WSM

WORKSHOP MANUAL

ZD1011-AU

Kubota

KiSC issued 10, 2019 A

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GENERAL

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3. SPECIFICATIONS

Model				ZD1011-AU
Engine	Model			D782-E4
	Max. engine power (Gross)		kW (HP)	14.4 (19.3) (*1)(*2)
	Type			Indirect injection, Liquid-cooled
	Number of cylinders			3
	Bore and stroke		mm (in.)	67 × 73.6 (2.64 × 2.90)
	Total displacement		cm^3 (cu. in.)	778 (47.5)
	Rated revolution		rpm	3200
	Low idling revolution		rpm	1400 to 1500
	Fuel			Diesel fuel No. 2 Diesel fuel No. 1 [below −10 °C (14 °F)]
	Starter			Electric starter with battery, glow plug, 12 V, 1.2 kW
	Lubrication			Forced lubrication by trochoidal pump
	Cooling			Liquid with pressurized radiator
	Battery			51R (12 V, RC:80 min, CCA:430 A)
Capacities	Fuel tank		L (U.S.gals.)	23 (6)
	Engine crankcase (with filter)		L (U.S.qts.)	2.8 (3.0)
	Engine coolant		L (U.S.qts.)	2.7 (2.85)
	Recovery tank		L (U.S.qts.)	0.25 (0.26)
	Transmission case including Rear axle gear case		L (U.S.qts.)	7.5 (7.9) (*3)
Dimensions	Overall length		mm (in.)	2230 (87.8)
	Overall width w/o mower deck		mm (in.)	1210 (47.7)
	Overall height	With ROPS upright	mm (in.)	1890 (74.4)
		With ROPS folded	mm (in.)	1430 (56.3)
	Wheel base		mm (in.)	1380 (54.3)
	Min. ground clearance		mm (in.)	130 (5.12) with 54"
	Tread	Front	mm (in.)	890 (35.0)
		Rear	mm (in.)	930 (36.6)
Weight (W/MOWER DECK)			kg (lbs.)	600 (1323) with 54"
Travelling system	Tires	Front		13 × 5.0 - 6 Smooth Pneumatic
		Rear		24 × 9.5 - 14 Low profile
	Travelling speeds (*2)	Forward	mph (km/h)	0 to 9.0 (0 to 14.5)
		Reverse	mph (km/h)	0 to 5.0 (0 to 8.0)
	Steering			2-Hand levers
	Transmission			2 - HST w / Gear
	Parking brake			Wet multi disks / Foot applied, released
	Min. turning radius		mm (in.)	0 (0)
PTO	Revolution			1 speed (2530 rpm at 3200 engine rpm)
	Drive system			Shaft drive, KUBOTA 10 tooth involute spline
	Clutch type			Wet multi disks
	PTO brake			Wet single disks

(Specifications and design subject to change without notice)

(To be continued)

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7. MAINTENANCE CHECK LIST

■ **IMPORTANT**

- **The jobs indicated by ★ must be done initially.**
  ***1: The initial 50 hours should not be a replacement cycle.**
  ***2: Air cleaner must be cleaned more often in dusty conditions than in normal conditions.**
  ***3: Every 1000 hours or every 1 year whichever comes faster.**
  ***4: Replace if any deterioration (crack, hardening, scar, or deformation) or damage occurred.**
  ***5: Every 2000 hours or every 2 years whichever comes faster.**
  ***6: When the battery is used for less than 100 hours per year, check the battery condition by reading theindicator annually.**
  ***7: The initial 100 hours should not be a replacement cycle.**
- **The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the U.S.EPA non-road emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.**
  Please see the Warranty Statement in detail.

No.	Item		Service Interval												After since	Reference page		
			50	100	150	200	250	300	350	400	450	500	550	600				
1	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-25		
2	OPC system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-26		
3	Mower gear box oil	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-28		
		Change			☆			☆			☆			☆	every 150 Hr	G-34		
4	Greasing (except mower and mower link bushings)	–	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-27		
5	Throttle cable	Oil	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-28		
6	Greasing (mower link bushings, pivot)	–		☆		☆		☆		☆		☆		☆	every 100 Hr	G-33		
7	Air cleaner primary element	Clean		☆		☆		☆		☆		☆		☆	every 100 Hr	G-29	*2	@
		Replace													every 1000 Hr or 1 year	G-38	*3	
	Secondary element	Replace													every 1000 Hr or 1 year	G-38	*3	
8	Fuel filter element	Check		☆		☆		☆		☆		☆		☆	every 100 Hr	G-30		@
		Replace								☆					every 400 Hr	G-36		
9	Fan belt	Adjust		☆		☆		☆		☆		☆		☆	every 100 Hr	G-30		
10	Parking brake	Adjust		☆		☆		☆		☆		☆		☆	every 100 Hr	G-31		
11	Battery condition	Check		☆		☆		☆		☆		☆		☆	every 100 Hr	G-32	*6	
12	Engine oil	Change	★			☆				☆				☆	every 200 Hr	G-21	*1	
13	Engine oil filter	Replace	★			☆				☆				☆	every 200 Hr	G-22	*1	
14	Transmission oil filter [HST]	Replace	★			☆				☆				☆	every 200 Hr	G-22	*1	
15	Front axle pivot	Adjust		★		☆				☆				☆	every 200 Hr	G-23	*7	
16	Transmission fluid and rear axle gear case (R.H. and L.H.) fluid	Change								★					every 400 Hr	G-24		

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: See page "6. TIGHTENING TORQUES" on page G-12.)

Item	Size × Pitch	N·m	kgf·m	lbf·ft
*Cylinder head cover screw	M6 × 1	9.81 to 11.2	0.7 to 1.15	5.1 to 8.3
Injection pipe retaining nut	M12 × 1.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3
Overflow pipe retaining nut	M12 × 1.5	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Nozzle holder assembly	M20 × 1.5	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Glow plug	M8 × 1	7.8 to 14.7	0.8 to 1.5	5.8 to 10.8
*Rocker arm bracket nut	M6 × 1	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
*Cylinder head screw	M8 × 1.25	37.3 to 42.2	3.8 to 4.3	27.5 to 31.1
*Fan drive pulley screw	M12 × 1.5	117.7 to 127.5	12.0 to 13.0	86.8 to 94.0
*Idle gear shaft screw	M6 × 1	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
Oil pump mounting screw	M8 × 1.25	17.7 to 21.6	1.80 to 2.20	13.0 to 15.9
*Connecting rod screw	M7 × 0.75	26.5 to 30.4	2.7 to 3.1	19.5 to 22.4
*Flywheel screw	M10 × 1.25	53.9 to 58.8	5.5 to 6.0	39.8 to 43.4
Bearing case cover mounting screw	M6 × 1	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Main bearing case screw 2	M7 × 1	26.5 to 30.4	2.7 to 3.1	19.5 to 22.4
*Main bearing case screw 1	M6 × 1	12.7 to 15.7	1.3 to 1.6	9.4 to 11.6
Oil pressure switch	PT 1/8	15 to 19	1.5 to 2.0	11 to 14
Nozzle holder	–	34.3 to 39.2	3.5 to 4.0	25.3 to 28.9
Drain plug with copper gasket	M12 × 1.25	32.4 to 37.3	3.3 to 3.8	23.9 to 27.5
Drain plug with copper gasket	M22 × 1.5	63.7 to 73.5	6.5 to 7.5	47.0 to 54.2
Drain plug with rubber coated gasket	M22 × 1.5	44.1 to 53.9	4.5 to 5.5	32.5 to 39.8
Universal joint mounting bolt	M8 × 1.25	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Engine mounting nut	M8 × 1.25	17.6 to 20.6	1.80 to 2.10	13.0 to 15.1
Engine support mounting bolt	M10 × 1.25	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
Muffler mounting nuts	M8 × 1.25	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3

■ **NOTE**

- **For "*" marked screws, bolts and nuts on the table, apply engine oil to their threads and seats before tightening.**
- **The letter "M" in Size × Pitch means that the screw, bolt or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal distance in mm between two threads.**

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1. TROUBLESHOOTING

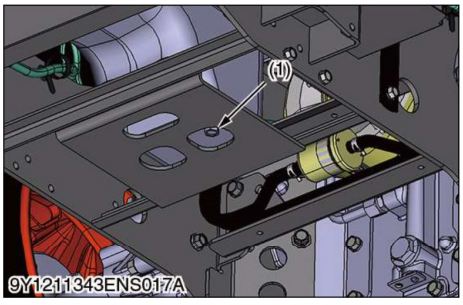
Symptom	Probable Cause and Checking Procedure	Solution	Reference Page
Engine Does Not Start	1. No fuel	Fill fuel	G-9
	2. Air in the fuel system	Vent air	G-48
	3. Water in the fuel system	Change fuel and repair or replace fuel system	–
	4. Fuel pipe clogged	Clean or replace	G-43
	5. Fuel filter clogged	Replace	G-43
	6. Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-9
	7. Fuel with low cetane number	Use specified fuel	G-9
	8. Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	–
	9. Incorrect injection timing	Adjust	1-S16
	10. Fuel camshaft worn	Replace	1-S33
	11. Injection nozzle clogged	Clean or replace	1-S27
	12. Injection pump malfunctioning	Replace	1-S31
	13. Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	1-S32 to 1-S38, 1-S44 to 1-S55
	14. Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S28
	15. Improper valve timing	Correct or replace timing gear	1-S32
	16. Piston ring and cylinder worn	Replace	1-S34, 1-S35
	17. Excessive valve clearance	Adjust	1-S12
	18. Stop solenoid malfunctioning	Replace	–
Starter Does Not Operate	1. Battery discharged	Charge	G-32
	2. Starter malfunctioning	Repair or replace	1-S26
	3. Key switch malfunctioning	Replace	5-S9
	4. Wiring disconnected	Connect	–
Engine Revolution Is Not Smooth	1. Fuel filter clogged or dirty	Replace	G-30
	2. Air cleaner clogged	Clean or replace	G-29
	3. Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S26
	4. Injection pump malfunctioning	Replace	1-S31
	5. Incorrect nozzle opening pressure	Adjust	1-S18
	6. Injection nozzle stuck or clogged	Replace	1-S27
	7. Governor malfunctioning	Repair	1-S33

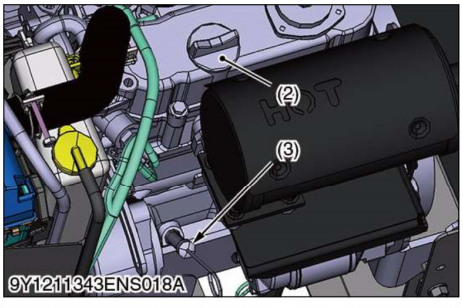
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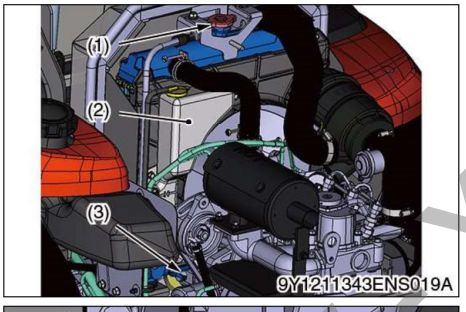
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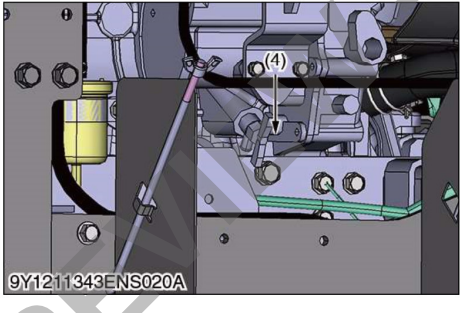
5. DISASSEMBLING AND ASSEMBLING

[1] SEPARATING ENGINE









Draining Engine Oil

1. Park the machine on level ground.
2. Start and warm up the engine for approx. 5 minutes.
3. Place an oil pan underneath the engine.
4. Remove the drain plug (1) to drain oil.
5. After draining, screw in the drain plug (1).

(When refilling)

- Fill the engine oil up to the upper line on the dipstick (3).

Engine oil capacity	3.6 L 3.8 U.S.qts 3.2 Imp.qts

■ **IMPORTANT**

- **Never mix two different type of oil.**
- **Use the proper SAE Engine Oil according to ambient temperatures.**
  Refer to "5. LUBRICANTS, FUEL AND COOLANT" on page G-9.

(1) Drain Plug
(2) Oil Inlet Plug
(3) Dipstick

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Draining Coolant

WARNING

To avoid serious injury

- **Never open the radiator cap while operating or immediately after stopping. Otherwise, hot water will spout out from the radiator. Wait for more than ten minutes to cool the radiator, before opening the cap.**

1. Stop the engine and let cool down.
2. Remove the radiator coolant drain plug (1) and engine coolant drain valve (4) to drain the coolant.
3. Remove the radiator cap (3) to completely drain the coolant.
4. After all coolant is drained, close the drain plugs.

Coolant capacity	Radiator	2.7 L 2.85 U.S.qts 2.4 Imp.qts
	Recovery tank	0.25 L 0.26 U.S.qts 0.22 Imp.qts

(1) Radiator Cap
(2) Recovery Tank
(3) Radiator Coolant Drain Plug
(4) Engine Coolant Drain Valve

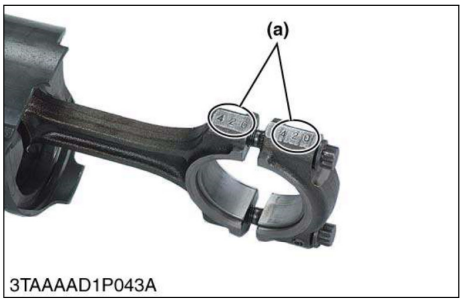
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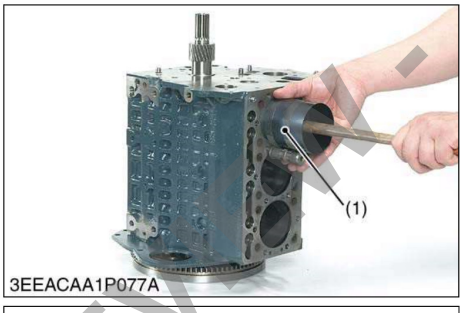
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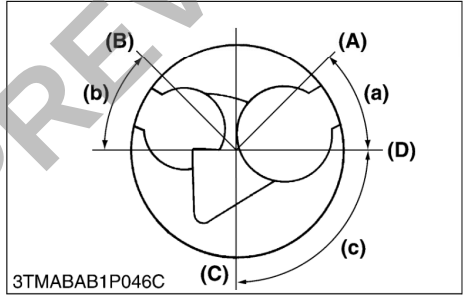
[4] PISTON AND CONNECTING ROD











Removing Connecting Rod

1. Remove the connecting rod cap (1).

(When reassembling)

- Align the marks **(a)** with each other. (Face the marks toward the injection pump.)
- Apply engine oil to the connecting rod screws and lightly screw it in by hand, then tighten it to the specified torque.
  If the connecting rod screw won't be screwed in smoothly, clean the threads.
  If the connecting rod screw is still hard to screw in, replace it.

Tightening torque	Connecting rod screw	27 to 30 N·m 2.7 to 3.1 kgf·m 20 to 22 lbf·ft

(1) Connecting Rod Cap **(a) Mark**

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Removing Piston

1. Turn the flywheel and bring the piston to top dead center.
2. Draw out the piston upward by lightly tapping it from the bottom of the crankcase with the grip of a hammer.
3. Draw out the other piston in the same method as above.

(When reassembling)

- Before inserting the piston into the cylinder, apply enough engine oil to the piston.
- When inserting the piston into the cylinder, face the mark on the connecting rod to the injection pump.

■ IMPORTANT

- **Do not change the combination of cylinder and piston. Make sure of the position of each piston by marking. For example, mark "1" on the No.1 piston.**
- **When installing the piston into the cylinder, place the gaps of all the piston rings as shown in the figure.**
- **Carefully insert the pistons using a piston ring compressor (1). Otherwise, their chrome-plated section may be scratched, causing trouble inside the cylinder.**

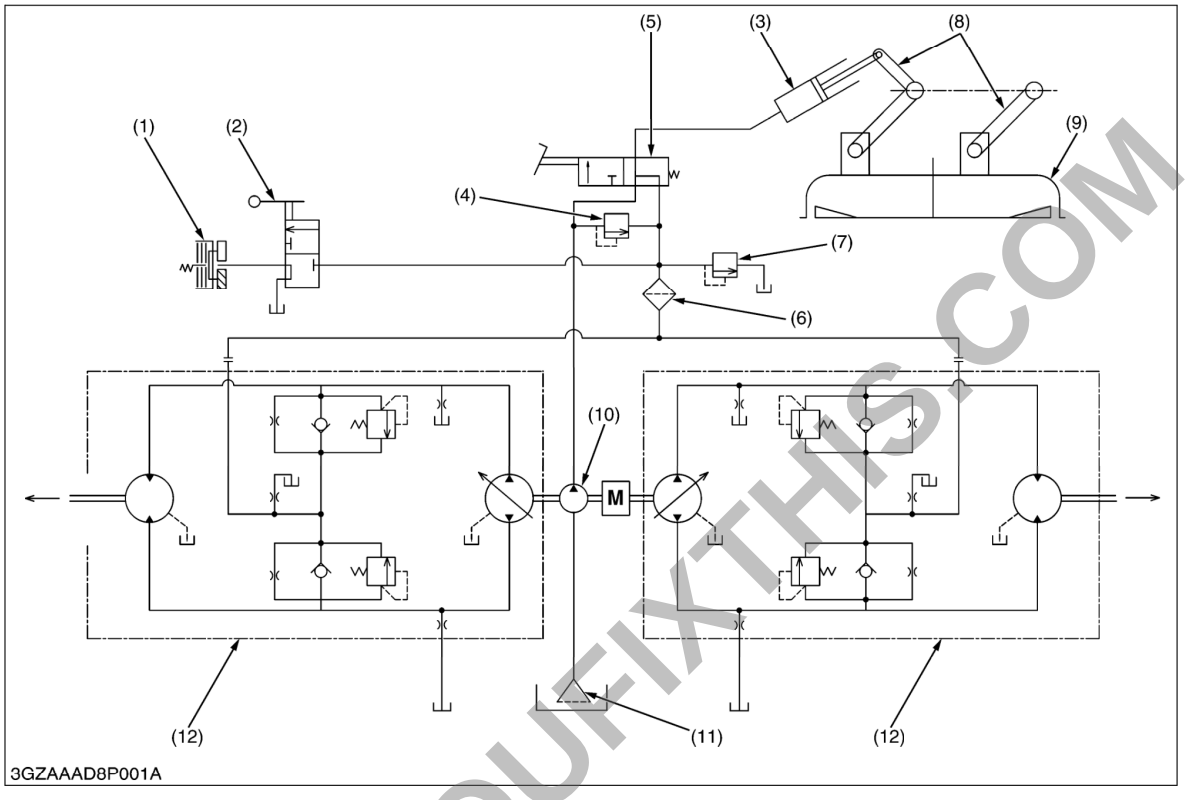
Models	Mark
D782-E4B	B

(1) Piston Ring Compressor
(A) Top Ring Gap
(B) Second Ring Gap
(C) Oil Ring Gap
(D) Piston Pin Hole
(a) 0.79 rad (45°)
(b) 0.79 rad (45°)
(c) 1.57 rad (90°)

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1. HYDRAULIC STRUCTURE



(1) PTO Clutch
(2) PTO Clutch Valve
(3) Mower Loft Cylinder
(4) Relief Valve
(5) Control Valve
(6) Oil Filter
(7) Regulator Valve
(9) Mower Link
(10) Hydraulic Pump
(11) Oil Strainer
(12) Hydrostatic Transmission

The hydraulic system of this machine consists of a hydraulic pump (10), control valve assembly (5), mower lift cylinder (3) and other components.

Oil is supplied by hydraulic pump (10) which is driven by engine.

Power from the input shaft (pump shaft) is distributed right and left with the bevel gears and drives each hydrostatic transmission (12). Moreover, oil from the hydraulic pump (10) is sent to the transmission centre case through the control valve. On the other hand, oil is regulated with the regulator valve (7) to constant pressure and sent to the hydrostatic transmission (12) and PTO clutch (1).

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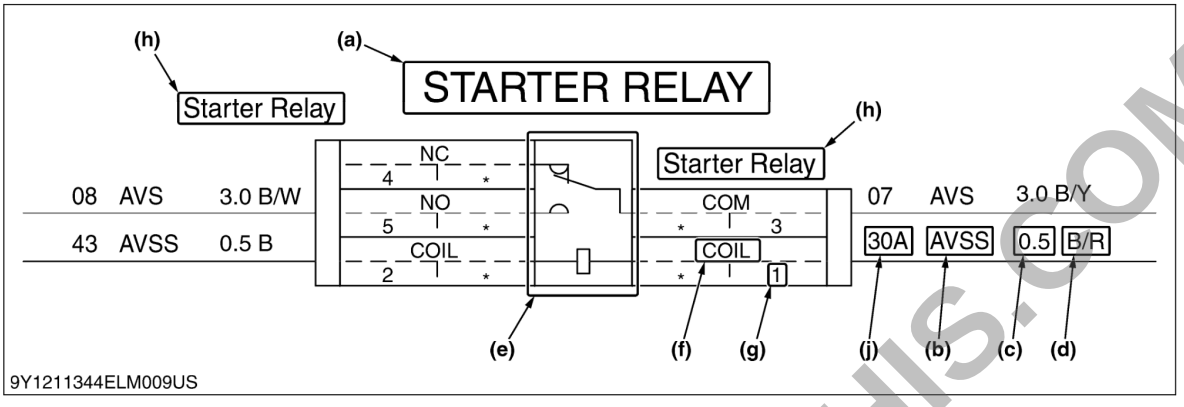
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3. READING THE ELECTRICAL CIRCUIT DIAGRAMS

[1] HOW TO READ WIRING DIAGRAMS

Electrical Wiring Chart Symbols for Harnesses and Wires



9Y1211344ELM009US

	Item	(Example) Contents of illustration	Reference
(a)	Name of part	Starter Relay	
(b)	Wire Specification Code	All use (common)	
(c)	Wire size	0.50 mm^2	
(d)	Wire color	Black/ Red	Wire color page
(e)	Unit symbol	Relay	Unit symbol page
(f)	Pin name	Coil	
(g)	Pin No.	1	
(h)	Connector name	SENSOR, FUEL	Connector diagram
(j)	Wire Number	30 A	

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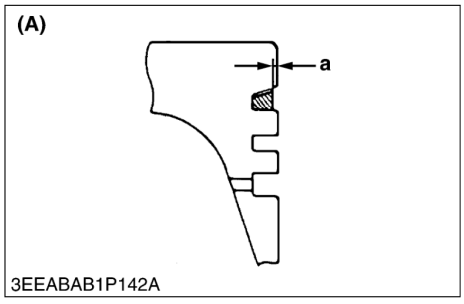
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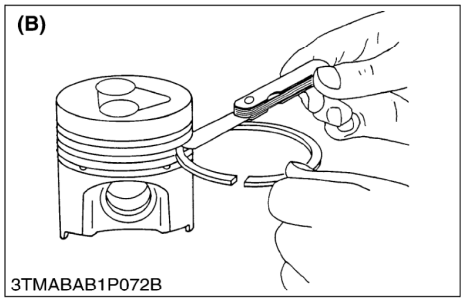
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I INFORMATION

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Checking Clearance between Piston ring and Piston Ring Groove

1. Clean the rings and the ring grooves, and install each ring in its groove.
2. Measure the clearance between the ring and the groove with a feeler gauge or depth gauge.
3. If the clearance exceeds the allowable limit, replace the piston ring.
4. If the clearance still exceeds the allowable limit with new ring, replace the piston.

Clearance between piston ring and piston ring groove	Second ring	Factory specification	0.090 to 0.12 mm 0.0036 to 0.0047 in.
		Allowable limit	0.15 mm 0.0059 in.
	Oil ring	Factory specification	0.04 to 0.08 mm 0.002 to 0.0031 in.
		Allowable limit	0.15 mm 0.0059 in.

Factory specification: **a**	More than 0.2 mm 0.008 in.

(A) Top Ring (Key Stone Type) **(B) 2nd, Oil Ring**

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