WSM

WORKSHOP MANUAL
DIESEL ENGINE

SM-E2B SERIES



KiSC issued 06, 2006 A

MidWestTech | Kubota SM-E2B Series Diesel Engine Service Manual | Publication 9Y011-03173

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

GENERAL

CONTENTS

1. ENGINE IDENTIFICATION G-1
   [1] MODEL NAME AND ENGINE SERIAL NUMBER G-1
   [2] E2B ENGINE G-2
   [3] CYLINDER NUMBER G-2
2. GENERAL PRECAUTIONS G-3
3. MAINTENANCE CHECK LIST G-4
4. CHECK AND MAINTENANCE G-6
   [1] DAILY CHECK POINTS G-6
   [2] CHECK POINTS OF INITIAL 50 HOURS G-8
   [3] CHECK POINT OF EVERY 50 HOURS G-10
   [4] CHECK POINT OF EVERY 75 HOURS G-11
   [5] CHECK POINTS OF EVERY 100 HOURS G-12
   [6] CHECK POINT OF EVERY 150 HOURS G-15
   [7] CHECK POINTS OF EVERY 200 HOURS G-15
   [8] CHECK POINTS OF EVERY 400 HOURS G-16
   [9] CHECK POINTS OF EVERY 500 HOURS G-17
   [10]CHECK POINTS OF EVERY 1 OR 2 MONTHS G-19
   [11]CHECK POINT OF EVERY YEAR G-21
   [12]CHECK POINT OF EVERY 800 HOURS G-22
   [13]CHECK POINTS OF EVERY 1500 HOURS G-23
   [14]CHECK POINTS OF EVERY 3000 HOURS G-25
   [15]CHECK POINTS OF EVERY 2 YEARS G-28
5. SPECIAL TOOLS G-32

KiSC issued 06, 2006 A

MidWestTech | Kubota SM-E2B Series Diesel Engine Service Manual | Publication 9Y011-... Order the manual at mid-west-tech.com >

MECHANISM

CONTENTS

1. ENGINE BODY M-1
   [1] HALF-FLOATING HEAD COVER M-1
   [2] CLOSED BREATHER M-1
   [3] PISTON (Z602-E2B, D902-E2B) M-2
   [4] OIL PAN (Z602-E2B, D902-E2B) M-2
2. COOLING SYSTEM M-2
   [1] COOLING FIN (Z602-E2B, D902-E2B) M-3

KiSC issued 06, 2006 A

MidWestTech | Kubota SM-E2B Series Diesel Engine Service Manual | Publication 9Y011-... Order the manual at mid-west-tech.com >

SERVICING

CONTENTS

1. TROUBLESHOOTING S-1
2. SERVICING SPECIFICATIONS S-4
3. TIGHTENING TORQUES S-11
   [1] TIGHTENING TORQUES FOR GENERAL USE SCREWS, BOLTS AND NUTS S-11
   [2] TIGHTENING TORQUES FOR SPECIAL USE SCREWS, BOLTS AND NUTS S-12
4. CHECKING, DISASSEMBLING AND SERVICING S-13
   [1] CHECKING AND ADJUSTING S-13
      (1) Engine Body S-13
      (2) Lubricating System S-15
      (3) Cooling System S-15
      (4) Fuel System S-17
      (5) Electrical System S-21
   [2] DISASSEMBLING AND ASSEMBLING S-28
      (1) Draining Engine Oil and Coolant S-28
      (2) External Components S-29
      (3) Cylinder Head, Valves and Oil Pan S-29
      (4) Gear Case and Timing Gears S-35
      (5) Piston and Connecting Rod S-42
      (6) Flywheel and Crankshaft S-45
      (7) Starter S-49
      (8) Dynamo S-51
      (9) Alternator S-52
   [3] SERVICING S-53
      (1) Cylinder Head and Valves S-53
      (2) Timing Gears S-59
      (3) Piston and Connecting Rod S-61
      (4) Crankshaft S-64
      (5) Cylinder S-70
      (6) Oil Pump S-71
      (7) Starter S-72
      (8) Alternator S-75

KiSC issued 06, 2006 A

MidWestTech | Kubota SM-E2B Series Diesel Engine Service Manual | Publication 9Y011-... Order the manual at mid-west-tech.com >

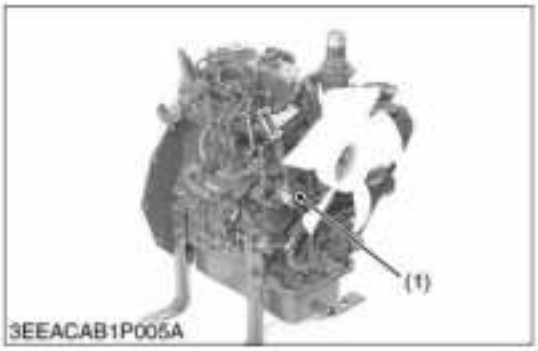
1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Replenish fuel	G-10
	Air in the fuel system	Bleed	G-10
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel hose clogged	Clean or replace	G-10
	Fuel filter clogged	Replace	G-16
	Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	4, G-8
	Fuel with low cetane number	Use specified fuel	4
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	S-29
	Incorrect injection timing	Adjust	S-17, 18
	Fuel camshaft worn	Replace	S-41
	Injection nozzle clogged	Clean or replace	S-20, 21
	Injection pump malfunctioning	Repair or replace	S-19, 35, 36, 37
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	S-40 to 48 S-64 to 71
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	S-30, 31, 32
	Improper valve timing	Correct or replace timing gear	S-40
	Piston ring and cylinder worn	Replace	S-43, 44, 63
	Excessive valve clearance	Adjust	S-14
	Stop solenoid malfunctioning	Replace	S-26, 27, 29, 36
Starter Does Not Run	Battery discharged	Charge	G-19
	Starter malfunctioning	Repair or replace	S-29, 72 to 75
	Wiring disconnected	Connect	–
Engine Revolution Is Not Smooth	Fuel filter clogged or dirty	Replace	G-16
	Air cleaner clogged	Clean or replace	G-13, 16, 21
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	S-29
	Injection pump malfunctioning	Repair or replace	S-19, 35, 36, 37
	Incorrect nozzle injection pressure	Adjust	S-20
	Injection nozzle stuck or clogged	Repair or replace	S-20, 21
	Governor malfunctioning	Repair	S-41

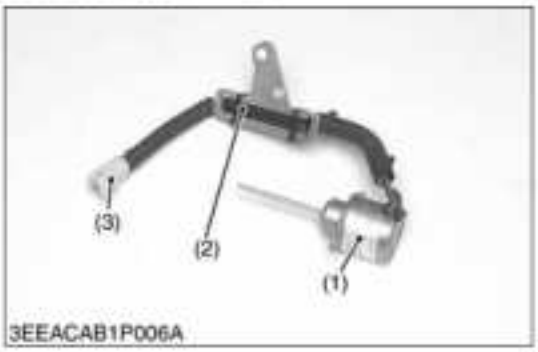
W1014322

KiSC issued 06, 2006 A

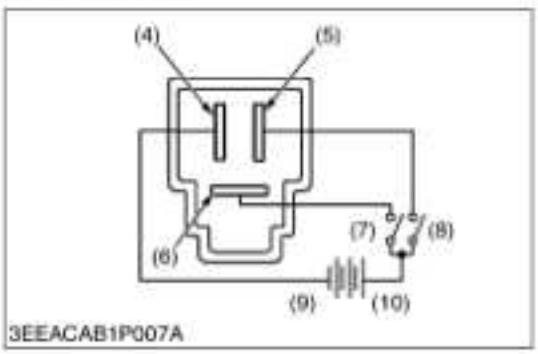
MidWestTech | Kubota SM-E2B Series Diesel Engine Service Manual | Publication 9Y011-... Order the manual at mid-west-tech.com >



3EEACAB1P005A



3EEACAB1P006A



3EEACAB1P007A

Engine Stop Solenoid Test (Energize to Run Type)

1. Disconnect the **3P** connector (3) from the engine stop solenoid (1) wiring harness.
2. Remove the engine stop solenoid (1) from the engine.
3. Connect the jumper leads from the pulling coil terminal (6) to the switch (7), and from switch (7) to the battery positive terminal (10).
4. Connect the jumper leads from the holding coil terminal (5) to the switch (8), and from switch (8) to the battery positive terminal (10).
5. Connect the jumper leads from the ground terminal (4) to the battery negative terminal (9).
6. When the switch (7) is turn on, the plunger pull into the solenoid body and then the plunger comes out within approximately 1.2 seconds.
7. Turn on the switch (8) then turn on the switch (7), the plunger pull into the solenoid body and it keeps in holding position after turn off the switch (7),
8. If the plunger is not attracted, the engine stop solenoid is faulty.

■ **NOTE**

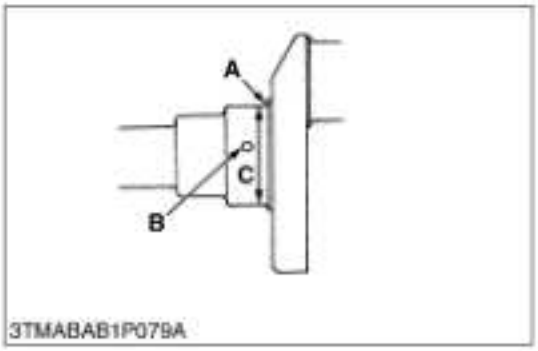
- **This solenoid assembly includes reverse polarity protected pulling coil timer module (2) to prevent solenoid burnout due to engine over crank or misadjustment of linkage by limiting the pull coil ON time.**

Pull coil energized time	Factory spec.	0.52 to 1.20 seconds

(1) Engine Stop Solenoid
(2) Pulling Coil Timer Module
(3) **3P** Connector
(4) Ground Terminal
(5) Holding Coil Terminal
(6) Pulling Coil Terminal
(7) Switch for Pulling Coil
(8) Switch for Holding Coil
(9) Battery Negative Terminal
(10) Battery Positive Terminal

W1022853

MidWestTech | Kubota SM-E2B Series Diesel Engine Service Manual | Publication 9Y011-... Order the manual at mid-west-tech.com >



3TMABAB1P079A

Oil Clearance between Crankshaft Journal and Crankshaft Bearing 1 (Continued)

(Reference)

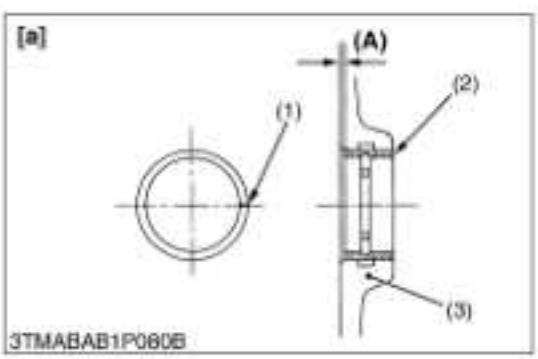
- Undersize crankshaft bearing 1

Undersize	Models	Bearing	Code Number	Marking
0.2 mm 0.008 in.	Z482-E2B D662-E2B D722-E2B D782-E2B	Crankshaft bearing 1 02	15861-23910	020 US
	Z602-E2B D902-E2B		1G460-23910	
0.4 mm 0.016 in.	Z482-E2B D662-E2B D722-E2B D782-E2B	Crankshaft bearing 1 04	15861-23920	040 US
	Z602-E2B D902-E2B		1G460-23920	

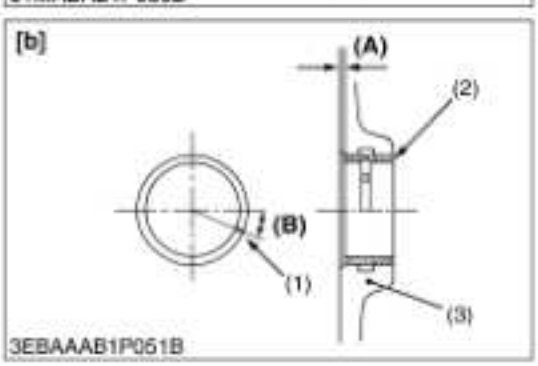
- Undersize dimensions of crankshaft journal

Undersize	Models	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension **A**	All models	1.8 to 2.2 mm radius 0.071 to 0.087 in.radius	1.8 to 2.2 mm radius 0.071 to 0.087 in.radius
*Dimension **B**	All models	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief
Dimension **C**	Z482-E2B D662-E2B D722-E2B D782-E2B	39.734 to 39.750 mm dia. 1.56433 to 1.56496 in. dia.	39.534 to 39.550 mm dia. 1.55646 to 1.55709 in. dia.
	Z602-E2B D902-E2B	43.734 to 43.750 mm dia. 1.72181 to 1.72244 in. dia.	43.534 to 43.550 mm dia. 1.71394 to 1.71457 in. dia.
The crankshaft journal must be fine-finished to higher than VVVV (0.8S). *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.0394 to 0.0591 in.) relief.			

W1044484



3TMABAB1P080B



3EBAAAB1P051B

Replacing Crankshaft Bearing 1

(When removing)

1. Press out the used crankshaft bearing 1 using a crankshaft bearing 1 replacing tool. (Refer to "**SPECIAL TOOLS**".)

(When installing)

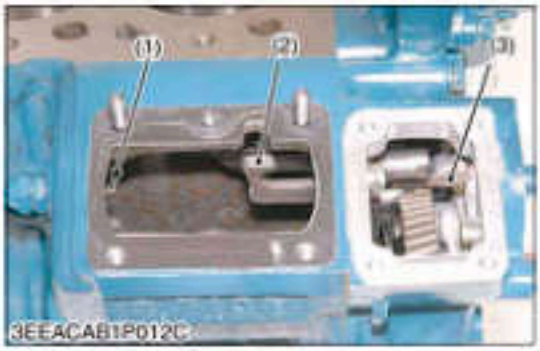
1. Clean a new crankshaft bearing 1 and crankshaft journal bore, and apply engine oil to them.
2. Using a crankshaft bearing 1 replacing tool, press in a new bearing 1 (2) so that its seam (1) directs toward the exhaust manifold side. (See figure.)

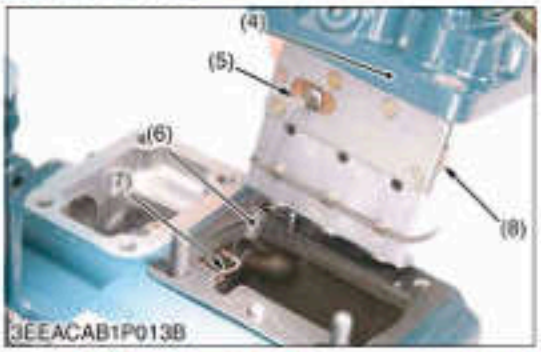
Dimension (**A**)	Factory spec.	0.0 to 0.3 mm 0.0 to 0.0118 in.

(1) Seam
(2) Crankshaft Bearing 1
(3) Cylinder Block
(A) Dimension
(B) 0.366 rad (21 °)
[a] Z482-E2B, D662-E2B, D722-E2B, D782-E2B
[b] Z602-E2B, D902-E2B

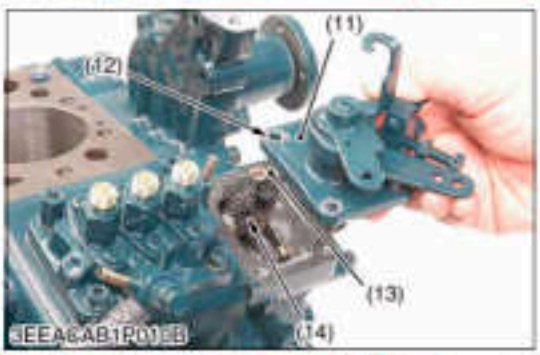
W10342000

MidWestTech | Kubota SM-E2B Series Diesel Engine Service Manual | Publication 9Y011-... Order the manual at mid-west-tech.com >











Injection Pump, Fuel Feed Pump and Speed Control Plate (for Energize to Run Type Engine Stop Solenoid) (Continued)

(When reassembling)

1. Move the fork lever (2) to the gear case side.
2. Hook the start spring (6) to the injection pump control rack pin (5).
3. Put the specific tool (7) through the fork lever hole of cylinder block (9) and hook the start spring (6).
4. Keep this spring slightly extended and install the injection pump (4). Make sure the control rod (8) should be pushed by the idling adjusting spring (1) and the pin (5) on the rod engages with the fork lever (2).
5. Hook the start spring (6) to the bracket (3) using the specific tool (7).
6. Hook the governor springs (small and large) (14) to the governor lever (13) using the specific tool (7) and install the speed control plate (11). Be sure to place the copper washers underneath two screws (12) in the upper of the speed control plate.
7. Install the engine stop solenoid rod (15) to the guide hole of cylinder block (10) and fix the engine stop solenoid (16) with socket head screws.

■ **NOTE**

- **Be careful not to stretch the start spring (6) too long. Otherwise it may get deformed permanently.**
- **Make sure the start spring (6) is tight on the bracket (3).**
- **The sealant is applied to both sides of the soft metal gasket shim. The liquid gasket is not required for assembling.**
- **Addition or reduction of shim (0.05 mm, 0.0020 in.) delays or advances the injection timing by approx. 0.0087 rad (0.5 °).**
- **In disassembling and replacing, be sure to use the same number of new gasket shims with the same thickness.**

(1) Idling Adjusting Spring
(2) Fork Lever
(3) Bracket
(4) Injection Pump
(5) Injection Pump Control Rack Pin
(6) Start Spring
(7) Specific Tool
(8) Injection Pump Control Rod
(9) Fork Lever Hole of Cylinder Block
(10) Guide Hole of Cylinder Block
(11) Speed Control Plate
(12) Screw and Copper Washer
(13) Governor Lever
(14) Governor Spring
(15) Engine Stop Solenoid Rod
(16) Engine Stop Solenoid

W1028534

MidWestTech | Kubota SM-E2B Series Diesel Engine Service Manual | Publication 9Y011-... Order the manual at mid-west-tech.com >

[6] CHECK POINT OF EVERY 150 HOURS





Replacing Oil Filter Cartridge (for Optional Depth Oil Pans)

CAUTION

- **Be sure to stop the engine before changing filter cartridge.**

1. Remove the oil filter cartridge (1) with the filter wrench.
2. Apply a slight coat of oil onto the new cartridge gasket.
3. To install the new cartridge, screw it in by hand. Over tightening may cause deformation of rubber gasket.
4. After the new cartridge has been replaced, the engine oil normally decrease a little. Thus see that the engine oil does not leak through the seal and be sure to read the oil level on the dipstick. Then, replenish the engine oil up to the specified level.

■ IMPORTANT

- **To prevent serious damage to the engine, replacement element must be highly efficient. Use only a KUBOTA genuine filter or its equivalent.**

(1) Engine Oil Filter Cartridge

[a] Standard Type
[b] One-side Maintenance Type

W1018457

[7] CHECK POINTS OF EVERY 200 HOURS





Replacing Oil Filter Cartridge (for Standard Depth Oil Pans)

CAUTION

- **Be sure to stop the engine before changing filter cartridge.**

1. Remove the oil filter cartridge (1) with the filter wrench.
2. Apply a slight coat of oil onto the new cartridge gasket.
3. To install the new cartridge, screw it in by hand. Over tightening may cause deformation of rubber gasket.
4. After the new cartridge has been replaced, the engine oil normally decrease a little. Thus see that the engine oil does not leak through the seal and be sure to read the oil level on the dipstick. Then, replenish the engine oil up to the specified level.

■ IMPORTANT

- **To prevent serious damage to the engine, replacement element must be highly efficient. Use only a KUBOTA genuine filter or its equivalent.**

(1) Engine Oil Filter Cartridge

[a] Standard Type
[b] One-side Maintenance Type

W1018643

MidWestTech | Kubota SM-E2B Series Diesel Engine Service Manual | Publication 9Y011-... Order the manual at mid-west-tech.com >