------------------|----------------------|
| (1) Front Wheel Hub | (7) Knuckle Shaft | (12) Front Axle Support | (16) Bracket (Front) |
| (2) Slotted Nut | (8) Knuckle Dust Proof Cover | (13) Front Axle Bracket | (17) Oil Seal |
| (3) Taper Roller Bearing | (9) Knuckle Stub Gasket | (14) Power Steering Cylinder | (18) Bushing |
| (4) Knuckle Arm | (10) Front Axle Middle | (15) Power Steering Cylinder Bracket | (19) Center Pin |
| (5) Knuckle Shaft Bushing | (11) Front Axle | | (20) Bracket (Rear) |
| (6) Knuckle Shaft Dowel Pin | | | |

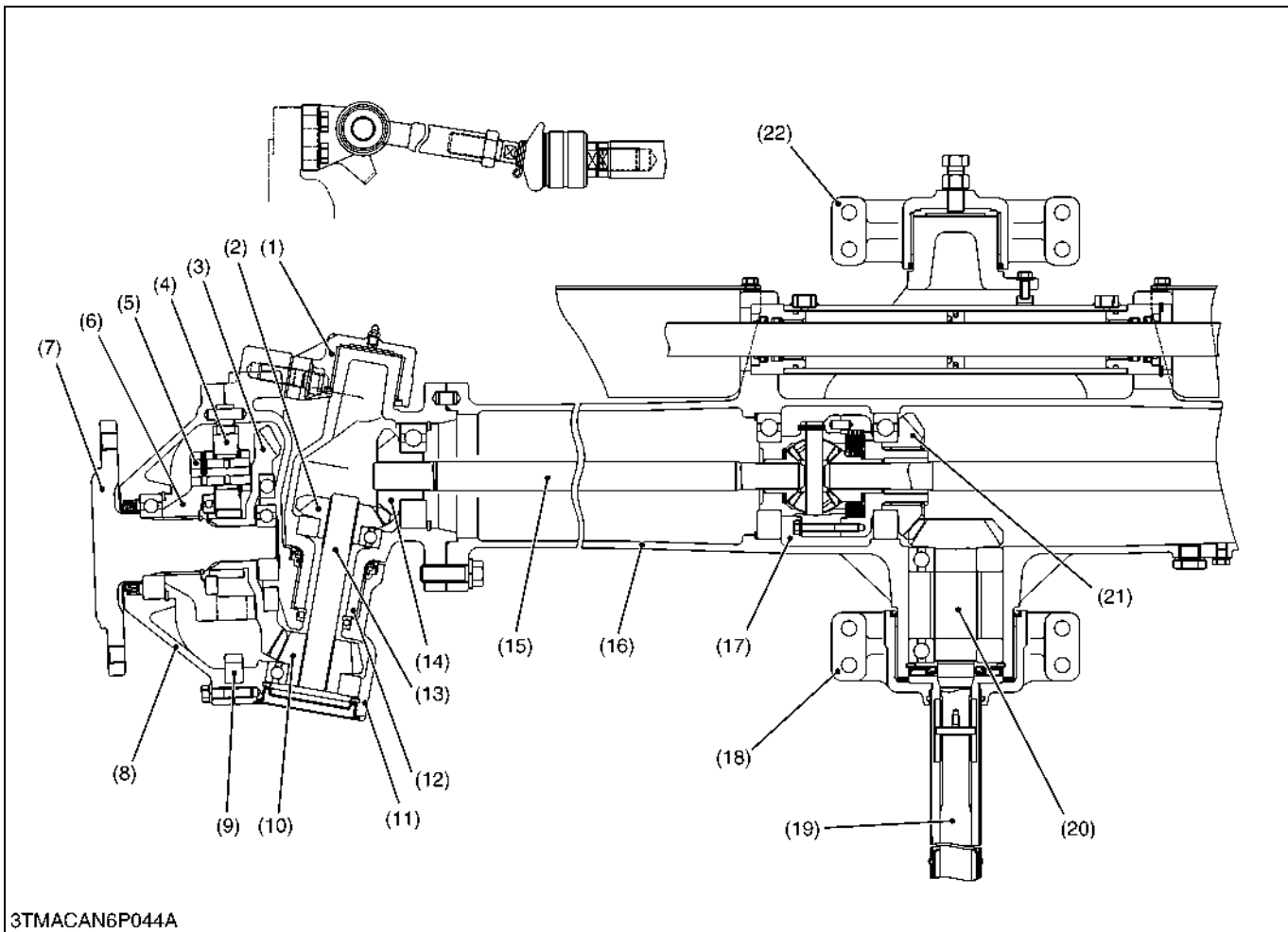
The front axle of the 2WD model is constructed as shown above.

The knuckle shaft (7) is installed to the front axle (11) by the "RUMOAN" method.

With this method, the shape of the front axle is relatively simple, and front axle is supported at its center with the front axle support (12) on the front axle bracket (13), so that steering operation is stable even on an uneven ground encountered in a farm field.

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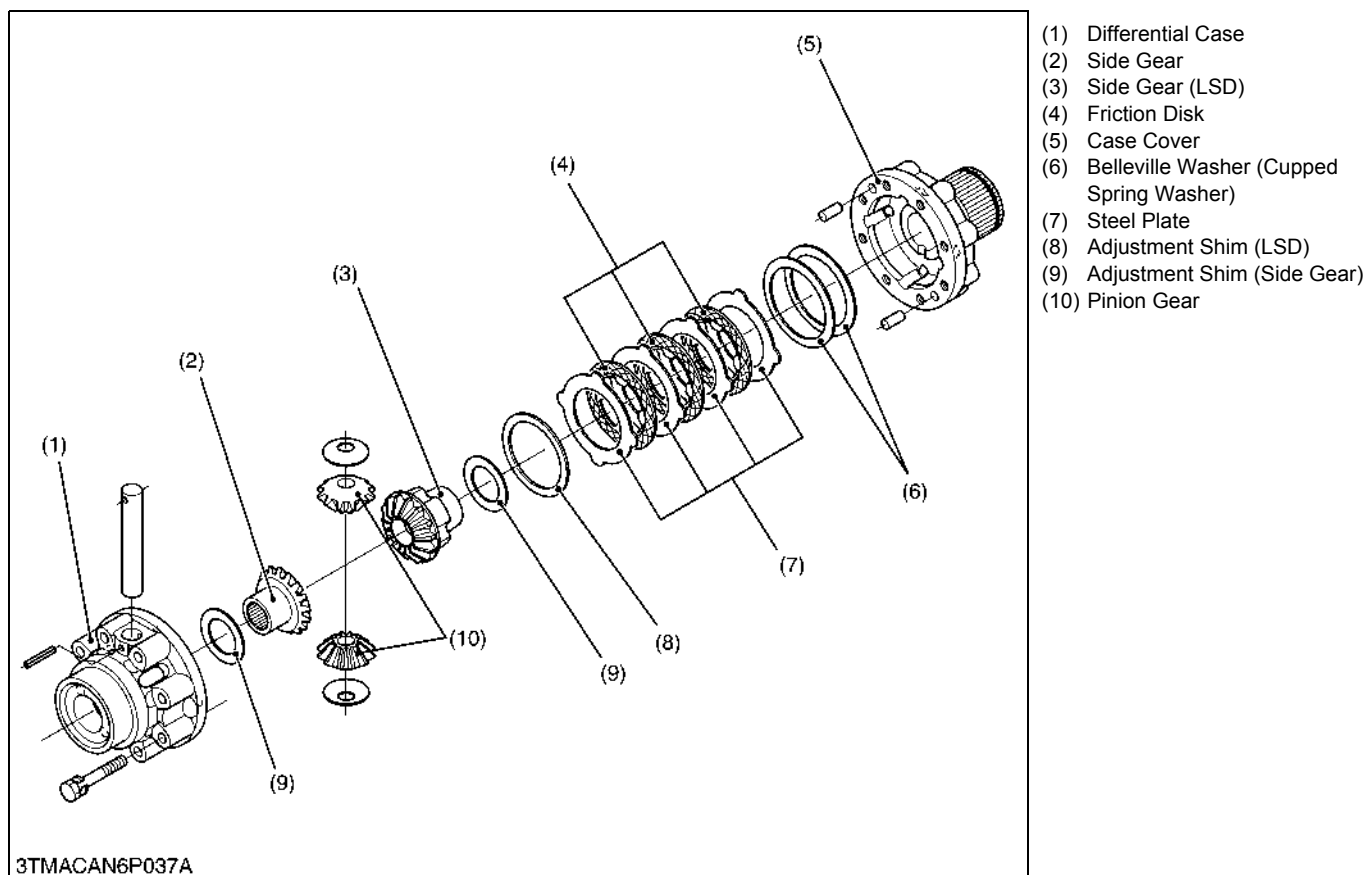
[2] 4 WHEEL DRIVE



- | | | | |
|-----------------------------|---------------------------|---------------------------------------|-----------------------------|
| (1) Front Axle Case Support | (7) Front Axle | (13) Bevel Gear Shaft | (18) Bracket (Rear) |
| (2) 18T Bevel Gear | (8) Front Axle Case Cover | (14) 17T Bevel Gear | (19) Propeller Shaft |
| (3) 41T Bevel Gear | (9) 62T Internal Gear | (15) Differential Yoke Shaft | (20) 17T Bevel Pinion Shaft |
| (4) 23T Planetary Gear | (10) 15T Bevel Gear | (16) Front Differential Case | (21) 23T Bevel Gear |
| (5) Planetary Gear Pin | (11) Front Axle Case | (17) Differential Gear Assembly (LSD) | (22) Bracket (Front) |
| (6) Planetary Gear Support | (12) Bevel Gear Case | | |

9Y1210686FAM0003US0

[3] LIMITED SLIP DIFFERENTIAL (LSD)



In addition to conventional components, this differential gear system has friction disks (4) on one side of a side gear (LSD) (3), steel plates (7) on the differential gear case cover (5), belleville washer (cupped spring washer) (6), and an adjustment shim (LSD) (8).

The steel plates (7) and the friction disks (4) are coupled and pressed against each other with the belleville washer (cupped spring washer) (6), which assembles the side gear (LSD) (3) and the differential case (1) into one.

Therefore, this differential gear system is always differential lock condition under normal conditions.

When a tractor is driving straight ahead, the differential gear is in differential lock condition and the right and left wheels rotate at the same speed, allowing stable running in a straight line.

When the tractor takes a turn, the right and left wheels are forced to rotate in different speeds, and the difference in rotation makes the right and left side gears rotate in different speeds.

At this point, if a torque higher than a specified load level is applied the belleville washer (cupped spring washer) (6), the spring operates and the steel plate is released from the friction disk.

As a result, the right and left side gears rotate differently just as usual differential gear, allowing smooth cornering.

A load specified on the spring is adjusted by changing thickness of the adjustment shim (LSD) (8).

9Y1210686FAM0004US0

SERVICING

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1. TROUBLESHOOTING.....	5-S1
2. SERVICING SPECIFICATIONS	5-S2
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4. CHECKING, DISASSEMBLING AND SERVICING	5-S6
[1] CHECKING AND ADJUSTING	5-S6
[2] DISASSEMBLING AND ASSEMBLING	5-S8
(1) Separating Front Axle [2WD Model]	5-S8
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(3) Disassembling Front Axle [2WD Model]	5-S10
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(5) Removing Differential Gear and Bevel Pinion Shaft.....	5-S15
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[3] SERVICING	5-S18
(1) 2WD Model	5-S18
(2) 4WD Model	5-S19

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Front Wheels Wander to Right or Left	Tire pressure uneven	Adjust	–
	Improper toe-in adjustment (improper alignment)	Adjust	5-S6
	Front axle bracket (front, rear) bushing excessive wear	Replace	5-S15, 5-S24
	Front axle rocking force too small	Adjust	5-S6
	Front wheel sway excessive	Replace	5-S6
	Tie-rod end loose	Tighten	5-S12
	Aeration of the hydraulic fluid in power steering circuit	Bleed	–
	Knuckle shaft bushings worn [2WD model]	Replace	5-S18
Front Wheels Can Not Be Driven [4WD Type]	Propeller shaft broken	Replace	5-S9
	Front wheel drive gears in transmission broken	Replace	–
	Front differential gear broken	Replace	5-S16
	Coupling displaced	Reassemble	5-S9
Noise [4WD Type]	Gear backlash excessive	Adjust or replace	–
	Oil insufficient	Replenish	G-12
	Bearings damaged or broken	Replace	5-S19
	Gears damaged or broken	Replace	–

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2. SERVICING SPECIFICATIONS

[2WD]

Item		Factory Specification	Allowable Limit
Toe-in		1.0 to 5.0 mm 0.04 to 0.20 in.	—
Front Wheel	Steering Angle	0.925 to 0.960 rad 53 to 55 °	—
	Axial Sway (Face Runout of Wheel at Bead)	Less than 5.0 mm 0.20 in.	—
Front Axle Middle Boss to Bracket Bushing	Clearance	0.050 to 0.15 mm 0.0020 to 0.0059 in.	0.35 mm 0.0138 in.
• Front Axle Middle Boss	O.D.	39.938 to 40.000 mm 1.5724 to 1.5748 in.	—
• Bracket Bushing	I.D.	40.050 to 40.088 mm 1.5768 to 1.5782 in.	—
Knuckle Shaft (Kingpin) to Bushing	Clearance	0.020 to 0.125 mm 0.00088 to 0.00492 in.	0.35 mm 0.0138 in.
• Knuckle Shaft	O.D.	37.975 to 38.000 mm 1.4951 to 1.4960 in.	—
• Bushing	I.D.	38.020 to 38.100 mm 1.4969 to 1.5000 in.	—

[4WD]

Item		Factory Specification	Allowable Limit
Toe-in		2.0 to 8.0 mm 0.079 to 0.31 in.	—
Front Wheel	Steering Angle	0.925 to 0.960 rad 53 to 55 °	—
	Axial Sway (Face Runout of Wheel at Bead)	Less than 5.0 mm 0.20 in.	—
Bevel Gear Case to Stopper	Clearance	Below 0.5 mm 0.02 in.	—
Bevel Gear to Bevel Pinion Shaft	Backlash	0.20 to 0.30 mm 0.0079 to 0.011 in.	0.4 mm 0.02 in.
Differential Case to Differential Side Gear	Clearance	0.050 to 0.091 mm 0.0020 to 0.0035 in.	0.35 mm 0.014 in.
• Differential Case Bore	I.D.	32.025 to 32.050 mm 1.2609 to 1.2618 in.	—
• Differential Side Gear Boss	O.D.	31.959 to 31.975 mm 1.2583 to 1.2588 in.	—
Differential Pinion Shaft to Pinion Gear	Clearance	0.016 to 0.052 mm 0.00063 to 0.0020 in.	0.25 mm 0.0098 in.
• Differential Pinion Shaft	O.D.	15.966 to 15.984 mm 0.62859 to 0.62929 in.	—
• Differential Pinion Gear	I.D.	16.000 to 16.018 mm 0.62993 to 0.63062 in.	—
Pinion Gear to Differential Side Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.01 in.	0.4 mm 0.02 in.
Pinion Gear to LSD Side Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.01 in.	0.4 mm 0.02 in.
LSD Disk	Slip Torque	54 to 67 N·m 5.5 to 6.9 kgf·m 40 to 49 lbf·ft	—
Front Bracket to Rear Bracket Bushing	Alloy Thickness	0.57 mm 0.022 in.	—
• Rear Differential Case Boss	O.D.	109.965 to 110.000 mm 4.32933 to 4.33070 in.	—
• Front Differential Case Boss	O.D.	79.965 to 80.000 mm 3.1483 to 3.1496 in.	—
Front Wheel Case Support Bushing	Alloy Thickness	0.57 mm 0.022 in.	—
• Bearing Retainer	O.D.	59.97 to 60.00 mm 2.361 to 2.362 in.	—

Item		Factory Specification	Allowable Limit
Front Wheel Case Bushing	Alloy Thickness	0.57 mm 0.022 in.	—
• Bevel Gear Case	O.D.	59.97 to 60.00 mm 2.361 to 2.362 in.	—
Bevel Gear in Bevel Gear Case	Backlash	0.20 to 0.30 mm 0.0079 to 0.011 in.	0.4 mm 0.02 in.
Bevel Gear in Front Wheel Case	Backlash	0.20 to 0.30 mm 0.0079 to 0.011 in.	0.4 mm 0.02 in.
Internal Gear to Planetary Gear	Backlash	0.10 to 0.30 mm 0.0040 to 0.011 in.	0.5 mm 0.02 in.
Planetary Gear to Shaft	Clearance	0.0090 to 0.046 mm 0.00036 to 0.0018 in.	0.3 mm 0.01 in.
• Planetary Gear	I.D.	33.009 to 33.025 mm 1.2993 to 1.3001 in.	—
• Shaft	O.D.	24.991 to 25.000 mm 0.98390 to 0.98425 in.	—
• Needle Bearing	O.D.	3.994 to 4.000 mm 0.1573 to 0.1574 in.	—
Thrust Collar	Thickness	0.75 to 0.85 mm 0.030 to 0.033 in.	0.5 mm 0.02 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : Refer to G-14)

[2WD]

Item	N·m	kgf·m	lbf·ft
Tie-rod end lock nut	167 to 196	17.0 to 20.0	123 to 144
Front axle rocking force adjusting screw	20 to 29	2.0 to 3.0	15 to 21
Front axle rocking force adjusting lock nut	98.1 to 147	10.0 to 15.0	72.4 to 108
Power steering hose retaining nut	23 to 27	2.3 to 2.8	17 to 20
Front wheel mounting nut (M14)	166 to 196	17.0 to 20.0	123 to 144
Bracket mounting nut	124 to 147	12.6 to 15.0	91.2 to 108
Bracket mounting screw	167 to 196	17.0 to 20.0	123 to 144
Front wheel hub slotted nut	30 to 39	3.0 to 4.0	22 to 28
Front wheel mounting stud bolt (M14)	83.4 to 98.0	8.50 to 10.0	61.5 to 72.3
Front wheel hub turning torque	3.0 to 4.9	0.30 to 0.50	2.2 to 3.6
Tie-rod end slotted nut	157 to 176	16.0 to 18.0	116 to 130
Knuckle arm mounting screw and nut	124 to 147	12.6 to 15.0	91.2 to 108

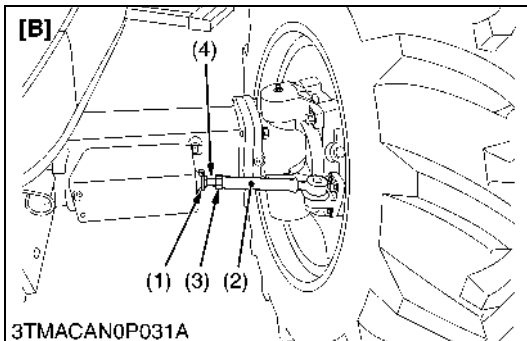
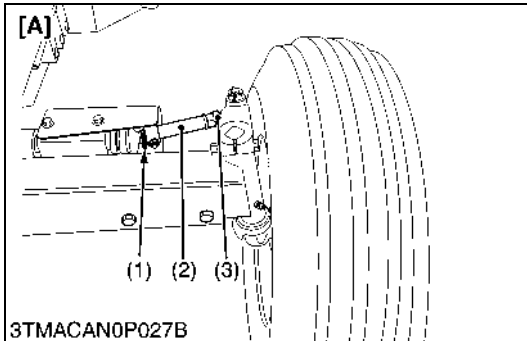
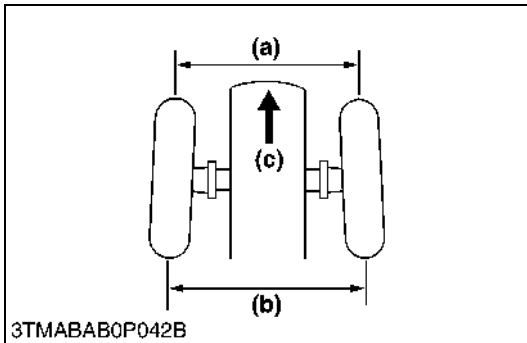
[4WD]

Item	N·m	kgf·m	lbf·ft
Tie-rod end lock nut	167 to 196	17.0 to 20.0	123 to 144
Front axle rocking force adjusting screw	20 to 29	2.0 to 3.0	15 to 21
Front axle rocking force adjusting lock nut	98.1 to 147	10.0 to 15.0	72.4 to 108
Power steering hose retaining nut	23 to 27	2.3 to 2.8	17 to 20
Front wheel mounting nut (M16)	260 to 304	26.5 to 31.0	192 to 224
Bracket mounting nut	124 to 147	12.6 to 15.0	91.2 to 108
Bracket mounting screw	167 to 196	17.0 to 20.0	123 to 144
Tie-rod end slotted nut	157 to 176	16.0 to 18.0	116 to 130
Tie-rod joint lock nut	167 to 196	17.0 to 20.0	123 to 144
Knuckle arm mounting screw (M12)	78 to 90	7.9 to 9.2	58 to 66
Bevel gear case mounting screw (M16, 9T)	260 to 304	26.5 to 31.0	192 to 224
Front wheel case support mounting screw (M16, 9T)	260 to 304	26.5 to 31.0	192 to 224
Front wheel case cover mounting screw	48 to 55	4.9 to 5.7	36 to 41
Front wheel mounting stud bolt (M16)	131 to 152	13.3 to 15.5	96.2 to 112
Differential case cover mounting screw (M8, 9T)	30 to 34	3.0 to 3.5	22 to 25

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4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING



Adjusting Toe-in

1. Park tractor on a flat place.
2. Turn steering wheel so front wheels are in the straight ahead position.
3. Lower the implement, lock the park brake and stop the engine.
4. Measure distance between tire beads at front of tire, hub height.
5. Measure distance between tire beads at rear of tire, hub height.
6. Front distance should be shorter than rear distance.
7. If not, adjust tie-rod length.

Toe-in (b-a)	Factory specification	2WD	1.0 to 5.0 mm 0.040 to 0.19 in.
		4WD	2.0 to 8.0 mm 0.079 to 0.31 in.

■ Toe-in Adjustment

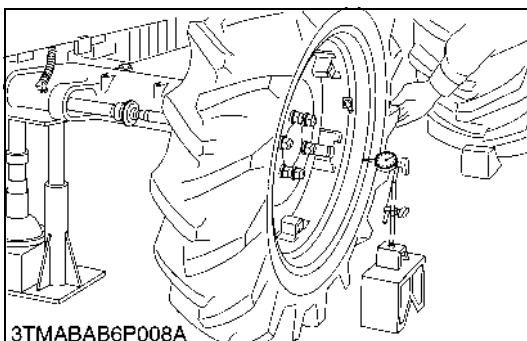
1. Remove the cylinder covers.
2. Detach the snap ring (1).
3. Loosen the tie-rod end lock nut (3).
4. Turn the tie-rod joint (2) to adjust until the proper toe-in measurement is obtained. (2WD model)
Turn the rod end (4) to adjust until the proper toe-in measurement is obtained. (4WD model)
5. Retighten the tie-rod nut (3).
6. Attach the snap ring (1) of the tie-rod joint.

Tightening torque	Front axle rocking force adjusting screw	20 to 29 N·m 2.0 to 3.0 kgf·m 15 to 21 lbf·ft
	Tie-rod end lock nut	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

- (1) Snap Ring
- (2) Tie-rod Joint
- (3) Tie-rod End Lock Nut
- (4) Rod End

- (a) Wheel-to-wheel distance at front
- (b) Wheel-to-wheel distance at rear
- (c) "FRONT"
- [A] 2WD Model
- [B] 4WD Model

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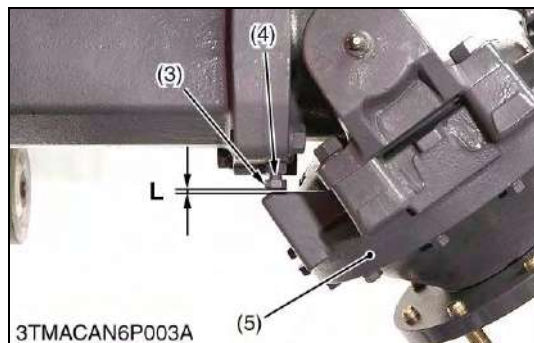
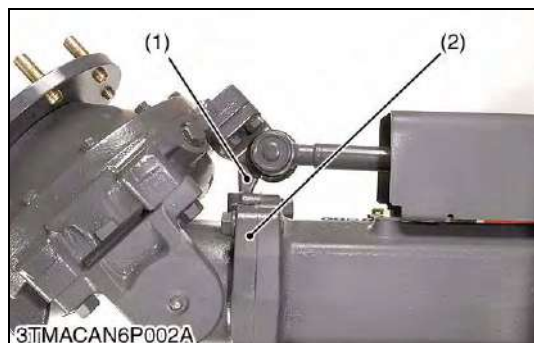
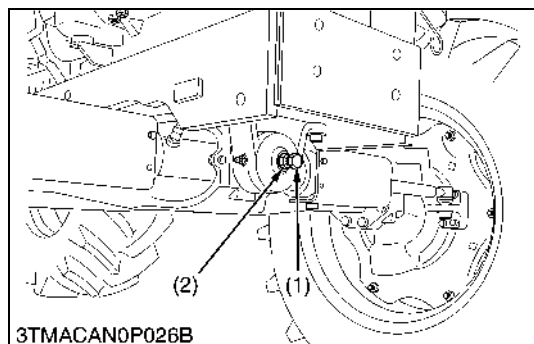
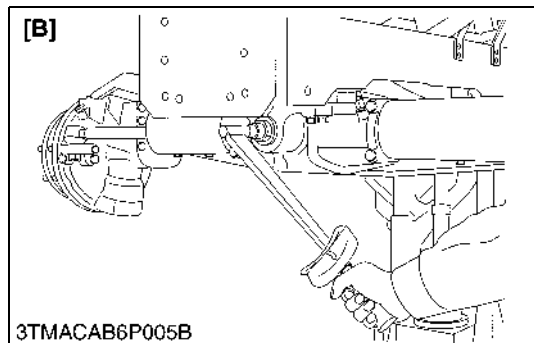
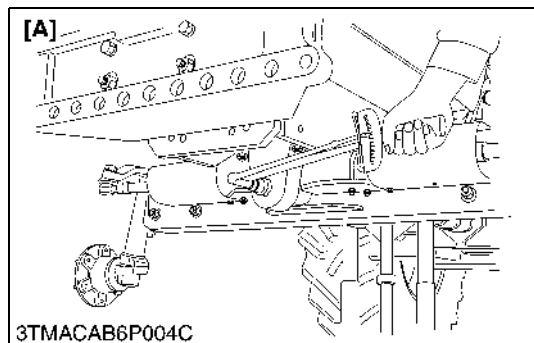


Axial Sway of Front Wheel

1. Jack up the front side of tractor.
2. Set a dial gauge on the outside of rim.
3. Turn the wheel slowly and rear the runout of rim.
4. If the measurement exceeds the factory specifications, check the bearing, rim and front wheel hub.

Axial sway of front wheel (Face runout of wheel at bead)	Factory specification	Less than 5.0 mm 0.20 in.
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Adjusting Front Axle Pivot

1. Jack up the tractor body, then loosen the front axle rocking force adjusting lock nut (2).
2. Screw in the adjusting screw (1) until seated, then tighten the adjusting screw (1) with an additional 1/6 turn.
3. Retighten the lock nut (2).

Tightening torque	Front axle rocking force adjusting screw	20 to 29 N·m 2.0 to 3.0 kgf·m 15 to 21 lbf·ft
	Front axle rocking force adjusting lock nut	98.1 to 147 N·m 10.0 to 15.0 kgf·m 72.4 to 108 lbf·ft

- (1) Adjusting Screw
(2) Lock Nut

[A] 2WD Model

[B] 4WD Model

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Adjusting between Bevel Gear Case and Stopper [4WD Model]

1. Inflate the tires to the specified pressure.
2. Steer the wheels to the extreme right until the knuckle arm (1) contacts with the bevel gear case (2).
3. If the knuckle arm (1) can not be contacted with the bevel gear case (2), shorten the length of stopper (3).
4. Keeping the knuckle arm (1) contact with the bevel gear case (2), make a specified length as shown in the table.
5. After adjustment, secure the stopper with the lock nut (4).
6. For adjusting the left steering angle, perform the same procedure as mentioned in right steering angle.

Clearance between bevel gear case and stopper (L)	Factory specification	Below 0.5 mm 0.02 in.
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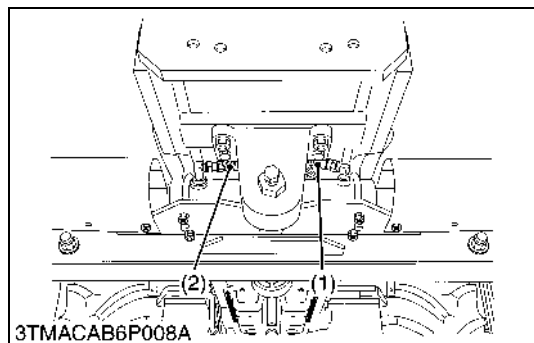
- (1) Knuckle Arm
(2) Bevel Gear Case
(3) Stopper
(4) Lock Nut
(5) Front Gear Case

L : Clearance

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[2] DISASSEMBLING AND ASSEMBLING

(1) Separating Front Axle [2WD Model]



Front Wheel and Power Steering Hoses

1. Check the front axle and engine are securely mounted on the disassembly stand.
2. Loosen the front wheel mounting nuts.
3. Lift the front axle and remove the front wheels.
4. Disconnect the power steering hoses (1), (2).

(When reassembling)

Tightening torque	Power steering hose retaining nut	23 to 27 N·m 2.3 to 2.8 kgf·m 17 to 20 lbf·ft
	Front wheel mounting nut (M14)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) Power Steering Hose 1

(2) Power Steering Hose 2

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Front Axle

1. Place a disassembly stand under the front axle case and support it with a jack.
2. Remove the bracket (front) (1) mounting screws and nuts.
3. Remove the bracket (rear) mounting screws and nuts.
4. Separating the front axle from front axle bracket.

(When reassembling)

Tightening torque	Bracket mounting nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
	Bracket mounting screw	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

■ IMPORTANT

- Be sure to adjust the front axle pivot.

(1) Front Bracket

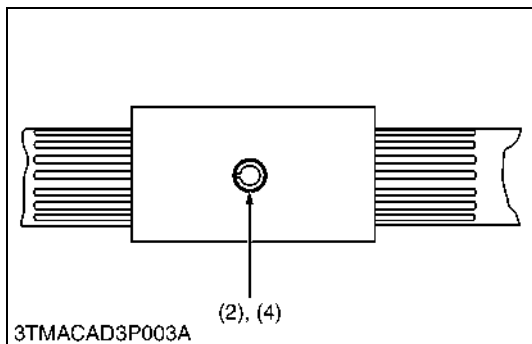
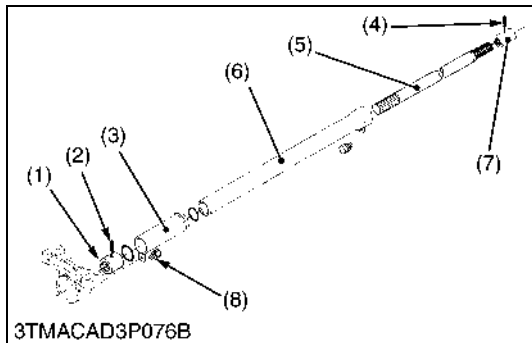
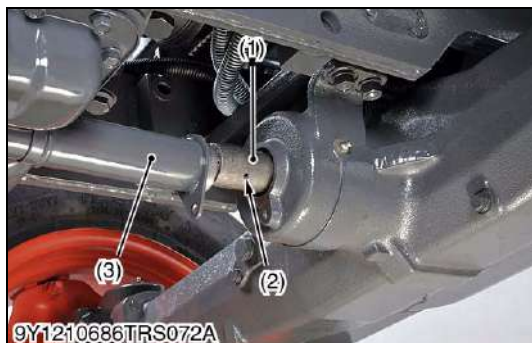
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(2) Separating Front Axle [4WD Model]

Draining Front Axle Gear Case (Right and Left) and Front Differential Case Oil

- See page G-37, G-38.

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Propeller Shaft

1. Slide the propeller shaft cover (3) after removing the screw (8).
2. Tap out the roll pins (2) and then slide the coupling (1) to the rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (5) and pinion shaft.
- Tap in the roll pins (2) as shown in figure.

- | | |
|---------------------------|---------------------|
| (1) Coupling | (5) Propeller Shaft |
| (2) Roll Pin | (6) Cover |
| (3) Propeller Shaft Cover | (7) Coupling |
| (4) Roll Pin | (8) Screw |

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Front Wheel and Power Steering Hoses

1. Check the front axle and engine are securely mounted on the disassembly stand.
2. Remove the front wheel.
3. Lift the front axle and remove the front wheels.
4. Disconnect the power steering hoses (1), (2).

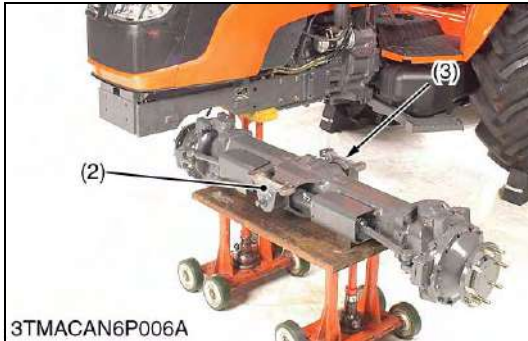
(When reassembling)

Tightening torque	Power steering hose retaining nut	23 to 27 N·m 2.3 to 2.8 kgf·m 17 to 20 lbf·ft
	Front wheel mounting nut (M16)	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 lbf·ft

(1) Power Steering Hose 1

(2) Power Steering Hose 2

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Front Axle

1. Place a disassembling stand under the front axle case and support it with a jack.
2. Disconnect the breather hose (1).
3. Remove the bracket (front) (3) mounting screws and nuts.
4. Remove the bracket (rear) (2) mounting screws and nuts.
5. Separate the front axle from front axle bracket.

(When reassembling)

Tightening torque	Bracket mounting nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
	Bracket mounting screw	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

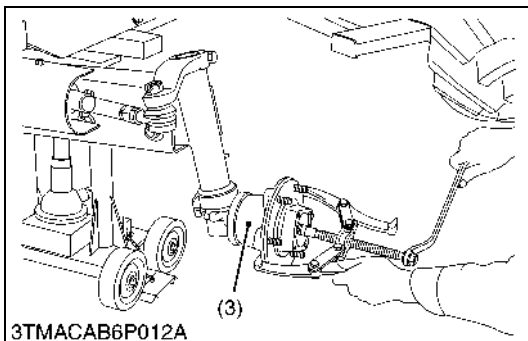
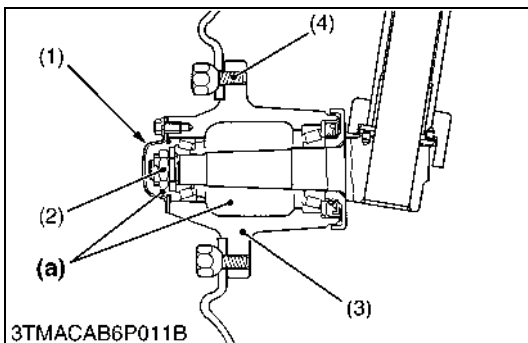
■ IMPORTANT

- Be sure to adjust the front axle pivot.

- (1) Breather Hose (3) Front Bracket
(2) Rear Bracket

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(3) Disassembling Front Axle [2WD Model]



Front Wheel Hub

1. Remove the front wheel cap (1).
2. Draw out the cutter pin.
3. Remove the slotted nut (2).
4. Remove the collar.
5. Remove the front wheel hub (3) with puller.

(When reassembling)

- Replace cotter pin with a new one.
- Apply grease to the oil seal and bearing in the front wheel hub.

Tightening torque	Front wheel hub slotted nut	30 to 39 N·m 3.0 to 4.0 kgf·m 22 to 28 lbf·ft
	Front wheel mounting stud bolt (M14)	83.4 to 98.0 N·m 8.50 to 10.0 kgf·m 61.5 to 72.3 lbf·ft

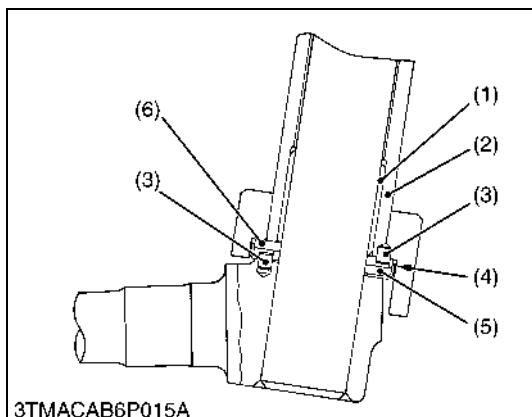
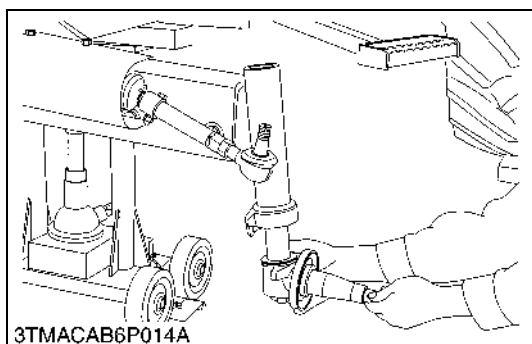
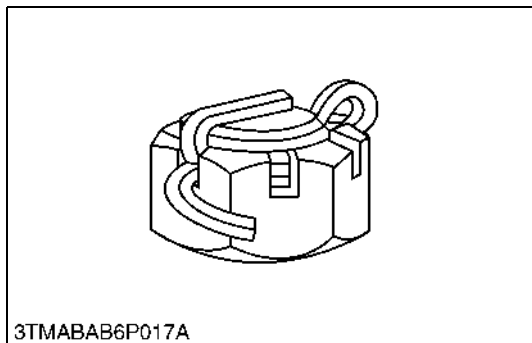
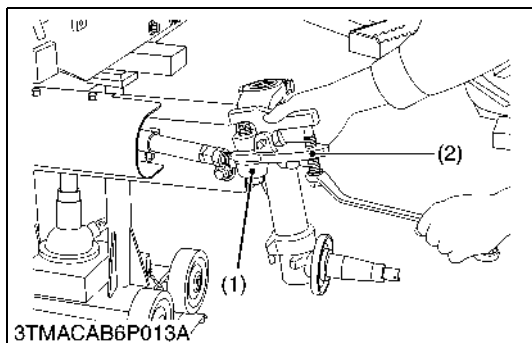
■ IMPORTANT

- After tightening the slotted nut to the specified torque, measure the front wheel hub turning torque.
- If the measurement is not within the factory specifications, adjust with the slotted nut.

Front wheel hub turning torque	Factory specification	3.0 to 4.9 N·m 0.30 to 0.50 kgf·m 2.2 to 3.6 lbf·ft
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- (1) Front Wheel Cap (a) Grease
(2) Slotted Nut
(3) Front Wheel Hub
(4) Stud Bolt

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Tie-rod

1. Pull out the cotter pin and loosen the tie-rod end nut.
2. Disconnect the tie-rod (1) with a tie-rod end lifter (2) (Code No. 07909-39051).
3. Remove the tie-rod end nut and tie-rod end.

(When reassembling)

- Replace cotter pin with a new one.
- After tightening the tie-rod end nut to the specified torques, install a cotter pin as shown in the figure.

Tightening torque	Tie-rod end slotted nut	157 to 176 N·m 16.0 to 18.0 kgf·m 116 to 130 lbf·ft
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(1) Tie-rod

(2) Tie-rod End Lifter

9Y1210686FAS0015US0

Knuckle Shaft

1. Remove the knuckle arm and draw out the knuckle shaft from the front axle.

(When reassembling)

- Assemble the knuckle shaft, making sure that the hole of the thrust collars (5), (6) at properly fitted to the knuckle shaft dowel pins (3).
- When lift the knuckle shaft, the knuckle arms must be mounted so that the clearance between the knuckle arms and front axle is 0.30 to 1.0 mm (0.012 to 0.039 in.).

Tightening torque	Knuckle arm mounting screw and nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
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(1) Knuckle Shaft Bushing

(4) Thrust Collar Cap

(2) Front Axle

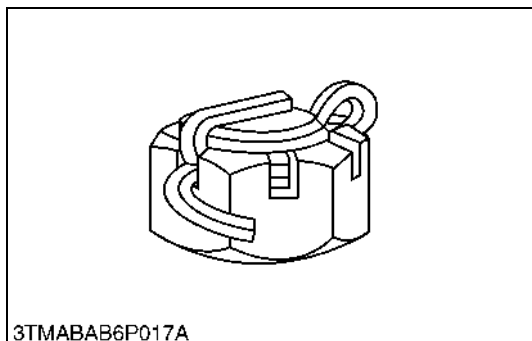
(5) Thrust Collar 1

(3) Dowel Pin

(6) Thrust Collar 2

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(4) Disassembling Front Axle [4WD Model]



Tie-rod

1. Pull out the cotter pin and remove the tie-rod end slotted nuts.
2. Remove the tie-rod with a tie-rod end lifter (Code No. 07909-39051).

(When reassembling)

- Replace cotter pin with a new one.
- Bend the cotter pin as shown in the figure.

Tightening torque	Tie-rod end slotted nut	157 to 176 N·m 16.0 to 18.0 kgf·m 116 to 130 lbf·ft
	Tie-rod joint lock nut	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	Knuckle arm mounting screw (M12)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

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Separating of Front Differential Case from Bevel Gear Case

1. Remove the bevel gear case (2) and the front wheel case (3) as a unit from the front differential case (1).

(When reassembling)

- Apply grease to the O-ring.
- Install the bevel gear case to the front differential case, noting the O-ring.

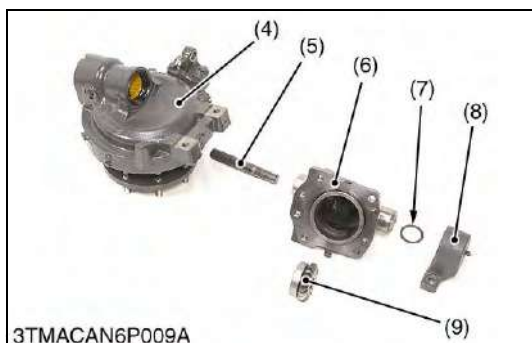
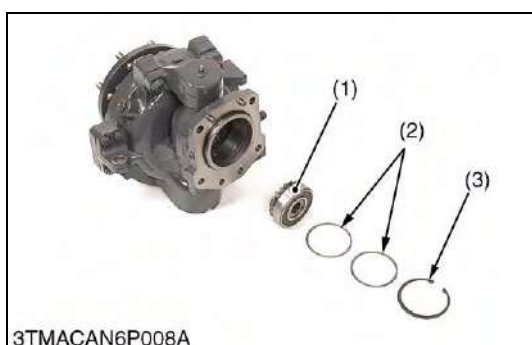
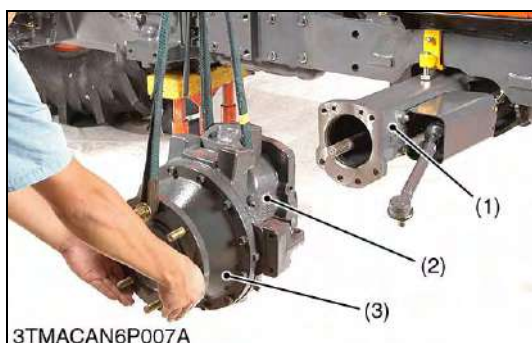
Tightening torque	Bevel gear case mounting screw (M16, 9T)	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 lbf·ft
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(1) Front Differential Case

(3) Front Wheel Case

(2) Bevel Gear Case

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Bevel Gear Case

1. Remove the internal circlip (3) and shim (2) then draw out the 17T bevel gear (1) with bearing.
2. Remove the front wheel case support (8).
3. Draw out the 18T bevel gear (9) and bevel gear shaft (5).

(When reassembling)

- Apply grease to the front wheel case support DX bushing and front wheel case DX bushing.
- Install the oil seal to the front wheel case support so that its lip faces the outward.
- Apply gear oil to the bearing.

Tightening torque	Front wheel case support mounting screw (M16, 9T)	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 lbf·ft
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(1) 17T Bevel Gear

(6) Bevel Gear Case

(2) Shim

(7) Collar

(3) Internal Circlip

(8) Front Wheel Case Support

(4) Front Wheel Case

(9) 18T Bevel Gear

(5) Bevel Gear Shaft

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Front Wheel Case Cover

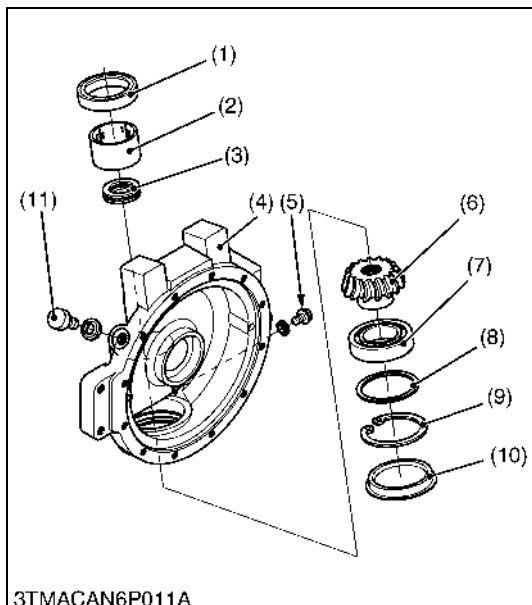
1. Remove the front wheel case cover from the front wheel case.

(When reassembling)

- Apply transmission fluid to the O-ring.

Tightening torque	Front wheel case cover mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
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Front Wheel Case

1. Remove the cap (10) which is installed in the bottom of front wheel case.
2. Remove the internal circlip (9) and take out the adjusting shims (8).
3. Tap the bevel gear to downward, and take out the 15T bevel gear (6) with bearing.

(When reassembling)

- Apply grease to the front wheel case DX bushing (2).
- Apply grease to the oil seal.
- Replace the cap (10) with new one.
- Apply transmission fluid to the cap.

(1) Oil Seal	(7) Ball Bearing
(2) DX Bushing	(8) Shim
(3) Thrust Ball Bearing	(9) Internal Circlip
(4) Front Wheel Case	(10) Cap
(5) Plug	(11) Plug
(6) 15T Bevel Gear	

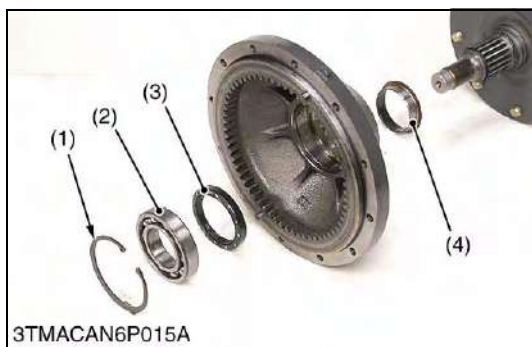
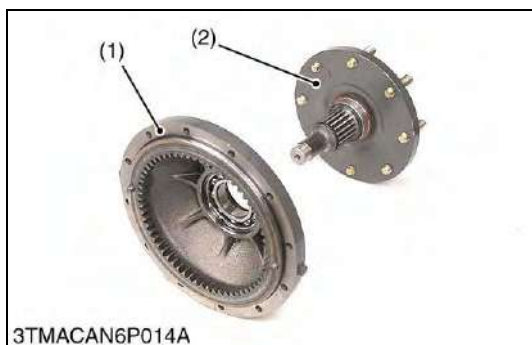
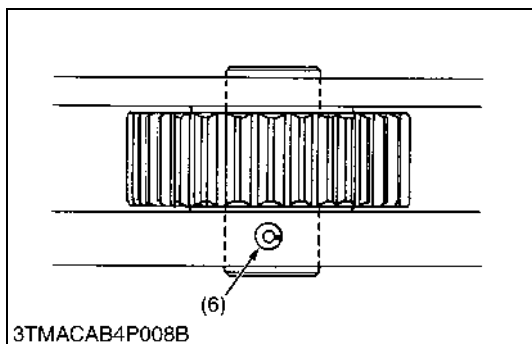
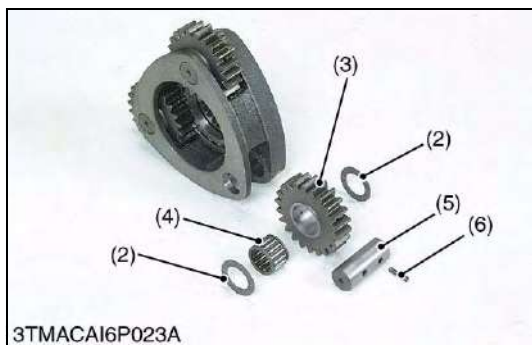
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Bevel Gear

1. Remove the bevel gear and bearing with a puller.

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Planetary Gear

1. Remove the external circlip (1).
2. Remove the planetary gear support assembly.
3. Tap the roll pin (6) into the planetary gear shaft (5).
4. Draw out the planetary gear shaft (5), and remove the planetary gear (3).
5. Tap out the roll pin (6) from the planetary gear shaft (5).

(When reassembling)

- Apply transmission fluid to the needle bearing (4).
- Tap in the roll pin (6) as shown in the figure left.
- Replace the external circlip (1) with new one.

- | | |
|----------------------|--------------------------|
| (1) External Circlip | (4) Needle Bearing |
| (2) Thrust Collar | (5) Planetary Gear Shaft |
| (3) Planetary Gear | (6) Roll Pin |

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Front Axle

1. Tap out the front axle (2) from front wheel case cover (1).

(When reassembling)

- Apply grease to the front axle oil seal.

Tightening torque	Front wheel mounting stud bolt (M16)	131 to 152 N·m 13.3 to 15.5 kgf·m 96.2 to 112 lbf·ft
-------------------	--------------------------------------	--

- | | |
|----------------------------|----------------|
| (1) Front Wheel Case Cover | (2) Front Axle |
|----------------------------|----------------|

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Front Axle Oil Seal

1. Remove the internal circlip (1) and tap out the bearing (2).
2. Draw out the oil seal (3), (4).

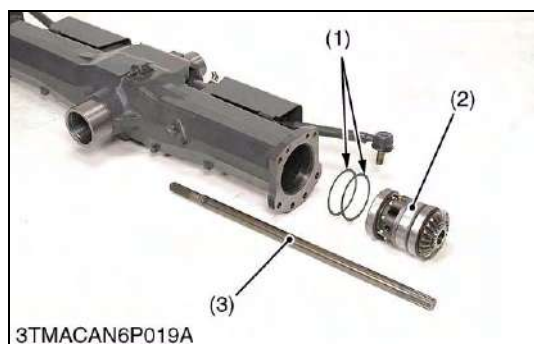
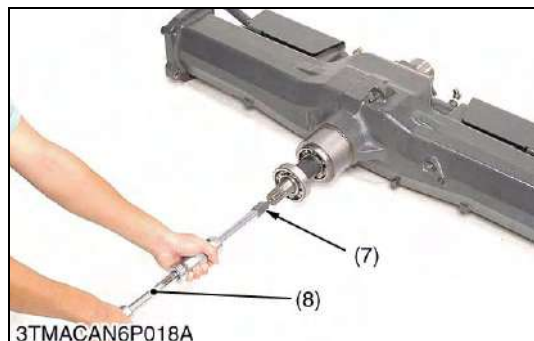
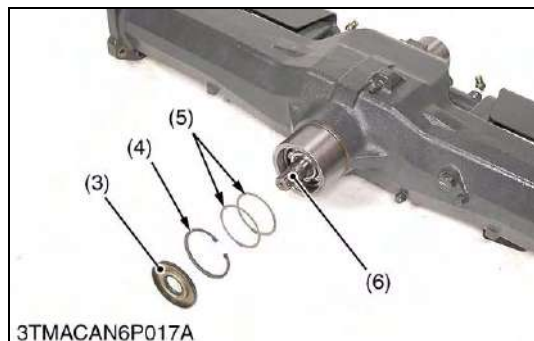
(When reassembling)

- Install the oil seal outward to the front wheel case cover so that its lip faces the outward.

- | | |
|----------------------|--------------|
| (1) Internal Circlip | (3) Oil Seal |
| (2) Bearing | (4) Oil Seal |

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(5) Removing Differential Gear and Bevel Pinion Shaft



Bevel Pinion Shaft

1. Draw out the front bracket (2) and rear bracket (1).
2. Remove the oil seal (3), internal circlip (4) and shim (5).
3. Pull out the bevel pinion shaft (6) using a slide hammer (8).

(When reassembling)

- Replace oil seal (3) with new one.
- Install the oil seal (3) to the front axle case so that its lip faces the inward.
- Apply grease to the DX bushing for bracket (1), (2).

(Reference)

- Adaptor for slide hammer : M6 pitch 1.0 mm.
(See page G-70.)

- | | |
|----------------------|------------------------------|
| (1) Rear Bracket | (5) Shim |
| (2) Front Bracket | (6) Bevel Pinion Shaft |
| (3) Oil Seal | (7) Adaptor for Slide Hammer |
| (4) Internal Circlip | (8) Slide Hammer |

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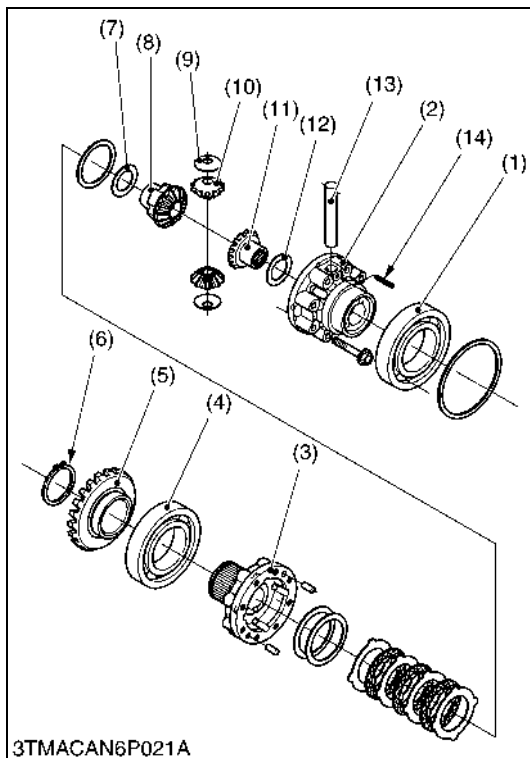
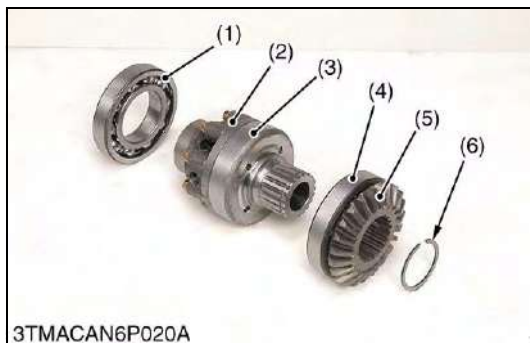
Differential Gear (LSD) Assembly

1. Draw out the both yoke shaft.
2. Tap out the differential gear (LSD) assembly (2) and shim (1) to R.H. side.

- | | |
|--------------------------------------|-----------------------|
| (1) Shim | (3) Yoke Shaft (R.H.) |
| (2) Differential Gear (LSD) Assembly | |

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(6) Disassembling Differential Gear (LSD)



Spiral Bevel Gear

1. Remove the external circlip (6) and the 23T spiral bevel gear (5) with bearing (4).
2. Remove the bearing (1).
3. Remove the differential case cover mounting screws and remove the differential case cover.
4. Tap out the roll pin (14) and draw out the differential pinion shaft (13) and pinion gears (10), differential side gear (11) and shim.

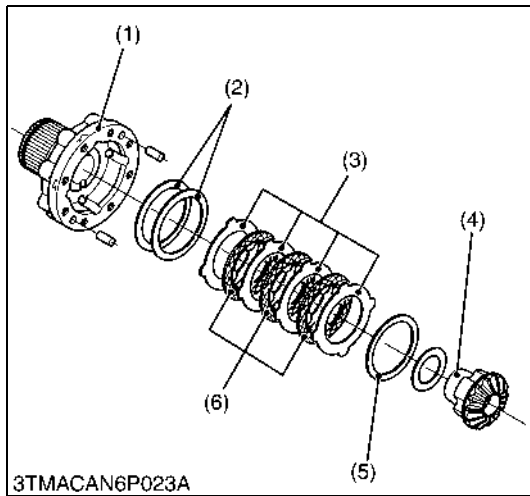
(When reassembling)

- Replace the external circlip (6) with new one.
- Check the differential pinion gears (10), pinion shaft (13) for excessive wear. If these parts are damaged or excessively worn, replace there parts thy are in mesh with, or they sliding on.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to inner circumferential surface of differential pinions, side gear and shim.
- Install the parts to there original position.
- Face the roll pin (14) as shown in the photo.

Tightening torque	Differential case cover mounting screw (M8, 9T)	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft
-------------------	---	---

- | | |
|-----------------------------|--------------------------------|
| (1) Bearing | (8) LSD Side Gear |
| (2) Differential Case | (9) Pinion Washer |
| (3) Differential Case Cover | (10) Differential Pinion Gear |
| (4) Bearing | (11) Differential Side Gear |
| (5) 23T Spiral Bevel Gear | (12) Shim |
| (6) External Circlip | (13) Differential Pinion Shaft |
| (7) Shim | (14) Roll Pin |

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LSD Disk and Steel Plate

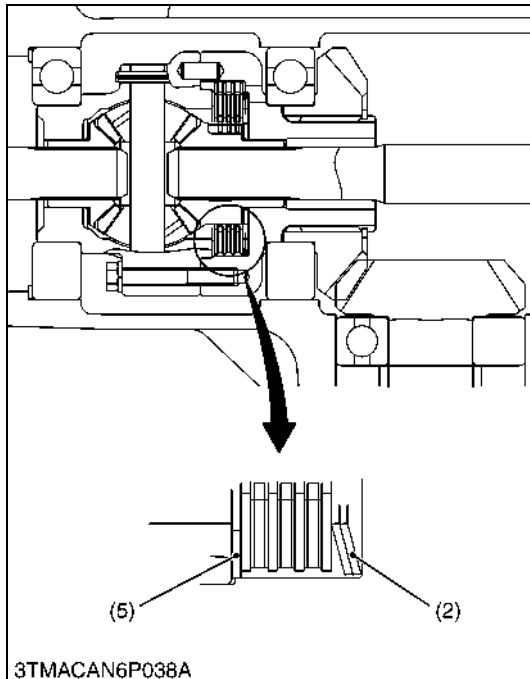
1. Draw out the LSD side gear (4), LSD shim (5), steel plates (3), LSD disks (6) and belleville washers (cupped spring washer) (2).

(When reassembling)

- Apply transmission fluid to the LSD disks.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to side gear and shim.
- Assemble the belleville washers (cupped spring washer) as shown in the figure.
- Check the slip torque of LSD after assembling. (See page 5-S23.)

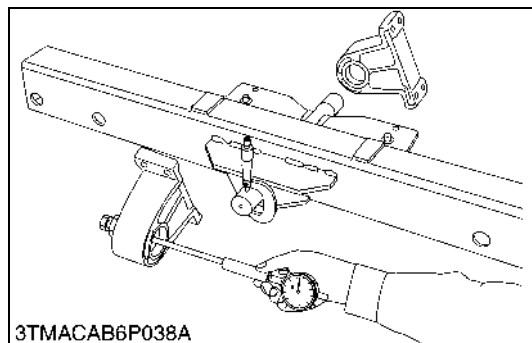
- | | |
|--|-------------------|
| (1) Differential Case Cover | (4) LSD Side Gear |
| (2) Belleville Washer (Cupped Spring Washer) | (5) LSD Shim |
| (3) Steel Plate | (6) LSD Disk |

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[3] SERVICING

(1) 2WD Model



Clearance between Front Axle Middle Boss and Bracket Bushing

1. Measure the front axle middle boss O.D. at several points where it contacts with the bushings.
2. Measure the front axle bracket (front) bushing I.D. and bracket (rear) bushing I.D. in the same method, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace it.

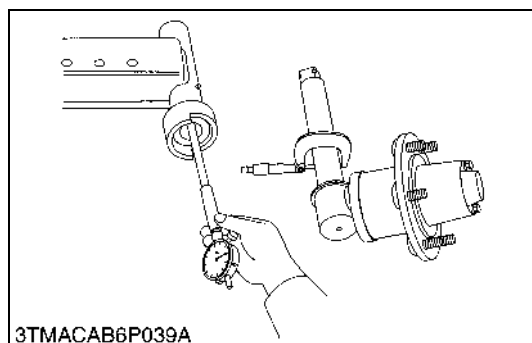
Clearance between front axle middle boss and bracket bushing	Factory specification	0.050 to 0.15 mm 0.0020 to 0.0059 in.
	Allowable limit	0.35 mm 0.014 in.

Front axle middle boss O.D.	Factory specification	39.938 to 40.000 mm 1.5724 to 1.5748 in.
Bracket bushing I.D.	Factory specification	40.050 to 40.088 mm 1.5768 to 1.5782 in.

(When replacing bushing)

- Before press-fitting the bushing, install the new thrust collar.
- Install the oil seals, noting their direction.

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Clearance between Knuckle Shaft (Kingpin) and Bushing

1. Measure the shaft O.D. at several point where it contacts with the bushings.
2. Measure the bushing I.D. in the same method, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bushing.

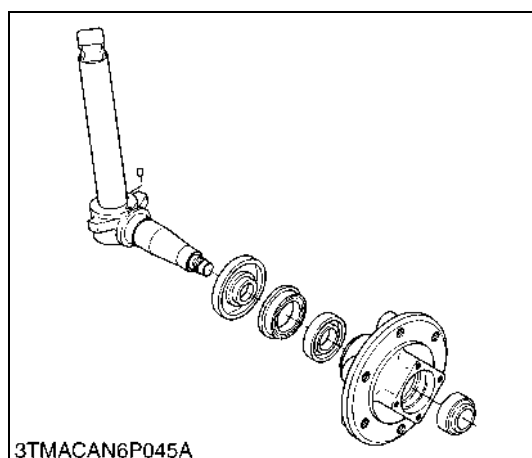
Clearance between knuckle shaft (kingpin) and bushing	Factory specification	0.0200 to 0.125 mm 0.000788 to 0.00492 in.
	Allowable limit	0.35 mm 0.014 in.

Knuckle shaft O.D.	Factory specification	37.975 to 38.000 mm 1.4951 to 1.4960 in.
Bushing I.D.	Factory specification	38.020 to 38.100 mm 1.4969 to 1.5000 in.

(When replacing bushing)

- Remove the bushing with a bushing puller set (Code No. 07916-51011).

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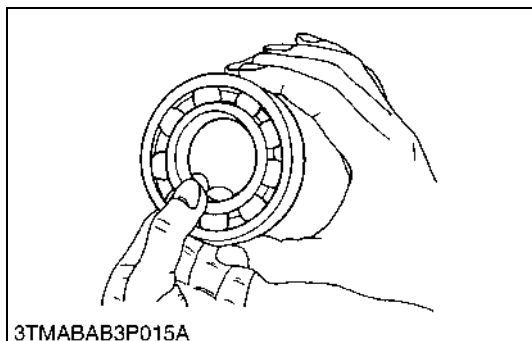


Taper Roller Bearing

1. Check the bearing for abrasion, color change or other damage.
2. If there is any doubt as to the condition of a taper roller bearing, replace it.

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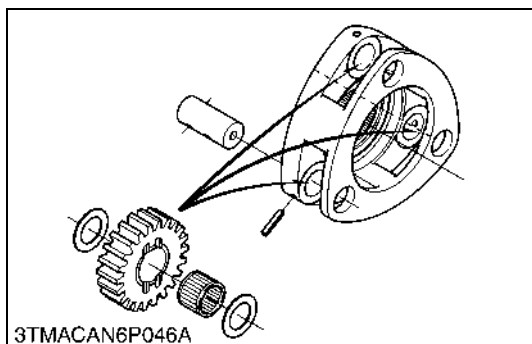
(2) 4WD Model



Ball Bearing

1. Hold the inner race, and push and pull the outer race in all directions to check for wear and roughness.
2. Apply transmission fluid to the bearing, and hold the inner race. Then, turn the outer race to check rotation.
3. If there is any defect, replace it.

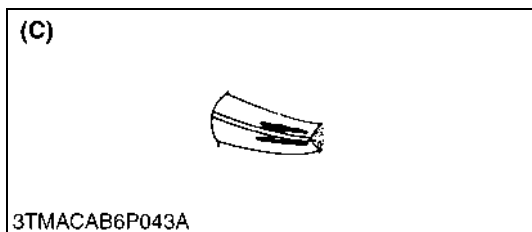
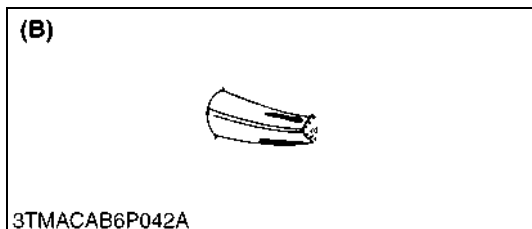
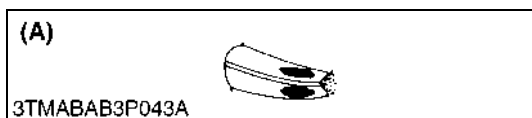
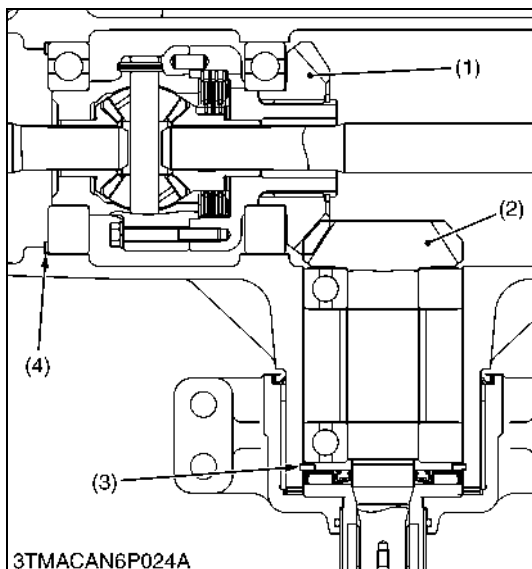
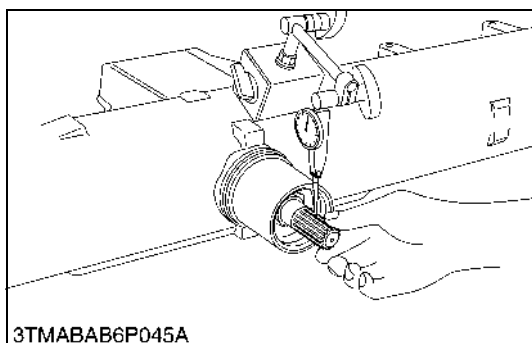
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Needle Bearing

1. Check the needle bearing for abrasion, color, change or other damage.
2. If there is any doubt as to the condition of a needle bearing, replace it.

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Backlash and Tooth Contact between Bevel Pinion Shaft and Bevel Gear

1. Set a dial indicator (lever type) with its finger on the tooth surface.
2. Measure the backlash by fixing the bevel pinion shaft (2) and moving the bevel gear (1) by hand.
3. Calculate the backlash from the ratio of the shaft diameter to the gear diameter. (Backlash = Play × 2.7)
4. If the backlash exceeds the allowable limit, adjust with the shim (4).
5. Adjust the backlash properly by repeating the above procedures.

Backlash between bevel gear and bevel pinion shaft	Factory specification	0.20 to 0.30 mm 0.0079 to 0.011 in.
	Allowable limit	0.4 mm 0.02 in.

6. Apply red lead lightly over several teeth at three positions equally spaced on the bevel gear (1).
7. Turn the bevel pinion shaft (2), against the periphery of the bevel gear.
8. Check the tooth contact. If not proper, adjust according to the instructions shown in the figure.

(Reference)

- Thickness of adjusting shims (3) :
0.1 mm (0.004 in.) [Code No.: 35533-44080]
0.2 mm (0.008 in.) [Code No.: 35533-44090]
0.4 mm (0.016 in.) [Code No.: 35533-44100]
0.8 mm (0.032 in.) [Code No.: 35533-44110]
1.0 mm (0.039 in.) [Code No.: 35533-44120]
1.2 mm (0.047 in.) [Code No.: 35533-44130]
- Thickness of adjusting shims (4) :
0.7 mm (0.028 in.) [Code No.: 3A151-32180]
0.8 mm (0.032 in.) [Code No.: 3A151-32130]
1.0 mm (0.039 in.) [Code No.: 3A151-32140]
1.2 mm (0.047 in.) [Code No.: 3A151-32150]
1.4 mm (0.551 in.) [Code No.: 3A151-32160]
2.3 mm (0.091 in.) [Code No.: 3A151-32170]
- Standard size of shim (3) : 0.5 mm (0.020 in.)
Standard size of shim (4) : 1.2 mm (0.047 in.)
- Backlash changes per 0.1 mm (0.004 in.) shim :
Approx. 0.05 mm (0.002 in.)

■ IMPORTANT

- **Adjust the tooth contact with shims (3) and (4) so that the spiral bevel pinion shaft may not contact with the differential case.**

- (1) Bevel Gear
(2) Bevel Pinion Shaft
(3) Shim
(4) Shim

- (A) **Proper Contact :**
More than 35 % red lead contact area on the gear tooth surface.
The center of tooth contact at 1/3 of the entire width from the small end.
- (B) **Deep Contact :**
Decrease the shims.
- (C) **Shallow Contact :**
Increase the shims.

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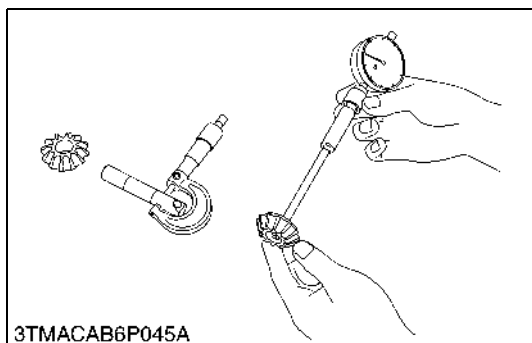
Clearance between Differential Case and Differential Side Gear

1. Measure the differential side gear boss O.D..
2. Measure the differential case bore I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace it.

Clearance between differential case and differential side gear	Factory specification	0.050 to 0.091 mm 0.0020 to 0.0035 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case bore I.D.	Factory specification	32.025 to 32.050 mm 1.2609 to 1.2618 in.
Differential side gear boss O.D.	Factory specification	31.959 to 31.975 mm 1.2583 to 1.2588 in.

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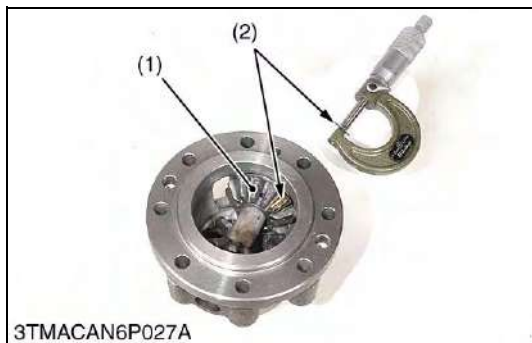
Clearance between Differential Pinion Shaft and Pinion Gear

1. Measure the differential pinion shaft O.D..
2. Measure the differential pinion gear I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace.

Clearance between differential pinion shaft and pinion gear	Factory specification	0.016 to 0.052 mm 0.00063 to 0.0020 in.
	Allowable limit	0.25 mm 0.0098 in.

Differential pinion shaft O.D.	Factory specification	15.966 to 15.984 mm 0.62859 to 0.62929 in.
Differential pinion gear I.D.	Factory specification	16.000 to 16.018 mm 0.62993 to 0.63062 in.

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Backlash between Differential Pinion and Differential Side Gear

1. Hold the plastigauge (wire of solder) (2) on the pinion gear (1) with grease.
2. Turn the pinion gear (1) to mesh the plastigauge (wire of solder).
3. Measure the thickness of plastigauge (wire of solder).
4. If the backlash exceeds the allowable limit, adjust with shim (3).
5. Adjust the backlash properly by repeated above procedure.

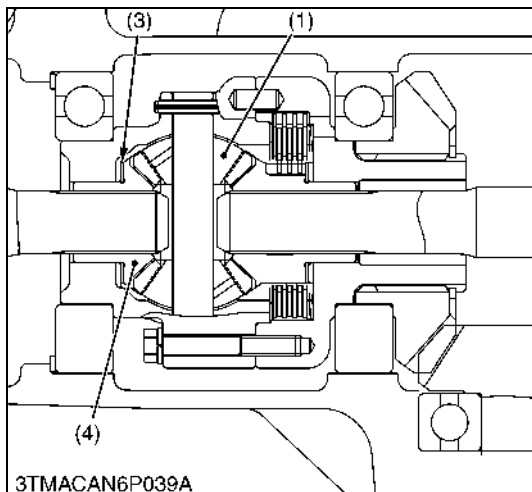
Backlash between pinion gear and differential side gear	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

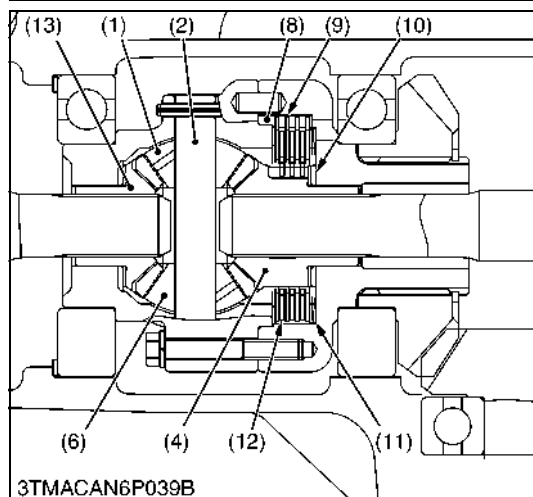
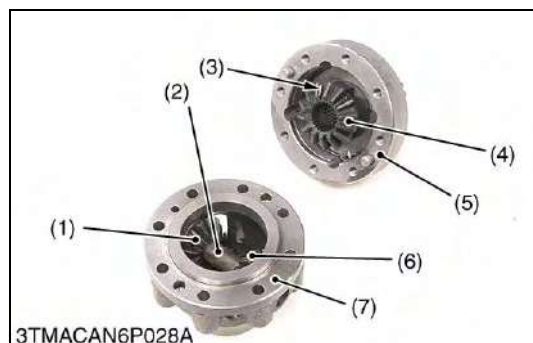
(Reference)

- Thickness of adjusting shim :
0.8 mm (0.032 in.) [Code No. 67211-15170]
1.0 mm (0.039 in.) [Code No. 67211-15160]
1.2 mm (0.047 in.) [Code No. 67211-15180]
- Standard size of shim : 1.0 mm (0.039 in.)

- (1) Pinion Gear (3) Shim
(2) Plastigauge (Wire of Solder) (4) Side Gear

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Backlash between Differential Pinion and LSD Side Gear

1. Assemble the pinion gear (1), (6) and pinion shaft (2) without differential side gear (13).
2. Assemble the LSD side gear (4) without belleville washers (cupped spring washer) (11), steel plates (9), LSD disks (12) and LSD shim (8).
3. Put the plastigauge (wire of solder) (3) on the LSD side gear (4).
4. Assemble the differential case (7) and differential case cover (5).
5. Turn the LSD side gear using the yoke shaft to clash the plastigauge (wire of solder).
6. Disassemble the differential case cover and measure the thickness of plastigauge (wire of solder).
7. If the backlash exceeds the allowable limit, adjust with shim (10).
8. Adjust the backlash properly by repeated above procedure.

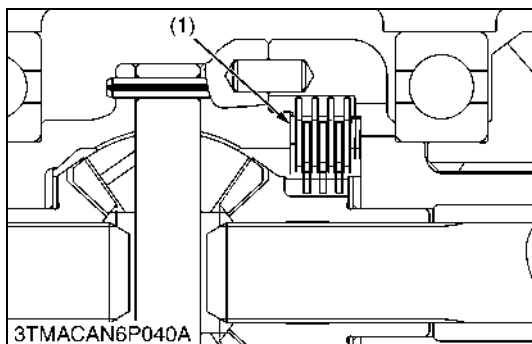
Backlash between pinion gear and LSD side gear	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

(Reference)

- Thickness of adjusting shim :
0.8 mm (0.032 in.) [Code No. 67211-15170]
1.0 mm (0.039 in.) [Code No. 67211-15160]
1.2 mm (0.047 in.) [Code No. 67211-15180]
- Standard size of shim : 1.0 mm (0.039 in.)

- | | |
|----------------------------------|---|
| (1) Pinion Gear | (8) Shim (LSD) |
| (2) Pinion Shaft | (9) Steel Plate |
| (3) Plastigauge (Wire of Solder) | (10) Shim (LSD Side Gear) |
| (4) Side Gear (LSD) | (11) Belleville Washer (Cupped Spring Washer) |
| (5) Differential Case Cover | (12) LSD Disk |
| (6) Pinion Gear | (13) Side Gear |
| (7) Differential Case | |

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Slip Torque of LSD Disk

1. Set the differential assembly on the vice securely.
2. Check the LSD slip torque using a jig as shown in the photo.
3. If the LSD slip torque is not within the factory specification, adjust with LSD shim (1).

■ IMPORTANT

- When measuring the slip torque for LSD, apply ample lubricant to the LSD disk.
- Turn the LSD side gear using a jig clockwise and counterclockwise each direction several times to mesh the LSD disk and steel plate.

LSD slip torque	Factory specification	54 to 67 N·m 5.5 to 6.9 kgf·m 40 to 49 lbf·ft
-----------------	-----------------------	---

(Reference)

- Jig in the photo is : Spline from yoke shaft and welded with box wrench. (See page G-71.)
- Thickness of LSD shim :
 - 0.1 mm (0.004 in.) [Code No.: 35533-43010]
 - 0.2 mm (0.008 in.) [Code No.: 35533-43020]
 - 0.4 mm (0.016 in.) [Code No.: 35533-43030]
 - 0.8 mm (0.032 in.) [Code No.: 35533-43040]
 - 1.0 mm (0.039 in.) [Code No.: 35533-43050]
 - 1.2 mm (0.047 in.) [Code No.: 35533-43060]

Thickness of steel plate	Factory specification	1.32 to 1.48 mm 0.0520 to 0.0582 in.
Thickness of LSD disk	Factory specification	2.55 to 2.65 mm 0.101 to 0.104 in.

- Slip torque changes per 0.1 mm (0.004 in.) shim :
Approx. 5 to 6 N·m (0.5 to 0.7 kgf·m, 4 to 5 lbf·ft)

(1) Shim

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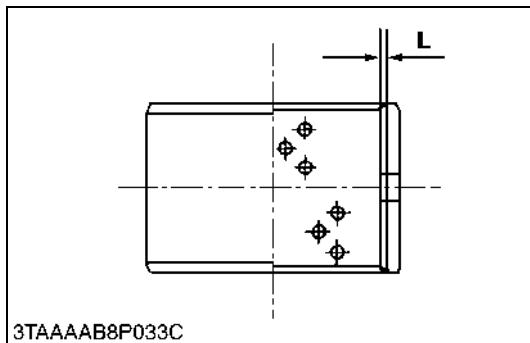


Front Bracket and Rear Bracket Bushing

1. Visually inspect the DX bushings for signs of wear or damage.
(The DX bushing tends to show concentrated wear.)
2. If the DX bushing is worn beyond the alloy portion (**L**), replace it.

Front bracket and rear bracket bushing	Alloy thickness (L)	0.57 mm 0.022 in.
Rear differential case boss O.D.	Factory specification	109.965 to 110.000 mm 4.32933 to 4.33070 in.
Front differential case boss O.D.	Factory specification	79.965 to 80.000 mm 3.1483 to 3.1496 in.

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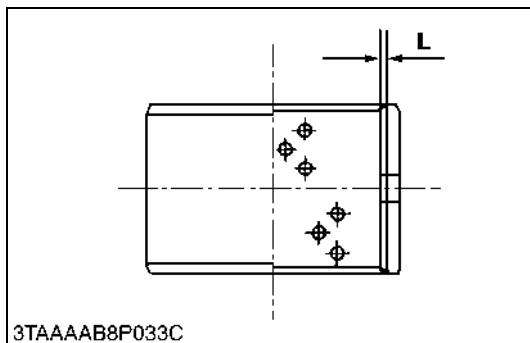


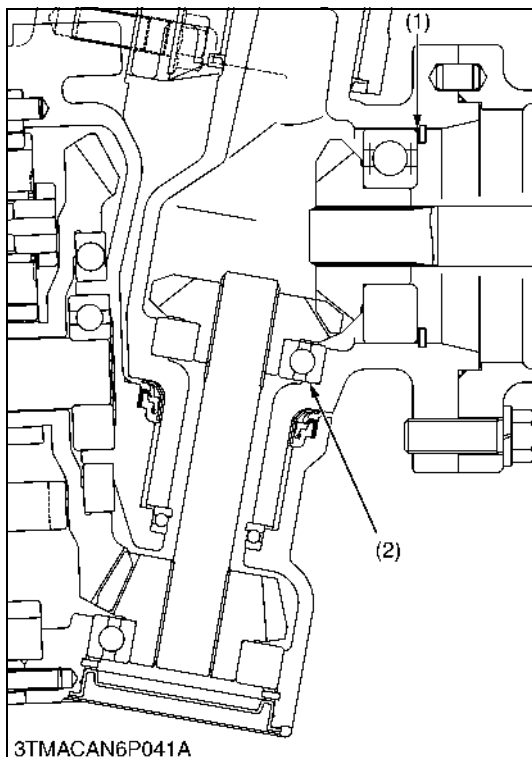
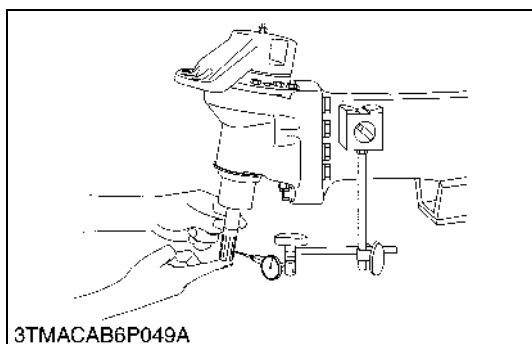
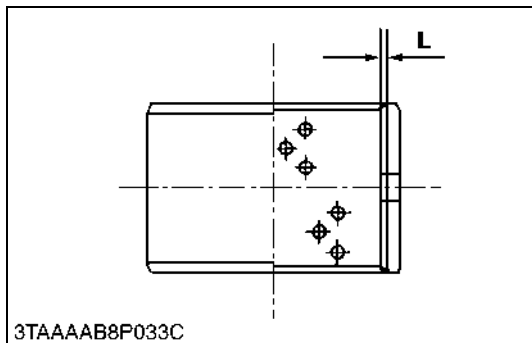
Bearing Retainer and Front Wheel Case Support Bushing

1. Visually inspect the DX bushings for signs of wear or damage.
(The DX bushing tends to show concentrated wear.)
2. If the DX bushing is worn beyond the alloy portion (**L**), replace it.

Front wheel case support bushing	Alloy thickness (L)	0.57 mm 0.022 in.
Bearing retainer O.D.	Factory specification	59.97 to 60.00 mm 2.361 to 2.362 in.

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Bevel Gear Case and Front Wheel Case Bushing

1. Visually inspect the DX bushings for signs of wear or damage. (The DX bushing tends to show concentrated wear.)
2. If the DX bushing is worn beyond the alloy portion (L), replace it.

Front wheel case bushing	Alloy thickness (L)	0.57 mm 0.022 in.
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Bevel gear case O.D.	Factory specification	59.97 to 60.00 mm 2.361 to 2.362 in.
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Backlash of Bevel Gear in Bevel Gear Case

1. Set a dial indicator (lever type) on the shaft (Kingpin).
2. Move the shaft (Kingpin) by hand and measure the circumferential play of the shaft.
3. Calculate the backlash from the ratio of the shaft diameter to the gear diameter. (Backlash = Play × 2)
4. If the backlash exceeds the allowable limit, adjust with the shims (1).

Backlash of bevel gear in bevel gear case	Factory specification	0.20 to 0.30 mm 0.0079 to 0.011 in.
	Allowable limit	0.4 mm 0.02 in.

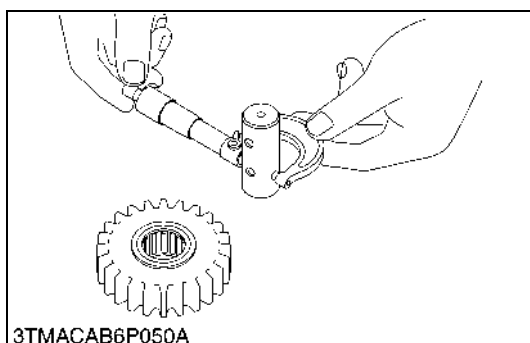
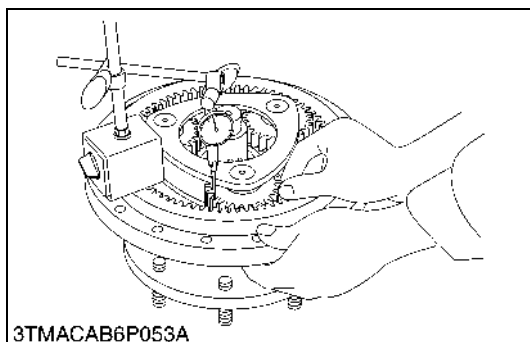
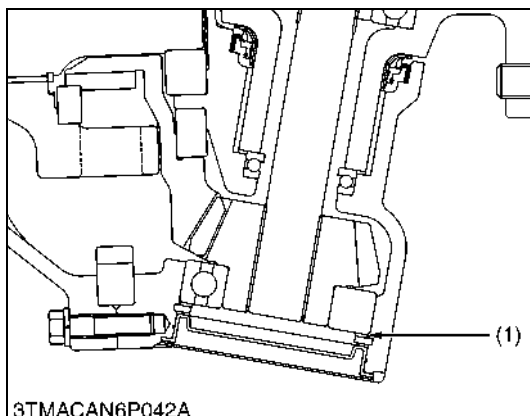
(Reference)

- Thickness of adjusting shims (1) :
0.1 mm (0.004 in.) [Code No.: 35533-44020]
0.2 mm (0.008 in.) [Code No.: 35533-44030]
0.4 mm (0.016 in.) [Code No.: 35533-44040]
0.8 mm (0.032 in.) [Code No.: 35533-44050]
1.0 mm (0.039 in.) [Code No.: 35533-44060]
1.2 mm (0.047 in.) [Code No.: 35533-44070]
- Thickness of adjusting shims (2) :
0.1 mm (0.004 in.) [Code No.: 35533-44080]
0.2 mm (0.008 in.) [Code No.: 35533-44090]
- Standard size of shim (1) : 1.0 mm (0.039 in.)
Standard size of shim (2) : None.
- Backlash changes per 0.1 mm (0.004 in.) shim :
Approx. 0.04 mm (0.002 in.)

(1) Shim

(2) Shim

9Y1210686FAS0044US0



Backlash of Bevel Gear in Front Wheel Case

1. Set a dial indicator (lever type) on the shaft (Kingpin).
2. Move the shaft (Kingpin) by hand and measure the circumferential play of the shaft.
3. Calculate the backlash from the ratio of the shaft diameter to the gear diameter. (Backlash = Play × 2)
4. If the backlash exceeds the allowable limit, adjust with the shims (1).

Backlash of bevel gear in front wheel case	Factory specification	0.20 to 0.30 mm 0.0079 to 0.011 in.
	Allowable limit	0.4 mm 0.02 in.

(Reference)

- Thickness of adjusting shims (1) :
 0.1 mm (0.004 in.) [Code No.: 35533-44080]
 0.2 mm (0.008 in.) [Code No.: 35533-44090]
 0.4 mm (0.016 in.) [Code No.: 35533-44100]
 0.8 mm (0.032 in.) [Code No.: 35533-44110]
 1.0 mm (0.039 in.) [Code No.: 35533-44120]
 1.2 mm (0.047 in.) [Code No.: 35533-44130]
- Standard size of shim (1) : 2.0 mm (0.079 in.)

(1) Shim

9Y1210686FAS0045US0

Backlash between Internal Gear and Planetary Gear

1. Set a dial indicator (lever type) on the tooth of the planetary gear.
2. Hold the planetary gear support and move only the planetary gear.
3. If the measurement exceeds the allowable limit, check the planetary gear and planetary shaft.

Backlash between internal gear and planetary gear	Factory specification	0.10 to 0.30 mm 0.0040 to 0.011 in.
	Allowable limit	0.5 mm 0.02 in.

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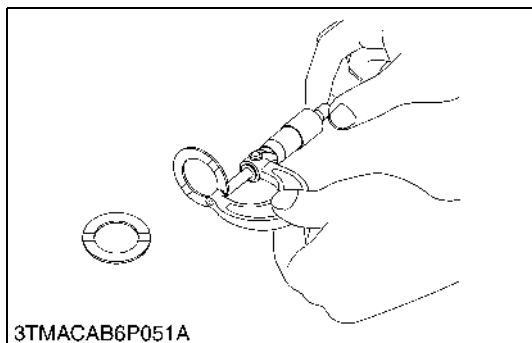
Clearance between Planetary Gear and Shaft

1. Measure the planetary gear I.D. and the planetary gear shaft O.D. (rubbing surface).
2. Measure the O.D. of two needles installed diagonally in the needle bearing.
3. Calculate the clearance.
4. If the clearance exceeds the allowable limit, replace them.

Clearance between planetary gear and shaft	Factory specification	0.0090 to 0.046 mm 0.00036 to 0.0018 in.
	Allowable limit	0.3 mm 0.01 in.

Planetary gear I.D.	Factory specification	33.009 to 33.025 mm 1.2993 to 1.3001 in.
Shaft O.D.	Factory specification	24.991 to 25.000 mm 0.98390 to 0.98425 in.
Needle bearing O.D.	Factory specification	3.994 to 4.000 mm 0.1573 to 0.1574 in.

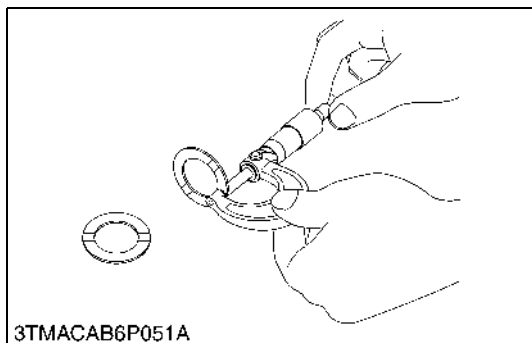
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**Thrust Collar Thickness**

1. Measure the thickness of the thrust collar.
2. If the measurement is less than the allowable limit, replace it.

Thrust collar thickness	Factory specification	0.75 to 0.85 mm 0.030 to 0.033 in.
	Allowable limit	0.5 mm 0.02 in.

9Y1210686FAS0048US0

**Thrust Collar Thickness**

1. Measure the thickness of the thrust collar.
2. If the measurement is less than the allowable limit, replace it.

Thrust collar thickness	Factory specification	0.75 to 0.85 mm 0.030 to 0.033 in.
	Allowable limit	0.5 mm 0.02 in.

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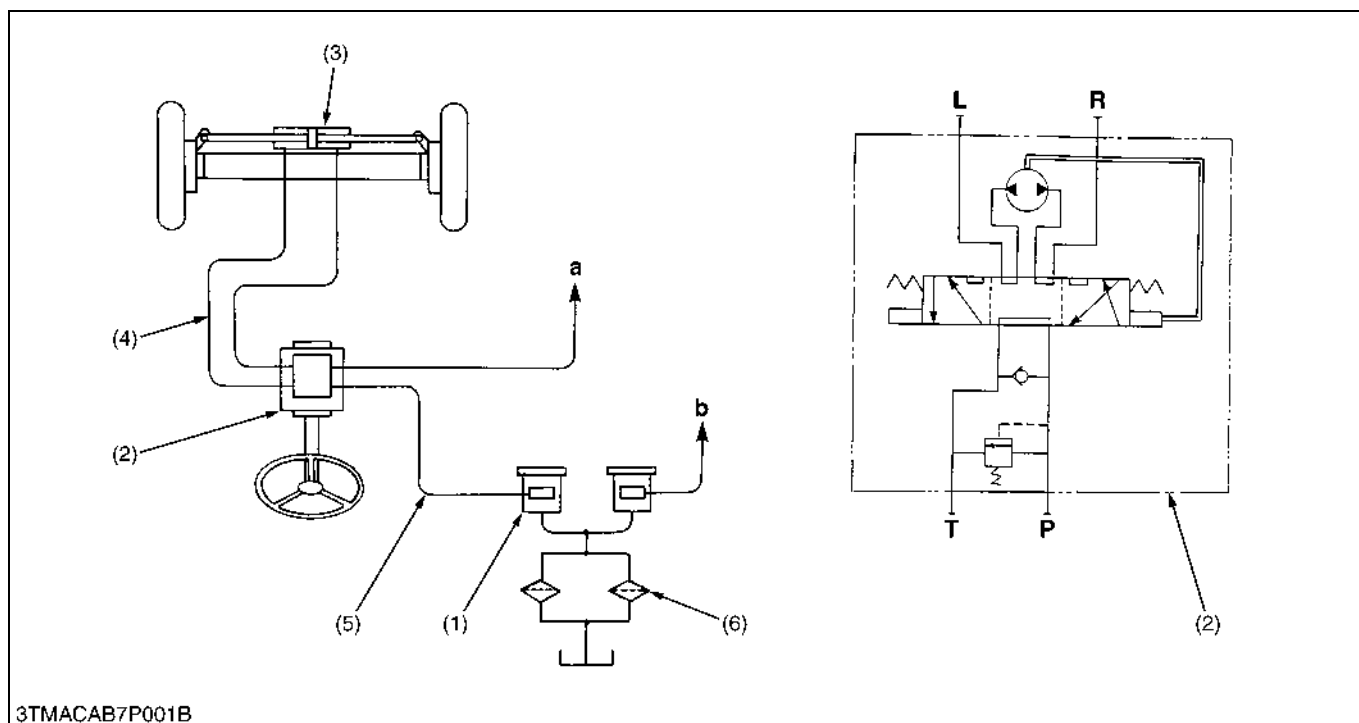
6 STEERING

MECHANISM

CONTENTS

- 1. STEERING MECHANISM 6-M1
- 2. STEERING CYLINDER 6-M2

1. STEERING MECHANISM



(1) Hydraulic Pump
(2) Steering Controller

(3) Steering Cylinder
(4) Power Steering Hose

(5) Power Steering Pipe
(6) Magnet Filter

a : To Oil Cooler and Brake
Master Cylinder

b : To 3-point Hydraulic System

All models are provided with a full hydrostatic power steering. Generally power steering systems are divided into 4 types : booster type, integral type, semi-integral type and full hydrostatic type.

In the full hydrostatic power steering, the steering controller is connected to the steering cylinder with only the hydraulic piping. This steering is actuated by oil pressure. Accordingly, it does not have mechanical transmitting parts such as steering gear, pitman arm, drag link, etc.. Therefore, it is simple in construction.

This steering system consists of the hydraulic pump (1), steering controller (2), steering cylinder (3), magnet filter (6), etc..

The full hydrostatic power steering systems are divided into two types : non-load reaction type and load reaction type.

They are distinguished by whether the cylinder port is blocked or not with the controller in neutral. In these models, load reaction type is used.

With the load reaction type power steering, the steering wheel returns almost to the straight forward position as with an automobile when the operator releases his hands from the steering wheel.

(Reference)

With the non-load reaction type power steering, the steering wheel maintains their position when the operator releases his hands from the steering wheel.

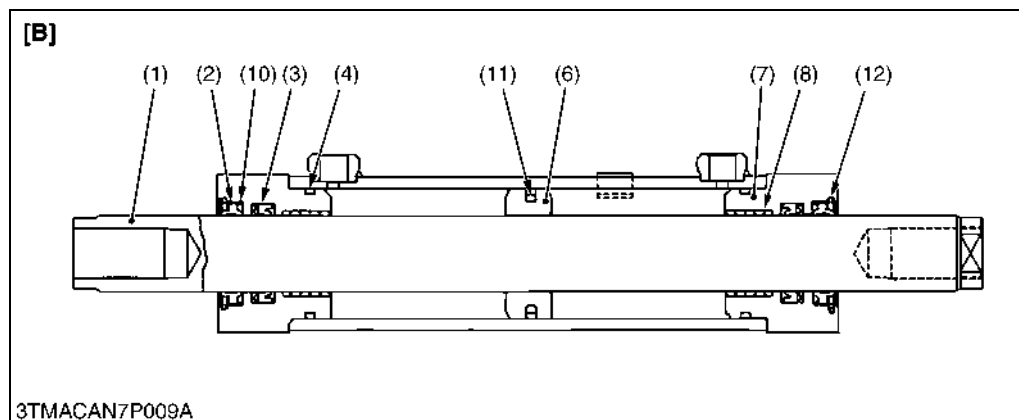
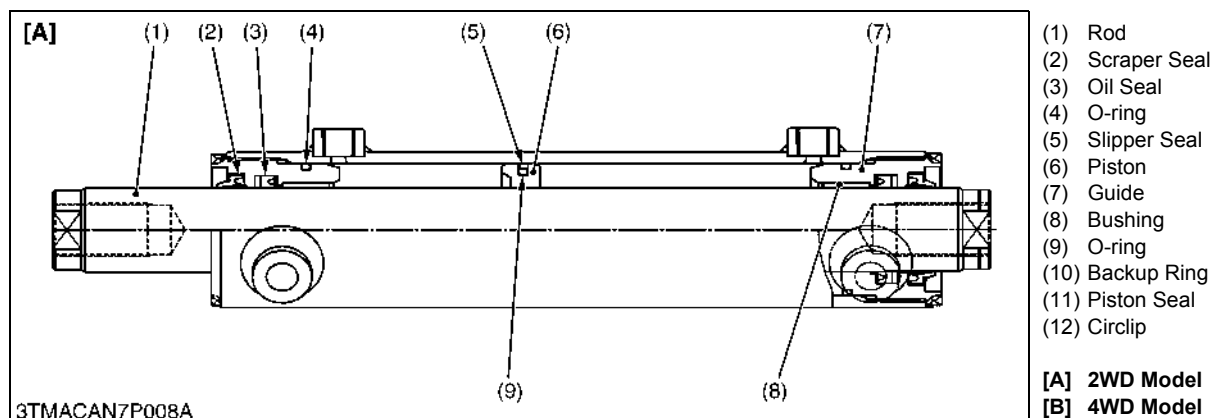
Vibration at the wheels is not transmitted to the steering wheel.

■ NOTE

- Refer to "7. STEERING" section in the workshop manual of tractor mechanism (Code No. 9Y021-18200).

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2. STEERING CYLINDER



The steering cylinder is single piston both rod double-acting type. This steering cylinder is installed parallel to the front axle and connected to tie-rods.

The tie-rods connected to both knuckle arm guarantees equal steering movement to both front wheels.

The steering cylinder provide force in both directions. Depending upon direction the steering wheel is turned pressure oil enters at one end of the cylinder to extend, or the other end to retract it, thereby turning front wheel of the tractor.

9Y1210686STM0002US0

SERVICING

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3. TIGHTENING TORQUES	6-S3
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[4] SERVICING	6-S15

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Tractor Cannot Be Steered	Drive shaft in the power steering controller improper assembled	Reassemble	6-S5
	Pipe broken	Pipe broken	—
Hard Steering	Oil improper	Change with specified oil	G-12
	Hydraulic pump malfunctioning	Replace	7-S20
	Relief valve malfunctioning	Replace	6-S5
	Controller (spool and sleeve) malfunctioning	Repair or replace	6-S5, 6-S10
	Oil leak due to seal damaged	Replace	—
Steering Force Fluctuates	Controller malfunctioning	Replace	6-S5
	Air sucked in pump due to leaking or missing of oil	Replenish	G-12
	Air sucked in pump from suction circuit	Repair	—
Heavy Steering Especially in the Beginning of Steering	Controller malfunctioning	Repair or replace	6-S5, 6-S10
Steering Wheel Turns Spontaneously When Released	Controller malfunctioning	Repair or replace	6-S5, 6-S10
Front Wheels Wander to Right and Left	Controller malfunctioning	Repair or replace	6-S5, 6-S10
	Air sucked in pump due to lack of oil	Replenish	G-12
	Air sucked in pump from suction circuit	Repair	—
	Insufficient bleeding	Bleed	—
	Cylinder malfunctioning	Repair or replace	6-S12
Wheels Are Turned to a Direction Opposite to Steering Direction	Cylinder piping connected in reverse	Repair	—
Steering Wheel Turns Idle in Manual Steering	Insufficient bleeding	Bleed	—
	Air sucked in pump due to lack of oil	Replenish	G-12
Noise	Air sucked in pump due to lack of oil	Replenish	G-12
	Air sucked in pump from suction circuit	Repair	—
	Pipe deformed	Replace	—
Oil Temperature Increases Rapidly	Relief valve malfunctioning	Replace	6-S5
Front Wheels Vibrate	Mechanical connections or wheel bearings worn	Replace defective parts	—

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Relief Valve Setting Pressure	At Idling Engine Speed	Above 12.3 MPa 125 kgf/cm ² 1780 psi	—
	At Maximum Engine Speed	Below 18.6 MPa 190 kgf/cm ² 2700 psi	—
Toe-in [2WD]		1.0 to 5.0 mm 0.04 to 0.20 in.	—
Toe-in [4WD]		2.0 to 8.0 mm 0.08 to 0.31 in.	—
Steering Cylinder	I.D.	55.000 to 55.074 mm 2.1654 to 2.1682 in.	55.100 mm 2.1693 in.
Rod to Bushing	Clearance	0.010 to 0.14 mm 0.00040 to 0.0055 in.	0.250 mm 0.00984 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : Refer to G-14.)

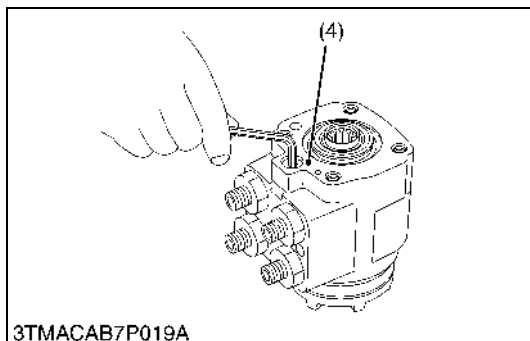
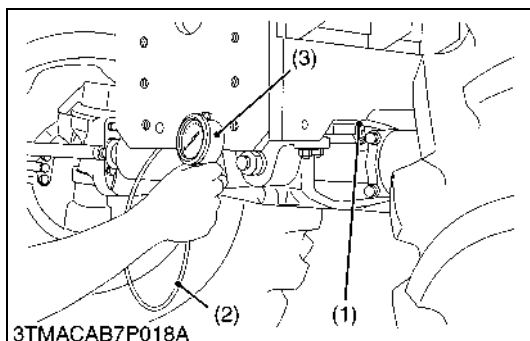
Item	N·m	kgf·m	lbf·ft
Power steering delivery hose 1 and 2	23 to 27	2.3 to 2.8	17 to 20
Controller pipe retaining nut	49 to 68	5.0 to 7.0	37 to 50
Master cylinder delivery pipe joint screw	30 to 34	3.0 to 3.5	22 to 25
Oil cooler pipe retaining nut	49 to 68	5.0 to 7.0	37 to 50
Master cylinder pipe retaining nut	30 to 34	3.0 to 3.5	22 to 25
Master cylinder return pipe retaining nut	30 to 34	3.0 to 3.5	22 to 25
Brake pipe R.H. and L.H. retaining nut	16 to 24	1.7 to 2.4	12 to 17
Master cylinder hose retaining nut	23 to 27	2.3 to 2.8	17 to 20
Gerotor assembly mounting screw (5/16')	26 to 28	2.6 to 2.9	19 to 20
Tie-rod end slotted nut (2WD)	78 to 90	7.9 to 9.2	58 to 66
Tie-rod joint lock nut (2WD)	167 to 196	17.0 to 20.0	123 to 144
Cylinder clamp nut (2WD)	35 to 39	3.5 to 4.0	26 to 28
Cylinder clamp lock nut (2WD)	40 to 45	4.0 to 4.6	29 to 33
Cylinder cover mounting screw (2WD)	49 to 55	4.9 to 5.7	36 to 41
Power steering delivery hose (2WD)	23 to 27	2.3 to 2.8	17 to 20
Power steering delivery hose (4WD)	23 to 27	2.3 to 2.8	17 to 20
Tie-rod end slotted nut (4WD)	78 to 90	7.9 to 9.2	58 to 66
Tie-rod joint (4WD)	167 to 196	17.0 to 20.0	123 to 144
Hose joint	30 to 34	3.0 to 3.5	22 to 25
Cylinder guide assembly (2WD)	143 to 152	14.5 to 15.5	105 to 112

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4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Steering Controller



Relief Valve Setting Pressure

1. Disconnect the delivery hose 1 (or 2) from steering cylinder and set a pressure gauge (3) (Code No. 07916-50321) between them using power steering adaptor (1) (Code No. 07916-54021), joint (Code No. 07916-50401) and cable (Code No. 07916-50331). (See page G-66.)
2. Start the engine and fully turn the steering wheel to the left or right and read the pressure when the relief valve operates both idling and maximum engine speed.
3. If the measurement is not within the factory specifications, adjust the relief pressure by the adjust plug (4).

■ IMPORTANT

(Air Bleeding)

- Start the engine, then turn the steering wheel slowly in both directions all the way alternately a few times, and stop the engine.

(Reference)

- One full turn of the set screw changes the relief setting pressure by approx. 2.9 MPa (30 kgf/cm², 430 psi).

Relief valve setting pressure	Factory specification	At idling engine speed	Above 12.3 MPa 125 kgf/cm ² 1780 psi
		At maximum engine speed	Below 18.6 MPa 190 kgf/cm ² 2700 psi

Condition

- Oil temperature : 50 to 60 °C (122 to 140 °F)

■ NOTE

- Be sure to use a pressure gauge with over 19.6 MPa (200 kgf/cm², 2840 psi) capacity.

- (1) Power Steering Adaptor
(2) Cable

- (3) Pressure Gauge
(4) Adjust Plug for Relief Valve

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(2) Hydraulic Pump

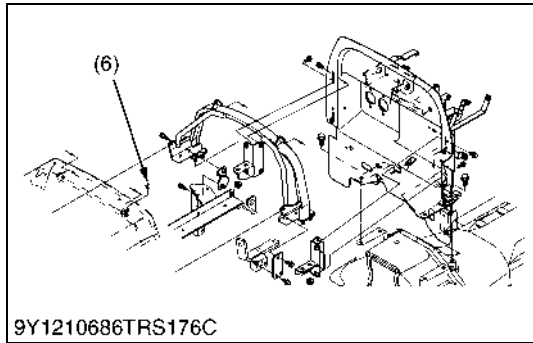
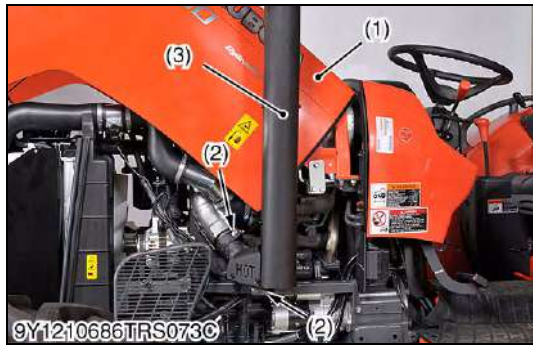
Hydraulic Flow Test

- See page 7-S5.

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[2] PREPARATION

(1) Removing Steering Controller (ROPS Model)



Bonnet

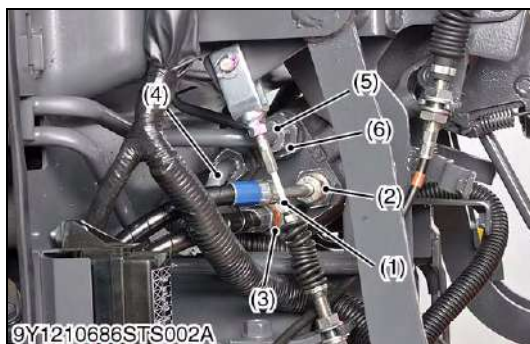
1. Open the bonnet (1) and disconnect the battery negative terminal.
2. Remove the muffler pipe mounting screws (2) and muffler pipe (3).
3. Disconnect the **3P** connector (4) for head lights.
4. Close the bonnet (1) and remove the plug.
5. Pull out the snap pin (6) and then remove the bonnet (1).
6. Remove the bonnet support mounting screws (7), nuts (8) on both sides and the bonnet support (9).

■ IMPORTANT

- When disconnecting the battery cables, disconnect the grounding cable first. When connecting, positive cable first.
- When assembling the bonnet damper (5), make sure that the rod part of bonnet damper (5) is on the backside.

- | | |
|--------------------------------------|-----------------------------------|
| (1) Bonnet | (6) Snap Pin |
| (2) Muffler Pipe Mounting Screw | (7) Bonnet Support Mounting Screw |
| (3) Muffler Pipe | (8) Bonnet Support Mounting Nut |
| (4) 3P Connector (Head Light) | (9) Bonnet Support |
| (5) Bonnet Damper | |

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Cover

1. Remove the rubber sheet (1) and steering support under cover (2).
2. Remove the steering (3).
3. Remove the steering post cover (4) and rear bonnet (5).

- | | |
|----------------------------------|-------------------------|
| (1) Rubber Sheet | (4) Steering Post Cover |
| (2) Steering Support Under Cover | (5) Rear Bonnet |
| (3) Steering | |

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Shuttle Cable and Oil Pipes

1. Disconnect the clutch cable (1).
2. Disconnect the power steering delivery hose 1 (2) and 2 (3) from power steering controller.
3. Disconnect the controller pipe (4) and oil cooler pipe retaining nut (5).
4. Remove the master cylinder delivery pipe joint screw (6).

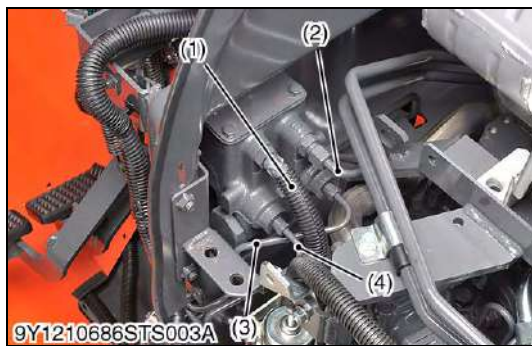
(When reassembling)

- Be sure to assemble the power steering delivery hose to original position.
- After assembling the power steering controller, be sure to adjust the clutch cable. (See page 2-S8.)

Tightening torque	Power steering delivery hose 1 and 2	23 to 27 N·m 2.3 to 2.8 kgf·m 17 to 20 lbf·ft
	Controller pipe retaining nut	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Master cylinder delivery pipe joint screw	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft
	Oil cooler pipe retaining nut	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft

- | | |
|------------------------------------|---|
| (1) Clutch Cable | (4) Controller Pipe |
| (2) Power Steering Delivery Hose 1 | (5) Oil Cooler Pipe Retaining Nut |
| (3) Power Steering Delivery Hose 2 | (6) Master Cylinder Delivery Pipe Joint Screw |

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Pipes for Master Cylinder

1. Disconnect the master cylinder delivery pipe (2) and master cylinder return hose (1).
2. Disconnect the brake pipe L.H. (3) and R.H. (4) from master cylinder.
3. Remove the brake pipe clamp (5).

■ IMPORTANT

- After assembling the master cylinder pipes, be sure to bleed the air from brake system. (See page 4-S6.)

Tightening torque	Master cylinder pipe retaining nut	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft
	Master cylinder return pipe retaining nut	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft
	Brake pipe R.H. and L.H. retaining nut	16 to 24 N·m 1.7 to 2.4 kgf·m 12 to 17 lbf·ft

- | | |
|-----------------------------------|---------------------|
| (1) Master Cylinder Return Hose | (4) Brake Pipe R.H. |
| (2) Master Cylinder Delivery Pipe | (5) Pipe Clamp |
| (3) Brake Pipe L.H. | |

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Controller

1. Remove the controller mounting screw.
2. Remove the controller (1) to right side.

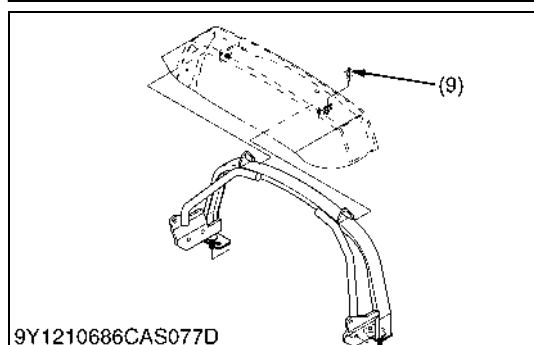
(When reassembling)

- Be sure to fit the controller to the controller support.

- (1) Controller

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(2) Removing Steering Controller (CABIN Model)



Bonnet

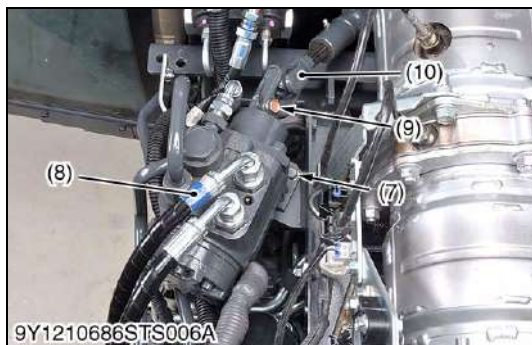
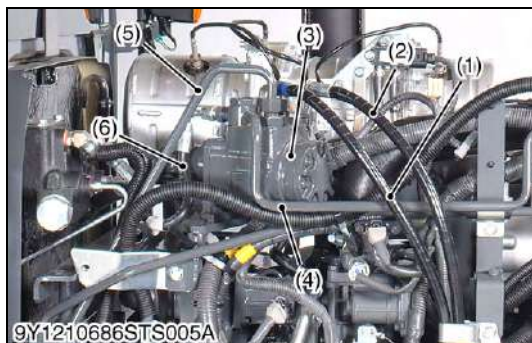
1. Open the bonnet (1) and disconnect the battery (2) negative terminal.
2. Remove the muffler pipe mounting screws 1 (6) and the muffler pipe (5).
3. Remove the side panel (3) and the side cover guide (4) on both sides.
4. Disconnect the 3P connector (7) for head light and remove the bonnet damper (8).
5. Close the bonnet (1) and remove the plug.
6. Pull out the snap pin (9), and then remove the bonnet (1).
7. Remove the bonnet support mounting screw 2 (10), the bonnet mounting nut (11) on both side, and the bonnet support (12).

■ IMPORTANT

- When disconnecting the battery cables, disconnect the negative cable first. When connecting, connect the positive cable first.
- When assembling the bonnet damper (8), Make sure that the rod part of bonnet damper (8) is on the backside.

- | | |
|-----------------------------------|--------------------------------------|
| (1) Bonnet | (7) 3P Connector (Head Light) |
| (2) Battery | (8) Bonnet Damper |
| (3) Side Panel | (9) Snap Pin |
| (4) Side Cover Guide | (10) Bonnet Support Mounting Screw 2 |
| (5) Muffler Pipe | (11) Bonnet Support Mounting Nut |
| (6) Muffler Pipe Mounting Screw 1 | (12) Bonnet Support |

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Oil Pipes, Hoses and Controller

1. Disconnect the power steering delivery hose 1 (1) and 2 (2) from power steering controller (3).
2. Disconnect the controller pipe (5) and oil cooler pipe (4).
3. Remove the master cylinder hose (6).
4. Remove the U-joint screw (9) and draw out the U-joint (10) from controller (3).
5. Remove the controller mounting screws (8) and remove the controller (3).

(When reassembling)

- Be sure to assemble the power steering delivery hose to original position. (The power steering hose with blue tape (8) fix to rear joint.)

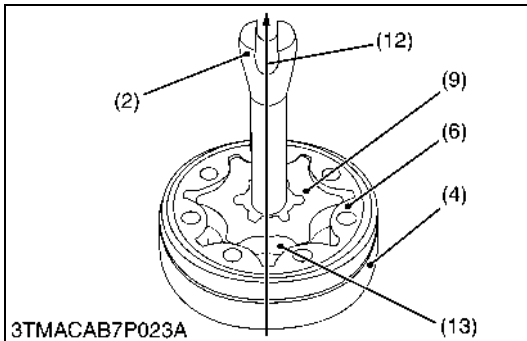
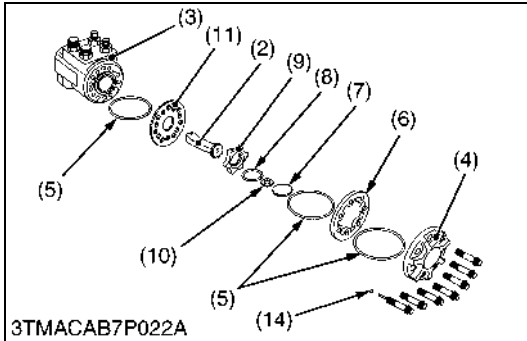
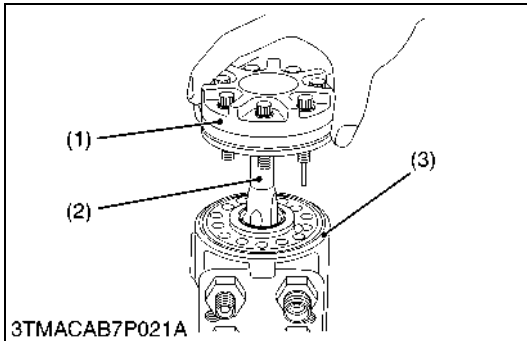
Tightening torque	Power steering delivery hose 1 and 2 retaining nut	23 to 27 N·m 2.3 to 2.8 kgf·m 17 to 20 lbf·ft
	Controller pipe retaining nut	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Master cylinder hose retaining nut	23 to 27 N·m 2.3 to 2.8 kgf·m 17 to 20 lbf·ft
	Oil cooler pipe retaining nut	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft

- | | |
|------------------------------------|-------------------------------|
| (1) Power Steering Delivery Hose 1 | (6) Master Cylinder Hose |
| (2) Power Steering Delivery Hose 2 | (7) Controller Mounting Screw |
| (3) Controller | (8) Blue Tape |
| (4) Oil Cooler Pipe | (9) U-joint Screw |
| (5) Controller Pipe | (10) U-joint |

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[3] DISASSEMBLING AND ASSEMBLING

(1) Steering Controller



Removing Gerotor

1. Secure the housing (3) in a vise and remove seven gerotor mounting screws and gerotor assembly (1).
2. Remove the distributor plate (11) and driven shaft (2).
3. Remove the rotor (9), O-ring (5) between the distributor plate and stator (6).
4. Take out the spacer ring (10) and spacer (7).
5. Remove the O-ring (8) from the rotor (9).

(When reassembling)

1. Fit an O-ring into the groove of the end cap (4), and insert 2 or 3 bolts.
2. Fit an O-ring into the groove of the stator (6), and put it on the end cap, with the O-ring upward.
3. Apply clean transmission fluid (specified fluid) to the rotor (9), fit an O-ring (8) into the groove of the rotor and put the spacer on it. Keeping the spacer on the rotor, fit it into the stator (6) with the spline bevelled side upward.
4. After putting the spacer into the rotor (9), insert the splines of driven shaft (2) into the rotor (9), aligning the direction of drive shaft pin groove (12) with the rotor tooth bottom (13).
5. Fit an O-ring into the groove of the housing (3).
Fit the pin groove of the driven shaft (2) to the dowel pin inside the housing.

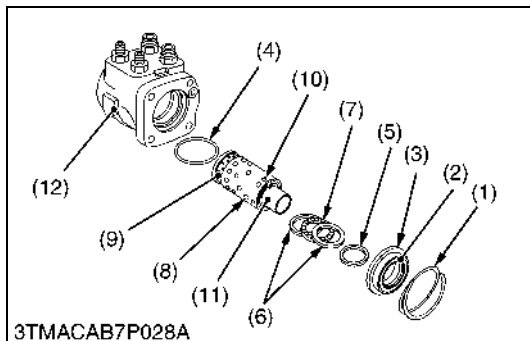
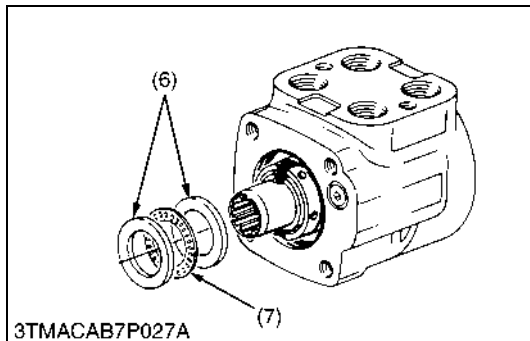
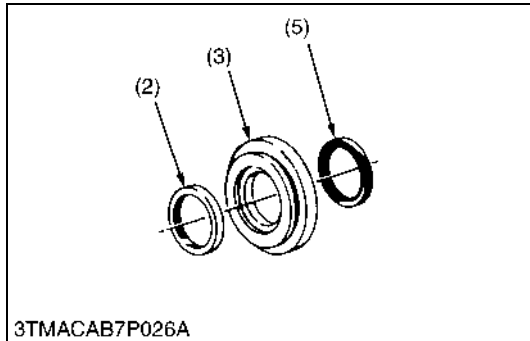
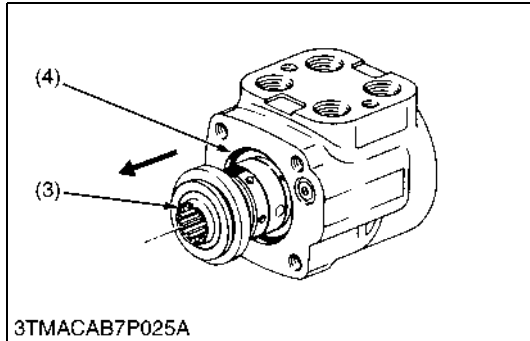
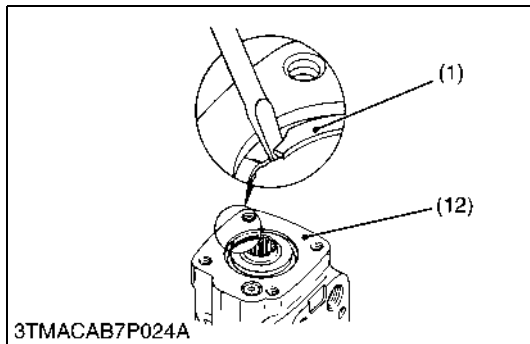
■ IMPORTANT

- Be sure to align the direction of the drive shaft pin groove (12) with the rotor tooth bottom (13).

Tightening torque	Gerotor assembly mounting screw (5/16")	26 to 28 N·m 2.6 to 2.9 kgf·m 19 to 20 lbf·ft
-------------------	---	---

- | | |
|----------------------|---------------------------|
| (1) Gerotor Assembly | (8) O-ring |
| (2) Driven Shaft | (9) Rotor |
| (3) Housing | (10) Spacer Ring |
| (4) End Cap | (11) Distributor Plate |
| (5) O-ring | (12) Direction Pin Groove |
| (6) Stator | (13) Rotor Tooth Bottom |
| (7) Spacer | (14) Ball |

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Grand Seal, Needle Bearing, Sleeve and Spool

1. Remove the retaining ring (1) with a screw driver.
2. Hold the control valve unit vertically and spool and sleeve align the cross pin parallels to flat side of housing (flow priority valve mounting side), the cross pin is visible through open end of spool.
3. At this time, take care so as not to allow the cross pin to be caught in the groove of the housing. If the cross pin is caught, adjust its position with a fingertip.
4. Push the spool and sleeve to the allow direction and remove the seal grand bushing (3) with dust seal (2) and quad ring seal (5).
5. Remove the O-ring (4) from the housing (12).
6. Remove the dust seal from the seal grand bushing (3).
7. Remove the O-ring (4).

(When reassembling)

- Replace O-ring with new one.
Apply transmission oil to the dust seal, quad ring seal and O-ring.
- 8. Remove the quad ring seal (5) from the sleeve (9).
- 9. Remove the bearing races and needle bearing from valve assembly.

(When reassembling)

- Apply transmission oil to the bearing races and needle bearing.
- 10. Draw out the sleeve (9) and spool (11) assembly from the gerotor side, with the port surface of the housing downward. At this time, take care so as not to allow the dowel pin to be caught in the groove of the housing (12). If the dowel pin is caught, adjust its position with a fingertip and draw out the sleeve and spool assembly slowly.

■ IMPORTANT

- As the clearance between the housing and sleeve is very narrow, do not forcibly draw out the sleeve.

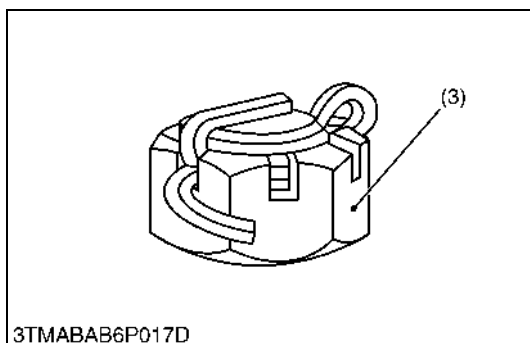
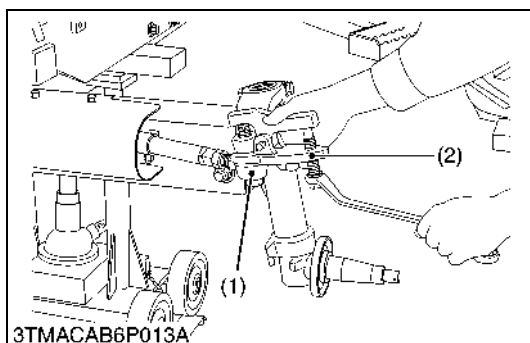
(When reassembling)

- When fitting the sleeve (9) and spool (11) assembly into the housing (12), apply clean transmission oil to the assembly and then insert it while turning it slowly, taking care so that the parts are not inclined. Also, pay attention to the dowel pin so that it is not caught in the housing grooves. If the pin is caught, adjust its position with a fingertip.

- | | |
|------------------------|-----------------------|
| (1) Retaining Ring | (7) Needle Bearing |
| (2) Dust Seal | (8) Pin |
| (3) Seal Grand Bushing | (9) Sleeve |
| (4) O-ring | (10) Centering Spring |
| (5) Quad Ring Seal | (11) Spool |
| (6) Bearing Race | (12) Housing |

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(2) Removing Power Steering Cylinder (2WD Model)



Tie-rod

1. Pull out the cotter pin and loosen the tie-rod end slotted nut (3).
2. Disconnect the tie-rod (1) with a tie-rod end lifter (2) (Code No. 07909-39051).
3. Remove the tie-rod end nut and tie-rod end.

(When reassembling)

- Replace cotter pin with a new one.
- After tightening the tie-rod end nut to the specified torques, install a cotter pin as shown in the figure.
- After assembling the power steering cylinder and tie-rod, check the toe-in and adjust it if necessary.

Tightening torque	Tie-rod end slotted nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Tie-rod joint lock nut	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
Toe-in	Factory specification	1.0 to 5.0 mm 0.04 to 0.20 in.

(1) Tie-rod

(3) Slotted Nut

(2) Tie-rod End Lifter

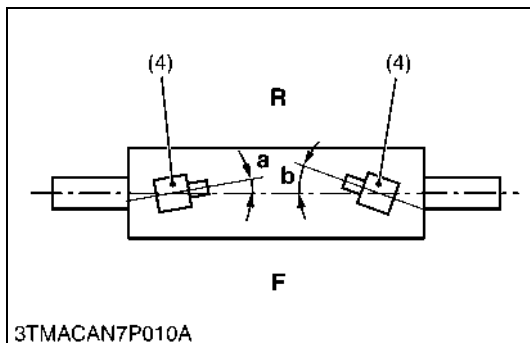
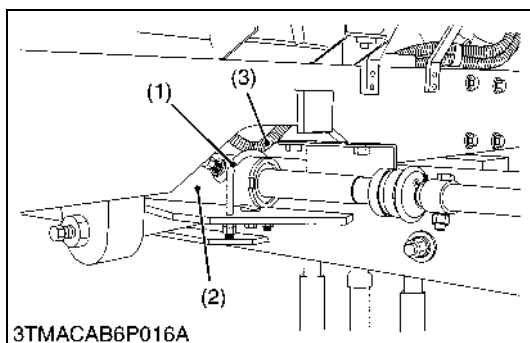
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Steering Cylinder

1. Remove the cylinder cover.
2. Disconnect the power steering delivery hoses (3).
3. Remove the cylinder clamps (1).
4. Take out the steering cylinder (2).

(When reassembling)

- If remove the hose joint (4), apply teflon tape and fix the direction as shown in the figure.



Tightening torque	Cylinder clamp nut	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Cylinder clamp lock nut	40 to 45 N·m 4.0 to 4.6 kgf·m 29 to 33 lbf·ft
	Cylinder cover mounting screw	49 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Power steering delivery hose	23 to 27 N·m 2.3 to 2.8 kgf·m 17 to 20 lbf·ft
	Hose joint	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft

(1) Cylinder Clamp

(2) Steering Cylinder

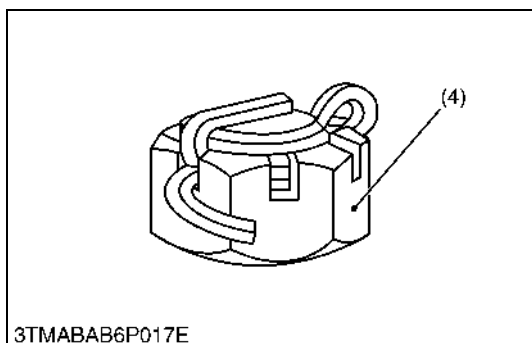
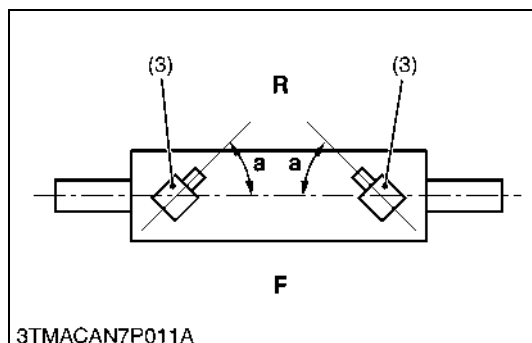
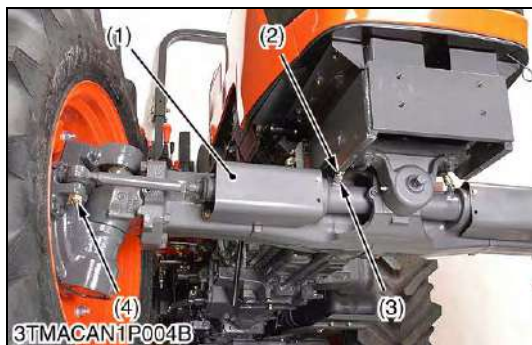
(3) Power Steering Delivery Hose

(4) Hose Joint

F : Front**R : Rear****a : 0.17 rad (10 °)****b : 0.35 rad (20 °)**

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(3) Removing Power Steering Cylinder (4WD Model)



Tie-rod

1. Remove the both cylinder cover (1).
2. Disconnect the both power steering delivery hoses (2) from cylinder.
3. Remove the both hose joints (3) from steering cylinder.
4. Pull out the cotter pin and remove the tie-rod end slotted nuts (4).
5. Remove the tie-rod with a tie-rod end lifter (Code No. 07909-39051).

(When reassembling)

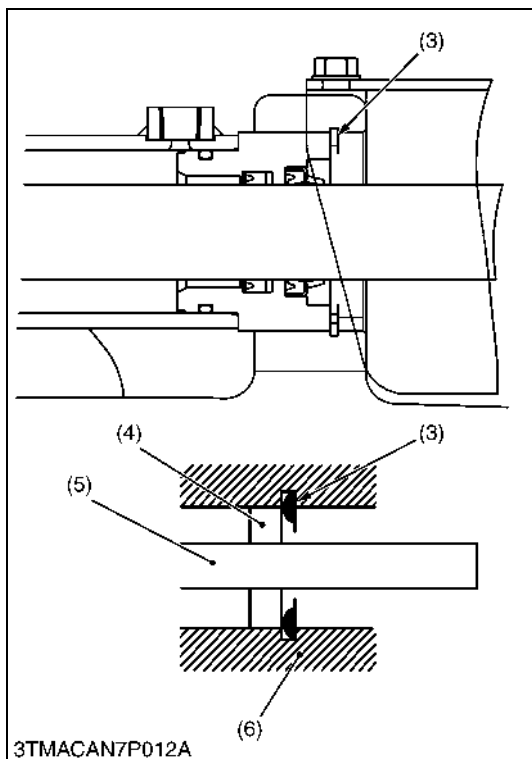
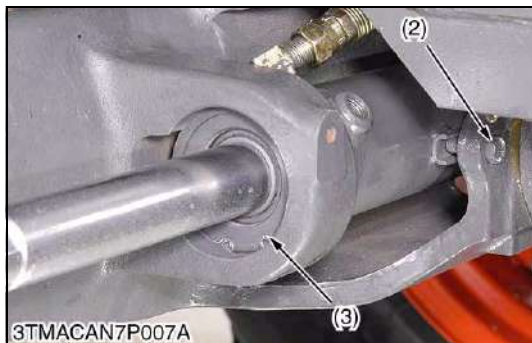
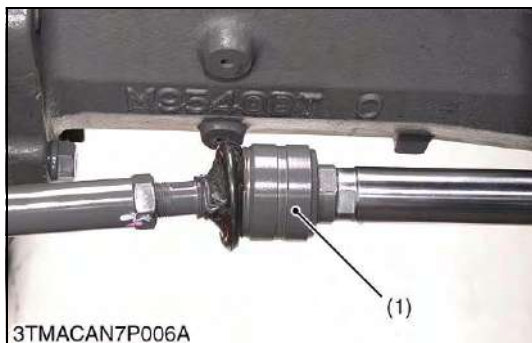
- Apply teflon tape to joint and set the joint as shown in figure.
- Connect the power steering delivery hose with blue tape to the R.H..
- Replace cotter pin with a new one.
- After tightening the tie-rod end nut to the specified torque, install a cotter pin as shown in the figure left.
- After assembling the power steering cylinder and tie-rod, check the toe-in and adjust it if necessary.

Tightening torque	Power steering delivery hose	23 to 27 N·m 2.3 to 2.8 kgf·m 17 to 20 lbf·ft
	Tie-rod end slotted nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Hose joint	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft
Toe-in	Factory specification	2.0 to 8.0 mm 0.08 to 0.31 in.

- (1) Cylinder Cover
(2) Power Steering Delivery Hose
(3) Hose Joint
(4) Slotted Nut

F: Front
R: Rear
a: 0.79 rad (45 °)

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Steering Cylinder

1. Remove the both tie-rod joint (1).
2. Remove the internal circlip (3) and set screw (2).
3. Draw out the steering cylinder to the right.

(When reassembling)

- Apply liquid lock (Three Bond 1372 or equivalent) to the tie-rod joint.
- When reassembling internal circlip (3), should be positioned so that sharp edge face to outward as shown in the figure.

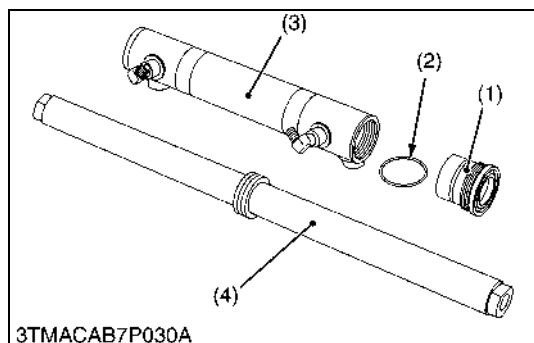
Tightening torque	Tie-rod joint	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
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- (1) Tie-rod Joint
(2) Set Screw
(3) Internal Circlip

- (4) Cylinder
(5) Cylinder Rod
(6) Front Axle Case

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(4) Disassembling Steering Cylinder



Steering Cylinder (2WD Model)

1. Carefully clamp the cylinder in a vise.
2. Remove the cylinder guide assembly (1) and draw out the piston rod (4).

(When reassembling)

- Apply transmission fluid to the oil seal and O-ring.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) on the screw of guide when tighten it.
- After tightening the guide assembly to the specified torque, stake the cylinder firmly.

Tightening torque	Cylinder guide assembly	143 to 152 N·m 14.5 to 15.5 kgf·m 105 to 112.1 lbf·ft
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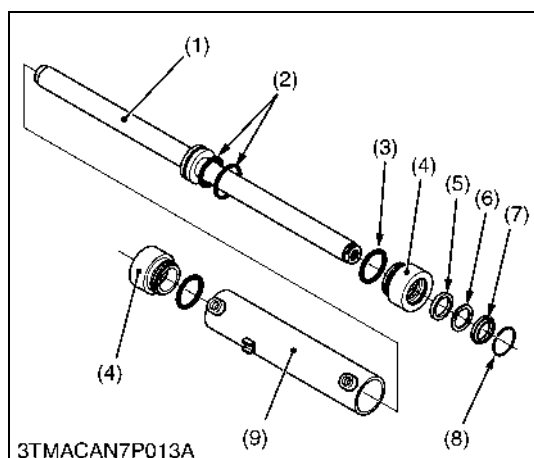
(1) Cylinder Guide Assembly

(2) O-ring

(3) Cylinder Tube

(4) Piston Rod

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Steering Cylinder (4WD Model)

1. Draw out the cylinder head (4).
2. Draw out the cylinder rod (1).

(When reassembling)

- Apply transmission fluid to the O-ring (3), rod seal (5) and inside of cylinder tube (9).

(1) Cylinder Rod

(2) Piston Seal

(3) O-ring

(4) Cylinder Head

(5) Rod Seal

(6) Backup Ring

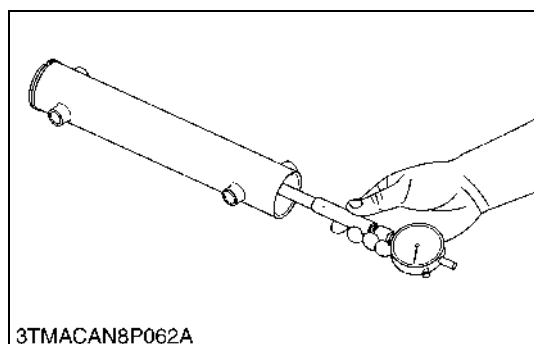
(7) Dust Seal

(8) Internal Circlip

(9) Cylinder Tube

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[4] SERVICING

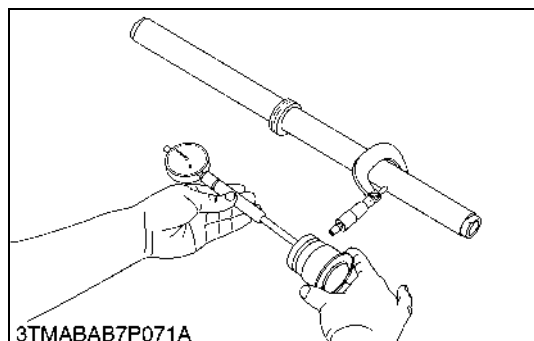


Steering Cylinder I.D.

1. Measure the steering cylinder I.D. with a cylinder gauge.
2. If the cylinder I.D. exceeds the allowable limit, replace the cylinder barrel.

Steering cylinder I.D.	Factory specification	55.000 to 55.074 mm 2.1654 to 2.1682 in.
	Allowable limit	55.100 mm 2.1693 in.

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Clearance between Rod and Bushing

1. Measure the bushing I.D. with a cylinder gauge.
2. Measure the rod O.D. with an outside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace as a unit.

Clearance between rod and bushing	Factory specification	0.010 to 0.14 mm 0.00040 to 0.0055 in.
	Allowable limit	0.250 mm 0.00984 in.

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7 HYDRAULIC SYSTEM

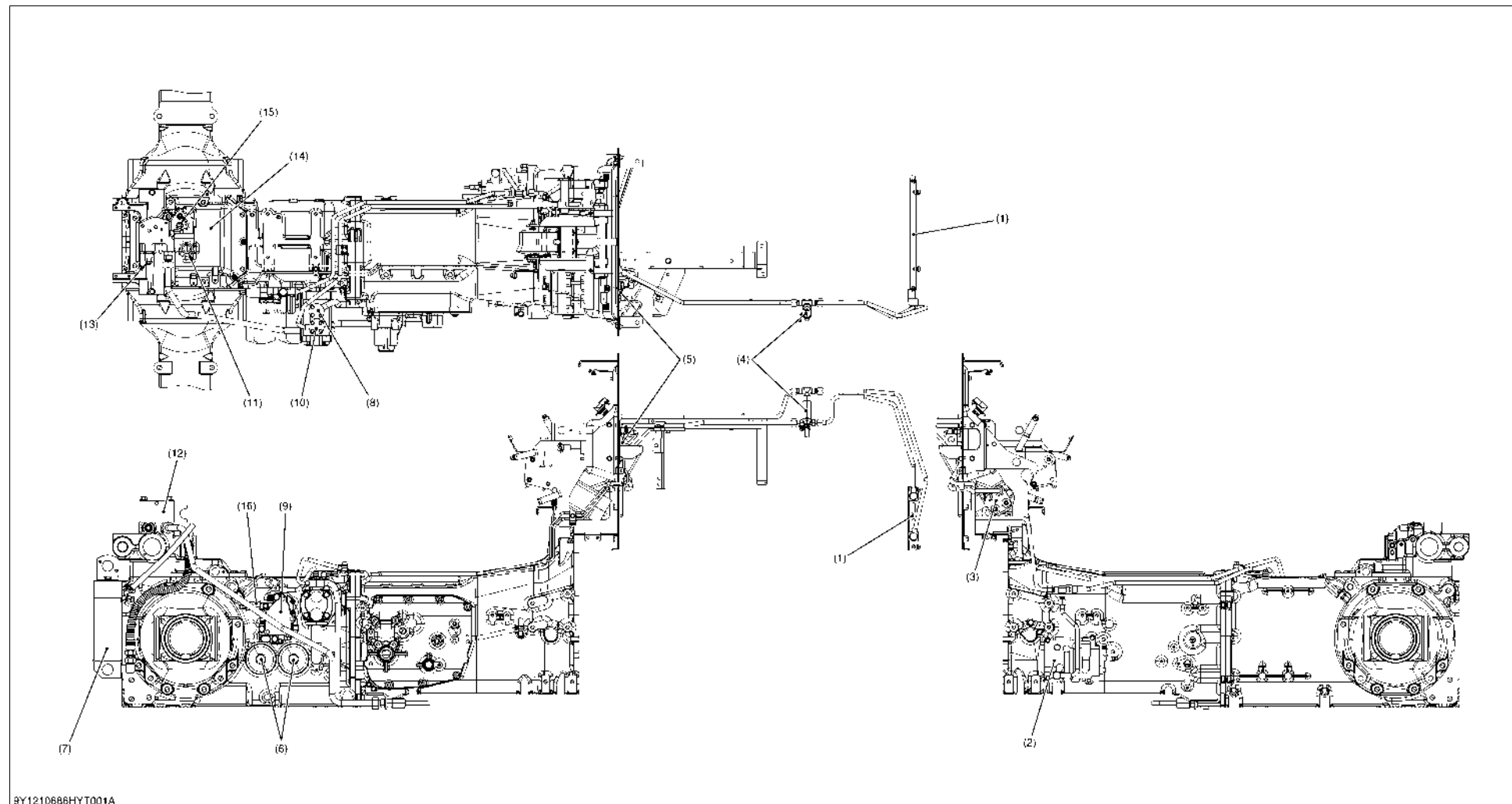
MECHANISM

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1. STRUCTURE

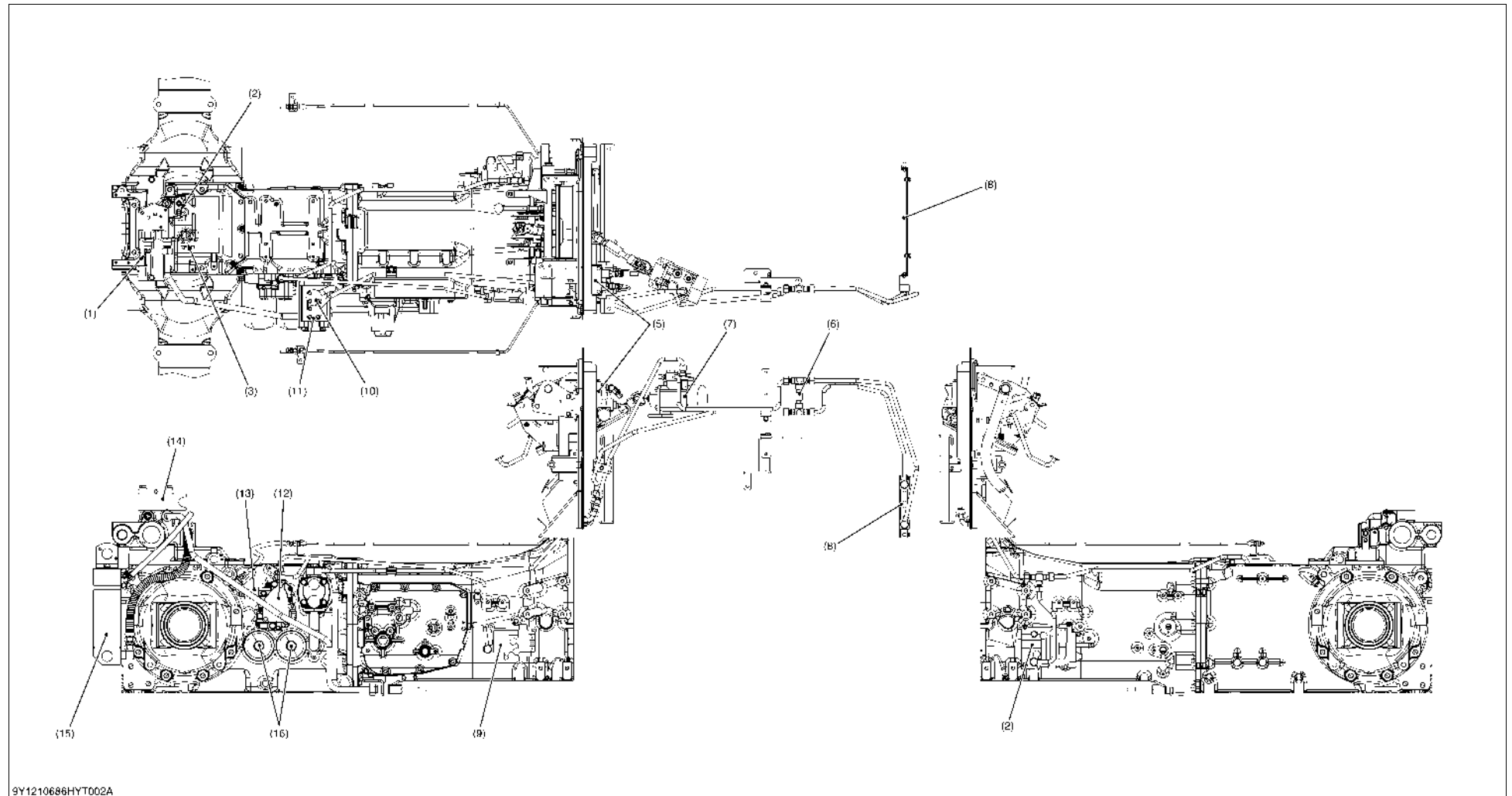
[1] F8/R8, F12/R12 SPEED TRANSMISSION MODEL



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- | | | | | | |
|-------------------------------|--|--|---|-----------------------------------|--|
| (1) Oil Cooler | (4) Oil Cooler Relief Valve (ROPS Model) | (6) Oil Filter Cartridge | (9) Solenoid Valve (PTO) | (11) Safety Valve (3-point Hitch) | (14) Top Cover (3-point Hitch Hydraulic Block) |
| (2) Shuttle Valve | Oil Cooler Check Valve (CABIN Model) | (7) Hydraulic Cylinder (3-point Hitch) | (10) Hydraulic Pump (Power Steering, Shuttle and PTO) | (12) Auxiliary Control Valve | (15) Lowering Speed Adjusting Valve |
| (3) Power Steering Controller | (5) Brake Master Cylinder | (8) Hydraulic Pump (3-point Hitch) | | (13) Relief Valve | (16) Relief Valve (System Pressure) |

[2] F24/R24 SPEED TRANSMISSION MODEL



9Y1210686HYT002A

(1) Relief Valve (3-Point Lifting Linkage)
(2) Lowering Speed Adjusting Valve
(3) Cylinder Safety Valve
(4) Shuttle Valve

(5) Brake Master Cylinder
(6) Oil Cooler Check Valve
(7) Power Steering Controller

(8) Oil Cooler
(9) Hi-Lo Dual Speed Solenoid Valve
(10) Hydraulic Pump (3-point Hitch)

(11) Hydraulic Pump (Power Steering, Shuttle and Solenoid Valve)

(12) Solenoid Valve Assembly (PTO, 4WD, Differential Lock)
(13) Relief Valve (System Pressure)

(14) Auxiliary Control Valve
(15) Hydraulic Cylinder
(16) Oil Filter

The hydraulic system of the M8560 and M9960 tractor is composed of a 3-point hitch, remote hydraulic control for implements, power steering, PTO clutch, shuttle clutch, dual speed clutch, 4WD clutch, differential lock and hydraulic brakes shown above.

This system has the following functions.

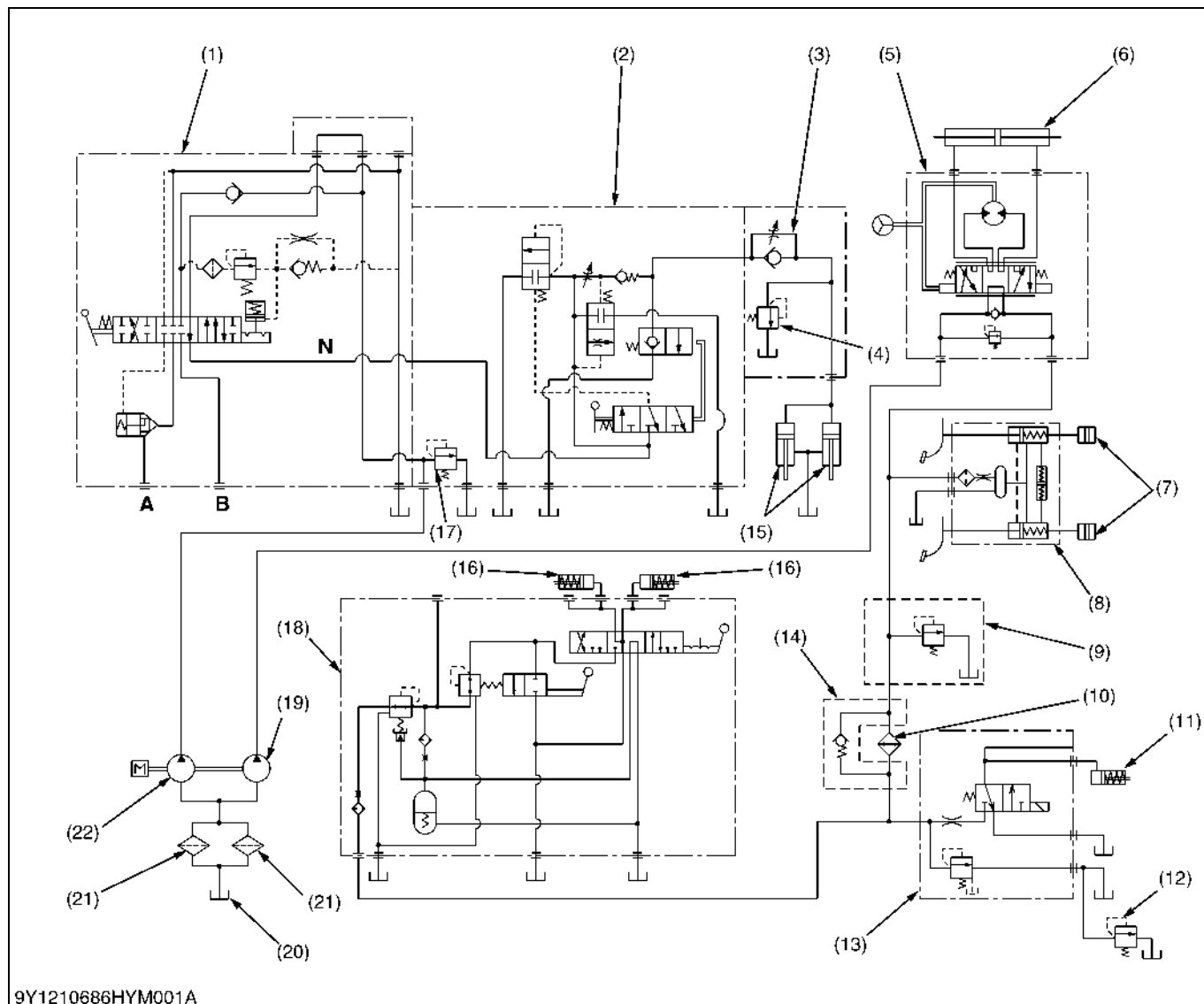
1. Raise and lower implements connected to the 3-point hitch with external hydraulic cylinders. The hydraulic lift is subject to position control and draft control (mixed) control.
2. Draw hydraulic power from auxiliary control valve to operate implement hydraulic cylinders.
 - Implements with double acting cylinders can easily receive, hydraulic power drawn from the quick coupler.
 - Auxiliary control permits simultaneous operation of implements powered by hydraulic pressure along with operation of 3-point hitch.
 - Oil flow from 3-point hitch pump can be connected with oil flow from auxiliary control valve.
 - Total oil flow is 64.3 L/min (17.0 U.S.gals/min, 14.1 Imp.gals/min).
 - Operating pressure is 19.6 MPa (200 kgf/cm², 2847 psi).
 - Maximum of three remote valves or 2 valves with a flow control valve.
3. Hydraulic oil flow for power steering is 23.8 L/min (6.29 U.S.gals/min, 5.24 Imp.gals/min).
4. Operation of power steering through the steering controller, refer to "6. STEERING" section in this workshop manual.
5. Hydraulic oil flow for shuttle, PTO, 4WD, rear differential lock and dual speed (F24/R24 speed transmission model) is 23 L/min (6.1 U.S.gals/min, 5.1 Imp.gals/min).
6. Operation of PTO clutch, shuttle clutch, dual speed clutch, 4WD clutch, differential lock, refer to "2. TRANSMISSION" section in this workshop manual.
7. Operation of hydraulic brakes, refer to "4. BRAKES" section in this workshop manual.
8. Operation of auxiliary control valve, refer to "8. HYDRAULIC SYSTEM" section in the workshop manual of tractor mechanism (Code No. 9Y021-18200).

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2. HYDRAULIC CIRCUIT

[1] TOTAL HYDRAULIC CIRCUIT

(1) F8/R8, F12/R12 Speed Transmission Model



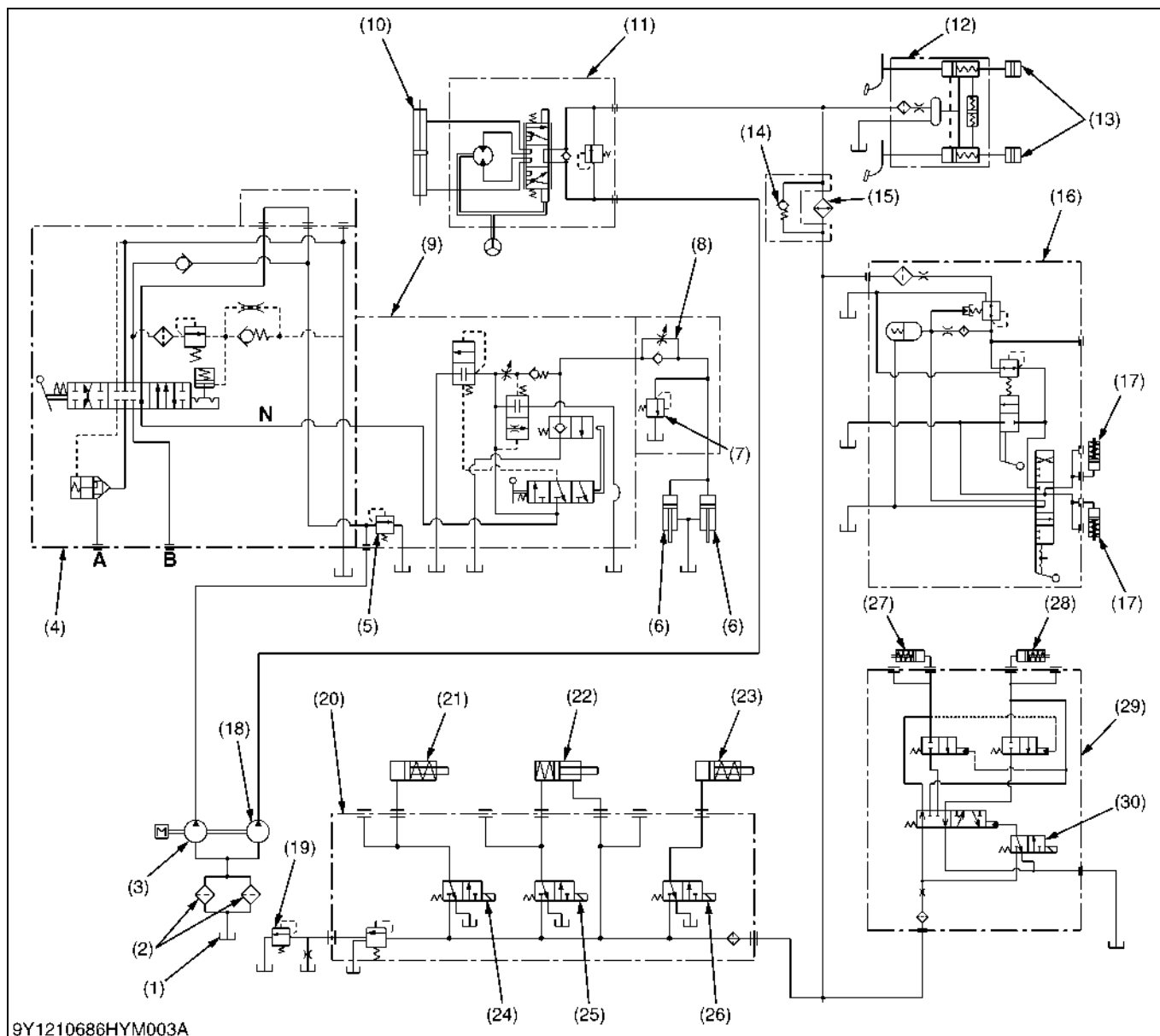
- | | | | |
|------------------------------------|---|--|-------------------------------------|
| (1) Auxiliary Control Valve | (9) Oil Cooler Relief Valve (ROPS Model) | (15) Exterior Hydraulic Cylinder | (21) Hydraulic Oil Filter Cartridge |
| (2) Control Valve (3-point Hitch) | (10) Oil Cooler | (16) Shuttle Clutch Pack | (22) Hydraulic Pump (3-point Hitch) |
| (3) Lowering Speed Adjusting Valve | (11) PTO Clutch Pack | (17) Relief Valve (3-point Hitch) | |
| (4) Cylinder Safety Valve | (12) Relief Valve (Lubricating Line) | (18) Shuttle Valve | |
| (5) Power Steering Controller | (13) Solenoid Valve (PTO) | (19) Hydraulic Pump (Power Steering, Brake, PTO Clutch and Shuttle Clutch) | |
| (6) Steering Cylinder | (14) Oil Cooler Check Valve (CABIN Model) | (20) Oil Tank (Transmission Case) | |
| (7) Brake Piston | | | |
| (8) Brake Master Cylinder | | | |
- A : To Implement Cylinder**
B : To Implement Cylinder
N : N Port

Operating Pressure

(4)	23.1 to 24.5 MPa (235 to 250 kgf/cm ² , 3350 to 3550 psi)	(13)	2.16 MPa (22.0 kgf/cm ² , 313 psi)
(5)	(Idling Engine Speed) Above 12.3 MPa (125 kgf/cm ² , 1780 psi) (Maximum Engine Speed) Below 18.6 MPa (190 kgf/cm ² , 2700 psi)	(14)	Approx. 0.8 MPa (8 kgf/cm ² , 100 psi)
(9)	4.5 to 4.9 MPa (45 to 50 kgf/cm ² , 640 to 710 psi)	(17)	18.9 to 19.8 MPa (192 to 202 kgf/cm ² , 2730 to 2870 psi)

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(2) F24/R24 Speed Transmission Model



- | | | | |
|------------------------------------|-----------------------------------|--|--|
| (1) Oil Tank (Transmission Case) | (9) Control Valve (3-point Hitch) | (18) Hydraulic Pump (Power Steering and System Line) | (26) Solenoid Valve (Rear Differential Lock) |
| (2) Hydraulic Oil Filter Cartridge | (10) Steering Controller | (19) Relief Valve (Lubricating Line) | (27) Clutch Pack (Hi) |
| (3) Hydraulic Pump (3-point Hitch) | (11) Power Steering Controller | (20) Solenoid Valve Assembly | (28) Clutch Pack (Lo) |
| (4) Auxiliary Control Valve | (12) Brake Master Cylinder | (21) PTO Clutch Pack | (29) Dual Speed Valve |
| (5) Relief Valve (3-point Hitch) | (13) Brake Piston | (22) 4WD Clutch Pack | (30) Solenoid Valve (Dual Speed) |
| (6) Exterior Hydraulic Cylinder | (14) Oil Cooler Check Valve | (23) Rear Differential Lock Piston | |
| (7) Cylinder Safety Valve | (15) Oil Cooler | (24) Solenoid Valve (PTO) | |
| (8) Lowering Speed Adjusting Valve | (16) Shuttle Valve | (25) Solenoid Valve (4WD) | |
| | (17) Shuttle Clutch Pack | | |
- A: To Implement Cylinder**
B: To Implement Cylinder
N: N Port

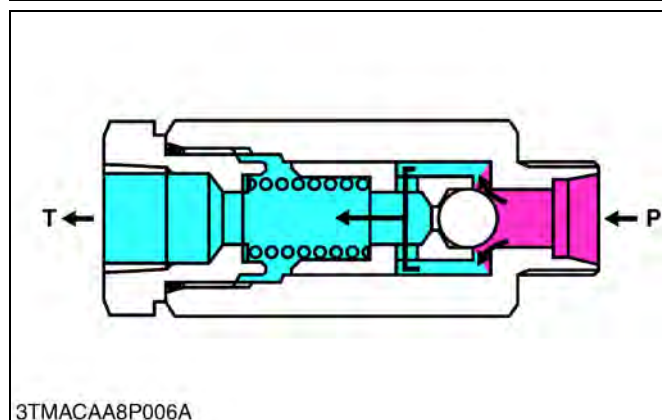
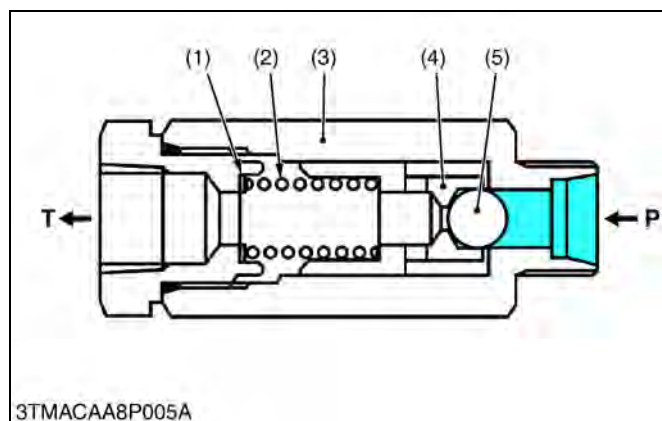
Operating Pressure

(5)	18.9 to 19.8 MPa (192 to 202 kgf/cm ² , 2730 to 2870 psi)	(14)	Approx. 0.8 MPa (8 kgf/cm ² , 100 psi)
(7)	23.1 to 24.5 MPa (235 to 250 kgf/cm ² , 3350 to 3550 psi)	(20)	2.16 MPa (22.0 kgf/cm ² , 313 psi)
(11)	(Idling Engine Speed) Above 12.3 MPa (125 kgf/cm ² , 1780 psi) (Maximum Engine Speed) Below 18.6 MPa (190 kgf/cm ² , 2700 psi)		

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3. THREE POINT HYDRAULIC SYSTEM

[1] OIL COOLER RELIEF VALVE (ROPS MODEL)



The oil cooler relief valve is located on the right hand side of the engine.

This valve uses a direct acting relief valve, which is suitable for low volume and less frequent operations.

This valve has a fast response, makes it ideal for relieving shock pressure caused by engine starting.

If pressure in the oil cooler line becomes too great, oil pressure forces the ball (5) off the seat of valve body (3), compressing the coil spring (2) and allows oil to flow to the transmission case through the T port.

(Reference)

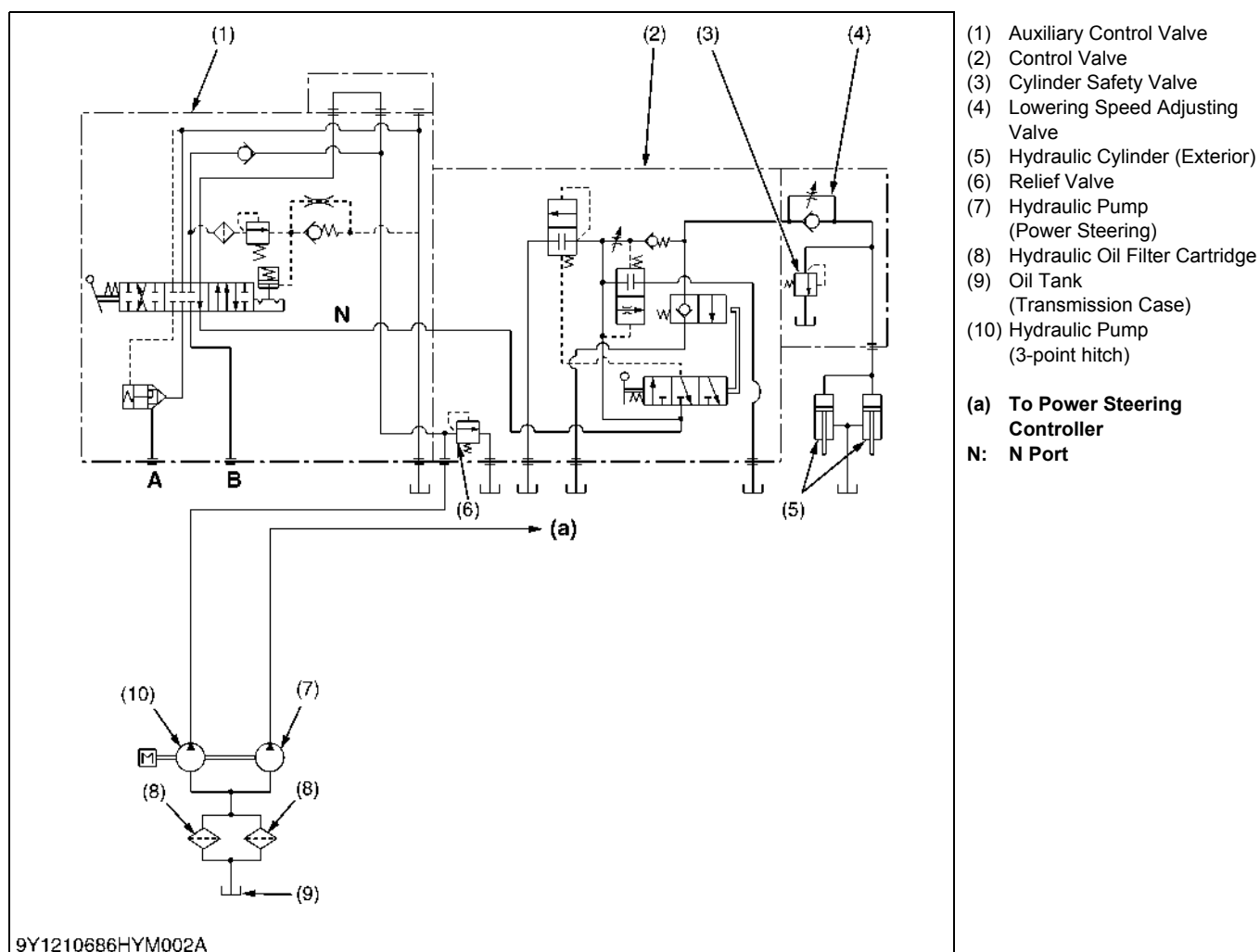
- Oil cooler relief valve setting pressure.
4.5 to 4.9 MPa
45 to 50 kgf/cm²
640 to 710 psi

- (1) Shim
- (2) Spring
- (3) Valve Body
- (4) Poppet
- (5) Ball

P : P Port (From Power Steering Controller)
T : Tank Port (To Transmission Case)

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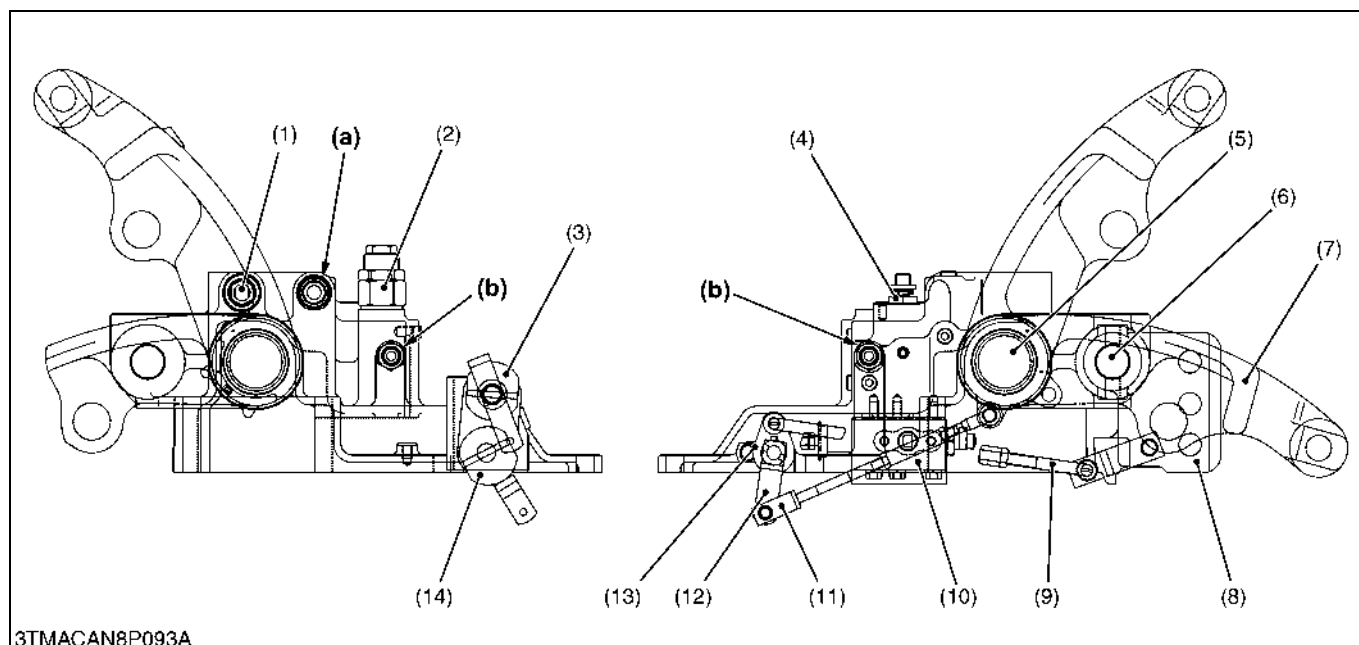
[2] HYDRAULIC CIRCUIT



1. When the engine is started, the hydraulic pump (10) is rotated to draw oil from transmission case (9) through the suction pipe.
Supplied oil is filtered by the hydraulic oil filter cartridge (8).
2. Filtered oil is forced out by the hydraulic pump to the auxiliary control valve (1).
3. With the auxiliary control valve (1) in neutral position, oil is channeled from "N" port to the control valve (2).
4. The hydraulic system has a relief valve (6) which restricts the maximum pressure in the circuit.
The hydraulic cylinders (5) have a cylinder safety valve (3) to relieve shock pressure due to heavy implement bounce.
5. The control valve (2) is actuated by the mechanical linkage for "Position control" or "Draft control" or both "Mix control" (combining position control with draft control).
6. Tractor has a double acting auxiliary control valve (1) as standard equipment.

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[3] HYDRAULIC BLOCK



- | | | | |
|------------------------------------|-------------------------|-------------------------------|-----------------------------------|
| (1) Relief Valve | (5) Hydraulic Arm Shaft | (10) Control Valve | (a) From Hydraulic Pump |
| (2) Cylinder Safety Valve | (6) Torsion Bar | (11) Position Feedback Rod | (b) To or From Hydraulic Cylinder |
| (3) Draft Control Linkage | (7) Lift Arm | (12) Position Feedback Link | |
| (4) Lowering Speed Adjusting Valve | (8) Top Link Bracket | (13) Draft Feedback Link | |
| | (9) Draft Feedback Rod | (14) Position Control Linkage | |

The hydraulic block is equipped with cylinder safety valve (2), relief valve (1), lowering speed adjusting valve (4), check valve, control valve (10), lift arm (7), lift arm shaft (5), torsion bar (6), position feedback rod (11) and draft feedback rod (9) etc.

The hydraulic outlet port (b) is located in the hydraulic block to take power from the tractor to operate the hydraulic cylinders of the 3-point linkage.

1. To operate the control valve, refer to "8. HYDRAULIC SYSTEM / (7) Position Control Valve - Type 7" in the workshop manual of tractor mechanism (Code No. 9Y021-18200).
2. To operate the relief valve operation, refer to "8. HYDRAULIC SYSTEM / 4. RELIEF VALVE / [2] PILOT OPERATED TYPE" in the workshop manual of tractor mechanism (Code No. 9Y021-18200).
3. To operate the cylinder safety valve (surge relief valve) operation, refer to "8. HYDRAULIC SYSTEM / 7. CYLINDER SAFETY VALVE (SURGE RELIEF VALVE)" in the workshop manual of tractor mechanism (Code No. 9Y021-18200).

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[4] LINKAGE MECHANISM

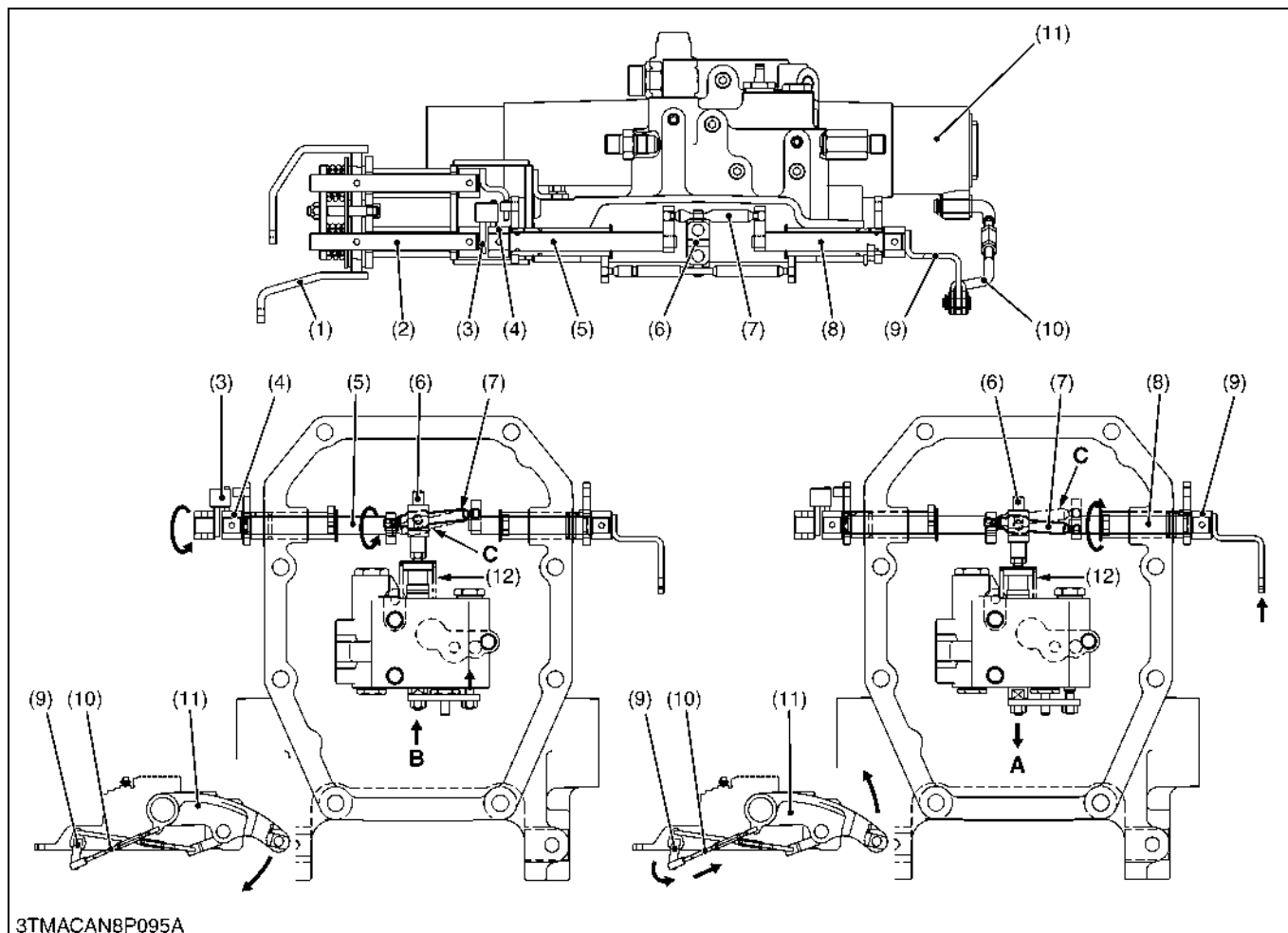
(1) Position Control

Position control is a linkage mechanism to raise or lower the implement attached to the tractor in proportion to the movement of the position control lever.

The implement can be positioned at any height by moving the position control lever. Fine position adjustment is also easy.

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Lift



(1) Position Control Lever

(2) Position Lever Shaft 1

(3) Position Link 1

(4) Position Link 2

(5) Position Lever Shaft 2

(6) Spool

(7) Spool Drive Lever (Position)

(8) Position Feedback Shaft

(9) Position Feedback Lever

(10) Position Feedback Rod

(11) Lift Arm

A: LIFT**B: DOWN****C: Neutral Position**

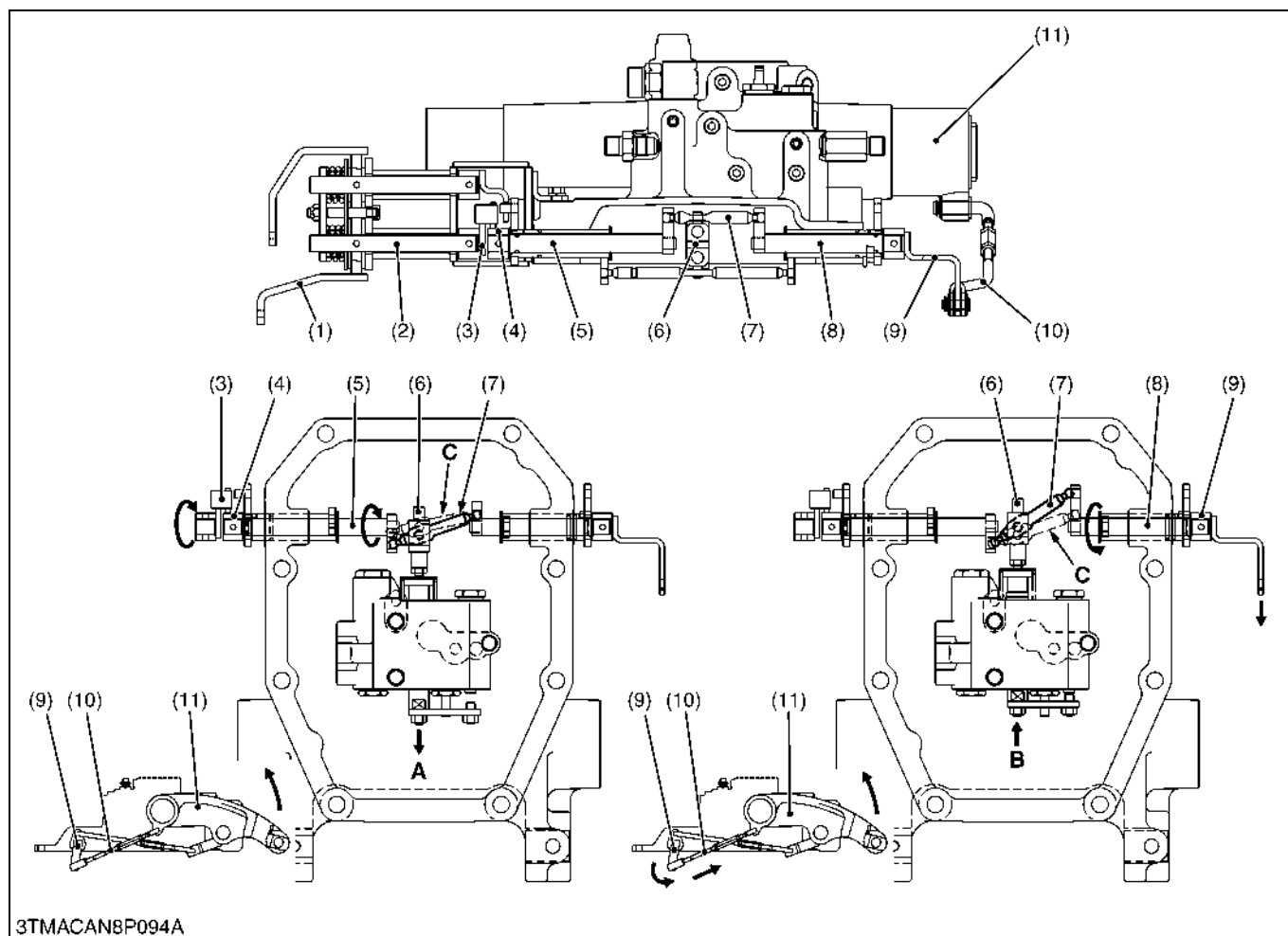
1. When the position control lever (1) is moved to the **"LIFT"** position, the position lever shaft 1 (2) and position link 1 (3) rotates and press down the position link 2 (4).

The position lever shaft 2 (5) rotates and pushes the spool (6) by the spool drive lever (7), opening the **"LIFT"** circuit.

2. When the lift arm (11) moves upward, position feedback shaft (8) rotates via position feedback rod (10) and pulls the spool (6) by the spool drive lever (7).

The lift arm stops when the spool (6) returns to the neutral position **"C"**.

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Down

- | | | | |
|----------------------------|----------------------------------|-----------------------------|----------------------------|
| (1) Position Control Lever | (5) Position Lever Shaft 2 | (9) Position Feedback Lever | A: LIFT |
| (2) Position Lever Shaft 1 | (6) Spool | (10) Position Feedback Rod | B: DOWN |
| (3) Position Link 1 | (7) Spool Drive Lever (Position) | (11) Lift Arm | C: Neutral Position |
| (4) Position Link 2 | (8) Position Feedback Shaft | | |

1. When the position control lever (1) is moved to the **"DOWN"** position, the position link 2 (4) is free. The spool (6) of control valve moves by spool spring to opening the **"DOWN"** circuit.
2. When the lift arm (11) moves downward, feedback shaft (8) rotates via position feedback rod (10) and push the spool (6) by the spool drive lever (7). The lift arm stops when the spool returns to the neutral position **"C"**.

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(2) Draft Control

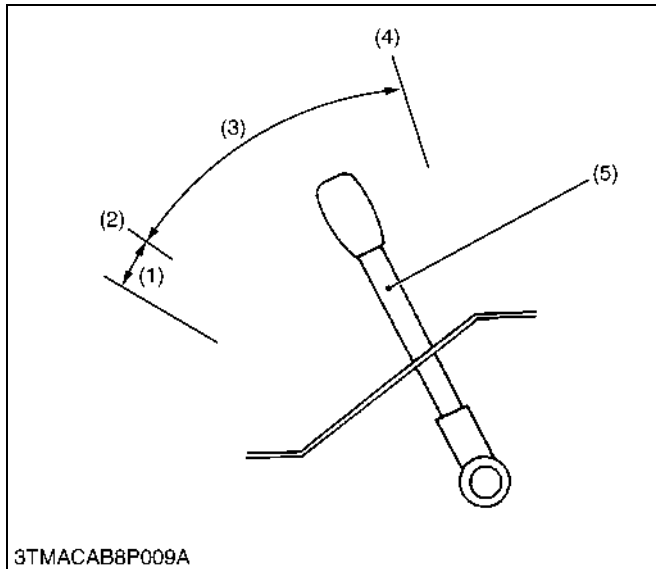
Draft control is a system which maintains a constant traction load, and is suited for the work which needs heavy traction load such as plowing.

The implement is automatically raised when its traction load is increased, and lowers when the traction load is decreased. By maintaining a constant load level, it prevents the tractor from slipping and being loaded excessively.

The setting traction load can be adjusted by changing the position of the draft control lever (5).

The draft control system uses the same control valve as the position control system. The traction load applied to the tractor is sensed and is fed back to the control valve by means of the other linkage mechanism.

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With this type of draft control, operation is as described below according to the position of the draft control lever.

1. When the draft control lever is positioned in the floating range (1), the implement lowers to the ground.
2. When the draft control lever is positioned in the draft control range (3), work is performed as follows.
 - As the traction load applied to the tractor from the implement increases, the implement is raised.
 - As the traction load decreases, the implement lowers to the position at which it matches the setting traction load.
3. When the implement is raised as described in 2 above, the force to raise the implement is applied to the rear wheels so that the ground pressure of the wheels is momentarily increased to prevent slippage.

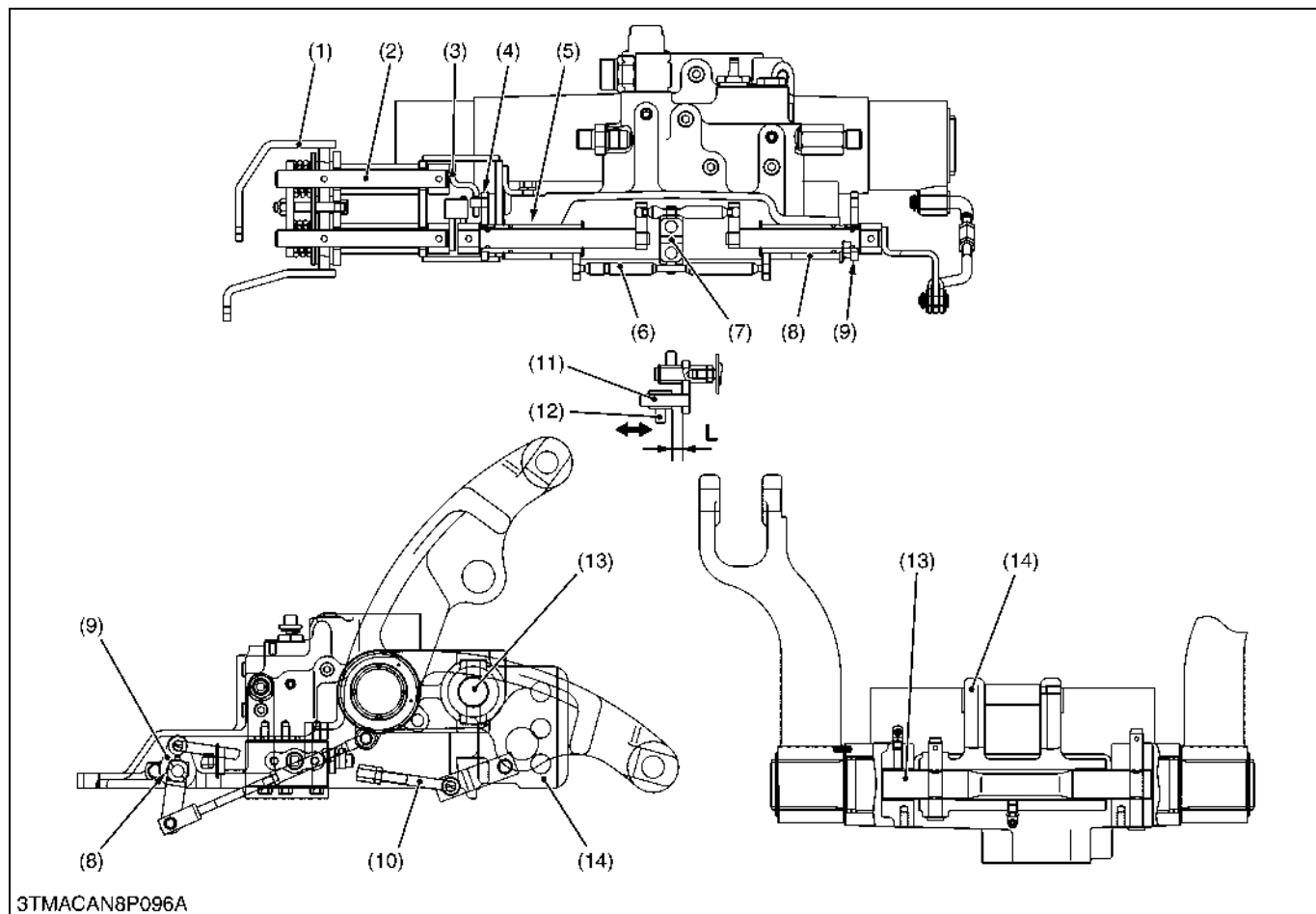
(Reference)

- When the draft control is used, the position control lever should be set at **"FLOATING"** range.
- If the position control lever is set at working range, both control systems operate performing mix control system. (See page 7-M14.)

- (1) Floating Range
(2) Deep
(3) Draft Control Range

- (4) Shallow
(5) Draft Control Lever

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Draft Control Operation

- | | | | |
|-------------------------|-------------------------------|--------------------------|----------------------|
| (1) Draft Control Lever | (5) Draft Link Shaft | (9) Draft Feedback Lever | (13) Torsion Bar |
| (2) Draft Lever Shaft | (6) Spool Drive Lever (Draft) | (10) Draft Feedback Rod | (14) Top Link Holder |
| (3) Draft Lever | (7) Spool | (11) Spool Shaft | |
| (4) Draft Link | (8) Draft Feedback Link Shaft | (12) Spool Link | |

L: Clearance

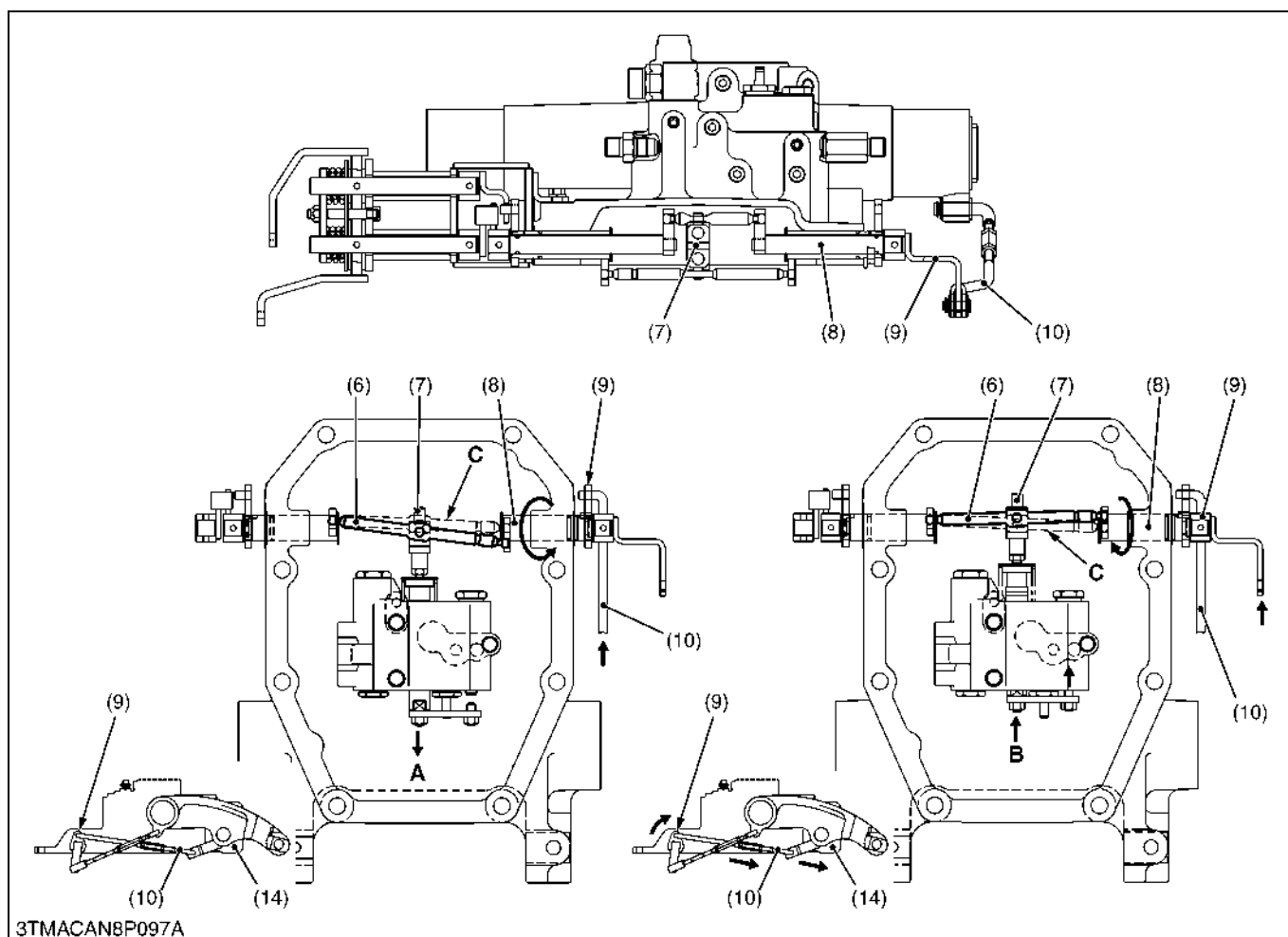
1. The traction load applied to the tractor from the implement act as a torsional force to the torsion bar (13) via the top link and top link holder (14). When the torsion bar (13) is twisted, its displacement is transmitted to the draft feedback link shaft (8) to rotate via the draft feedback rod (10) and draft feedback lever (9). The draft feedback link shaft (8) rotates. The end of the spool drive lever (6) is connected to the draft feedback link shaft (8) and the other end is fixed with the draft link shaft (5), pulling out or pushing in the spool (7) by the rotation of the draft link shaft (5).

The angle of the draft link shaft (5) is controlled by the draft control lever (1).

The angle of the draft link shaft (5) slides the spool link (12) on the spool shaft (11). This sliding motion changes clearance "L" and draft sensibility.

(To be continued)

(Continued)



(6) Spool Drive Lever (Draft)
(7) Spool

(8) Draft Feedback Link Shaft
(9) Draft Feedback Lever

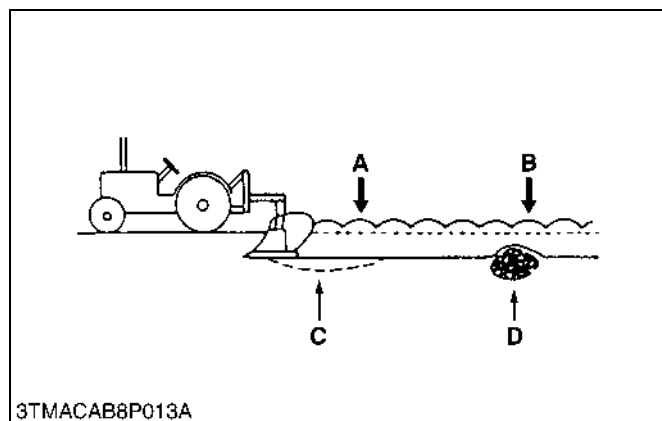
(10) Draft Feedback Rod
(14) Top Link Holder

A: LIFT
B: DOWN
C: Neutral Position

2. When the traction load increases, the torsion bar is twisted, and its displacement is transmitted to the draft feedback link shaft (8) via the draft feedback rod (10) and draft feedback lever (9). The draft feedback link shaft (8) rotates.
The draft feedback link shaft (8) pushes the spool (7) in via the spool drive lever (6) and the **"LIFT"** circuit is activated.
As the implement is raised and the traction load decreases, the torsion bar is restored to return the spool (7) to neutral point **"C"**.
3. When the traction load decreases, the torsion bar is restored and its displacement is transmitted to the draft feedback link shaft (8) via the draft feedback rod (10) and draft feedback lever (9). As the draft feedback link shaft (8) rotates, the spool drive lever (6) pulls the spool (7) to form the **"DOWN"** circuit.
As the implement lowers and the traction load increases, the torsion bar is twisted to return the spool (7) to neutral position **"C"**.

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(3) Mixed Control



Mixed control is a system combining position control with draft control.

When traction load increases, the draft control functions to raise the lift arms (implement). When traction load reduces, the lift arms (implement) lower to the height set by the position control only, when traction load increases, slippage or engine stop may occur unless the implement is raised.

With the draft control only, plowing depth cannot be kept constant if soil hardness changes greatly.

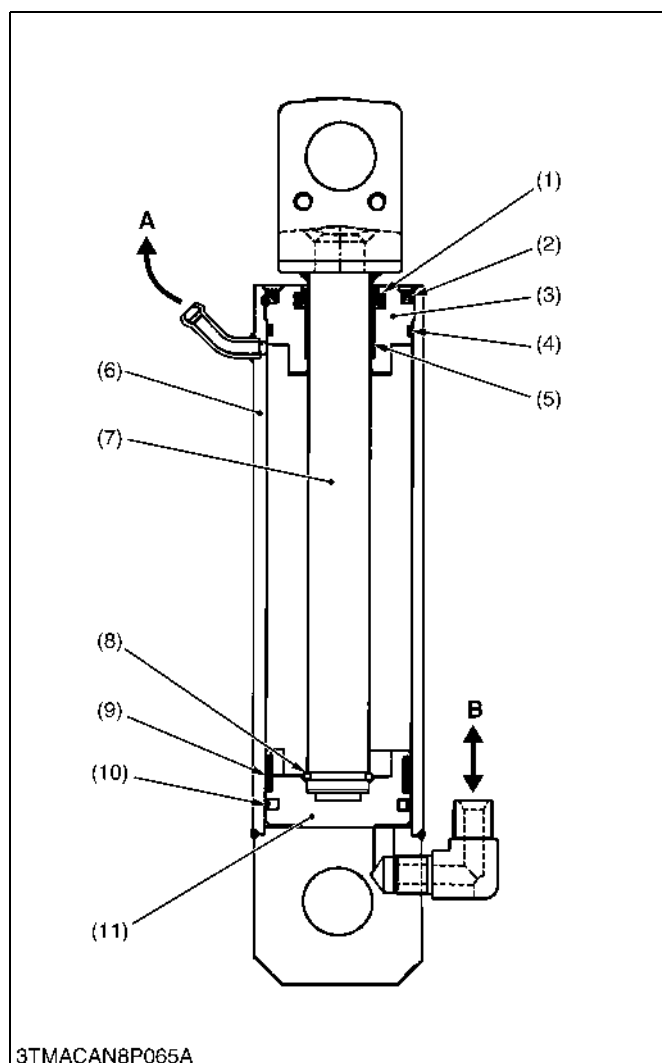
The mixed control serves to eliminate such disadvantages.

A: Position Controlled
B: Draft Controlled
C: Not Deep Even in Soft Soil

D: Shallow where Resistance Occurs

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[5] HYDRAULIC CYLINDER



The external type hydraulic cylinders are used for 3-point linkage system. This hydraulic cylinder is single acting type, and it is installed directly between hydraulic lift arms.

The main components of the hydraulic cylinder are shown in the figure.

(1) Dust Seal
 (2) Circlip
 (3) Head
 (4) O-ring
 (5) Bushing
 (6) Cylinder Tube
 (7) Rod
 (8) Circlip
 (9) Wear Ring
 (10) Seal
 (11) Piston

A: To Transmission Case
B: To or From Position Control Valve

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SERVICING

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Implement Does Not Raise (Not Noise)	Control linkage improperly assembled or damaged	Repair or replace	7-S24
	Control valve malfunctioning (unload valve, spool, check valve, poppet valve)	Repair or replace	7-S28
	Control valve broken	Replace	7-S28
	Control valve improperly adjusted	Adjust	7-S28
	Relief valve spring damaged	Replace	7-S31
	Cylinder damaged	Replace	7-S30
	Safety valve damaged	Replace	7-S32
Implement Does Not Raise (Noise)	Transmission fluid improper or insufficient	Change or replenish	G-12
	Oil filter clogged	Replace	G-21
	Relief valve setting pressure too low	Adjust	7-S8
	Relief valve spring weak or damaged	Replace	7-S31
	Hydraulic pump malfunctioning	Repair or replace	7-S20
Implement Does Not Reach Maximum Height	Position rod and feedback rod improperly adjusted	Adjust	7-S9
	Draft rod and feedback rod improperly adjusted	Adjust	7-S9
Implement Does Not Lower	Control valve malfunctioning	Repair or replace	7-S28
	Spool damaged	Replace	7-S28
	Lowering speed adjusting valve closed	Open	7-S33
Implement Drops by Weight	Hydraulic cylinder worn or damaged	Replace	7-S30
	Safety valve damaged	Replace	7-S32
	Lowering speed adjusting valve damaged	Replace	7-S33
	Control valve malfunctioning (check valve seat surface, check valve O-ring, poppet valve seat surface and poppet valve O-ring damaged)	Replace	7-S28
Implement Hunts (Moves Up and Down)	Poppet valve, poppet seat surface damaged	Replace	7-S28
	Check valve, check valve seat surface damaged	Replace	7-S28
	Control valve O-ring worn or damaged	Replace	7-S28
Draft Control Malfunctioning	Draft control linkage improperly adjusted	Adjust	7-S9, 7-S33
	Torsion bar weak or broken	Replace	7-S32

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2. SERVICING SPECIFICATIONS

HYDRAULIC PUMP

Item		Factory Specification	Allowable Limit
Hydraulic Pump for Power Steering Condition - Engine speed: Approx. 2400 min⁻¹ (rpm) (ROPS) Approx. 2600 min⁻¹ (rpm) (CABIN) - Rated pressure 18.6 MPa 190 kgf/cm² 2700 psi - Oil temperature 50 to 60 °C (122 to 140 °F)	Delivery (ROPS)	Above 23.3 L/min 6.16 U.S.gals/min 5.13 Imp.gals/min	19.6 L/min 5.18 U.S.gals/min 4.31 Imp.gals/min
	Delivery (CABIN)	Above 25.2 L/min 6.66 U.S.gals/min 5.54 Imp.gals/min	21.1 L/min 5.57 U.S.gals/min 4.64 Imp.gals/min
Hydraulic Pump for 3-point Linkage Condition - Engine speed: Approx. 2400 min⁻¹ (rpm) (ROPS) Approx. 2600 min⁻¹ (rpm) (CABIN) - Rated pressure 19.1 MPa 195 kgf/cm² 2770 psi - Oil temperature 50 to 60 °C (122 to 140 °F)	Delivery (ROPS)	Above 59.3 L/min 15.7 U.S.gals/min 13.0 Imp.gals/min	49.7 L/min 13.1 U.S.gals/min 10.9 Imp.gals/min
	Delivery (CABIN)	Above 64.3 L/min 17.0 U.S.gals/min 14.1 Imp.gals/min	53.9 L/min 14.2 U.S.gals/min 11.9 Imp.gals/min

RELIEF AND SAFETY VALVE

Item		Factory Specification	Allowable Limit
Relief Valve	Setting Pressure	18.9 to 19.8 MPa 192 to 202 kgf/cm ² 2730 to 2870 psi	—
Safety Valve	Operating Pressure	23.1 to 24.5 MPa 235 to 250 kgf/cm ² 3350 to 3550 psi	—

POSITION AND DRAFT CONTROL LINKAGE

Item		Factory Specification	Allowable Limit
Position Control Rod (ROPS)	Length	154 to 156 mm 6.07 to 6.14 in.	—
Draft Control Rod (ROPS)	Length	143 to 145 mm 5.63 to 5.70 in.	—
Position Control Rod (CABIN)	Length	184 to 186 mm 7.25 to 7.32 in.	—
Draft Control Rod (CABIN)	Length	178 to 180 mm 7.01 to 7.08 in.	—
Position Control	Floating Range	10 to 30 mm 0.40 to 1.1 in.	—
Uppermost Position of Lift Arm	Floating Range	5 to 8 mm 0.2 to 0.3 in.	—
Draft Lever Free Range	Floating Range	Less than 25 mm 0.98 in.	—
Draft Floating Range Check	Floating Range	More than 15 mm 0.59 in.	—
Position and Draft Control Lever	Operating Force	20 to 39 N 2.0 to 4.0 kgf 4.4 to 8.8 lbf	—

AUXILIARY CONTROL VALVE LINKAGE

Item		Factory Specification	Allowable Limit
Clearance between Wire End and Valve Lever Pin (ROPS)	Length	0 to 3.0 mm 0 to 0.12 in.	—
Clearance between Wire End and Valve Lever Pin (CABIN)	Length	0 to 5.0 mm 0 to 0.19 in.	—

OIL COOLER RELIEF VALVE (ROPS MODEL)

Item		Factory Specification	Allowable Limit
Oil Cooler Relief Valve	Operating Pressure	4.5 to 4.9 MPa 45 to 50 kgf/cm ² 640 to 710 psi	—

OIL COOLER CHECK VALVE (CABIN MODEL)

Item		Factory Specification	Allowable Limit
Oil Cooler Check Valve	Operating Pressure	Approx. 0.8 MPa 8 kgf/cm ² 100 psi	—

CONTROL VALVE

Item		Factory Specification	Allowable Limit
Spool Joint	Length	22.5 to 23.0 mm 0.886 to 0.905 in.	—

LIFT ARM AND TOP LINK BRACKET

Item		Factory Specification	Allowable Limit
Bushing	Press-fit Location	11.0 mm 0.433 in.	—

3. TIGHTENING TORQUES

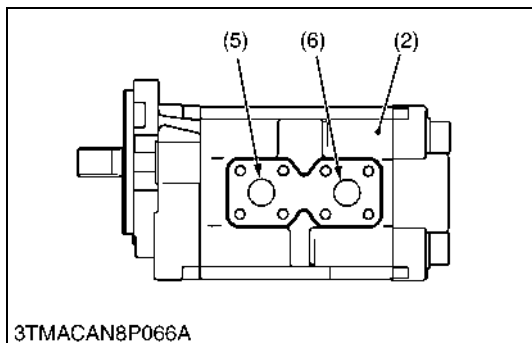
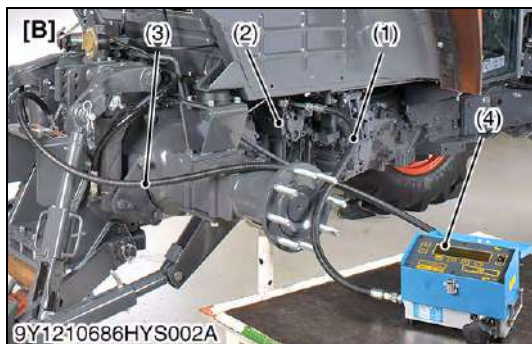
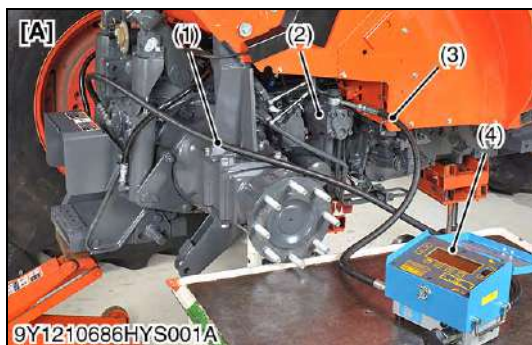
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to G-14.)

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting nut	344 to 402	35.0 to 41.0	254 to 296
Relief valve assembly	35 to 39	3.5 to 4.0	26 to 28
Safety valve assembly	40 to 49	4.0 to 5.0	29 to 36
Safety valve lock nut	59 to 78	6.0 to 8.0	44 to 57
Oil cooler relief valve retaining nut	49 to 68	5.0 to 7.0	37 to 50
Oil cooler check valve retaining nut	49 to 68	5.0 to 7.0	37 to 50
Housing cover mounting screw	40 to 44	4.0 to 4.5	29 to 32
3-point hitch delivery pipe nut	108 to 117	11.0 to 12.0	79.6 to 86.7
Cylinder hose retaining nut	46 to 53	4.6 to 5.4	34 to 39
Top cover mounting screw (M14, 9T)	167 to 196	17.0 to 20.0	123 to 144
Top cover mounting nut (M14, 7T)	124 to 147	12.6 to 15.0	91.2 to 108
Cabin mounting bolt and nut (M14, 7T)	124 to 147	12.6 to 15.0	91.2 to 108
Control valve mounting screw	20 to 23	2.0 to 2.4	15 to 17
Seat plug 1	40 to 58	4.0 to 6.0	29 to 43
Seat plug 2	40 to 58	4.0 to 6.0	29 to 43
Seat plug	40 to 58	4.0 to 6.0	29 to 43
Lock nut	16 to 19	1.6 to 2.0	12 to 14
Seat plug	30 to 49	3.0 to 5.0	22 to 36
Lowering speed adjusting valve assembly	35 to 39	3.5 to 4.0	26 to 28

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4. CHECKING AND ADJUSTING

[1] HYDRAULIC PUMP



Hydraulic Flow Test

■ IMPORTANT

- When using flowmeter other than KUBOTA specified flowmeter, be sure to use the instructions with the flowmeter.
 - Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.
 - Set the main change lever and shuttle lever in Neutral position.
 - Set parking brake lever in parking position.
1. Place the disassembling stand under the transmission case.
 2. Remove the right rear wheel.
 3. Place the disassembling stand under the right rear axle case.
 4. Disconnect the differential lock rod from pedal.
 5. Disconnect the delivery pipe for power steering or delivery pipe for 3 point hydraulic from hydraulic pump (2).
 6. Install the adaptor **53** and **54** (see page G-66) to the pump discharge port.
 7. Connect the hydraulic test hose (3) to the adaptor at hydraulic pump (2) and flowmeter (4) inlet port.
 8. Connect the other hydraulic test hose (1) to the flowmeter outlet, insert the hydraulic test hose other end to transmission oil filling port at PTO case.
 9. Open the flowmeter loading valve completely. (Turn counterclockwise.)
 10. Start the engine and set the engine speed at 2000 to 2200 min⁻¹ (rpm).
 11. Slowly close the loading valve to generator pressure approx. 9.81 MPa (100 kgf/cm², 1420 psi). Hold in this condition until oil temperature reaches approx. 55 °C (131 °F).
 12. Open the loading valve completely.
 13. Set the engine speed. (Refer to the following "**Condition**".)
 14. Read and note the pump delivery at rated pressure.
 15. Open the loading valve completely and stop the engine.
 16. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.
 17. Check the hydraulic flow test for power steering and three point pump are same procedure.

(When reassembling)

Tightening torque	Rear wheel mounting nut	344 to 402 N·m 35.0 to 41.0 kgf·m 254 to 296 lbf·ft
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- (1) Hydraulic Test Hose
- (2) Hydraulic Pump
- (3) Hydraulic Test Hose
- (4) Flowmeter
- (5) Port for 3-Point Hydraulic
- (6) Port for Power Steering

[A] ROPS Model
[B] CABIN Model

(To be continued)

(Continued)**[Power Steering Pump Delivery]****Condition**

- Engine speed
Approx. 2400 min⁻¹ (rpm) (ROPS Model)
Approx. 2600 min⁻¹ (rpm) (CABIN Model)
- Rated pressure
18.6 MPa
190 kgf/cm²
2700 psi
- Oil temperature: 50 to 60 °C (122 to 140 °F)

[ROPS Model]

Hydraulic pump delivery at no pressure	Factory specification	Above 23.8 L/min 6.29 U.S.gals/min 5.24 Imp.gals/min
Hydraulic pump delivery at rated pressure	Factory specification	23.3 L/min 6.16 U.S.gals/min 5.13 Imp.gals/min
	Allowable limit	19.6 L/min 5.18 U.S.gals/min 4.31 Imp.gals/min

[CABIN Model]

Hydraulic pump delivery at no pressure	Factory specification	Above 25.7 L/min 6.79 U.S.gals/min 5.65 Imp.gals/min
Hydraulic pump delivery at rated pressure	Factory specification	25.2 L/min 6.66 U.S.gals/min 5.54 Imp.gals/min
	Allowable limit	21.1 L/min 5.57 U.S.gals/min 4.64 Imp.gals/min

(To be continued)

(Continued)**[Three Point Pump Delivery]****Condition**

- Engine speed
Approx. 2400 min⁻¹ (rpm) (ROPS Model)
Approx. 2600 min⁻¹ (rpm) (CABIN Model)
- Rated pressure
19.1 MPa
195 kgf/cm²
2770 psi
- Oil temperature: 50 to 60 °C (122 to 140 °F)

[ROPS Model]

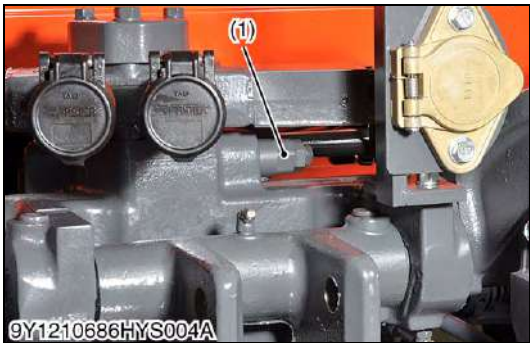
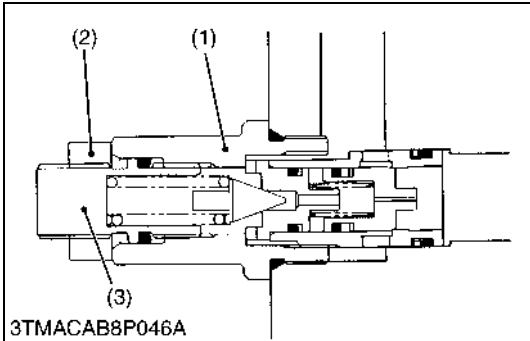
Hydraulic pump delivery at no pressure	Factory specification	Above 59.9 L/min 15.8 U.S.gals/min 13.2 Imp.gals/min
Hydraulic pump delivery at rated pressure	Factory specification	59.3 L/min 15.7 U.S.gals/min 13.0 Imp.gals/min
	Allowable limit	49.7 L/min 13.1 U.S.gals/min 10.9 Imp.gals/min

[CABIN Model]

Hydraulic pump delivery at no pressure	Factory specification	Above 64.9 L/min 17.1 U.S.gals/min 14.3 Imp.gals/min
Hydraulic pump delivery at rated pressure	Factory specification	64.3 L/min 17.0 U.S.gals/min 14.1 Imp.gals/min
	Allowable limit	53.9 L/min 14.2 U.S.gals/min 11.9 Imp.gals/min

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[2] RELIEF AND SAFETY VALVE



Relief Valve Setting Pressure Test Using Pressure Tester

- 1. Set the relief valve setting pressure adaptor **G** (Code No. 07916-52751) to the half male of the quick coupler and then set a pressure gauge (Code No. 07916-50322), cable (Code No. 07916-50331). (See page G-66.)
- 2. Start the engine, set at maximum speed.
- 3. Set the auxiliary control valve operation lever to the **UP** position and read the pressure gauge when the relief valve is actuated.
- 4. If the pressure is not within the factory specification, adjust the relief valve adjuster (3).

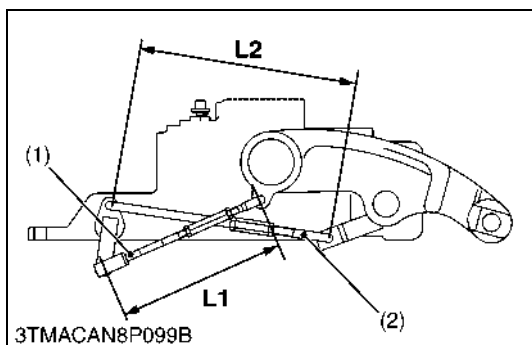
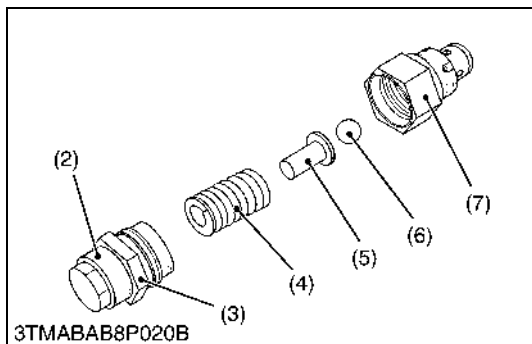
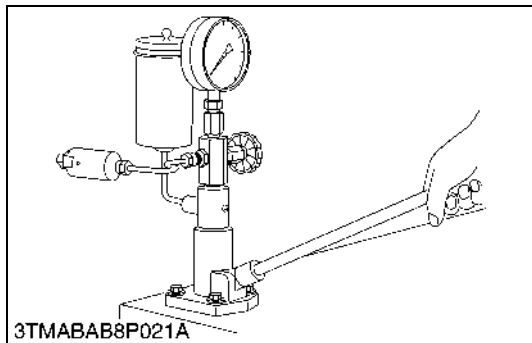
Condition

- Engine speed
Approx. 2400 min⁻¹ (rpm) (ROPS Model)
Approx. 2600 min⁻¹ (rpm) (CABIN Model)
- Oil temperature: 45 to 55 °C (113 to 131 °F)

Tightening torque	Relief valve assembly	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
Relief valve operating pressure	Factory specification	18.9 to 19.8 MPa 192 to 202 kgf/cm ² 2730 to 2870 psi

- (1) Relief Valve
- (2) Lock Nut
- (3) Adjuster

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Safety Valve Setting Pressure Test Using Injection Nozzle Tester

1. Remove the safety valve assembly (1).
2. Attach the safety valve to an injection nozzle tester with a safety valve setting adaptor (see page G-78).
3. Measure the operating pressure of the safety valve.
4. If the operating pressure is not within the factory specifications, adjust by turning the adjusting screw (2).
5. After adjustment, tighten the lock nut (3) firmly.

(When reassembling)

- Install the safety valve to the hydraulic cylinder block, taking care not to damage the O-ring and apply transmission fluid.

Tightening torque	Safety valve assembly	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Safety valve lock nut	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft
Safety valve operating pressure	Factory specification	23.1 to 24.5 MPa 235 to 250 kgf/cm ² 3350 to 3550 psi

NOTE

- Use specified transmission fluid (See page G-12) to test the operating pressure of the cylinder safety valve.

- | | |
|---------------------------|-------------|
| (1) Safety Valve Assembly | (5) Seat |
| (2) Adjusting Screw | (6) Ball |
| (3) Lock Nut | (7) Housing |
| (4) Spring | |

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Adjusting Position Feedback Rod and Draft Feedback Rod

1. Be sure to adjust the position feedback rod (1) length (L1) and draft feedback rod (2) length (L2).

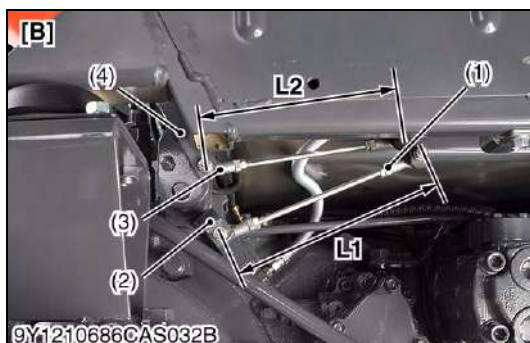
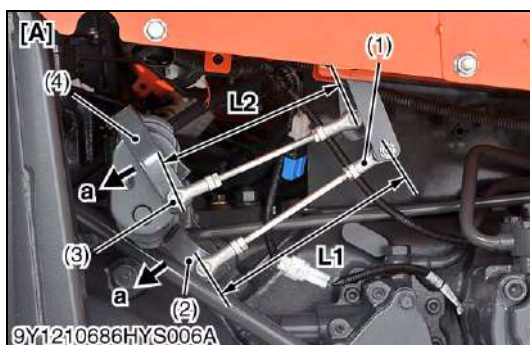
Position feedback rod length (L1)	Reference value	Approx. 210 mm 8.27 in.
Draft feedback rod length (L2)	Reference value	Approx. 272 mm 10.7 in.

- (1) Position Feedback Rod
- (2) Draft Feedback Rod

L1 : Length of Position Feedback Rod
L2 : Length of Draft Feedback Rod

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[3] POSITION AND DRAFT CONTROL LINKAGE



Adjusting Position Control Rod and Draft Control Rod

1. Be sure to adjust the position control rod (1) length (L1) and draft control rod (3) length (L2).

■ IMPORTANT

- Each draft control lever and position control lever should contact with lever guide lowest position when operate the position lever 1 (2) and draft lever 1 (4) to end of direction (a).

If not, adjust the position control rod (1) length (L1) and/or draft control rod (3) length (L2).

[ROPS Model]

Position control rod length (L1)	Factory specification	154 to 156 mm 6.07 to 6.14 in.
Draft control rod length (L2)	Factory specification	143 to 145 mm 5.63 to 5.70 in.

[CABIN Model]

Position control rod length (L1)	Factory specification	184 to 186 mm 7.25 to 7.32 in.
Draft control rod length (L2)	Factory specification	178 to 180 mm 7.01 to 7.08 in.

- (1) Position Control Rod
- (2) Position Lever 1
- (3) Draft Control Rod
- (4) Draft Lever 1
- (5) Position Control Lever
- (6) Draft Control Lever

[A] ROPS Model

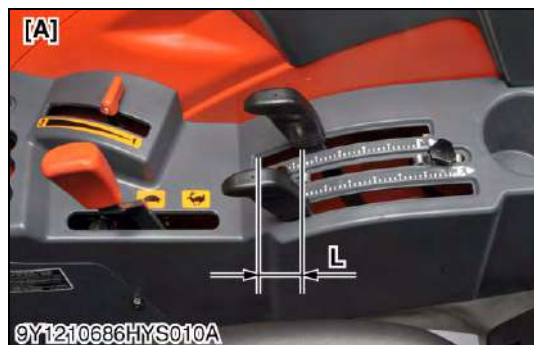
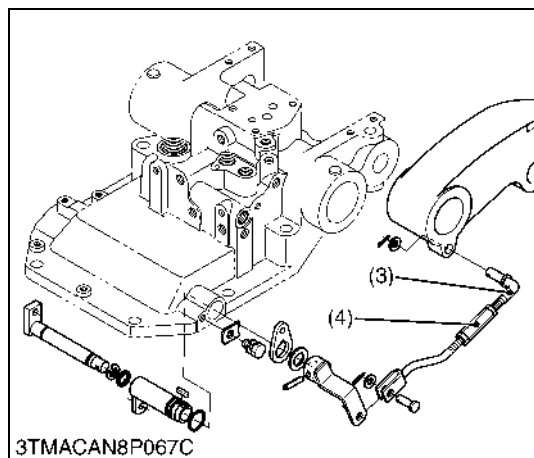
[B] CABIN Model

L1 : Length of Position Control Rod

L2 : Length of Draft Control Rod

a : Direction for Lower

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Adjusting Position Control

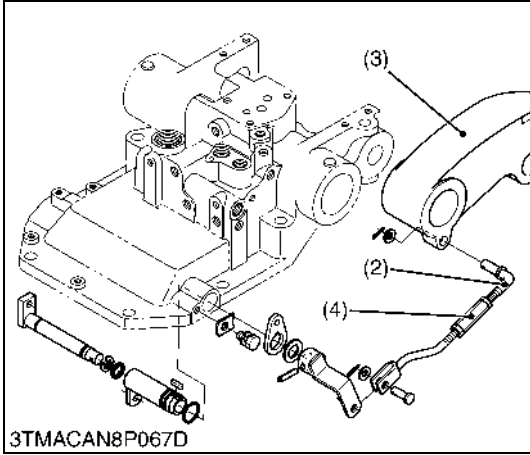
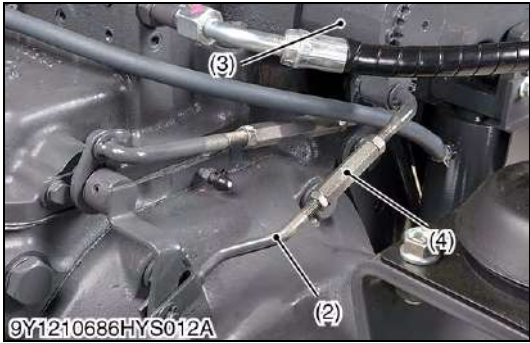
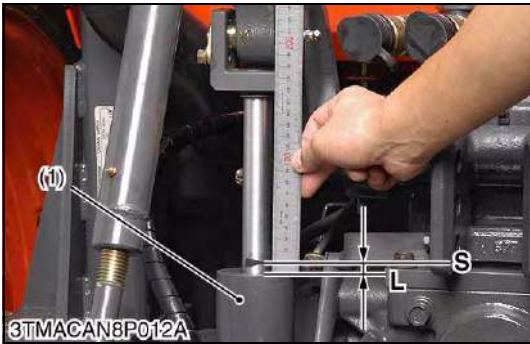
1. Attach the weight of approx. 490 N (50 kgf, 110 lbf) to the end of the lower links.
2. Set the position control lever (2) and draft control lever (1) to the lowest position.
3. Start the engine, and after warming-up, set the engine speed at 1000 min⁻¹ (rpm).
4. Move the position control lever (2) to the uppermost position. (Contact to the position control lever guide.)
5. Lengthen the position feedback rod (3) until the relief valve begins to be operated.
6. From the relief valve operating position, turn the turnbuckle (4) 1.5 turns to shorten the position feedback rod (3).
7. Tighten the nut (4).
8. Move the position control lever (2) to the lowest position to check the cylinder goes to lowest position.
9. Set the position control lever (2) to the lowest position, then slowly shift the lift arm to the upper until the lift arm begins to operated. Check the floating range (L) guide end and position control lever.
10. If floating range (L) is not with in the factory specification, readjust with above procedure.

Floating range (L)	Factory specification	10 to 30 mm 0.40 to 1.1 in.
--------------------	-----------------------	--------------------------------

- (1) Draft Control Lever
(2) Position Control Lever
(3) Position Feedback Rod
(4) Turnbuckle

[A] ROPS Model
[B] CABIN Model
L : Floating Range

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Adjusting Uppermost Position of Lift Arm

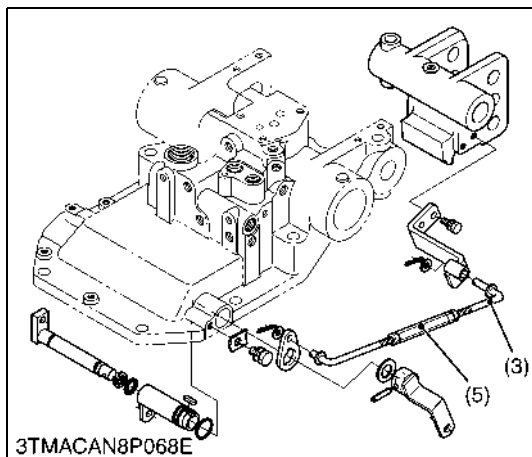
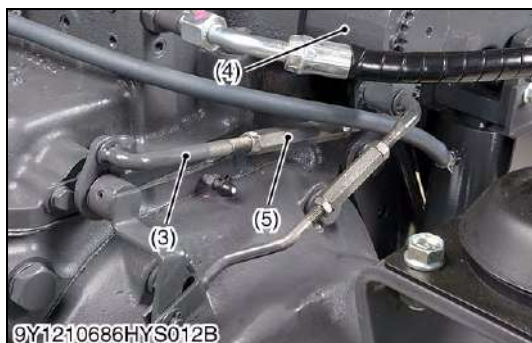
1. Move the position and draft control levers all the way down.
2. Start the engine and set the speed at maximum speed.
3. Operate the position control lever to the uppermost position.
4. Raise the lift arm (3) to the top dead center by hand, and mark hydraulic cylinder (1) with the mark (S) respectively.
5. Measure the cylinder free play (L) from the mark (S) to cylinder body end.
6. If the cylinder free play is not within the factory specifications, adjust the position feedback rod (2).

Cylinder free play (L)	Factory specification	5 to 8 mm 0.2 to 0.3 in.
------------------------	-----------------------	-----------------------------

- (1) Hydraulic Cylinder
- (2) Position Feedback Rod
- (3) Lift Arm
- (4) Turnbuckle

L : Cylinder Free Play
S : Mark

9Y1210686HYS0007US0



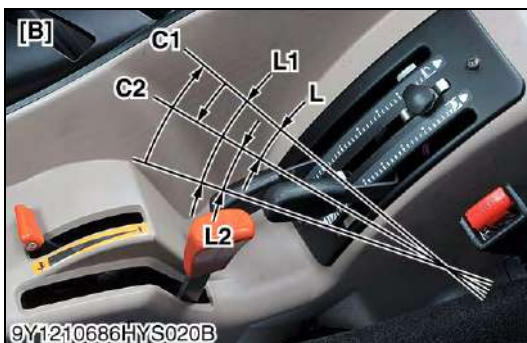
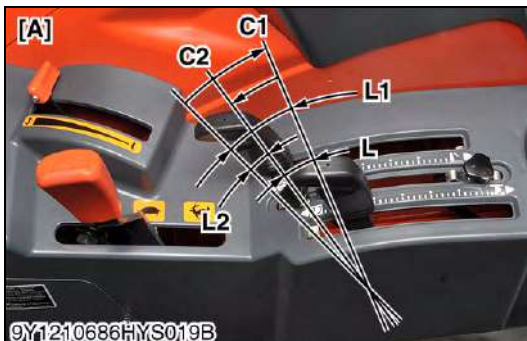
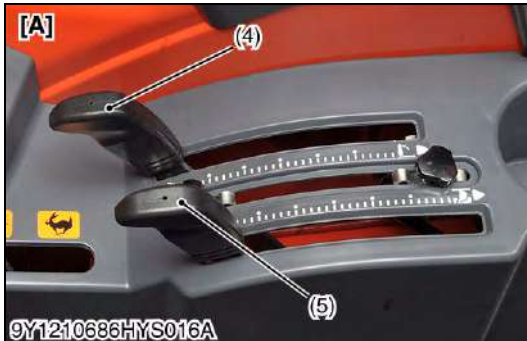
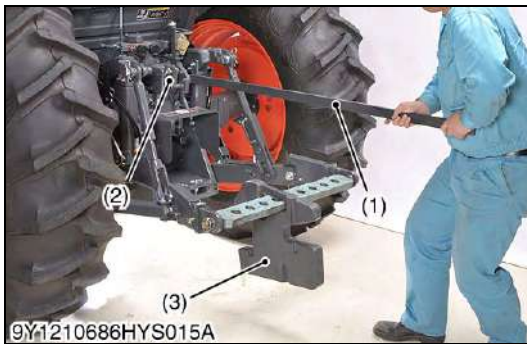
Adjusting Draft Control

1. Attach the weight of approx. 490 N (50 kgf, 110 lbf) to the end of the lower links.
2. Start the engine and set the speed at 1000 min⁻¹ (rpm).
3. Move the position control lever (1) and draft control lever (2) all the way down.
4. Move the draft control lever (2) to uppermost position then lengthen the draft feedback rod (3) and check the point where the lift arms begin to rise.
5. When the lift arms (4) begin to rise, turn the turnbuckle (5) 1 turn to shorten the draft feedback rod (3).
6. Move the position control lever (1) and draft control lever (2) to uppermost position to make sure the relief does not operate.
7. If the relief valve operate, adjust the draft feedback rod (3).
8. Tighten the lock nuts securely.

- (1) Position Control lever
- (2) Draft Control Lever
- (3) Draft Feedback Rod
- (4) Lift Arm
- (5) Turnbuckle

- [A] ROPS Model
- [B] CABIN Model

9Y1210686HYS0008US0



Draft Lever Free Range

1. Attach the weight (3) of approx. 490 N (50 kgf, 110 lbf) to the end of the lower links.
2. Attach the test bar (1) (see page G-76) to the top link bracket (2).
3. Start the engine and set the engine speed at maximum speed.
4. Move the draft and position control lever (5), (4) all the way down.
5. Press the test bar (1) downward until the top link bracket (2) comes in contact with the body.
6. Slowly shift the draft control lever (5) upward until the lift arms begin to rise (**C1**). Then slowly shift the draft control lever (5) downward until the lift arms begin to down (**C2**). Calculate the free range (**L**) of the draft control lever (5) on the lever guide.

Free range L1 – L2	Factory specification	Less than 25 mm 0.98 in.
--------------------	-----------------------	--------------------------------

- (1) Test Bar
- (2) Top Link Bracket
- (3) Weight
- (4) Position Control Lever
- (5) Draft Control Lever

C1 : Begin to rise the lift arm

C2 : Begin to down the lift arm

L : Free Range

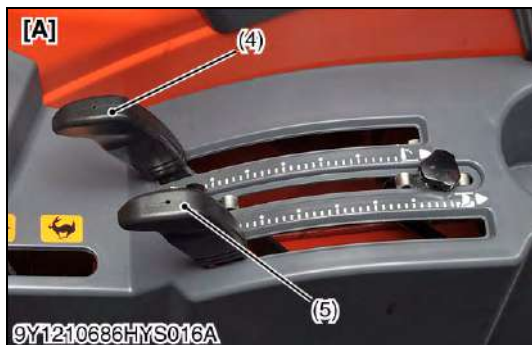
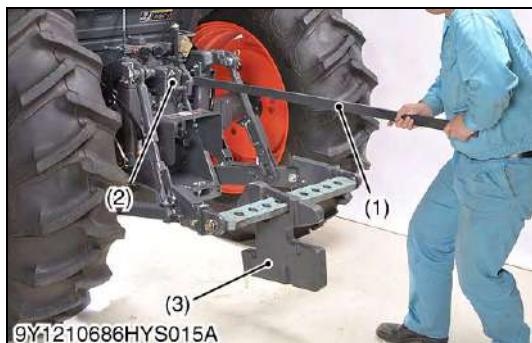
L1 : Distance for begin to rise the lift arm

L2 : Distance for begin to down the lift arm

[A] ROPS Model

[B] CABIN Model

9Y1210686HYS0009US0



Draft Floating Range Check

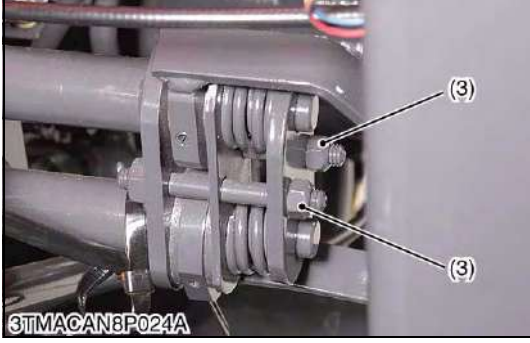
1. Attach the weight (3) of approx. 490 N (50 kgf, 110 lbf) to the end of the lower links.
2. Attach the test bar (1) (see page G-76) to the top link bracket (2).
3. Start the engine and set the speed at maximum speed.
4. Move the draft and position control lever (5), (4) all the way down.
5. Press the test bar (1) downward until the top link bracket (2) comes in contact with the body.
6. Slowly shift the draft control lever (5) upward to mid way of the lift arm guide. At this time, the lift arm should rise. Then slowly shift the draft control lever (5) downward until the lift arms begin to down, measure the floating range (L) of the draft control lever (5) from the end of the lever guide (4).
7. If floating range (L) is not within the factory specification, adjust the draft control rod.

Floating range (L)	Factory specification	More than 15 mm 0.59 in.
--------------------	-----------------------	--------------------------------

- (1) Test Bar
- (2) Top Link Bracket
- (3) Weight
- (4) Position Control Lever
- (5) Draft Control Lever

L : Floating Range
[A] ROPS Model
[B] CABIN Model

9Y1210686HYS0010US0



Position and Draft Control Lever Operating Force

- 1. Check the position and draft control lever operating force.
- 2. If measurement is not within the factory specification, adjust the with tightening nuts (3).

Operating force for position and draft control lever	Factory specification	20 to 39 N 2.0 to 4.0 kgf 4.4 to 8.8 lbf
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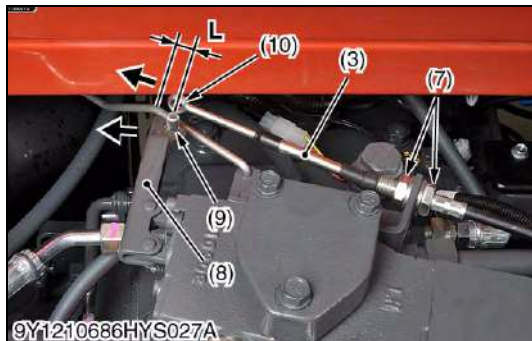
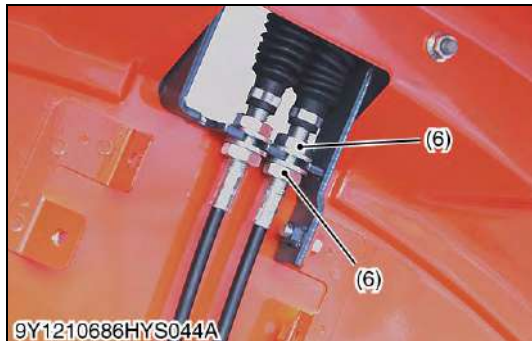
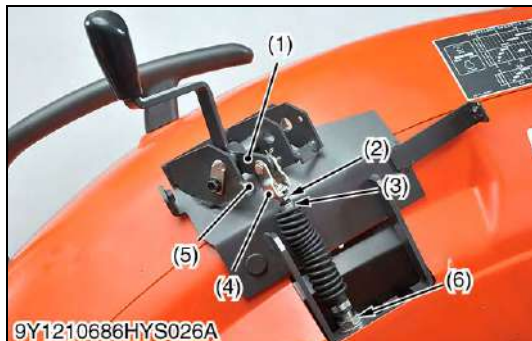
- (1) Position Control Lever
- (2) Draft Control Lever
- (3) Nut

[A] ROPS Model
[B] CABIN Model

9Y1210686HYS0011US0

[4] AUXILIARY CONTROL VALVE LINKAGE

(1) ROPS Model



Adjusting Wire of Auxiliary Control Valve

(Lever Side)

1. Screw in the wire (3) to the rod end (4) fully.
2. Shift the control lever (1) forward and fix the wire with lock nuts (2) to contact the control lever (1) and stopper (5).
3. Fix the wire (3) with retaining nut (6) center of thread.

(Valve Side)

1. Pull the auxiliary valve lever (8) to a full engage position.
2. Pull out the wire (3) fully, and fix the wire with retaining nuts (7) to be a clearance (L) between center of wire end (10) and center of valve lever pin (9) as shown in the photo.

Clearance (L)	Factory specification	0 to 3.0 mm 0 to 0.12 in.
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(1) Control Lever

(2) Lock Nut

(3) Wire

(4) Rod End

(5) Stopper

(6) Retaining Nut (Lever Side)

(7) Retaining Nut (Valve Side)

(8) Auxiliary Valve Lever

(9) Lever Pin

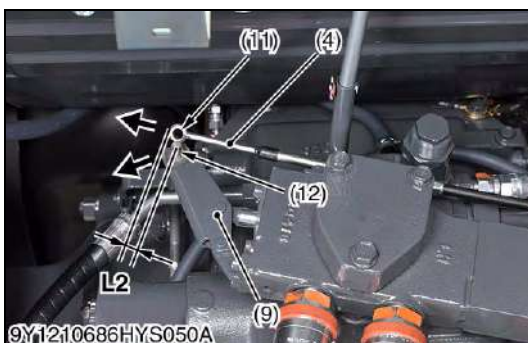
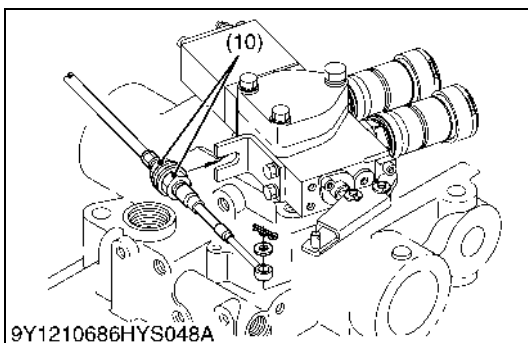
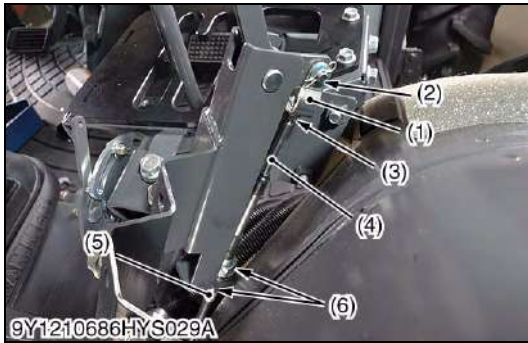
(10) Wire End

A : Screw in the wire to the rod end fully.

L : Clearance

9Y1210686HYS0013US0

(2) CABIN Model



Adjusting Wire of Auxiliary Control Valve

(Lever Side)

1. Screw in the wire (4) to the rod end (1) fully.
2. Shift the control lever (7) forward and fix the wire with lock nuts or the retaining nut (10) to be a clearance (**L1**) between the control lever (7) and the stopper plate (8) as shown photo.

(Valve Side)

1. Pull the auxiliary valve lever (9) to a full engage position.
2. Pull out and push the wire (4), and fix the wire with retaining nuts (10) to be a clearance (**L2**) between center of wire end (11) and center of valve lever pin (12) as shown in the photo.

(When reassembling)

- Insert the pin (2) from the fender side.

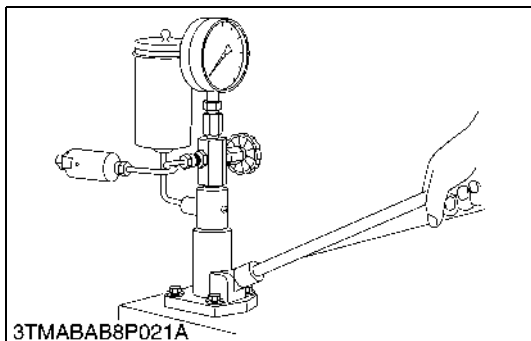
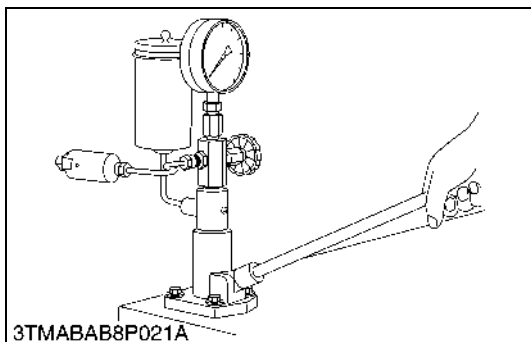
Clearance between control lever and stopper plate (L1)	Factory specification	0 to 1.0 mm 0 to 0.039 in.
Clearance between wire end and valve lever pin (L2)	Reference value	0 to 5.0 mm 0 to 0.19 in.

- | | |
|--------------------------------|---------------------------------|
| (1) Rod End | (9) Auxiliary Valve Lever |
| (2) Pin | (10) Retaining Nut (Valve Side) |
| (3) Lock Nut | (11) Wire End |
| (4) Wire | (12) Lever Pin |
| (5) Thread | |
| (6) Retaining Nut (Lever Side) | |
| (7) Control Lever | |
| (8) Stopper Plate | |

A : Screw in the wire to the rod end fully.

9Y1210686HYS0015US0

[5] OIL COOLER RELIEF VALVE



Operating Pressure of Oil Cooler Relief Valve (ROPS Model)

1. Attach the oil cooler relief valve to a injection nozzle tester with a relief valve adaptor (see page G-79).
2. Measure the operating pressure of the oil cooler relief valve (1).
3. If the pressure is not within the factory specifications, replace relief valve with the new one.

Oil cooler relief valve operating pressure	Factory specification	4.5 to 4.9 MPa 45 to 50 kgf/cm ² 640 to 710 psi
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Tightening torque	Oil cooler relief valve retaining nut	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
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■ NOTE

- Use specified transmission fluid (see page G-12) to test the operating pressure of the oil cooler relief valve (1).

(1) Oil Cooler Relief Valve

9Y1210686HYS0016US0

Operating Pressure of Oil Cooler Check Valve (CABIN Model)

1. Attach the oil cooler check valve to a injection nozzle tester with a relief valve adaptor (see page G-79).
2. Measure the operating pressure of the oil cooler check valve (1).
3. If the pressure is not within the factory specifications, replace relief valve with the new one.

Oil cooler check valve operating pressure	Factory specification	Approx. 0.8 MPa 8 kgf/cm ² 50 psi
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Tightening torque	Oil cooler check valve retaining nut	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
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■ NOTE

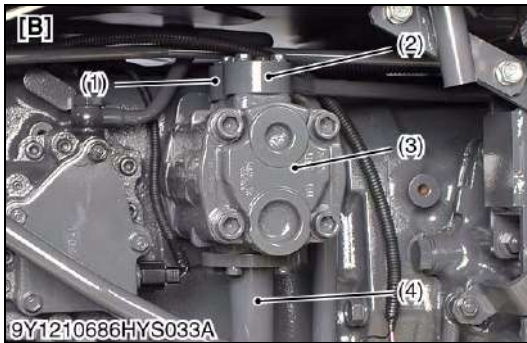
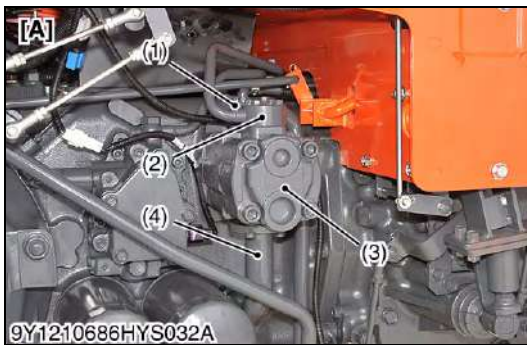
- Use specified transmission fluid (see page G-12) to test the operating pressure of the oil cooler check valve (1).

(1) Oil Cooler Check Valve

9Y1210686HYS0017US0

5. DISASSEMBLING AND ASSEMBLING

[1] HYDRAULIC PUMP



Removing Hydraulic Pump Assembly

1. Place the disassembling stand under the transmission case and right rear axle.
2. Remove the right rear wheel.
3. Unscrew the delivery pipes for power steering (2) and delivery pipe for three point linkage (1) retaining screws from hydraulic pump (3).
4. Unscrew the suction pipe (4) retaining screws from hydraulic pump (3).
5. Remove the hydraulic pump (3).

NOTE

- Do not remove detach the suction pipe from transmission case and keep the vertically position to prevent the oil flow out.

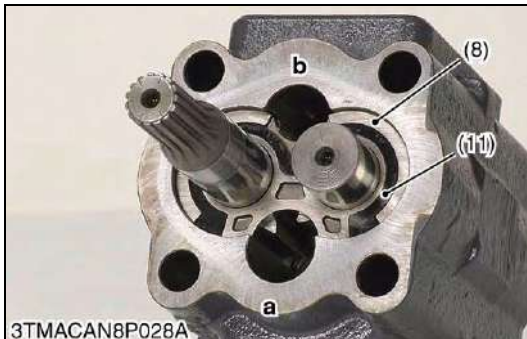
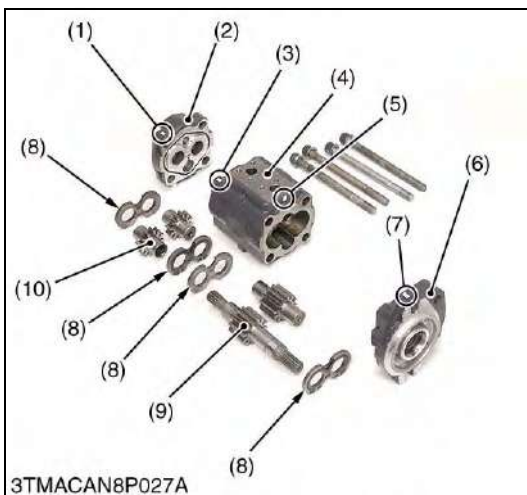
(When reassembling)

- Be sure to fix the O-ring with transmission fluid.

Tightening torque	Rear wheel mounting nut	344 to 402 N·m 35.0 to 41.0 kgf·m 254 to 296 lbf·ft
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- (1) Delivery Pipe for Three Point Linkage
(2) Delivery Pipe for Power Steering
(3) Hydraulic Pump
(4) Suction Pipe
- [A] ROPS Model
[B] CABIN Model

9Y1210686HYS0018US0



Hydraulic Pump

1. Put the parting marks (1), (3), (5), (7) on the flange (6), housing (4), housing (8) and housing cover (2).
2. Unscrew the housing cover mounting screw and separate the flange (6) and housing cover (2) from the housing (4).
3. Remove the backup plate (8).
4. Take out the gears (9), (10).

(When reassembling)

- When installing the backup plate (8) with seal element (11), be sure to reassemble them to the each original position. Seal element on the backup plate (8) does not face to the gear side.
- Take care not to damage the seal elements and O-rings.
- After reassembly, check the smooth rotation of the hydraulic pump (for example, mount arm an approx. 100 mm (3.94 in.) long to the drive gear and rotate its arm slowly for smooth rotation).

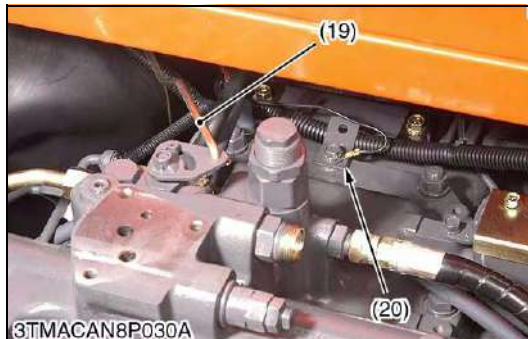
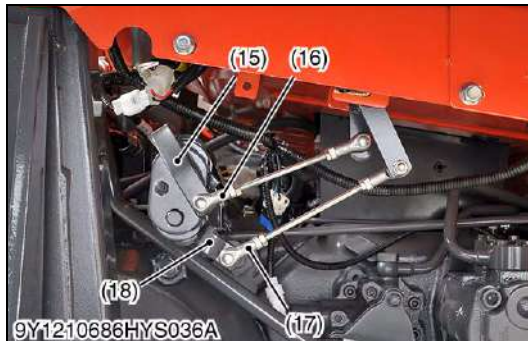
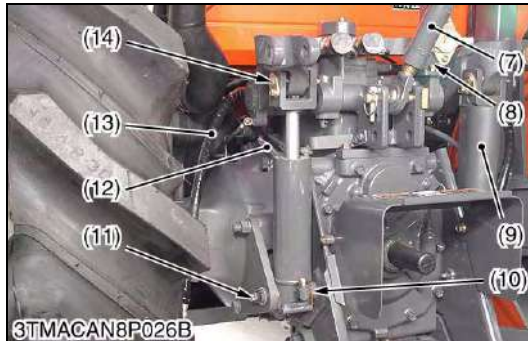
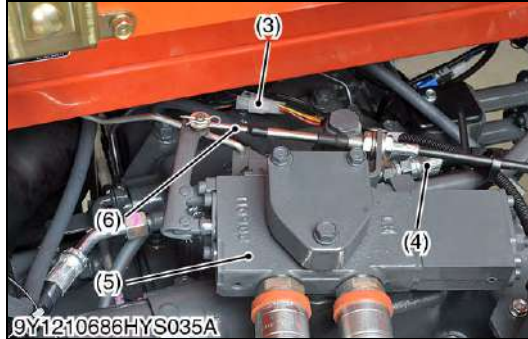
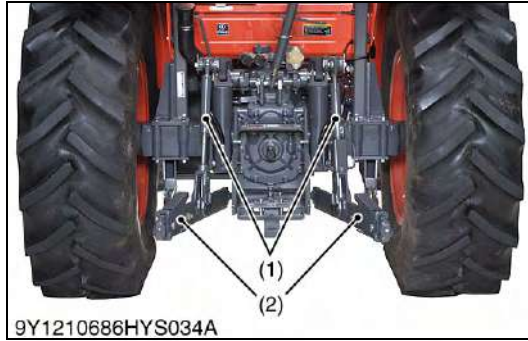
Tightening torque	Housing cover mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft
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- (1) Parting Mark
(2) Housing Cover
(3) Parting Mark
(4) Housing
(5) Parting Mark
(6) Flange
(7) Parting Mark
(8) Backup Plate
(9) Gear (Three Point System)
(10) Gear (Power Steering)
(11) Seal Element
- a : Inlet
b : Outlet

9Y1210686HYS0019US0

[2] REMOVING TOP COVER (3-POINT HITCH HYDRAULIC BLOCK)

(1) ROPS Model



Preparation

1. Remove the lower links (2) and lift rods (1).
2. Disconnect the connector (3) for trailer coupler then remove the top link holder (8) with trailer coupler.
3. Disconnect the auxiliary control valve wire (6).
4. Disconnect the cylinder hose (13) from hydraulic cylinder.
5. Remove the hydraulic cylinder cover (9).
6. Disconnect the breather hose (12) from hydraulic cylinder.
7. Remove the cylinder pin (upper) (14).
8. Remove the cylinder pin (lower) (11) and collar (10), then take out the cylinder.
9. Remove the top link (7).
10. Remove the delivery pipe (4).
11. Disconnect the position control rod (17) from the position lever 1 (18) and draft control rod (16) from the draft lever 1 (15).
12. Remove the auxiliary control valve (5).
13. Disconnect the ground wire (20).
14. Disconnect the lowering speed rod (19).

NOTE

- Take care not to damage the grease nipple when remove the hydraulic cylinder pin.

(When reassembling)

- Apply grease to the grease nipples.
- Take care not to damage the grease nipples when reassemble the hydraulic cylinder.
- To assemble the auxiliary control valve wire (see page 7-S17).
- Be sure to fit the O-rings for auxiliary control valve.

Tightening torque	3-point hitch delivery pipe retaining nut	108 to 117 N·m 11.0 to 12.0 kgf·m 79.6 to 86.7 lbf·ft
	Cylinder hose retaining nut	46 to 53 N·m 4.6 to 5.4 kgf·m 34 to 39 lbf·ft

- | | |
|----------------------------------|---------------------------|
| (1) Lift Rod | (11) Cylinder Pin (Lower) |
| (2) Lower Link | (12) Breather Hose |
| (3) Connector | (13) Cylinder Hose |
| (4) Delivery Pipe | (14) Cylinder Pin (Upper) |
| (5) Auxiliary Control Valve | (15) Draft Lever 1 |
| (6) Auxiliary Control Valve Wire | (16) Draft Control Rod |
| (7) Top Link | (17) Position Control Rod |
| (8) Top Link Holder | (18) Position Lever 1 |
| (9) Hydraulic Cylinder Cover | (19) Lowering Speed Rod |
| (10) Collar | (20) Ground Wire |

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Removing Top Cover (3-Point Hitch Hydraulic Block)

1. Remove the top cover mounting screws and nuts.
2. Take out the top cover assembly.

(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of transmission case and top cover.

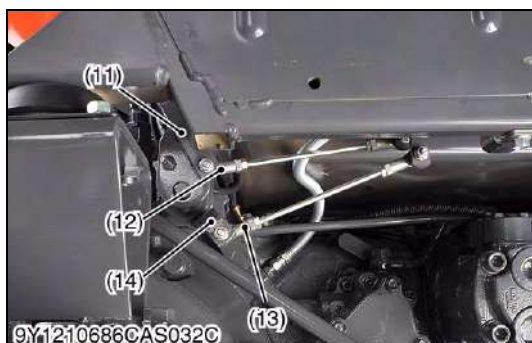
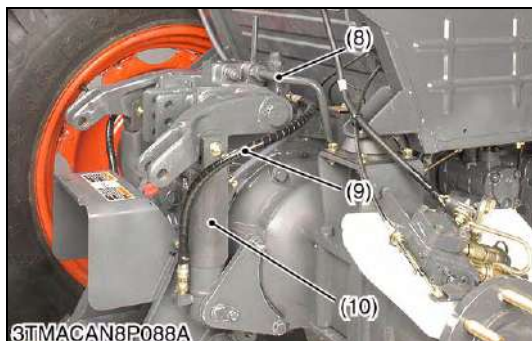
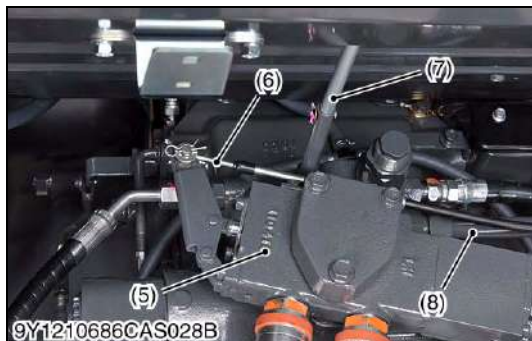
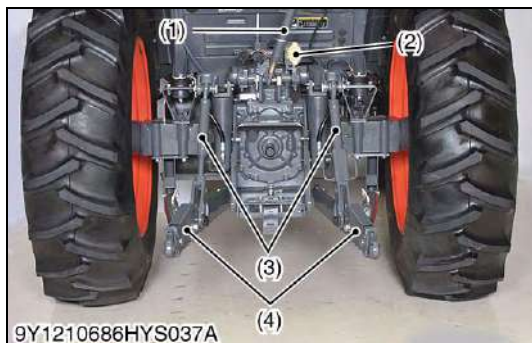
NOTE

- After reassembling the top cover assembly to the tractor, be sure to adjust the position and draft levers and position and draft feedback rods.
- Top cover mounting screw has two different length, be sure to assemble the original position.

Tightening torque	Top cover mounting screw (M14, 9T)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	Top cover mounting nut (M14, 7T)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft

9Y1210686HYS0021US0

(2) CABIN Model



Preparation

1. Park the tractor on a flat place.
2. Remove the lower links (4), lift rods (3) and top link (1).
3. Remove the trailer coupler stay (2).
4. Disconnect the lowering speed rod (7).
5. Remove the auxiliary control wire (6) and auxiliary control valve (5).
6. Place the disassembling stand under the transmission case and remove the right rear wheel.
7. Remove the both cylinder hoses (9) and cylinders (10).
8. Remove the both delivery pipe (8) retaining nuts.
9. Disconnect the position control rod (13) from the position lever 1 (14) and draft rod (12) from the draft lever 1 (11).

NOTE

- Take care not to damage the grease nipple when remove the hydraulic cylinder pin.

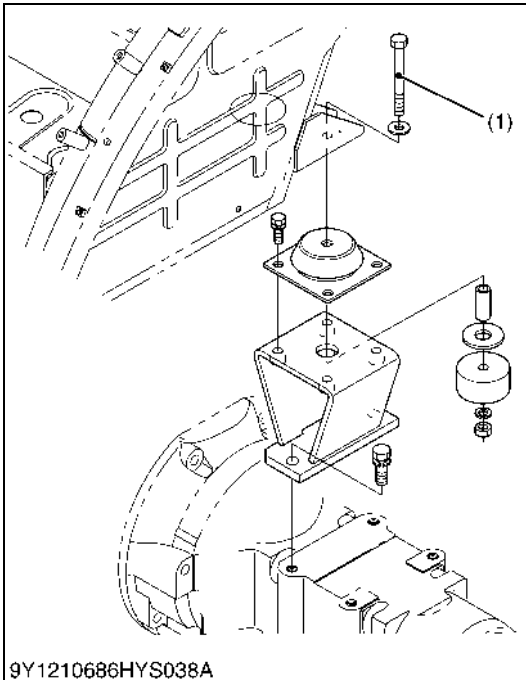
(When reassembling)

- Apply grease to the grease nipples.
- Take care not to damage the grease nipples when reassemble the hydraulic cylinder.
- To assemble the auxiliary control valve wire (see page 7-S18).
- Be sure to fit the O-rings for auxiliary control valve.

Tightening torque	Rear wheel mounting nut	344 to 402 N·m 35.0 to 41.0 kgf·m 254 to 296 lbf·ft
	3-point hitch delivery pipe retaining nut	108 to 117 N·m 11.0 to 12.0 kgf·m 79.6 to 86.7 lbf·ft
	Cylinder hose retaining nut	46 to 53 N·m 4.6 to 5.4 kgf·m 34 to 39 lbf·ft

- | | |
|-----------------------------|---------------------------|
| (1) Top Link | (8) Delivery Pipe |
| (2) Trailer Coupler Stay | (9) Cylinder Hose |
| (3) Lift Rod | (10) Cylinder |
| (4) Lower Link | (11) Draft Lever 1 |
| (5) Auxiliary Control Valve | (12) Draft Rod |
| (6) Auxiliary Control Wire | (13) Position Control Rod |
| (7) Lowering Speed Rod | (14) Position Lever 1 |

9Y1210686HYS0022US0



Removing Top Cover (3-Point Hitch Hydraulic Block)

1. Remove the both cabin mounting bolts (1) and lift up the cabin rear side approx. 38 to 50 mm (1.5 to 1.9 in.) and then set the wooden pieces (2) between the cabin frame and cabin mount as shown in the photo.
2. Remove the top cover mounting screws and nuts.
3. Take out the top cover assembly.

(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of transmission case and top cover.

■ NOTE

- After reassembling the top cover assembly to the tractor, be sure to adjust the position and draft levers and position and draft feedback rods.
- Top cover mounting screw has two different length, be sure to assemble the original position.
- Photo shows wooden pieces (2) for supporting the cabin.
- Be sure to assemble the cabin mount as shown in the figure.

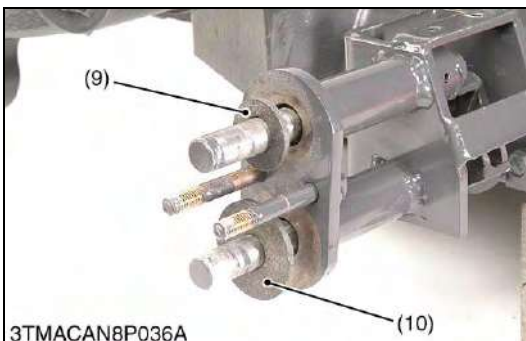
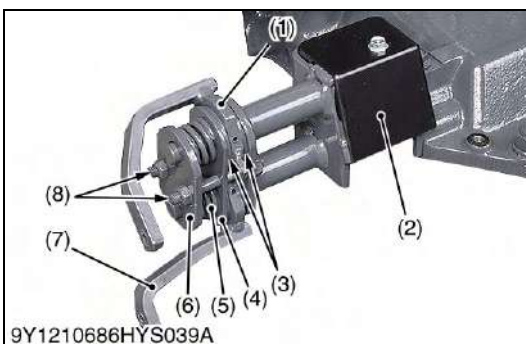
Tightening torque	Cabin mounting bolt and nut (M14, 7T)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
	Top cover mounting screw (M14, 9T)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	Top cover mounting nut (M14, 7T)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft

(1) Cabin Mounting Bolt

(2) Wooden Piece

9Y1210686HYS0023US0

[3] HYDRAULIC LINKAGE



Position and Draft Linkage

1. Remove the link cover (2).
2. Unscrew the nuts (8) then draw out the spring plates (6), springs (5) and plate (4).
3. Tap out the roll pin then draw out the friction plates (3), draft lever 1 (1) and position lever 1 (7).

(When reassembling)

- Be sure to assemble the friction plate to original position and they are free for oil and dust.
 - Smaller friction plate (Dia. 29 mm (1.1 in.)) to the draft (upper) side.
 - Larger friction plate (Dia. 42 mm (1.7 in.)) to the position (lower) side.

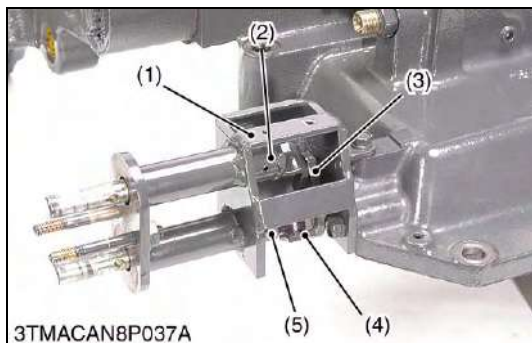
■ NOTE

- After assembling the linkage, adjust the position and draft levers operating force and position and draft rods.

- (1) Draft Lever 1
(2) Link Cover
(3) Friction Plate
(4) Plate
(5) Spring

- (6) Spring Plate
(7) Position Lever 1
(8) Nut
(9) Friction Plate (Smaller)
(10) Friction Plate (Larger)

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Linkage Bracket

1. Remove the bracket (1).

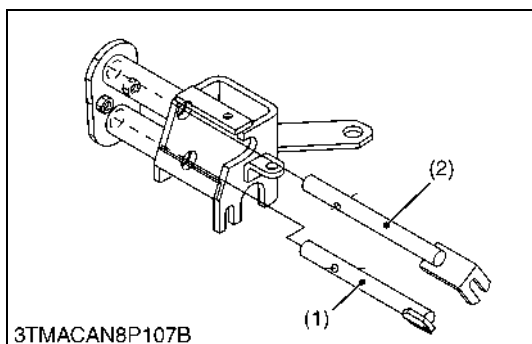
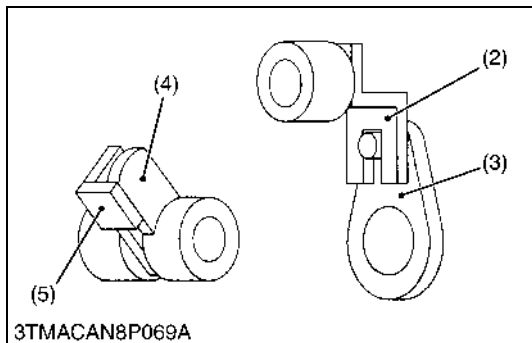
(When reassembling)

- Be sure to assemble the position lever 2 (5) and 3 (4) as shown in figure.
- Be sure to assemble the draft link cam 2 (2) and draft lever 3 (3) as shown in figure.

(1) Bracket
(2) Draft Link Cam 2
(3) Draft Lever 3

(4) Position Lever 3
(5) Position Lever 2

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Draft Lever Rod and Position Lever Rod

1. Draw out the rod (1) and (2).

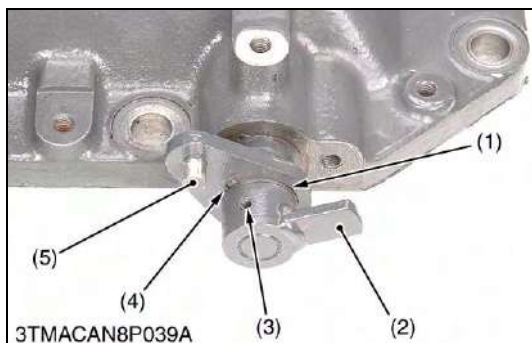
(When reassembling)

- Apply grease to the bushes.

(1) Rod

(2) Rod

9Y1210686HYS0026US0



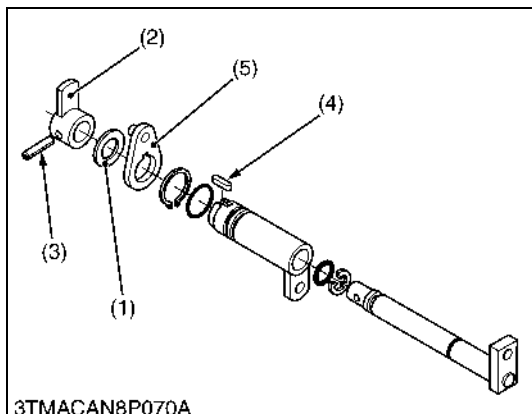
Draft Lever 3 and Position Lever 3

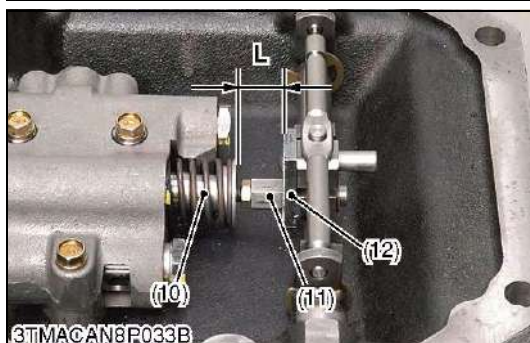
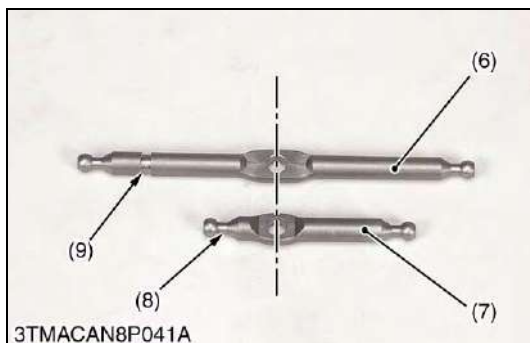
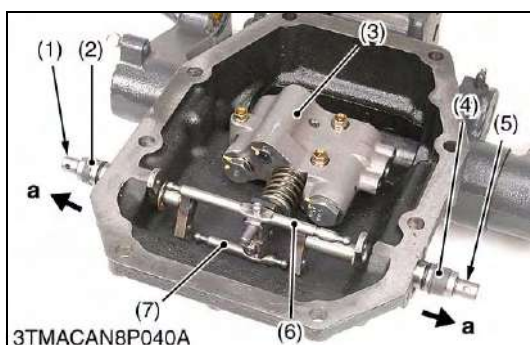
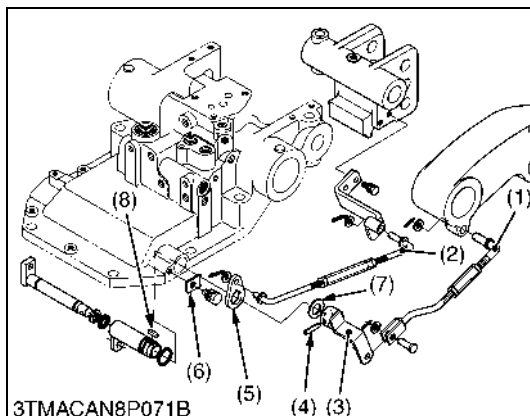
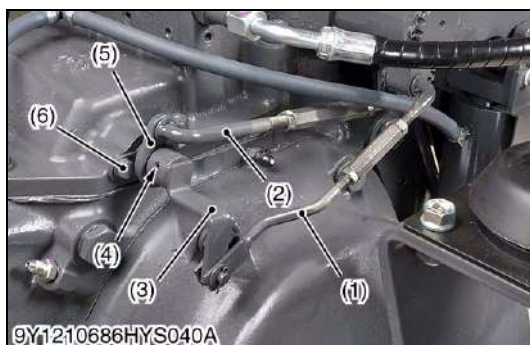
1. Tap out the roll pin (3).
2. Remove the position lever 3 (2), washer (1), draft lever 3 (5) and key (4).

(1) Washer
(2) Position Lever 3
(3) Roll Pin

(4) Key
(5) Draft Lever 3

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Position Feedback Rod and Draft Feedback Rod

1. Tap out the roll pin (4), remove the position feedback rod (1) with position feedback lever (3) and washer (7).
2. Remove the draft feedback rod (2) with draft feedback lever (5) and key (8).
3. Remove the stopper (6).

(When reassembling)

- Adjust the position and feedback rod length to the factory specifications.

Position feedback rod length	Reference valve	210 mm 8.3 in.
Draft feedback rod length	Reference valve	272 mm 10.7 in.

- | | |
|-----------------------------|--------------------------|
| (1) Position Feedback Rod | (5) Draft Feedback Lever |
| (2) Draft Feedback Rod | (6) Stopper |
| (3) Position Feedback Lever | (7) Washer |
| (4) Roll Pin | (8) Key |

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Draft Spool Lever and Position Spool Lever

1. Push out the draft feedback shaft (2) and position feedback shaft (1).
2. Push out the draft shaft (4) and position shaft (5).
3. Remove the draft spool lever (6).
4. Remove the control valve (3) then remove the position spool lever (7).

(When reassembling)

- Fix the with groove side (9) on the draft spool lever (6) and shorter side (8) on the position spool lever (7) face to the hydraulic operating lever side.
- Be sure to fix the O-rings to the control valve and apply grease to them.

■ NOTE

- **Do not disassemble the spool joint 1 (11) from the spool (10) unless necessary.**

If disassembled due to unavoidable reasons, record the installation length (L) between the spool joint 3 (12) and spring retainer (as shown in the figure).

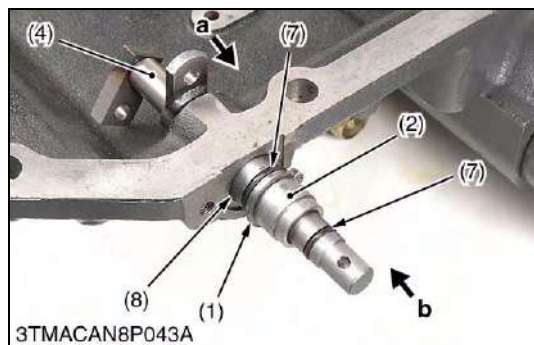
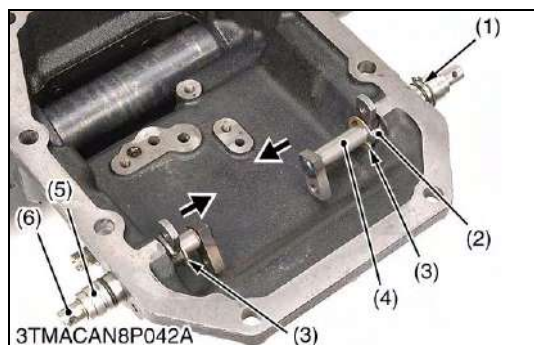
When reassembling, be sure to make to a former length.

Length (L)	Factory specification	22.5 to 23.0 mm 0.886 to 0.905 in.
------------	-----------------------	---------------------------------------

- | | |
|-----------------------------|--------------------|
| (1) Position Feedback Shaft | (8) Shorter Side |
| (2) Draft Feedback Shaft | (9) Groove |
| (3) Control Valve | (10) Spool |
| (4) Draft Shaft | (11) Spool joint 1 |
| (5) Position Shaft | (12) Spool joint 3 |
| (6) Draft Spool Lever | |
| (7) Position Spool Lever | |

(a) : Push Out Direction

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Position and Draft Control Shaft and Position and Draft Feedback Shaft

1. Remove the position and draft feedback rod (6) and (5).
2. Remove the external circlip (1) then draw out the position and draft control shaft (4) and (2).
3. Remove the E-shaped stopper (3) then remove the position feedback shaft (6) from draft feedback shaft (5) and remove the position control shaft (4) from draft control shaft (2).

(When reassembling)

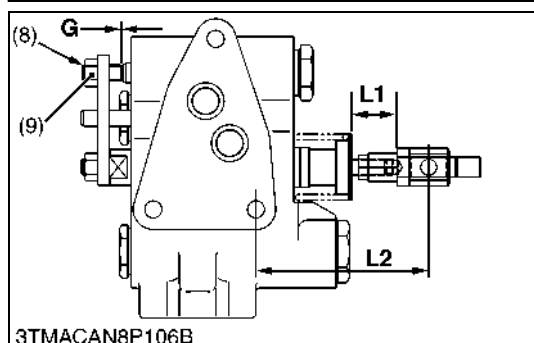
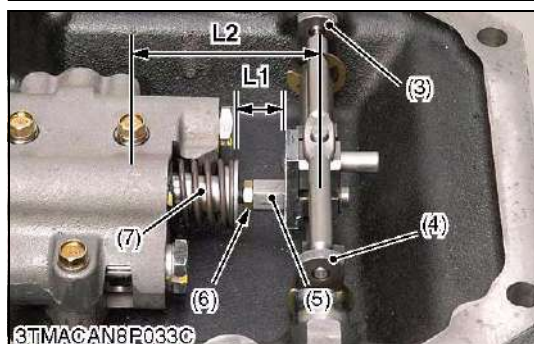
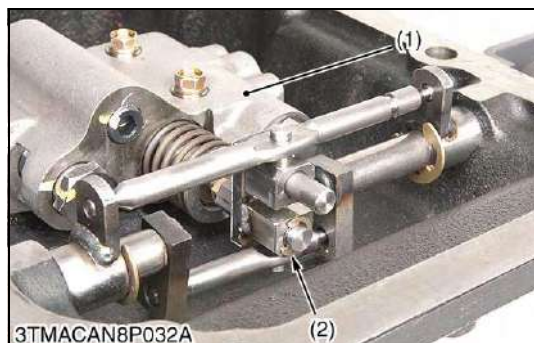
- Remove the O-ring (7) from position control shaft.
 - Insert the position control shaft and draft control shaft to the body until the both O-ring grooves comes out.
 - Apply grease to the O-ring then assemble the O-ring from outside.
 - Fix the external circlip the draft control shaft then push back the position control shaft with draft control shaft.
 - Fix the E-shaped stopper (3).
- The feedback side same as control side.

- | | |
|-----------------------------|-------------|
| (1) External Circlip | (7) O-ring |
| (2) Draft Control Shaft | (8) Chamfer |
| (3) E-shaped Stopper | |
| (4) Position Control Shaft | |
| (5) Draft Feedback Shaft | |
| (6) Position Feedback Shaft | |

a : To Fix O-rings
b : To Assemble Shafts

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[4] CONTROL VALVE



Removing Control Valve

1. Remove the E-shaped stopper (2).
2. Remove the control valve mounting screws.
3. Remove the control valve (1).

NOTE

- Do not disassemble the spool joint 1 (5) from the spool (7) unless necessary.

If disassembled due to unavoidable reasons, record the installation length (L1) between the spool joint 3 and spring retainer. (as shown figure.)

When reassembling, be sure to make a former length.

- Do not loosen the adjusting screw (8) unless necessary.
- (When reassembling)

- Be sure to fit the O-rings (10).

Tightening torque	Control valve mounting screw	20 to 23 N·m 2.0 to 2.4 kgf·m 15 to 17 lbf·ft
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Length (L1)	Factory specification	22.5 to 23.0 mm 0.886 to 0.905 in.
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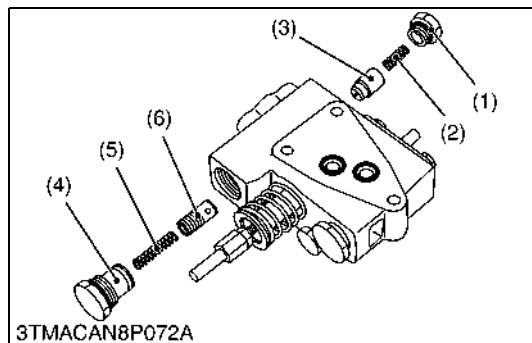
Adjusting Spool Joint

1. Set the length L1 to the reference value or recorded value.
2. Set the length L2 to the factory specification (neutral state), with operate the draft feedback lever (4) and position link lever (3).
3. Check the gap (G) between the lowering poppet and adjusting screw (8).
4. If the gap (G) is not within the reference valve, recheck the length (L2) at the neutral state of spool.
If necessary to adjust the gap (G), loosen the lock nut (9) and adjust by the adjusting screw (8).

Length (L2)	Reference Value	85.8 to 86.2 mm 3.38 to 3.39 in.
Gap (G)	Reference Value	0.2 to 0.3 mm 0.008 to 0.01 in.

- | | |
|-------------------------|---------------------|
| (1) Control Valve | (7) Spool |
| (2) E-shaped Stopper | (8) Adjusting Screw |
| (3) Position Link Lever | (9) Lock Nut |
| (4) Draft Link Lever | (10) O-ring |
| (5) Spool joint | |
| (6) Lock Nut | |
- G : Gap**

9Y1210686HYS0031US0



Plug and Unload Valve

1. Secure the control valve with a vise.
2. Remove the seat plug 1 (1) for unload poppet 1 (3).
3. Draw out the spring (2) for unload poppet 1 (3).
4. Remove the seat plug 2 (4) for unload poppet 2 (6).
5. Draw out the spring (5) and unload poppet 2 (6).

(When reassembling)

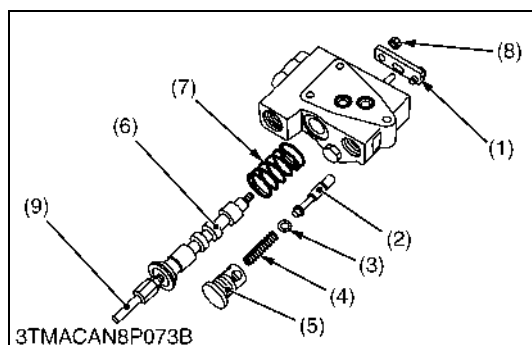
- Install the plug, noting O-ring.

Tightening torque	Seat plug 1	40 to 58 N·m 4.0 to 6.0 kgf·m 29 to 43 lbf·ft
	Seat plug 2	40 to 58 N·m 4.0 to 6.0 kgf·m 29 to 43 lbf·ft

- (1) Seat Plug 1
(2) Spring
(3) Unload Poppet 1

- (4) Seat Plug 2
(5) Spring
(6) Unload Poppet 2

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Spool and Poppet Valve

1. Remove the lock nut (8) for spool (6).
2. Draw out the spool (6).
3. Remove the seat plug (5) for poppet valve (2).
4. Draw out the spring (4), collar (3) and poppet valve (2).

■ IMPORTANT

- Do not change the adjuster (1) adjustment.
- Do not disassemble the spool joint 1 (9) from the spool (6) unless necessary.

(When reassembling)

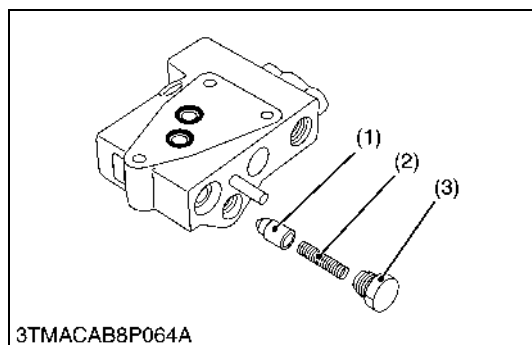
- Install the poppet valve, noting O-ring and backup ring.

Tightening torque	Seat plug	40 to 58 N·m 4.0 to 6.0 kgf·m 29 to 43 lbf·ft
	Lock nut	16 to 19 N·m 1.6 to 2.0 kgf·m 12 to 14 lbf·ft

- (1) Adjuster
(2) Poppet Valve
(3) Collar
(4) Spring
(5) Seat Plug

- (6) Spool
(7) Spring
(8) Lock Nut
(9) Spool Joint 1

9Y1210686HYS0033US0



Check Valve

1. Remove the seat plug (3).
2. Draw out the spring (2) and check valve (1).

(When reassembling)

- Install the plug, noting O-ring.

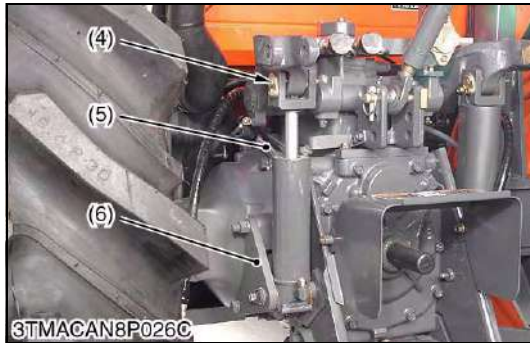
Tightening torque	Seat plug	30 to 49 N·m 3.0 to 5.0 kgf·m 22 to 36 lbf·ft
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- (1) Check Valve
(2) Spring

- (3) Seat Plug

9Y1210686HYS0034US0

[5] HYDRAULIC CYLINDER



Removing Hydraulic Cylinder

1. Remove the lift rod pin (1).
2. Disconnect the hydraulic hose (2) from hydraulic cylinder.
3. Remove the hydraulic cylinder cover (3).
4. Remove the cylinder pin (upper) (4).
5. Disconnect the breather hose (5) from hydraulic cylinder.
6. Remove the cylinder pin (lower) (6).
7. Take out the hydraulic cylinder.

NOTE

- Take care not to damage the grease nipples when remove the hydraulic cylinder.

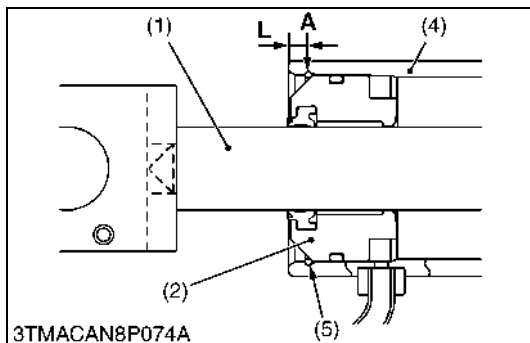
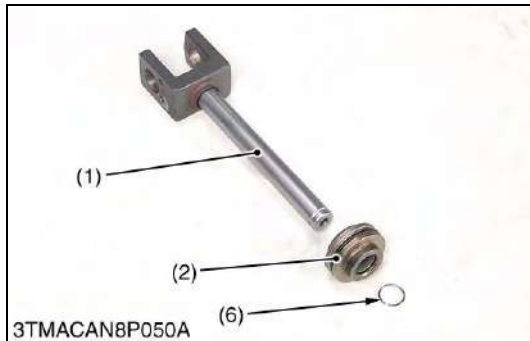
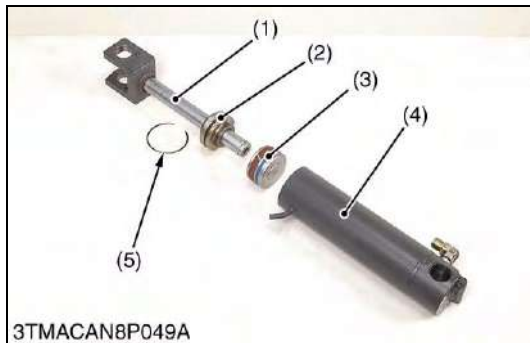
(When reassembling)

- Apply grease to the grease nipples.
- Take care not to damage the grease nipples when reassemble the hydraulic cylinder.

Tightening torque	Cylinder hose retaining nut	46 to 52 N·m 4.6 to 5.4 kgf·m 34 to 39 lbf·ft
-------------------	-----------------------------	---

- | | |
|------------------------------|--------------------------|
| (1) Lift Rod Pin | (4) Cylinder Pin (Upper) |
| (2) Hydraulic Hose | (5) Breather Hose |
| (3) Hydraulic Cylinder Cover | (6) Cylinder Pin (Lower) |

9Y1210686HYS0035US0



Disassembling Hydraulic Cylinder

1. Remove the liquid gasket from top of head (2).
2. Slightly tap-in the head (2) to inside, and remove the internal circlip (5) by using the small screwdriver.
3. If the internal circlip (5) cannot be removed by above-mentioned method, remove it by the following procedure.
 - Carefully clamp the cylinder tube (4) in a vise.
 - Drill approx. 2.5 mm (0.098 in.) diameter hole on the cylinder tube (position A) just over the internal circlip (5) as shown in figure.
 - Use a small screwdriver and remove the internal circlip (5). Simultaneously support this action by pushing from the outside of the cylinder tube with another small screwdriver or similar tool.
4. Remove the rod (1) and head (2).
5. Inject the compressed air through the oil inlet port of the cylinder tube (4), and remove the piston (3).
6. Remove the external circlip (6), and remove the head (2).

(When reassembling)

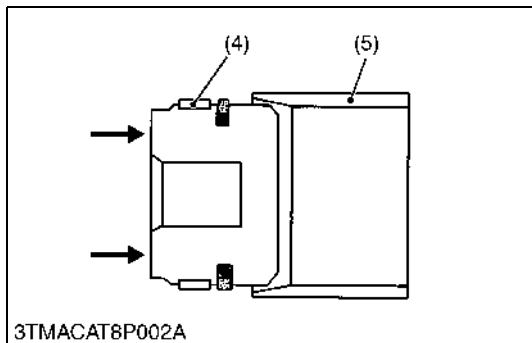
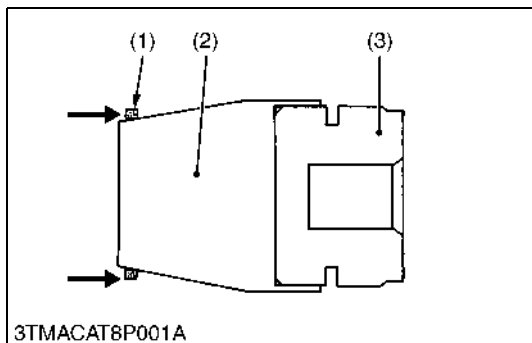
- Apply transmission fluid to the piston (3), head (2) and cylinder tube (4).
- Take care not to damage the O-ring, backup ring and seal.
- Apply liquid gasket (Three Bond 1206C or equivalent) to the top of head (2), while pressing the head (2) against internal circlip (5).
- After reassembling the cylinder, be sure to close the drilled hole by liquid gasket.

- | | |
|------------|----------------------|
| (1) Rod | (4) Cylinder Tube |
| (2) Head | (5) Internal Circlip |
| (3) Piston | (6) External Circlip |

A : Position for drilling

L : 6.0 mm (0.24 in.)

9Y1210686HYS0036US0



Installing Piston Seal

1. Place the slide jig (2) on the piston (3).
2. Install the piston seal (1) to the piston using the slide jig. (See page G-77)
3. Compress the piston seal to the correct size by installing the piston into the correcting jig (5).

NOTE

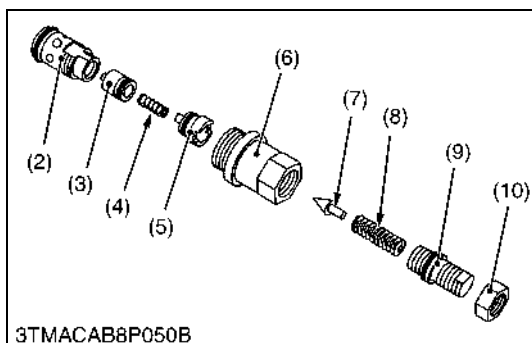
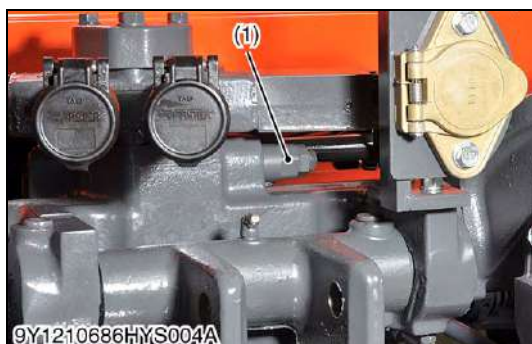
- Do not turn (roll) the piston seal as you install it.

- (1) Piston Seal
(2) Slide Jig
(3) Piston

- (4) Bearing Ring
(5) Correcting Jig

9Y1210686HYS0037US0

[6] RELIEF VALVE



Relief Valve

1. Remove the relief valve assembly (1).
2. Secure the relief valve assembly (1) in a vise.
3. Loosen the lock nut (10).
4. Remove the adjuster (9), and remove the spring (8) and then pilot valve (7).
5. Remove the valve seat (2), and draw out the valve seat (5), the spring (4) and the main valve (3).

(When reassembling)

- Take care not to damage the O-ring.

Tightening torque	Relief valve	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
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IMPORTANT

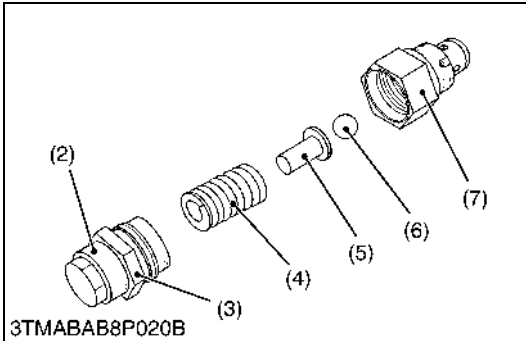
- After disassembling and assembling the relief valve, be sure to adjust the relief valve setting pressure.

- (1) Relief Valve
(2) Valve Seat
(3) Main Valve
(4) Spring
(5) Valve Seat

- (6) Valve Body
(7) Pilot Valve
(8) Spring
(9) Adjuster
(10) Lock Nut

9Y1210686HYS0038US0

[7] SAFETY VALVE



Safety Valve

1. Remove the safety valve assembly (1).
2. Secure the safety valve assembly in a vise.
3. Loosen the lock nut (3), and remove the adjust screw (2).
4. Draw out the spring (4), seat (5) and ball (6).

(When reassembling)

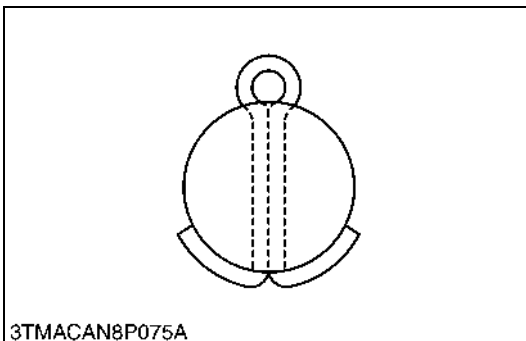
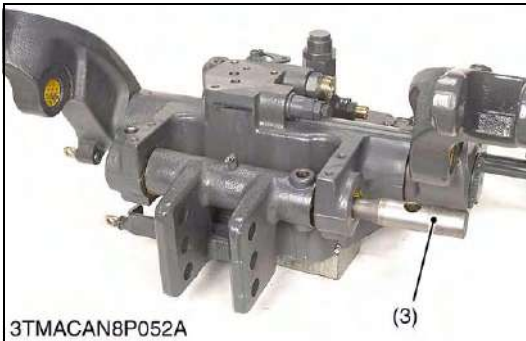
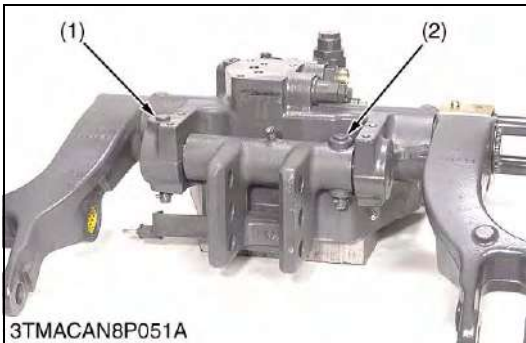
- Install the safety valve to the hydraulic cylinder block, taking care not to damage the O-ring.

Tightening torque	Safety valve assembly	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Safety valve lock nut	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft

- | | |
|---------------------------|-------------|
| (1) Safety Valve Assembly | (5) Seat |
| (2) Adjust Screw | (6) Ball |
| (3) Lock Nut | (7) Housing |
| (4) Spring | |

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[8] TOP LINK BRACKET



Top Link Bracket

1. Remove the position and draft feedback rod.
2. Remove the cotter pin and take out the clevis pins (1) and (2).
3. Draw out the torsion bar (3).

(When reassembling)

- Apply grease to the torsion bar bushing.
- Replace the cotter pin with new one, and assemble as shown figure.

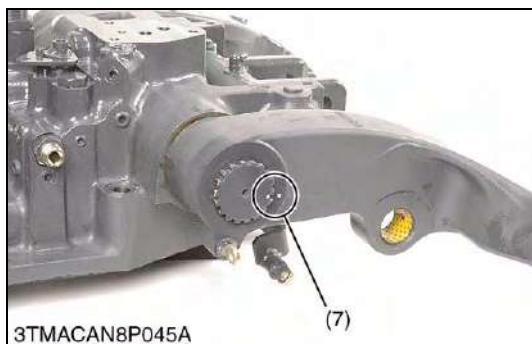
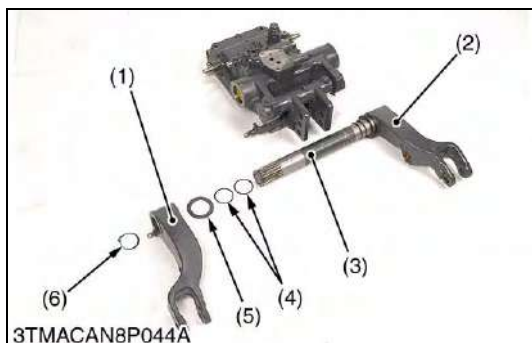
■ NOTE

- **After assembling the top link bracket, be sure to adjust the position and draft feedback levers.**
- **Grease up to the grease nipples.**

- | | |
|----------------|-----------------|
| (1) Clevis Pin | (3) Torsion Bar |
| (2) Clevis Pin | |

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[9] LIFT ARM AND LIFT ARM SHAFT



Lift Arm and Lift Arm Shaft

1. Remove the external circlip (6).
2. Remove the lift arm R.H. (2).
3. Draw out the lift arm shaft (3) and lift arm L.H. (1) as a unit.
4. Remove the collar (5) and O-rings (4).

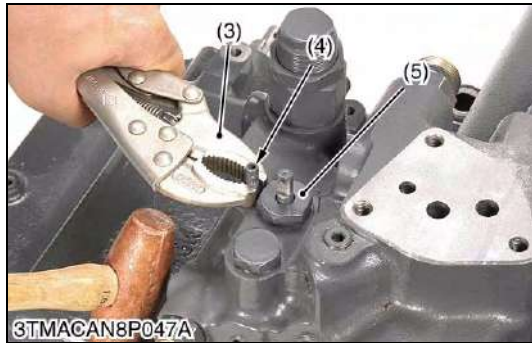
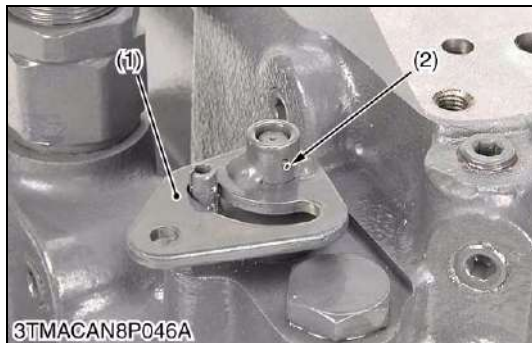
(When reassembling)

- Align the alignment marks (7) of the lift arm shaft and lift arms.
- Apply grease to the right and left bushings of lift arm support and O-rings.
- Take care not to damage the O-rings.

- | | |
|--------------------|----------------------|
| (1) Lift Arm L.H. | (5) Collar |
| (2) Lift Arm R.H. | (6) External Circlip |
| (3) Lift Arm Shaft | (7) Alignment Mark |
| (4) O-ring | |

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[10] LOWERING SPEED ADJUSTING VALVE



Lowering Speed Adjusting Valve

1. Tap out the roll pin (2) then remove the plate (1).
2. Tap out the roll pin (4) using a vice grip pliers (3).
3. Remove the lowering speed adjusting valve assembly (5).

(When reassembling)

- Check the lowering speed adjusting valve turns smoothly.

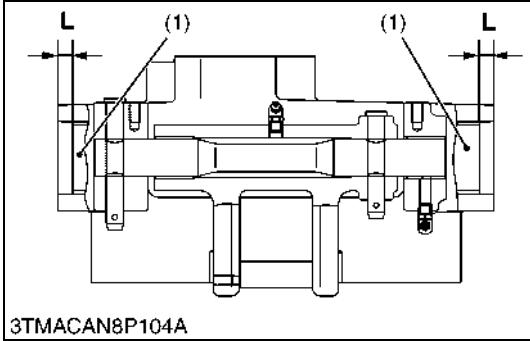
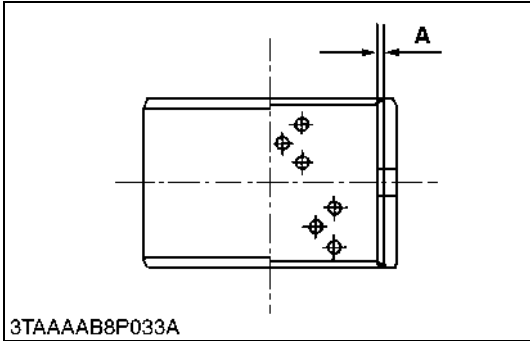
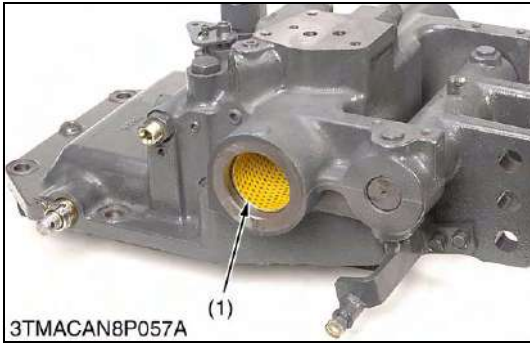
Tightening torque	Lowering speed adjusting valve assembly	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
-------------------	---	---

- | | |
|----------------------|---|
| (1) Plate | (5) Lowering Speed Adjusting Valve Assembly |
| (2) Roll Pin | (6) Valve |
| (3) Vice Grip Pliers | (7) Pin |
| (4) Roll Pin | |

9Y1210686HYS0042US0

6. SERVICING

[1] LIFT ARM AND TOP LINK BRACKET



- Lift Arm Support Bushing**
1. Visually inspect the DX bushings for signs of wear or damage. (The DX bushing tends to show concentrated wear.)
 2. If the DX bushing is worn beyond the alloy portion (**A**), replace it.

- (When installing)**
- When press-fitting a new bushing with a press-fitting tool (see page G-76).
 - When press-fitting a new bushing, apply transmission fluid to the lift arm support liner boss.
 - When press-fitting a new bushing
 - Lift arm support bushing's seam face to rear and hole face to front and upper.
 - Lift arm bushing's seam face to front and lower and hole face to rear.

Press-fit location of bushing (L)	Factory specification	11.0 mm 0.433 in.
-----------------------------------	-----------------------	----------------------

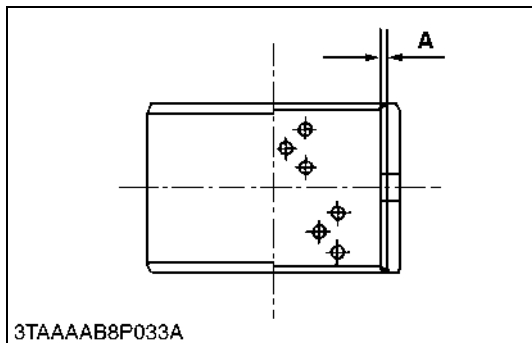
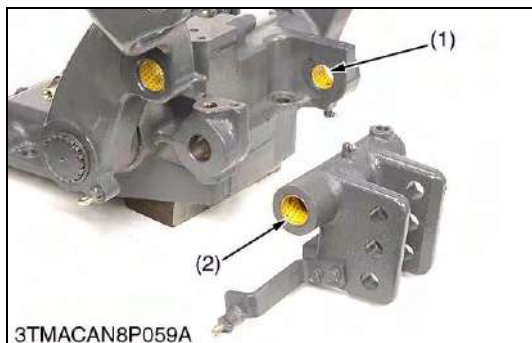
(Reference)

Lift arm support and lift arm bushing	Alloy thickness (A)	0.57 mm 0.022 in.
---------------------------------------	------------------------------	----------------------

- (1) Lift Arm Support Bushing

(2) Lift Arm Bushing
- A: Alloy Thickness**

L: Press-fit Location
- 9Y1210686HYS0043US0



Torsion Bar and Top Link Bracket

1. Visually inspect the DX bushings for signs of wear or damage. (The DX bushing tends to show concentrated wear.)
2. If the DX bushing is worn beyond the alloy portion (**A**), replace it.

(When installing)

- When press-fitting a new bushing, apply transmission fluid to the bushing press in position.
- When press-fitting a new bushing of top link bracket, the seam of bushing face to rear.
- When press-fitting a new bushing of torsion bar, the hole of bushing face lower to align with grease gallery.

(Reference)

Lift arm bushing	Alloy thickness (A)	0.57 mm 0.022 in.
------------------	------------------------------	----------------------

- (1) Torsion Bar Bushing
(2) Top Link Bracket Bushing

A : Alloy Thickness

9Y1210686HYS0044US0

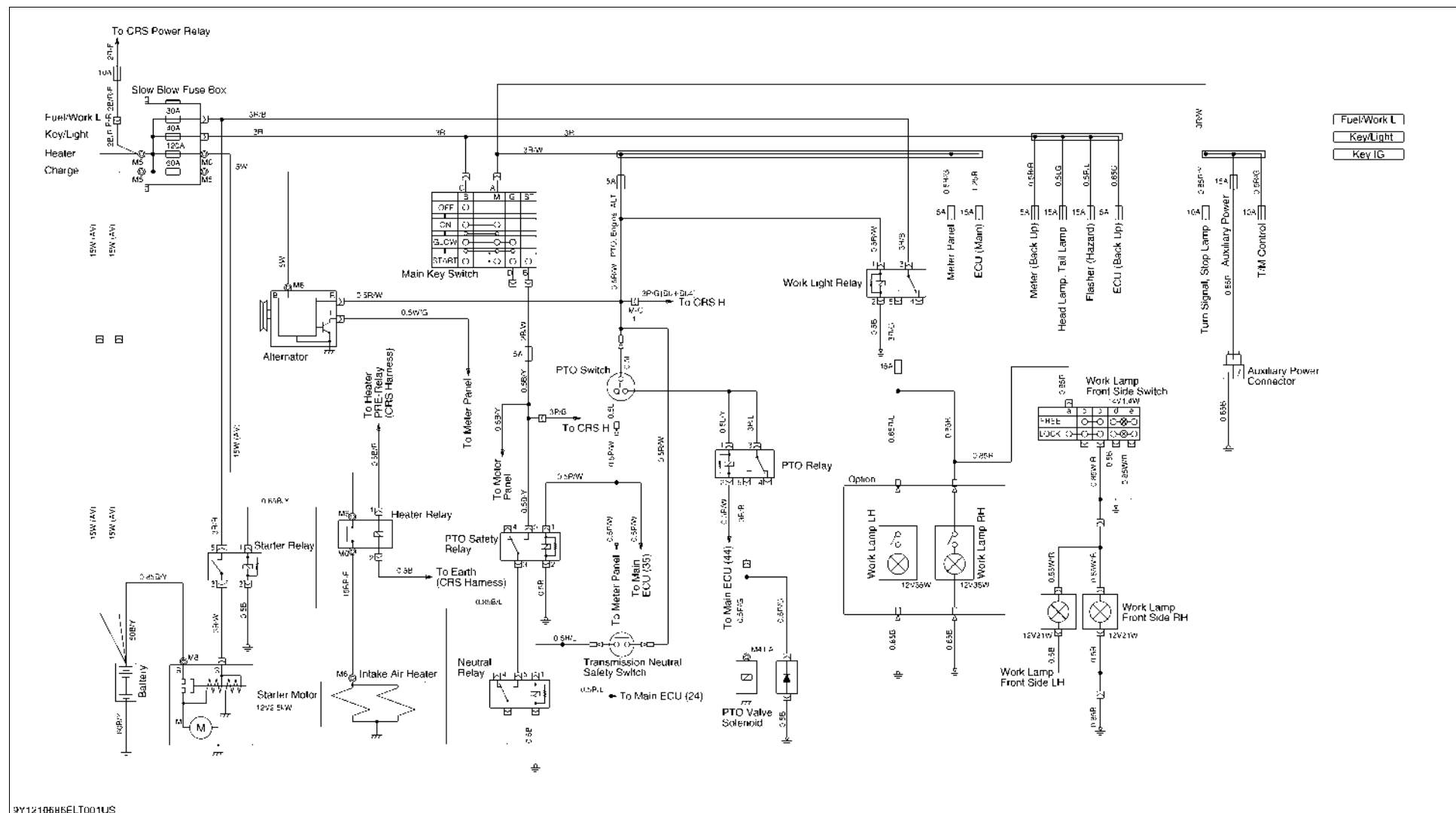
8 ELECTRICAL SYSTEM

MECHANISM

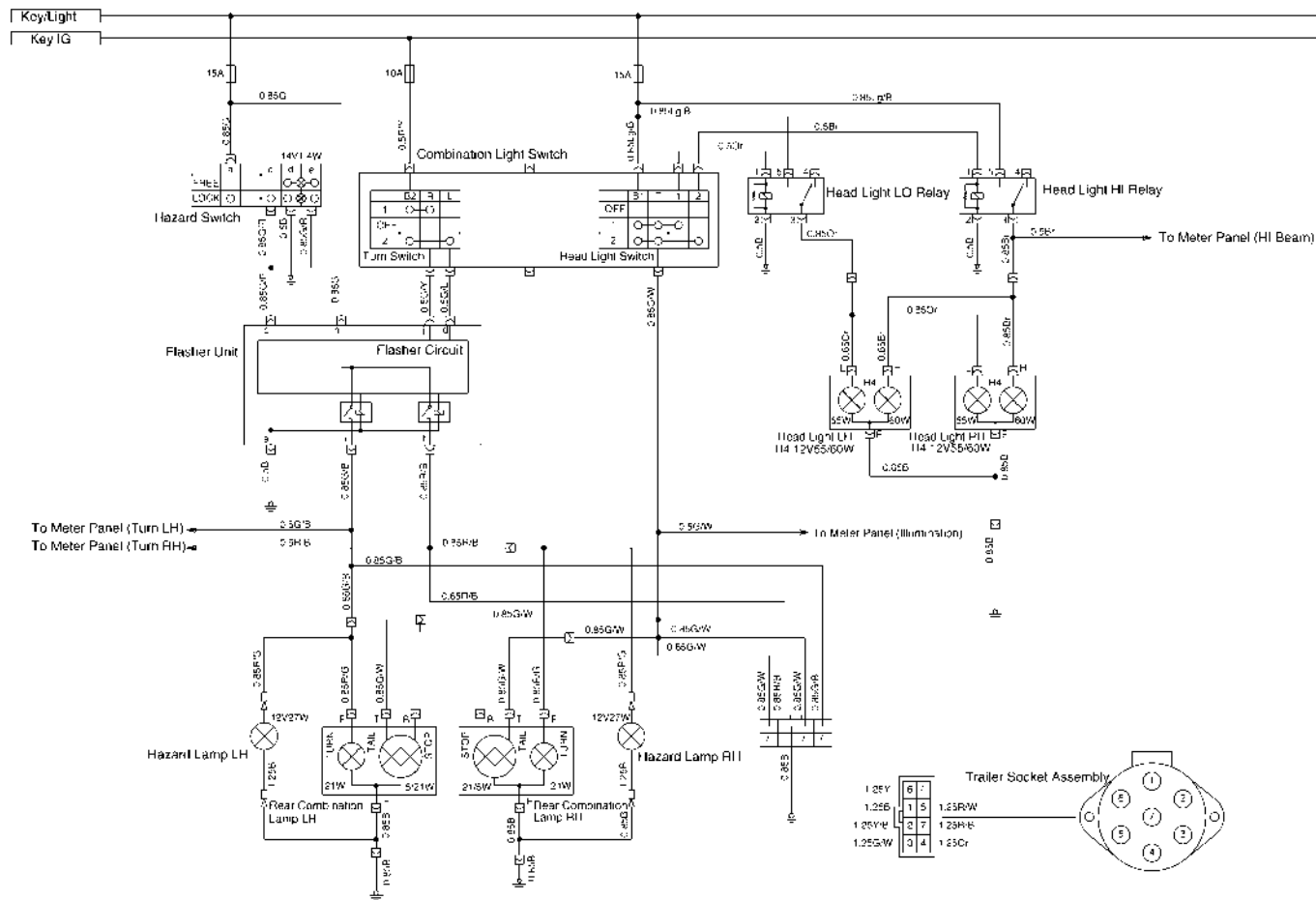
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(1) Starting System and Charging System

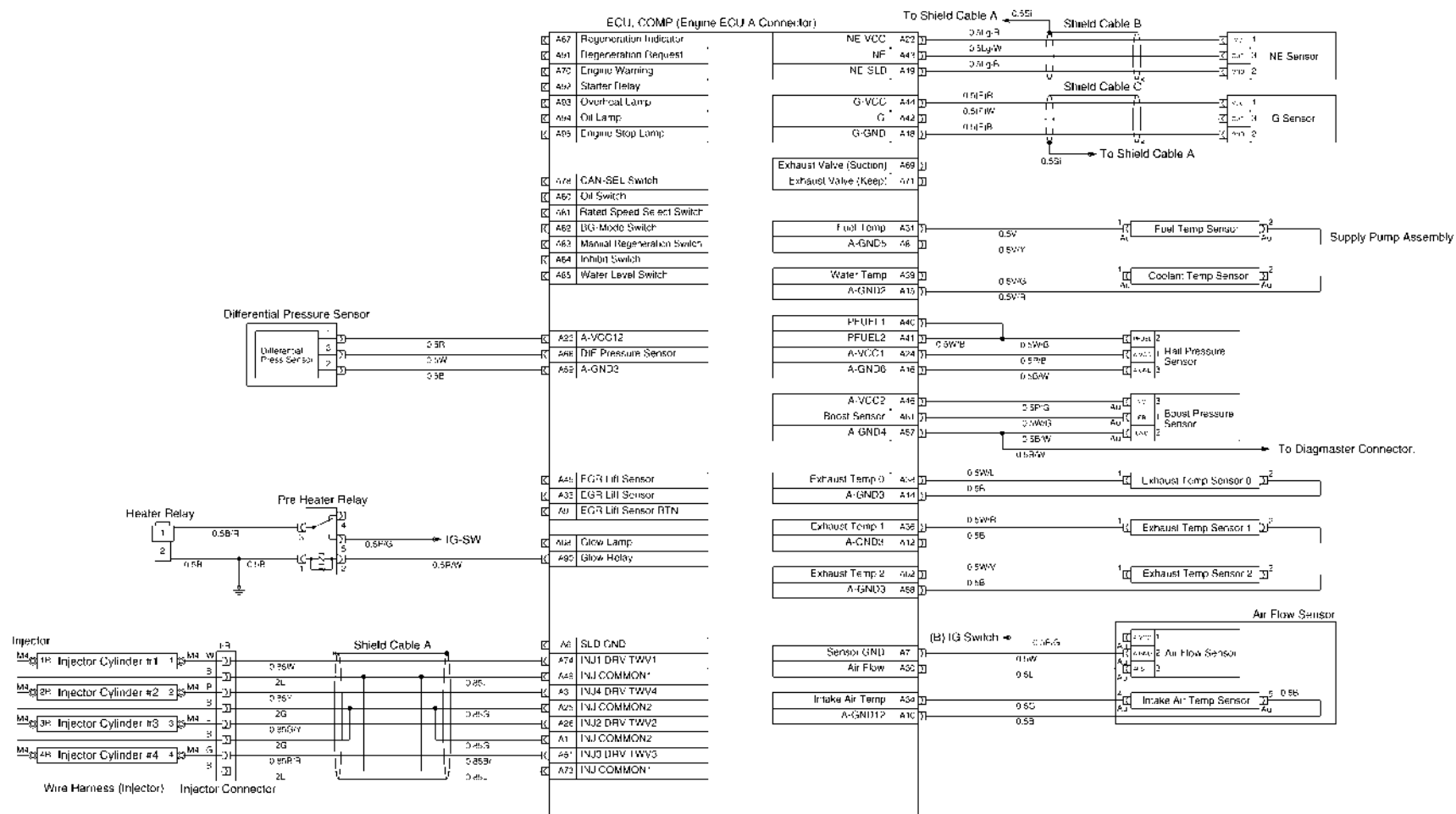


(2) Lighting System



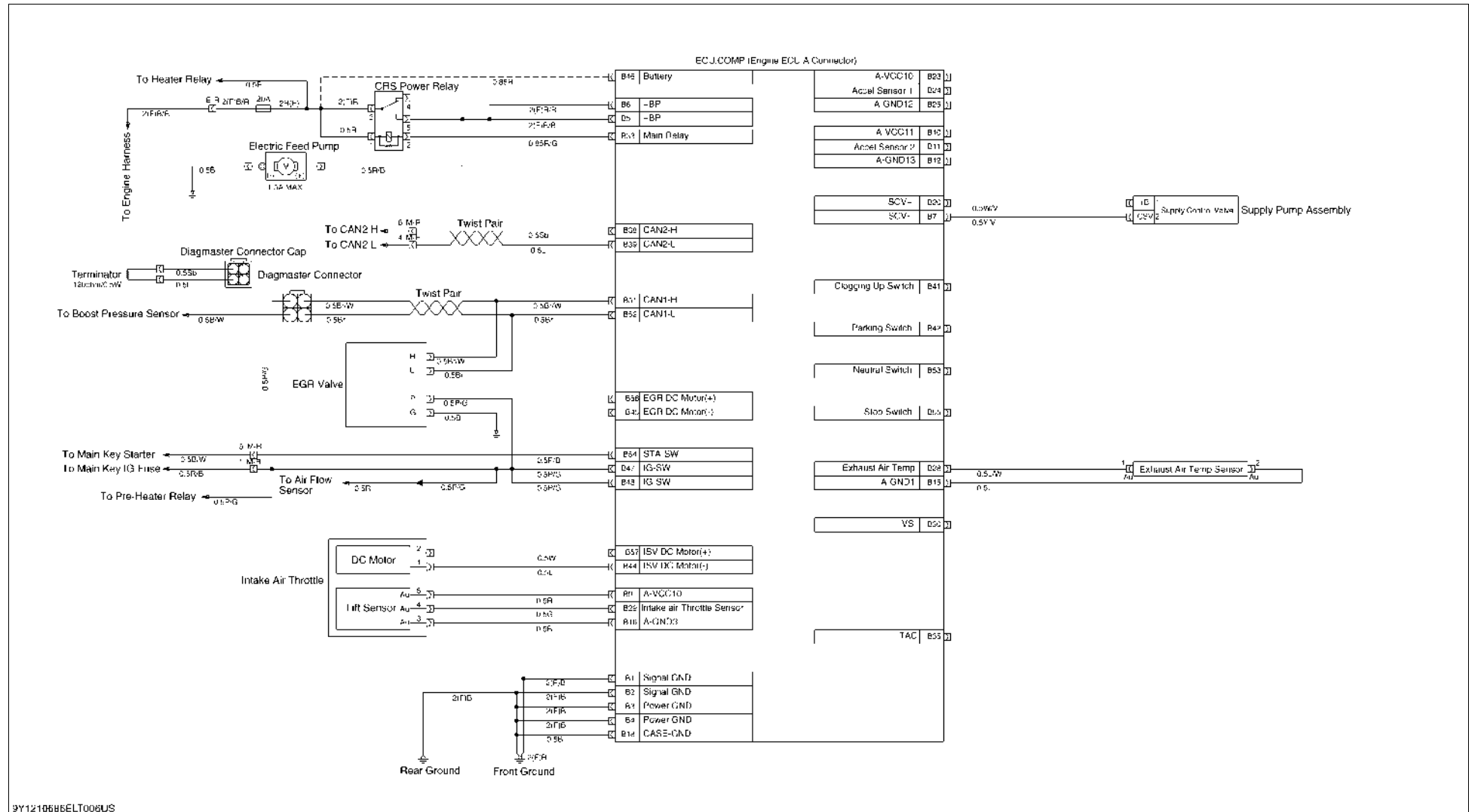
9Y12106H5ELT002US

(5) Engine Control System 1 (Engine ECU)



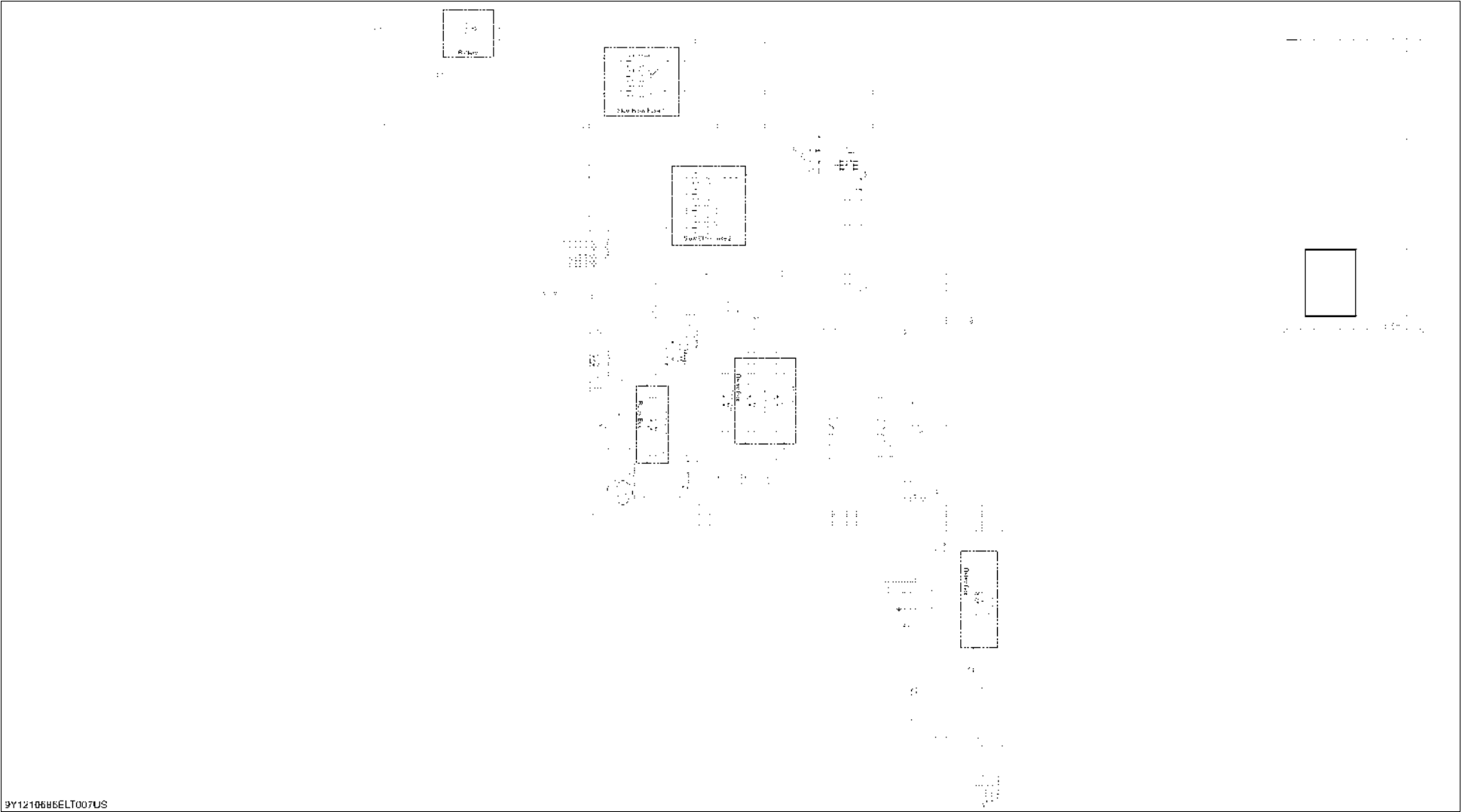
9Y12106H6ELT005US

(6) Engine Control System 2 (Engine ECU)

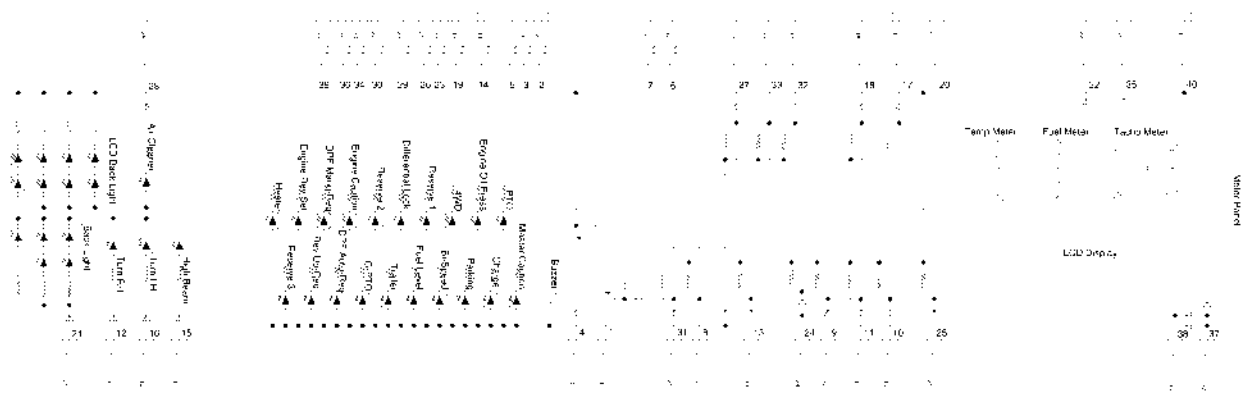


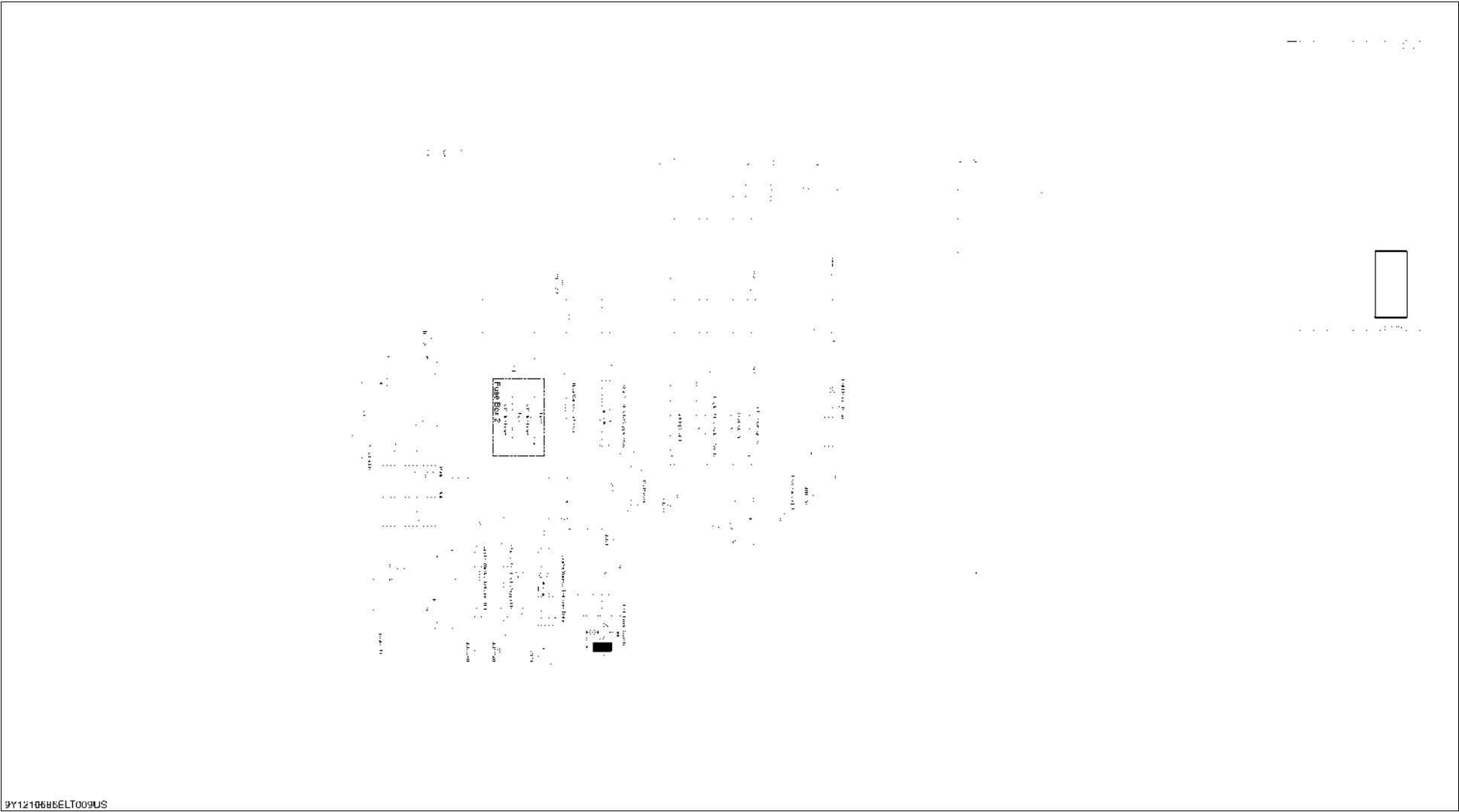
9Y12106H5ELT006US

[2] CABIN MODEL

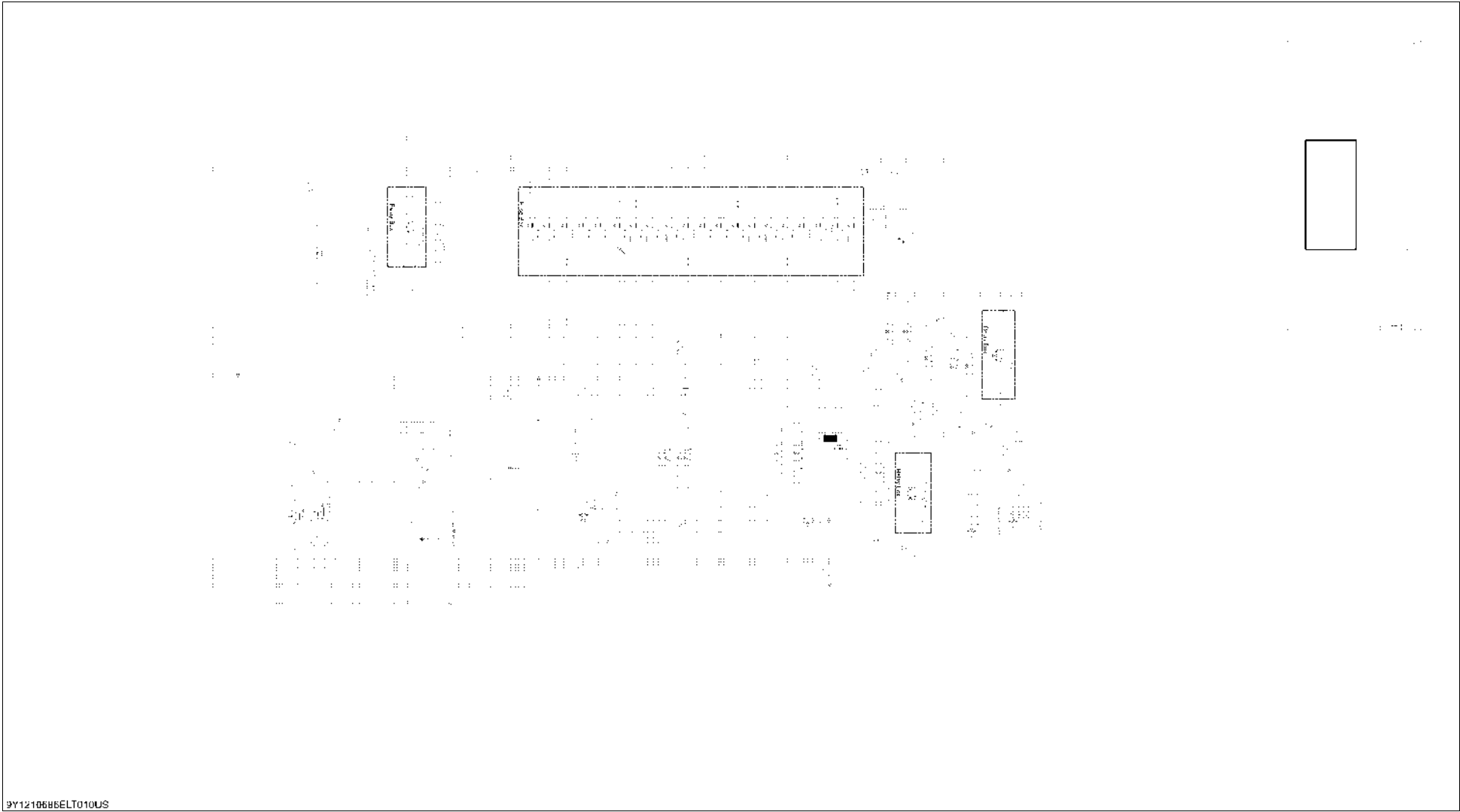


9Y12106H6ELT007US

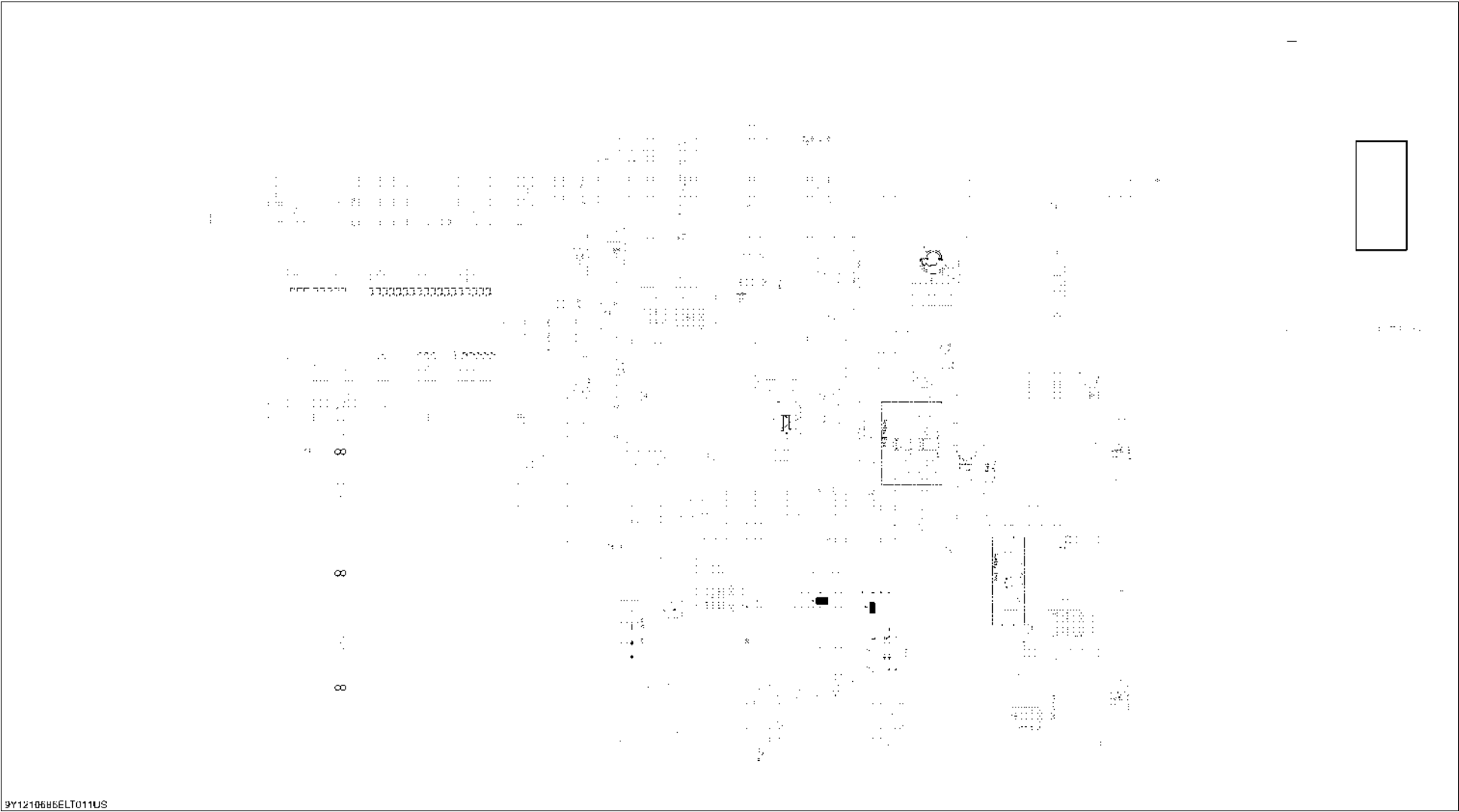




9Y12106H6ELT009US



9Y1210686ELT010US



9Y1210606ELT011US

7

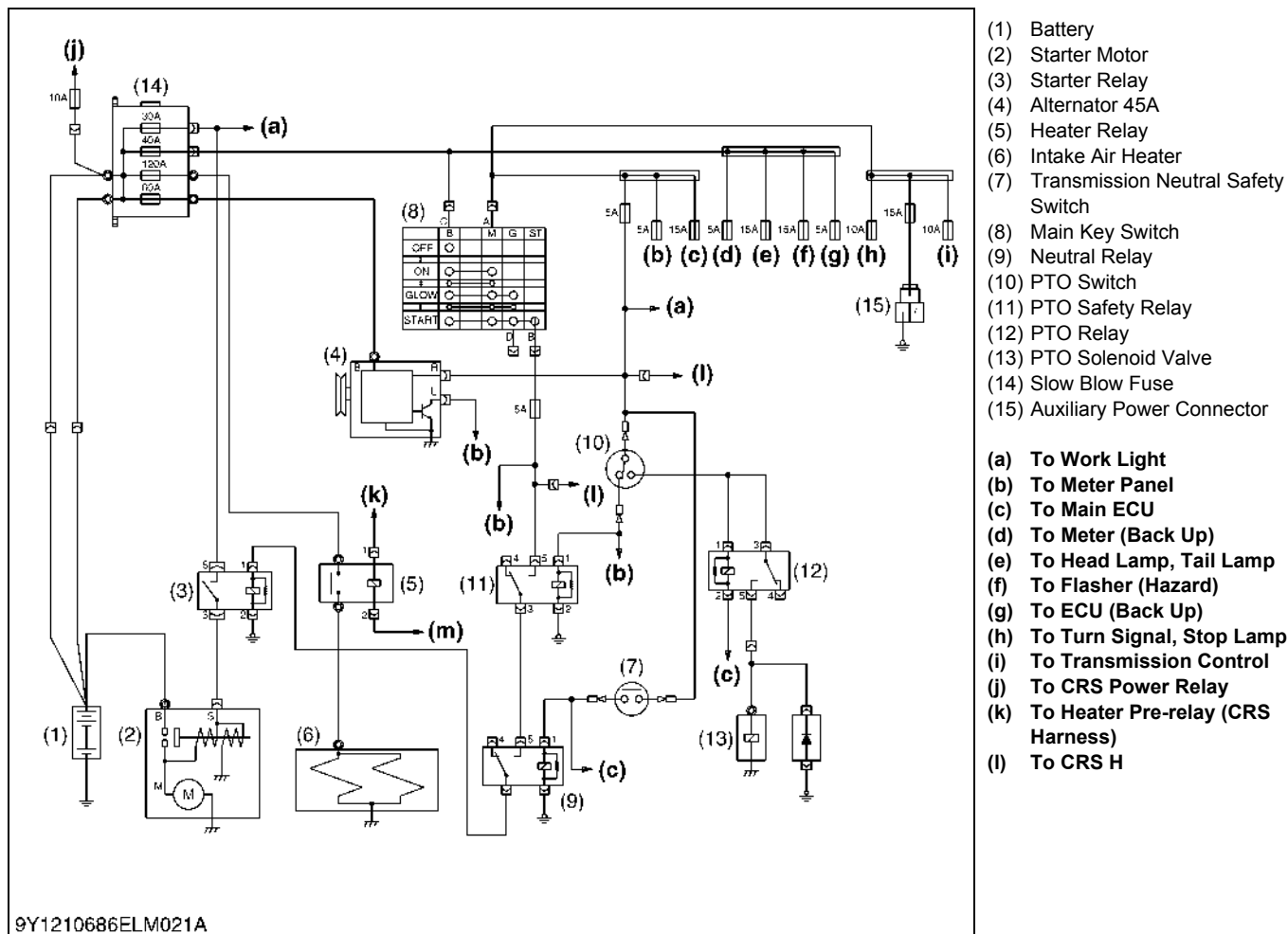


9Y1210606ELT013US

2. STARTING SYSTEM

[1] SYSTEM OUTLINE AND ELECTRICAL CIRCUIT

(1) ROPS Model



There are four key positions, "OFF", "ON", "GLOW" and "START" on the main key switch (8) as shown above.

When the main key switch (8) is set "ON", terminal **AM** of the main key switch (8) is connected to terminal **M**.

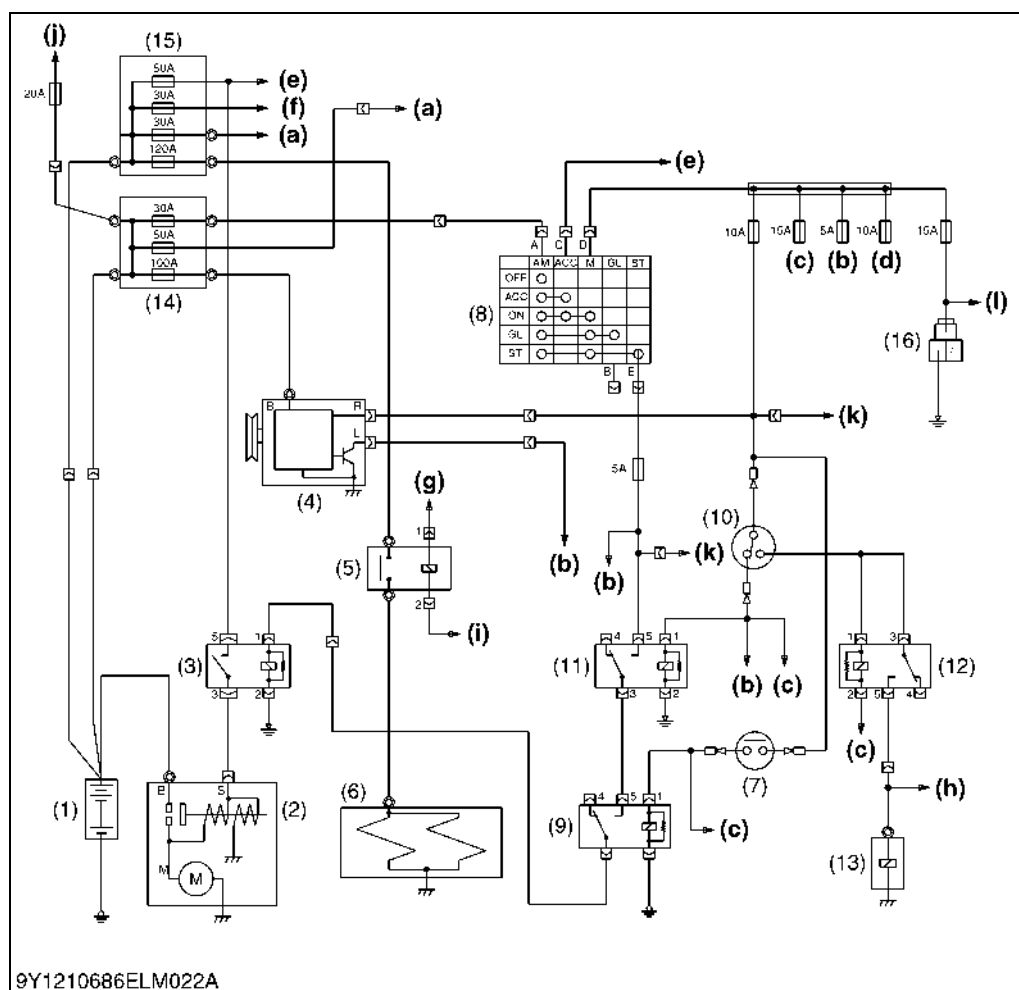
When the main key switch (8) is set to "START" under the condition that the hydraulic shuttle lever is neutral position to transmission neutral safety switch (7) and the PTO switch (10) is turned **OFF** position. Terminal **G** of the main key switch is connected to terminal **M** and terminal **ST**. Consequently, battery current flows to PTO switch (10), coil of starter relay (3), PTO safety relay (11). (When the PTO switch is set to **OFF**, battery current flows PTO switch (10) and coil of PTO safety relay (11).)

This actuates starter (2).

When the main switch is released after starting the engine, the main switch returns to "ON" automatically. This stops the starter.

9Y1210686ELM0001US0

(2) CABIN Model



- (1) Battery
- (2) Starter Motor
- (3) Starter Relay
- (4) Alternator
- (5) Heater Relay
- (6) Intake Air Heater
- (7) Transmission Neutral Safety Switch
- (8) Main Key Switch
- (9) Neutral Relay
- (10) PTO Switch
- (11) PTO Safety Relay
- (12) PTO Relay
- (13) PTO Solenoid Valve
- (14) Slow Blow Fuse 1
- (15) Slow Blow Fuse 2
- (16) Auxiliary Power Connector

- (a) To Work Light
- (b) To Meter Panel
- (c) To Main ECU
- (d) To Turn Signal
- (e) To CAB
- (f) To Auxiliary Sensor
- (g) To Heater Pre-relay (CRS Harness)
- (h) To PTO/Diode
- (i) To Ground (CRS Harness)
- (j) To CRS Power Relay
- (k) To CRS H
- (l) To Auxiliary Socket

There are five key positions, **"OFF"**, **"ACC"**, **"ON"**, **"GLOW"** and **"START"** on the main key switch (8) as shown above.

When the main switch is set to **"ACC"** (Accessory), the radio, windshields wipers (front and rear), work lights (front and rear), cigar lighter and blower fan can be used.

When the main key switch (8) is set **"ON"**, terminal **AM** of the main key switch (8) is connected to terminal **ACC** and terminal **M**.

When the main key switch (8) is set to **"START"** under the condition that the hydraulic shuttle lever is neutral position to transmission neutral safety switch (7) and the PTO switch (10) is turned **"OFF"** position. Terminal **AM** of the main switch is connected to terminal **M** and terminal **ST**. Consequently, battery current flows to PTO switch (10), coil of starter relay (3), PTO safety relay (11). (When the PTO switch is set to **OFF**, battery current flows PTO switch (10) and coil of PTO safety relay (11).)

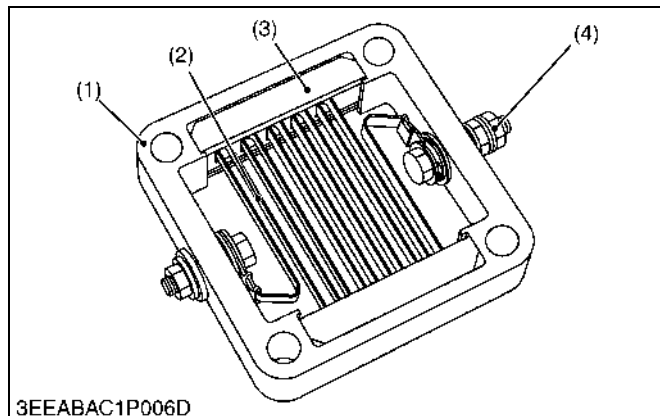
This actuates starter (2).

When the main switch is released after starting the engine, the main switch returns to **"ON"** automatically. This stops the starter.

9Y1210686ELM0002US0

[2] COMPONENTS

(1) Intake Air Heater



The intake air heater is introduced in order to further improve the starting performance in cold regions. The intake air heater is mounted on the air inlet manifold, while the conventional glow plug on the cylinder head. This means that a multi-valve design can be implemented and that the starting performance and serviceability are enhanced.

[Structure]

The 12 V battery's positive terminal is connected with the main terminal. When the key switch is set to the "ON" position, the current starts flowing in this routes as indicated with the arrow marks: main terminal → PTC element → ground (body).

The preheating time and after heating time are controlled by CPU that is in the meter panel.

- | | |
|-----------------|---------------|
| (1) Body | (3) Insulator |
| (2) PTC Element | (4) Terminal |

9Y1210686ELM0003US0

(2) Heater Relay



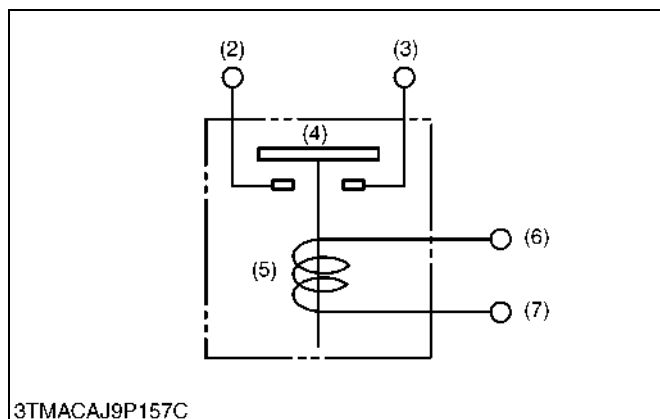
In some cases, the air heater relay (1) is mounting on air heating system to prevent the contact of the main switch burning out when the main switch is switched.

Current from the heater relay 2 flows only the air heater relay coil (5), and the relay contact (4) is pulled to **ON** position by electromagnetic force.

Therefore, current from the battery flows directly to the air heater.

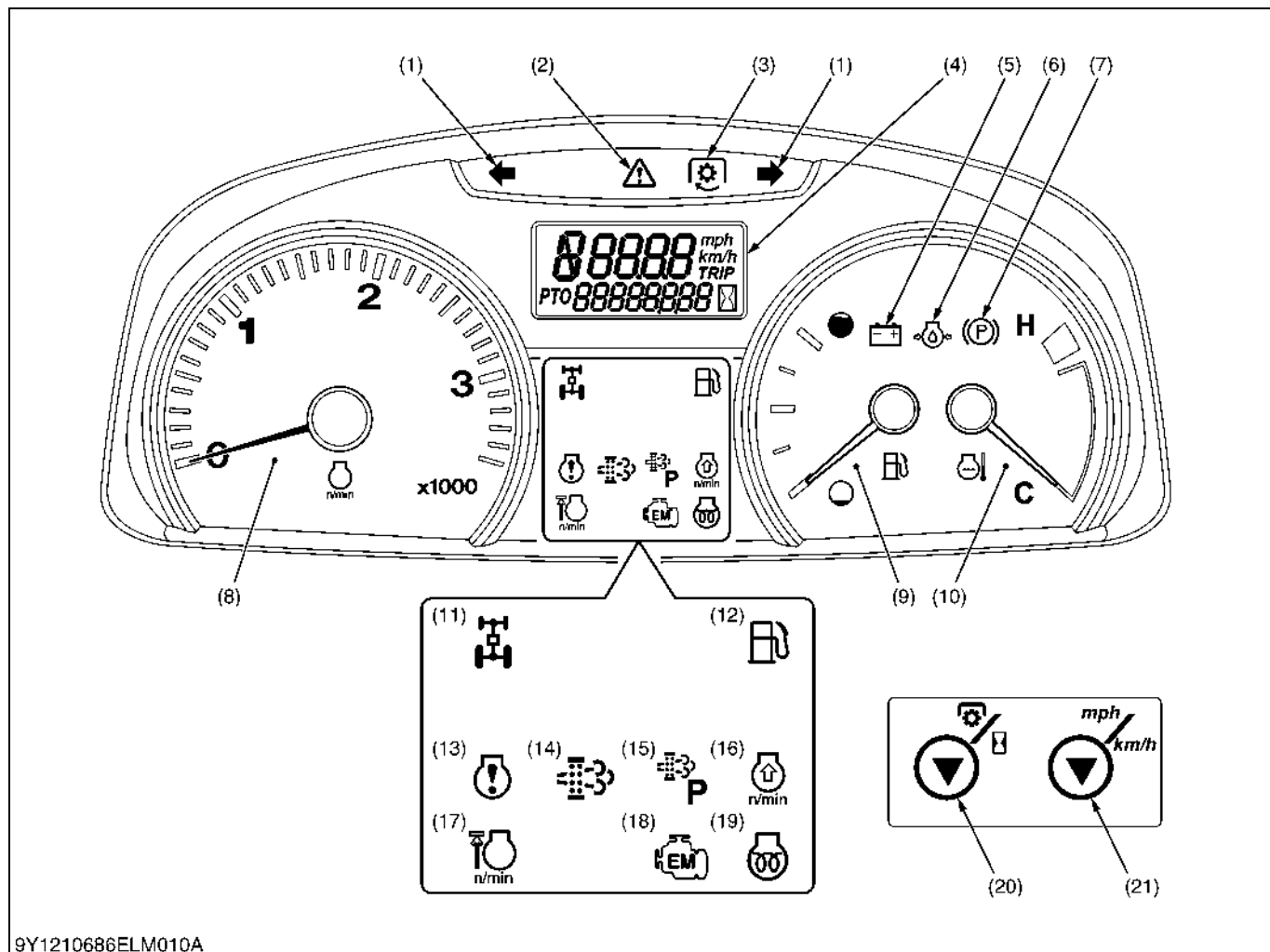
- | | |
|-------------------|--------------------|
| (1) Heater Relay | (5) Relay Coil |
| (2) From Battery | (6) From ECU (CRS) |
| (3) To Air Heater | (7) To Ground |
| (4) Relay Contact | |

9Y1210686ELM0004US0



3. INSTRUMENT PANEL

[1] INDICATION ITEMS OF METER PANEL

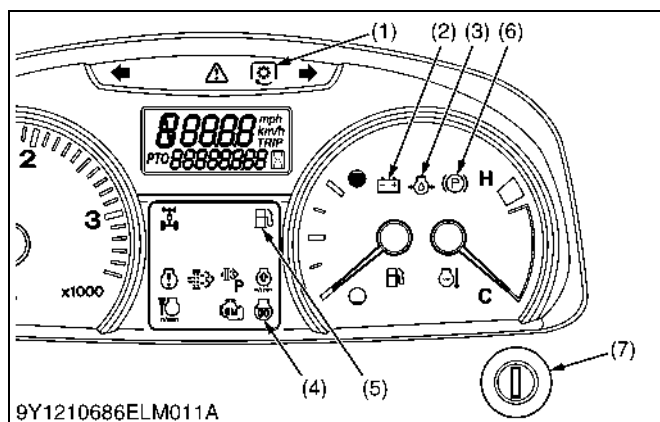


9Y1210686ELM010A

- | | | | |
|---|-------------------------------------|------------------------------------|-------------------------------------|
| (1) Hazard / Turn Signal Indicator | (7) Parking Brake Warning Indicator | (12) Fuel Level Indicator | (17) Rev-limiter Indicator |
| (2) Master System Warning Indicator | (8) Tachometer | (13) Engine Warning Indicator | (18) Emission Indicator |
| (3) PTO Clutch Indicator | (9) Fuel Gauge | (14) Regeneration Indicator | (19) Heater Indicator |
| (4) Liquid Crystal Display | (10) Coolant Temperature Gauge | (15) Parked Regeneration Indicator | (20) PTO / Hour Meter Select Switch |
| (5) Electrical Charge Warning Indicator | (11) 4WD Indicator | (16) Engine RPM Increase Indicator | (21) Travel Speed Select Switch |
| (6) Engine Oil Pressure Warning Indicator | | | |

9Y1210686ELM0005US0

[2] EASY CHECKER™



1. When the key is turned **"ON"**, lamps (2), (3) should come on. If trouble should occur at any location while the engine is running, the indicator lamp corresponding to problem will turn **"ON"**.
2. Suppose that the engine coolant temperature is not high enough yet. The heater indicator (4) also turns **"ON"** when the key is turned **"ON"** to preheat the engine and goes off automatically when preheat is completed. Illumination time of indicator varies according to the temperature of coolant.
3. The PTO clutch indicator (1) comes on while PTO clutch control switch is engaged **"ON"** and goes off when disengaged.
4. If the fuel level indicator (5) lights up, when fuel level is very low, therefore add fuel and the light will turn **"OFF"**.
5. If the parking brake warning indicator (6) does not illuminate, place the main gear shift lever in park position.

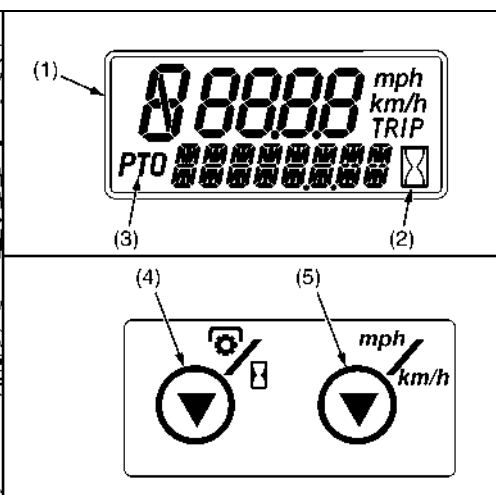
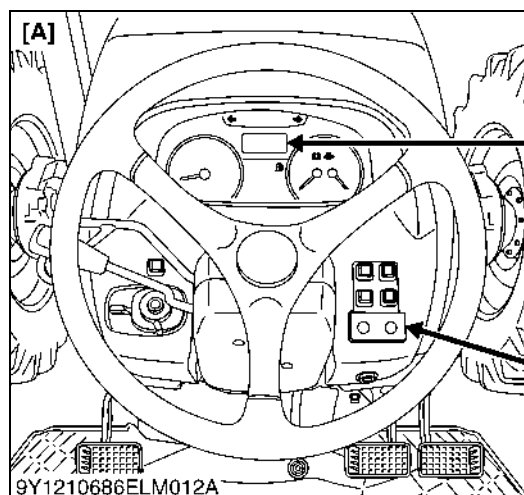
[Fuel Level]

Prescribed level	20 L
	5.3 U.S.gals
	4.4 Imp.gals

- | | |
|---|-------------------------------------|
| (1) PTO Clutch Indicator | (4) Heater Indicator |
| (2) Electrical Charge Warning Indicator | (5) Fuel Level Indicator |
| (3) Engine Oil Pressure Warning Indicator | (6) Parking Brake Warning Indicator |
| | (7) Key Switch |

9Y1210686ELM0006US0

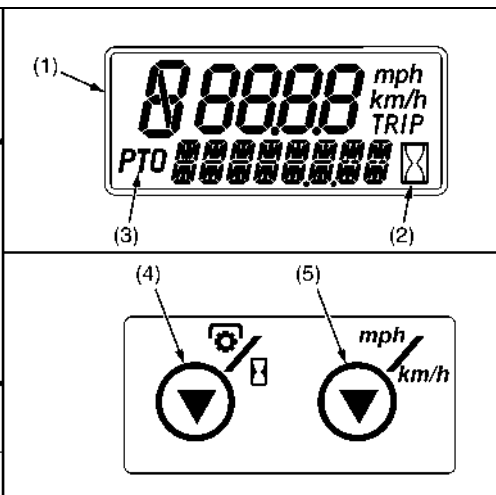
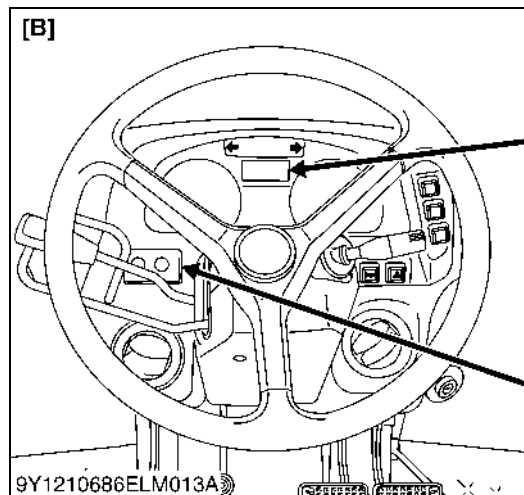
[3] LCD MONITOR INDICATION



- (1) LCD Monitor
- (2) Hour Meter Indication
- (3) PTO Indication
- (4) PTO / Hour Meter Select Switch
- (5) Traveling Speed Select Switch

[A] ROPS Model

[B] CABIN Model

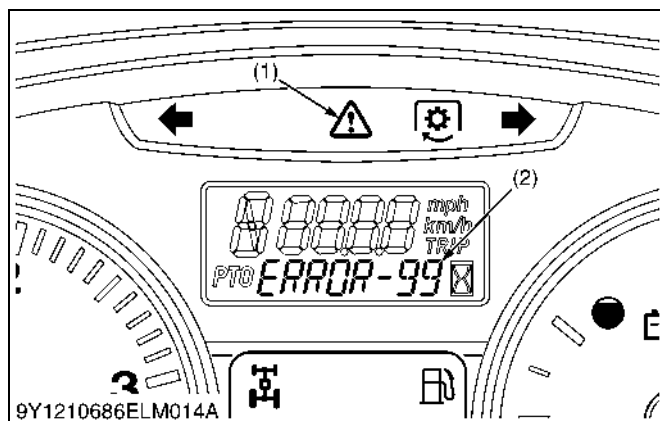


■ Changing Display Mode

1. The LCD monitor gives three different display modes: "Traveling speed and Hour meter", "Traveling speed and PTO speed" and "Traveling speed and Fuel meter". Each time the PTO/Hour meter select switch is pressed, the mode is switched to the changing display.
2. The PTO clutch control switch works for the following automatic display modes.
 - a) PTO clutch control switch ON: Traveling speed and PTO speed are displayed.
 - b) PTO clutch control switch OFF: Traveling speed and Hour meter are displayed.
3. The units of travel speed and mileage (mile, km, gallon and liter) can be selected with the traveling speed select switch.

9Y1210686ELM0007US0

(1) ERROR Mode



When the tractor occurred the below troubles as shown as the table of next page, the meter panel of this tractor displays the displayed error codes.

■ IMPORTANT

- **This error codes are the error which corresponds to the Tractor ECU. DTC codes are not displayed on the meter panel.**

1. When the error code is displayed, do the decided procedures.
2. After doing the procedure, there is no error code on the meter panel.

- (1) Master System Warning Indicator (2) Error Code

Displayed Error Code	Trouble	Remarks
ERROR-1	Acceleration sensor (main) trouble	
ERROR-2	Acceleration sensor (sub) trouble	
ERROR-3	Acceleration sensor main/sub phase shifting trouble	
ERROR-11	PTO relay trouble	
ERROR-12	4-wheel-drive solenoid trouble	
ERROR-13	Bi-speed turn solenoid trouble	
ERROR-21	Range gear shift (Hi) switch trouble	
ERROR-22	Range gear shift (6th) switch trouble (Main range gear shift switch)	
ERROR-23	Shuttle rotating sensor or switch trouble	Range gear shift (Hi) switch and Range gear shift (6th) switch (Main range gear shift switch)
ERROR-24	Machine speed sensor or switch trouble	
ERROR-60	Analog reference supply voltage +5 V trouble	5V power supply ERROR
ERROR-63	Acceleration and engine adjustment trouble	The tractor ECU memorizes a wrong data of the acceleration sensor and engine rev.
ERROR-99	Communication trouble	CAN Communication ERROR
Eng NG	Engine communication trouble	Engine trouble, etc. CAN Communication ERROR between Engine ECU and Tractor ECU
ECU NG	Tractor ECU communication trouble	Tractor or Meter ECU trouble, etc. CAN Communication ERROR between Tractor ECU and Meter ECU.

9Y1210686ELM0008US0

(2) Setting Mode

- Input the various data to RAM.
- There are three different setting modes: "PTO speed display mode switching", "entering the traveling speed coefficient" and "model select mode".

■ PTO Speed Display Mode Switching

[With 540/540E min⁻¹ (rpm) model]

The PTO speed display mode has been factory-set at Code 4. Do not attempt to change the code. Otherwise the correct PTO speed will not be displayed in the LCD monitor.

[With 540/1000 min⁻¹ (rpm) model]

The PTO speed display mode has been factory-set at Code 5. Do not attempt to change the code. Otherwise the correct PTO speed will not be displayed in the LCD monitor.

[With Shiftable PTO (540 / 1000 min⁻¹ (rpm)) model]

Whenever the PTO speed is changed to the other speed, it is necessary to switch the PTO speed display mode. Otherwise the PTO speed will not get correctly displayed in the LCD monitor. When the PTO speed is changed from 540 to 1000 min⁻¹ (rpm) or from 1000 to 540 min⁻¹ (rpm), it is necessary to switch the PTO speed display mode.

9Y1210686ELM0009US0

(3) Testing Mode

This tractor has "Testing mode" as shown the below table.

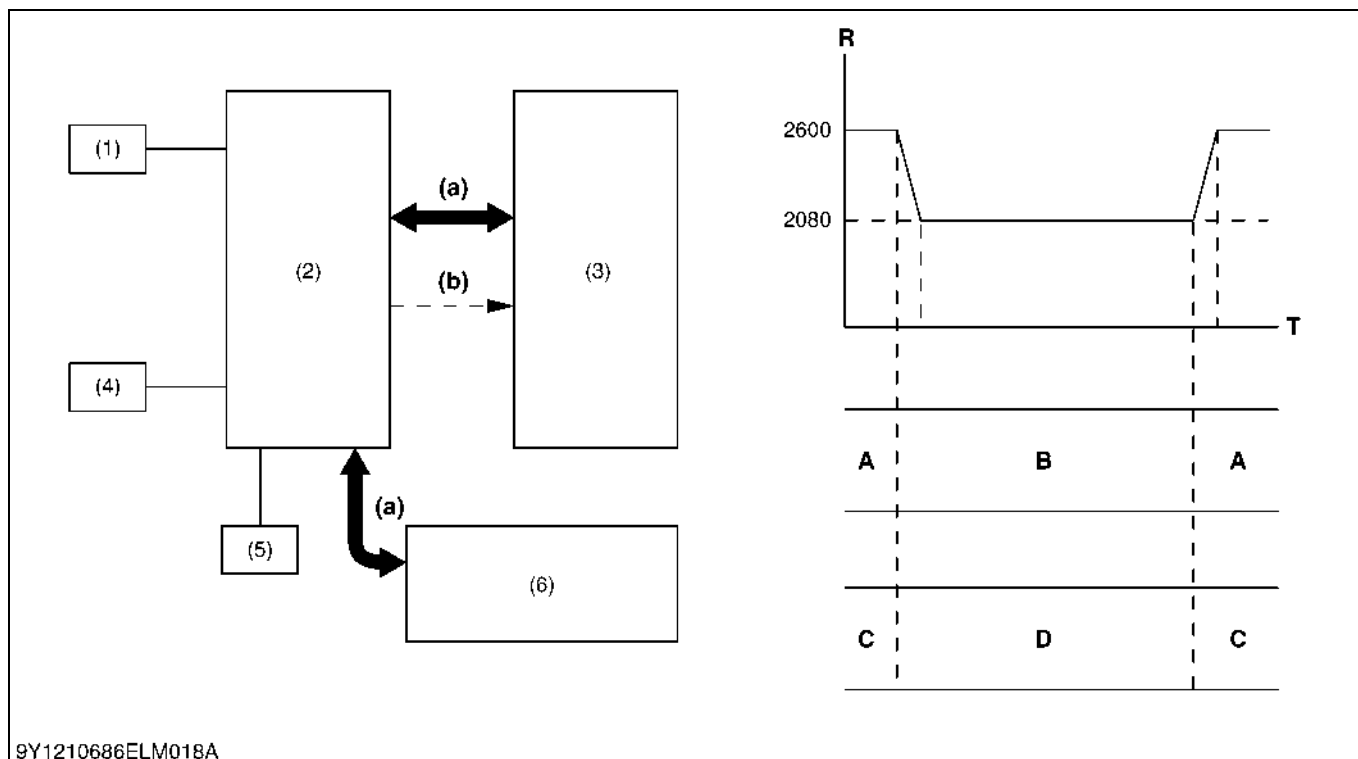
In the testing mode, there are 11 contents.

No.	Contents	Normal Condition	Unit	Remark
1	Accelerator Sensor (main)	0.05 to 4.9	Voltage	Main (1) + sub (2) 3.85 V to 6.15 V (Normal Condition)
2	Accelerator Sensor (sub)	0.05 to 4.9	Voltage	
3	Engine Revolution	0 to 2800	n/min	
4	Shuttle Revolution	0 to 2450	n/min	
5	Engine Coolant Temperature	-30 to 120 °C (-4 to 248 °F)	Celsius	
6	Fuel Empty Sensor Voltage	Empty to Full	Voltage	Fuel Tank Sensor
7	Battery Voltage	8.0 to 16.0	Voltage	
8	PTO Revolution	0 to 1000	n/min	
9	PM Sedimentation Quantity 1	4 to 38	Gram	DPF Regeneration Request trigger 1
10	PM Sedimentation Quantity 2	4 to 38	Gram	DPF Regeneration Request trigger 2
11	Fuel Quantity After Regeneration	MAX 80	L	DPF Regeneration Request trigger 3

9Y1210686ELM0010US0

[4] ECO 40 km/h FUNCTION

(1) Structure



(1) Range Gear (6th) Switch

(2) Tractor ECU

(3) Engine ECU

(4) Range Gear (High) Switch

(5) Throttle Sensor

(6) Meter ECU

A: 5th-High

B: 6th-High

C: OFF

D: ON

R: min⁻¹ (rpm)

T: Time

(a) CAN Communication

(b) Send Signal (Engine Limit)

■ Travel Speed Limiter (ECO 40 km/h)

With the 6-speed main gear shift type, the highest travel speed is reachable when the engine rpm is at around the middle level with the maximum travel speed range. This provides for a fuel-efficient run while traveling along roads, pulling a trailer, etc. Step on the foot throttle, and the engine rpm rises proportionally and the travel speed goes up accordingly. But the engine speed is limited to 2080 min⁻¹ (rpm) or so, and it does not increase even if the foot throttle is increased. When the main gear shift lever is set to the High-6th position, the Rev-Limiter indicator illuminates.

This figure is "Travel Speed Limiter" mechanism.

This mechanism is controlled by the Tractor ECU, the range gear shift (Hi) switch, the main gear shift (6th) switch, the shuttle revolution sensor and the engine ECU. The tractor ECU checks in condition of 6th (main) and high (sub). The range gear shift (Hi) switch and range gear shift (6th) switch are normal close. When sub range shift (6th) gear is changed from 5th position to 6th position, the switch opens. After that, when the tractor exceeds 40 km/h, the tractor ECU communicates the engine ECU to be limited the engine rpm (2080 min⁻¹ (rpm)).

When the tractor becomes out of condition, this feature releases.

Even if one of each sensor is gone wrong, the tractor never extends 40 km/h in any condition. This function is fault safe.

Model	Maximum travelling speeds
ROPS	39.9 km/h (24.8 mph)
CABIN	39.5 km/h (24.5 mph)

■ Condition

Main gear shift range: 6th

Sub range gear range: High

Engine limits revolution: 2080 min⁻¹ (rpm)

9Y1210686ELM0011US0

(2) Components



Range Gear Shift (Hi) and Range Gear Shift (6th) Switch

The range gear shift (Hi) (1) checks whether sub range gear shift is high. The range gear shift (6th) (2) checks whether main range gear shift is 6th position.

Both switches are normal close type.

- (1) Range Gear Shift switch (Hi) (2) Range Gear Shift switch (6th)

9Y1210686ELM0012US0

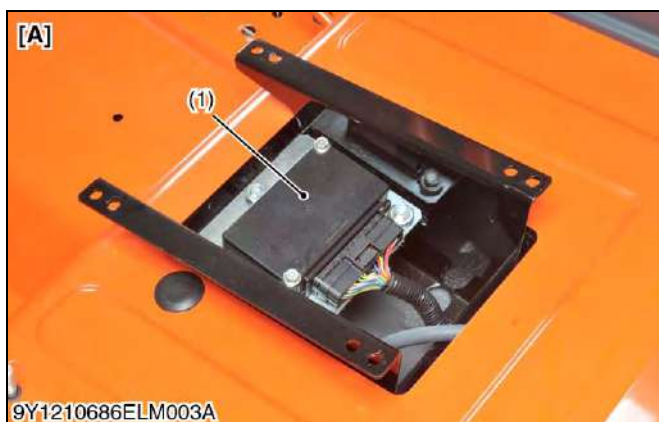


Shuttle Rev Rotation Sensor

The shuttle rev rotation sensor (1) calculates shuttle rotation. This sensor is equipped for calculating the travelling speeds.

- (1) Shuttle rev rotation sensor

9Y1210686ELM0013US0



Tractor ECU

The tractor ECU (1) processes and judges the input signals from the switches and sensors around the tractor.

- (1) Tractor ECU

[A] ROPS
[B] CABIN

9Y1210686ELM0014US0





Engine ECU

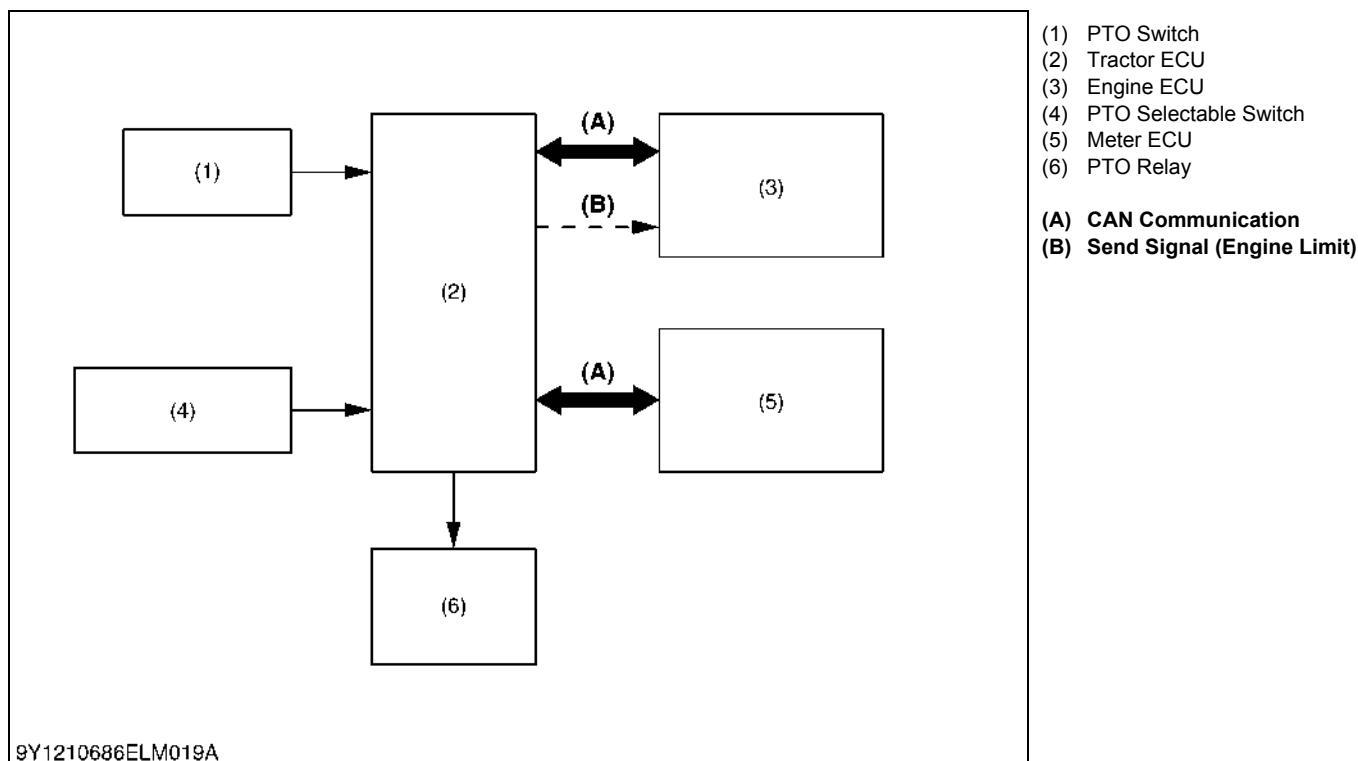
The engine ECU (1) processes and judges the input signals from the switches and sensors around the engine.

(1) Engine ECU

9Y1210686ELM0015US0

[5] PTO SPEED LIMITER (IF EQUIPPED 540ECONOMY)

(1) Structure



PTO	Limitation PTO/Engine speed min ⁻¹ (rpm)
540E	630/1772

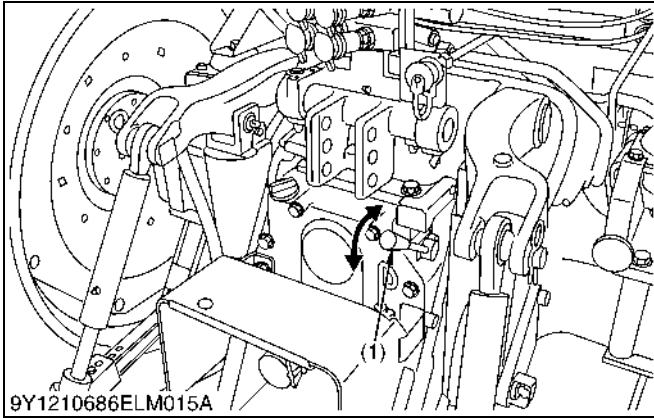
Move the PTO gear shift lever to "540E" and then turn on the PTO clutch control switch, and the rev-limiter indicator (1) lights up on the meter panel.

If the PTO clutch control switch is turned on with the engine rpm higher than the PTO 540E limit level, the PTO clutch indicator on the meter panel starts blinking and the PTO is disabled. After a while, the engine rpm automatically drops below the PTO 540E limit level and the PTO starts functioning. At the same time, the flashing PTO clutch indicator stays **"ON"**.

If the PTO clutch control switch is turned **"OFF"** but the engine rpm fails to rise with the throttle, return the engine rpm to a lower level. This enables acceleration again.

9Y1210686ELM0016US0

(2) Components



PTO Gear Selectable Switch

PTO Gear Selectable Switch (1) checks whether PTO revolution is 540 Economy.

This switch is normal close type.

- (1) PTO Gear Selectable Switch

9Y1210686ELM0017US0



Meter Panel ECU

This meter panel ECU communicates to the tractor ECU. This meter panel ECU controls signal, LCD display.

9Y1210686ELM0018US0



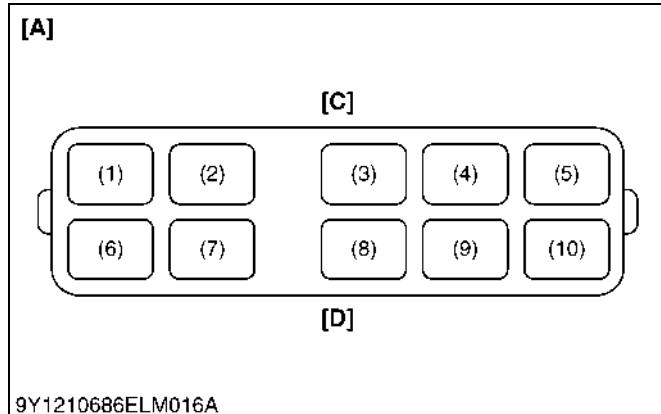
PTO Relay

The Tractor ECU communicates to the PTO relay (6). PTO

- | | |
|---------------------------------------|-----------------------|
| (1) PTO Safety Relay | (8) Front Motor Relay |
| (2) Front Light Relay | (9) Side Lamp Relay |
| (3) Air Conditioner Blower High Relay | |
| (4) Working Light Relay | |
| (5) Air Conditioner Blower Relay | |
| (6) PTO Relay | |
| (7) Neutral Relay | |

[A] CABIN
[B] ROPS
[C] Plate Side
[D] Blower Side

9Y1210686ELM0019US0





PTO Switch

PTO Switch is a switch to engage PTO.

When the operator push and turn right the PTO Switch, the PTO is engaged.

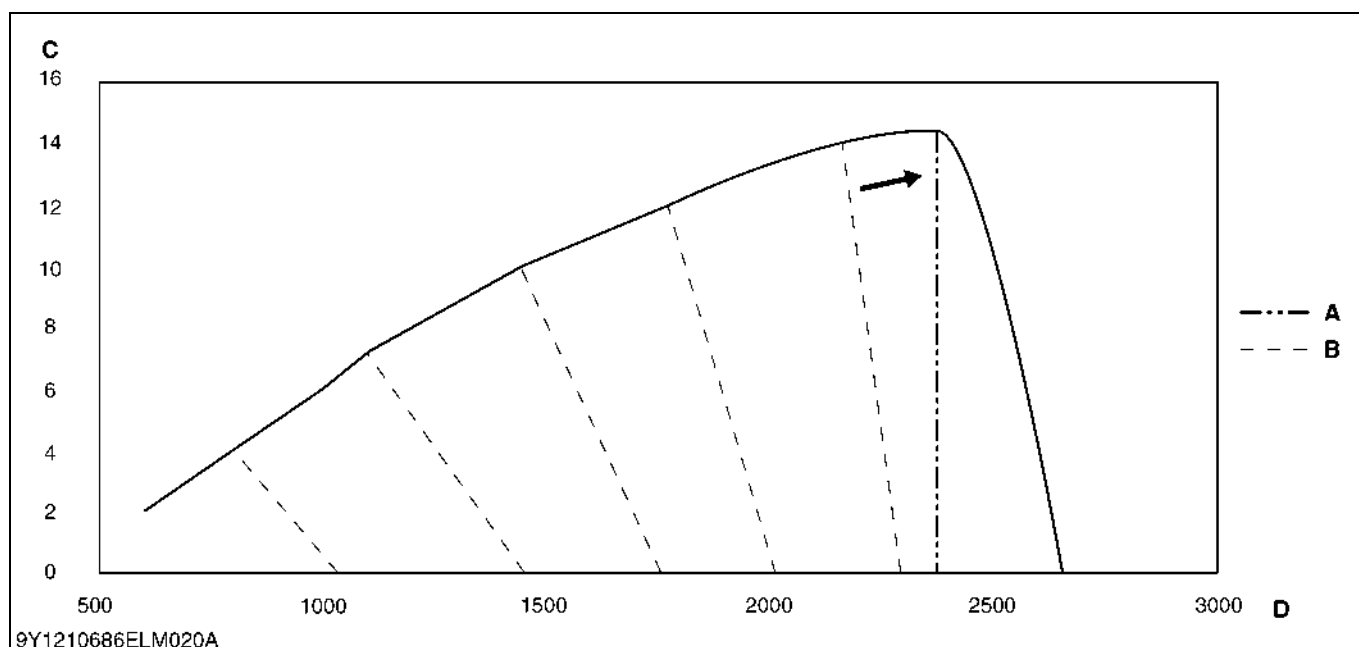
When the operator pushes the switch, the PTO is disengaged.

(1) PTO Switch

9Y1210686ELM0020US0

[6] CONSTANT RPM MANAGEMENT SWITCH WITH INDICATOR (WORK CRUISE)

(1) Structure



A: Work Cruise ON

B: Work Cruise OFF

C: kW

D: min⁻¹ (rpm)

■ Constant RPM Management Control

Constant RPM Management can be turned "ON" or "OFF" by operating the switch. Pressing the switch turns the control "ON" and pressing the switch again turns it "OFF".

■ When constant RPM management is "ON"

Fluctuations in the engine speed due to load fluctuations are reduced and the travel speed and PTO speed are kept nearly constant, allowing stable work. When constant RPM management is "ON", the switch's indicator light up.

■ When constant RPM management is "OFF"

As in a conventional engine, the engine speed increases or decreases according to changes in the load. The operator judges the size of the load from the engine speed and engine sound, and can adjust the travel speed or plowing depth to prevent overload on the tractor.

9Y1210686ELM0021US0

Constant RPM management mechanism

The engine maintains same engine RPM.

When the tractor charges load or doesn't charge load the engine ECU starts to control fuel of the injector. During using the constant RPM management function, the engine tries to increase to inject fuel quantity by controlling the engine ECU.

9Y1210686ELM0022US0

4. LIGHTING SYSTEM

[1] COMPONENTS

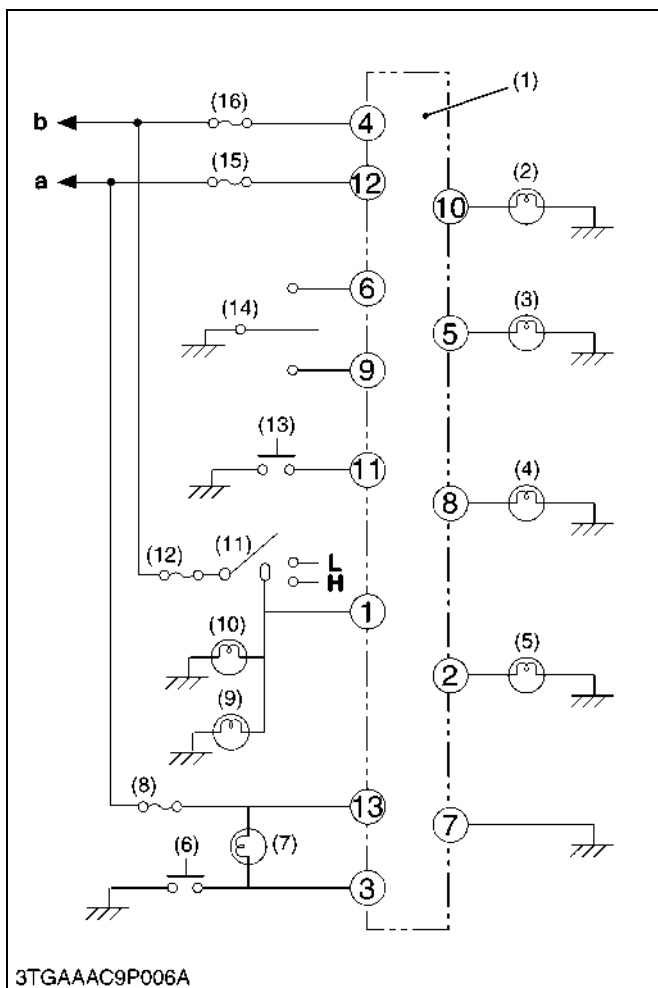
(1) Flasher Unit



Flasher Unit

The function of flasher unit is as follows.

1. The flasher unit blinks the turn signal light (3), (4) and hazard indicator light (2) when the hazard switch (13) is turned on.
2. Then flasher unit blinks the turn signal light (3) or (4), when the turn signal switch (14) is turned clockwise or counterclockwise.
3. The flasher unit lights the position light (5) when the light switch (11) is turned on (Lo or Hi).
4. The flasher unit lights the position light (5) when the position light switch (6) is turned on.
5. The blinking frequency is 60 to 120 times per minutes.



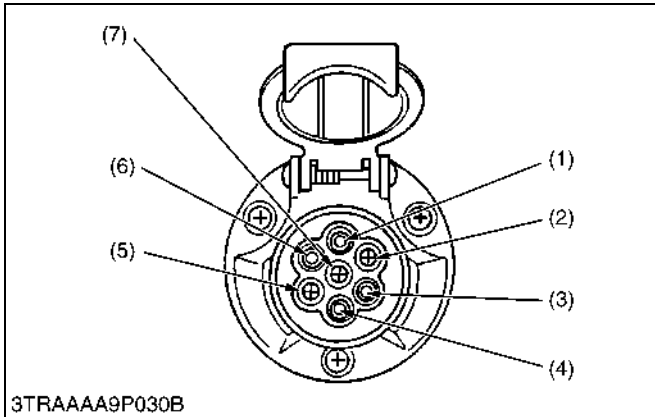
- (1) Flasher Unit
- (2) Hazard Indicator Light
- (3) Turn Signal Light (Right)
- (4) Turn Signal Light (Left)
- (5) Position Light
- (6) Position Light Switch
- (7) Position Indicator Light
- (8) Fuse (10 A)
- (9) Illumination Light Panel
- (10) Licence Light

- (11) Light Switch
- (12) Fuse (15 A)
- (13) Hazard Switch
- (14) Turn Signal Switch
- (15) Fuse (15 A)
- (16) Fuse (10 A)

a: To Battery
b: To Key Switch AC Terminal

9Y1210686ELM0023US0

5. TRAILER SOCKET



The trailer socket is provided to take out the electrical power from tractor to trailer or implement.

The function of each terminal is shown below.

Terminal	Function	Color of wire harness
(1)	Turn signal light (L.H.)	Green / White
(2)	—	—
(3)	Ground	Black
(4)	Turn signal light (R.H.)	Red / White
(5)	Tail light Sidemarker light Parking light	Yellow / Red
(6)	Brake stop light	Yellow
(7)	Registration plate light	Yellow / White

(1) Terminal **1**

(2) Terminal **2**

(3) Terminal **3**

(4) Terminal **4**

(5) Terminal **5**

(6) Terminal **6**

(7) Terminal **7**

9Y1210686ELM0024US0

SERVICING

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
All Electrical Equipments Do Not Operate	Battery discharged or defective	Recharge or replace	8-S9
	Battery positive cable disconnected or improperly connected	Repair or replace	8-S9
	Battery negative cable disconnected or improperly connected	Repair or replace	8-S9
	Slow blow fuse blown	Replace	8-S10
Fuse Blown Frequently	Short-circuited	Repair or replace	—

BATTERY

Symptom	Probable Cause	Solution	Reference Page
Battery Discharges Too Quickly	Battery defective	Replace	8-S9
	Alternator defective	Repair or replace	8-S19
	Wiring harness disconnected or improperly connected (between battery positive terminal and alternator B terminal)	Repair or replace	—
	Cooling fan belt slipping	Adjust tension	8-S29

STARTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Starter Motor Does Not Operate	Battery discharged or defective	Recharge or replace	—
	Slow blow fuse blown	Replace	8-S9
	Starter relay defective	Replace	8-S42
	PTO switch defective	Repair or replace	—
	Wiring harness disconnected or improperly connected (between main switch M terminal and PTO switch, between main switch ST terminal and PTO relay, shuttle neutral switch, between safety switch and starter relay, between starter relay and ground, between starter relay and starter motor S terminal, between battery positive terminal and starter motor B terminal)	Repair or replace	—
	Starter motor defective	Repair or replace	8-S55
	Main switch defective	Replace	8-S15

AIR HEATER

Symptom	Probable Cause	Solution	Reference Page
Air Heater Does Not Heat	Slow blow fuse blown	Replace	8-S11
	Air heater relay defective	Replace	8-S43
	Air heater defective	Replace	8-S18

LIGHTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Head Light Does Not Light	Fuse blown	Replace	8-S10
	Bulb blown	Replace	G-49
	Wiring harness disconnected or improperly connected	Repair or replace	—
Illumination Light Does Not Light	Fuse blown	Replace	8-S10
	Meter panel defective	Replace	—
	Wiring harness disconnected or improperly connected	Repair or replace	—
Tail Light Does Not Light	Fuse blown	Replace	8-S10
	Wiring harness disconnected or improperly connected	Repair or replace	—
Hazard Light Does Not Light	Fuse blown	Replace	8-S10
	Bulb blown	Replace	G-49
	Flasher unit defective	Replace	—
	Hazard switch defective	Replace	—
	Turn signal switch defective	Replace	—
Hazard and Turn Signal Indicator Lamp Does Not Light	Meter panel defective	Replace	—
	Wiring harness disconnected or improperly connected	Repair or replace	—
Hazard and Turn Signal Light Does Not Go ON and OFF	Flasher unit defective	Replace	—
Work Light Does Not Light	Fuse blown	Replace	8-S10
	Bulb blown	Replace	G-49
	Wiring harness disconnected or improperly connected	Repair or replace	—
Brake Light Does Not Light	Fuse blown	Replace	8-S10
	Bulb blown	Replace	G-49

HORN

Symptom	Probable Cause	Solution	Reference Page
Horn Does Not Sound when Horn Button Is Pushes	Horn switch defective	Replace	—
	Horn defective	Replace	—
	Wiring harness disconnected or improperly connected (between combination switch terminal H terminal and horn)	Repair or replace	—

EASY CHECKER™

Symptom	Probable Cause	Solution	Reference Page
Engine Oil Pressure Lamp Lights Up When Engine is Running	Engine oil pressure too low	Repair	1-S13
	Engine oil insufficient	Replenish	G-21
	Engine oil pressure switch defective	Replace	1-S13
	Short circuit between engine oil pressure switch lead and chassis	Repair	1-S13
	Circuit in panel board defective	Replace	—
Engine Oil Pressure Lamp Does Not Light When Main Switch is Turned ON and Engine Is Not Running	Meter panel defective	Replace	—
	Engine oil pressure switch defective	Replace	1-S13
	Wiring harness disconnected or improperly connected (between meter panel and engine oil pressure switch)	Repair or replace	—
	Circuit in meter panel defective	Replace	—
Charge Lamp Does Not Go OFF When Engine Is Running	Alternator defective	Repair or replace	8-S19
	Short circuit between alternator terminal L and chassis	Repair	—
	Circuit in meter panel defective	Replace	—
Charge Lamp Does Not Light When Main Switch Is Turned ON	Wiring harness disconnected or improperly connected (between meter panel and alternator)	Repair or replace	—
	Circuit in meter panel defective	Replace	—
PTO Lamp Lights Up When PTO Switch Is OFF Position	PTO switch is defective	Replace	—
PTO Lamp Does Not Light Up When PTO Switch Is ON Position	PTO switch is defective	Replace	—
	Meter panel defective	Replace	—
Fuel Level Indicator Lamp Lights Up	Fuel insufficient	Replenish	G-12
	Fuel level sensor defective	Replace	8-S38
	Short circuit between fuel unit lead and chassis	Repair	—
	Circuit in meter panel defective	Replace	—
Fuel Level Indicator Lamp Does Not Light When Fuel Tank Is Empty	Fuel level sensor defective	Replace	8-S38
	Wiring harness disconnected or improperly connected (between meter panel and fuel unit)	Repair or replace	—
	Circuit in meter panel defective	Replace	—
Coolant Temperature Indicator Does Not Light When Water Temperature Gauge Points to H (Red Zone)	Fuse blown	Replace	8-S10
	Coolant temperature sensor is defective	Replace	1-S13
	Wiring harness disconnected or improperly connected (between panel and coolant temperature sensor)	Repair or replace	—
	Circuit in panel board is defective	Replace	—
4WD Indicator Lamp Lights Up When 4WD Is Not Engaged	4WD switch is defective	Replace	8-S39
4WD Indicator Lamp Does Not Light When 4WD Is Engaged	4WD switch is defective	Replace	8-S39

Symptom	Probable Cause	Solution	Reference Page
Air Cleaner Clogged Lamp Lights Up	Air cleaner clogged	Clean or replace	G-31

ENGINE KEY SWITCH SHUT-OFF SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Stop When Main Switch Is Turned OFF	Fuse blown	Replace	8-S10
	Key stop relay defective	Replace	8-S44
	Engine stop relay defective	Replace	8-S44
	Meter panel defective	Replace	–
	Wiring harness disconnected or improperly connected	Repair or replace	–
Engine Does Not Start	Fuse or slow blow fuse blown	Replace	8-S10
	Engine stop solenoid defective	Replace	8-S44
	Engine stop relay defective	Replace	8-S44
	Key stop relay defective	Replace	8-S44
	PTO switch defective	Replace	–
	Shuttle neutral switch defective	Replace	8-S35

4WD

Symptom	Probable Cause	Solution	Reference Page
Front Wheel Does Not Drive When 4WD Switch is Turned ON	4WD switch or wiring harness is defective	Replace	8-S39
Front Wheel Drive Not Be Cancelled	4WD switch or wiring harness is defective	Repair or replace	8-S39

GAUGES

Symptom	Probable Cause	Solution	Reference Page
Fuel Gauge Does Not Function	Fuel level sensor defective	Replace	8-S38
	Wiring harness disconnected or improperly connected (between meter panel and fuel unit)	Repair or replace	—
	Circuit in meter panel defective	Replace	—
Coolant Temperature Gauge Does Not Function	Coolant temperature gauge defective	Replace	8-S40
	Coolant temperature sensor defective	Replace	8-S40
	Wiring harness disconnected or improperly connected (between meter panel and coolant temperature sensor)	Repair or replace	—
	Circuit in meter panel defective	Replace	—

LCD MONITOR

Symptom	Probable Cause	Solution	Reference Page
Nothing is Displayed in LCD	Battery discharged or defective (Battery voltage is below 10 V)	Recharge or replace	8-S8
	Slow blow fuse blown	Replace	8-S13
	Meter panel connector disconnect	Connect	—
	Meter panel defective	Replace	—
Indication on LCD Does Not Change When Pushing the Display Mode Switch	Display mode select switch defective	Replace	—
	Wiring harness disconnected	Repair	—
Traveling Speed is Not Indicating	Wiring harness disconnected	Repair	—
	Traveling speed sensor defective	Replace	8-S39
PTO Speed is Not Indicating	Wiring harness disconnected	Repair	—

9Y1210686ELS0107US0

2. SERVICING SPECIFICATIONS

STARTER MOTOR

Item		Factory Specification	Allowable Limit
Commutator	O.D.	32.0 mm 1.26 in.	31.4 mm 1.24 in.
Mica	Undercut	0.50 to 0.80 mm 0.020 to 0.031 in.	0.2 mm 0.0079 in.
Brush	Length	18.0 mm 0.709 in.	11.0 mm 0.433 in.

AIR HEATER

Item		Factory Specification	Allowable Limit
Air Heater	Resistance	Approx. 0.3 Ω	—

ALTERNATOR

Item		Factory Specification	Allowable Limit
Brush	Length	18.5 mm 0.728 in.	5.0 mm 0.20 in.
Slip Ring	O.D.	22.7 mm 0.894 in.	22.1 mm 0.870 in.

FUEL LEVEL SENSOR

Item		Factory Specification	Allowable Limit
Float at Uppermost Position	Resistance	3.0 to 5.0 Ω	—
Float at Lowermost Position	Resistance	107.5 to 112 Ω	—

COOLANT TEMPERATURE SENSOR

Item		Factory Specification	Allowable Limit
Coolant Temperature at 120 °C (248 °F)	Resistance	Approx. 117 Ω	—
Coolant Temperature at 100 °C (212 °F)	Resistance	Approx. 189 Ω	—
Coolant Temperature at 80 °C (176 °F)	Resistance	Approx. 290 to 354 Ω	—
Coolant Temperature at 50 °C (122 °F)	Resistance	Approx. 808 Ω	—
Coolant Temperature at 20 °C (68 °F)	Resistance	Approx. 2.21 to 2.69 k Ω	—

FLASHER UNIT

Item		Factory Specification	Allowable Limit
Flasher Blinking	Times	60 to 120 times / minutes	—

SOLENOID VALVE

Item		Factory Specification	Allowable Limit
PTO Solenoid Valve 4WD Solenoid Valve Rear Differential Lock Solenoid Valve	Resistance	10 to 12 Ω	—

DUAL SPEED SOLENOID VALVE (F24/R24 SPEED TRANSMISSION MODEL)

Item		Factory Specification	Allowable Limit
Dual Speed Solenoid Valve	Resistance	10 to 12 Ω	—

9Y1210686ELS0108US0

3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to G-14)

Item	N·m	kgf·m	lbf·ft
Pulley nut (Alternator)	58.3 to 78.9	5.95 to 8.05	43.0 to 58.2

9Y1210686ELS0089US0

4. CHACKING AND ADJUSTING

CAUTION

- To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.
- Never remove the battery cap while the engine is running.
- Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately.
- Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.

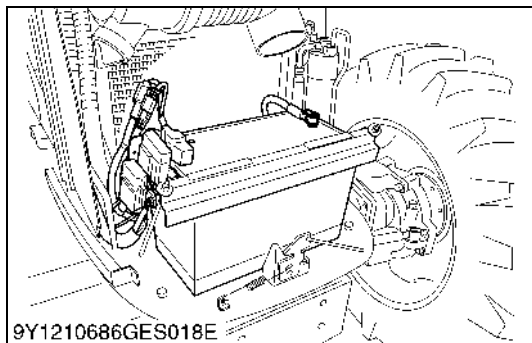
■ IMPORTANT

- If the machine is to be operated for a short time without battery (using a slave battery for starting), use additional current (lights) while engine is running and insulate terminal of battery. If this advice is disregarded, damage to alternator and regulator may result.

9Y1210686ELS0001US0

[1] BATTERY, FUSE, GROUNDING AND CONNECTOR

(1) Battery

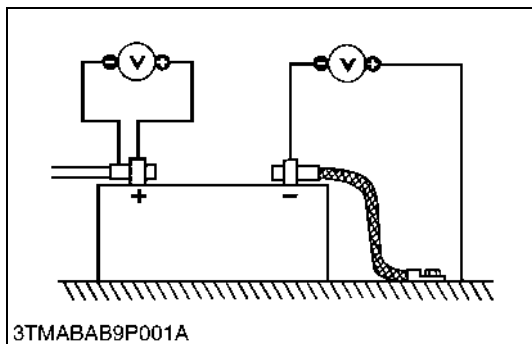


Battery Voltage

1. Stop the engine and turn the main switch off.
2. Connect the COM (-) lead of the voltmeter to the battery's negative terminal post and the (+) lead to the positive terminal post, and measure the battery voltage.
3. If the battery voltage is less than the factory specification, check the battery specific gravity and recharge the battery.

Battery voltage	Factory specification	More than 12 V
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9Y1210686ELS0002US0

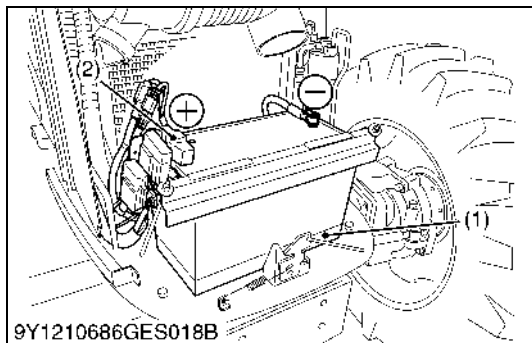


Battery Terminal Connection

1. Turn the main switch on, and turn on the head light.
2. Measure the voltage with a voltmeter across the battery's positive terminal post and the cable terminal, and the voltage across the battery's negative terminal post and the chassis.
3. If the measurement exceeds the factory specification, clean the battery terminal posts and cable clamps, and tighten them firmly.

Potential difference	Factory specification	Less than 0.1 V
----------------------	-----------------------	-----------------

9Y1210686ELS0003US0



Battery Condition Indicator

1. Check the battery condition by reading the indicator (2).

State of indicator display	
Green	Specific gravity of electrolyte and quality of electrolyte are both in good condition.
Black	Needs charging battery
White	Needs replacing battery

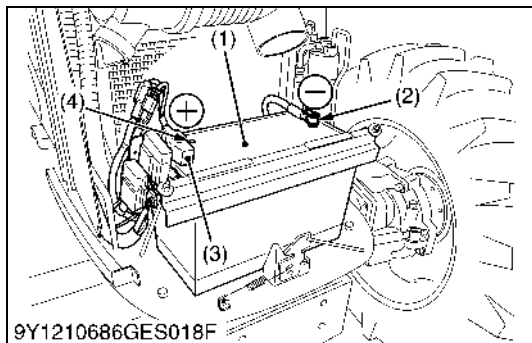
■ IMPORTANT

- The factory installed battery is of non-refillable type. If the indicator turns white, do not charge the battery but replace it with new one.

(1) Battery

(2) Indicator

9Y1210686ELS0004US0



Battery Charging



CAUTION

- When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.
- When charging the battery, ensure the vent caps are securely in place. (if equipped)
- When disconnecting the cable from the battery, start with the negative terminal first.
When connecting the cable to the battery, start with the positive terminal first.
- Never check battery charge by placing a metal object across the posts.
Use a voltmeter or hydrometer.

1. To slow charge the battery (1), connect the battery positive terminal (3) to the charge positive terminal and the negative terminal (2) to the negative, then recharge in the standard fashion.
2. A boost charge is only for emergencies. It will partially charge the battery at a high rate and in a short time.
When using a boost-charged battery, it is necessary to recharge the battery as early as possible.
Failure to do this will shorten the battery's service life.
3. The battery is charge if the indicator display turns green from black.
4. When exchanging an old battery for a new one, use battery of equal specification shown in table.

Table

Battery Type	Volts (V)	Capacity at 5H.R. (A.H.)
GP31 (105E41R)	12	85.3

Reserve Capacity (min)	Cold Cranking Amps	Normal Charging Rate (A)
160	900	11

(1) Battery

(3) Positive Terminal

(2) Negative Terminal

(4) Indicator

9Y1210686ELS0005US0

Directions for Storage

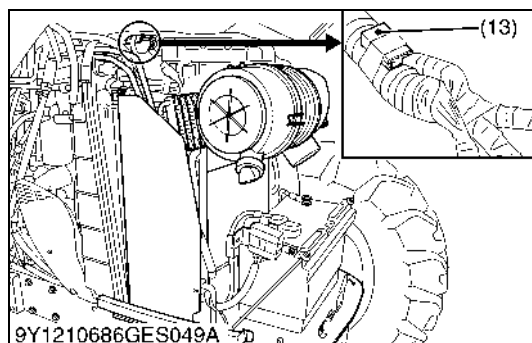
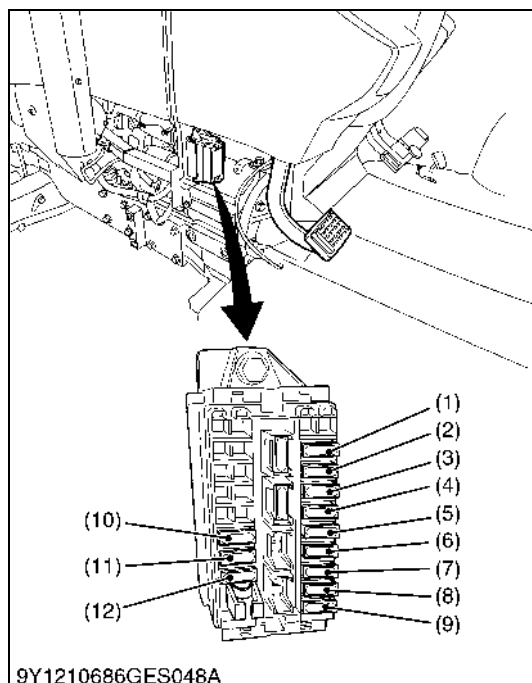
1. When storing the tractor for long periods of time, remove the battery from tractor, adjust the electrolyte to the proper level and store in a dry place out of direct sunlight.
2. The battery self-discharges while it is stored. Recharge it once every three months in hot seasons and once every six month in cold seasons.

(Reference)

- Self-discharge Rate

Temperature	Self-discharge rate
30 °C (86 °F)	Approx. 1.0 % per day
20 °C (68 °F)	Approx. 0.5 % per day
10 °C (50 °F)	Approx. 0.25 % per day

9Y1210686ELS0006US0

(2) Checking Fuse**Fuse (ROPS Model)**

1. The tractor electrical system is protected from potential damage by fuses.
2. A blown fuse indicates that there is an overload or short somewhere in the electrical system.
3. If any of the fuses should blow, replace with a new one of the same capacity.

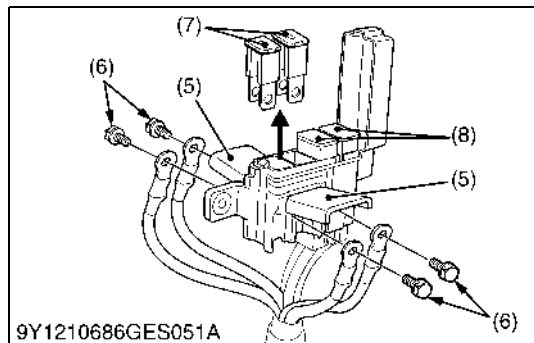
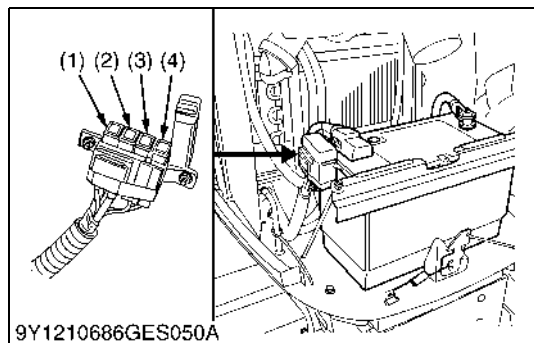
■ IMPORTANT

- Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system.

■ Protected Circuit

Fuse I.D.	Capacity (A)	Protected circuit
(1)	15	Work light
(2)	5	Meter (Backup)
(3)	5	ECU (Backup)
(4)	10	Turn signal
(5)	15	Loader plug
(6)	5	Meter panel
(7)	15	Head light
(8)	15	Flasher (Hazard)
(9)	5	Starter relay
(10)	5	Engine, PTO
(11)	10	Transmission control
(12)	15	ECU
(13)	20	CRS relay

9Y1210686ELS0109US0



Slow Blow Fuse (ROPS Model)

■ NOTE

- The slow blow fuse are intended to protect the electrical cabling. If any of them has blown out, be sure to pinpoint the cause. Never use any substitute, use only a KUBOTA genuine part.

■ Replacement procedure

Non bolt fixed slow blow fuse:

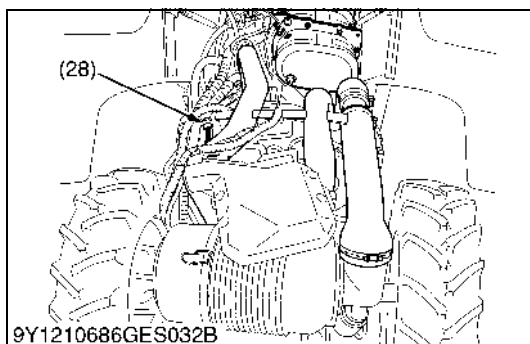
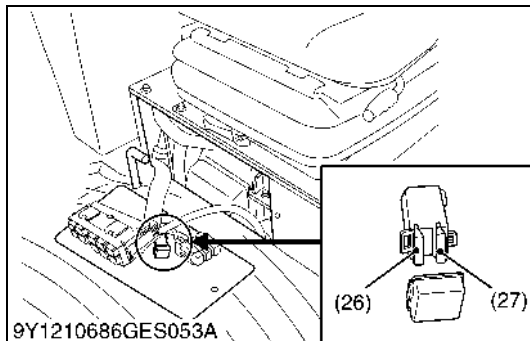
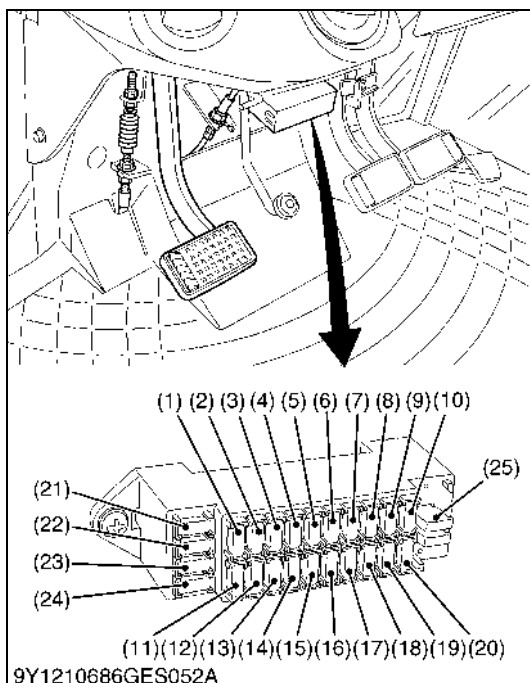
- Disconnect the negative cord of the battery.
- Unscrew the bolt (6) from fuse box (5). (Bolt fixed slow blow fuse)
- Pull out the fuse from the fuse box (5).

Fuse I.D.	Capacity (A)	Protected circuit	Type
(1)	50	Charge	Bolt fixed
(2)	120	Engine preheat	
(3)	40	Head lamp. starter	Non bolt fixed
(4)	30	Key switch, Work light	

(5) Fuse Box
(6) Bolt

(7) Bolt Fixed Slow Blow Fuse
(8) Non Bolt Fixed Slow Blow Fuse

9Y1210686ELS0110US0



Fuse (CABIN Model)

1. The tractor electrical system is protected from potential damage by fuses.
2. A blown fuse indicates that there is an overload or short somewhere in the electrical system.
3. If any of the fuses should blow, replace with a new one of the same capacity.

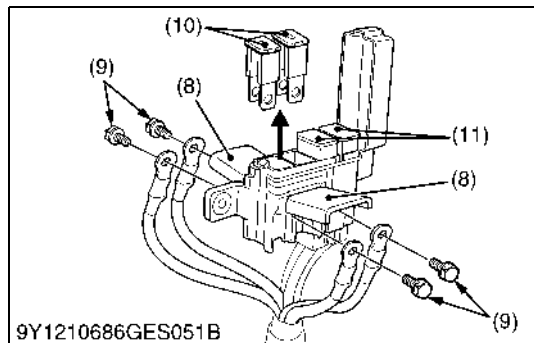
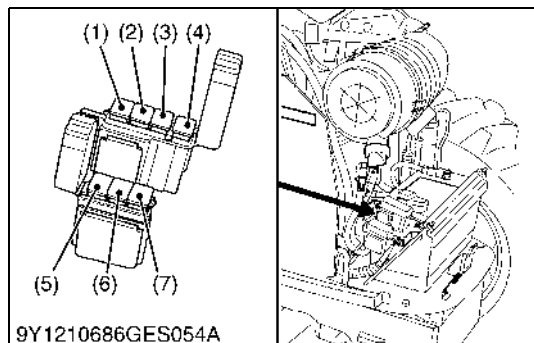
■ IMPORTANT

- Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system.

■ Protected Circuit

Fuse I.D.	Capacity (A)	Protected circuit
(1)	5	Radio
(2)	5	Air conditioner (Control)
(3)	15	Wiper
(4)	10	Alternator, PTO, Engine
(5)	5	Meter
(6)	10	Turn signal, Stop lamp
(7)	10	Back up (Meter)
(8)	20	Head light
(9)	20	Flasher (Hazard)
(10)	5	Back up (ECU)
(11)	15	Work light (Rear)
(12)	15	Work light (Front)
(13)	15	Cigarette lighter
(14)	30	Air conditioner (Fan motor)
(15)	10	Air conditioner (Compressor)
(16)	20	Work light (Front side)
(17)	5	Transmission control
(18)	15	Loader plug
(19)	15	ECU
(20)	5	Starter relay
(21)	5	Spare fuse
(22)	10	Spare fuse
(23)	15	Spare fuse
(24)	20	Spare fuse
(25)	Fuse puller	
(26)	20	Rear window defogger
(27)	20	Side window defogger
(28)	10	CRS power

9Y1210686ELS011US0



Slow Blow Fuse (CABIN Model)

■ NOTE

- The slow blow fuse are intended to protect the electrical cabling. If any of them has blown out, be sure to pinpoint the cause. Never use any substitute, use only a KUBOTA genuine part.

■ Replacement procedure

Non bolt fixed slow blow fuse:

- Disconnect the negative cord of the battery.
- Unscrew the bolt (9) from fuse box (8). (Bolt fixed slow blow fuse)
- Pull out the fuse from the fuse box (8).

Fuse I.D.	Capacity (A)	Protected circuit	Type
(1)	120	Engine preheat	Bolt fixed
(2)	30	Work light	
(3)	30	Electrical outlet	Non bolt fixed
(4)	50	Starter. Air conditioner	
(5)	100	Charge	Bolt fixed
(6)	50	Head lamp. Hazard	
(7)	30	Main key switch	

(8) Fuse Box
(9) Bolt

(10) Bolt Fixed Slow Blow Fuse
(11) Non Bolt Fixed Slow Blow Fuse

9Y1210686ELS0112US0

(3) Checking Grounding Wires



Grounding Wire

1. Check the whether the grounding wire (1) is connected securely to the tractor chassis.
2. If the grounding wire is broken or disconnected, replace it.



- (1) Grounding Wire
(2) Grounding Connector

- [A] ROPS Model
[B] CABIN Model

9Y1210686ELS0007US0

(4) Connector

Checking Connector

1. When inspect the circuit line, check the related connectors.
2. Disconnect the connectors and check their terminals for contamination and deformation.
3. Check to see that cable does not broken or terminals are not shelled off.
4. If any defective parts are found, repair or replace them.

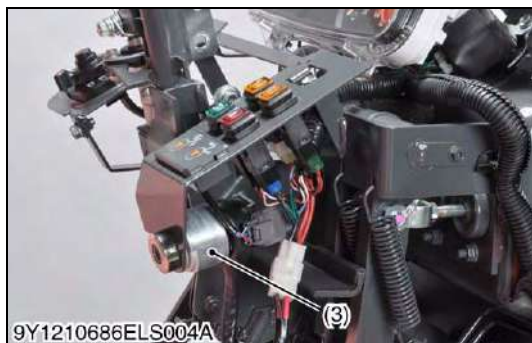
■ IMPORTANT

- Connect connector surely after checked.

9Y1210686ELS0008US0

[2] MAIN SWITCH

(1) Main Switch (ROPS Model)



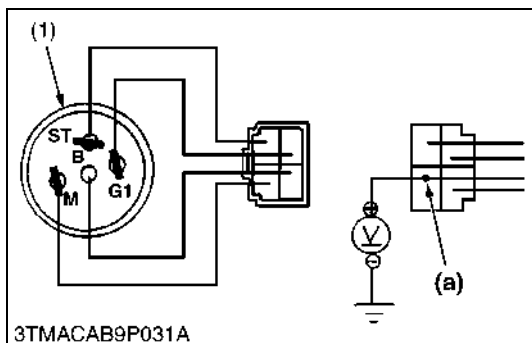
Main Switch (ROPS Model)

1. Remove the panel cover (1) and steering post cover (2).
2. Disconnect the 4P connector for main switch (3).
3. Remove the main switch (3).

- (1) Panel Cover
(2) Steering Post Cover

- (3) Main Switch

9Y1210686ELS0009US0



3TMACAB9P031A

Connector Voltage

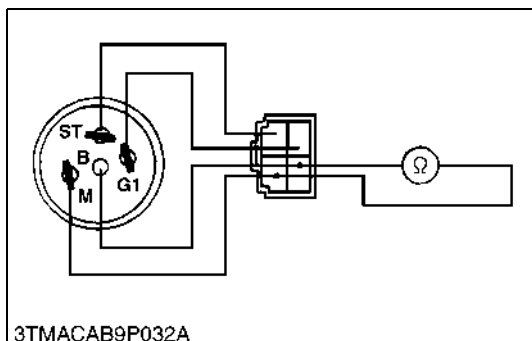
1. Measure the voltage with a voltmeter across the connector terminal **B** and chassis.
2. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness is faulty.

Voltage	Connector terminal B – Chassis	Approx. battery voltage
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- (1) Main Switch

- (a) From Battery Positive Terminal

9Y1210686ELS0010US0



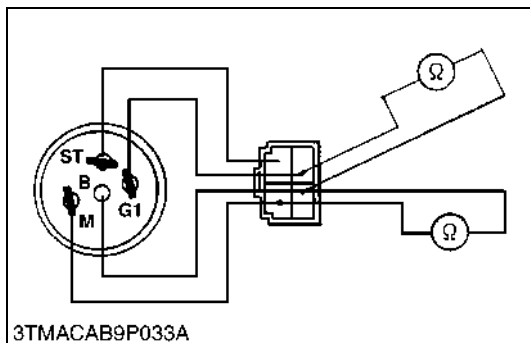
3TMACAB9P032A

Main Switch at ON Position

1. Turn the main switch to **ON** position.
2. Measure the resistance with an ohmmeter across the terminal **B** and the terminal **M**.
3. If 0 ohm is not indicated, the **B – M** contacts of the main switch are faulty.

Resistance	Terminal B – Terminal M	0 Ω
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9Y1210686ELS0011US0

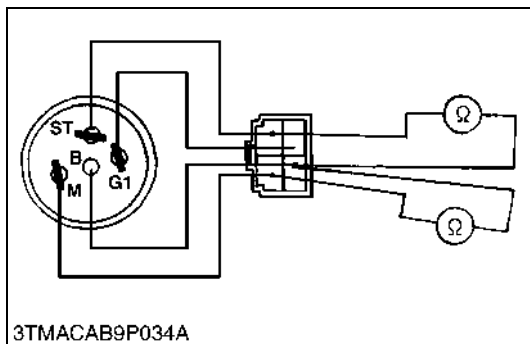


Main Switch at PREHEAT Position

1. Turn and hold the main switch at the **PREHEAT** position.
2. Measure the resistances with an ohmmeter across the terminal **B** and the terminal **G1** and across terminal **B** and terminal **M**.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	Terminal B – Terminal G1	0 Ω
	Terminal B – Terminal M	0 Ω

9Y1210686ELS0012US0



Main Switch at START Position

1. Turn and hold the main switch at the **START** position.
2. Measure the resistances with an ohmmeter across the terminal **B** and the terminal **ST** and across terminal **B** and the terminal **M**.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	Terminal B – Terminal ST	0 Ω
	Terminal B – Terminal M	0 Ω

9Y1210686ELS0013US0

(2) Main Switch (CABIN Model)

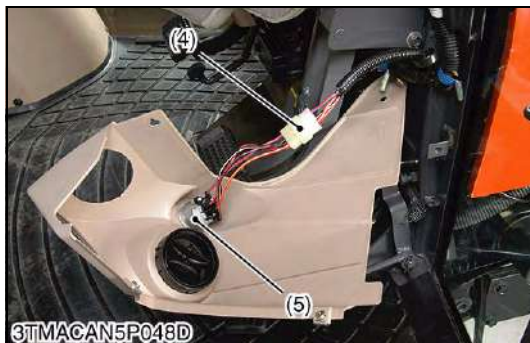


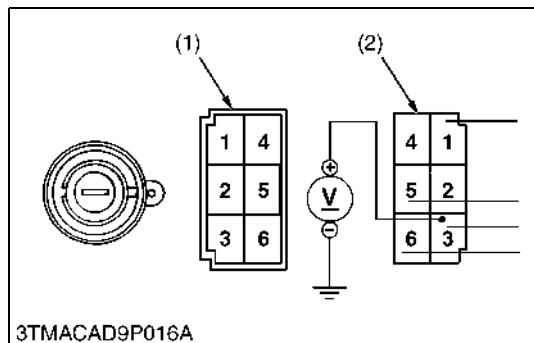
Main Switch (CABIN Model)

1. Remove the panel cover (1).
2. Remove the air outlet (2).
3. Remove the panel under cover R.H. (3) and disconnect the **6P** connector (4) for main switch (5).
4. Perform the following checking.

- | | |
|----------------------------|-------------------------|
| (1) Panel Cover | (4) 6P Connector |
| (2) Air Outlet | (5) Main Switch |
| (3) Panel Under Cover R.H. | |

9Y1210686ELS0014US0





Connector Voltage

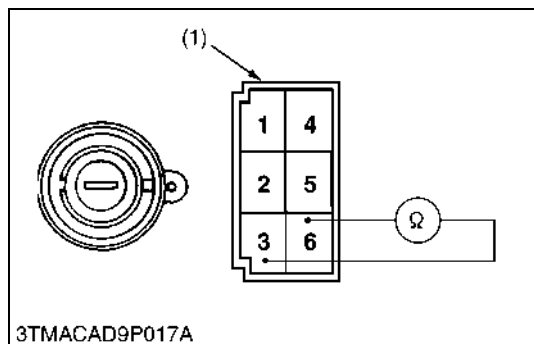
1. Measure the voltage with a voltmeter across the connector terminal **3** and chassis.
2. If the voltage differs from the battery voltage, the wiring harness is faulty.

Voltage	Connector terminal 3 – Chassis	Approx. battery voltage
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(1) Main Switch

(2) Main Switch Connector
(Wire Harness Side)

9Y1210686ELS0015US0



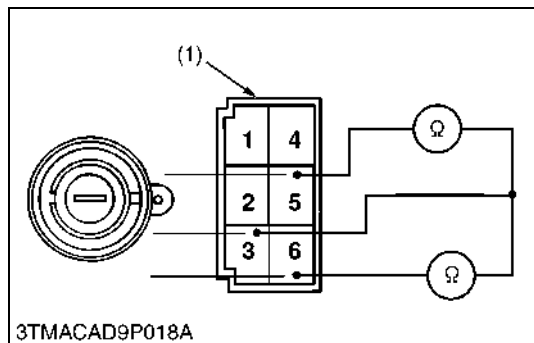
Main Switch at ON Position

1. Turn the main switch to **ON** position.
2. Measure the resistance with an ohmmeter across the terminal **3** and the terminal **6**.
3. If 0 ohm is not indicated, the **3 – 6** contacts of the main switch are faulty.

Resistance	Terminal 3 – Terminal 6	0 Ω
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(1) Main Switch Connector

9Y1210686ELS0016US0



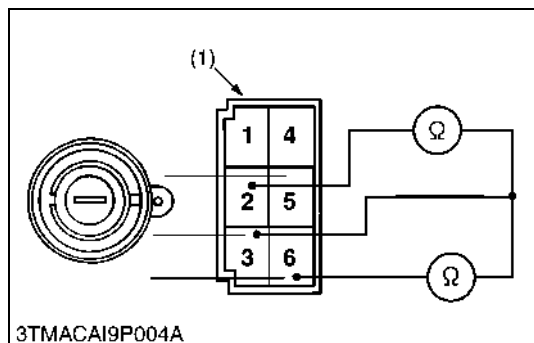
Main Switch at START Position

1. Turn and hold the main switch at the **START** position.
2. Measure the resistances with an ohmmeter across the terminal **5** and across terminal **3** and the terminal **6**.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	Terminal 3 – Terminal 5	0 Ω
	Terminal 3 – Terminal 6	0 Ω

(1) Main Switch Connector

9Y1210686ELS0017US0



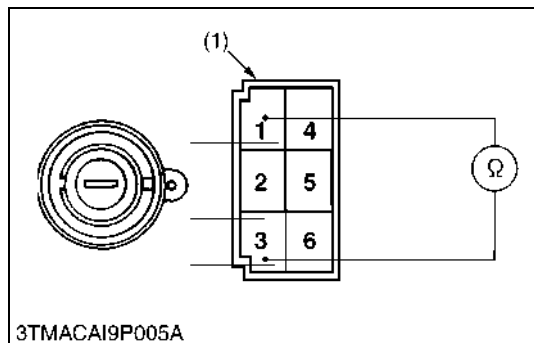
Main Switch at PREHEAT Position

1. Turn and hold the main switch key at the **PREHEAT** position.
2. Measure the resistances with an ohmmeter across the terminal **3** and terminal **2**, and the terminal **3** and the terminal **6**.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	Terminal 3 – Terminal 2	0 Ω
	Terminal 3 – Terminal 6	0 Ω

(1) Main Switch Connector

9Y1210686ELS0018US0



Main Switch at ACC Position

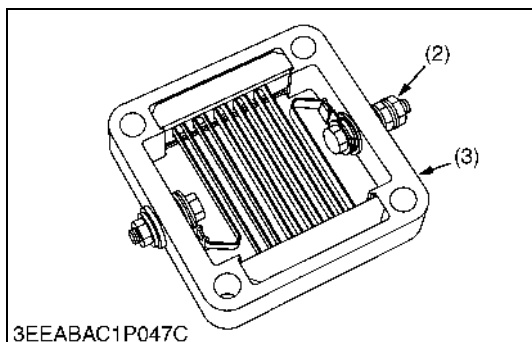
1. Turn the main switch key at the **ACC** position.
2. Measure the resistances with an ohmmeter across the terminal **3** and the terminal **1**.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	Terminal 3 – Terminal 1	0 Ω
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(1) Main Switch Connector

9Y1210686ELS0019US0

[3] INTAKE AIR HEATER



Intake Air Heater

1. Disconnect the lead.
2. Measure the resistance between + terminal (2) and intake air heater body (3).
3. If the resistance is infinity, the intake air heater is faulty.

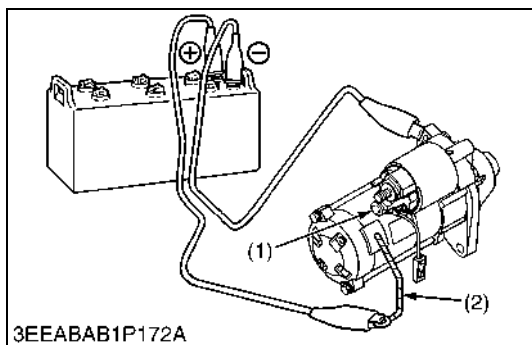
Intake air heater resistance	Factory specification	Approx. 0.3 Ω (At cold occasion)
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- (1) Intake Air Heater
(2) + Terminal

- (3) Intake Air Heater Body

9Y1210686ELS0020US0

[4] STARTER MOTOR



Starter Motor Terminal B Voltage

1. Measure the voltage with a voltmeter across the terminal **B** (1) and chassis.
2. If the voltage differs from the battery voltage, the battery's positive cable or the battery negative cable is faulty.

Voltage	Factory specification	Approx. battery voltage
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- (1) Terminal B

- (2) Starter Motor

9Y1210686ELS0021US0

Starter Motor Test



CAUTION

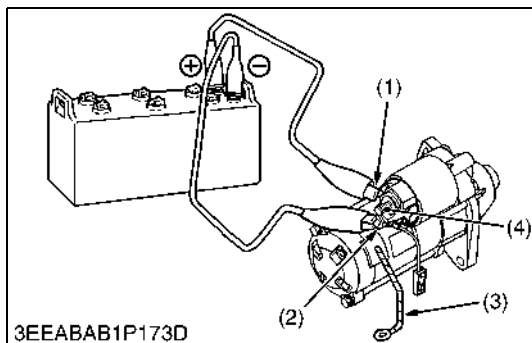
- **Secure the starter to prevent it from jumping up and down while testing the motor.**

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter terminal **C** (1).
3. Remove the starter from the engine.
4. Disconnect the connecting lead (2) from the starter terminal **C** (1).
5. Connect a jumper lead from the connecting lead (2) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter motor housing and the battery negative terminal post.
7. If the motor does not run, check the motor.

- (1) Terminal C

- (2) Connecting Lead

9Y1210686ELS0022US0



Magnet Switch Test

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter terminal **B** (4).
3. Remove the starter from the engine.
4. Disconnect the connecting lead (3) from the starter terminal **C** (2).
5. Connect a jumper lead from the starter terminal **S** (1) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter terminal **C** (2) and the battery negative terminal post.
7. If the pinion gear does not pop out, check the magnetic switch.

■ NOTE

- This test should be carried out for a short time, about 3 to 5 seconds.

- (1) Terminal **S**
(2) Terminal **C**

- (3) Connecting Lead
(4) Terminal **B**

9Y1210686ELS0023US0

[5] ALTERNATOR



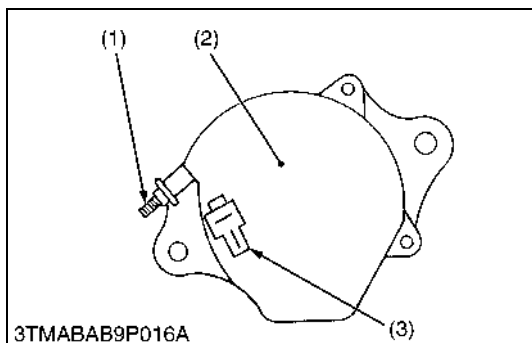
Alternator

1. Check and remove the connector of the alternator.
2. Perform the following procedure.

- (1) Alternator (45 A)
(2) Alternator (60 A)

- [A] **ROPS Model**
[B] **CABIN Model**

9Y1210686ELS0024US0



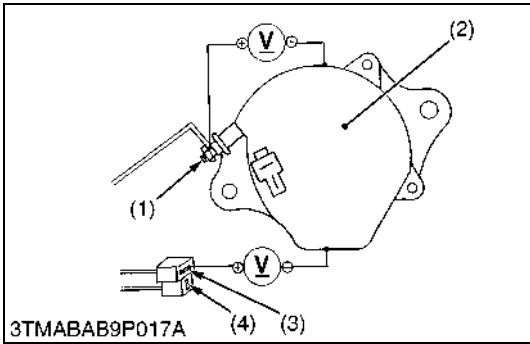
Preparation

1. Disconnect the **2P** connector (3) from alternator after turning the main switch **OFF**.
2. Perform the following procedure.

- (1) Terminal **B**
(2) Alternator

- (3) **2P** Connector

9Y1210686ELS0025US0



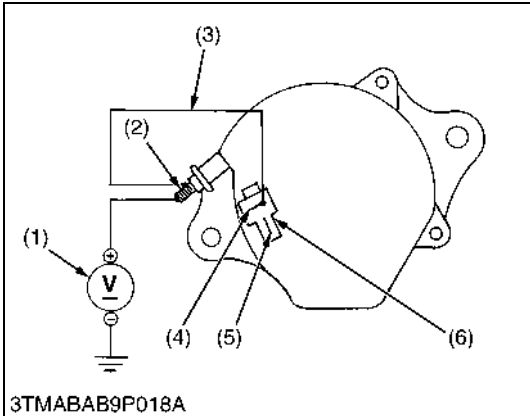
Connector Voltage

1. Turn off the main switch. Measure the voltage between the terminal **B** (1) and the chassis.
2. Turn on the main switch. Measure the voltage between the terminal **IG** (3) and the chassis.

Voltage (Main switch at OFF)	Terminal B – Chassis	Approx. battery voltage
Voltage (Main switch at ON)	Terminal IG – Chassis	Approx. battery voltage

- (1) Terminal **B** (3) Terminal **IG**
(2) Alternator (4) Terminal **L**

9Y1210686ELS0026US0



No-Load Test

1. Connect the **2P** connector (6) to previous positions of the alternator after turning off the main switch.
2. Connect the jumper lead (3) between terminal **IG** (4) and terminal **B** (2).
3. Start the engine and then set at idling speed.
4. Disconnect the negative cable from the battery.
5. Measure the voltage between the terminal **B** (2) and the chassis.
6. If the measurement is less than the factory specifications, disassemble the alternator and check the IC regulator.

Voltage	Factory specification	More than 14 V
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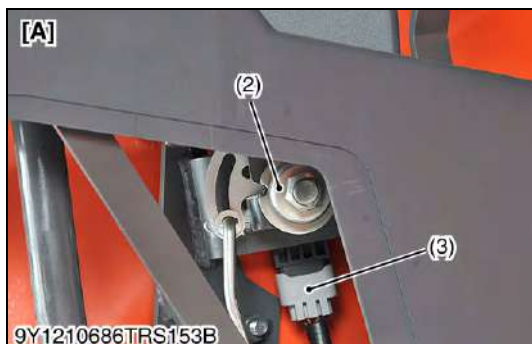
(Reference)

- Once the engine has started, the alternator temperature rises quickly up to an ambient temperature of 70 to 90 °C (158 to 194 °F). As the temperature goes higher than 50 °C (122 °F), the alternator voltage slowly drops; at higher than 100 °C (212 °F), it drops by about 1 V.

- (1) Voltmeter (4) Terminal **IG**
(2) Terminal **B** (5) Terminal **L**
(3) Jumper Lead (6) **2P** Connector

9Y1210686ELS0027US0

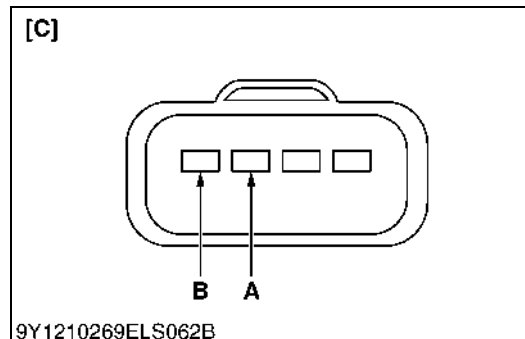
[6] THROTTLE SENSOR



Throttle Sensor Input Voltage

1. Remove the hand throttle lever grip and the throttle sensor connector (3).
2. Turn the main key switch **ON**.
3. Check the voltage between terminal **A** (+) and terminal **B** (-) of the wire harness side.

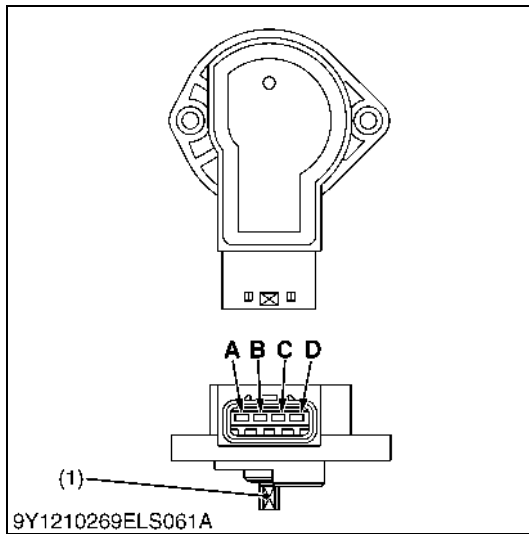
Voltage	Terminal A –Terminal B	5 V
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- (1) Hand Throttle Lever
(2) Throttle Sensor
(3) Throttle Sensor Connector

- [A] ROPS Model
[B] CABIN Model
[C] Connector (Harness)
A: Terminal A
B: Terminal B

9Y1210686ELS0030US0



Throttle Sensor Resistance

1. Measure the resistance between terminal **A** and **D** while slowly turning the sensor shaft (1).
2. Then, check resistance between terminal **B** and **D** while slowly turning the sensor shaft (1).
3. It is OK if the resistance value is approximate to the value shown in the table below.

(Reference)

- The change of resistance can be checking easily when an analog tester is employed.

Resistance	Terminal A – Terminal D	0 to 1 kΩ
	Terminal B – Terminal D	0 to 1 kΩ

(1) Sensor Shaft

A: Terminal **A**

B: Terminal **B**

C: Terminal **C**

D: Terminal **D**

9Y1210686ELS0031US0

[7] METER PANEL

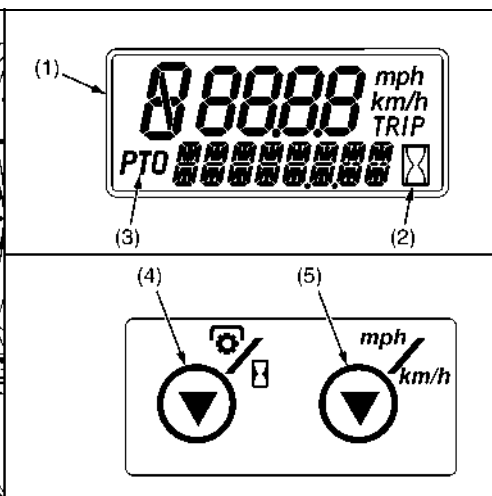
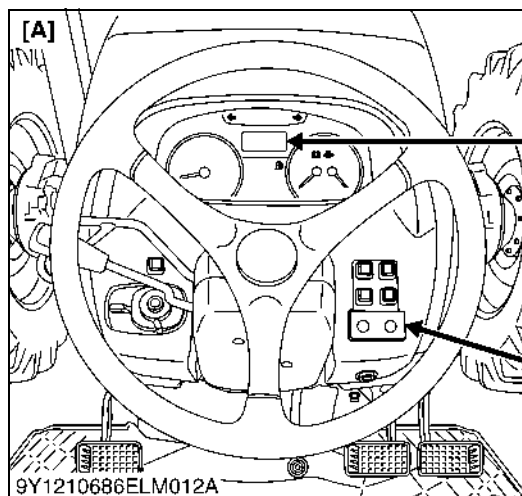
(1) Setting Mode



CAUTION

- To perform the meter panel, the operator must be seated on the tractor.

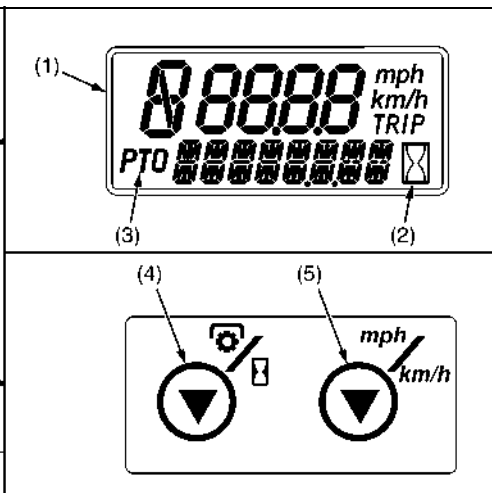
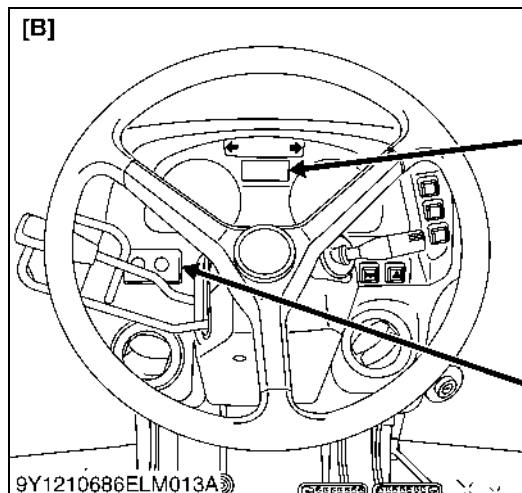
9Y1210686ELS0090US0



- (1) LCD Monitor
- (2) Hour Meter Indication
- (3) PTO Indication
- (4) PTO / Hour Meter Select Switch
- (5) Traveling Speed Select Switch

[A] ROPS Model

[B] CABIN Model

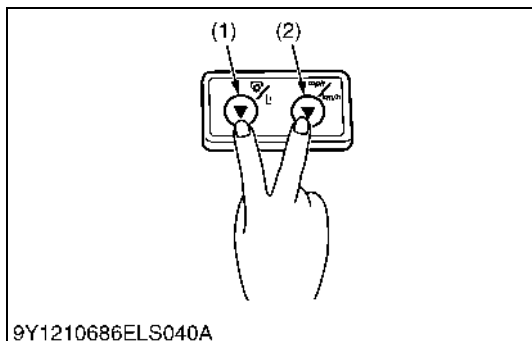


■ Changing Display Mode

- The LCD monitor gives three different display modes: "Traveling speed and Hour meter", "Traveling speed and PTO speed" and "Traveling speed and Fuel meter". Each time the PTO/Hour meter select switch is pressed, the mode is switched to the changing display.
- The PTO clutch control switch works for the following automatic display modes.
 - PTO clutch control switch ON: Traveling speed and PTO speed are displayed.
 - PTO clutch control switch OFF: Traveling speed and Hour meter are displayed.
- The units of travel speed and mileage (mile, km, gallon and liter) can be selected with the traveling speed select switch.

9Y1210686ELS0091US0

(2) Adjusting Meter Panel



Mode Select

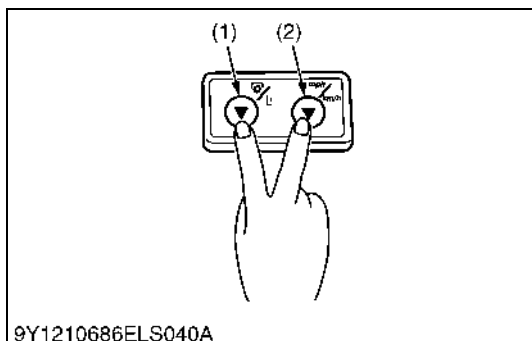
1. While pressing both the PTO/Hour meter select switch (1) and traveling speed select switch (2), turn the key switch to **ON** position.
2. Release temporarily both switches.
3. Press both the PTO/Hour meter selects switch (1) and traveling speed select switch (2).
4. Select the mode in below table.

(1) PTO/Hour Meter Select Switch (2) Traveling Speed Select Switch

Mode	Item No.	Mode Name	Item Name
TST	1	Testing sensor	Check the each sensor value
CHK	1	Check the error code	Checking the error code history
	2		Erasing error code history
SEL	1	Selecting the tractor specification	Tractor specification
	2		PTO gear ratio
	3		Tire dimension
	4		Block heater
ADJ	1	Adjusting throttle sensor	Adjusting throttle sensor

9Y1210686ELS0092US0

(3) Adjusting Throttle Sensor



9Y1210686ELS040A



9Y1210686ELS011A



9Y1210686ELS041A



9Y1210686ELS042A

Memorize Throttle Sensor Value

■ NOTE

- Before inputting the throttle sensor value in the tractor ECU, warm up the engine about 10 to 15 minutes.

- (1) PTO/Hour Meter Select Switch (2) Traveling Speed Select Switch

9Y1210686ELS0094US0

Adjusting the Throttle Sensor

1. Select the "ADJ-1" mode.
2. Start the engine.
3. Travel speed select switch press and hold longer than 2 seconds.
4. "SET 0" is displayed.
5. Set the hand accelerator lever (1) and pedal at idling position (Min.).
6. Press the travel speed select switch press and hold those longer than 2 seconds.
7. "WAIT" is displayed.

- (1) Hand Accelerator Lever

9Y1210686ELS0095US0



9Y1210686ELS043A



9Y1210686ELS011B

Set the MAX Position

1. The engine revolution rises automatically.
2. **"SET 100"** is displayed.
3. Set the hand accelerator lever (1) at MAX position (close to the stopper).
4. Wait for about 5 seconds.
5. Press and hold the traveling speed select switch.

(1) Hand Accelerator Lever

9Y1210686ELS0096US0

After Finishing This Procedure

1. If this setting process is correct, **"OK"** is displayed in the meter panel. After that, stop the engine.
2. If this setting process is incorrect, **"NG"** or error code is displayed.
3. Set this procedure again.

9Y1210686ELS0097US0

(4) Testing Mode

Testing the Each Sensor Value

1. Select the "**TST-1**"
2. Make sure that the mode item "**TST-1**" blinks on the display with press and hold the traveling speed select switch until "**T1**" appears on the display.
3. Make sure that the "**T1**" appears on the display, and then release the traveling speed select switch.

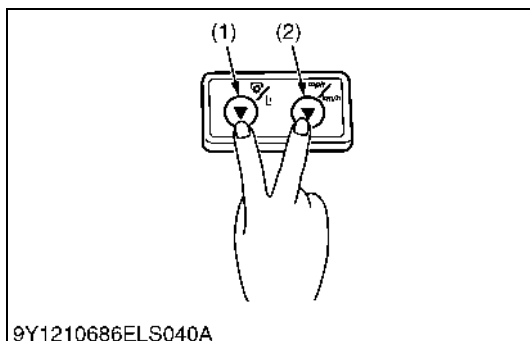
■ **NOTE**

- The mode "**TST -1**" consists of 11 checking items.
- Every time pressing the PTO/Hour meter select switch, the menu item changes.

No.	Contents	Normal Condition	Unit	Remark
1	Accelerator sensor (main)	0.05 to 4.9	Voltage	Main (1) + sub (2) 3.85 V to 6.15 V (Normal condition)
2	Accelerator sensor (sub)	0.05 to 4.9	Voltage	
3	Engine revolution	0 to 2800	n/min	
4	Shuttle revolution	0 to 2450	n/min	
5	Engine coolant temperature	-30 to 120 °C (-4 to 248 °F)	Celsius	
6	Fuel empty sensor voltage	Empty to Full	Voltage	Fuel tank sensor
7	Battery voltage	8.0 to 16.0	Voltage	
8	PTO revolution	0 to 1000	n/min	
9	PM sedimentation quantity 1	4 to 38	Gram	DPF regeneration request trigger 1
10	PM sedimentation quantity 2	4 to 38	Gram	DPF regeneration request trigger 2
11	Fuel quantity after regeneration	MAX 80	L	DPF regeneration request trigger 3

9Y1210686ELS0098US0

(5) Checking the Error Code



Preparation

1. While pressing both the PTO/Hour meter select switch (1) and traveling speed select switch (2), turn the key switch to **ON** position.
2. Release and press both the PTO/Hour meter select switch (1) and traveling speed select switch (2).

(1) PTO/Hour Meter Select Switch (2) Traveling Speed Select Switch

9Y1210686ELS0099US0

Checking Mode 1 (Check the Error History)

■ IMPORTANT

- This error code history is displayed only tractor ECU information. You cannot check the DTC code in this mode.

1. Set the mode item "**CHK-1**".
2. Make sure that the mode item "**TST-1**" blinks on the display with press and hold the traveling speed select switch until "**E-XXX**" or "**NO ERROR**" appears on the display.

■ NOTE

- Every time pressing the PTO/Hour meter select switch or traveling speed select switch, the item changes in order of diagnostic trouble code history. If there is no diagnostic trouble code history, "**NO ERROR**" shows on the display.

1. Press the "PTO/Hour meter select switch" Item No. count up.
2. Press the "traveling speed select switch" Item No. count down.
3. Turn the main switch "**OFF**".

9Y1210686ELS0101US0

Checking Mode 2 (Erase Error History)

1. Set the mode item "**CHK-2**".
2. Make sure that the mode item "**CHK-2**" blinks on the display with press and hold the traveling speed select switch until "**CLEAR**" appears on the display.
3. Make sure that the mode item "**CLEAR**" blinks on the display with press and hold the traveling speed select switch until "**CLEAR**" appears on the display.
4. After confirming "**OK**", turn the main switch "**OFF**".

9Y1210686ELS0102US0

(6) Selecting the Tractor Specification

Preparation

1. Set the mode item "**SEL-1**" to "**SEL-4**".
2. Check each "Specification Table".

9Y1210686ELS0100US0

Select the Tractor Model (SEL-1)

1. Set the mode item "**SEL-1**".
2. Make sure that the mode item "**SEL-1**" blinks on the display with press and hold the traveling speed select switch until "**TYPE-1**" appears on the display.
3. Each time the traveling speed select switch is pressed, the code change in order of "**1**" → "**2**" → "**3**" → "**4**" → "**1**". Select the appropriate code according to the table in last page.
4. Turn the key switch to "**OFF**" position to exit.

Model specifications		
Display		Specifications
TYPE	1	North America (Except F24/R24)
	2	North America F24/R24.
	3	EURO ROPS/CABIN model
	4	EURO Low-Profile model

DT·Bi-Speed	
Display	Specifications
2WD	2WD
4WD	4WD
Bi	Bi-speed

Main and sub gear	
Display	Specifications
1	4th, H/L
2	4th, H/L, C
3	6th, H/L
4	6th, H/L, DS
5	6th, H/L, C
6	6th, H/L, C, DS

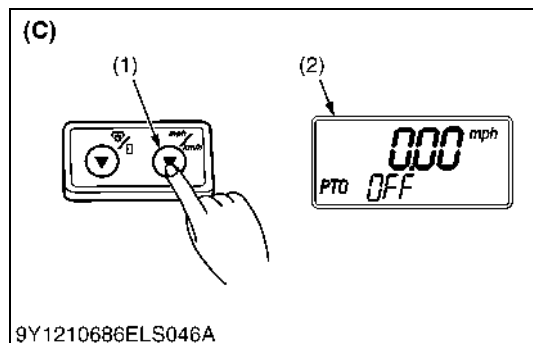
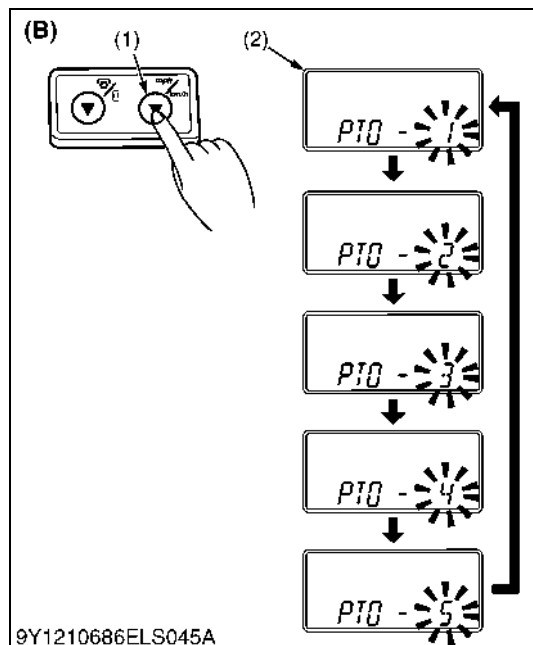
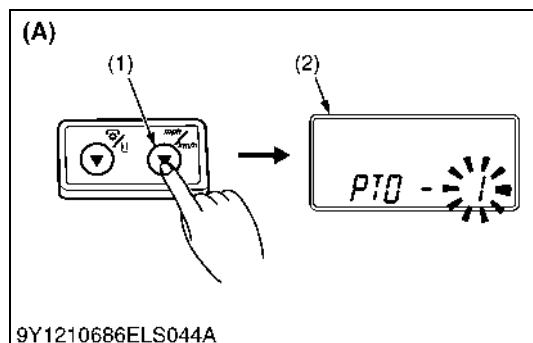
4th/6th: Main gear range

H/L: Sub gear range (High/Low)

C: Creep (If equipped)

DS: Dual speed model

9Y1210686ELS0103US0



Select the PTO Gear Ratio (SEL-2)

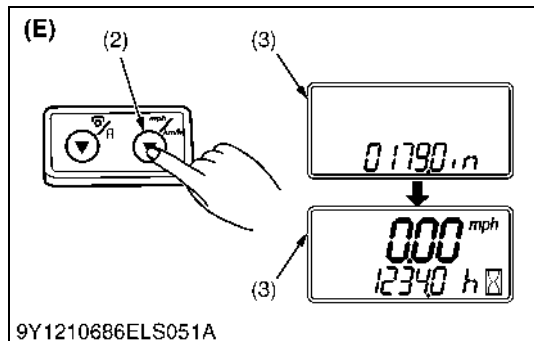
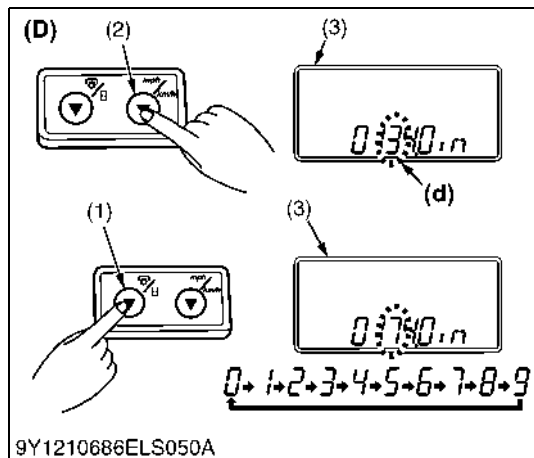
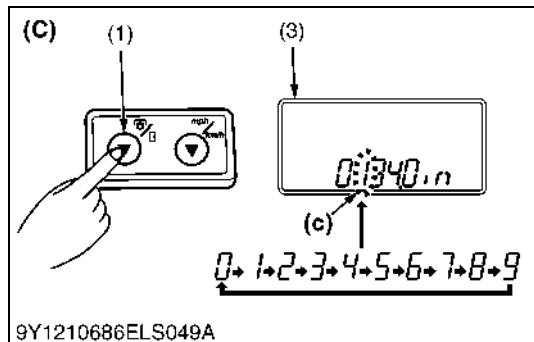
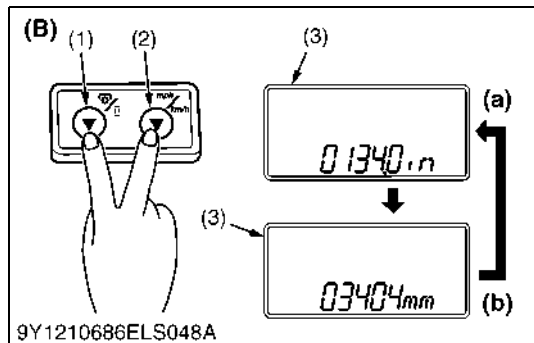
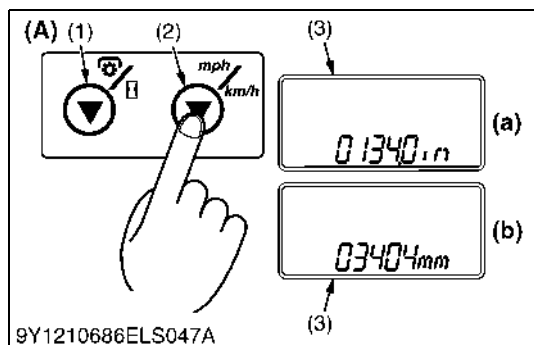
1. Set the mode item **"SEL-2"**.
2. Make sure that the mode item **"SEL 1"** blinks on the display with press and hold the traveling speed select switch, and then **"PTO-1"** appears on the display.
3. Each time the traveling speed select switch is pressed, the code change in order of **"1" → "2" → "3" → "4" → "5" → "1"**. Select the appropriate code according to the table in last page.
4. When selecting the appropriate code. And then, press and hold the traveling speed select switch until appropriate code is light.
5. Turn the key switch to **"OFF"** position to exit.

PTO gear ratio		
Display		Specifications
PTO	1	540 1 stage
	2	540 Replacement type
	3	1000 Replacement type
	4	540 / 540E 2 stages
	5	540 / 1000 2 stages

- (1) Traveling Speed Select Switch
(2) LCD Monitor

- (A) Procedure to enter the PTO speed display mode switching
(B) Procedure to select numerical code
(C) Procedure to put in memory

9Y1210686ELS0104US0



Tire Dimension (SEL-3)

[Example: Entering 179.0 inch]

1. While pressing the traveling speed select switch (2), turn the key switch to "ON" position. The setting of the current tire's circumference is displayed in inches (a) or millimeters (b). The highest-digit numeral starts flashing.
2. Each time both the PTO/Hour meter select switch (1) and traveling speed select switch (2) are pressed at the same time, the unit changes for inches (a) or millimeters (b). Select the inch display mode.
3. Note that the highest-digit numeral (c) is flashing. Press the PTO/Hour meter select switch (1) to select "1". (The numeral changes from 0 to 9 at each push of the switch.)
4. Press the traveling speed select switch (2), and the next highest digit (d) starts flashing. Now press the PTO/Hour meter select switch (1) to select "7".
5. Enter "9" and "0" for the remaining digits in the same procedure.
6. Make sure the entry is "179.0". Press and hold the traveling speed select switch (2) longer than 2 seconds. The setting is put in memory, and the LCD monitor (3) goes back to the hour meter mode.
7. Turn the key switch to "OFF" position to exit.

NOTE

- The setting will be cancelled if the key switch is turned OFF halfway in the procedure.

Tire circumference chart (reference)

Rear tire size	Entry (in.)	Entry (mm)
16.9-24 LowProfile	152.0	3861
19.5L-24 R4 IND	154.0	3912
18.4-26 R3 Turf	167.0	4242
16.9-30 R1	171.0	4343
18.4-26 R1	173.7	4411
18.4-28 R1	175.0	4445
18.4-30 R1	179.0	4546
18.4R30	183.3	4656
16.9-34 R1	184.0	4674

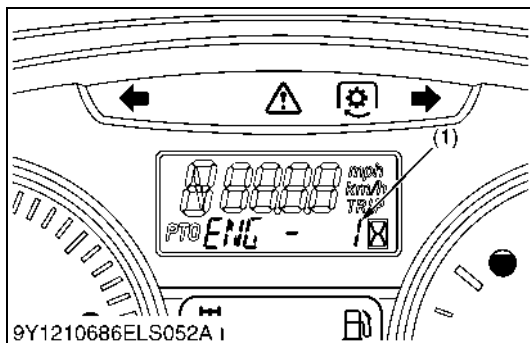
- (1) PTO/Hour Meter Select Switch
(2) Traveling Speed Select Switch
(3) LCD Monitor

- (D) Procedure to change next highest digit and select numerical
(E) Procedure to put in memory

- (A) Procedure to enter the traveling speed coefficient mode
(B) Procedure to select display for inches or millimeters
(C) Procedure to select numerical at highest digit

- (a) Displayed in inches
(b) Displayed in millimeters
(c) Highest-digit numerical
(d) Next Highest-digit numerical

9Y1210686ELS0105US0



Block Heater (SEL-4)

1. Set the mode item **"SEL-4"**.
2. Make sure that the mode item **"SEL-4"** blinks on the display with press and hold the traveling speed select switch until **"ENG-0"** appears on the display.
3. Each time the traveling speed select switch is pressed, the code change in order of **"0" → "1" → "0"**. Select the appropriate code according to the table.

Block Heater		
Display		Specifications
ENG	0	Without Block Heater
	1	With Block Heater

(1) LCD Monitor

9Y1210686ELS0106US0

[8] TRACTOR ECU

(1) Tractor ECU



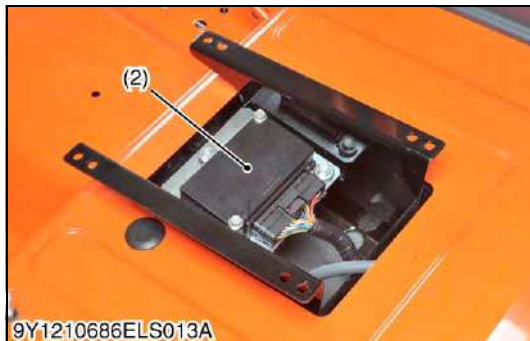
Tractor ECU (ROPS Model)

1. Remove the OPC connector.
2. Remove the seat (1).

(1) Seat

(2) Tractor ECU

9Y1210686ELS0032US0



**Tractor ECU (CABIN Model)**

1. Remove the lever grips (1).
2. Remove the wire harness.
3. Remove the connector of switch.
4. Remove the cover (2).

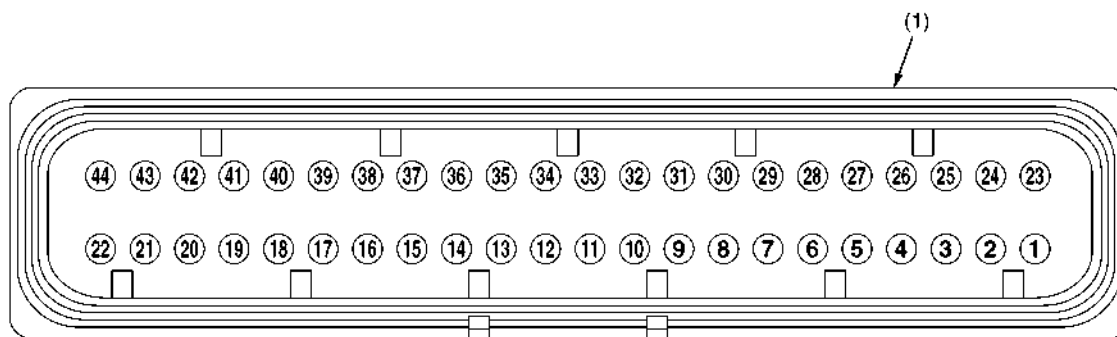
- (1) Lever Grip
(2) Cover

- (3) Tractor ECU

9Y1210686ELS0033US0



(2) Connector Pin (44 Pin)



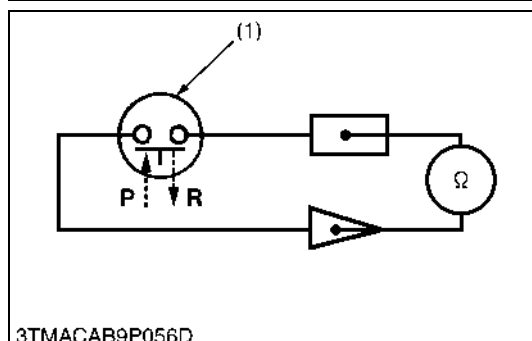
9Y1210686ELS037A

No.	Terminal Name	No.	Terminal Name
1	Shuttle revolution sensor	23	Traveling speed sensor
2	Foot brake switch	24	Hydraulic shuttle switch (neutral)
3	RXD (for check)	25	TXD (for check)
4	4WD switch	26	Blank
5	Throttle sensor (Main)	27	Throttle sensor (sub)
6	Blank	28	Blank
7	CAN (H)	29	CAN (L)
8	Sub range gear shift switch	30	Blank
9	DPF regeneration switch	31	+5V (Sensor use)
10	DPF auto switch	32	GND (Ground for sensor line)
11	Blank	33	Turning angle inspection switch
12	Blank	34	Bi-Speed switch
13	Blank	35	PTO switch
14	Constant RPM management switch	36	Blank
15	6th range switch	37	Battery GND
16	PTO shift switch (540E)	38	DPF regeneration lamp
17	Blank	39	DPF AUTO lamp
18	Dual speed (H-L) switch	40	4WD solenoid
19	+B (Direct)	41	Bi-Speed solenoid
20	+B (to main switch)	42	Blank
21	Blank	43	Blank
22	Blank	44	PTO relay

(1) Tractor ECU Connector

9Y1210686ELS0034US0

[9] TRAVELING SWITCH AND SENSOR



Range Gear (6th) Switch and Range Gear (High) Switch Continuity

1. Remove the range gear (6th) switch (1) and the range gear (High) switch (2) continuity switch.
2. Check the continuity with an ohmmeter across the switch terminals.
3. If it does not conduct or any value is indicated when the switch is released, the switch is faulty.
4. If infinity is not indicated when the switch is pushed, the switch is faulty.

- (1) Range Gear (6th) Switch
(2) Range Gear (High) Switch

P: Pushed
R: Released

9Y1210686ELS0036US0

Shuttle Neutral Switch

1) Shuttle Neutral Switch Continuity

1. Check the continuity with an ohmmeter across the switch terminals.
2. If it does not conduct or any value is indicated when the switch is pushed, the switch is faulty.
3. If infinity is not indicated when the switch is released, the switch is faulty.

■ NOTE

- Be sure to check the position of shuttle spool (2), the mark (3) toward the outside as shown photo.

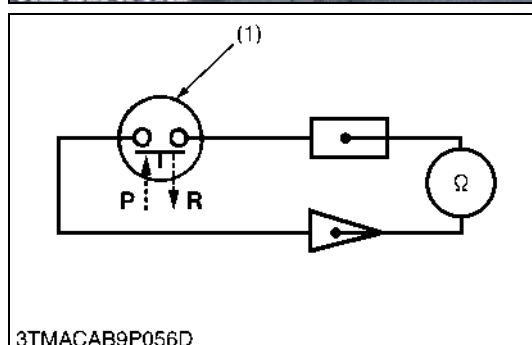
If the shuttle spool (2) is not correct position, shuttle neutral switch (1) operates improperly.

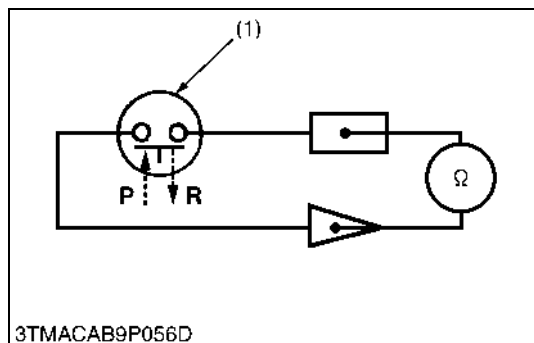
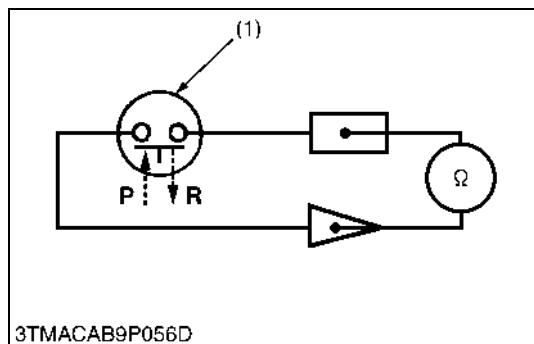
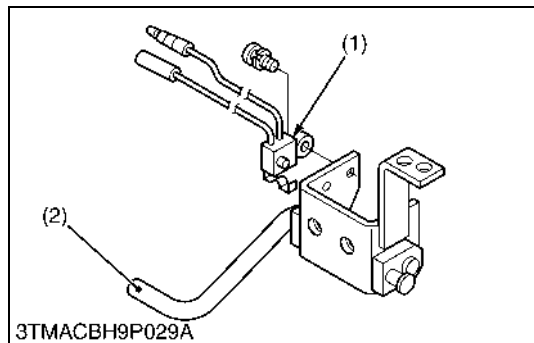
Resistance (Across switch terminals)	Reference value	When switch is pushed "P"	0 Ω
		When switch is released "R"	Infinity

- (1) Shuttle Neutral Switch
(2) Shuttle Spool
(3) Mark

P: Pushed
R: Released

9Y1210686ELS0037US0





Rear Differential Lock Switch

1) Rear Differential Lock Switch Continuity

1. Check the continuity with an ohmmeter across the switch terminals.
2. If it does not conduct or any value is indicated when the switch is pushed, the switch is faulty.
3. If infinity is not indicated when the switch is released, the switch is faulty.

Resistance (Across switch terminals)	Reference value	When switch is pushed "P"	0 Ω
		When switch is released "R"	Infinity

- (1) Rear Differential Lock Switch
(2) Rear Differential Lock Pedal

P: Pushed
R: Released

9Y1210686ELS0038US0

Foot Brake Switch

1) Wiring Harness

1. Disconnect the leads from the foot brake switch (1).
2. Connect the wiring harness lead terminals to each other and turn the main switch **ON**.
3. If the stop lights do not light, the fuse, wiring harness or bulb is faulty.

2) Brake Switch Continuity

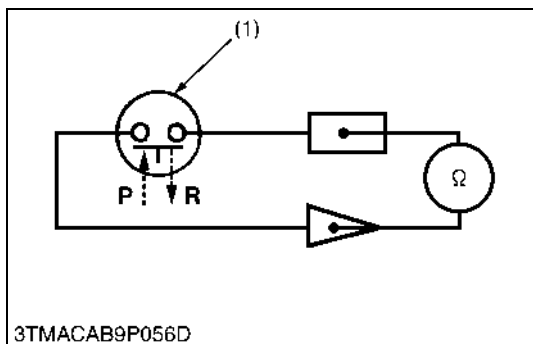
1. Remove the foot brake switch (1).
2. Check the continuity with an ohmmeter across the switch terminals.
3. If it does not conduct or any value is indicated when the switch is released, the switch is faulty.
4. If infinity is not indicated when the switch is pushed, the switch is faulty.

Resistance (Across switch terminals)	Reference value	When switch is pushed	Infinity
		When switch is released	0 Ω

- (1) Foot Brake Switch

P: Pushed
R: Released

9Y1210686ELS0039US0



Parking Brake Switch

■ NOTE

- If the main range gear is parking position, this switch is pushed.

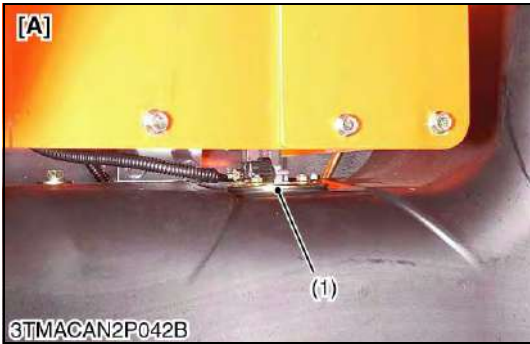
1. Remove the cover.
2. Disconnect the connector of parking brake switch.
3. Measure the resistance value of switch when the main range gear is parking position.

Resistance (Across switch terminal)	Reference value	When switch is pushed	Infinity
		When switch is released	0 Ω

(1) Parking Brake Switch

P: Pushed
R: Released

9Y1210686ELS0040US0



Checking Fuel Level Sensor

- 1. Remove the fuel level sensor from the fuel tank.
- 2. Measure the resistance with an ohmmeter across the terminal **a** and terminal **b**.
- 3. If the measurement is not indicated, the sensor is faulty.

Resistance (Sensor terminal a – terminal b)	Factory specification	Float at uppermost position	3.0 to 5.0 Ω
		Float at lowermost position	107.5 to 112.5 Ω

(1) Fuel Unit

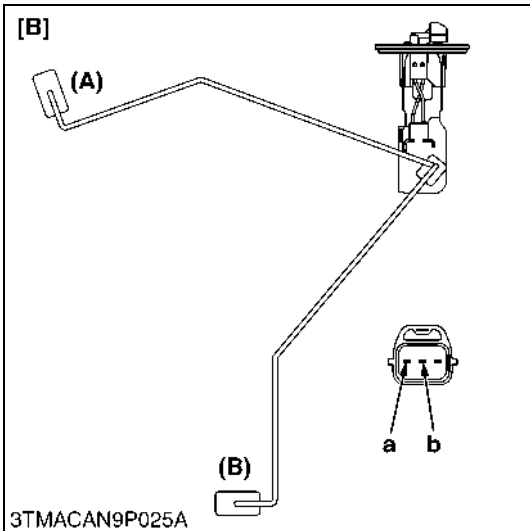
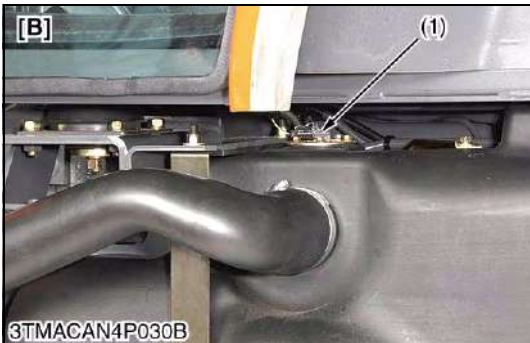
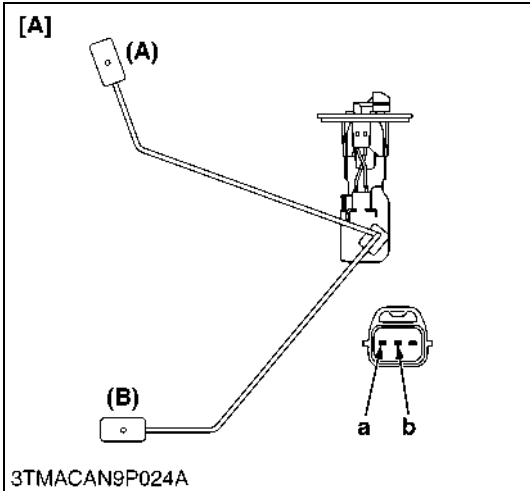
(A) Float at Uppermost Position

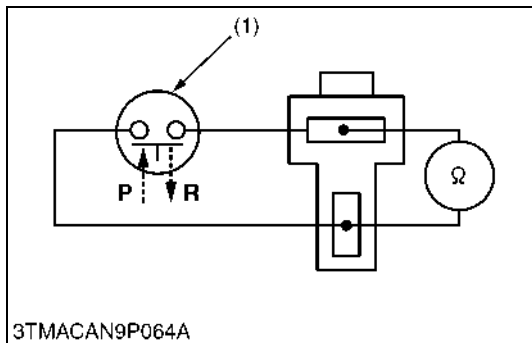
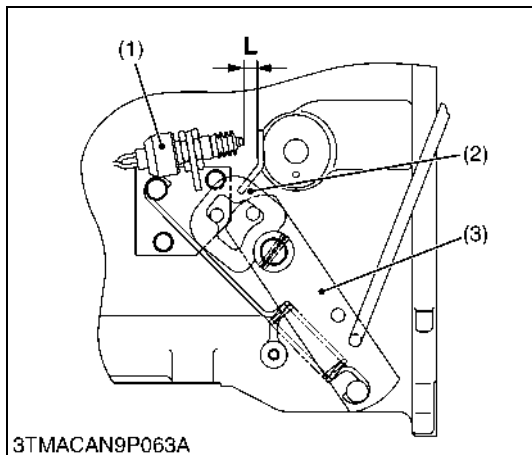
(B) Float at Lowermost Position

[A] ROPS Model
[B] CABIN Model

a: Terminal 1
b: Terminal 2

9Y1210686ELS0041US0





4WD ON-OFF Switch

1) 4WD ON-OFF Switch Continuity

1. Check the continuity with an ohmmeter across the switch terminals.
2. If it does not conduct or any value is indicated when the 4WD ON-OFF switch is pushed, the 4WD ON-OFF switch is faulty.
3. If infinity is not indicated when the switch is released, the 4WD ON-OFF switch is faulty.

Resistance (Across switch terminals)	Reference value	When switch is pushed "P"	0 Ω
		When switch is released "R"	Infinity

2) Setting 4WD ON-OFF Switch

1. Be sure to set the 4WD lever (2) at 2WD position.
2. Measure the setting length (L) between the plate of 4WD lever (2) and tip of the 4WD ON-OFF switch (1) as shown in figure.
3. If the measurement is not within the reference value, adjust with the 4WD switch retaining nuts.

4WD switch setting length "L"	Reference value	10.0 to 11.5 mm 0.394 to 0.452 in.
----------------------------------	-----------------	---------------------------------------

- (1) 4WD ON-OFF Switch
(2) 4WD Lever
(3) DT Shift Lever

L: 4WD Switch Setting Length
P: Pushed
R: Released

9Y1210686ELS0042US0

Traveling Speed Sensor

1. Check traveling speed display.
2. If it is OK, the engine speed is displayed in the meter panel.
3. If it is OK, the traveling speed is displayed in the LCD monitor.

■ NOTE

- As for engine speed sensor and traveling speed sensor are not checking with circuit tester.

- (1) Traveling Speed Sensor

9Y1210686ELS0043US0

Shuttle Rotation Sensor

1. Check the meter panel.
2. If the shuttle rotation sensor (1) is detected, [ERROR-23] is displayed in meter panel.

■ NOTE

- As for shuttle rotation sensor is not checking with circuit tester.

- (1) Shuttle Rotation Sensor

9Y1210686ELS0044US0

[10] ENGINE SENSOR

■ IMPORTANT

- On the Diagmaster Software, you can check and measure the resistance and voltage of the engine sensors. When you measure the value of the engine sensors, use the Diagmaster Software.
- Refer to Diagmaster Manual "9Y130-01920" in detail points.

9Y1210686ELS0045US0



Exhaust Temperature Sensor

- Remove the exhaust temperature sensor.
- Measure the resistance between terminal (+) and (-).

Exhaust temperature sensor 0, 1, 2	Reference value	20 °C (68 °F)	Approx. 150 Ω
		200 °C (392 °F)	Approx. 4 kΩ

- (1) Exhaust Temperature Sensor 0 (3) Exhaust Temperature Sensor 2
(2) Exhaust Temperature Sensor 1

9Y1210686ELS0046US0



Coolant Temperature Sensor

- Measure the resistance between terminal (+) and (-).

Coolant temperature sensor resistance	Factory specification	15.04 kΩ at -20 °C (-4 °F) 2.45 kΩ at 20 °C (68 °F) 0.318 kΩ at 80 °C (176 °F) 0.1417 kΩ at 110 °C (230 °F)
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- (1) Coolant Temperature Sensor

9Y1210686ELS0047US0

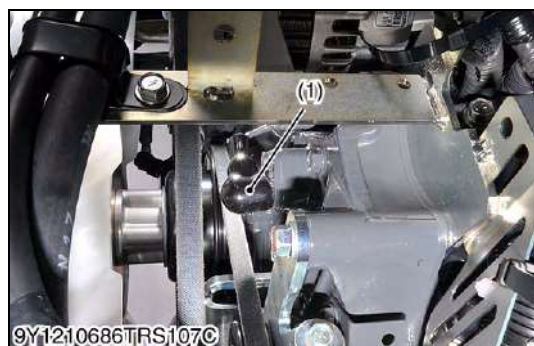


Camshaft Position Sensor

Refer to "Diagnosis Manual". (Code No. 9Y130-01920)

- (1) Camshaft Position Sensor

9Y1210686ELS0048US0





Crankshaft Position Sensor

Refer to "Diagnosis Manual". (Code No. 9Y130-01920)

- (1) Crankshaft Position Sensor

9Y1210686ELS0049US0



Intake Air Mass Flow Sensor

1. Measure the resistance between terminal (+) and (-).

Intake air mass flow sensor	Representative value	Approx. 20 °C (68 °F)	Approx. 2.4 V
		Approx. 40 °C (104 °F)	Approx. 1.5 V

- (1) Intake Air Mass Flow Sensor

9Y1210686ELS0050US0



Intake Throttle Sensor

1. Measure the voltage between terminal (+) and (-).

Intake throttle sensor	Representative value	12.96 kg/h	1.239 V
		698.4 kg/h	4.598 V

- (1) Intake Throttle Sensor

9Y1210686ELS0051US0



Intake Air Temperature sensor

1. Measure the voltage between terminal (+) and (-).

Intake air temperature sensor	Representative value	Approx. 20 °C (68 °F)	Approx. 3.1 V
		Approx. 80 °C (176 °F)	Approx. 0.9 V

- (1) Intake Air Temperature Sensor

9Y1210686ELS0052US0



Differential Pressure Sensor

1. Measure the voltage between terminal (+) and (-).

Differential pressure sensor	Representative value	-1.7 kPa	0.5 V
		34.5 kPa	4.5 V

- (1) Differential Pressure Sensor

9Y1210686ELS0053US0



Exhaust Gas Recirculation (EGR) Position Sensor Output

Refer to "Diagnosis Manual". (Code No. 9Y130-01920)

EGR position sensor	Representative (Valve lift)	16 to 106
---------------------	--------------------------------	-----------

- (1) EGR Position Sensor

9Y1210686ELS0054US0



Suction Control Valve (SCV) Current

1. Measure the voltage between terminal (+) and (-).

Suction control valve	Representative value	Idling speed	Approx. 1800 mA
-----------------------	----------------------	--------------	-----------------

- (1) Suction Control Valve

9Y1210686ELS0055US0



Rail Pressure Sensor Output Voltage

1. Measure the voltage between terminal (+) and (-).

Rail pressure sensor output voltage	Representative value	When stopped	1.0 V
		Idling speed	1.65 to 1.80 V
		During no-load maximum speed	2.50 to 2.85 V
		During acceleration	2.5 to 3.3 V

- (1) Rail Pressure Sensor

9Y1210686ELS0056US0

[11] RELAYS

(1) Starter Relay



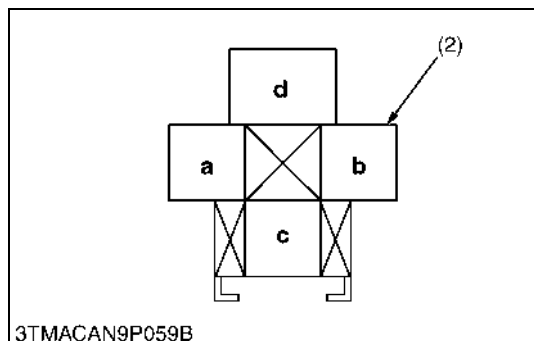
Checking Connector Voltage

1. Measure the voltage with a voltmeter across the battery terminal and chassis as table below.
2. If the voltage differs from the battery voltage, the wiring harness or fuse is faulty.

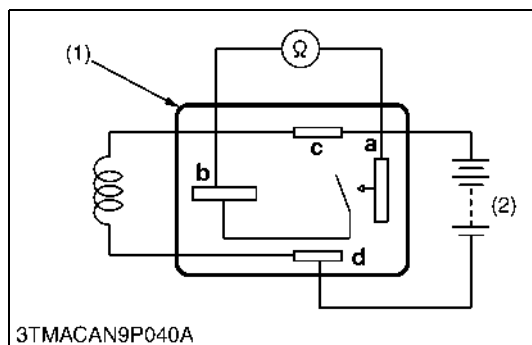
- (1) Starter Relay

- (2) Connector (Wire Harness)

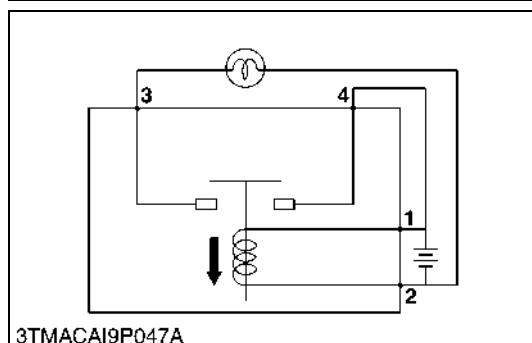
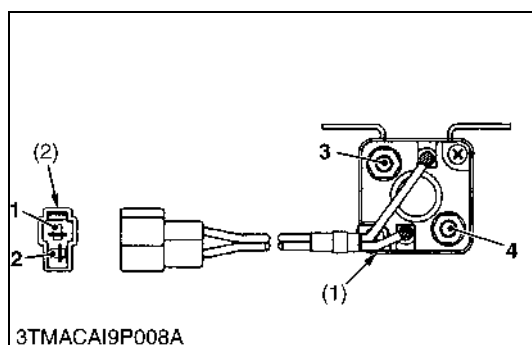
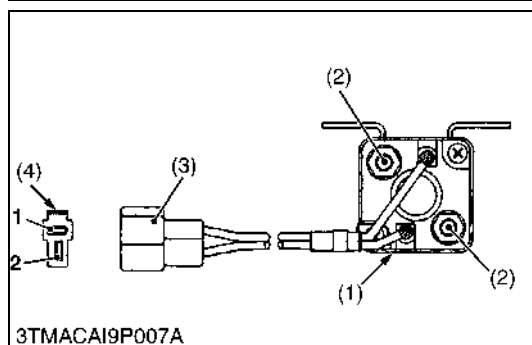
9Y1210686ELS0057US0



3TMACAN9P059B



(2) Intake Air Heater Relay



Functional Check

NOTE

- The relays described here are used same ones so that these are interchangeable.

- Apply battery voltage across the terminals c and d, and check for continuity across the terminals a and b.
- If continuity is not established across the terminals a and b, replace it.

(1) Connector (Relay)

(2) Battery

9Y1210686ELS0058US0

Connector Voltage

- Turn off the main switch.
- Disconnect the **2P** connector (3) and both white color lead and red color lead from relay (1).
- Measure the voltage with a voltmeter across white color lead and chassis.
- If the voltage differs from battery voltage the wiring harness or slow blow fuse is faulty.
- Turn on the main switch to at the **PREHEAT** position.
- Measure the voltage a voltmeter across **2P** connector's (4) 1 terminal and chassis.
- If the voltage differs from the battery voltage, the wiring harness or slow blow fuse is faulty.

Voltage	Main switch at "OFF"	White color lead – chassis	Approx. battery voltage
	Main switch at "PREHEAT"	1 terminal – chassis	

(1) Air Heater Relay

(4) 2P Connector (Wire Harness Side)

(2) Terminal

(3) 2P Connector (Relay Side)

1 and 2 : Terminal

9Y1210686ELS0059US0

Functional Check

- Remove the air heater relay.
- Apply battery voltage across the 1 and 2 terminals, check continuity across 3 terminal and 4 terminal as shown in figure.
- If continuity is not established across 3 terminal and 4 terminal, air heater relay is faulty.

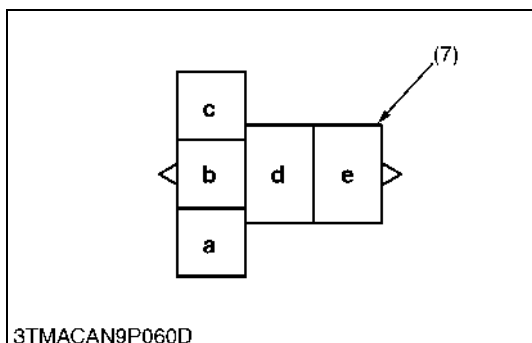
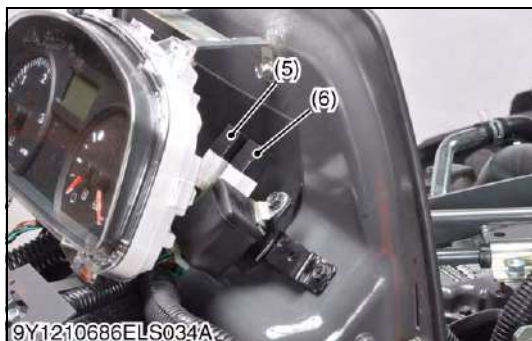
(1) Air Heater Relay

1 to 4 : Terminal

(2) Relay Connector

9Y1210686ELS0060US0

(3) Relays



Checking Connector Voltage (ROPS Model)

1. Measure the voltage with a voltmeter across the battery terminal and chassis as table below.
2. If the voltage differs from the battery voltage, the wiring harness or fuse is faulty.

NOTE

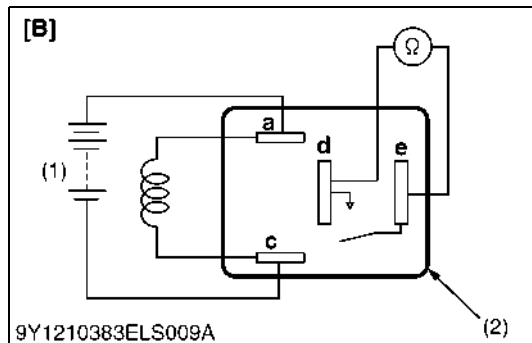
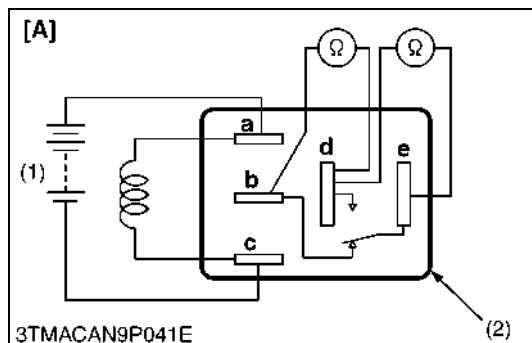
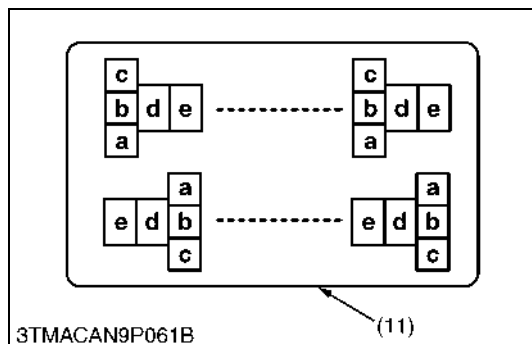
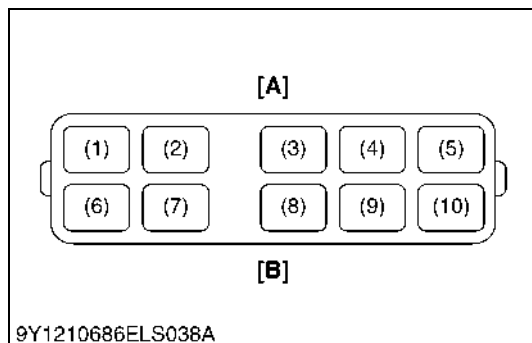
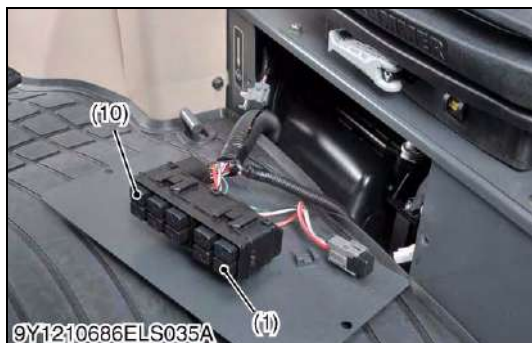
- Be sure to use the 5 terminal type relay for the engine stop relay (1).
- Other relays can use both 4 terminal type relay and 5 terminal relay.
- The color of the relay are black, both 4 terminal type relay and 5 terminal type relay.

(1)	Engine stop relay (main switch at ON position)	Terminal c – Chassis	Approx. battery voltage
(2)	PTO safety relay (main switch at ON position and PTO lever OFF position)	Terminal c – Chassis	Approx. battery voltage
(3)	Work light relay (front) (main switch at OFF position)	Terminal e – Chassis	Approx. battery voltage
(4)	Key stop relay (main switch at OFF position)	Terminal e – Chassis	Approx. battery voltage
(5)	Head light relay (low) (main switch at OFF position)	Terminal d – Chassis	Approx. battery voltage
(6)	Head light relay (high) (main switch at OFF position)	Terminal d – Chassis	Approx. battery voltage

- (1) Engine Stop Relay
(Green: 5 Terminals Type)
(2) PTO Safety Relay
(3) Work Light Relay (Front)

- (4) Key Stop Relay
(5) Head Light Relay (Low)
(6) Head Light Relay (High)
(7) Connector (Wire Harness)

9Y1210686ELS0061US0



Checking Connector Voltage (CABIN Model)

1. Measure the voltage with a voltmeter across the battery terminal and chassis as table below.
2. If the voltage differs from the battery voltage, the wiring harness or fuse is faulty.

(1)	PTO safety relay (main switch at ON position and PTO lever OFF position)	Terminal c – Chassis	Approx. battery voltage
(2)	Front light relay	Terminal e – Chassis	Approx. battery voltage
(3)	Air conditioner blower high relay	Terminal c – Chassis	Approx. battery voltage
(4)	Working Light Relay (main switch at OFF position)	Terminal e – Chassis	Approx. battery voltage
(5)	Air conditioner blower relay (main switch at ACC position)	Terminal d – Chassis	Approx. battery voltage
(6)	PTO relay		Approx. battery voltage
(7)	Neutral relay		Approx. battery voltage
(8)	Front motor relay	Terminal c – Chassis	Approx. battery voltage
(9)	Side lamp relay		Approx. battery voltage
(10)	Air compressor relay (main switch at OFF position)	Terminal d – Chassis	Approx. battery voltage

- | | |
|---------------------------------------|---------------------------|
| (1) PTO Safety Relay | (8) Front Motor Relay |
| (2) Front Light Relay | (9) Side Lamp Relay |
| (3) Air Conditioner Blower High Relay | (10) Air Compressor Relay |
| (4) Working Light Relay | (11) Connector Box |
| (5) Air Conditioner Blower Relay | |
| (6) PTO Relay | |
| (7) Neutral Relay | |
- [A] Plate Side
[B] Blower Side

9Y1210686ELS0062US0

Functional Check

1. Apply battery voltage across the terminals **a** and **c**, and check for continuity across the terminals **d** and **e**.
2. If continuity is not established across terminals **d** and **e**, replace it.

	b	d	e
At 0 voltage between terminal a and c	●		●
At battery voltage between terminal a and c		●	●

9Y1210686ELS039US

- (1) Battery
(2) Connector (Relay)

- [A] 5 Terminal Type
[B] 4 Terminal Type

9Y1210686ELS0063US0

[12] LIGHTING SWITCHES AND FLASHER UNIT

(1) Combination Switch (ROPS Model)



Checking Connector Voltage

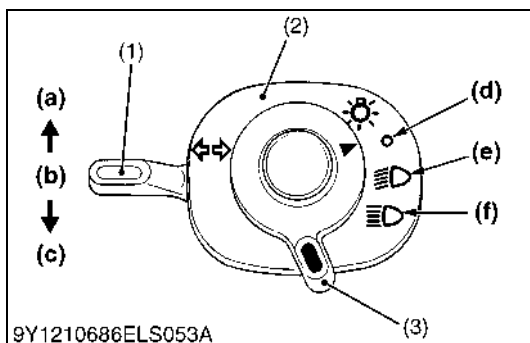
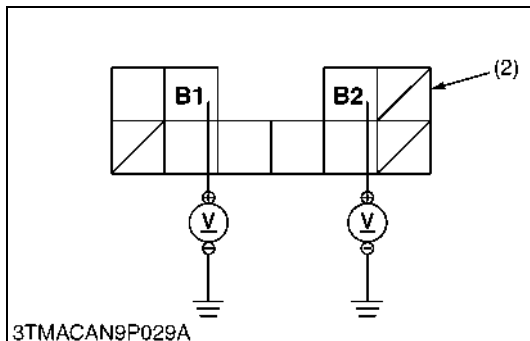
1. Disconnect the combination switch connector.
2. Measure the voltage with voltmeter across the connector terminal **B1** and chassis, across the terminal **B2** and chassis.
3. If the voltage differs from the battery voltage, the wiring harness, fuses or main switch faulty.

Voltage	Main switch at "ON"	Terminal B1 – Chassis	Approx. battery voltage
	Main switch at "OFF"	Terminal B2 – Chassis	

(1) Combination Switch

(2) Combination Switch Connector
(Wire Harness Side)

9Y1210686ELS0113US0



Checking Light Switch and Turn Signal Switch

1. Test the continuity through the switch with an ohmmeter.

		Terminal						
Continuity	Position	B1	T	1	2	B2	R	L
Turn signal switch	R.H. (a)					●	●	
	OFF (b)							
	L.H. (c)					●		●
Light switch	OFF (d)							
	Lo (e)	●	●	●				
	Hi (f)	●	●	●	●			

9Y1210686ELS057US

(1) Turn Signal Switch

(2) Combination Switch

(3) Light Switch

(4) Combination Switch Connector
(Switch Side)

(a) Right Turn

(b) OFF

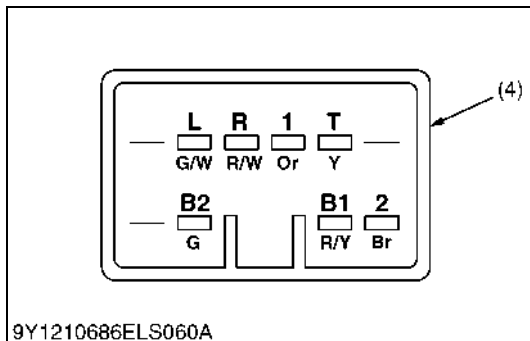
(c) Left Turn

(d) Head Light (Off)

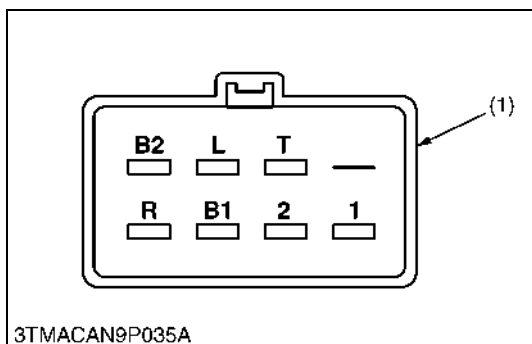
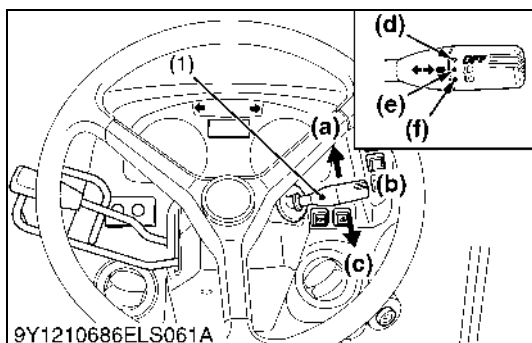
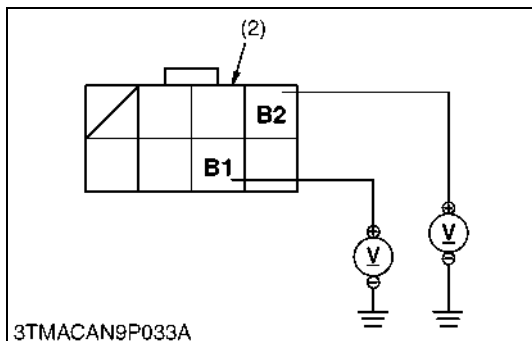
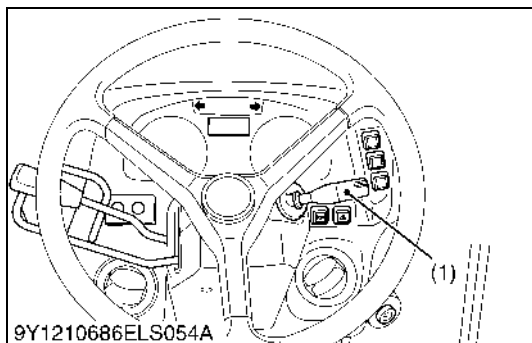
(e) Head Light (Lo)

(f) Head Light (Hi)

9Y1210686ELS0114US0



(2) Lever Combination Switch and Horn Switch (CABIN Model)



Checking Connector Voltage

1. Disconnect the lever combination switch connector (1).
2. Measure the voltage with voltmeter across the connector terminal **B1** and chassis, across the terminal **B2** and chassis.
3. If the voltage differs from the battery voltage, the wiring harness, fuses or main switch is faulty.

Voltage	Main switch at "OFF"	Terminal B1 – Chassis	Approx. battery voltage
	Main switch at "ON"	Terminal B2 – Chassis	

(1) Lever Combination Switch

(2) Combination Switch Connector (Wire Harness Side)

9Y1210686ELS0115US0

Checking Light Switch and Turn Signal Switch

1. Test the continuity through the switch with an ohmmeter.
2. If the continuity specified below is not indicated, the switch is faulty.

		Terminal						
Continuity	Position	B1	T	1	2	B2	R	L
Turn signal switch	R.H. (a)					●	●	
	OFF (b)							
	L.H. (c)					●		●
Light switch	OFF (d)							
	Lo (e)	●	●	●				
	Hi (f)	●	●	●	●			

9Y1210686ELS058US

(1) Lever Combination Switch Connector (Switch Side)

(a) Right Turn

(b) OFF

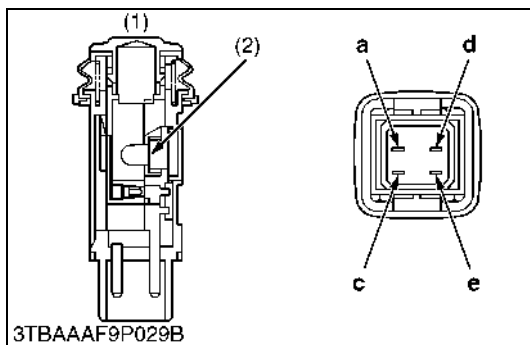
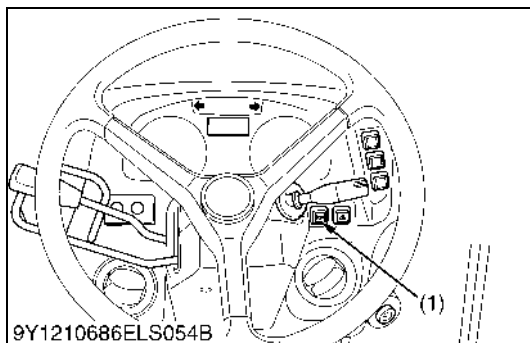
(c) Left Turn

(d) OFF

(e) Head Light (Lo)

(f) Head Light (Hi)

9Y1210686ELS0116US0



Checking Horn Switch Continuity (CABIN Model)

1. Measure the resistance with ohmmeter across the terminal **a** and terminal **c**, and across the terminal **d** and terminal **e**.
2. If the measurement is not following below, the horn switch or the bulb are faulty.

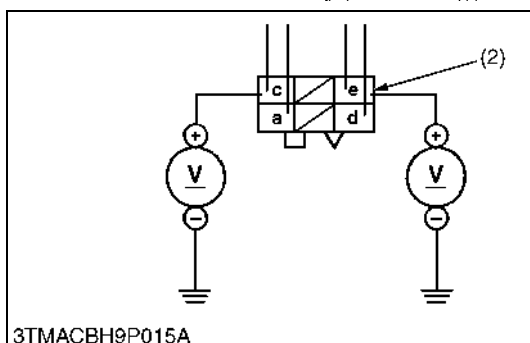
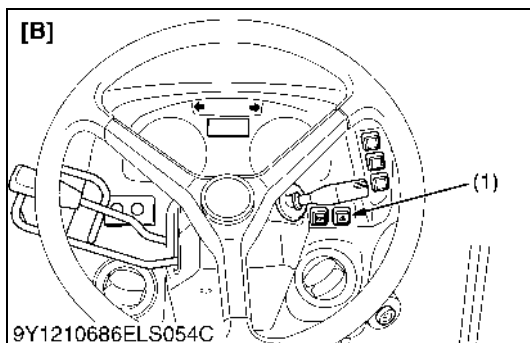
Resistance (Switch at OFF)	Terminal a – Terminal c	Infinity
Resistance (Switch at ON)	Terminal a – Terminal c	0 Ω
Resistance (Bulb)	Terminal d – Terminal e	Approx. 13 Ω

(1) Horn Switch

(2) Bulb

9Y1210686ELS0117US0

(3) Hazard Switch



Checking Connector Voltage

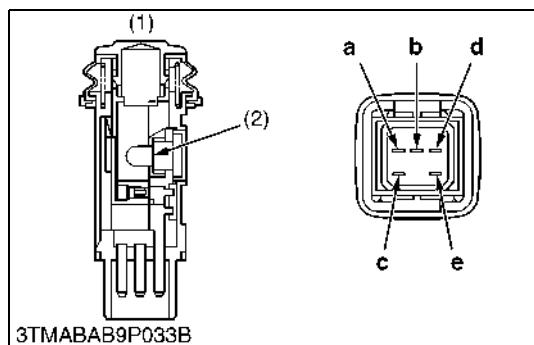
1. Connect the battery negative code, then measure the voltage with a voltmeter across the each terminal **c/e** and chassis.
2. If the voltage differ from the battery voltage, the wiring harness is faulty.

Voltage	Terminal c/e – Chassis	Approx. battery voltage
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(1) Hazard Switch

[A] ROPS Model(2) **6P** Connector (Wire Harness Side)**[B] CABIN Model**

9Y1210686ELS0118US0



Checking Hazard Switch Continuity

1. Measure the resistance with ohmmeter across the terminal **a** and terminal **c**, and across the terminal **d** and terminal **e**.
2. If the measurement is not following below, the hazard switch or the bulb are faulty.

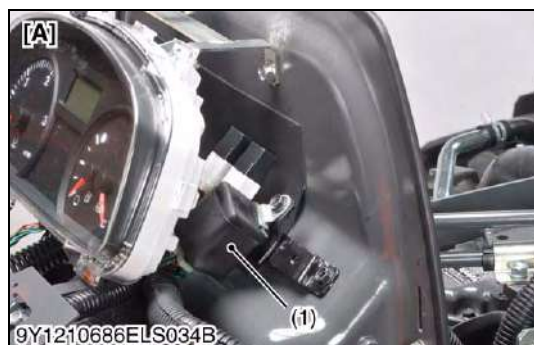
Resistance (Switch at OFF)	Terminal a – Terminal c	Infinity
Resistance (Switch at ON)	Terminal a – Terminal c	0 Ω
Resistance (Bulb)	Terminal d – Terminal e	Approx. 13 Ω

(1) Hazard Switch

(2) Bulb

9Y1210686ELS0119US0

(4) Flasher Unit



Connector Voltage

1. Disconnect the flasher unit connector.
2. Measure the voltage with voltmeter across the wiring harness connector's terminal **5** and chassis.
3. If the voltage differs from the battery voltage, the wiring harness or fuse is faulty.

Voltage	Terminal 5 – Chassis	Approx. battery voltage
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(Reference)

Terminal	Color	Terminal Connector
1	0.5 B	GND
2	0.85 G/R	Hazard (Input)
3	–	Vacancy
4	0.5 L	Turning signal L.H. (Input)
5	0.5 G/Y	Turning signal R.H. (Input)
6	0.85 G	Battery Voltage
7	0.5 G/B	Turning signal L.H. (Output)
8	0.5 R/B	Turning Signal R.H. (Output)

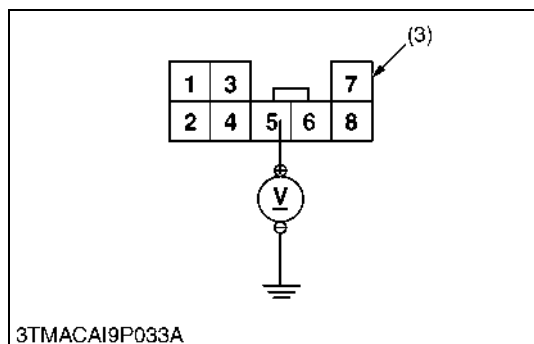
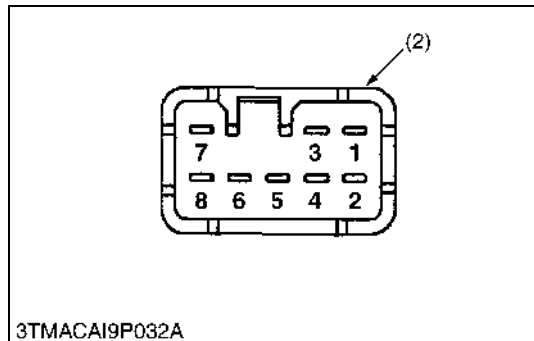
(1) Flasher Unit

(2) Flasher Unit Connector

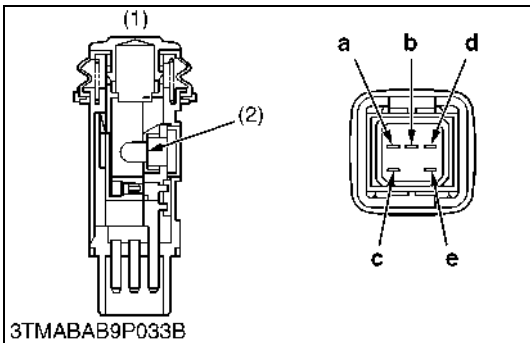
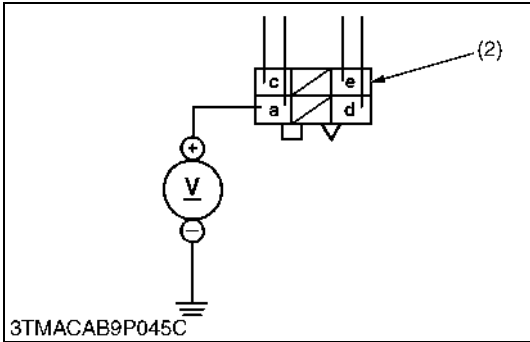
(3) Wire Harness Connector

[A] ROPS Model**[B] CABIN Model**

9Y1210686ELS0125US0



(5) Front Work Light Switch (ROPS Model)



Checking Connector Voltage

- 1. Turn the main switch to **ON** position.
- 2. Measure the voltage with a voltmeter across the terminal a and chassis.
- 3. If the voltage differ from the battery voltage, the wiring harness or fuse is faulty.

Voltage	Terminal a – Chassis	Approx. battery voltage
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- (1) Front Work Light Switch
 - (2) 6P Connector (Wire Harness Side)
- 9Y1210686ELS0121US0

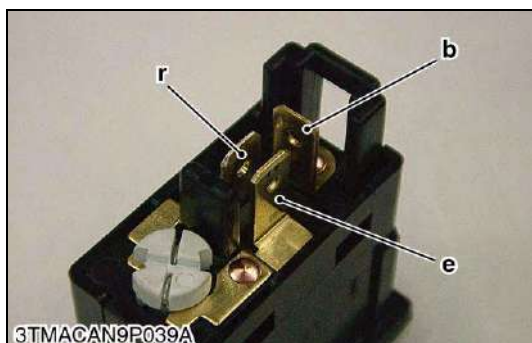
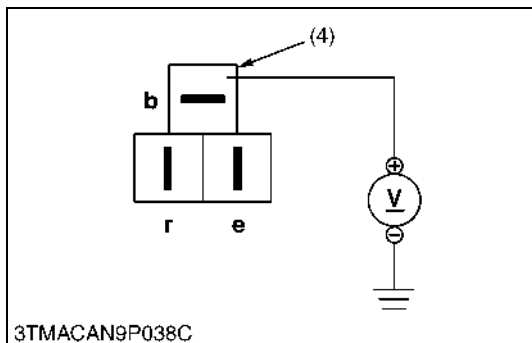
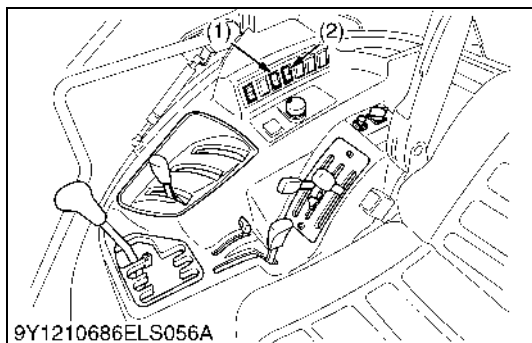
Checking Front Work Light Switch Continuity

- 1. Measure the resistance with ohmmeter across the terminal a and terminal c, and across the terminal d and terminal e.
- 2. If the measurement is not following below, the switch or the bulb are faulty.

Resistance (Switch at OFF)	Terminal a – Terminal c	Infinity
Resistance (Switch at ON)	Terminal a – Terminal c	0 Ω
Resistance (Bulb)	Terminal d – Terminal e	Approx. 13 Ω

- (1) Front Work Light Switch
 - (2) Bulb
- 9Y1210686ELS0122US0

(6) Front/Rear Work Light (CABIN Model)



Checking Connector Voltage

1. Turn the main switch to **ON** position.
2. Measure the voltage with a voltmeter across the terminal **b** and chassis.
3. If the voltage differ from the battery voltage, the wiring harness or fuse is faulty.

NOTE

- The terminal **b** of 3P connector for front work light switch is white/black color wire, for rear light switch is white/blue color wire.

Voltage	Terminal b – Chassis	Approx. battery voltage
---------	-----------------------------	-------------------------

(1) Work Light Switch (Front)

(2) Work Light Switch (Rear)

(3) **3P** Connector (Wire Harness Side)

9Y1210686ELS0123US0

Checking Switch Continuity

1. Test the continuity through the switch with an ohmmeter.
2. If continuity specified below is not indicated, the switch is faulty.

	b	r	e
OFF		●	●
ON	●	●	●

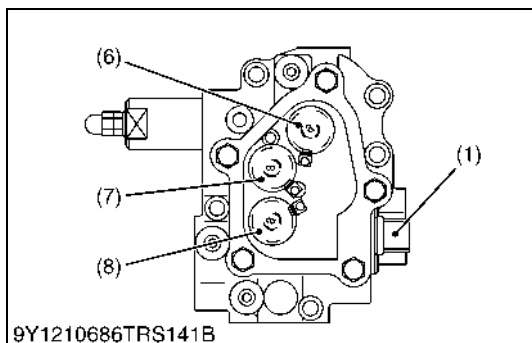
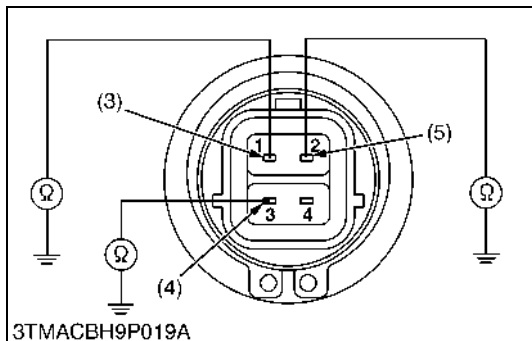
9Y1210686ELS059US

(1) Work Light Switch

9Y1210686ELS0124US0

[13] SOLENOID VALVE

(1) PTO, 4WD and Rear Differential Lock



Solenoid Valves

1) Connector Voltage

1. Remove the connector (1).
2. Turn on the main switch, PTO switch, 4WD switch or rear differential lock switch at **ON** position.
3. Measure the voltage across the each terminal and chassis.
4. If the voltage differs from battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	Each terminal – Chassis	Approx. battery voltage
---------	-------------------------	-------------------------

2) Solenoid Valve

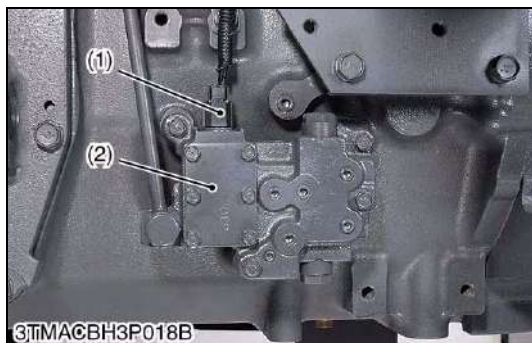
1. Disconnect the wire harness connector (1).
2. Measure the resistance with an ohmmeter across the each terminal **1/2/3** on the connector (1) and chassis.
3. If infinity is indicated, the solenoid valve is faulty.

Resistance	Solenoid valve 1/2/3 terminal to chassis	10 to 12 Ω
------------	---	-------------------

- | | |
|---|---|
| (1) Connector | (6) PTO Solenoid Valve |
| (2) Solenoid Valve Assembly | (7) Rear Differential Lock Solenoid Valve |
| (3) Terminal 1 for 4WD Solenoid Valve | (8) 4WD Solenoid Valve |
| (4) Terminal 3 for PTO Solenoid Valve | |
| (5) Terminal 2 for Rear Differential Lock Solenoid Valve | |

9Y1210686ELS0064US0

(2) Dual Speed (F24/R24 Speed Transmission Model)



Solenoid Valves

1) Connector Voltage

1. Remove the connector (1).
2. Turn on the dual speed switch at **Lo** position.
3. Measure the voltage across the each terminal and chassis.
4. If the voltage differs from battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	Each terminal – Chassis	Approx. battery voltage
---------	-------------------------	-------------------------

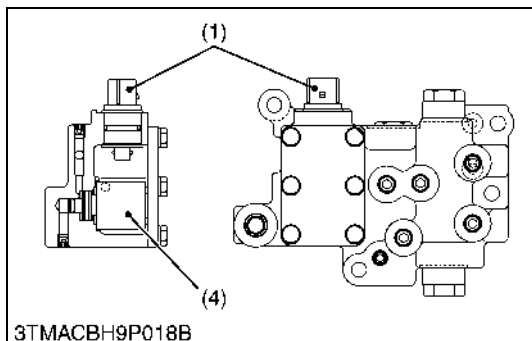
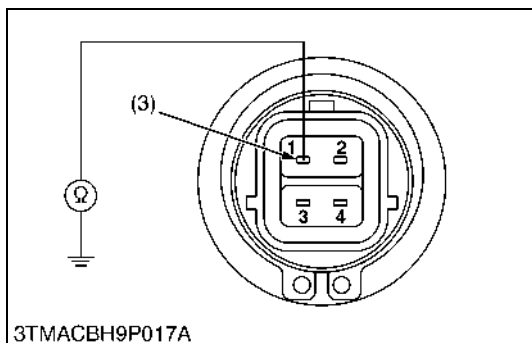
2) Solenoid Valve

1. Disconnect the wire harness connector (1).
2. Measure the resistance with an ohmmeter across the each terminal **1** on the connector (1) and chassis.
3. If infinity is indicated, the solenoid valve is faulty.

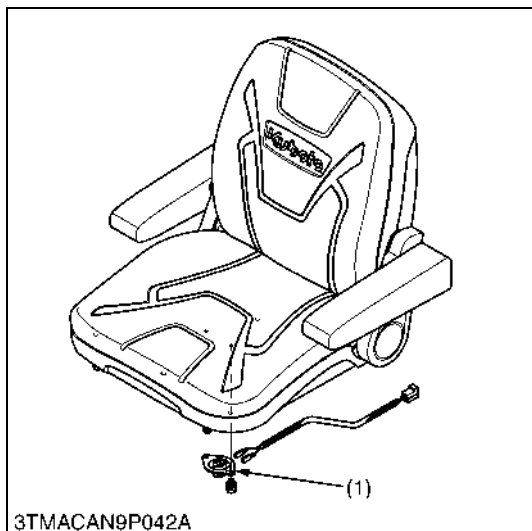
Resistance	Solenoid valve 1 terminal to chassis	10 to 12 Ω
------------	---	-------------------

- | | |
|--|---|
| (1) Connector | (3) Terminal 1 for Dual Speed Solenoid Valve |
| (2) Dual Speed Solenoid Valve Assembly | (4) 4WD Solenoid Valve |

9Y1210686ELS0065US0



[14] OPC (OPERATOR PRESENCE CONTROL) SYSTEM



Checking OPC System

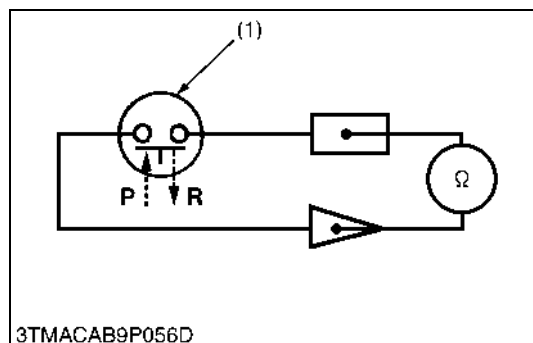
WARNING

- Disconnect the implement drive universal joint from the PTO shaft, if the implement has mounted.

1. Sit on the seat.
2. Run the engine.
3. Shift the PTO clutch control switch to **"ON"**. Make sure the warning buzzer does not whistle.
4. Stand up from the seat.
5. The warning buzzer whistles about one second after standing up. It whistles for 10 seconds.

- (1) Seat Switch

9Y1210686ELS0066US0



Checking Seat Switch

1. Disconnect the connector from the cabin wire harness.
2. Check the continuity with an ohmmeter across the switch terminals.
3. If it does not conduct or any value is indicated when the switch is pushed (**ON** seat), the switch is faulty.
4. If infinity is not indicated when the switch is released (**OFF** seat), the switch is faulty.

Resistance (Across switch terminals)	Reference value	When switch is pushed " P "	0 Ω
		When switch is released " R "	Infinity

(1) Seat Switch

P: Pushed
R: Released

9Y1210686ELS0067US0



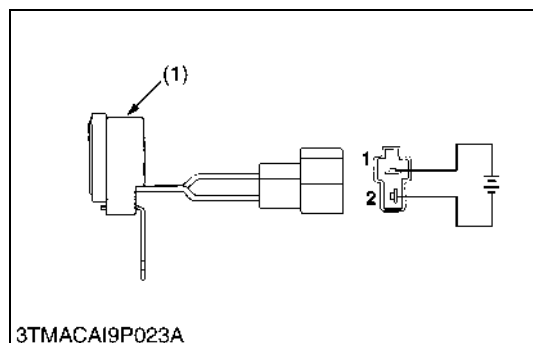
Buzzer

1. Remove the buzzer (1).
2. Connect the jumper lead across the battery positive terminal and terminal 1 of connector.
3. Connect the jumper lead across the battery negative terminal and terminal 2 of connector.
4. If the buzzer does not whistle, replace it.

(1) Buzzer

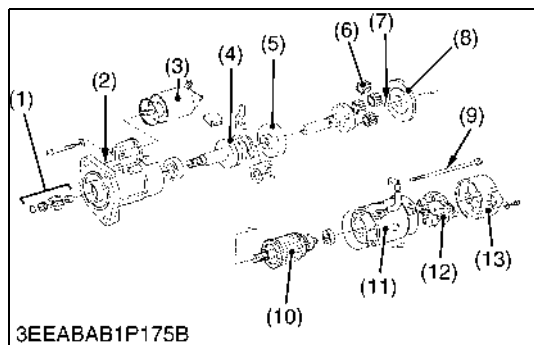
[A] ROPS Model
[B] CABIN Model

9Y1210686ELS0068US0



5. DISASSEMBLING AND ASSEMBLING

[1] STARTER MOTOR



Disassembling Motor

1. Disconnect the solenoid switch (3).
2. Remove the 2 through screws (9) and the 2 brush holder lock screws. Take out the rear end frame (13) and the brush holder (12).
3. Disconnect the armature (10) and the yoke (11). Remove also the ball (7) from the tip of the armature.
4. Remove the set of packings (8), the 4 planetary gears and another packing.
5. Take out the shaft assembly. Take note of the position of the lever.

■ IMPORTANT

- Before disconnecting the yoke, put tally marks on the yoke and the front bracket.
- Take note of the positions of the set of packings and the setup bolt.
- Apply grease to the gears, bearings, shaft's sliding part and ball.

■ NOTE

- Do not damage to the brush and commutator.

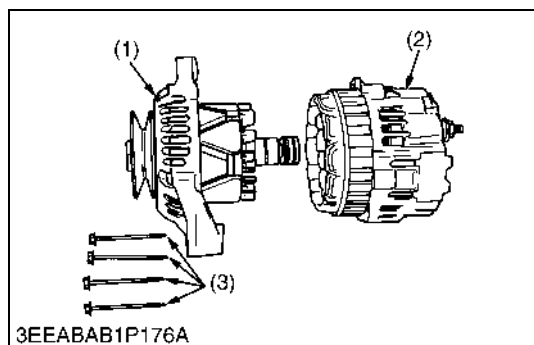
(When reassembling)

- Apply grease (DENSO CO. No. 50 or equivalent) to the parts indicated in the figure.

- | | |
|------------------------|---------------------|
| (1) Gear | (8) Set of Packings |
| (2) Front Bracket | (9) Through Screw |
| (3) Solenoid Switch | (10) Armature |
| (4) Overrunning Clutch | (11) Yoke |
| (5) Internal Gear | (12) Brush Holder |
| (6) Planetary Gear | (13) Rear End Frame |
| (7) Ball | |

9Y1210686ELS0069US0

[2] ALTERNATOR



Front Bracket

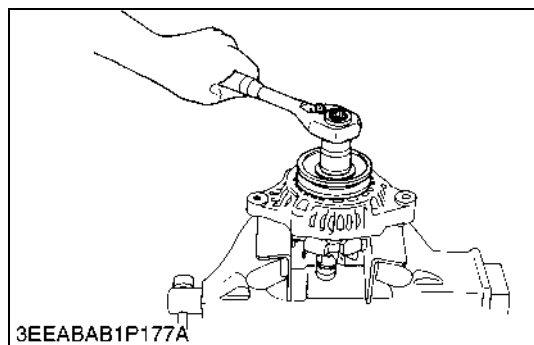
1. Remove the 4 screws.
2. Separate the front bracket (1) and the rear bracket (2) from each other.

■ IMPORTANT

- Put a tally line on the front bracket and the rear bracket for reassembling them later.

- | | |
|-------------------|-----------|
| (1) Front Bracket | (3) Screw |
| (2) Rear Bracket | |

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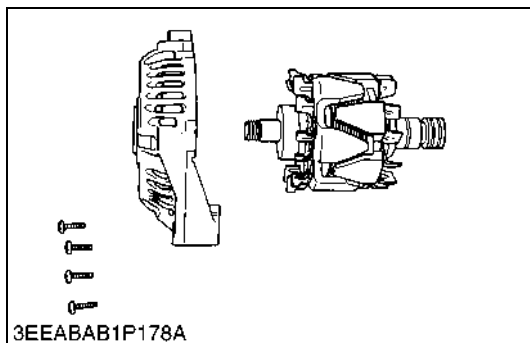


Pulley

1. Hold the rotor (base of the claw) in a vise. Loosen the lock nut using a M24 box wrench.

Tightening torque	Pulley nut	58.3 to 78.9 N·m 5.95 to 8.05 kgf·m 43.0 to 58.2 lbf·ft
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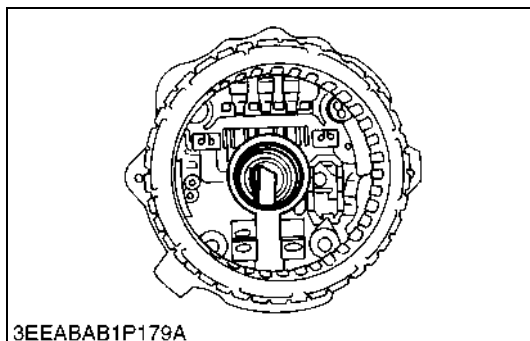
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Rotor

1. Remove the 4 screws and detach the bearing retainer.
2. Temporarily install the nut on the pulley screw, and detach the rotor.

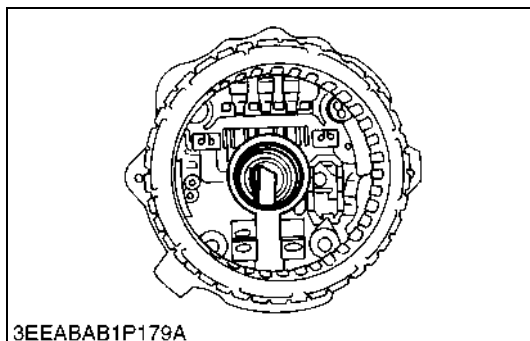
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Brush

1. When the rotor is detached, the 2 brushes are found to stretch out of the shaft hole.

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Reassembling the Brush

1. Fit the brush with its sliding face in the clockwise direction when viewed from front.

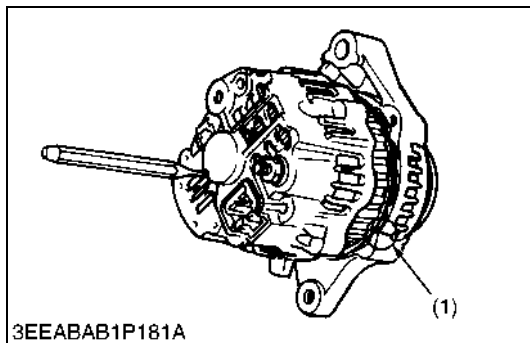
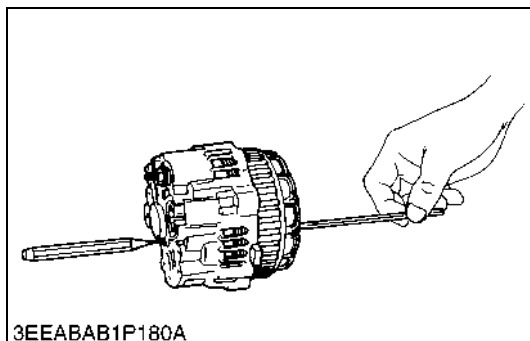
■ IMPORTANT

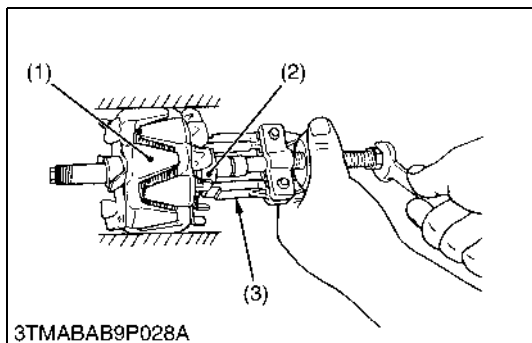
- Be sure to keep the 2 brushes deep in the brush holder. Otherwise the rotor and the rear section can not be fitted into position.
- Use a 4 mm hex. wrench to push the brushes into place.
- Using a pin-pointed (2 mm) punch, keep the brushes from popping out.

2. Match the tally line of the front section with that of the rear section.
3. Tighten the 4 screws, and draw out the pin-pointed punch out of the brush holder.

- (1) Marking

9Y1210686ELS0074US0





Bearing at Slip Ring Side

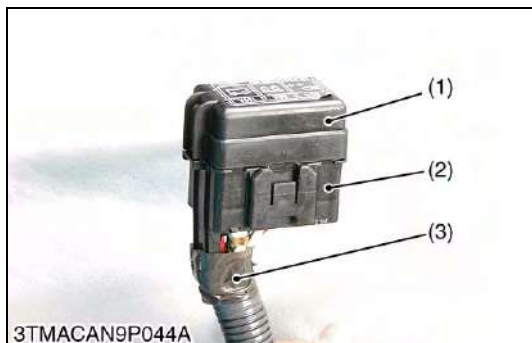
1. Lightly secure the rotor (1) with a vise to prevent damage, and remove the bearing (2) with a puller (3).

(1) Rotor
(2) Bearing

(3) Puller

9Y1210686ELS0075US0

[3] FUSE (SLOW BLOW 100 A) FOR CABIN MODEL



Fuse

[Replacing procedure for 100 A]

1. Remove the battery negative cable.
2. Remove the top cover (1) and protect tape (3).
3. Draw out the fuse stay (5) from the fuse box (2).
4. Open the cover (4) and remove the screw (6) to draw out the fuse (100 A) (7).

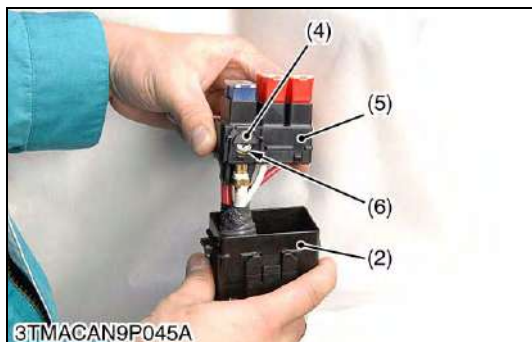
(When reassembling)

- Be sure to apply the nylon tape.

(1) Top Cover
(2) Fuse Box
(3) Tape
(4) Cover

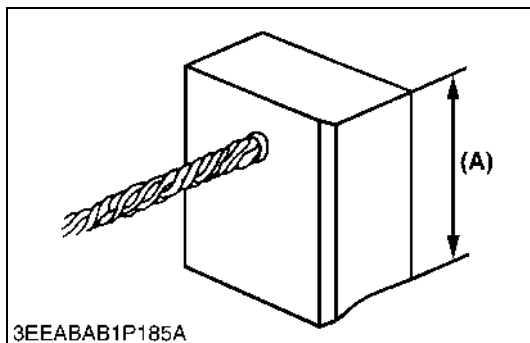
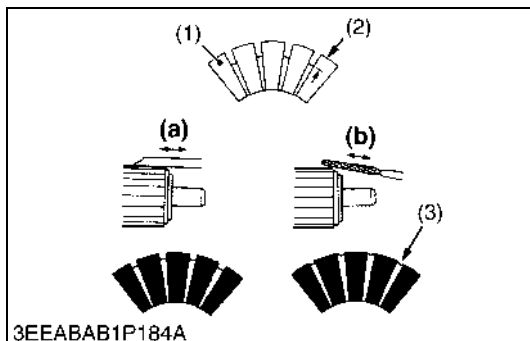
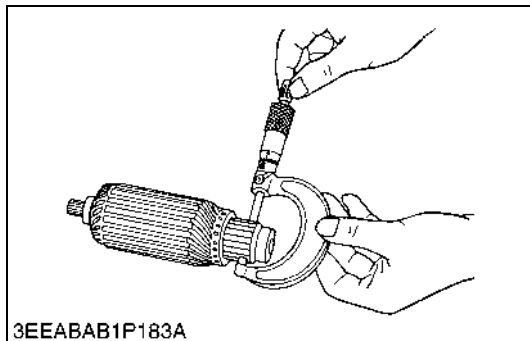
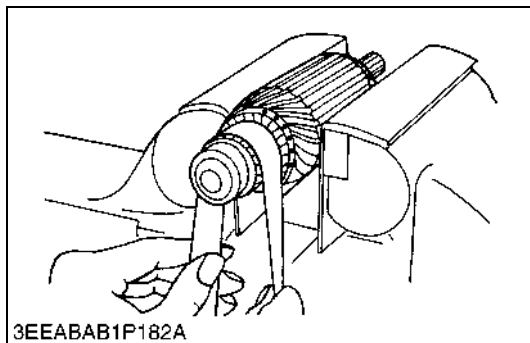
(5) Fuse Stay
(6) Screw
(7) Fuse (100 A)

9Y1210686ELS0076US0



6. SERVICING

[1] STARTER



Commutator and Mica

1. Check the contact face of the commutator for wear, and grind the commutator with emery paper if it is slightly worn.
2. Measure the commutator O.D. with an outside micrometer at several points.
3. If the minimum O.D. is less than the allowable limit, replace the armature.
4. If the difference of the O.D.'s exceeds the allowable limit, correct the commutator on a lathe to the factory specification.
5. Measure the mica undercut.
6. If the undercut is less than the allowable limit, correct it with a saw blade and chamfer the segment edges.

Commutator O.D.	Factory specification	32 mm 1.2598 in.
	Allowable limit	31.4 mm 1.2362 in.

Mica undercut	Factory specification	0.50 to 0.80 mm 0.0197 to 0.0315 in.
	Allowable limit	0.20 mm 0.0079 in.

- (1) Segment
(2) Depth of Mica
(3) Mica

(a) Good
(b) Bad

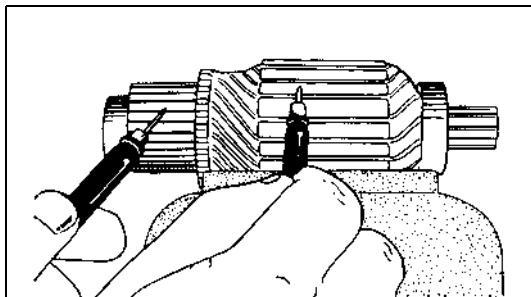
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Brush Wear

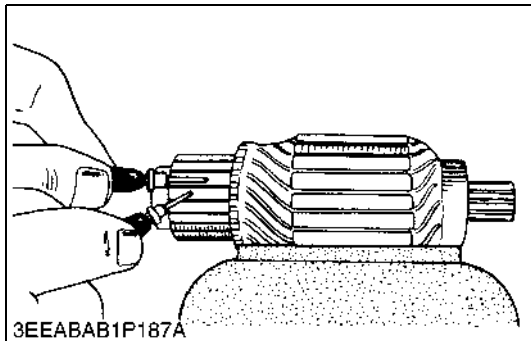
1. If the contact face of the brush is dirty or dusty, clean it with emery paper.
2. Measure the brush length (A) with vernier calipers.
3. If the length is less than the allowable limit, replace the yoke assembly and brush holder.

Brush length (A)	Factory specification	18.0 mm 0.7086 in.
	Allowable limit	11.0 mm 0.4331 in.

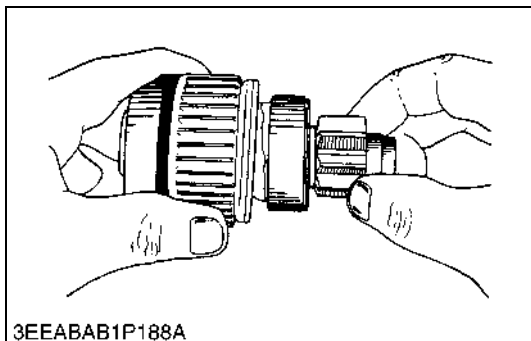
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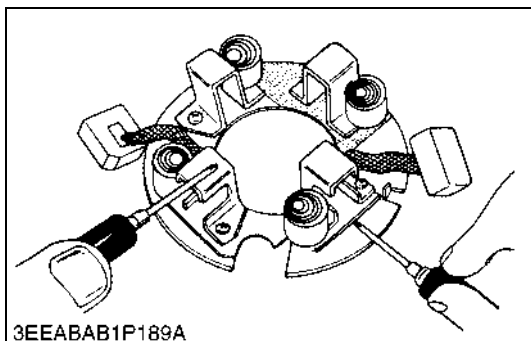
3EEABAB1P186A



3EEABAB1P187A



3EEABAB1P188A



3EEABAB1P189A

Armature Coil

1. Check the continuity across the commutator and armature coil core with an ohmmeter.
2. If it conducts, replace the armature.
3. Check the continuity across the segments of the commutator with an ohmmeter.
4. If it does not conduct, replace the armature.

Resistance	Commutator – Armature coil core	Infinity
	Commutator segment	0 Ω

9Y1210686ELS0079US0

Overrunning Clutch

1. Inspect the pinion for wear or damage.
2. If there is any defect, replace the overrunning clutch assembly.
3. Check that the pinion turns freely and smoothly in the overrunning direction and does not slip in the cranking direction.
4. If the pinion slips or does not rotate in the both directions, replace the overrunning clutch assembly.

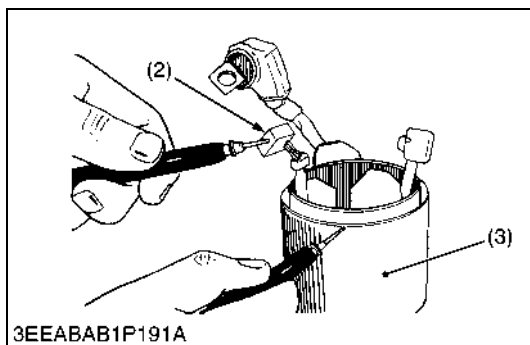
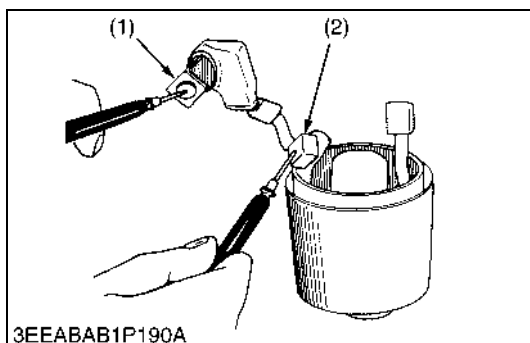
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Brush Holder

1. Check the continuity across the brush holder and the holder support with an ohmmeter.
2. If it conducts, replace the brush holder.

Resistance	Brush holder – Holder support	Infinity
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Field Coil

1. Check the continuity across the lead (1) and brush (2) with an ohmmeter.
2. If it does not conduct, replace the yoke assembly.
3. Check the continuity across the brush (2) and yoke (3) with an ohmmeter.
4. If it conducts, replace the yoke assembly.

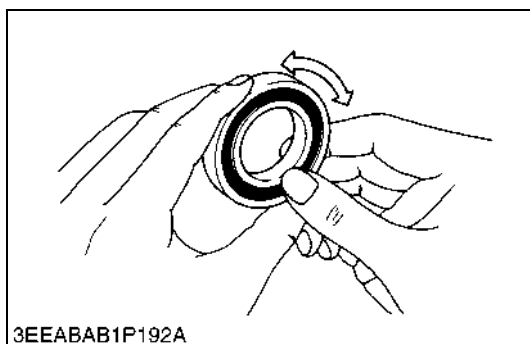
Resistance	Lead (1) – Brush (2)	0 Ω
	Brush (2) – Yoke (3)	Infinity

(1) Lead
(2) Brush

(3) Yoke

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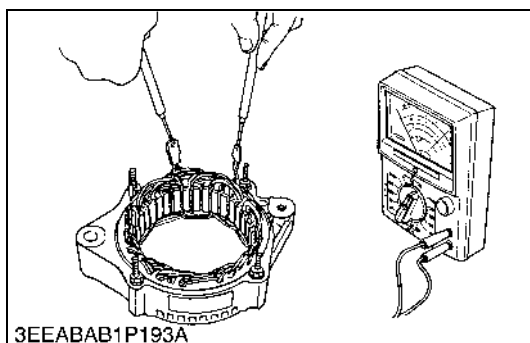
[2] ALTERNATOR



Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

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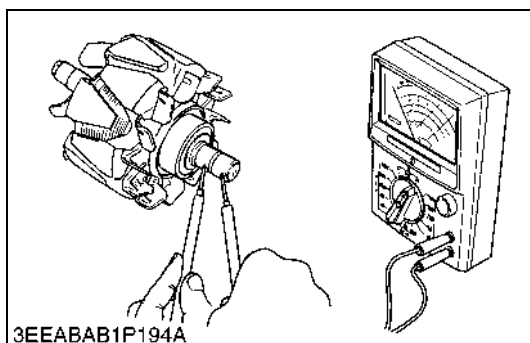


Stator

1. Measure the resistance across each lead of the stator coil with an ohmmeter.
2. If the measurement is not within factory specification, replace it.
3. Check the continuity across each stator coil lead and core with an ohmmeter.
4. If infinity is not indicated, replace it.

Resistance	Factory specification	Less than 1.0 Ω
------------	-----------------------	------------------------

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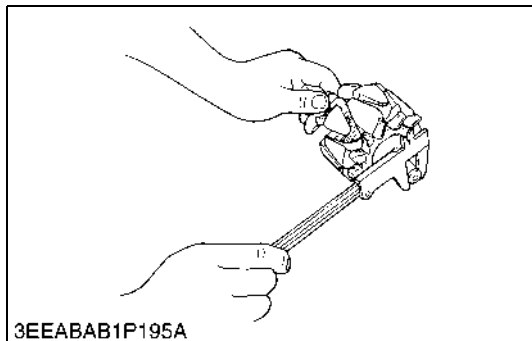


Rotor

1. Measure the resistance across the slip rings with an ohmmeter.
2. If the resistance is not the factory specification, replace it.
3. Check the continuity across the slip ring and core with an ohmmeter.
4. If infinity is not indicated, replace it.

Resistance	Factory specification	2.8 to 3.3 Ω
------------	-----------------------	---------------------

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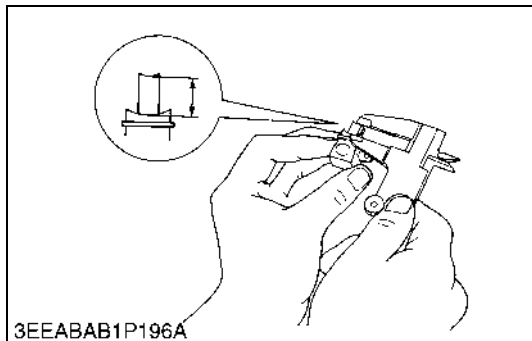


Slip Ring

1. Check the slip ring for score.
2. If scored, correct with an emery paper or on a lathe.
3. Measure the O.D. of slip ring with vernier calipers.
4. If the measurement is less than the allowable limit, replace it.

Slip ring O.D.	Factory specification	22.7 mm 0.894 in.
	Allowable limit	22.1 mm 0.870 in.

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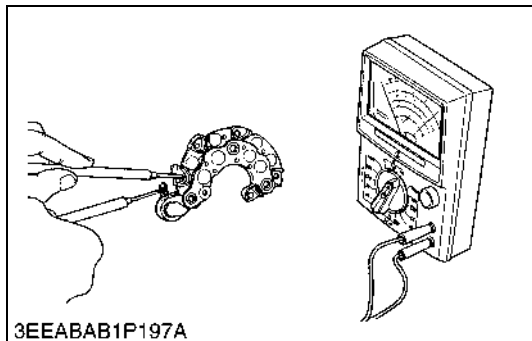


Brush Wear

1. Measure the brush length with vernier calipers.
2. If the measurement is less than allowable limit, replace it.
3. Make sure that the brush moves smoothly.
4. If the brush is defective, replace it.

Brush length	Factory specification	18.5 mm 0.728 in.
	Allowable limit	5.0 mm 0.197 in.

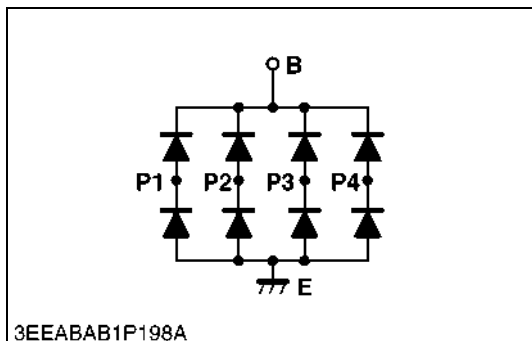
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Rectifier

1. Check the continuity across each diode of rectifier with an ohmmeter.
2. The rectifier is normal if the diode in the rectifier conducts in one direction and does not conduct in the reverse direction.

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9 CABIN

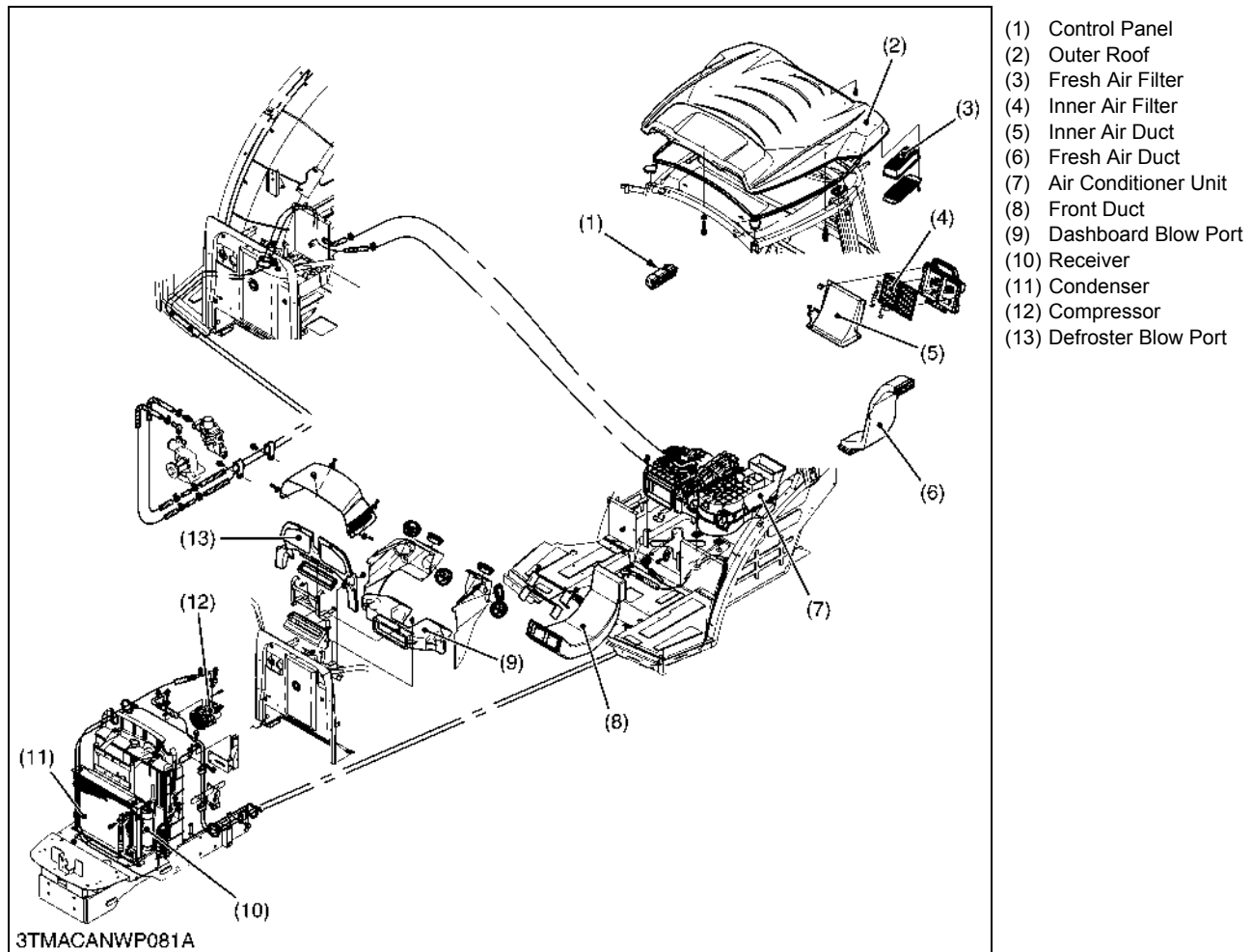
MECHANISM

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1. AIR CONDITIONING SYSTEM

[1] STRUCTURE



This cabin is equipped with the inner air circulation/outside air inhalation type large capacity thin air conditioner. The inner air inhaled from the inner air filter (4) provided behind the seats goes through the inner air duct (5) and goes into the air conditioner unit (7). The fresh air inhaled from the fresh air filter (3) goes through the center pillar on the left and goes into the air conditioner unit (7) via the fresh air duct (6).

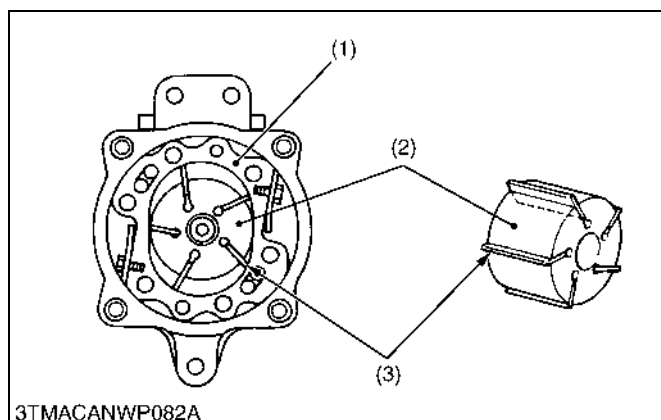
The inner air and fresh air inhaled into the air conditioner unit (7) is cooled and dehumidified in the cooling section of the air conditioner unit (7). The comfortable air, warmed moderately with the heater, comes from the air duct with low humidity.

The six dashboard air outlets allow opening and closing, and adjusting direction of winds. The defroster air outlet is opened and closed by moving the mode dial on the control panel (1).

Capacity (Cooling)	Factory specification	3.95 kW
Capacity (Warming)	Factory specification	4.30 kW
Kinds of refrigerant (Charge amount)	Factory specification	R134a 0.85 to 0.95 kg 1.9 to 2.0 lbs
Pressure sensor (Low)	Factory specification	0.20 MPa 2.0 kgf/cm ² 28 psi
Pressure sensor (High)	Factory specification	3.14 MPa 32.0 kgf/cm ² 455 psi

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[2] COMPRESSOR



The vane type compressor installed on this cabin is composed of a cylinder (1) with an oval cross section and a rotor (2) with five vanes (3). The vane type compressor is provided with two suction ports and two discharge ports respectively.

The five vanes (3) mounted on the rotor (2), rotating along the inner wall of the cylinder (1), keeps air-tightness using the centrifugal force of the rotor (2) and the back pressure of the vanes (3) that grow in proportion to the rotating speed of the rotor (2).

As a result, the volumes of the five cylinder chambers separated with the cylinder (1) and the five vanes (3) change.

For each rotation of the rotor (2), each of the cylinder chambers performs two cycles of inhalation, compression, and discharge.

- (1) Cylinder
- (2) Rotor
- (3) Vane

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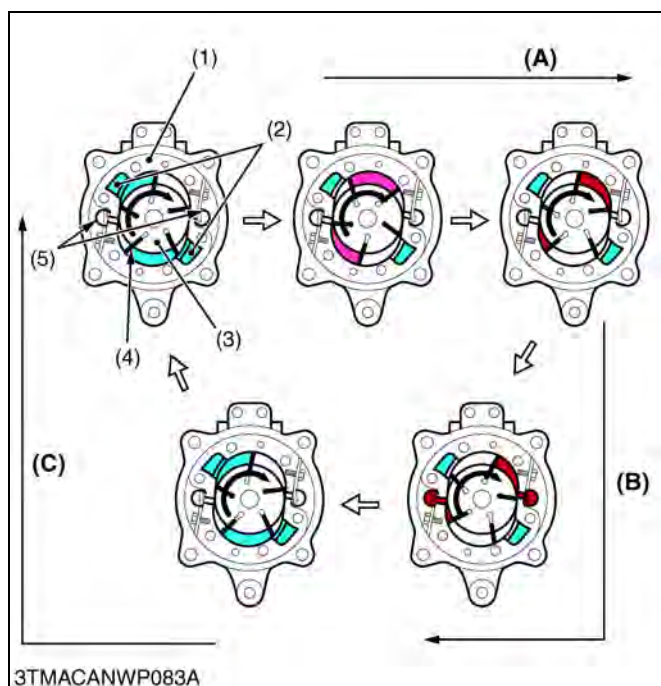
Operation

In proportion to the rotation of the rotor (3), a volume of a cylinder chamber separated with the cylinder (1) and the vanes (4) increases. The cylinder chamber inhales refrigerant gas from the suction port (2).

As the rotor (3) rotates further, a volume of the cylinder chamber separated with the cylinder (1) and the vanes (4) decreases, and the refrigerant gas is compressed. As the rotor (3) rotates even further, the refrigerant gas is highly compressed and then presses the discharge valve to open. The refrigerant gas is discharged from the discharge port (5).

- (1) Cylinder
 - (2) Suction Port
 - (3) Rotor
 - (4) Vane
 - (5) Discharge Port
- (A) Compression Process
 - (B) Discharge Process
 - (C) Suction Process

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Compressor Oil

The compressor oil dissolves in the refrigerant, circulates through the air-conditioning cycle, and functions to lubricate the compressor. But the conventional compressor oil for R12 does not dissolve in R134a, so it does not circulate through the cycle, and the lifespan of the compressor is considerably shortened.

It is still essential to ensure that the correct refrigerant oil is used. R12 systems were lubricated with mineral oil, which is totally unsuitable for R134a systems. The latter require PAG oil, which mixes very well with the refrigerant and provides ideal lubrication throughout the system.

Quantity (Total)	Brand Name
100 to 120 cc 0.106 to 0.126 U.S.qts 0.0880 to 0.105 Imp.qts	ND-OIL 8 <PAG* oil>

*PAG: Polyalkyleneglycol (Synthetic oil)

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[3] AIR CONDITIONER UNIT



The air conditioner unit (3) consists of evaporator (2), expansion valve (4), heater core (1), blower (5). etc..

- | | |
|--------------------------|---------------------|
| (1) Heater Core | (4) Expansion Valve |
| (2) Evaporator | (5) Blower |
| (3) Air Conditioner Unit | |

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A/C Blower

The blower is incorporated in the left-hand space of the air conditioner unit. It blows cool, warm or fresh air via the dashboard and defroster blow ports into the cabin.

The speed of the blower motor (1) can be adjusted in 4 steps by the resistor (3).

The blower fan (2) is centrifugal type. The air being sucked in parallel with the rotary shaft is blown in the centrifugal direction; in other words, perpendicular to the rotary shaft.

- | | |
|------------------|--------------|
| (1) Blower Motor | (3) Resistor |
| (2) Blower Fan | |

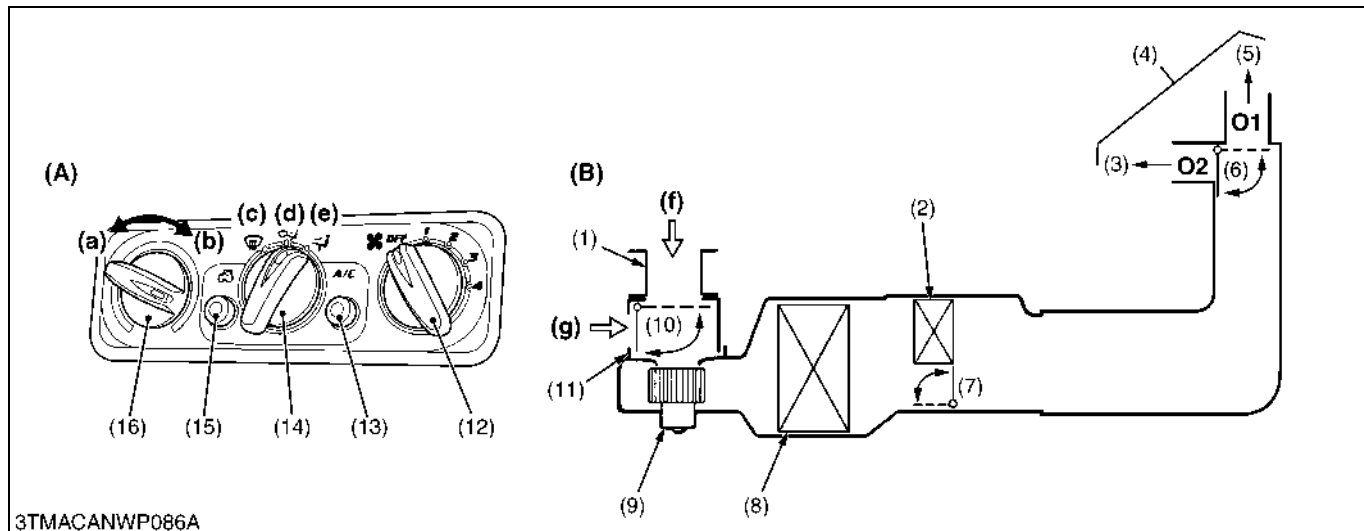
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■ NOTE

- As for the mechanism and function of each component part, refer to "10. CABIN" section in the Workshop Manual of tractor mechanism (Code No. 9Y021-18200).

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[4] SYSTEM CONTROL



- | | | | |
|---|--|---|--|
| (1) Fresh Air Inlet Port | (9) Blower | (16) Temperature Control Dial | (d) Air is blown the dashboard and defroster air outlets |
| (2) Heater | (10) D1: Air Intake Door | (A) Control Panel | (e) Air is blown from only the dashboard air outlets |
| (3) Dashboard | (11) Recirculated Air Inlet Port | (B) Block Diagram of Air Flow Passage | (f) Fresh Air |
| (4) Defroster and Dashboard | (12) Blower Switch | | (g) Recirculated Air |
| (5) Defroster | (13) Air Conditioner Switch (with Indicator) | | |
| (6) D3: Air Outlet Door (Mode Door) | (14) Mode Dial | (a) COOL | O1: Defroster Air Outlet |
| (7) D2: Temperature Door (Air Mixed Door) | (15) Recirculation/Fresh Air Selection Switch (with Indicator) | (b) WARM | O2: Dashboard Air Outlets |
| (8) Evaporator | | (c) Air is blown from only the defroster air outlet | |

■ Recirculation / Fresh Air Selection Switch

• RECIRCULATION (Indicator: ON)

By pushing the recirculation / fresh air selection switch (15) to "RECIRCULATION" position (indicator: ON), door D1 (10) shuts the fresh air inlet port (1). Air inside the cabin is recirculated.

• FRESH AIR (Indicator: OFF)

By pushing the recirculation / fresh air selection switch (15) to "FRESH AIR" position (indicator: OFF), door D1 (10) opens the fresh air inlet port (1). Outside air comes into cabin.

■ Temperature Control Dial

• COOL

By moving the temperature control dial (16) to "COOL" position (a), door D2 (7) moves to close water valve and opens side passage. The air flows toward door D3 (6) through the side passage.

• WARM

By moving the temperature control dial (16) to "WARM" position (b), door D2 (7) moves to open water valve and closes side passage. The air flows toward door D3 (6) through the heater (2).

■ Mode Dial

• DEFROSTER

Moving the mode dial (14) to (c) position, the door D3 (6) is moved to set up the air passage to outlet O1. Air comes out from outlet O1.

• DEFROSTER + DASHBOARD

Moving the mode dial (14) to (d) position, the door D3 (6) is moved to establish the air passages to outlets O1 and O2. Air comes out from both outlets.

• DASHBOARD

Moving the mode dial (14) to (e) position, the door D3 (6) is moved to set up the air passage to outlet O2. Air comes out from outlet O2.

■ Blower Switch

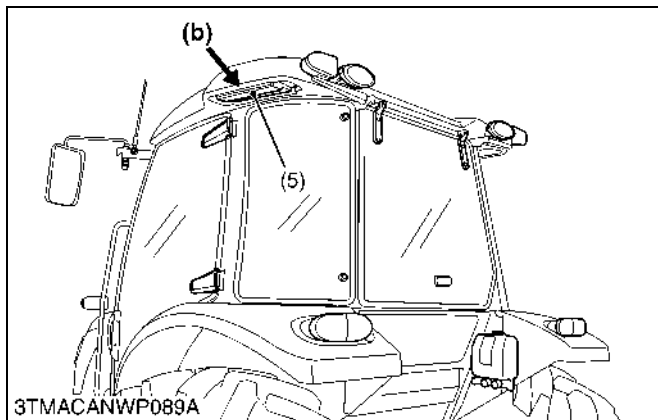
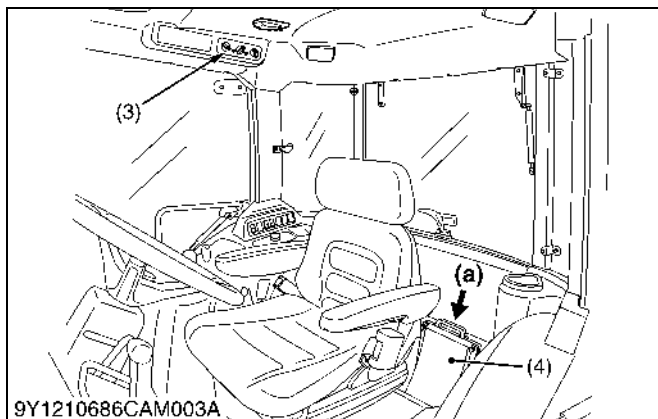
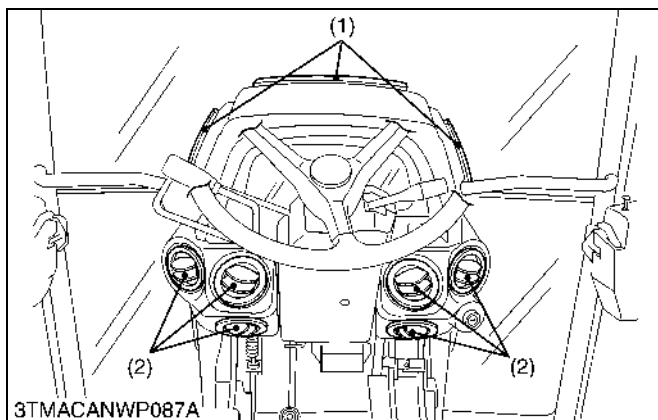
Air volume can be changed in four steps. At the "4" position, the largest air volume is obtained.

■ Air Conditioner Switch

Push this switch to activate the air conditioner. An indicator will light up when the switch is set to "ON". Push switch again to turn air conditioner off, in which case the indicator light will be off.

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[5] AIR FLOW



Flow

Air in the cabin and fresh air introduced into the cabin flow as shown below. Adjust the 7 air ports to obtain the desired condition.

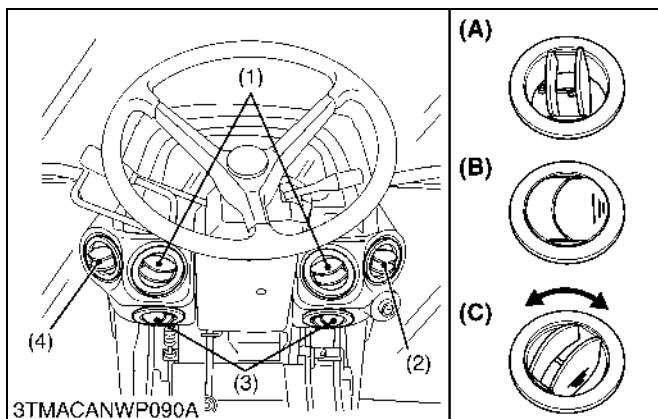
■ IMPORTANT

- Do not pour water directly into the fresh air port while washing the vehicle.

- | | |
|--------------------------|-----------------------------|
| (1) Defroster Air Outlet | (a) Inner Air Recirculation |
| (2) Dashboard Air Outlet | (b) Fresh Air Inlet |
| (3) Control Panel | |
| (4) Inner Air Filter | |
| (5) Fresh Air Filter | |

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[6] AIR CONTROL VENT



Dashboard Air Outlet

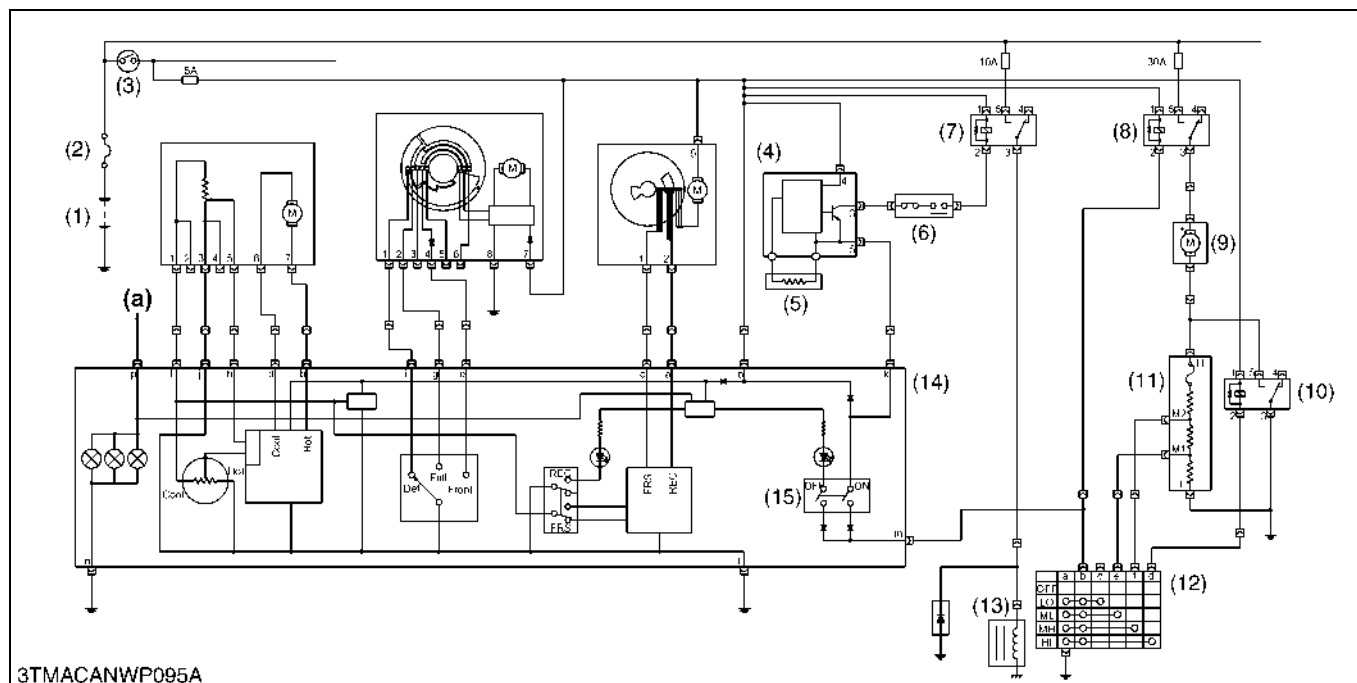
The dashboard air outlet can be independently adjusted as required.

- | | |
|--------------------------|----------|
| (1) Face Area Air Outlet | (A) Open |
| (2) Back Area Air Outlet | (B) Shut |
| (3) Feet Area Air Outlet | (C) Turn |
| (4) Back Area Air Outlet | |

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[7] ELECTRICAL SYSTEM

(1) Electrical Circuit



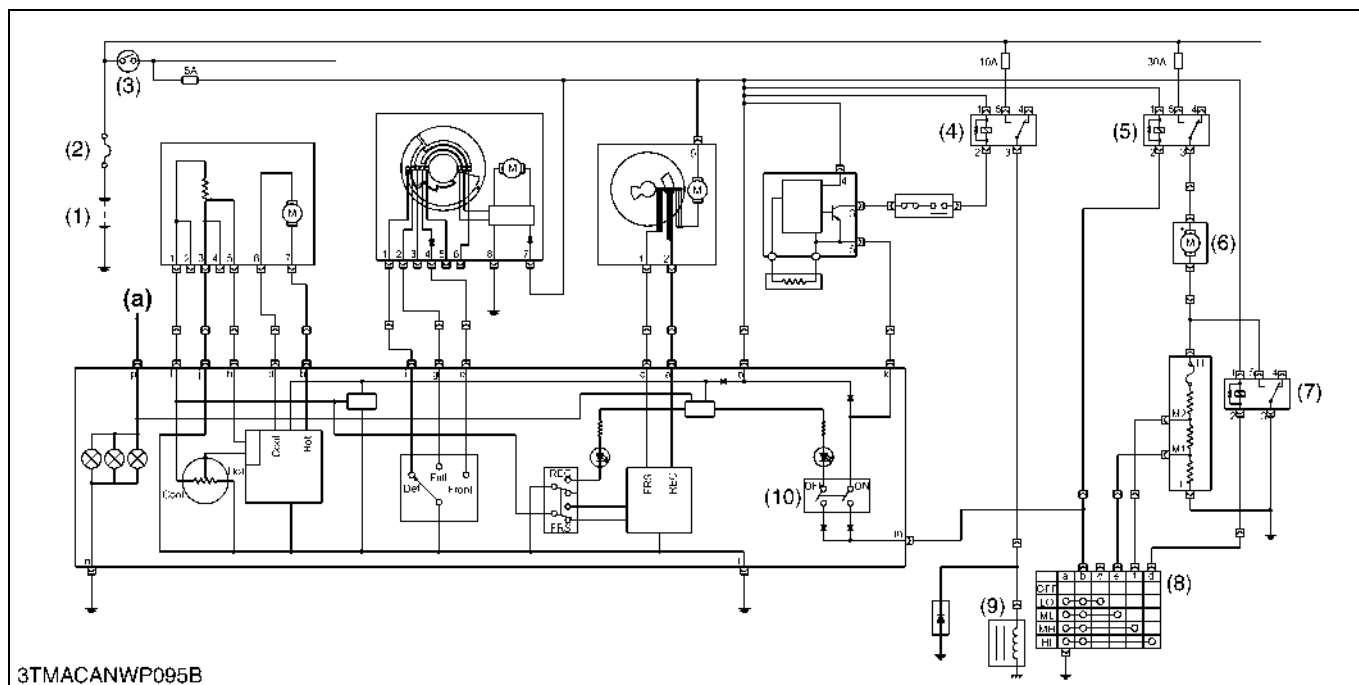
- | | | | |
|----------------------|----------------------|------------------------|------------------------|
| (1) Battery | (6) Pressure Switch | (10) Blower High Relay | (14) A/C Control Panel |
| (2) Slow Blow Fuse | (7) Compressor Relay | (11) Blower Resistor | (15) A/C Switch |
| (3) Main Switch | (8) Blower Relay | (12) Blower Switch | |
| (4) Thermo Amplifier | (9) Blower Motor | (13) Compressor | |
| (5) Frost Thermistor | | | (a) To Light Switch |

The process of magnetic clutch being engaged is shown below.

Main Switch (3) **ON** → A/C Switch (15) **ON** → Blower Switch (12) **ON** (Low, Medium 1, Medium 2 or High) → Compressor Relay (7) **ON** → Thermo Amplifier (4) **ON** (the thermostat temperature is more than 3 °C (37.4 °F)) → Pressure Switch (6) **ON** (if refrigerant pressure is between 0.21 MPa (2.1 kgf/cm², 30 psi) and 2.6 MPa (27 kgf/cm², 380 psi) → Magnetic Clutch of Compressor Engaged.

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(2) Blower Relay and Compressor Relay



Remove the seat, the seat under cover and the relays on the right side of the air conditioner unit: blower relay (5), blower high relay (7) and compressor relay (4). When the blower fan is adjusted for the air flow rate, the blower relay (5) and blower high relay (7) are activated by a signal from the blower switch (8) on the control panel.

Among the air conditioner components, current flows to the blower motor (6) and magnetic clutch. If all of these current were to be passes through the main switch (3) and supplied, the current would be too large for the main switch (3) so that there will be danger or burning out the main switch contact. If the current were to be passed directly from the battery (1), forgetting to turn off the blower motor (6) could result in a discharged battery (1).

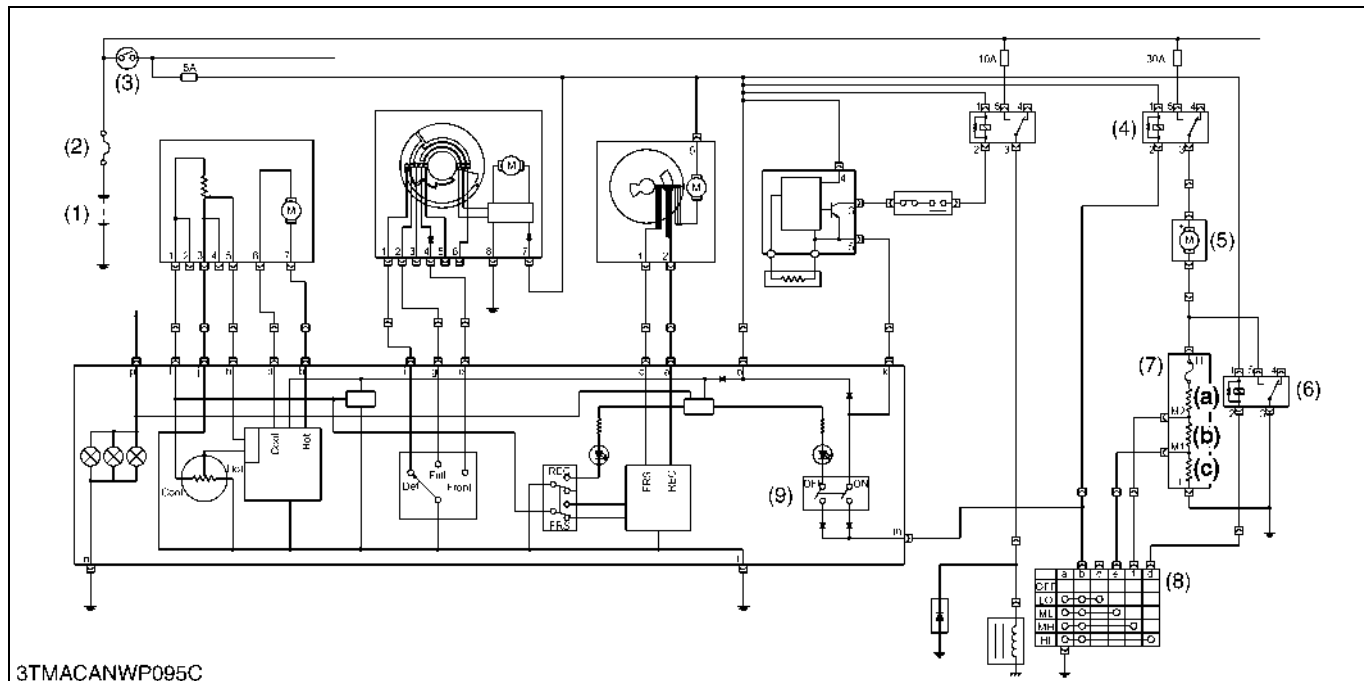
To protect against such trouble, relays have been provided. These relays have been made so that when current flows through its coil, the contact close to supply the power from the battery (1). By employing these relays, the current flowing through the main switch (3) has been decreased as only a small current is required to actuate the relay. Thus there will be no danger of burning out the switch contact, and when the main switch (3) is opened, the relay contact will open at the same time. This action stops the current flow in the air conditioner circuit so that there will also be no chance of the battery discharging.

- | | |
|----------------------|-----------------------|
| (1) Battery | (7) Blower High Relay |
| (2) Slow Blow Fuse | (8) Blower Switch |
| (3) Main Switch | (9) Compressor |
| (4) Compressor Relay | (10) A/C Switch |
| (5) Blower Relay | |
| (6) Blower Motor | |
- (a) To Light Switch

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(3) Blower Relay

When Blower Switch is in Low, Medium 1, Medium 2 or High Position



- | | | | |
|--------------------|-----------------------|---------------------|-----------------|
| (1) Battery | (4) Blower Relay | (7) Blower Resistor | (a) Resistor M2 |
| (2) Slow Blow Fuse | (5) Blower Motor | (8) Blower Switch | (b) Resistor M1 |
| (3) Main Switch | (6) Blower High Relay | (9) A/C Switch | (c) Resistor L |

When the main switch (3) and blower switch (8) is turned **ON**, the current flows from battery (1) to blower relay coil and blower relay (4) is turned **ON**. As the blower relay (4) is turned **ON**, the current from battery (1) flows to the blower switch (8) through the blower motor (5) as follows.

- **Low Position**

Battery (1) → Slow Blow Fuse (2) → Main Switch (3) → Fuse → Blower Relay (4) → Blower Motor (5) → Blower Resistor (7): (a), (b) and (c) → Blower Switch (8) → Ground.

- **Medium 1 Position**

Battery (1) → Slow Blow Fuse (2) → Main Switch (3) → Fuse → Blower Relay (4) → Blower Motor (5) → Blower Resistor (7): (a) and (b) → Blower Switch (8) → Ground.

- **Medium 2 Position**

Battery (1) → Slow Blow Fuse (2) → Main Switch (3) → Fuse → Blower Relay (4) → Blower Motor (5) → Blower Resistor (7): (a) → Blower Switch (8) → Ground.

- **High Position**

Battery (1) → Slow Blow Fuse (2) → Main Switch (3) → Fuse → Blower Relay (4) → Blower Motor (5) → Blower High Relay (6) → Blower Switch (8) → Ground.

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SERVICING

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1. TROUBLESHOOTING

COMPRESSOR

Symptom	Probable Cause	Solution	Reference Page
Noisy (Compressor ON)	Bearing of compressor worn or damaged	Replace	9-S43
	Valves in compressor damaged	Replace	9-S43
	Belt slipping	Adjust or replace	G-29
	Compressor bracket mounting screws loosen	Tighten	–
	Piping resonant	Tighten or add clamp	–
Noisy (Compressor OFF)	Blower defective	Repair or replace	9-S28, 9-S46
	Bearings of magnetic clutch, idle pulley or crank pulley worn or damaged	Replace	9-S23

AIR CONDITIONING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Does Not Cool (No Air Flow)	Fuse blown	Replace	
	A/C compressor relay defective	Replace	
	A/C blower motor defective	Replace	9-S30, 9-S46
	A/C blower switch defective	Replace	9-S30, 9-S46
	Wiring harness disconnected or improperly connected	Repair	–
Does Not Cool (Compressor Does Not Rotate)	Fuse blown	Replace	
	Magnetic clutch defective	Repair or replace	9-S23
	A/C switch defective	Replace	9-S25
	Pressure switch defective	Replace	9-S31
	Belt slipping	Adjust or replace	G-29
Does Not Cool (Others)	Insufficient refrigerant	Check with manifold gauge	9-S22
	Expansion valve defective	Replace	–
	Compressor defective	Replace	9-S43
Insufficient Cooling (Insufficient Air Flow)	Air filter clogged	Clean or replace	G-35
	Evaporator frosted	Clean or replace thermo switch	–
	A/C blower motor defective	Replace	9-S28, 9-S46
	A/C blower resistor defective	Replace	9-S28, 9-S46
Insufficient Cooling (Many Bubbles in Sight Glass)	Insufficient refrigerant	Check with manifold gauge	9-S22
	Gas leaking from some place in refrigerating cycle	Repair and charge refrigerant	9-S20
	Air mixed in	Check with manifold gauge	9-S13

Symptom	Probable Cause	Solution	Reference Page
Insufficient Cooling (No Bubbles in Sight Glass)	Too much refrigerant	Check with manifold gauge	9-S22
Insufficient Cooling (Compressor Does Not Rotate Properly)	Belt slipping	Adjust or replace	G-29
	Magnetic clutch defective	Repair or replace	9-S23
	Compressor defective	Replace	9-S43
Insufficient Cooling (Others)	Thermostat defective	Replace	–
	Water valve defective	Replace	–
	Condenser fin clogged with dust	Clean	G-29
	Expansion valve defective	Replace	–
Insufficient Heating	Water valve defective	Replace	–
	Temperature motor defective	Check and repair	9-S29, 9-S57
	Insufficient coolant	Replenish	G-12
Too Low Air Flow Rate (Blower Motor Does Not Run)	Blower fan switch defective	Check and repair	9-S25
	A/C compressor relay defective	Replace	
	Brush in poor contact	Replace	–
	Fuse blown out	Replace	
	Wrong wiring or loose connections	Check and repair	–
Too Low Air Flow Rate (Flow Rate Does Not Change in 4 Steps)	Blower resistor defective	Replace	9-S28, 9-S46
	Relay defective	Replace	
	Blower fan switch defective	Replace	9-S25
Too Low Air Flow Rate (Others)	Blower is not tightened enough	Check and repair	9-S28, 9-S46
	Blower deformed	Replace	9-S28, 9-S46
	Blower in contact with casing	Check and repair	–
	Obstacle at or near suction port	Check and repair	–
	Evaporator frosted	Clean or replace	–
	Filter clogged	Clean or replace	G-35
	Blow duct clogged or missing	Check and repair	–
Insufficient Cooling (Compressor Magnetic Clutch Does Not Work)	Low battery voltage	Charge	–
	Rotor in contact with stator	Replace	
	Wrong wiring loose connections	Check and repair	–
	Relay defective	Replace	
	Coil shortage	Replace	–
	Ground malfunction	Check and Repair	–
	Coil burst out	Replace	–
Insufficient Cooling (Hi-pressure Level is Too High)	Refrigerant overcharged	Check with manifold gauge	9-S22
	Condenser clogged with dust and dirt	Clean	G-29
	Air mixed	Check with manifold gauge	9-S13

Symptom	Probable Cause	Solution	Reference Page
Insufficient Cooling (Hi-pressure Level is Too Low)	Refrigerant too short	Check with manifold gauge	9-S22
	Compressor discharge valve damaged	Replace	9-S46
	Compressor gasket damaged	Replace	9-S46
	Low-pressure hose in trouble (Cracked or clogged)	Replace	9-S46
Insufficient Cooling (Low-pressure Level is Too High)	Refrigerant overcharged	Check with manifold gauge	9-S22
	Heat-sensitive tube in poor contact	Check and repair	—
	Expansion valve too open	Replace	—
Insufficient Cooling (Low-pressure Level is Too Low)	Refrigerant too short	Check with manifold gauge	9-S22
	Gas leak at heat-sensitive tube	Replace	—
	Evaporator frosted	Clean or replace	—
	Low-pressure hose in trouble (Cracked or clogged)	Replace	9-S50
	Expansion valve clogged	Replace	—
Insufficient Cooling (Both Hi-pressure and Low-pressure Level is Too High)	Refrigerant overcharged	Check with manifold gauge	9-S22
Insufficient Cooling (Both Hi-pressure and Low-pressure Level is Too Low)	Refrigerant too short	Check with manifold gauge	9-S22
Temperature Cannot be Controlled (Temperature Motor and/or Temperature Control Dial Malfunction)	Temperature motor defective	Replace	9-S29, 9-S46
	Temperature control dial defective	Replace	9-S29, 9-S46
	Controller wiring harness disconnected	Repair or replace	9-S25
Temperature Cannot be Controlled (Water Valve Does Not Open Properly)	Cable wrongly set	Repair	—
	Cable disconnected	Repair	—
Temperature Cannot be Controlled (Mode Motor and/or Mode Switch Malfunction)	Mode motor defective	Replace	9-S29
	Mode Switch defective	Replace	9-S25
	Wiring harness controller disconnected	Repair or replace	9-S25
Temperature Cannot be Controlled (Heater Hoses Laid is Bad)	Heater hose caught	Repair	—
	Heater hose twisted or bent	Repair or replace	—

WINDSHIELD WIPER

Symptom	Probable Cause	Solution	Reference Page
Windshield Wiper Does Not Operate	Fuse blown (Short-circuit, burnt component inside motor or other part for operation)	Correct cause and replace	
	Wiper motor defective (Broken armature, worn motor brush or seized motor shaft)	Replace	9-S57
	Wiper switch defective	Replace	9-S32, 9-S33
	Foreign material interrupts movement of link mechanism	Repair	9-S57
	Wiper arm seized or rusted	Lubricate or replace	9-S57
Windshield Wiper Operating Speed Is Too Low	Wiper motor defective (Short-circuit of motor armature, worn motor brush or seized motor shaft)	Replace	9-S57
	Low battery voltage	Recharge or replace	
	Humming occurs on motor in arm operating cycle due to seized arm shaft	Lubricate or replace	9-S57
	Wiper switch contact improper	Replace	9-S32, 9-S33
Windshield Wiper Does Not Stop Correctly	Wiper motor defective (Contaminated auto-return contacts or improper contact due to foreign matter)	Replace	9-S57

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Refrigerating Cycle (Refrigerating Cycle is Normal Operating)	Pressure (LO Pressure Side)	0.15 to 0.19 MPa 1.5 to 2.0 kgf/cm ² 22 to 28 psi	—
	Pressure (HI Pressure Side)	1.3 to 1.6 MPa 13 to 17 kgf/cm ² 190 to 240 psi	—
Magnetic Clutch Stator Coil	Resistance	3.0 to 4.0 Ω	—
A/C Compressor Magnetic Clutch	Air Gap	0.30 to 0.65 mm 0.012 to 0.025 in.	—
Blower	Resistance	(Terminal Hi - Terminal M2) Approx. 0.22 Ω	—
		(Terminal Hi - Terminal M1) Approx. 0.69 Ω	—
		(Terminal Hi - Terminal Lo) Approx. 1.69 Ω	—
Pressure Switch (When pressure switch is turned OFF)	Setting Pressure (LO Pressure Side)	Less than approx. 0.20 MPa 2.0 kgf/cm ² 28 psi	—
	Setting Pressure (HI Pressure Side)	More than approx. 3.1 MPa 32 kgf/cm ² 460 psi	—
Front Wiper	Rotating Speed	25 to 43 times/min	—
Rear Wiper	Rotating Speed	25 to 43 times/min	—
Air Conditioner Drive Belt	Tension	10 to 12 mm (0.40 to 0.47 in.) deflection at 98 N (10 kgf, 22 lbf) of force	—
Air-gap of A/C Compressor Magnetic Clutch	Air-gap	0.30 to 0.65 mm 0.012 to 0.025 in.	—

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to G-14.)

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting nut	344 to 402	35.0 to 41.0	254 to 296
Compressor bracket mounting screw (M8) to aluminum parts	18 to 20	1.8 to 2.1	13 to 15
Compressor bracket mounting screw (M8) to ordinariness parts	24 to 27	2.4 to 2.8	18 to 20
Compressor bracket mounting screw (M10) to ordinariness parts	48 to 55	4.9 to 5.7	36 to 41
High pressure hose mounting screw (compressor side)	7.9 to 11	0.80 to 1.2	5.8 to 8.6
Low pressure hose mounting screw (compressor side)	7.9 to 11	0.80 to 1.2	5.8 to 8.6
Master cylinder hose retaining nut	24 to 27	2.4 to 2.8	18 to 20
Power steering joint shaft mounting screw	24 to 27	2.4 to 2.8	18 to 20
Brake hose retaining nut	24 to 27	2.4 to 2.8	18 to 20
Cabin mounting screw and nut	124 to 147	12.6 to 15.0	91.2 to 108
Compressor mounting screw	25 to 29	2.5 to 3.0	18 to 21
Magnetic clutch mounting screw	15 to 21	1.5 to 2.1	11 to 15
A/C unit mounting screw (M8)	9.8 to 15	1.0 to 1.6	7.3 to 11
Pressure hose joint mounting screw (cooler unit side)	7.9 to 11	0.80 to 1.2	5.8 to 8.6
High pressure pipe mounting screw (condenser side)	7.9 to 11	0.80 to 1.2	5.8 to 8.6
High pressure pipe retaining nut (receiver side)	12 to 14	1.2 to 1.5	8.7 to 10
Wiper arm mounting nut (front wiper)	6.9 to 9.8	0.70 to 1.0	5.1 to 7.2
Wiper arm mounting nut (rear wiper)	7.9 to 9.8	0.80 to 1.0	5.8 to 7.2
Wiper motor mounting screw	7.9 to 9.8	0.80 to 1.0	5.8 to 7.2

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4. PRECAUTIONS AT REPAIRING REFRIGERANT CYCLE

When checking or repairing the air conditioning system, the following precautions and rules must be observed. And it is of first importance that no other personnel than a well-trained serviceman should be allow to handle the refrigerant.



CAUTION

- Since direct contact of the liquid refrigerant with your skin will cause frostbite, always be careful when handling the refrigerant. Always wear goggles to protect your eyes when working around the system.
- The refrigerant service container has a safe strength. However, if handled incorrectly, it will explode. Therefore, always follow the instructions on the label. In particular, never heat the refrigerant container above 40 °C (104 °F) or drop it from a high height.
- Do not steam clean on the system, especially condenser since excessively high pressure will build up in the system, resulting in explosion of the system.
- If you improperly connect the hose between the service valve of compressor and gauge manifold, or incorrectly handle the valves, the refrigerant service container or charging hose will explode. When connecting the hose or handling the valve, be sure to check the high pressure side or low pressure side.
- In case the refrigerant is charged while the compressor is operated, do not open the high pressure valve of the gauge manifold.
- Beware of the toxicity of the gas. The gas is harmless and nontoxic in its original state, however it produces a toxic substance when it comes in contact with high temperature parts and decomposes.
- Do not heat the service can unless necessary. When it has to be heated, use warm water of 40 °C (104 °F) or lower. Do not heat using boiling water.

IMPORTANT

- If the refrigerant, O-rings, etc. for R12 are used in the R134a air conditioner system, problems such as refrigerant leakage or cloudiness in the sight glass may occur. Therefore, in order to prevent charging of refrigerant or erroneous connections, the shapes of the piping joint as well as the shapes of the service valve and the service tools have been changed.
- Always keep the working place clean and dry and free from dirt and dust. Wipe off water from the line fittings with a clean cloth before disconnecting.
- Use only for R134a refrigerant service tool.
- Use for R134a refrigerant recovery and recycling machine when discharging the refrigerant.
- Before attaching the charging hose to the can tap valve of the refrigerant container, check each packing for clogging.
- When disconnecting the charging hose from the charging valve of compressor and receiver, remove it as quick as possible so that gas leakage can be minimized.
- Be sure to charge the specified amount of refrigerant, but not excessively. Over-charging of the refrigerant in particular may cause insufficient cooling, etc..
- Since the charging hose can be connected to can tap valve by hand, do not use a pliers for tightening it.
- Keep refrigerant containers in a cool and dark place avoiding such place which are subject to strong sunlight or high temperature.
- R134a compressor oil absorbs moisture easily, so that be sure to seal after disconnecting the each parts.
- Do not use old-type refrigerant R12a or compressor oil for old-type refrigerant.
- When replacing the condenser, evaporator and receiver, etc., replenish the compressor oil to compressor according to the table below.

(Refrigerant)

Kinds of refrigerant (Charge amount)	Factory specifica- tion	R134a 0.85 to 0.95 kg 1.9 to 2.0 lbs
---	-------------------------------	--

(Compressor Oil)

Quantity (Total)	Brand Name
100 to 120 cc 0.106 to 0.126 U.S.qts 0.0880 to 0.105 Imp.qts	ND-OIL 8 <PAG* oil>

*PAG: Polyalkyleneglycol (Synthetic oil)

(To be continued)

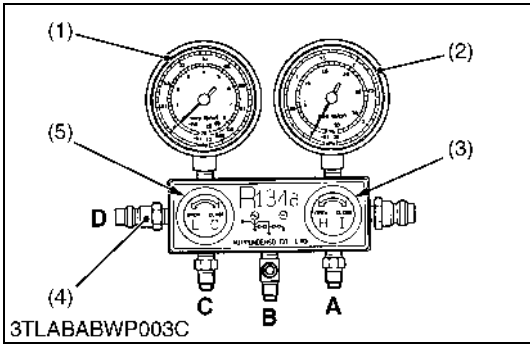
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(Reference)

Replacing Parts	Replenish Quantity	Brand Name
Condenser	40 cc 0.042 U.S.qts 0.035 Imp.qts	ND-OIL 8 <PAG* oil>
Evaporator	40 cc 0.042 U.S.qts 0.035 Imp.qts	
Receiver	10 cc 0.011 U.S.qts 0.009 Imp.qts	
Hose	10 cc 0.011 U.S.qts 0.009 Imp.qts	

*PAG: Polyalkyleneglycol (Synthetic oil)

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[1] HANDLING OF SERVICE TOOLS
(1) Manifold Gauge Set



The hand valves on the manifold gauge set are used to open and close the valve. The hand valve inscribed **LO** is for the low pressure side valve (5) and **HI** is for the high pressure side valve (3). By opening or closing the high and low pressure hand valves, the following circuits are established.

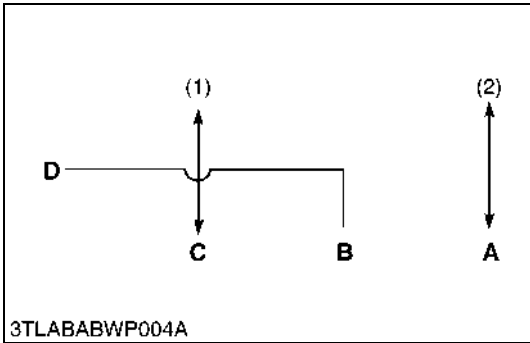
- (1) **LO** Pressure Gauge

(2) **HI** Pressure Gauge

(3) **HI** Pressure Side Valve
- (4) Schrader Valve

(5) **LO** Pressure Side Valve

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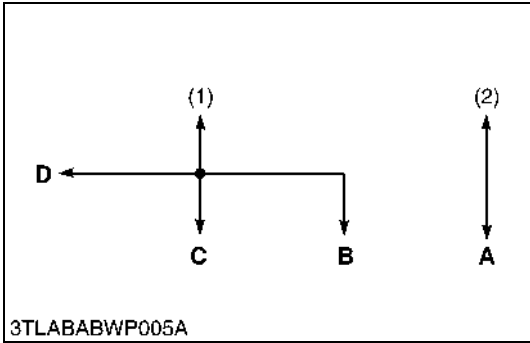


■ When LO Pressure Side Valve and HI Pressure Side Valve are Closed

Two circuits are established.
Port (C) → **LO** pressure gauge (1)
Port (A) → **HI** pressure gauge (2)

- **NOTE**
- Schrader valve (D) must be opened.

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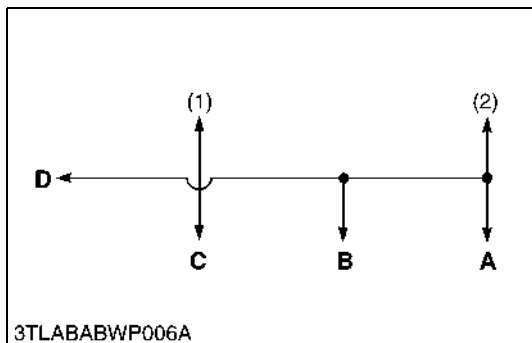


■ When LO Valve is Opened and HI Valve is Closed

Two circuits are established.
Port (C) → **LO** pressure gauge (1)
 → Port (B)
 → Port (D)
Port (A) → **HI** pressure gauge (2)

- **NOTE**
- Schrader valve (D) must be opened.

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■ **When LO Valve is Closed and HI Valve is Opened**

Two circuits are established.

Port (C) → **LO** pressure gauge (1)

→ Port (B)

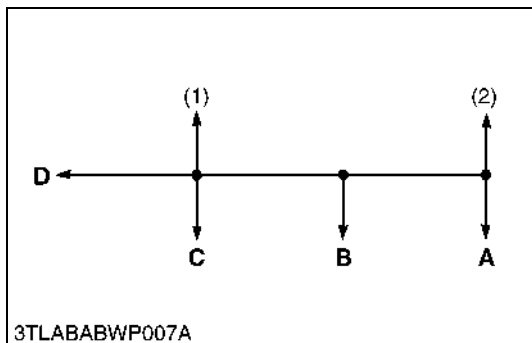
→ Port (D) (Schrader valve must be opened)

Port (A) → **HI** pressure gauge (2)

■ **NOTE**

- **Schrader valve (D) must be opened.**

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■ **When LO and HI Valve is Opened**

Two circuits are established.

Port (A) → **HI** pressure gauge (2)

→ **LO** pressure gauge (1)

→ Port (B)

→ Port (C)

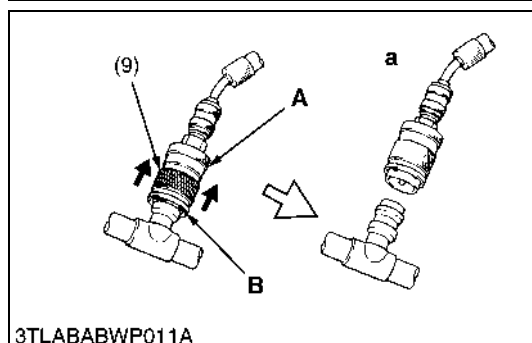
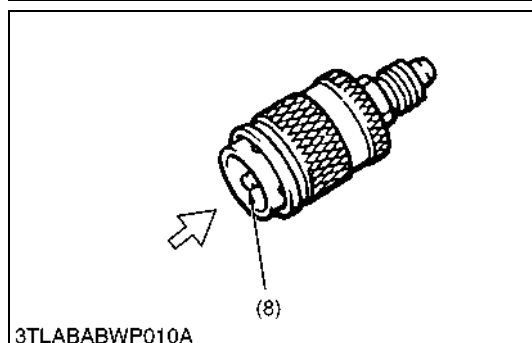
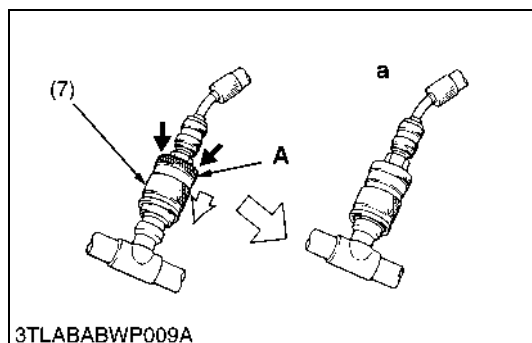
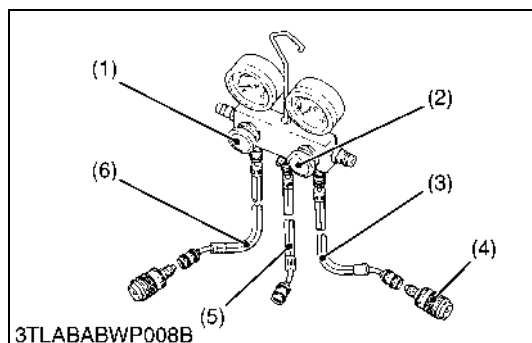
→ Port (D) (Schrader valve must be opened)

■ **NOTE**

- **Schrader valve (D) must be opened.**

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(2) Refrigerant Charging Hose



The charging hoses are classified into three colors. Each charging hose must be handled as follows:

- The air conditioner manufacture recommends that the blue hose (6) is used for the **LO** pressure side (suction side), the green hose (5) for refrigeration side (center connecting port) and the red hose (3) for **HI** pressure side (discharged side).

(When connecting)

- Push the quick disconnect adaptor (4) into the charging valve, and push on part **A** until a click is heard.

■ NOTE

- When connecting, push carefully so the pipe does not bend.
- When connecting the quick disconnect connector, should the sleeve (7) move before the quick link connector can be connected to the charging valve, move the quick sleeve to its original position and try again.
- When some refrigerant remains in the charging hose at the time of connections, it may be difficult to connect the quick link connector. In this case, perform the operation after removing any residual pressure in the hose. (Remove the residual pressure by pushing the pusher (8).)

(When reassembling)

- While holding on to part **A** of the quick disconnect adaptor, slide part **B** up.

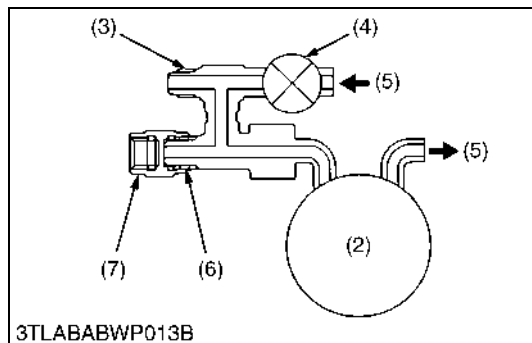
■ NOTE

- After removing the adaptor, ensure to cap the quick disconnect adaptor service valve.

- | | |
|------------------------------|-----------------|
| (1) LO Pressure Side Valve | (7) Sleeve |
| (2) HI Pressure Side Valve | (8) Pusher |
| (3) Red Hose | (9) Sleeve |
| (4) Quick Disconnect Adaptor | |
| (5) Green Hose | a: CLICK |
| (6) Blue Hose | |

9Y1210686CAS0007US0

(3) Vacuum Pump Adaptor



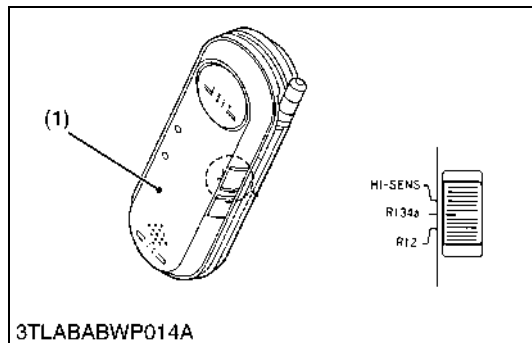
Objective of the Vacuum Pump Adaptor

1. After vacuum has been created in the air conditioning cycle, when the vacuum pump (2) is stopped, since there is vacuum in hoses within the gauge manifold, the vacuum pump oil flows back into the charging hose. If the refrigerant is refilled with the system still in this state, the vacuum pump oil left in the charging hose enters the air conditioner cycle together with the refrigerant. Vacuum pump adaptor (1) with a solenoid valve is used to prevent this back-flow of oil from the vacuum pump (2). The role of the solenoid valve is that when the current passes through the solenoid valve, the valve closes to keep out the outside air and allow the vacuum to build up, but when the current stops, the valve opens to allow in air and end the vacuum.
2. Attaching this adaptor to the R12 vacuum pump currently being used allows the pump to be used with both R134a and R12.

- | | |
|-------------------------|---------------|
| (1) Vacuum Pump Adaptor | (5) Air |
| (2) Vacuum Pump | (6) For R12 |
| (3) For R134a | (7) Blind Cap |
| (4) Magnetic Valve | |

9Y1210686CAS0008US0

(4) Electric Gas Leak Tester



The current R12 gas leak tester has poor sensitivity for R134a and cannot be used. Therefore, a new electric gas leak tester with greater sensitivity has been designed and can be used with both R134a and R12.

(Reference)

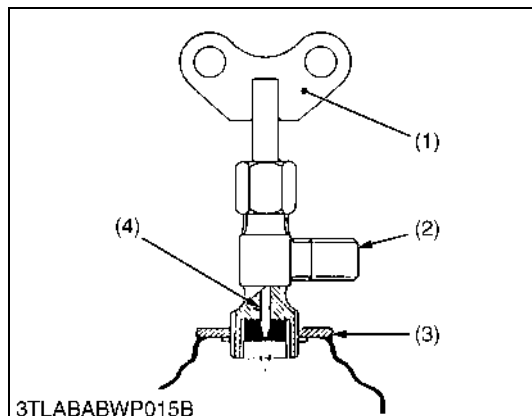
Leak tester with halide torch

- Since the reaction with chlorine within the refrigerant is used to detect gas leaks, R134a, which contains no chlorine, cannot be detected.

- (1) Electric Gas Leak Tester

9Y1210686CAS0009US0

(5) Can Tap Valve



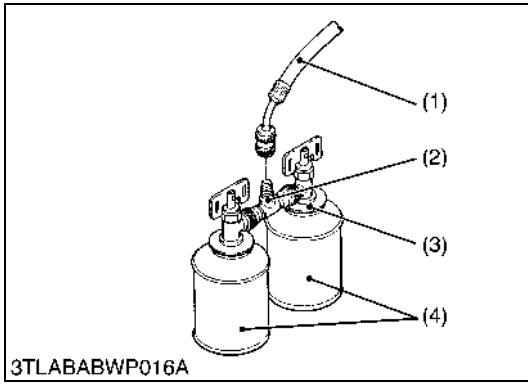
The can tap valve that is used to charge the refrigerant into the air conditioning system, should be used as follows:

1. Before putting the can tap valve on the refrigerant container, turn the handle (1) counterclockwise till the valve needle is fully retracted.
2. Turn the plate nut (disk) (3) counterclockwise till it reaches its highest position, then screw down the can tap valve into the sealed tap.
3. Turn the plate nut clockwise fully, and fix the center charging hose to the valve.
4. Tighten the plate nut firmly by hand.
5. Turn the handle (1) clockwise, thus making a hole in the sealed tap.
6. To charge the refrigerant into the system, turn the handle (1) counterclockwise. To stop charging, turn it clockwise.

- | | |
|----------------------|------------|
| (1) Butterfly Handle | (3) Disk |
| (2) Connection | (4) Needle |

9Y1210686CAS0010US0

(6) T-joint



T-joint (2) is used to increase efficiency of gas charging using two refrigerant containers (4) at a time.

1. Install two refrigerant container service valves to T-joint (2) sides and connect the charging hose (1) to it.

- (1) Charging Hose (Green)
(2) T-joint

- (3) Can Tap Valve
(4) Refrigerant Container

9Y1210686CAS0011US0

(7) R134a Refrigerant Recover and Recycling Machine

When there is necessity of discharging the refrigerant on repairing the tractor, it should use recovery and recycling machine. (Do not release the refrigerant into the atmosphere.)

■ IMPORTANT

- Use only R134a refrigerant recovery and recycling machine, eliminate mixing R134a equipment, refrigerant and refrigerant oils with R12 systems to prevent compressor damage.

9Y1210686CAS0012US0

5. CHECKING AND CHARGING REFRIGERANT CYCLE

[1] CHECKING WITH MANIFOLD GAUGE

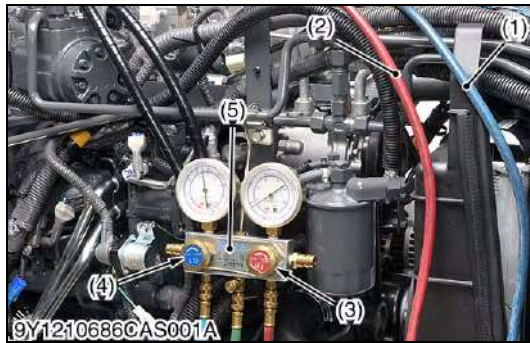
■ IMPORTANT

- The gauge indications described in the following testing are those taken under the same condition, so it should be noted that the gauge readings will differ somewhat with the ambient conditions.

Condition

- Ambient temperature: 30 to 35 °C (86 to 95 °F)
- Engine speed: Approx. 1500 min⁻¹ (rpm)
- Temperature control lever: Maximum cooling position
- Blower switch: **HI** position

9Y1210686CAS0013US0



Manifold Gauge Connecting and Test Preparation

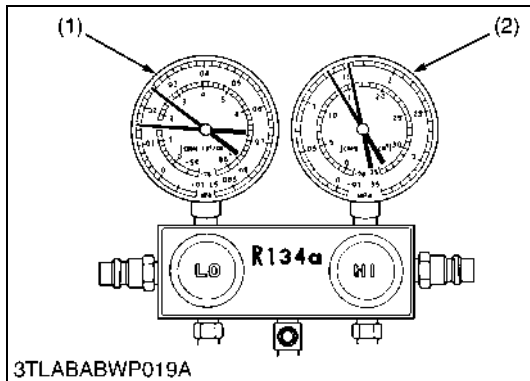
- Close the manifold gauge **HI** and **LO** pressure side valve (3), (4) tightly.
- Connect the charging hose (red) (2) to the **HI** pressure side charging valve (7) and connect the charging hose (blue) (1) to the **LO** pressure side charging valve (6).

■ NOTE

- Be sure to drive out the air in the charging hoses at the manifold gauge connection end by utilizing the refrigerant pressure in the refrigerating cycle.
- Start the engine and set at approx. 1500 min⁻¹ (rpm).
 - Turn on the A/C switch and set the temperature control dial to maximum cooling position.
 - Set the blower switch to **HI** position.

- | | |
|-----------------------------------|--|
| (1) Charging Hose (Blue) | (5) Manifold Gauge |
| (2) Charging Hose (Red) | (6) LO Pressure Side Charging Valve |
| (3) HI Pressure Side Valve | (7) HI Pressure Side Charging Valve |
| (4) LO Pressure Side Valve | |

9Y1210686CAS0014US0



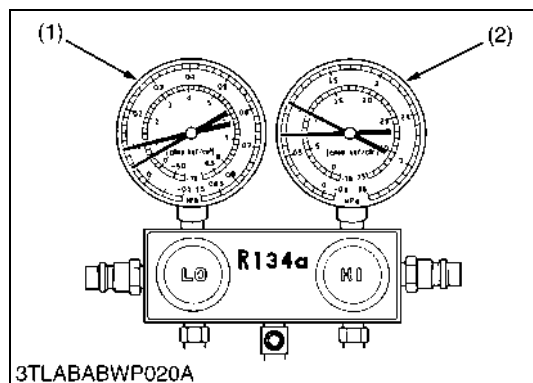
Normal Operating

If the refrigerating cycle is operating normally, the reading at the **LO** pressure side (1) should be generally by around 0.15 to 0.19 MPa (1.5 to 2.0 kgf/cm², 22 to 28 psi) and that at the **HI** pressure side (2) around 1.3 to 1.6 MPa (13 to 17 kgf/cm², 190 to 240 psi).

Gas pressure	Factory specification	Low pressure side	0.15 to 0.19 MPa 1.5 to 2.0 kgf/cm ² 22 to 28 psi
		High pressure side	1.3 to 1.6 MPa 13 to 17 kgf/cm ² 190 to 240 psi

(1) **LO** Pressure Side(2) **HI** Pressure Side

9Y1210686CAS0015US0

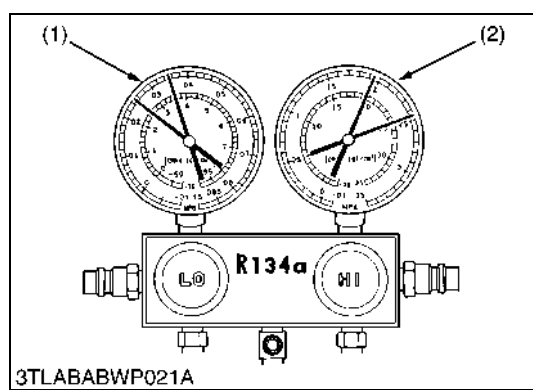


Insufficient Refrigerant

- Symptoms seen in refrigerating cycle
 - Both **LO** and **HI** pressure side (1), (2) pressures too low.
 - LO** pressure side (1): 0.049 to 0.098 MPa (0.50 to 1.0 kgf/cm², 7.2 to 14 psi)
 - HI** pressure side (2): 0.69 to 0.98 MPa (7.0 to 10 kgf/cm², 100 to 140 psi)
 - Bubbles seen in sight glass.
 - Air discharged from air conditioner slightly cold.
- Probable cause
 - Gas leaking from some place in refrigerant cycle.
- Solution
 - Check for leakage with electric gas leak tester (see page 9-S8) and repair.
 - Recharge refrigerant to the proper level. (See page 9-S20.)

(1) **LO** Pressure Side(2) **HI** Pressure Side

9Y1210686CAS0016US0



Excessive Refrigerant or Insufficient Condenser Cooling

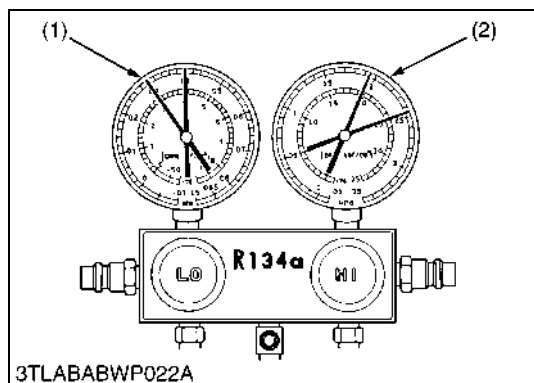
- Symptoms seen in refrigerating cycle
 - Both **LO** and **HI** pressure side (1), (2) pressures too high.
 - LO** pressure side (1): 0.20 to 0.34 MPa (2.0 to 3.5 kgf/cm², 29 to 49 psi)
 - HI** pressure side (2): 2.0 to 2.4 MPa (20 to 25 kgf/cm², 290 to 350 psi)
- Probable cause
 - Overcharging refrigerant into cycle.
 - Condenser cooling faulty.
- Solution
 - Clean condenser. (See page 9-S8.)
 - Adjust air conditioner belt to proper tension. (See page G-29.)
 - If the above two items are in normal condition, check refrigerant quantity. (See page 9-S22.)

■ NOTE

- If excessive refrigerant is to be discharged, loosen manifold gauge **LO** pressure side valve and vent out slowly.

(1) **LO** Pressure Side(2) **HI** Pressure Side

9Y1210686CAS0017US0



Air Entered in the Cycle

- Symptoms seen in refrigerating cycle
 - Both **LO** and **HI** pressure side (1), (2) pressures too high.
 - LO** pressure side (1): 0.20 to 0.34 MPa (2.0 to 3.5 kgf/cm², 29 to 49 psi)
 - HI** pressure side (2): 2.0 to 2.4 MPa (20 to 25 kgf/cm², 290 to 350 psi)
 - LO** pressure side (1) piping not cold when touched.
- Probable cause
 - Air entered in refrigerating cycle.
- Solution
 - Replace receiver.
 - Check compressor oil contamination and quantity.
 - Evacuate and recharge new refrigerant. (See page 9-S20.)

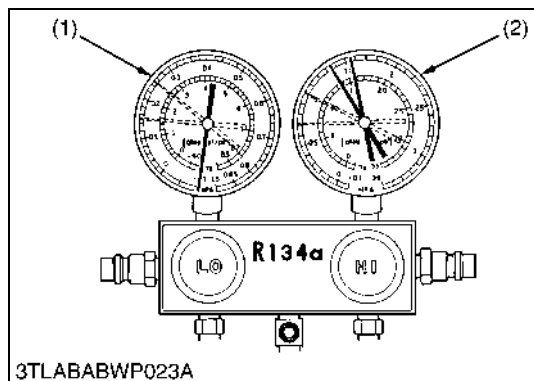
NOTE

- The above cycle can be seen when the cycle is charged without evacuation.

(1) **LO** Pressure Side

(2) **HI** Pressure Side

9Y1210686CAS0018US0



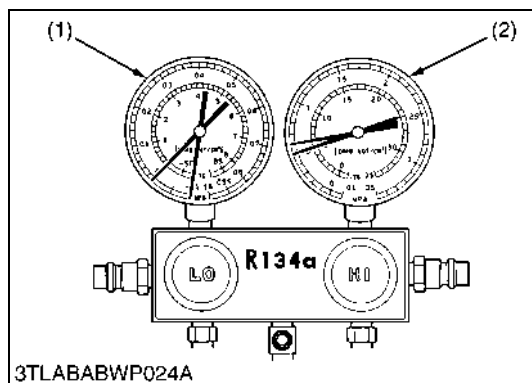
Moisture Entered in the Cycle

- Symptoms seen in refrigerating cycle
 - The air conditioner operates normally at the beginning, but over time, **LO** pressure side (1) pressure is vacuum and **HI** pressure side (2) is low pressure.
 - LO** pressure side (1): Vacuum
 - HI** pressure side (2): 0.69 to 0.98 MPa (7.0 to 10 kgf/cm², 100 to 140 psi)
- Probable cause
 - The moisture in the refrigerating cycle freezes in the expansion valve orifice and causes temporary blocking. After a time, the ice melts and condition returns to normal.
- Solution
 - Replace receiver.
 - Remove moisture in cycle by means of repeated evacuation. (See page 9-S19.)
 - Recharge new refrigerant to the proper level. (See page 9-S20.)

(1) **LO** Pressure Side

(2) **HI** Pressure Side

9Y1210686CAS0019US0



Refrigerant Fails to Circulate

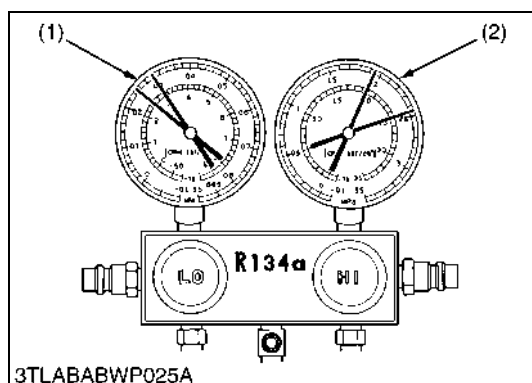
1. Symptoms seen in refrigerating cycle
 - **LO** pressure side (1) pressure is vacuum and, **HI** pressure side (2) is low pressure.
 - LO** pressure side (1): Vacuum
 - HI** pressure side (2): 0.49 to 0.58 MPa (5.0 to 6.0 kgf/cm², 72 to 85 psi)
2. Probable cause
 - Refrigerant flow obstructed by moisture or dirt in the refrigerating cycle freezing or sticking on the expansion valve orifice.
3. Solution

Allow to stand for same time and then resume operation to decide whether the plugging is due to moisture or dirt.

 - If caused by moisture, correct by referring to instructions in previous.
 - If caused by dirt, remove the expansion valve and blow out the dirt with compressed air.
 - If unable to remove the dirt, replace the expansion valve. Replace the receiver. Evacuate and charge in proper amount of new refrigerant. (See page 9-S19, 9-S20.)
 - If caused by gas leakage in heat sensitizing tube, replace the expansion valve.

(1) **LO** Pressure Side(2) **HI** Pressure Side

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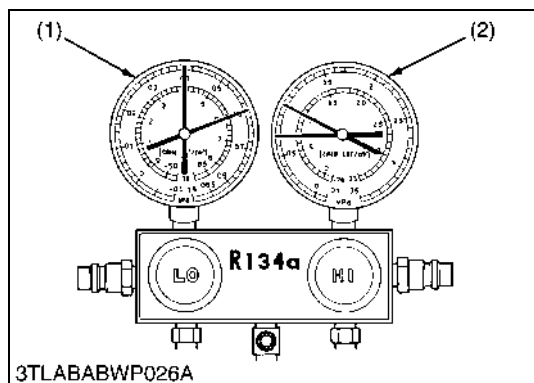


Expansion Valve Opens Too Far or Improper Installation of Heat Sensitizing Tube

1. Symptoms seen in refrigerating cycle
 - Both **LO** and **HI** pressure side (1), (2) pressures too high.
 - LO** pressure side (1): 0.30 to 0.39 MPa (3.0 to 4.0 kgf/cm², 43 to 56 psi)
 - HI** pressure side (2): 2.0 to 2.4 MPa (20 to 25 kgf/cm², 290 to 350 psi)
 - Frost or heavy dew on low pressure side piping.
2. Probable cause
 - Expansion valve trouble or heat sensitizing tube improperly installed.
 - Flow adjustment not properly done.
3. Solution
 - Check installed condition of heat sensitizing tube.
 - If installation of heat sensitizing tube is correct, replace the expansion valve.

(1) **LO** Pressure Side(2) **HI** Pressure Side

9Y1210686CAS0021US0



Faulty Compression of Compressor

1. Symptoms seen in refrigerating cycle
 - **LO** pressure side (1):
0.40 to 0.58 MPa (4.0 to 6.0 kgf/cm², 57 to 85 psi)
 - **HI** pressure side (2):
0.69 to 0.98 MPa (7.0 to 10 kgf/cm², 100 to 140 psi)
2. Probable cause
 - Leak in compressor.
3. Solution
 - Replace compressor. (See page 9-S46.)

NOTE

- **Manifold gauge indications (left side figure) at faulty compressing by compressor.**

(1) **LO** Pressure Side

(2) **HI** Pressure Side

9Y1210686CAS0022US0

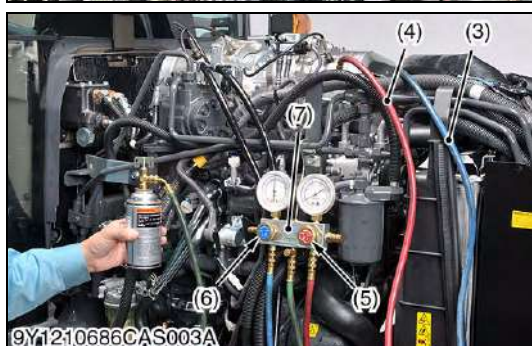
[2] DISCHARGING, EVACUATING AND CHARGING

■ IMPORTANT

- When discharging, evacuating or charging the refrigerating system, be sure to observe the "4. PRECAUTION AT REPAIRING REFRIGERANT CYCLE". (See page 9-S7.)

9Y1210686CAS0023US0

(1) Discharging the Refrigerant



Prepare for the R134a refrigerant recovery and recycling machine (8).

1. Connect low pressure side hose (blue) (3) from the recovery and recycling machine (8) to **LO** pressure side charging valve (1). Connect high pressure side hose (red) (4) to **HI** pressure side charging valve (2).
2. Follow the manufacturers instructions and discharge the system.

■ IMPORTANT

- Use only R134a refrigerant recovery and recycling machine (8). Eliminate mixing R134a equipment, refrigerant, and refrigerant oils with R12 system to prevent compressor damage.



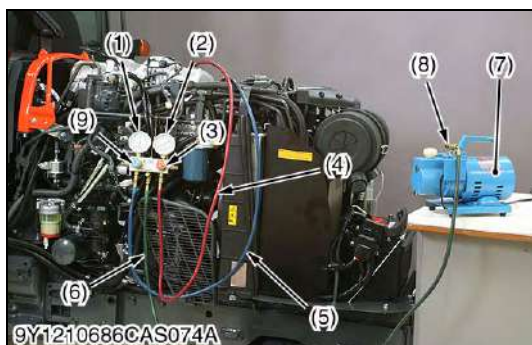
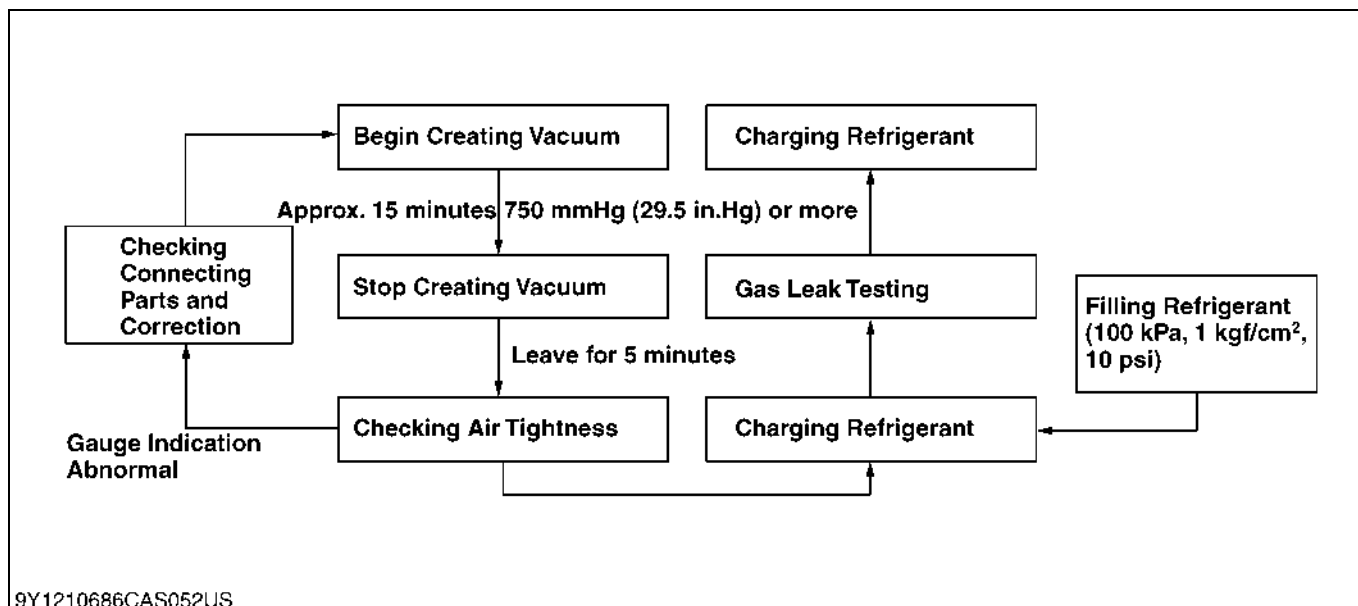
CAUTION

- Protect fingers and eyes with cloth against frostbite by refrigerant when disconnecting the hose to the charging valve.

- | | |
|--|--|
| (1) LO Pressure Side Charging Valve | (6) LO Pressure Side Valve |
| (2) HI Pressure Side Charging Valve | (7) Manifold Gauge |
| (3) Charging Hose (Blue) | (8) Refrigerant Recovery and Recycling Machine |
| (4) Charging Hose (Red) | |
| (5) HI Pressure Side Valve | |

9Y1210686CAS0024US0

(2) Evacuating the System



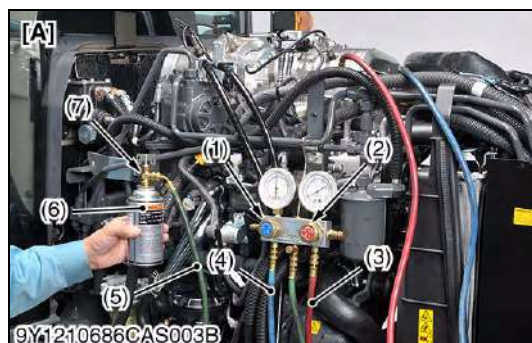
Evacuating the System

1. Discharge refrigerant from the system by R134a refrigerant recovery and recycling machine. (See page 9-S18.)
2. Connect the charging hose (red) (4) to the **HI** pressure side charging valve and connect the charging hose (blue) (5) to the **LO** pressure side charging valve.
3. Connect the center charging hose (green) (6) to a vacuum pump inlet.
4. Open both valves (3) and (9) of manifold gauge fully. Then run the vacuum pump (7) to evacuate the refrigerant cycle. (For approx. 15 minutes.)
5. When **LO** pressure gauge (1) reading is more than 750 mmHg (29.5 in.Hg), stop the vacuum pump (7) and close both valves (3), (9) of manifold gauge fully.
6. Wait for over 5 minutes with the **HI** and **LO** pressure side valves (3) and (9) of gauge manifold closed, and then check that gauge indicator does not return to 0.
7. If the gauge indicator is going to approach to 0, check whether there is a leaking point and repair if it is, and then evacuate it again.

- | | |
|-----------------------------------|-----------------------------------|
| (1) LO Pressure Gauge | (6) Charging Hose (Green) |
| (2) HI Pressure Gauge | (7) Vacuum Pump |
| (3) HI Pressure Side Valve | (8) Vacuum Pump Adaptor |
| (4) Charging Hose (Red) | (9) LO Pressure Side Valve |
| (5) Charging Hose (Blue) | |

9Y1210686CAS0094US0

(3) Charging the Refrigerant



Charging an Empty System (Liquid)

This procedure is for charging an empty system through the **HI** pressure side with the refrigerant in the liquid state.



CAUTION

- **Never run the engine when charging the system through the HI pressure side.**
- **Do not open the LO pressure valve when refrigerant R134a is being charged in the liquid state (refrigerant container is placed upside-down).**

IMPORTANT

- **After charging the refrigerant in the liquid state with approx. 500 g (1.10 lbs) through the HI pressure side, be sure to recharge the refrigerant in the vapor state to specified amount through the LO pressure side.**
1. Close the **HI** and **LO** pressure side valves (1) and (2) of manifold gauge after the system is evacuated completely.
 2. Connect the center charging hose (green) (5) to the can tap valve (7) fitting, and then loosen the center charging hose (green) (5) at the center fitting of manifold gauge until hiss can be heard. Allow the air to escape for few seconds and tighten the nut.
 3. Open the **HI** pressure side valve (2) fully, and keep the container upside-down to charge the refrigerant in the liquid state from the **HI** pressure side.
 4. Charge the refrigerant in the liquid state with approx. 500 g (1.10 lbs) from the **HI** pressure side.

NOTE

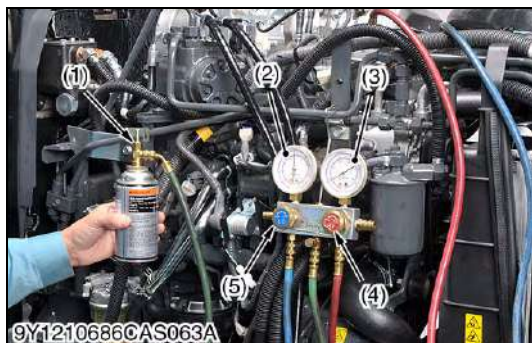
- **If LO pressure gauge does not show a reading, the system is clogged and must be repaired.**
5. Close the **HI** pressure side valve (2) of manifold gauge and can tap valve of refrigerant container.

- (1) **LO** Pressure Side Valve
- (2) **HI** Pressure Side Valve
- (3) Charging Hose (Red)
- (4) Charging Hose (Blue)
- (5) Charging Hose (Green)
- (6) Refrigerant Container (R134a)
- (7) Can Tap Valve

[A] Refrigerant Container "Upside"

[B] Refrigerant Container "Down Side"

9Y1210686CAS0026US0



Charging an Empty or Partially Charged System (Vapor)

This procedure is to charge the system through the **LO** pressure side with refrigerant in the vapor state. When the refrigerant container is placed right side up, refrigerant will enter the system as a vapor.



CAUTION

- **Never open the HI pressure side valve of manifold gauge while the engine is running.**

NOTE

- **Do not turn the refrigerant container upside-down when charging the system by running the engine.**
- **Put refrigerant container into a pan of warm water (maximum temperature 40 °C (104 °F)) to keep the vapor pressure in the container slightly higher than vapor pressure in the system.**

1. Check that the **HI** pressure side valve (4) is closed.
2. Start the engine and set an approx. 1500 min⁻¹ (rpm).
3. Turn on the A/C switch.
Set the temperature control lever to maximum cooling position and the blower switch to **HI** position.
4. Open the **LO** pressure side valve (5) of manifold gauge and the can tap valve (1) on refrigerant container and charge the refrigerant until air bubbles in the sight glass of the receiver vanish.
5. After charging the specified amount of refrigerant into the system, close the **LO** pressure side valve (5) of manifold gauge and can tap valve (1), then stop the engine.
6. Check for gas leak with an electric gas leak tester. (See page 9-S11.)

(Reference)

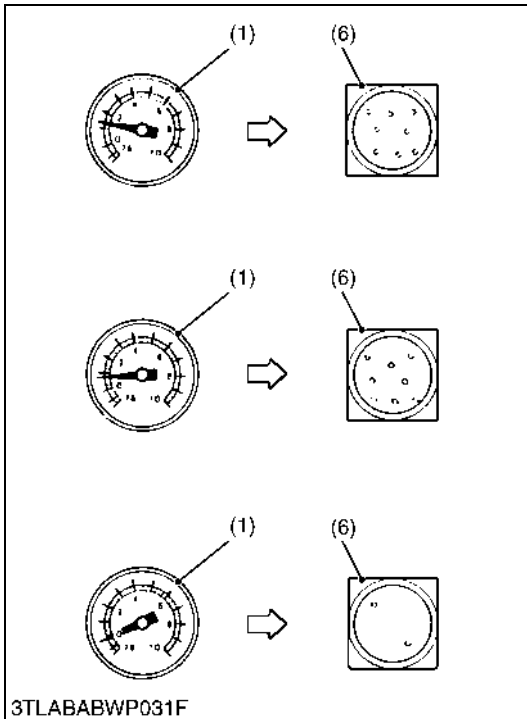
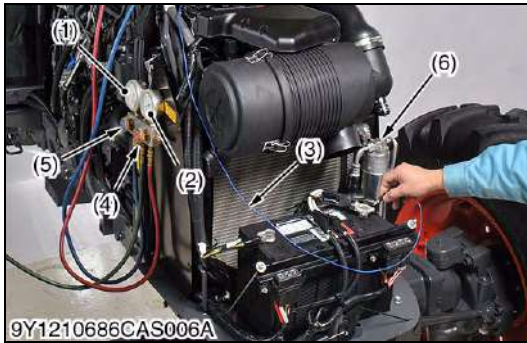
- Specified amount of refrigerant (total):
R134a
0.85 to 0.95 kg
1.9 to 2.0 lbs
- Manifold gauge indication at fully charged system (at ambient temperature: 30 °C (86 °F))
 - **HI** pressure side:
1.3 to 1.6 MPa
13 to 17 kgf/cm²
190 to 240 psi
 - **LO** pressure side:
0.15 to 0.19 MPa
1.5 to 2.0 kgf/cm²
22 to 28 psi

- (1) Can Tap Valve
(2) **LO** Pressure Gauge
(3) **HI** Pressure Gauge

- (4) **HI** Pressure Side Valve
(5) **LO** Pressure Side Valve

9Y1210686CAS0027US0

(4) Checking Charge Refrigerant Amount



After charging the refrigerant, check for amount of charging refrigerant as follows.

■ NOTE

- The pressure on the following checking is the gauge indications at ambient temperature 30 °C (86 °F), so it should be noted that the pressure will differ some what with the ambient temperature.

1. Disconnect the **1P** connector of magnetic clutch.
2. Start the engine and set a approx. 1500 min⁻¹ (rpm).
3. Connect the **1P** connector of magnetic clutch to battery directly, and then set the blower switch to **HI** position.
4. Leave the system for approx. 5 minutes until the refrigerant cycle becomes stable, keeping pressure on the **HI** pressure side from 1.3 to 1.6 MPa (13 to 17 kgf/cm², 190 to 240 psi).
5. When the refrigerant cycle is stabilizer, turn off the blower switch and let the compressor alone to run. Then pressure on the **LO** pressure side gradually drops. At this time, if pressure on the **HI** pressure side is maintained from 1.3 to 1.6 MPa (13 to 17 kgf/cm², 190 to 240 psi), air bubbles which pass through the sight glass (6) becomes as stated below depending on refrigerant charged amount.

■ Insufficient refrigerant charge

Air bubbles pass continuously the sight glass when pressure on the **LO** pressure side is over 98 kPa (1.0 kgf/cm², 14 psi). In this case, charge the refrigerant from the **LO** pressure side.

■ Properly refrigerant charge

Air bubbles pass through the sight glass continuously when pressure on the **LO** pressure side is within 59 to 98 kPa (0.60 to 1.0 kgf/cm², 8.6 to 14 psi).

If the charge refrigerant amount is proper, no air bubble is observed on the sight glass at pressure on the **LO** pressure side over 98 kPa (1.0 kgf/cm², 14 psi) when the blower switch is turned on. When the blower switch is turned off, bubbles pass through the sight glass in case pressure on the **LO** pressure side is within 59 to 98 kPa (0.60 to 1.0 kgf/cm², 8.6 to 14 psi).

■ Excessive refrigerant charge

Air bubbles pass through the sight glass time to time or no air bubble is observed when pressure on the **LO** pressure side is under 60 kPa (0.6 kgf/cm², 9 psi).

In this case, discharge excessive refrigerant gradually from the **LO** pressure side.

- (1) **LO** Pressure Gauge
- (2) **HI** Pressure Gauge
- (3) To Battery

- (4) **HI** Pressure Side Valve
- (5) **LO** Pressure Side Valve
- (6) Sight Glass

9Y1210686CAS0028US0

6. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Compressor



Operation of Magnetic Clutch

1. Turn off the A/C switch after starting the engine.
2. Check whether abrasion or abnormal noise is heard when only the magnetic clutch pulley is running.
3. Check that the magnetic clutch (1) does not slip when the A/C switch and blower switch are turned **ON** (when the air conditioner is in operation).
4. If anything abnormal is found, repair or replace.

(1) Magnetic Clutch

9Y1210686CAS0029US0



Stator Coil

1. Measure the resistance of the stator coil with an ohmmeter across the **1P** connector (1) of magnetic clutch and compressor body.
2. If the measurement is not within the factory specifications, replace the stator coil.

Stator coil resistance	Factory specification	3.0 to 4.0 Ω
------------------------	-----------------------	---------------------

(1) **1P** Connector

9Y1210686CAS0030US0



Air Gap

1. Check the air gap with feeler gauge.
2. If the measurement is not within the factory specifications, adjust it. (See page 9-S58.)

Air gap	Factory specification	0.30 to 0.65 mm 0.012 to 0.025 in.
---------	-----------------------	---------------------------------------

9Y1210686CAS0031US0

(2) Relay (A/C Compressor, Front Working Light, Front Wiper, Blower, Blower Hi, ACC, Auxiliary Power)

Connector Voltage

- See page 8-S27.

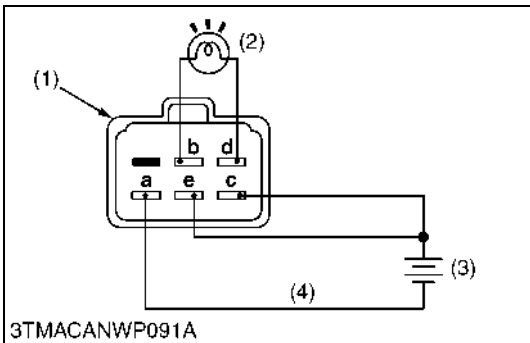
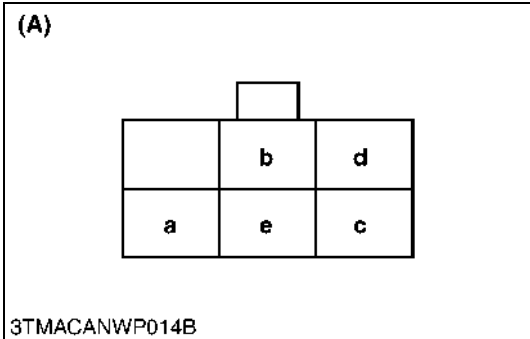
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Relay Test

- See page 8-S44.

9Y1210686CAS0033US0

(3) Wiper Relay



Connector Voltage

- 1. Disconnect the 6P connector (2) from wiper relay (1).
- 2. Turn the main switch to "ON" position.
- 3. Measure the voltage with a voltmeter across the connector terminal c and chassis.
- 4. Measure the voltage with a voltmeter across the connector terminal e and chassis.
- 5. If the voltage differs from the battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	Terminal c – chassis	Approx. battery voltage
	Terminal e – chassis	Approx. battery voltage

- (1) Wiper Relay

(2) 6P Connector
- (A) 6P Connector

(Wire Harness Side)

9Y1210686CAS0034US0

Wiper Relay Checking

- 1. Remove the wiper relay.
- 2. Connect jumper leads across the wiper relay, bulb (2) and 12 V battery (3) as shown in the figure left.
- 3. When the jumper lead (4) is connected with terminal a, the bulb (2) should light up. When it is disconnected, the bulb (2) should light off.
- 4. If the bulb does not light up or light off correctly, the relay is faulty.

Ampere	Bulb	When jumper lead is connected	Light up
		When jumper lead is disconnected	Light off

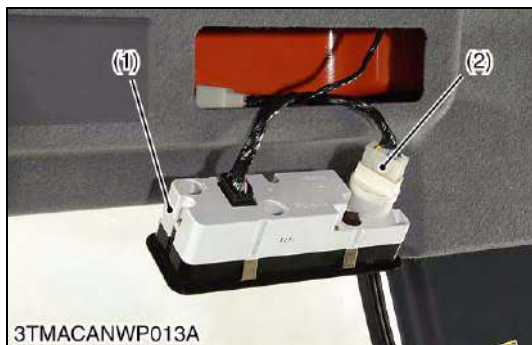
- (1) 6P Connector (Wiper Relay Side)

(2) Bulb
- (3) Battery

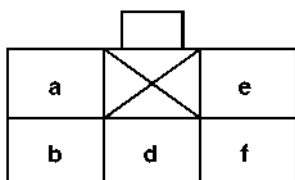
(4) Jumper Lead

9Y1210686CAS0035US0

(4) Control Panel (Blower Switch, A/C Switch, Mode Control Dial, Temperature Control Dial and Recirculation/Fresh Air Selection Switch)

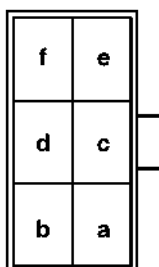


(A)



3TMACANWP014A

(A)



3TMACANWP015A

Blower Switch Connector Voltage

1. Disconnect the **6P** connector (2) from blower switch.
2. Turn the main switch to **"ON"** position.
3. Measure the voltage with a voltmeter across the connector terminal **a** and terminal **b**.
4. If the voltage differs from the battery voltage, the wiring harness, A/C relay, fuse or main switch is faulty.

Voltage	Terminal a – Terminal b	Approx. battery voltage
---------	----------------------------	-------------------------

- (1) Control Panel
(2) 6P Connector

(A) 6P Connector
(Wire Harness Side)

9Y1210686CAS0036US0

Blower Switch Test

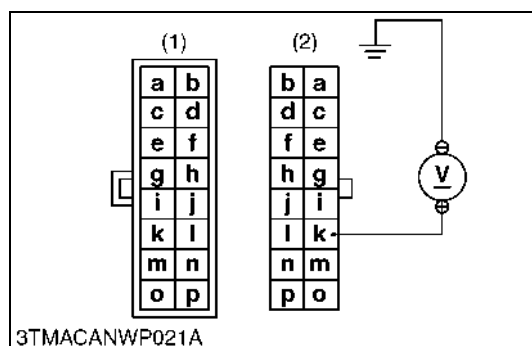
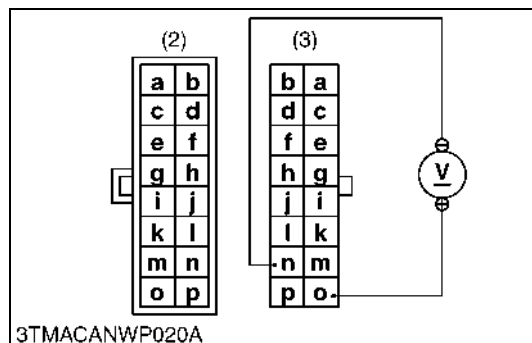
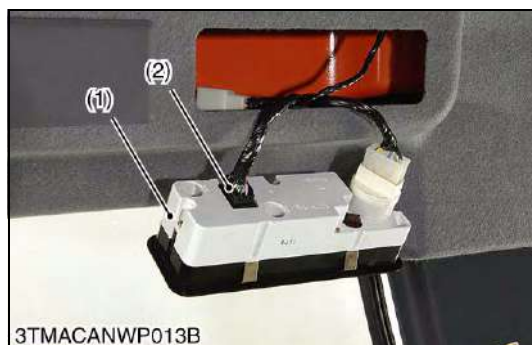
1. Check the continuity through the switch with an ohmmeter.
2. If the continuity specified below are not indicated, the switch is faulty.

Position		Terminal					
		a	b	c	d	e	f
A/C blower switch	OFF						
	● (Low)	●	●	●			
	● (Medium Low)	●	●			●	
	● (Medium High)	●	●				●
	● (High)	●	●		●		

9Y1210686CAS069US

(A) 6P Connector
(Blower Switch Side)

9Y1210686CAS0037US0



Connector Voltage

1. Disconnect the **16P** connector (2) from control panel switch.
2. Turn the main switch to **"ON"** position.
3. Measure the voltage with a voltmeter across the terminal **o** and terminal **n**.
4. If the voltage differs from the battery voltage, the wiring harness, A/C relay or fuse is faulty.

Voltage	Terminal n – Terminal o	Approx. battery voltage
---------	--	-------------------------

- (1) Control Panel (2) **16P** Connector (Switch Side) (3) **16P** Connector (Wire Harness Side)

9Y1210686CAS0038US0

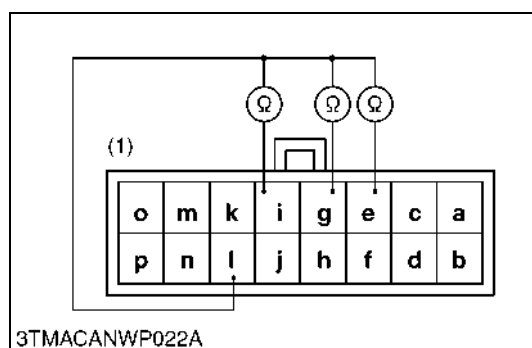
A/C Switch Checking

1. Measure the voltage with a voltmeter across the terminal **k** and chassis.
2. Turn the main switch to **"ON"** position.
3. Turn the blower switch to **"ON"** position.
4. Press the air conditioner switch to set it to **"OFF"** position (indicator: OFF), and then measure a voltage using a circuit tester.
5. Press the air conditioner switch to set it at **"ON"** position (indicator: ON), and then measure a voltage using a circuit tester.
6. If a measured voltage does not comply with the values in the table below, the control panel, wiring harness or fuse is faulty.

Voltage	Terminal k – Chassis	A/C switch at ON	Approx. battery voltage
		A/C switch at OFF	Approx. 1 V

- (1) **16P** Connector (Switch Side) (2) **16P** Connector (Wire Harness Side)

9Y1210686CAS0039US0



Mode Control Dial Checking

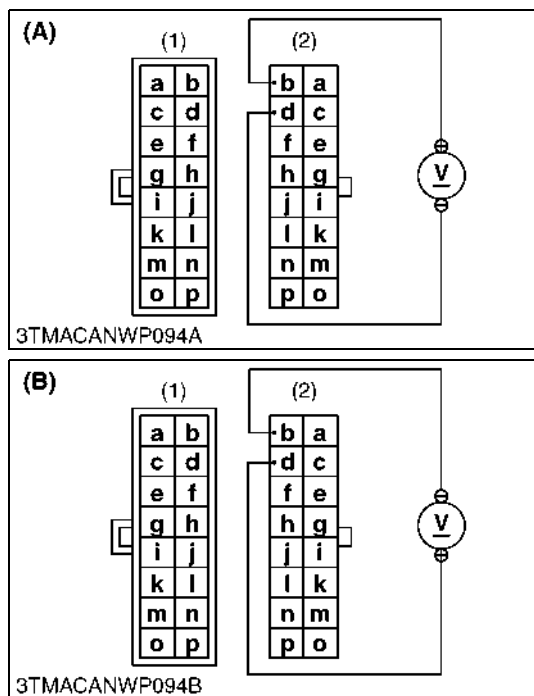
1. Disconnect the **16P** connector from control panel switch.
2. Check the continuity through the switch with an ohmmeter.
3. If the continuity specified below is not indicated, the switch is faulty.

Position		Terminal			
		e	g	i	l
Mode switch	FRONT	●			●
	FULL		●		●
	DEF			●	●

9Y1210686CAS070US

- (1) **16P** Connector (Switch Side)

9Y1210686CAS0040US0



Temperature Control Dial Checking

1. Turn the temperature control dial counterclockwise till it stops (at **"COOL"** position).
2. Measure the voltage with a voltmeter across the terminal **b** and terminal **d**. Make the following measurement with the terminals connected.
3. Turn the main switch to **"ON"** position.
4. Check that an output voltage is approximately 10 V when turning the temperature control dial clockwise till it stops (**"WARM"** position).
5. Turn the main switch back to **"OFF"** position.
6. Turn the temperature control dial clockwise till it stops (**"WARM"** position).
7. Measure the voltage with a voltmeter across the terminal **d** and terminal **b**. Make the following measurement with the terminals connected.
8. Turn the main switch to **"ON"** position.
9. Check that an output voltage is approximately 10 V, when turning the temperature control dial counterclockwise till it stops (**"COOL"** position).
10. If an output voltage differs from approximately 10 V, the control panel, wiring harness or fuse is faulty.

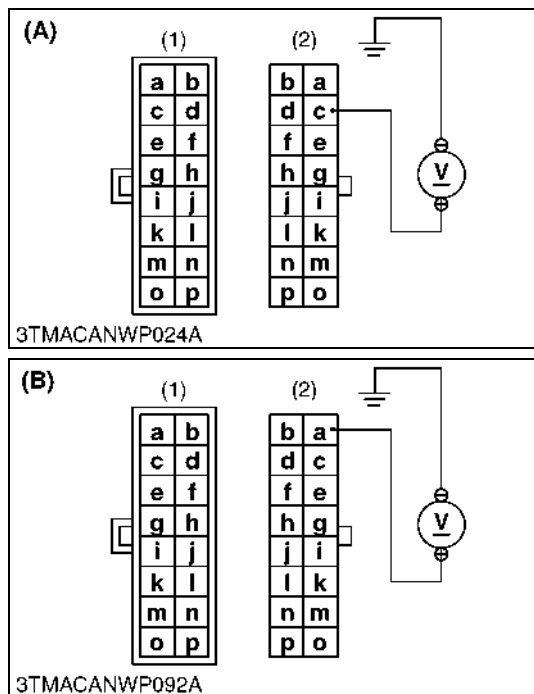
(1) 16P Connector (Switch Side)

(2) 16P Connector (Wire Harness Side)

(A) **"COOL"** position to **"WARM"** position

(B) **"WARM"** position to **"COOL"** position

9Y1210686CAS0041US0



Recirculation / Fresh Air Selection Switch Checking

1. Measure the voltage with a voltmeter across the terminal **c** and chassis. Make the following measurement with the terminals connected.
2. Turn the main switch to **"ON"** position.
3. Press the recirculation/fresh air selection switch to set it at fresh air position (indicator: OFF), and then measure a voltage using a circuit tester.
4. Turn the main switch back to **"OFF"** position.
5. Measure the voltage with a voltmeter across the terminal **a** and chassis. Make the following measurement with the terminals connected.
6. Turn the main switch to **"ON"** position.
7. Press the recirculation/fresh air selection switch to set it at recirculation position (indicator: ON), and then measure a voltage using a circuit tester.
8. If a measured voltage does not comply with the values in the table below, the control panel, wiring harness or fuse is faulty.

Voltage	Terminal c – Chassis	Recirculation / fresh air selection switch at "Fresh Air" (indicator: OFF)	Approx. battery voltage
	Terminal a – Chassis	Recirculation / fresh air selection switch at "Recirculation" (indicator: ON)	Approx. battery voltage

(1) 16P Connector (Switch Side)

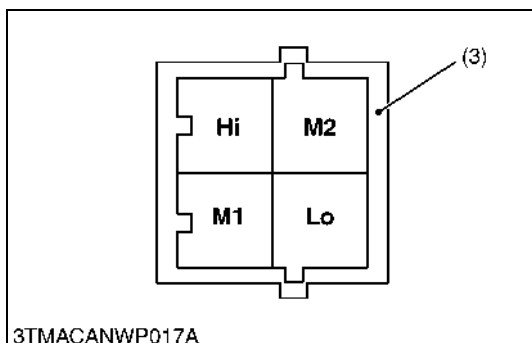
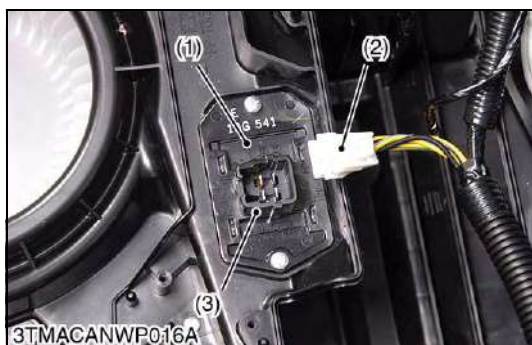
(2) 16P Connector (Wire Harness Side)

(A) **Fresh Air (Indicator: OFF)**

(B) **Recirculation (Indicator: ON)**

9Y1210686CAS0042US0

(5) Blower Resistor



Blower Resistor Check

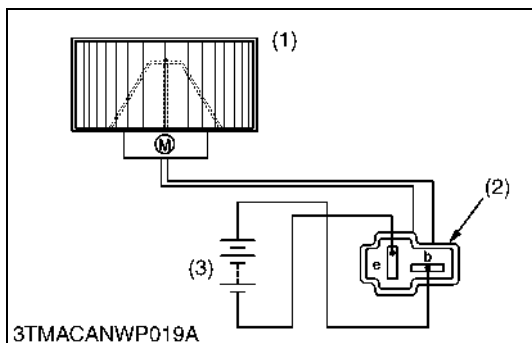
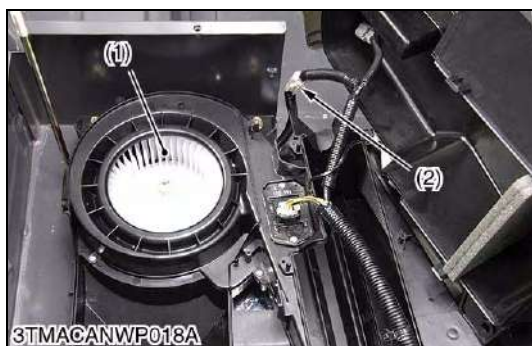
1. Disconnect the **4P** connector (2) from blower resistor (1).
2. Measure each resistance from terminal **Hi**.
3. If the factory specifications are not indicated, replace blower resistor.

Resistance	Factory specification	Terminal Hi – Terminal M2	Approx. 0.22 Ω
		Terminal Hi – Terminal M1	Approx. 0.69 Ω
		Terminal Hi – Terminal Lo	Approx. 1.69 Ω

- (1) Blower Resistor (2) **4P** Connector (Wire Harness Side) (3) **4P** Connector (Blower Resistor Side)

9Y1210686CAS0043US0

(6) Blower Motor



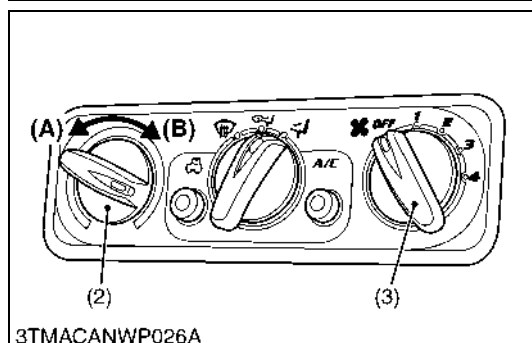
Blower Motor Test

1. Turn the blower motor (1) by hand and check whether it turns smoothly.
2. Disconnect the **2P** connector (2) of blower motor (1).
3. Connect a jumper lead from battery (3) positive terminal to connector terminal **b**.
4. Connect a jumper lead from battery negative terminal to connector terminal **e** momentarily.
5. If the blower motor does not run, check the motor.

- (1) Blower Motor (2) **2P** Connector (Blower Motor Side) (3) Battery (12 V)
- b: Terminal b**
e: Terminal e

9Y1210686CAS0044US0

(7) Temperature Motor



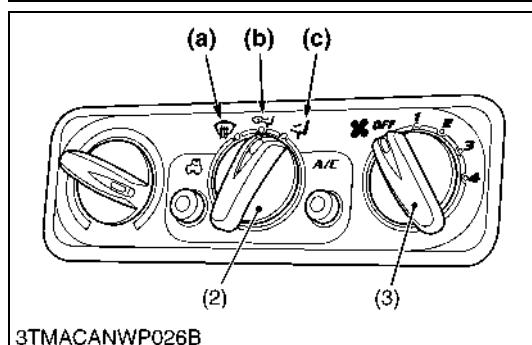
Temperature Motor Checking

1. Confirm whether the temperature control dial (2) is defective. (See page 9-S25.)
2. Turn the main switch to **"ON"** position.
3. Turn the blower switch (3) at **1** position.
4. Turn the temperature control dial from **"COOL"** position (A) to **"WARM"** position (B). At the time, confirm the motor is operating.
5. If the motor does not operate, replace it.

- | | |
|------------------------------|-----------------|
| (1) Temperature Motor | (A) COOL |
| (2) Temperature Control Dial | (B) WARM |
| (3) Blower Switch | |

9Y1210686CAS0045US0

(8) Mode Motor



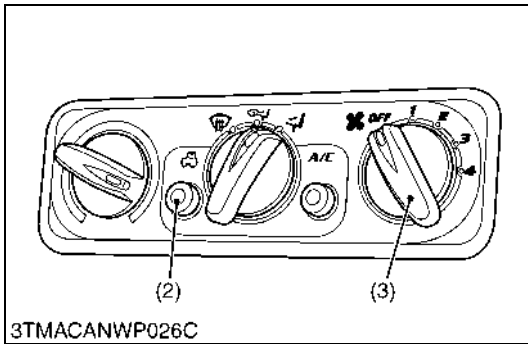
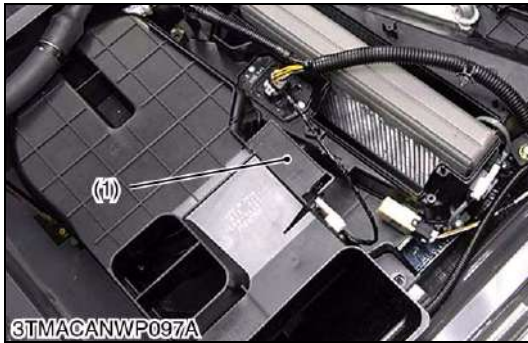
Mode Motor Checking

1. Confirm whether the mode switch (2) is defective. (See page 9-S25.)
2. Turn the main switch to **"ON"** position.
3. Turn the blower switch at **1** position.
4. Turn the mode switch each (a), (b) and (c).
5. Confirm whether the position where the mode motor (1) is stopped synchronize with mode switch (2).
6. If the motor does not move, replace it.

- | | |
|-------------------|---|
| (1) Mode Motor | (a) Air is blown from only the defroster air outlet |
| (2) Mode Switch | (b) Air is blown the dashboard and defroster air outlets |
| (3) Blower Switch | (c) Air is blown from only the dashboard air outlets |

9Y1210686CAS0046US0

(9) Recirculation/Fresh Air Motor



Recirculation/Fresh Air Motor Checking

1. Confirm whether the recirculation/fresh air selection switch (2) is defective. (See page 9-S25.)
2. Turn the main switch to **"ON"** position.
3. Turn the blower switch at **1** position.
4. Push the recirculation/fresh air selection switch to **"Recirculation"** position.
5. If the motor does not move, replace it.

- (1) Recirculation/Fresh Air Motor (3) Blower Switch
(2) Recirculation/Fresh Air Selection Switch

9Y1210686CAS0047US0

(10) Pressure Switch



Pressure Switch

1) HI Pressure Side

1. Connect the manifold gauge (3) to compressor as following procedure.

Close the **HI** and **LO** pressure valves (4), (5) of manifold gauge tightly, and connect the charging hoses (2), (1) (red and blue) to the respective compressor service valves. (See page 9-S8)

■ NOTE

- Be sure to drive out the air in the charging hoses at the manifold gauge connection end by utilizing the refrigerant pressure in the refrigerant cycle.
2. Start the engine and set at approx. 1500 min⁻¹ (rpm). Turn on the A/C switch, then set the blower switch to **HI** position.
 3. Raise pressure on the **HI** pressure side of the refrigerant cycle by covering the condenser front with a corrugated carboard, and the pressure switch is activated and the compressor magnetic clutch is turned off. At this time, read the **HI** pressure gauge of the manifold gauge. If this pressure reading differs largely with the setting pressure, replace the pressure switch with a new one.

Setting pressure	Factory specification	Pressure switch OFF	More than approx. 3.1 MPa 32 kgf/cm ² 460 psi
------------------	-----------------------	-------------------------------	---

2) LO Pressure Side

1. Disconnect **2P** connector (6) of pressure switch.
2. Measure the resistance with an ohmmeter across the connector terminals.
3. If 0 ohm is not indicated at normal condition, there is no refrigerant in the refrigerating cycle because gas leaks or pressure switch is defective.

(Reference)

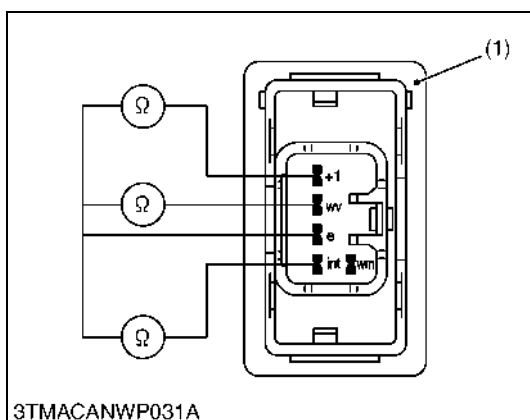
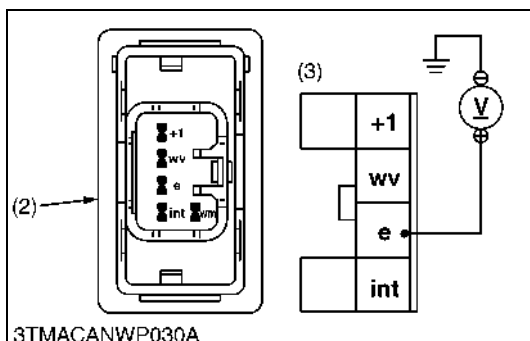
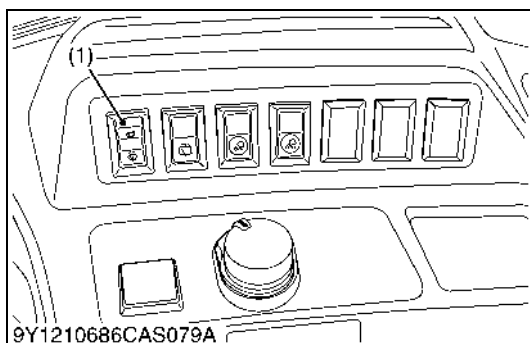
Setting pressure	Factory specification	Pressure switch OFF	Less than approx. 0.20 MPa 2.0 kgf/cm ² 28 psi
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- The resistance of pressure switch is 0 ohm in normal condition, but it becomes infinity if the pressure is out of factory spec.. Because the pressure switch starts to work.

- | | |
|---|--|
| (1) Charging Hose (Blue) | (5) LO (Low Pressure Side) Charging Valve |
| (2) Charging Hose (Red) | |
| (3) Manifold Gauge | (6) 2P Connector |
| (4) HI (High Pressure Side) Charging Valve | |

9Y1210686CAS0048US0

(11) Front Wiper Switch



Connector Voltage

1. Disconnect the **6P** connector from front wiper switch (1).
2. Turn the main switch to **"ON"** position.
3. Measure the voltage with a voltmeter across the connector terminal **e** of wiring harness side and chassis.
4. If the voltage differs from the battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	Terminal e – Chassis	Approx. battery voltage
---------	-----------------------------	-------------------------

- (1) Front Wiper Switch (3) **6P** Connector (Wire Harness Side)
 (2) **6P** Connector (Switch Side)

9Y1210686CAS0049US0

Front Wiper Switch Checking

1. Check the continuity through the switch with an ohmmeter.
2. If continuity specified below is not indicated, the switch is faulty.

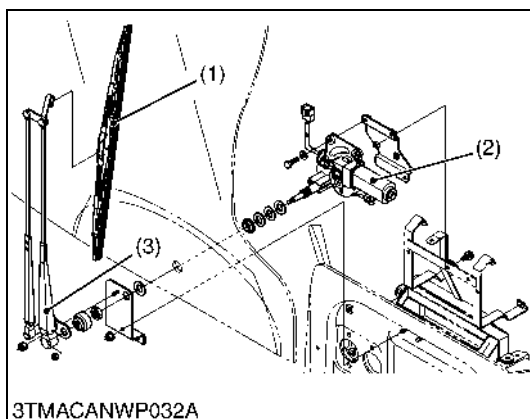
Position		Terminal				
		int	+1	e	wv	wm
Front wiper switch	WASH I		●	●	●	●
	ON		●	●		
	OFF					
	INT	●		●		
	WASH II	●		●	●	●

9Y1210686CAS071US

- (1) **6P** Connector (Switch Side)

9Y1210686CAS0050US0

(12) Front Wiper Motor



Front Wiper Motor

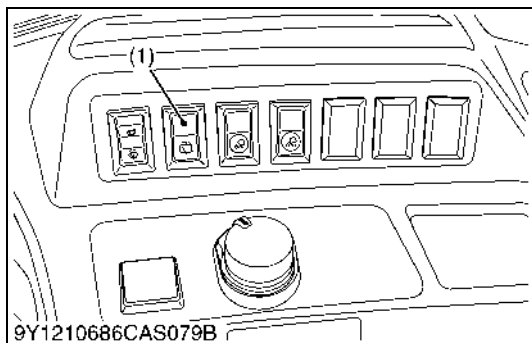
1. Raise up the front wiper arm (3).
2. Turn the main switch to **"ON"** position.
3. Push the front wiper switch to **"ON"** position.
4. Count the number of wiper arm rocking per minutes.
5. If the number differs from the factory specifications, replace the wiper motor assembly.

No. of wiper arm swing frequency at no load	Factory specification	25 to 43 times/min
---	-----------------------	--------------------

- (1) Wiper Blade (3) Wiper Arm
 (2) Wiper Motor

9Y1210686CAS0051US0

(13) Rear Wiper Switch (If equipped)



Connector Voltage

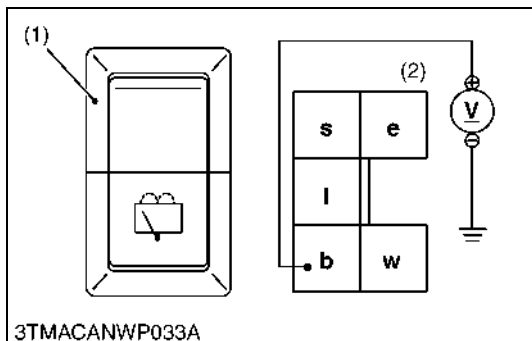
1. Disconnect the **5P** connector from rear wiper switch (1).
2. Turn the main switch to **"ON"** position.
3. Measure the voltage with a voltmeter across the connector terminal **b** of the wiring harness side and chassis.
4. If the voltage differs from the battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	Terminal b – Chassis	Approx. battery voltage
---------	-----------------------------	-------------------------

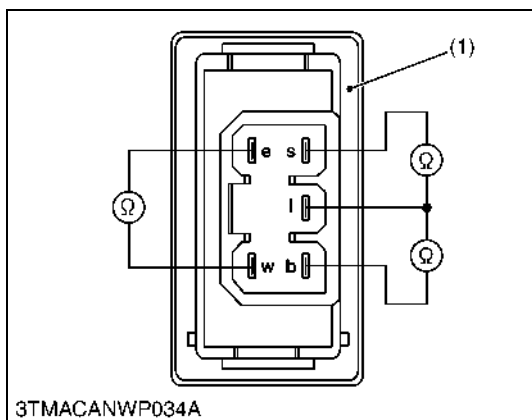
(1) Rear Wiper Switch

(2) **5P** Connector (Switch Side)

9Y1210686CAS0052US0



3TMACANWP033A



3TMACANWP034A

Rear Wiper Switch Checking

1. Check the continuity through the switch with an ohmmeter.
2. If continuity specified below is not indicated, the switch is faulty.

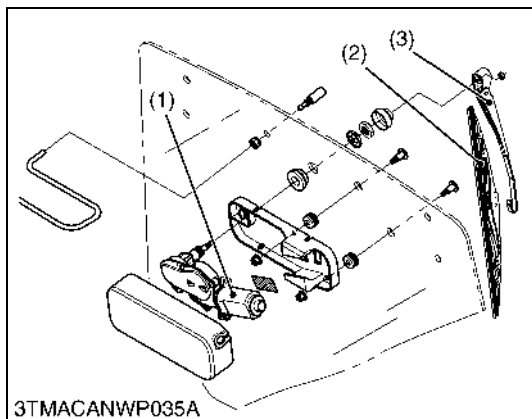
Position		Terminal				
		e	w	b	l	s
Rear wiper switch	WASH I	●	●		●	●
	ON			●	●	
	OFF				●	●
	WASH II	●	●	●	●	

9Y1210686CAS072US

(1) **5P** Connector (Switch Side)

9Y1210686CAS0053US0

(14) Rear Wiper Motor (If equipped)



3TMACANWP035A

Rear Wiper Motor

1. Raise up the rear wiper arm (3).
2. Turn the main switch to **"ON"** position.
3. Push the front wiper switch to **"ON"** position.
4. Count the number of wiper arm rocking per minutes.
5. If the number differs from the factory specifications, replace the wiper motor assembly.

No. of wiper arm swing frequency at no load	Factory specification	25 to 43 times/min
---	-----------------------	--------------------

(1) Wiper Motor

(3) Wiper Arm

(2) Wiper Blade

9Y1210686CAS0054US0

[2] DISASSEMBLING AND ASSEMBLING

(1) Separating Cabin from Tractor



Draining Coolant



CAUTION

- Do not remove radiator cap while coolant is hot. When cool, slowly rotate cap to the first stop and allow sufficient time for excess pressure to escape before removing the cap completely.

- Stop the engine and let the engine cool down.
- To drain the coolant, open the radiator drain plug (1). When opening the drain plug, set the hose to drain port.
- Remove the radiator cap to completely drain the coolant.
- After all coolant is drained, reinstall the radiator drain plug.

Coolant	Capacity	9.0 L 9.5 U.S.qts 7.9 Imp.qts
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(1) Drain Plug

9Y1210686CAS0096US0



Front Axle Rocking Restrictor and Rear Wheels

- Chock the front wheel and install the front axle rocking restrictors (1) to the front axle bracket in both sides. (See page G-68.)
- Place the disassembling stand under the transmission case and drawbar bracket.
- Remove the rear wheels (2).
- Place the disassembling stand under the rear axle in both sides.

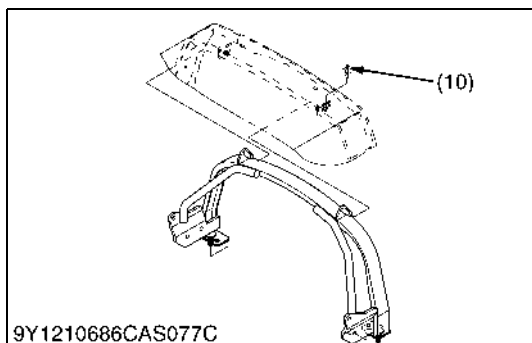
Tightening torque	Rear wheel mounting nut	344 to 402 N·m 35.0 to 41.0 kgf·m 254 to 296 lbf·ft
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(1) Rocking Restrictor

(2) Rear Wheel

9Y1210686CAS0095US0





Bonnet and Cover

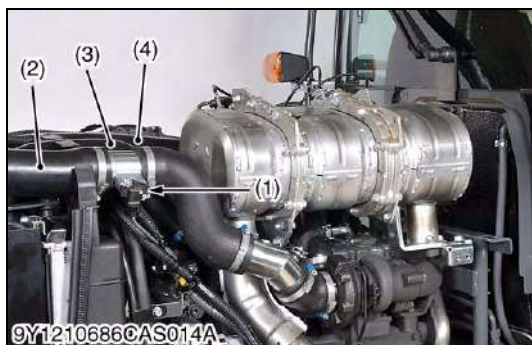
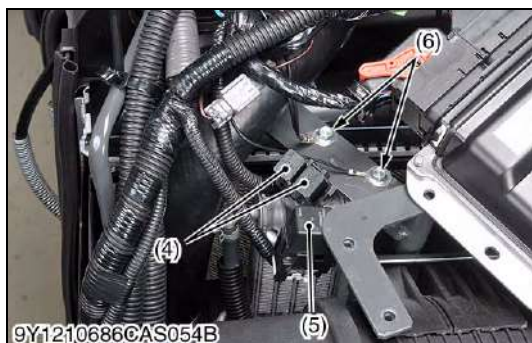
1. Open the bonnet (1) and disconnect the battery (2) negative terminal.
2. Remove the muffler pipe mounting screws 1 (7) and the muffler pipe (6).
3. Remove the cover (3), the side panel (4) and the side cover guide (5) on both sides.
4. Disconnect the **3P** connector (8) for head light and remove the bonnet damper (9).
5. Close the bonnet (1) and remove the plug.
6. Pull out the snap pin (10), and then remove the bonnet (1).
7. Remove the bonnet support mounting screw 2 (11), the bonnet mounting nut (12) on both side, and the bonnet support (13).

■ IMPORTANT

- When disconnecting the battery cables, disconnect the negative cable first. When connecting, connect the positive cable first.
- When assembling the bonnet damper (9), Make sure that the rod part of bonnet damper (9) is on the backside.

- | | |
|-----------------------------------|--------------------------------------|
| (1) Bonnet | (8) 3P Connector (Head Light) |
| (2) Battery | (9) Bonnet Damper |
| (3) Side Cover | (10) Snap Pin |
| (4) Side Panel | (11) Bonnet Support Mounting Screw 2 |
| (5) Side Cover Guide | (12) Bonnet Support Mounting Nut |
| (6) Muffler Pipe | (13) Bonnet Support |
| (7) Muffler Pipe Mounting Screw 1 | |

9Y1210686CAS0104US0



Wiring Harness for Tractor Front Side

1. Remove the engine ECU cover (1).
2. Let the red handles of engine ECU be rotated 0.79 rad (45 °) and disconnect the **96P** connector (2) and **58P** connector (3).
3. Remove the relays (4).
4. Remove the relay (5).
5. Disconnect the ground wires(6).

NOTE

- **Do not be rotated over 0.79 rad (45 °). The red handle may be damaged.**

- | | |
|---------------------------------------|---------------------|
| (1) Engine ECU Cover | (4) Relay (CRS) |
| (2) 96P Connector (Engine ECU) | (5) Relay (Starter) |
| (3) 58P Connector (Engine ECU) | (6) Ground Wire |

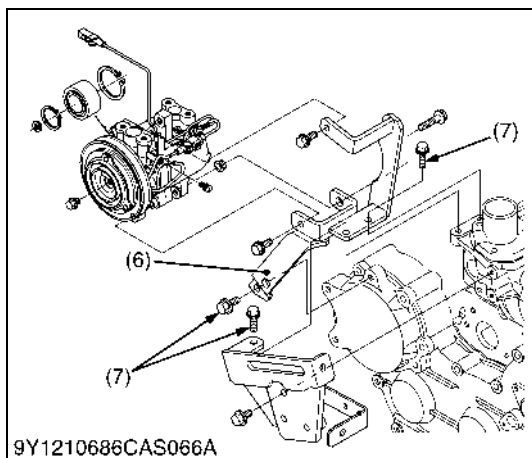
9Y1210686CAS0103US0

Hose

1. Disconnect the **5P** connector for mass air flow sensor (1) and the air cleaner hose (2).
2. Disconnect the intercooler hose 1 (3) and the intercooler hose 2 (4). (for M9960 Model)

- | | |
|--------------------------|------------------------|
| (1) Mass Air Flow Sensor | (3) Intercooler Hose 1 |
| (2) Air Cleaner Hose | (4) Intercooler Hose 2 |

9Y1210686CAS0058US0



Condenser and Compressor

■ Without discharging the refrigerant from system

1. Remove the screw 1 (1) from the condenser (2) and slide out the condenser (2).
2. Remove the hose clamps (3).
3. Disconnect 1P connector (4) of magnetic clutch.
4. Remove the compressor stay (6) mounting screw 2 (7) from engine.
5. Remove the compressor (5) with hoses and compressor stay (6).

(When reassembling)

- Take care not to damage the air condenser fin.
- After reassembling the compressor, be sure to adjust the air conditioner belt tension. (See page G-29.)

Tightening torque	Compressor bracket mounting screw (M8) to aluminum parts	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	Compressor bracket mounting screw (M8) to ordinariness parts	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Compressor bracket mounting screw (M10) to ordinariness parts	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

- | | |
|------------------------------------|---|
| (1) Screw 1 | (6) Compressor Stay |
| (2) Condenser | (7) Compressor Support Mounting Screw 2 |
| (3) Hose Clamp | (8) Low Pressure Hose |
| (4) 1P Connector (Magnetic Clutch) | (9) High Pressure Hose |
| (5) Compressor | |

(To be continued)

(Continued)



■ With discharge the refrigerant from system

1. See page 9-S18.
2. Disconnect the low pressure hose (8) and high pressure hose (9) from compressor (5).

(When reassembling)

- Charge the refrigerator to the air conditioner system. (See page 9-S20.)
- Apply compressor oil (DENSO CO. ND-OIL8) to the O-rings and take care not to damage them.

■ IMPORTANT

- After removing the condenser, return the front wheel to straight.

Tightening torque	High pressure hose mounting screw	7.9 to 11 N·m 0.80 to 1.2 kgf·m 5.8 to 8.6 lbf·ft
	Low pressure hose mounting screw	7.9 to 11 N·m 0.80 to 1.2 kgf·m 5.8 to 8.6 lbf·ft

- | | |
|------------------------------------|---|
| (1) Screw 1 | (6) Compressor Stay |
| (2) Condenser | (7) Compressor Support Mounting Screw 2 |
| (3) Hose Clamp | (8) Low Pressure Hose |
| (4) 1P Connector (Magnetic Clutch) | (9) High Pressure Hose |
| (5) Compressor | |

9Y1210686CAS0059US0



Hoses and Steering Joint Shaft

1. Remove the hose clamps (1).
2. Disconnect the heater hoses (2).
3. Disconnect the breather hose (3).
4. Remove the steering joint shaft mounting screw (5) then disconnect the steering joint shaft (4) from steering joint.
5. Disconnect the master cylinder hose (6) and master cylinder return hose (7).

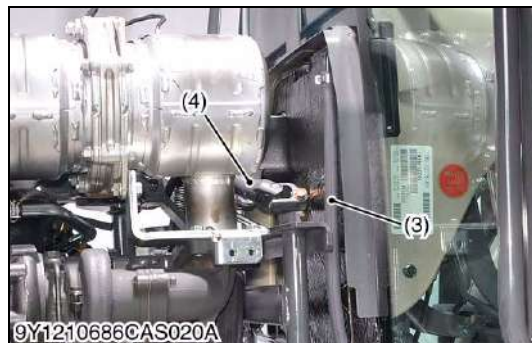
(When reassembling)

- Be sure to fix the heater hose to the original position. Note the inlet hose and outlet hoses.

Tightening torque	Master cylinder hose retaining nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Power steering joint shaft mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

- | | |
|--------------------------|---------------------------------|
| (1) Hose Clamp | (5) Screw |
| (2) Heater Hose | (6) Master Cylinder Hose |
| (3) Breather Hose | (7) Master Cylinder Return Hose |
| (4) Steering Joint Shaft | |

9Y1210686CAS0060US0



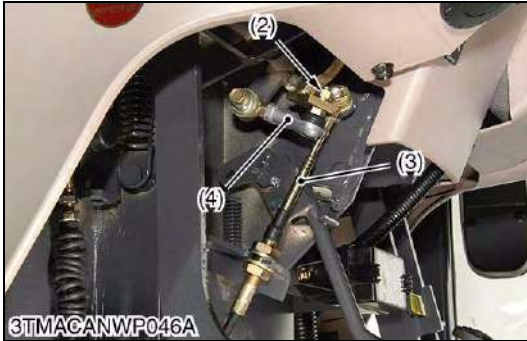


Step, Floor Mats and Wiring Harness for Tractor CABIN

1. Remove the auxiliary step on both sides.
2. Remove the fuel filling port (2).
3. Remove the floor mat 1 (3) and mat 2 (4).
4. Remove the floor cover (5).
5. Disconnect the connectors (6), (7), (8) and (9) for engine wire harness.
6. Disconnect the connector (10) and (11) for main wire harness.
7. Pull out these connectors from cabin.

- | | |
|--------------------------|---------------------------|
| (1) Auxiliary Step | (7) 4P Connector |
| (2) Fuel Filling Port | (8) 2P Connector |
| (3) Floor Mat 1 | (9) 4P Connector |
| (4) Floor Mat 2 | (10) 17P Connector |
| (5) Floor Cover | (11) 8P Connector |
| (6) 10P Connector | |

9Y1210686CAS0061US0



Shuttle Select Rod and Cables

1. Disconnect the clutch cable (1).
2. Remove the shuttle select rod mounting nut (2) from shuttle select rod (4) then disconnect the shuttle select rod (4).
3. Disconnect the shuttle cable (3).

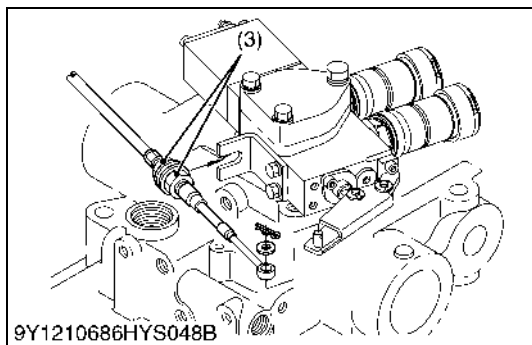
(When reassembling)

- Be sure to adjust the clutch cable for the clutch pedal free travel. (See page 2-S11.)
- Be sure to adjust the shuttle cable for the shuttle lever neutral position. (See page 2-S8.)

- (1) Clutch Cable
(2) Nut

- (3) Shuttle Cable
(4) Shuttle Select Rod

9Y1210686CAS0062US0



Auxiliary Control Wire and Rods

1. Disconnect the lowering speed adjusting rod (1).
2. Loose the retaining nuts (3) and disconnect the auxiliary control wires (2).
3. Disconnect the breather hose (4).
4. Disconnect the ground cable (5).
5. Disconnect the 4WD shift rod (6).

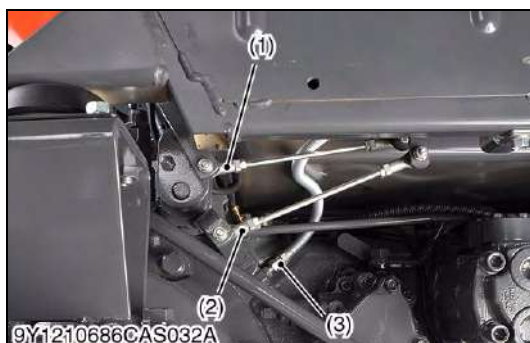
(When reassembling)

- Be sure to adjust the auxiliary control lever movement by auxiliary control wire (2). (See page 7-S18.)

- | | |
|----------------------------------|-------------------|
| (1) Lowering Speed Adjusting Rod | (6) 4WD Shift Rod |
| (2) Auxiliary Control Wire | |
| (3) Retaining Nut | |
| (4) Breather Hose | |
| (5) Ground Cable | |

**[A] F8/R8 and F12/R12 Speed
Transmission Model**

9Y1210686CAS0063US0



Control Rods, Brake Hoses and Levers

1. Disconnect the position control rod (2) and draft control rod (1).
2. Disconnect the brake hose (3) in both sides.
3. Disconnect the main gear shift lever (4).
4. Disconnect the range gear shift lever (5).

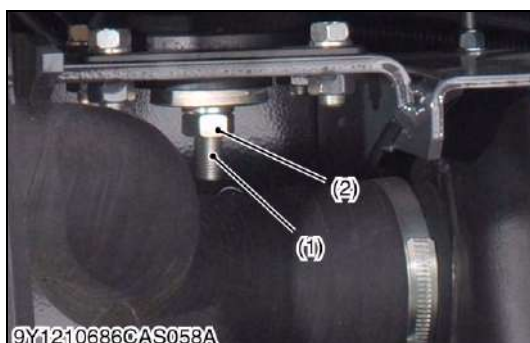
(When reassembling)

- Be sure to adjust the length of position control rod (2) and draft control rod (1). (See page 7-S10.)
- Be sure to adjust the main gear lever (4). (See page 2-S13.)
- Be sure to adjust the range gear shift lever (5). (See page 2-S15.)
- Be sure to bleed the air from hydraulic brake line. (See page 4-S6.)

Tightening torque	Rear wheel mounting nut	344 to 402 N·m 35.0 to 41.0 kgf·m 254 to 296 lbf·ft
	Brake hose retaining nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

- | | |
|--------------------------|----------------------------|
| (1) Draft Control Rod | (4) Main Gear Shift Lever |
| (2) Position Control Rod | (5) Range Gear Shift Lever |
| (3) Brake Hose | |

9Y1210686CAS0064US0



Dismounting Cabin

1. Set the cabin dismounting tool (3) to the cabin. (See page G-81.)
2. Remove the cabin mounting all screws (1) and nuts (2).
3. Dismounting the cabin from tractor body.

(When reassembling)

Tightening torque	Cabin mounting screw and nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
-------------------	------------------------------	--

- | | |
|--------------------------|----------------------------|
| (1) Cabin Mounting Screw | (3) Cabin Dismounting Tool |
| (2) Cabin Mounting Nut | |

9Y1210686CAS0065US0

(2) Removing Compressor Assembly

Bonnet and Cover

- See page 9-S35.

9Y1210686CAS0097US0

Wiring Harness for Tractor Front Side

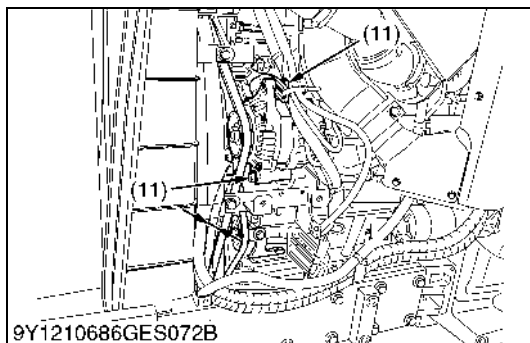
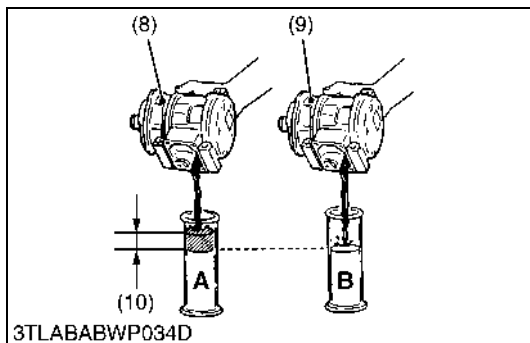
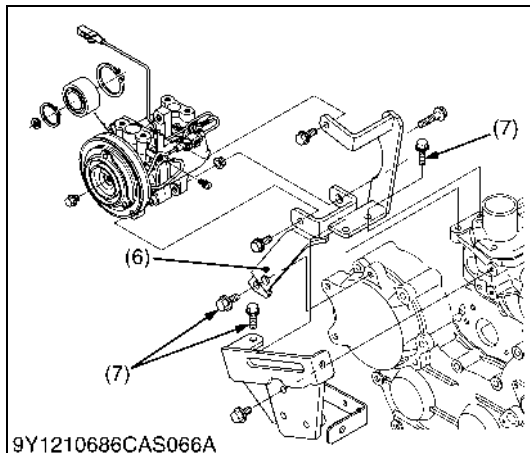
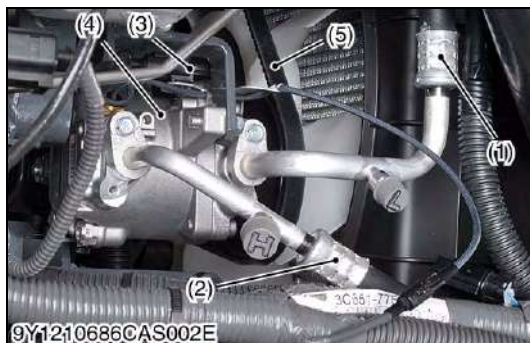
- See page 9-S36.

9Y1210686CAS0098US0

Hoses

- See page 9-S36.

9Y1210686CAS0099US0



Compressor Assembly

1. Disconnect the low pressure hose (suction) (1) and high pressure hose 1 (discharge) (2) from the compressor, then cap the place immediately with disconnected both pressure hoses to keep the moisture out of the system.
2. Disconnect the **1P** connector (3) of magnetic clutch.
3. Remove the air conditioner belt (5) and remove the compressor (4) with compressor stay (7).

(When reassembling)

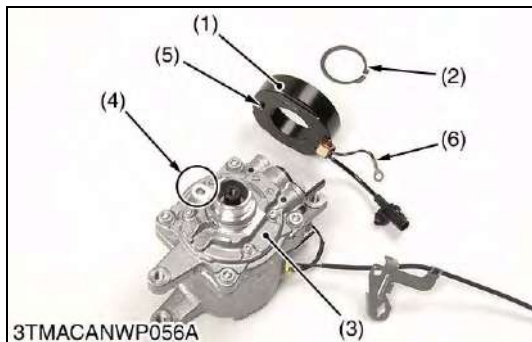
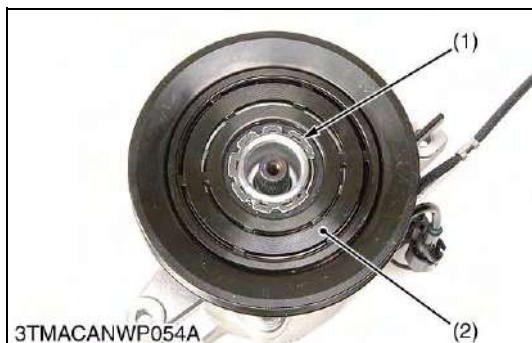
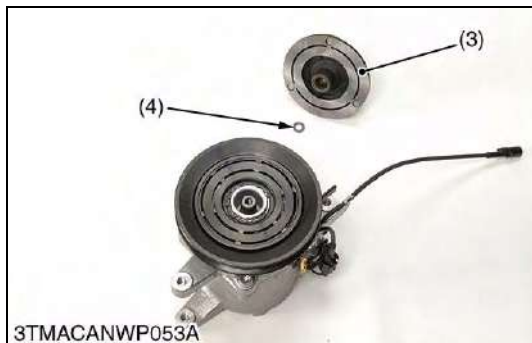
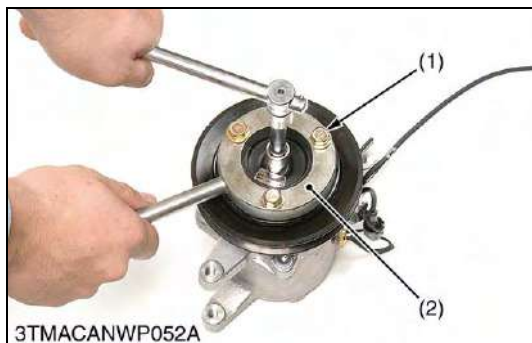
- After reassembling the compressor, be sure to adjust the air conditioner belt tension and recharge the refrigerant to the system. (See page 9-S20.)
- Apply compressor oil (DENSO CO. ND-OIL8 or equivalent) to the O-rings and take care not to damage them.
- **"S"** letter is marked on the compressor for connecting the low pressure hose (suction side).
- **"D"** letter is marked on the compressor for connecting the high pressure hose (discharge side).
- When replacing the compressor with a new one, meet the oil amount with old one.
- Push on the belt between the pulleys with a finger. Deflection **"L"** of 10 to 12 mm (0.40 to 0.47 in.) under a 98 N (10 kgf, 22 lbf) load is appropriate.
- If tension is incorrect, loosen the alternator mounting bolts (9) and, using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.

Tightening torque	High pressure hose 1 and low pressure hose mounting screw	7.9 to 11 N·m 0.80 to 1.2 kgf·m 5.8 to 8.6 lbf·ft
	Compressor bracket mounting screw (M8) to aluminum parts	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	Compressor bracket mounting screw (M8) to ordinariness parts	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Compressor bracket mounting screw (M10) to ordinariness parts	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Compressor mounting screws	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft

Belt tension	Factory specification	10 to 12 mm 0.39 to 0.47 in.
--------------	-----------------------	---------------------------------

- | | |
|---|---|
| (1) Low Pressure Hose | (9) Old Compressor |
| (2) High Pressure Hose | (10) Remove the Excess Oil (A-B) |
| (3) 1P Connector (Magnetic Clutch) | (11) Alternator Mounting Screw |
| (4) Compressor | |
| (5) Air Conditioner Belt | A: Oil Flow New Compressor |
| (6) Compressor Mounting Screw | B: Oil Flow Replace Compressor |
| (7) Compressor Stay | L: Deflection |
| (8) New Compressor | (10 to 12 mm (0.40 to 0.47 in.)) |

9Y1210686CAS0066US0



Hub Plate

1. Three stopper bolts (1) are set in stopper magnet clutch (2) at the position corresponding to the shape of compressor. (See page G-86.)
2. The stopper magnet clutch (2) is hung on hub plate (3) and it is fixed that the compressor rotates.
3. Remove the magnetic clutch mounting screw.
4. Remove the hub plate (3) and air gap adjustment shim (4).

(When reassembling)

- Do not apply grease or oil on the hub plate facing.
- Do not use the magnetic clutch mounting screw again.
- It is confirmed to turn rotor by hand after assembling and not contact with stator and hub plate.
- Check and adjust the air gap before tight the magnet clutch mounting screw to the specified torque. (See page 9-S58.)

Tightening torque	Magnetic clutch mounting screw	15 to 21 N·m 1.5 to 2.1 kgf·m 11 to 15 lbf·ft
-------------------	--------------------------------	---

- (1) Stopper Bolt
(2) Stopper Magnet Clutch

- (3) Hub Plate
(4) Shim

9Y1210686CAS0067US0

Rotor

1. Remove the external circlip (1).
2. Remove the rotor (2).

(When reassembling)

- Do not use the external circlip again.
- Assemble the external circlip for the tapered side to become outside of rotor.
- The width of expanding of external circlip is set in boss of shaft as a minimum.

(Reference)

- Code No. for external circlip: T1065-87450

- (1) External Circlip

- (2) Rotor

9Y1210686CAS0068US0

Stator

1. Remove the lead wire (6) from compressor body.
2. Remove the external circlip (2).
3. Remove the stator (1).

(When reassembling)

- Do not use the external circlip again.
- Assemble the external circlip for the tapered side to become outside of front housing.
- The width of expanding of external circlip is set is boss of shaft as a minimum.
- Match and assemble the concave part (4) of the front housing (3) and the pin (5) of stator.

(Reference)

- Code No. for external circlip: T1065-87440

- (1) Stator
(2) External Circlip
(3) Front Housing

- (4) Concave Part
(5) Pin
(6) Lead Wire

9Y1210686CAS0069US0

(3) Removing Air Conditioner Unit

Draining Coolant

- See page 9-S34.

9Y1210686CAS0055US0

Discharging Refrigerant

- See page 9-S18.

9Y1210686CAS0070US0

Seat, Floor Mats and Floor Cover

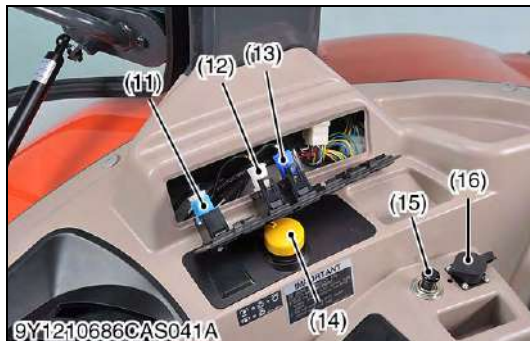
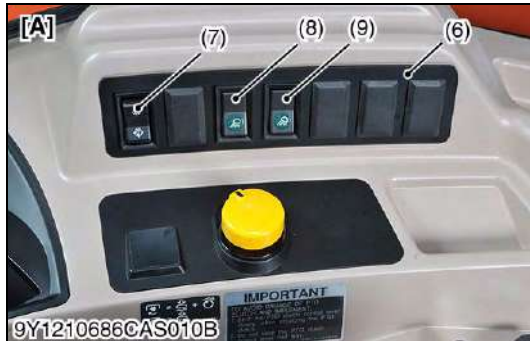
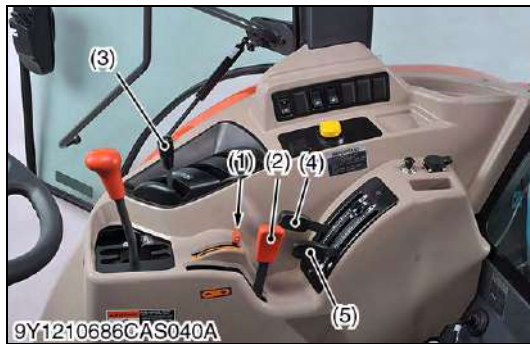
1. Disconnect the battery negative cable from battery.
2. Remove the seat (1).
3. Remove the floor mat 1 (2) and mat 2 (3).
4. Remove the floor cover (4).

- (1) Seat
(2) Floor Mat 1

- (3) Floor Mat 2
(4) Floor Cover

9Y1210686CAS0071US0





Inner Cover (R.H.)

1. Remove the hand accelerator lever grip (1).
2. Remove the range gear shift lever grip (2).
3. Remove the auxiliary control lever grip (3).
4. Remove the position control lever grip (4) and draft control lever grip (5).
5. Pull out the switch board (6).
6. Disconnect the **5P** connector (11) from front wiper switch (7).
7. Disconnect the **5P** connector from rear wiper switch (if equipped).
8. Disconnect the **3P** connector (white) (12) from front working light switch (8).
9. Disconnect the **3P** connector (blue) (13) from rear working light switch (9).
10. Disconnect the **3P** connector (white) from 4WD switch (F24/R24 transmission model) (10).
11. Remove the inner cover R.H. (17).
12. Disconnect the **3P** connector (18) from PTO switch (14).
13. Disconnect the **2P** connector (19) from cigar lighter (15).
14. Disconnect the **3P** connector (20) from auxiliary socket (16).

- (1) Hand Accelerator Lever Grip
- (2) Range Gear Shift Lever Grip
- (3) Auxiliary Control Lever Grip
- (4) Position Control Lever Grip
- (5) Draft Control Lever Grip
- (6) Switch Board
- (7) Front Wiper Switch
- (8) Front Working Switch
- (9) Rear Working Switch
- (10) 4WD Switch
- (11) **5P** Connector (Front Wiper Switch)
- (12) **3P** Connector (Front Working Light Switch)

- (13) **3P** Connector (Rear Working Light Switch)
- (14) PTO Switch
- (15) Cigar Lighter
- (16) Auxiliary Socket
- (17) Inner Cover (R.H.)
- (18) **3P** Connector (PTO Switch)
- (19) **2P** Connector (Cigar Lighter)
- (20) **3P** Connector (Auxiliary Socket)

[A] F8/R8 and F12/R12 Transmission Model

[B] F24/R24 Transmission Model

9Y1210686CAS0072US0

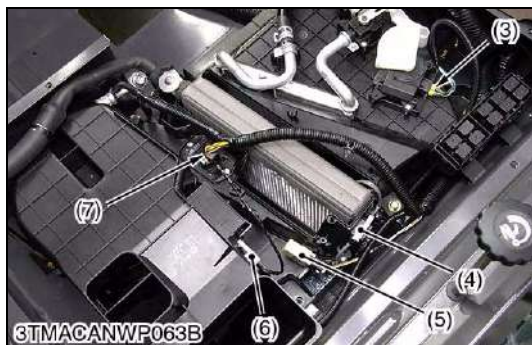


Air Conditioner Ducts and Covers

1. Remove the holder cover (1).
2. Remove the holder cover stay (2).
3. Remove the inner cover (3).
4. Remove the duct 1 (4).
5. Remove the duct 2 (5).
6. Remove the 4WD lever grip (6). (F8/R8 and F12/R12 speed transmission model.)
7. Remove the seat under cover 1 (7).
8. Remove the seat under cover 2 (8).
9. Remove the duct 3 (9).

- | | |
|-----------------------|------------------------|
| (1) Holder Cover | (6) 4WD Lever Grip |
| (2) Holder Cover Stay | (7) Seat Under Cover 1 |
| (3) Inner Cover | (8) Seat Under Cover 2 |
| (4) Duct 1 | (9) Duct 3 |
| (5) Duct 2 | |

9Y1210686CAS0073US0



Wiring Harness

1. Disconnect the **2P** connector (1) for pressure switch.
2. Disconnect the **2P** connector (2) for blower motor.
3. Disconnect the **4P** connector (7) for blower resistor.
4. Disconnect the **5P** connector (6) for recirculation/fresh air selection motor.
5. Disconnect the **7P** connector (3) for air mix control motor.
6. Disconnect the **1P** connector (4) for thermistor.
7. Disconnect the **5P** connector (5) for thermostat.

- | | |
|---|---|
| (1) 2P Connector (Pressure Switch) | (5) 5P Connector (Thermostat) |
| (2) 2P Connector (Blower Motor) | (6) 5P Connector (Recirculation/Fresh Air Selection Motor) |
| (3) 7P Connector (Air Mix Control Motor) | (7) 4P Connector (Blower Resistor) |
| (4) 1P Connector (Thermistor) | |

9Y1210686CAS0074US0

Air Conditioning Unit

1. Disconnect the heater hoses (1).
2. Remove the pressure hose joint mounting screws and pressure hose joints.
3. Disconnect the high pressure hose (3) and low pressure hose (2).
4. Take off the unit.

■ NOTE

- **Open parts are cap and moisture is prevented from going into the system at once.**

(When reassembling)

- When reconnecting the pressure hoses with the unit, apply compressor oil (DENSO OIL8 or equivalent) to O-rings.

Tightening torque	A/C unit mounting screw (M8)	9.8 to 15 N·m 1.0 to 1.6 kgf·m 7.3 to 11 lbf·ft
	Pressure hose joint mounting screw	7.9 to 11 N·m 0.80 to 1.2 kgf·m 5.8 to 8.6 lbf·ft

- | | |
|-----------------------|---|
| (1) Heater Hose | (3) High Pressure Hose (Cooler Hose (Liquid)) |
| (2) Low Pressure Hose | |

9Y1210686CAS0075US0

(4) Removing Air Conditioner Hose

Discharging Refrigerant

- See page 9-S18.

9Y1210686CAS0070US0

Bonnet and Cover

- See page 9-S35.

9Y1210686CAS0097US0

Wiring Harness for Tractor Front Side

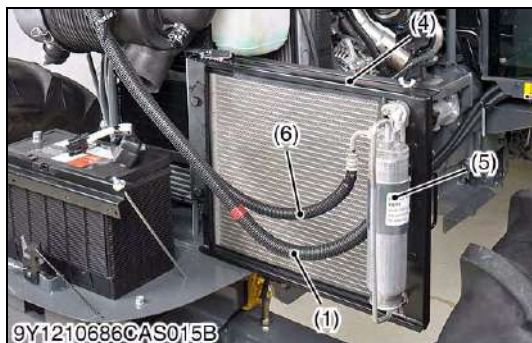
- See page 9-S36.

9Y1210686CAS0098US0

Hoses

- See page 9-S36.

9Y1210686CAS0099US0



High Pressure Hose 1, 2 and Low Pressure Hose

1. Disconnect the low pressure hose (3) and high pressure hose 1 (1) from the compressor (2), then cap the open fittings immediately to keep moisture out of the system.
2. Slide the condenser (4).
3. Disconnect the high pressure hose 1 (1) from the condenser (4) and cap the place immediately which disconnected pressure hose to keep moisture out of the system.
4. Disconnect the high pressure hose 2 (6) from the receiver (5) and cap the place immediately which disconnected pressure hose to keep moisture out of the system.

(When reassembling)

- Apply compressor oil (DENSO CO. ND-OIL8) to the O-rings and take care not to damage them.

Tightening torque	Low pressure hose mounting screw (compressor side)	7.9 to 11 N·m 0.80 to 1.2 kgf·m 5.8 to 8.6 lbf·ft
	High pressure hose 1 mounting screw (compressor side)	7.9 to 11 N·m 0.80 to 1.2 kgf·m 5.8 to 8.6 lbf·ft
	High pressure hose 1 mounting screw (condenser side)	7.9 to 11 N·m 0.80 to 1.2 kgf·m 5.8 to 8.6 lbf·ft
	High pressure hose 2 retaining nut (receiver side)	12 to 14 N·m 1.2 to 1.5 kgf·m 8.7 to 10 lbf·ft

(1) High Pressure Hose 1

(4) Condenser

(2) Compressor

(5) Receiver

(3) Low Pressure Hose

(6) High Pressure Hose 2

9Y1210686CAS0077US0



Seat and Floor Mats

1. Disconnect the battery negative cable from battery.
2. Remove the seat (1).
3. Remove the floor mat 1 (2) and mat 2 (3).

(1) Seat
(2) Floor Mat 1

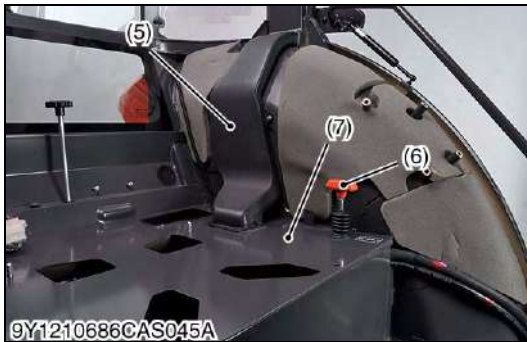
(3) Floor Mat 2

9Y1210686CAS0101US0

Inner Cover (R.H.)

- See page 9-S47.

9Y1210686CAS0100US0



Air Conditioner Ducts and Covers

1. Remove the holder cover (1).
2. Remove the holder cover stay (2).
3. Remove the inner cover (L.H.) (3).
4. Remove the duct 1 (4).
5. Remove the duct 2 (5).
6. Remove the 4WD lever grip (6). (F8/R8 and F12/R12 speed transmission model.)
7. Remove the seat under cover 1 (7).
8. Remove the seat under cover 2 (8).

- (1) Holder Cover
- (2) Holder Cover Stay
- (3) Inner Cover (L.H.)
- (4) Duct 1

- (5) Duct 2
- (6) 4WD Lever Grip
- (7) Seat Under Cover 1
- (8) Seat Under Cover 2

9Y1210686CAS0102US0



High Pressure Hose 2 and Low Pressure Hose

1. Remove the rubber (1) and pressure hoses joint mounting screw.
2. Remove the pressure hoses joint.
3. Disconnect the high pressure hose 2 (3) and low pressure hose (2), then cap the place immediately which disconnected pressure hose to keep moisture out of the system.
4. Pull out the high pressure hose 2 (3) and low pressure hose (2) from the bottom of the cabin and take out the pressure hoses.

(When reassembling)

- Replace the rubber (1) with a new one.
- Apply compressor oil (DENSO CO. ND-OIL8) to the O-rings and take care not to damage them.

Tightening torque	Pressure hose joint mounting screw	7.9 to 11 N·m 0.80 to 1.2 kgf·m 5.8 to 8.6 lbf·ft
-------------------	------------------------------------	---

(1) Rubber

(3) High Pressure Hose 2

(2) Low Pressure Hose

9Y1210686CAS0080US0

(5) Removing Heater Hoses

Draining Coolant

- See page 9-S34.

9Y1210686CAS0055US0



Side Cover (R.H.) and Heater Hoses

1. Remove the side cover (R.H.) (1).
2. Disconnect the heater hoses (2) and (3) from the engine.
3. Remove the clamps (4).

(When reassembling)

- Note the inlet hose and outlet hose.

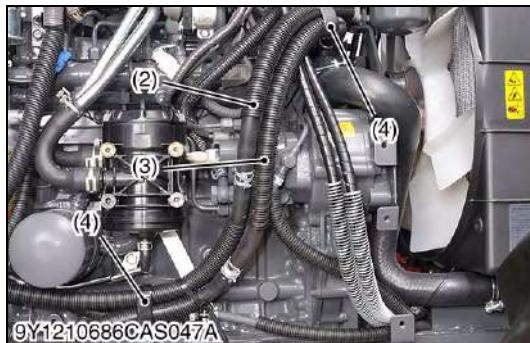
(1) Side Cover (R.H.)

(3) Heater Hose 2

(2) Heater Hose 1

(4) Clamp

9Y1210686CAS0081US0



Seat and Floor Mats

- See page 9-S51.

9Y1210686CAS0078US0

Air Conditioner Ducts and Covers

- See page 9-S52.

9Y1210686CAS0079US0

Inner Cover (R.H.)

- See page 9-S47.

9Y1210686CAS0100US0



Removing Heater Hoses

1. Disconnect the heater hoses (1) and (2).
2. Pull out the heater hoses (1) and (2) from the bottom of the cabin.
3. Take out the heater hoses (1) and (2).

(When reassembling)

- When connecting the heater hose with A/C unit, hose should be put into the A/C unit pipe more than 30 mm (1.2 in.).
 - Be sure to fix the heater hoses (1) and (2) to the original position.
- Note the inlet hose and outlet hoses.

(1) Heater Hose 1

(2) Heater Hose 2

9Y1210686CAS0082US0

(6) Cab Windshield

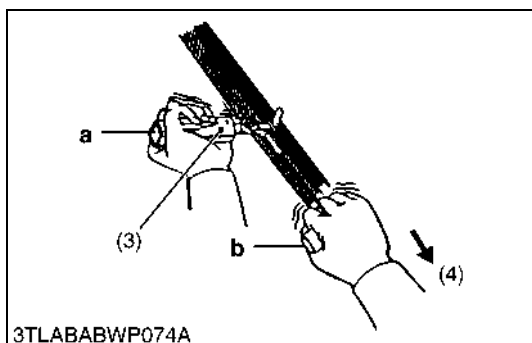
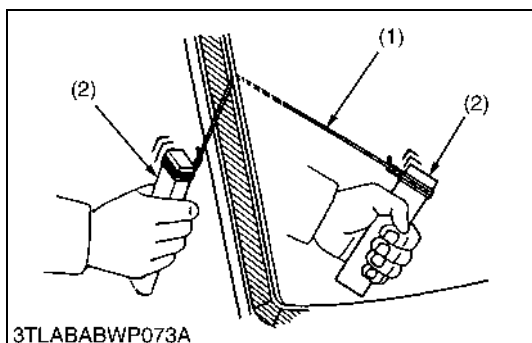
Preparation

1. Prepare the followings.
 - Cutter knife: 1 piece
 - Scraper: 1 piece
 - Gun for coating: 1 piece
 - Sika Tack-Ultrafast or equivalent
 - Sika-cleaner No. 1
 - Gummed tape

■ NOTE

- Sika Tack-Ultrafast and cleaner No. 1 are made by Sika Corporation.
- These materials can not be provided by Kubota Corporation.
- Therefore, please find the local made equivalent materials in your country and use them when you need.

9Y1210686CAS0083US0



Before Replacing Windshields (1)

[In case of using piano wire (When glass is cracked)]

1. Thread the piano wire from the inside of cabin. Tie its both ends to a wooden blocks or the like. (See the left figure.)
2. Pull the piano wire inward/outward alternately to cut the adhered part.

■ NOTE

- Do not let the piano wire make sliding contact with the edge of glass plate forcibly.

[In case of using cutter knife (When glass is totally crushed finely)]

1. Insert the knife (3) into the adhered part.
2. Keep the edge of knife blade square to the glass edge at the part "a". Slide the knife blade along the glass surface and the edge. Pull the part "b" in the direction parallel to the glass edge to cut them off.

■ NOTE

- Find a wider gap between the glass and body.
- Take care of handling the cutter knife not to damage your hand.

(1) Piano Wire
(2) Wood Peace

(3) Cutter Knife
(4) Pulling

9Y1210686CAS0084US0

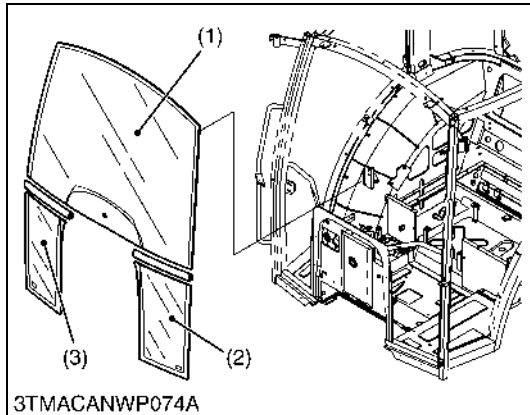
Before Replacing Windshields (2)

1. When the Sika Tack-Ultrafast or equivalent attached to the cabin frame and the glass are reused, remove the bond clearly.
2. Clean the frame surface with Sika-cleaner No. 1.

NOTE

- Remove the bond completely.

9Y1210686CAS0085US0

**Before Replacing Windshields (3)**

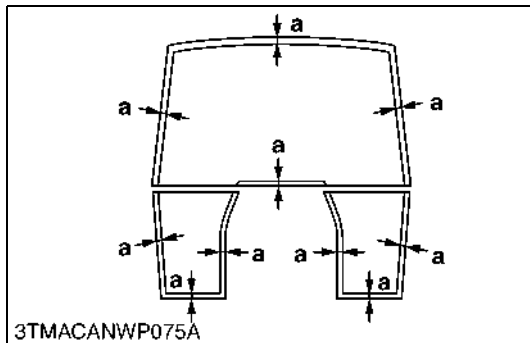
1. Check that the glasses are not damaged and cracked.
2. Turn over the glass and clean this surface of the glass by Sika-cleaner No. 1.
3. The cleaning area of the rear surface is indicated "a" in the figure left.

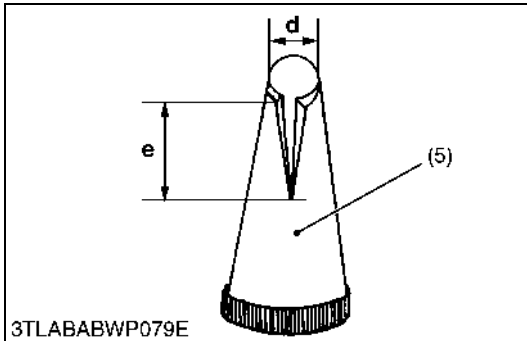
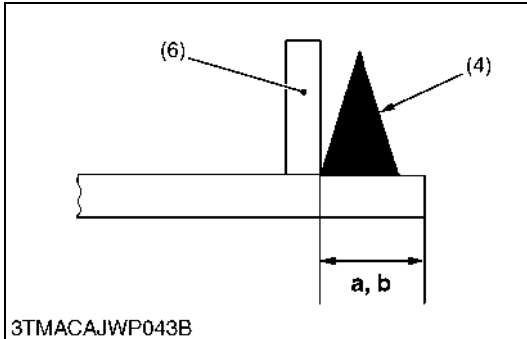
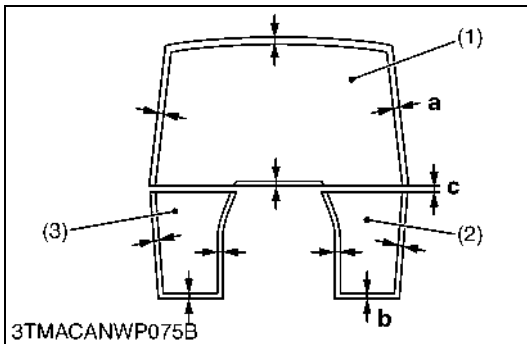
NOTE

- If not cleaning the glass, it may result in adhesive failure.

- | | |
|------------------------------|---------------------|
| (1) Upper Windshield | a: 25 mm (0.98 in.) |
| (2) Lower Windshield (Left) | |
| (3) Lower Windshield (Right) | |

9Y1210686CAS0086US0





Applying Sika Tack-Ultrafast

1. Apply a Sika Tack-Ultrafast (or equivalent) on the glasses as shown in figure left.

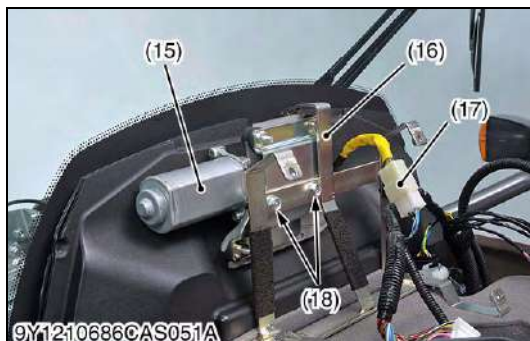
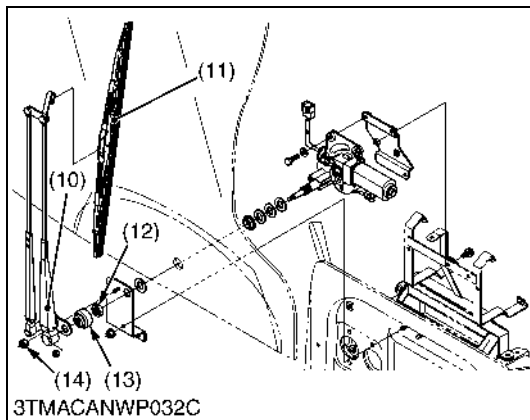
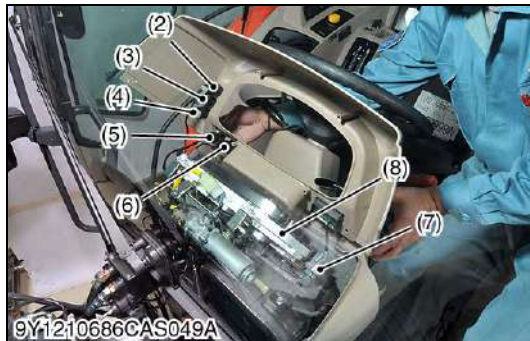
NOTE

- Apply the Sika Tack-Ultrafast (or equivalent) with the jig having the specified tip shape as shown in the figure left.
- Apply it with a uniform speed to minimize unevenness.
- Follow the instruction manual of Sika Tack-Ultrafast.

- | | |
|------------------------------|--------------------------------|
| (1) Upper Windshield | a: 10 mm (0.39 in.) |
| (2) Lower Windshield (Left) | b: 12 mm (0.47 in.) |
| (3) Lower Windshield (Right) | c: 4.0 mm (0.16 in.) |
| (4) Sika Tack-Ultrafast | d: 8.0 mm dia. (0.31 in. dia.) |
| (5) Jig | e: 12 mm (0.47 in.) |
| (6) Shield | |

9Y1210686CAS0087US0

(7) Wiper Motor



Front Wiper Motor

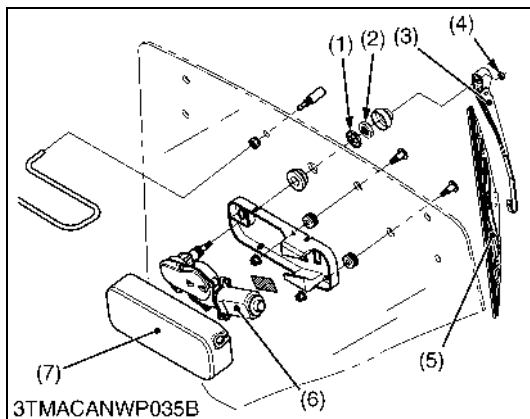
1. Remove the panel cover (1).
2. Disconnect the **6P** connector (2) from constant RPM management switch.
3. Disconnect the **6P** connector (3) from parked regeneration switch.
4. Disconnect the **6P** connector (4) from auto regeneration switch.
5. Disconnect the **6P** connector (5) from hazard light switch.
6. Disconnect the **6P** connector (6) from horn button.
7. Disconnect the **3P** connector (7) from display switch.
8. Remove the meter panel (8).
9. Disconnect the **40P** connector (9) from meter panel (8) and remove the meter panel (8).
10. Disconnect the **4P** connector (17) from front wiper motor (15).
11. Remove the wiper arm mounting nut 2 (14) and wiper arm (10).
12. Remove the wiper link cap (13) and nut 1 (12).
13. Disconnect the earth lead setting screw.
14. Remove the front wiper motor bracket (16) mounting screws (18), then take out the front wiper motor (15).

(When reassembling)

Tightening torque	Wiper arm mounting nut	6.9 to 9.8 N·m 0.70 to 1.0 kgf·m 5.1 to 7.2 lbf·ft
-------------------	------------------------	--

- | | |
|--|--|
| (1) Panel Cover | (9) 40P Connector (Meter Panel) |
| (2) 6P Connector (Constant RPM Management Switch) | (10) Wiper Arm |
| (3) 6P Connector (Parked Regeneration Switch) | (11) Wiper Blade |
| (4) 6P Connector (Auto Regeneration Switch) | (12) Nut 1 |
| (5) 6P Connector (Hazard Light Switch) | (13) Wiper Link Cap |
| (6) 6P Connector (Horn Button) | (14) Nut 2 |
| (7) 3P Connector (Display Switch) | (15) Wiper Motor |
| (8) Meter Panel | (16) Wiper Motor Bracket |
| | (17) 4P Connector (Wiper Motor) |
| | (18) Screw |

9Y1210686CAS0088US0



Rear Wiper Motor (If equipped)

1. Remove the wiper motor cover (7).
2. Disconnect the **4P** connector from rear wiper motor (6).
3. Remove the wiper arm mounting nut (4) and wiper arm (3).
4. Remove the wiper link cap (1) and nut (2).
5. Remove the rear wiper motor mounting screws, then take out the rear wiper motor (6).

Tightening torque	Wiper arm mounting nut	7.9 to 9.8 N·m 0.80 to 1.0 kgf·m 5.8 to 7.2 lbf·ft
	Wiper motor mounting screw	7.9 to 9.8 N·m 0.80 to 1.0 kgf·m 5.8 to 7.2 lbf·ft

- (1) Wiper Link Cap
(2) Nut
(3) Wiper Arm
(4) Nut

- (5) Wiper Blade
(6) Rear Wiper Motor
(7) Wiper Motor Cover

9Y1210686CAS0089US0

[3] SERVICING



Adjustment of Air Gap

1. Measure the air gap with a feeler gauge.
2. When the measurement value comes off from factory specification, adjustment shim (3) is added or deleted.

Air gap "L"	Factory specification	0.30 to 0.65 mm 0.012 to 0.025 in.
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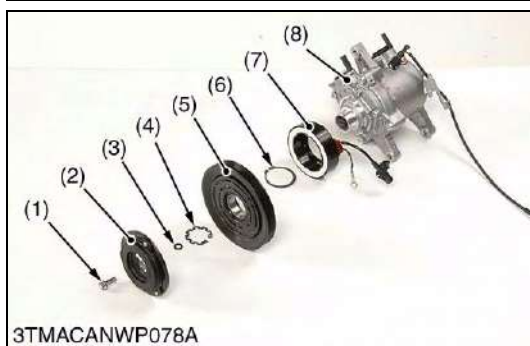
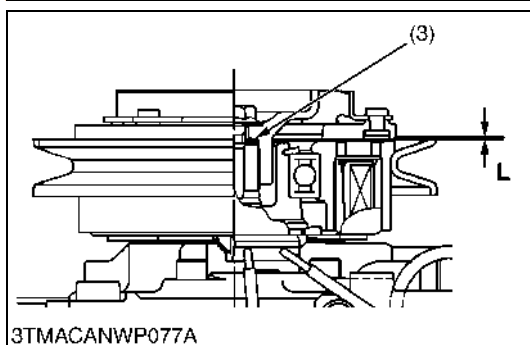
(Reference)

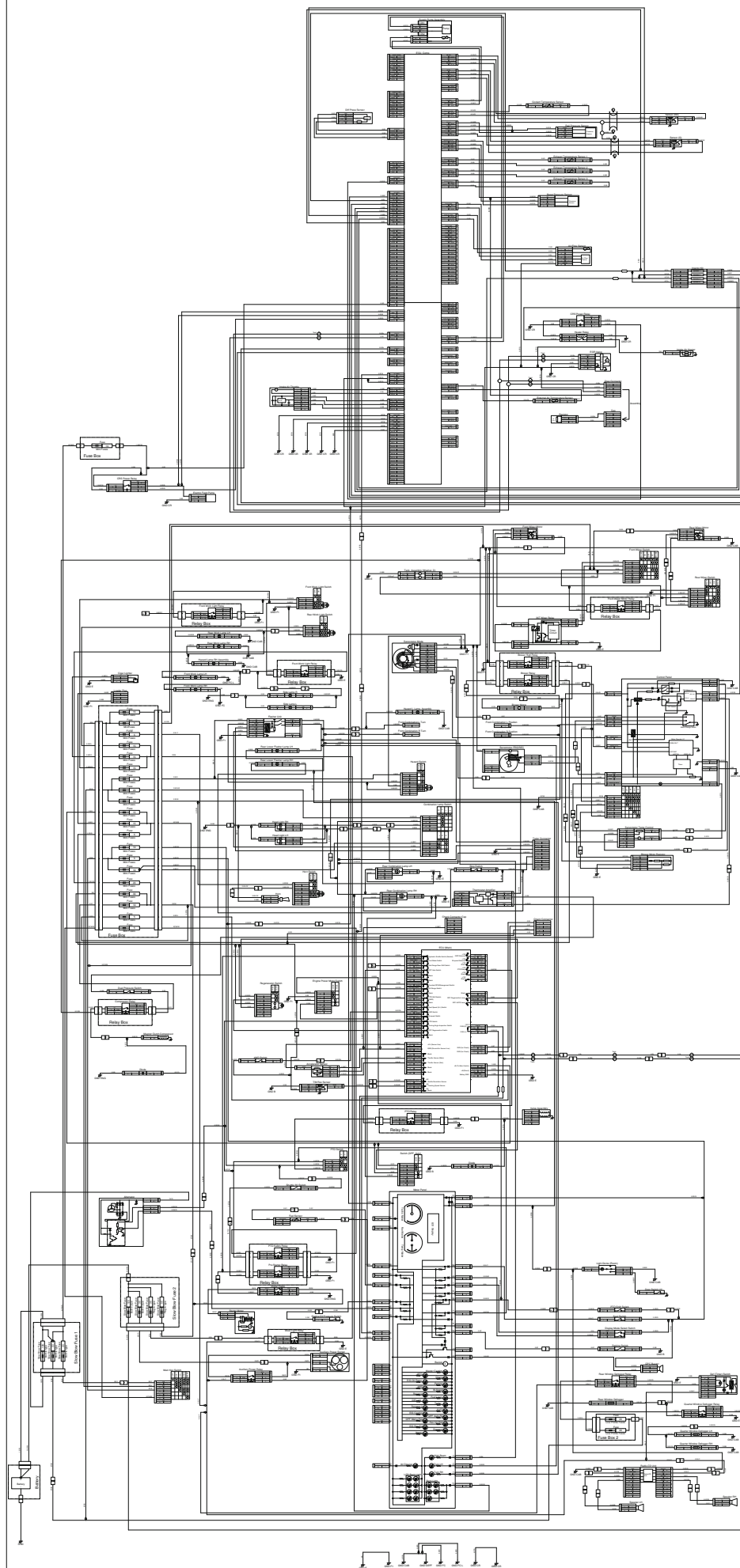
Adjusting Shim Size	Code No.
0.10 mm (0.0039 in.)	T1065-87340
0.15 mm (0.0059 in.)	T1065-87350
0.40 mm (0.016 in.)	T1065-87360
0.60 mm (0.024 in.)	T1065-87370
1.0 mm (0.0394 in.)	T1065-87380

- (1) Magnetic Clutch Mounting Screw (6) External Snap Ring
(2) Hub Plate (7) Stator
(3) Shim (8) Compressor Body
(4) External Snap Ring
(5) Rotor

L: Air Gap

9Y1210686CAS0090US0





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