SEN00074-16

Shop Manual

ENGINE

140E -5 SERIES

KOMATSU®

MidWestTech | Komatsu 140E-5 Series Engine Service Manual | Publication SEN00074-16

Order the manual at mid-west-tech.com >

Composition of shop manual

The contents of this shop manual are shown together with Form No. in a list.

Note 1: Always keep the latest version of this manual in accordance with this list and utilize accordingly.
The marks shown to the right of Form No. denote the following:
○: New issue (to be filed additionally) ●: Revision (to be replaced for each Form No.)

Note 2: This shop manual can be supplied for each Form No.

Note 3: To file this shop manual in the special binder for management, handle it as follows:
- Place a divider on the top of each section in the file after matching the Tub No. with No. indicated next to each Section Name shown in the table below:
- File overview and other materials in sections in the order shown below and utilize them accordingly.

Section Title	Form Number	
Shop Manual, contents binder, binder label and tabs	SEN00074-16	
00 Index and foreword	SEN00075-16	
Index	SEN00076-16	●
Foreword and general information	SEN00077-07	
01 Specification	SEN00078-07	
Specification and technical data	SEN00079-07	●
10 Structure, function and maintenance standard	SEN00080-08	
Structure, function and maintenance standard, Part 1	SEN00081-08	●
Structure, function and maintenance standard, Part 2	SEN00082-06	●
20 Standard value table	SEN00083-07	
Standard service value table	SEN00147-07	●
30 Testing and adjusting	SEN00148-05	
Testing and adjusting	SEN00149-05	
40 Troubleshooting	SEN00150-06	
General information on troubleshooting	SEN00151-04	
Troubleshooting of mechanical system (S-mode)	SEN00152-03	
Troubleshooting of electrical system (E-mode), Part 1	SEN00153-03	
Troubleshooting of electrical system (E-mode), Part 2	SEN00154-02	
50 Disassembly and assembly	SEN00155-07	
General information on disassembly and assembly	SEN00156-05	
Disassembly and assembly, Part 1 (with EGR)	SEN00157-05	
Disassembly and assembly, Part 2 (EGR-less)	SEN00158-05	
Disassembly and assembly, Part 3	SEN00159-04	
90 Repair and replacement of parts	SEN05197-02	
Information related to repair and replacement	SEN05198-00	
Cylinder head	SEN05199-02	
Cylinder block	SEN05200-01	

MidWestTech | Komatsu 140E-5 Series Engine Service Manual | Publication SEN0007... Order the manual at mid-west-tech.com >

Table of contents

00 Index and foreword
Index SEN00076-16
Composition of shop manual ... 2
Table of contents ... 3
Foreword and general information SEN00077-07
Safety notice ... 2
How to read the shop manual ... 7
Explanation of terms for maintenance standard ... 9
Handling of electric equipment and hydraulic component ... 11
Handling of connectors newly used for engines ... 20
How to read electric wire code ... 23
Precautions when carrying out operation ... 26
Method of disassembling and connecting push-pull type coupler ... 29
Standard tightening torque table ... 32
Conversion table ... 36

01 Specification
Specification and technical data SEN00079-07
Outline ... 2
Specifications ... 6
General view ... 24
Weight table ... 61
Engine performance curves ... 65

10 Structure, function and maintenance standard
Structure, function and maintenance standard, Part 1 SEN00081-08
Air intake and exhaust unit ... 3
Air cleaner ... 5
Turbocharger ... 8
Aftercooler ... 19
Muffler ... 20
EGR system ... 25
Cylinder head ... 32
Cylinder block ... 36
Cylinder liner ... 39
Main moving parts ... 40
Crankshaft ... 42
Camshaft ... 43
Cam follower and push rod ... 44
Piston, piston ring and piston pin ... 46
Connecting rod ... 48
Flywheel and flywheel housing ... 49
Vibration damper ... 52
Timing gear ... 54
Valve system ... 58
Valve and valve guide ... 60
Rocker arm and shaft ... 62
Crosshead and guide ... 63
Structure, function and maintenance standard, Part 2 SEN00082-06
Lubrication system ... 4
Lubrication system diagram ... 4
Oil pump ... 8
EGR oil pump ... 9
Oil filter ... 10
Oil cooler ... 12

MidWestTech | Komatsu 140E-5 Series Engine Service Manual | Publication SEN0007... Order the manual at mid-west-tech.com >

Fuel system ... 14
CRI system diagram ... 14
Outline of CRI system ... 16
Fuel piping ... 38
Fuel cooler ... 42
Fuel filter ... 43
Priming pump ... 46
Electric priming pump ... 47
Engine controller cooler ... 48
Cooling system ... 49
Cooling system diagram ... 49
Water pump ... 54
Thermostat ... 57
Corrosion resistor ... 58
Cooling fan drive ... 60
Accessories ... 63
Front PTO ... 63
Electrical equipment ... 65
Alternator ... 65
Starting motor ... 76
Starting aid ... 78
Engine controller ... 79

20 Standard value table
Standard service value table SEN00147-07
Standard service value table for testing, adjusting, and troubleshooting ... 2
Running-in standard and performance test standard ... 19

30 Testing and adjusting
Testing and adjusting SEN00149-05
Testing and adjusting (with EGR) ... 3
Testing and adjusting tools list ... 3
Sketches of special tools ... 5
Testing air boost pressure ... 6
Testing exhaust temperature ... 7
Adjusting valve clearance ... 8
Testing compression pressure ... 9
Testing blow-by pressure ... 11
Testing engine oil pressure ... 12
Testing EGR valve and bypass valve drive oil pressure ... 13
Handling fuel system parts ... 14
Releasing residual pressure in fuel system ... 14
Testing fuel pressure ... 15
Reduced cylinder mode operation ... 16
No-injection cranking ... 16
Testing fuel return rate and leakage ... 17
Bleeding air from fuel circuit ... 20
Testing fuel system for leakage ... 22
Testing and adjusting alternator belt tension ... 23
Testing and adjusting fan belt tension ... 24
Handling controller high-voltage circuit ... 25
Testing and adjusting (EGR-less) ... 26
Testing and adjusting tools list ... 26
Sketches of special tools ... 28
Testing air boost pressure ... 29
Testing exhaust temperature ... 30
Adjusting valve clearance ... 31

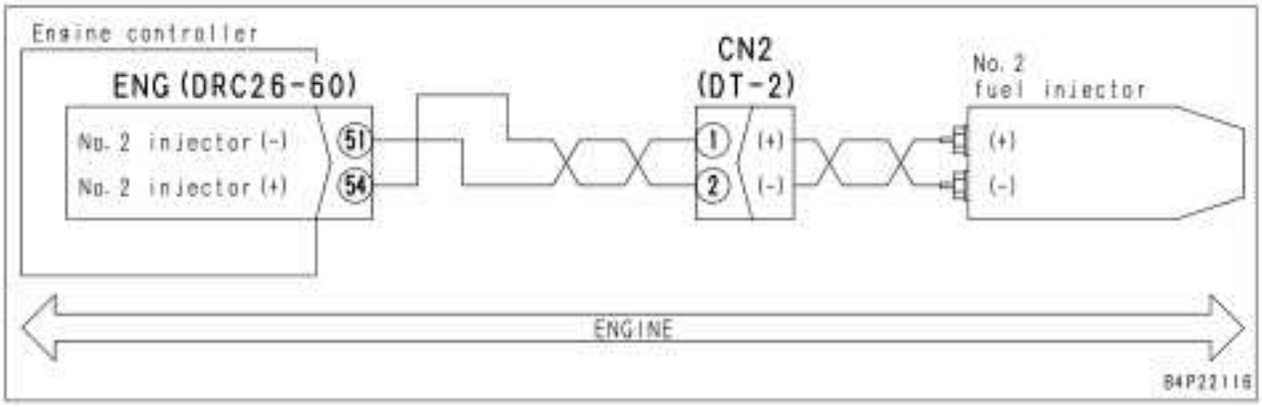
MidWestTech | Komatsu 140E-5 Series Engine Service Manual | Publication SEN0007... Order the manual at mid-west-tech.com >

Engine name			SAA6D140E-5
Machine models			D155A-6
Number of cylinders – Bore × Stroke		mm	6 – 140 × 165
Total displacement		ℓ{cc}	15.2 {15,230}
Firing order		—	1–5–3–6–2–4
Dimensions	Overall length	mm	1,461
	Overall width	mm	1,109
	Overall height (excluding exhaust pipe)	mm	1,157
	Overall height (including exhaust pipe)	mm	1,950
Performance	Rated horsepower	kW{HP}/min^{-1}{rpm}	268 {359.9}/1,900 {1,900} (Gross)
	Max. torque	Nm{kgm}/min^{-1}{rpm}	1,834 {187}/1,300 {1,300} (Gross)
	Max. speed with no load (High idle speed)	min^{-1}{rpm}	2,100 (0/–50) {2,100 (0/–50)}
	Min. speed with no load (Low idle speed)	min^{-1}{rpm}	740 (+40/0) {740 (+40/0)}
	Fuel consumption ratio at rated point	g/kW·h {g/HP·h}	215 {160}
Dry weight		kg	1,725
Fuel supply pump		—	DENSO ECD-U2
Governor		—	Electronic control type
Quantity of lubricating oil (refill capacity)		ℓ	45 (37)
Quantity of coolant		ℓ	25 (In only engine)
Alternator		—	24V, 60A, 75A, 90A
Starting motor		—	24V, 11kW
Battery		—	12V, 170Ah × 2
Turbocharger		—	KOMATSU KTR110L
Air compressor		—	—
Others		—	With air-cooled aftercooler

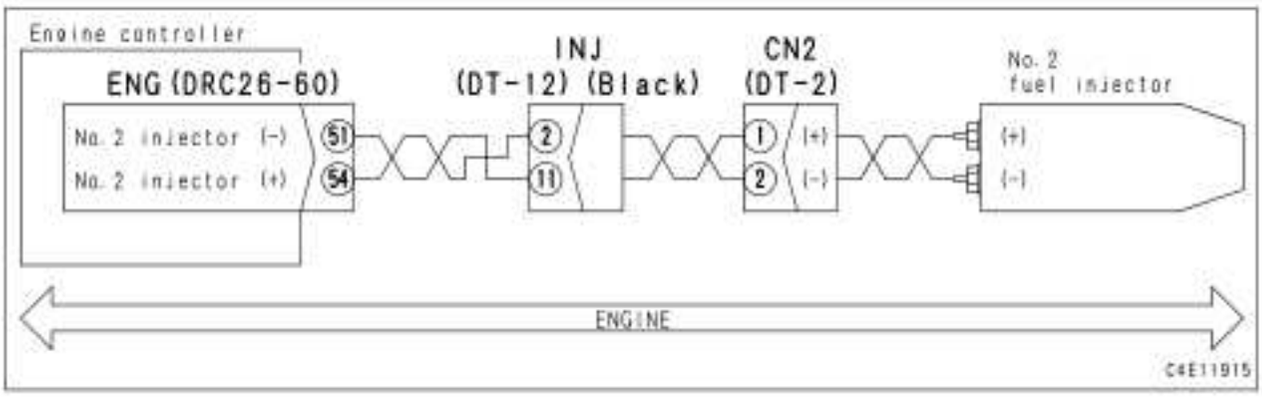
MidWestTech | Komatsu 140E-5 Series Engine Service Manual | Publication SEN0007... Order the manual at mid-west-tech.com >

Circuit diagram related to injector #2

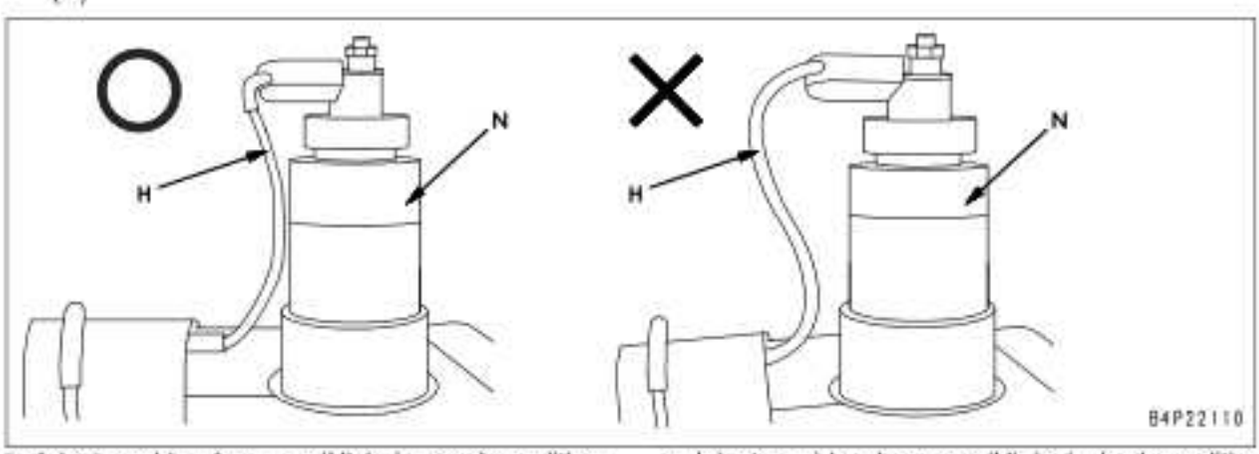
★ **For "with EGR"**



★ **For "EGR-less"**



- Improper installation of injector wiring harness (H)



○: Injector wiring harness (H) is in good condition being laid close to injector (N)

x: Injector wiring harness (H) is in bad condition without being laid close to injector (N)

★: Injector wiring harness (H) may interfere with rocker arm.

MidWestTech | Komatsu 140E-5 Series Engine Service Manual | Publication SEN0007... Order the manual at mid-west-tech.com >

E-48 Code [778/CA778] Eng. Bkup Speed Sensor Error

Error code	Failure code	Trouble	Abnormality in engine Bkup speed sensor
778	CA778		
Contents of trouble	• Abnormality occurred in engine Bkup speed sensor circuit.		
Action of controller	• Operates with signals of Ne speed sensor.		
Problem that appears on machine	• Running engine stops (when Ne speed sensor is also abnormal). • Stopped engine cannot be started (when Ne speed sensor is also abnormal).		
Related information	• Different machine models may have different connector Nos.		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective sensor power supply system	If code [**187**/**CA187**] or [**227**/**CA227**] is indicated, carry out troubleshooting for it first.		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – G (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – G (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (26) – G (female) (3)	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – G (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – G (female) (2) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (26) – G (female) (3) and chassis ground	Resistance	Min. 1 MΩ
	4	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – G (female) (1) and between ENG (female) (47) – G (female) (2)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – G (female) (1) and between ENG (female) (26) – G (female) (3)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – G (female) (2) and between ENG (female) (26) – G (female) (3)	Resistance	Min. 1 MΩ
	5	Defective mount of sensor or defective rotation sensing part	Check Bkup speed sensor directly for defective mount (defective clearance) or check rotation sensing part (in supply pump) directly for defect.		
	6	Defective engine Bkup speed sensor	If causes 1 – 5 are not detected, engine Bkup speed sensor may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		
	7	Defective engine controller	If causes 1 – 6 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

MidWestTech | Komatsu 140E-5 Series Engine Service Manual | Publication SEN0007... Order the manual at mid-west-tech.com >