

Service Manual

Service Manual

MDT-9

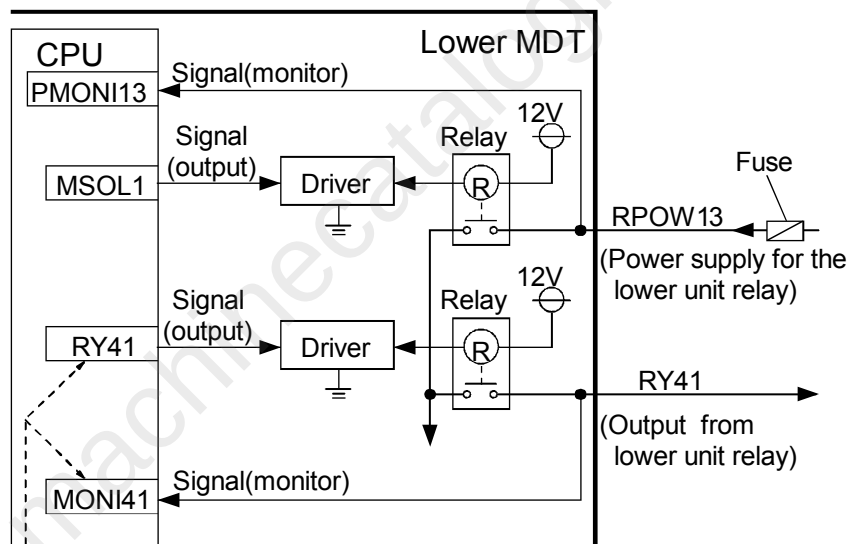
Multiplex Data Transmitter
MDT-9

4.9 Port/bit Nos., input/output signal Nos. and corresponding signals

For the name of signal, refer to "Input/output signal lists".

1. PMONI1 to PMONI16:
Signals representing the monitored voltages of the power supplies RPOW1 to RPOW16 for the lower unit relays and being sent to lower CPU
2. MONI1 to MONI56:
Signals representing the monitored output voltages of lower unit outputs RY1 to RY56 and being sent to lower CPU
3. MSOL1:
Signal of relay cutting the output power supply of lower unit outputs RY41 and 42
4. MSOL2:
Signal of relay cutting the output power supply of lower unit outputs RY43 to 48
5. MSOL3:
Signal of relay cutting the output power supply of lower unit outputs RY53 to 56

Scheme of lower relay output



---CPU always checks outputs signal (RY41) and monitor signal (MONI41).
If these signals do not match up,CPU displays the error code.
(refer to "Troubleshooting" for details)

IW303-0263J01E

Troubleshooting

Error code	Error [Details]	Condition	Cause	Remarks
			Countermeasure	
10	Failure in accelerator sensor 1 data	The ratio of accelerator sensor 1's input data to the power supply voltage (5V) is 5% or less 95% or more, and this state continues for 600 ms. ◆ Failure is not detected for 2 seconds after the system is reset. ◆ Failure is not detected while error 13 occurs.	1. Failure in accelerator sensor 1. 2. Broken or short-circuited wires between the accelerator sensor 1 and the upper unit input connector (terminal "10" of CN8). 3. Failure in the A/D conversion circuit in the upper unit. Repair or replace the faulty part referring to the crane electric circuit diagram. Replace the accelerator sensor 1. Replace the upper unit CPU board.	MDT action: The output value for accelerator sensor 1 is set to 0.
11	Failure in accelerator sensor 2 data	The ratio of accelerator sensor 2's input data to the power supply voltage (5V) is 5% or less 95% or more, and this state continues for 600 ms. ◆ Failure is not detected for 2 seconds after the system is reset. ◆ Failure is not detected while error 13 occurs.	1. Failure in accelerator sensor 2. 2. Broken or short-circuited wires between the accelerator sensor 2 and the upper unit input connector (terminal "11" of CN8). 3. Failure in the A/D conversion circuit in the upper unit. Repair or replace the faulty part referring to the crane electric circuit diagram. Replace the accelerator sensor 2. Replace the upper unit CPU board.	MDT action: The output value for accelerator sensor 2 is set to 0.
12	Failure in idle volume data	The ratio of idle volume input data to the power supply voltage (5V) is 5% or less 95% or more, and this state continues for 600 ms. ◆ Failure is not detected for 2 seconds after the system is reset. ◆ Failure is not detected while error 13 occurs.	1. Failure in idle volume. 2. Broken or short-circuited wires between the idle volume and the upper unit input connector (terminal "12" of CN8). 3. Failure in the A/D conversion circuit in the upper unit. Repair or replace the faulty part referring to the crane electric circuit diagram. Replace the idle volume. Replace the upper unit CPU board.	MDT action: The output value for idle volume is set to 0.

Troubleshooting

Error code	Error [Details]	Condition	Cause	Remarks
			Countermeasure	
* b3	Faulty RY20 output	The monitored data continue ON while RY20 output data is OFF.	1. Circuit connected with terminal "10" of lower unit CN10 is short-circuited with the 24V circuit. 2. Failure in relay output circuit in the lower unit	MDT action: RY20 is set to OFF.
			Repair or replace the faulty part referring to the crane electric circuit diagram. Replace the lower unit relay board. (Replace the CPU board if the failure is not recovered even after the relay board is replaced.)	
* b4	Faulty RY21 output	The monitored data continue ON while RY21 output data is OFF.	1. Circuit connected with terminal "11" of lower unit CN10 is short-circuited with the 24V circuit. 2. Failure in relay output circuit in the lower unit	MDT action: RY21 is set to OFF.
			Repair or replace the faulty part referring to the crane electric circuit diagram. Replace the lower unit relay board. (Replace the CPU board if the failure is not recovered even after the relay board is replaced.)	
* b5	Faulty RY22 output	The monitored data continue ON while RY22 output data is OFF.	1. Circuit connected with terminal "12" of lower unit CN10 is short-circuited with the 24V circuit. 2. Failure in relay output circuit in the lower unit	MDT action: RY22 is set to OFF.
			Repair or replace the faulty part referring to the crane electric circuit diagram. Replace the lower unit relay board. (Replace the CPU board if the failure is not recovered even after the relay board is replaced.)	

Input/output signal lists

Signal	Signal name	Signal detail	Applicable spec.
Di21(+)	4-wheel steering	0 [L (0V)]: 4-wheel steering OFF 1 [H (24V)]: 4-wheel steering ON	Group 1–8
	6-wheel steering	0 [L (0V)]: 6-wheel steering OFF 1 [H (24V)]: 6-wheel steering ON	Group 9, 10
Di22(+)	Crab steering	0 [L (0V)]: Crab steering OFF 1 [H (24V)]: Crab steering ON	
Di23(+)	Rear steering	0 [L (0V)]: Rear steering OFF 1 [H (24V)]: Rear steering ON	Group 1–3, 9, 10
	Spare input		Group 4–8
Di24(+)	Spare input		
Di25(+)	High/low shift	0 [L (0V)]: High 1 [H (24V)]: Low (4-low)	
Di26(+)	2/4-wheel drive shift	0 [L (0V)]: 2-wheel drive 1 [H (24V)]: 4-wheel drive (4-high)	
Di27(+)	Spare input		
Di28(+)	Spare input		
Di29(+)	Spare input		
Di30(+)	Headlamp A	0 [L (0V)]: Head lamp OFF 1 [H (24V)]: Head lamp lit	
Di31(+)	Headlamp B	0 [L (0V)]: Head lamp High 1 [H (24V)]: Head lamp Low	
Di32(+)	Clearance lamp	0 [L (0V)]: Clearance lamp OFF 1 [H (24V)]: Clearance lamp ON	
Di33(+)	Exhaust brake	0 [L (0V)]: Exhaust brake switch OFF 1 [H (24V)]: Exhaust brake switch ON	
Di34(+)	Horn	0 [L (0V)]: Horn switch OFF 1 [H (24V)]: Horn switch ON	
Di35(+)	Working lamp	0 [L (0V)]: Not lit 1 [H (24V)]: Lit	
Di36(+)	PTO	0 [L (0V)]: PTO OFF 1 [H (24V)]: PTO ON	
Di37(+)	Parking brake	0 [L (0V)]: Applying operation 1[H(24V)]: Releasing operation	
Di38(+)	Spare input		Group 1, 2, 4, 5, 9, 10
	Idle up	0 [L (0V)]: Idle up switch OFF 1 [H (24V)]: Idle up switch ON	Group 3, 6–8
Di39(+)	T/C oil cooler	0 [L (0V)]: Oil cooler switch OFF 1 [H (24V)]: Oil cooler switch ON	Group 1–6
	Spare input		Group 7, 8, 9, 10
Di40(+)	Starter switch	0 [L (0V)]: Starter switch OFF 1 [H (24V)]: Starter switch ON (ON/START)	
Di41(+)	Main winch high-speed	0 [L (0V)]: Main winch high-speed switch OFF 1 [H (24V)]: Main winch high-speed switch ON	Group 1–3, 9, 10
	Spare input		Group 4–8
Di42(+)	Aux. winch high-speed	0 [L (0V)]: Aux. winch high-speed switch OFF 1 [H (24V)]: Aux. winch high-speed switch ON	Group 1–3, 9, 10
	Spare input		Group 4–8
Di43(+)	Vehicle speed restriction	0 [L (0V)]: Vehicle speed restriction deactivated 1 [H (24V)]: Vehicle speed restriction activated	
Di44(+)	Eco mode switch	0 [L (0V)]: Eco mode switch OFF 1 [H (24V)]: Eco mode switch ON	
Di45(+)	Over-front detection	0 [L (0V)]: Over-front detection OFF 1 [H (24V)]: Over-front detection ON	

Data table

2.3 Applicable spec.: Group 3, Group 6

1. Signal transmitted to DCU that is put in one-to-one correspondence with upper unit input signal.
 1. Di33 (exhaust brake) → Do15 (exhaust brake)
 2. Di35 (working lamp) → Do22 (working lamp)
 3. Di36 (PTO) → Do21 (PTO)
2. Signal transmitted to DCU that is put in one-to-one correspondence with lower unit input signal.
 1. Di9 (air low pressure) → Do11 (air low pressure warning)
 2. Di10 (WTS lamp) → Do8 (speed and overrun warning)
 3. Di12 (coolant level warning) → Do4 (coolant level)
 4. Di4 (steering pump low pressure) → Do7 (steering alarm)
 5. Di13 (DIAG lamp 1) → Do3 (engine ECU error (red))
 6. Di14 (DIAG lamp 2) → Do16 (engine ECU error (yellow))
3. Signal transmitted to AML that is put in one-to-one correspondence with lower unit input signal.
 1. Di29 (hydraulic oil temp. 85°C (185°F)) → Di4 (hydraulic oil temp. 85°C (185°F))
 2. Di30 (hydraulic oil temp. 50°C (122°F)) → Di3 (hydraulic oil temp. 50°C (122°F))
4. Signal output from lower unit that is put in one-to-one correspondence with upper unit input signal.
 1. Di32 (clearance lamp) → Tr2 (clearance lamp)
 2. Di38 (Idle up) → RY26 (Idle up)
 3. Di48 (Idle down) → RY27 (Idle down)
 4. Di50 (input spare) → RY51 (output spare)
5. Signal output from upper unit that is put in one-to-one correspondence with upper unit input signal.
 1. Di34 (horn) → Tr4 (horn)
 2. Di62 (DPF regeneration disable switch) → Tr3 (DPF regeneration disable lamp)
6. Signal transmitted to AML that is put in one-to-one correspondence with upper unit input signal
 1. Di32 (clearance lamp) → Di6 (clearance lamp)
 2. Di1 (emergency transmission) → Di7 (emergency transmission)
 3. Di36 (PTO) → Di8 (PTO)
Di8: Inverted signal of upper unit input signal (Di36)
 4. Di41 (main winch high-speed selection) → Di10 (main winch high-speed selection)
 5. Di42 (auxiliary winch high-speed selection) → Di11 (auxiliary winch high-speed selection)
7. Signal transmitted to STM-E that is put in one-to-one correspondence with upper unit input signal.
 1. Di62 (DPF regeneration disable switch) → SPN1
8. Signal output from upper unit that is put in one-to-one correspondence with STM-E signal.
 1. DPF data b1 (high exhaust system temperature lamp) → Tr6 (high exhaust system temperature lamp)

Data table

9. Outrigger switch neutral position detection

9.1 Applicable spec.: Group 1-Group 10

1. The outrigger switch out-of neutral warning indicator is lit when an outrigger control switch on the upper or lower unit is out of the neutral position.
2. The alarm buzzer sounds intermittently if no outrigger operation is performed for 10 seconds while the upper unit Ext./Ret. or Jack/Slider selector switches are not in the neutral position.
3. The alarm buzzer sounds intermittently if no outrigger operation is performed from the lower controls for 10 seconds while the Ext./Ret. Selector switch on the lower control is out of neutral position.

Upper unit input status				Lower unit input status	Serial signal output status to AML	Upper unit output status
Di13(+) (Ext.)	Di14(+) (Ret.)	Di15(+) (Jack)	Di16(+) (Slider)	Di26(+) (outrigger switch in neutral)	Di5 (outrigger switch neutral position)	Tr1 (alarm buzzer)
0	0	0	0	0	0	0
				1	1	*2
Combination other than the above				0		*1
				1		*3
1: switch contact closed (H) 0: switch contact open (L)					1: level "H" 0: level "L"	1: transistor ON 0: transistor OFF 1/0: alternates ON and OFF at 0.6 second intervals.
Remarks	*1. Output is "1/0" if all of upper unit inputs Di8, Di9, Di10, Di11 and Di12 remain "0" for more than 10 seconds continuously. Output is "0" if any of the above inputs is "1". *2. Output is "1/0" if both of lower output monitors MONI5 and MONI6 remain "0" for 10 seconds or longer continuously. Output is "0" if any of the above output is "1". *3. Output is "1/0" if the output is "1/0" for either of the conditions *1 or *2. Output is "0" if the outputs are "0" for both conditions of *1 and *2.					

Data table

Gearshift output status and combination meter display

Ordinary combination meter display

Upper unit input status							Gearshift output status	Serial signal output status to DCU					
Di1(+) (emergency transmission)	Di2 (+) (1)	Di3 (+) (2)	Di4 (+) (3)	Di5 (+) (D)	Di6 (+) (N)	Di7 (+) (R)		Do30 (1)	Do29 (2)	Do28 (3)	Do26 (N)	Do27 (D)	Do25 (R)
0	-	-	-	-	-	-	N	0	0	0	1	0	0
							Manual 1st	1	0	0	0	0	0
							Manual 2nd	0	1	0	0	0	0
							Manual 3rd	0	0	1	0	0	0
							Automatic 1st	1	0	0	0	1	0
							Automatic 2nd	0	1	0	0	1	0
							Automatic 3rd	0	0	1	0	1	0
							4th	0	0	0	0	1	0
Reverse	0	0	0	0	0	0	1						
1	0	0	0	0	1	0	-	0	0	0	1	0	0
	1	0	0	0	0	0		1	0	0	0	0	0
	0	1	0	0	0	0		0	1	0	0	0	0
	0	0	1	0	0	0		0	0	1	0	0	0
	0	0	0	1	0	0		0	0	0	1	0	0
	0	0	0	0	1	0		0	0	0	0	1	0
	0	0	0	0	0	1		0	0	0	0	0	1
	Combination other than the above							Previous status is retained.					
Remarks	1: switch contact closed (H) 0: switch contact open (L)						1: level "H" 0: level "L"						

Combination meter display under vehicle speed restriction

Upper unit input status							Gearshift output status	Serial signal output status to DCU					
Di1(+) (emergency transmission)	Di2 (+) (1)	Di3 (+) (2)	Di4 (+) (3)	Di5 (+) (D)	Di6 (+) (N)	Di7 (+) (R)		Do30 (1)	Do29 (2)	Do28 (3)	Do26 (N)	Do27 (D)	Do25 (R)
0	-	-	-	-	-	-	N	0	0	0	1	0	0
							Manual 1st	1	0	0	0	0	0
							Manual 2nd	0	1	0	0	0	0
							Manual 3rd	0	0	1	0	0	0
							Automatic 1st	1	0	0	0	1	0
							Automatic 2nd	0	1	0	0	1	0
							Automatic 3rd	0	0	1	0	1	0
							4th	0	0	0	0	1	0
Reverse	0	0	0	0	0	1							
1	0	0	0	0	1	0	-	0	0	0	1	0	0
	1	0	0	0	0	0		1	0	0	0	0	0
	0	1	0	0	0	0		0	1	0	0	0	0
	0	0	1	0	0	0		0	1	0	0	0	0
	0	0	0	1	0	0		0	1	0	0	0	0
	0	0	0	0	0	0		0	0	0	0	0	1
	0	0	0	0	0	1		0	0	0	0	0	1
Combination other than the above							Previous status is retained.						
Remarks	1: switch contact closed (H) 0: switch contact open (L)							1: level "H" 0: level "L"					

Data table

35. DPF manual regeneration operation

35.1 Applicable spec.: Group 3, Group 6, Group 7

1. When the DPF manual regeneration switch is turned ON, the DPF manual regeneration signal is output.

However, the signal is not output in the following situations (to ensure safety of the vehicle).

- (1) Vehicle speed: 1 km/h or more
- (2) Gearshift: other than N
- (3) PTO: ON
- (4) Parking brake: released

(1 km/h = 0.62 mi/h)

Upper unit input status					Lower unit input status	Lower unit output status	
Di61(-) (DPF manual regeneration)		Pi2 (main speed)	Gearshift status (N)	Di36(+) (PTO)	Di37(+) (parking brake)	Di3(-) (air low-pressure parking brake))	RY25 (DPF manual regeneration)
1		Vs < 1	1	0	0	1	1
Combination other than above							0
Remarks	1: switch contact closed (L) 0: switch contact open (H)	Vs: vehicle speed (km/h)	1: switch contact closed (H) 0: switch contact open (L)		1: switch contact closed (L) 0: switch contact open (H)		1: relay contact ON 0: relay contact OFF
	NOTICE 1: When only one of the gearshift inputs {R, N, D, 3rd (not available for some models), 2nd and 1st} is "1", the gearshift status is renewed. Otherwise the previous status remains.						
	NOTICE 2: If the main speed input signal is erroneous (error 01), the main speed is supposed to be Vs≥1.						

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Tadano MDT-9 Multiplex Data Transmitter Service Manual

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