

Product: Kubota GR1600EC2 Service Manual

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WSM

WORKSHOP MANUAL

GR1600EC2

Kubota

KiSC issued 07, 2007 A

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TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of KUBOTA GR1600EC2. It is divided into three parts, "General", "Mechanism" and "Servicing".

General

Information on the tractor identification, the general precautions, maintenance check list, check and maintenance and special tools are described.

Mechanism

Information on the construction and function are included. This part should be understood before proceeding with troubleshooting, disassembling and servicing.

Servicing

Information on the troubleshooting, servicing specification lists, tightening torque, checking and adjusting, disassembling and assembling, and servicing which cover procedures, precautions, factory specifications and allowable limits.

All information illustrations and specifications contained in this manual are based on the latest product information available at the time of publication.

The right is reserved to make changes in all information at any time without notice.

Due to covering many models of this manual, information or picture being used, have not been specified as one model.

July 2006

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KiSC issued 07, 2007 A

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SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.

It is essential that you read the instructions and safety regulations before you attempt to repair or use this unit.



DANGER

: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

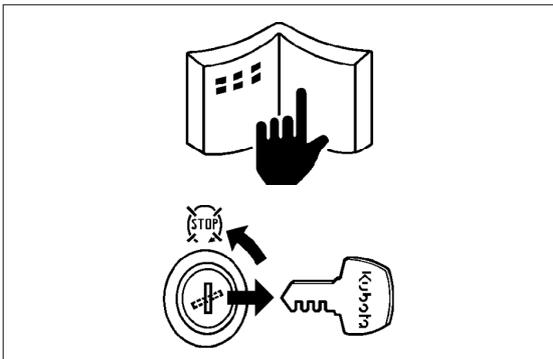
: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

IMPORTANT

: Indicates that equipment or property damage could result if instructions are not followed.

NOTE

: Gives helpful information.



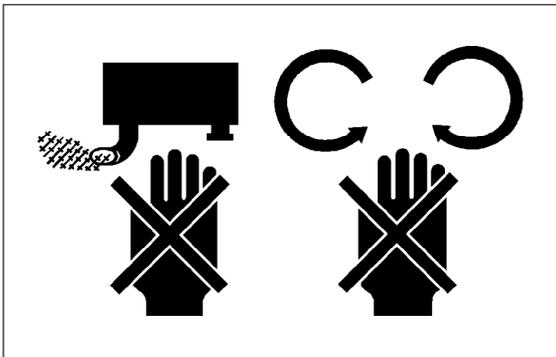
BEFORE SERVICING AND REPAIRING

- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a firm and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, and remove the key.
- Disconnect the battery negative cable.
- Hang a "DO NOT OPERATE" tag in operator station.



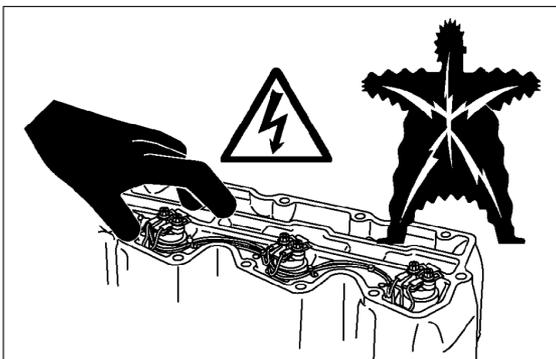
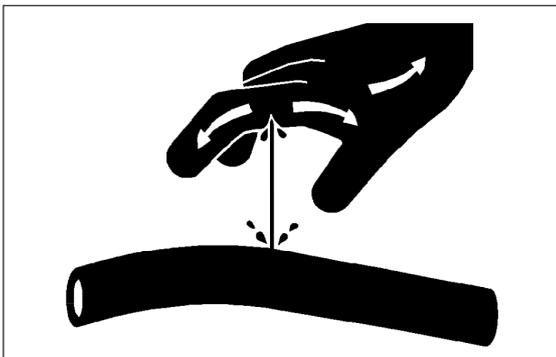
SAFETY STARTING

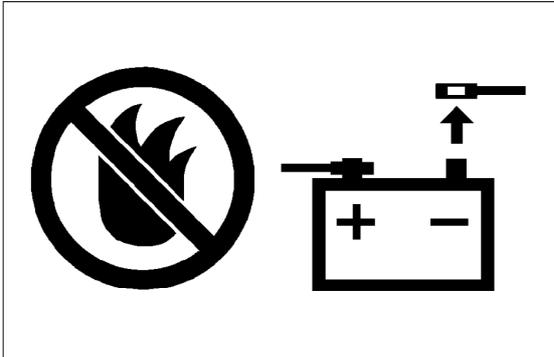
- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Never start the engine while standing on ground. Start the engine only from operator's seat.



SAFETY WORKING

- Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
- Wear close fitting clothing and safety equipment appropriate to the job.
- Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
- When servicing is performed together by two or more persons, take care to perform all work safely.
- Do not work under the machine that is supported solely by a jack. Always support the machine by safety stands.
- Do not touch the rotating or hot parts while the engine is running.
- Never remove the radiator cap while the engine is running, or immediately after stopping. Otherwise, hot water will spout out from radiator. Only remove radiator cap when cool enough to touch with bare hands. Slowly loosen the cap to first stop to relieve pressure before removing completely.
- Escaping fluid (fuel or hydraulic oil) under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or fuel lines. Tighten all connections before applying pressure.
- Do not open high-pressure fuel system. High-pressure fluid remaining in fuel lines can cause serious injury. Do not disconnect or attempt repair fuel lines, sensors, or any other components between the high-pressure fuel pump and injectors on engines with high pressure common rail fuel system.
- High voltage exceeding 100 V is generated in the ECU and injector. Pay sufficient caution to electric shock when performing work activities.





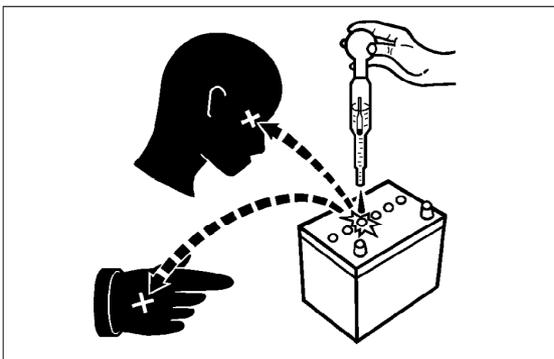
AVOID FIRES

- Fuel is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.
- To avoid sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- Battery gas can explode. Keep sparks and open flame away from the top of battery, especially when charging the battery.
- Make sure that no fuel has been spilled on the engine.



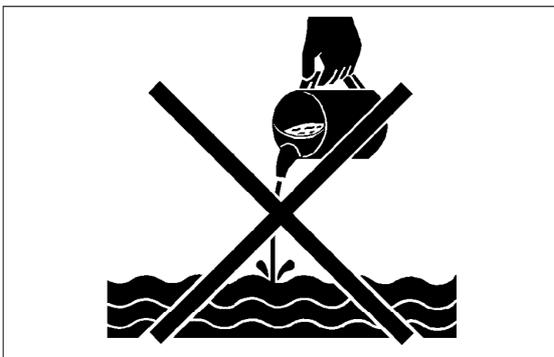
VENTILATE WORK AREA

- If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in a closed area. The exhaust gas contains poisonous carbon monoxide.



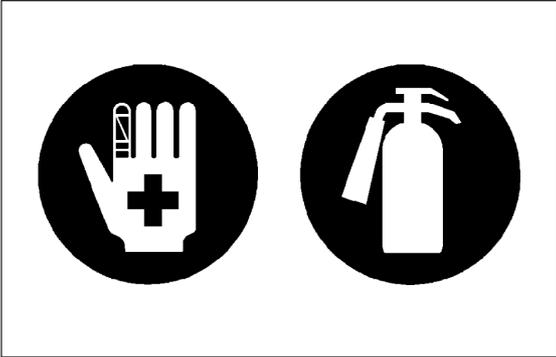
PREVENT ACID BURNS

- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, clothing and cause blindness if splashed into eyes. Keep electrolyte away from eyes, hands and clothing. If you spill electrolyte on yourself, flush with water, and get medical attention immediately.



DISPOSE OF FLUIDS PROPERLY

- Do not pour fluids into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, electrolyte and other harmful waste.

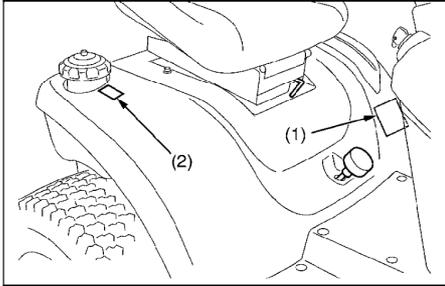


PREPARE FOR EMERGENCIES

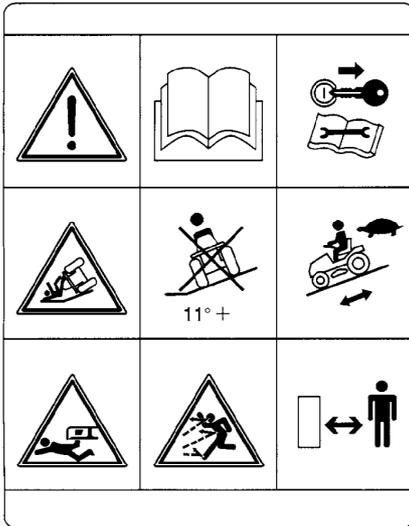
- Keep a first aid kit and fire extinguisher handy at all times.
- Keep emergency numbers for doctors, ambulance service, hospital and fire department near your telephone.

SAFETY DECALS

The following safety decals are installed on the machine. If a decal becomes damaged, illegible or is not on the machine, replace it. The decal part number is listed in the parts list.



(1) Part No. K1213-6581-1



1BDAHAAAP0280

(2) Part No. K2110-6585-1

Diesel fuel only No fire

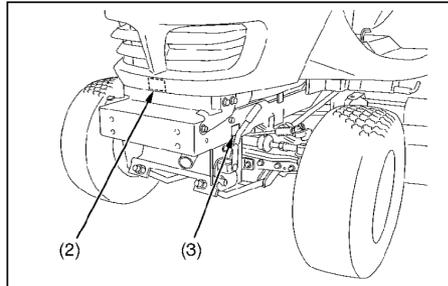
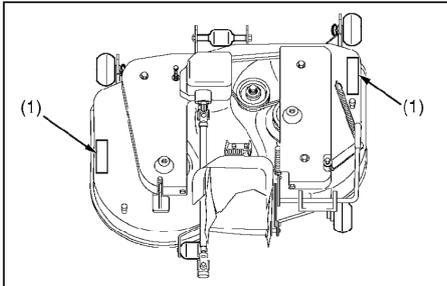


1BDAHADAP0300

3GLAAADCP001A

TO AVOID INJURY OR DEATH:

- Read and understand Operator's Manual.
- Stop the engine and remove key before servicing.
- DO NOT operate where machine could slip or tip.
- Mow up and down slopes, not across.
- DO NOT allow any bystanders or children around or near machine at any time when the engine is running.



(1) Part No. K5410-7311-1

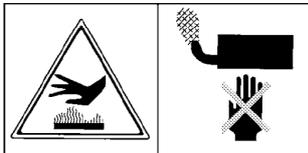


ROTATING BLADES HAZARDOUS:

- DO NOT put hands or feet into mower when engine is running.
- Keep all shields and guards in place.

(2) Part No. K2561-6542-1

Do not touch hot surface like muffler, etc.



1BDAHADAP0310

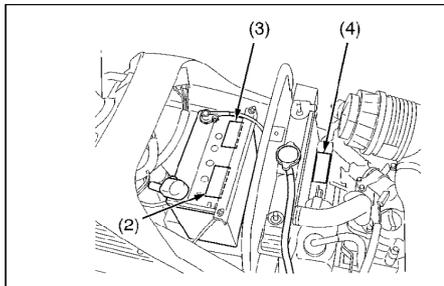
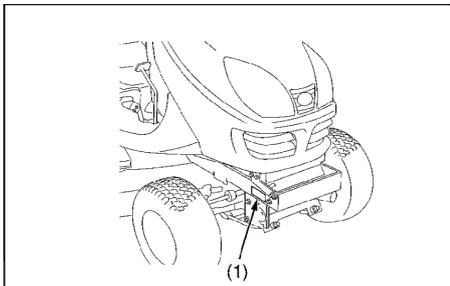
(3) Part No. K2110-6573-1

HOT SURFACE
DO NOT TOUCH

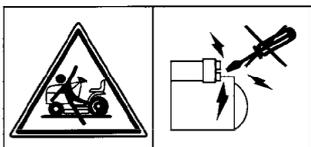


1BDAHAAAP0320

3GLAAAICP001A



(1) Part No. K1213-6583-1



1BDAHAAAP0310

TO AVOID MACHINE RUNAWAY:

- DO NOT start engine by shorting across starter terminals or bypassing the safety start switch.

(2) Part No. K1211-6115-1



1BDAHADAP0240

(3) Part No. K1211-6116-1



1BDAHADAP0250

(4) Part No. 6C090-4958-2
Stay clear of engine fan and fan belt.



1BDABARAP113A

CARE OF DANGER, WARNING AND CAUTION LABELS

1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels.
4. If a component with danger, warning or caution label (s) affixed is replaced with new part, make sure new label (s) is (are) attached in the same location (s) as the replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

3GLAAADCP003A

SPECIFICATIONS

Model		GR1600EC2	
Engine	Maker	KUBOTA	
	Model	Z482-E2-GX	
	Type	Indirect injection. Vertical, water-cooled, 4-cycle diesel	
	Number of cylinders	2	
	Bore and stroke	67 x 68 mm (2.64 x 2.68 in.)	
	Total displacement	479 cm ³ (29.9 cu.in.)	
	Engine gross power (DIN)	10.0 kW (13.4 HP)	
	Rated revolution	53.3 r/s [3200 min ⁻¹ (rpm)]	
	Battery	51R (12 V, 450CCA)	
	Starting system	Cell starter (with glow plug)	
	Lubrication system	Forced lubrication by trochoidal pump	
	Cooling system	Pressurized radiator, forced circulation with water pump	
	Fuel	Diesel fuel No.2-D [above -10 °C (14 °F)], Diesel fuel No.1-D [below -10 °C (14 °F)]	
Capacities	Fuel tank	18 L (4.8 U.S.gals, 4.0 Imp.gals)	
	Engine crankcase (with filter)	1.2 L (1.27 U.S.qts., 1.06 Imp.qts.)	
	Engine coolant (with recovery tank)	2.15 L (2.27 U.S.qts., 1.89 Imp.qts.)	
	Transmission case	2.7 L (0.71 U.S.gals., 0.59 Imp.gals.)	
Dimensions	Overall length (with grass catcher)	2710 mm (107 in.)	
	Overall width	1110 mm (43.7 in.)	
	Overall height	1190 mm (46.9 in.)	
	Wheel base	1280 mm (50.4 in.)	
	Tread	Front	750 mm (29.5 in.)
	Rear	800 mm (31.5 in.)	
Weight (without mower and grass catcher)		310 kg (684 lbs)	
Traveling system	Tires	Front	15 x 6.00 - 6, 4PR
		Rear	20 x 10.00 - 8, 4PR
	Steering	Manual (Sector gear type)	
	Transmission	Hydrostatic transmission	
	Brake	Internal expanding brake	
	Differential	Bevel gear	
	Traveling speed	Forward	0.0 to 10.0 km/h (0.0 to 6.2 mph)
Reverse		0.0 to 5.0 km/h (0.0 to 3.1 mph)	
PTO system	Clutch	Mechanical wet multi discs	
	PTO brake	Wet multi discs	

NOTE: *Manufacture's estimate

The company reserves the right to change the specifications without notice.

W1028280

Model		RCK42GREC2	
Mower	Cutting width	1067 mm (42.0 in.)	
	Cutting height	25 to 102 mm (1 to 4 in.)	
	Adjustment of cutting height	Dual gauge	
	Mounting method	Quick joint, Parallel linkage	
	Weight (Approx.)	75 kg (165 lbs)	
	Dimensions	Total length	965 mm (38.0 in.)
		Total width	1110 mm (43.7 in.)
		Total height	295 mm (11.6 in.)
	Discharge direction	Rear	
Gear box oil	0.33 L (0.35 U.S.qts, 0.29 Imp.qts)		

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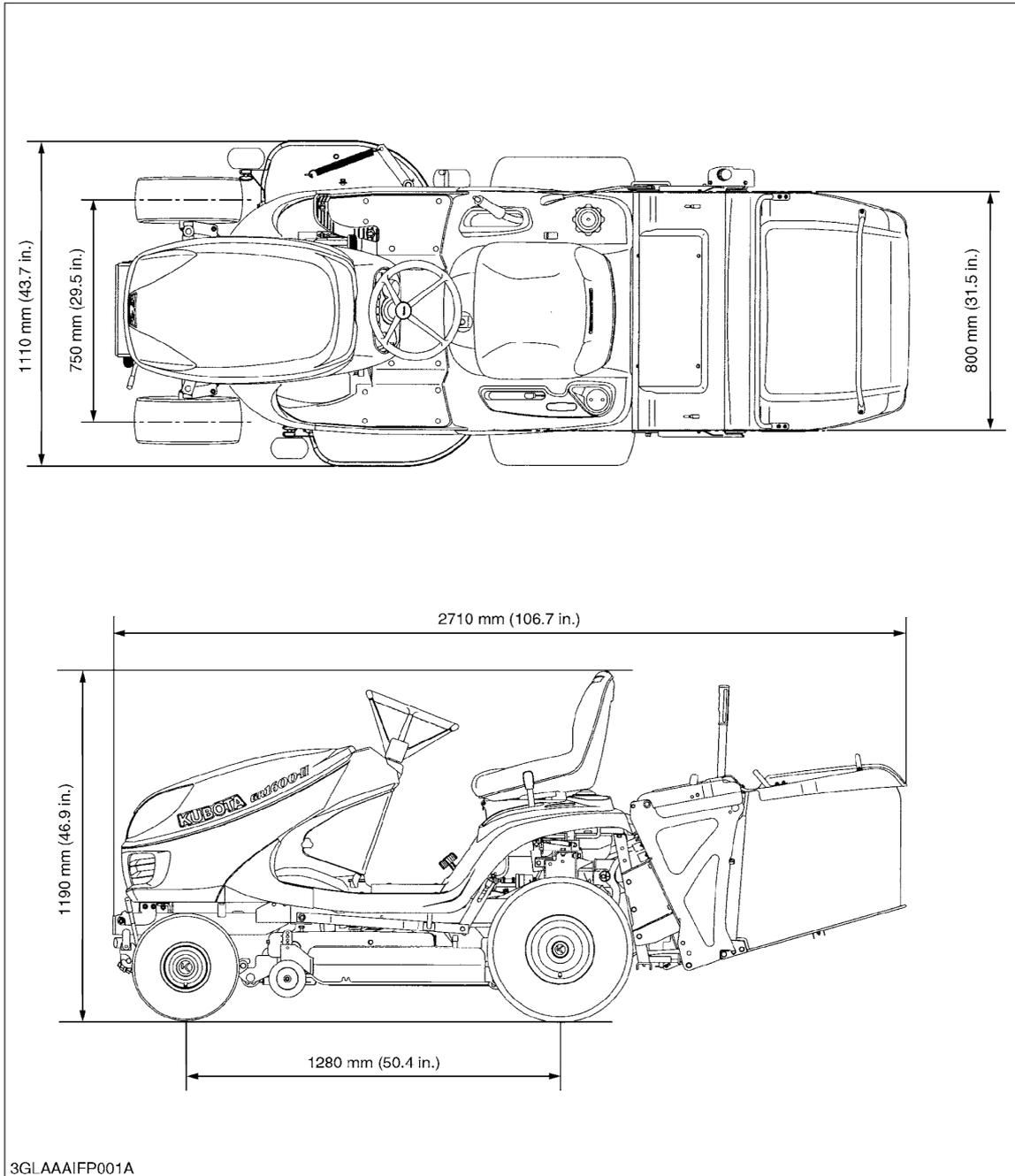
Model		GCK370GREC2
Grass catcher	Container capacity	370 L (97.7 U.S.gals, 81.4 Imp.gals)
	Weight (Approx.)	40 kg (88.2 lbs)

NOTE: *Manufacture's estimate

The company reserves the right to change the specifications without notice.

W1031306

DIMENSIONS



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G GENERAL

GENERAL

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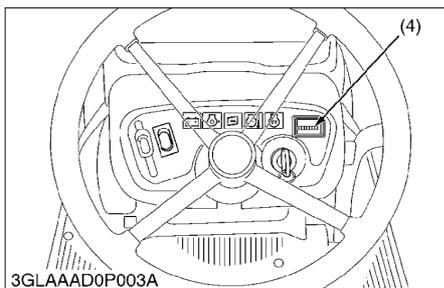
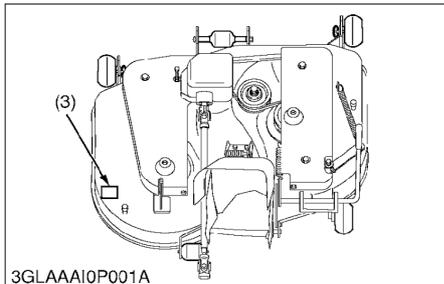
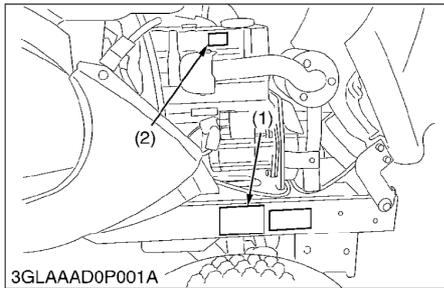
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1. IDENTIFICATION

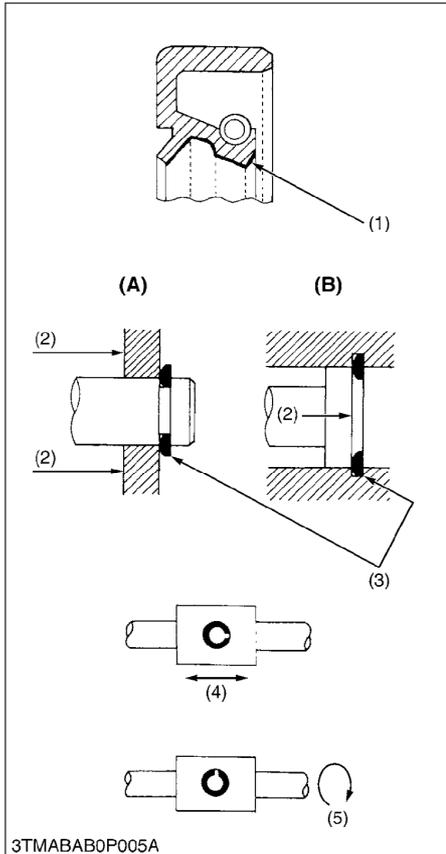
When contacting your local KUBOTA distributor, always specify engine serial number (2), machine serial number (1), mower serial number (3) and hour meter reading.

- | | |
|---------------------------|-------------------------|
| (1) Machine Serial Number | (3) Mower Serial Number |
| (2) Engine Serial Number | (4) Hour Meter |

W1010594



2. GENERAL PRECAUTIONS



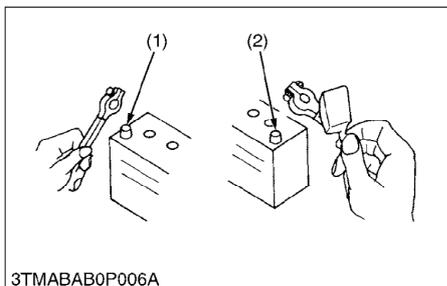
- During disassembly, carefully arrange removed parts in a clean area to prevent confusion later. Screws, bolts and nuts should be installed in their original position to prevent reassembly errors.
- When special tools are required, use KUBOTA genuine special tools. Special tools which are not frequently used should be made according to the drawings provided.
- Before disassembling or servicing electrical wires, always disconnect the ground cable from the battery first.
- Remove oil and dirt from parts before measuring.
- Use only KUBOTA genuine parts for parts replacement to maintain machine performance and to assure safety.
- Gaskets and O-rings must be replaced during reassembly. Apply grease to new O-rings or oil seals before assembling. See the figure left side.
- When reassembling external snap rings **(A)** or internal snap rings **(B)**, they must be positioned so that sharp edge faces against the direction from which a force is applied. See the figure left side.
- When inserting spring pins, their splits must face the direction from which a force is applied. See the figure left side.
- To prevent damage to the hydraulic system, use only specified fluid or equivalent.

- (1) Grease
- (2) Force
- (3) Sharp Edge
- (4) Axial Force
- (5) Rotating Movement

- (A) External Snap Ring**
- (B) Internal Snap Ring**

W10109040

3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING



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To ensure safety and prevent damage to the machine and surrounding equipment, heed the following precautions in handling electrical parts and wiring.

IMPORTANT

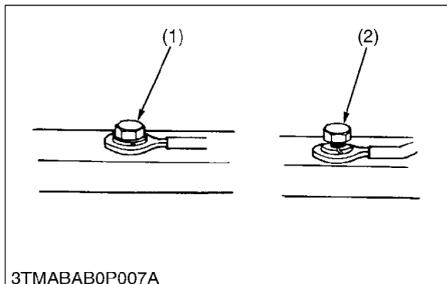
- Check electrical wiring for damage and loosened connection every year. To this end, educate the customer to do his or her own check and at the same time recommend the dealer to perform periodic check for a fee.
- Do not attempt to modify or remodel any electrical parts and wiring.
- When removing the battery cables, disconnect the negative cable first. When installing the battery cables, connect the positive cable first.

(1) Negative Terminal

(2) Positive Terminal

W10111140

[1] WIRING



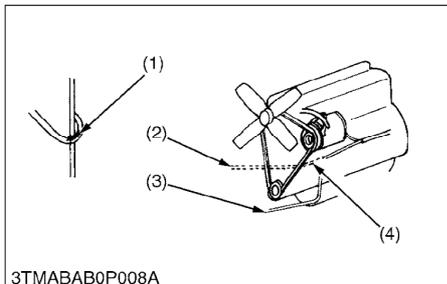
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- Securely tighten wiring terminals.

(1) Correct
(Securely Tighten)

(2) Incorrect
(Loosening Leads to Faulty Contact)

W10112160



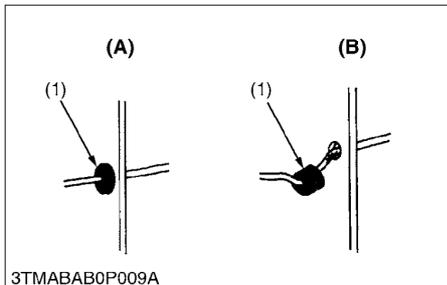
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- Do not let wiring contact dangerous part.

(1) Dangerous Part
(2) Wiring (Incorrect)

(3) Wiring (Correct)
(4) Dangerous Part

W10113130



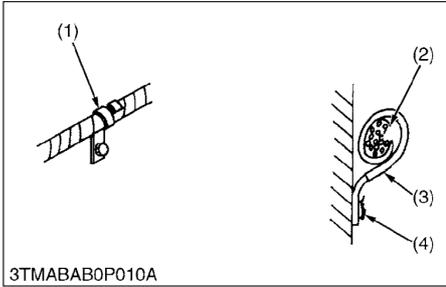
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- Securely insert grommet.

(1) Grommet

(A) Correct
(B) Incorrect

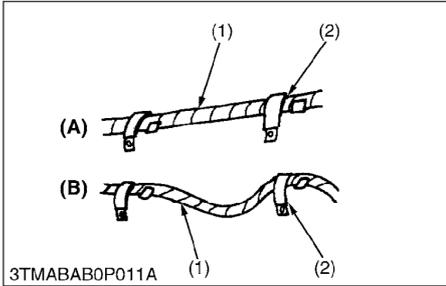
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- Securely clamp, being careful not to damage wiring.

- (1) Clamp
 - Wind Clamp Spirally
- (2) Wire Harness
- (3) Clamp
- (4) Welding Dent

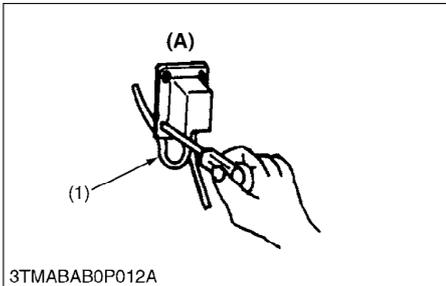
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- Clamp wiring so that there is no twist, unnecessary sag, or excessive tension, except for movable part, where sag be required.

- (1) Wiring
- (2) Clamp
- (A) Correct
- (B) Incorrect

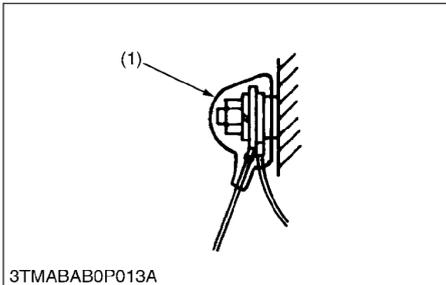
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- In installing a part, take care not to get wiring caught by it.

- (1) Wiring
- (A) Incorrect

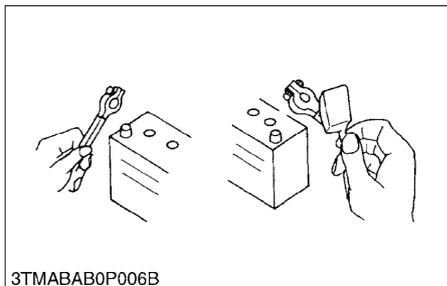
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- After installing wiring, check protection of terminals and clamped condition of wiring, only connect battery.

- (1) Cover
 - Securely Install Cover

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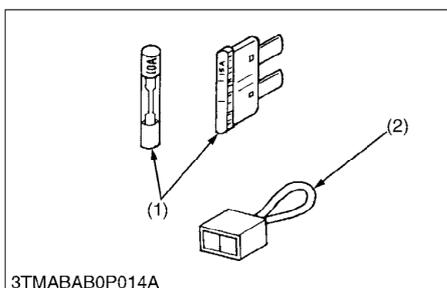
[2] BATTERY

- Take care not to confuse positive and negative terminal posts.
- When removing battery cables, disconnect negative cable first. When installing battery cables, check for polarity and connect positive cable first.
- Do not install any battery with capacity other than is specified (Ah).
- After connecting cables to battery terminal posts, apply high temperature grease to them and securely install terminal covers on them.
- Do not allow dirt and dust to collect on battery.

⚠ CAUTION

- **Take care not to let battery liquid spill on your skin and clothes. If contaminated, wash it off with water immediately.**
- **Before recharging the battery, remove it from the machine.**
- **Before recharging, remove cell caps.**
- **Do recharging in a well-ventilated place where there is no open flame nearby, as hydrogen gas and oxygen are formed.**

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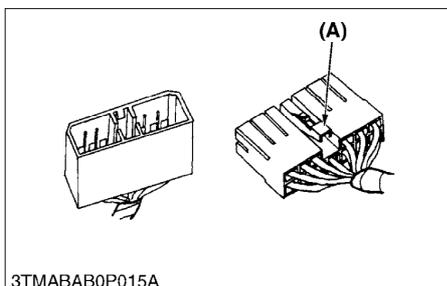
[3] FUSE

- Use fuses with specified capacity. Neither too large or small capacity fuse is acceptable.
- Never use steel or copper wire in place of fuse.
- Do not install working light, radio set, etc. on machine which is not provided with reserve power supply.
- Do not install accessories if fuse capacity of reserve power supply is exceeded.

(1) Fuse

(2) Fusible Link

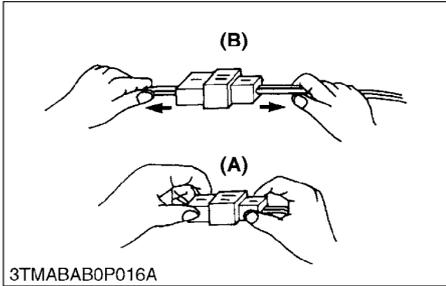
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[4] CONNECTOR

- For connector with lock, push lock to separate.

(A) Push

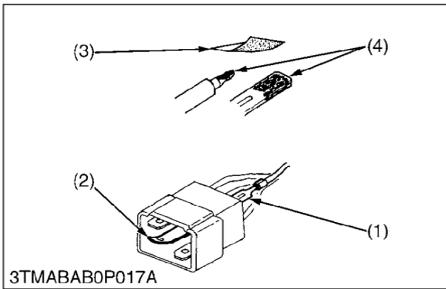
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- In separating connectors, do not pull wire harnesses.
- Hold connector bodies to separate.

(A) Correct (B) Incorrect

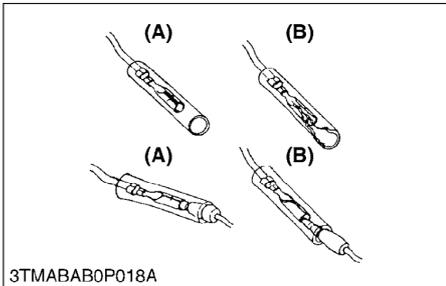
W10122720



- Use sandpaper to remove rust from terminals.
- Repair deformed terminal. Make certain there is no terminal being exposed or displaced.

(1) Exposed Terminal (3) Sandpaper
(2) Deformed Terminal (4) Rust

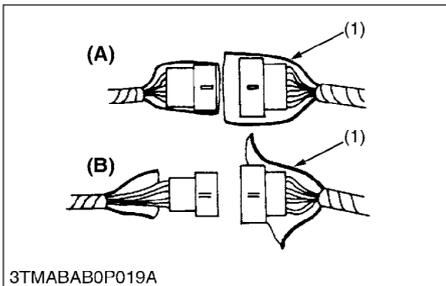
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- Make certain that there is no female connector being too open.

(A) Correct (B) Incorrect

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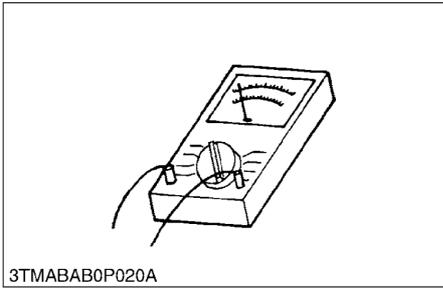


- Make certain plastic cover is large enough to cover whole connector.

(1) Cover (A) Correct (B) Incorrect

W10125190

[5] HANDLING OF CIRCUIT TESTER



3TMABAB0P020A

- Use tester correctly following manual provided with tester.
- Check for polarity and range.

W10126840

4. LUBRICANTS, FUEL AND COOLANT

No.	Place	Capacity	Lubricants, fuel and coolant	
1	Fuel tank	18 L 4.8 U.S.gals. 4.0 Imp.gals.	No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below -10 °C (14 °F)	
2	Cooling system with recovery tank	2.15 L 2.27 U.S.qts. 1.89 Imp.qts.	Fresh clean water with anti-freeze	
3	Engine crankcase	1.2 L 1.27 U.S.qts. 1.06 Imp.qts.	Engine oil : API service CD, CE or CF Below 0 °C (32 °F) : SAE10W, 10W-30 or 10W-40 0 to 25 °C (32 to 77 °F) : SAE20, 10W-30 or 10W-40 Above 25 °C (77 °F) : SAE30, 10W-30 or 10W-40	
4	Transmission case	2.7 L 0.71 U.S.gals. 0.59 Imp.gals.	KUBOTA UDT or SUPER UDT fluid*	
5	Mower gear box	0.33 L 0.35 U.S.qts. 0.29 Imp.qts.	SAE90 gear oil (API service classification : more than GL-3)	
Greasing				
No.	Place	No. of greasing points	Capacity	Type of grease
6	Engine transmission universal joint	1	Until grease overflows	SAE multi-purpose type grease
7	King pin	2		
8	Center pin	–		
9	Speed control pedal shaft	–	Moderate amount	Engine oil
10	Mower link	–		
11	Seat adjuster	–		
12	Cable	–		
13	PTO lever	–		
14	Hydraulic lift lever	–		
15	Grass catcher hinge	–		
	[Mower]			
16	Spindle shafts	2	Until grease overflows	SAE multi-purpose type grease
17	Tension arm	1		
18	Mower universal joint	1	Moderate amount	Engine oil

* KUBOTA original transmission hydraulic fluid.

5. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS

Screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual should be tightened according to the table below.

Indication on top of bolt	④ No-grade or 4T						⑦ 7T						⑨ 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit	N-m	kgf-m	ft-lbs												
Diameter															
M6 (6 mm, 0.24 in.)	7.85 to 9.31	0.80 to 0.95	5.79 to 6.87	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8 (8 mm, 0.31 in.)	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	16.7 to 19.6	1.7 to 2.0	12.3 to 14.4	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	29.5 to 34.3	3.0 to 3.5	21.7 to 25.3
M10 (10 mm, 0.39 in.)	39.3 to 45.1	4.0 to 4.6	29.0 to 33.2	31.4 to 34.3	3.2 to 3.5	23.2 to 25.3	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5	60.9 to 70.6	6.2 to 7.2	44.9 to 52.0
M12 (12 mm, 0.47 in.)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	-	-	-	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	103 to 117	10.5 to 12.0	76.0 to 86.7
M14 (14 mm, 0.55 in.)	108 to 125	11.0 to 12.8	79.6 to 92.5	-	-	-	124 to 147	12.6 to 15.0	91.2 to 108	-	-	-	167 to 196	17.0 to 20.0	123 to 144
M16 (16 mm, 0.63 in.)	167 to 191	17.0 to 19.5	123 to 141	-	-	-	197 to 225	20.0 to 23.0	145 to 166	-	-	-	260 to 304	26.5 to 31.0	192 to 224
M18 (18 mm, 0.71 in.)	246 to 284	25.0 to 29.0	181 to 209	-	-	-	275 to 318	28.0 to 32.5	203 to 235	-	-	-	344 to 402	35.0 to 41.0	254 to 296
M20 (20 mm, 0.79 in.)	334 to 392	34.0 to 40.0	246 to 289	-	-	-	368 to 431	37.5 to 44.0	272 to 318	-	-	-	491 to 568	50.0 to 58.0	362 to 419

W1034542

[2] METRIC SCREWS, BOLTS AND NUTS

Grade	Property class 8.8			Property class 10.9		
	⑧ 8.8			⑩ 10.9		
Unit	N-m	kgf-m	ft-lbs	N-m	kgf-m	ft-lbs
Nominal Diameter						
M 8	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2	29.4 to 34.3	3.0 to 3.5	21.7 to 25.3
M 10	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2	60.8 to 70.5	6.2 to 7.2	44.9 to 52.1
M 12	77.5 to 90.1	7.9 to 9.2	57.2 to 66.5	103.0 to 117.0	10.5 to 12.0	76.0 to 86.8
M 14	124.0 to 147.0	12.6 to 15.0	91.2 to 108.0	167.0 to 196.0	17.0 to 20.0	123.0 to 144.0
M 16	196.0 to 225.0	20.0 to 23.0	145.0 to 166.0	260.0 to 303.0	26.5 to 31.0	192.0 to 224.0

W1016172

[3] AMERICAN STANDARD SCREWS, BOLTS AND NUTS WITH UNC OR UNF THREADS

Grade	SAE GR.5 			SAE GR.8 			
	Unit	N-m	kgf-m	ft-lbs	N-m	kgf-m	ft-lbs
Nominal Diameter							
5/16	23.1 to 27.8	2.35 to 2.84	17.0 to 20.5	32.5 to 39.3	3.31 to 4.01	24.0 to 29.0	
3/8	47.5 to 57.0	4.84 to 5.82	35.0 to 42.0	61.0 to 73.2	6.22 to 7.47	45.0 to 54.0	
1/2	108.5 to 130.2	11.07 to 13.29	80.0 to 96.0	149.2 to 179.0	15.22 to 18.27	110.0 to 132.0	
9/16	149.2 to 179.0	15.22 to 18.27	110.0 to 132.0	217.0 to 260.4	22.14 to 26.57	160.0 to 192.0	
5/8	203.4 to 244.1	20.75 to 24.91	150.0 to 180.0	298.3 to 358.0	30.44 to 36.53	220.0 to 264.0	

W1022485

[4] PLUGS

Shape	Size	Material of opponent part					
		Ordinariness			Aluminum		
		N-m	kgf-m	ft-lbs	N-m	kgf-m	ft-lbs
Tapered screw 	R1/8	12.7 to 21.6	1.3 to 2.2	9.4 to 15.9	12.7 to 19.6	1.3 to 2.0	9.4 to 15.4
	R1/4	24.5 to 44.1	2.5 to 4.5	18.1 to 32.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.4
	R3/8	49.0 to 88.3	5.0 to 9.0	36.2 to 65.1	49.0 to 58.8	5.0 to 6.0	36.2 to 43.4
	R1/2	58.8 to 107.9	6.0 to 11.0	43.4 to 79.6	58.8 to 78.5	6.0 to 8.0	43.4 to 57.9
Straight screw 	G1/4	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3	–	–	–
	G3/8	61.8 to 82.4	6.3 to 8.4	45.6 to 60.8	–	–	–
	G1/2	49.0 to 88.3	5.0 to 9.0	36.2 to 65.1	–	–	–

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6. MAINTENANCE CHECK LIST

IMPORTANT

- The jobs indicated by must be done initially.
- *1 : This maintenance should be done daily more often in dusty conditions than in normal conditions.
Suggested cleaning interval is every 100 hours in normal conditions.

No.	Item	Period	Indication on hour meter (Hr)												After since	Impor- tant	Refer- ence page	
			50	100	150	200	250	300	350	400	450	500	550	600				
1	Engine oil	Change														every 100 hr		G-26
2	Engine oil filter	Replace														every 200 hr		G-28
3	Transmission fluid	Change														every 200 hr		G-29
4	Transmission oil filter	Replace														every 200 hr		G-30
5	Transmission strainer	Clean														every 200 hr		G-30
6	Front axle pivot	Adjust														every 200 hr		G-31
7	Safety device	Check														every 50 hr		G-19
8	Oiling	–														every 50 hr		G-21
9	Greasing	–														every 50 hr		G-20
10	Mower gear box oil	Check														every 50 hr		G-20
		Change														every 150 hr		G-28
11	Air cleaner element	Clean														every 50 hr	*1	G-20
		Replace														every 1 year		G-32
12	Battery condition	Check														every 50 hr		G-24
13	Brake	Adjust														every 100 hr		G-27
14	Fan drive belt tension	Adjust														every 100 hr		G-28
15	Fuel filter element	Check														every 100 hr		G-27
		Replace														every 400 hr		G-31

W1035769

No.	Item	Period	Indication on hour meter (Hr)										After since	Impor- tant	Refer- ence page			
			50	100	150	200	250	300	350	400	450	500				550	600	
16	Fuel line	Check													every 100 hr		G-27	
		Replace													every 2 year		G-34	
17	Radiator hose and clamp	Check													every 200 hr		G-30	
		Replace													every 2 year		G-34	
18	Intake air line	Check													every 200 hr		G-31	
		Replace													every 2 year		G-34	
19	Fuel injection nozzle (Injection pressure)	Check													every 1500 hr		G-32	
20	Radiator	Clean													every 1 year		G-32	
21	Coolant	Change													every 1 year		G-32	
22	Mower gear box oil seal	Replace													every 2 year		G-34	
23	Fuse	Replace															G-35	
24	Blade	Replace													Service as re- quired		G-36	
25	Mower belt	Replace																G-37
26	Fuel system	Bleed																G-37

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7. CHECK AND MAINTENANCE



CAUTION

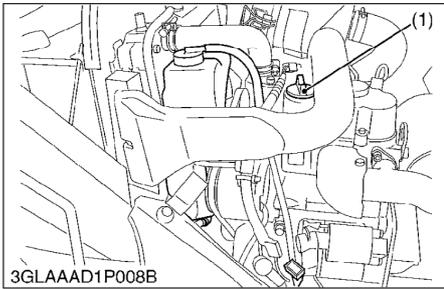
- **Be sure to check and service the machine on a flat place with engine shut off, the parking brake on and chock the wheels.**

[1] DAILY CHECK

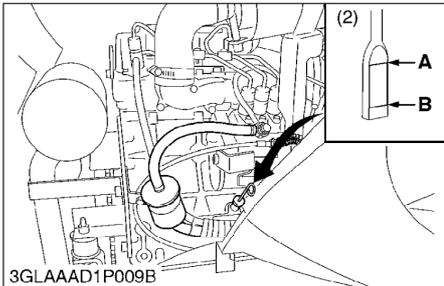
To prevent trouble from occurring, it is important to know the condition of the machine. Check the following items before starting.

Checking

- Walk around the machine.
 1. Tire pressure, wear and damage
 2. Oil and water leak
 3. Engine oil level
 4. Transmission fluid level
 5. Coolant level in the recovery tank
 6. Damage of machine body, tightness of all bolts and nuts
 7. Radiator screen
 8. Panel screen
 9. Brake play
 10. Fuel level
 11. Check air cleaner element
 - Mower
 1. Oil leak
 2. Make sure blade cap screws are tight.
 3. Blades for wear or damage.
 4. Check all hardware.
 5. Make sure all pins are in place.
 6. Mower deck cleaning
 7. Greasing
 - While sitting in the operator's seat,
 1. Speed control pedal and brake pedal
 2. Brake
 - Turning the key switch "ON"
 1. Performance of the easy checker light.
 - Starting the engine
 1. Color of the exhaust fumes
 2. Safety start switch, seat safety control and another safety devices.
 3. Check for abnormal noise and vibration.
 - Others
 1. Check the areas where previous troubles were experienced.



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Checking Engine Oil Level

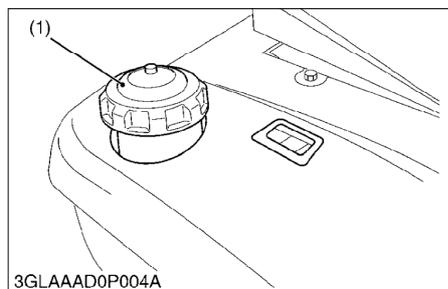
CAUTION

- **Always stop the engine and remove the key before checking oil.**
1. Check engine oil before starting and 5 minutes or more after the engine has stopped.
 2. Wipe dipstick (2) area clean.
 3. To check the oil level, remove the dipstick (2), wipe it clean, reinsert it, and draw it out again. Check to see that the oil level is between the two notches.
 4. Add new oil to the prescribed level at the oil inlet (1) if necessary.
 5. When using a different brand or viscosity oil from the previous one, remove all of the old oil and oil filter. Never mix two different types of oil.
 6. Use the proper Engine Oil SAE according to the ambient temperatures. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" in this section.)

- (1) Engine Oil Inlet
 (2) Oil Level Dipstick

A : Upper Level
B : Lower Level

W1048088



Checking Amount of Fuel and Refueling

CAUTION

- Handle fuel carefully. If the engine is running, do not fill the fuel tank. If engine is hot, let engine cool several minutes before adding fuel.

Do not smoke while filling the fuel tank or servicing the fuel system. Fill fuel tank only to bottom of filler neck.

Check the fuel level. Take care that the fuel tank does not become empty.

Fuel tank capacity	18 L 4.8 U.S.gals 4.0 Imp.gals
--------------------	--------------------------------------

IMPORTANT

- Use Diesel fuel only

1. Use No.2-D diesel fuel.
2. Use No.1-D diesel fuel if the temperature is below -10°C (14°F).
3. Always use a strainer when refueling to prevent fuel injection pump contamination.

NOTE

- No.2-D is a distillate fuel of lower volatility for engines in industrial and heavy mobile service.

(SAE J313 JUN87)

Grade of Diesel Fuel Oil according to ASTM D975

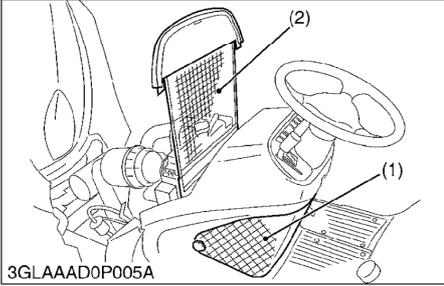
Flash Point $^{\circ}\text{C}$	Water and Sediment, volume %	Carbon Residue on, 10 percent Residuam %	Ash, weight %
Min	Max	Max	Max
52	0.05	0.35	0.01

Distillation Temperatures $^{\circ}\text{C}$ 90 % Point		Kinematic Viscosity cSt or mm^2/s at 40°C		Saybolt Viscosity, SUS at 100°F	
Min	Max	Min	Max	Min	Max
282	338	1.9	4.1	32.6	40.1

Sulfur, weight	Copper strip Corrsion	Catane Number
Max	Max	Min
0.50	No.3	40

(1) Fuel Cap

W1021324



Checking Cleaning Radiator to Prevent Overheating

CAUTION

- Be sure to stop the engine and remove the key before cleaning.

Daily or after every 5 hours of operation, check to be sure the radiator screen (2) and radiator core are clean. Dirt or chaff on the radiator screen (2) or radiator core decrease cooling performance.

1. Remove the radiator screen (2) and panel screen (1) and remove all foreign material.
2. Remove the dust from between the fins and the tube.
3. Tighten the fan drive belt as necessary. For this, refer to "CHECK POINT EVERY 100 HOURS".
4. If scale forms in the tube, clean with the scale inhibitor or its equivalent.
5. Each time the panel screen (1) is covered with grass during operation, rub it off the screen with hand. Check the radiator screen (2) from time to time if grass accumulates.
6. If the dust or chaff has accumulated inside of the panel, remove the radiator screen (2) and clean inside completely. After cleaning, reinstall the radiator screen (2) properly.

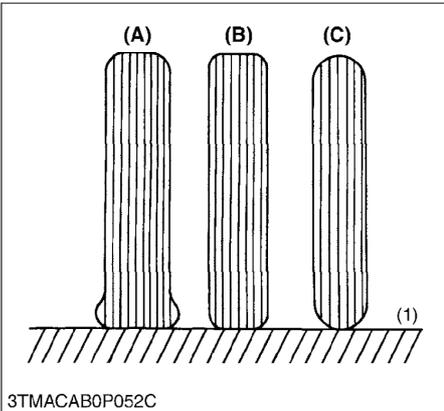
NOTE

- When assembling the panel screen (1), be sure to fit it to panel with no clearance at the bottom.

(1) Panel Screen

(2) Radiator Screen

W1049374



Checking Tire Pressure

WARNING

- Do not attempt to mount a tire on a rim. This should be done by a qualified person with the proper equipment.
- Always maintain the correct tire pressure. Do not inflate tires above the recommended pressure.
- Inflation pressure in front tires rises quickly when using compressed air.

CAUTION

- Never operate machine with a loose rim, wheel or axle.
- Whenever bolts are loosened, retighten to specified torque.
- Check all bolts frequently and keep them tightened.

Inflation Pressure

Though the inflation pressure is factory-set to the prescribed level, it naturally drops slowly in the course of time. Thus, check it every day and inflate as necessary.

	Tire sizes	Recommended Inflation Pressure
Front	15 x 6.0-6, 4PR	200 kPa (2.0 kgf/cm ² , 29 psi)
Rear	20 x 10.00-8, 4PR	140 kPa (1.4 kgf/cm ² , 20 psi)

(1) Ground

(A) Insufficient

(B) Normal

(C) Excessive

W1068933