PART NO. TABA50-EN-00

HITACHI

Reliable solutions

Technical Manual

ZX 17U-5A 19U-5A

Hydraulic Excavator

Hitachi Construction Machinery Co., Ltd.

URL:http://www.hitachi-c-m.com

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Service Manual consists of the following separate Part No.

Technical Manual	: Vol. No.TABA50-EN
Workshop Manual	: Vol. No.WABA50-EN
Engine Manual	: Vol. No.EABA-EN

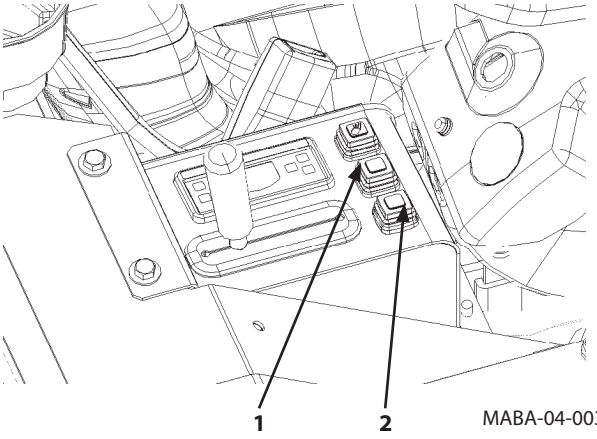
ZX17U-5A • 19U-5A HYDRAULIC EXCAVATOR TECHNICAL MANUAL

TABA50-EN-00

General Precautions for Cab

- Before entering the cab, thoroughly remove all dirt and/or oil such as mud, grease, soil or stones that may mess up the cab from the soles of your work boots. If any controls such as a pedal is operated while with dirt and/or oil on the soles of the operator's work boots, the operator's foot may slip off the pedal, possibly resulting in a personal accident.
- Do not mess up around the operator's seat with parts, tools, soil, stones, obstacles that may fold up or turn over, cans or lunch box. The levers or pedals become inoperable if obstacle jams in operation stroke of the travel levers/pedals, pilot control shut-off lever or control levers, which may result in serious injury or death.
- Avoid storing transparent bottles in the cab. Do not attach any transparent type window decorations on the windowpanes as they may focus sunlight, possibly starting a fire.
- Refrain from listening to the radio, or using music headphones or mobile telephones in the cab while operating the machine.
- Keep all flammable objects and/or explosives away from the machine.
- After using the ashtray, always cover it to extinguish the match and/or tobacco.
- Do not leave cigarette lighters in the cab. When the temperature in the cab increases, the lighter may explode.
- Use proper floor mat dedicated to the machine. If another floor mat is used, it may be displaced and contact with the travel pedals during operation, resulting in serious injury or death.

- When the machine descends a slope at high speed, machine weight accelerates descending speed. It may cause collision accident due to misjudging of braking distance or machine turnover due to running on an unexpected obstacle.
  Before descending a slope, always ensure that engine control lever (1) is in the slow idle position, and then reduce the engine speed. Turn the travel mode switch (2) to slow speed for ZX26U-5A.
- Be sure to thoroughly warm up the machine before ascending steep slopes. If hydraulic oil has not warmed up sufficiently, sufficient performance may not be obtained.
- Use a signal person when moving, swinging or operating the machine in congested areas. Coordinate hand signals before starting the machine.
- Before moving machine, determine which way to move travel pedals/levers for the direction you want to go. When the travel motors are in the rear, pushing down on the front of the travel pedals or pushing the levers forward moves the machine forward, towards the idlers. An arrow-mark seal is stuck on the inside surface of the side frame to indicate the machine front direction.
- Select a travel route that is as flat as possible. Steer the machine as straight as possible, making small gradual changes in direction.
- Before traveling on them, check the strengths of bridges and road shoulders, and reinforce if necessary.
- Use wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.
- When crossing train tracks, use wood plates in order not to damage them.
- Do not make contact with electric wires or bridges.
- When crossing a river, measure the depth of the river using the bucket, and cross slowly. Do not cross the river when the depth of the river is deeper than the upper edge of the upper roller.
- When traveling on rough terrain, reduce engine speed. Select slow travel speed. Slower speed will reduce possible damage to the machine.
- Avoid operations that may damage the track and undercarriage components.
- During freezing weather, always clean snow and ice from track shoes before loading and unloading machine, to prevent the machine from slipping.



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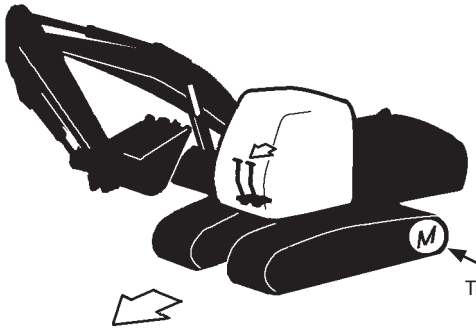

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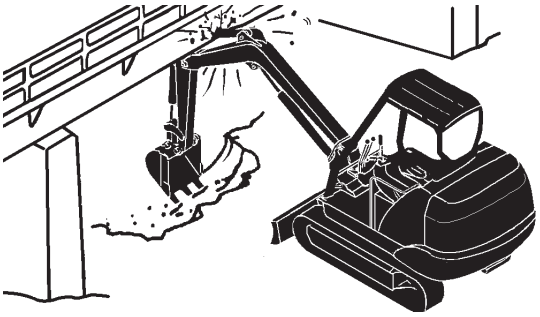
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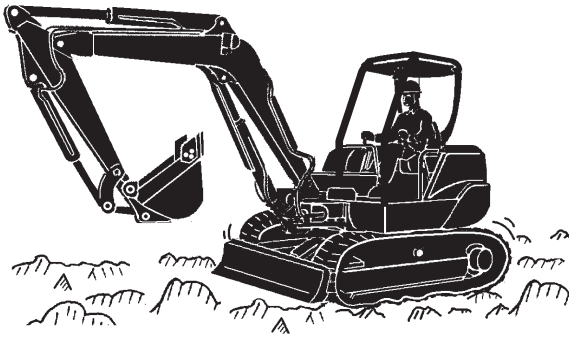
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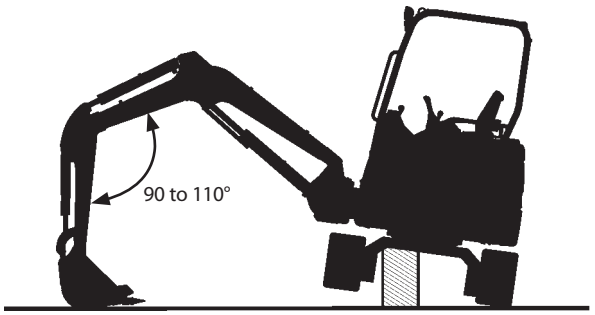
Practice Safe Maintenance

To avoid accidents:
- Understand service procedures before starting work.
- Keep the work area clean and dry.
- Do not spray water or steam inside cab.
- Never lubricate or service the machine while it is moving.
- Keep hands, feet and clothing away from power-driven parts.

SA-028

Before servicing the machine:
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Run the engine at slow idle speed without load for 5 minutes.
4. Turn the key switch to OFF to stop engine.
5. Relieve the pressure in the hydraulic system by moving the control levers several times.
6. Remove the key from the key switch.
7. Attach a "Do Not Operate" tag on the control lever.
8. Pull the pilot control shut-off lever to the LOCK position.
9. Allow the engine to cool.



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- If a maintenance procedure must be performed with the engine running, do not leave the machine unattended.
- If the machine must be raised, maintain a 90 to 110° angle between the boom and arm. Securely support any machine elements that must be raised for service work.
- Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of operator's manual.
- Keep all parts in good condition and properly installed.
- Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.
- When cleaning parts, always use nonflammable detergent oil. Never use highly flammable oil such as fuel oil and gasoline to clean parts or surfaces.
- Disconnect battery ground cable (–) before making adjustments to electrical systems or before performing welding on the machine.

SA-527

Avoid Heating Near Pressurized Fluid Lines

- Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders.
  - Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.
  - Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install temporary fire-resistant guards to protect hoses or other materials before engaging in welding, soldering, etc..

SA-030

Avoid Applying Heat to Lines Containing Flammable Fluids

- Do not weld or flame cut pipes or tubes that contain flammable fluids.
- Clean them thoroughly with nonflammable solvent before welding or flame cutting them.

Precautions for Handling Accumulator (ZX26U-5A)

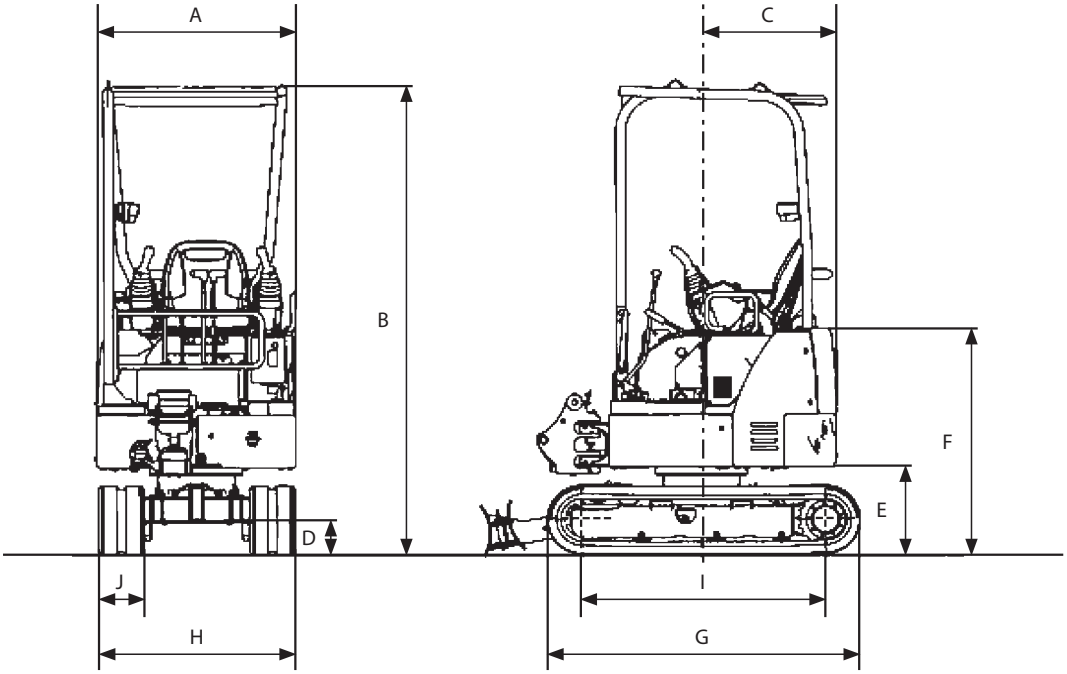
High-pressure nitrogen gas is sealed in the accumulator and the gas damper. Inappropriate handling may cause explosion, possibly resulting in serious injury or death.

Strictly comply with the following items:

- Do not disassemble the unit.
- Keep the units away from open flames and fire.
- Do not attempt to bore a hole or cut by torch.
- Avoid giving shocks by hitting or rolling the unit.
- Before disposing the unit, sealed gas must be released. Consult your nearest Hitachi dealer.

Specifications

ZX17U-5A

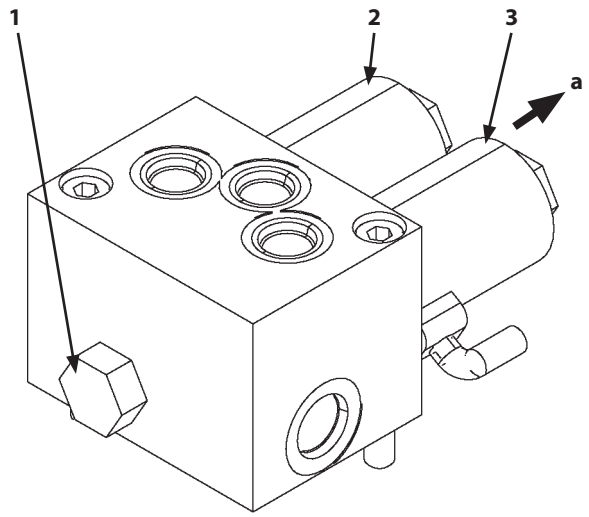


MABC-12-001

Model		ZX17U-5A
Specification		3-Pillars Canopy
Type of Front-End Attachment	-	Boom Swing Type
Bucket Capacity (Heaped)	m^3 (yd^3)	0.044 (0.06)
Operating Weight	kg (lb)	1640 (3620)
Base Machine Weight	kg (lb)	1320 (2920)
Engine	kW/min^{-1} (PS/rpm)	3TNV70 10.6/2400 (14.4/2400)
A: Overall Width	mm (ft·in)	990 (3' 3")
B: Overall Height	mm (ft·in)	2380 (7' 10")
C: Rear End Swing Radius	mm (ft·in)	680 (2' 3")
D: Minimum Ground Clearance	mm (ft·in)	165 (7")
E: Counterweight Clearance	mm (ft·in)	450 (1' 6")
F: Engine Cover Height	mm (ft·in)	1150 (3' 9")
G: Undercarriage Length	mm (ft·in)	1570 (5' 2")
H: Undercarriage Width	mm (ft·in)	980 (3' 3")/1280 (4' 2")
I: Sprocket Center to Idler Center	mm (ft·in)	1210 (4')
J: Track Shoe Width	mm (ft·in)	230 (9")
Ground Pressure	kPa (kgf/cm^2, psi)	26.6 (0.27, 3.9)
Swing Speed	min^{-1} (rpm)	9.4 (9.4)
Travel Speed (fast/slow)	km/h (mph)	4.2/2.4 (2.6/1.7)
Gradeability		25° (tan θ = 0.47)

NOTE: The dimensions do not include the height of the shoe lug. The dimensions of the machine equipped with rubber crawlers are shown.

2-Spool Solenoid Valve

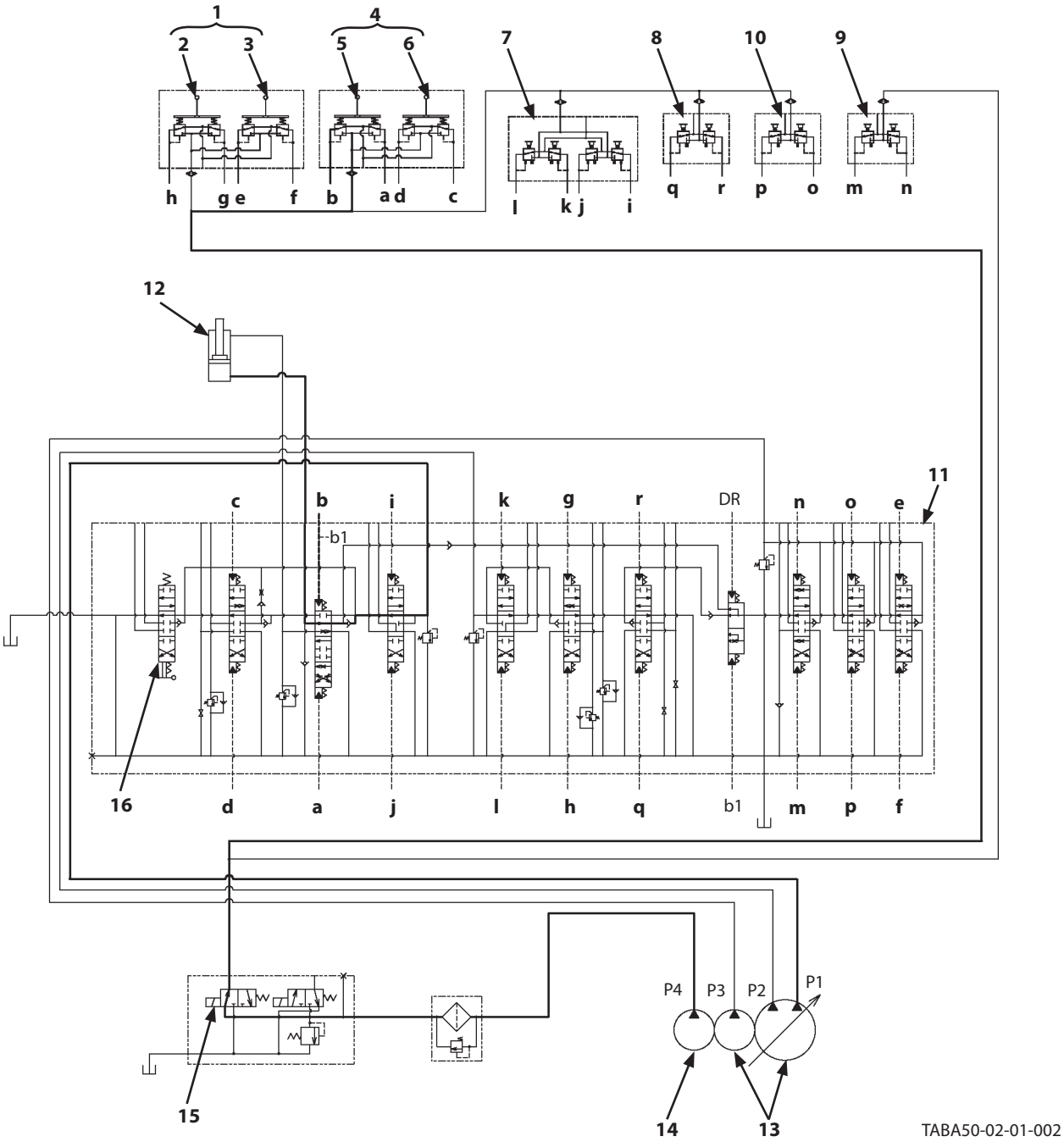


TABA50-01-02-012

a- Machine Front Side

1- Pilot Relief Valve
2- Pilot Shut-Off Solenoid Valve
3- Travel Mode Control Solenoid Valve

FRONT ATTACHMENT PILOT VALVE	Plunger Stroke	Ports 1, 3: 6.6±0.5 mm (0.26±0.02 in)
		Ports 2, 4: 8.0±0.5 mm (0.31±0.02 in)
TRAVEL PILOT VALVE	Plunger Stroke	Ports 1, 2, 3, 4: 3.4±0.3 mm (0.13±0.012 in)
BOOM SWING / AUXILIARY PILOT VALVE	Plunger Stroke	Ports 1, 2: 3.7±0.3 mm (0.15±0.012 in)
BLADE PILOT VALVE	Plunger Stroke	Ports 1, 2: 4.0±0.3 mm (0.16±0.012 in)
2-SPOOL SOLENOID VALVE UNIT (2-Spool Solenoid Valve with Pilot Relief Valve)	Relief Set-Pressure	4.1±0.2 MPa (42±2 kgf/cm^2, 595±29 psi)
	Rated Voltage	DC 12 V
	Operating Voltage	DC 10 to 15 V
	Coil Resistance	12.2±0.85 Ω
	Solenoid Valve	Port A Side: Pilot Shut-Off Solenoid Valve Port B Side: Travel Mode Selector Solenoid Valve
OIL COOLER BYPASS CHECK VALVE	Cracking Pressure	300 kPa (3 kgf/cm^2, 44 psi) at 30 L/min



TABA50-02-01-002

a- Boom Lower
b- Boom Raise
c- Bucket Roll-In
d- Bucket Roll-Out
e- Swing (Left)
f- Swing (Right)
g- Arm Roll-In
h- Arm Roll-Out
i- Travel (Left Forward)
j- Travel (Left Reverse)
k- Travel (Right Forward)
l- Travel (Right Reverse)
m- Boom Swing (Left)
n- Boom Swing (Right)
o- Blade Raise
p- Blade Lower
q- Auxiliary
r- Auxiliary

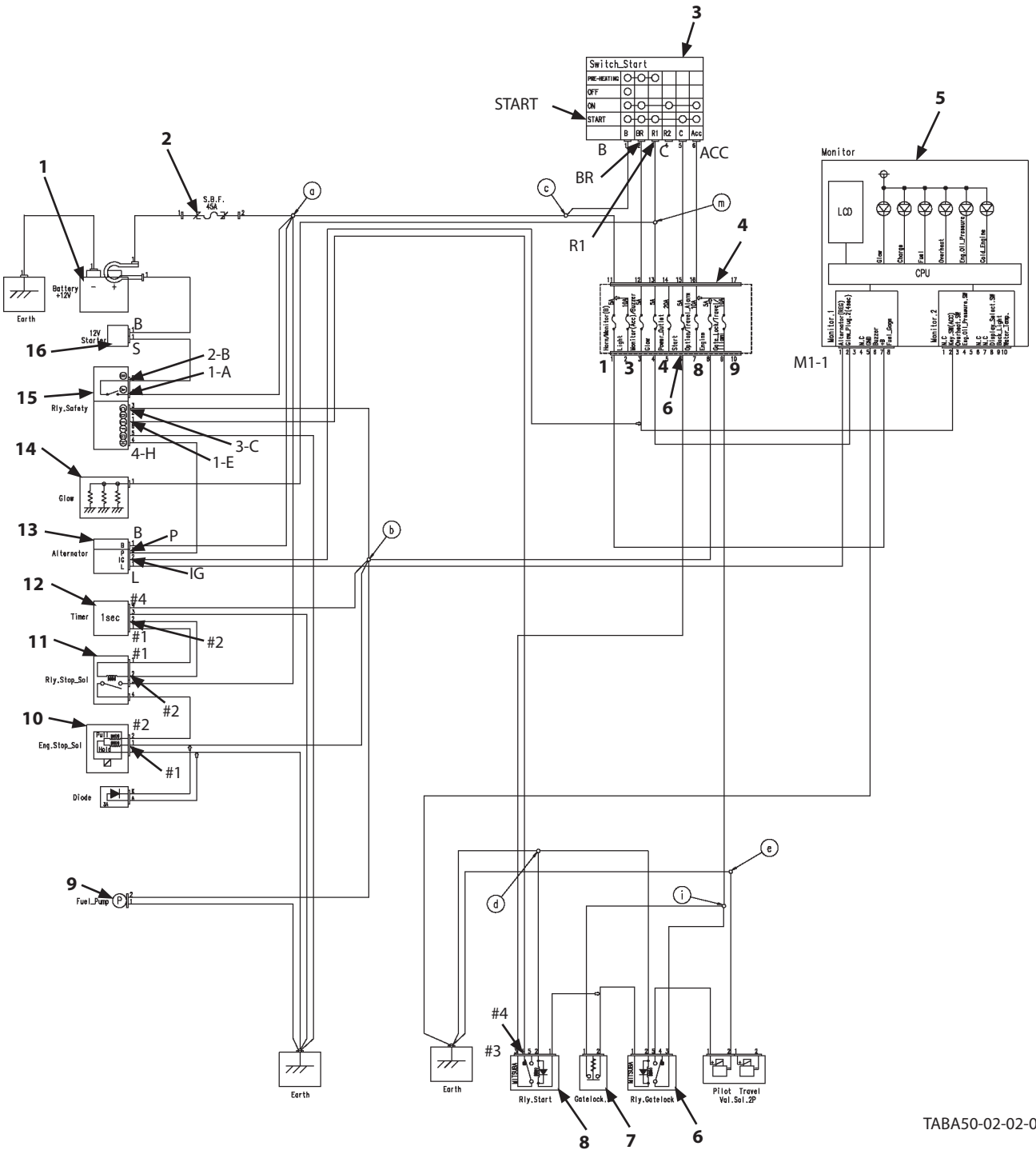
1- Pilot Valve (Left)
2- Arm
3- Swing
4- Pilot Valve (Right)
5- Boom
6- Bucket
7- Travel Pilot Valve
8- Auxiliary Pilot Valve
9- Boom Swing Pilot Valve
10- Blade Pilot Valve
11- Control Valve
12- Boom Cylinder
13- Main Pump
14- Pilot Pump
15- Pilot Shut-Off Solenoid Valve
16- Side Fame Extend/Retract Spool

Outline

The electrical circuit is broadly divided into the main circuit and monitor circuit.

- Main Circuit:
  The main circuit operates the engine and the accessory related circuits.

- Monitor Circuit:
  The monitor circuit displays the machine operating conditions. Consists of monitor controller, sensors, relays, and switches.



1- Battery
2- Slow Blow Fuse
3- Key Switch
4- Fuse Box
5- Monitor Controller
6- Pilot Shut-Off Relay
7- Pilot Shut-Off Switch
8- Starter Relay 1
9- Fuel Pump
10- Engine Stop Solenoid
11- Power Relay
12- One-Second Timer
13- Alternator
14- Glow Plug
15- Starter Relay 2
16- Starter

Monitor Circuit

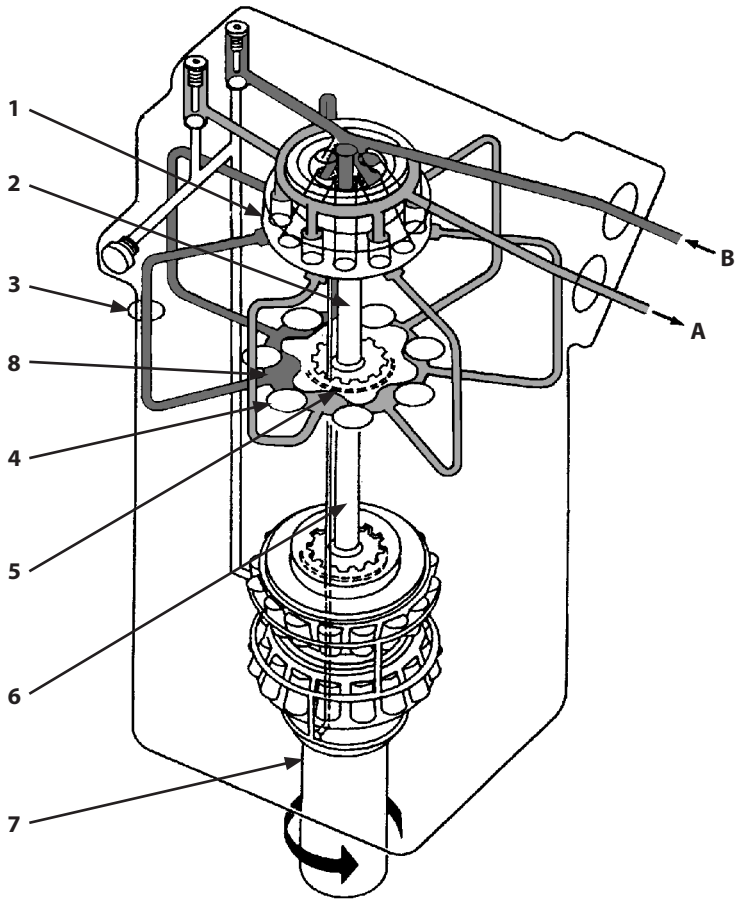
The major functions and circuits in the monitor circuit are as follows.

- Indicator Circuit: The indicator circuit turns the indicator ON due to the signals from switches and sensors. (Alternator Indicator, Fuel Level Indicator, Overheat Indicator, Engine Oil Pressure Indicator, Preheat Indicator)
- Work Light/Monitor Internal Light Circuit: The work light/monitor internal light circuit is operated when the work light switch is in the ON position. (Work Light, Monitor Internal Light)
- Gauge Circuit: The gauge circuit operates the hour meter. Also the gauge circuit controls the fuel gauge and the coolant temperature indicator according to the signals from sensors. (Hour Meter, Fuel Gauge, Coolant Temperature Indicator)

SECTION 3

COMPONENT OPERATION

CONTENTS



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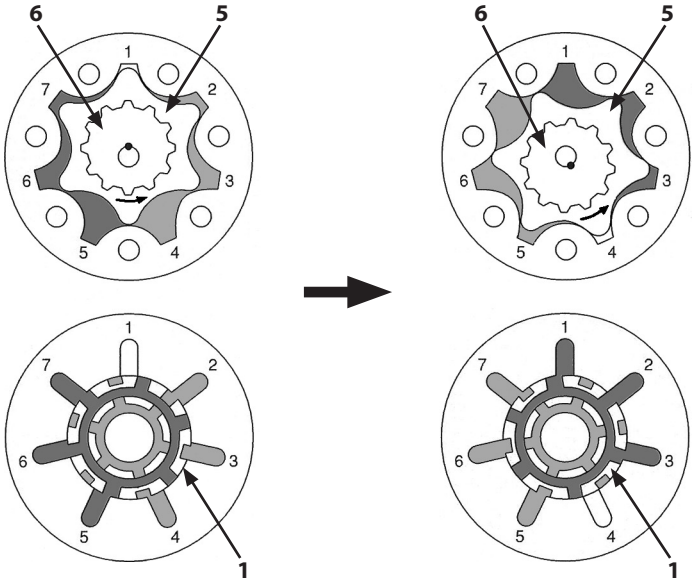

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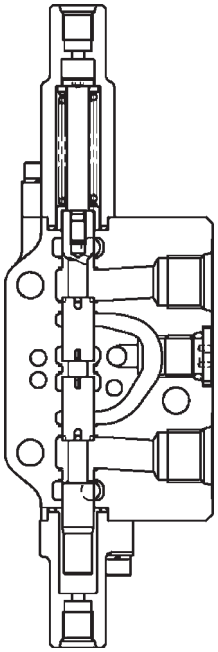
Section G (Travel (Right))



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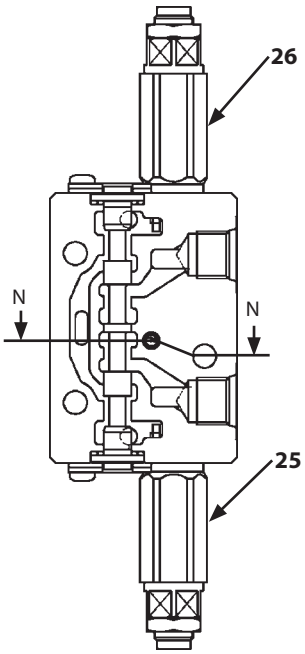
Section H (Delivery Part from Main Pumps P1, P2)



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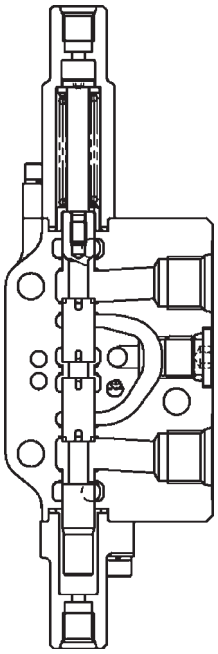
Section I (Travel (Left))



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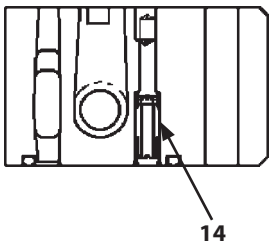
Section N-N



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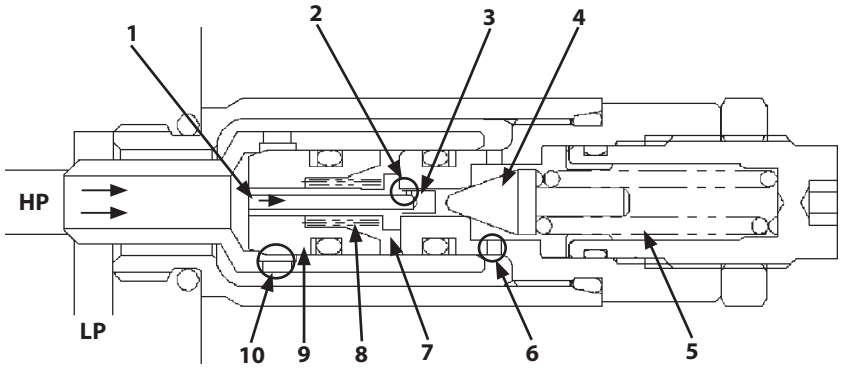
During Normal Operation:



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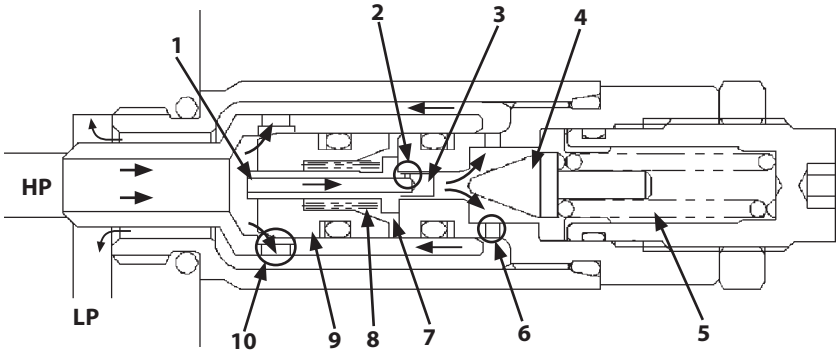
During Relief Operation:

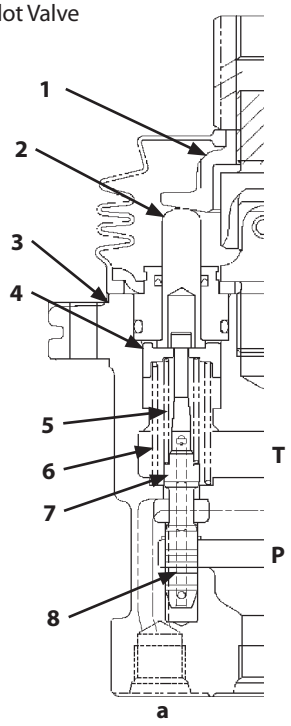


TABA50-03-03-022

HP- Main Circuit
LP- Hydraulic Oil Tank

1- Passage
2- Orifice
3- Piston
4- Pilot Poppet
5- Spring
6- Passage
7- Spring Chamber
8- Spring
9- Main Poppet
10- Passage

Front Attachment/
Swing Pilot Valve



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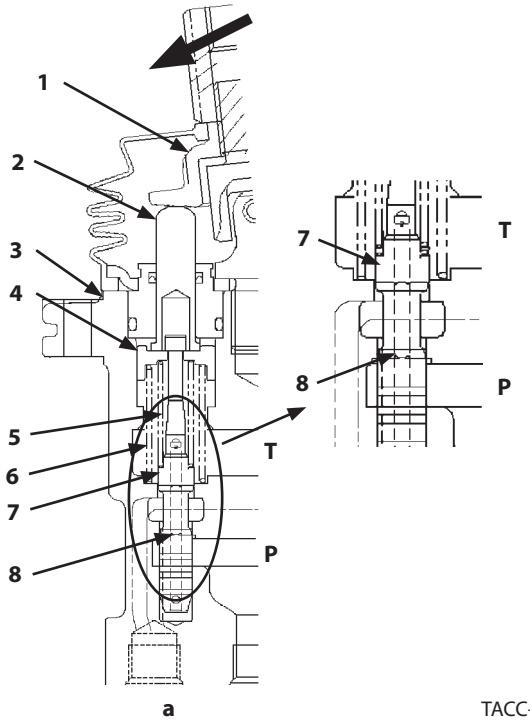

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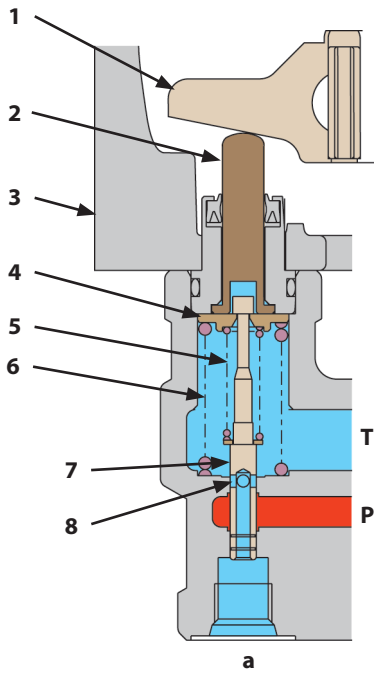
Travel Pilot Valve



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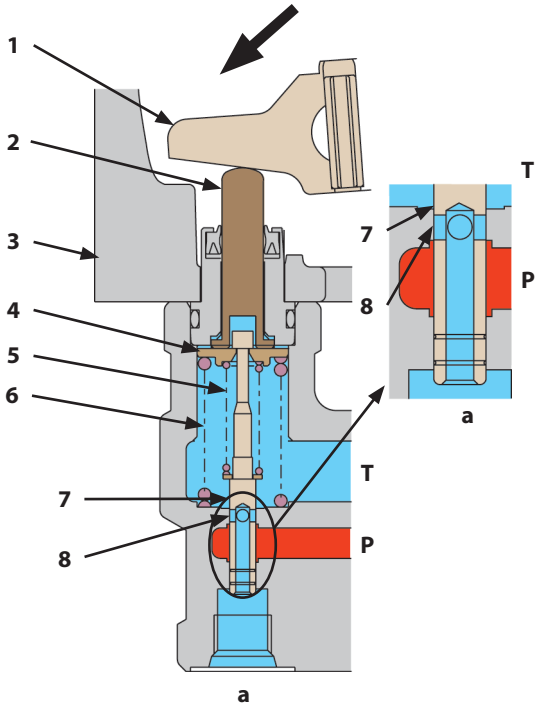


TPPP-03-04-011

P- Port P

T- Port T

a- Output Port

1- Cam
2- Pusher
3- Casing
4- Spring Guide
5- Balance Spring
6- Return Spring
7- Spool
8- Hole

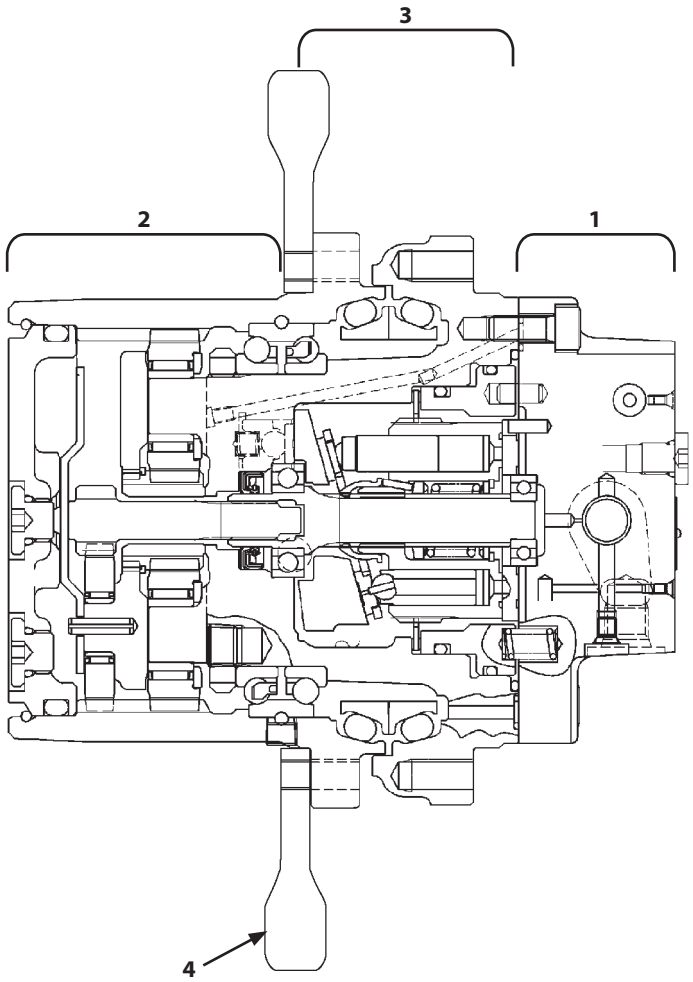
SECTION 3 COMPONENT OPERATION

Group 5 Travel Device

Outline

The travel device consists of travel motor (3), travel reduction gear (2), and travel brake valve (1).
Travel motor (3) is a swash plate type variable displacement axial plunger motor. Travel motor (3) is driven by pressure oil from the pump and transmits the rotation power to travel reduction gear (2).

Travel reduction gear (2) is a two-stage planetary reduction gear, converts the travel motor (3) rotation power to a slow-large torque, and rotates sprocket (4) and the track.
Travel brake valve (1) ensures smooth start/stop travel operation and prevents the machine from running away when traveling on a down slope.



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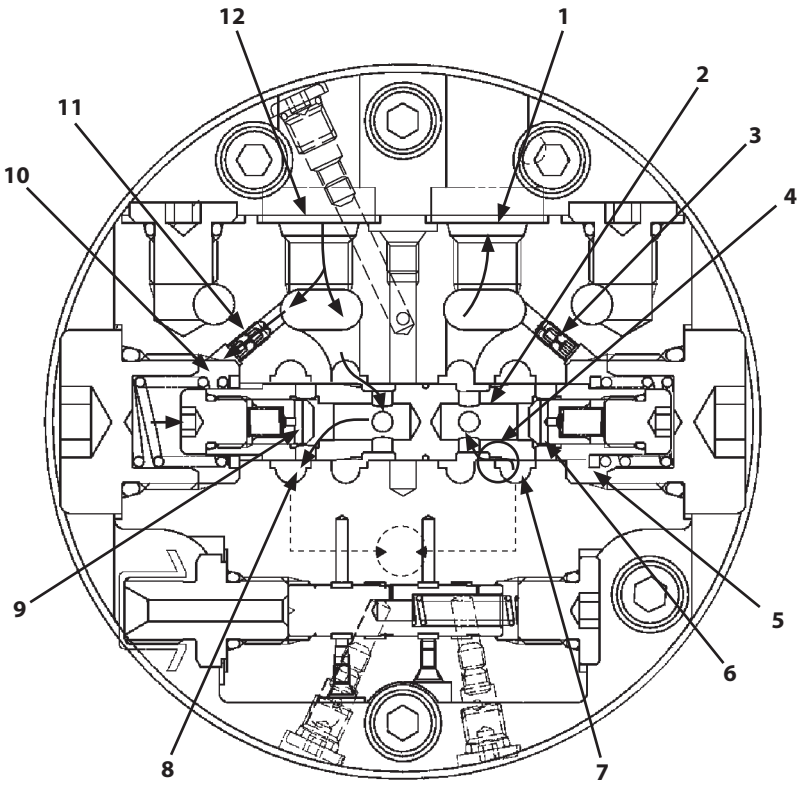
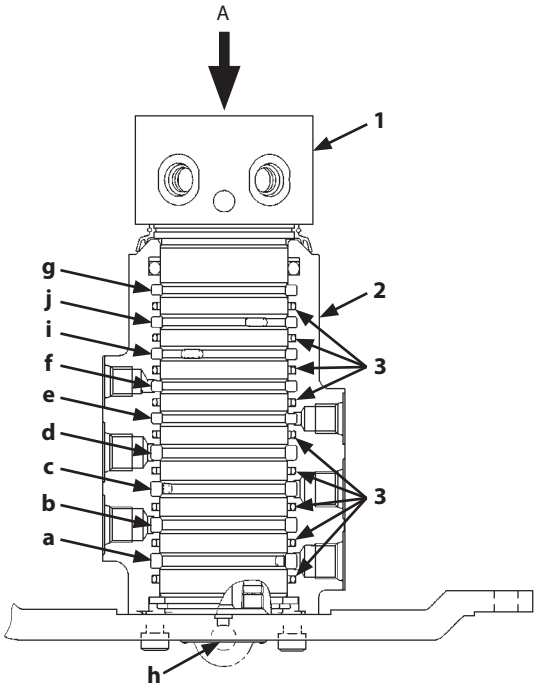
1- Travel Brake Valve
2- Travel Reduction Gear
3- Travel Motor
4- Sprocket

During travel operation:



TABA50-03-05-005

1- Port AV
2- Spool (Counterbalance Valve)
3- Orifice
4- Notch
5- Chamber A
6- Check Valve AC
7- Motor Port AM
8- Motor Port BM
9- Check Valve BC
10- Chamber B
11- Orifice
12- Port BV



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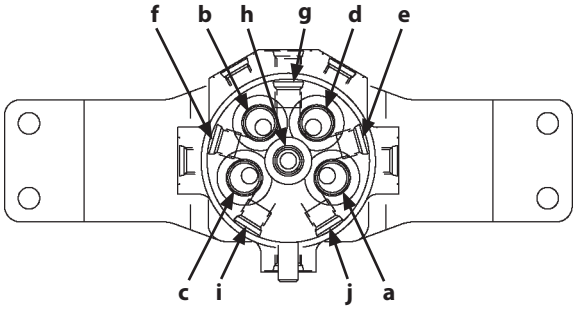
View A



TABA50-03-07-003

a-	Travel (Right Reverse)	d-	Travel (Left Forward)	g-	Pilot Pressure for Travel Mode Control	i-	Side Fame Extend
b-	Travel (Left Reverse)	e-	Blade Raise			j-	Side Fame Retract
c-	Travel (Right Forward)	f-	Blade Lower	h-	Drain		

1-	Spindle	2-	Body	3-	Seal

SECTION 4 OPERATIONAL PERFORMANCE TEST

Group 2 Standard

Performance Test Designation	Unit	Performance Standard	Remarks	Reference Page
HYDRAULIC CYLINDER CYCLE TIME	sec		ZX17U-5A: 0.93 m arm ZX19U-5A: 1.13 m arm 0.044 m^3 (PCSA heaped) bucket Bucket: empty	T4-4-14
Boom Raise (ZX17U-5A/ZX19U-5A)		2.0±0.3/1.9±0.3		
Boom Lower (ZX17U-5A/ZX19U-5A)		2.2±0.3/2.1±0.3		
Arm Roll-In (ZX17U-5A/ZX19U-5A)		3.1±0.3/3.6±0.3		
Arm Roll-Out (ZX17U-5A/ZX19U-5A)		2.2±0.3/2.4±0.3		
Bucket Roll-In		2.4±0.3		
Bucket Roll-Out		1.7±0.3		
Boom Swing (Right)		6.2±0.5		
Boom Swing (Left)		6.2±0.5		
Blade Raise		1.3±0.3		
Blade Lower		1.8±0.3		
Side Frame Extend		2.0±0.3		
Side Frame Retract		1.3±0.3		
DIG FUNCTION DRIFT CHECK	mm/5 min		ZX17U-5A: 0.93 m arm ZX19U-5A: 1.13 m arm 0.044 m^3 (PCSA heaped) bucket Bucket: loaded	T4-4-17
Boom Cylinder		10 or less		
Arm Cylinder		8 or less		
Bucket Cylinder		5 or less		
Bucket Bottom		150 or less		
Blade Cylinder		3 or less		
Blade Cylinder (With track off the ground)		10 or less		
Boom Swing Cylinder		5 or less		

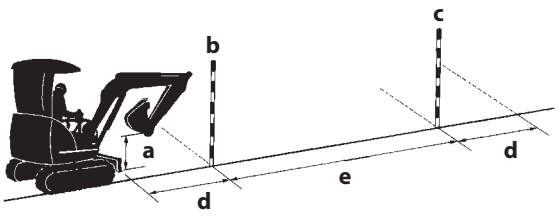
Travel Speed

Summary:

1. Measure the time required for the machine to travel a test track and check the performance of the travel device system (from main pump to travel motor).
2. Fully extend the side fame extend/retract cylinder for safety ensuring during operation.

Preparation:

1. Adjust the track sag of both tracks equally.
2. Provide a flat, solid test yard 20 m (65.6 ft) in length, with extra length of 3 to 5 m (10 to 16 ft) on both ends for machine acceleration and deceleration.
3. With the arm and the bucket cylinders fully extended, hold the bucket 0.3 to 0.5 m (12 to 20 in) above the ground.
4. Maintain the hydraulic oil temperature at 50±5 °C (122±9 °F).



TADB-04-04-001

a - Bucket Height: 0.3 to 0.5 m (12 to 20 in)
b - Start
c - End
d - Acceleration/Deceleration Zone: 3 to 5 m (10 to 16 ft)
e - 20 m (65.6 ft)

Measurement:

1. Measure in both fast and slow travel modes.
2. Select the following conditions.

Travel Mode Switch	Engine Speed
Slow Mode	Fast Idle
Fast Mode	Fast Idle

3. Start traveling the machine in the acceleration zone with the travel levers to full stroke.
4. Measure the time required to travel 20 m (65.6 ft).
5. After measuring the forward travel speed, turn the upperstructure 180° and measure the reverse travel speed in the same way.
6. Repeat the measurement three times and calculate the mean values.

Evaluation:

Refer to Operational Performance Standard.

Remedy:

Refer to Troubleshooting B.

Measurement:

1. Set the engine to the fast idle speed.
2. Operate the swing control lever to full stroke to swing the upperstructure to the uphill side.
3. If the machine can swing, measure the cab floor slant angle.
4. When the machine can swing, increase the slant angle. Check in both clockwise and counterclockwise directions.
5. Repeat the measurement three times.

Evaluation:

Refer to Operational Performance Standard.

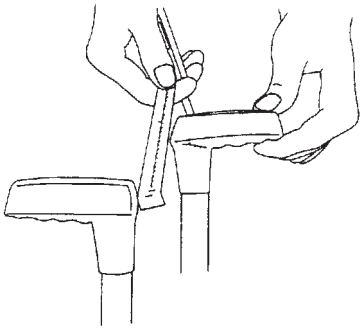
Remedy:

Refer to Troubleshooting B.

Control Lever Stroke

Summary:

1. Check a play and operating condition of each control lever and boom swing pedal, and measure their strokes.
2. Measure the lever stroke at the grip center of each control lever. As for the boom swing pedal, measure the stroke from the center position to the stopper.
3. In case lever stroke play is present in the neutral position, add half (1/2) the play present to both side lever strokes.



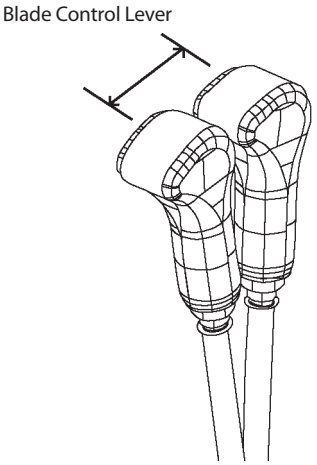
T107-06-03-005

Preparation:

1. Maintain the hydraulic oil temperature at 50±5 °C (122±9 °F).

Measurement:

1. Stop the engine.
2. Measure each lever stroke from neutral to the stroke end of each control lever of boom, arm, bucket, swing, travel, and blade.
3. As for the boom swing pedal, measure the straight distance between the center and fully depressed positions at tip of the pedal.
4. Measure the chord length from neutral to the stroke end.
5. Repeat the measurement three times and calculate the mean values.



TADB-04-04-017

Evaluation:

Refer to Operational Performance Standard.

Relief Pressure (when relieving swing)

Adjustment:

1. Loosen lock nut (3).

   : 10 mm

2. Turn adjusting screw (2) in order to adjust pressure.

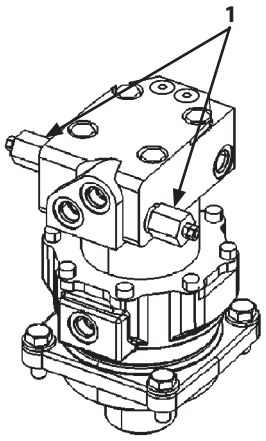
   : 3 mm

3. Tighten lock nut (3).

   : 10 mm

   : 4 N·m (0.4 kgf·m, 3 lbf·ft)

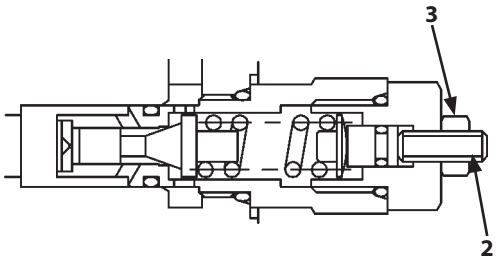
4. After adjustment, check the set pressures.



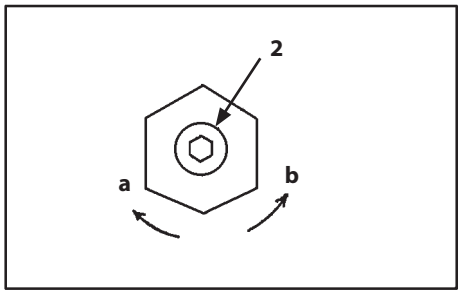
T1MS-01-02-008

NOTE: Standard Change in Pressure (Reference)

Adjusting Screw (2) Turns		1/4	1/2	3/4	1
Change in Pressure	MPa	2.45	4.9	7.4	9.8
	(kgf/cm^2)	(25)	(50)	(75)	(100)
	(psi)	(355)	(710)	(1070)	(1420)



T1MS-04-05-005



W107-02-05-129

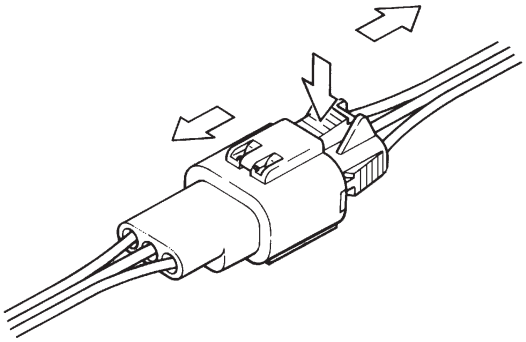
a - Pressure Increase
b - Pressure Decrease
1- Swing Relief Valve
2- Adjusting Screw
3- Lock Nut

MEMO

Instructions for Disconnecting Connectors

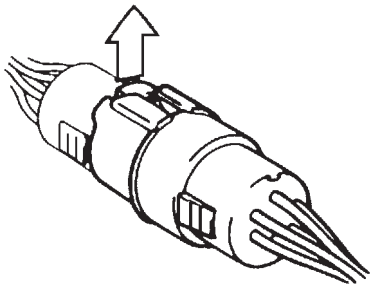
- Push, Unlock, and Separate Type

  - Connectors will not be easily separated even if the lock is pushed while being pulled.
  - The lock is located on female side connector (wire harness end side).



T107-04-05-002

- Raise Lock, Pull, and Separate Type



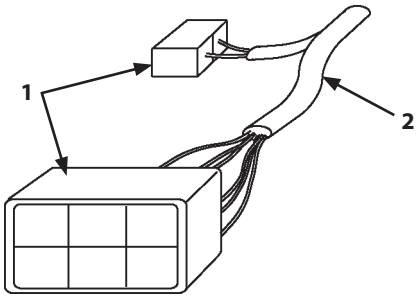
T107-04-05-003

Troubleshooting B (Machine Diagnosis by Using Troubleshooting Symptom) Procedure

Refer to troubleshooting B procedures for diagnosis by using trouble symptom.

- Diagnosis Procedure
  - The diagnosis procedures for the displayed fault codes are explained in this group.

NOTE: All connector images in this section are viewed from the open end side of wire harness end.



T6L4-05-03-001

1- Wire Harness End Connector 2- Wire Harness

A-4 Actuator does not stop even if control lever is set to neutral. (Other than side frame extend/ retract)

Boom, Arm, Bucket, Boom Swing

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Switch corresponding overload relief valve and make-up valve with normal ones.	-	Actuator stops.	Faulty overload relief valve or faulty make-up valve
2	-	-	Normal in above check	Faulty control valve (stuck spool) or faulty pilot valve (stuck spool)

Swing

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Measure relief pressure when relieving swing.	When relieving swing	The value is not within the normal values. (Normal value: 20.7±1.0 MPa (pump))	Faulty swing relief valve
2	-	-	Normal in above check	Faulty control valve (stuck spool) or faulty pilot valve (stuck spool)

Travel

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Disassemble and inspect counterbalance valve in travel device.	-	There is abnormality.	Faulty counterbalance valve
2	-	-	Normal in above check	Faulty control valve (stuck spool) or faulty pilot valve (stuck spool)

T-3 Slow travel is not selected. Travel mode does not change from fast mode to slow mode.

Preparation

- Check the wiring connections first.

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Disconnect connector of the travel mode control solenoid valve.	-	The symptom does not disappear.	Faulty travel mode control solenoid valve (stuck spool)
2	Disconnect connector of the travel mode switch.	Key Switch: ON	The symptom disappears.	Faulty travel mode switch
3	Disconnect travel mode selector relay.	Key Switch: ON	The symptom disappears.	Faulty travel mode selector relay
4	-	-	Normal in above check	Shorted circuit in wire harness between travel mode control solenoid valve and travel mode selector relay

Malfunction of Monitor Buzzer

- Check the wiring connections first.

NOTE: Operating Conditions of the Buzzer: The engine oil pressure indicator or overheat indicator lights.

The buzzer continues to sound even when the engine oil pressure indicator or overheat indicator goes OFF with the engine running.

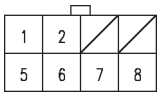
Procedure	Inspection Method	Condition	Evaluation	Cause
1	Disconnect monitor controller harness end terminal M1-6.	Key Switch: ON	The buzzer continues to sound.	Faulty buzzer
2	-	-	Normal in above check	Shorted circuit in wire harness between buzzer and monitor controller or faulty monitor controller

The buzzer does not sound even when the engine oil pressure indicator or overheat indicator lights with the engine running.

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Check continuity in wire harness between buzzer #1 and #2.	-	∞ Ω	Faulty buzzer
2	Measure voltage between buzzer harness end #1 and the body.	Key Switch: ON	0 V	Open circuit in wire harness between fuse box and buzzer
3	Measure voltage at monitor controller harness end terminal M1-6.	Key Switch: ON	0 V	Open circuit in wire harness between buzzer and monitor controller
4	-	-	Normal in above check	Faulty monitor controller

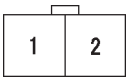
Connector (Wire harness end)

- Monitor Controller M1



TABA50-05-03-002

- Buzzer



T2BC-05-04-031