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TO THE OWNER:

This manual contains information concerning the operation, adjust, and maintenance of the CM Mower. You have purchased a dependable machine, but only by proper care and operation can you expect to receive the performance and long service built into this Mower. Please have all operators read this manual carefully and keep the manual available for ready reference.

Your SHIBAURA dealer will instruct you in the general operation of you Mower. (Refer to the "Delivery Report" at the back of this manual.) Your dealer's staff of factory-trained service technicians will be glad to answer any questions that may arise regarding the operation of your Mower.

Your SHIBAURA dealer carries a complete line of genuine SHIBAURA parts. These parts are manufactured and carefully inspected to insure high quality and accurate fitting of any necessary replacement parts.



CAUTION: THIS SYMBOL IS USED THROUGHOUT THIS BOOK WHENEVER PERSONAL SAFETY IS INVOLVED. TAKE TIME TO READ AND FOLLOW THE INSTRUCTIONS. BE CAREFUL!

CAUTION: PICTURES IN THIS MANUAL MAY SHOW PROTECTIVE SHIELDING OPEN OR REMOVED TO BETTER ILLUSTRATE A PARTICULAR FEATURE OR ADJUSTMENT.

BE CERTAIN, HOWEVER, TO CLOSE OR REPLACE ALL SHIELDING BEFORE OPERATING THE MACHINE.

IMPROVEMENTS

ISHIKAWAJIMA-SHIBAURA is continually striving to improve its products. We reserve the right to make improvements or changes when it becomes practical and possible to do so, without incurring any obligation to make changes or additions to the equipment sold previously.

PRECAUTIONARY STATEMENTS

PERSONAL SAFETY

Throughout this manual and on machine decals, you will find precautionary statements (“CAUTION”, “WARNING”, and “DANGER”) followed by specific instructions. These precautions are intended for the personal safety of you and those working with you. Please take time to read them.



CAUTION: THE WORD “CAUTION” IS USED WHERE A SAFE BEHAVIORAL PRACTICE ACCORDING TO OPERATING AND MAINTENANCE INSTRUCTIONS AND COMMON SAFETY PRACTICES WILL PROTECT THE OPERATOR AND OTHERS FROM ACCIDENT INVOLVEMENT.



WARNING: THE WORD “WARNING” DENOTES A POTENTIAL OR HIDDEN HAZARD WHICH HAS A POTENTIAL FOR SERIOUS INJURY. IT IS USED TO WARN OPERATORS AND OTHERS TO EXERCISE EVERY APPROPRIATE MEANS TO AVOID A SURPRISE INVOLVEMENT WITH MACHINERY.



DANGER: THE WORD “DANGER” DENOTES A FORBIDDEN PRACTICE IN CONNECTION WITH A SERIOUS HAZARD.

FAILURE TO FOLLOW THE “CAUTION”, “WARNING”, AND “DANGER” INSTRUCTIONS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH.

MACHINE SAFETY

Additional precautionary statements (“ATTENTION” and “IMPORTANT”) are followed by specific instructions. These statements are intended for machine safety.

ATTENTION: The word “ATTENTION” is used to warn the operator of potential machine damage if a certain procedure is not followed.

IMPORTANT: The word “IMPORTANT” is used to inform the reader of something he needs to know to prevent minor machine damage if a certain procedure is not followed.

SAFETY PRECAUTIONS

The following precautions are suggested to help prevent accidents.
SEE SPECIFIC INSTRUCTION IN TEXT FOR DETAIL.

A careful operator is the best operator. Most accidents can be avoided by observing certain precautions. Read and take the following precautions before operating the Commercial Mower to help prevent accidents. Equipment should be operated only by those who are responsible and instructed to do so.

This cutting machine is capable of amputating hands and feet and throwing objects. Failure to observe the following safety instructions could result in serious injury or death.

COMMERCIAL MOWER

1. All persons who will operate the unit should read the Operator’s manual carefully before using the equipment. Lack of operating knowledge can lead to accidents.
2. Permit only properly trained and qualified persons to operate the unit.
3. Use the step plates when getting on and off the unit to prevent falls. Keep steps and platform cleared of mud and debris.
4. Use an approved Rollover Protective Structure (ROPS) and seat belt for safe operation. Overturning a unit without a ROPS and seat belt can result in death or injury. If the standard ROPS of seat belt has been removed, see your SHIBAURA for replacement.
5. Always use the seat belt with ROPS. If the ROPS has been removed, do not use the seat belt.
6. Do not permit anyone but the operator to ride on the unit. There is no safe place for extra riders.
7. Replace missing, illegible, or damaged safety decals. Refer to 0-8,9,10, and11 for illustrations of the decals.
8. Keep safety decals clean dirt and grime.

SERVICING THE COMMERCIAL MOWER

1. The cooling system operates under pressure which is controlled by the radiator cap. It is dangerous to remove the cap while system is hot. Always turn cap slowly to the first stop and allow the pressure to escape before removing the cap entirely.
2. Do not smoke while refueling the unit. Keep any type of open flame away. Wait for engine to cool before refueling.
3. Keep the Commercial Mower in good operating condition for your safety. An improperly maintained unit can be hazardous.
4. Keep open flame away from battery or cold weather starting aids to prevent fires or explosions. Use jumper cables according to instructions to prevent sparks which could cause explosion.
5. Before servicing, park the unit on a firm, level surface and apply the parking brake. Remove the key to prevent accidental start-up.

6. Escaping hydraulic/diesel fluid under pressure can penetrate the skin causing serious injury.
 - DO NOT use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks.
 - Stop engine and relieve pressure before connecting or disconnecting lines.
 - Tighten all connections before starting engine or pressurizing lines.
 - If fluid is injected into skin, obtain medical attention immediately or gangrene may result.
7. Do not modify or alter or permit anyone else to modify or alter this unit or any of its components or any unit function without first consulting your New Holland Dealer.
8. The fuel oil the injection system is under high pressure and can penetrate the skin. Unqualified persons should not remove or attempt to adjust a pump, injector nozzle or any other part of the fuel injection system. Failure to follow these instructions can result in serious injury.
9. Some components on your Commercial Mower, such as gaskets may contain asbestos. Breathing asbestos dust is dangerous to your health. You are therefore advised to have any maintenance or repair operations on such components carried out by an authorized SHIBAURA Dealer. If, however, service operations are to be undertaken on parts that contain asbestos, the essential precautions listed below must be observed:
 - Work outdoors or in a well ventilated area.
 - Dust found on the unit or produced during work on the unit should be removed by extraction not by blowing.
 - Dust waste should be dampened, placed in a sealed container and marked to ensure safe disposal.
 - If any cutting, drilling, etc., is attempted on materials containing asbestos, the item should be dampened any only hand tools or low speed power tools used.
10. Continuous long term contact with used engine oil has caused skin cancer in animal tests. Avoid prolonged skin contact with used engine oil. Wash skin promptly with soap and water.
11. Do not work under a raised attachment unless it is securely supported by a suitable hoist or floor jack and multiple jack stands.
12. The ROPS and seat belt must be properly maintained, and must not be modified, drilled, or altered in any way. If the ROPS is damaged, it must be replaced, and should not be straightened or welded.

SAFETY PRECAUTIONS

DRIVING THE COMMERCIAL MOWER

1. Watch where you are going especially at row ends, on roads, around trees and low hanging obstacles.
2. To avoid upsets drive the Commercial Mower with care and at speeds compatible with safety, especially when operating over rough ground, when crossing ditches or slopes, and when turning corners.
3. Keep the unit in the same gear when going downhill as used when going uphill. Do not coast or free wheel down hills.
4. When the unit is stuck or tyres are frozen to the ground, go up forward to prevent upset.
5. Always check overhead clearance, especially when transporting the Commercial Mower.
6. Avoid quick stops especially when an attachment is raised or not installed. Quick stops can cause upsets.
7. Do not attach chains or ropes to the ROPS for pulling purposes.

OPERATING THE POWER TAKE OFF (PTO)

Before installing or using PTO-driven equipment, read the manufacturer’s manual and review the safety labels attached to the equipment.

1. When operating PTO driven equipment, shut off the engine and wait until the PTO stops before getting off the unit and disconnecting the equipment.
2. Do not wear loose clothing when operating the power take off, or when near rotating equipment.
3. When operating stationary PTO driven equipment, always place gear shift lever in neutral, apply the parking brake and block in front wheels front and back.
4. To avoid injury, do not clear, adjust, unclog or service PTO driven equipment when the engine is running.

OPERATING THE MOWER DECK

1. Release the Commercial Mower HST foot pedal, apply the parking brake, place the PTO lever in the OFF position, the lift control lever in NEUTRAL position and the transmission in neutral before starting the engine.
2. Do not start the engine or operate controls while standing beside the unit. Always sit in the seat when starting the engine or operating controls.
3. Do not bypass the neutral safety start switch. Consult your SHIBAURA Dealer if your neutral safety start controls malfunction.

4. Use jumper cables only in the recommended manner. Improper use can result in the unit running away.
5. Avoid accidental contact with the gear shift lever while the engine running.
6. Do not get off the Commercial Mower while it is in motion.
7. Disengage PTO, shut off the engine and apply the parking brake before getting off the unit.
8. Do not park the Commercial Mower on a steep incline.
9. Do not operate the engine in an enclosed building without adequate ventilation. Exhaust fumes can cause death.
10. If engine operates irradically, stop the engine immediately.
11. Do not leave equipment in the raised position.
12. Do not operate the Commercial Mower or any attachments while under the influence of alcohol, medication, controlled substances or when tired.
13. Do not operate near ditches, holes, embankments, or other terrain which may collapse under the machine weight. The risk of machine tip over increases when the ground is loose or wet.
14. When working in cooperation with other operators, always let others know what you are doing ahead of time.
15. Never try to mount or dismount a moving unit.
16. Do not operate the Commercial Mower with bare feet. Keep hands, feet, and clothing away from power-driven parts.
17. Do not drive machine on streets or highways. Watch for traffic when you cross roads or operate near roads.
18. Look to the rear before and when backing. You must disengage blades before shifting into reverse. Make sure the area immediately behind you is clear of obstructions or holes and small children. Use extra caution when machine is equipped with Grass Catcher.
19. Do not cross gravel roads with the PTO engaged.
20. Do not operate the mower deck without locking the hood and seat.
21. Disengage power to mower deck when transporting or not in use.
22. Disengage power to mower deck before backing up. Do not mow in reverse unless absolutely necessary and then only after careful observation of the entire area behind the mower deck.

SAFETY PRECAUTIONS

When mowing proceed as follows:

- a) Mow only in daylight or in good artificial light.
 - b) Never make a cuffing height adjustment while the engine motor is running if the operator must dis-mount to do so.
 - c) Check the blade mounting bolts for proper tight-ness at frequent intervals.
 - d) Shut off the engine when removing the grass catch-er or clearing chute.
24. Watch for holes in terrain and other hidden hazards.
 25. Do not stop or start suddenly when going uphill or downhill. Mow up and down the face of steep slopes, never cross the face.
 26. Disengage power to attachment(s) and stop the en-gine before leaving the operators position.
 27. Never leave equipment in the raised position.
 28. Always keep the discharge side of the cutter directed away from people and objects which could be struck by debris thrown from the cutter.
 29. Install Commercial Mower weights to increase stabil-ity when operating on slopes.
 30. Avoid quick stops especially when the mower deck is raised. Quick stops will cause upset.
 31. Keep all shields in place.
 32. Replace safety and warning decals when they be-come illegible.
 33. The vehicle and attachments should be stopped and inspected for damage after striking a foreign object and the damage should be repaired before restarting and operating equipment.
 34. Do not lubricate or make mechanical adjustments while the unit is in motion or when the engine is run-ning. However, if minor engine adjustments must be made, apply the parking brake securely, block the wheels and use extreme caution.
 35. Periodically maintain the mower deck. Tighten nuts, bolts and fittings periodically for safe operation. Check the blade for tightness.

DIESEL FUEL

1. Under no circumstances should gasoline, alcohol or blended fuels be added to diesel fuel. These com-binations can create an increased fire or explosive hazard. Such blends are more explosive than pure gasoline in a closed container such as a fuel tank. Do not use these blends.
2. Never remove the fuel cap or refuel with the engine running or hot.
3. Do not smoke while refueling or when standing near fuel.
4. Maintain control of the fuel filler pipe nozzle when fill-ing the tank.
5. Do not fill the fuel tank to capacity. Allow room for ex-pansion.
6. Wipe up spilled fuel immediately.
7. Always tighten the fuel tank cap securely.
8. If the original fuel tank cap is lost, replace it with an ap-proved cap. A non-approved, proprietary cap may not be safe.
9. Keep equipment clean and properly maintained.
10. Do not drive equipment near open fires.
11. Never use fuel for cleaning purposes.
12. Arrange fuel purchases so that winter grade fuels are not held over and used in the spring.

AVOID HIGH-PRESSURE FLUIDS

Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before dis-connecting hydraulic or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard to search for leaks.

If ANY fluid is injected the skin it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result.

Whenever you see this symbol  it means: ATTENTION !
BECOME ALERT! YOUR SAFETY IS INVOLVED !

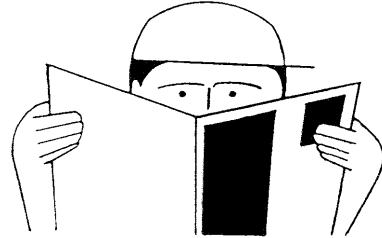
SAFETY PRECAUTIONS

Safety is NO accident.....Be Alert!

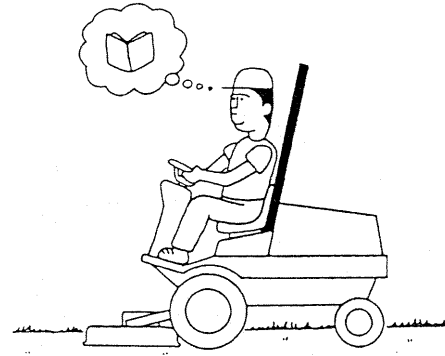


This symbol is used to attract your attention to the safety precautions that should be understood by the operator to avoid accidents.

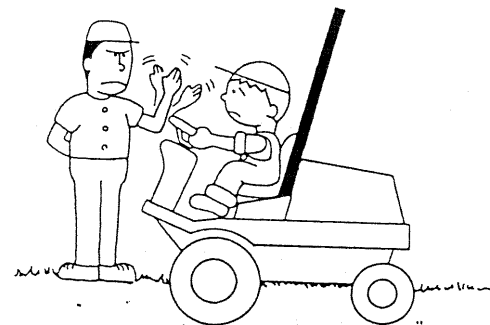
When you see this symbol - HEED ITS WARNING!



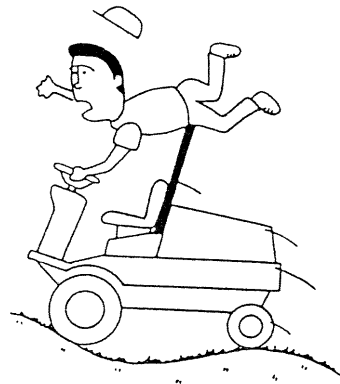
- Be sure to read all instructions before operation.
- Use the approved standard Roll over Protective Structure (ROPS) and seat belt at all times.



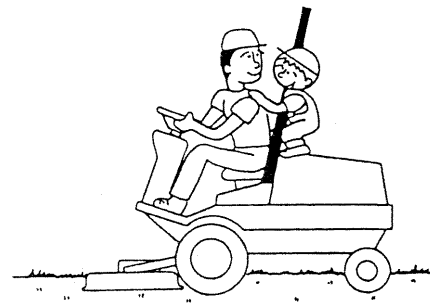
- Improper use of the Commercial Mower can result in injury. Give complete and undivided attention to the work you are doing.
- Know your controls. Know how to stop the unit and engine in an emergency.



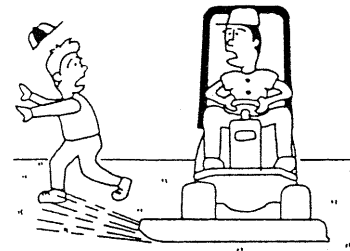
- Do not allow children to operate the Commercial Mower. Anyone else should be properly instructed as to its operation.
- Keep children and pets away. Children and pets should be kept a safe distance away from mower.
- Stop operation when another person approaches.



- Reduce speed on all side slopes and sharp turns to prevent tipping or losing control.



- Do not allow anyone to ride on the unit or any of its attachments.



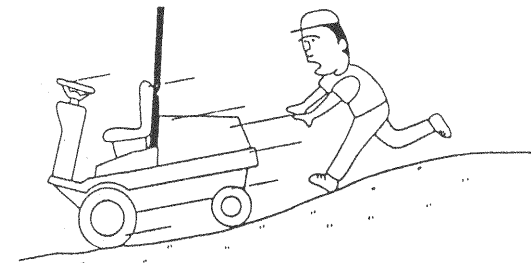
- Never allow mower to discharge grass towards anyone.



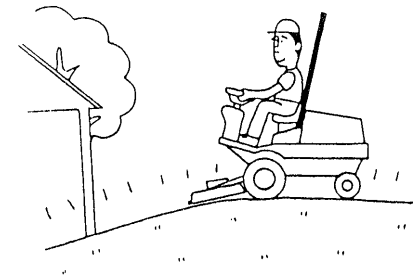
- All guards must be in place before operating the unit.
- If safety decals become illegible, they should be replaced.
- Make certain unit or mower deck cannot be started by unauthorized persons before leaving the unit.

SAFETY PRECAUTIONS

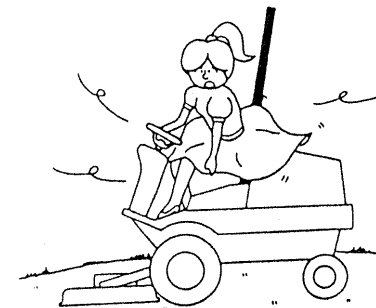
- Periodically maintain mower. Tighten nuts, bolts and fittings periodically and lubricate mower for proper and safe operation. Check blades for tightness.



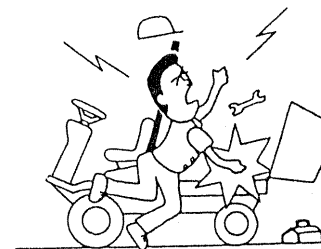
- Set parking brake and stop engine before leaving seat.



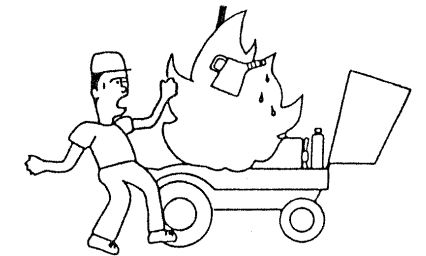
- Be sure lawn is clean. Remove stones, wires, sticks, toys, anything that might catch or be thrown by the mower blade.



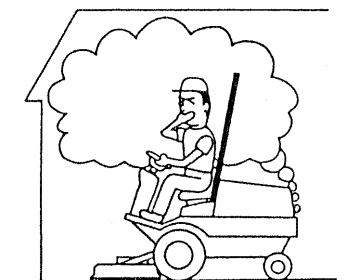
- Do not wear loose fitting clothing that might get caught in mowing parts. Also, keep hands and feet away from moving parts.
- Wear and use any additional safety items such as hard hat, safety boots or shoes, eye and hearing protection, gloves, etc. As appropriate or required.



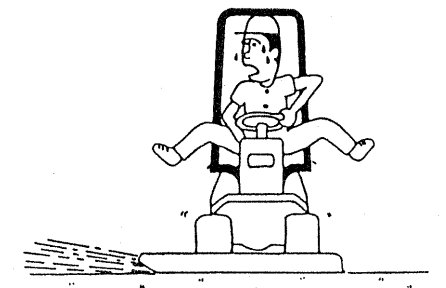
- Stop engine before working on mower deck. Stop engine before cleaning discharge chute or making any adjustment inspection or repairs.



- Never remove the fuel cap or refuel with the engine running or hot. Do not smoke while refueling or standing near fuel. Wipe up spilled fuel immediately.



- Do not operate the Commercial Mower in a confined area. Exhaust fumes are dangerous. Only run engine out of doors.

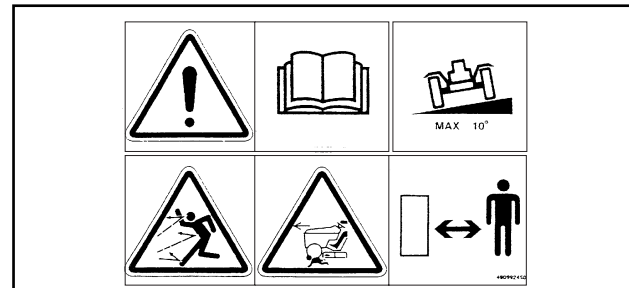


- Disengage all clutches and place gear shift in neutral before attempting to start engine.
- The discharge guard must be down at all times during mowing operation.
- If mower strikes a foreign object, stop the mower and engine immediately. Inspect the mower deck for damage. Repair any damage before starting again.

DECALS

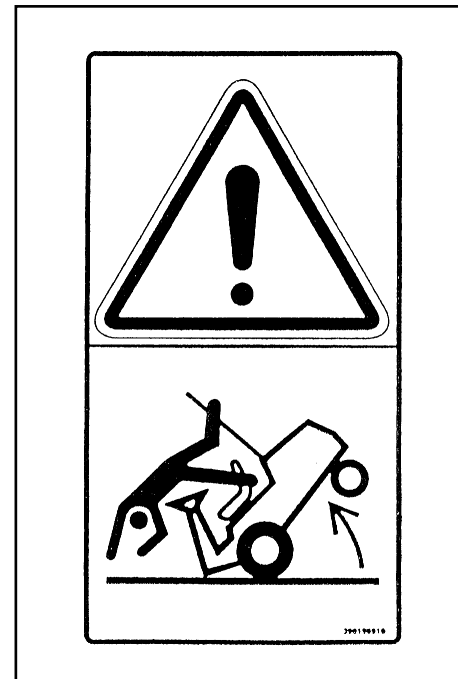
If safety or instruction decals become damaged or illegible, new decals should be obtained from your SHIBAURA Dealer and placed at their original positions.

SAFETY DECALS



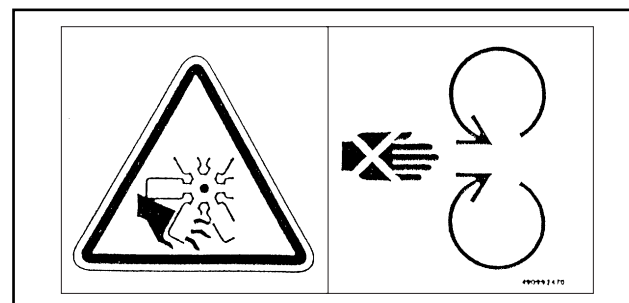
WARNING: SAFE OPERATING PROCEDURES
PART NO: 490992450

- Read this Owner's Manual before using the CM mower.
- Keep other people at a distance while using.
- Make sure that children stay clear of the machine all time when engine is running.
- Do not use this machine on slopes greater than 10°.



WARNING: AVOID QUICK STOPS
PART NO: 390196910

- Quick stop will cause upset of the machine.



WARNING: KEEP HANDS AND CLOTHING AWAY FROM ROTATING FAN
PART NO: 490992470

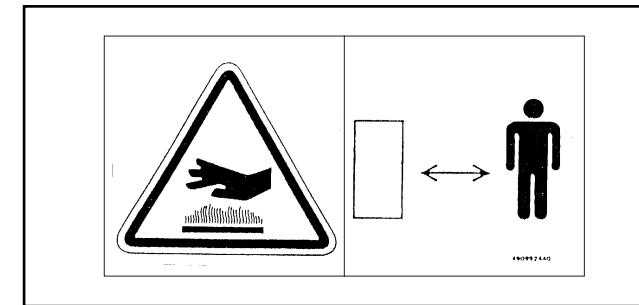
- Never reach into rotating parts when engine is running.



WARNING: RADIATOR CAP
PART NO: 490992490

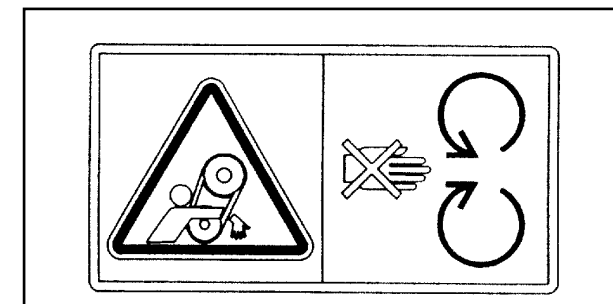
- Do not open when hot.
- Contents under pressure.

SAFETY DECALS



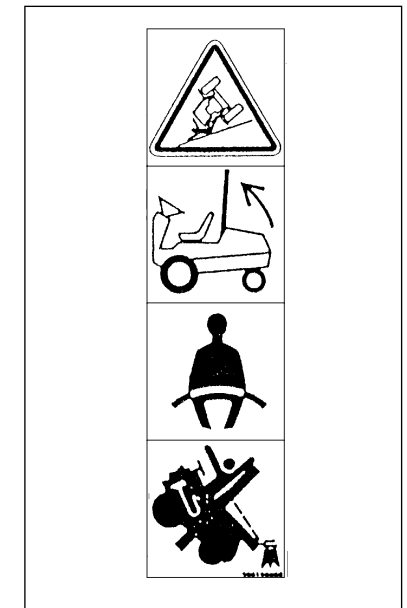
WARNING: MUFFLER
PART NO: 490992440

- Stay clear of hot surface.



WARNING: V-BELT
PART NO: 690360260

- Never reach into rotating parts when engine is running.



WARNING: ROPS AND SEAT BELT
PART NO: 390196900

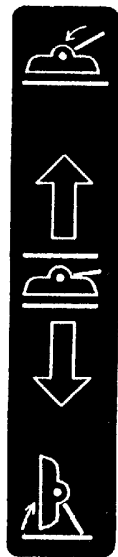
- Always lock ROPS in upright position unless it has to be folded down to allow operation underneath trees or bushes.
- Always wear seat belt except when ROPS is lowered.
- Do not attach ropes or chains to ROPS for pulling purposes.
- Use of ROPS and seat belt reduce the chance of injury or death if rollover or upset occurs.



WARNING: BATTERY
PART NO: 490992480

- Batteries produce explosive gas. Keep sparks and flames away.
- Battery contains sulfuric acid. Wear protective clothing and use eye protection.

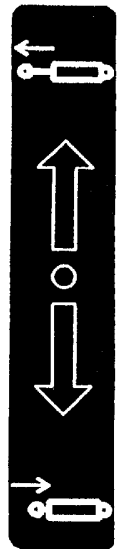
INSTRUCTION DECALS



LIFT CONTROL LEVER
PART NO: 390372400



PTO CONTROL LEVER
PART NO: 390173600



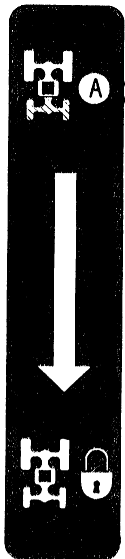
REMOTE VALVE LEVER (OPT) (Auxiliary)
PART NO: 390372410



DIESEL FUEL
PART NO: 490992430

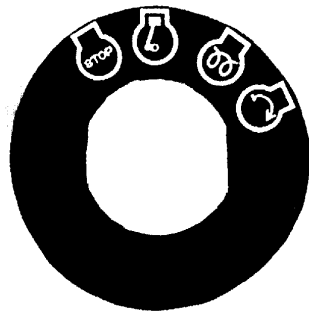


ENGINE OIL
PART NO: 390230120

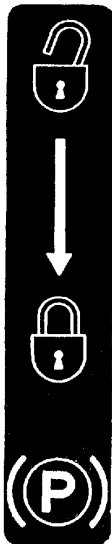


FWD SELECTOR LEVER
PART NO: 390173610

INSTRUCTION DECALS



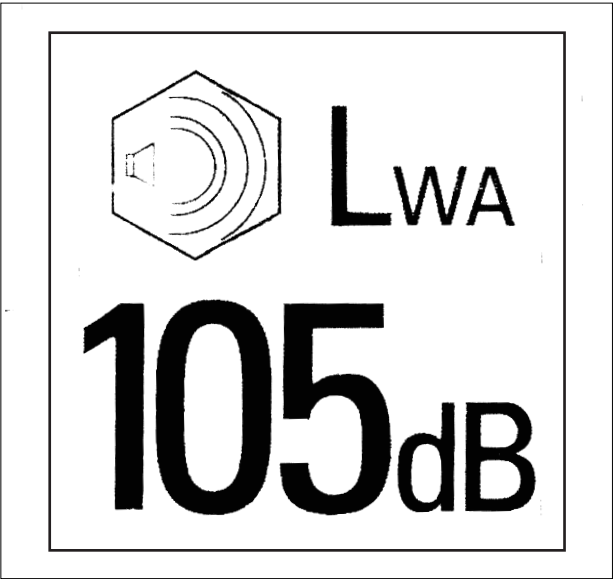
STARTER SWITCH
PART NO: 390197720



PARKING BRAKE
PART NO: 390197710

GUARANTEED SOUND POWER LEVEL
MARK

Guaranteed Sound Power Level According to
Directive 2000/14/EC



SECTION 1

GENERAL INFORMATION

PLEASE READ CAREFULLY:

For a complete list of the pre-delivery service checks performed by your dealer, refer to the PRE-DELIVERY SERVICE checklist found at the back of this manual. Keep one copy as your record of the service performed. The other copy should be removed from the manual and kept by your dealer. MAKE SURE THAT BOTH COPIES ARE COMPLETED AND THAT YOU AND THE DEALER SIGN BOTH COPIES.

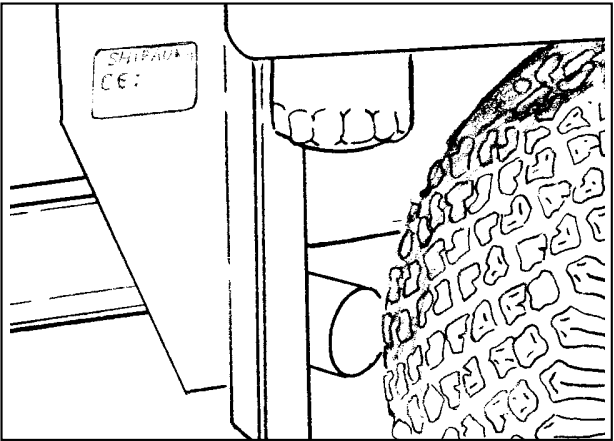
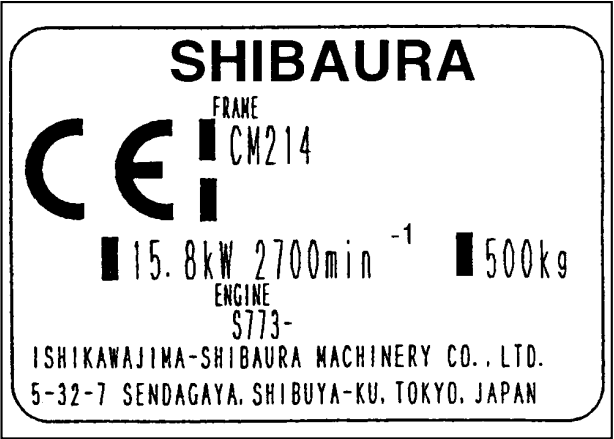
A PRODUCT IDENTIFICATION PLATE is located on the R. H. side of chassis frame.

The numbers on the plate are important in the event your mower should require future service. For your convenience, have your dealer record these numbers in the appropriate spaces below.

ISHIKAWAJIMA-SHIBAURA MACHINERY CO., LTD. is continually striving to improve its products. We reserve the right to change prices, specification, or equipment at any time without notice.

All data given in this book is subject to production variations. Dimensions and weights are approximate only, and the illustrations do not necessarily depict Mower in standard condition. For exact information about any particular Mower, please consult your SHIBAURA dealer.

This Mower has been designed for doing light work, such as mowing, blowing snow. Do not attempt to use implements that were not designed for this mower, as they may cause damage to the mower.



GENERAL INFORMATION

MINIMUM HARDWARE TIGHTENING TORQUES

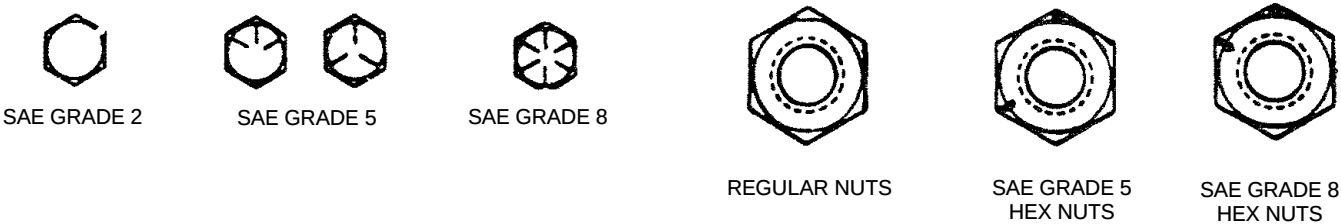
IN FOOT POUNDS (NEWTON-METERS) FOR NORMAL ASSEMBLY APPLICATIONS

INCH HARDWARE AND LOCKNUTS

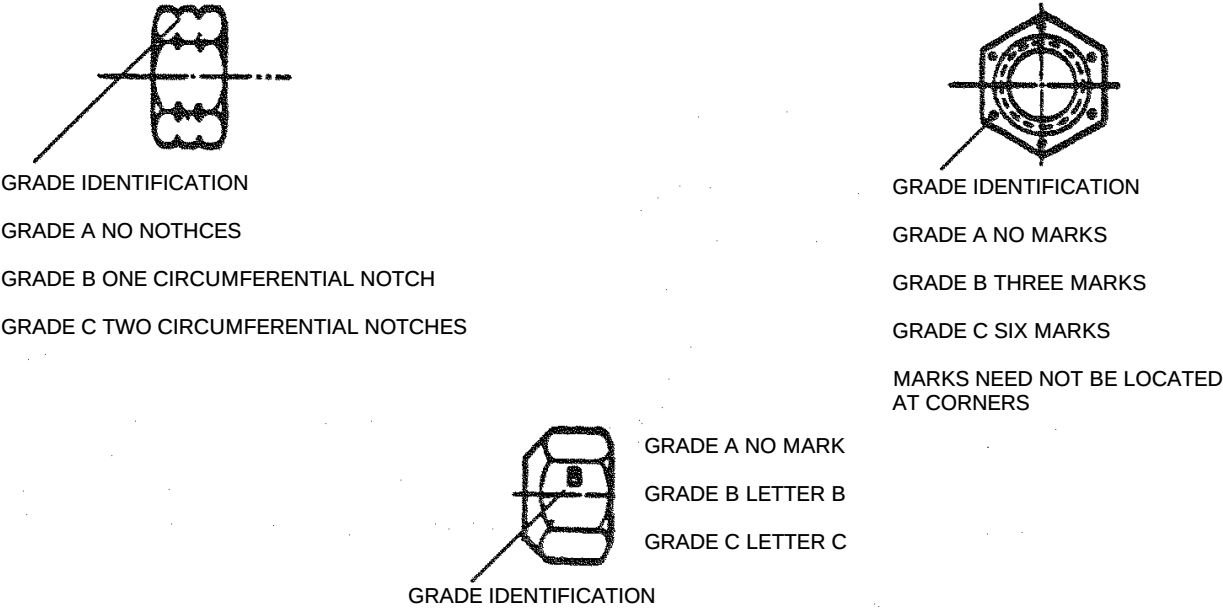
NOMINAL SIZE	SAE GRADE 2		SAE GRADE 5		SAE GRADE 8		LOCKNUT		NOMINAL SIZE
	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	GR.B w/GR ₅	GR.C w/GR ₈	
1/4	55*(6.2)	72*(8.1)	86*(9.7)	112*(13)	121*(14)	157*(18)	61* (6.9)	86* (9.8)	1/4
5/16	115*(13)	149*(17)	178*(20)	229*(26)	250*(28)	324*(37)	125* (14)	176* (20)	5/16
3/8	17 (23)	22 (30)	26 (35)	34 (46)	37 (50)	48 (65)	19 (26)	26 (35)	3/8
7/16	27 (37)	35 (47)	42 (57)	54 (73)	59 (80)	77 (104)	30 (41)	42 (57)	7/16
1/2	42 (57)	54 (73)	64 (87)	83 (113)	91 (123)	117 (159)	45 (61)	64 (88)	1/2
9/16	60 (81)	77 (104)	92 (125)	120 (163)	130 (176)	169 (229)	65 (88)	92 (125)	9/16
5/8	83 (112)	107 (145)	128 (174)	165 (224)	180 (244)	233 (316)	90 (122)	127 (172)	5/8
3/4	146 (198)	189 (256)	226 (306)	293 (397)	319 (432)	413 (560)	160 (217)	226 (306)	3/4
7/8	142 (193)	183 (248)	365 (495)	473 (641)	515 (698)	667 (904)	258 (350)	364 (494)	7/8
1	213 (289)	275 (373)	547 (742)	708 (960)	773 (1048)	1000 (1356)	386 (523)	545 (739)	1

NOTE: Torque values shown with * are inch pounds.

IDENTIFICATION
CAP SCREWS AND CARRIAGE BOLTS



LOCKNUTS



GENERAL INFORMATION

MINIMUM HARDWARE TIGHTENING TORQUES

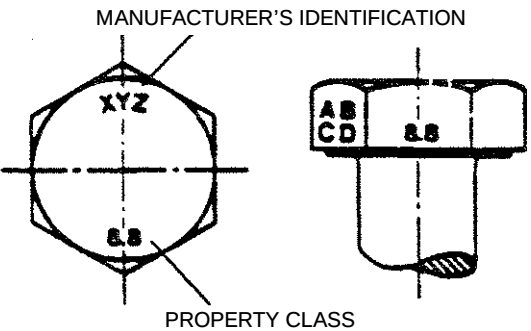
IN FOOT POUNDS (NEWTON-METERS) FOR NORMAL ASSEMBLY APPLICATIONS

METRIC HARDWARE AND LOCKNUTS

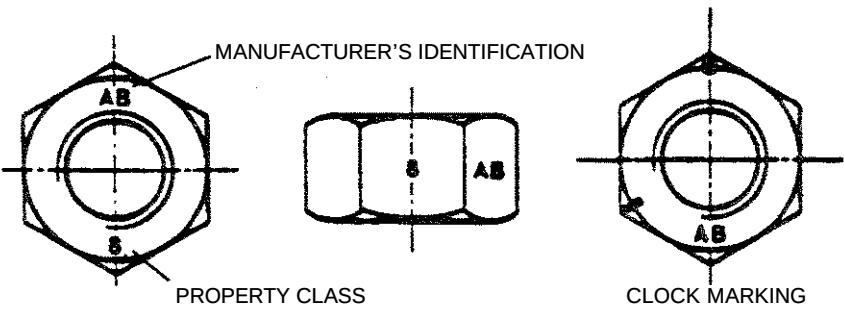
NOMINAL SIZE	CLASS 5.8		CLASS 8.8		CLASS 10.9		LOCKNUT CL.8 W/CL8.8 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr	
M4	15*(1.7)	19*(2.2)	23*(2.6)	30*(3.4)	33*(3.7)	42*(4.8)	16*(1.8)
M6	51*(5.8)	67*(7.6)	79*(8.9)	102*(12)	115*(13)	150*(17)	56*(6.3)
M8	124*(14)	159*(18)	195*(22)	248*(28)	274*(31)	354*(40)	133*(15)
M10	21 (28)	27 (36)	32 (43)	41 (56)	45 (61)	58 (79)	22 (30)
M12	36 (49)	46 (63)	55 (75)	72 (97)	79 (107)	102 (138)	39 (53)
M16	89 (121)	117 (158)	137 (186)	177 (240)	196 (266)	254 (344)	97 (131)
M20	175 (237)	226 (307)	277 (375)	358 (485)	383 (519)	495 (671)	195 (265)
M24	303 (411)	392 (531)	478 (648)	619 (839)	662 (897)	855 (1160)	338 (458)

NOTE: Torque values shown with * are inch pounds.

IDENTIFICATION
HEX CAP SCREW AND CARRIAGE BOLTS
CLASSES 5.6 AND UP



HEX NUTS AND LOCKNUTS
CLASSES 05 AND UP



GENERAL INFORMATION

INTERNATIONAL SYMBOLS

As a guide to the operation of your tractor, various international symbols have been used on instruments and controls. These symbols are depicted and described below.

	Hours Recorded		Neutral		Battery
	Engine Water Temperature		Diesel Fuel		Power Take-off (ON)
	Air Filter		Glow		Power Take-off (OFF)
	Engine Oil Pressure		Engine Stop		"Tortoise"-SLOW or Minimum Setting
	Full Time 4WD		Engine Oil		"Hare"-FAST or Maximum Setting
	Auto 4WD		Engine Start		Warning
	Continuously Variable		Parking Brake		Control Lever Hold
	Increase		Lock		Rock Shaft (Raised)
	Decrease		Release Lock		Rock Shaft (Lowered)
	Fuel Level		Differential Lock		Remote Cylinder (Retracted)
	High Range		Volume Empty		Remote Cylinder (Extended)
	Low Range		Volume Full		

SECTION 2
OPERATION

CONTROLS AND INSTRUMENTS

SEAT, SEAT BELT AND ROPS

OPERATORS SEAT

Your seat is adjustable to obtain the most comfortable position.

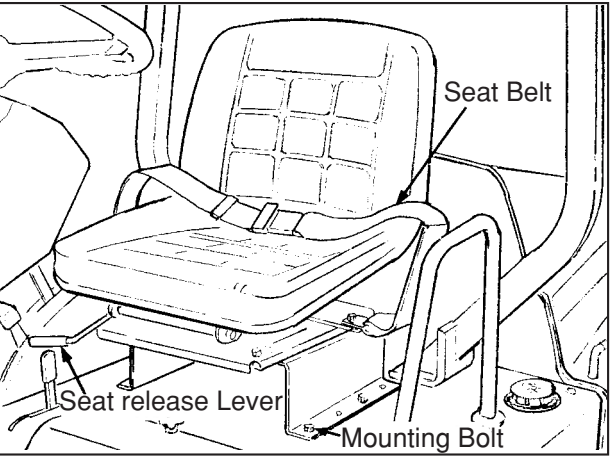
To move the seat fore and aft, move the seat release lever upward and slide the seat fore or aft as desired.

An additional adjustment can be obtained by repositioning the mounting bolts.

IMPORTANT: If not adjusted properly, the seat switch will not close to allow engine to start.



WARNING: DO NOT ATTEMPT BYPASS SEAT SAFETY INTERLOCK SWITCH.



Seat Belt

Always fasten the seat belt before starting.

To lengthen the belt, tip the buckle end down and pull on the buckle until the ends can be joined.

To shorten the belt, buckle it, then pull on the loose end until the belt is snug.

If the seat belt is to be cleaned, use soap and water. Do not use carbon tetrachloride, naptha, etc., as these will weaken the webbing. For the same reason, do not bleach or redye the webbing. Replace seat belt if worn or damaged.

ROLLOVER PROTECTIVE STRUCTURE (ROPS)

A Roll Over Protective Structure (ROPS) and seat belts were standard equipment for this mower at time of factory assembly. If the ROPS was deleted by the original purchaser or has been removed, it is recommended that you equip your mower with a Roll Over Protective Structure (ROPS) and seat belts. ROPS are effective in reducing injuries during mower overturn accidents. Overturning mower without a ROPS can result in serious injury or death.

Roll Over Protective Structure (ROPS), and seat belts are available from your Dealer.

The safety offered by the roll bar and seat belt is minimized if your seat belt is not buckled. Always use your seat belt - they save lives.



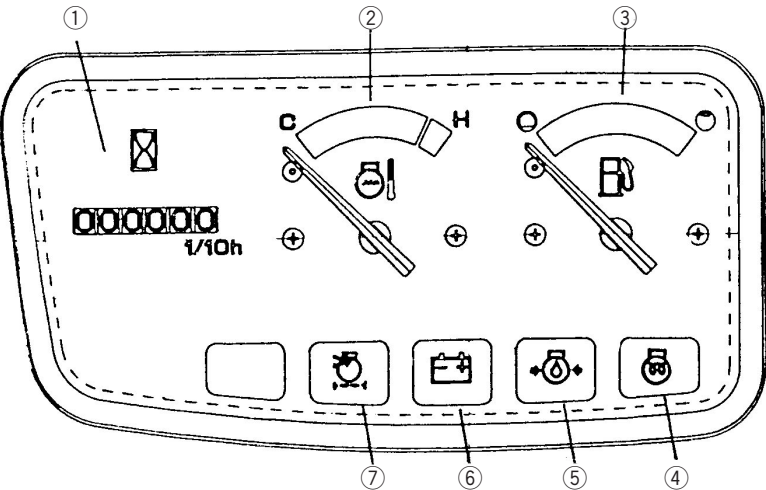
WARNING: ALWAYS WEAR THE SEAT BELT WHEN THE MOWER IS EQUIPPED WITH A ROPS. HOWEVER, IF THE ROPS HAS BEEN REMOVED FROM THE MOWER, THE SEAT BELT SHOULD NOT BE USED.

WARNING: ALWAYS PULL FROM THE MOWER DRAWBAR. DO NOT ATTACH CHAINS OR ROPES TO THE ROPS FOR PULLING PURPOSES, AS THE MOWER CAN TIP BACKWARDS.

WARNING: WHEN DRIVING THROUGH DOOR OPENINGS OR UNDER LOW OVERHEAD OBJECTS, MAKE SURE THERE IS SUFFICIENT CLEARANCE FOR THE ROPS.

OPERATION

INSTRUMENT PANEL



- ① Engine Proof Meter
- ② Temperature Gauge
- ③ Fuel Gauge
- ④ Glow Plug Warning Light
- ⑤ Engine Oil Pressure Warning Light
- ⑥ Battery Charge Warning Light
- ⑦ Air Cleaner Restriction Warning Light

PROOF-METER

The Proof-Meter is located on the left side of the instrument panel. Proof-Meter indicates hours of operation, and the figures after the decimal point express 0.1 hour. Use the Proof-Meter as a guide to determine hourly service and maintenance intervals.

TEMPERATURE GAUGE

When the needle is in the middle area, the engine is at its normal operating temperature. The needle at the "H" end indicates an overheated engine.



WARNING: THE COOLING SYSTEM OPERATES UNDER PRESSURE WHICH IS CONTROLLED BY THE RADIATOR CAP. IT IS DANGEROUS TO REMOVE THE CAP WHILE THE SYSTEM IS HOT.

ALWAYS COVER THE CAP WITH A THICK CLOTH AND TURN THE CAP SLOWLY COUNTER-CLOCKWISE TO THE FIRST STOP. ALLOW ALL PRESSURE TO ESCAPE BEFORE REMOVING THE CAP COMPLETELY.

FUEL GAUGE

The needle indicates the amount of fuel in the tank.

WARNING LIGHTS

When the key start switch is turned "ON" the oil pressure and charge lights come on. After the engine has been started, the lights should go out within a few seconds. If they do not go out:

Glow plug indicator warning light: This light comes on when turning the key switch to the "HEAT" position or "START" position. This light will stay on for approximately 5 seconds in the "HEAT" Position.

Engine oil pressure warning light: Stop the engine immediately and investigate the cause. It is important to remember that this light indicates oil pressure only. The operator must regularly check the crankcase for proper oil level.

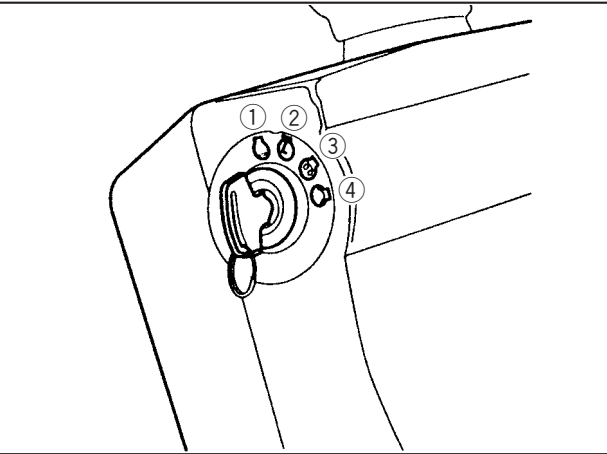
Charge indicator warning light: This is an indication that charging system is not operating normally. Investigate the cause as soon as possible, otherwise the battery will become fully discharged.

Air Cleaner Restriction Warning Light
When the air cleaner element is clogged by foreign substance such as Dust and clear air is restricted to the engine, this light will illuminate.

OPERATION

SWITCHES

KEY START SWITCH



- KEY START SWITCH
- 1. 'Off' Position
 - 2. 'On' Position
 - 3. Heat Position
 - 4. Starter Position

Turning the key right to the "ON" position activates the warning lights and instruments. The pre-heat system is activated when the key is turned further to the right to the "HEAT" position, and the engine starts when the key is turned to the extreme right. The key spring returns to the "ON" position when released.

PRE-HEATING THE SYSTEM

Your CM mower has a diesel engine. Before starting a cold engine, the precombustion chambers must be heated.

To pre-heat the engine, turn the key switch to the "HEAT" position and hold the key in this position for approximately 5 seconds. The glow plugs heat the precombustion chambers during this time, and the engine will start.

The starting circuit can only be activated when:

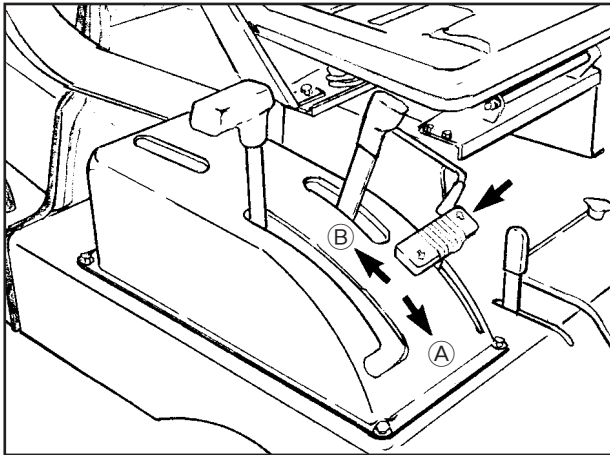
- 1. Operator is seated.
- 2. HST foot pedals are released.
- 3. PTO lever is in the "OFF" position.
- 4. Brake pedal is depressed or parking brake lever is locked.

For safe operation, always check to make certain the lift control lever is in neutral before attempting to start engine. Refer to page 2-7 for complete starting instructions.

IMPORTANT: The key start switch must remain in the "ON" position while operating the engine. The warning lights and battery charging system will not function with the switch in the "OFF" position.

THROTTLE CONTROL

HAND THROTTLE CONTROL LEVER



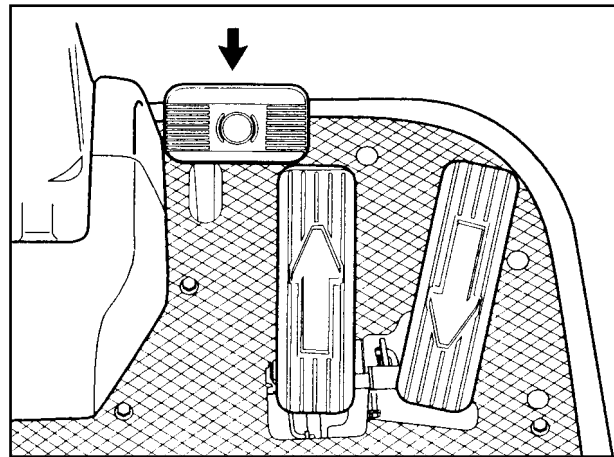
- A. Increase Engine RPM
- B. Decrease Engine RPM

Push the throttle forward to increase engine rpm. Pull the throttle rearward to decrease engine rpm. Always operate mower deck or other attachment at full engine rpm.

OPERATION

BRAKE CONTROL

Depress the brake pedal to stop the unit.

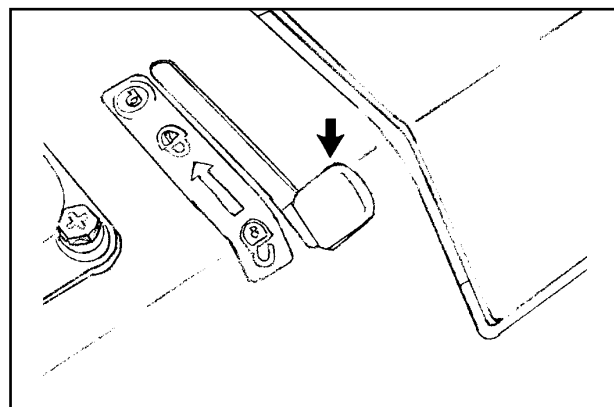


BRAKE PEDALS

PARKING BRAKE

The parking brake is used for locking the brake pedal in the applied position.

The parking brake should be applied whenever the mower is parked.



PAKING BRAKE CONTROL



WARNING: DO NOT PARK ON AN INCLINE. IF NECESSARY TO PARK ON AN INCLINE BE SURE TO CHOCK THE WHEELS TO PREVENT ACCIDENTAL ROLLING OF THE MACHINE.

To apply the parking brake:

- Depress the brake pedal.
- Pull the parking brake latch rearward. The pawl on the control will engage the teeth on the brake pedal and will retain the pedal in the applied position.

To release the parking brake:

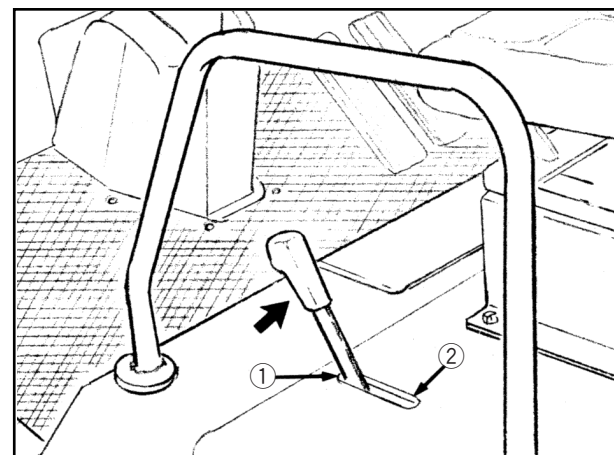
- Depress the brake pedal to release the pawl.

FOUR WHELL DRIVE CONTROL

The lever is used to select Automatic Four-wheel Drive (FWD) or Full-Time Four-Wheel Drive.

Push the lever forward to engage Automatic FWD. Pull the lever rearward to engage Full-Time FWD.

The selection of Automatic and Full-Time FWD is possible at either front-mower is in motion or stopping.



FWD Selector lever
1. Automatic FWD
2. Full-time FWD

OPERATION

Automatic Four-Wheel Drive (FWD) means that the four-wheel drive line is engaged automatically when the front wheels start to slip, but, in normal mowing, reverts to 2WD, this provides sharp and smooth turn without damaging turf.

Full-Time Four-Wheel drive should be used when additional traction is required while operating in loose soil, wet, slippery coditions or slopes.

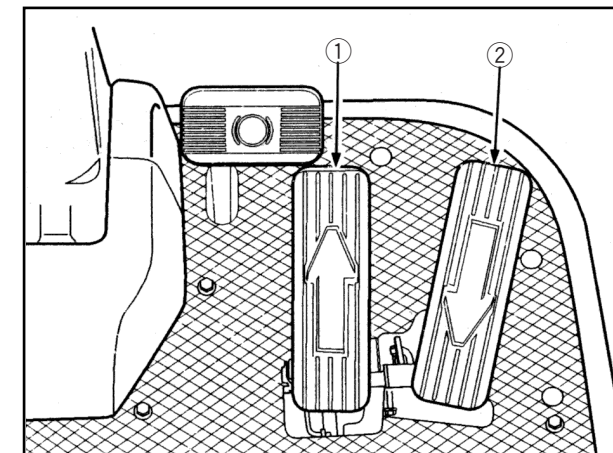
The steering (rear) axle will not drive in reverse when Mower is operating in Automatic FWD.



WARNING : WHILE DRIVING ON SLOPES, ALWAYS USE PERMANENT / FULL TIME 4WD.

OPERATING THE HYDROSTATIC TRANSMISSION

The ground speed of the CM mower is continuously variable from zero to full rated speed.



HST FOOT PEDALS
1. Forward Travel Pedal
2. Reverse Travel Pedal

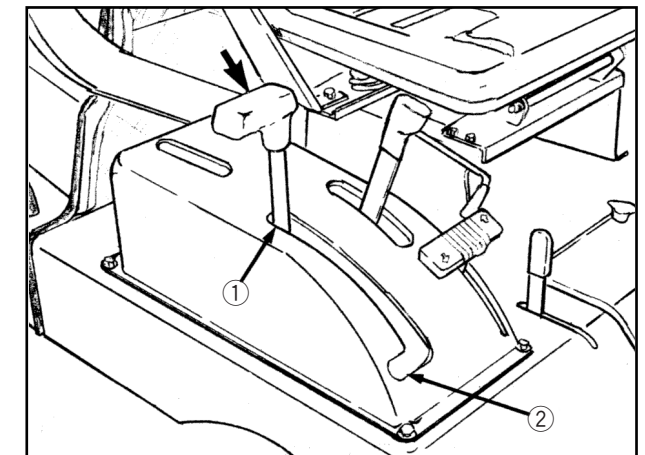
The ground speed is controlled by HST foot pedals. Depress the forward travel pedal to progressively increase forward speed. For reverse travel, depress the reverse travel pedal.

To stop the unit, release the pedal gradually (except on an emergency). When release, the pedal returns to the Neutral position automatically, stopping the unit. Sudden release can result in an abrupt, and possible dangerous stop.

OPERATING THE POWER TAKE-OFF CONTROL

The power take-off (PTO) transfers engine power directly to the PTO equipment.

PTO is controlled through the PTO lever ①. To engage the PTO, push the lever forward. To disengage the PTO, pull the lever rearward.



PTO ENGAGEMENT
1. Disengagement
2. Engagement



WARNING : TO AVOID PERSONAL INJURY, KEEP CHILDREN AND OTHERS AWAY WHEN OPERATING PTO EQUIPMENT.

NOTE: The PTO lever must be placed in the disengaged the PTO equipment.

OPERATION

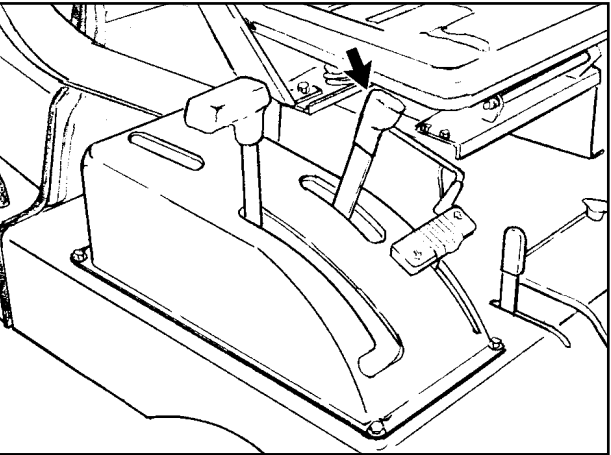
OPERATING THE HYDRAULIC LIFT SYSTEM

The hydraulic lift system provides accurate, smooth, and instant hydraulic power for raising front mounted equipment whenever the engine is running.

To raise the front mounted equipment, pull the lift control lever rearward and hold it until the desired equipment height is reached.

To lower the equipment, push the lever forward. The lever will remain in a lowered and floating position.

IMPORTANT: Always set the lift control lever at floating position when mowing.



HYDRAULIC LIFT CONTROL



WARNING: MAKE SURE THE AREA IS CLEAR OF PEOPLE BEFORE RAISING OR LOWERING EQUIPMENT.



WARNING: ALWAYS LOWER THE HYDRAULIC LIFT AND EQUIPMENT BEFORE STOPPING THE UNIT.

BREAK-IN PROCEDURES

Your CM Mower will provide long and dependable service if given proper care during the first 50-hour break-in period. During the first 50 hours of operation:

1. Avoid “lugging” the engine. Operating in too high a gear under heavy load may cause engine lugging, which is indicated when the engine will not respond to a throttle increase.
2. Use the lower gear ratios when pulling heavy loads and avoid continuous operation at constant engine speeds. You will save fuel and minimize engine wear by selecting the correct gear ratio for a particular operation. Operating the tractor in low gear with a light load and high engine speed wastes fuel.
3. Avoid prolonged operation at either high or low engine speeds without a load on the engine.
4. Check the instruments frequently and keep the radiator and oil reservoirs filled to recommended levels. Daily checks include the engine oil level, radiator coolant, and air cleaner.
5. After the first 50 hours of use, be sure to perform the maintenance items listed in the maintenance schedule.

OPERATION

STARTING THE ENGINE

SAFETY STARTING DEVICE

Your CM Mower is equipped with four safety switches;

HST foot pedals, PTO lever, brake pedal and seat. The engine can be started only when;

- HST foot pedals are released
- PTO lever is disengaged
- Depressing the brake pedal or applying the parking brake
- Operator is in seat.

For safe operation the front mounted equipment should be lowered prior to starting the engine.



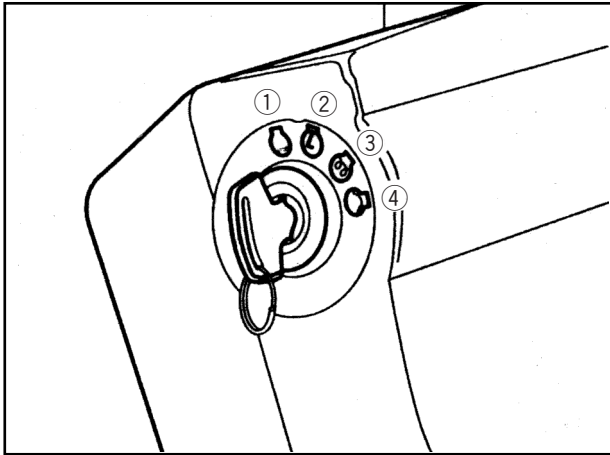
WARNING: NEVER ATTEMPT TO START THE ENGINE WHILE STANDING BESIDE THE UNIT - ALWAYS SIT IN THE SEAT WHEN STARTING THE ENGINE.

IMPORTANT: DO NOT ENGAGE THE STARTING MOTOR CONTINUOUSLY FOR MORE THAN 30 SECONDS; DOING SO MAY CAUSE STARTING MOTOR FAILURE.

WARM WEATHER STARTING

To start a cold engine in warm weather or to start an engine that is warm;

1. Depress the brake pedal fully and move the PTO to the off and neutral positions.
2. Move the hand throttle forward to a near half open position.
3. Turn the key switch to the “start” position. When the engine starts, release the key. Check to be sure the warning lights go out. If the engine fails to start after cranking for approximately 10 seconds, refer to the following “COLD WEATHER STARTING” information.



KEY SWITCH
1. 'STOP' Position
2. 'Run' Position
3. 'Cold Start' Position
4. 'Starter' Position

OPERATION

COLD WEATHER STARTING

If the engine fails to start using the preceding warm weather starting procedure or when starting the engine in cold weather;

1. Depress brake pedal fully and move the PTO and transmission shift levers to the off and neutral positions.
2. Move the hand throttle forward to the full-open position.
3. Turn the key switch to "HEAT" to preheat the precombustion chamber and wait until the glow plug indicator warning lights on the instrument panel go out (approximately 5 seconds).
4. Turn the key switch to the "START" position. When the engine starts, release the key. Check to be sure the warning lights go out.

IMPORTANT: IN COLD WEATHER BELOW 23°F(-5°C) START THE ENGINE AFTER HOLDING THE KEY SWITCH TO THE "HEAT" POSITION FOR APPROXIMATELY 10 SECONDS EVEN IF THE GLOW PLUG INDICATOR WARNING LIGHT HAS GONE OUT.



WARNING: DO NOT USE ETHER WITH THE THERMOSTAT STARTING AID.

STARTING THE ENGINE WITH JUMPER CABLES



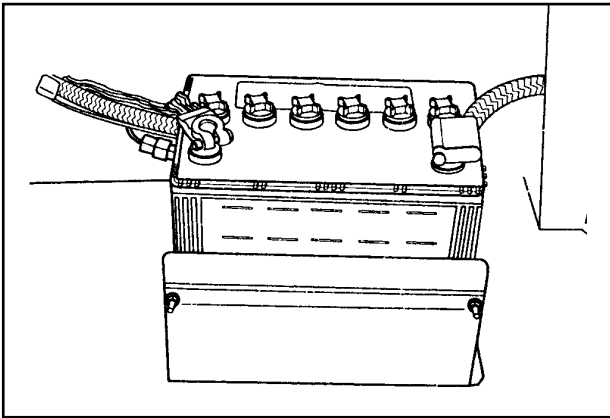
WARNING: START ENGINE ONLY FROM THE OPERATOR'S SEAT.

If it is necessary to use jumper cables to start the engine, follow the instructions below.

1. Shield eyes.

2. Connect one end of the jumper cable to the battery positive (+) terminal and the other to the auxiliary battery positive (+) terminal. Connect one end of the other cable first to the auxiliary battery (-) negative terminal, and the other end to the (-) negative terminal. Follow the starting procedures above after the jumper cables are connected as instructed.

Idle the engine and turn on all electrical equipment, then disconnect the cables in reverse order of the connecting procedure above. This will help protect the alternator from damage due to extreme load changes.



BATTERY



WARNING: BATTERIES CONTAIN SULFURIC ACID AND PRODUCE EXPLOSIVE GASES. FOLLOW THE INSTRUCTIONS BELOW TO PREVENT PERSONAL INJURY.

- Wear eye and skin protection.
- Keep sparks and flame away.
- Always have adequate ventilation while charging or using the battery.
- If ice is present or the battery is cracked, DO NOT ATTEMPT TO "JUMP START" vehicle.
- Follow the battery manufacturer's instructions which are shown on the battery.
- Bring helper vehicle with a battery of the same voltage as disabled machine within easy cable reach. "THE VEHICLES MUST NOT TOUCH".

OPERATION

ENGINE WARM-UP

In cold weather, run the engine at half throttle for a few minutes to allow engine oil and transmission oil to warm-up.



WARNING: ALWAYS APPLY THE PARKING BRAKE, WHEN LEAVING THE SEAT.

STOPPING THE ENGINE

Stopping the engine should be done according to the following procedures;

1. Push the throttle lever fully rearward.
2. Release the HST foot pedals.
3. Apply the parking brake.
4. Place the lift control levers in the "N" position.
5. Turn the key start switch to the "OFF" position.
6. Remove the key.

IMPORTANT: Failure to turn the key start switch to the "OFF" position, after the engine stops, will allow the warning lights to remain on, causing the battery to discharge.

IMPORTANT: Do not stop the engine immediately after hard or extended operation. Keep the engine running at slow idle for about 2 minutes to allow engine to cool down.

OPERATION SHUT-OFF DEVICE

The CM Mower is equipped with operation shut-off device for safety operation.

ENGINE STOP SYSTEM: Raising off the seat, the engine will stop whenever operating PTO driven equipment such as the mower deck. Also the engine will stop when raising off the seat unless the parking brake or master brake pedal is applied.



WARNING: FOR SAFE OPERATION, DO NOT ATTEMPT TO OVERRIDE OR BYPASS EITHER OF THESE SYSTEMS. IF EITHER SYSTEM FAILS TO FUNCTION, IT SHOULD BE REPAIRED BEFORE USING THE UNIT.

OPERATION

OVER HEATED ENGINE

The coolant temperature fluctuates depending on ambient temperatures and working loads. If the needle at the "H" end indicates during operation, the overheat alarm buzzer sounds. This time take the following steps.

- 1. Set the PTO of the mower to the OFF-position.
- 2. Wipe the air intake panel off chaff and dirt by hand.
- 3. Run the engine idle until the meter needle comes back to the middle area.
- 4. Stop the engine and check the coolant level in the reservoir tank.
 - (1) If the coolant level is lower than LOW mark, add clean water or antifreeze solution as necessary.
 - (2) If there is no coolant left in the reservoir tank, remove the radiator cap and visually check the level of the coolant. If the coolant level is just below the bottom of the filler neck, add clean water or antifreeze solution as necessary.



WARNING: THE COOLING SYSTEM OPERATES UNDER PRESSURE WHICH IS CONTROLLED BY THE RADIATOR CAP. IT IS DANGEROUS TO REMOVE THE CAP WHILE THE SYSTEM IS HOT. ALWAYS COVER THE CAP WITH A THICK CLOTH AND TURN THE CAP SLOWLY COUNTERCLOCKWISE TO THE FIRST STOP. ALLOW ALL PRESSURE TO ESCAPE BEFORE REMOVING THE CAP COMPLETELY.

- 5. Clean the radiator screen.

DRIVING THE CM MOWER



WARNING: TO PREVENT PERSONAL INJURY, OBSERVE THE FOLLOWING PRECAUTIONS WHEN DRIVING THE UNIT.

- Watch where you are going - especially at row ends, on roads, and around the trees.
- Reduce speed before turning or applying brakes.
- Avoid sudden starts and stops on slopes.
- Be careful when changing direction on slopes.
- Stay alert for holes, rocks, roots and other hidden hazards in the terrain. Keep away from drop-offs.
- Do not park on slopes.
- Avoid quick stops especially when an attachment is not installed or raised. Quick stops will cause upsets.
- Use extreme care when operating on slopes.

SECTION 3
LUBRICATION AND MAINTENANCE

This section gives full details of the service procedures necessary to maintain your CM Mower at peak efficiency while the lubrication and maintenance charts provide ready reference to these requirements.

NOTE: Ensure that the unit is on level ground and that all hydraulic rams are extended, where applicabel before checking oil levels.

To prevent contamination when changing oils or filters etc., always clean the area around the filler, level and drain plugs, dipsticks and filters. Ensure that oil contained within remote cylinders is clean, has not broken down due to long storage and is of the correct grade.

After the first 50 hours of operation of your CM mower the following maintenance is required:

50-HOUR SERVICE

INOPERATIVE SERVICE CHECKS

- 1. Tire pressure
- 2. Check air cleaner hose connection
- 3. Replace diesel fuel filter(s)
- 4. Tighten injector line fittings
- 5. Radiator coolant level
- 6. Fan belt tension
- 7. Battery cleanliness and vent openings, electrolyte level and charge
- 8. All electrical cables, terminals and wires
- 9. Drain and refill engine oil
- 10. Replace engine oil filter
- 11. Transmission and front axle oil level
- 12. Rear axle oil level
- 13. Replace HST oil filter
- 14. Replace hydraulic system oil filter
- 15. ROPS and seat belt
- 16. PTO belt tension

OPERATIVE SERVICE CHECKS

- 1. Instruments for proper operation, and fuel shut down with key switch off
- 2. Fluid and oil leaks
- 3. Maximum no-load speed and idle speed adjustments
- 4. Starting and starter switches
- 5. Hydraulic system:
 - Lift control lever operation
- 6. Operation of safety devices:
 - Engine stop system

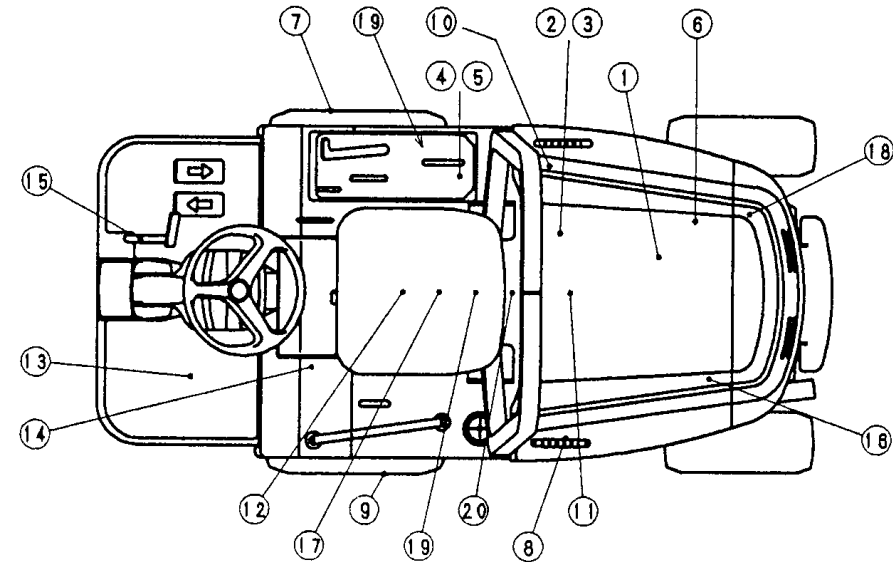
PERFORMANCE SERVICE CHECKS

- 1. Engine operation including throttle and governor operation
- 2. HST transmission
- 3. Steering control
- 4. Brake action
- 5. All optional equipment and accessories



**PROPERLY MAINTAINED EQUIPMENT
IS SAFE EQUIPMENT**

LUBRICATION AND MAINTENANCE CHART



No.	LUBRICATION & MAINTENANCE ITEMS	CHECK	CLEAN	LUBE	CHARGE	ADJUST	SERVICE INTERVALS
1 2 3 20	Engine Oil Level Air Cleaner Radiator Coolant Radiator screen	x x x x					Every 10 Hours or Daily
4 5 1,6 7 8 9 —	Hydraulic Filter H.S.T. Filter Engine Oil & Filter Tire Pressure Fuel Filter Wheel Bolt Torque All Fluid Levels				x x x x x x x		First 50 Hours
7 10 11 12	Tires Pressure Battery Fan Belt Transmission Oil	x x x x					Every 50 Hours
13 14 15 16 17	Lubrication Fittings: Lift arm Lift cylinder Brake Pedal Shaft Power SteeringCylinder Transmission Input Shaft				x x x x x		

No.	LUBRICATION & MAINTENANCE ITEMS	CHECK	CLEAN	LUBE	CHARGE	ADJUST	SERVICE INTERVALS
1,6 2 8 18 19	Engine Oil & filter Air Cleaner Element Fuel Filter Rear Axle 4WD Oil PTO Belt Tension		x x x x			x x x	Every 100 Hours
11 9	Fan Belt Wheel Bolt Torque	x				x	Every 200 Hours
4 5	Hydraulic Filter H.S.T. Filter					x x	Every 300 Hours
12 18	Transmission Oil Rear Axle 4WD Oil					x x	Every 600 Hours
2 3	Air Cleaner Element Radiator Coolant					x x	Seasonal
2	Safety Air Filter Element					x	Every 3 rd Primary Element Change or Every 1000 Hours, Whichever Comes First

LUBRICATION

Adequate lubrication and maintenance on a regular schedule is vital to maintaining your CM mower. To ensure long service and efficient operation, follow the lubrication and maintenance schedules outlined in this section. The use of proper fuels, oils, and filters, as well as keeping the systems clean, will also extend machine and component life.

ATTENTION: Always use genuine replacement filters to ensure proper filtration of engine and hydraulic systems.

RECOMMENDED LUBRICANTS

Engine Oil -----Service Grade CD

Ambient Temp (°C)	Recommended Oil
+5°-50°	SAE 30W
-15°-50°	SAE 15W-40
-25°-50°	SAE 10W-30
-30°-15°	SAE 5W-30

NOTE: CM Mower are originally shipped with 10W-30 oil.

Transmission Oil-----ISO VG46
Grease-----High Viscosity Lithium Base - NLG 1 # 2

LUBRICATION FITTINGS

NOTE: After every 50 hours of normal operation, apply a good quality grease to the lubrication points listed below (refer to the Recommended Lubricants chart). When operating under extremely dirty conditions, lubricate more frequently than every 50 hours.

- Lift cylinder
- Front Lift arm
- Power Steering Cylinder
- Brake pedal shaft
- Transmission Input Shaft

To lubricate these points:

1. Wipe away all old grease and dirt from the lubrication fittings to prevent dirt or foreign material from entering as new grease is applied.
2. Use a high pressure grease gun to force in the new grease. Apply pressure until clean grease oozes from each lubrication point.
3. Wipe away any excess grease.

DIESEL FUEL

- Use clean, quality No. 1-D or No. 2-D fuel (ASTM D975).
- Use No. 1-D fuel if the ambient temperature is expected to be lower than 4°C (40°F) or if the loader is to be used at an altitude exceeding 1524 m (500 ft.).
- Use No. 1-2 diesel fuel with a pour point of at least -12°C (10°F) below the expected ambient temperature to prevent fuel flow problems in cold weather.
- Keep dirt from entering the fuel tank.
- Sulfur content of the fuel should be no more than 0.5%.
- Sediment and water content should not exceed 0.05%.
- Minimum cetane number is 40. Low temperature or high altitude operation may require use of fuel with a higher cetane number.
- Use properly mixed winter fuel when temperatures are extremely cold. In most areas, diesel fuel is properly blended for summer and winter grades as ambient temperatures change. In winter, use winter grade diesel fuel only. Otherwise, the fuel may cloud and block the fuel system.

LUBRICATION AND MAINTENANCE

Fuel Usage Safety

- **UNDER NO CIRCUMSTANCES** should gasoline, alcohol, or gasohol be added to diesel fuel. These combinations can create an increased fire or explosive hazard.
- Never remove the fuel cap or refuel the tractor while the engine is running or hot.
- Never smoke while refueling or anywhere near fuel.
- When filling the tank, maintain control of the nozzle.
- Do not fill the fuel tank to capacity. Allow room for expansion.
- Wipe up spills immediately.
- Always tighten the fuel cap securely.
- If the original fuel tank cap is lost, always replace it with a SHIBAURA approved cap. A "will-fit" cap may not be safe.
- Keep equipment properly maintained.
- Do not drive equipment near open fires.
- Never use gasoline for cleaning parts.



WARNING: FUEL OIL IN THE INJECTION SYSTEM IS UNDER HIGH PRESSURE AND CAN PENETRATE THE SKIN. UNQUALIFIED PERSONS SHOULD NOT REMOVE OR ATTEMPT TO ADJUST A PUMP INJECTOR, NOZZLE, OR ANY PART OF THE FUEL INJECTION SYSTEM.

- **DO NOT USE YOUR HAND TO CHECK FOR LEAKS. USE A PIECE OF CARDBOARD OR PAPER TO SEARCH FOR LEAKS.**
- **IF ANY FLUID IS INJECTED INTO THE SKIN, OBTAIN MEDICAL ATTENTION IMMEDIATELY OR GANGRENE MAY RESULT.**

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN SERIOUS INJURY.

Refueling the Mower

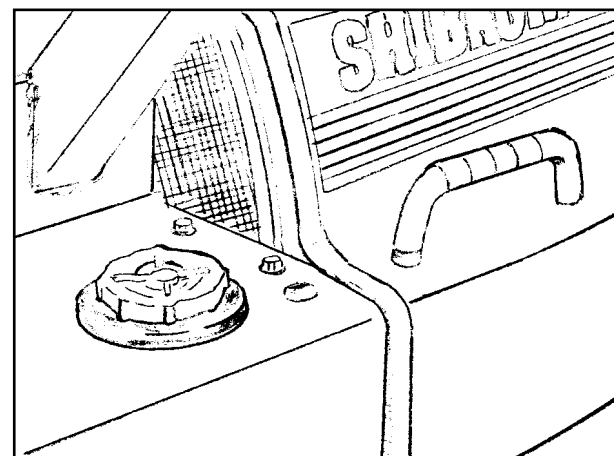
The fuel tank filler cap A is located at the lift side of the mower hood. Before removing the cap, wipe all dust and dirt from around the cap to prevent debris from falling into the tank while filling.

Use an approved fuel container and check the inside of the container periodically for cleanliness. Fuel tank capacity is 28L (7.4 gal).

NOTE: The fuel cap is a vented-type. Use only an approved SHIBAURA replacement cap to prevent fuel system-related problems.

If there is no filter on the storage tank or fuel container, filter the fuel through a 100-mesh or finer screen when filling the mower fuel tank. Keep the mower tank as full as possible (without filling to capacity) to minimize condensation.

NOTE: It is a good practice to fill the fuel tank at the end of each day, as this will reduce overnight condensation.



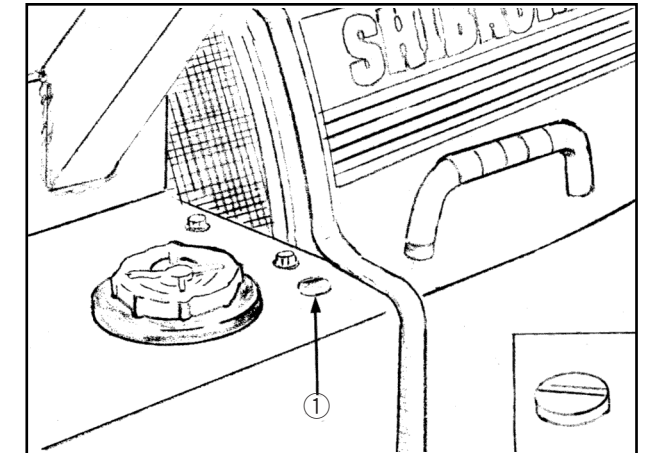
FUEL FILLER CAP

LUBRICATION AND MAINTENANCE

SERVICE ACCESS

OPENING HOOD

Unlock the hood latch ① and raise the hood holding the hood handle.

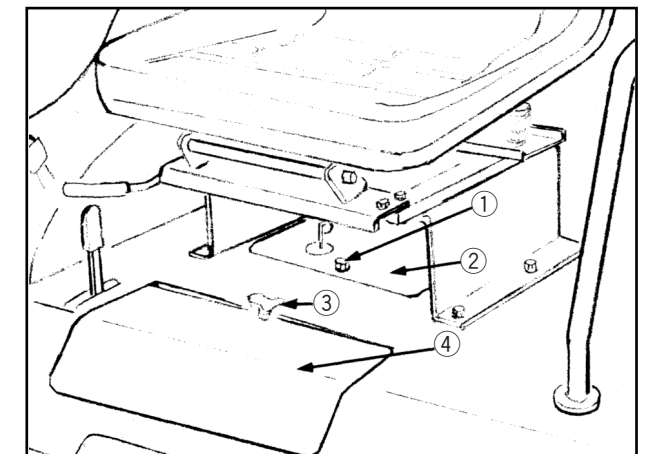


OPENING HOOD

OPENING UNDER-SEAT COVER

Loosen the bolts ①, and take the cover ② off.

This opening is used to apply the grease to transmission INPUT shaft, to check or replace the PTO belts.



OPENING UNDER-SEAT COVER AND FRONT COVER

1. Bolt
2. Under-seat cover
3. Knob
4. Front cover

OPENING FRONT COVER

Loosen the knob ③, and flip up the front cover ④.

This opening is used to attach the drive joint to the PTO shaft.



CAUTION: TO AVOID PERSONAL INJURY FROM CONTACT WITH MOVING PARTS;

- **NEVER OPEN THE HOOD, UNDER-SEAT COVER, AND FRONT COVER WHILE THE ENGINE IS RUNNING.**
- **DO NOT TOUCH MUFFLER OR EXHAUST PIPES WHILE THEY ARE HOT; SEVERE BURNS COULD RESULT.**

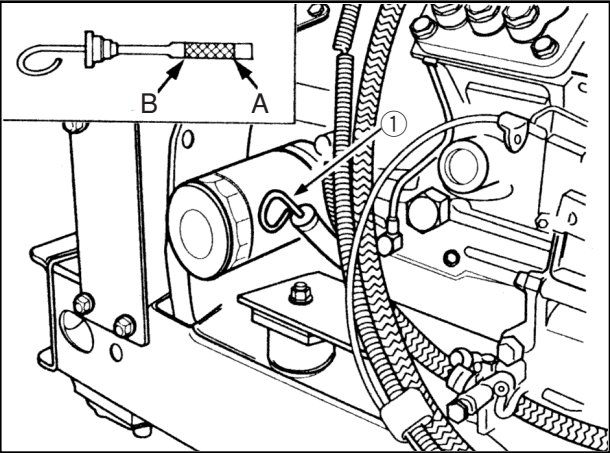
FUEL AND LUBRICANT SERVICE PROCEDURES

ENGINE

Checking the Engine Oil Level

NOTE: Check the engine oil level daily or after every 10 hours of operation.

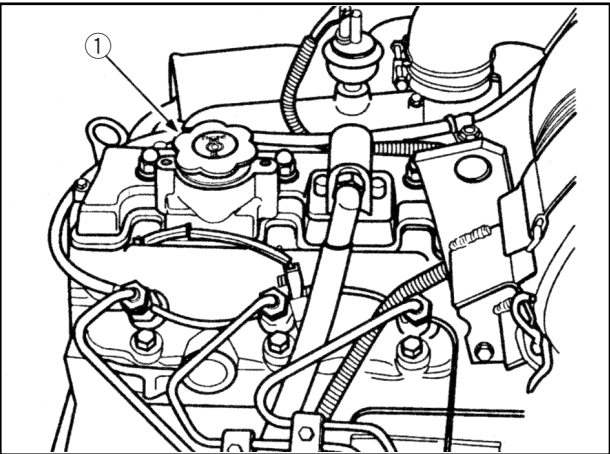
- 1. After the engine has been stopped for a period of time and with the Mower standing level, check the oil level using the dipstick ①.



ENGINE OIL LEVEL DIPSTICK AND FILTER
1. Dipstick A. Low Mark (Top up)
 B. Full Mark

- 2. If the oil level is low, remove the filler cap ①, and add oil through the filler hole. Add enough oil so that the level registers between the two marks on the dipstick. Do not overfill.

- 3. Install the oil filler cap.



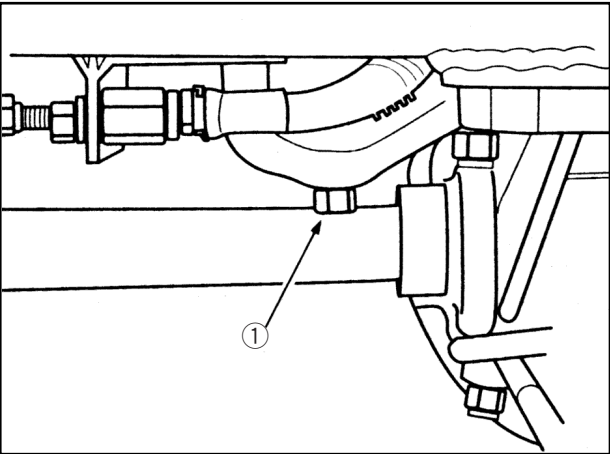
ENGINE OIL FILLER CAP
1. Filler Cap

Changing the Engine Oil

NOTE: Change the engine oil and filter after the first 50 hours of operation, then every 100 hours thereafter. If the CM mower is operated for extended periods of time at maximum rated power and speed, or under other types of continuous, severe operating conditions, the engine oil and filter should be changed at 70-hour intervals following the initial oil change.

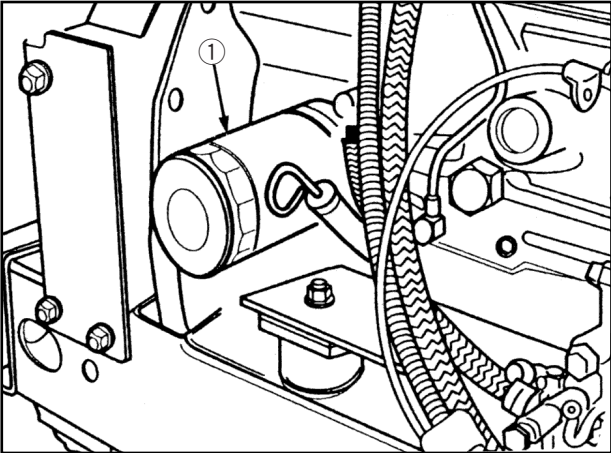
To change the engine oil:

- 1. Place a suitable container beneath the drain opening to catch the used oil. With the CM mower engine off but at normal operating temperature, remove the drain plug ①. Reinstall the plug after all the oil has been drained.



ENGINE OIL DRAIN
1. Drain Plug

- 2. Next, place a container below the oil filter ① to catch the used oil and unscrew the oil filter. Discard the used oil and filter.
- 3. Coat the gasket on the new filter with a film of clean oil. Screw the filter into place until the gasket contacts its mating surface, then turn the filter approximately three-quarters of a turn by hand. Do not overtighten.
- 4. Add the proper type and level of new oil, then start the engine and check the filter for leaks.



ENGINE OIL FILTER

Recommended Oils

Ambient Temp (°C)	Recommended Oil
+5°-50°	SAE 30W
-15°-50°	SAE 15W-40
-25°-50°	SAE 10W-30
-30°-15°	SAE 5W-30

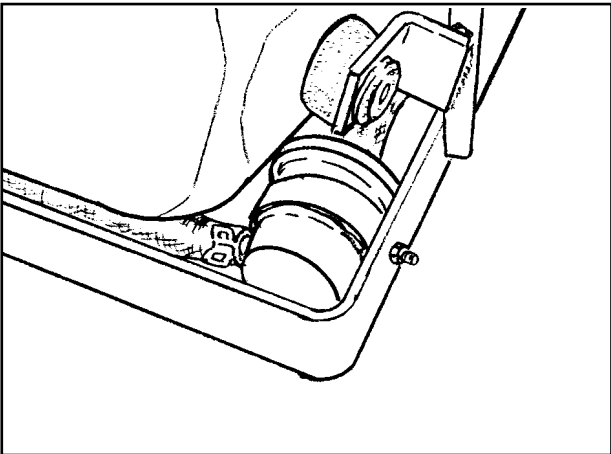
NOTE: CM Mower are originally shipped with 10W-30 oil.

FUEL FILTER

Draining the Filter: In case that water remains in the fuel filter, drain water.

Changing the Fuel Filter: Visually inspect the filter periodically and replace when dirty.

- 1. Provide a suitable pan to catch the fuel from the tank.
- 2. Remove the clips on the both side of the fuel filter.
- 3. Drain the fuel from the tank.
- 4. Loosen the clamping bolt securing the fuel filter.
- 5. Drain water, or replace the fuel filter.



FUEL FILTER



WARNING: KEEP AWAY FROM FIRE.

BLEEDING THE FUEL SYSTEM

The CM Mower fuel system is designed to bleed automatically.

1. When the fuel tank is empty

Fill until the fuel level of the tank is at least half full, then wait about one minute for air to dissipate.

2. When the fuel filter has been replaced:

After replacing the filter, open the fuel shutoff valve. Air will dissipate for about one minute

NOTE: Fuel tank fuel level must be half full or more for auto bleed system to function correctly.

NOTE: The CM mower has auto bleeding system. No manual bleeding procedures needed.



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UNQUALIFIED PERSONS SHOULD NOT REMOVE OR ATTEMPT TO ADJUST A PUMP INJECTOR, NOZZLE OR ANY PART OF THE FUEL INJECTION SYSTEM.

DO NOT USE YOUR HAND TO CHECK FOR LEAKS. USE A PIECE OF CARDBOARD OR PAPER TO SEARCH FOR LEAKS.

IF ANY FLUID IS INJECTED INTO THE SKIN, OBTAIN MEDICAL ATTENTION IMMEDIATELY OR GANGRENE MAY RESULT.

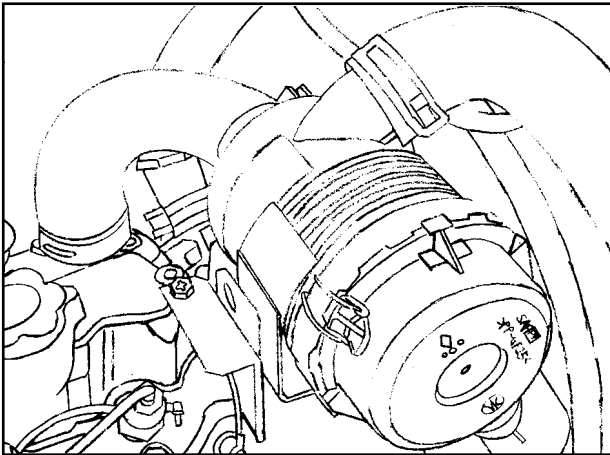
FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN SERIOUS INJURY.

NEVER FAIL TO CHECK THE FUEL LINE PERIODICALLY. THE FUEL LINE IS SUBJECT TO WEAR AND AGING, FUEL MAY LEAK ONTO THE RUNNING ENGINE, CAUSING A FIRE.

AIR CLEANER

The air cleaner is accessed by opening the tractor hood.

The air cleaner assembly contains two elements: an outer primary element and an inner safety element.



To remove the primary element, loosen the spring clamps and remove the end cap from the air cleaner body to expose the primary element.

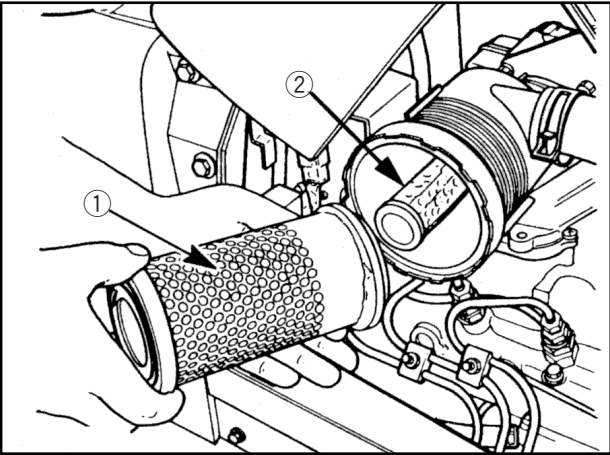
Air Cleaner Primary Element

NOTE: Clean the primary element after every 100 hours of service. Extremely dusty conditions may require more frequent service intervals.

1. Pull the primary element from the canister. Clean any loose dirt from the canister and inspect the end of the canister for dirt which may prevent the new element from sealing properly.

2. Clean the primary element using low air pressure (30 PSI or less). Blow dust from the inside to the outside of the element (opposite to normal air flow through element).

IMPORTANT: Be careful not to rupture the filter element. Maintain a safe distance between the air nozzle and the filter element when directing air up and down the clean air side of the element pleats.



AIR CLEANER ELEMENTS
1. Primary Element
2. Inner Safety Element

3. After cleaning the element, check the inner diameter seals for damage. If damage is present, replace the primary element. Change the element after six cleanings or once a year.
4. Reinstall the primary element by inserting it into the canister and pushing on the end of the element until it is seated against the canister.

NOTE: Place a light inside the element to check for paper leaks or for bonding of the paper to the end plate. If any leaks are found, replace the element.

NOTE: If element is not inserted far enough into canister, the end cap cannot be installed.

5. Place the end cap onto the canister body and attach spring clamps. Make sure the end cap is locked in place and not loose.

IMPORTANT: Never tap the element with hard objects or against a hard surface. This may dent or break the element end cap seals.

ATTENTION: Failure to obtain a good seal between elements and the canister may cause major engine damage.

Air Cleaner Inner Safety Element

NOTE: For maximum engine protection and air cleaner service life, install a new inner safety element every third primary element change or after every 1000 hours of operation, whichever comes first.

The air cleaner inner safety element ① cannot be cleaned. It must be replaced once it becomes partially clogged. A clogged element will cause an air restriction resulting in a loss of engine power or excessive black exhaust smoke.

NOTE: Conduct a visual inspection of the inner safety element by placing a light inside the element. Little or no light will shine through the element if it is partially clogged.

To remove the inner safety element, pull it out of the canister body.

To install the new element, push it into the canister until seated.

IMPORTANT: Clean any dirt from the canister before installing the inner safety element. Check element inner diameter seals for damage and replace the safety element if seal damage is present.

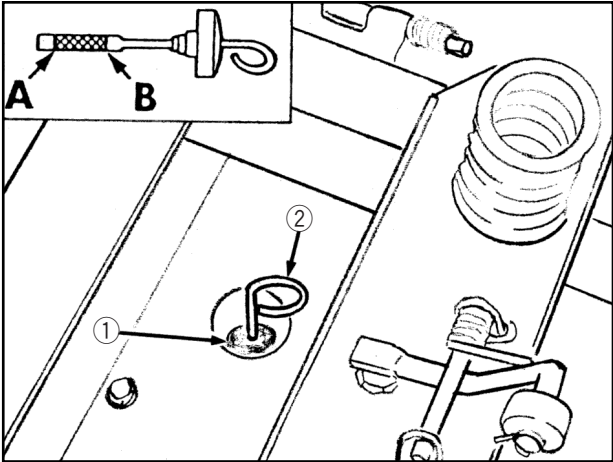
ATTENTION: Failure to obtain a good seal between the filter and canister may cause major engine damage.

LUBRICATION AND MAINTENANCE

TRANSMISSION, FRONT AXLE AND HYDRAULIC SYSTEM

Checking Oil Level: Check the oil level every 50 hours.

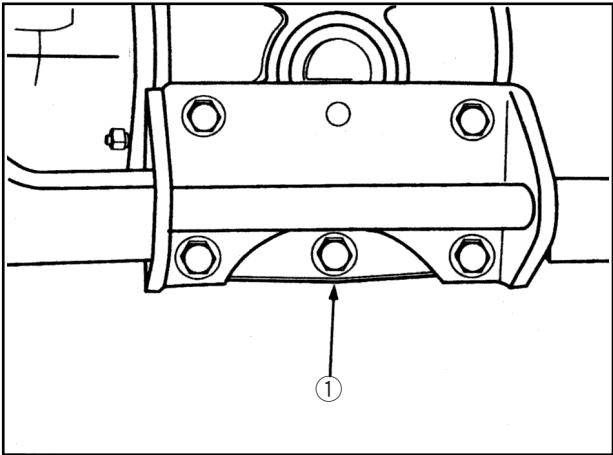
1. With the Tractor standing level and the engine off, check the oil level with the dipstick.
2. The oil is at the correct level when the oil level is within the mark at the lower end of the dipstick. If low, add hydraulic oil, through the filler hole. Do not fill beyond the mark on the stick, as the transmission will be overfilled.
3. Install the dipstick.



TILTING SEAT LOCKING LEVER
TRANSMISSION, FRONT AXLE AND HYDRAULIC OIL
1. Filler hole A. Low Mark (TOP UP)
2. Dipstick B. Full Mark

Changing Oil: Change the oil every 600 hours.

1. With the oil at normal operating temperature (Caution "Hot" oil!), drain and discard the oil by removing the transmission drain plug. Reinstall the plug after the oil has drained.
2. Check the oil and if necessary replace the hydraulic oil filter.
3. Remove the filler plug, and fill with hydraulic oil.
4. The transmission is filled to the correct level when the oil level is within the mark at the lower end of the dipstick. Do not fill beyond the mark on the stick, as the transmission will be overfilled.
5. Install the dipstick and filler plug.



TRANSMISSION, FRONT AXLE AND HYDRAULIC SYSTEM OIL DRAIN
1. Plug

IMPORTANT: The transmission, front axle and hydraulic system operate from a common oil sump. Special attention must be given to keeping oil clean.

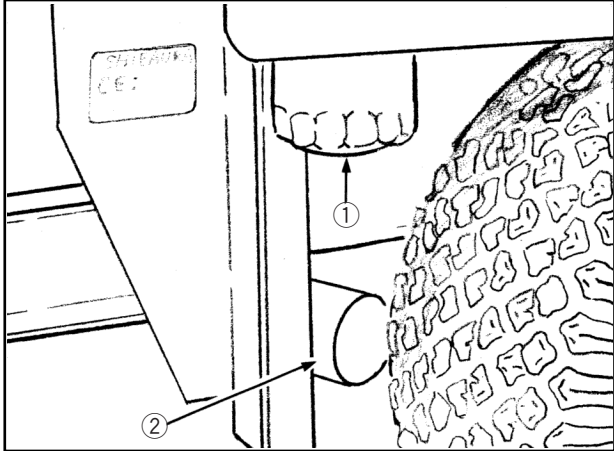
LUBRICATION AND MAINTENANCE

HYDRAULIC OIL FILTER (SUCTION & HST)

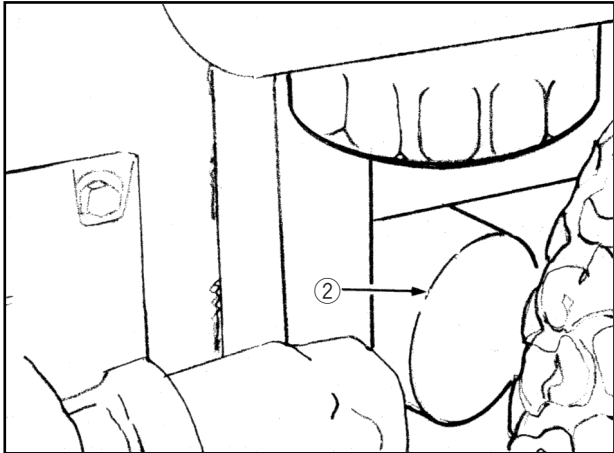
The hydraulic system is equipped with spin-on type oil filters.

NOTE: Replace the filters after the first 50 hours of operation and every 300 hours thereafter following the procedure below:

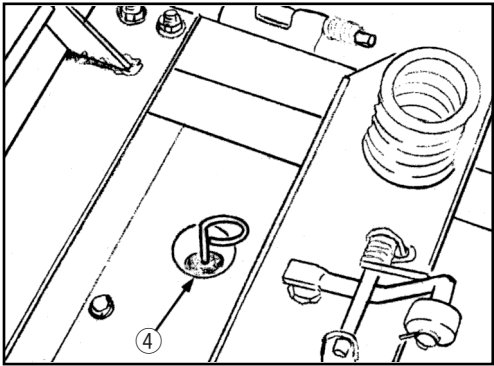
1. Remove the drain plug ① of the front gear case and discharge the HST oil.
2. Unscrew the oil filter ②, ③ and discard.
3. Coat the gasket on the new filter with a film of oil. Screw the filter into place until the gasket contacts the sealing surface, then tighten the filter approximately 3/4 of a turn by hand. Do not over tighten.
4. Install the oil filter in place and supply new HST oil from the oil inlet ④.
5. Start the engine and check the hydraulic oil filter for leaks.
6. Stop the engine and check the hydraulic oil level. Replenish if necessary.



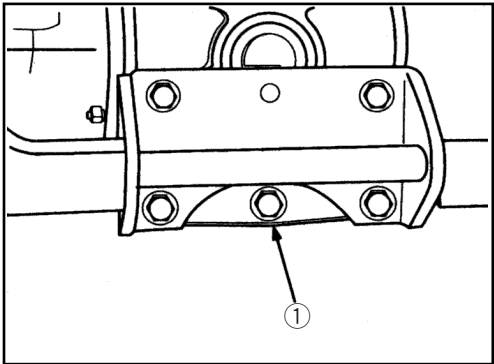
HYDRAULIC OIL FILTER
2. Hydraulic Oil Filter
3. HST Oil Filter



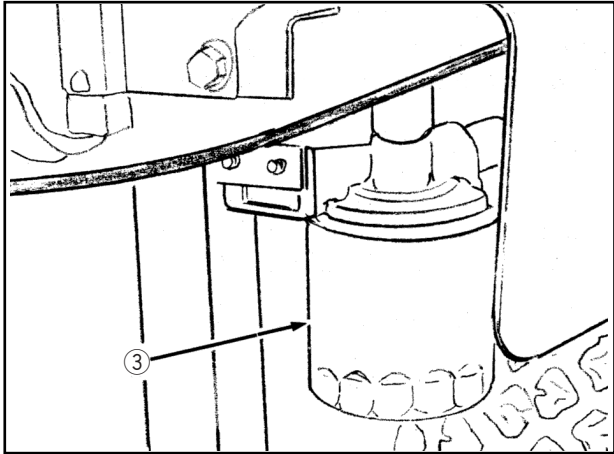
HYDRAULIC OIL FILTER



TRANSMISSION, FRONT AXLE AND HYDRAULIC OIL



TRANSMISSION, FRONT AXLE AND HYDRAULIC SYSTEM OIL DRAIN



HST OIL FILTER

LUBRICATION AND MAINTENANCE

REAR AXLE DIFFERENTIAL CASE AND FINAL REDUCTION GEAR CASES

Checking Oil Level: Check the oil level every 100 hours.

1. With the engine off and the tractor standing level, check the oil level using the combined dipstick/filler plug ①. The oil is at the correct level when it reads between the two marks on the dipstick.

NOTE: Place the dipstick/filler plug ① horizontally over the oil inlet and measure the oil level. Do not screw dipstick into housing when checking oil level.

2. If the level is low, add hydraulic oil through the filler hole. Do not fill above the dipstick full mark.

3. Reinstall the dipstick/filler plug ①.

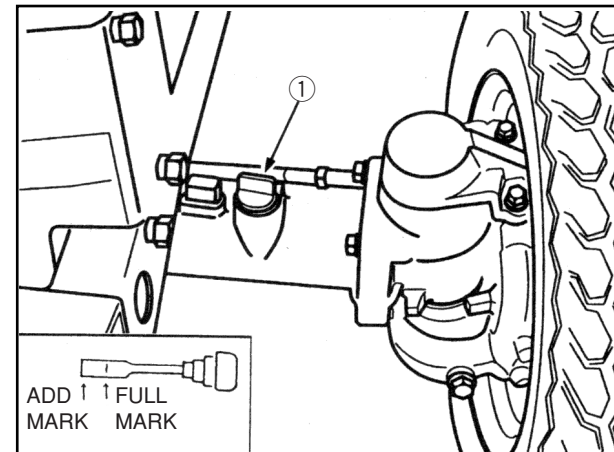
Changing Oil: Change the oil every 600 hours.

1. With the oil at normal operating temperature, drain the oil by removing the rear axle differential ② and final reduction gear case drain plugs ③. Reinstall the plugs after the oil has drained. Discard the oil.

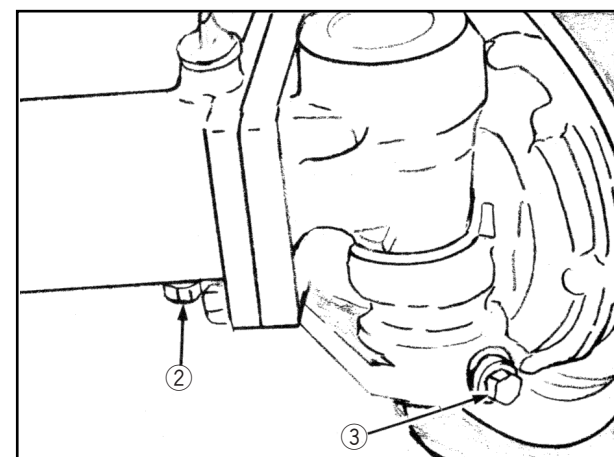
2. Supply new hydraulic oil into the fill hole ①.

NOTE: By this method, it takes much time until the oil is spread fully into the final reduction gear case. The oil can be supplied by the following method also.

1. Remove the right and left rear wheels.
2. Oil supply plugs are located on the front side of the right and left final reduction gear case. Remove the plugs.
3. By supplying the hydraulic oil from the plug holes, the final reduction gear case can be filled more quickly, reducing the oil supply time.



REAR AXLE DIFFERENTIAL LUBRICATION
1. Level / Filler Plug



REAR AXLE DIFFERENTIAL / FINAL REDUCTION
2. Rear Axle Differential Drain Plug
3. Final Reduction Lubrication Drain Plug

LUBRICATION AND MAINTENANCE

GENERAL MAINTENANCE

COOLING SYSTEM

The CM mower engine must operate at the correct temperature to obtain maximum efficiency and service life. This is dependent on the cooling system.

Always fill the system with a 50/50 solution of permanent antifreeze and clear water.

Checking the Coolant Level

NOTE: Check the coolant level daily or after every 10 hours of operation. The engine should be cold when coolant level is checked.

Open the hood, and check the coolant recovery reservoir located next to the battery. The fluid should be between the low and the full marks on the reservoir.

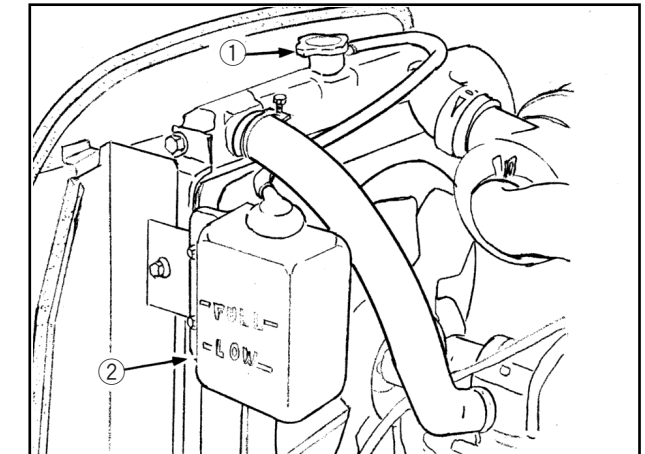
If the coolant recovery reservoir is empty, remove the radiator cap ① and add a 50/50 solution of water and antifreeze until the radiator is full. Then add the water antifreeze solution to the coolant recovery reservoir until it is to the full level.



WARNING: THE COOLING SYSTEM OPERATES UNDER PRESSURE CONTROLLED BY THE RADIATOR CAP. IT IS DANGEROUS TO REMOVE THE CAP WHILE THE SYSTEM IS HOT. ALWAYS COVER THE CAP WITH A THICK CLOTH AND TURN IT SLOWLY COUNTERCLOCKWISE TO THE FIRST STOP. ALLOW ALL PRESSURE TO ESCAPE BEFORE REMOVING THE CAP COMPLETELY.

If the coolant level is below the low mark on the reservoir, add a 50/50 solution of water and antifreeze to the coolant recovery reservoir bringing the level to the full mark.

Be sure that the radiator fins are clear of chaff and dirt to allow free air movement.



COOLANT SYSTEM
1. Radiator Cap
2. Coolant Reservoir

LUBRICATION AND MAINTENANCE

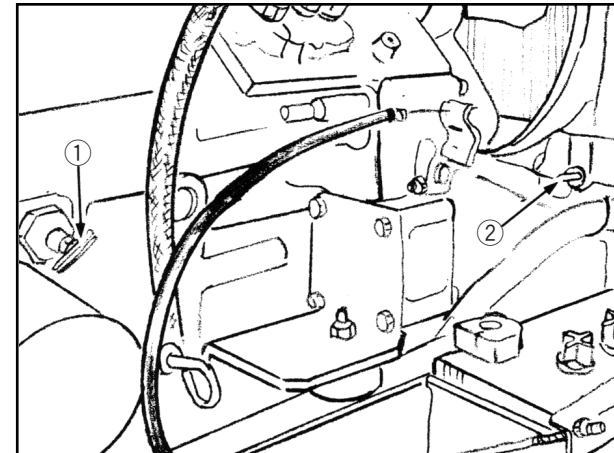
Draining and Flushing the Cooling System

NOTE: Drain and flush the radiator and engine block every 12 months. Refill with a 50/50 mixture of permanent antifreeze and clear water.

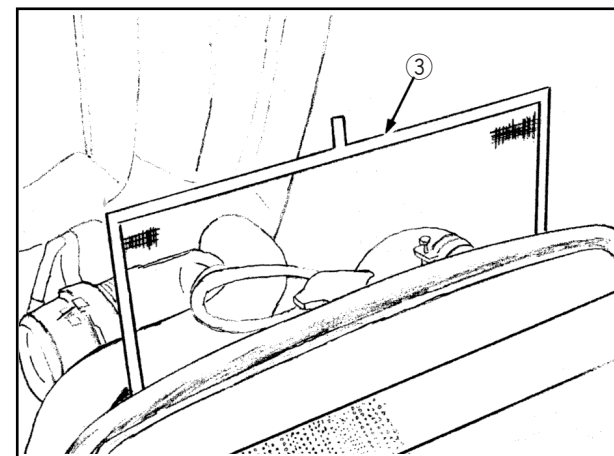
To drain the cooling system:

1. Use a suitable receptacle to catch the used coolant. Remove the radiator cap and open the radiator drain valve ②, and engine block drain valve ①.
2. After the coolant has drained, place a water hose in the radiator filler neck and run water through the system. When water is flowing from the block drain valve, start the engine. When the water flowing from the drain valve, is free of discoloration and sediment, stop the engine and remove the hose. Allow all water to drain from the system through the drain valves.
3. Close the drain valve and slowly refill the system with a 50/50 solution of permanent antifreeze and clear water. Fill until the coolant level is approximately 1.2 cm-2.5 cm (1/2"-1") below the bottom of the filler neck. Do not fill beyond this level.
4. Clean the radiator cap and cap seal and install the cap.
5. Fill the coolant recovery reservoir bringing the fluid level up until it is between the full and low marks on the reservoir.
6. Pull out the front screen ④ upward and remove chaff, dust, or other foreign substances. The foreign substances can be dropped onto the ground through the rubber at the lower part.
7. Pull out the radiator screen ③ and clean it.
8. Run the engine until normal operating temperature is reached, then stop the engine. Recheck the coolant level when the engine is cold and add additional coolant as necessary.

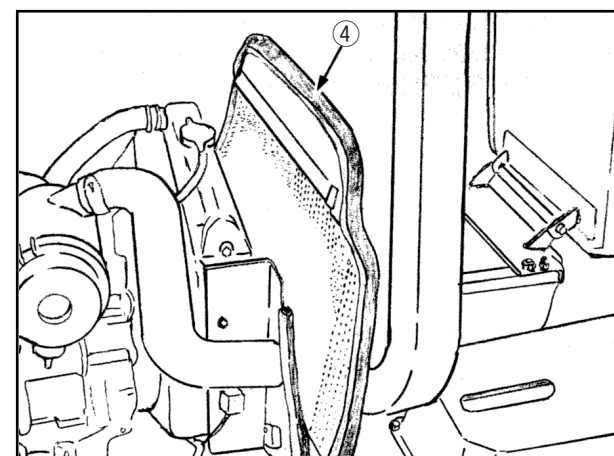
IMPORTANT: Never run the engine when the cooling system is empty. Do not add cold water or cold antifreeze solution if the engine is hot.



COOLING SYSTEM
1. Engine Block Drain Valve
2. Radiator Drain Valve



3. Radiator Screen



4. Front Screen

LUBRICATION AND MAINTENANCE

Fan Belt

NOTE: Check the condition of the fan belt after every 50 hours of operation. Check fan belt tension after every 200 hours of operation.

A belt-driven fan located at the front of the engine draws air through the fins of the radiator to lower the temperature of the radiator coolant.

When 9-11 kg (20-25 lbs.) of thumb pressure is applied midway between the belt pulleys, a correctly tightened belt will deflect 10 mm-15 mm (7/16"-9/16").

If the fan belt is slipping, fan efficiency is lowered, resulting in the engine running too hot. If the belt is too tight, the life of the alternator bearing will be shortened. If the fan belt shows signs of cracking or fraying, install a new one.

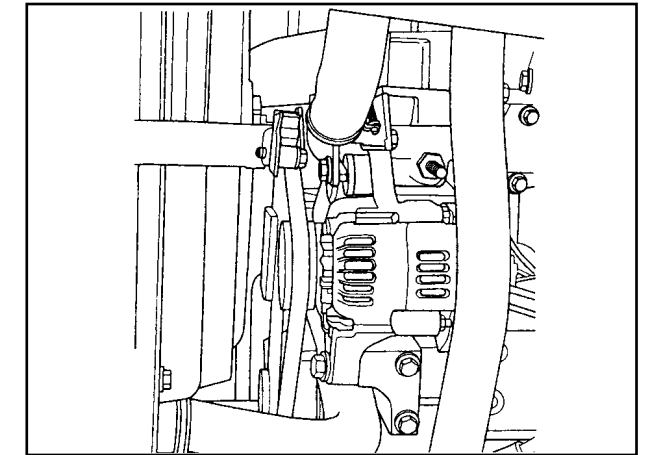
To adjust fan belt tension:

1. Loosen the alternator mounting bolts ①.

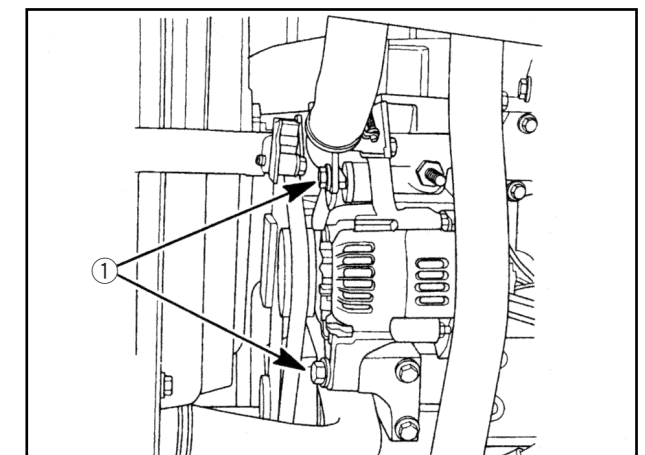


WARNING: NEVER ATTEMPT TO LOOSEN OR TIGHTEN MOUNTING BOLTS WITH THE ENGINE RUNNING.

2. Pry the alternator away from the engine and tighten the mounting bolts.
3. Recheck belt deflection.



FAN BEST



ALTERNATOR BELT TENSION ADJUSTMENT
1. Alternator Mounting Bolts

LUBRICATION AND MAINTENANCE

ALTERNATOR

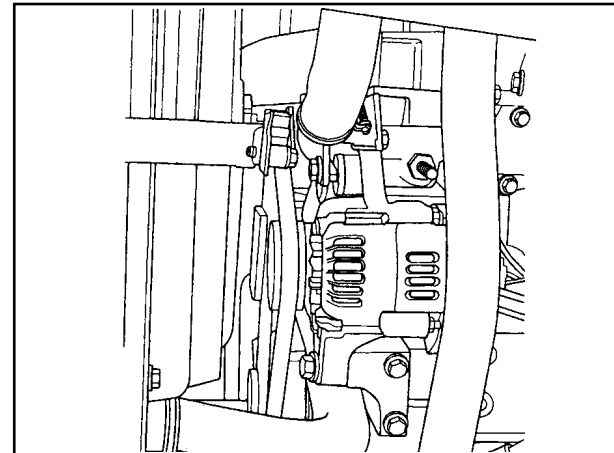
The CM mower 20 amp alternator is belt-driven from the engine crankshaft pulley. It is important that belt slippage does not occur, or the charging system will be affected. To adjust the belt, see the instructions previously given under the "Fan Belt" section.

Other than belt adjustment, the only alternator maintenance required is to periodically inspect the terminals to ensure they are clean and tight. The alternator cooling fan should also be cleaned periodically.

When working on or checking the alternator, adhere to following precautions or alternator damage may occur:

- Do not UNDER ANY CIRCUMSTANCES short the field terminal of the alternator to ground.
- Do not disconnect the alternator output lead or battery cables while the alternator is operating.
- Do not remove the alternator from the tractor without first disconnecting the negative (-) battery cable. When removing the battery, disconnect the negative (-) cable first.
- To install a battery, MAKE SURE that the positive (+) cable is connected first and that the negative terminal is connected to ground. Reverse polarity will destroy the rectifier diodes in the alternator.

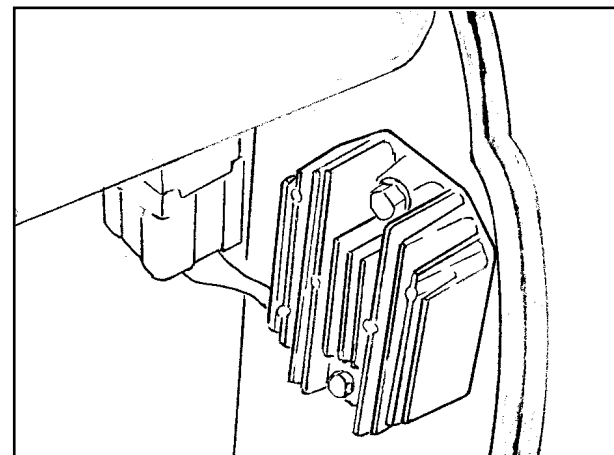
If the battery charge warning light illuminates, indicating that the alternator is not charging the battery, check the fan belt and the wiring connections. If these items are in satisfactory condition and the warning light continues to indicate no charge, consult your Dealer.



ALTERNATOR

VOLTAGE REGULATOR

The voltage regulator, automatically controls the alternator charging rate. No attempt should be made to adjust the setting of the regulator. If the charge indicator warning light indicates that the alternator is not charging the battery, check the fan belt and the wiring connections. If these are satisfactory and the warning light continues to indicate no charge, consult your SHIBAURA Dealer.

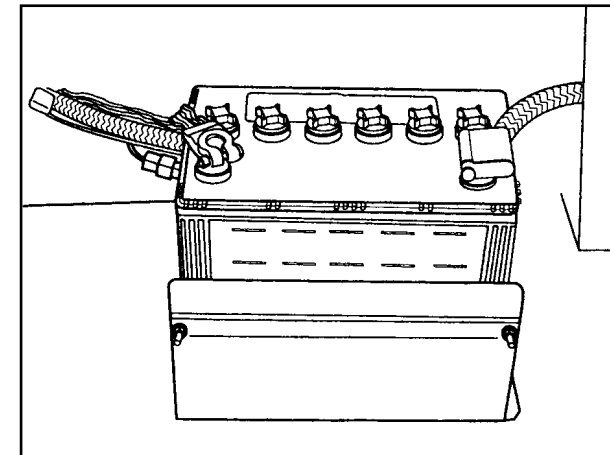


VOLTAGE REGULATOR

LUBRICATION AND MAINTENANCE

BATTERY

The CM mower is equipped with a BCI group 45, 12-bolt battery with a minimum cold cranking ability of 325 amps at -18°C (0°F)



BATTERY



WARNING: ALWAYS CHECK THE ELECTROLYTE LEVEL WITH THE MOWER ENGINE OFF, AS AN EXPLOSIVE GAS IS PRODUCED INSIDE THE BATTERY WHEN THE ALTERNATOR IS CHARGING. DO NOT USE AN EXPOSED FLAME AND DO NOT SMOKE WHEN CHECKING THE BATTERY ELECTROLYTE LEVEL.

To check the battery electrolyte level:

1. Clean the top of the battery, then remove the vent plugs.
2. Add distilled water if the electrolyte level is low. The level is correct when the liquid is 6.35 mm (1/4") above the plates.

NOTE: Keep distilled water in a nonmetallic container that is clean and well-covered.

3. Install the vent plug after making sure the vent holes are not blocked. At below freezing temperatures, run the engine for a period of time after adding water, allowing the battery to charge, which prevents the water from freezing.

Make sure the battery connections are tight and free of corrosion. A solution of baking soda and water may be used to wash the outside surface and terminals of the battery when necessary. However, make sure the solution does not get inside the battery. After cleaning, wash the battery with clean water, then apply a small amount of petroleum jelly to the terminals to prevent corrosion.

In freezing temperatures, a good battery charge must be maintained. If the battery becomes discharged or run down, the electrolyte becomes weak and may freeze, causing damage to the case. If you must add water, use distilled water. Add the water just before using the tractor so that the water will mix with the electrolyte during the charging process, thus preventing the water from freezing.

To determine the battery charge, check the specific gravity of the electrolyte.

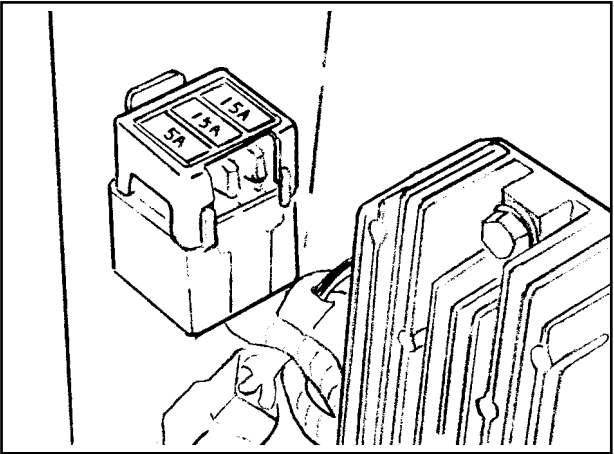
Checking the Electrolyte Level

NOTE: Check the battery electrolyte level after every 50 hours of operation.

LUBRICATION AND MAINTENANCE

FUSE BLOCK

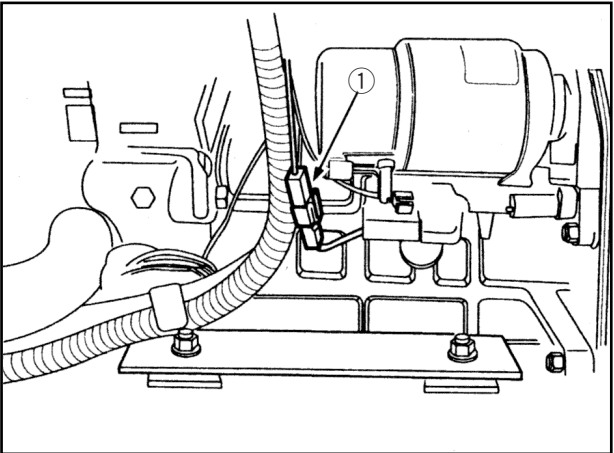
The fuse block is located on the left side of the mower compartment. Always replace blown fuses with the size specified for that circuit.



FUSE BLOCK

FUSIBLE LINK

A fusible link wire ① is used to protect the mower's entire electrical system. If too much amperage passes through this wire it will melt down so that it will no longer allow current to pass (similar to the way a fuse works). The fusible link wire is a red wire that goes from the starter terminal to a connector that links into the main wiring harness.



ELECTRICAL SYSTEM PROTECTION
1. Fusible Link

To replace the fusible link wire:

1. Disconnect the negative battery cable from the battery.
2. Unplug the connector linking the wire to the main wiring harness.
3. Remove the old fusible link wire from the starter terminal.
4. Replace the old fusible link wire with a new one - first attaching to starter terminal, and then connecting into the main wire harness.

IMPORTANT: Always replace the fusible link wire with the appropriate fusible link wire for this tractor (part # SBA 385603370).

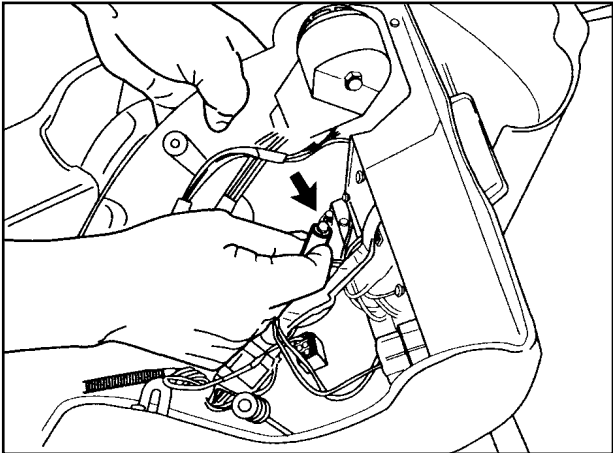
INSTRUMENT LIGHTS

To change a burned out instrument bulb:

1. Remove lower cover.
2. Remove 4 screws from the dashboard.
3. Remove the front cover of the dashboard.
4. Turn the bulb together with the socket half a turn counterclockwise and pull it out.
5. Replace the bulb with new one and return the valve and socket to the original place.

Indicator Bulb Type

(Q'ty 4) JIS T6.4 14V 3W (SBA 385470301)
(Q'ty 1) JIS T5 13.5V 2W (SBA 385470302)



INSTRUMENT PANEL AND WARNING LIGHTS
Bulbs

LUBRICATION AND MAINTENANCE

PTO BELT

Front-PTO and Side-PTO shafts are driven by the V-belts.

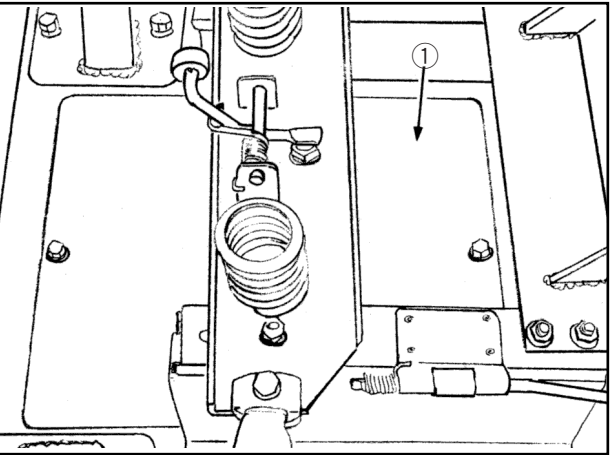
If the PTO belts are slipping, check the PTO belts for wear or damages and adjust the belt tension.



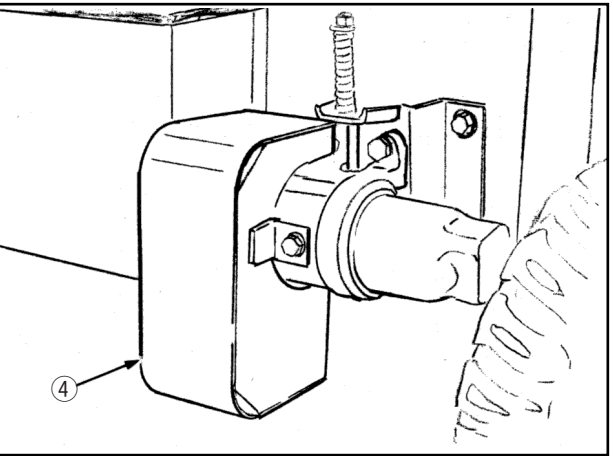
WARNING: NEVER ENGAGE THE STARTING MOTOR, WHEN CHECKING THE PTO BELTS.

To check the PTO belts:

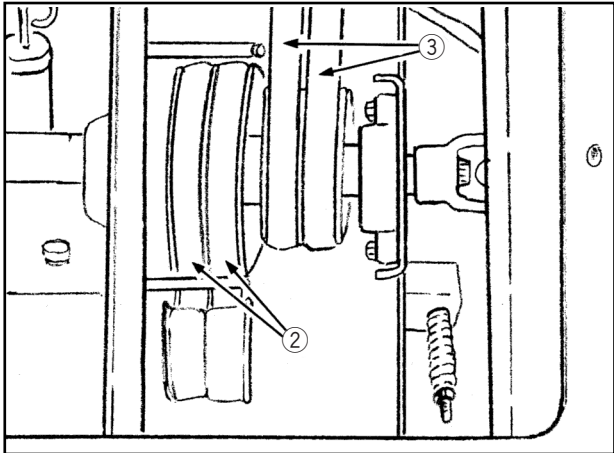
1. Remove the under-seat cover①.
2. Check the Front-PTO driven belts ②, and side-PTO driven belts ③ for wear or damages.
3. Remove the Side-PTO cover ④.
4. Check the Side-PTO driven belts ⑤.



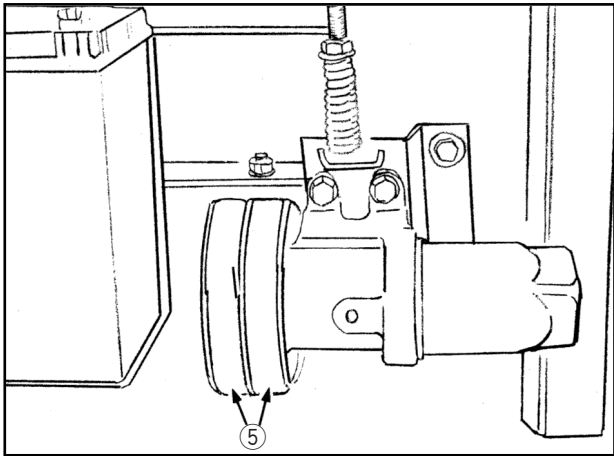
1. Under-Seat Cover



4. Side-PTO Cover



FRONT, SIDE-PTO DRIVEN BELTS
2. Front-PTO driven Belts
3. Side-PTO driven Belts

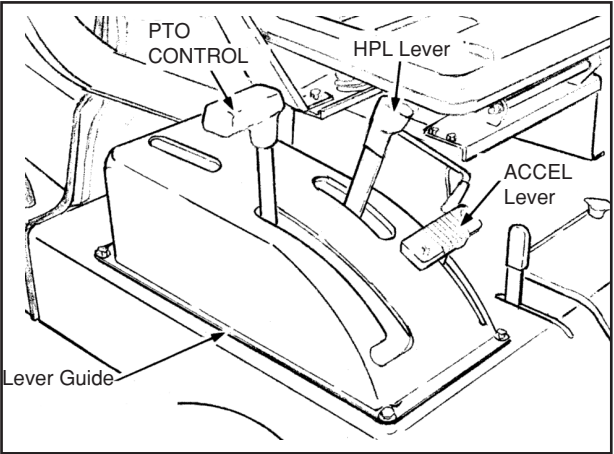


5. Side-PTO Driven Belts

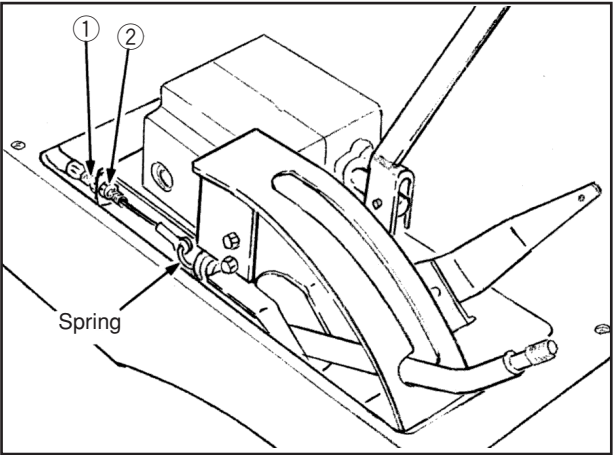
Adjust the PTO belt tension as follows.

Front-PTO Belt Tension.

- 1. Remove the grips on PTO control lever, accel lever and HPL lever.
- 2. Remove the lever guide.
- 3. Place the PTO control lever at engaged position.
- 4. Loosen the lock nut A at end of PTO wire cable.
- 5. Adjust the spring length to 110 mm by turning the adjuster nut ②.
- 6. Tighten the lock nut ①.



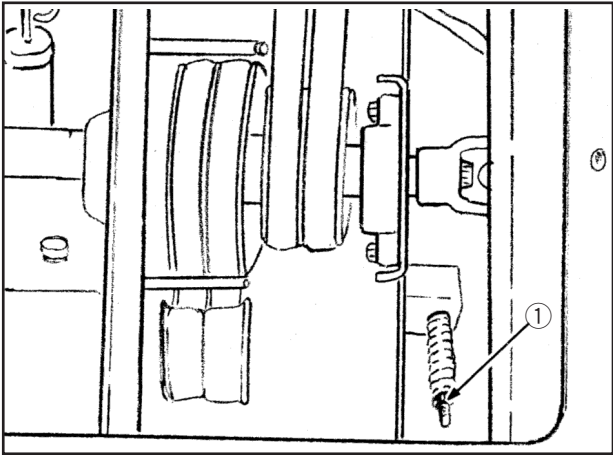
LEVER GUIDE



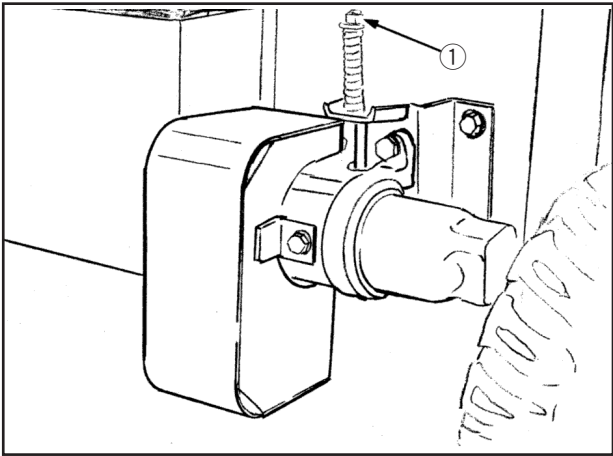
FRONT PTO BELT TENSION
1. Lock Nut
2. Adjuster Nut

SIDE-PTO Belt Tension

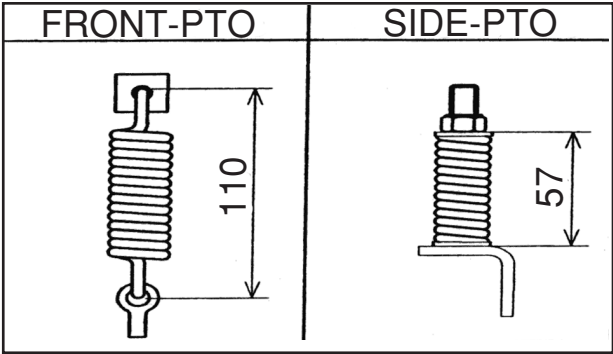
- 1. Remove the under-seat cover.
- 2. Adjust the spring length to 57 mm by turning the adjuster nut ①.



SIDE-PTO BELT TENSION
1. Lock Nut



SIDE-PTO BELT TENSION
1. Lock Nut



TENSION SPRING LENGTH

TIRES

NOTE: Check tire pressure after every 50 hours of operation or weekly.

Tire inflation pressure affects the amount of weight a tire can carry. Check the air pressure in your Mower tires. If necessary, adjust the tire pressure, being careful not to overinflate or underinflate. Observe the following guidelines:

- Do not inflate a tire above the maximum pressure shown on the tire. If the tire is not marked, do not exceed the maximum pressure shown in the Tire Inflation chart found in this manual.
- Do not reinflate a tire that has been run flat or seriously underinflated until the tire has been inspected for damage by a qualified person.
- When checking tire pressure, inspect the tire for damaged sidewalls and tread cuts. Neglected damage leads to early tire failure.

Tire Size	Inflation pressure	Max. Load
20×10.00—8—4PR	150 KPa (1.5kgf/cm ²)	5300 N (540 kgf)
16×10.00—8—4PR	190 KPs (1.9kgf/cm ²)	2750 N (280 kgf)



WARNING: INFLATING OR SERVICING TIRES CAN BE DANGEROUS. TRAINED PERSONNEL SHOULD SERVICE AND/OR MOUNT TIRES WHENEVER POSSIBLE.

If you must inflate or service tires, follow these safety precautions to avoid injury or fatality.

- Make sure the rim is clean and free of rust.
- Lubricate both tire beads and rim flanges with soap solution. Do not use oil or grease.

- Use a clip-on tire chuck with a remote hose and gauge. This allows the operator to stand clear of the tire while inflating.
- After seating the beads, adjust inflation pressure to recommended operating pressure.
- Do not inflate a tire unless the rim is mounted on the Mower or is secured so that will not move if the tire or rim should suddenly fail.
- Do not weld, braze, otherwise repair, or use a damaged rim.
- Never attempt tire repairs on a public road or highway.
- Use jack stands or other suitable blocking to support the Mower while repairing tires.
- Ensure jack has adequate capacity to lift your Mower.
- Place jack on a firm, level surface.
- Do not place any part of your body beneath the Mower or start the engine while the Mower is on the jack.

WHEEL BOLT TORQUE

Tighten the wheel bolts to the specified torque anytime the wheel assembly is removed from the mower or the wheel bolts are loosened.

Wheel Torque
74.5±9 N·m (760±90 kg-m)

NOTE: Torque for the wheels is the same for front and rear axles.

Check wheel bolt torque daily until torque stabilized.

STORING THE MOWER UNIT

A CM Mower that is to be stored for an extended period should be protected during storage. The following is a suggested list of operations to be carried out.

1. Thoroughly clean the unit. Use touch-up paint where necessary to prevent rust.
2. Check the unit for worn or damaged parts. Install new parts as required.
3. Raise the lift arms hydraulically to their fully raised position so the lift cylinder is in a fully retracted position.

This will protect the cylinder rod surfaces from corrosion.

4. Lubricate the unit. Drain and refill the transmission, hydraulic system and front axle with new oil. Drain the engine oil and refill with new lubricating oil. Also clean the air cleaner.
 5. If the CM Mower is stored or removed from operation for an extended period, special precautions should be taken to protect the fuel injection pump and the injector nozzle against corrosion and gumming during the storage period.
- Before storing, the fuel system should be flushed with a special oil, a quantity of which will remain in the system when the engine is shut down for storage.

SECTION 4
SPECIFICATIONS

ENGINE

Model	ISM S773 liquid-cooled Diesel
No. of Cylinders	3
Displacement	1005 cc
Compression Ratio	
Gross Horsepower	16.0 KW / 2700 rpm (21.5 HP / 2700 rpm)
Ele. Charge System	20 Amps
Battery	12 V – 45 AH
Air Cleaner	4 – inch Dual Filter

TRANSMISSION

Type		HST Trans.
Drive		Automatic 4WD or 4WD
Range		Single
Travel Speed	Forward	0 ~ 140. km / H
	Reverse	0 ~ 8.0 km / H
Speed Direction Control		2-pedals (Forward and Reverse Pedals)
Brake System		Wet Disc Brakes (Single Pedal Control)

PTO

	FRONT	MID
Shaft Size	25.4 mm 15 sp-DP 16 / 32	22.0 mm with key
Speed	2200 rpm at engine speed 2700 rpm	
Direction of Rotation	Clockwise (view from shaft end)	
Clutch System	Belt Tension	None

DEVICES

Mower Lifting System		Hydraulic Control
Steering System		Full Hydraulic Power Steering
Tire	Front	20 × 10.0 - 8 4 PR
	Rear	16 × 6.50 - 8 4 PR
ROPS		2 - Post ROPS

SPECIFICATIONS

CAPACITY

Fuel Tank	28.0 ℓ
Engine Oil	3.5 ℓ
Coolant	3.5 ℓ
Transmission Oil	14.0 ℓ
Rear Axle Oil	1.8 ℓ

DIMENSIONS

Wheel Base	1050 mm
Tread Width	Front 800 mm
	Rear 830 mm
Overall Width	1040 mm
Overall Length	2130 mm (Rear bumper to end of lift arm)
Overall Height	1875 mm (Top of ROPS)
Min. Ground Clearance	125 mm (Bottom of front axle)
Shipping Weight	530 kg (with ROPS)

PRE-DELIVERY SERVICE
CHECK AND ADJUST AS REQUIRED

INOPERATIVE SERVICE CHECKS

1. Tire pressure☐
2. Air cleaner element and hose connections☐
3. Radiator coolant level☐
4. Fan belt tension☐
5. Battery cleanliness, vent openings, electrolyte level, and charge☐
6. Engine oil level☐
7. Transmission and front axle oil level☐
8. Brake adjustment and pedal equalization☐
9. Front wheel hub bolts for tightness☐
10. Rear wheel spindle nuts for tightness☐
11. Rear wheel toe-in☐
12. Fuel level☐
13. Sheet metal and paint condition☐
14. Drain diesel fuel filter☐

SAFETY ITEMS CHECKS

1. Safety decals installed☐
2. Neutral start switch operation☐
3. Parking brake & latch operation☐
4. Operator's Manual☐

OPERATIVE SERVICE CHECKS

- All operating checks are to be performed with the Front Mower at normal operating temperature.
1. Lights and instruments for proper operation, and fuel shut down with key switch OFF☐
2. Fluid and oil leaks☐
3. Maximum no-load speed and idle speed adjustments☐
4. PTO engagement and disengagement☐
5. Hydraulic system:

• Lift control lever operation☐

• Weight transfer valve operation☐
6. Full-time-FWD operation☐
7. Operation of HST☐
8. HST speed control level☐
9. Operation of safety devices:

• PTO disengagement system☐

• Engine stop system (seat)☐

MODEL_____

INSPECTION PERFORMED
WARRANTY EXPLAINED

SERIAL NO._____

OWNER'S SIGNATURE

DATA

DEALER'S SIGNATURE

DATE

50-HOUR SERVICE
CHECK AND ADJUST AS REQUIRED

INOPERATIVE SERVICE CHECKS

1. Tire pressure☐
2. Check air cleaner hose connection☐
3. Replace diesel fuel filter(s)☐
4. Tighten injector line fittings☐
5. Radiator coolant level☐
6. Fan belt tension☐
7. Battery cleanliness and vent openings, electrolyte level and charge☐
8. All electrical cables, terminals and wires☐
9. Drain and refill engine oil☐
10. Replace engine oil filter☐
11. Transmission and front axle oil level☐
12. Rear axle oil level☐
13. Replace hydraulic system oil filter☐

OPERATIVE SERVICE CHECKS

1. Lights and instruments for proper operation, and fuel shut down with key switch OFF☐
2. Fluid and oil leaks☐
3. Maximum no-load speed and idle speed adjustments☐
4. Starting and starter safety switches☐
5. Hydraulic system:

• Lift control lever operation☐
6. Operation of safety devices:

• PTO disengagement system☐

• Engine stop system☐

PERFORMANCE SERVICE CHECKS

1. Engine operation including throttle and governor operation☐
2. HST transmission☐
3. Steering control☐
4. Differential lock engagement and disengagement☐
5. Brake action☐
6. All optional equipment and accessories☐

MODEL_____

INSPECTION PERFORMED

SERIAL NO._____

OWNER'S SIGNATURE

DATA

DEALER'S SIGNATURE

DATE

PRE-DELIVERY SERVICE
CHECK AND ADJUST AS REQUIRED

INOPERATIVE SERVICE CHECKS

- 1. Tire pressure ☐
- 2. Air cleaner element and hose connections ☐
- 3. Radiator coolant level ☐
- 4. Fan belt tension ☐
- 5. Battery cleanliness, vent openings, electrolyte level, and charge ☐
- 6. Engine oil level ☐
- 7. Transmission and front axle oil level ☐
- 8. Brake adjustment and pedal equalization ☐
- 9. Front wheel hub bolts for tightness ☐
- 10. Rear wheel spindle nuts for tightness ☐
- 11. Rear wheel toe-in ☐
- 12. Fuel level ☐
- 13. Sheet metal and paint condition ☐
- 14. Drain diesel fuel filter ☐

SAFETY ITEMS CHECKS

- 1. Safety decals installed ☐
- 2. Neutral start switch operation ☐
- 3. Parking brake & latch operation ☐
- 4. Operator's Manual ☐

OPERATIVE SERVICE CHECKS

- All operating checks are to be performed with the Front Mower at normal operating temperature.
- 1. Lights and instruments for proper operation, and fuel shut down with key switch OFF ☐
 - 2. Fluid and oil leaks ☐
 - 3. Maximum no-load speed and idle speed adjustments ☐
 - 4. PTO engagement and disengagement ☐
 - 5. Hydraulic system:
 - Lift control lever operation ☐
 - Weight transfer valve operation ☐
 - 6. Full-time-FWD operation ☐
 - 7. Operation of HST ☐
 - 8. HST speed control level ☐
 - 9. Operation of safety devices:
 - PTO disengagement system ☐
 - Engine stop system (seat) ☐

MODEL_____

INSPECTION PERFORMED
WARRANTY EXPLAINED

SERIAL NO._____

OWNER'S SIGNATURE

DATA

DEALER'S SIGNATURE

DATE

50-HOUR SERVICE
CHECK AND ADJUST AS REQUIRED

INOPERATIVE SERVICE CHECKS

- 1. Tire pressure ☐
- 2. Check air cleaner hose connection ☐
- 3. Replace diesel fuel filter(s) ☐
- 4. Tighten injector line fittings ☐
- 5. Radiator coolant level ☐
- 6. Fan belt tension ☐
- 7. Battery cleanliness and vent openings, electrolyte level and charge ☐
- 8. All electrical cables, terminals and wires ☐
- 9. Drain and refill engine oil ☐
- 10. Replace engine oil filter ☐
- 11. Transmission and front axle oil level ☐
- 12. Rear axle oil level ☐
- 13. Replace hydraulic system oil filter ☐

OPERATIVE SERVICE CHECKS

- 1. Lights and instruments for proper operation, and fuel shut down with key switch OFF ☐
- 2. Fluid and oil leaks ☐
- 3. Maximum no-load speed and idle speed adjustments ☐
- 4. Starting and starter safety switches ☐
- 5. Hydraulic system:
 - Lift control lever operation ☐
- 6. Operation of safety devices:
 - PTO disengagement system ☐
 - Engine stop system ☐

PERFORMANCE SERVICE CHECKS

- 1. Engine operation including throttle and governor operation ☐
- 2. HST transmission ☐
- 3. Steering control ☐
- 4. Differential lock engagement and disengagement ☐
- 5. Brake action ☐
- 6. All optional equipment and accessories ☐

MODEL_____

INSPECTION PERFORMED

SERIAL NO._____

OWNER'S SIGNATURE

DATA

DEALER'S SIGNATURE

DATE

Certificate of Conformity for Europe

I, the undersigned, certify that, the products described below conform to the specifications of Directive 98/37/EC

Harmonized Standard : EN836

Products :

1. Category : Professional Mower
2. Make : SHIBAURA
3. Model : CM214

Tokyo, Oct. 11, 2001



Yoshimasa Kitou
General Manager
Tractor Division
Ishikawajima-Shibaure Machinery Co., Ltd.
5-32-7, Sendagaya, Shibuya-ku,
Tokyo, JAPAN

Certificate de Conformité pour l'Europe

Je, soussigné, certifie que les produits décrits ci-dessous sont conformes aux spécifications de la Directive 98/37/CE

Standard Harmonisé : EN836

Produits :

1. Catégorie : Tondeuses professionnelles
2. Marque : SHIBAURA
3. Modèle : CM214

Tokyo, le 11 Octobre 2001.



Yoshimasa Kitou
General Manager
Tractor Division
Ishikawajima-Shibaure Machinery Co., Ltd.
5-32-7, Sendagaya, Shibuya-ku,
Tokyo, JAPAN

Declaration of Conformity for Europe

I, the undersigned, certify that the products described below conform to the specifications of Directive 2000/14/EC.

Category : Professional Mower								
Make : SHIBAURA								
Model	Engine		Guaranteed Sound Power dB(A)	Measured Sound Power dB(A)	Identification of the series	Model of cutting device	Cutting width cm	Blade speed rpm
	Type	Speed rpm						
CM214	S773	2250	105	102	10001~	FM48	122	3154

Tokyo, January 1, 2002



Yoshimasa Kitou
General Manager
Tractor Division
Ishikawajima-Shibaura Machinery Co., Ltd.
5-32-7, Sendagaya, Shibuya-ku,
Tokyo, JAPAN

Name and address of the Notified Body :
TÜV Süddeutschland Group,
TÜV Bau und Betrieb GmbH
Westendstrasse 199 D-80339 Munich Germany

Déclaration de Conformité pour l'Europe

Je, soussigné, certifie que les produits décrits ci-dessous sont conformes aux spécifications de la Directive 2000/14/CE.

Catégorie : Tondeuses professionnelles								
Marque : SHIBAURA								
Modèles	Moteur		Puissance sonore garantie dB(A)	Niveau sonore mesuré dB(A)	Identification de la série	Modèle de dispositif de coupe	Largeur de coupe cm	Vitesse de rotation lame tr/mn
	Type	Vitesse de rotation tr/mn						
CM214	S773	2250	105	102	10001~	FM48	122	3154

Tokyo, le 1 Janvier 2002



Yoshimasa Kitou
General Manager
Tractor Division
Ishikawajima-Shibaura Machinery Co., Ltd.
5-32-7, Sendagaya, Shibuya-ku,
Tokyo, JAPAN

Nom et l'adresse de l'organisme notifié :
TÜV Süddeutschland Group,
TÜV Bau und Betrieb GmbH
Westendstrasse 199 D-80339 Munich Germany