WSM

WORKSHOP MANUAL
DIESEL ENGINE

RK SERIES

Kubota

KiSC issued 07, 2014 A

PREVIEW YOUFIXTHIS.COM

Download full manual at youfixthis.com

CONTENTS

MECHANISM

FEATURE M-1
[1] Fuel Saving M-3
[2] Quiet/Low Vibration M-5
[3] Easy Operation/Starting M-5
[4] High Durability M-7
[5] New Design/Safety Engine M-7

ENGINE BODY M-8
[1] Cylinder Head M-8
[2] Valve Mechanism M-10
[3] Cylinder Block and Cylinder Liner M-11
[4] Crankshaft and Journal Bearing M-12
[5] Piston and Piston Ring M-13
[6] Connecting Rod and Connecting Rod Bearing M-15
[7] Timing Gear M-15
[8] Camshaft M-16
[9] Flywheel M-16

LUBRICATING SYSTEM M-17
[1] General M-17
[2] Oil Pump M-18
[3] Oil Strainer M-18
[4] Relief Valve M-19
[5] Oil Signal M-19

COOLING SYSTEM M-20
[1] General M-20
[2] Radiator M-22
[3] Radiator Cap M-22

INTAKE/EXHAUST SYSTEM M-23
[1] Air Cleaner M-23
[2] Muffler M-23

FUEL SYSTEM M-24
[1] General M-24
[2] Injection Pump M-25
[3] Injection Nozzle M-28
[4] Governor Mechanism M-29
[5] Fuel Filter M-30

ELECTRICAL SYSTEM M-31
[1] General M-31
[2] Fan Dynamo M-31

KiSC issued 07, 2014 A

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

[SPECIFICATIONS]

Model		RK50	RK60	RK70
Type		Horizontal, water-cooled 4-cycle diesel engine		
Number of Cylinder		1		
Bore x Stroke		72.0 x 75.0 mm 2.83 x 2.95 in.	76.0 x 75.0 mm 2.99 x 2.95 in.	80.0 x 75.0 mm 3.15 x 2.95 in.
Displacement		305 cm^3 18.6 cu.in.	340 cm^3 20.7 cu.in.	376 cm^3 22.9 cu.in.
Continuous Rated Output		4.5 HP/2200 min^{-1} (rpm)	5.0 HP/2200 min^{-1} (rpm)	6.0 HP/2200 min^{-1} (rpm)
		3.4 kW/2200 min^{-1} (rpm)	3.7 kW/2200 min^{-1} (rpm)	4.5 kW/2200 min^{-1} (rpm)
Max. Output		5.0 HP/2400 min^{-1} (rpm)	6.0 HP/2400 min^{-1} (rpm)	7.0 HP/2400 min^{-1} (rpm)
		3.7 kW/2400 min^{-1} (rpm)	4.4 kW/2400 min^{-1} (rpm)	5.2 kW/2400 min^{-1} (rpm)
Max. Bare Speed (min^{-1} (rpm))		2560 min^{-1} (rpm)		
Min. Bare Idling Speed (min^{-1} (rpm))		1000 min^{-1} (rpm) or less		
Max. Torque		See performance curves		
Combustion System		TVCS		
Compression Ratio		24		
Lubricating System		Forced Lubrication with Trochoid Pump		
Oil Pressure Adjustment		Relief Valve		
Lubricating Oil		SSupplement 1 or MIL-L-46152, or API service class. CD (SAE 30,20,10W,10W-30)		
Lubricant Capacity		2.0 ℓ (0.53 U.S.gals)		
Cooling System	-,-N Type	Pressurized Radiator, Natural Convection		
	-H Type	Hopper		
Cooling Water Capacity	-,-N Type	1.3 ℓ (0.34 U.S.gals)		
	-H Type	8.5 ℓ (2.2 U.S.gals)		
Fuel Injection Pump		ND-PFR1M55/1ND329 ND-PFR1M55/1ND330 ND-PFR1M55/1ND331		
Governor		Centrifugal Mechanical Governor		
Injection Nozzle Piece		ND-DN4SD24		
Injection Timing		0.34 to 0.36 rad (19° to 21°) before Top Dead Center		
Injection Pressure		13.8 to 14.7 MPa (140 to 150 kgf/cm^2, 2000 to 2130 psi)		
Fuel		Diesel Fuel No.2-D (ASTM D975)		
Fuel Tank Capacity		7.5 ℓ (2.0 U.S.gals)		
Starting System		Speed Doubling Handle by Hand		
Dynamo Output	-	12V 45W		
	-N,-H Type	—		
Dry Weight	-,-N Type	64.0 kg (141 lbs)	65.0 kg (143 lbs)	67.0 kg (148 lbs)
	-H Type	62.0 kg (137 lbs)	63.0 kg (139 lbs)	65.0 kg (143 lbs)
Direction of Rotation		Counter-clockwise Viewed from Flywheel		

KiSC issued 07, 2014 A

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

[4] TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start.	• No fuel	Replenish fuel	
	• Air in the fuel system	Vent air	M-30
	• Water in the fuel system	Replace fuel and repair or replace fuel system	
	• Fuel pipe clogged	Clean	
	• Fuel filter clogged	Clean	S-20
	• Excessively high viscosity of fuel at low temperature	Use the specified fuel	1,2
	• Fuel with low cetane number	Use the specified fuel	1,2
	• Fuel leak due to loose injection pipe retaining nut	Tighten nut	S-35
	• Incorrect injection timing	Adjust	S-25,75
	• Fuel camshaft worm	Replace	
	• Injection nozzle clogged	Clean	S-21,23,79
	• Injection pump malfunctioning	Repair or replace	S-25,76
	• Seizure of crankshaft,camshaft,piston, cylinder liner or bearing	Replace	
	• Compression leak from cylinder head	Replace head gasket	S-32
		Tighten cylinder head nut and nozzle holder	S-35,39
		Correct valve seat	S-24,55
	• Deficient compression	Check and correct valve recessing	S-53
		Check and correct top clearance	S-52
	• Piston rings and liner worn	Replace	S-59,65
	• Improper valve seat alignment, valve spring broken, valve seized	Repair or replace	S-24,54
	• Incorrect valve timing	Correct or replace	S-45
	• Excessive valve clearance	Adjust	S-20,32,37
Engine Revolution Is Not Smooth.	• Fuel filter clogged or dirty	Clean	S-20
	• Air cleaner clogged	Clean or replace	S-19
	• Fuel leak due to loose injection pipe retaining nut	Tighten nut	S-35
	• Injection pump malfunctioning	Repair or replace	S-25,76
	• Incorrect nozzle injection pressure	Repair injection nozzle	S-21,23,79
	• Injection nozzle stuck or clogged	Repair or replace	S-21,23,79
	• Fuel overflow pipe clogged	Clean	
	• Governor malfunctioning	Repair	S-46
Either White or Blue Exhaust Gas Is Observed.	• Excessive engine oil	Reduce to the specified level	S-17
	• Piston rings and liner worn or stuck	Repair or replace	S-59,65
	• Incorrect injection timing	Adjust	S-25,75
	• Deficient compression	Check and correct valve recessing	S-53
		Check and correct top clearance	S-52
Either Black or Dark Gray Exhaust Gas is Observed.	• Overload	Lessen load	
	• Low grade fuel used	Use the specified fuel	1,2
	• Fuel filter clogged	Clean	S-20
	• Air cleaner clogged	Clean or replace	S-19

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

[5] SERVICING SPECIFICATIONS

ENGINE BODY

[Cylinder Head]

Item	Factory Specification	Allowable Limit
Cylinder Head Surface Flatness	—	0.05 mm 0.002 in.
Top Clearance	0.60 to 0.75 mm 0.024 to 0.029 in.	—
Cylinder Head Gasket Thickness (Grommet Section) [RK50·60·70] Free	1.20 to 1.40 mm 0.0473 to 0.0551 in.	—
Tightened	0.950 to 1.05 mm 0.0374 to 0.0413 in.	—
[RK80-1·95-1·105-2·125-2] Free	1.40 to 1.60 mm 0.0552 to 0.0629 in.	—
Tightened	1.15 to 1.25 mm 0.0453 to 0.0492 in.	—
Compression Pressure	3.04 to 3.33 MPa 31.0 to 34.0 kgf/cm^2 441 to 483 psi	2.40 MPa 24.5 kgf/cm^2 348 psi

[Decompression Device]

Adjustment of Decompression Device [RK50·60·70]	Screw in 1-1/2 turns 1.00 to 1.40 mm 0.0394 to 0.0551 in.	—
[RK80-1·95-1·105-2·125-2]	Screw in 1-1/2 turns 0.940 to 1.31 mm 0.0370 to 0.0515 in.	—

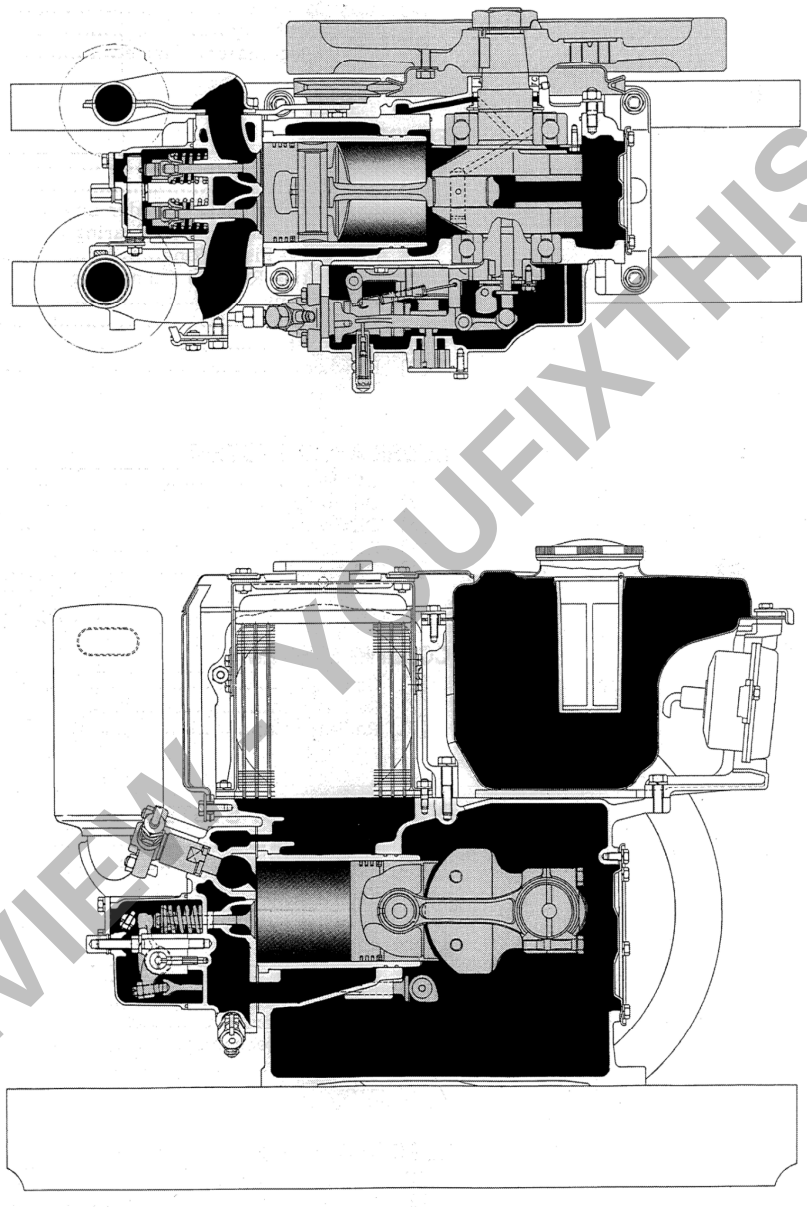
[Valves (IN.,EX.)]

Valve Clearance (Cold) [RK50·60·70·80-1·95-1]	0.16 to 0.20 mm 0.0063 to 0.0078 in.	—
[RK105-2·125-2]	0.20 to 0.23 mm 0.0079 to 0.0090 in.	—
Valve Seat Width [RK50·60·70]	2.1 mm 0.083 in.	—
[RK80-1·95-1·105-2·125-2]	1.4 mm 0.055 in.	—
Valve Seat Angle	0.785 rad 45.0°	—
Valve Face Angle	0.786 to 0.794 rad 45.0° to 45.5°	—
Valve Recessing [RK50·60·70]	0.80 to 0.90 mm 0.032 to 0.035 in.	1.5 mm 0.059 in.
[RK80-1·95-1·105-2·125-2]	0.65 to 0.95 mm 0.026 to 0.037 in.	1.5 mm 0.059 in.

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

FEATURE

RK50·60·70



0133F011

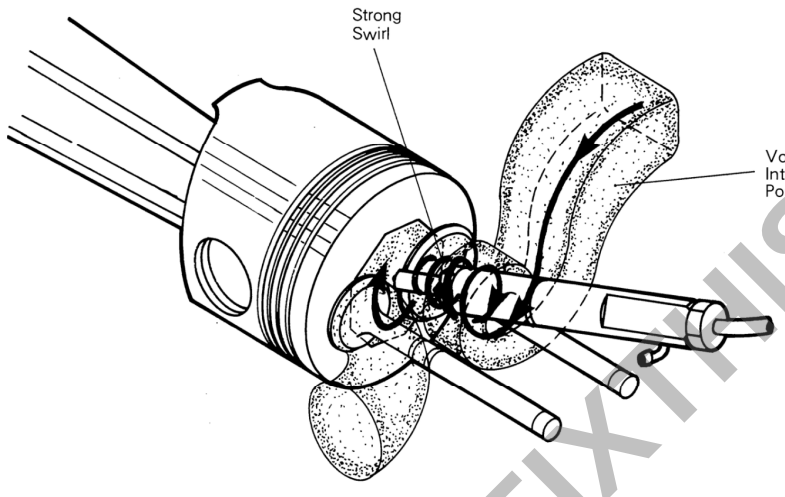
● Figure above shows type RK70.

KiSC issued 07, 2014 A

PREVIEW: YOUFIXTHIS.COM

Download full manual at youfixthis.com

RK80-1-95-1-105-2-125-2



C066F013

[RK80-1-95-1-105-2-125-2]

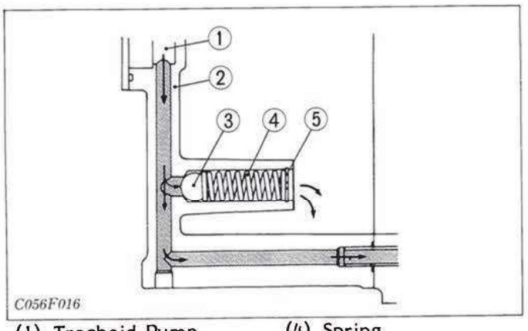
In the diesel engine, fuel injected from the injection nozzle is mixed with air by the evaporation of heated fuel drops and the interaction between fuel and air.

These series engines use a vortex intake port which causes the intake air to strong swirl, and promote effective mixing of air and fuel.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

[4] RELIEF VALVE



(1) Trochoid Pump
(2) Gear Case
(3) Ball
(4) Spring
(5) Internal Snap Ring

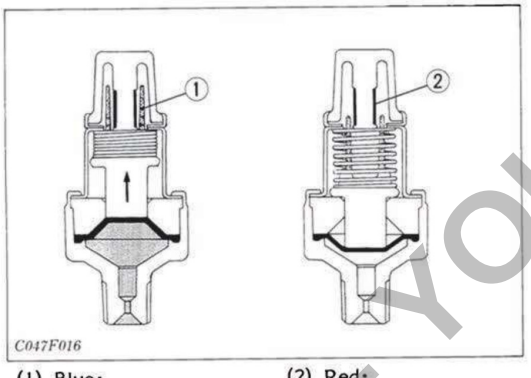
The relief valve consists of a ball(3), spring (4), and internal snap ring (5), which holds and is built into the lower part of the gear case (2).

The valve is used to regulate the lubricating oil pressure to a proper level (150 to 490 kPa, 1.5 to 5.0 kgf/cm^2, 22 to 71 psi).

The oil which has passed through the relief valve falls to inside the gear case.

If this regulated pressure is too low, the delivery of lubricating oil to various portions will become deficient and may cause seizure. Too high oil pressure may cause oil leakage.

[5] OIL SIGNAL



(1) Blue:
50 kPa or more
0.5 kgf/cm^2 or more
7 psi or more

(2) Red:
50 kPa or less
0.5 kgf/cm^2 or less
7 psi or less

The oil signal is mounted to the cylinder head (RK50-60-70) or to the cylinder block (RK80-1-95-1-105-2-125-2) to warn the operator that the lubricating oil pressure is poor. At engine stop or at unusually low pressure (50 kPa or less, 0.5 kgf/cm^2 or less, 7 psi or less), the red indication (2) is displayed. When the oil pressure is normal (50 kPa or more, 0.5 kgf/cm^2 or more, 7 psi or more), the blue signal (1) is pushed out by means of the oil pressure.

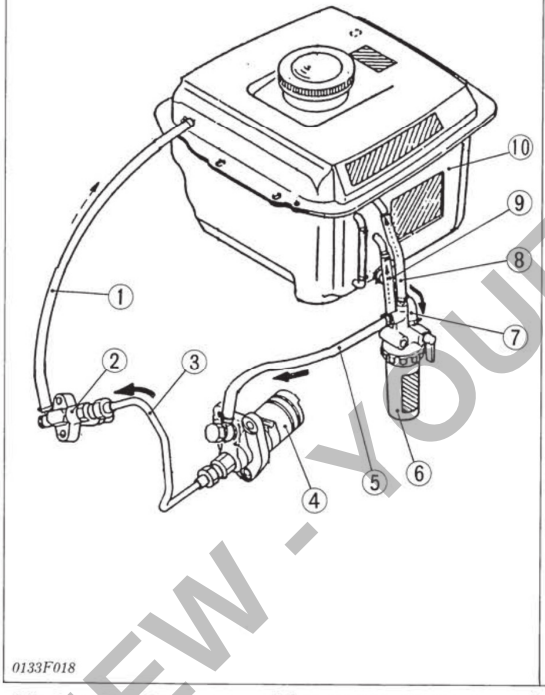
PREVIEW ONLY YOUFIXTHIS.COM

Download full manual at youfixthis.com

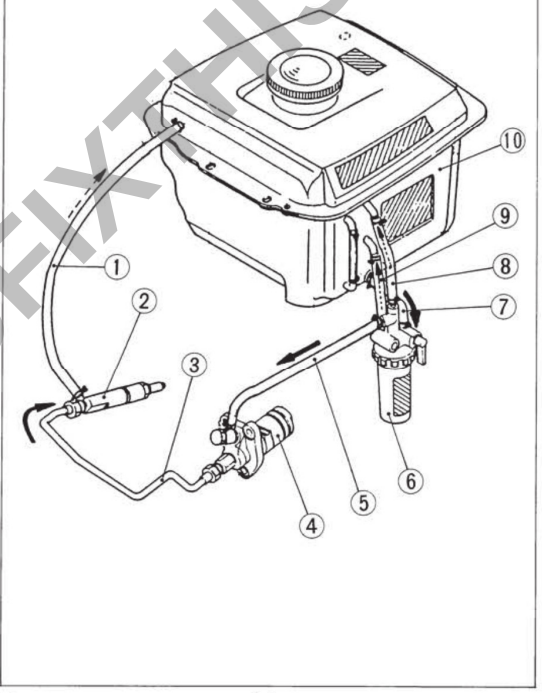
FUEL SYSTEM

[1] GENERAL

RK50·60·70



RK80-1·95-1·105-2·125-2



0133F018

(1) Overflow Pipe
(2) Injection Nozzle
(3) Injection Pipe
(4) Injection Pump
(5) Fuel Pipe 2
(6) Fuel Filter
(7) Fuel Pipe 1
(8) Air Vent Pipe 1
(9) Air Vent Pipe 2
(10) Fuel Tank

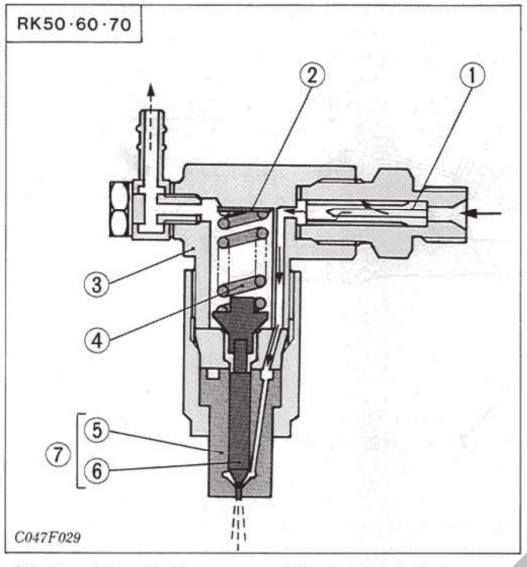
Fuel from the fuel tank (10) passes through the fuel filter (6), and then enters the injection pump (4) after impurities such as dirt, water, etc. are removed. The fuel pressurized by the injection pump to the opening pressure (RK50·60·70·····13.8 to 14.7 MPa, 140 to 150 kgf/cm^2, 2000 to 2130 psi) (RK80-1·95-1·105-2·125-2·····21.6 to 22.5 MPa, 220 to 230 kgf/cm^2, 3130 to 3270 psi) of the injection nozzle is injected into the combustion chamber by the injection nozzle (2).

Part of the fuel fed to the injection nozzle (2) lubricates the moving parts of the plunger inside the nozzle, then returns to the fuel tank through the fuel overflow pipe (1) from the upper part of the nozzle holder.

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

[3] INJECTION NOZZLE

RK50·60·70



(1) Bar (Edge) Filter
(2) Adjusting Washer
(3) Nozzle Holder
(4) Nozzle Spring
(5) Nozzle Body
(6) Needle Valve
(7) Nozzle Piece

[RK50·60·70]

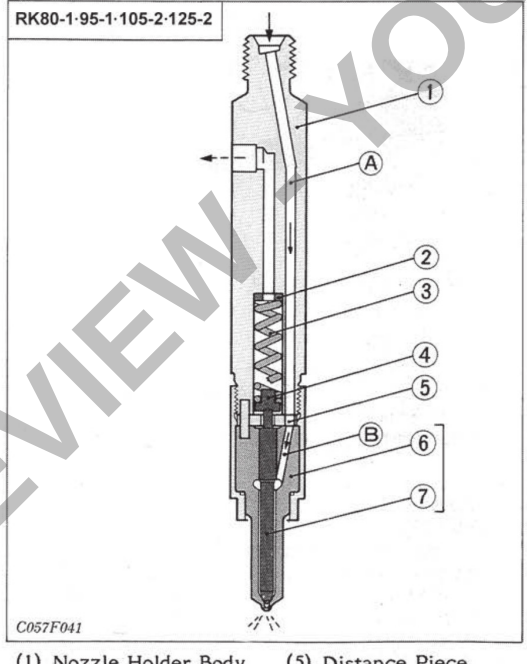
Due to the use of a throttle type injection nozzle, the fuel injection quantity is small at the beginning of injection, and the fuel injection amount increases gradually for the main fuel injection. This type of injection nozzle features smooth combustion rise and quiet combustion.

The fuel is delivered into the nozzle body (5) by injection pump through the bar (edge) filter (1), where fine metallic particles, dirt and other in the fuel are removed.

When the fuel pressure overcomes the force of the nozzle spring (4) (Injection pressure: 13.7 MPa, 140 kgf/cm^2, 1990 psi), the needle valve (6) is pushed up and fuel is injected from the injection port. The fuel which has lubricated between the needle valve and nozzle body returns to the tank through the fuel overflow pipe.

Injection pressure is adjusted by changing an adjusting washer (2) thickness.

RK80-1·95-1·105-2·125-2



(1) Nozzle Holder Body
(2) Adjusting Washer
(3) Nozzle Spring
(4) Push Rod
(5) Distance Piece
(6) Nozzle Body
(7) Needle Valve
(8) Nozzle Piece

[RK80-1·95-1·105-2·125-2]

This hole type of nozzle can atomize fuel in four directions and mix it with air to generate air mixture suitable for combustion. The four injection ports are provided at the tip of the nozzle body (6) at a given angle centering around the nozzle. In addition, in order to achieve quicker mixture of fuel jetted out of the nozzle with air, the atomizing pressure is higher than that of the swirl combustion chamber type.

The high-pressure fuel fed from the injection pump passes through the passage (A), (B) at the side of the nozzle body and compresses the nozzle spring (3) to push up the needle valve (7). When the fuel pressure overcomes the force of the nozzle spring (3) (Injection pressure: 21.6 MPa, 220kgf/cm^2, 3130 psi), the needle valve is pushed up and fuel is injected into the combustion chamber from the injection holes at the nozzle body tip.

The fuel, after lubricating the needle valve and nozzle body, returns to the fuel tank through the fuel overflow pipe.

Injection pressure is adjusted by changing an adjusting washer (2) thickness.

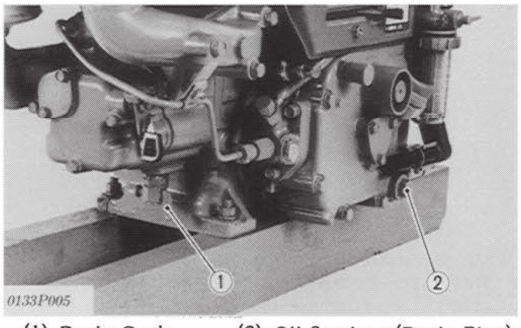
PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

DISASSEMBLING AND ASSEMBLING

*** Next parts should be prepared: Cylinder Head Gasket, Copper Gasket on Injection Nozzle, O-rings.**

[1] DRAINING WATER AND OIL



(1) Drain Cock (2) Oil Strainer (Drain Plug)

Engine oil capacity	RK50-60 70-80-1 95-1	2.0 ℓ 0.53 U.S.gals
	RK105-2 125-2	2.5 ℓ 0.66 U.S.gals

Specified Engine Oil	
Viscosity	Temperature
SAE 30	Above 20°C (68°F)
SAE 20	5°C (41°F) to 20°C (68°F)
SAE 10W or 10W-30	Below 5°C (41°F)
API Service Class. better than CD Class, Supplement 1 or MIL-L-46152	

Draining Cooling Water and Engine Oil

⚠ CAUTION

- **Never remove radiator cap until cooling water temperature is below its boiling point. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.**

1. **[Radiator Type]** Remove the radiator cap.
2. Prepare a bucket. Open the drain cock (1) to drain cooling water.
3. Prepare a oil pan. Remove the oil strainer (drain plug) (2) to drain engine oil in the pan.

Cooling water capacity	RK50 60 70	Radiator type	1.3 ℓ 0.34 U.S.gals
		Hopper type	8.5 ℓ 2.2 U.S.gals
	RK 80-1 95-1	Radiator type	1.6 ℓ 0.42 U.S.gals
		Hopper type	11.0 ℓ 2.91 U.S.gals
	RK 105-2 125-2	Radiator type	2.1 ℓ 0.55 U.S.gals
		Hopper type	14.0 ℓ 3.70 U.S.gals

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

[3] TIGHTENING TORQUES

Screws, bolts and nuts must be tightened to the specified torque with a torque wrench.
Several screws and nuts such as used on the cylinder head must be tightened in proper sequence and to the proper torque.

1) Tightening Torques for Special Use Screws, Bolts and Nuts

■ NOTE
- For "*" marked nuts on the table, apply engine oil to their threads and molybdenum disulfide oil to their seats before tightening.
- For "o" marked screws, bolts and nuts on the table, apply engine oil to their threads and seats before tightening.

Item			Size×Pitch	Tightening Torque		
				N·m	kgf·m	lbf·ft
* Flywheel Nut			M28×1.5	300 to 390	30 to 40	220 to 280
o Connecting Rod Screws		RK50-60-70 (916059 ~)	M8×1.0	42 to 46	4.2 to 4.7	31 to 33
		RK50-60-70 (~ 916058)	M8×1.0	30 to 34	3.0 to 3.5	22 to 25
		RK80-1-95-1	M8×1.0	30 to 34	3.0 to 3.5	22 to 25
		RK105-2-125-2	M9×1.0	49 to 53	5.0 to 5.5	37 to 39
o Cylinder Head	Studs	RK50-60-70-80-1-95-1	M12 × 1.5	49 to 58	5.0 to 6.0	37 to 43
		RK105-2-125-2	M14 × 2.0	49 to 58	5.0 to 6.0	37 to 43
	Nuts	RK50-60-70-80-1-95-1	M12 × 1.5	98.1 to 117	10.0 to 12.0	72.4 to 86.7
		RK105-2-125-2	M14 × 1.5	138 to 156	14.0 to 16.0	102 to 115
Main Bearing Case Tightening Screws and Nuts			M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Cylinder Block Rear Cover Screws			M6 × 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
Gear Case Screws		RK50-60-70	M6 × 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
		RK80-1-95-1-105-2-125-2	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
o Rocker Arm Bracket Retaining Nuts		RK50-60-70	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
		RK80-1-95-1-105-2-125-2	M10 × 1.5	40 to 45	4.0 to 4.6	29 to 33
Cylinder Head Cover	Nut	RK50-60-70	M6 × 1.0	3.0 to 3.9	0.30 to 0.40	2.2 to 2.8
	Screw	RK80-1-95-1-105-2-125-2	M6 × 1.0	11.8 to 12.7	1.20 to 1.30	8.68 to 9.40
Idle Gear Shaft Screws		RK80-1-95-1-105-2-125-2	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Crankshaft Counterweight Screws			M10 × 1.25	59 to 68	6.0 to 7.0	44 to 50
Oil Signal Holder		RK80-1-95-1-105-2-125-2	PT 1/8	15 to 19	1.5 to 2.0	11 to 14
Oil Signal			PT 1/8	6.9 to 9.8	0.70 to 1.0	5.1 to 7.2
Muffler Retaining Nuts			M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Injection Pump Mounting Screws		RK50-60-70	M6 × 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
		RK80-1-95-1-105-2-125-2	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Injection Pump Delivery Valve Holder			M18 × 1.5	40 to 44	4.0 to 4.5	29 to 32
Injection Pump Eye Joint Screw			M12 × 1.5	25 to 29	2.5 to 3.0	18 to 21
Injection Pipe Retaining Nut			M12 × 1.5	25 to 34	2.5 to 3.5	18 to 25
Nozzle Holder	Retaining Nut	RK50-60-70	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
	Clamp Screw	RK80-1-95-1-105-2-125-2	M10 × 1.25	48 to 55	4.9 to 5.7	36 to 41
Nozzle Holder Body to Nozzle Holder		RK50-60-70		98.1 to 117	10.0 to 12.0	72.4 to 86.7
		RK80-1-95-1-105-2-125-2		40 to 49	4.0 to 5.0	29 to 36

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

PREVIEW ONLY

You're viewing 12 of 125 pages

The full manual includes:

- All 125 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Kubota RK Series Workshop Manual

Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual