

RT-flex engine Expert system

Developed by DIESEL UNITED, LTD.

Concept of the system

- ◆ To assist trouble shooting of flex engine.
- ◆ Easier understanding of flex system for crew.
- ◆ Easier training for crew by simulation of alarm.

Mimic pages

Page1 : Rail unit

Page2 : Supply unit

Page3 : Control and wiring

Page4 : Cylinder lubricating system

RT-flex Engine Expert system

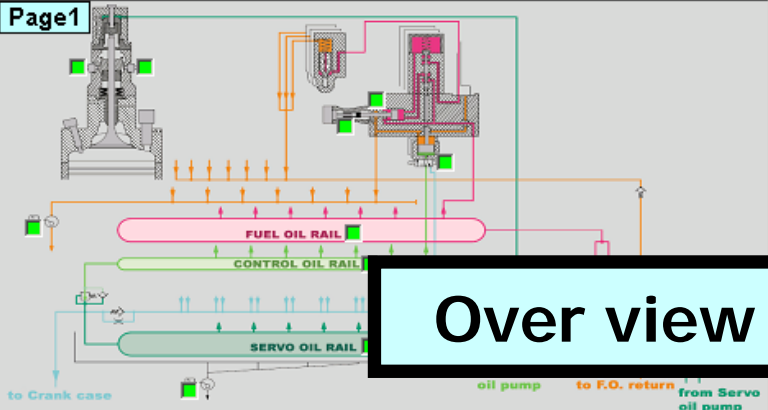
DU-ExpertSystem for DU-Sulzer-flex 7RT-flex84TD Engine (DIESEL UNITED,Ltd)

Alarm Item	Substance of Alarm
1 WECS POWER SUPPLY FAILURE	AC source or some AC/DC convertor are fail. Check E85 panel.
2 CRANK ANGLE, 1 FAIL	Crank angle sensor fail.
3 CRANK ANGLE, 2 FAIL	Crank angle sensor fail.
4 CRANK ANGLE 1 HIGH SHIFT	Compared with TDC signal.
5 CRANK ANGLE 1 LOW SHIFT	Compared with TDC signal.
6 CRANK ANGLE 2 HIGH SHIFT	Compared with TDC signal.
7 CRANK ANGLE 2 LOW SHIFT	Crank angle signal shifts low value compared with TDC signal.

List of alarms

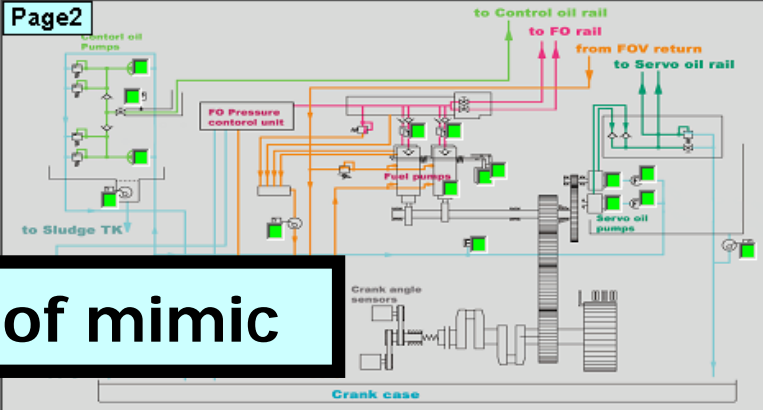
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Page1

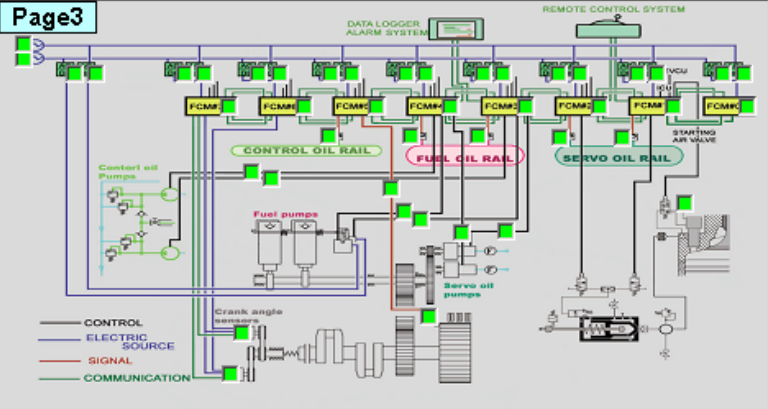


Over view of mimic

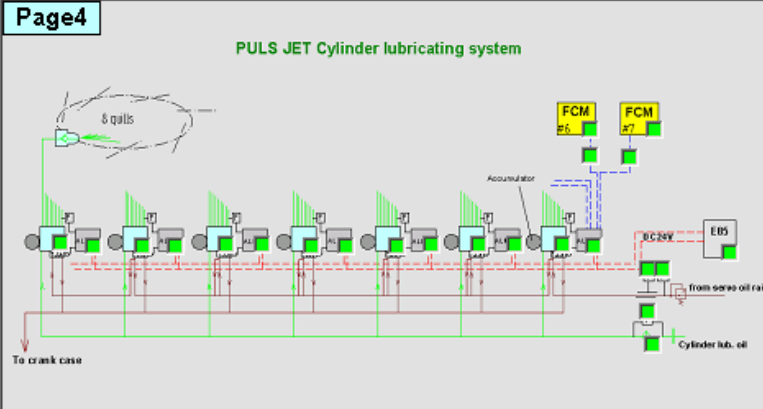
Page2



Page3



Page4



RT-flex Engine Expert system

DU-ExpertSystem for DU-Sulzer-flex 7RT-flex84TD Engine (DIESEL UNITED,Ltd.)

	Alarm Item	Substance of Alarm
1	<input type="checkbox"/> WECS POWER SUPPLY FAILURE	AC source or some AC/DC convertor are fail. Check EB5 panel.
2	<input type="checkbox"/> CRANK ANGLE, 1 FAIL	Crank angle sensor fail.
3	<input type="checkbox"/> CRANK ANGLE, 2 FAIL	Crank angle sensor fail.
4	<input type="checkbox"/> CRANK ANGLE	
5	<input type="checkbox"/> CRANK ANGLE	
6	<input type="checkbox"/> CRANK ANGLE	
7	<input type="checkbox"/> CRANK ANGLE	

Page1 : Rail unit

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Page1

to Crank case

FUEL OIL RAIL

CONTROL OIL RAIL

SERVO OIL RAIL

from F.O.P.

from Control oil pump

to F.O. return

from Servo oil pump

RT-flex Engine Expert system

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Alarm Item	Substance of Alarm
1 WECS POWER SUPPLY FAILURE	AC source or some AC/DC convertor are fail. Check E85 panel.
2 CRANK ANGLE 1 FAIL	Crank angle sensor fail.
3 CRANK ANGLE 2 FAIL	Crank angle sensor fail.
4 CRANK ANGLE 3 FAIL	Crank angle sensor fail.
5 CRANK ANGLE 4 FAIL	Crank angle sensor fail.
6 CRANK ANGLE 5 FAIL	Crank angle sensor fail.
7 CRANK ANGLE 6 FAIL	Crank angle signal shifts low value compared with TDC signal.

Page2 : Supply unit

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Control oil pumps

to Control oil rail

to FO rail

from FOV return to Servo oil rail

to Servo oil rail

FO Pressure control unit

Fuel pumps

Servo oil pumps

to Sludge TK

Automatic LO filter

LO supply

FO leak

FO return

FO supply

Crank angle sensors

Crank case

RT-flex Engine Expert system

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Alarm Item	Substance of Alarm
1 WECS POWER SUPPLY FAILURE	AC source or some AC/DC convertor are fail. Check E85 panel.
2 CRANK ANGLE, 1 FAIL	Crank angle sensor fail.
3 CRANK ANGLE, 2 FAIL	Crank angle sensor fail.
4 CRANK ANGLE 1	
5 CRANK ANGLE 1	
6 CRANK ANGLE 2	
7 CRANK ANGLE 2	

Page3 : Control and wiring

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Page3

Legend:

- CONTROL
- ELECTRIC SOURCE
- SIGNAL
- COMMUNICATION

RT-flex Engine Expert system

DU-ExpertSystem for DU-Sulzer-flex 7RT-flex84TD Engine (DIESEL UNITED,Ltd)

Alarm Item	Substance of Alarm
1 WECS POWER SUPPLY FAILURE	AC source or some AC/DC convertor are fail. Check EB5 panel.
2 CRANK ANGLE, 1 FAIL	Crank angle sensor fail.
3 CRANK ANGLE, 2 FAIL	Crank angle sensor fail.
4 CRANK ANGLE, 3 FAIL	Crank angle sensor fail.
5 CRANK ANGLE, 4 FAIL	Crank angle sensor fail.
6 CRANK ANGLE, 5 FAIL	Crank angle sensor fail.
7 CRANK ANGLE, 6 FAIL	Crank angle sensor fail.

Page4 : Cylinder lubricating system

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Page4

PULS JET Cylinder lubricating system

8 quills

FCM #6 FCM #7

Accumulator

DC 24V E85

from servo oil rail

Cylinder lub. oil

To crank case

Features

Automatically ...

- ◆ List up general check point according to alarms.
- ◆ List up parts order by higher possibility of damage.

When select any parts, then...

- ◆ List up check point of the parts.
- ◆ Indicate position where the parts are equipped.
- ◆ Show up picture or illustration of the parts.
- ◆ Show up instruction manual or code book of related chapter.

RT-flex Engine Expert system

Select alarm items, then related marker flicker on mimic view.

DU-ExpertSystem for DU-Sulzer-flex 7RT-flex84TD Engine (DIESEL UNITED,Ltd)

Alarm Item	Substance of Alarm
<input type="checkbox"/> 41 INJ QUANTITY 04, MEAS. FAIL	Fuel quantity sensor #4 do not work correctory
<input type="checkbox"/> 42 INJ QUANTITY 05, MEAS. FAIL	Fuel quantity sensor #5 do not work correctory
<input type="checkbox"/> 43 INJ QUANTITY 06, MEAS. FAIL	Fuel quantity sensor #6 do not work correctory
<input type="checkbox"/> 44 INJ QUANTITY 07, MEAS. FAIL	Fuel quantity sensor #7 do not work correctory
<input checked="" type="checkbox"/> 45 INJ 01 TIMING FAIL	#01 cylinder injection fail.
<input type="checkbox"/> 46 INJ 02 TIMING FAIL	#02 cylinder injection fail.
<input type="checkbox"/> 47 INJ 03 TIMING FAIL	#03 cylinder injection fail.

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Page1

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Page4

PULS JET Cylinder lubricating system

— CONTROL
 — ELECTRIC SOURCE
 — SIGNAL
 — COMMUNICATION

RT-flex Engine Expert system

Diagnose the alarms

DU-ExpertSystem for DU-Sulzer-flex 7RT-flex84TD Engine (DIESEL UNITED,Ltd)

Alarm Item	Substance of Alarm
41 INJ. QUANTITY 04, MEAS. FAIL	Fuel quantity sensor #4 do not work correctory
42 INJ. QUANTITY 05, MEAS. FAIL	Fuel quantity sensor #5 do not work correctory
43 INJ. QUANTITY 06, MEAS. FAIL	Fuel quantity sensor #6 do not work correctory
44 INJ. QUANTITY 07, MEAS. FAIL	Fuel quantity sensor #7 do not work correctory
45 <input checked="" type="checkbox"/> INJ. 01 TIMING FAIL	#01 cylinder injection fail.
46 INJ. 02 TIMING FAIL	#02 cylinder injection fail.
47 INJ. 03 TIMING FAIL	#03 cylinder injection fail.

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Page1 Page2

Click this button, then go to diagnostic page

Page3 Page4

next page

Note:

flex engine monitors many items. Therefore if trouble happens, many alarms usually appears in same time. But the system can diagnose and list up parts that might be damaged one.

RT-flex Engine Expert system

Diagnosis page shows up!!

Diagnosis [CLOSE]

General Expert system shows general check point. Please check according to following items.

Alarm category	Please check some parts according to following procedure.
1 INJ. #n TIMING FAIL	Could be consequence of a rail valve failure.
2 INJ. #n TIMING FAIL	Not injecting with all active injector nozzles.
3 INJ. #n TIMING FAIL	
4 INJ. #n TIMING FAIL	
5 INJ. #n TIMING FAIL	Cracked or seized injection nozzles?
6 INJ. #n TIMING FAIL	Could be consequence of injector pipe leakage.
7 INJ. #n TIMING FAIL	Can occur when operating with stroke feedback disconnected.

List up general check point correspond to alarm

Detail

Error	
1	Crank angle sensor unit
2	Rail Valves for ICU for #1 cylinder
3	FCM#1 (Flex Control Module)
4	Fuel high pressure pipe for #1 cylinder
5	Fuel injection valves for #1 cylinder

List up parts order by higher possibility of damage

Click any parts, then

Maintenance
Operation
Code Book

Arrangement of selected parts

RT-flex Engine Expert system

Detail information about selected parts

Diagnosis CLOSE

General Expert system shows general check point. Please check according to following items.

Alarm category	Please check some parts according to following procedure.
1 INJ. #n TIMING FAIL	Could be consequence of a rail valve failure.
2 INJ. #n TIMING FAIL	Not injecting with all active injector nozzles.
3 INJ. #n TIMING FAIL	Sometimes observed under rough sea conditions with quick load changes.
4 INJ. #n TIMING FAIL	Might be too low opening pressure of injector valve.
5 INJ. #n TIMING FAIL	Cracked or seized injection nozzles?
6 INJ. #n TIMING FAIL	Could be consequence of injector pipe leakage.
7 INJ. #n TIMING FAIL	Can occur when operating with stroke feedback disconnected

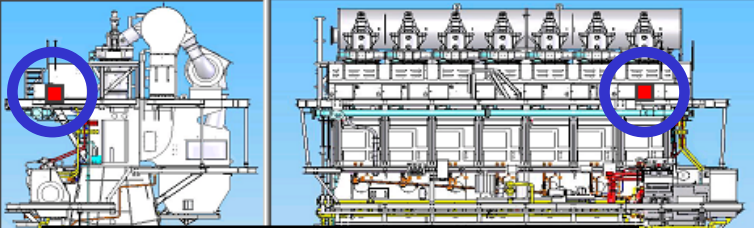
Detail Expert system lists up possibility of error parts. Please click one item to show detail information.

Error Parts (Click one item!)	Check Point of selected parts
1 Crank angle sensor unit	1 Check for electric source of FCM. Is DC24V supplied?
2 Rail Valves for ICU for #1 cylinder	2 Confirm LED and check FCM condition
3 FCM#1 (Flex Control Module)	3 Check electric cable connection on FCM
4 Fuel high pressure pipe for #1 cylinder	
5 Fuel injection valves for #1 cylinder	

Show up check point of the parts

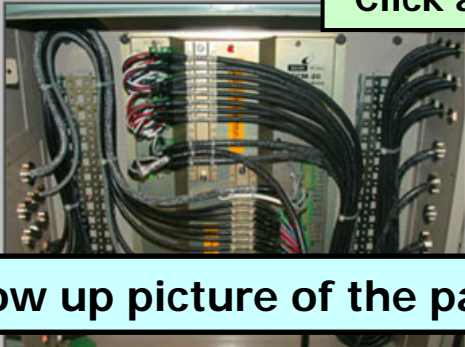
Instructions
Maintenance
Operation
Code Book

Arrangement of selected parts



Indicate position that the parts are equipped.

FCM#1 (Flex Control Module)

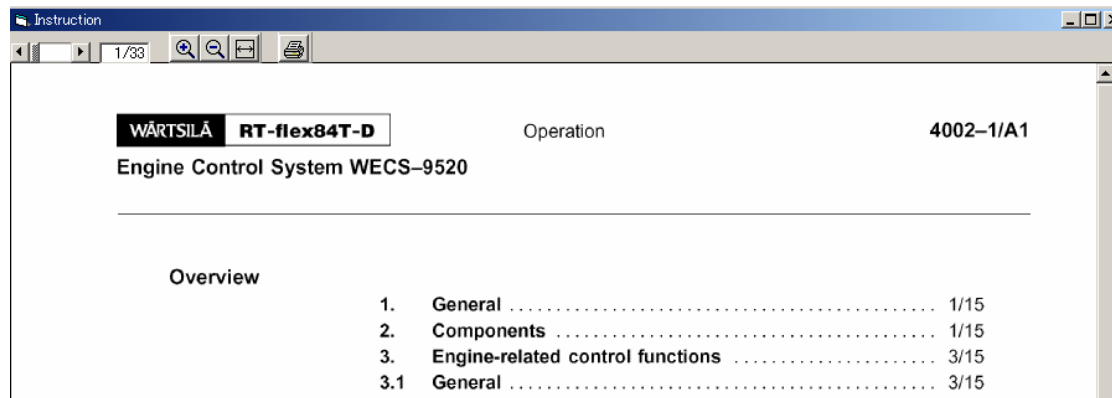


Show up picture of the parts

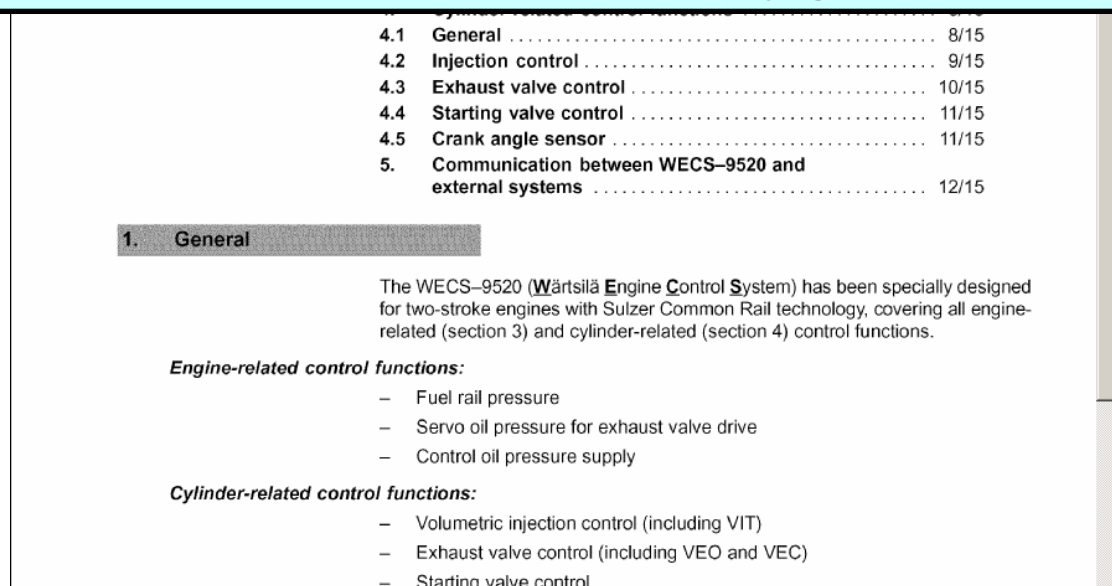
Click any document, then

RT-flex Engine Expert system

Instruction manuals shows up!!



Related chapters are automatically gathered and shown up.



Thank you very much!

We hope the system is useful and helpful for you.