PREPARE FOR EMERGENCIES

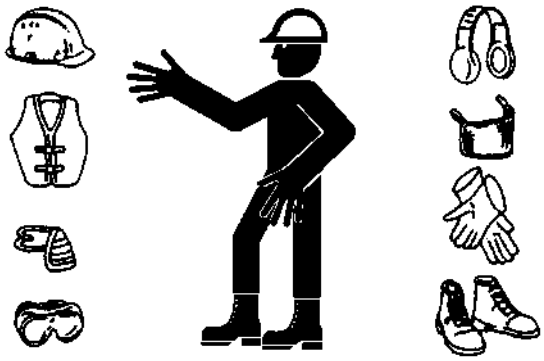
- Be prepared if a fire starts or if an accident occurs.
  - Keep a first aid kit and fire extinguisher on hand.
  - Thoroughly read and understand the label attached on the fire extinguisher to use it properly.
  - To ensure that a fire-extinguisher can be always used when necessary, check and service the fire-extinguisher at the recommended intervals as specified in the fire-extinguisher manual.
  - Establish emergency procedure guidelines to cope with fires and accidents.
  - Keep emergency numbers for doctors, ambulance service, hospital, and fire department posted near your telephone.

SA-437

004-E01A-0437

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.

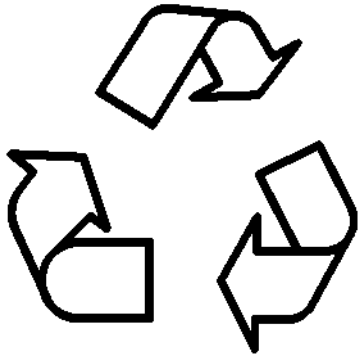


SA-438

005-E01A-0438

DISPOSE OF WASTE PROPERLY

- Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with HITACHI equipment includes such items as oil, fuel, coolant, brake fluid, filters, and batteries.
  - Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.
  - Do not pour waste onto the ground, down a drain, or into any water source.
  - Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.
  - Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center.



SA-226

S516-E01A-0226

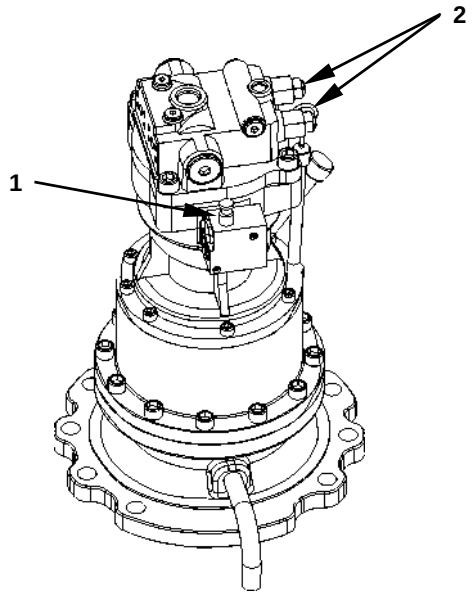
BEFORE RETURNING THE MACHINE TO THE CUSTOMER

- After maintenance or repair work is complete, confirm that:
  - The machine is functioning properly, especially the safety systems.
  - Worn or damaged parts have been repaired or replaced

SA-435

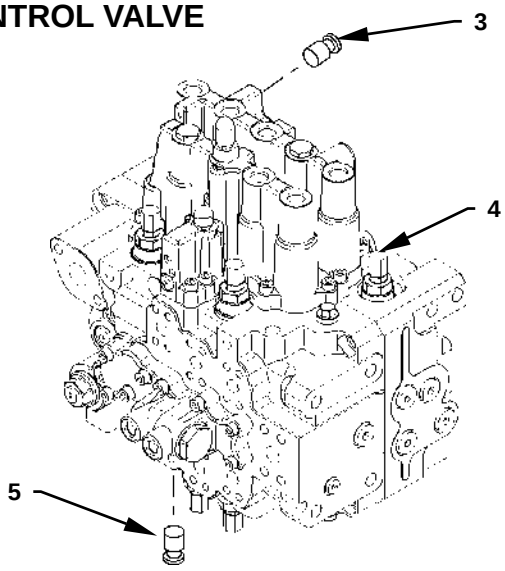
S517-E01A-0435

SWING DEVICE



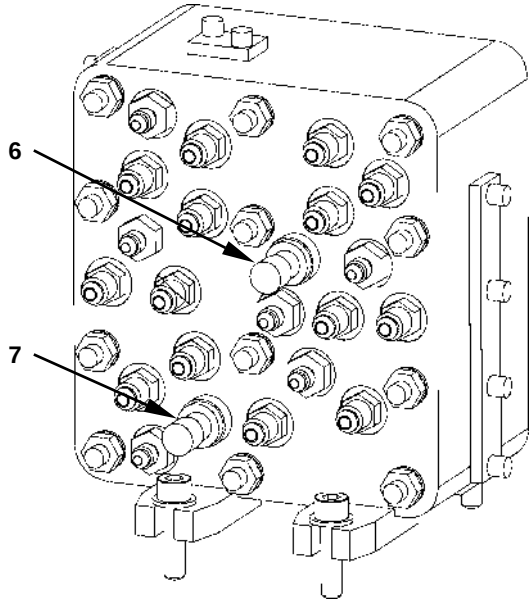
T176-01-02-002

CONTROL VALVE



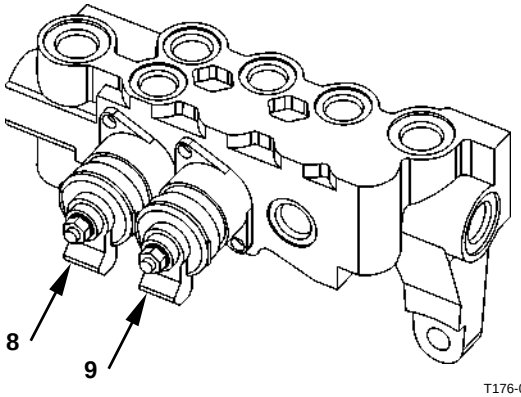
T176-01-02-003

SIGNAL CONTROL VALVE



T178-03-06-015

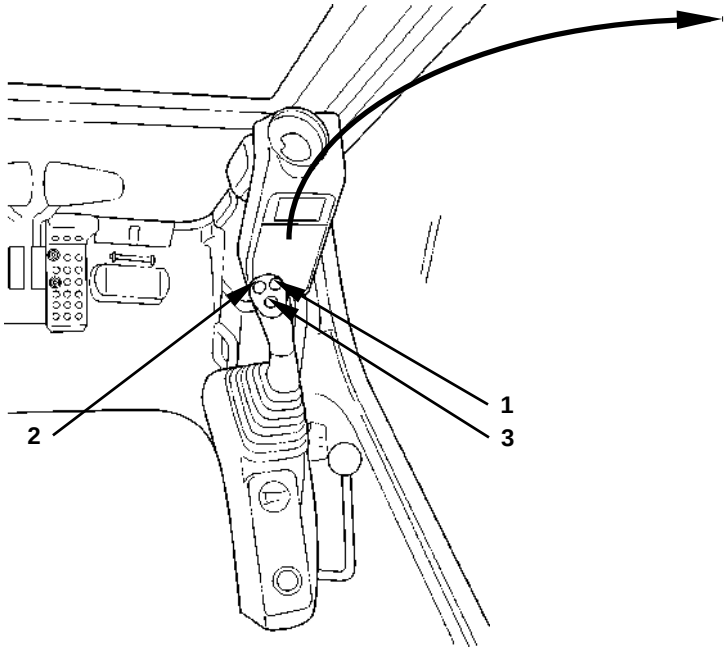
SOLENOID VALVE UNIT



T176-03-07-002

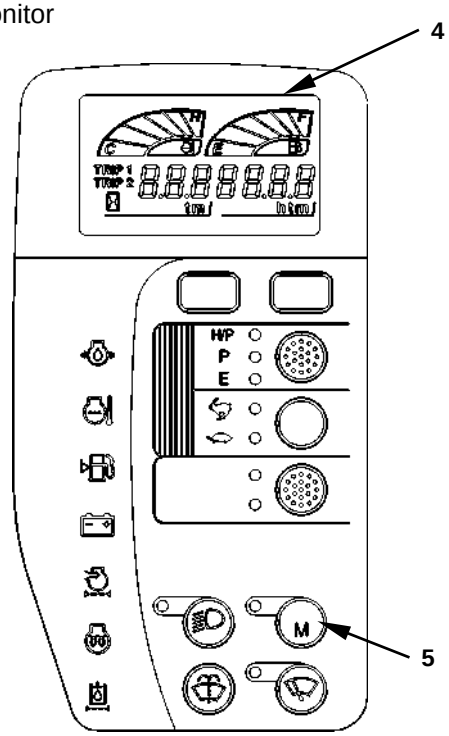
1 - Pressure Sensor (Front Attachment) (Except Swing Device of ZAXIS135UR)
2 - Swing Relief Valve
3 - Pressure Sensor (Arm Roll-In)
4 - Main Relief Valve
5 - Pressure Sensor (Boom Raise)
6 - Pressure Sensor (Swing)
7 - Pressure Sensor (Travel)
8 - Solenoid Valve Unit (SC)
9 - Solenoid Valve Unit (SI)

Cab Inside



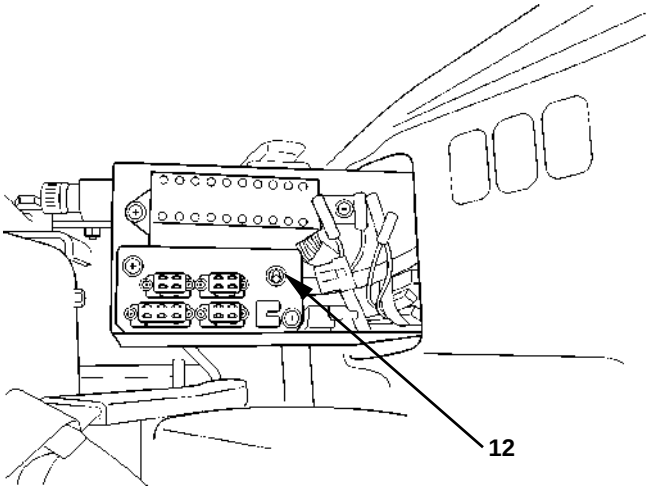
T1CF-01-01-003

System Monitor



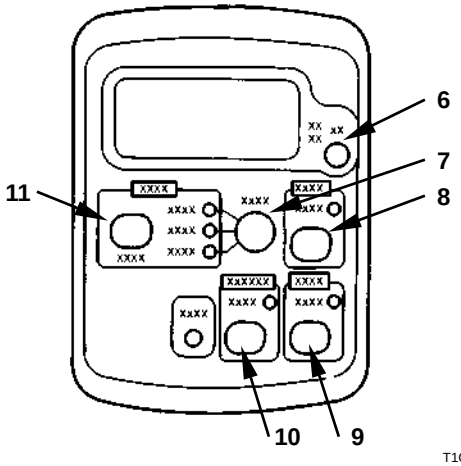
T1SM-01-02-014

Right Front of Seat



T1CF-01-01-004

Optional Monitor

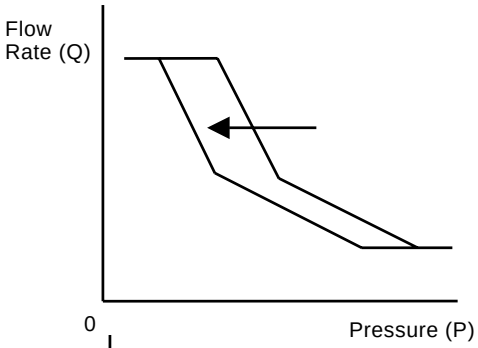


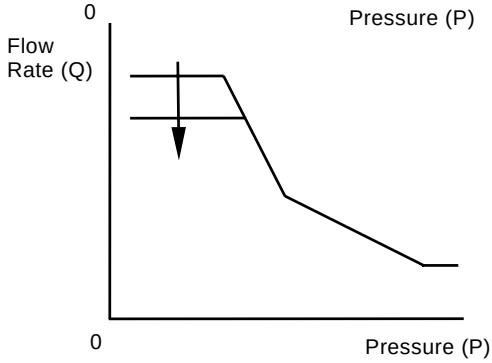
T1CF-02-02-004

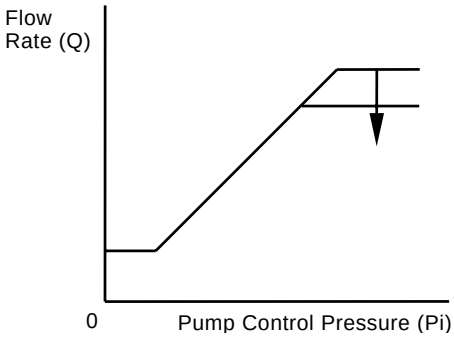
1 - Right Offset Switch
2 - Left Offset Switch
3 - Front Movement Restriction Deactivation Switch
4 - Liquid Crystal Monitor
5 - Auto-MARCCINO Mode Switch
6 - Absolute/Relative Distance Selector
7 - Monitor Indication Selector
8 - Height Limit Switch
9 - Depth Limit Switch
10 - Offset Limit Switch
11 - Zero Position Set Switch
12 - Evacuation Emergency Switch

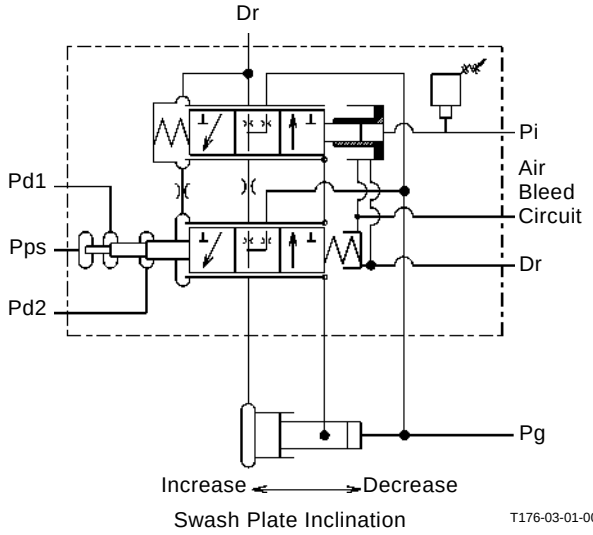
- Control by Pilot Pressure from Torque Control Solenoid Valve
  The main controller (MC) operates based on both the engine target speed input data and actual speed information signals and outputs signals to the torque control solenoid valve. In response to the signals from the MC, the torque control solenoid valve delivers torque control pilot pressure Pps to the regulator. Upon receiving pilot pressure Pps, the regulator reduces the pump flow rate. (Speed Sensing Control: Increasing torque at a slow speed)
  (Refer to the CONTROL SYSTEM section.)

- Control by Pilot Pressure from Maximum Pump Flow Rate Control Solenoid Valve
  (Pump 2 side only)
  When the MC receives signals from the work mode switch, pressure sensor (auxiliary) or attachment mode switch (optional), the MC sends signals to the maximum pump 2 flow rate limit solenoid valve. Then, in response to the signals from the MC, the maximum pump flow rate limit control solenoid valve reduces pump control pressure Pi, limiting the maximum pump flow rate. (Pump Flow Rate Limit Control)
  (Refer to the CONTROL SYSTEM section.)

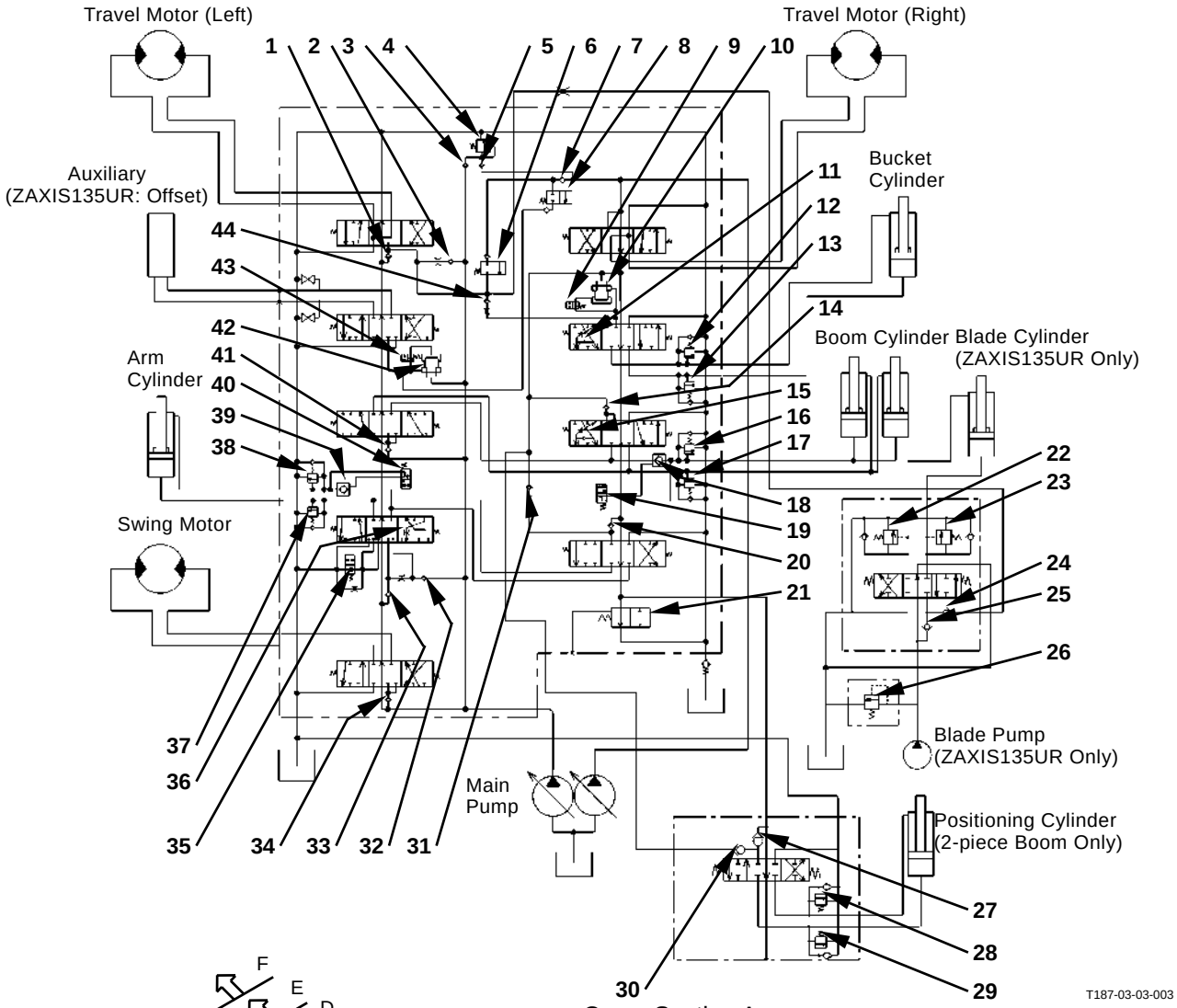






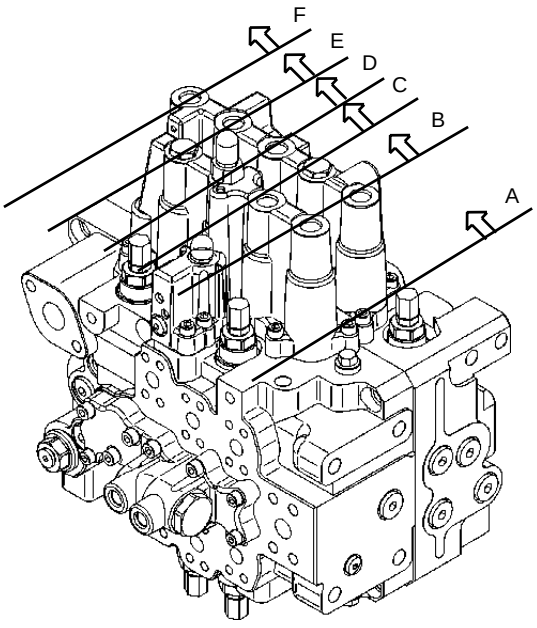


Pd1 -Pump 1 Delivery Pressure
Pd2 -Pump 2 Delivery Pressure
Dr - Return to Hydraulic Oil Tank
Pi - Pump Control Pressure
Pps -Torque Control Pressure
Pg - Primary Pilot Pressure (From Pilot Pump)

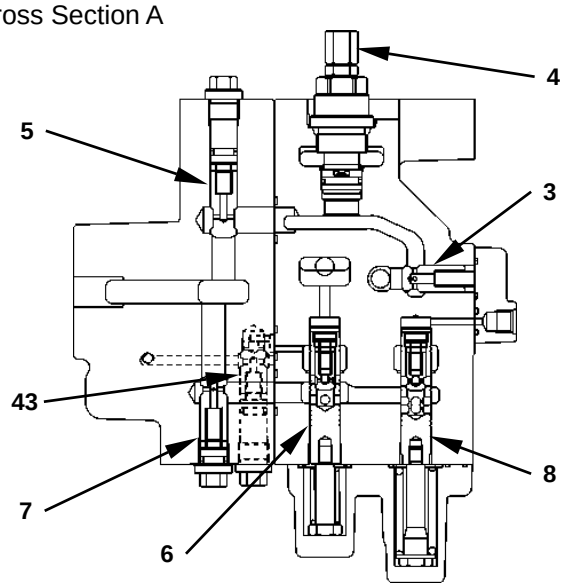


T187-03-03-003

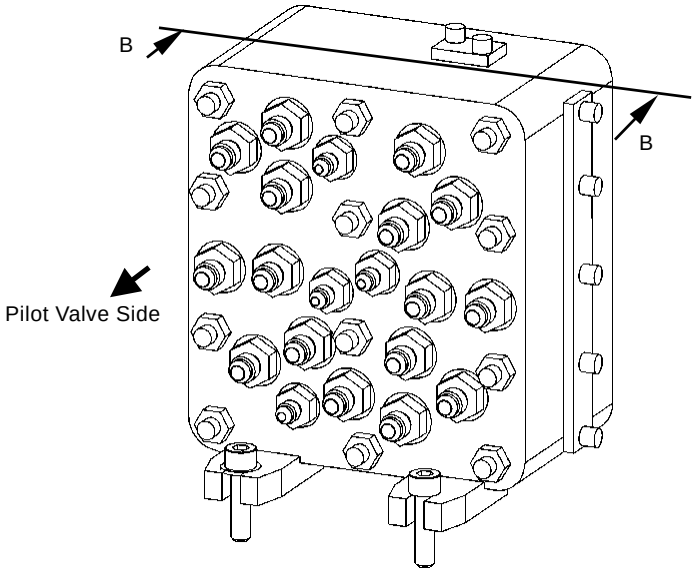
Cross Section A



T176-03-03-035

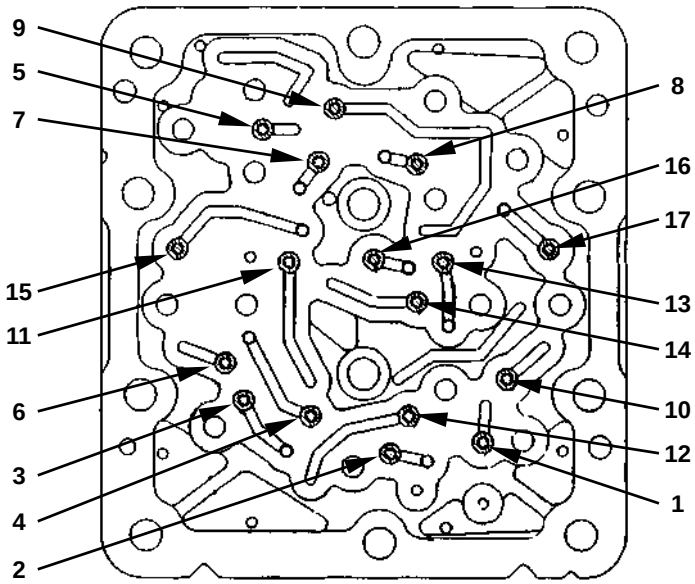


T176-03-03-002



T178-03-06-016

Cross Section B-B



T178-03-06-009

1 - Left Travel
2 - Left Travel/Right Travel
3 - Right Travel
4 - Boom/Arm/Bucket/ Right Travel
5 - Arm
6 - Boom/Arm/Bucket/Right Travel
7 - Boom/Arm
8 - Boom
9 - Arm/Boom Raise
10 - Boom/Arm/Bucket/Left Travel/Swing/Auxiliary (ZAXIS135UR : Offset)
11 - Boom/Arm/Bucket
12 - Boom/Arm/Bucket/ Swing/Auxiliary (ZAXIS135UR : Offset)
13 - Arm/Boom Raise/Swing/Auxiliary (ZAXIS135UR : Offset)
14 - Bucket
15 - Swing
16 - Swing/Auxiliary (ZAXIS135UR : Offset)
17 - Auxiliary (ZAXIS135UR : Offset)

Item	Reference Value	Measured Value				Remarks
		First	Second	Third	Average	
TARGET ENGINE SPEED (min^{-1})						
Fast Idle*	1750					
Fast Idle (When operating a control lever)*	1950					
Fast Idle (HP Mode)*	2150					When relieving boom raise circuit
Fast Idle (E Mode)*	1750					
Auto-Idle*	1050					
Slow Idle*	800					
ACTUAL ENGINE SPEED (min^{-1})						
Fast Idle*	1930					
Fast Idle (When operating a control lever)*	2000					
Fast Idle (HP Mode)*	2240					When relieving boom raise circuit
Fast Idle (E Mode)*	1940					
Auto-Idle*	1190					
Slow Idle*	920					
ENGINE SPEED DEVIATION (min^{-1})						
Fast Idle*	186					
Fast Idle (When operating a control lever)*	56					
Fast Idle (HP Mode)*	94					When relieving boom raise circuit
Fast Idle (E Mode)*	190					
Auto-Idle*	134					
Slow Idle*	128					
EC ANGLE (Volt)						
Minimum*	2.55					
Maximum*	3.12					
DIAL ANGLE (Volt)						
Minimum*	0.44					
Maximum*	4.25					

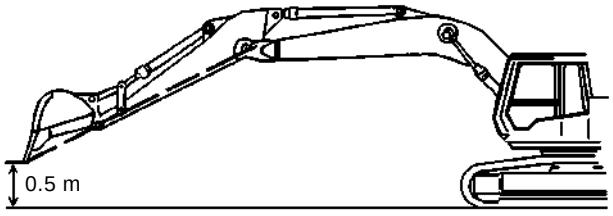
BOOM RAISE AND ARM ROLL-IN COMBINED OPERATION

Summary:

1. Performance of boom raise and arm roll-in combined operation is checked.
2. Make sure that the cylinders don't hesitate while operating the cylinder with the engine running at fast idle.

Preparation:

1. Fully retract the arm cylinder and fully extend the bucket cylinder. Adjust the boom cylinder so that the bucket tooth tip height is 0.5 m (1 ft 8 in) above the ground. (Empty the bucket.)
2. Maintain the hydraulic oil temperature at 50 ± 5 °C (122±9 °F).



T107-06-03-006

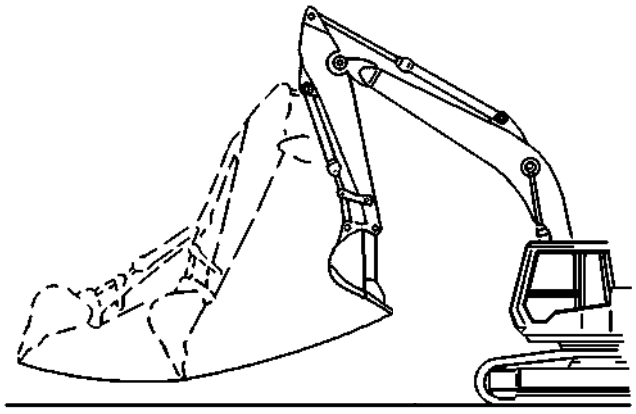
Measurement:

1. Select the switch positions as follows.

Engine Control Dial	Power Mode Switch	*Work Mode Switch	Auto-Idle/ Acceleration Selector
Fast Idle	P Mode	Digging Mode	OFF

* : The work mode switch is not equipped for ZAXIS135UR.

2. Raise the boom and roll the arm in full stroke at the same time.
3. Measure the time required for the arm to reach the stroke end with the bucket empty.
4. Repeat the measurement three times and calculate the average value.



T107-06-03-008

Evaluation:

Refer to T4-2 Operational Performance Standard.

Remedy:

Refer to T5-4 Troubleshooting B.

Changing Parameters In The Controller

NOTE: The following explanation exemplifies the transition diagrams for ZAXIS110.
Start the service mode on the condition that the engine learning switch is turned on.

To change the parameter, it is necessary to enter the password. To change the password, refer to the “Changing the password” section.

Start the service software in the **service mode**

Select **Start** from the EPVC_Mid software menu.

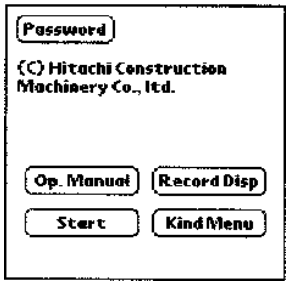


Fig. A T178-05-01-006

Press **Correct** if the displayed model name is correct.

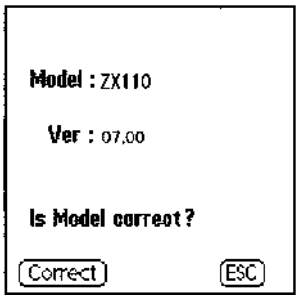


Fig. B T187-05-01-001

Select **ESC** to return to Fig. A.

Confirm that you are in the service mode, and select **Re-checked**.

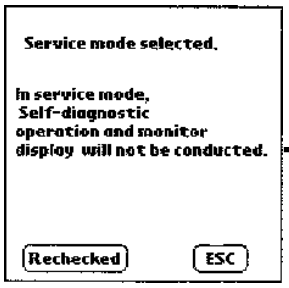


Fig. C T178-05-01-034

Select **ESC** to return to Fig. A.

The service software will start in the service mode

Select **Special Function**.

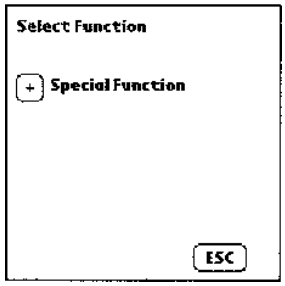


Fig. D T178-05-01-035

Select **ESC** to return to Fig. A

Execute the parameter change

The menu will be displayed. Select **Parameter Change** from the menu.

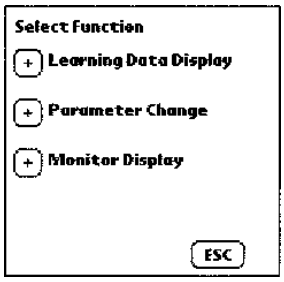


Fig. E T178-05-01-042

Select **ESC** to return to Fig. D.

Enter the password

Enter the password to change the parameter.

Fig. F T178-05-01-043

Select **ESC** to return to Fig. E.

Select a parameter change item

Select the item you want to change. The up- and down-arrow buttons can be used to scroll through the item list.

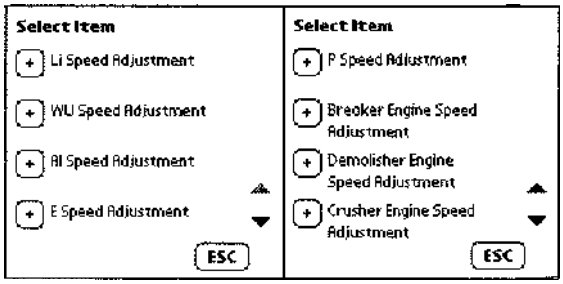


Fig. G T178-05-01-044

Select **ESC** to return to Fig. E.

FAULT CODE 14 (ABNORMAL SWING PILOT PRESSURE) FAULT CODE 15 (ABNORMAL BOOM RAISE PILOT PRESSURE) FAULT CODE 16 (ABNORMAL ARM ROLL-IN PILOT PRESSURE) FAULT CODE 18 (ABNORMAL TRAVEL PILOT PRESSURE)

Checking Instruction

- All pressure sensors seldom fail at the same time. Accordingly, if fault codes 14, 15, 16, and 18 are displayed simultaneously, faulty harness may be the cause of this problem.

Check if fault code disappears after switching pressure sensor with another pressure sensor and retrying.

Fault Code:
14: Pressure Sensor (Swing)
15: Pressure Sensor (Boom Raise)
16: Pressure Sensor (Arm Roll-In)
18: Pressure Sensor (Travel)

NO → Disconnect pressure sensor. Check if voltage between harness end connector terminals #1 and #3 is 5±0.5 V.

· Key switch: ON

YES → Check harness between MC connector C (31P) harness end each corresponding terminal and pressure sensor terminal #2 for breakage or short circuit.

Connector C Terminal:
#14: Pressure Sensor (Swing)
#2: Pressure Sensor (Boom Raise)
#5: Pressure Sensor (Arm Roll-In)
#3: Pressure Sensor (Travel)

YES → Faulty harness between MC and pressure sensor.

NO → Faulty MC.

· Refer to T4-6-6.

NO → Check if voltage between pressure sensor harness end connector terminal #1 and vehicle frame matches specification.

· Key switch: ON
· Specification: 5±0.5 V

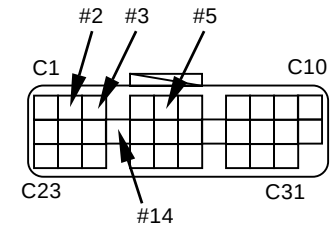
YES → Broken harness between MC and pressure sensor terminal #3.

NO → Broken harness between MC and pressure sensor terminal #1.

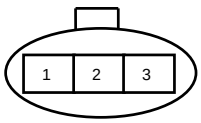
YES → Faulty pressure sensor.

Connector (Harness End Connector Viewed from the Open End Side)

MC Connector C



Pilot Pressure Sensor

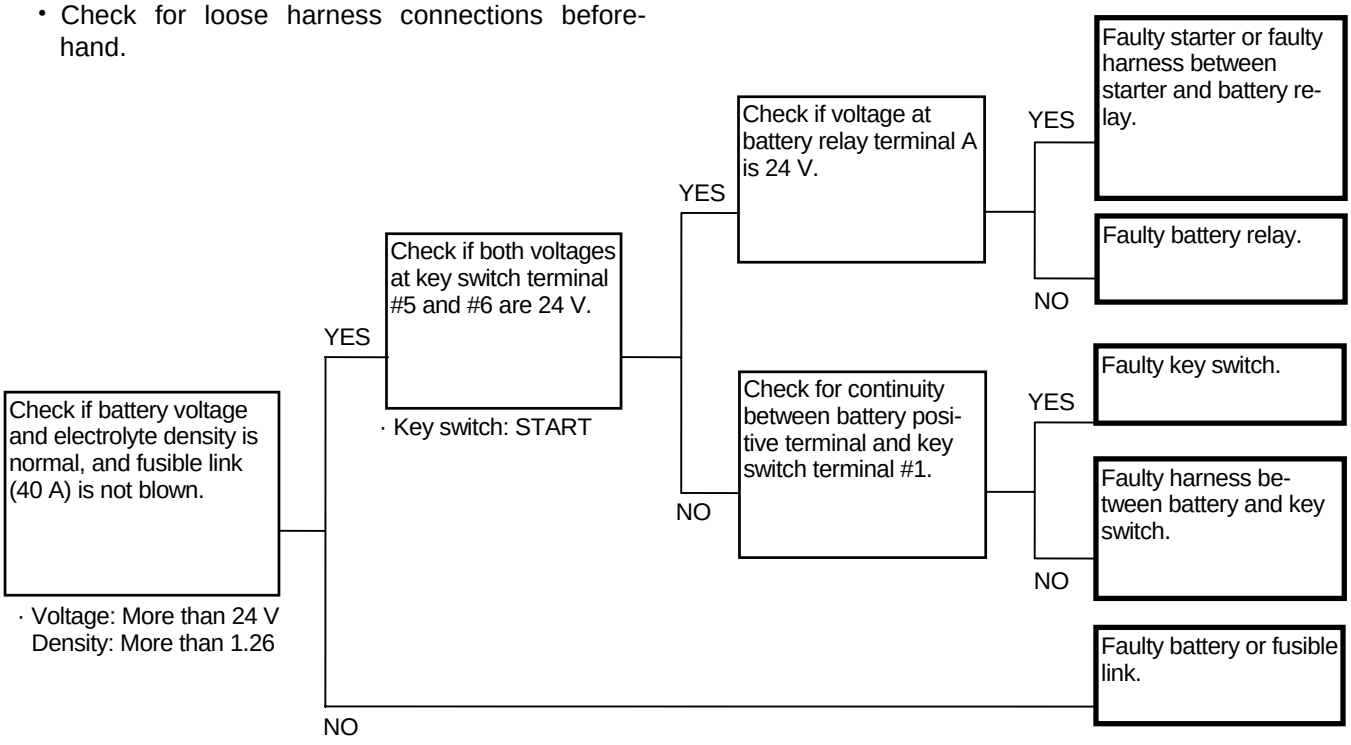


ENGINE SYSTEM TROUBLESHOOTING

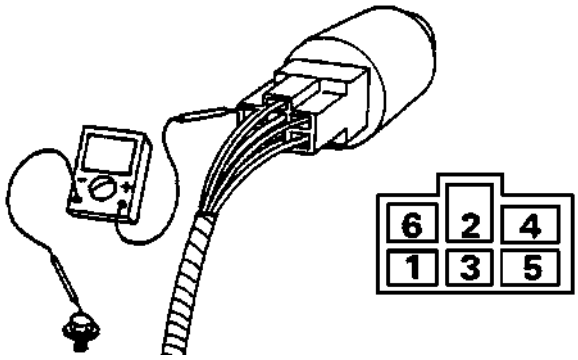
E-1 Starter doesn't rotate.

Related Fault Code: None

- This trouble has nothing to do with the electronic control system such as the MC.
- Check for loose harness connections beforehand.

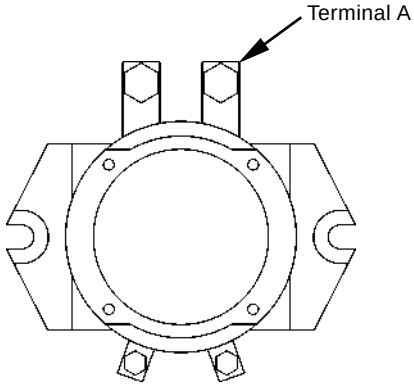


Key Switch



T105-07-04-002

Battery Relay



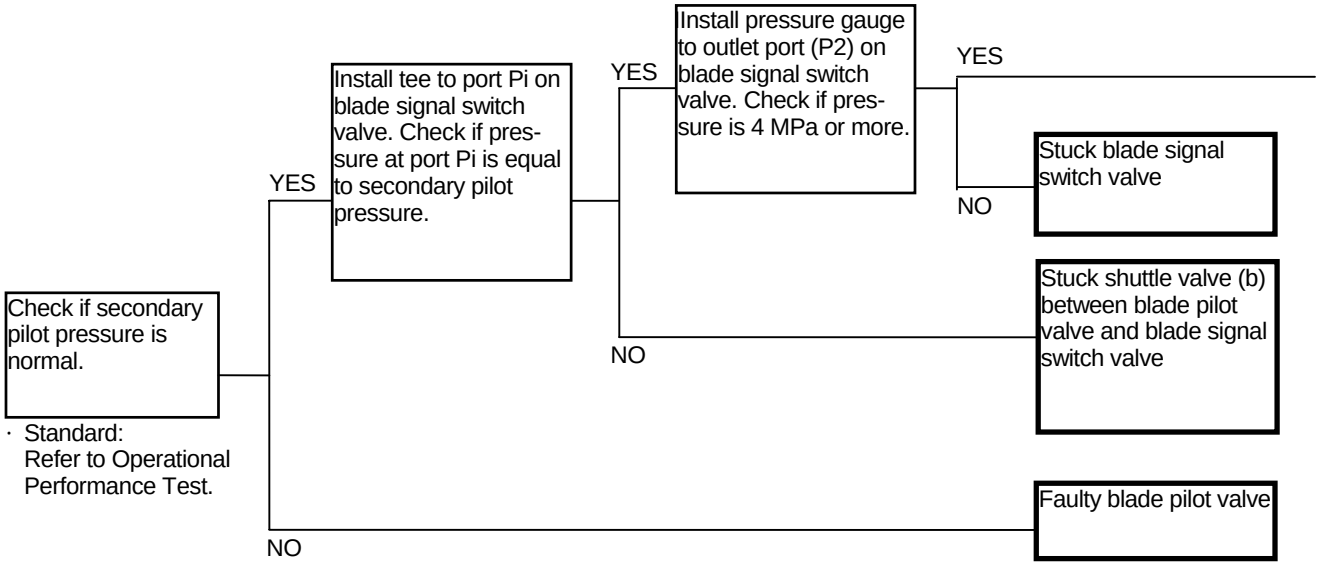
T178-05-04-001

BLADE SYSTEM TROUBLESHOOTING (ZAXIS135UR ONLY)

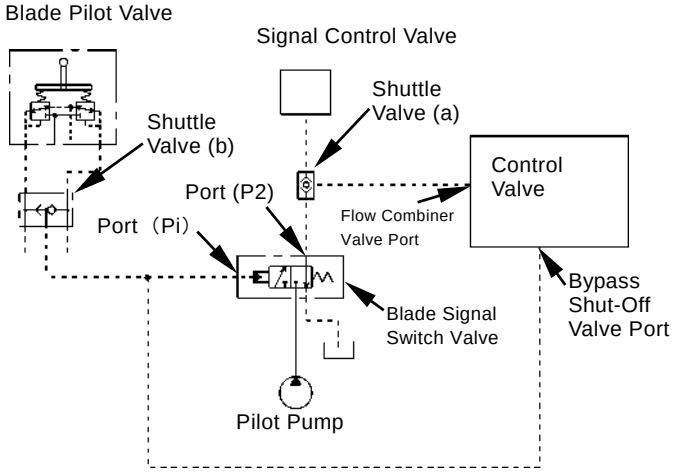
B-1 Single blade operation is slow or weak in power.

Related Fault Code: None

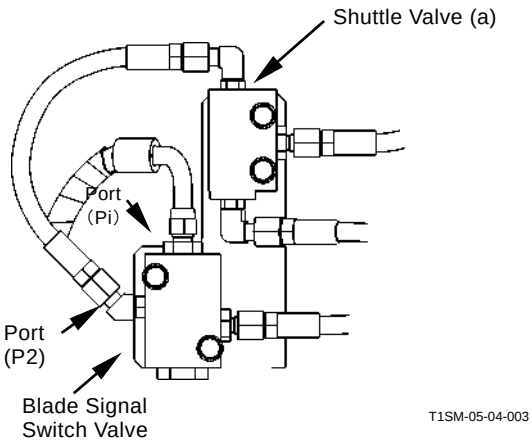
- Check whether the pilot system or the main circuit system is faulty.
- In case the machine mistracks, a potential cause is sticking of the flow combiner valve or the shuttle valve between the signal control valve and the flow combiner valve.
- The pressure oil from main pumps 1 and 2 is jointlysupplied to the blade circuit to increase the blade speed. In case only the operation speed is slow (strong in power), potential cause may be faulty main relief valve (in the blade circuit). Even if the main relief valve (in the blade circuit) is faulty, the oil pressure is maintained by the main relief valve in the main circuit.



Blade Pilot Circuit



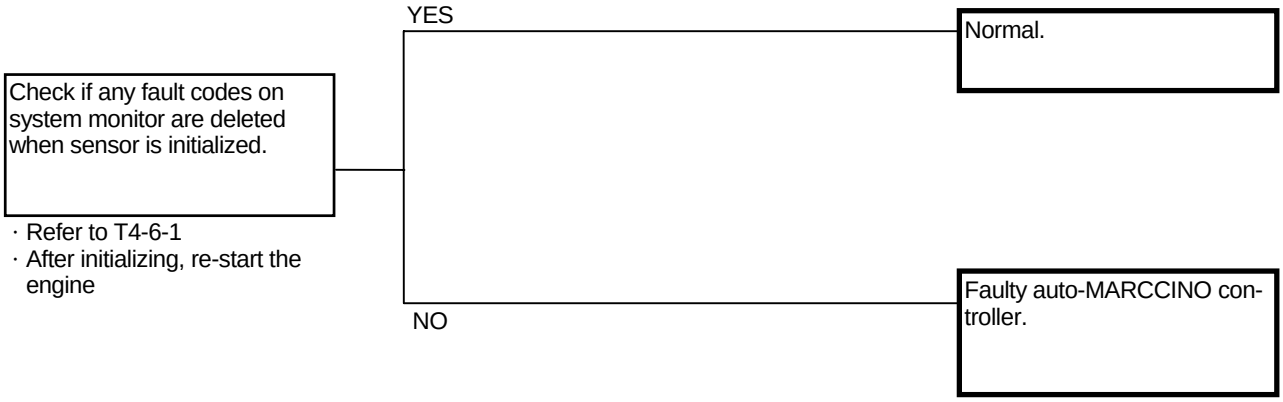
T1SM-05-04-002



T1SM-05-04-003

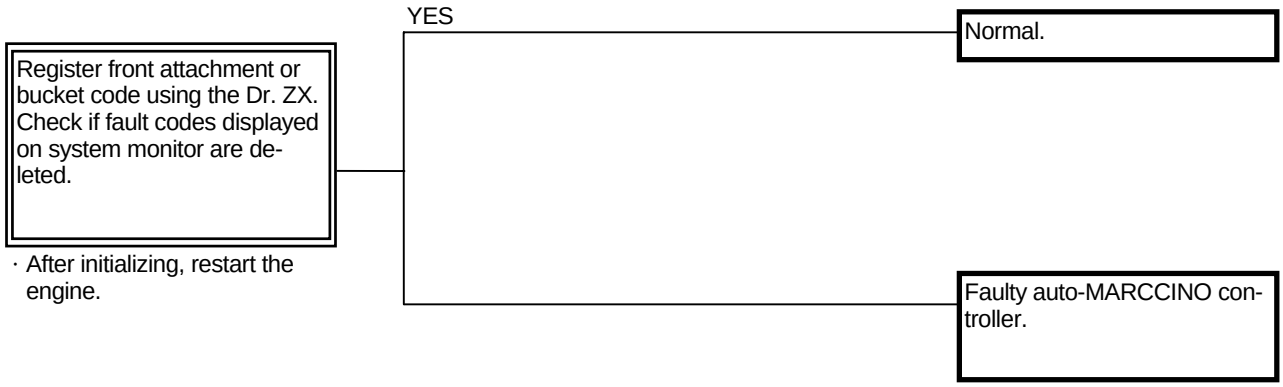
FAULT CODE 07 (ABNORMAL CALIBRATION VALUE)

- Calibration values are input into the auto-MARCCINO controller beforehand. Accordingly, this fault code is rarely displayed during machine operation.



FAULT CODE 08 (ABNORMAL CODE SETTING)

- When no front attachment or bucket codes are registered, this fault code is displayed. Register the front attachment or bucket code.



Attach to Vol. No.: TT187E-04

Note:Refer to the PEFORMANCE STANDARD in the technical manual for the relief valve pressure setting valve.

ZAXIS125US/135US HYDRAULIC CIRCUIT DIAGRAM