PART NO. TOKFB91-EN-00

HITACHI

Reliable solutions

Technical Manual
Operational Principle

EX3600-7B
Hydraulic Excavator

Tier 4 Final Cummins engine

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TOKFB91-EN
Technical Manual (Troubleshooting)	: Vol. No.TTKFB91-EN
Workshop Manual	: Vol. No.WKFB91-EN

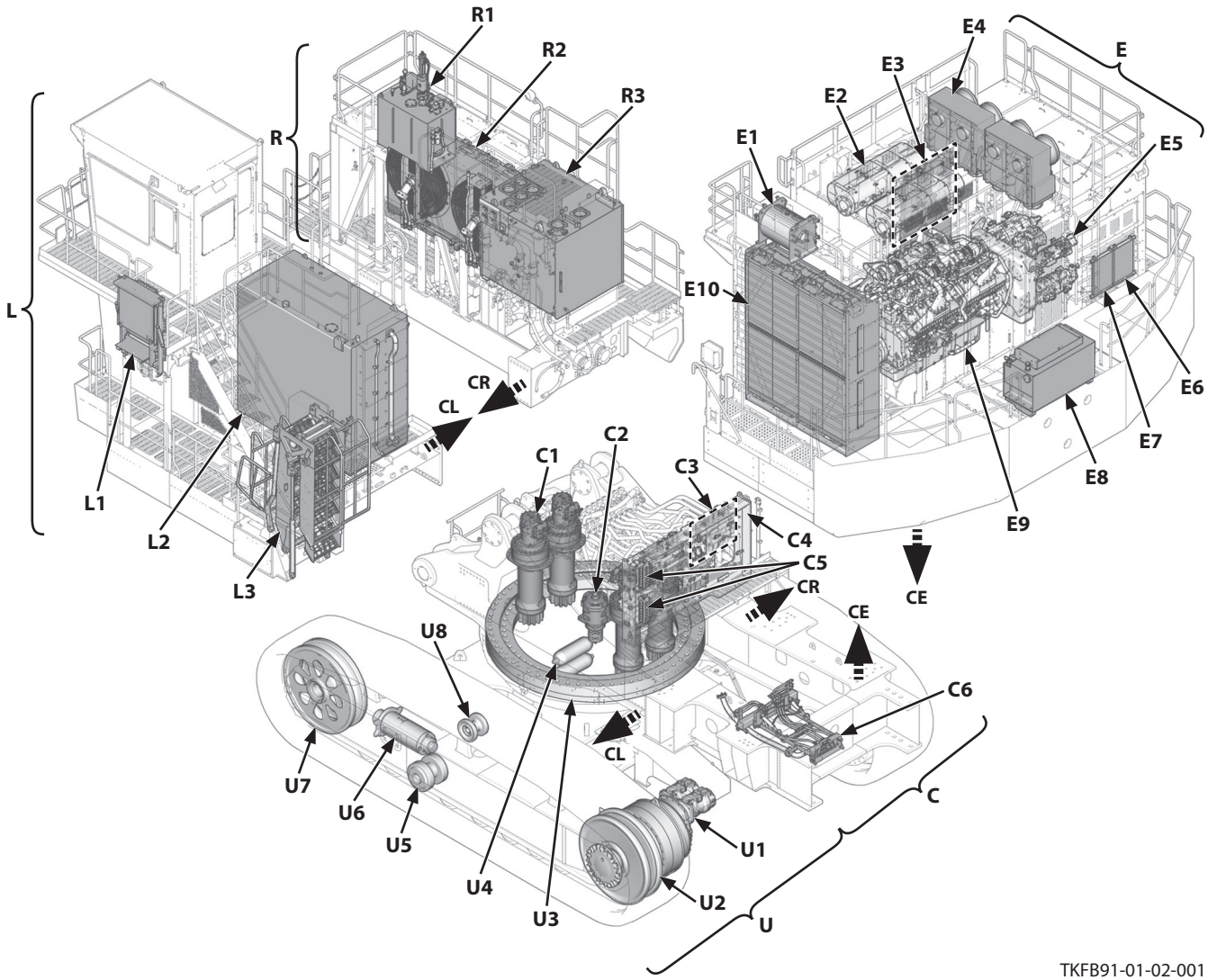
EX3600-7B HYDRAULIC EXCAVATOR TECHNICAL MANUAL OPERATIONAL PRINCIPLE

TOKFB91-EN-00

Hitachi Construction Machinery Co., Ltd.

PRINTED IN JAPAN (K) 2018, 02

Main Component (Overview)



TKFB91-01-02-001

L- Left Frame
R- Right Frame

L1- Escape Device
L2- Fuel Tank (Refer to T1-2-26.)
L3- Folding Stairway (Refer to T1-2-27.)

R1- Auto-Lubrication Device (Refer to T1-2-31.)
R2- Around Oil Cooler (Refer to T1-2-30.)
R3- Hydraulic Oil Tank (Refer to T1-2-32.)

E- Engine Frame

E1- Water Tank (Refer to T1-2-19.)
E2- Urea SCR Muffler Unit (Refer to T1-2-25.)
E3- Air Fan (Refer to T1-2-23.)
E4- Air Cleaner (Refer to T1-2-17.)
E5- Around Pump (Refer to T1-2-20.)
E6- Pump Transmission Oil Cooler (Refer to T1-2-22.)
E7- Fuel Cooler (Refer to T1-2-22.)
E8- DEF Tank (Refer to T1-2-24.)
E9- Engine (Refer to T1-2-16.)

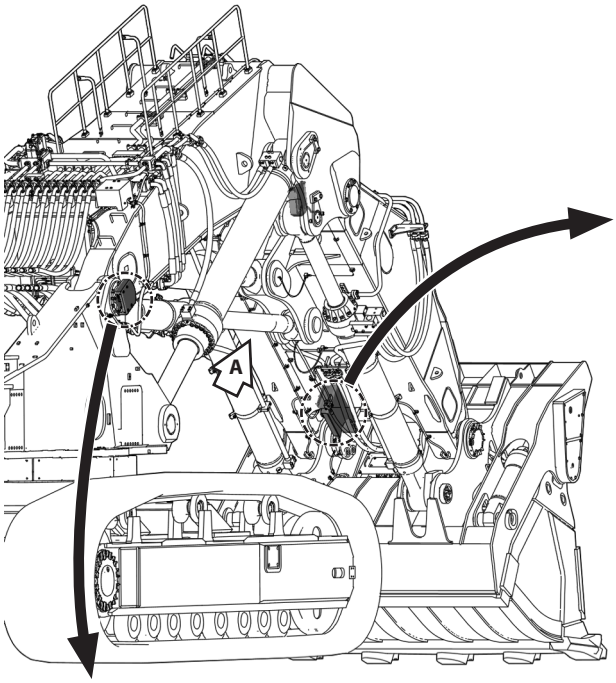
C- Center Frame

E10- Around Radiator (Refer to T1-2-18.)
C1- Swing Device (Refer to T1-2-41.)
C2- Center Joint (Refer to T1-2-42.)
C3- Control Valve (Refer to T1-2-33.)
C4- Pilot Panel (Refer to T1-2-37.)
C5- EDQR Valve (Refer to T1-2-38.)
C6- Fast-Filling System (Refer to T1-2-39.)

U- Undercarriage

U1- Travel Device (Refer to T1-2-44.)
U2- Drive Tumbler (2 Used)
U3- Swing Bearing
U4- Accumulator (Refer to T1-2-43.)
U5- Lower Roller (16 Used)
U6- Adjuster Cylinder (Refer to T1-2-43.)
U7- Front Idler (2 Used)
U8- Upper Roller (6 Used)

Electrical System (Angle Sensor)



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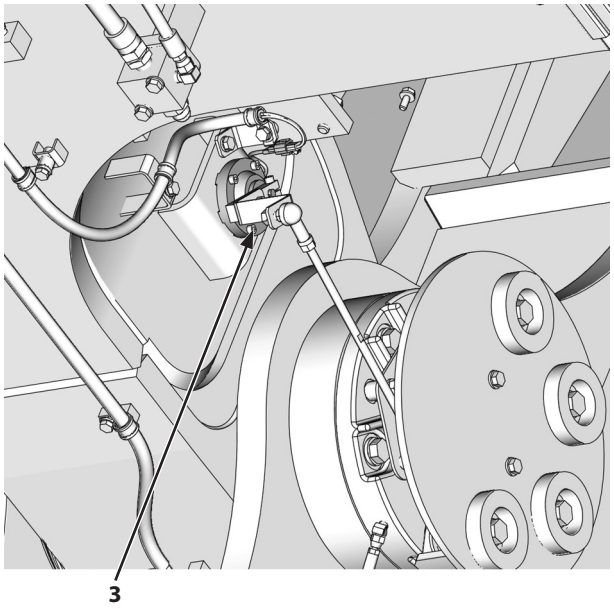

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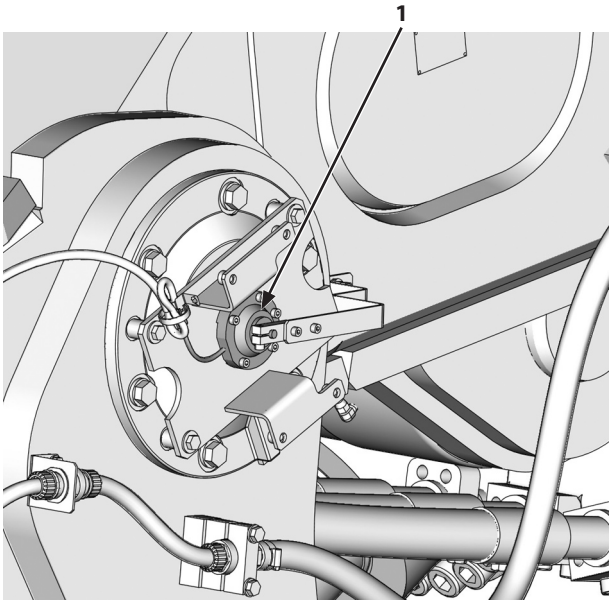

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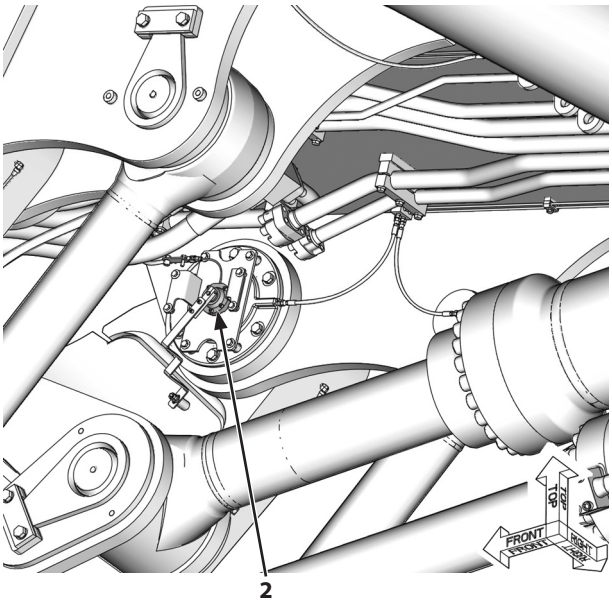
View A



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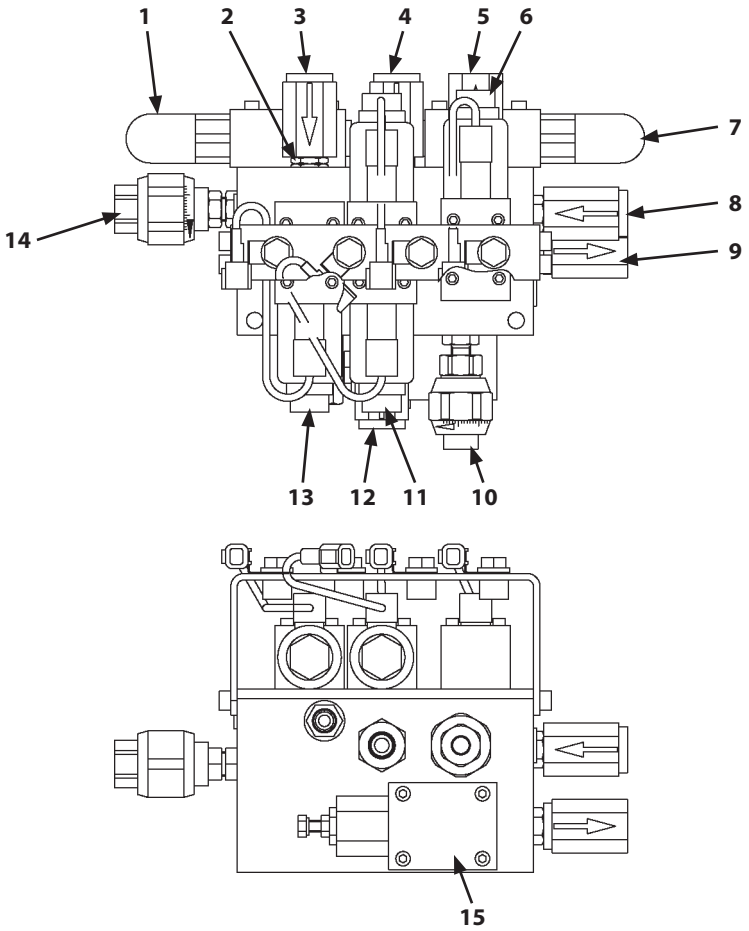
1- Boom Angle Sensor
2- Arm Angle Sensor
3- Bucket Angle Sensor

Valve Unit



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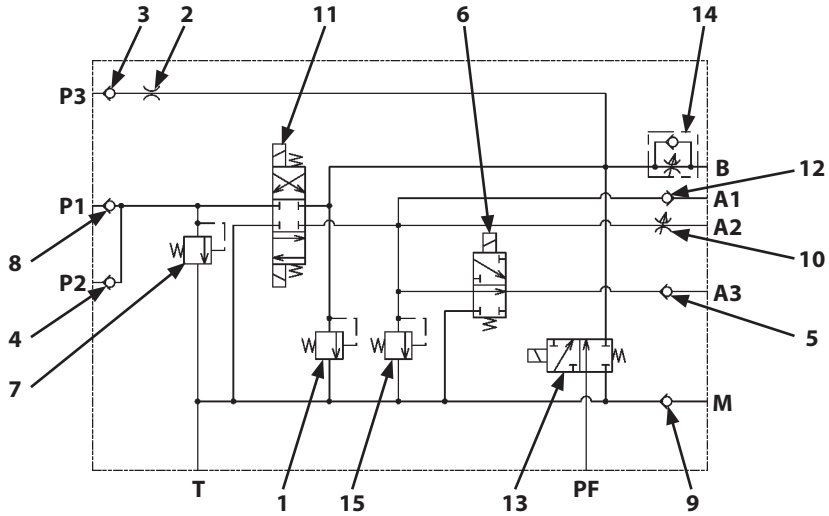
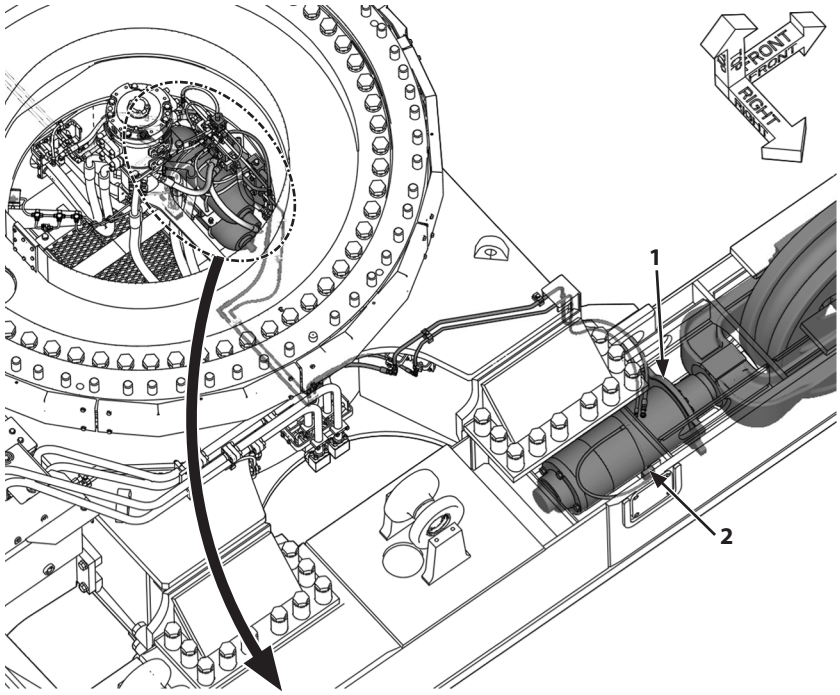


T18L-01-02-035

1- Overload Relief Valve (Folding Stairway Cylinder Bottom Side)
2- Orifice
3- Check Valve
4- Check Valve
5- Check Valve
6- Folding Stairway Solenoid Valve 3
7- Main Relief Valve
8- Check Valve
9- Check Valve
10- Throttle Valve
11- Folding Stairway Solenoid Valve 1
12- Check Valve
13- Folding Stairway Solenoid Valve 2
14- Slow Return Valve
15- Overload Relief Valve (Folding Stairway Cylinder Rod Side)

Undercarriage



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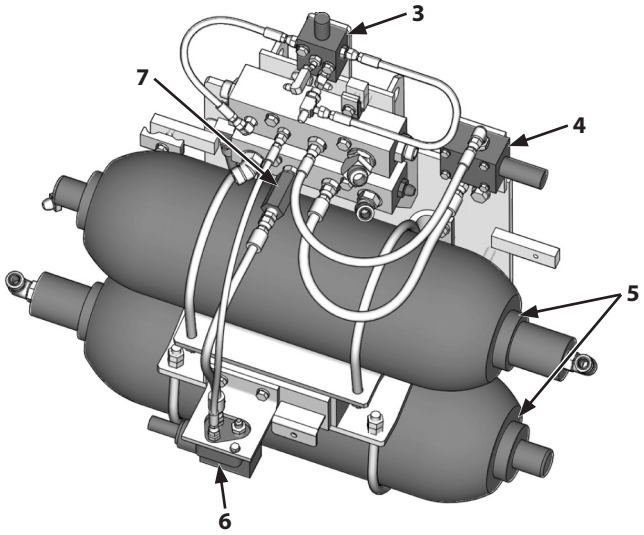
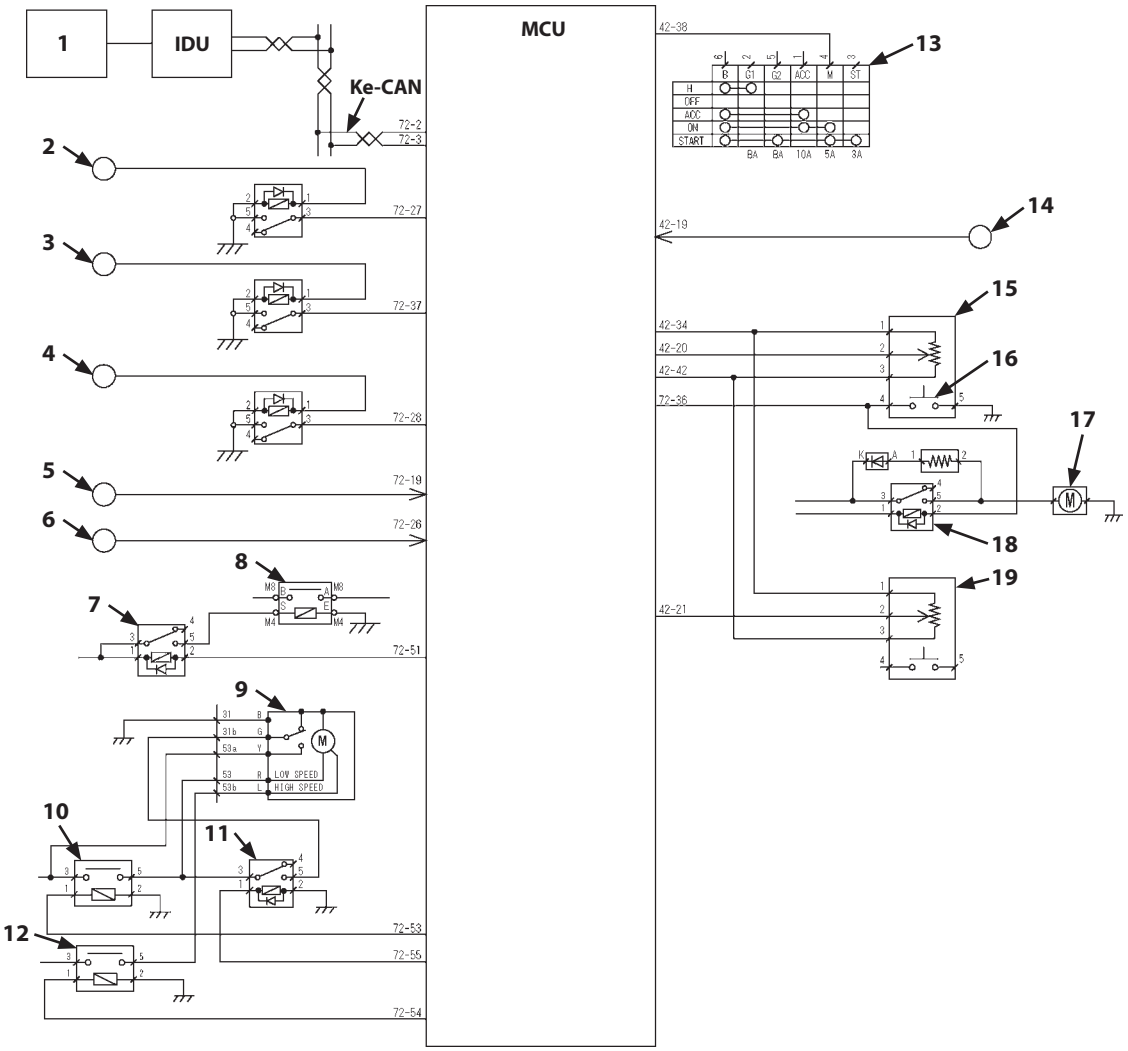


TKFB91-01-02-080

1- Adjuster Cylinder
2- Grease Fitting
3- Pilot Pressure Control Valve (For Travel Stop)
4- Relief Valve
5- Accumulator (For Adjuster Cylinder)
6- Reducing Valve
7- Check Valve

PRESSURE SWITCH	Auto-Lubrication Device	23.5 Mpa (3410 psi)		
GREASE PUMP	Grease Maximum Delivery Pressure	24.5±0.5 Mpa (3550 ± 73 psi)		
	Grease Delivery Amount	9.6 L/min (2.5 US gpm)		
GREASE TANK LEVEL SWITCH	Application	For Grease Level Indicator		
	Type	Electrostatic Capacity Type	Grease Capacity	526 L (139 US gal) (Grease Tank)

AIR CONDITIONER	Refrigerant	134 a
	Cooling Ability	over 4.5 kW (6.1 PS)
	Cool Air Volume	over 550 m^3 (720 yd^3)
	Heating Ability	over 5.8 kW (7.9 PS)
	Warm Air Volume	over 390 m^3 (510 yd^3)
	Temperature Adjusting System	Electronic Type
	Refrigerant Quantity	Refrigeration Cycle 1 (Air Conditioner (Right)) = 1050±50 g (2.3±0.1 lb) Refrigeration Cycle 2 (Air Conditioner (Left)) = 900±50 g (2±0.1 lb) Refrigeration Cycle 3 (Air Conditioner (Rear)) = 900±50 g (2±0.1 lb)
	Compressor Oil Quantity	180 cm^3 (11 in^3)



TKFB91-02-01-004

1- Monitor Display
2- Grease Tank Level Switch (Middle)
3- Grease Tank Level Switch (High)
4- Grease Tank Level Switch (Low)
5- Fuel Level Switch (High)
6- Fuel Level Switch (Low)
7- Delayed Power OFF Relay
8- Battery Relay
9- Wiper Motor
10- Wiper Relay 1
11- Wiper Relay 2
12- Wiper Relay 3
13- Key Switch
14- Fuel Level Float Sensor
15- Wiper Switch
16- Washer Switch
17- Washer Motor
18- Washer Motor Relay
19- Wiper Interval Switch

IDU: Information Display Unit (Information Display Controller)

Outline

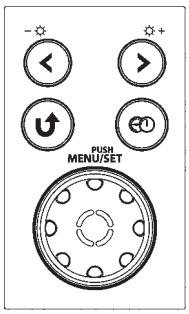
IDU receives the data by using the CAN communication and key pad. IDU displays the data on the monitor display.

- Meter Display
  The display data such as the meter data and machine model information is sent to IDU from other controllers (MCU, ECM, PFU, ELUF, DLU, HUM, and ODR). IDU displays these data on the monitor display.

Meter Display Item
1- Engine Coolant Temperature Gauge
2- Engine Oil Temperature Gauge
3- Engine Oil Pressure Gauge
4- Engine Speed Meter
5- DEF Gauge
6- Machine Inclination/Travel Indicator
7- Grease Gauge
8- Fuel Gauge
9- Hydraulic Oil Temperature Gauge

Other Display Item
10- Machine Model
11- Operating Pattern of Electric Control Levers
12- Ambient Air Temperature Gauge
13- Clock
14- Hour Meter
15- Status Indication (Refer to T2-1-26.)

Key Pad



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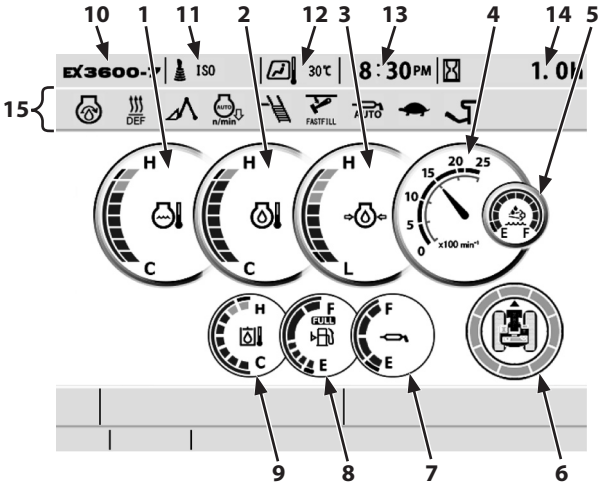
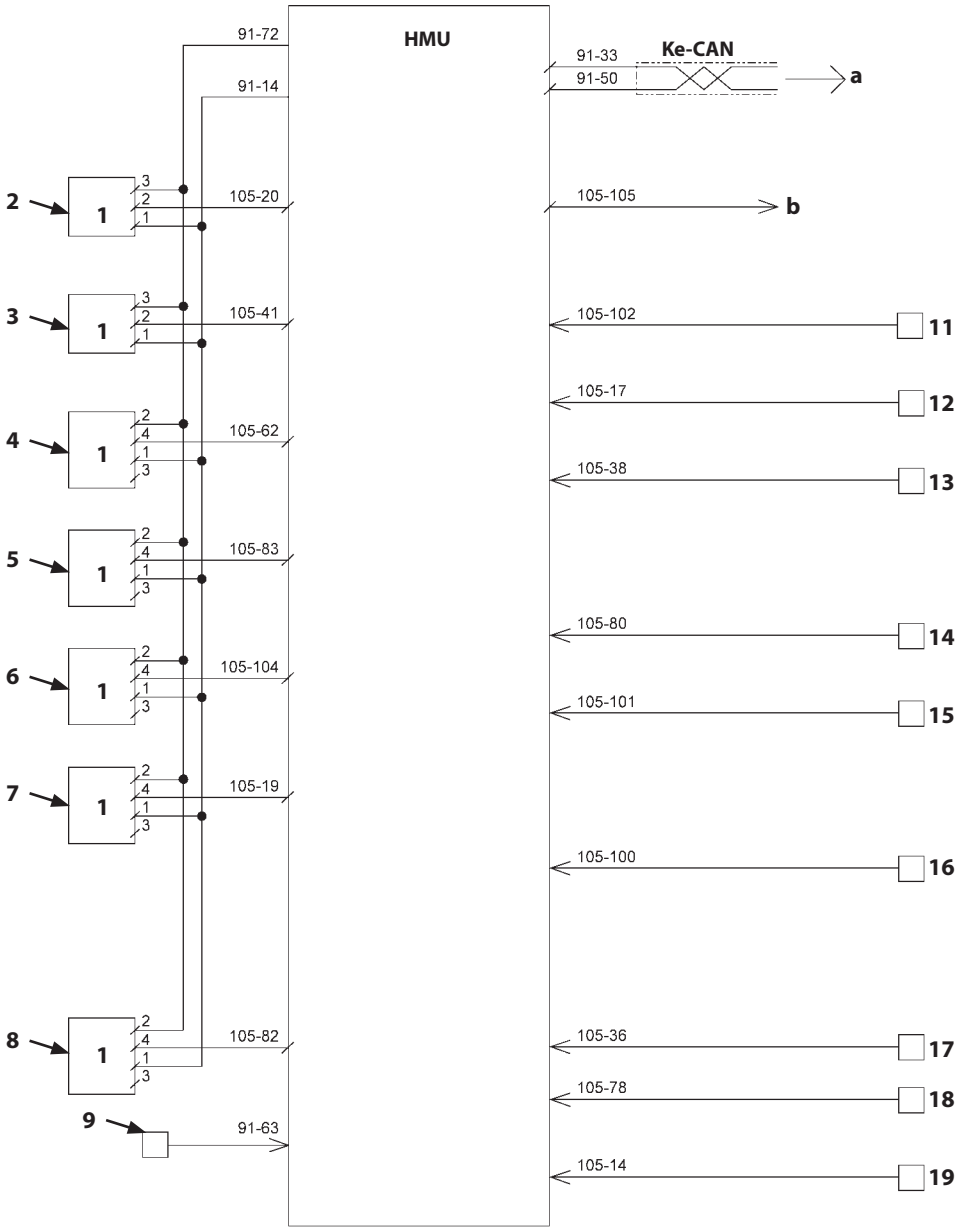
Monitor Display



TKFB91-02-01-011

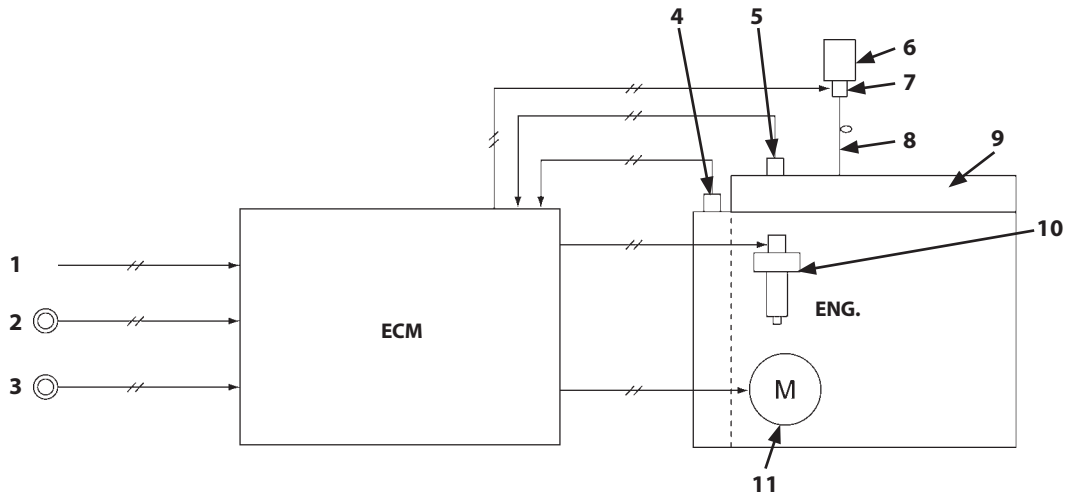


TKFB91-02-01-018

a- To IDU, DLU

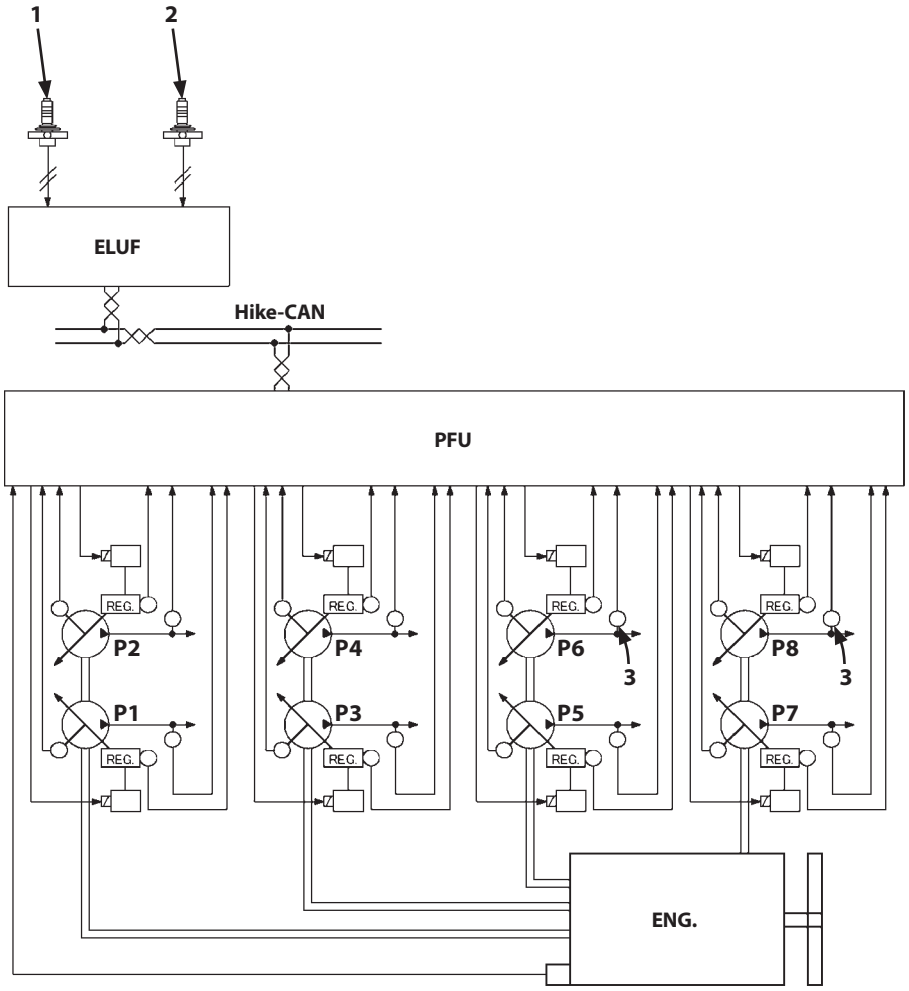
b- Warning Light LED (Yellow)

1- Pressure Sensor
2- Swing Motor Pressure (Swing Right)
3- Swing Motor Pressure (Swing Left)
4- Swing Motor Drain Pressure (Left Front)
5- Swing Motor Drain Pressure (Left Rear)
6- Swing Motor Drain Pressure (Right Front)
7- Swing Motor Drain Pressure (Right Rear)
8- Hydraulic Oil Tank Pressure
9- Limit Switch (Cab Bed Door)
11- Ambient Air Temperature Sensor
12- Oil Cooler Front Air Temperature Sensor 1
13- Oil Cooler Rear Air Temperature Sensor 1
14- Oil Cooler Front Air Temperature Sensor 2
15- Oil Cooler Rear Air Temperature Sensor 2
16- Oil Cooler Inlet Oil Temperature Sensor
17- Oil Cooler Outlet Hydraulic Oil Temperature Sensor 1
18- Oil Cooler Outlet Hydraulic Oil Temperature Sensor 2
19- Oil Cooler Outlet Hydraulic Oil Temperature Sensor 3



TKFB91-02-02-002

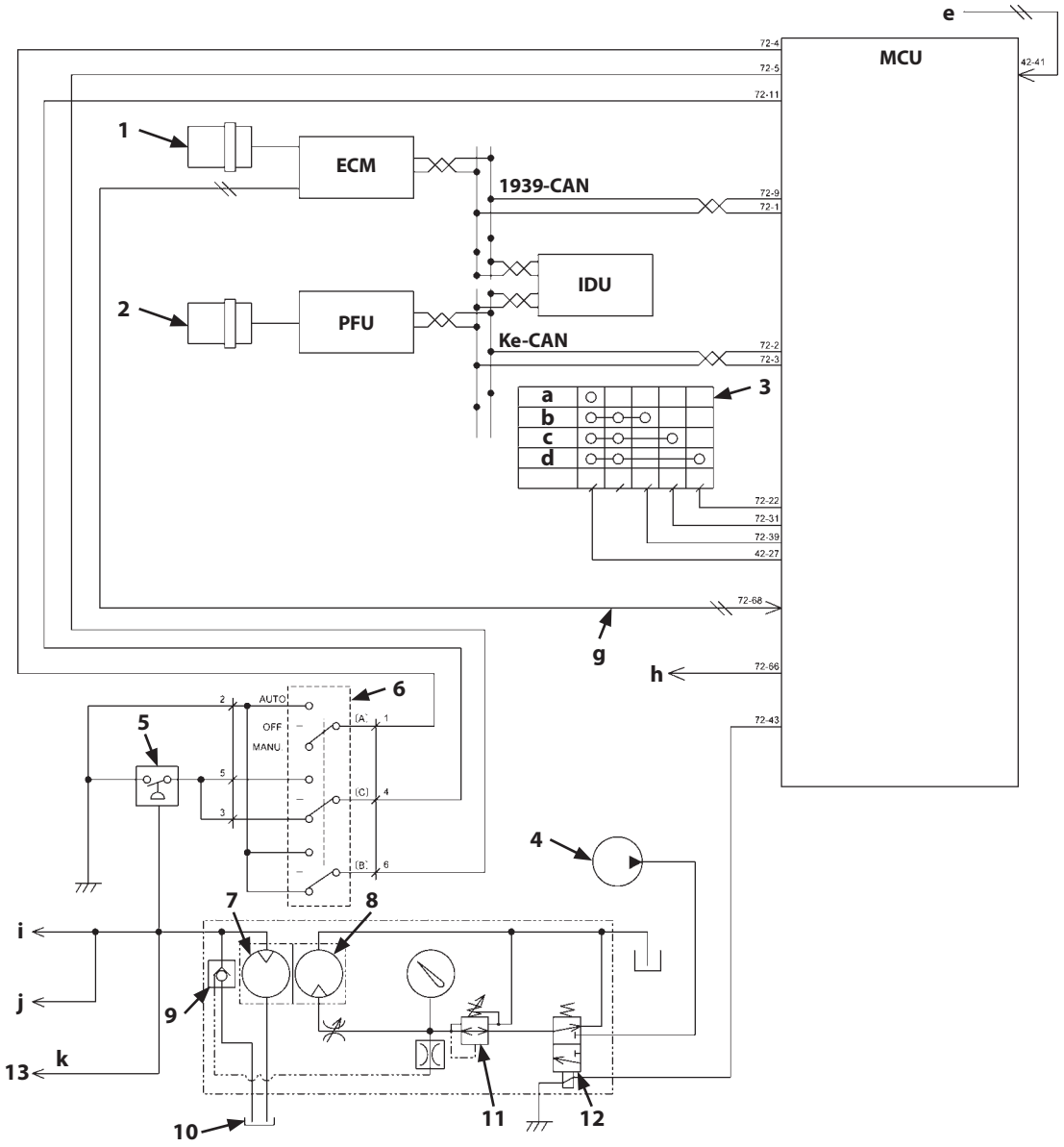
1- Key Switch ON Signal
2- Engine Start Switch
3- Engine Stop Switch
4- Crank Speed Sensor
5- Intake Manifold Temperature Sensor
6- Ether Bottle
7- Ether Solenoid Valve
8- Ether Line
9- Intake Manifold
10- Injector
11- Starter



TKFB91-02-02-009

P1- Main Pump 1
P2- Main Pump 2
P3- Main Pump 3
P4- Main Pump 4
P5- Main Pump 5
P6- Main Pump 6
P7- Main Pump 7
P8- Main Pump 8

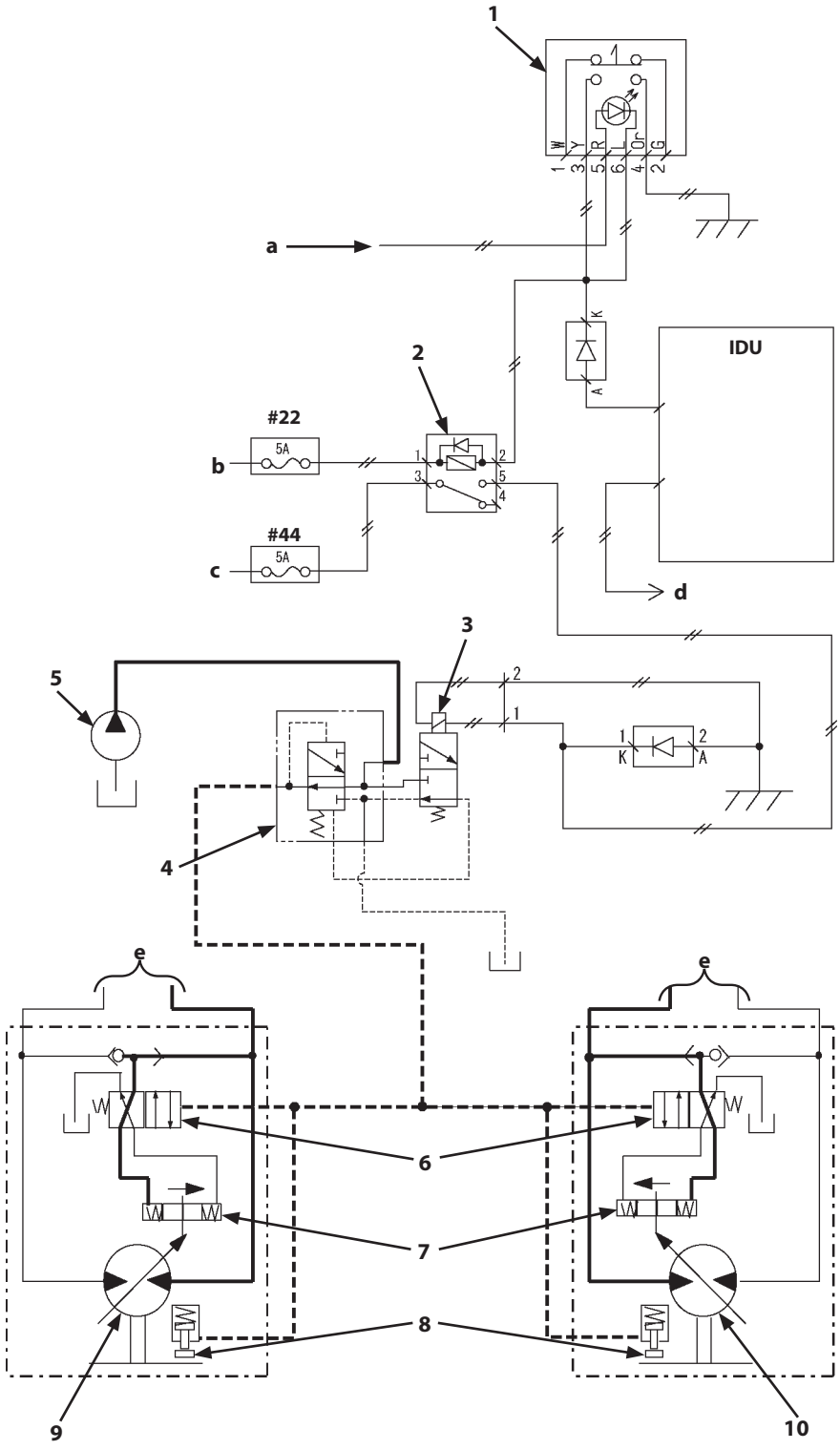
1- Electric Control Lever (Arm/ Swing)
2- Electric Control Lever (Boom/ Bucket)
3- Delivery Pressure Sensor



TKFB91-02-02-015

a- 3 minutes
b- 5 minutes
c- 10 minutes
d- 15 minutes
e- Key Switch ON Signal
g- Engine ON Signal
h- Warning Light LED (Red)
i- Front Attachment Lubrication Circuit
j- Swing Bearing Lubrication Circuit
k- Hose Reel Circuit

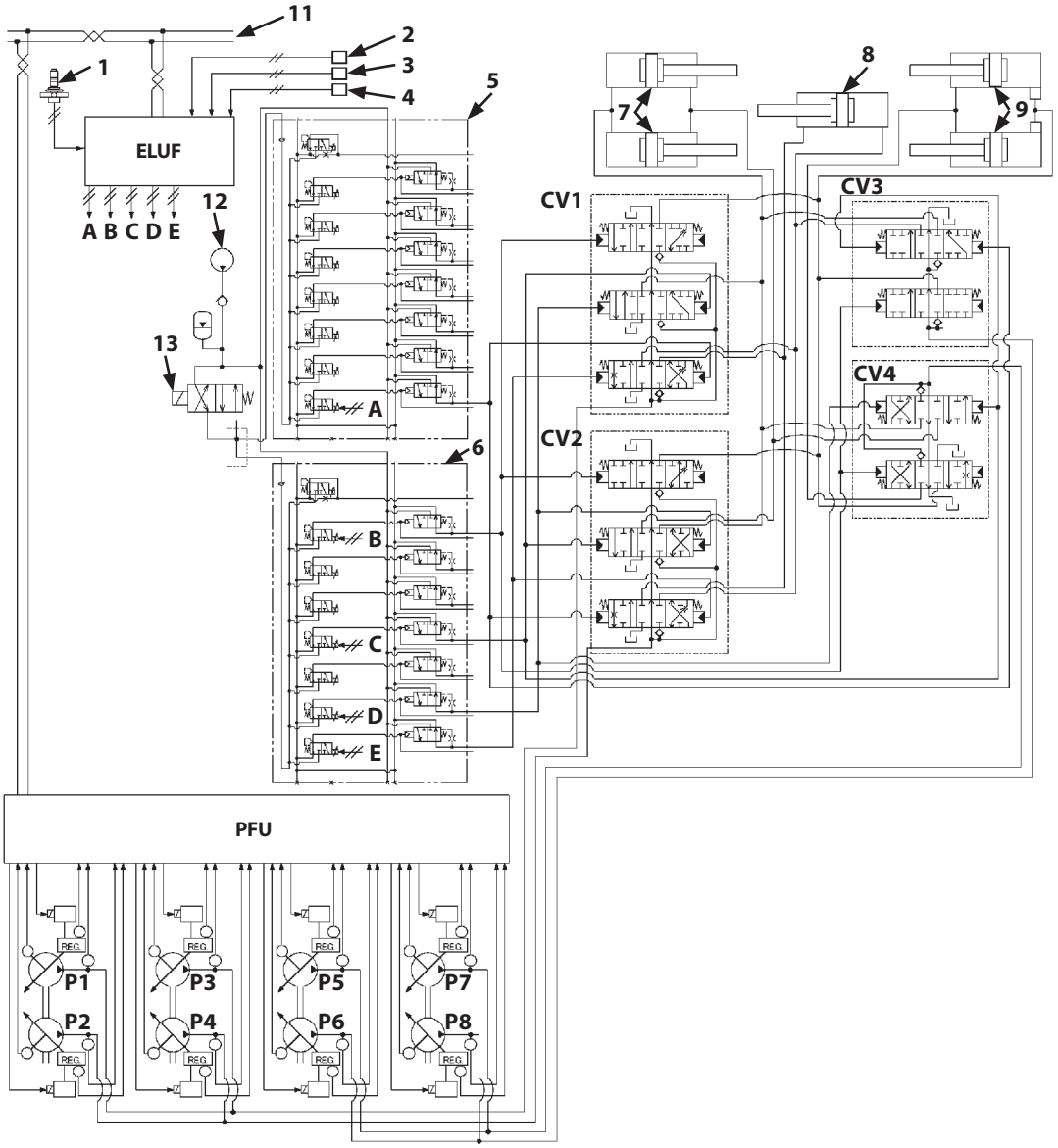
1- Crank Speed Sensor
2- Engine Speed Sensor
3- Auto-Lubrication Interval Switch
4- Pilot Pump
5- Pressure Switch (For Lubrication)
6- Auto-Lubrication Mode Switch
7- Grease Pump
8- Grease Pump Motor
9- Vent Valve
10- Grease Tank
11- Reducing Valve
12- Auto-Lubrication Solenoid Valve
13- Grease Gun



TKEB-02-02-012

a- From LED Power
b- Key Switch ON Signal
c- From Battery Line
d- Travel Mode Display
e- From Control Valve

1- Travel Mode Switch
2- Travel Mode Relay
3- Travel Mode Selector Solenoid Valve
4- Reducing Valve
5- Pilot Pump
6- Travel Mode Selector Valve
7- Tilt Piston
8- Parking Brake
9- Travel Motor (Left)
10- Travel Motor (Right)



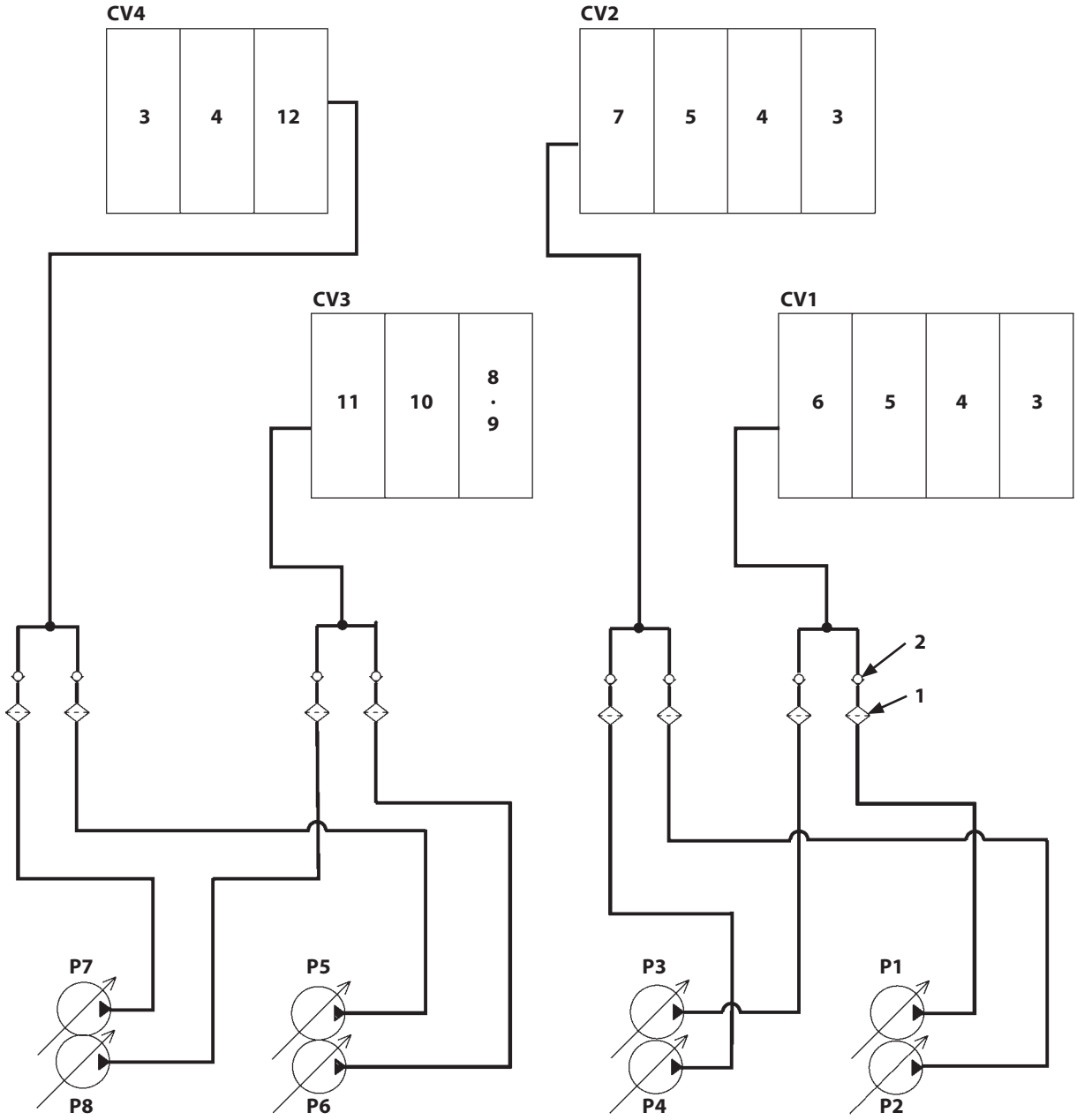
TKFB91-02-03-003

A- Arm Extend
B- Boom Raise
C- Bucket Tilt-In
D- Bucket Tilt-Out
E- Arm Retract

P1- Main Pump 1
P2- Main Pump 2
P3- Main Pump 3
P4- Main Pump 4
P5- Main Pump 5
P6- Main Pump 6
P7- Main Pump 7
P8- Main Pump 8

CV1- Control Valve 1 (Lower Left)
CV2- Control Valve 2 (Upper Left)
CV3- Control Valve 3 (Lower Right)
CV4- Control Valve 4 (Upper Right)

1- Electric Control Lever
2- Bucket Angle Sensor
3- Arm Angle Sensor
4- Boom Angle Sensor
5- EDQR Valve (Upper)
6- EDQR Valve (Lower)
7- Bucket Cylinder
8- Arm Cylinder
9- Boom Cylinder
11- HiKe-CAN
12- Pilot Pump
13- Pilot Shut-Off Solenoid Valve



TKFB91-02-04-004

P1- Main Pump 1
P2- Main Pump 2
P3- Main Pump 3
P4- Main Pump 4
P5- Main Pump 5
P6- Main Pump 6
P7- Main Pump 7
P8- Main Pump 8

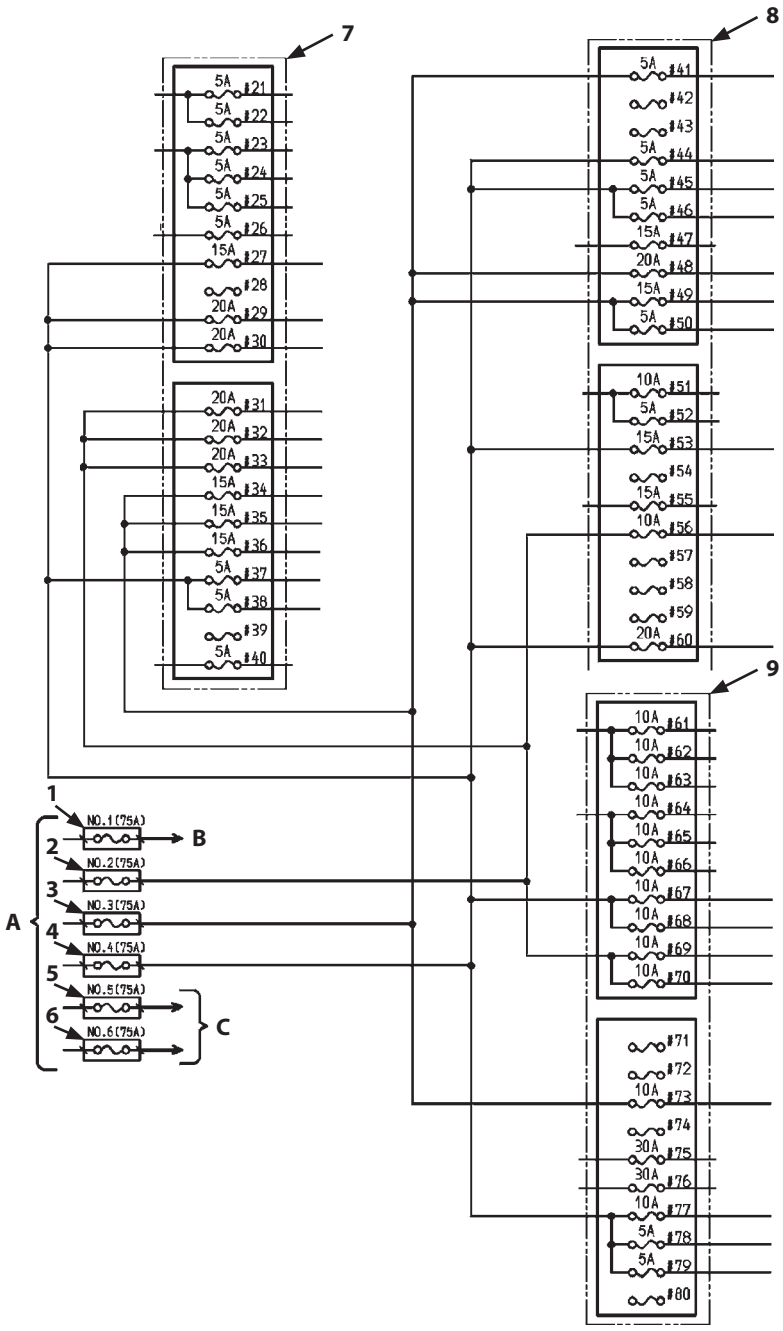
CV1- Control Valve 1 (Lower Left)
CV2- Control Valve 2 (Upper Left)
CV3- Control Valve 3 (Lower Right)
CV4- Control Valve 4 (Upper Right)

1- High-Pressure Strainer (8 Used)
2- Check Valve (8 Used)
3- Boom
4- Bucket
5- Arm
6- Left Travel
7- Bucket Open/Close
8- Bucket Tilt-In
9- Arm Extend
10- Swing
11- Boom Raise
12- Right Travel

Outline

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

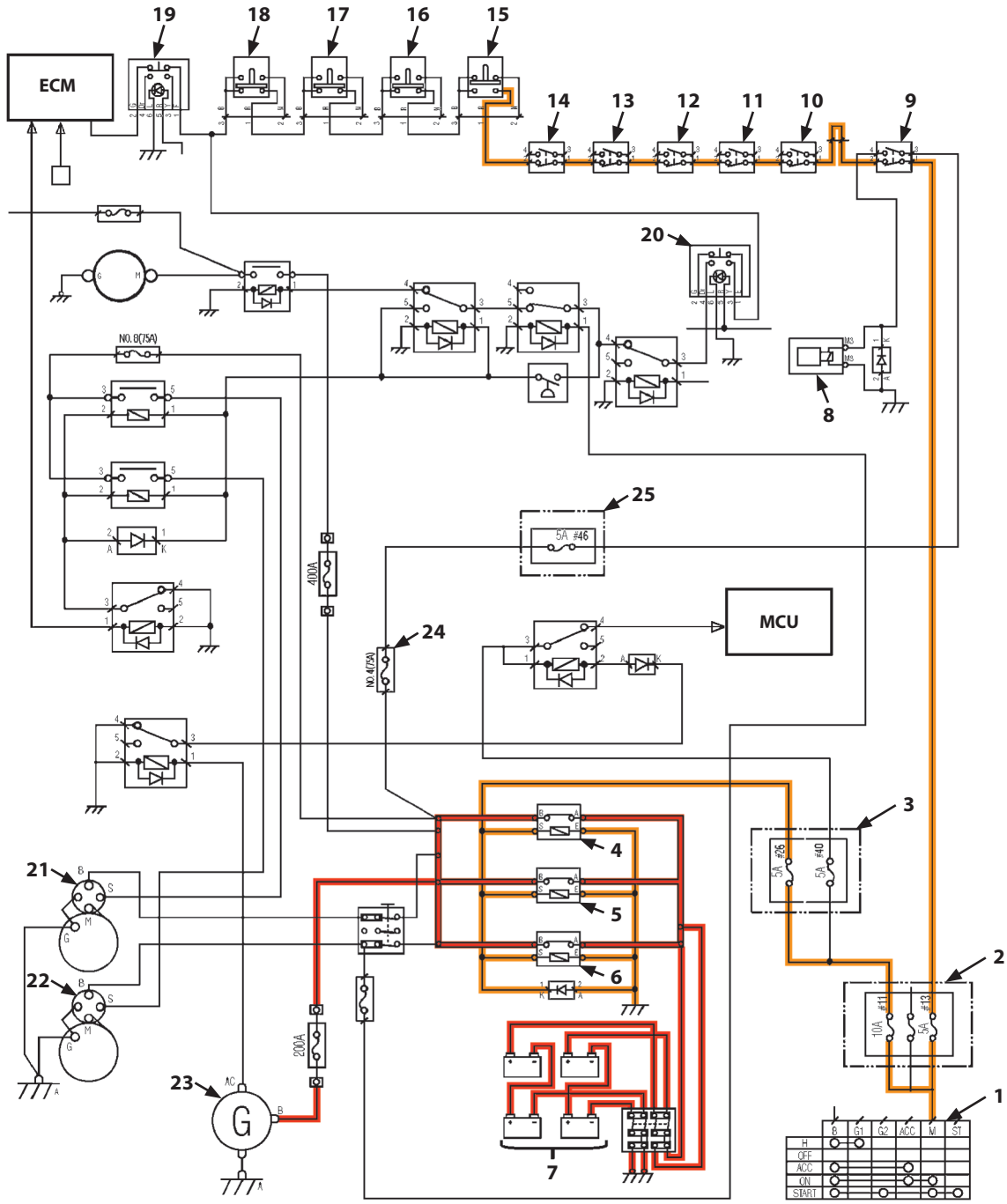
- The main circuit consists of the engine and the accessory related circuits.
- The control circuit consists of the machine operation control related circuits.
  (Refer to SYSTEM/ Control System.)
- The monitor circuit consists of the machine operation status indication circuits.
  (Refer to SYSTEM/ Controller.)



TKFB91-02-05-007

1- Slow Blow Fuse 1
2- Slow Blow Fuse 2
3- Slow Blow Fuse 3
4- Slow Blow Fuse 4
5- Slow Blow Fuse 5
6- Slow Blow Fuse 6
7- Fuse Box 2
8- Fuse Box 3
9- Fuse Box 4

A- Refer to T2-5-9.
B- Refer to T2-5-13.
C- Refer to T2-5-17.



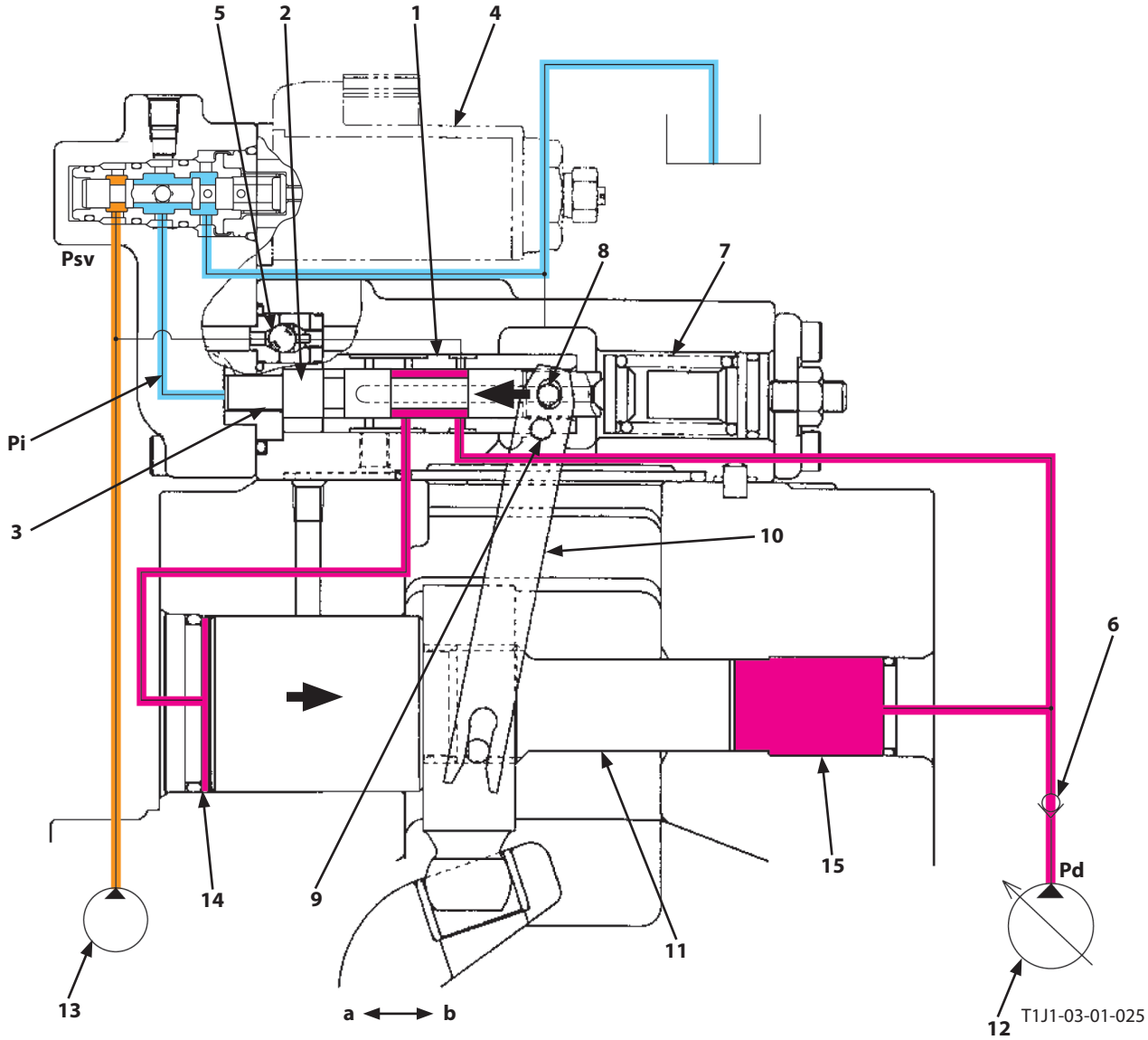
TKFB91-02-05-013

1- Key Switch
2- Fuse Box (Cab 2)
3- Fuse Box 2
4- Battery Relay 1
5- Battery Relay 2
6- Battery Relay 3
7- Battery
8- Air Bleeding Solenoid Valve
9- Emergency Engine Stop Switch 1
10- Emergency Engine Stop Switch 2
11- Emergency Engine Stop Switch 3
12- Emergency Engine Stop Switch 4
13- Emergency Engine Stop Switch 5
14- Emergency Engine Stop Switch 6
15- Valve Limit Switch (U-Return)
16- Valve Limit Switch (L-Return)
17- Valve Limit Switch (L-Suction)
18- Valve Limit Switch (R-Suction)
19- Engine Stop Switch
20- Engine Start Switch
21- Starter (Upper)
22- Starter (Lower)
23- Alternator
24- Slow Blow Fuse 4
25- Fuse Box 3

SECTION 3

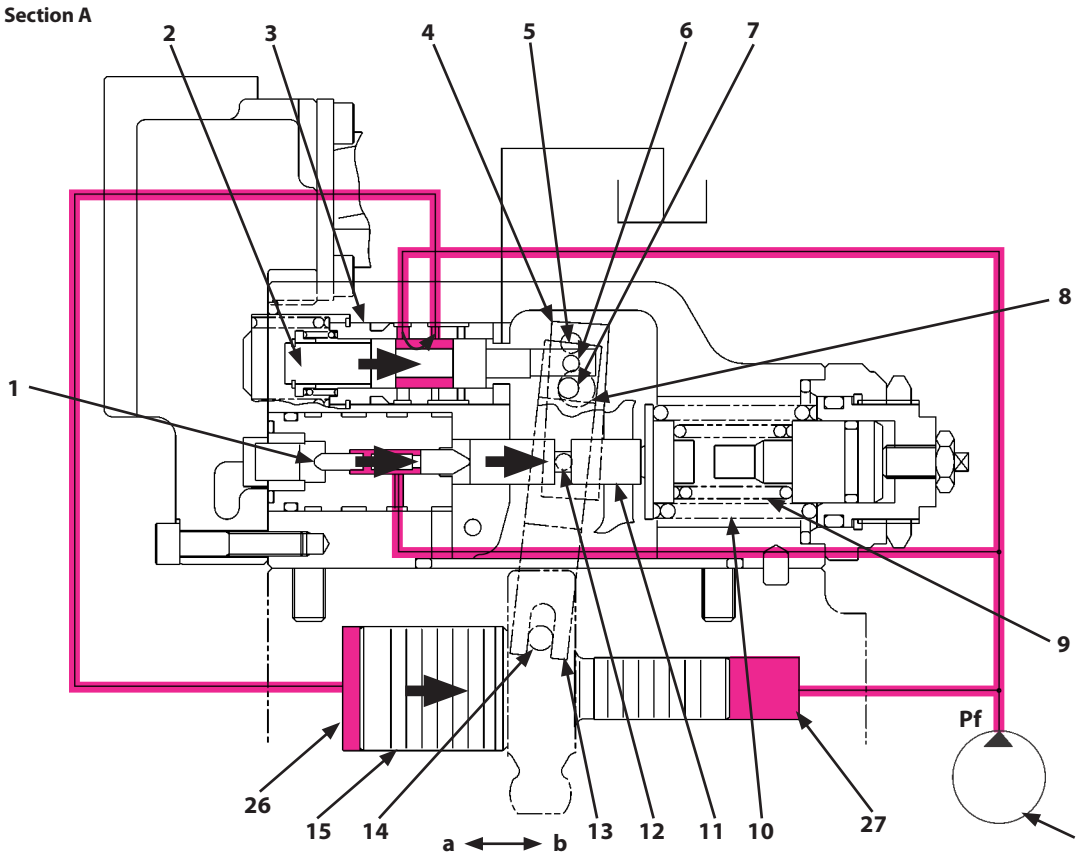
COMPONENT OPERATION

CONTENTS



Pd- Own Pump Delivery Pressure
Pi- Flow Rate Control Pressure
Psv- Primary Pilot Pressure
a- Displacement Angle Increase
b- Displacement Angle Decrease

1- Sleeve
2- Spool
3- Piston
4- Pump Control Solenoid Valve
5- Check Valve
6- Check Valve
7- Spring
8- Pin
9- Pin
10- Feedback Lever
11- Servo Piston
12- Main Pump
13- Pilot Pump
14- Large Chamber
15- Small Chamber



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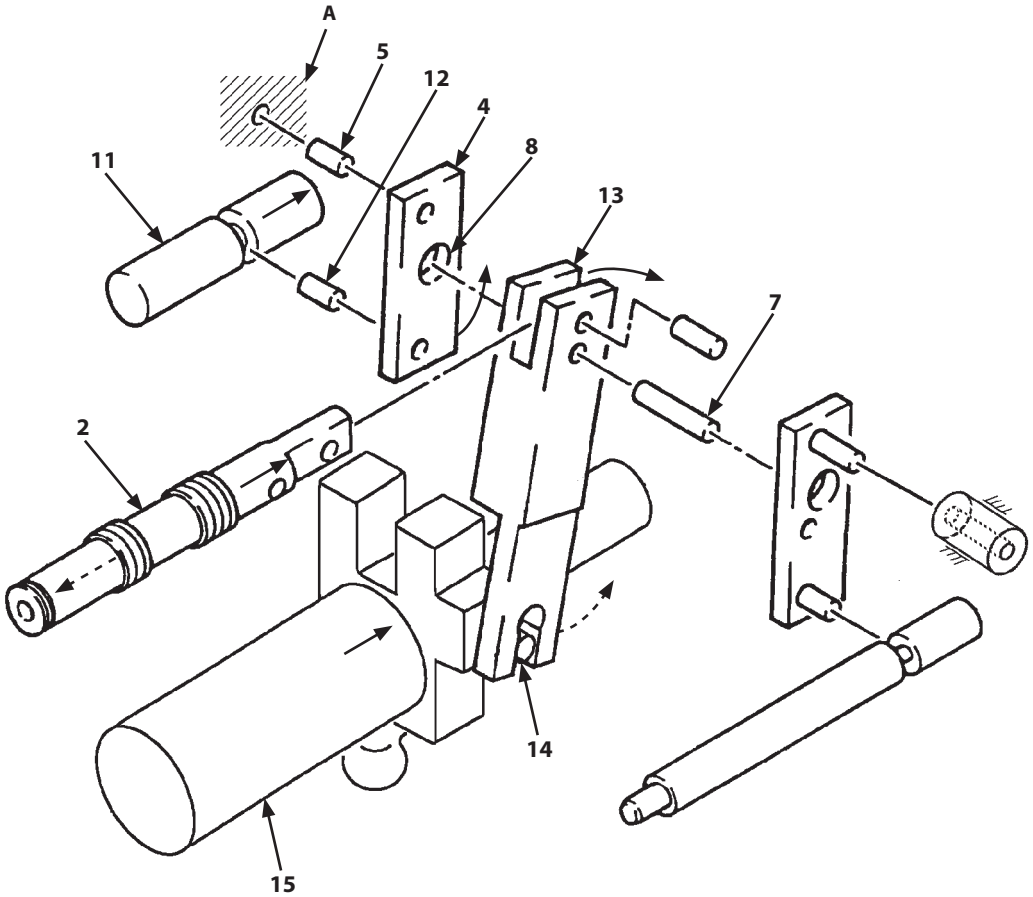
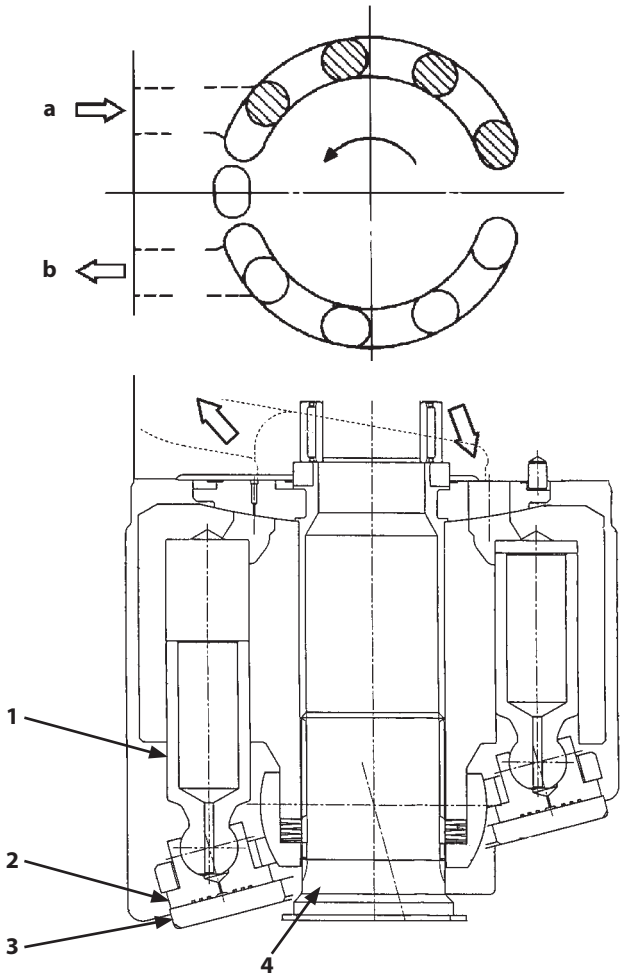


T1J1-03-01-007

Operational Principle

Swing speed varies depending on the amount of oil flow rate which is supplied to the swing motor.
When pressure oil is supplied to port A (a), plungers (1) are pushed and shoes (2) slide along swash plate (3). Then, the rotation power occurs. This rotation power is transmitted to the swing reduction gear via shaft (4). Pressure oil from port B (b) returns to the hydraulic oil tank.
The rotation direction depends on whether pressure oil is supplied to port A or port B.

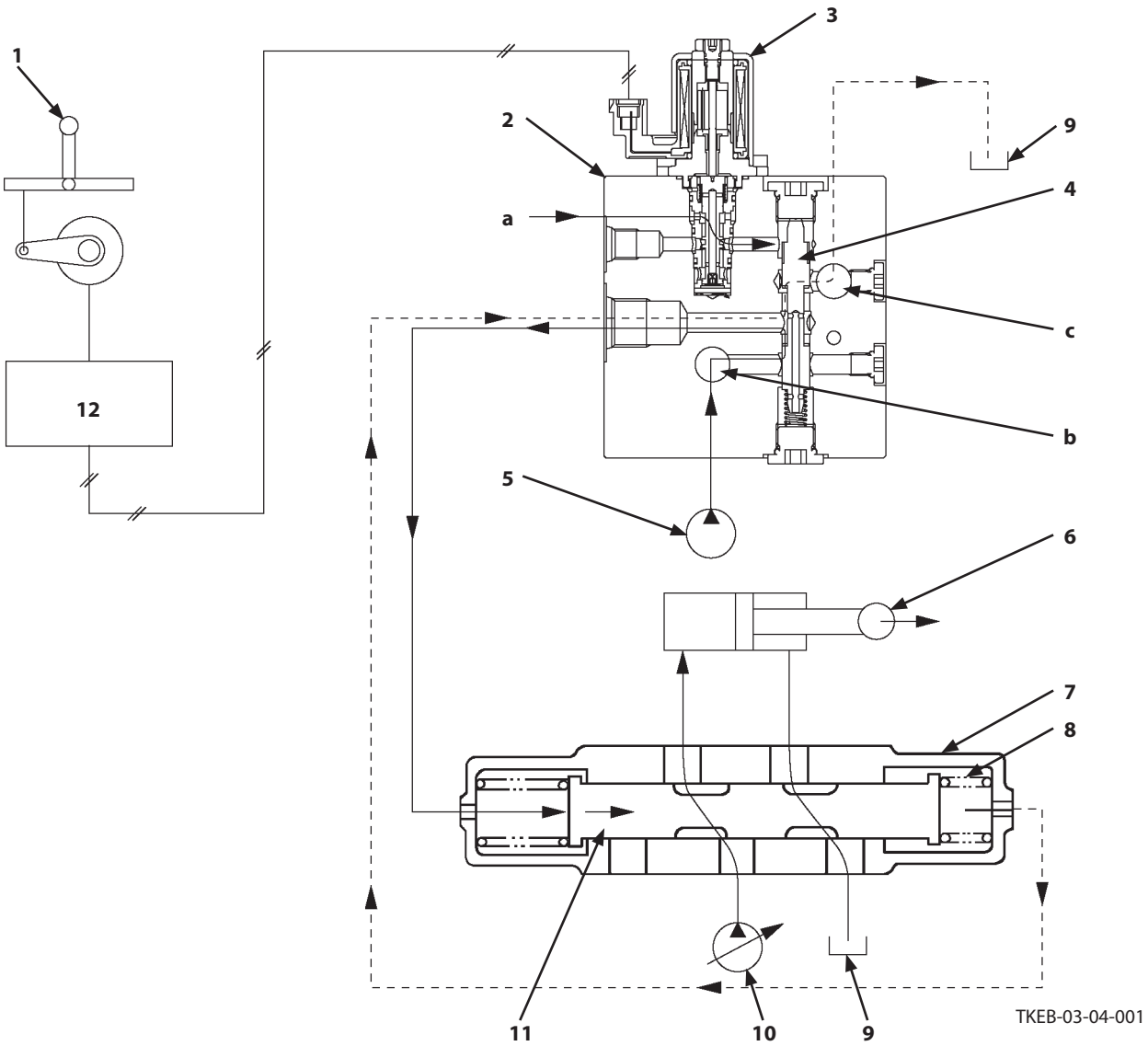


T115-02-03-003

a- Port A
b- Port B
1- Plunger
2- Shoe
3- Swash Plate
4- Shaft

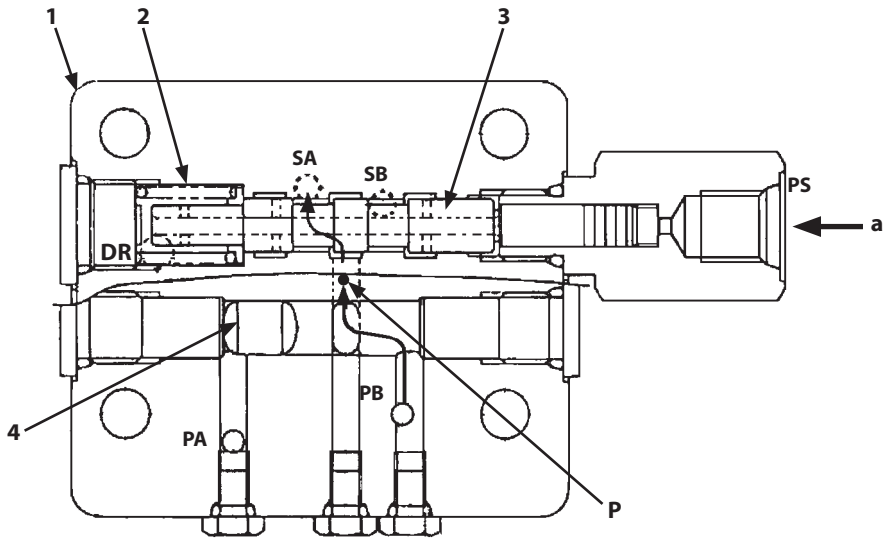
Outline

On this machine, spool (11) in control valve (7) is operated by electric control lever (1), ELU (12), and EDQR valve (2) for electric control lever.



a- From Pilot Shut-Off Solenoid Valve
b- Port P
c- Port T

1- Electric Control Lever
2- EDQR Valve for Electric Control Lever
3- Solenoid Valve
4- Spool
5- Pilot Pump
6- Actuator
7- Control Valve
8- Spring
9- Hydraulic Oil Tank
10- Main Pump
11- Spool
12- ELU



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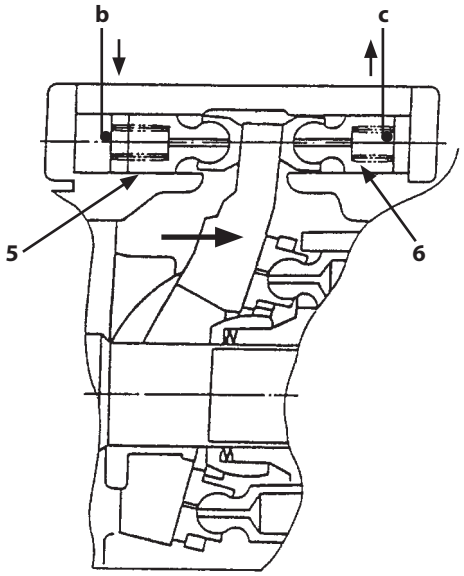

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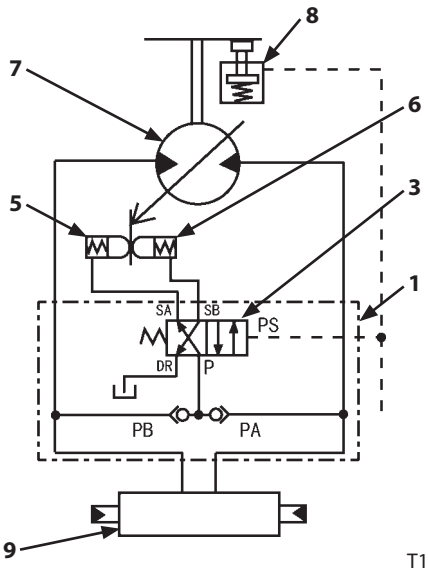


T141-03-05-003

a- Pilot Pressure from Reducing Valve (2.4 MPa)
b- From Port SA
c- To Port SB

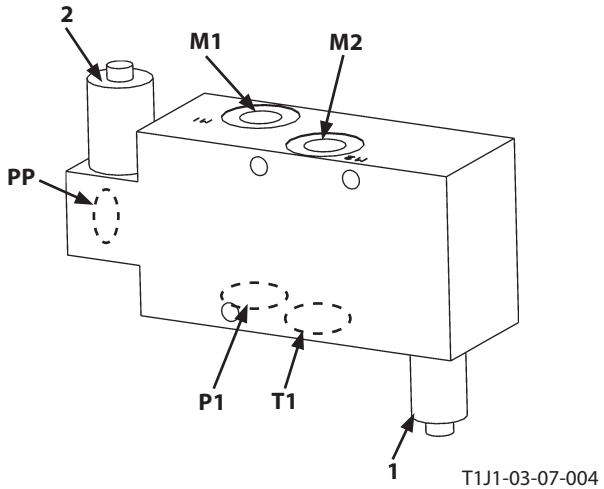
1- Travel Mode Selector Valve
2- Spring
3- Spool
4- Shuttle
5- Tilt Piston (Slow Speed Side)
6- Tilt Piston (Fast Speed Side)
7- Travel Motor
8- Parking Brake
9- Control Valve

Fan Valve

The fan valve is used for the following circuit

- Air fan motor circuit
- Fuel cooler/pump transmission oil cooler fan motor circuit

The fan valve consists of relief valve (1) and stop control solenoid valve (2).
Relief valve (1) relieves pressure oil from the air fan motor and the fuel cooler/pump transmission oil cooler fan pump to the hydraulic oil tank when pressure oil from the air fan motor and the fuel cooler/pump transmission oil cooler fan pump reaches the relief set pressure.
When the motor circuit pressure decreases, it supplies oil from the hydraulic oil tank and prevents the occurrence of cavitation (make-up function).
Stop control solenoid valve (2) shifts fan stop spool (3) according to the signal from MCU.
Fan stop spool (3) select the port of pressure oil to fan motor and rotates the fan motor in rotation or stop direction. (Refer to SYSTEM/Control System.)



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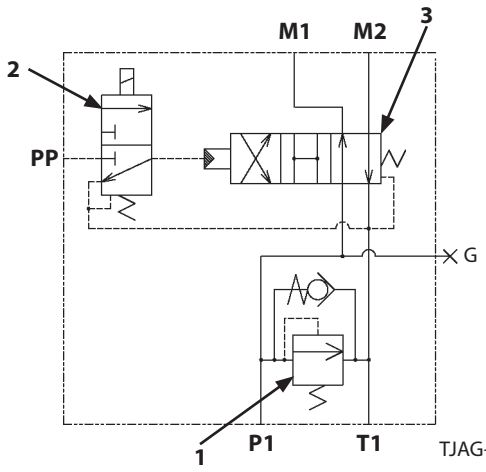


TJAG-03-07-001

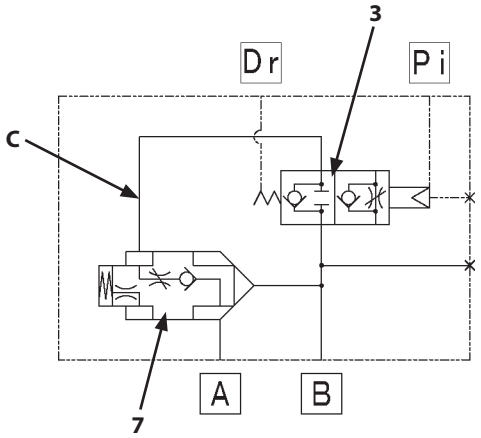
M1- Port M1 (To Fan Motor: Rotation, To Hydraulic Oil Tank: Stop)
M2- Port M2 (From Fan Motor: Rotation, To Hydraulic Oil Tank: Stop)
P1- Port P1 (From air fan motor and the fuel cooler/pump transmission oil cooler Fan Pump)
T1- Port T1 (To Hydraulic Oil Tank)
PP- Port PP (From Pilot Pump)

1- Relief Valve
2- Stop Control Solenoid Valve
3- Fan Stop Spool

Make-Up Valve

The make-up valve is located in the boom lower flow rate regenerative circuit between the boom cylinder bottom and rod sides. The make-up valve is activated when performing boom lower operation.
The make-up valve consists of housing (1), cover (2), spool (3), check valve (4), spring (5), sleeve (6), poppet (7), check valve (8), and spring (9).

Hydraulic Circuit Diagram



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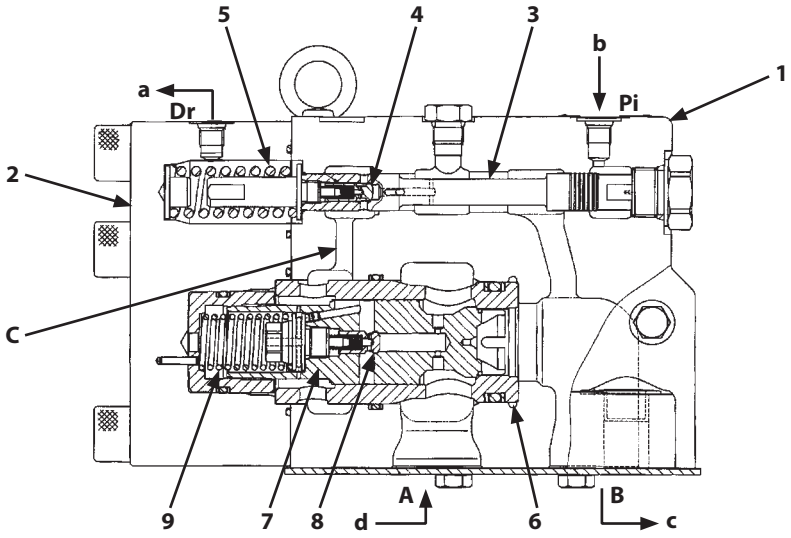


T18G-03-04-015

A- Port A
B- Port B
C- Passage

Pi- Port Pi
Dr- Port Dr
a- To Hydraulic Oil Tank

b- From Boom Lower Make-Up Solenoid Valve
c- To Cylinder Rod Side

d- From Cylinder Bottom Side

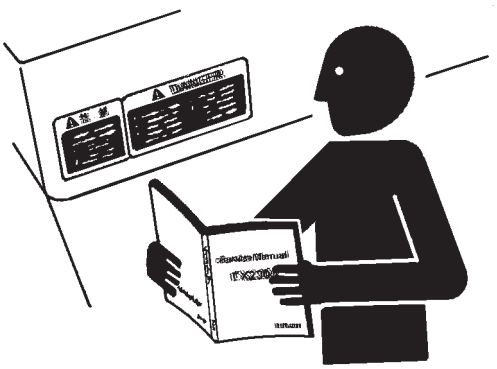
1- Housing
2- Cover
3- Spool

4- Check Valve
5- Spring
6- Sleeve

7- Poppet
8- Check Valve
9- Spring

Follow Safety Instructions

- Carefully read and follow all safety signs on the machine and all safety messages in this manual.
- Safety signs should be installed, maintained and replaced when necessary.
  - If a safety sign or this manual is damaged or missing, order a replacement from your authorized dealer in the same way you order other replacement parts (be sure to state machine model and serial number when ordering).
- Learn how to operate the machine and its controls correctly and safely.
- Allow only trained, qualified, authorized personnel to operate the machine.
- Keep your machine in proper working condition.
  - Unauthorized modifications of the machine may impair its function and/or safety and affect machine life.
  - Do not modify any machine parts without authorization. Failure to do so may deteriorate the safety, function, and/or service life of the part. In addition, personal accident, machine trouble, and/or damage to material caused by unauthorized modifications will void Hitachi Warranty Policy.
  - Never attempt to modify or disassemble the inlet/exhaust parts and the aftertreatment device. Avoid shocks to the element of the aftertreatment device, such as striking or dropping objects onto the element. Failure to do so may affect the exhaust gas purifying device, possibly damaging it or lowering its performance.
  - Do not use attachments and/or optional parts or equipment not authorized by Hitachi. Failure to do so may deteriorate the safety, function, and/or service life of the machine. In addition, personal accident, machine trouble, and/or damage to material caused by using unauthorized attachments and/or optional parts or equipment will void Hitachi Warranty Policy.
- The safety messages in this SAFETY chapter are intended to illustrate basic safety procedures of machines. However it is impossible for these safety messages to cover every hazardous situation you may encounter. If you have any questions, you should first consult your supervisor and/or your authorized dealer before operating or performing maintenance work on the machine.

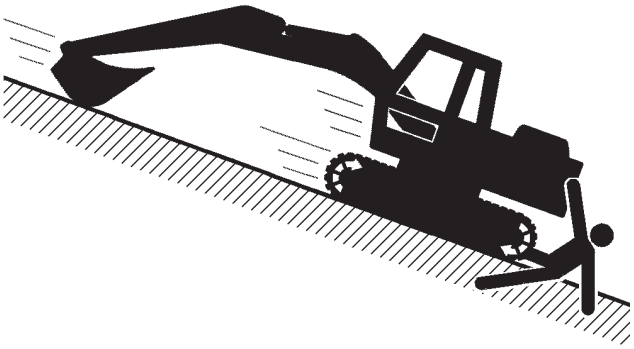


SA-003

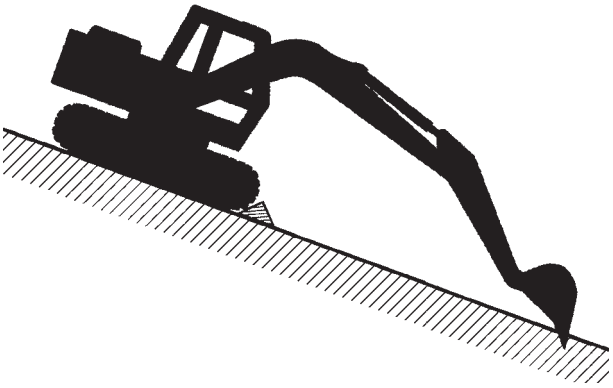
Avoid Injury from Rollaway Accidents

- Death or serious injury may result if you attempt to mount or stop a moving machine.

  To avoid rollaways:
  - Select level ground when possible to park the machine.
  - Do not park the machine on a gradient.
  - Lower the bucket and/or other work tools to the ground.
  - Turn the auto-idle switch OFF.
  - Run the engine at slow idle speed without load for 5 minutes to cool down the engine.
  - Stop the engine and remove the key from the key switch.
  - Pull the pilot control shut-off lever to LOCK position.
  - Block both tracks and lower the bucket to the ground. Thrust the bucket teeth into the ground if you must park on a gradient.
  - Position the machine to prevent rolling.
  - Park at a reasonable distance from other machines.



SA-391



SA-2273

Clean up Flammable Materials:

- Spilled fuel and oil, trash, grease, debris, accumulated coal dust, and other flammable materials may cause fires.
  - Prevent fires by inspecting and cleaning the machine daily, and by removing adhered oil or accumulated flammable materials immediately. Check and clean high temperature parts such as the exhaust outlet and muffler earlier than the normal interval.
  - Do not wrap high temperature parts such as a muffler or exhaust pipe with oil absorbents.
  - Do not store oily cloths as they are vulnerable to catching fire.
  - Keep flammable materials away from open flames.
  - Do not ignite or crush a pressurized or sealed container.
  - Check and clean the machine every day and immediately remove accumulated flammable materials.

Check Engine Stop Switch:

- If a fire breaks out, failure to stop the engine will escalate the fire, hampering fire fighting.
  Always check engine stop switch function before operating the machine every day:
  1. Start the engine and run it at slow idle.
  2. Press and hold the engine stop switch to confirm that the engine stops.
  - If any abnormalities are found, be sure to repair them before operating the machine.

Check Heat Shields:

- Damaged or missing heat shields may lead to fires.
  - Damaged or missing heat shields must be repaired or replaced before operating the machine.
  - If hydraulic hoses are broken while the engine cover is open, splattered oil on the high temperature parts such as muffler may cause fire. Always close the engine cover while operating the machine.

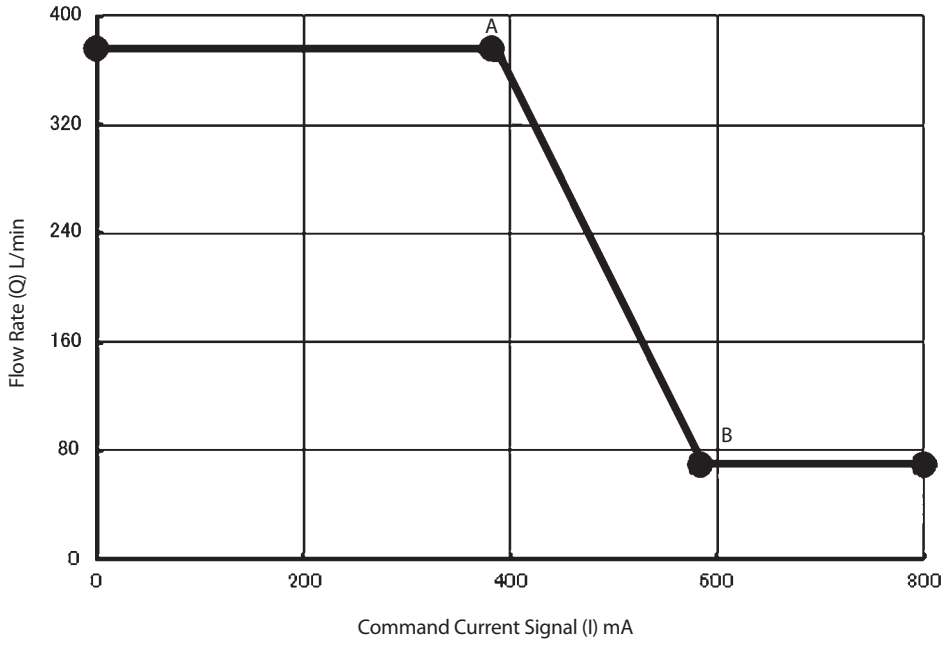
(Blank)

Oil Cooler Fan Motor Pump/Radiator Fan Motor Pump I-Q Diagram

- I-Q Control
  - Rated Pump Speed: 1996 min^{-1}
  - Pump Speed Ratio: 1.109
  - Hydraulic Oil Temperature: 50±5 °C (122±9 °F).

Points on I-Q Line

	Command Current Signal (I) of Pump Control Solenoid Valve mA	Flow Rate (Q) L/min (gpm)
A	381±30	374±3 (98.8±0.8)
B	592±40	77±5 (20.3±1.3)

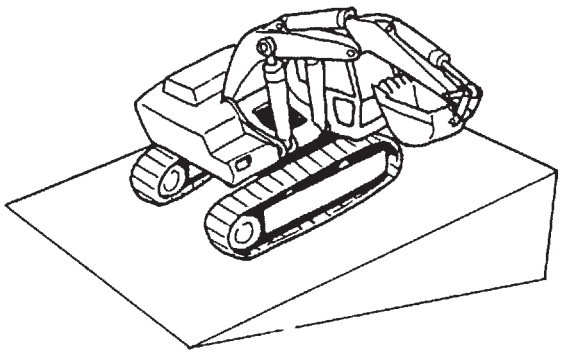


TKFB91-04-02-004

Swing Motor Leakage

Summary:

1. Set the machine on a specified slope and swing the upperstructure 90 degrees to the slope. Measure the upperstructure drift while suspending a load on a specified slope and check the performance of the swing parking brake.
   (The mechanical brake for the swing parking brake is equipped for the swing device.)



T105-06-03-011

Preparation:

1. Check lubrication of the swing gear and the swing bearing.
2. Load the bucket. (Refer to the Operational performance Standard about the loading weight.)
3. Fully extend the arm and bucket cylinders. Adjust and hold the boom so that the arm end pin height is the same as the boom foot pin height.
4. Park the machine on a smooth slope with a gradient of 15±1 degrees.
5. Climb a slope and swing the upperstructure to position it 90 degrees to the slope. Put the marks on the swing bearing outer circumference (upperstructure side) and the track frame.
6. Maintain the hydraulic oil temperature at 50±5 °C (122±9 °F).

Secondary Pilot Pressure (Solenoid Valve of EDQR Valve)

Preparation:

1. Stop the engine.

CAUTION: Do not turn the cap of the hydraulic oil tank quickly. The cap may fly off by internal pressure. Slowly loosen the cap and release any remaining pressure. Remove the cap.

2. Loosen the cap and release any pressure from the hydraulic oil tank. (Refer to T4-5-1.)

   : 4 mm

3. Disconnect wire harnesses (1 to 16) according to the circuits to be measured. Remove pressure sensor (19).

   Install adapter (ST 6069) (21) and pressure gauge (ST 6942) (20).

   : 19 mm, 24 mm

4. Start the engine. Confirm that no oil leakage is observed at the pressure gauge connection.
5. Maintain the hydraulic oil temperature at 50±5 °C (122±9 °F).

Measurement:

CAUTION: Prevent personal injury. Always make sure that the area is clear and that coworkers are out of the work area before starting the measurement.

When measuring the boom lower secondary pilot pressure, set the machine position with the tracks raised off the ground. Take care not to allow the rear of the machine to come in contact with the ground. Take care not to allow the machine overturn as the machine becomes unbalanced.

1. Select the following conditions.

Engine Control Dial	Auto-Idle Switch
Fast Idle	OFF
Slow Idle	OFF

2. Operate the control lever to be measured. Measure the pilot pressure by using the pressure gauge with the control lever set to the full stroke.
3. Repeat the measurement three times and calculate the mean values.

Evaluation:

Refer to Operational Performance Standard.

NOTE: When the measured data is abnormal, measure the primary pilot pressure. When the primary pilot pressure is normal, the EDQR valve can be determined as faulty.

Adjustment of Maximum Flow Rate and Minimum Flow Rate (Main Pump)

The main pump flow rate can be adjusted by changing the position when the servo piston reaches maximum stroke. Loosen lock nut (1) of the large chamber side of the servo piston, turn adjusting screw (2), and adjust the maximum pump flow rate. Loosen lock nut (3) of the small chamber side of the servo piston, turn adjusting screw (4), and adjust the minimum pump flow rate.

Lock Nut (1)

: 30 mm

: 240 N·m (177 lbf·ft)

Adjusting Screw (2)

: 13 mm

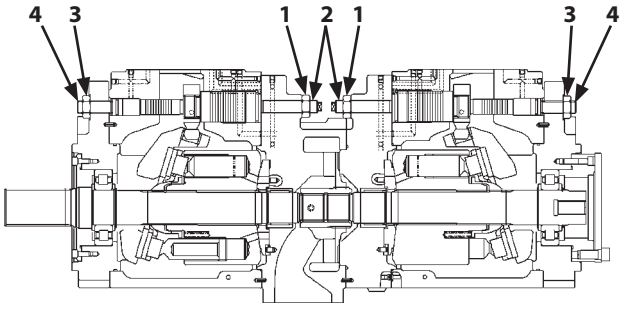
Lock Nut (3)

: 30 mm

: 240 N·m (177 lbf·ft)

Adjusting Screw (4)

: 10 mm



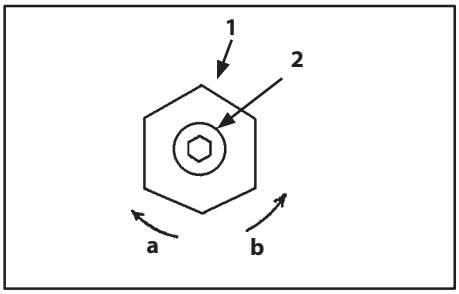
TKFB91-04-05-009

1- Lock Nut (Large Chamber Side)
2- Adjusting Screw (Large Chamber Side)
3- Lock Nut (Small Chamber Side)
4- Adjusting Screw (Small Chamber Side)

NOTE: Standard Change in Flow Rate (Reference)

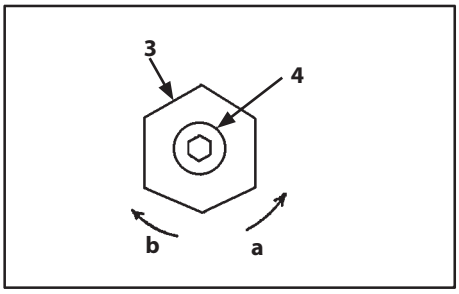
Engine Speed: 1800 min^{-1}

Adjusting Screw Turns	1/4
Change in Flow Rate (Large Chamber Side)	9.4 L/min (2.48 US gal/min)
Change in Flow Rate (Small Chamber Side)	9.4 L/min (2.48 US gal/min)



W107-02-05-129

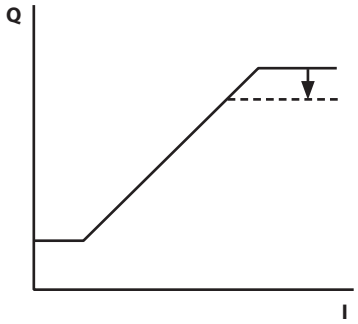
a- Flow Rate Decrease
b- Flow Rate Increase
1- Lock Nut (Large Chamber Side)
2- Adjusting Screw (Large Chamber Side)



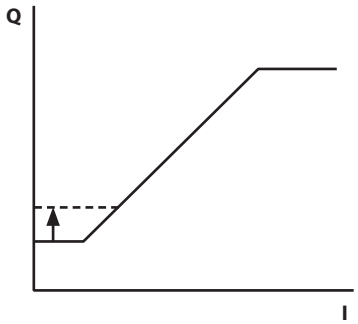
W107-02-05-129

a- Flow Rate Decrease
b- Flow Rate Increase
3- Lock Nut (Small Chamber Side)
4- Adjusting Screw (Small Chamber Side)

Adjustment of Maximum Flow Rate



Adjustment of Minimum Flow Rate



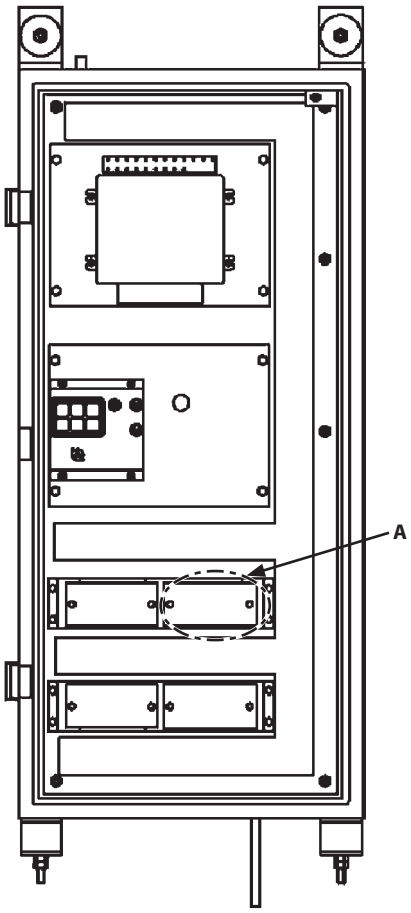
I: Command Current Signal of Pump Control Solenoid Valve

Group 5 Troubleshooting for Each Code

Group 7 Air Conditioner

Group 8 e-Service

Group 9 Aftertreatment Device



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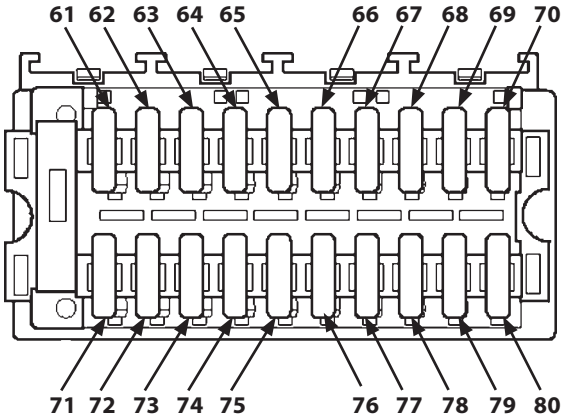
Detail A



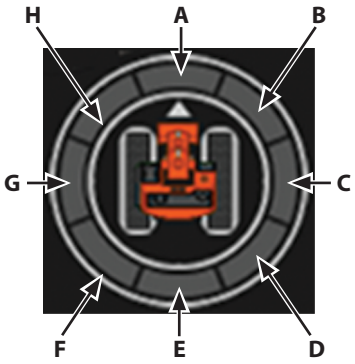
TKEB-05-01-002

Fuse Box 4

Fuse No.	Capacity	Connected to
61	10A	Work Light Relay 1 (Power)
62	10A	Work Light Relay 2 (Power)
63	10A	Work Light Relay 3 (Power)
64	10A	Work Light Relay 4 (Power)
65	10A	Work Light Relay 5 (Power)
66	10A	Work Light Relay 6 (Power)
67	10A	Maintenance Light Relay 1 (Power)
68	10A	Maintenance Light Relay 2 (Power)
69	10A	Maintenance Light Relay 3 (Power)
70	10A	Maintenance Light Relay 4 (Power)
71	-	-
72	-	-
73	10A	Entrance Light Relay 1 (Power)
74	-	-
75	30A	Wiper Relay 1 (Slow Speed) (Power)
76	30A	Wiper Relay 3 (Fast Speed) (Power)
77	10A	Washer Motor Relay (Power)
78	5A	Fast Filling Relay (Power)
79	5A	CSU (Main Power)
80	-	-

Engine	Key Switch	Location to be Measured		Specification
Electric Power Circuit				
Stopped	ON	Between (1) and Ground:	Battery Relay 1	22.5 to 25.5V
Stopped	ON	Between (2) and Ground:	Battery Relay 2	22.5 to 25.5V
Stopped	ON	Between (3) and Ground:	Battery Relay 3	22.5 to 25.5V
Stopped	ON	Between (4) and Ground:	Starter (Upper)	22.5 to 25.5V
Stopped	ON	Between (5) and Ground:	Starter (Lower)	22.5 to 25.5V
Stopped	ON	Between (6) and Ground:	Fuse (400A)	22.5 to 25.5V
Stopped	ON	Between (7) and Ground:	Slow Blow Fuse 4	22.5 to 25.5V
Stopped	ON	Between (8) and Ground:	Slow Blow Fuse 8	22.5 to 25.5V
Stopped	ON	Between (9) and Ground:	Prelube Relay	22.5 to 25.5V
Stopped	ON	Between (10) and Ground:	Starter Relay (Upper)	22.5 to 25.5V
Stopped	ON	Between (11) and Ground:	Starter Relay (Lower)	22.5 to 25.5V
Stopped	ON	Between (12) and Ground:	Fuse Box (Cab 2) (#11)	22.5 to 25.5V
Stopped	ON	Between (13) and Ground:	Fuse Box (Cab 2) (#13)	22.5 to 25.5V
Stopped	ON	Between (14) and Ground:	Fuse Box 2 (#26)	22.5 to 25.5V
Stopped	ON	Between (15) and Ground:	Emergency Engine Stop Switch 1	22.5 to 25.5V
Stopped	ON	Between (16) and Ground:	Emergency Engine Stop Switch 2	22.5 to 25.5V
Stopped	ON	Between (17) and Ground:	Emergency Engine Stop Switch 3	22.5 to 25.5V
Stopped	ON	Between (18) and Ground:	Emergency Engine Stop Switch 4	22.5 to 25.5V
Stopped	ON	Between (19) and Ground:	Emergency Engine Stop Switch 5	22.5 to 25.5V
Stopped	ON	Between (20) and Ground:	Emergency Engine Stop Switch 6	22.5 to 25.5V
Stopped	ON	Between (21) and Ground:	Valve Limit Switch (U-Return)	22.5 to 25.5V
Stopped	ON	Between (22) and Ground:	Valve Limit Switch (L-Return)	22.5 to 25.5V
Stopped	ON	Between (23) and Ground:	Valve Limit Switch (L-Suction)	22.5 to 25.5V
Stopped	ON	Between (24) and Ground:	Valve Limit Switch (R-Suction)	22.5 to 25.5V
Stopped	ON	Between (25) and Ground:	Engine Stop Switch	22.5 to 25.5V
Stopped	ON	Between (26) and Ground:	Engine Start Switch	22.5 to 25.5V
Stopped	ON	Between (27) and Ground:	ECM	22.5 to 25.5V

Machine Inclination/Travel Indicator

Gauge	No		Inclination (degree)			
			Pitch (Back and Forward)	Voltage (V)	Roll (Right and Left)	Voltage (V)
 TKEB-05-02-070	A	Blinking (Red)	less than -23.5	more than 3.381	-5.9 to 5.9	2.279 to 2.500
		Blinking (Yellow)	-23.4 to -16	3.100 to 3.381	↑	↑
		Lit (Yellow)	-15.9 to -8.5	2.819 to 3.100	↑	↑
		Normal	-8.4 to 0	2.500 to 2.819	↑	↑
	B	Blinking (Red)	less than -23.5	more than 3.381	less than -16	less than 1.904
		Blinking (Yellow)	-23.4 to -16	3.100 to 3.381	-15.9 to -11	1.904 to 2.091
		Lit (Yellow)	-15.9 to -8.5	2.819 to 3.100	-10.9 to -6	2.091 to 2.279
		Normal	-8.4 to 0	2.500 to 2.819	-5.9 to 0	2.279 to 2.500
	C	Blinking (Red)	-8.4 to 8.4	2.185 to 2.500	more than -16	less than 1.904
		Blinking (Yellow)	↑	↑	-15.9 to -11	1.904 to 2.091
		Lit (Yellow)	↑	↑	-10.9 to -6	2.091 to 2.279
		Normal	↑	↑	-5.9 to 0	2.279 to 2.500
	D	Blinking (Red)	more than 23.5	less than 1.623	more than -16	less than 1.904
		Blinking (Yellow)	16 to 23.4	1.623 to 1.904	-15.9 to -11	1.904 to 2.091
		Lit (Yellow)	8.5 to 15.9	1.904 to 2.185	-10.9 to -6	2.091 to 2.279
		Normal	0 to 8.4	2.185 to 2.500	-5.9 to 0	2.279 to 2.500
	E	Blinking (Red)	more than 23.5	less than 1.623	-5.9 to 5.9	2.500 to 2.721
		Blinking (Yellow)	16 to 23.4	1.623 to 1.904	↑	↑
		Lit (Yellow)	8.5 to 15.9	1.904 to 2.185	↑	↑
		Normal	0 to 8.4	2.185 to 2.500	↑	↑
	F	Blinking (Red)	more than 23.5	less than 1.623	more than 16	more than 3.100
		Blinking (Yellow)	16 to 23.4	1.623 to 1.904	11 to 15.9	2.913 to 3.100
		Lit (Yellow)	8.5 to 15.9	1.904 to 2.185	6 to 10.9	2.725 to 2.913
		Normal	0 to 8.4	2.185 to 2.500	0 to 5.9	2.500 to 2.725
	G	Blinking (Red)	-8.4 to 8.4	2.500 to 2.815	more than 16	more than 3.100
		Blinking (Yellow)	↑	↑	11 to 15.9	2.913 to 3.100
		Lit (Yellow)	↑	↑	6 to 10.9	2.725 to 2.913
		Normal	↑	↑	0 to 5.9	2.500 to 2.725
	H	Blinking (Red)	more than -23.5	more than 3.381	more than 16	more than 3.100
		Blinking (Yellow)	-23.4 to -16	3.100 to 3.381	11 to 15.9	2.913 to 3.100
		Lit (Yellow)	-15.9 to -8.5	2.819 to 3.100	6 to 10.9	2.725 to 2.913
		Normal	-8.4 to 0	2.500 to 2.819	0 to 5.9	2.500 to 2.725

*Voltage tolerance of the gauge is ±1%.

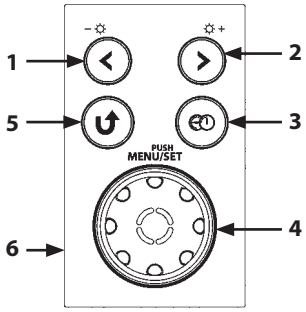
- Record
  The monitoring data displayed on the monitor screen is recorded in IDU as a snapshot.

1. When pushing function key (left) (1), the monitoring data displayed on Monitoring screen (Fig. C) is started recording. When pushing function key (left) (1) again, the monitoring data is stopped recording.
2. When pushing previous screen switch (5), the recording is completed and the data is saved.

- Replay
  The snapshot recorded in IDU is replayed on Monitoring screen (Fig. C).

1. When pushing MENU/SET switch (4) immediately after the recording is completed, the the most recently recorded snapshot is replayed. When pushing MENU/SET switch (4) again, the replaying is stopped.

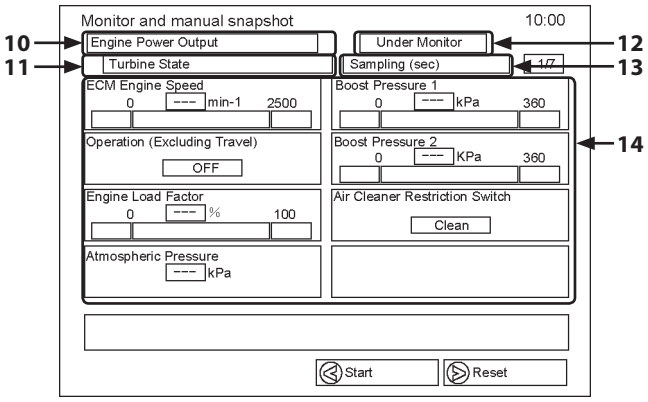
NOTE: Only the the most recently recorded snapshot can be replayed. When the other screen is displayed after recording the snapshot, the recorded snapshot of Replay of Monitor and manual snapshot menu is replayed.



TKEB-05-05-003

1- Function Key (Left)
2- Function Key (Right)
3- Basic Screen Switch
4- MENU/SET Switch
5- Previous Screen Switch
6- Key Pad

C



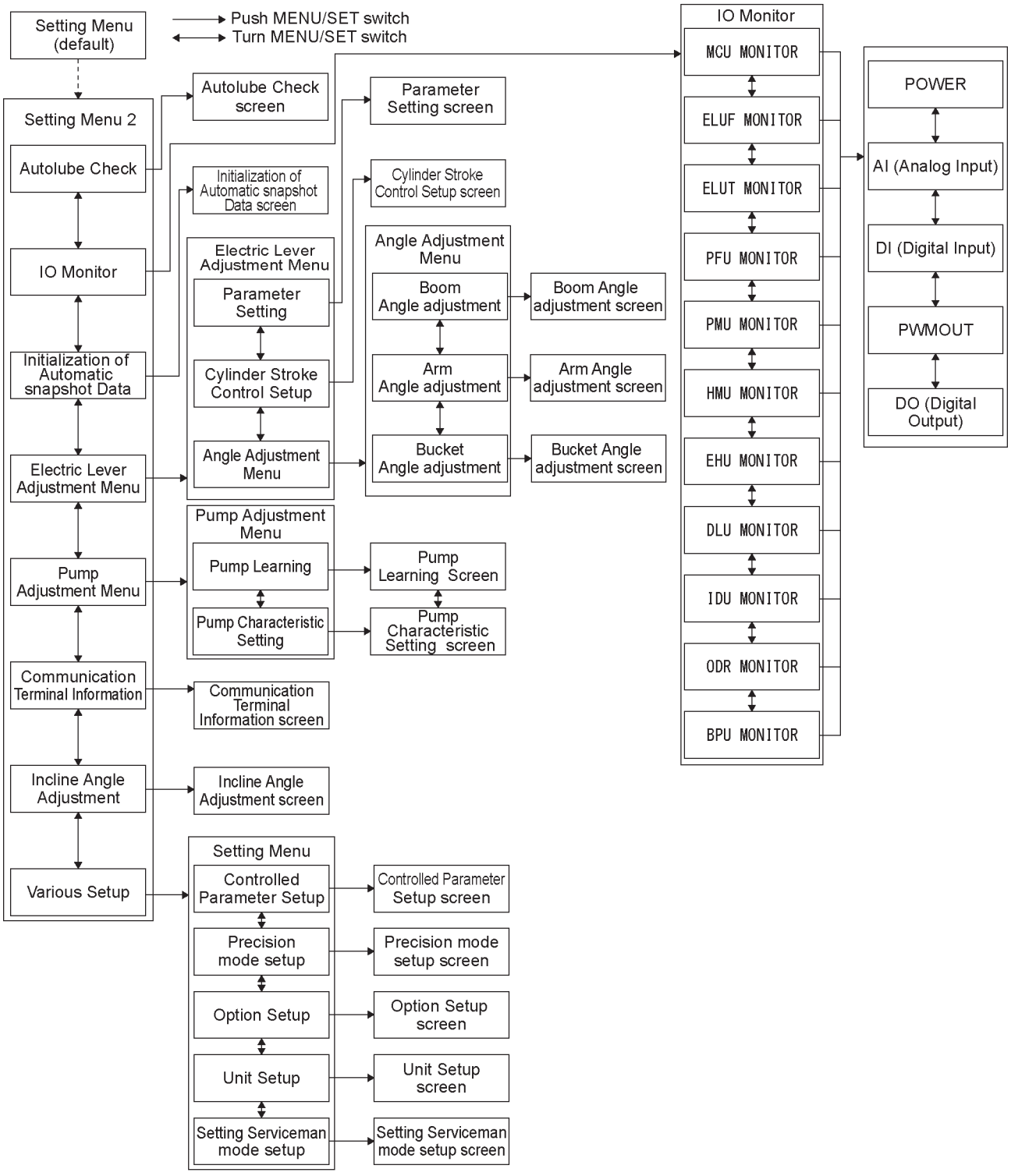
TKEB-05-02-088

10- Monitoring Middle Item
11- Monitoring Minor Item
12- Display Mode
13- Data Sampling Interval
14- Monitoring Data Value

Monitoring Middle Item	Monitoring Minor Item		Monitoring Data Value
State of centralized oil supply	Fast Fill	1	Engine Speed
		2	Pilot Pump Pressure
		3	Panel Position Switch
		4	-
		5	Panel Control Relay Output
		6	Fast Fill Warning
		7	Fuel Full Lamp
		8	-
Wiper Control	Wiper Control	1	Interval
		2	Washer Switch
		3	Wiper Mode
		4	-
		5	Wiper Relay Output (Low)
		6	Wiper Relay Output (Blade Stop)
		7	Wiper Relay Output (High)
		8	-
State of Pump / Motor	Initial Status	1	Engine Speed
		2	Pilot Pump Pressure
		3	Operation (Excluding Travel)
		4	Engine Load Factor
		5	-
		6	-
		7	-
		8	-
	Main Pump (Drain Pressure)	1	Drain Pressure Main Pump #1
		2	Drain Pressure Main Pump #2
		3	Drain Pressure Main Pump #3
		4	Drain Pressure Main Pump #4
		5	Drain Pressure Main Pump #5
		6	Drain Pressure Main Pump #6
		7	Drain Pressure Main Pump #7
		8	Drain Pressure Main Pump #8
	Swing Motor (#1-#2)	1	Swing Motor Inlet Pressure 1
		2	Drain Pressure Swing Motor #1
		3	Drain Pressure Swing Motor #2
		4	Drain Pressure Swing Motor #3
		5	Swing Motor Inlet Pressure 2
		6	Drain Pressure Swing Motor #4
		7	-
		8	-

Setting Menu 2

Transition Flow of Monitor Screen



TKFB91-05-02-011

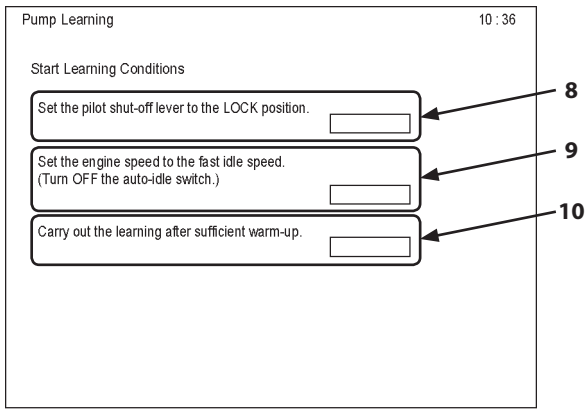
3. When pushing MENU/SET switch (4), Pump Learning Conditions screen (Fig. C) is displayed. Check if pilot control shut-off lever state (8), engine speed (9), hydraulic oil temperature (10) meet the following conditions.

- Pilot control shut-off lever: LOCK position
- Engine speed: Fast idle
- Hydraulic oil temperature: 50±5 °C

IMPORTANT: Do not touch the pilot control shut-off lever and electric control lever while performing the pump learning.

4. After checking that Pump Learning Conditions are met, push MENU/SET switch (4). Then, the pump learning starts.
5. When the pump learning is completed, Result (11) is displayed (Fig.D). When the pump learning has failed, error code (12) is displayed. Refer to Pump Learning Error Code and Remedy on the next page.

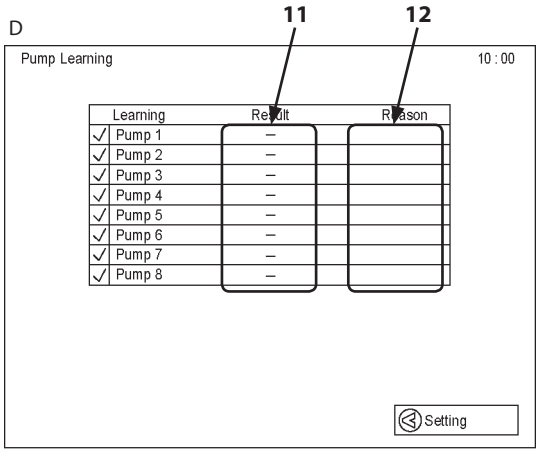
C



TKEB-05-02-120

8- Pilot Control Shut-Off Lever State
9- Engine Speed
10- Hydraulic Oil Temperature:

D

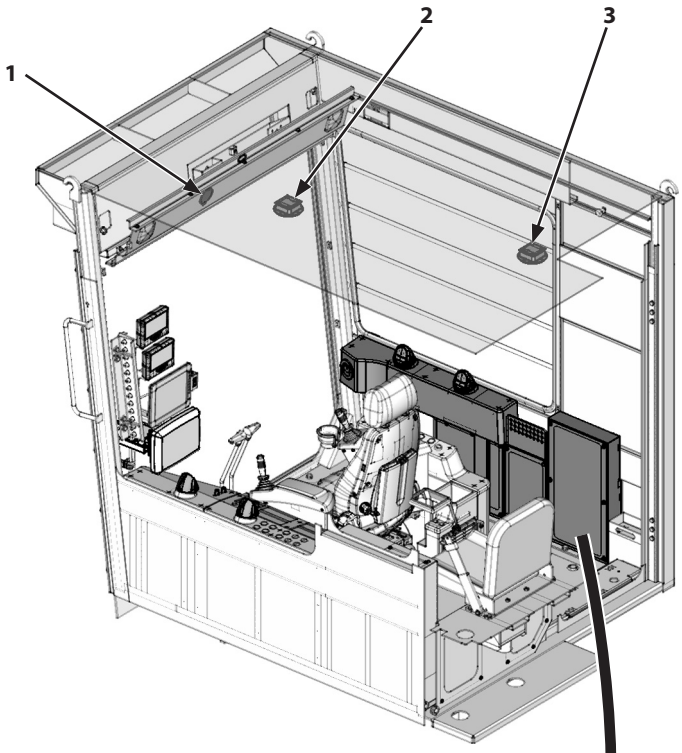


TKFB91-05-02-012

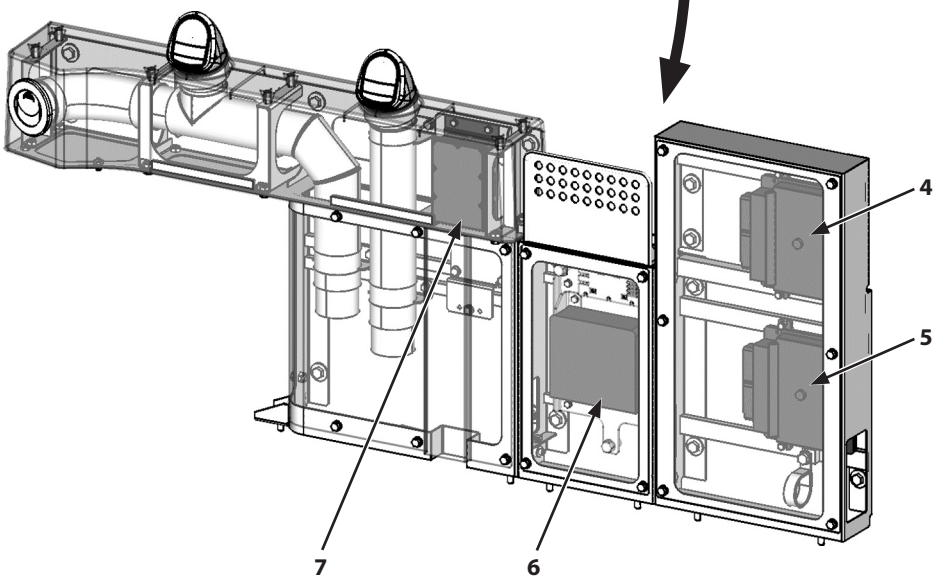
11- Result
12- Error Code

(Blank)

No.	Position	Component Name	Page	Item Number	Note
031	15D	Contamination Sensor (Main Pump 5)	T5-4-21	D5	
032	15D	Body Tilt Sensor (Main Pump 5)	T5-4-21	D2	
033	15E	Drain Pressure Sensor (Main Pump 5)	T5-4-21	D3	
034	15F	Delivery Pressure Sensor (Main Pump 5)	T5-4-21	D4	
035	15F	Regulator Pressure Sensor (Main Pump 5)	T5-4-21	D6	
036	15F	Control Solenoid Valve (Main Pump 5)	T5-4-21	D1	
037	16I	Control Solenoid Valve (Main Pump 6)	T5-4-21	C1	
038	16I	Body Tilt Sensor (Main Pump 6)	T5-4-21	C2	
039	16J	Delivery Pressure Sensor (Main Pump 6)	T5-4-21	C4	
040	16K	Regulator Pressure Sensor (Main Pump 6)	T5-4-21	C6	
041	16K	Contamination Sensor (Main Pump 6)	T5-4-21	C5	
042	16K	Drain Pressure Sensor (Main Pump 6)	T5-4-21	C3	
043	21E	Contamination Sensor (Main Pump 7)	T5-4-21	D5	
044	21E	Body Tilt Sensor (Main Pump 7)	T5-4-21	D2	
045	21E	Drain Pressure Sensor (Main Pump 7)	T5-4-21	D3	
046	21F	Delivery Pressure Sensor (Main Pump 7)	T5-4-21	D4	
047	21G	Regulator Pressure Sensor (Main Pump 7)	T5-4-21	D6	
048	21G	Control Solenoid Valve (Main Pump 7)	T5-4-21	D1	
049	21I	Control Solenoid Valve (Main Pump 8)	T5-4-21	C1	
050	21J	Body Tilt Sensor (Main Pump 8)	T5-4-21	C2	
051	21J	Delivery Pressure Sensor (Main Pump 8)	T5-4-21	C4	
052	21K	Regulator Pressure Sensor (Main Pump 8)	T5-4-21	C6	
053	21K	Contamination Sensor (Main Pump 8)	T5-4-21	C5	
054	21L	Drain Pressure Sensor (Main Pump 8)	T5-4-21	C3	
055	25B	Work Light (Right Side of Rear Frame)	T5-4-3	E6	
056	25B	Fuel Cooler/Pump Transmission Oil Cooler Fan Motor Solenoid Valve	-	-	
057	25C	Fan Solenoid Valve (Engine Compartment)	-	-	
058	27A	Emergency Engine Stop Switch 5 (Pump Compartment)	T5-4-3	E5	
059	27B	Maintenance Light (Pump Compartment)	T5-4-3	E4	
060	27C	Delivery Pressure Sensor (Oil Cooler Fan Motor Pump)	T5-4-20	12	
061	27C	Delivery Pressure Sensor (Radiator Fan Motor Pump)	T5-4-20	11	



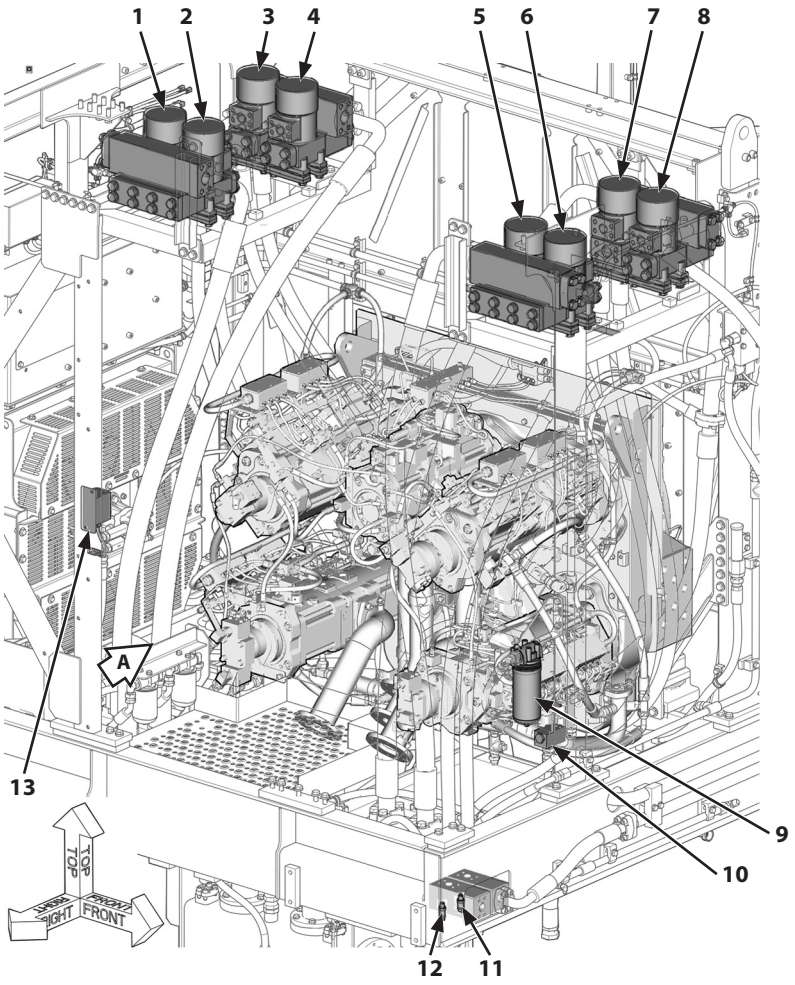
TKEB-01-02-070



TKEB-01-02-071

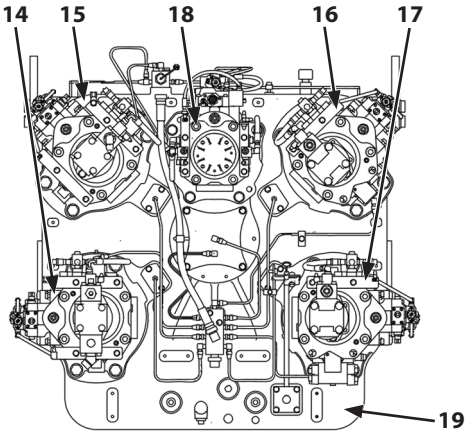
1- Hour Meter
2- Dome Light (Front)
3- Dome Light (Rear)
4- ELUF
5- ELUT
6- ACU
7- Satellite Communication Terminal (Option)/Mobile Communication Terminal (Option)

Around Pump



TKFB91-01-02-035

View A

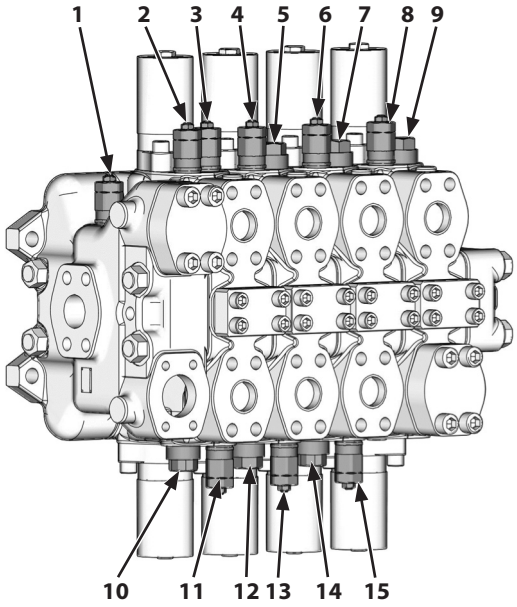


TKFB91-01-02-036

1- High-Pressure Strainer (For Main Pump 2)
2- High-Pressure Strainer (For Main Pump 4)
3- High-Pressure Strainer (For Main Pump 1)
4- High-Pressure Strainer (For Main Pump 3)
5- High-Pressure Strainer (For Main Pump 6)
6- High-Pressure Strainer (For Main Pump 8)
7- High-Pressure Strainer (For Main Pump 5)
8- High-Pressure Strainer (For Main Pump 7)
9- Pilot Filter
10- Pilot Relief Valve
11- Delivery Pressure Sensor (Radiator Fan Motor Pump)
12- Delivery Pressure Sensor (Oil Cooler Fan Motor Pump)
13- Emergency Engine Stop Switch 5
14- Main Pump 1 (Pump Transmission Side)/Main pump 2 (Pump End Side)/Pump Transmission Oil Pump (Pump Tip)
15- Main Pump 3 (Pump Transmission Side)/Main pump 4 (Pump End Side)/ Air Conditioner Compressor Motor Pump (Pump Tip)
16- Main Pump 5 (Pump Transmission Side)/Main pump 6 (Pump End Side)/Air Fan Motor and Fuel Cooler/Pump Transmission Oil Cooler Fan Motor Pump (Pump Tip)
17- Main Pump 7 (Pump Transmission Side)/Main pump 8 (Pump End Side)/Pilot Pump (Pump Tip)
18- Radiator Fan Motor Pump (Pump Transmission Side)/Oil Cooler Fan Motor Pump (Pump End Side)
19- Pump Transmission

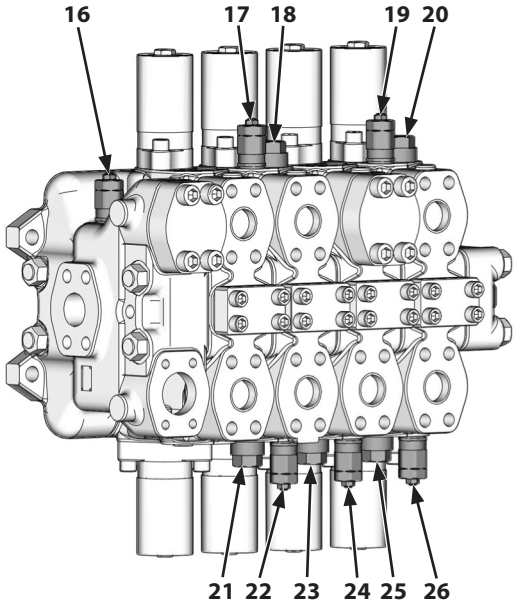
Control Valves 1, 2

Control Valve 2 (Upper Left)



TKFB91-01-02-062

Control Valve 1 (Lower Left)



TKFB91-01-02-063

Control Valve 2 (Upper Left)

1- Main Relief Valve
2- Overload Relief Valve (LD: Bucket Close)
3- Overload Relief Valve (LD: Bucket Close)
4- Overload Relief Valve (LD: Arm Extend, BH: Arm Roll-In)
5- Make-Up Valve (LD: Arm Extend, BH: Arm Roll-In)
6- Overload Relief Valve (Bucket Tilt-In)
7- Make-Up Valve (Bucket Tilt-In)
8- Overload Relief Valve (Boom Raise)
9- Make-Up Valve (Boom Raise)
10- Make-Up Valve (LD: Bucket Open)
11- Overload Relief Valve (LD: Bucket Open)
12- Make-Up Valve (LD: Arm Retract, BH: Arm Extend)
13- Overload Relief Valve (LD: Arm Retract, BH: Arm Roll-Out)
14- Make-Up Valve (Bucket Tilt-Out)
15- Overload Relief Valve (Bucket Tilt-Out)

Control Valve 1 (Lower Left)

16- Main Relief Valve
17- Overload Relief Valve (LD: Arm Retract, BH: Arm Roll-Out)
18- Make-Up Valve (LD: Arm Retract, BH: Arm Roll-Out)
19- Overload Relief Valve (Boom Raise)
20- Make-Up Valve (Boom Raise)
21- Make-Up Valve (LD: Arm Extend, BH: Arm Roll-In)
22- Overload Relief Valve (LD: Arm Extend, BH: Arm Roll-In)
23- Make-Up Valve (Bucket Tilt-In)
24- Overload Relief Valve (Bucket Tilt-In)
25- Make-Up Valve (Boom Lower)
26- Overload Relief Valve (Boom Lower)

NOTE: LD: Loading Shovel

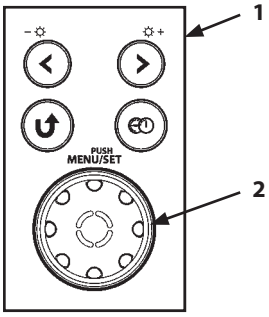
BH: Backhoe

System Check

The communication state between controllers can be checked.

1. Push MENU/SET switch (4) of the key pad (1) to move from the gauge screen to the Service Menu screen. (Fig. A)
2. Turn MENU/SET switch (2) to highlight System Check (3). Push the MENU/SET switch (2) to display the System Check information. (Fig. B)
3. When abnormal situation happens in the communication line, error locations (4) blink in red.
4. Find out the error position by using the System Check screens (Fig. B) and controller location screen (Fig. C).

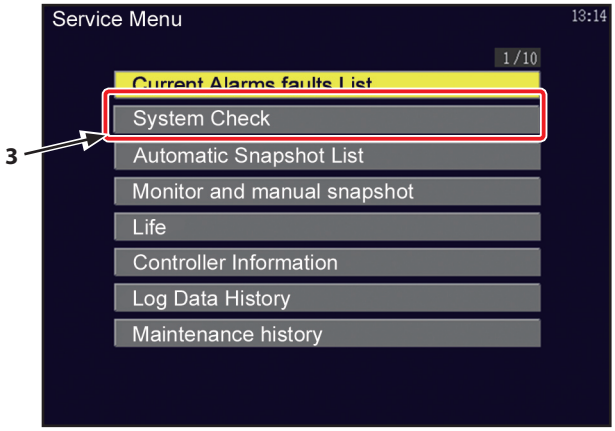
NOTE: When error occurs with System Check, the fault code is displayed in Current Alarms Faults List screen.



TKEB-05-05-003

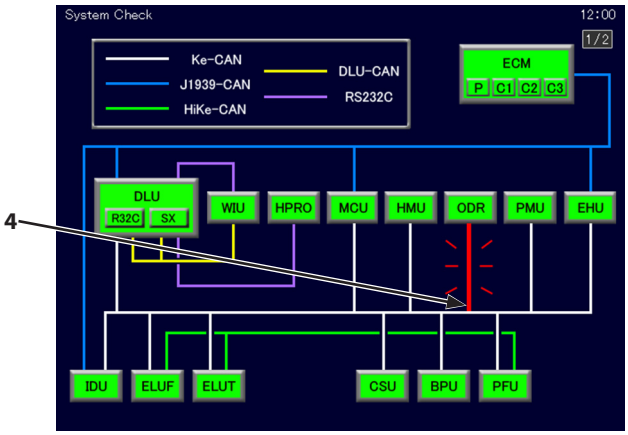
1- Key Pad 2- MENU/SET Switch

Fig. A



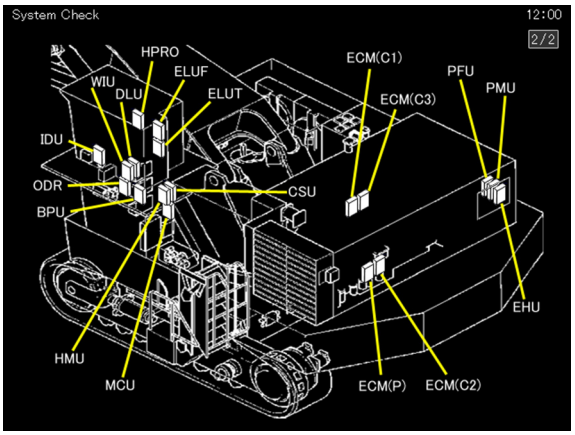
TKEB-05-05-010

Fig. B



TKEB-05-02-172

Fig. C



TKFB91-05-02-016

Faulty cooling (2)

Condition:

- Fault Code: Un-displayed
- Airflow volume: Normal
- Compressor: Compressor rotates normally
- Compressor pressure: Normal

Fresh air enters	Close the window and door.
	Readjust the fresh/re-circulated air selection damper.
Disconnection of A/M link	Set the link again.

(Blank)

List of Operation Data

List of Daily Report Data

Item		Details
Date		Date of daily report data.
Machine Hour Meter		Hour meter cumulative hours. (Hours are recorded by hour meter from DLU.)
Travel Operating Time		Total travel operating hours during a day. (Hours are recorded by travel operation pressure information from ELUT.)
Swing Operating Time		Total swing operating hours during a day. (Hours are recorded by swing operation pressure information from ELUF.)
Machine Operation Time		Total operating hours which adding travel operating hours and swing operating hours, during a day.
Engine Load Information		The mean Engine Load Information every hour. (The value that the fuel consumption (L/hr) from ECM (L), (R) is divided by the rated fuel consumption (L/hr) is recorded.)
Engine Blow-By Information		The Engine Blow-By Information every hour. (The value is recorded by engine blow-by information from ECM (L), (R).)
Engine Speed Histogram	780 to 1200 min^{-1}	The distribution of each Engine Speed every hour. (The distribution is recorded by engine speed information from PFU (L), (R).)
	1201 to 1600 min^{-1}	
	over 1601 min^{-1}	
Engine Coolant Temperature Histogram	less than 83 °C	The distribution of each Engine Coolant Temperature every hour. (The distribution is recorded by engine coolant temperature information from ECM (L), (R).)
	84 to 96 °C	
	over 97 °C	
Hydraulic Oil Temperature Histogram	less than 80 °C	The distribution of each Hydraulic Oil Temperature every hour. (The distribution is recorded by hydraulic oil temperature information from MCU.)
	81 to 90 °C	
	over 91 °C	
Controller Information		The software version of each controller.
Latitude		Final position during a day. (Signal from GPS antenna.)
Longitude		Final position during a day. (Signal from GPS antenna.)

NOTE: The daily operation in this table is equivalent to the hours between 0:00 and 23:59:59 counted by GMT (world standard time) which is received by using a GPS antenna. In case the engine is kept operated beyond 0:00, such data are recorded as those for the following day.

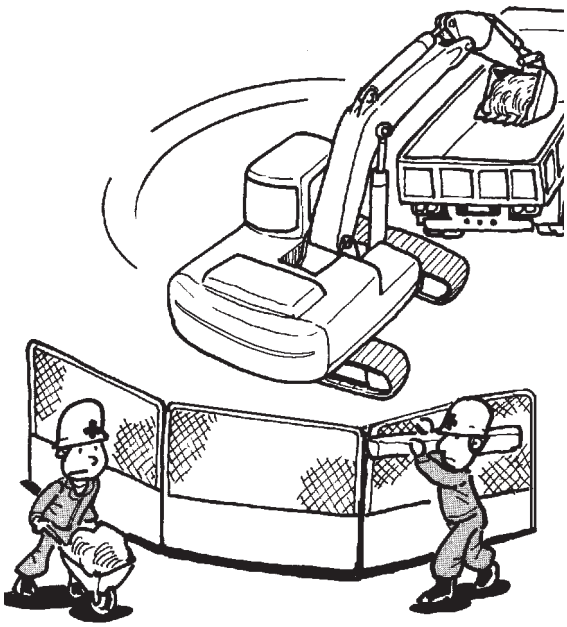
Keep Riders off Machine

- Riders on machine are subject to injury such as being struck by foreign objects and being thrown off the machine.
  - Only the operator should be on the machine. Keep riders off.
  - Riders also obstruct the operator's view, resulting in the machine being operated in an unsafe manner.
  - If the machine is equipped with a second seat and someone other than the operator is on board, the person must always stay in the second seat with the seat belt fastened.

SA-379

Precautions for Operations

- Investigate the work site before starting operations.
  - Be sure to wear close fitting clothing and safety equipment appropriate for the job, such as a hard hat, etc. when operating the machine.
  - Keep bystanders and obstacles clear of the area of machine operation.
    Keep persons other than the operator away from areas where there is danger, such as from flying objects.
  - Always be aware of the surroundings while operating. When working in a small area surrounded by obstacles, take care not to hit the upperstructure against obstacles.
  - When loading onto trucks, bring the bucket over the truck beds from the rear side. Take care not to swing the bucket over the cab or over any person.



M178-05-007

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. Turn the auto-idle switch off.
4. Run the engine at slow idle speed without load for 5 minutes.
5. Press and hold the engine stop switch to stop the engine.
6. Relieve the pressure in the hydraulic system by moving the control levers several times.
7. Remove the key from the key switch.
8. Attach a "Do Not Operate" tag on the control lever.
9. Pull the pilot control shut-off lever to the LOCK position.
10. Allow the engine to cool.

SA-527

- 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.
- Never work under a machine raised by the boom.
- Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of this 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.
- Turn the battery disconnect switch to OFF before adjusting the electrical systems or performing welding on the machine.

Never Ride Attachment

Never allow anyone to ride on attachments or the load. This is an extremely dangerous practice.

Notes on Aftertreatment Device

About Aftertreatment Device

The aftertreatment device removes particulate matter (PM) and NOx (Nitrogen Oxide) from the exhaust gas. Follow the instructions below to prevent the aftertreatment device from being damaged.

Exhaust gas from the aftertreatment device, muffler, exhaust piping and tail piping becomes hot during and right after engine running and regeneration of aftertreatment device. Keep away from the exhaust system or hot gas from the exhaust piping during regeneration. Be careful to avoid skin contact with exhaust gas. It may cause severe burns.

- White smoke may be generated during aftertreatment device regeneration. Do not attempt to perform aftertreatment device manual regeneration in a badly ventilated area.

- Do not touch water coming directly out of the aftertreatment device. The water is mildly-acidic by oxidation catalyst mounted in the aftertreatment device. If filter water spills on your skin, immediately flush it out with clean water.

Precautions for Communication Terminal

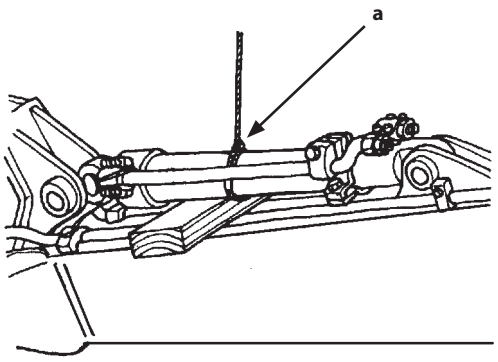
Electrical wave transmitted from the communication terminal may cause malfunction of other electronic devices.
Inquire to the device manufacturer for information on electrical wave disturbance when using an electronic device near the communication terminal.

Precautions for Using Nylon Sling

This WORKSHOP MANUAL lists weight (kg, lb) of every single part, hydraulic component or assembled parts which is more than 20kg (45lb) by following work procedure.
Prepare necessary lifting and moving equipments which comply with the local regulations, standards and or legal requirements of the particular country where the machine is being operated.

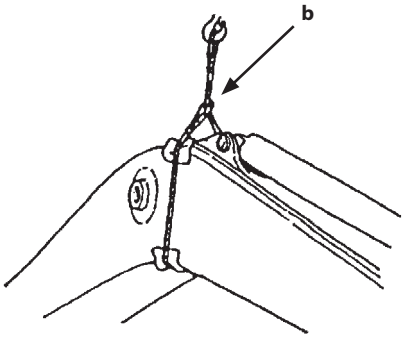
1. Follow the precautions below to use nylon slings safely.

- Attach protectors (soft material) on the corners of the load so that the nylon sling does not directly contact the corners. This will prevent the nylon sling from being damaged and the lifted load from slipping.
- Lower the temperature of the lifted load to lower than 100 °C (212 °F). If the temperature of the lifted load is over 100 °C (212 °F), consider using wire ropes.
- Do not lift acid or alkali chemicals.
- Take care not to allow the sling to become wet. The load may slip.
- When required to use more than one sling, use slings with the same width and length to keep the lifted load balanced.
- When lifting a load using an eyehole, be sure to eliminate any gaps between the sling and load. (Refer to the right illustration.) Reduce the load weight so that it is less than 80 % of the sling breaking force.
- Avoid using twisted, bound, connected, or hitched slings.
- Do not place any object on twisted or bent slings. (Refer to the right illustration.)
- When removing the slings from under the load, take care not to damage the nylon slings. Avoid contact with protrusions.
- Avoid dragging slings on the ground, throwing slings, or pushing slings with a metal object.
- When using with other types of slings (wire rope) or accessories (shackle), protect the joint so that the nylon sling is not damaged.
- Store the nylon slings indoors so that they won't deteriorate with heat, sun light, or chemicals.



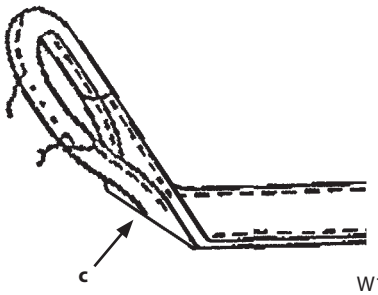
W102-04-02-016

a - Correct Eyehole Lifting Method



W105-04-01-008

b - Incorrect Eyehole Lifting Method



W162-01-01-009

c - Bent of Sling

Bleeding Air from Hydraulic Oil Tank

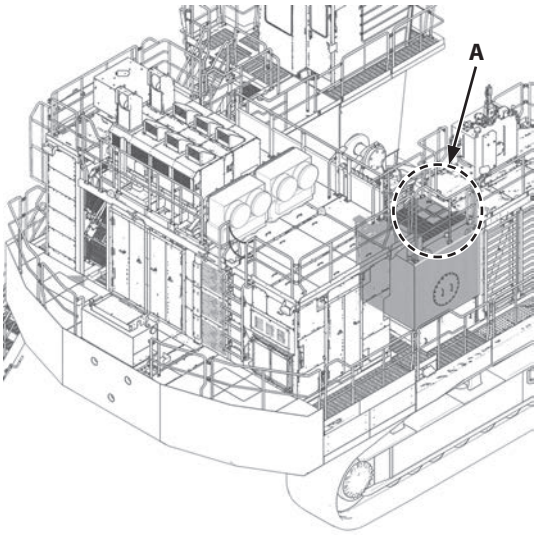
CAUTION: Escaping fluid under pressure may penetrate the skin and eyes, and cause serious injury. Release pressure before disconnecting the hydraulic pipings or removing other equipment. Hot hydraulic oil just after operation may spout out and cause severe burns. Allow oil to cool before starting any work.

If cap (1) of hydraulic oil tank is turned quickly, there is the danger that internal pressure may cause the cap (1) to fly off. Allow internal pressure to escape before removing cap (1).

Preparation

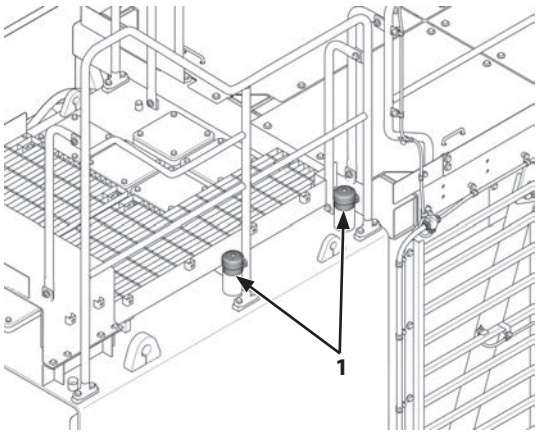
1. Set the machine position for inspection and maintenance. Stop the engine. (Refer to W1-6-1.)
2. Use hex wrench (a) and loosen the lock of one of the hydraulic oil tank caps (1) (2 used).

   : 4 mm
3. Turn cap (1) 30 degrees counterclockwise. Bleed the air from inside the hydraulic oil tank.

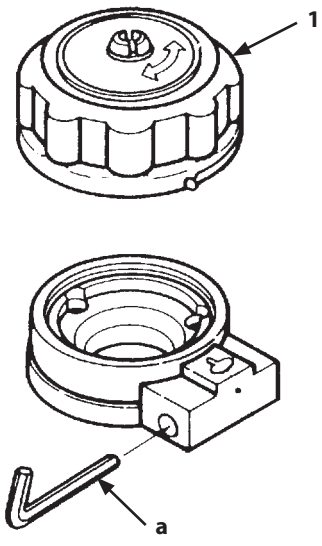


WKFB91-01-04-001

Detail A



WKFB91-01-04-002



W118-02-03-018

a- Hex Wrench

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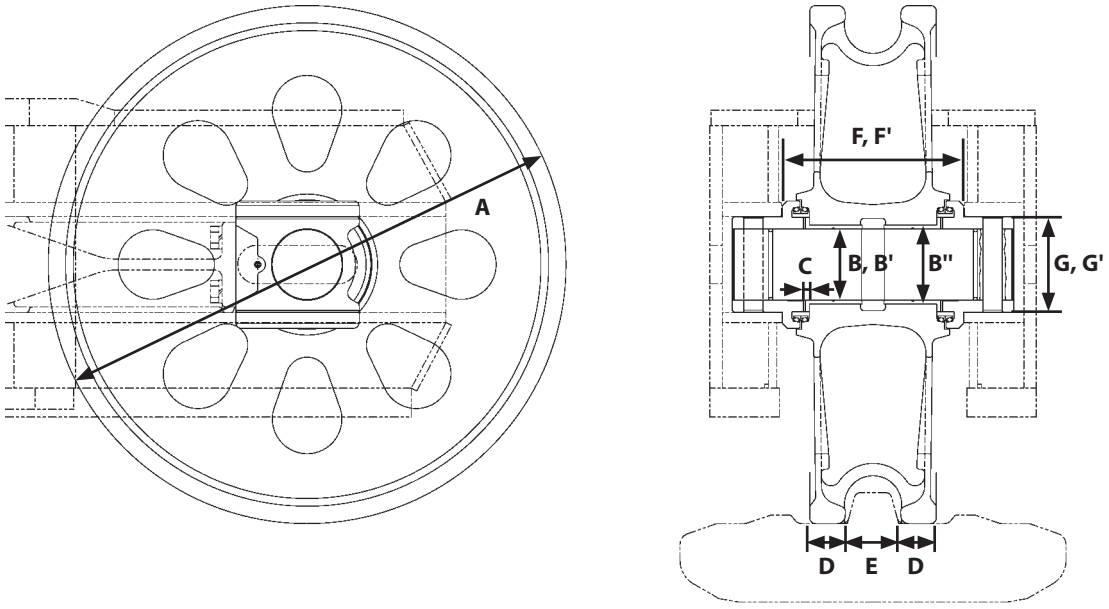
Front Idler



WKEB-02-02-001

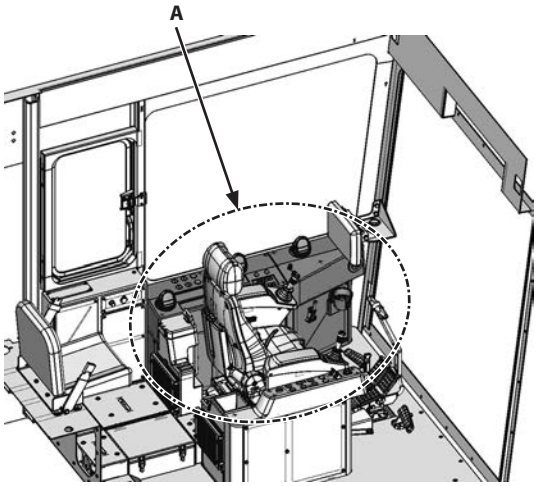
Unit: mm (in)

	Item	Standard	Allowable Limit	Remedy
A	Idler Outer Diameter	1526 (60.1)	1496 (58.9)	Repair or Replace
B	Axle Outer Diameter	220 (8.66)	[218 (8.58)]	Repair or Replace
B'	Bushing Inner Diameter	220 (8.66)	[223 (8.78)]	Replace
B''	Bushing Outer Diameter	242 (9.53)	-	Replace
C	Bushing Flange Thickness	15 (0.59)	[12 (0.47)]	Replace
D	Tread Width	100 (3.94)	[70 (2.76)]	Repair or Replace
E	Tread Interval	165 (6.50)	[205 (8.07)]	Repair or Replace
F	Fork Guide Interval	*535 (21.1)	[*565 (22.2)]	Repair or Finishing
F'	Bearing Width	528.4 (20.8)	[515 (20.3)]	Repair or Replace
G	Fork Guide Height	*290 (11.4)	[*310 (12.2)]	Repair or Finishing
G'	Bearing Height	288 (11.3)	[275 (10.8)]	Repair or Replace

NOTE: Values in [ ] are just for reference.

*NOTE: The value with mark * is the dimension at the track frame side.*

Removal of Cover, Disconnection of Wire Harnesses and Duct Hose in Cab (1A)



WKEB-03-01-012

1. Remove bolts, washers (2) (4 used). Remove the cover (1) assembly. At this time, cup holder (b) and emergency hammer (c) are removed with the cover (1) assembly together.

   : 13 mm

   : 10 N·m (7.4 lbf·ft)

2. Remove bolts, washers (4) (4 used). Remove covers (3).

   : 13 mm

   : 10 N·m (7.4 lbf·ft)

3. Loosen clamps (5) (2 used). Disconnect duct hoses (6, 7).

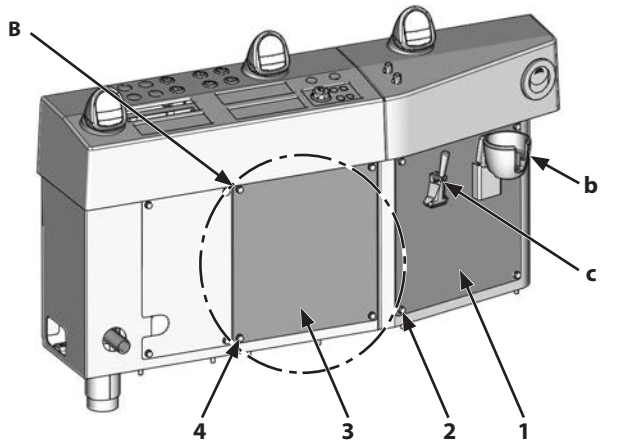
   : 10 mm

   : 4 N·m (3 lbf·ft)

4. Push duct hoses (6, 7) so that duct hoses (6, 7) should be below cab floor (8).

NOTE: Length of duct hoses (6, 7) is adjustable.

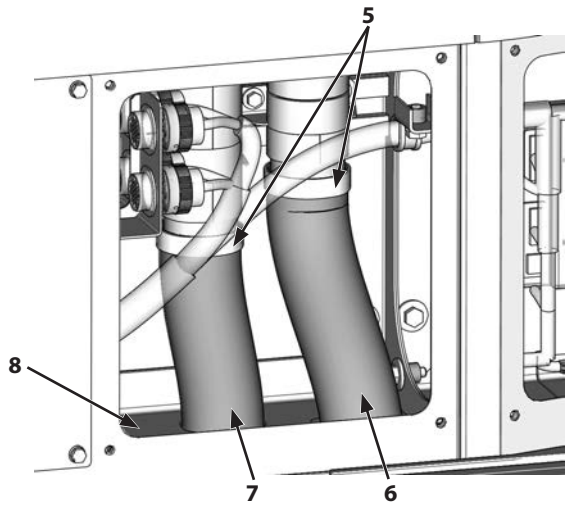
Detail A



WKFB91-03-01-005

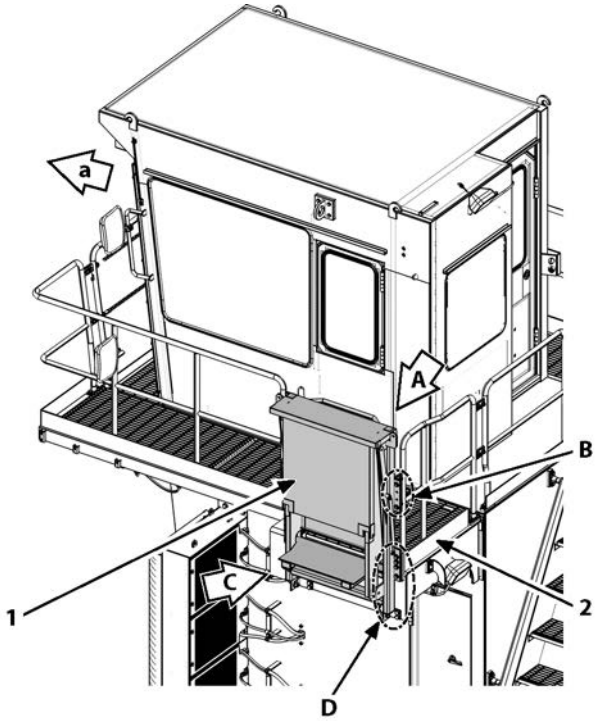
b- Cup Holder c- Emergency Hammer

Detail B



WKFB91-03-01-006

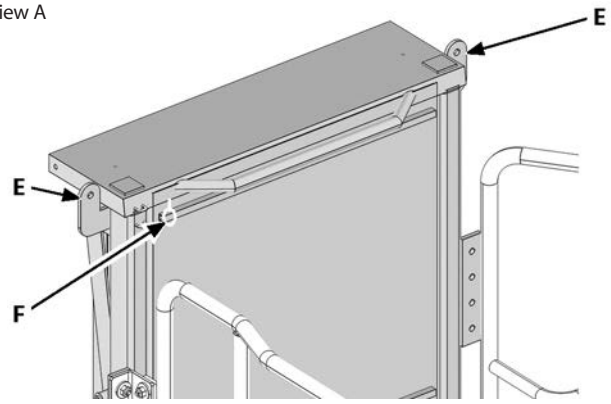
Removal and Installation of Escape Device



a- Machine Front Side

WKGB91-03-01-101

View A



WKGB91-03-01-102

E- Suspension Bracket F- Lock Pin

Removal

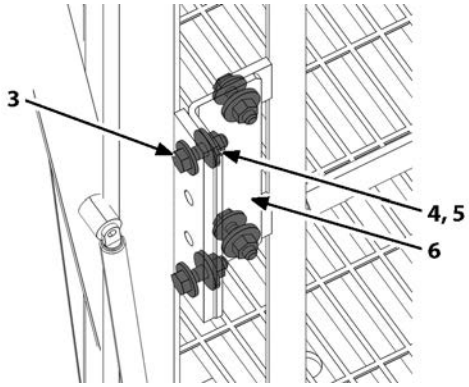
1. Set the machine position for inspection and maintenance. Stop the engine. Turn OFF the isolation switch. (Refer to W1-6-1.)

CAUTION: Escape device (1) weight: 195 kg (430 lb)

IMPORTANT: Be careful not to remove the lock pin (F) of escape device (1).

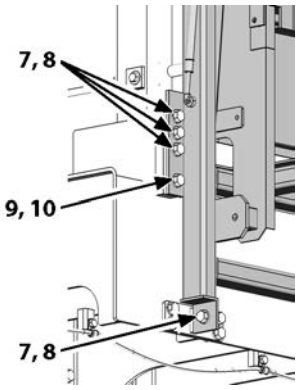
2. Install shackles (2 used) onto lifting brackets (E) (2 places) of escape device (1). Attach nylon slings onto the shackles. Hoist and hold escape device (1).

Detail B



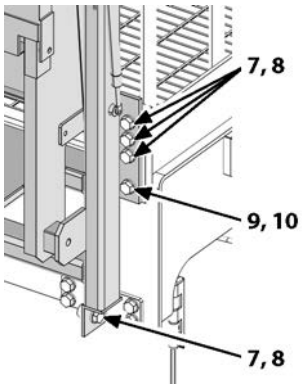
WKGB91-03-01-103

View C



WKGB91-03-01-104

Detail D



WKGB91-03-01-105

3. Remove bolts and washers (3) (4 used), nuts (4) (4 used), and washers (5) (4 used). Remove plate (6).

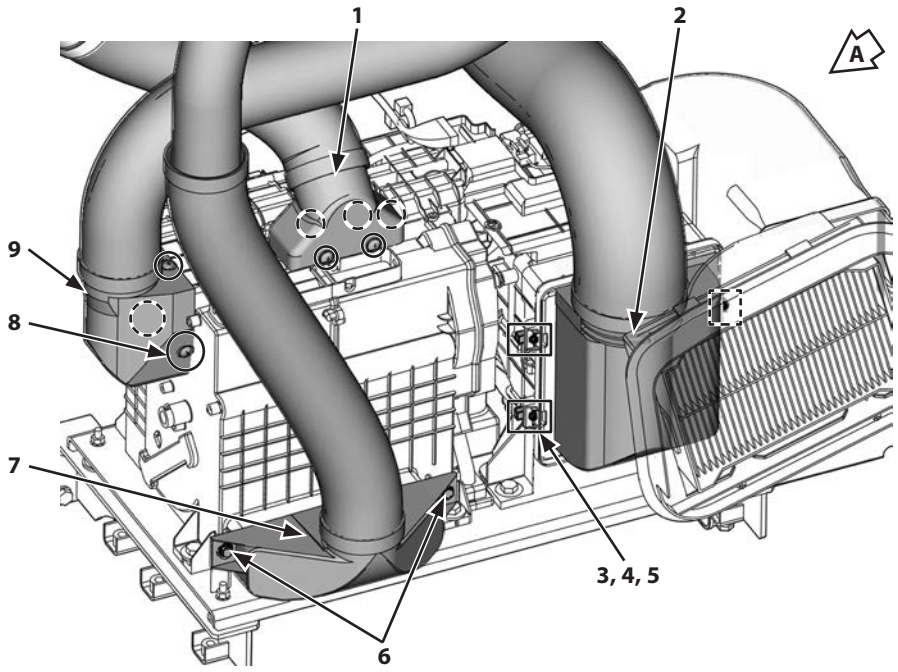
: 19 mm

4. Remove bolts (7) (8 used), bolts (9) (2 used), washers (8) (8 used), and washers (10) (2 used).

: 24 mm

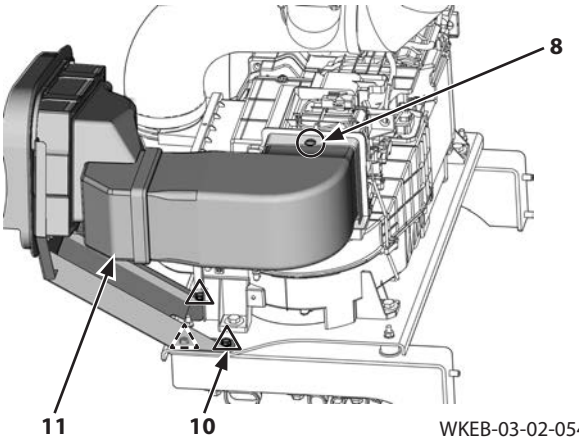
5. Hoist and remove escape device (1) from step (2).

NOTE: Remove escape device (1) in the stored condition when removing it.

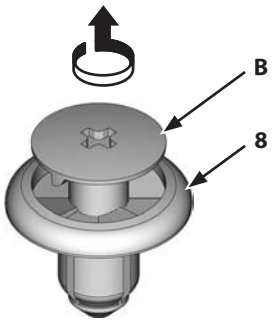


WKEB-03-02-053

View A



WKEB-03-02-054



B- Pin

WKEB-03-02-055

9. Remove bolts, washers (6) (2 used). Disconnect duct (7).

   : 13 mm

   : 10 N·m (7.4 lbf·ft)

10. Remove rivets (8) and bolts, washers (10) (3 used). Remove the duct (11) assembly.

    : 13 mm

    : 10 N·m (7.4 lbf·ft)

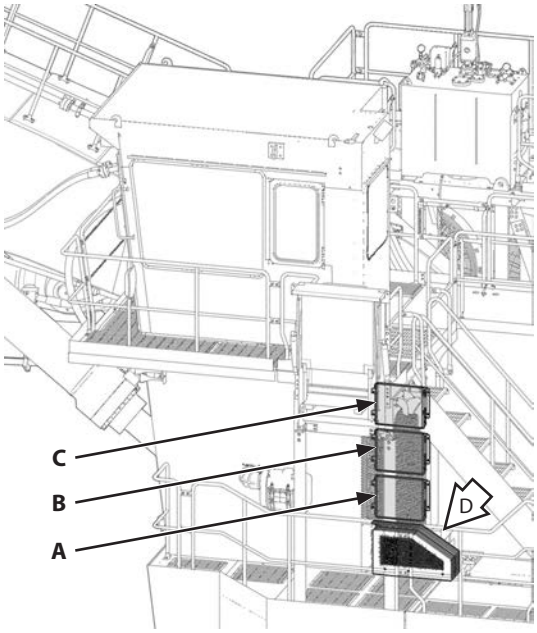
NOTE: Turn pin (B) by using a screwdriver for removing rivet (8).

[At installation]

- Set rivets (8) to the mounting holes and push pins (B) for installing rivets (8).

11. Remove screws (3) (3 used), washers (4) (3 used) and clamps (5) (3 used). Disconnect duct (2).
12. Remove rivets (8) (3 used). Disconnect duct (9).
13. Remove rivets (8) (5 used). Disconnect duct (1).

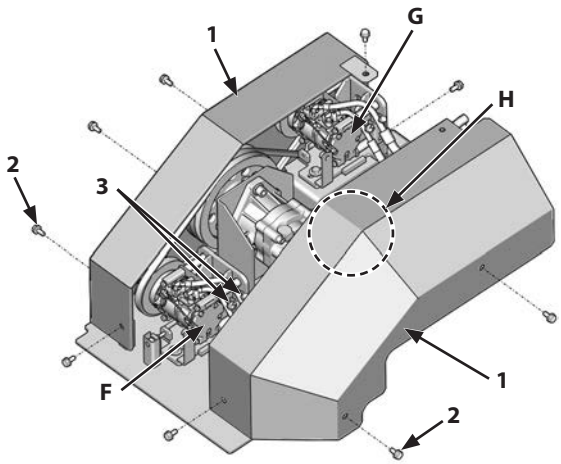
Removal and Installation of Air Conditioner Condensers



WKFB91-03-02-008

A- Air Conditioner Condenser (Rear)
B- Air Conditioner Condenser (Left)
C- Air Conditioner Condenser (Right)

View D



WKFB91-03-02-006

F- Air Conditioner Compressor (Rear)
G- Air Conditioner Compressor (Left)
H- Air Conditioner Compressor (Right)

- The air conditioner condensers are located on the outside of the cab bed. There are 3 air conditioner condensers. The procedures for removal and installation are nearly identical. The explanation here is for air conditioner condenser (rear) (A).

In this sub group, only the removal procedure is described. Perform installation in the reverse order to removal. Information necessary for installation is described as [At installation].

CAUTION: The refrigerant is harmful to the environment. Be sure to recover all of the refrigerant. Servicing, recharging (charging), recovery, and other work must be performed only by a trained and qualified technician.

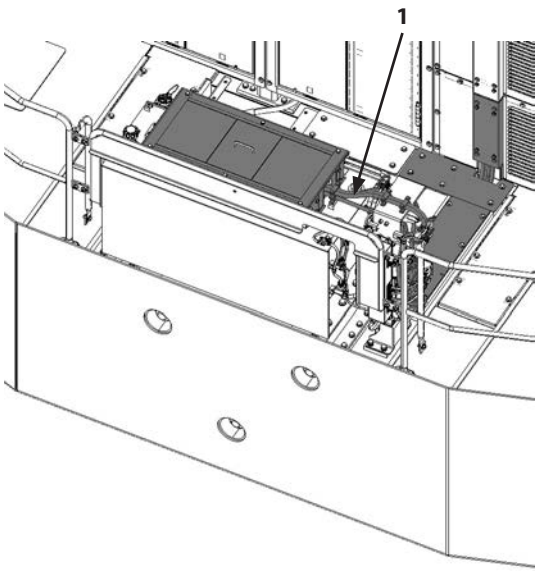
IMPORTANT: Cap the open ends in case the hoses and pipes have been disconnected. In addition, attach an identification tag onto the connectors, hoses, and pipes for assembly. If the clips which secure the hoses have been removed, install the clips after connecting the hoses.

Removal

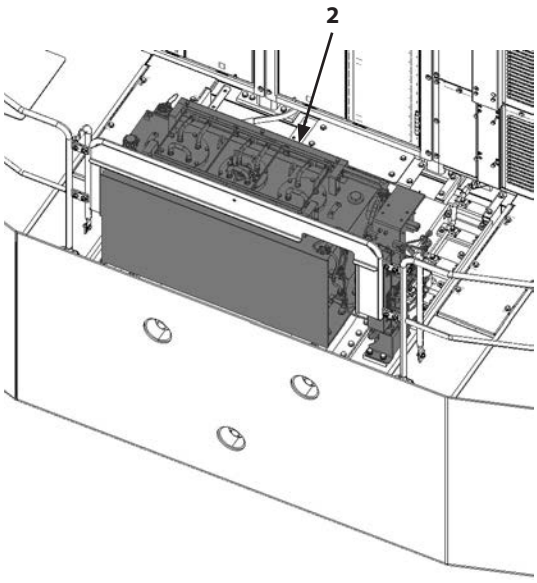
1. Set the machine position for inspection and maintenance. Stop the engine. Turn OFF the isolation switch. (Refer to W1-6-1.)
2. Remove bolts and washers (2) (9 used). Remove covers (1) (2 used).

   : 17 mm

   : 50 N·m (37.0 lbf·ft)
3. Connect the refrigerant recovery equipment to ports (3) (2 places) on air conditioner compressor (rear) (F). Recover the refrigerant. (Refer to W3-2-8.)



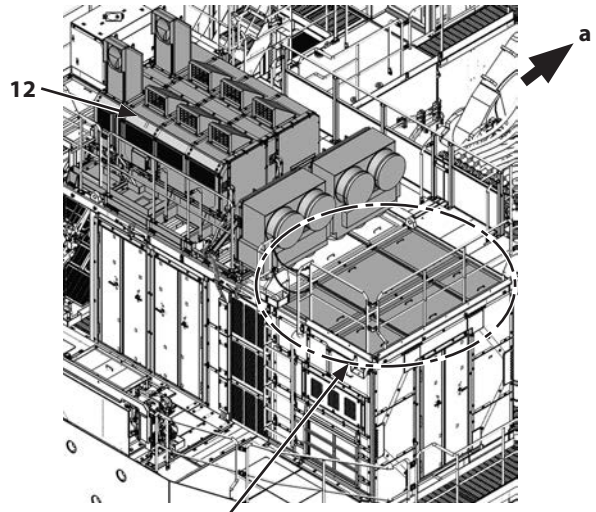
WKFB91-03-03-003



WKFB91-03-03-004

5. Remove the cover and DEF hose assembly (1) and place the cover and DEF hose assembly (1) outside the work area. (Refer to W3-10-2.)
6. Remove the DEF tank (2) assembly. (Refer to W3-10-1.)

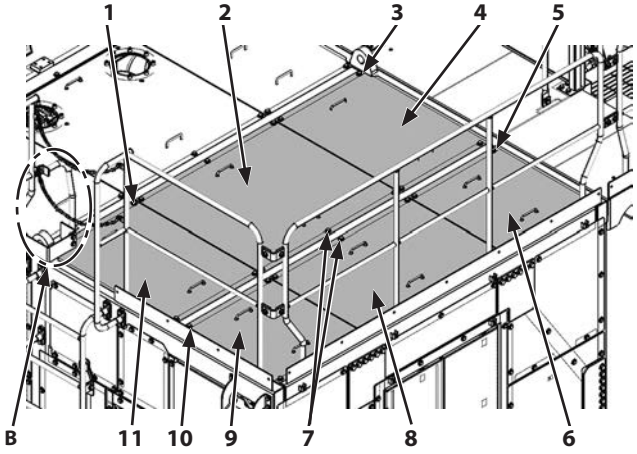
Removal of Upper Covers



a- Machine Front Side

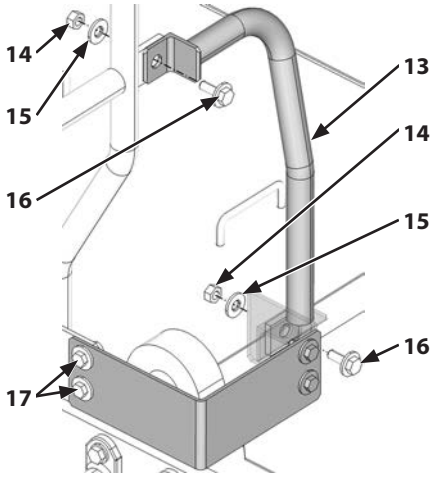
WKFB91-03-06-106

Detail A



WKFB91-03-06-108

Detail B



WKFB91-03-06-118

1. Remove intake exhaust unit (12). (Refer to W3-5-1.)
2. Remove bolts, washers (16, 17) (2 used for each), nuts (14) (2 used), and washers (15) (2 used). Remove the stay (13) assembly.

   Bolt, Washer (16)

   : 19 mm

   : 90 N·m (66 lbf·ft)

   Bolt, Washer (17)

   : 17 mm

   : 50 N·m (37 lbf·ft)
3. Remove bolts, washers (1, 3, 5, 10) (4 used for each). Remove covers (4, 6, 9, 11).

   : 19 mm

   : 90 N·m (66 lbf·ft)

CAUTION: Cover (8) weight: 23 kg (51 lb)

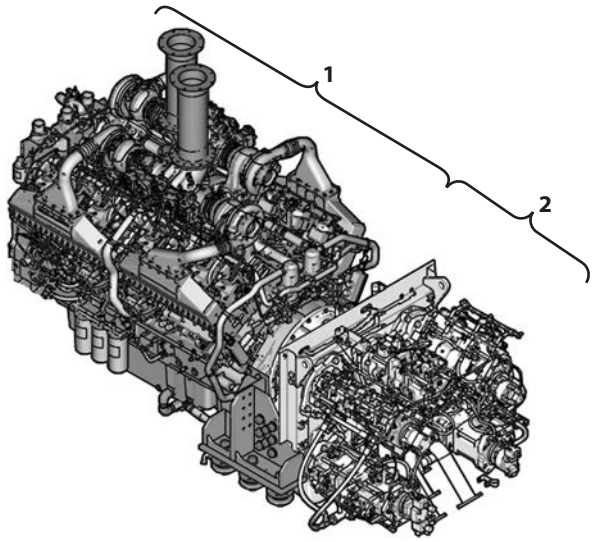
4. Attach nylon slings onto cover (8). Hoist and hold cover (8).
5. Remove bolts, washers (7) (6 used). Remove cover (8).

   : 19 mm

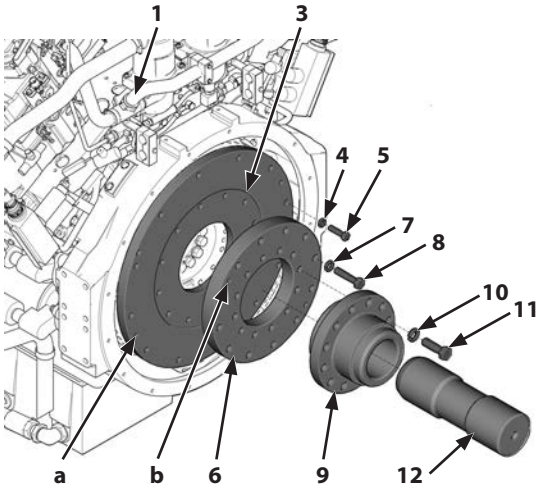
   : 90 N·m (66 lbf·ft)

CAUTION: Cover (2) weight: 29 kg (64 lb)

6. Remove cover (2) in the same way as step 4 to step 5.



WKFB91-03-05-062



WKFB91-03-05-092

a,b- Lifting Hole

9. Remove pump device (2) and shaft (12) from engine (1). (Refer to W3-6-1 Removal of Pump Device.)

CAUTION: The hub (9) assembly weight: 45 kg (100 lb)

10. Attach nylon slings to the hub (9) assembly. Hoist and hold the hub (9) assembly.
11. Remove bolts (11) (12 used) and washers (10) (12 used). Remove the hub (9) assembly.

: 36 mm

: 950 N·m (700 lbf·ft)

NOTE: LOCTITE #242 has been applied to bolt (11).

CAUTION: Plate (6) weight: 42 kg (93 lb)

12. Install rotating eyebolts (M16, Pitch 2 mm) (2 used) to lifting holes (b) (2 places) of plate (16). Attach nylon slings onto the rotating eyebolts (2 used). Hoist and hold plate (6).
13. Remove bolts (8) (12 used) and washers (7) (12 used). Remove plate (6).

: 30 mm

: 550 N·m (410 lbf·ft)

NOTE: LOCTITE #242 has been applied to bolt (8).

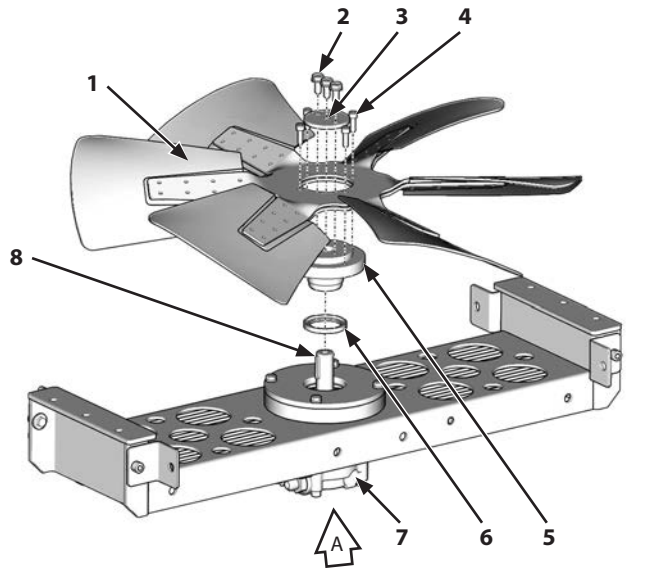
CAUTION: Plate (3) weight: 88 kg (195 lb)

14. Install rotating eyebolts (M16, Pitch 2 mm) (2 used) to lifting holes (a) (2 places) of plate (3). Attach nylon slings onto the rotating eyebolts (2 used). Hoist and hold plate (3).
15. Remove bolts (5) (12 used) and washers (4) (12 used). Remove plate (3).

: 24 mm

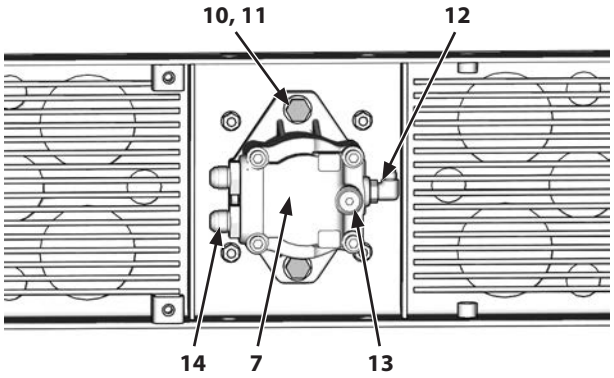
: 270 N·m (200 lbf·ft)

NOTE: LOCTITE #242 has been applied to bolt (5).



WKFB91-03-05-029

View A



WKFB91-03-05-030

9. Remove bolts, washers (2) (3 used). Remove stopper (3).

: 19 mm

: 90 N·m (66 lbf·ft)

NOTE: LOCTITE #242 or equivalent has been applied onto bolts, washers (2) (3 used).

[Installation Info]

- Apply LOCTITE #242 or equivalent onto bolts, washers (2) (3 used).

10. Remove socket bolts (4) (4 used). Remove the fan (1) assembly.

: 8 mm

: 100 N·m (74 lbf·ft)

NOTE: LOCTITE #242 or equivalent has been applied onto socket bolts (4) (4 used).

[Installation Info]

- Apply LOCTITE #242 or equivalent to socket bolts (4) (4 used).

IMPORTANT: Oil seal (6) and key (8) cannot be reused.

11. Remove coupling (5), oil seal (6), and key (8).

[Installation Info]

- Check the position to install coupling (5). Refer to Assembly procedure of coupling (W3-5-4-4).

12. Remove bolts (10) (2 used) and washers (11) (2 used). Remove fan motor (7).

: 24 mm

: 270 N·m (200 lbf·ft)

[Installation Info]

- Check the position to install fan motor (7). Refer to Assembly procedure of coupling (W3-5-4-4).
- Remove plug (13). Add hydraulic oil to fan motor (7). Install plug (13).

: 8 mm

: 23±1 N·m (17±0.7 lbf·ft)

NOTE:

Amount of oil: 0.38 to 0.58 L (0.1 to 0.153 US gal)

13. Remove the adapters with fan motor (7) attached if necessary.

[Installation Info]

NOTE:

Elbow (12)

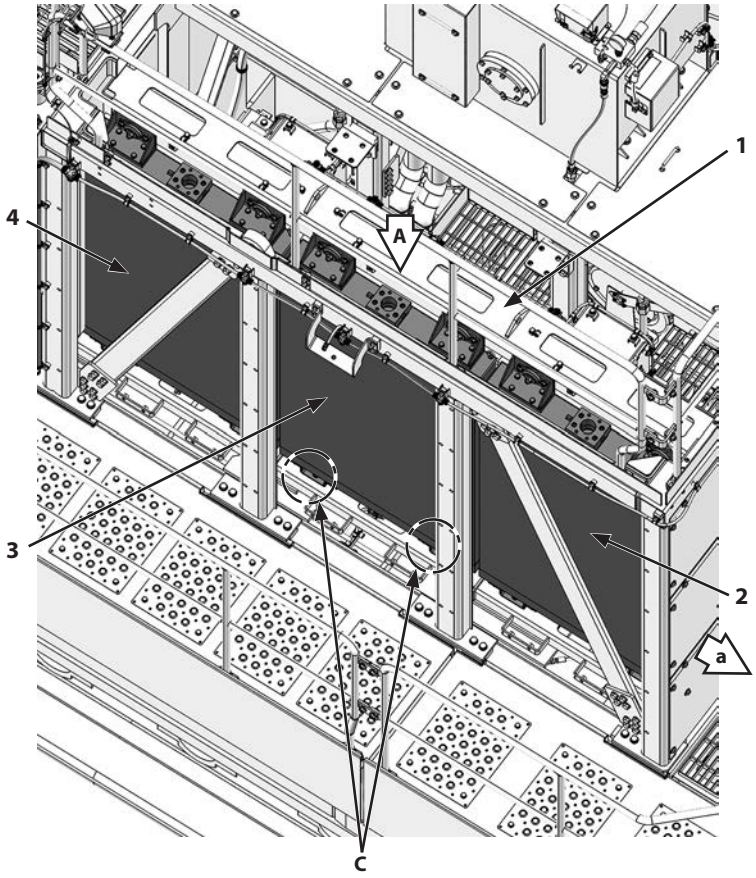
: 22 mm

: 70 N·m (52 lbf·ft)

Adapter (14)

: 36 mm

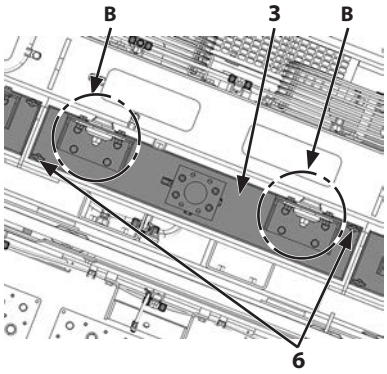
: 180 N·m (133 lbf·ft)



WKFB91-03-05-119

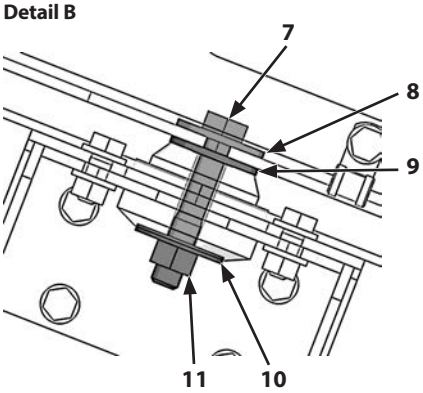
a- Machine Front Side

View A



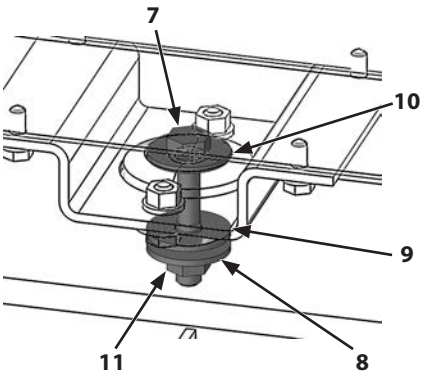
WKFB91-03-05-120

Detail B



WKFB91-03-05-121

Detail C



WKFB91-03-05-122

CAUTION: The oil cooler core (3) assembly weight: 175 kg (390 lb)

25. Attach nylon slings onto eyebolts (6) (2 used) of oil cooler core (3). Hoist and hold the oil cooler core (3) assembly.
26. Remove bolts (7) (4 used), washers (8, 9, 10) (4 used for each), and nuts (11) (4 used). Remove the oil cooler core (3) assembly from frame (1).

    : 24 mm

    : 160 N·m (118 lbf·ft)

CAUTION: The oil cooler core (2, 4) assembly weight: 175 kg (390 lb) for each

27. Remove the oil cooler core (2, 4) assemblies in the same way as steps 25 to 26.
28. Remove the adapters with oil cooler cores (2, 3, 4) attached if necessary.

Assembly procedure of coupling

1. Apply grease onto the fan motor (1) shaft.
2. Install special tool (ST 8406) to housing (4). Insert the fan motor (1) shaft into special tool (ST 8406) and adjust the installation position. Install bolt (2) and washer (3). Remove special tool (ST 8406).

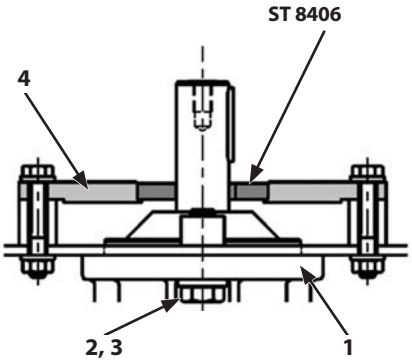
   : 24 mm

   : 270 N·m (200 lbf·ft)
3. Tap special tool (ST 8406) by using a plastic hammer to install oil seal (5) to housing (4). Remove special tool (ST 8406).
4. Install key (6) to the fan motor (1) shaft.

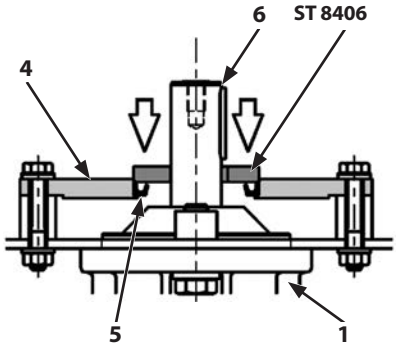
IMPORTANT: Check the position to install coupling (7).

5. Apply rubber grease onto the grease applying part (a) of coupling (7) and the lip part of oil seal (5). Tap coupling (7) by using a plastic hammer until the installation position of coupling (7) reaches dimensions b, c. Install coupling (7) to the fan motor (1) shaft.

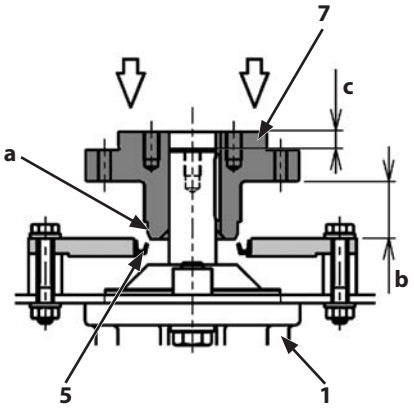
NOTE: When fixing coupling (7), dimension c becomes 0 mm by tightening bolts, washers.



WKFB91-03-05-021

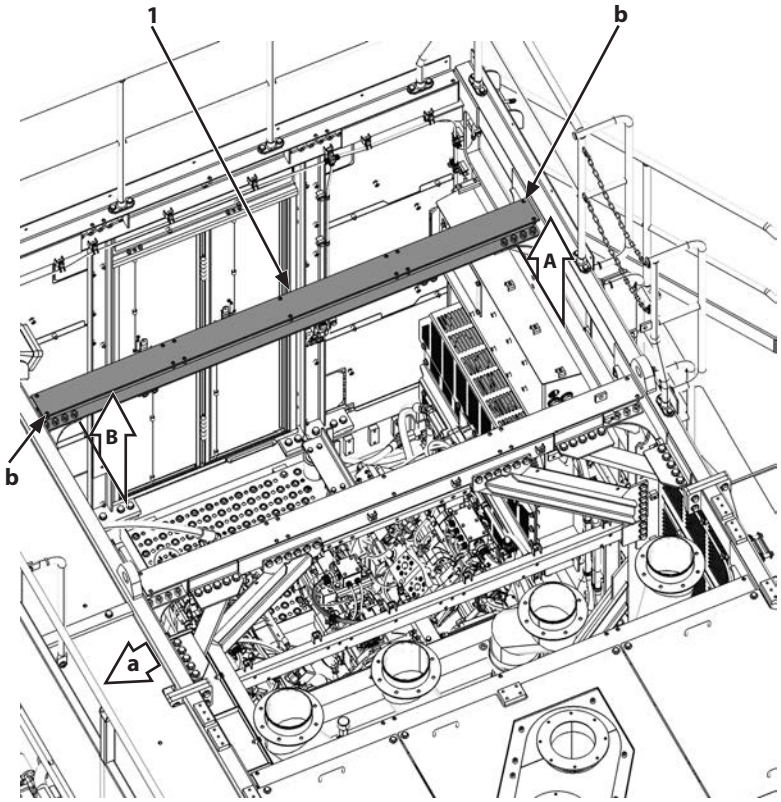


WKFB91-03-05-022



WKFB91-03-05-023

a- Grease Applying Part b- 41.2 mm (1.622 in) c- 12 mm (0.472 in)

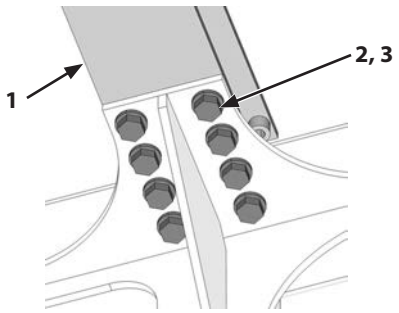


WKFB91-03-06-132

a- Machine Front

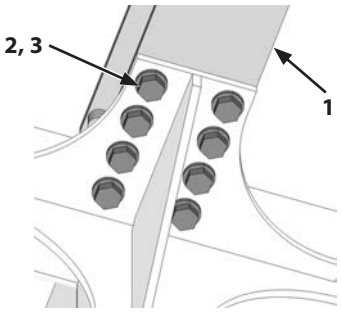
b- Lifting Hole (M12, Pitch 1.75 mm)

View A



WKFB91-03-06-133

View B



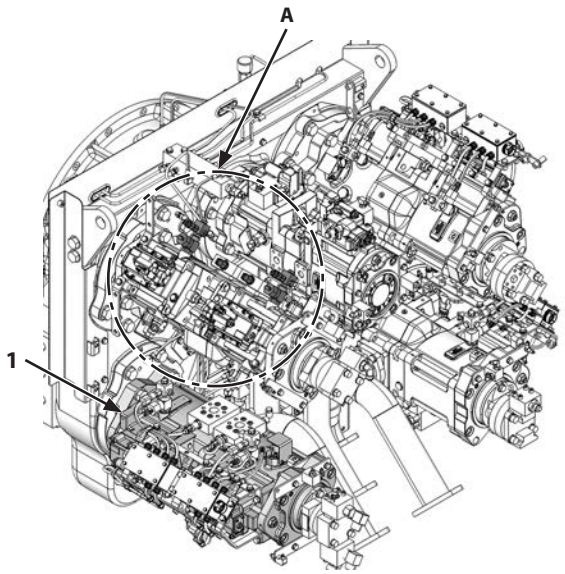
WKFB91-03-06-134

CAUTION: Beam (1) weight: 58 kg (130 lb)

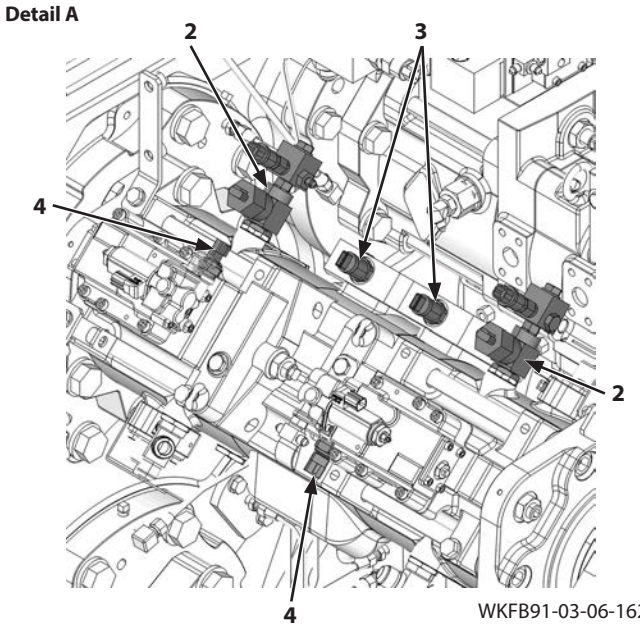
33. Install eyebolts (M12, Pitch 1.75 mm) (2 used) to diagonally opposite lifting holes (b) of beam (1). Attach nylon slings onto the eyebolts (2 used). Hoist and hold beam (1).
34. Remove bolts (2) (16 used) and washers (3) (16 used). Remove beam (1).

: 24 mm

: 270 N·m (200 lbf·ft)



WKFB91-03-06-194



WKFB91-03-06-162

25. Remove the tee (2) assemblies (2 used) and sensors (3, 4) (2 used for each).

    Tee (2) Assembly

    : 32 mm

    : 180 N·m (133 lbf·ft)

    Sensor (3)

    : 27 mm

    : 98 N·m (72 lbf·ft)

    Sensor (4)

    : 27 mm

    : 39.2 N·m (29 lbf·ft)

26. Perform the same work as step 21 to step 25 for pump (1).

Disassembly of Tandem Pumps

- The disassembly procedure for the main pumps is explained here. The fan motor drive pumps have the same basic pump parts although the direction of the cover, and the numbers of socket bolts, plugs, and O-rings are different.

CAUTION: The main pump assembly weight: (Refer to List of Weights (W3-6-3-21).)

IMPORTANT: Do not remove set screws (11, 48) (2 used for each) and lock nuts (10, 49) (2 used for each) as the setting of the pump flow rate control changes.

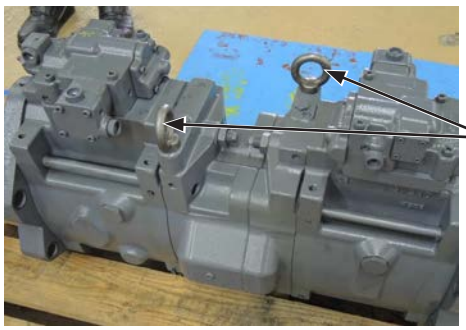
IMPORTANT: The parts of housing (28) are same as those of housing (62). Do not confuse the disassembled parts.

IMPORTANT: Valve plate (42) is different from valve plate (53). Record the position and the direction to install valve plates (42, 53) before removing.

Preparation

Install eyebolts (47) (M16) (2 used). Attach nylon slings onto eyebolts (47) (2 used). Hoist the main pump assembly. Install the main pump assembly to special tool (ST 4242) with bolts (M24, Pitch 3 mm) (4 used). Install special tool (ST 4242) to workbench (ST 4243) with bolts (4 used) and nuts (4 used) in order to receive a reaction force.

: 19 mm

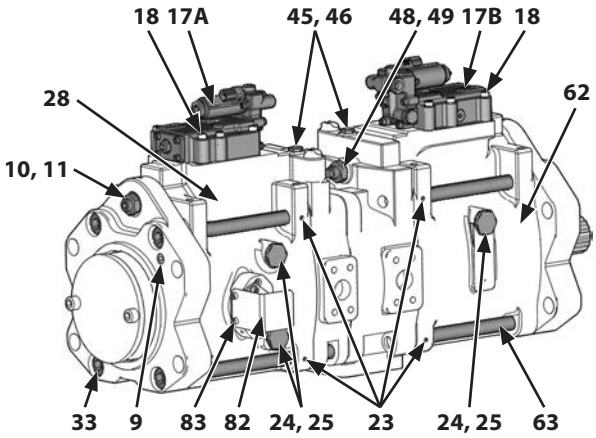


WKGB91-03-06-023

WKGB91-03-06-024

WKGB91-03-06-047

Disassembly of the Main Pump Assembly



WKFB91-03-06-006

1. Remove socket bolts (18) (12 used). Remove regulators (17A, 17B).
   : 6 mm

NOTE: Check that O-ring of regulator (17) does not fall off.

2. Remove plugs (25) (6 used) and plugs (46) (2 used). Drain hydraulic oil from housings (28, 62).
   : 36 mm, 19 mm
3. Remove O-rings (24) (6 used) from plug (25). Remove O-rings (45) (2 used) from plug (46).
4. Remove set screws (23) (8 used) (main pump only).
   : 4 mm

NOTE: LOCTITE #263 or equivalent has been applied to set screw (23).

5. Loosen socket bolts (33) (4 used), socket bolts (9) (4 used), and socket bolts (63) (4 used).
   : 17 mm, 8 mm
6. Remove socket bolts (83) (4 used) (main pump only). Remove covers (82) (2 used) from units (70) (2 used).
   : 5 mm
7. Remove socket bolts (79) (4 used) and washers (80) (4 used) (main pump only). Remove swash plate angle sensors (78) (2 used), O-rings (77) (2 used), and plate springs (76) (2 used).
   : 5 mm
8. Remove socket bolts (81) (4 used) (main pump only).
   Remove units (70) (2 used).
   : 6 mm

38. Apply LOCTITE #263 or equivalent to the thread part of set screws (23) (8 used) (main pump only). Install set screws (23) (8 used).

    : 4 mm

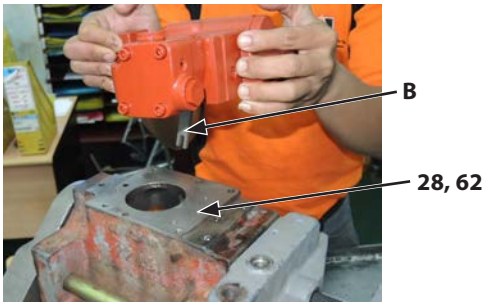
    : 12 N·m (8.9 lbf·ft)

39. Install O-rings (24) (6 used) to plugs (25) (6 used). Install O-rings (45) (2 used) to plugs (46) (2 used).

40. Install plugs (25) (6 used) and plugs (46) (2 used) to the main pump assembly.

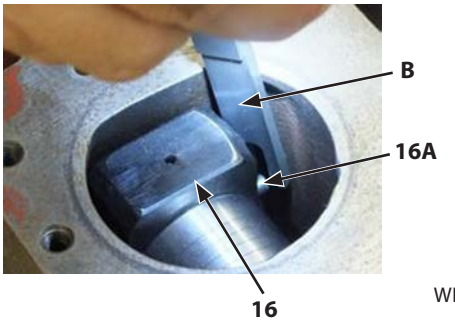
    : 36 mm, 19 mm

41. Fit the groove on feedback lever (B) of regulator (17) to pin (16A) of tilting pin (16).

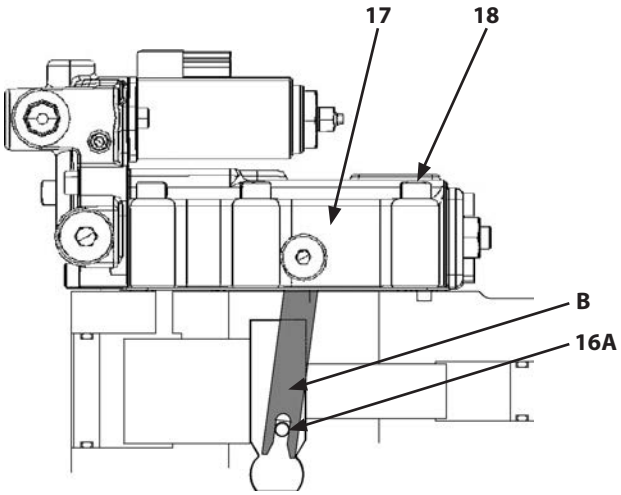


WKGB91-03-06-045

B- Feedback Lever



WKGB91-03-06-046



WKEB-03-06-012

B- Feedback Lever

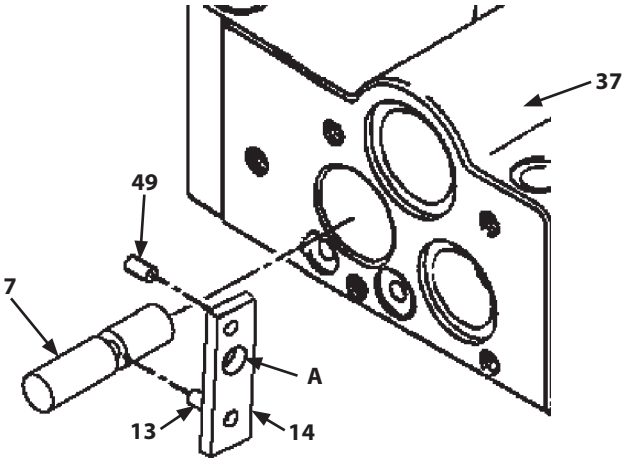
42. Install regulators (17) (2 used) with socket bolts (18) (12 used).

    : 6 mm

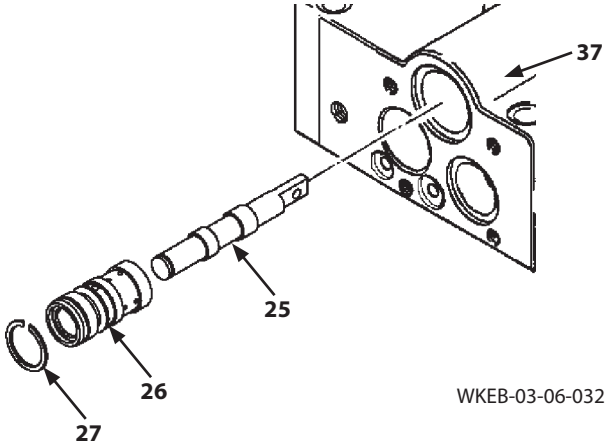
    : 29 N·m (21.5 lbf·ft)

NOTE: Check that O-ring of regulator (17) does not fall off.

Assembly of Regulator for Fan Motor Drive Pump



WKEB-03-06-031



WKEB-03-06-032

A- Hole of Lever (14)

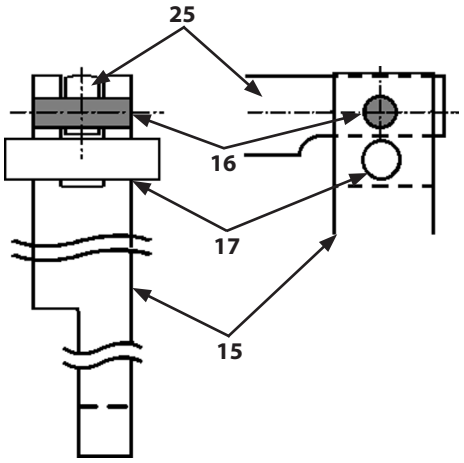
IMPORTANT: Before assembling, apply hydraulic oil to parts in order to prevent them from seizing.

IMPORTANT: Do not turn lock nuts (42, 46, 47), set screws (40, 48), and stopper (11). If turning, the setting changes.

1. Install compensating rod (7) to casing (37).
2. Fit pin (13) of lever (14) to the groove of compensating rod (7). Install lever (14) to pin (49) in casing (37).

IMPORTANT: Check the direction to install spool (25). After installing spool (25), check that spool (25) can smoothly move by hand.

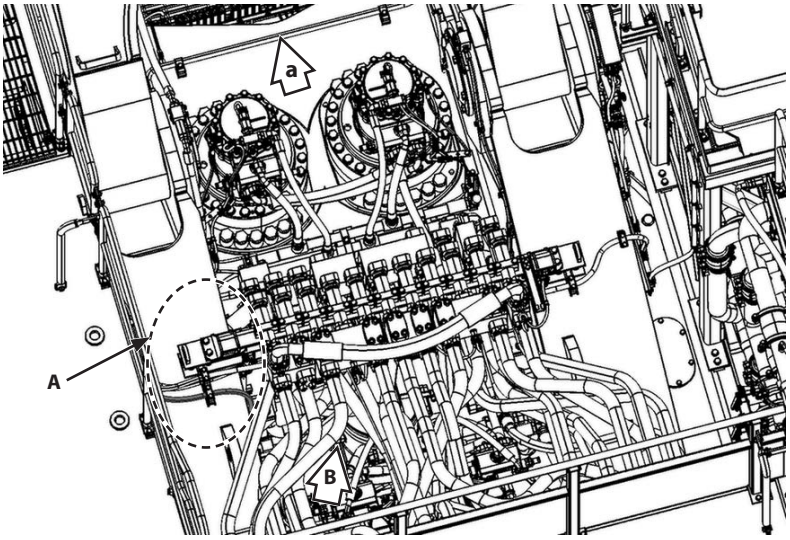
3. Install retaining ring (27) to sleeve (26). Install sleeve (26) and spool (25) to casing (37).



WKEB-03-06-033

IMPORTANT: Check the direction to install feedback lever (15).

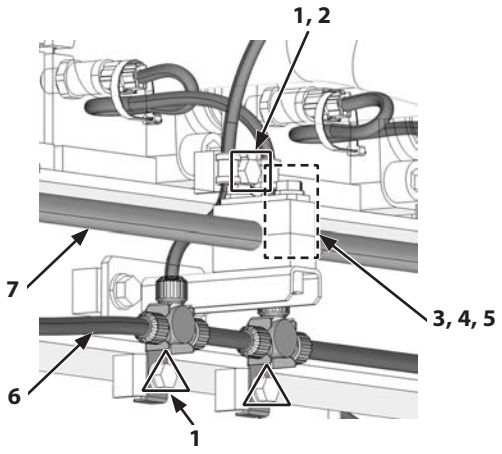
4. Install feedback lever (15) to spool (25) with pin (16). Fit pin (17) to hole (A) of lever (14).



a- Machine Front Side

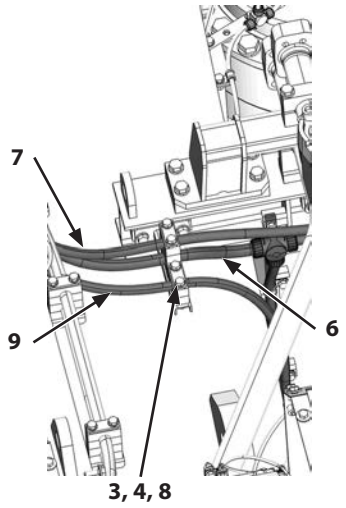
WKFB91-03-07-111

Detail C



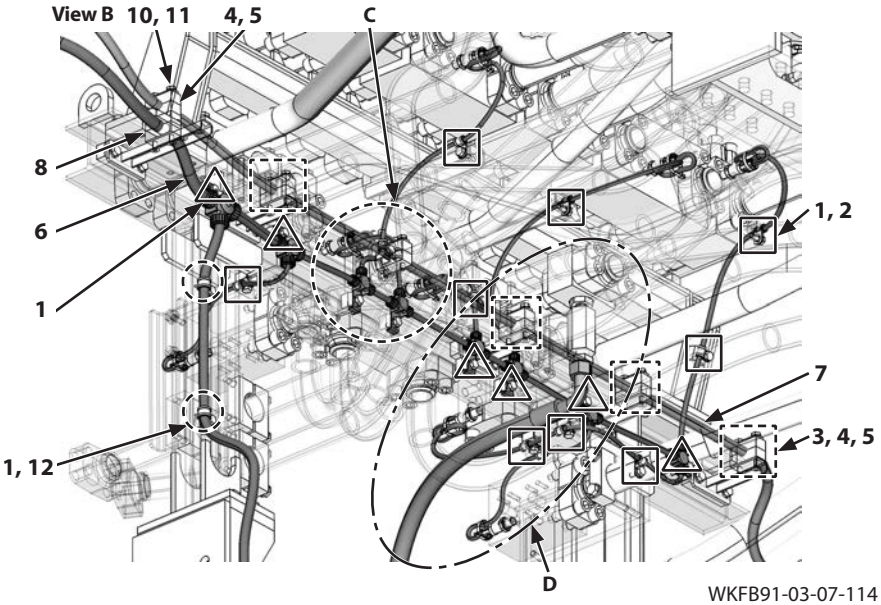
WKFB91-03-07-112

Detail A



WKFB91-03-07-113

View B



WKFB91-03-07-114

15. Remove bolts, washers (1) (20 used), clips (2) (13 used), and clips (12) (2 used).

: 17 mm

: 50 N·m (37 lbf·ft)

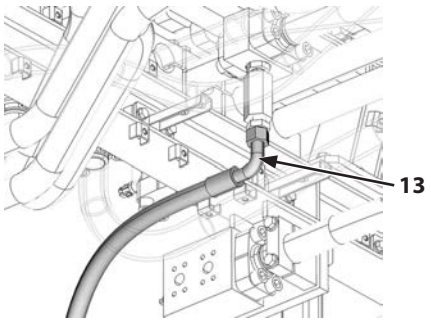
16. Remove the following parts. Place wire harnesses (6, 7, 9) outside the work area.

- Bolts, Washers (3) (12 Used)
- Bolts (10) (2 Used)
- Washers (11) (2 Used)
- Brackets (4) (7 Used)
- Clamps (5) (6 Used), Clamps (8) (2 Used)

: 17 mm

: 12 N·m (8.9 lbf·ft)

Detail D



WKFB91-03-07-144

17. Disconnect hose (13).

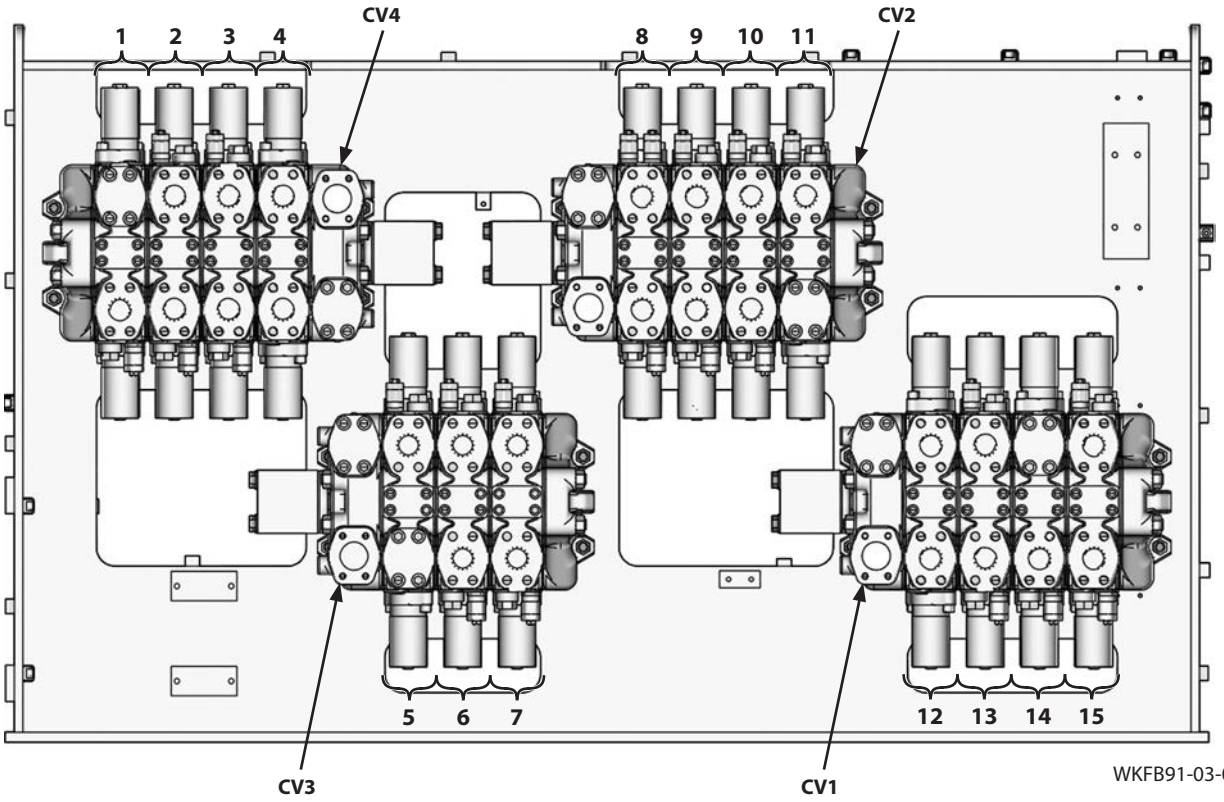
: 41 mm

: 210 N·m (155 lbf·ft)

Disassembly of Control Valve

Layout of Valve Section

NOTE: The illustration shows the layout viewed from the machine front.



WKFB91-03-07-003

CV4- Control Valve 4 (Upper Right)

1- No Use
2- Boom
3- Bucket
4- Right Travel

CV3- Control Valve 3 (Lower Right)

5- Boom Raise
6- Swing
7- Bucket Tilt-In/Arm Extend

CV2- Control Valve 2 (Upper Left)

8- Bucket Open/Close
9- Arm
10- Bucket
11- Boom

CV1- Control Valve 1 (Lower Left)

12- Left Travel
13- Arm
14- Bucket
15- Boom

Disassembly and Assembly of Main Relief Valve and Overload Relief Valve

IMPORTANT: The overload relief valve requires performance tests and adjustments of the unit part. Do not disassemble unless there is a problem.

Disassembly

1. Put matching marks on plug (2) and adjustment screw (15).
2. Place a spanner onto plug (2). Loosen lock nut (13) and remove adjustment screw (15). At this time, do not drop pilot spring (8) and pilot poppet (6).

   : 17 mm, 38 mm

   : 6 mm
3. Secure cap (1) in a vise. Remove plug (2) and O-ring (11) from cap (1).

   : 38 mm
4. Remove spring (7) and sleeve (3) from cap (1).
5. Remove O-ring (9) and backup ring (10) from plug (2).
6. Remove main poppet (4) from sleeve (3).

Assembly

1. Install main poppet (4) into sleeve (3).
2. Install O-ring (9) and backup ring (10) onto plug (2).
3. Install spring (7) into sleeve (3).
4. Install plug (2) into sleeve (3).

NOTE: When installing plug (2) into sleeve (3), install with sleeve (3) standing upright.

IMPORTANT: When installing pilot poppet (6), check that plug (2) is securely inserted.

5. Install pilot poppet (6) and pilot spring (8) into plug (2). Install adjustment screw (15) into plug (2) with the matching marks made at the time of disassembly aligned, and secure it with lock nut (13).

   : 17 mm

   : 50 N·m (37 lbf·ft)

   : 6 mm

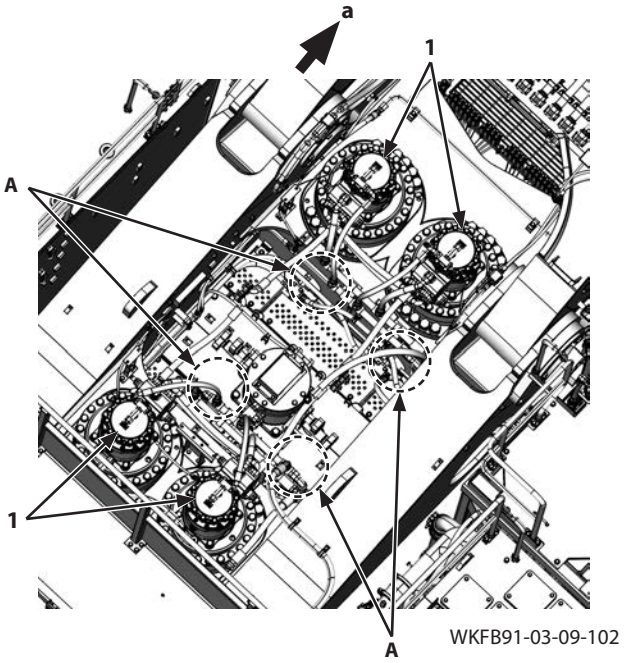
   : 20 N·m (15 lbf·ft)
6. Install O-ring (11) onto plug (2). Install plug (2) to cap (1).

   : 38 mm

   : 150 N·m (111 lbf·ft)

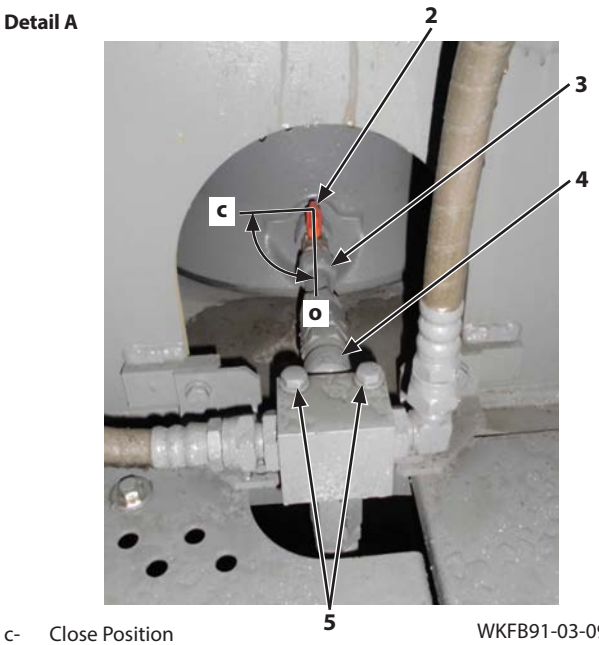
IMPORTANT: After assembly, check that main poppet (4) slides.

IMPORTANT: After assembly, test the performance of main relief valve unit. (Refer to TROUBLESHOOTING/Operational Performance Test in the separated volume, T/M.)



WKFB91-03-09-102

a- Machine Front Side



WKFB91-03-09-110

c- Close Position
o- Open Position

Removal

1. Set the machine position for inspection and maintenance. Stop the engine. Turn OFF the isolation switch. (Refer to W1-6-1.)
2. Remove the control valve assembly. (Refer to W3-7-1.)
3. Drain gear oil from swing device (1). (Refer to Operator's Manual.)

[Installation Info]

- Check the gear oil level. (Refer to Operator's Manual.)

4. Close valve (2) of swing device (1).
5. Remove bolts, washers (5) (2 used).

   : 17 mm

   : 50 N·m (37 lbf·ft)
6. Remove pipe (4) from the pipe (3) assembly. Place it outside the work area.

   : 36 mm

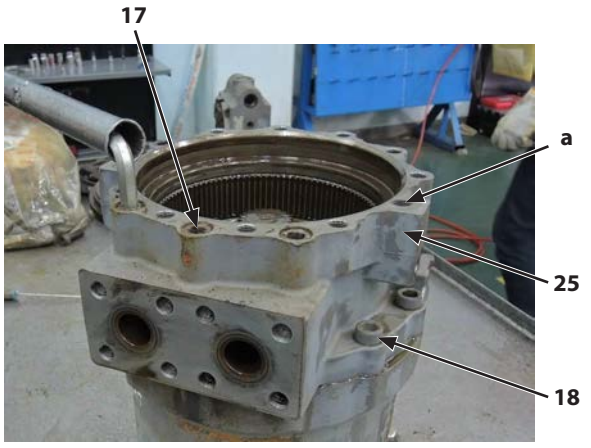
   : 180 N·m (133 lbf·ft)
7. Disconnect the pipe (3) assembly from valve (2).

   : 36 mm

   : 180 N·m (133 lbf·ft)
8. Work for other swing devices (1) (3 used) in the same way as step 3 to step 7.

20. Loosen socket bolts (17) (3 used) and socket bolts (18) (9 used).

: 14 mm



WKEB-03-09-125

a- Screw Hole

CAUTION: The cover (25) assembly weight: 40 kg

21. Install eyebolts (M16, Pitch 2.0 mm) (2 used) to screw holes (a) (2 places) of cover (25). Attach nylon slings onto the eyebolts (2 used). Hoist and hold the cover (25) assembly.

IMPORTANT: When removing the cover (25) assembly, valve plate (31) may be removed together. Do not drop valve plate (31).

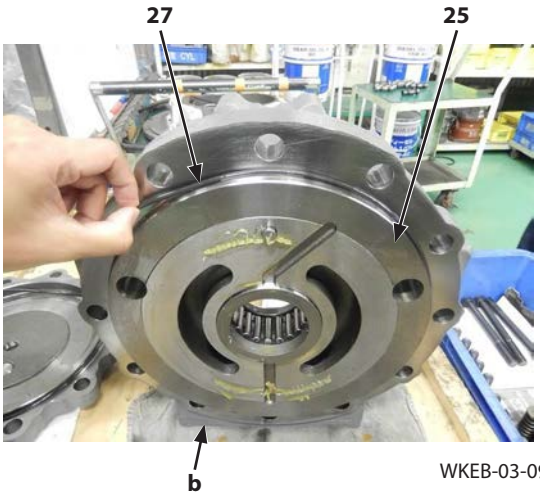
IMPORTANT: Knock pin (26) has been installed by pressing. Do not remove knock pin (26) unless necessary.

22. Remove socket bolts (17) (3 used) and socket bolts (18) (9 used). Remove the cover (25) assembly from casing (9). At this time, the outer race of needle bearing (29) and guide ring (30) are removed with cover (25) together.

: 14 mm

WKEB-03-09-126

23. Place the cover (25) assembly with the valve unit (22) mounting surface (b) down. Remove O-ring (27) from cover (25).

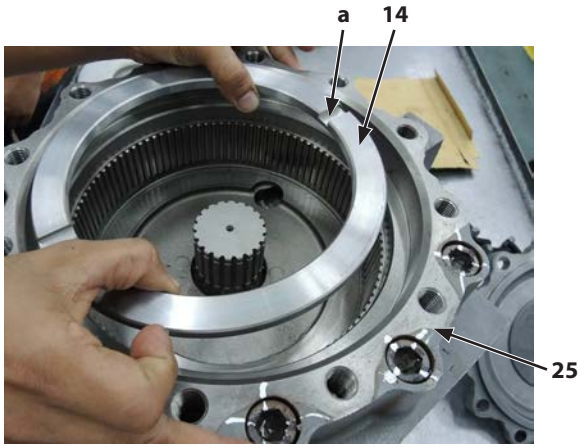


WKEB-03-09-127

b- Valve Unit (22) Mounting Surface

IMPORTANT: Check the direction to install spacer (14).

34. Install spacer (14) to cover (25) with groove (a) up.

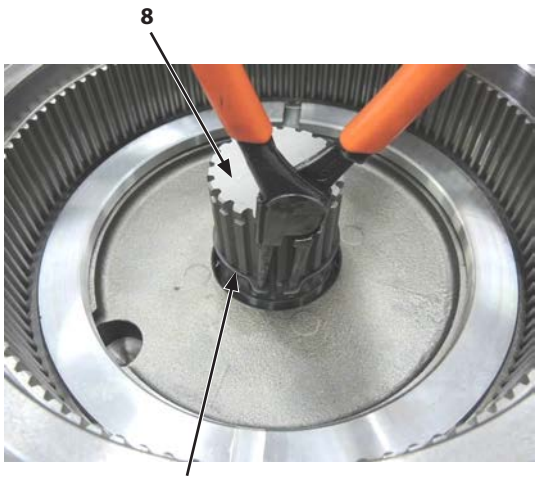


WKEB-03-09-166

a- Groove

IMPORTANT: Install retaining ring (15) with the chamfered side up.

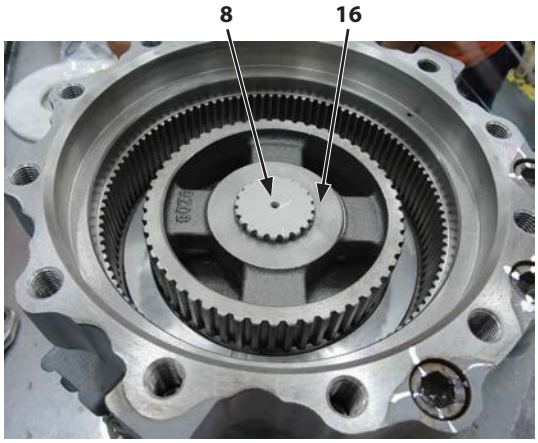
35. Install retaining ring (15) to shaft (8).



WKEB-03-09-167

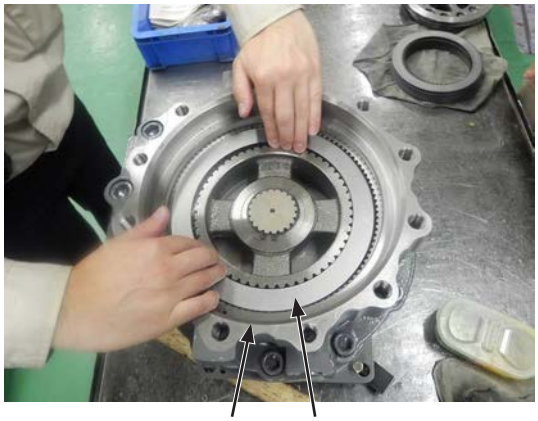
IMPORTANT: Check the direction to install coupling (16).

36. Install coupling (16) to shaft (8) with the stamped mark up.

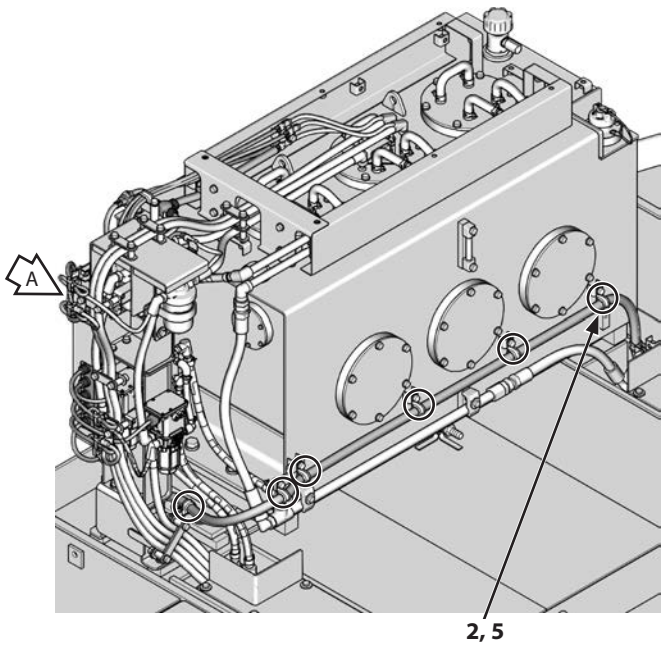


WKEB-03-09-168

37. Install shim (13) to cover (25).

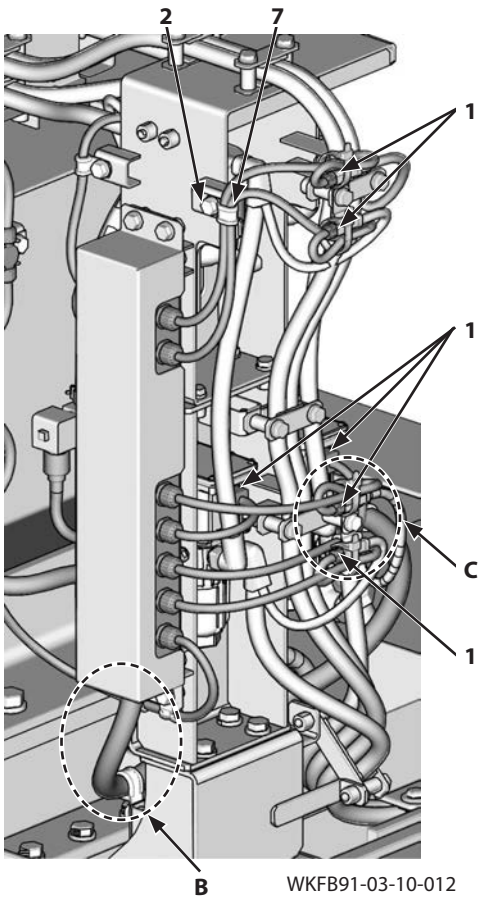


WKEB-03-09-169



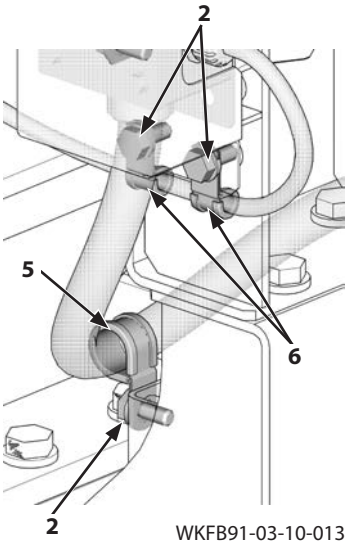
WKFB91-03-10-006

View A



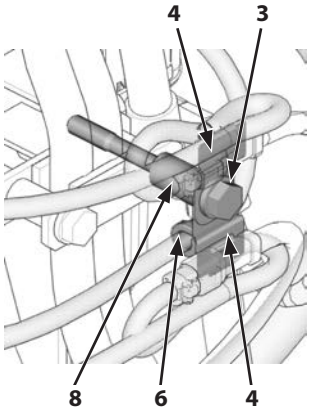
WKFB91-03-10-012

Detail B



WKFB91-03-10-013

Detail C



WKFB91-03-10-014

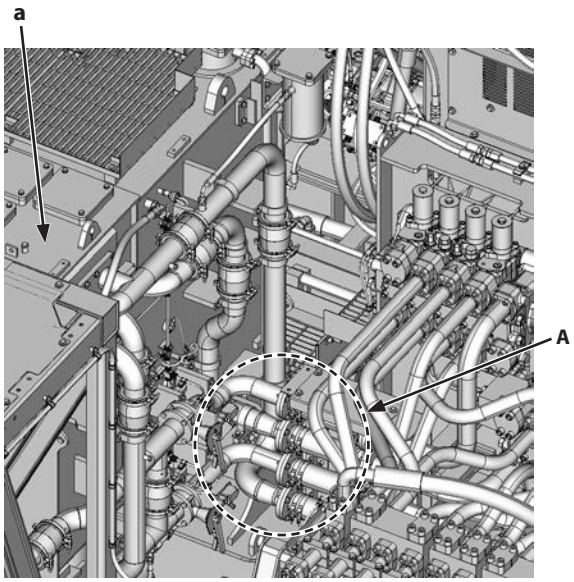
5. Remove the parts below.

- Bolts, Washers (2) (10 Used), and Bolt, Washer (3)
- Brackets (4) (2 Used)
- Clips (5) (7 Used), Clips (6) (3 Used), and Clip (7)
- Spacer (8)

: 17 mm

: 50 N·m (37 lbf·ft)

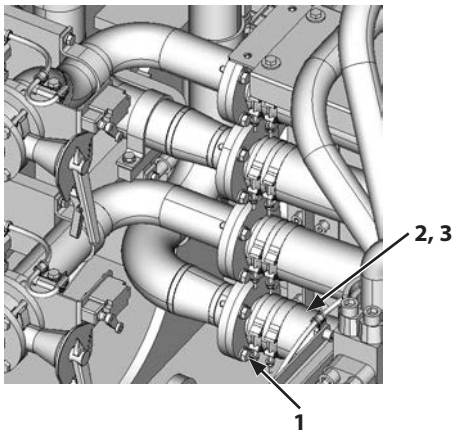
6. Disconnect connectors (1) (6 used).



a- Hydraulic Oil Tank

WKFB91-03-11-021

Detail A



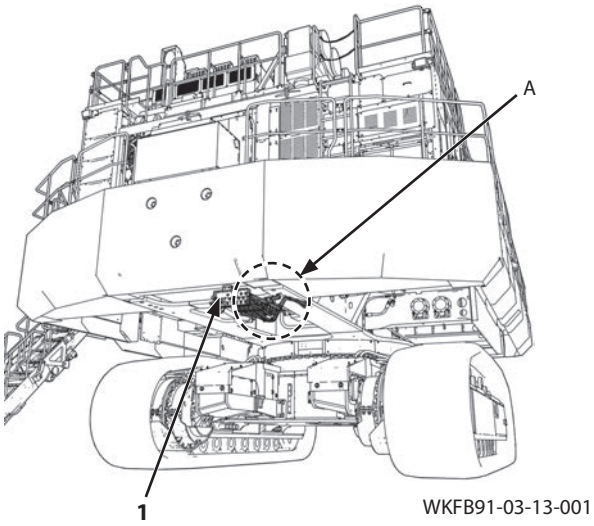
WKFB91-03-11-010

18. Remove bolts, washers (1) (16 used). Disconnect pipes (2) (4 used). Remove O-rings (3) (4 used).

    : 19 mm

    : 90 N·m (66 lbf·ft)

Removal and Installation of Lift Cylinder (Fast-Filling System)



WKFB91-03-13-001

In this subgroup, only the removal procedure is described. Assembly procedure is the reverse order of disassembly. Supplemental information required for assembly is followed by [Installation Info].

IMPORTANT: The hoses and pipes contain hydraulic oil. When removing the hoses and pipes, receive oil with a container in order to avoid spilling.

IMPORTANT: Cap the open ends in case the hoses and pipes have been disconnected. In addition, attach identification tags onto the connectors, hoses, and pipes for assembly. If the clips which secure the hoses have been removed, install the clips after connecting the hoses.

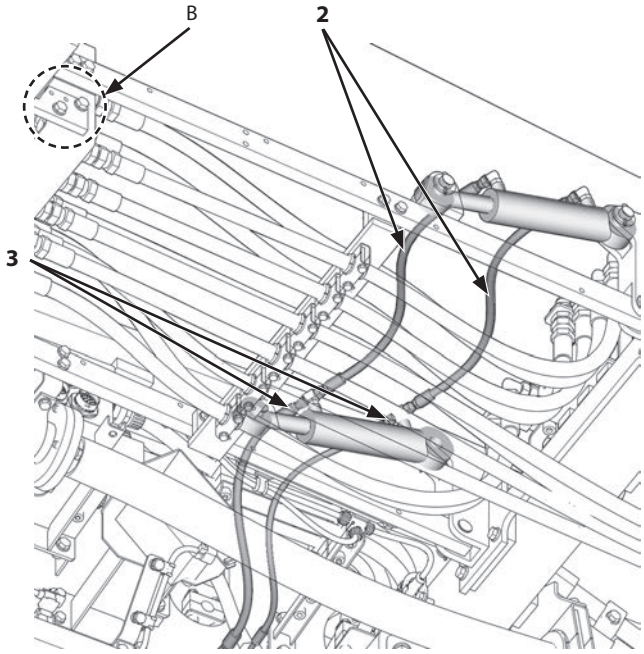
Removal

1. Set the machine position for inspection and maintenance. Set fast-filling system (1) to the retracted position. Stop the engine. Turn OFF the isolation switch. (Refer to W1-6-1.)

CAUTION: Bleed air from the hydraulic oil tank. (Refer to W1-4-1.)

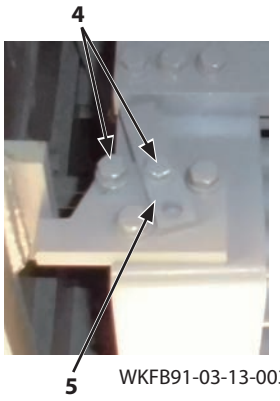
[Installation Info]
- If air is mixed in the cylinder, fast-filling system (1) may suddenly descend when the engine starts.
- Bleed air from the hydraulic system. (Refer to W1-4-2.)
- Check the hydraulic oil level. Start the engine and check for any oil leaks.

Detail A

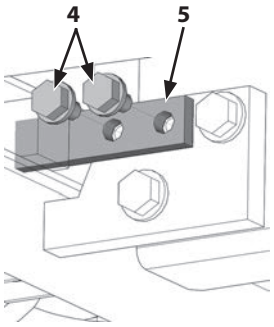


WKFB91-03-13-002

Detail B



WKFB91-03-13-003



WKEB-03-13-002

2. Remove bolts, washers (4) (2 used). Remove stopper (5). Install stopper (5) with bolts, washers (4) (2 used).

: 17 mm

: 50 N·m (37 lbf·ft)

3. Disconnect both ends of hoses (2) (2 used) and hoses (3) (2 used).

: 17 mm

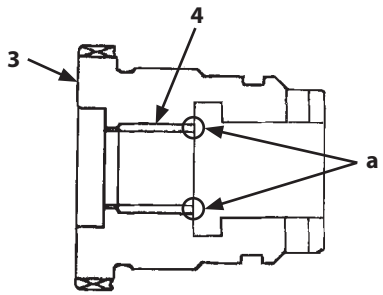
: 25 N·m (18.5 lbf·ft)

Assemble Lift Cylinder

IMPORTANT: Before assembling, apply hydraulic oil to parts in order to prevent them from seizing.

IMPORTANT: The seals cannot be reused. Replace the seals with the new ones.

IMPORTANT: Check that bushing (4) does not protrude from the U-ring (5) mounting part inside of cylinder head (3) in order not to damage U-ring (5).



W1M9-04-02-011

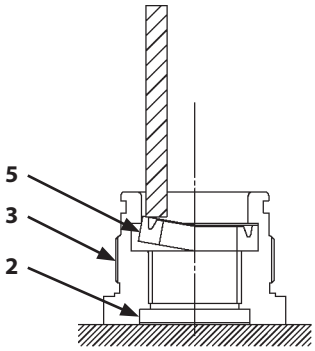
a- Check that bushing (4) does not protrude.

1. Install bushing (4) to cylinder head (3).
2. Install backup ring (6) and O-rings (7, 8) to cylinder head (3).

IMPORTANT: Do not damage U-ring (5).

IMPORTANT: Check the direction to install U-ring (5).

3. Install U-ring (5) and wiper ring (2) to cylinder head (3).



WACG90-05-02-004

4. Install a protective tape onto the thread part of cylinder rod (1) in order to protect the seal of cylinder head (3).
5. Insert the cylinder head (3) assembly into cylinder rod (1).
6. Install seal ring (12) and slide rings (10) (2 used) to piston (13).
7. Install the piston (13) assembly to cylinder rod (1).

   : 50 mm

   : 590 N·m (440 lbf·ft)
8. Install steel ball (14) to piston (13). Install set screw (15). Crimp set screw (15) by using a punch (2 places).

   : 6 mm

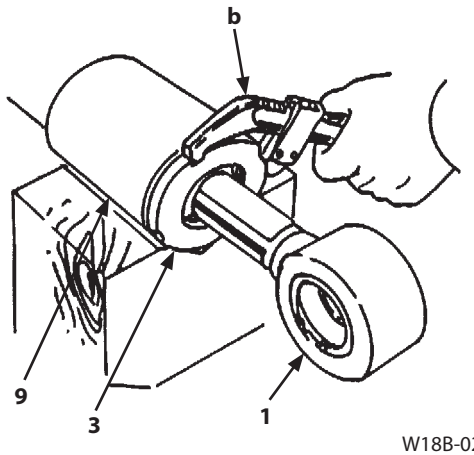
   : 16.5±3 N·m (12±2.2 lbf·ft)

IMPORTANT: Insert the cylinder rod (1) assembly straight in order not to damage the inside of cylinder tube (9).

9. Secure cylinder tube (9) to a workbench horizontally. Insert the cylinder rod (1) assembly into cylinder tube (9).
10. Apply THREEBOND #1901 to the thread part of cylinder head (3). Secure cylinder head (3) to cylinder tube (9) by using hook wrench (b).

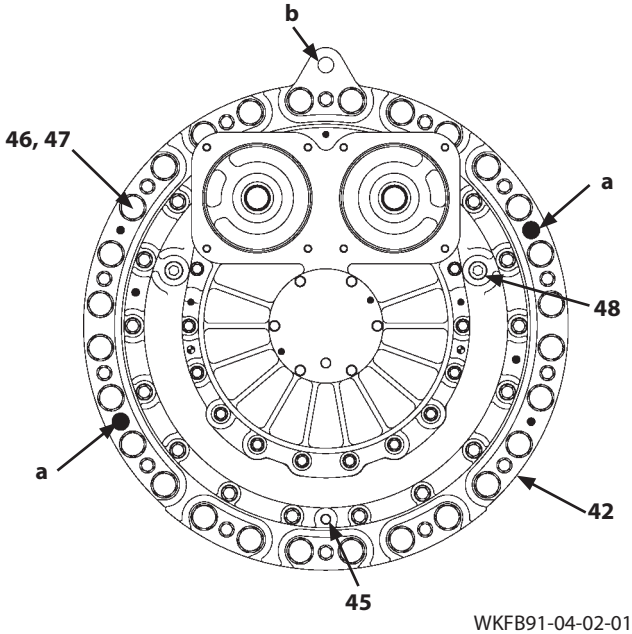
    Diameter of cylinder head (3): 82 mm

    : 340±80 N·m (250±59 lbf·ft)

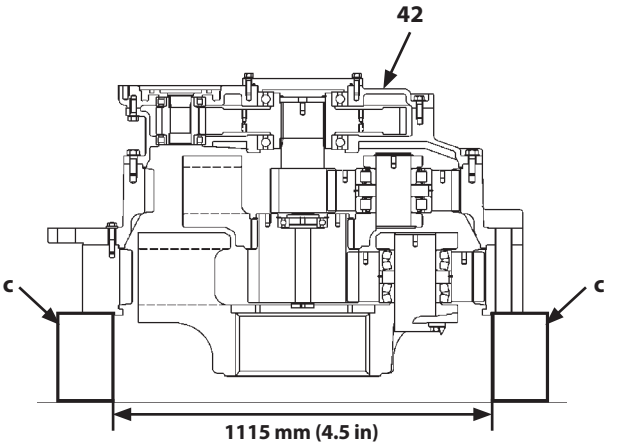


W18B-02-16-006

b- Hook Wrench



WKFB91-04-02-010



W18B-03-02-004

a- Pulling-Out Hole

b- Lifting Hole (Diameter 41.2 mm) (Diameter 1.6 in)

c- Wooden Blocks

16. Remove drain plug (45) from travel reduction gear (42). Drain gear oil. After completely draining gear oil, install drain plug (45) to travel reduction gear (42).

    : 23 mm

    : 180 N·m (133 lbf·ft)

NOTE: Gear oil can be quickly drained when performing the work without level plug (48).

    : 24 mm

    : 200 N·m (148 lbf·ft)

    Amount of gear oil: 216 L (57 US gal)

17. Remove the corks (2 used) from pulling-out holes (a) (2 places) of travel reduction gear (42).

CAUTION: Travel reduction gear (42) weight: 3460 kg (7630 lb)

18. Install a shackle to lifting hole (b). Attach wire ropes onto the shackle. Hoist and hold travel reduction gear (42).

CAUTION: Be careful to avoid getting your hand caught by a reaction force bar when using a hydraulic wrench.

19. Remove bolts (46) (28 used) and washers (47) (28 used) by using a hydraulic wrench. Install bolts (46) to pulling-out holes (a) (2 places). Hoist and remove travel reduction gear (42) from the side frame.

    : 60 mm

    : 4415 N·m (3260 lbf·ft)

NOTE: THREEBOND #1215 has been applied between the side frame and travel reduction gear (42).

20. Set wooden blocks (c) at the firm and steady place as illustrated above.

NOTE: Dimension of wooden blocks (c) (reference)

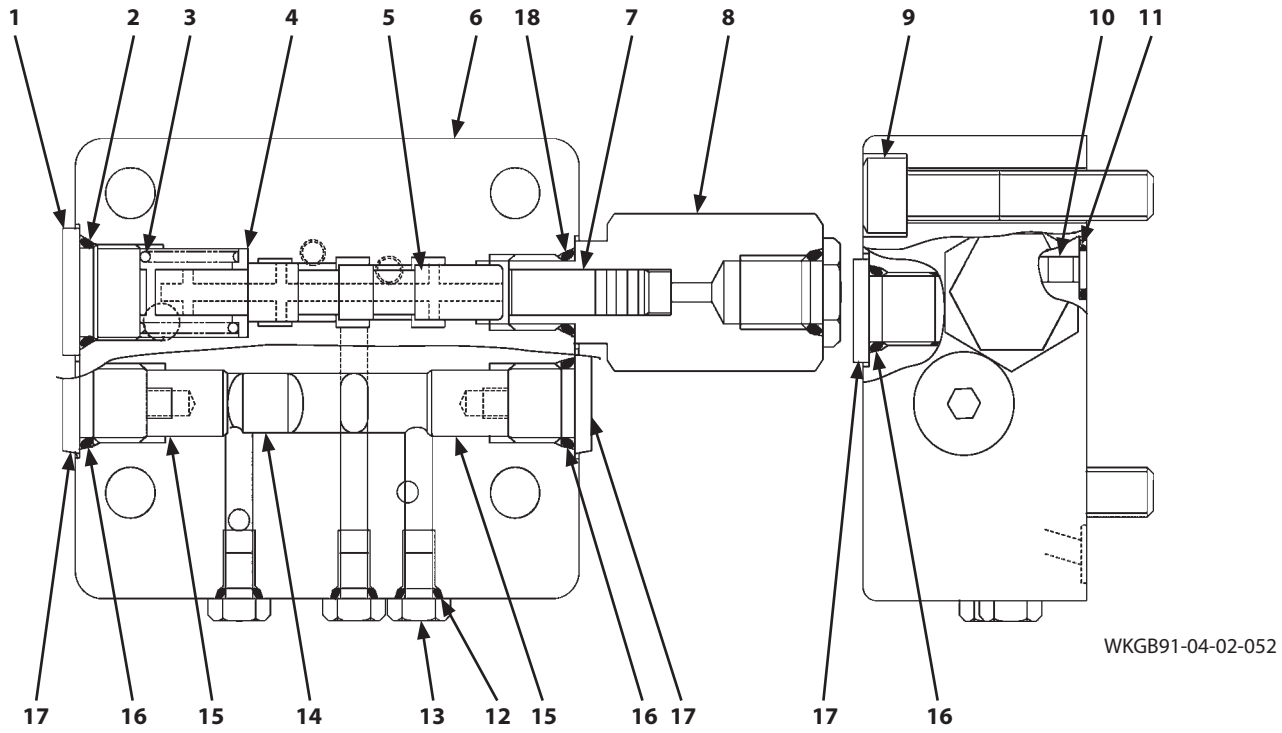
Height 250 mm (9.8 in), Width 150 mm (5.9 in),

Length 150 mm (5.9 in)

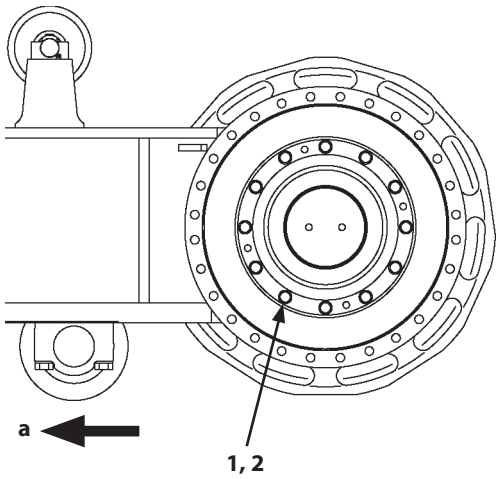
21. Place travel reduction gear (42) onto wooden blocks (c).

Disassembly and Assembly of Travel Mode Selector Valve

In this subgroup, only the structure is described. Refer to the separated Manual, "Workshop Manual Support Documentation EX1900-5, EX1900-6, EX3600-5, EX3600-6 MB750 TRAVEL MOTOR" for disassembly and assembly procedure. (Publication number:WSD-TME-18C-2)



1- Plug
2- O-Ring
3- Spring
4- Spring Seat
5- Spool
6- Valve Casing
7- Piston
8- Plug
9- Socket Bolt (4 Used)
10- Orifice (2 Used)
11- O-Ring (6 Used)
12- O-Ring (3 Used)
13- Plug (3 Used)
14- Piston
15- Spacer (2 Used)
16- O-Ring (3 Used)
17- Plug (3 Used)
18- O-Ring

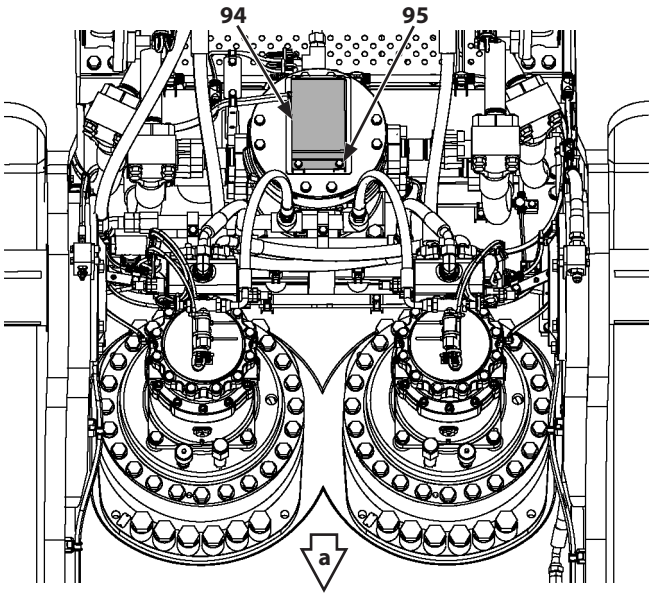


a- Machine Front Side

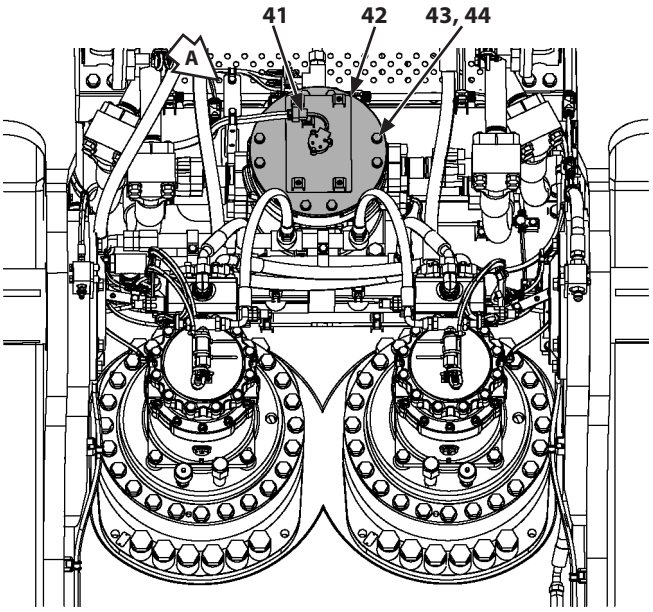
WKFB91-04-04-006

12. Remove bolts (1) (12 used) and washers (2) (12 used) from the travel device mounting surface side.

: 46 mm



WKFB91-04-05-048



WKFB91-04-05-049

a- Machine Front Side

13. Remove bolts, washers (95) (4 used). Remove cover (94).

    : 17 mm

    : 50 N·m (37 lbf·ft)

14. Disconnect connector (41).
15. Remove bolts (43) (8 used) and washers (44) (8 used). Remove the cover (42) assembly.

    : 24 mm

    : 210 N·m (155 lbf·ft)

16. Disconnect connector (45).
17. Remove bolts, washers (46) (2 used), clip (47), and clip (48).

    : 17 mm

    : 50 N·m (37 lbf·ft)

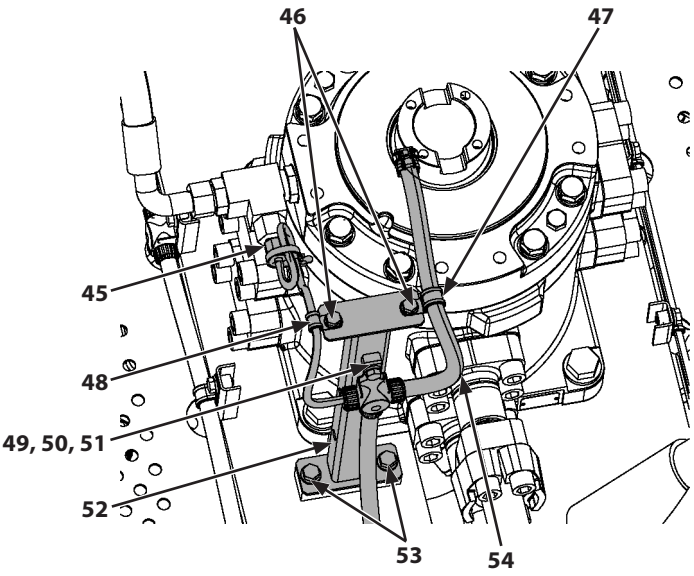
18. Remove bolt, washer (49), bracket (50), and spacer (51).

    Place wire harness (54) outside the work area.

    : 17 mm

    : 50 N·m (37 lbf·ft)

View A



WKFB91-04-05-029

19. Remove bolts, washers (53) (2 used). Remove bracket (52).

    : 19 mm

    : 90 N·m (66 lbf·ft)

Assembly of Center Joint

IMPORTANT: Before assembling, clean the parts in order to prevent contamination.

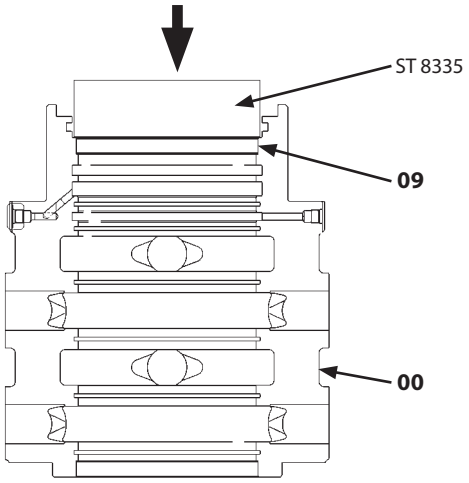
CAUTION: Body (00) weight: 220 kg (485 lb)

1. Attach nylon slings onto body (00). Hoist body (00). Place body (00) onto a stand with the cover (17) mounting surface down.
2. Apply molybdenum disulfide to the bushing (09) mounting surface of body (00).

IMPORTANT: Horizontally set body (00), bushing (09), and special tool (ST 8335).

3. Install bushing (09) to special tool (ST 8335). Horizontally place them onto body (00). Slowly install bushing (09) to the groove end of body (00) by using a press.

NOTE: Force for installing: 10 to 15 kN (2250 to 4500 lbf)



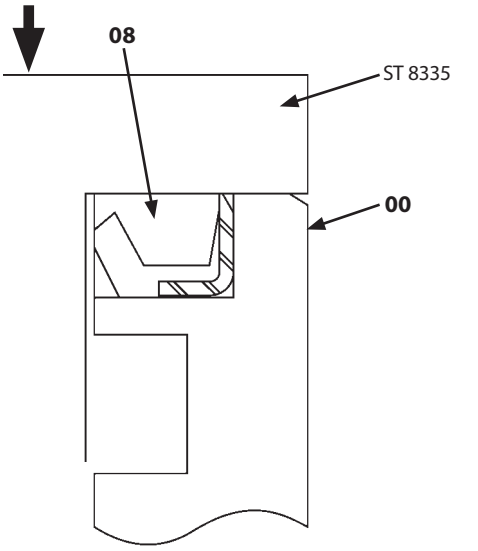
WKEB-04-05-122

4. Install seals (04) (6 used), O-rings (05, 07), and backup ring (06) to body (00).
5. Apply molybdenum disulfide to the inner circumference of dust seal (08) fitting part of body (00).

IMPORTANT: Check the direction to install dust seal (08).

IMPORTANT: Horizontally set body (00), dust seal (08), and special tool (ST 8335).

6. Install dust seal (08) to special tool (ST 8335). Horizontally place them onto body (00). Slowly install dust seal (08) to the groove end of body (00) by using a press.



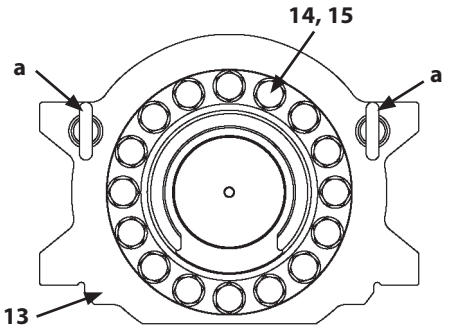
WKEB-04-05-004

CAUTION: Flange (13) weight: 85 kg (187 lb)

7. Attach nylon slings onto eyebolts (a) (2 used). Hoist and hold flange (13). Install flange (13) to cylinder (6) with washers (15) (16 used) and bolts (14) (16 used).

: 41 mm

: 1176 N·m (867 lbf·ft)



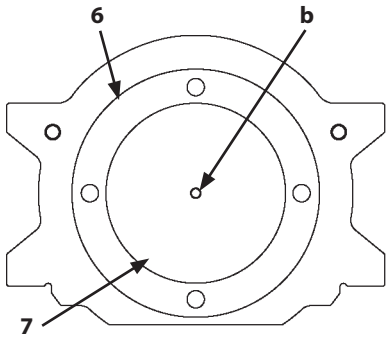
a- Eyebolt (2 Used) WKFB91-04-06-006

CAUTION: Cylinder (6), piston (7), flange (13), and switch valve (17) weight: 550 kg (1210 lb)

8. Attach nylon slings onto the cylinder (6) assembly. Hoist the cylinder (6) assembly. Turn over the cylinder (6) assembly.

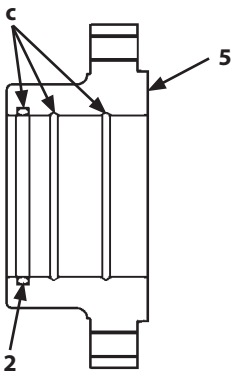
CAUTION: The piston (7) assembly weight: 58 kg (128 lb)

9. Install an eyebolt (M16, Pitch 2.0 mm) to lifting hole (b) of the piston (7) assembly. Attach nylon slings onto the eyebolt. Hoist and hold the piston (7) assembly. Install the piston (7) assembly to cylinder (6).



b- Lifting Hole WKFB91-04-06-005

10. Apply grease to groove parts (c) (4 places) of flange (5). Install O-ring (2) to flange (5).



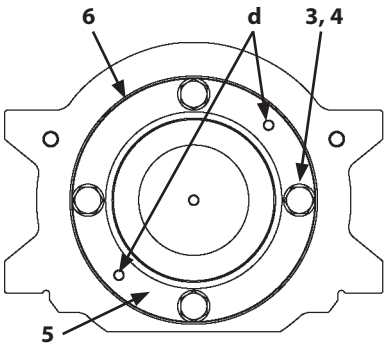
c- Groove Part WKEB-04-06-117

CAUTION: Flange (5) weight: 52 kg (115 lb)

11. Install eyebolts (M16, Pitch 2.0 mm) to lifting holes (c) (2 places) of flange (5). Attach nylon slings onto the eyebolts (2 used). Hoist and hold flange (5). Install flange (5) to cylinder (6) with washers (4) (6 used) and bolts (3) (6 used).

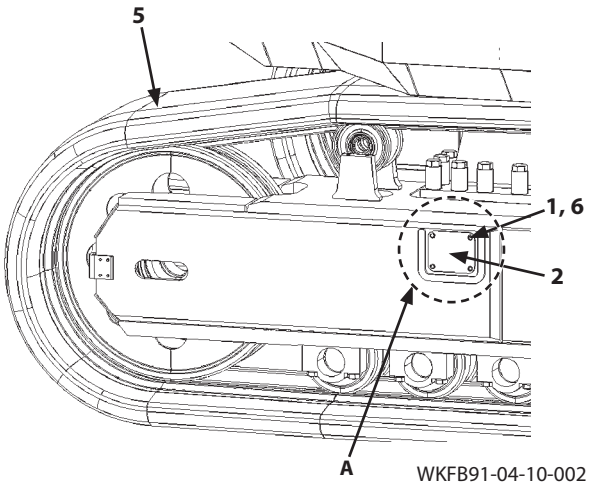
: 41 mm

: 1176 N·m (867 lbf·ft)



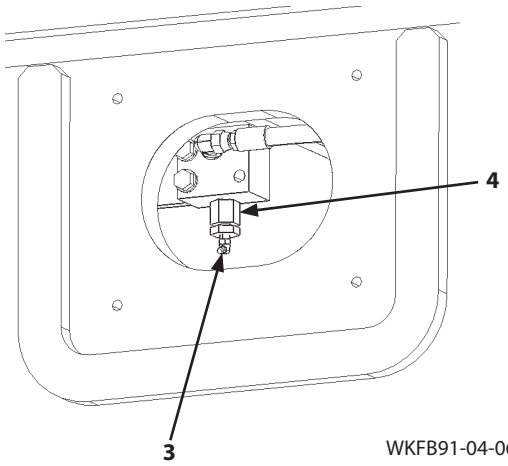
d- Lifting Hole (2 Places) WKFB91-04-06-004

Removal and Installation of Lower Roller



WKFB91-04-10-002

Detail A



WKFB91-04-06-001

In this subgroup, only the disassembly procedure is described. Assembly procedure is the reverse order of disassembly. Supplemental information required for assembly is followed by [Installation Info].

Removal

1. Remove bolts (1) (4 used) and spring washers (6) (4 used). Remove cover (2).

   : 19 mm

   : 90 N·m (66 lbf·ft)

CAUTION: The pressure inside the adjuster cylinder is high. Do not loosen valve (4) quickly or too much as valve (4) may fly out or high-pressure grease may spout out. Keep body parts and face away from valve (4) and loosen it gradually. Do not loosen grease fitting (3).

IMPORTANT: Loosening valve (4) by 1 to 1.5 turns is enough.

2. Loosen valve (4). Drain grease from the adjuster cylinder and loosen track (5).

   : 24 mm

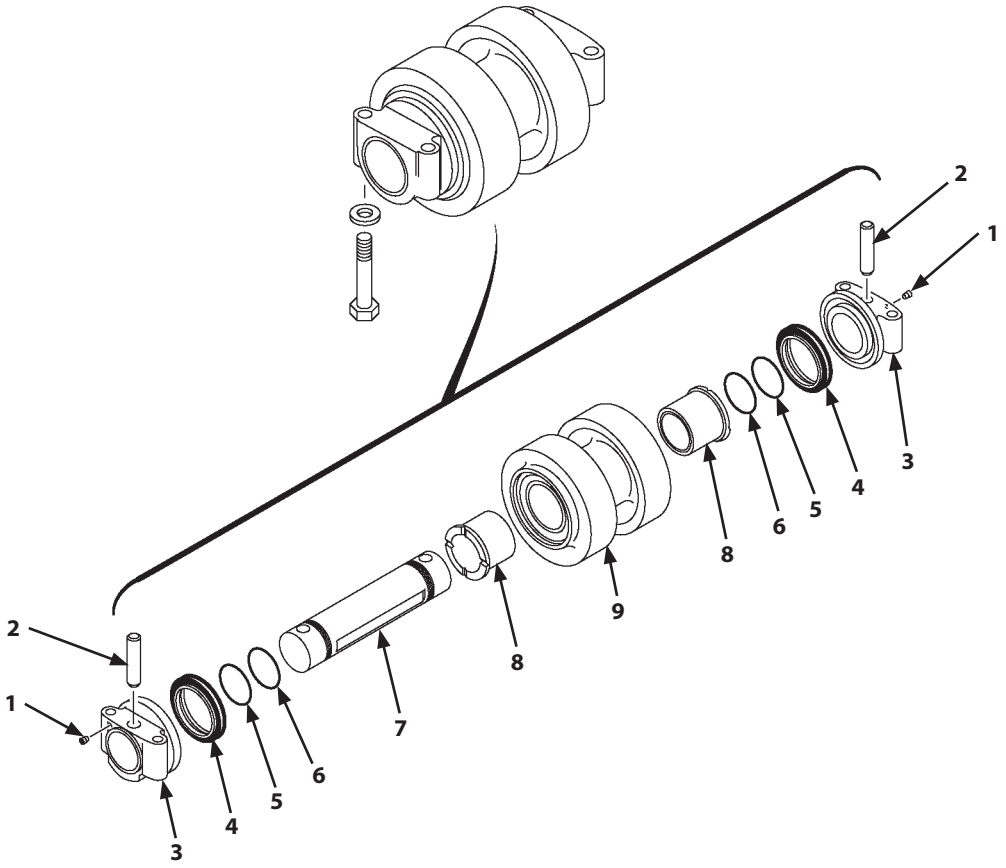
   : 147 N·m (108 lbf·ft)

NOTE: When operating the machine reverse with valve (4) loosened, track (5) is further loosened.

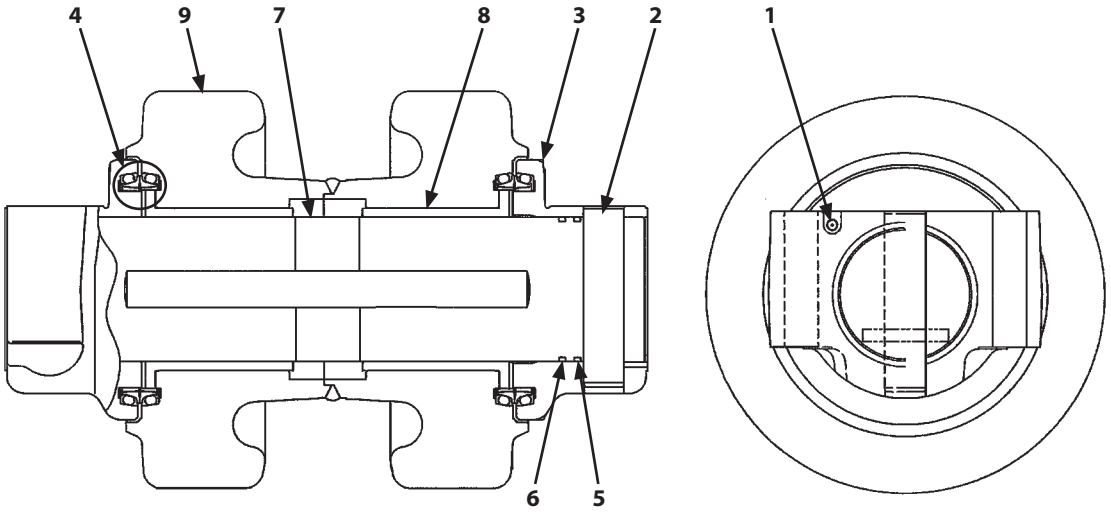
3. Set the machine position for inspection and maintenance. Stop the engine. Turn OFF the isolation switch. (Refer to W1-6-1.)

CAUTION: Bleed air from the hydraulic oil tank. (Refer to W1-4-1.)

Assembly of Lower Roller



WKEB-04-08-112



WKEB-04-08-114

1- Plug (2 Used)
2- Pin (2 Used)
3- Collar (2 Used)
4- Floating Seal (2 Used)
5- O-Ring (2 Used)
6- O-Ring (2 Used)
7- Axle
8- Bushing (2 Used)
9- Roller

Disassembly of Accumulator

CAUTION: Accumulator weight: 95 kg (209 lb)

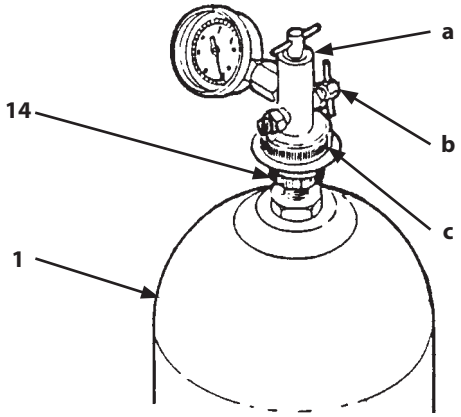
CAUTION: As the accumulator is charged with high pressure gas, do not weld or torch-cut it, nor expose the accumulator to the flame.

IMPORTANT: Wire (25) cannot be reused.

1. Clean outside of the accumulator before disassembling. Cut wire (25). Remove valve guard (26) from valve stem (14).
2. Remove cap (24) from gas valve (23).

IMPORTANT: Before installing charge valve (c), turn handle (a) counterclockwise of charge valve (c). Turn handle (b) clockwise.

3. Install charge valve (c) (Parts No.: 4032854) to valve stem (14). Turn handle (a) clockwise. Slowly turn handle (b) counterclockwise. Release nitrogen gas from bladder (13) until the gauge shows zero pressure.



WKEB-04-10-001

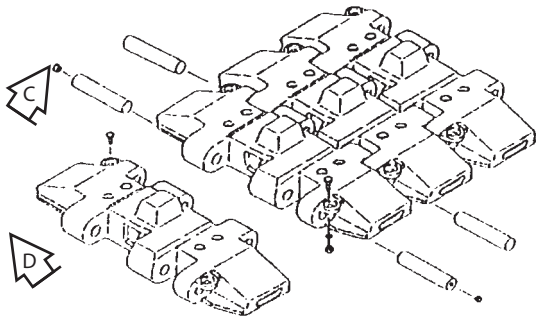
a- Handle b- Handle c- Charge Valve

4. Remove charge valve (c) from valve stem (14).
5. Slowly open gas valve (23). Remove gas valve (23) from valve stem (14). Remove O-ring (22) from gas valve (23).
6. Remove lock ring (21) from valve stem (14) by using a hook wrench.
7. Remove backup ring (8) and O-ring (7) from gas plug (16).
8. Turn over shell (1). (Set the oil port body assembly (2) up.)
9. Remove lock ring (9) by using a hook wrench.
10. Remove backup ring (8) and O-ring (7) from the oil port body assembly (2).
11. Insert fingers into shell (1). Catch ring (5) with fingers. Pull out ring (5) from shell (1).
12. Remove the oil port body assembly (2) from shell (1).
13. Insert fingers into shell (1) through the hole on the oil port body assembly (2) side. Catch bladder (13) with fingers. Remove bladdar (13) from shell (1).
14. Remove gas plug (16) and O-ring (15) from valve stem (14).
15. Remove ring (5) from shell (1).

Repair Track Shoes (Shoe Lugs)

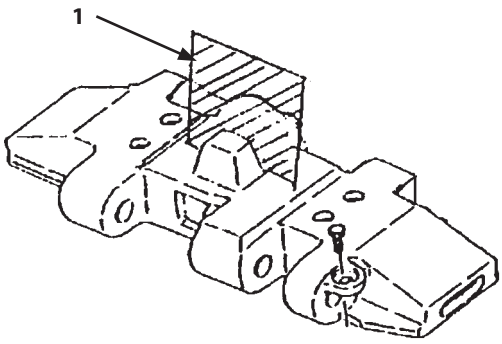
1. Prepare gauges (A, B) by using the pattern drawings attached in the back of this book.

   Measure wear amounts of the track shoes by using gauges (A, B), as illustrated. If the track shoe is excessively worn, repair it by following step 2 to step 6.



W115-03-11-003

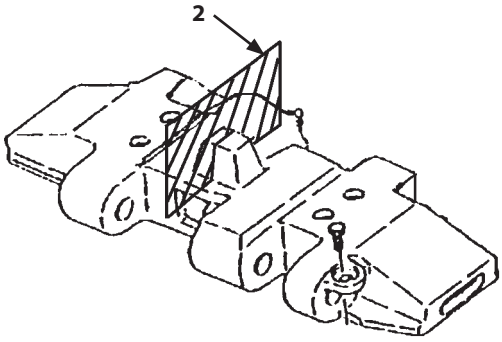
Direction C to Be Measured



W115-03-11-011

1- Gauge A

Direction D to Be Measured



W157-01-01-095

2- Gauge B

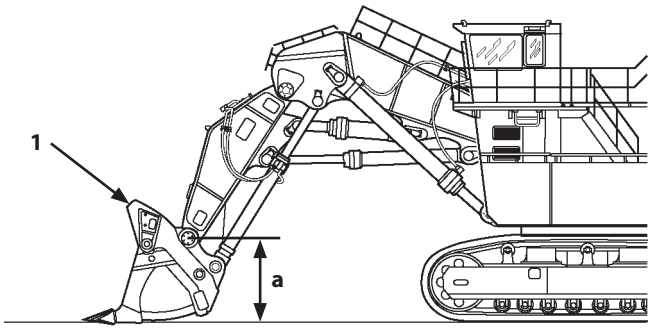
Removal and Installation of Bucket

In this sub group, only the disassembly procedure is described. Assembly procedure is the reverse order of disassembly. Supplemental information required for assembly is followed by [Installation Info].

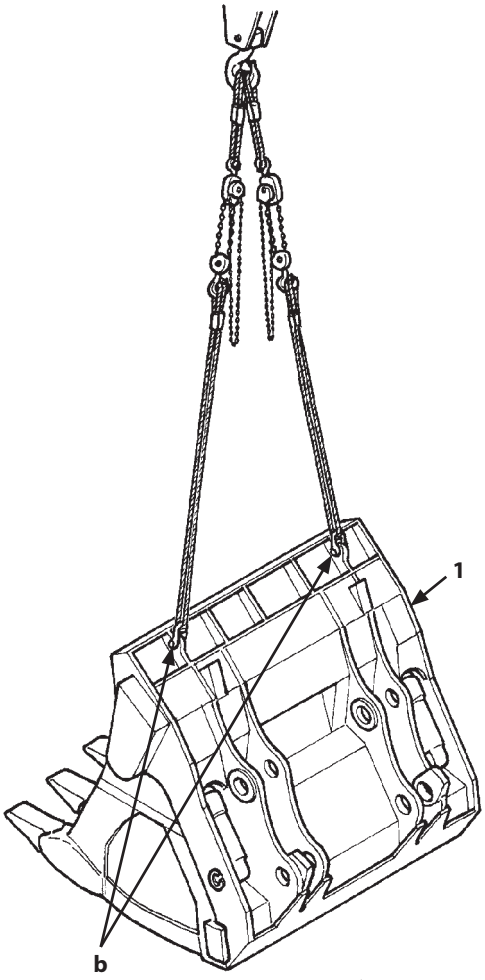
- Set the auto-lubrication mode switch to the OFF position.

Removal

1. Start the engine. Lower bucket (1) onto the ground so that the height of the arm end pin is 2600 mm (8 ft 6.4 in).
2. Attach the shackles, wire ropes, and chain blocks to lifting holes (b) (2 places). Hoist bucket (1).



a- 2600 mm (8 ft 6.4 in) WKFB91-05-01-100

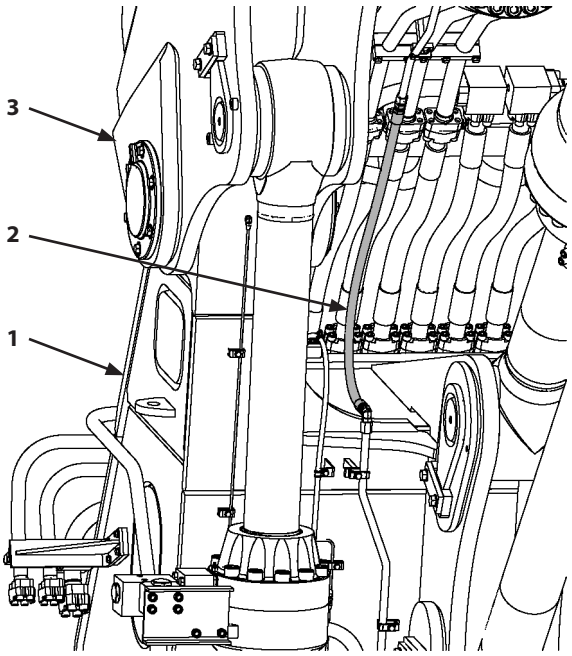


b- Lifting Hole (Diameter 70 mm (2.8 in)) WKFB91-05-01-101

11. Disconnect hose (2) between boom (3) and arm (1) at the arm (1) side.

: 36 mm

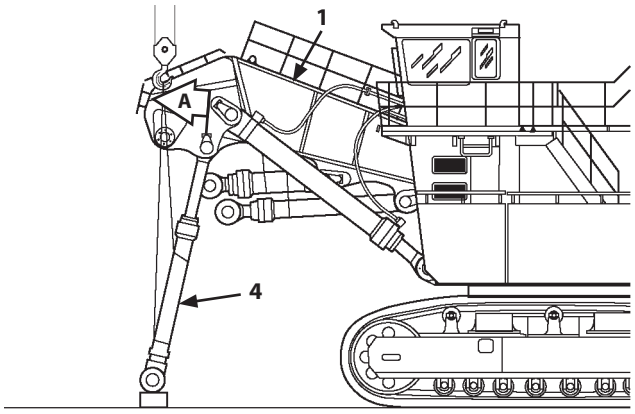
: 240 N·m (175 lbf·ft)



WKFB91-05-01-058

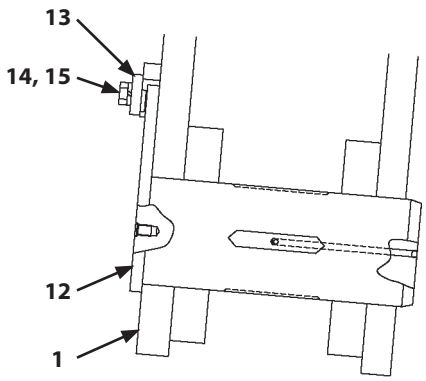
49. Do not remove pin (12). Return pin (12) to the bucket cylinder (4) rod mounting hole of boom (1) by using special tools (ST 1677, ST 1755).
50. Temporarily install plate (13) to boom (1) with bolts (14) (2 used) and spring washers (15) (2 used).

    : 36 mm
51. Remove other bucket cylinder (4) in the same way as step 43 to step 50.

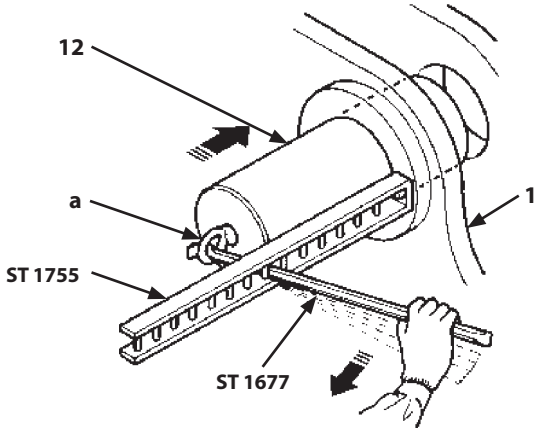


WKFB91-05-01-079

Section A

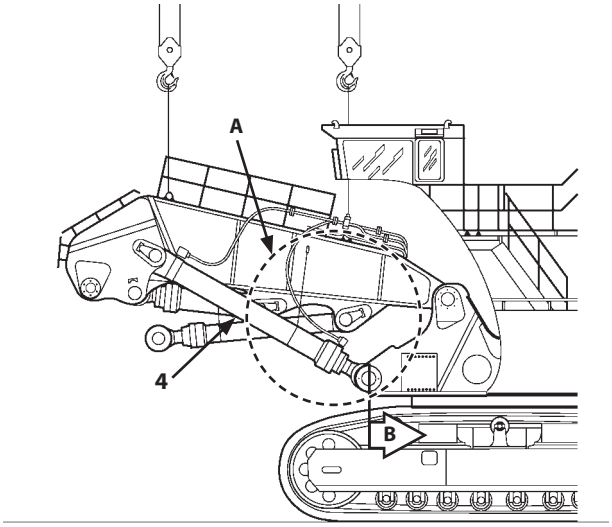


WKFB91-05-01-082



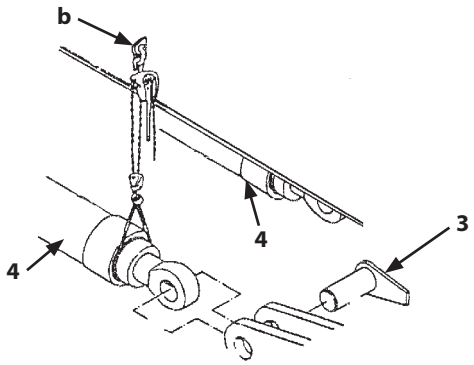
a- Eyebolt

W18P-04-01-016



WKFB91-05-01-011

Detail A



b- Lifting Hole (Diameter 73 mm (2.9 in)) W18B-04-01-041

Removal

1. Disconnect lubrication hose (13) from pin (11) at the rod side of boom cylinder (4). Remove elbow (12) from pin (11).

   Elbow (12)

   : 16 to 17 mm

   : 30 N·m (22 lbf·ft)

   Hose (13)

   : 19 mm

   : 30 N·m (22 lbf·ft)

2. Remove other lubrication hose (13) and elbow (12) in the same way as step 1.

   Elbow (12)

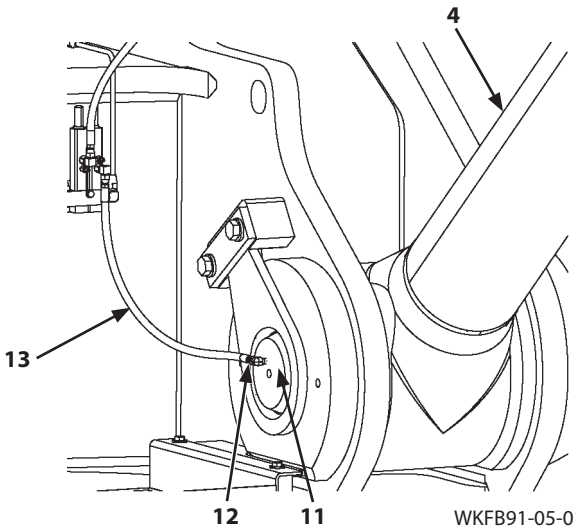
   : 16 to 17 mm

   : 30 N·m

   Hose (13)

   : 19 mm

   : 30 N·m



WKFB91-05-01-005

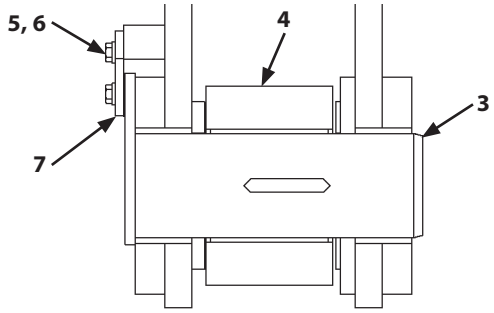
CAUTION: Boom cylinder (4) weight: 4350 kg (9600 lb)

3. Attach wire ropes and chain block onto boom cylinders (4) (2 used). Hoist and hold boom cylinders (4).
4. Remove bolts (6) (4 used) and spring washers (5) (4 used) from pins (3) (2 used) at the rod side of both boom cylinders (4). Remove plates (7) (2 used).

   : 36 mm

   : 700 N·m (520 lbf·ft)

Section B



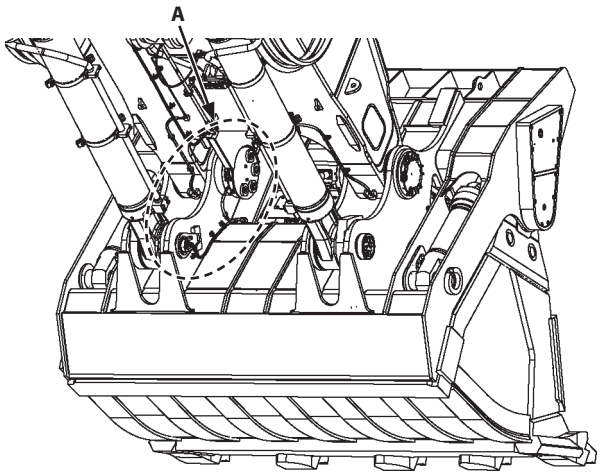
WKFB91-05-01-010

3. Disconnect lubrication hose (12).

   : 17 mm

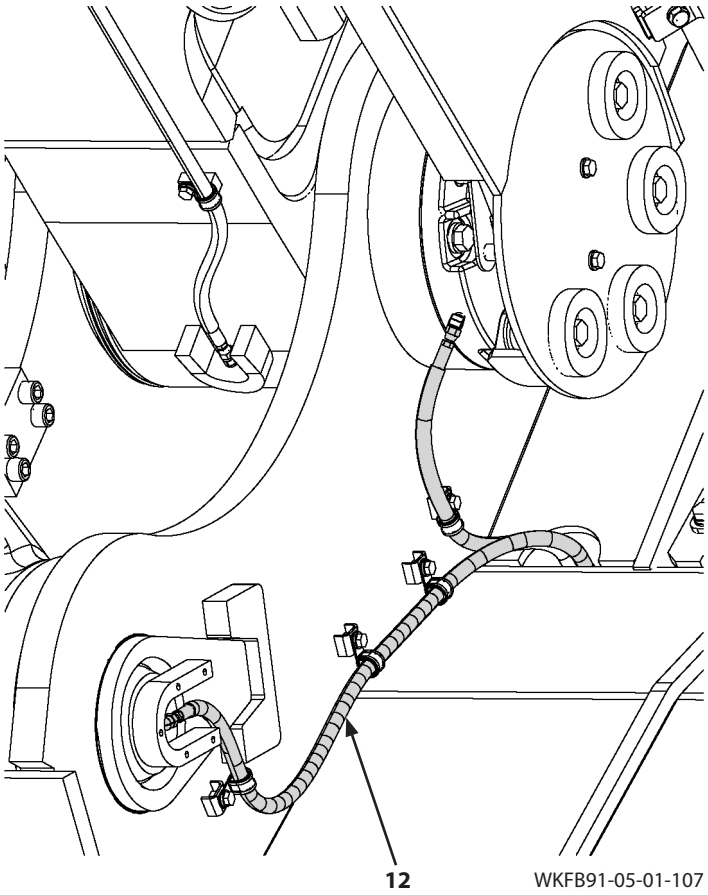
   : 25 N·m (19 lbf·ft)

4. Disconnect other hose (12) in the same way.

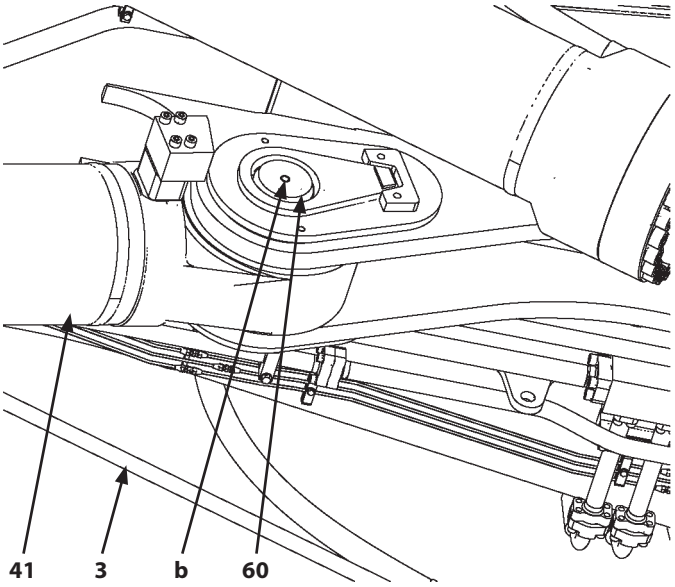


WKFB91-05-01-106

Detail A



WKFB91-05-01-107

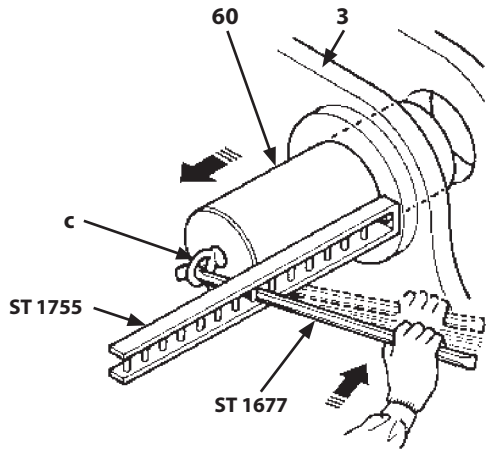


WKFB91-05-02-307

b- Screw Hole

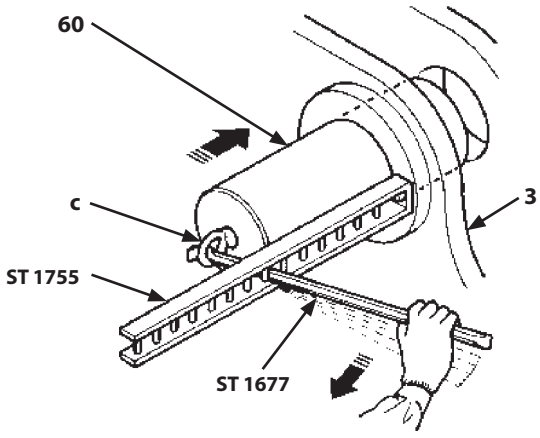
CAUTION: The pin (60) weight: 160 kg (355 lb)

15. Install eyebolt (c) to screw hole (b) (M20, Pitch 2.5 mm) of the pin (60).
16. Move pin (60) to the position where level cylinder (41) can be removed from boom (3) by using special tools (ST 1677, ST 1755).
17. Lower and remove level cylinder (41) by using lever blocks and nylon slings.
18. Do not remove pin (60). Return pin (60) to the level cylinder (41) bottom mounting hole of boom (3) by using special tools (ST 1677, ST 1755).



W18P-04-01-015

c- Eyebolt



W18P-04-01-016

c- Eyebolt