PART NO. TTCFA-E-00

HITACHI

Technical Manual
Troubleshooting

ZX
145W-3
Wheeled Excavator

ZX145W-3 WHEELED EXCAVATOR TECHNICAL MANUAL TROUBLESHOOTING

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

PRINTED IN JAPAN (K) 2010. 07

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TOCFA-E
Technical Manual (Troubleshooting)	: Vol. No.TTCFA-E
Workshop Manual	: Vol. No.WCFA-E

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.

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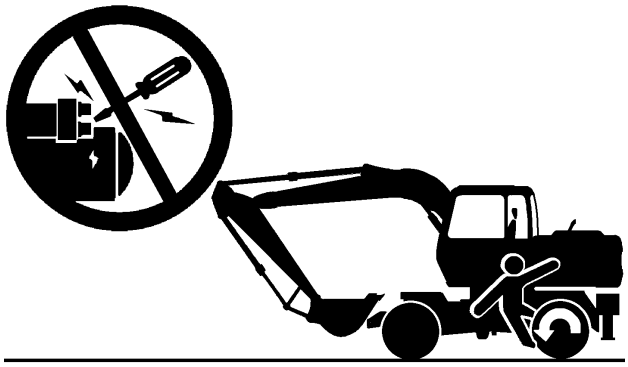

SA-084

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.

S013-E01A-0032

SA-032

KEEP RIDERS OFF MACHINE

- Riders on machine are subject to injury such as being struck by foreign objects and being thrown off the machine.
  - Only the operator should be on the machine. Keep riders off.
  - Riders also obstruct the operator's view, resulting in the machine being operated in an unsafe manner.

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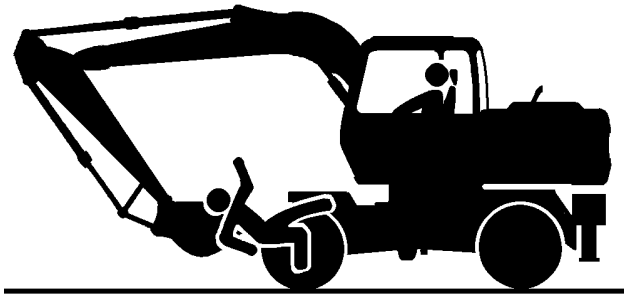
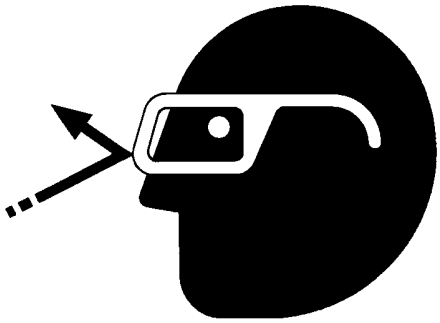


SA-091

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

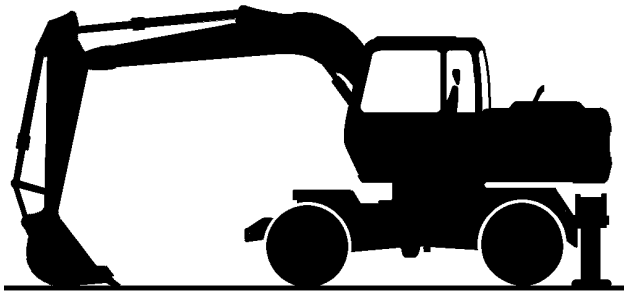


SA-432

PARK MACHINE SAFELY

To avoid accidents:

- Park machine on a firm, level surface.
- Lower bucket to the ground.
- Place FNR switch in neutral, and put the brake switch in the P (parking brake) position.
- Turn auto-idle switch OFF.
- 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.
- Pull the pilot control shut-off lever to the LOCK position.
- Close windows, roof vent, and cab door.
- Lock all access doors and compartments.



SA-093

HANDLE FLUIDS SAFELY–AVOID FIRES

- Handle fuel with care; it is highly flammable. If fuel ignites, an explosion and/or a fire may occur, possibly resulting in serious injury or death.
  - Do not refuel the machine while smoking or when near open flame or sparks.
  - Always stop the engine before refueling the machine.
  - Fill the fuel tank outdoors.

- All fuels, most lubricants, and some coolants are flammable.
  - Store flammable fuels well away from fire hazards.
  - Do not incinerate or puncture pressurized containers.
  - Do not store oily rags; they can ignite and burn spontaneously.
  - Securely tighten the fuel and oil filler cap.

034-E01A-0496

SA-018

SA-019

BEWARE OF ASBESTOS DUST

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

SA-029

PREVENT BATTERY EXPLOSIONS

- Battery gas can explode.
  - Keep sparks, lighted matches, and flame away from the top of battery.
  - Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.
  - Do not charge a frozen battery; it may explode. Warm the battery to 16˚C (60˚ F) first.
  - Do not continue to use or charge the battery when electrolyte level is lower than specified. Explosion of the battery may result.
  - Loose terminals may produce sparks. Securely tighten all terminals.

SA-032

- Battery electrolyte is poisonous. If the battery should explode, battery electrolyte may be splashed into eyes, possibly resulting in blindness.
  - Be sure to wear eye protection when checking electrolyte specific gravity.

512-E01B-0032

SERVICE AIR CONDITIONING SYSTEM SAFELY

- If spilled onto skin, refrigerant may cause a cold contact burn.
  - Refer to the instructions described on the container for proper use when handling the refrigerant.
  - Use a recovery and recycling system to avoid leaking refrigerant into the atmosphere.
  - Never touch the refrigerant.

513-E01A-0405

SA-405

SECTION 4 OPERATIONAL PERFORMANCE TEST

Group 2 Standard

Performance Standard

The performance standard values are listed in the table below.
For details including measuring method, refer to T4-3 onward.
The value indicated in parentheses is only a reference.

* The standard measurement conditions are as follows.
  - Engine Control Dial: Fast Idle
  - Power Mode Switch: P mode
  - Auto-Idle Switch: OFF
  - Work Mode: Digging mode
  - Engine Speed Control Mode Selection Switch: Dial mode
  - Hydraulic Oil Temperature: 50±5 °C (122±9 °F)

Descriptions	Performance Standard	Remarks	Reference
ENGINE SPEED min^{-1}			T4-3-1
Slow Idle Speed	900±100	Value indicated on Dr. ZX.	
Fast Idle Speed	1800±50	↑	
Fast Idle Speed (Relief operation)	1800±50	Arm roll-in relief control. Value indicated on Dr. ZX.	
Fast Idle Speed (E mode)	1600±50	Value indicated on Dr. ZX.	
Fast Idle Speed (HP mode, Relief operation)	2000±50	Arm roll-in relief control. Value indicated on Dr. ZX.	
Slow Idle Speed (Pedal mode)	1100±50	Travel mode switch: Fast speed Brake switch: OFF or Axle lock Jack up and measure. Value indicated on Dr. ZX.	
Fast Idle Speed (Pedal mode, Working accelerator)	2000±50	Forward/reverse travel switch: N Brake switch: OFF, Auto axle lock or Axle lock Value indicated on Dr. ZX.	
Fast Idle Speed (Pedal mode, Relief operation)	2200±50	Travel mode switch: Fast speed Brake switch: OFF, Auto axle lock or Axle lock Depress the brake pedal, perform travel relief or jack up and measure. Values indicated on Dr. ZX.	
Auto-Idle Speed	1100±100	Value indicated on Dr. ZX.	
Warming-Up Speed	1500±100	↑	
ENGINE COMPRESSION PRESSURE MPa (kgf/cm^2, psi)	3.04±0.2 (31±2, 440)	Engine speed: at 200 min^{-1}	T4-3-4
VALVE CLEARANCE (IN, EX) mm	0.15	With engine cold	T4-3-6
LUBRICANT CONSUMPTION (Rated Output) mL/h	30 or less	Hour meter: 2000 hours or less	T4-3-9

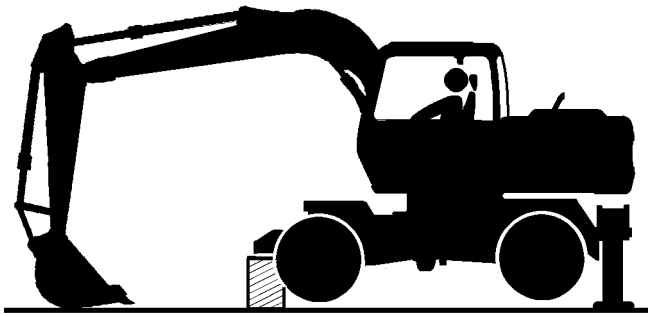
• Engine Speed Control Mode Selection Switch: Pedal mode

	Accelerator Pedal	Power Mode Switch	Auto-Idle Switch	Work Mode	Test Conditions
Slow Idle	Not depressed	P	OFF	Digging mode	• FNR switch: (F or R) • Brake switch: OFF or Axle lock • Engine control dial: Slow
Fast Idle	Max. depressing	P	OFF	Digging mode	• FNR switch: N • Work brake: Operable
Fast Idle (Relief operation)	Max. depressing	P	OFF	Digging mode	• Travel speed mode switch: Fast • Brake switch: OFF or Axle lock • Raising Machine • Travel operation with brake depressed

Method Raising Machine:
As for a machine attached with an outrigger or a blade in front and rear of the chassis, raise the machine off the ground by using the outrigger or blade.

CAUTION: Securely support the raised machine by using the blocks.

As for a machine attached with an outrigger or a blade only in rear of the chassis, raise the machine by using a front attachment as illustrated in the right.



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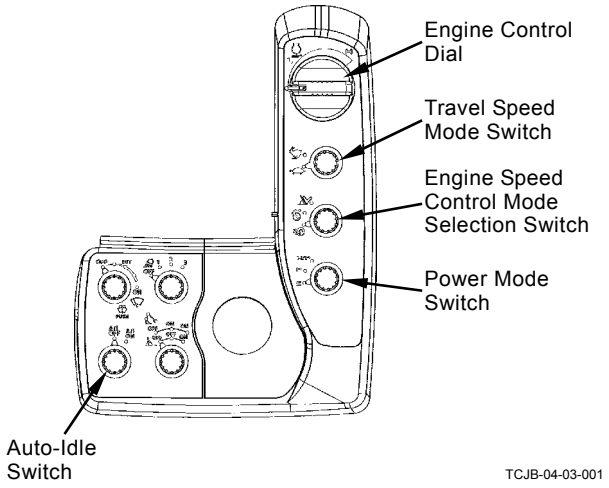
Switch Panel:



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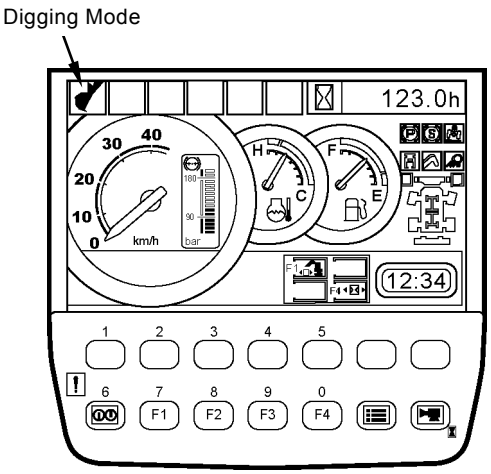
Monitor Unit:



TCJB-05-02-064

SERVICE BRAKE FUNCTION

Summary:

1. Check the performance of hydraulic brake circuit and brake.
2. Brake control function is the safety item. Carry out the performance test of brake certainly.

Preparation:

CAUTION: Set the swing lock lever to the LOCK position while traveling.

1. Adjust pressure of all tires equally.
   Pressure: 700 kPa (7.1 kgf/cm^2, 102 psi)
2. Prepare a dry and paved test track 200 m (656 ft) long (acceleration zone 100 m (328 ft) and test track 100 m (328 ft)). Determine the brake start position.
3. Position the front attachment as illustrated in the operator's manual.
4. Maintain hydraulic oil temperature at 50±5 °C (122±9 °F).

Measurement:

CAUTION: Do not measure travel speed when traveling in reverse. (FNR Switch: F)

1. Measure travel speed in fast idle.
2. Select the following switch positions:

Travel Speed Mode Switch	Engine Speed Control Mode Selection Switch	Accelerator Pedal	Power Mode Switch	Work Mode	Auto-Idle Switch
Fast	Pedal	Max. depressing	P	Digging mode	OFF

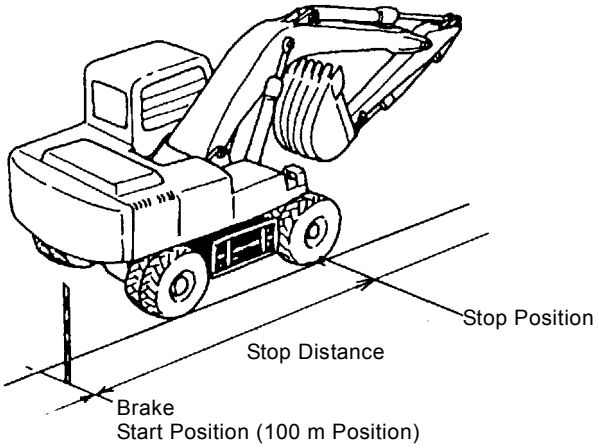
3. Turn the FNR switch to the F (forward) position. Depress the accelerator pedal to full stroke and travel the machine at fast.
4. Depress the brake pedal at the brake start position and stop the machine completely.
5. Measure the distance from the brake start position to the tread of a front tire.
6. Repeat the measurement three times. Calculate the average values.

Evaluation:

Refer to OPERATIONAL PERFORMANCE TEST / Standard in Group T4-2.

Remedy:

Refer to TROUBLESHOOTING / Troubleshooting B in Group T5-7.



T1F3-04-04-004

Measurement:

1. Select the following switch positions:

Engine Control Dial	Power Mode Switch	Work Mode	Auto-Idle Switch	Work Brake
Fast idle	P	Digging mode	OFF	Operable

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

2-1. Boom cylinder:
Operate the boom control lever to full stroke. Measure the time to raise and lower the boom.

2-2. Arm cylinder:
Operate the arm control lever to full stroke. Measure the time to roll in and roll out the arm.

2-3. Bucket cylinder:
Operate the bucket control lever to full stroke. Measure the time to roll in and roll out the bucket.

2-4. Blade cylinder:
Operate the blade control lever to full stroke. Measure the time to raise and lower the blade.

2-5. Outrigger cylinder:
Operate the outrigger control lever to full stroke. Measure the time to raise and lower the outrigger. Measure the time for the cylinders one by one.

3. Repeat the measurement three times. Calculate the average values.

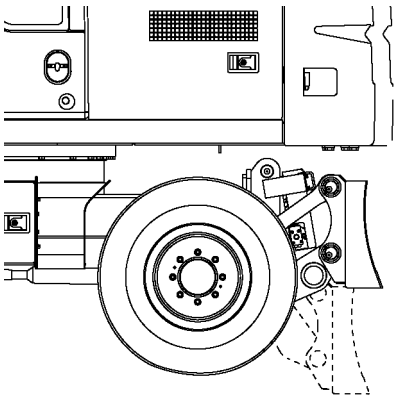
Evaluation:

Refer to OPERATIONAL PERFORMANCE TEST / Standard in Group T4-2.

Remedy:

Refer to TROUBLESHOOTING / Troubleshooting B in Group T5-7.

Blade Cylinder:



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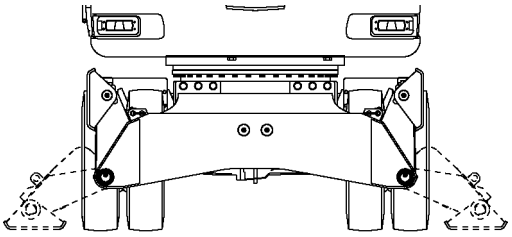
NOTE: The illustration shows the rear blade.

Outrigger Cylinder:



TCJB-04-04-002

NOTE: The illustration shows the rear outrigger.

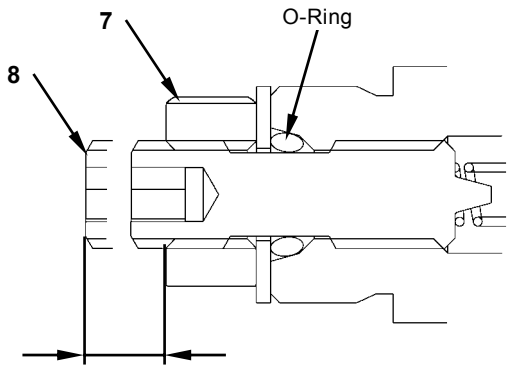
Solenoid Valve Adjustment Procedure

IMPORTANT: As O-ring is damaged and oil leakage may cause, do not loosen adjusting screw (8) excessively.
Do not loosen adjusting screw (8) more than 2 turns.

1. Loosen lock nut (7). Turn adjusting screw (8) and adjust the set pressure.
2. After adjustment, tighten lock nut (7).
   : 10 mm
   : 5 N·m (0.5 kgf·m, 3.7 lbf·ft)
   : 3 mm
3. After adjustment, check the set pressure.

NOTE: Standard Change in Pressure (Reference)

Screw Turns		1/4	1/2	3/4	1
Change in Pressure	kPa	69	137	206	275
	(kgf/cm^2)	(0.7)	(1.4)	(2.1)	(2.8)
	(psi)	(10)	(20)	(30)	(40)



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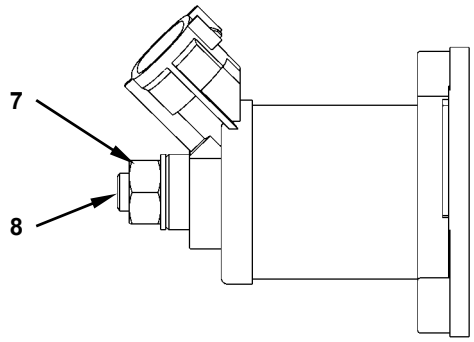

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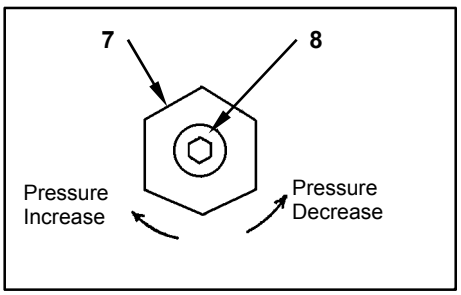


W107-02-05-129

Evaluation:

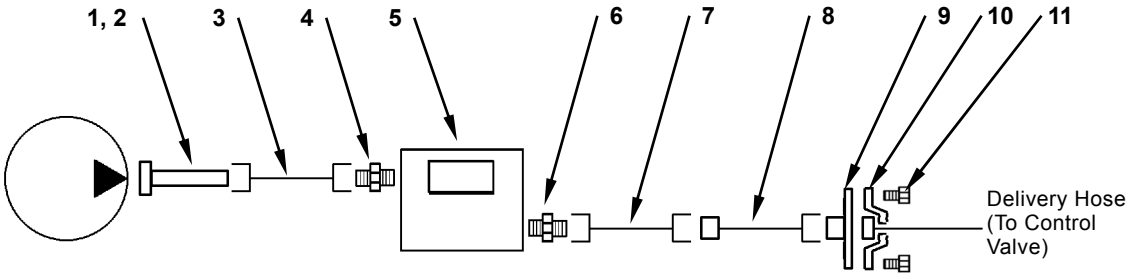
1. Convert the measured flow rates to those at the specified pump speed by using the following formulas:

Qc = Ns×Q/Ne

Qc : Converted Flow Rate
Q : Measured Flow Rate
Ns : Specified Engine Speed: 2200 min^{-1}
Ne : Measured Engine Speed:
Values indicated on Dr. ZX

2. Standard Flow Rate
Refer to OPERATIONAL PERFORMANCE TEST / Standard in Group T4-2.

NOTE: When actually measuring, install pipe (1 or 2) only to the pump to be measured.



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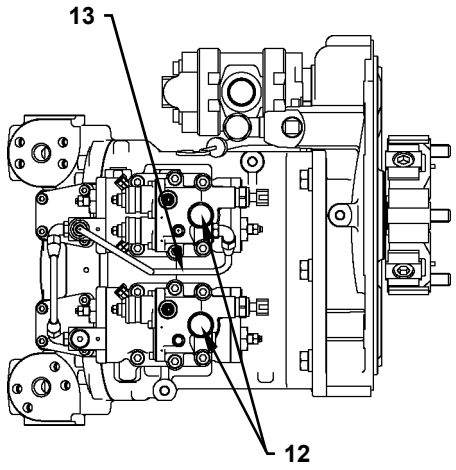

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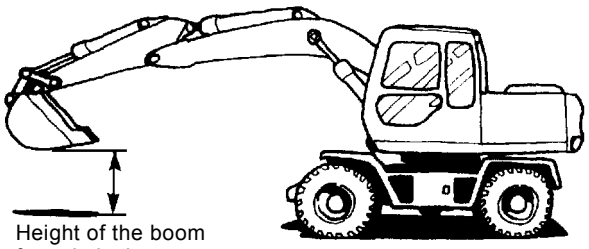
1 - Pipe E (ST 6144)
2 - Pipe B (ST 6143)
3 - Test Hose (ST 6145)
4 - Adapter PF1 × UNF1-7/8 (ST 6146)
5 - Hydraulic Tester (ST 6299)
6 - Adapter PF1 × UNF1-7/8 (ST 6146)
7 - Joint (ST 6330)
8 - Test Hose (ST 6320)
9 - Flange (ST 6118)
10 - Split Flange (ST 6130)
11 - Bolt (ST 6409) (4 Used)
12 - Plug
13 - Pipe

Measurement:

CAUTION: Prevent personal injury. Always make sure that the area is clear and that co-workers are out of the swing area before starting the measurement.
Also, take care not to fall off the machine while the measurement.

- Amount of Oil Drained While Swinging the Upperstructure

1. Fully retract the arm cylinder. Fully extend the bucket cylinder. Hold the boom so that the arm tip pin height is the same as the boom foot pin height. The bucket must be empty.
2. Start the engine. Operate and hold the swing control lever to full stroke. After the swing speed reaches a constant maximum speed, start draining oil measurement when drain oil starts coming out of the drain hose end.
3. Repeat the measurement three times in both clockwise and counterclockwise directions. Calculate the average values.
4. The measuring time should be for more than 45 seconds.



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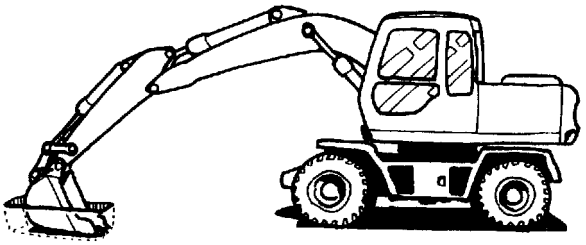
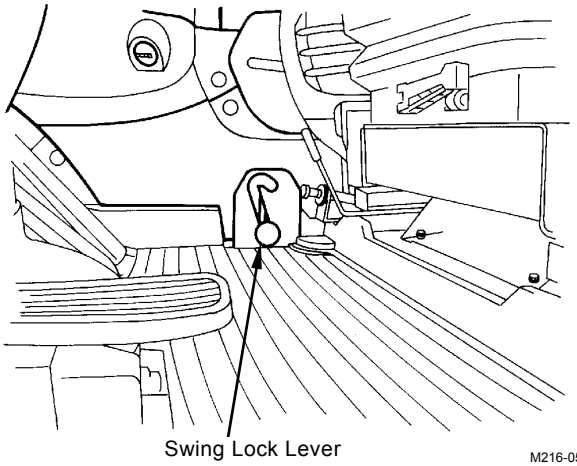


T212-07-04-002

- Amount of Oil Drained While Relieving Swing Motor Circuit

1. Thrust the bucket teeth into the ground so that the upperstructure does not rotate. Set the swing lock lever to the LOCK position so that the upperstructure does not rotate.
2. Start the engine. Operate and hold the swing control lever to full stroke. Start draining oil measurement when drain oil starts coming out of the drain hose end.
3. Repeat the measurement three times in both clockwise and counterclockwise directions. Calculate the average values.
4. The measuring time should be for more than 45 seconds.

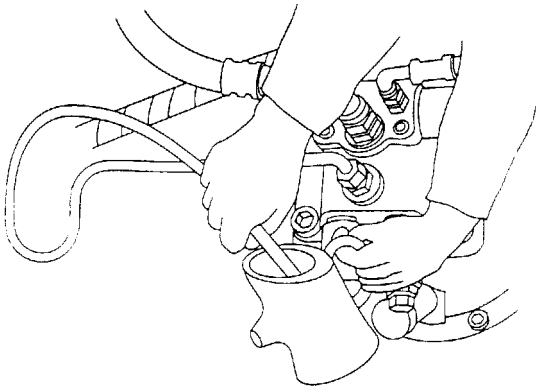


M216-05-004

Evaluation:
Refer to OPERATIONAL PERFORMANCE TEST / Standard in Group T4-2.

∗Conversion of amount of drain oil measured into the per-minute value
First measure amount of drain oil by using a calibrated container. Then, convert the measured drain oil into the per-minute value by using the formula below:

$\Delta Q = 60 \times q / t$
ΔQ : Amount of drain oil per minute (L/min)
t : Measured time (seconds)
q : Total amount of drain oil (L)



T107-06-05-008

Conditions for Measurement

1. Select the following switch positions.

Engine Control Dial	Power Mode Switch	Work Mode	Auto-Idle Switch	FNR Switch	Brake Switch
Fast idle	P	Digging mode	OFF	N	OFF

Measurement:

1. Stop the engine. Turn the key switch to ON position.
2. Set the engine control dial to slow idle.
3. Depress the brake pedal several times and make the warning buzzer sound.
4. Start the engine. Measure the pressure when sounding of the warning buzzer stops. Notice that it is difficult to read the gauge as the pressure increases rapidly.
5. Repeat the measurement three times and calculate the average values.

Evaluation:

Refer to OPERATIONAL PERFORMANCE TEST / Standard in Group T4-2.

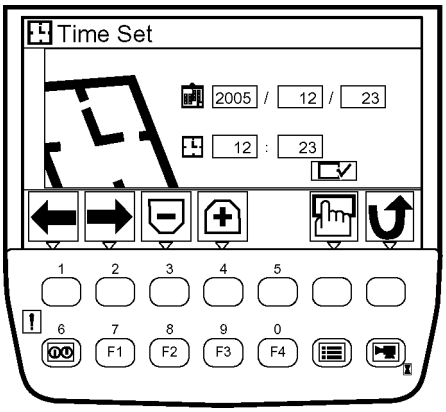
Remedy:

Refer to TROUBLESHOOTING / Troubleshooting B in Group T5-7.

6. Trace possible causes
   Before reaching a conclusion, check the most likely causes again. Try to identify the actual cause of the trouble.
   Based on your conclusion, make a plan for appropriate repairs to avoid consequent malfunctions.

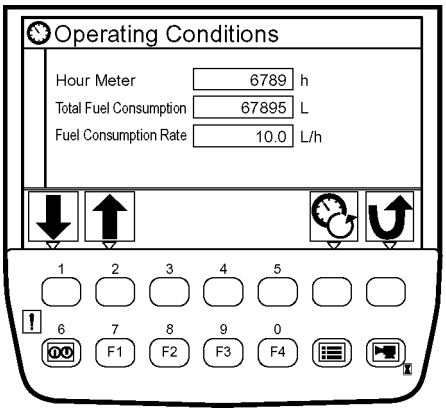
Main Menu

- Time Setting
  Time is set. (Refer to T5-2-29.)



Time Set Screen T1V5-05-01-021

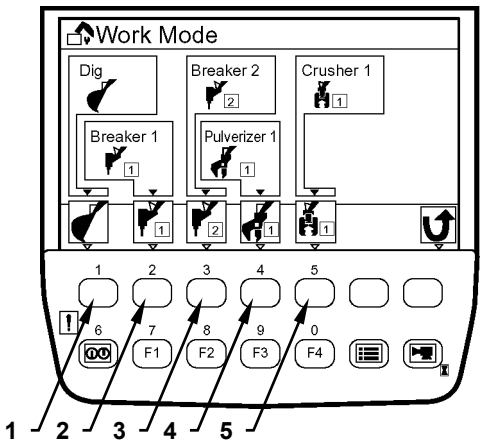
- Operating Conditions
  This screen displays machine operating hour, fuel usage and fuel consumption rate registered by the monitor unit.
  (Refer to T5-2-32.)



Operating Conditions Screen T1V5-05-01-025

- Attachment Selection (Work Mode)
  (Only machines equipped with optional parts)
  Selects digging mode and attachment mode set by Dr. ZX on this screen.
  (Refer to T5-2-40.)

NOTE: In attachment mode, the following four modes are set by default.
1 - Digging
2 - Breaker 1
3 - Breaker 2
4 - Pulverizer 1
5 - Crusher 1



T1V5-05-01-109

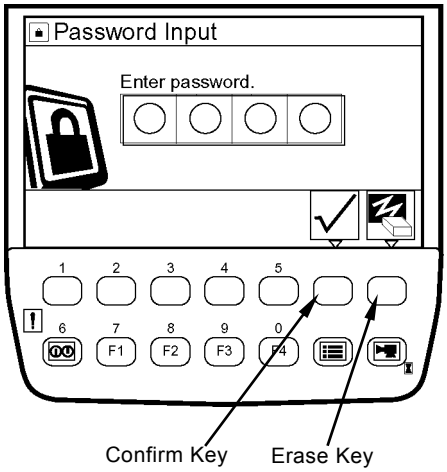
Attachment Selection Screen

NOTE: The items on monitor unit and HITACHI pattern are same.

Monitor Unit	HITACHI pattern
Breaker1	Hydraulic Breaker1
Breaker2	Hydraulic Breaker2
Pulverizer1	Secondary Crusher1
Crusher1	Primary Crusher1

3. Input a password by using the keys located under the screen. If pushing the confirm key, the monitor unit matches the input password to the registered one. If they match, the primary screen appears.

NOTE: When inputting the password again, the entered characters can be erased by pushing the erase key.



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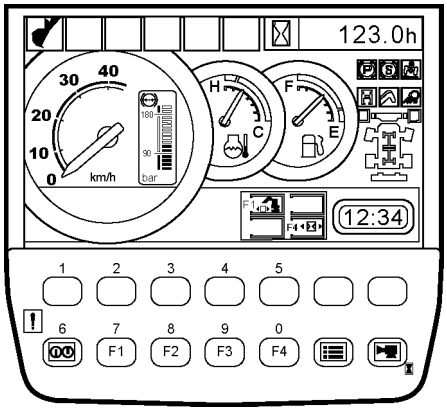
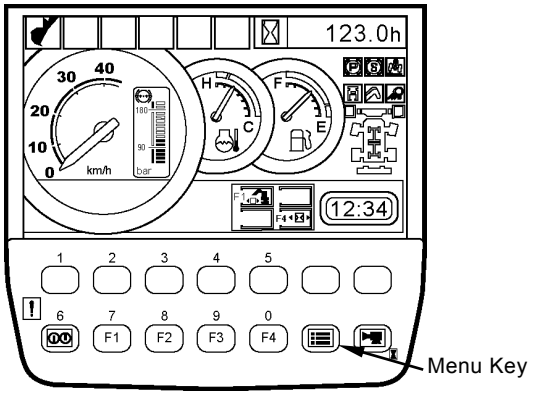


Primary Screen

TCJB-05-02-064

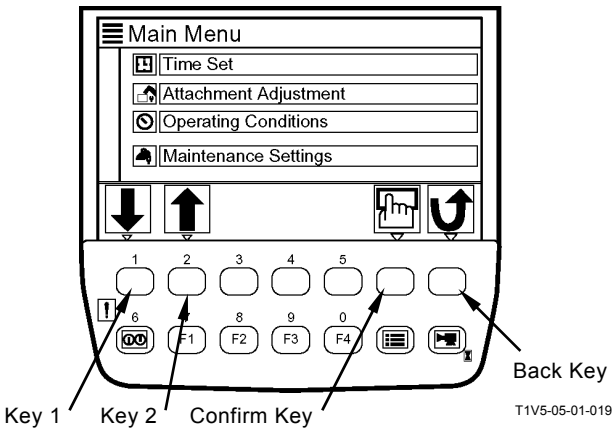
TIME SETTING

1. When the primary screen appears, push the menu key and display main menu.



Primary Screen TCJB-05-02-064

2. Select time set from main menu by using keys 1 and 2. Push the confirm key. Then, the time setup screen appears.



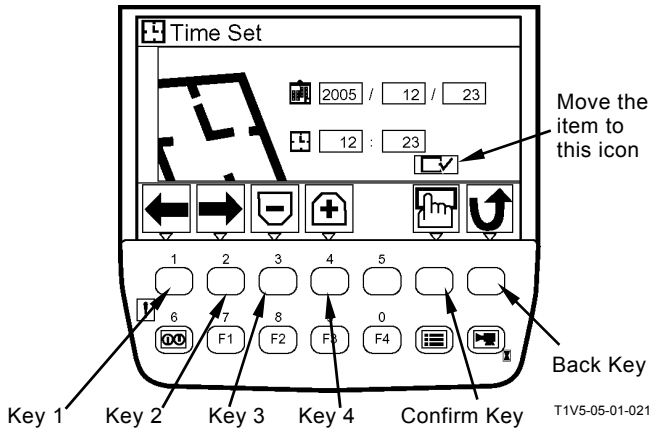
T1V5-05-01-019

3. On the time setup screen, select the items to be set (Year, Month, Day and Time) by using keys 1 and 2 and set the figures by using keys 3 and 4.

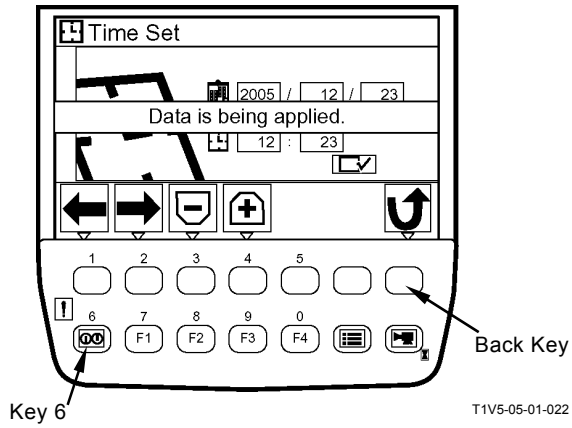
4. By using key 2, move the item to . Push the confirm key. Then, system time is updated with the values specified on the screen.

NOTE: When pushing the back key, return to the previous screen.

5. Push key 6, and return to the primary screen.



T1V5-05-01-021



T1V5-05-01-022

- When more than two items are displayed

1. If the key switch is turned to the ON position, the primary screen appears. At this time, if maintenance is required, the primary screen gives notice of the maintenance item. In three seconds, the maintenance information display screen is displayed automatically.
   (In the right example, Hydraulic Oil is displayed.)

NOTE: As for a machine which the primary screen is displayed according to a password on, after the password is input successfully and the confirm key is pushed. And then the primary screen appears.

2. If data is reset, while the scheduled maintenance screen is displayed, select the required item by using keys 1 and 2. Push the confirm key. Then, the maintenance information display screen for the selected item appears.
   (In the right example, Hydraulic Oil is selected.)

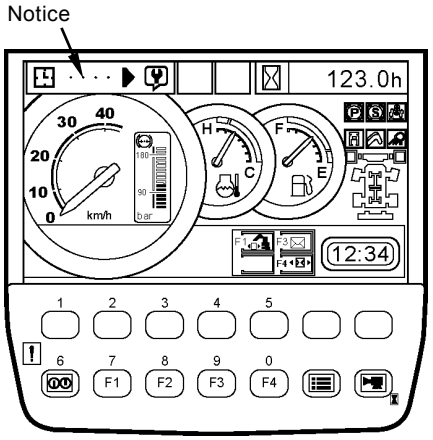
NOTE: When pushing the back key while the scheduled maintenance screen is displayed, the primary screen appears.

3. Push the reset key while the maintenance information display screen is displayed.
   The message “Reset Data. OK?” appears. Then, push the confirm key.
   The value of remaining hours is reset to that of change interval. The previous change date/hour is updated with current date and time.

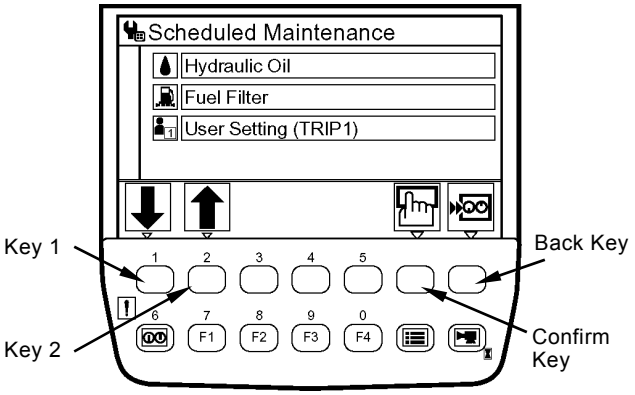
NOTE: When pushing the back key while the maintenance information display screen is displayed, return to the scheduled maintenance screen.

NOTE: When pushing the back key while the reset screen is displayed, return to the maintenance information display screen.

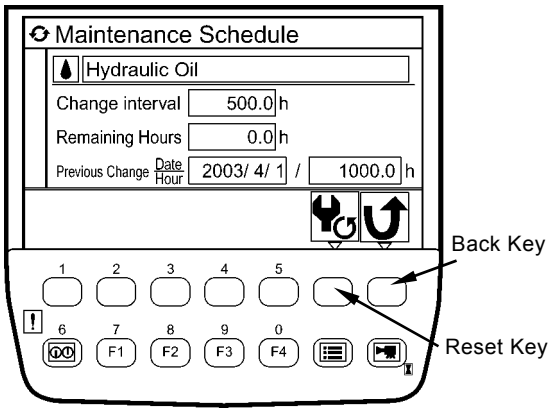
4. After the maintenance information display screen is displayed for ten seconds, the primary screen is displayed.



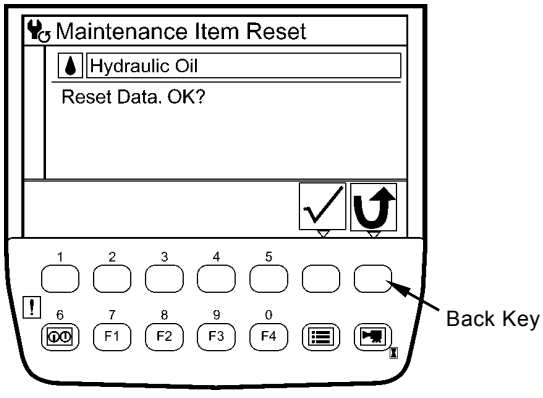
Primary Screen TCJB-05-02-055



Scheduled Maintenance Screen T1V5-05-01-169

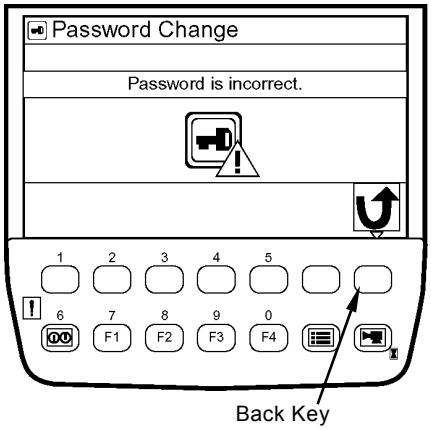


Maintenance Information Display Screen TCHB-05-02-011



Reset Screen T1V5-05-01-171

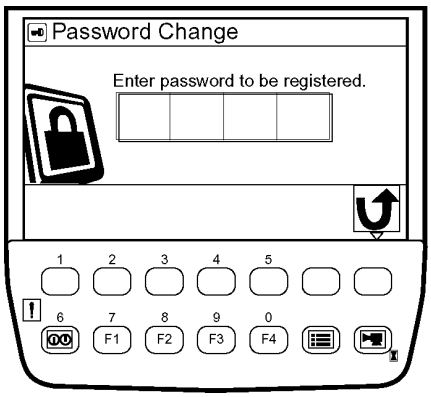
NOTE: If inputting an incorrect password after pushing the confirm key, the message "Password is incorrect." appears.
Push the back key and go back to the previous screen. Input the password again.



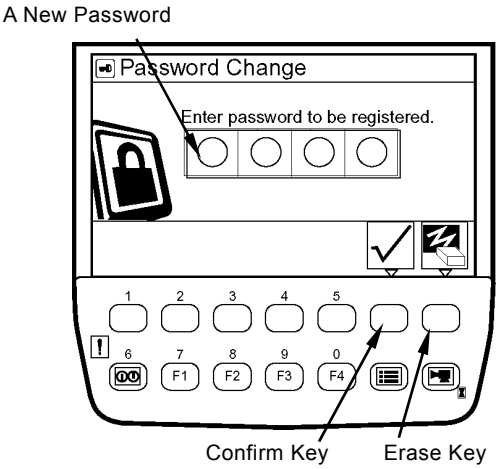
T1V5-05-01-044

5. The message "Enter password to be registered." appears. Then, input a new password with three or four digits and push the confirm key.

6. If inputting the password again, push the erase key.



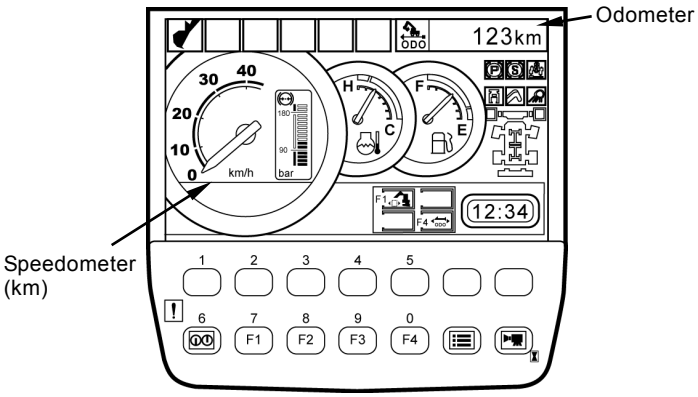
T1V5-05-01-130



T1V5-05-01-131

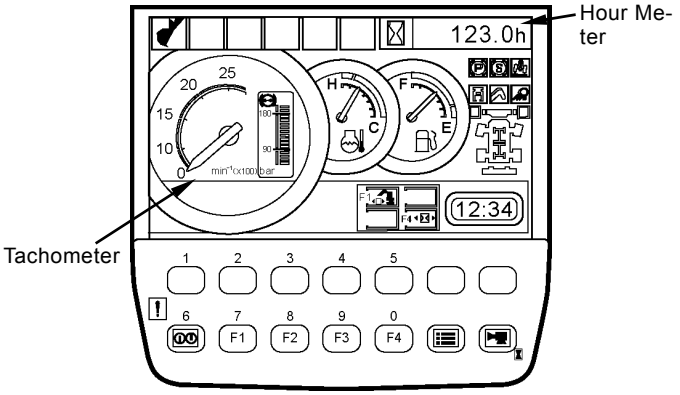
NOTE: Examples of combination

- When selecting km (speedometer) and odometer



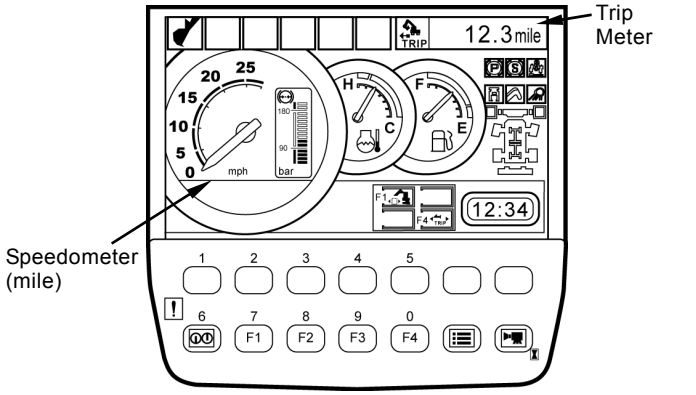
TCJB-05-02-069

- When selecting min^{-1} (tachometer) and hour meter



TCJB-05-02-065

- When selecting mph (speedometer) and trip meter
  (Unit: When selecting mile)



TCJB-05-02-070

Items	Units	Remarks
Speed	km/h	Although mile is selected from main menu, travel speed (km/h) is displayed.
Travel Motor Over Speed	(Count)	
Brake Pressure	MPa	
Emergency Stop	OFF/ON	
Attachment1/Positioning1 Signal	V	
Attachment2/Positioning2 Signal	V	
Blade1/Outrigger1 Signal	V	
Blade2/Outrigger2 Signal	V	
Assist1 Signal	V	
Assist2 Signal	V	
Assist3 Signal	V	
Assist4 Signal	V	
Hydraulic Oil Temperature (Pilot)	°C	Signal from pilot hydraulic oil temperature sensor
Assist1 Proportional Valve	MPa	
Assist2 Proportional Valve	MPa	
Positioning1 Proportional Valve	MPa	
Positioning2 Proportional Valve	MPa	
Blade1/Outrigger1 Proportional Valve	MPa	
Blade2/Outrigger2 Proportional Valve	MPa	
Assist1 Proportional Valve	MPa	
Assist2 Proportional Valve	MPa	
Assist3 Proportional Valve	MPa	“-” is displayed as default.
Assist4 Proportional Valve	MPa	“-” is displayed as default.

Function	Item		Setting Function		Default
			Monitor Unit	Dr.ZX	
Maintenance Setting	Air Conditioner Filter	Maintenance display items ON/OFF	×	○(Monitor Controller)	ON
		Notification function Enable/Disable	○	○(Monitor Controller)	Enable
		Change interval	×	×	3000 hours
		Remaining hours data reset	○	×	—
		Previous change Date/Hour Meter check	○	×	—
	User Setting (TRIP 1)	Maintenance display items ON/OFF	×	×	ON
		Notification function Enable/Disable	○	×	Disable
		Change interval	○	×	5000 hours
		Remaining hours data reset	×	×	—
		Previous change Date/Hour Meter check	○	×	—
Optional Function	Work mode function Set/Unset		×	○(Monitor Controller)	Set
	Mail function Set/Unset		×	○(Monitor Controller)	Unset
	Send the mail		○	×	—
Overload Alarm	Overload alarm Enable/Disable		×	○(Monitor Controller)	Disable
Back Monitor Setting	Back monitor function Enable/Disable		×	○(Monitor Controller)	Enable
	Auto-display/no auto-display of camera image during travel reverse operation (auto-control)		○	×	No auto display
	Back monitor display Normal/Flip Vertical		×	○(Monitor Controller)	Normal
	Selection of NTSC/PAL (image method)		×	○(Monitor Controller)	NTSC
Meter Setting	Meter setup function Enable/Disable		×	○(Monitor Controller)	Enable
	Meter combination setting change		○	×	Speedometer + Hour Meter
Unit Setting	Unit setup function Enable/Disable		×	○(Monitor Controller)	Enable
	Unit Change		○	×	km
Language Setting	Select language		○	×	English
	Register/delete language		×	×	—
	Registered language check		○	×	—
Trouble-shooting	Check alarms while trouble occurs		○	○(Troubleshooting)	—
	Check alarms which occurred		×	○(Troubleshooting)	—
	Clear fault code (Retry B)		×	○(Troubleshooting)	—
Monitoring	Item order change		○	×	—
	Reset item order to default		○	×	—
Blade / Out-rigger Setting	Blade/Outrigger setting change		○	×	1/12

Item		Unit	Data
Selecting	Monitoring		
Swing Parking Release FB	Swing Parking FB	mA	Feedback from swing parking brake release solenoid valve output
Att 1 P/S/V FB	Att 1 P/S/V FB	mA	Feedback from auxiliary solenoid valve output
Att 2 P/S/V FB	Att 2 P/S/V FB	mA	Feedback from auxiliary solenoid valve output
Blade 1/Outrigger 1 P/S/V FB	BL1/OR1 P/V FB	mA	Feedback from blade/outrigger solenoid valve output
Blade 2/Outrigger 2 P/S/V FB	BL2/OR2 P/V FB	mA	Feedback from blade/outrigger solenoid valve output
Positioning 1 P/S/V FB	Posn 1 P/V FB	mA	Feedback from positioning solenoid valve output
Positioning 2 P/S/V FB	Posn 2 P/V FB	mA	Feedback from positioning solenoid valve output
Att SW 1 P/S/V FB	Att SW 1 P/V FB	mA	Feedback from attachment solenoid valve output
Att SW 2 P/S/V FB	Att SW 2 P/V FB	mA	Feedback from attachment solenoid valve output
Att SW 3 P/S/V FB	Att SW 3 P/V FB	mA	Feedback from attachment solenoid valve output
Att SW 4 P/S/V FB	Att SW 4 P/V FB	mA	Feedback from attachment solenoid valve output
Outrigger Control	Outrigger Control	ON, OFF	Outrigger main relay 2 ON/OFF selection status
Valve Selector	Valve Selector	ON, OFF	Selector valve control solenoid valve ON/OFF selection status
2nd Relief Selector	2nd Relief Selector	ON, OFF	Secondary pilot relief pressure control solenoid valve ON/OFF selection status
Acc Change	Acc Change	ON, OFF	Accumulator control solenoid valve ON/OFF selection status
Electric Lever Pilot Cut	Electric Lever Pilot Cut	ON, OFF	Outrigger selection switch (pilot cut) ON/OFF selection status
Load Alarm On/Off SW	Load Alarm On/Off SW	ON, OFF	Overload alarm switch ON/OFF selection status

Adjustment List

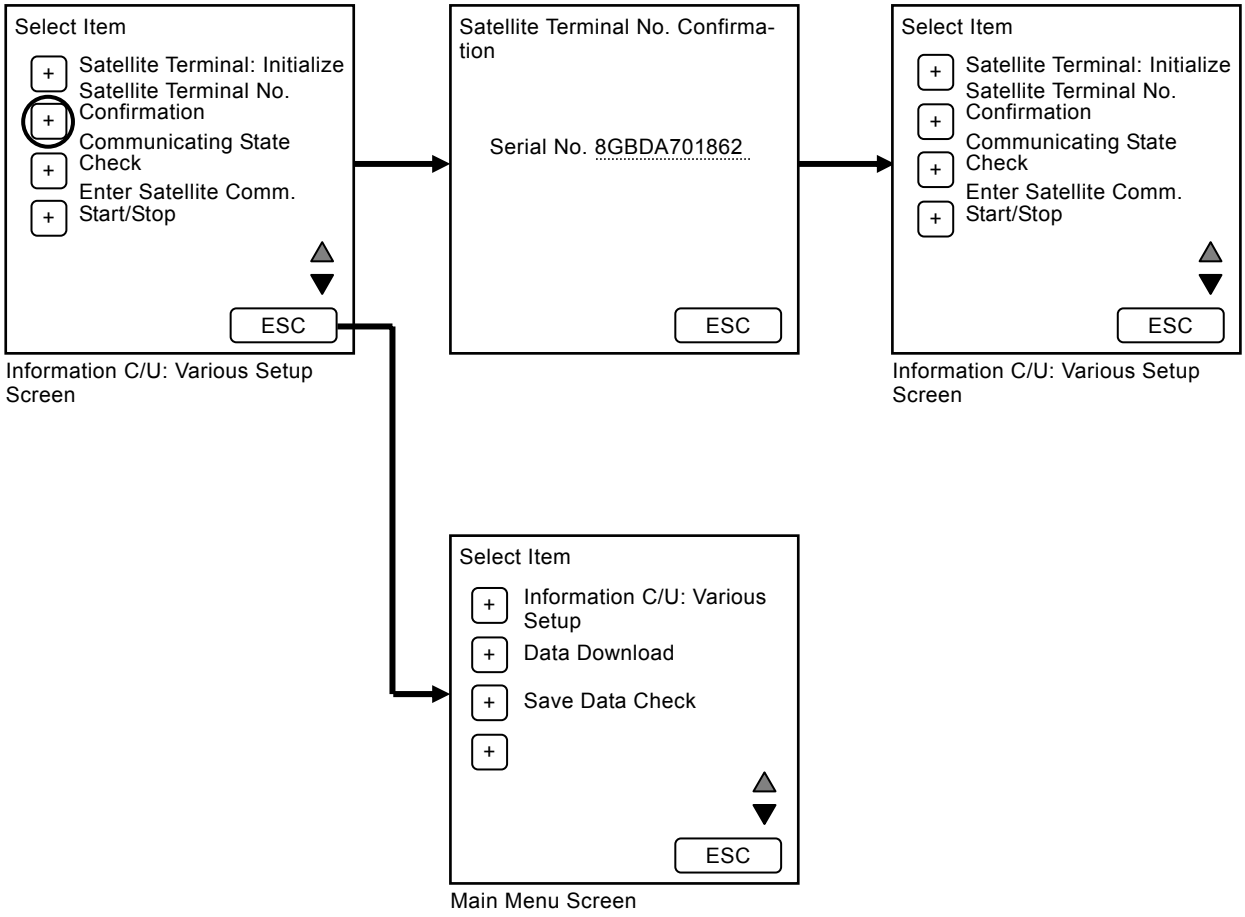
Item	Unit	Minimum Adjustment	Adjustable Range	Initial Value
Att Ope 1 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Att Ope 2 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Blade/OR Ope 1 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Blade/OR Ope 2 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Att SW Ope 1 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Att SW Ope 2 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Att SW Ope 3 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Att SW Ope 4 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Positioning Ope 1 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Positioning Ope 2 P/S/V Adjustment	MPa	0.0196	-0.5 to 0.5	0
Attachment Function	Enable/Disable	-	-	Disable
Outrigger/Blade Function	Enable/Disable	-	-	Enable
Positioning Function	Enable/Disable	-	-	Enable
Att SW Function (Proportional SW)	Enable/Disable	-	-	Disable
Att SW Function	Enable/Disable	-	-	Disable
Aux Assignment (Proportional SW)	0, 1, 2, 3, 4	-	-	0 (Disable)
Load Alarm Min Bottom Pressure	kgf/cm^2	2	-100 to 170	0
Pressure Alarm Dtrmn Empty Load	kgf/cm^2	2	0 to 100	80

(Blank)

1.7 Satellite Terminal Serial No. Check

Push Satellite Terminal No. Confirmation.
Push ESC and return to Main Menu Screen.

Confirm serial No. (12 digits). Push ESC and return to Information C/U: Various Setup Screen.



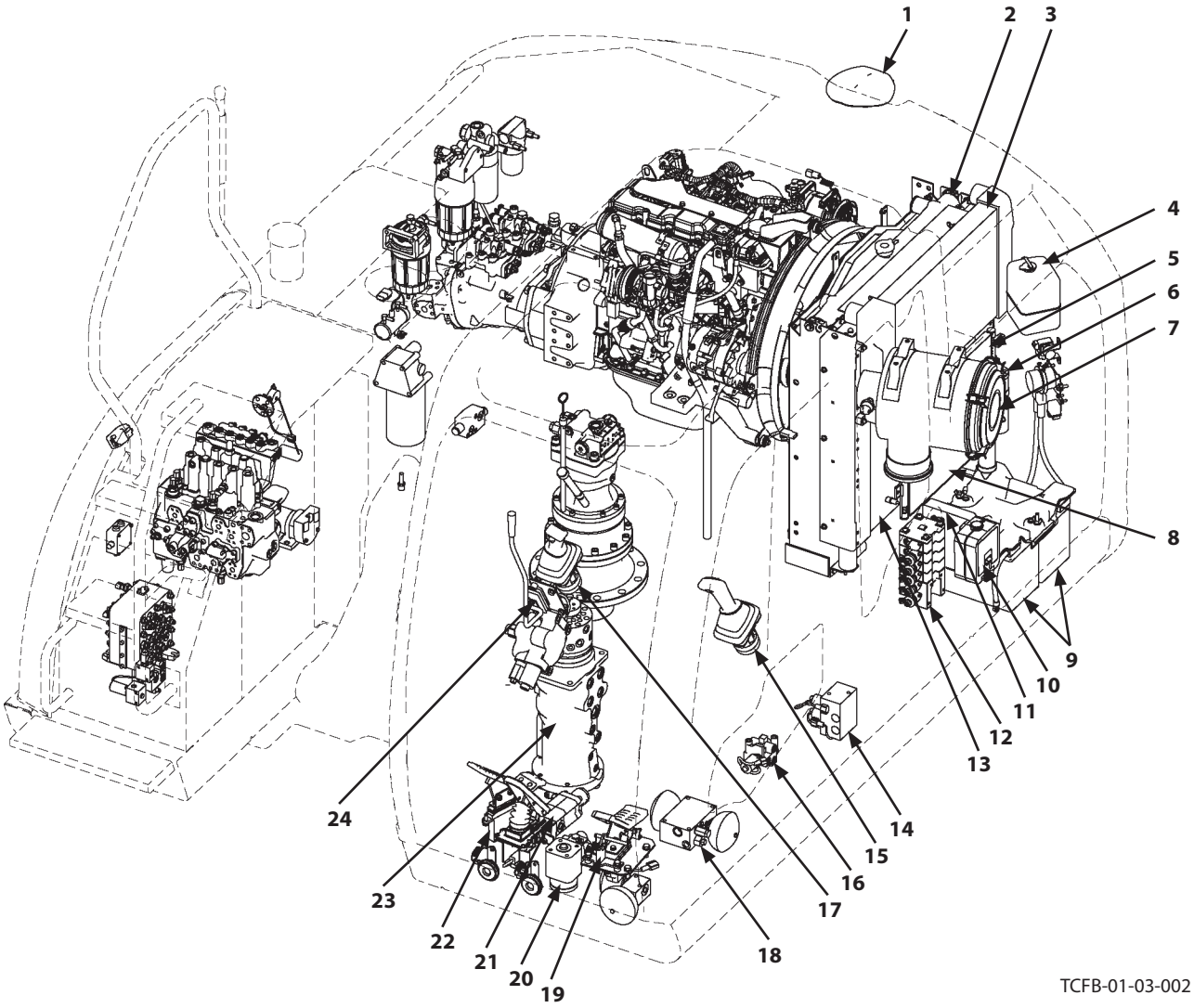
Information C/U: Various Setup Screen

Information C/U: Various Setup Screen

Main Menu Screen

Main Component Layout

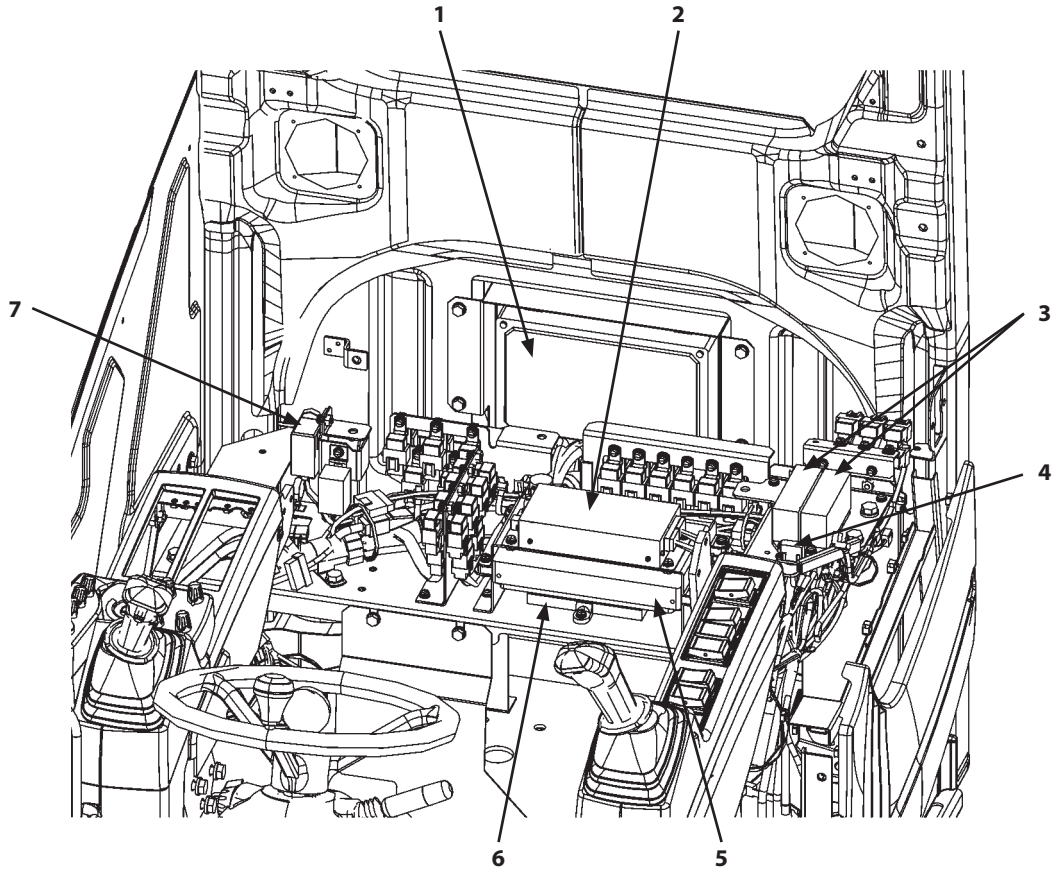
Upperstructure (1)



TCFB-01-03-002

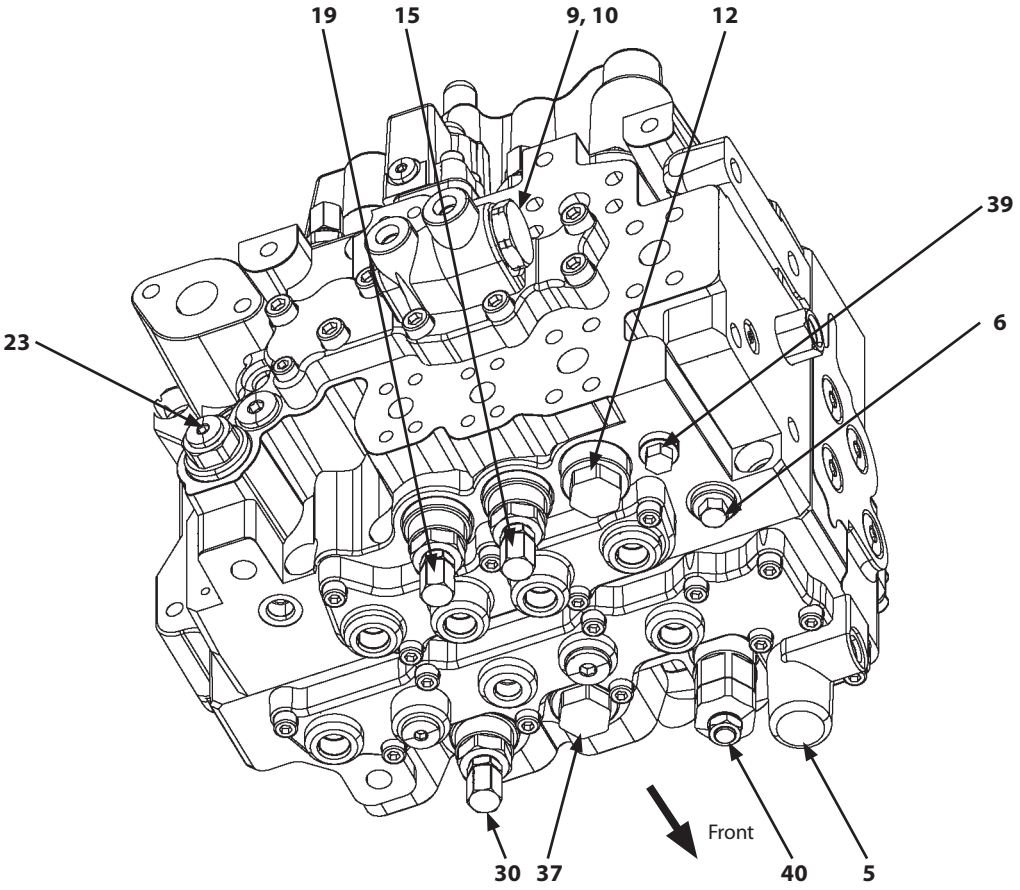
1- Rear Camera
2- Radiator
3- Inter Cooler
4- Reserve Tank
5- Air Conditioner Condenser
6- Receiver Drier
7- Air Cleaner
8- Fuel Cooler
9- Battery
10- Washer Tank
11- ECM (Engine Controller)
12- Solenoid Valve Unit (For Electric Lever)
13- Oil Cooler
14- Travel Shockless Valve
15- Pilot Valve (Left)
16- Pilot Shut-Off Solenoid Valve
17- Pilot Valve (Right)
18- Accumulator Charging Valve
19- Auxiliary / Positioning Electric Lever
20- Steering Valve
21- Brake Valve
22- Travel Pilot Valve
23- Center Joint
24- Blade / Outrigger Electric Lever

Electrical System (Controllers and Relays)



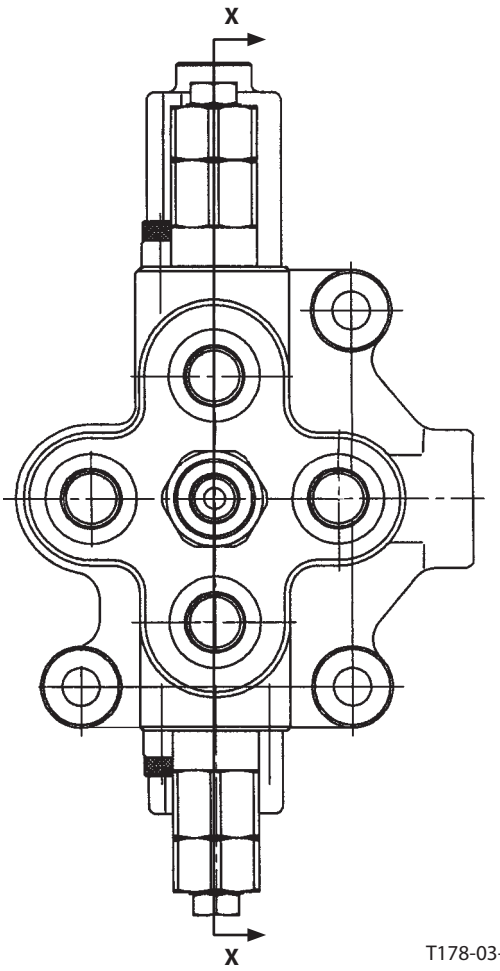
TCJB-01-02-015

1- MC (Main Controller)
2- Satellite Communication Terminal (Optional)
3- Fuse Box
4- Dr.ZX Connector (Use as Download Connector)
5- Option Controller
6- ICF (Information Controller)
7- Flasher



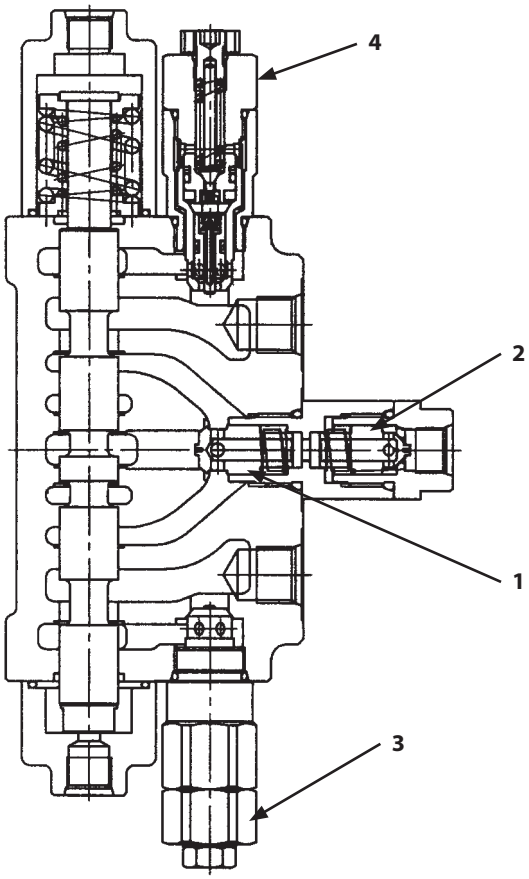
T16W-03-03-031

1- Load Check Valve (Blade/ Outrigger Tandem Circuit)
2- Load Check Valve (Blade/ Outrigger Parallel Circuit)
3- Check Valve (Main Relief Circuit)
4- Main Relief Valve
5- Auxiliary Flow Combiner Valve
6- Check Valve (Auxiliary Flow Combiner Circuit)
7- Check Valve (Main Relief Circuit)
8- Check Valve (Flow Combiner Circuit)
9- Bucket Flow Rate Control Valve (Selector Valve)
10- Bucket Flow Rate Control Valve (Poppet Valve)
11- Make-Up Valve (Travel Reverse Side)
12- Make-Up Valve (Travel Forward Side)
13- Bucket Regenerative Circuit
14- Overload Relief Valve (Bucket Rod Side)
15- Overload Relief Valve (Bucket Bottom Side)
16- Load Check Valve (Boom 1 Parallel Circuit)
17- Boom Regenerative Circuit
18- Overload Relief Valve (Boom Bottom Side)
19- Overload Relief Valve (Boom Rod Side)
20- Boom Anti-Drift Valve (Check Valve)
21- Boom Anti-Drift Valve (Selector Valve)
22- Load Check Valve (Arm 2 Tandem Circuit)
23- Bypass Shut-Out Valve
24- Check Valve (Orifice) (Arm 2 Parallel Circuit)
25- Load Check Valve (Arm 1 Parallel Circuit)
26- Load Check Valve (Arm 1 Tandem Circuit)
27- Load Check Valve (Swing Circuit)
28- Arm Regenerative Valve (Selector Valve)
29- Arm Regenerative Circuit
30- Overload Relief Valve (Arm Bottom Side)
31- Overload Relief Valve (Arm Rod Side)
32- Arm Anti-Drift Valve (Check Valve)
33- Arm Anti-Drift Valve (Selector Valve)
34- Load Check Valve (Boom 2 Parallel Circuit)
35- Aux. Flow Rate Control Valve (Poppet Valve)
36- Aux. Flow Rate Control Valve (Selector Valve)
37- Overload Relief Valve (Auxiliary)
38- Overload Relief Valve (Auxiliary)
39- Load Check Valve (Bucket Parallel Circuit)
40- Overload Relief Valve (Blade/ Outrigger Rod Side)
41- Overload Relief Valve (Blade/ Outrigger Bottom Side)



T178-03-03-070

Cross Section X-X



T198-03-03-003

1- Load Check Valve (Positioning Parallel Circuit)
2- Load Check Valve (Positioning Tandem Circuit)
3- Overload Relief Valve (Positioning: Bottom Side)
4- Overload Relief Valve (Positioning: Rod Side)

Symptoms in Machine Operation When Trouble Occurs.	Remedy by Dr. ZX	Remedy
• Combined operation of arm roll-in and boom raise or combined operation of arm-roll-in and swing: Arm speed is slow. • Single operation of boom raise: Lifting force is weak.	Retrial B	• Check the harness. • Replace the pump 1 delivery pressure sensor.
• Combined operation of arm roll-in and boom raise or combined operation of arm-roll-in and swing: Arm speed is slow. • Single operation of boom raise: Lifting force is weak.	Retrial B	• Check the harness. • Replace the pump 1 delivery pressure sensor.
• Combined operation of arm roll-in and boom raise or combined operation of arm-roll-in and swing: Arm speed is slow.	Retrial B	• Check the harness. • Replace the pump 2 delivery pressure sensor.
• Combined operation of arm roll-in and boom raise or combined operation of arm-roll-in and swing: Arm speed is slow.	Retrial B	• Check the harness. • Replace the pump 2 delivery pressure sensor.
• The steering pump torque decrease control is inactive.	Retrial B	• Check the harness. • Replace the steering pump delivery pressure sensor.
• The steering pump torque decrease control is inactive.	Retrial B	• Check the harness. • Replace the steering pump delivery pressure sensor.
• Although speed normally returns to P speed when lever is operated in E mode, speed stays at P speed in this failure.	Retrial B	• Check the harness. • Replace the pump 1 control pressure sensor.
• Although speed normally returns to P speed when lever is operated in E mode, speed stays at P speed in this failure.	Retrial B	• Check the harness. • Replace the pump 1 control pressure sensor.
• Although speed normally returns to P speed when lever is operated in E mode, speed stays at P speed in this failure.	Retrial B	• Check the harness. • Replace the pump 2 control pressure sensor.
• Although speed normally returns to P speed when lever is operated in E mode, speed stays at P speed in this failure.	Retrial B	• Check the harness. • Replace the pump 2 control pressure sensor.

Symptoms in Machine Operation When Trouble Occurs.	Remedy by Dr. ZX	Remedy
In case the attachment flow rate is limited, it cannot be limited.	Retrial B	・Check the harness.
Operation during abnormal high current: ・Travel mistakes. ・Boom raise operation is slow. ・Arm operation is slow. ・Swing operation is slow.	Retrial B	・Check the harness.
Operation during abnormal low current: ・In case the attachment flow rate is limited, it cannot be limited.	Retrial B	・Check the harness.
In case the attachment flow rate is limited, it cannot be limited.	Retrial B	・Check the harness.
Operation during abnormal high current: ・Travel mistakes. ・Boom raise operation is slow. ・Arm operation is slow. ・Swing operation is slow.	Retrial B	・Check the harness.
Operation during abnormal low current: ・In case the attachment flow rate is limited, it cannot be limited.	Retrial B	・Check the harness.
In case the attachment flow rate is limited, it cannot be limited.	Retrial B	・Check the harness.
Operation during abnormal high current: ・Travel mistakes. ・Boom raise operation is slow. ・Arm operation is slow. ・Swing operation is slow.	Retrial B	・Check the harness.
Operation during abnormal low current: ・In case the attachment flow rate is limited, it cannot be limited.	Retrial B	・Check the harness.

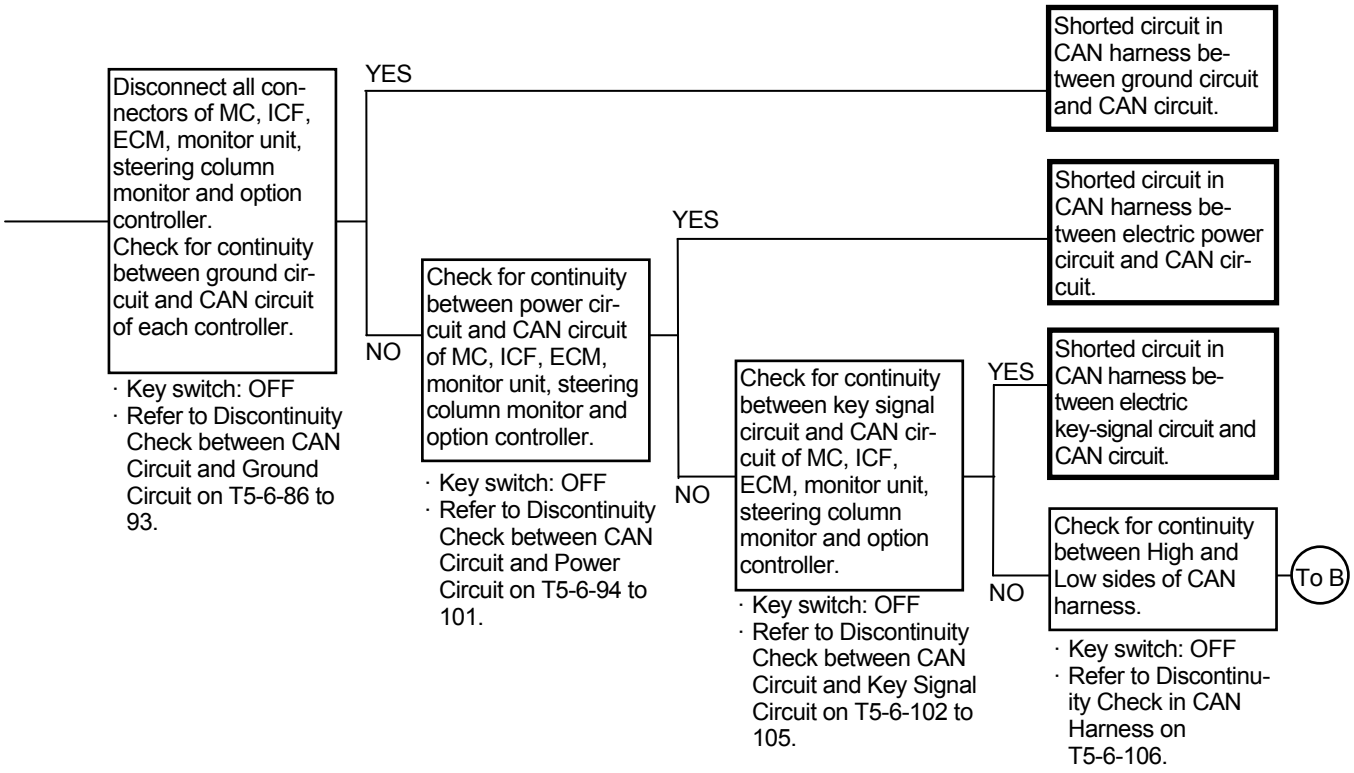
Presumptive Symptoms in Real Machine Operation	Assumptive Conditions at Backup	Fault Code (Tech 2)
• While the engine runs, there is nothing abnormal with machine operation. • After the engine is stalled, the re-start is impossible.	While the engine runs, operate according to standard of the crank sensor. When the engine stops, the start is impossible (in order to prevent the engine from damaging).	P0340 P0341
• The output power may decrease, white smoke may occur and vibration may occur. • The engine may be stalled. (If the cam senor is normal, the engine can re-start.)	Operate according to standard of the cam sensor.	P0335 P0336
• While the engine runs, there is nothing abnormal with machine operation. • After the engine is stalled, the re-start is impossible.	The timing chain and the belt does not turn smoothly but turn in reverse.	P1345
Nothing special	When starting: -10 °C (14 °F) (Start the engine although what state.) When operating: 25 °C (77 °F) (Operate normally.)	P0113 P0112
Normal temperature: When starting, dark smoke may occur and engine combustion sound may be become loud. While warming up with fresh air in low temperature: Rough idle, engine stall or while smoke may be occur.	When starting: -20 °C (-4 °F) (Start the engine although what state.) When operating: 80 °C (176 °F) (Operate normally.)	P0118 P0117
Dark smoke occurs.	Boost pressure cannot be corrected.	P0238 P0237
There is influence to exhaust gas.	As the sensor input is not certain, it cannot be controlled. Exhaust gas becomes bad. Operate the engine with EGR valve fully open.	P0487
Dark smoke occurs at high altitude.	Atmospheric pressure 80 kPa (0.8 kgf/cm^2, 12 psi) (2000 m above the sea)	P0108 P0107
Nothing special.	When starting: -20 °C (-4 °F) (Start the engine although what state.) When operating: 70 °C (158 °F) (Operate normally.)	P0183 P0182

(Blank)

Presumptive Symptoms in Real Machine Operation	Assumptive Conditions at Backup	Fault code (Tech2)
The engine runs at idle speed.	CAN communication is impossible.	U2104
		U2106

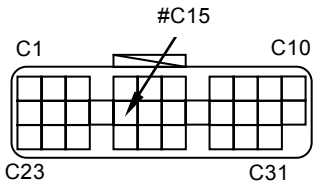
Symptoms in Machine Operation When Trouble Occurs.	Remedy by Dr. ZX	Remedy
• All proportional solenoid valve outputs stop by shutting off pilot pressure. • Display "Abnormal electric lever solenoid valve output warning" on the monitor unit. • Buzzer (continuous sound) sounds.	Retrial B	Check the harness.
• All proportional solenoid valve outputs stop by shutting off pilot pressure. • Display "Abnormal electric lever solenoid valve output warning" on the monitor unit. • Buzzer (continuous sound) sounds.	Retrial B	Check the harness.
• All proportional solenoid valve outputs stop by shutting off pilot pressure. • Display "Abnormal electric lever solenoid valve output warning" on the monitor unit. • Buzzer (continuous sound) sounds.	Retrial B	Check the harness.
• All proportional solenoid valve outputs stop by shutting off pilot pressure. • Display "Abnormal electric lever solenoid valve output warning" on the monitor unit. • Buzzer (continuous sound) sounds.	Retrial B	Check the harness.
• If outrigger/blade stroke 2 is neutral, outrigger/blade operation stops. • If outrigger/blade stroke 2 is not neutral, outrigger/blade operation is active with pressure decreasing by 40%. • Display "Abnormal outrigger/blade operation signal warning" on the monitor unit. • Buzzer (intermittent sound) sounds.	Retrial B	Check the harness.
• If outrigger/blade stroke 2 is neutral, outrigger/blade operation stops. • If outrigger/blade stroke 2 is not neutral, outrigger/blade operation is active with pressure decreasing by 40%. • Display "Abnormal outrigger/blade operation signal warning" on the monitor unit. • Buzzer (intermittent sound) sounds.	Retrial B	Check the harness.
• If outrigger/blade stroke 1 is neutral, outrigger/blade operation stops. • If outrigger/blade stroke 1 is not neutral, outrigger/blade operation is active with pressure decreasing by 40%. • Display "Abnormal outrigger/blade operation signal warning" on the monitor unit. • Buzzer (intermittent sound) sounds.	Retrial B	Check the harness.
• If outrigger/blade stroke 1 is neutral, outrigger/blade operation stops. • If outrigger/blade stroke 1 is not neutral, outrigger/blade operation is active with pressure decreasing by 40%. • Display "Abnormal outrigger/blade operation signal warning" on the monitor unit. • Buzzer (intermittent sound) sounds.	Retrial B	Check the harness.

Symptoms in Machine Operation When Trouble Occurs.	Remedy by Dr. ZX	Remedy
Positioning operation stops.	Retrial B	Check the harness.
Positioning operation stops.	Retrial B	Check the harness.
Positioning operation stops.	Retrial B	Check the harness.
Positioning operation stops.	Retrial B	Check the harness.
Positioning operation stops.	Retrial B	Check the harness.
Positioning operation stops.	Retrial B	Check the harness.

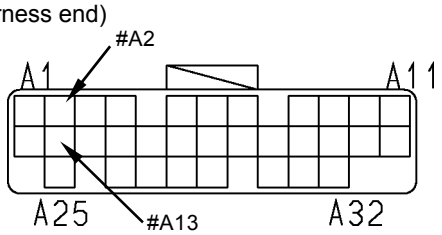

Disconnect all connectors of MC, ICF, ECM, monitor unit, steering column monitor and option controller.
Check for continuity between ground circuit and CAN circuit of each controller.
· Key switch: OFF
· Refer to Discontinuity Check between CAN Circuit and Ground Circuit on T5-6-86 to 93.
YES
Shorted circuit in CAN harness between ground circuit and CAN circuit.
NO
Check for continuity between power circuit and CAN circuit of MC, ICF, ECM, monitor unit, steering column monitor and option controller.
· Key switch: OFF
· Refer to Discontinuity Check between CAN Circuit and Power Circuit on T5-6-94 to 101.
YES
Shorted circuit in CAN harness between electric power circuit and CAN circuit.
NO
Check for continuity between key signal circuit and CAN circuit of MC, ICF, ECM, monitor unit, steering column monitor and option controller.
· Key switch: OFF
· Refer to Discontinuity Check between CAN Circuit and Key Signal Circuit on T5-6-102 to 105.
YES
Shorted circuit in CAN harness between electric key-signal circuit and CAN circuit.
NO
Check for continuity between High and Low sides of CAN harness.
· Key switch: OFF
· Refer to Discontinuity Check in CAN Harness on T5-6-106.
To B

- MC
  Between CAN Circuit (Low Side) and Ground Circuit
  - Check for continuity between terminal #C15 (harness end) of connector MC-C and terminal #A2 (harness end) of connector MC-A.
  - Check for continuity between terminal #C15 (harness end) of connector MC-C and terminal #A13 (harness end) of connector MC-A.
  - Check for continuity between terminal #C15 (harness end) of connector MC-C and terminal #B8 (harness end) of connector MC-B.
  - Check for continuity between terminal #C15 (harness end) of connector MC-C and terminal #B18 (harness end) of connector MC-B.

Connector
Connector MC-C
(Harness end)

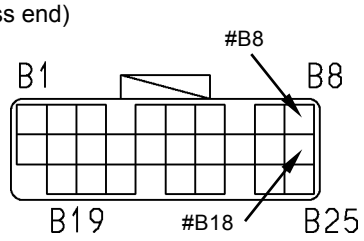


Connector MC-A
(Harness end)



T183-05-04-008

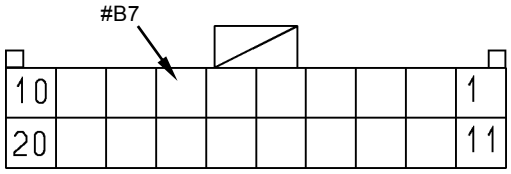
Connector MC-B
(Harness end)



T183-05-04-021

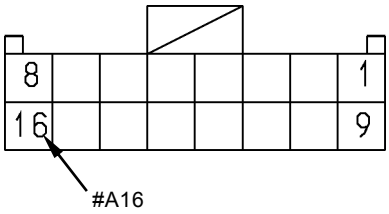
- Monitor Unit
  Between CAN Circuit (High Side) and Power Circuit
  - Check for continuity between terminal #B7 (harness end) of connector monitor-B and terminal #A16 (harness end) of connector monitor-A.

Monitor Unit Connector Monitor-B
(Harness end)



T183-05-04-013

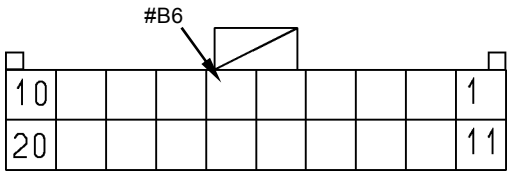
Monitor Unit Connector Monitor-A
(Harness end)



T183-05-05-001

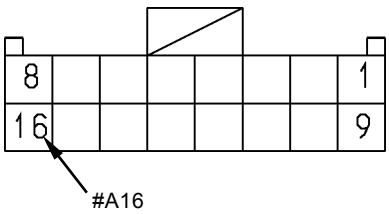
- Monitor Unit
  Between CAN Circuit (Low Side) and Power Circuit
  - Check for continuity between terminal #B6 (harness end) of connector monitor-B and terminal #A16 (harness end) of connector monitor-A.

Monitor Unit Connector Monitor-B
(Harness end)



T183-05-04-013

Monitor Unit Connector Monitor-A
(Harness end)



T183-05-05-001

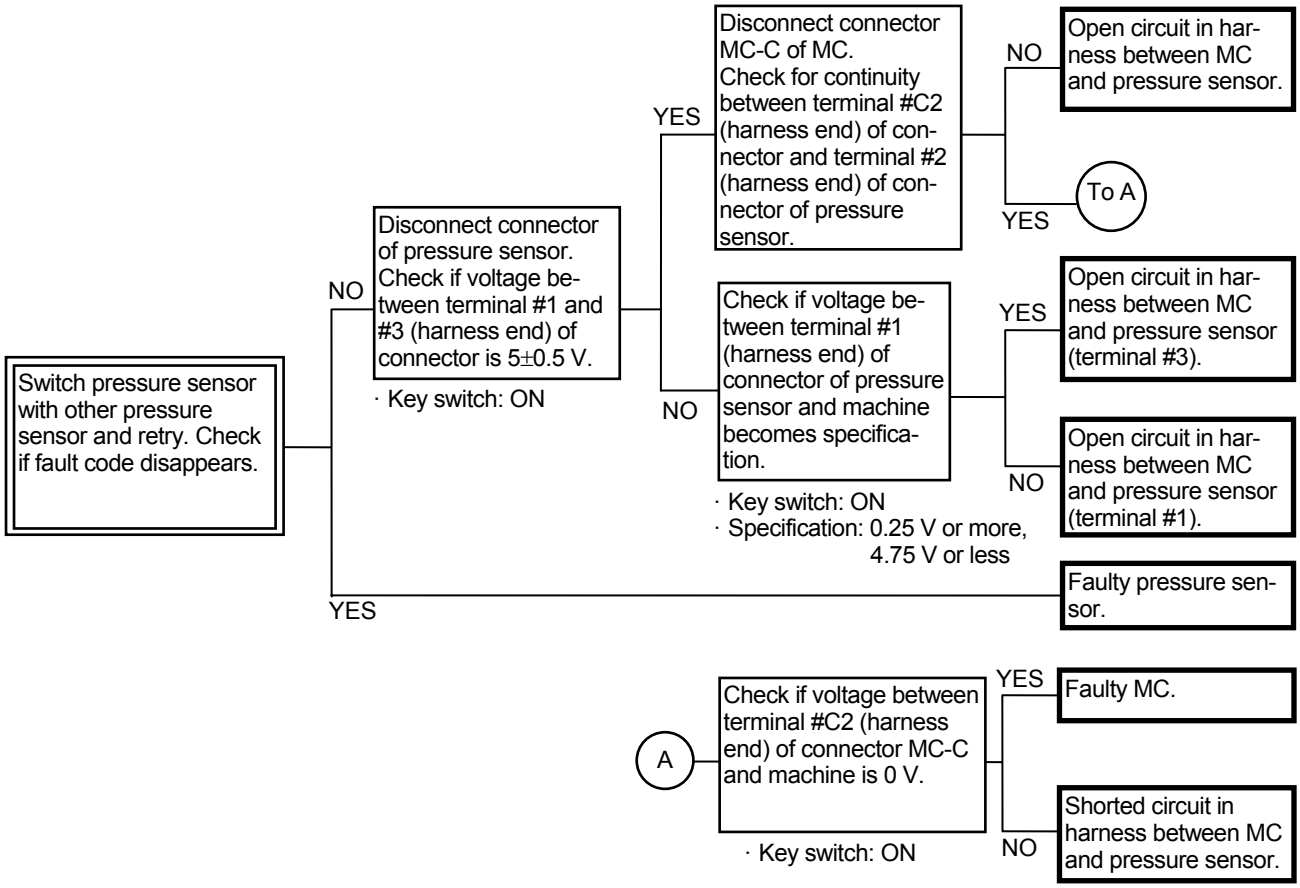
MC FAULT CODE 11100

Fault Code	Trouble	Cause
11100-2	Abnormal Engine Speed	Engine speed: 4000 min^{-1} or more

- Actual engine speed which ECM sends by using CAN bus line is abnormal.
  Diagnose ECM.

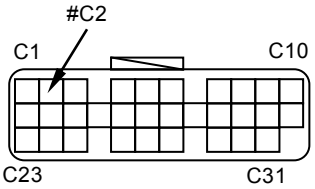
MC FAULT CODE 11305

Fault Code	Trouble	Cause
11305-3	Abnormal Travel Forward Pilot Pressure Sensor High Voltage	Voltage: more than 4.75 V
11305-4	Abnormal Travel Forward Pilot Pressure Sensor Low Voltage	Voltage: less than 0.25 V

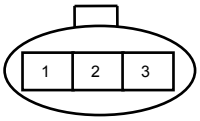


Connector (Harness end of connector viewed from the open end side)

MC Connector MC-C

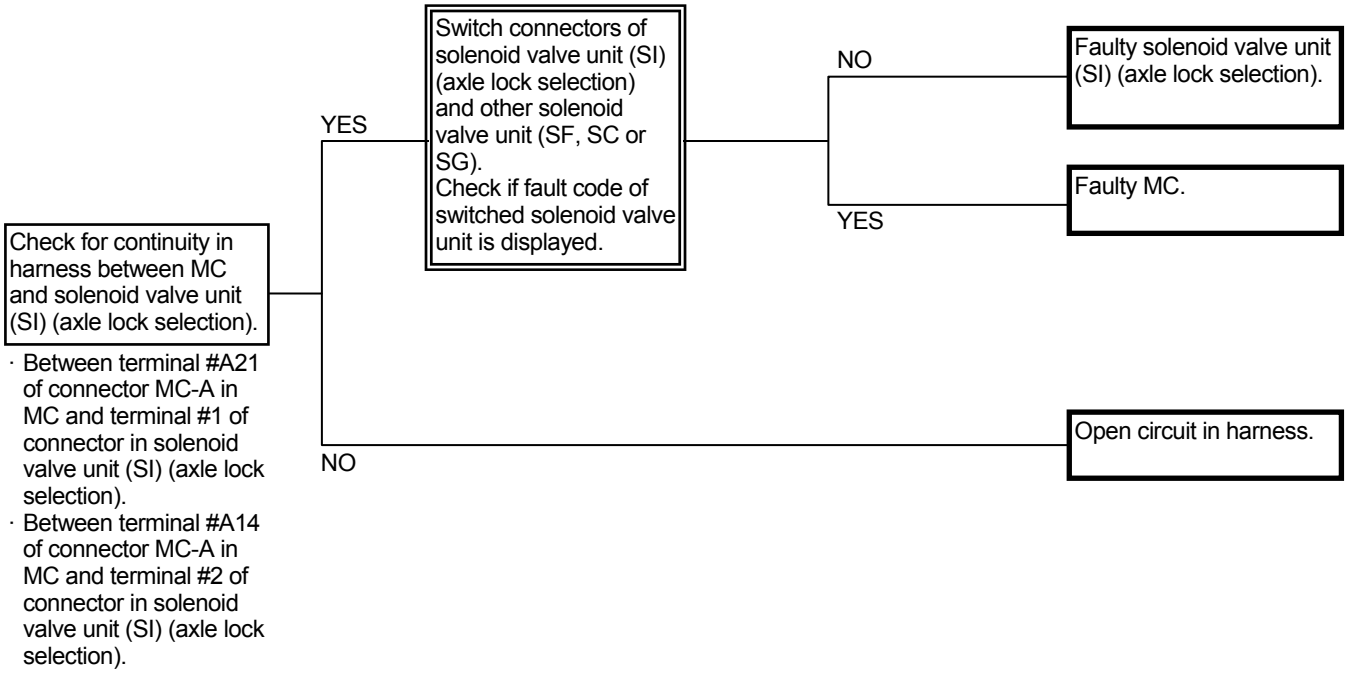


Pressure Sensor (Travel Forward)

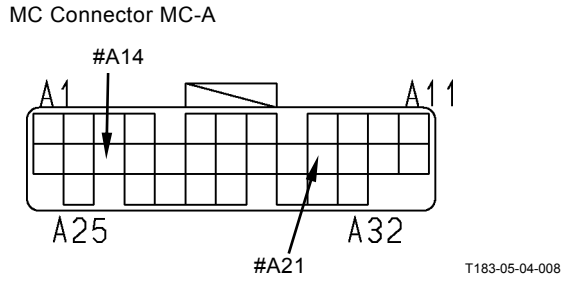


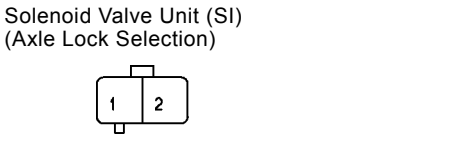
MC FAULT CODE 11424

Fault Code	Trouble	Cause
11424-2	Abnormal Current Feedback of Solenoid Valve Unit (SI) (Axle Lock Selection)	Current: Both of Higher than 920 mA and Less than 60 mA are detected
11424-3	Abnormal Feedback High Current of Solenoid Valve Unit (SI) (Axle Lock Selection)	Current: Higher than 920 mA
11424-4	Abnormal Feedback Low Current of Solenoid Valve Unit (SI) (Axle Lock Selection)	Current: Less than 56 mA



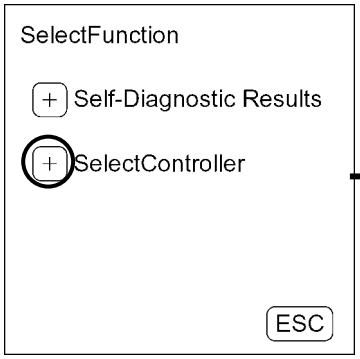
Connector (Harness end of connector viewed from the open end side)





CONTROL DATA: INITIALIZE

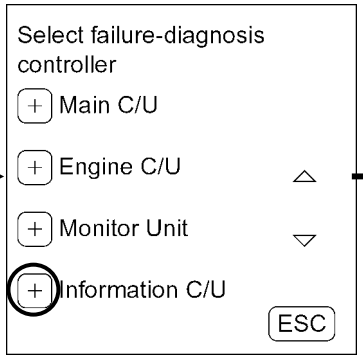
After starting Dr. ZX, push Select Controller.



T1V7-05-03-001

Function Selection Screen

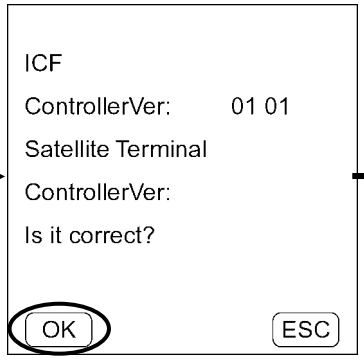
Push Information C/U.



T1V7-05-03-009

Controller Selection Screen

Push OK.

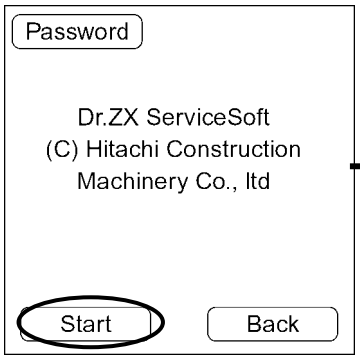


To the lower

T1V7-05-03-024

ICF Controller Screen

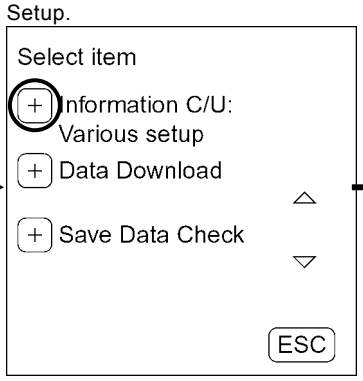
Push Start.



T1V7-05-03-025

Title Screen

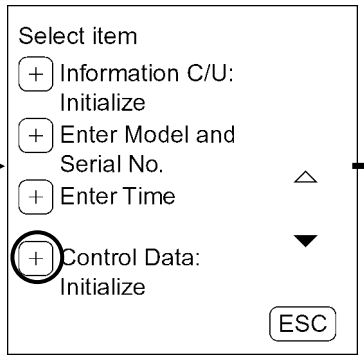
Push Information C/U: Various Setup.



T1V7-05-03-026

Main Menu Screen

Push Control Data: Initialize.

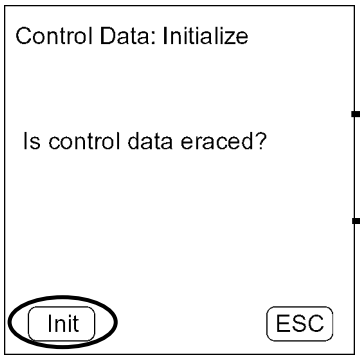


To the lower

T1V7-05-03-027

Information C/U: Various Setup Screen

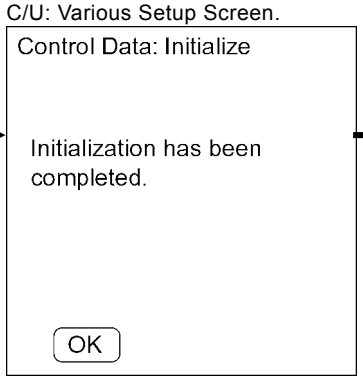
Push Init and the controller control data is initialied. Push ESC and return to Information C/U: Various Setup Screen.



T1V7-05-03-033

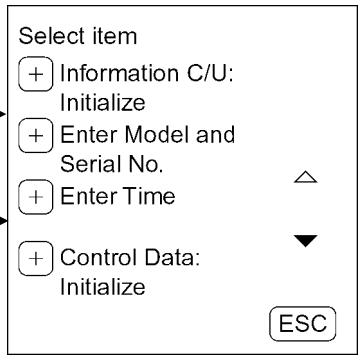
Control Data: Initialize Screen

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



T1V7-05-03-034

Push ESC and return to Main Menu Screen.

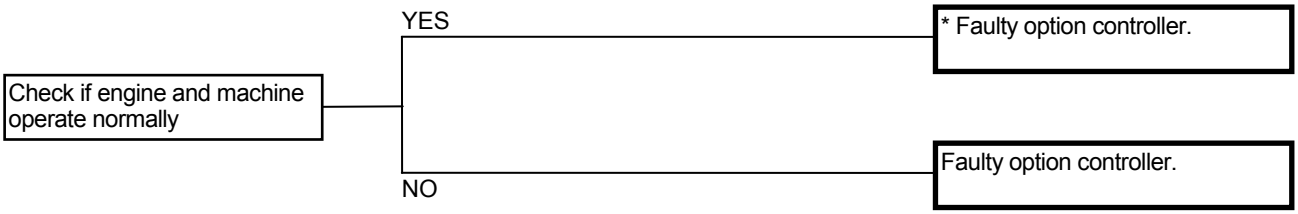


T1V7-05-03-027

Information C/U: Various Setup Screen

OPTION CONTROLLER FAULT CODES 15500 TO 15504

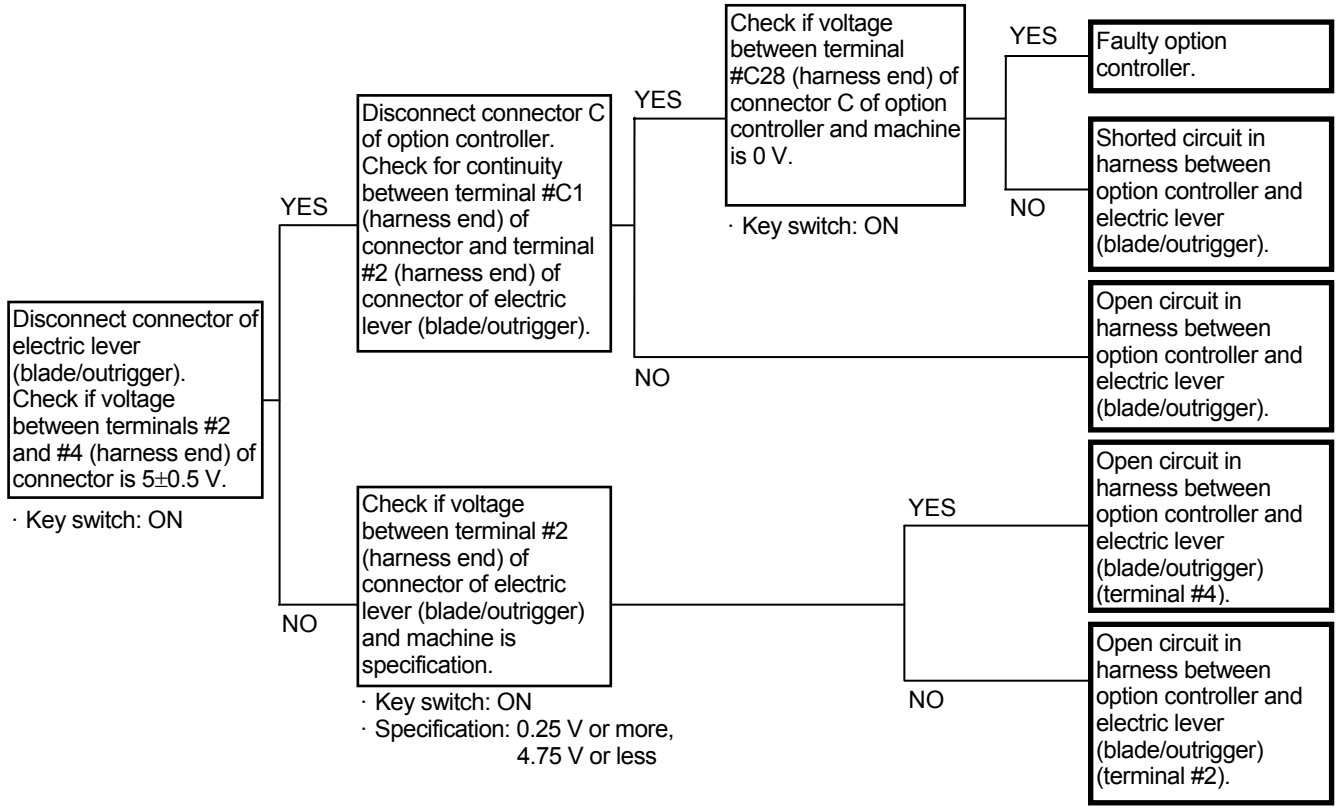
Fault Code	Trouble	Cause
15500-4	Abnormal External Reference Voltage	Faulty controller
15501-2	Abnormal Read of Initial Setting Value (EEPROM)	Faulty controller
15502-2	Abnormal EEPROM	Faulty controller
15503-2	Abnormal RAM	Faulty controller
15504-2	Abnormal A/D Conversion	Faulty controller



* After retrial, if the engine and the machine operate normally with the fault code shown, the machine can be operated.

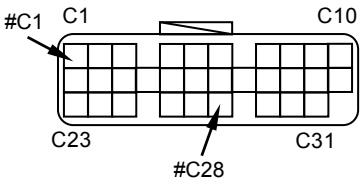
OPTION CONTROLLER FAULT CODE 15519

Fault Code	Trouble	Cause
15519-3	Abnormal Outrigger/Blade Stroke 2 Sensor High Voltage	Voltage: more than 4.85 V
15519-4	Abnormal Outrigger/Blade Stroke 2 Sensor Low Voltage	Voltage: less than 0.15 V

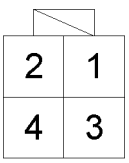


Connector (Harness end of connector viewed from the open end side)

Option Controller Connector C



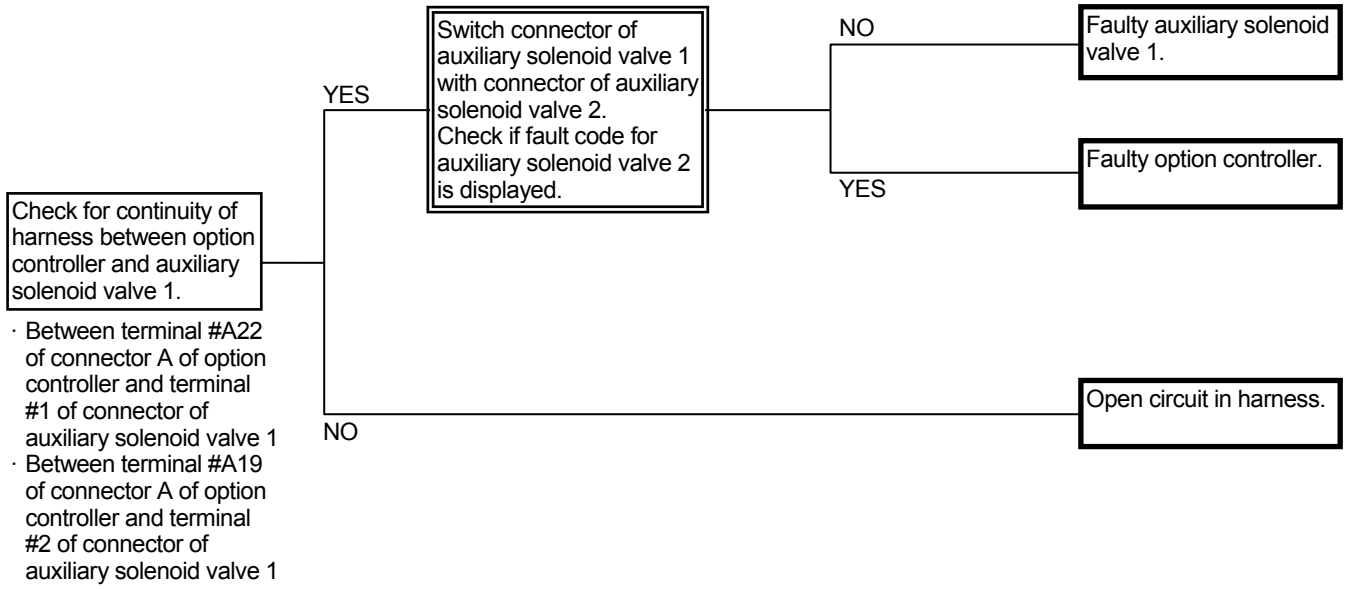
Electric Lever (Blade/Outrigger)



TCJB-05-06-005

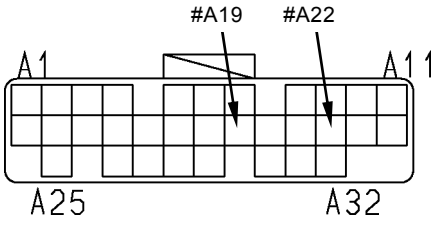
OPTION CONTROLLER FAULT CODE 15520

Fault Code	Trouble	Cause
15520-2	Invalid and Abnormal Current Feedback Value of Auxiliary 1 Proportional Valve	Current: Both of Higher than 920 mA and Less than 60 mA are detected
15520-3	Abnormal Feedback Value High Current of Auxiliary 1 Proportional Valve	Current: Higher than 920 mA
15520-4	Abnormal Feedback Value Low Current of Auxiliary 1 Proportional Valve	Current: Less than 56 mA



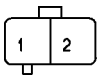
Connector (Harness end of connector viewed from the open end side)

Option Controller Connector A



T183-05-04-008

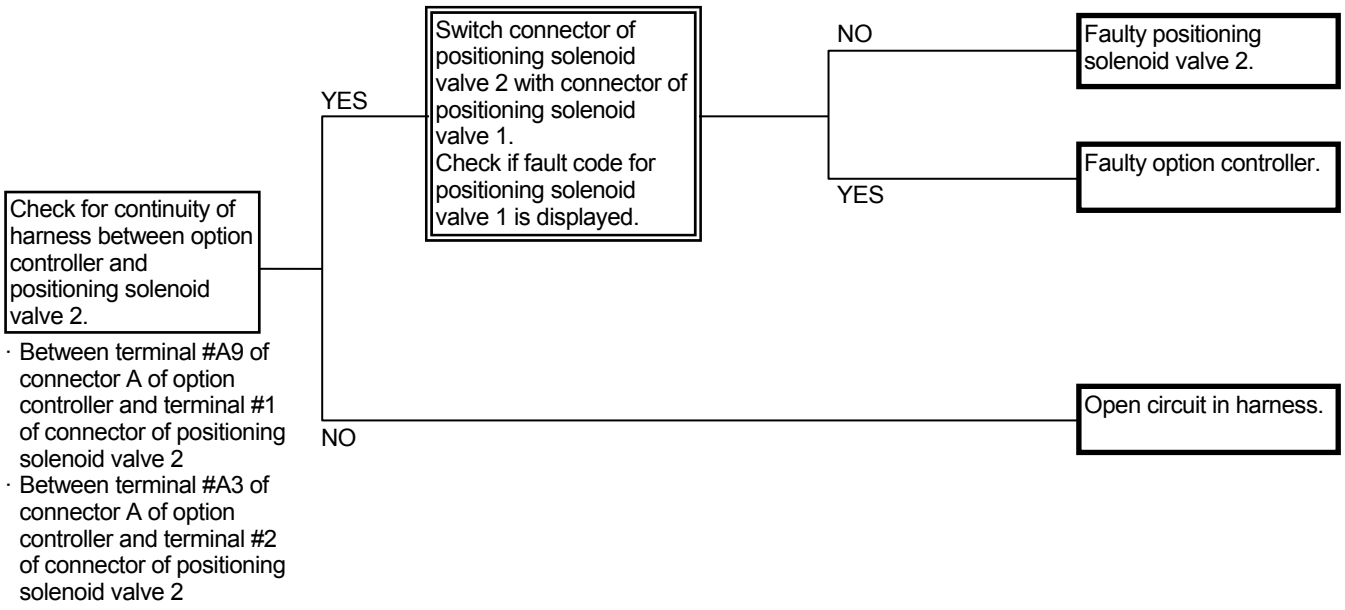
Auxiliary Solenoid Valve 1



T1V1-05-04-003

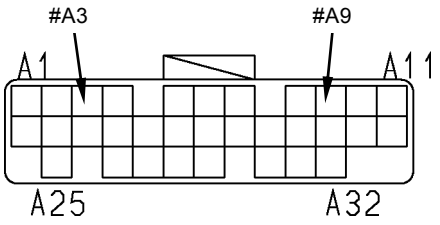
OPTION CONTROLLER FAULT CODE 15530

Fault Code	Trouble	Cause
15530-2	Invalid and Abnormal Current Feedback Value of Positioning 2 Proportional Valve	Current: Both of Higher than 920 mA and Less than 60 mA are detected
15530-3	Abnormal Feedback Value High Current of Positioning 2 Proportional Valve	Current: Higher than 920 mA
15530-4	Abnormal Feedback Value Low Current of Positioning 2 Proportional Valve	Current: Less than 56 mA



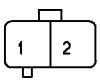
Connector (Harness end of connector viewed from the open end side)

Option Controller Connector A



T183-05-04-008

Positioning Solenoid Valve 2



T1V1-05-04-003

Solenoid Valve Unit (SC)	Solenoid Valve Unit (SI)	Solenoid Valve Unit (SG)	Max Pump 1 Flow Rate Limit Control Solenoid Valve
• Routes return oil from arm cylinder rod side to bottom side when rolling arm in order to increase arm speed.	• Is shifted when axle lock or auto axle lock is selected by brake switch. Shifts operating check valve of axle lock cylinder in order to control auto axle lock control.	Adjusts machine height when machine height control switch is ON.	• When machine is traveling in travel creeper mode, and attachment is operated, maximum flow rate of pump 1 is restricted in order to control pump 1 flow rate limit control in travel creeper speed mode pump 1 flow rate limit, and attachment flow rate limit control.
• If solenoid valve unit (SC) is not activated, pressure at port SC becomes 0 MPa (0 kgf/cm^2). Arm regenerative control will not operate at this time.	• If solenoid valve unit (SI) is not activated, pressure at port SI becomes 0 MPa (0 kgf/cm^2).	Output port pressure is 0 MPa when machine height cannot be adjusted.	· If max pump 1 flow rate limit control solenoid valve is not activated pressure at output port becomes 0 MPa (0 kgf/cm^2).
Abnormal low current: • All operation speeds become slow. Abnormal high current: • Arm speed becomes fast as arm regenerative control is always operated.	Abnormal low current: • Axle lock is not released. Abnormal high current: • Axle lock is kept in released condition. • Condition when front attachment is operated is unstable.	Abnormal low current: • Machine height cannot be adjusted. Abnormal high current: • Machine height can be adjusted anytime.	Abnormal low current: • When attachment, front attachment and superfine travel are operated, operating speed becomes fast. Abnormal high current: • Travel, bucket arm and boom speeds become slow as maximum flow rate of pump 1 decreases.
11403	11424	11426	11410
Monitor Item: Arm Regenerative P/S Valve Output (Possible to display by built-in diagnosing system)	Monitor Item: Axle Lock Output	Monitor Item: Vehicle Height adjust P/S/V	Monitor Item: Pump 1 Flow Rate Limit P/S/V Out
• Install lamp harness (ST 7226). Check output signals from MC and harness condition.	• Install lamp harness (ST 7226). Check output signals from MC and harness condition.	-	-
-	-	-	-
-	-	-	-
T2-2	T2-2	T2-2	T2-2

Arm Anti-Drift Valve	Boom Anti-Drift Valve	Auxiliary Flow Combiner Valve	Bypass Shut-Out Valve
• Check valve in arm roll-in return circuit is forcibly opened and arm move only when arm is rolled in. Prevents arm from drifting due to oil leaks in control valve.	• Check valve in boom lower return circuit is forcibly opened and makes boom move only when boom is lowered. Prevents boom from drifting due to oil leaks in control valve.	• Is shifted by pilot pressure from auxiliary flow combiner solenoid valve when attachment mode (secondary pulverizer, hydraulic crusher) of travel speed “ON” is selected. • Supplies pressure oil from	• Supplies pressure oil from pump 1 to auxiliary spool and positioning control valve when auxiliary or positioning is operated.
• If switch valve is bound, check valve does not open.	• If switch valve is bound, check valve does not open.	• As below	• As below
• If check valve is kept closed, arm roll-in speed becomes slow. • If check valve is kept open, front attachment drift increases due to oil leaks in control valve. • Arm moves jerky or arm speed becomes slow depending on valve bound conditions.	• If check valve is kept closed, boom does not lower. • If check valve is kept open, front attachment drift increases due to oil leaks in control valve. • Boom moves jerky or boom speed becomes slow depending on valve bound conditions.	• If switch valve is kept closed, attachment speed does not become fast during single auxiliary operation. • If switch valve is kept open, attachment speed does not become slow when attachment mode (HSB breaker, NPK breaker) of travel speed “OFF” is selected.	• If spool is bound at fully open position, single attachment operation speed becomes slow. • If spool is bound at fully closed position, main relief valve continues to relieve with all control levers positioned in neutral. • When all control levers are in neutral, pump 1 pressure is higher than pump 2 pressure according to bound spool conditions.
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
T3-3	T3-3	T3-3	T3-3

NOTE: The trouble symptoms in this table are described provided that each trouble occurs independently.

In case more than one trouble occurs at the same time, find out all faulty components while checking all suspected components in each trouble symptom.

E-11	E-12	E-13	E-14
Although operating attachment at attachment mode, engine speed does not increase.	When attachment mode is selected, engine speed does not decrease.	Engine stalls during operation under adverse condition such as at high altitude.	Engine is difficult to start at low temperature.
●	●	●	
○	○	●	●
○	○		
●			
			●
		●	
			●
		○	●
		○	●
		●	
		Check batteries.	

● : Related, required to check

○ : Related. However, in case this component fails, other trouble symptom will be more noticeable so that this component will not be the direct cause of the trouble concerned.

T-5	T-6	T-7
Travel mode (fast/slow) does not shift.	Axle lock is not released.	Axle lock is not operable.
●	●	●
	●	●
●		
●		
●		
○		
●		
	●	●
●		
	○	○
	●	●

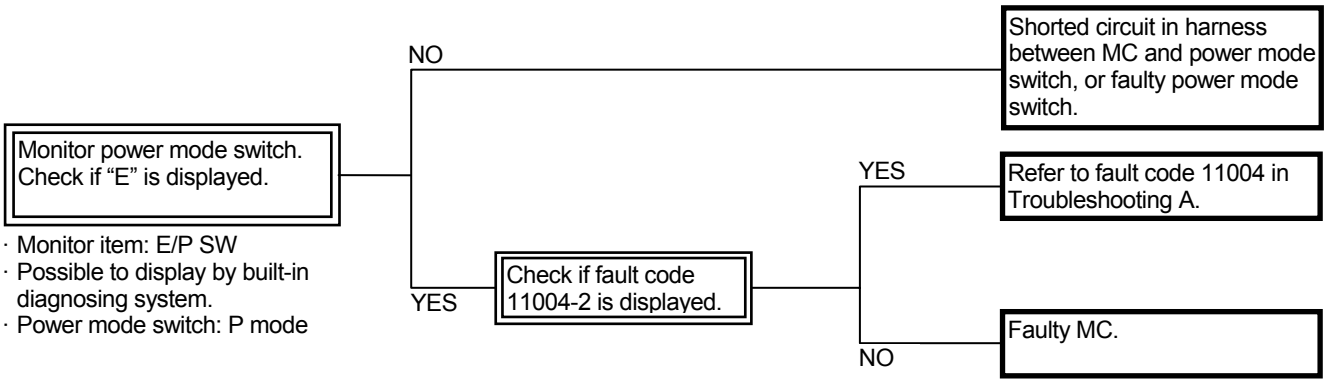
● : Related, required to check
○ : Related. However, in case this component fails, other trouble symptom will be more noticeable so that this component will not be the direct cause of the trouble concerned.

NOTE: The trouble symptoms in this table are described provided that each trouble occurs independently.
In case more than one trouble occurs at the same time, find out all faulty components while checking all suspected components in each trouble symptom.

(Blank)

- Although power mode switch is not turned to E mode, engine speed decreases.

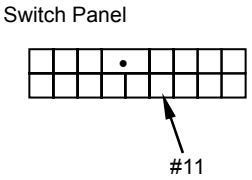
  - Required engine speed from the engine control dial should be beyond 1800 min^{-1} when the pump control pressures of pump 1 and 2 are low or the average delivery pressures of pump 1 and 2 are high, if E mode control is performed. The sensors related to this condition may not be faulty at the same time.

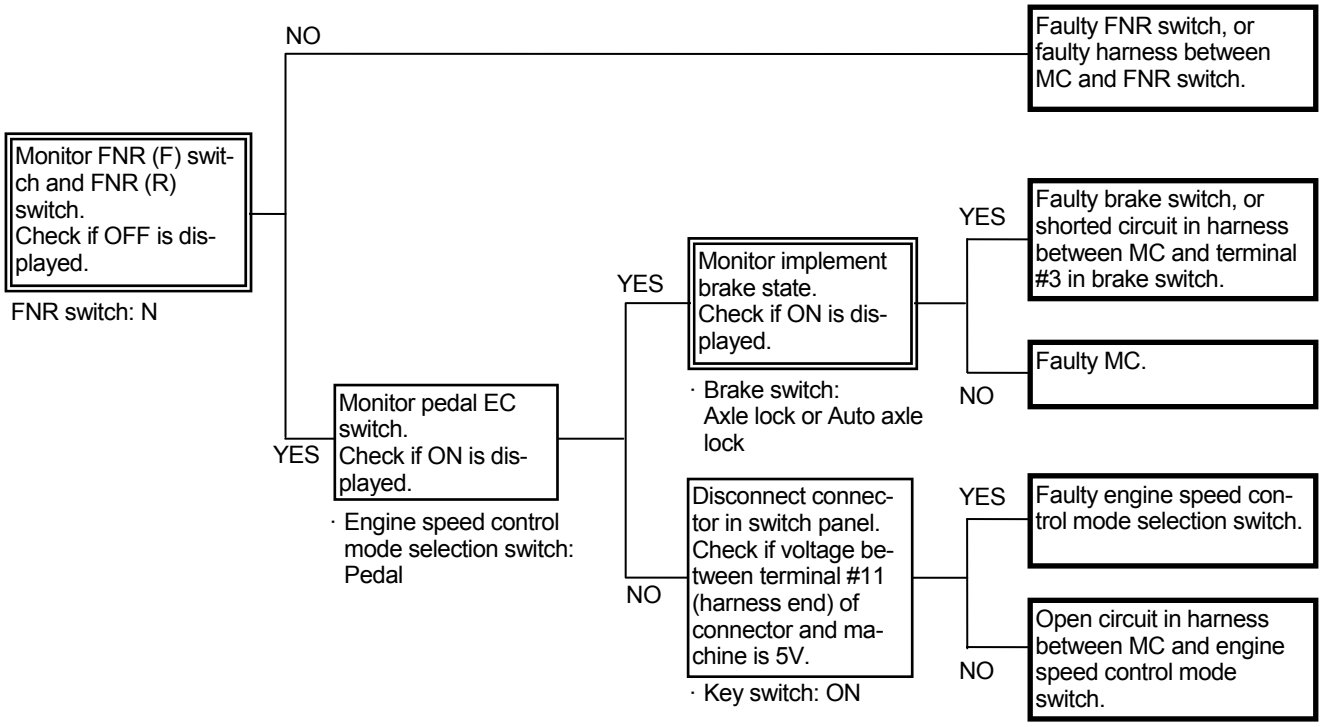


E-16 Although depressing accelerator pedal during digging operation, engine speed does not change.

- Check that:
  Work Brake: Operable
  FNR Switch: N Position
  Engine Speed Control Mode Selection Switch: Pedal Mode Position
- Faulty pressure sensor (travel forward/reverse) may be the cause of this problem. In this case, other functions should become abnormal.

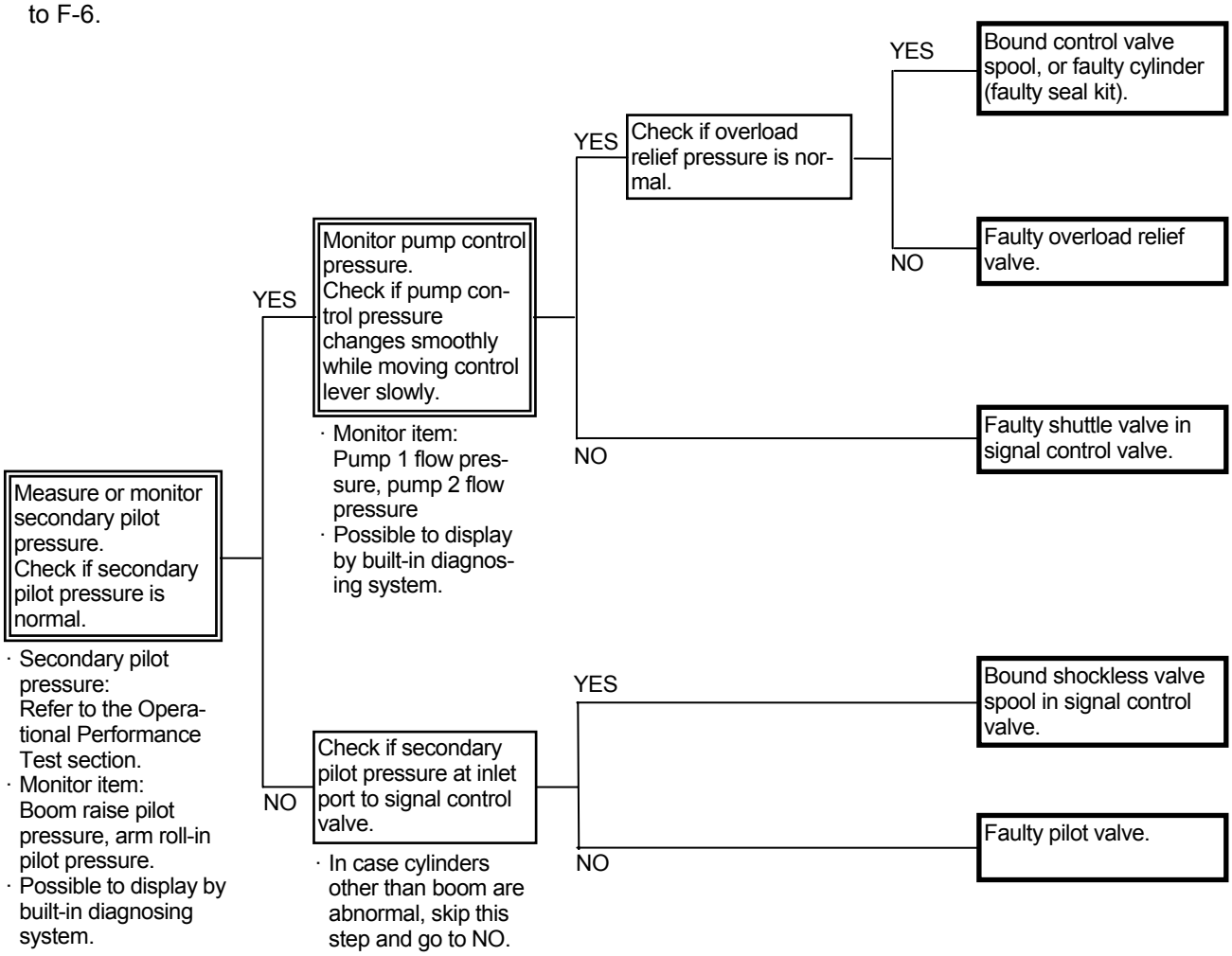
Connector (Harness end of connector viewed from the open end side)

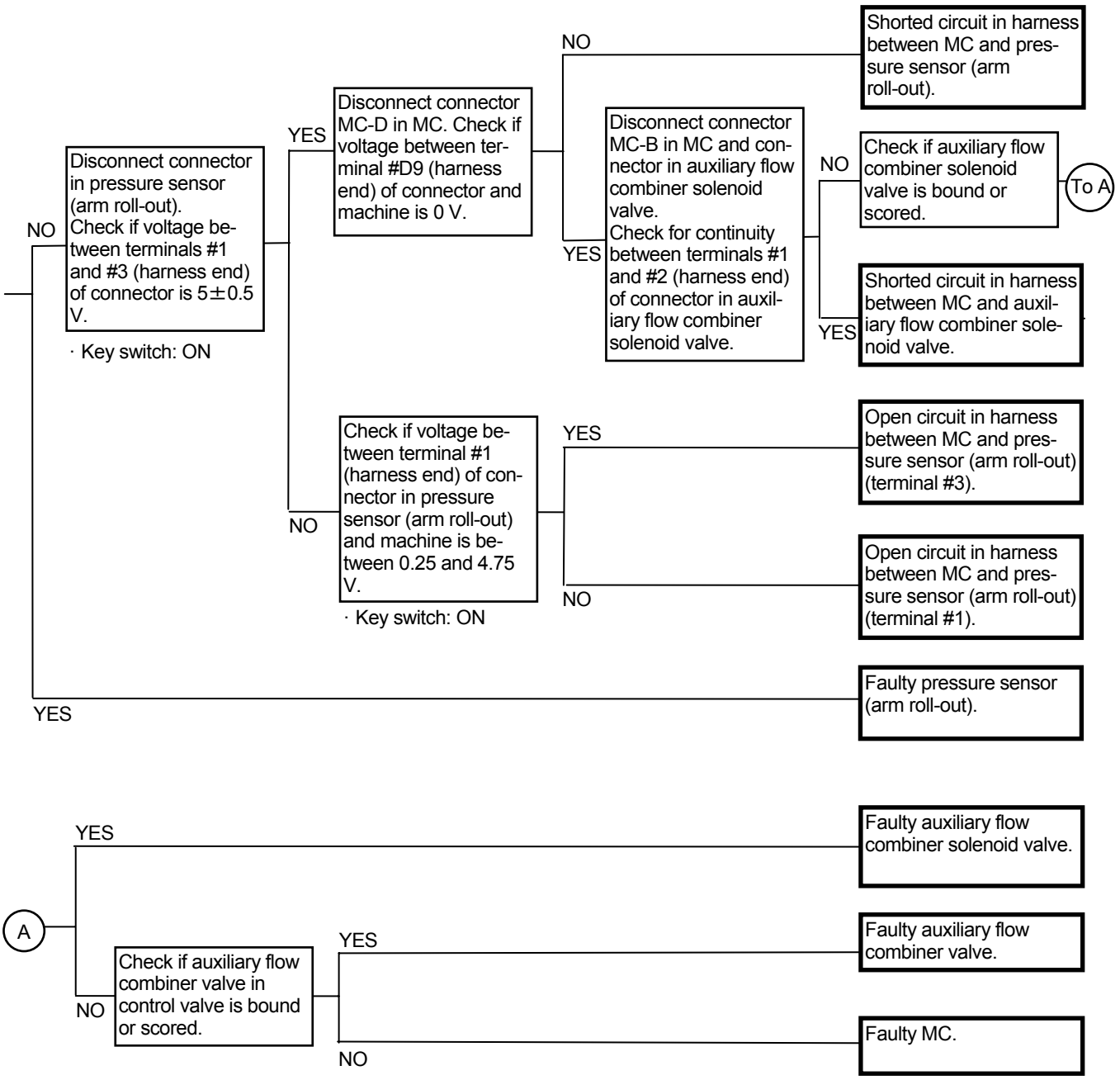


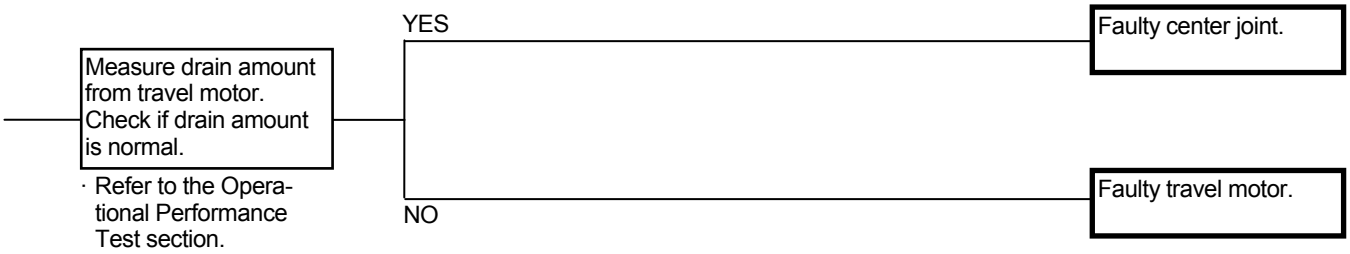


F-2 Some cylinders are not operated or speeds are slow.

- When other actuators (travel and swing) operate normally, the pilot pump (primary pilot pressure) is considered to be normal.
- If single bucket operation speed is slow, refer to F-4.
- If single arm roll-in operation speed is slow, refer to F-5.
- If single boom lower operation speed is slow, refer to F-6.



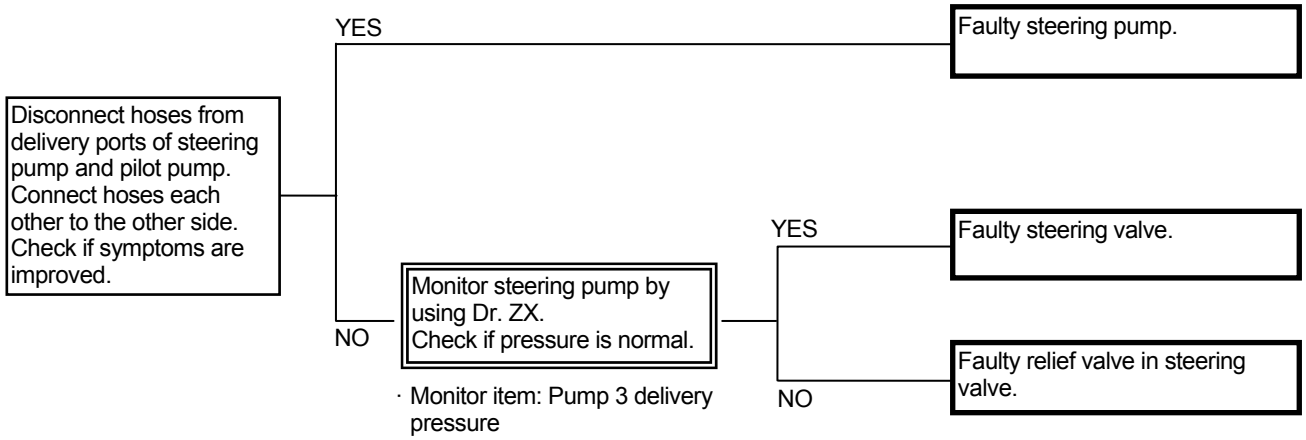

Disconnect connector in pressure sensor (arm roll-out). Check if voltage between terminals #1 and #3 (harness end) of connector is 5±0.5 V.
· Key switch: ON
NO
YES
Disconnect connector MC-D in MC. Check if voltage between terminal #D9 (harness end) of connector and machine is 0 V.
YES
NO
Shorted circuit in harness between MC and pressure sensor (arm roll-out).
Disconnect connector MC-B in MC and connector in auxiliary flow combiner solenoid valve. Check for continuity between terminals #1 and #2 (harness end) of connector in auxiliary flow combiner solenoid valve.
YES
NO
Check if auxiliary flow combiner solenoid valve is bound or scored.
To A
NO
Shorted circuit in harness between MC and auxiliary flow combiner solenoid valve.
YES
Check if voltage between terminal #1 (harness end) of connector in pressure sensor (arm roll-out) and machine is between 0.25 and 4.75 V.
· Key switch: ON
NO
YES
Open circuit in harness between MC and pressure sensor (arm roll-out) (terminal #3).
NO
Open circuit in harness between MC and pressure sensor (arm roll-out) (terminal #1).
YES
Faulty pressure sensor (arm roll-out).
A
YES
Faulty auxiliary flow combiner solenoid valve.
NO
Check if auxiliary flow combiner valve in control valve is bound or scored.
YES
Faulty auxiliary flow combiner valve.
NO
Faulty MC.


Measure drain amount from travel motor. Check if drain amount is normal.
· Refer to the Operational Performance Test section.
YES
NO
Faulty center joint.
Faulty travel motor.

STEERING SYSTEM TROUBLESHOOTING

H-1 Although steering wheel is rotated, steering is heavy.

- Check the steering filter first.



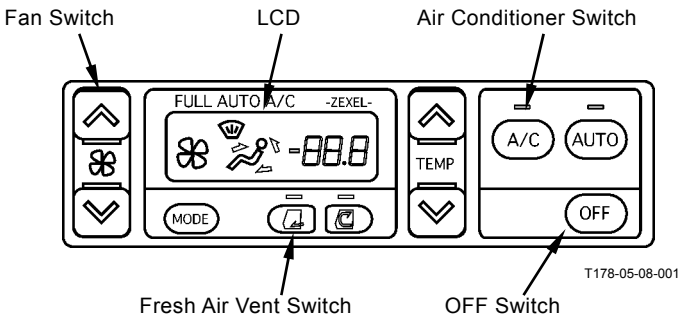
H-2 Although steering wheel is rotated, steering is impossible.

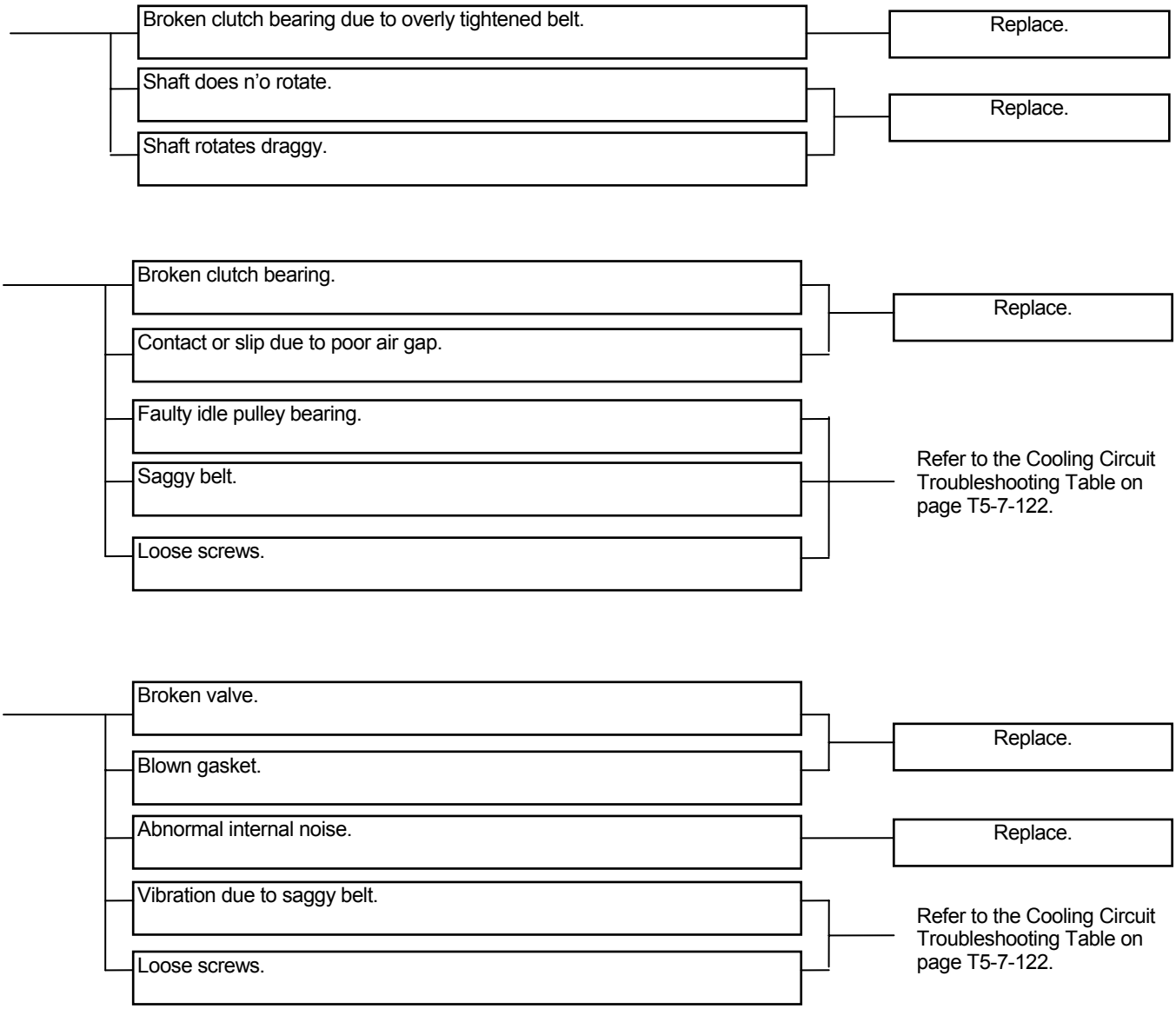
- Although the steering valve does not have enough pressure oil from the steering pump, the machine can turn the left and right.
- If the machine cannot turn the left and right, the center joint may be faulty.
- If only one side (left or right) can turn, the center joint or the overload relief valve in the steering valve may be faulty.

STEP 6-2 Selection of Celsius and Fahrenheit Temperature Indication

Selection of Celsius and Fahrenheit Temperature Indication.

- Each time when the fresh air vent switch is pushed, Celsius or Fahrenheit temperature may be displayed alternately.
- Temperature is displayed at the top of LCD window as follows.
  (C: Celsius, F: Fahrenheit)
  C ⟷ F
- Select the next step in order to be performed by operating the switches as follows:
  - Push the Air Conditioner Switch and lower side of fan switch: To return to “STEP 5.”
  - Keep pushing the OFF switch for more than 3 seconds: Deactivate the self-diagnostic system. (Normal function is resumed.)





NOTE:

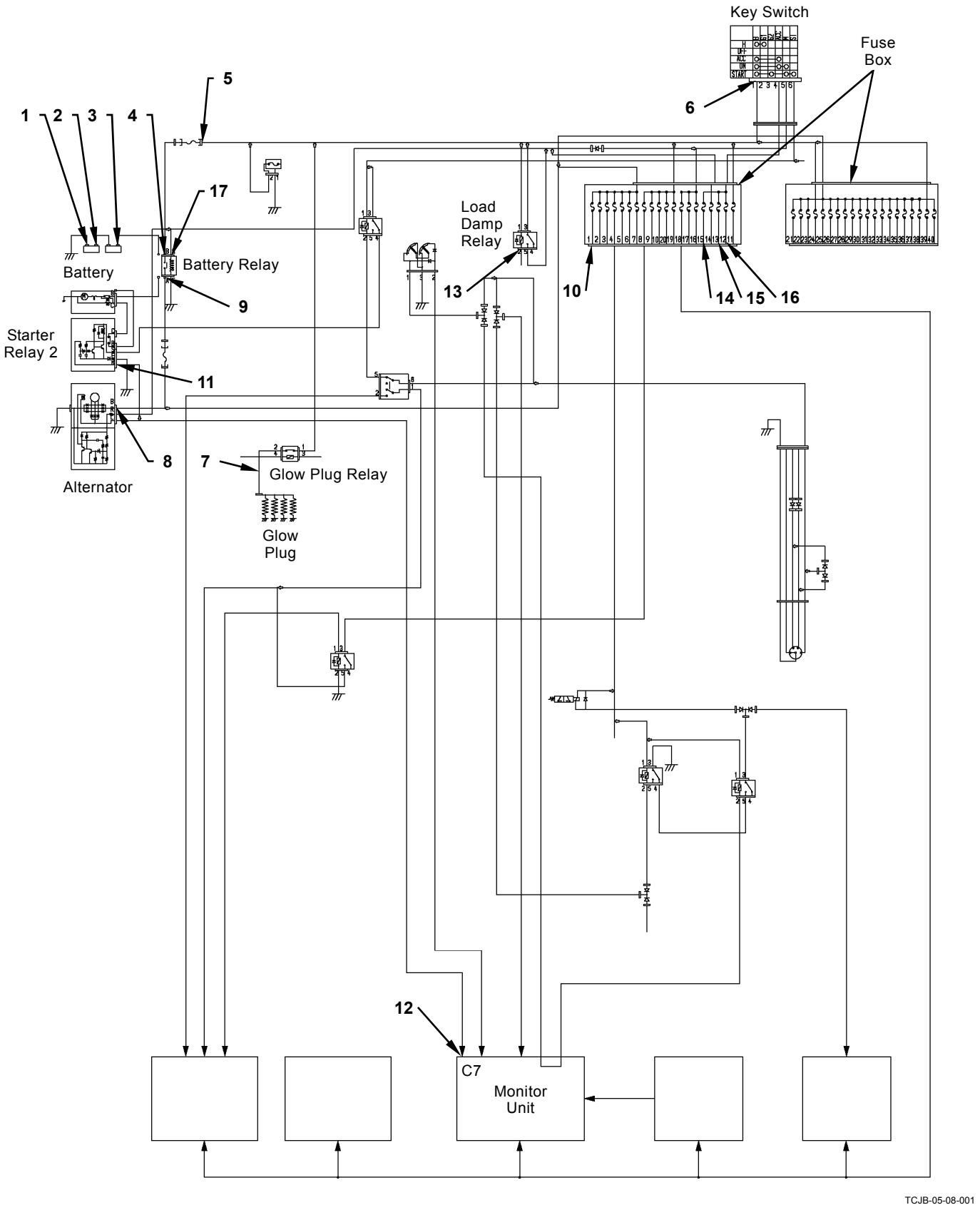
1. *Do not quickly decide that oil is leaking when a stain around the clutch and/or gasket is found. A slight oil seepage will appear due to the seal construction. However, this oil seepage will not cause malfunction. Accurately check whether oil is leaking or seeping only.*
2. *When gas detector is 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.*

PRECAUTIONS FOR INSPECTION AND MAINTENANCE

1. Disconnect the power source.
   Remove the harness from the negative terminal side in battery first when taking wire harnesses and connectors off for repair or replacement work. Failure to do so can result in damage to the wire harnesses, fuses and fusible links and, in some cases, cause fire due to short circuiting.
2. Color coding of wire harnesses.
   As for the color codes of wire harnesses in the electrical system, refer to the table below.
   In cases on the design sheet where two colors are indicated for one wire, the left initial stands for base color, while the right initial stands for marking color.

Code	Color	Code	Color
R	Red	W	White
L	Blue	G	Green
Or	Orange	Lg	Light green
Y	Yellow	B	Black
Br	Brown	P	Pink
Gr	Gray	V	Violet

NOTE:
- *Code BW indicates a black base wire with white fine-line marking.*
- *Initials "O" and "Or" both stand for the color orange.*
- *Wires with longitudinal stripes printed on them are not color coded. Do not confuse them with color coded wires.*


Key Switch
Fuse Box
1
2
3
4
5
6
17
Battery
Battery Relay
9
Load Damp Relay
13
10
14
15
16
Starter Relay 2
11
8
7
Glow Plug Relay
Glow Plug
Alternator
12
C7
Monitor Unit
TCJB-05-08-001