PART NO. TT4FK-E-00

HITACHI

Technical Manual
Troubleshooting

ZW 100-G 120-G
Wheel Loader

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TO4FK-E
Technical Manual (Troubleshooting)	: Vol. No.TT4FK-E
Workshop Manual	: Vol. No.W4FK-E

Hitachi Construction Machinery
URL:http://www.hitachi-c-m.com

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OPERATE ONLY FROM OPERATOR'S SEAT

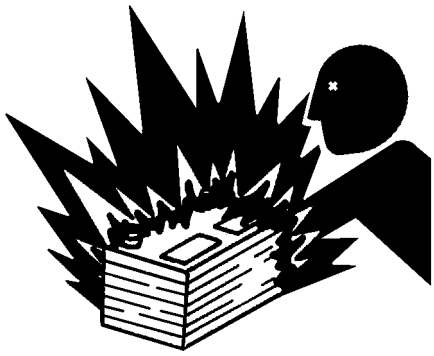
- Inappropriate engine starting procedures may cause the machine to runaway, possibly resulting in serious injury or death.
  - Start the engine only when seated in the operator's seat.
  - NEVER start the engine while standing on the track or on ground.
  - Do not start engine by shorting across starter terminals.
  - Before starting the engine, confirm that all control levers are in neutral.
  - Before starting the engine, confirm the safety around the machine and sound the horn to alert bystanders.

SA-431

012-E01B-0431

JUMP STARTING

- Battery gas can explode, resulting in serious injury.
  - If the engine must be jump started, be sure to follow the instructions shown in the “OPERATING THE ENGINE” chapter in the operator’s manual.
  - The operator must be in the operator’s seat so that the machine will be under control when the engine starts.
  - Jump starting is a two-person operation.
  - Never use a frozen battery.
  - Failure to follow correct jump starting procedures could result in a battery explosion or a runaway machine.



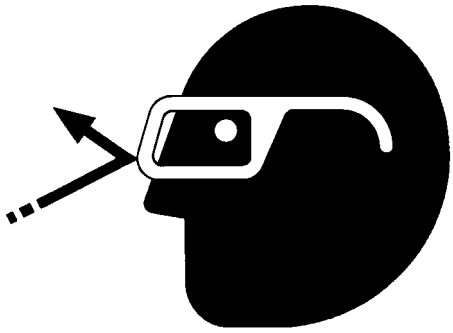
SA-032

S013-E01A-0032 SA-032

PROTECT AGAINST FLYING DEBRIS

- If flying debris hit eyes or any other part of the body, serious injury may result.
  - Guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.
  - Keep bystanders away from the working area before striking any object.

031-E01A-0432



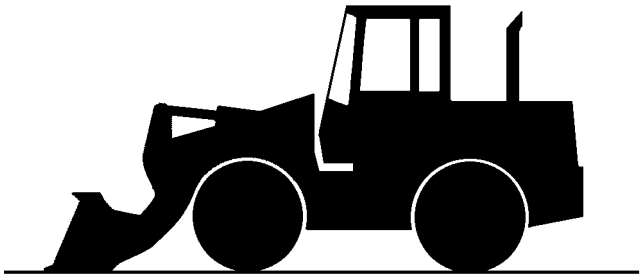
SA-432

PARK MACHINE SAFELY

To avoid accidents:

- Park machine on a firm, level surface.
- Lower bucket to the ground.
- Place the F-N-R lever in neutral, and put the park brake switch in the ON (parking brake) position.
- Run engine at slow idle speed without load for 5 minutes.
- Turn key switch to OFF to stop engine.
- Remove the key from the key switch.
- Lower the lock lever to the LOCK position.
- Close windows, roof vent, and cab door.
- Lock all access doors and compartments.

033-E07B-0456



SA-456

AVOID HEATING NEAR PRESSURIZED FLUID LINES

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

SA-030

AVOID APPLYING HEAT TO LINES CONTAINING FLAMMABLE FLUIDS

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

510-E01B-0030

REMOVE PAINT BEFORE WELDING OR HEATING

- 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 material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

SA-029

511-E01A-0029

ZW100-G OPERATIONAL PERFORMANCE STANDARD TABLE

The standard Performance values are listed in the table below. Refer to the Group T4-3 to T4-5 for performance test procedures. Values indicated in parentheses are reference values.

The following switch positions shall be selected and the hydraulic oil temperature shall be maintained as indicated below as the preconditions of performance tests unless otherwise instructed in each performance test procedure:

Acceletor Pedal : Full Stroke
Hydraulic Oil Temperature : 50±5 °C (122±9 °F)

PERFORMANCE TEST DESIGNATION	ZW100-G (Performance Standard)	Remarks	Reference Page
ENGINE SPEED min^{-1}			T4-3-1
Slow Idle Speed (without load)	1100±25		
Fast Idle Speed (without load)	2350^{+0}_{-50}		
Fast Idle Speed (with HST relieved)	2220±50		
Fast Idle Speed (with Front attachment relieved)	2160±50		
ENGINE COMPRESSION PRESSURE MPa(kgf/cm^2,psi)	3.4 (34, 493)	Engine speed: 200 min^{-1}	T4-3-3
VALVE CLEARANCE (IN, EX) mm	0.23 to 0.27	With the engine cold	T4-3-4
RADIATOR CAP OPENING PRESSURE kPa(kgf/cm^2,psi)	49 (0.5, 7)		
TRAVEL SPEED km/h			T4-4-1
Fast Speed	$34.5^{+0.4}_{-3.5}$		
Slow Speed	12.5±1.2		
SERVICE BRAKE CAPACITY m	5 or less	Travel Speed 20 km/h	T4-4-2
PARKING BRAKE CAPACITY mm/5 min	0		T4-4-3

ENGINE SPEED

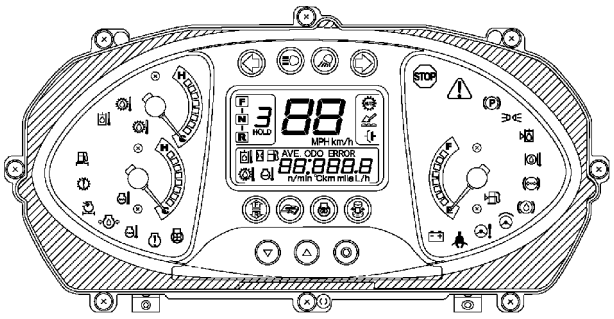
Summary:

1. Measure the engine speed by using the monitor panel or Dr. ZX.
2. Measure the engine speeds in each mode.

NOTE: If the engine speed under each condition is not adjusted correctly, all other performance data will be unreliable. Consequently, measure the engine speed before performing all other tests in order to check that the engine speed meets specification.

Preparation:

1. Select the service mode of monitor panel or the service menu of Dr. ZX.
2. Warm up the machine until coolant temperature reaches 50 °C (122 °F) or more, hydraulic oil temperature is 50±5 °C (122±9 °F).



T4FJ-02-04-020

Engine Speed

T4FJ-05-02-003

Measurement:

1. Select the pedal, switch, and FNR shift lever positions as follows:

Cylinder	Accelerator Pedal	Parking Brake Switch	Forward/ Reverse Lever
Lift Arm	Fully Depressing	ON	N
Bucket	Fully Depressing	ON	N
Steering	Not Depressing	ON	N
Steering	Fully Depressing	ON	N

2. Operate each cylinder as follows (including the cushion stroke range):

Lift Arm Cylinder:
While moving the lift arm lever full stroke, measure the time required to raise or lower the lift arm. In addition, measure the time required to lower the lift arm from the maximum raised position to the ground with the lift arm lever in the FLOAT position.
Bucket Cylinder:
While moving the bucket lever full stroke, measure the time required to tilt or dump the bucket.
Steering Cylinder:
While turning the steering wheel full stroke, measure the time required to fully steer the machine from the right to the left and vice versa.

3. Repeat measurement three times and calculate the average value.

Evaluation:
Refer to the Performance Standard Table in Group T4-2.

Remedy:
Refer to the Troubleshooting B in Group T5-6.

(Blank)

Measurement:

CAUTION: Put the blocks onto the front and rear tires in order not to move the machine and keep away from the machine.

1. Select the following positions.

	Accelerator Pedal	Parking Brake Switch	Forward/Reverse Lever	Travel Mode Switch
Engine Fast Idle	Fully depressing	OFF	F	Hi
Engine Fast Idle	Fully depressing	OFF	R	Hi

2. With the service brake pedal depressed, step on the accelerator pedal to the stroke end. Measure the pressure at the engine fast idle speed.
3. Repeat the measurement three times and calculate the mean valves.

Evaluation:

Refer to Operational Performance Standard in T4-2.

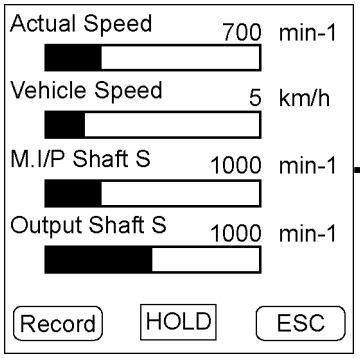
Group 8 Electrical System Inspection

OUTLINE

Dr. ZX is used for diagnosis of MC (main controller), ECM (engine control module), ICF (information controller) and the monitor unit. Dr. ZX is connected to ICF and the failure of each controller and each sensor is displayed as a fault code. (Self-Diagnostic Result)

Dr. ZX displays the input status of the sensors and the switches connected to each controller and the output status to the actuator including the solenoid valve from the controller with the machine operated in real time. (Controller Diagnosis)

Push Record.

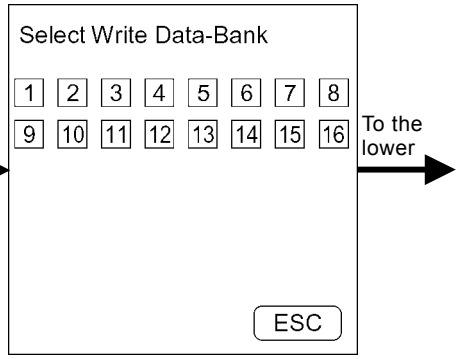


T4FC-05-02-104

Monitor Screen

T1V7-05-03-096

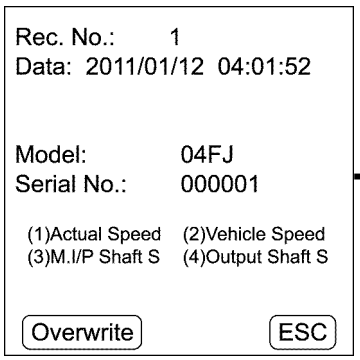
Push Rec. No. and the recording screen for Rec. No. is made.



T1V7-05-03-097

Select Write Data-Bank Screen

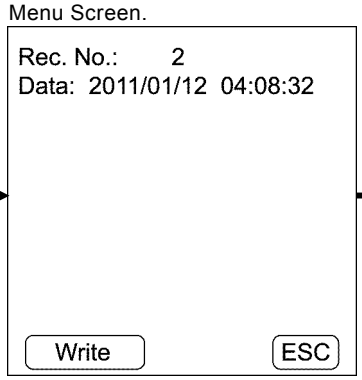
If Rec. No. has already been recorded and push Overwrite, data is overwritten. Push ESC and return to Main Menu Screen.



T4FJ-05-02-105

Recording Screen

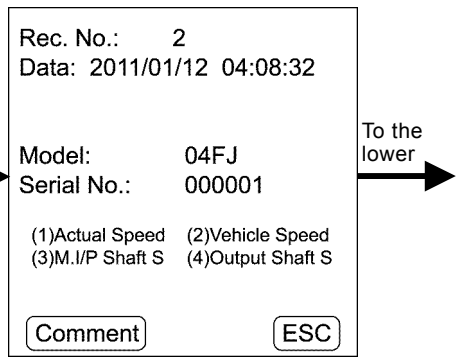
If Rec. No. has not been recorded yet and push Overwrite, data is written to the recording screen. Push ESC and return to Main Menu Screen.



T4FJ-05-03-100

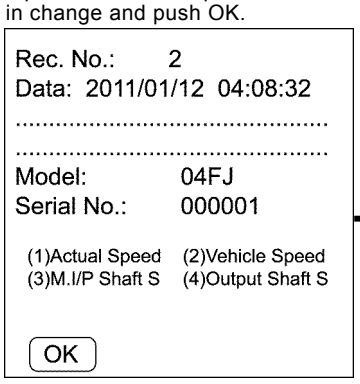
Recording Screen

Push Comment.
Push ESC and return to Main Menu Screen.



T4FJ-05-02-106

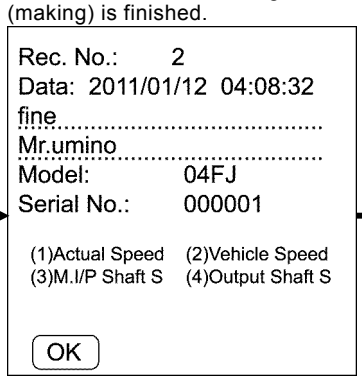
Input weather and person's name in change and push OK.



T4FJ-05-02-107

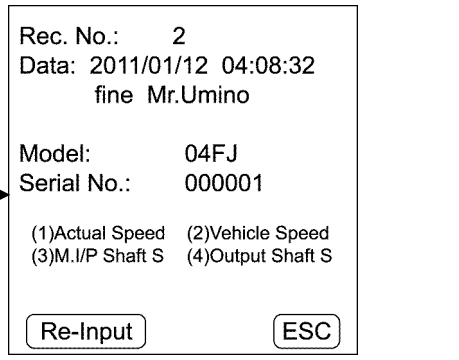
Recording Screen (Comment Input)

Push OK and the recording screen (making) is finished.



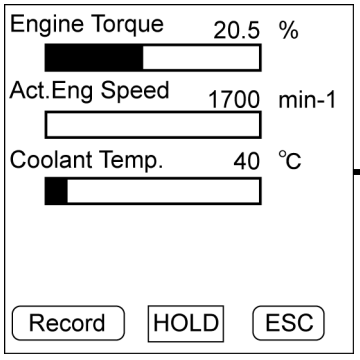
T4FJ-05-02-108

Push Re-Input and return to Recording Screen (Comment Input). Push ESC and return to Monitor Screen.



T4FJ-05-02-109

Push Record.

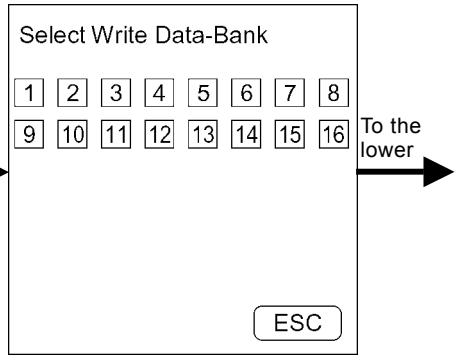


T4FL-05-02-114

Monitor Screen

T1V7-05-03-134

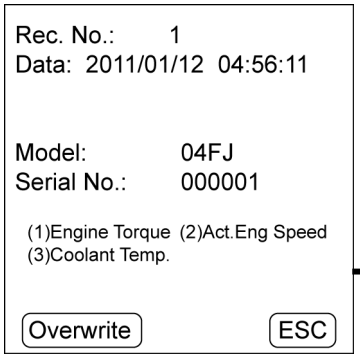
Push Rec. No. and the recording screen for Rec. No. is made.



T1V7-05-03-135

Select Write Data-Bank Screen

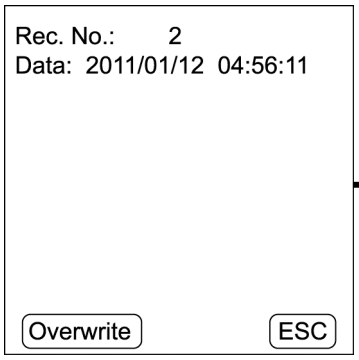
If Rec. No. has already been recorded and push Overwrite, data is overwritten.
Push ESC and return to Main Menu Screen.



T4FL-05-02-122

Recording Screen

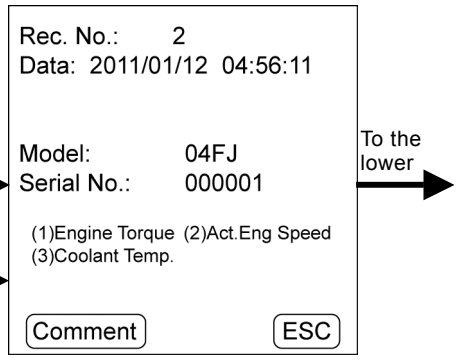
If Rec. No. has not been recorded yet and push Overwrite, data is written to the recording screen.
Push ESC and return to Main Menu Screen.



T4FJ-05-02-030

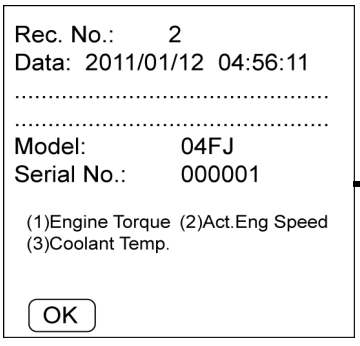
Recording Screen

Push Comment.
Push ESC and return to Main Menu Screen.



T4FL-05-02-123

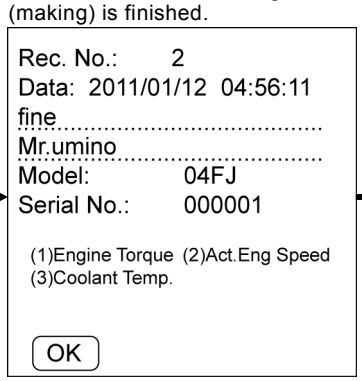
Input weather and person's name in change and push OK.



T4FL-05-02-124

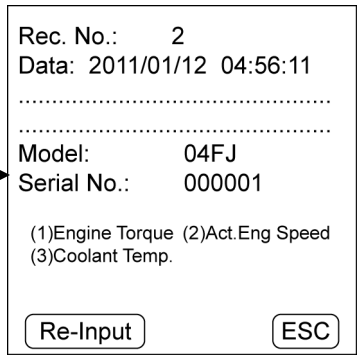
Recording Screen (Comment Input)

Push OK and the recording screen (making) is finished.



T4FL-05-02-125

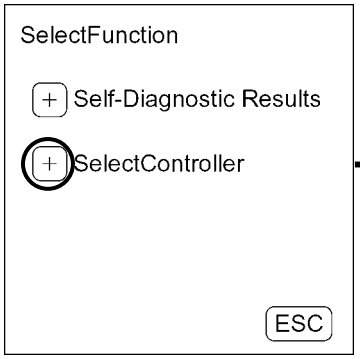
Push Re-Input and return to Recording Screen (Comment Input).
Push ESC and return to Main Menu Screen.



T4FL-05-02-126

Satellite Terminal: Initialize

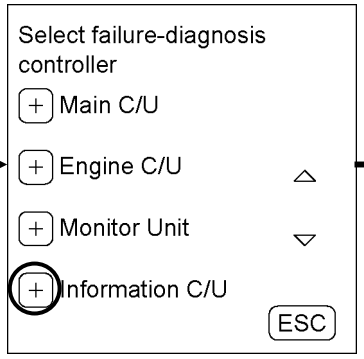
After starting Dr. ZX, push Select Controller.



T1V7-05-03-001

Function Selection Screen

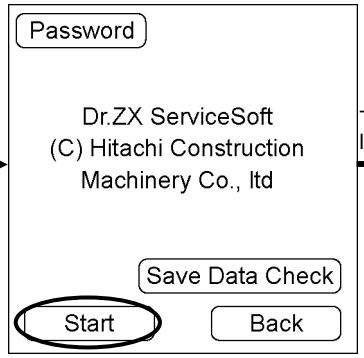
Push Information C/U.



T4GB-05-02-053

Controller Selection Screen

Push Start.

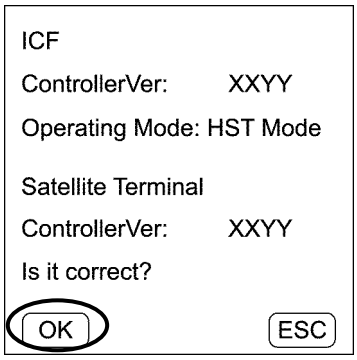


To the lower

T4GD-05-02-013

Title Screen

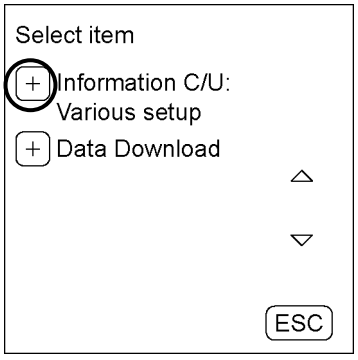
Push OK.



T4FJ-05-02-116

ICF Controller Screen

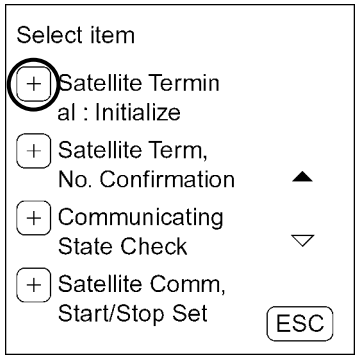
Push Information C/U: Various setup.



T4GD-05-02-014

Main Menu Screen

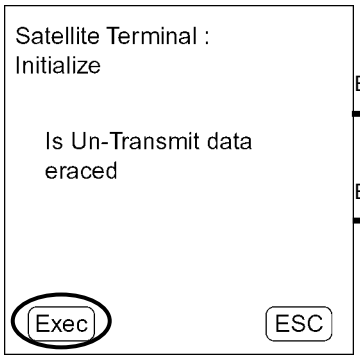
Push ▼ and move to the next screen of Information C/U: Various Setup Screen. Push Satellite Terminal: Initialize.



T1V7-05-03-035

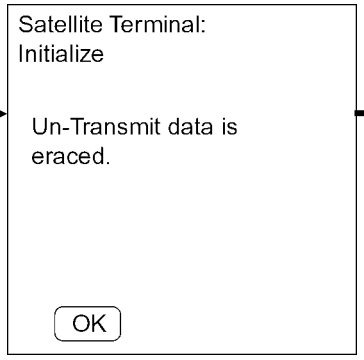
Information C/U: Various Setup Screen

Push Exec.
Push ESC and return to Information C/U: Various Setup Screen.

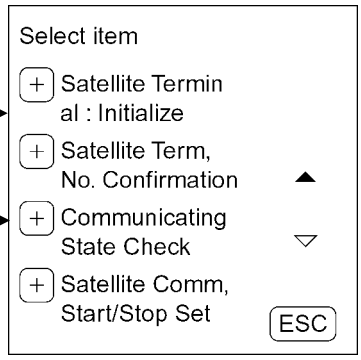


T1V7-05-03-036

Push OK and return to Information C/U: Various Setup Screen.



T1V7-05-03-145

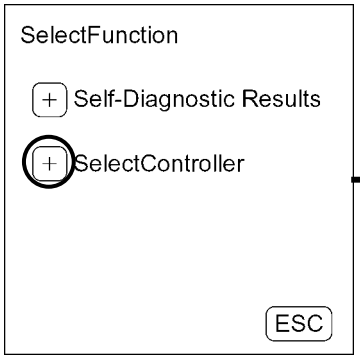


T1V7-05-03-035

Information C/U: Various Setup Screen

Monitoring

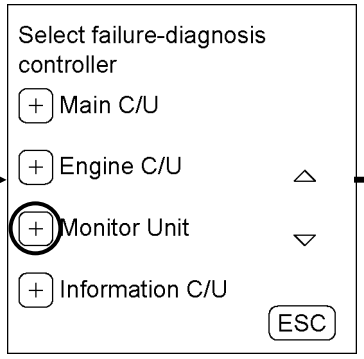
After starting Dr. ZX, push Select Controller.



T1V7-05-03-001

Function Selection Screen

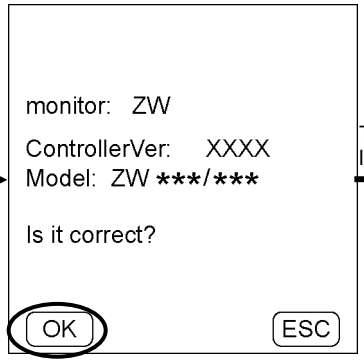
Push Monitor Unit.



T4GB-05-02-053

Controller Selection Screen

Push OK.

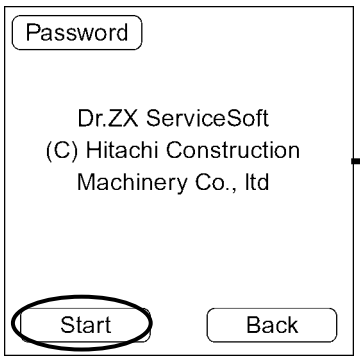


To the lower

T4FJ-05-02-040

Monitor Controller Screen

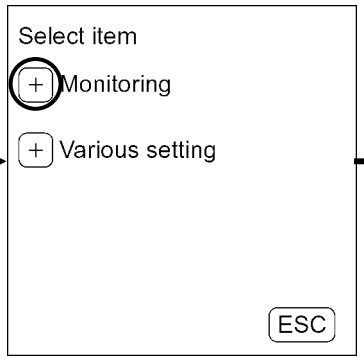
Push Start.



T1V7-05-03-025

Title Screen

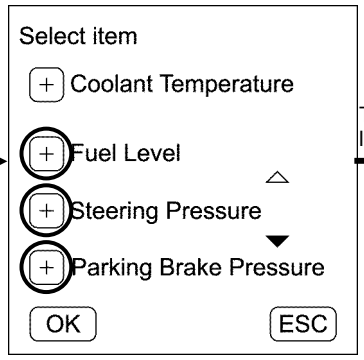
Push Monitoring.



T1V7-05-03-042

Main Menu Screen

Push item for monitoring and push OK. Refer to T5-2-40 as for the monitoring item.
Push ESC and return to Main Menu Screen.

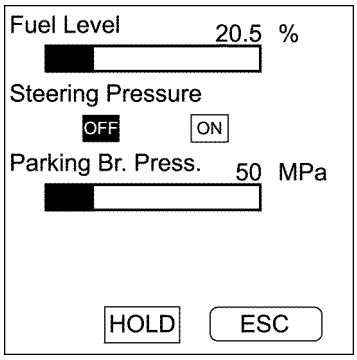


To the lower

T4FJ-05-02-119

Monitoring Item Selection Screen

When pushing HOLD, the monitor is stopped temporarily.
When re-starting the monitor, push HOLD again. Push ESC and return to Monitoring Item Selection Screen.

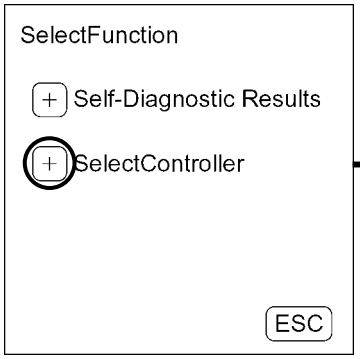


T4FJ-05-02-120

Monitoring Screen

Data Download

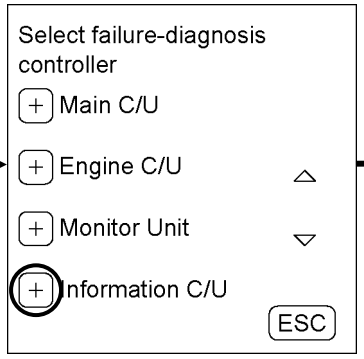
After starting Dr. ZX, push Select Controller.



T1V7-05-03-001

Function Selection Screen

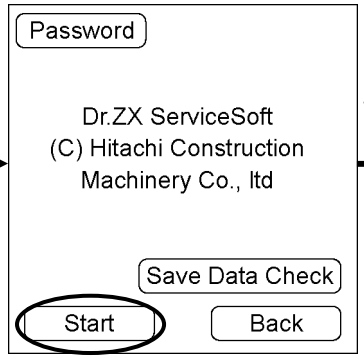
Push Information C/U.



T4GB-05-02-053

Controller Selection Screen

Push Start.

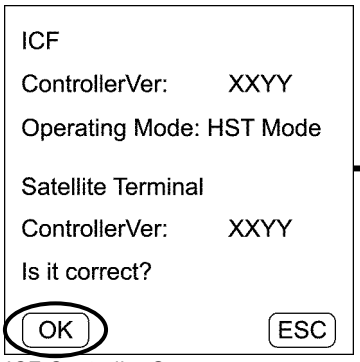


To the lower

T4GD-05-02-013

Title Screen

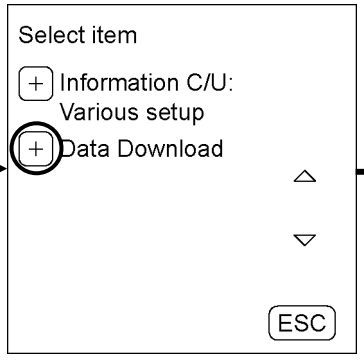
Push OK.



ICF Controller Screen

T4FJ-05-02-116

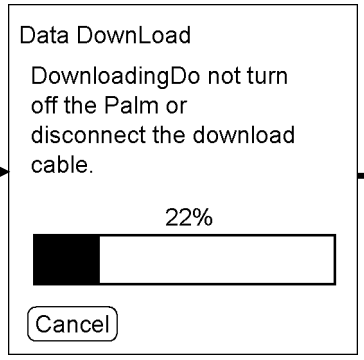
Push Data Download.



Main Menu Screen

T4GD-05-02-014

While downloading data, Data Download Screen is displayed.

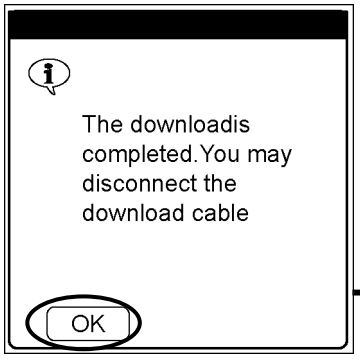


To the lower

Data Download Screen

T1V7-05-03-038

When downloading is completed normally, Normal End Screen is displayed. Push OK and return to Main Menu Screen.



Normal End Screen

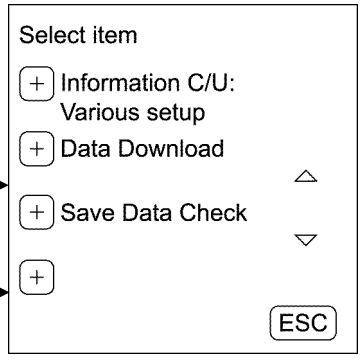
T1V7-05-03-039

If pushing Cancel on Data Download Screen, Alarm Screen is displayed. Push OK and return to Main Menu Screen.

Alarm Screen

T1V7-05-03-148

Push ESC and return to Title Screen.

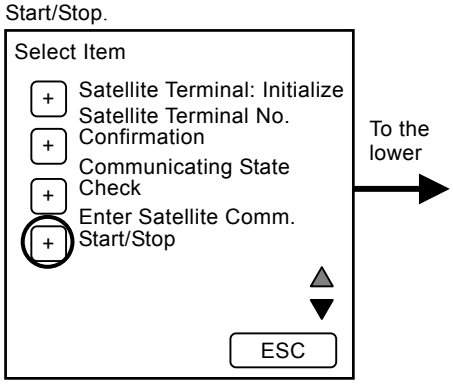


Main Menu Screen

T4FJ-05-02-014

1.9 Enter Satellite Comm. Start/Stop

Push ▼ and move to the next screen of Information C/U: Various Setup Screen.
Push Enter Satellite Comm. Start/Stop.

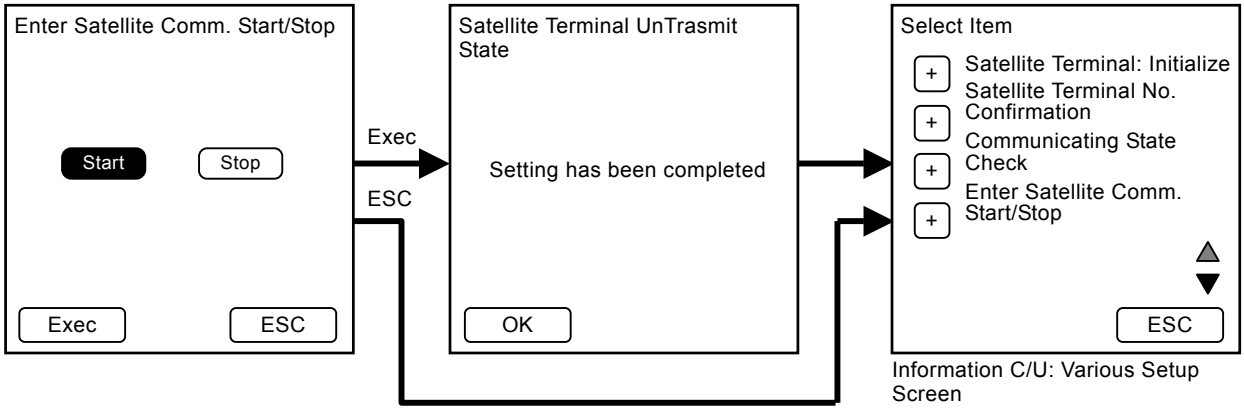


Information C/U: Various Setup Screen

In normal, Start is selected. When stopping Satellite Comm., due to some reasons, push Stop and push Exec.
Push ESC and return to Information C/U: Various Setup Screen.

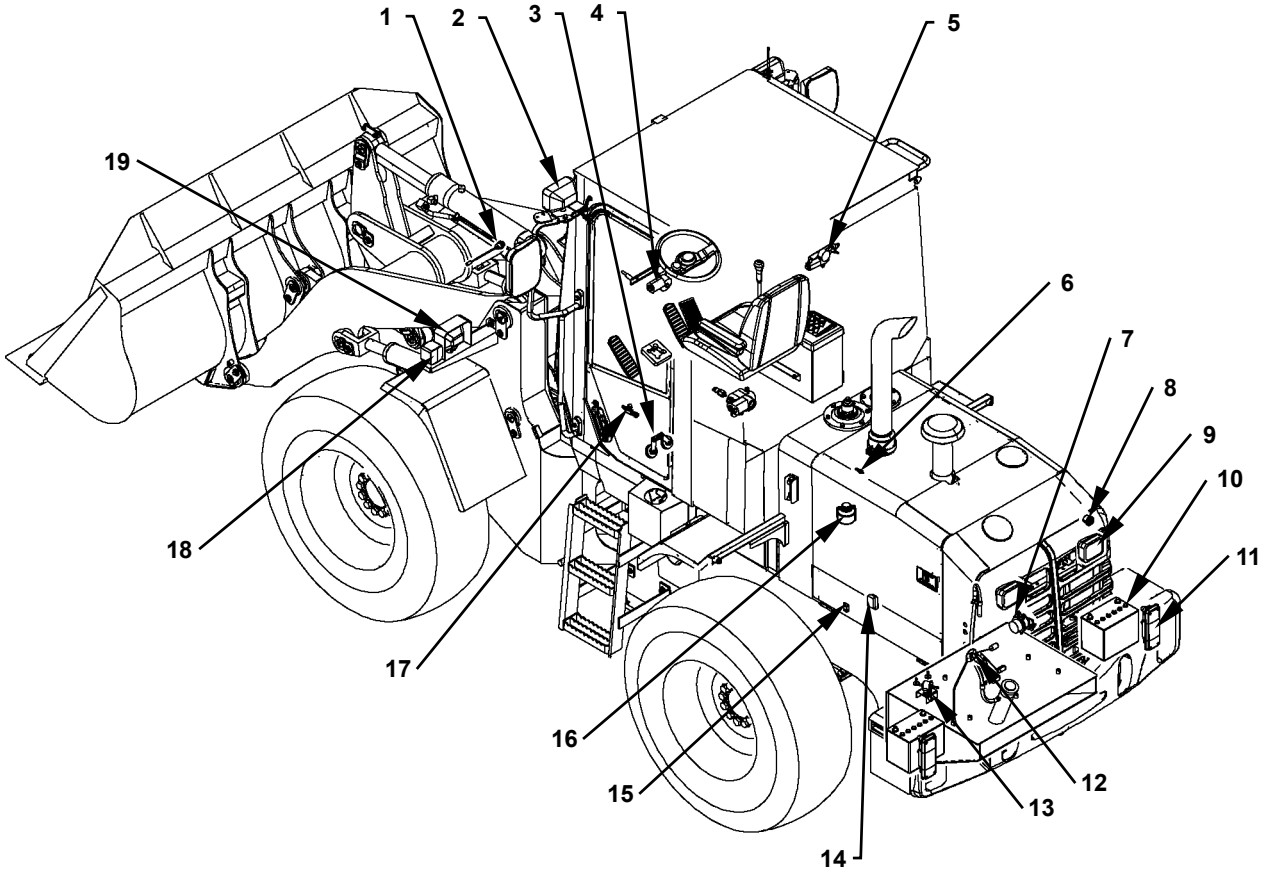
Push OK and return to Information C/U: Various Setup Screen.

Push ESC and return to Main Menu Screen.



Information C/U: Various Setup Screen

ELECTRICAL SYSTEM (OVERVIEW)

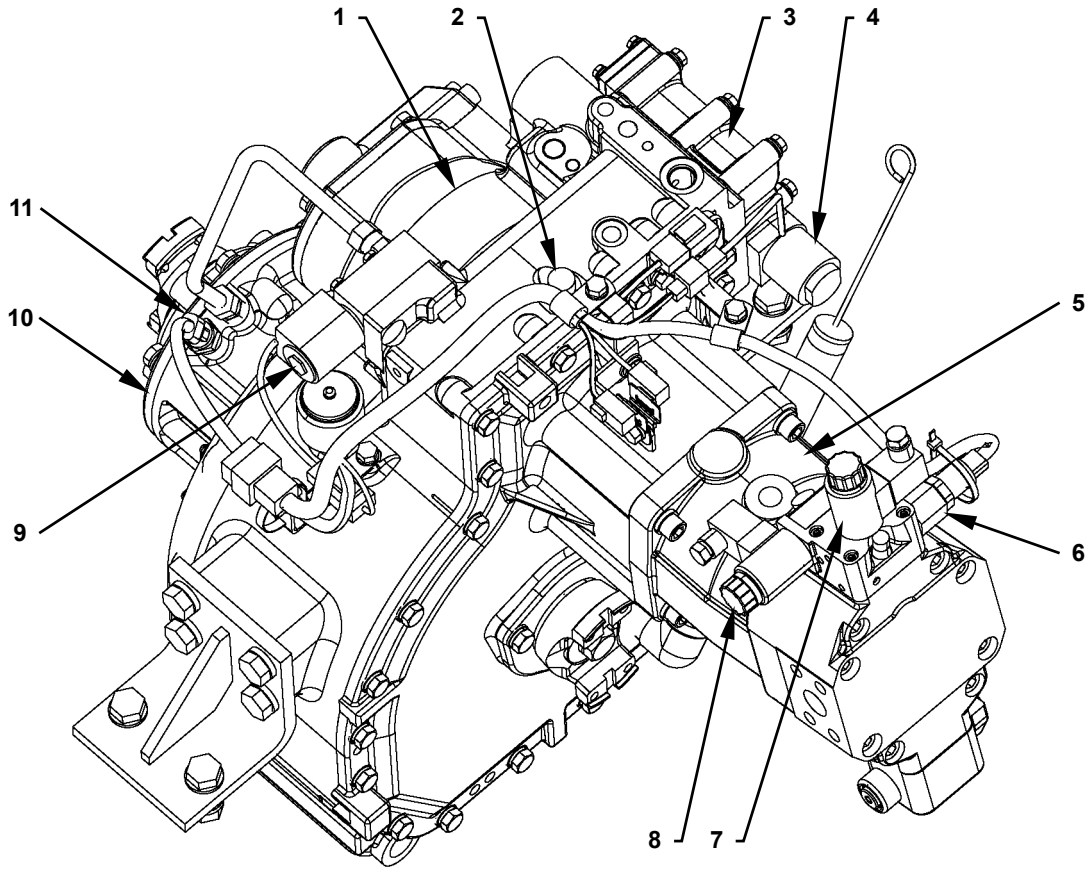


T4FJ-01-02-003

NOTE: The illustration shows the cab Vehicle

1 - Bucket Proximity Switch (Optional)	6 - HST Oil Temperature Sensor	11 - Rear Combination Light (Turn Signal Light/ Clearance Light/ Brake Light/ Reverse Light)	16 - Brake Oil Level Switch
2 - Front Work Light (Optional)	7 - Battery Relay	12 - Fuel Level Sensor	17 - Brake Light Switch
3 - Horn	8 - Reverse Buzzer	13 - Solenoid Pump	18 - Clearance Light/ Turn Signal Light
4 - Front Wiper Motor (Cab)	9 - Rear Work Light	14 - ECM (Engine Control Module)	19 - Head Light
5 - Rear Wiper Motor (Cab)	10 - Battery	15 - ECM Main Relay	

TRANSMISSION



T4FJ-01-02-014

1 -	Transmission	4 -	Travel Mode Selector Solenoid Valve, Accumulator	7 -	Displacement Angel Control Solenoid Valve	10 -	Parking Brake
2 -	Vehicle Speed Sensor	5 -	HST Motor	8 -	Travel Control Solenoid Valve	11 -	Parking Brake Pressure Sensor
3 -	Travel Mode Selector Valve	6 -	HST Pressure Sensor	9 -	Parking Brake Solenoid Valve		

Symptoms in Machine Operation When Trouble Occurs	Remedy
The machine can travel reverse only.	• Retrial B by using Dr. ZX. • Check the harness.
The machine can travel forward only.	• Retrial B by using Dr. ZX. • Check the harness.
The abnormality cannot be recognized although HST circuit failure occurs.	• Retrial B by using Dr. ZX. • Check the harness.
The machine speed cannot increase as the vehicle speed is limited for the clutch is slow speed side.	• Retrial B by using Dr. ZX. • Check the harness.
The back-up buzzer does not sound during slow travel operation.	• Retrial B by using Dr. ZX. • Check the harness.
• The machine speed cannot increase as the vehicle speed is limited for the clutch is slow speed side. • The machine speed cannot be shifted.	• Retrial B by using Dr. ZX. • Check the harness. • Replace the sensor.
The machine cannot travel.	• Retrial B by using Dr. ZX. • Check the harness. • Check the Forward/reverse lever.
The machine speed cannot increase as the vehicle speed is limited.	• Retrial B by using Dr. ZX. • Check the CAN harness. • Replace the ECM. • Replace the MC.
There is no influence when operating the machine.	• Retrial B by using Dr. ZX. • Check the CAN harness. • Replace the monitor unit. • Replace the MC.
The machine cannot travel.	• Retrial B by using Dr. ZX. • Check the harness. • Replace the MC.

Remedy
Refer to the Troubleshooting flow chart.
If this error code is displayed after retrial, replace the monitor unit.
Check the CAN harness.
• Retrial B by using Dr. ZX • Check the harness. • Replace the sensor.
• Retrial B by using Dr. ZX • Check the harness. • Replace the sensor.
• Retrial B by using Dr. ZX • Check the harness. • Replace the sensor.
• Retrial B by using Dr. ZX • Check the harness. • Replace the sensor.
• Retrial B by using Dr. ZX • Check the harness. • Replace the sensor.
• Retrial B by using Dr. ZX • Check the harness. • Replace the sensor.

Discontinuity Check between CAN Circuit and Ground Circuit

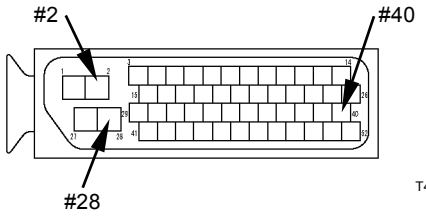
IMPORTANT: Before continuity check, turn the key switch OFF.
- **In case of continuity, the circuit between CAN circuit and ground circuit is shorted.**
- **In case of discontinuity, the circuit is normal.**

- MC Connector
  Between CAN Circuit (High Side) and Ground Circuit
  Check for continuity between terminals #40 and #2 of harness end of MC connector.

  Check for continuity between terminal #40 and #28 of harness end of MC connector.

Connector

MC Connector
(Harness end)

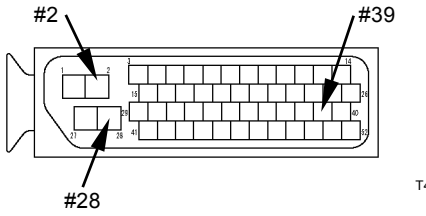


T4FC-05-05-001

Between CAN Circuit (Low Side) and Ground Circuit
Check for continuity between terminals #39 and #2 of harness end of MC connector.

Check for continuity between terminals #39 and #28 of harness end of MC connector.

MC Connector
(Harness end)



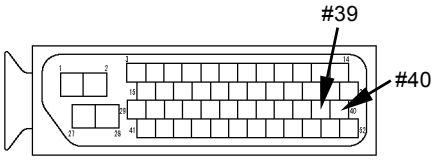
T4FC-05-05-001

Discontinuity Check in CAN Harness

IMPORTANT: Before continuity check, turn the key switch OFF.
- **In case of continuity, the circuit between CAN (High side) circuit and CAN (Low side) circuit is shorted.**
- **In case of discontinuity, the circuit is normal.**

- MC Connector
  Check for continuity between terminals #40 and #39 of harness end of MC connector.

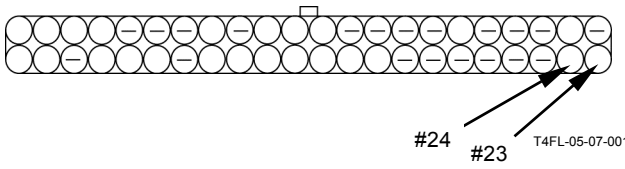
MC Connector
(Harness end)



T4FC-05-05-001

- Connector ECM
  Check for continuity between terminals #23 and #24 of harness end of connector in ECM.

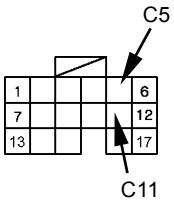
ECM Connector
(Harness end)



T4FL-05-07-001

- Connector ICF-C
  Check for continuity between terminals C5 and C11 of harness end of connector ICF-C in ICF.

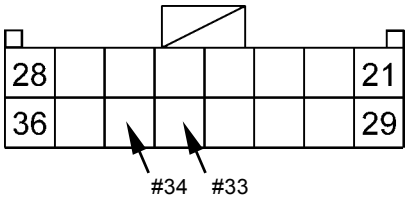
ICF
Connector ICF-C
(Harness end)



T1V1-05-04-002

- Connector Monitor-2B in Monitor Unit
  Check for continuity between terminals #33 and #34 of harness end of connector monitor-2B in the monitor unit.

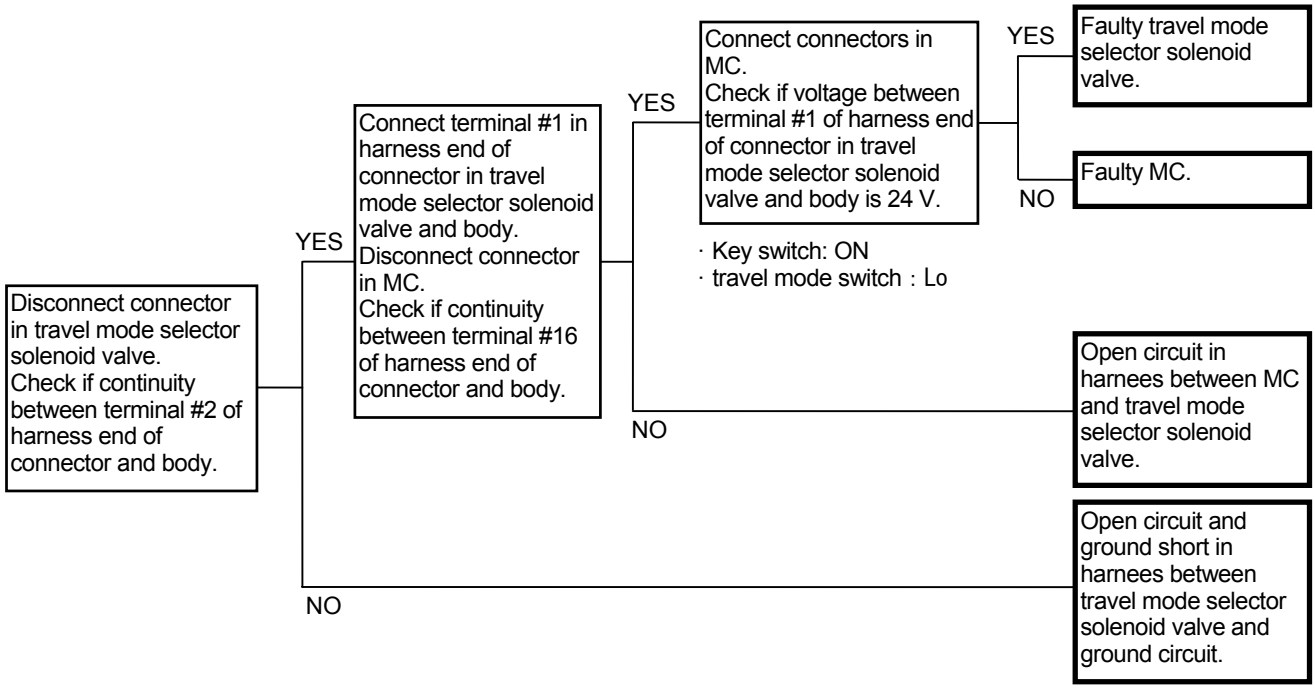
Monitor Unit
Connector Monitor-2B
(Harness end)



T4GB-05-05-002

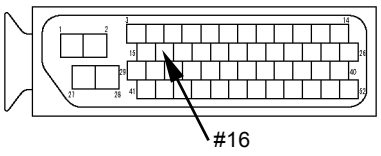
MC FAULT CODE 11455

Fault Code	Trouble	Cause	Influenced Control
11455-2	Hi/Lo Control Signal Abnormal Output	• Faulty the harness. • Faulty the travel mode selector solenoid valve	Slow Travel Speed Selection Control



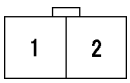
Connector (Harness end of connector viewed from the open end side)

MC Connector



T4FC-05-05-001

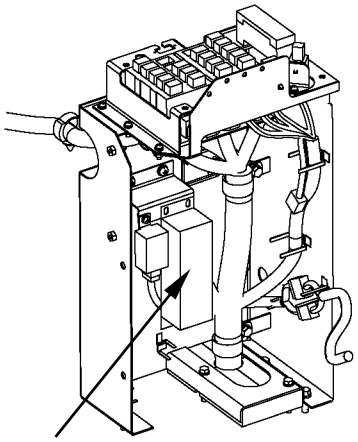
Travel Mode Selector Solenoid Valve



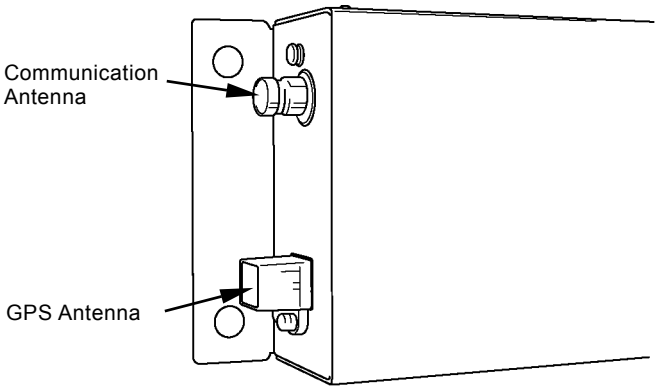
T2BC-05-04-031

(Blank)

Fault Codes 14102-2, 14103-2



T4FJ-01-02-008

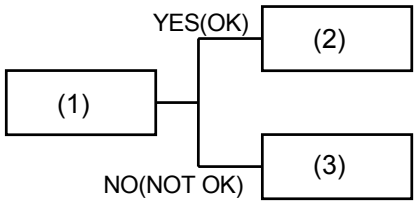


T1V1-05-06-004

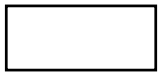
TROUBLESHOOTING B PROCEDURE

Apply troubleshooting B procedure when no fault code is displayed on the service mode panel in monitor and Dr. ZX although the machine operation is abnormal.
On the front section pages of this group are the tables indicating the relationship between machine trouble symptoms and related parts which may cause such trouble if failed.
Start the troubleshooting with more probable causes selected by referring to these tables.

- How to Read the Troubleshoting Flow Charts

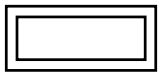


- After checking or measuring item (1), select either YES (OK) or NO (NOT OK) and proceed to item (2) or (3), as appropriate.



· Key switch: ON

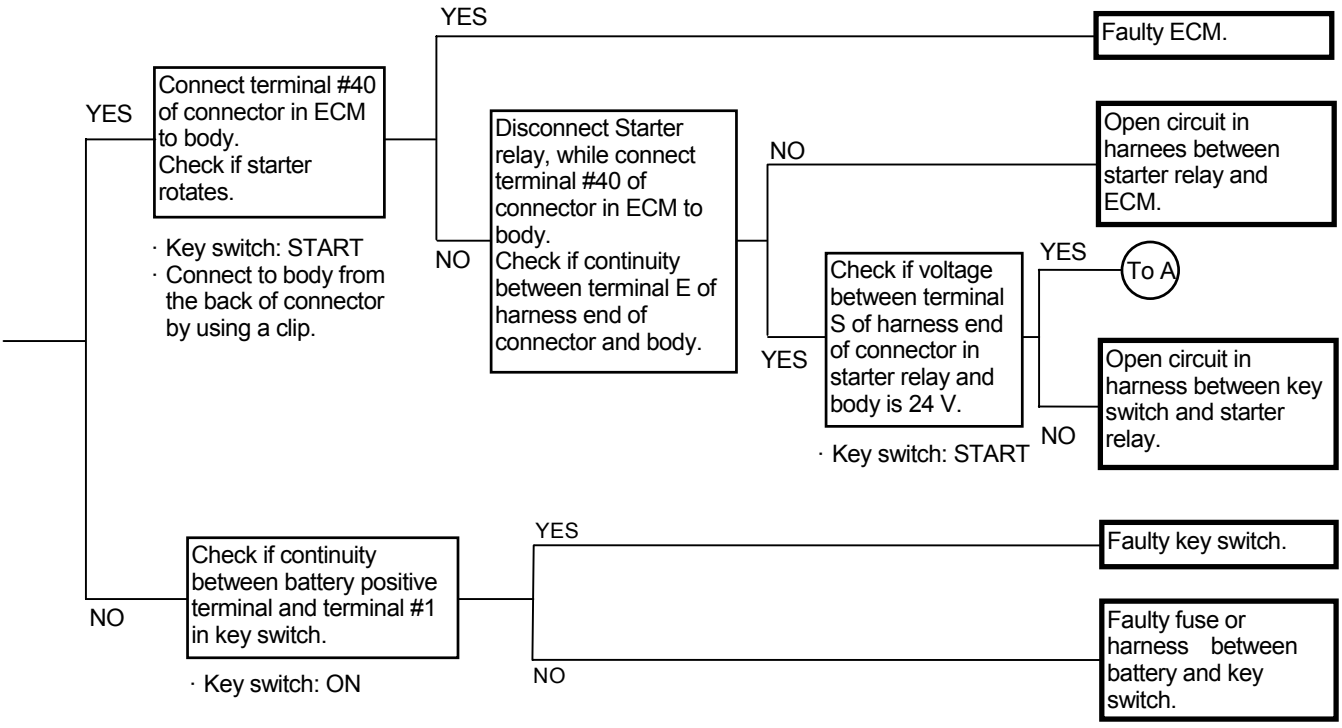
- Special instructions or reference item are indicated in the spaces under the box. Incorrect measuring or checking methods will render troubleshooting impossible, and may damage components as well.



- Use the service mode in monitor panel or the diagnosing system/monitor function in Dr. ZX.

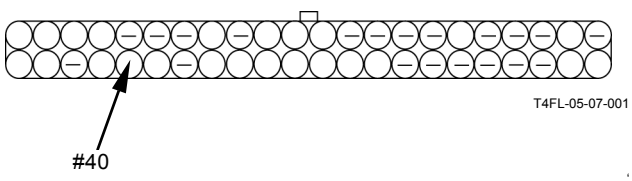
- Causes are stated in a thick-line box. Scanning through thick-line boxes, possible causes can be seen without going through the flow chart.

Evaluation by Fault Code	Evaluation by Monitor Function	NOTE	Descriptions of Control (Operational Principle Section in T/M)
-	-	-	T2-4, T3-4
-	Monitor Item: Ride control proportional solenoid valve output	• If the vehicle speed sensor malfunctions, monitor unit makes ride control disabled.	T2-2, T2-4, T3-10
-	-	-	T2-4, T3-3
-	-	-	T2-2



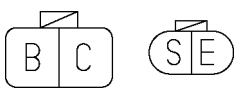
Connector (Harness end of connector viewed from the open end side)

ECM Connector
(Harness end)



T4FL-05-07-001

Starter Relay



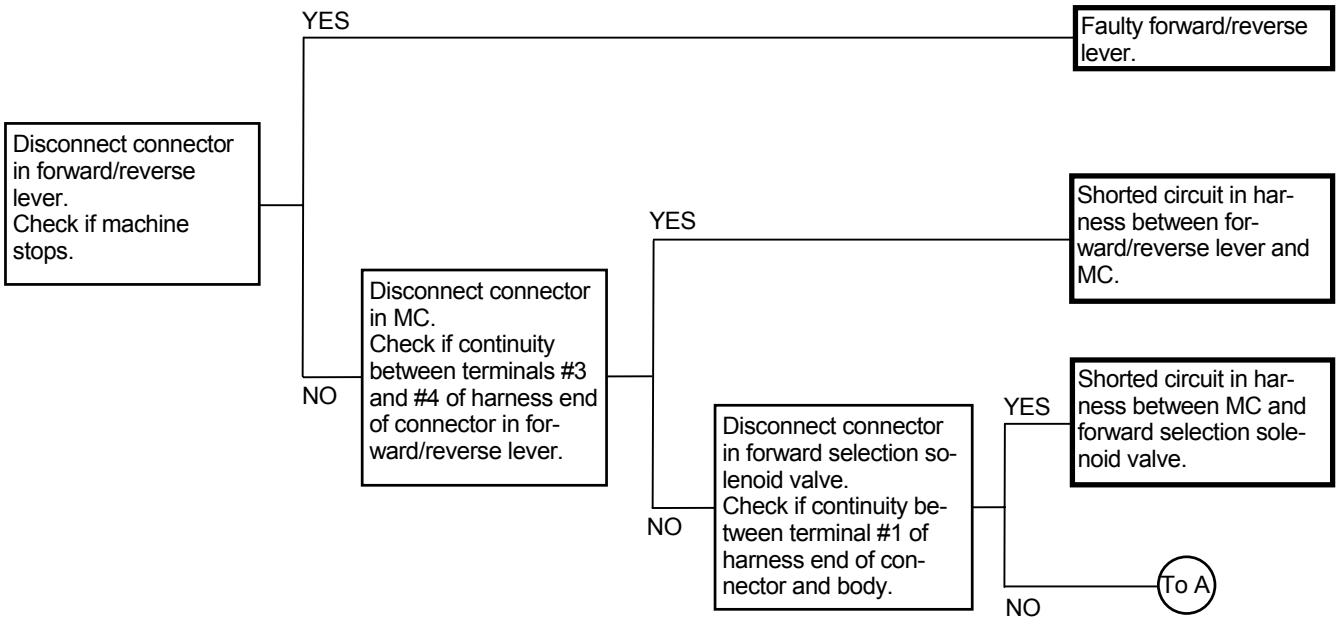
T8V4-05-07-001

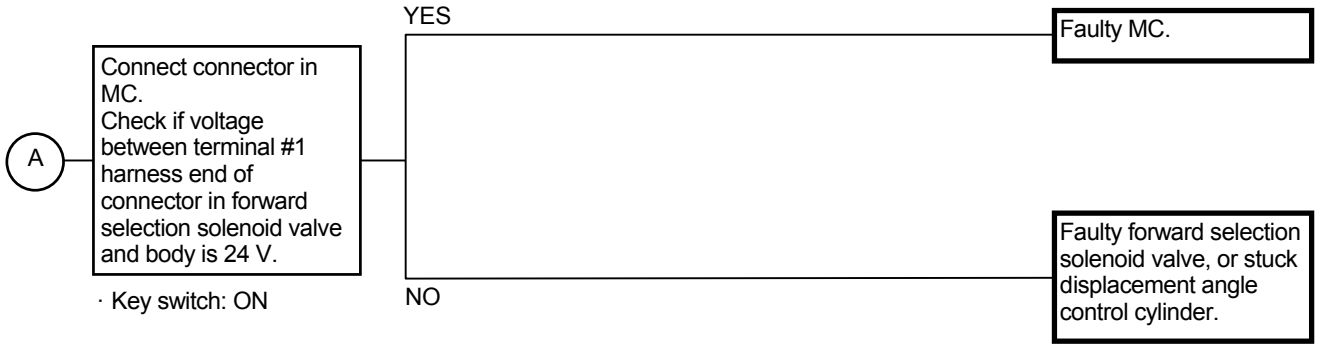
(Blank)

T-3 Even if Forward/Reverse Lever is set to N position, machine travels forward.

Related MC Fault Code: None

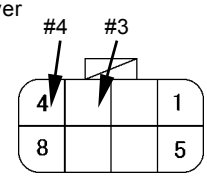
- Check the wiring connections first.





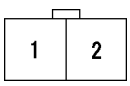
Connector (Harness end of connector viewed from the open end side)

Forward/Reverse Lever

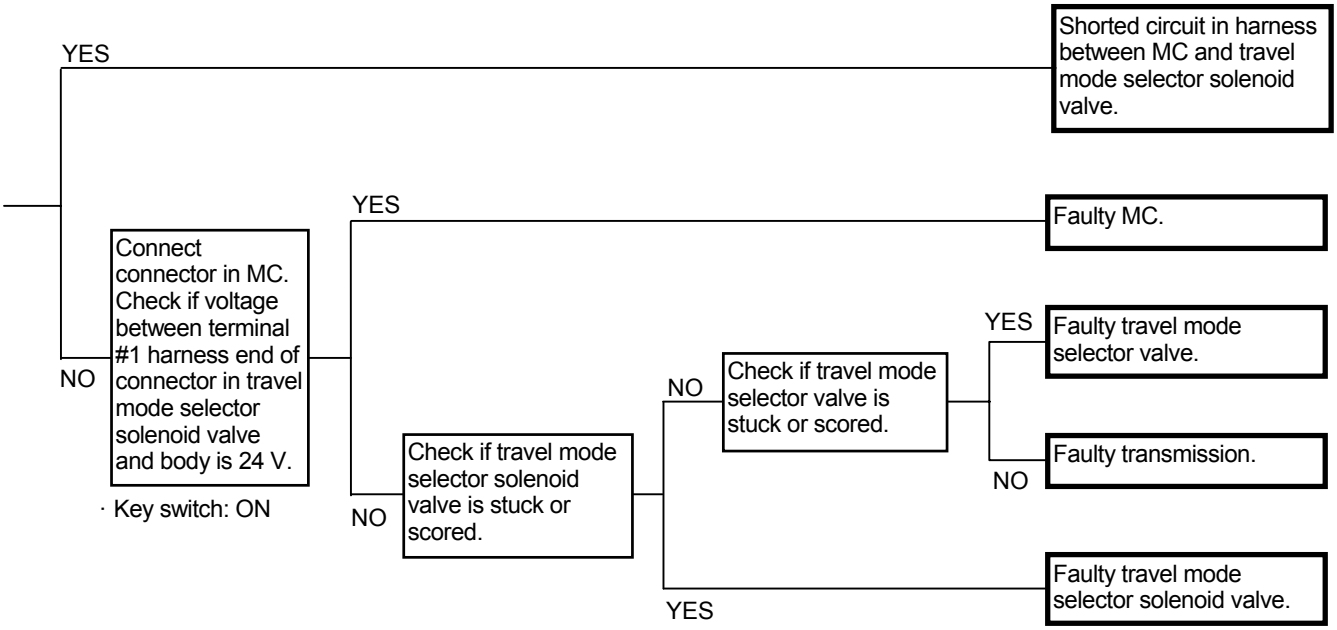


T6LE-05-03-002

Forward Selection Solenoid Valve



T2BC-05-04-031


YES
Shorted circuit in harness between MC and travel mode selector solenoid valve.
YES
Faulty MC.
Connect connector in MC. Check if voltage between terminal #1 harness end of connector in travel mode selector solenoid valve and body is 24 V.
· Key switch: ON
NO
YES
Faulty travel mode selector valve.
NO
Check if travel mode selector valve is stuck or scored.
Faulty transmission.
NO
Check if travel mode selector solenoid valve is stuck or scored.
NO
YES
Faulty travel mode selector solenoid valve.

OTHER SYSTEM TROUBLESHOOTING

O-1 Air conditioner is faulty

The air conditioner has a self-diagnosis function. The self-diagnosis functions to:

1) Display Fault Codes
2) Change Displayed Fault Codes
3) Delete Fault Code
4) End Fault Code Display

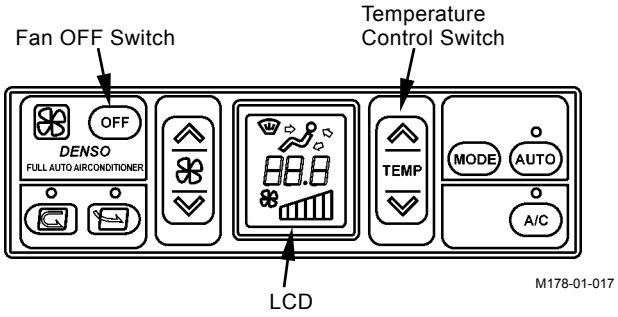
- Display Fault Code

1. Push the fan OFF switch and turn the fan OFF.
2. Push and hold both upper and lower sides of the temperature control switch on the air conditioner control panel at the same time for more than 3 seconds with the key switch ON.

NOTE: After connect operation has been performed, the buzzer will sound.

3. If any fault codes are found, the LCD displays the fault codes as 「E○○」.

NOTE: If more than one fault code is found, the lower number fault code will be displayed first.



Fault Code List

Item	Fault Code	Cause	Symptom
Abnormal circulation air sensor	E11	Open circuit in air circulation sensor	Value Y (air flow-in temperature) in response to the set temperature is fixed.
	E12	Shorted circuit in air circulation sensor	
Abnormal fresh air sensor	E13	Open circuit in fresh air sensor	Operation is controlled under such circumstance as no fresh air sensor is provided.
	E14	Shorted circuit in fresh air sensor	
Abnormal coolant temperature sensor	E15	Open circuit in coolant temperature sensor	Operation is controlled under such circumstance as the water temperature is set to 60 °C (140 °F). (Warm-up control is not performed.)
	E16	Shorted circuit in coolant temperature sensor	
Abnormal air vent sensor	E21	Open circuit in air vent sensor	Operation is controlled under such circumstance as air flow-in temperature 0 °C (32 °F).
	E22	Shorted circuit in air vent sensor	
Abnormal damper	E43	Abnormal air vent damper	Corresponding damper servo becomes inoperable.
	E44	Abnormal air mix damper	
Abnormal refrigerant	E51	Abnormal high/low refrigerant pressure	The compressor clutch is disengaged. (The compressor stops.)

NOTE:

1. *Do not quickly decide that oil is leaking when a stain around the clutch and/or gasket is found. A slight oil seepage will appear due to the seal construction. However, this oil seepage will not cause malfunction. Accurately check whether oil is leaking or seeping only.*
2. *When gas detector is used in the high sensitivity range, normal gas leaks from rubber hose surface may be detected. As long as the specified rubber hoses are used, the problem should not occur. (In case a large leaks is detected, the hose may be broken.)*
3. *After allowing the compressor to idle for 10 to 15 minutes, normal pressure difference between high-pressure side and low-pressure side is 0.5 MPa (5 kgf/cm^2) or less. When the clutch is turned OFF, the pressure difference between high-pressure side and low-pressure side will disappear within about 10 seconds.*

3. The checklist before the summer season is as follows:
(1) Check each air conditioner component for abnormalities.
(2) Check the line connections for oil leaks.
(3) Check refrigerant quantity.
(4) Check the engine cooling circuit.
(5) Check V-belts for wear. Replace if necessary.

4. Off-Season Maintenance
(1) During off-season, operate the idler pulley and compressor at least once a month for a short time in order to check for any abnormal sounds.
(2) Do not remove the compressor belts during off-season. Operate the compressor occasionally at slow speed for 5 to 10 minutes with the belt slightly loosened in order to lubricate the machine parts.

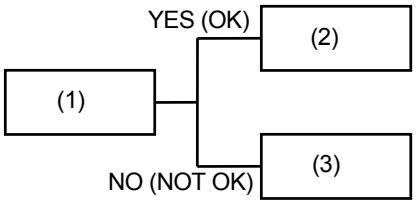
Generated/Detected Data Position	Controller Sending Data on CAN	Inspected Position
Crank speed sensor	ECM	Communication line between ECM and ICF (CAN bus line)
Front attachment pressure sensor	MC	Communication line between MC and ICF (CAN bus line)
HST circuit pressure sensor	MC	Communication line between MC and ICF (CAN bus line)
MC	MC	Communication line between MC and ICF (CAN bus line)
Coolant temperature sensor	Monitor unit	Communication line between monitor unit and ICF (CAN bus line)
HST oil temperature sensor	Monitor unit	Communication line between monitor unit and ICF (CAN bus line)
Vehicle speed sensor	MC	Communication line between MC and ICF (CAN bus line)
MC	MC	Communication line between MC and ICF (CAN bus line)
Vehicle speed sensor	MC	Communication line between MC and ICF (CAN bus line)
ECM	ECM	Communication line between ECM and ICF
• ECM • Vehicle speed sensor	• MC • ECM	• Communication line between MC and ICF (CAN bus line) • Communication line between ECM and ICF (CAN bus line)
• MC • Vehicle speed sensor	MC	Communication line between MC and ICF (CAN bus line)
• HST oil temperature sensor • Vehicle speed sensor	• Monitor unit • MC	• Communication line between MC and ICF (CAN bus line) • Communication line between monitor unit and ICF (CAN bus line)

As for inspection method of the CAN line, refer to TROUBLESHOOTING / Troubleshooting A.

TROUBLESHOOTING C (TROUBLE-SHOOTING FOR MONITOR PANEL) PROCEDURE

Use troubleshooting C when any monitor panel, such as gauges or indicators malfunction.

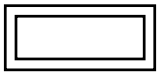
- How to Read Troubleshooting Flow Charts



After completing the checking and/or measuring procedures in box (1), select YES (OK) or NO (NOT OK) and proceed to box (2) or (3).

· Key switch: ON

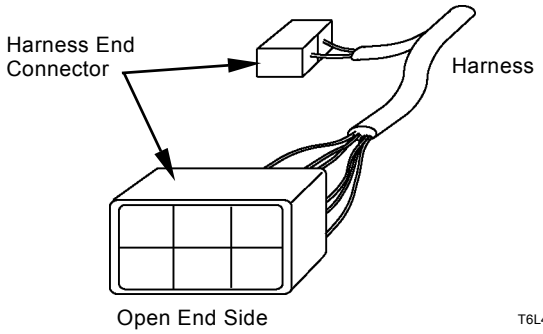
Instructions, reference, and/or instruction methods on inspection and/or measurements are occasionally described under the box. If incorrectly checked or measured, not only will troubleshooting be unsuccessful but also damage to components may result.



Use the service mode in monitor panel and the diagnosing system / controller diagnosing system in Dr. ZX.

Causes of machine problems are stated in the thick-line box. Scanning quickly through the thick-line boxes, allows you to estimate the possible causes before actually following the flow chart.

NOTE: Harness end connector viewed from the open end side by the all connectors image shown in this section.



Faulty fuel level sensor.

YES — Open circuit in harness between monitor unit and fuel level sensor.

NO — Faulty monitor unit.

Faulty fuel level sensor.

YES — Shorted circuit in harness between monitor unit and fuel level sensor.

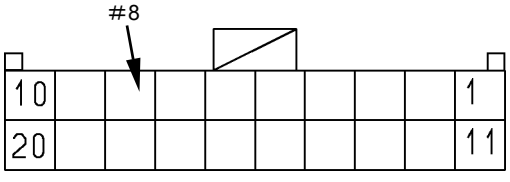
NO — Faulty monitor unit.

Faulty fuel level sensor.

Faulty monitor unit.

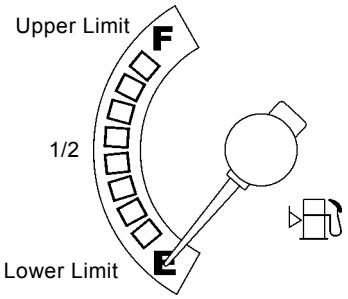
Connector (Harness end of connector viewed from the open end side)

Monitor Unit
Connector 2-A



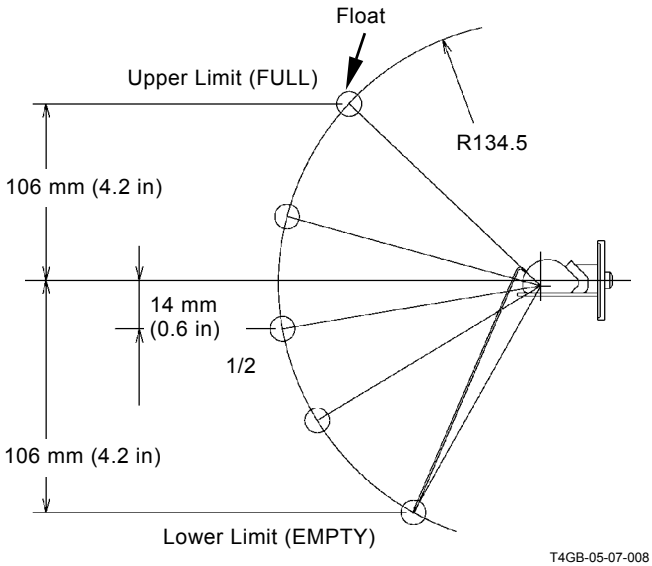
T183-05-04-013

Fuel Gauge



T4GB-05-07-007

Fuel Level Sensor

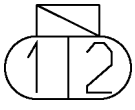


T4GB-05-07-008

NOTE: 1 mm = 0.03937 in

Float Position	Resistance (Ω)
Upper Limit (FULL)	10^{+0}_{-4}
1/2	32.9
Warning Level	77±3
Lower Limit (EMPTY)	90^{+10}_{-0}

Fuel level Sensor



T183-05-04-010

Faulty HST oil temperature sensor.

YES

Open circuit in harness between monitor unit and HST oil temperature sensor.

Faulty monitor unit.

NO

Faulty monitor unit.

Faulty HST oil temperature sensor.

Shorted circuit in harness between monitor unit and HST oil temperature sensor.

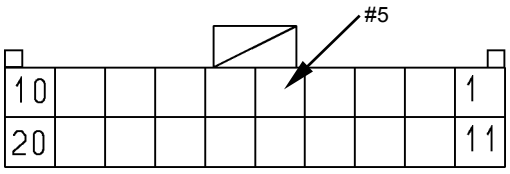
Faulty monitor unit.

HST Oil Temperature Indicator

Oil Temperature	Operation
Less than 100 °C (212 °F)	OFF
100 °C (212 °F) or higher	ON

Connector (Harness end of connector viewed from the open end side)

Monitor Unit
Connector 2-A



T183-05-04-013

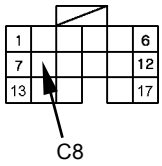
Open circuit in harness between monitor unit and parking brake switch.

Faulty monitor unit.

Faulty monitor unit.

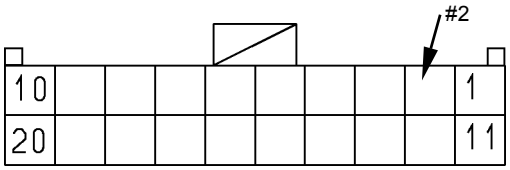
Connector (Harness end of connector viewed from the open end side)

ICF
Connector-C



T1V1-05-04-002

Monitor Unit
Connector 2-A



T183-05-04-013

Faulty monitor unit.

Faulty harness between terminal L in alternator and monitor unit.

Faulty regulator, or faulty alternator.

Check voltage at terminal #2 of connector 2-A in monitor unit.

· Engine: Running

13 V or more
Less than 33.5 V

Faulty monitor unit.

Faulty harness between terminal L in alternator and monitor unit.

Less than 13 V or 33.5 V or more

Faulty alternator.

Refer to Engine System Troubleshooting in Troubleshooting B.

Faulty monitor unit, or faulty charge lamp.

BATTERY VOLTAGE CHECK

1. Turn the key switch OFF.
2. Open the battery box cover on left side of the machine with the front attachment side facing forward.
3. Check voltage between the battery positive terminal and the vehicle frame (ground).

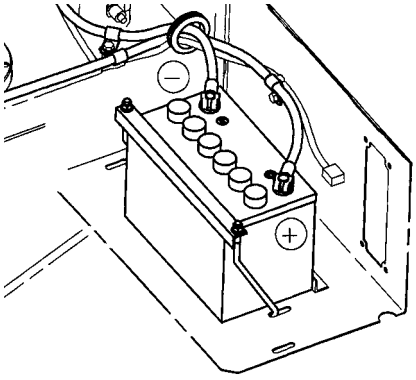
   Normal Voltage: 24 V

NOTE: If voltage is abnormal, recharge or replace the battery.

4. Start the engine. Check voltage between the battery positive terminal and the vehicle frame (ground).

   Normal Voltage: 26 to 28 V

NOTE: If voltage is abnormal, check the charging system.



T4FC-05-08-003

MEMO

WEAR PROTECTIVE CLOTHING

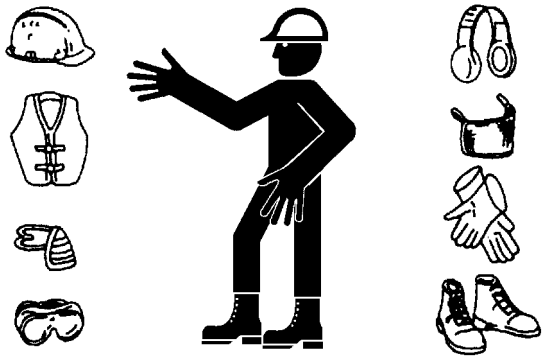
- Wear close fitting clothing and safety equipment appropriate to the job.

  You may need:
  - A hard hat
  - Safety shoes
  - Safety glasses, goggles, or face shield
  - Heavy gloves
  - Hearing protection
  - Reflective clothing
  - Wet weather gear
  - Respirator or filter mask.

  Be sure to wear the correct equipment and clothing for the job. Do not take any chances.

  - Avoid wearing loose clothing, jewelry, or other items that can catch on control levers or other parts of the machine.

- Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating the machine.

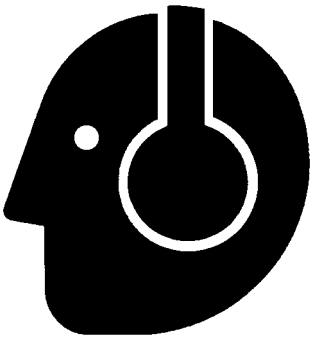


SA-438

005-E01A-0438

PROTECT AGAINST NOISE

- Prolonged exposure to loud noise can cause impairment or loss of hearing.
  - Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortably loud noises.



006-E01A-0434

SA-434

NSPECT MACHINE

- Inspect your machine carefully each day or shift by walking around it before you start it to avoid personal injury.
  - In the walk-around inspection be sure to cover all points described in the “PRE-START INSPECTION” chapter in the operator’s manual.

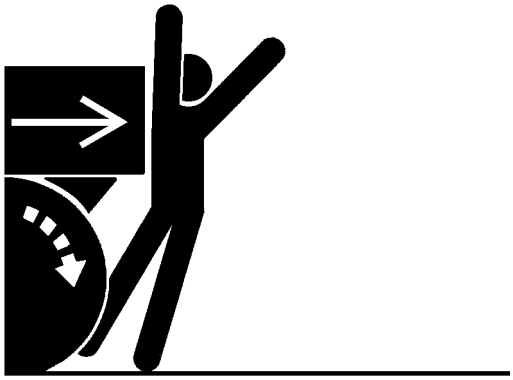
007-E01A-0435

SA-435

AVOID ACCIDENTS FROM BACKING UP AND TURNING

- Make sure no one is working under or close to the machine before backing up or turning the machine to avoid personal injury and/or death by being run over or entangled in the machine.
  - Keep all personnel away from the machine by sounding the horn and/or using hand signals. Use extra care to be sure no one is in from the articulation area before turning the machine.
  - Keep windows, mirrors, and lights in good condition.
  - Reduce travel speed when dust, heavy rain, fog, etc., reduce the visibility.
  - In case good visibility is not obtained, use a signal person to guide you.

021-E02A-0517



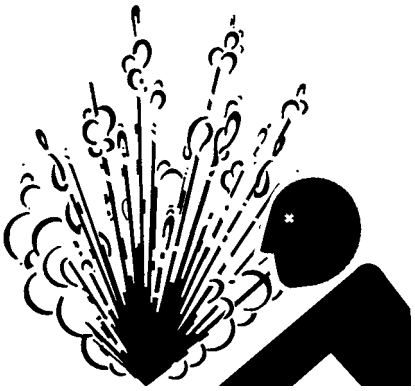
SA-383

SA-312

PREVENT BURNS

Hot spraying fluids:

- After operation, engine coolant is hot and under pressure. Hot water or steam is contained in the engine, radiator and heater lines.
  Skin contact with escaping hot water or steam can cause severe burns.
  - To avoid possible injury from hot spraying water. DO NOT remove the radiator cap until the engine is cool. When opening, turn the cap slowly to the stop. Allow all pressure to be released before removing the cap.
  - The hydraulic oil tank is pressurized. Again, be sure to release all pressure before removing the cap.

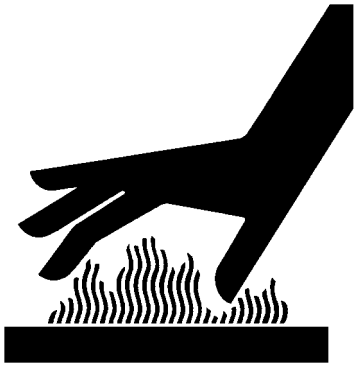


SA-039

Hot fluids and surfaces:

- Engine oil, gear oil and hydraulic oil also become hot during operation.
  The engine, hoses, lines and other parts become hot as well.

  - Wait for the oil and components to cool before starting any maintenance or inspection work.



SA-225

505-E01B-0498

REPLACE RUBBER HOSES PERIODICALLY

- Rubber hoses that contain flammable fluids under pressure may break due to aging, fatigue, and abrasion. It is very difficult to gauge the extent of deterioration due to aging, fatigue, and abrasion of rubber hoses by inspection alone.

  - Periodically replace the rubber hoses. (See the page of “Periodic replacement of parts” in the operator’s manual.)

SA-019

- Failure to periodically replace rubber hoses may cause a fire, fluid injection into skin, or the front attachment to fall on a person nearby, which may result in severe burns, gangrene, or otherwise serious injury or death.

S506-E01A-0019

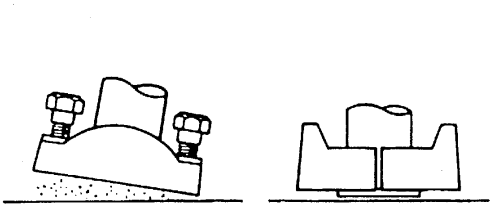
SECTION 1
GENERAL

— CONTENTS —

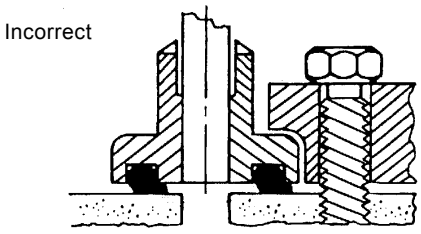
Precautions for Spilt Flange

IMPORTANT:

- **Clean the sealing surfaces. Check if there are any scratches and roughness on the surface of the seal that cause oil leaks and damage to the O-ring.**
- **Use only specified O-rings. Inspect O-rings for any damage. Do not file the O-ring surfaces. When installing O-ring into a groove, use grease in order to hold O-ring in place.**
- **While tightening the bolt by hand, check that flange is installed to the port correctly. Do not pinch the O-ring.**
- **Tighten the bolts up and down, left and right alternately, in order to ensure even tightening to the specified torque.**
- **Do not use air wrenches. Using an impact wrench often causes tightening of one bolt fully before tighten the others, resulting in damage to O-rings or uneven tightening of bolts.**



W105-01-01-015



W105-01-01-016

Nut and Bolt Locking

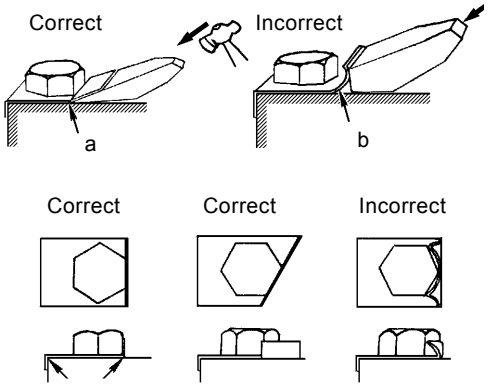
- Lock Plate

IMPORTANT: Do not reuse the lock plates. Do not try to bend the same point twice.

W105-01-01-008

- Split Pin

IMPORTANT: Do not turn in the loosening direction in order to align the grooves and holes on the nut. Always turn in the tightening direction. Do not reuse the split pins.

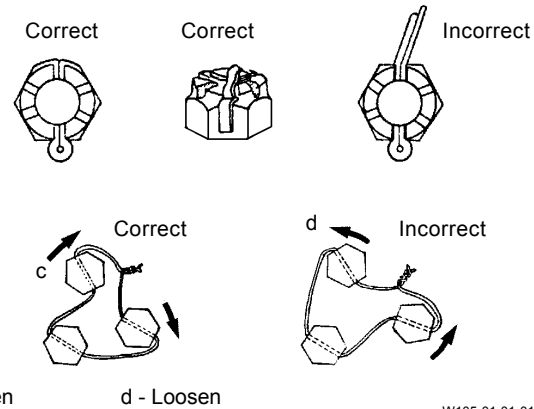


W105-01-01-009

- Wire

IMPORTANT: Attach wire to bolts in the bolt-tightening direction. Do not reuse the wire.

a - Bend along edge sharply b - Do not bend it round



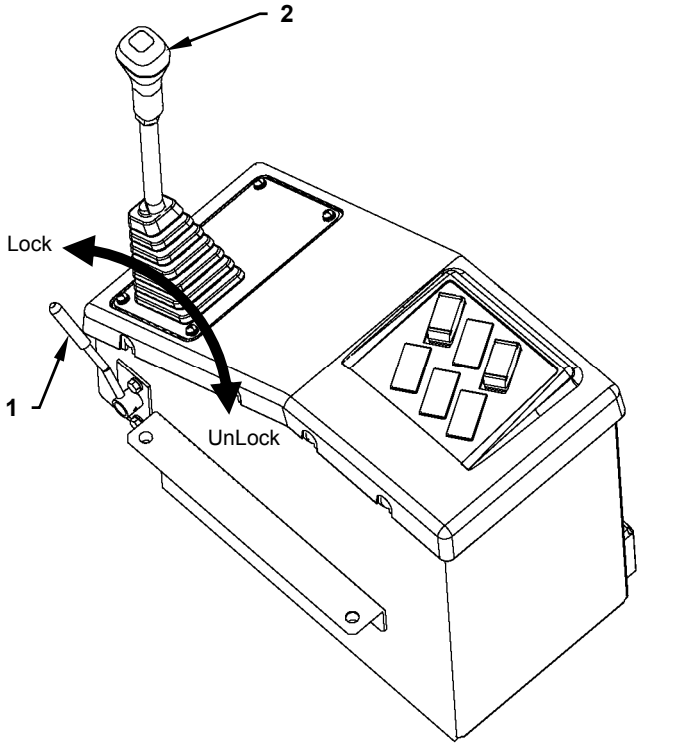
c - Tighten d - Loosen

W105-01-01-010

HYDRAULIC CIRCUIT PRESSURE RELEASE PROCEDURE

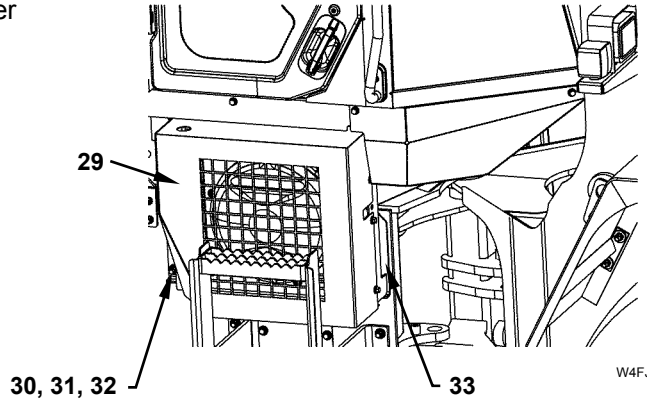
Release the remaining pressure in hydraulic circuit as follows when front attachment etc. have been removed / installed.

1. Set front control lever lock (1) to the UN LOCK position.
2. Run the engine at low idle speed for 5 minutes to cool the engine.
3. Turn key switch OFF.
4. Move front control lever (2) to 4 or 5 turn of pressure release circuit.
5. Set front control lever lock (1) to the LOCK position.



M4FJ-01-004

12. Remove bolts (30) (7 used), spring washers (31) (7 used), and washers (32) (7 used) from cover (29). Remove cover (29) from bracket (33).
    : 17 mm

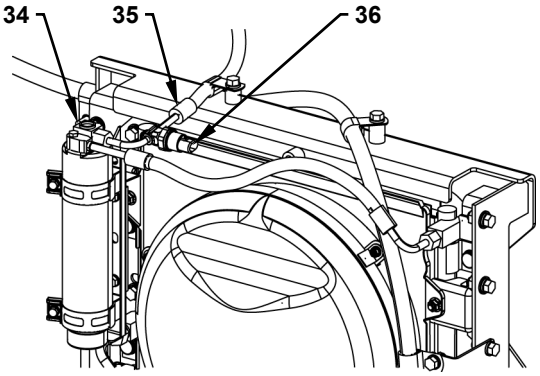


W4FJ-02-09-001

13. Disconnect connector (36).

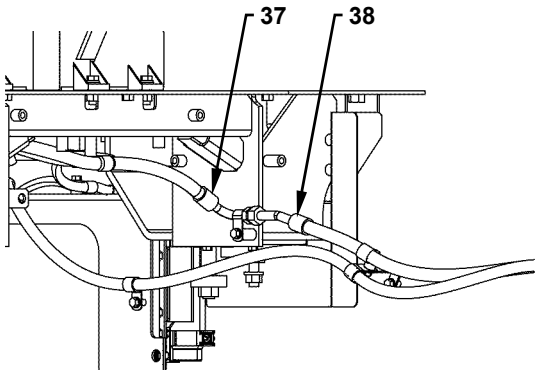
IMPORTANT: Do not release chlorofluorocarbon into the atmosphere for protection of the ozone layer and prevention of global warming.

14. Disconnect hose (35) from receiver drier (34). Cap the open ends. Attach an identification tag onto the disconnected hoses for assembling.
    : 19 mm



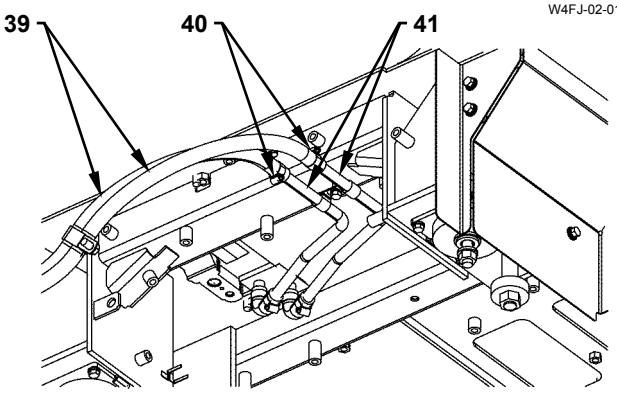
W4FJ-02-01-003

15. Disconnect hoses (37, 38) between air conditioner unit and compressor. Cap the open ends. Attach an identification tag onto the disconnected hoses for assembling.
    : 24 mm, 27 mm



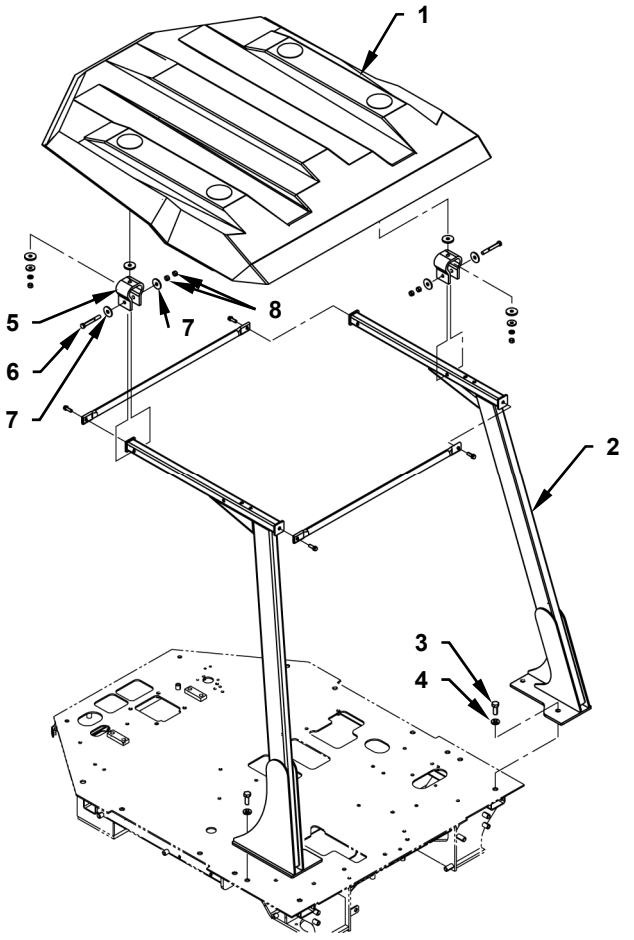
W4FJ-02-01-004

16. Loosen bands (40) (2 used). Disconnect hoses (39) (2 used) from heater pipe (41) (2 used). Cap the open ends. Attach an identification tag onto the disconnected hoses for assembling.



W4FJ-02-01-005

REMOVAL AND INSTALLATION OF CANOPY



W4FL-02-01-002

Removal

1. Remove bolts (6) (4 used), nuts (8) (8 used), washers (7) (8 used), and rubbers (5) (4 used) from prop assembly (2). Remove roof (1) from prop assembly (2).
   : 19 mm

CAUTION: Prop assembly (2): 56 kg (123 lb)

2. Attach a nylon sling onto prop assembly (2). Hoist and hold prop assembly (2).

3. Remove bolts (3) (4 used) and washers (4) (4 used) from prop assembly (2). Remove prop assembly (2) from the cockpit.
   : 24 mm

Installation

CAUTION: Prop assembly (2): 56 kg (123 lb)

1. Attach a nylon sling onto prop assembly (2). Hoist and hold prop assembly (2). Fit prop assembly (2) to the mounting hole of the cockpit.

2. Install prop assembly (2) to the cockpit with washers (4) (8 used) and bolts (3) (4 used).
   : 24 mm
   : 210 N·m (21 kgf·m, 152 lbf·ft)

3. Install roof (1) to prop assembly (2) with rubbers (5) (4 used), washers (7) (8 used), nuts (8) (8 used), and bolts (6) (4 used).
   : 19 mm
   : 35 N·m (3.5 kgf·m, 25.5 lbf·ft)

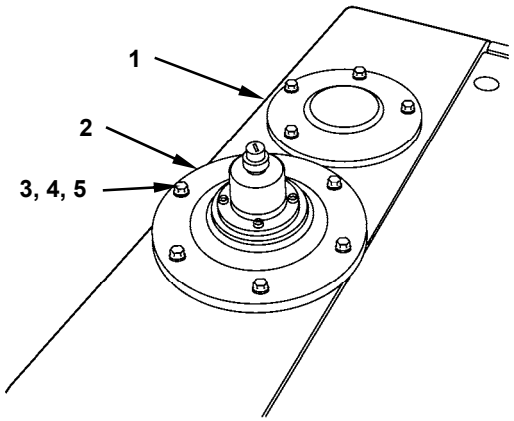
REMOVAL AND INSTALLATION OF HYDRAULIC OIL TANK

Removal

1. Set the machine position for inspection and maintenance. (Refer to PREPARATION FOR INSPECTION AND MAINTENANCE on W1-6-1.)

2. Bleed air from the hydraulic oil tank. (Refer to BLEEDAIR FROM HYDRAULIC OIL TANK on W1-4-1.)

3. Remove bolts (3) (6 used), spring washers (4) (6 used), and washers (5) (6 used) from cover (2). Remove cover (2) from hydraulic oil tank (1). Prepare a container (capacity: approx. 100 L). Drain hydraulic oil from hydraulic oil tank (1) by using a pump. Install cover (2) after draining hydraulic oil.



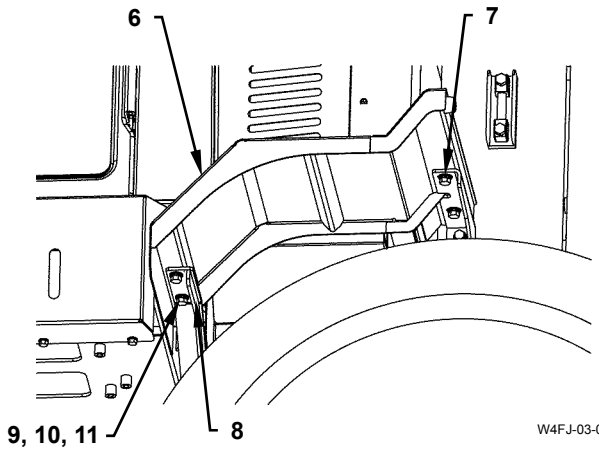
M4FJ-07-034

NOTE: Hydraulic Oil Amount: 90 L

: 17 mm

: 50 N·m (5 kgf·m, 37 lbf·ft)

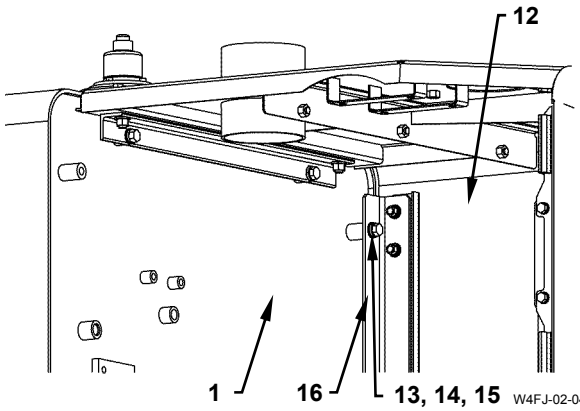
4. Remove bolts (9) (4 used), spring washers (10) (4 used), and washers (11) (4 used) from brackets (7, 8). Remove rear fender (6) from brackets (7, 8).
   Remove rear fender (6) at the opposite side in the same way.
   : 19 mm



W4FJ-03-06-001

CAUTION: Side cover (12) weight: 24 kg (53 lb)

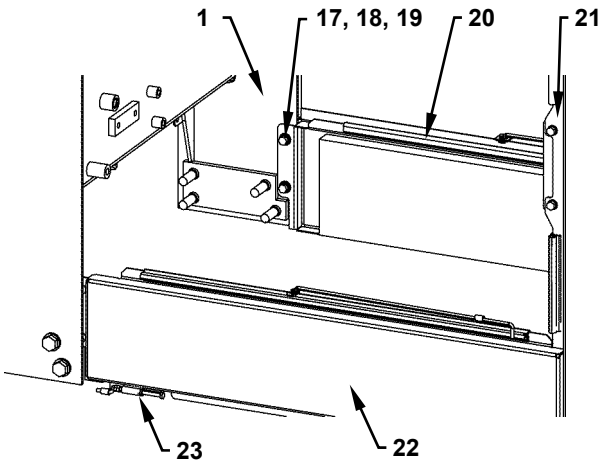
5. Remove bolts (13) (2 used), spring washers (14) (2 used), and washers (15) (2 used) from angle (16). Remove side cover (12) from hydraulic oil tank (1).
   Remove side cover (12) at the opposite side in the same way.
   : 19 mm



W4FJ-02-04-002

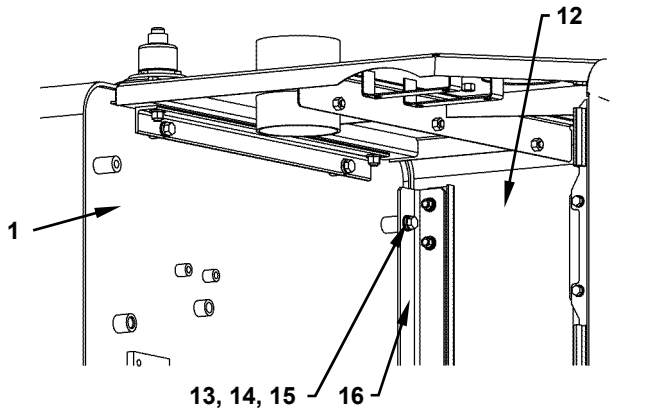
22. Install right side panel (20) to hydraulic oil tank (1) and grill support (21) with washers (19) (4 used), spring washers (18) (4 used), and bolts (17) (4 used).
    : 17 mm
    : 50 N·m (5 kgf·m, 37 lbf·ft)

23. Install left side panel (22) to the hinge part of rear frame (23).



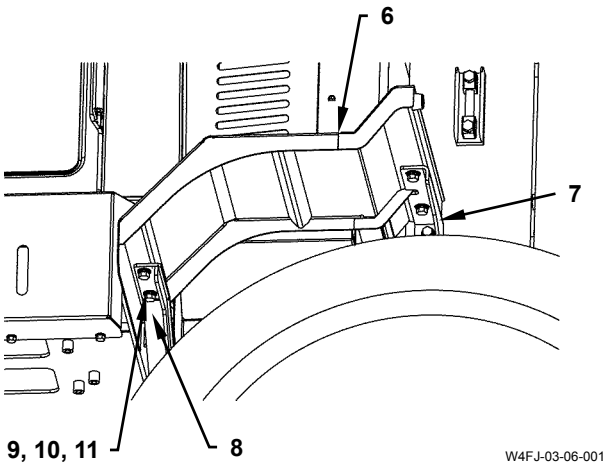
W4FJ-02-04-003

24. Fit angle (16) to the mounting hole of hydraulic oil tank (1). Install side cover (12) to hydraulic oil tank (1) with washers (15) (2 used), spring washers (14) (2 used), and bolts (13) (2 used).
    Install side cover (12) at the opposite side in the same way.
    : 19 mm
    : 90 N·m (9 kgf·m, 66 lbf·ft)



W4FJ-02-04-002

25. Install rear fender (6) to brackets (7, 8) with washers (11) (4 used), spring washers (10) (4 used), and bolts (9) (4 used).
    Install rear fender (6) at the opposite side in the same way.
    : 17 mm
    : 50 N·m (5 kgf·m, 37 lbf·ft)



W4FJ-03-06-001

01 - Rotary Group
05 - Forward/Reverse Selector Control Valve
07A - DA Valve
07B - Orifice
10 - Housing
13 - Joint Pin (2 Used)
20A - Plug
20B - O-Ring
22A - Plug (4 Used)
22B - O-Ring (4 Used)
27 - Plug
31 - Pin (2 Used)
32 - Plug (2 Used)
33 - Plug (2 Used)
37 - Plug (2 Used)
46 - Adjusting Screw
47 - Lock Nut
49 - Orifice
54 - Orifice

01A - Cylinder Assembly
01AA - Cylinder
01AB - Piston (9 Used)
01AC - Spring
01AD - Shim (Several)
01AE - Retainer
01AF - Guide
01AG - Shim (2 Used)
01AH - Spring
01AJ - Retaining Ring
01B - Control Plate
01C - Swash Plate
01D - Guide
01E - Drive Shaft
01F - Pin (2 Used)
01G - Bearing Cup (2 Used)
01H - Bearing
01J - Bearing (2 Used)
01K - Retaining Ring
01L - Retaining Ring (2 Used)
01M - Shaft Seal

02A - Piston Assembly
02AA - Piston
02AB - Adjusting Screw
02AC - Ring (2 Used)
02AD - Ring (2 Used)
02AE - Spring Collar (2 Used)
02AF - Spring (2 Used)
02AG - Spring (2 Used)
02AH - Retaining Ring (2 Used)
02AJ - O-Ring
02AK - Spring Collar (2 Used)
02AL - Spring (2 Used)
02B - Cover
02C - Cover
02D - Nut
02E - Socket Bolt (8 Used)
02F - O-Ring (2 Used)
02G - Guide Ring (2 Used)
02H - Ring (2 Used)

03AA - High-Pressure Relief Valve (2 Used)
03B - Low-Pressure Relief Valve
03C - Cutoff Valve
03D - Port Plate
03E - Bushing
03F - Socket Bolt (4 Used)
03G - O-Ring
03H - Plug (2 Used)
03J - Plug
03K - O-Ring
03LA - Plug (2 Used)
03LB - O-Ring (2 Used)
03M - Bushing
03N - Metal
03P - O-Ring (2 Used)
03Q - Plug (2 Used)

04 - Internal Gear Pump
04A - Gear Pump Assembly
04AA - Flange
04AB – Pump Cover
04AC - Bushing
04AD - Through Drive Shaft
04AE - Wheel
04AF - Key
04AG - Ring
04AH - Socket Bolt (4 Used)
04AJ - Socket Bolt (8 Used)
04AK - O-Ring
04AL - Seal (8 Used)
04AM - O-Ring
04AN - O-Ring
04B - Wear Plate
04BA - Wear Plate
04BB - O-Ring
04C - Element (2 Used)

Assembly of HST Pump

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

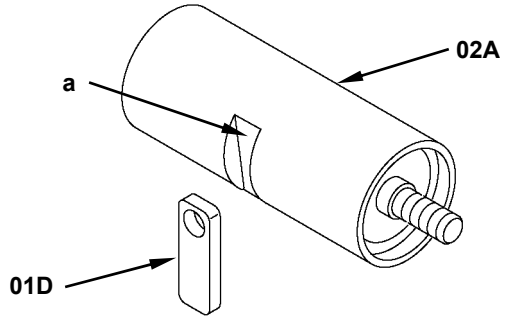
1. Install seal rings (02H) (2 used) to housing (10).
2. Install guide rings (02G) (2 used) to housing (10).
3. Install adjusting screw (02AB) to piston (02A).
4. Install spring collars (02AK, 02AE), and springs (02AL, 02AF, 02AG) to piston (02A).

IMPORTANT: Spring collars (02AK, 02AE) may fly out due to the springs (02AL, 02AF, 02AG) force.

5. While pushing spring collar (02AE), install retaining ring (02AH) and rings (02AC, 02AD) to spring collar (02AE). Install O-ring (02AJ) to adjusting screw (02AB).
6. Assemble the piston (02AA) at the opposite side in the same way as steps 4 to 5.

IMPORTANT: Install so that lever (01D) and groove (a) on piston assembly (02A) are positioned as illustrated.

7. Install the piston assembly (02A) to housing (10).



W4FC-03-02-011

8. Install O-rings (02F) (2 used) to covers (02B, 02C).
9. Install covers (02B, 02C) onto housing (10) with socket bolts (02E) (8 used) while aligning the matching marks made when disassembling.
   : 5 mm
10. Install nut (02D) to adjusting screw (02AB). Adjust the adjusting screw (02AB) to the recorded dimension before disassembling with nut (02D).

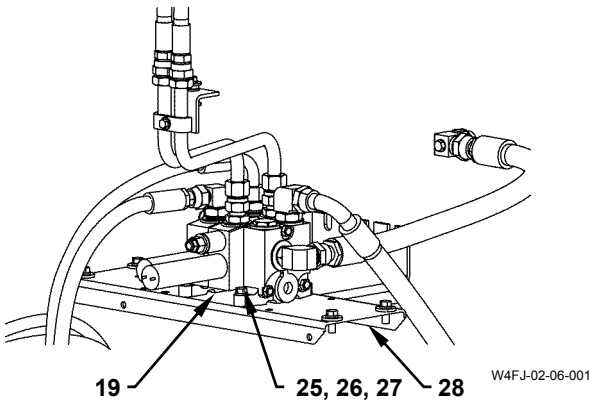
BODY / Pump Device

01 - Front Cover
02 - Body
03 - Drive Gear
04 - Driven Gear
05 - Bearing (2 Used)
06 - Bearing (4 Used)
07 - Side Plate (2 Used)
11 - Adapter Plate
12 - Adapter Plate
13 - Body
14 - Drive Gear
15 - Driven Gear
16 - Side Plate (2 Used)
17 - Bushing
18 - Bushing (3 Used)
50 - Seal (2 Used)
51 - Gasket (2 Used)
52 - O-Ring (2 Used)
53 - Socket Bolt (8 Used)
54 - Socket Bolt (8 Used)
56 - Oil Seal
57 - Retaining Ring
58 - O-Ring (5 Used)
60 - Gasket (2 Used)
61 - O-Ring
62 - Socket Bolt (4 Used)
63 - Washer (20 Used)
64 - Oil Seal
65 - Coupling
66 - Retaining Ring
67 - Steel Ball (2 Used)
68 - O-Ring
69 - Collar

CAUTION: Control valve (19) weight: 21 kg (47 lb)

12. Attach a nylon sling onto control valve (19). Hoist and hold control valve (19).

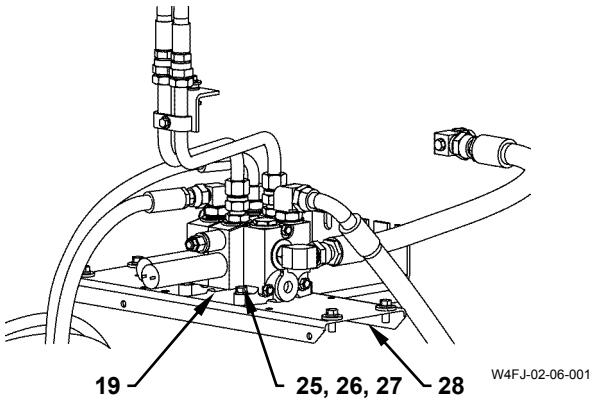
13. Remove bolts (25) (3 used), nuts (26) (3 used), and washers (27) (3 used) from control valve (19). Remove control valve (19) from bracket (28).
    : 19 mm



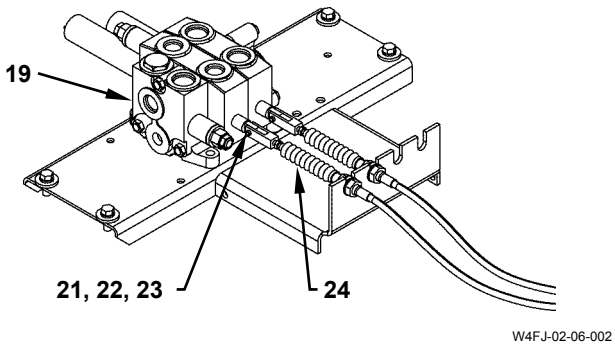
Installation

CAUTION: Control valve (19) weight: 21 kg (47 lb)

1. Attach a nylon sling onto control valve (19). Hoist control valve (19). Fit control valve (19) to the mounting hole of backet (28). Install control valve (19) to bracket (28) with bolts (25) (3 used), washers (27) (3 used), and nuts (26) (3 used).
    : 19 mm
    : 90 N·m (9 kgf·m, 66 lbf· ft)



2. Connect control cables (24) (2 used) to the spools (2 places) of control valve (19) with clevis pins (23) (2 used), washers (22) (2 used), and snap pins (21) (2 used).



Disassembly of Lift Arm Spool Assembly

1. Remove O-ring (5), poppet (3), and spring (4) from the housing (1) assembly.

2. Secure the housing (1) assembly in a vise by using a copper plates.

3. Remove socket bolts (22) (2 used).Remove the spool (2) assembly and seal plate (9), and spacer (18) from the housing (1) assembly.
   : 5 mm

NOTE: They can be removed easily by rotating spool (2).

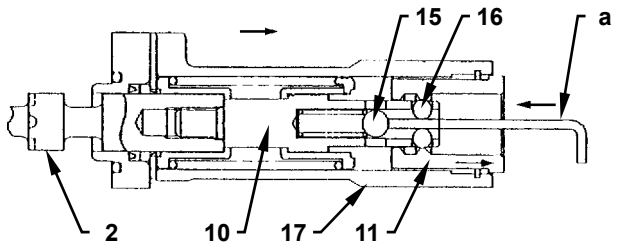
4. Remove screws (8) (2 used) and seal plate (9) from housing (1).Remove wiper ring (7) and seal ring (6) from housing (1).

5. Secure the spool (2) assembly in a vise by using copper plates.

6. Remove retaining ring (21) and spacer (20) from cap (17).

CAUTION: Steel ball (15) and steel balls (16) (4 used) may fly out due to the spring (12) force. Do not lose them.

7. Push in steel ball (15) through the pin (10) hole by using the hexagonal wrench (a) (3 mm or less).Remove sleeve (11) and cap (17) from the spool (2) assembly.

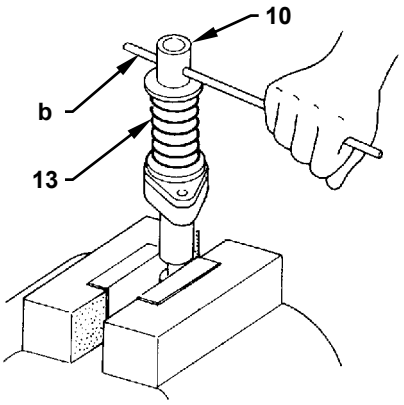


W4FJ-02-06-010

8. Remove steel ball (15), steel balls (16) (4 used), spring (12), and shim (23) through the pin (10) hole.

CAUTION: The spring (13) force is applied to pin (10).

IMPORTANT: Insert the round bar (b) (6 mm or less) into the steel ball (16) hole of pin (10).Release spring (13) by rotating the round bar (b) counterclockwise slowly.



W4FJ-02-06-009

9. Remove pin (10), spring seats (14) (2 used), and spring (13) from the spool (2) assembly.

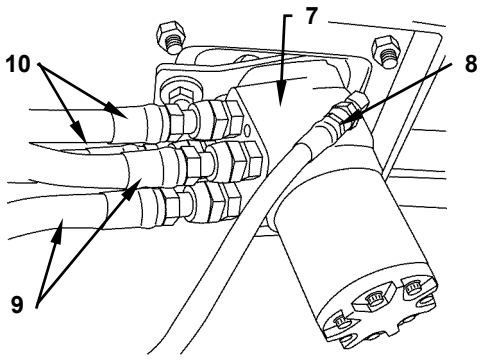
10. Remove seal plate (9) and spacer (18) from the spool (2) assembly.

11. Remove wiper ring (7), seal ring (6), and O-ring (19) from spacer (18).

6. Connect hoses (10) (2 used) to steering valve (7).
   : 22 mm
   : 40 N·m (4 kgf·m, 30 lbf·ft)

7. Connect hoses (9) (2 used) to steering valve (7).
   : 22 mm
   : 40 N·m (4 kgf·m, 30 lbf·ft)

8. Connect hose (8) to steering valve (7).
   : 19 mm
   : 30 N·m (3 kgf·m, 22 lbf·ft)



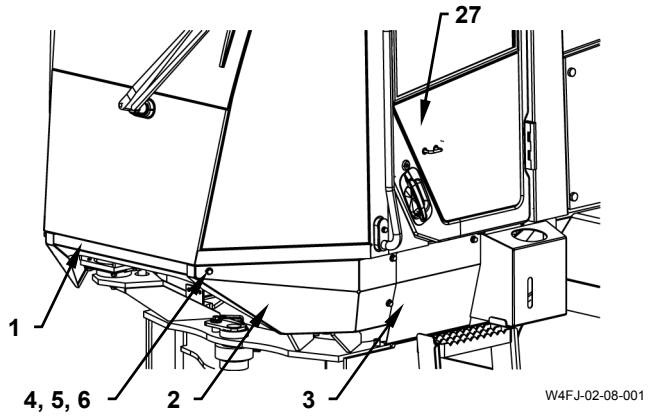
W4FJ-02-07-002

9. Install covers (1, 2, and 3) to the cockpit with washers (6) (9 used), spring washers (5) (9 used), and bolts (4) (9 used).
   : 17 mm
   : 50 N·m (5 kgf·m, 37 lbf·ft)

10. Close door (27) of the cab.

IMPORTANT: Check the hydraulic oil level. Start the engine. Check for any oil leaks at each connection.

11. Bleed air from the hydraulic system. (Refer to BLEED AIR FROM HYDRAULIC SYSTME on W1-4-2.)



W4FJ-02-08-001

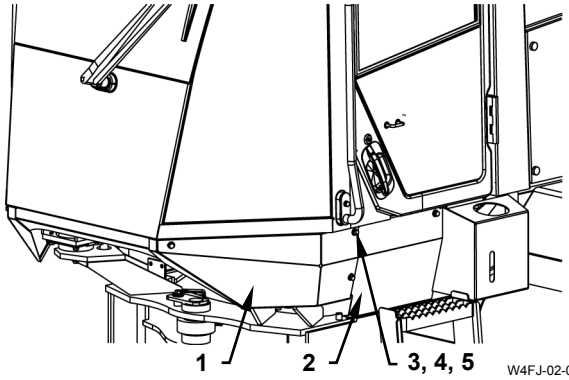
REMOVAL AND INSTALLATION OF BRAKE VALVE

Removal

1. Set the machine position for inspection and maintenance. (Refer to PREPARATION FOR INSPECTION AND MAINTENANCE on W1-6-1.)

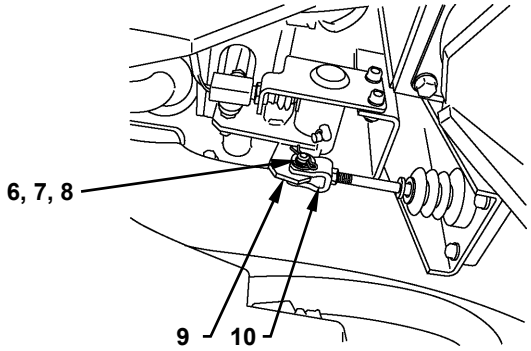
2. Before doing any work, stop the engine and depress/release the brake pedal about 80 times in order to release any pressure in the service brake circuit. The pedal can be depressed lightly when the pressure is released.

3. Remove bolts (3) (7 used), spring washers (4) (7 used), and washers (5) (7 used) from covers (1, 2). Remove covers (1, 2) from the cockpit.
   : 17 mm



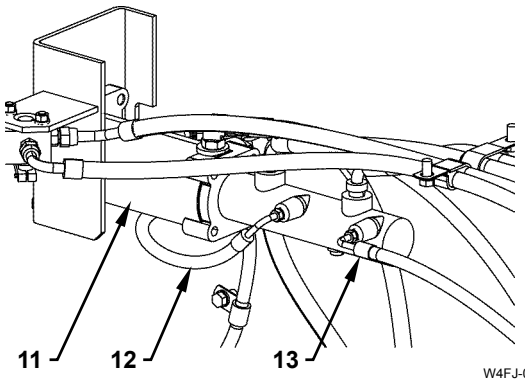
W4FJ-02-08-001

4. Remove split pin (7) and washer (8) from pin (6). Remove pin (6) from joint (10). Remove joint (10) from lever (9).



M4FC-07-015

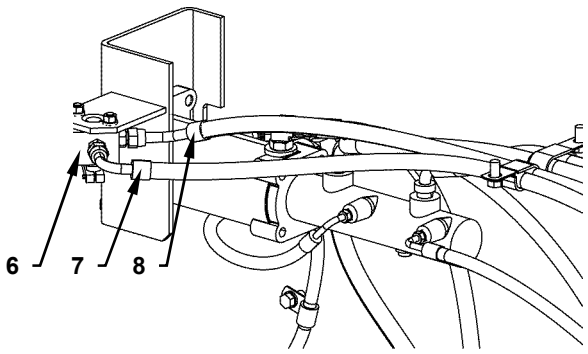
5. Disconnect hoses (12, 13) from brake valve (11). Cap the open ends. Attach an identification tag onto the disconnected hoses for assembling.
   : 19 mm



W4FJ-02-10-001

No.	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
29	Body	1					
30	O-Ring	1					
31	Washer	4					
32	Bolt	4	: 17	32	(3.2)	(23)	
33	Piston	1					
34	Stopper	1					
35	Packing	1					
36	Piston	1					
37	C-Ring	1					
38	Plug	3	: 6	20	(2)	(15)	LOCTITE #262
39	Connector	2	: 19	35	(3.5)	(26)	LOCTITE #262

4. Connect hoses (7, 8) to inching valve (6).
   : 22 mm
   : 40 N·m (4 kgf·m, 30 lbf·ft)

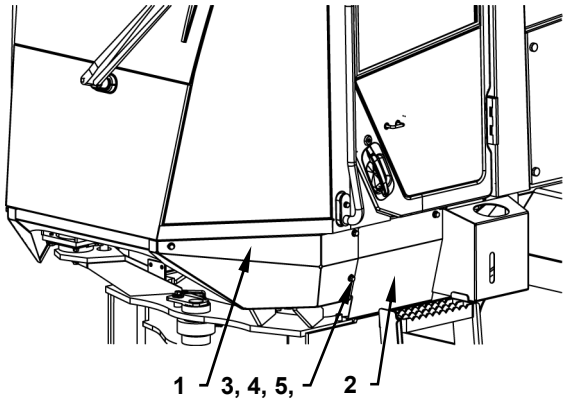


W4FJ-02-10-002

IMPORTANT: Check the hydraulic oil level. Start the engine. Check for any oil leaks at each connection.

5. Bleed air from the hydraulic system. (Refer to BLEED AIR FROM HYDRAULIC SYSTME on W1-4-2.)

6. Install covers (1, 2) to the cockpit with washers (5) (7 used), spring washers (4) (7 used), and bolts (3) (7 used).
   : 17 mm
   : 50 N·m (5 kgf·m, 37 lbf·ft)



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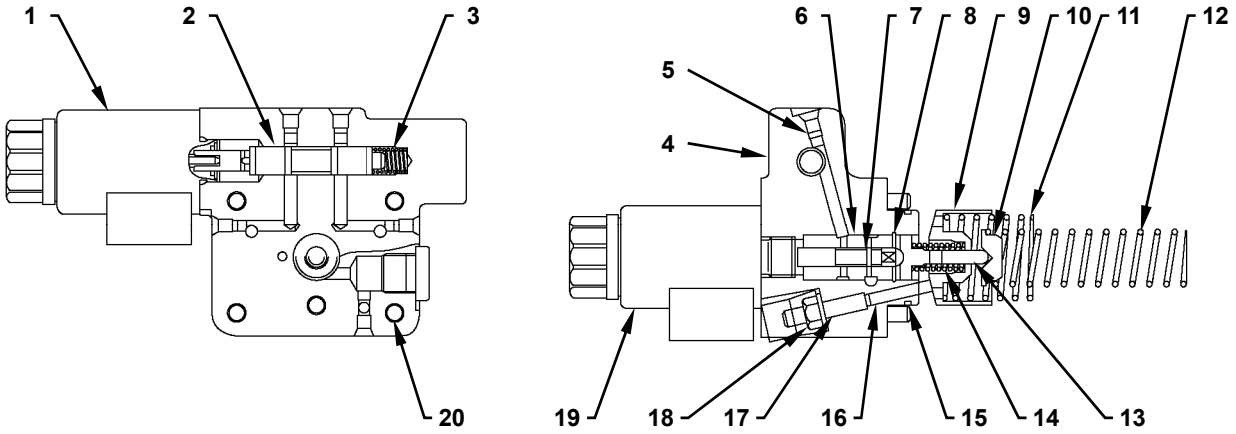
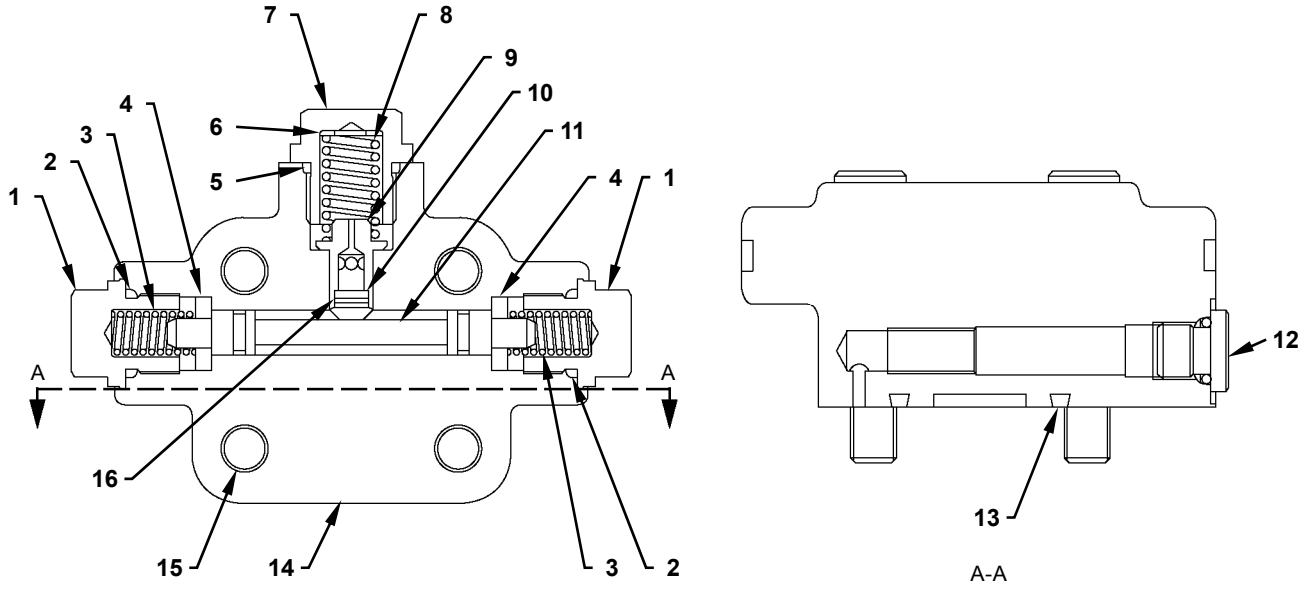
STRUCTURE OF HST MOTOR DISPLACEMENT ANGLE CONTROL VALVE



W4FC-03-03-012

1 - Solenoid
2 - Control Piston
3 - Spring
4 - Housing
5 - Plug (5 Used)
6 - Bushing
7 - Spool
8 - Retaining Ring
9 - Spring Collar
10 - Spring Collar
11 - Spring
12 - Spring
13 - Spring Collar
14 - Spring
15 - O-Ring
16 - Pin
17 - Socket Bolt
18 - Nut (Seal Lock)
19 - Solenoid
20 - Socket Bolt (4 Used)



W4FC-03-03-014

1 - Plug (2 Used)
2 - O-Ring (2 Used)
3 - Spring (2 Used)
4 - Spring Collar (2 Used)
5 - O-Ring
6 - Shim
7 - Plug
8 - Spring
9 - Plunger
10 - Orifice
11 - Spool
12 - Plug Assembly
13 - O-Ring
14 - Housing
15 - Socket Bolt (4 Used)
16 - Retaining Ring

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1 - Bolt (23 Used)
2 - Spring Washer (23 Used)
3 - Transmission Cover
4 - Transmission Case
5 - Breather
6 - Parking Brake Solenoid Valve
7 - Washer (4 Used)
8 - Bolt (4 Used)
9 - Pipe
10 - Plug
11 - O-Ring
12 - Spring
13 - Spring
14 - Piston
15 - Plug (12 Used)
16 - Plug (2 Used)
17 - Bolt
18 - Vehicle Speed Sensor
19 - O-Ring
20 - Knock Pin (2 Used)
21 - O-Ring
22 - Plug
23 - Orifice
24 - Control Valve
25 - Spring Washer (7 Used)
26 - Bolt (3 Used)
27 - Bolt (4 Used)
28 - Bolt (4 Used)
29 - Spring Washer (4 Used)
30 - Suction Tube
31 - Gasket
32 - O-Ring
33 - Suction Strainer
34 - Oil Gauge
35 - Pipe
36 - Stay
37 - Bolt
38 - Clip
39 - Nut
40 - Elbow
41 - Bearing
42 - O-Ring
43 - Disc Hub
44 - Retaining Ring
45 - Brake Disc
46 - Disc Plate
47 - End Plate
48 - Brake Housing
49 - O-Ring
50 - Socket Bolt (2 Used)
51 - D-Ring
52 - Piston
53 - D-Ring
54 - Oil Seal
55 - Cap
56 - Spring (12 Used)
57 - Washer (8 Used)
58 - Spring Washer (2 Used)
59 - Bolt (2 Used)
60 - Plug (4 Used)
61 - Flange
62 - Plug
63 - Retaining Ring
64 - Bolt (4 Used)
65 - Bolt (4 Used)
66 - Spring Washer (4 Used)
67 - Cover
68 - O-Ring
69 - Plug (2 Used)
70 - O-Ring (3 Used)
71 - Plug
72 - Clutch Assembly
73 - Retaining Ring
74 - Retaining Ring
75 - Retaining Ring
76 - Sleeve
77 - Output Gear (Lo)
78 - Retaining Ring (3 Used)
79 - Output Shaft
80 - Output Gear (Hi)
81 - Bearing
82 - Oil Baffle
83 - Washer (2 Used)
84 - Spring Washer (2 Used)
85 - Bolt (2 Used)
86 - O-Ring
87 - Oil Seal
88 - Retainer Seal
89 - Spring Washer (3 Used)
90 - Bolt (3 Used)
91 - Flange
92 - O-Ring
93 - Shim
94 - Shim (5 Used)
95 - Washer
96 - Washer
97 - Bolt

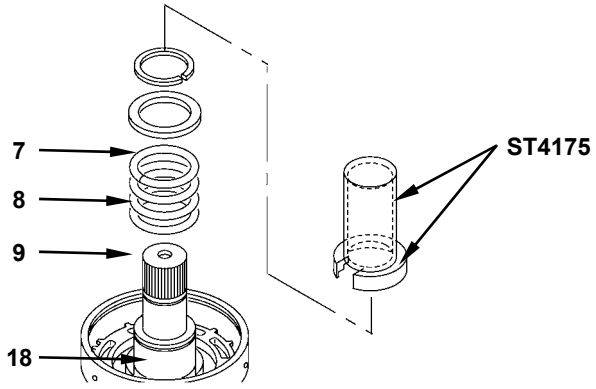
Assembly of Clutch Assembly

CAUTION: The clutch assembly weight: Approx. 19 kg (42 lb)

1. Install seal ring (14) to the clutch (18) shaft.

2. Install seal ring (16) to piston (15) with the lip part facing the inside. Install piston (15), spring (9), and spring seat (8) to the clutch (18) shaft.

3. Compress spring (9) by using the special tool (ST 4175) and a press. Install retaining ring (7) to the groove of clutch (18) shaft. Release spring (9).



W4FJ-03-03-015

4. Install inner discs (12) (ZW100-G: 3 used, ZW120-G: 4 used) and outer discs (13) (ZW100-G: 3 used, ZW120-G: 4 used) to the clutch (18) drum alternately.

IMPORTANT: Install end plate (11) with its convex side facing the inside.

5. Install end plate (11) and retaining ring (10) to the clutch (18) drum.

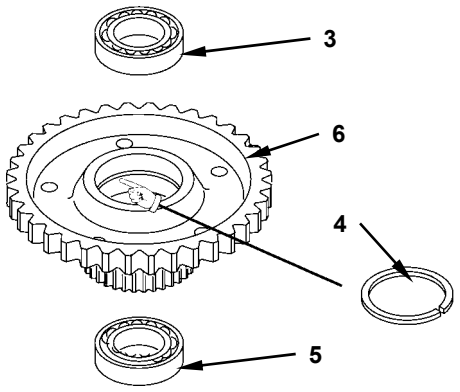
IMPORTANT: Check the position and direction to install bearings (3, 5).

6. Install bearings (3, 5) and retaining ring (4) to gear (Hi) (6).

7. Install the gear (Hi) (6) assembly to the clutch (18) shaft.

NOTE: Install the gear (Hi) (6) assembly while rotating clockwise.

8. Install retaining ring (2) and bearing (1) to the clutch (18) shaft.



W4FJ-03-03-016

9. Install the parts at the gear (Lo) (21) side in the same way as step 1 to step 4.

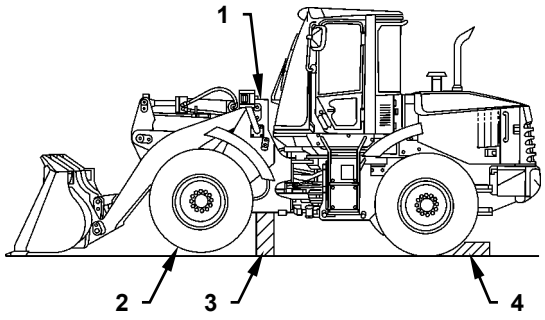
REMOVAL AND INSTALLATION OF FRONT AXLE

Removal

1. Set the machine position for inspection and maintenance. (Refer to PREPARATION FOR INSPECTION AND MAINTENANCE on W1-6-1.)

CAUTION: Machine weight :
ZW100-G: 6950 kg (15400 lb)
ZW120-G: 7980 kg (17600 lb)

2. Set hydraulic jack on both sides of front frame (1). Raise front frame (1). Place stand (3) under front frame (1). Set wheel stopper (4) to the rear wheel. Start the engine. Lower the bucket end on the ground. Stop the engine. Remove the hydraulic jack.



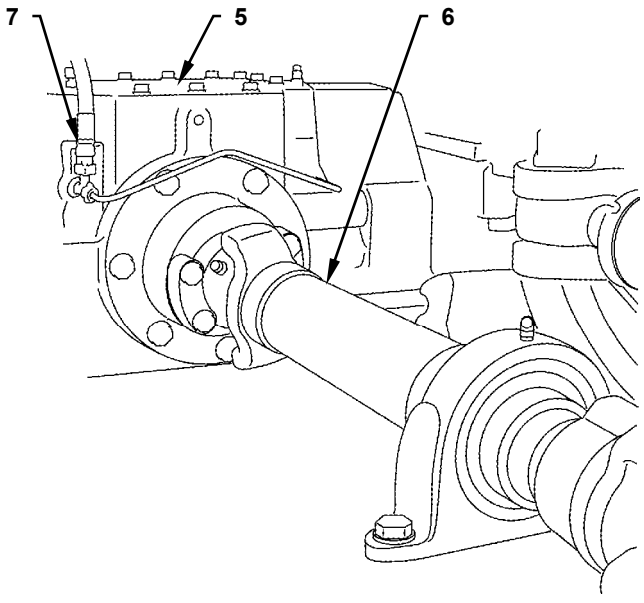
W4FC-03-05-051

CAUTION: Tire (2) weight:
ZW100-G: 145 kg (320 lb)
ZW120-G: 180 kg (400 lb)

3. Remove front tires (2) (2 used). (Refer to REMOVAL AND INSTALLATION OF TIRE on W3-6-1.)

4. Remove propeller shaft (6) from front axle (5). (Refer to REMOVAL AND INSTALLATION OF PROPELLER SHAFT on W3-5-1.)

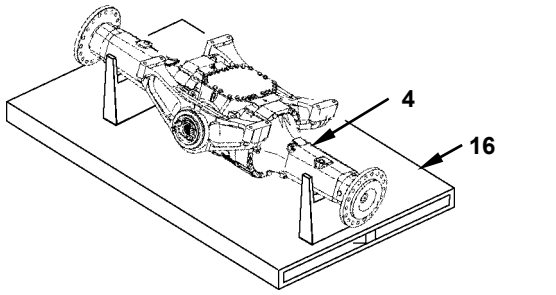
5. Disconnect hose (7) from front axle (5). Cap the open ends. Attach an identification tag onto the disconnected hoses for assembling.
: 19 mm



M4FJ-07-026

Disassembly of Rear Axle Assembly

CAUTION: Place the rear axle (4) assembly on stand (16) in order to stabilize the rear axle (4) assembly.



W4GB-03-03-113

CAUTION: Axle support (3) weight:
ZW100-G: 35 kg (77 lb)
ZW120-G: 40 kg (88 lb)

1. Attach a nylon sling onto axle support (3). Hoist and hold axle support (3). Remove axle support (3) from rear axle (4).

INPORTANT: Do not remove bushing (2) unless necessary.

2. Remove packings (1) (2 used) and bushing (2) from axle support (3).

CAUTION: Axle support (5) weight:
ZW100-G: 45 kg (99 lb)
ZW120-G: 55 kg (121 lb)

3. Attach a nylon sling onto axle support (5). Hoist and hold axle support (5).

4. Remove bolts (11) (6 used), and washers (10) (6 used) from thrust cap (9). Remove thrust cap (9), and thrust washer (6) from axle support (5).
: 19 mm

5. Remove bolts (8) (8 used) from thrust plate (7). Remove thrust plate (7) and thrust washer (6) from axle support (5).
: 19 mm

6. Remove axle support (5) from rear axle (4).

INPORTANT: Do not remove bushing (2) unless necessary.

7. Remove packing (1) and bushing (2) from axle support (5).

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REMOVAL AND INSTALLATION OF TIRE

Removal of Front Tire

1. Set the machine position for inspection and maintenance. (Refer to PREPARATION FOR INSPECTION AND MAINTENANCE on W1-6-1.)

2. Remove nuts (3) (6 used), spring washers (4) (6 used), and washers (5) (6 used) from front fender (2).Remove front fender (2) from front frame (1). Remove front fender (2) at the other side in the same way.

3. Loosen wheel bolts (6) (12 used) of tire (7) by about one turn.
   : 36 mm

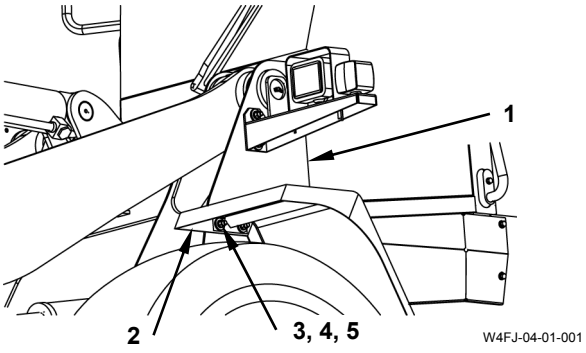
CAUTION: Machine weight:
ZW100-G: 6950 kg (15400 lb)
ZW120-G: 7980 kg (17600 lb)

4. Raise the machine until tire (7) slightly gets away from the road surface. Support the machine securely by using the blocks.

CAUTION: Tire (7) weight:
ZW100-G: 145 kg (320 lb)
ZW120-G: 180 kg (400 lb)

5. Attach a lifting tool onto tire (7). Hoist and hold tire (7).

6. Remove wheel bolts (6) (12 used) and washers (8) (12 used) from tire (7). Remove tire (7) from the front axle.
   : 36 mm



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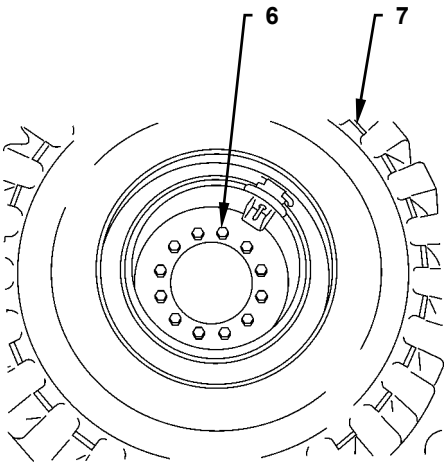

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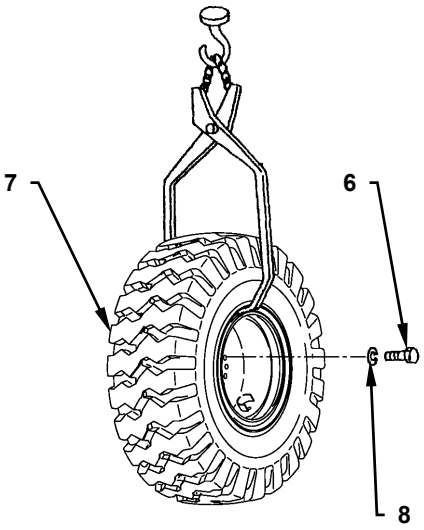


W4GB-03-01-003

REMOVAL AND INSTALLATION OF FRONT ATTACHMENT

Removal

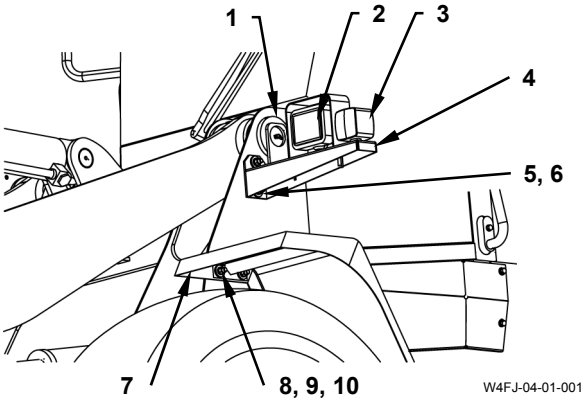
1. Set the machine position for inspection and maintenance. (Refer to PREPARATION FOR INSPECTION AND MAINTENANCE on W1-6-1.)

2. Release the remaining pressure. (Refer to HYDRAULIC CIRCUIT PRESSURE RELEASE PROCEDURE on W1-5-1.)

3. Disconnect connectors of head light (2) and front combination lamp (3).
   Disconnect connectors at the opposite side in the same way.

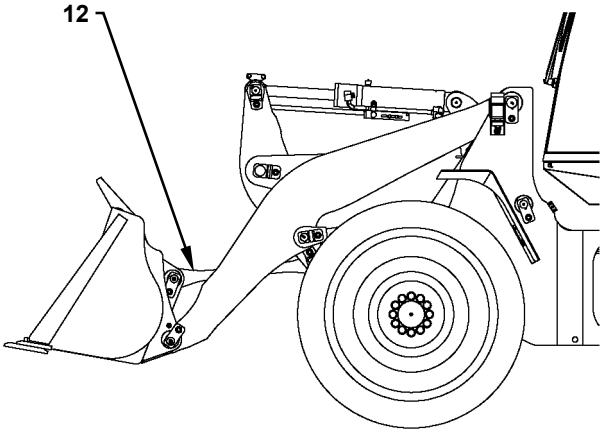
4. Remove nuts (5) (2 used) and spring washers (6) (2 used) from bracket (4). Remove bracket (4) assembly from front frame (1).
   Remove Bracket (4) assembly at the opposite side in the same way.
   : 19 mm

5. Remove nuts (8) (3 used), spring washers (9) (3 used) and washers (10) (3 used) from front fender (7). Remove front fender (7) from front frame (1).
   Remove front fender (7) at the opposite side in the same way.
   : 19 mm



CAUTION: Bucket link (12) weight:
ZW100-G: 20 kg (44 lb)
ZW120-G: 30 kg (66 lb)

6. Attach a nylon sling onto bucket link (12). Hoist and hold bucket link (12).



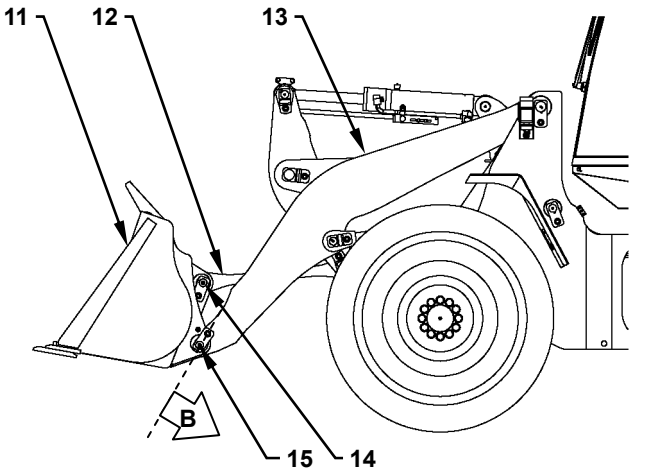
CAUTION: Bucket (11) weight:
ZW100-G: 550 kg (1212 lb)
ZW120-G: 710 kg (1565 lb)

20. Attach a nylon sling onto bucket (11). Hoist bucket (11). Fit bucket (11) to the mounting hole of lift arm (13).

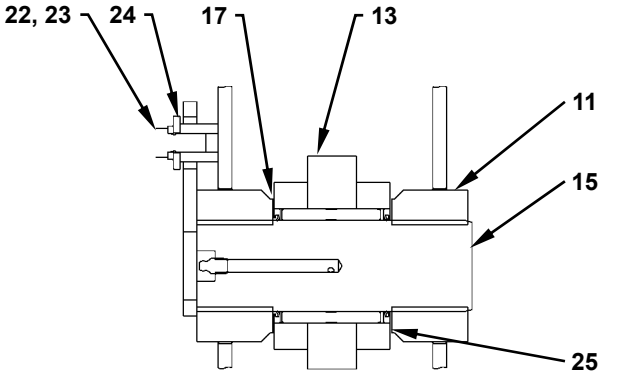
IMPORTANT: Adjust quantity of spacer (25) (thickness: 1.0 mm (0.04 in)) so that the clearance should be 1.5 mm (0.06 in) or less.

21. Install spacers (25) (2 used) to the mounting hole of bucket (11).

22. Install bucket (11) to lift arm (13) with pin (15), washer (24), spring washer (23), and bolt (22). Move O-rings (17) (2 used) which were moved to the bucket (11) side to the bucket (11) and the lift arm (13) connection part.
Install pin (15) at the opposite side in the same way.
: 19 mm
: 90 N·m (9 kgf·m, 66 lbf·ft)



M4FJ-07-024



Section B
W4FJ-04-01-003

Removal of Bucket Cylinder

1. Set the machine position for inspection and maintenance. (Refer to PREPARATION FOR INSPECTION AND MAINTENANCE on W1-6-1.)

2. Release the remaining pressure. (Refer to HYDRAULIC CIRCUIT PRESSURE RELEASE PROCEDURE on W1-5-1.) Bleed air from the hydraulic oil tank. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

CAUTION: Bucket cylinder (3) weight:
ZW100-G: 58 kg (132 lb)
ZW120-G: 67 kg (154 lb)

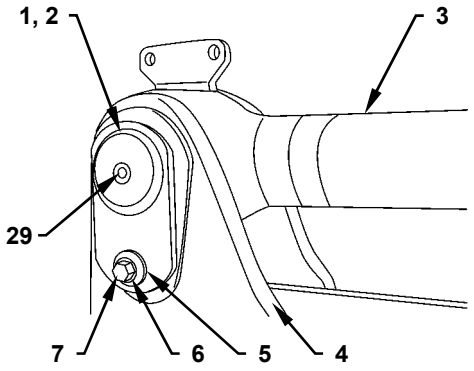
3. Attach a nylon sling onto bucket cylinder (3). Hoist and hold bucket cylinder (3).

4. Remove grease fitting (29) from pin (1). Cap the open ends.
   : 10 mm

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, helmets, etc in order to prevent personal injury.

5. Remove bolt (7), spring washer (6), and plate (5) from pin (1). Remove pin (1) and spacers (2) (2 used) from bell crank (4).
   : 19 mm

6. Start the engine. Retract the piston rod bucket cylinder (3). Remove bucket cylinder (3) from bell crank (4). Stop the engine. In order not to extend the rod, pass a wire through the rod hole and secure to the cylinder tube.



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