PART NO. TTKAA90-EN-00

HITACHI

Reliable solutions

Technical Manual
Troubleshooting

EX1200-7
Hydraulic Excavator

BACKHOE FRONT SPECIFICATIONS

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TOKAA90-EN
Technical Manual (Troubleshooting)	: Vol. No.TTKAA90-EN
Workshop Manual	: Vol. No.WKAA90-EN

EX1200-7 HYDRAULIC EXCAVATOR TECHNICAL MANUAL TROUBLESHOOTING

TTKAA90-EN-00

Hitachi Construction Machinery Co., Ltd.

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

PRINTED IN JAPAN (K) 2018, 05

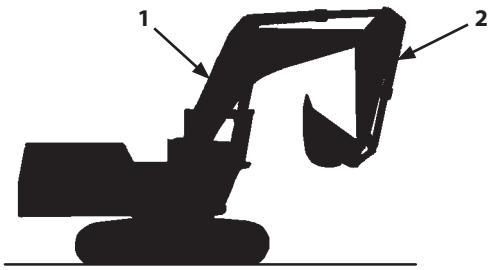
General Precautions for the Cab

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

- Use a signal person when moving, swinging or operating the machine in congested areas. Coordinate hand signals before starting the machine.
- Before moving machine, determine which way to move travel pedals/levers for the direction you want to go. When the travel motors are in the rear, pushing down on the front of the travel pedals or pushing the levers forward moves the machine forward, towards the idlers.
- Select a travel route that is as flat as possible. Steer the machine as straight as possible, making small gradual changes in direction.
- Before traveling on them, check the strengths of bridges and road shoulders, and reinforce if necessary.
- Use wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.
- When crossing train tracks, use wood plates in order not to damage them.
- Do not make contact with electric wires or bridges.
- When crossing a river, measure the depth of the river using the bucket, and cross slowly. Do not cross the river when the depth of the river is deeper than the upper edge of the upper roller.
- When traveling on rough terrain, reduce engine speed. Select slow travel speed. Slower speed will reduce possible damage to the machine.
- Avoid operations that may damage the track and undercarriage components.
- During freezing weather, always clean snow and ice from track shoes before loading and unloading the machine, to prevent the machine from slipping.
- When traveling on a level surface, position the front with boom (1) fully raised, and arm (2) fully retracted, as illustrated, in order to apply the load as evenly as possible to all of the lower rollers.

M104-05-008

SA-011



M145-05-027

M145-05-022

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 firm, 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. Turn the key switch to OFF to stop 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.
- Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of operator's manual.
- Keep all parts in good condition and properly installed.
- Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.
- When cleaning parts, always use nonflammable detergent oil. Never use highly flammable oil such as fuel oil and gasoline to clean parts or surfaces.
- Disconnect battery ground cable (–) before making adjustments to electrical systems or before performing welding on the machine.
- Turn the battery disconnect switch to the OFF position before adjusting the electrical systems or performing welding on the machine.

Remove Paint Before Welding or Heating

SA-029

- Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. If inhaled, these fumes may cause sickness.
  - Avoid potentially toxic fumes and dust.
  - Do all such work outside or in a well-ventilated area. Dispose of paint and solvent properly.
  - Remove paint before welding or heating:

1. If you sand or grind paint, avoid breathing the dust.

   Wear an approved respirator.

2. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable materials from area. Allow fumes to disperse at least 15 minutes before welding or heating.

Beware of Asbestos and Silica Dust and Other Contamination

SA-029

- Take care not to inhale dust produced in the work site. Inhalation of asbestos fibers may be the cause of lung cancer. Inhalation of silica dust or other contaminations may cause sickness.
  - Depending on the work site conditions, the risk of inhaling asbestos fiber, silica dust or other contaminations may exist. Spray water to prevent asbestos fibers, silica dust or other contaminations from becoming airborne. Do not use compressed air.
  - When operating the machine in a work site where asbestos fibers, silica dust or other contaminations might be present, be sure to operate the machine upwind, and wear a mask rated to prevent the inhalation of asbestos, silica dust or other contaminations.
  - Keep bystanders out of the work site during operation.
  - Asbestos fibers might be present in imitation parts. Use only genuine Hitachi Parts.

SECTION 4

OPERATIONAL PERFORMANCE TEST

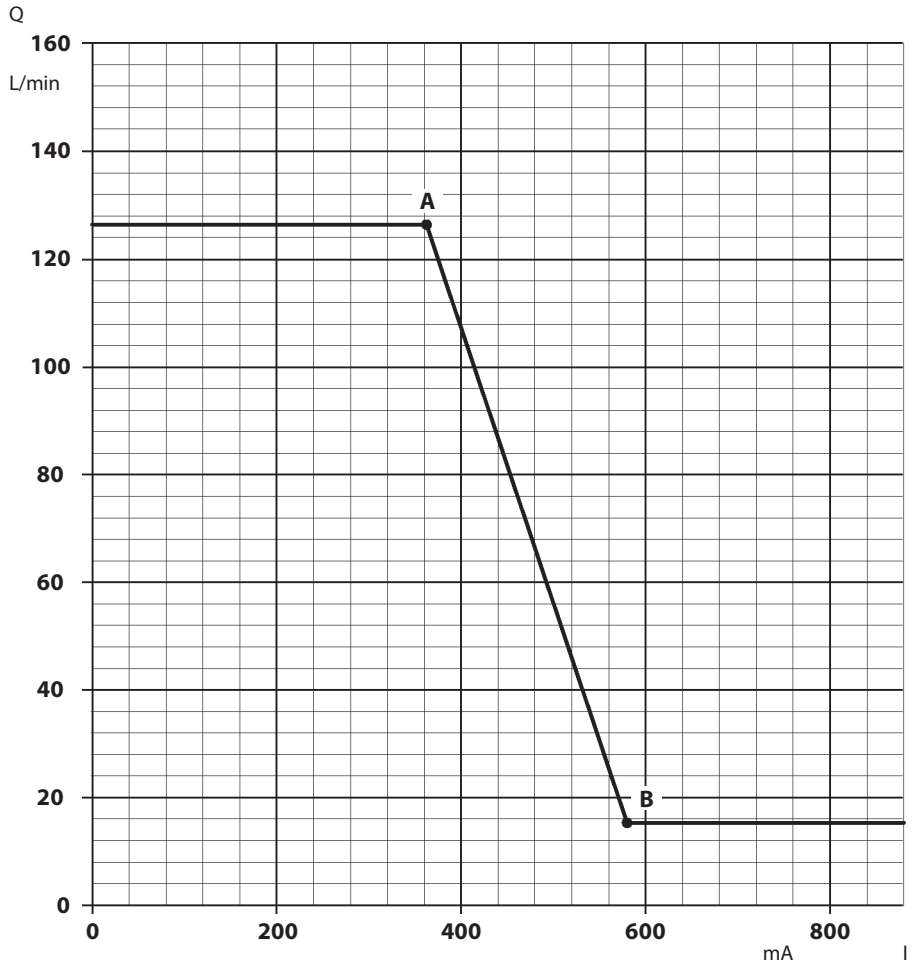
CONTENTS

Fan Pump I-Q Diagram

- I-Q Control
  (NOTE: Measured at Test Stand)
  - Rated Pump Speed: 1800 min^{-1}
  - Power Mode Switch: PWR
  - Hydraulic Oil Temperature: 50±5 °C (122±9 °F)

Points on I-Q Line

	Fan Pump Control Solenoid Valve Command Current (I) mA	Flow Rate (Q) L/min (gpm)
A	361±30	126±3 (33±0.8)
B	590±40	15.1±3 (4.0±0.8)



TKAB-04-02-003

Swing Speed

Summary:

1. Measure the time required to swing three complete turns and check the performance of the swing system (from main pump to swing motor).

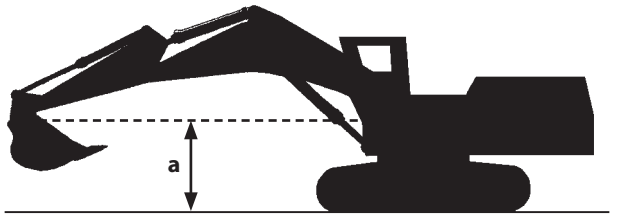
Preparation:

1. Check lubrication of the swing gear and the swing bearing.
2. Place the machine on a flat and solid ground with ample space for swinging. Do not conduct this test on a slope.
3. Fully retract the arm cylinder. Fully extend the bucket cylinder. Adjust and hold the boom so that the arm end pin height is the same as the boom foot pin height. (Empty the bucket.)

NOTE: In case a sufficient space for the measurement is difficult to find, carry out the measurement with the boom fully raised and the arm fully rolled-in.

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

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



TKAB-04-04-005

a- The same height as boom foot pin

Measurement:

1. Select the following conditions.

Engine Control Dial	Power Mode	Auto-Idle Switch	Work Mode
Fast Idle	HP	OFF	Digging Mode

2. Operate the swing control lever to full stroke and swing the upperstructure.
3. Measure the time required to swing three turns when the swing speed is a constant speed.
4. Check the time in both clockwise and counterclockwise directions.
5. Repeat the measurement three times and calculate the mean values.

Evaluation:

Refer to Operational Performance Standard.

Remedy:

Refer to Troubleshooting B.

Measurement:

1. Select the following conditions.

Engine Control Dial	Power Mode	Auto-Idle Switch	Work Mode
Fast Idle	HP	OFF	Digging Mode

2. Measure the cylinder cycle times as follows: (Cylinder full stroke includes cylinder cushioning zone.)

- Measurement of the cycle time of the boom cylinder: Operate the boom control lever to full stroke. Measure the time to raise and lower the boom.
- Measurement of the cycle time of the arm cylinder: Operate the arm control lever to full stroke. Measure the time to retract and extend the arm.
- Measurement of the cycle time of the bucket cylinder: Operate the bucket control lever to full stroke. Measure the time to tilt in and tilt out the bucket.

3. Repeat the measurement three times and calculate the mean values.

NOTE: The cycle time is changed according to the bucket weight when the wear resistant material is installed.

Evaluation:

Refer to Operational Performance Standard.

Remedy:

Refer to Troubleshooting B.

2-Spool Solenoid Valve Set Pressure

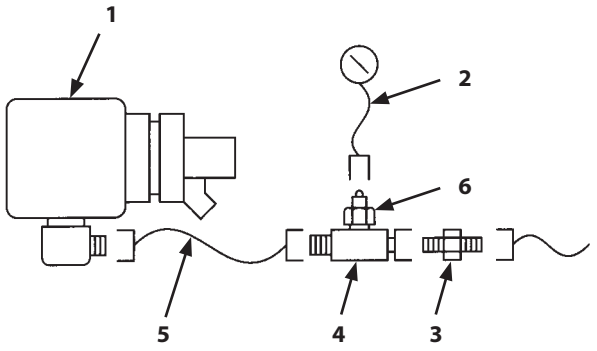
Use MPDr. and a pressure gauge at the same time.

Preparation:

1. Stop the engine.
2. Loosen the filling cap of the hydraulic oil tank and bleed air.
3. Disconnect the hose from the solenoid valve. Install tee (4), hose (5), adapter (3), adapter (6), and pressure gauge (2) between the disconnected hose and solenoid valve unit (1).

   : 17 mm, 19 mm

   Connect MPDr. and select the monitoring function.
4. Start the engine. Confirm that no oil leakage is observed at the pressure gauge (2) connection.
5. Maintain the hydraulic oil temperature at 50±5 °C.



T157-05-04-002

1- Solenoid Valve Unit
2- Pressure Gauge (ST 6942)
3- Adapter (ST 6461)
4- Tee (ST 6451)
5- Hose (4216453)
6- Adapter (ST 6069)

Measurement:

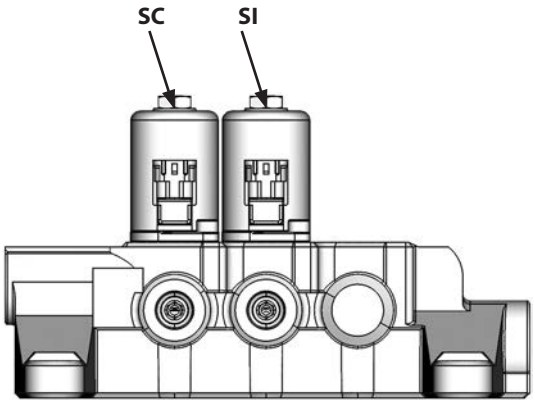
1. Select the following conditions.

Engine Control Dial	Power Mode	Auto-Idle Switch	Work Mode
Fast Idle	HP	OFF	Digging Mode
Slow Idle	HP	OFF	Digging Mode

2. Perform the following procedures for the solenoid valve to be measured.

- Solenoid Valve (SC):
  Not used for this machine
- Solenoid Valve (SI):
  Combined operation of boom raise and arm roll-in

3. Read the values on both MPDr. and the pressure gauge.
4. Repeat the measurement three times and calculate the mean values.



TKAB-04-05-019

Evaluation:

Refer to Operational Performance Standard.

Relief Pressure (when relieving travel)

Loosen lock nut (2) and adjust the set pressure of overload relief valve (1) by using adjusting screw (3).

1. Loosen lock nut (2).

   : 19 mm

2. Turn adjusting screw (3) and adjust the set pressure.

   : 6 mm

3. Tighten lock nut (2).

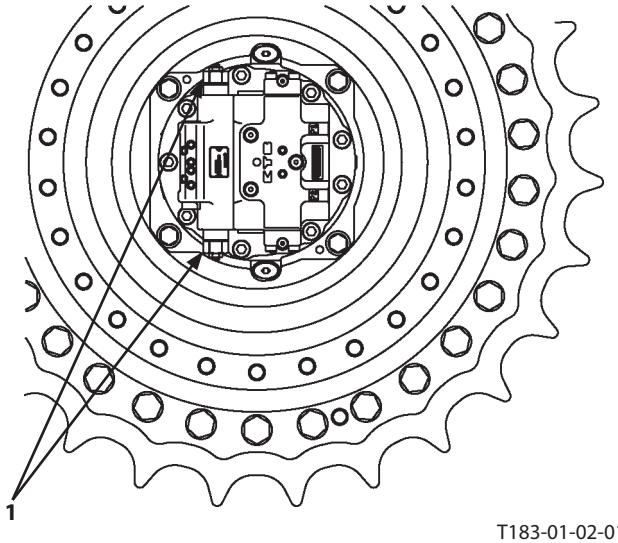
   : 19 mm

   : 34.3 to 44.1 N·m

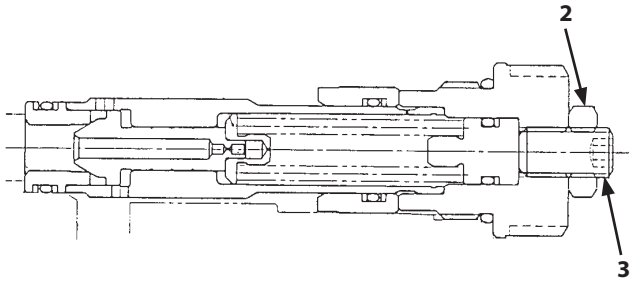
4. After the adjustment, check the set pressure.

NOTE: Standard Change in Pressure (Reference)

Adjusting Screw (3) Turns		1/4	1/2	3/4	1
Change in Pressure	MPa	1.96	3.92	5.88	7.85

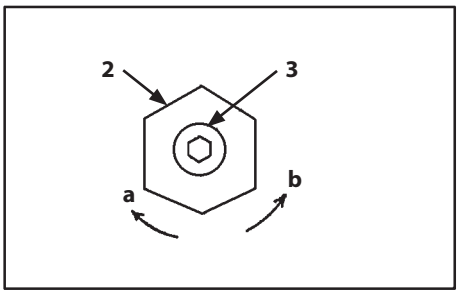


T183-01-02-012



T142-05-04-007

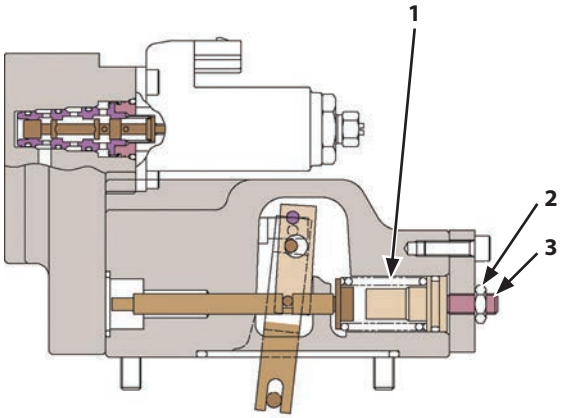
1- Travel Relief Valve
2- Lock Nut
3- Adjusting Screw



W107-02-05-129

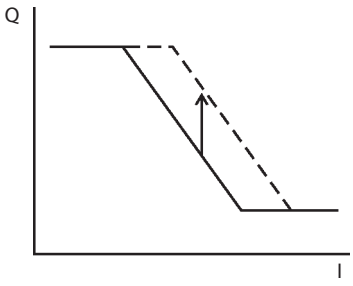
a- Pressure Increase
b- Pressure Decrease

• Adjustment of Flow Rate Control



TKAB-04-05-016

1- Spring (Flow Rate Control)
2- Lock Nut (Flow Rate Control)
3- Adjusting Screw (Flow Rate Control)

Adjustment Item	Adjustment Procedure	Remark
3. Flow Rate Control  TKAB-04-05-022	Loosen lock nut (2) and adjust the pump flow rate by using adjusting screw (3). Turning adjusting screw (3) 1/4 turn clockwise increases the pump flow rate by 4.6 cm^3/rev. Lock Nut (2) : 13 mm : 16 N·m Adjusting Screw (3) : 4 mm	Do not turn adjusting screw (3) more than 1 turn. After the adjustment, securely tighten lock nut (2).

SECTION 5

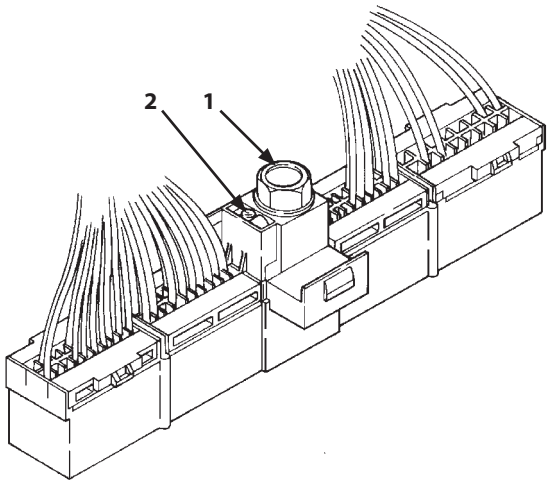
TROUBLESHOOTING

CONTENTS

- Pull and Separate Type After Removing Bolt

NOTE: Use a 10 mm wrench.

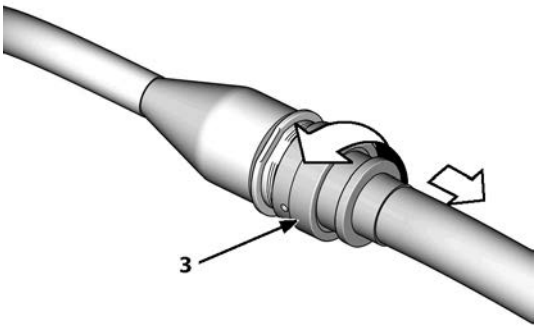
Tighten the bolt until torque mark (2) appears.



T107-04-05-005

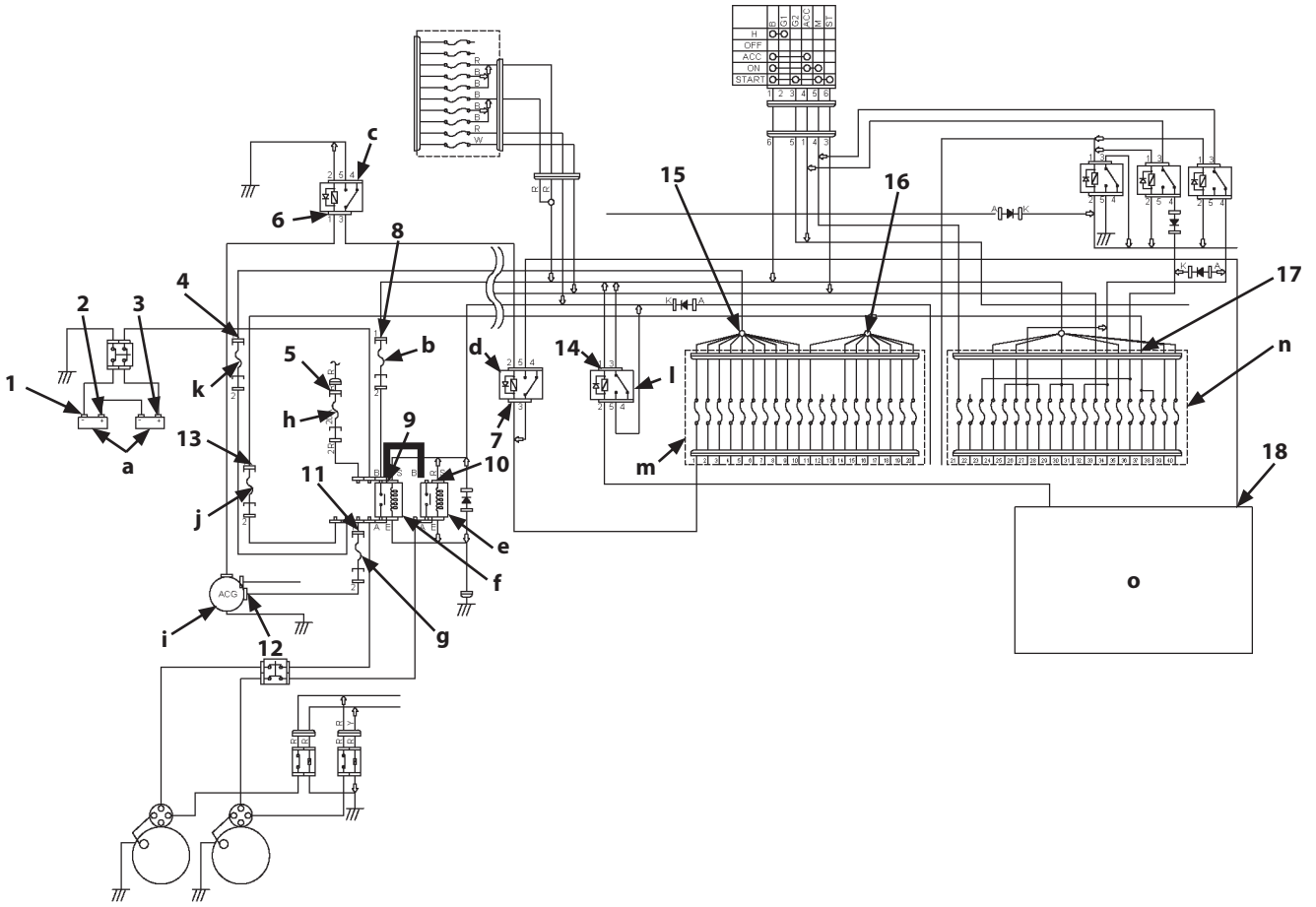
1- Bolt 2- Torque Mark

- Pull and Separate Type After Turning Coupling Nut (3)



TKFB91-05-01-001

3- Coupling Nut



TKAA90-05-01-001

a- Battery
b- Slow Blow Fuse 1 (45 A)
c- Charge Relay (R32)
d- Charge Signal Relay (R33)
e- Battery Relay 2
f- Battery Relay 1
g- Slow Blow Fuse 4 (200 A)
h- Fuse 1 (20 A)
i- Alternator
j- Slow Blow Fuse 2 (75 A)
k- Slow Blow Fuse 3 (75 A)
l- Load Dump Relay (R22)
m- Fuse Box 1
n- Fuse Box 2
o- Monitor Controller

Test Wire Harness

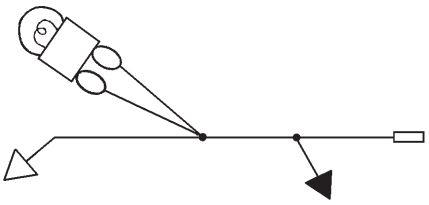
Install a test wire harness between connectors. Check the circuit condition depending on whether the test wire harness lamp lights or extinguishes during operation.

- Parts Number 4283594 (ST 7126)

Use in order to check a single-line (open circuit and/or voltage).

- During Operation: Light is ON.

Parts Number 4283594 (ST 7126)



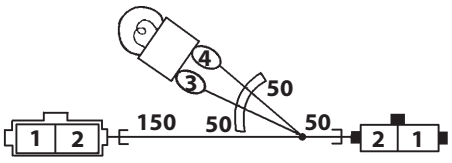
T107-07-05-012

Parts Number (ST 7226)

- Parts Number (ST 7226)

Use in order to check the solenoid valve unit circuits.

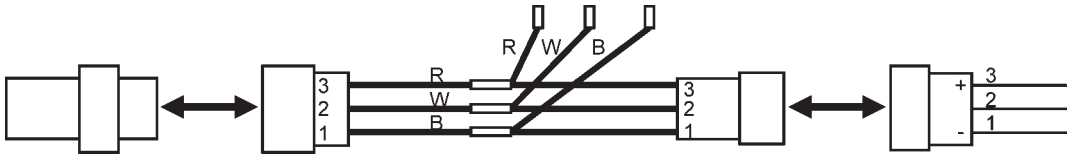
- When the corresponding control lever or switch is operated: Light is ON.



T107-07-06-015

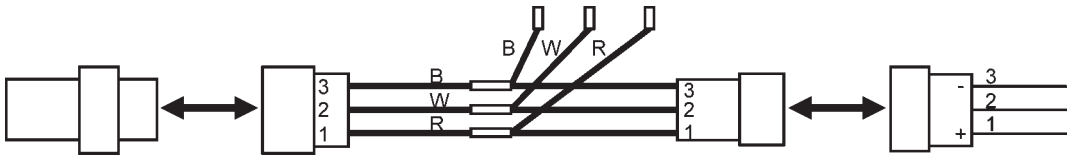
Connect a test wire harness to the wire harness end connector of pressure sensor. Check the state of pressure sensor circuit.

- ST 6701 for high-pressure sensor



TDFB-05-01-001

- ST 6703 for low-pressure sensor



TDFB-05-01-002

Main Controller 1 (MC1)

Item	Unit	Data
Demand Engine Speed	min^{-1}	Input signal from engine control dial
Actual Engine Speed	min^{-1}	Input signal from ECM
Engine Speed Deviation	min^{-1}	Value of difference between Actual Engine Speed and Demand Engine Speed
Boost Temperature	°C	Input signal from boost temperature sensor
EC Dial	V	Input signal from engine control dial
Hydraulic Oil Temperature	°C	Input signal from hydraulic oil temperature sensor
Electric Lever Signal 1*	V	Input signal from electric lever 1 (right) (assist)
Tgt Pump 1 Flow Rate	L	Command signal to pump 1 control solenoid valve
Tgt Pump 2 Flow Rate	L	Command signal to pump 2 control solenoid valve
Tgt Pump 3 Flow Rate	L	Command signal to pump 3 control solenoid valve
Tgt Pump 1 Displacement	cm^3	Value calculated from engine speed and input signal from pump 1 delivery pressure sensor
Tgt Pump 2 Displacement	cm^3	Value calculated from engine speed and input signal from pump 2 delivery pressure sensor
Tgt Pump 3 Displacement	cm^3	Value calculated from engine speed and input signal from pump 3 delivery pressure sensor
Pump 1 Load Factor	%	Value calculated from engine speed and input signal from pump 1 delivery pressure sensor
Pump 2 Load Factor	%	Value calculated from engine speed and input signal from pump 2 delivery pressure sensor
Pump 3 Load Factor	%	Value calculated from engine speed and input signal from pump 3 delivery pressure sensor
Pump 1 Delivery Pressure	MPa	Input signal from pump 1 delivery pressure sensor
Pump 2 Delivery Pressure	MPa	Input signal from pump 2 delivery pressure sensor
Pump 3 Delivery Pressure	MPa	Input signal from pump 3 delivery pressure sensor
Boom Cyl Bottom Pressure	MPa	Input signal from boom bottom pressure sensor
Bucket Cylinder Bottom Pressure	MPa	Input signal from bucket bottom pressure sensor
Bucket Cylinder Rod Pressure	MPa	Input signal from bucket rod pressure sensor
Boom Raise Pilot Pressure	MPa	Input signal from pressure sensor (boom raise)
Arm Roll-In Pilot Pressure	MPa	Input signal from pressure sensor (arm roll-in)
Bucket Roll-In Pilot Pressure	MPa	Input signal from pressure sensor (bucket roll-in)
Travel Pilot Pressure	MPa	Input signal from pressure sensor (travel)

*NOTE: *: Option*

List of Alarm

Display	Contents of Alarms	Trouble Screen	Remedy
 M183-01-075	Engine Oil Level Alarm	Check Engine Oil Level And Add Oil If Required.	Follow the instructions on the monitor.
 M183-01-076	Coolant Level Alarm	Check Coolant Level And Add Coolant If Required.	Follow the instructions on the monitor.
 MDAA-01-067	Overheat Alarm	Coolant Temperature Is Abnormally High. Stop Operation. Run The Engine At Slow Idle To Cool Coolant Temperature.	Refer to Troubleshooting A.
 MDAA-01-068	Hydraulic Oil Overheat Alarm	Hydraulic Oil Temperature Is Abnormally High. Stop Operation, Check Hydraulic Oil Level And Check For Any Oil Leaks From Hydraulic Circuit.	Refer to Troubleshooting A.

- List of Adjustment (Constant Change)

Item	Unit	Minimum Adjustment	Adjustable Range	Initial Value
ECO Control Suspend	0, 1	-	0, 1	0
Fan Speed Control Suspend	0, 1	-	0, 1	0
Cut-off Control Temporally Release	0, 1	-	0, 1	0
Li Speed	min^{-1}	10	0 to 400	0
AI Speed	min^{-1}	10	-400 to 400	0
PWR Mode Speed	min^{-1}	10	-200 to 200	0
ECO Control Selection	0, 1	-	0, 1	1
Power Mode Memory Selection	0, 1	-	0, 1	0
Work Mode Memory Selection	0, 1	-	0, 1	1
Power Mode Selection	0 to 4	-	0 to 4	3
Auto Shut-Down Control	0 to 2	-	0 to 2	0
Auto Shut-Down Set Time Holding	0, 1	-	0, 1	0
Air Conditioner Control Mode	0 to 10	-	0 to 10	3
ATT Speed Deceleration Waiting Time	ms	40	0 to 3000	1000

Item	Unit	Details	Initial Valut
Swing Bearing Grease	0: Un-displayed 1: Display	Display	1
Swing Gear Grease	0: Un-displayed 1: Display	Display	1
Air Cleaner Element	0: Un-displayed 1: Display	Display	1
Compressor Belt Tension Check	0: Un-displayed 1: Display	Display	1
Air Conditioner Re-circulated Air Filter	0: Un-displayed 1: Display	Display	1
Air Conditioner Fresh Air Filter	0: Un-displayed 1: Display	Display	1
Breaker Line Filter	0: Un-displayed 1: Display	Display	1
User Setting 1	0: Un-displayed 1: Display	Display	1
User Setting 2	0: Un-displayed 1: Display	Display	1
Engine Oil Filter (Sub)	0: Un-displayed 1: Display	Display	1
PreFilter	0: Un-displayed 1: Display	Display	1
Fuel Filter (Stage 1)	0: Un-displayed 1: Display	Display	1
Fuel Filter (Stage 2)	0: Un-displayed 1: Display	Display	1
Coolant Filter	0: Un-displayed 1: Display	Display	1
Troubleshooting (Information Menu)	0: Void 1: Exist	with or without function	1
Monitoring (Information Menu)	0: Void 1: Exist	with or without function	1
Portable Antenna	0: Un-displayed 1: Display	-	0

Group 3 Cross Reference Table

IMPORTANT: The No. indicates the component number in the circuit diagram.

The position indicates the component's position in the circuit diagram.

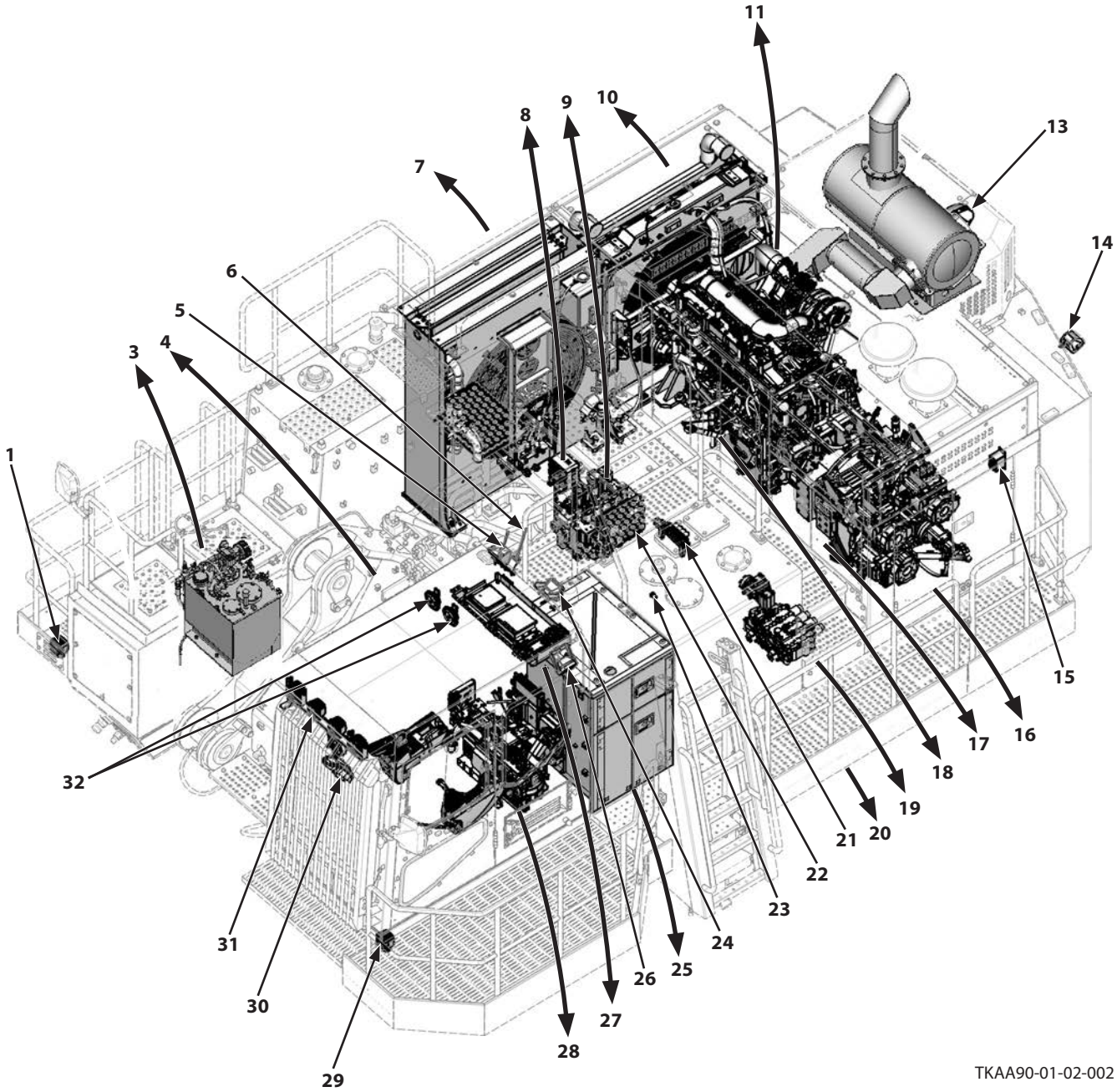
The number at left side is horizontal lines of drawing frame, the alphabet at right side is vertical lines of drawing frame.

Refer to the page and item number in the following group.

Electrical Circuit Diagram

No.	Position	Component Name	Page	Item Number	Note
001	1C	Isolation Switch (Battery Circuit)	T5-4-8	1	
002	1C	Battery	T5-4-8	3	
003	2C	Slow Blow Fuse 3 (75 A)	T5-4-8	18	
004	2D	Slow Blow Fuse 2 (75 A)	T5-4-8	19	
005	2C	Battery Relay 1	T5-4-8	6	
006	2D	Slow Blow Fuse 4 (200 A)	T5-4-8	16	
007	3C	Slow Blow Fuse 1 (45 A)	T5-4-8	17	
008	3C	Battery Relay 2	T5-4-8	8	
009	3D	Diode 1	T5-4-8	7	
010	2D	Isolation Switch (Starter Circuit)	T5-4-8	2	
011	1F	Starter 1	T5-4-16	8	
012	2F	Starter 2	T5-4-16	9	
013	2F	Air Conditioner Compressor	T5-4-16	1	
014	1G	Work Light (Cab Upper)	T5-4-3	31	
015	1H	Work Light (Right)	T5-4-3	1	
016	1H	Work Light (Left)	T5-4-3	29	
017	2H	Horn	T5-4-3	32	
018	1I	Auto-Lubrication Device	T5-4-1	2	
019	1I	Grease Pump	T5-4-18	4	
020	2I	Diode 23	T5-4-18	5	
021	1I	Proximity Switch	T5-4-18	2	
022	-	-	-	-	
023	6A	Fuse Box 3 (Option)	T5-4-7	5	
024	5B	Charge Relay	T5-4-7	14	
025	4C	Pilot Shut-Off Relay	T5-4-7	15	
026	5C	Sliding Fold-In Ladder Relay	T5-4-6	23	
027	5C	Security Relay	T5-4-7	22	
028	5C	Starter Cut Relay	T5-4-7	21	
029	6C	Charge Signal Relay	T5-4-7	13	
030	7C	Load Dump Relay	T5-4-7	20	

Electrical System (Overview)

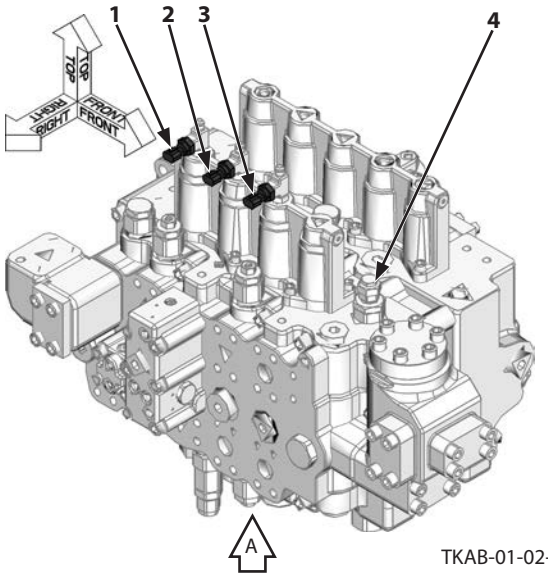


TKAA90-01-02-002

1- Work Light (Right)
3- Components Related with Auto-Lubrication Device (Refer to T5-4-18.)
4- Swing Device and Pressure Sensors for Front Attachment (Refer to T5-4-19.)
5- Satellite Communication Antenna
6- WIU Antenna
7- Around Oil Cooler (Refer to T5-4-17.)
8- Components Related with Signal Control Valve (Refer to T5-4-14.)
9- Components Related with Main Control Valve (Refer to T5-4-13.)
10- Around Radiator (Refer to T5-4-17.)
11- Components Related with Engine (Refer to T5-4-17.)
13- Rear View Camera
14- Rear Light
15- Engine Stop Switch 2
16- Components Related with Pump Device (Refer to T5-4-12.)
17- Around Air Cleaner (Refer to T5-4-9.)
18- Around Engine Compartment (Refer to T5-4-9.)
19- Components Related with Swing Control Valve (Refer to T5-4-13.)
20- Pressure Sensor (4-Spool Side)/Pressure Sensor (5-Spool Side) (Refer to T5-4-10.)
21- 4-Spool Solenoid Valve Unit
22- 2-Spool Solenoid Valve Unit
23- Hydraulic Oil Level Check Switch
24- Cab Rear Light (Option)
25- Electrical System (Battery Box) (Refer to T5-4-8.)
26- Step Light
27- Electrical System (Electrical Equipment Box) (Refer to T5-4-6.)
28- Electrical System (In Cab) (Refer to T5-4-4.)
29- Work Light (Left)
30- Monitor
31- Work Light (Cab Upper)
32- Horn

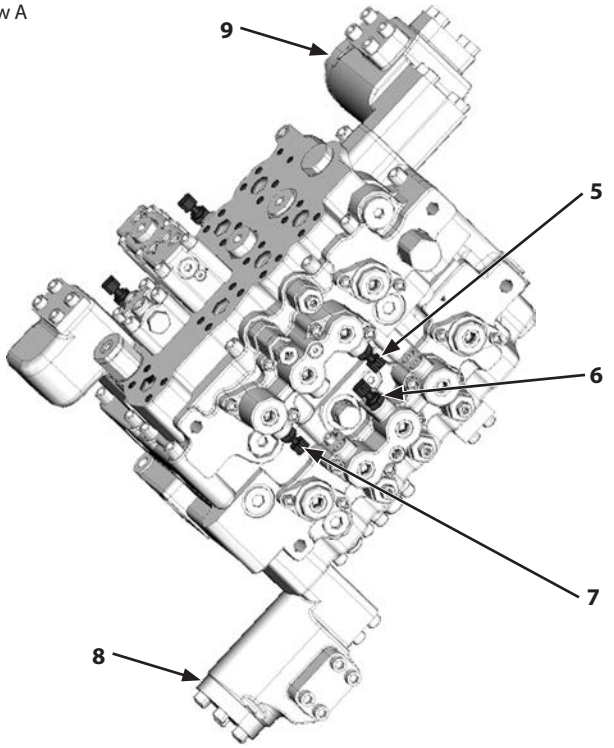
Control Valve

Main Control Valve



TKAB-01-02-021

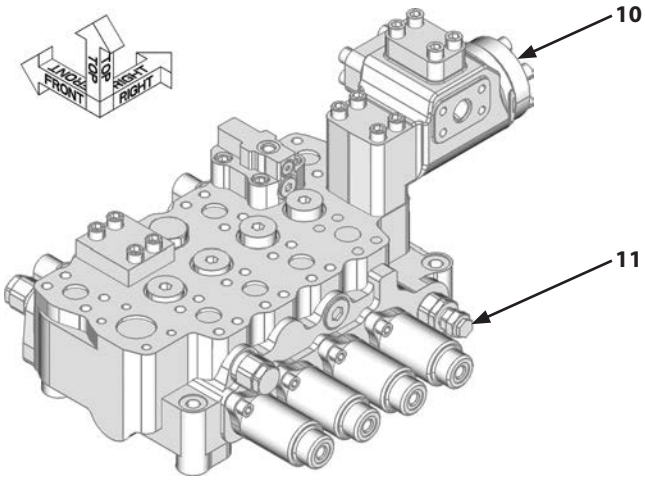
View A



TKAB-01-02-022

1- Press Sensor (Arm Roll-Out)
2- Pressure Sensor (Boom Raise)
3- Pressure Sensor (Bucket Roll-Out)
4- Main Relief Valve
5- Pressure Sensor (Bucket Roll-In)
6- Pressure Sensor (Boom Lower)
7- Press Sensor (Arm Roll-In)
8- High-Pressure Filter
9- High-Pressure Filter

Swing Control Valve

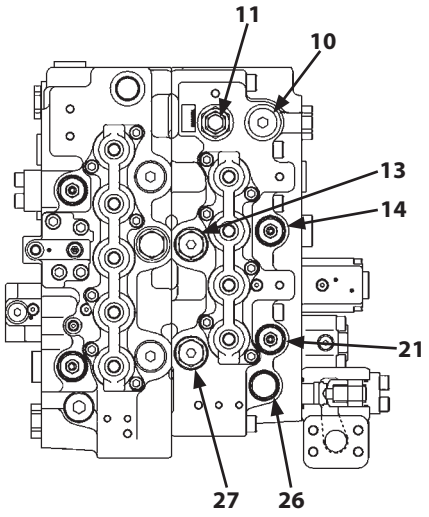


TKAB-01-02-023

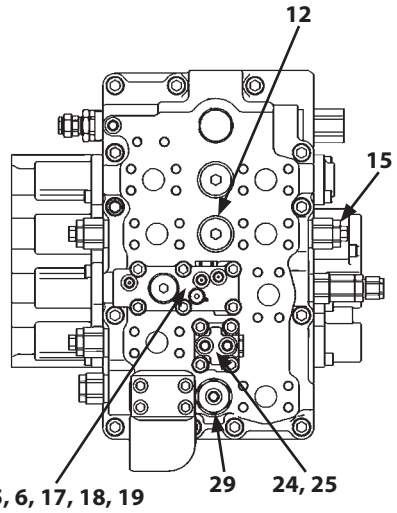
10- High-Pressure Filter
11- Main Relief Valve

Main Control Valve (4-Spool Side)

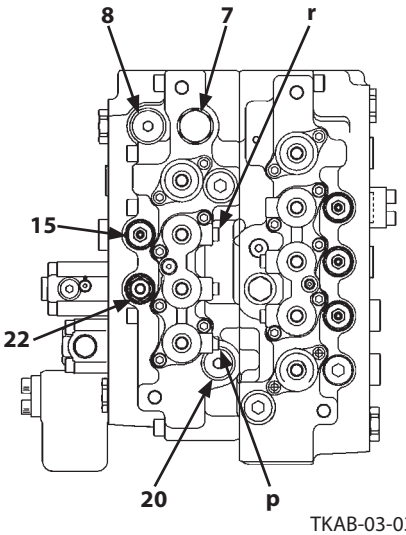
Upper Surface



Right Side Surface



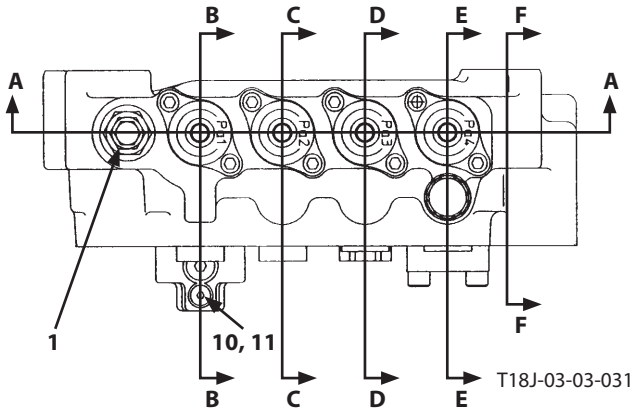
Lower Surface



TKAB-03-03-003

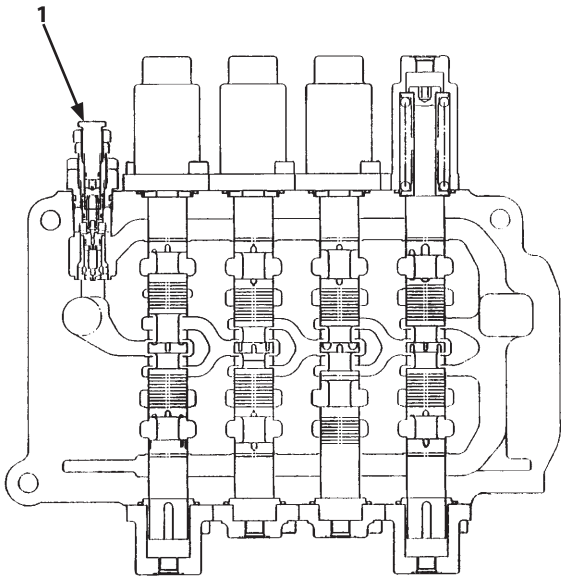
a- 4-Spool Side
b- 5-Spool Side
d- Travel (Right) Spool
e- Bucket 1 Spool
f- Boom 1 Spool
g- Arm 2 Spool
h- Bucket 2 Spool
j- Arm 1 Spool
k- Boom 2 Spool
m- Auxiliary Spool
n- Travel (Left) Spool
p- Press Sensor (Arm Roll-In) Connecting Position
r- Pressure Sensor (Bucket Roll-In) Connecting Position

1- Pump 1
2- Pump 2
3- Bypass Shut-Out Valve (5-Spool Side)
4- Check Valve (Main Relief Circuit)
5- Boom 1 Flow Rate Control Valve (Poppet Valve)
6- Boom 1 Flow Rate Control Valve (Selector Valve)
7- Flow Combiner Valve
8- Check Valve (Flow Combiner Circuit)
9- Line Filter
10- Check Valve (Main Relief Circuit)
11- Main Relief Valve
12- Load Check Valve (Bucket Parallel Circuit)
13- Bucket Regeneration Cut Valve
14- Overload Relief Valve (Bucket: Rod Side)
15- Overload Relief Valve (Bucket: Bottom Side)
16- Bucket Regenerative Valve
17- Boom Lower Meter-In Cut Valve
18- Boom 1 Anti-Drift Valve (Selector Valve)
19- Boom 1 Anti-Drift Valve (Check Valve)
20- Load Check Valve
21- Overload Relief Valve (Boom 1: Bottom Side)
22- Overload Relief Valve (Low Pressure) (Boom 1: Rod Side)
23- Boom Overload Relief Selector Valve
24- Arm 2 Flow Rate Control Valve (Selector Valve)
25- Arm 2 Flow Rate Control Valve (Poppet Valve)
26- Check Valve (Arm Make-Up)
27- Arm Regeneration Cut Valve
28- Check Valve
29- Bypass Shut-Out Valve (4-Spool Side)
30- Boom Regenerative Valve
31- Arm Regenerative Valve
32- Line Filter
36- Load Check Valve (Arm 1 Tandem Circuit)
38- Arm 1 Anti-Drift Valve (Selector Valve)
39- Overload Relief Valve (Arm 1: Bottom Side)
40- Arm 1 Anti-Drift Valve (Check Valve)
41- Overload Relief Valve (Arm 1: Rod Side)
42- Load Check Valve (Boom 2 Parallel Circuit)
43- Check Valve (Boom 2 Regenerative Circuit)
44- Boost Check Valve (Boom Regenerative Back Pressure Valve)
45- Overload Relief Valve (Boom 2: Rod Side)
46- Boom 2 Anti-Drift Valve (Selector Valve)
47- Boom 2 Anti-Drift Valve (Check Valve)
48- Load Check Valve (Auxiliary Parallel Circuit)
49- Load Check Valve (Auxiliary Tandem Circuit)
50- Overload Relief Valve (Auxiliary)
51- Overload Relief Valve (Auxiliary)
52- Load Check Valve (Travel (Left) Parallel Circuit)
53- Load Check Valve (Travel (Left) Tandem Circuit)



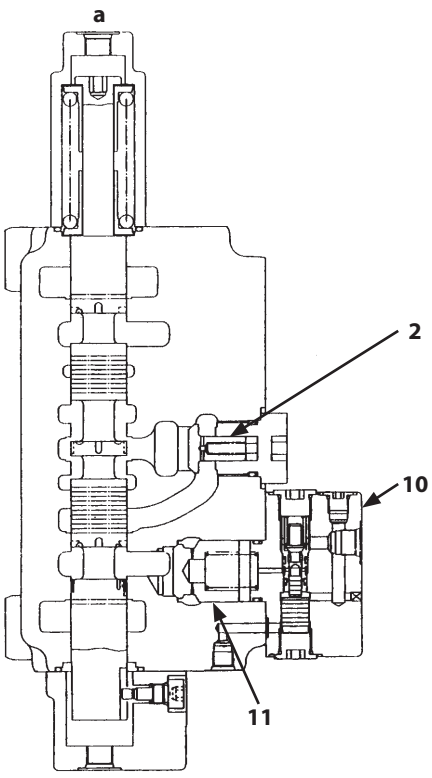
T18J-03-03-031

Section A-A



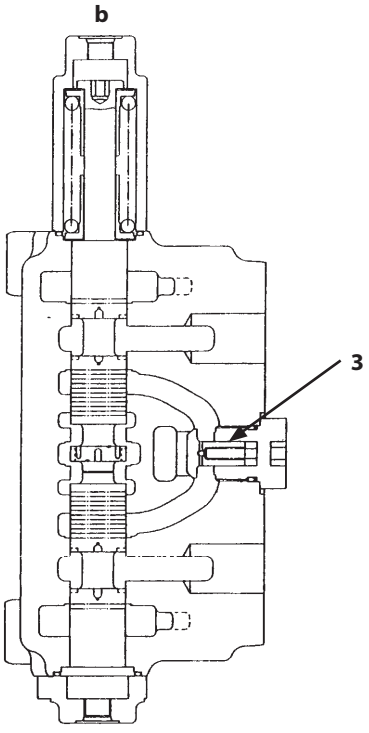
T18J-03-03-032

Section B-B



T18J-03-03-033

Section C-C



T18J-03-03-034

CAN Data Reception Failure

Fault Code	Trouble	Cause	Symptoms in Machine Operation When Trouble Occurs	Remedy
11006-2	(MC) EC Communication Error	Faulty wire harness	The machine movement is slow. (The torque is reduced by the speed sensing.)	Check the wire harness.
11007-2	(MC) IC Communication Error 1	Faulty MC1 Faulty CAN0 harness	The machine movement is slow.	Check the CAN0 harness. Check MC1.
11008-2	(MC) IC Communication Error 2	Faulty MC1 Faulty CAN1 harness	Auto shut-down is not activated.	Check the CAN1 harness. Check MC1.
11009-2	(MC) Monitor Controller Communication Error 1	Faulty MC1 Faulty CAN0 harness	The machine movement is slow.	Check the CAN0 harness. Check MC1.
11010-2	(MC) Monitor Controller Communication Error 2	Faulty MC1 Faulty CAN1 harness	Auto shut-down is not activated.	Check the CAN1 harness. Check MC1.

NOTE: IC is the Information Control Unit of Monitor Controller.

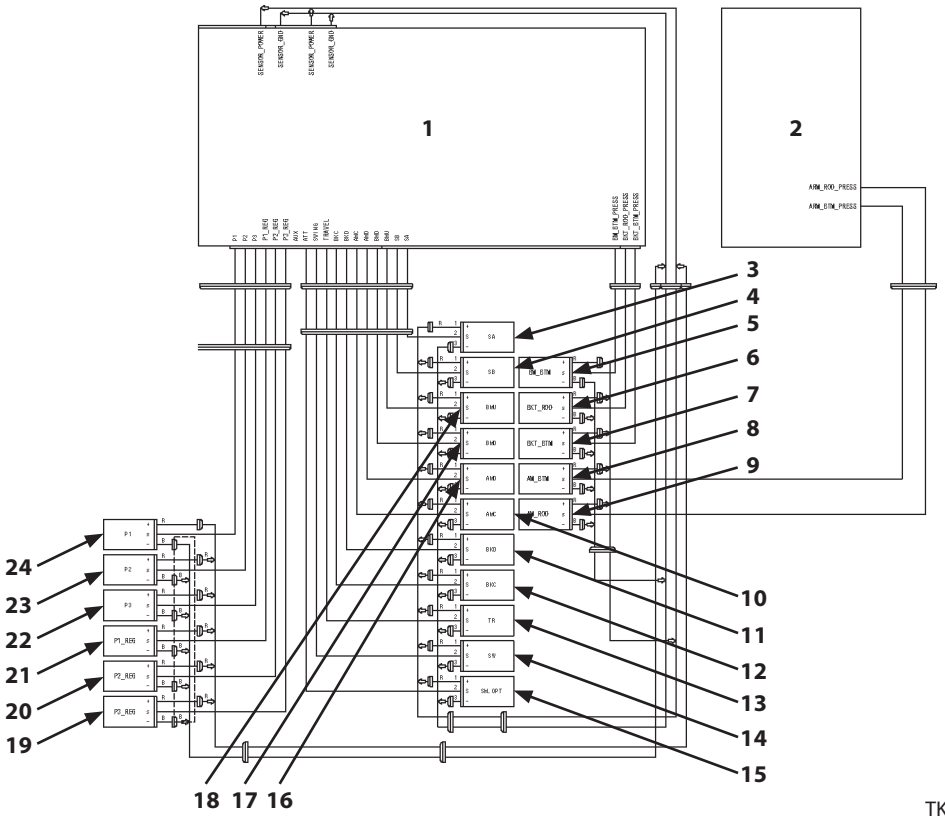
Fault Code	Trouble	Cause	Symptoms in Machine Operation When Trouble Occurs	Remedy
11901-3	Hyd. Oil Temp Sensor Circuit High Input	Voltage: more than 4.35 V	When hydraulic oil temperature is less than 0 °C, the auto-warming up control cannot be activated.	Check the wire harness.
11901-4	Hyd. Oil Temp Sensor Circuit Low Input	Voltage: less than 0.1 V	When hydraulic oil temperature is less than 0 °C, the auto-warming up control cannot be activated.	Check the wire harness.
11930-3	Arm Roll-Out Pilot Pressure Sensor Voltage Abnormally High	-	-	-
11930-4	Arm Roll-Out Pilot Pressure Sensor Voltage Abnormally Low	-	-	-
11931-3	Arm Roll-In Pilot Pressure Sensor Voltage Abnormally High	-	-	-
11931-4	Arm Roll-In Pilot Pressure Sensor Voltage Abnormally Low	-	-	-
11932-3	Bucket Open Pilot Pressure Sensor Voltage Abnormally High	-	-	-
11932-4	Bucket Open Pilot Pressure Sensor Voltage Abnormally Low	-	-	-
11933-3	Bucket Close Pilot Pressure Sensor Voltage Abnormally High	-	-	-
11933-4	Bucket Close Pilot Pressure Sensor Voltage Abnormally Low	-	-	-
11934-3	Bucket Open/Close Pilot Pressure Sensor Voltage Abnormally High	-	-	-
11934-4	Bucket Open/Close Pilot Pressure Sensor Voltage Abnormally Low	-	-	-

(Blank)

MC1 Fault Code 11003

IMPORTANT: When fault code 11003-3 (Abnormal Sensor Voltage) is displayed with other fault code, diagnose on fault code 11003-3 first.

Fault Code	Trouble	Procedure	Inspection Method	Evaluation	Cause
11003-3	Abnormal Sensor Voltage	1	Disconnect connectors from all sensors and switch panel. Retry the troubleshooting by using MPDr..	Un-displayed fault codes 11003-3	YES: Faulty sensor
					NO: Go to Procedure No. 2.
		2	Check short circuit in wire harness between sensor harness end #1 and #3.	0 Ω	YES: Short circuit in wire harness between #1 and #3
					NO: Faulty MC1

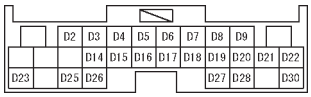


TKAB-05-05-001

1- MC1
2- MC2
3- Pressure Sensor (4-Spool Side)
4- Pressure Sensor (5-Spool Side)
5- Boom Bottom Pressure Sensor
6- Bucket Rod Pressure Sensor
7- Bucket Bottom Pressure Sensor
8- Arm Bottom Pressure Sensor
9- Arm Rod Pressure Sensor
10- Press Sensor (Arm Roll-In)
11- Pressure Sensor (Bucket Roll-Out)
12- Pressure Sensor (Bucket Roll-In)
13- Pressure Sensor (Travel)
14- Pressure Sensor (Swing)
15- Pressure Sensor (Auxiliary)
16- Press Sensor (Arm Roll-Out)
17- Pressure Sensor (Boom Lower)
18- Pressure Sensor (Boom Raise)
19- Pump 3 Regulator Pressure Sensor
20- Pump 2 Regulator Pressure Sensor
21- Pump 1 Regulator Pressure Sensor
22- Pump 3 Delivery Pressure Sensor
23- Pump 2 Delivery Pressure Sensor
24- Pump 1 Delivery Pressure Sensor

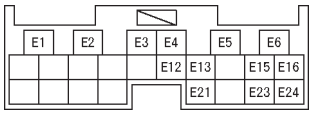
Connector (Wire harness end)

- MC1-D Connector



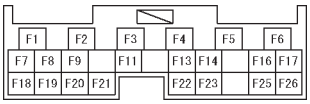
TKAB-05-05-002

- MC1-E Connector



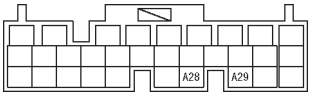
TKAB-05-05-003

- MC1-F Connector



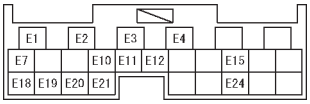
TKAB-05-05-004

- MC2-A Connector



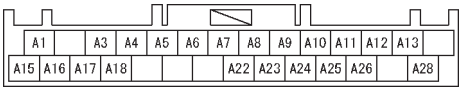
TKAB-05-05-005

- MC2-E Connector



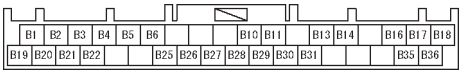
TKAB-05-05-006

- Monitor Controller-A Connector



TKAB-05-05-009

- Monitor Controller-B Connector



TKAB-05-05-010

- Radio Connector

TDC1-05-05-010

- A/C1 Connector

TDC1-05-05-008

- A/C2 Connector

TDC1-05-05-009

- DLU-26 Pin Connector

TKAB-05-05-011

- DLU-22 Pin Connector

TKAB-05-05-012

MC1 Fault Code 11412

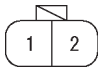
Preparation

- Check the wiring connections first.

Fault Code	Trouble	Procedure	Inspection Method	Evaluation	Cause
11412-3	Hyd. Fan P/S Valve FB High Current	1	Measure resistance between solenoid valve #1 and #2.	0 Ω (Specification: 22 Ω)	YES: Faulty solenoid valve
					NO: Short circuit in wire harness between #1 and #2
11412-4	Hyd. Fan P/S Valve FB Low Current	1	Measure resistance between solenoid valve #1 and #2.	∞ Ω (Specification: 22 Ω)	YES: Faulty solenoid valve.
					NO: Go to Procedure No. 2.
		2	Measure voltage between solenoid valve harness end #1 and the body.	0 V	YES: Open circuit in wire harness #1
					NO: Open circuit in wire harness #2

Connector (Wire harness end)

- Solenoid Valve Connector



TKAB-05-05-015

MC1 Fault Code 11989

Preparation

- Check the wiring connections first.

Fault Code	Trouble	Procedure	Inspection Method	Evaluation	Cause
11989-3	Boom Mode Control P/S Valve FB High Current	1	Measure resistance between solenoid valve #1 and #2.	0 Ω (Specification: 22 Ω)	YES: Faulty solenoid valve
					NO: Short circuit in wire harness between #1 and #2
11989-4	Boom Mode Control P/S Valve FB Low Current	1	Measure resistance between solenoid valve #1 and #2.	∞ Ω (Specification: 22 Ω)	YES: Faulty solenoid valve
					NO: Go to Procedure No. 2.
		2	Measure voltage between solenoid valve harness end #1 and the body.	0 V	YES: Open circuit in wire harness #1
					NO: Open circuit in wire harness #2

Connector (Wire harness end)

- Solenoid Valve Connector

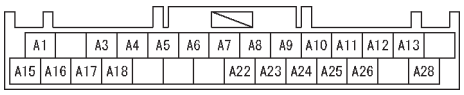
TDC1-05-05-026

Monitor Controller (Information) Fault Codes 20100 to 20107, 20114

Fault Code	Trouble	Procedure	Inspection Method	Evaluation	Cause
20100-2	Overheat Alarm	1	Perform troubleshooting on fault codes of ECM.	-	-
20114-2	Overheat Alarm (Immediately after the key is turned ON)	1	Perform troubleshooting on fault codes of ECM.	-	-
20101-2	Engine Warning Alarm	1	Perform troubleshooting on fault codes of ECM.	-	-
20102-2	Engine Oil Pressure Alarm	1	Perform troubleshooting on fault codes of ECM.	-	-
20105-2	Hydraulic Oil Filter Restriction Alarm	1	Disconnect a connector of the hydraulic oil filter. Retry troubleshooting by using MPDr..	Displayed fault code	YES: Faulty monitor controller or short circuit in wire harness
					NO: Faulty hydraulic oil filter.
20106-2	Air Cleaner Restriction Alarm	1	Disconnect a connector of the air cleaner. Retry troubleshooting by using MPDr..	Displayed fault code	YES: Faulty monitor controller or short circuit in wire harness
					NO: Faulty air cleaner.
20107-2	Water Separator Alarm	1	Disconnect a connector of the water separator alarm switch. Retry troubleshooting by using MPDr..	Displayed fault code	YES: Faulty monitor controller or short circuit in wire harness
					NO: Faulty water separator alarm switch

Connector (Wire harness end)

- Monitor Controller-A Connector



TKAB-05-05-009

Parts / Item	Lubrication Mode Selection Switch	Proximity Switch (Auto-Lubrication Device)
Function	This switch activates auto-lubrication. (Auto-Lubrication Control) ON: 0 V→ Auto-lubrication is activated. OFF: 5 V→ Auto-lubrication is not activated.	This switch detects the number of the distribution valve operating times, and sets the lubrication time. (Auto-Lubrication Control)
Symptoms in control system when trouble occurs	No signal is input to MC1.	No signal is input to MC1.
Symptoms in machine operation when trouble occurs	Open and short circuits: Auto-lubrication is not activated.	As the pump continues to be operated until auto-lubrication error judgment time, more grease is applied. When time reaches auto-lubrication error judgment time, the auto-lubrication alarm is displayed on the monitor unit.
Evaluation by Fault Code	-	-
Evaluation by Monitoring	MC1: AG Main Switch	MC1: AG Main Switch
Evaluation by using Test Harness	-	-
Note	-	-
Descriptions of Control (Operational Principle Section in T/M)	T2-2	T2-2

Parts / Item	4-Spool Solenoid Valve Unit (SF)	2-Spool Solenoid Valve Unit (SI)
Function	Valve (SF) increases relief pressure of main relief valve temporarily.	Valve (SI) shifts selector valve of arm 2 flow rate control valve.
Symptoms in control system when trouble occurs	High current: Relief pressure always increases. Low current: Relief pressure always does not increase.	High current: As valve (SI) always shifts arm 2 flow rate control valve (selector valve), arm speed becomes slow. Low current: As valve (SI) always does not shift (selector valve) arm 2 flow rate control valve (selector valve), combined operation including arm is not smooth.
Symptoms in machine operation when trouble occurs	Same as shown above	Same as shown above
Evaluation by Fault Code	11948	11428
Evaluation by Monitoring	MC1: Main Relief Boost Press Output, Main Relief Boost Press O/P FB	MC1: Arm 2 Flw Cont P/S Output, Arm 2 Flw Cont P/S O/P FB
Evaluation by using Test Harness	Install light harness (ST 7226). Check output signals from MC1 and wire harness condition.	Install light harness (ST 7226). Check output signals from MC1 and wire harness condition.
Note	-	-
Descriptions of Control (Operational Principle Section in T/M)	T2-2	T2-2

Correlation between Trouble Symptoms and Part Failures

This table indicates the relationship between machine troubles and parts contributing to the cause of the trouble if failed.
The trouble symptoms in this table are described based on the conditions that other operations are normal and only one particular trouble symtom occurs. In case more than one trouble occurs at the same time, find out all faulty components while checking all suspected components in each trouble symptom.

The marks ●/○ in this table indicate the influence to trouble symptom.
●: Related, required to check
○: Related. However, in case this component fails, fault code is displayed, or other trouble symptom will be more noticeable. Thus, this component will not be the direct cause of the trouble concerned.

Trouble Symptom / Parts	F-9 Front attachment drifts remarkably.	F-10 Boom lower speed above ground is faster than other actuators when performing combined operation. Machine cannot be raised off the ground.	F-11 Arm speed is fast when performing arm level crowding operation. Arm power is weak when performing digging operation.
MC1		○	○
Power Mode Switch			
Pilot Shut-Off Solenoid Valve			
Main Pump 1		○	○
Main Pump 2		○	○
Main Pump 3		○	○
Pilot Pump			
Pump 1 Regulator			
Pump 2 Regulator			
Pump 3 Regulator			
Pump 1 Delivery Pressure Sensor			
Pump 2 Delivery Pressure Sensor			
Pump 3 Delivery Pressure Sensor			
Pump 1 Control Solenoid Valve			
Pump 2 Control Solenoid Valve			
Pump 3 Control Solenoid Valve			
Main Relief Valve			
Boom Anti-Drift Valve	●		
Arm Anti-Drift Valve (Rod Side)	●		
Arm Regeneration Cut Valve			●
Bucket Regenerative Valve			
Bucket Regeneration Cut Valve			
Boom 1 Flow Rate Control Valve		○	
Arm 2 Flow Rate Control Valve			○
Bypass Shut-Out Valve		●	
Boom Lower Meter-In Cut Valve		●	
Boom Overload Relief Selector Valve			
Load Check Valve	○		○
Overload Relief Valve	●		
Emergency Valve	●		
Spool	●	○	○
Pressure Sensor (Boom Raise)			○
Pressure Sensor (Boom Lower)			
Press Sensor (Arm Roll-In)			○
Press Sensor (Arm Roll-Out)			
Pressure Sensor (Bucket Roll-In)			
Pressure Sensor (Bucket Roll-Out)			
Cylinder	●	○	○
Pilot Valve			
Shockless Valve (Signal Control Valve)			
Shuttle Valve (Signal Control Valve)	○		
Pressure Sensor (Travel)			
Pressure Sensor (Swing)			
Pressure Sensor (4-Spool Side)			
Pressure Sensor (5-Spool Side)			
4-Spool Solenoid Valve Unit (SG)			
4-Spool Solenoid Valve Unit (SI)		○	
4-Spool Solenoid Valve Unit (SF)			
4-Spool Solenoid Valve Unit (SC)			
2-Spool Solenoid Valve Unit (SC)			
2-Spool Solenoid Valve Unit (SI)			○
Pilot Filter			
Pilot Relief Valve			
Remark			

E-3 Even if power mode switch is operated, power mode is not shifted.

Preparation

- Check the wiring connections first.

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Monitor Power Mode Switch.	Power Mode Switch: ON	OFF is displayed.	YES: Faulty power mode switch or open circuit in wire harness between power mode switch and MC1
				NO: Faulty MC1

A-6 Actuator does not stop even if control lever is set to neutral.

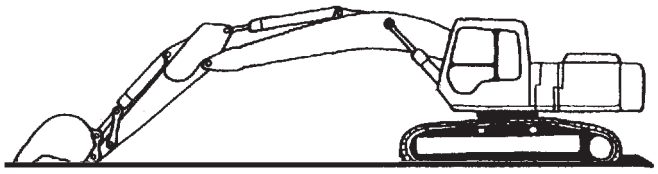
Preparation

- Stuck spool in the pilot valve, stuck main spool in the main control valve, or stuck main spool in the swing control valve is suspected.

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Set the pilot shut-off lever to the LOCK position.	-	The actuator stops.	YES: Faulty pilot valve (stuck spool)
				NO: Faulty main control valve or faulty swing control valve (stuck spool)

F-9 Front attachment drifts remarkably.

- Boom Cylinder Internal Leakage Check
  1. With the bucket cylinder fully retracted and the arm cylinder slightly extended from the fully retracted position, lower the bucket tooth tips onto the ground.
  2. Disconnect the hoses from the boom cylinder rod side. Drain oil from the hoses and cylinders. (Plug the disconnected hose ends.)
  3. Retract the arm cylinder and lift the bucket off the ground. If oil flows out of the hose disconnected piping ends and the boom cylinders are retracted at this time, oil leaks in the boom cylinders. If no oil flows out of the hose disconnected piping ends but the boom cylinders are retracted, oil leaks in the control valve.



T105-07-04-009

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Switch overload relief valves.	-	The symptom disappears.	YES: Faulty overload relief valve
				NO: Go to Procedure No. 2.
2	Disassemble and inspect the anti-drift valves (arm, boom).	-	There is abnormality.	YES: Faulty anti-drift valve
				NO: Go to Procedure No. 3.
3	Disassemble and inspect the emergency valve.	-	There is abnormality.	YES: Faulty emergency valve
				NO: Go to Procedure No. 4.
4	Disassemble and inspect the cylinder.	-	There is abnormality.	YES: Faulty cylinder (seal kit)
				NO: Scored control valve spool, broken spring, or loose spool end

Other System Troubleshooting

O-1 Work lights (left, right) and rear light do not light.

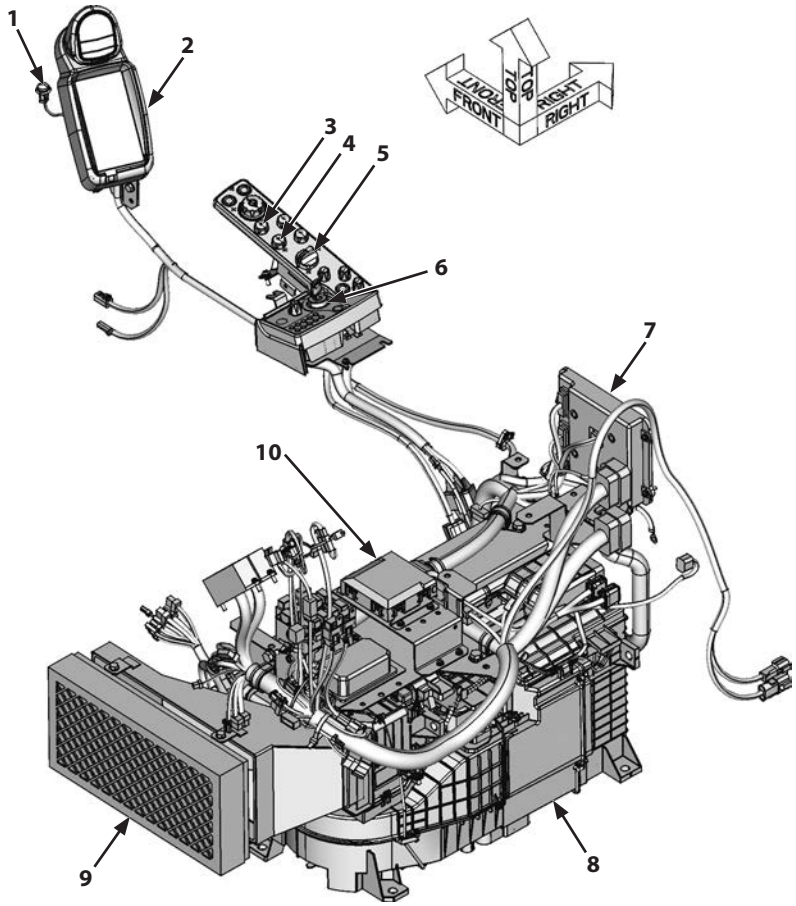
Preparation

- Check that the work lights (left, right) and rear light are not broken first.
- Refer to SYSTEM/Electrical System.
- Check the wiring connections first.

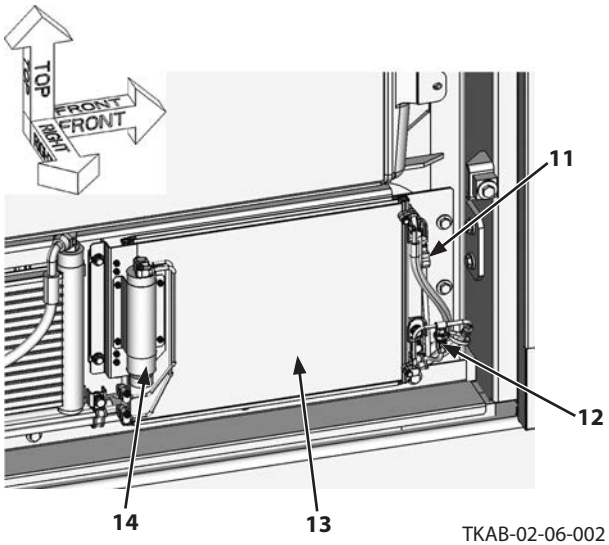
Procedure	Inspection Method	Condition	Evaluation	Cause
1	Monitor Work Light 1 Relay.	Work Light Switch: 1 position	OFF is displayed	YES: Faulty work light relay 1 and back light relay, or open circuit in wire harness between work light relay 1 and MC2
				NO: Go to Procedure No.2.
2	Monitor Work Light 1 Switch	Work Light Switch: 1 position	OFF is displayed	YES: Faulty work light switch or open circuit in wire harness between work light switch and MC2
				NO: Faulty MC2

(Blank)

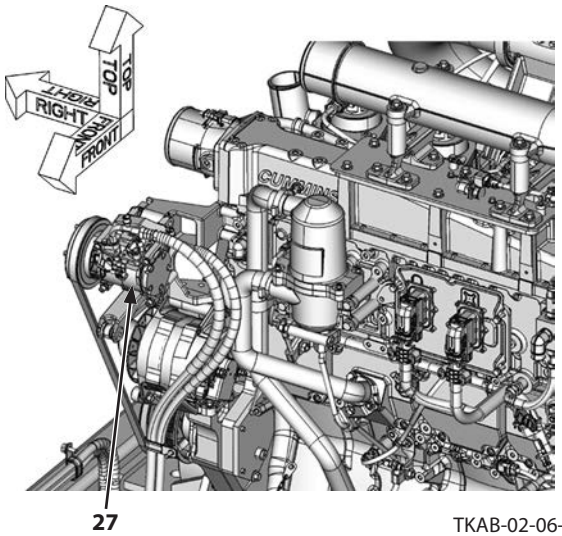
Component Layout



TKAB-02-06-001



TKAB-02-06-002



TKAB-02-06-003

1- Solar Radiation Sensor
2- Monitor
3- Temperature Control Switch/ Mode Switch
4- AUTO/OFF Switch / Blower Switch
5- Engine Control Dial
6- Key Switch
7- Monitor Controller
8- Air Conditioner Unit
9- Fresh Air Filter
10- Air Conditioner Controller
11- Ambient Temperature Sensor
12- High/Low Pressure Switch
13- Air Conditioner Condenser
14- Receiver Tank
27- Compressor

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.

Faulty heating (2)

Condition:

- Fault Code: 44 (Abnormal air mix damper servo motor)

Caught foreign matter	Remove foreign matter.
Faulty wire harness, open circuit, disconnection of connector	Check the wire harness.
Faulty servo motor	Replace

Refill Compressor Oil

When replacing the cooling circuit parts, refill compressor oil to the specified level.

Replacement parts	Compressor	Condenser	Evaporator
Oil replenishing quantity	40 cm^3 (2.4 in^3)	40 cm^3 (2.4 in^3)	40 cm^3 (2.4 in^3)

- When replacing compressor

New compressor is charged with oil required for cooling circuit. When replacing to new compressor, refill compressor oil 40 cm^3 (2.4 in^3) so that total oil is 200 cm^3 (12.2 in^3).

NOTE: New compressor oil quantity: 160 cm^3 (9.8 in^3)

- Compressor oil refill container

Oil type	Part No	Quantity
ND-OIL8	4422696	40 cm^3 (2.4 in^3)