WSM

WORKSHOP MANUAL
TRACTOR,FRONT LOADER, BACKHOE

B26,TL500,BT820

Kubota

KiSC issued 10, 2008 A

⚠ SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.

It is essential that you read the instructions and safety regulations before you attempt to repair or use this unit.

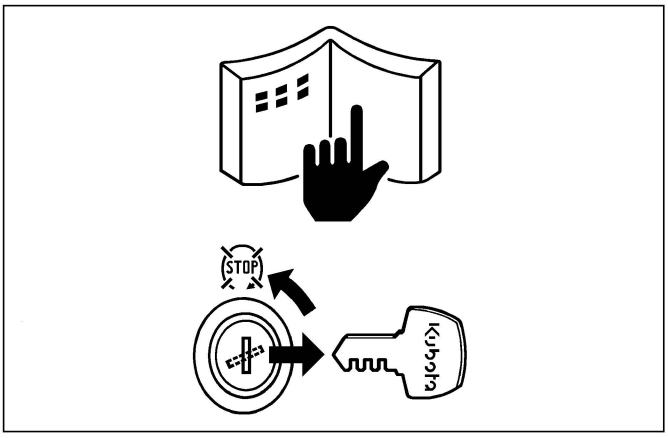
⚠ **DANGER** : **Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**

⚠ **WARNING** : **Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

⚠ **CAUTION** : **Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**

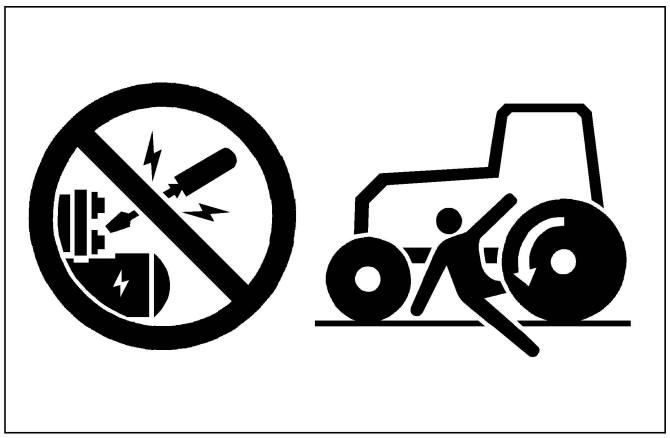
■ **IMPORTANT** : **Indicates that equipment or property damage could result if instructions are not followed.**

■ **NOTE** : **Gives helpful information.**



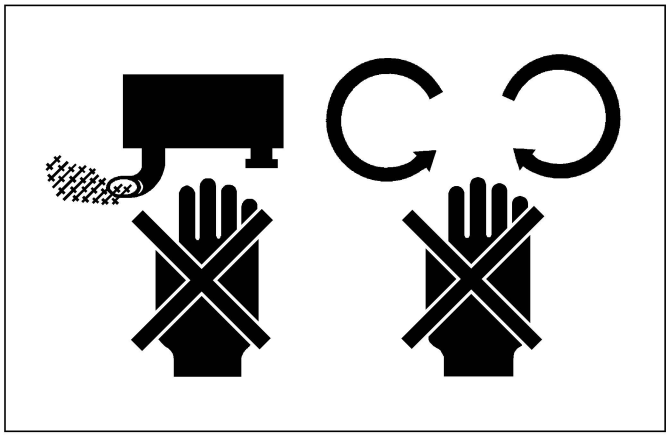
BEFORE SERVICING AND REPAIRING

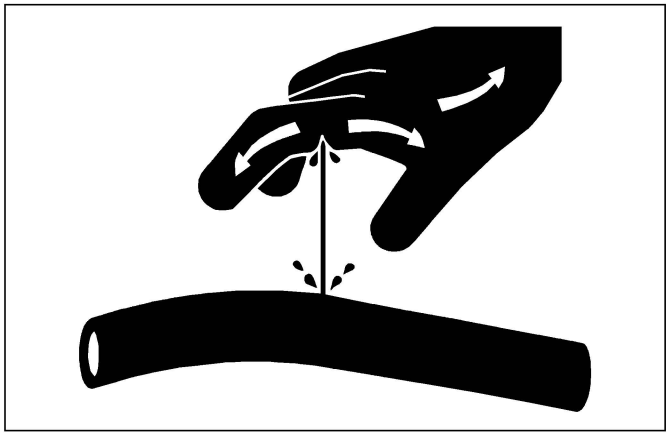
- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a firm and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, and remove the key.
- Disconnect the battery negative cable.
- Hang a "**DO NOT OPERATE**" tag in operator station.



SAFETY STARTING

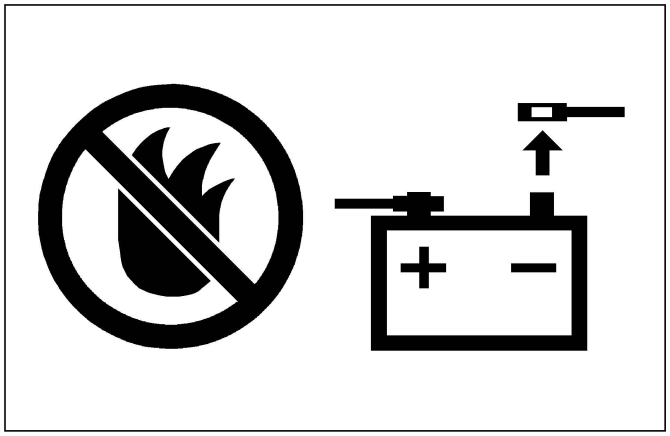
- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Never start the engine while standing on ground. Start the engine only from operator's seat.





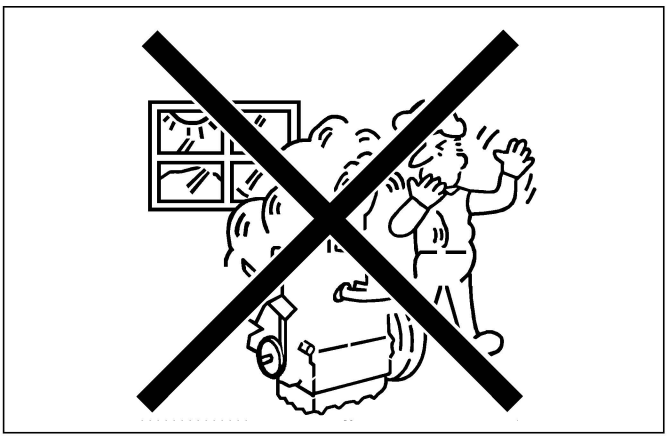
SAFETY WORKING

- Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
- Wear close fitting clothing and safety equipment appropriate to the job.
- Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
- When servicing is performed together by two or more persons, take care to perform all work safely.
- Do not work under the machine that is supported solely by a jack. Always support the machine by safety stands.
- Do not touch the rotating or hot parts while the engine is running.
- Never remove the radiator cap while the engine is running, or immediately after stopping. Otherwise, hot water will spout out from radiator. Only remove radiator cap when cool enough to touch with bare hands. Slowly loosen the cap to first stop to relieve pressure before removing completely.
- Escaping fluid (fuel or hydraulic oil) under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or fuel lines. Tighten all connections before applying pressure.



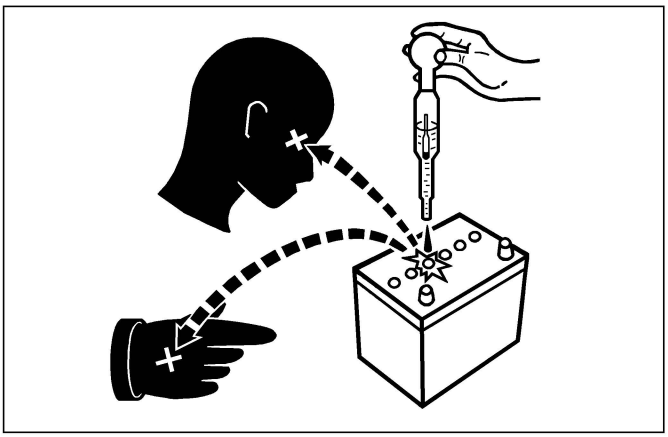
AVOID FIRES

- Fuel is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.
- To avoid sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- Battery gas can explode. Keep sparks and open flame away from the top of battery, especially when charging the battery.
- Make sure that no fuel has been spilled on the engine.



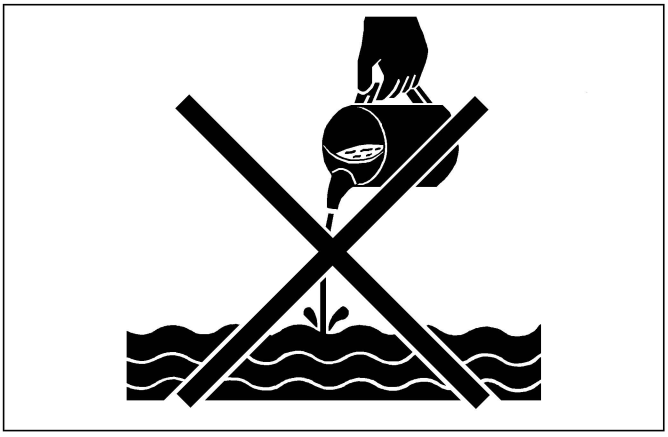
VENTILATE WORK AREA

- If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in a closed area. The exhaust gas contains poisonous carbon monoxide.



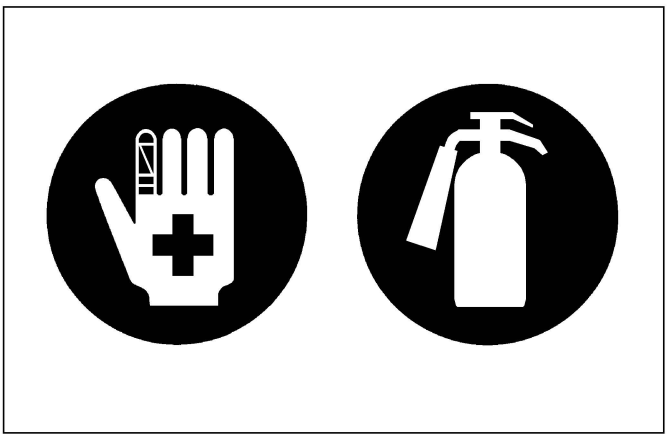
PREVENT ACID BURNS

- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, clothing and cause blindness if splashed into eyes. Keep electrolyte away from eyes, hands and clothing. If you spill electrolyte on yourself, flush with water, and get medical attention immediately.



DISPOSE OF FLUIDS PROPERLY

- Do not pour fluids into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, electrolyte and other harmful waste.



PREPARE FOR EMERGENCIES

- Keep a first aid kit and fire extinguisher handy at all times.
- Keep emergency numbers for doctors, ambulance service, hospital and fire department near your telephone.

SAFETY DECALS

The following safety decals are installed on the machine.
If a decal becomes damaged, illegible or is not on the machine, replace it. The decal part number is listed in the parts list.

(1) Part No. 6C070-4742-2

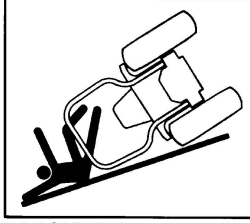
⚠CAUTION

TO AVOID PERSONAL INJURY:
1. Read and understand the operator's manual before operation.
2. Before starting the engine, make sure that everyone is at a safe distance from the tractor and that the PTO is OFF.
3. Do not allow passengers on the tractor at any time.
4. Before allowing other people to use the tractor, have them read the operator's manual.
5. Check the tightness of all nuts and bolts regularly.
6. Keep all shields in place and stay away from all moving parts.
7. Lock the two brake pedals together before driving on the road.
8. Slow down for turns, or rough roads, or when applying individual brakes.
9. On public roads use SMV emblem and hazard lights, if required by local traffic and safety regulations.
10. Pull only from the drawbar.
11. Before dismounting, lower the implement to the ground, set the parking brake, stop the engine and remove the key.
12. Securely support tractor and implements before working underneath.

1AGAEBMAP068E

(2) Part No. 32771-4925-1

⚠WARNING



TO AVOID PERSONAL INJURY OR DEATH FROM ROLL-OVER :
1. Kubota recommends the use of a Roll-Over Protective structures (ROPS) and seat belt in almost all applications.
2. To ensure ROPS protection, do not operate tractor without loader mainframe.
3. Never use just the seat belt or just the ROPS. They must be used together. For further details, consult your Operator's Manual or your local dealer.

1HNACABAP0880

(3) Part No. 32741-4751-1

⚠CAUTION

TO AVOID PERSONAL INJURY:
BEFORE STARTING THE ENGINE
1. Make sure the parking brake is set.
2. Make sure the range gear shift lever (L-M-H) is in "NEUTRAL" position.

1HNABABAP065E

(4) Part No. 6C150-4743-1

⚠WARNING

BEFORE DISMOUNTING TRACTOR:
1. **ALWAYS SET PARKING BRAKE.**
   Leaving transmission in gear with the engine stopped will not prevent tractor from rolling.
2. **PARK ON LEVEL GROUND WHENEVER POSSIBLE.**
   If parking on a slope, position tractor across the slope.
3. **LOWER ALL IMPLEMENTS TO THE GROUND.**
4. **STOP THE ENGINE.**

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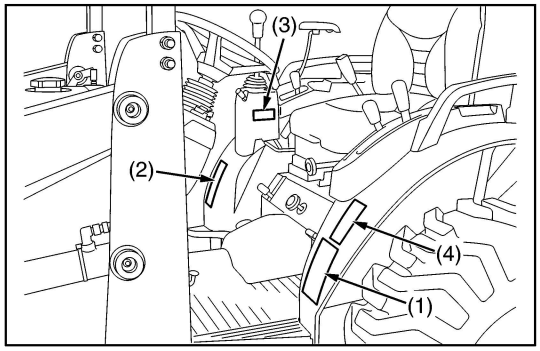

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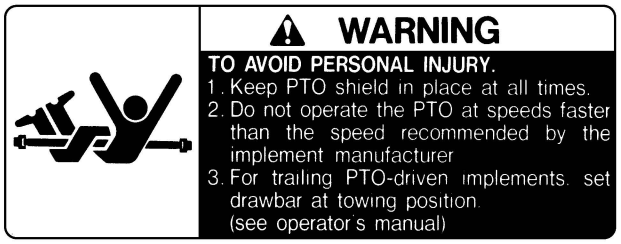
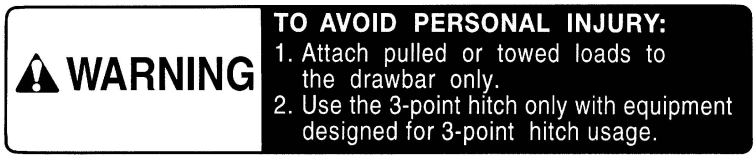
(1) Part No. TA040-4959-3



1AGAMAAAP3830

(2) Part No. 6C140-4744-1



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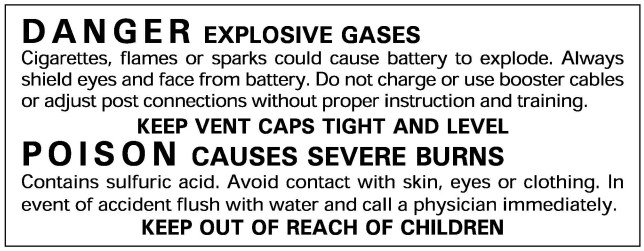
(3) Part No. 6C040-5559-1



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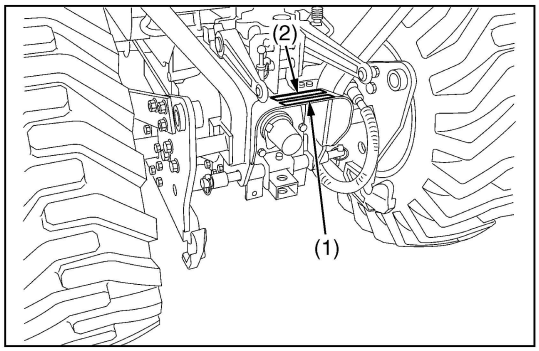
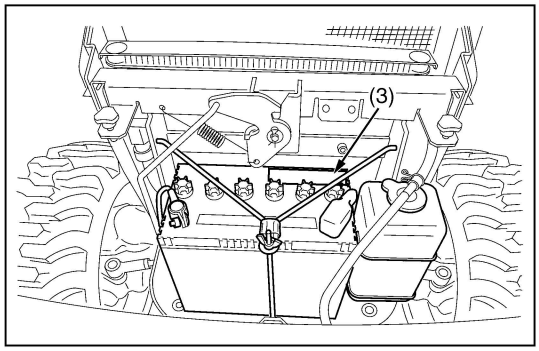
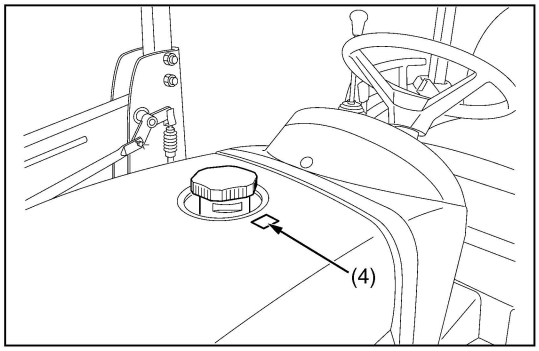
(4) Part No. 6C300-4741-3

No fire

1AGAECDAP058E





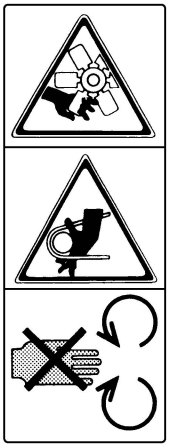


3TVAAAFCP009A

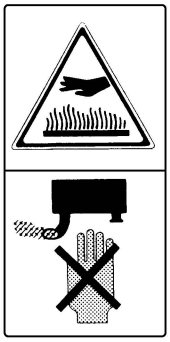
(1) Part No. 6C090-4965-1

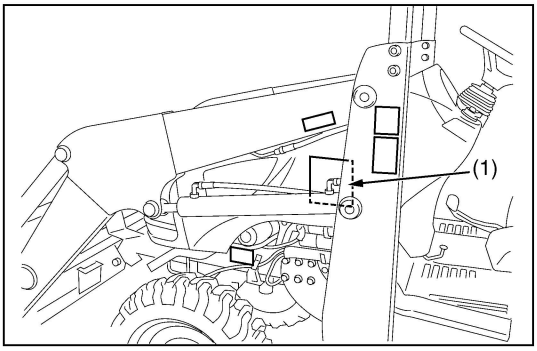
1AGAEBMAP074E

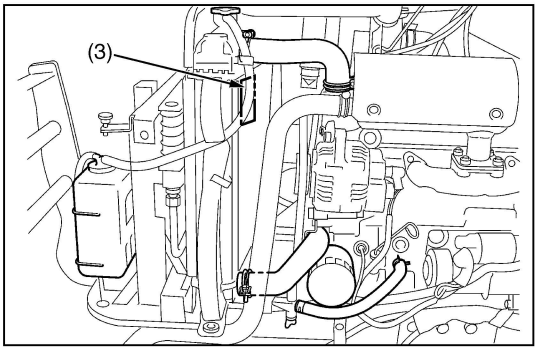
(2) Part No. 32751-4958-1
Do not get your hands close to engine fan and fan belt.

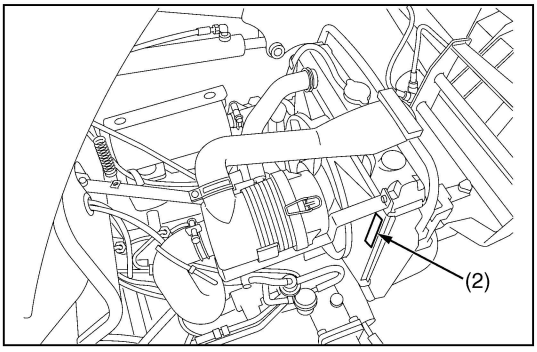


(3) Part No. TA040-4958-1
Do not touch hot surface like muffler, etc..









3TVAAAFCP005A

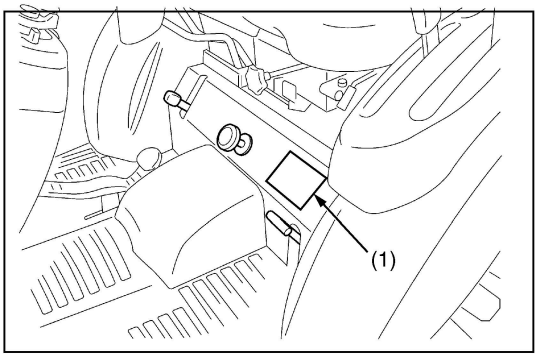
(1) Part No. 32751-4921-2

⚠ WARNING

TO AVOID SERIOUS PERSONAL INJURY OR DEATH:

1. Keep tractor seat in forward position except when operating backhoe.
2. Using seat in reversed position while operating attachments other than backhoe may result in entanglement with PTO shaft or 3-point hitch.

1HNACABAP0770



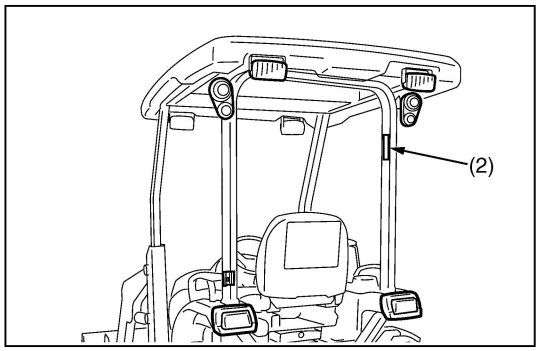
(2) Part No. 6C140-4746-1

⚠WARNING

TO AVOID PERSONAL INJURY:

Do not modify or repair a ROPS because welding grinding, drilling or cutting any portion may weaken the structure.

1AGAMAAAP3870



CARE OF DANGER, WARNING AND CAUTION LABELS

1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels from your local KUBOTA distributor.
4. If a component with danger, warning and caution label(s) affixed is replaced with new part, make sure new label(s) is (are) attached in the same location(s) as the replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

3TVAAAFCP008A

SPECIFICATIONS

Model			B26
			4WD
PTO power			14.5 kW (19.5 HP)*
Engine	Maker		KUBOTA
	Model		D1105-E2-D21 / D1105-E3-TLB
	Type		Indirect injection. Vertical, water-cooled 4-cycle diesel
	No. of cylinders		3
	Bore and stroke		ϕ 78 × 78.4 mm (ϕ 3.1 × 3.1 in.)
	Total displacement		1123 cm^3 (68.5 cu. in.)
	Engine gross power		19.4 kW (26.0 HP)*
	Rated revolution		2800 min^{-1} (rpm)
	Maximum torque		77.6 N·m (57.2 lbf·ft)
	Battery		12 V, RC: 79 min., CCA: 433A
	Fuel		Diesel fuel No. 1 [below −10 °C (14 °F)], Diesel fuel No. 2 [above −10 °C (14 °F)]
Capacities	Fuel tank		31 L (8.1 U.S.gals, 6.8 Imp.gals)
	Engine crankcase (with filter)		3.0 L (3.2 U.S.qts, 2.6 Imp.qts)
	Engine coolant		4.5 L (4.7 U.S.qts, 4.0 Imp.qts)
	Transmission case (with oil tank)		26 L (6.9 U.S.gals, 5.7 Imp.gals)
Dimensions	Overall length (without 3P)		2557 mm (100.7 in.)
	Overall width (min. tread)		1365 mm (53.7 in.)
	Overall height (with canopy)		2273 mm (89.5 in.)
	Wheel base		1581 mm (62.2 in.)
	Min. ground clearance		350 mm (13.8 in.)
	Tread	Front	905 mm (35.6 in.)
		Rear	1050 mm (41.3 in.)
Weight (with ROPS and FOPS, main frame)			1182 kg (2606 lbs)
Clutch			N/A
Traveling system	Tires	Front	23 × 8.50-14
		Rear	12.4-16
	Steering		Hydrostatic type power steering
	Transmission		Main-hydrostatic transmission, 3 range gear shift (3 forward, 3 reverse)
	Brake		Wet disk type
	Min. turning radius (without brake)		2.5 m (8.2 feet)
Hydraulic unit	Hydraulic control system		Position control
	Pump capacity		3P : 26.3 L/min. (7.0 U.S.gals/min., 5.8 Imp.gals/min.) Power steering : 16.0 L/min. (4.2 U.S.gals/min., 3.5 Imp.gals/min.)
	Three point hitch		SAE Category 1
	Max. lift force	At lift points	970 kg (2139 lbs)
		24 in. behind lift point	760 kg (1676 lbs)
PTO	Rear PTO		SAE 1-3/8, 6 splines
	PTO / Engine speed		1 speed 540 min^{-1} (rpm) / 2768 min^{-1} (rpm)

NOTE: * Manufacture's estimate The company reserves the right to change the specifications without notice.

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TRAVELLING SPEEDS

(At rated engine rpm)

Model		**B26**			
Tire size (Rear)		12.4-16 R4 IND		12.4-16 Farm	
	Range gear shift lever	km/h	mph	km/h	mph
Forward	Low	0 to 4.5	0 to 2.8	0 to 4.8	0 to 3.0
	Middle	0 to 8.4	0 to 5.2	0 to 8.9	0 to 5.5
	High	0 to 17.8	0 to 11.1	0 to 18.6	0 to 11.5
Reverse	Low	0 to 4.0	0 to 2.5	0 to 4.2	0 to 2.6
	Middle	0 to 7.4	0 to 4.6	0 to 7.9	0 to 4.9
	High	0 to 15.8	0 to 9.8	0 to 16.5	0 to 10.3

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Model		**B26**	
Tire size (Rear)		13.6-16 Turf	
	Range gear shift lever	km/h	mph
Forward	Low	0 to 4.9	0 to 3.1
	Middle	0 to 9.1	0 to 5.7
	High	0 to 19.0	0 to 11.8
Reverse	Low	0 to 4.3	0 to 2.7
	Middle	0 to 8.1	0 to 5.0
	High	0 to 16.9	0 to 10.5

The company reserves the right to change the specifications without notice.

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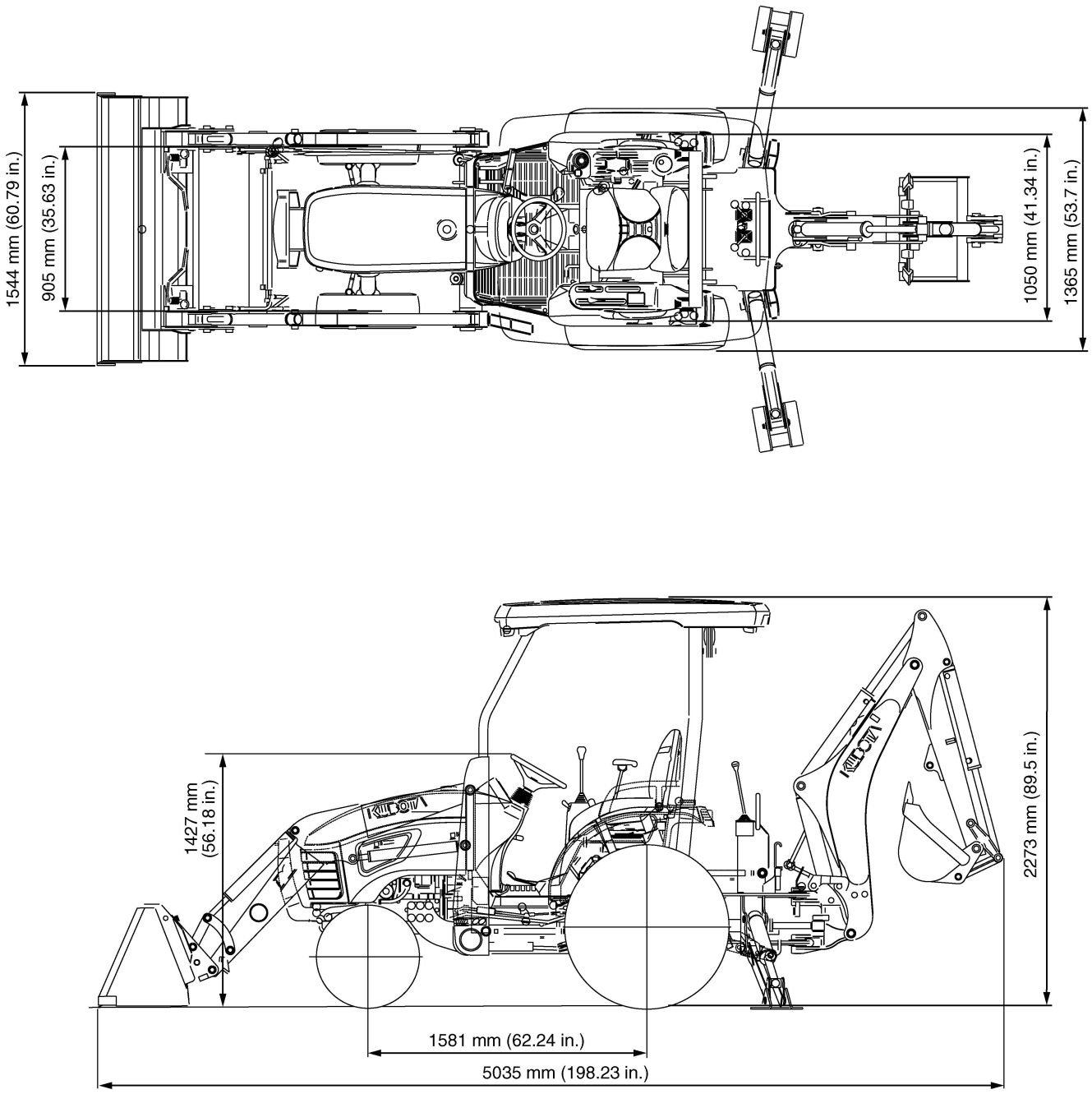
DIMENSIONS



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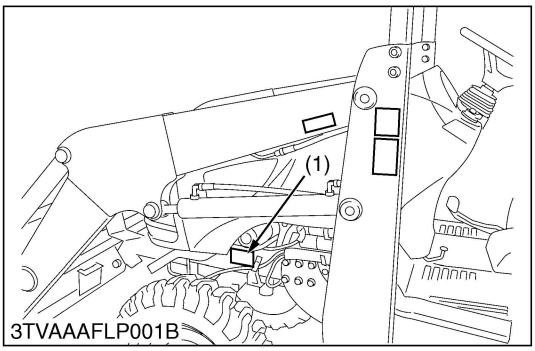
G GENERAL

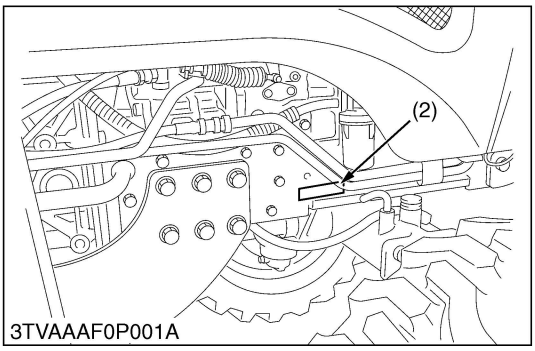
GENERAL

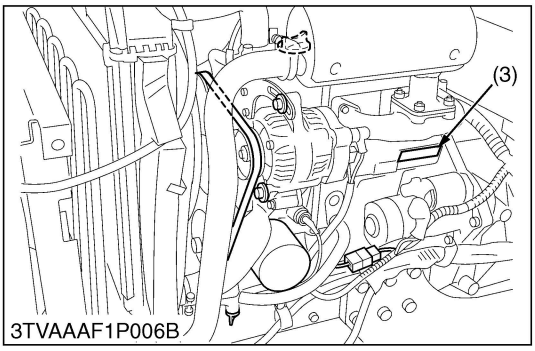
CONTENTS

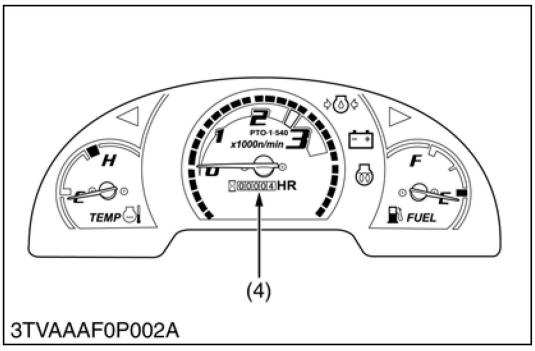
1. TRACTOR IDENTIFICATION

[1] MODEL NAME AND SERIAL NUMBERS









When contacting your local KUBOTA distributor, always specify engine serial number, tractor serial number and hour meter reading.

(1) Tractor Identification Plate
(2) Tractor Serial Number
(3) Engine Serial Number
(4) Hour Meter (IntelliPanel Display)

W10106000

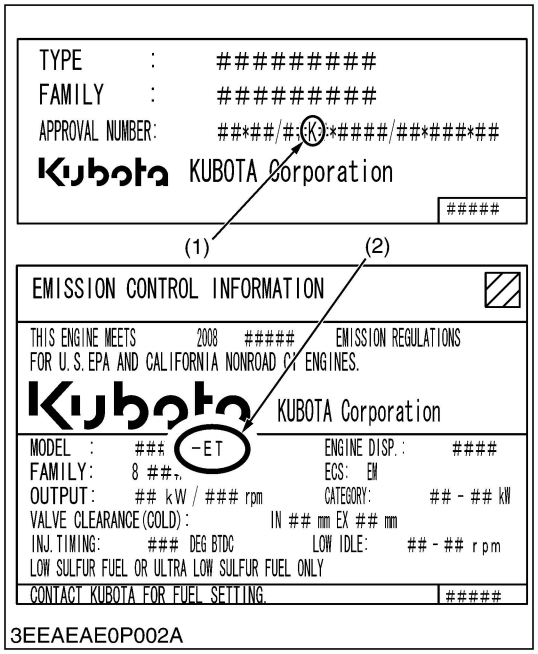
[2] E3 ENGINE

[Example : Engine Model Name V2403-M-TE3-XXX]

The emission controls previously implemented in various countries to prevent air pollution will be stepped up as Non-Road Emission Standards continue to change. The timing or applicable date of the specific Non-Road Emission regulations depends on the engine output classification.

Over the past several years, Kubota has been supplying diesel engines that comply with regulations in the respective countries affected by Non-Road Emission regulations. For Kubota Engines, E3 will be the designation that identifies engine models affected by the next emission phase (See the table below).

When servicing or repairing ###-E3 series engines, use only replacement parts for that specific E3 engine, designated by the appropriate E3 Kubota Parts List and perform all maintenance services listed in the appropriate Kubota Operator's Manual or in the appropriate E3 Kubota Workshop Manual. Use of incorrect replacement parts or replacement parts from other emission level engines (for example: E2 engines), may result in emission levels out of compliance with the original E3 design and EPA or other applicable regulations. Please refer to the emission label located on the engine head cover to identify Output classification and Emission Control Information. E3 engines are identified with "ET" at the end of the Model designation, on the US EPA label. Please note : E3 is not marked on the engine.



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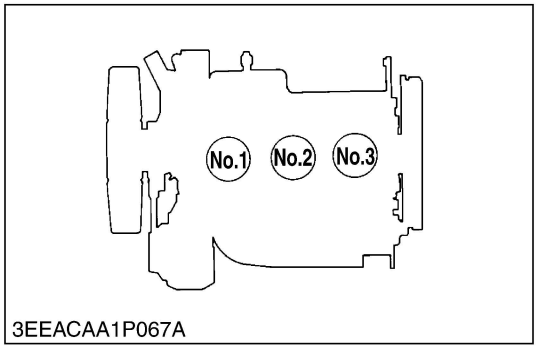
Category (1)	Engine output classification	EU regulation
K	From 19 to less than 37 kW	STAGE IIIA
J	From 37 to less than 75 kW	STAGE IIIA
I	From 75 to less than 130 kW	STAGE IIIA

Category (2)	Engine output classification	EPA regulation
ET	Less than 19kW	Tier 4
	From 19 to less than 56 kW	Interim Tier 4
	From 56 to less than 75 kW	Tier 3
	From 75 to less than 130 kW	Tier 3

(1) EU regulation engine output classification category
(2) "E3" engines are identified with "ET" at the end of the Model designation, on the US EPA label.
"E3" designates Tier 3 and some Interim Tier 4 / Tier 4 models, depending on engine output classification.

W1031971

[3] CYLINDER NUMBER



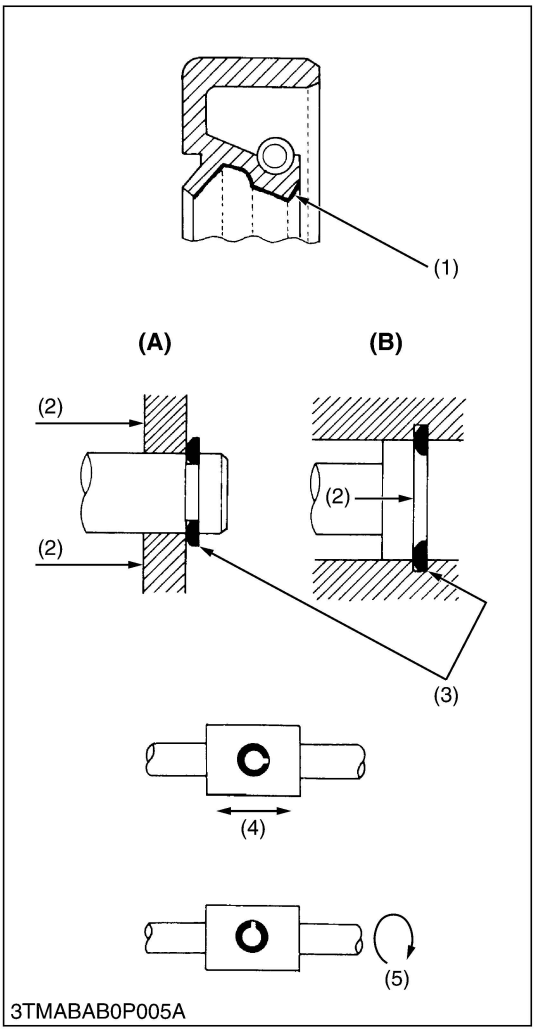
3EEACAA1P067A

The cylinder numbers of KUBOTA diesel engine are designated as shown in the figure.

The sequence of cylinder numbers is given as No.1, No.2 and No.3 starting from the gear case side.

W1011077

2. GENERAL PRECAUTIONS



3TMABAB0P005A

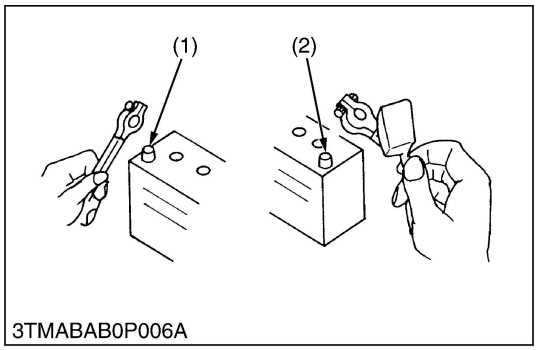
- During disassembly, carefully arrange removed parts in a clean area to prevent confusion later. Screws, bolts and nuts should be installed in their original position to prevent reassembly errors.
- When special tools are required, use KUBOTA genuine special tools. Special tools which are not frequently used should be made according to the drawings provided.
- Before disassembling or servicing electrical wires, always disconnect the ground cable from the battery first.
- Remove oil and dirt from parts before measuring.
- Use only KUBOTA genuine parts for parts replacement to maintain machine performance and to assure safety.
- Gaskets and O-rings must be replaced during reassembly. Apply grease to new O-rings or oil seals before assembling. See the figure left side.
- When reassembling external snap rings or internal snap rings, they must be positioned so that sharp edge faces against the direction from which a force is applied. See the figure left side.
- When inserting spring pins, their splits must face the direction from which a force is applied. See the figure left side.
- To prevent damage to the hydraulic system, use only specified fluid or equivalent.

(1) Grease
(2) Force
(3) Sharp Edge
(4) Axial Force
(5) Rotating Movement

(A) External Snap Ring
(B) Internal Snap Ring

W10109040

3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING



3TMABAB0P006A

To ensure safety and prevent damage to the machine and surrounding equipment, heed the following precautions in handling electrical parts and wiring.

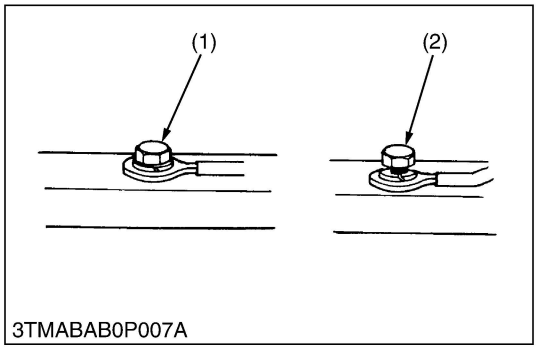
■ **IMPORTANT**

- **Check electrical wiring for damage and loosened connection every year. To this end, educate the customer to do his or her own check and at the same time recommend the dealer to perform periodic check for a fee.**
- **Do not attempt to modify or remodel any electrical parts and wiring.**
- **When removing the battery cables, disconnect the negative cable first. When installing the battery cables, connect the positive cable first.**

(1) Negative Terminal (2) Positive Terminal

W10111140

[1] WIRING

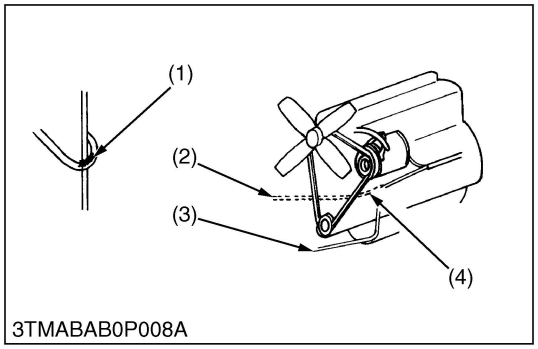


3TMABAB0P007A

- Securely tighten wiring terminals.

(1) Correct (Securely Tighten) (2) Incorrect (Loosening Leads to Faulty Contact)

W10112160

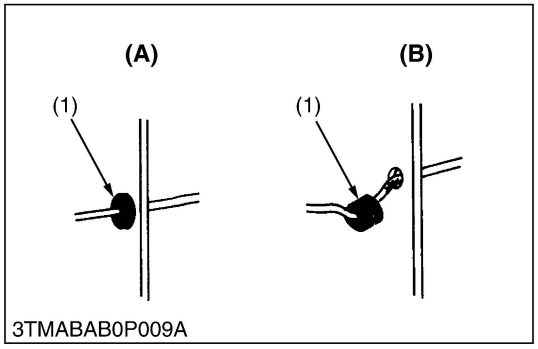


3TMABAB0P008A

- Do not let wiring contact dangerous part.

(1) Dangerous Part (3) Wiring (Correct)
(2) Wiring (Incorrect) (4) Dangerous Part

W10113130

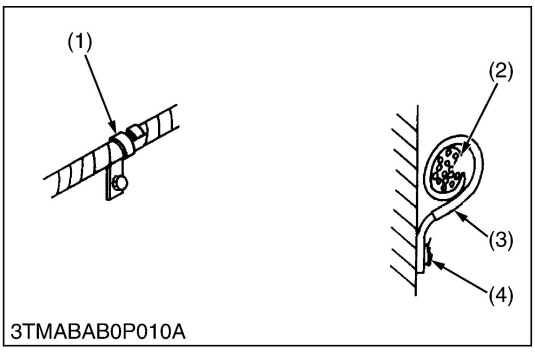


3TMABAB0P009A

- Securely insert grommet.

(1) Grommet **(A) Correct** **(B) Incorrect**

W10113880

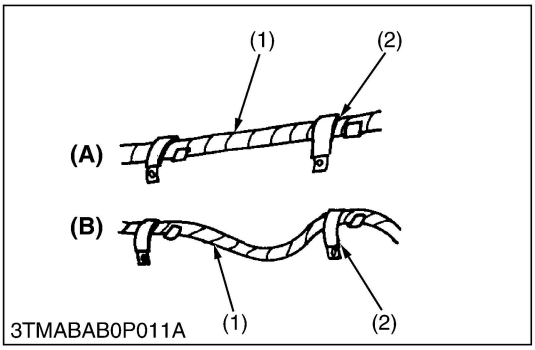


3TMABAB0P010A

- Securely clamp, being careful not to damage wiring.

(1) Clamp
• Wind Clamp Spirally
(2) Wire Harness
(3) Clamp
(4) Welding Dent

W10114580

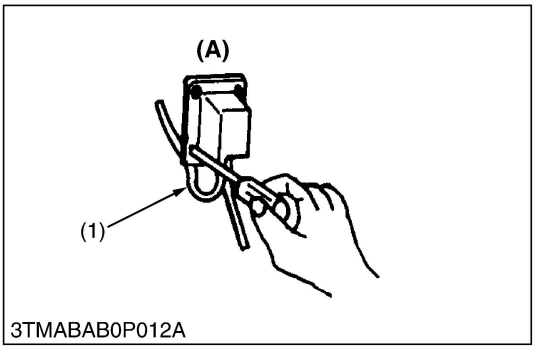


3TMABAB0P011A

- Clamp wiring so that there is no twist, unnecessary sag, or excessive tension, except for movable part, where sag be required.

(1) Wiring
(2) Clamp
(A) Correct
(B) Incorrect

W10115870

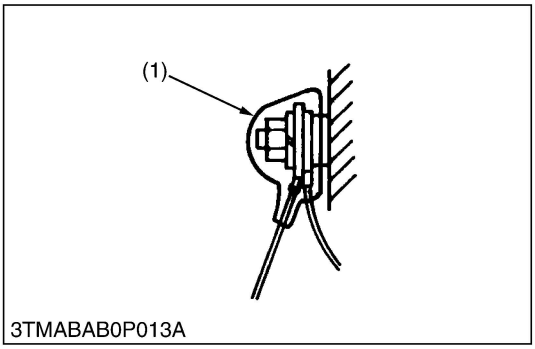


3TMABAB0P012A

- In installing a part, take care not to get wiring caught by it.

(1) Wiring
(A) Incorrect

W10116700



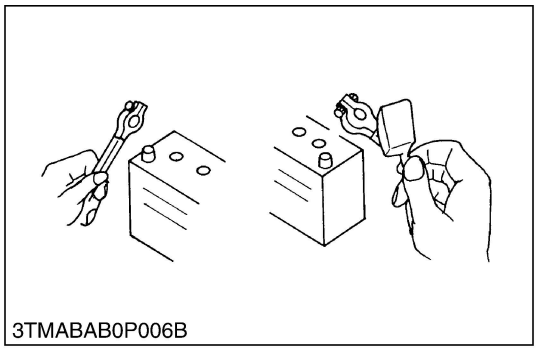
3TMABAB0P013A

- After installing wiring, check protection of terminals and clamped condition of wiring, only connect battery.

(1) Cover
• Securely Install Cover

W10117350

[2] BATTERY


3TMABAB0P006B

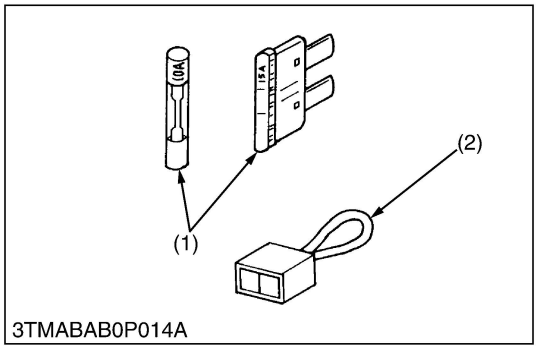
- Take care not to confuse positive and negative terminal posts.
- When removing battery cables, disconnect negative cable first. When installing battery cables, check for polarity and connect positive cable first.
- Do not install any battery with capacity other than is specified (Ah).
- After connecting cables to battery terminal posts, apply high temperature grease to them and securely install terminal covers on them.
- Do not allow dirt and dust to collect on battery.

CAUTION

- **Take care not to let battery liquid spill on your skin and clothes. If contaminated, wash it off with water immediately.**
- **Before recharging the battery, remove it from the machine.**
- **Before recharging, remove cell caps.**
- **Do recharging in a well-ventilated place where there is no open flame nearby, as hydrogen gas and oxygen are formed.**

W10118160

[3] FUSE



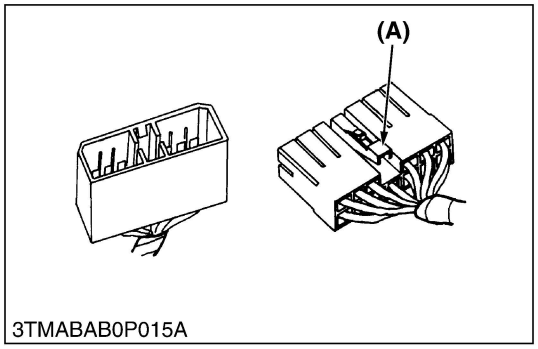
3TMABAB0P014A

- Use fuses with specified capacity.
  Neither too large or small capacity fuse is acceptable.
- Never use steel or copper wire in place of fuse.
- Do not install working light, radio set, etc. on machine which is not provided with reserve power supply.
- Do not install accessories if fuse capacity of reserve power supply is exceeded.

(1) Fuse (2) Slow Blow Fuse

W10120920

[4] CONNECTOR

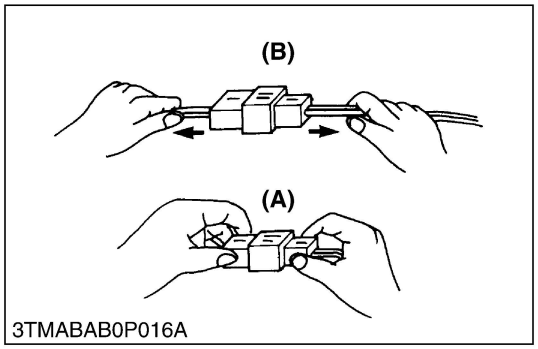


3TMABAB0P015A

- For connector with lock, push lock to separate.

(A) Push

W10122110

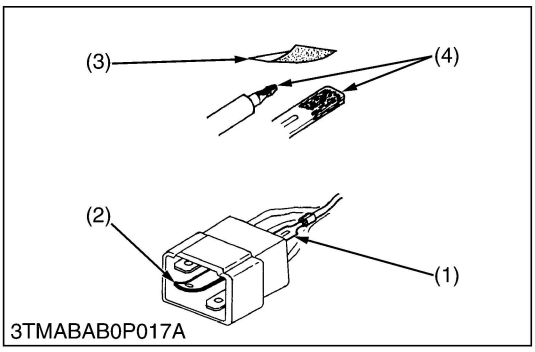


3TMABAB0P016A

- In separating connectors, do not pull wire harnesses.
- Hold connector bodies to separate.

(A) Correct **(B) Incorrect**

W10122720

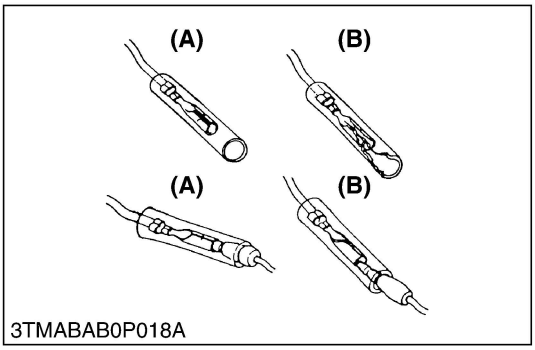


3TMABAB0P017A

- Use sandpaper to remove rust from terminals.
- Repair deformed terminal. Make certain there is no terminal being exposed or displaced.

(1) Exposed Terminal
(2) Deformed Terminal
(3) Sandpaper
(4) Rust

W10123460

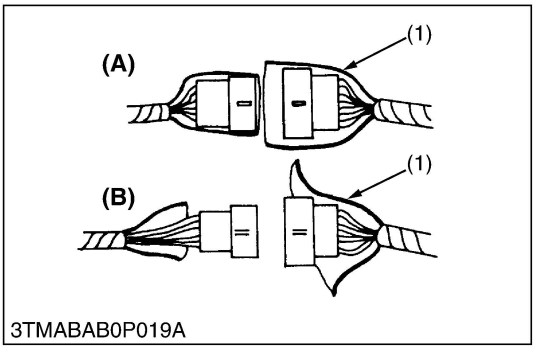


3TMABAB0P018A

- Make certain that there is no female connector being too open.

(A) Correct
(B) Incorrect

W10124300



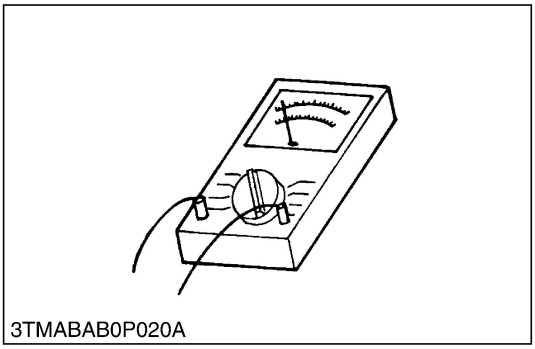
3TMABAB0P019A

- Make certain plastic cover is large enough to cover whole connector.

(1) Cover
(A) Correct
(B) Incorrect

W10125190

[5] HANDLING OF CIRCUIT TESTER


3TMABAB0P020A

- Use tester correctly following manual provided with tester.
- Check for polarity and range.

W10126840

4. LUBRICANTS, FUEL AND COOLANT

	Place	Capacity	Grade
		B26	
1	Fuel	31 L 8.1 U.S.gals 6.8 Imp.gals	No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below −10 °C (14 °F)
2	Coolant (with recovery tank)	4.5 L 4.7 U.S.qts 4.0 Imp.qts	Fresh clean water with LLC
3	Engine crankcase (with filter)	3.0 L 3.2 U.S.qts 2.6 Imp.qts	Engine oil : API service Classification [E2 Engine] CF or better [E3 Engine] Refer to next page. Below 0 °C (32 °F) : SAE10W, 10W-30 or 15W-40 0 to 25 °C (32 to 77 °F): SAE20, 10W-30 or 15W-40 Above 25 °C (77 °F): SAE30, 10W-30 or 15W-40
4	Transmission case (with oil tank)	26 L 6.9 U.S.gals 5.7 Imp.gals	KUBOTA UDT or SUPER UDT fluid*
5	Front axle case	4.7 L 5.0 U.S.qts 4.1 Imp.qts	KUBOTA UDT or SUPER UDT fluid* or SAE80, 90 gear oil

Greasing

	Place	No. of greasing point	Capacity	Type of grease
6	Top link	1	Until grease overflows	Multipurpose type grease NLGI-2 or NLGI-1 (GC-L8)
	Left rod (RH)	2		
	Speed control pedal	1		
	Battery terminal	2	Moderate amount	
	Suspension adjuster	–		
	Lock plate	–		
	Spring hook	–		
	Reversible seat	–		

* KUBOTA UDT or SUPER UDT fluid ... KUBOTA original transmission hydraulic fluid.

■ NOTE

Engine Oil :

- Oil used in the engine should have an American Petroleum Institute (API) service classification and Proper SAE Engine Oil according to the ambient temperature as shown above.
- With the emission control now in effect, the CF-4 and CG-4 lubricating oils have been developed for use of a low-sulfur fuel on on-road vehicle engines. When an off-road vehicle engine runs on a high-sulfur fuel, it is advisable to employ the "CF or better" lubricating oil with a high Total Base Number (TBN). **If the "CF-4, CG-4, CH-4 or CI-4" lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals. (approximately half)**
- Lubricating oil recommended when a low-sulfur or high-sulfur fuel is employed.

Lubricating oil class	Fuel		Remark
	Low-sulfur	High-sulfur	
CF	❍	❍	TBN ≥ 10
CF-4	❍☆	X	
CG-4	❍☆	X	
CH-4	❍☆	X	
CI-4	❍	X	

❍ : Recommendable X : Not recommendable

- ☆ : Class CF-4, CG-4 and CH-4 engine oils cannot be used on EGR (Exhaust Gas Re-circulation) type engines.
- The CJ-4 engine oil is intended for DPF (Diesel Particulate Filter) type engines, and cannot be used on this tractor.

Fuel :

- Cetane number of 45 minimum. Cetane number greater than 50 is preferred, especially for temperatures below -20 °C (-4 °F) or elevations above 1500 m (5000 ft).
- If diesel fuel with sulfur content greater than 0.5 % sulfur content is used, reduce the service interval for engine oil and filter by 50 %.
- DO NOT use diesel fuel with sulfur content greater than 1.0 %.
- Diesel fuels specified to EN 590 or ASTM D975 are recommended.
- No. 2-D is a distillate fuel of lower volatility for engines in industrial and heavy mobile service. (SAE J313 JUN87)
- Since this engine adopts EPA Tier 4 and Interim Tier 4 standards, the use of low sulfur fuel or ultra low sulfur fuel is mandatory in EPA regulated area (North America). Therefore, please use No. 2-D S500 or S15 diesel fuel as an alternative to No. 2-D, or use No. 1-D S500 or S15 diesel fuel as an alternative to No. 1-D if outside air temperature is below -10 °C (14 °F).

Transmission Oil :

The oil used to lubricate the transmission is also used as hydraulic fluid. To insure proper operation of the hydraulic system and to complete lubrication of the transmission, it is important that a multi-grade transmission fluid is used in this system. We recommend the use of **KUBOTA UDT** or **SUPER UDT fluid** for optimum protection and performance.

Do not mix different brands together.

- Indicated capacities of water and oil are manufacture's estimate.

5. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS

Screws, bolts, and nuts whose tightening torques are not specified in this Workshop Manual should be tightened according to the table below.

Indication on top of bolt	⬡ ④ No-grade or 4T						⑦ 7T						⑨ 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit / Diameter	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6 (6 mm, 0.24 in.)	7.9 to 9.3	0.80 to 0.95	5.8 to 6.8	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8 (8 mm, 0.31 in.)	18 to 20	1.8 to 2.1	13 to 15	17 to 19	1.7 to 2.0	13 to 14	24 to 27	2.4 to 2.8	18 to 20	18 to 20	1.8 to 2.1	13 to 15	30 to 34	3.0 to 3.5	22 to 25
M10 (10 mm, 0.39 in.)	40 to 45	4.0 to 4.6	29 to 33	32 to 34	3.2 to 3.5	24 to 25	48 to 55	4.9 to 5.7	36 to 41	40 to 44	4.0 to 4.5	29 to 32	61 to 70	6.2 to 7.2	45 to 52
M12 (12 mm, 0.47 in.)	63 to 72	6.4 to 7.4	47 to 53	–	–	–	78 to 90	7.9 to 9.2	58 to 66	63 to 72	6.4 to 7.4	47 to 53	103 to 117	10.5 to 12.0	76.0 to 86.7
M14 (14 mm, 0.55 in.)	108 to 125	11.0 to 12.8	79.6 to 92.5	–	–	–	124 to 147	12.6 to 15.0	91.2 to 108	–	–	–	167 to 196	17.0 to 20.0	123 to 144
M16 (16 mm, 0.63 in.)	167 to 191	17.0 to 19.5	123 to 141	–	–	–	197 to 225	20.0 to 23.0	145 to 166	–	–	–	260 to 304	26.5 to 31.0	192 to 224
M18 (18 mm, 0.71 in.)	246 to 284	25.0 to 29.0	181 to 209	–	–	–	275 to 318	28.0 to 32.5	203 to 235	–	–	–	344 to 402	35.0 to 41.0	254 to 296
M20 (20 mm, 0.79 in.)	334 to 392	34.0 to 40.0	246 to 289	–	–	–	368 to 431	37.5 to 44.0	272 to 318	–	–	–	491 to 568	50.0 to 58.0	362 to 419

W1034542

[2] STUD BOLTS

Material of opponent part	Ordinariness			Aluminum		
Unit / Diameter	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8 (8 mm, 0.31 in.)	12 to 15	1.2 to 1.6	8.7 to 11	8.9 to 11	0.90 to 1.2	6.5 to 8.6
M10 (10 mm, 0.39 in.)	25 to 31	2.5 to 3.2	18 to 23	20 to 25	2.0 to 2.6	15 to 18
M12 (12 mm, 0.47 in.)	29.5 to 49.0	3.0 to 5.0	21.7 to 36.1	31.4	3.2	23.1
M14 (14 mm, 0.55 in.)	62 to 73	6.3 to 7.5	46 to 54	–	–	–
M16 (16 mm, 0.63 in.)	98.1 to 112	10.0 to 11.5	72.4 to 83.1	–	–	–
M18 (18 mm, 0.71 in.)	172 to 201	17.5 to 20.5	127 to 148	–	–	–

W1048139

[3] METRIC SCREWS, BOLTS AND NUTS

Grade	Property class 8.8 (8.8)			Property class 10.9 (10.9)		
Unit / Nominal Diameter	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8	24 to 27	2.4 to 2.8	18 to 20	30 to 34	3.0 to 3.5	22 to 25
M10	48 to 55	4.9 to 5.7	36 to 41	61 to 70	6.2 to 7.2	45 to 52
M12	78 to 90	7.9 to 9.2	58 to 66	103 to 117	10.5 to 12.0	76 to 86.7
M14	124 to 147	12.6 to 15.0	91.2 to 108	167 to 196	17.0 to 20.0	123 to 144
M16	197 to 225	20.0 to 23.0	145 to 166	260 to 304	26.5 to 31.0	192 to 224

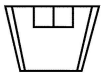
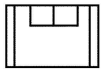
W1016172

[4] AMERICAN STANDARD SCREWS, BOLTS AND NUTS WITH UNC OR UNF THREADS

Grade	SAE GR.5			SAE GR.8		
Unit / Nominal Diameter	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
5/16	23.1 to 27.7	2.35 to 2.83	17.0 to 20.5	32.6 to 39.3	3.32 to 4.00	24.0 to 29.0
3/ 8	48 to 56	4.9 to 5.8	35.0 to 42.0	61.1 to 73.2	6.23 to 7.46	45.0 to 54.0
1/ 2	109 to 130	11.1 to 13.2	80.0 to 96.0	149.2 to 178.9	15.21 to 18.24	110.0 to 132.0
9/16	149.2 to 178.9	15.21 to 18.24	110.0 to 132.0	217.0 to 260.3	22.12 to 26.54	160.0 to 192.0
5/ 8	203.4 to 244	20.74 to 24.88	150.0 to 180.0	298.3 to 357.9	30.42 to 36.49	220.0 to 264.0

W1022485

[5] PLUGS

Shape	Size	Material of opponent part					
		Ordinariness			Aluminum		
		N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
Tapered screw 	R1/8	13 to 21	1.3 to 2.2	9.4 to 15	13 to 21	1.3 to 2.0	9.4 to 15
	R1/4	25 to 44	2.5 to 4.5	18 to 32	25 to 34	2.5 to 3.5	18 to 25
	R3/8	49 to 88	5.0 to 9.0	37 to 65	49.0 to 58	5.0 to 6.0	37 to 43
	R1/2	59 to 107	6.0 to 11.0	44 to 79.5	59 to 78	6.0 to 8.0	44 to 57
Straight screw 	G1/4	25 to 34	2.5 to 3.5	18 to 25	–	–	–
	G3/8	62 to 82	6.3 to 8.4	46 to 60	–	–	–
	G1/2	49 to 88	5.0 to 9.0	37 to 65	–	–	–

0000001666E

[6] HYDRAULIC FITTINGS

■ Adaptors, Elbows and Others

Item	Thread size	Tightening torque		
		N·m	kgf·m	lbf·ft
Adjustable elbow, Adaptor	9/16	37 to 44	3.8 to 4.5	27 to 33
	3/4	48 to 54	4.9 to 5.5	35 to 40
Hose fitting, Flare nut	9/16	22 to 25	2.3 to 2.6	16 to 19
	3/4	36 to 40	3.6 to 4.1	26 to 30
Adaptor (NPT)	3/8	38 to 43	3.9 to 4.4	28 to 32
	1/2	49 to 58	5.0 to 5.9	36 to 43

■ NOTE

- **When connecting a hose with flare nut, after tightening the nut with specified torque, return it approximately 45 degrees and re-tighten it to specified torque.**

W1015484

■ Hydraulic Pipe Cap Nuts

Pipe size	Tightening torque		
	N·m	kgf·m	lbf·ft
Φ6	25 to 34	2.5 to 3.5	18 to 25
Φ8	30 to 39	3.0 to 4.0	22 to 28
Φ10	40 to 49	4.0 to 5.0	29 to 36
Φ12	49 to 68	5.0 to 7.0	37 to 50
Φ15	108 to 117	11.0 to 12.0	79.6 to 86.7
Φ16	138 to 147	14.0 to 15.0	102 to 108
Φ18	108 to 117	11.0 to 12.0	79.6 to 86.7

W1014848

6. MAINTENANCE

No.	Item		Indication on hour meter														Inter-val	Refe-rence page	Impor-tant	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700				
1	Greasing	–	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-21		
2	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-22		
3	Wheel bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-22		
4	Main frame bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-23		
5	Air cleaner element [Double element type] Primary element	Clean		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-24	*1	@
		Replace															every 1 year	G-33	*2	
	Air cleaner element [Double element type] Secondary element	Replace															every 1 year	G-33		
6	Fuel filter element	Clean		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-24		@
		Replace								☆							every 400 Hr	G-31		
7	Fan belt	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-25		
8	Fuel line	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-25		@
		Replace															every 2 year	G-36	*3	
9	Brake	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-25		
10	Battery condition	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-26	*4	
11	Spark arrester	Clean		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-28		
12	Engine oil	Change	★			☆				☆				☆			every 200 Hr	G-29		
13	Engine filter	Replace	★			☆				☆				☆			every 200 Hr	G-29		
14	HST oil filter	Replace	★			☆				☆				☆			every 200 Hr	G-29		
15	Radiator hose and clamp	Check				☆				☆				☆			every 200 Hr	G-29		
		Replace															every 2 year	G-36		

W1050775

No.	Item		Indication on hour meter														Since then	Reference page	Important	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700				
16	Intake air line	Check				☆				☆				☆			every 200 Hr	G-29		@
		Replace															every 2 year	G-21	*3	
17	Toe-in	Adjust				☆				☆				☆			every 200 Hr	G-30		
18	Power steering oil line	Check				☆				☆				☆			every 200 Hr	G-30		
		Replace															every 2 year	G-36		
19	Transmission fluid	Change								☆							every 400 Hr	G-31		
20	Transmission oil filter	Replace	★							☆							every 400 Hr	G-31		
21	Front axle case oil	Change								☆							every 400 Hr	G-32		
22	Front axle pivot	Adjust								☆							every 400 Hr	G-32		
23	Engine valve clearance	Adjust															every 800 Hr	G-33		
24	Fuel injection nozzle injection pressure	Check															every 1500 Hr	G-33		@
25	Injection pump	Check															every 3000 Hr	G-33		@
26	Cooling system	Flush								☆							every 2 year	G-34		
27	Coolant	Change															every 2 year	G-34		
28	Fuel system	Bleed															Service as required	G-37		
29	Clutch housing water	Drain																G-37		
30	Fuse	Replace																G-38		
31	Light bulb	Replace																G-38		

W1028983

■ IMPORTANT

- **The jobs indicated by ★ must be done after the first 50 hours of operation.**
- ***1 : Air cleaner should be cleaned more often in severe dusty conditions.**
- ***2 : Every year or after 6 cleanings.**
- ***3 : Replace only if necessary.**
- ***4 : When the battery is used for less than 100 hours per year, check the fluid level annually.**
- **The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in U.S.EPA nonroad emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.**
  Please see the Warranty Statement in detail.

7. CHECK AND MAINTENANCE

CAUTION

- **Be sure to check and service the tractor on a flat place with the engine shut off and the parking brake "ON".**

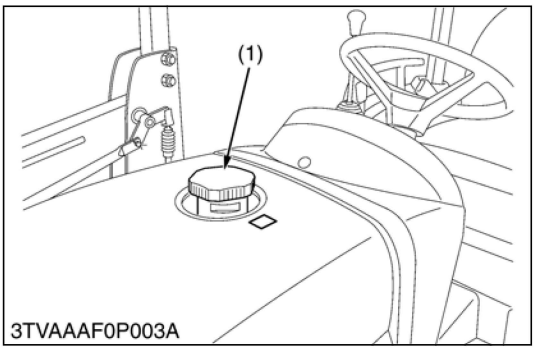
[1] DAILY CHECK

For your own safety and maximum service life of the machine, make a through daily inspection before operating the machine to start the engine.

Walk Around Inspection

Look around and under the tractor for such items as loose bolts, trash build-up, oil or coolant leaks, broken or worn parts.

W1033559



Checking and Refueling

CAUTION

- **Do not smoke while refueling.**
- **Be sure to stop the engine before refueling.**

1. Turn the key switch to "**ON**", check the amount of fuel by fuel gauge.
2. Fill fuel tank when fuel gauge shows 1/4 or less fuel in tank.
3. Use grade No. 2 Diesel fuel at temperature above -10 °C (14 °C). Use grade No. 1 Diesel fuel at temperature below -10 °C (14 °C).

■ **IMPORTANT**

- **Do not permit dirt or trash to get into the fuel system.**
- **Be careful not to let the fuel tank become empty, otherwise air will enter the fuel system, necessitating bleeding before next engine start.**
- **Be careful not to spill during refueling. If should spill, wipe it off at once, or it may cause a fire.**
- **To prevent condensation (water) accumulation in the fuel tank, fill the tank before parking overnight.**

■ **NOTE**

- **No. 2 Diesel is a distillate fuel of lower volatility for engines in industrial and heavy mobile service. (SAE J313 JUN87)**
- **Grade of Diesel Fuel Oil According to ASTM D975.**

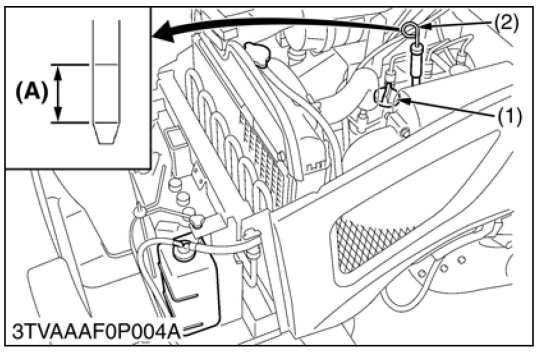
Flash Point, °C (°F)	Water and Sediment, volume %	Carbone Residue on, 10 percent Residuum, %	Ash, weight %
Min	Max	Max	Max
52 (125)	0.05	0.35	0.01

Distillation Temperatures, °C (°F) 90 % Point		Viscosity Kinematic cSt or mm^2/s at 40 °C		Viscosity Saybolt, SUS at 100 °F		Sulfur weight %	Copper Strip Corrosion	Cetane Number
Min	Max	Min	Max	Min	Max	Max	Max	Max
282 (540)	338 (640)	1.9	4.1	32.6	40.1	0.50	No. 3	40

Fuel tank capacity	31 L 8.1 U.S.gals 6.8 Imp.gals

(1) Fuel Tank Cap

W1053886



Checking Engine Oil Level

CAUTION

- **Be sure to stop the engine before checking the oil level.**

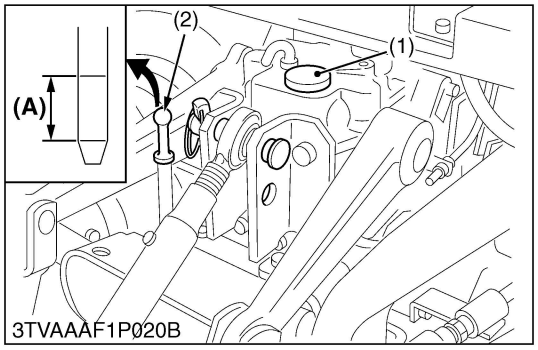
1. Park the machine on a flat surface.
2. Check engine oil before starting the engine or 5 minutes or more after the engine has stopped.
3. To check the oil level, draw out the dipstick, wipe it clean, replace it, and draw it out again. Check to see that the oil level lies between the two notches.
   If the level is too low, add new oil to the prescribed level at the oil inlet. (See page G-8.)

■ IMPORTANT

- **When using an oil of different maker or viscosity from the previous one, remove all of the old oil.**
  Never mix two different types of oil.
- **If oil level is low, do not run engine.**

(1) Oil Inlet
(2) Dipstick
(A) Oil level is acceptable within this range.

W1034155



Checking Transmission Fluid Level

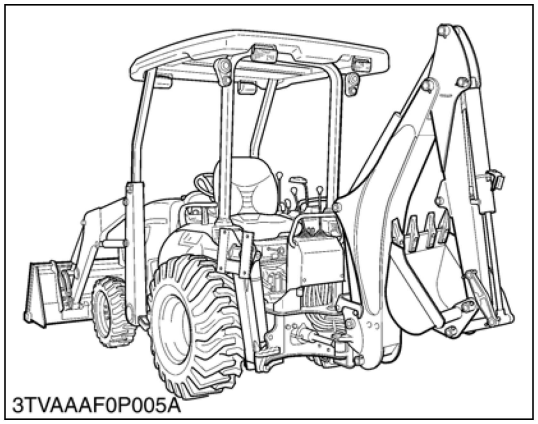
1. Park the machine on a flat surface, lower the implement and shut off engine.
2. To check the oil level, draw out the dipstick, wipe it clean, replace it, and draw it out again. Check to see that the oil level lies between the two notches.
   If the level is too low, add new oil to the prescribed level at the oil inlet. (See page G-8.)

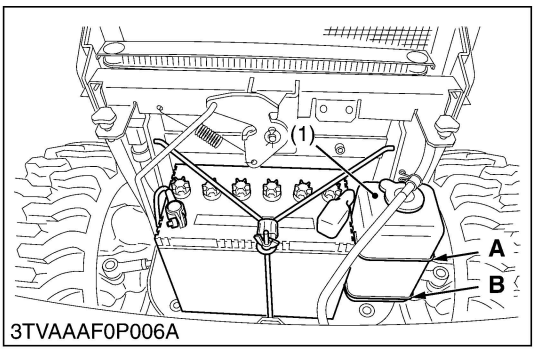
■ IMPORTANT

- **If oil level is low, do not run engine.**
- **When using BT820 Backhoe on a flat surface, set the loader / backhoe as illustrated below.**

(1) Oil Inlet
(2) Dipstick
(A) Oil level is acceptable within this range.

W1034473





Checking Coolant Level

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.**

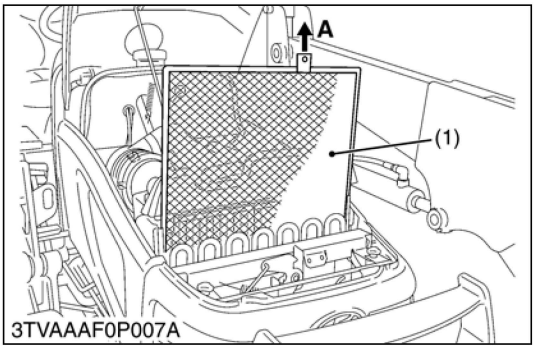
1. Check to see that the coolant level is between the **"FULL"** and **"LOW"** marks of recovery tank.
2. When the coolant level drops due to evaporation, add water only up to the full level.
   In case of leakage, add anti-freeze and water in the specified mixing ratio up to the full level. (See page G-8.)

IMPORTANT

- **If the radiator cap has to be removed, follow the caution above and securely retighten the cap.**
- **Use clean, fresh water and anti-freeze to fill the recovery tank.**

(1) Recovery Tank — **A : FULL**, **B : LOW**

W1034667



Cleaning Grill, Radiator Screen and Oil Cooler

CAUTION

- **Be sure to stop the engine before removing the screen.**

1. Check front grill and side screens to be sure they are clean of debris.
2. Detach the screen and remove all foreign materials.

IMPORTANT

- **Grill and screen must be clean from debris to prevent engine from overheating and to allow good air intake for the air cleaner.**

(1) Radiator Screen — **A : DETACH**

W1034911

Checking Brake Pedal

1. Inspect the brake pedals for free travel, and smooth operation.
2. Adjust if incorrect measurement is found. (see page G-25.)

W1060258

Checking Gauges, Meter and Easy Checker(TM)

1. Inspect the instrument panel for broken gauge(s), meter(s) and Easy Checker(TM) lamps.
2. Replace it broken.

W1060482

Checking Head Light, Hazard Light etc.

1. Inspect the lights for broken bulbs and lenses.
2. Replace it broken.

W1060582

Checking Seat Belt, ROPS and FOPS

1. Always check condition of seat belt, ROPS and FOPS attaching hardware before operating tractor.
2. Replace if damaged.

W1035535

Checking and Cleaning of Electrical Wiring and Battery Cables

CAUTION

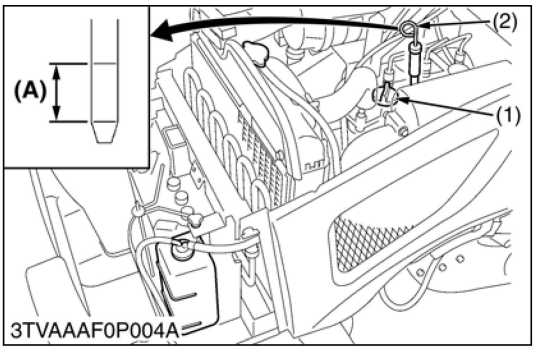
- **A loosened terminal, connector, or damaged wire may affect the performance of electrical components or cause short circuits. Leakage of electricity could result in a fire hazard, a dead battery or damage to electrical components.**
- **Replace damaged wires or connections promptly.**
- **If a fuse blows soon after replacement, DO NOT USE A FUSE LARGER THAN RECOMMENDED OR BYPASS THE FUSE SYSTEM.**
- **Many wiring connections are protected by waterproof plugs. Plug and unplug these connections carefully and make sure they are sealed correctly after assembly.**
- **Accumulation of dust, chaff or spilled fuel deposits around the battery, electrical wiring, engine or exhaust system are a fire hazard.**
  CLEAN THESE AREAS BEFORE STARTING WORK.
  To avoid premature electrical malfunctions DO NOT APPLY high pressure water directly to battery, wiring, connectors, electrical components or instrument panel.

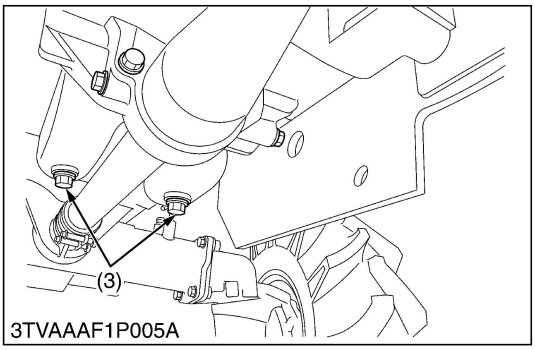
[Inspect the following regularly]

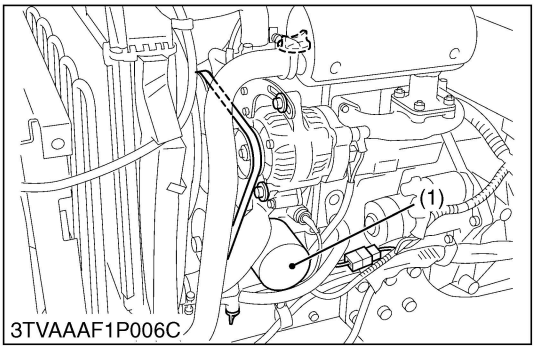
1. Check wiring for chafed or cracked insulation.
2. Check wiring harness clamps. Replace if necessary.
3. Check connectors and terminals for looseness, contamination or overheated (discolored) connections.
4. Check instrument panel for correct operation of switches and gauge.

W1060744

[2] CHECK POINTS OF INITIAL 50 HOURS







Changing Engine Oil

CAUTION

- **Be sure to stop the engine before changing the oil.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plug at the bottom of the engine and drain the oil completely into the oil pan.
   All the used oil can be drained out easily when the engine is still warm.
2. After draining reinstall the drain plug.
3. Fill with the new oil up to the upper notch on the dipstick. (See page G-8.)

Oil capacity (with filter)	3.0 L 3.2 U.S.qts 2.6 Imp.qts

(1) Oil Inlet
(2) Dipstick
(3) Drain Plug (both sides)

(A) Oil level is acceptable within this range.

W1036028

Replacing Engine Oil Filter

CAUTION

- **Be sure to stop the engine before changing the oil filter cartridge.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

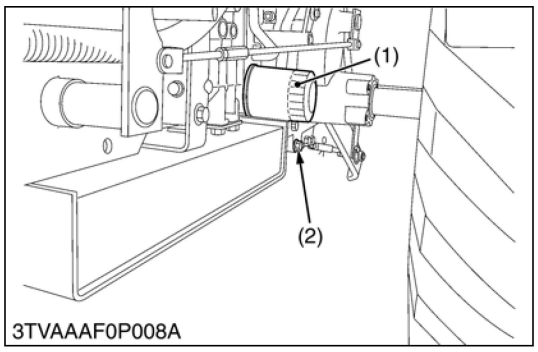
1. Remove the oil filter.
2. Put a film of clean engine oil on the rubber seal of the new filter.
3. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
4. After the new filter has been replaced, the engine oil normally decreases a little. Make sure that the engine oil does not leak through the seal and be sure to check the oil level on the dipstick. Then, replenish the engine oil up to the prescribed level.

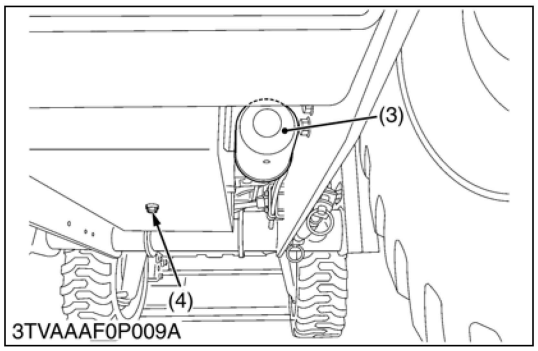
■ IMPORTANT

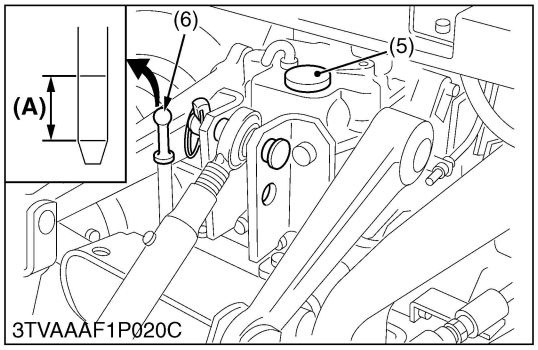
- **To prevent serious damage to the engine, use only a KUBOTA genuine filter.**

(1) Engine Oil Filter

W1036408







Replacing Transmission Oil Filter

CAUTION

- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plug at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.
3. Remove the oil filter.
4. Put a film of clean transmission oil on the rubber seal of the new filter.
5. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
6. Fill with new KUBOTA SUPER UDT fluid up to the upper notch on the dipstick. (See page G-8.)
7. After running the engine for a few minutes, stop it and check the oil level again, add oil to the prescribed level.
8. After the new filter has been replaced, the transmission fluid level will decreased a little. Make sure that the transmission fluid does not leak through the seal, and check the fluid level. Top off if necessary.
9. Properly dispose of used oil.

■ IMPORTANT

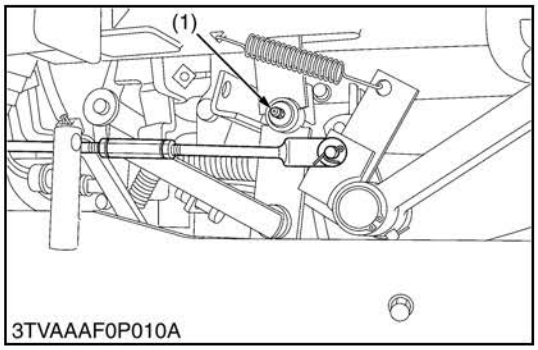
- **To prevent serious damage to the hydraulic system, use only a KUBOTA genuine filter.**
- **If the 3-point hitch can not be raised by setting the hydraulic control lever to the UP position after long term storage or when changing the transmission oil, turn steering wheel to the right and left several times to bleed air from the system.**
- **Do not operate the tractor immediately after changing the transmission fluid.**

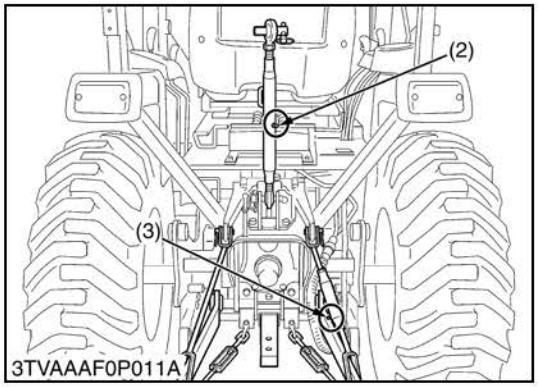
(1) Filter (HST)
(2) Drain Plug (Both Sides)
(3) Filter
(4) Drain Plug
(5) Oil Inlet
(6) Dipstick

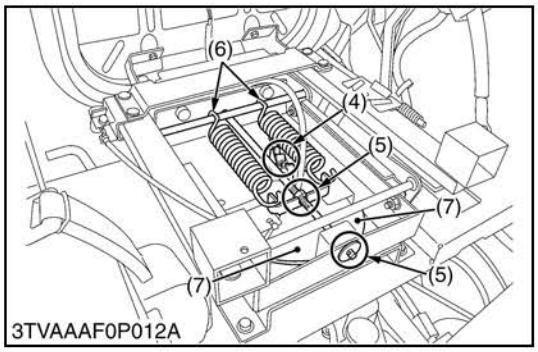
(A) Oil level is acceptable within this range.

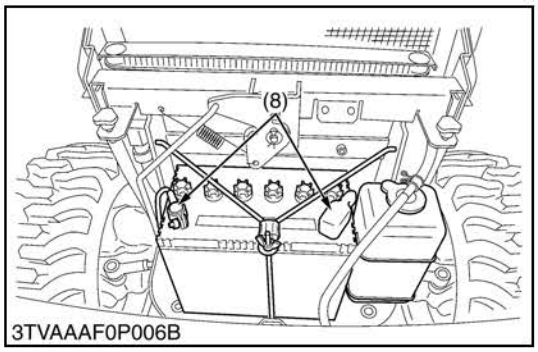
W1036617

[3] CHECK POINTS OF EVERY 50 HOURS







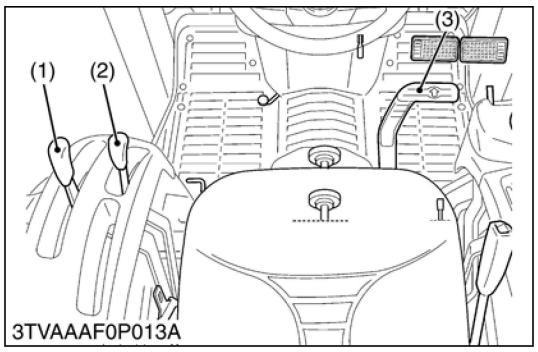


Lubricating Grease Fitting

1. Apply a small amount of multipurpose grease to the following points every 50 hours.
   If you operated the machine in extremely wet and muddy conditions, lubricate grease fittings more often.

(1) Grease Fitting (Speed Control Pedal)
(2) Grease Fitting (Top Link)
(3) Grease Fitting (Lifting Rod) [RH]
(4) Lock Plate
(5) Suspension Adjuster
(6) Spring Hook
(7) Reversible Seat
(8) Battery Terminals

W10308650



Checking Engine Start System

CAUTION

- **Do not allow anyone near the tractor while testing.**
- **If the tractor does not pass the test, do not operate the tractor.**

■ **Preparation before testing.**

1. Sit on operator's seat.
2. Set the parking brake and stop the engine.
3. Shift the range gear shift lever to "**NEUTRAL**" position.
4. Place the speed control pedal in "**NEUTRAL**" position.
5. Shift the PTO clutch lever to "OFF" position.

■ **Test 1 : Switch for the speed control pedal.**

1. Depress the speed control pedal.
2. Turn the key to "**START**" position.
3. The engine must not crank.

■ **Test 2 : Switch for the PTO clutch lever.**

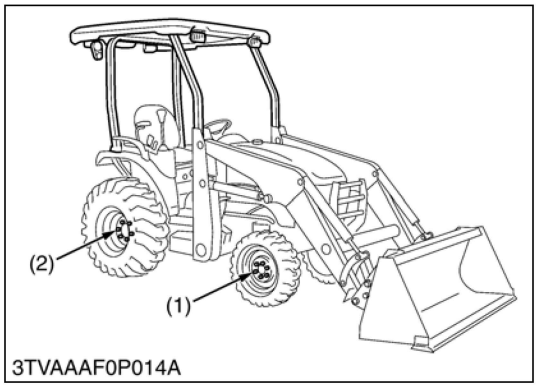
1. Place the speed control pedal in "**NEUTRAL**" position.
2. Shift the PTO clutch lever to "**ON**" position.
3. Turn the key to "**START**" position.
4. The engine must not crank.

■ **Test 3 : Switches for the operator's seat and the PTO clutch lever.**

1. Sit on operator's seat.
2. Start the engine.
3. Engage the PTO clutch lever.
4. Stand up. (Do not get off the machine.)
5. The engine must shut off after approximately 1 second.

(1) Range Gear Shift Lever (L-M-H)
(2) PTO Clutch Lever
(3) Speed Control Pedal

W10312010



Checking Wheel Bolt Torque

CAUTION

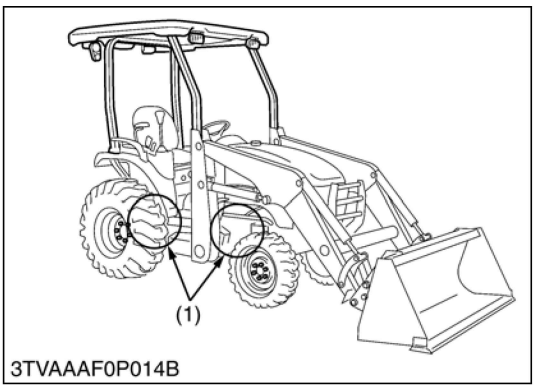
- **Never operate tractor with a loose rim, wheel, or axle.**
- **Any time bolts and nuts are loosened, retighten to specified torque.**
- **Check all bolts and nuts frequently and keep them tight.**

1. Check wheel screws and nuts regularly especially when new. If there are loosened, tighten as follows.

Tightening torque	Front wheel mounting nut	77 to 90 N·m 7.9 to 9.2 kgf·m 57 to 67 lbf·ft
	Rear wheel mounting bolt	196 to 225 N·m 20 to 23 kgf·m 145 to 166 lbf·ft
	Rear wheel mounting nut	167 to 191 N·m 17 to 19.5 kgf·m 123 to 141 lbf·ft

(1) Front Wheel Mounting Nut
(2) Rear Wheel Mounting Bolt and Nut

W1030725



Checking Main Frame Bolt Torque

CAUTION

- **Never operate front loader and backhoe with a loose main frame.**
- **Any time bolts and nuts are loosened, retighten to specified torque.**
- **Check all bolts and nuts frequently and keep them tight.**

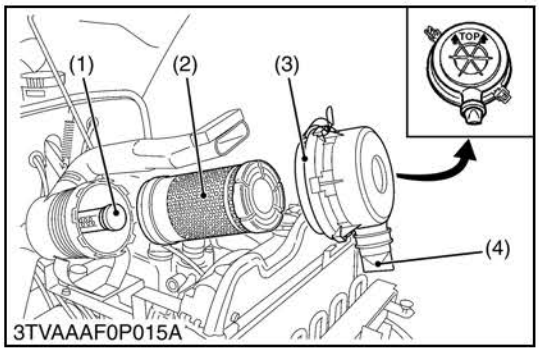
1. Check main frame bolts and nuts regularly especially when new. If they are loose, tighten them as follows.

Tightening torque	Main frame mounting bolt (M14)	170 to 200 N·m 17 to 20 kgf·m 125 to 145 lbf·ft
	Main frame mounting bolt and nut (M16)	200 to 225 N·m 20 to 23 kgf·m 145 to 166 lbf·ft
	Main frame mounting bolt (M12)	105 to 120 N·m 11 to 12 kgf·m 78 to 88 lbf·ft

(1) Main Frame Mounting Bolt and Nut

W1067657

[4] CHECK POINTS OF EVERY 100 HOURS



Cleaning Air Cleaner Primary Element

1. Open the hood and remove the air cleaner cover and the primary element.
2. Clean the primary element :
   - When dry dust adheres to the element, blow compressed air from the inside, turning the element. Pressure of compressed air must be under 205 kPa (2.1 kgf/cm^2, 30 psi).
   - When carbon or oil adheres to the element, soak the element in detergent for 15 minutes then wash it several times in water, rinse with clean water and dry it naturally. After element is fully dried, inspect inside of the element with a light and check if it is damaged or not.
3. Replace air cleaner primary element :
   Once yearly or after every six times of cleaning, whichever comes first.

■ **NOTE**

- **Check to see if the evacuator valve is blocked with dust.**

■ **IMPORTANT**

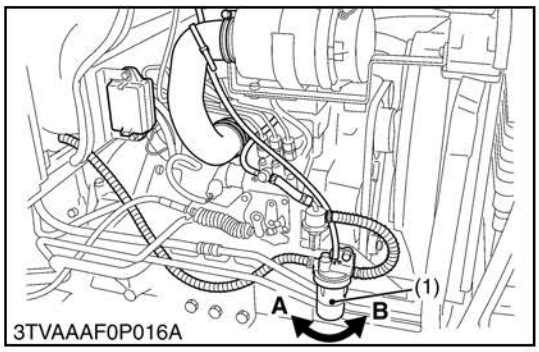
- **The air cleaner uses a dry element, never apply oil.**
- **Do not run the engine with filter element removed.**
- **Be sure to refit the cover with the arrow ↑ (on the rear of cover) upright. If the cover is improperly fitted, evacuator valve will not function and dust will adhere to the element.**
- **Do not touch the secondary element except in cases where replacing is required.**

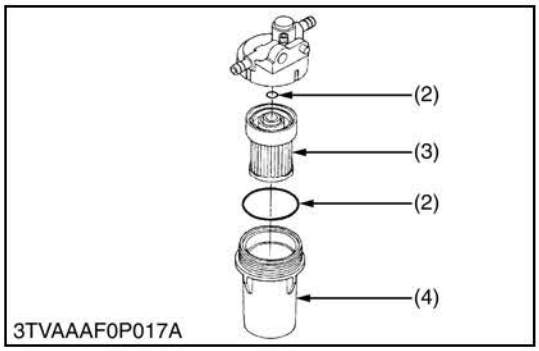
■ **Evacuator Valve**

Open the evacuator valve (4) once a week under ordinary conditions or daily when used in a dusty place to get rid of large particles of dust and dirt.

(1) Secondary (Safety) Element
(2) Primary Element
(3) Cover
(4) Evacuator Valve

W1076669





Cleaning Fuel Filter

This job should not be done in the field, but in a clean place.

1. Loosen and remove the filter bowl, and rinse the inside with kerosene.
2. Take out the element and dip it in the kerosene to rinse.
3. After cleaning, reassemble the fuel filter, keeping out dust and dirt.
4. Bleed the fuel system. (See page G-37.)

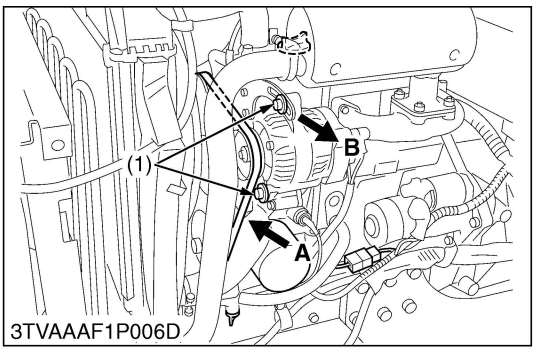
■ **IMPORTANT**

- **When the fuel filter bowl has been removed, fuel stops flowing from the fuel tank. If the fuel tank is almost full, however, the fuel will flow back from the fuel return pipe to the fuel filter. Before checking, make sure the fuel tank is less than half-full.**
- **If dust, dirt or water enters the fuel system, the fuel pump and injection nozzles are subject to premature wear. To prevent this, be sure to clean the fuel filter bowl and element periodically.**

(1) Fuel Filter Bowl
(2) O-ring
(3) Filter Element
(4) Filter Bowl

A : Loosen
B : Tighten

W1078193



Adjusting Fan Belt Tension

CAUTION

- **Be sure to stop the engine before checking fan belt tension.**

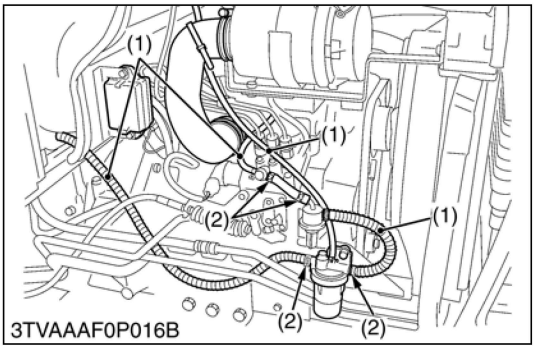
1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.
4. Replace fan belt if it is damaged.

Fan belt tension	Factory spec.	A deflection of between 7 to 9 mm (0.28 to 0.34 in.) when the belt is pressed in the middle of the span.

(1) Bolt

A : Check the belt tension
B : To Tighten

W10326270



Checking Fuel Line

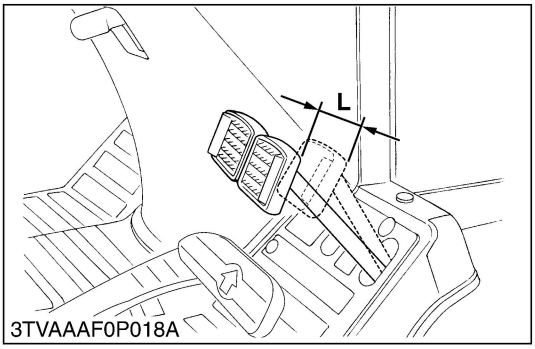
1. Check to see that all lines and hose clamps are tight and not damaged.
2. If hoses and clamps are found worn or damaged, replace or repair them at once.

■ **NOTE**

- **If the fuel line is removed, be sure to properly bleed the fuel system. (See page G-37.)**

(1) Fuel Lines
(2) Clamp Bands

W10342570



Adjusting Brake Pedal

CAUTION

- **Stop the engine and chock the wheels before checking brake pedal.**

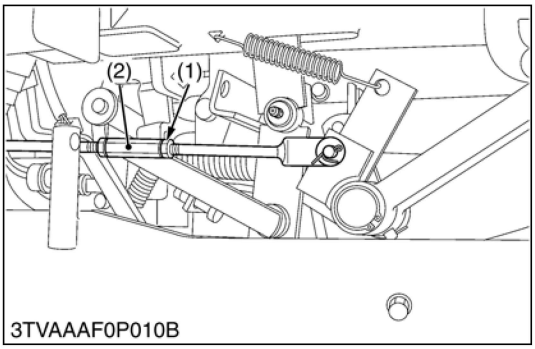
1. Release the parking brake.
2. Slightly depress the brake pedals and measure free travel at the top of pedal stroke.
3. If adjustment is needed, loosen the lock nut and turn the turnbuckle to adjust the rod length within acceptable limits.
4. Retighten the lock nut.

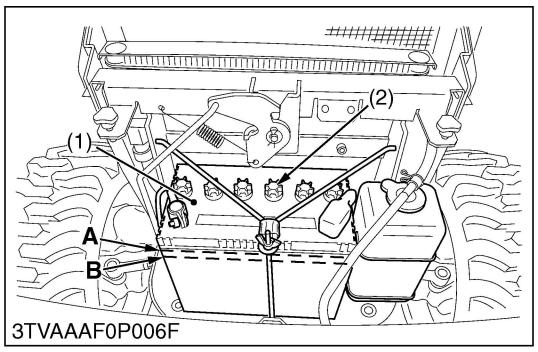
Brake pedal free travel	30 to 40 mm (1.18 to 1.57 in.) on the pedal	
	Keep the free travel in the right and left brake pedals equal	

(1) Lock Nut
(2) Turnbuckle

L : Free Travel

W10710180





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Checking Battery Condition

DANGER

To avoid the possibility of battery explosion:
For the refillable type battery, follow the instructions below.

- **Do not use or charge the refillable type battery if the fluid level is below the LOWER (lower limit level) mark. Otherwise, the battery component parts may prematurely deteriorate, which may shorten the battery's service life or cause an explosion. Check the fluid level regularly and add distilled water as required so that the fluid level is between the UPPER and LOWER levels.**

CAUTION

- **Never remove the vent caps 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 and get medical attention.**
- **Wear eye protection and rubber gloves when working around battery.**

1. Mishandling the battery shortens the service life and adds to maintenance costs.
2. The original battery is maintenance free type battery, but need some servicing.
   If the battery is weak, the engine will be difficult to start and the lights will be dim. It is important check the battery periodically.

(1) Battery
(2) Vent Cap
A : Upper Level
B : Lower Level

W1095602

■ 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 battery, ensure the vent caps are securely in place. (If equipped)**
- **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.
  (For accessible maintainable type batteries with removable vent caps.)

1. Make sure each electrolyte level is to the bottom of vent wells, if necessary add distilled water in a well-ventilated area.
2. The water in the electrolyte evaporates during recharging. Liquid shortage damages the battery.
   Excessive liquid spills over and damage the tractor body.
3. To slow charge the battery, connect the battery positive terminal to the charger positive terminal and the negative to the negative, then recharge in the normal manner.
4. 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.
5. When the specific gravity of electrolyte is between 1.27 and 1.29, the charging is completed.
6. When exchanging an old battery into new one, use battery of equal specification shown in **Table 1**.

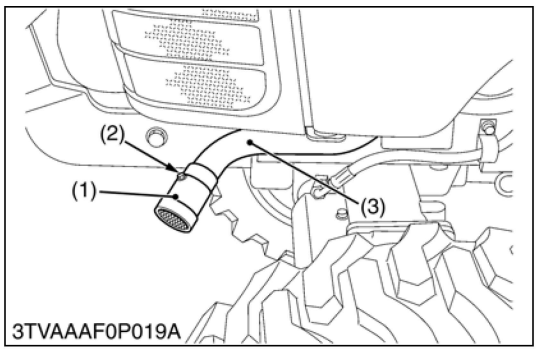
Table 1

Battery Type	Volt (V)	Capacity at 5 H.R.	Reserve Capacity (min.)	Cold Cranking Amps	Normal Charging Rate (A)
55B24L (S)-MF	12	36	79	433	4.5

■ Direction for Storage

1. When storing the tractor for long period, 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 months in cold seasons.

W1033925



Cleaning Spark Arrester

CAUTION

- **After operating the engine, do not touch the muffler, exhaust pipe, or spark arrester until they have had sufficient time to cool.**

This screen type spark arrester was examined, tested, and qualified in accordance with the USDA Forest Service Standard 5100-1c, "Spark Arresters for Internal Combustion Engines" for the B26.

■ Maintenance

The screen type spark arrester should be removed, cleaned, and inspected after every 100 hours of use.

1. The spark arrester (1) is located inside the end of the exhaust pipe, and is fastened with one screw.
2. Unfasten the screw (2) and remove the spark arrester (1).
3. Shake loosened particles out of the screen assembly and lightly clean the screen with a wire brush. Soak in solvent and again clean with wire brush if necessary.
4. If any breaks in the screen or weldments are discovered, the assembly must be replaced.
5. Return the spark arrester (1) to the exhaust outlet, align the screw holes and refasten the screw (2).

■ IMPORTANT

- **USDA approval requires clearance between spark arrester sleeve and exhaust pipe to be no larger than 0.584 mm (0.023 in.).**

■ Installation

1. Insert provided spark arrester and align its screw mount hole with a pre-drilled hole (O.D. 3.2 mm (0.125 in.)) in the muffler tail pipe. If there is no mounting hole, drill a (3.2 mm (0.125 in.)) hole 15.2 mm (0.60 in.) from the end of muffler tail pipe.
2. Fasten the spark arrester (1) with provided tapping screw (2) (No.8 - 6.35 mm (0.25 in.) Long) firmly.
3. Check if the fit is correct by wiggling the spark arrester (1).

(1) Spark Arrest
(2) Tapping Screw
(3) Muffler

W1072216

[5] CHECK POINTS OF EVERY 200 HOURS

Changing Engine Oil

1. See page G-19.

W10320350

Replacing Engine Oil Filter

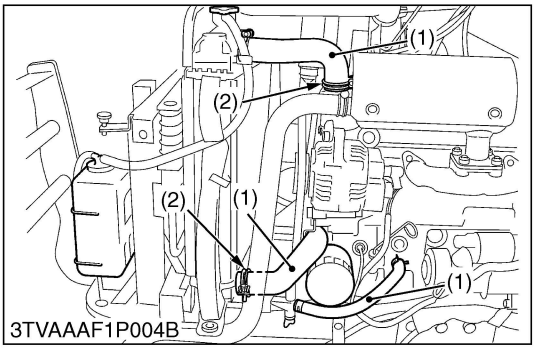
1. See page G-19.

W10344210

Replacing HST Oil Filter

1. See page G-20.

W10977530



Checking Radiator Hose and Hose Clamp

Check to see if radiator hoses are properly fixed every 200 hours of operation or six months, whichever comes first.

1. If hose clamps are loose or water leaks, tighten bands securely.
2. Replace hoses and tighten hose clamps securely, if radiator hoses are swollen, hardened or cracked.
   Replace hoses and hose clamps every 2 years or earlier if checked and found that hoses are swollen, hardened or cracked.

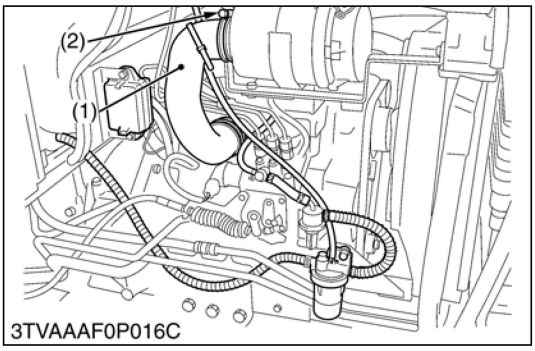
■ **Precaution at Overheating**

Take the following actions in the event the coolant temperature is nearly or more than the boiling point, what is called **"Overheating"**.

1. Park the tractor in a safe place and keep the engine unloaded idling.
2. Do not stop the engine suddenly, but stop it after about 5 minutes of unloaded idling.
3. Keep yourself well away from the machine for further 10 minutes or while the steam blown out.
4. Check that there are no dangers such as burns. Get rid of the cause of overheating according to the manual, see "**TROUBLESHOOTING**" section, and then, start again the engine.

(1) Radiator Hose (2) Clamp Band

W10347370

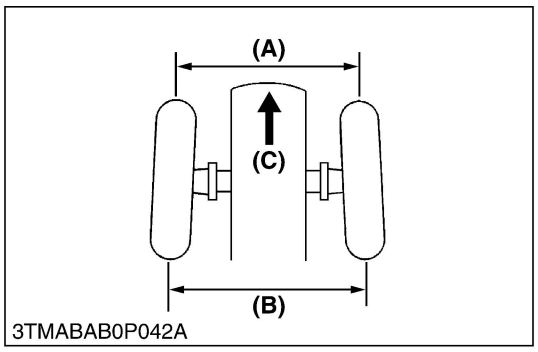


Checking Intake Air Line

1. Check to see that hoses and hose clamps are tight and not damaged.
2. If hoses and clamps are found worn or damaged, replace or repair them at once.

(1) Hose (2) Hose Clamps

W10739780



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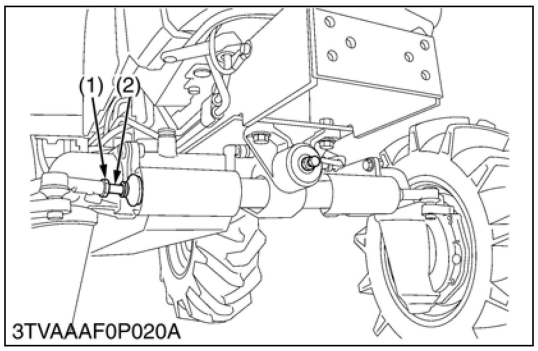

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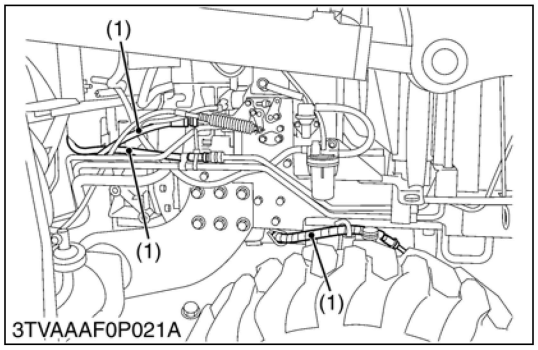

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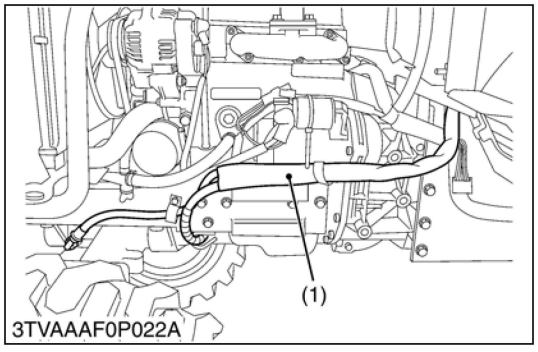

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Adjusting Toe-in

1. Park the tractor on the 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 0 to 10 mm (0 to 0.39 in.) less than rear distance. If not, adjust tie rod length.

■ Adjusting Procedures

1. Loosen the tie-rod nut (1).
2. Turn the tie-rod joint (2) to adjust the tie-rod length until the proper toe-in measurement is obtained.
3. Retighten the tie-rod nut (1).

■ IMPORTANT

- **A right and left tie-rod joint is adjusted to the same length.**

(1) Tie-rod Nut
(2) Tie-rod Joint

(A) Wheel to Wheel Distance at front
(B) Wheel to Wheel Distance at rear
(C) Front

W1082751

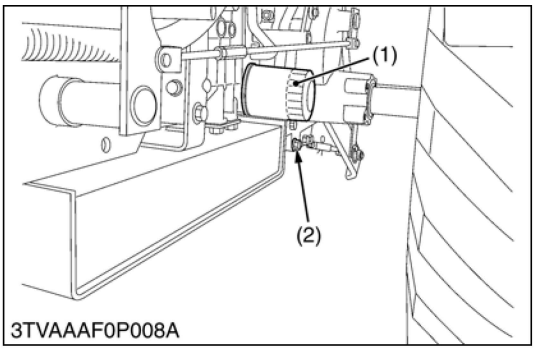
Checking Power Steering Line

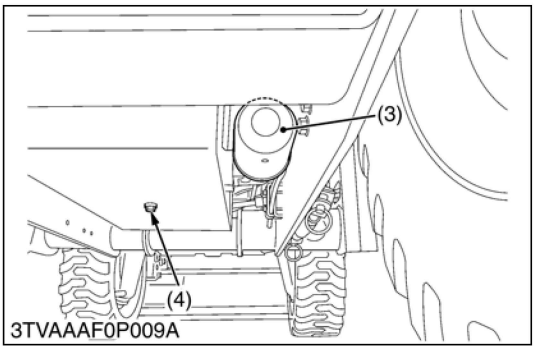
1. Check to see that all lines and hose clamps are tight and not damaged.
2. If hoses and clamps are found worn or damaged, replace or repair them at once.

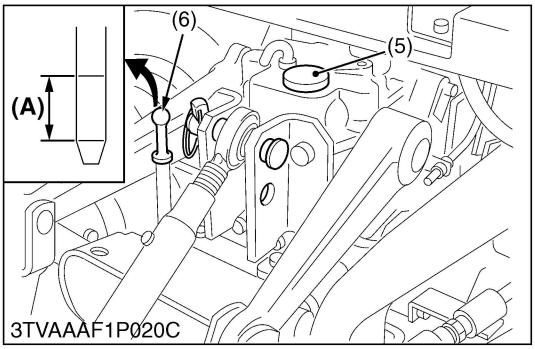
(1) Power Steering Hose

W10345660

[6] CHECK POINTS OF EVERY 400 HOURS







Changing Transmission Fluid / Replacing Transmission Oil Filter

CAUTION

- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plug at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.
3. Remove the oil filter.
4. Put a film of clean transmission oil on the rubber seal of the new filter.
5. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
6. Fill with new KUBOTA SUPER UDT fluid up to the upper notch on the dipstick. (See page G-8.)
7. After running the engine for a few minutes, stop it and check the oil level again, add oil to the prescribed level.
8. After the new filter has been replaced, the transmission fluid level will decreased a little. Make sure that the transmission fluid does not leak through the seal, and check the fluid level. Top off if necessary.
9. Properly dispose of used oil.

■ IMPORTANT

- **To prevent serious damage to the hydraulic system, use only a KUBOTA genuine filter.**
- **If the 3-point hitch can not be raised by setting the hydraulic control lever to the UP position after long term storage or when changing the transmission oil, turn steering wheel to the right and left several times to bleed air from the system.**
- **Do not operate the tractor immediately after changing the transmission fluid.**

Transmission fluid capacity (with oil tank)	26.0 L 6.9 U.S.gals 5.7 Imp.gals

(1) Filter (HST)
(2) Drain Plug (Both Sides)
(3) Filter
(4) Drain Plug
(5) Oil Inlet
(6) Dipstick

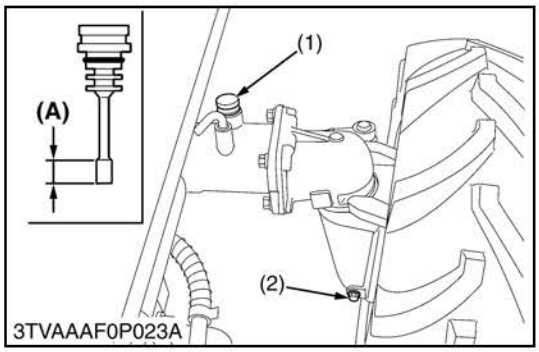
(A) Oil level is acceptable within this range.

W1075781

Replacing Fuel Filter Element

1. See page G-24.

W1085936



Changing Front Axle Case Oil

1. Park the tractor on a firm, flat and level surface.
2. To drain the used oil, remove the right and left drain plugs and filling plug at the front axle case and drain the oil completely into the oil pan.
3. After draining, reinstall the drain plugs.
4. Fill with new oil up to the upper notch on the dipstick. (See page G-8.)

■ **IMPORTANT**

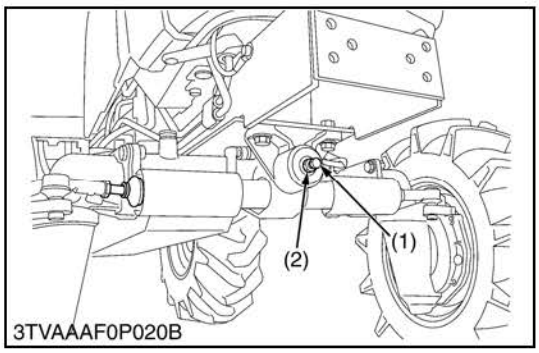
- **After ten minutes, check the oil level again; add oil to prescribed level.**

5. After filling, reinstall the filling plug.
6. Properly dispose of used oil.

Front axle case oil capacity	4.7 L 5.0 U.S.qts 4.1 Imp.qts

(1) Filling Plug with Dipstick
(2) Drain Plug
(A) Oil level is acceptable within this range.

W10300640



Adjusting Front Axle Pivot (Front Axle Locking Force)

If the front axle pivot pin adjustment is not correct, front wheel vibration can occur causing vibration in the steering wheel.

1. Jack up the front side of tractor.
2. Set a spring balance to the front axle flange.
3. Measure the front axle locking force.

■ **NOTE**

- **When adjusting the locking force, apply liquid gasket (Three Bond 1206D or equivalent) to the thread part of an adjusting screw.**

4. If the measurement is not within the factory specifications, adjust with the adjusting screw (1).
5. Tighten the lock nut (2) firmly.

Front axle locking force	Factory spec.	50.0 to 100 N 5.10 to 10.1 kgf 11.3 to 22.4 lbf

(1) Lock Nut
(2) Adjusting Screw

W1032993

[7] CHECK POINT OF EVERY 800 HOURS

Adjusting Engine Valve Clearance

1. Refer to "**1. ENGINE**" servicing section.

W1036805

[8] CHECK POINT OF EVERY 1500 HOURS

Checking Fuel Injection Nozzle Injection Pressure

1. Refer to "**1. ENGINE**" servicing section.

W1036874

[9] CHECK POINT OF EVERY 3000 HOURS

Checking Injection Pump

1. Refer to "**1. ENGINE**" servicing section.

W1036957

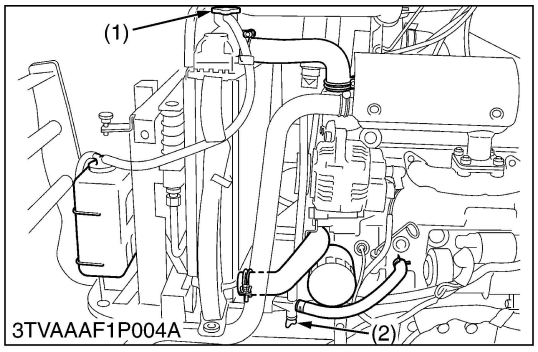
[10] CHECK POINT OF EVERY 1 YEAR

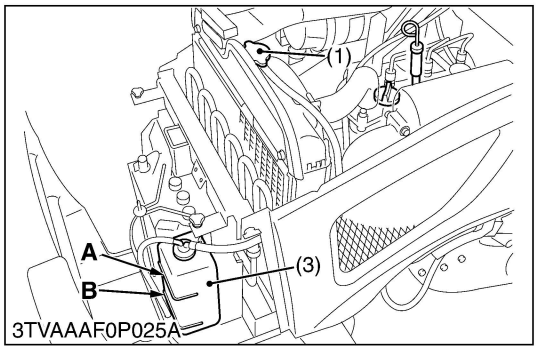
Replacing Air Cleaner Primary Element and Secondary Element

1. Replace the primary and secondary elements. (Refer to G-24.)

W1037077

[11] CHECK POINTS OF EVERY 2 YEARS





Flushing Cooling System and Changing Coolant

CAUTION

- **Do not remove the 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.**

1. Stop the engine, remove the key and let it cool down.
2. To drain the coolant, open the radiator drain cock and remove the radiator cap. The radiator cap must be removed to completely drain the coolant.
3. After all coolant is drained, close the drain cock.
4. Fill with clean water and cooling system cleaner.
5. Follow directions of the cleaner instruction.
6. After flushing, fill with clean water and anti-freeze until the coolant level is just below the radiator cap. Install the radiator cap securely.
7. Fill with coolant up to the **"FULL"** mark on the recovery tank.
8. Start and operate the engine for few minutes.
9. Stop the engine, remove the key and let cool.
10. Check coolant level of recovery tank and add coolant if necessary
11. Properly dispose of used coolant.

■ IMPORTANT

- **Do not start engine without coolant.**
- **Use clean, fresh water and anti-freeze to fill the radiator and recovery tank.**
- **When the anti-freeze is mixed with water, the anti-freeze mixing ratio must be less than 50 %.**
- **Securely tighten radiator cap. If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**

Coolant capacity (with recover tank)	4.5 L 4.7 U.S.qts 4.0 Imp.qts

(1) Radiator Cap
(2) Drain Cock
(3) Recovery Tank

A : FULL
B : LOW

W1037510

Flush Cooling System and Changing Coolant (Continued)

■ Anti-Freeze

CAUTION

- **When using antifreeze, put on some protection such as rubber gloves (Antifreeze contains position.).**
- **If should drink antifreeze, throw up at once and take medical attention.**
- **When antifreeze comes in contact with the skin or clothing, wash it off immediately.**
- **Do not mix different type of Antifreeze.**
  The mixture can produce chemical reaction causing harmful substances.
- **Antifreeze is extremely flammable and explosive under certain conditions. Keep fire and children away from antifreeze.**
- **When draining fluids from the engine, place some container underneath the engine body.**
- **Do not pour waste onto the grounds, down a drain, or into any water source.**
- **Also, observe the relevant environmental protection regulations when disposing of antifreeze.**

If it freezes, coolant can damage the cylinders and radiator. If the ambient temperature falls below 0 °C (32 °F) or before a long-term storage, let out cooling water completely, or mix fresh water with long-life coolant and fill the radiator and reserve tank with the mixture.

1. Long-life coolant (hereafter LLC) comes in several types. Use ethylene glycol (EG) type for this engine.
2. Before employing LLC-mixed cooling water, fill the radiator with fresh water and empty it again.
   Repeat this procedure 2 or 3 times to clean up the inside.
3. Mixing the LLC
   Put the LLC in cooling water in the percentage (%) for a target temperature. When mixing, stir it up well, and then fill into the radiator.
4. The procedure for the mixing of water and antifreeze differs according to the make of the antifreeze and the ambient temperature. Refer to SAE J1034 standard, more specifically also to SAE J814c.

W10801950

Flush Cooling System and Changing Coolant (Continued)

■ **IMPORTANT**

- **When the antifreeze is mixed with water, the antifreeze mixing ratio must be less than 50 %.**

Vol % Anti-freeze	Freezing Point		Boiling Point*	
	°C	°F	°C	°F
40	−24	−12	106	222
50	−37	−34	108	226

*At 760 mmHg pressure (atmospheric). A higher boiling points is obtained by using a radiator pressure cap which permits the development of pressure within the cooling system

5. Adding the LLC
   - Add only water if the mixture reduces in amount by evaporation.
   - If there is a mixture leak, add the LLC of the same manufacture and type in the same mixture percentage.
     *Never add any long-life coolant of different manufacture. (Different brands may have different additive components, and the engine may fail to perform as specified.
6. When the LLC is mixed, do not employ any radiator cleaning agent. The LLC contains anticorrosive agent. If mixed with the cleaning agent, sludge may build up, adversely affecting the engine parts.
7. Kubota's genuine long-life coolant has a service life of 2 years. Be sure to change the coolant every 2 years.

■ **NOTE**

- **The above data represent industry standards that necessitate a minimum glycol content in the concentrated anti-freeze.**
- **When the coolant level drops due to evaporation, add water only to keep the antifreeze mixing ratio less than 50 %. In case of leakage, add antifreeze and water in the specified mixing ratio before filling in to the radiator.**

W10812160

Replacing Radiator Hose (Water Pipes)

1. Replace the hoses and clamps, if necessary.
   Refer to **"Checking Radiator Hose and Hose Clamp"**. (See page G-29.)

W1037429

Replacing Power Steering Hose

1. Replace the power steering hose, if necessary.
   Refer to **"Checking Power Steering Line"**. (See page G-30.)

W1082518

Replacing Fuel Hose

1. Replace the fuel hose, if necessary.
   Refer to "**Checking Fuel Hose**". (See page G-25.)

W1045670

Replacing Intake Air Line

1. Replace the intake air line, if necessary.
   Refer to "**Checking Intake Air Line**". (See page G-29.)

W1070227

[12] OTHERS

Bleeding Fuel System

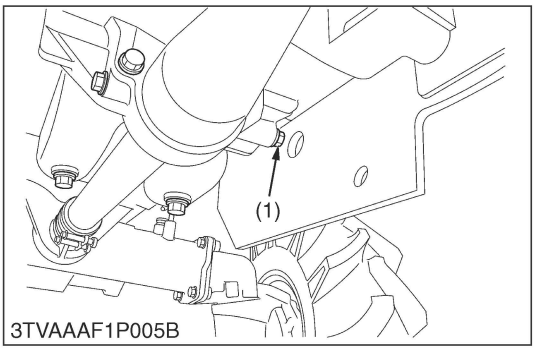
Air must be removed:

1. When the fuel filter or lines are removed.
2. When the tank is completely empty.
3. After the tractor has not been used for a long period of time.

Bleeding procedure is as follows.

1. Fill the fuel tank with fuel.
2. Start the engine and run for about 30 seconds, and then stop the engine.

W1039026



3TVAAAF1P005B

Draining Clutch Housing Water

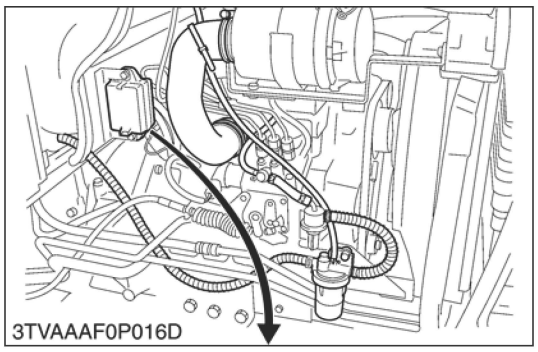
■ **NOTE**

- **The tractor is equipped with a drain plug (1) under the clutch housing.**
- **After operating in rain, snow or tractor has been washed, water may get into the clutch housing.**

1. Check it by pushing in the split pin (1).
2. If water enters into the clutch housing, remove the plug (1) and drain the water, then reinstall the plug again.

(1) Water Drain Plug

W1039199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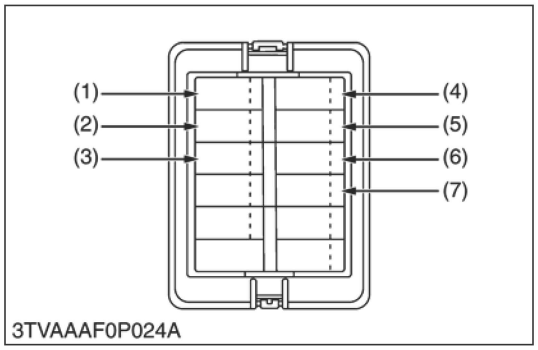

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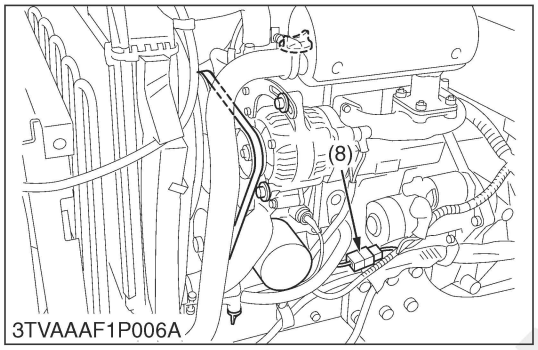


3TVAAAF1P006A

Replacing Fuse

1. The tractor electrical system is protected from potential damage by fuses.
   A blown fuse indicates that there is an overload or short somewhere in the electrical system.
2. 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. Refer to the "TROUBLESHOOTING" section of this manual.**

■ **Protected Circuit**

Fuse No.	Capacity (A)	Protected circuit
(1)	5	OPC
(2)	10	Head light instrumental cluster
(3)	20	Auxiliary
(4)	20	Flasher / Hazard
(5)	30	Key stop
(6)	25	Front work light
(7)	25	Rear work light
(8)	Slow blow fuse 40	Check circuit against wrong battery connection

W1039315

Replacing Light Bulb

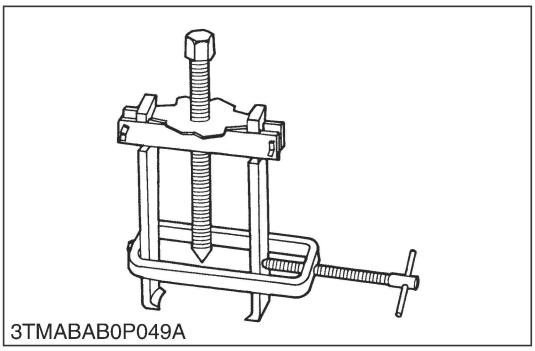
1. Head lights :
   Take the bulb out of the light body and replace with a new one.
2. Other lights :
   Detach the lens and replace the bulb.

Light	Capacity
Head lights / Work light	35 W
Tail light	8 W
Turn signal / Hazard light	23 W
Instrument panel light	1.7 W
Hazard light switch indicator	0.6 W
Work light (if equipped)	55 W

W1039659

8. SPECIAL TOOLS

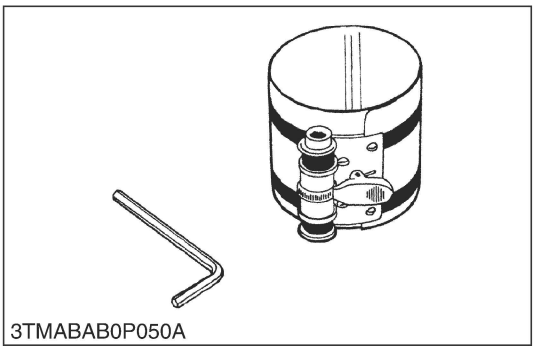
[1] SPECIAL TOOLS FOR ENGINE


3TMABAB0P049A

Special Use Puller Set

Code No.: 07916-09032
Application: Use exclusively for pulling out bearing, gears and other parts with ease.

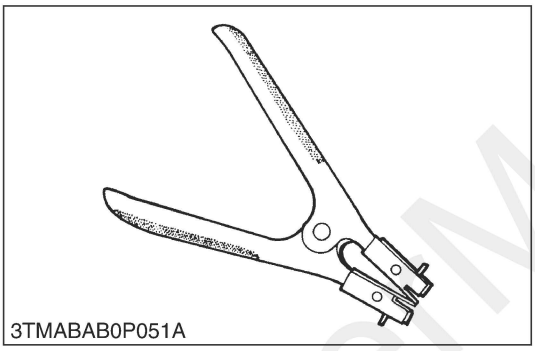
W10240500


3TMABAB0P050A

Piston Ring Compressor

Code No.: 07909-32111
Application: Use exclusively for pushing in the piston with piston rings into the cylinder.

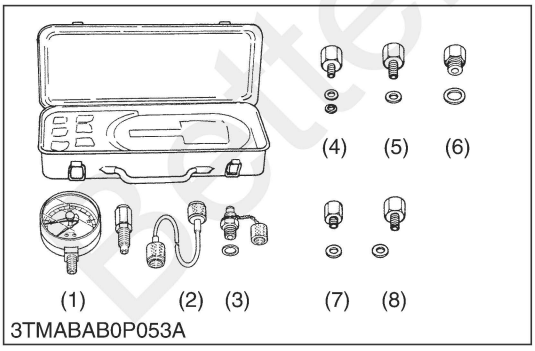
W10241000


3TMABAB0P051A

Piston Ring Tool

Code No.: 07909-32121
Application: Use exclusively for removing or installing the piston ring with ease.

W10241500



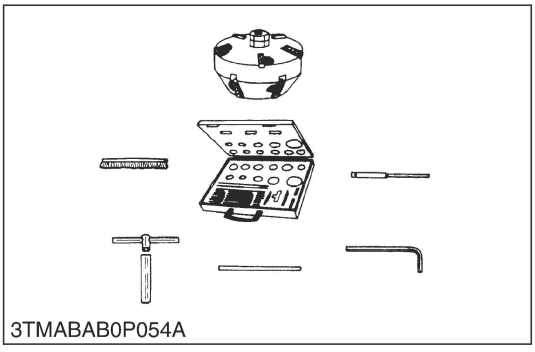
3TMABAB0P053A

Oil Pressure Tester

Code No.: 07916-32032
Application: Use to measure lubricating oil pressure.

(1) Gauge
(2) Cable
(3) Threaded Joint
(4) Adaptor **1**
(5) Adaptor **2**
(6) Adaptor **3**
(7) Adaptor **4**
(8) Adaptor **5**

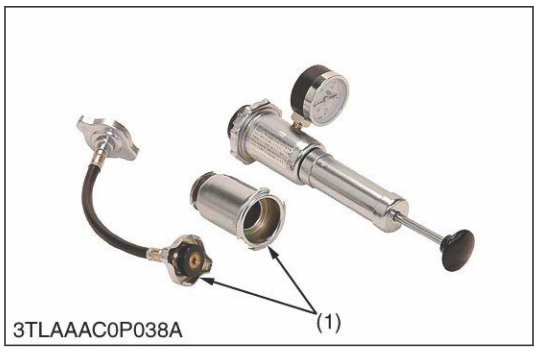
W1091227


3TMABAB0P054A

Valve Seat Cutter

Code No.: 07909-33102
Application: Use to reseat valves.
Angle: 0.785 rad (45°)
0.262 rad (15°)
Diameter: 28.6 mm (1.126 in.) 38.0 mm (1.496 in.)
31.6 mm (1.244 in.) 41.3 mm (1.626 in.)
35.0 mm (1.378 in.) 50.8 mm (2.000 in.)

W1024458

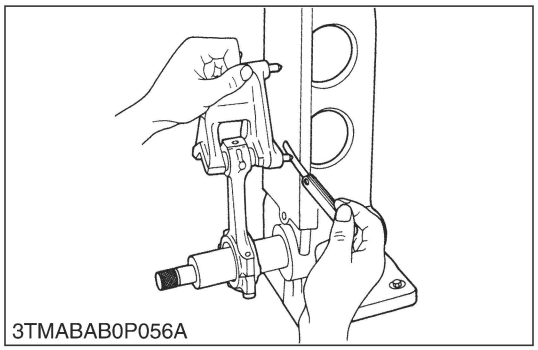


3TLAAAC0P038A

Radiator Tester

Code No.: 07909-31551
Application: Use to check of radiator cap pressure, and leaks from cooling system.
Remarks: Adaptor (1) BANZAI Code No. RCT-2A-30S

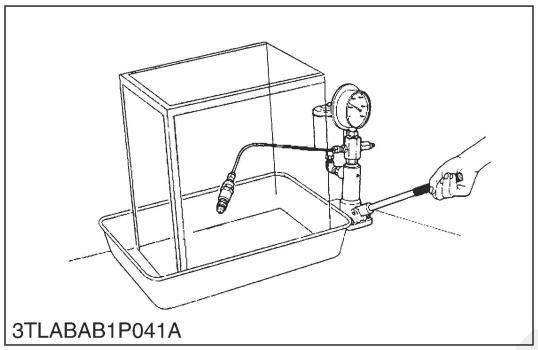
W1024532


3TMABAB0P056A

Connecting Rod Alignment Tool

Code No.: 07909-31661
Application: Use to check the connecting rod alignment.
Applicable range: Connecting rod big end I.D.
30 to 75 mm (1.18 to 2.95 in.) dia.
Connecting rod length
65 to 300 mm (2.56 to 11.81 in.)

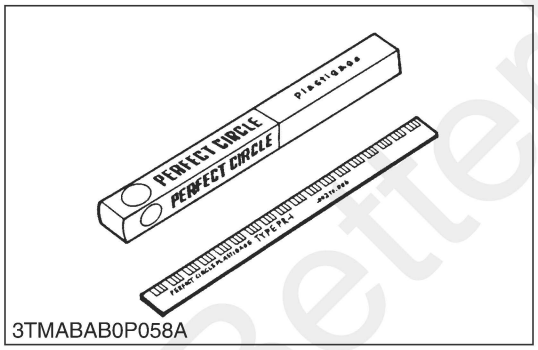
W1024583


3TLABAB1P041A

Nozzle Tester

Code No.: 07909-31361
Application: Use to check the fuel injection pressure and spray pattern of nozzle.
Measuring range: 0 to 50 MPa
(0 to 500 kgf/cm^2, 0 to 7000 psi)

W1024653

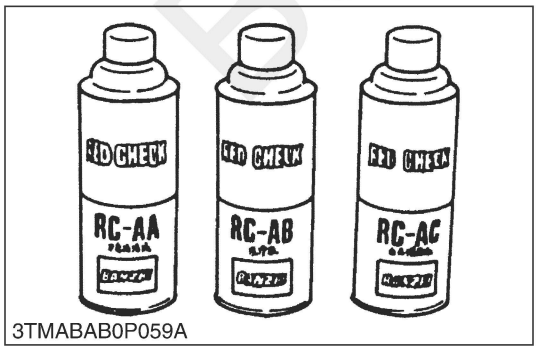


3TMABAB0P058A

Plastigage

Code No.: 07909-30241
Application: Use to check the oil clearance between crankshaft and bearing, etc..
Measuring range: Green 0.025 to 0.076 mm (0.001 to 0.003 in.)
Red 0.051 to 0.152 mm (0.002 to 0.006 in.)
Blue0.102 to 0.229 mm (0.004 to 0.009 in.)

W1024719



3TMABAB0P059A

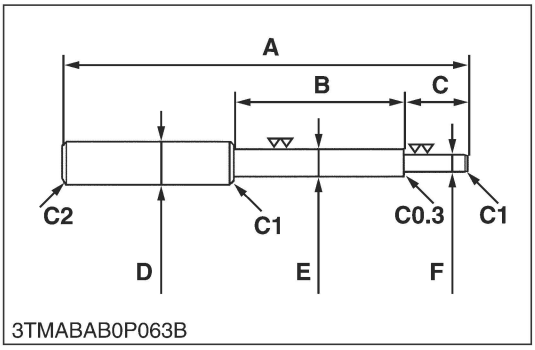
Red Check

Code No.: 07909-31371
Application: Use to check cracks on cylinder head, cylinder block, etc..

W1024909

■ **NOTE**

- **The following special tools are not provided, so make them referring to the figure.**



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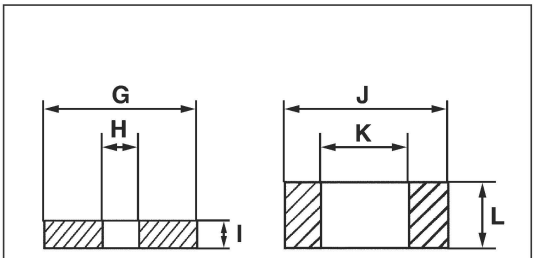

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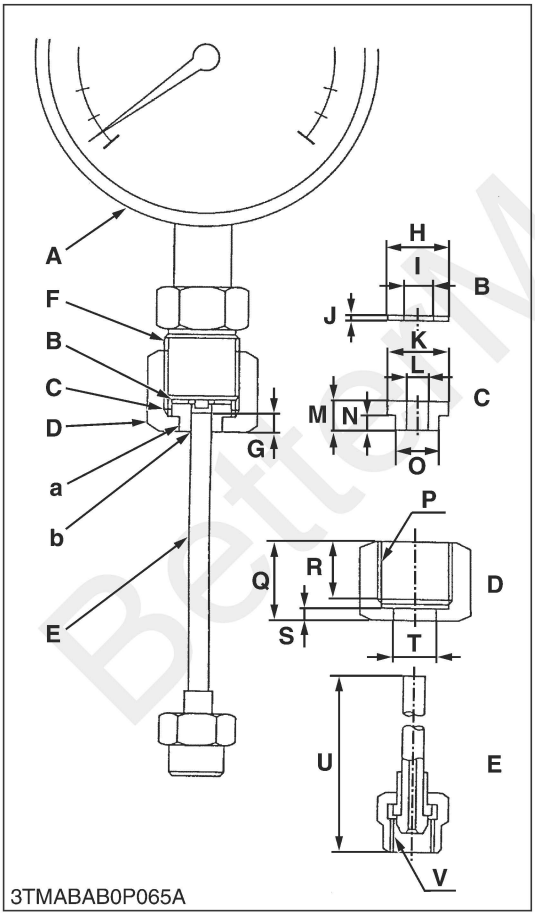


3TMABAB0P065A

Valve Guide Replacing Tool

Application: Use to press out and press fit the valve guide.

A	225 mm (8.86 in.)
B	70 mm (2.8 in.)
C	45 mm (1.8 in.)
D	20 mm dia. (0.79 in. dia.)
E	11.7 to 11.9 mm dia. (0.461 to 0.469 in. dia.)
F	6.50 to 6.60 mm dia. (0.256 to 0.260 in. dia.)
G	25 mm (0.98 in.)
H	6.70 to 7.00 mm dia. (0.264 to 0.276 in. dia.)
I	5 mm (0.2 in.)
J	20 mm dia. (0.79 in. dia.)
K	12.5 to 12.8 mm dia. (0.493 to 0.503 in. dia.)
L	8.90 to 9.10 mm (0.351 to 358 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.3 mm (0.01 in.)

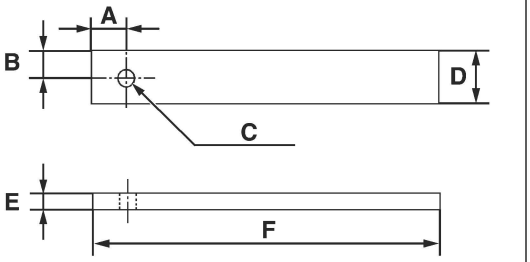
W10250170

Injection Pump Pressure Tester

Application: Use to check fuel tightness of injection pumps.

A	Pressure gauge full scale : More than 29.4 MPa (300 kgf/cm^2, 4267 psi)
B	Copper gasket
C	Flange (Material : Steel)
D	Hex. nut 27 mm (1.1 in.) across the plat
E	Injection pipe
F	PF 1/2
G	5 mm (0.2 in.)
H	17 mm dia. (0.67 in. dia.)
I	8 mm dia. (0.3 in. dia.)
J	1.0 mm (0.039 in.)
K	17 mm dia. (0.67 in. dia.)
L	6.10 to 6.20 mm dia. (0.241 to 0.244 in. dia.)
M	8 mm (0.3 in.)
N	4 mm (0.2 in.)
O	11.97 to 11.99 mm dia. (0.4713 to 0.4720 in. dia.)
P	PF 1/2
Q	23 mm (0.91 in.)
R	17 mm (0.67 in.)
S	4 mm (0.2 in.)
T	12.00 to 12.02 mm dia. (0.4725 to 0.4732 in. dia.)
U	100 mm (3.94 in.)
V	M12 × P1.5
a	Adhesive application
b	Fillet welding on the enter circumference

W10252400



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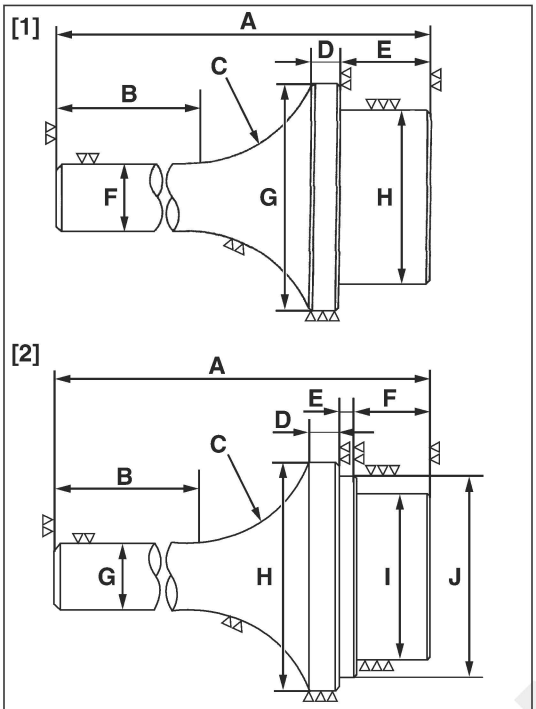


3TMABAB0P068A

Flywheel Stopper

Application: Use to loosen and tighten the flywheel screw.

A	20 mm (0.79 in.)
B	15 mm (0.59 in.)
C	10 mm dia. (0.39 in. dia.)
D	30 mm (1.2 in.)
E	8 mm (0.3 in.)
F	200 mm (7.87 in.)

W10259480

Crankshaft Bearing 1 Replacing Tool

Application: Use to press out and press fit the crankshaft bearing 1.

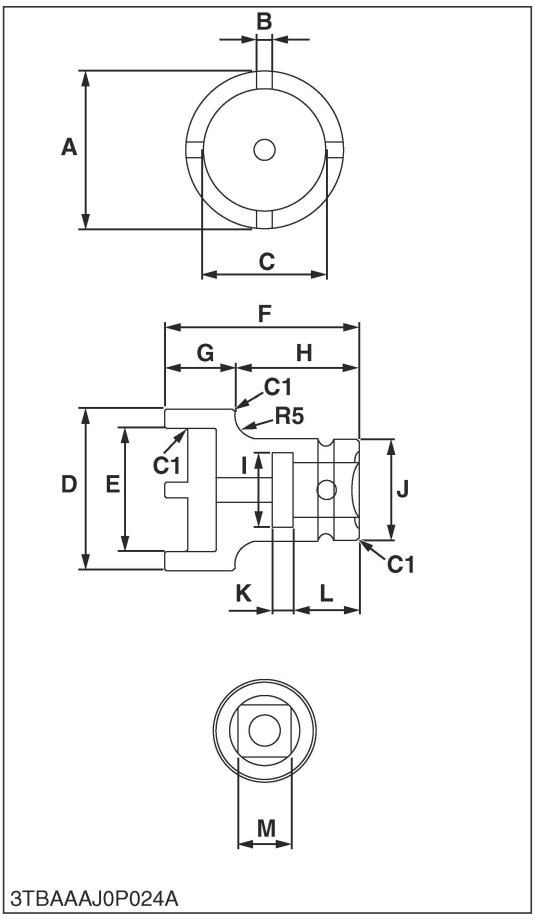
1. Extracting tool

A	135 mm (5.31 in.)
B	72 mm (2.8 in.)
C	40 mm radius (1.6 in. radius)
D	10 mm (0.39 in.)
E	20 mm (0.79 in.)
F	20 mm dia. (0.79 in. dia.)
G	56.80 to 56.90 mm dia. (2.237 to 2.240 in. dia.)
H	51.80 to 51.90 mm dia. (2.040 to 2.043 in. dia.)

2. Inserting tool

A	130 mm (5.12 in.)
B	72 mm (2.8 in.)
C	40 mm radius (1.6 in. radius)
D	9 mm (0.4 in.)
E	4 mm (0.2 in.)
F	20 mm (0.79 in.)
G	20 mm dia. (0.79 in. dia.)
H	68 mm dia. (2.7 in. dia.)
I	51.80 to 51.90 mm dia. (2.040 to 2.043 in. dia.)
J	56.80 to 56.90 mm dia. (2.237 to 2.240 in. dia.)

W1026139



3TBAAAJ0P024A

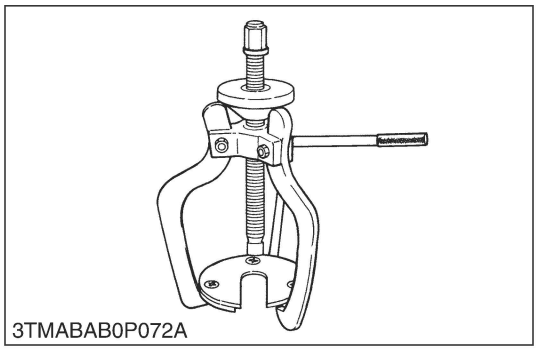
Socket

Application: Use to loosen and tighten the idle gear 2 bearing lock nut.

A	28.5 to 28.8 mm (1.12 to 1.13 in.)
B	3.5 to 3.7 mm (0.14 to 0.15 in.)
C	28.5 to 28.8 mm (0.12 to 1.13 in.)
D	38 mm dia. (1.50 in. dia.)
E	28.5 to 29.0 mm dia. (1.12 to 1.14 in. dia.)
F	47.5 mm (1.87 in.)
G	17.5 mm (0.69 in.)
H	30 mm (1.18 in.)
I	18 mm dia. (0.71 in. dia.)
J	24.5 mm dia. (0.96 in. dia.)
K	5.0 mm (0.21 in.)
L	16 mm (0.63 in.)
M	12.8 to 13.0 mm (0.50 to 0.51 in.)
C1	Chamfer 1.0 mm (0.039 in.)
R5	5.0 mm radius (0.20 in. radius)

W10497240

[2] SPECIAL TOOLS FOR TRACTOR

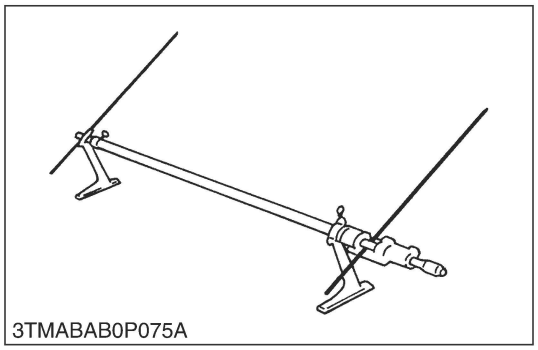

3TMABAB0P072A

Steering Wheel Puller

Code No: 07916-51090

Application: Use for removing the steering wheel without damaging the steering shaft.

W10265330

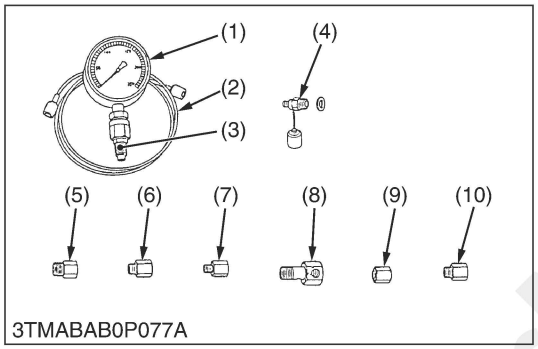

3TMABAB0P075A

Toe-in Gauge

Code No: 07909-31681

Application: This allows easy measurement of toe-in for all machine models.

W10266890



3TMABAB0P077A

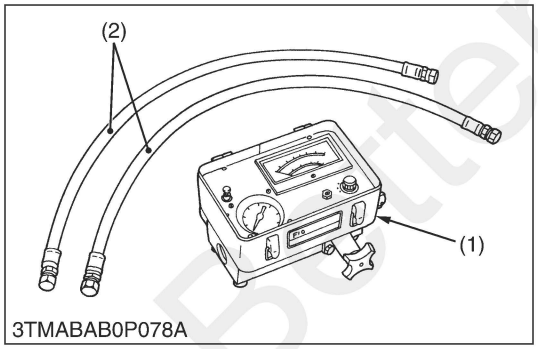
Relief Valve Pressure Tester

Code No.: 07916-50045

Application: This allows easy measurement of relief set pressure.

(1) Gauge (07916-50322)
(2) Cable (07916-50331)
(3) Threaded Joint (07916-50401)
(4) Threaded Joint (07916-50341)
(5) Adaptor **B** (M18 × P1.5) (07916-50361)
(6) Adaptor **C** (PS3/8) (07916-50371)
(7) Adaptor **D** (PT1/8) (07916-50381)
(8) Adaptor **E** (PS3/8) (07916-50392)
(9) Adaptor **F** (PF1/2) (07916-62601)
(10) Adaptor **58** (PT1/4) (07916-52391)

W1026741



3TMABAB0P078A

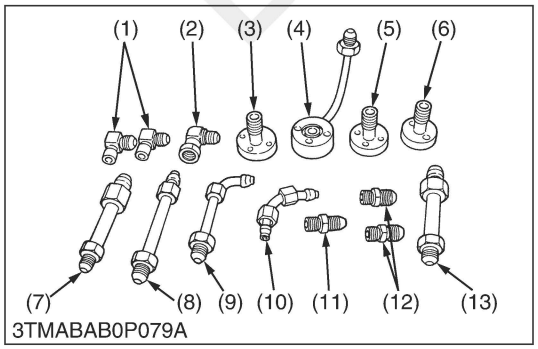
Flow Meter

Code No: 07916-52791 (Flow Meter)
07916-52651 (Hydraulic Test Hose)

Application: This allows easy testing of hydraulic system.

(1) Flow Meter
(2) Hydraulic Test Hose

W10313180



3TMABAB0P079A

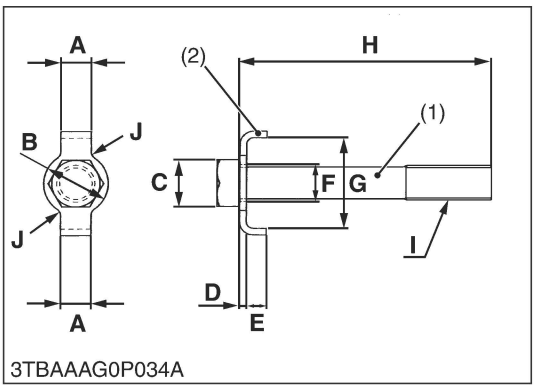
Adaptor Set for Flow Meter

Code No: 07916-54031

Application: Use for testing the hydraulic system.

(1) Adaptor **52**
(2) Adaptor **53**
(3) Adaptor **54**
(4) Adaptor **61**
(5) Adaptor **62**
(6) Adaptor **63**
(7) Adaptor **64**
(8) Adaptor **65**
(9) Adaptor **66**
(10) Adaptor **67**
(11) Adaptor **68**
(12) Adaptor **69**
(13) Hydraulic Adaptor **1**

W10313960



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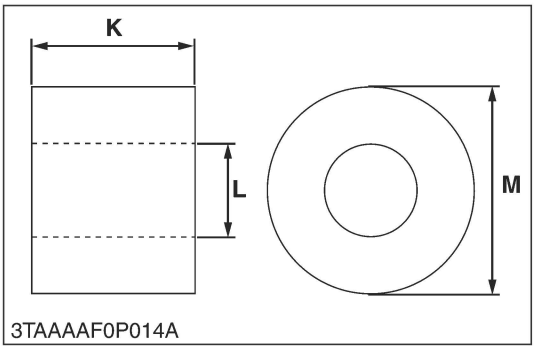


3TAAAAF0P014A

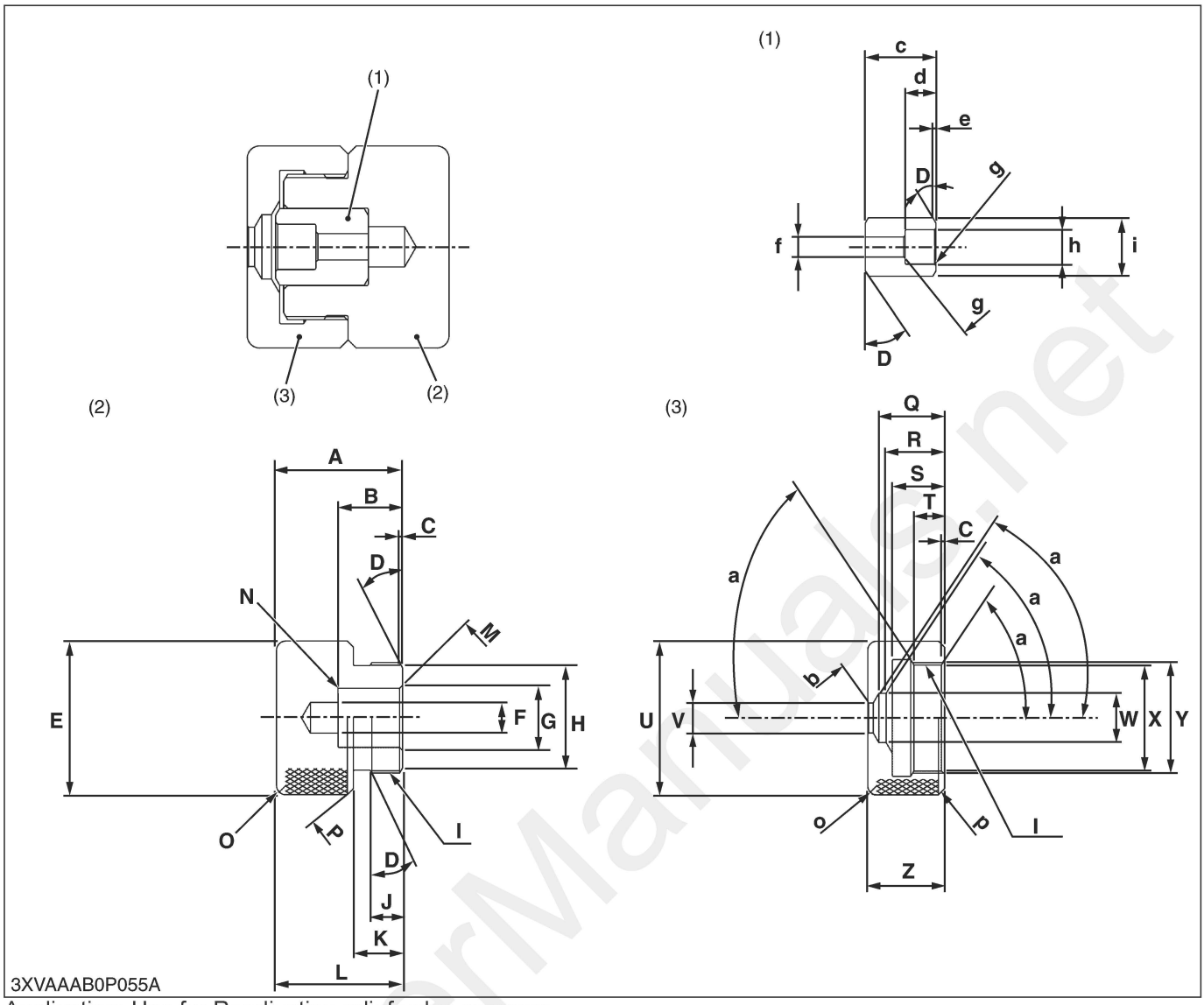
Independent PTO Clutch Spring Compression Tool

Application: Use for compressing the spring into the spline boss. This tool can be used for B30 series, BX50 series and BX24 tractor.

A	12 mm (0.47 in.)
B	25.4 mm (1.00 in.)
C	19 mm radius (0.75 in.) Hex.
D	2.7 mm (0.11 in.)
E	8 mm (0.3 in.)
F	15 mm dia. (0.59 in. dia.)
G	37 mm (1.5 in.)
H	70 mm (2.76 in.)
I	M14 ×1.5
J	R 3.0 mm (0.12 in.)
K	30 mm (1.18 in.)
L	17 mm (0.67 in.)
M	38 mm (1.50 in.)

W10495600

Check and High Pressure Relief Valve Assembly Tool



Application: Use for Readjusting relief valve pressure.

A	30.0 mm (1.18 in.)	N	Chamfer 0.4 mm (0.02 in.)	a	1.05 rad (60.0 °)
B	21.0 mm (0.827 in.)	O	Chamfer 3.0 mm (0.12 in.)	b	Chamfer 0.3 mm (0.01 in.)
C	1 mm (0.04 in.)	P	Chamfer 2.0 mm (0.079 in.)	c	23.0 mm (0.906 in.)
D	0.52 rad (30 °)	Q	21.4 mm (0.843 in.)	d	10.0 mm (0.394 in.)
E	50.0 mm dia. (1.97 in. dia.)	R	19.0 mm (0.748 in.)	e	1 mm (0.039 in.)
F	10.0 mm dia. (0.39 in. dia.)	S	17.0 mm (0.669 in.)	f	6.5 mm (0.26 in.)
G	9.10 to 9.30 mm dia. (0.359 to 0.366 in.)	T	10.0 mm (0.394 in.)	g	Chamfer 0.5 mm (0.02 in.)
H	34.0 mm dia. (1.34 in. dia.)	U	50.0 mm dia. (1.97 in. dia.)	h	11.1 to 11.3 mm (0.437 to 0.444 in.)
I	M36 x 1.5 mm	V	9.8 mm dia. (0.39 in. dia.)	i	18.8 to 19.0 mm (0.741 to 0.748 in.)
J	10.0 mm (0.39 in.)	W	16.0 mm dia. (0.630 in. dia.)		
K	16.0 mm (0.63 in.)	X	34.5 mm dia. (1.36 in. dia.)	(1)	Spacer (for ZD and ZG Series)
L	41.0 mm (1.61 in.)	Y	38.0 mm dia. (1.50 in. dia.)	(2)	Block
M	Chamfer 1 mm (0.04 in.)	Z	25.0 mm (0.984 in.)	(3)	Cap

9. TIRES

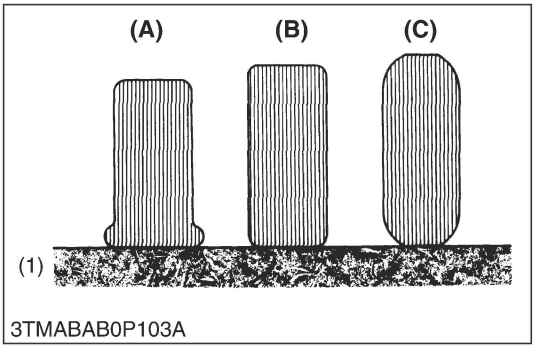
[1] TIRE PRESSURE

CAUTION

- **Do not attempt to mount a tire on a rim. This should be done by a qualified person with the proper equipment.**
- **Always maintain the correct the pressure.**
  Do not inflate tires above the recommended pressure shown in the operator's manual.

■ IMPORTANT

- **Do not use tires other than those approved by KUBOTA.**



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■ Inflation Pressure

Though the tire pressure is factory-set to the prescribed level, it naturally drops slowly in the course of time. Thus, check it everyday and inflate as necessary.

	Tire sizes	Inflation Pressure
Rear	12.4-16 Ind, 4PR	138 kPa (1.4 kgf/cm^2, 20 psi)
	12.4-16, 4PR	110 kPa (1.1 kgf/cm^2, 16 psi)
	13.6-16, 4PR	100 kPa (1.0 kgf/cm^2, 14 psi)
Front	23 × 8.50-14 Ind, 4PR	241 kPa (2.5 kgf/cm^2, 35 psi)
	7-12, 4PR	170 kPa (1.7 kgf/cm^2, 24 psi)
	24 × 8.50-14, 4PR	150 kPa (1.5 kgf/cm^2, 22 psi)

■ NOTE

- **Maintain the maximum recommended pressure in the front tires, when using a front loader or when equipped with a full load of front weights.**

■ Dual Tires

Dual tires are not approved.

(1) Ground

(A) Insufficient
(B) Standard
(C) Excessive

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[2] TREADS

CAUTION

- **When working on slopes or when working with trailer, set the wheel tread as wide as practical for maximum stability.**
- **Support tractor securely on stands before removing a wheel.**
- **Do not work under any hydraulically supported devices. They can settle, suddenly leak down, or be accidentally lowered. If necessary to work under tractor or any machine elements for servicing or adjustment, securely support them with stands or suitable blocking beforehand.**
- **Never operate tractor with a loose rim, wheel, or axle**

(1) Front Wheels

Front tread width can not be adjusted.

IMPORTANT

- **Do not turn front discs to obtain wider tread.**
  In setting up the front wheels, make sure that the inflation valve stem of the tires face outward.

(2) Rear Wheels

Rear tread width can not be adjusted.

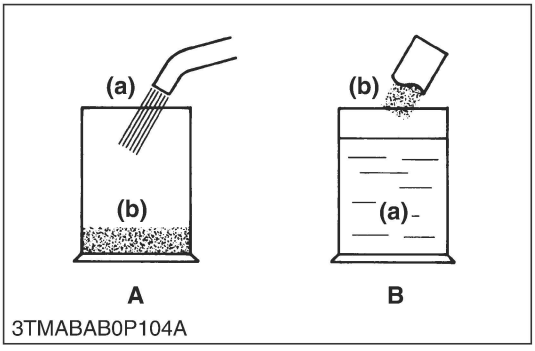
[3] TIRE LIQUID INJECTION

Auxiliary weights can be used to increase traction force for plowing in fields or clayey ground.

Another way is to inject water or another liquid, such as a calcium chloride solution in the tires. Water must not be used in winter since it freezes at 0 °C (32 °F). The calcium chloride solution will not freeze and moreover, affords higher effect than water since its specific gravity is higher than that of water by about 20 %. Below is an explanation of calcium chloride solution injection.

■ **IMPORTANT**

- **Do not fill the front tires with liquid.**



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Preparation of Calcium Chloride Solution

CAUTION

- **When making a calcium chloride solution, do not pour water over calcium chloride since this results in chemical reaction which will cause high temperature. Instead add a small amount of calcium chloride to the water at a time until the desired solution is achieved.**

Freezing temp.	Weight of $CaCl_2$ to be dissolved in 100 L (26.5 U.S.gals, 22.0 Imp.gals) of water
–5 °C (23 °F)	12 kg (26.4 lbs)
–10 °C (14 °F)	21 kg (46.3 lbs)
–15 °C (5 °F)	28 kg (61.7 lbs)
–20 °C (–4 °F)	34 kg (75.0 lbs)
–25 °C (–13 °F)	40 kg (88.2 lbs)
–30 °C (–22 °F)	44 kg (97.0 lbs)
–35 °C (–31 °F)	49 kg (108 lbs)
–40 °C (–40 °F)	52 kg (114.6 lbs)
–45 °C (–49 °F)	56 kg (123.5 lbs)
–50 °C (–58 °F)	61 kg (134.5 lbs)

(a) Water
(b) $CaCl_2$ (Calcium Chloride)
A : Bad
B : Good

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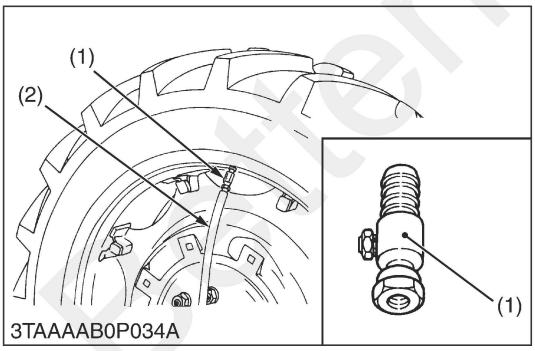

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Attaching Injector

1. Lift the rear tires off the ground.
2. Turn the tire so that the air valve is at the top.
3. Remove the air valve, and attach the injector. (Code No. 07916-52501).

(1) Injector
(2) Hose

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Fig. 1

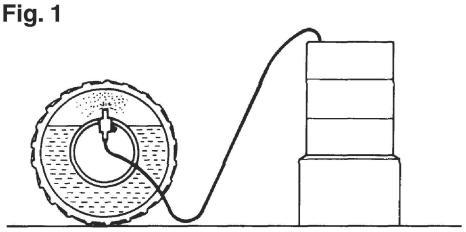


Fig. 2

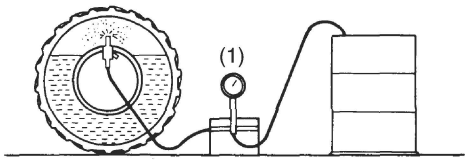
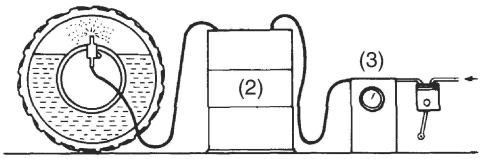


Fig. 3



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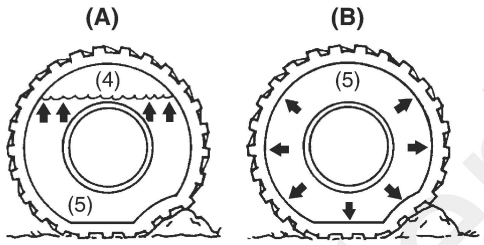

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Injection and Rear Ballast

CAUTION

- **When a calcium chloride solution is used, cool it before pouring it into the tire.**
- **Do not fill tires with water or solution more than 75 % of full capacity (to the valve stem level).**

The following four ways can be used to inject water or a calcium chloride solution into tires.

1. Gravity injection (Fig. 1)
2. Pump injection (Fig. 2)
3. Pressure tank injection (Fig. 3)
4. Injection directly from top (only when water is being used)

■ NOTE

- **Once injection is completed, reset the air valve, and pump air into the tire to the specified pressure.**

■ Liquid Ballast in Rear Tires : Liquid weight pen tire (75 % filled)

Tire sizes	12.4-16
Slush free at –10 °C (14 °F) Solid at –30 °C (–22 °F) [Approx. 1 kg (2 lbs) $CaCl_2$ per 4 L (1 gal.) of water]	85 kg (187 lbs)
Slush free at –24 °C (–11 °F) Solid at –47 °C (–52 °F) [Approx. 1.5 kg (3.5 lbs) $CaCl_2$ per 4 L (1 gal.) of water]	89 kg (196 lbs)
Slush free at –47 °C (–53 °F) Solid at –52 °C (–62 °F) [Approx. 2.25 kg (5 lbs) $CaCl_2$ per 4 L (1 gal.) of water]	94 kg (207 lbs)

(1) Pump
(2) Pressure Tank
(3) Compressor
(4) Air
(5) Water

(A) Correct : 75 % Full Air Compresses Like a Cushion
(B) Incorrect : 100 % Water can not be compressed

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Front Ballast

CAUTION

- **Additional ballast will be needed for transporting heavy implements. When the implement is raised, drive slowly over rough ground, regardless of how much ballast is used.**
- **Do not fill the front wheels with liquid to maintain steering control.**

■ Front Ballast

Heavy pulling and heavy rear mounted implements tend to lift front wheels. Therefore do not remove the loader from the tractor at all times to maintain steering control and prevent tip over.

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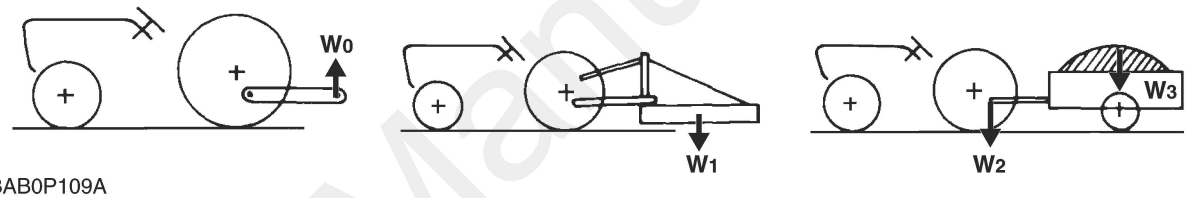
10. IMPLEMENT LIMITATIONS

The KUBOTA Tractor has been thoroughly tested for proper performance with implements sold or approved by KUBOTA. Use with implements which are not sold or approved by KUBOTA and which exceed the maximum specifications listed below, or which are otherwise unfit for use with the KUBOTA Tractor may result in malfunctions or failures of the tractor, damage to other property and injury to the operator or others. [Any malfunctions or failures of the tractor resulting from use with improper implements are not covered by the warranty.]

Model	Tread (max. width)		Lower link end max. loading weight W0
	Front	Rear	
B26	935 mm (368 in.)	1050 mm (41.3 in.)	360 kg (800 lbs)

Model	Actual figures		
	Implement weight W1 and / or size	Max. drawbar load W2	Trailer loading weight W3 Max. capacity
B26	As in the following list (Shown in the next page)	500 kg (1100 lbs)	1500 kg (3300 lbs)

Lower link end max. loading capacity.....The max. allowable load which can be put on the lower link end : W0
Implement weight.....The implement's weight which can be put on the lower link : W1
Max. drawbar load.....W2
Trailer loading weight.....The max. loading weight for trailer (without trailer's weight) : W3



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■ **NOTE**
- **Implement size may vary depending on soil operating conditions.**

No.	Implement		Remarks	B26
1	Mower	Rotary-Cutter (1 Blade)	Max. cutting width	1220 mm (48 in.)
			Max.weight	227 kg (500 lbs)
		Rotary-Mount (2 or 3 Blade)	Max. cutting width	1830 mm (72 in.)
			Max.weight	227 kg (500 lbs)
		Flail Mower	Max. cutting width	1220 mm (48 in.)
		Sickle Bar	Max. cutting width	1524 mm (60 in.)
2	Rotary Tiller		Max. tilling width	1270 mm (50 in.)
			Max. weight	250 kg (550 lbs)
			Slip clutch	Necessary
3	Bottom Plow		Max. size	305 mm (12 in.) × 2
4	Disc Plow		Max. size	559 mm (22 in.) × 2
5	Cultivator		Max. size	1524 mm (60 in.) 1 Row
6	Disc Harrow		Max. harrowing width	1676 mm (66 in.)
			Max. weight	250 kg (550 lbs)
7	Sprayer		Max. tank capacity	246 L (65 U.S.gals)
8	Front Blade		Max. cutting width	1676 mm (66 in.)
			Sub frame	Necessary
9	Rear Blade		Max. cutting width	1676 mm (66 in.)
			Max. weight	250 kg (2550 lbs)
10	Front Loader		Max. lifting capacity	500 kg (1102 lbs)
			Max. width	1544 mm (61 in.)
11	Box Blade		Max. cutting width	1372 mm (54 in.)
			Max. weight	227 kg (500 lbs)
12	Back Hoe		Max. digging depth	2535 mm (100 in.)
			Max. weight	465 kg (1025 lbs)
			Sub frame	Necessary
13	Snow Blower (Front)		Max. working width	1524 mm (60 in.)
			Max. weight	227 kg (550 lbs)
14	Trailer		Max. load capacity	1500 kg (3300 lbs)
			Max. draw bar load	500 kg (1100 lbs)

■ **NOTE**

- **Implement size may vary depending on soil operating conditions.**

W1012736

1 ENGINE

MECHANISM

NOTICE

Regarding engine mechanism information, please refer to Workshop Manual DIESEL ENGINE, MECHANISM (Code No. 9Y021-01874).

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Replenish fuel	–
	Air in the fuel system	Bleed	G-37
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel hose clogged	Clean	–
	Fuel filter clogged	Change	G-31
	Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-8
	Fuel with low cetane number	Use specified fuel	G-8
	Incorrect injection timing	Adjust	1-S17
	Injection nozzle clogged	Repair or replace	1-S19
	Injection pump malfunctioning	Replace	1-S36
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair	–
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S32, S33
	Improper valve timing	Correct or replace timing gear	1-S37
	Piston ring and cylinder worn	Replace	1-S39, S40
	Excessive valve clearance	Adjust	1-S13
Engine Revolution Is Not Smooth	Fuel filter clogged or dirty	Replace	G-31
	Air cleaner clogged	Clean or replace	G-24
	Fuel leak due to loosing injection pipe retaining nut	Tighten retaining nut	1-S32
	Injection pump malfunctioning	Replace	1-S36
	Incorrect nozzle injection pressure	Adjust	1-S19
	Injection nozzle stuck or clogged	Repair or replace	1-S20
	Governor malfunctioning	Repair	–
Either White or Blue Exhaust Gas Is Observed	Excessive engine oil	Reduce to specified level	G-29
	Piston ring and cylinder worn or stuck	Repair or replace	1-S39, S40
	Incorrect injection timing	Adjust	1-S17
	Deficient compression	Repair	1-S12, S53, S58

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Symptom	Probable Cause	Solution	Reference Page
Either Black or Dark Gray Exhaust Gas Is Observed	Overload	Reduce the load	–
	Low grade fuel used	Use specified fuel	–
	Fuel filter clogged	Replace	G-31
	Air cleaner clogged	Clean or replace	G-24
	Deficient nozzle injection	Repair or replace nozzle	1-S20
Deficient Output	Incorrect injection timing	Adjust	1-S17
	Engine's moving parts seem to be seizing	Repair or replace	–
	Uneven fuel injection	Replace injection pump	1-S36
	Deficient nozzle injection	Repair or replace nozzle	1-S19
	Compression leak	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S32, S33
Excessive Lubricant Oil Consumption	Piston ring's gap facing the same direction	Shift ring gap direction	1-S53
	Oil ring worn or stuck	Replace	1-S53
	Piston ring groove worn	Replace piston	1-S53
	Valve stem and valve guide worn	Replace	1-S45
	Oil leaking due to defective seals or packing	Replace	–
Fuel Mixed into Lubricant Oil	Injection pump's plunger worn	Replace injection pump	1-S36
	Deficient nozzle injection	Repair or replace nozzle	1-S20
	Injection pump broken	Replace	1-S33
Water Mixed into Lubricant Oil	Head gasket defective	Replace	1-S33
	Cylinder block or cylinder head flawed	Replace	1-S33
Low Oil Pressure	Engine oil insufficient	Replenish	G-19
	Oil strainer clogged	Clean	1-S38
	Oil filter cartridge clogged	Replace	G-19
	Relief valve stuck with dirt	Clean	–
	Relief valve spring weaken or broken	Replace	–
	Excessive oil clearance of crankshaft bearing	Replace	1-S56
	Excessive oil clearance of crankpin bearing	Replace	1-S55
	Excessive oil clearance of rocker arm	Replace	1-S47
	Oil passage clogged	Clean	–
	Different type of oil	Use specified type of oil	G-8
	Oil pump defective	Repair or replace	1-S59

Symptom	Probable Cause	Solution	Reference Page
High Oil Pressure	Different type of oil	Use specified type of oil	G-8
	Relief valve defective	Replace	–
Engine Overheated	Engine oil insufficient	Replenish	G-19
	Fan belt broken or tensioned improperly	Replace or adjust	G-25
	Coolant insufficient	Replenish	G-34
	Radiator net and radiator fin clogged with dust	Clean	–
	Inside of radiator corroded	Clean or replace	G-34
	Coolant flow route corroded	Clean or replace	G-34
	Radiator cap defective	Replace	1-S16
	Radiator hose damaged	Replace	G-36
	Overload running	Reduce the load	–
	Head gasket defective	Replace	1-S33
	Incorrect injection timing	Adjust	1-S17
	Unsuitable fuel used	Use specified fuel	G-8

W1014322

2. SERVICING SPECIFICATIONS

ENGINE BODY

Item		Factory Specification	Allowable Limit
Compression Pressure	E2 Engine	2.85 to 3.23 MPa 29.0 to 33.0 kgf/cm^2 413 to 469 psi	2.26 MPa 23.0 kgf/cm^2 327 psi
	E3 Engine	3.73 to 4.11 MPa 38.0 to 42.0 kgf/cm^2 541 to 597 psi	2.26 MPa 23.0 kgf/cm^2 327 psi
Variance Among Cylinders		–	10 % or less
Valve Clearance (Cold)		0.145 to 0.185 mm 0.00571 to 0.00728 in.	–
Top Clearance		0.55 to 0.70 mm 0.022 to 0.027 in.	–
Cylinder Head Surface	Flatness	–	0.05 mm 0.002 in.
Valve Recessing	Intake and Exhaust	0.050 to 0.25 mm 0.002 to 0.0098 in.	0.40 mm 0.016 in.
Valve Stem to Valve Guide	Clearance	0.035 to 0.065 mm 0.0014 to 0.0025 in.	0.10 mm 0.0039 in.
Valve Stem	O.D.	6.960 to 6.975 mm 0.2741 to 0.2746 in.	–
Valve Guide	I.D.	7.010 to 7.025 mm 0.2760 to 0.2765 in.	–
Valve Seat	Angle (Intake)	1.0 rad 60 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
	Width	2.12 mm 0.0835 in.	
Valve Face	Angle (Intake)	1.0 rad 60 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
Valve Spring	Tilt	–	1.0 mm 0.039 in.
	Free Length	37.0 to 37.5 mm 1.46 to 1.47 in.	36.5 mm 1.44 in.
	Setting Load	117.4 N / 31.0 mm 11.97 kgf / 31.0 mm 26.39 lbf / 1.22 in.	100.0 N / 31.0 mm 10.20 kgf / 31.0 mm 22.48 lbf / 1.22 in.

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ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Rocker Arm Shaft to Rocker Arm	Clearance	0.016 to 0.045 mm 0.00063 to 0.00177 in.	0.10 mm 0.0039 in.
Rocker Arm Shaft	O.D.	11.973 to 11.984 mm 0.47138 to 0.47181 in.	–
Rocker Arm	I.D.	12.000 to 12.018 mm 0.47244 to 0.47314 in.	–
Push Rod	Alignment	–	0.25 mm 0.0098 in.
Tappet to Tappet Guide Bore	Clearance	0.020 to 0.062 mm 0.00079 to 0.0024 in.	0.07 mm 0.003 in.
Tappet	O.D.	19.959 to 19.980 mm 0.78579 to 0.78661 in.	–
Tappet Guide	I.D.	20.000 to 20.021 mm 0.78741 to 0.78822 in.	–
Idle Gear Crank Gear to Idle Gear 1	Backlash	0.0320 to 0.115 mm 0.00126 to 0.00452 in.	0.15 mm 0.0059 in.
Idle Gear 1 to Cam Gear	Backlash	0.0360 to 0.114 mm 0.00142 to 0.00448 in.	0.15 mm 0.0059 in.
Idle Gear 1 to Injection Pump Gear	Backlash	0.0340 to 0.116 mm 0.00134 to 0.00456 in.	0.15 mm 0.0059 in.
Idle Gear 1 to Idle Gear 2	Backlash	0.0300 to 0.117 mm 0.00119 to 0.00460 in.	0.15 mm 0.0059 in.
Idle Gear 2 to Governor Gear	Backlash	0.0300 to 0.117 mm 0.00119 to 0.00460 in.	0.15 mm 0.0059 in.
Idle Gear Idle Gear 1	Side Clearance	0.20 to 0.51 mm 0.0079 to 0.020 in.	0.8 mm 0.03 in.
Idle Gear 2	Side Clearance	0.20 to 0.51 mm 0.0079 to 0.020 in.	0.8 mm 0.03 in.
Camshaft	Side Clearance	0.070 to 0.22 mm 0.0028 to 0.0086 in.	0.30 mm 0.012 in.
	Alignment	–	0.01 mm 0.0004 in.
Cam Height	Intake	28.80 mm 1.134 in.	28.75 mm 1.132 in.
	Exhaust	29.00 mm 1.142 in.	28.95 mm 1.140 in.

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ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Camshaft Journal to Cylinder Block Bore	Oil Clearance	0.050 to 0.091 mm 0.0020 to 0.0035 in.	0.15 mm 0.0059 in.
Camshaft Journal	O.D.	35.934 to 35.950 mm 1.4148 to 1.4153 in.	–
Cylinder Block Bore	I.D.	36.000 to 36.025 mm 1.4174 to 1.4183 in.	–
Piston Pin Bore	I.D.	22.000 to 22.013 mm 0.86615 to 0.86665 in.	22.03 mm 0.8673 in.
Piston Pin to Small End Bushing	Clearance	0.014 to 0.038 mm 0.00056 to 0.0015 in.	0.15 mm 0.0059 in.
Piston Pin	O.D.	22.002 to 22.011 mm 0.86622 to 0.86657 in.	–
Small End Bushing	I.D.	22.025 to 22.040 mm 0.86713 to 0.86771 in.	–
Piston Pin to Small End Bushing (Spare Parts)	Oil Clearance	0.015 to 0.075 mm 0.00059 to 0.0029 in.	0.15 mm 0.0059 in.
Small End Bushing	I.D.	22.026 to 22.077 mm 0.86717 to 0.86917 in.	–
Piston Ring Gap	Top Ring	0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.
	Second Ring	0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.
	Oil Ring	0.25 to 0.40 mm 0.0099 to 0.015 in.	1.25 mm 0.0492 in.
Piston Ring to Piston Ring Groove Second Ring	Clearance	0.085 to 0.112 mm 0.00335 to 0.00440 in.	0.20 mm 0.0079 in.
Oil Ring	Clearance	0.020 to 0.055 mm 0.00079 to 0.0021 in.	0.15 mm 0.0059 in.
Connecting Rod	Alignment	–	0.05 mm 0.002 in.
Crankshaft	Side Clearance	0.15 to 0.31 mm 0.0059 to 0.0122 in.	0.50 mm 0.02 in.
	Alignment	–	0.02 mm 0.0008 in.
Crankshaft to Crankpin Bearing	Oil Clearance	0.029 to 0.091 mm 0.0012 to 0.0035 in.	0.20 mm 0.0079 in.
Crankpin	O.D.	39.959 to 39.975 mm 1.5732 to 1.5738 in.	–
Crankpin Bearing	I.D.	40.004 to 40.050 mm 1.5750 to 1.5767 in.	–

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ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Crankshaft to Crankshaft Bearing 1	Oil Clearance	0.034 to 0.114 mm 0.00134 to 0.00448 in.	0.20 mm 0.0079 in.
Crankshaft	O.D.	47.934 to 47.950 mm 1.8872 to 1.8877 in.	–
Crankshaft Bearing 1	I.D.	47.984 to 48.048 mm 1.8892 to 1.8916 in.	–
Crankshaft Bearing	Dimension	0 to 0.3 mm 0 to 0.01 in.	–
Crankshaft to Crankshaft Bearing 2	Oil Clearance	0.034 to 0.095 mm 0.0014 to 0.0037 in.	0.20 mm 0.0079 in.
Crankshaft Journal	O.D.	47.934 to 47.950 mm 1.8872 to 1.8877 in.	–
Crankshaft Bearing 2	I.D.	47.984 to 48.029 mm 1.8892 to 1.8909 in.	–
Crankshaft to Crankshaft Bearing 3	Oil Clearance	0.034 to 0.098 mm 0.0014 to 0.0038 in.	0.20 mm 0.0079 in.
Crankshaft Journal	O.D.	51.921 to 51.940 mm 2.0442 to 2.0448 in.	–
Crankshaft Bearing 3	I.D.	51.974 to 52.019 mm 2.0463 to 2.0479 in.	–
Cylinder Liner	I.D.	78.000 to 78.019 mm 3.0709 to 3.0716 in.	+0.15 mm 0.0059 in.
Cylinder Liner (Oversized)	I.D.	78.500 to 78.519 mm 3.0906 to 3.0912 in.	78.65 mm 3.096 in.
Rotor Lobe	Clearance	0.060 to 0.18 mm 0.0024 to 0.0070 in.	–
Outer Rotor and Pump Body	Clearance	0.100 to 0.180 mm 0.00394 to 0.00708 in.	–
Rotor and Cover	Clearance	0.025 to 0.075 mm 0.00099 to 0.0029 in.	–

W10138740

LUBRICATING SYSTEM

Item		Factory Specification	Allowable Limit
Engine Oil Pressure	At Idle Speed	More than 50 kPa 0.5 kgf/cm^2 7 psi	–
	At Rated Speed	200 to 440 kPa 2.0 to 4.5 kgf/cm^2 29 to 64 psi	150 kPa 1.5 kgf/cm^2 21 psi

W10139730

COOLING SYSTEM

Fan Belt	Tension	7.0 to 9.0 mm / 98 N 0.28 to 0.35 in. / 98 N (10 kgf, 22 lbf)	–
Thermostat	Valve Opening Temperature (At Beginning)	69.5 to 72.5 °C 157.1 to 162.5 °F	–
	Valve Opening Temperature (Opened Completely)	85 °C 185 °F	–
Radiator Cap	Pressure Falling Time	10 seconds or more 88 → 59 kPa 0.90 → 0.60 kgf/cm^2 12 → 8.6 psi	–
Radiator	Water Leakage Test Pressure	No leak at specified pressure 140 kPa 1.4 kgf/cm^2 20 psi	–

W10135990

FUEL SYSTEM

Item		Factory Specification	Allowable Limit
Injection Pump	Injection Timing E2 Engine	0.28 to 0.31 rad (16 to 18 °) before T.D.C.	–
	E3 Engine	0.2837 to 0.3097 rad (16.25 to 17.75 °) before T.D.C.	–
Pump Element	Fuel Tightness	–	13.73 MPa 140.0 kgf/cm^2 1991 psi
Delivery Valve	Fuel Tightness	10 seconds or more for pressure falling from 13.73 → 12.75 MPa from 140.0 → 130.0 kgf/cm^2 from 1992 → 1849 psi	5 seconds or more for pressure falling from 13.73 → 12.75 MPa from 140.0 → 130.0 kgf/cm^2 from 1992 → 1849 psi
Injection Nozzle	Injection Pressure	13.73 to 14.71 MPa 140.0 to 150.0 kgf/cm^2 1992 to 2133 psi	–
Injection Nozzle Valve Seat	Valve Seat Tightness	When the pressure is 12.75 MPa (130.0 kgf/cm^2, 1849 psi)	–

W10139730

3. TIGHTENING TORQUES

Tightening torque of screws, bolts and nuts on the table below are specially specified. (For general use screws, bolts and nuts : See page G-10.)

[1] TRACTOR SECTION

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting bolts	196 to 225	20.0 to 23.0	145 to 166
Rear wheel mounting nuts	167 to 191	17 to 19.5	123 to 141
Main frame mounting bolt (front side) (M14, 9T)	170 to 200	17 to 20	125 to 145
Main frame mounting bolt (rear side) (M16)	200 to 225	20 to 23	145 to 166
Rear axle mounting bolt (M12)	105 to 120	11 to 12	78 to 88
Front axle frame mounting screw (M10, 9T)	61 to 70	6.2 to 7.2	45 to 52
Engine mounting bolt (M12)	63 to 72	6.4 to 7.4	47 to 53

W1082929

[2] ENGINE SECTION

■ **NOTE**

- **In removing and applying the bolts and nuts marked with " * ", a pneumatic wrench or similar pneumatic tool, if employed, must be used with enough care not to get them seized.**
- **For " * " marked screws, bolts and nuts on the table, apply engine oil to their threads and seats before tightening.**
- **The letter "M" in Size × Pitch means that the screw, bolt or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal distance in mm between two threads.**

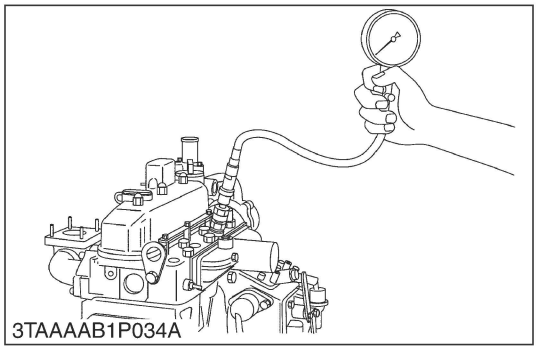
Item	Size x Pitch	N·m	kgf·m	lbf·ft
Oil pressure switch	–	15 to 19	1.5 to 2.0	11 to 14
Nozzle holder	–	35 to 39	3.5 to 4.0	26 to 28
Overflow pipe nut	M12 x 1.5	20 to 24	2.0 to 2.5	15 to 18
Nozzle holder assembly	M20 x 1.5	49 to 68	5.0 to 7.0	37 to 50
Cylinder head cover nut	M7 x 1.0	6.9 to 8.8	0.70 to 0.90	5.1 to 6.5
Injection pipe retaining nut	M12 x 1.5	25 to 34	2.5 to 3.5	18 to 25
*Rocker arm bracket nut	M7 x 1.0	22 to 26	2.2 to 2.7	16 to 19
*Cylinder head screw	M10 x 1.25	64 to 68	6.5 to 7.0	47 to 50
*Fan drive pulley screw	M14 x 1.5	236 to 245	24.0 to 25.0	174 to 180
Idle gear 2 lock nut	–	25 to 29	2.5 to 3.0	18 to 21
Idle gear 2 bearing nut	–	35 to 39	3.5 to 4.0	26 to 28
*Connecting rod screw	M8 x 1.0	42 to 46	4.2 to 4.7	31 to 33
*Flywheel screw	M10 x 1.25	54 to 58	5.5 to 6.0	40 to 43
*Bearing case cover screw	M6 x 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
*Main bearing case screw 2	M9 x 1.25	49 to 53	5.0 to 5.5	37 to 39
*Main bearing case screw 1	M8 x 1.25	30 to 34	3.0 to 3.5	22 to 25

W1013236

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Engine Body



Compression Pressure

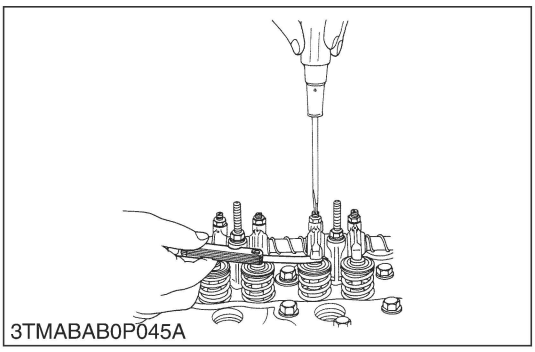
1. Run the engine until it is warmed up.
2. Stop the engine.
3. Remove the air cleaner, the muffler and all glow plugs (or nozzles).
4. Set a compression tester with the adaptor to the glow plug hole (or nozzle hole).
   Nozzle Hole : Adaptor H
   Glow Plug Hole : Adaptor L
5. After making sure that the stop lever is set at the stop position (non-injection), run the engine with the starter and measure the compression pressure.
6. Repeat steps 4 and 5 for each cylinder.
7. If the measurement is below the allowable limit, apply a small amount of oil to the cylinder wall through the glow plug hole (or nozzle hole) and measure the compression pressure again.
8. If the compression pressure is still less than the allowable limit, check the top clearance, valve clearance and cylinder head.
9. If the compression pressure increases after applying oil, check the cylinder wall and piston rings.

■ **NOTE**

- **Check the compression pressure with the specified valve clearance.**
- **Always use a fully charged battery for performing this test.**
- **Variances in cylinder compression values should be under 10 %.**

Compression pressure	Factory spec.	2.85 to 3.23 MPa 29.0 to 33.0 kgf/cm^2 413 to 469 psi
	Allowable limit	2.26 MPa 23.0 kgf/cm^2 327 psi

W1013828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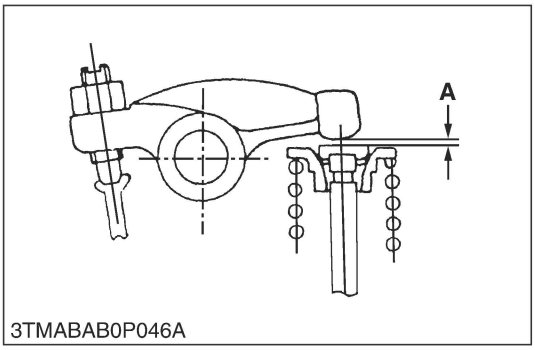

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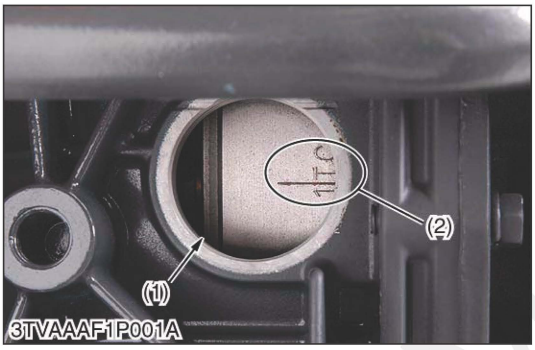

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Valve Clearance

■ **IMPORTANT**

- **Valve clearance must be checked and adjusted when engine is cold.**

1. Remove the head cover, the glow plugs and the timing window cover on the clutch housing.
2. Align the **"1TC"** mark line on the flywheel and center of timing window so that the No. 1 piston comes to the compression top dead center.
3. Check the following valve clearance marked with "☆" using a feeler gauge.
4. If the clearance is not within the factory specifications, adjust with the adjusting screw.

Valve clearance	Factory spec.	0.145 to 0.185 mm 0.00571 to 0.00728 in.

■ **NOTE**

- **The "TC" marking line on the flywheel is just for No. 1 cylinder. There is no "TC" marking for the other cylinders.**
- **No. 1 piston comes to the T.D.C. position when the "TC" marking line is aligned with center of timing window on front case. Turn the flywheel 0.26 rad (15 °) clockwise and counterclockwise to see if the piston is at the compression top dead center or the overlap position. Now referring to the table below, readjust the valve clearance. (The piston is at the compression top dead center when both the IN. and EX. valves do not move; it is at the overlap position when both the valves move.)**
- **Finally turn the flywheel 6.28 rad (360 °) and align the "TC" marking line and the center of timing window. Adjust all the other valve clearance as required**
- **After turning the flywheel counterclockwise twice or three times, recheck the valve clearance, firmly tighten the lock nut of the adjusting screw.**

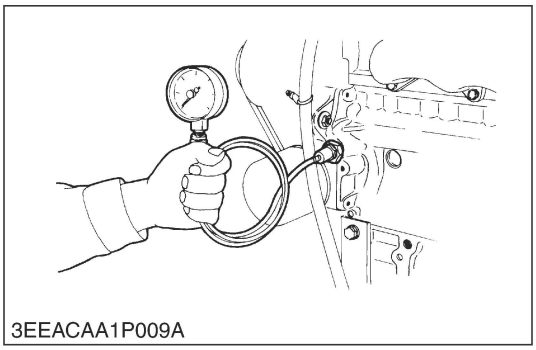
Number of cylinders / Valve arrangement / Adjustable cylinder location of piston		IN.	EX.
When No. 1 piston comes to compression top dead center	No. 1	☆	☆
	No. 2		☆
	No. 3	☆	
When No. 1 piston comes to compression top dead center	No. 1		
	No. 2	☆	
	No. 3		☆

(1) Timing Window
(2) TC Mark Line

A : Valve Clearance

W10507730

(2) Lubricating System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Engine Oil Pressure

1. Remove the engine oil pressure switch, and set an oil pressure tester.
2. Start the engine. After warming up, measure the oil pressure of both idling and rated speeds.
3. If the oil pressure is less than the allowable limit, check the following.

- Engine oil insufficient
- Oil pump defective
- Oil strainer clogged
- Oil filter cartridge clogged
- Oil gallery clogged
- Excessive oil clearance
- Foreign matter in the relief valve

Engine oil pressure	At idle speed	Factory spec.	More than 50 kPa 0.5 kgf/cm^2 7 psi
	At rated speed	Factory spec.	200 to 440 kPa 2.0 to 4.5 kgf/cm^2 29 to 64 psi
		Allowable limit	150 kPa 1.5 kgf/cm^2 21 psi

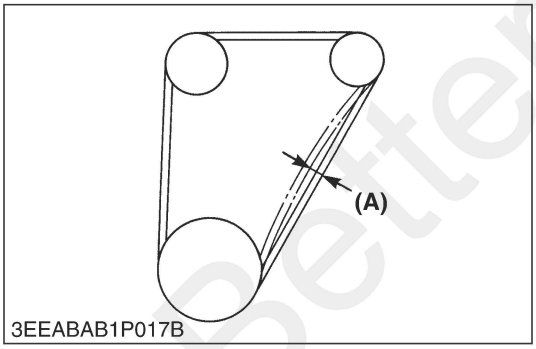
(When reassembling)

- After checking the engine oil pressure, tighten the engine oil pressure switch to the specified torque.

Tightening torque	Oil pressure switch	15 to 19 N·m 1.5 to 2.0 kgf·m 11 to 14 lbf·ft

W10539350

(3) Cooling System



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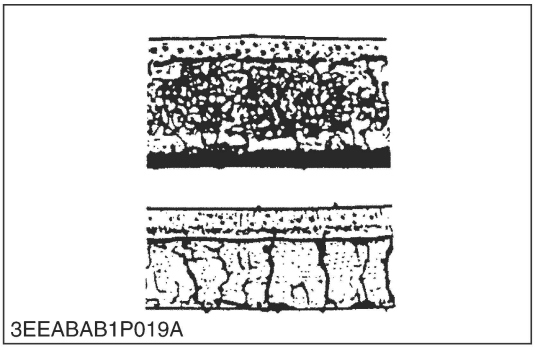
Fan Belt Tension

1. Measure the deflection **(A)**, depressing the belt halfway between the fan drive pulley and alternator pulley at specified force (98 N, 10 kgf, 22 lbf).
2. If the measurement is not within the factory specifications, loosen the alternator mounting screws and relocate the alternator to adjust.

Deflection **(A)**	Factory spec.	7.0 to 9.0 mm 0.28 to 0.35 in.

W1036412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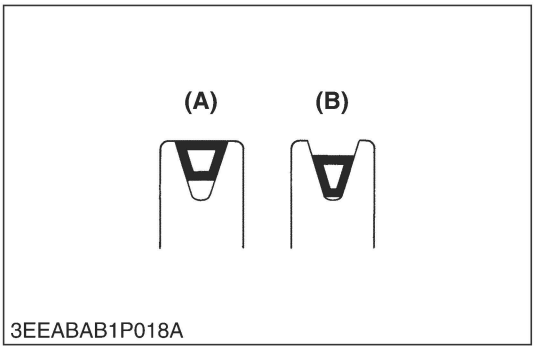
Fan Belt Damage and Wear

1. Check the fan belt for damage.
2. If the fan belt is damaged, replace it.
3. Check if the fan belt is worn and sunk in the pulley groove.
4. If the fan belt is nearly worn out and deeply sunk in the pulley groove, replace it.

(A) Good **(B) Bad**

W1025874



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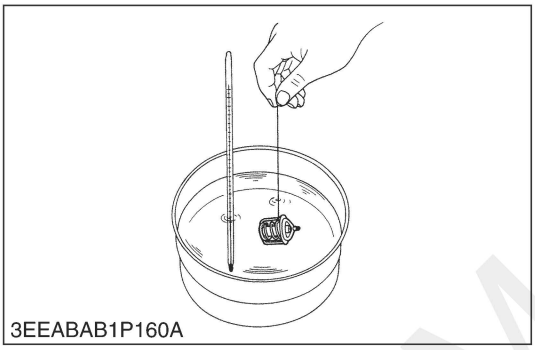
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Thermostat Valve Opening Temperature

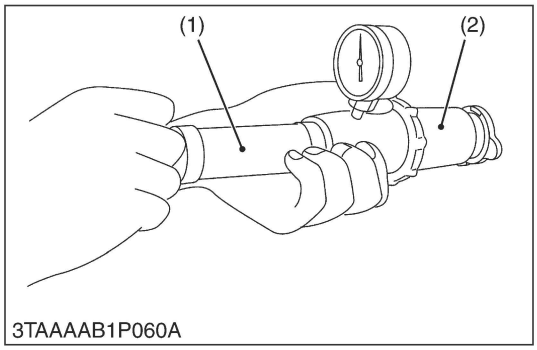
1. Suspend the thermostat in the water by a string with its end inserted between the valve and seat.
2. Heating the water gradually, read the temperature when the valve opens and leaves the string.
3. Continue heating and read the temperature when the valve opens approx. 8 mm (0.315 in.).
4. If the measurement is not within the factory specifications, replace the thermostat.

Thermostat's valve opening temperature	Factory spec.	69.5 to 72.5 °C 157.1 to 162.5 °F
Temperature at which thermostat completely opens	Factory spec.	85 °C 185 °F

W10548440

CAUTION

- **When removing the radiator cap, wait at least ten minutes after the engine has stopped and cooled down. Otherwise, hot water may gush out, scalding nearby people.**



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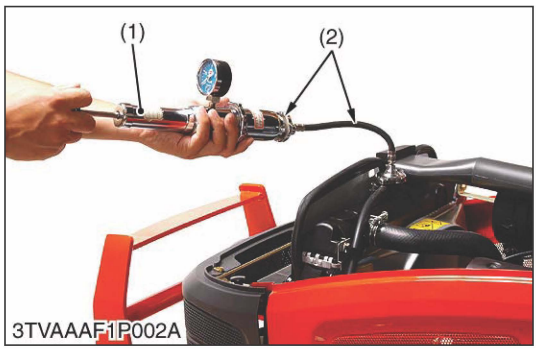
Radiator Cap Air Leakage

1. Set a radiator tester (1) and adaptor (2) on the radiator cap.
2. Apply the specified pressure 88 kPa (0.90 kgf/cm^2, 12 psi), and measure the time for the pressure to fall to 59 kPa (0.60 kgf/cm^2, 8.6 psi).
3. If the measurement is less than the factory specification, replace the radiator cap.

Pressure falling time	Factory spec.	More than 10 seconds for pressure fall from 88 to 59 kPa (from 0.90 to 0.60 kgf/cm^2, from 12 to 8.6 psi)

(1) Radiator Tester (2) Adaptor

1025874



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Radiator Water Leakage

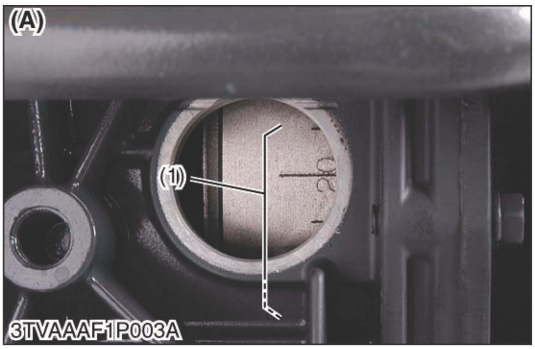
1. Pour a specified amount of water into the radiator.
2. Set a radiator tester (1) and an adaptor (2) and raise the water pressure to the specified pressure.
3. Check the radiator for water leaks.
4. For water leak from the pinhole, repair with the radiator cement. When water leak is excessive, replace the radiator.

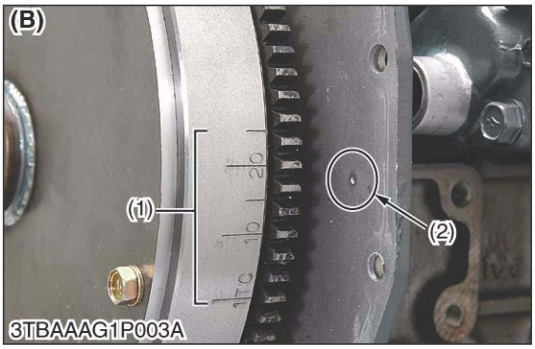
Radiator water leakage test pressure	Factory spec.	140 kPa 1.4 kgf/cm^2 20 psi

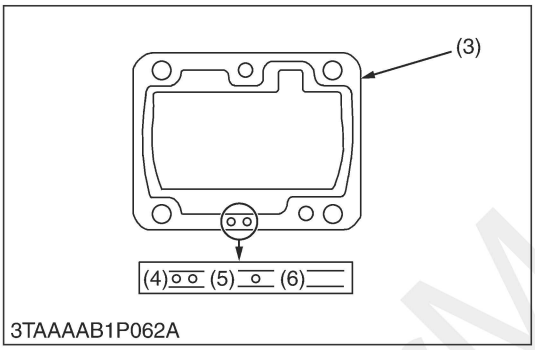
(1) Radiator Tester (2) Adaptor

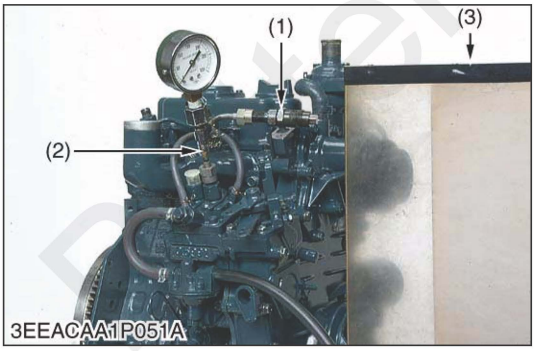
W10553600

(4) Fuel System









Injection Timing

1. Remove the injection pipes.
2. Remove the engine stop solenoid.
3. Turn the flywheel counterclockwise (facing the flywheel) until fuel flows from the delivery valve holder.
4. Continue to turn the flywheel slowly, and stop it as soon as the fuel level at the tip of the delivery valve holder begins to increase.
5. Check to see if the timing angle lines on the flywheel is aligned with the alignment mark (2).
6. If the injection timing is out of adjustment, readjust the timing with shims.

Injection timing	Factory spec.	E2 Engine	0.28 to 0.31 rad (16 to 18 °) before T.D.C.
		E3 Engine	0.2837 to 0.3097 rad (16.25 to 17.75 °) before T.D.C.

■ **NOTE**

- **The sealant is applied to both sides of the shim (soft metal gasket shim). The liquid gasket is not required for assembling.**
- **Shims are available in thickness of 0.20 mm (0.0079 in.), 0.25 mm (0.0098 in.) and 0.30 mm (0.012 in.). Combine these shims for adjustments.**
- **Addition or reduction of shim (0.05 mm, 0.0020 in.) delays or advances the injection timing by approx. 0.009 rad (0.5 °).**
- **In disassembling and replacing the injection pump, be sure to use the same number of new shims with the same thickness.**
- **Refer to figure below to check the thickness of the shims.**

(1) Timing Line
(2) Alignment Mark
(3) Shim (Soft Metal Gasket Shim)
(4) Two-holes : 0.20 mm (0.0079 in.)
(5) One-hole : 0.25 mm (0.0098 in.)
(6) Without hole : 0.30 mm (0.012 in.)
(A) Engine mounted on the tractor
(B) Engine only

W1045781

Fuel Tightness of Pump Element

1. Remove the engine stop solenoid.
2. Remove the injection pipes and glow plugs.
3. Install the injection pump pressure tester to the injection pump.
4. Install the injection nozzle (1) jetted with the proper injection pressure to the injection pump pressure tester (2). (See photo.)
5. Set the speed control lever to the maximum speed position.
6. Run the starter to increase the pressure.
7. If the pressure can not reach the allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

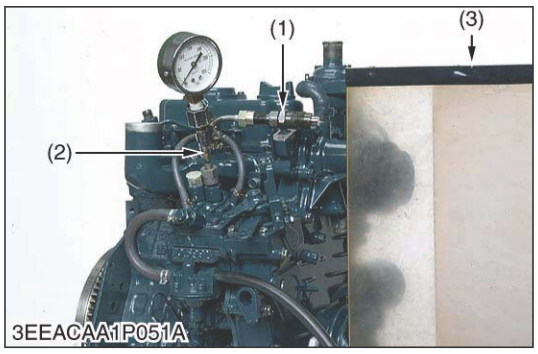
Fuel tightness of pump element	Allowable limit	13.73 MPa 140.0 kgf/cm^2 1991 psi

■ **NOTE**

- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**

(1) Injection Nozzle
(2) Injection Pump Pressure Tester
(3) Protection Cover for Jetted Fuel

W1045879



Fuel Tightness of Delivery Valve

1. Remove the engine stop solenoid.
2. Remove the injection pipes and glow plugs.
3. Set a pressure tester to the fuel injection pump.
4. Install the injection nozzle (1) jetted with the proper injection pressure to the injection pump pressure tester (2).
5. Run the starter to increase the pressure.
6. Stop the starter when the fuel jets from the injection nozzle. After that, turn the flywheel by the hand and raise the pressure to approx. 13.73 MPa (140.0 kgf/cm^2, 1992 psi).
7. Now turn the flywheel back about half a turn (to keep the plunger free). Maintain the flywheel at this position and clock the time taken for the pressure to drop from 13.73 to 12.75 MPa (from 140.0 to 130.0 kgf/cm^2, from 1992 to 1849 psi).
8. Measure the time needed to decrease the pressure from 13.73 to 12.75 MPa (from 140.0 to 130.0 kgf/cm^2, from 1992 to 1849 psi).
9. If the measurement is less than allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

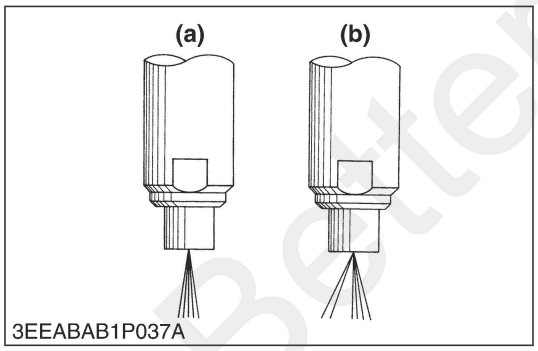
Fuel tightness of delivery valve	Factory spec.	10 seconds 13.73 → 12.75 MPa 140.0 → 130.0 kgf/cm^2 1992 → 1849 psi
	Allowable limit	5 seconds 13.73 → 12.75 MPa 140.0 → 130.0 kgf/cm^2 1992 → 1849 psi

■ **NOTE**

- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**

(1) Injection Nozzle
(2) Injection Pump Pressure Tester
(3) Protection Cover for Jetted Fuel

W10563160



Nozzle Spraying Condition

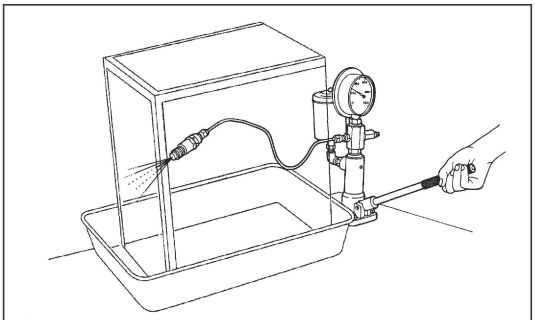
CAUTION

- **Check the injection pressure and condition after confirming that there is nobody standing in the direction the fume goes.**
- **If the fume from the nozzle directly injects the human body, cells may be destroyed and blood poisoning may be caused.**

1. Set the injection nozzle to a nozzle tester, and check the nozzle spraying condition.
2. If the spraying condition is defective, replace the nozzle piece.

(a) Good **(b) Bad**

W1047856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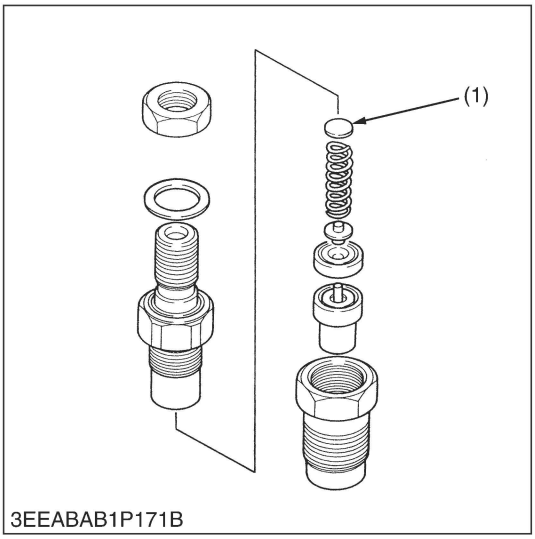

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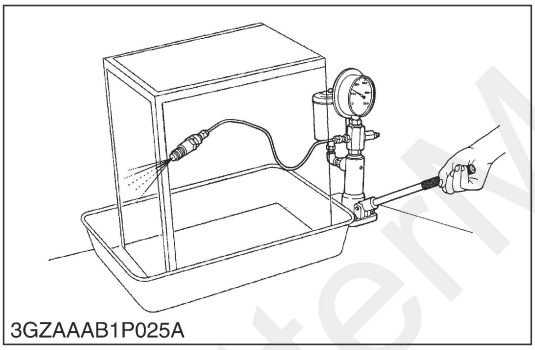
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Fuel Injection Pressure

1. Set the injection nozzle to a nozzle tester.
2. Slowly move the tester handle to measure the pressure at which fuel begins jetting out from the nozzle.
3. If the measurement is not within the factory specifications, replace the adjusting washer (1) in the nozzle holder to adjust it.

Fuel injection pressure	Factory spec.	13.73 to 14.71 MPa 140.0 to 150.0 kgf/cm^2 1992 to 2133 psi

(Reference)

- Pressure variation with 0.01 mm (0.0004 in.) difference of adjusting washer thickness
  Approx. 235 kPa (2.4 kgf/cm^2, 34 psi)
- Pressure with 0.01 mm (0.0004 in.) difference of adjusting washer thickness varies approx. 235 KPa (2.4 kgf/cm^2, 34 psi)

(1) Adjusting Washer

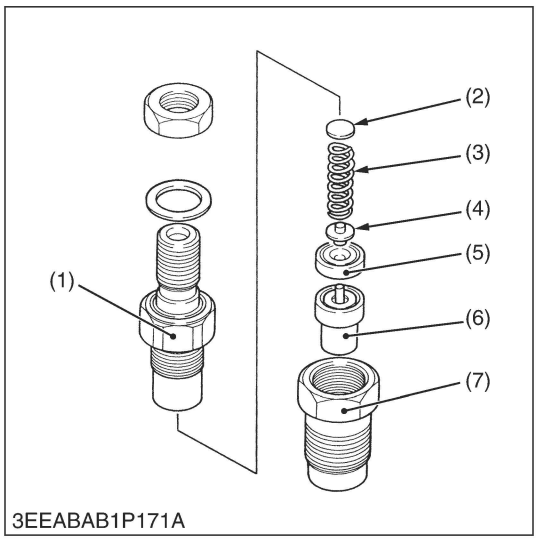
W1056842

Valve Seat Tightness

1. Set the injection nozzle to a nozzle tester.
2. Raise the fuel pressure, and keep at 12.75 MPa (130.0 kgf/cm^2, 1849 psi) for 10 seconds.
3. If any fuel leak is found, replace the nozzle piece.

Valve seat tightness	Factory spec.	No fuel leak at 12.75 MPa 130.0 kgf/cm^2 1849 psi

W10581240



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Nozzle Holder

1. Secure the nozzle retaining nut (7) with a vise.
2. Remove the nozzle holder (1), and take out parts inside.

(When reassembling)

- Assemble the nozzle in clean fuel oil.
- Install the push rod (4), noting its direction.
- After assembling the nozzle, be sure to adjust the fuel injection pressure.

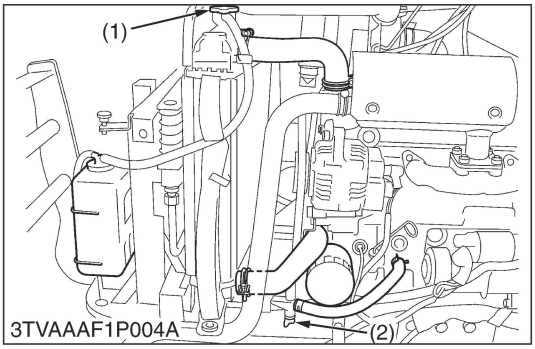
Tightening torque	Nozzle holder	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Overflow pipe nut	20 to 24 N·m 2.0 to 2.5 kgf·m 15 to 18 lbf·ft
	Nozzle holder assembly	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft

(1) Nozzle Holder
(2) Adjusting Washer
(3) Nozzle Spring
(4) Push Rod
(5) Distance Piece
(6) Nozzle Piece
(7) Nozzle Retaining Nut

W10586760

[2] SEPARATING ENGINE

(1) Draining Coolant, Engine Oil



Draining Coolant

CAUTION

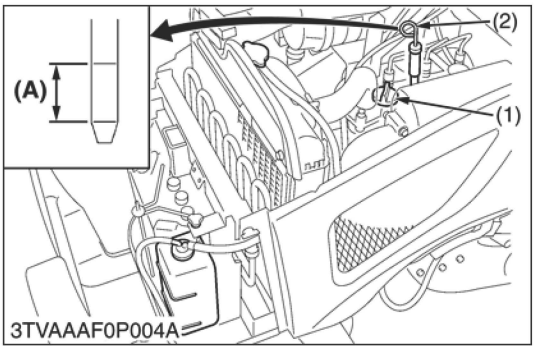
- **Since hot water will spout out from the radiator, do not open the radiator cap while the engine operates. Do not open the radiator cap immediately after stopping the engine.**

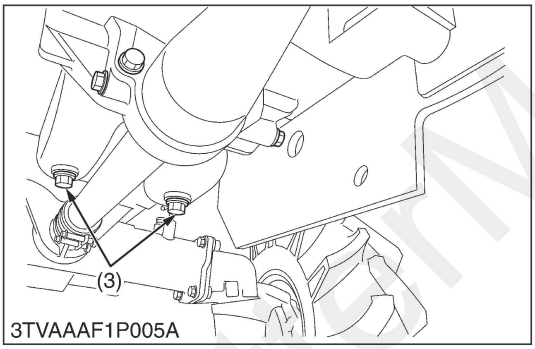
1. Loosen the drain cock (2) from the radiator hose to drain coolant.
2. Remove the radiator cap (1) to drain coolant smoothly.

Coolant	Capacity	4.5 L 4.7 U.S.qts 4.0 Imp.qts

(1) Radiator Cap (2) Drain Cock

W1038342





Draining Engine Oil

CAUTION

- **Be sure to stop the engine before changing the oil.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plug at the bottom of the engine and drain the oil completely into the oil pan.
   All the used oil can be drained out easily when the engine is still warm.
2. After draining reinstall the drain plug.
3. Fill with the new oil up to the upper notch on the dipstick. (See page G-8.)

Oil capacity (with filter)	3.0 L 3.2 U.S.qts 2.6 Imp.qts

(1) Oil Inlet
(2) Dipstick
(3) Drain Plug (both sides)

(A) Oil level is acceptable within this range.

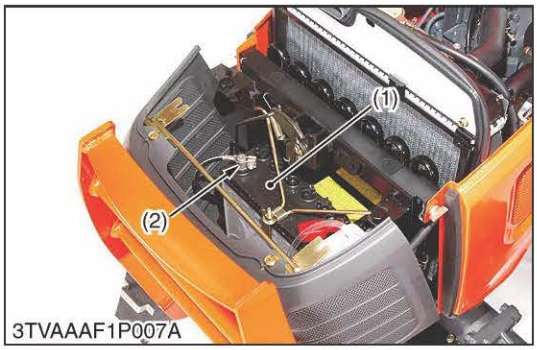
W1075525

(2) Separating Front Loader, Backhoe and Main Frame

Front Loader and Backhoe

1. Refer to "**9. FRONT LOADER**" section and "**10. BACKHOE**" section.

W1038999



Battery Negative Cable

1. Open the bonnet and disconnect the battery negative cable from the battery.

(When reassembling)

■ **NOTE**

- **When connecting the battery cords, connect the battery positive cable first.**

(1) Battery (2) Negative Cable

W10404050

Front Wheel Drive Shaft

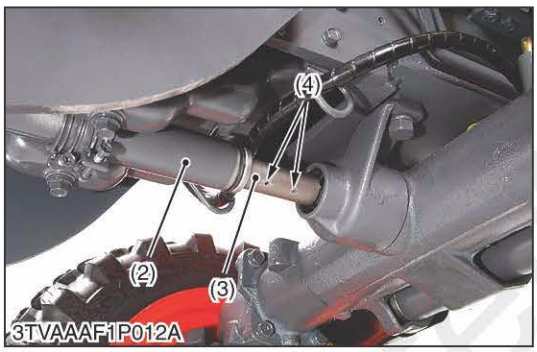
1. Loose the front wheel drive shaft cover band screws (1).
2. Slide the front wheel drive shaft cover (2) to the rear.
3. Tap out the coupling spring pins (4).
4. Remove the front wheel drive shaft.

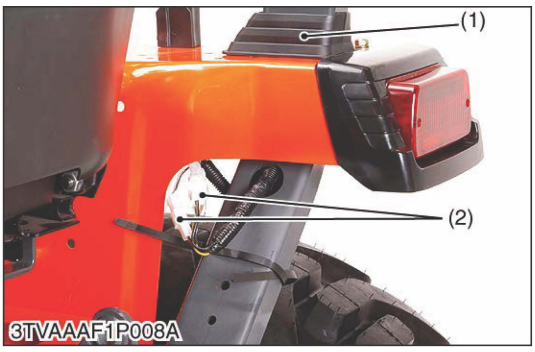
(When reassembling)

- Apply grease to the splines of the front wheel drive shaft.

(1) Screw (3) Coupling
(2) Cover (4) Spring Pin

W1042656



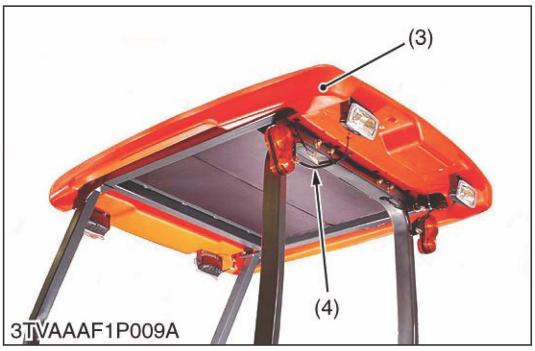


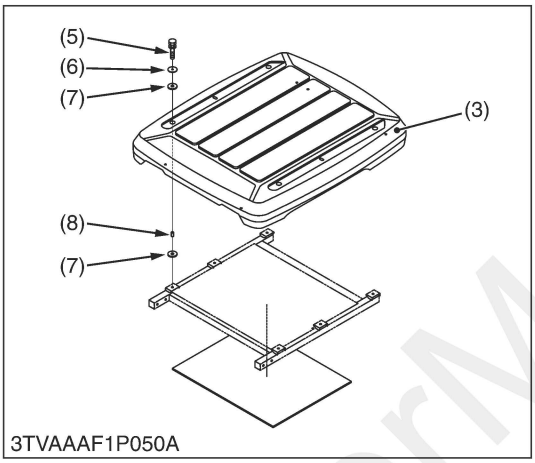
Canopy

1. Disconnect the connectors (2).
2. Remove the rubber (1).
3. Disconnect the hazard light connectors (4).
4. Remove the canopy (3) with wiring harness.

(1) Rubber
(2) Connector
(3) Canopy
(4) Connector
(5) Bolt
(6) Plane Washer
(7) Cution
(8) Collar

W1042198





Frames

1. Remove the upper frame (2).
2. Remove the front frames (1) (3).

(1) Front Frame, RH
(2) Upper Frame
(3) Front Frame, LH

W1042406

Rear Wheels

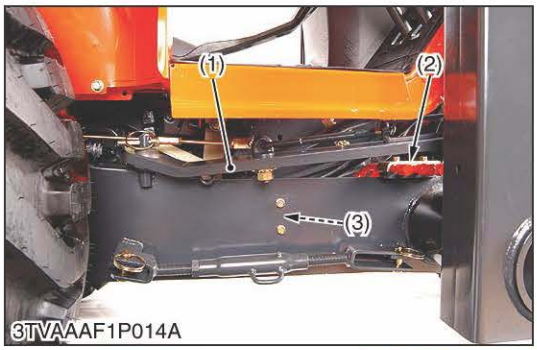
1. Place a hydraulic jack under the frame and jack up the tractor.
2. Remove the rear wheel mounting belts and nuts.
3. Remove the rear wheels (1) (2).
4. Place the rigid jacks under the rear axles. And remove the hydraulic jack.

(When reassembling)

Tightening torque	Rear wheel mounting bolts	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Rear wheel mounting nuts	167 to 191 N·m 17 to 19.5 kgf·m 123 to 141 lbf·ft

(1) Rear Wheel, LH (1) Rear Wheel, RH

W1043116

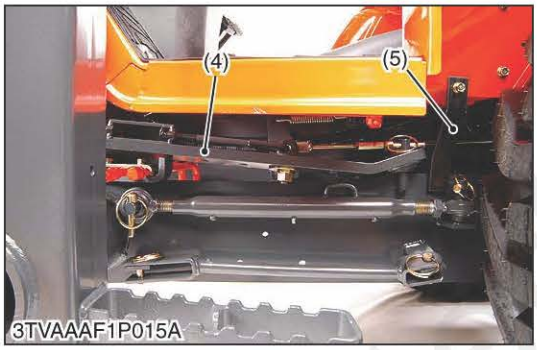


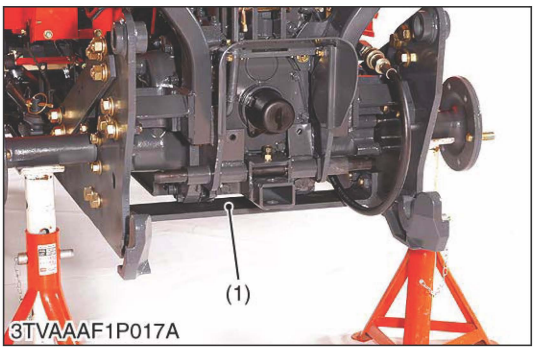
Lower Links and Pipe Clamps

1. Remove the lower links (1) (4).
2. Remove the pipe clamps (2) (3) (6).
3. Remove the step support (5).

(1) Lower Link, RH
(2) Pipe Clamp
(3) Pipe Clamp
(4) Lower Link, LH
(5) Step Support
(6) Pipe Clamp

W1043339



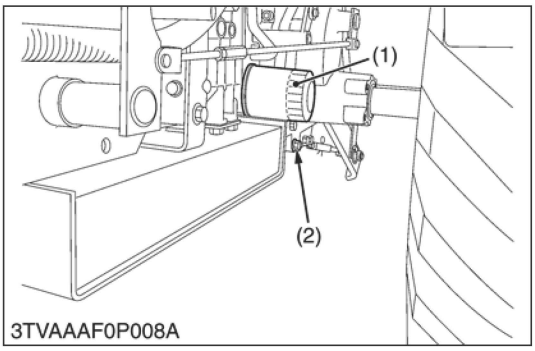


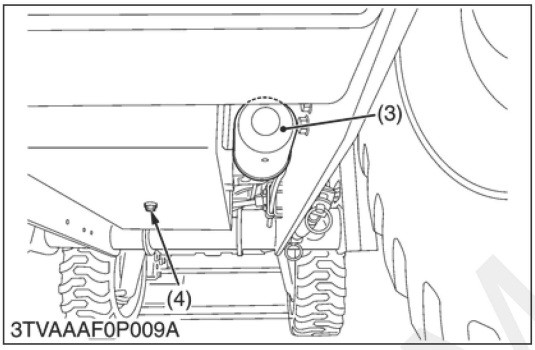
Main Frame Connecting Plate

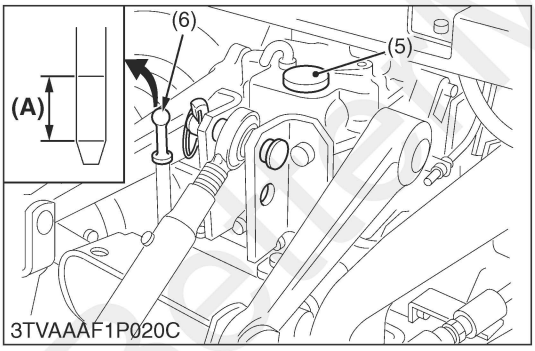
1. Remove the main frame connecting plate (1).

(1) Main Frame Connecting Plate

W1043787







Draining Transmission Fluid / Replacing Transmission Oil Filter

CAUTION

- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plug at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.
3. Remove the oil filter.
4. Put a film of clean transmission oil on the rubber seal of the new filter.
5. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
6. Fill with new KUBOTA SUPER UDT fluid up to the upper notch on the dipstick. (See page G-8.)
7. After running the engine for a few minutes, stop it and check the oil level again, add oil to the prescribed level.
8. After the new filter has been replaced, the transmission fluid level will decreased a little. Make sure that the transmission fluid does not leak through the seal, and check the fluid level. Top off if necessary.
9. Properly dispose of used oil.

■ IMPORTANT

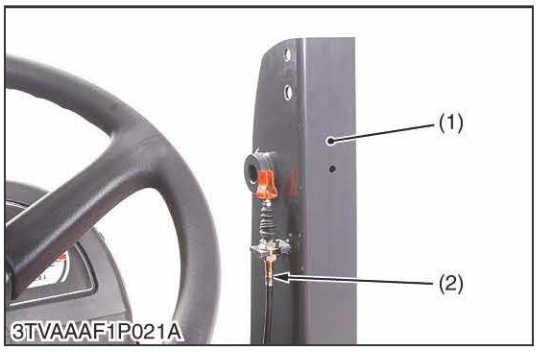
- **To prevent serious damage to the hydraulic system, use only a KUBOTA genuine filter.**
- **If the 3-point hitch can not be raised by setting the hydraulic control lever to the UP position after long term storage or when changing the transmission oil, turn steering wheel to the right and left several times to bleed air from the system.**
- **Do not operate the tractor immediately after changing the transmission fluid.**

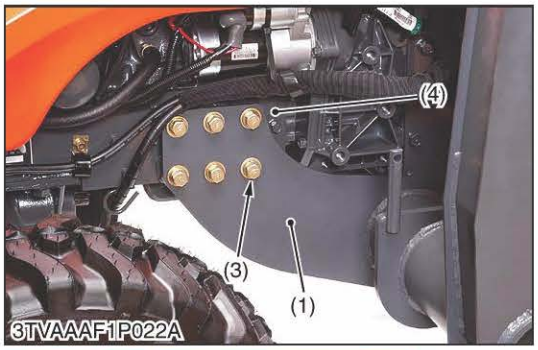
Transmission fluid capacity (with oil tank)	26.0 L 6.9 U.S.gals 5.7 Imp.gals

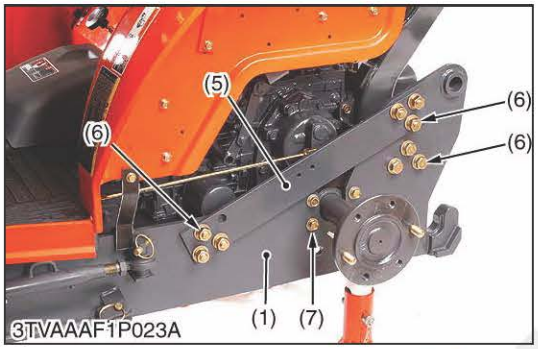
(1) Filter (HST)
(2) Drain Plug (Both Sides)
(3) Filter
(4) Drain Plug
(5) Oil Inlet
(6) Dipstick

(A) Oil level is acceptable within this range.

W1076317







Loosing Main Frame Mounting Bolts and Nuts

1. Loosing the lock nut from the main frame.
2. Remove the spill guard cable (2) from the main frame (1).
3. Loose the main frame mounting bolts.
4. Remove the connecting plate mounting bolts.
5. remove the connecting plates (5).

(When reassembling)

Tightening torque	Main frame mounting bolt (front side) (M14, 9T)	170 to 200 N·m 17 to 20 kgf·m 125 to 145 lbf·ft
	Main frame mounting bolt (rear side) (M16)	200 to 225 N·m 20 to 23 kgf·m 145 to 166 lbf·ft
	Rear axle mounting bolt (M12)	105 to 120 N·m 11 to 12 kgf·m 78 to 88 lbf·ft

(1) Main Frame
(2) Spill Guard Cable
(3) Bolt (M14)
(4) Front Axle Frame
(5) Connecting Plate
(6) Bolt and Nut (M16)
(7) Bolt (M12)

W1045366

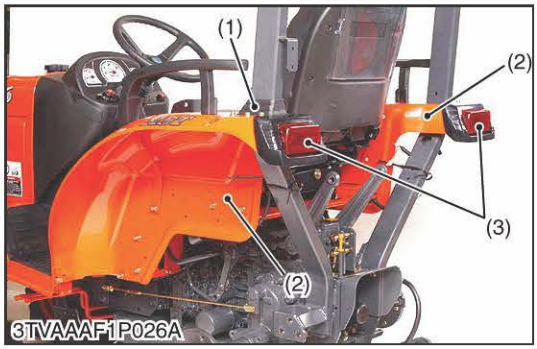
Main Frame

1. Hoist the rear side of the main frame (1).
2. Dismount the rear side of the main frame slowly.
3. Hoist the front side of the main frame (2) slowly.

(1) Rear Side of Main Frame
(2) Front Side of Main Frame

W1045959

(3) Separating Front Axle and Front Frame as a Unit

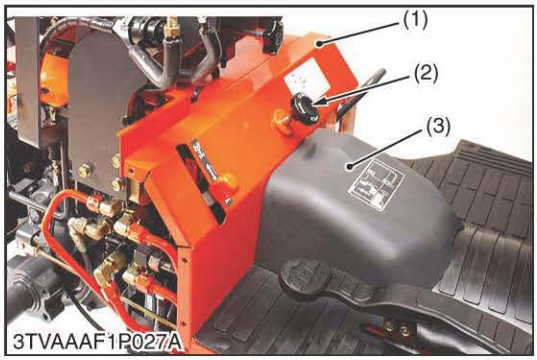


Fenders

1. Disconnect the tail light connectors.
2. Remove the tail light assemblies (3).
3. Remove the rubber (1).
4. Remove the fenders (2).

(1) Rubber
(2 Fender
(3) Tail Light Assembly

W1067655

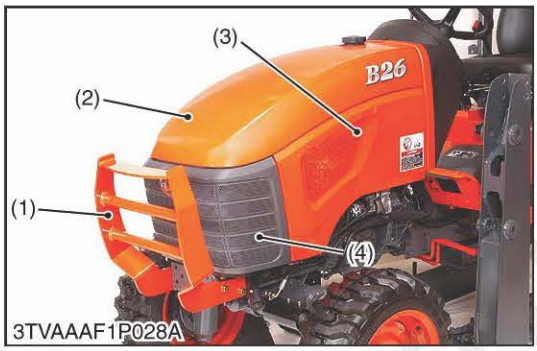


Front Cover and Floor Cover

1. Remove the front cover (3).
2. Remove the lowering speed adjusting knob (2).
3. Remove the floor cover (1).

(1) Floor Cover
(2 Lowering Speed Adjusting Knob
(3) Front Cover

W1068448

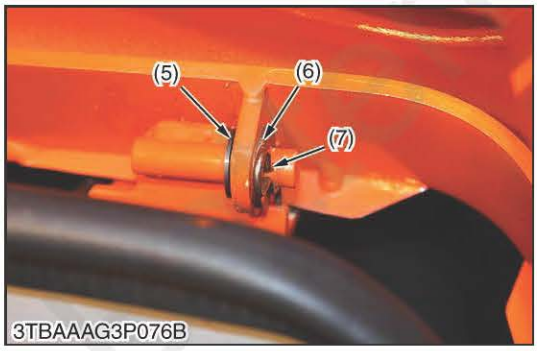


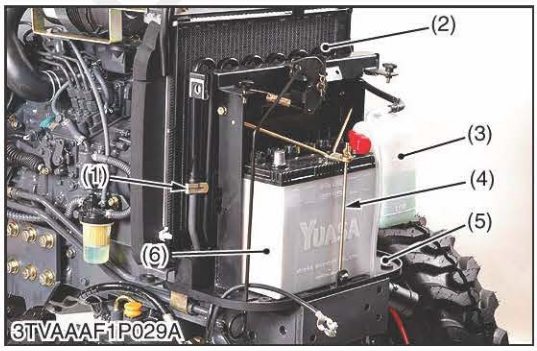
Front Guard, Bonnet and Under Cover

1. Remove the front guard (1).
2. Open the bonnet and remove the bonnet mounting snap pin. Remove the bonnet (2).
3. Remove the under cover (3).
4. Remove the front grill (4).

(1) Front Guard
(2) Bonnet
(3) Under Cover
(4) Front Grill
(5) Bush
(6) Plain Washer
(7) Snap Pin

W1069219



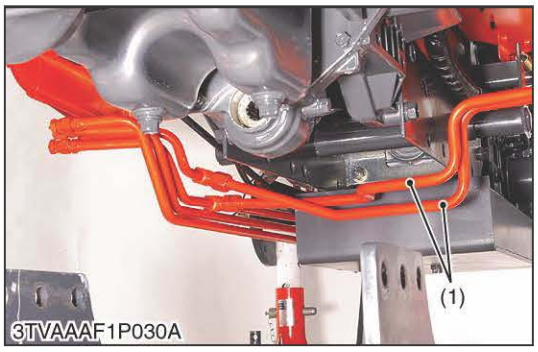


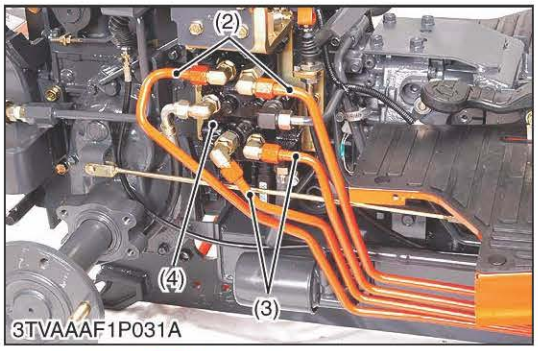
Battery, Coolant Recovery Tank and Oil Cooler

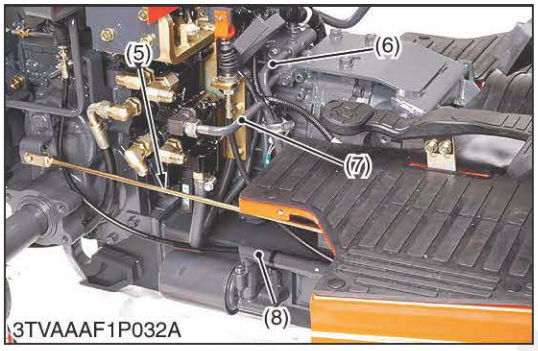
1. Remove the battery retainer (4).
2. Disconnect the battery cable.
3. Remove the coolant recovery tank (3).
4. Remove the battery (6) and the battery bracket (5).
5. Remove the oil cooler pipe clamps (1).
6. Remove the oil cooler (2) to upper side.

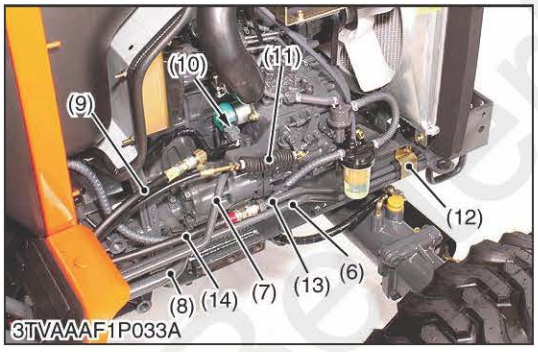
(1) Oil Cooler Pipe Clamp
(2) Oil Cooler
(3) Coolant Recovery Tank
(4) Battery Retainer
(5) Battery Bracket
(6) Battery

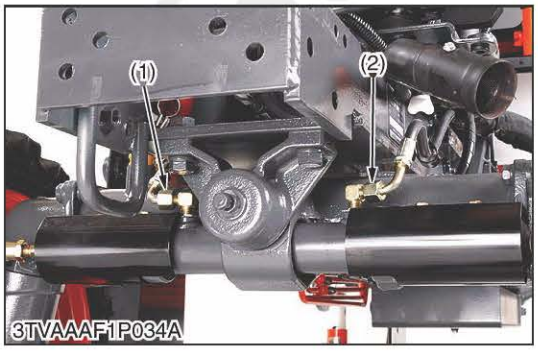
W1070045











Loader Pipe, Hydraulic Pipes and Hoses

1. Remove the loader pipes (1) (2) (3) from the front loader valve (4).
2. Remove the brake rod RH (5).
3. Disconnect the delivery pipe (7).
4. Disconnect the PTO delivery pipe (6).
5. Disconnect the suction pipe (8).
6. Disconnect the power steering delivery hose (9).
7. Disconnect the throttle wire (11) and stop solenoid connector (10).
8. Remove the pipe clamp (12).
9. Remove the delivery pipe (7), PTO delivery pipe (6), oil cooler pipe (13) and suction pipe (8).

(When reassembling)

- Do not damage the O-ring.
- Check the oil leakage from the pipe and hose connections.

(1) Loader Pipe
(2) Loader Pipe
(3) Loader Pipe
(4) Front Loader Valve
(5) Brake Rod, RH
(6) PTO Delivery Pipe
(7) Delivery Pipe
(8) Suction Pipe
(9) Power Steering Delivery Hose
(10) Stop Solenoid Connector
(11) throttle Wire
(12) Clamp
(13) Oil Cooler Pipe
(14) Hose

W1070867

Power Steering Cylinder Hoses

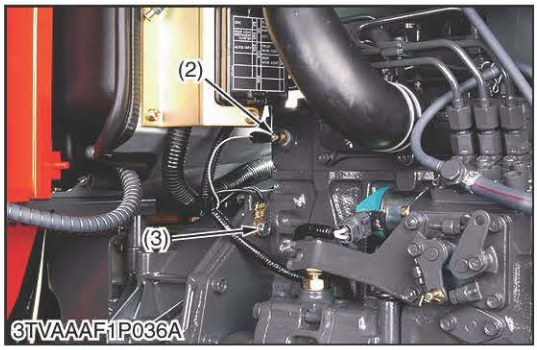
1. Disconnect the power steering cylinder hose (1) (2).

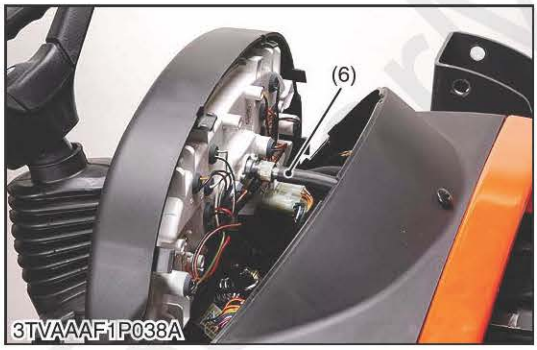
(When reassembling)

- Check power steering oil not to leak from the connections.

(1) Power Steering Hose, RH
(2) Power Steering Hose, LH

W1071799





Wiring Leads, Stay and Hour Meter Cable

1. Disconnect the glow plug lead (1).
2. Disconnect the lead (2) from the water temperature sensor.
3. Disconnect the ground lead (3) from the rear-end plate.
4. Disconnect the over flow pipes (4) from the fuel tank.
5. Remove the fuel tank stay (5).
6. Disconnect the hour meter cable (6) from the meter panel.

(1) Glow Plug Lead
(2) Lead
(3) Ground Lead
(4) Over Flow Pipe
(5) Fuel Tank Stay
(6) Hour Meter Cable

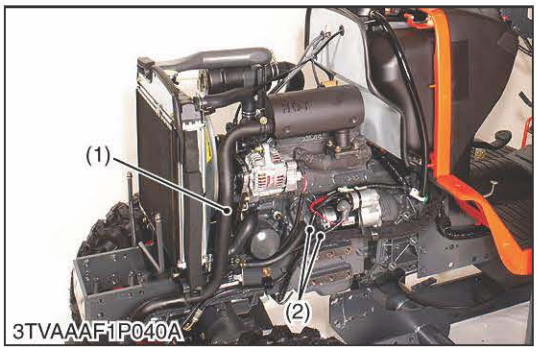
W1072546

Fuel Hose

1. Disconnect the fuel hoses (2) (3) from the fuel filter.
2. Disconnect the overflow pipe (1).

(1) Over Flow Pipe
(2) Fuel Hose
(3) Fuel Hose

W1073355

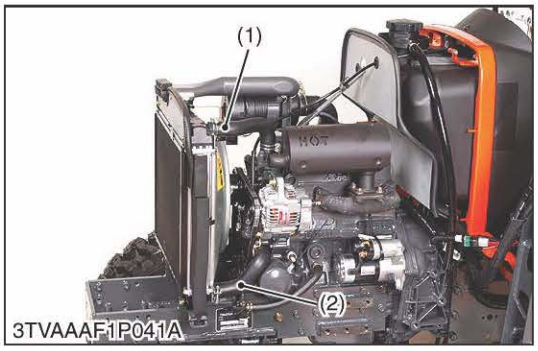


Wiring Harness and Muffler Pipe

1. Disconnect the wiring harness (2) from the alternator, the engine oil switch and the starter motor.
2. Remove the muffler pipe (1).

(1) Muffler Pipe (2) Wiring Harness

W1074086



Radiator Front Axle and Engine

1. Disconnect the radiator hoses (1) (2).
2. Remove the radiator from the engine.
3. Remove the front axle mounting bolts.
4. Hook the engine with a hoist.
5. Separate the front axle with frame from the engine.
6. Remove the stator motor (3).
7. Remove the engine mounting bolts.
8. Dismount the engine from the tractor body.
9. Mount the engine on a engine stand.

(When reassembling)

- Tighten the radiator hose bands securely.

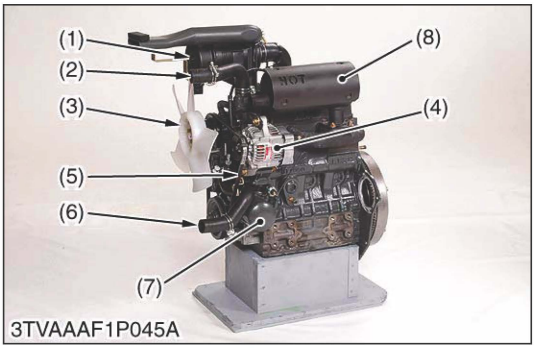
Tightening torque	Front axle frame mounting screw (M10, 9T)	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
	Engine mounting bolt (M12)	63 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft

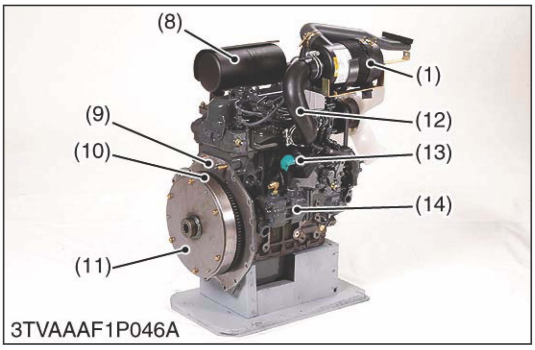
(1) Radiator Hose (3) Stator Motor
(2) Radiator Hose

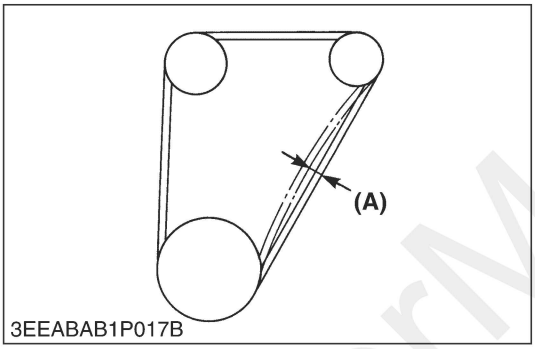
W1066309

[3] DISASSEMBLING AND ASSEMBLING

(1) External Components







Engine External Components

1. Remove the air-cleaner assembly (1).
2. Remove the radiator hoses (2) (6).
3. Remove the cooling fan(3) and the fan belt (5).
4. Remove the alternator (4) and the engine oil filter cartridge (7)
5. Remove the exhaust muffler (8).
6. Remove the air-cleaner inlet hose (12)
7. Remove the engine stop solenoid (13)
8. Remove the hydraulic pump assembly (14)
9. Remove the steel plate (11) from the fly wheel (10).

(When reassembling)

- Adjust the fan belt tension securely.

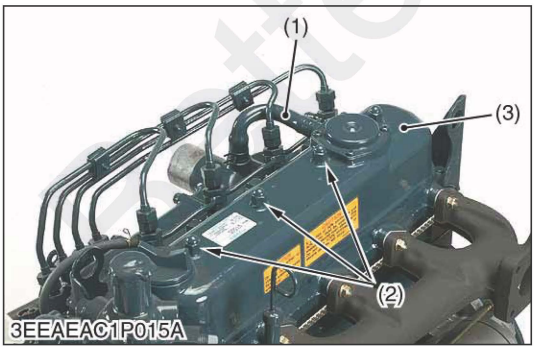
Deflection **(A)**	Factory spec.	7.0 to 9.0 mm 0.28 to 0.35 in.

(1) Air Cleaner Assembly
(2) Radiator Hose
(3) Cooling Fan
(4) Alternator
(5) Fan Belt
(6) Radiator Hose
(7) Engine Oil Filter Cartridge
(8) Exhaust Muffler
(9) Rear End Plate
(10) Fly Wheel
(11) Steel Plate
(12) Air Cleaner Inlet Hose
(13) Engine Stop Solenoid
(14) Hydraulic Oil Pump Assembly

(A) Deflection

W10178940

(2) Cylinder Head and Valve and Oil Pan



Cylinder Head Cover

1. Disconnect the breather hose (1).
2. Remove the head cover nut (2).
3. Remove the cylinder head cover (3).

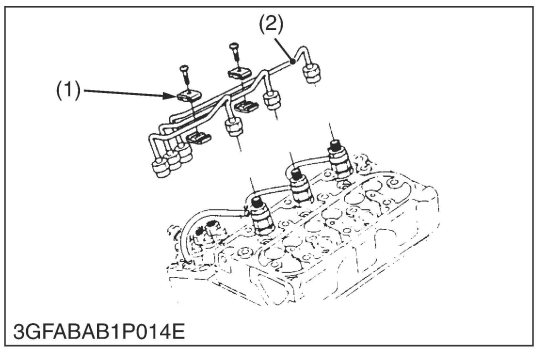
(When reassembling)

- Check to see if the cylinder head cover gasket is not defective.

Tightening torque	Cylinder head cover nut	6.9 to 8.8 N·m 0.70 to 0.90 kgf·m 5.1 to 6.5 lbf·ft

(1) Breather Hose
(2) Head Cover Screws
(3) Cylinder Head Cover

W1103532



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Injection Pipes

1. Loosen the screws on the pipe clamp (1).
2. Detach the injection pipes (2).

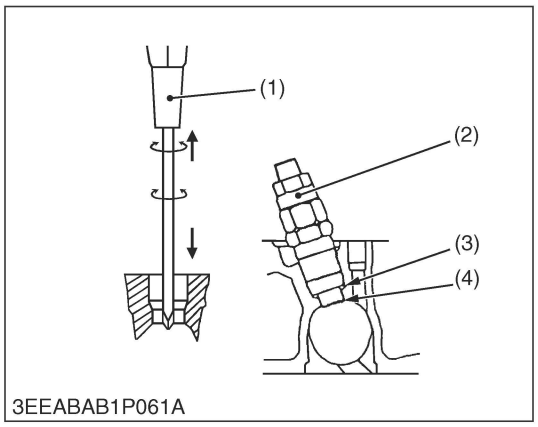
(When reassembling)

- Sent compressed air into the pipes to blow out dust. Then, reassemble the pipes in the reverse order.

Tightening torque	Injection pipe retaining nut	25 to 34 N·m 2.5 to 3.5 kgf·m 18 to 25 lbf·ft

(1) Pipe Clamp (2) Injection Pipe

W1113866



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Nozzle Heat Seal Service Removal Procedure

■ **IMPORTANT**

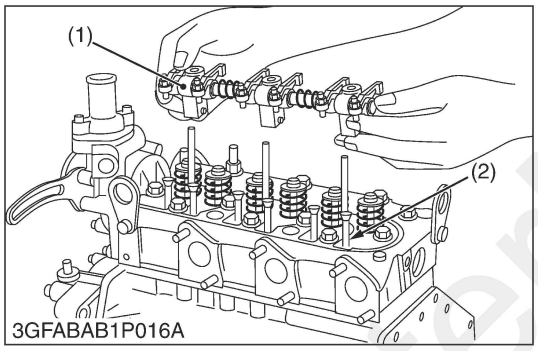
- **Use a plus (phillips head) screw driver of which Dia. is bigger than the heat seal hole (Approx. 6 mm (1/4 in.)).**

1. Drive screw driver lightly into the heat seal hole.
2. Turn screw driver three or four times each way.
3. While turning the screw driver, slowly pull the heat seal out together with the injection nozzle gasket.

If the heat seal drops, repeat the above procedure. Heat seal and injection nozzle gasket must be changed when the injection nozzle is removed for cleaning or for service

(1) Plus Screw Driver (3) Injection Nozzle Packing
(2) Injection Nozzle (4) Heat Seal

W1104847



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Rocker Arm and Push Rod

1. Remove the rocker arm bracket nut.
2. Detach the rocker arm assembly (1).
3. Remove the push rods (2).

(When reassembling)

- When putting the push rods (2) onto the tappets (3), check to see if their ends are properly engaged with the dimples.

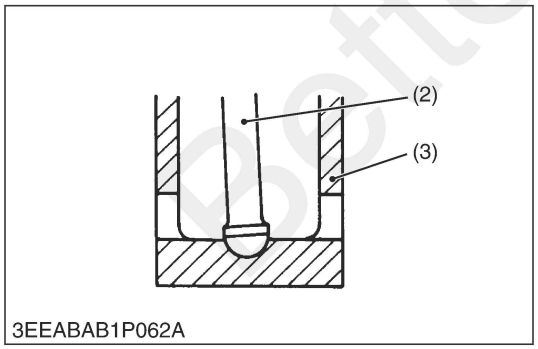
■ **IMPORTANT**

- **After installing the rocker arm, be sure to adjust the valve clearance.**

Tightening torque	Rocker arm bracket nut	22 to 26 N·m 2.2 to 2.7 kgf·m 16 to 19 lbf·ft

(1) Rocker Arm Assembly (3) Tappet
(2) Push Rod

W1104997



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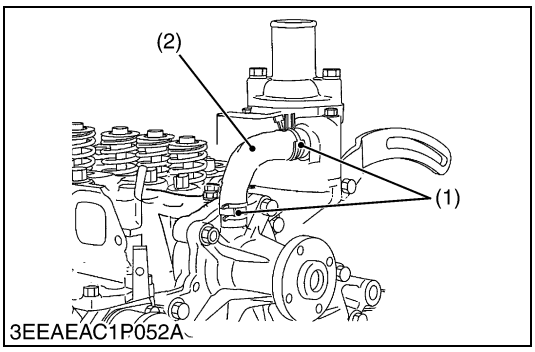

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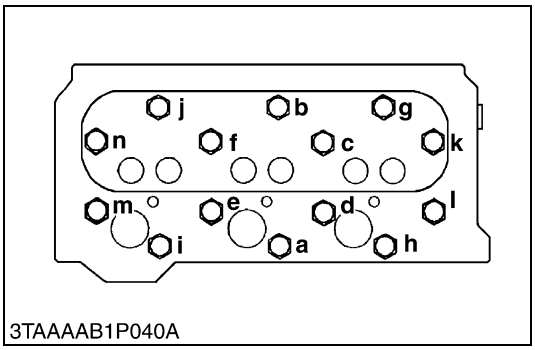

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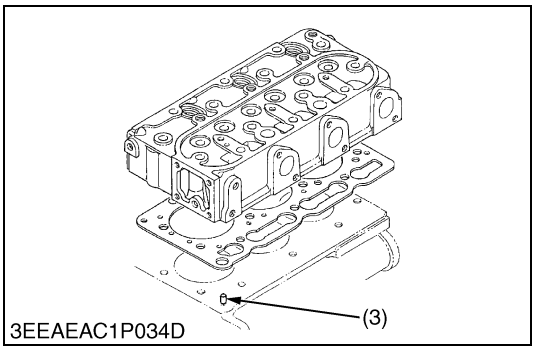

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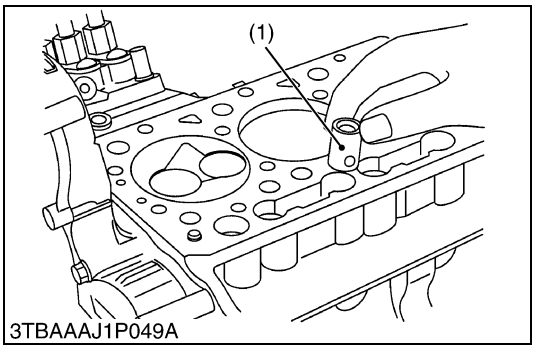

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Cylinder Head

1. Loosen the hose clamps (1), and remove the water return hose (2).
2. Remove the cylinder head screw in the order of (**n**) to (**a**).
3. Lift up the cylinder head to detach.
4. Remove the cylinder head gasket.

(When reassembling)

- Replace the cylinder head gasket with new one.
- When mounting the gasket, set it to the pin pipe holes. Take care not to mount it reversely.
- The cylinder head should be free of scratches and dust.
- Install the cylinder head, using care not to damage the gasket.
- After applying engine oil to the thread of screws, tighten them in several steps and specified sequence (**a**) to (**n**).

Tightening torque	Cylinder head screw	64 to 68 N·m 6.5 to 7.0 kgf·m 47 to 50 lbf·ft

(1) Pipe Clamp
(2) Water Return Pipe
(3) Pin Pipe

(n) to (a) : To Loosen
(a) to (n) : To Tighten

W1105524

Tappets

1. Remove the tappets (1) from the crankcase.

(When reassembling)

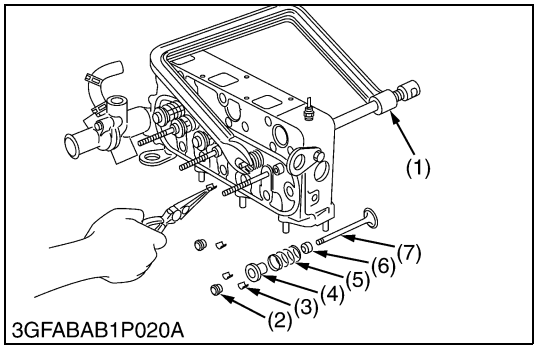
- Visually check the contact between tappets and cams for proper rotation. If defect is found, replace tappets.
- Before installing the tappets, apply engine oil thinly around them.

■ **IMPORTANT**

- **Do not change the combination of tappet and tappet guide.**

(1) Tappet

W1109239



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Valves

1. Remove the valve caps (2).
2. Remove the valve spring collet (3), pushing the valve spring retainer (4) by valve spring replacer (1).
3. Remove the valve spring retainer (4), valve spring (5) and valve stem seal (6).
4. Remove the valve (7).

(When reassembling)

- Wash the valve stem seal and valve guide hole, and apply engine oil sufficiently.
- After installing the valve spring collets, lightly tap the stem to assure proper fit with a plastic hammer.

■ **IMPORTANT**

- **Do not change the combination of valve and valve guide.**

(1) Valve Spring Replacer
(2) Valve Cap
(3) Valve Spring Collet
(4) Valve Spring Retainer
(5) Valve Spring
(6) Valve Stem Seal
(7) Valve

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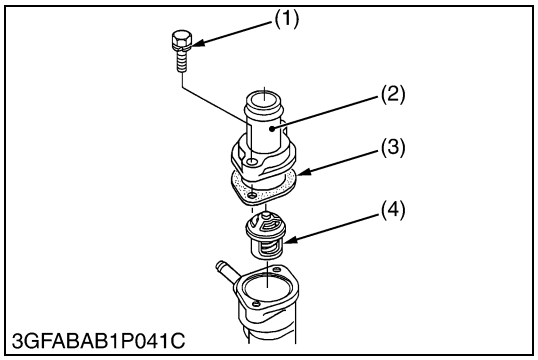

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Thermostat Assembly

1. Remove the thermostat cover mounting screws (1), and remove the thermostat cover (2).
2. Remove the thermostat assembly (4).

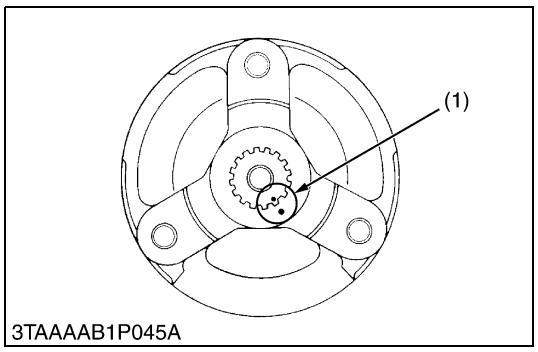
(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) only at the thermostat cover side of the gasket (3).

(1) Thermostat Cover Mounting Screw
(2) Thermostat Cover
(3) Thermostat Cover Gasket
(4) Thermostat Assembly

W1130733

(3) Gear Case



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Fan Drive Pulley

1. Secure the flywheel to keep it from turning.
2. Remove the fan drive pulley screw.
3. Draw out the fan drive pulley with a puller.

(When reassembling)

- Install the pulley (D1105) to the crankshaft, aligning the mark (1) on them.
- Apply engine oil to the fan drive pulley retaining screws. And tighten them.

Tightening torque	Fan drive pulley screw	236 to 245 N·m 24.0 to 25.0 kgf·m 174 to 180 lbf·ft

(1) Alignment Mark

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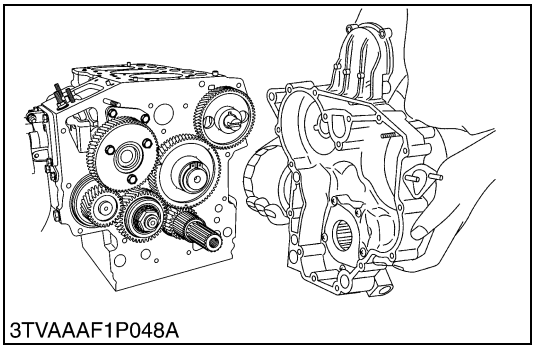
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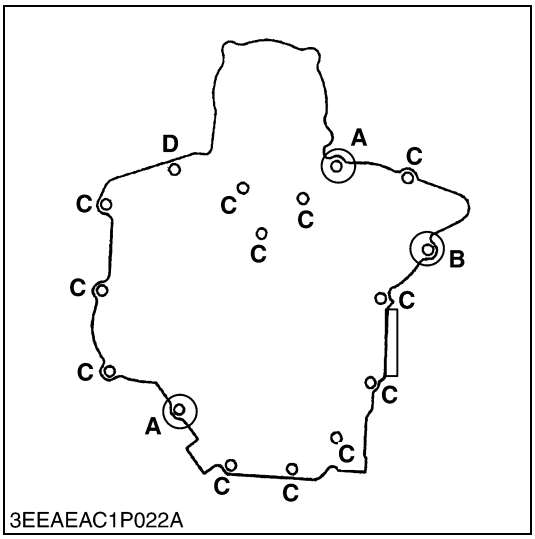

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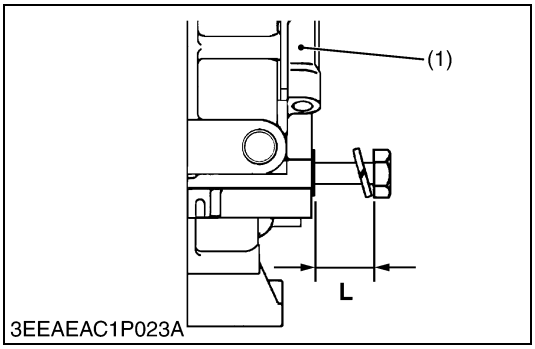

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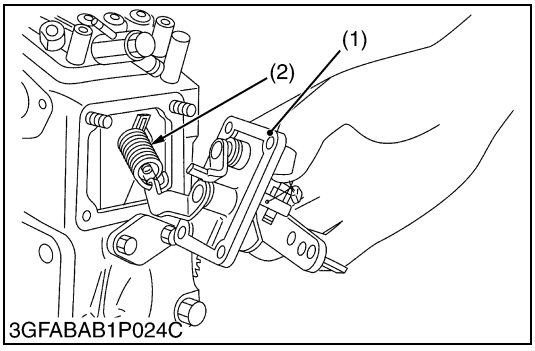

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Gear Case

1. Remove the gear case (1).

(When reassembling)

- Grease thinly to the oil seal, and install it, ensuring the lip does not come off.
- Measure the length (**L**) when the gear case mounting bolt is inserted in the gear case bolt hole and judge the installation position of the mounting bolt when you do not understand the installation position of the mounting bolt.
  A : L= 18 mm (0.71 in.) (Pipe Pin Position)
  B : L= 13 mm (0.51 in.) (Water Pipe Mounting)
  C : L= 10 mm (0.39 in.)
  D : Nut
  L : Length between the mounting bolt and the gear case surface

(1) Gear Case

W11462290

Engine Stop Solenoid and Speed Control Plate

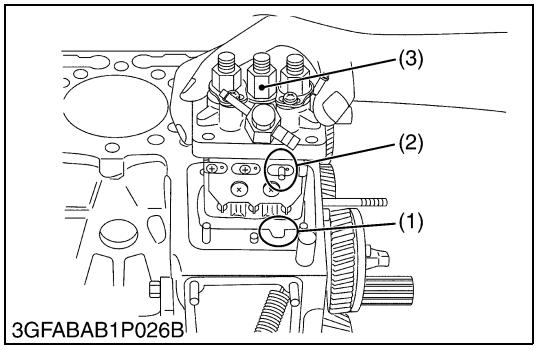
1. Remove the engine stop solenoid.
2. Disconnect the governor spring (2) from the speed control plate (1).
3. Remove the speed control plate.

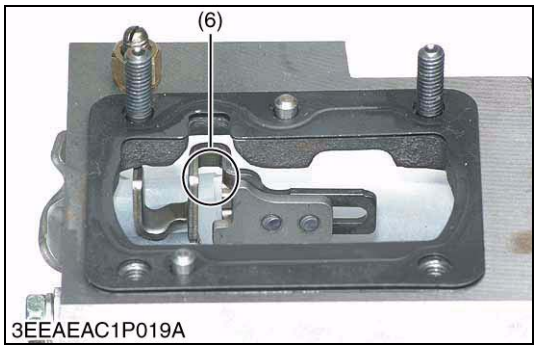
(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) to both sides of the solenoid cover gasket and control plate gasket.
- Be careful not to drop the governor springs into the crankcase.

(1) Speed Control Plate (2) Governor Spring

W11477990





Injection Pump

1. Disconnect the starter spring (4) on the thrust lever side (5).
2. Align the control rack pin (2) with the notch (1) on the crankcase, and remove the injection pump (3).
3. Remove the injection pump shims.
4. In principle, the injection pump should not be disassembled.

(When reassembling)

- When installing the injection pump, insert the control rack pin (2) firmly into the groove (6) of the thrust lever of fork lever.

■ **NOTE**

- **The sealant is applied to both sides of the soft metal gasket shim. The liquid gasket is not required for assembling.**
- **Addition or reduction of shim 0.05 mm (0.002 in.) delays or advances the injection timing by approx. 0.009 rad (0.5 °).**
- **In disassembling and replacing, be sure to use the same number or new gasket shims with the same thickness.**

(1) Notch
(2) Control Rack Pin
(3) Injection Pump
(4) Start Spring
(5) Thrust Lever
(6) Groove

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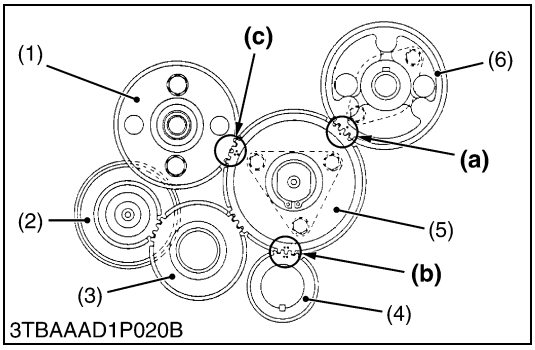

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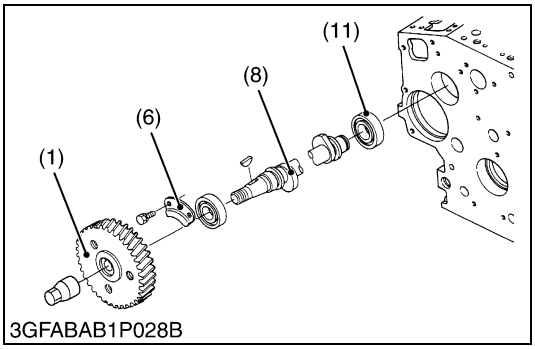

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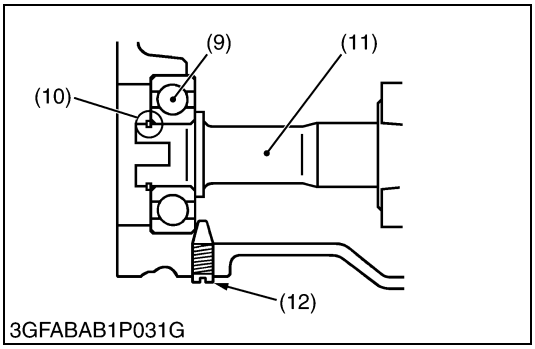

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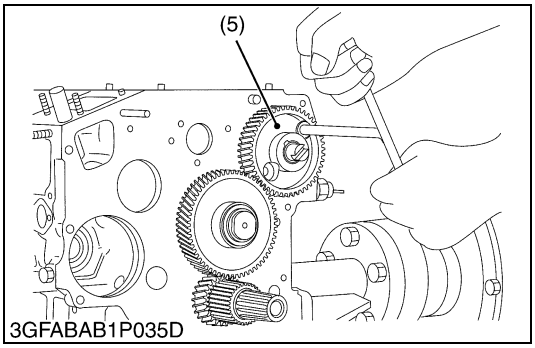

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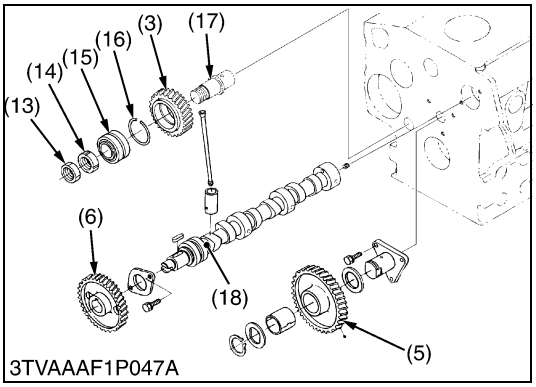

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Cam Gear and Idle Gear 1, 2

1. Remove the lock nut (13) and the bearing nut (14).
2. Remove the idle gear 2 (3) and the Idle gear 1 (5).
3. Remove the fuel camshaft stopper (7).
4. Draw out the fuel cam gear (1) with fuel camshaft (8).
5. Remove the camshaft stopper bolt.
6. Remove the cam gear (6) with camshaft (8).
7. Remove the cir-clip (10) from the governor shaft (11).
8. Remove the governor gear (2) with governor shaft (11).

(When reassembling)

- Apply engine oil thinly to the fuel camshaft before installation.
- Make sure to assemble the external snap ring of the governor shaft.
- Check the governor shaft for smooth rotation.

Tightening torque	Idle gear 2 lock nut	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft
	Idle gear 2 bearing nut	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

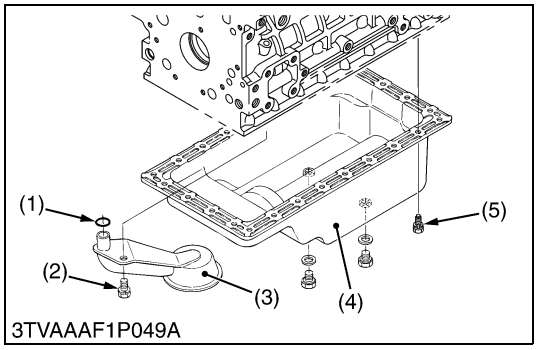
■ **IMPORTANT**

- **When replacing the ball bearing (9) of governor shaft, securely fit the ball bearing (9) to the crankcase, apply an adhesive (Three Bond 1375N or equivalent) to the set screw (12), and fasten the screw until its tapered part contacts the circumferential end of the ball bearing.**

(1) Injection Pump Gear
(2) Governor Gear
(3) Idle Gear 2
(4) Crank Gear
(5) Idle Gear 1
(6) Cam Gear
(7) Fuel Camshaft Gear
(8) Fuel Camshaft
(9) Ball Bearing
(10) Cir-clip
(11) Governor Shaft
(12) Set Screw
(13) Lock Nut
(14) Bearing Nut
(15) Taper Roller Bearing
(16) Cir-clip
(17) Idle Gear Shaft
(18) Cam Shaft

(a) Alignment Mark : Idle Gear 1 and Cam Gear 1
(b) Alignment Mark : Idle Gear 1 and Crank Gear
(c) Alignment Mark : Idle Gear 1 and Fuel Cam Gear

W11550310



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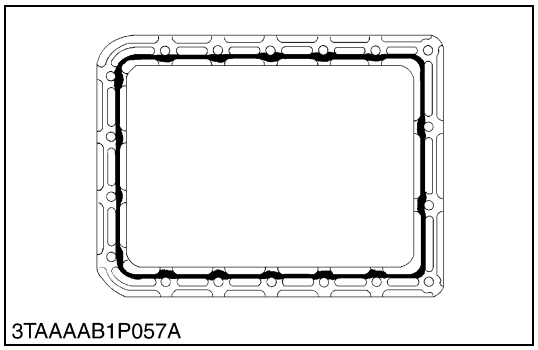
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Oil Pan and Oil Strainer

1. Remove the oil pan mounting screws (5).
2. Remove the oil pan (4).
3. Remove the oil strainer (3).

(When reassembling)

- After cleaning the oil strainer, check to see that the filter mesh is clean, and install it.
- Visually check the O-ring (1), apply engine oil, and install it.
- Securely fit the O-ring to the oil strain.
- To avoid uneven tightening, tighten oil pan mounting screws in diagonal order from the center.

■ **IMPORTANT**

- **Scrape off the old adhesive completely. Wipe the sealing surface clean using waste cloth soaked with gasoline. Now apply new adhesive 3.0 to 5.0 mm (0.12 to 0.19 in.) thick all over the contact surface. Apply the adhesive also on the center of the flange as well as on the inner wall of each screw hole.**
- **Cut the nozzle of the "liquid gasket" container at its second notch. Apply "liquid gasket" about 5 mm (0.2 in.) thick. Within 20 minutes after the application of fluid sealant, reassemble the components. Wait then for about 30 minutes, and pour oil in the crankcase.**

(1) O-ring
(2) Screw
(3) Oil Strainer
(4) Oil Pan
(5) Oil Pan Mounting Screws

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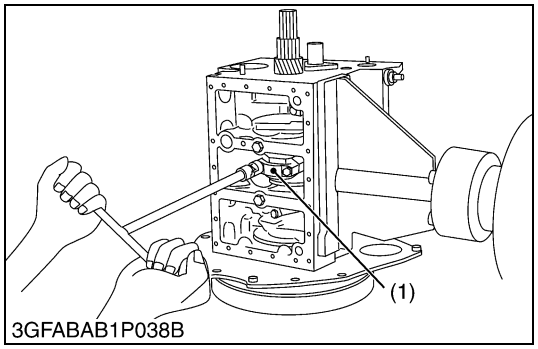
(4) Piston and Connecting Rod



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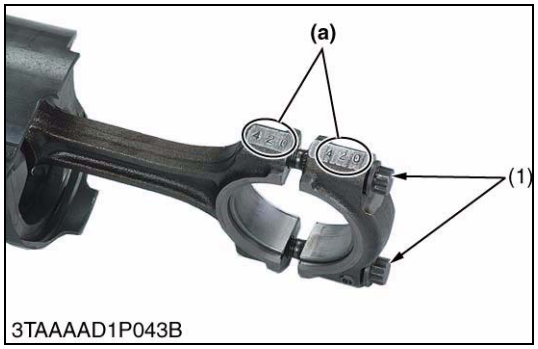

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Connecting Rod

1. Remove the connecting rod cap.

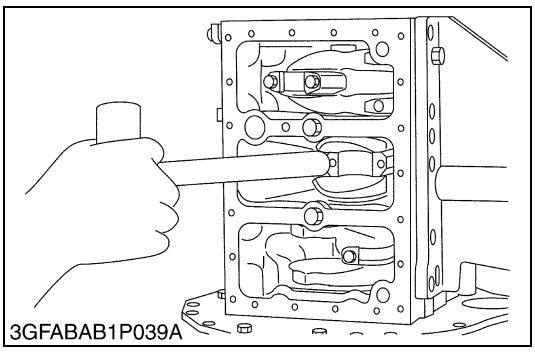
(When reassembling)

- Align the marks **(a)** with each other. (Face the marks toward the injection pump.).
- Apply engine oil to the connecting rod screws (1) and lightly screw it in by hand, then tighten it to the specified torque.
  If the connecting rod screw won't be screwed in smoothly, clean the threads.
  If the connecting rod screw (1) is still hard to screw in, replace it.

Tightening torque	Connecting rod screw	42 to 46 N·m 4.2 to 4.7 kgf·m 31 to 33 lbf·ft

(1) Connecting Rod Screw
(a) Mark

W11652500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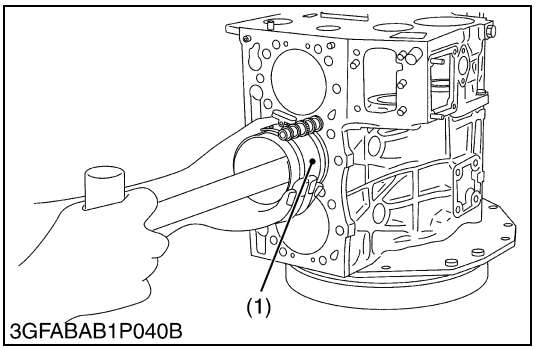

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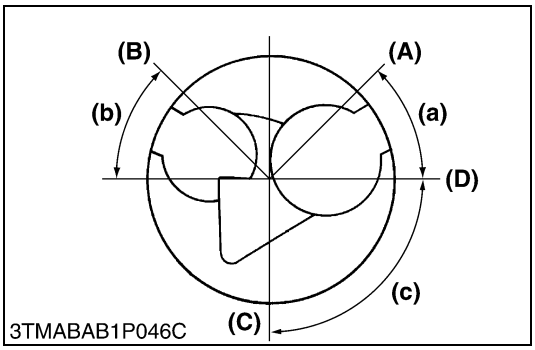

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Piston

1. Turn the flywheel and bring the piston to top dead center.
2. Draw out the piston upward by lightly tapping it from the bottom of the crankcase with the grip of a hammer.
3. Draw out the other piston in the same method as above.

(When reassembling)

- Before inserting the piston into the cylinder, apply enough engine oil to the piston.
- When inserting the piston into the cylinder, face the mark on the connecting rod to the injection pump.

■ **IMPORTANT**

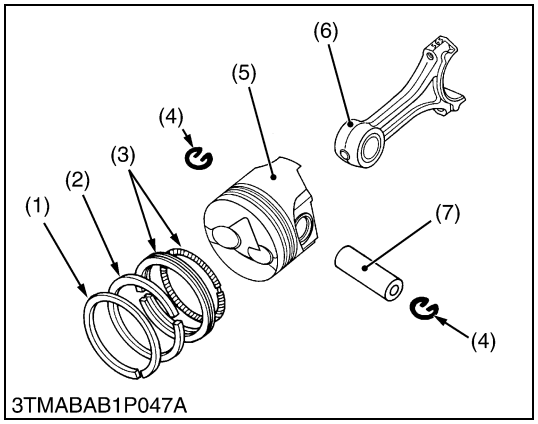
- **Do not change the combination of cylinder and piston. Make sure of the position of each piston by marking. For example, mark "1" on the No.1 piston.**
- **When installing the piston into the cylinder, place the gaps of all the piston rings as shown in the figure.**
- **Carefully insert the piston using a piston ring compressor (1). Otherwise, their chrome-plated section may be scratched, causing trouble inside the cylinder.**

(1) Piston Ring Compressor

(A) Top Ring Gap
(B) Second Ring Gap
(C) Oil Ring Gap
(D) Piston Pin Hole

(a) 0.79 rad (45 °)
(b) 0.79 rad (45 °)
(c) 1.6 rad (90 °)

W11665130



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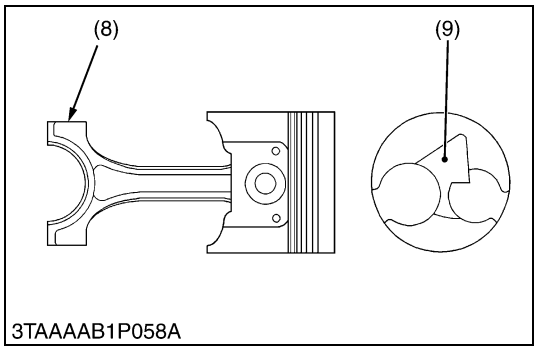

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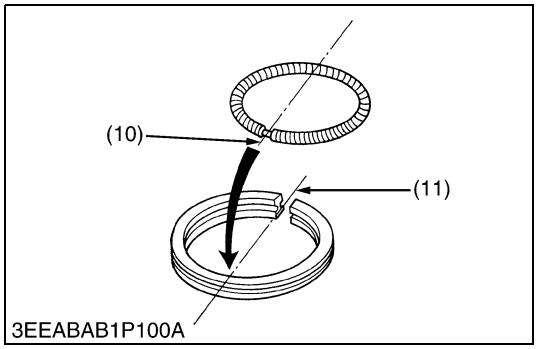

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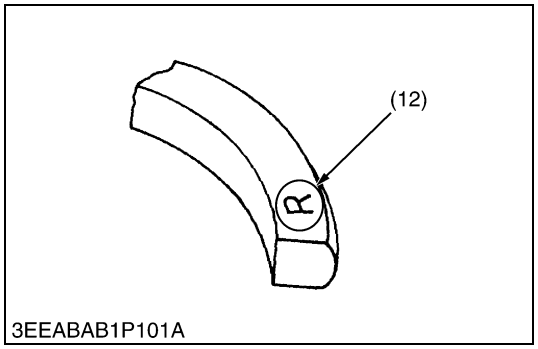

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Piston Ring and Connecting Rod

1. Remove the piston rings using a piston ring tool.
2. Remove the piston pin (7), and separate the connecting rod (6) from the piston (5).

(When reassembling)

- When installing the ring, assemble the rings so that the manufacturer's mark (12) near the gap faces the top of the piston.
- When installing the oil ring onto the piston, place the expander joint (10) on the opposite side of the oil ring gap (11).
- Apply engine oil to the piston pin.
- When installing the connecting rod to the piston, immerse the piston in 80 °C (176 °F) oil for 10 to 15 minutes and insert the piston pin to the piston.
- When installing the connecting rod to the piston, align the mark (8) on the connecting rod to the fan-shaped concave (9).

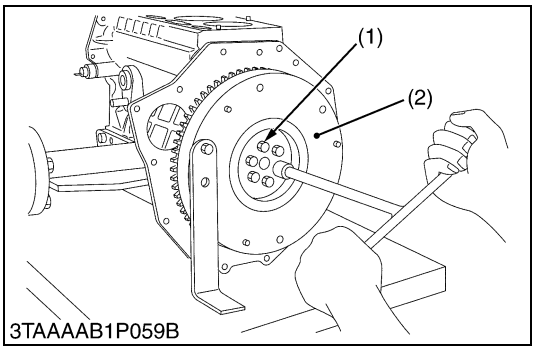
■ **NOTE**

- **Mark the same number on the connecting rod and the piston so as not to change the combination.**

(1) Top Ring
(2) Second Ring
(3) Oil Ring
(4) Piston Pin Snap Ring
(5) Piston
(6) Connecting Rod
(7) Piston Pin
(8) Mark
(9) Fan-Shaped Concave
(10) Expander Joint
(11) Oil Ring Gap
(12) Manufacturer's Mark

W11728660

(5) Crankshaft



Flywheel

1. Secure the flywheel to keep it from turning, using a flywheel stopper.
2. Remove all flywheel screws (1) and then remove the flywheel (2).

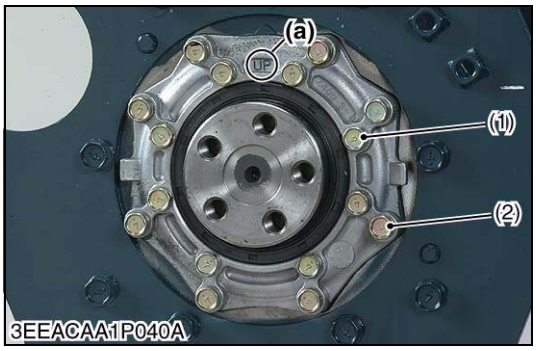
(When reassembling)

- Apply engine oil to the threads and the undercut surface of the flywheel screw and fit the screw.

Tightening torque	Flywheel screw	54 to 58 N·m 5.5 to 6.0 kgf·m 40 to 43 lbf·ft

(1) Flywheel Screw (2) Flywheel

W11754860



Bearing Case Cover

1. Remove the bearing case cover mounting screws.
2. Remove the bearing case cover (6).

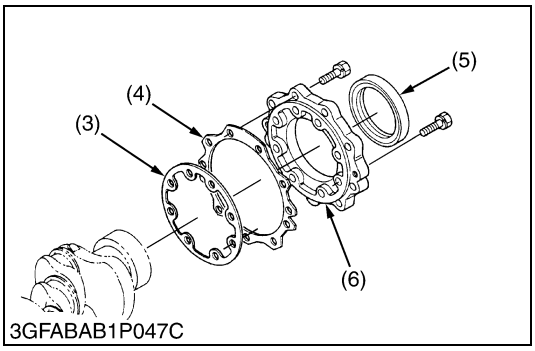
(When reassembling)

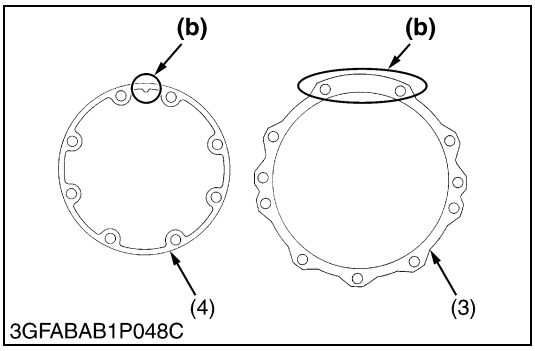
- Fit the bearing case gasket (3) and the bearing case cover gasket (4) with correct directions.
- Install the bearing case cover (6) to position the casting mark "**UP" (a)** on it upward.
- Apply engine oil to the oil seal (5) lip and take care that it is not rolled when installing.
- Tighten the bearing case cover mounting screws with even force on the diagonal line.

Tightening torque	Bearing case cover screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft

(1) Bearing Case Cover Mounting Screw (Inside)
(2) Bearing Case Cover Mounting Screw (Outside)
(3) Bearing Case Gasket
(4) Bearing Case Cover Gasket
(5) Oil Seal
(6) Bearing Case Cover
(a) Top Mark "UP"
(b) Up Side

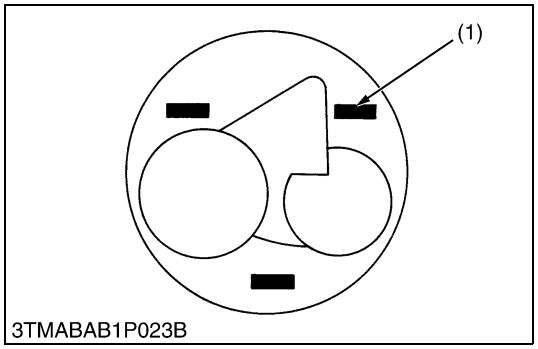
W11791000





[4] SERVICING

(1) Cylinder Head and Valves



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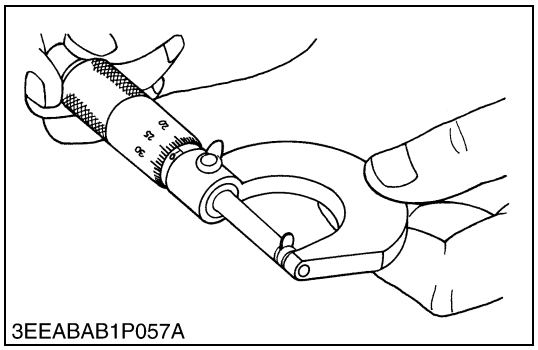
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Top Clearance

1. Remove the cylinder head. (Do not attempt to remove the cylinder head gasket.)
2. Move the piston up, and stick a strip of fuse [1.5 mm dia. (0.059 in. dia.), 5.0 to 7.0 mm long (0.20 to 0.27 in. long)] on the piston head at three positions with grease so as to avoid the intake and exhaust valves and the combustion chamber ports.
3. Lower the piston, and install the cylinder head and tighten the cylinder head screws to the specified torque.
4. Turn the flywheel until the piston exceeds top dead center.
5. Remove the cylinder head, and measure the thickness of the squeezed fuses.
6. If the measurement is not within the factory specifications, check the oil clearance between the crankpin and crankpin bearing and between the piston pin and small end bushing.

■ **NOTE**

- **After checking the top clearance, be sure to assemble the cylinder head with a new cylinder head gasket.**

Top clearance	Factory spec.	0.55 to 0.70 mm 0.022 to 0.027 in.

Tightening torque	Cylinder head screws	64 to 68 N·m 6.5 to 7.0 kgf·m 47 to 50 lbf·ft

(1) Fuse

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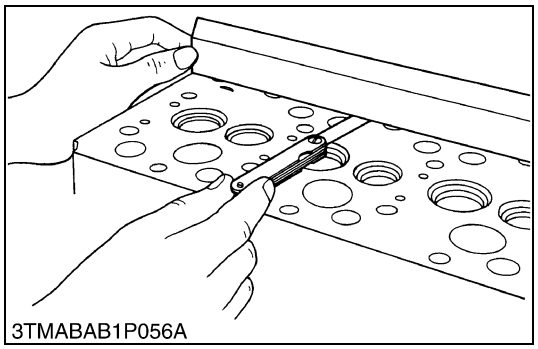
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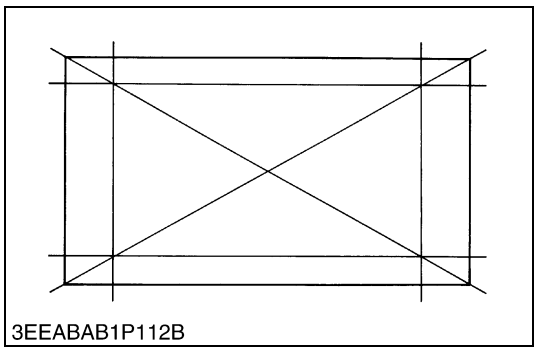
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Cylinder Head Surface Flatness

1. Clean the cylinder head surface.
2. Place a straightedge on the cylinder head's four sides and two diagonal as shown in the figure.
3. Measure the clearance with a thickness gauge.
4. If the measurement exceeds the allowable limit, correct it with a surface grinder.

■ **IMPORTANT**

- **Do not place the straightedge on the combustion chamber.**
- **Be sure to check the valve recessing after correcting.**

Cylinder head surface flatness	Allowable limit	0.05 mm 0.002 in.

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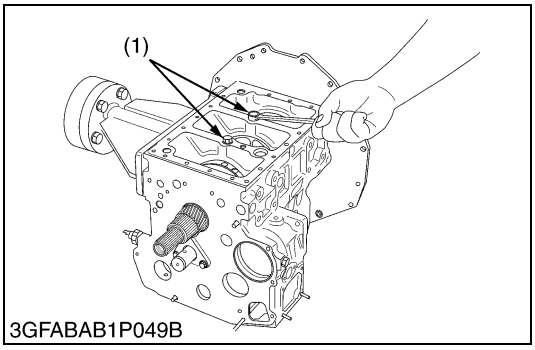

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Crankshaft Assembly

1. Remove the main bearing case screw 2 (1).
2. Pull out the crankshaft assembly.

■ **IMPORTANT**

- **Take care to protect crankshaft bearing 1 from scratches, caused by the crank gear, etc.. (Wrap the gear in vinyl tape, etc.).**

(When reassembling)

- Clean the oil passage of the crankshaft with compressed air.
- Apply oil to the main bearing case screw 2 (1).
- Install the crankshaft assembly, aligning the screw hole of main bearing case with the screw hole of crankcase.
- Clean the oil passage of the crankshaft with compressed air.

Tightening torque	Main bearing case screw 2	49 to 53 N·m 5.0 to 5.5 kgf·m 37 to 39 lbf·ft

(1) Main Bearing Case Screw 2

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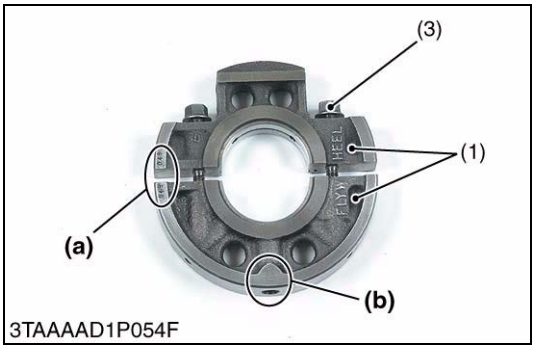

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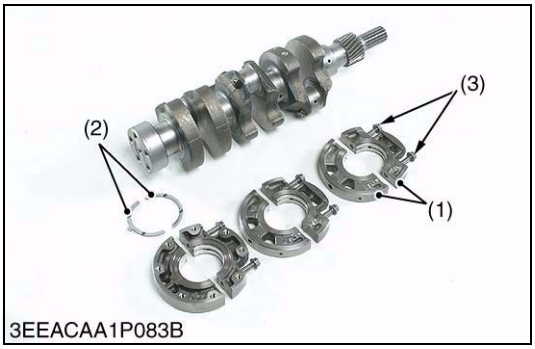
Main Bearing Case Assembly

1. Remove the two main bearing case screws 1 (3) of each main bearing cases.
2. Remove the main bearing case from crankshaft.

(When reassembling)

- Clean the oil passage in the main bearing cases.
- Apply clean engine oil on the bearings.
- Install the main bearing case assemblies in original positions. Since diameters of main bearing cases vary, install them in order to marking **(c)** (**A**, **B**, **C**) from the gear case side.
- Match the alignment numbers **(a)** on the main bearing case assembly 1.
- When installing the main bearing case 1 and 2, face the mark **"FLYWHEEL"** to the flywheel.
- Install the thrust bearing (2) with its oil groove facing outward.
- Confirm that the main bearing case moves smoothly after tightening the main bearing case screw 1 to the specified torque.



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Tightening torque	Main bearing case screw 1	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft

(1) Main Bearing Case Assembly 1
(2) Thrust Bearing
(3) Main Bearing Case Screw 1
(a) Alignment Number
(b) Marking (A, B, C)

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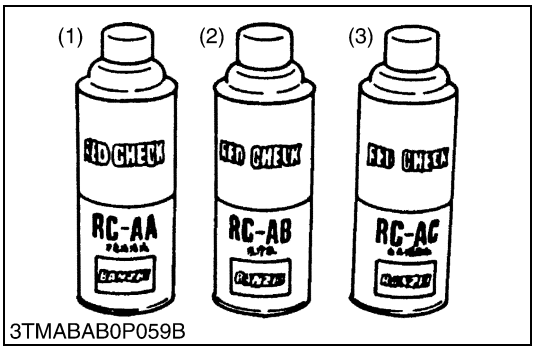

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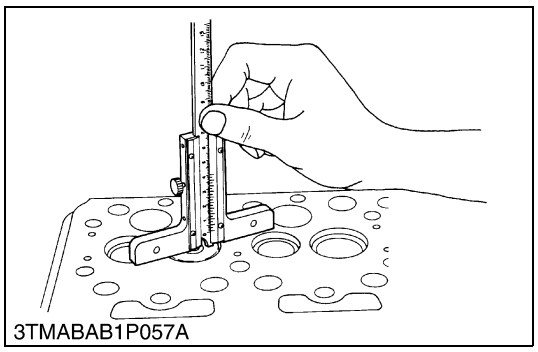
Cylinder Head Flaw

1. Prepare an air spray red check.
2. Clean the surface of the cylinder head with detergent (2).
3. Spray the cylinder head surface with the red permeative liquid (1). Leave it five to ten minutes after spraying.
4. Wash away the read permeative liquid on the cylinder head surface with the detergent (2).
5. Spray the cylinder head surface with white developer (3).
6. If flawed, it can be identified as red marks.

(1) Red Permeative Liquid
(2) Detergent
(3) White Developer

W1076542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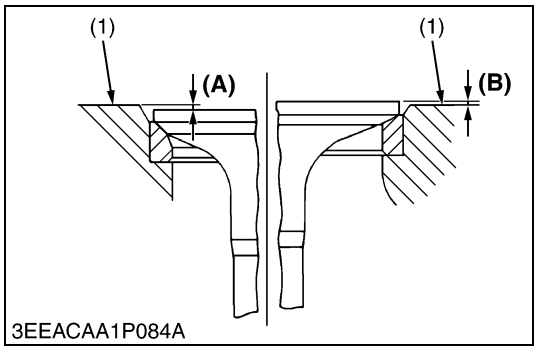
Valve Recessing

1. Clean the cylinder head surface, valve face and valve seat.
2. Insert the valve into the valve guide.
3. Measure the valve recessing with a depth gauge.
4. If the measurement exceeds the allowable limit, replace the valve.
5. If it still exceeds the allowable limit after replacing the valve, replace the cylinder head.

Valve recessing (Intake and Exhaust)	Factory spec.	0.050 (protrusion) to 0.25 (recessing) mm 0.002 (protrusion) to 0.0098 (recessing) in.
	Allowable limit	0.40 (recessing) mm 0.016 (recessing) in.



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(1) Cylinder Head Surface

(A) Recessing
(B) Protrusion

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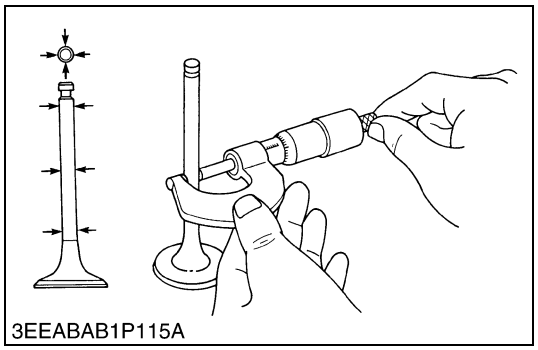
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Clearance between Valve Stem and Valve Guide

1. Remove carbon from the valve guide section.
2. Measure the valve stem O.D. with an outside micrometer.
3. Measure the valve guide I.D. with a small hole gauge, and calculate the clearance.
4. If the clearance exceeds the allowable limit, replace the valves. If it still exceeds the allowable limit, replace the valve guide.

Clearance between valve stem and valve guide	Factory spec.	0.035 to 0.065 mm 0.0014 to 0.0025 in.
	Allowable limit	0.10 mm 0.0039 in.

Valve stem O.D.	Factory spec.	6.960 to 6.975 mm 0.2741 to 0.2746 in.
Valve guide I.D.	Factory spec.	7.010 to 7.025 mm 0.2760 to 0.2765 in.

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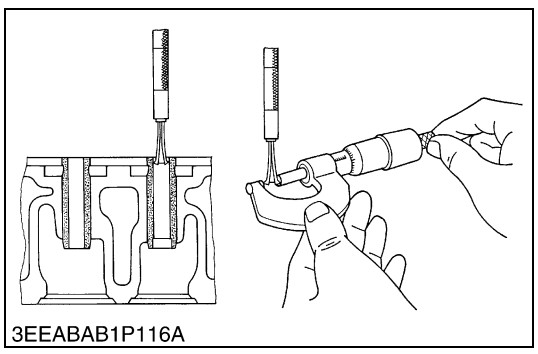
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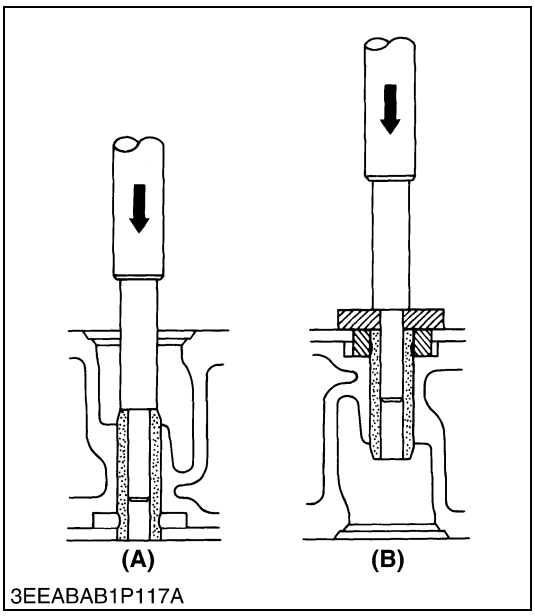

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Replacing Valve Guide

(When removing)

1. Press out the used valve guide using a valve guide replacing tool. (See page **"SPECIAL TOOLS"**.)

(When installing)

1. Clean a new valve guide and valve guide bore, and apply engine oil to them.
2. Press in a new valve guide using a valve guide replacing tool.
3. Ream precisely the I.D. of the valve guide to the specified dimension.

Valve guide I.D. (Intake and exhaust)	Factory spec.	7.010 to 7.025 mm 0.2760 to 0.2765 in.

■ **IMPORTANT**

- **Do not hit the valve guide with a hammer during replacement.**

(A) When Removing **(B) When Installing**

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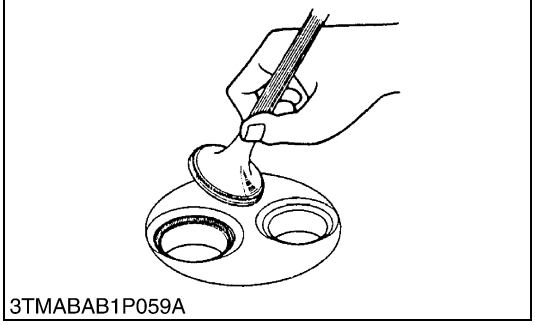
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Valve Seating

1. Coat the valve face lightly with prussian blue and put the valve on its seat to check the contact.
2. If the valve does not seat all the way around the valve seat or the valve contact is less than 70%, correct the valve seating as follows.
3. If the valve contact does not comply with the reference value, replace the valve or correct the contact of valve seating.

Valve seat width	Factory spec.	2.12 mm 0.0835 in.

(1) Correct
(2) Incorrect
(3) Incorrect

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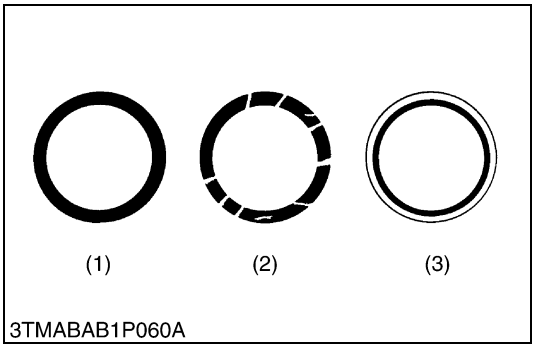

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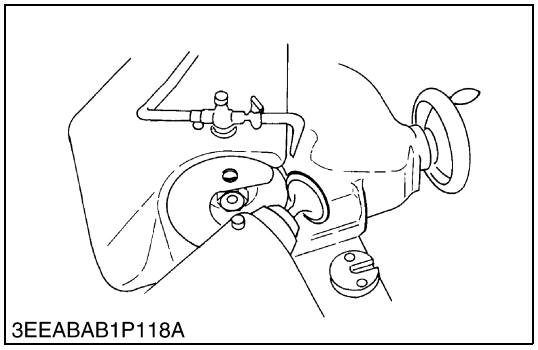
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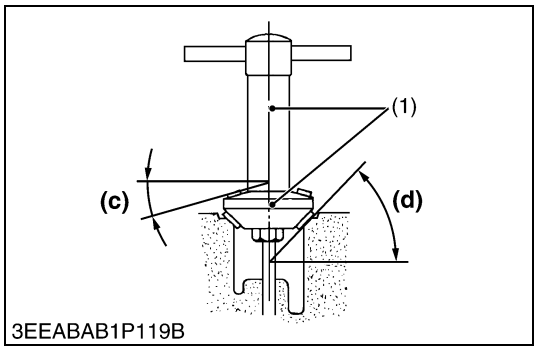

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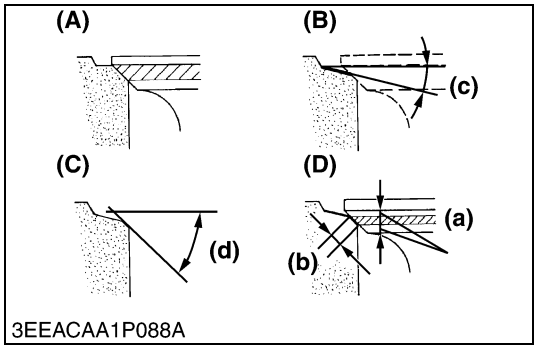

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Correcting Valve and Valve Seat

■ **NOTE**
- **Before correcting the valve and seat, check the valve stem and the I.D. of valve guide section, and repair them if necessary.**
- **After correcting the valve seat, be sure to check the valve recessing.**

1) Correcting Valve

1. Correct the valve with a valve refacer.

Valve face angle	Factory spec.	IN.	1.0 rad 60 °
		EX.	0.79 rad 45 °

2) Correcting Valve Seat

1. Slightly correct the seat surface with a 0.79 rad (45 °) / 1.0 rad (60 °) valve seat cutter.
2. Fitting the valve, check the contact position of the valve face and seat surface with prussian blue. (Visual check) [If the valve has been used for a long period, the seat tends to come in contact with the upper side of the valve face.]
3. Grind the upper surface of the seat with a 0.52 rad (30 °) valve seat cutter until the valve seat touches to the center of the valve face (so that **(a)** equals **(b)** as shown in the figure).
4. Grind the seat with a 0.26 rad (15 °) valve seat cutter again, and visually recheck the contact between the valve and seat.
5. Repeat steps 3 and 4 until the correct contact is achieved.
6. Continue lapping until the seated rate becomes more than 70% of the total contact area.

Valve seat angle	Factory spec.	IN.	1.0 rad 60 °
		EX.	0.79 rad 45 °

(1) Valve Seat Width

(A) Check Contact
(B) Correct Seat Width
(C) Correct Seat Surface
(D) Check Contact

(a) Identical Dimensions
(b) Valve Seat Width
(c) 0.26 rad (15 °)
(d) 0.79 rad (45 °)

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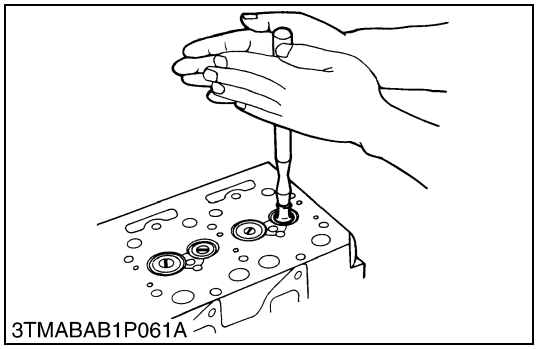
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Valve Lapping

1. Apply compound evenly to the valve lapping surface.
2. Insert the valve into the valve guide. Lap the valve onto its seat with a valve flapper or screwdriver.
3. After lapping the valve, wash the compound away and apply oil, then repeat valve lapping with oil.
4. Apply prussian blue to the contact surface to check the seated rate. If it is less than 70%, repeat valve lapping again.

■ **IMPORTANT**
- **When valve lapping is performed, be sure to check the valve recessing and adjust the valve clearance after assembling the valve.**

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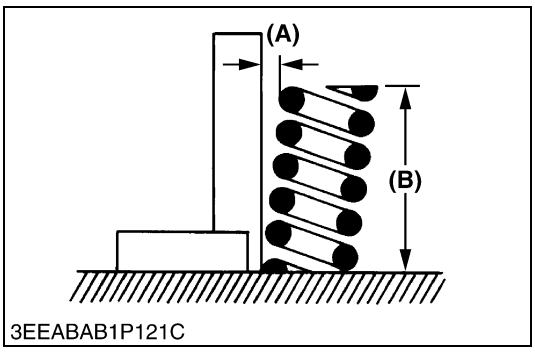

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Free Length and Tilt of Valve Spring

1. Measure the free length **(B)** of valve spring with vernier calipers. If the measurement is less than the allowable limit, replace it.
2. Put the valve spring on a surface plate, place a square on the side of the valve spring.
3. Check to see if the entire side is in contact with the square. Rotate the valve spring and measure the maximum tilt **(A)**. If the measurement exceeds the allowable limit, replace it.
4. Check the entire surface of the valve spring for scratches. If there is any defect, replace it.

Tilt **(A)**	Allowable limit	1.0 mm 0.039 in.

Free length **(B)**	Factory spec.	37.0 to 37.5 mm 1.46 to 1.47 in.
	Allowable limit	36.5 mm 1.44 in.

(A) Tilt **(B) Free Length**

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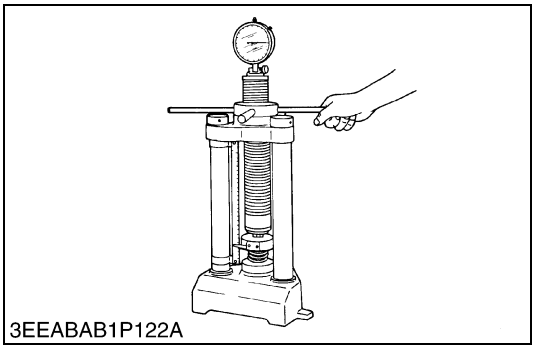
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Valve Spring Setting Load

1. Place the valve spring on a tester and compress it to the same length it is actually compressed in the engine.
2. Read the compression load on the gauge.
3. If the measurement is less than the allowable limit, replace it.

Setting load / Setting length	Factory spec.	117.4 N / 31.0 mm 11.97 kgf / 31.0 mm 26.39 lbf / 1.22 in.
	Allowable limit	100.0 N / 31.0 mm 10.20 kgf / 31.0 mm 22.48 lbf / 1.22 in.

W10784360


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Oil Clearance between Rocker Arm and Rocker Arm Shaft

1. Measure the rocker arm shaft O.D. with an outside micrometer.
2. Measure the rocker arm I.D. with an inside micrometer, and then calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the rocker arm and measure the oil clearance again. If it still exceeds the allowable limit, replace also the rocker arm shaft.

Oil clearance between rocker arm and rocker arm shaft	Factory spec.	0.016 to 0.045 mm 0.00063 to 0.0017 in.
	Allowable limit	0.10 mm 0.0039 in.

Rocker arm shaft O.D.	Factory spec.	11.973 to 11.984 mm 0.47138 to 0.47181 in.
Rocker arm I.D.	Factory spec.	12.000 to 12.018 mm 0.47244 to 0.47314 in.

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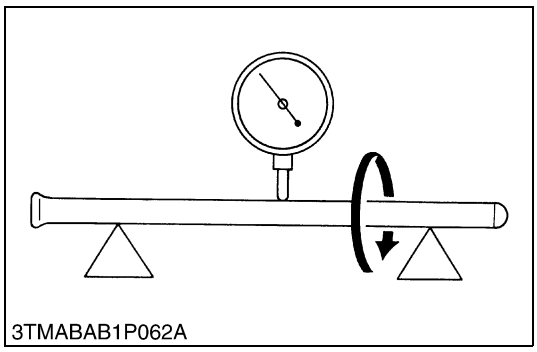
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Push Rod Alignment

1. Place the push rod on V blocks.
2. Measure the push rod alignment.
3. If the measurement exceeds the allowable limit, replace the push rod.

Push rod alignment	Allowable limit	0.25 mm 0.0098 in.

W10292900


3TAAAAD1P061A

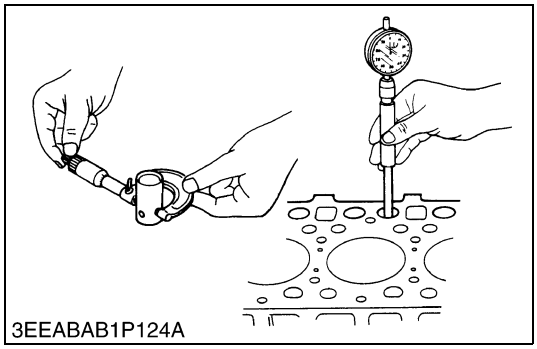
Oil Clearance between Tappet and Tappet Guide Bore

1. Measure the tappet O.D. with an outside micrometer.
2. Measure the I.D. of the tappet guide bore with a cylinder gauge, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit or the tappet is damaged, replace the tappet.

Oil Clearance between tappet and tappet guide bore	Factory spec.	0.020 to 0.062 mm 0.00079 to 0.0024 in.
	Allowable limit	0.07 mm 0.003 in.

Tappet O.D.	Factory spec.	19.959 to 19.980 mm 0.78579 to 0.78661 in.
Tappet guide bore I.D.	Factory spec.	20.000 to 20.021 mm 0.78741 to 0.78822 in.

W10293660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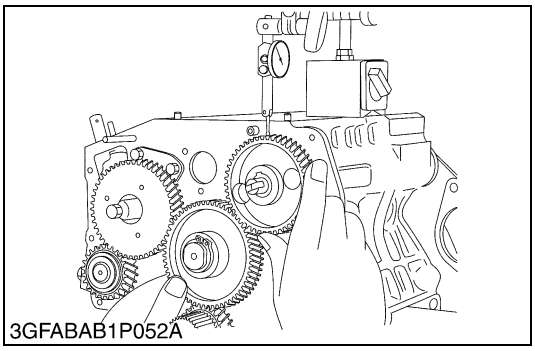
(2) Idle Gear and Camshaft

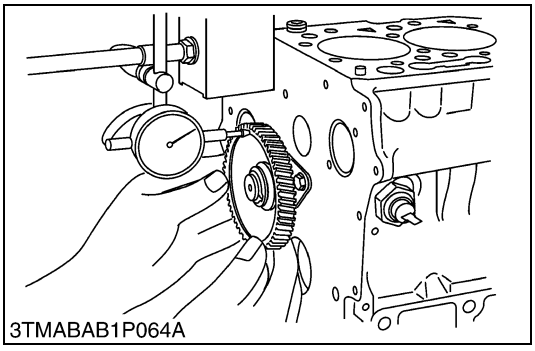

3GFABAB1P052A

Idle Gear Backlash

1. Set a dial indicator (lever type) with its tip on the gear tooth.
2. Move the gear to measure the backlash, holding its mating gear.
3. If the backlash exceeds the allowable limit, check the oil clearance of the shafts and the gear.
4. If the oil clearance isn't proper, replace the gear.

Backlash between idle gear 1 and crank gear	Factory spec.	0.0320 to 0.115 mm 0.00126 to 0.00452 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear 1 and cam gear	Factory spec.	0.0360 to 0.114 mm 0.00142 to 0.00448 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear 1 and injection pump gear	Factory spec.	0.0340 to 0.116 mm 0.00134 to 0.00456 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between injection pump gear and governor gear	Factory spec.	0.0300 to 0.117 mm 0.00119 to 0.00460 in.
	Allowable limit	0.15 mm 0.0059 in.
Idle gear 2 and governor gear	Factory spec.	0.0300 to 0.117 mm 0.00119 to 0.00460 in.
	Allowable limit	0.15 mm 0.0059 in.

W10280630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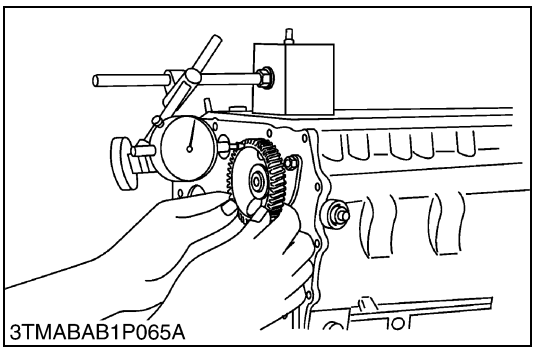
Idle Gear 1 and 2 Side Clearance

1. Set a dial indicator with its tip on the idle gear.
2. Measure the side clearance by moving the idle gear to the front and rear.
3. If the measurement exceeds the allowable limit, replace the idle gear collar.

Idle gear 1 and 2 side clearance	Factory spec.	0.20 to 0.51 mm 0.0079 to 0.020 in.
	Allowable limit	0.8 mm 0.03 in.

W10285590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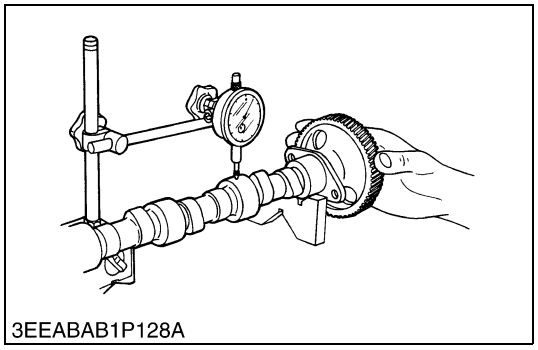
Camshaft Side Clearance

1. Set a dial indicator with its tip on the camshaft.
2. measure the side clearance by moving the cam gear to the front to rear.
3. If the measurement exceeds the allowable limit, replace the camshaft stopper.

Camshaft side clearance	Factory spec.	0.070 to 0.22 mm 0.0028 to 0.0086 in.
	Allowable limit	0.30 mm 0.012 in.

W10295630

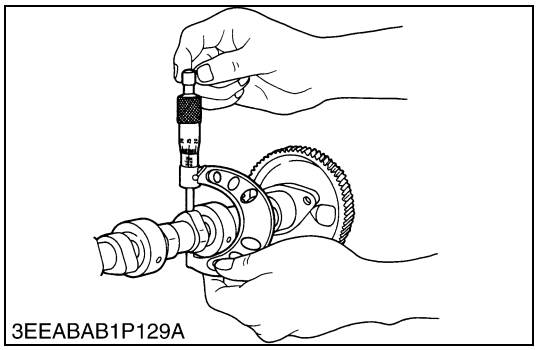

3EEABAB1P128A

Camshaft Alignment

1. Support the camshaft with V blocks on the surface plate at both end journals.
2. Set a dial indicator with its tip on the intermediate journal.
3. Measure the camshaft alignment.
4. If the measurement exceeds the allowable limit, replace the camshaft.

Camshaft alignment	Allowable limit	0.01 mm 0.0004 in.

W10296710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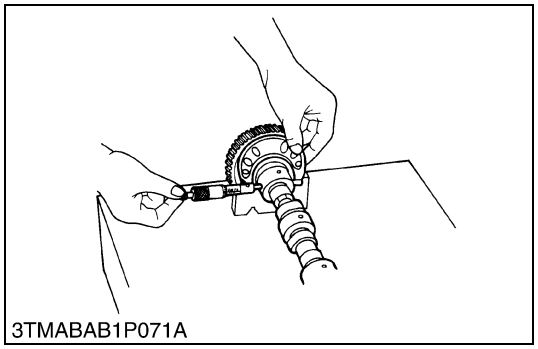
Cam Height

1. Measure the height of the cam at its highest point with an outside micrometer.
2. If the measurement is less than the allowable limit, replace the camshaft.

Cam height of intake	Factory spec.	28.80 mm 1.134 in.
	Allowable limit	28.75 mm 1.132 in.

Cam height of exhaust	Factory spec.	29.00 mm 1.142 in.
	Allowable limit	28.95 mm 1.140 in.

W10297880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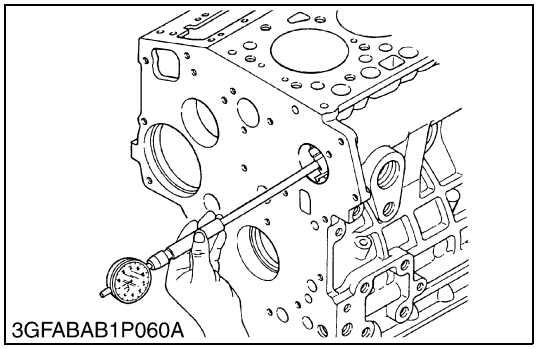
Oil Clearance of Camshaft Journal

1. Measure the camshaft journal O.D. with an outside micrometer.
2. Measure the cylinder block bore I.D. for camshaft with a cylinder gauge, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the camshaft.

Oil clearance of camshaft journal	Factory spec.	0.050 to 0.091 mm 0.0020 to 0.0035 in.
	Allowable limit	0.15 mm 0.0059 in.

Camshaft journal O.D.	Factory spec.	35.934 to 35.950 mm 1.4148 to 1.4153 in.
Camshaft bearing I.D. (Cylinder block bore I.D.)	Factory spec.	36.000 to 36.025 mm 1.4174 to 1.4183 in.

W10299330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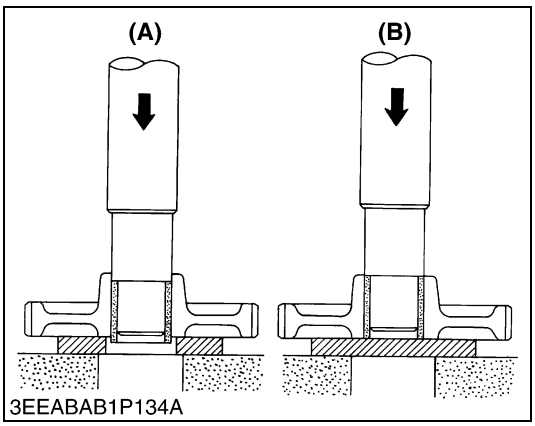


3EEABAB1P134A

Replacing Idle Gear Bushing

(When removing)

1. Press out the used idle gear bushing using an idle gear bushing replacing tool. (See page **"SPECIAL TOOLS"**.)

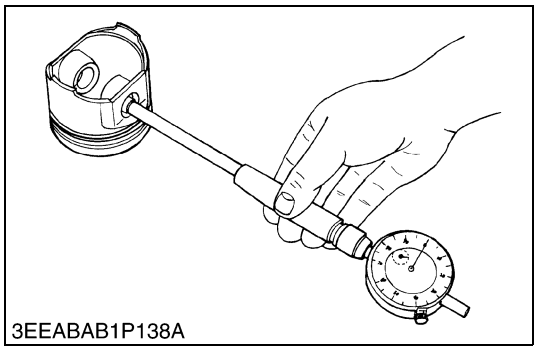
(When installing)

1. Clean a new idle gear bushing and idle gear bore, and apply engine oil to them.
2. Press in a new bushing using an idle gear bushing replacing tool, until it is flush with the end of the idle gear.

(A) When Removing **(B) When Installing**

W10302410

(3) Piston and Connecting Rod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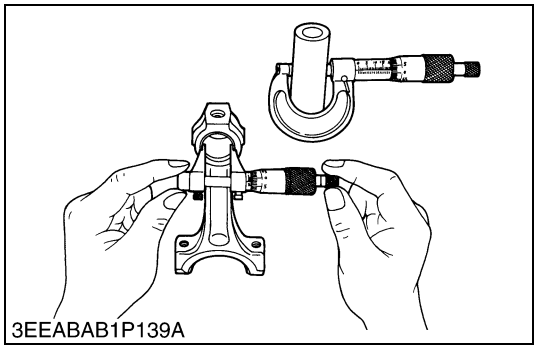
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Piston Pin Bore I.D.

1. Measure the piston pin bore I.D. in both the horizontal and vertical directions with a cylinder gauge.
2. If the measurement exceeds the allowable limit, replace the piston.

Piston pin bore I.D.	Factory spec.	22.000 to 22.013 mm 0.86615 to 0.86665 in.
	Allowable limit	22.03 mm 0.8673 in.

W10304770

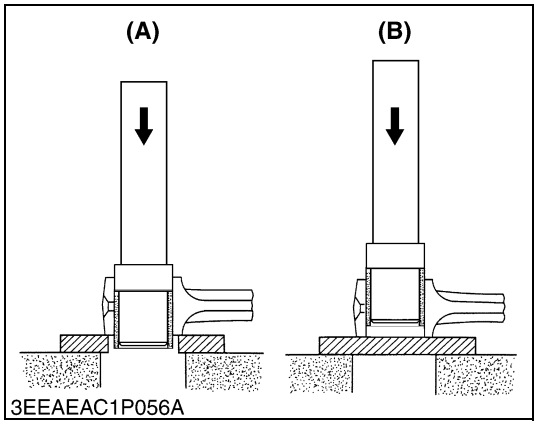
Oil Clearance between Piston Pin and Small End Bushing

1. Measure the piston pin O.D. where it contacts the bushing with an outside micrometer.
2. Measure the small end bushing I.D. with an inside micrometer, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the bushing. If it still exceeds the allowable limit, replace the piston pin.

Oil clearance between piston pin and small end bushing	Factory spec.	0.014 to 0.038 mm 0.00056 to 0.0015 in.
	Allowable limit	0.15 mm 0.0059 in.

Piston pin O.D.	Factory spec.	22.002 to 22.011 mm 0.86622 to 0.86657 in.
Small end bushing I.D.	Factory spec.	22.025 to 22.040 mm 0.86713 to 0.86771 in.

W10305740



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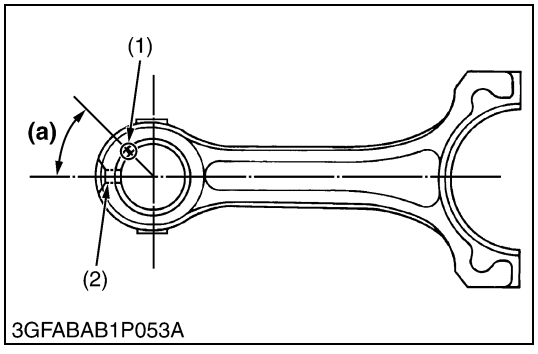

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Replacing Small End Bushing

(When removing)

1. Press out the used bushing using a small end bushing replacing tool. (See page "**SPECIAL TOOLS**".)

(When installing)

1. Clean a new small end bushing and bore, and apply engine oil to them.
2. Insert a new bushing onto the tool and press-fit it with a press so that the seam (1) of bushing positions as shown in the figure, until it is flush with the connecting rod.
3. Drill a hole to the bushing with aligning the oil hole (2) of connecting rod. (Refer to the figure.)

■ **NOTE**

- **Be sure to chamfer the oil hole circumference with an oil stone.**

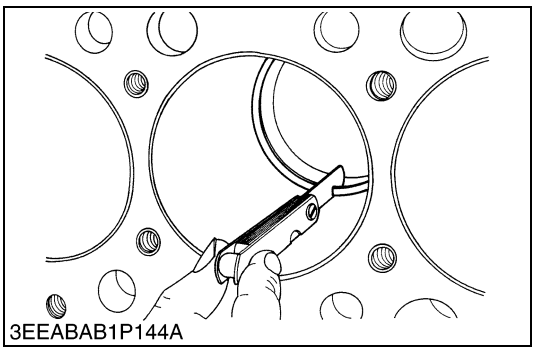
Oil clearance between piston pin and small end bushing (Spare parts)	Factory spec.	0.015 to 0.075 mm 0.00059 to 0.0029 in.
	Allowable limit	0.15 mm 0.0059 in.

Small end bushing I.D. (Spare parts)	Factory spec.	22.026 to 22.077 mm 0.86717 to 0.86917 in.

(1) Seam
(2) Oil Hole

(A) When removing
(B) When installing
(a) 0.79 rad (45 °)

W10307120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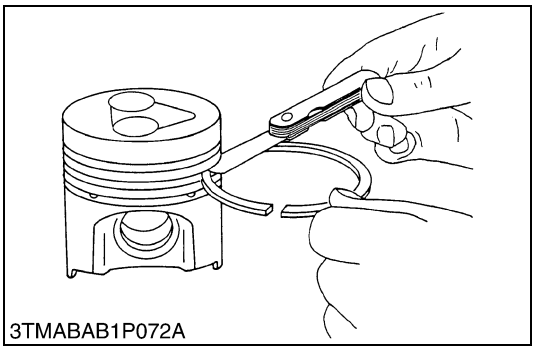
Piston Ring Gap

1. Insert the piston ring into the lower part of the cylinder (the least worn out part) with a piston.
2. Measure the ring gap with a thickness gauge.
3. If the measurement exceeds the allowable limit, replace the piston ring.

Piston ring gap	Top ring	Factory spec.	0.30 to 0.45 mm 0.012 to 0.017 in.
		Allowable limit	1.25 mm 0.0492 in.
	Second ring	Factory spec.	0.30 to 0.45 mm 0.012 to 0.017 in.
		Allowable limit	1.25 mm 0.0492 in.
	Oil ring	Factory spec.	0.25 to 0.40 mm 0.0099 to 0.015 in.
		Allowable limit	1.25 mm 0.0492 in.

W10310120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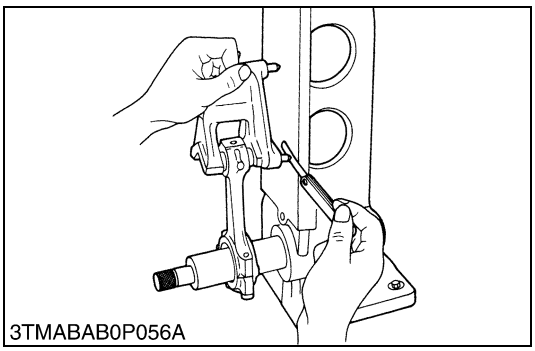
Clearance between Piston ring and Piston Ring Groove

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

Clearance between piston ring and piston ring groove	Second ring	Factory spec.	0.085 to 0.112 mm 0.00335 to 0.00440 in.
		Allowable limit	0.20 mm 0.0079 in.
	Oil ring	Factory spec.	0.020 to 0.055 mm 0.00079 to 0.0021 in.
		Allowable limit	0.15 mm 0.0059 in.

W10312390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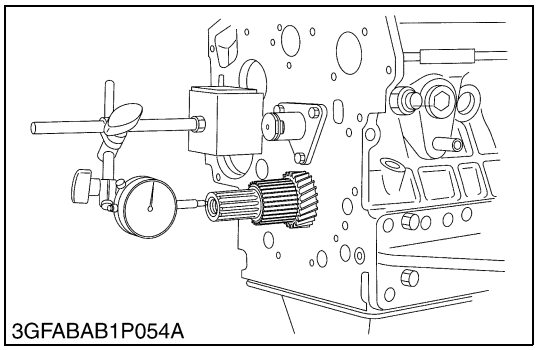
Connecting Rod Alignment

1. Remove the crankpin bearing, and install the connecting rod cap.
2. Install the piston pin in the connecting rod.
3. Install the connecting rod on the connecting rod alignment tool.
4. Put a gauge over the piston pin, and move it against the face plate.
5. If the gauge does not fit squarely against the face plate, measure the space between the pin of the gauge and the face plate.
6. If the measurement exceeds the allowable limit, replace the connecting rod.

Space between gauge pin face plate	Allowable limit	0.05 mm 0.002 in.

W10314620

(4) Crankshaft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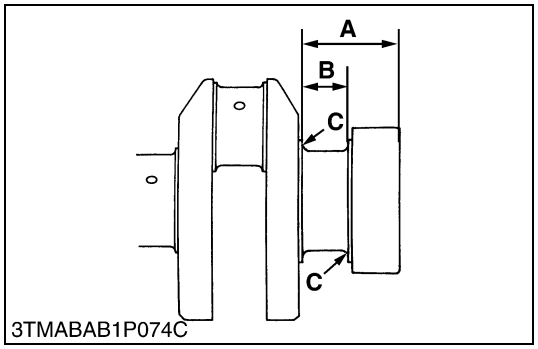

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Crankshaft Side Clearance

1. Set a dial indicator with its tip on the end of the crankshaft.
2. Measure the side clearance by moving the crankshaft to the front and rear.
3. If the measurement exceeds the allowable limit, replace the thrust bearings.
4. If the same size bearing is useless because of the crankshaft journal wear, replace it with an oversize one referring to the table and figure.

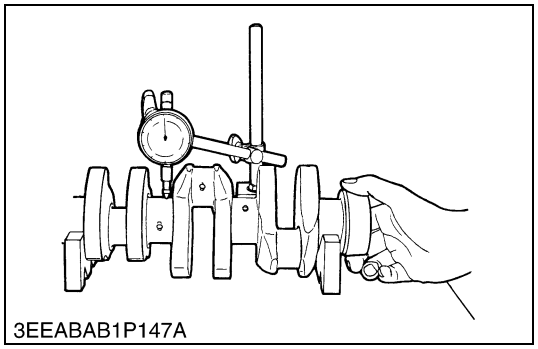
Crankshaft side clearance	Factory spec.	0.15 to 0.31 mm 0.0059 to 0.012 in.
	Allowable limit	0.50 mm 0.020 in.

(Reference)

- Oversize dimensions of crankshaft journal

Oversize	0.2 mm 0.008 in.	0.4 mm 0.02 in.
Dimension **A**	51.50 to 51.70 mm 2.028 to 2.035 in.	51.60 to 51.80 mm 2.031 to 2.039 in.
Dimension **B**	28.20 to 28.25 mm 1.111 to 1.112 in.	28.40 to 28.45 mm 1.119 to 1.120 in.
Dimension **C**	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius	2.3 to 3.7 mm radius 0.091 to 0.10 in. radius
The crankshaft journal must be fine-finished to higher than ∇∇∇∇ (0.8-S)		

W10317070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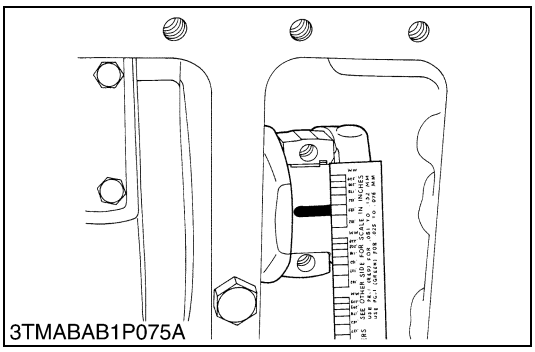
Crankshaft Alignment

1. Support the crankshaft with V blocks on the surface plate at both end journals.
2. Set a dial indicator with its tip on the intermediate journal.
3. Measure the crankshaft alignment.
4. If the measurement exceeds the allowable limit, replace the crankshaft.

Crankshaft alignment	Allowable limit	0.02 mm 0.0008 in.

W10330010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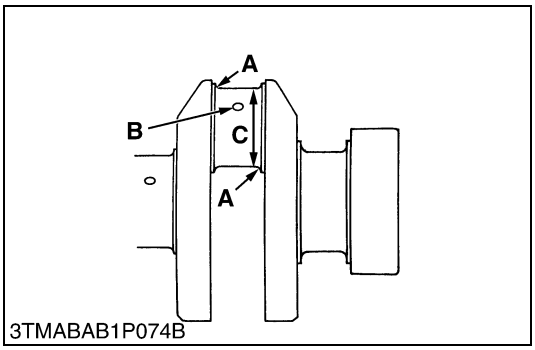

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Oil Clearance between Crankpin and Crankpin Bearing

1. Clean the crankpin and crankpin bearing.
2. Put a strip of plastigage on the center of the crankpin.
3. Install the connecting rod cap and tighten the connecting rod screws to the specified torque, and remove the cap again.
4. Measure the amount of the flattening with the scale, and get the oil clearance.
5. If the oil clearance exceeds the allowable limit, replace the crankpin bearing.
6. If the same size bearing is useless because of the crankpin wear, replace it with an undersize one referring to the table and figure.

■ **NOTE**

- **Never insert the plastigage into the crankpin oil hole.**
- **Be sure not to move the crankshaft while the connecting rod screws are tightened.**

Oil clearance between crankpin and crankpin bearing	Factory spec.	0.029 to 0.091 mm 0.0012 to 0.0035 in.
	Allowable limit	0.20 mm 0.0079 in.

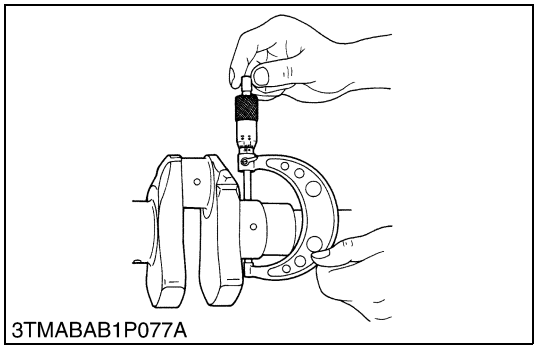
Crankpin O.D.	Factory spec.	39.959 to 39.975 mm 1.5732 to 1.5738 in.
Crankpin bearing I.D.	Factory spec.	40.004 to 40.050 mm 1.5750 to 1.5767 in.

(Reference)

- Undersize dimensions of crankpin

Undersize	0.2 mm 0.008 in.	0.4 mm 0.02 in.
Dimension **A**	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	39.759 to 39.775 mm dia. 1.5654 to 1.5659 in. dia.	39.559 to 39.575 mm dia. 1.5575 to 1.5580 in. dia.
(0.8-S) The crankpin must be fine-finished to higher than ∇∇∇∇ *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

W10331060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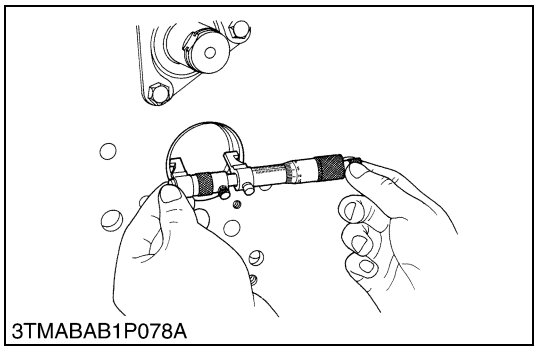
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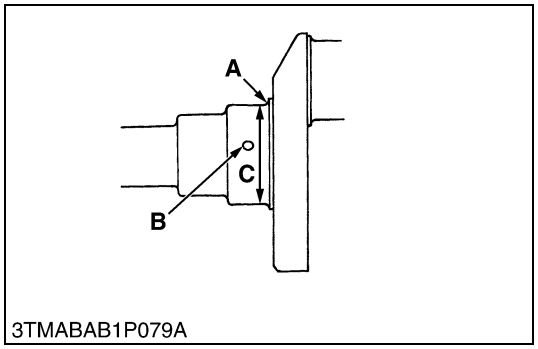

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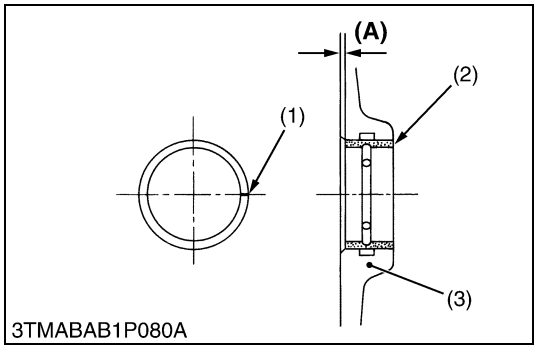

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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 1

1. Measure the O.D. of the crankshaft front journal with an outside micrometer.
2. Measure the I.D. of the crankshaft bearing 1 with an inside micrometer, and calculate the oil clearance.
3. If the clearance exceeds the allowable limit, replace the crankshaft bearing 1.
4. If the same size bearing is useless because of the crankshaft journal wear, replace it with an undersize one referring to the table and figure.

Oil clearance between crankshaft journal and crankshaft bearing 1	Factory spec.	0.034 to 0.114 mm 0.00134 to 0.00448 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D.	Factory spec.	47.934 to 47.950 mm 1.8872 to 1.8877 in.
Crankshaft bearing 1 I.D.	Factory spec.	47.984 to 48.048 mm 1.8892 to 1.8916 in.

(Reference)

- Undersize dimensions of crankshaft journal

Undersize	0.2 mm 0.008 in.	0.4 mm 0.02 in.
Dimension **A**	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	47.734 to 47.750 mm dia. 1.8793 to 1.8799 in. dia.	47.534 to 47.550 mm dia. 1.8715 to 1.8720 in. dia.
(0.8-S) The crankshaft journal must be fine-finished to higher than ∇∇∇∇ *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

W10337170

Replacing Crankshaft Bearing 1

(When removing)

1. Press out the used crankshaft bearing 1 using a crankshaft bearing 1 replacing tool. (See page **"SPECIAL TOOLS"**.)

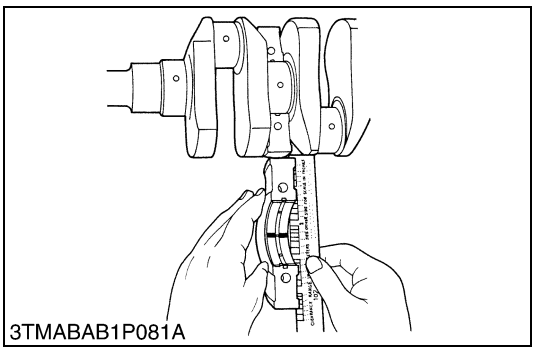
(When installing)

1. Clean a new crankshaft bearing 1 and crankshaft journal bore, and apply engine oil to them.
2. Using a crankshaft bearing 1 replacing tool, press in a new bearing 1 (2) so that its seam (1) directs toward the exhaust manifold side. (See figure.)

Dimension **(A)**	Factory spec.	0 to 0.3 mm 0 to 0.01 in.

(1) Seam
(2) Crankshaft Bearing 1
(3) Cylinder Block

W10339460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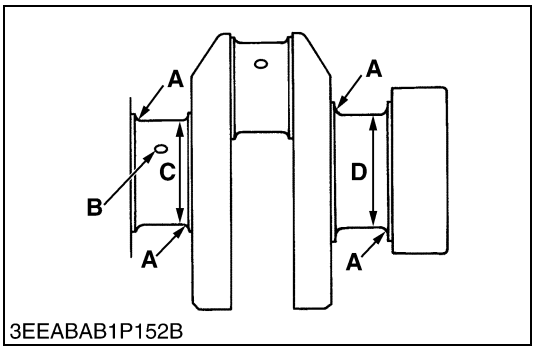

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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 2 (Crankshaft Bearing 3)

1. Put a strip of plastigage on the center of the journal.
2. Install the bearing case and tighten the bearing case screws 1 to the specified torque, and remove the bearing case again.
3. Measure the amount of the flattening with the scale, and get the oil clearance.
4. If the oil clearance exceeds the allowable limit, replace the crankshaft bearing 2 (crankshaft bearing 3).
5. If the same size bearing is useless because of the crankshaft journal wear, replace it with an undersize one referring to the table and figure.

■ **NOTE**

- **Be sure not to move the crankshaft while the bearing case screws are tightened.**

Oil clearance between crankshaft journal and crankshaft bearing 2	Factory spec.	0.034 to 0.095 mm 0.0014 to 0.0037 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D. (Intermediate)	Factory spec.	47.934 to 47.950 mm 1.8872 to 1.8877 in.
Crankshaft bearing 2 I.D.	Factory spec.	47.984 to 48.029 mm 1.8892 to 1.8909 in.

Oil clearance between crankshaft journal and crankshaft bearing 3	Factory spec.	0.034 to 0.098 mm 0.0014 to 0.0038 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D. (Flywheel side)	Factory spec.	51.921 to 51.940 mm 2.0442 to 2.0448 in.
Crankshaft bearing 3 I.D.	Factory spec.	51.974 to 52.019 mm 2.0463 to 2.0479 in.

(Reference)

- Undersize dimensions of crankshaft journal

Undersize	0.2 mm 0.008 in.	0.4 mm 0.02 in.
Dimension **A**	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	47.734 to 47.750 mm dia. 1.8793 to 1.8799 in. dia.	47.534 to 47.550 mm dia. 1.8715 to 1.8720 in. dia.
Dimension **D**	51.721 to 51.740 mm dia. 2.0363 to 2.0370 in. dia.	51.521 to 51.540 mm dia. 2.0284 to 2.0291 in. dia.
(0.8-S) The crankshaft journal must be fine-finished to higher than ∇∇∇∇ *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

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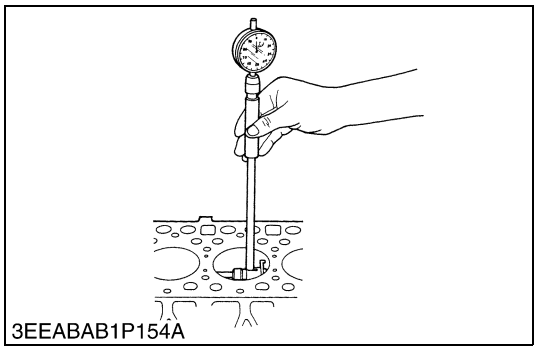
(5) Cylinder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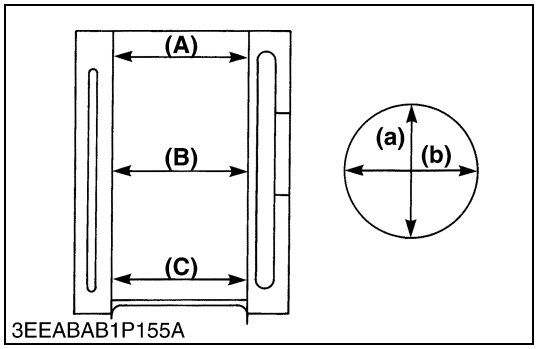
Cylinder Wear

1. Measure the I.D. of the cylinder at the six positions (see figure) with a cylinder gauge to find the maximum and minimum I.D.'s.
2. Get the difference (Maximum wear) between the maximum and the minimum I.D.'s.
3. If the wear exceeds the allowable limit, bore and hone to the oversize dimension. (Refer to **"Correcting Cylinder"**.)
4. Visually check the cylinder wall for scratches. If deep scratches are found, the cylinder should be bored. (Refer to **"Correcting Cylinder"**.)

Cylinder I.D.	Factory spec.	78.000 to 78.019 mm 3.0709 to 3.0716 in.
	Allowable limit	0.15 mm 0.0059 in.



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(A) Top
(B) Middle
(C) Bottom (Skirt)
(a) Right-angled to Piston Pin
(b) Piston Pin Direction

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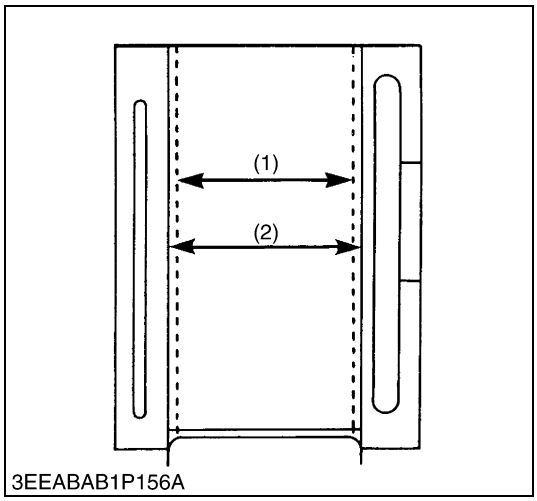
Correcting Cylinder

1. When the cylinder is worn beyond the allowable limit, bore and hone it to the specified dimension.

Oversized cylinder liner I.D.	Factory spec.	78.500 to 78.519 mm 3.0906 to 3.0912 in.
	Allowable limit	78.65 mm 3.096 in.
Finishing	Hone to 1.2 to 2.0 μm R max. ∇∇∇ (48 to 78 μin. R max.)	



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■ **NOTE**

- **When the oversize cylinder is worn beyond the allowable limit, replace the cylinder block with a new one.**

(1) Cylinder I.D. (Before Correction) (2) Cylinder I.D. (Oversize)

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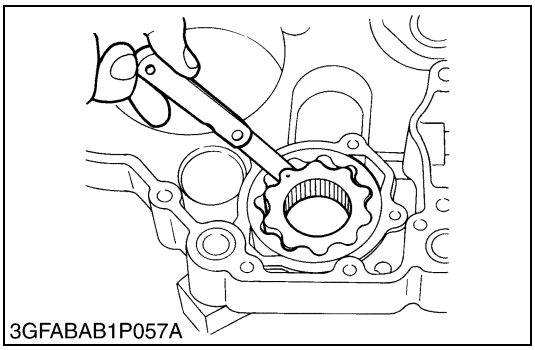
(6) Oil Pump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Rotor Lobe Clearance

1. Measure the clearance between lobes of the inner rotor and the outer rotor with a feeler gauge.
2. If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

Rotor lobe clearance	Factory spec.	0.060 to 0.18 mm 0.0024 to 0.0070 in.

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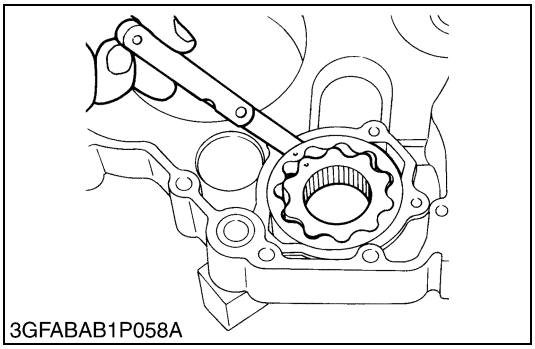
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Clearance between Outer Rotor and Pump Body

1. Measure the clearance between the outer rotor and the pump body with a feeler gauge.
2. If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

Clearance between outer rotor and pump body	Factory spec.	0.100 to 0.180 mm 0.00394 to 0.00708 in.

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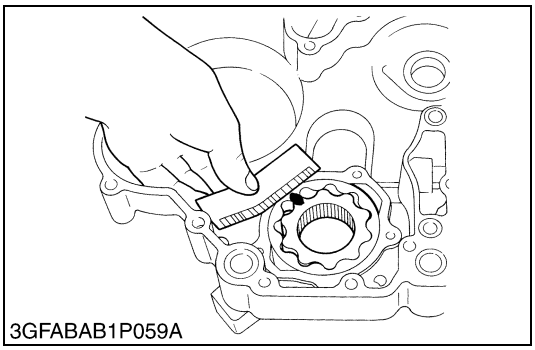
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Clearance between Rotor and Cover

1. Put a strip of plastigage onto the rotor face with grease.
2. Install the cover and tighten the screws.
3. Remove the cover carefully, and measure the amount of the flattening with the scale and get the clearance.
4. If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

Clearance between rotor and cover	Factory spec.	0.025 to 0.075 mm 0.00099 to 0.0029 in.

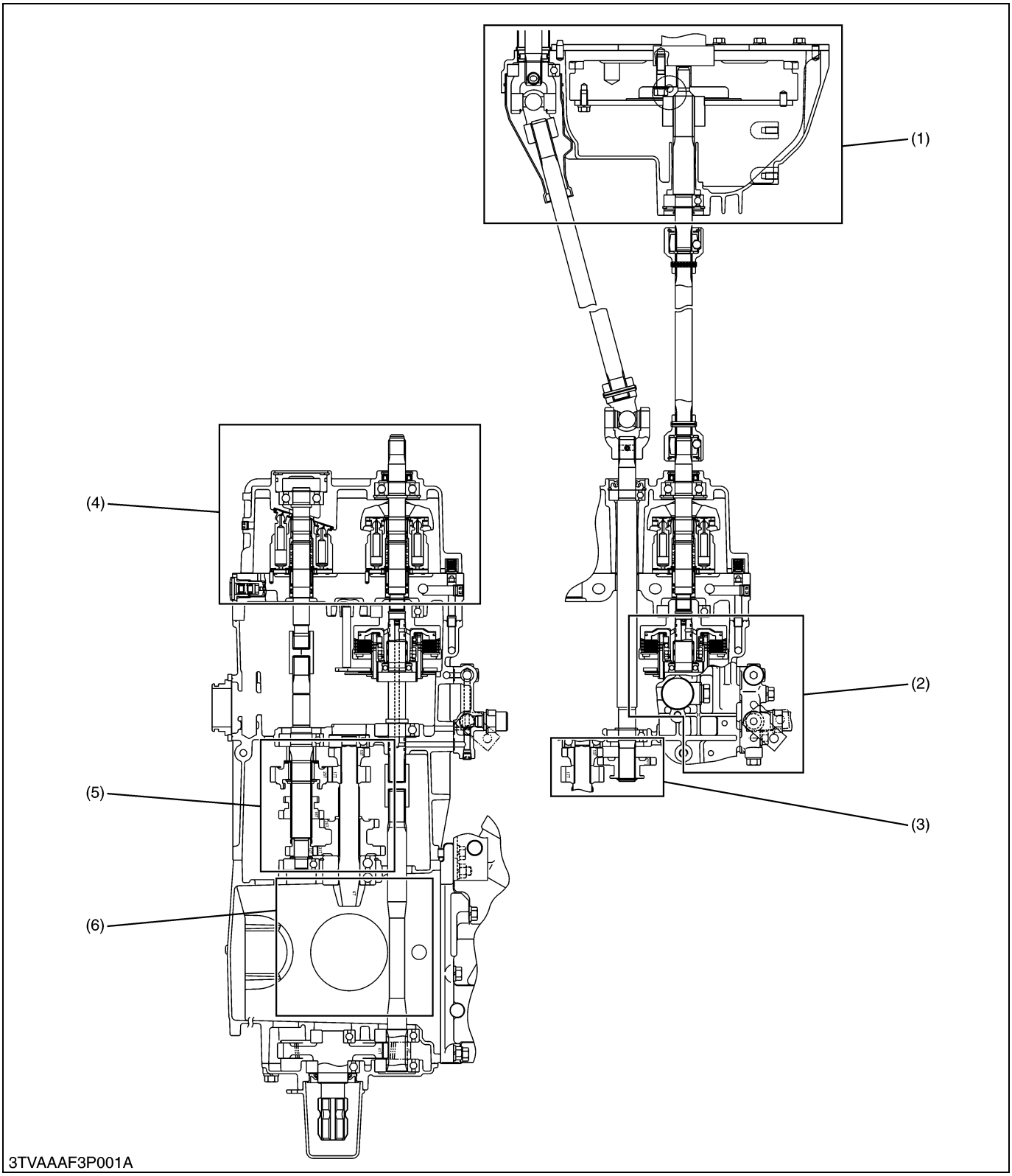
W10357320

2 TRANSMISSION

MECHANISM

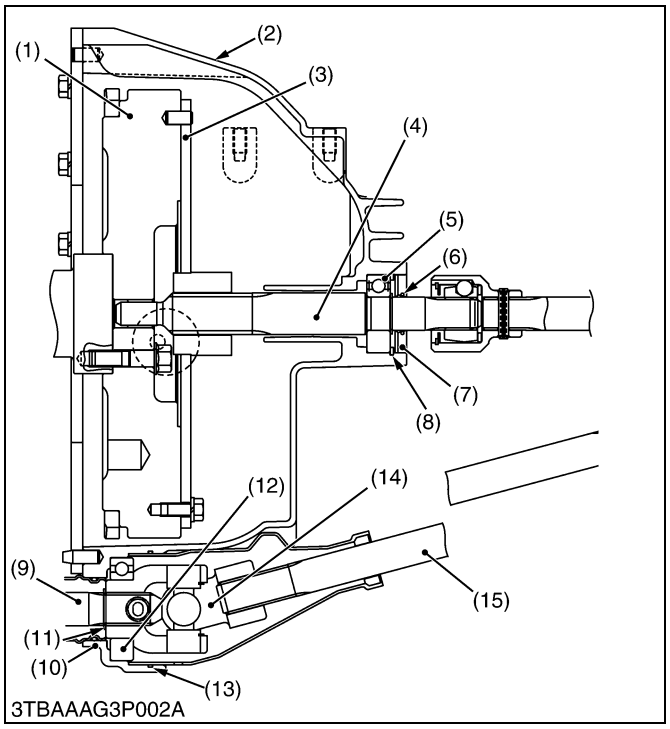
CONTENTS

1. STRUCTURE



(1) Front Case Section
(2) PTO Section
(3) Front Wheel Drive Section
(4) Hydrostatic Transmission Section
(5) Range Gear Shift Section
(6) Differential Gear Section

2. FRONT CASE



In this tractor, clutch disk is not installed.

The steel plate (3) is installed on the clutch shaft (4).

Power from the engine is transmitted through the steel plate (3) to the clutch shaft (4) and HST pump shaft.

(1) Flywheel
(2) Clutch Housing
(3) Steel Plate
(4) Clutch Shaft
(5) Ball Bearing
(6) External Circlip
(7) Oil Seal
(8) Internal Circlip
(9) Front Drive Shaft
(10) O-Ring
(11) External Circlip
(12) Ball Bearing
(13) O-Ring
(14) Universal Joint
(15) Rear Drive Shaft

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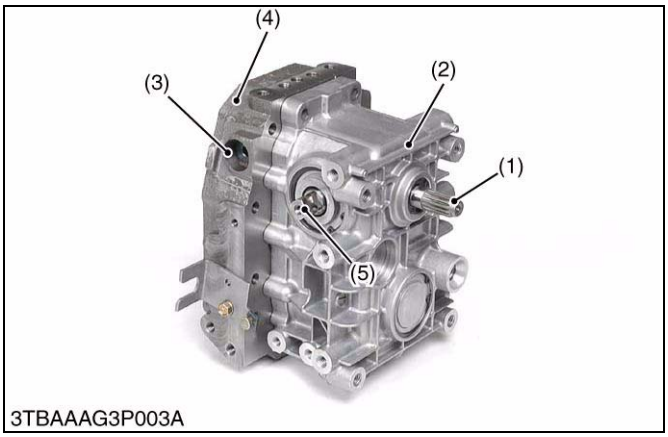
3. HYDROSTATIC TRANSMISSION

[1] STRUCTURE



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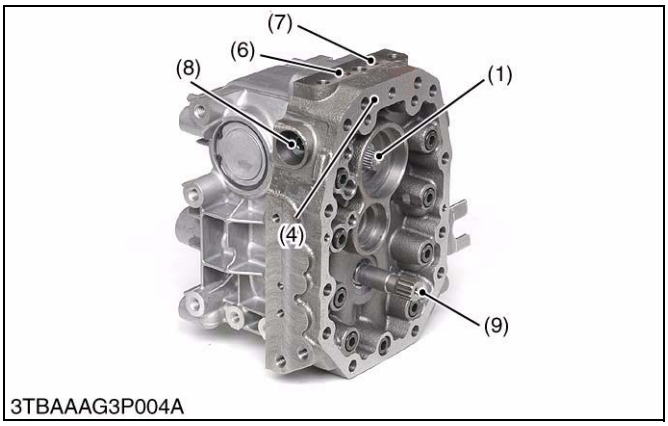

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Hydrostatic transmission is composed of variable displacement piston pump, fixed displacement piston motor and valve system.

(1) Input Shaft (Pump Shaft)
(2) Housing
(3) Check and High Pressure Relief Valve (Reverse)
(4) Center Section
(5) Trunnion Shaft
(6) Check Port
(7) Check Port
(8) Check and High Pressure Relief Valve (Forward)
(9) Output Shaft (Motor Shaft)

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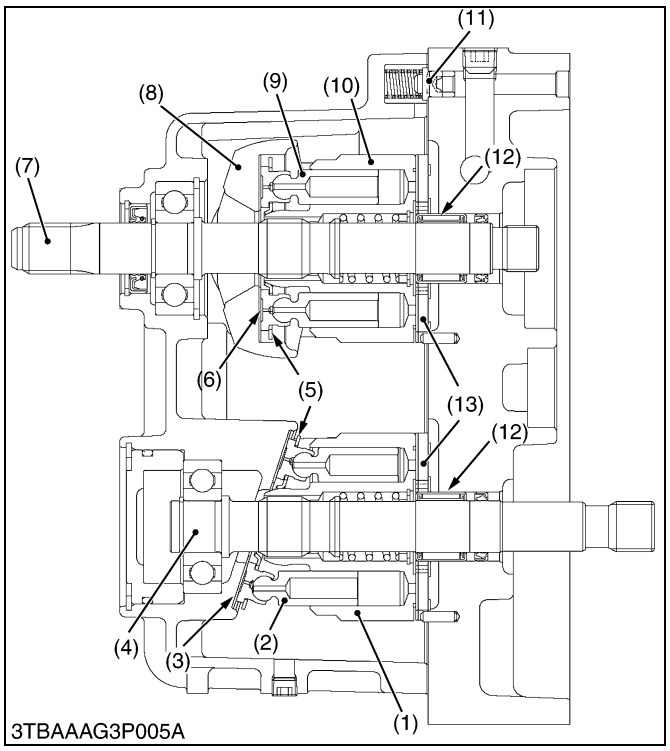

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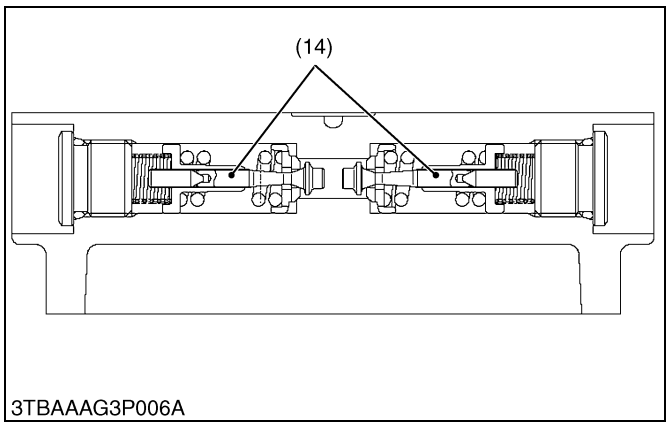

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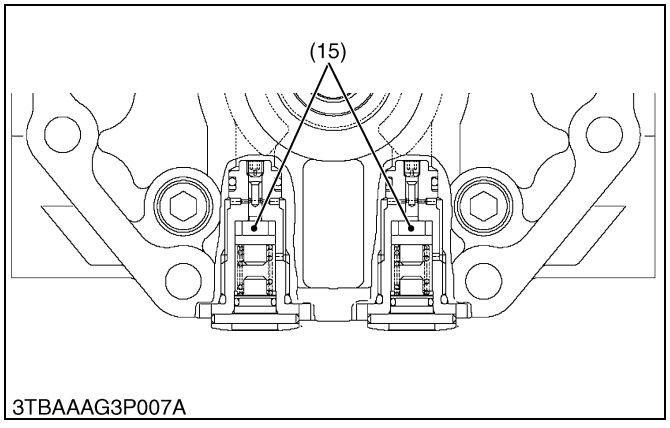

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(1) Cylinder Block (Motor)
(2) Piston
(3) Thrust Collar
(4) Motor Shaft
(5) Retainer Plate
(6) Thrust Collar
(7) Pump Shaft
(8) Variable Swashplate
(9) Piston
(10) Cylinder Block (Pump)
(11) Charge Relief Valve
(12) Needle Bearing
(13) Valve Plate
(14) Check and High Pressure Relief Valve
(15) Neutral Valve

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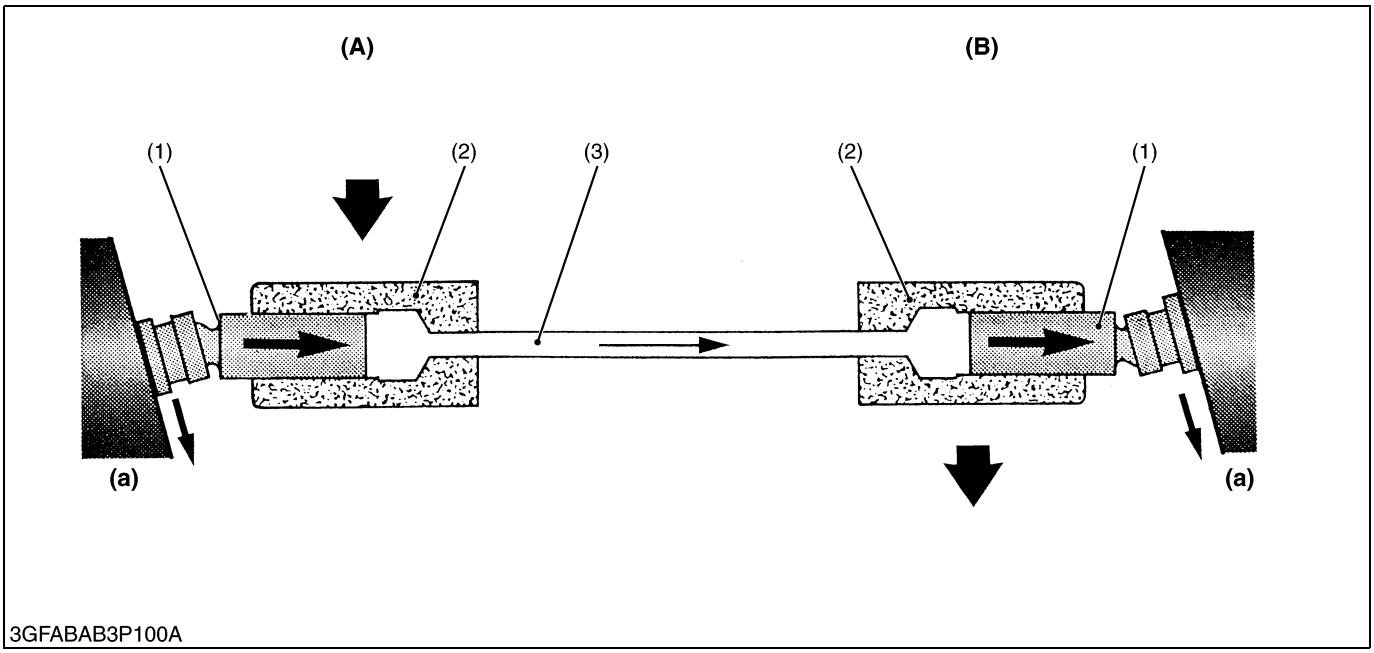
[2] PUMP AND MOTOR



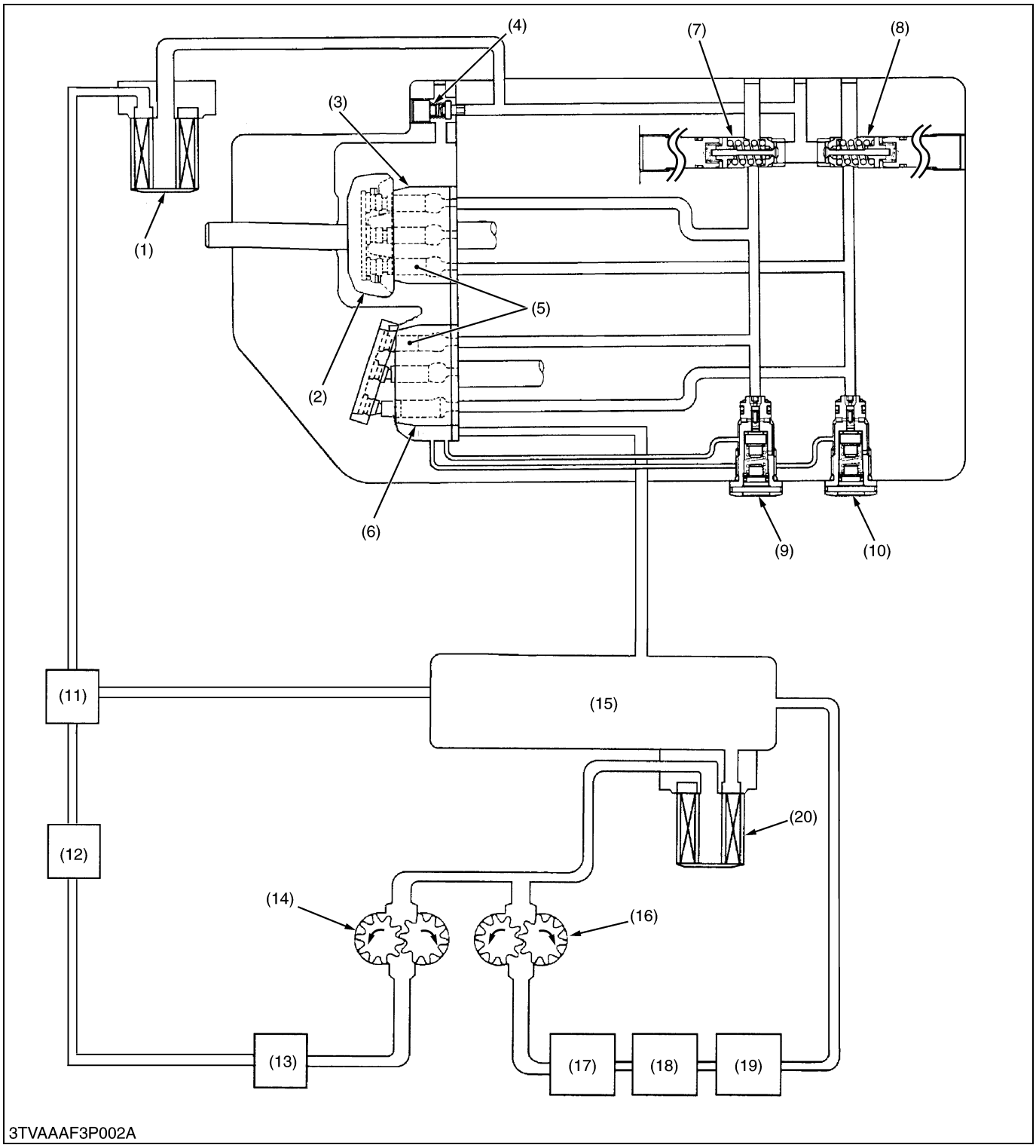
(1) Piston
(2) Cylinder
(3) Oil
(A) Pump
(B) Motor
(a) Swashplate

Pump and motor cylinder, each containing pistons, are connected by lines. Cylinders and lines are filled with oil piston ride against swashplates located in pump and motor.

In the pump, as the cylinder rotates, pistons move across the sloping face of swashplate and slide in or out of their cylinder bores. The oil forced out by the pump pistons, causes the motor pistons to slide out of their cylinder bores.

In the motor, sliding out of the cylinder and moving across the sloping face of swashplate, the pistons rotate the cylinder

[3] OIL FLOW AND VALVES



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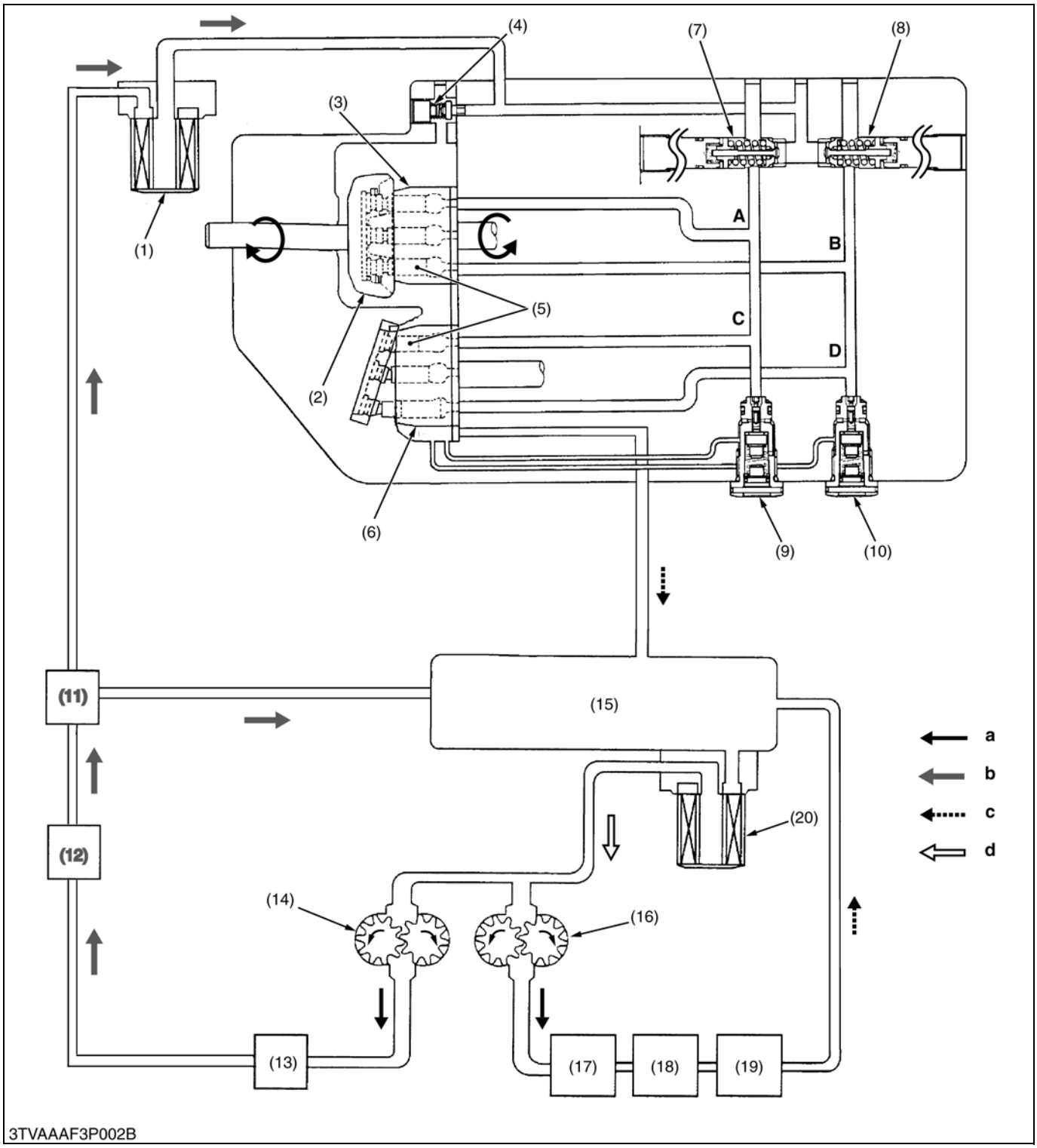
(1) Oil Filter Cartridge (for HST)
(2) Swashplate
(3) Cylinder Block (for Pump)
(4) Charge Relief Valve
(5) Piston
(6) Cylinder Block (for Motor)
(7) Check and High Pressure Relief Valve (for Forward)
(8) Check and High Pressure Relief Valve (for Reverse)
(9) Neutral Valve (for Forward)
(10) Neutral Valve (for Reverse)
(11) Independent PTO Control Valve
(12) Oil Cooler
(13) Power Steering
(14) Hydraulic Pump (for Power Steering, Independent PTO, HST)
(15) Oil Tank
(16) Hydraulic Pump (for 3-points Hitch)
(17) Front Loader Control valve
(18) Backhoe Control valve
(19) Hydraulic Control Valve (for 3-points Hitch)
(20) Oil Filter Cartridge

The pump and the motor are joined in a closed hydraulic circuit. Most of oil circulates with in the main oil circuit. A little oil lubricates and oozes out from the clearance between the moving parts in the case. Then oil in the main oil circuit of the HST needs to be supplied a want.

So all of oil fed from hydraulic pump flow to hydraulic transmission for charging and cooling.

The charge oil aids smooth operation of pistons for pump and motor. The charge oil passed to charge relief valve port. The rest of oil passed through the charge relief valve into the HST housing. And overflow oil from HST housing return to the transmission case.

■ Neutral



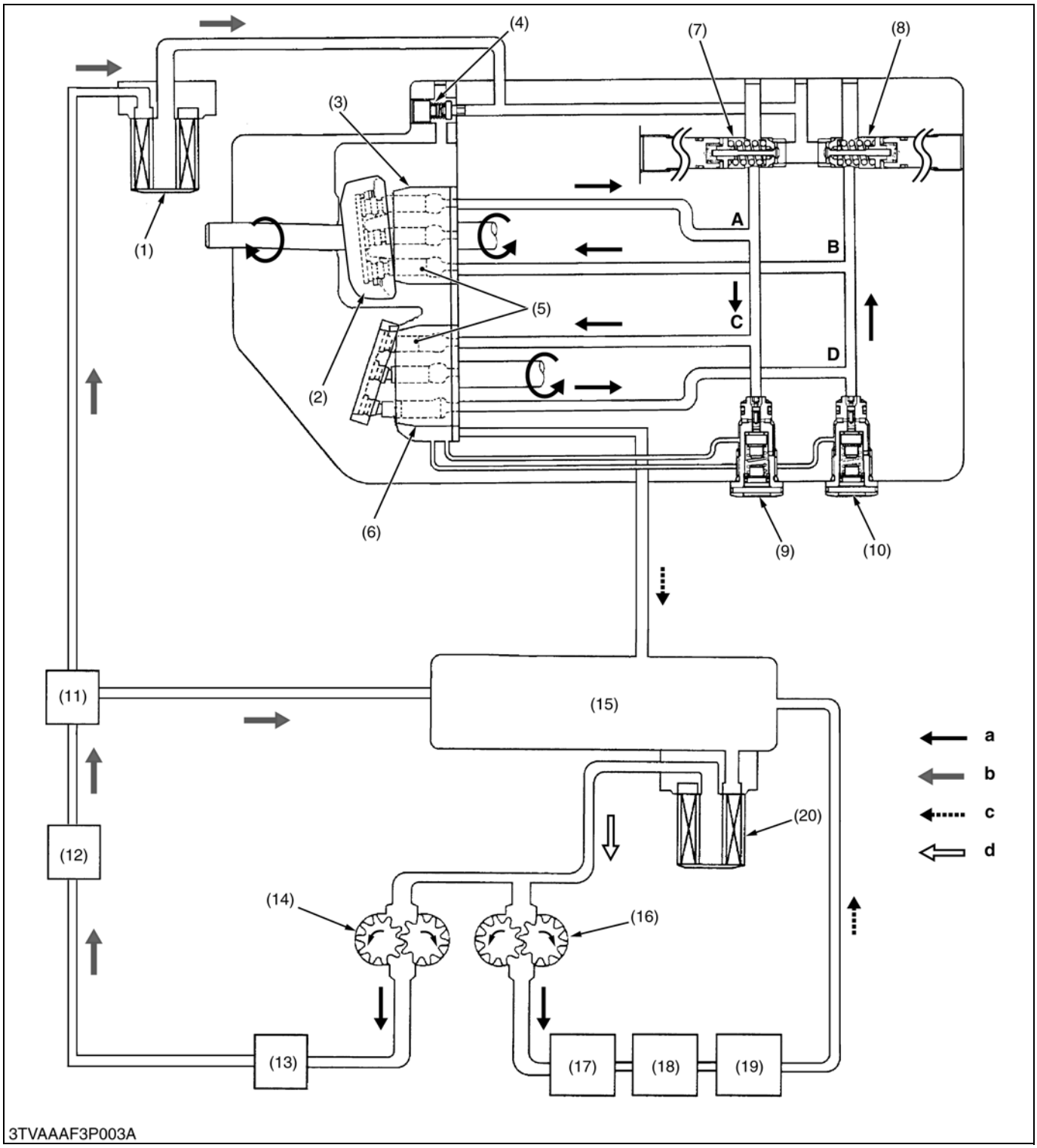
(1) Oil Filter Cartridge (for HST)
(2) Swashplate
(3) Cylinder Block (for Pump)
(4) Charge Relief Valve
(5) Piston
(6) Cylinder Block (for Motor)
(7) Check and High Pressure Relief Valve (for Forward)
(8) Check and High Pressure Relief Valve (for Reverse)
(9) Neutral Valve (for Forward)
(10) Neutral Valve (for Reverse)
(11) Independent PTO Control Valve
(12) Oil Cooler
(13) Power Steering
(14) Hydraulic Pump (for Power Steering, Independent PTO, HST)
(15) Oil Tank
(16) Hydraulic Pump (for 3-points Hitch)
(17) Front Loader Control valve
(18) Backhoe Control valve
(19) Hydraulic Control Valve (for 3-points Hitch)
(20) Oil Filter Cartridge

A : Pump A Port
B : Pump B Port
C : Pump C Port
D : Pump D Port
a : High Pressure Oil
b : Low Pressure Oil
c : Free Oil
d : Suction Oil

When the speed control pedal is in **"NEUTRAL"**, the variable swashplate is right-angles to the pump pistons. And the pump pistons only rotate with cylinder block (pump) without reciprocating.

Since the oil is not being pumped to the motor, the cylinder block (motor) is stationary. And the output shaft does not rotate.

■ Forward



(1) Oil Filter Cartridge (for HST)
(2) Swashplate
(3) Cylinder Block (for Pump)
(4) Charge Relief Valve
(5) Piston
(6) Cylinder Block (for Motor)
(7) Check and High Pressure Relief Valve (for Forward)
(8) Check and High Pressure Relief Valve (for Reverse)
(9) Neutral Valve (for Forward)
(10) Neutral Valve (for Reverse)
(11) Independent PTO Control Valve
(12) Oil Cooler
(13) Power Steering
(14) Hydraulic Pump (for Power Steering, Independent PTO, HST)
(15) Oil Tank
(16) Hydraulic Pump (for 3-points Hitch)
(17) Front Loader Control valve
(18) Backhoe Control valve
(19) Hydraulic Control Valve (for 3-points Hitch)
(20) Oil Filter Cartridge

A : Pump A Port
B : Pump B Port
C : Pump C Port
D : Pump D Port
a : High Pressure Oil
b : Low Pressure Oil
c : Free Oil
d : Suction Oil

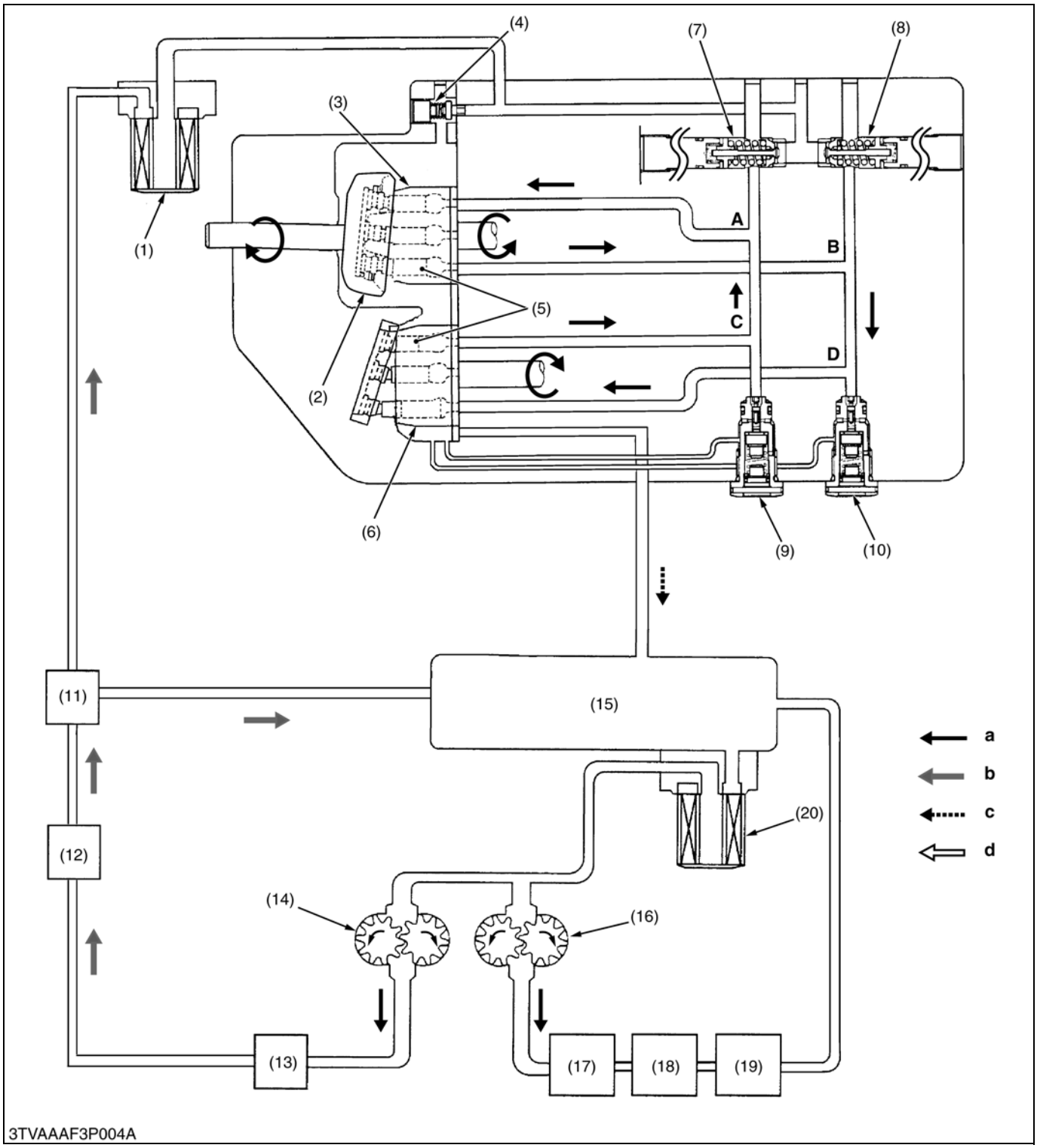
When the speed control pedal is stepped on and set to **"FORWARD"**, the variable swashplate is tilted as shown in figure.

As the pump cylinder block rotates with the input shaft, oil is forced out of pump port **A** at high pressure. As pressure oil from the pump cylinder block enters to motor port **C**, the pistons, which align with port **C**, are pushed against the swashplate and slide down the inclined surface.

Then the output shaft rotates with the motor cylinder block. This drives the machine forward and the angle of pump swashplate determines the output speed.

As the motor cylinder block continues to rotate, oil is forced out of motor port **D** at low pressure and retunes to the pump port **B**.

■ Reverse



(1) Oil Filter Cartridge (for HST)
(2) Swashplate
(3) Cylinder Block (for Pump)
(4) Charge Relief Valve
(5) Piston
(6) Cylinder Block (for Motor)
(7) Check and High Pressure Relief Valve (for Forward)
(8) Check and High Pressure Relief Valve (for Reverse)
(9) Neutral Valve (for Forward)
(10) Neutral Valve (for Reverse)
(11) Independent PTO Control Valve
(12) Oil Cooler
(13) Power Steering
(14) Hydraulic Pump (for Power Steering, Independent PTO, HST)
(15) Oil Tank
(16) Hydraulic Pump (for 3-points Hitch)
(17) Front Loader Control valve
(18) Backhoe Control valve
(19) Hydraulic Control Valve (for 3-points Hitch)
(20) Oil Filter Cartridge

A : Pump A Port
B : Pump B Port
C : Pump C Port
D : Pump D Port
a : High Pressure Oil
b : Low Pressure Oil
c : Free Oil
d : Suction Oil

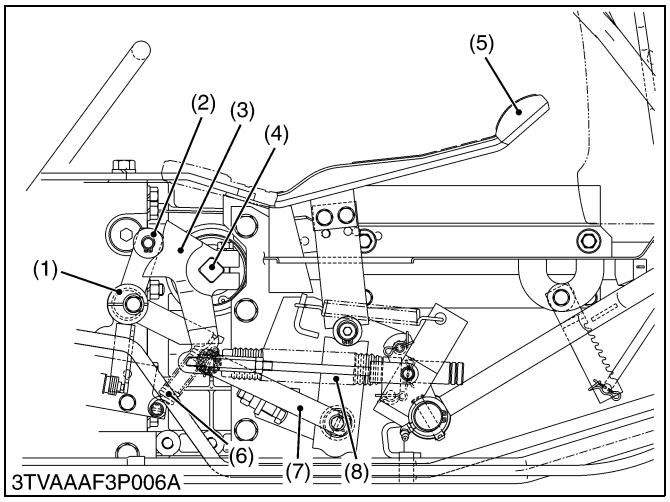
When the speed control pedal is stepped on and set to **"REVERSE"**, the variable swashplate is tilted as shown in figure.

As the pump cylinder block rotates with the input shaft, oil is forced out of pump port **B** at high pressure. AS pressure oil from the pump cylinder block enters to motor port **D**, the pistons, which align with port **D**, are pushed against the swashplate and slide down the inclined surface.

Then the output shaft rotates with the motor cylinder block. This drives the machine reward and the angle of pump swashplate determines the output speed.

As the motor cylinder block continues to rotate, oil is forced out of motor port **C** at low pressure and retunes to the pump port **A**.

[4] CONTROL LINKAGE



The HST pedal (5) and trunnion shaft (4) of variable swashplate are linked with the speed control rod (7) and the neutral holder (3). As the front footrest of the pedal is depressed, the swashplate rotates and forward travelling speed increases. Depressing the rear footrest increases reverse travelling speed.

The roller (2) on the neutral holder arm (1) is held with spring seats and the detent of the neutral holder (3) so that the neutral holder (3) returns to neutral. When the pedal is releases, the swashplate is returned to neutral with the neutral holder (3). The damper (8) connected to the HST pedal (5) restricts the movement of the linkage to prevent abrupt operation or reversing.

(1) Neutral Arm
(2) Roller
(3) Neutral Holder
(4) Trunnion Shaft
(5) HST Pedal
(6) Spring
(7) Speed Control Rod (HST)
(8) Damper

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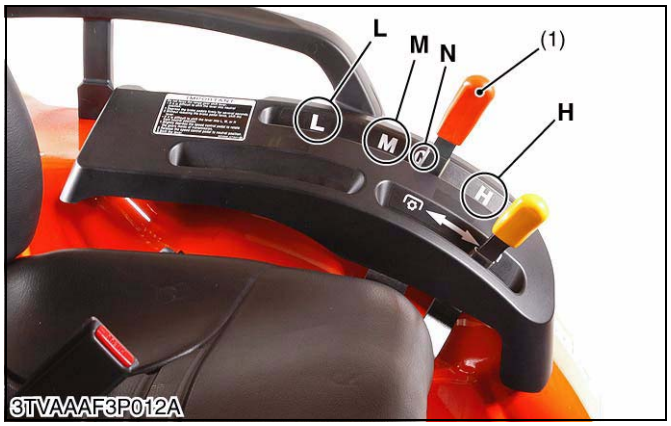
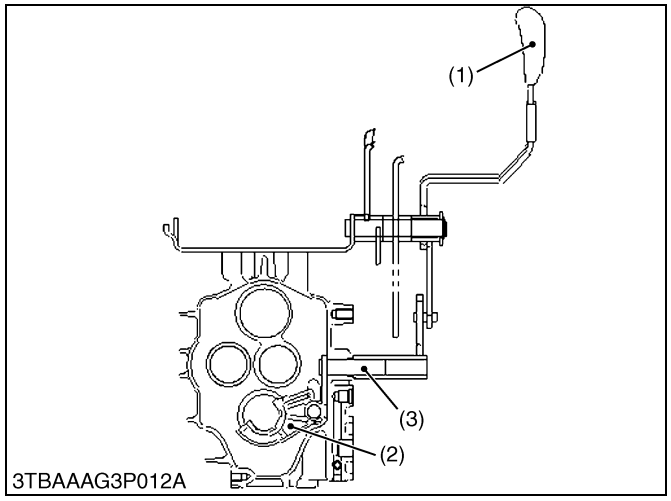
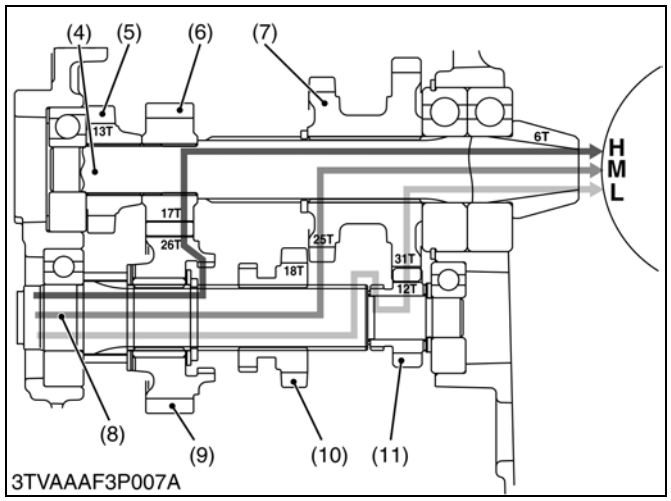
4. RANGE GEAR SHIFT SECTION







Range gear shift lever (1) is located at left side fender.

Range gear shift lever (1) can select three speed range, low speed, mid speed and high speed.

Range gear shift lever (1) and 18T shifter gear (10) are linked with range shift arm (3) and range shift fork (2) etc..

Three range gear shifts are selected by shifting the 18T shifter gear (10) on the sub shaft (8) to 17T gear (6) and 25T - 31T gear (7) on 6T bevel pinion shaft (4)

■ **Low Speed Position**

Sub shaft (8) → 18T shifter gear (10) → 12T gear (11) → 31T of 25T - 31T gear (7) → 6T bevel pinion shaft (4).

■ **Middle Speed Position**

Sub shaft (8) → 18T shifter gear (10) → 25T of 25T - 31T gear (7) → 6T bevel pinion shaft (4).

■ **High Speed Position**

Sub shaft (8) → 18T shifter gear (10) → 26T gear (9) → 17T gear (6) → 6T bevel pinion shaft (4).

(1) Range Gear Shift Lever
(2) Range Shift Fork
(3) Range Shift Arm
(4) 6T Bevel Pinion Shaft
(5) 13T Gear (for Front Wheel Drive)
(6) 17T Gear
(7) 25T - 31T Gear
(8) Sub Shaft
(9) 26T Gear
(10) 18T Shifter Gear
(11) 12T Gear

L : "LOW" range
M : "MIDDLE" range
N : "NEUTRAL" position
H : "HIGH" range

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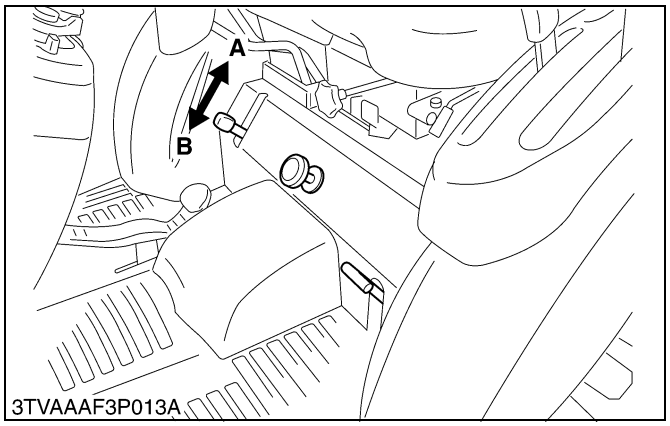
5. FRONT WHEEL DRIVE SECTION



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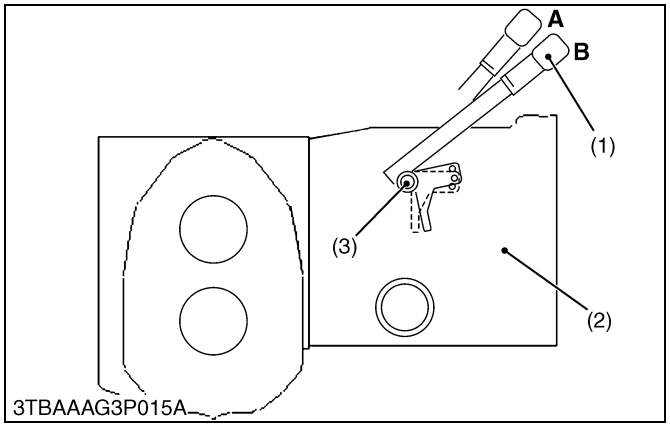

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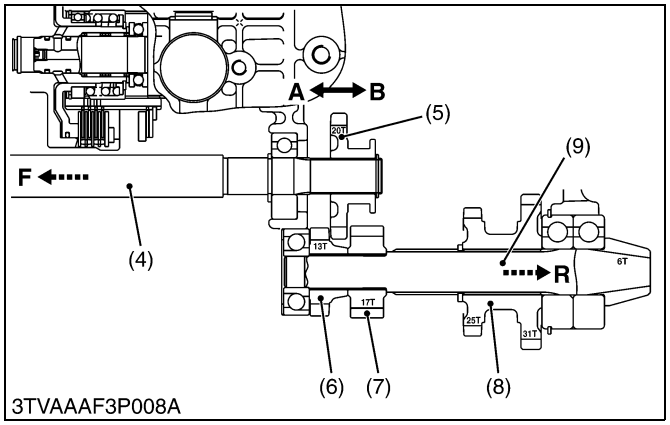

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Front wheel drive lever (1) is located at the front floor cover.

Front wheel drive lever (1) and shifter (3) are linked.

20T shifter gear (5) is located on the front wheel drive shifter (4).

2-wheel drive or 4-wheel drive is selected by changing the position of 20T shifter gear (5) reverse or forward.

When the font wheel drive lever (1) is set to **"4 Wheel Drive Position",** 20T shifter gear (5) slides forward, meshes the13T gear (6) on the 6T bevel pinion shaft (9).

In this state, power from the 6T bevel pinion shaft (9) is transmitted through 20T shifter gear (5) to the front wheel drive shaft (4) and the front wheels.

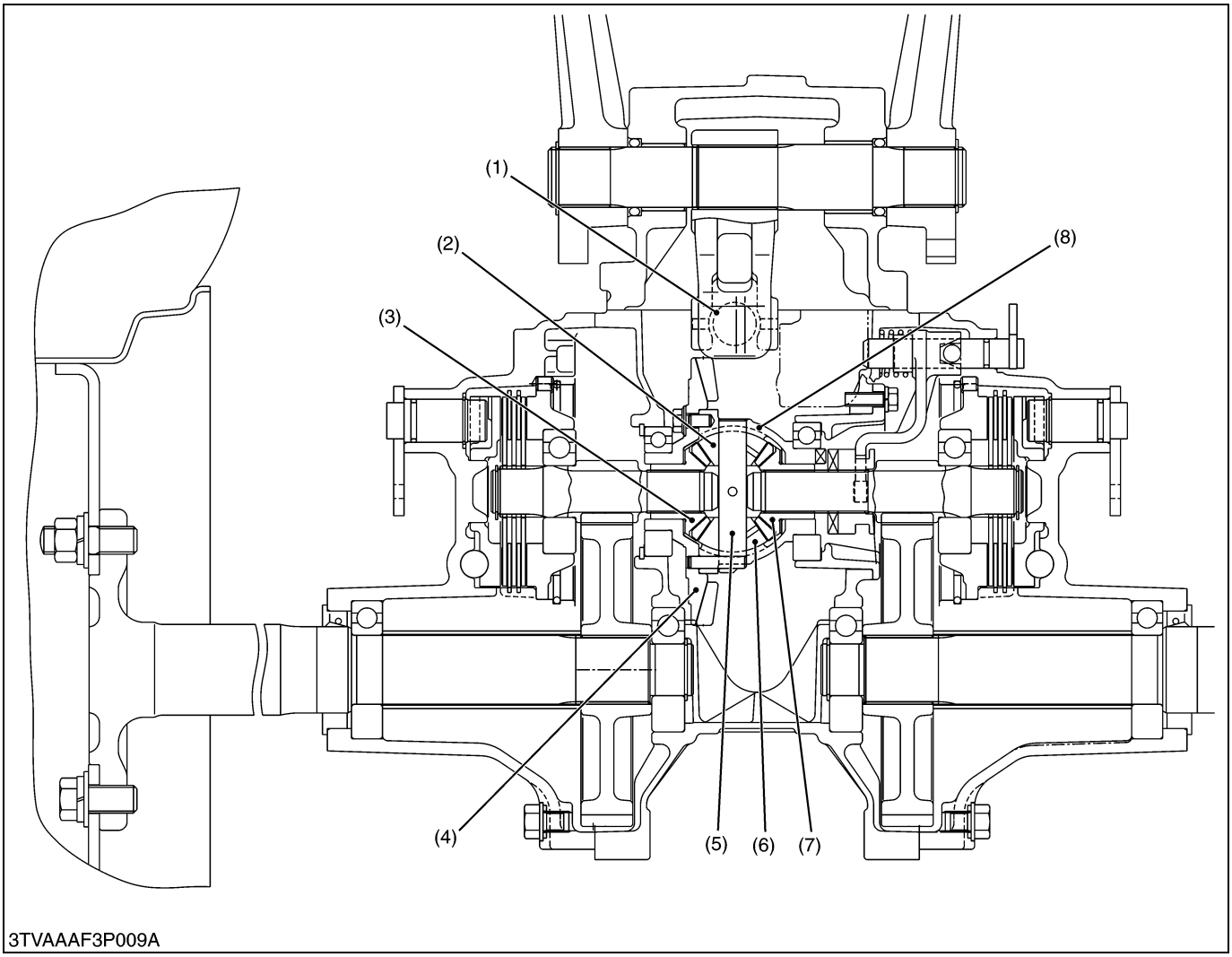
(1) Front Wheel Drive Lever
(2) Transmission Case
(3) Shifter
(4) Front Wheel Drive Shaft
(5) 20T Shifter Gear
(6) 13T Gear
(7) 17T Gear
(8) 25T-31T Gear
(9) 6T Bevel Pinion Shaft

A : "4 Wheel Drive" position
B : "2 Wheel Drive" position
F : Power to Front Wheels
R : Power to Rear Wheels

W1017020

6. DIFFERENTIAL GEAR SYSTEM

[1] DIFFERENTIAL FUNCTION



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(1) Spiral Bevel Pinion
(2) Differential Pinion
(3) Differential Side Gear
(4) Spiral Bevel Gear
(5) Differential Pinion Shaft
(6) Differential Pinion
(7) Differential Side Gear
(8) Differential Case

■ **During Straight Running**

Rotation of the spiral bevel pinion (1) is transmitted to the spiral bevel gear (4) and differential case (8). When road resistance to the right and left wheels are equal, differential pinions (2), (6) and differential side gears (3), (7) are all rotate as a unit. Both rear axles received equal input, and both wheels turn at the same speed, allowing the tractor to ho straight ahead. At this time, differential pinions (2), (6) does not rotate around the differential pinion shaft (5).

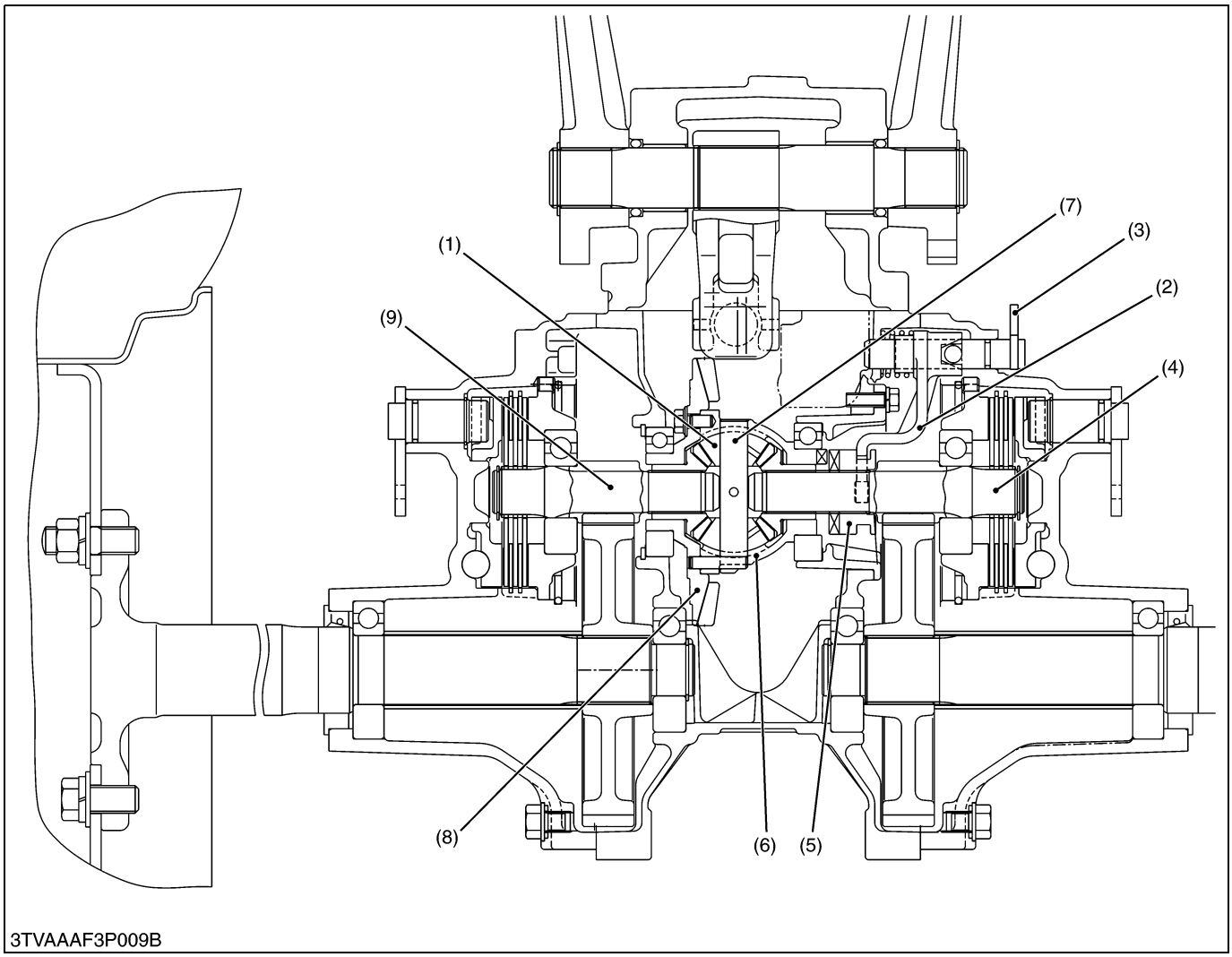
■ **During Turning**

When the tractor turns, the road resistance to the inside tire increases (as if braking is applied to that side only).

In other words, if one of tires slows down, revolution difference is generated in the differential side gears (3), (7). When rotation of one differential side gear becomes lower than the other, differential pinions (2), (6) begin rotating around differential pinion shaft (5). The other differential side gear is increased in speed by the speed increment of differential pinion shaft (5). This means that rotation of one rear axle is slowed down and that of the other rear axle is increased. Thus, the tractor turns smoothly without power loss.

The combined number of revolutions of the right and left differential side gears is always twice that of the spiral bevel gear (4). When spiral bevel gear revolution is 100 rpm, and if one of the differential side gears stops moving, the revolution of the other differential side gear becomes 200 rpm and if one rotates at 50 rpm, the other rotates at 150 rpm.

[2] DIFFERENTIAL LOCK



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(1) Differential Pinion
(2) Shift Fork
(3) Differential Lock Lever
(4) Differential Gear Shaft (Right)
(5) Differential Lock Clutch
(6) Differential Case
(7) Differential Pinion Shaft
(8) Spiral Bevel Pinion
(9) Differential Gear Shaft (Left)

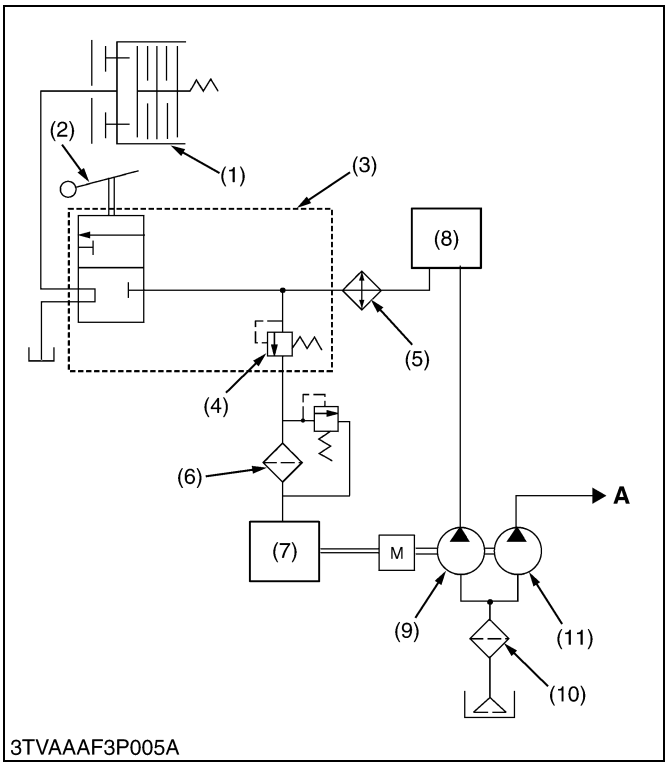
When resistance to the right and the left tires are greatly different due to ground conditions or type of work, the tire with less resistance slips and prevents the tractor from moving ahead. To compensate for this drawback, the differential lock restricts the differential action and causes both rear axles to rotate as a unit.

When the differential lock pedal is stepped on, it causes the differential lock lever (3) to rotate. The differential lock lever (3) will move the shift fork (2) and the differential lock clutch (5) toward the spiral bevel gear (8). The differential lock clutch (5) engages with the teeth of the differential case (6) to make the differential case (6) and the differential lock clutch (5) to rotate together as a unit.

Therefore, the differential pinions (1) are unable to rotate around the differential pinion shaft (7) and differential revolutions are transmitted to the right and the left differential gear shaft (4) (9).

7. INDEPENDENT PTO

[1] HYDRAULIC CIRCUIT



(1) PTO Clutch
(2) Independent PTO Lever
(3) Independent PTO Control Valve
(4) Relief Valve
(5) Oil Cooler
(6) Oil Filter Cartridge (for HST)
(7) HST
(8) Power Steering
(9) Hydraulic Pump (for HST, Power Steering and Independent PTO)
(10) Oil Filter Cartridge
(11) Hydraulic Pump (3-Points Hitch)
(12) 3-Points Hitch

A : To Front Loader, Backhoe and 3-Points Hitch

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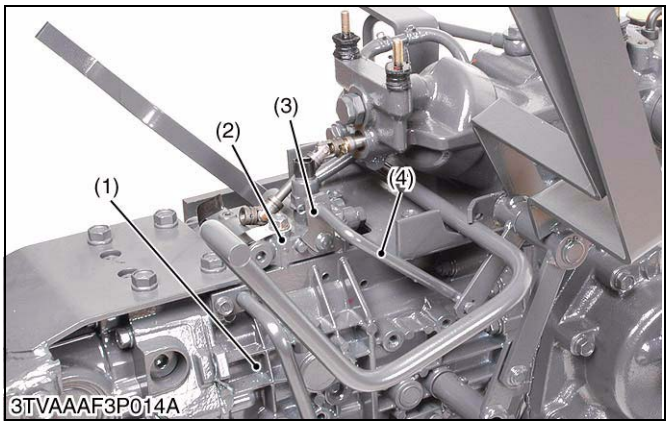
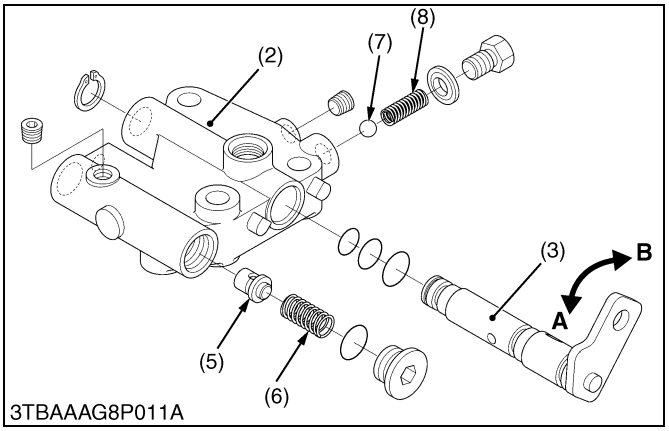
[2] INDEPENDENT PTO CONTROL VALVE





Independent PTO control valve (2) is located at transmission case (1).

The independent PTO control valve (2) is composed of PTO arm (3), poppet (5), ball (7) and etc..

The PTO arm (3) is connected to control rod (4) and the independent PTO lever.

The PTO arm (3) is moved to **"OFF"** or **"ON"** position by the independent PTO lever.

Oil passage in the PTO arm (3) is turned by the independent PTO lever.

When the PTO arm (3) is moved to **"OFF"** position, oil in the independent PTO control valve does not flow to the oil passage.

When the PTO arm (3) is moved to **"ON"** position, oil in the independent PTO control valve flow to the oil passage.

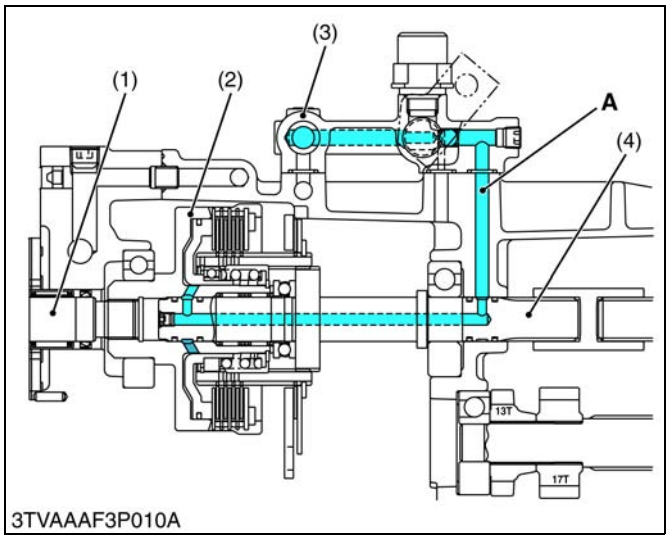
Poppet (5) and spring (6) operate as a relief valve.

(1) Transmission Case
(2) Independent PTO Control Valve
(3) PTO Arm
(4) Control Rod
(5) Poppet
(6) Spring
(7) Ball
(8) Spring

A : PTO Arm "OFF" Position
B : PTO Arm "ON" Position

W1017325

[3] INDEPENDENT PTO CLUTCH



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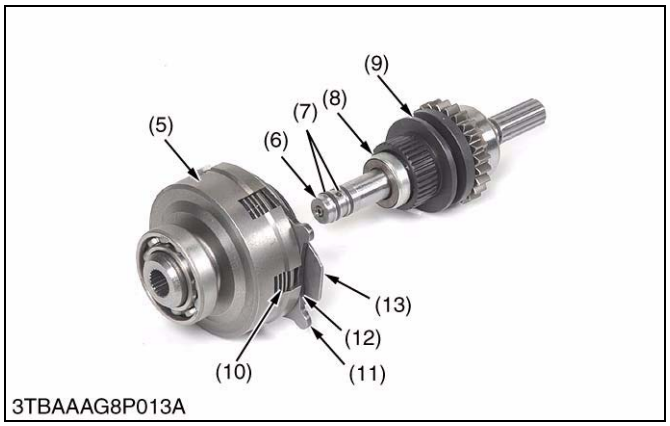

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Independent PTO clutch (2) is located behind the HST pump shaft (1) in the transmission case.

Independent PTO clutch (2) is operated with pressured hydraulic oil forced from the independent PTO control valve (3).

When independent PTO lever is shifted to **"ENGAGED"** position, hydraulic oil is forced through the transmission case inner passage **A** and PTO clutch shaft (6) to PTO clutch. In this state, power from HST pump shaft is transmitted through independent PTO clutch (2) to independent PTO clutch shaft (6).

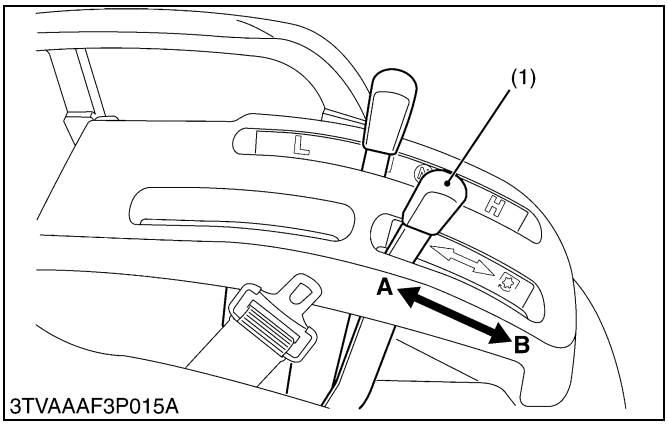
When independent PTO lever is shifted to **"DISENGAGED"** position, hydraulic oil is not forced to the PTO clutch. In this state, power from HST pump shaft (1) is not transmitted to independent PTO clutch shaft (6).

(1) HST Pump Shaft
(2) Independent PTO Clutch
(3) Independent PTO Control Valve
(4) PTO Clutch Shaft
(5) Case
(6) PTO Clutch Shaft
(7) Seal
(8) Bearing
(9) Shifter
(10) Clutch Disks and Plates
(11) Brake Plate 4
(12) Brake Disk
(13) Brake Plate 2

A : Passage

W1017867

[4] INDEPENDENT PTO LEVER “ENGAGED”



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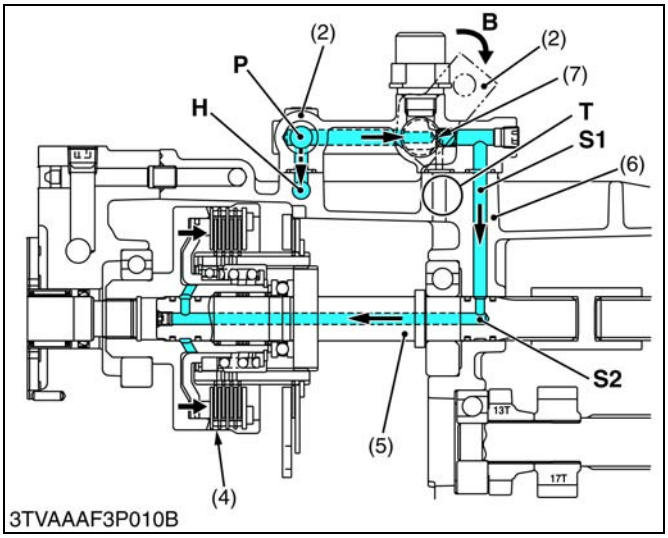

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When the independent PTO lever (1) is shifted to the **"ENGAGED"** position, the PTO arm (3) is turned to **"ON"** position.

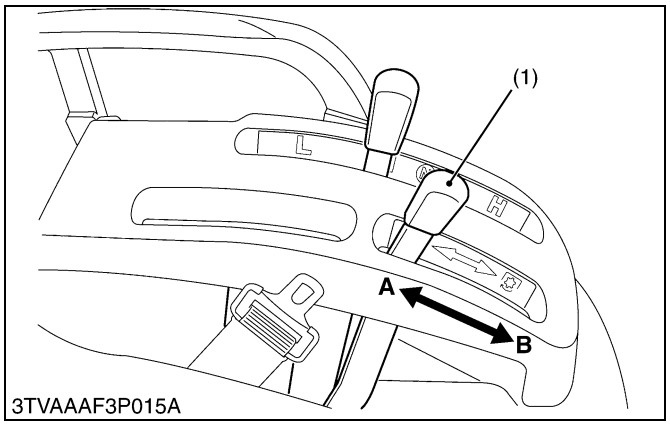
Hydraulic oil from **P** port flows through oil passage (7) of the PTO arm (3), oil passage **S1** in the transmission case (6) and oil passage **S2** in the PTO clutch shaft (5) to the PTO clutch (4).

Since the piston of the PTO clutch (4) is pushed by pressurized oil, clutch disks and clutch plates are pushed, and the PTO clutch (4) is engaged.

(1) Independent PTO Lever	**A : “DISENGAGED” Position**
(2) Independent PTO Control Valve	**B : “ENGAGED” Position**
	P : Pump Port
(3) PTO Arm	**H : HST Port**
(4) PTO Clutch	**T : Tank Port**
(5) PTO Clutch Shaft	**S1 :Oil Passage (in the Transmission Case)**
(6) Transmission Case	**S2 :Oil Passage (in the PTO Clutch Shaft)**
(7) Oil Passage (in the PTO arm)	

W1018718

[5] INDEPENDENT PTO LEVER “DISENGAGED”



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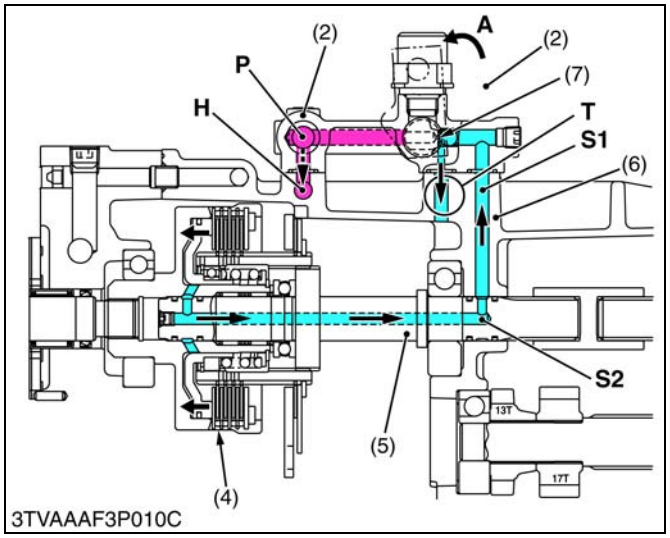

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When the independent PTO lever (1) is shifted to the **"DISENGAGED"** position, the PTO arm(3) is turned to **"OFF"** position.

Hydraulic oil is stopped at the PTO arm (3).

This oil flows to the HST port.

Oil in the PTO clutch (4) and the PTO clutch shaft (5) drains through oil passage **S2**, **S1** and **T** port to the transmission case.

(1) Independent PTO Lever
(2) Independent PTO Control Valve
(3) PTO Arm
(4) PTO Clutch
(5) PTO Clutch Shaft
(6) Transmission Case

A : “DISENGAGED” Position
B : “ENGAGED” Position
P : Pump Port
H : HST Port
T : Tank Port
S1 : Oil Passage (in the Transmission Case)
S2 : Oil Passage (in the PTO Clutch Shaft)

W1019510

SERVICING

CONTENTS

1. TROUBLESHOOTING

HYDROSTATIC TRANSMISSION SECTION

Symptom	Probable Cause	Solution	Reference Page
System Will Not Operate in Either Direction	Oil level is low	Check oil level or fill oil to proper level	G-8, 2-S13
	Speed control pedal linkage defective	Repair linkage	2-S19
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-20
		2. Check charge pressure	2-S7
		3. Inspect or flush charge relief valve	2-S41
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	2-S41
	Neutral valve defective	Inspect or replace neutral valve	2-S41
	Component parts defective	Replace hydrostatic transmission assembly	2-S22
Vibration and Noise	Oil level is too low	Check oil level or fill oil to proper level	G-8, 2-S13
	Speed control pedal linkage defective	Repair linkage	2-S19
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-20
		2. Check charge pressure	2-S7
		3. Inspect or flush charge relief valve	2-S41
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	2-S41
	Neutral valve is defective	Inspect or replace neutral valve	2-S41
	Component parts defective	Replace hydrostatic transmission assembly	2-S22

W1022927

HYDROSTATIC TRANSMISSION SECTION (Continued)

Symptom	Probable Cause	Solution	Reference Page
Loss of Power	Oil level is too low	Check oil level or fill oil to proper level	G-8, 2-S13
	Speed control pedal linkage defective	Repair linkage	2-S19
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-20
		2. Check charge pressure	2-S7
		3. Inspect or flush charge relief valve	2-S41
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	2-S41
	Neutral valve is defective	Inspect or replace neutral valve	2-S41
	Component parts defective	Fill transmission oil level up to proper level	2-S13
Transmission Oil Over Heats	Low transmission oil level	Fill oil to proper level	G-8, 2-S13
	Radiator net clogged	Clean radiator net	–
	Excessive machine load	Reduce machine load	–
	Improper charge pressure	1. Check high relief pressure	2-S8
		2. Replace transmission oil filter cartridge	G-20
		3. Replace check and high pressure relief valve	2-S41
		4. Inspect and replace charge relief valve	2-S41
Machine Will not Stop in Neutral Position	Speed control linkage is out of adjustment or sticking	Repair or replace linkage	2-S19
		Adjust neutral adjuster	–
	Neutral valve defective	Inspect or replace neutral valve	2-S41
System Operates in One Direction Only	Speed control linkage defective	Repair or replace linkage	2-S19
	Check and high pressure relief valve defective	Replace check and high pressure relief valve	2-S41

W1024729

FRONT CASE

Symptom	Probable Cause	Solution	Reference Page
Noise From Front Case	Clutch shaft spline worn	Replace	2-S20
	Bearing Worn	Replace	2-S20

W1021570

TRANSMISSION CASE SECTION

Noise From Front Transmission	Transmission oil insufficient	Refill	2-S13
	Gear worn or broken	Replace	–
	Improper backlash between spiral bevel pinon and bevel gear	Adjust	2-S45
	Improper backlash between differential pinion and differential side gear	Adjust	2-S45
	Bearings worn	Replace	2-S44
	PTO clutch damaged	Repair or replace	2-S43

W1023839

DIFFERENTIAL CASE SECTION

Excessive or Unusual Noise at All Times	Improper backlash between spiral bevel pinion and bevel gear	Adjust	2-S45
	Improper backlash between differential pinion and differential side gear	Adjust	2-S45
	Bearing worn	Replace	–
	Insufficient or improper type of transmission fluid used	Replenish or replace	G-8
Noise while Turning	Differential pinions or differential side gears worn or damaged	Replace	2-S45
	Differential lock binding (does not disengage)	Replace	3-S9
	Bearing worn	Replace	2-S46
Differential Lock Can Not Be Set	Differential lock shift fork damaged	Replace	3-S9
	Differential lock shifter mounting pin damaged	Replace	3-S9
	Differential lock clutch damaged	Replace	3-S9
Differential Lock Pedal Does Not Return	Differential lock pedal return spring weakened or damaged	Replace	3-S9
	Differential lock fork shaft rusted	Repair	3-S9

W1025803

2. SERVICING SPECIFICATIONS

HYDROSTATIC TRANSMISSION (HST)

Item		Factory Specification	Allowable Limit
Charge Relief Valve	Setting Pressure	0.41 to 0.59 MPa 4.1 to 6.1 kgf/cm^2 59 to 86 psi	–
Check and High Pressure Relief Valve	Setting Pressure [Relief Valve]	33.9 to 34.8 MPa 345 to 355 kgf/cm^2 4910 to 5040 psi	–
Piston Slipper	Thickness	3.00 mm 0.118 in.	2.90 mm 0.1142 in.
Piston to Bore (HST)	Clearance	0.2 mm 0.0008 in.	0.04 mm 0.0016 in.

W1027349

INDEPENDENT PTO CLUTCH

Clutch Disc	Thickness	1.70 to 1.90 mm 0.067 to 0.075 in.	1.55 mm 0.061 in.
Steel Plate Wear (without Hole)	–	0.95 to 1.05 mm 0.0374 to 0.0413 in.	0.8 mm 0.031 in.
Steel Plate Wear (with Holes, with Holes and Rubber Plugs)	–	1.15 to 1.25 mm 0.045 to 0.049 in.	1.10 mm 0.043 in.
Pressure plate wear	–	1.95 to 2.05 mm 0.0768 to 0.0807 in.	1.8 mm 0.071 in.
Clutch Plate	Thickness (With Hole)	1.15 to 1.25 mm 0.045 to 0.049 in.	1.10 mm 0.043 in.
Pressure Plate	Thickness	1.95 to 2.05 mm 0.0768 to 0.0807 in.	1.8 mm 0.071 in.
Piston Return Spring	Free Length	44.0 mm 1.73 in.	–
	Load / Length	638.7 N / 26 mm 65.13 kgf / 26 mm 143.6 lbf / 1.02 in.	539.4 N / 26 mm 55 kgf / 26 mm 121.3 lbf / 1.02 in.

W1027629

TRANSMISSION CASE AND DIFFERENTIAL GEAR

Item		Factory Specification	Allowable Limit
Shift Fork to Shifter Gear Groove	Clearance	0.10 to 0.35 mm 0.004 to 0.014 in.	0.5 mm 0.020 in.
Differential case to Differential Side Gear	Clearance	0.025 to 0.066 mm 0.0010 to 0.0025 in.	0.30 mm 0.0118 in.
Differential Case	I.D.	32.000 to 32.025 mm 1.2599 to 1.2608 in.	–
Spiral Bevel Gear	I.D.	32.000 to 32.025 mm 1.2599 to 1.2608 in.	–
Differential Side Gear Boss	O.D.	31.925 to 31.950 mm 1.25689 to 1.25787 in.	–
Differential Pinion to Differential Pinion Shaft	Clearance	0.016 to 0.045 mm 0.0006 to 0.0018 in.	0.3 mm 0.0118 in.
Differential Pinion	I.D.	16.000 to 16.018 mm 0.6299 to 0.6306 in.	–
Differential Pinion Shaft	O.D.	15.973 to 15.984 mm 0.6289 to 0.6293 in.	–
Differential Pinion to Differential Side Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.012 in.	0.4 mm 0.016 in.
Spiral Bevel Pinion Shaft	Movements at shaft directions	Approx. 0 mm 0 in.	–
Spiral Bevel Pinion to Spiral Bevel Gear	Backlash	0.10 to 0.30 mm 0.0039 to 0.012 in.	–

W1028297

3. TIGHTENING TORQUES

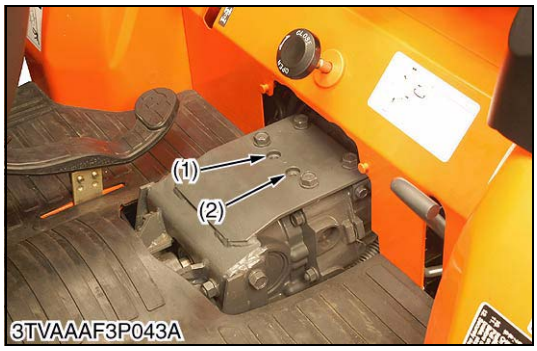
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

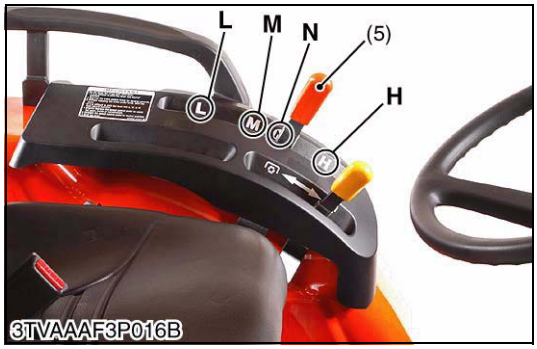
Item	N·m	kgf·m	lbf·ft
Checking port plug	30 to 44	3.0 to 4.5	22 to 33
Hex. socket head screw	24.5 to 29.5	2.5 to 3.0	18.1 to 21.7
Rear wheel mounting bolts	196 to 225	20.0 to 23.0	145 to 166
Rear wheel mounting nuts	167 to 191	17 to 19.5	123 to 141
ROPS mounting bolt	91 to 95	9.2 to 9.7	67 to 70
Center frame mounting bolt for ordinariness material (M12)	78 to 90	7.9 to 9.2	58 to 66
Center frame mounting bolt for aluminum material (M12)	63 to 72	6.4 to 7.4	47 to 53
Front case mounting nut for aluminum material (M8)	18 to 20	1.8 to 2.1	13 to 15
Front case mounting bolt for aluminum material (M10)	40 to 45	4.0 to 4.5	29 to 32
Steel plate mounting bolt (M8)	24 to 27	2.4 to 2.8	18 to 20
HST assembly mounting bolt (M10, aluminum)	40 to 45	4.0 to 4.5	29 to 32
Center section mounting hex. bolt (M10, aluminum)	40 to 45	4.0 to 4.5	29 to 32
Check and high pressure relief valve plug	118 to 147	12.0 to 15.0	86.8 to 108.5
Neutral valve body	59 to 68	6.0 to 7.0	44 to 50
Transmission case mounting bolt (M10) and nut	40 to 45	4.0 to 4.5	29 to 32
Hydraulic cylinder mounting bolt (M10) and nut	40 to 45	4.0 to 4.5	29 to 32
Rear axle case (LH and RH) mounting bolt for aluminum material (M10)	40 to 45	4.0 to 4.5	29 to 32
Rear PTO cover mounting bolt for aluminum material (M10)	40 to 45	4.0 to 4.5	29 to 32
Differential bearing holder mounting bolt for aluminum material (M8)	18 to 20	1.8 to 2.1	13 to 15

W1056590

4. CHECKING AND ADJUSTING

[1] HST





Charge Relief Pressure

CAUTION

- **When checking, park the tractor on flat ground and fully engage the parking brake.**

1. Remove the lowering speed adjusting knob and the seat under cover.
2. Remove the plug from **P1** port (reverse) or **P2** port (forward).

■ **NOTE**

- **If the plug is tight to remove, warm up the plug by a hair dryer etc..**

3. Install the adaptor (4) to **P1** port (1) or **P2** port (2).
4. Install the cable (3) and low pressure gauge to the adaptor (4).

Engine speed	Rated speed
Range gear shift position	Neutral
HST pedal	Neutral

5. Start the engine and warm the oil before testing.
6. Change the range gear shift lever (5) to **"NEUTRAL"** position.
7. Run the engine at the rated speed.
8. Release the foot from the HST pedal.
9. Read the low pressure gauge to measure the charge relief pressure.
10. If the measurement is not same as factory specification, check the charge relief valve and the related hydraulic components.

Charge pressure	Factory spec.	0.41 to 0.59 MPa 4.1 to 6.1 kgf/cm^2 59 to 86 psi

■ **NOTE**

- **Low pressure gauge is 2.9 MPa (30 kgf/cm^2, 427 psi) full scale.**

(When reassembling)

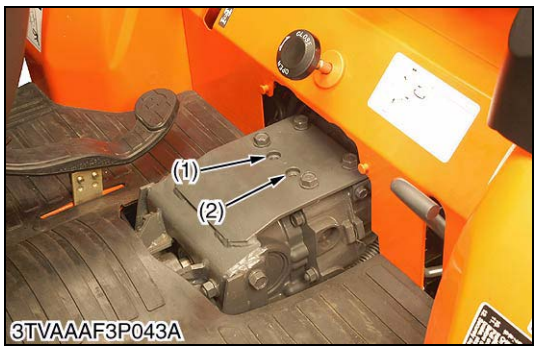
- Apply liquid lock (Three Bond 1375N or its equivalent) to the plug.

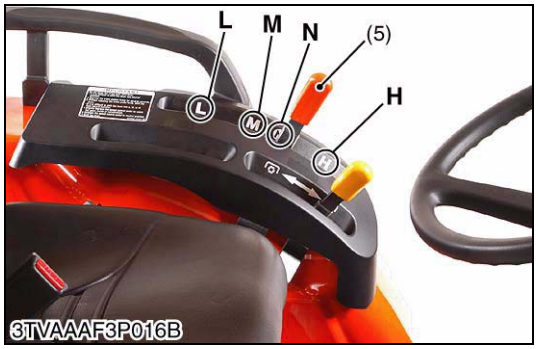
Tightening torque	Checking port plug	30 to 44 N·m 3.0 to 4.5 kgf·m 22 to 33 lbf·ft

(1) **P1** Port (Reverse)
(2) **P2** Port (Forward)
(3) Cable
(4) Adaptor
(5) Range Gear Shift Lever

L : Low Speed Position
M : Medium Speed Position
N : Neutral Position
H : High Speed Position

W1011821





High Pressure Relief Valve

CAUTION

- **When checking, park the tractor on flat ground and fully engage the parking brake.**

1. Remove the lowering speed adjusting knob and the seat under cover.
2. Remove the plug from **P1** port (reverse) or **P2** (forward).

NOTE

- **If the plug is tight to remove, warm up the plug by a hair drier etc..**

3. Install the adaptor (4) to **P1** port (1) or **P2** port (2).
4. Install the cable (3) and high pressure gauge.

Engine speed	Rated speed
Range gear shift position	High
HST pedal	Forward or Reverse
Brake pedal	Depressed

5. Start the engine and warm the oil before testing. Check to see that parking brake is applied.
6. Place the range gear shift lever (5) to **"HIGH"** position.
7. Run the engine at the rated speed.
8. Depress the rear side pedal of the HST pedal.
9. Read the high pressure gauge to measure the high pressure relief valve pressure.
10. If the measurement is not the same as factory specification, check the check and high pressure relief valve assembly.

Check and high relief pressure (Oil temperature at 40 to 60 °C (104 to 140 °F)	Factory spec.	33.9 to 34.8 MPa 345 to 355 kgf/cm^2 4910 to 5040 psi

IMPORTANT

- **Measure quickly so than the relief valve may not be in operation more than 10 seconds.**

Condition

- High pressure gauge is 40 MPa (400 kgf/cm^2, 5800 psi) full scale.
- Engine speed : Rated speed.
- Oil temperature : 45 to 55 °C
  113 to 131 °C.

(When reassembling)

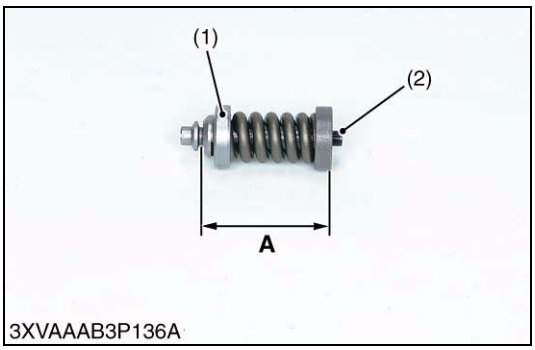
- Apply liquid lock (Three Bond 1375N or its equivalent) to the plug.

Tightening torque	Checking port plug	30 to 44 N·m 3.0 to 4.5 kgf·m 22 to 33 lbf·ft

(1) **P1** Port (Reverse)
(2) **P2** Port (Forward)
(3) Cable
(4) Adaptor
(5) Range Gear Shift Lever

L : Low Speed Position
M : Medium Speed Position
N : Neutral Position
H : High Speed Position

W1031469



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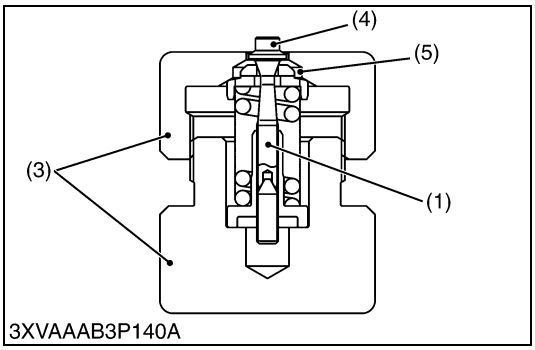

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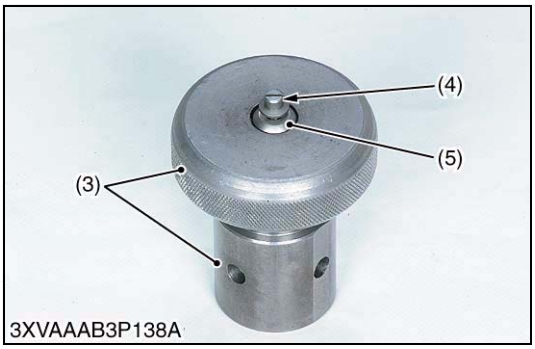

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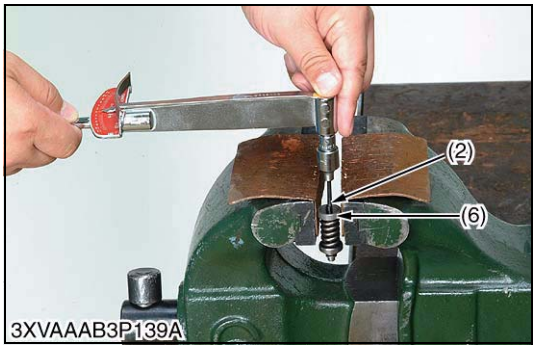

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Readjustment of Relief Valve (When the HST does not work due to its loose hexagon socket head screw)

■ **IMPORTANT**

- **The KUBOTA does not recommend the readjustment of relief valve. And KUBOTA will recommend to replace with genuine parts.**
- **As the HST may be damaged if the pressure is set to higher by mistake, be careful when adjusting it.**

■ **NOTE**

- **The relief pressure is set in between 33.3 to 36.3 MPa (340 to 370 kgf/cm^2, 4836 to 5262 psi) when shipped from the factory. But, for the purpose of after-sales services, as it is impossible to reset the pressure precisely as set in the factory, its setting range is defined as a slightly wider range between 31.4 to 35.3 MPa (320 to 360 kgf/cm^2, 4551 to 5120 psi)**

1. Measure the pre-adjustment distance **A**.
2. Compress the spring of the relief valve with a relief valve assembling tool (3).
3. Then, find the distance **A** by turning the poppet (4) with a screwdriver.
   Reference: The distance **A** changes by about 0.5 mm (0.0197 in.) per one turn of the poppet (4).
4. Repeat the same operation a few times to find the distance **A** as it is difficult to acquire at the first time.
5. After finding the distance **A**, hold the setscrew (6) to a vice and fasten the hexagon socket head screw (2) with specified torque. On this occasion, use a copper plate, etc. for the vice jaws not to damage the setscrew (6).
6. Install the relief valve in the HST.
7. Check the relief pressure as indicated in page 2-S7 and 2-S8. The distance **A** is for refresh only. Make sure to check the relief pressure after readjustment.
8. If the relief pressure does not fall within the readjustment pressure range, repeat the processes of the above item 1 onward.
   Reference: The pressure changes by 1.47 MPa (15 kgf/cm^2, 213.3 psi) per 0.1 mm (0.0039 in.) in distance **A**.

Tightening torque	Hex. socket head screw	24.5 to 29.5 N·m 2.5 to 3.0 kgf·m 18.1 to 21.7 lbf·ft

(Reference)

Relief valve readjusting pressure	Factory spec.	31.4 to 35.3 MPa 320 to 360 kgf/cm^2 4551 to 5120 psi

Distance **A**	Reference value	37.9 to 38.0 mm 1.4921 to 1.4960 in.

(1) Relief Valve Assembly
(2) Hexagon Socket Head Screw
(3) Relief Valve Assembling Tool
(4) Poppet
(5) Valve Seat
(6) Setscrew

W1034685

5. DISASSEMBLING AND ASSEMBLING

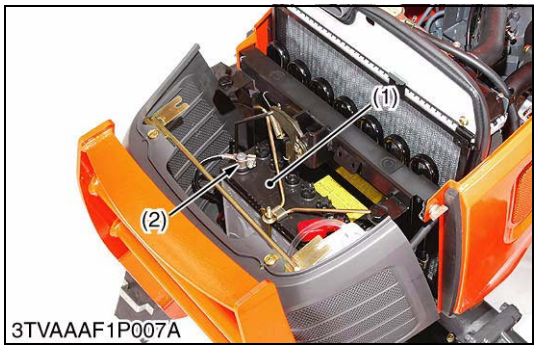
[1] PREPARATION

(1) Separating Front Loader, Backhoe and Main Frame

Front Loader and Backhoe

1. Refer to "**9. FRONT LOADER**" section and "**10. BACKHOE**" section.

W1038999



Battery Negative Cable

1. Open the bonnet and disconnect the battery negative cable from the battery.

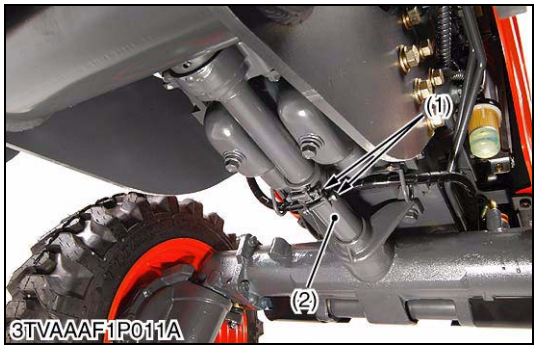
(When reassembling)

■ **NOTE**

- **When connecting the battery cords, connect the battery positive cable first.**

(1) Battery (2) Negative Cable

W10404050



Front Wheel Drive Shaft

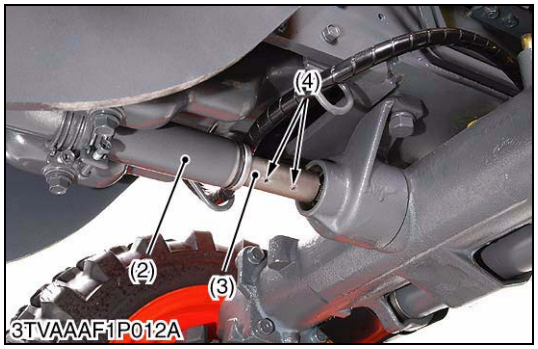
1. Loose the front wheel drive shaft cover band screws (1).
2. Slide the front wheel drive shaft cover (2) to the rear.
3. Tap out the coupling spring pins (4).
4. Remove the front wheel drive shaft.

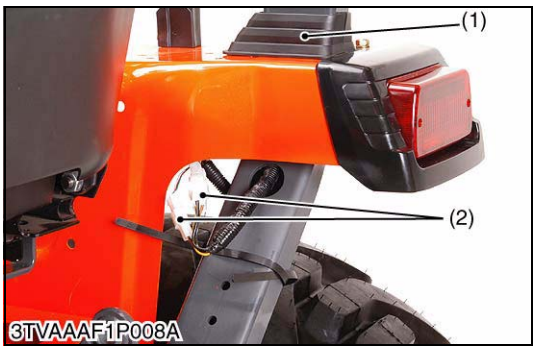
(When reassembling)

- Apply grease to the splines of the front wheel drive shaft.

(1) Screw (3) Coupling
(2) Cover (4) Spring Pin

W1050368



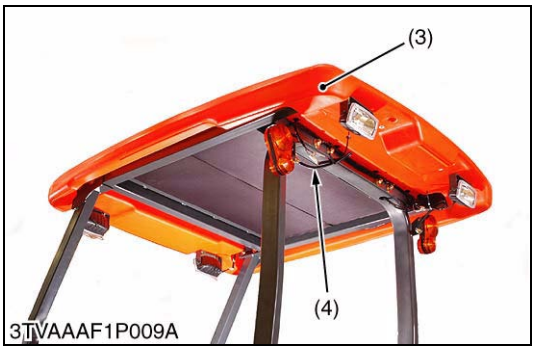


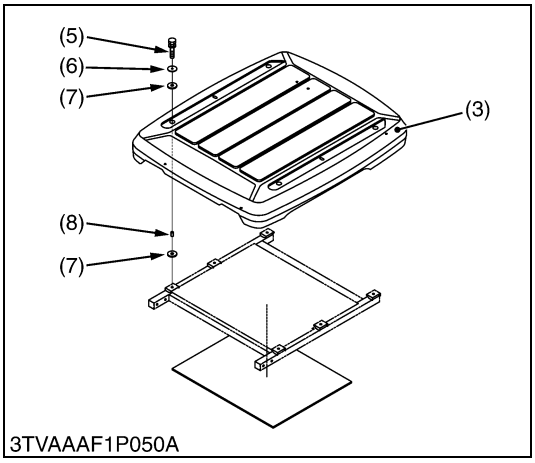
Canopy

1. Disconnect the connectors (2).
2. Remove the rubber (1).
3. Disconnect the hazard light connectors (4).
4. Remove the canopy (3) with wiring harness.

(1) Rubber
(2) Connector
(3) Canopy
(4) Connector
(5) Bolt
(6) Plane Washer
(7) Cution
(8) Collar

W1042198





Frames

1. Remove the upper frame (2).
2. Remove the front frames (1) (3).

(1) Front Frame, RH
(2) Upper Frame
(3) Front Frame, LH

W1042406

Rear Wheels

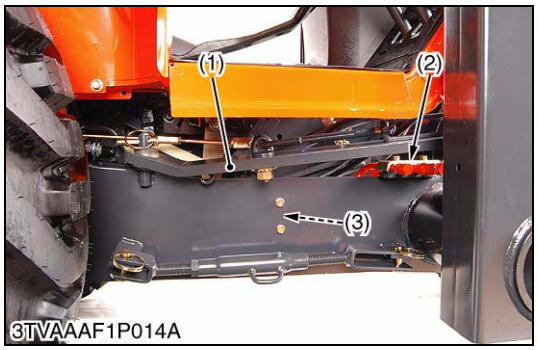
1. Place a hydraulic jack under the frame and jack up the tractor.
2. Remove the rear wheel mounting belts and nuts.
3. Remove the rear wheels (1) (2).
4. Place the rigid jacks under the rear axles. And remove the hydraulic jack.

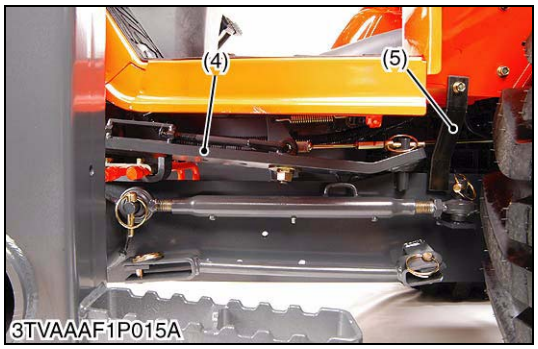
(When reassembling)

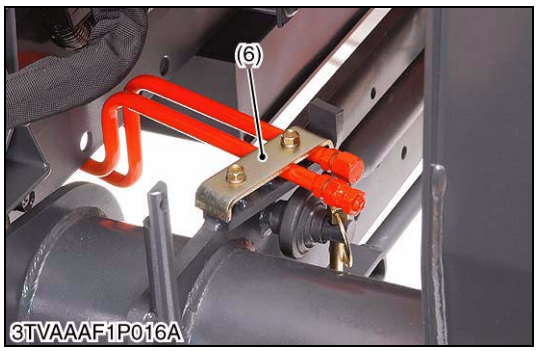
Tightening torque	Rear wheel mounting bolts	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Rear wheel mounting nuts	167 to 191 N·m 17 to 19.5 kgf·m 123 to 141 lbf·ft

(1) Rear Wheel, LH (1) Rear Wheel, RH

W1051497





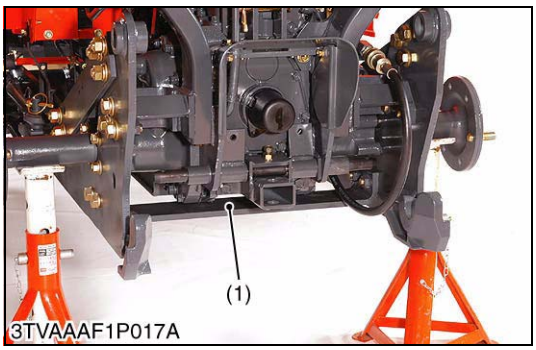


Lower Links and Pipe Clamps

1. Remove the lower links (1) (4).
2. Remove the pipe clamps (2) (3) (6).
3. Remove the step support (5).

(1) Lower Link, RH (4) Lower Link, LH
(2) Pipe Clamp (5) Step Support
(3) Pipe Clamp (6) Pipe Clamp

W1043339

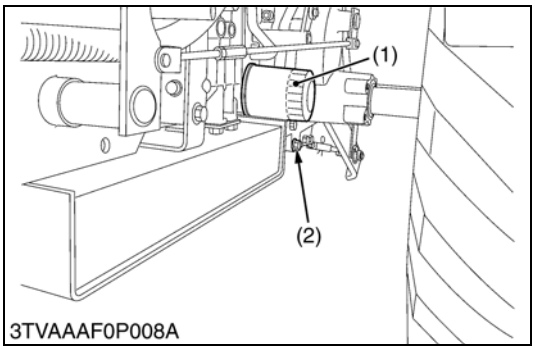


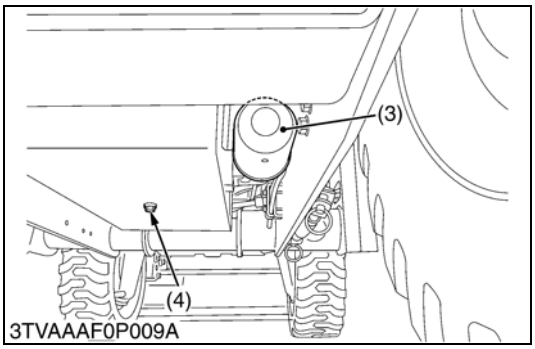
Main Frame Connecting Plate

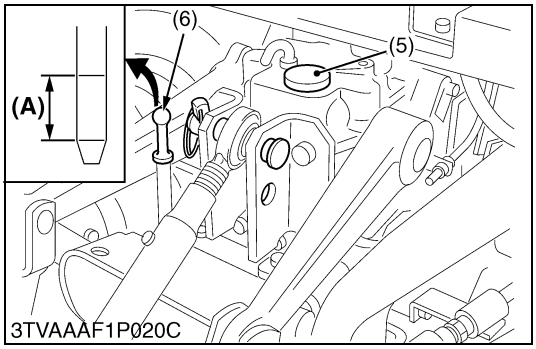
1. Remove the main frame connecting plate (1).

(1) Main Frame Connecting Plate

W1052480







Draining Transmission Fluid / Replacing Transmission Oil Filter

CAUTION

- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plug at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.
3. Remove the oil filter.
4. Put a film of clean transmission oil on the rubber seal of the new filter.
5. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
6. Fill with new KUBOTA SUPER UDT fluid up to the upper notch on the dipstick. (See page G-8.)
7. After running the engine for a few minutes, stop it and check the oil level again, add oil to the prescribed level.
8. After the new filter has been replaced, the transmission fluid level will decreased a little. Make sure that the transmission fluid does not leak through the seal, and check the fluid level. Top off if necessary.
9. Properly dispose of used oil.

■ IMPORTANT

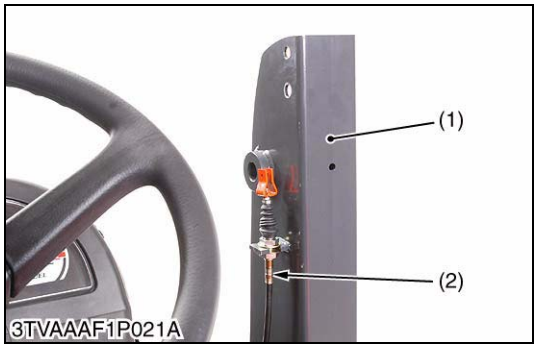
- **To prevent serious damage to the hydraulic system, use only a KUBOTA genuine filter.**
- **If the 3-point hitch can not be raised by setting the hydraulic control lever to the UP position after long term storage or when changing the transmission oil, turn steering wheel to the right and left several times to bleed air from the system.**
- **Do not operate the tractor immediately after changing the transmission fluid.**

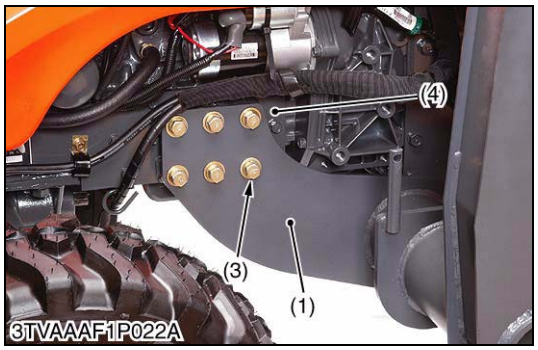
Transmission fluid capacity (with oil tank)	26.0 L 6.9 U.S.gals 5.7 Imp.gals

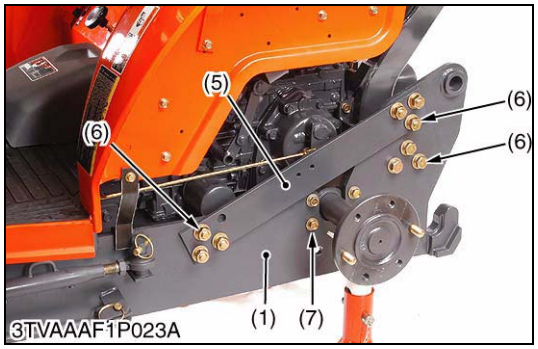
(1) Filter (HST)
(2) Drain Plug (Both Sides)
(3) Filter
(4) Drain Plug
(5) Oil Inlet
(6) Dipstick

(A) Oil level is acceptable within this range.

W1053224







Loosing Main Frame Mounting Bolts and Nuts

1. Loosing the lock nut from the main frame.
2. Remove the spill guard cable (2) from the main frame (1).
3. Loose the main frame mounting bolts.
4. Remove the connecting plate mounting bolts.
5. remove the connecting plates (5).

(When reassembling)

Tightening torque	Main frame mounting bolt (front side) (M14, 9T)	170 to 200 N·m 17 to 20 kgf·m 125 to 145 lbf·ft
	Main frame mounting bolt (rear side) (M16)	200 to 225 N·m 20 to 23 kgf·m 145 to 166 lbf·ft
	Rear axle mounting bolt (M12)	105 to 120 N·m 11 to 12 kgf·m 78 to 88 lbf·ft

(1) Main Frame
(2) Spill Guard Cable
(3) Bolt (M14)
(4) Front Axle Frame
(5) Connecting Plate
(6) Bolt and Nut (M16)
(7) Bolt (M12)

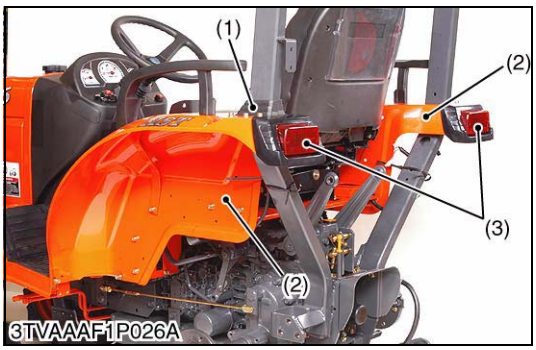
W1045366

Main Frame

1. Hoist the rear side of the main frame (1).
2. Dismount the rear side of the main frame slowly.
3. Hoist the front side of the main frame (2) slowly.

(1) Rear Side of Main Frame
(2) Front Side of Main Frame

W1054368

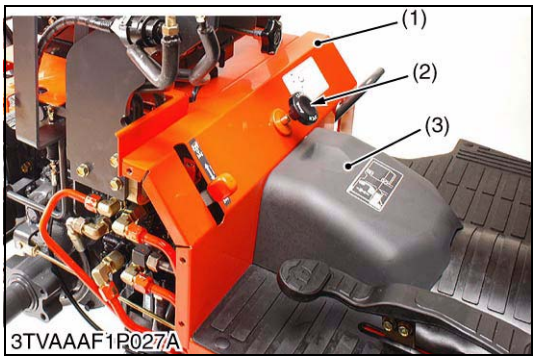


Fenders

1. Disconnect the tail light connectors.
2. Remove the tail light assemblies (3).
3. Remove the rubber (1).
4. Remove the fenders (2).

(1) Rubber
(2 Fender
(3) Tail Light Assembly

W1067442

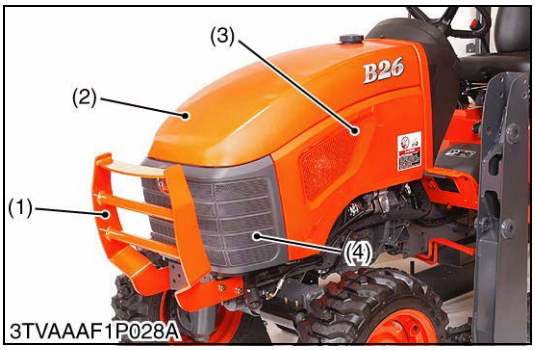


Front Cover and Floor Cover

1. Remove the front cover (3).
2. Remove the lowering speed adjusting knob (2).
3. Remove the floor cover (1).

(1) Floor Cover
(2 Lowering Speed Adjusting Knob
(3) Front Cover

W1068232

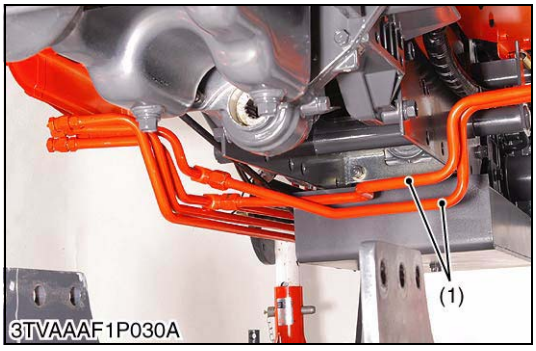


Front Guard and Under Cover

1. Remove the front guard (1).
2. Open the bonnet (2).
3. Remove the under cover (3).
4. Remove the front grill (4).

(1) Front Guard
(2) Bonnet
(3) Under Cover
(4) Front Grill

W1033000



Loader Pipe

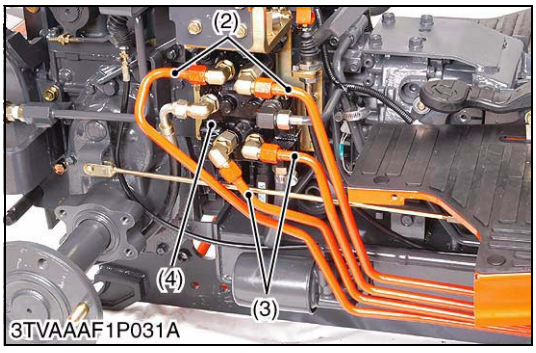
1. Remove the loader pipes (1) (2) (3) from the front loader valve (4).

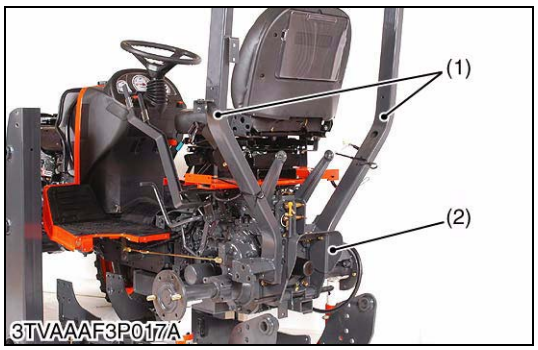
(When reassembling)

- Check the oil leakage from the pipe connections.

(1) Loader Pipe
(2) Loader Pipe
(3) Loader Pipe
(4) Front Loader Valve

W1033182



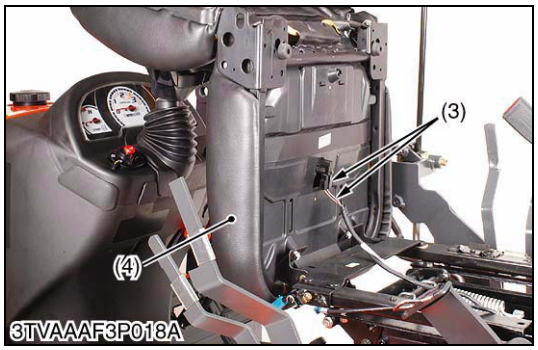


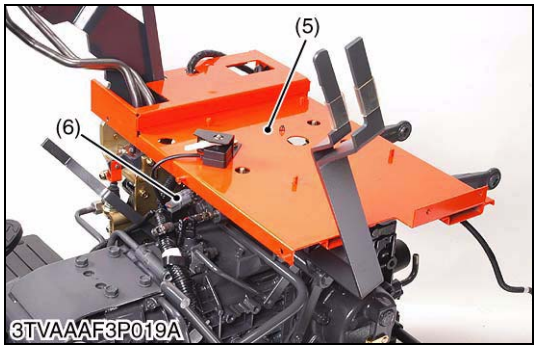
ROPS, Seat and Floor Seat

1. Remove the clamp for wireharness.
2. Remove the ROPS (1) and PTO cover (2).
3. Disconnect the seat switch leads (3).
4. Remove the seat (4).
5. Disconnect the seat turn switch connector (6).
6. Remove the floor seat (5).

(When reassembling)

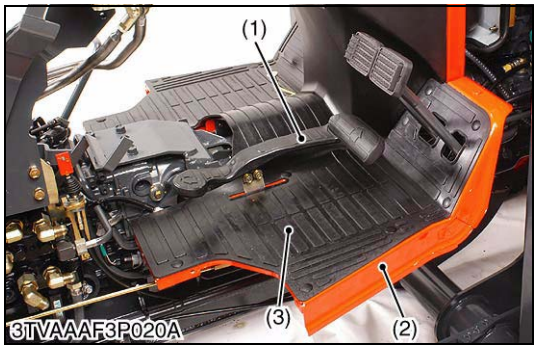
Tightening torque	ROPS mounting bolt	91 to 95 N·m 9.2 to 9.7 kgf·m 67 to 70 lbf·ft





(1) ROPS
(2) PTO Cover
(3) Seat Switch Lead
(4) Seat
(5) Floor Seat
(6) Seat Turn Switch Connector

W1033537

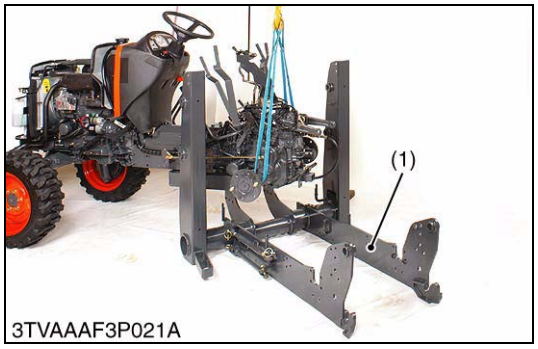


Speed Control Pedal and Step

1. Remove the speed control pedal (1).
2. Remove the mat (3).
3. Disconnect the parking brake rod.
4. Remove the steps (2).

(1) Speed Control Pedal
(2) Step
(3) Mat

W1034179



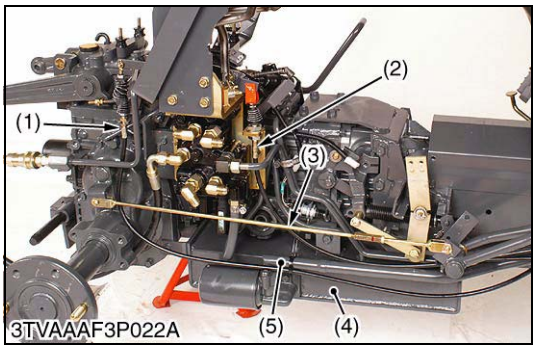
Main Frame

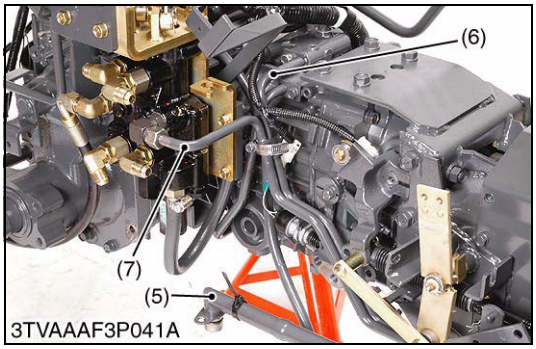
1. Lift the tractor rear side.
2. Move the main frame (1) to the rear side.

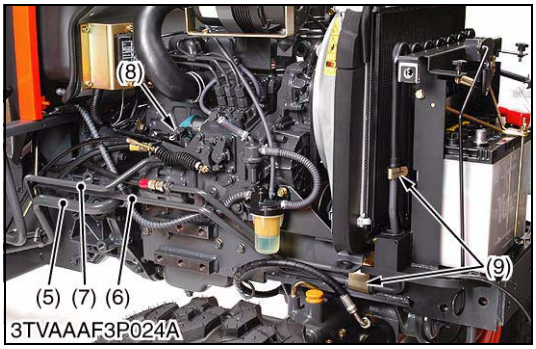
(1) Main Frame

W1034444

(2) Separating Engine and Front Case





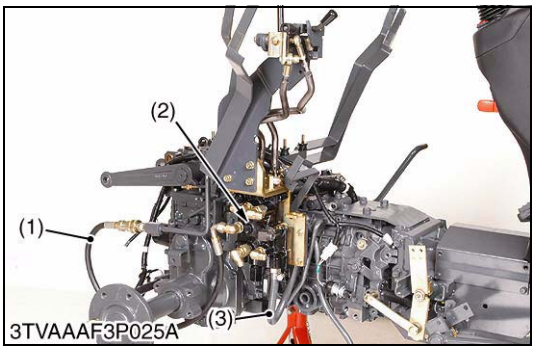


Oil Tank and Hydraulic Pipes

1. Remove the brake rods (3).
2. Disconnect the throttle cable (1).
3. Remove the spill guard cable (2).
4. Disconnect the suction pipe (5) of oil tank side.
5. Disconnect the breather hoses of oil tank.
6. Remove the oil tank (4) with filter.
7. Remove the pipe clamps (9).
8. Remove the throttle cable (1).
9. Disconnect the stop solenoid connector (8).
10. Remove the delivery pipe (7), PTO delivery pipe (6) and suction pipe (5).

(1) Throttle Cable
(2) Spill Guard Cable
(3) Brake Rod
(4) Oil Tank
(5) Suction Pipe
(6) PTO Delivery Pipe
(7) Delivery Pipe
(8) Stop Solenoid Connector
(9) Pipe Clamp

W1034599

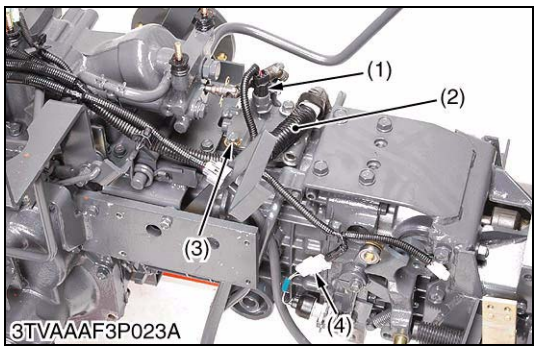


Front Loader Control Valve

1. Remove the hose (1).
2. Remove the return hose (3).
3. Remove the front loader control valve (2) with stay.

(1) Hose
(2) Front Loader Control Valve
(3) Return Hose

W1035234

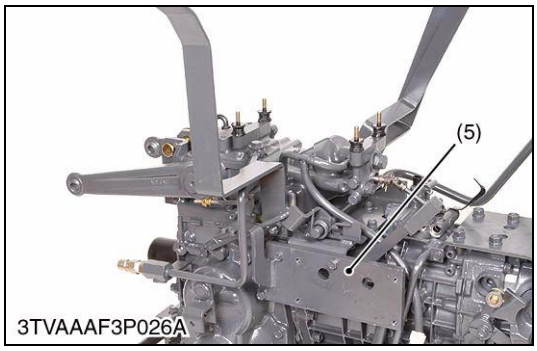


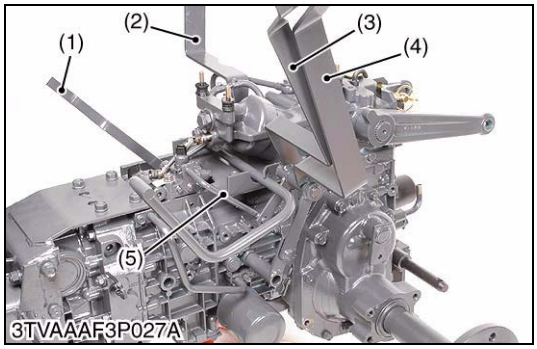
Wiring Harness and Front Loader Valve Bracket

1. Disconnect the PTO switch connector (1).
2. Disconnect the ground lead (3) from PTO valve.
3. Disconnect the HST neutral switch connector (4).
4. Move the wiring harness (2) to the engine side.
5. Remove the front loader valve bracket (5).

(1) PTO Switch Connector
(2) Wiring Harness
(3) Ground Lead
(4) HST Neutral Switch Connector
(5) Front Loader Valve Bracket

W1035505



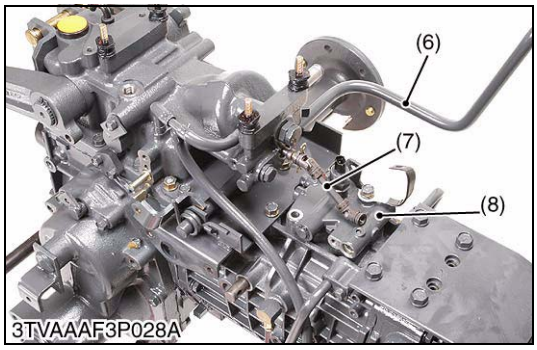


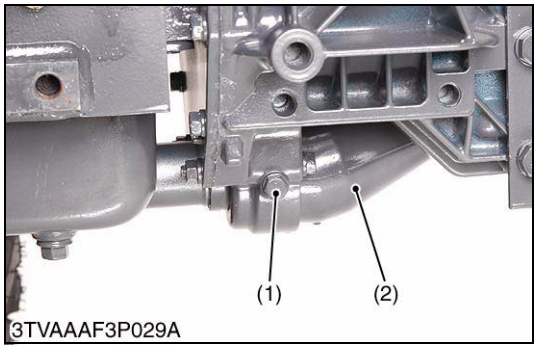
Levers and PTO Control Valve

1. Remove the position control lever (2) and the front wheel drive lever (1).
2. Remove the range gear shift lever (4) and the PTO lever (3).
3. Remove the lowering adjusting speed rod (7).
4. Remove the PTO control valve (8).
5. Remove the differential lock pedal (6) with stay.

(1) Front Wheel Drive Lever
(2) Position Control Lever
(3) PTO Lever
(4) Range Gear Shift Lever
(5) PTO Control Rod
(6) Differential Lock Pedal
(7) Lowering Adjusting Speed Rod
(8) PTO Control Valve

W1035728



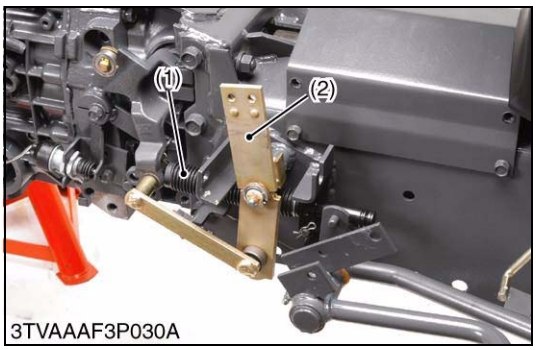


Front Wheel Propeller Shaft Cover

1. Remove the stopper bolt (1).
2. Side the front wheel propeller shaft cover (2) to the rear side.

(1) Stopper Bolt
(2) Front Wheel Drive Shaft Cover

W1035949

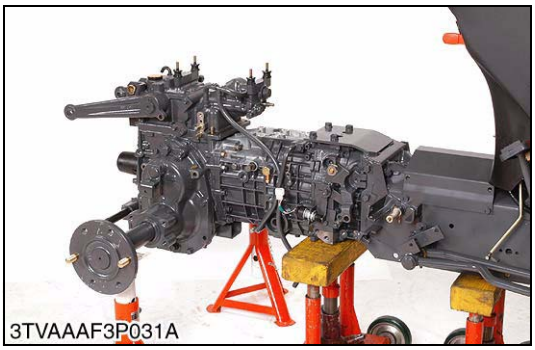


HST Linkage

1. Remove the HST linkage (2) and damper (1).

(1) Damper (2) HST Linkage

W1036155



Separating Transmission Case from Center Frame

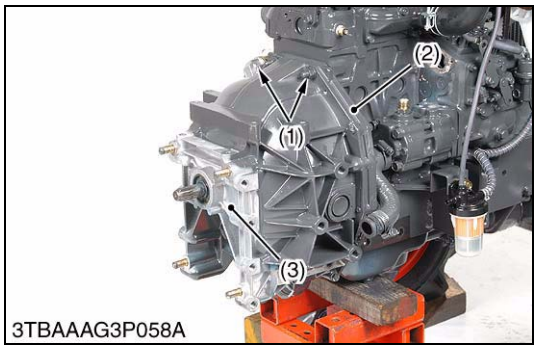
1. Place disassembling stand under the center frame and transmission case.
2. Remove the center frame mounting bolts.
3. Separate the transmission body and center frame.

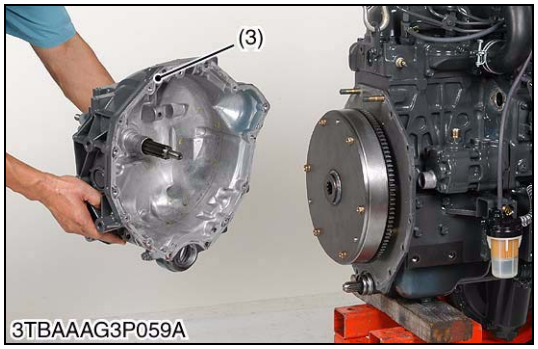
(When reassembling)

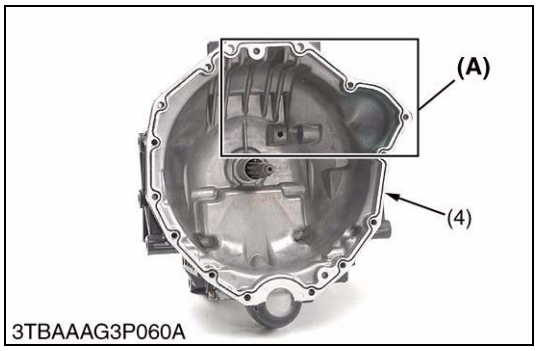
Tightening torque	Center frame mounting bolt for ordinariness material (M12)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Center frame mounting bolt for aluminum material (M12)	63 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft

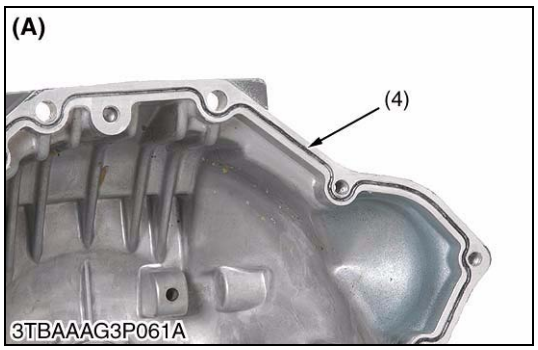
W1036530

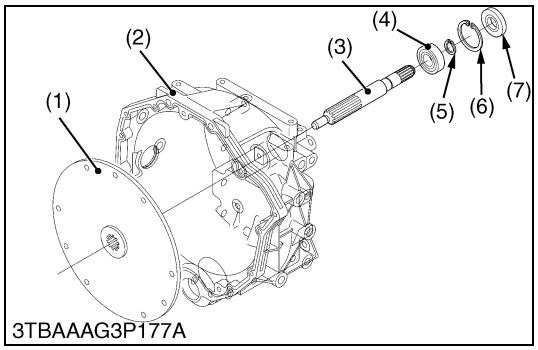
[2] FRONT CASE











Clutch Housing

1. Support the engine securely.
2. Remove the front case mounting bolts (1).
3. Remove the front case (3) from the engine.

(When reassembling)

- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint face of the engine and the front case.

Tightening torque	Front case mounting nut for aluminum material (M8)	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	Front case mounting bolt for aluminum material (M10)	40 to 45 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Bolt
(2) Engine Rear-End Plate
(3) Front Case
(4) Groove (for Liquid gasket)

(A) Front Case Corner

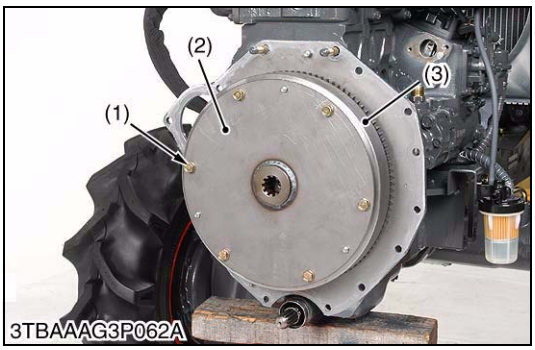
W1034463

Clutch Shaft and Ball Bearing

1. Remove the oil seal (7).
2. Remove the cir-clip (6).
3. Remove the clutch shaft (3) from the front case (2).

(1) Steal Plate
(2) Front Case
(3) Clutch Shaft
(4) Ball Bearing
(5) External Cir-clip
(6) Internal Cir-clip
(7) Oil Seal

W1034707



Steel Plate

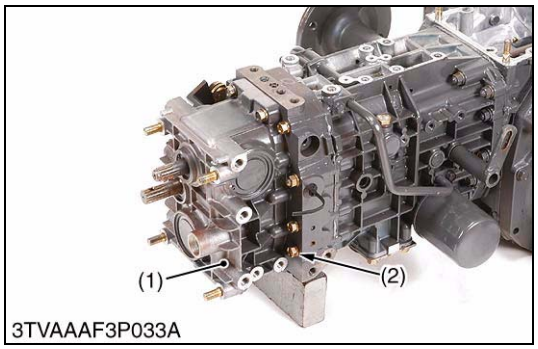
1. Remove the steel plate mounting bolts (1).
2. Remove the steel plate (2) from the flywheel.
   - Apply liquid gasket (Three Bond 1206D or equivalent) to the joint face of the engine and the front case.

Tightening torque	Steel plate mounting bolt (M8)	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Steel Plate Mounting Bolt
(2) Steel Plate
(3) Flywheel

W1074681

[3] HYDRAULIC TRANSMISSION (HST)



HST Assembly

1. Remove the HST mounting bolts (2).
2. Separate the HST assembly (1) from the transmission.

(When reassembling)

- Install the O-ring (3) to the transmission case.
- Apply liquid gasket (Three Bond 1206D or equivalent) to the groove of the transmission case.

Tightening torque	HST assembly mounting bolt (M10, aluminum)	40 to 45 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) HST Assembly
(2) HST Assembly Mounting Bolt
(3) O-ring

W1024639

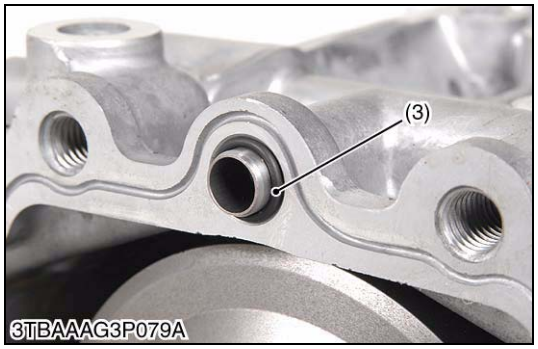
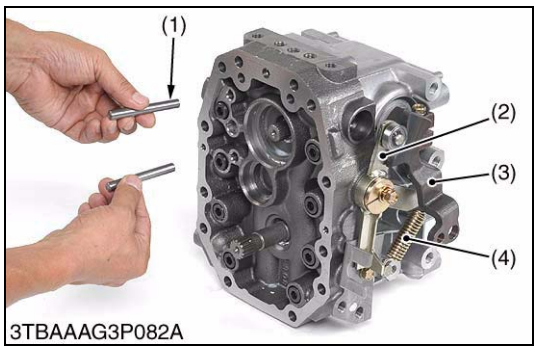


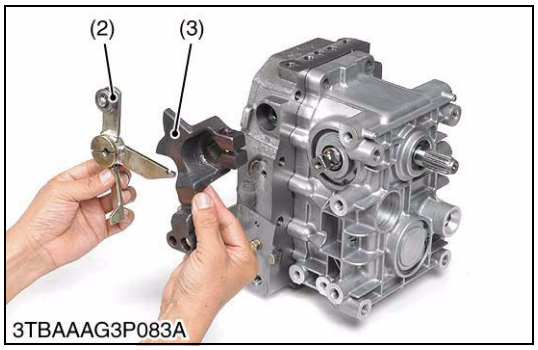
Plate Push Rod, Neutral Arm and Neutral Holder

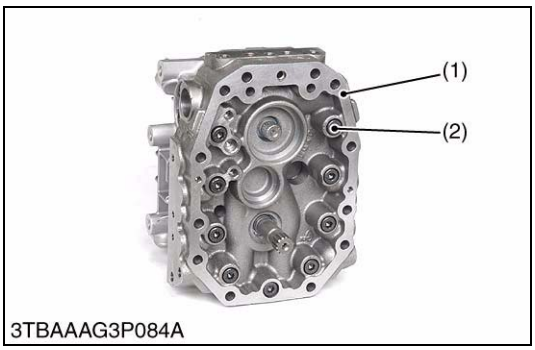
1. Remove the plate push rod (1).
2. Remove the spring (4).
3. Remove the neutral arm mounting bolt.
4. Loosen the bolt of the neutral holder (3).
5. Remove the neutral holder (3).

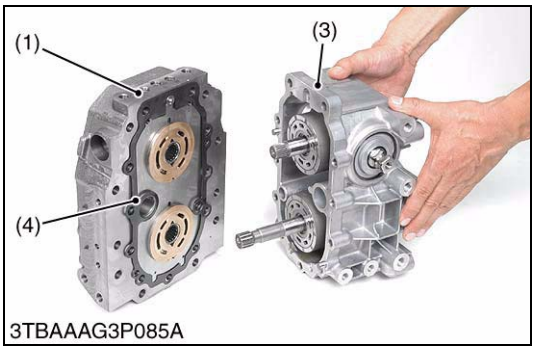
(1) Plate Push Rod
(2) Neutral Arm
(3) Neutral Holder
(4) Spring

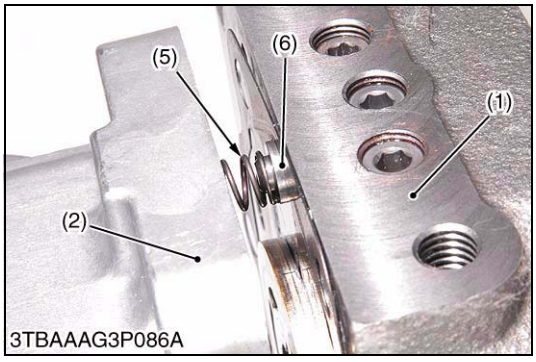
W1024976

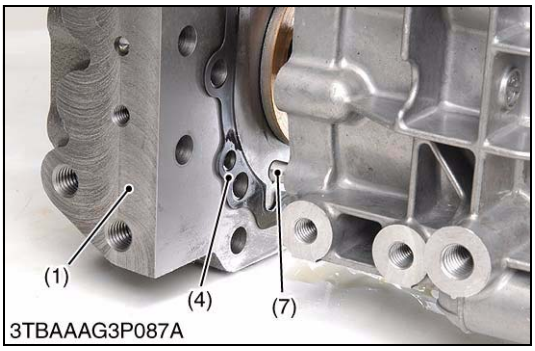












Center Section 1

1. Remove the center section mounting hex. bolts (2).
2. Separate the HST housing (3) from the center section (1).

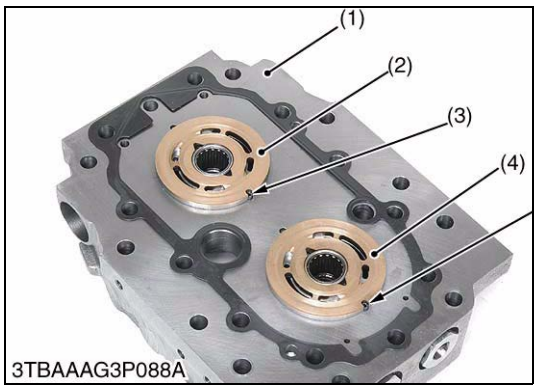
(When reassembling)

- Use a new gasket.
- Install the poppet to the center section (1). Don't drop the spring (5).
- Check the knock pin.
- Hold the gasket with the hex. bolts (2) not to drop the gasket (4).

Tightening torque	Center section mounting hex. bolt (M10, aluminum)	40 to 45 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Center Section
(2) Hex. Bolt
(3) HST Housing
(4) Gasket
(5) Spring
(6) Poppet
(7) Knock Pin

W1077570



Valve Plates

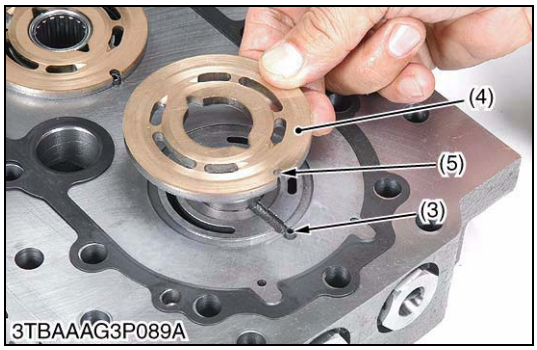
1. Pushing the valve plate (2) against the anchor pin (3), lift the valve plate (2) to remove.
2. Remove the valve plate (2).
3. Remove the valve plate (4).

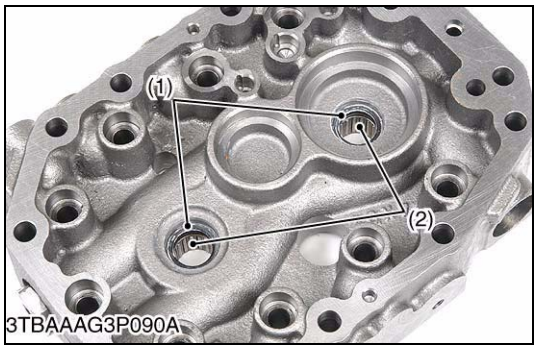
(When reassembling)

- Install the groove (5) the valve plates (2), (4) to the anchor pins (3) securely.

(1) Center Section
(2) Valve Plate (Pump Shaft)
(3) Anchor Pin
(4) Valve Plate (Motor Shaft)
(5) Groove

W1078965





Oil Seals and Needle Bearings

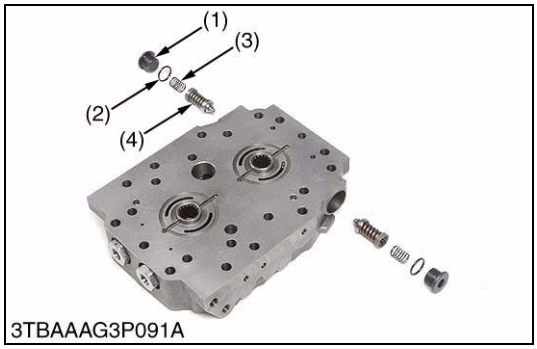
1. Remove the needle bearing (2).
2. Remove the oil seals (1).

(When reassembling)

- After checking or changing the oil seals, apply the bearing with hydrostatic transmission oil and the oil seal with grease.

(1) Oil Seal
(2) Needle Bearing

W1079889



Check and High Pressure Relief Valve

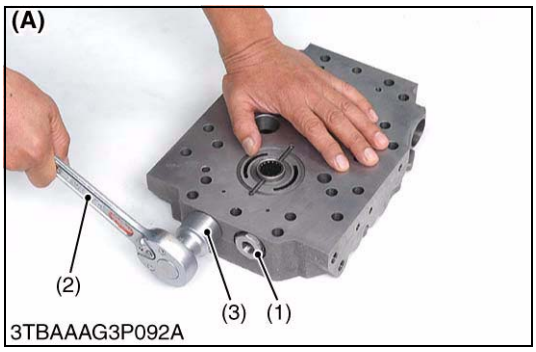
1. Remove the valve plug (1) with a hex. wrench.
2. Remove the spring (3) and the valve (4).

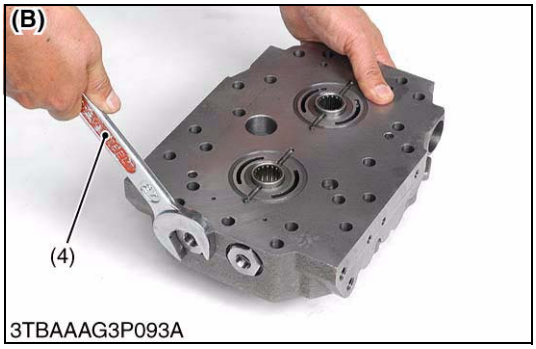
(When reassembling)

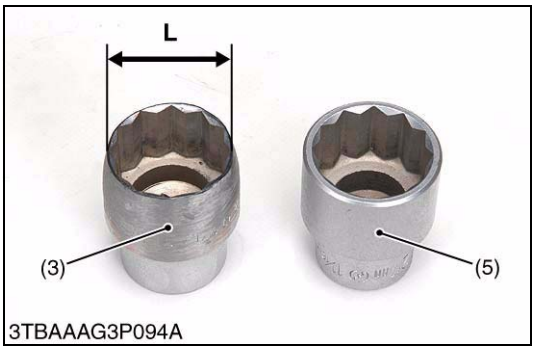
Tightening torque	Check and high pressure relief valve plug	118 to 147 N·m 12.0 to 15.0 kgf·m 86.8 to 108.5 lbf·ft

(1) Valve Plug
(2) O-ring
(3) Spring
(4) Valve

W1080348







Removing Neutral Valve

1. Remove the neutral valve (1) with the rachet handle and the thin socket (27 mm (1.06 in.)).

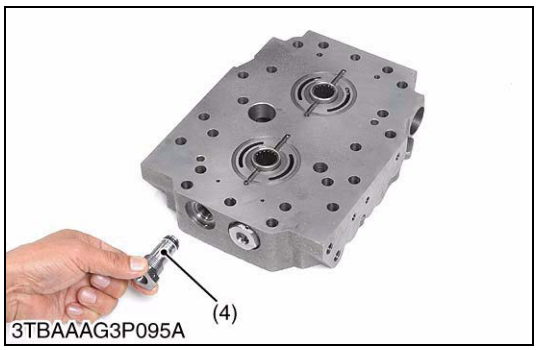
(When reassembling)

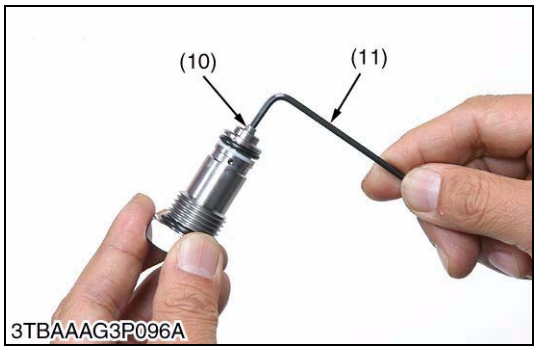
Tightening torque	Neutral valve body	59 to 68 N·m 6.0 to 7.0 kgf·m 44 to 50 lbf·ft

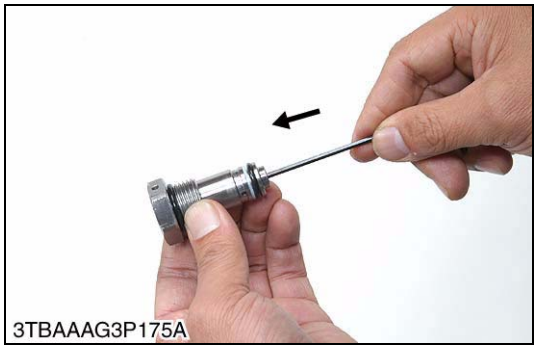
(1) Neutral Valve
(2) Rachet Handle
(3) Thin Socket (27 mm (1.06 in.))
(4) Spanner (27 mm (1.06 in.))
(5) Common Socket (27 mm (1.06 in.))

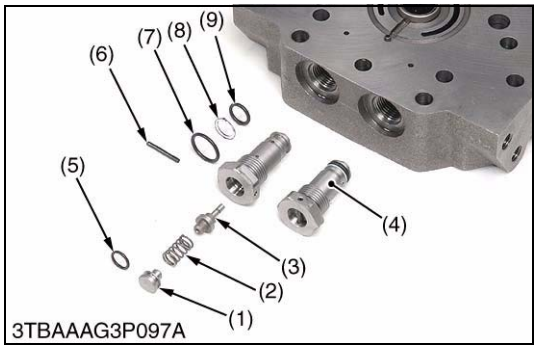
(A) Using Correct Tools
(B) Using Wrong Tools
L : Outside Diameter (Approx. 27mm (1.06 in.))

W1081157









Neutral Valve

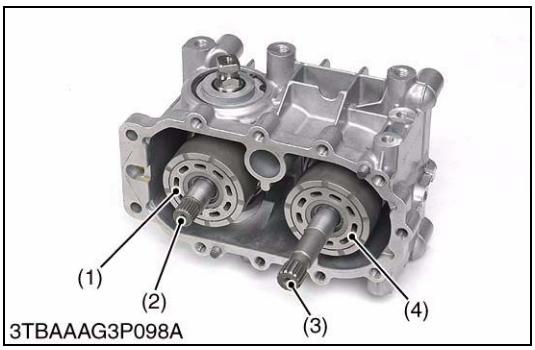
1. Remove the neutral valve body (4).
2. Remove the pin (6) from the neutral valve body (4).
3. Remove the plug (10) with 2.5 mm hex. wrench (11).
4. Push the neutral valve (3) with 2.5 mm hex. wrench (11) not to damage it.
5. Take out the inner parts from the neutral valve body (4).

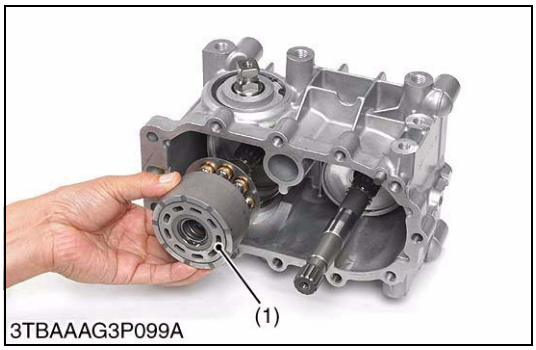
(When reassembling)

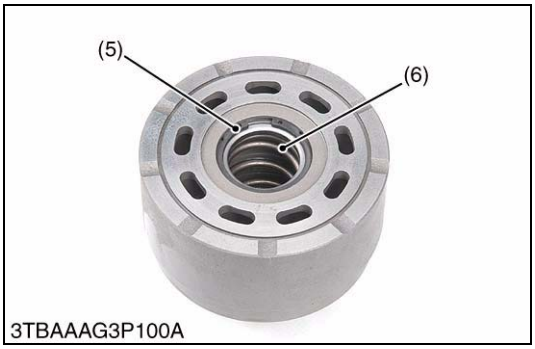
Tightening torque	Neutral valve body	59 to 68 N·m 6.0 to 7.0 kgf·m 44 to 50 lbf·ft

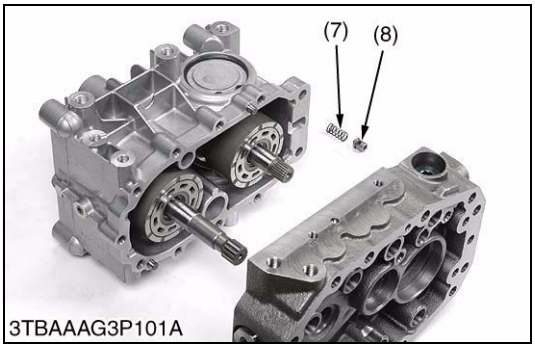
(1) Plug
(2) Spring
(3) Neutral Valve
(4) Neutral Valve Body
(5) O-ring
(6) Pin
(7) Pin
(8) Back-up Ring
(9) O-ring
(10) Plug
(11) 2.5 mm Hex. Wrench

W1082003









HST Housing Case Cylinder Blocks

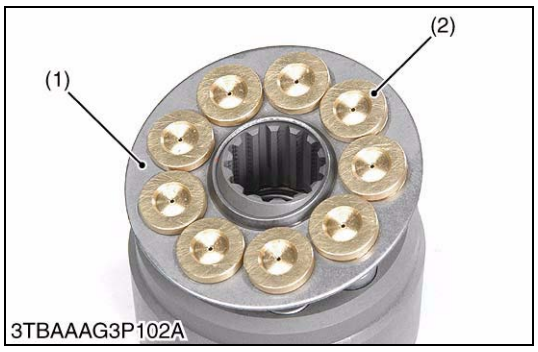
1. Remove the cylinder blocks (2)(4) from the pump shaft (2) and the motor shaft (3).
2. Remove the cir-clip (5) and spring (6) from the cylinder block.

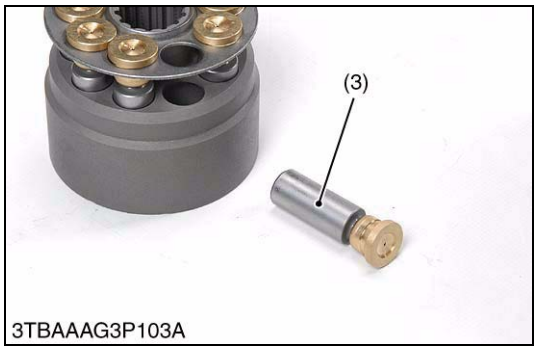
(When reassembling)

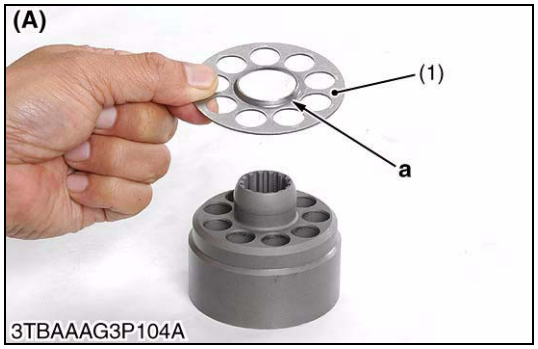
- Install the poppet (8) to the center section, not to drop it.
- Install the spring (7) to the HST housing side.

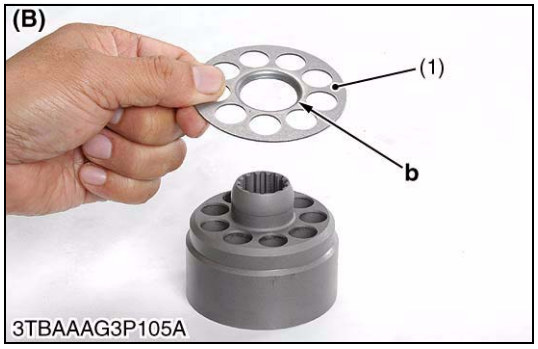
(1) Cylinder Block (Pump)
(2) Pump Shaft
(3) Motor Shaft
(4) Cylinder Block (Motor)
(5) Cir-clip
(6) Spring
(7) Spring
(8) Poppet

W1083346









Piston and Retainer Plate

1. Remove the pistons (2) with the retainer plates (1).

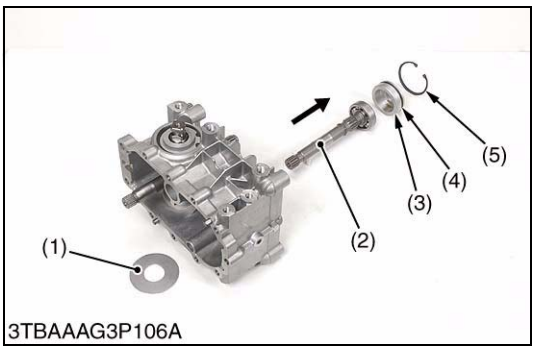
(When reassembling)

- Install the piston to its original position of the cylinder block.
- Check the direction of the thrust collar (1) as shown in the picture.
- If the direction of the thrust collar is wrong, HST will not be operated properly.

(1) Retainer Plate
(2) Piston Slipper
(3) Piston

(A) Retainer Plate Correct Direction
(B) Retainer Plate Wrong Direction
a : Correct Direction
b : Wrong Direction

W1084635



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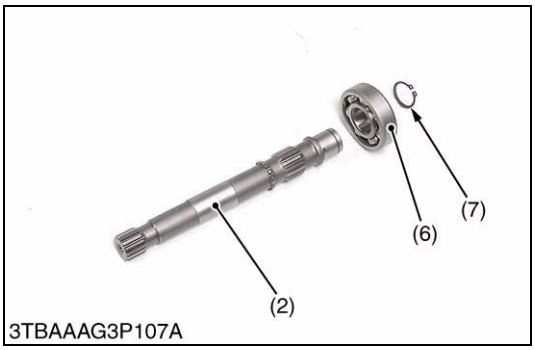

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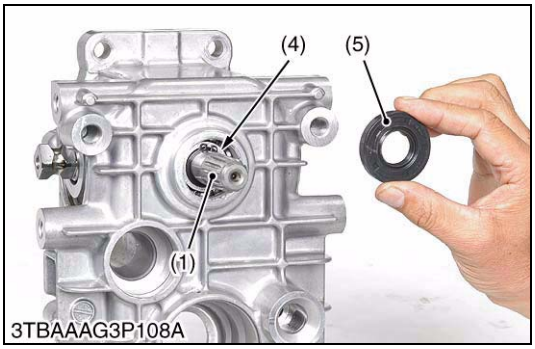

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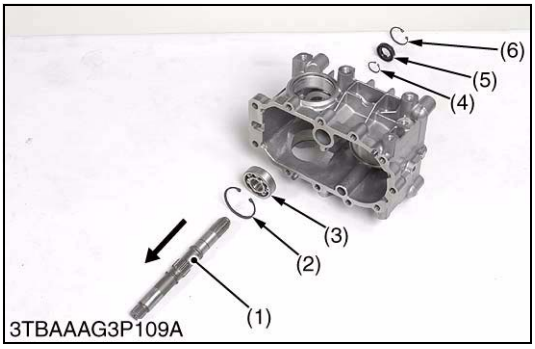

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Motor Shaft

1. Remove the internal cir-clip (5) from the HST housing.
2. Remove the cover with an O-ring.
3. Remove the motor shaft (2) with the ball bearing (6) from the HST housing.
4. Remove the external cir-clip from the motor shaft (2).
5. Remove the ball bearing (6) from the motor shaft (2).

(1) Thrust Collar
(2) Motor Shaft
(3) Cover
(4) O-ring
(5) Internal Cir-clip
(6) Ball Bearing
(7) External Cir-clip

W1086022

Pump Shaft

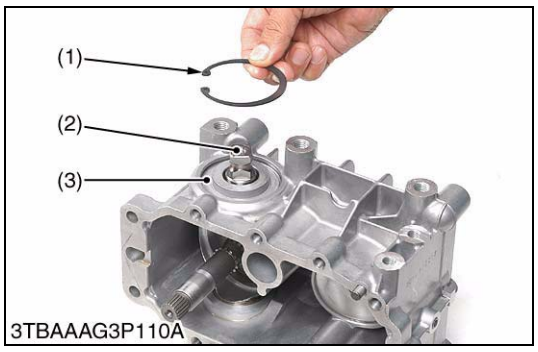
1. Remove the internal cir-clip (6) from the HST housing.
2. Remove the oil seal (5) from the HST housing.
3. Remove the external cir-clip (4) from the pump shaft (1).
4. Remove the internal cir-clip (2) from the HST housing.
5. Remove the pump shaft (1) to the cylinder block side.

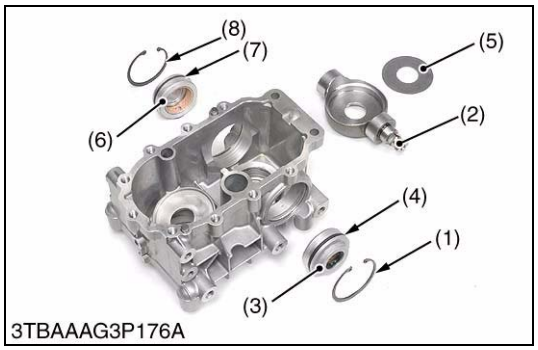
(When reassembling)

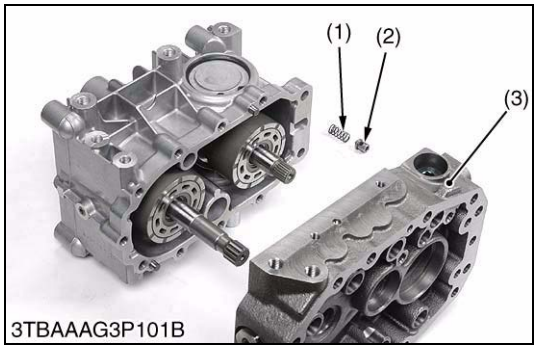
- Replace the used oil seal with a new one.

(1) Pump Shaft
(2) Internal Cir-clip
(3) Ball Bearing
(4) External Cir-clip
(5) Oil Seal
(6) Internal Cir-clip

W1087141







Trunnion Shaft

1. Remove the internal cir-clip (1) from the HST housing.
2. Remove the internal cir-clip (8) from the HST housing.
3. Strike out the trunnion shaft (2) slightly with a plastic hammer to the left side not to damage the o-rings (7) (4).
4. Take out the cover (3) with o-ring.
5. Take out the thrust collar using air blower.

(When reassembling)

- Check the O-rings for damage.

(1) Internal Cir-clip
(2) Trunnion Shaft
(3) Cover (RH)
(4) O-ring
(5) Thrust Collar
(6) Cover (LH)
(7) O-ring
(8) Internal Cir-clip

W1087755

Charge Relief Valve

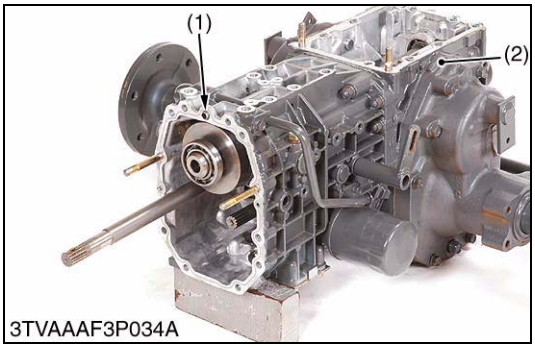
1. Check the spring (1) for breakage and wear.
2. If it is unusual, replace it.

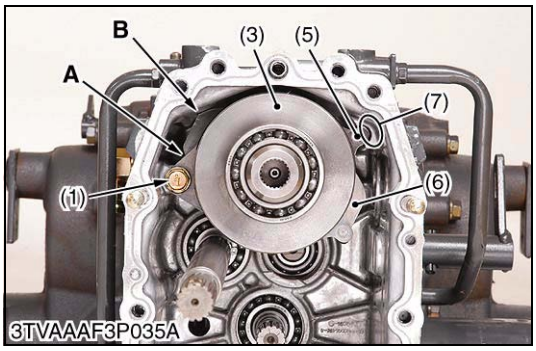
(1) Spring
(2) Poppet
(3) Center Section

W1088697

[4] TRANSMISSION CASE

(1) PTO Clutch





Separating Transmission case and PTO Clutch Case

1. Separate the hydraulic block assembly.
2. Remove the transmission case mounting bolts.
3. Separate the transmission case (1) from the differential case (2).
4. Remove the PTO brake plate 4 mounting bolt (4).

(When reassembling)

- Install the PTO brake plate 4 (5) to the transmission case groove (7) securely as shown in the picture.
- Place the PTO brake plate 2 (6) between **A** and **B**.

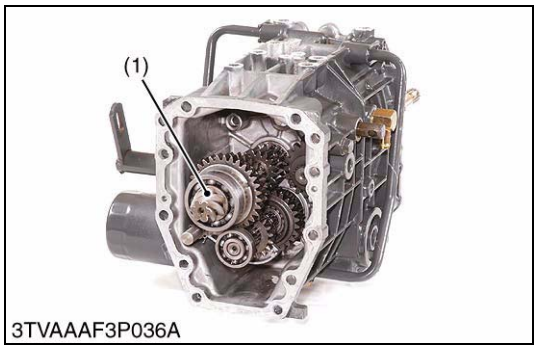
Tightening torque	Transmission case mounting bolt (M10) and nut	40 to 45 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft
	Hydraulic cylinder mounting bolt (M10) and nut	40 to 45 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Transmission Case
(2) Differential Case
(3) PTO Clutch Case
(4) PTO Brake Plate 4 Mounting Bolt
(5) PTO Brake Plate 4
(6) PTO Brake Plate 2
(7) Transmission Case Groove

A : Position
B : Position

W1089293

(2) Bevel Pinion Shaft



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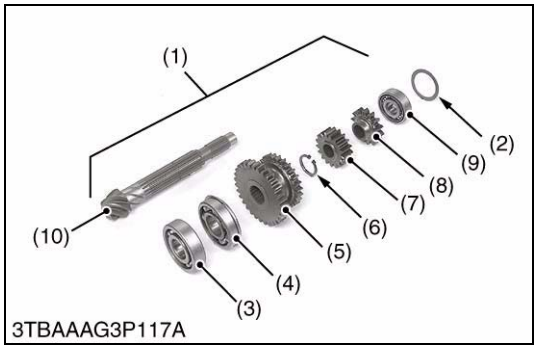

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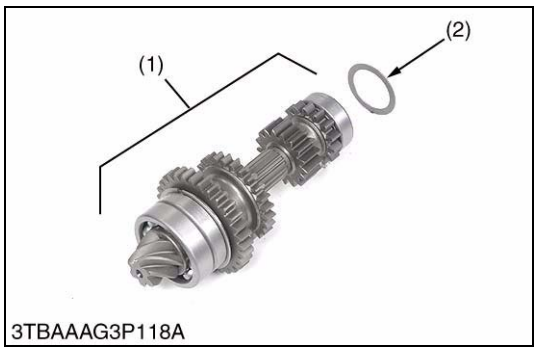


3TBAAAG3P118A

Bevel Pinion Shaft

1. Remove the bevel pinion shaft assembly (1) from the transmission case.
2. Remove the spacer (2).

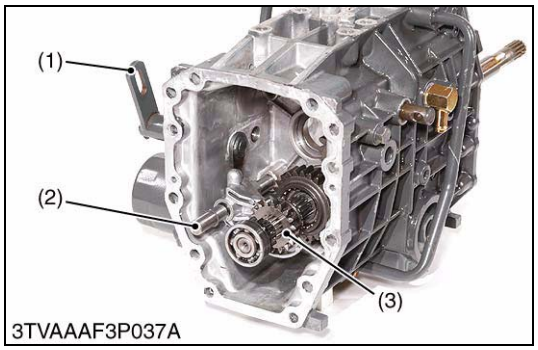
(When reassembling)

- Install the spacer (2) to the transmission case.
- Install the bevel pinion shaft assembly (1).

(1) Bevel Pinion Shaft Assembly
(2) Spacer
(3) Ball Bearing
(4) Ball Bearing
(5) Gear (25T-31T)
(6) Cir-clip
(7) Gear (17T)
(8) Gear (13T)
(9) Ball Bearing
(10) Bevel Pinion Shaft

W1091169

(3) Range Gear Shaft



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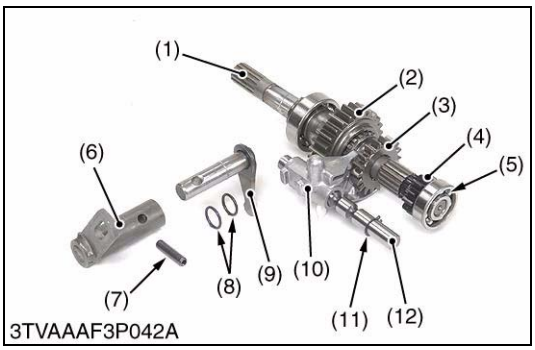
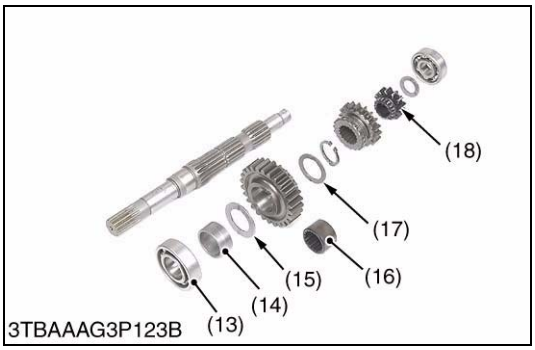
Range Gear Shaft Assembly

1. Remove the cir-clip from the range gear shaft.
2. Remove the spring pin from the shift arm lever (1).
3. Remove the range gear shaft assembly (3) and the fork rod (2) from the transmission case.

(1) Shift Arm Lever
(2) Fork Rod
(4) Range Gear Shaft Assembly

W1051118





Range Gear Shaft and Gears

1. Remove the ball bearing (5) from the rang gear shaft (1).
2. Remove the 12T gear (4), the 18T gear(3) and the 26T gear (2)

(When reassembling)

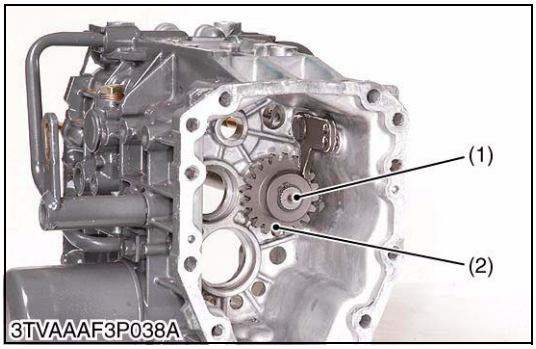
- Install the range shift arm (9) to the range shift fork (10) securely.
- Install the O-rings (8) to the range shift arm (9).

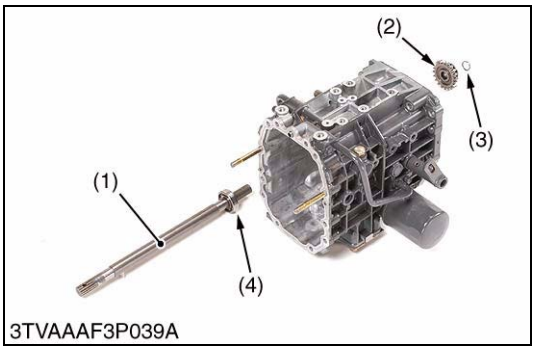
(1) Range Gear Shaft
(2) Gear (26T)
(3) Gear (18T)
(4) Gear (12T)
(5) Ball Bearing
(6) Shift Arm Lever
(7) Spring Pin
(8) O-ring
(9) Range Shift Arm
(10) Range Shift Fork
(11) Cir-clip
(12) Fork Rod
(13) Ball Bearing
(14) Collar
(15) Collar
(16) Inner Ring
(17) Collar
(18) Collar

T : Transmission Case
F : Front Side
R : Rear Side

W1092651

(4) Front Wheel Drive Shaft



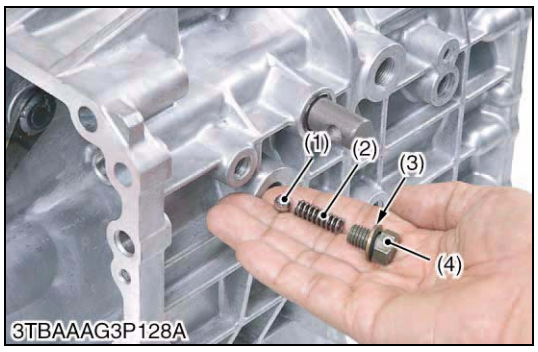


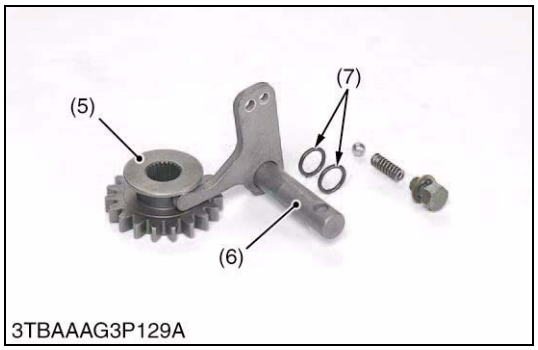
4WD Shaft

1. Remove the cir-clip from the 4WD shaft (1).
2. Remove the 20T gear (2) from the 4WD shaft (1).
3. Remove the 4WD shaft (1).
4. Remove the ball bearing (4).

(1) 4WD Shaft
(2) 20T Gear
(3) Cir-clip
(4) Ball Bearing

W1093246





4WD Shaft Lever

1. Remove the bolt (4) and the washer with rubber (3).

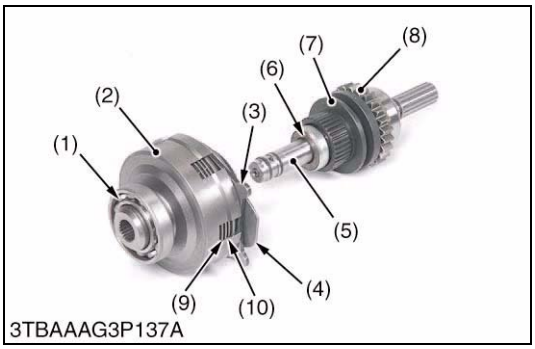
(When reassembling)

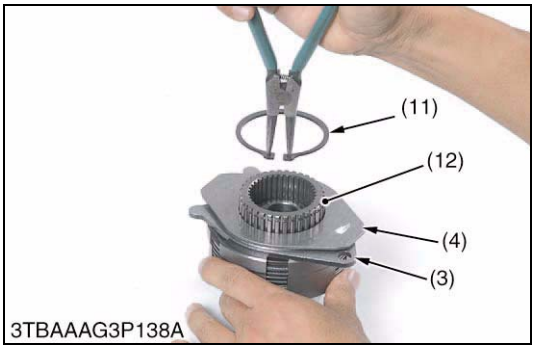
- Install the 20T gear (5) to the 4WD shaft.
- Install the 4WD shaft arm (6) to the 4WD gear (5).
- Install the O-rings to the 4WD shift arm (6).

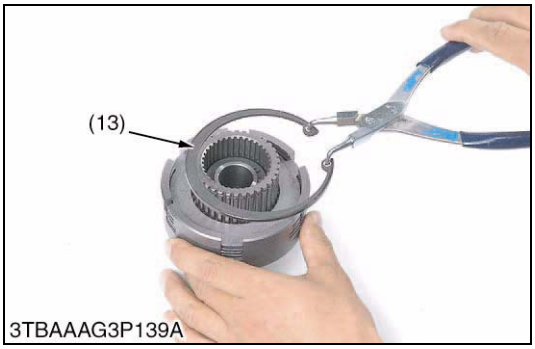
(1) Ball
(2) Spring
(3) Washer with Rubber
(4) Bolt
(5) 20T Gear
(6) 4WD Shift Arm
(7) O-ring

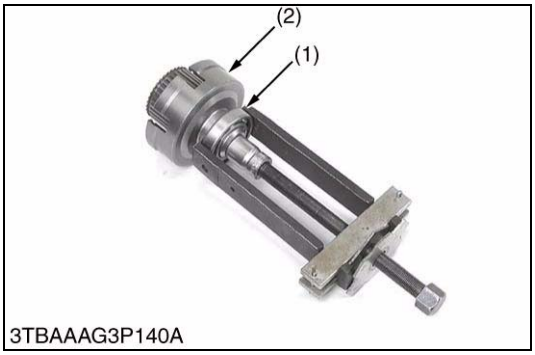
W1093892

(5) Independent PTO Clutch









PTO Clutch Case

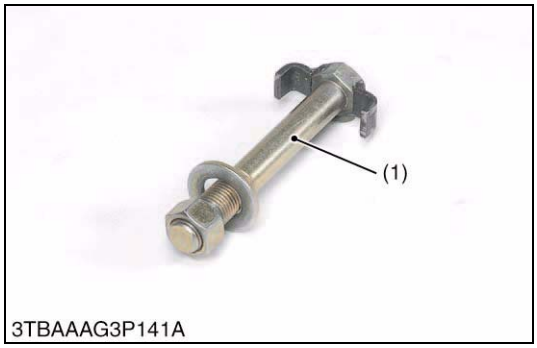
1. Remove the external cir-clip (11) from the spline boss (12).
2. Remove the internal cir-clip (13) from the PTO clutch case (2).
3. Remove the clutch disks (9) and the clutch plates (10) from the PTO clutch case (2).
4. Remove the ball bearing (1) from the PTO clutch case (2) with a puller.

■ **NOTE**

- **When removing the cir-clip, use an adequate size snap ring plier.**

(1) Ball Bearing
(2) PTO Clutch Case
(3) Brake Plate 4
(4) Brake Plate 2
(5) PTO Clutch Shaft
(6) Thrust Bearing
(7) PTO Shifter
(8) 25T Mid-gear
(9) Clutch Disk
(10) Clutch Plate
(11) External Cir-clip
(12) Spline Boss
(13) Internal Cir-clip

W1095622



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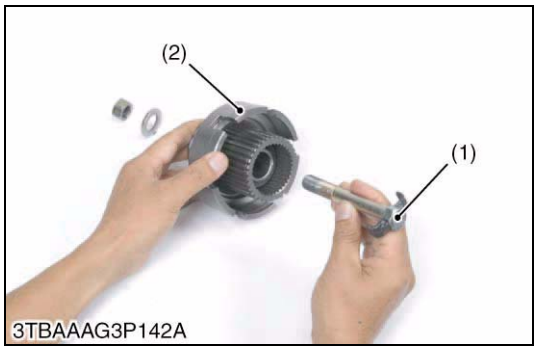

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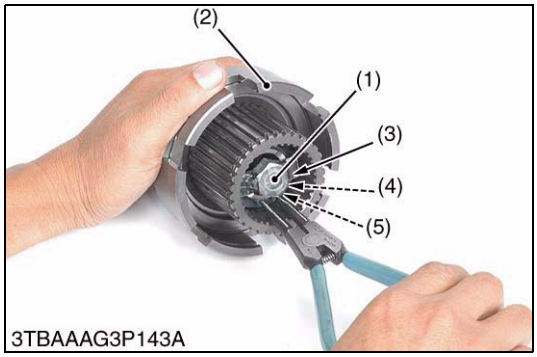

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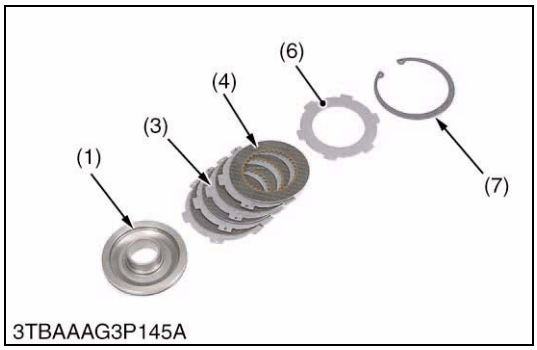
PTO Clutch Spring

1. Set the PTO clutch spring compressor (1) to the PTO clutch case (2). (Refer to G-45.)
2. Tighten the nut and remove the external cir-clip (3).
3. Remove the spring collar (4) and the PTO clutch spring (5).

(1) PTO Clutch Spring Compressor
(2) PTO Clutch Case
(3) External Cir-clip
(4) Spring Collar
(5) PTO Clutch Spring

W1096441



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PTO Clutch Disks and Brake

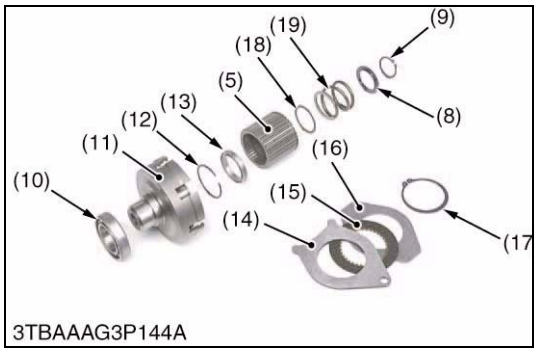
1. After removing the inner cir-clip (7) from the PTO clutch case (11), remove the pressure plate (6).
2. Remove the clutch disks (4) and clutch plates (3).
3. Remove the external cir-clip (17) from the spline boss (5).
4. Remove the brake plate (16), the brake disks (15) and the brake plate (14).
5. After removing the external cir-clip (9) and the spring (19).

(When reassembling)

- Install the parts to the original positions.

(1) Clutch Piston
(2) O-ring
(3) Clutch Plate
(4) Clutch Disk
(5) Spline Boss
(6) Pressure Plate
(7) Internal Cir-clip
(8) Spring Collar
(9) External Cir-clip
(10) Ball Bearing
(11) PTO Clutch Case
(12) Cir-clip
(13) Ball Bearing
(14) Brake Plate
(15) PTO Brake Disk
(16) Brake Plate
(17) External Cir-clip
(18) Bearing Collar
(19) Spring

W1096998



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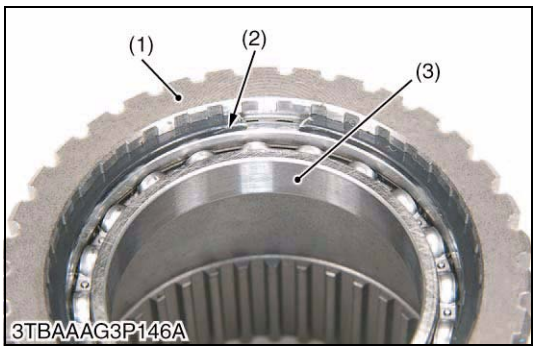


Spline Boss Cir-clip

1. Push the cir-clip with a small screw driver through the small hole of the spline boss (1).
2. Lift the cir-clip (2) with a screw driver not to damage it.

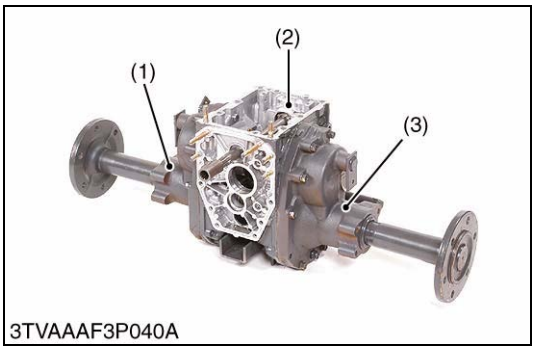
(When reassembling)

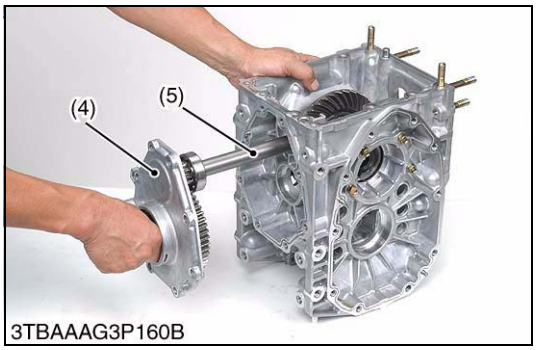
- Install the cir-clip (2) holding it by hands.

(1) Spline Boss
(2) Cir-clip
(3) Ball Bearing

W1098228

(6) Differential Gear





Transmission Case and Mid-gear Shaft

1. Remove the rear axle mounting bolts.
2. Remove the rear axle case LH (3) and the rear axle case RH (1) from the differential case.
3. Remove the rear PTO cover mounting bolts and the rear PTO cover (4).

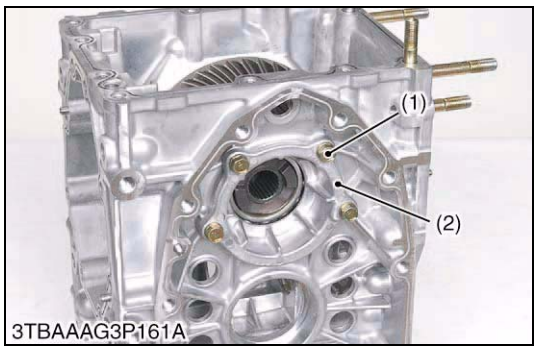
(When reassembling)

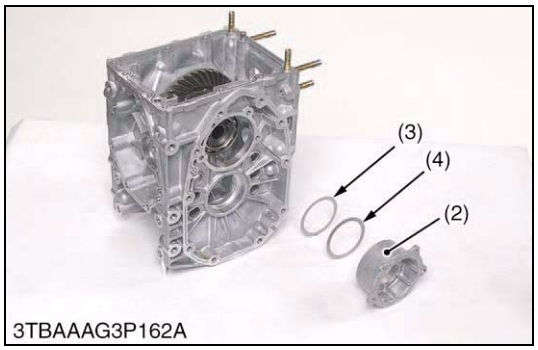
- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint surface of the rear axles cases and the rear PTO cover.

Tightening torque	Rear axle case (LH and RH) mounting bolt for aluminum material (M10)	40 to 45 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft
	Rear PTO cover mounting bolt for aluminum material (M10)	40 to 45 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Rear Axle Case RH
(2) Differential Case
(3) Rear Axle Case LH
(4) Rear PTO Cover
(5) PTO Drive Shaft

W1100724





Differential Bearing Holder (RH)

1. Remove the differential holder mounting bolts (1).
2. Remove the differential holder (2) and shims (3) (4).

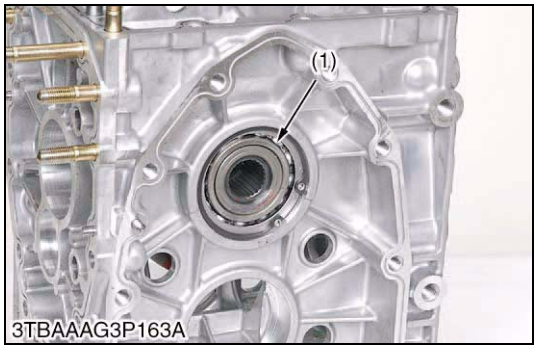
(When reassembling)

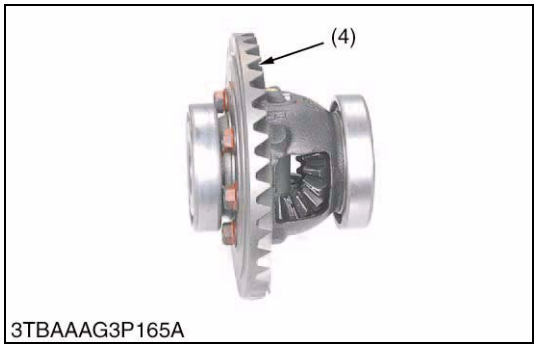
- 0.5 mm (0.020 in.) shim 66591-1498-0
- 0.2 mm (0.008 in.) shim 66591-1499-0

Tightening torque	Differential bearing holder mounting bolt for aluminum material (M8)	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

(1) Differential Bearing Holder Mounting Bolt
(2) Differential Bearing Holder
(3) Shim
(4) Shim

W1101519





Differential Gear Assembly

1. Remove the internal cir-clip (1) from the differential case.
2. Remove the shims (2), (3).
3. Remove the differential gear assembly (4) from the differential case.

(When reassembling)

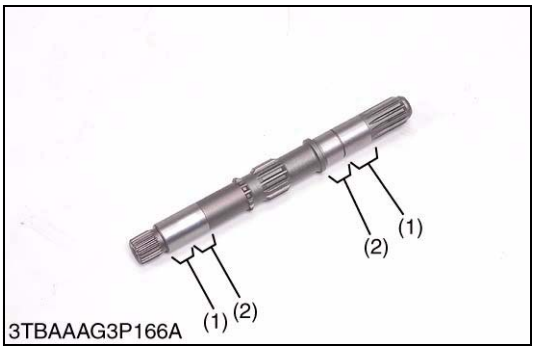
- 0.5 mm (0.020 in.) shim 66591-1498-0
- 0.2 mm (0.008 in.) shim 66591-1499-0

(1) Internal Cir-clip
(2) Shim
(3) Shim
(4) Differential Gear Assembly

W1102065

6. SERVICING

[1] HST

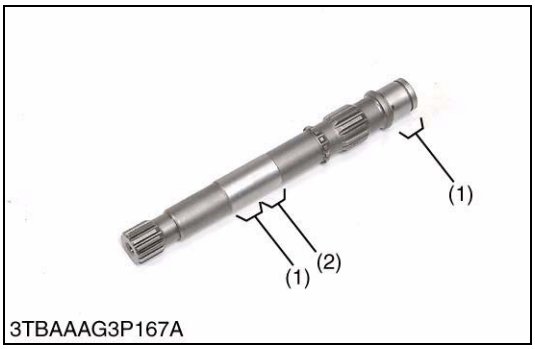


Pump Shaft

1. Pull out the pump shaft from the HST housing case.
2. Check the oil seal surface (1) the bearing surface (2) and the bearing.
3. If the shaft is rough or grooved, replace it.
4. If the bearing is worn, replace it.

(1) Oil Seal Surface (2) Bearing Surface

W1024186

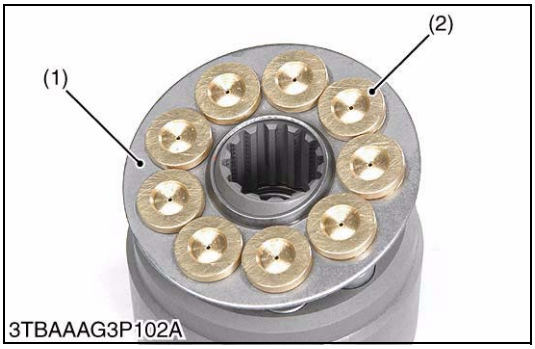


Motor Shaft

1. Pull out the motor shaft from the HST housing case.
2. Check the oil seal surface (1) the bearing surface (2) and the bearing.
3. If the shaft is rough or grooved, replace it.
4. If the bearing is worn, replace it.

(1) Oil Seal Surface (2) Bearing Surface

W1103300



Cylinder Block Bore and Pistons

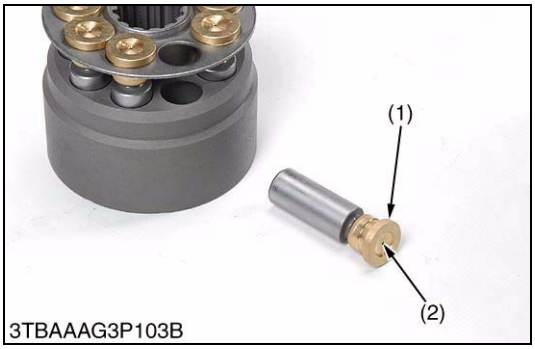
1. Lift all the pistons gently with the retainer plate (1).
2. Check the pistons for their free movement in the cylinder block bores.
3. If the piston or the cylinder block bore is scored, replace cylinder block assembly.

■ **IMPORTANT**

- **Do not interchange pistons between pump and motor cylinder block. Pistons and cylinder blocks are matched.**

(1) Retainer Plate (2) Piston Slipper

W1035703



Piston Slipper and Retainer Plate

1. Check the slipper (1) for flatness.
2. If rounded, replace piston.
3. Measure the thickness of piston slipper.
4. If the measurement is less than the allowable limit, replace the piston.
5. Check the lubricant hole (2) for clogging.

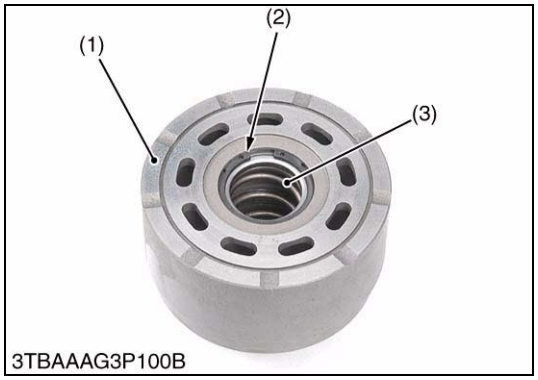
■ **IMPORTANT**

- **Do not interchange pistons between pump and motor cylinder block. Pistons and cylinder blocks are matched.**

Thickness of slipper	Factory spec.	3.00 mm 0.118 in.
	Allowable limit	2.90 mm 0.114 in.

(1) Piston Slipper (2) Lubricant Hole

W1035895

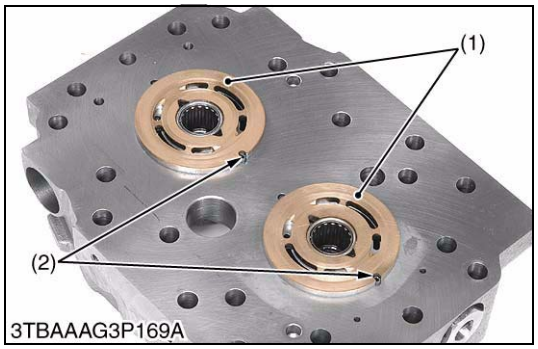


Cylinder Block Face

1. Check the polished face (1) of cylinder block for scoring.
2. If scored, replace cylinder block assembly.
3. Check the spring (3) for breakage.
4. If broken, replace cylinder block assembly.

(1) Polished Face
(2) Cir-clip
(3) Spring

W1036188



Valve Plate and Center Section Face

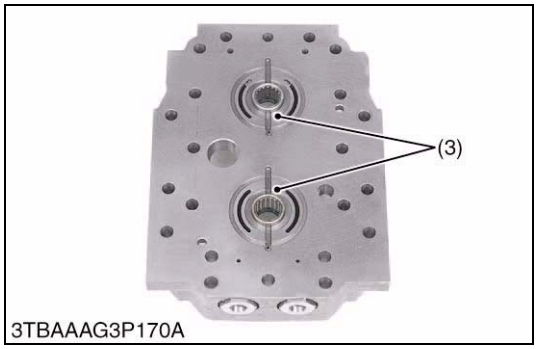
1. Check the engagement of the valve plate (1) and the anchor pin (2).
2. Pushing the valve plate (1) against the anchor pin (2), lift it to remove.
3. Check the valve plate (1) for foreign particles.
4. Clean the valve plate (1) and dry with compressed air.
5. Check the valve plate (1) for scratches, wear and erosion. (Run a finger nail across the valve plate surface. If worn, it will be felt.)
6. If worn or scored, replace it.

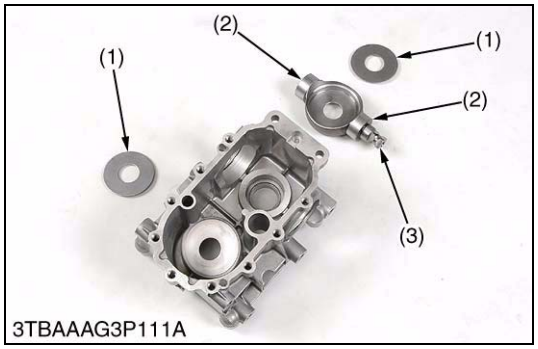
■ **NOTE**

- **After checking, coat them with hydrostatic transmission oil.**

(1) Valve Plates
(2) Anchor Pin
(3) Center Section Face

W1036339



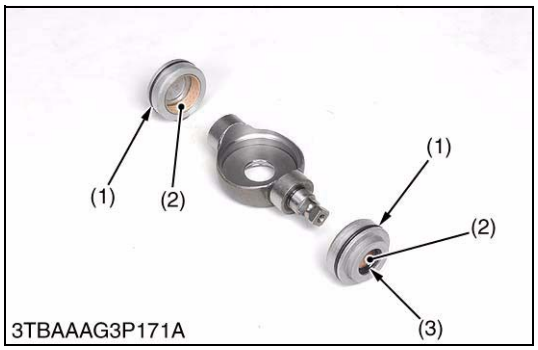


Thrust Plates and Bearing Surface

1. Check the thrust plate (1) for scratches and excessive wear.
2. If worn or scored, replace it.
3. Check the bearing surface (2) of trunnion shaft (swashplate)(3) for scratches and excessive wear.
4. If worn or scored, replace it.

(1) Thrust Plate
(2) Bearing Surface
(3) Trunnion Shaft

W1036630



Trunnion Shaft Cover

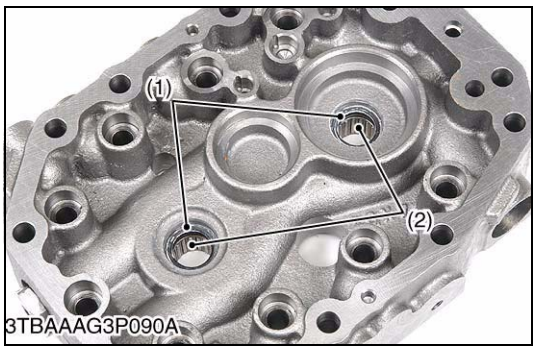
1. Check the bearing (2) for scratches and excessive wear.
2. If worn or scored, replace it.
3. Check the oil seal (3) and the O-rings (1) for damage.

■ **NOTE**

- **After checking, coat the bearings with hydrostatic transmission oil, and the oil seal lip and the O-rings (1) with grease.**

(1) O-ring
(2) Bearing
(3) Oil Seal

W1036765



Center Section Oil Seals and Bearings

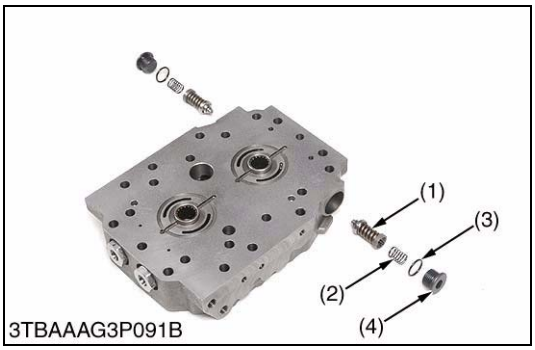
1. Check the oil seals (1) for damage.
2. Check the needle bearings (2) for wear.
3. If the needle bearings (2) and oil seals (1) are worn, replace all seals and needle bearings.

■ **NOTE**

- **After checking, coat the bearing with hydrostatic transmission oil and the oil seal lip with grease.**

(1) Oil Seal
(2) Needle Bearing

W1036910



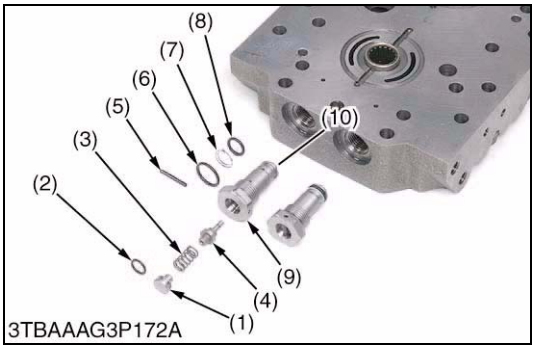
Check and High Pressure Relief Valve

1. Check the valve plug (4) and valve (1) for scratches and damage.
2. Check the valve seat in the port block for damage.
3. Check the spring (2) for breakage and wear.
4. If anything unusual, replace the check and high pressure relief valve assembly.

Tightening torque	Valve plug	118 to 147 N·m 12.0 to 15.0 kgf·m 86.8 to 108.5 lbf·ft

(1) Valve
(2) Spring
(3) O-ring
(4) Valve Plug

W1037053



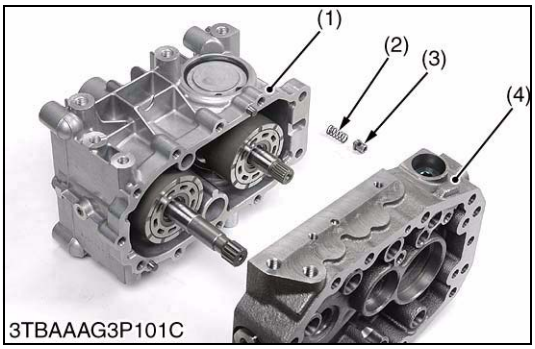
Neutral Valve

1. Check the holes of the valve body (9) and the neutral valve (4) for clogging.
2. If clogged, open hole with compressed air.
3. Replace the O-rings (2), (6), (8) and the backup ring (7) for scratches and damage.
4. Check the springs for breakage and wear.
5. If the valve surface is scored, replace it.
6. If anything is unusual, replace it.

Tightening torque	Neutral valve plug	59 to 68 N·m 6.0 to 7.0 kgf·m 44 to 50 lbf·ft

(1) Plug
(2) O-ring
(3) Spring
(4) Neutral Valve
(5) Pin
(6) O-ring
(7) Backup Ring
(8) O-ring
(9) Valve Body
(10) Plug

W1107714

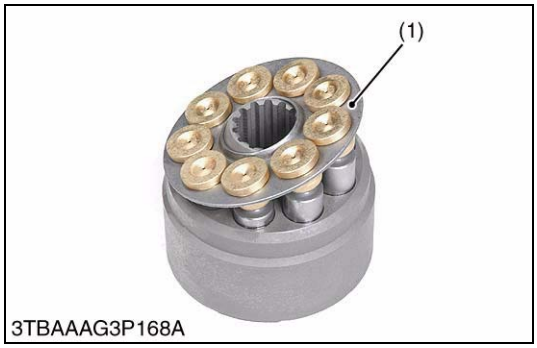


Charge Relief Valve

1. Check the spring (2) for breakage and wear.
2. If it is unusual, replace it.

(1) HST Housing
(2) Spring
(3) Poppet
(4) Center Section

W1037317



Cylinder Block Bore and Pistons

1. Lift all the pistons gently with the retainer plate (1).
2. Check the pistons for their free movement in the cylinder block bores.
3. If the piston or the cylinder block bore is scored, replace cylinder block assembly.

■ **IMPORTANT**

- **Do not interchange pistons between pump and motor cylinder block. Pistons and cylinder blocks are matched.**

Clearance between piston and bore	Factory spec.	0.02 mm 0.0008 in.
	Allowable limit	0.04 mm 0.0016 in.

(1) Retainer Plate

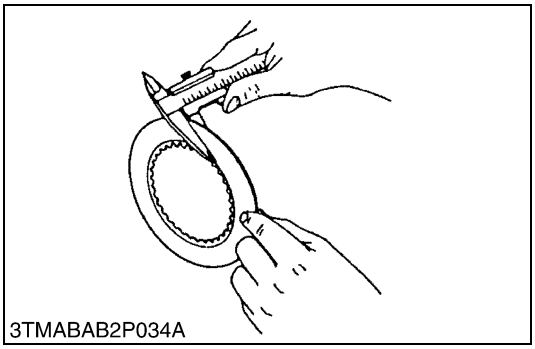
W1108478

[2] INDEPENDENT PTO CLUTCH

Checking 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.

W1017239

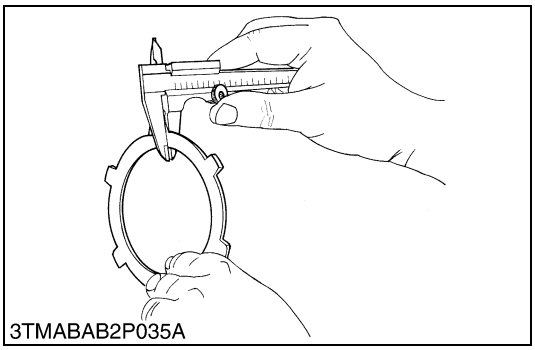


Clutch Disc Wear

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

Clutch disc wear	Factory spec.	1.70 to 1.90 mm 0.067 to 0.075 in.
	Allowable limit	1.55 mm 0.061 in.

W1017366



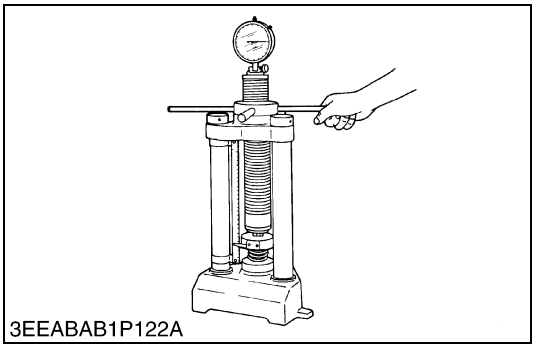
Steel Plate and Pressure Plate Wear

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

Steel plate wear (without hole)	Factory spec.	0.95 to 1.05 mm 0.0374 to 0.0413 in.
	Allowable limit	0.8 mm 0.031 in.
Steel plate wear (with holes, with holes and rubber plugs)	Factory spec.	1.15 to 1.25 mm 0.045 to 0.049 in.
	Allowable limit	1.10 mm 0.043 in.

Pressure plate wear	Factory spec.	1.95 to 2.05 mm 0.0768 to 0.0807 in.
	Allowable limit	1.8 mm 0.071 in.

W1026873



Piston Return Spring Free Length and Tension

1. Measure the free length of the piston return spring with vernier calipers.
2. Place the piston return spring on a spring compression tester and compress to the specified length, and read the gauge.
3. If the measurement is less than the allowable limit, replace.

Piston / return spring free length	Factory spec.	44.0 mm 1.73 in.

Piston return spring tension	Factory spec.	638.7 N / 26 mm 65.13 kgf / 26 mm 143.6 lbf / 1.02 in.
	Allowable limit	539.4 N / 26 mm 55 kgf / 26 mm 121.3 lbf / 1.02 in.

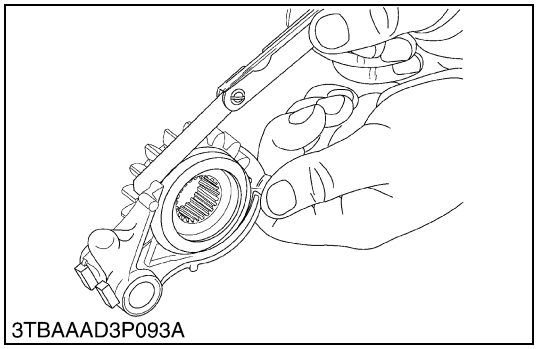
W1110066

[3] TRANSMISSION CASE

Checking 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.

W1024506



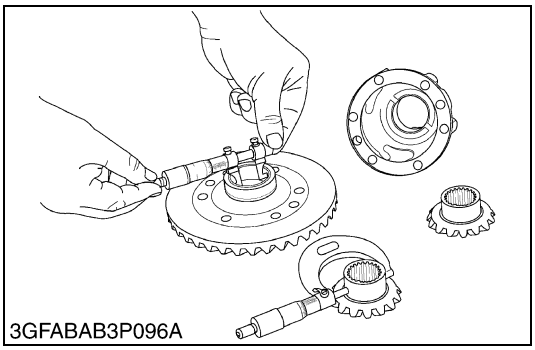
Clearance between Shift Fork and Shift Gear Groove

1. Insert the fork into the shift gear groove and measure the clearance with a feeler gauge.
2. If the clearance exceeds the allowable limit, replace it.

Clearance between shift fork and shift gear groove	Factory spec.	0.10 to 0.35 mm 0.004 to 0.014 in.
	Allowable limit	0.5 mm 0.020 in.

W1026751

[4] DIFFERENTIAL GEAR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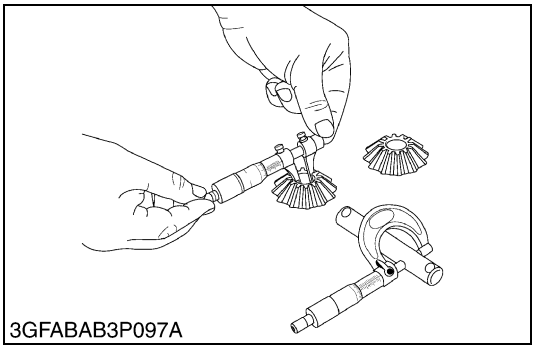
Clearance between Differential Case (Spiral Bevel Gear) and Differential Side Gear

1. Measure the differential side gear boss O.D. with an outside micrometer.
2. Measure the differential case I.D. and the spiral bevel gear I.D. with an inside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace faulty parts.

Clearance between differential case (spiral bevel gear) and differential side gear	Factory spec.	0.025 to 0.066 mm 0.0010 to 0.0025 in.
	Allowable limit	0.30 mm 0.0118 in.

Differential case I.D.	Factory spec.	32.000 to 32.025 mm 1.2599 to 1.2608 in.
Spiral bevel gear I.D.	Factory spec.	32.000 to 32.025 mm 1.2599 to 1.2608 in.
Differential side gear O.D.	Factory spec.	31.959 to 31.975 mm 1.2582 to 1.2589 in.

W1028123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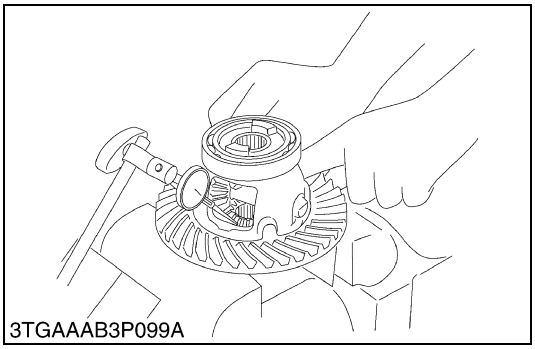
Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinion shaft O.D. with an outside micrometer.
2. Measure the differential pinion I.D. with an inside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace faulty parts.

Clearance between differential pinion shaft and differential pinion	Factory spec.	0.016 to 0.045 mm 0.0007 to 0.0018 in.
	Allowable limit	0.30 mm 0.0118 in.

Differential pinion I.D.	Factory spec.	16.000 to 16.018 mm 0.6300 to 0.6306 in.
Differential pinion shaft O.D.	Factory spec.	15.973 to 15.984 mm 0.6289 to 0.6292 in.

W1028504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Backlash between Differential Pinion and Differential Side Gear

1. Secure the differential case with a vise.
2. Set the dial indicator (lever type) with its finger on the tooth of the differential side gear.
3. Press differential pinion and side gear against the differential case.
4. Hold the differential pinion and move the differential side gear to measure the backlash.
5. If the backlash exceeds the allowable limit, adjust with differential side gear shims.

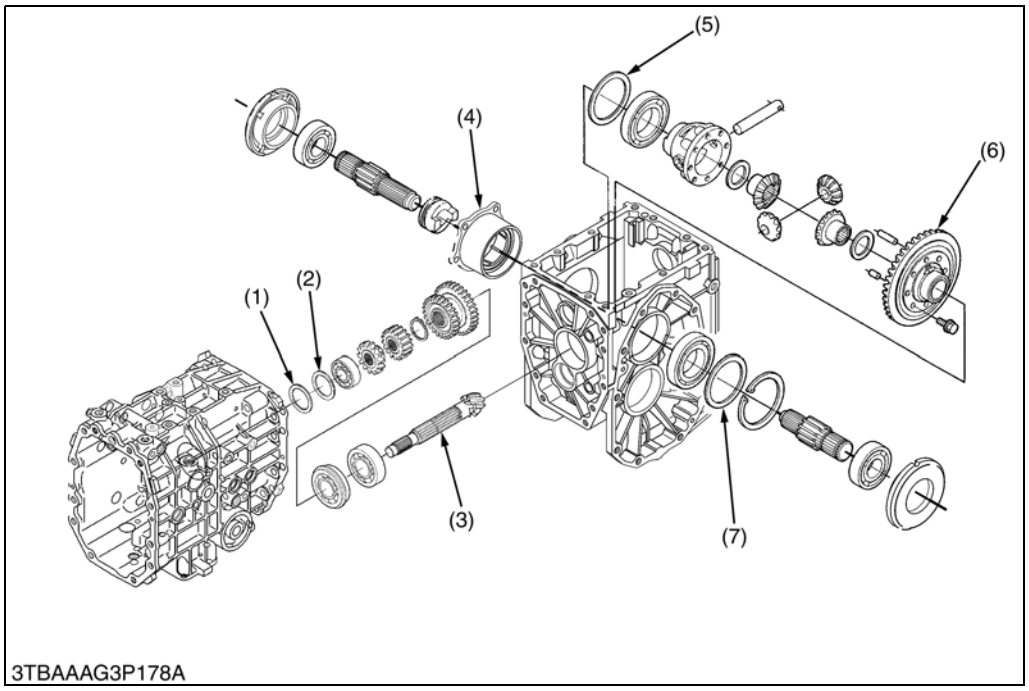
Backlash between differential pinion and differential side gear	Factory spec.	0.1 to 0.3 mm 0.004 to 0.011 in.
	Allowable limit	0.4 mm 0.016 in.

■ **NOTE**

- **Thickness of shims :**
  0.80 mm (0.0315 in.) [Part No. 67211-15170]
  1.00 mm (0.0394 in.) [Part No. 67211-15160]
  1.20 mm (0.0472 in.) [Part No. 67211-15180]

W1028708

Backlash between Spiral Bevel Pinion and Spiral Bevel Gear



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(1) Shim
(2) Shim
(3) Spiral Bevel Pinion
(4) Bearing Holder
(5) Shim
(6) Spiral Bevel Gear
(7) Shim

W1029105

1. Set the dial indicator (lever type) with its finger on the end of spiral bevel pinion (3).
2. Move the spiral bevel pinion back and forth to each end and measure the side clearance.
3. If the side clearance exceeds the factory specifications, adjust with the shims (2) at front end of spiral bevel pinion.
4. Set the dial indicator (lever type) with its finger on the tooth surface of bevel gear.
5. Measure the backlash by fixing the spiral bevel pinion (2) and moving bevel gear (5) by hand.
6. If the backlash exceeds the factory specifications, adjust with the shims (2), (6) at bearing holder (7) and differential case.
7. Adjust the backlash properly by repeating the above procedure.

(When adjusting)

Movement of spiral bevel pinion shaft at shaft directions	Factory spec.	Approx. 0 mm 0 in.
Backlash between spiral bevel pinion and spiral bevel gear	Factory spec.	0.10 to 0.30 mm 0.0039 to 0.0012 in.

W1029368

(Reference)

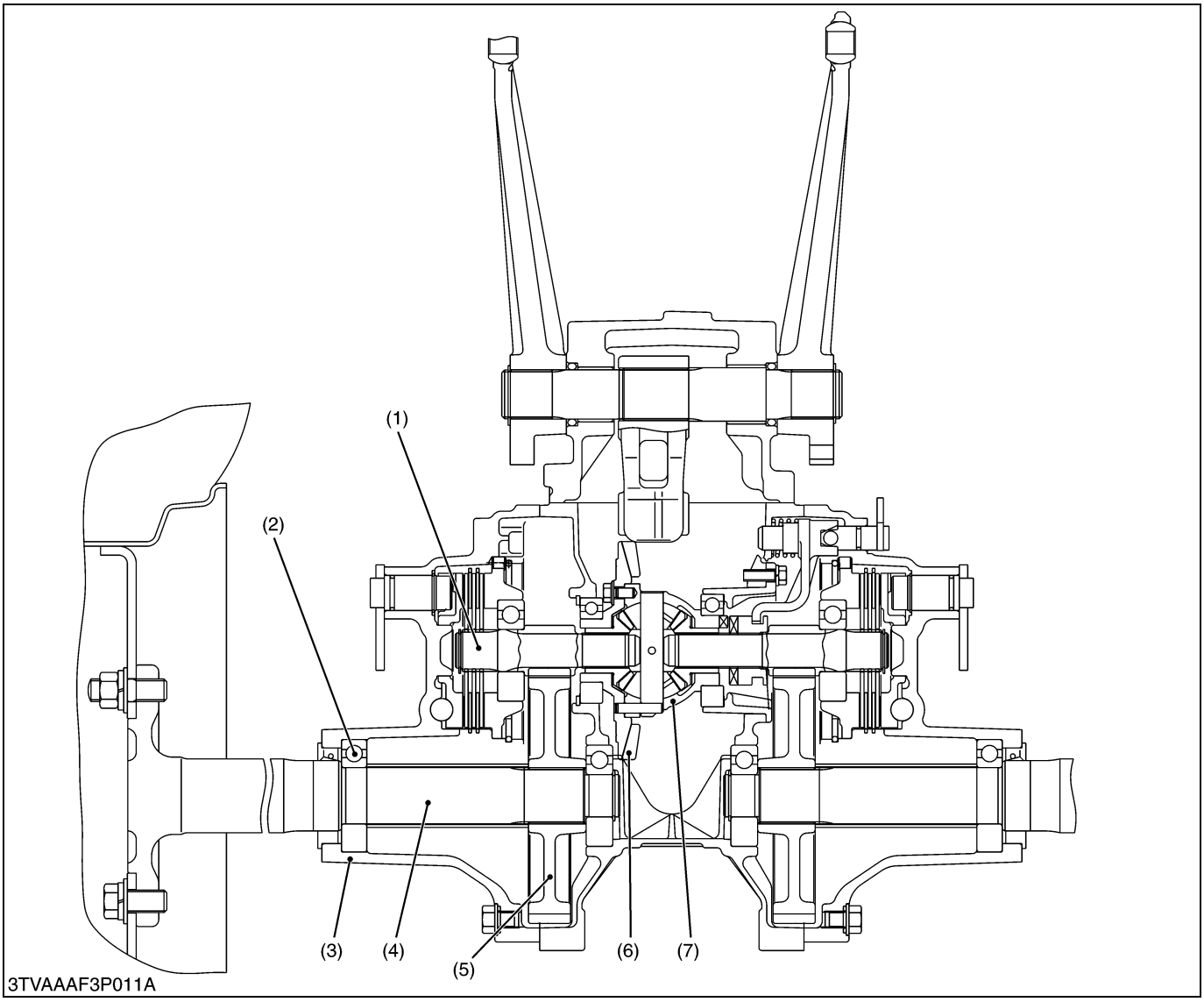
- Thickness of shims (1) :
  0.2 mm (0.008 in.) 1.4 mm (0.055 in.)
- Thickness of shims (5), (7) :
  0.2 mm (0.008 in.) 0.5 mm (0.020 in.)

3 REAR AXLE

MECHANISM

CONTENTS

1. STRUCTURE



(1) Differential Gear Shaft
(2) Ball Bearing
(3) Rear Axle Case
(4) Rear Axle
(5) Spur Gear
(6) Spiral Bevel Gear
(7) Differential Gear

The rear axles are the semi floating type with ball bearing (2) between the rear axle (4) and the rear axle case (3), which supports the rear wheel load as well as transmitting power to the rear wheels.

The differential gears (7) automatically control the revolution of right and left wheels when the rear wheels encounter unequal resistance during turning.

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive or Unusual Noise at All Time	Improper backlash between differential gear shaft and final reduction gear	Replace	2-S45
	Bearing worn	Replace	–
	Insufficient or improper type of transmission fluid used	Replenish or change	G-8
Noise while Turning	Brake shaft and spur gear and internal gear worn or damaged	Replace	3-S11

W1014322

2. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting bolt	196 to 225	20.0 to 23.0	145 to 166
Rear wheel mounting nut	167 to 191	17 to 19.5	123 to 141
Main frame mounting bolt (front side) (M14, 9T)	170 to 200	17 to 20	125 to 145
Main frame mounting bolt (rear side) (M16)	200 to 225	20 to 23	145 to 166
Rear axle mounting bolt (M12)	105 to 120	11 to 12	78 to 88
Rear axle case mounting bolt (M10)	40 to 44	4.0 to 4.5	29 to 32

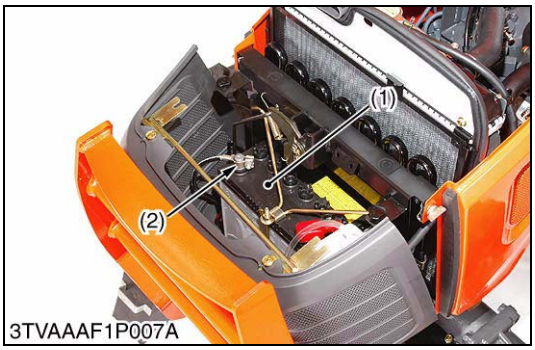
W1016410

3. DISASSEMBLING AND ASSEMBLING

Front Loader and Backhoe

1. Refer to "**9. FRONT LOADER**" section and "**10. BACKHOE**" section.

W1038999



Battery Negative Cable

1. Open the bonnet and disconnect the battery negative cable from the battery.

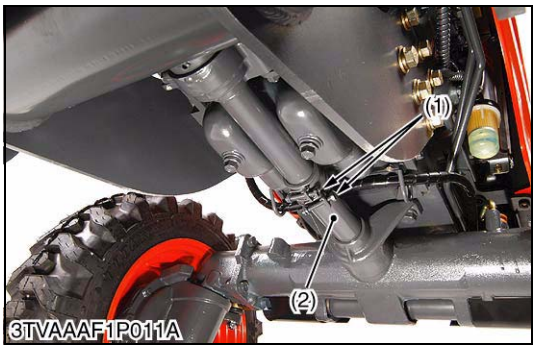
(When reassembling)

■ **NOTE**

- **When connecting the battery cords, connect the battery positive cable first.**

(1) Battery
(2) Negative Cable

W10404050



Front Wheel Drive Shaft

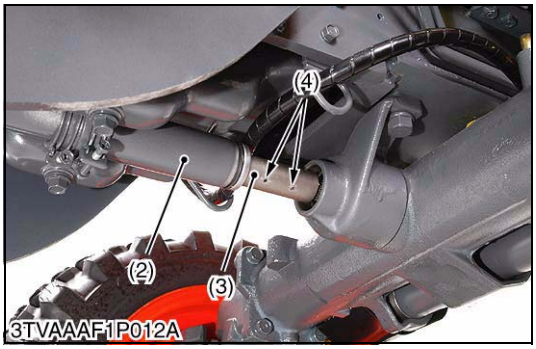
1. Loose the front wheel drive shaft cover band screws (1).
2. Slide the front wheel drive shaft cover (2) to the rear.
3. Tap out the coupling spring pins (4).
4. Remove the front wheel drive shaft.

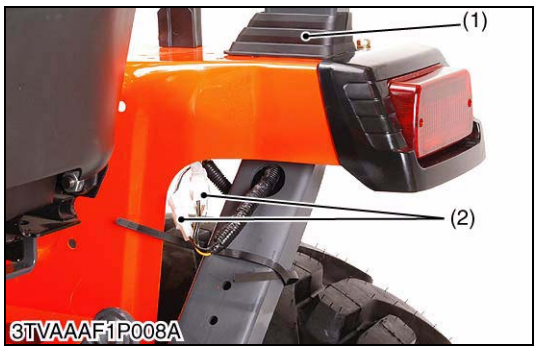
(When reassembling)

- Apply grease to the splines of the front wheel drive shaft.

(1) Screw
(2) Cover
(3) Coupling
(4) Spring Pin

W1019147



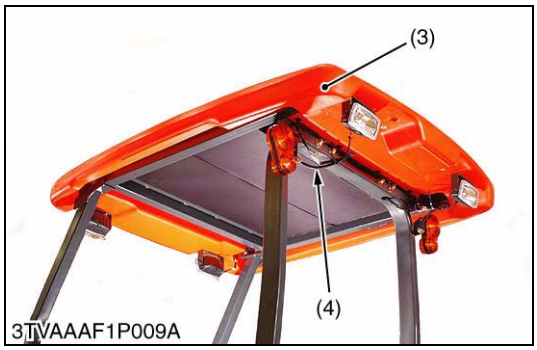


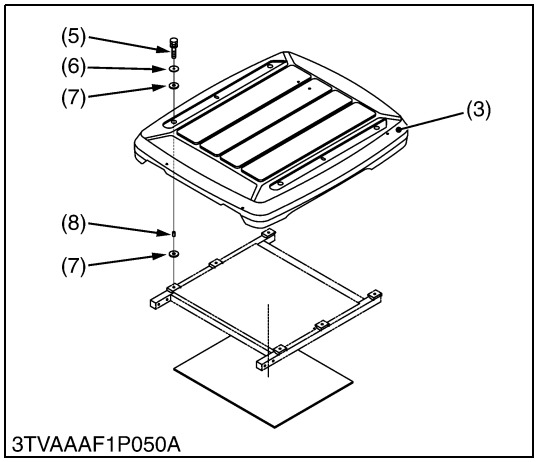
Canopy

1. Disconnect the connectors (2).
2. Remove the rubber (1).
3. Disconnect the hazard light connectors (4).
4. Remove the canopy (3) with wiring harness.

(1) Rubber
(2) Connector
(3) Canopy
(4) Connector
(5) Bolt
(6) Plane Washer
(7) Cution
(8) Collar

W1042198





Frames

1. Remove the upper frame (2).
2. Remove the front frames (1) (3).

(1) Front Frame, RH
(2) Upper Frame
(3) Front Frame, LH

W1042406

Rear Wheels

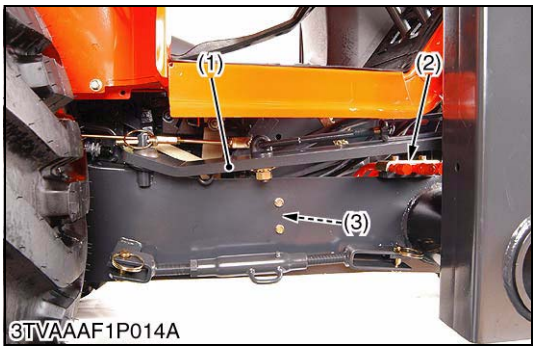
1. Place a hydraulic jack under the frame and jack up the tractor.
2. Remove the rear wheel mounting belts and nuts.
3. Remove the rear wheels (1) (2).
4. Place the rigid jacks under the rear axles. And remove the hydraulic jack.

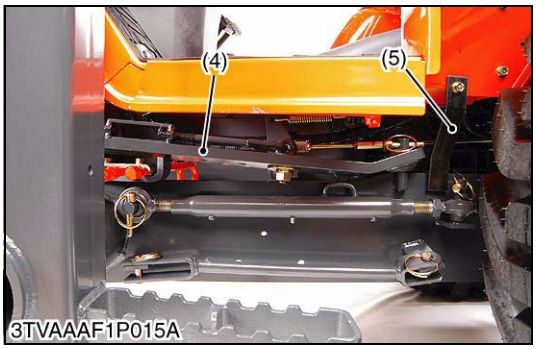
(When reassembling)

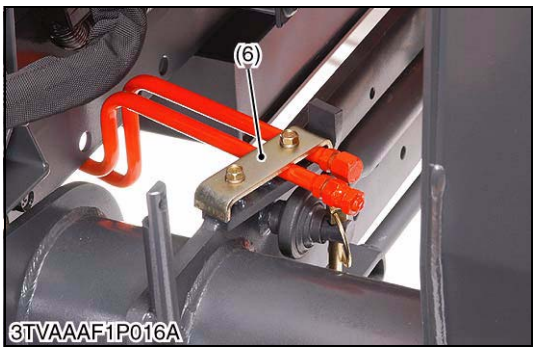
Tightening torque	Rear wheel mounting bolts	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Rear wheel mounting nuts	167 to 191 N·m 17 to 19.5 kgf·m 123 to 141 lbf·ft

(1) Rear Wheel, LH (1) Rear Wheel, RH

W1019677





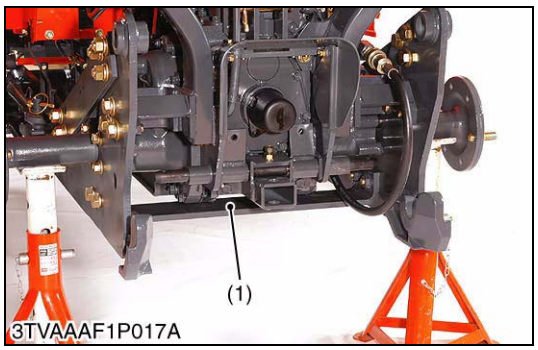


Lower Links and Pipe Clamps

1. Remove the lower links (1) (4).
2. Remove the pipe clamps (2) (3) (6).
3. Remove the step support (5).

(1) Lower Link, RH
(2) Pipe Clamp
(3) Pipe Clamp
(4) Lower Link, LH
(5) Step Support
(6) Pipe Clamp

W1043339

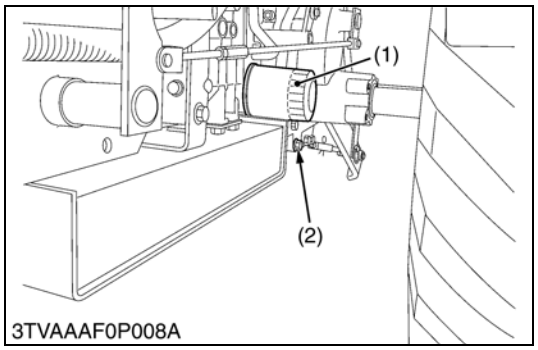


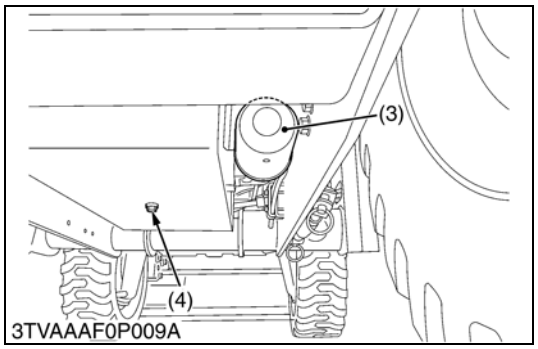
Main Frame Connecting Plate

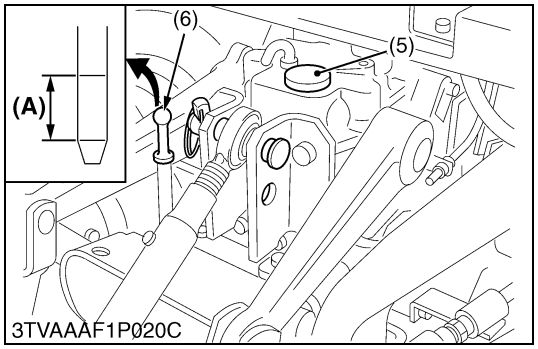
1. Remove the main frame connecting plate (1).

(1) Main Frame Connecting Plate

W1020062







Draining Transmission Fluid / Replacing Transmission Oil Filter

CAUTION

- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plug at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.
3. Remove the oil filter.
4. Put a film of clean transmission oil on the rubber seal of the new filter.
5. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
6. Fill with new KUBOTA SUPER UDT fluid up to the upper notch on the dipstick. (See page G-8.)
7. After running the engine for a few minutes, stop it and check the oil level again, add oil to the prescribed level.
8. After the new filter has been replaced, the transmission fluid level will decreased a little. Make sure that the transmission fluid does not leak through the seal, and check the fluid level. Top off if necessary.
9. Properly dispose of used oil.

■ IMPORTANT

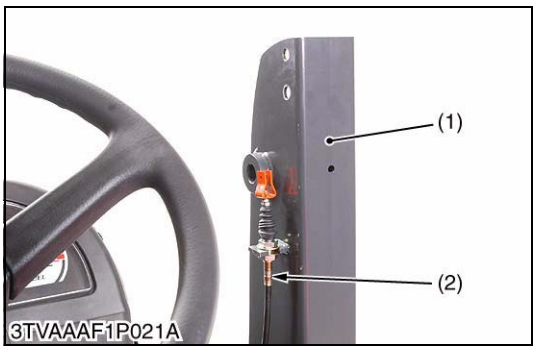
- **To prevent serious damage to the hydraulic system, use only a KUBOTA genuine filter.**
- **If the 3-point hitch can not be raised by setting the hydraulic control lever to the UP position after long term storage or when changing the transmission oil, turn steering wheel to the right and left several times to bleed air from the system.**
- **Do not operate the tractor immediately after changing the transmission fluid.**

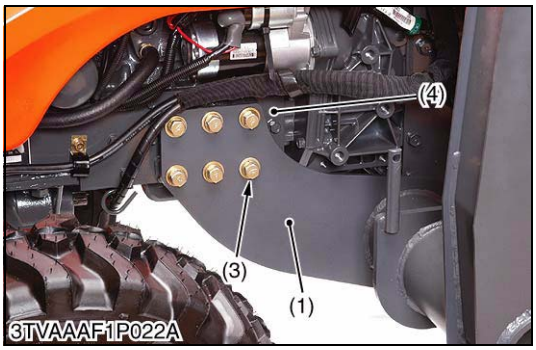
Transmission fluid capacity (with oil tank)	26.0 L 6.9 U.S.gals 5.7 Imp.gals

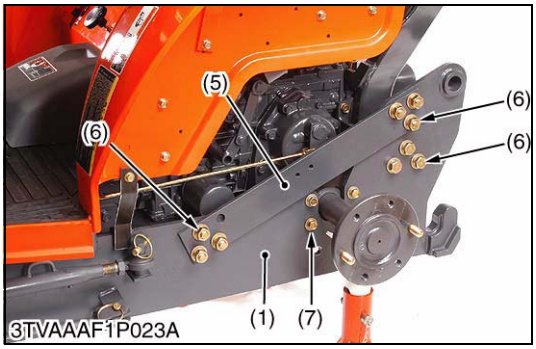
(1) Filter (HST)
(2) Drain Plug (Both Sides)
(3) Filter
(4) Drain Plug
(5) Oil Inlet
(6) Dipstick

(A) Oil level is acceptable within this range.

W1020235







Loosing Main Frame Mounting Bolts and Nuts

1. Loosing the lock nut from the main frame.
2. Remove the spill guard cable (2) from the main frame (1).
3. Loose the main frame mounting bolts.
4. Remove the connecting plate mounting bolts.
5. remove the connecting plates (5).

(When reassembling)

Tightening torque	Main frame mounting bolt (front side) (M14, 9T)	170 to 200 N·m 17 to 20 kgf·m 125 to 145 lbf·ft
	Main frame mounting bolt (rear side) (M16)	200 to 225 N·m 20 to 23 kgf·m 145 to 166 lbf·ft
	Rear axle mounting bolt (M12)	105 to 120 N·m 11 to 12 kgf·m 78 to 88 lbf·ft

(1) Main Frame
(2) Spill Guard Cable
(3) Bolt (M14)
(4) Front Axle Frame
(5) Connecting Plate
(6) Bolt and Nut (M16)
(7) Bolt (M12)

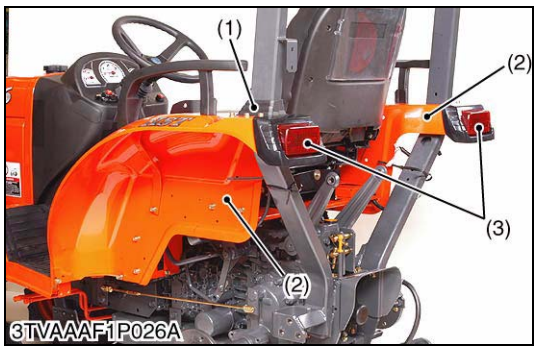
W1045366

Main Frame

1. Hoist the rear side of the main frame (1).
2. Dismount the rear side of the main frame slowly.
3. Hoist the front side of the main frame (2) slowly.

(1) Rear Side of Main Frame
(2) Front Side of Main Frame

W1020839

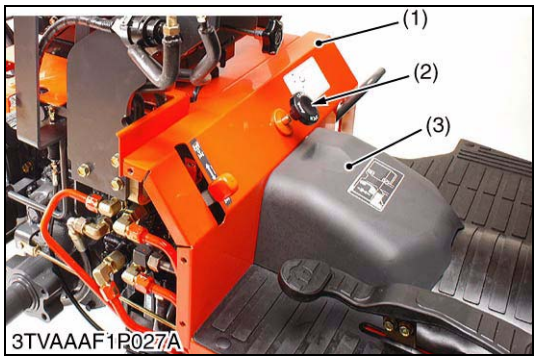


Fenders

1. Disconnect the tail light connectors.
2. Remove the tail light assemblies (3).
3. Remove the rubber (1).
4. Remove the fenders (2).

(1) Rubber
(2 Fender
(3) Tail Light Assembly

W1013274

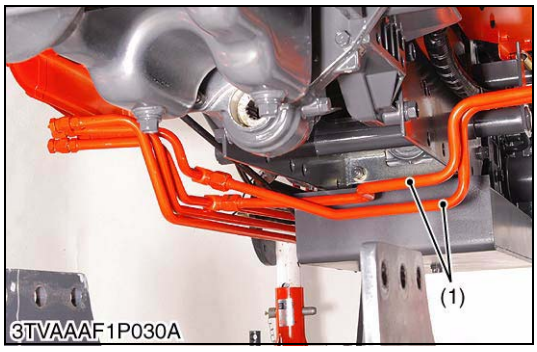


Front Cover and Floor Cover

1. Remove the front cover (3).
2. Remove the lowering speed adjusting knob (2).
3. Remove the floor cover (1).

(1) Floor Cover
(2 Lowering Speed Adjusting Knob
(3) Front Cover

W1013395



Front Loader Pipes and Front Control Valve

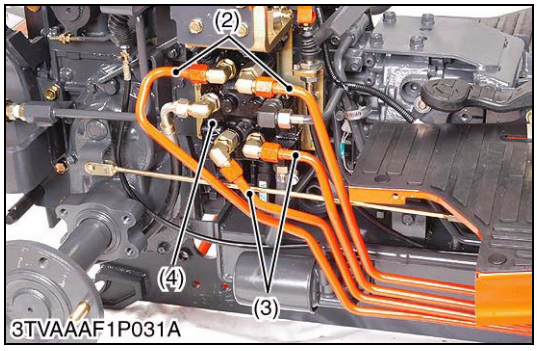
1. Remove the front loader pipes (1) (2) (3).
2. Disconnect the throttle cable (10).
3. Disconnect the spill guard cable (6).
4. Disconnect the return hose (9).
5. Remove the clamp (7).
6. Disconnect the delivery pipe (8) and hydraulic hose (5).
7. Remove the front loader control valve (4) with bracket.

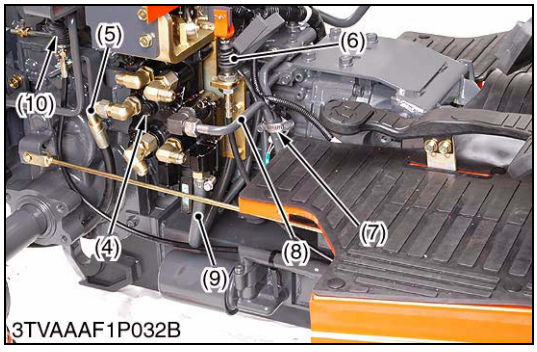
(When reassembling)

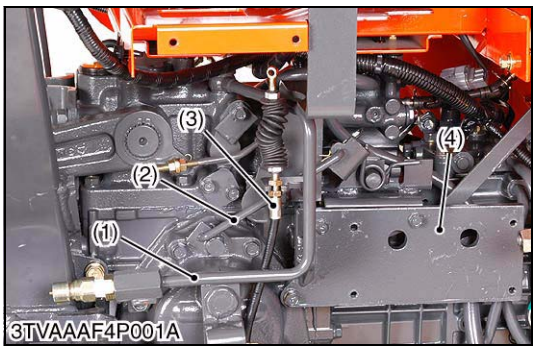
- Do not damage the O-ring.
- Check the oil leakage from the pipe and hose connections.

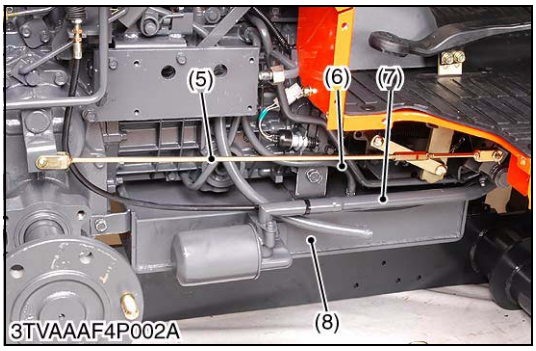
(1) Front Loader Pipe
(2) Front Loader Pipe
(3) Front Loader Pipe
(4) Front Loader Control Valve
(5) Hydraulic Hose
(6) Spill Guard Cable
(7) Clamp
(8) Delivery Pipe
(9) Return Hose
(10) Throttle Cable

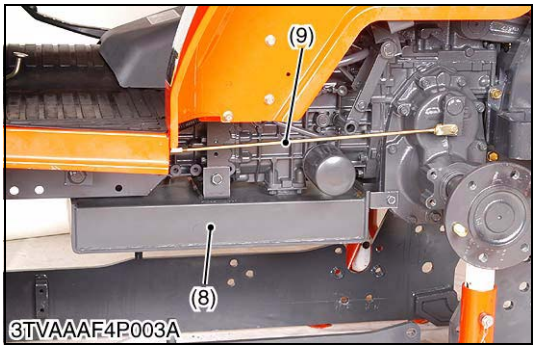
W1013497

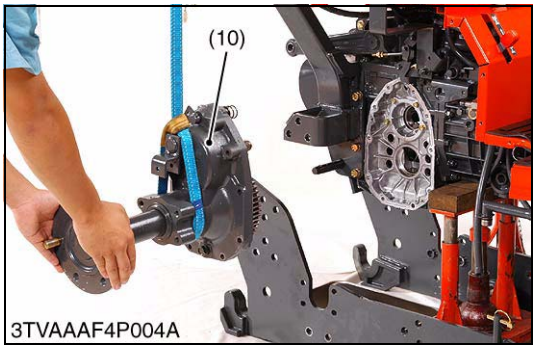












Separating Rear Axle Case

[Rear Axle RH]

1. Remove the hydraulic pipe (1).
2. Disconnect the throttle cable (3) from stay.
3. Remove the differential lock rod (2).
4. Remove the front loader valve bracket (4).
5. Remove the brake rod RH (5).
6. Disconnect the suction pipe (7) and the breather hose (6).
7. Remove the oil tank (8).
8. Life the rear axle case RH (10).
9. Separate the rear axle case RH (10).

[Rear Axle LH]

1. Remove the brake rod LH (5).
2. Disconnect the suction pipe (7) and the breather hose (6).
3. Remove the oil tank (8).
4. Life the rear axle case LH.
5. Separate the rear axle case LH.

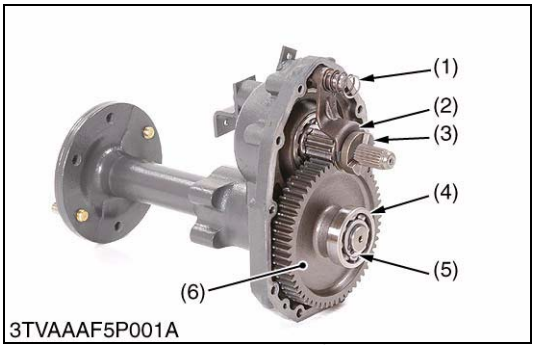
(When reassembling)

- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint face of the rear axle case and the differential case.

Tightening torque	Rear axle case mounting bolt (M10)	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Hydraulic Pipe
(2) Differential Lock Rod
(3) Throttle Cable
(4) Front Loader Valve Bracket
(5) Brake Rod RH
(6) Breather Hose
(7) Suction Pipe
(8) Oil Tank
(9) Brake Rod LH
(10) Rear Axle Case

W1013882

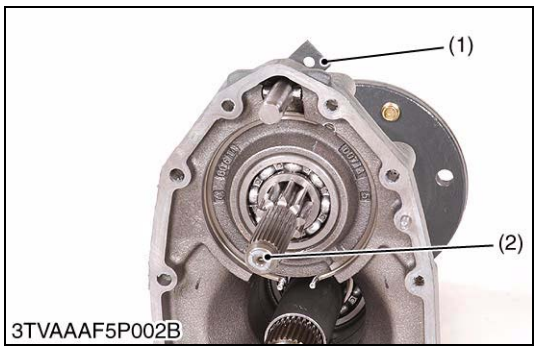


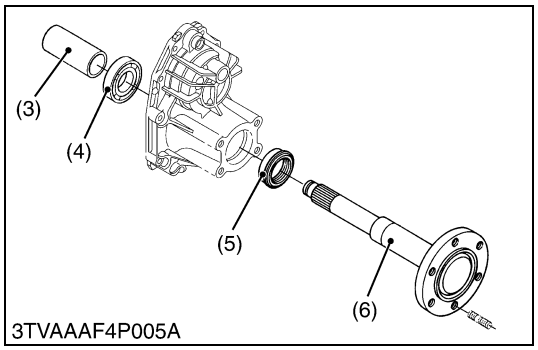
Differential Lock Shift Fork

1. Remove the spring (1).
2. Draw out the differential lock shift lock clutch (3) and the differential lock shift fork (2).
3. Remove the external cir-clip (5).
4. Remove the ball bearing (4).
5. Remove the 58T gear (6).

(1) Spring
(2) Differential Lock Shift Fork
(3) Differential Lock Clutch
(4) Ball Bearing
(5) External Cir-clip
(6) 58T Gear

W1017363





Rear Axle Shaft

1. Remove the fork rod (1).
2. Remove the brake shaft assembly (2).
3. Tap out the rear axle shaft (5) with a rubber hammer to the outside.

(When reassembling)

- Tap in the ball bearing to the rear axle case.

(1) Fork Rod
(2) Brake Shaft Assembly
(3) Collar
(4) Ball Bearing
(5) Oil Seal
(6) Rear Axle Shaft

W1017976

4. SERVICING

Checking 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.

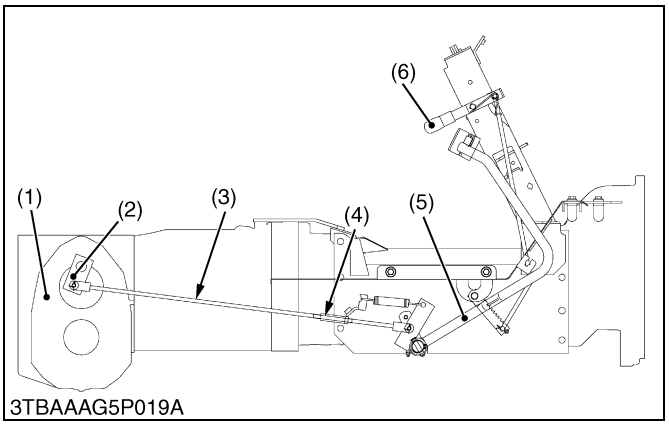
W1019024

4 BRAKES

MECHANISM

CONTENTS

1. FEATURE



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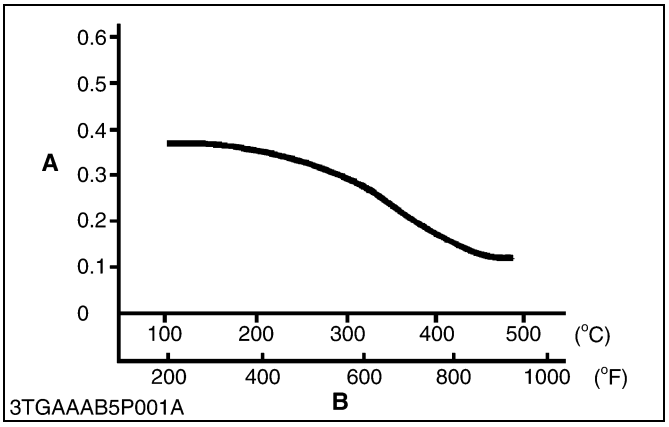

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Independent mechanical wet disc brakes are used for the right and left travelling brakes. They are operated by the brake pedals through the mechanical linkages and provide stable braking and require little adjustment.The parking brake is mechanical type which is designed to actuate the travelling brakes through the parking brake linkages. When pulling the parking brake lever (6), parking brake mechanism is the same mechanism of travelling brake operated.

■ **Features of Wet Disc Brakes**

1. **Reduced disc wear**
   Although wet discs are worn by approx. several tens of microns depending on the accuracy of parts during the initial contact in initial period of 50 hours or so, almost no wear occurs afterward. This means that very little brake adjustments are required.
2. **Stable braking**
   Since the brake discs are immersed in transmission oil, ***Fade** is rarely caused even after repeated braking and a stable braking force is obtained.
3. **Pedal stroke does not change under influence of heat**
   Unlike internal expanding type brakes, the drum-to-shoe clearance of the wet disc brake does not increase due to thermal expansion and the increased pedal stroke does not result. Thus, the wet disc brake provides a constant pedal stroke.

***Fade**

Fade is a phenomenon of braking force loss caused by the heat generated in repeated braking. Generally, the friction coefficient of brake disc tends to lower and the braking force reduces with the rise of the temperature of the brake disc.

(Reference)

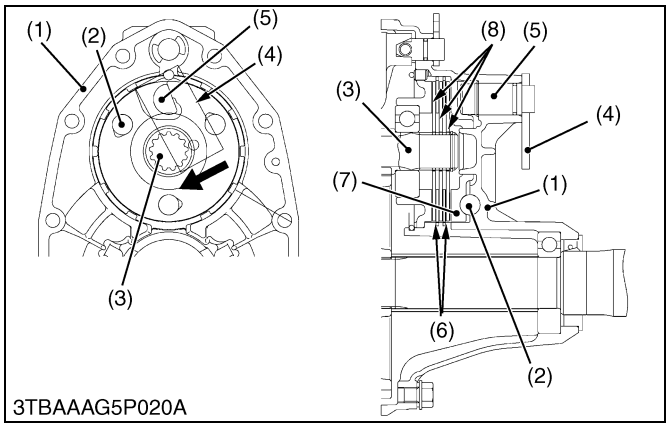
- Relationship between temperature and friction coefficient of brake disc is shown in the graph.

(1) Rear Axle Case
(2) Brake Cam Lever
(3) Brake Rod
(4) Turnbuckle
(5) Brake Pedal
(6) Parking Brake Lever

A : Friction Coefficient
B : Temperature

W1012645

2. OPERATION



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The brake body incorporated in the rear axle case (1) filled with transmission oil and is designed to brake when the brake disc (8) splined with the differential gear shaft (3) is pressed against the cam plate (7) by means of the cam mechanism incorporating steel balls (2).

For greater braking force, three brake discs are provided at the right and left sides respectively, and two friction plates (6) fixed to the rear axle case are arranged between the brake discs.

■ **During Braking**

When the brake pedal is pressed, the linkage causes the brake cam lever (4) and brake cam (5) to turn into the direction of arrow shown in the above figure.

Therefore, the cam plate (7) also moves to the direction of arrow. At this time, since the cam plate (7) rides on the steel balls (2) set in the grooves of the rear axle case to press the brake disc (8), the differential gear shaft (3) is braked by the frictional force generated by the cam plates (7) and brake discs (8).

(1) Rear Axle Case
(2) Steel Ball
(3) Brake Shaft (Differential Gear Shaft)
(4) Brake Cam Lever
(5) Brake Cam
(6) Friction Plate
(7) Cam Plate
(8) Brake Disc

W1013253

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Uneven Braking Force	Brake pedal free travel unevenly adjusted	Adjust	4-S4
	Brake disc worn	Replace	4-S6
	Cam plate warped	Replace	4-S7
Brake Drags	Brake pedal free travel too small	Adjust	4-S4
	Parking brake lever free travel too small	Replace	4-S4
	Brake pedal return spring weaken or broken	Replace	–
	Brake cam rusted	Repair	4-S7
Poor Braking Force	Brake pedal free travel excessive	Adjust	4-S4
	Brake disc worn	Replace	4-S6
	Cam plate warped	Replace	4-S7
	Brake cam or lever damaged	Replace	4-S7
	Transmission fluid improper	Change	G-8

W1014322

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Brake Pedal	Free Travel	30 to 40 mm 1.18 to 1.57 in.	–
	Difference of Stroke (RH and LH)	0 mm 0 in.	–
Cam Plate and Ball	Height	22.89 to 22.99 mm 0.9012 to 0.9051 in.	22.40 mm 0.8819 in.
Brake Disc	Thickness	3.3 to 3.5 mm 0.130 to 0.137 in.	3.0 mm 0.118 in.
Friction Plate	Thickness	1.92 to 2.08 mm 0.0756 to 0.0818 in.	1.52 mm 0.0598 in.

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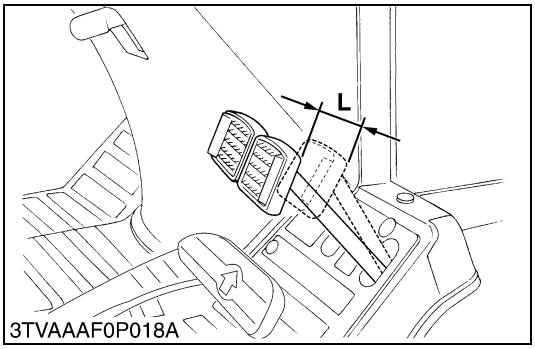
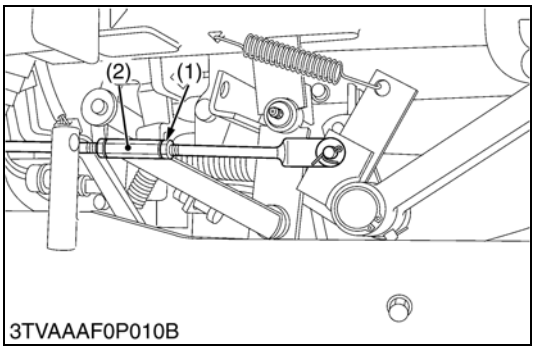
3. CHECKING AND ADJUSTING





Adjusting Brake Pedal

CAUTION

- **Stop the engine and chock the wheels before checking brake pedal.**

1. Release the parking brake.
2. Slightly depress the brake pedals and measure free travel at the top of pedal stroke.
3. If adjustment is needed, loosen the lock nut and turn the turnbuckle to adjust the rod length within acceptable limits.
4. Retighten the lock nut.

Brake pedal free travel	30 to 40 mm (1.18 to 1.57 in.) on the pedal
	Keep the free travel in the right and left brake pedals equal

(1) Lock Nut
(2) Turnbuckle

L : Free Travel

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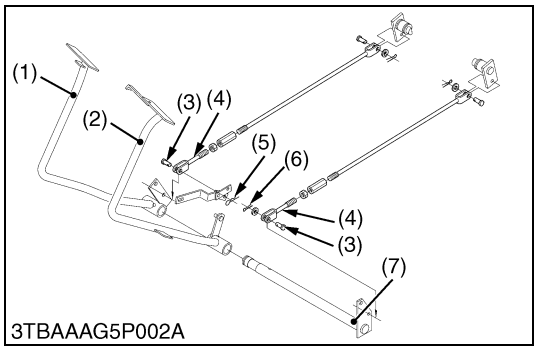
4. DISASSEMBLING AND ASSEMBLING



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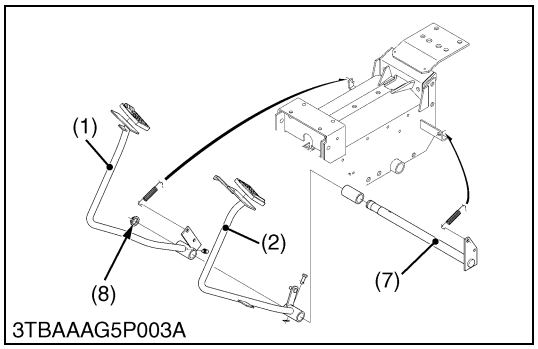


3TBAAAG5P003A

Separating Brake Pedal

1. Remove the snap pin (5) and the split pin (6). And remove the joint pins (3) from the brake font pins (4).
2. Remove the external cir-clip (8) from the pedal shaft (7).
3. Top out the pedal shaft (7) from the brake pedals (1) (2).

(When reassembling)

- Apply grease to the brake pedal shaft.

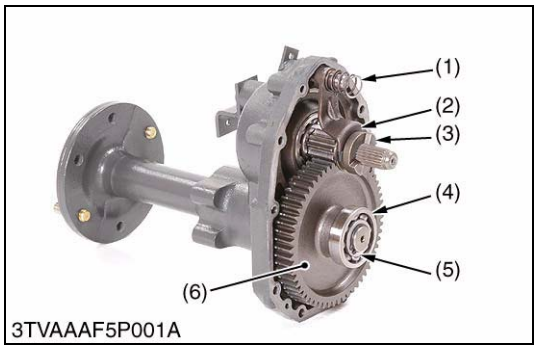
(1) Brake Pedal (RH)
(2) Brake Pedal (LH)
(3) Joint Pin
(4) Brake Front Pin
(5) Snap Pin
(6) Split Pin
(7) Pedal Shaft
(8) External Cir-clip

W1013589

Separating Rear Axle Case

1. Refer to "**REAR AXLE**" section.

W1014159



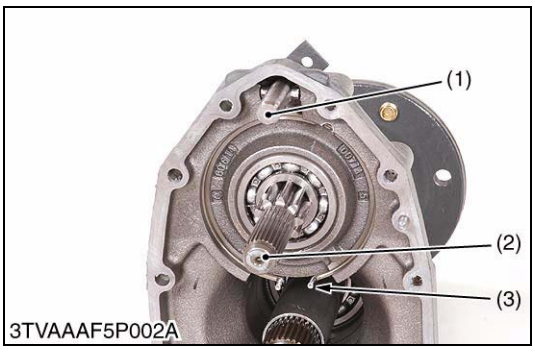
3TVAAAF5P001A

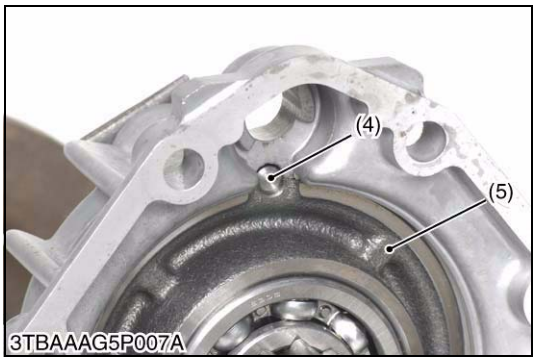
Differential Lock Clutch and Final Gear

1. Remove the spring (1).
2. Remove the differential lock clutch (3) and the differential shift fork (2).
3. Remove the external cir-clip (5).
4. Remove the ball bearing with a puller.
5. Remove the final gear (6).

(1) Spring
(2) Differential Lock Shift Fork
(3) Differential Lock Clutch
(4) Ball Bearing
(5) External Cir-clip
(6) Final Gear (58T)

W1014217





Separating Brake Pedal

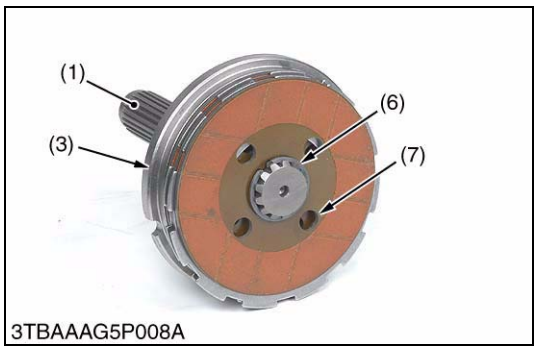
1. Remove the differential fork lever (1).
2. Remove the internal snap ring (3).
3. Remove the brake shaft (2) with the brake disks and the brake places as an assembly.

(When reassembling)

- When installing the internal snap ring (3) to the rear axle case as shown in the picture.
- When installing the bearing holder.

(1) Differential Fork Lever
(2) Brake Shaft
(3) Internal Snap Ring
(4) Straight Pin
(5) Bearing Holder

W1014492



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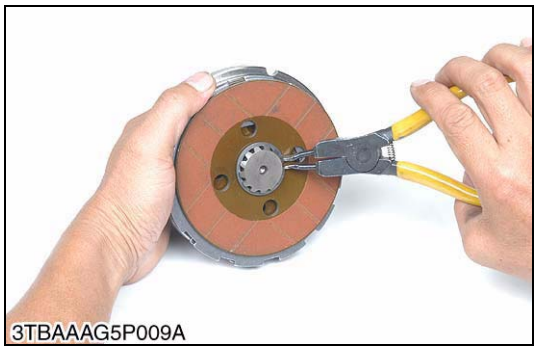
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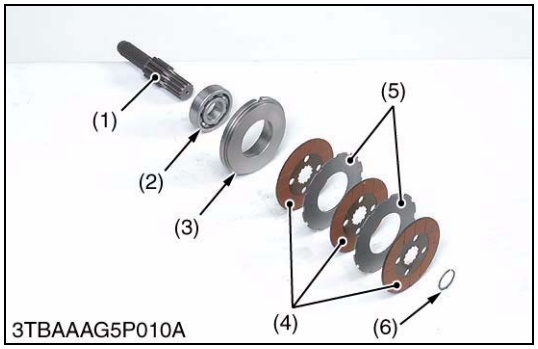

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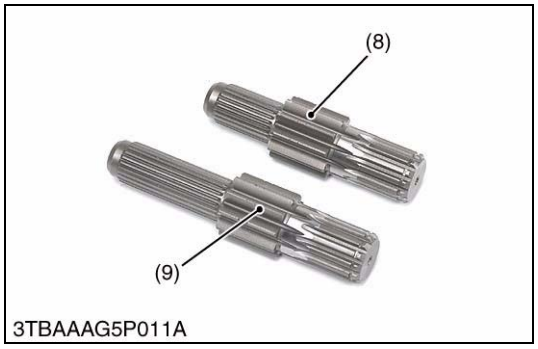

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Brake Disks, Brake Plates and Brake Shaft

1. Remove the external cir-clip (6), and remove the brake disks (4) and the brake plates (5).
2. Remove the bearing holder (3) and the ball bearing (2).

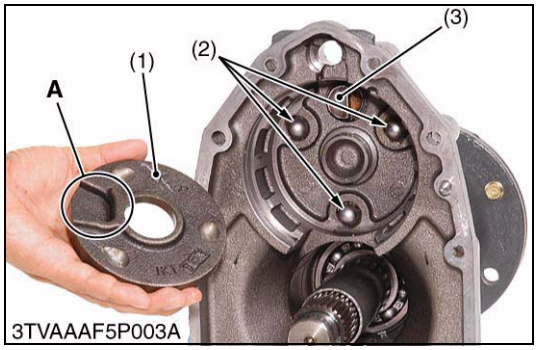
(When reassembling)

■ **NOTE**

- **Since the length of the brake shaft (LH) and the brake shaft (RH) are different, don't exchange them.**
- **Install the brake disks with their holes (7) deviation at less than 1/3 of the total hole area.**

(1) Brake Shaft
(2) Ball Bearing
(3) Bearing Holder
(4) Brake Disk
(5) Brake Plate
(6) External Cir-clip
(7) Hole
(8) Brake Shaft (LH)
(9) Brake Shaft (RH)

W1014923



3TVAAAF5P003A

Brake Cam Plate and Brake Cam Lever

1. Remove the brake cam plate (1) and the balls (3).

(When reassembling)

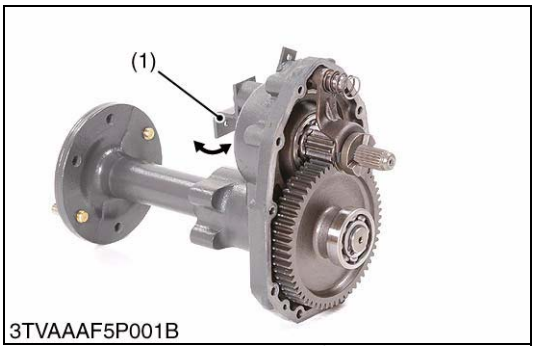
- Apply grease to the balls (3).
- If O-ring (4) is defective, change it.
- Install the brake cam lever (3) to the brake cam plate (1) securely.
- Move the brake cam lever (3) by hand to check the movement. If the movement is heavy, refine the brake cam plate (1) with emery paper.

(1) Brake Cam Plate
(2) Ball
(3) Brake Cam Lever
(4) O-ring
(5) Brake Shaft

A : Portion to the Brake Cam Lever

W1015481

5. SERVICING



Brake Cam Lever Movement

1. Move the brake cam lever (1) by hand to check the movement.
2. If the movement is heavy, refine the brake cam with emery paper.

(1) Brake Cam Lever

W1016116

Cam Plate Flatness and Bearing Holder Wear

1. Place a straightedge of 150 mm (5.91 in.) or more in length on the contacting surface of the cam plate and the bearing holder.
2. Inspect the friction surface of the cam plate and the bearing holder with the straightedge, and determine if a 0.30 mm (0.0118 in.) feeler gauge will fit on the part of wear.
3. If it will fit, resurface the cam plate.

W1016242

Height of Cam Plate and Ball

1. Measure the height of the cam plate with the ball installed.
2. If the measurement is less than the allowable limit, replace the cam plate and balls.
3. Inspect the ball holes of cam plate for uneven wear.
4. If the uneven wear is found, replace it.

Height of cam plate and ball	Factory spec.	22.89 to 22.99 mm 0.9012 to 0.9051 in.
	Allowable limit	22.40 mm 0.8819 in.

W1016380

Brake Disc and Friction Plate Wear

1. Measure the brake disc thickness and the friction plate thickness with an outside micrometer.
2. If the thickness is less than the allowable limit, replace it.

Brake disc thickness	Factory spec.	3.3 to 3.5 mm 0.130 to 0.137 in.
	Allowable limit	3.0 mm 0.118 in.

Friction plate thickness	Factory spec.	1.92 to 2.08 mm 0.0756 to 0.0818 in.
	Allowable limit	1.52 mm 0.0598 in.

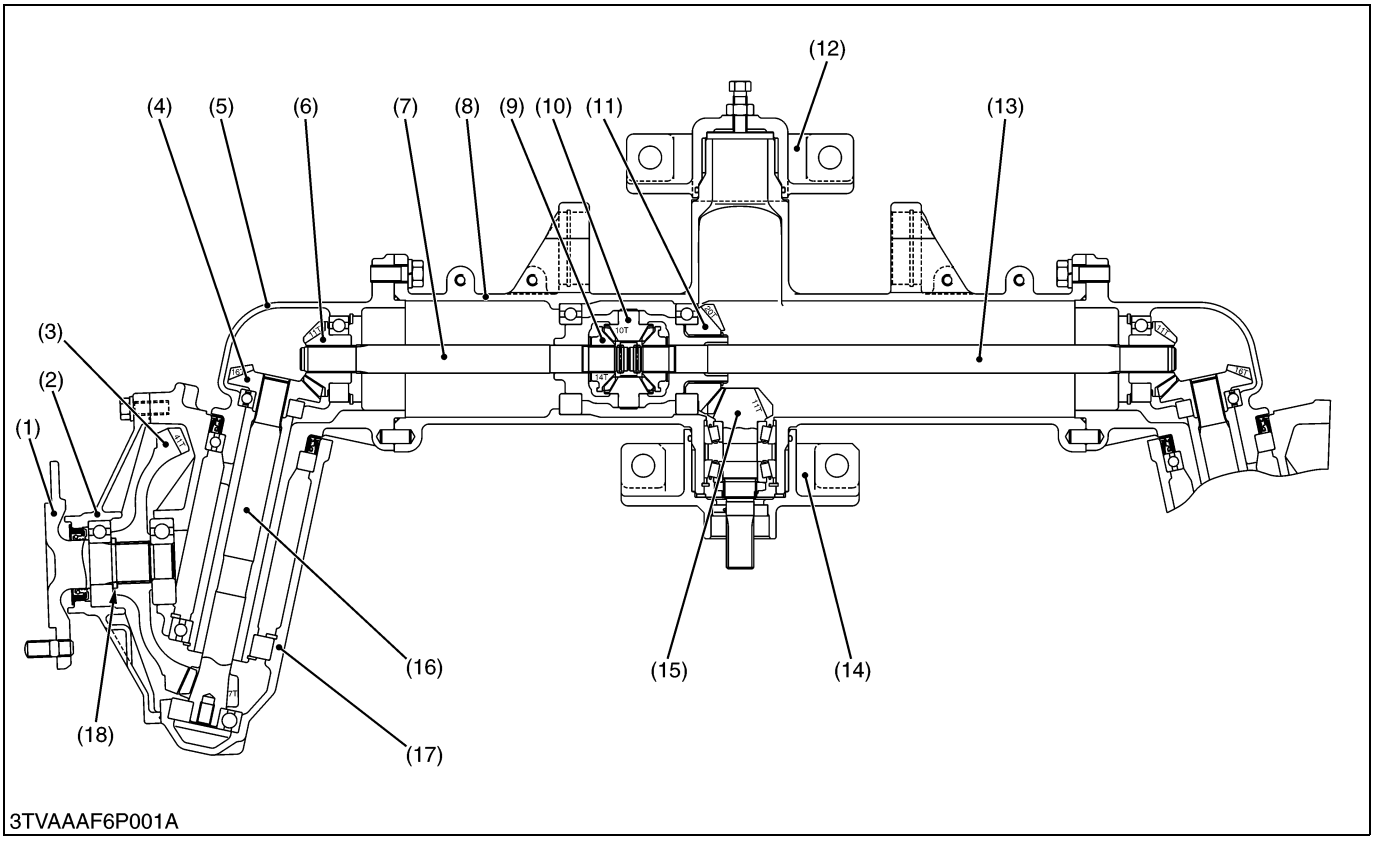
W1015877

5 FRONT AXLE

MECHANISM

CONTENTS

1. STRUCTURE



(1) Axle
(2) Axle Flange
(3) Bevel Gear (41T)
(4) Bevel Gear (16T)
(5) Bevel Gear Case
(6) Bevel Gear (11T)
(7) Differential Yoke Shaft, LH
(8) Front Axle Case
(9) Differential Side Gear (14T)
(10) Differential Pinion Gear (10T)
(11) Spiral Bevel Gear (20T)
(12) Front Axle Bracket, Front
(13) Differential Yoke Shaft, RH
(14) Front Axle Bracket, Rear
(15) Spiral Bevel Pinion Shaft (11T)
(16) Bevel Gear Shaft (7T)
(17) Front Gear Case
(18) Collar

The front axle of this machine is constructed as shown above. Power is transmitted from the transmission through the propeller shaft to the spiral bevel pinion shaft, then to the spiral bevel gear (11) and to the differential side gear (9).

The power through the differential side gear (9) is transmitted to the differential yoke shaft (7) (13), and to the bevel gear shaft (16) through the bevel gears (4) (6) in the bevel gear case (5).

The revolution is greatly reduced by the bevel gear shaft (16) and the bevel gear (3), then the power is transmitted to the axle (1).

The differential system allows each wheel to rotate at a different speed to make turning easier.

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Front Wheels Wander to Right or Left	Tire pressure uneven	Adjust	G-47
	Improper toe-in adjustment (improper alignment)	Adjust	G-30, 5-S4
	Clearance between front axle case boss and front axle bracket bushing (front, rear) excessive	Replace	5-S16
	Front axle locking force too small	Adjust	5-S4
	Tie-rod end loose	Tighten	6-S8
	Air sucked in power steering circuit	Bleed	5-S6
Front Wheels Can Not Be Driven	Front wheel driving gears in front axle gear case broken	Replace	5-S8
	Universal joint broken	Replace	–
	Front wheel drive gears in transmission broken	Replace	2-S33
	Front differential gear broken	Replace	5-S12
	Coupling displaced	Reassembling	–
Noise	Gear backlash excessive	Adjust or replace	5-S10
	Oil insufficient	Replenish	5-S5
	Bearings damaged or broken	Replace	–
	Gears damaged or broken	Replace	–
	Spiral bevel pinion shaft turning force improper	Adjust	5-S13

W1011382

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Front Wheel Alignment	Toe-in	0 to 10 mm 0 to 0.39 in.	–
Front Axle	Locking Force	50.0 to 100 N 5.10 to 10.2 kgf 11.3 to 22.4 lbf	–
Differential Case, (Differential Case Cover) to Differential Side Gear	Clearance	0.040 to 0.082 mm 0.00157 to 0.00323 in.	0.17 mm 0.0067 in.
Differential Case	I.D.	26.000 to 26.021 mm 1.02362 to 1.2445 in.	–
Differential Case Cover	I.D.	26.000 to 26.021 mm 1.02362 to 1.02445 in.	–
Differential Side Gear	O.D.	25.939 to 25.960 mm 1.02122 to 1.02205 in.	–
Pinion Shaft to Differential Pinion	Clearance	0.038 to 0.068 mm 0.00150 to 0.00268 in.	0.17 mm 0.0067 in.
Pinion Shaft	O.D.	9.972 to 9.987 mm 0.39260 to 0.39312 in.	–
Differential Pinion	I.D.	10.025 to 10.040 mm 0.39469 to 0.39528 in.	–
Spiral Bevel Pinion Shaft	Turning Torque	0.8 to 1.0 N·m 0.08 to 0.10 kgf·m 0.59 to 0.73 lbf·ft	–
Spiral Bevel Pinion Shaft to Spiral Bevel Gear	Backlash	0.10 to 0.30 mm 0.0040 to 0.011 in.	–
11T Bevel Gear to 16T Bevel Gear	Backlash	0.10 to 0.30 mm 0.0040 to 0.011 in.	–
Front Axle Case Boss to Bracket Bushing (Front)	Clearance	0.125 to 0.280 mm 0.0049 to 0.0110 in.	0.45 mm 0.018 in.
Front Axle Case Boss	O.D.	49.950 to 49.975 mm 1.9665 to 1.9675 in.	–
Bracket Bushing	I.D.	50.10 to 50.23 mm 1.9722 to 1.9774 in.	–
Front Axle Case Boss to Bracket Bushing (Rear)	Clearance	0.090 to 0.250 mm 0.0035 to 0.0098 in.	0.45 mm 0.018 in.
Front Axle Case Boss	O.D.	64.94 to 64.97 mm 2.5567 to 2.5579 in.	–
Bracket Bushing	I.D.	65.06 to 65.19 mm 2.5614 to 2.5665 in.	–

W1013874

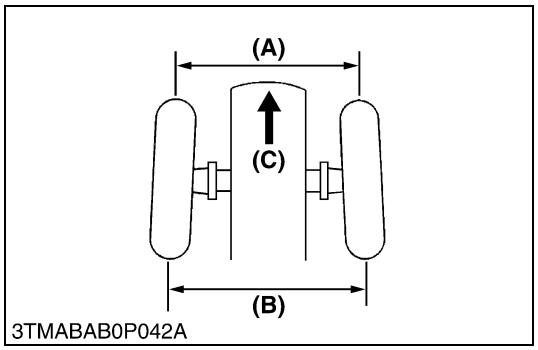
3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	lbf·ft
Front wheel mounting nut	78 to 90	7.9 to 9.2	58 to 66
Power steering hose retaining nut	25 to 28	2.5 to 2.9	18 to 20
Front axle bracket mounting bolt	200 to 230	20.4 to 23.4	148 to 169
Tie-rod slotted nut	18 to 34	1.8 to 3.5	13 to 25
Tie-rod joint	74 to 84	7.5 to 8.6	55 to 62
Bevel gear case mounting screw	78 to 90	7.9 to 9.2	58 to 66
Axle flange mounting bolt	48 to 55	4.9 to 5.7	36 to 41

W1012736

4. CHECKING AND ADJUSTING



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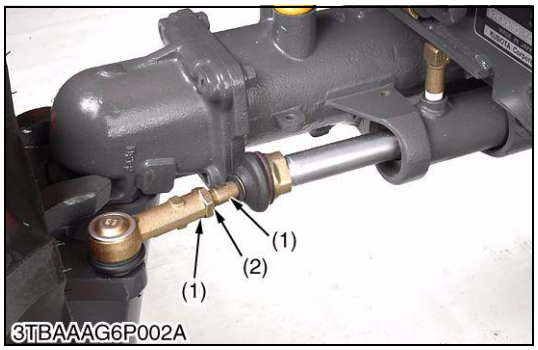
Toe-in

1. Inflate the tires to the specified pressure.
2. Turn the front wheels straight ahead.
3. Measure the toe-in (**(B) - (A)**).
4. If the measurement is not within the factory specifications, adjust the tie-rod length.

Toe-in **(B) - (A)**	Factory spec.	0 to 10 mm 0 to 0.39 in.

(A) Wheel to Wheel Distance at front **(C) Front**
(B) Wheel to Wheel Distance at rear

W1011852



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Toe-in Adjusting

1. Loosen the lock nut (2).
2. Turn the tie-rod joint (1) to adjust the rod length until the proper toe-in measurement is obtained.
3. Retighten the lock nut (2).

(1) Tie-rod Joint (2) Lock Nut

W1010993


3TVAAAF6P002A

Front Axle Locking Force

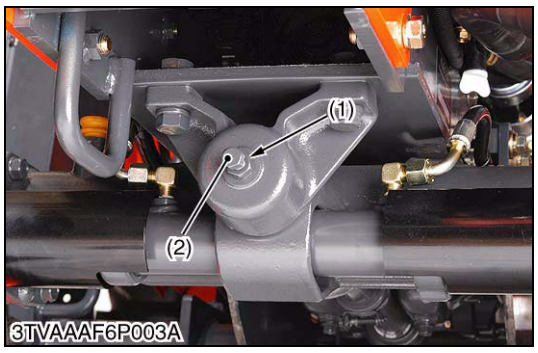
1. Jack up the front side of tractor.
2. Set a spring balance to the front axle flange.
3. Measure the front axle locking force.

■ **NOTE**

- **When adjusting the locking force, apply liquid gasket (Three Bond 1206D or equivalent) to the thread part of an adjusting screw to prevent front axle oil from leaking out of the front axle holder (3).**

4. If the measurement is not within the factory specifications, adjust with the adjusting screw (2).
5. Tighten the lock nut (1) firmly.

Front axle locking force	Factory spec.	50.0 to 100 N 5.10 to 10.1 kgf 11.3 to 22.4 lbf

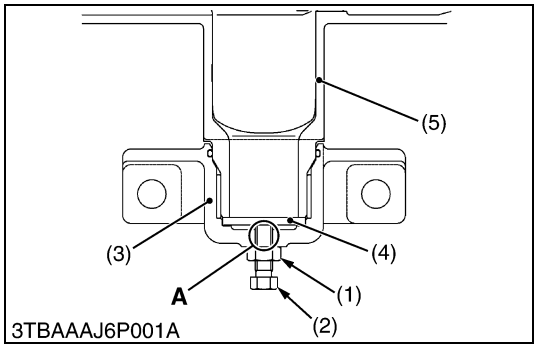


3TVAAAF6P003A

(1) Lock Nut
(2) Adjusting Screw
(3) Holder
(4) Thrust Collar
(5) Front Axle Case

A : Thread Portion

W1013044



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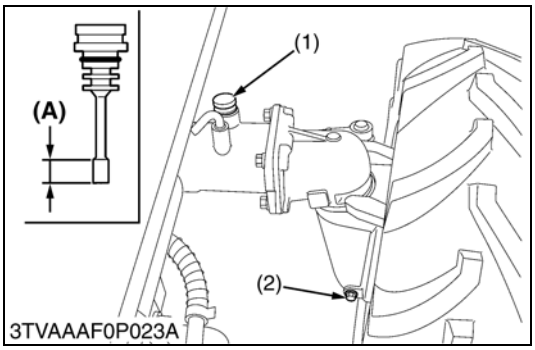
5. DISASSEMBLING AND ASSEMBLING

[1] SEPARATING FRONT AXLE ASSEMBLY



Draining Front Axle Case Oil

1. Park the tractor on a firm, flat and level surface.
2. To drain the used oil, remove the right and left drain plugs and filling plug at the front axle case and drain the oil completely into the oil pan.
3. After draining, reinstall the drain plugs.
4. Fill with new oil up to the upper notch on the dipstick.

■ **IMPORTANT**

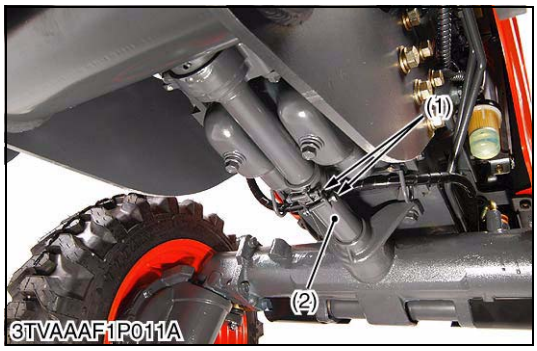
- **After ten minutes, check the oil level again; add oil to prescribed level.**

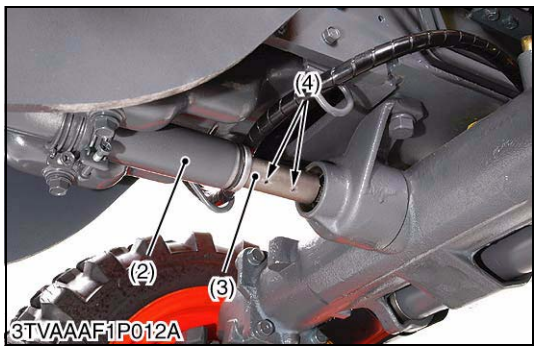
5. After filling, reinstall the filling plug.
6. Properly dispose of used oil.

Front axle case oil capacity	4.7 L 5.0 U.S.qts 4.1 Imp.qts

(1) Filling Plug with Dipstick
(2) Drain Plug
(A) Oil level is acceptable within this range.

W10280320





Front Wheel Drive Shaft

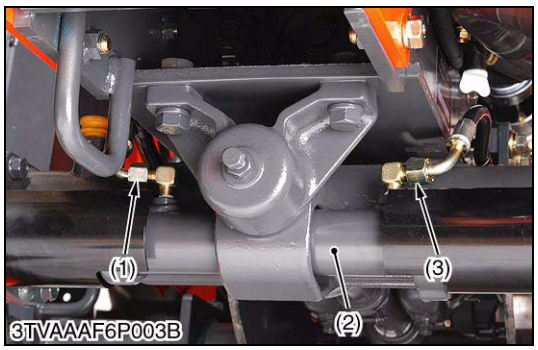
1. Loose the front wheel drive shaft cover band screws (1).
2. Slide the front wheel drive shaft cover (2) to the rear.
3. Tap out the coupling spring pins (4).
4. Remove the front wheel drive shaft.

(When reassembling)

- Apply grease to the splines of the front wheel drive shaft.

(1) Screw
(2) Cover
(3) Coupling
(4) Spring Pin

W1015842



Front Wheels and Power Steering Hoses

1. Disconnect the power steering hoses (1), (3).
2. Lift up the tractor front side.
3. Remove the front wheels.

■ **NOTE**

- **After disconnecting the power steering hoses, do not steer the front axle so that the steering oil may come out from the power steering hoses.**

■ **IMPORTANT**

- **Connect the power steering hoses to the original position.**

(When reassembling)

- Be sure to assemble the power steering hose RH and LH as shown in figure.

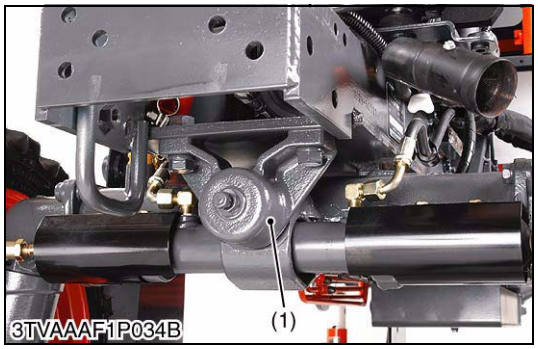
(Bleeding air in power steering circuit)

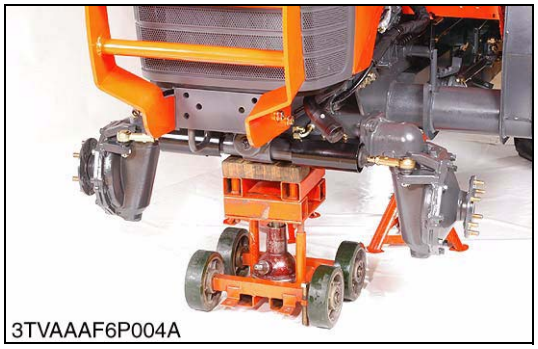
- Start the engine.
- Turn the steering wheel slowly in bolt directions all the way alternately several times, and stop the engine.

Tightening torque	Front wheel mounting nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Power steering hose retaining nut	25 to 28 N·m 2.5 to 2.9 kgf·m 18 to 20 lbf·ft

(1) Power Steering Hose (RH)
(2) Steering Cylinder
(3) Power Steering Hose (LH)

W1013983





Front Axle Holder and Front Axle

1. Place the disassembling stand under the front axle.
2. Remove the front axle holder mounting bolts.
3. Separate the front axle brackets (Front and rear) (1).
4. Separate the front axle from the front axle frame.

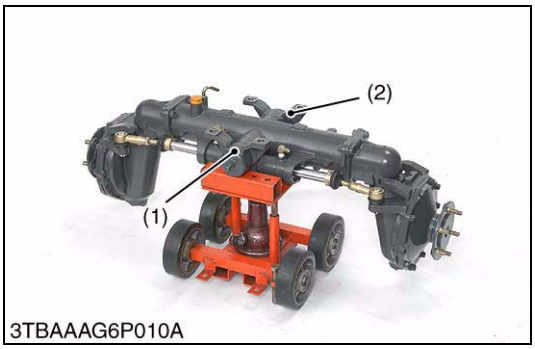
(When reassembling)

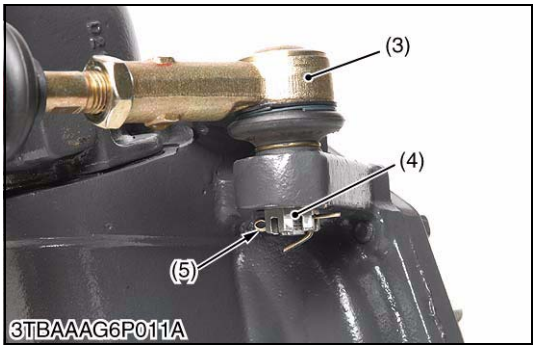
Tightening torque	Front axle bracket mounting bolt	200 to 230 N·m 20.4 to 23.4 kgf·m 148 to 169 lbf·ft

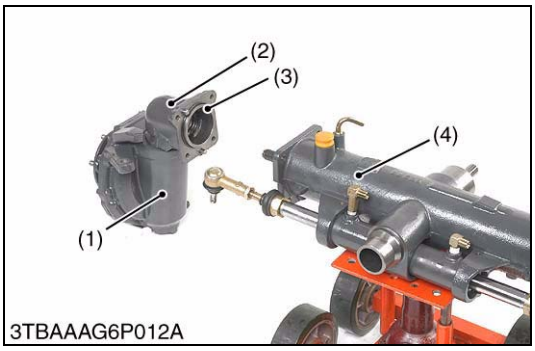
(1) Front Axle Bracket

W1014459

[2] DISASSEMBLING FRONT AXLE ASSEMBLY







Front Axle Brackets and Tie-rod Joints

1. Remove the slotted nut (4) and remove the tie-rod joint (3).
2. Remove the front axle brackets (1), (2).

(When reassembling)

- Apply grease to the thrust collar of front axle bracket.
- Apply grease to the O-ring and take care not to damage it.
- After tightening the slotted nut, install cotter pin as shown in the figure.

Tightening torque	Tie-rod slotted nut	18 to 34 N·m 1.8 to 3.5 kgf·m 13 to 25 lbf·ft
	Tie-rod joint	74 to 84 N·m 7.5 to 8.6 kgf·m 55 to 62 lbf·ft

(1) Front Axle Bracket (Front)
(2) Front Axle Bracket (Rear)
(3) Tie-rod End
(4) Slotted Nut
(5) Cotter Pin

W1015040

Bevel Gear Case

1. Remove the bevel gear case mounting screws.
2. Remove the bevel gear case (2) and front gear case (1) as a unit from the front axle case (4).

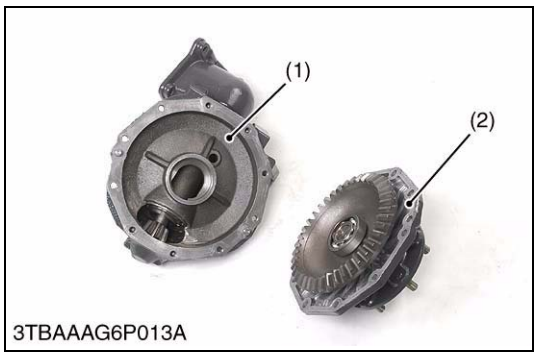
(When reassembling)

- Apply grease to the O-ring (3) and take care not to damage it.
- Do not interchange right and left bevel gear case assemblies and right and left gear case assemblies.

Tightening torque	Bevel gear case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

(1) Front Gear Case
(2) Bevel Gear Case
(3) O-ring
(4) Front Axle Case

W1015491



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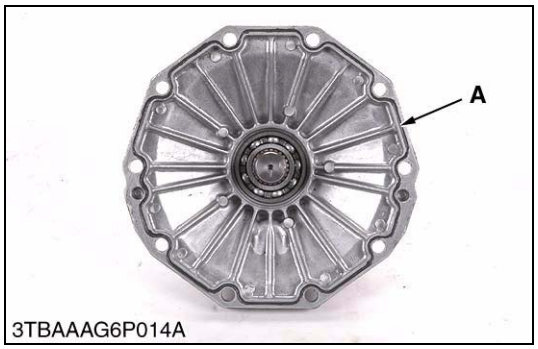

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Front Gear Case and Axle Flange

1. Remove the axle flange mounting bolts.
2. Remove the axle flange (2).

(When reassembling)

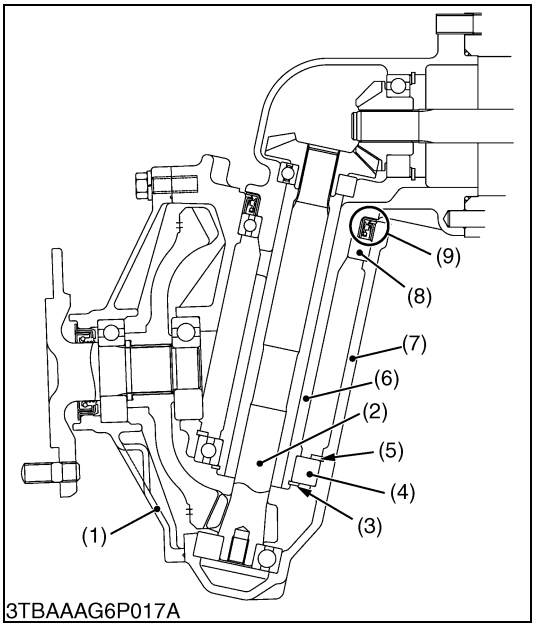
- Apply liquid gasket (Three Bond 1206D or equivalent) to joint face of the axle flange (2) and the front gear case (1) after eliminating the water, oil and stuck liquid gasket.
- Tighten the axle flange bolts and nuts diagonally in several steps.

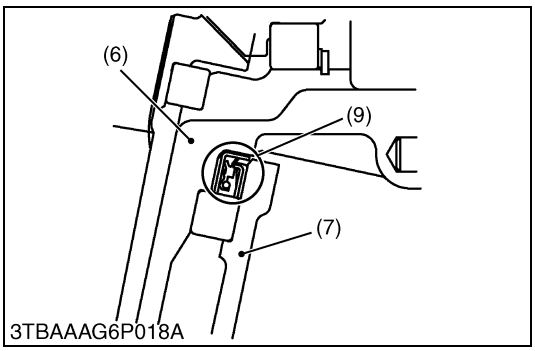
Tightening torque	Axle flange mounting bolt	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) Front Gear Case
(2) Axle Flange

A : Portion to apply liquid gasket

W1015873





Bevel Gear Shaft and Bevel Gear Case Oil Seal

1. Remove the external cir-clip (3).
2. Remove the bevel gear case (6) from the front gear case (7).
3. Remove the oil seal (9).
4. Remove the ball bearing (8).
5. Remove the internal cir-clip (5) and remove the ball bearing (4).
6. Remove the bevel gear shaft (2) with the bearing.

(When reassembling)

- Install the oil seal (9) of the bevel gear case, noting its direction as shown in the figure.

(1) Axle Flange
(2) Bevel Gear Shaft (7T)
(3) External Cir-clip
(4) Ball Bearing
(5) Internal Cir-clip
(6) Bevel Gear Case
(7) Front Gear Case
(8) Ball Bearing
(9) Bevel Gear Case Oil Seal

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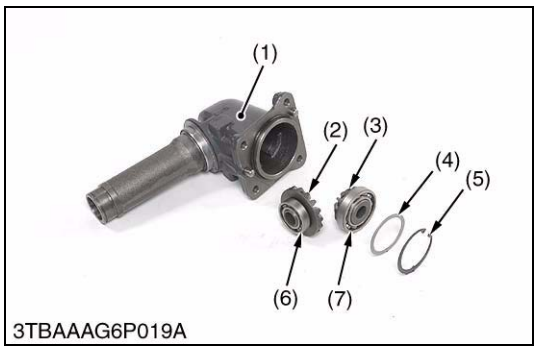

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Bevel Gear Case Gears

1. Remove the internal snap ring (5).
2. Take out the bevel gears (3) (2) with ball bearings (7) (6) and shims (4).

(When reassembling)

- Install the shim (4) to their original position.

(Reference)

- Thickness of adjusting shims :
  0.8 mm (0.031 in.) 1.2 mm (0.047 in.)
  1.0 mm (0.039 in.) 1.4 mm (0.055 in.)

(1) Bevel Gear Case
(2) Bevel Gear (16T)
(3) Bevel Gear (11T)
(4) Shim
(5) Internal Cir-clip
(6) Ball Bearing
(7) Ball Bearing

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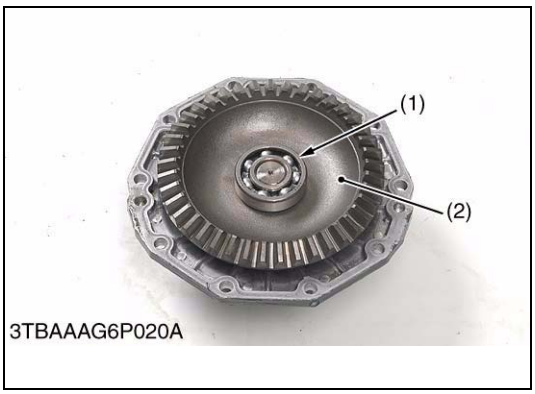

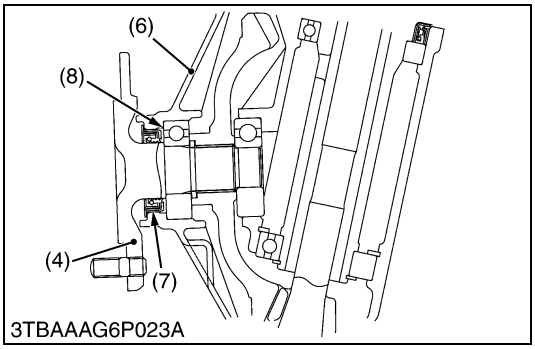

Axle

1. Remove the bearing (1).
2. Take out the bevel gear (2).
3. Take out the collar (3).
4. Tap out the axle (4).

(When reassembling)

- Install the oil seal (7) of axle flange (6), noting its direction as shown in the figure.
- Install the shims (8) to their original position.

(Reference)

- Thickness of adjusting shims :
  0.2 mm (0.008 in.) 0.3 mm (0.012 in.)

(1) Ball Bearing
(2) Bevel Gear (41T)
(3) Collar
(4) Axle
(5) Ball Bearing
(6) Axle Flange
(7) Oil Seal
(8) Shim

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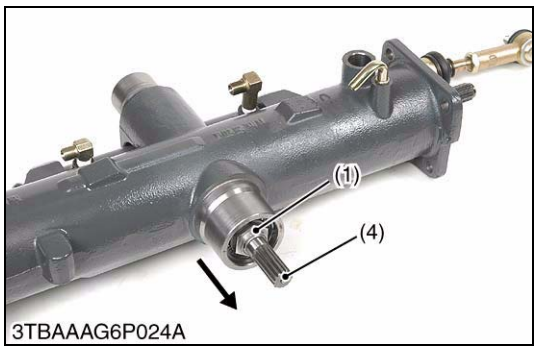

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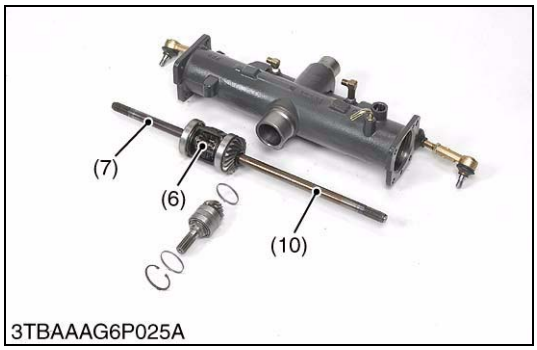

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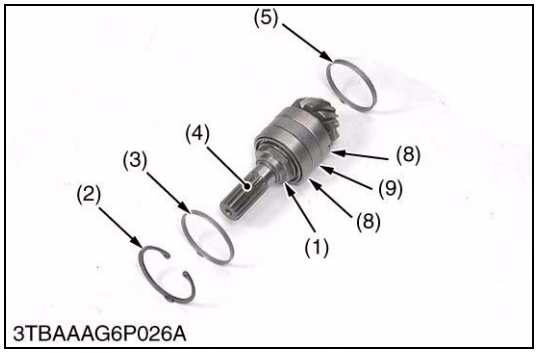

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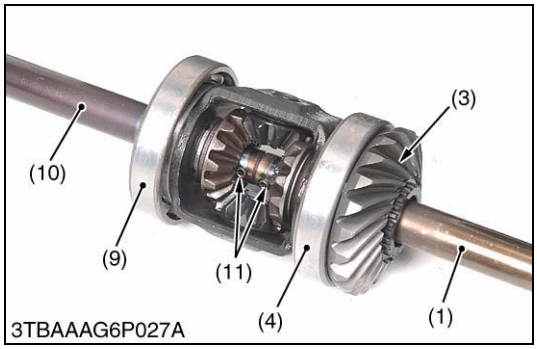

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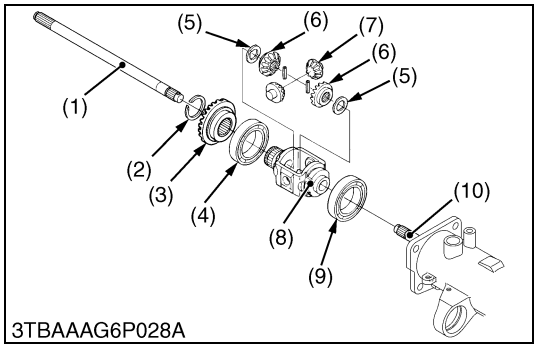

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Spiral Bevel Pinion Shaft and Differential Gear Assembly

1. Remove the oil seal from the front axle case.
2. Remove the internal cir-clip (2) and the collar (3).
3. Tap out the spiral bevel pinion shaft (4) to the rear side.
4. Take out the differential gear assembly (6) from the right side of the front axle case.
5. Remove the nut (1) from the spiral bevel pinion shaft (4).
6. Remove the taper roller bearings (8).

(When reassembling)

- Replace the oil seal and the nut (1) with new one.
- Apply grease to the oil seal.
- Tighten up the nut (1) until the turning torque of the spiral bevel pinion shaft reaches the factory specifications. (See page 5-S15).
- Install the same shims and collars before they are removed.
- Install the taper roller bearing correctly, noting their direction, and apply gear oil to them.
- Stake the lock nut firmly.

(1) Nut
(2) Internal Cir-clip
(3) Spiral Bevel Pinion Shaft
(4) Axle
(5) Collar
(6) Differential Gear Assembly
(7) Differential Yoke Shaft (LH)
(8) Taper Roller Bearing
(9) Collar
(10) Differential Yoke Shaft (RH)

W1017425

Differential Gear

1. Remove the external cir-clip (2) from the differential case (8).
2. Tap out the spring pins (11) from the differential yoke shafts (1) (10).
3. Remove the differential yoke shafts (1) (10) from the differential case (8).
4. Remove the bevel gears (6) and the collars (5) from the differential case (8).
5. Remove the spiral bevel gear (3) and the ball bearings (4) from the differential case (8).

■ **NOTE**

- **Arrange the parts to know their original position.**

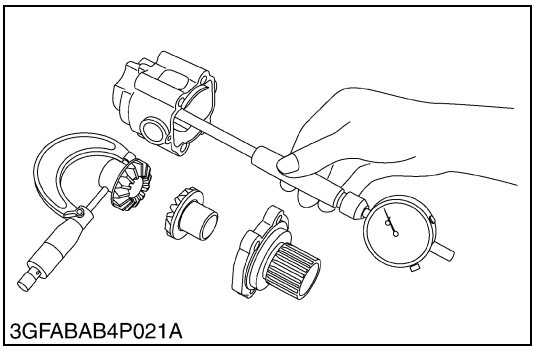
(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential bevel gears (6) and differential pinion (7).

(1) Differential Yoke Shaft (RH)
(2) External Cir-clip
(3) Spiral Bevel Gear
(4) Ball Bearing
(5) Collar
(6) Bevel Gear (14T)
(7) Differential Pinion (10T)
(8) Differential Case
(9) Ball Bearing
(10) Differential Yoke Shaft (LH)
(11) Spring Pin

W1018139

6. SERVICING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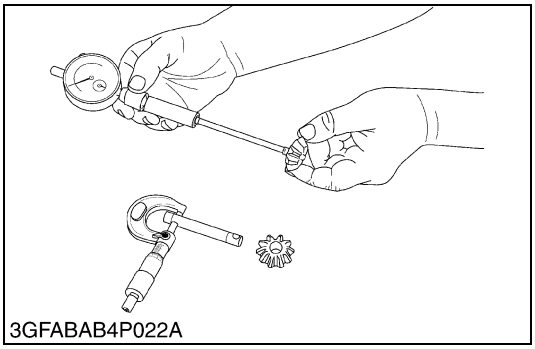
Clearance between Differential Case (Differential Case Cover) and Differential Side Gear

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

Clearance between differential case (differential case cover) and differential side gear	Factory spec.	0.040 to 0.082 mm 0.00157 to 0.00323 in.
	Allowable limit	0.17 mm 0.0067 in.

Differential case I.D.	Factory spec.	26.000 to 26.021 mm 1.02362 to 1.02445 in.
Differential case cover I.D.	Factory spec.	26.000 to 26.021 mm 1.02362 to 1.02445 in.
Differential side gear O.D.	Factory spec.	25.939 to 25.960 mm 1.02122 to 1.02205 in.

W1018602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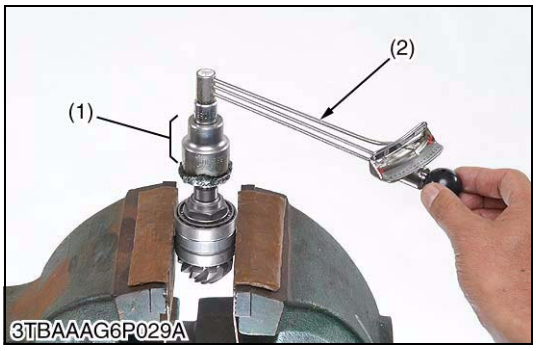
Clearance between Differential Pinion Shaft and Differential Pinion

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

Clearance between differential pinion shaft and differential pinion	Factory spec.	0.038 to 0.068 mm 0.00150 to 0.00268 in.
	Allowable limit	0.17 mm 0.0067 in.

Differential pinion shaft O.D.	Factory spec.	9.972 to 9.987 mm 0.39260 to 0.39312 in.
Differential side gear I.D.	Factory spec.	10.025 to 10.040 mm 0.39469 to 0.39528 in.

W1019016



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Turning Torque of Spiral Bevel Pinion Shaft

1. Cramp the spiral bevel pinion shaft assembly to the vise and tighten the staking nut.
2. Measure the turning torque of bevel pinion shaft.
3. If the turning torque is not within the factory specifications, adjust with the lock nut.

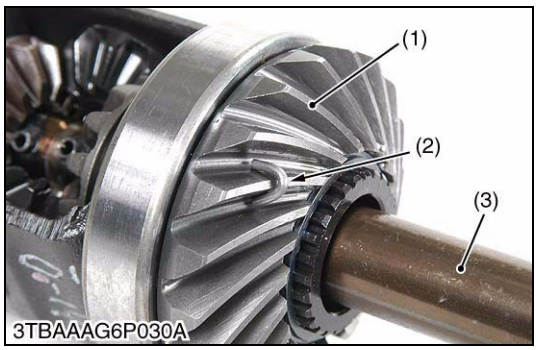
Turning torque	Factory spec.	0.8 to 1.0 N·m 0.08 to 0.10 kgf·m 0.59 to 0.73 lbf·ft

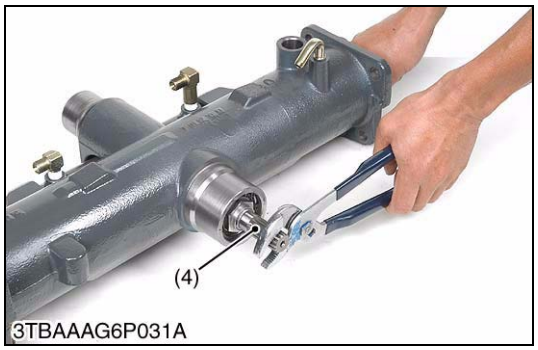
■ **NOTE**

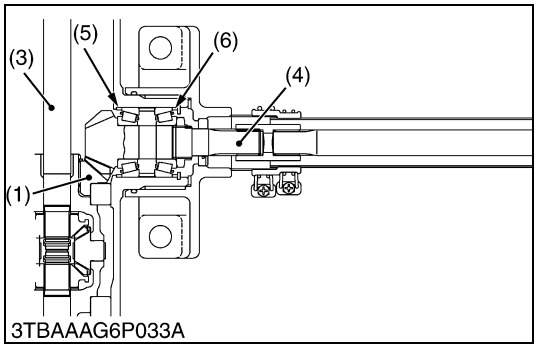
- **After turning force adjustment, be sure to stake the lock nut.**

(1) Adaptor (2) Torque Wrench

W1019246







Backlash between Spiral Bevel Pinion Shaft and Spiral Bevel Gear

1. Place the fuse (2) on the gear tooth of the spiral bevel gear (1).
2. Install the spiral bevel gear (1) and the differential yoke shaft (3) into the front axle case.
3. Install the spiral bevel pinion shaft (4) to the front axle case. Install the internal cir-clip to the front axle case.
4. Turn the spiral bevel pinion shaft (4) holding the differential yoke shaft (3) by hand lightly.
5. Take out the fuse (2). And measure the fuse (2)
6. If the backlash is not within the factory specifications, change the adjusting collars (5) (6). For example change the adjusting collar (6) to 0.1 mm (0.004 in.) smaller size, and change the adjusting collar (5) to 0.1 mm (0.004 in.) larger size.
7. Adjust the backlash properly by repeating the above procedures.

Backlash between spiral bevel pinion shaft and spiral bevel gear	Factory spec.	0.10 to 0.30 mm 0.0040 to 0.011 in.

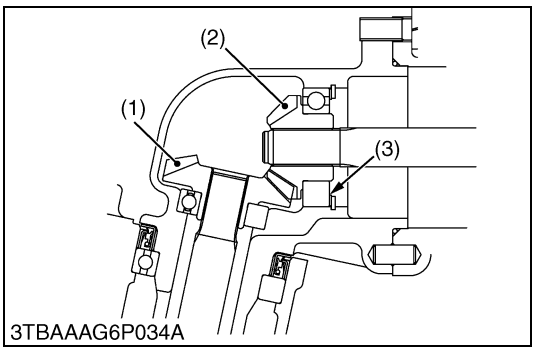
(Reference)

- Above factory specification should be measured on the tooth of spiral bevel pinion. When measuring the backlash on the spline of its shaft, factory specification will be 0.0571 to 0.1714 mm (0.00225 to 0.00675 in.).
- Thickness of adjusting collars (3) (4) :

3.4 mm (0.134 in.)	4.1 mm (0.161 in.)
3.6 mm (0.142 in.)	4.2 mm (0.165 in.)
3.8 mm (0.150 in.)	4.4 mm (0.173 in.)
4.0 mm (0.157 in.)	4.6 mm (0.181 in.)

(1) Spiral Bevel Gear (20T)
(2) Fuse
(3) Differential Yoke Shaft (RH)
(4) Spiral Bevel Pinion Shaft (11T)
(5) Adjusting Collar
(6) Adjusting Collar

W1019697



Backlash between 11T Bevel Gear and 16T Bevel Gear

1. Stick a strip of fuse to three spots on the 16T bevel gear (1) with grease.
2. Fix the front axle case, bevel gear case and front gear case.
3. Turn the axle.
4. Remove the bevel gear case from front axle case and measure the thickness of the fuses with an outside micrometer.
5. If the backlash is not within the factory specifications, adjust with shim (3).

Backlash between bevel gear (11T) and bevel gear (16T)	Factory spec.	0.10 to 0.30 mm 0.0040 to 0.011 in.

(Reference)

- Thickness of adjusting shims (3) :
  0.8 mm (0.031 in.) 1.2 mm (0.047 in.)
  1.0 mm (0.039 in.) 1.4 mm (0.055 in.)
- Tooth contact : More than 35%

(1) Bevel Gear (16T)
(2) Bevel Gear (11T)
(3) Shim

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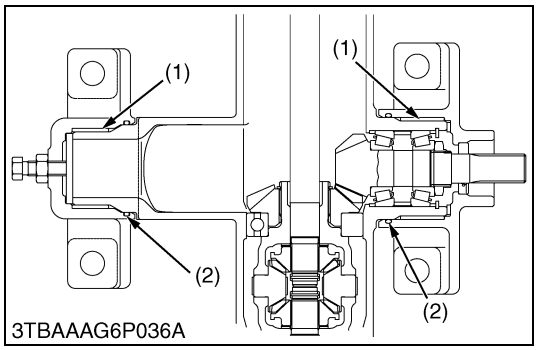

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Clearance between Front Axle Case Bosses and Bracket Bushing

1. Measure the front axle case bosses O.D. with an outside micrometer.
2. Measure the bracket Bushing I.D. with a cylinder gauge, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bracket bushing.
4. If the clearance still exceeds the allowable limit, replace the front axle case.

Clearance between front axle case boss (front) and bracket bushing (front)	Factory spec.	0.125 to 0.280 mm 0.0049 to 0.0110 in.
	Allowable limit	0.45 mm 0.018 in.

Front axle case boss (front) O.D.	Factory spec.	49.950 to 49.975 mm 1.9665 to 1.9675 in.
Bracket bushing (front) I.D.	Factory spec.	50.10 to 50.23 mm 1.9722 to 1.9774 in.

Clearance between front axle case boss (rear) and bracket bushing (rear)	Factory spec.	0.090 to 0.250 mm 0.0035 to 0.0098 in.
	Allowable limit	0.45 mm 0.018 in.

Front axle case boss (rear) O.D.	Factory spec.	64.94 to 64.97 mm 2.5567 to 2.5579 in.
Bracket bushing (rear) I.D.	Factory spec.	65.06 to 65.19 mm 2.5614 to 2.5665 in.

■ **Press-fitting Bushing**

- When replacing the bushings (1), press-fit it until bushing contact to inside of front axle case.
- Apply grease to the O-rings (2) and take care not to damage it.

■ **NOTE**

- **After replacing the bushing, be sure to adjust the front axle locking force. (See page 5S-4).**

(1) Bushing (2) O-ring

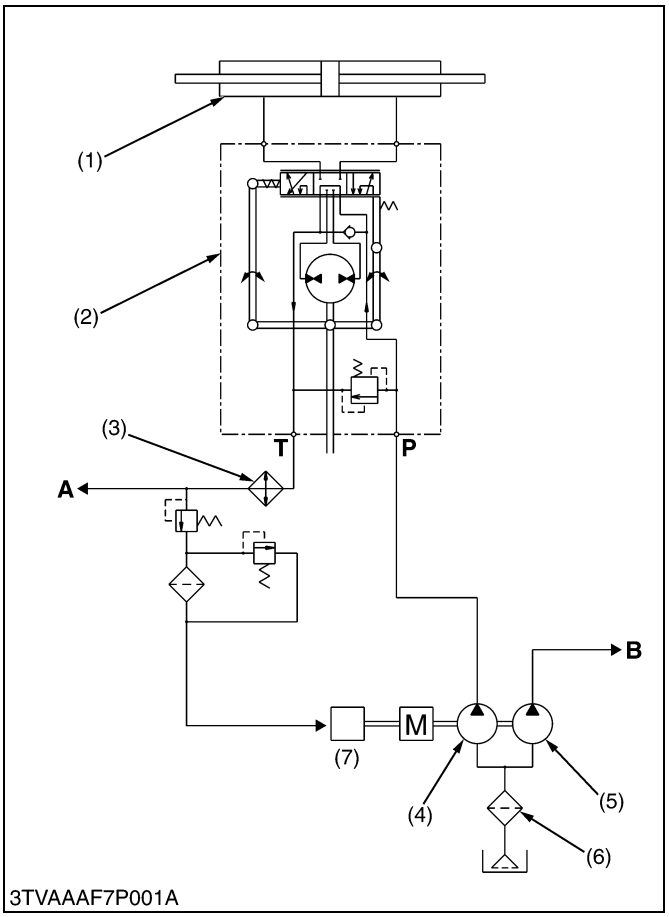
W1020752

6 STEERING

MECHANISM

CONTENTS

1. HYDRAULIC CIRCUIT



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The model is provided with a full hydrostatic power steering.

In the hydrostatic power steering, the steering controller is connected to the steering cylinder with only the hydraulic piping. 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 oil filter cartridge (6), hydraulic pump (4), steering controller (2), steering cylinder (1), etc..

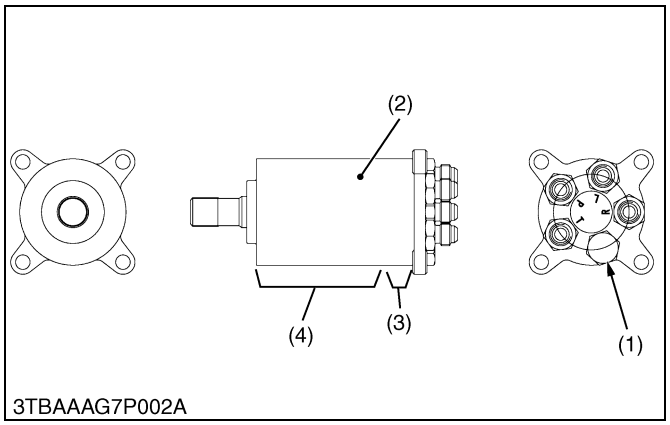
By operating the power steering controller, the required amount of oil is fed to the steering cylinder (1).

(1) Power Steering Cylinder
(2) Power Steering Controller
(3) Oil Cooler
(4) Hydraulic Pump (for Power Steering, Independent PTO and HST)
(5) Hydraulic Pump (for 3-Points Hitch)
(6) Oil Filter Cartridge
(7) HST

A : Independent PTO Control Valve
B : To 3-Points Hitch

W1012645

2. STEERING CONTROLLER



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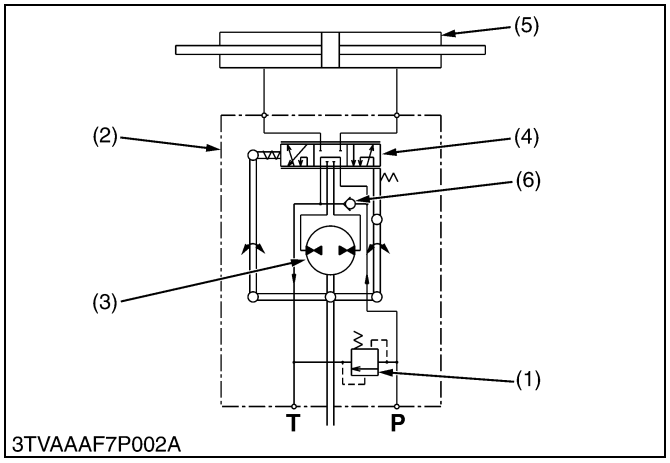

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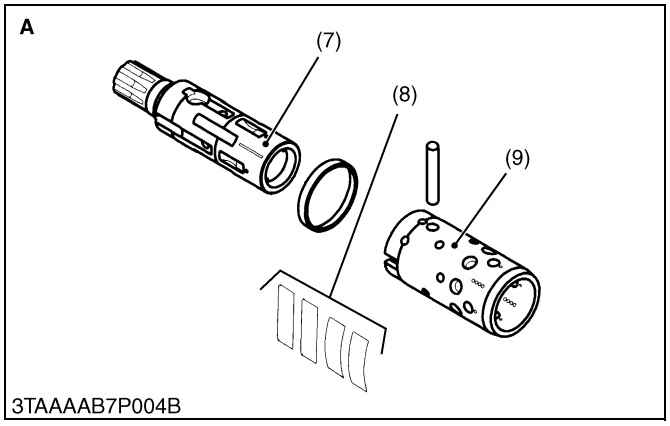

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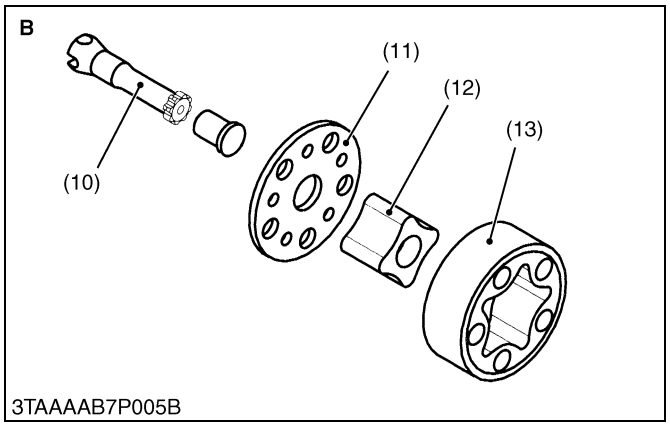

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The steering controller consists of a control valve (4) and a metering device (3).

■ **Control Valve**

The control valve is a rotating spool type. When the steering wheel is not turned, the position of the spool (7) and sleeve (9) is kept neutral by the centering spring (8). This causes the forming of a "**Neutral**" oil circuit. When the steering wheel is turned either clockwise or counterclockwise, the position of the spool and sleeve changes in relation to the centering spring. This allows the forming of a "**Right Turning**" or "**Left Turning**" oil circuit. At the same time, the gear pump (Metering device) rotates with the spool and sends the oil to the cylinder corresponding to the rotation of the steering wheel.

■ **Metering Device**

An oil, sent from the hydraulic pump to the steering cylinder, passes through the metering device (3). Namely, when the rotor is driven, two chambers suck in oil due to volumetric change in the pump chambers formed between the rotor (12) and the stator (13), while oil is discharged from other two chambers. On the other hand, rotation of the steering wheel is directly transmitted to the rotor through the spool (7), drive shaft (10), etc. Accordingly, the metering device serves to supply the steering cylinder with oil, amount of which corresponds to the rotation of the steering wheel. The wheels are thus turned by the angle corresponding to the rotation of the steering wheel. When the engine stops or the hydraulic pump malfunctions, the metering device functions as a manual trochoid pump, which makes manual steering possible.

■ **Relief Valve**

The relief valve (1) is located in the steering controller. It controls the maximum pressure of the power steering system.

Its setting pressure is as follows.

11.9 to 12.8 MPa

121 to 131 kgf/cm^2

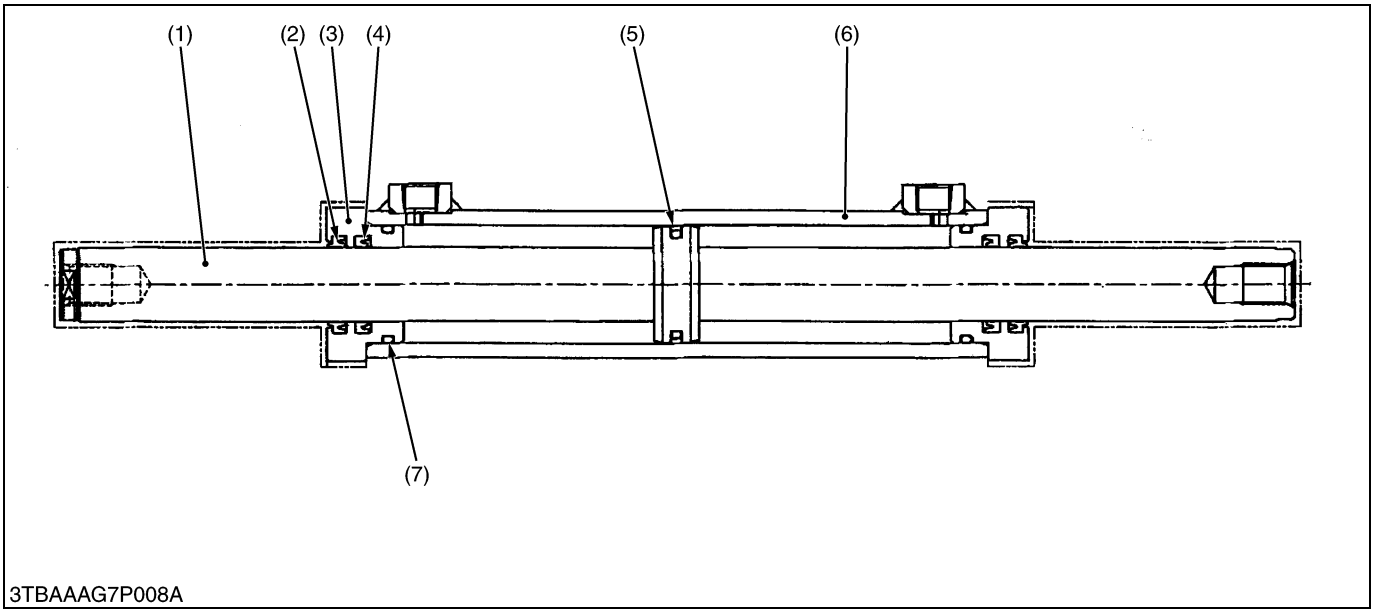
1730 to 1860 psi

(1) Relief Valve
(2) Steering Controller
(3) Metering Device
(4) Control Valve
(5) Steering Cylinder
(6) Check Valve
(7) Spool
(8) Centering Spring
(9) Sleeve
(10) Drive Shaft
(11) Distributor Plate
(12) Rotor
(13) Stator

A : Control Valve
B : Metering Device
P : P Port (from Hydraulic Pump)
T : T Port (to Independent PTO Clutch Valve and HST Circuit)

W1012996

3. STEERING CYLINDER



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(1) Rod
(2) Dust Seal
(3) Rod Cover
(4) U gasket
(5) Piston Seal
(6) Cylinder Tube
(7) O-ring

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.

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Cannot Be Steered	Steering controller malfunctioning	Replace	6-S6
	Pipe broken	Replace	6-S6
Hard Steering	Power steering oil improper	Change with specified oil	G-8, 15
	Hydraulic pump malfunctioning	Replace	7-S11
	Steering controller malfunctioning	Replace	6-S6
	Oil leak from pipe joint	Retighten pipe joint	6-S6
	Improper relief valve pressure	Check and replace	6-S4
	Relief valve malfunctioning	Replace power steering controller	6-S6
	Air in the hydraulic pipes	Bleed air	6-S4
Steering Force Fluctuates	Steering controller malfunctioning	Replace	6-S6
	Air sucked in pump due to lack of oil	Replenish	G-16
	Air sucked in pump from suction circuit	Repair	–
Steering Wheel Turns Spontaneously When Released	Steering controller malfunctioning	Replace	6-S6
Rear Wheels Wander to Right and Left	Steering controller malfunctioning	Replace	6-S6
	Air sucked in pump due to lack of oil	Replenish	G-16
	Air sucked in pump from suction circuit	Repair	–
	Insufficient bleeding	Bleed air	6-S4
	Cylinder malfunctioning	Repair or replace	6-S8
	Improper toe-in adjustment	Adjust	5-S4
	Tire pressure uneven	Inflate	G-47
Wheels Are Turned to a Direction Opposite to Steering Direction	Cylinder piping connected in reverse	Repair	6-S4
Steering Wheel Turns Idle in Manual Steering	Insufficient bleeding	Bleed air	6-S4
	Air sucked in due to lack of oil	Replenish	G-16
Noise	Air sucked in pump due to lack of oil	Replenish	G-16
	Air sucked in pump from suction circuit	Repair	–
	Pipe deformed	Replace	6-S6
Oil Temperature Increases Rapidly	Steering controller (relief valve) malfunctioning	Replace	6-S7

W1014322

2. SERVICING SPECIFICATIONS

POWER STEERING BODY

Item		Factory Specification	Allowable Limit
Relief Valve	Setting Pressure	11.9 to 12.8 MPa 121 to 131 kgf/cm^2 1730 to 1860 psi	–

W1013874

POWER STEERING CYLINDER

Steering Cylinder	I.D.	40.000 to 40.062 mm 1.57480 to 1.57724 in.	40.100 mm 1.57874 in.
Piston Rod to Guide	Clearance	0.020 to 0.070 mm 0.00079 to 0.00276 in.	0.200 mm 0.00787 in.

W1013973

3. TIGHTENING TORQUES

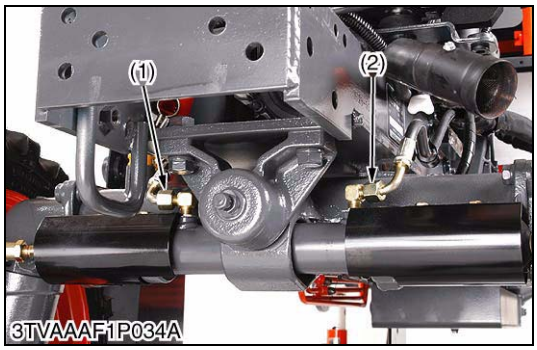
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10)

Item	N·m	kgf·m	lbf·ft
Power steering hose retaining nut	25 to 28	2.5 to 2.9	18 to 20
Steering wheel mounting nut	30 to 49	3.0 to 5.0	22 to 36
Power steering controller hose retaining nut	25 to 28	2.5 to 2.9	18 to 20
Tie-rod slotted nut	18 to 34	1.8 to 3.5	13 to 25
Tie-rod joint	74 to 84	7.5 to 8.6	55 to 62

W1012736

4. CHECKING

[1] RELIEF VALVE



Relief Valve Operating Pressure

1. Disconnect the power steering hose LH (or RH) from steering the power steering cylinder, and set a pressure gauge and cable.

(Reference)

- Hose and adaptor size : 9/16-18UNF, 37 ° flare.

2. Start the engine and set at maximum speed (3000 min^{-1} (rpm)).
3. Fully turn the steering wheel to the left (or right) to check the feeling which the steering wheel lightly locks. Read the relief valve operating pressure when the steering wheel to the above-mentioned lock position by operation force at approximately 9.8 N (1.0 kgf, 2.2 lbf) of outer.

■ **NOTE**

- **After set a pressure gauge, be sure to bleed air.**
- **Note that the pressure value changes by the pump action of the power steering controller when the steering operation is continued after the steering wheel is lightly locked and accurate relief valve pressure cannot be measured.**

(Bleeding air in power steering circuit)

- Start the engine.
- Turn the steering wheel slowly in both directions all the way alternately several times, and stop the engine.

Relief valve operating pressure	Factory spec.	11.9 to 12.8 MPa 121 to 131 kgf/cm^2 1730 to 1860 psi

Tightening torque	Power steering hose retaining nut	25 to 28 N·m 2.5 to 2.9 kgf·m 18 to 20 lbf·ft

(1) Power Steering Hose (RH)
(2) Power Steering cylinder
(3) Power Steering Hose (LH)

W1011368

5. DISASSEMBLING AND ASSEMBLING

[1] SEPARATING POWER STEERING CONTROLLER

Steering Wheel and Meter Panel

1. Remove the steering wheel cap (2).
2. Remove the steering wheel (1) with a steering wheel puller (Code No. 07916-51090).
3. Remove the meter panel (3).
4. Disconnect the hourmeter cable (4).
5. Disconnect the coupler (5).

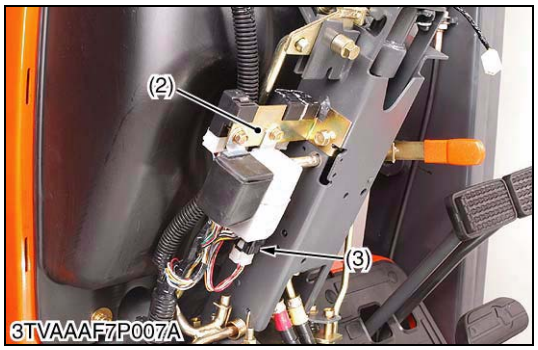
(When reassembling)

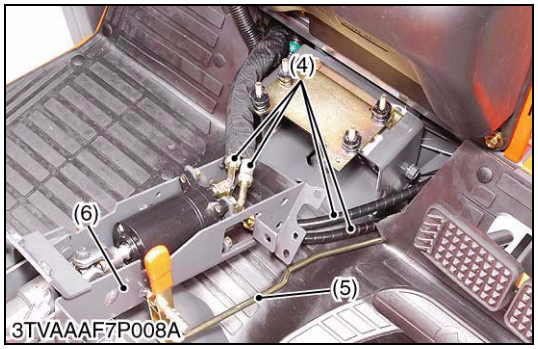
- Tighten the steering wheel mounting nut securely.

Tightening torque	Steering wheel mounting nut	30 to 49 N·m 3.0 to 5.0 kgf·m 22 to 36 lbf·ft

(1) Steering Wheel
(2) Cap
(3) Meter Panel
(4) Hourmeter Panel
(5) Coupler

W1013840





Under Cover and Steering Post

1. Remove the under cover (2).
2. Remove the wireharness bracket (2) with wireharness.
3. Remove the relay (3) bolt.
4. Dismount the steering post assembly (6).
5. Disconnect the power steering hoses (4).
6. Remove the parking brake rod (5).

(When reassembling)

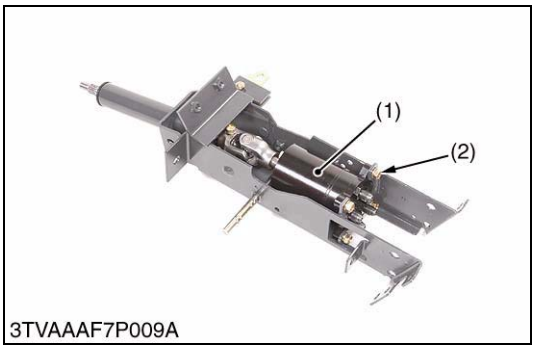
- Connect the power steering hoses (4) to the power steering controller securely.

Tightening torque	Power steering controller hose retaining nut	25 to 28 N·m 2.5 to 2.9 kgf·m 18 to 20 lbf·ft

(1) Under Cover
(2) Wireharness Bracket
(3) Relay
(4) Power Steering Hose
(5) Parking Brake Rod
(6) Steering Post

W1013752

[2] POWER STEERING CONTROLLER



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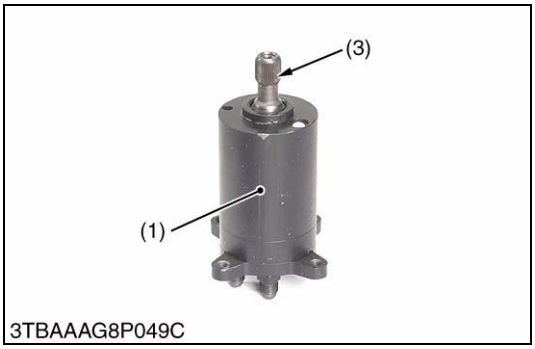

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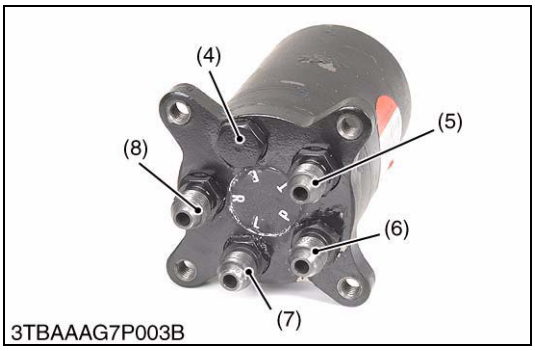

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Power Steering Controller

1. Remove the steering controller mounting bolts (2) from the steering post.
2. Remove the bolt from the universal joint.
3. Remove the power steering controller (1) from the steering post.

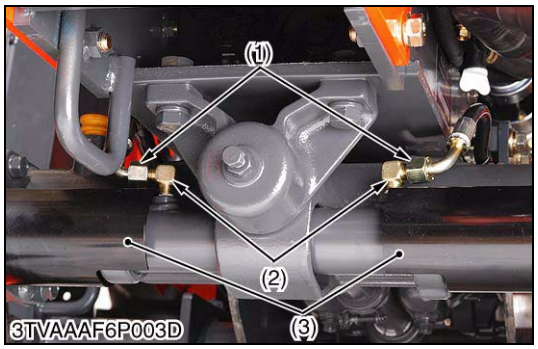
(When reassembling)

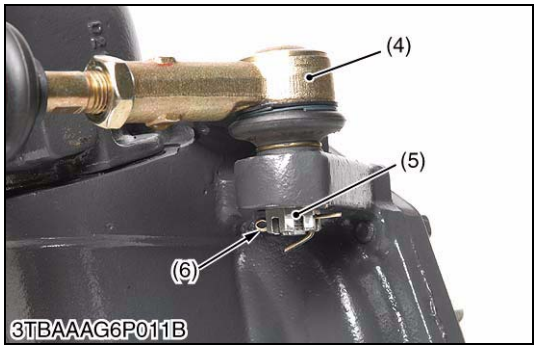
- If oil leaking from the power steering controller (1) is found, replace the power steering controller (1). O-ring in the power steering controller (1) is not supplied as a spare part.
- Align the power steering controller shaft (3) to the universal joint securely.

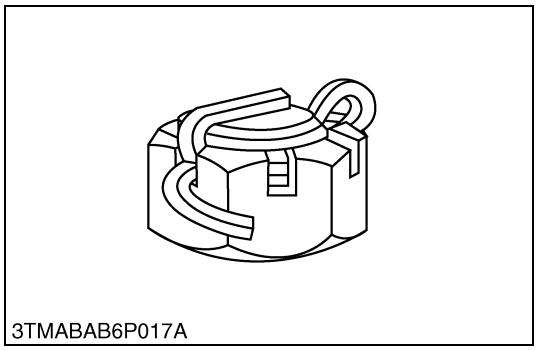
(1) Power Steering Controller
(2) Power Steering Mounting Bolt
(3) Steering Shaft
(4) Relief Valve
(5) Adaptor (to Oil Cooler)
(6) Adaptor (to Hydraulic Pump)
(7) Adaptor (to Left Cylinder)
(8) Adaptor (to Right Cylinder)

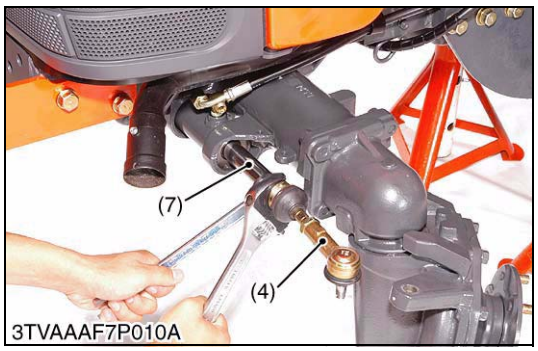
W1014193

[3] POWER STEERING CYLINDER









Tie-rod Joint

1. Remove the cylinder cover (3).
2. Remove the front wheels.
3. Disconnect the power steering hoses (1).
4. Remove the slotted nut (5) and remove the tie-rod joint LH (4).
5. Remove the tie-rod joint LH (4) from the rod (7).

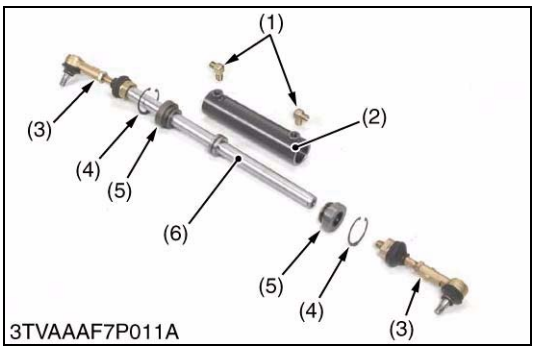
(When reassembling)

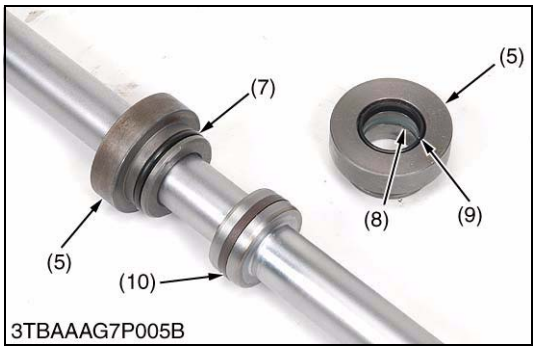
- After tightening the tie-rod end nut to the specified torque, install a cotter pin as shown in the figure left.
- After liquid lock (Three Bond 1375N or equivalent) to the tie-rod joint LH (4).

Tightening torque	Power steering hose retaining nut	25 to 28 N·m 2.5 to 2.9 kgf·m 18 to 20 lbf·ft
	Tie-rod slotted nut	18 to 34 N·m 1.8 to 3.5 kgf·m 13 to 25 lbf·ft
	Tie-rod joint	74 to 84 N·m 7.5 to 8.6 kgf·m 55 to 62 lbf·ft

(1) Power Steering Hose
(2) Adaptor
(3) Cylinder Cover
(4) Tie-rod Joint LH
(5) Slotted Nut
(6) Cotter Pin
(7) Rod

W1015113





Power Steering Cylinder

1. Remove the adaptors (1).
2. Remove the power steering cylinder to the left side.
3. Remove the rod cover (5).

(When reassembling)

- Apply the lock tight (Three Bond 1375N or equivalent) to the tie-rod joint (3).

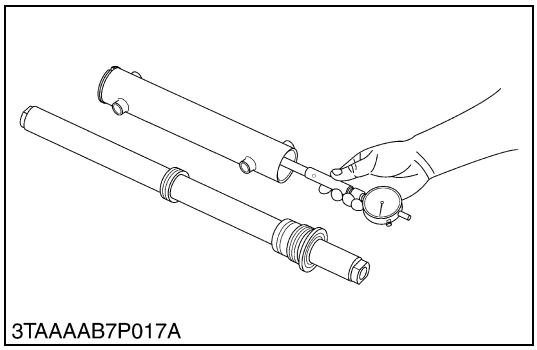
Tightening torque	Tie-rod joint	74 to 84 N·m 7.5 to 8.6 kgf·m 55 to 62 lbf·ft

(1) Adaptor
(2) Tube
(3) Tie-rod Joint
(4) Internal Cir-clip
(5) Rod Cover
(6) Rod
(7) O-ring
(8) U Gasket
(9) Dust Seal
(10) Piston Seal

W1015562

6. SERVICING

[1] POWER STEERING CYLINDER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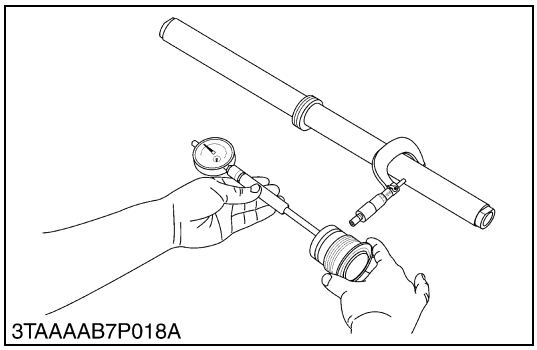
Steering Cylinder I.D.

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

Steering cylinder I.D.	Factory spec.	40.000 to 40.062 mm 1.57480 to 1.57724 in.
	Allowable limit	40.100 mm 1.57874 in.

W1011546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Clearance between Rod and Guide

1. Measure the rod guide 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 guide	Factory spec.	0.020 to 0.070 mm 0.00079 to 0.00276 in.
	Allowable limit	0.200 mm 0.00787 in.

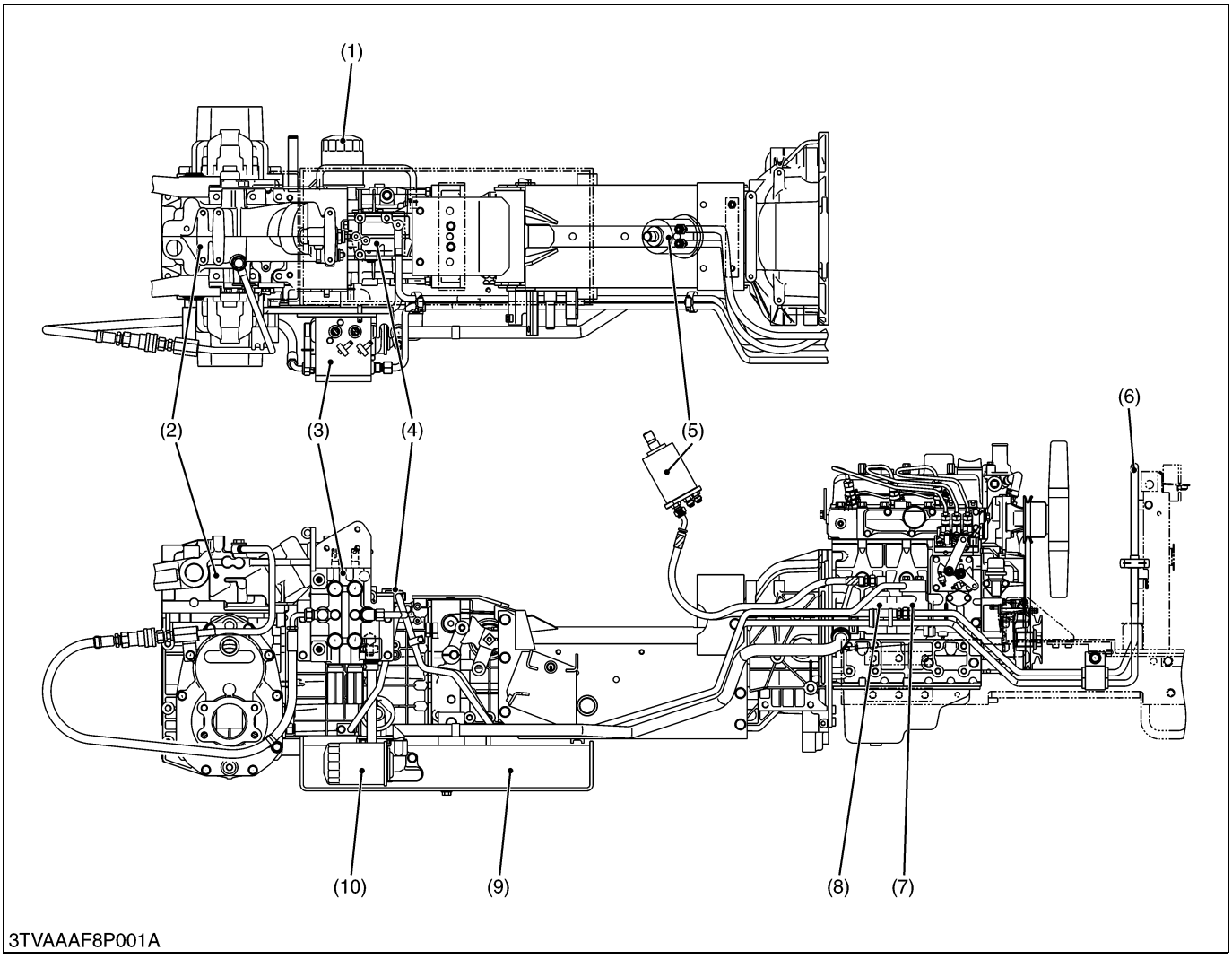
W1016514

7 HYDRAULIC SYSTEM

MECHANISM

CONTENTS

1. STRUCTURE



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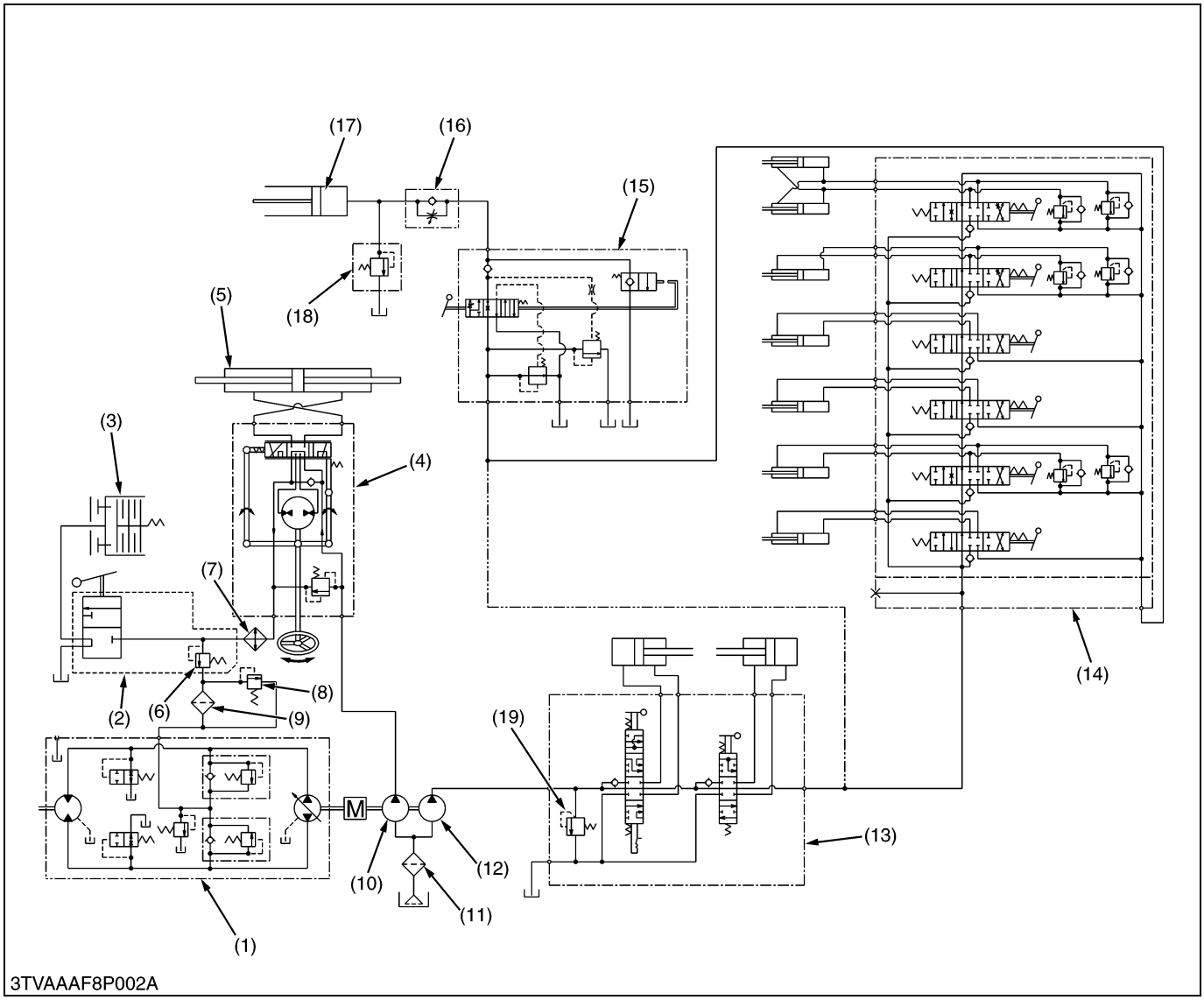
(1) HST Filter Cartridge
(2) Hydraulic Cylinder Block
(3) Front Loader Control Valve
(4) Independent PTO Control Valve
(5) Power Steering Controller
(6) Oil Cooler
(7) Hydraulic Pump (for Front Loader, Backhoe and 3-point Hitch)
(8) Hydraulic Pump (for Power Steering, Independent PTO and HST)
(9) Oil Tank
(10) Oil Filter Cartridge

2. HYDRAULIC CIRCUIT



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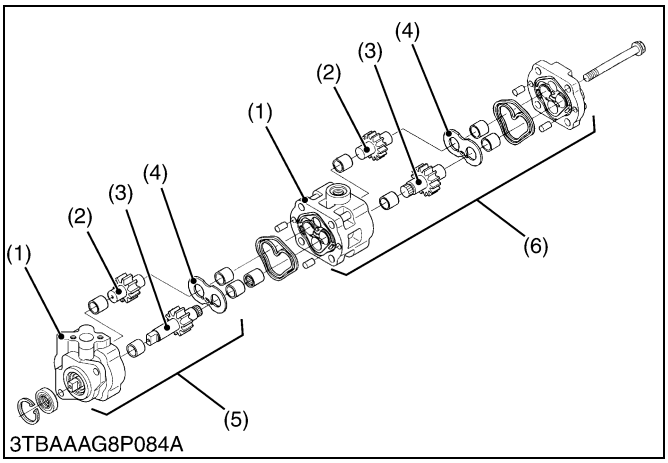
(1) Hydrostatic Transmission (HST)
(2) Independent PTO Control Valve
(3) Independent PTO Clutch
(4) Power Steering Controller
(5) Power Steering Cylinder
(6) Relief Valve
(7) Oil Cooler
(8) Relief Valve
(9) Oil Filter Cartridge
(10) Hydraulic Pump (for Power Steering, Independent PTO and HST)
(11) Oil Filter
(12) Hydraulic Pump (for Front Loader, Backhoe and 3-point Hitch)
(13) Front Loader Control Valve
(14) Backhoe Control Valve
(15) Position Control Valve (for 3-point Hitch)
(16) Lowering Speed Adjusting Valve
(17) Hydraulic Cylinder
(18) Safety Valve
(19) Main Relief Valve

The hydraulic system are composed of hydraulic pumps (10) (12), power steering (4), independent PTO (2), HST (1), and 3-points hitch, front loader, backhoe and other components.

3. HYDRAULIC PUMP



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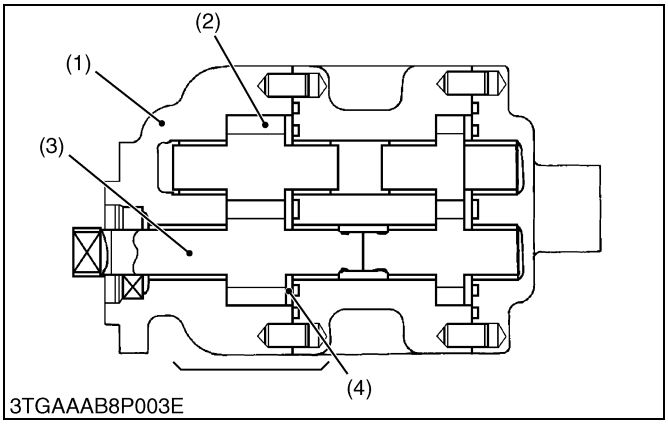

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The hydraulic pump is composed of the casing (1), side plate (4), and two spur gears (drive gear (3) and driven gear (2)) that are in mesh.

Hydraulic pump is driven by the fuel camshaft.

Maximum displacement is as follows.

Hydraulic Pump
(for 3-points Hitch, Front Loader and Backhoe)

	Displacement	Engine speed	Condition
Factory spec.	Above 27.1 L/min. 7.16 U.S.gals/min. 5.96 Imp.gals/min.	At 2800 min^{-1} (rpm)	at no load

Hydraulic Pump (for Power Steering, PTO and HST)

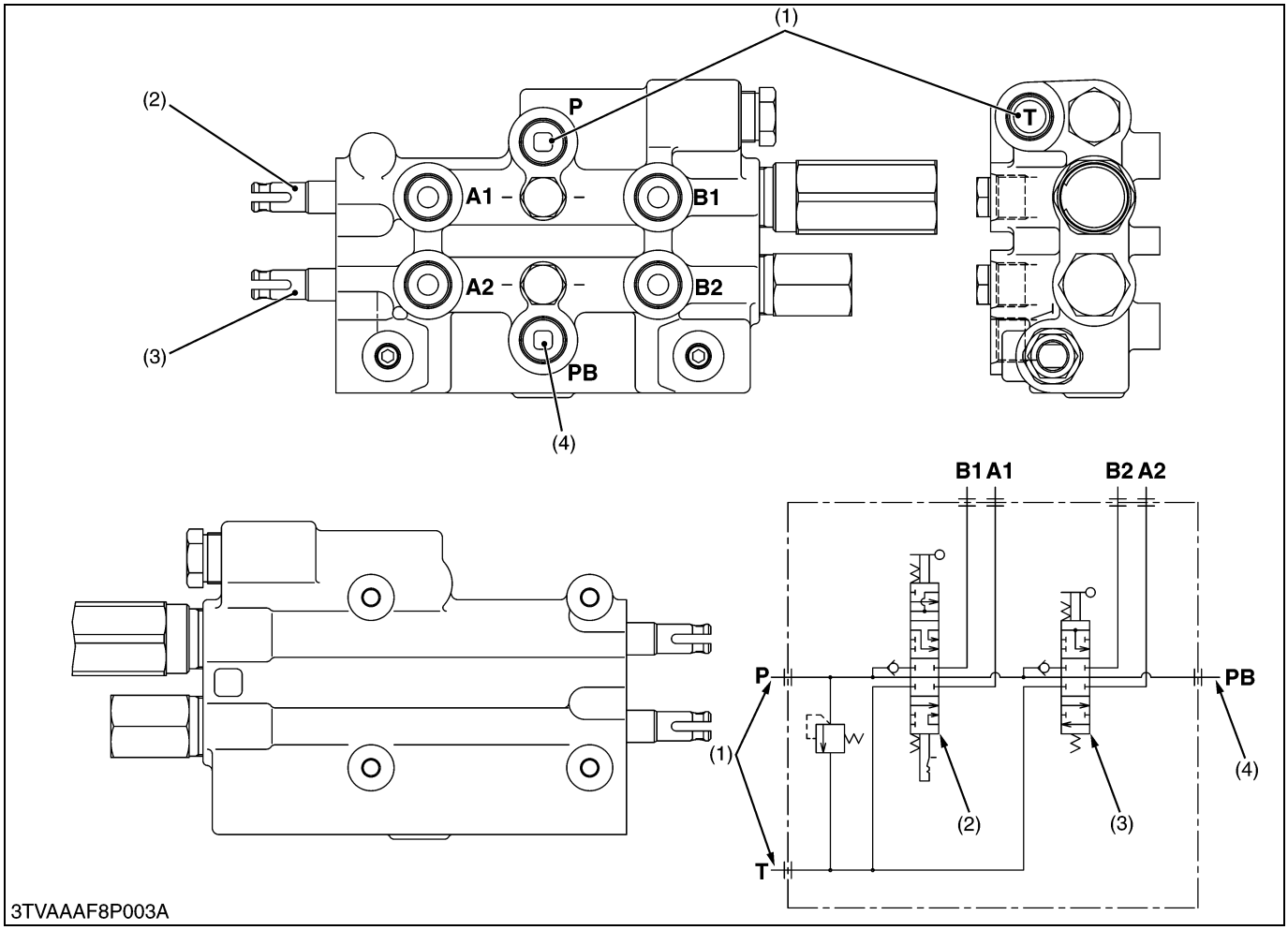
	Displacement	Engine speed	Condition
Factory spec.	Above 16.5 L/min. 4.36 U.S.gals/min. 3.63 Imp.gals/min.	At 2800 min^{-1} (rpm)	at no load

(1) Casing
(2) Driven Gear
(3) Drive Gear
(4) Side Plate
(5) Hydraulic Pump (for 3-Points Hitch, Front Loader and Backhoe)
(6) Hydraulic Pump (for Power Steering, PTO and HST)

W1013860

4. FRONT LOADER CONTROL VALVE

[1] STRUCTURE



(1) Inlet and Outlet Section
(2) Boom Control Valve
(3) Bucket Control Valve
(4) Power Beyond

P : P Port **T : T Port** **A1 : A1 Port** **A2 : A2 Port** **B1 : B1 Port** **B2 : B2 Port** **PB : PB Port**

The control valve assembly is composed of one casting block and four major section as shown above.

(1) Inlet and Outlet Section

This section has **P** and **T** ports.

The **P** port is connected to the **OUTLET** port of hydraulic block by the hydraulic pipe.

The **T** port is connected to the **TANK** port of hydraulic block by the hydraulic hose.

(2) Boom Control Section

The boom control valve is of 4-position, 6-connection, detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A1** and **B1** ports and controls oil flow to the boom cylinder.

(3) Bucket Control Section

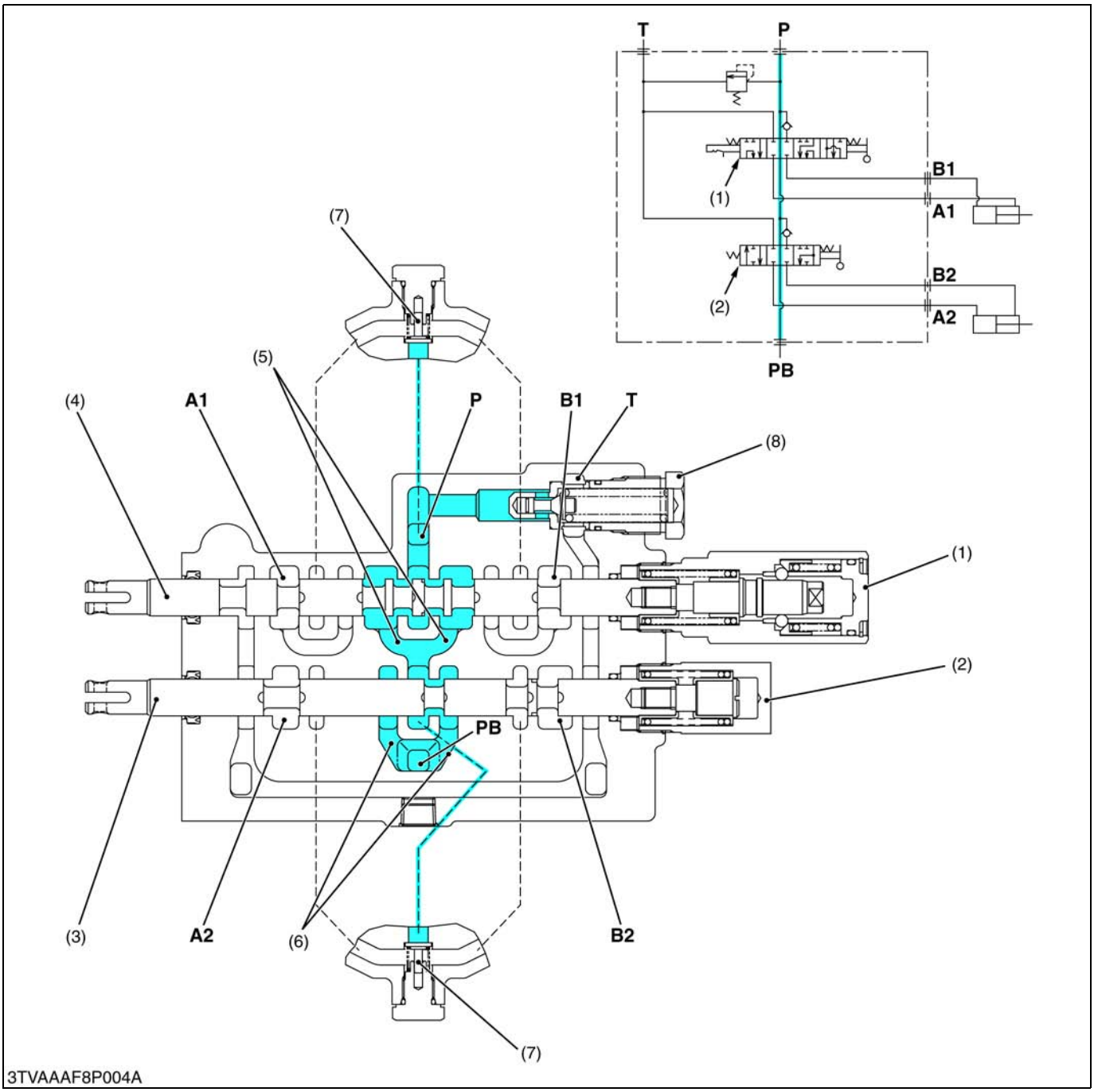
The bucket control valve is of 4-position, 6-connection, no detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A2** and **B2** ports and controls oil flow to the bucket cylinder.

(4) Power Beyond

This section has **PB** port which is connected to the **INLET** port of hydraulic block by the hydraulic hose, and feeds oil to the three point hydraulic control valve.

[2] OPERATION

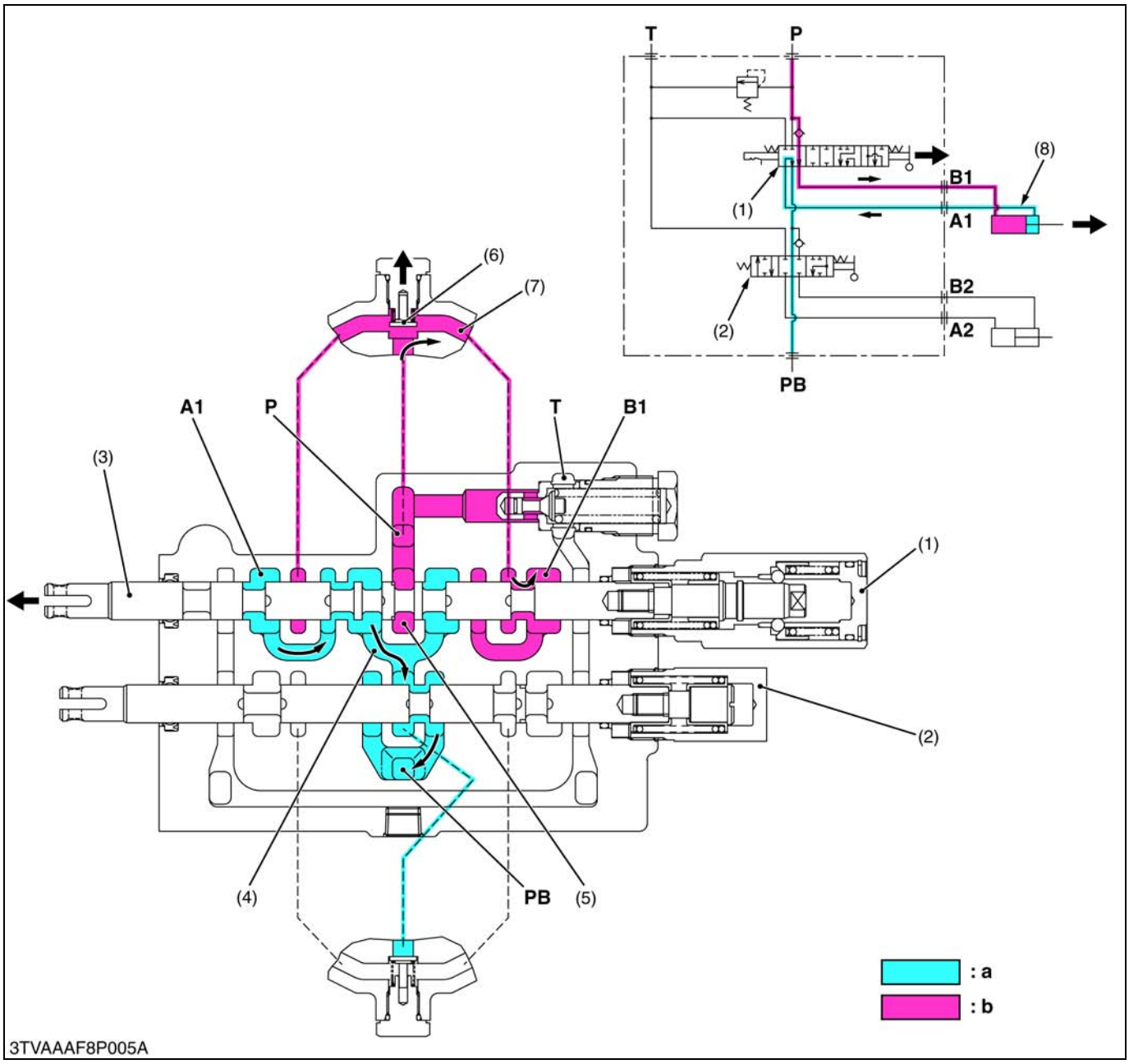
■ Neutral



(1) Boom Control Section
(2) Bucket Control Section
(3) Spool
(4) Spool
(5) **PB** Passage 1
(6) **PB** Passage 2
(7) Load Check Valve
(8) Relief Valve

T : T Port
P : P Port
A1 : A1 Port
A2 : A2 Port
B1 : B1 Port
B2 : B2 Port
PB : PB Port

■ Up



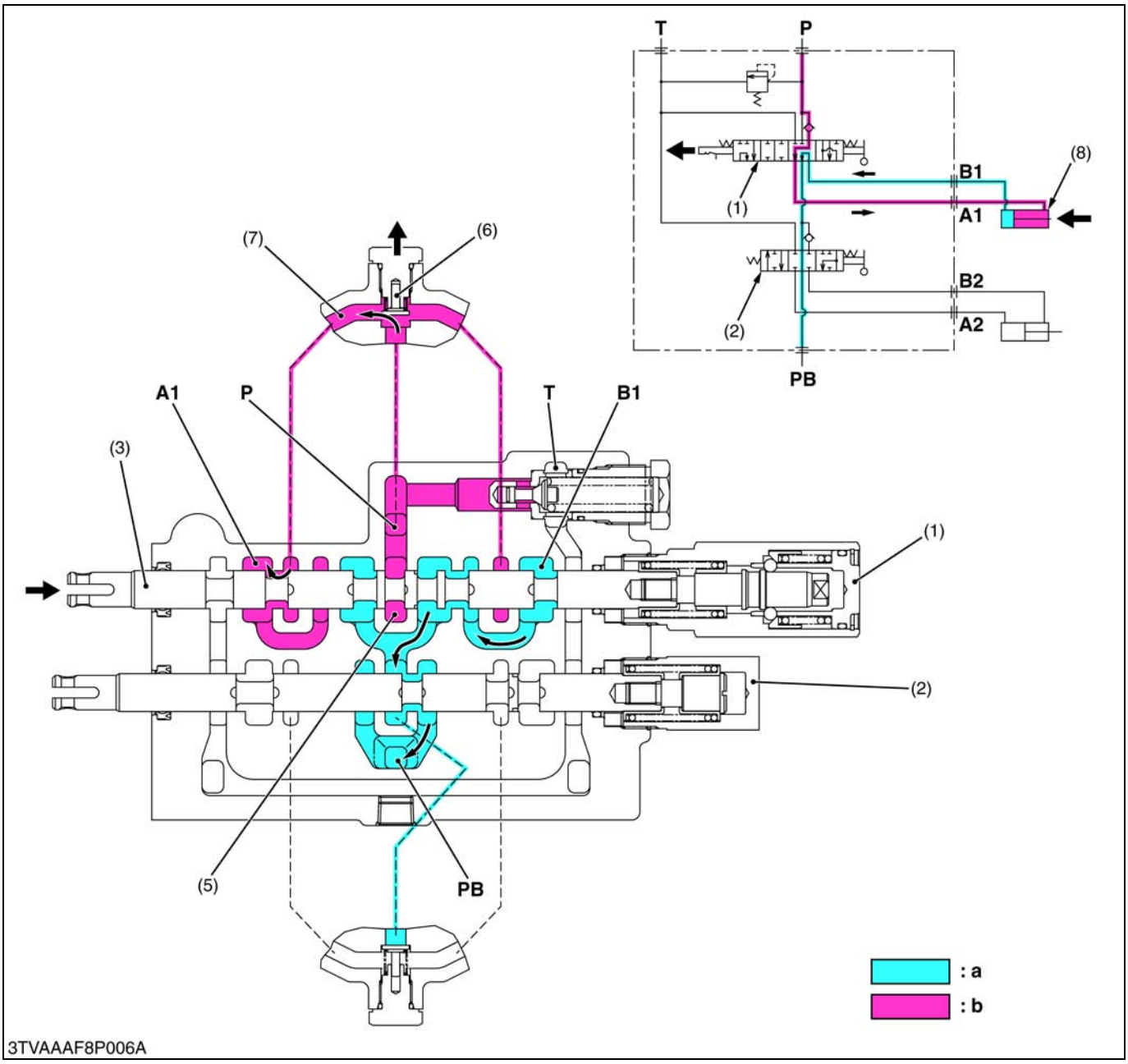
(1) Boom Control Section
(2) Bucket Control Section
(3) Spool
(4) **PB** Passage 1
(5) Neutral Passage 1
(6) Load Check Valve
(7) Passage 1
(8) Boom Cylinder

P : P Port
T : T Port

A1 : A1 Port (From Boom Cylinder)
B1 : B1 Port (To Boom Cylinder)
PB : PB Port
a : Low Pressure
b : High Pressure

1. When the hydraulic control lever is set to the **"UP"** position, the spool (3) of the boom control section (1) moves to the left, which forms oil passages between passage 1 (7) and **B1** port, and between **A1** port and **PB** passage 1 (4).
2. As the oil passage from the neutral passage 1 (5) to the **PB** passage 1 (4) is closed by the spool (3), the pressure-fed oil from the **P** port opens the load check valve (6) and flows through the notched section of the spool (3) and **B1** port to extend the boom cylinder (8).
3. Return oil from the boom cylinder (8) flows from the **A1** port through the passage in the spool (3) and **PB** passage 1 (4) to the bucket control section (2).

■ Down



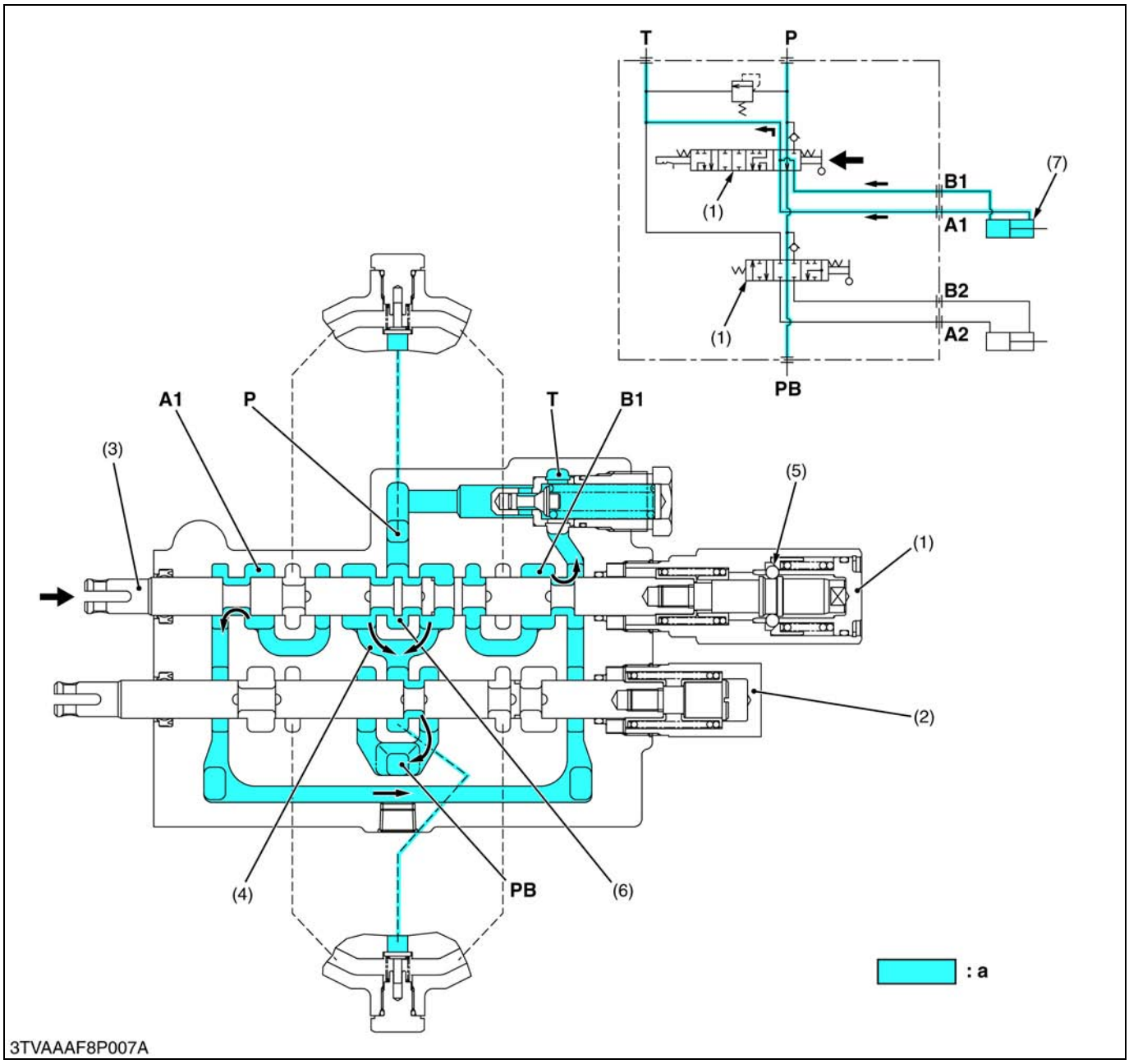
(1) Boom Control Section
(2) Bucket Control Section
(3) Spool
(4) **PB** Passage 1
(5) Neutral Passage 1
(6) Load Check Valve
(7) Passage 1
(8) Boom Cylinder

P : P Port
T : T Port

A1 : A1 Port (To Boom Cylinder)
B1 : B1 Port (From Boom Cylinder)
PB : PB Port
a : Low Pressure
b : High Pressure

1. When the hydraulic control lever is set to the **"DOWN"** position, the spool (3) moves to the right, which forms oil passages between passage 1 (7) and **A1** port, and between **B1** port and **PB** passage 1 (4).
2. As the oil passage from the neutral passage 1 (5) to the **PB** passage 1 (4) is closed by the spool (3), the pressure-fed oil from the **P** port opens the load check valve (6) and flows through the notched section of the spool (3) and **A1** port to retract the boom cylinder (8).
3. Return oil from the boom cylinder (8) flows from the **B1** port through the passage in the spool (3) and **PB** passage 1 (4) to the bucket control section (2).

■ Floating



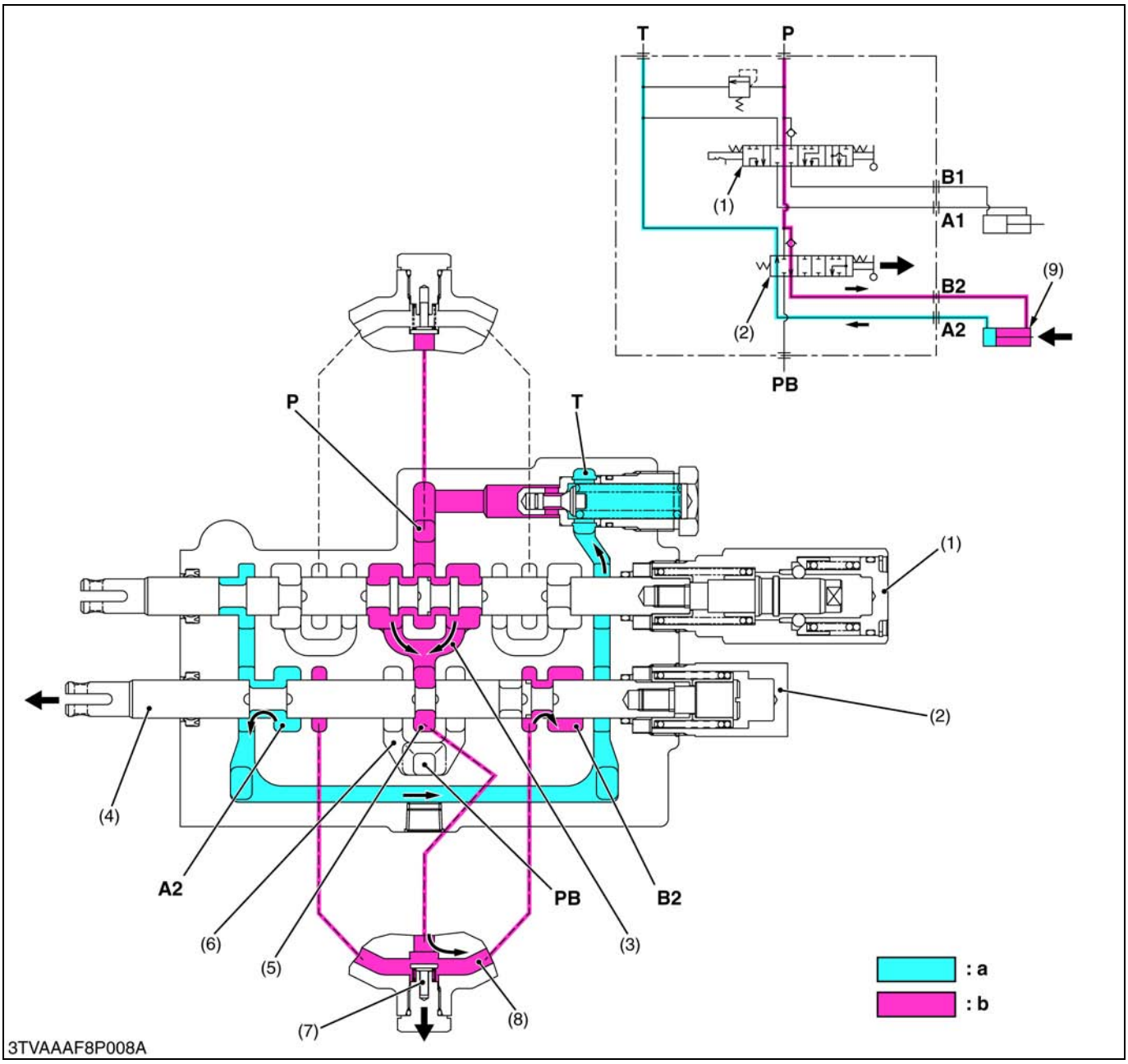
(1) Boom Control Section
(2) Bucket Control Section
(3) Spool
(4) **PB** Passage 1
(5) Detent Mechanism
(6) Neutral Passage 1
(7) Boom Cylinder

P : P Port
T : T Port

A1 : A1 Port
B1 : B1 Port
PB : PB Port
a : Low Pressure

1. When the hydraulic control lever is set to the **"FLOAT"** position, the spool (3) moves further to the right from the **"DOWN"** position and is retained by the detent mechanism (5).
2. This forms oil passages among the **A1** port, **B1** port and **T** port. As a result, oil in the boom cylinder (7) flows freely from the **A1** port and **B1** port through the **T** port to the transmission case.
3. Oil entering the **P** port flows to the bucket control section (2) through the neutral passage 1 (6) and **PB** passage 1 (4).

■ Roll-back

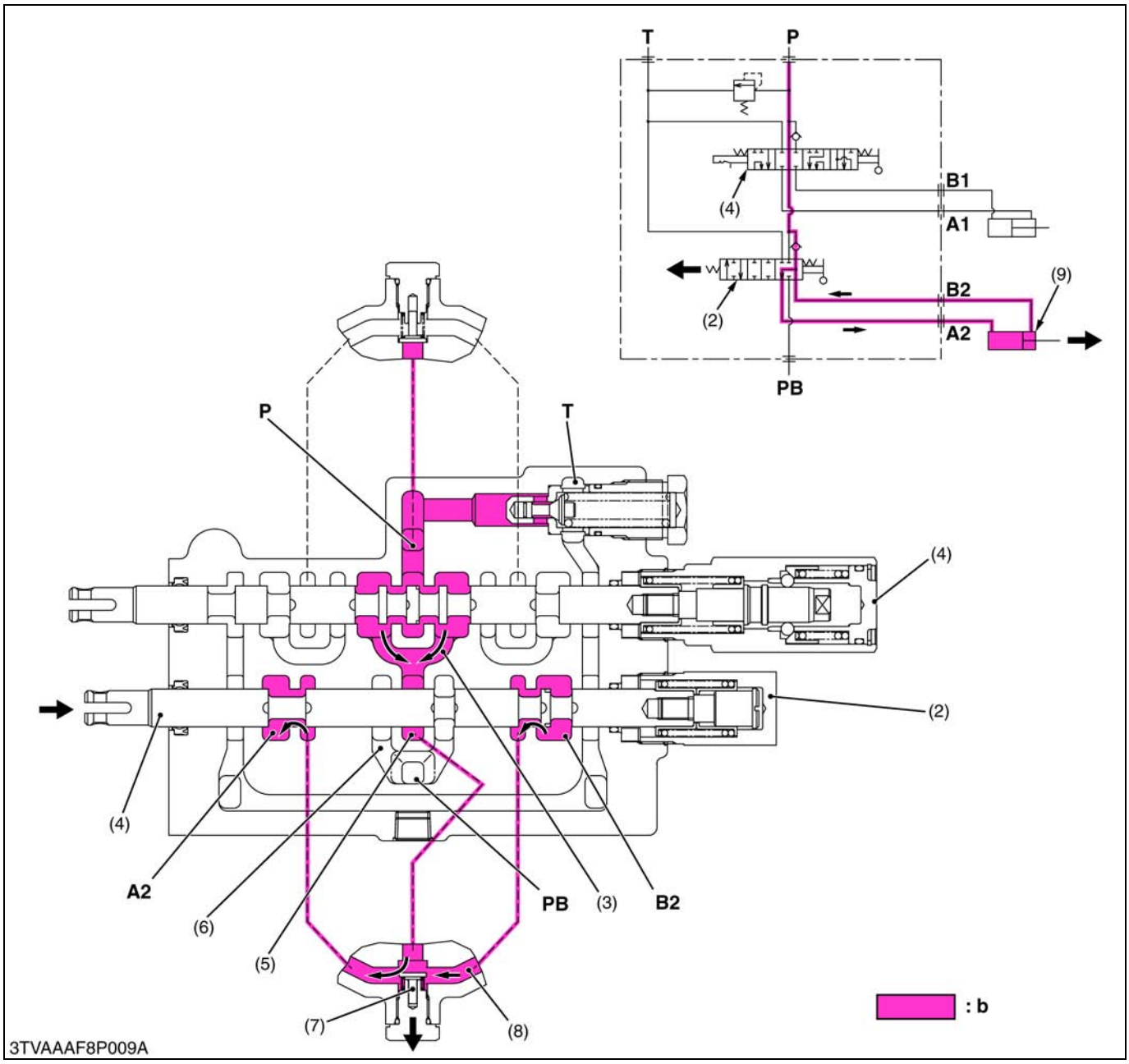


(1) Boom Control Section
(2) Bucket Control Section
(3) **PB** Passage 1
(4) Spool
(5) Neutral Passage 2
(6) **PB** Passage 2
(7) Load Check Valve
(8) Passage 2
(9) Bucket Cylinder

P : P Port
T : T Port
PB : PB Port
A2 : A2 Port (From Bucket Cylinder)
B2 : B2 Port (To Bucket Cylinder)
a : Low Pressure
b : High Pressure

1. When the hydraulic control lever is set to the **"ROLL-BACK"** position, the spool (4) of the bucket control section (2) moves to the left, which forms oil passages between passage 2 (8) and **B2** port, and between **A2** port and **T** port.
2. The pressure-fed oil from the **P** port flows to the neutral passage 2 (5) through the boom control section (1) and **PB** passage 1 (3). As the oil passage from the neutral passage 2 (5) to the **PB** passage 2 (6) is closed by the spool (4), this oil opens the load check valve (7), and flows through the notched section of the spool (4) and **B2** port to retract the bucket cylinder (9).
3. Return oil from the bucket cylinder (9) flows to the transmission case through the **A2** port and **T** port.

■ Dump



(1) Boom Control Section
(2) Bucket Control Section
(3) **PB** Passage 1
(4) Spool
(5) Neutral Passage 2
(6) **PB** Passage 2
(7) Load Check Valve
(8) Passage 2
(9) Bucket Cylinder

P : P Port
T : T Port
PB :PB Port

A2 : A2 Port (To Bucket Cylinder)
B2 : B2 Port (From Bucket Cylinder)
b : High Pressure

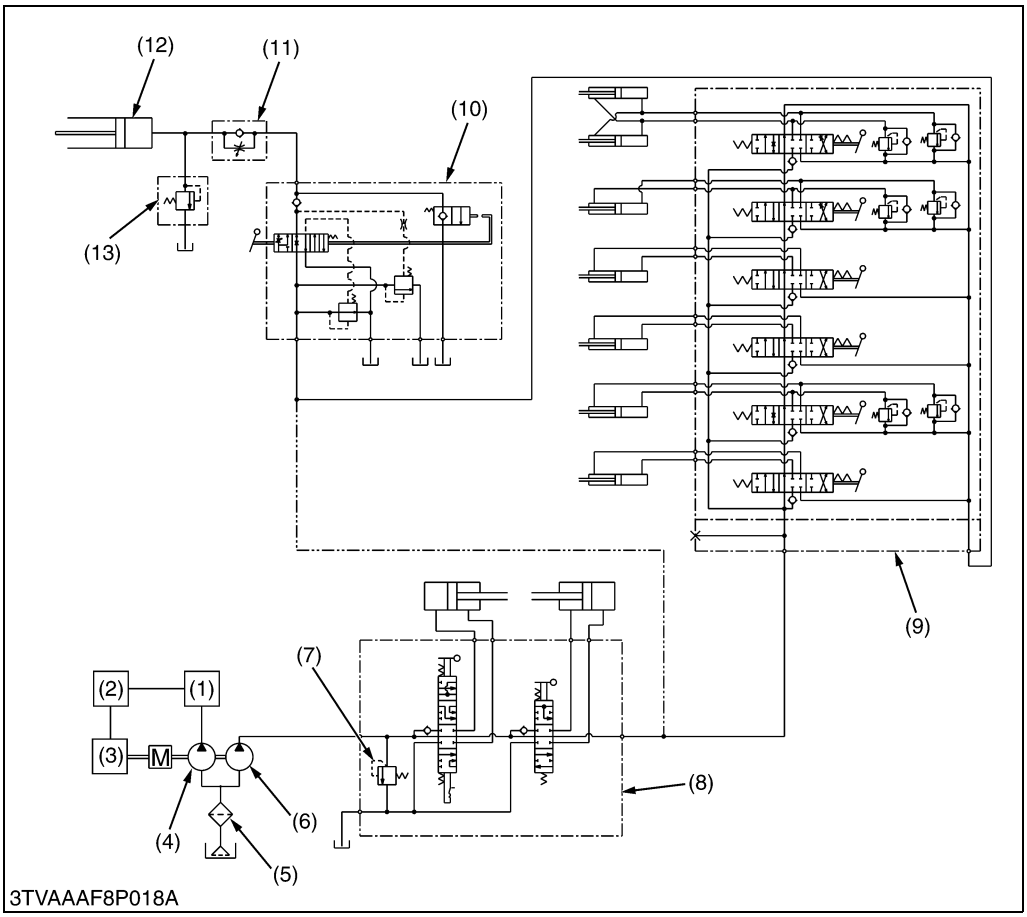
1. When the hydraulic control lever is set to the "**DUMP**" position, the spool (4) of the bucket control section (3) moves to the right, which forms oil passages among passage 2 (8), **A2** port and **B2** port.
2. The pressure-fed oil from the **P** port flows to the **A2** port just like the **"DUMP"** position.
3. Return oil from the bucket cylinder (9) flows from the **B2** port to the passage 2 (8), and flows to the **A2** port together with the pressure-fed oil from the **P** port.
   As a result, the dump speed is increased.

(Reference)

- The oil pressure of the **A2** port and **B2** port is identical, but the bucket cylinder extend by the difference of received pressure area (cylinder rod part).

5. THREE POINTS HYDRAULIC SYSTEM

[1] HYDRAULIC CIRCUIT



(1) Power Steering Controller
(2) Independent PTO
(3) HST
(4) Hydraulic Pump (for Power Steering, HST, and Independent PTO)
(5) Oil Filter Cartridge
(6) Hydraulic Pump (for Front Loader, Backhoe and 3-Points Hitch)
(7) Relief valve
(8) Front Loader Control Valve
(9) Backhoe Control Valve
(10) Position Control Valve
(11) Lowering Speed Adjusting Valve
(12) Hydraulic Cylinder
(13) Safety Valve

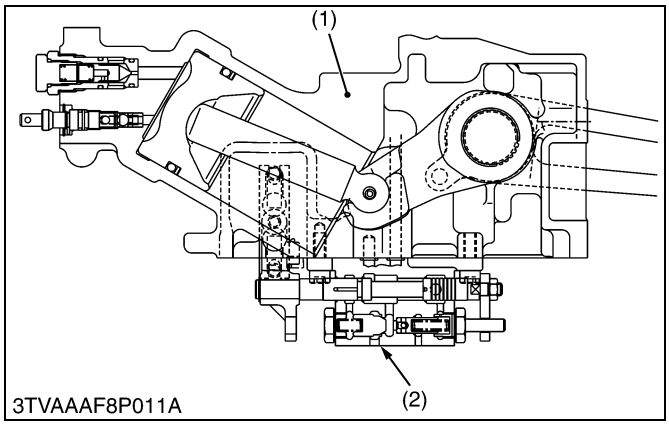
W1016702

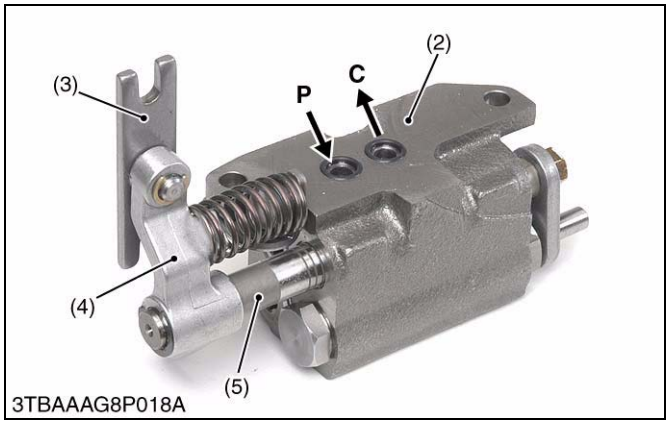
Two hydraulic pumps (4) (6) are installed in the B26.

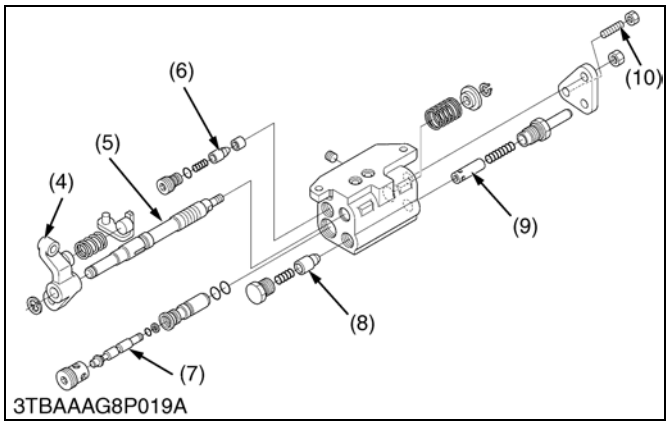
Hydraulic oil is forced from hydraulic pump (6) to the front loader control valve (8), backhoe control valve (9), relief valve (8), hydraulic block (9) and position control valve (10).

Three point hydraulic oil pressure is controlled by the relief valve (7).

[2] POSITION CONTROL VALVE







This position control (2) valve is located under the hydraulic cylinder block (1).

This control valve is mechanically connected to the position control lever with linkage.

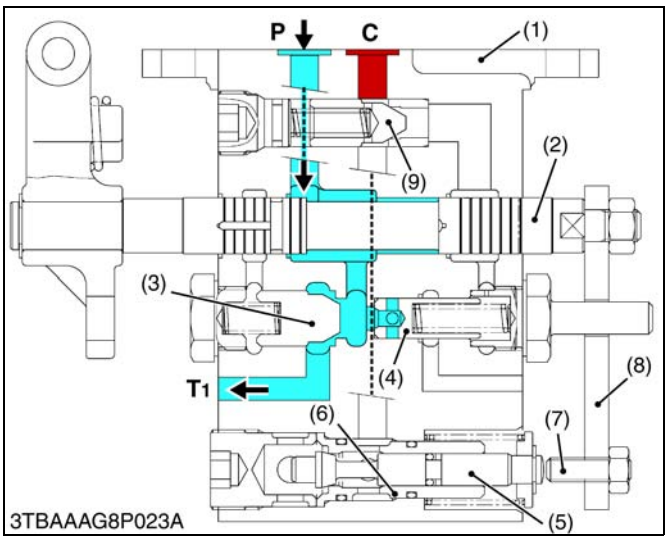
This control valve is also mechanically connected to the lift arm with a feed back rod.

This control valve controls the oil flow forced from hydraulic pump and the oil returned back from the hydraulic cylinder.

(1) Hydraulic Cylinder Block
(2) Position Control Valve
(3) Link
(4) Lever
(5) Spool
(6) Poppet
(7) Poppet
(8) Poppet
(9) Poppet
(10) Set Screw

P : Pump Port
C : Cylinder Port

W1021448



■ Neutral

Oil forced into the control valve through **P** port pushes and opens the unload valve (3), and opens the unload valve (3), and then returns to the transmission case through **T1** port.

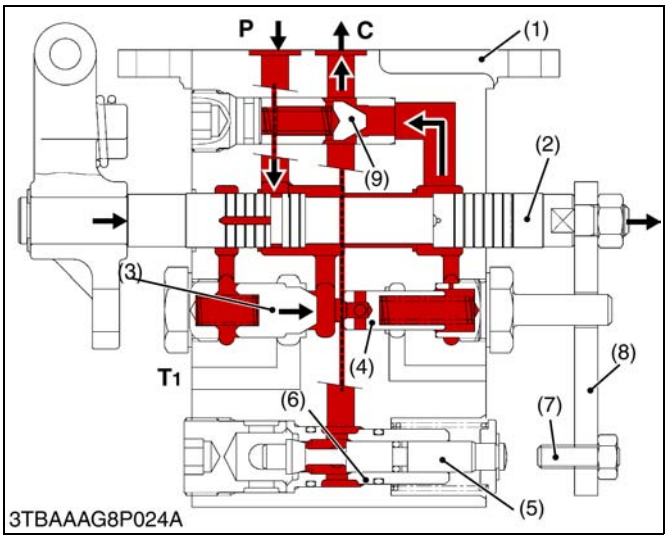
Oil behind the unload valve (3) returns to the transmission case through the groove of the spool (2).

Since the check valve (9) and the poppet 2 (5) are closed, oil in the hydraulic cylinder does not flow to the transmission case. Thus, the implement remains at its fixed position.

(1) Valve Body
(2) Spool
(3) Unload Valve
(4) Unload Poppet
(5) Poppet 2
(6) Sleeve
(7) Adjusting Bolt
(8) Connecting Plate
(9) Check Valve

P : Pump Port
C : Cylinder Port
T1 :Tank Port

W1021891



■ Lift

When the position control lever is set to **"LIFT"** position, the spool (2) is pushed into the valve body (1).

The oil forced into the control valve body (1) through **P** port flows to two oil circuits.

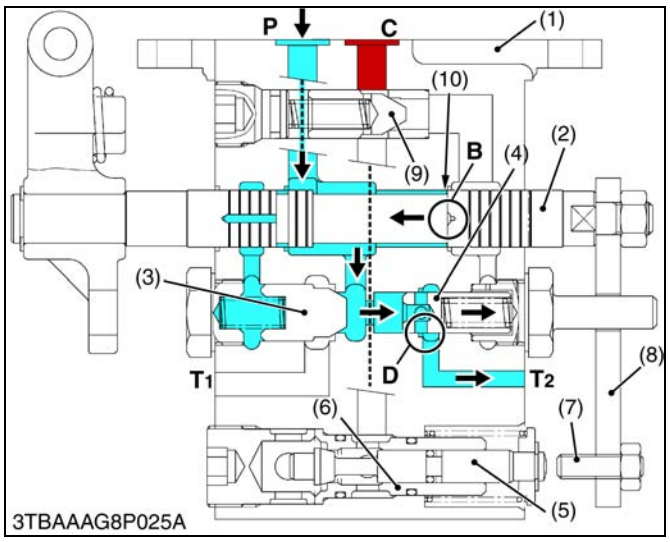
The first circuit is oil flowing to the back of the unload valve (3) to close it.

The second oil circuit is oil flowing to the check valve (9) and the hydraulic cylinder through **C** port to lift the implement.

(1) Valve Body
(2) Spool
(3) Unload Valve
(4) Unload Poppet
(5) Poppet 2
(6) Sleeve
(7) Adjusting Bolt
(8) Connecting Plate
(9) Check Valve

P : Pump Port
C : Cylinder Port
T1 :Tank Port

W1022342



■ Shockless mechanism operating (Lift to Neutral)

When the implement begins to lift up, the feedback rod connected to the lift arm pushes back the spool (2) to near "**NEUTRAL**" position.

When the implement lifts up near the "**NEUTRAL**" position, quantity of oil passing through the orifice (10) is reduced.

It causes oil pressure difference between portion **B** and unload poppet (4).

Since oil pressure at unload poppet (4) is higher than oil pressure at portion **D**, oil forced from **P** port pushes and opens unload poppet (4), and oil drains through **T2** port to transmission case.

Quantity of oil flowing through portion **B** is less.

Quantity of oil flowing to unload poppet (4) is greater.

It causes oil pressure increase at portion **D** of the unload poppet (4).

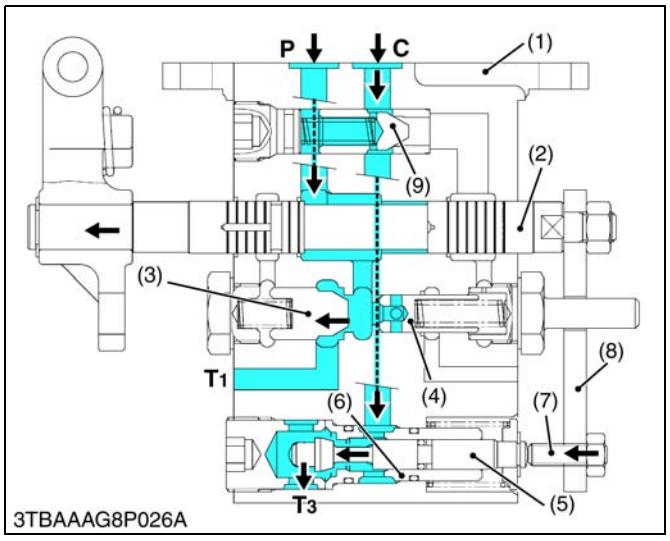
While the implement is coming to "**NEUTRAL**" position, quantity of oil flowing to spool (2) is reduced at portion **B**. And then, oil drains through unload poppet (4) to transmission case.

It causes implement's smooth stopping at "**NEUTRAL**" position without shock.

(1) Valve Body
(2) Spool
(3) Unload Valve
(4) Unload Poppet
(5) Poppet 2
(6) Sleeve
(7) Adjusting Bolt
(8) Connecting Plate
(9) Check Valve
(10) Orifice

P : Pump Port
B : Portion B
C : Cylinder Port
D : Portion D
T1 :Tank Port

W1022580



■ Down

When the position control lever is set to **"DOWN"** position, the spool (2) is pulled out from the control valve body (1).

At the same time, the adjust bolt (7) connected to the connecting plate (8) pushes the poppet (5) into the control valve body (1). And then the poppet (5) is opened.

Oil in the hydraulic cylinder is forced out from **C** port through and goes valve body (1) to transmission case by the weight of the implement, causing the implement to lower.

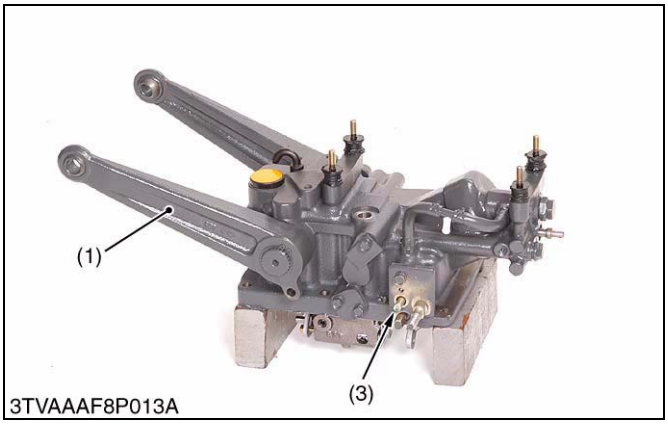
Oil forced into the control valve through **P** port pushes and opens the unload valve (3) and returns to the transmission case through **T1** port.

(1) Valve Body
(2) Spool
(3) Unload Valve
(4) Unload Poppet
(5) Poppet 2
(6) Sleeve
(7) Adjusting Bolt
(8) Connecting Plate
(9) Check Valve

P : Pump Port
C : Cylinder Port
T1 :Tank Port
T3 :Tank Port

W1023023

[3] FEEDBACK LINKAGE FOR POSITION CONTROL



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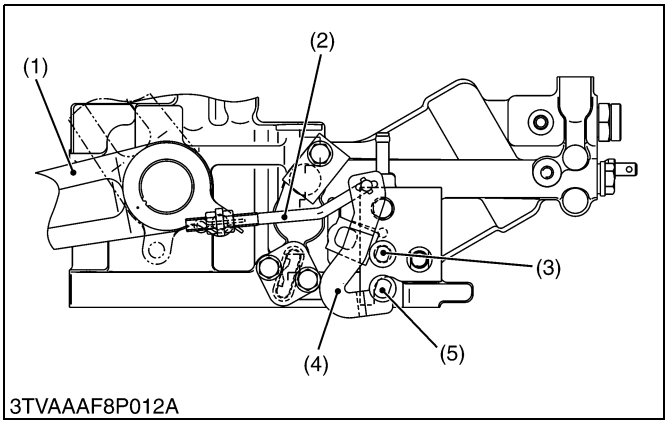

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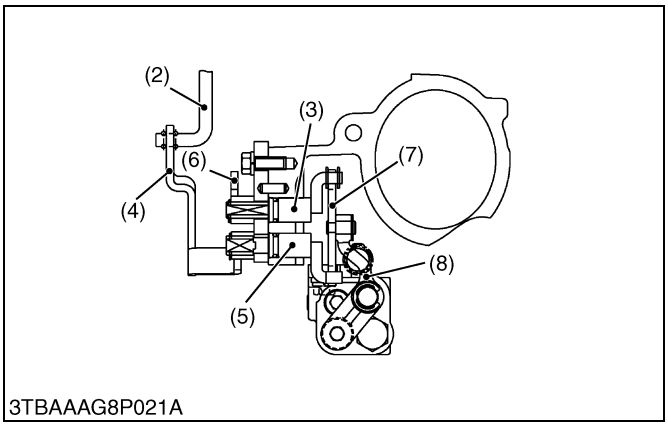

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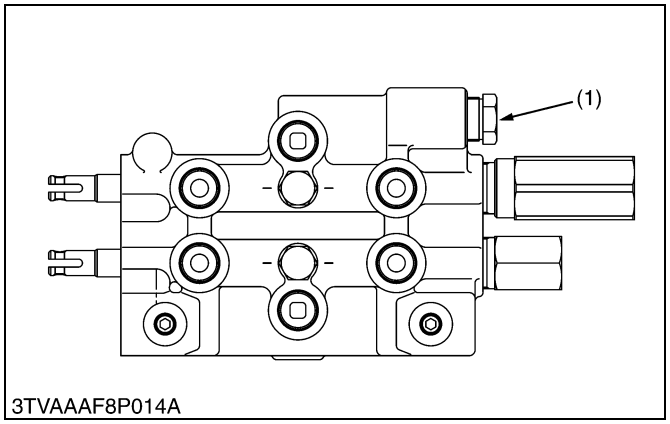
When the position control lever is moved to rearward to lift the implement, the spool of the position control valve is pushed in to form a lifting circuit by the motions of the control lever arm, the control lever shaft (3), the connecting arm (7) and the lever (8). After the lift arm (1) moves upward, the spool is pulled out and returns to form a neutral circuit by the motions of the feedback rod (2), the feedback arm (4), the feedback, the arm shaft (5), the connecting arm (7) and the lever (8).

As a result, the implement height can be easily determined in proportion to the set position of the position control lever.

(1) Lift Arm
(2) Feedback Rod
(3) Control Lever Shaft
(4) Feedback Arm
(5) Feedback Arm Shaft
(6) Control Lever Arm
(7) Connecting Arm
(8) Lever

W1023464

[4] RELIEF VALVE



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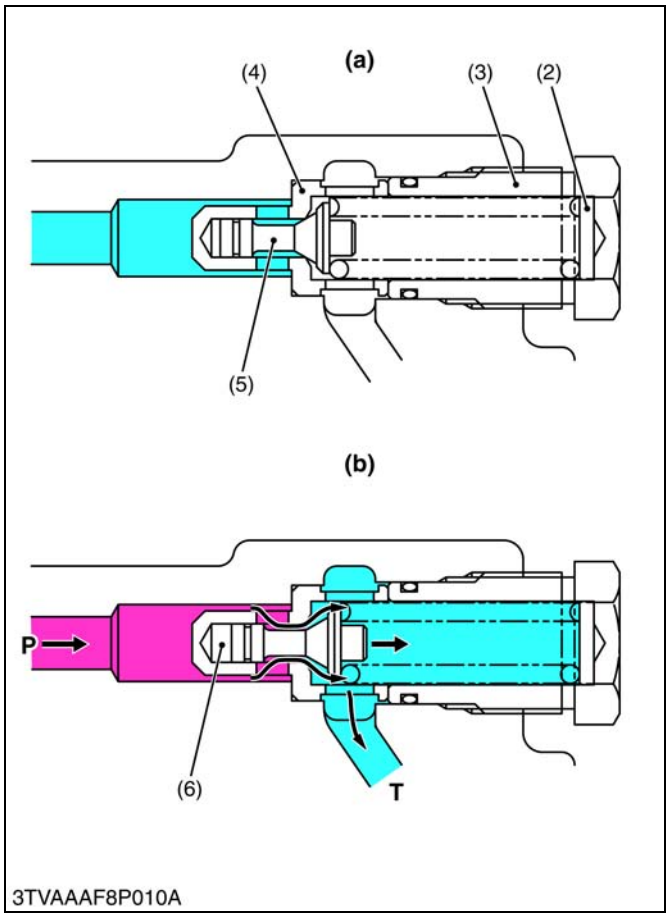

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The hydraulic raising and lowering circuit is fitted with a relief valve to control the maximum pressure.

This is a guide piston relief valve with damper, a direct acting relief valve suitable for relatively high pressure and capacity, and constructed so as to prevent chattering and other unstableness associated with direct acting relief valves. As shown in the diagram, poppet (5) has a guide, and there is a valve chamber called a damping chamber (6) in the base of this guide piston. The valve inlet is connected to this chamber through the clearance between the guide surface and the seat so that the chamber provides a damping effect, controlling valve vibration.

When the pressure in the circuit rises, the pressure in the damping chamber also rises, and when it exceeds the relief pressure setting (150 to 160 kgf/cm^2) the spring is compressed, making a clearance between the poppet and the seat. The hydraulic oil can escape to the transmission case through this clearance, controlling the pressure rise.

- Relief valve setting pressure
  15.8 to 16.5 MPa
  161 to 169 kgf/cm^2
  2290 to 2400 psi

Condition

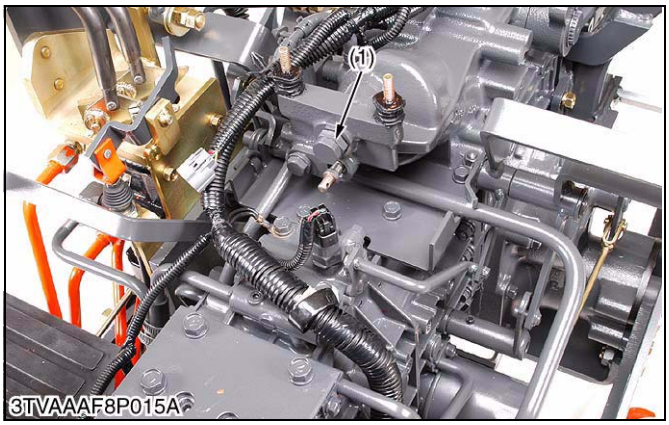
- Engine speed ..... Maximum
- Oil temperature .. 45 to 55 °C
  113 to 131 °C

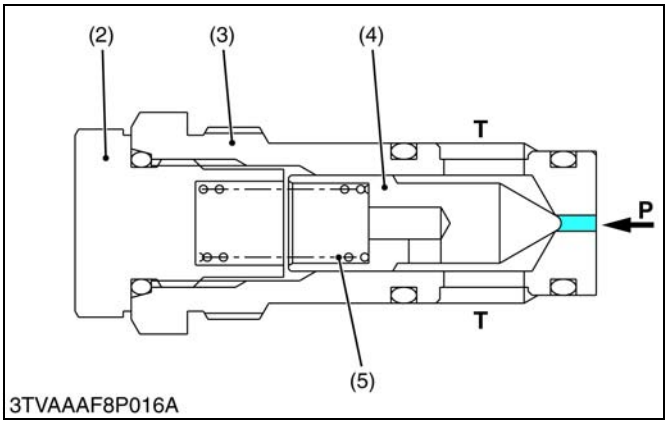
(1) Relief Valve
(2) Shim
(3) Plug
(4) Seat
(5) Poppet
(6) Damping Chamber

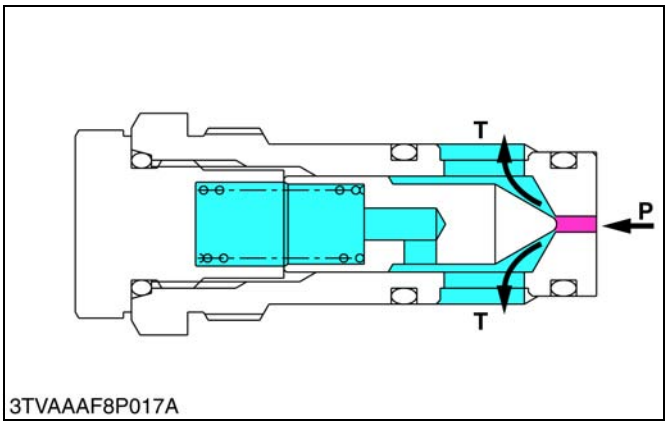
(a) Normal State
(b) Active State
T : T Port
(To Transmission Case)
P : P Port (From Pump)

W1020101

[5] CYLINDER SAFETY VALVE (SURGE RELIEF VALVE)







The cylinder safety valve is located on the cylinder cover of the three point hydraulic system. This tractor use 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 heavy implement bounce and thereby reducing the possibility of damage to three point hydraulic system components.

If pressure in the cylinder becomes too great, oil pressure forces the poppet (4) off the seat of valve body (3), compressing the spring (5) and allows oil to flow to the transmission case through the T port.

(Reference)

- Cylinder safety valve setting pressure :
  18.7 to 19.6 MPa
  190 to 200 kgf/cm^2
  2710 to 2840 psi

(1) Safety Valve
(2) Plug
(3) Valve Body
(4) Poppet
(5) Spring

T : T Port (To Transmission Case)
P : P Port (From Pump)

W1016088

SERVICING

CONTENTS

1. TROUBLESHOOTING

POWER STEERING

Symptom	Probable Cause	Solution	Reference Page
Front Wheels Vibration	Air in power steering circuit	Bleed air	6-S4
Hard Steering	Transmission fluid improper or insufficient	Change	G-31
	Oil leak from pipe or hose joint	Retighten	6-S4, S6
	Hydraulic pump malfunctioning	Replace	7-S11
	Improper relief valve adjustment	Replace	6-S7
	Relief valve malfunctioning	Replace	6-S7
	Seals or O-rings in the steering controller damaged	Replace	6-S6
	Air in the hydraulic pipes	Air vent	6-S4
Low Operating Pressure	Hydraulic pump malfunctioning	Replace	7-S11
	Improper relief valve adjustment	Replace	6-S7
	Relief Valve malfunctioning	Replace	6-S7
	Seals or O-rings in the steering controller damaged	Replace	6-S7
	Oil leak from pipe or hose	Replace	6-S4, S6
	Pipe or hose broken	Replace	6-S4, S6
Steering Wheel Does Not Return to Neutral Position	Power steering controller damaged	Replace	6-S7
Steering Force Fluctuates	Insufficient oil	Replenish	G-31
	Insufficient bleeding	Bleed	6-S4
	Steering controller malfunctioning	Replace	6-S7
Noise	Insufficient oil	Replenish	G-31
	Air sucked in pump from suction circuit	Repair	6-S6
	Pipe deformed	Replace	6-S6

W1014322

INDEPENDENT PTO

Symptom	Probable Cause	Solution	Reference Page
PTO Clutch Slip	Operating pressure is low	Adjust	7-S8
	Independent PTO control valve malfunctioning	Repair or replace	7-S8
	Clutch disk or drive plate excessively worn	Replace	2-S36
	Deformation of piston or return plate	Replace	2-S36
PTO Shaft Does Not Rotate	PTO clutch malfunctioning	Repair or replace	2-S31
	PTO propeller shaft coupling disengaged	Engage	–
PTO Clutch Operating Pressure is Low	Transmission oil improper or insufficient	Replenish or change	G-31
	Relief valve malfunctioning	Adjust or replace	7-S8
PTO Clutch Drags	Brake plate excessively worn	Replace	2-S36
	Return spring weaken or broken	Replace	2-S36
	Accumulator valve malfunctioning	Repair or replace	2-S36
	Deformation or return plate or steel plate	Replace	2-S36

W1016417

3-POINTS HITCH

Implement Does Not Rise (No Noise)	Control valve broken	Replace	7-S21
	Control valve improperly adjusted	Adjust	7-S21
	Control valve improperly assembled	Repair	7-S21
	Relief valve spring damaged	Replace	7-S9
Implement Does Not Rise (Noise)	Oil filter cartridge clogged	Clean or replace	G-31
	Suction pipe loose or broken	Repair or replace	2-S18
	Suction pipe connecting hose loose or broken	Repair or replace	2-S18
	Suction pipe O-ring broken	Replace	2-S18
	Insufficient transmission oil	Refill	G-31
	Relief valve setting pressure too low	Adjust or replace	7-S9
	Hydraulic pump broken	Replace	7-S11
Implement Does Not Reach Maximum Height	Feedback rod improperly adjusted	Adjust	7-S10
Implement Does Not Lower	Control valve malfunctioning	Repair or replace	7-S21
Implement Drops by its Weight	Hydraulic cylinder worn or damaged	Replace	7-S22
	Piston O-ring worn or damaged	Replace	7-S22
	Control valve malfunctioning	Replace	7-S21
Implement Hunts	Control valve improperly adjusted	Adjust	7-S21

W1017152

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Pump Delivery at Engine 2800 rpm, Oil Temperature 50 °C , 122 °F	At no pressure	Above 16.5 L/min. 4.36 U.S.gals/min. 3.63 Imp.gals/min.	–
	At rated pressure	Above 16.0 L/min. 4.23 U.S.gals/min. 3.52 Imp.gals/min.	14.4 L/min. 3.80 U.S.gals/min. 3.17 Imp.gals/min.
Pump Delivery at Engine 2800 rpm, Oil Temperature 50 °C , 122 °F	At no pressure	Above 27.1 L/min. 7.16 U.S.gals/min. 5.96 Imp.gals/min.	–
	At rated pressure	Above 26.3 L/min. 6.95 U.S.gals/min. 5.79 Imp.gals/min.	23.7 L/min. 6.26 U.S.gals/min. 5.21 Imp.gals/min.
Relief Valve for Independent PTO Valve **Condition** Engine Speed : Maximum Oil Temperature : 50 °C (122 °F)	Setting Pressure	1.1 to 1.5 MPa 11.2 to 15.3 kgf/cm^2 160 to 218 psi	–
Relief Valve for 3-Points Hitch **Condition** Engine Speed : Approx. 2800 min^{-1} (rpm) Oil Temperature : 50 °C (122 °F)	Setting Pressure	15.8 to 16.5 MPa 161 to 169 kgf/cm^2 2290 to 2400 psi	–
Lift Arm	Free Play	10 to 15 mm 0.40 to 0.59 in.	–
Gears to Casing	Clearance	–	0.15 mm 0.0059 in.
Gear Shaft to Bushing	Clearance	0.020 to 0.091 mm 0.0008 to 0.0036 in.	0.12 mm 0.0047 in.
Gear Shaft	O.D.	14.970 to 14.980 mm 0.5894 to 0.5898 in.	–
Bushing	I.D.	15.000 to 15.061 mm 0.5906 to 0.5930 in.	–
Side Plate	Thickness	2.48 to 2.50 mm 0.0976 to 0.0984 in.	2.40 mm 0.0945 in.

W1013874

Item		Factory Specification	Allowable Limit
Hydraulic Cylinder	I.D.	70.05 to 70.10 mm 2.7579 to 2.7598 in.	70.15 mm 2.7618 in.
Hydraulic Arm Shaft to Bushing	Clearance	0.020 to 0.110 mm 0.0008 to 0.0043 in.	0.30 mm 0.0118 in.
Hydraulic Arm Shaft (RH)	O.D.	37.925 to 37.950 mm 1.4931 to 1.4941 in.	–
Hydraulic Arm Shaft (LH)	O.D.	33.925 to 33.950 mm 1.3356 to 1.3366 in.	–
Hydraulic Cylinder Bushing (RH)	I.D.	37.970 to 38.035 mm 1.4949 to 1.4974 in.	–
Hydraulic Cylinder Bushing (LH)	I.D.	33.970 to 34.035 mm 1.3374 to 1.3400 in.	–

W1017004

3. TIGHTENING TORQUES

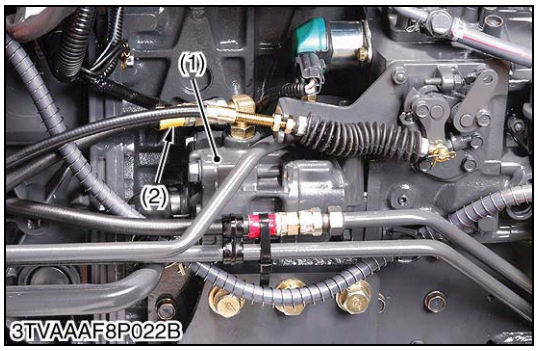
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	lbf·ft
Delivery retaining nut for power steering	65 to 75	6.6 to 7.7	48 to 55
Rear wheel mounting bolt	196 to 225	20.0 to 23.0	145 to 166
Rear wheel mounting nut	167 to 191	17.0 to 19.5	123 to 141
ROPS mounting bolt	91 to 95	9.2 to 9.7	67 to 70
Hydraulic cylinder mounting bolt M10	40 to 45	4.1 to 4.5	30 to 33

W1012736

4. CHECKING AND ADJUSTING

[1] HYDRAULIC PUMP



Flowmeter Connecting and Test Preparation

■ **IMPORTANT**

- **When using a flowmeter other than KUBOTA specified flowmeter (Code No : 07916-52792), be sure to use the instructions with that flowmeter.**
- **In this hook-up, there is no relief valve. Therefore while testing, do not close the flowmeter loading valve completely.**

■ **Hydraulic Pump (Power Steering Circuit)**

1. Disconnect the power steering hose (2).
2. Install the hydraulic test hose to power steering pump.
3. Connect the hydraulic test hose to flow meter inlet port.
4. Connect the other hydraulic test hose (3) to the flowmeter outlet and put the end of the hose into the transmission oil port.
5. Open the flowmeter (5) loading valve completely. (Turn counterclockwises.)
6. Start the engine and set the engine speed at 2000 to 2200 min^{-1} (rpm).
7. Slowly close the loading valve to generate pressure approx. 9.8 MPa (100 kgf/cm^2, 1422 psi). Hold in this condition until oil temperature reaches approx. 50 °C (122 °F).
8. Open the loading valve completely.
9. Set the engine speed. (Refer to condition.)
10. Read and note the pump delivery at no pressure.
11. Slowly close the loading valve to increase rated pressure. (Refer to condition.) As the load is increased, engine speed drops, therefore, reset the engine speed.
12. Read and note the pump delivery at rated pressure.
13. Open the loading valve completely and stop the engine.
14. If the pump delivery is extremely lower than factory specifications, check the pump suction line, oil filter or hydraulic pump, and replace pump, if necessary.

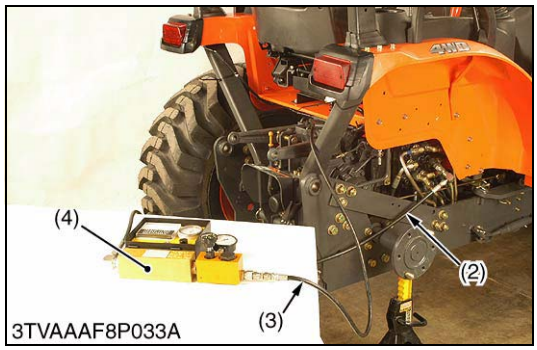
Hydraulic pump (power steering) delivery at no pressure	Factory spec.	Above 16.5 L/min. 4.36 U.S.gals/min. 3.63 Imp.gals/min.
Hydraulic pump (power steering) delivery at rated pressure	Factory spec.	Above 16.0 L/min. 4.23 U.S.gals/min. 3.52 Imp.gals/min.
	Allowable limit	14.4 L/min. 3.80 U.S.gals/min. 3.17 Imp.gals/min.

Condition

- Engine speed ..... 2800 min^{-1} (rpm)
- Rated pressure ..... 11.9 MPa
  121 kgf/cm^2
  1720 psi
- Oil temperature ..... 50 °C (122 °F)

(1) Hydraulic Pump
(2) Power Steering Delivery Hose
(3) Hydraulic Test Hose (Transmission Oil Port)
(4) Hydraulic Test Hose (Inlet Port)
(5) Flowmeter

W1011231



Hydraulic Pump (Main Circuit)

1. Disconnect the backhoe (Refer to the “BACKHOE” section.). Place the disassembling stand under the rear axle
2. Remove the rear wheel RH.
3. Disconnect the delivery pipe.
4. Install the flowmeter adaptor to the delivery pipe and the hydraulic test hose (2).
5. Connect the hydraulic test hose (2) to the flowmeter inlet port.
6. Connect the other hydraulic test hose to the flowmeter outlet and put the end of the hose (3) into the transmission oil port.
7. Open the flowmeter loading valve completely. (Turn counterclockwises.)
8. Start the engine and set the engine speed at 2000 to 2200 min^{-1} (rpm).
9. Slowly close the loading valve to generate pressure approx. 9.8 MPa (100 kgf/cm^2, 1422 psi). Hold in this condition until oil temperature reaches approx. 50 °C (122 °F).
10. Open the loading valve completely.
11. Set the engine speed. (Refer to condition.)
12. Read and note the pump delivery at no pressure.
13. Slowly close the loading valve to increase rated pressure. (Refer to condition.) As the load is increased, engine speed drops, therefore, reset the engine speed.
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 is extremely lower than factory specifications, check the pump suction line, oil filter or hydraulic pump, and replace pump, if necessary.

Hydraulic pump (main circuit) delivery at no pressure	Factory spec.	Above 27.1 L/min. 7.16 U.S.gals/min. 5.96 Imp.gals/min.
Hydraulic pump (main circuit) delivery at rated pressure	Factory spec.	Above 26.3 L/min. 6.95 U.S.gals/min. 5.79 Imp.gals/min.
	Allowable limit	23.7 L/min. 6.26 U.S.gals/min. 5.21 Imp.gals/min.

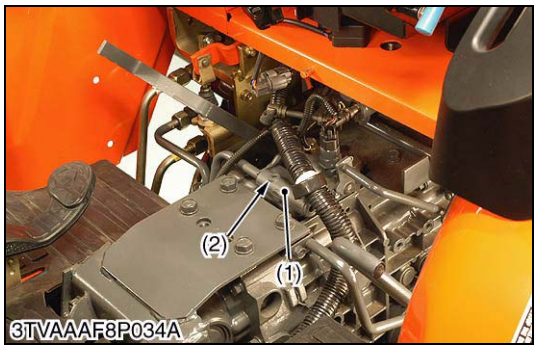
Condition

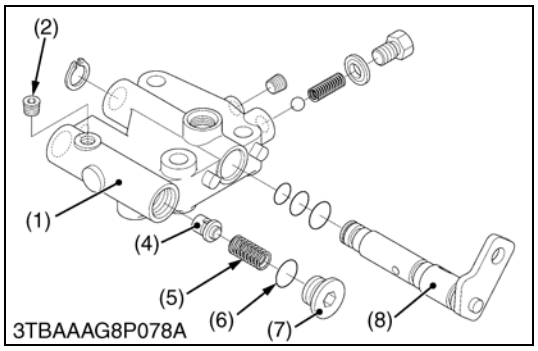
- Engine speed ..... 2800 min^{-1} (rpm)
- Rated pressure ..... 15.8 MPa
  161 kgf/cm^2
  2290 psi
- Oil temperature ..... 50 °C (122 °F)

(1) Hydraulic Pump (Main Circuit)
(2) Hydraulic Test Hose (Inlet Port)
(3) Hydraulic Test Hose (Transmission Oil Port)
(4) Flowmeter

W1036348

[2] INDEPENDENT PTO CONTROL VALVE





Operating Pressure

1. Remove the plug (2) with a hexagon wrench.
2. Install the adapter (3) to the independent PTO control valve (1).
3. Connect the cable and the pressure gauge to the adapter (3).
4. Start the engine and set at the maximum speed.
5. Measure the pressure.

Independent PTO valve setting pressure	Factory spec.	1.1 to 1.5 MPa 11.2 to 15.3 kgf/cm^2 160 to 218 psi

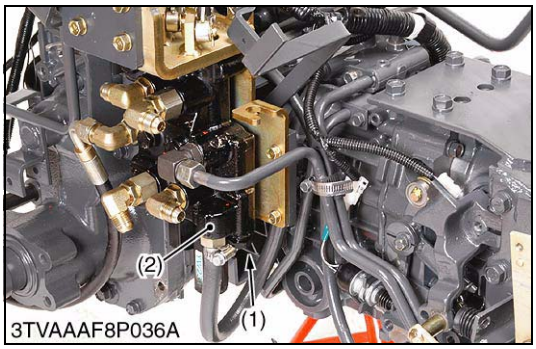
Condition

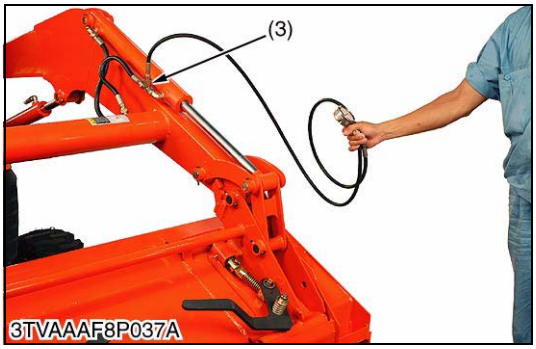
- Engine speed : Maximum
- Oil temperature : 50 °C
  122 °F

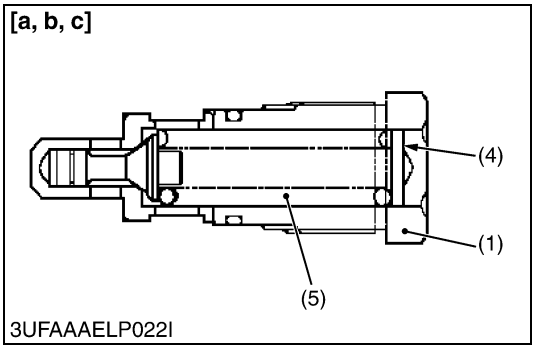
(1) Independent PTO Control Valve
(2) Plug
(3) Adapter
(4) Poppet
(5) Spring
(6) O-ring
(7) Plug
(8) PTO Arm

W1024425

[3] 3-POINTS HITCH RELIEF VALVE







Relief Valve Setting Pressure

1. Remove the seat under cover.
2. Install the adaptor (3). Then connect the cable and the pressure gauge to the adaptor (3).
3. Start the engine and set the rated speed.
4. Move the front loader control lever set the "**DUMP**" position.
5. If the pressure is not factory specifications, adjust the relief valve setting pressure with the adjusting shims (4).

Relief valve setting pressure	Factory spec.	15.8 to 16.5 MPa 161 to 169 kgf/cm^2 2290 to 2400 psi

Condition

- Engine rated speed ..... 2800 min^{-1} (rpm)
- Oil temperature ..... 50 °C
  122 °F

(Reference)

- Thickness of shims (4) : 0.1 mm (0.0039 in.)
  0.2 mm (0.0079 in.)
  0.4 mm (0.0160 in.)

(1) Plug
(2) Front Loader Control Valve
(3) Adaptor
(4) Shim
(5) Spring

W1026366

[4] LIFT ARM

Lift Arm Free Play

1. Set the position control lever (1) to the lowest position.
2. Start the engine, and set at the idling speed.
3. Move the position control lever (1) to the uppermost position.
4. Move the lift arm (2) to the upper end by hand and measure the free play.
5. If the measurement is not within the factory specifications, adjust the free play by changing the position control feedback rod (3) setting length.

Lift arm free play	Factory spec.	10 to 15 mm 0.40 to 0.59 in.

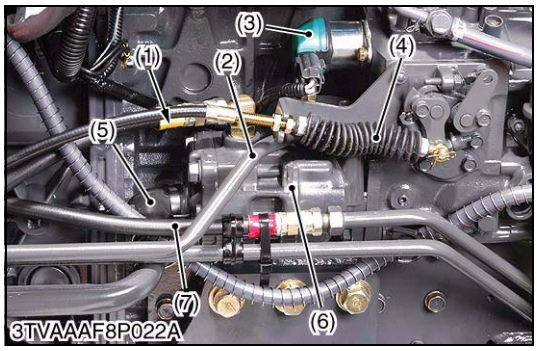
(1) Position Control Lever
(2) Lift Arm
(3) Position Control Feedback Rod

L : Lowest Position
H : Uppermost Position

W12345678

5. DISASSEMBLING AND ASSEMBLING

[1] HYDRAULIC PUMP



Removing Hydraulic Pump

1. Open the bonnet then remove the front grille, side cover (RH) and disconnect the battery grounding cable.
2. Disconnect the connector (3) of the engine stop solenoid and throttle cable.
3. Disconnect the power steering delivery hose (7) and disconnect the delivery hose (3) from the oil cooler.
4. Disconnect the suction hose (5).
5. Disconnect the delivery pipe (2) and the hydraulic pump (6).

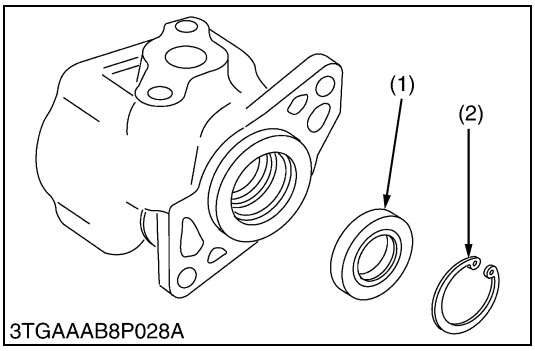
■ **NOTE**

- **For fastening hydraulic pipe nut, use two wrenches. Hold the fitting with a wrench, turn the pipe nut with another wrench to avoid damage at fitting installed part,**

Tightening torque	Delivery retaining nut for power steering	65 to 75 N·m 6.6 to 7.7 kgf·m 48 to 55 lbf·ft

(1) Power Steering Delivery Hose
(2) Delivery Pipe
(3) Connector
(4) Throttle Cable
(5) Suction Hose
(6) Hydraulic Pump
(7) Delivery Hose

W1026961



Oil Seal

1. Remove the internal snap ring (2), and remove the oil seal (1).

(When reassembling)

- If the oil seal is defective, worn or scratched, replace it.

(1) Oil Seal
(2) Internal Snap Ring

W1036139

[2] FRONT LOADER CONTROL VALVE

(1) Separating Front Loader Control Valve

Rear Wheel and Fender

1. Place the disassembling stand under the draw bar.
2. Remove the rear wheel RH (1).
3. Disconnect the tail light connector and remove the tail light assembly (3).
4. Remove the fender RH (2).

(1) Rear Wheel RH
(2) Fender RH
(3) Tail Light Assembly

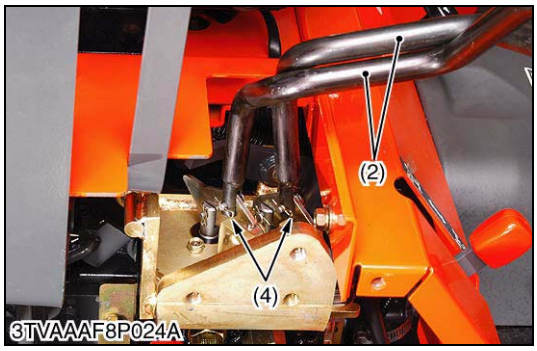
W1025564

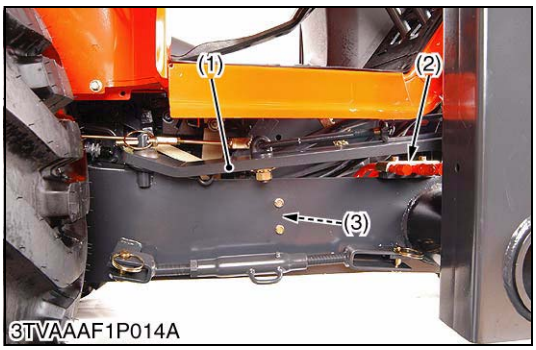
Front Loader Control Lever

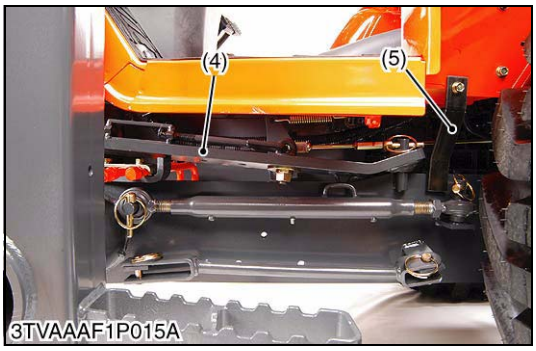
1. Disconnect the control lever rods (2) for front loader lever side.
2. Remove the front loader control lever (1) with bracket (3).
3. Remove the snap pins (4) and the control lever rods (2).

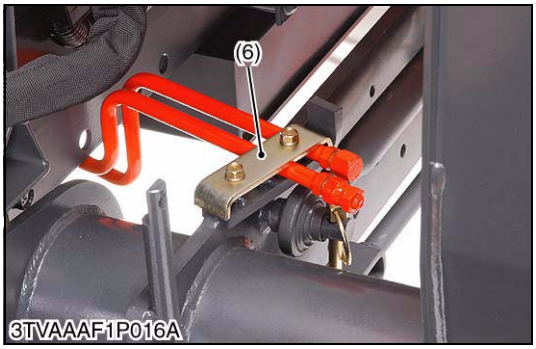
(1) Front Loader Control Lever
(2) Control Lever Rod
(3) Bracket
(4) Snap Pin

W1025738







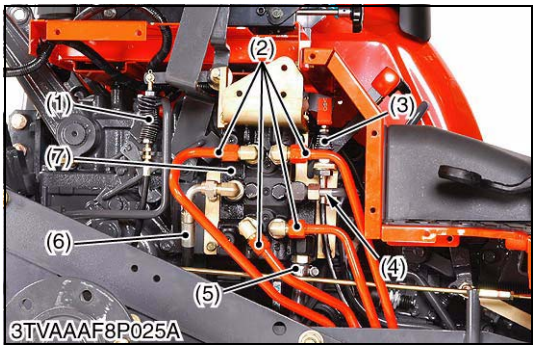


Lower Links and Pipe Clamps

1. Remove the lower links (1) (4).
2. Remove the pipe clamps (2) (3) (6).
3. Remove the step support (5).

(1) Lower Link, RH
(2) Pipe Clamp
(3) Pipe Clamp
(4) Lower Link, LH
(5) Step Support
(6) Pipe Clamp

W1026078

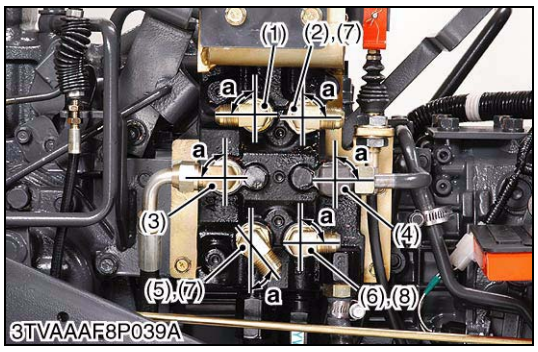


Front Loader Pipes and Front Control Valve

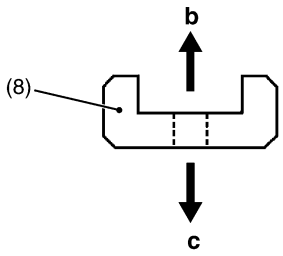
1. Remove the front loader pipes (2).
2. Disconnect the throttle cable (1).
3. Disconnect the spill guard cable (3).
4. Disconnect the return hose (5).
5. Disconnect the delivery pipe (4) and hydraulic hose (6).
6. Remove the front loader control valve (7).

(1) Throttle Cable
(2) Front Loader Pipe
(3) Spill Guard Cable
(4) Delivery Pipe
(5) Return Hose
(6) Hydraulic Hose
(7) Front Loader Control Valve

W1026244



(6)



3TVAAAF8P040A

Elbow and orifice

■ **Elbow angle as indicated table below.**

	Elbow angle
P, **1A**, **2A**, **1B**, **PB Port**	1.6 rad (90 °)
2B Port	0.79 rad (45 °)

■ **IMPORTANT**

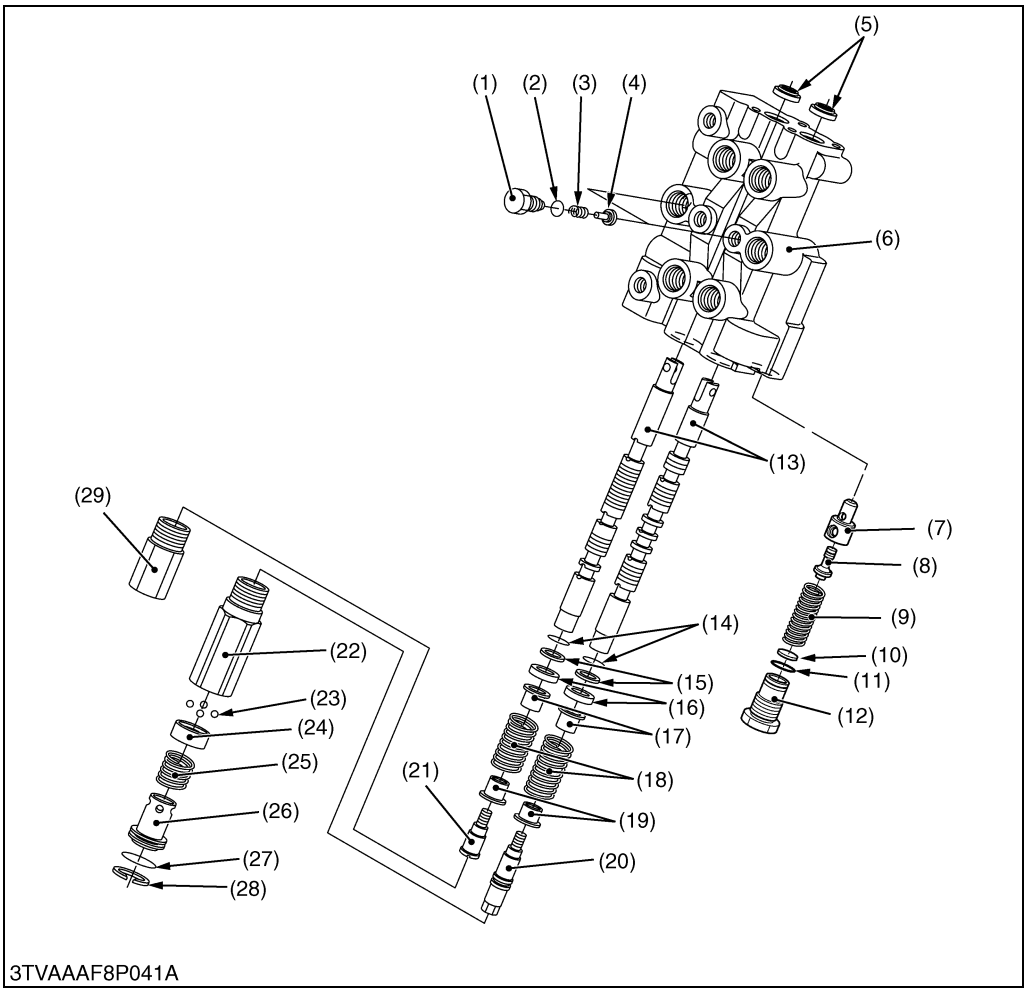
- **Attach the orifice (8) as shown in figure.**

(1) **2A Port**
(2) **1A Port**
(3) **PB Port**
(4) **P Port**
(5) **2B Port**
(6) **1B Port**
(7) Adaptor
(8) Orifice

a : Elbow Angle
b : Pipe Side
c : Valve Side

W1037315

(2) Disassembling Front Loader Control Valve and Relief Valve



3TVAAAF8P041A

(1) Plug
(2) O-ring
(3) Spring
(4) Check Valve
(5) Dust Seal
(6) Valve Body
(7) Poppet 1
(8) Poppet 2
(9) Spring
(10) Shim
(11) O-ring
(12) Plug
(13) Spool
(14) O-ring
(15) Back-up Ring
(16) Collar
(17) Spring Holder
(18) Spring
(19) Spring Holder
(20) Detent Bolt
(21) Bolt
(22) Plug
(23) Ball
(24) Detent Ring
(25) Spring
(26) Stopper
(27) O-ring
(28) Ring
(29) Plug

W1016062

■ Boom Control Section and Bucket Control Section

1. Remove the plug (1) and take out the spring (3) and load check valve (4).
2. Remove the plug (22), (29) from valve body (6).
3. Remove the ring (28) and take out the stopper (26), detent spring (25), detent ring (24) and ball (23).
4. Draw out the spool (13) with other component parts from valve body (6).
5. Remove the plug (12) and take out the spring and poppet.

[3] HYDRAULIC CYLINDER

(1) Separating Hydraulic Cylinder

Backhoe

1. Refer to the "**BACKHOE**" section.

W1042406

Rear Wheels

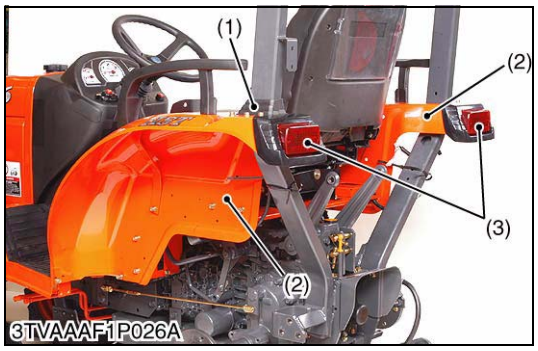
1. Place a hydraulic jack under the frame and jack up the tractor.
2. Remove the rear wheel mounting belts and nuts.
3. Remove the rear wheels (1) (2).
4. Place the rigid jacks under the rear axles. And remove the hydraulic jack.

(When reassembling)

Tightening torque	Rear wheel mounting bolts	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Rear wheel mounting nuts	167 to 191 N·m 17.0 to 19.5 kgf·m 123 to 141 lbf·ft

(1) Rear Wheel, LH (1) Rear Wheel, RH

W1038140

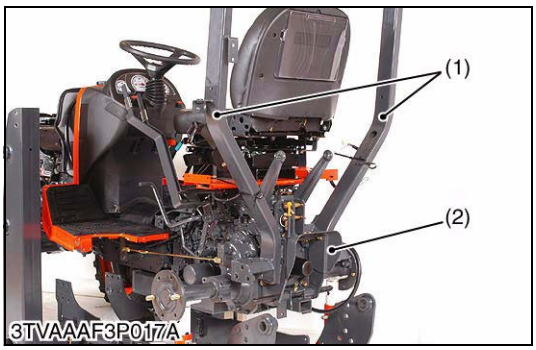


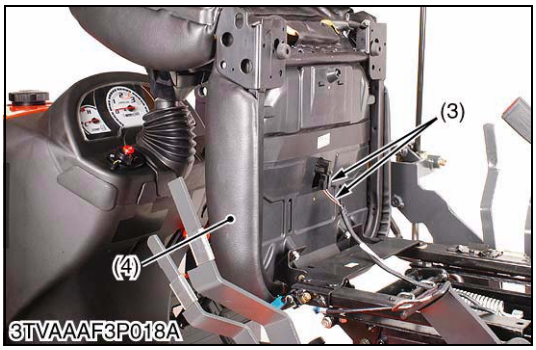
Fenders

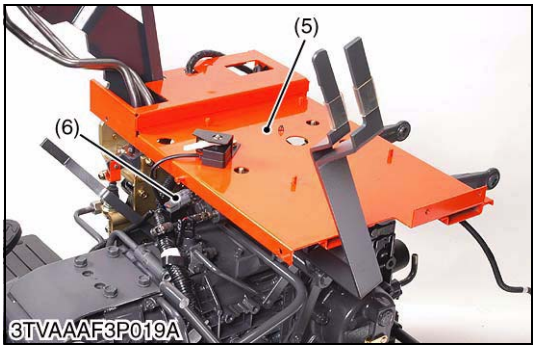
1. Disconnect the tail light connectors.
2. Remove the tail light assemblies (3).
3. Remove the rubber (1).
4. Remove the fenders (2).

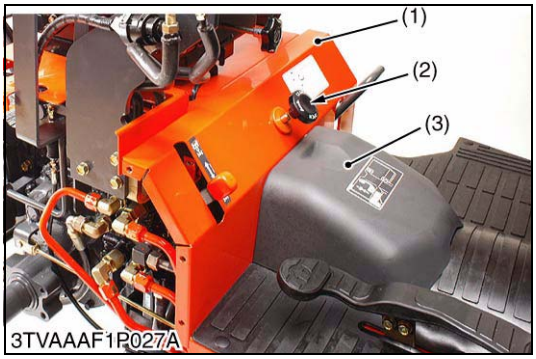
(1) Rubber (3) Tail Light Assembly
(2 Fender

W1038379









ROPS, Seat and Floor Seat

1. Remove the clamp for wireharness.
2. Remove the ROPS (1) and PTO cover (2).
3. Disconnect the seat switch leads (3).
4. Remove the seat (4).
5. Disconnect the seat turn switch connector (6).
6. Remove the floor seat (5).

(When reassembling)

Tightening torque	ROPS mounting bolt	91 to 95 N·m 9.2 to 9.7 kgf·m 67 to 70 lbf·ft

(1) ROPS
(2) PTO Cover
(3) Seat Switch Lead
(4) Seat
(5) Floor Seat
(6) Seat Turn Switch Connector

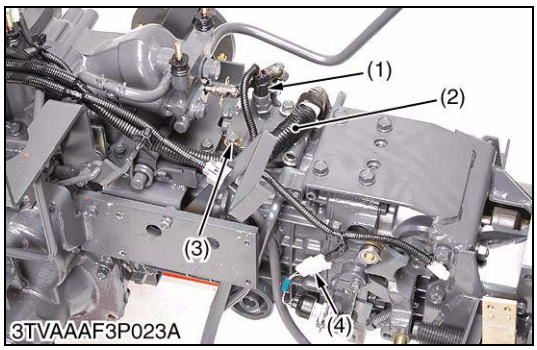
W1038649

Front Cover and Floor Cover

1. Remove the front cover (3).
2. Remove the lowering speed adjusting knob (2).
3. Remove the floor cover (1).

(1) Floor Cover
(2 Lowering Speed Adjusting Knob
(3) Front Cover

W1038939

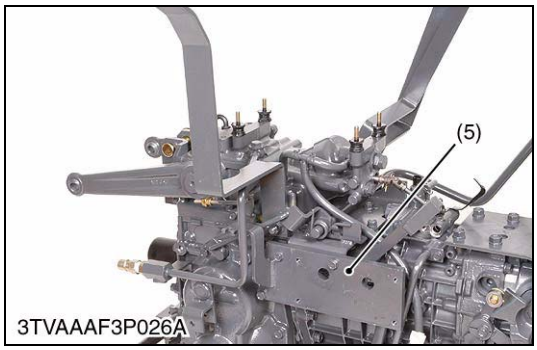


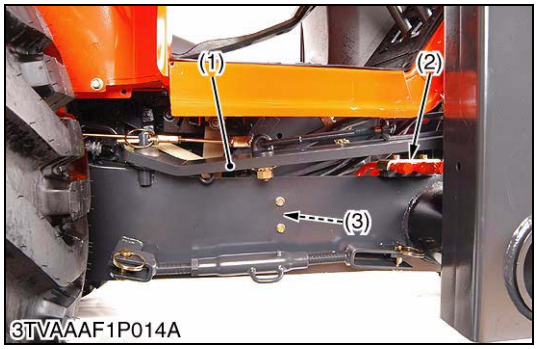
Wiring Harness and Front Loader Valve Bracket

1. Disconnect the PTO switch connector (1).
2. Disconnect the ground lead (3) from PTO valve.
3. Disconnect the HST neutral switch connector (4).
4. Move the wiring harness (2) to the engine side.
5. Remove the front loader valve bracket (5).

(1) PTO Switch Connector
(2) Wiring Harness
(3) Ground Lead
(4) HST Neutral Switch Connector
(5) Front Loader Valve Bracket

W1039112



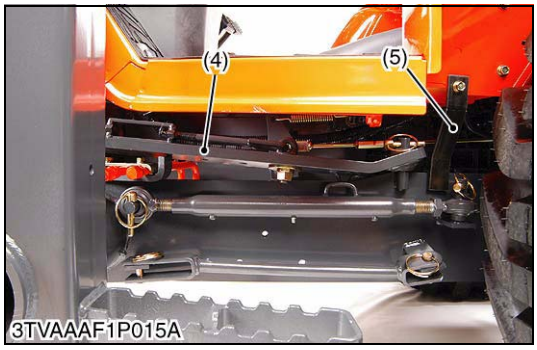


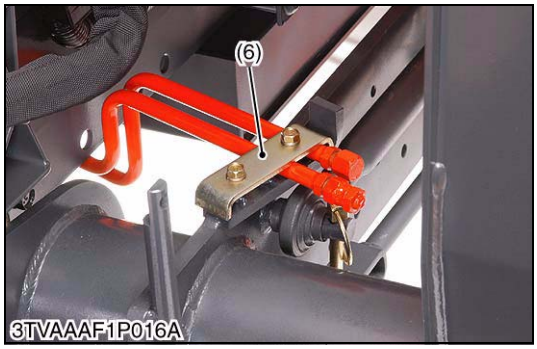
Lower Links and Pipe Clamps

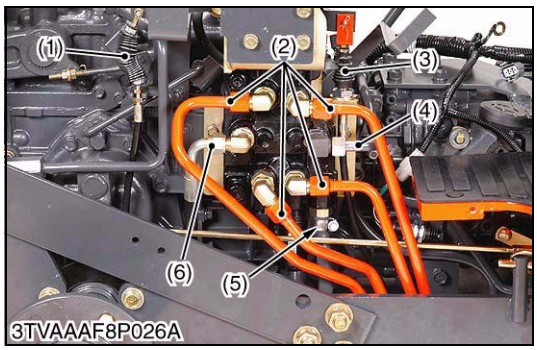
1. Remove the lower links (1) (4).
2. Remove the pipe clamps (2) (3) (6).
3. Remove the step support (5).

(1) Lower Link, RH
(2) Pipe Clamp
(3) Pipe Clamp
(4) Lower Link, LH
(5) Step Support
(6) Pipe Clamp

W1039377





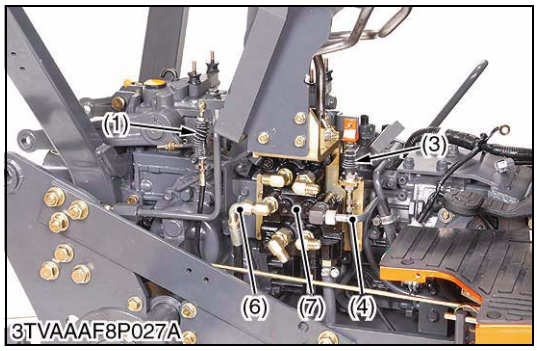


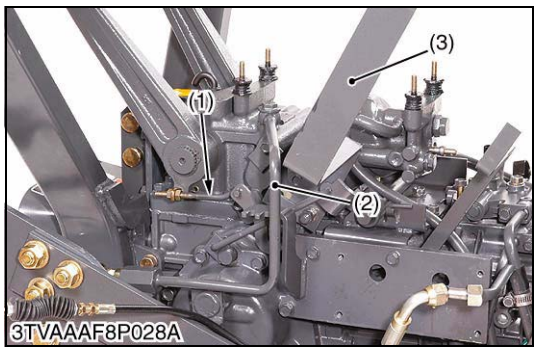
Front Loader Pipes and Front Control Valve

1. Remove the front loader pipes (2).
2. Disconnect the throttle cable (1).
3. Disconnect the spill guard cable (3).
4. Disconnect the return hose (5).
5. Disconnect the delivery pipe (4) and hydraulic hose (6).
6. Remove the front loader control valve (7).

(1) Throttle Cable
(2) Front Loader Pipe
(3) Spill Guard Cable
(4) Delivery Pipe
(5) Return Hose
(6) Hydraulic Hose
(7) Front Loader Control Valve

W1027991



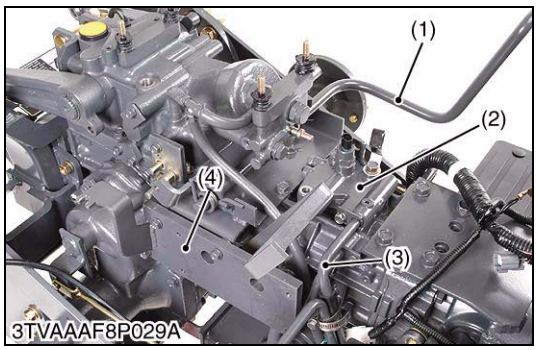


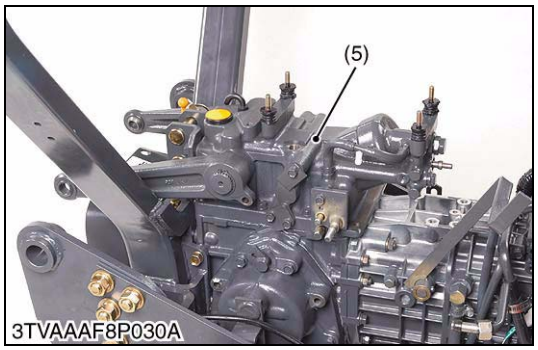
Feed Back Rod and Position Control Lever

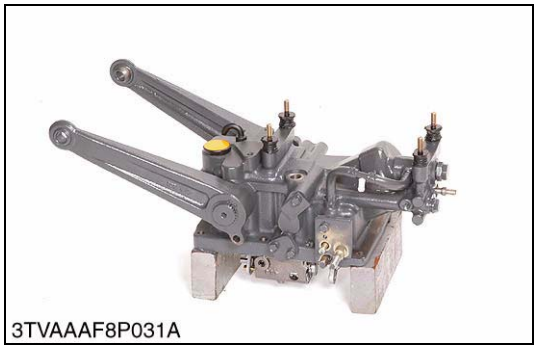
1. Remove the hydraulic pipe (2).
2. Remove the feed back rod (1).
3. Remove the position control lever (3).

(1) Feedback Rod
(2) Hydraulic Pipe
(3) Position Control Lever

W1028280







Hydraulic Cylinder and Others

1. Remove the front loader valve stay (4).
2. Disconnect the PTO delivery pipe (3).
3. Remove the PTO control valve (2).
4. Remove the differential lock pedal (1) with stay.
5. Separate the hydraulic cylinder (5).

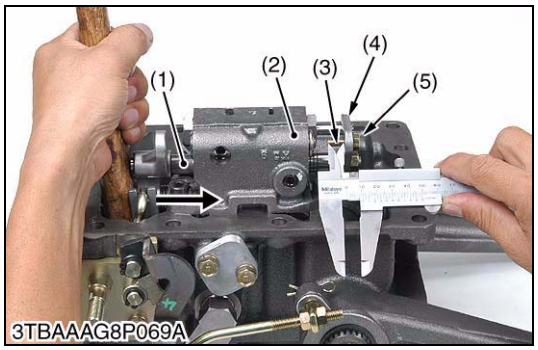
(When reassembling)

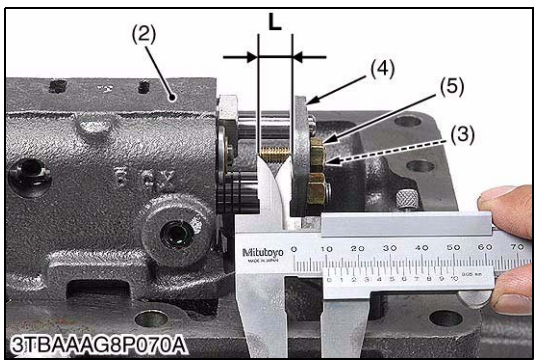
Tightening torque	Hydraulic cylinder mounting bolt (M10)	40 to 45 N·m 4.1 to 4.5 kgf·m 30 to 33 lbf·ft

(1) Differential Lock Pedal
(2) PTO Control Valve
(3) PTO Delivery Pipe
(4) Front Loader Valve Stay
(5) Hydraulic Cylinder

W1028610

(2) Hydraulic Cylinder





Checking the Length of the Adjusting Bolt

■ **NOTE**

- **Before disassembling the control valve, check the length of the adjusting bolt.**

1. Push the spool (1) into the control valve (2).
2. Check the length **L** of the adjusting bolt (3) as shown in the picture.

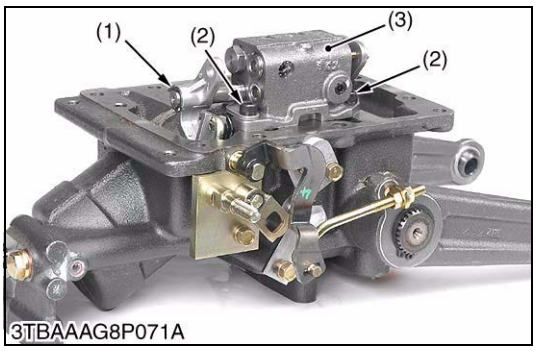
(Reference)

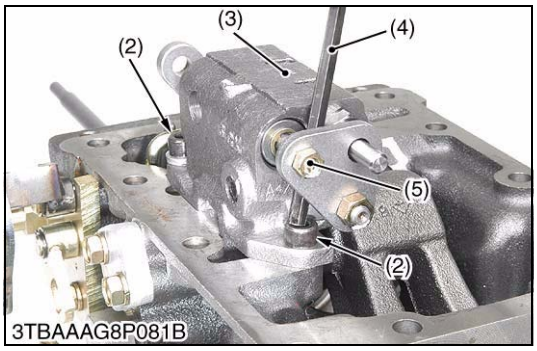
- Length **L** : approximately 10.7 mm
  0.421 in.

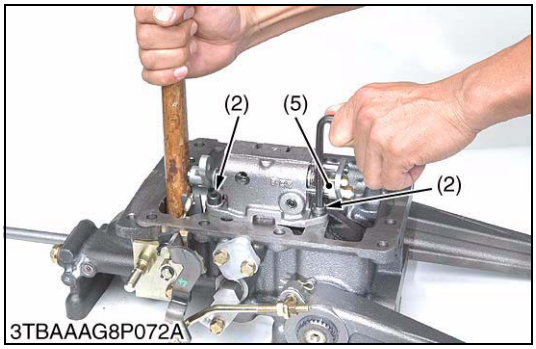
(1) Spool
(2) Control Valve
(3) Adjusting Bolt
(4) Connecting Plate
(5) Nut

L : Length of the adjusting bolt

W1030189







Control Valve

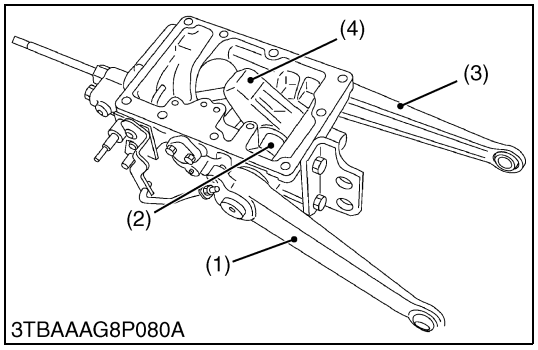
■ **NOTE**

- **When the control valve is installed in the hydraulic cylinder, the hexagon wrench is not aligned straight to the hexagon bolt without pushing the spool as shown in the picture.**

1. Push the spool (1) into the control valve (3).
2. Remove the hexagon bolts (2) with a hexagon wrench (4).

(1) Spool
(2) Hexagon Bolt
(3) Control Valve
(4) Hexagon Wrench
(5) Adjusting Bolt

W1030779



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Lift Arm, Hydraulic Arm Shaft and Hydraulic Arm

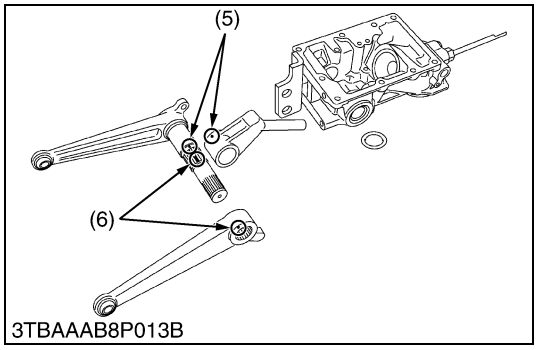
1. Remove the external snap ring, and remove the lift arm LH (2).
2. Draw out the hydraulic arm shaft (3) and lift arm RH (4) as a unit.

(When reassembling)

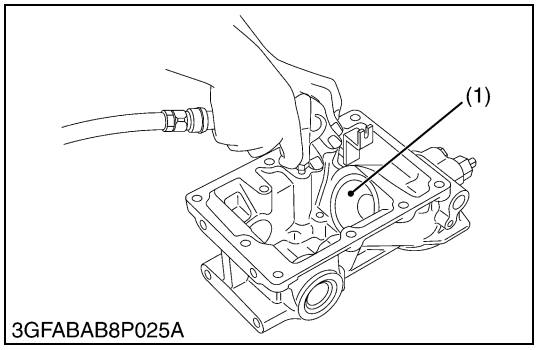
- Align the alignment marks (5) of the hydraulic arm and hydraulic arm shaft.
- Align the alignment marks (6) of the lift arm LH and hydraulic arm shaft.
- Apply grease to the right and left bushings and O-rings.
- Take care not to damage the O-rings.

(1) Lift Arm RH
(2) Hydraulic Arm Shaft
(3) Lift Arm LH
(4) Hydraulic Arm
(5) Alignment Marks
(6) Alignment Marks

W1031356



3TBAAAB8P013B



3GFABAB8P025A

Hydraulic Piston

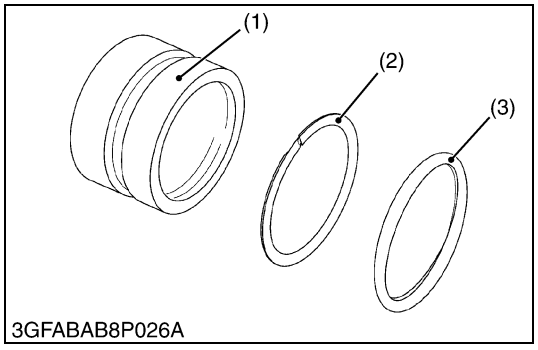
1. Inject the compressed air into the hydraulic cylinder, and take out the hydraulic piston (1).

(When reassembling)

- Take care not to damage the O-ring (3) and backup ring (2).
- Apply transmission fluid to the O-ring.
- Replace the O-ring if it is defective, worn or scratched, which may cause oil leakage.

(1) Hydraulic Piston
(2) Backup Ring
(3) O-ring

W1032073



3GFABAB8P026A

Hydraulic Adjust Shaft

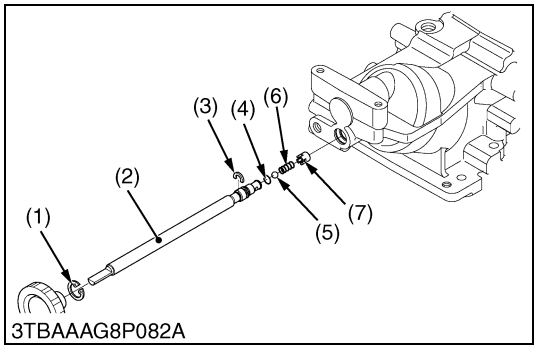
1. Remove the internal cir-clip (1) and the hydraulic adjusting shaft (2).
2. Draw out the ball (5), the spring (6) and the collar (7).

(When reassembling)

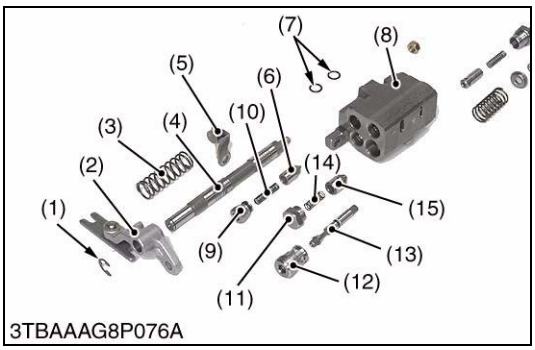
- Take care not to damage the O-rings.

(1) Internal Cir-clip
(2) Hydraulic Adjust Shaft
(3) Stopper
(4) O-ring
(5) Ball
(6) Spring
(7) Collar

W1032234



3TBAAAG8P082A



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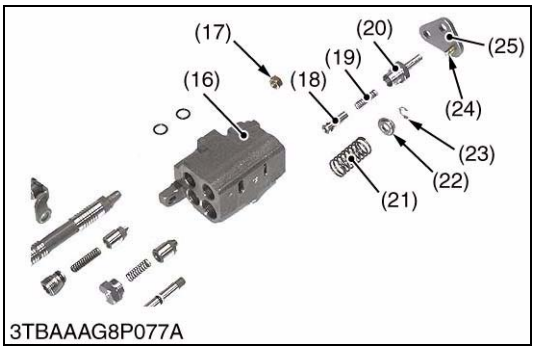

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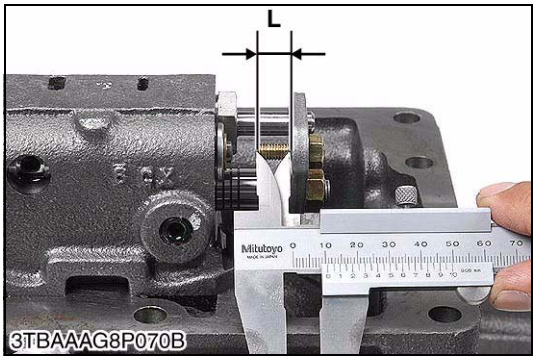


3TBAAAG8P070B

Disassembling Position Control Valve

1. After removing the control valve, disassemble the component parts as shown in the picture.

(When reassembling)

■ **IMPORTANT**

- **Measure the length "L" before disassembling and make sure to reset it when reassembling.**

(Reference)

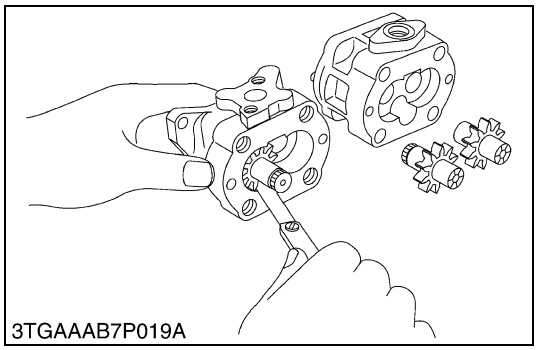
- Length **L** : Approximately 10.7 mm
  0.421 in.

(1) External Cir-clip
(2) Lever
(3) Spring
(4) Spool
(5) Spring Holder
(6) Poppet
(7) O-ring
(8) Control Valve Body
(9) Plug
(10) Spring
(11) Unload Plug
(12) Plug
(13) Poppet
(14) Spring
(15) Unload Poppet
(16) Control Valve Body
(17) Nut
(18) Poppet
(19) Spring
(20) Plug
(21) Spring
(22) Spring Holder
(23) External Cir-clip
(24) Adjusting Bolt
(25) Connecting Plate

L : Length of adjusting bolt

W1032382

6. SERVICING

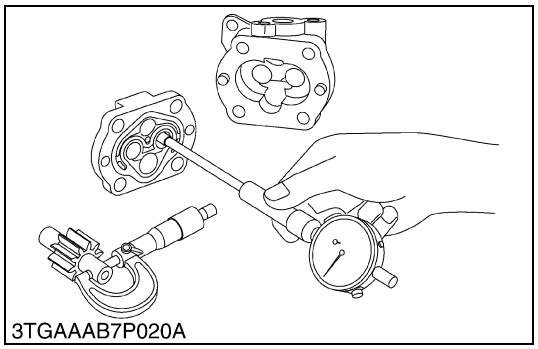

3TGAAAB7P019A

Clearance between Tip of Gear Tooth and Casing

1. Measure the clearance between gear and casing at several points with feeler gauge.
2. If the clearance exceeds the allowable limit, replace the assembly.

Clearance between tip of gear tooth and casing	Allowable limit	0.15 mm 0.0059 in.

W1015764


3TGAAAB7P020A

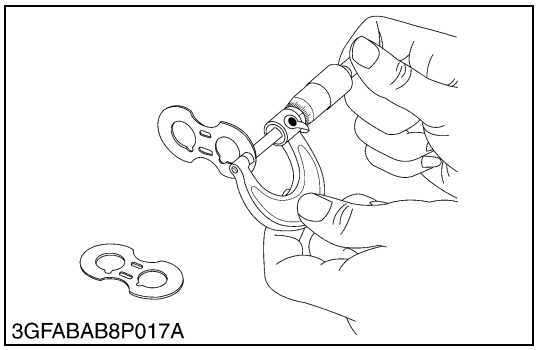
Clearance between Bushing and Shaft

1. Measure the shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with a cylinder gauge.
3. If the clearance exceeds the allowable limit, replace it.

Clearance between bushing and shaft	Factory spec.	0.020 to 0.091 mm 0.0008 to 0.0036 in.
	Allowable limit	0.12 mm 0.0047 in.

Shaft O.D.	Factory spec.	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory spec.	15.000 to 15.061 mm 0.5906 to 0.5930 in.

W1015972

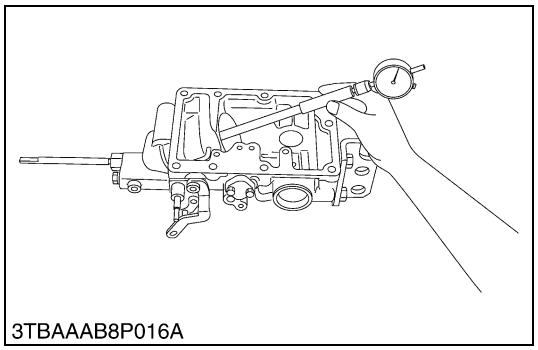

3GFABAB8P017A

Side Plate Thickness

1. Measure the side plate thickness with an outside micrometer.
2. If the thickness is less than the allowable limit, replace it.

Side plate thickness	Factory spec.	2.48 to 2.50 mm 0.0976 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

W1016194

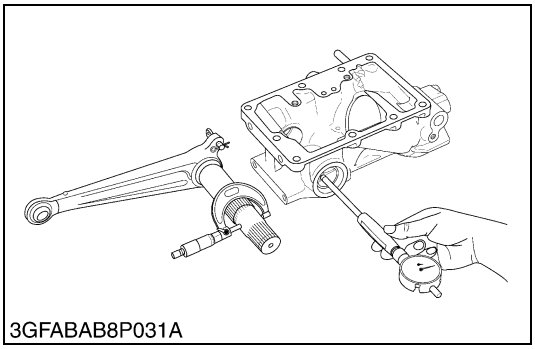

3TBAAAB8P016A

Hydraulic Cylinder Bore

1. Check the cylinder internal surface for scoring or damage.
2. Measure the cylinder I.D. with a cylinder gauge.
3. If the measurement exceeds the allowable limit, replace the hydraulic cylinder block.

Cylinder I.D.	Factory spec.	70.05 to 70.10 mm 2.7579 to 2.7598 in.
	Allowable limit	70.15 mm 2.7618 in.

W10171300


3GFABAB8P031A

Clearance between Hydraulic Arm Shaft and Bushing

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

Clearance between hydraulic arm shaft and bushing	Factory spec.	0.020 to 0.110 mm 0.0008 to 0.0043 in.
	Allowable limit	0.30 mm 0.0118 in.

Hydraulic arm shaft O.D.	Factory spec.	Right	37.925 to 37.950 mm 1.4931 to 1.4941 in.
		Left	33.925 to 33.950 mm 1.3356 to 1.3366 in.

Hydraulic cylinder bushing I.D. (after press filed)	Factory spec.	Right	37.970 to 38.035 mm 1.4949 to 1.4974 in.
		Left	33.970 to 34.035 mm 1.3374 to 1.3400 in.

W10413570

8 ELECTRICAL SYSTEM

MECHANISM

CONTENTS

1. WIRING DIAGRAM

Flasher Unit

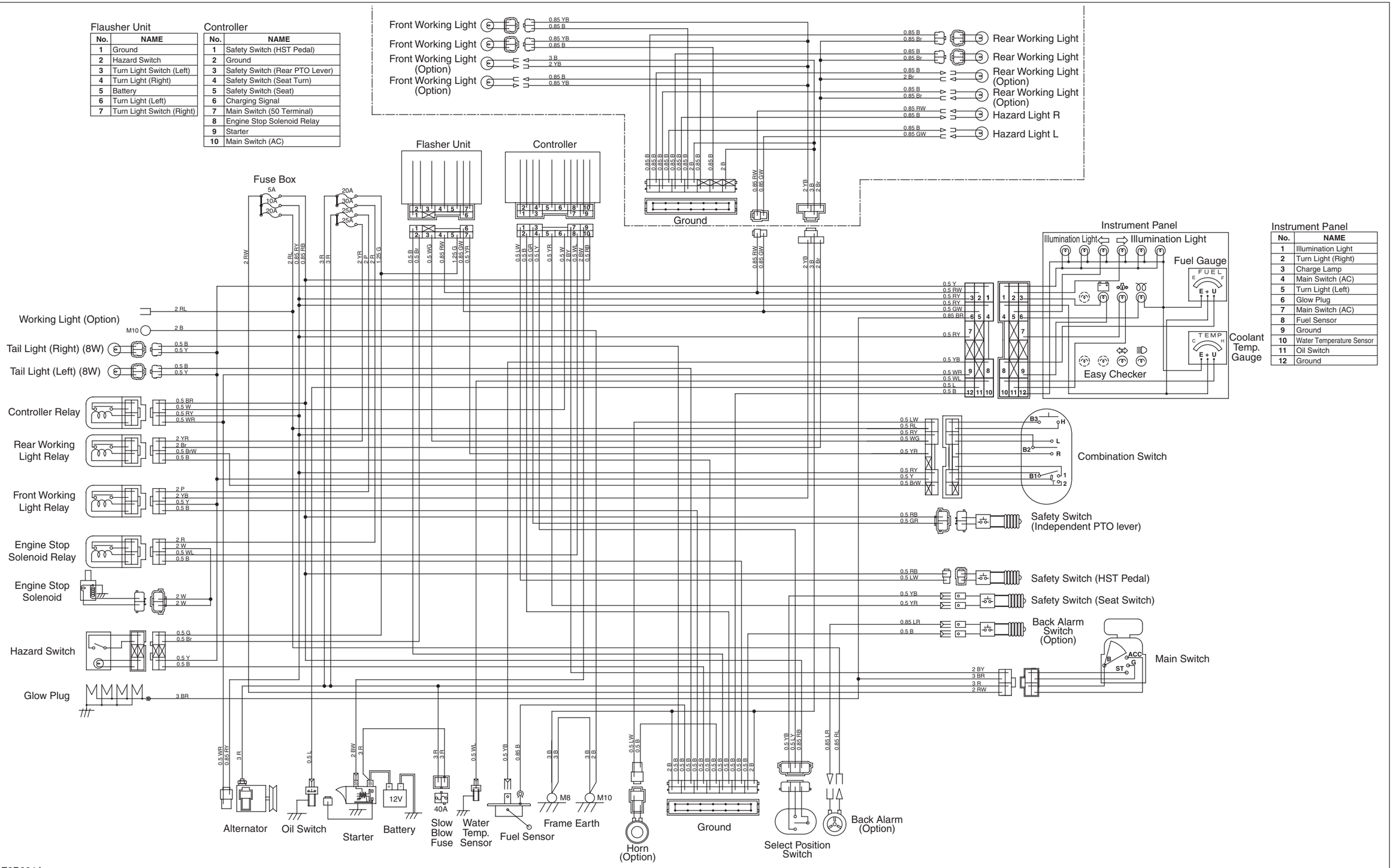
No.	NAME
1	Ground
2	Hazard Switch
3	Turn Light Switch (Left)
4	Turn Light (Right)
5	Battery
6	Turn Light (Left)
7	Turn Light Switch (Right)

Controller

No.	NAME
1	Safety Switch (HST Pedal)
2	Ground
3	Safety Switch (Rear PTO Lever)
4	Safety Switch (Seat Turn)
5	Safety Switch (Seat)
6	Charging Signal
7	Main Switch (50 Terminal)
8	Engine Stop Solenoid Relay
9	Starter
10	Main Switch (AC)

Instrument Panel

No.	NAME
1	Illumination Light
2	Turn Light (Right)
3	Charge Lamp
4	Main Switch (AC)
5	Turn Light (Left)
6	Glow Plug
7	Main Switch (AC)
8	Fuel Sensor
9	Ground
10	Water Temperature Sensor
11	Oil Switch
12	Ground



3TVAAAF9P001A

Color of Wiring

W ..... White	WR ..... White / Red	BrW ..... Brown / White
R ..... Red	WL ..... White / Blue	LY ..... Blue / Yellow
L ..... Blue	RW ..... Red / White	LW ..... Blue / White
Y ..... Yellow	RL ..... Red / Blue	LR ..... Blue / Red
B ..... Black	RY ..... Red / Yellow	YR ..... Yellow / Red
G ..... Green	RB ..... Red / Black	YB ..... Yellow / Black
P ..... Pink	BW ..... Black / White	GR ..... Green / Red
Br ..... Brown	BR ..... Black / Red	GW ..... Green / White
WG ..... White / Green	BY ..... Black / Yellow	

■ **NOTE**

- **Some colors shown in the above table is not used in B26 tractor wirings.**

W1019456

2. ENGINE STARTING SYSTEM AND STOPPING SYSTEM

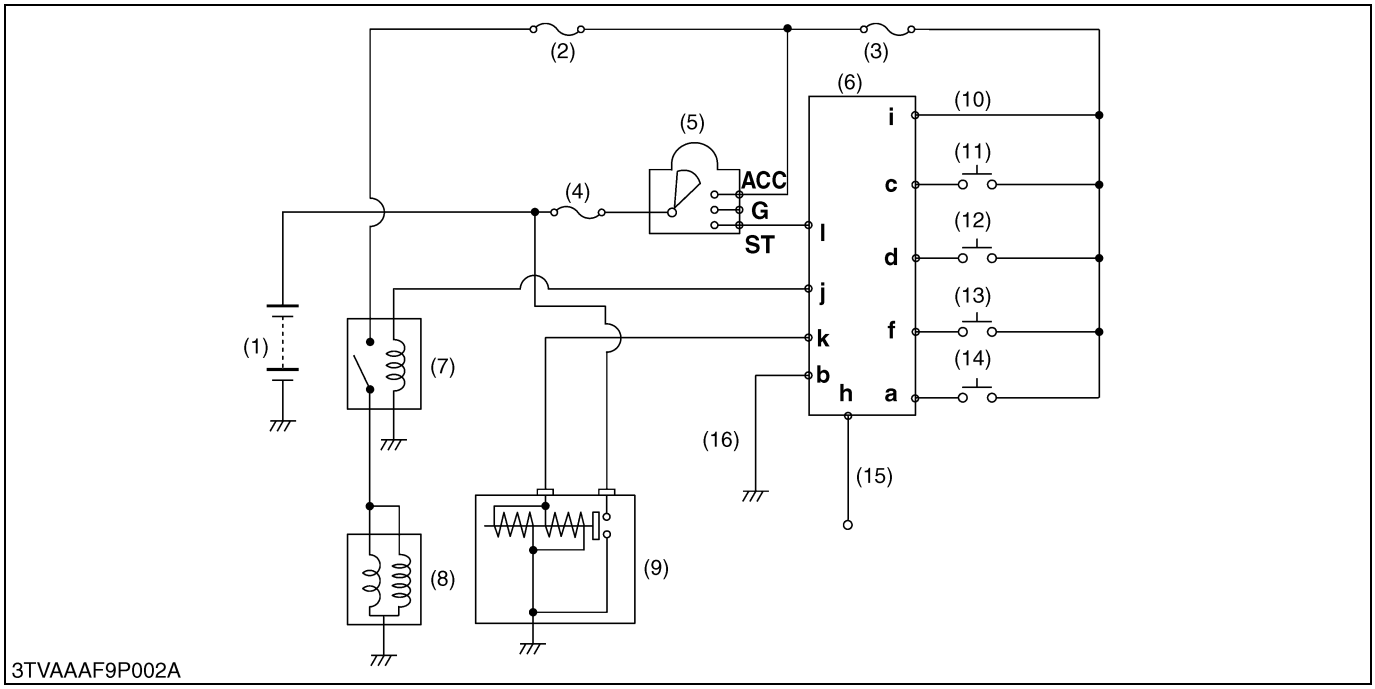
B26 tractor equip operator presence control (OPC) system will automatically stop the engine when operator stands up from the seat while shifting the independent PTO lever or the HST pedal.

This system is controlled by five safety switches, (independent PTO lever switch, seat turn switch, HST pedal switch, seat switch) and controller.

Engine starting is operated with starter motor after current flowing from controller to starter motor.

Engine stopping is operated with engine stop solenoid after current flowing from controller through engine stop solenoid relay to engine stop solenoid.

[1] OPC SYSTEM CIRCUIT



(1) Battery
(2) Fuse (30 A)
(3) Fuse (5 A)
(4) Slow Blow Fuse (30 A)
(5) Main Switch
(6) Controller
(7) Engine Stop Solenoid Relay
(8) Engine Stop Solenoid
(9) Starter Motor
(10) AC Terminal Lead
(11) Independent PTO Lever Switch
(12) Seat Turn Switch
(13) HST Pedal Switch
(14) Seat Switch
(15) Regulator L Terminal Lead
(16) Frame Earth

a to l :Controller Terminal
AC :AC Terminal
G : G Terminal
ST :ST Terminal

The BX1850 and BX2350 tractor (with the OPC timer (18))equipped the operator presence control (OPC) system which automatically stops the engine in approximately one second when operator stands from the seat while shifting the PTO clutch lever and range gear shift lever

(1) Related Switches

■ Seat Switch

This switch is located under the seat.
When sitting on the seat, the seat switch (1) is pushed in and electrical circuit is closed. When the seat is vacant, this switch is not pushed and electrical circuit is opened.

(1) Seat Switch

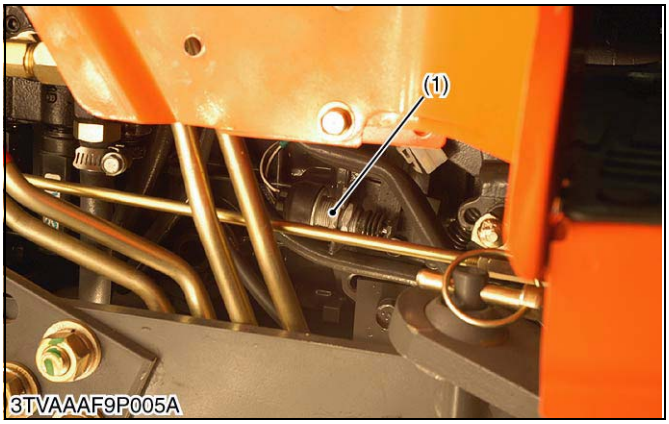
W1017285

■ Seat Turn Switch

This switch is located under the seat bracket.
When the seat position is forward or reverse (backhoe) position, electrical circuit is closed.

(1) Seat Turn Switch

W1017505

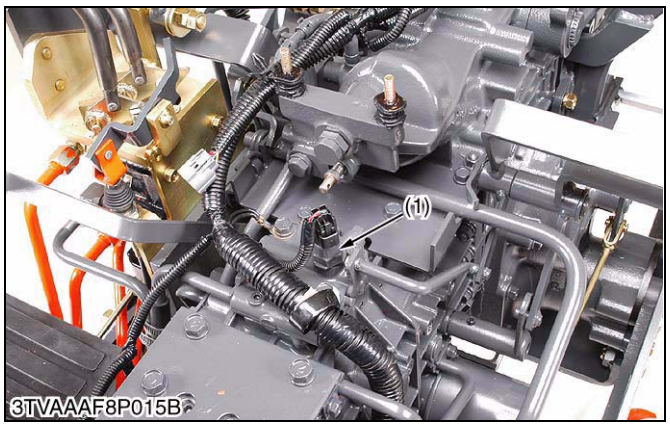


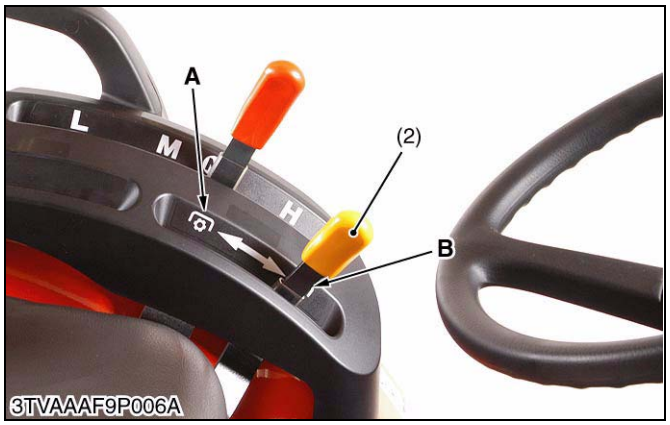
■ HST Pedal Switch

This switch located at the neutral switch stay.
This switch is a push type.
This switch detects the position of the HST pedal.
When HST pedal is at "**NEUTRAL**" position, this switch is turned to "**ON**".
When HST pedal is at "**FORWARD**" or "**REVERSE**" position, this switch is turned to "**OFF**".

(1) HST Pedal Switch

W1017592





■ **Independent PTO Lever Switch**

This switch locations at the top of the independent PTO control valve.

This switch is a push type.

This switch detects the independent PTO valve operating.

When the independent PTO lever is set to "**DISENGAGED**" position, this switch is turned to "**ON**".

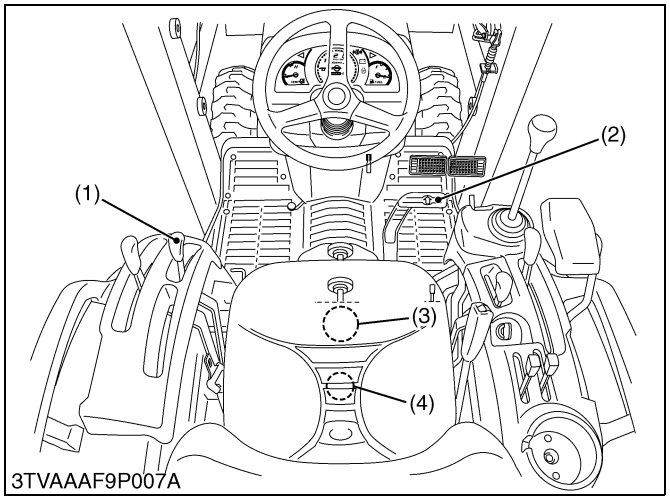
When the independent PTO lever is set to "**ENGAGED**" position, this switch is turned to "**OFF**".

(1) Independent PTO Lever Switch
(2) Independent PTO Lever

A : "ENGAGED" Position
B : "DISENGAGED" Position

W1020650

(2) Engine Starting Conditions



When the following conditions become complete, electric current (12V) reaches starter **AC** terminal through operator presence controller from the main switch **ST** terminal, and the engine can be started.

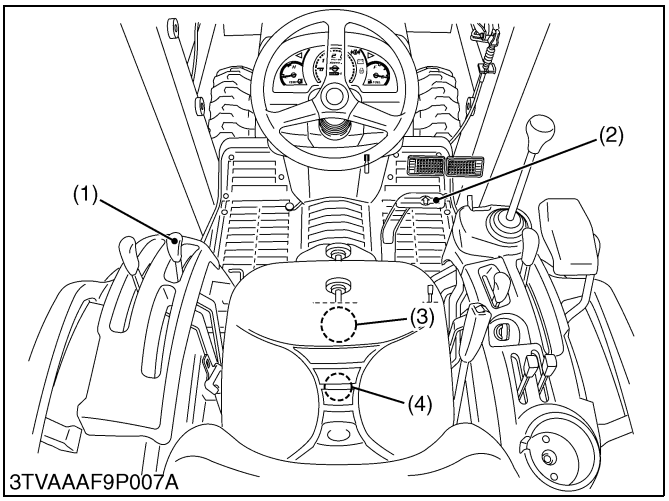
(1) PRO Clutch Lever
(2) HST Pedal
(3) Seat Turn Switch
(4) Seat Switch

W1018382

Condition	Independent PTO Lever Switch	HST Pedal Switch	Seat Switch	Seat Turn Switch	Engine Condition
	Disengaged : ON Engaged : OFF	Neutral : ON Engaged : OFF	Occupied : ON Vacant : OFF	Forward, Reverse : ON Other : OFF	
1	OFF	ON	ON or OFF	ON or OFF	Can not start
2	ON	OFF	ON or OFF	ON or OFF	Can not start
3	ON	ON	ON or OFF	ON or OFF	Can start

W1021323

(3) Automatic Engine Stop



Engine can be shut off under the following conditions since these conditions cause OPC controller to operate and it controls fuel cut solenoid.

(1) PRO Clutch Lever
(2) HST Pedal
(3) Seat Turn Switch
(4) Seat Switch

W1018678

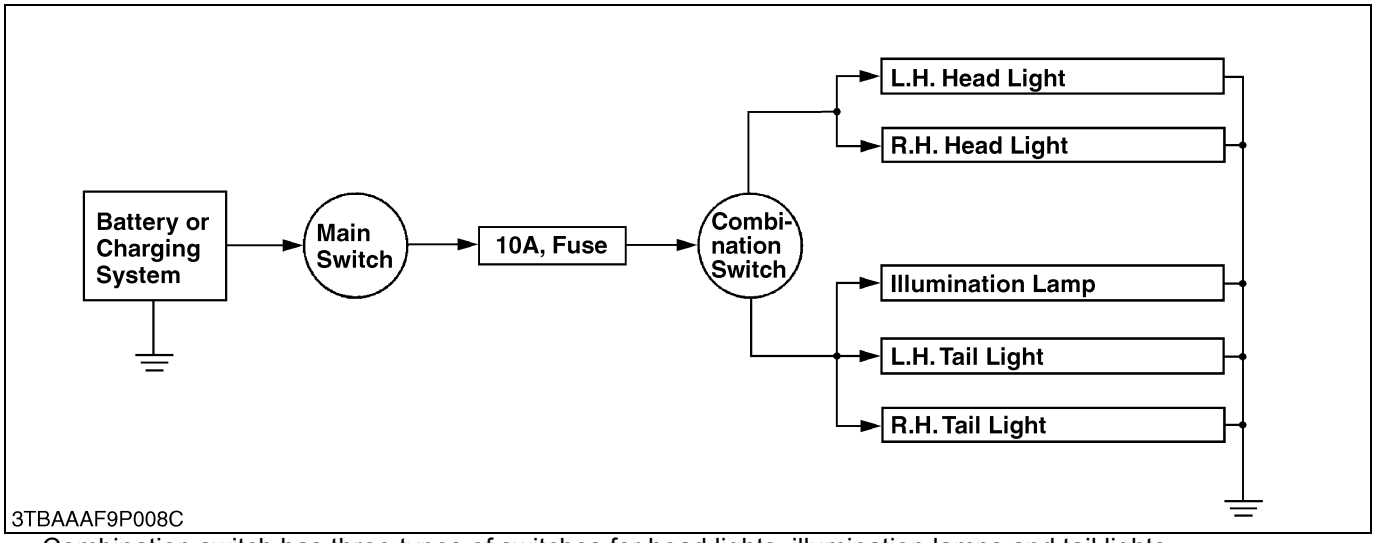
Condition	Independent PTO Lever Switch	HST Pedal Switch	Seat Switch	Seat Turn Switch	Engine Condition
					Engine Starting
	Disengaged : ON Engaged : OFF	Neutral : ON Engaged : OFF	Occupied : ON Vacant : OFF	Forward : ON 1 Reverse : ON 2 Other : OFF	Current to engine stop solenoid : OFF, one second delay engine shut off
1	ON	OFF	OFF	ON 1	One second delay engine shut off
2	OFF	ON	OFF	ON 2	One second delay engine shut off
3	ON	OFF	ON or OFF	ON 2	One second delay engine shut off
4	OFF	ON	ON or OFF	ON 2	Running

W1018850

3. LIGHTING SYSTEM

The lighting system consists of combination switch for head light, illumination lamp, tail light and hazard switches for tail lights etc..

[1] HEAD LIGHT AND TAIL LIGHT



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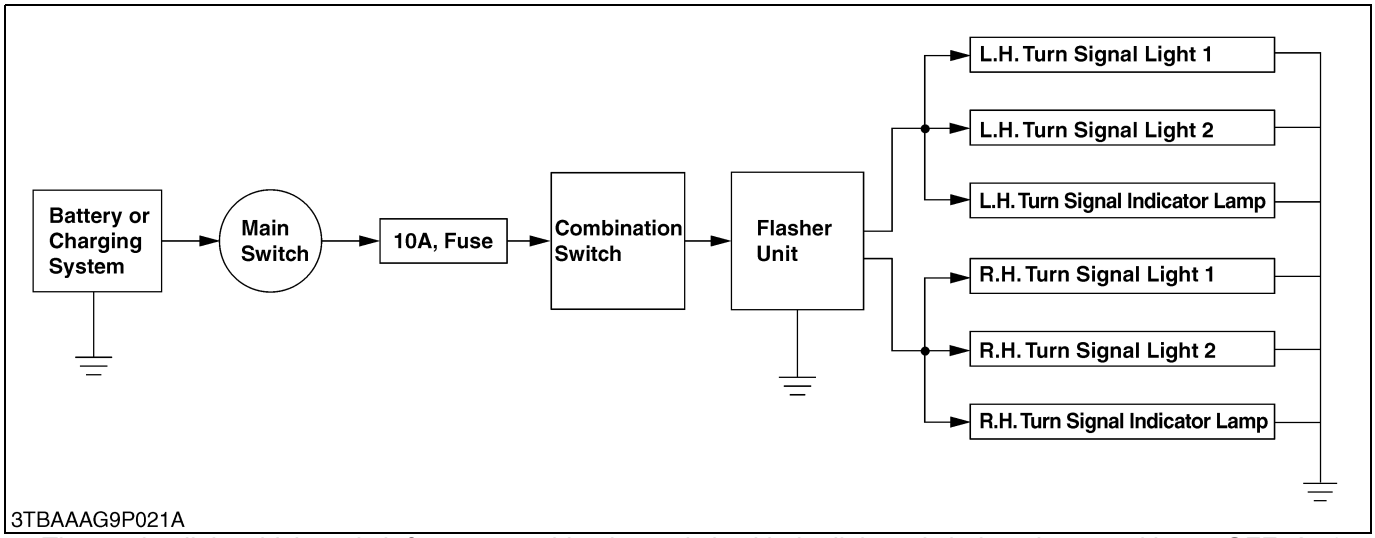
Combination switch has three types of switches for head lights, illumination lamps and tail lights.

Current passes through the light circuit as shown in the figure above.

[2] TURNING LIGHT



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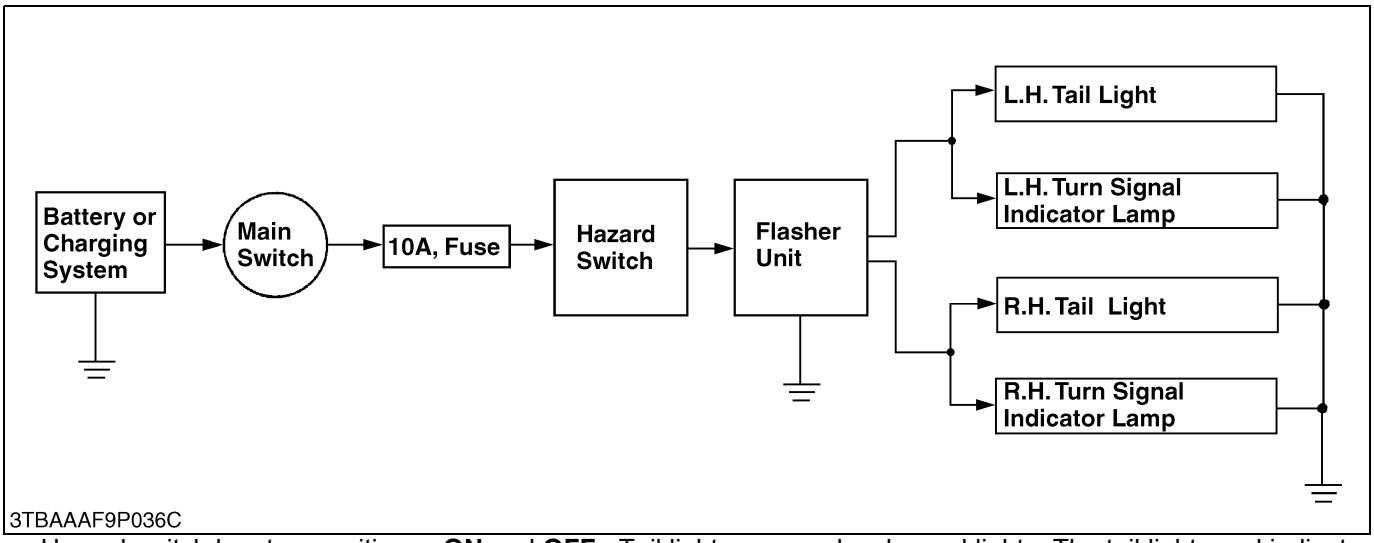
The turning light which, switch forms a combination switch with the light switch, has three positions ; **OFF**, **1.**, **2.**.

When turning, light switch blinks only one side light and other one stays on. Priority is given to the turning light when the hazard switch and the turn signal light switch are turned on at the same time.

[3] TAIL LIGHT



Hazard switch has two positions : **ON** and **OFF**. Tail lights are used as hazard lights. The tail lights and indicator lamps are shown in the figure above. The tail light is operative when the key switch is in either the **ON** or **OFF** position.

4. EASY CHECKER

To check the conditions of tractor easily before and during operation, easy checker combination of lamps on the easy checker board is provided.

[1] INDICATION ITEMS

■ **Charge Lamp**

When the charging system does not function properly, this lamp illuminates.

■ **Pre-heat indicator Lamp**

When the key switch is in the **"Pre-heat"** position, the pre-heat indicator lamp illuminates.

■ **Oil Pressure Lamp**

When the engine oil pressure is low, this lamp illuminates.

(1) Oil Pressure Lamp
(2) Charge Lamp
(3) Pre-heat Indicator Lamp

W1021891

SERVICING

CONTENTS

1. TROUBLESHOOTING

FUSE AND WIRING

Symptom	Probable Cause	Solution	Reference Page
All Electrical Equipment Do Not Operate	Battery discharged or defective	Recharge or Replace	8-S8
	Battery positive cable disconnected or improperly connected	Repair or Replace	8-S8
	Battery negative cable disconnected or improperly connected	Repair or Replace	8-S8
	Slow blow fuse blown	Replace	G-38
Fuse Blown Frequently	Short-circuited	Repair or Replace	–

W10143220

BATTERY

Battery Discharges Too Quickly	Battery defective	Recharge or Replace	8-S8
	Alternator defective	Repair or Replace	8-S29
	Regulator defective	Replace	8-S29
	Wiring harness disconnected or improperly connected (between battery positive terminal and regulator **B** terminal)	Repair or Replace	–
	Cooling fan belt slipping	Adjust tension	G-25

W10137180

STARTING SYSTEM

Starter Motor Does Not Operate	Battery discharged or defective	Recharge or Replace	8-S8
	Slow blow fuse blown	Replace	G-38
	Safety switch improperly adjusted or defective	Repair or replace	8-S15
	Wiring harness disconnected or improperly connected (between main switch **ST** terminal and operator presence controller, between main switch **ST** terminal and starter relay, between safety switches and operator presence controller, between safety switches and starter relay, between battery positive terminal and starter motor)	Repair or replace	–
	Operator presence controller defective	Replace	8-S16
	Starter relay defective	Replace	–
	Starter motor defective	Repair or replace	8-S26
	Main switch defective	Replace	8-S10
Pre-heat indicator Lamp Does Not Light When Main Switch Is in Pre-heat Position	Battery discharged or defective	Recharge or Replace	8-S8
	Slow blow fuse blown	Replace	G-38
	Wiring harness disconnected or improperly connected (between main switch **G** terminal and pre-heat indicator, between pre-heat indicator and glow plugs)	Repair or Replace	–
	Main switch defective	Replace	8-S10
	Pre-heat indicator defective	Replace	8-S23

W10137180

OPERATOR PRESENCE CONTROL (OPC)

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Stop	Solenoid fuse blown (30A)	Replace	G-38
	Engine stop solenoid relay defective	Replace	8-S14
	Engine stop solenoid defective	Replace	8-M3, M5
	Operator presence controller defective	Replace	8-S16
	Independent PTO lever switch defective	Adjust or Replace	8-S15
	HST pedal switch defective	Adjust or Replace	8-S15
	Wiring harness disconnected or improperly connected (between key stop solenoid relay and key stop solenoid, between engine stop solenoid relay and battery positive terminal)	Repair or Replace	–
	Wiring harness disconnected or improperly connected (between operator presence controller and engine stop solenoid relay)	Repair or Replace	–
Starter Motor Does Not Operate	Solenoid fuse blown	Replace	G-38
	Engine stop solenoid defective	Replace	8-M3, M5
	Engine stop solenoid relay defective	Replace	8-S14
	Seat switch or seat turn switch defective	Adjust or Replace	8-S15
	Independent PTO lever switch defective	Adjust or Replace	8-S15
	HST pedal switch defective	Adjust or Replace	8-S15
	Operator presence controller defective	Replace	8-S16
	Wiring harness disconnected or improperly connected (between engine stop solenoid relay and key stop solenoid, between key stop solenoid relay and battery positive terminal)	Repair or Replace	–
	Wiring harness disconnected or improperly connected (between operator presence controller and engine stop solenoid relay)	Repair or Replace	–
Engine Stops When HST Pedal is Pushed in Forward or in Reverse	Wrong wiring of seat switch and seat turn switch	Proper Wiring	8-S15

W10236630

CHARGING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Charging Lamp Does Not Light when Main Switch is Turned ON	Fuse blown (10A)	Replace	G-38
	Wiring harness disconnected or improperly connected (between main switch **ACC** terminal and panel board, between panel board and dynamo)	Repair or Replace	–
	Alternator defective	Repair or Replace	8-S27
	Regulator defective	Replace	8-S30
Charging Lamp Does Not Go Off When Engine Is Running	Wiring harness disconnected or improperly connected (between main switch **ST** terminal and alternator, between panel board and dynamo)	Repair or Replace	–
	Alternator defective	Repair or Replace	8-S27
	Regulator defective	Replace	8-S30

W10135800

LIGHTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Head Light Does Not Light	Fuse blown (10 A)	Replace	G-38
	Bulb blown	Replace	G-38
	Wiring harness disconnected or improperly connected (between main switch **ACC** terminal and combination switch **B1** terminal, between combination switch **1** terminal and headlight	Repair or Replace	–
Tail Light Does Not Light	Fuse blown (10 A)	Replace	G-38
	Bulb blown	Replace	G-38
	Wiring harness disconnected or improperly connected (between main switch **ACC** terminal and combination switch **B1** terminal, between combination switch **T** terminal and tail light)	Repair or Replace	–
Illumination Light Does Not Light	Fuse blown (10 A)	Replace	G-38
	Bulb blown	Replace	G-38
	Wiring harness disconnected or improperly connected (between main switch **ACC** terminal and combination switch **B1** terminal, between combination switch **T** terminal and panel board)	Repair or Replace	–
Hazard Light (Tail Light) Does Not Light	Fuse blown (10 A)	Replace	G-38
	Bulb blown	Replace	G-38
	Wiring harness disconnected or improperly connected	Repair or Replace	–
	Flasher unit defective	Replace	8-S22
	Hazard switch defective	Replace	8-S20
Hazard Indicator Lamp (Turn Signal Lamp) Does Not Light	Bulb blown	Replace	G-38
	Wiring harness disconnected or improperly connected	Replace	–
Hazard Light (Tail Light) Does Not Flicker	Flasher unit defective	Repair or Replace	8-S22
Turn Signal Light Does Not Light	Fuse blown (10 A)	Replace	G-38
	Bulb blown	Replace	G-38
	Wiring harness disconnected or improperly connected	Repair or Replace	–
	Flasher unit defective	Replace	8-S22
	Combination switch defective	Replace	8-S17
Turn Signal Light Indicator Lamp Does Not Light	Bulb blown	Replace	G-38
	Wiring harness disconnected or improperly connected (between combination switch **R** or **L** terminal and panel board)	Repair or Replace	–
Turn Signal Light Does Not Flicker	Flasher unit defective	Replace	8-S22
	Blinker switch defective	Replace	8-S17

W10137180

EASY CHECKER

Symptom	Probable Cause	Solution	Reference Page
Oil Pressure Lamp Lights Up When Engine Is Running	Engine oil pressure too low	Repair engine	–
	Engine oil insufficient	Replenish	G-19
	Oil pressure switch defective	Replace	8-S23
	Short circuit between oil pressure switch lead and chassis	Repair	–
	Circuit in panel board defective	Replace	–
Oil Pressure Lamp Does Not Light When Main Switch Is Turned On and Engine Is Not Running	Bulb blown	Replace	G-38
	Oil pressure switch defective	Replace	8-S23
	Wiring harness disconnected or improperly connected (between panel board and oil pressure switch)	Repair or Replace	–
	Circuit in panel board defective	Repair or Replace	–

W10250050

GAUGES

Fuel Gauge Does Not Function	Fuel gauge defective	Repair	–
	Fuel level sensor defective	Replace	8-S25
	Wiring harness disconnected or improperly connected (between panel board and fuel level sensor)	Repair or Replace	–
	Circuit in panel board defective	Replace	–
Coolant Temperature Gauge Does Not Function	Coolant temperature gauge defec	Replace	8-S24
	Coolant temperature sensor defective	Replace	8-S24
	Wiring harness disconnected or improperly connected (between panel board and coolant temperature sensor)	Repair or Replace	–
	Circuit in panel board defective	Replace	–

W10137180

2. SERVICING SPECIFICATIONS

BATTERY

Item		Factory Specification	Allowable Limit
Battery Voltage	Voltage	More than 12V	–
Battery Terminal Connection	Voltage	Less than 0.1V	–

W10259840

GLOW PLUG

Glow Plug	Resistance	Approx. 0.9 Ω	–

W10258630

STARTER

Commutator	O.D. Difference of O.D.'s	28.0 mm 1.102 in. Less than 0.02 mm 0.0008 in.	27.0 mm 1.063 in. 0.05 mm 0.0020 in.
Mica	Undercut	0.60 mm 0.0236 in.	0.20 mm 0.0079 in.
Brush	Length	14.0 mm 0.551 in.	9.0 mm 0.354 in.
Brush Holder to Holder Support	Resistance	Infinity	–

W10138740

ALTERNATOR

Stator	Resistance	Less than 1.0 Ω	–
Rotor	Resistance	2.9 Ω	–
Slip Ring	O.D.	14.4 mm 0.567 in.	12.8 mm 0.504 in.
Brush	Length	10.5 mm 0.413 in.	8.4 mm 0.331 in.

W10559890

SAFETY SWITCH

HST Pedal Switch	Resistance	0 Ω when placing the HST pedal to **"NEUTRAL"**	–
Independent PTO Lever Switch	Resistance	0 Ω when placing the independent pedal to **"OFF (Disengaged)"** position	–
Seat Switch	Resistance	0 Ω when sitting on the seat.	–

W10562150

3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	lbf·ft
Pulley nut	58.3 to 78.9	5.95 to 8.05	43.0 to 58.2

W1056607

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

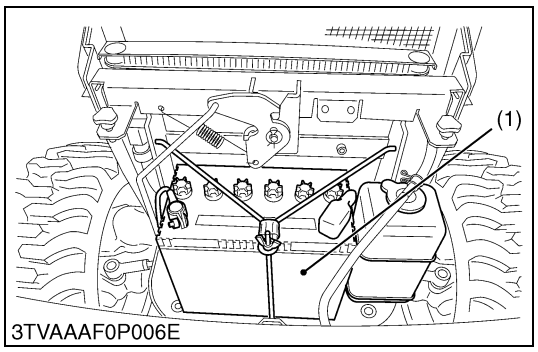
CAUTION

- **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.**

(1) Battery



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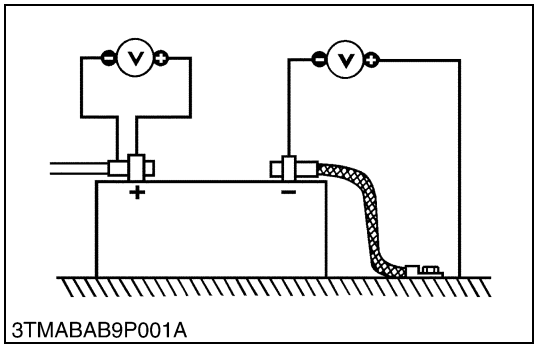

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Battery Voltage

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 spec.	More than 12 V

(1) Battery

W10125620

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 spec.	Less than 0.1 V

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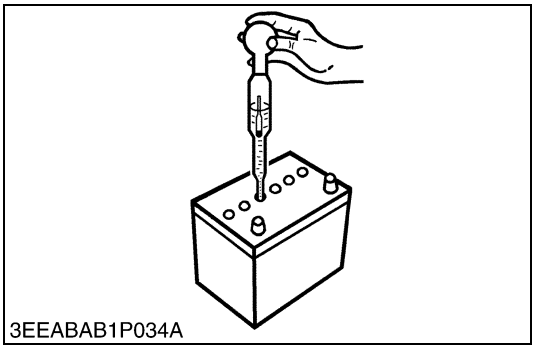
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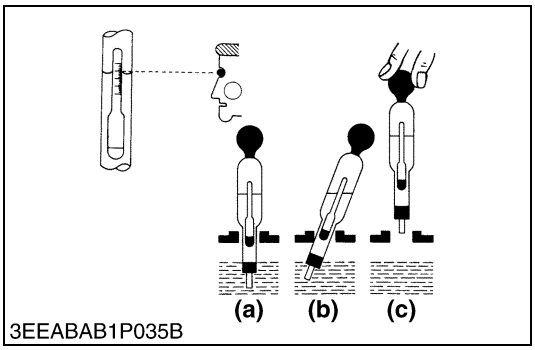

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Battery Specific Gravity

1. Check the specific gravity of the electrolyte in each cell with a hydrometer.
2. When the electrolyte temperature differs from that at which the hydrometer was calibrated, correct the specific gravity reading following the formula mentioned in **(Reference)**.
3. If the specific gravity is less than 1.215 (after it is corrected for temperature), charge or replace the battery.
4. If the specific gravity differs between any two cells by more than 0.05, replace the battery.

■ **NOTE**

- **Hold the hydrometer tube vertical without removing it from the electrolyte.**
- **Do not suck too much electrolyte into the tube.**
- **Allow the float to move freely and hold the hydrometer at eye level.**
- **The hydrometer reading must be taken at the highest electrolyte level.**

(Reference)

- Specific gravity slightly varies with temperature. To be exact, the specific gravity decreases by 0.0007 with an increase of 1 °C (0.0004 with an increase of 1 °F) in temperature, and increases by 0.0007 with a decreases of 1 °C (0.0004 with a decrease of 1 °F).
  Therefore, using 20 °C (68 °F) as a reference, the specific gravity reading must be corrected by the following formula :
  - Specific gravity at 20 °C = Measured value + 0.0007 × (electrolyte temperature − 20 °C)
  - Specific gravity at 68 °F = Measured value + 0.0004 × (electrolyte temperature − 68 °F)

Specific Gravity	State of Charge
1.260 Sp. Gr.	100 % Charged
1.230 Sp. Gr.	75 % Charged
1.200 Sp. Gr.	50 % Charged
1.170 Sp. Gr.	25 % Charged
1.140 Sp. Gr.	Very Little Useful Capacity
1.110 Sp. Gr.	Discharged

At an electrolyte temperature of 20 °C (68 °F)

(a) Good
(b) Bad
(c) Bad

W10127630

(2) Main Switch

Main Switch

1. Disconnect the **4P** connector and remove the main switch (1).
2. Perform the following checks.

(1) Main Switch (2) Connector

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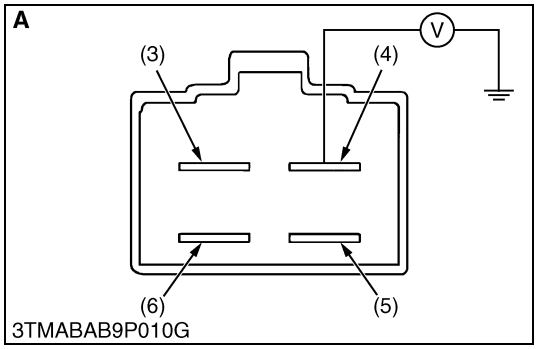


Connector Voltage

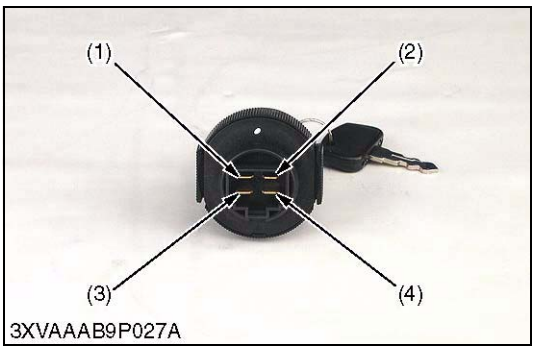
1. Measure the voltage with a voltmeter across the connector **B** (red) terminal and chassis.
2. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness is faulty.

Voltage	Connector **B** (Red) terminal – chassis	Approx. battery voltage

(1) Main Switch
(2) Connector
(3) **ST** Terminal
(4) **B** Terminal
(5) **ACC** Terminal
(6) **G** Terminal

A : Wiring Harness Side

W1014402



Main Switch Continuity

1) Main Switch Key at OFF Position

1. Set the main switch **OFF** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **ACC** terminal, **B** terminal and **ST** terminal, **B** terminal and **G** terminal.
3. If infinity is not indicated, the contacts of the main switch are faulty.

Resistance	**B** terminal – **ACC** terminal	Infinity
	B terminal – **ST** terminal	
	B terminal – **G** terminal	

2) Main Switch Key at ON Position

1. Set the main switch **ON** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, the **B** – **ACC** contact of the main switch are faulty.

Resistance	**B** terminal – **ACC** terminal	0 Ω

3) Main Switch Key at PREHEAT Position

1. Set and hold the main switch key at the **PREHEAT** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **G** terminal, and measure the resistance across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	**B** terminal – **G** terminal	0 Ω
	B terminal – **ACC** terminal	

4) Main Switch Key at START Position

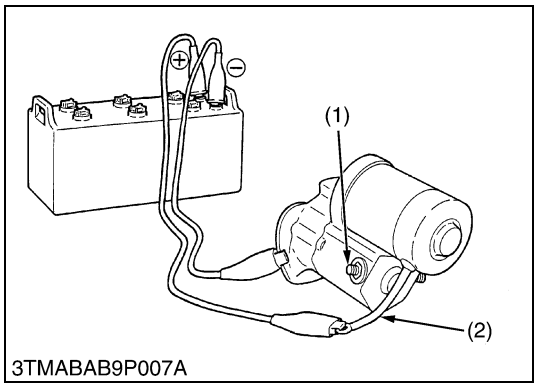
1. Set and hold the main switch key at the **START** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **G** terminal, across the **B** terminal and the **ST** terminal, and across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	**B** terminal – **G** terminal	0 Ω
	B terminal – **ST** terminal	
	B terminal – **ACC** terminal	

(1) **G** Terminal
(2) **ACC** Terminal
(3) **ST** Terminal
(4) **B** Terminal

W10136580

(3) Starter



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Motor Test

CAUTION

- **Secure the starter to prevent if 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.
3. Remove the starter from the engine.
4. Disconnect the connecting lead (2) from the starter **C** terminal (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) **C** Terminal (2) Connecting Lead

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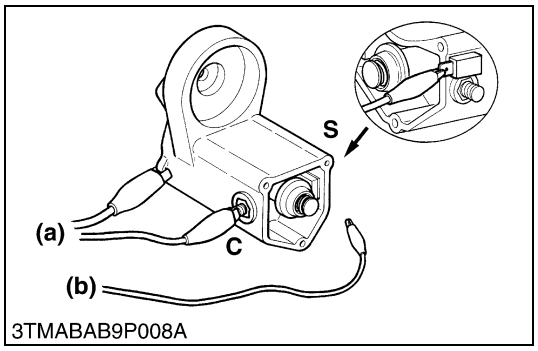

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Magnet Switch Test (Pull-in, Holding Coils)

1. Remove the motor from the starter housing.
2. Preparate a 6 V battery for the test.
3. Connect jumper leads from the battery negative terminal to the housing and the starter **C** terminal.
4. The plunger should be attracted and the pinion gear should pop out when a jumper lead is connected from the battery positive terminal to the **S** terminal. It's a correct.
5. Disconnect the jumper lead to the starter **C** terminal. Then the pinion gear should remain popped out. It's a correct.

■ **IMPORTANT**

- **Testing time must be 3 to 5 sec..**

C : C Terminal **(a) To Negative Terminal**
S : S Terminal **(b) To Positive Terminal**

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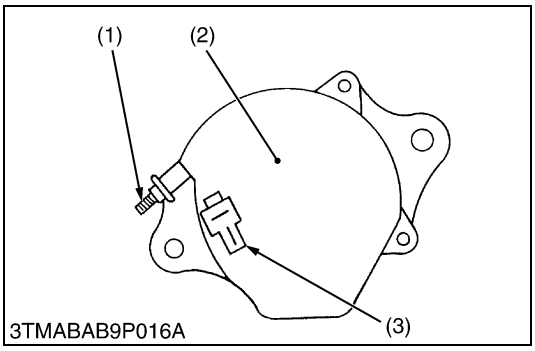
(4) Alternator



Alternator

1. Disconnect the **2P** connector (3) from alternator after turning the main switch **OFF**.
2. Perform the following checkings.

(1) **B** Terminal
(2) Alternator
(3) **2P** Connector

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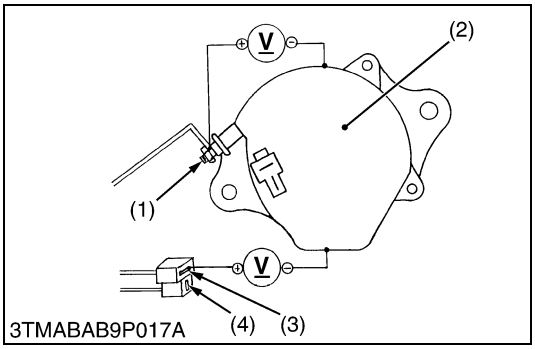


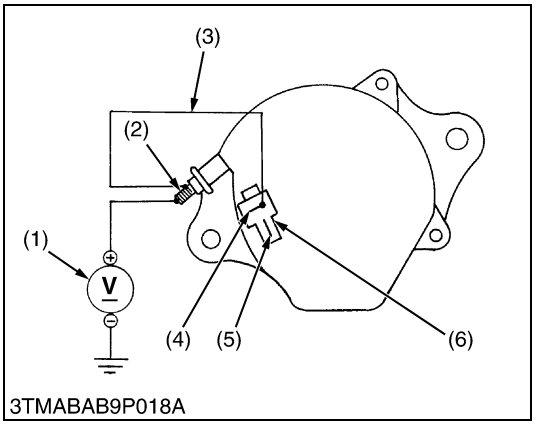
Connector Voltage

1. Turn the main switch **OFF**. Measure the voltage between the **B** terminal (1) and the chassis.
2. Turn the main switch **ON**. Measure the voltage between the **IG** terminal (3) and the chassis.

Voltage (Main switch at **OFF**)	**B** terminal (1) – Chassis	Approx. battery voltage
Voltage (Main switch at **ON**)	**IG** terminal (3) – Chassis	Approx. battery voltage

(1) **B** Terminal
(2) Alternator
(3) **IG** Terminal
(4) **L** Terminal

W10182790



No-Load Test

1. Connect the **2P** connector (6) to previous positions of the alternator after turning the main switch **OFF**.
2. Connect the jumper lead (3) between **IG** terminal (4) and **B** terminal (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 **B** terminal (2) and the chassis.
6. If the measurement is less than the factory specification, disassemble the alternator and check the IC regulator.

Voltage	Factory spec.	More than 14 V

(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
(2) **B** Terminal
(3) Jumper Lead
(4) **IG** Terminal
(5) **L** Terminal
(6) **2P** Terminal

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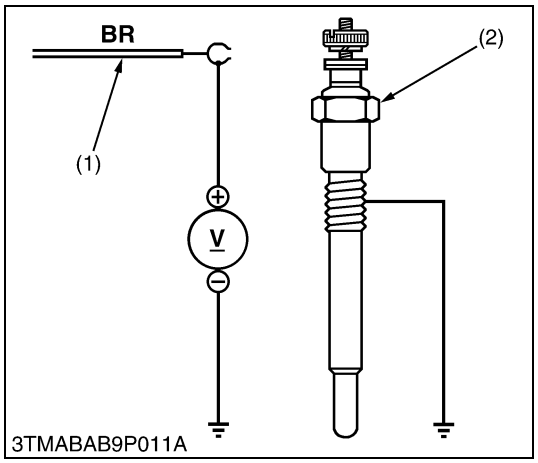
(5) Glow Plug



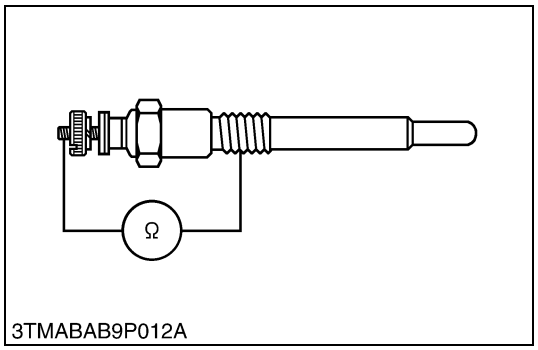
Lead Terminal Voltage

1. Disconnect the wiring lead (1) from the glow plug (2) after turning the main switch off.
2. Turn the main switch key to the **"PREHEAT"** position, and measure the voltage between the lead terminal and the chassis.
3. Turn the main switch key to the **"START"** position, and measure the voltage with a voltmeter between the lead terminal and the chassis.
4. If the voltage at either position differs from the battery voltage, the wiring harness or main switch is faulty.

Voltage (Lead terminal – Chassis)	Main switch key at **"PREHEAT"**	Approx. battery voltage
	Main switch key at **"START"**	Approx. battery voltage

(1) Wiring Lead (Positive) (2) Glow Plug

W10149130



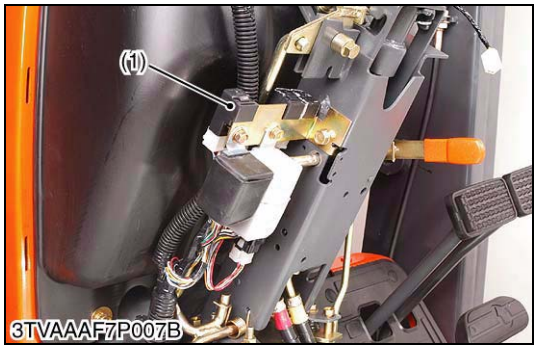
Glow Plug Continuity

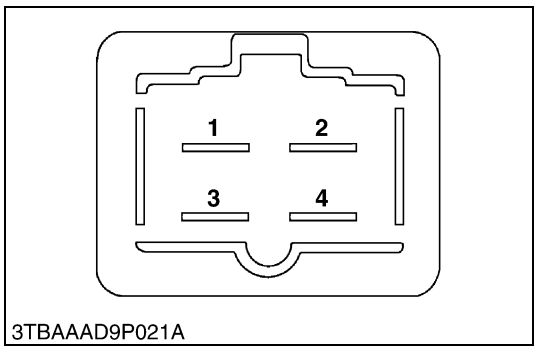
1. Disconnect the lead from the glow plugs.
2. Measure the resistance with an ohmmeter between the glow plug terminal and the chassis.
3. If 0 ohm is indicated, the screw at the tip of the glow plug and the housing are short-circuited.
4. If the factory specification is not indicated, the glow plug is faulty.

Glow plug resistance	Factory spec.	Approx. 0.9 Ω

0000001152E

(6) Engine Stop Solenoid Relay





Engine Stop Solenoid Relay (Starter Relay)

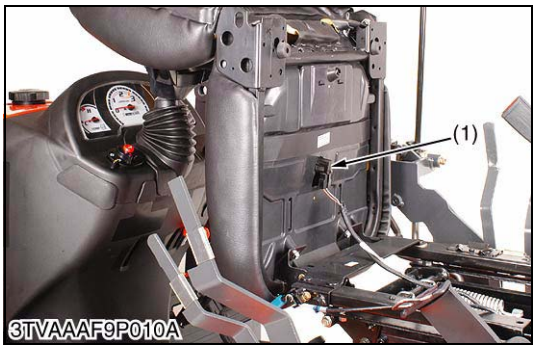
1. Open the panel board and remove the engine stop solenoid relay (6).
2. Apply battery voltage across **2** terminal and **4** terminal, and check for continuity across **1** terminal and **3** terminal.
3. If 0 Ω is not indicated, renew the engine stop solenoid relay (6).

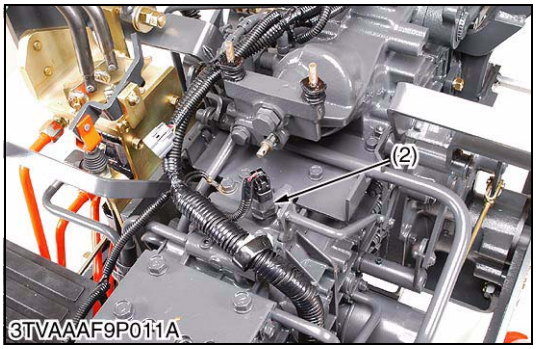
Resistance	**1** terminal - **3** terminal	Battery voltage is applied across **2** terminal and **4** terminal	0 Ω

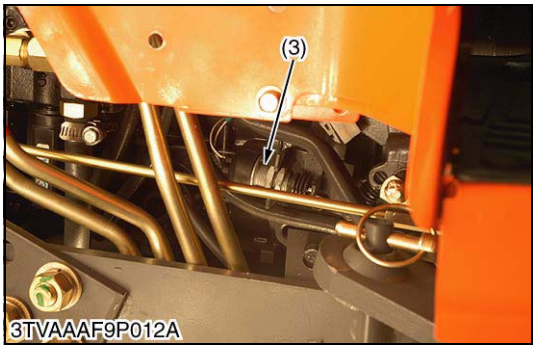
(1) Engine Stop Solenoid Relay **1 to 4 :Terminals**

W10142670

(7) Safety Switch







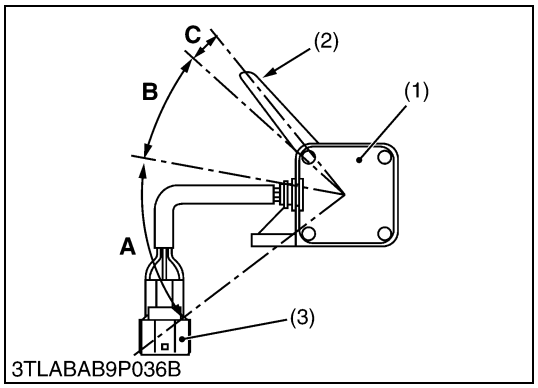
Safety Switch Continuity (Independent PTO Lever, Seat, HST Pedal)

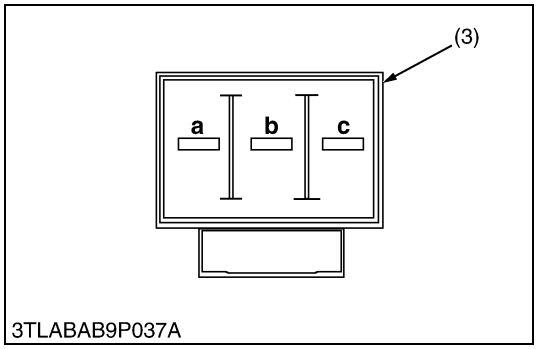
1. Remove the safety switch leads.
2. Connect the circuit tester to the safety switch leads.
3. Measure the resistance between leads.
4. If the safety switch is defective, replace it.

Resistance (Across switch terminal)	When switch push is pushed	0 Ω
	When switch push is released	Infinity

(1) Seat Switch
(2) Independent PTO Lever Switch
(3) HST Pedal Switch

W1016375





Seat Turn Switch

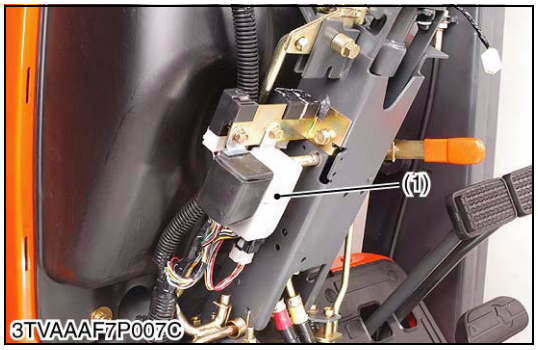
1. Release the seat lock.
2. Disconnect the seat turn switch connector (3).
3. Change the sensor bar (2) angle and measure the resistance between connector terminals, referring to the table below.
4. If the measurement does not between as table, switch is faulty.

Sensor bar angle	Measuring terminal	Resistance
Approx. 60 ° (Angle **A**)	a - c	0 Ω
	a - b, b - c	infinity
Approx. 25 ° (Angle **B**)	a - b, a - c, b - c	infinity
Approx. 5 ° (Angle **C**)	b - c	0 Ω
	a - b, a - c	infinity

(1) Seat Switch
(2) Sensor Bar
(3) Seat Switch Connector

W10490030

(8) OPC Controller



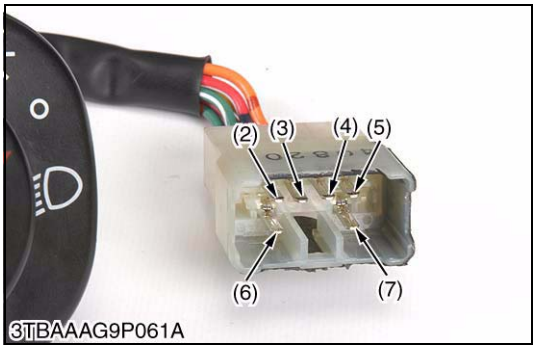
Replacing Controller

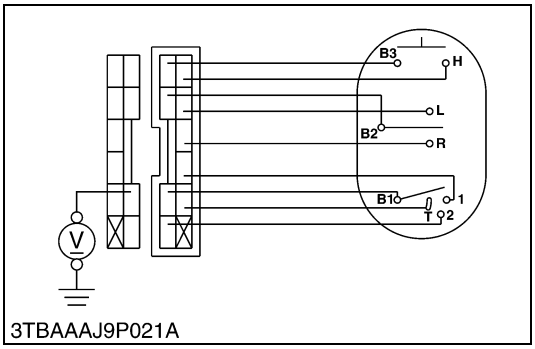
1. If engine is not started, check all part regarding the starting system referring to "**MECHANISM**".
2. If all part except the controller is not defective, replace the controller.

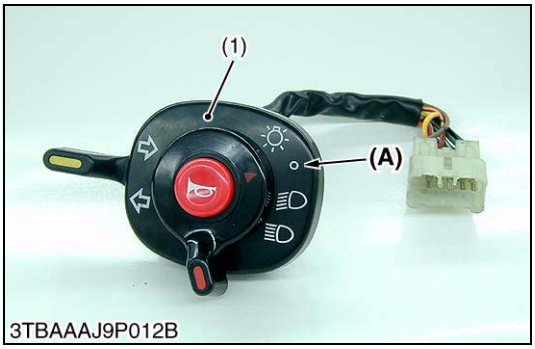
(1) Controller

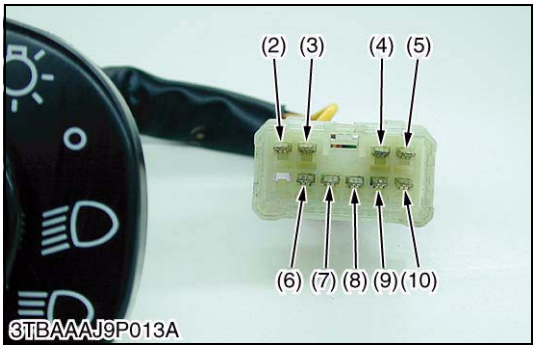
W1024727

(9) Combination Switch









Combination Switch

1. Remove the meter panel, and disconnect the combination switch connector.
2. Remove the combination switch (1) and perform the following checks **1)** to **6)**.

(1) Combination Switch
(2) **L** Terminal
(3) **R** Terminal
(4) **1** Terminal
(5) **T** Terminal
(6) **B2** Terminal
(7) **B1** Terminal

W1036317

1) Connector Voltage

1. Connect the combination switch connector to the main wire harness.
2. Measure the voltage with a voltmeter across the connector **B1** terminal and chassis when the main switch is **"ON"** position.
3. If the voltage differs from the battery voltage, the wiring harness and main switch is faulty.

Voltage	Main switch at **"ON"** position	**B1** terminal - Chassis	Battery voltage

W10366410

2) Head Light Switch Continuity when Setting Switch at "OFF" Position

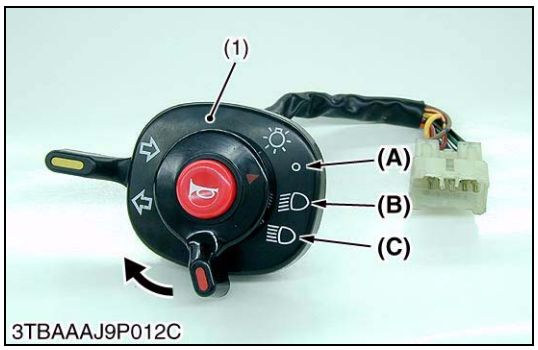
1. Set the light switch to the **OFF** position.
2. Measure the resistance with an ohmmeter across the **B1** terminal (3) to the **T** terminal (2), the **B1** terminal (3) to the **1** terminal (1).
3. If infinity is not indicated, the head light switch is faulty.

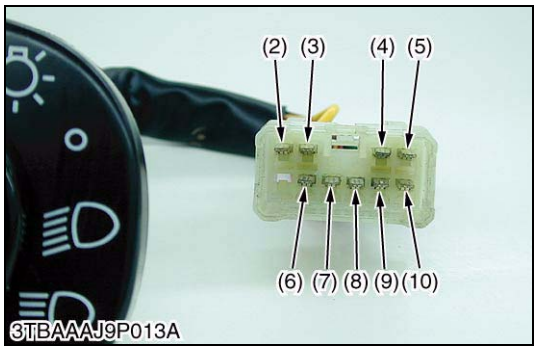
Resistance (Switch at **OFF** position)	**B1** terminal - **T** terminal	Infinity
	B1 terminal - **1** terminal	

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) **B3** Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Head Light "OFF" Position

W10497130





3) Head Light Switch Continuity when Setting Switch at "LOW BEAM" and "HIGH BEAM" Position

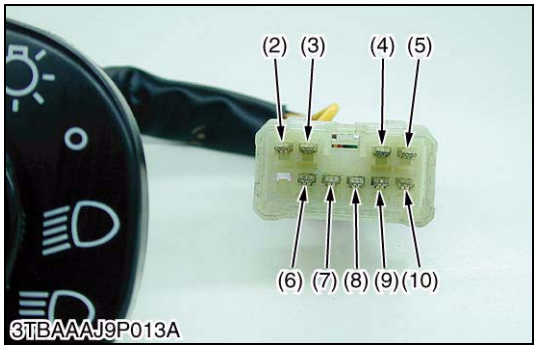
1. Set the light switch to the **LOW BEAM** position.
2. Measure the resistance with an ohmmeter across the **B1** terminal (3) to the **T** terminal (6) and the **B1** terminal (3) to the **1** terminal (7).
3. If 0 Ω is not indicated, the head light switch is faulty.
4. Set the light switch to **HIGH BEAM** position.
5. Measure the resistance with an ohmmeter across the **B1** terminal (3) to the T terminal (6) and the B1 terminal (3) to the **2** terminal (2).
6. If 0 Ω is not indicated, the head light switch is faulty.

Resistance (Switch at **HIGH BEAM** position)	**B1** terminal - **T** terminal	0 Ω
	B1 terminal - **2** terminal	

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) **B3** Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Head Light "OFF" Position
(B) Head Light "LOW BEAM" Position
(C) Head Light "HIGH BEAM" Position

W11256200



4) Turn Signal Light Switch Continuity When Setting Switch Knob "OFF" Position

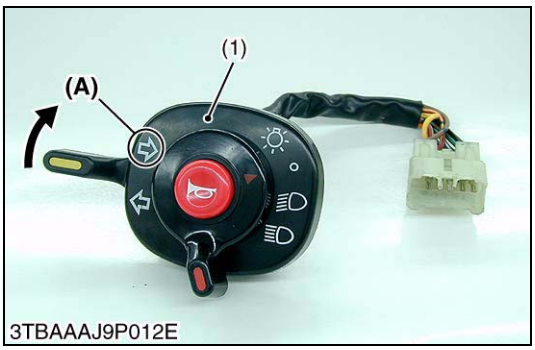
1. Set the hazard switch knob to the **OFF** position.
2. Measure the resistance with an ohmmeter across the **B2** terminal (4) and **L** terminal (9), and across **B2** terminal (4) and **R** terminal (2).
3. If infinity is not indicated, the combination switch is faulty.

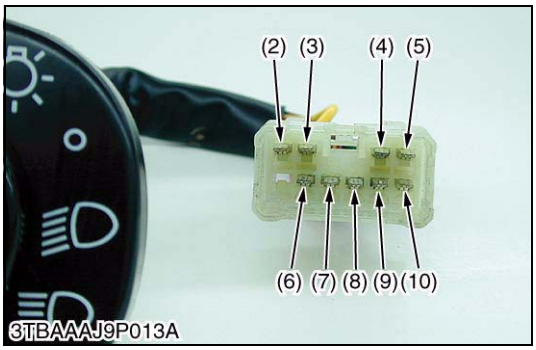
Resistance (Switch knob at **OFF** position)	**B2** terminal - **L** terminal	Infinity
	B2 terminal - **R** terminal	

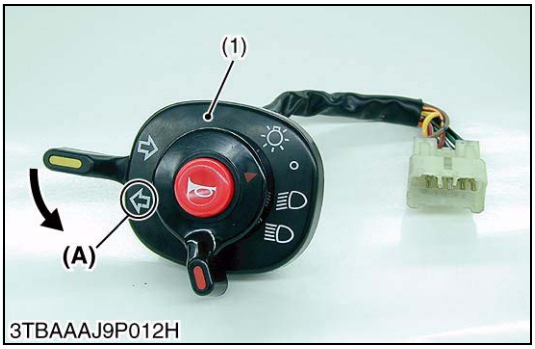
(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) **B3** Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

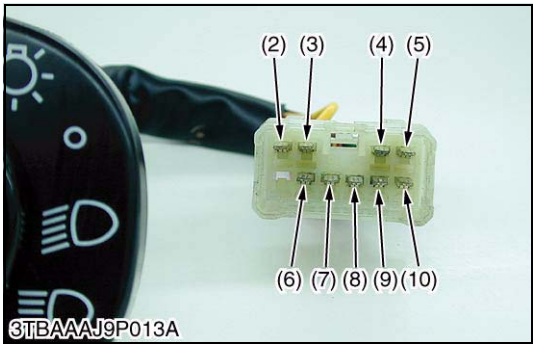
(A) Turn Signal Light Switch "OFF" Position

W11272080









5) Turn Signal Light Switch Continuity When Setting Switch Knob at "RIGHT" Position

1. Set the hazard switch knob to the **RIGHT** position.
2. Measure the resistance with an ohmmeter across the **B2** terminal (4) and **R** terminal (8) and across **B2** terminal (4) and **L** terminal (9).
3. If 0 Ω is not indicated at **RIGHT** position, the combination switch is faulty.

Resistance (Switch knob at **RIGHT** position)	**B2** terminal - **R** terminal	0 Ω
	B2 terminal - **L** terminal	Infinity

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) **B3** Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Turn Signal Light Switch "RIGHT" Position

W11286780

6) Turn Signal Light Switch Continuity When Setting Switch Knob at "LEFT" Position

1. Set the hazard switch knob to the **LEFT** position.
2. Measure the resistance with an ohmmeter across the **B2** terminal (4) and **L** terminal (9) and across the **B2** terminal (4) and **R** terminal (8).
3. If 0 Ω is not indicated at **LEFT** position, the combination switch is faulty.

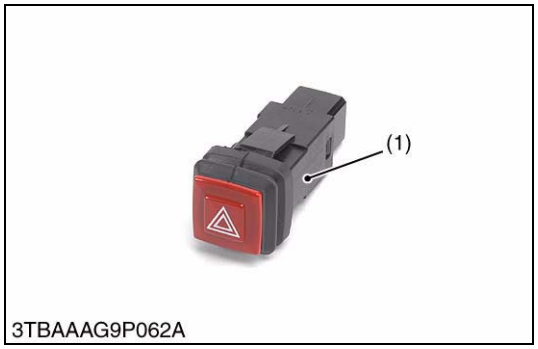
Resistance (Switch knob at **LEFT** position)	**B2** terminal - **L** terminal	0 Ω
	B2 terminal - **R** terminal	Infinity

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) **B3** Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Turn Signal Light Switch "LEFT" Position

W11298990

(10) Hazard Switch

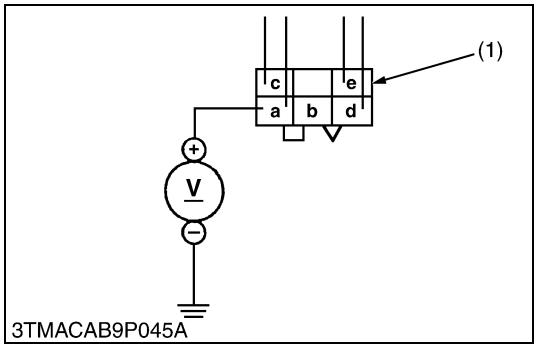


Hazard Switch

1. Remove the meter panel and disconnect the **4P** connector from hazard switch after disconnecting the battery negative code.
2. Remove the hazard switch.
3. Perform the following checking.

(1) Hazard Switch

W1038038



Connector Voltage

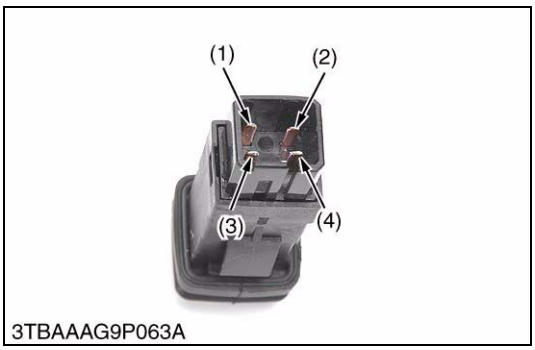
1. Connect the battery negative code, then measure the voltage with a voltmeter across the **a** terminal and chassis.
2. If the voltage differ from the battery voltage, the wiring harness is faulty.

Voltage	**a** terminal - Chassis	Approx. battery voltage

(1) **4P** Connector (for Hazard Switch)

a to e :Terminals

W10509940



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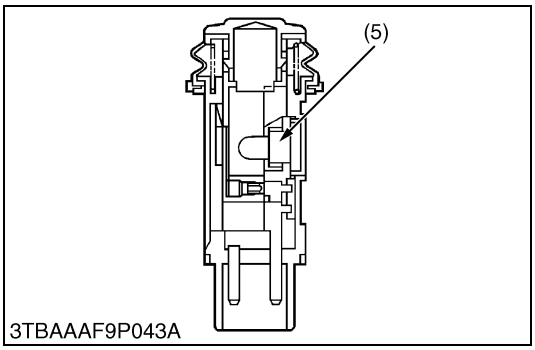


3TBAAAF9P043A

Hazard Switch continuity

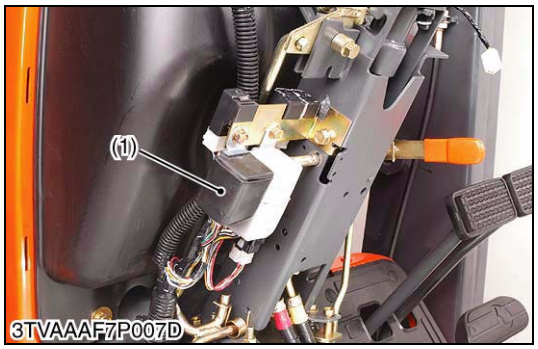
1. Measure the resistance with ohmmeter across the **a** terminal (1) and **c** terminal (3), and across the **d** terminal (2) and **e** terminal (4).
2. If the measurement is not following below, the hazard switch or the bulb are faulty.

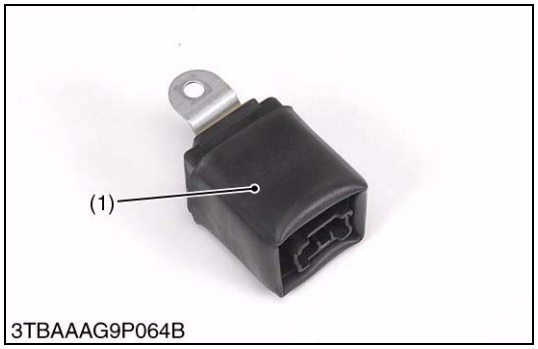
Resistance (Switch at **OFF**)	**a** terminal - **c** terminal	Infinity
Resistance (Switch at **ON**)	**a** terminal - **c** terminal	0 Ω
Resistance (Bulb)	**d** terminal - **e** terminal	Approx. 13 Ω

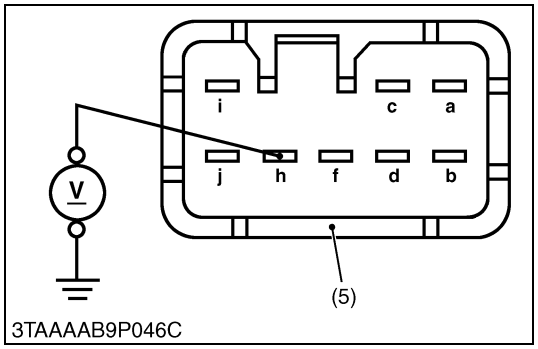
(1) **a** Terminal
(2) **d** Terminal
(3) **c** Terminal
(4) **e** Terminal
(5) Bulb

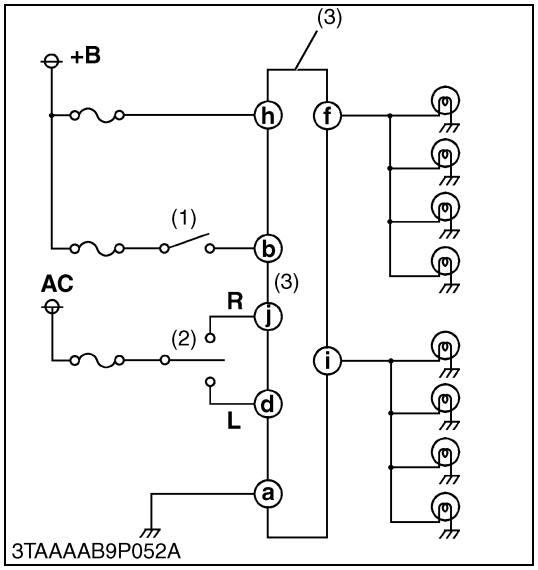
W10511450

(11) Flasher Unit









Flasher Unit Connector Voltage

1. Remove the instrument pedal.
2. Disconnect the connector from the flasher unit (1).
3. Measure the voltage with a voltmeter across the **h** terminal and chassis.
4. If the voltage differ from the battery voltage, the wiring harness is faulty.

Voltage	**h** terminal - Chassis	Approx. battery voltage

(1) Flasher Unit

a : Frame Earth
b : Hazard Input
c : Vacant
d : Turn Signal (Left) Output
f : Turn Signal (Right) Input
h : Battery
i : Turn Signal (Left) Output
j : Turn Signal (Right) Input

W10513810

Flasher Unit Actuation Test

1. Set the hazard switch to the **ON** position, and make sure the hazard light gives 60 to 85 flashes for a minute.
2. With the main switch and the hazard switch respectively at the **ON** positions, move the turn signal switch to the left. Make sure that the right-hand light stays on and the left-hand light gives flashes earlier (by about 20 flashes) than when the hazard lamp is activated. Then move the turn signal switch to the right and make sure the corresponding actions take place.
3. Now set the main switch to the **ON** position and move the turn signal switch. Make sure the same action is as above.
4. If both the hazard switch and the turn signal switch function but the above actions do not take place, replace the hazard unit with new one.

(1) Hazard Switch
(2) Turn Signal Switch
(3) Flasher Unit

B : B Terminal
AC :AC Terminal

W1039502

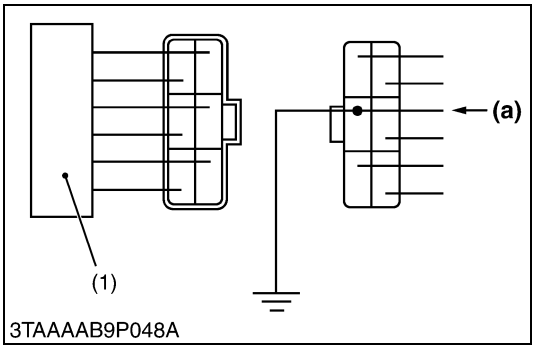
(12) Easy Checker

Easy Checker

1. Remove the panel board and disconnect the connector (1) from it.
2. Turn the main switch on.
3. Measure the voltage with a voltmeter across the terminal (Red / Yellow) and the earth terminal (Black).
4. If the voltage differs from the battery voltage, the wiring harness fuses and main switch should be checkede.

(1) Connector

W1041556

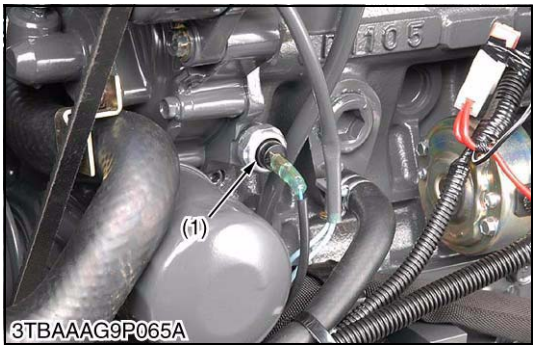


Charging Circuit (Panel Board and Wiring Harness)

1. Remove the panel board from tractor.
2. Disconnect the **6P** connector from the regulator after turning the main switch off.
3. Turn the main switch on and connect a jumper lead from the wiring harness connector terminal (Black) to the chassis.
4. If the charge lamp does not light, the panel board circuit, regulator, wiring harness, or fuse is fault.

(1) Regulator **(a) From Charge Lamp**

W1041786

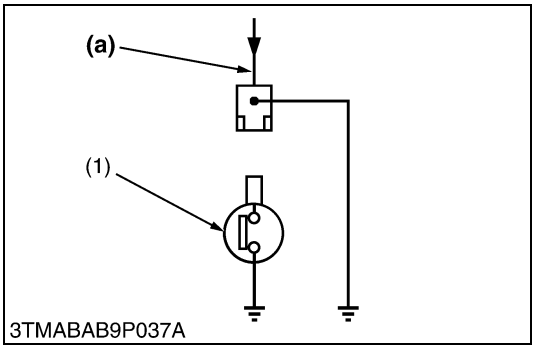


Engine Oil Pressure Switch, Panel Board and Wiring Harness

1. Disconnect the lead from the engine oil pressure switch (1) after turning the main switch **OFF**.
2. Turn the main switch **ON** and connect a jumper lead from the lead to the chassis.
3. If the engine oil pressure indicator lamp does not light, the panel board circuit or the wiring harness is faulty.

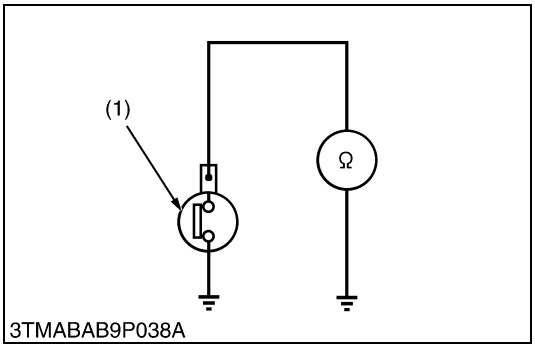
(1) Engine Oil Pressure Switch **(a) From Oil Pressure Lamp**

W1042011



Engine Oil Pressure Switch Continuity

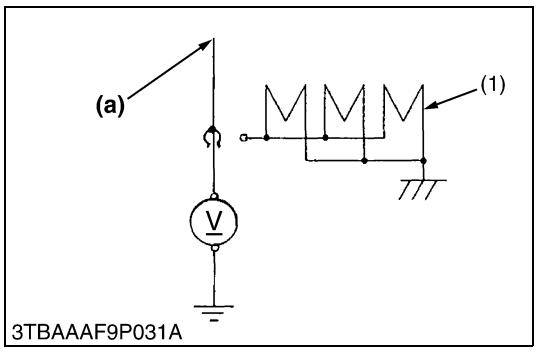
1. Measure the resistance with an ohmmeter across the switch terminal and the chassis.
2. If 0 Ω is not indicated in the normal state, the switch is faulty.
3. If infinity is not indicated at pressure over 4.9 kPa (0.5 kgf/cm^2, 7 psi), the switch is faulty.



Resistance (Switch terminal - Chassis)	In normal state	0 Ω
	At pressure over approx. 4.9 kPa (0.5 kgf/cm^2, 7 psi)	Infinity

(1) Engine Oil Pressure Switch

W10425610

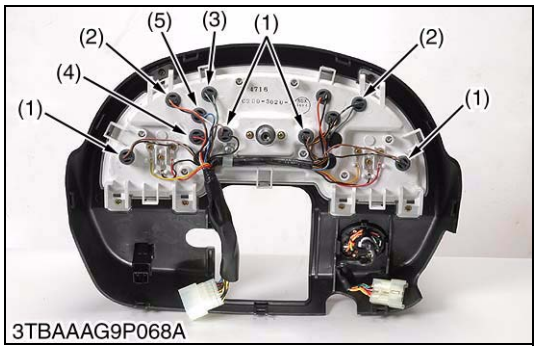


Glow Plug

1. Disconnect the lead from the glow plug.
2. Connect the tester positive cable to the glow plug lead and negative one to the chassis.
3. Measure its voltage with a voltmeter, after turning the main switch to the preheating or starting position.
4. If its voltage is not approximately the battery one, check the main switch or wiring harness.

(1) Glow Plugs
(a) From Main Switch 19 and Pre-heat Indicator Lamp

W10427640



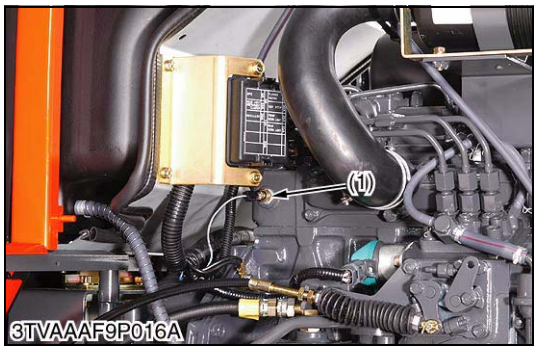
Monitor Lamp (for Charge, Engine Oil Pressure, Pre-heat, Illumination and Hazard)

1. After removing the panel board from tractor, remove the plate behind the panel.
2. Remove the each lamp.
3. Measure the lamp resistance.
4. If it is infinity, replace the lamp with new.

Lamp spec.	All lamp	12 V, 1.7 W

(1) Illumination
(2) Hazard
(3) Engine Oil Pressure
(4) Pre-heat
(5) Charge

W10429330



Coolant Temperature Sensor

1. Measure the resistance across the sensor terminal and the chassis.
2. If the measurement is not indicated, the sensor is faulty.

Characteristics of Thermistor		
Temperature	**Resistance of VR : ★**	**Condition**
80 °C (176 °F)	Approx. 51.9 Ω	(A)
100 °C (212 °F)	Approx. 27.4 Ω	

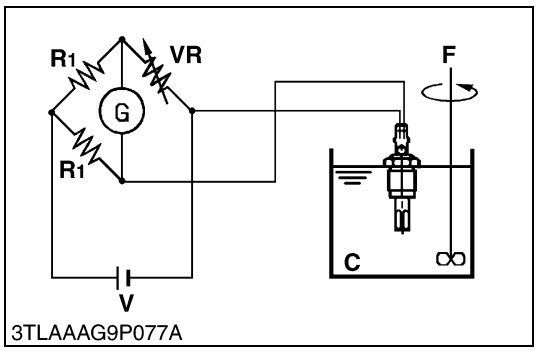
★ : When galvarnometer shows 0 (zero).

Condition	Setting Value
(A)	R1 : 54.945 to 55.055 Ω V : DC 6.9 to 7.1 V

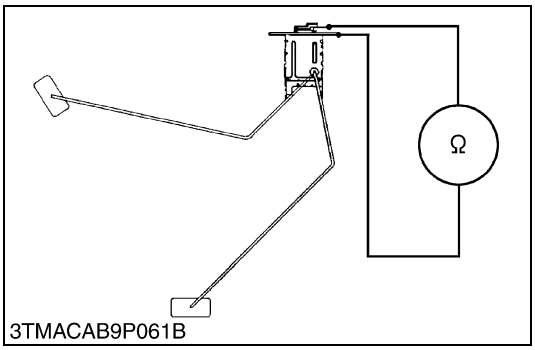
★ : When galvarnometer shows 0 (zero).

(1) Coolant Temperature Sensor

W1022725



(13) Gauge



3TMACAB9P061B

3TBAAAG9P068B

Fuel Level Sensor

1) Sensor Continuity

1. Remove the fuel level sensor from the fuel tank.
2. Measure the resistance with an ohmmeter across the sensor terminal and its body.
3. If the reference values are not indicated, the sensor is faulty.

Resistance (Sensor terminal - its body)	Reference value	Float at upper-most position	1 to 5 Ω
		Float at lower-most position	103 to 117 Ω

W1044997

Fuel Gauge and Coolant Temperature Gauge Continuity

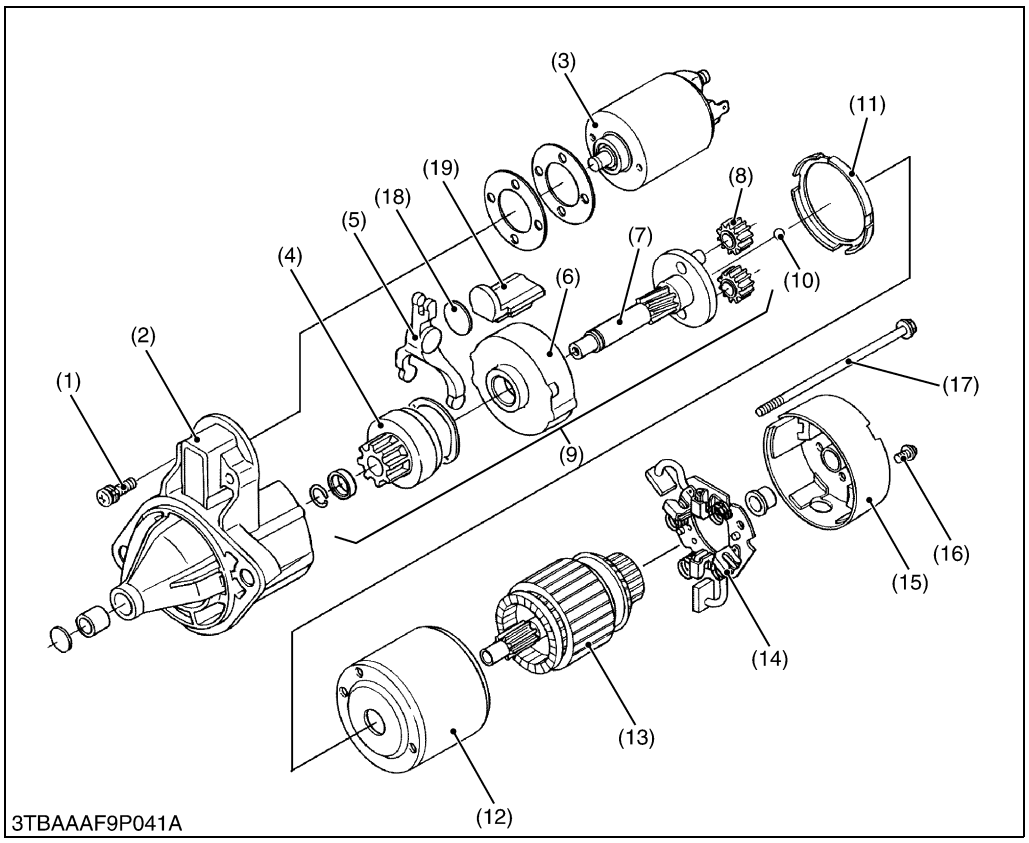
1. Remove the panel board from the tractor.
2. Check the continuity with an ohmmeter across the **U** terminal (2) and **IGN** terminal (3) and across the **U** terminal (2) and **GND** terminal (1).
3. If infinity is indicated, the coolant temperature is faulty.
4. Check the continuity with an ohmmeter across the **U** terminal (5) and **IGN** terminal (6) and across the **U** terminal (5) and **GND** terminal (4).
5. If infinity is indicated, the fuel gauge is faulty.

(1) **GND** Terminal (Temperature)
(2) **U** Terminal (Temperature)
(3) **IGN** Terminal (Temperature)
(4) **GND** Terminal (Fuel)
(5) **U** Terminal (Fuel)
(6) **IGN** Terminal (Fuel)

W1045622

[2] DISASSEMBLING AND ASSEMBLING

(1) Starter



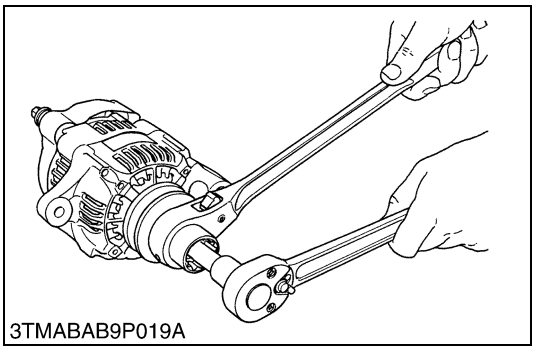
(1) Screw
(2) Front Bracket
(3) Magnetic Switch
(4) Overrunning Clutch
(5) Drive Lever
(6) Internal Gear
(7) Shaft
(8) Planetary Gear
(9) Shaft Assembly
(10) Ball
(11) Gasket
(12) Yoke
(13) Armature
(14) Brush Holder
(15) Rear End Frame
(16) Screw
(17) Through Bolt

W1016748

1. Disconnect the connecting lead from the magnetic switch (3).
2. Remove the screw (1) and remove the magnet switch (3).
3. Remove the screw (16) and through bolt (17), and separate the rear end frame (15).
4. Remove the brush holder (14).
5. Draw out the armature (13) and yoke (12).
6. Remove the gasket (11), gasket (19) and plate (18).
7. Draw out the shaft assembly (9) with the drive lever (5).

■ **NOTE**
- **Do not damage the brush and commutator.**
- **Do not miss the ball (10).**

(2) Alternator


3TMABAB9P019A

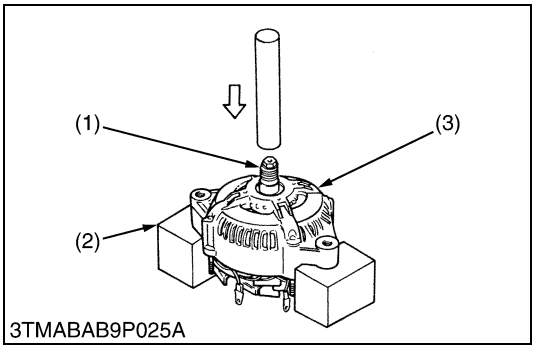
Pulley

1. Secure the hexagonal end of the pulley shaft with a double-ended ratchet wrench as shown in the figure, loosen the pulley nut with a socket wrench and remove it.

(When reassembling)

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

W10187280



3TMABAB9P025A

Rotor

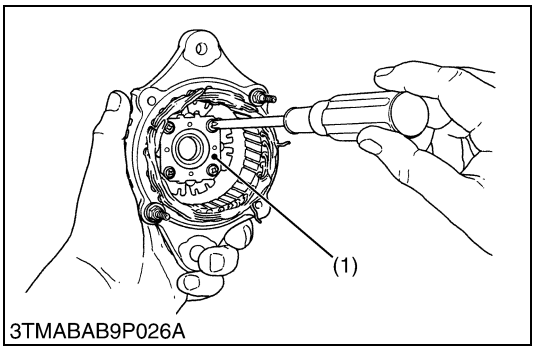
1. Press out the rotor (1) from drive end frame (3).

■ **IMPORTANT**

- **Take special care not to drop the rotor and damage the slip ring or fan, etc..**

(1) Rotor
(2) Block
(3) Drive End Frame

W10194380



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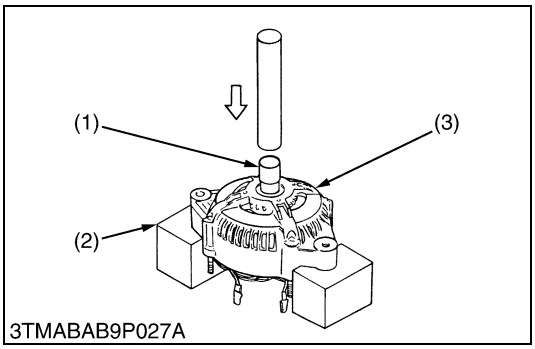
Retainer Plate

1. Unscrew the four screws holding the retainer plate, and remove the retainer plate (1).

(1) Retainer Plate

W10195420



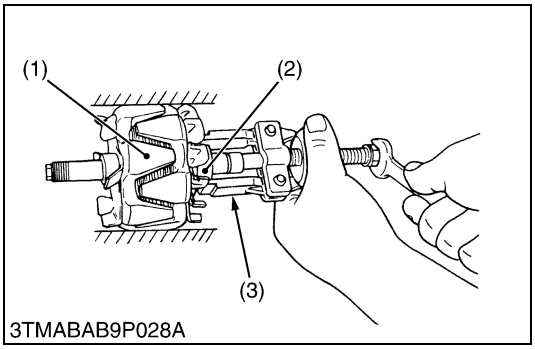
3TMABAB9P027A

Bearing on Drive End Side

1. Press out the bearing from drive end frame (3) with a press and jig (1).

(1) Jig
(2) Block
(3) Drive End Frame

W10196110



3TMABAB9P028A

Bearing at Slip Ring Side

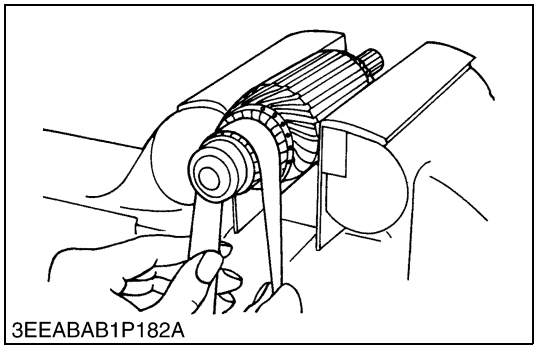
1. Lightly secure the rotor (1) with a vise to prevent damage, and remove the bearing (2) with a puller (3).

(1) Rotor
(2) Bearing
(3) Puller

W10197010

[3] SERVICING

(1) Starter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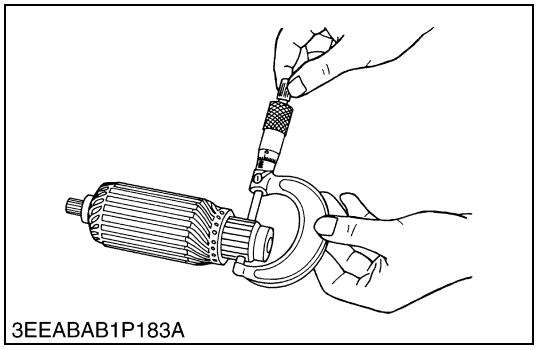
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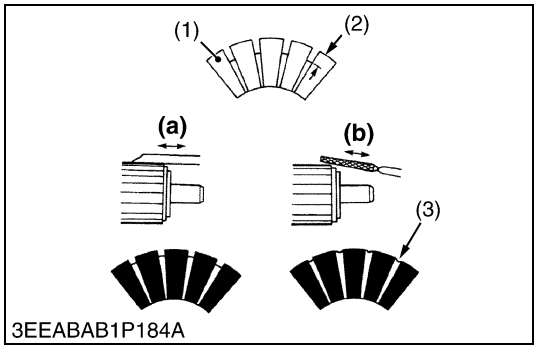

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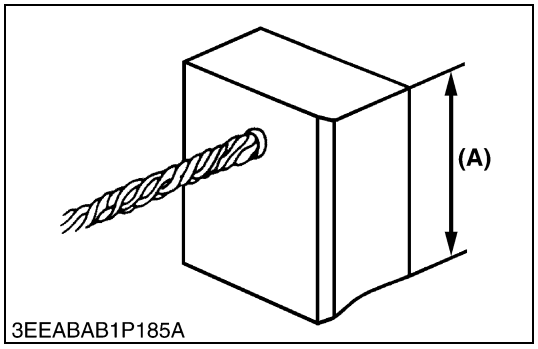

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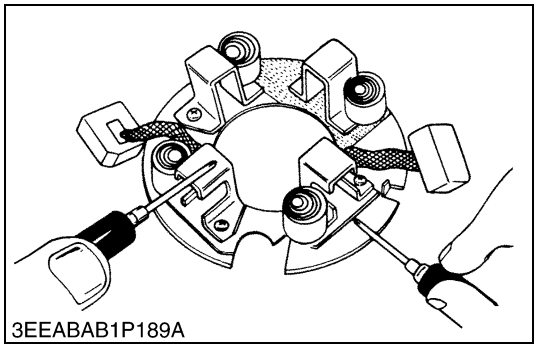

3EEABAB1P189A

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, correct the commutator on a lathe to the factory specification.
4. Measure the mica undercut.
5. If the undercut is less than the allowable limit, correct it with a saw blade and chamfer the segment edges.

Commutator O.D.	Factory spec.	28.0 mm 1.102 in.
	Allowable limit	27.0 mm 1.063 in.
Difference of O.D.'s	Factory spec.	Less than 0.02 mm 0.0008 in.
	Allowable limit	0.05 mm 0.0020 in.
Mica undercut	Factory spec.	0.60 mm 0.0236 in.
	Allowable limit	0.20 mm 0.0079 in.

(1) Segment
(2) Undercut
(3) Mica

(a) Correct
(b) Incorrect

W1017092

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 spec.	14.0 mm 0.551 in.
	Allowable limit	9.0 mm 0.354 in.

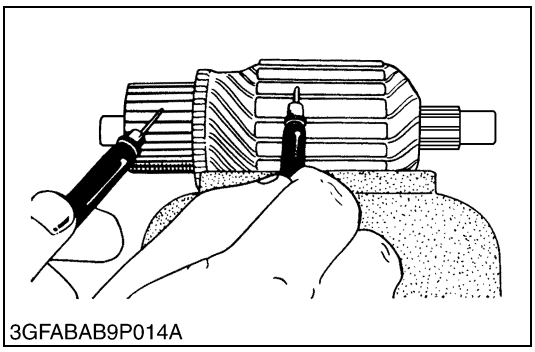
W1017544

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

W1017672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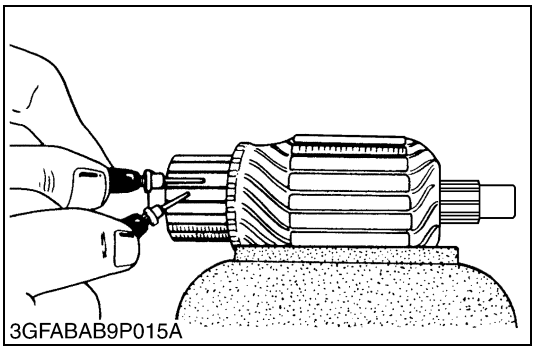
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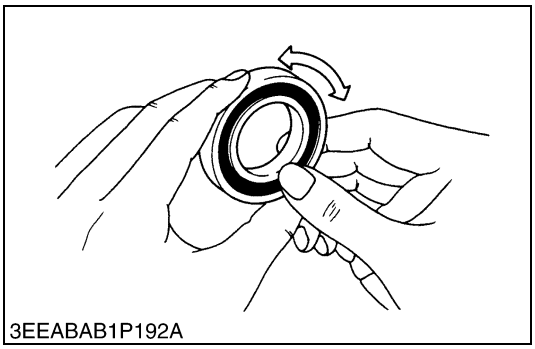
Armature Coil

1. Check the continuity between the commutator and armature coil core with an ohmmeter.
2. If it conducts, replace the armature.
3. Check the continuity between the segments of the commutator with an ohmmeter.
4. If it does not conduct, replace the armature.

W1017767

(2) Alternator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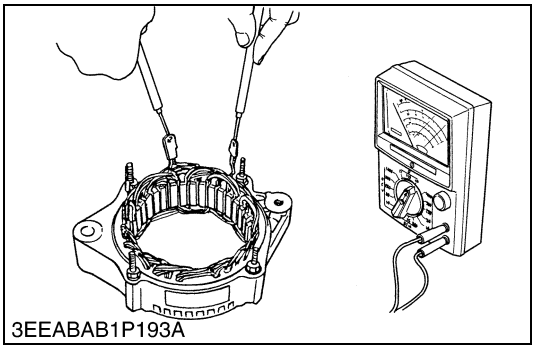
Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

W10197900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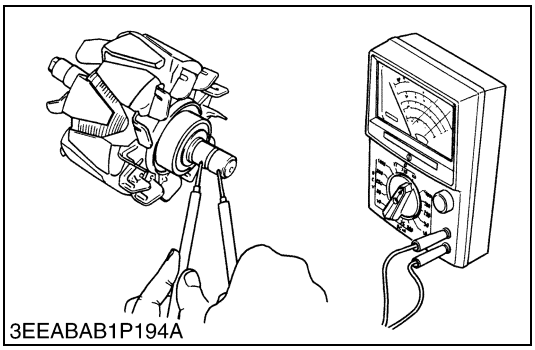
Stator

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 spec.	Less than 1.0 Ω

W10199640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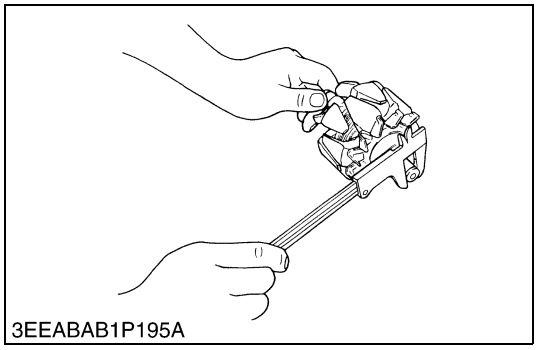
Rotor

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 spec.	2.9 Ω

W10200940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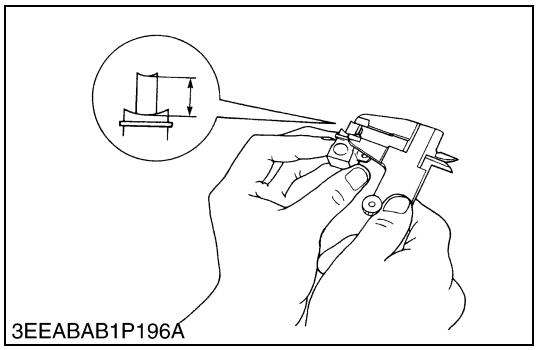
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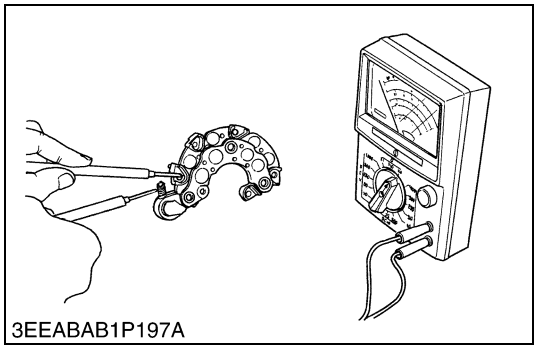
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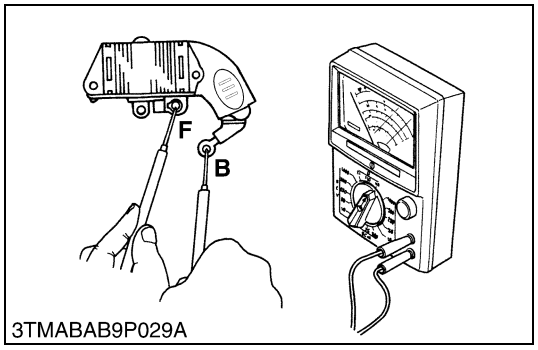


3TMABAB9P029A

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 spec.	14.4 mm 0.567 in.
	Allowable limit	12.8 mm 0.504 in.

W10202080

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 spec.	10.5 mm 0.413 in.
	Allowable limit	8.4 mm 0.331 in.

W10203290

Rectifier

1. Check the continuity across each diode of rectifier with an analog ohmmeter. Conduct the test in the (R × 1) setting.
2. The rectifier is normal if the diode in the rectifier conducts in one direction and does not conduct in the reverse direction.

■ **IMPORTANT**

- **Do not use a 500 V megger for measuring because it will destroy the rectifier.**

■ **NOTE**

- **Do not use an auto digital multimeter. Because it's very hard to check the continuity of rectifier by using it.**

W10204520

IC Regulator

1. Check the continuity across the **B** terminal and the **F** terminal of IC regulator with an analog ohmmeter. Conduct the test in the (R × 1) setting.
2. The IC regulator is normal if the IC regulator conducts in one direction and does not conduct in the reverse direction.

■ **IMPORTANT**

- **Do not use a 500 V megger for measuring because it will destroy the IC regulator.**

■ **NOTE**

- **Do not use an auto digital multimeter. Because it's very hard to check the continuity of IC regulator by using it.**

W10206450

9 FRONT LOADER

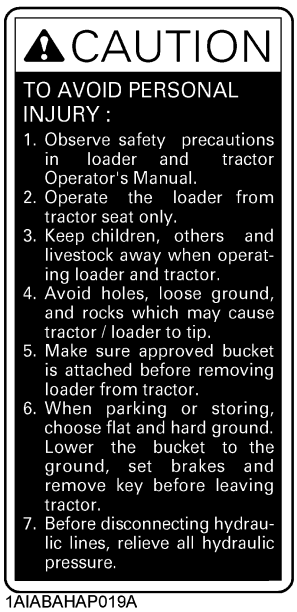
SAFETY DECALS

The following safety decals are installed on the machine.
If a decal becomes damaged, illegible or is not on the machine, replace it. The decal part number is listed in the parts list.

(1) Part No. 7J246-5643-1

1AIABAHAP016A

(2) Part No. 7J246-5645-1



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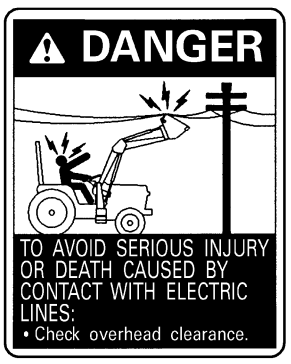
(3) Part No. 7J246-5642-1



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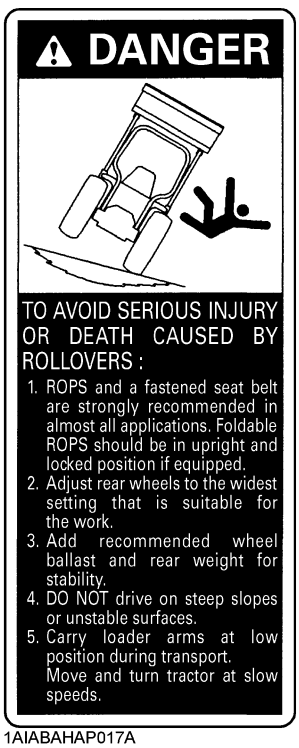

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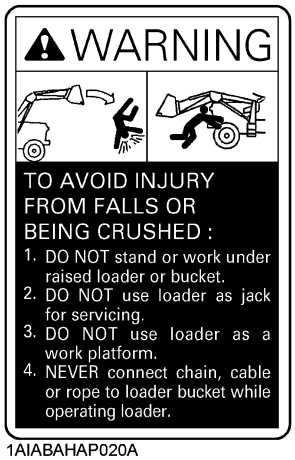
(3) Part No. 7J246-5644-2
(Both sides)



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(5) Part No. 7J266-5649-2

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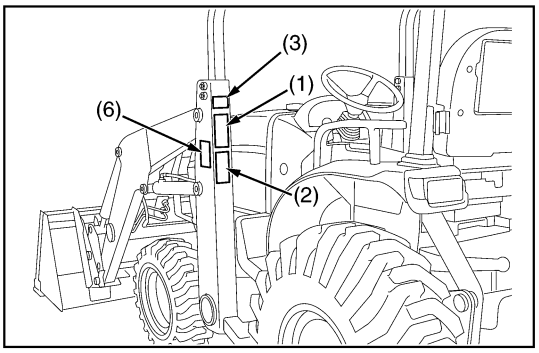

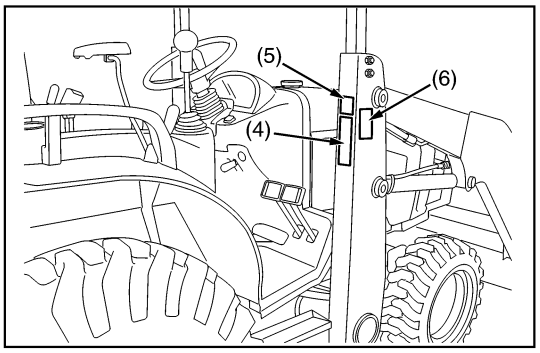

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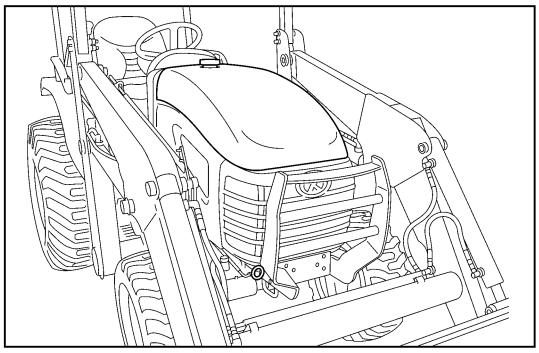
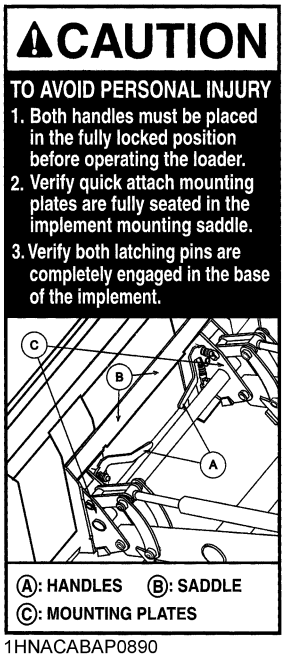


(1) Part No. 75585-3619-3



1HNACABAP0890

CARE OF DANGER, WARNING AND CAUTION LABELS

1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels from your local KUBOTA distributor.
4. If a component with danger, warning and caution label(s) affixed is replaced with new part, make sure new label(s) is (are) attached in the same location(s) as the replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

3TVAAAFCP007A

SPECIFICATIONS

■ Loader Specifications

Loader model		**TL500**
Tractor model		B26
Boom cylinder	Bore	50 mm (1.97 in.)
	Stroke	399 mm (15.7 in.)
Bucket cylinder	Bore	55 mm (2.17 in.)
	Stroke	382.5 mm (15.1 in.)
Control valve		One detente float position, power beyond circuit
Maximum pressure		16.6 MPa (169 gf/cm^2, 2402 psi)
Net weight (Approximate)		285 kg (628 lbs)

W1027852

■ Bucket Specifications

Loader model		**TL500**	
Model		HD Round 60	LM Round 66
Type		Quick attach	
Width		1524 mm (60 in.)	1676 mm (66 in.)
Depth (L)		453 mm (17.8 in.)	623 mm (24.5 in.)
Height (M)		584 mm (23.0 in.)	584 mm (23.0 in.)
Length (N)		646 mm (25.4 in.)	816 mm (32.1 in.)
Capacity	Struck	0.22 m^3 (7.8 CU.FT.)	0.32 m^3 (11.3 CU.FT.)
	Heaped	0.27 m^3 (9.5 CU.FT.)	0.39 m^3 (13.8 CU.FT.)
Weight		126 kg (278 lbs)	149 kg (328 lbs)

W1030245

■ Dimensional Specifications

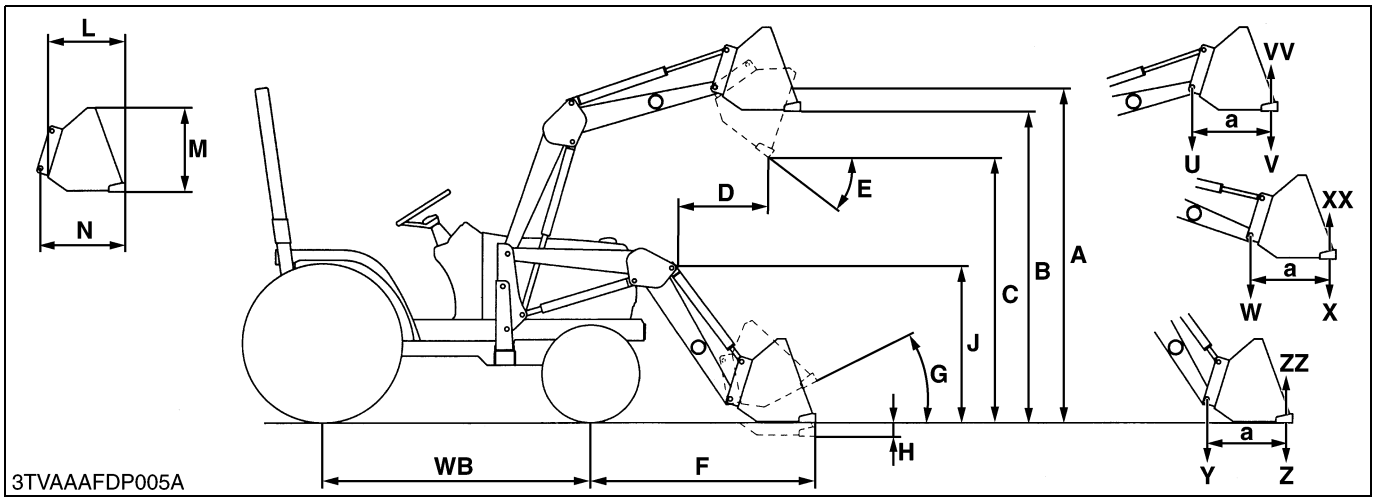
Loader Model		**TL500**
Tractor model		B26
A	Max. lift height (To bucket pivot pin)	2400 mm (94.5 in.)
B	Max. lift height under level bucket	2189 mm (86.2 in.)
C	Clearance with bucket dumped	1778 mm (70 in.)
D	Reach at max. lift height (Dumping reach)	567 mm (22.3 in.)
E	Max. dump angle	0.79 rad (45 deg.)
F	Reach with bucket on ground	1561 mm (61.5 in.)
G	Bucket roll-back angle	0.80 rad (46 deg.)
H	Digging depth	177 mm (7.0 in.)
J	Overall height in carrying position	1258 mm (49.5 in.)

W1028417

■ Operational Specifications

Loader Model		TL500
Tractor model		B26
Lift capacity to max. height (Bucket bottom mid point)		500 kg (1102 lbs)
U	Lift capacity (Bucket pivot pin, max. height)	590 kg (1301 lbs)
V	Lift capacity (500 mm forward, max. height)	429 kg (946 lbs)
W	Lift capacity (Bucket pivot pin, 1500 mm (59 in.) height)	723 kg (1594 lbs)
X	Lift capacity (500 mm (20 in.) forward, 1500 mm (59 in.) height)	563 kg (1241 lbs)
Y	Breakout force (Bucket pivot pin)	10417 N (2343 lbs)
Z	Breakout force (500 mm (20 in.) forward)	7771 N (1748 lbs)
VV	Bucket roll-back force at max. height	10035 N (2258 lbs)
XX	Bucket roll-back force at 1.5M (5.9 in.)	15190 N (3417 lbs)
ZZ	Bucket roll-back force at ground level	17645 N (3969 lbs)
Raising time		3.6 sec.
Lowering time		2.4 sec.
Bucket dumping time		1.8 sec.
Bucket rollback time		3.4 sec.
a	Mesure point	500 mm (20 in.)

W1030633



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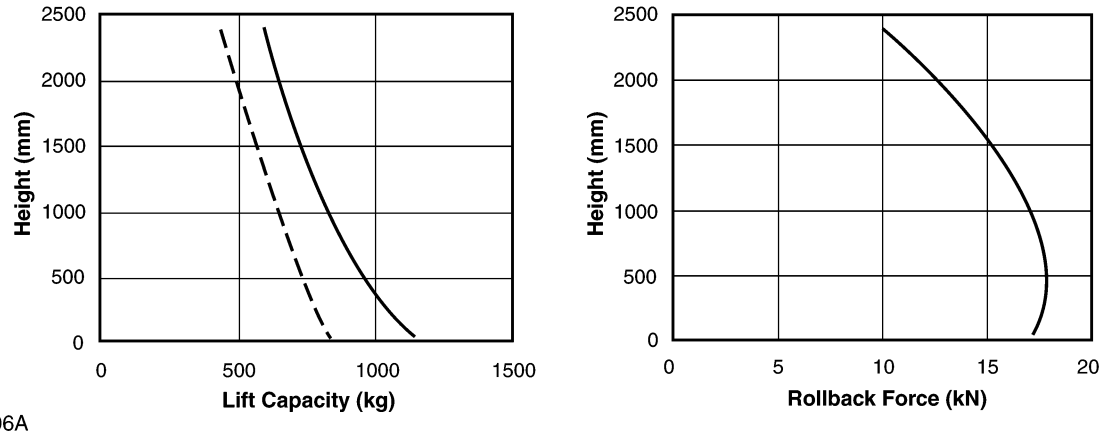
[TL500]



3TVAAAFDP006A

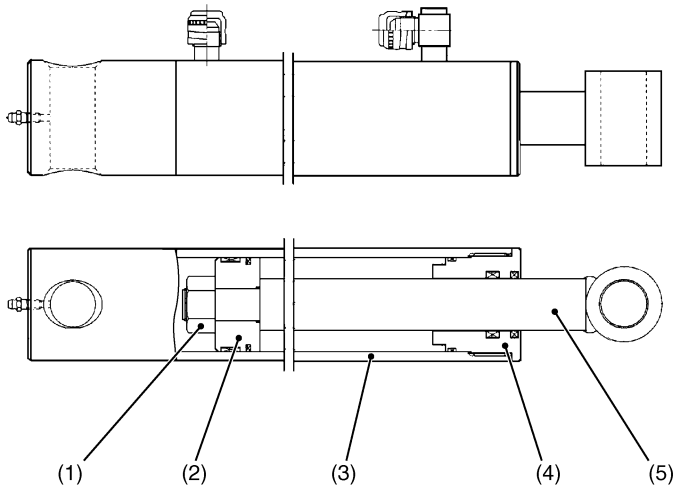
MECHANISM

CONTENTS

1. FRONT LOADER CONTROL VALVE AND RELIEF VALVE

- Refer to “**HYDRAULIC SYSTEM**” section.

2. BOOM CYLINDER AND BUCKET CYLINDER



3UFAAACLP017A

(1) Nut
(2) Piston
(3) Cylinder Tube
(4) Head
(5) Piston Rod

Both boom cylinder and bucket cylinder consists of a head (4), cylinder tube (3), piston rod (5), piston (2), and other parts as shown in the figure above.

They are single-rod double acting cylinder in which the reciprocating motion of the piston is controlled by hydraulic force applied to both of its ends.

Cylinder Specifications

Boom Cylinder	Cylinder I.D.	50 mm (1.97 in.)
	Rod O.D.	30 mm (1.18 in.)
	Stroke	399 mm (15.7 in.)
Bucket Cylinder	Cylinder I.D.	55 mm (2.17 in.)
	Rod O.D.	30 mm (1.18 in.)
	Stroke	382 mm (15.1 in.)

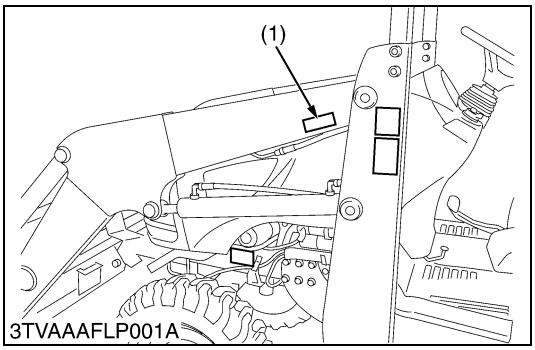
W1025274

SERVICING

CONTENTS

1. GENERAL

[1] FRONT LOADER IDENTIFICATION



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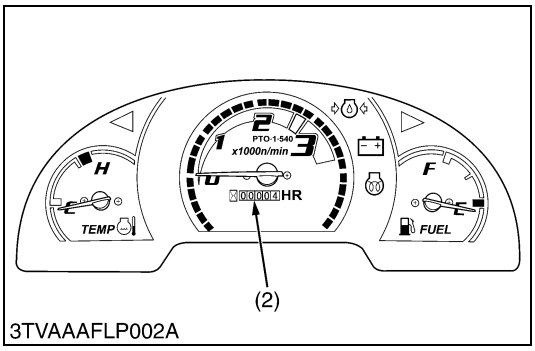


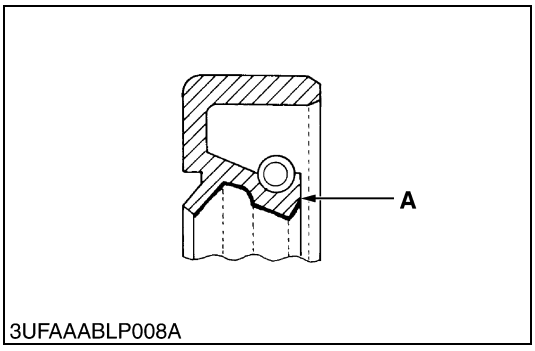
3TVAAAFLP002A

When contacting your local KUBOTA distributor, always specify front loader serial number and hourmeter reading.

(1) Serial Number (2) Hourmeter

W1010475

[2] GENERAL PRECAUTION



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- During disassembly, carefully arrange removed parts in a clean area to prevent later confusion. Screws, bolts and nuts should be replaced in their original positions to prevent reassembly errors.
- When special tools are required, use genuine KUBOTA tools. Special tools which are not used frequently should be made according to the drawings provided.
- Clean parts before measuring them.
- Use only genuine KUBOTA parts for pars replacement to maintain loader performance and to assure safety.
- O-rings and oil seals must be replaced during reassembly. Apply grease to new O-rings or oil seals before reassembling.

A : Grease

W1010562

[3] LUBRICANTS

To prevent serious damage to hydraulic system, use only specified fluid or its equivalent.

Place	Capacities	Lubricants
Transmission Case	26 L 6.9 U.S.gals 5.7 Imp.gals	KUBOTA UDT or SUPER UDT Fluid *
Grease fitting	Until grease overflows	Moly Ep type grease **

* KUBOTA UDT or SUPER UDT Fluid ..... KUBOTA original transmission hydraulic fluid.

** “External pressure” and containing Molybdenum disulfide is recommended. This grease may specify “Moly Ep” on it’s label.

W1010650

[4] MAINTENANCE CHECK LIST

To keep the machine working in good condition as well as to avoid any accident and trouble, carry out periodic inspection and maintenance. Check the following points before use.

Service Internal	Check Points	Reference Page
Daily (Each use)	Check the transmission fluid level	9-S3
	Check the hydraulic hoses	9-S3
Every 10 hours	Grease all grease nipples	9-S3

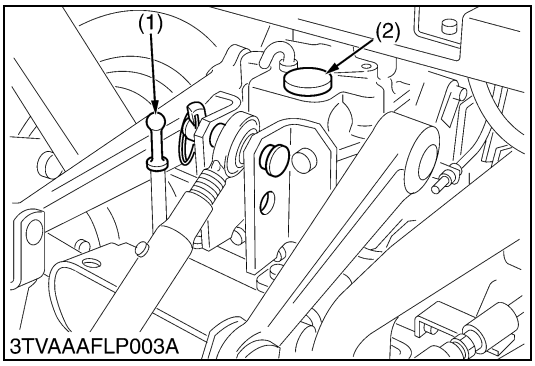
W1010764

[5] CHECK AND MAINTENANCE

CAUTION

- **When checking and repairing, park the tractor on flat ground and apply the parking brake.**
- **When checking and repairing, lower the bucket and stop the engine.**

(1) Check Points of Each Use or Daily



Checking Transmission Fluid Level

1. Check that the tractor hydraulic fluid level.
2. To check the oil level, remove the dipstick (1), wipe it clean, replace it, and remove it again.
   Check that the oil level is between the two notches.
3. If the level is too low, replenish new oil

■ **IMPORTANT**

- **Use only KUBOTA SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. Refer to "LUBRICANTS".**

(1) Dipstick
(2) Oil Filling Port

A : Oil level acceptable within this range

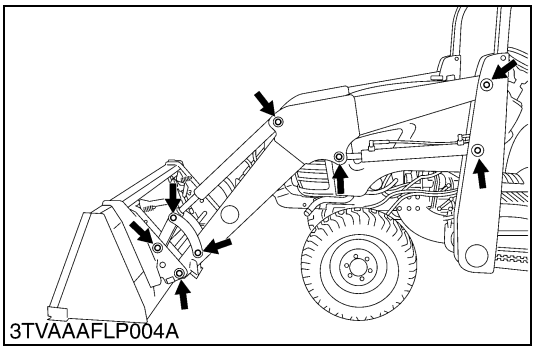
W1011257

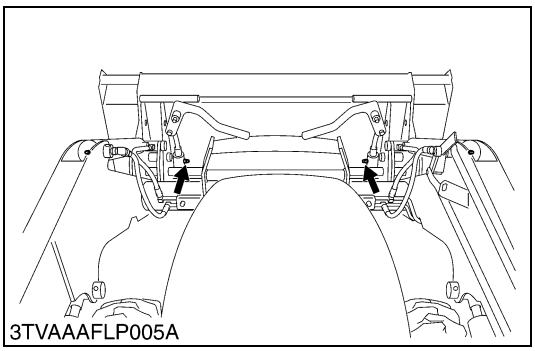
Checking Hydraulic Hoses

1. Check all hydraulic hoses for cuts or wear.
2. If defects are found, replace them.

W1011407

(2) Check Point of Every 10 Hours





Greasing

1. Inject grease all grease nipples with a hand grease gun.

W1011466

2. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Boom Does Not Rise	Control valve malfunctioning	Repair or replace	7-S12
	Boom cylinder defective	Repair or replace	9-S15
	Control lever linkage defective	Repair or replace	–
	Hydraulic pump malfunctioning	Repair or replace	7-S11
	Oil filter clogged	Replace	G-31
	Relief valve spring damaged	Replace	7-S15
	Hydraulic hose damaged	Replace	–
Boom Does Not Lower	Control valve malfunctioning	Repair or replace	7-S12
Insufficient Boom Speed	Boom cylinder tube worn or damaged	Replace	9-S15
	Boom cylinder piston ring (piston seal and O-ring) worn or damaged	Replace	9-S16
	Oil leaks from pipe joints	Repair	–
	Relief valve setting pressure too low	Adjust	7-S9
	Insufficient transmission fluid	Refill	G-8, G-31
	Inlet pipe O-ring damaged	Replace	–
Bucket Does Not Move	Control valve malfunctioning	Repair or replace	7-S12
	Bucket cylinder defective	Repair or replace	9-S14
	Control lever linkage defective	Repair or replace	–
	Hydraulic pump malfunctioning	Repair or replace	7-S11
	Oil filter clogged	Replace	G-31
	Relief valve spring damaged	Replace	7-S9
	Hydraulic hose damaged	Replace	9-S16
Insufficient Bucket Speed	Bucket cylinder tube worn or damaged	Replace	9-S15
	Bucket cylinder piston ring (piston seal and O-ring) worn or damaged	Replace	9-S16
	Oil leaks from pipe joints	Repair	–
	Relief valve setting pressure too low	Adjust	7-S9
	Insufficient transmission fluid	Refill	G-8, G-31
	Inlet pipe O-ring damaged	Replace	–
Front End Loader Drops By Its Weight	Boom cylinder tube worn or damaged	Replace	9-S15
	Boom cylinder piston ring (piston seal and O-ring) worn or damaged	Replace	9-S16
	Oil leaks from pipe joints	Repair	–
	Control valve malfunctioning	Repair or replace	7-S12
Spill Guard Does Not Work	Control valve malfunctioning	Repair or replace	7-S12
	Improper adjustment of spill guard linkage	Adjust	9-S13

W1014322

3. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Relief Valve	Setting Pressure	15.8 to 16.5 MPa 161 to 169 kgf/cm^2 2290 to 2400 psi	–
Piston Rod	Bend	–	0.25 mm 0.0098 in.

W1013874

4. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS

Screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual should be tightened according to the table below.

American standard cap screws with UNC or UNF threads						
Grade	SAE 5			SAE 8		
Unit / Size	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
1/4	12.0 to 15.7	1.22 to 1.60	8.80 to 11.6	16.3 to 19.7	1.66 to 2.01	12.0 to 14.6
5/16	23.1 to 27.7	2.35 to 2.83	17.0 to 20.5	32.6 to 39.3	3.32 to 4.00	24.0 to 29.0
3/8	47.5 to 56.9	4.84 to 5.80	35.0 to 42.0	61.1 to 73.2	6.22 to 7.46	45.0 to 54.0
1/2	109 to 130	11.1 to 13.2	80.0 to 96.0	149.2 to 178.9	15.21 to 18.24	110.0 to 132.0
9/16	149.2 to 178.9	15.21 to 18.24	110.0 to 132.0	217.0 to 260.3	22.12 to 26.54	160.0 to 192.0
5/8	203.4 to 244.1	20.74 to 24.88	150.0 to 180.0	298.3 to 357.9	30.42 to 36.49	220.0 to 264.0

W1013653

Metric cap screws			
Grade	Property class 8.8 (Approx. SAE grade 5)		
Unit / Size	N·m	kgf·m	lbf·ft
M6	9.8 to 10	1.0 to 1.1	7.3 to 7.9
M8	24 to 27	2.4 to 2.8	18 to 20
M10	48 to 55	4.9 to 5.7	36 to 41
M12	78 to 90	7.9 to 9.2	58 to 66
M14	124 to 147	12.6 to 15.0	91.2 to 108
M16	196 to 225	20.0 to 23.0	145 to 166
M18	275 to 318	28.0 to 32.5	203 to 235

W1013699

[2] HYDRAULIC FITTINGS

■ Adaptors, Elbows and Others

Item	Thread size	Tightening torque		
		N·m	kgf·m	lbf·ft
Adjustable elbow, Adaptor	9/16	37 to 44	3.8 to 4.5	27 to 33
	3/4	48 to 54	4.9 to 5.5	35 to 40
Hose fitting, Flare nut	9/16	22 to 25	2.3 to 2.6	16 to 19
	3/4	36 to 40	3.6 to 4.1	26 to 30
Adaptor (NPT)	3/8	38 to 43	3.9 to 4.4	28 to 32
	1/2	49 to 58	5.0 to 5.9	36 to 43

■ NOTE

- **When connecting a hose with flare nut, after tightening the nut with specified torque, return it approximately 45 degrees and re-tighten it to specified torque.**

W1015484

■ Hydraulic Pipe Cap Nuts

Pipe size	Tightening torque		
	N·m	kgf·m	ft-lbs
Φ6	25 to 34	2.5 to 3.5	18 to 25
Φ8	30 to 39	3.0 to 4.0	22 to 28
Φ10	40 to 49	4.0 to 5.0	29 to 36
Φ12	49 to 68	5.0 to 7.0	37 to 50
Φ15	108 to 117	11.0 to 12.0	79.6 to 86.7
Φ16	138 to 147	14.0 to 15.0	102 to 108
Φ18	108 to 117	11.0 to 12.0	79.6 to 86.7

W1014848

[3] TIGHTENING TORQUE FOR SPECIALLY SPECIFIED

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	lbf·ft
Boom cylinder head mounting torque	200 to 230	20.4 to 23.4	148 to 169
Bucket cylinder head mounting torque	250 to 300	25.5 to 30.5	184.4 to 221.2
Cylinder piston mounting nut	200 to 230	20.4 to 23.4	148 to 169

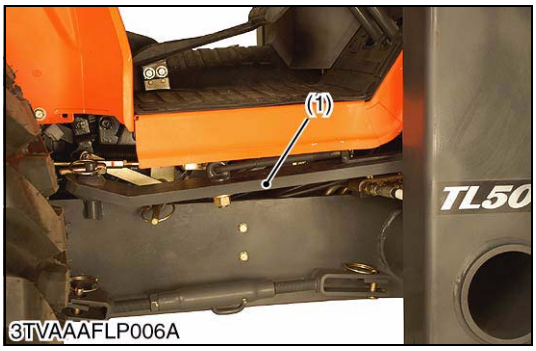
W1023545

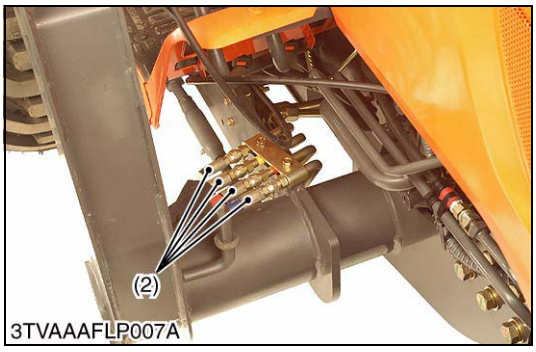
5. DISMOUNTING AND MOUNTING

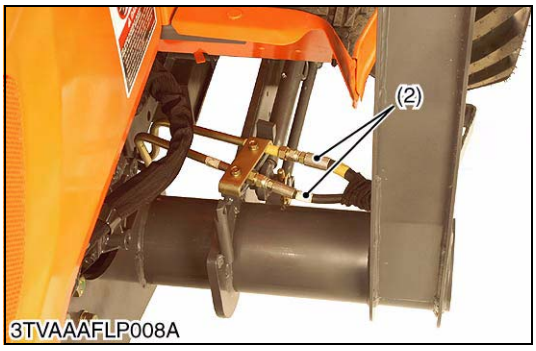
[1] DISMOUNTING FRONT LOADER ASSEMBLY

■ **IMPORTANT**

- **When dismounting the loader, park the tractor on flat and hard ground, apply the parking brake, and stop the engine.**







Lower Links and Hydraulic Hoses

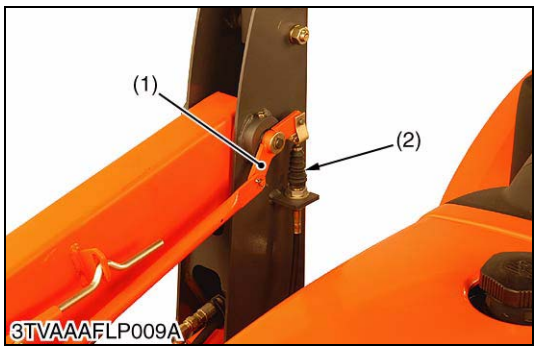
1. Remove the lower links (1).
2. Slowly release all hydraulic pressure by moving the front loader control lever in all directions.
3. Disconnect the hydraulic hoses (2) from hydraulic pipes.

■ **NOTE**

- **Before disconnecting the hydraulic hoses, be sure to note their original positions.**
- **Place protective caps on the remaining exposed hose ends.**

(1) Lower Links (2) Hydraulic Hose

W1010810



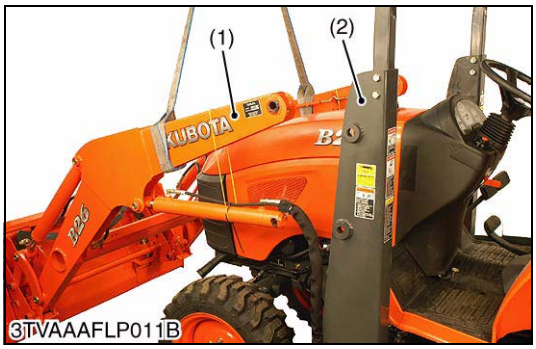
Front Loader Assembly

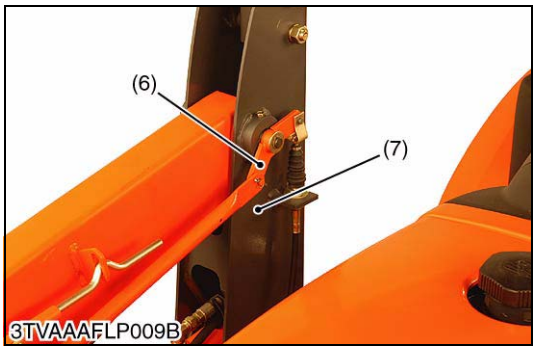
1. Disconnect the cable (2) and spill guard linkage (1)
2. Hoist the front loader assembly slightly, and remove the pin (3) and pin (5), and separate the front loader assembly (6) from the loader frames (4).

(1) Spill Guard Linkage
(2) Cable
(3) Pin
(4) Loader Frame
(5) Pin
(6) Front Loader Assembly

W1010894

[2] MOUNTING FRONT LOADER ASSEMBLY





Front Loader Assembly

1. Hoist and move the front loader assembly.
2. Install the hydraulic hoses to tractor frame.
3. Connect the boom (1) and tractor frame (2) with pins (3).
4. Connect the hydraulic hoses to hydraulic pipe.
5. Start the engine and move the boom cylinder (5) to connect the loader frame (2). Install pins (4).
6. Connect the spill guard link (6) and cable (7).
7. Install the setting bolts and locking nuts to pins.
   Lock the locking nuts to setting bolts at position where the setting bolt may still be rotated.
8. Install the lower links.

■ **NOTE**

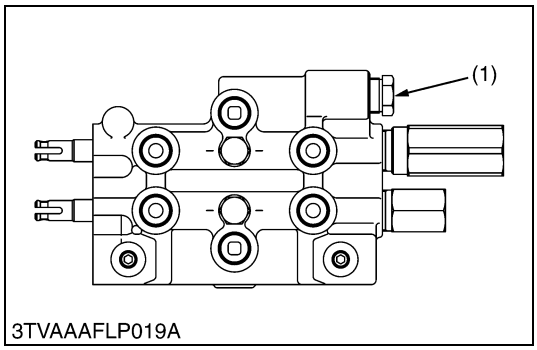
- **After installing the loader to tractor bleed the air from the system by operating the control lever.**
- **Check the spill guard operation. (Refer to the "CHECKING AND ADJUSTING" at this section.)**

(1) Boom
(2) Tractor Frame
(3) Pin
(4) Pin
(5) Boom Cylinder
(6) Spill Guard Link
(7) Cable

W1013896

6. CHECKING AND ADJUSTING

[1] RELIEF VALVE



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Relief Valve Setting Pressure

■ **NOTE**
- **The relief valve of the tractor hydraulic system is used as a relief valve of the front loader hydraulic circuit. When checking the setting pressure of relief valve, refer to "CHECKING AND ADJUSTING" at "8. HYDRAULIC SYSTEM".**

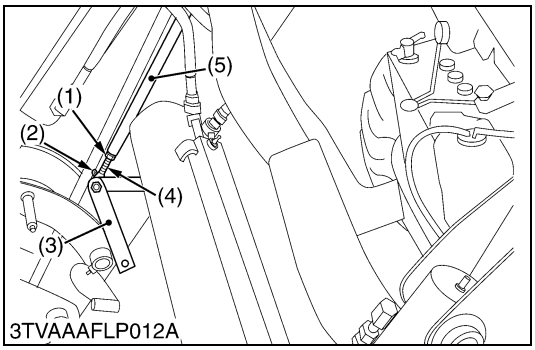
Relief valve setting pressure	Factory spec.	15.8 to 16.5 MPa 161 to 169 kgf/cm^2 2290 to 2400 psi

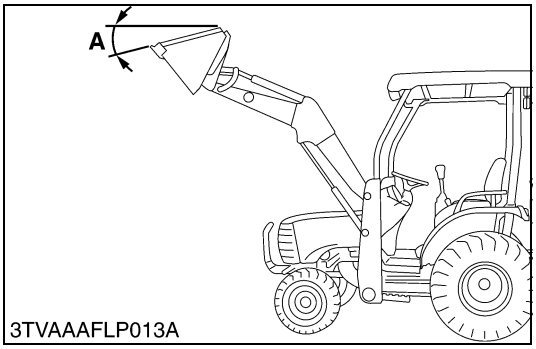
Condition
- Engine speed : Maximum
- Oil temperature : 40 to 60 °C
  104 to 140 °F

(1) Relief Valve

W1014041

[2] SPILL GUARD





Adjustment of Spill Guard Link

CAUTION

- **Keep your hand away from links or boom when operating the loader.**

1. Remove the cotter pin.
2. Remove the rod from the link.
3. Unfasten the lock nut and adjust the length of connecting rod by turning rod.
4. Tighten the lock nut and set the rod to the link with the cotter pin.
5. Start engine and set the bucket fully rolled back at the ground.
6. Lift the boom to maximum height and check the rollback angle.
7. If the side edge is not the same as following illustration, repeat the steps 1 to 6 above.

Condition of the bucket at full height	Adjustment
Bucket rolled back too far	Shorten connecting rod
Bucket dumped too far	Lengthen connecting rod

(1) Lock Nut
(2) Cotter Pin
(3) Link
(4) Rod
(5) Connecting Rod

A : 5 ° to 10° (0.09 to 0.17 rad.)

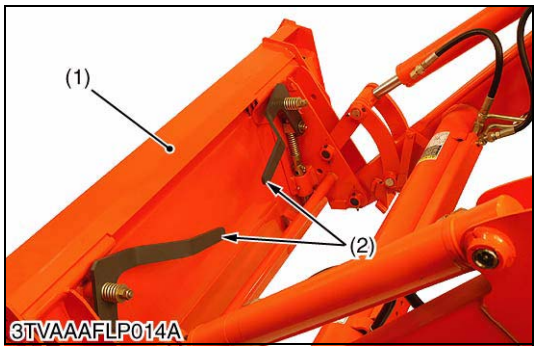
W1019625

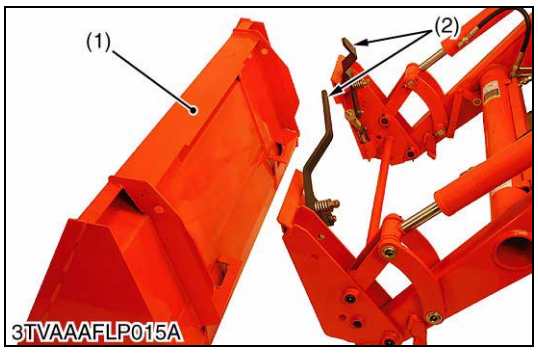
[3] BUCKET, BOOM AND HYDRAULIC CYLINDERS

(1) Disassembling and Assembling

■ **IMPORTANT**
- **When reassembling the mount pins, busings and inner rings, apply slight coat or grease to them.**
- **When tightening the hydraulic hoses, refer to "HYDRAULIC FITTINGS".**

■ **NOTE**
- **Implements should be located on a flat, film surface when attaching and deteching them from the Quick Hitch.**
- **Implements should not exceed the capacity of the loader or tractor.**





Bucket

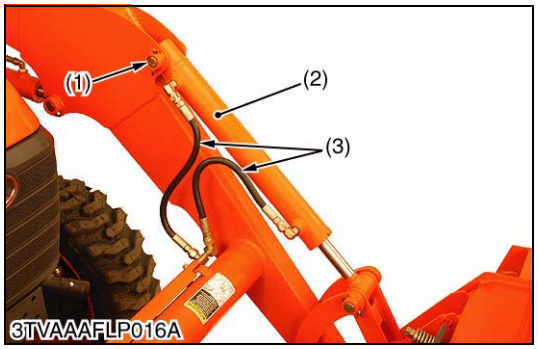
DANGER
- **If you install after market implements the implement must meet the SAE standard J2513.**
  Failure to meet this standard could result in injury or death.

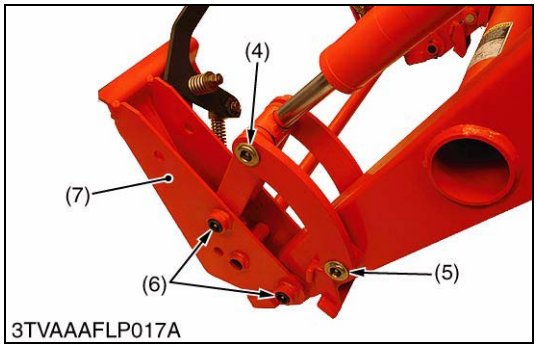
CAUTION
- **Never operate or transport implements which are not attached completely.**
- **Always replace damaged hardware immediately.**

1. Lift the quick hitch levers (2) and remove the bucket (1).

(1) Bucket
(2) Quick Hitch Lever

W1018048





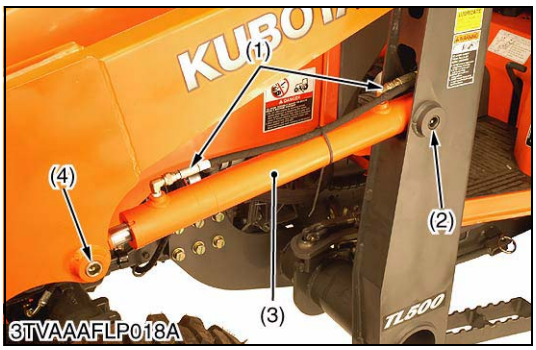
Bucket Cylinder and Quick Hitch

1. Remove the pins (6) and remove the quick hitch (7).
2. Disconnect the hydraulic hoses (3).
3. Remove the pins (4) and (1), and remove the bucket cylinders (2) with bucket links.

(When reassembling)
- Lock the locking nuts to setting bolts at position where the setting bolt may still be rotated.
- When attaching hydraulic cylinders, be careful of the direction of grease fittings.

(1) Pin
(2) Bucket Cylinder
(3) Hydraulic Hose
(4) Pin
(5) Pin
(6) Pin
(7) Quick Hitch

W1018145



Boom Cylinder

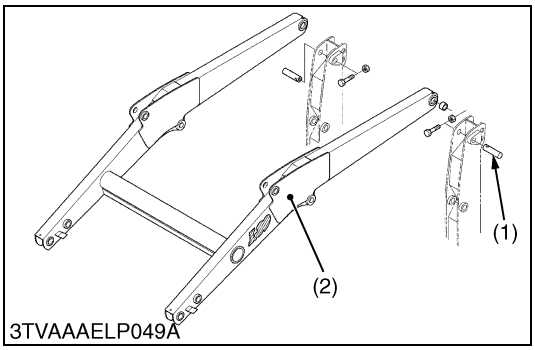
1. Disconnect the hydraulic hoses (1).
2. Remove the pins (2), (4) and remove the boom cylinder (3).

(When reassembling)

- Lock the locking nuts to setting bolts at position where the setting bolt may still be rotated.

(1) Hydraulic Hose
(2) Pin
(3) Boom Cylinder
(4) Pin

W1018332



Boom

1. Disconnect the four hoses from hydraulic tubes.
2. Hoist the boom slightly, and remove the pins 4 (1), then remove the boom (2).
3. Remove the clamps (4), cover (5) and remove the hydraulic tubes (3).

■ **NOTE**

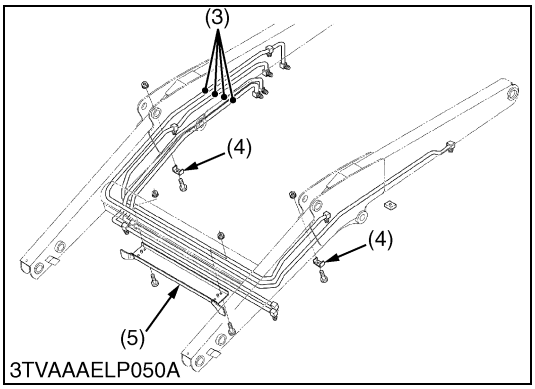
- **Before disconnecting the hydraulic hoses, be sure to note their original position.**
- **Place protective caps on the remaining exposed hose ends.**

(When reassembling)

- Lock the locking nuts to setting bolts at position where the setting bolt may still be rotated.

(1) Pin 4
(2) Boom
(3) Hydraulic Tube
(4) Clamp
(5) Cover

W1018463

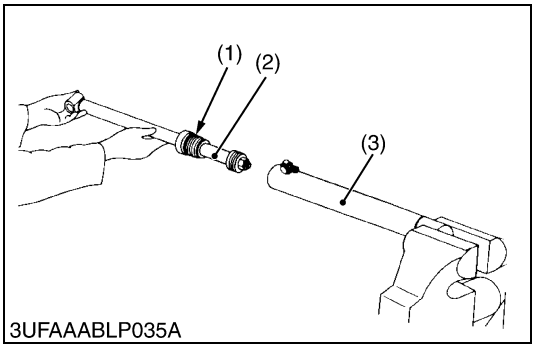


Removing Piston Rod Assembly from Cylinder

1. Drain hydraulic oil from the cylinder, and secure the tube end of the cylinder in a vise.
2. Unscrew the cylinder head (1) with the adjustable gland nut wrench (4).
3. Pull out the piston rod assembly (2) from the cylinder tube (3).

(When reassembling)

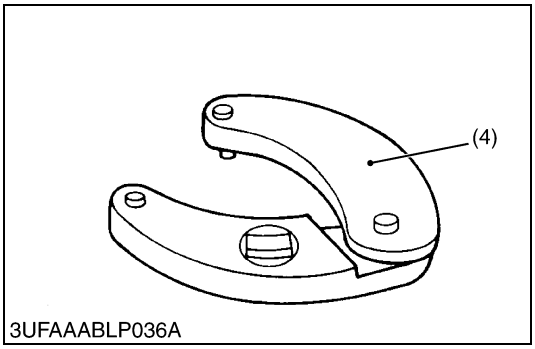
- Visually inspect the cylinder tube for signs of scoring or damage.
- Insert the piston rod assembly to the cylinder tube, using care not to damage the piston seal on the piston.
- Install the cylinder head to the cylinder tube, using care not to damage the O-ring on the cylinder head.

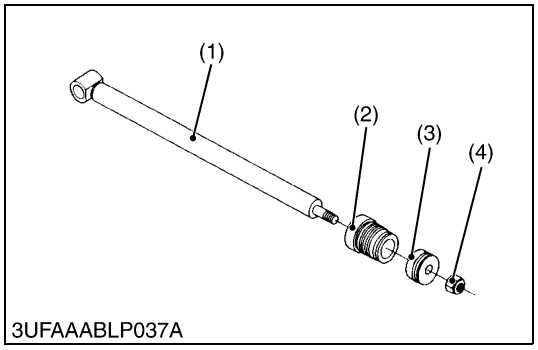


Tightening torque	Boom cylinder head mounting torque	200 to 230 N·m 20.4 to 23.4 kgf·m 148 to 169 lbf·ft
	Bucket cylinder head mounting torque	250 to 300 N·m 25.5 to 30.5 kgf·m 184.4 to 221.2 lbf·ft

(1) Cylinder Head
(2) Piston Rod Assembly
(3) Cylinder Tube
(4) Adjustable Gland Nut Wrench

W1018729





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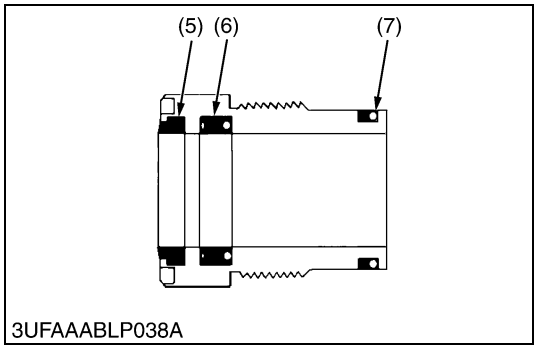

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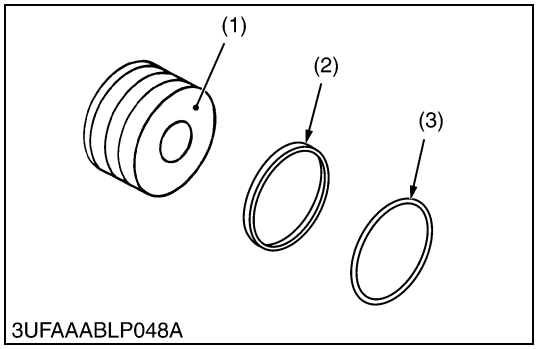

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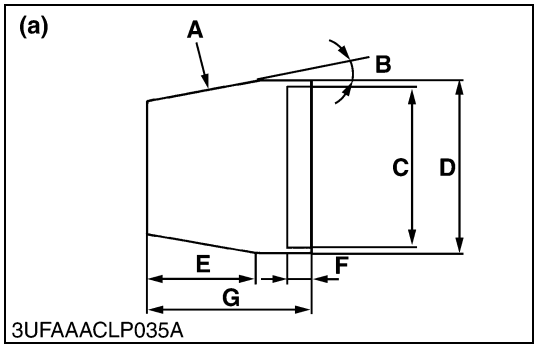

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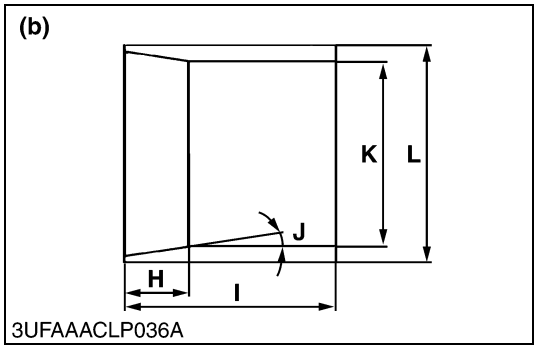

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Disassembling Piston Rod Assembly

1. Secure the rod end in a vise.
2. Unscrew the nut (4), and remove the piston (3) and cylinder head (2) from the piston rod (1).

(When reassembling)

- Visually inspect all parts for signs of scoring or damage.
- Insert the piston rod to the cylinder head, using care not to damage the wiper seal (5) and oil seal (6).

Tightening torque	Cylinder piston mounting nut	200 to 230 N·m 20.4 to 23.4 kgf·m 148 to 169 lbf·ft

(1) Piston Rod
(2) Cylinder
(3) Piston
(4) Nut
(5) Wiper Seal
(6) Oil Seal
(7) O-ring

W1018894

Removing Piston Seal and O-ring

1. Remove the piston seal (2) and O-ring (3) from the piston (1).

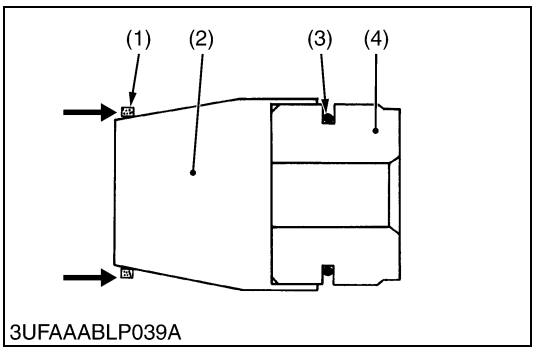
■ **IMPORTANT**

- **When installing the O-ring (3) and piston seal (2) to the piston (1), use the slide jig and correcting jig as shown in the figure.**

	Boom Cylinder (50 mm (1.97 in.))	Bucket Cylinder (55 mm (2.17 in.))
A	80 √	80 √
B	0.157 rad. 9 °	0.157 rad. 9 °
C	50.18 mm 1.98 in.	55.18 mm 2.17 in.
D	51.18 mm 2.01 in.	56.18 mm 2.21 in.
E	42 mm 1.65 in.	42 mm 1.65 in.
F	10.0 mm 0.4 in.	10.0 mm 0.4 in.
G	58.5 mm 2.30 in.	58.5 mm 2.30 in.
H	14.0 mm 0.55 in.	14.0 mm 0.55 in.
I	35.0 mm 1.38 in.	35.0 mm 1.38 in.
J	0.122 rad 7 °	0.122 rad. 7 °
K	50.2 mm 1.98 in.	55.2 mm 2.17 in.
L	58.9 mm 2.32 in.	63.9 mm 2.52 in.

(1) Piston
(2) Piston Seal
(3) O-ring
(a) Slide Jig
(b) Correcting Jig

W1017590



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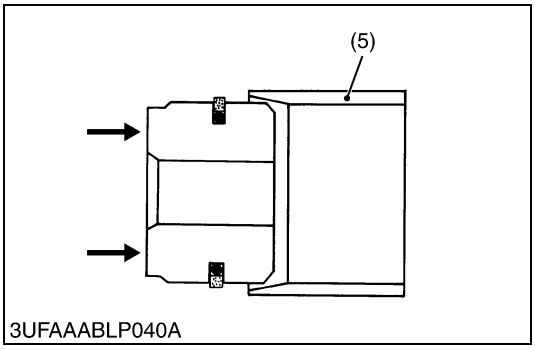


3UFAAABLP040A

Installing O-ring and Piston Seal

1. Place the slide jig (2) on the piston (4).
2. Install the O-ring (3) to the piston using the slide jig.
3. Install the piston seal (1) over the O-ring using the slide jig.
4. Compress the piston seal to the correct size by installing the piston into the correcting jig (5).

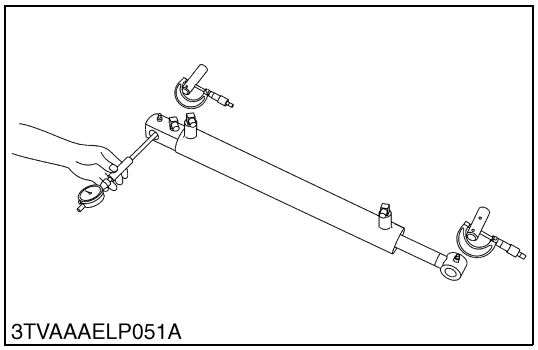
■ **NOTE**

- **Do not turn (roll) the piston seal as you install it.**

(1) Piston Seal
(2) Slide Jig
(3) O-ring
(4) Piston
(5) Correcting Jig

W1018156

(2) Servicing


3TVAAAELP051A

Clearance between Pin and Bushing or Pin Holes

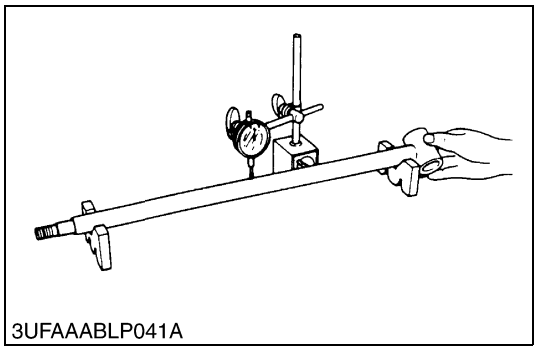
1. Measure the pin O.D. with an outside micrometer.
2. Measure the pin holes I.D.with a cylinder gauge.
3. If the clearance exceeds the factory specifications, replace the pin or bushings.

(Reference)

Clearance	Pin and cylinder bottom pin holes, boom rod, holes	Factory Spec.	0.10 to 0.38 mm 0.004 to 0.014 in.
	Pin and boom pivot pin hole bushing, bucket rod hole bushing and bucket link pin bushing		0.40 to 0.68 mm 0.02 to 0.03 in.

Pin 3, 5, 6 and 7 O.D.	Factory Spec.	25.32 to 25.40 mm 0.9976 to 1.000 in.
Boom pivot pin hole I.D. (with bushing)		25.80 to 26.00 mm 1.01 to 1.02 in.
Bucket pivot pin hole I.D. (with bushing)		25.80 to 26.00 mm 1.01 to 1.02 in.
Bucket link pivot pin hole I.D. (with bushing)		25.80 to 26.00 mm 1.01 to 1.02 in.
Bucket cylinder rod end pin hole I.D. (with bushing)		25.80 to 26.00 mm 1.01 to 1.02 in.
Cylinder pin hole I.D.		25.5 to 25.7 mm 1.00 to 1.01 in.
Bucket link pin hole I.D.		25.6 to 25.9 mm 1.01 to 1.02 in.
Quick hitch pin hole I.D.		25.6 to 25.9 mm 1.01 to 1.02 in.
Boom cylinder rod and pin hole I.D.		25.5 to 25.7 mm 1.00 to 1.01 in.

W1019768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Piston Rod Bend

1. Place piston rod on V blocks.
2. Set a dial indicator on the center of the rod.
3. Turn the piston rod and read the dial indicator.
4. If the measurement exceeds the allowable limit, replace it.

Piston rod bend	Allowable limit	0.25 mm 0.0098 in.

W1018329

10 BACKHOE

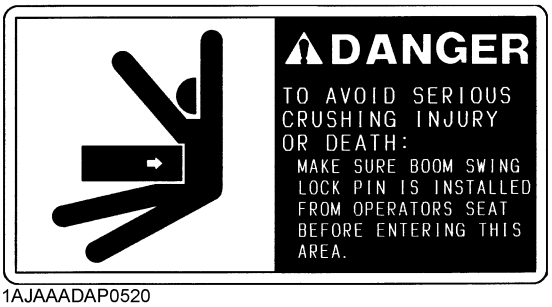
SAFETY DECALS

The following safety decals are installed on the machine.
If a decal becomes damaged, illegible or is not on the machine, replace it. The decal part number is listed in the parts list.

(1) Part No. 75597-7517-2

1AJAAADAP0490

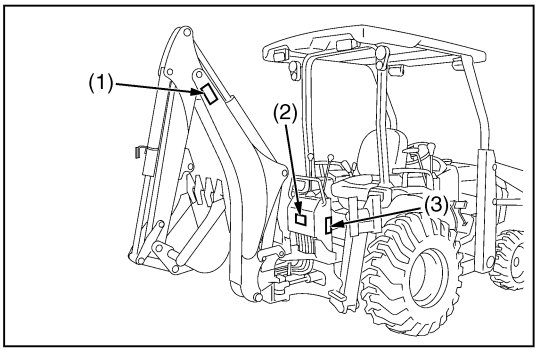
(2) Part No. 75595-7517-2



1AJAAADAP0520

(3) Part No. 75595-7524-2

1AJAAADAP0500

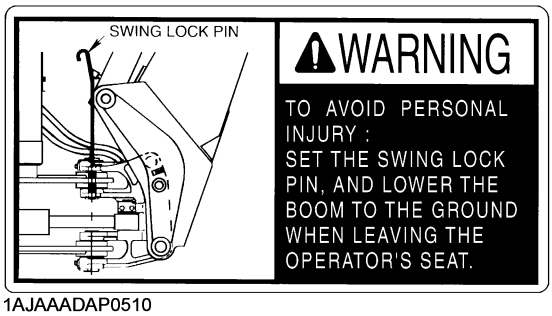


3TVAAAFCP001A

(4) Part No. 75597-7528-1

1AJAAADAP0480

(5) Part No. 75595-7529-3



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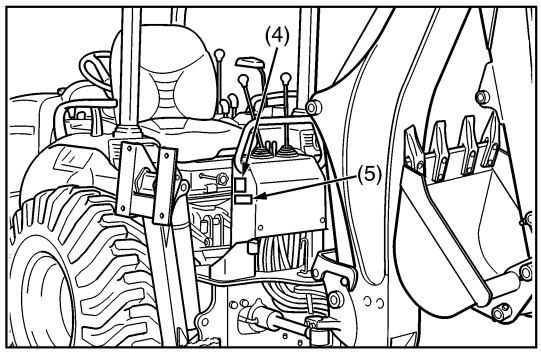
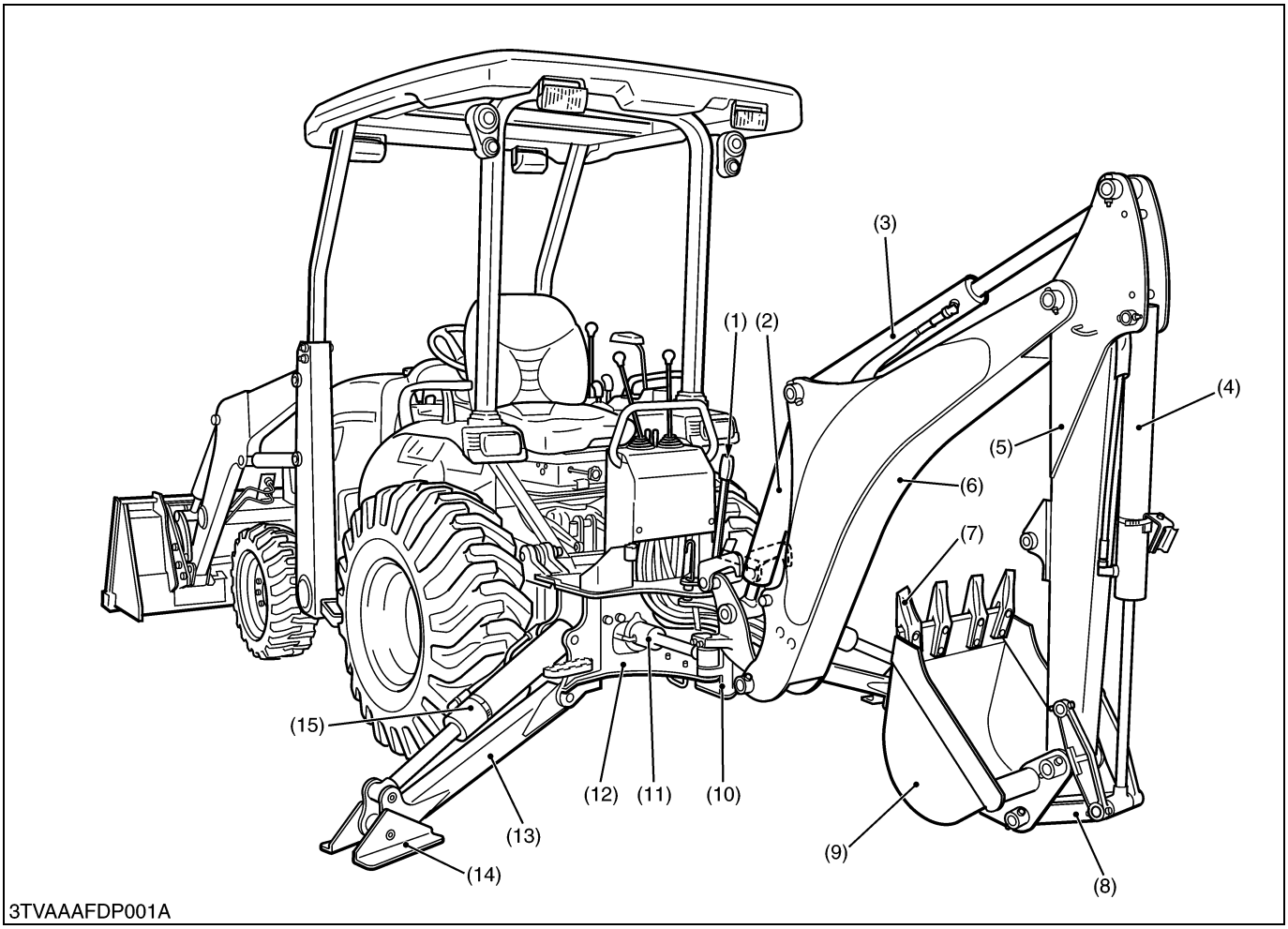


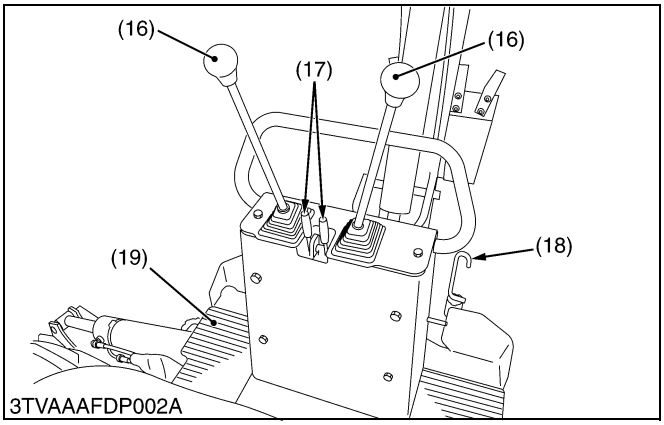
CARE OF DANGER, WARNING AND CAUTION LABELS

1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels from your local KUBOTA distributor.
4. If a component with danger, warning and caution label(s) affixed is replaced with new part, make sure new label(s) is (are) attached in the same location(s) as the replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

3TVAAAFCP002A

TERMINOLOGY

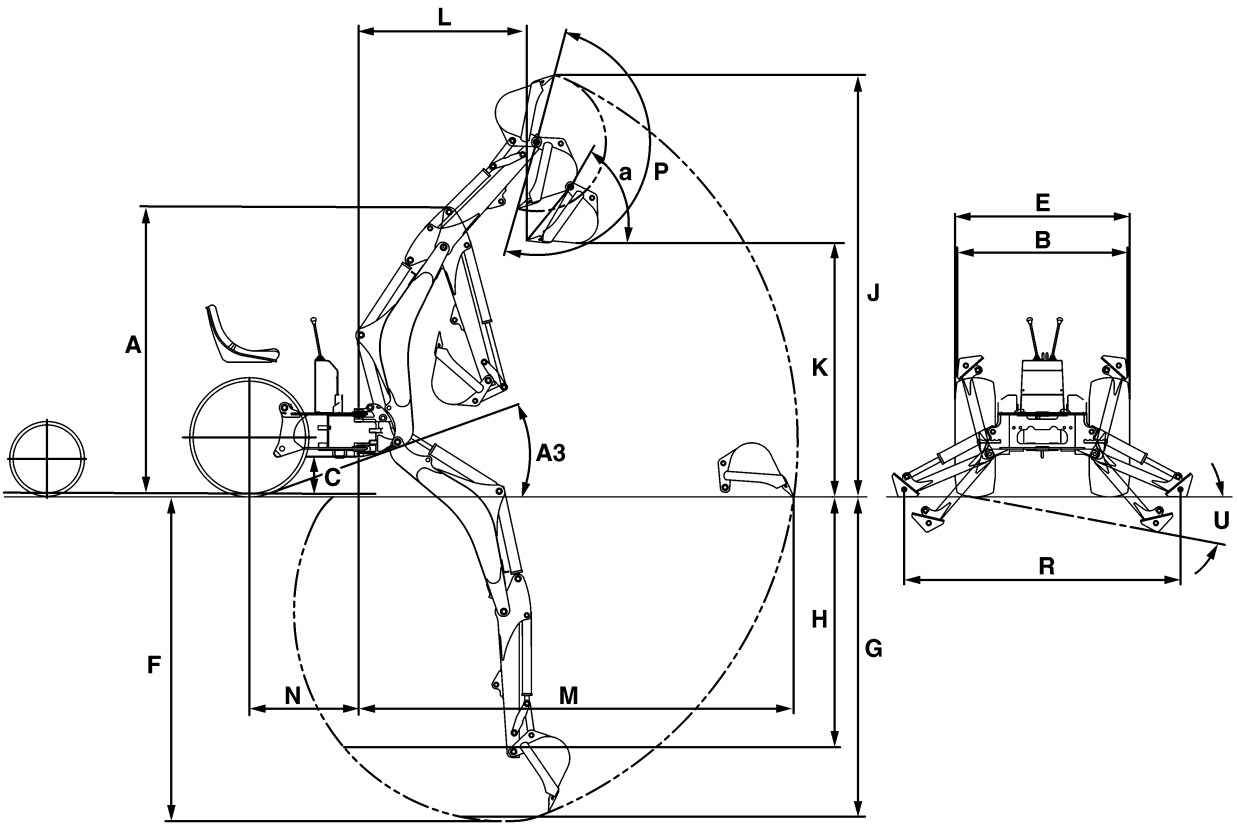




(1) Boom Lock Lever
(2) Boom Cylinder
(3) Dipperstick Cylinder
(4) Bucket Cylinder
(5) Dipperstick
(6) Boom
(7) Bucket Teeth
(8) Bucket Link
(9) Backhoe Bucket
(10) Swing Frame
(11) Swing Cylinder
(12) Main Frame
(13) Stabilizer
(14) Stabilizer Pad
(15) Stabilizer Cylinder
(16) Joystick Control
(17) Stabilizer Control
(18) Swing Lock Pin
(19) Step

SPECIFICATIONS

■ Dimensions



3TVAAAFDP003A

Model		BT820
A	Transport height	2264 mm (89.1 in.)
B	Stabilizer spread transport	1347 mm (53.0 in.)
C	Ground clearance	287 mm (11.3 in.)
E	Overall width	1365 mm (53.7 in.)
F	Maximum digging depth	2535 mm (99.8 in.)
G	Digging depth 2 ft., flat Bottom	2498 mm (98.3 in.)
H	Digging depth 8 ft., flat Bottom	1957 mm (77.0 in.)
J	Operating height, fully raised	3298 mm (129.8 in.)
K	Loading height (at 60 deg.)	1963 mm (77.3 in.)
L	Loading reach	1324 mm (52.1 in.)
M	Reach from swing pivot	3400 mm (133.9 in.)
N	Swing pivot to rear axle center line	855 mm (33.7 in.)
P	Bucket rotation	181.2 deg.
R	Stabilizer spread-operation	2116 mm (83.3 in.)
A3	Angle of departure per SAE J1234	20.3 deg.
U	Leveling angle	10.7 deg.
	Swing arc	180 deg.
a	–	60 deg.

NOTE: The specifications are taken with KUBOTA B26 tractor. (Tire size : Front 23 × 8.50-14, Rear 12.4-16)

W1028417

■ Digging Force (Per SAE J49)

With bucket cylinder	18731 N (4210 lbf)
With dipperstick cylinder	9444 N (2123 lbf)

W1027852

■ Cycle Time (Seconds)

Boom cylinder, extend	4.1
Boom cylinder, retract	3.0
Swing cylinder, from 90 ° to center	1.5
Dipperstick cylinder, extend	4.0
Dipperstick cylinder, retract	3.0
Bucket cylinder, extend	3.2
Bucket cylinder, retract	2.2
Stabilizer cylinder, max. height to ground	2.5
Stabilizer cylinder, ground to max. height	1.7

W1028902

■ Hydraulic Cylinders

	Boom cm (in.)	Dipperstick cm (in.)	Bucket cm (in.)	Stabilizer cm (in.)	Swing cm (in.)
Rod diameter	3.5 (1.38)	3.5 (1.38)	3.5 (1.38)	4.0 (1.57)	3.5 (1.38)
Cylinder bore	7.5 (2.95)	6.5 (2.56)	6.0 (2.36)	7.0 (2.76)	6.0 (2.36)

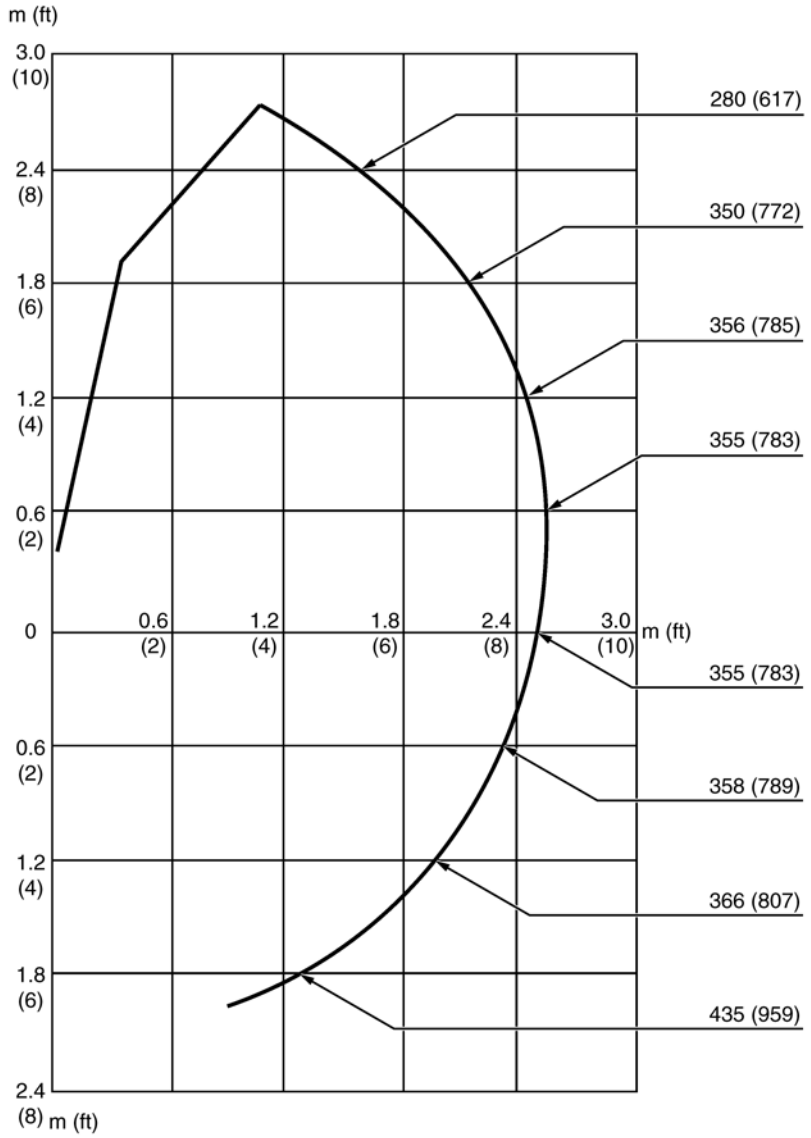
W1028958

■ Bucket Alternatives

	Width cm (in.)	SAE Struck Capacity m^3 (cu-ft)	SAE Heaped Capacity m^3 (cu-ft)	Number of Teeth	Weight kg (lbs)
Trenching 12”	30.5 (12)	0.024 (0.85)	0.031 (1.10)	3	38 (84)
Trenching 18”	45.7 (18)	0.038 (1.34)	0.052 (1.84)	4	42 (92)
Trenching 24”	61.0 (24)	0.053 (1.87)	0.074 (2.61)	5	48 (106)

W1029014

■ Lift Capacity (Per SAE J31)



3TVAAAFDP004A

Lift capacites shown are 87 % of maximum lift force, according to SAE definition.

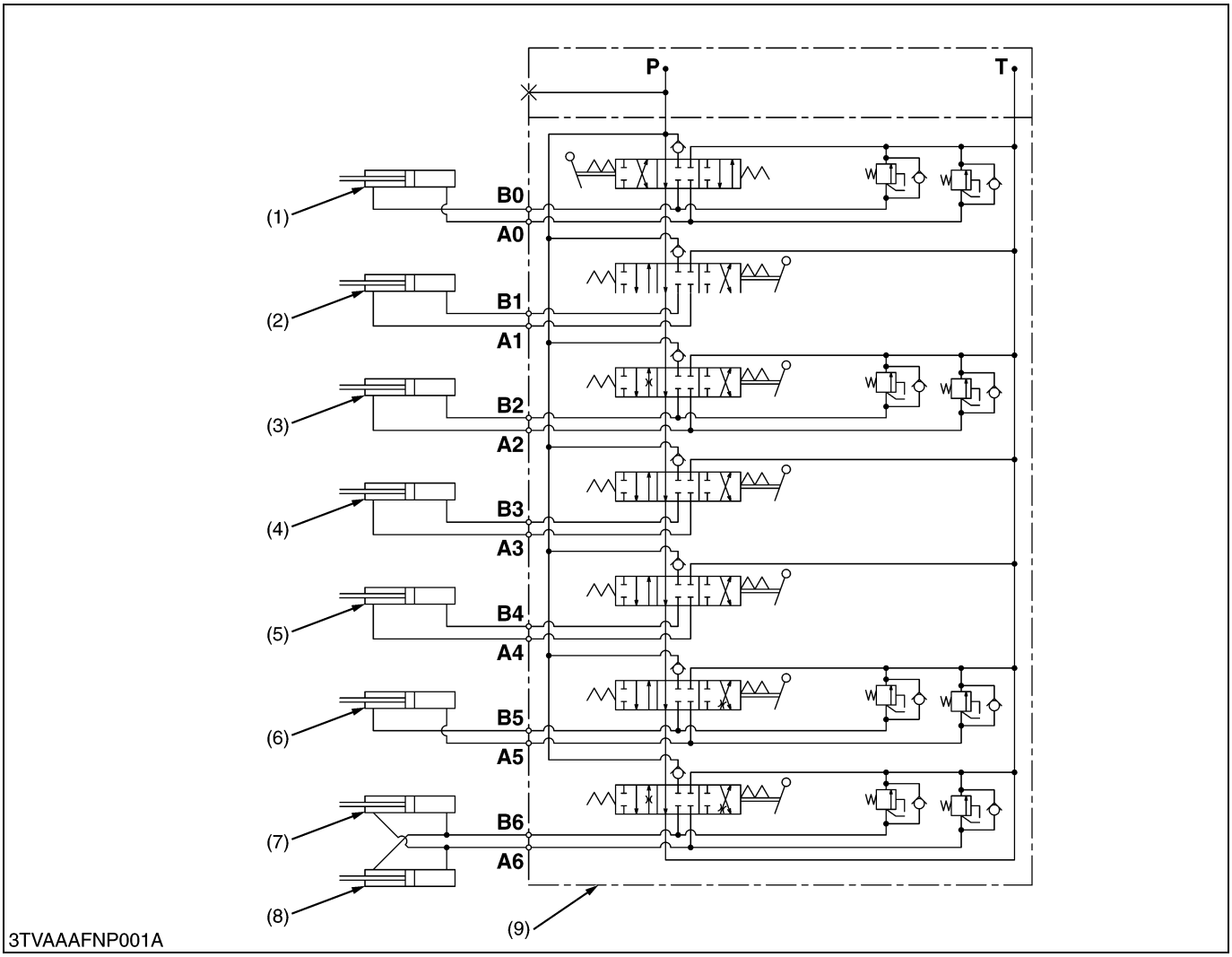
W1029646

MECHANISM

CONTENTS

1. HYDRAULIC SYSTEM

[1] HYDRAULIC CIRCUIT

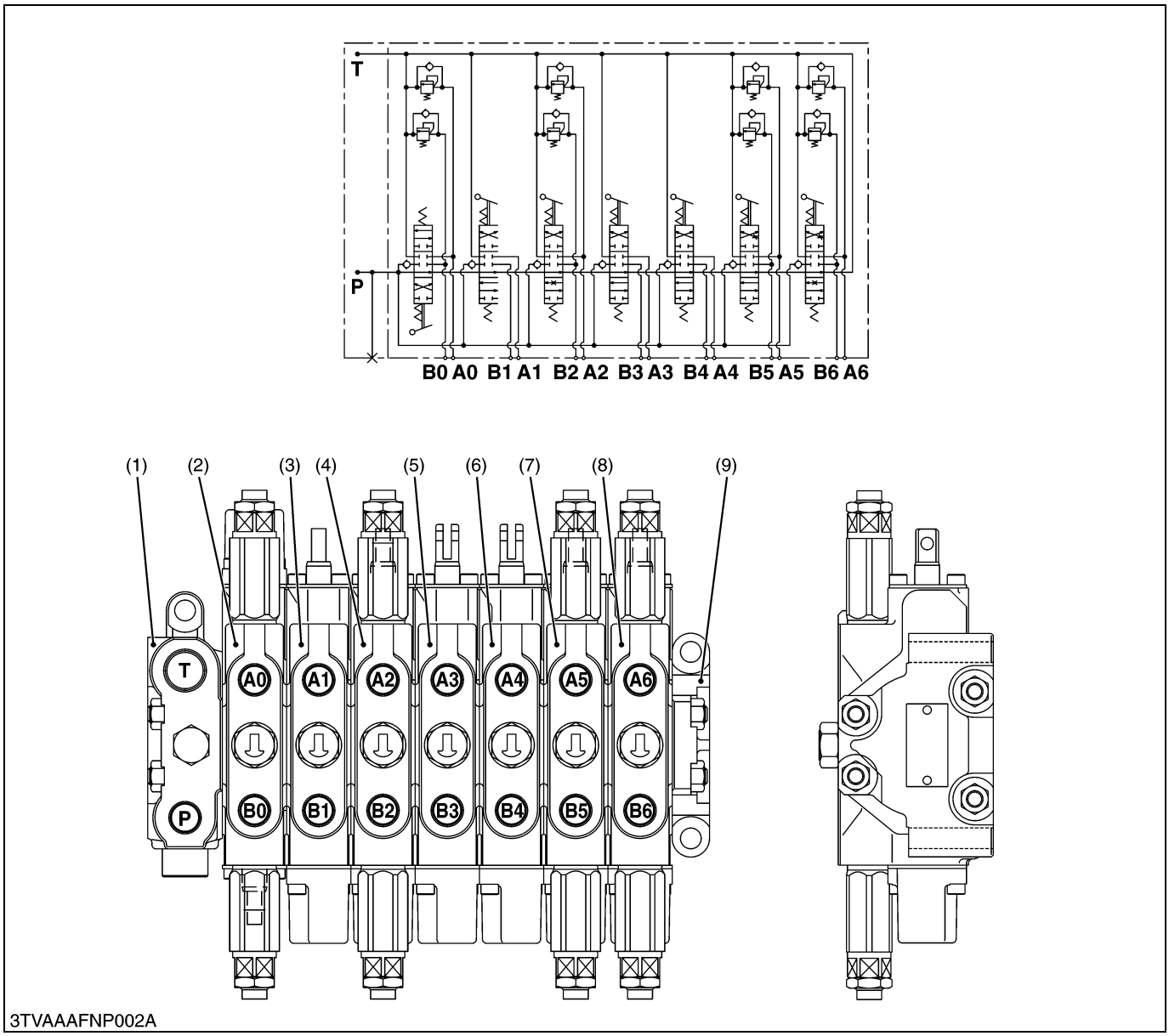


(1) Bucket Cylinder
(2) Thumb Cylinder (Option)
(3) Dipperstick Cylinder
(4) Stabilizer Cylinder RH
(5) Stabilizer Cylinder LH
(6) Boom Cylinder
(7) Swing Cylinder LH
(8) Swing Cylinder RH
(9) Backhoe Control Valve

P : From Front Loader
T : To 3 Point Hitch

[2] CONTROL VALVE

(1) Structure



3TVAAAFNP002A

(1) Inlet Section
(2) Thumb Control Valve (If equipped)
(3) Bucket Control Valve
(4) Dipperstick Control Valve
(5) Stabilizer RH Control Valve
(6) Stabilizer LH Control Valve
(7) Boom Control Valve
(8) Swing Control Valve
(9) Outlet Section

P : Pump Port
T : Tank Port

A0 : A0 Port
A1 : A1 Port
A2 : A2 Port
A3 : A3 Port
A4 : A4 Port
A5 : A5 Port
A6 : A6 Port

B0 : B0 Port
B1 : B1 Port
B2 : B2 Port
B3 : B3 Port
B4 : B4 Port
B5 : B5 Port
B6 : B6 Port

(1) Inlet / Outlet Section

This section has **P** and **T** ports.

The **P** port is connected to the **OUTLET** port of tractor connected by the quick coupler.

The **T** port is connected to the **RETURN** port of tractor connected by the quick coupler.

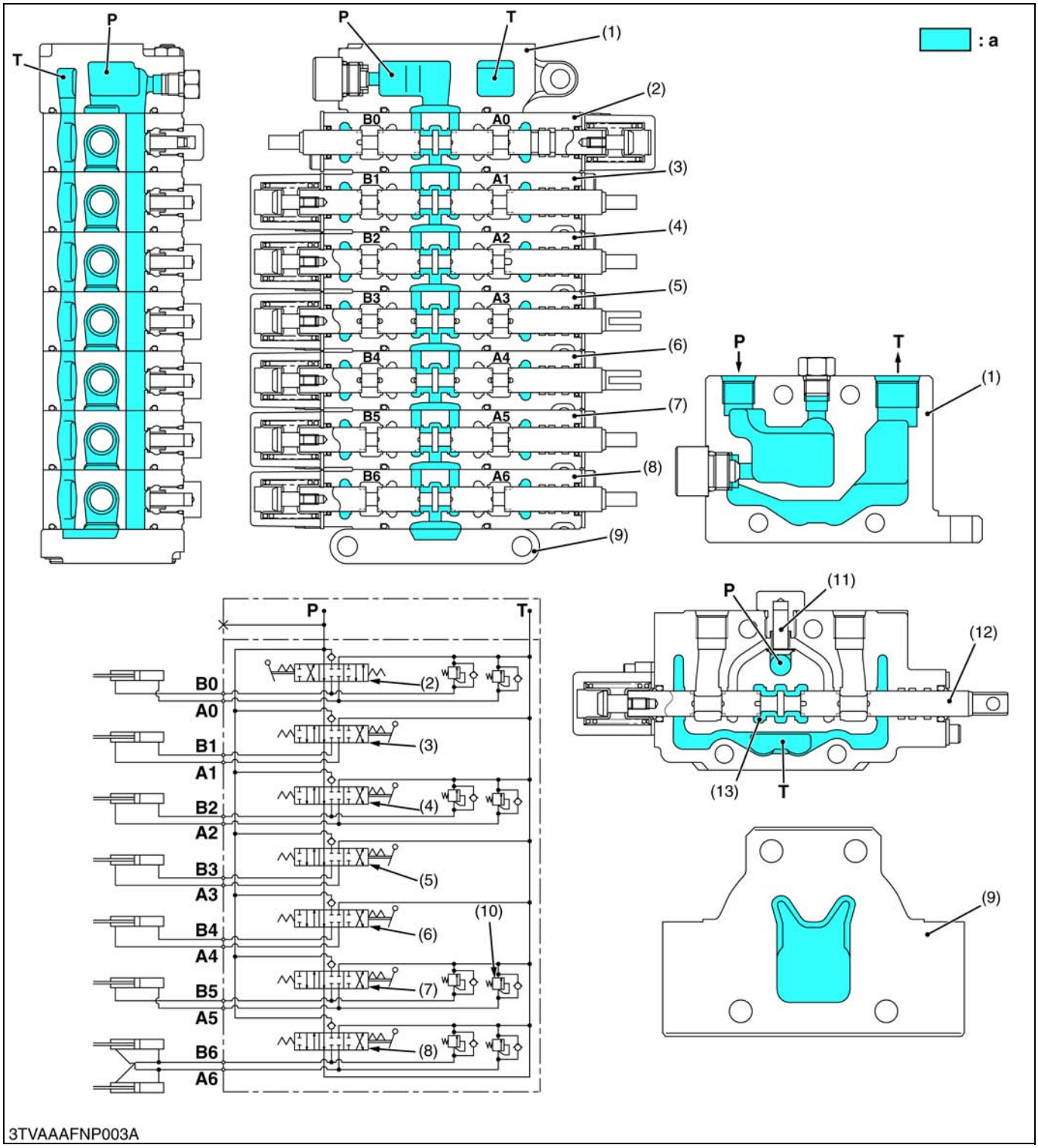
(2) Control Valve Section

The control valves are of 3 positions, 6 connections, no detent, spring center type. These valves have **A** and **B** ports and control oil flow to each cylinders.

These are consisting of a valve housing, spool, load check valve, overload relief valve, etc..

(2) Operation

■ Neutral



(1) Inlet Section
(2) Thumb Control Valve (If equipped)
(3) Bucket Control Valve
(4) Dipperstick Control Valve
(5) Stabilizer RH Control Valve
(6) Stabilizer LH Control Valve
(7) Boom Control Valve
(8) Swing Control Valve
(9) Outlet Section
(10) Overload Relief Valve (Port Relief Valve)
(11) Load Check Valve
(12) Spool
(13) Neutral Passage

P : Pump Port
T : Tank Port
A0 : A0 Port
A1 : A1 Port
A2 : A2 Port
A3 : A3 Port
A4 : A4 Port
A5 : A5 Port
A6 : A6 Port

B0 : B0 Port
B1 : B1 Port
B2 : B2 Port
B3 : B3 Port
B4 : B4 Port
B5 : B5 Port
B6 : B6 Port

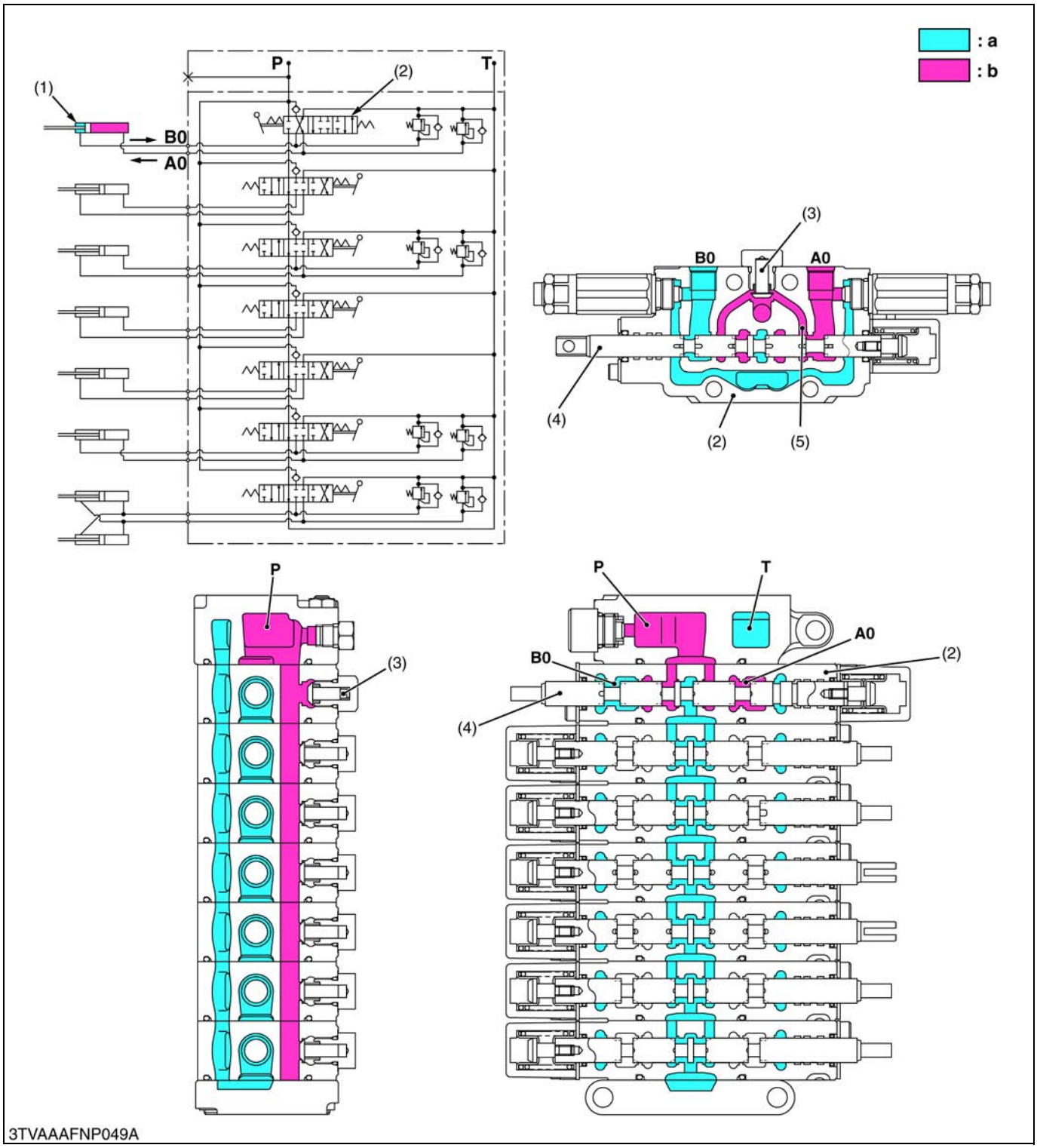
a : Low Pressure

Pressure-fed oil from the hydraulic pumps are delivered into **P** port in the inlet section (1).

As the load check valves (11) are kept closed in the neutral position, oil flows along the notched section of the spools (12) to the **T** port through the neutral passage (13).

Then the oil is fed to the transmission case via the return hose and pipe from the **T** port.

■ Thumb (Extend)

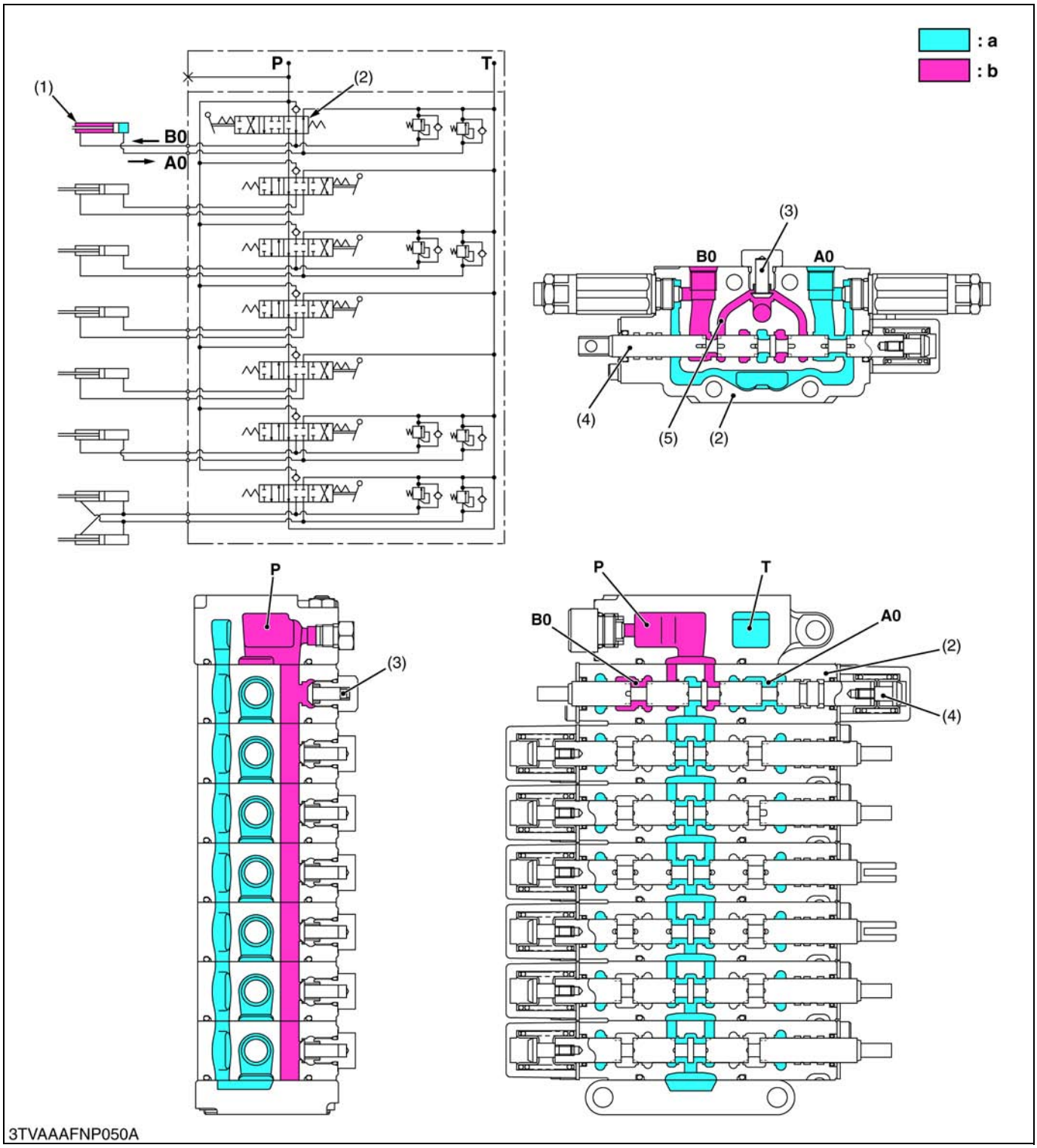


(1) Thumb Cylinder
(2) Thumb Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A0 : A0 Port
B0 : B0 Port
P : Pump Port
T : Tank Port
a : Low Pressure
b : High Pressure

1. When the thumb control pedal is pushed forward to set to the **"EXTEND"** position, the spool (4) of the thumb control valve (2) moves to the right, which forms oil passage between bridge passage (5) and **B0** port, and between **A0** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3), and flows to **B0** port to extend the thumb cylinder.
3. Return oil from the thumb cylinder returns to the transmission case through the **A0** port, low pressure passage and **T** port.

■ Thumb (Shrink)



(1) Thumb Cylinder
(2) Thumb Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

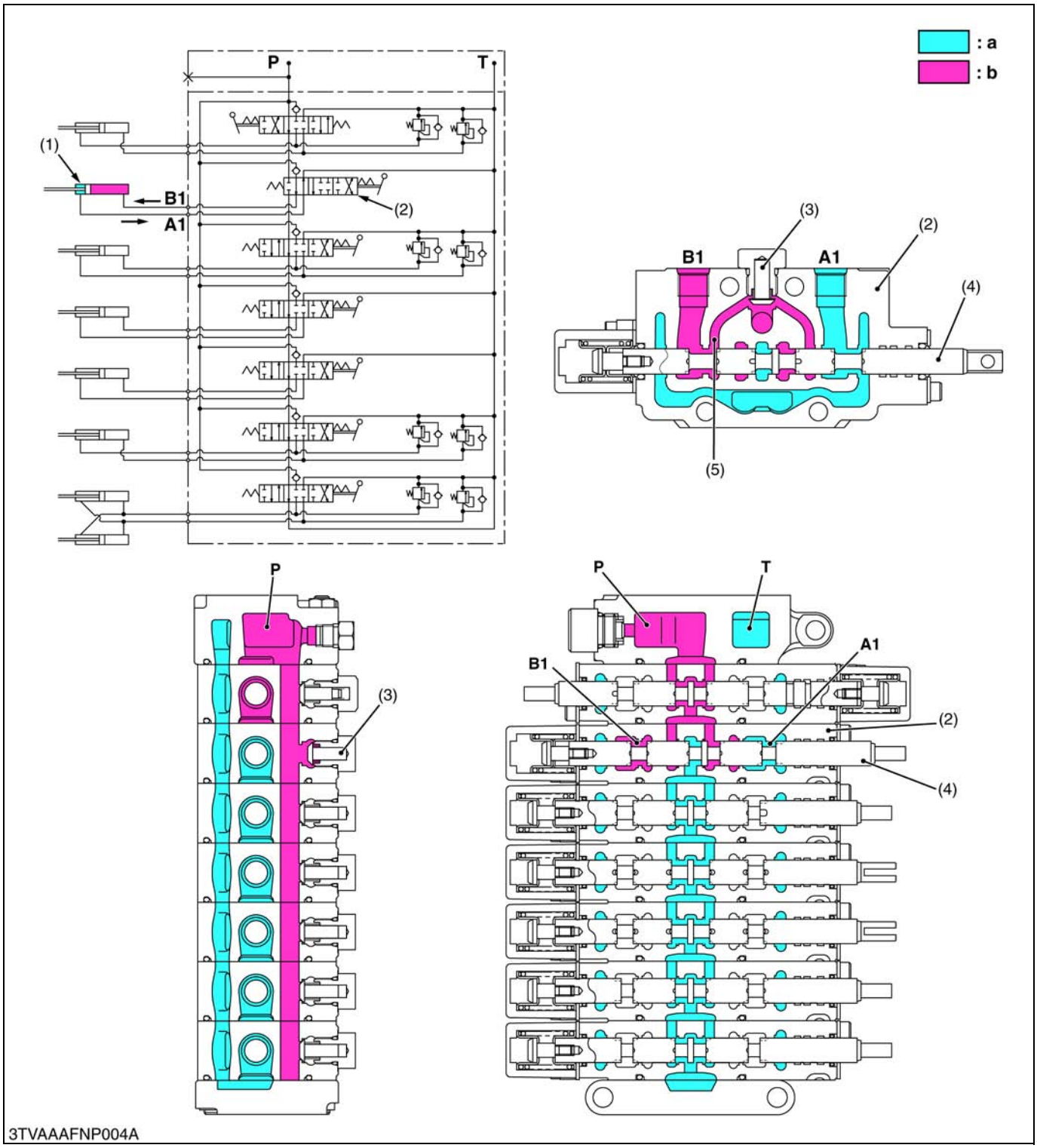
A0 : A0 Port (from Thumb Cylinder)
B0 : B0 Port (To Thumb Cylinder)

P : Pump Port
T : Tank Port

a : Low Pressure
b : High Pressure

1. When the thumb control pedal is pushed to the backward to set to the **"SHRINK"** position, the spool (4) of the thumb control valve (2) moves to the left, which forms oil passage between bridge passage (5) and **A0** port, and between **B0** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3), and flows to **A0** port to retract the thumb cylinder.
3. Return oil from the thumb cylinder returns to the transmission case through the **B0** port, low pressure passage and **T** port.

■ Bucket (Roll-back)

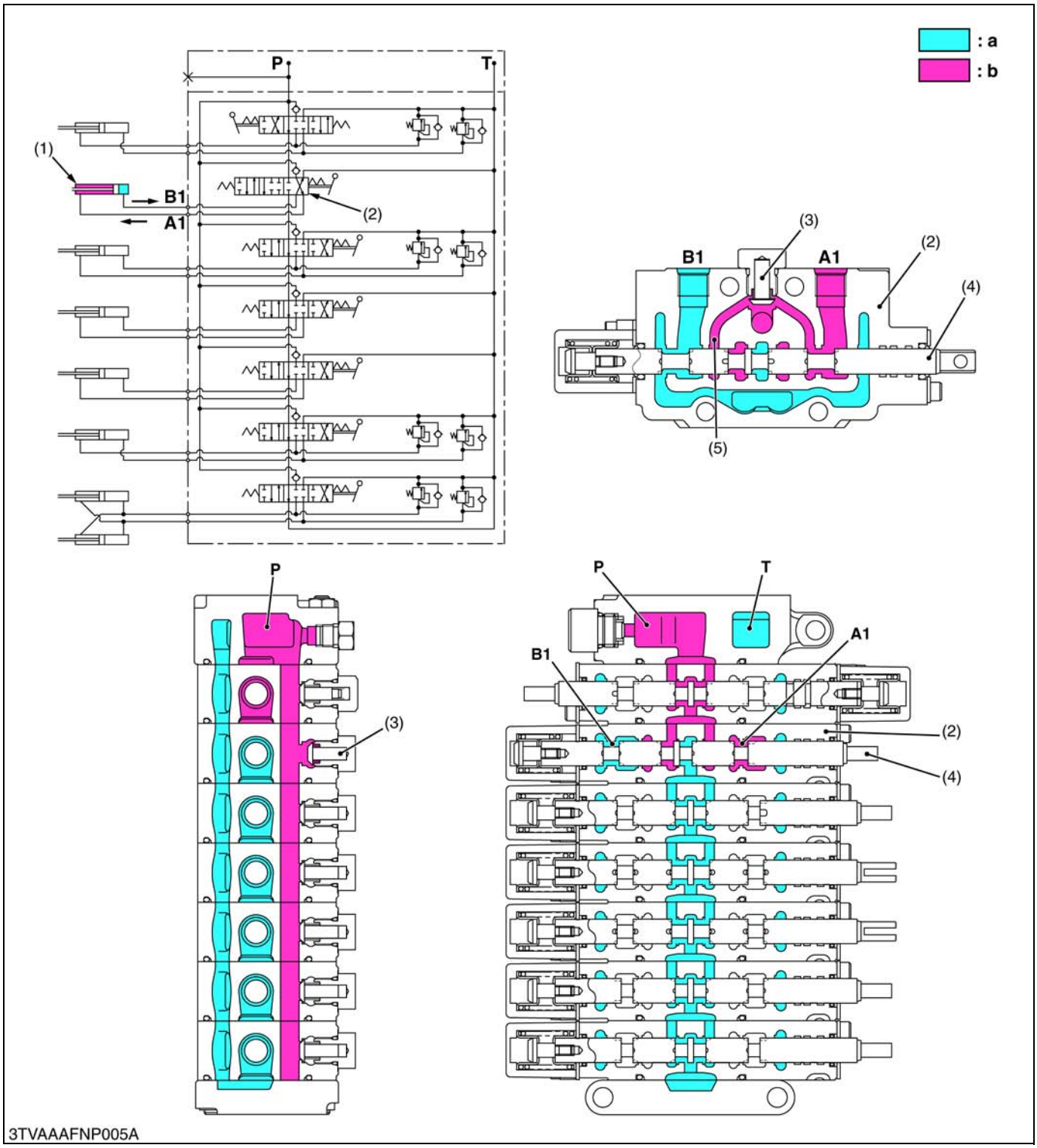


(1) Bucket Cylinder
(2) Bucket Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A1 : A1 Port (From Bucket Cylinder)
B1 : B1 Port (To Bucket Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the dipperstick and bucket lever is moved to the left to set to the **"ROLL-BACK"** position, the spool (4) of the bucket control valve (2) moves to the right, which forms oil passage between bridge passage (5) and **B1** port, and between **A1** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3) and flows to **B1** port to extend the bucket cylinder (1).
3. Return oil from the bucket cylinder (1) returns to the transmission case through the **A1** port, low pressure passage and **T** port.

■ Bucket (Dump)

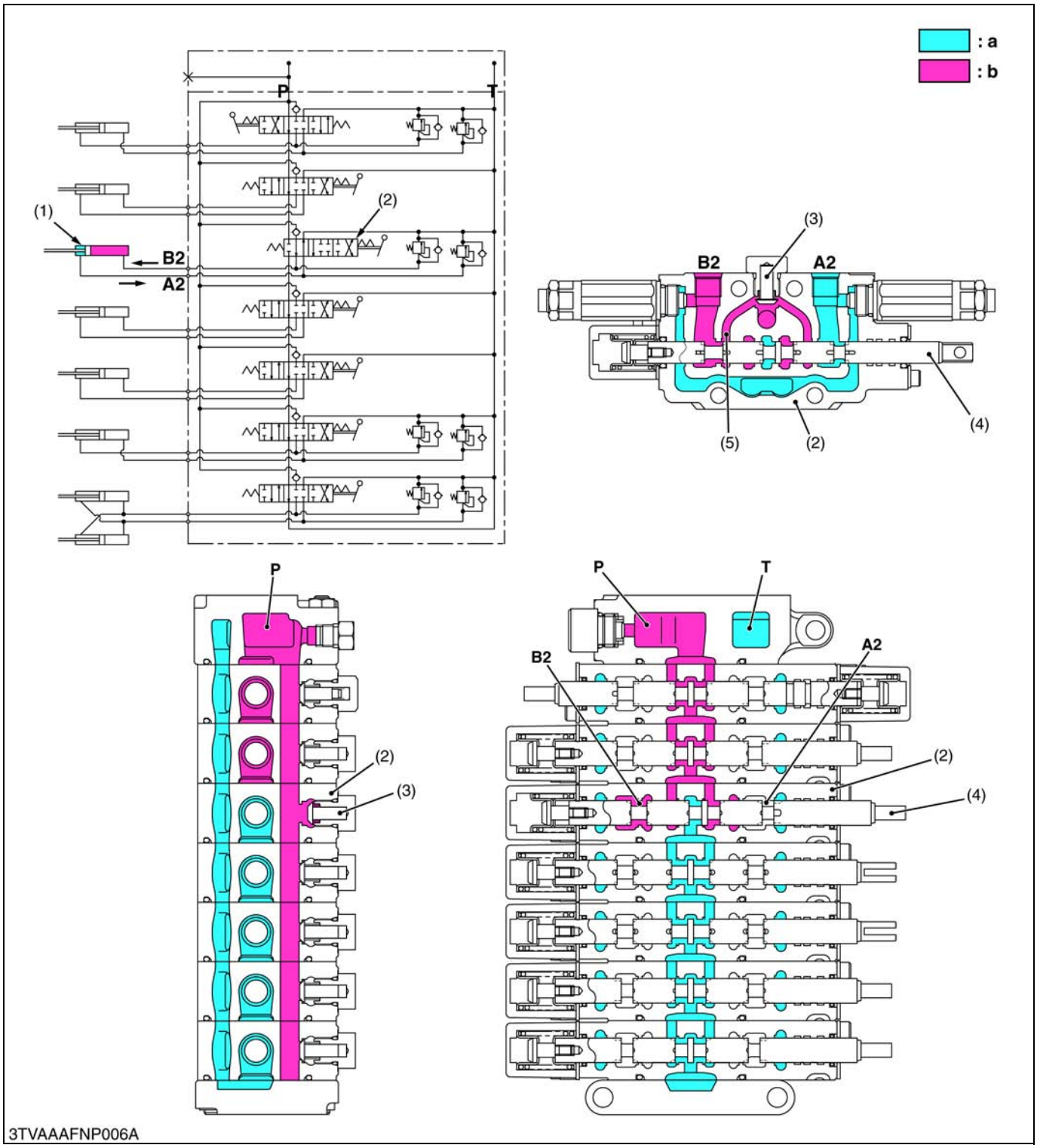


(1) Bucket Cylinder
(2) Bucket Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A1 : A1 Port (From Bucket Cylinder)
B1 : B1 Port (To Bucket Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the dipperstick and bucket lever is moved to the right to set to the **"DUMP"** position, the spool (4) of the bucket control valve (2) moves to the left, which forms oil passage between bridge passage (5) and **A1** port, and between **B1** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3) and flows to **A1** port to retract the bucket cylinder.
3. Return oil from the bucket cylinder returns to the transmission case through the **B1** port, low pressure passage and **T** port.

■ Dipperstick (Crowd)

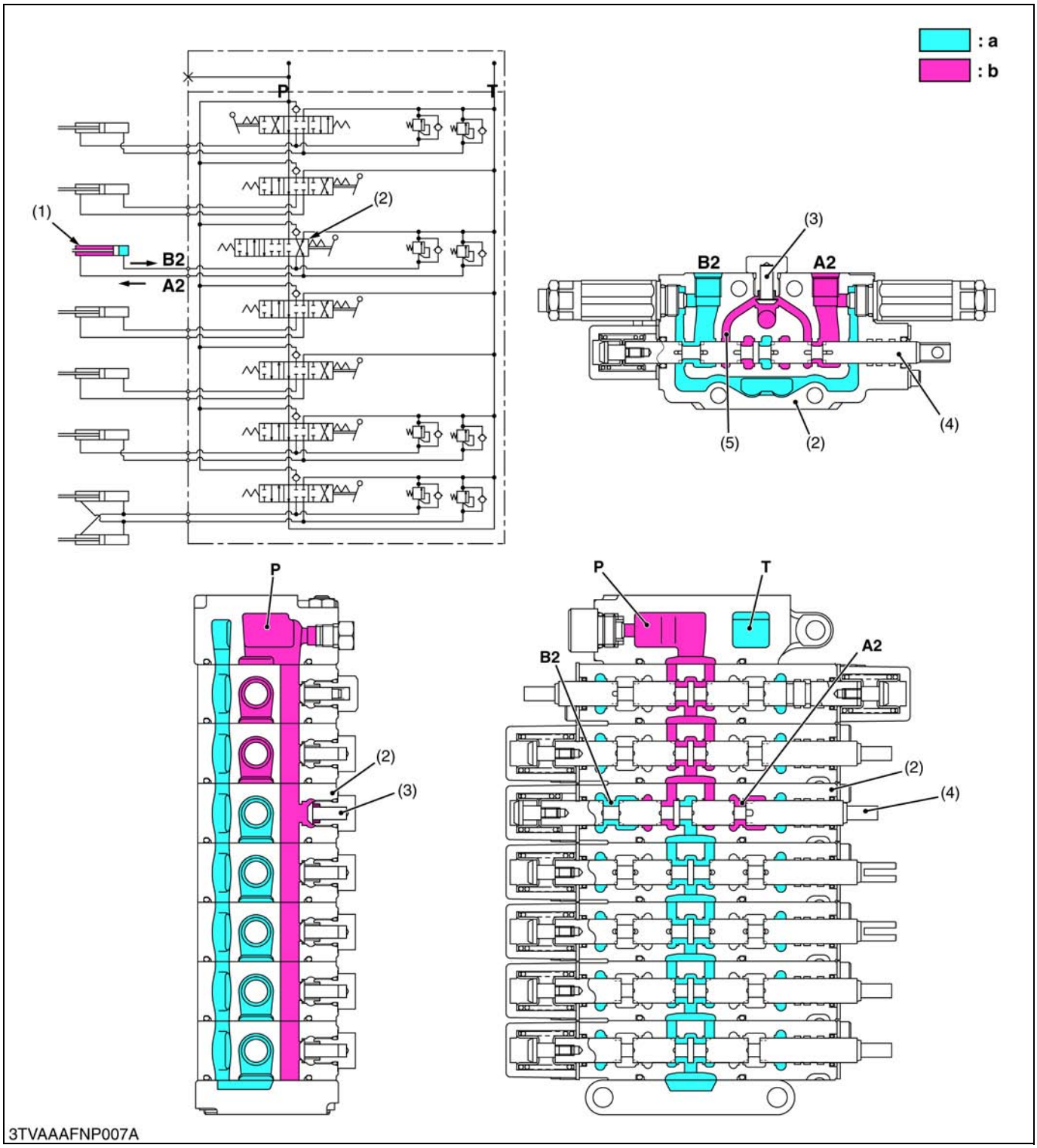


(1) Dipperstick Cylinder
(2) Dipperstick Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A2 : A2 Port (From Dipperstick Cylinder)
B2 : B2 Port (To Dipperstick Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the dipperstick and bucket lever is pulled to the backward to set to the **"CROWD"** position, the spool (4) of the dipperstick control valve (2) moves to the right, which forms oil passage between bridge passage (5) and **B2** port, and between **A2** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3) and flows to **B2** port to extend the dipperstick cylinder.
3. Return oil from the dipperstick cylinder returns to the transmission case through the **A2** port, low pressure passage and **T** port.

■ Dipperstick (Extend)

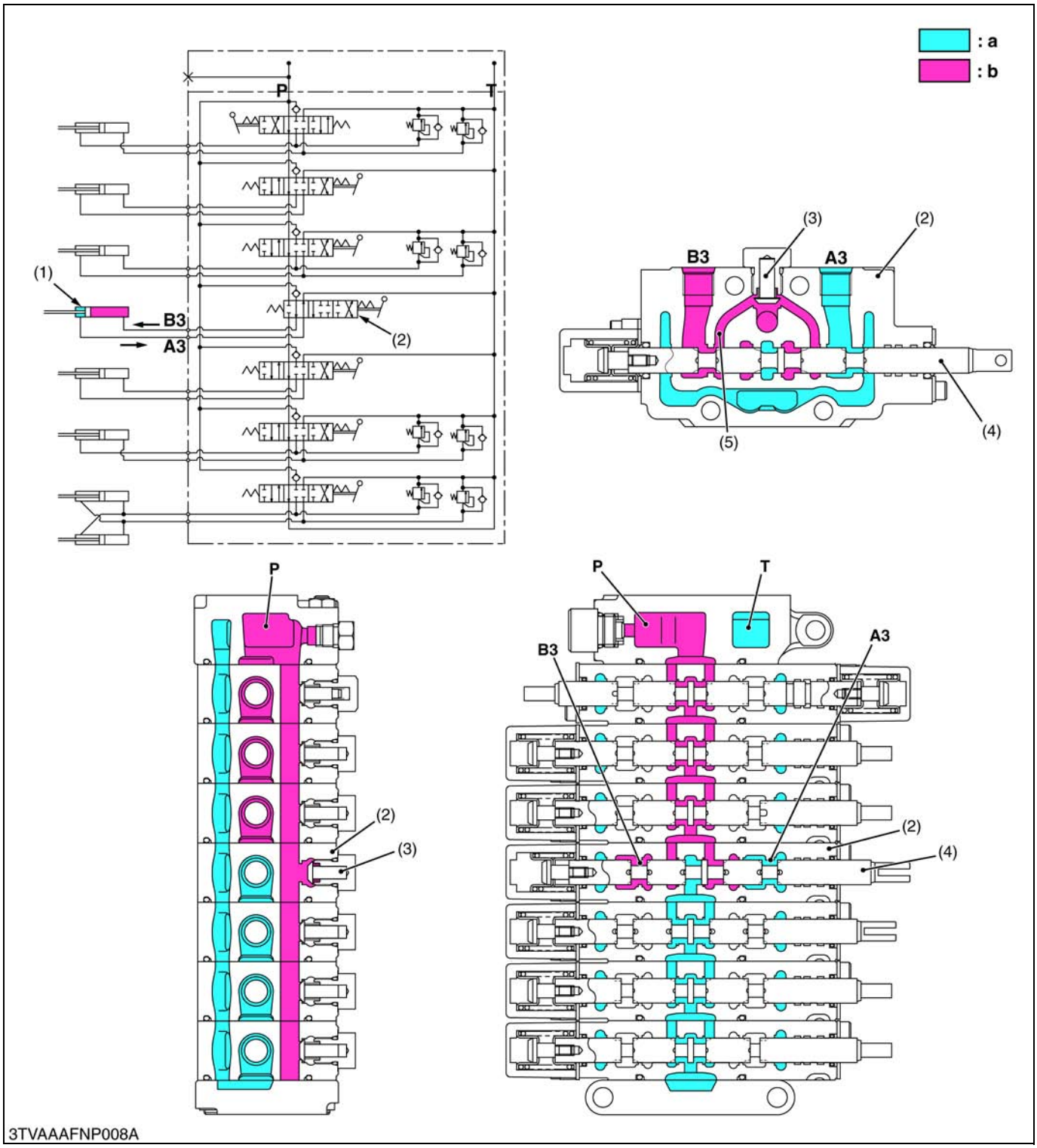


(1) Dipperstick Cylinder
(2) Dipperstick Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A2 : A2 Port (From Dipperstick Cylinder)
B2 : B2 Port (To Dipperstick Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the dipperstick and bucket lever is pushed to the forward to set to the **"EXTEND"** position, the spool (4) of the dipperstick control valve (2) moves to the left, which forms oil passage between bridge passage (5) and **A2** port, and between **B2** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3) and flows to **A2** port to retract the dipperstick cylinder.
3. Return oil from the dipperstick cylinder returns to the transmission case through the **B2** port, low pressure passage and **T** port.

■ Stabilizer RH (Extend)

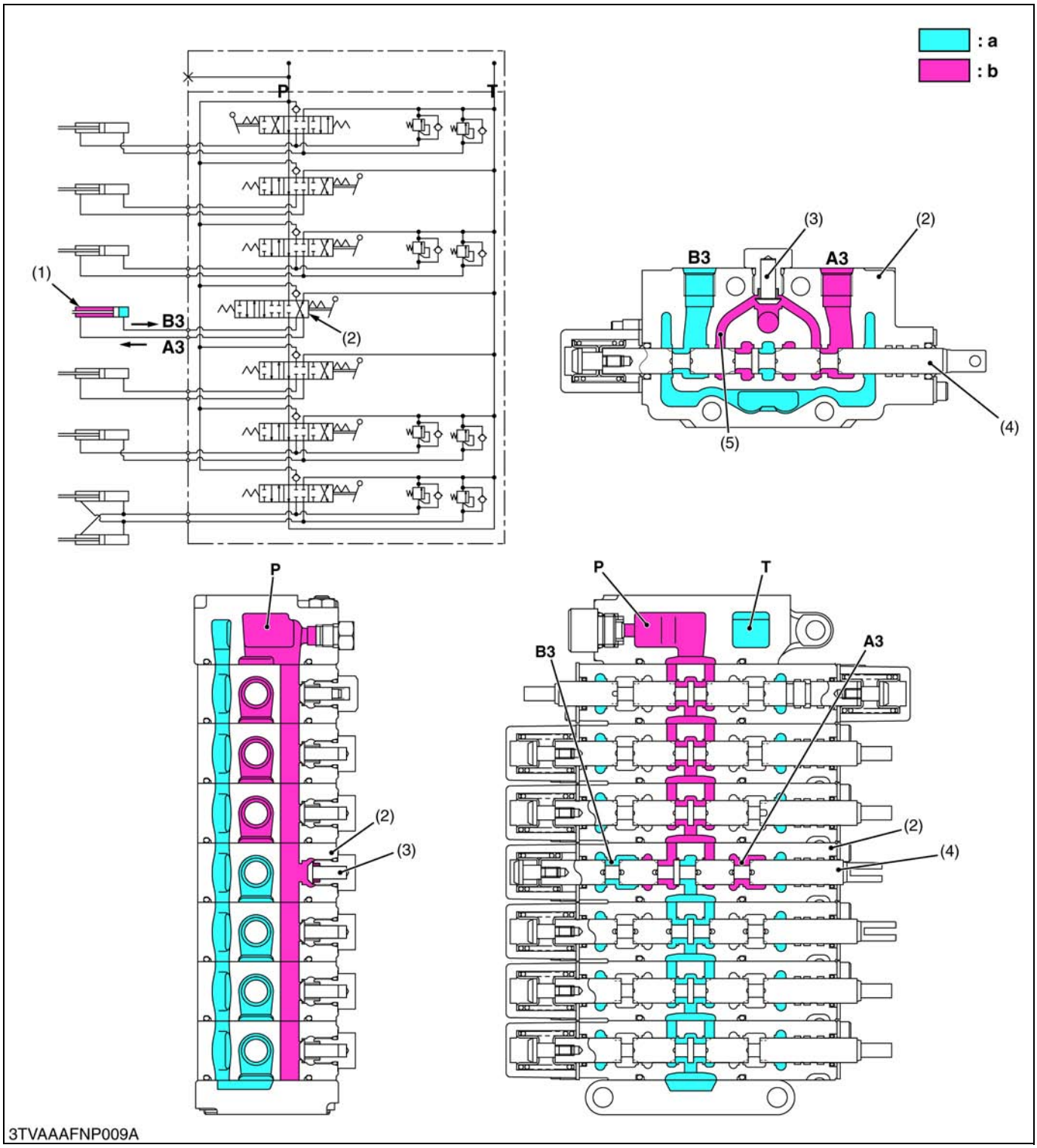


(1) Stabilizer Cylinder RH
(2) Stabilizer RH Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A3 : A3 Port (From Stabilizer RH Cylinder)
B3 : B3 Port (To Stabilizer RH Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the right stabilizer control lever is pulled to the downward to set to the **"EXTEND"** position, the spool (4) of the stabilizer RH control valve (2) moves to the right, which forms oil passage between bridge passage (5) and **B3** port, and between **A3** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3), and flows to **B3** port to extend the right stabilizer cylinder.
3. Return oil from the right stabilizer cylinder returns to the transmission case through the **A3** port, low pressure passage and **T** port.

■ Stabilizer RH (Shrink)

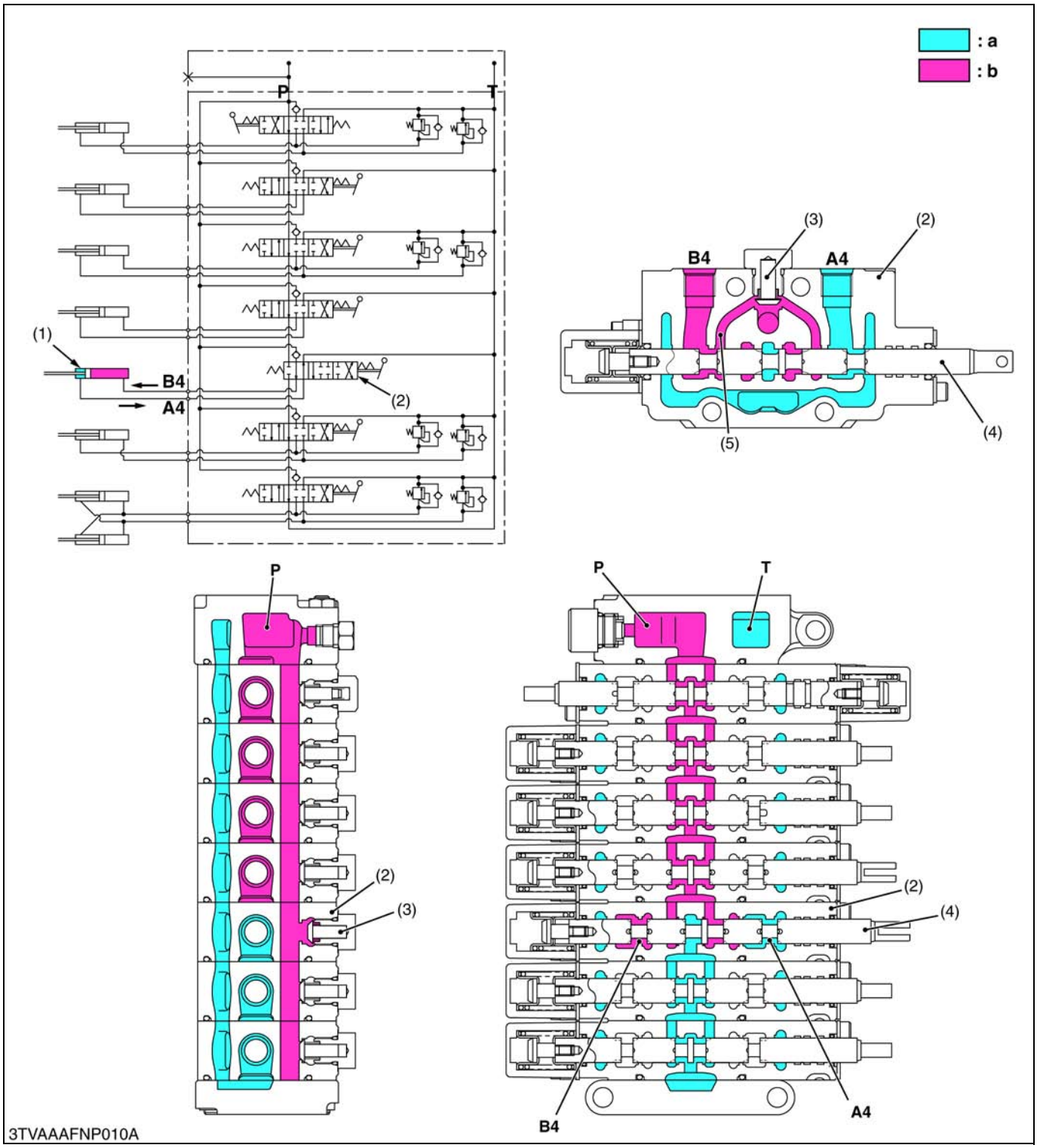


(1) Stabilizer Cylinder RH
(2) Stabilizer RH Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A3 : A3 Port (From Stabilizer RH Cylinder)
B3 : B3 Port (To Stabilizer RH Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the right stabilizer control lever is pushed to the forward to set to the **"SHRINK"** position, the spool (4) of the stabilizer RH control valve (2) moves to the left, which forms oil passage between bridge passage (5) and **A3** port, and between **B3** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3), and flows to **A3** port to retract the right stabilizer cylinder.
3. Return oil from the right stabilizer cylinder returns to the transmission case through the **B3** port, low pressure passage and **T** port.

■ Stabilizer LH (Extend)

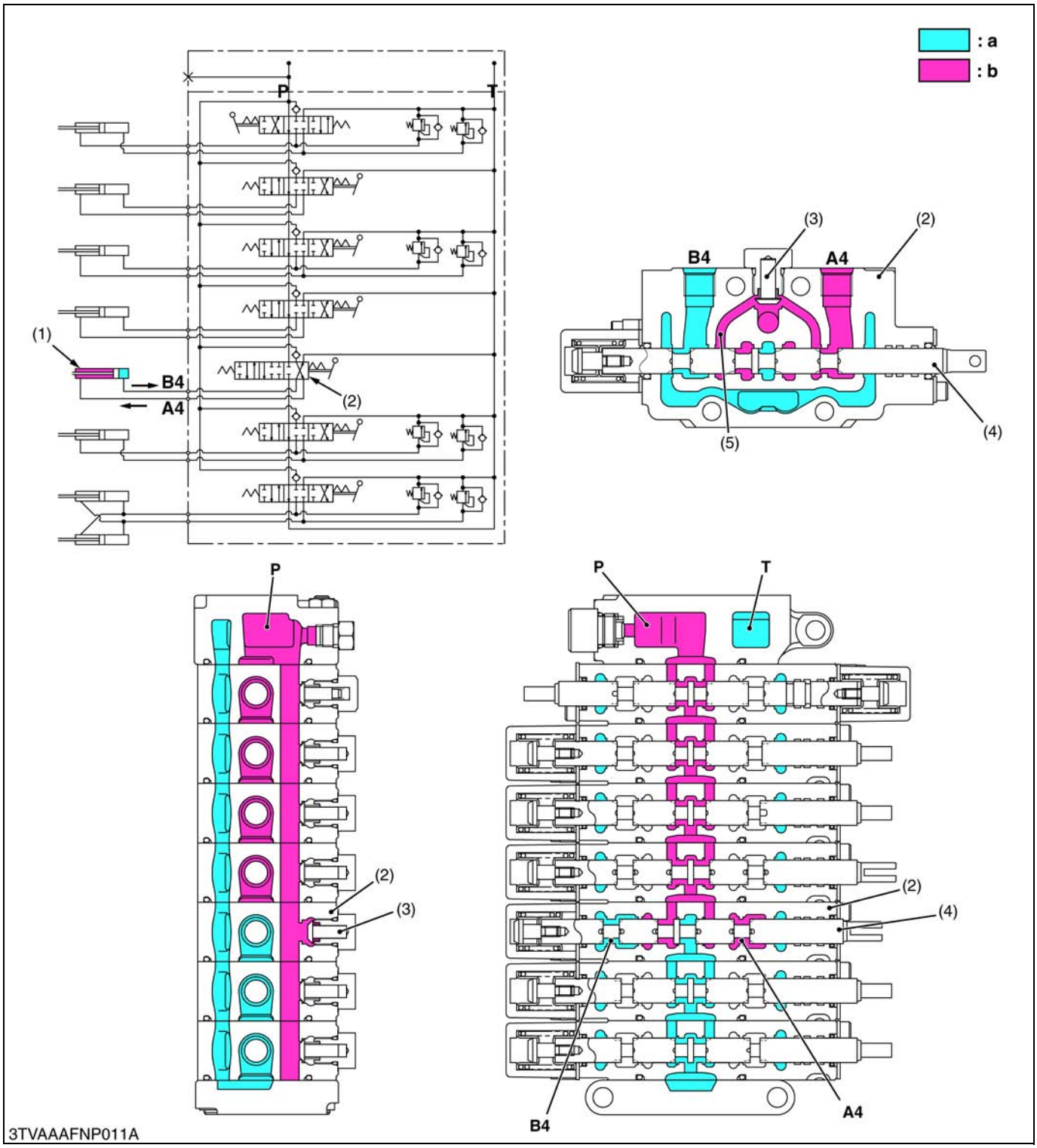


(1) Stabilizer Cylinder LH
(2) Stabilizer LH Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A4 : A4 Port (From Stabilizer LH Cylinder)
B4 : B4 Port (To Stabilizer LH Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the right stabilizer control lever is pulled to the downward to set to the **"EXTEND"** position, the spool (4) of the stabilizer LH control valve (2) moves to the right, which forms oil passage between bridge passage (6) and **B4** port, and between **A4** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3), and flows to **B4** port to retract the left stabilizer cylinder.
3. Return oil from the left stabilizer cylinder returns to the transmission case through the **A4** port, low pressure passage and **T** port.

■ Stabilizer LH (Shrink)

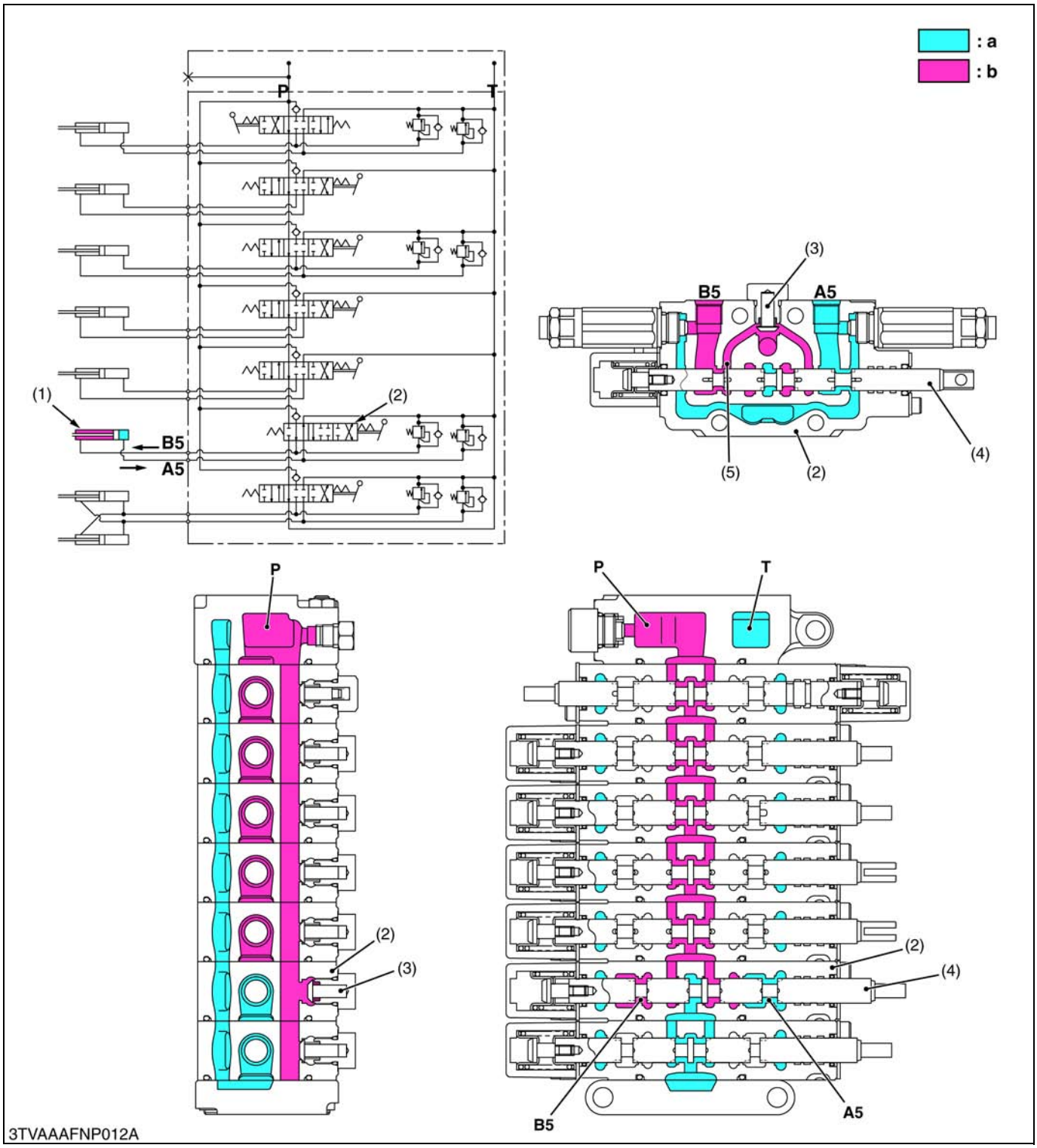


(1) Stabilizer Cylinder LH
(2) Stabilizer LH Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A4 : A4 Port (From Stabilizer LH Cylinder)
B4 : B4 Port (To Stabilizer LH Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the right stabilizer control lever is pushed to the forward to set to the **"SHRINK"** position, the spool (4) of the stabilizer LH control valve (2) moves to the left, which forms oil passage between bridge passage (5) and **A4** port, and between **B4** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (5), and flows to **A4** port to retract the left stabilizer cylinder.
3. Return oil from the left stabilizer cylinder returns to the transmission case through the **B4** port, low pressure passage and **T** port.

■ Boom (Up)

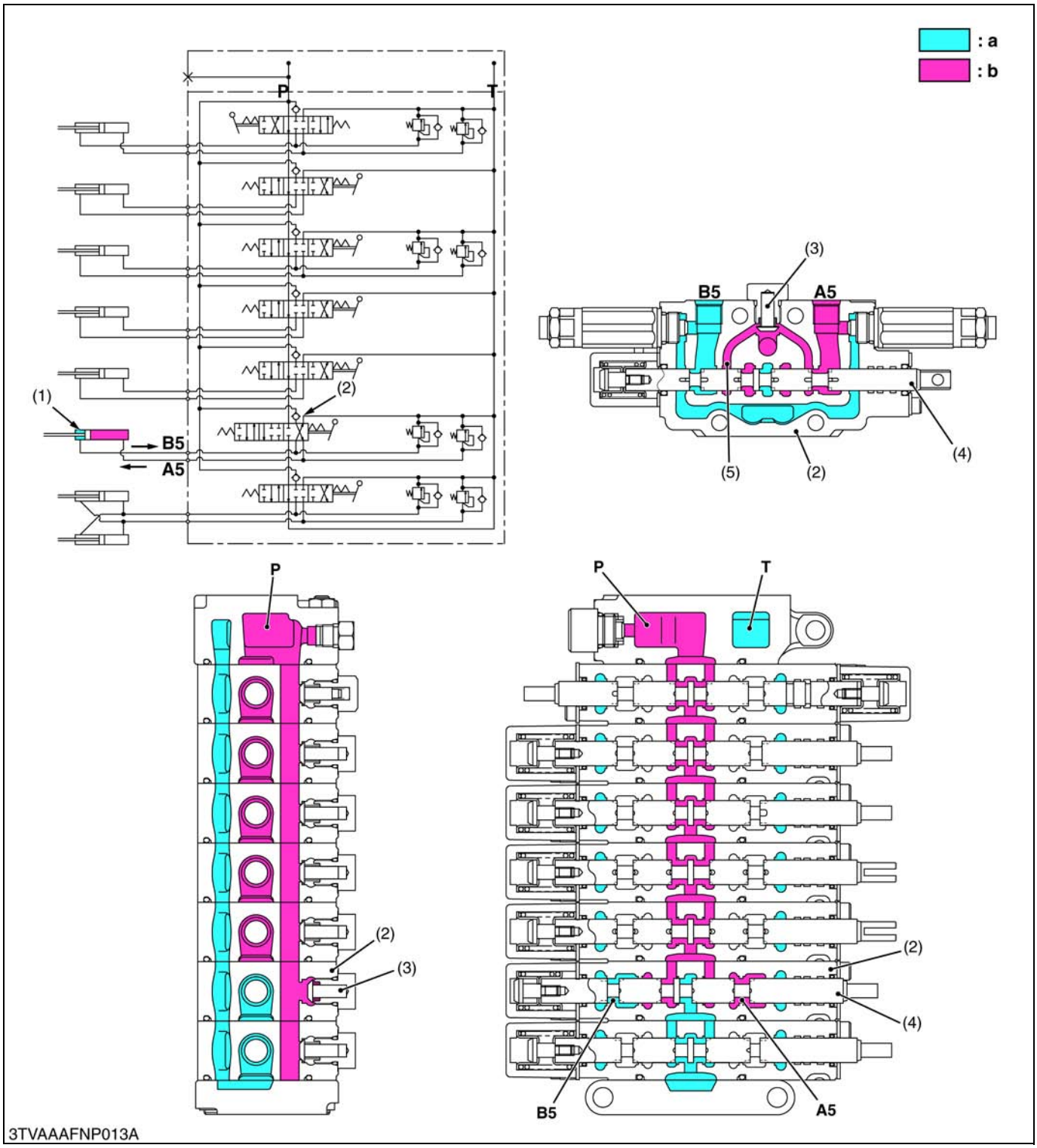


(1) Boom Cylinder
(2) Boom Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A5 : A5 Port (From Boom Cylinder)
B5 : B5 Port (To Boom Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the boom and swing lever is pulled to the backward to set to the **"UP"** position, the spool (4) of the boom control valve (2) moves to the right, which forms oil passage between bridge passage (5) and **B5** port, and between **A5** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3) and flows to **B5** port to retract the boom cylinder.
3. Return oil from the boom cylinder returns to the transmission case through the **A5** port, low pressure passage and **T** port.

■ Boom (Down)

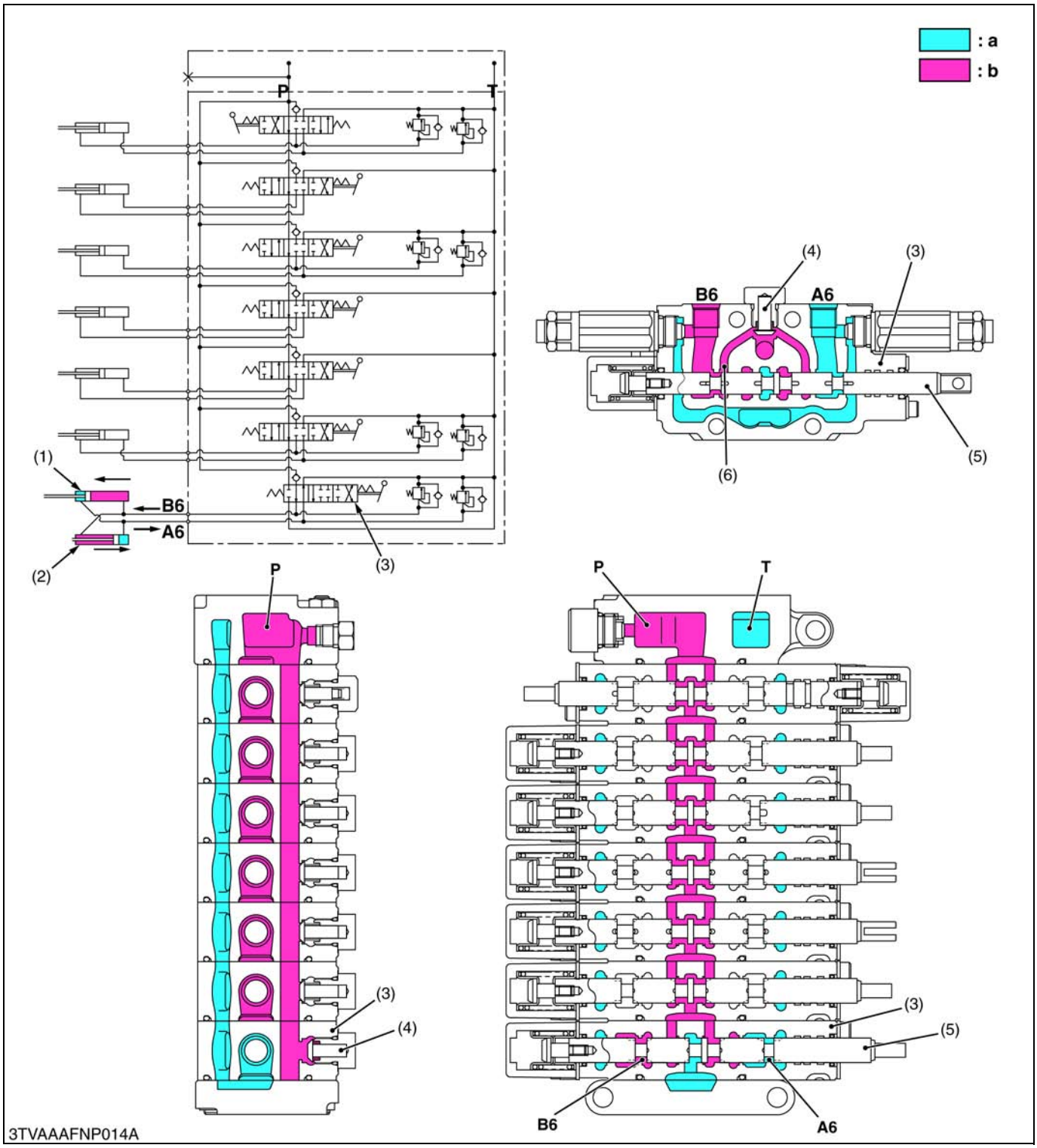


(1) Boom Cylinder
(2) Boom Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

A5 : A5 Port (From Boom Cylinder)
B5 : B5 Port (To Boom Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the boom and swing lever is pushed to the forward to set to the **"DOWN"** position, the spool (4) of the boom control valve (2) moves to the left, which forms oil passage between bridge passage (5) and **A5** port, and between **B5** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (3) and flows to **A5** port to extend the boom cylinder.
3. Return oil from the boom cylinder returns to the transmission case through the **B5** port, low pressure passage and **T** port.

■ Swing (Right)

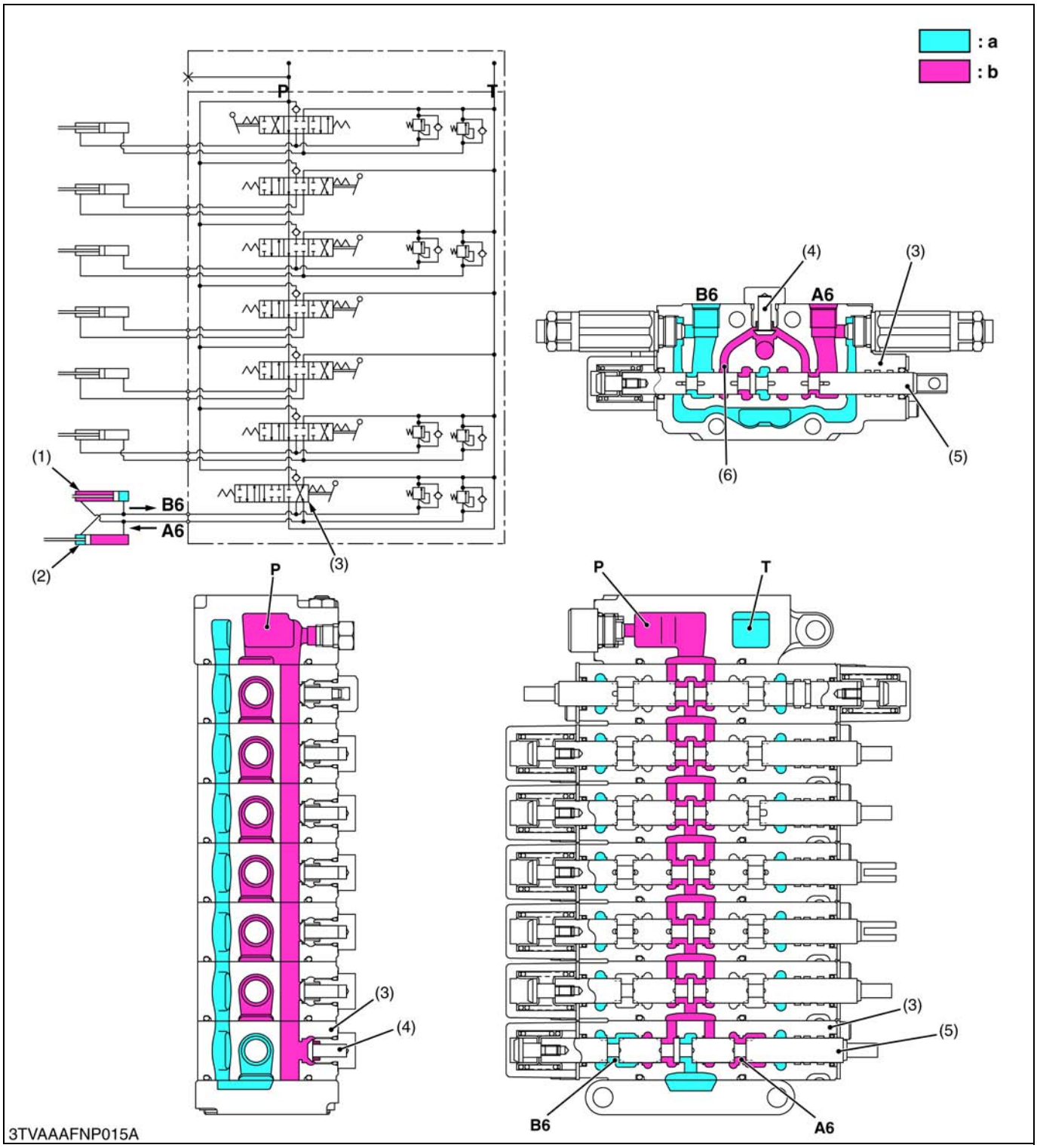


(1) Swing Cylinder LH
(2) Swing Cylinder RH
(3) Swing Control Valve
(4) Load Check Valve
(5) Spool
(6) Bridge Passage

A6 : A6 Port (From Swing Cylinder)
B6 : B6 Port (To Swing Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the boom and swing lever is moved to the right to set to the **"RIGHT"** position, the spool (5) of the swing control valve (3) moves to the right, which forms oil passage between bridge passage (6) and **B6** port, and between **A6** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (4) and flows to **B6** port to extend the swing cylinder LH (retract the swing cylinder RH).
3. Return oil from the swing cylinders return to the transmission case through the **A6** port, low pressure passage and **T** port.

■ Swing (Left)

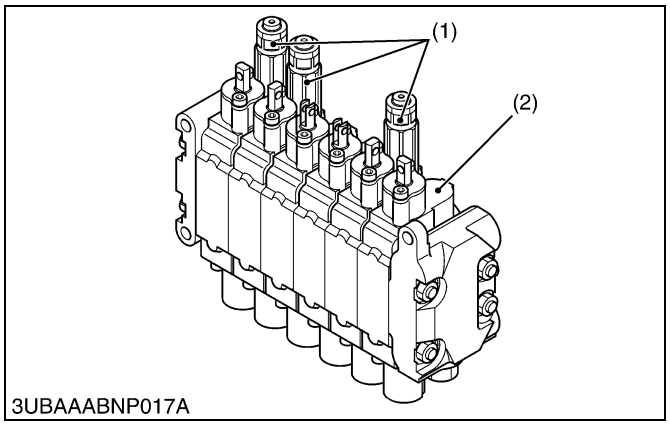


(1) Swing Cylinder LH
(2) Swing Cylinder RH
(3) Swing Control Valve
(4) Load Check Valve
(5) Spool
(6) Bridge Passage

A6 : A6 Port (From Swing Cylinder)
B6 : B6 Port (To Swing Cylinder)
P : P Port
T : T Port
a : Low Pressure
b : High Pressure

1. When the boom and swing lever is moved to the left to set to the **"LEFT"** position, the spool (5) of the swing control valve (3) moves to the left, which forms oil passage between bridge (6) and **A6** port, and between **B6** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (4) and flows to **A6** port to extend the swing cylinder RH (retract the swing cylinder LH).
3. Return oil from the swing cylinders return to the transmission case through the **B6** port, low pressure passage and **T** port.

(3) Overload Relief Valve



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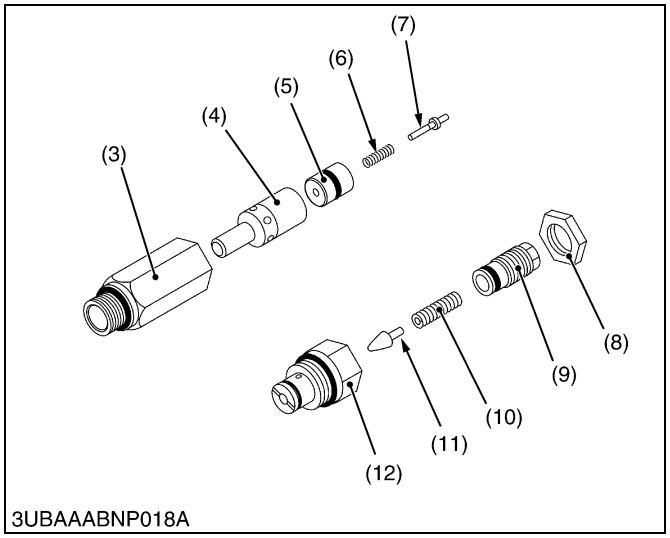

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Overload relief valve in this control valve is a combination valve combining a relief operation and anti-cavitation operation.

■ **Relief Operation**

When the control valve is in the neutral position, both cylinder ports of control valve are blocked by the spool. If an external load is imposed on the cylinder, pressure builds in the circuit.

When the pressure exceeds the set level of the overload relief vale, the relief valve opens and the oil returns to tank. In this way, the hydraulic circuit and actuator are protected from excessive pressures.

■ **Anti-cavitation Operation**

Overload relief valve also has anti-void function. If a negative pressure takes place in the circuit, the oil is fed from the tank to eliminate the negative pressure.

(1) Overload Relief Valve
(2) Control Valve
(3) Housing
(4) Check Valve Poppet
(5) Relief Valve Poppet
(6) Piston Spring
(7) Piston Poppet
(8) Lock Nut
(9) Adjusting Screw
(10) Pilot Spring
(11) Pilot Poppet
(12) Pilot Section

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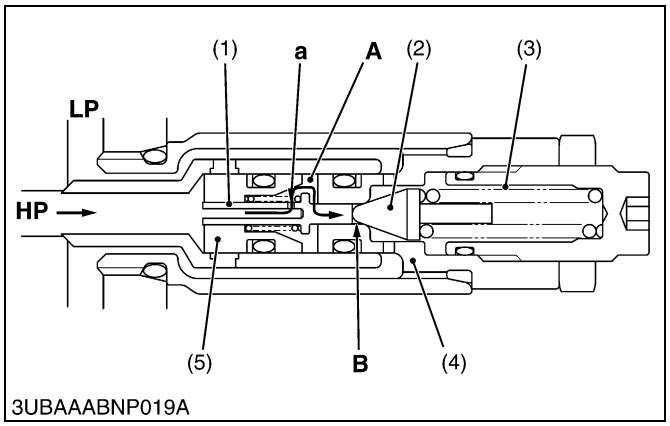
■ **Relief Operation**



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[When the actuator port pressure is lower than the setting]

The cylinder port **HP** is applied to the seat **B** in the following route : first through the throttle **a** of the piston poppet (1) built in the relief valve poppet (5), second through the spring chamber **A**, and then through the circular clearance between the adjusting screw (9) and the piston poppet (1). This cylinder port **HP** works to open the pilot poppet (2). Because the piston spring (3) has not reached the set pressure, however, the valve stays shut. In this way the seat remains intact and the relief valve poppet (5) stays shut.

(1) Piston Poppet
(2) Pilot Poppet
(3) Piston Spring
(4) Adjusting Screw
(5) Relief Valve Poppet

HP :High Pressure
LP :Low Pressure
A : Chamber
B : Seat
a : Throttle

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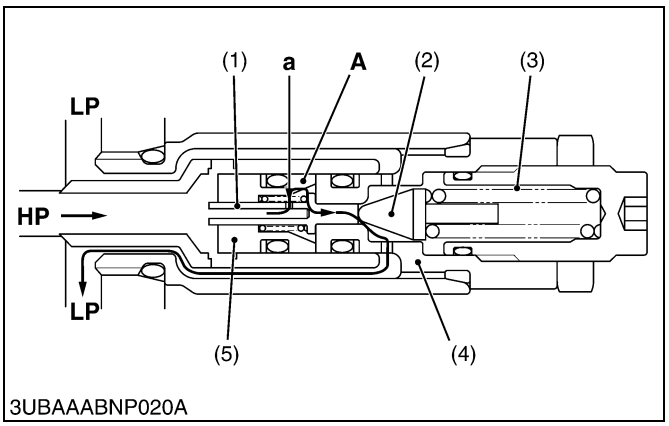

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[When the actuator port pressure is higher than the setting]

When the cylinder port **HP** has reached the set pressure of the piston spring (5), the pressure oil in the spring chamber **A** opens the pilot poppet (4) and flows through the drain passage into the tank passage. This lowers the pressure in the spring chamber **A**, and the pressure difference across the throttle **a** moves the relief valve poppet (1) to the right. Now the seat of the relief valve poppet (1) gets open. The pressure oil flows then from this seat into the tank, and the circuit pressure is kept at the pressure level set by the overload relief valve.

	Relief valve setting pressure
Dipperstick, Boom	23.6 to 24.0 MPa 240 to 245 kgf/cm^2 3420 to 3480 psi
Swing	18.7 to 19.1 MPa 190 to 195 kgf/cm^2 2700 to 2770 psi
Thumb (If equipped)	17.7 to 18.1 MPa 180 to 185 kgf/cm^2 2560 to 2630 psi

- Oil temperature : 45 to 55 °C
  113 to 131 °F

(1) Piston Poppet
(2) Pilot Poppet
(3) Piston Spring
(4) Adjusting Screw
(5) Relief Valve Poppet

HP :High Pressure
LP :Low Pressure
A : Chamber
a : Throttle

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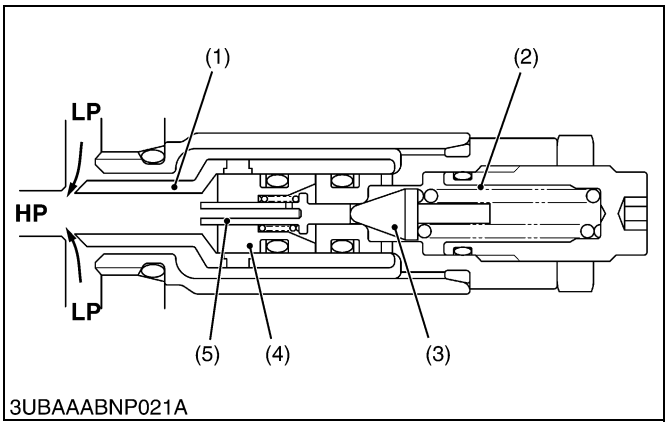
■ Anti-cavitation Operation



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This valve, in operation, prevents a condition – so called cavitation – that arises in the cylinder port **HP** where fluid is not entirely filling out.

That is, this relief valve is combined an anti-cavitation functions supplying oil.

The pressure oil at the tank port LH opens the check valve poppet, allowing oil to flow through the tank port to prevent negative pressure from being generated in the cylinder.

(1) Check Valve Poppet
(2) Piston Spring
(3) Pilot Poppet
(4) Relief Valve Poppet
(5) Piston Poppet

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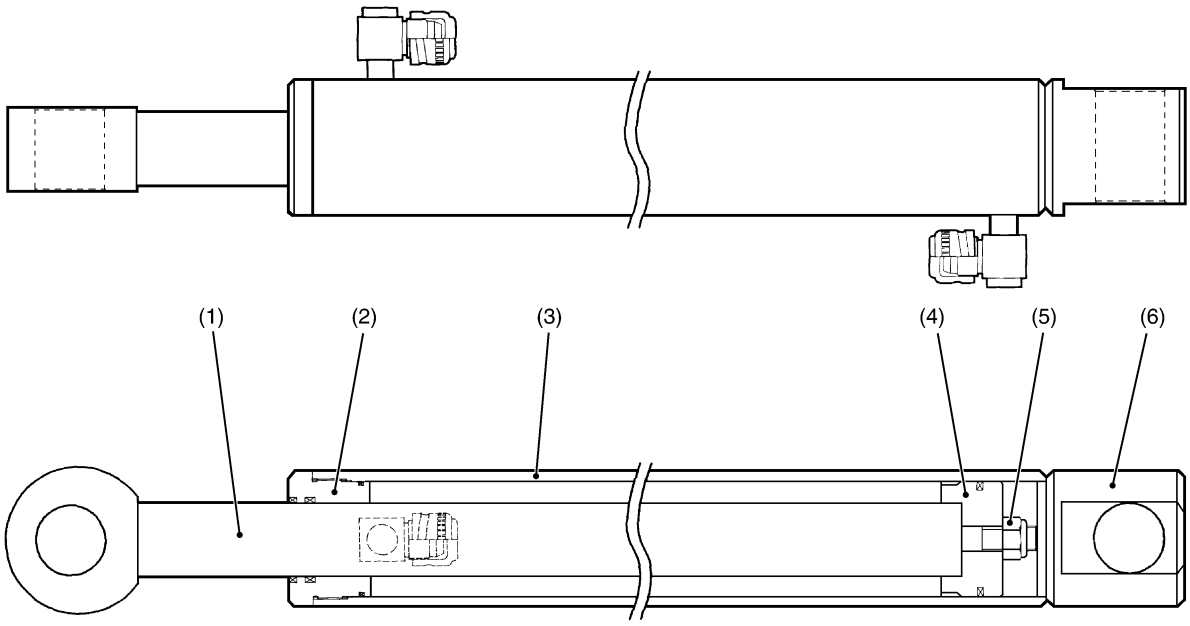
[3] HYDRAULIC CYLINDER



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(1) Rod
(2) Head
(3) Cylinder Tube
(4) Piston
(5) Nut
(6) Tube End

Bucket, dipperstick, boom, swing, and stabilizer cylinder consists of cylinder head (2), piston rod (1), cylinder tube (3), piston (4) and other parts as shown in the figure above.

They are single-rod double acting cylinders in which the reciprocating motion of the piston is controlled by hydraulic force applied to both of its ends.

Cylinder Specifications

	Bucket Cylinder mm (in.)	Dipperstick Cylinder mm (in.)	Boom Cylinder mm (in.)	Stabilizer Cylinder mm (in.)	Swing Cylinder mm (in.)
Rod O.D.	35.0 (1.38)	35.0 (1.38)	35.0 (1.38)	40.0 (1.57)	35.0 (1.38)
Cylinder I.D.	60.0 (2.36)	65.0 (2.56)	75.0 (2.95)	70.0 (2.76)	60.0 (2.36)
Stroke	465 (18.3)	487 (19.2)	402 (15.8)	311 (12.2)	248 (9.76)

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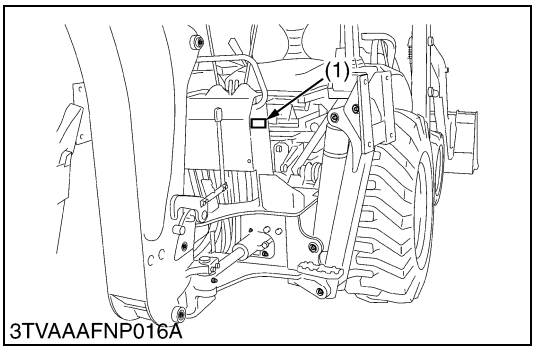
SERVICING

CONTENTS

1. GENERAL

[1] BACKHOE IDENTIFICATION



When contacting your local KUBOTA distributor, always specify backhoe serial number.

(1) Serial Number

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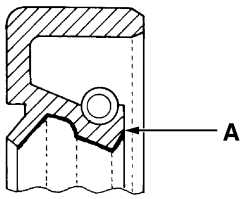
[2] GENERAL PRECAUTIONS



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- During disassembly, carefully arrange removed parts in a clean area to prevent later confusion. Screws, bolts and nuts should be replaced in their original positions to prevent reassembly errors.
- When special tools are required, use genuine KUBOTA tools. Special tools which are not used frequently should be made according to the drawings provided.
- Clean parts before measuring them.
- Use only genuine KUBOTA parts for parts replacement to maintain backhoe performance and to assure safety.
- O-rings and oil seals must be replaced during reassembly. Apply grease to new O-rings or oil seals before reassembling.
- Nipples must be tightened to the specified torque. Excessive torque may cause damages hydraulic units or nipples, and insufficient torque will result in oil leaks.
- When using a new hose or pipe, tighten nuts to the specified torque once, then loosen them (approx. by 45 °) to allow hose or pipe to settle before retightening to the specified torque (except sealtaped parts).
- When removing both ends of a pipe, remove the lower end first.
- Use two pliers in removal and reinstallation; one to hold the static side, and the other to turn the side being removed to avoid twisting.
- Check to see that sleeves of flareless connectors and tapered sections of hoses are free of dust and scratches.
- After tightening nipples, clean the joint and apply the maximum working pressure 2 to 3 times to check for oil leak.

A : Grease

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[3] LUBRICANTS

To prevent serious damage to hydraulic systems, use only specified fluid or its equivalent.

Place	Capacity	Lubricants, type of grease
Transmission case	26 L 6.9 U.S.gals 5.7 Imp.gals	KUBOTA UDT or SUPER UDT fluid*
Grease nipples	Until grease overflows	Moly Ep type grease**

* KUBOTA original transmission hydraulic fluid

** “Extreme pressure” and containing Molybdenum disulfide is recommended. This grease may specify “Moly Ep” on it’s label.

[4] TIGHTENING TORQUES

Screws, bolts, nuts and hydraulic fittings whose tightening torques are not specified in this Workshop Manual should be tightened according to tables below.

(1) General Use Screws, Bolts and Nuts

Indication on top of bolt	⬡ 4 No-grade or 4T						⟨7⟩ 7T						⟨9⟩ 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit / Diameter	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6 (6 mm, 0.24 in.)	7.9 to 9.3	0.80 to 0.95	5.8 to 6.8	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8 (8 mm, 0.31 in.)	18 to 20	1.8 to 2.1	13 to 15	17 to 19	1.7 to 2.0	13 to 14	24 to 27	2.4 to 2.8	18 to 20	18 to 20	1.8 to 2.1	13 to 15	30 to 34	3.0 to 3.5	22 to 25
M10 (10 mm, 0.39 in.)	40 to 45	4.0 to 4.6	29 to 33	32 to 34	3.2 to 3.5	24 to 25	48 to 55	4.9 to 5.7	36 to 41	40 to 44	4.0 to 4.5	29 to 32	61 to 70	6.2 to 7.2	45 to 52
M12 (12 mm, 0.47 in.)	63 to 72	6.4 to 7.4	47 to 53	–	–	–	78 to 90	7.9 to 9.2	58 to 66	63 to 72	6.4 to 7.4	47 to 53	103 to 117	10.5 to 12.0	76.0 to 86.7
M14 (14 mm, 0.55 in.)	108 to 125	11.0 to 12.8	79.6 to 92.5	–	–	–	124 to 147	12.6 to 15.0	91.2 to 108	–	–	–	167 to 196	17.0 to 20.0	123 to 144
M16 (16 mm, 0.63 in.)	167 to 191	17.0 to 19.5	123 to 141	–	–	–	197 to 225	20.0 to 23.0	145 to 166	–	–	–	260 to 304	26.5 to 31.0	192 to 224
M18 (18 mm, 0.71 in.)	246 to 284	25.0 to 29.0	181 to 209	–	–	–	275 to 318	28.0 to 32.5	203 to 235	–	–	–	344 to 402	35.0 to 41.0	254 to 296
M20 (20 mm, 0.79 in.)	334 to 392	34.0 to 40.0	246 to 289	–	–	–	368 to 431	37.5 to 44.0	272 to 318	–	–	–	491 to 568	50.0 to 58.0	362 to 419

W1034542

American standard cap screws with UNC or UNF threads						
Grade	SAE 5			SAE 8		
Unit / Size	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
1/4	12.0 to 15.7	1.22 to 1.60	8.80 to 11.6	16.3 to 19.7	1.66 to 2.01	12.0 to 14.6
5/16	23.1 to 27.7	2.35 to 2.83	17.0 to 20.5	32.6 to 39.3	3.32 to 4.00	24.0 to 29.0
3/8	47.5 to 56.9	4.84 to 5.80	35.0 to 42.0	61.1 to 73.2	6.22 to 7.46	45.0 to 54.0
1/2	109 to 130	11.1 to 13.2	80.0 to 96.0	149.2 to 178.9	15.21 to 18.24	110.0 to 132.0
9/16	149.2 to 178.9	15.21 to 18.24	110.0 to 132.0	217.0 to 260.3	22.12 to 26.54	160.0 to 192.0
5/8	203.4 to 244.1	20.74 to 24.88	150.0 to 180.0	298.3 to 357.9	30.42 to 36.49	220.0 to 264.0

W1013653

Metric cap screws			
Grade	Property class 8.8 (Approx. SAE grade 5)		
Unit / Size	N·m	kgf·m	lbf·ft
M6	9.8 to 10	1.0 to 1.1	7.3 to 7.9
M8	24 to 27	2.4 to 2.8	18 to 20
M10	48 to 55	4.9 to 5.7	36 to 41
M12	78 to 90	7.9 to 9.2	58 to 66
M14	124 to 147	12.6 to 15.0	91.2 to 108
M16	196 to 225	20.0 to 23.0	145 to 166
M18	275 to 318	28.0 to 32.5	203 to 235

W1013699

(2) Hydraulic Fittings

■ **Adaptors, Elbows and Others**

Item	Thread size	Tightening torque		
		N·m	kgf·m	lbf·ft
Adjustable elbow, Adaptor	9/16	37 to 44	3.8 to 4.5	27 to 33
	3/4	48 to 54	4.9 to 5.5	35 to 40
Hose fitting, Flare nut	9/16	22 to 25	2.3 to 2.6	16 to 19
	3/4	36 to 40	3.6 to 4.1	26 to 30
Adaptor (NPT)	3/8	38 to 43	3.9 to 4.4	28 to 32
	1/2	49 to 58	5.0 to 5.9	36 to 43

■ **NOTE**

- **When connecting a hose with flare nut, after tightening the nut with specified torque, return it approximately 45 degrees and re-tighten it to specified torque.**

W1015484

■ **Hydraulic Pipe Cap Nuts**

Pipe size	Tightening torque		
	N·m	kgf·m	lbf·ft
Φ6	25 to 34	2.5 to 3.5	18 to 25
Φ8	30 to 39	3.0 to 4.0	22 to 28
Φ10	40 to 49	4.0 to 5.0	29 to 36
Φ12	49 to 68	5.0 to 7.0	37 to 50
Φ15	108 to 117	11.0 to 12.0	79.6 to 86.7
Φ16	138 to 147	14.0 to 15.0	102 to 108
Φ18	108 to 117	11.0 to 12.0	79.6 to 86.7

W1014848

[5] MAINTENANCE CHECK LIST

To keep the machine working in good condition as well as to avoid any accident and trouble, carry out periodic inspection and maintenance. Check the following points before use.

Service Interval	Check Points	Reference page
Daily (Each use)	Check the transmission fluid level	10-S7
	Retighten the backhoe hardware to torque value	10-S7
	Check the hydraulic hoses	10-S7
Every 10 hours	Grease all grease nipples	10-S8

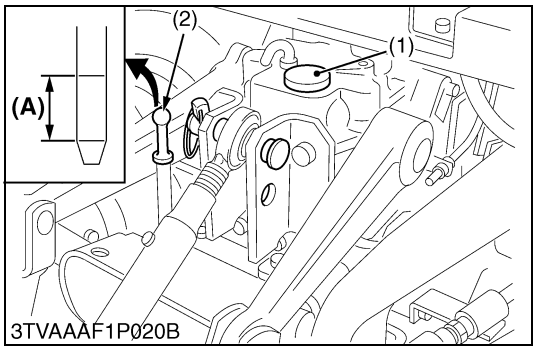
W1013874

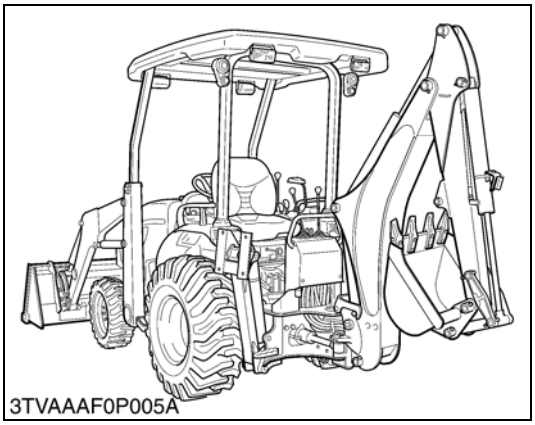
[6] CHECK AND MAINTENANCE

CAUTION

- **When checking and repairing, park the tractor on flat ground and apply the parking brake.**
- **When checking and repairing, lower the bucket and stabilizers, and stop the engine.**

(1) Check Points of Each Use or Daily





Checking Transmission Fluid Level

1. Park the machine on a flat surface, lower the implement and shut off engine.
2. To check the oil level, draw out the dipstick, wipe it clean, replace it, and draw it out again. Check to see that the oil level lies between the two notches.
   If the level is too low, add new oil to the prescribed level at the oil inlet. (See page G-8.)

■ **IMPORTANT**

- **If oil level is low, do not run engine.**
- **When using BT820 Backhoe on a flat surface, set the loader / backhoe as illustrated below.**

(1) Oil Inlet
(2) Dipstick
(A) Oil level is acceptable within this range.

W1034473

Retightening Backhoe Hardware

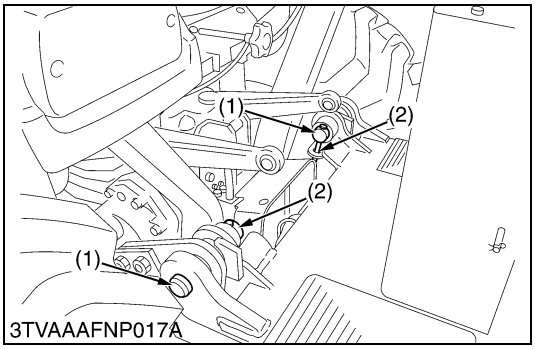
1. Check all hardware before daily operation.
2. If the screws, bolts and nuts are loosen, retighten them to the specified torque.

W1011636

Checking Hydraulic Hoses

1. Check all hydraulic hoses for cuts or wear.
2. If defects are found, replace them.

W1011703



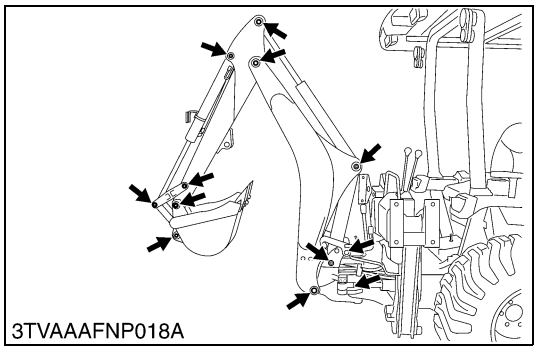
Checking Mounting Pin Slide Bar

1. Check the mounting pin slide bar is inserted into the hole of the main france before operation.

(1) Mounting Pin
(2) Slide Bar

W1012824

(2) Check Point of Every 10 Hours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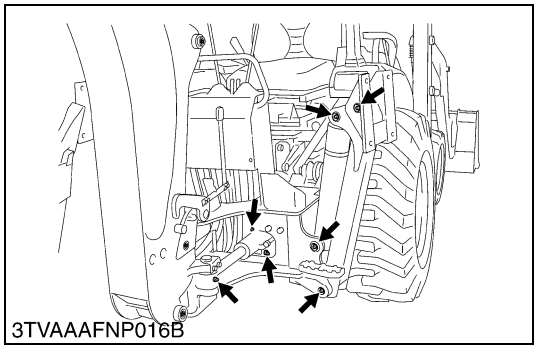
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Greasing

1. Inject grease all grease nipples with a hand grease gun.

W1015410

2. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
All Functions Inoperative (Front Loader Is OK)	Quick coupler disconnected	Reconnect	–
All Functions Including Front Loader, Are Inoperative	Insufficient transmission fluid	Replenish	G-8
	Relief valve spring damaged	Replace	7-S9, S15
	Hydraulic pump malfunctioning	Repair or replace	7-S11
	Oil filter clogged	Replace	G-31
Hydraulic Oil Overheats	Continuous operation against relief	Operate properly	–
	Transmission fluid improper brand and viscosity	Use proper fluid	G-8
	Relief valve misadjusted	Readjust	7-S9, S15
	Insufficient transmission fluid	Replenish	G-8
	Oil filter clogged	Replace	G-31
Individual Cylinder Circuit Weak or Inoperative (Others OK)	Valve spool not moving fully	Adjust linkage	–
	Valve spool stick (especially when warm)	Repair or replace	7-S15
	Piston seal ring worn or damaged	Replace	10-S23
	Cylinder tube worn or damaged	Replace	10-S22
	Oil leaks from joint	Repair or replace	10-S17
	Hydraulic hose damaged	Replace	10-S17
	Dust in overload relief valve	Flush hydraulic line	–
Excessive Cylinder Movement	Piston seal ring worn or damage	Replace	10-S23
	Excessive valve spool to bore tolerance	Replace	–
	Hydraulic hose or fitting damaged	Replace	10-S23
	Hydraulic hose or fitting loose	Retighten	10-S23
	Cylinder tube worn or damaged	Replace	10-S22
Insufficient Cylinder Speed	Engine rpm too low	Adjust rpm	–
	Hydraulic pump malfunctioning	Repair or replace	7-S11
	Relief valve pressure too low	Readjust	7-S9, S15
	Insufficient transmission fluid	Replenish	G-8

W1014322

3. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Thrust Washer	Thickness	2.45 to 2.82 mm 0.0966 to 0.1126 in.	1.8 mm 0.0709 in.
Piston Rod	Bend	–	0.25 mm 0.0098 in.

W1013089

4. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	lbf·ft
Boom, swing and bucket cylinder head	250 to 280	25.5 to 28.5	185 to 206
Dipperstick cylinder head	350 to 400	35.7 to 40.7	259 to 295
Stabilizer cylinder head	500 to 550	51.0 to 56.0	369 to 405
Dipperstick, bucket and stabilizer cylinder piston mounting nut	250 to 300	25.5 to 30.5	185 to 221
Boom and swing cylinder piston mounting nut	160 to 200	16.4 to 20.3	119 to 147

W1012736

5. DISMOUNTING AND MOUNTING

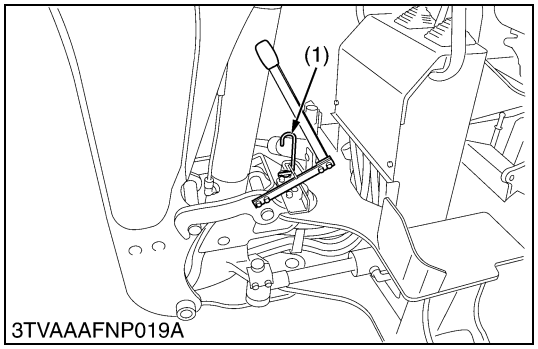
[1] DISMOUNTING BACKHOE

CAUTION

- **When starting the engine, always sit in the tractor operator's seat.**
- **When getting off the tractor, make sure that PTO lever is off and range gear shift lever is in neutral. Then set the parking brake.**
- **Keep hands, feet and body from between tractor and backhoe. Never allow any part of body under the machine.**
- **When leaving the backhoe operator's seat, fully lower the boom to the ground.**
- **When removing the backhoe, set the swing lock pin.**

■ IMPORTANT

- **When removing the backhoe, set the engine speed low idle.**
- **For removing the backhoe, locate the tractor / loader / backhoe on a flat level and hard surface, preferably concrete.**
  If the surface is soft, place a board on the ground for the bucket and stabilizers.



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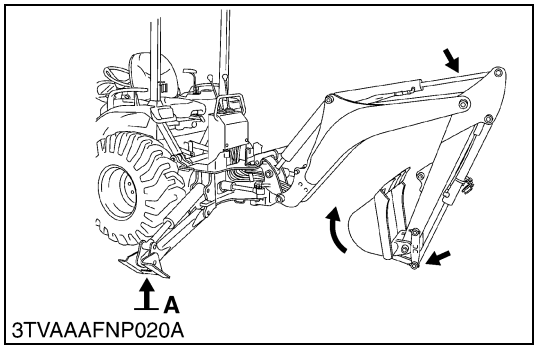

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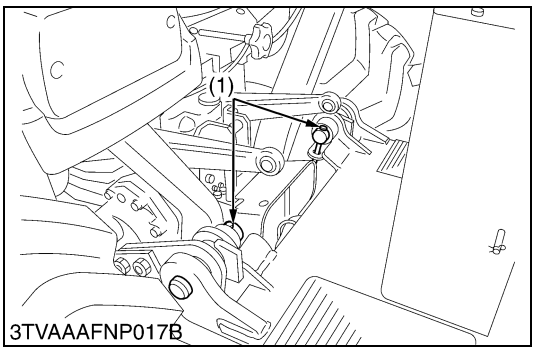
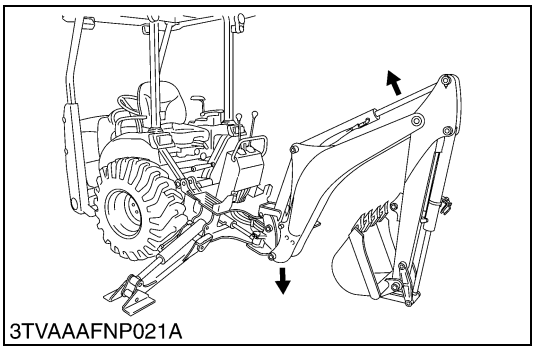
Preparation

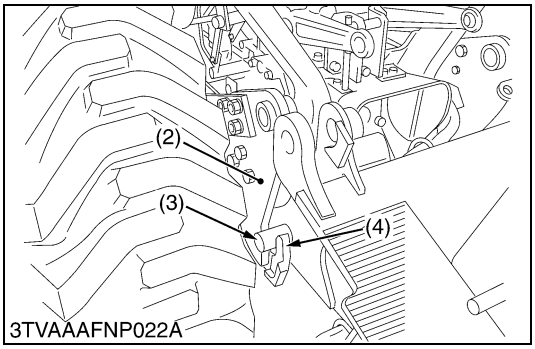
1. Start the engine and lower the front loader to the ground.
2. Set the swing lock pin (1) to prevent the pivoting of the boom before removing the backhoe.
3. Stand beside the rear tire, fully close the dipperstick, curl the bucket and lower the boom until the back of bucket contacts the ground.
4. Keep the stabilizer pads at about 380 mm (15 in.) high.

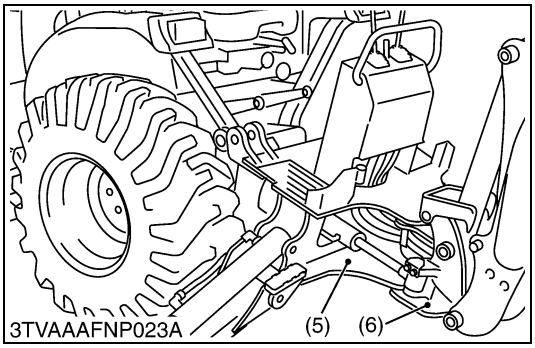
(1) Swing Lock Pin **A : 380 mm (15 in.)**

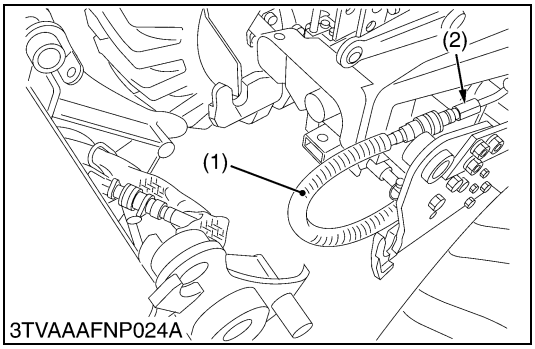
W1013069











Mounting Pin

1. Raise the rear wheels slightly with the boom and remove the mounting pins (1).
2. Slowly raise the boom to disengage the backhoe from the tractor.
3. Raise the backhoe by operating the stabilizers to the lowering direction until the mount bars (3) hit to the guide stopper (2) on the support hooks (4).
4. Move the tractor forward from the backhoe about 200 mm (8 in.).

■ **IMPORTANT**

- **Be careful not to damage or break the hoses when moving the tractor.**

5. Lower the main frame (5) and swing frame (6) onto the ground by operating the boom and stabilizer control levers.
6. Shut off the engine and set the parking brake.

(1) Mounting Pin
(2) Guide Stopper
(3) Mount Bar
(4) Support Hook
(5) Main Frame
(6) Swing Frame

W1013187

Hydraulic Hoses

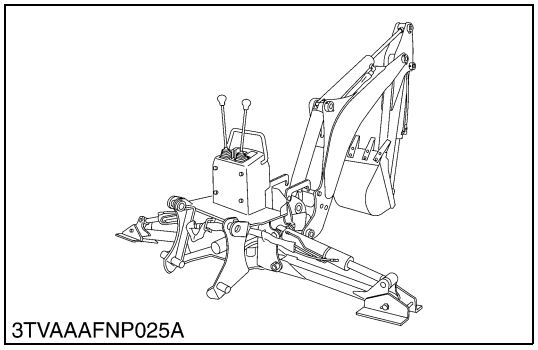
1. Slowly release all hydraulic pressure by moving the backhoe hydraulic control levers in all directions.
2. Disconnect the three hydraulic hoses.

■ **IMPORTANT**

- **Install the dust plugs and the dust cap onto the tractor's hydraulic couplers and nipple to prevent contamination.**

(1) Outlet Hose (Tractor)
(2) Return Pipe (Tractor)

W1013581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Separation

1. Start the engine.
   Then drive the tractor / loader slowly from the backhoe.
2. Shut off the engine and remove the key from the tractor. Set the parking brake.

■ **NOTE**
- **The entire three point hitch can now be reinstalled on the tractor for use with other rear mount implements.**
- **Be sure that there is sufficient ballast in the rear tires and an implement is attached to the three point hitch before using the loader with backhoe removed.**

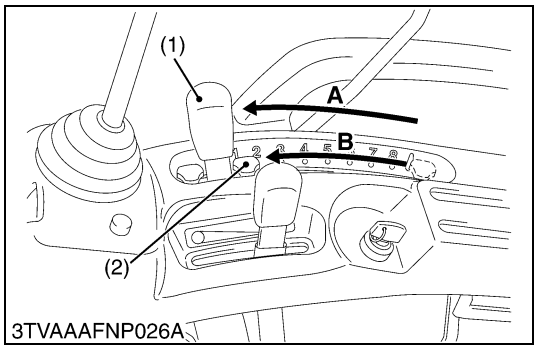
■ **IMPORTANT**
- **Make sure these hoses are firmly connected before starting the engine.**

W1013720

[2] MOUNTING BACKHOE TO TRACTOR

WARNING
- **When starting the engine, always sit on the operator's seat.**
- **When getting off the tractor, make sure that PTO lever is off and range gear shift lever is in neutral. Set the parking brake.**
- **Keep hands, feet and body from between tractor and backhoe. Never allow any part of body under the machine.**

CAUTION
- **Make sure the tractor PTO is disengaged.**



3TVAAAFNP026A

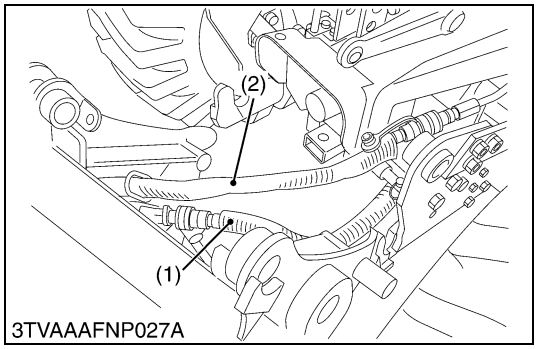
Preparation

■ **IMPORTANT**
- **When installing the backhoe, set the engine speed to low idle.**

1. Remove the 3 point hitch and / or drawbar. (If equipped)
2. Lower the position control lever (1) and place the lift arms in lowest position. Lock the position control lever in lowest position with the positioning plate (2).
3. Make sure the swing lock pin is installed.
4. Slowly back the tractor / loader, centering to the backhoe main frame.
   Stop the tractor 260 to 300 mm (10 to 12 in.) away from the backhoe.
5. Shut the engine off and set the parking brake.

(1) Position Control Lever — **A : Down**
(2) Positioning Plate — **B : Lock**

W1015093



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Hydraulic Hoses

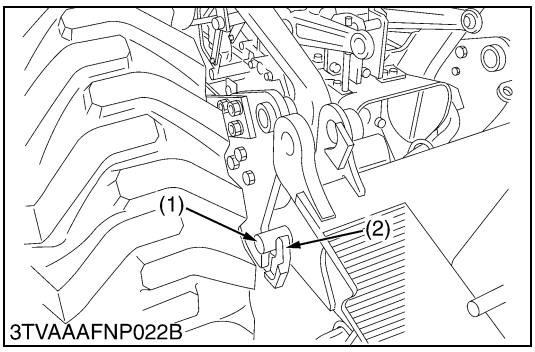
1. Connect the three hydraulic hoses (3), (4), (5).

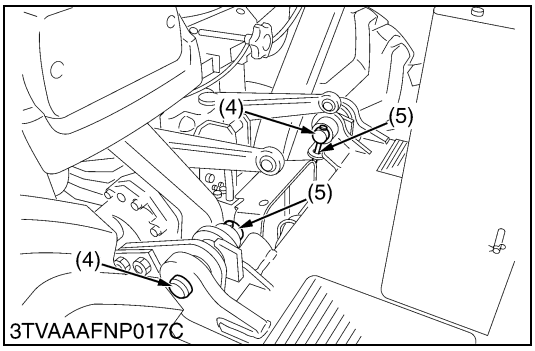
■ **IMPORTANT**
- **Make sure both hoses are firmly connected before starting the engine.**

2. Connect the inlet and outlet hoses of the backhoe to the outlet hose and return pipe of the tractor.

(1) Inlet Hose
(2) Return Hose

W1015234





Mounting Pin and Mounting Backhoe

WARNING

- **Do not move the joystick control lever to the swing position.**

1. Restart the engine.
2. Stand beside the rear wheel. Move the boom to fully raising position and raise the backhoe by operating the stabilizers until the mount bars on the backhoe main frame are slightly higher than the tractor main frame support hooks.

NOTE

- **If the support hooks are not parallel to the mount bars, adjust with the stabilizers.**

3. Move the tractor backward until the support hooks on the tractor main frame are just beneath the mount bar on the backhoe main frame.
4. Lower the mount bar onto the support hooks by operating the stabilizer and boom control levers.
5. Move the boom slowly to the lowering position, and engage the guide plates of the main frame to the bosses of sub frame. Then raise the rear wheels slightly by operating the boom to the lowering direction.
6. Shut off the engine. Reinstall the mounting pins, and insert the slide bar of the mounting pins to the hole of the main frame.

NOTE

- **Move the tractor / loader / backhoe to an open area and cycle all backhoe functions. This will check their operation and flow oil back through the system, filtering it and refilling each circuit. Check the hydraulic oil level before putting the backhoe into full operation. See "MAINTENANCE" section of the WSM for oil type and correct level.**

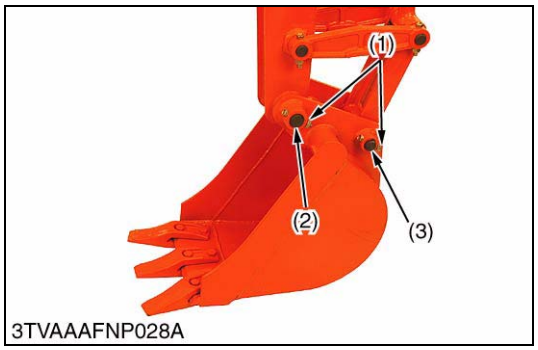
(1) Mount Bar
(2) Support Hook
(3) Guide Stop
(4) Mounting Pin
(5) Slide Bar

W1014341

6. DISASSEMBLING AND ASSEMBLING

[1] DISASSEMBLING BACKHOE

■ **IMPORTANT**
- **When reassembling the pins, bushing and inner rings, apply slight coat of grease to them.**
- **When tightening the hydraulic hoses, refer to "HYDRAULIC HOSES FITTING AND FLARE PIPES".**



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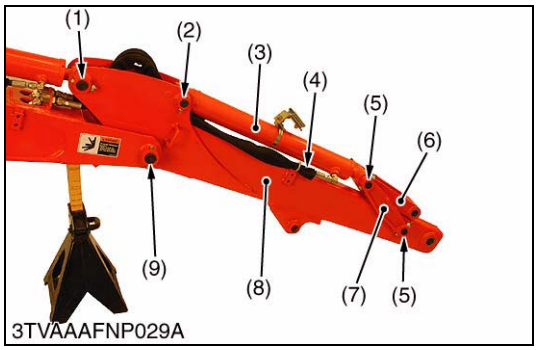
Bucket

1. Remove the bucket from the dipperstick.

(When reassembling)
- Install locking nuts (1) to setting bolts at position where the setting bolt may still be rotated.

(1) Locking Nut
(2) Pin (1.18 × 7.96 in.)
(3) Pin (0.98 × 6.93 in.)

W1015238



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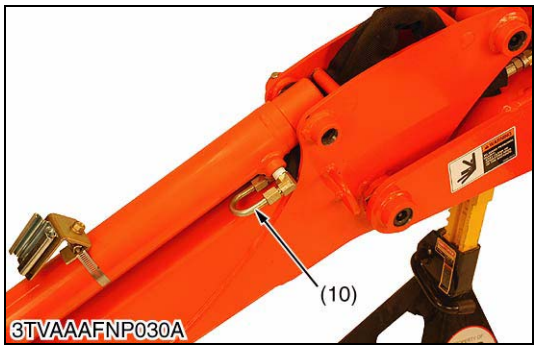
Dipperstick and Bucket Cylinder

1. Remove the pins (5) and remove the bucket link (7) and guide link (6).
2. Disconnect the hydraulic hoses (4) and remove the bucket cylinder (3).
3. Remove the pins (1), (9) and remove the dipperstick (8).
4. Remove the hydraulic pipe (10)

(When reassembling)
- Lock the locking nuts to setting bolts at position where the setting bolt may still be rotated.
- Replace the spacers (11) at their original position.

(1) Pin (30 × 142 mm)
(2) Pin (25 × 137 mm)
(3) Bucket Cylinder
(4) Hydraulic Hose
(5) Pin (0.98 × 6.68 in.)
(6) Bucket Line
(7) Guide Link
(8) Dipperstick
(9) Pin (1.25 × 8.82 in.)
(10) Hydraulic Pipe
(11) Spacer

W1015377



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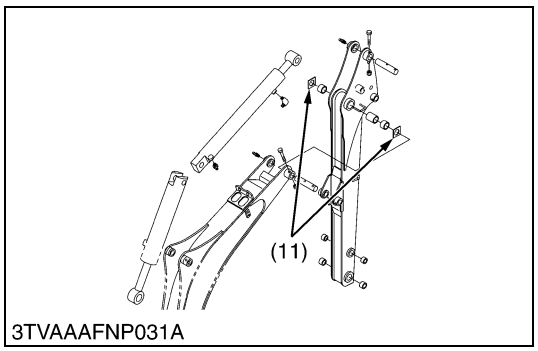

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Valve Cover

1. Remove the valve cover (1).

(1) Valve Cover

W1015611

Hydraulic Hoses

1. Disconnect the hydraulic hoses from the control valve and remove the hydraulic hoses.

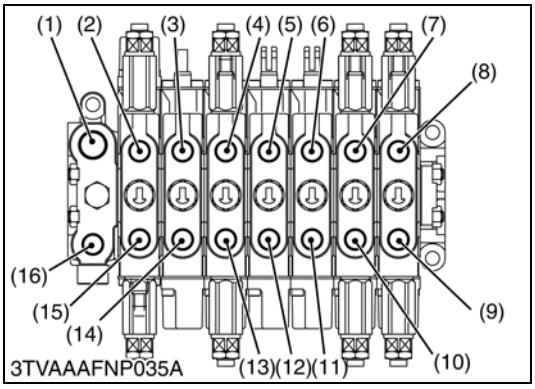
(When reassembling)

- Connect the hydraulic hoses at their original positions and be sure to connect the hose shown in figure.

(Reference)

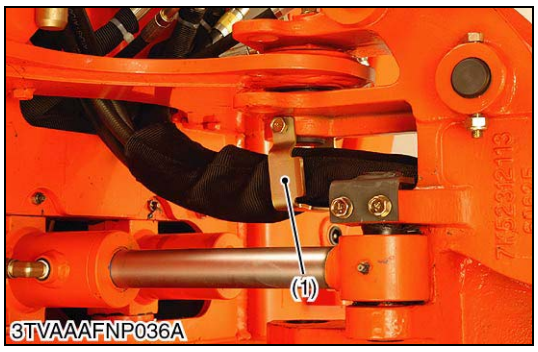
- Color of tape

Port	Color
A1, B1	Red
A2, B2	Orange
A3, B3	Green
A4, B4	White
A5, B5	Yellow



(1) **T** Port (Return)
(2) **A0** Port (for Thumb)
(3) **A1** Port (for Bucket)
(4) **A2** Port (for Dipperstick)
(5) **A3** Port (for Stabilizer RH)
(6) **A4** Port (for Stabilizer LH)
(7) **A5** Port (for Boom)
(8) **A6** Port (for Swing)
(9) **B6** Port (for Swing)
(10) **B5** Port (for Boom)
(11) **B4** Port (for Stabilizer LH)
(12) **B3** Port (for Stabilizer RH)
(13) **B2** Port (for Dipperstick)
(14) **B1** Port (for Bucket)
(15) **B0** Port (for Thumb)
(16) **B0** Port (Main Pump)

W1016658



Dipperstick Cylinder, Boom and Boom Cylinder

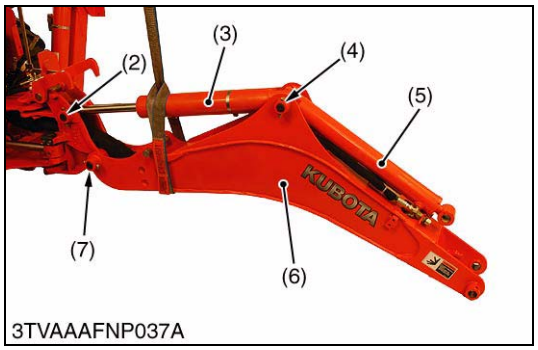
1. Hoist the boom (6).
2. Remove the pin (4) and remove the dipperstick cylinder (5).
3. Remove the pins (2) and remove the boom cylinder (3).
4. Remove the pin (7) and remove the boom (6).

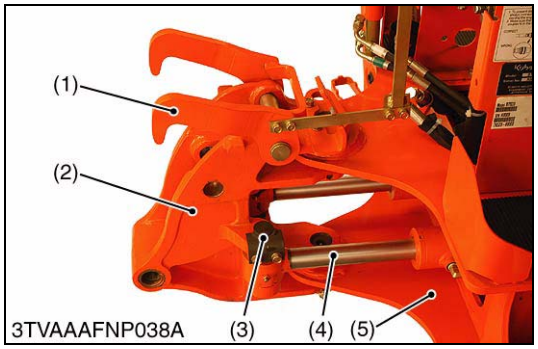
(When reassembling)

- Lock the locking nuts to setting bolt may still be rotated.

(1) Hose Guide
(2) Pin (30 × 150 mm)
(3) Boom Cylinder
(4) Pin (1.25 × 7.96 in.)
(4) Dipperstick Cylinder
(5) Boom
(6) Pin (1.25 × 8.82 in.)

W1016286





Swing Frame

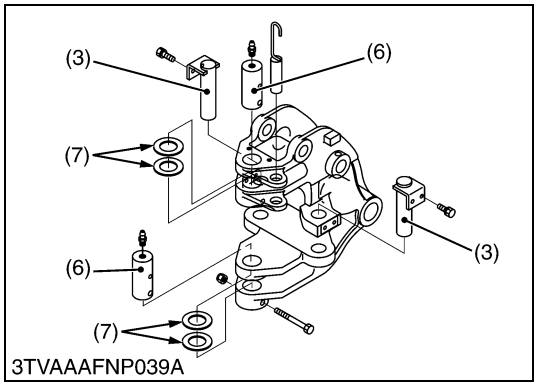
1. Remove the boom lock lever assembly (1).
2. Disconnect the swing cylinder rods (4) from swing frame (2).
3. Remove the swing frame (2) from main frame (5).

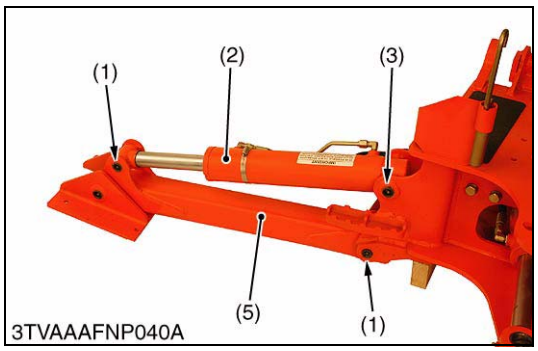
(When reassembling)

- Lock the locking nuts to setting bolt may still be rotated.
- Reinstall the thrust washers at their original positions.

(1) Boom Lock Lever Assembly
(2) Swing Frame
(3) Pin (1.25 × 5.25 in.)
(4) Swing Cylinder Rod
(5) Main Frame
(6) Pin (40 × 102 mm)
(7) Thrust Washer

W1017110





Stabilizers and Stabilizer Cylinder

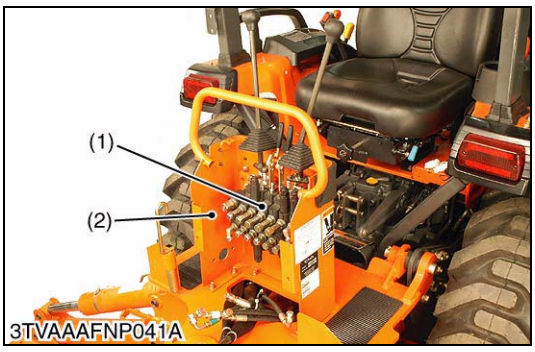
1. Remove the pins (1), (3) and remove the stabilizer cylinder (2) with hydraulic hoses.
2. Remove the pin (4) and remove the stabilizer (5).

(When reassembling)

- Lock the locking nuts to setting bolts at position where the setting bolt may still be rotated.

(1) Pin (31.7 × 132 in.)
(2) Stabilizer Cylinder
(3) Pin (1.25 × 7.57 in.)
(4) Pin (1.25 × 8.82 in.)
(5) Stabilizer

W1017254

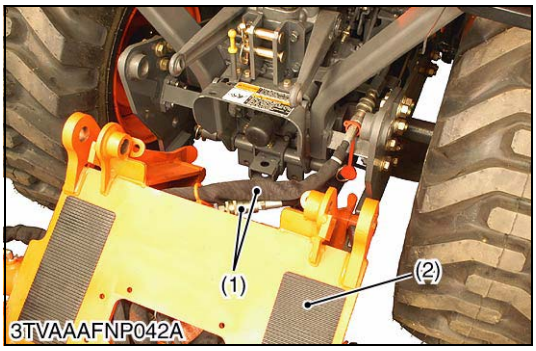


Control Valve and Step

1. Remove the control valve (1) assemble with control levers.
2. Remove the step (2) from the backhoe main frame.

(1) Control Valve (2) Step

W1017535



Backhoe Main Frame

1. Hoist the backhoe main frame (2) and remove the mount pins.
2. Disconnect the three hydraulic hoses (1).

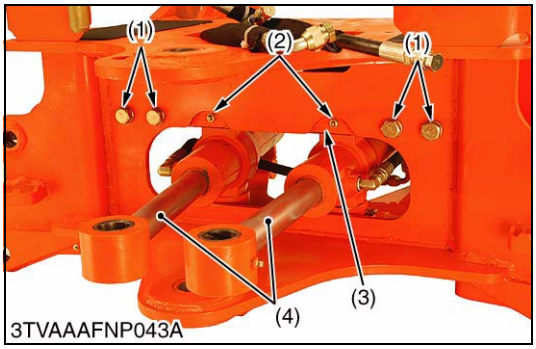
■ **IMPORTANT**

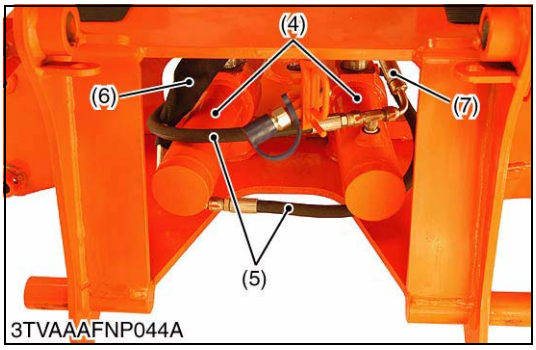
- **The tractor outlet hose must be connected to tractor return pipe when backhoe is removed.**

3. Separate the main frame (2) from the tractor frame.

(1) Hydraulic Hose (2) Backhoe Main Frame

W1017875





Swing Cylinder

1. Remove the cylinder support mounting screws (1), and remove the grease fittings (2).
2. Remove the cylinder support (3).
3. Remove the swing cylinders (4) from the backhoe main frame.
4. Remove the hydraulic hoses and tubes from swing cylinder.

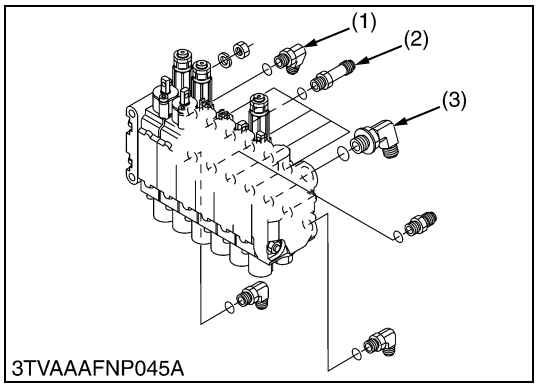
(When reassembling)

- Install hydraulic hoses (5) (6) (7) to swing cylinders as shown figure.

(1) Cylinder Support Mounting Screw
(2) Grease Fitting
(3) Cylinder Support
(4) Swing Cylinder
(5) Hydraulic Hose
(6) Hydraulic Hose (To **B5** Port)
(7) Hydraulic Hose (To **B6** Port)

W1018143

[2] CONTROL VALVE



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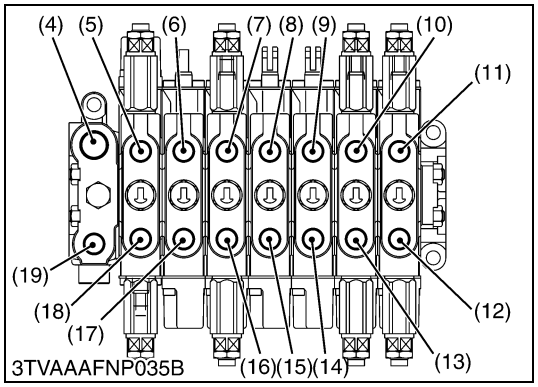

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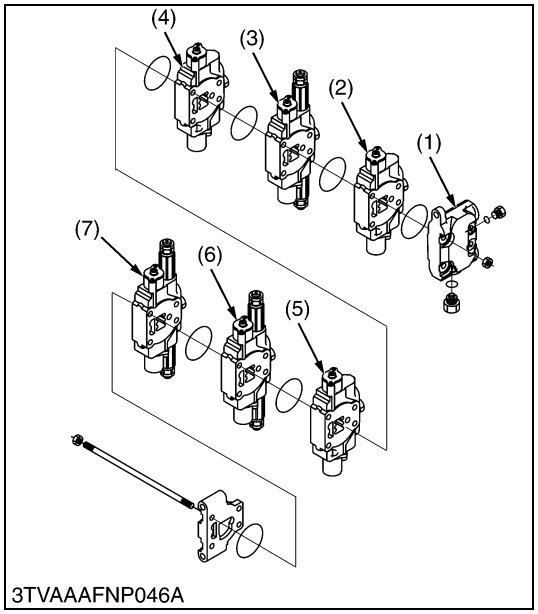

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Adapter, Elbow and Orifice Plate

1. Remove the adapters (2) and elbows (1) from the control valve (4).

(When reassembling)

- Use care not to damage the O-ring.
- Install the elbow angle as indicated table below.

	Angle of Elbow
A6 Port	R20 °

(1) Elbow
(2) Adapter
(3) Adjustable Elbow
(4) **P** Port
(5) **A0** Port
(6) **A1** Port
(7) **A2** Port
(8) **A3** Port
(9) **A4** Port
(10) **A5** Port
(11) **A6** Port
(12) **B6** Port
(13) **B5** Port
(14) **B4** Port
(15) **B3** Port
(16) **B2** Port
(17) **B1** Port
(18) **B0** Port
(19) **T** Port

W1033270

Separation of Section

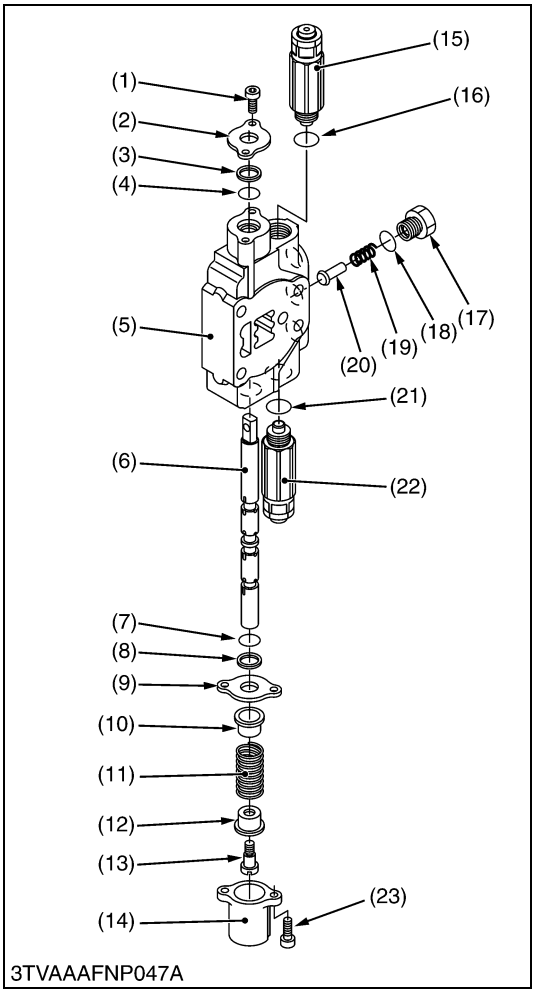
1. Unscrew the nuts, and separate each section.

(When reassembling)

- Use care not to damage the O-ring.

(1) Inlet Section and Outlet Section
(2) Bucket Valve Sectio
(3) Dipperstick Valve Section
(4) Stabilizer RH Valve Section
(5) Stabilizer LH Valve Section
(6) Boom Valve Section
(7) Swing Valve Section

W1033811



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Disassembling Control Valve

1. Remove the spring (19) and load check valve (20).
2. Remove the seal plate (2) and wiper ring (3) from valve housing (5).
3. Remove the cap (14), seal plate (9) and wiper ring (8), and draw out the spool (6) from the valve housing (5).

(When reassembling)

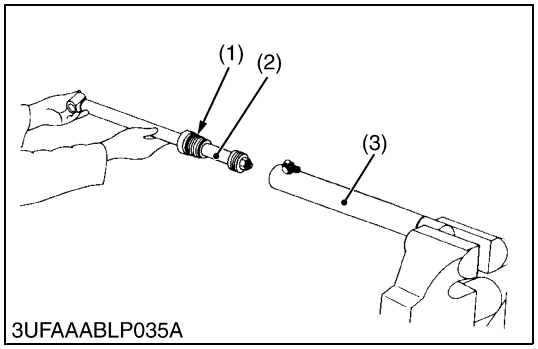
- Clean all parts with a suitable solvent, and dry with a lint-free cloth or air.
- Visually inspect all parts for signs of scoring or damage.
- Install the spool and seal plate to the valve housing, using care not to damage the O-rings.

(1) Screw
(2) Seal Plate
(3) Wiper Ring
(4) O-ring
(5) Valve Housing
(6) Spool
(7) O-ring
(8) Wiper Ring
(9) Seal Plate
(10) Spring Seat
(11) Return Spring
(12) Spring Seat
(13) Cap Screw
(14) Cap
(15) Overload Relief Valve
(16) O-ring
(17) Screw
(18) O-ring
(19) Spring
(20) Load Check Valve
(21) O-ring
(22) Overload Relief Valve
(23) Screw

W1032953

[3] BOOM, DIPPERSTICK, BUCKET, SWING AND STABILIZER CYLINDER

(1) Disassembling and Assembling



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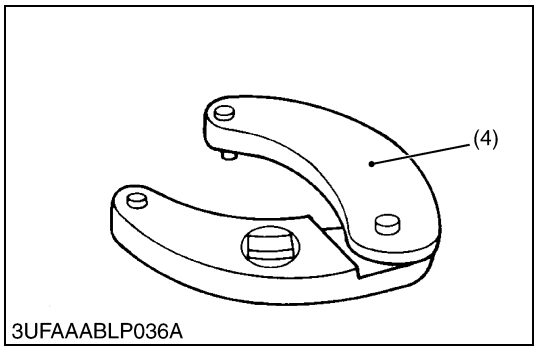

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Cylinder Rod Assembly

1. Drain hydraulic oil from the cylinder, and secure the tube end of the cylinder in a vise.
2. Unscrew the cylinder head (1) with the adjustable gland nut wrench (4).
3. Pull out the piston rod assembly (2) from the cylinder tube (3).

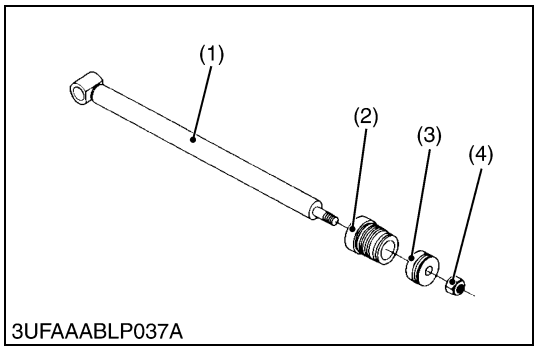
(When reassembling)

- Visually inspect the cylinder tube for signs of scoring or damage.
- Insert the piston rod assembly to the cylinder tube, using care not to damage the piston seal on the piston.
- Install the cylinder head to the cylinder tube, using care not to damage the O-ring on the cylinder head.

Tightening torque	Boom, swing and bucket cylinder head	250 to 280 N·m 25.5 to 28.5 kgf·m 185 to 206 lbf·ft
	Dipperstick cylinder head	350 to 400 N·m 35.7 to 40.7 kgf·m 259 to 295 lbf·ft
	Stabilizer cylinder head	500 to 550 N·m 51.0 to 56.0 kgf·m 369 to 405 lbf·ft

(1) Cylinder Head
(2) Piston Rod Assembly
(3) Cylinder Tube
(4) Adjustable Gland Wrench

W1021758



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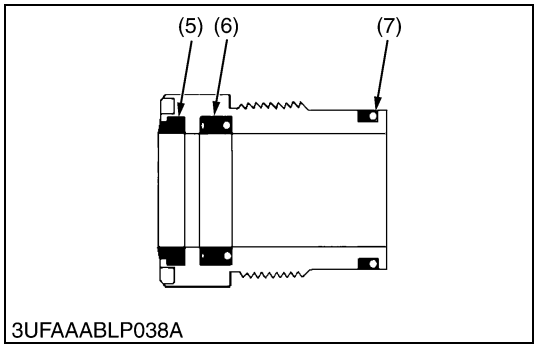

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Cylinder Head, Piston and Nut

1. Secure the rod end in a vise.
2. Unscrew the nut (4), and remove the piston (3) and cylinder head (2) from the piston rod (1).

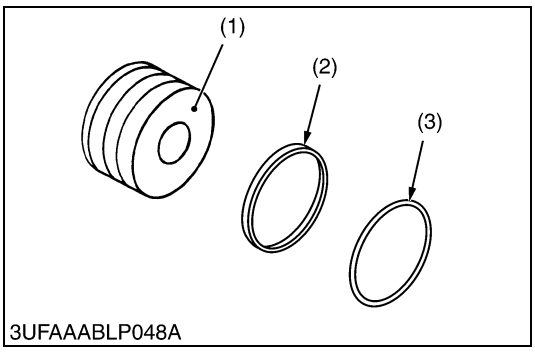
(When reassembling)

- Visually inspect all parts for signs of scoring or damage.
- Insert the piston rod to the cylinder head, using care not to damage the wiper seal (5) and oil seal (6).

Tightening torque	Dipperstick, bucket and stabilizer cylinder piston mounting nut	250 to 300 N·m 25.5 to 30.5 kgf·m 185 to 221 lbf·ft
	Boom and swing cylinder piston mounting nut	160 to 200 N·m 16.4 to 20.3 kgf·m 119 to 147 lbf·ft

(1) Piston Rod
(2) Cylinder Head
(3) Piston
(4) Nut
(5) Wiper Seal
(6) Oil Seal
(7) O-ring

W1021908



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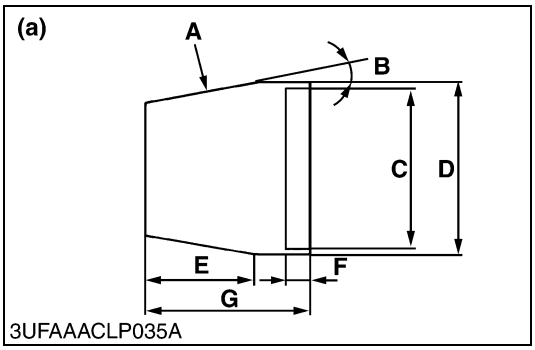

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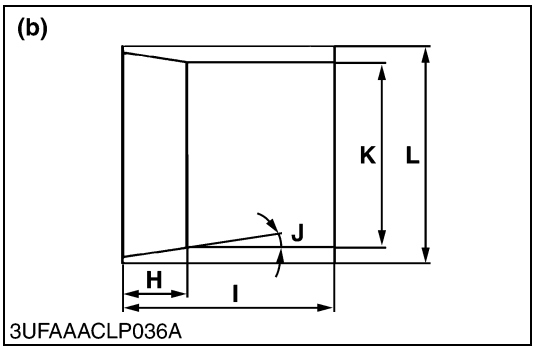

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Piston Seal and O-ring

1. Remove the piston seal (2) and O-ring (3) from the piston (1).

■ **IMPORTANT**

- **When installing the O-ring (3) and piston seal (2) to the piston (1), use the slide jig and correcting jig as shown in the figure.**

	Boom Cylinder Stabilizer Cylinder	Dipper Cylinder	Swing Cylinder Bucket Cylinder
A	80 √	80 √	80 √
B	0.157 rad. 9 °	0.157 rad. 9 °	0.157 rad. 9 °
C	90.18 mm 3.550 in.	80.18 mm 3.156 in.	70.18 mm 2.763 in.
D	91.18 mm 3.590 in.	81.18 mm 3.196 in.	71.18 mm 2.802 in.
E	42 mm 1.65 in.	42 mm 1.65 in.	42 mm 1.65 in.
F	10 mm 0.40 in.	10 mm 0.40 in.	10 mm 0.40 in.
G	58.5 mm 2.30 in.	58.5 mm 2.30 in.	58.5 mm 2.30 in.
H	14 mm 0.55 in.	14 mm 0.55 in.	14 mm 0.55 in.
I	35 mm 1.38 in.	35 mm 1.38 in.	35 mm 1.38 in.
J	0.122 rad. 7 °	0.122 rad. 7 °	0.122 rad. 7 °
K	90.2 mm 3.551 in.	80.2 mm 3.157 in.	70.2 mm 2.764 in.
L	98.9 mm 3.893 in.	88.9 mm 3.500 in.	78.9 mm 3.106 in.

(1) Piston
(2) Piston Seal
(3) O-ring
(a) Slide Jig
(b) Correcting Jig

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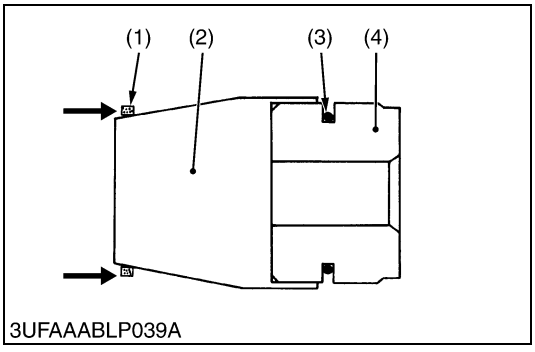

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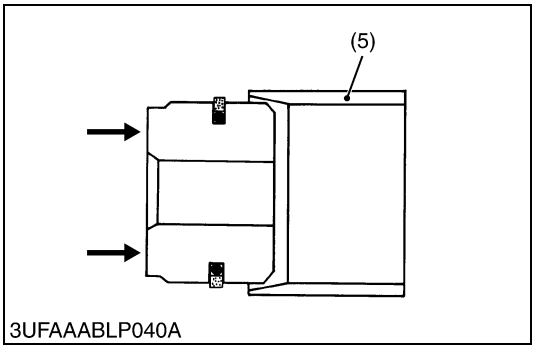

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Installing O-ring and Piston Seal

1. Place the slide jig (2) on the piston (4).
2. Install the O-ring (3) on the piston using the slide jig.
3. Install the piston seal (1) over the O-ring using the slide jig.
4. Compress the piston seal to the correct size by installing the piston into the correcting jig (5).

■ **NOTE**

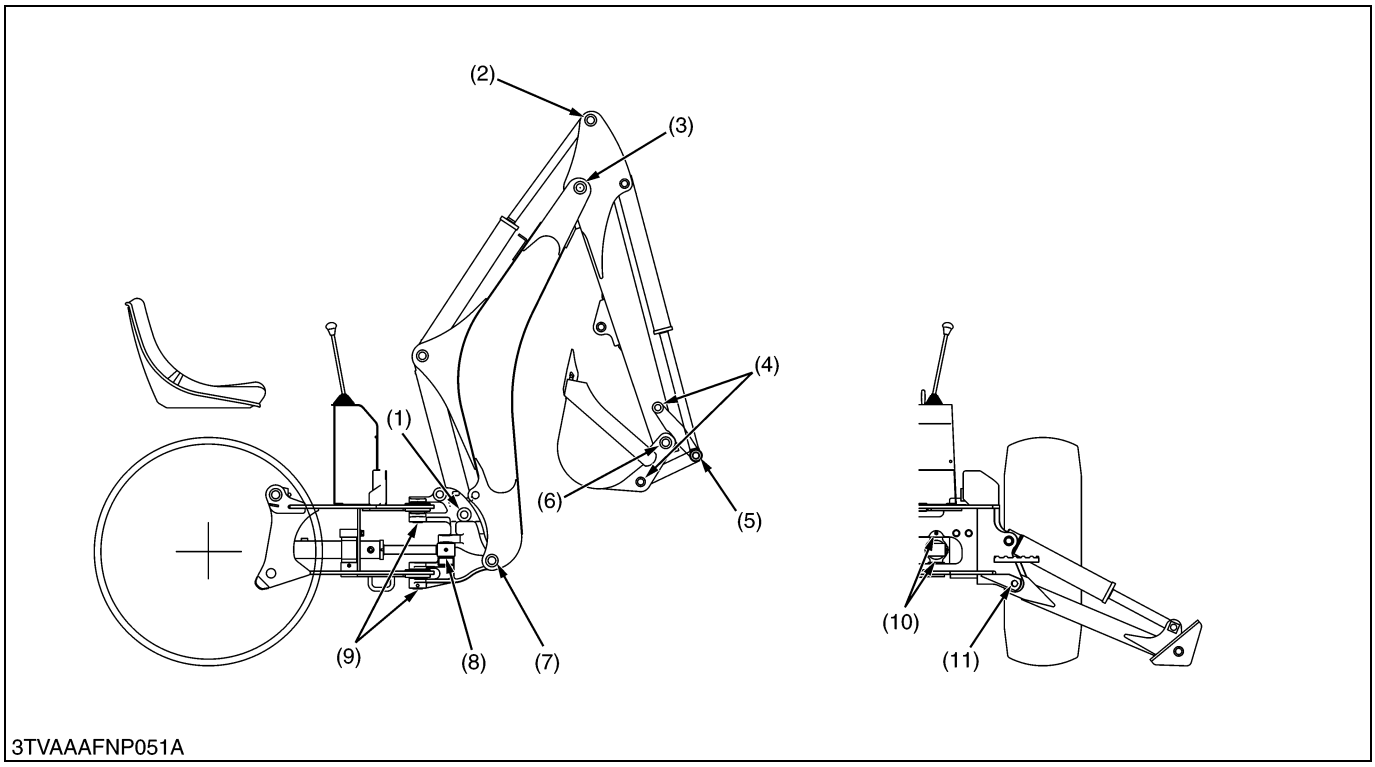
- **Do not turn (roll) the piston seal as you install it.**

(1) Piston Seal
(2) Slide Jig
(3) O-ring
(4) Piston
(5) Correcting Jig

W1022984

Clearance between Pin and Bushing

1. Measure the pins O.D. with an outside micrometer.
2. Measure the bushings I.D. with a cylinder gauge.
3. If the clearance exceeds the allowable limit, replace pin or bushing.



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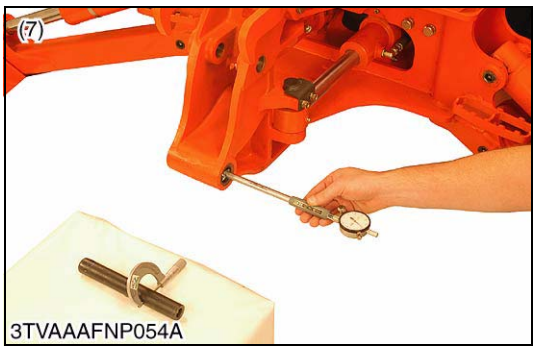

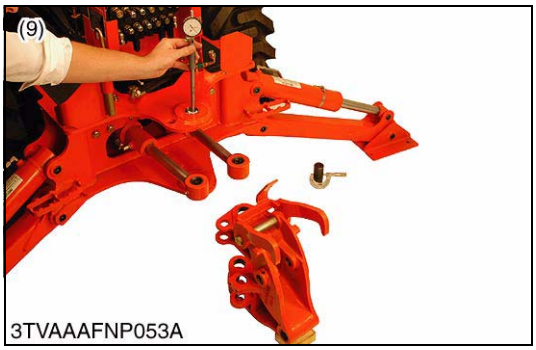

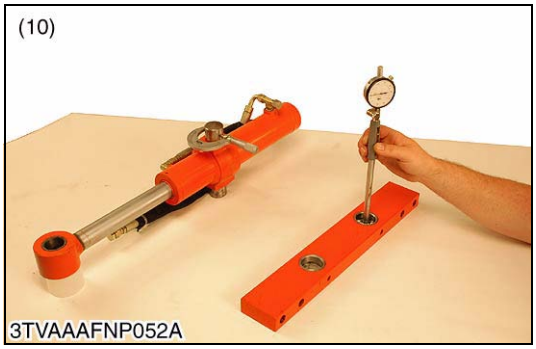

Clearance between Pin and Bushing (Continued)

(Reference)

	Clearance	Factory spec.	Allowable limit
(1)	Boom cylinder pin and bushing	0.129 to 0.180 mm 0.005 to 0.008 in.	1.0 mm 0.039 in.
(2)	Dipperstick cylinder pin and bushing	0.131 to 0.206 mm 0.005 to 0.008 in.	1.0 mm 0.039 in.
(3)	Dipperstick fulcrum pin and bushing	0.131 to 0.206 mm 0.005 to 0.008 in.	1.0 mm 0.039 in.
(4)	Bucket link / guide link pins and bushing	0.144 to 0.184 mm 0.006 to 0.007 in.	1.0 mm 0.039 in.
(5)	Bucket cylinder pin and bushing	0.144 to 0.184 mm 0.006 to 0.007 in.	1.0 mm 0.039 in.
(6)	Bucket fulcrum pin and bushing	0.144 to 0.184 mm 0.006 to 0.007 in.	1.0 mm 0.039 in.
(7)	Boom support pin and bushing	0.131 to 0.206 mm 0.005 to 0.008 in.	1.0 mm 0.039 in.
(8)	Swing cylinder pin and bushing	0.131 to 0.206 mm 0.005 to 0.008 in.	1.0 mm 0.039 in.
(9)	Main frame fulcrum pin and bushing	0.201 to 0.242 mm 0.008 to 0.010 in.	1.0 mm 0.039 in.
(10)	Swing cylinder trunnion boss and cylinder support bushing	0.130 to 0.210 mm 0.005 to 0.008 in.	0.5 mm 0.020 in.
(11)	Stabilizer arm pin and bushing	0.144 to 0.184 mm 0.006 to 0.007 in.	1.0 mm 0.039 in.

Swing cylinder trunnion boss I.D	Factory spec.	38.18 to 38.23 mm 1.503 to 1.505 in.
Main frame fulcrum pin O.D.		40.201 to 40.239 mm 1.5827 to 1.5824 in.
Swing cylinder rod pin		31.674 to 31.699 mm 1.247 to 1.248 in.
Boom and dipperstick cylinder rod pin		29.979 to 30.000 mm 1.180 to 1.181 in.
Boom cylinder bottom pin		29.82 to 29.85 mm 1.1740 to 1.1752 in.
Bucket cylinder rod pin		24.816 to 24.846 mm 0.9770 to 0.9782 in.
Stabilizer cylinder rod pin		24.956 to 24.981 mm 0.9825 to 0.98351 in.
Bucket and stabilizer cylinder bottom pin		24.90 to 24.93 mm 0.9803 to 0.9815 in.
Bucket fulcrum pin O.D.		29.82 to 29.85 mm 1.1740 to 1.1752 in.
Swing cylinder support bushing I.D.		38.18 to 38.23 mm 1.503 to 1.505 in.
Main frame fulcrum bushing I.D.		40.201 to 40.239 mm 1.5827 to 1.5842 in.
Bucket fulcrum bushing I.D.		29.990 to 30.000 mm 1.180 to 1.181 in.

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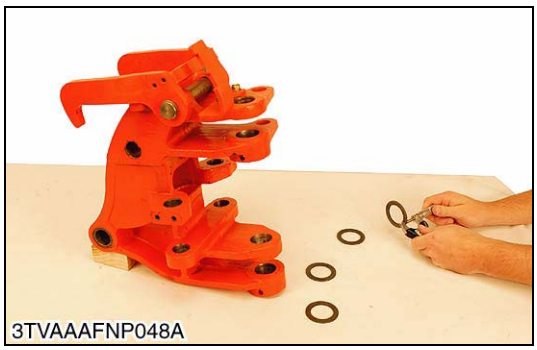
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Thrust Washer Wear

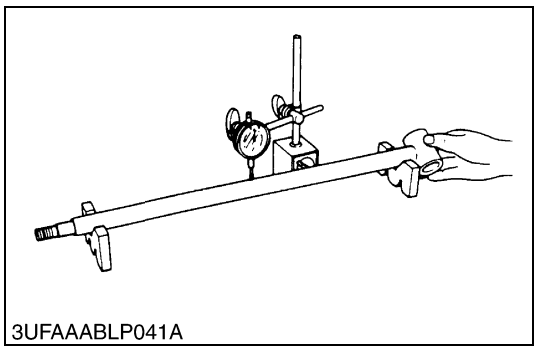
1. Measure the thickness of thrust washer with an outside micrometer.
2. If the wear exceeds the allowable limit, replace it.

■ **NOTE**

- **Visually inspect the thrust washer for signs of scoring or damage not only on the thrust washer but also on the main frame and swing frame contact surface.**

Thrust washer thickness	Factory spec.	2.45 to 2.82 mm 0.0966 to 0.1126 in.
	Allowable limit	1.8 mm 0.0709 in.

W1025818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Piston Rod Bend

1. Place piston rod on V blocks.
2. Set a dial indicator on the center of the rod.
3. Turn the piston rod and read the dial indicator.
4. If the measurement exceeds the allowable limit, replace it.

Piston rod bend	Allowable limit	0.25 mm 0.0098 in.

W1026026

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