

Product: Kubota WSM ZD18(F),ZD21(F),ZD28(F) Zero Turn Mower Service Repair Workshop Manual
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WSM

WORKSHOP MANUAL ZERO TURN MOWER

ZD18(F) • ZD21(F)
ZD28(F)

Kubota

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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 ZD18(F), ZD21(F) and ZD28(F) KUBOTA ZD Series ZERO-TURN MOWER. It is divided into two parts, "Mechanism" and "Servicing" for each section.

■ Mechanism

Information on the Features and New Mechanisms are described. This information should be understood before proceeding with troubleshooting, disassembling and servicing.

■ Servicing

The heading "General" includes general precautions, check and maintenance and special tools. Other section, there are troubleshooting, 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.

March 2002

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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.



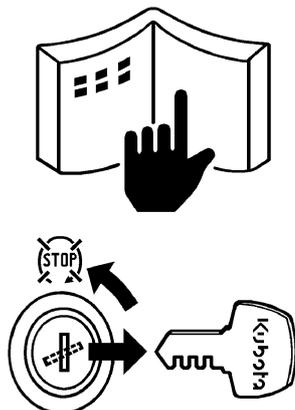
CAUTION : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



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

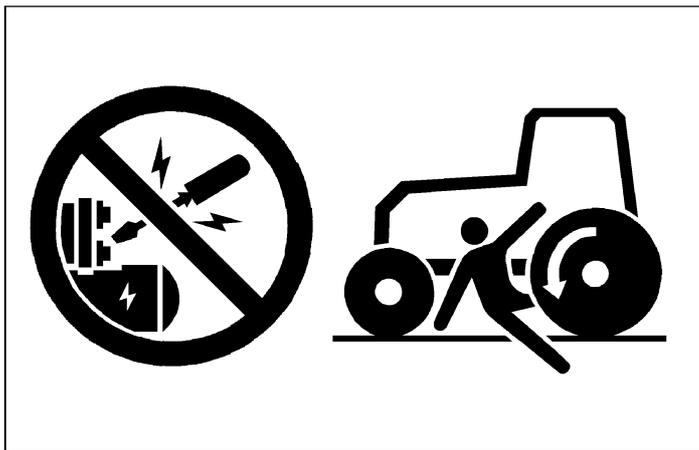


NOTE : Gives helpful information.



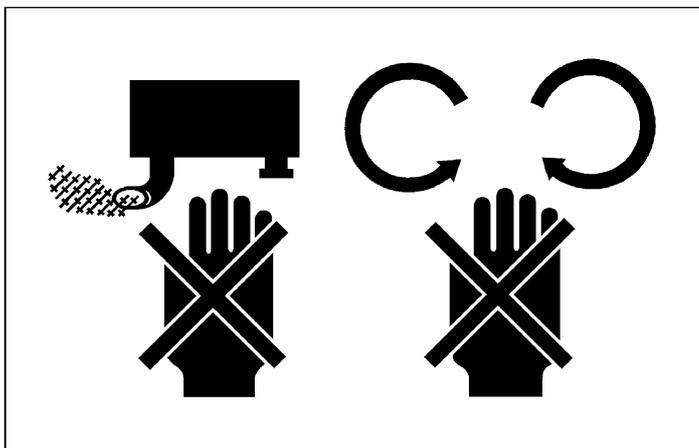
BEFORE SERVICING AND REPAIRING

- Read all instructions and safety instructions in this manual and on your generator safety decals.
- Clean the work area and generator.
- 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.



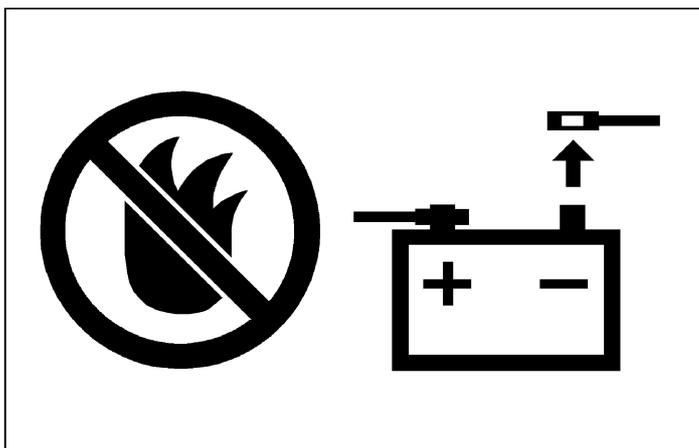
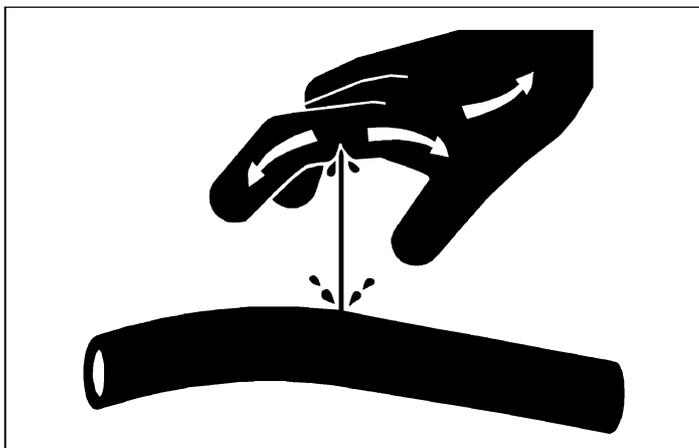
SAFETY STARTING

- 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.



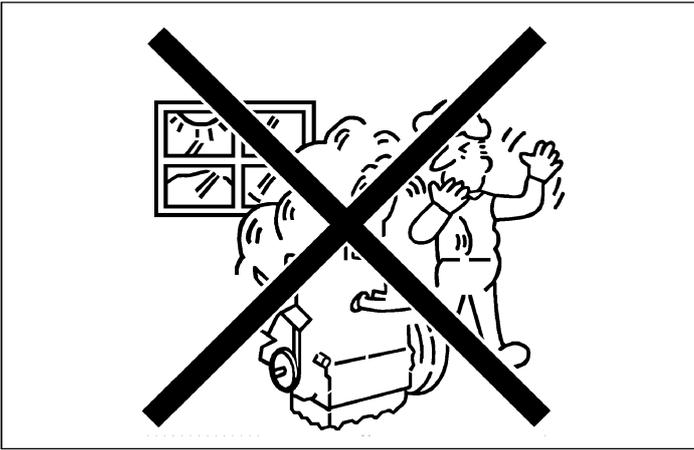
SAFETY WORKING

- 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.



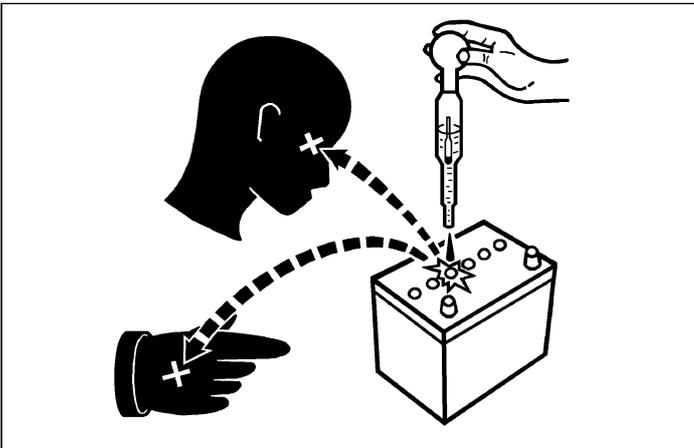
AVOID FIRES

- 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.



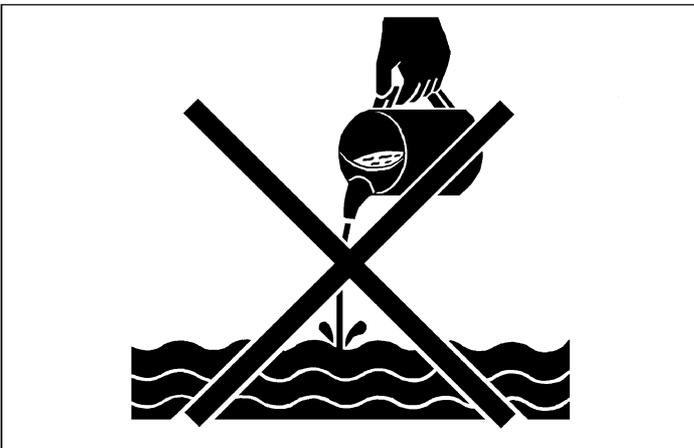
VENTILATE WORK AREA

- 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.



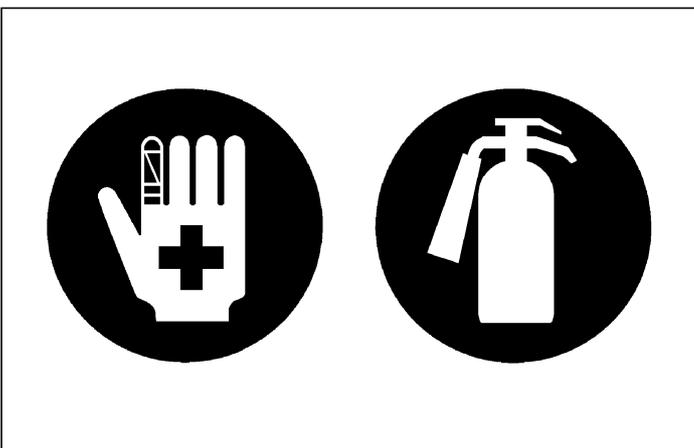
PREVENT ACID BURNS

- 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.

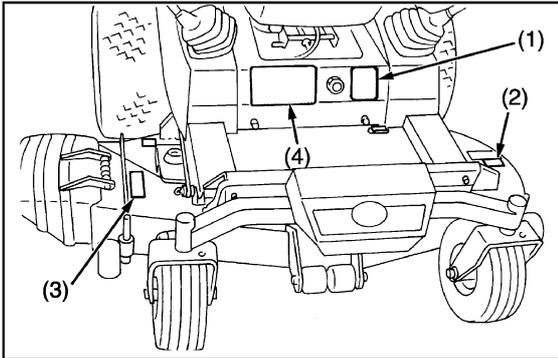
SAFETY DECALS

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.

[ZD18 · ZD21 · ZD28]

7. DANGER, WARNING AND CAUTION LABELS

(1) Part No. K3111-8817-3



⚠ WARNING

TO AVOID SERIOUS INJURY OR DEATH

- DO NOT PARK THE MACHINE ON AN INCLINE. IF NECESSARY TO PARK ON AN INCLINE, BE SURE TO STOP THE MACHINE.
- ① APPLY THE PARKING BRAKE, THEN
- ② STOP THE ENGINE.
- IF YOU STOP THE ENGINE ON AN INCLINE WITHOUT APPLYING THE PARKING BRAKE, THE MACHINE COULD MOVE AND RUN AWAY.
- IF THE ENGINE STOPS SUDDENLY DURING OPERATION APPLY THE PARKING BRAKE IMMEDIATELY TO PREVENT MACHINE RUNAWAY.

Ⓟ DEPRESS PARKING BRAKE PEDAL UNTIL LOCKED.





(2) Part No. K5112-7312-2

⚠ DANGER




DO NOT PUT HANDS OR FEET INTO MOWER WHEN ENGINE IS RUNNING.

(3) Part No. K5112-7311-2



⚠ DANGER

1. STAY CLEAR OF DISCHARGE OPENING AT ALL TIMES.
2. DO NOT PUT HANDS OR FEET INTO MOWER WHEN ENGINE IS RUNNING.
3. DO NOT OPERATE MOWER WITHOUT DISCHARGE DEFLECTOR.



(4) Part No. K3151-6581-1

⚠ WARNING



TO AVOID SERIOUS INJURY OR DEATH

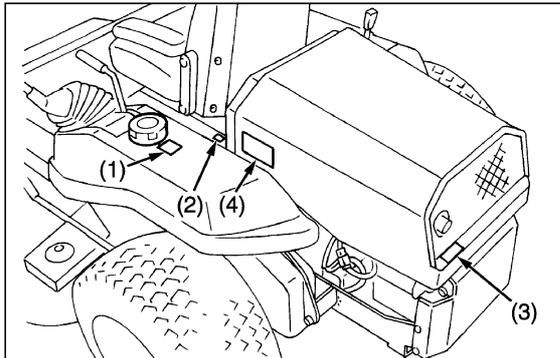
- USE EXTREME CAUTION WHEN OPERATING ON SLOPES.
- MOW ACROSS SLOPES - NOT UP AND DOWN.
- DRIVE SLOWLY ON SLOPES.
- AVOID SUDDEN STARTS.
- DO NOT OPERATE ON WET SLOPES.
- EXECUTE TURNS SLOWLY.
- LOSS OF TRACTION MAY OCCUR WHEN OPERATING ON SLOPES.
- NEVER CARRY CHILDREN OR OTHERS.
- KEEP SAFETY DEVICES (GUARDS, SHIELDS AND SWITCHES) IN PLACE AND WORKING.
- REMOVE OBJECTS THAT COULD BE THROWN BY THE BLADE.

READ AND UNDERSTAND OPERATOR'S MANUAL.

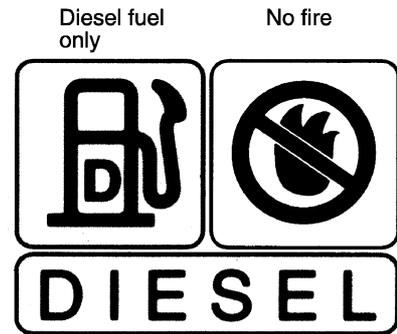
⚠ CAUTION

TO AVOID PERSONAL INJURY

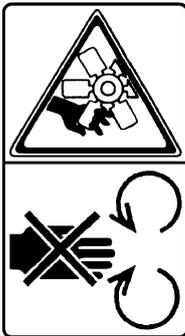
- KNOW LOCATION AND FUNCTION OF ALL CONTROLS.
- BEFORE STARTING ENGINE, MAKE CERTAIN PTO IS DISENGAGED, MOTION CONTROL LEVERS TO NEUTRAL LOCK AND EVERYONE IS AT A SAFE DISTANCE FROM THE MACHINE.
- TO REDUCE FIRE HAZARD, KEEP THE EXHAUST CLEAR OF DRY GRASS, DRY LEAVES OR OTHER COMBUSTIBLE MATERIALS.
- BEFORE DISMOUNTING, DISENGAGE PTO CLUTCH, LOWER IMPLEMENT, SHIFT INTO NEUTRAL SET PARKING BRAKE, STOP ENGINE AND REMOVE THE KEY.
- THIS MACHINE IS NOT FOR STREET OR HIGHWAY USE.



(1) Part No. K3111-6585-1



(2) Part No. K3111-6591-1



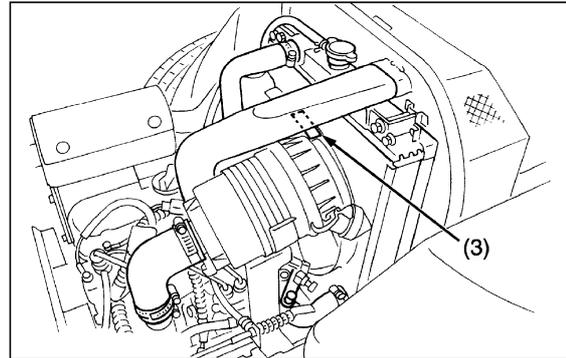
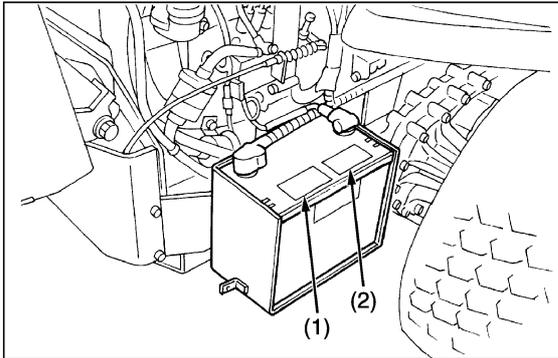
(3) Part No. 18620-8806-1



(4) Part No. K3111-6583-1



T15060ZZ00201



(1) Part No. K1211-6115-1



(2) Part No. K1211-6116-1



(3) Part No. K3111-6586-1
Stay clear of engine fan and fan belt.



CARE OF DANGER, WARNING AND CAUTION LABELS

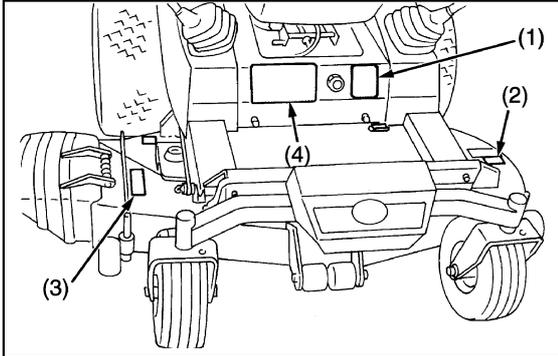
1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, and dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels.
4. If a component with danger, warning or 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.

T15060ZZ00301

[ZD18F · ZD21F · ZD28F]

7. DANGER, WARNING AND CAUTION LABELS

(1) Part No. K3111-8817-3



⚠ WARNING

TO AVOID SERIOUS INJURY OR DEATH

- DO NOT PARK THE MACHINE ON AN INCLINE. IF NECESSARY TO PARK ON AN INCLINE, BE SURE TO STOP THE MACHINE.
- ① APPLY THE PARKING BRAKE, THEN
- ② STOP THE ENGINE.
- IF YOU STOP THE ENGINE ON AN INCLINE WITHOUT APPLYING THE PARKING BRAKE, THE MACHINE COULD MOVE AND RUN AWAY.
- IF THE ENGINE STOPS SUDDENLY DURING OPERATION APPLY THE PARKING BRAKE IMMEDIATELY TO PREVENT MACHINE RUNAWAY.

(P) DEPRESS PARKING BRAKE PEDAL UNTIL LOCKED.

⊘ PULL BACK LEVER TO RELEASE PARKING LOCK.

(2) Part No. K5112-7312-2

⚠ DANGER

DO NOT PUT HANDS OR FEET INTO MOWER WHEN ENGINE IS RUNNING.

(3) Part No. K5112-7311-2

⚠ DANGER

1. STAY CLEAR OF DISCHARGE OPENING AT ALL TIMES.
2. DO NOT PUT HANDS OR FEET INTO MOWER WHEN ENGINE IS RUNNING.
3. DO NOT OPERATE MOWER WITHOUT DISCHARGE DEFLECTOR.

(4) Part No. K3151-6581-1

⚠ WARNING

TO AVOID SERIOUS INJURY OR DEATH

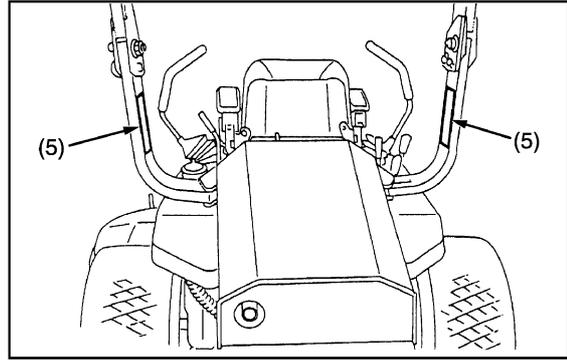
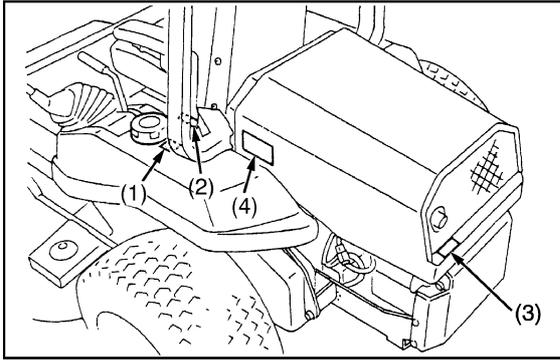
- USE EXTREME CAUTION WHEN OPERATING ON SLOPES.
- MOW ACROSS SLOPES - NOT UP AND DOWN.
- DRIVE SLOWLY ON SLOPES.
- AVOID SUDDEN STARTS.
- DO NOT OPERATE ON WET SLOPES.
- EXECUTE TURNS SLOWLY.
- LOSS OF TRACTION MAY OCCUR WHEN OPERATING ON SLOPES.
- NEVER CARRY CHILDREN OR OTHERS.
- KEEP SAFETY DEVICES (GUARDS, SHIELDS AND SWITCHES) IN PLACE AND WORKING.
- REMOVE OBJECTS THAT COULD BE THROWN BY THE BLADE.

READ AND UNDERSTAND OPERATOR'S MANUAL.

⚠ CAUTION

TO AVOID PERSONAL INJURY

- KNOW LOCATION AND FUNCTION OF ALL CONTROLS.
- BEFORE STARTING ENGINE, MAKE CERTAIN PTO IS DISENGAGED, MOTION CONTROL LEVERS TO NEUTRAL LOCK AND EVERYONE IS AT A SAFE DISTANCE FROM THE MACHINE.
- TO REDUCE FIRE HAZARD, KEEP THE EXHAUST CLEAR OF DRY GRASS, DRY LEAVES OR OTHER COMBUSTIBLE MATERIALS.
- BEFORE DISMOUNTING, DISENGAGE PTO CLUTCH, LOWER IMPLEMENT, SHIFT INTO NEUTRAL SET PARKING BRAKE.
- STOP ENGINE AND REMOVE THE KEY.
- THIS MACHINE IS NOT FOR STREET OR HIGHWAY USE.



(1) Part No. K3111-6585-1

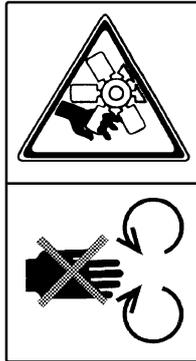
(2) Part No. K3111-6591-1

(5) Part No. K2591-6564-1

(6) Part No. K2591-6557-1

Diesel fuel only

No fire



(3) Part No. 18620-8806-1



(4) Part No. K3151-6583-1



⚠ DANGER

TO AVOID POSSIBLE INJURY OR DEATH FROM A MACHINE RUNAWAY.

1. Do not start engine by shorting across starter terminals or bypassing the safety start switch. Machine may start in gear and move if normal starting circuitry is bypassed.
 2. Start engine only from operator's seat with motion control levers in neutral lock position and PTO OFF.
- Never start engine while standing on the ground.

⚠ WARNING

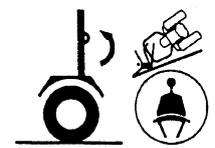
Never modify or repair a ROPS because welding, grinding, drilling or cutting any portion may weaken the structure.

⚠ CAUTION

TO AVOID INJURY WHEN RAISING OR FOLDING ROPS:

- Set parking brake and stop engine.
- Remove any obstruction that may prevent raising or folding of the ROPS.
- Do not allow any bystanders.
- Always perform function from a stable position at the rear of the tractor.
- Hold the top of the ROPS securely when raising or folding.
- Make sure all pins are installed and locked.

⚠ WARNING



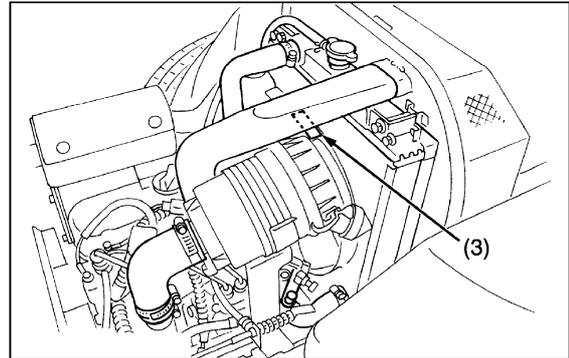
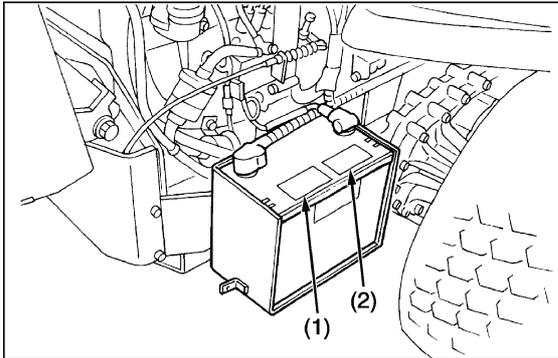
TO AVOID PERSONAL INJURY OR DEATH FROM ROLL-OVER:

1. Keep Roll-Over Protective Structures (ROPS) in the upright and locked position.
2. Fasten SEAT BELT before operating.



THERE IS NO OPERATOR PROTECTION WHEN THE ROPS IN THE FOLDED POSITION.

1. Check the operating area and fold the ROPS only when absolutely necessary.
2. Do not wear SEAT BELT if ROPS in folded.
3. Raise and lock ROPS as soon as vertical clearance allows.
4. Read ROPS related instruction and warnings.



(1) Part No. K1211-6115-1



(2) Part No. K1211-6116-1



(3) Part No. K3111-6586-1
Stay clear of engine fan and fan belt.



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, and 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.

T15060ZZ00301

SPECIFICATIONS

Model		ZD18	ZD21	ZD28
Maximum gross power		13.4 kW (18 HP)* ¹	15.7 kW (21 HP)* ¹	20.9 kW (28 HP)* ¹
Engine	Model	D722-E-XFM5	D782-E-XFM5	D1105-E-ZD
	Type	Indirect injection, vertical, water cooled, 4-cycle diesel engine		
	Number of cylinders	3		
	Bore and stroke	67.0 × 68.0 mm (2.64 × 2.68 in.)	67.0 × 73.6 mm (2.64 × 2.90 in.)	78.0 × 78.4 mm (3.07 × 3.09 in.)
	Total displacement	719 cm ³ (43.9 cu.in.)	778 cm ³ (47.5 cu.in.)	1123 cm ³ (68.5 cu.in.)
	Rated revolution	3200 rpm		3000 rpm
	Combustion chamber	Spherical type (E-TVCS)		
	Fuel injection pump	Bosch MD type mini pump		
	Governor	Centrifugal ball mechanical governor		
	Injection nozzle	Bosch throttle type		Throttle type
	Injection timing	0.33 to 0.37 rad. (19° to 21°) before T.D.C.		
	Injection order	1-2-3		
	Injection pressure	13.73 MPa (140 kgf/cm ² , 1990 psi)		
	Lubricating system	Forced lubrication by gear pump		
	Cooling system	Pressurized radiator, forced circulation with water pump		
	Lubricating oil	API Service classification CC or CD, Below 0 °C (32 °F) : SAE 10W or 10W-30, 0 to 25 °C (32 °F to 77 °F) : SAE 20 or 10W-30, Above 25 °C (77 °F) : SAE 30 or 10W-30		
	Starting system	Electric starter (12 V, 1.1 kW)		
	Battery	51 R (12 V, 450 CCA)		
Fuel	No. 2-D Diesel fuel (ASTM D975) [No. 1-D diesel fuel, if temperature is below - 10 °C (14 °F)]			
Capacities	Fuel tank	30 L (5.8 U.S.gals., 4.8 Imp.gals.)		
	Engine crankcase	3.2 L (3.4 U.S.qts., 2.8 Imp.qts.)	3.5 L (3.7 U.S.qts., 3.1 Imp.qts.)	3.4 L (3.6 U.S.qts., 3.0 Imp.qts.)
	Engine coolant	2.6 L (2.7 U.S.qts., 2.3 Imp.qts.)		3.8 L (4.0 U.S.qts., 3.3 Imp.qts.)
	Recovery tank	0.25 L (0.26 U.S.qts., 0.22 Imp.qts.)		
	Transmission (Including HST and cylinder)	4.0 L (4.2 U.S.qts., 3.5 Imp.qts.)* ²		
	Rear axle gear case	1.8 L (1.9 U.S.qts., 1.6 Imp.qts.)* ² each		
	Mower gear case oil	0.40 L (0.42 U.S.qts., 0.35 Imp.qts.)		
Tires	Front	15 × 6.0-6 (4PR) Rib		
	Rear	23 × 10.5-12 (4PR) Turf	24 × 12.0-12 (4PR) Turf	
Travelling speeds	Forward	0 to 14.5 km/h (0 to 9.0 mph)* ³	0 to 15.0 km/h (0 to 9.3 mph)* ³	0 to 15.0 km/h (0 to 9.3 mph)* ⁴
	Reverse	0 to 8.0 km/h (0 to 5.0 mph)* ³	0 to 8.3 km/h (0 to 5.2 mph)* ³	0 to 8.3 km/h (0 to 5.2 mph)* ⁴

NOTE: *¹ Manufacturer's estimate

*² Oil amount when the oil level is at the upper level.

*³ At 3200 engine rpm

*⁴ At 3000 engine rpm

W1028929

Model		ZD18	ZD21	ZD28
Dimensions	Overall length	2040 mm (80.3 in.)		
	Overall width (Without mower)	1328 mm (52.3 in.)	1451 mm (57.1 in.)	
	Overall height (Without ROPS)	1175 mm (46.3 in.)	1190 mm (46.9 in.)	
	Wheel base	1250 mm (49.2 in.)		1365 mm (53.7 in.)
	Treads	Front	975 mm (38.4 in.)	
Rear		1080 mm (42.5 in.)	1150 mm (45.3 in.)	
Weight (With mower deck)		560 kg (1234.6 lbs) / With 54" mower deck	570 kg (1256.6 lbs) / With 60" mower deck	650 kg (1433 lbs) / With 60" mower deck, 680 kg (1499 lbs) / With 72" mower deck

W1033163

Model		ZD18F	ZD21F	ZD28F	
Maximum gross power		13.4 kW (18 HP)* ¹	15.7 kW (21 HP)* ¹	20.9 kW (28 HP)* ¹	
Engine	Model	D722-E-XFM5	D782-E-XFM5	D1105-E-ZD	
	Type	Indirect injection, vertical, water cooled, 4-cycle diesel engine			
	Number of cylinders	3			
	Bore and stroke	67.0 × 68.0 mm (2.64 × 2.68 in.)	67.0 × 73.6 mm (2.64 × 2.90 in.)	78.0 × 78.4 mm (3.07 × 3.09 in.)	
	Total displacement	719 cm ³ (43.9 cu.in.)	778 cm ³ (47.5 cu.in.)	1123 cm ³ (68.5 cu.in.)	
	Rated revolution	3200 rpm		3000 rpm	
	Combustion chamber	Spherical type (E-TVCS)			
	Fuel injection pump	Bosch MD type mini pump			
	Governor	Centrifugal ball mechanical governor			
	Injection nozzle	Bosch throttle type		Throttle type	
	Injection timing	0.33 to 0.37 rad. (19° to 21°) before T.D.C.			
	Injection order	1-2-3			
	Injection pressure	13.73 MPa (140 kgf/cm ² , 1990 psi)			
	Lubricating system	Forced lubrication by gear pump			
	Cooling system	Pressurized radiator, forced circulation with water pump			
	Lubricating oil	API Service classification CC or CD, Below 0 °C (32 °F) : SAE 10W or 10W-30, 0 to 25 °C (32 °F to 77 °F) : SAE 20 or 10W-30, Above 25 °C (77 °F) : SAE 30 or 10W-30			
	Starting system	Electric starter (12 V, 1.1 kW)			
	Battery	51 R (12 V, 450 CCA)			
Fuel	No. 2-D Diesel fuel (ASTM D975) [No. 1-D diesel fuel, if temperature is below - 10 °C (14 °F)]				
Capacities	Fuel tank	30 L (5.8 U.S.gals., 4.8 Imp.gals.)			
	Engine crankcase	3.2 L (3.4 U.S.qts., 2.8 Imp.qts.)	3.5 L (3.7 U.S.qts., 3.1 Imp.qts.)	3.4 L (3.6 U.S.qts., 3.0 Imp.qts.)	
	Engine coolant	2.6 L (2.7 U.S.qts., 2.3 Imp.qts.)		3.8 L (4.0 U.S.qts., 3.3 Imp.qts.)	
	Recovery tank	0.25 L (0.26 U.S.qts., 0.22 Imp.qts.)			
	Transmission (Including HST and cylinder)	4.0 L (4.2 U.S.qts., 3.5 Imp.qts.)* ²			
	Rear axle gear case	1.8 L (1.9 U.S.qts., 1.6 Imp.qts.)* ² each			
	Mower gear case oil	0.40 L (0.42 U.S.qts., 0.35 Imp.qts.)			
Tires	Front	15 × 6.0-6 (4PR) Rib			
	Rear	23 × 10.5-12 (4PR) Turf	24 × 12.0-12 (4PR) Turf		
Travelling speeds	Forward	0 to 14.5 km/h (0 to 9.0 mph)* ³	0 to 15.0 km/h (0 to 9.3 mph)* ³	0 to 15.0 km/h (0 to 9.3 mph)* ⁴	
	Reverse	0 to 8.0 km/h (0 to 5.0 mph)* ³	0 to 8.3 km/h (0 to 5.2 mph)* ³	0 to 8.3 km/h (0 to 5.2 mph)* ⁴	
Dimensions	Overall length	2040 mm (80.3 in.)			
	Overall width (Without mower)	1328 mm (52.3 in.)	1451 mm (57.1 in.)		
	Overall height	With ROPS upright	1895 mm (74.6 in.)	1910 mm (75.2 in.)	
		With ROPS folded	1455 mm (57.3 in.)	1470 mm (57.9 in.)	
	Wheel base	1250 mm (49.2 in.)		1365 mm (53.7 in.)	
	Treads	Front	975 mm (38.4 in.)		1070 mm (42.1 in.)
Rear		1080 mm (42.5 in.)	1150 mm (45.3 in.)		

NOTE: *¹ Manufacturer's estimate

*² Oil amount when the oil level is at the upper level.

*³ At 3200 engine rpm

*⁴ At 3000 engine rpm

Model	ZD18F	ZD21F	ZD28F
Weight (With mower deck)	640 kg (1411 lbs) / With 54" mower deck	650 kg (1433 lbs) / With 60" mower deck	780 kg (1718 lbs) / With 72" mower deck
PTO	Shaft drive KUBOTA 10 tooth in spline (2530 rpm)		Shaft drive KUBOTA 10 tooth in spline (2540 rpm)
PTO clutch	Wet multi discs		
Revolution (PTO speed)	1 speed (2530 rpm at 3200 engine rpm)		1 speed (2540 rpm at 3000 engine rpm)
PTO brake	Wet single disc		
Steering	2-Hand levers		
Transmission	2-Hydrostatic transmission with gear		
Brake	Internal expanding shoe / Hand		

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

W1030228

Model		RCK54-18Z	RCK60-21Z	RCK60-28Z	RCK72-28Z	
Mower	Suitable machine	ZD18(F)	ZD18(F) / 21(F)	ZD28(F)		
	Mounting method	Quick joint, parallel linkage				
	Adjustment of cutting height	Dial gauge				
	Cutting width mm (in.)	1372 (54.0)	1524 (60.0)		1829 (72.0)	
	Cutting height mm (in.)	25 to 127 (1.0 to 5.0)				
	Weight (Approx.) kg (lbs)	103 (227)	120 (265)		150 (331)	
	Blade spindle speed r/s (rpm)	53.2 (3190)* ¹	54.0 (3240)* ¹	53.7 (3220)* ¹	47.8 (2870)* ¹	
	Blade tip velocity m/s (fpm)	79 (15700)* ¹	88.9 (17500)* ¹	88.4 (17400)* ¹	94.0 (18500)* ¹	
	Blade length mm (in.)	475 (18.7)	523 (20.6)		625 (24.6)	
	Number of blades	3				
	Dimensions	Total length mm (in.)	985 (38.8)	1025 (40.35)		1095 (43.1)
		Total width mm (in.)	1690 (66.5)	1845 (72.6)		2245 (88.4)
		Total height mm (in.)	300 (11.8)			
	Discharge	Right side				

NOTE: *¹ Engine Max rpm

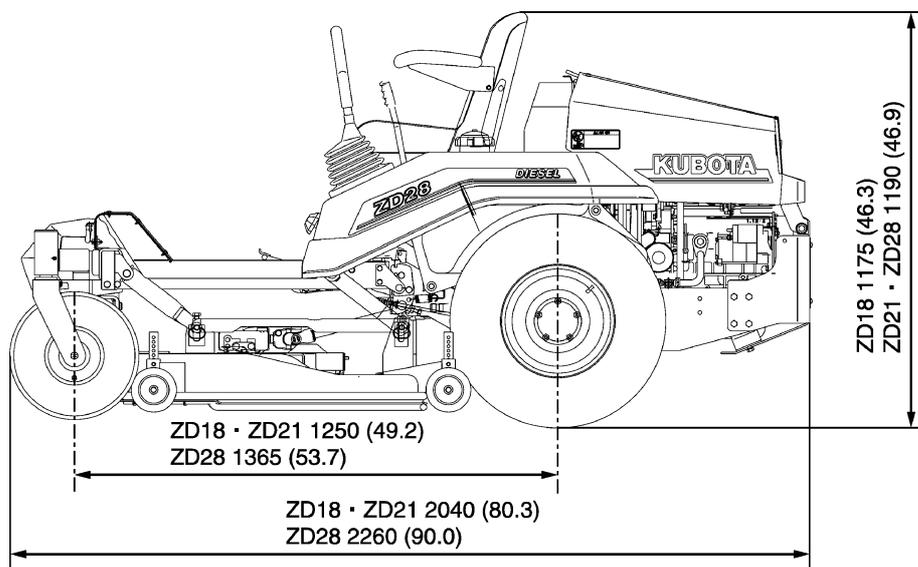
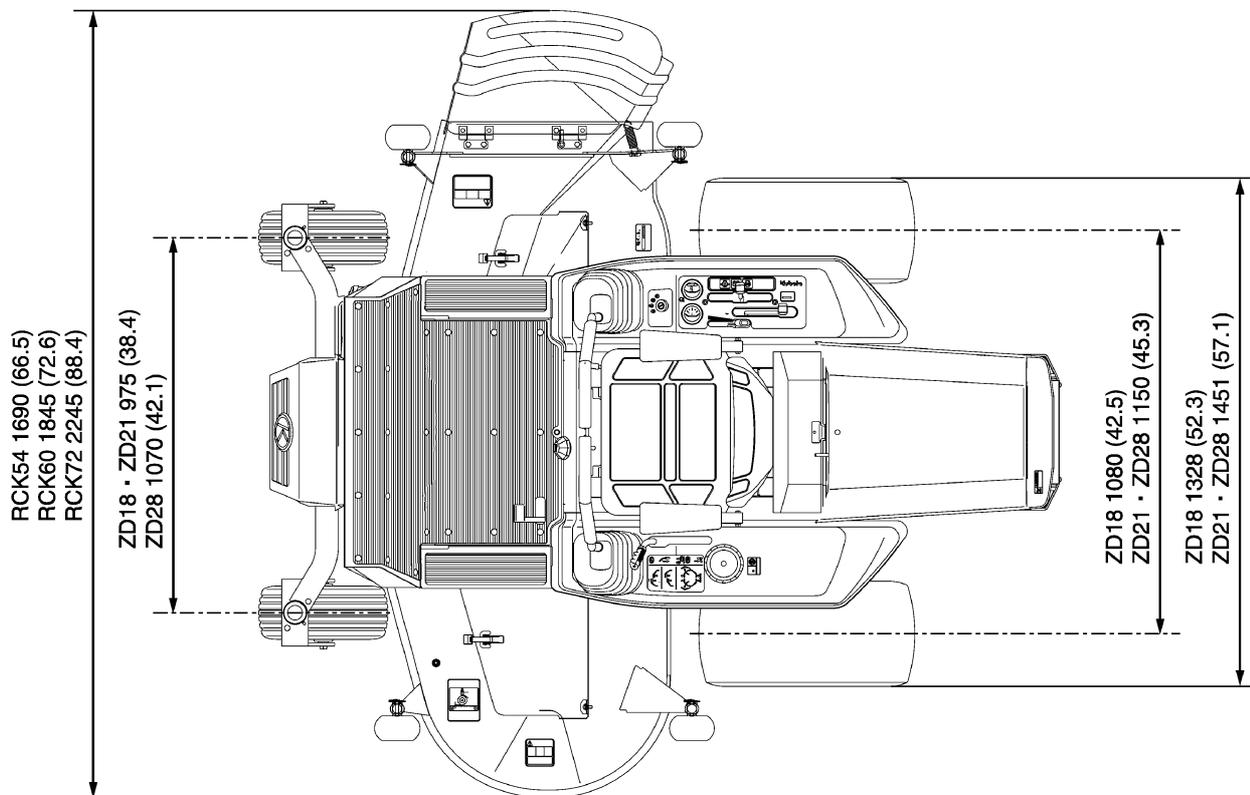
The company reserves the right to change the specifications without notice.

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DIMENSIONS

[ZD18 · ZD21 · ZD28]

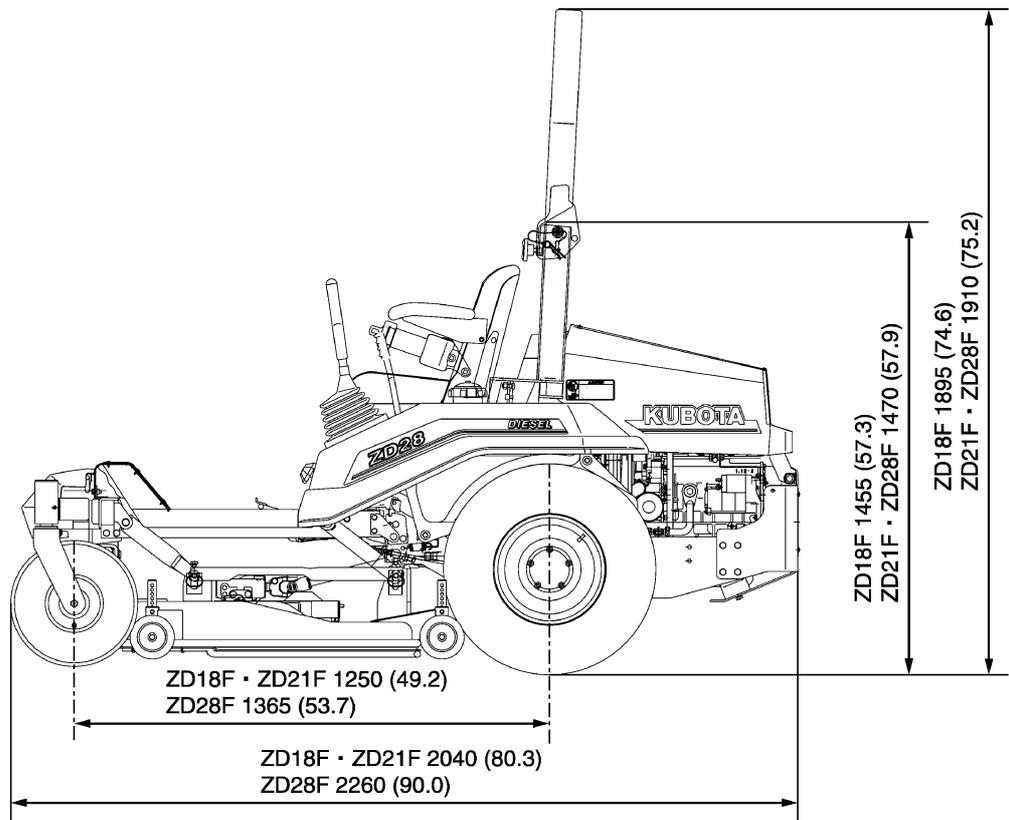
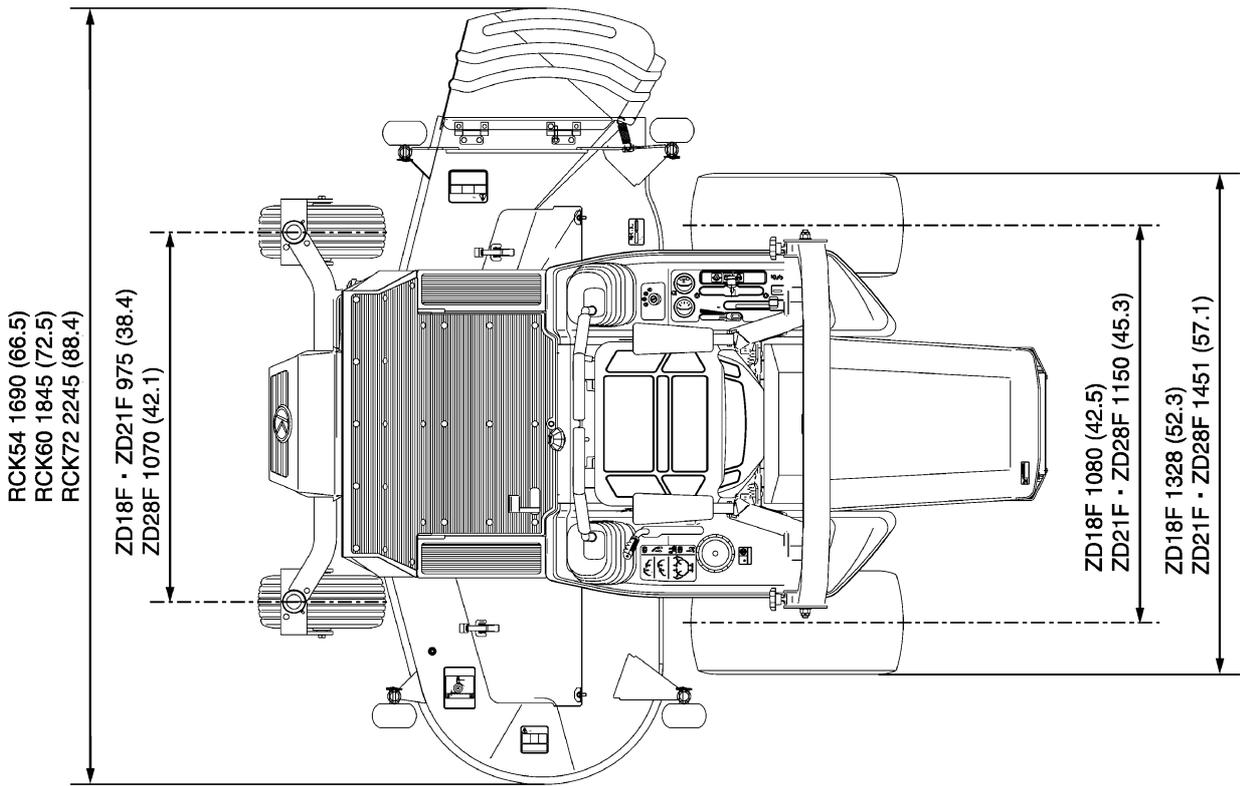
Unit : mm (in.)



T15061ZZ00101

[ZD18F · ZD21F · ZD28F]

Unit : mm (in.)



T15061ZZ00201

G GENERAL

GENERAL

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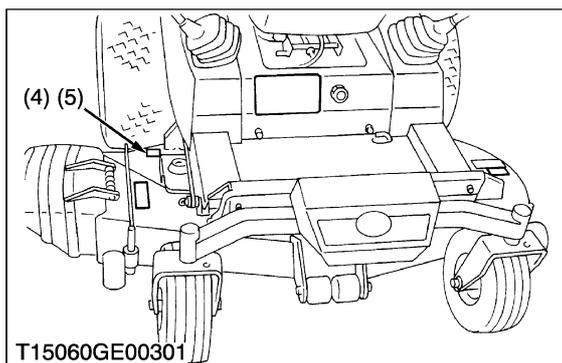
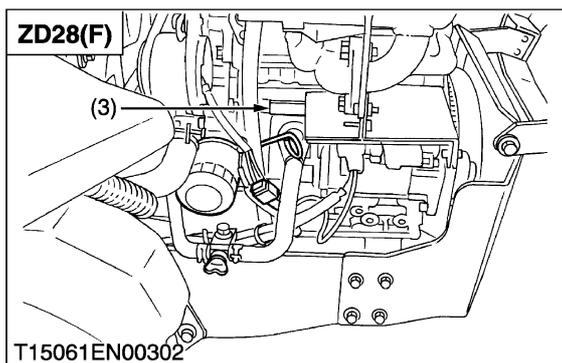
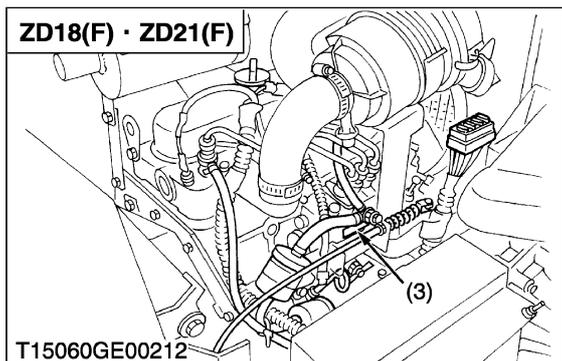
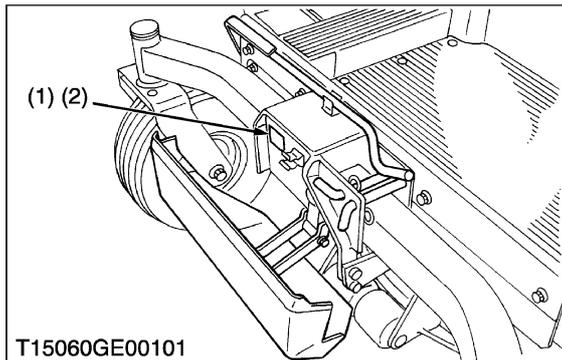
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1. IDENTIFICATION

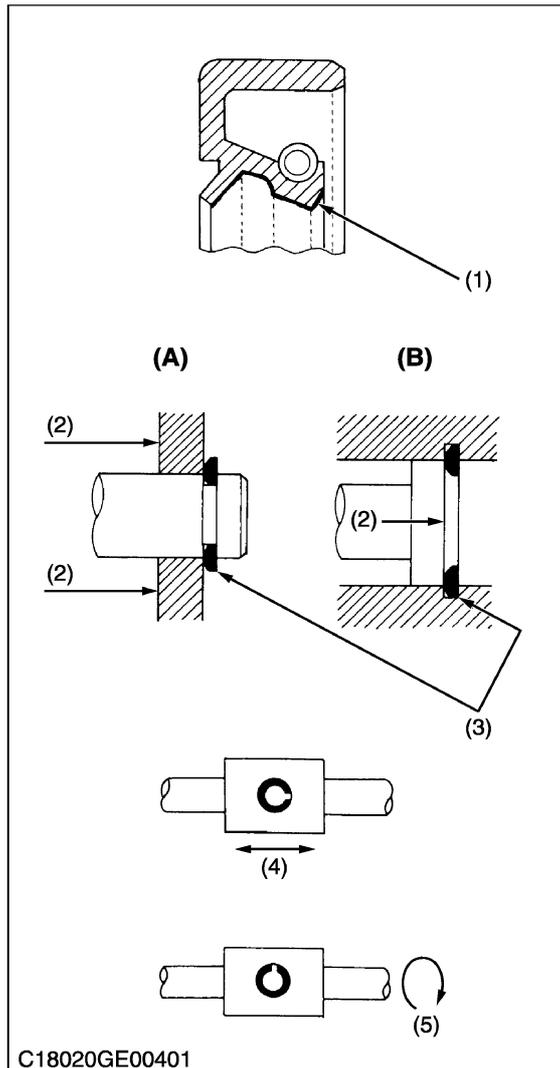
When contacting your local KUBOTA distributor, always specify engine serial number (3), machine serial number (2), mower serial number (4) and hour meter reading.

- (1) Machine Identification Plate
- (2) Machine Serial Number
- (3) Engine Serial Number
- (4) Mower Serial Number
- (5) Mower Identification Plate

W1010714



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 or internal snap rings, 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.

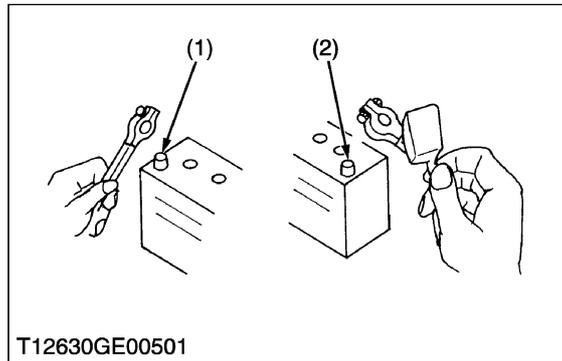
- (1) Grease
- (2) Force
- (3) Sharp Edge
- (4) Axial Force
- (5) Rotating Movement

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

W1010904

C18020GE00401

3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING



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

■ IMPORTANT

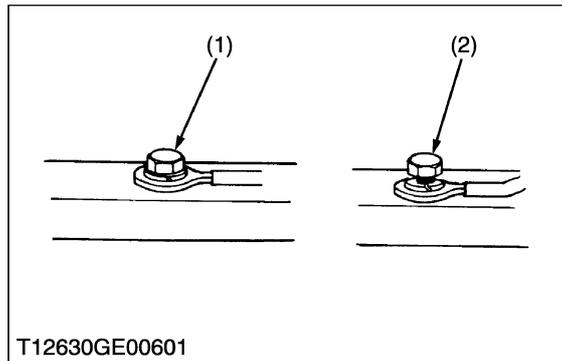
- Check electrical wiring for damage and loosened connection every year. To this end, educate the customer to do his or her own check and at the same time recommend the dealer to perform periodic check for a fee.
- Do not attempt to modify or remodel any electrical parts and wiring.
- When removing the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

(1) Negative Terminal

(2) Positive Terminal

W1011114

[1] WIRING

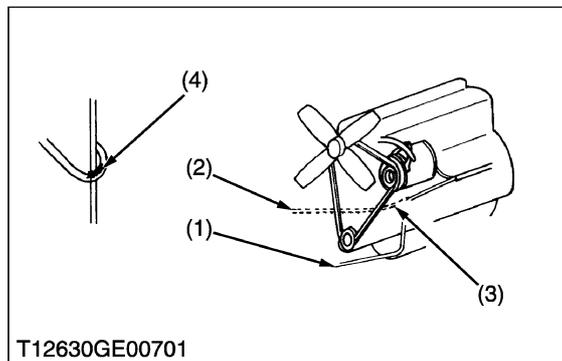


- Securely tighten wiring terminals.

(1) Correct
(Securely tighten)

(2) Incorrect
(Loosening leads to faulty contact)

W1011216

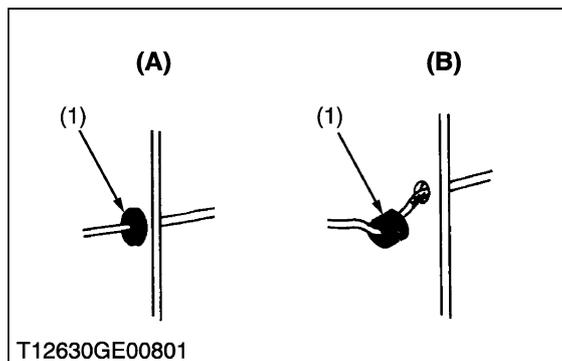


- Do not let wiring contact dangerous part.

(1) Wiring (Correct)
(2) Wiring (Incorrect)

(3) Dangerous Part
(4) Dangerous Part

W1011313

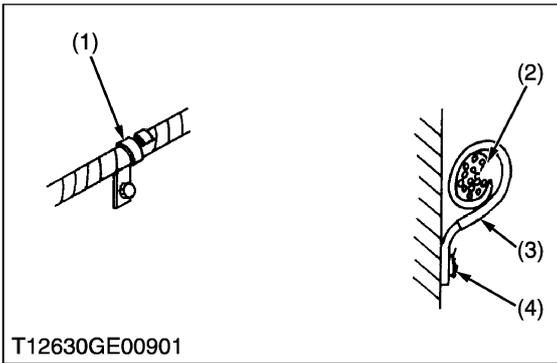


- Securely insert grommet.

(1) Grommet

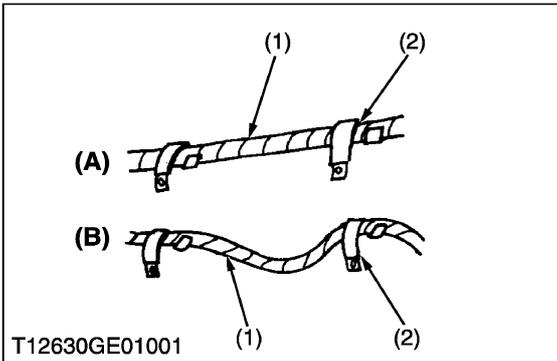
(A) Correct
(B) Incorrect

W1011388



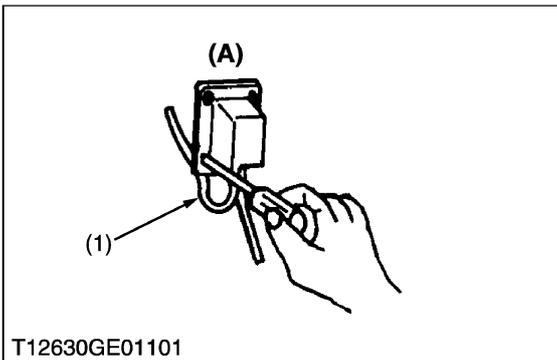
- Securely clamp, being careful not to damage wiring.
- | | |
|-----------------------|------------------|
| (1) Clamp | (3) Clamp |
| • Wind Clamp Spirally | (4) Welding Dent |
| (2) Wire Harness | |

W1011458



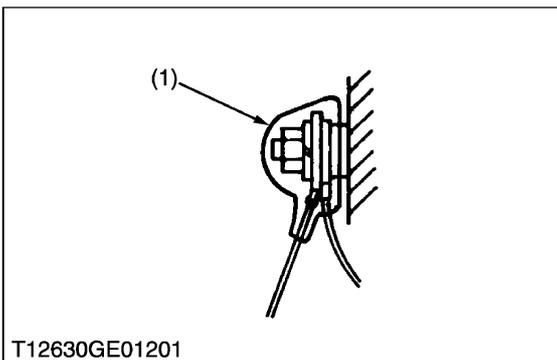
- Clamp wiring so that there is no twist, unnecessary sag, or excessive tension, except for movable part, where sag be required.
- | | |
|------------|---------------|
| (1) Wiring | (A) Correct |
| (2) Clamp | (B) Incorrect |

W1011587



- In installing a part, take care not to get wiring caught by it.
- | | |
|------------|---------------|
| (1) Wiring | (A) Incorrect |
|------------|---------------|

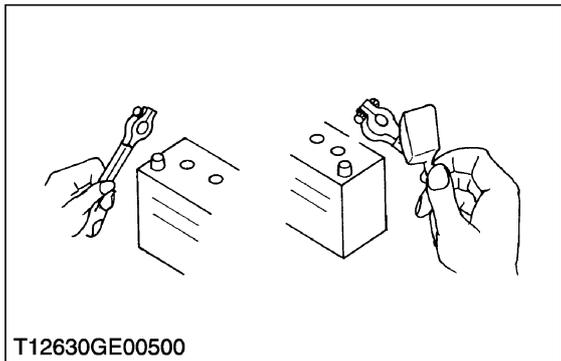
W1011670



- After installing wiring, check protection of terminals and clamped condition of wiring, only connect battery.
- | | |
|-----------|--------------------------|
| (1) Cover | • Securely Install Cover |
|-----------|--------------------------|

W1011735

[2] BATTERY



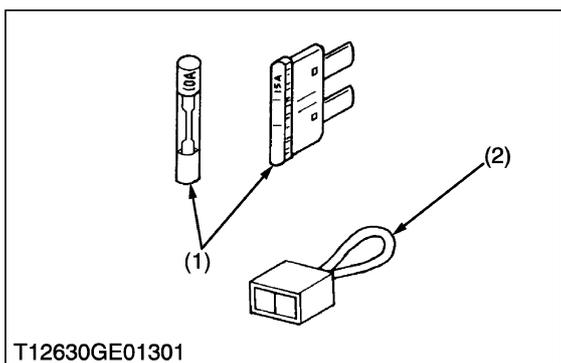
- Take care not to confuse positive and negative terminal posts.
- When removing battery cables, disconnect negative cable first. When installing battery cables, check for polarity and connect positive cable first.
- Do not install any battery with capacity other than is specified (Ah).
- After connecting 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.**

W1011816

[3] FUSE



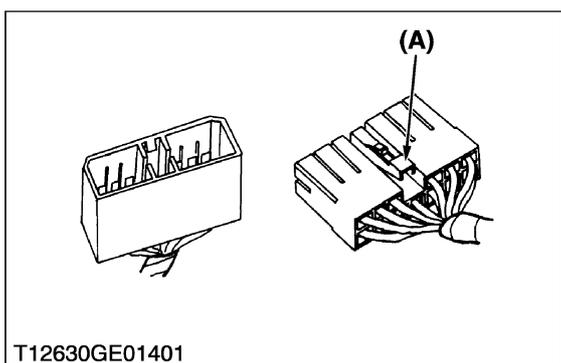
- Use fuses with specified capacity. Neither too large or small capacity fuse is acceptable.
- Never use steel or copper wire in place of fuse.
- Do not install working light, radio set, etc. on machine which is not provided with reserve power supply.
- Do not install accessories if fuse capacity of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

(1) Fuse

(2) Slow Blow Fuse

W1012092

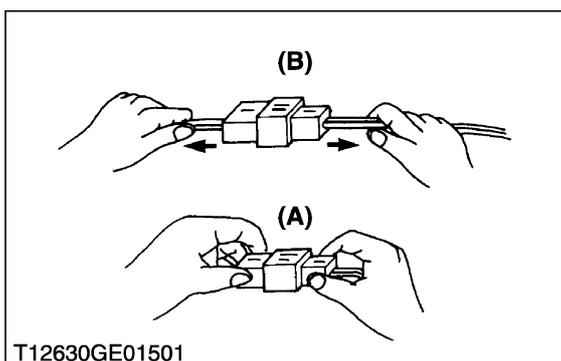
[4] CONNECTOR



- For connector with lock, push lock to separate.

(A) Push

W1012211



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

(A) Correct

(B) Incorrect

W1012272

4. LUBRICANTS, FUEL AND COOLANT

No.	Place		Capacity			Lubricants, fuel and coolant
			ZD18(F)	ZD21(F)	ZD28(F)	
1	Fuel		30 L 7.9 U.S.gals. 6.6 Imp.gals.			No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below – 10 °C (14 °F)
2	Coolant	Cooling system	2.6 L 2.7 U.S.qts. 2.3 Imp.qts.		3.8 L 4.0 U.S.qts. 3.3 Imp.qts.	Fresh clean water (soft water) with anti-freeze
		Recovery tank	0.25 L 0.26 U.S.qts. 0.22 Imp.qts.			
3	Engine crankcase		3.2 L* 3.4 U.S.qts. 2.8 Imp.qts.	3.5 L* 3.7 U.S.qts. 3.1 Imp.qts.	3.4 L* 3.6 U.S.qts. 3.0 Imp.qts.	Engine oil : API Service Classification CC or CD 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		3.2 L 3.4 U.S.qts. 2.8 Imp.qts.			KUBOTA UDT or SUPER UDT fluid**
5	Transmission case with filter & hose		4.0 L 4.2 U.S.qts. 3.5 Imp.qts.			
6	Rear axle case		1.8 L each 1.9 U.S.qts. each 1.6 Imp.qts. each			KUBOTA UDT or SUPER UDT fluid** or SAE 80 · 90 gear oil
7	Mower gear case		0.40 L 0.42 U.S.qts. 0.35 Imp.qts.			SAE 90 gear oil

* Oil amount when the oil level is the upper of the oil level gauge.

** KUBOTA original transmission hydraulic fluid

Greasing, oiling (Machine)				
No.	Place	No. of greasing point	Capacity	Type of grease
8	Motion control lever boss	2	Until grease overflows	SAE multi-purpose type grease
9	Motion control lever	2		
10	Center pin	1		
11	King pin	2		
12	Front wheel	2		
13	Front lift arm	2		
14	Universal joint	3		
15	Seat adjuster	2		
16	Throttle cable	2	Moderate amount	Engine oil
Greasing (Mower)				
17	Universal joint	3	Until grease overflows	SAE multi-purpose type grease
18	Three spindle shafts	3		
19	Belt tension pulley	1		
20	Belt tension pivot	1		

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

W1034542

[2] METRIC SCREWS, BOLTS AND NUTS

Grade Unit Nominal Diameter	Property class 8.8			Property class 10.9		
						
	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
M8	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
M10	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
M12	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
M14	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
M16	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 Unit Nominal Diameter	SAE GR.5 			SAE GR.8 		
	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
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

6. MAINTENANCE CHECK LIST

No.	Items	Period	Indication on hour meter						After purchase		Important	Reference page					
			50	50	100	150	200	400	1 year	2 years							
1	Engine oil	Change	★				☆					G-16					
2	Engine oil filter	Replace	★				☆					G-17					
3	Transmission fluid	Change					★	☆				G-19					
4	Transmission oil filter	Replace	★				☆					G-17					
5	Transmission strainer	Clean					★	☆				G-19					
6	Rear axle gear case (RH & LH) fluid	Change					★	☆				G-20					
7	Front axle pivot	Adjust			★		☆					G-18					
8	Safety device	Check	☆									G-21					
9	Greasing (without mower)	—	☆									G-23					
10	Mower gear box oil	Check	☆									G-25					
		Change				☆						G-30					
11	Air cleaner element	Clean	☆								*1	G-25					
		Replace							☆		*2	G-32					
12	Battery condition	Check		☆								G-25					
13	Fan belt	Adjust		☆								G-27					
14	Parking brake	Adjust		☆								G-28					
15	Fuel filter element	Check		☆								G-27					
		Replace						☆				G-32					
16	Fuel line	Check		☆								G-27					
		Replace								☆		G-35					
17	Radiator hose and clamp	Check					☆					G-30					
		Replace								☆		G-35					
18	Hydraulic hose	Check					☆					G-30					
		Replace								☆		G-35					
19	Intake air line	Check					☆					G-31					
		Replace								☆		G-35					
20	Motion control lever pivot	Adjust					☆					G-31					
21	Radiator	Clean							☆			G-33					
22	Coolant	Change							☆			G-33					
23	Mower gear box oil seal	Replace								☆		G-35					
24	Fuel system	Bleed	Service as required									G-37					
25	Fuse	Replace															G-36
26	Blade	Replace															G-37
27	Mower belt	Replace															G-37

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■ IMPORTANT

• The jobs indicated by ★ must be done initially.

*1 Air cleaner should be cleaned more often in dusty conditions than in normal conditions.

*2 Every year or every 6 times of cleaning