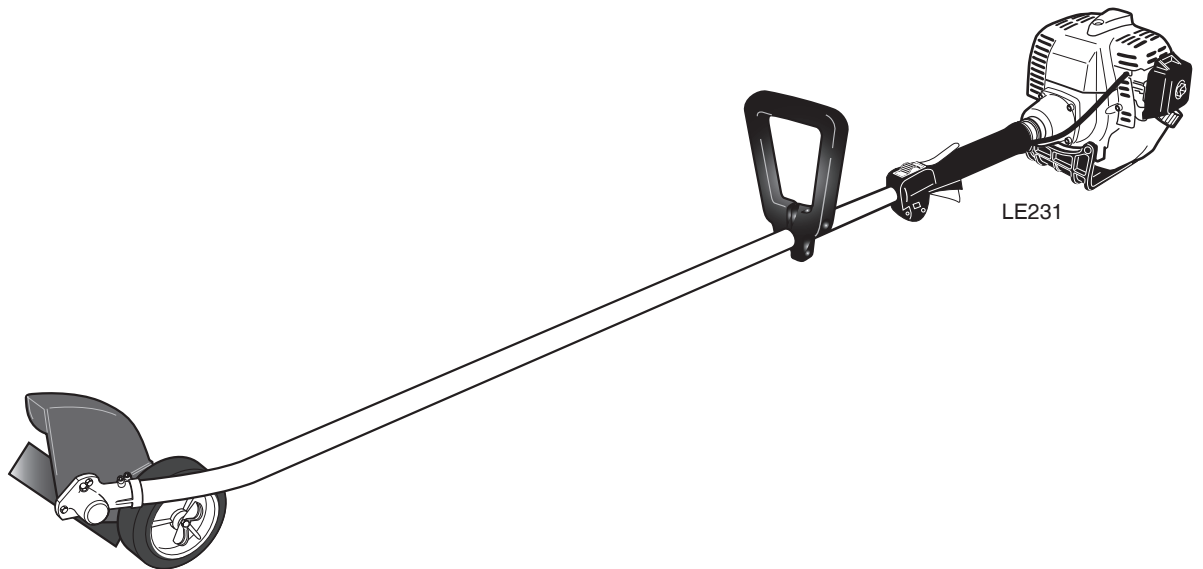


**SHINDAIWA OWNER'S/OPERATOR'S MANUAL**

# **LE231/EVC LAWN EDGER**



**WARNING!**

Minimize the risk of injury to yourself and others!  
Read this manual and familiarize yourself with the contents. Always wear eye and hearing protection when operating this unit.

# **shindaiwa**

Part Number 62719-94310 Rev. 11/06

## Introduction

The Shindaiwa 231-series of hand-held power tools has been designed and built to deliver superior performance and reliability without compromise to quality, comfort, safety or durability.

Shindaiwa's high-performance engines represent the leading edge of 2-cycle engine technology, delivering exceptionally high power with remarkably low displacement and weight. As an owner/operator, you'll soon discover for yourself why Shindaiwa is simply in a class by itself!

### IMPORTANT!

The information contained in this owner's/operator's manual describes units available at the time of publication.

Shindaiwa Inc. reserves the right to make changes to products without prior notice, and without obligation to make alterations to units previously manufactured.

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## Attention Statements

Throughout this manual are special "Attention Statements."



### WARNING!

A statement preceded by the triangular attention symbol and the word "WARNING" contains information that should be acted upon to prevent serious bodily injury.

### CAUTION!

A statement preceded by the word "CAUTION" contains information that should be acted upon to prevent mechanical damage.

### IMPORTANT!

A statement preceded by the word "IMPORTANT" is one that possesses special significance.

### NOTE:

A statement preceded by the word "NOTE" contains information that is handy to know and may make your job easier.



Read and follow this operators manual. Failure to do so could result in serious injury.



Wear eye and hearing protection at all times during the operation of this unit.



Keep bystanders at least 50 feet (15 m) away during operation.



Beware of thrown or ricocheted objects.



Keep feet away from blade. Rotating blade may cause injury.

### IMPORTANT!

The operational procedures described in this manual are intended to help you get the most from your unit as well as to protect you and others from harm. These procedures are guidelines for safe operation under most conditions, and are not intended to replace any safety rules and/or laws that may be in force in your area. If you have questions regarding your 231-series power tool, or if you do not understand something in this manual, your Shindaiwa dealer will be glad to assist you. You may also contact Shindaiwa Inc. at the address printed on the back of this Manual.

## General Safety Instructions

### Work Safely

Shindaiwa lawn edgers operate at very high speeds and can do serious damage or injury if they are misused or abused. *Never allow a person without training or instruction to operate your unit!*



### WARNING!

Never make unauthorized attachment installations. Nor use attachments not approved by Shindaiwa for use on this product.



### WARNING!

#### Use Good Judgment

**ALWAYS** wear eye protection to shield against thrown objects.

**NEVER** run the engine when transporting the unit.

**NEVER** run the engine indoors! Make sure there is always good ventilation. Fumes from engine exhaust can cause serious injury or death.

**ALWAYS** clear your work area of trash or hidden debris that could be thrown back at you or toward a bystander.

**ALWAYS** stop the unit immediately if it suddenly begins to vibrate or shake. Inspect for broken, missing or improperly installed parts or attachments.

**ALWAYS** keep the unit as clean as practical. Keep it free of loose vegetation, mud, etc.

**ALWAYS** hold the unit firmly with both hands when cutting or trimming, and maintain control at all times.

**ALWAYS** keep the handles clean.

**ALWAYS** disconnect the spark plug wire before performing any maintenance work.

# General Safety Instructions The Properly Equipped Operator

## Stay Alert

You must be physically and mentally fit to operate this unit safely.



### WARNING!



Never operate power equipment of any kind if you are tired or if you are under the influence of alcohol, drugs, medication or any other substance that could affect your ability or judgement.



### WARNING!

#### Minimize the Risk of Fire

**NEVER** smoke or light fires near the trimmer or edger.

**ALWAYS** stop the engine and allow it to cool before refueling. Avoid overfilling and wipe off any fuel that may have spilled.

**ALWAYS** move the unit to a place well away from a fuel storage area or other readily flammable materials before starting the engine.

**NEVER** place flammable material close to the engine muffler.

**NEVER** run the engine without the spark arrester screen in place.



### WARNING!

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.

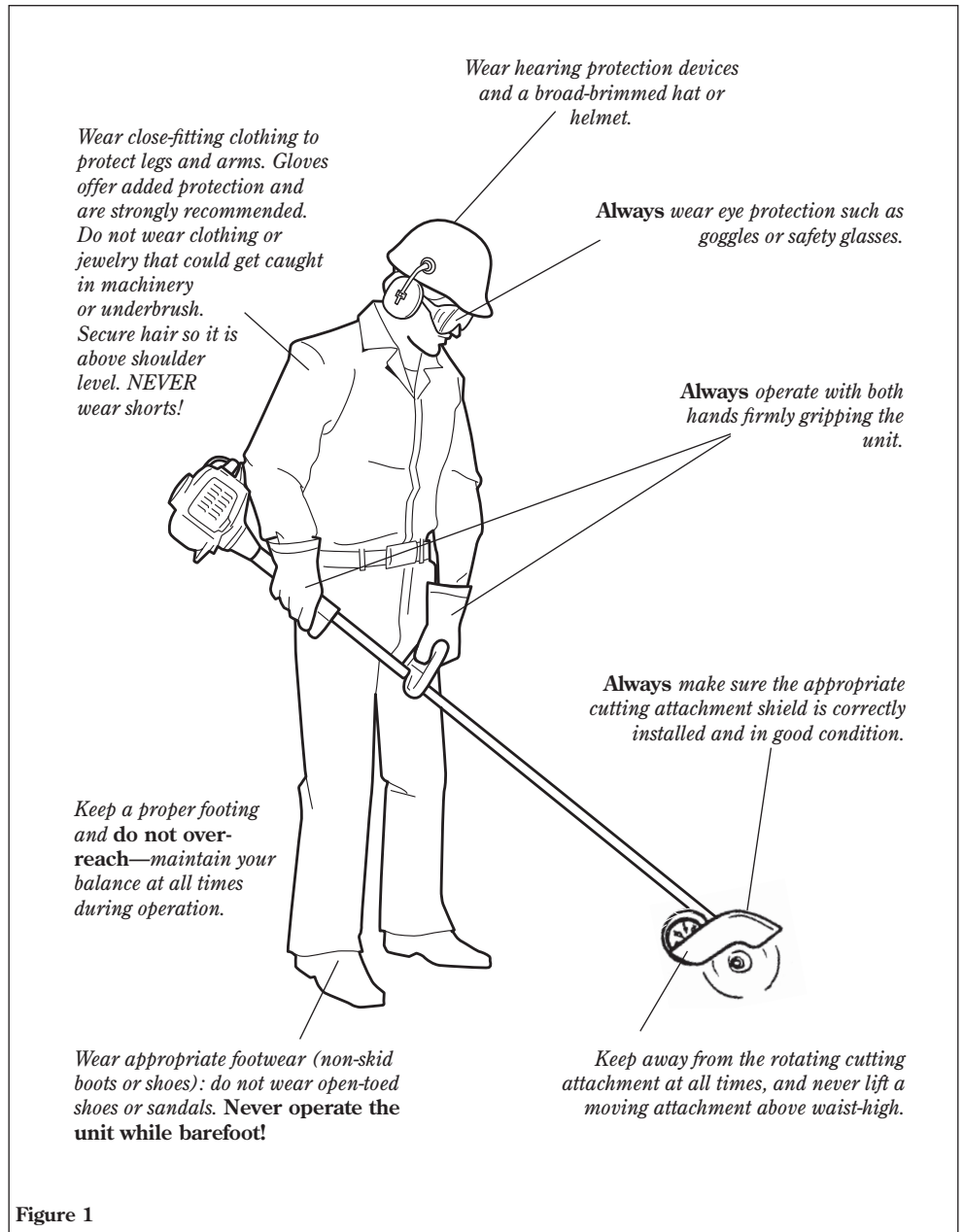


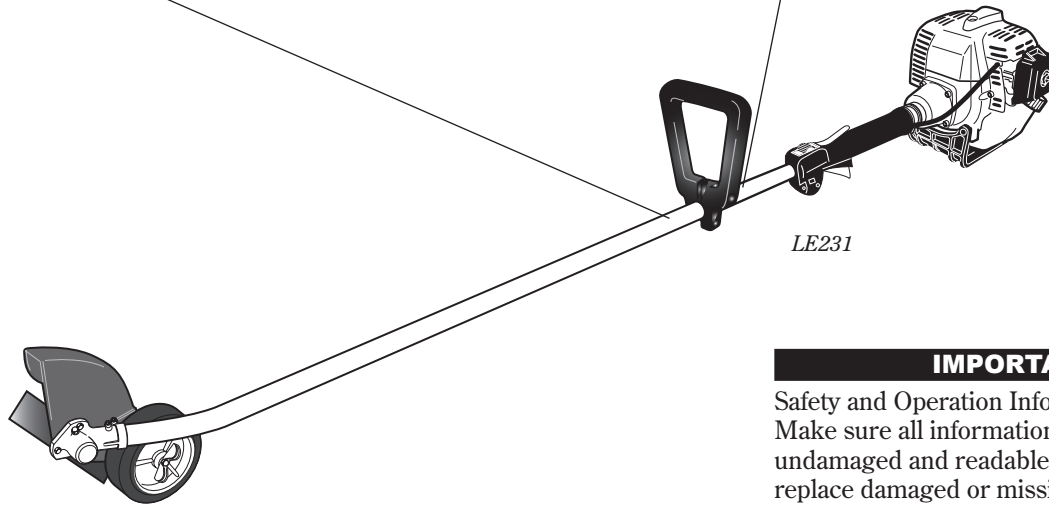
Figure 1

## Safety Labels



*This label indicates the minimum distance between front handle and rear grip per ANSI B175.3.*

POSITION HANDLE FORWARD OF THIS LINE



### IMPORTANT

Safety and Operation Information Labels: Make sure all information labels are undamaged and readable. Immediately replace damaged or missing information labels. New labels are available from your local authorized Shindaiwa dealer.

Figure 2

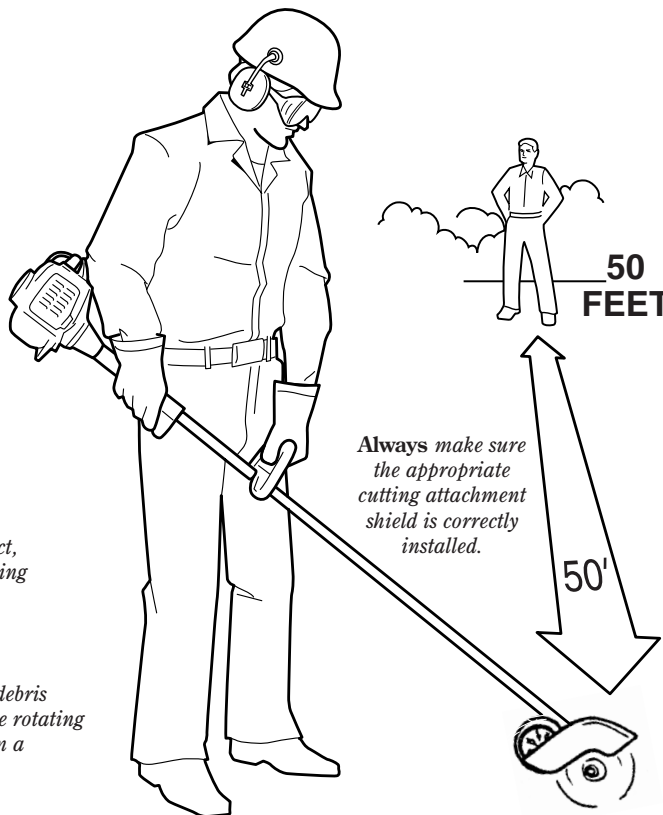
## Be Aware of the Working Environment

*Avoid long-term operation in very hot or very cold weather.*

*Be extremely careful of slippery terrain, especially during rainy weather.*

*If contact is made with a hard object, stop the engine and inspect the cutting attachment for damage.*

*Be constantly alert for objects and debris that could be thrown either from the rotating cutting attachment or bounced from a hard surface.*



*Make sure bystanders or observers outside the 50-foot "danger zone" wear eye protection.*

*Reduce the risk of bystanders being struck by flying debris. Make sure no one is within 50 feet (15 meters)—that's about 16 paces—of an operating attachment.*

*Beware of a coasting blade when edging. A coasting blade can injure while it continues to spin after the throttle trigger is released or after the engine is stopped.*

*When operating in rocky terrain or near electric wires or fences, use extreme caution to avoid contacting such items with the cutting attachment.*

Figure 3

## Product Description

Using the accompanying illustrations as a guide, familiarize yourself with your unit and its various components. Understanding your unit helps ensure top performance, long service life, and safer operation. See Figure 4.



### WARNING!

Do not make unauthorized modifications or alterations to any of these products or their components.

### Prior to Assembly

Before assembling, make sure you have all the components required for a complete unit:

- Engine assembly
- Outer tube assembly
- Cutting attachment shield
- Handle
- Kit containing cutting attachment shield mounting bracket and hardware, handle

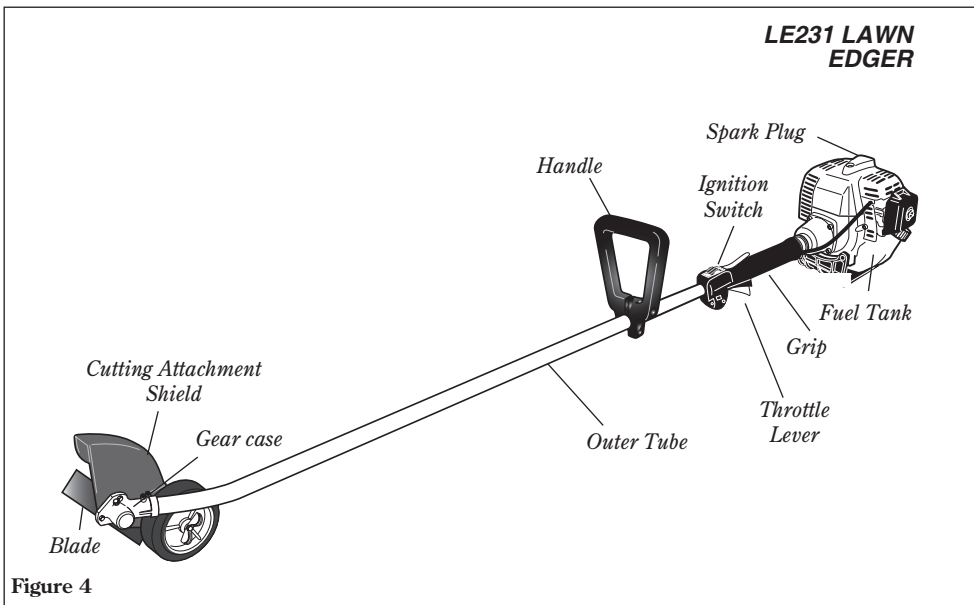


Figure 4

mounting hardware, this manual and tool kit for routine maintenance. Tool kits vary by model and may include a hex wrench, spark plug/screwdriver combination wrench, and spanner wrench.

Carefully inspect all components for damage.

### IMPORTANT!

The terms “left”, “left-hand”, and “LH”; “right”, “right-hand”, and “RH”; “front” and “rear” refer to directions as viewed by the operator during normal operation.

## Specifications

Engine Model .....	Shindaiwa S230
LE231 Dry Weight (less attachments) .....	13.7 lb./6.2 kg
Engine Model .....	Shindaiwa S230C
Engine Type .....	2-cycle, vertical-cylinder, air-cooled
Bore x Stroke.....	1.26 x 1.10 in./32 x 28 mm
Displacement.....	22.5 cc/1.4 cu. in.
Maximum Power.....	1.1 HP/0.8 kW @ 7500 RPM (min <sup>-1</sup> )
Fuel/oil Ratio.....	50:1 with ISO-L-EGD or JASO FC class 2-cycle Mixing Oil

*Shindaiwa ONE is a registered JASO FC classified oil and also meets or exceeds ISO-L-EGD performance requirements.*

Fuel Tank Capacity .....	22.7 oz./670 ml
Carburetor Type.....	Walbro WYL-122, diaphragm-type

Muffler .....	2-Stage, Catalyst
Ignition .....	One-piece electronic, transistor-controlled
Spark plug .....	Champion CJ8
Air cleaner type .....	Non-reversible flocked filter element
Starting method .....	Recoil
Stopping method .....	Slide switch
Transmission type.....	Automatic, centrifugal clutch w/bevel gear
EPA Emission Compliance Period* .....	Category A

\* The EPA emission compliance referred to on the emission compliance label located on the engine, indicates the number of operating hours for which the engine has been shown to meet Federal emission requirements. Category C = 50 hours (Moderate), B = 125 hours (Intermediate) and A = 300 hours (Extended).

\*Specifications are subject to change without notice.

## Assembly Driveshaft/Powerhead

### Connect the Outer Tube to the Powerhead.

1. Place the powerhead on a clean, flat surface, spark plug facing up. See Figure 5.

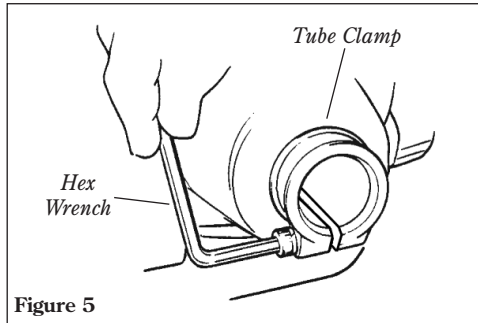


Figure 5

2. Use the 4 mm hex wrench to loosen the tube clamp screw. See Figure 5.
3. Add some moly-type EP grease to splines at the end of the main shaft.
4. Slide the outer tube into the tube clamp until the tube bottoms. If installation is difficult, rotate the outer tube or gearcase shaft slightly until you feel the mainshaft engage with the powerhead. See Figure 6.

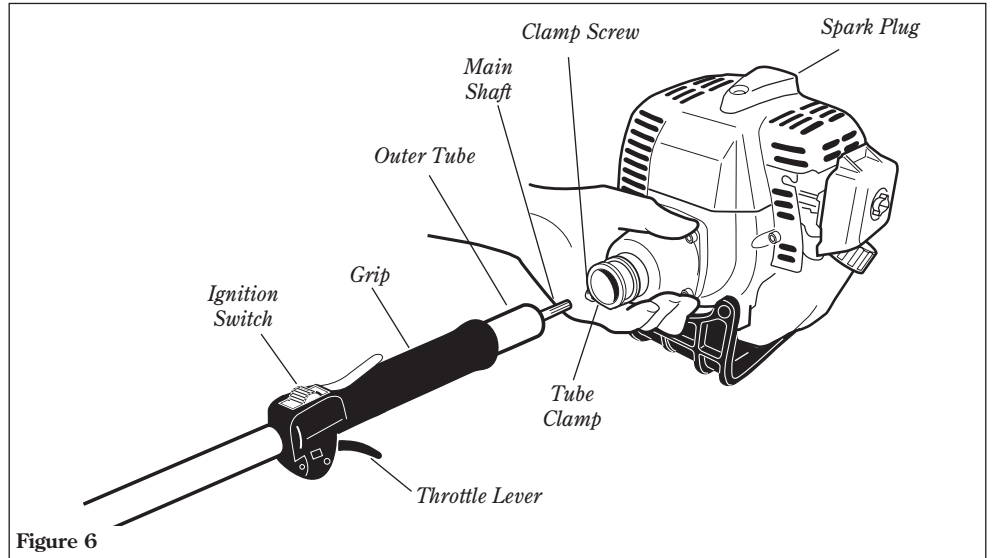


Figure 6

5. Position the outer tube so that the ignition switch is facing up and the throttle lever is facing down. See Figure 6.
6. Slide the outer tube into the powerhead until the throttle grip just contacts the tube clamp.

7. Tighten the clamp screw firmly.

### CAUTION!

Do not force the shaft tube into the powerhead! Excessive force can damage the shaft tube and mainshaft.

## Assembly Throttle Linkage and Ignition Leads

### Remove the Cylinder Cover.

1. Remove the spark plug boot.
2. Remove the two lower cylinder cover screws.
3. Loosen the top cylinder cover screw until the cover is free of the engine. (The top cylinder cover screw is captive). Lift the cylinder cover off of the engine. See Figure 7.

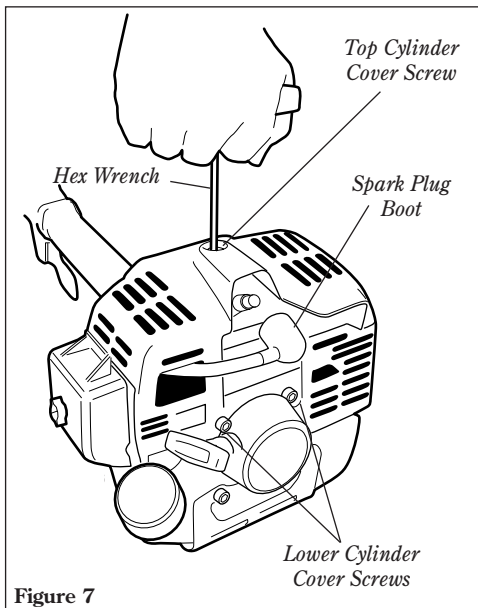


Figure 7

### Connect the Throttle Cable.

1. Loop the ribbed cable tube to the top left side of the engine.
2. Install the black wire between the two cable adjuster nuts as shown. See Figure 8.

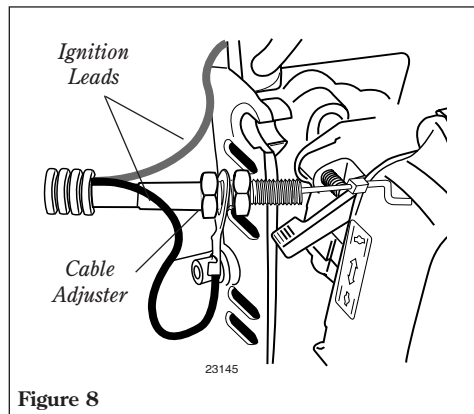


Figure 8

3. Connect the S-shaped end of the throttle cable to the throttle lever on top of the carburetor. See Figure 9.

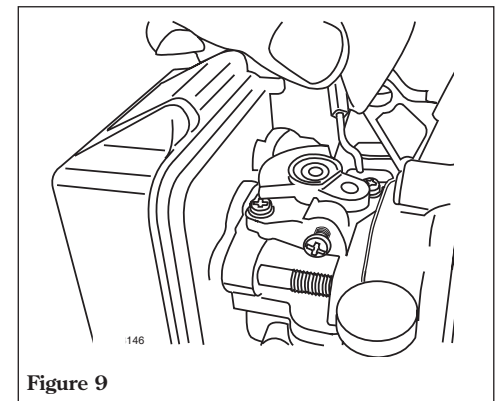


Figure 9

## Assembly

### Throttle Linkage and Ignition Leads

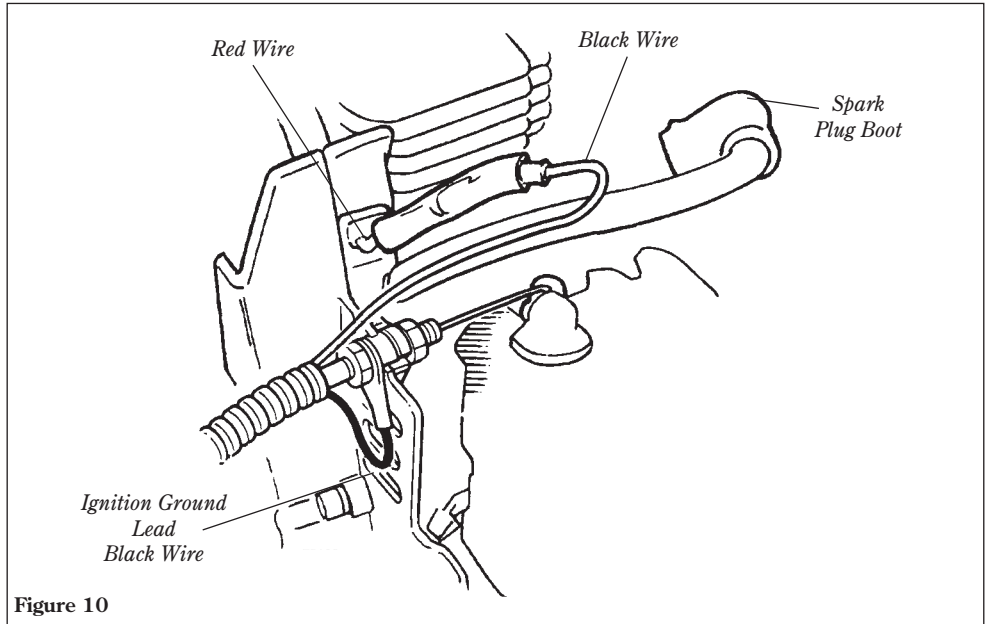
#### Assemble and Adjust the Throttle Cable.

1. Insert the throttle cable housing into the notch on the fan cover, and clamp the black wire's connector between the fan cover and the cable outer adjuster nut. See Figure 10.
2. Tighten the two throttle cable adjuster nuts.

#### **IMPORTANT!**

Adjust and tighten the cable nuts to allow approximately 1/4-inch free play at the throttle trigger.

3. Using finger pressure only, connect the black switch wire from the cable tube to the red ignition wire on the powerhead. Wire routing must be as shown in the illustration with the black wire located over the spark plug wire. See Figure 10.



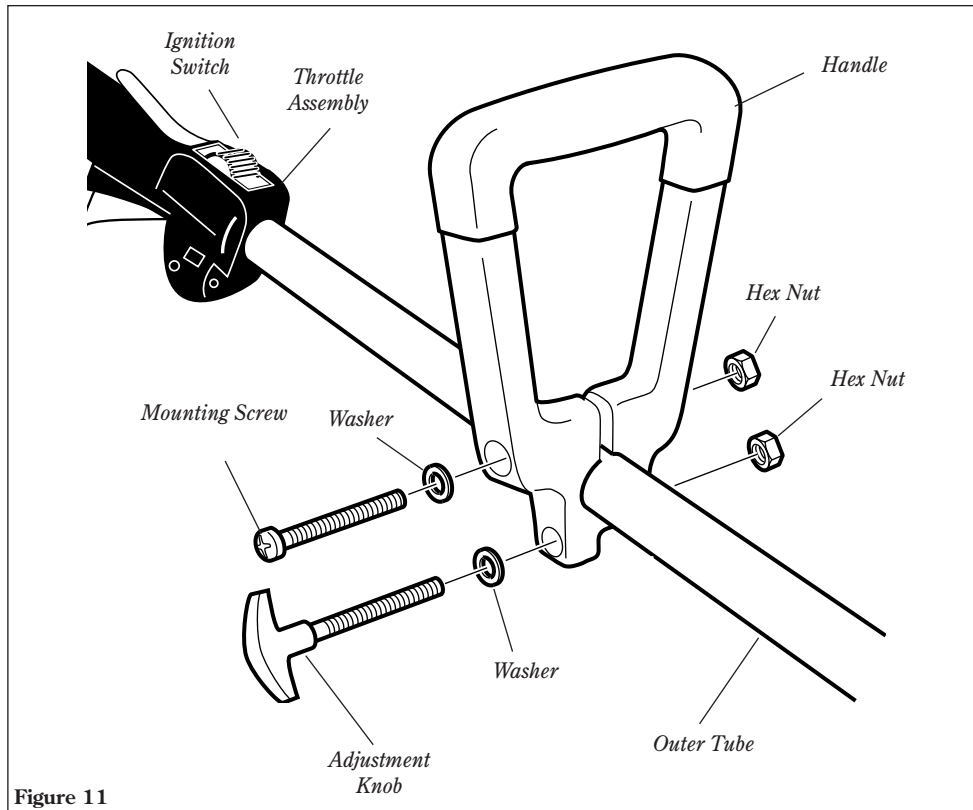
4. Reinstall the cylinder cover and tighten the three cover screws.
5. Reinstall the spark plug boot.

#### **CAUTION!**

Routing of wiring must not interfere with throttle operation.

## Assembly

### Handle LE231



#### Connect the Handle to the Outer Tube.

1. Remove both screws from the handle.
2. While spreading the handle at the mounting hole, position the handle on the outer tube as shown.
3. Reinstall the two mounting screws in the handle, but do not tighten them at this time.

#### **NOTE:**

The handle is recessed to receive the hex nuts.

4. Locate the handle at the best position for operator comfort (usually about 10 inches ahead of the throttle assembly).
5. Secure the handle by tightening the mounting screw and the adjustment knob screw.

## Assembly

### Attachment Shield and Edger Blade LE231

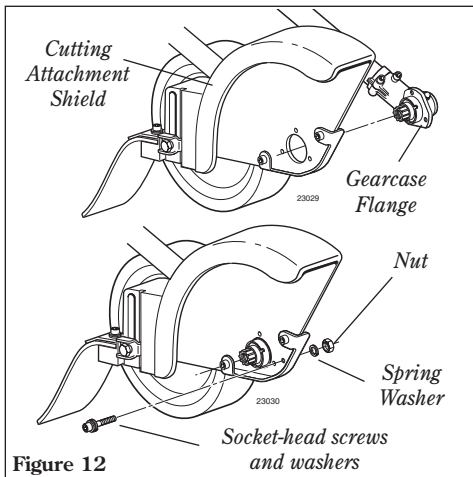


Figure 12

#### Mount the Cutting Attachment Shield on the Gearcase.

1. Remove the shaft bolt, bolt guard, holder A and holder B from the gearcase. See Figure 12.
2. Align the cutting attachment shield assembly with the gearcase as shown, and then fit the shield onto the matching flange on the gearcase. See Figure 12.



#### WARNING!

The LE231 is intended for right-handed operation only! When correctly assembled, the cutting attachment shield and shaft **must** be oriented as shown.

3. Install the socket-head screws with washers, then use the hex wrench to firmly tighten all three screws. See Figure 12.
4. Install a washer and nut on each of the three screws assembled in Step 3, then firmly tighten each nut.

#### IMPORTANT

The three socket-head screws must be firmly tightened against the cutting attachment shield before installing and tightening the nuts.

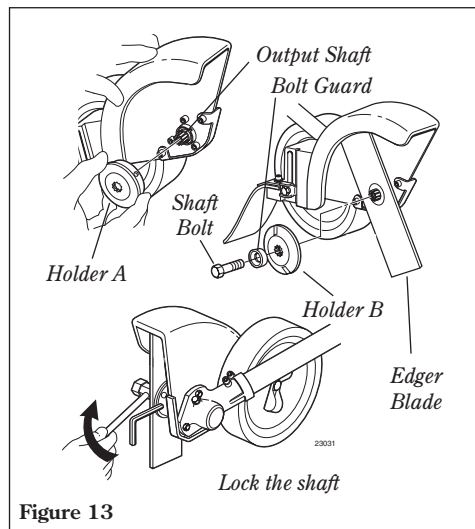


Figure 13

#### Mount the Edger Blade

1. Install the holder A onto the output shaft. See Figure 13.
2. Mount the edger blade and holder B onto the output shaft, and then install the bolt guard and shaft bolt (turn bolt counterclockwise to install). See Figure 13.
3. Align the hole in holder A with the matched hole in the gearcase, and then use the hex wrench to temporarily lock the output shaft. See Figure 13.
4. Use the combination wrench to firmly tighten the shaft bolt. Remove the hex wrench. See Figure 13.



#### WARNING!

- The LE231 is designed for use with an Edger blade only!
- Never operate the LE231 without the Cutting Attachment Shield installed and tightly secured!

The LE231 Edger should now be completely assembled.

## Mixing Fuel


#### CAUTION!

- Some types of gasoline contain alcohol as an oxygenate. Oxygenated gasoline may cause increased operating temperatures. Under certain conditions, alcohol-based gasoline may also reduce the lubricating qualities of some 2-cycle mixing oils.
- Never use any type of gasoline containing more than 10% alcohol by volume! Generic oils and some outboard oils may not be intended for use in high-performance 2-cycle type engines, and should never be used in your Shindaiwa engine.

- Use only fresh, clean unleaded gasoline with a pump octane of 87 or higher.
- Mixed with 50:1 Shindaiwa ISO-L-EGD or JASO FC class 2-cycle mixing oil at a gasoline/ratio of 50:1 (1 gallon of gasoline to 2.6 ozs mixing oil). Shindaiwa One meets or exceeds these requirements.


#### Examples of 50:1 mixing quantities

- 1 gallon of gasoline to 2.6 oz. mixing oil.
- 5 liters of gasoline to 100 ml. mixing oil.

 Oil is a registered JASO FC classified oil and also meets or exceeds ISO-L-EGD performance requirements. Shindaiwa One is recommended for use in all Shindaiwa

low emissions engines. Shindaiwa One also includes a fuel stabilizer.

#### IMPORTANT!

Mix only enough fuel for your immediate needs! If fuel must be stored longer than 30 days and  oil with fuel stabilizer is not used, it should first be treated with a fuel stabilizer such as STA-BIL™.

#### CAUTION!

This engine is designed to operate on a 50:1 mixture consisting of unleaded gasoline and ISO-L-EGD or JASO FC class 2-cycle mixing oil only. Use of non-approved mixing oils can lead to excessive carbon deposits.

## Filling the Fuel Tank



#### WARNING!

##### Minimize the Risk of Fire!

- **ALWAYS** stop the engine and allow it to cool before refueling. Avoid overfilling and wipe off any fuel that may have spilled.
- Wipe all spilled fuel and move the engine at least 10 feet (3 meters) from the fueling point and source before restarting!
- **NEVER** start or operate this unit if there is a fuel leak.

- **NEVER** start or operate this unit if the carburetor, fuel lines, fuel tank and/or fuel tank cap are damaged.
- **NEVER** smoke or light any fires near the engine or fuel source!
- **NEVER** place any flammable material near the engine muffler!
- **NEVER** operate the engine without the muffler and spark arrester in good working condition.

1. Place the unit on a flat, level surface.
2. Clear any dirt or other debris from around the fuel filler cap.
3. Remove the fuel cap, and fill the tank with clean, fresh fuel.
4. Reinstall the fuel filler cap and tighten firmly.



## Starting the Engine

### IMPORTANT!

Engine ignition is controlled by a two position switch mounted on the throttle housing labeled, "I" for ON or START and "O" for OFF or STOP.

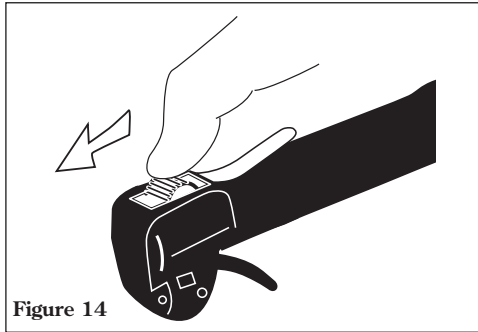


Figure 14

1. Slide the ignition switch to the "I" position (engine ON).

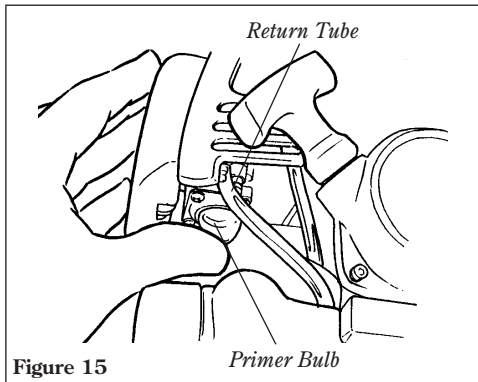


Figure 15

2. Press the primer bulb until fuel can be seen flowing in the transparent return tube.

### IMPORTANT!

The primer system only pushes fuel through the carburetor. Repeatedly pressing the primer bulb will not flood the engine with fuel.

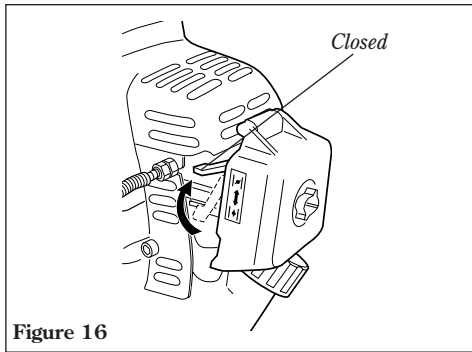


Figure 16

3. Set the choke lever to the CLOSED position if engine is cold.

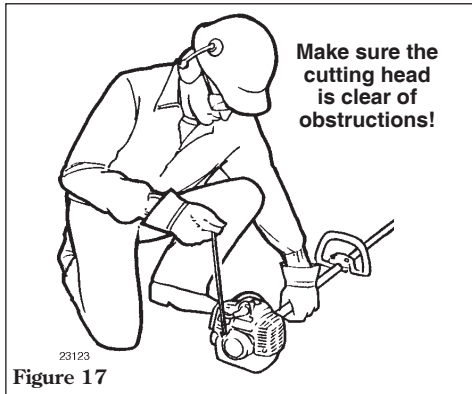


Figure 17

4. While holding the outer tube firmly with one hand, slowly pull the recoil starter handle until resistance is felt, then pull quickly to start the engine.

### CAUTION!

Do not pull the recoil starter to the end of the rope travel. Pulling the recoil starter to the end of the rope travel can damage the starter.



### WARNING!

The cutting attachment may rotate when the engine is started!

5. When the engine starts, slowly move the choke lever to the "OPEN" position. See Figure 18. (If the engine stops after the initial start, close the choke and restart.)

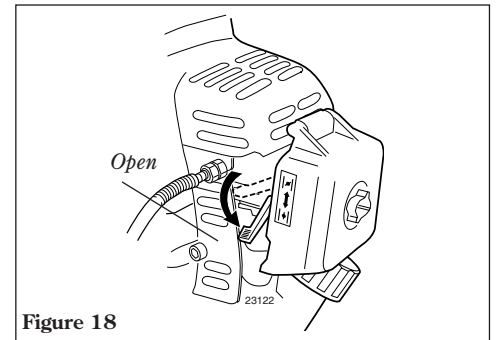


Figure 18



### WARNING!

Never start the engine from the operating position.

### IMPORTANT!

If the engine fails to start after several attempts with the choke in the closed position, the engine may be flooded with fuel. If flooding is suspected, move the choke lever to the open position and repeatedly pull the recoil starter to remove excess fuel and start the engine. If the engine still fails to start, refer to the troubleshooting section of this manual.

### When the Engine Starts...

- After the engine starts, allow the engine to warm up at idle 2 or 3 minutes before operating the unit.
- Advancing the throttle makes the cutting attachment turn faster; releasing the throttle permits the attachment to stop turning. If the cutting attachment continues to rotate when the engine returns to idle, carburetor idle speed should be adjusted.

## Stopping the Engine

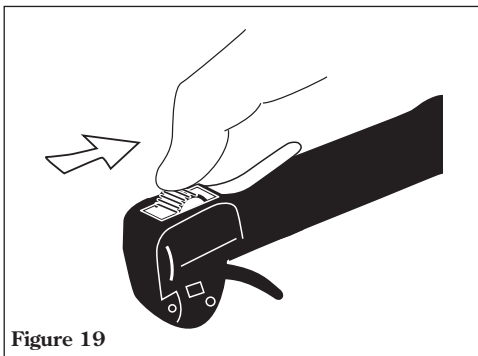
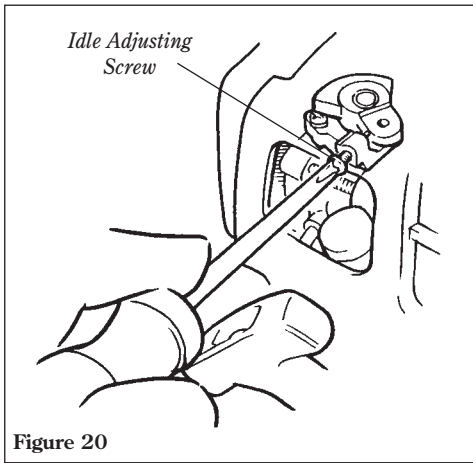


Figure 19

Idle the engine briefly before stopping (about 2 minutes), then slide the ignition switch to the "O" (engine OFF) position. See Figure 19.

## Adjusting Engine Idle



The engine must return to idle speed whenever the throttle lever is released. Idle speed is adjustable, and must be set low enough to permit the engine clutch to disengage the cutting attachment.

### Idle Speed Adjustment



#### WARNING!

The cutting attachment must NEVER rotate at engine idle! If the idle speed cannot be adjusted by the procedure described here, return the trimmer to your Shindaiwa dealer for inspection.

1. Place the trimmer on the ground, then start the engine, and then allow it to idle 2-3 minutes until warm.
2. If the attachment rotates when the engine is at idle, reduce the idle speed by turning the idle adjustment screw counter-clockwise. See Figure 20.
3. If a tachometer is available, the engine idle speed should be final adjusted to 2,750 ( $\pm 250$ ) RPM ( $\text{min}^{-1}$ ).
4. Carburetor fuel mixture adjustments are preset at factory and cannot be serviced in the field.

## Checking Unit Condition

NEVER operate the unit with the cutting attachment shield or other protective devices (ignition switch, etc.) removed!



#### WARNING!

A cutting attachment shield or other protective device is no guarantee of protection against ricochet. YOU MUST ALWAYS GUARD AGAINST FLYING DEBRIS!

Use only authorized Shindaiwa parts and accessories with your Shindaiwa trimmer. Do not make modifications to your unit without the written approval of Shindaiwa Inc.

ALWAYS make sure the cutting attachment is properly installed and firmly tightened before operation.

NEVER use a cracked or warped cutting attachment: replace it with a serviceable one.

ALWAYS make sure the cutting attachment fits properly into the appropriate attachment holder. If a properly installed at-

tachment vibrates, replace the attachment with a new one and re-check.

ALWAYS stop the engine immediately and check for damage if you strike a foreign object or if the unit becomes tangled. Do not operate with broken or damaged equipment, or attachments.

NEVER allow the engine to run at high rpm without a load. Doing so could damage the engine.

NEVER operate a unit with worn or damaged fasteners or attachment holders.

## Using a Hand-Held Edger

### Guidelines for Operating the Edger.

- Before edging, make sure the area is soft enough so the blade does not bog down. If necessary, water the area before edging.
- Remove debris and other obstacles that could be thrown by the rotating blade.
- Plan your work so the edger blade is always on your right-hand side.

Begin each pass by positioning the unit over the work, and with the engine running at about half-throttle. Slowly lower the blade to the ground while applying full throttle. See Figure 21.

#### CAUTION!

Low-speed edging can lead to premature clutch failure.

- Do not move the edger into the work so fast that the engine or blade bogs down.

Regular and frequent use of the edger will make a neater lawn, and a frequently trimmed edge will be easier to maintain.



#### WARNING!

- Wear eye protection, long pants, and boots when operating this unit!
- Whenever you strike a hard object with the blade, always stop the edger and carefully inspect the blade for damage. NEVER OPERATE THE EDGER WITH A DAMAGED BLADE!

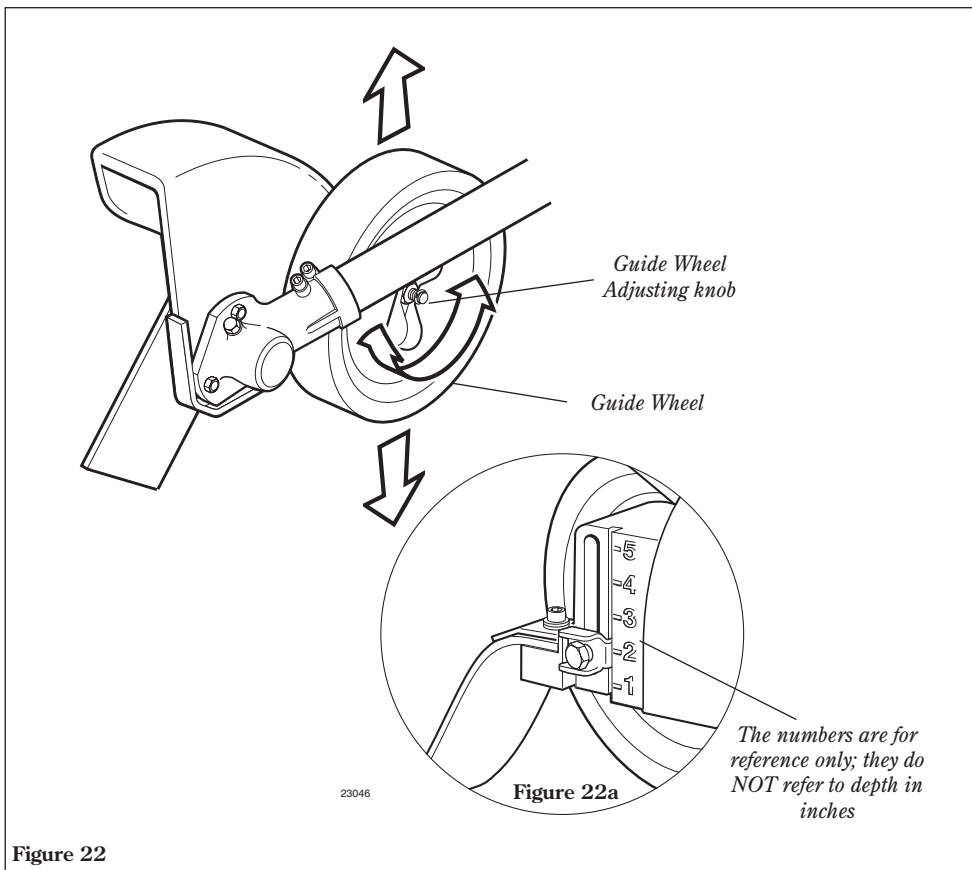


Figure 22

### Adjusting Blade Cutting Depth.

The edger's depth of cut is controlled by a combination of operator height, blade wear, and the positioning of the edger's guide wheel.

#### To adjust blade height:

1. Loosen the guide wheel adjusting knob. See Figure 22.
2. Raise or lower the guide wheel to the desired setting. See Figure 22a.
3. Tighten the guide wheel adjusting knob firmly. See Figure 22.



#### WARNING!

Never adjust the guide wheel while the engine is running.

#### NOTE:

Guide wheel adjustment is also required to compensate for blade wear.



#### WARNING!

Use only Shindaiwa replacement edger blades.

## General Maintenance

### IMPORTANT!

MAINTENANCE, REPLACEMENT OR REPAIR OF EMISSION CONTROL DEVICES AND SYSTEMS MAY BE PERFORMED BY ANY REPAIR ESTABLISHMENT OR INDIVIDUAL; HOWEVER, WARRANTY REPAIRS MUST BE PERFORMED BY A DEALER OR SERVICE CENTER AUTHORIZED BY Shindaiwa Corporation. THE USE OF PARTS THAT ARE NOT EQUIVALENT IN PERFORMANCE AND DURABILITY TO AUTHORIZED PARTS MAY IMPAIR THE EFFECTIVENESS OF THE EMISSION CONTROL SYSTEM AND MAY HAVE A BEARING ON THE OUTCOME OF A WARRANTY CLAIM.



#### WARNING!

Before performing any maintenance, repair or cleaning work on the unit, make sure the engine and cutting attachment are completely stopped. Disconnect the spark plug wire before performing service or maintenance work.



#### WARNING!

Non-standard parts may not operate properly with your unit and may cause damage and lead to personal injury.

#### NOTE:

Using non-standard replacement parts could invalidate your Shindaiwa warranty.

#### Muffler

This unit must never be operated with a faulty or missing spark arrester or muffler. Make sure the muffler is well secured and in good condition. A worn or damaged muffler is a fire hazard and may also cause hearing loss.

#### Spark Plug

Keep the spark plug and wire connections tight and clean.

#### Fasteners

Make sure nuts, bolts, and screws (except carburetor adjusting screws) are tight.

### Edger Blades

Check the edger blades condition frequently. If an edger blade's performance changes suddenly, stop the engine and check the blade for cracks or other damage. Replace a damaged edger blade IMMEDIATELY!



#### WARNING!

- Never repair a damaged edger blade by welding, straightening, or by modifying its shape. An altered edger blade may break during operation, resulting in serious personal injury.
- The LE231 Edger is designed for use with a single, bar-type blade only.
- Blades are not interchangeable between Shindaiwa edgers and brushcutter models. Operating any unit with a blade or attachment not approved for that unit can be hazardous and may cause serious injury.

## Daily Maintenance

Prior to each work day, perform the following:

- Check for loose or missing screws or components. Make sure the tool and cutting attachment are securely fastened.
- Check the entire unit for leaking fuel or grease.
- Remove dirt or debris from the engine, check the cooling fins and air cleaner for clogging and clean them as necessary.
- Carefully remove any accumulation of dirt or debris from the muffler or the fuel tank. Dirt build-up in these areas could cause the engine overheating, induce premature wear, or create a fire hazard.

## 10-Hour Maintenance

Every 10 hours of operation (more frequently in dusty or dirty conditions):

- Remove the air cleaner element. See Figure 23. Clean or replace as necessary. To clean element: Wash it thoroughly in soap and water. Let it dry before reinstalling the element.

### CAUTION!

Do not operate the unit if the air cleaner or element is damaged, or if the element is wet.

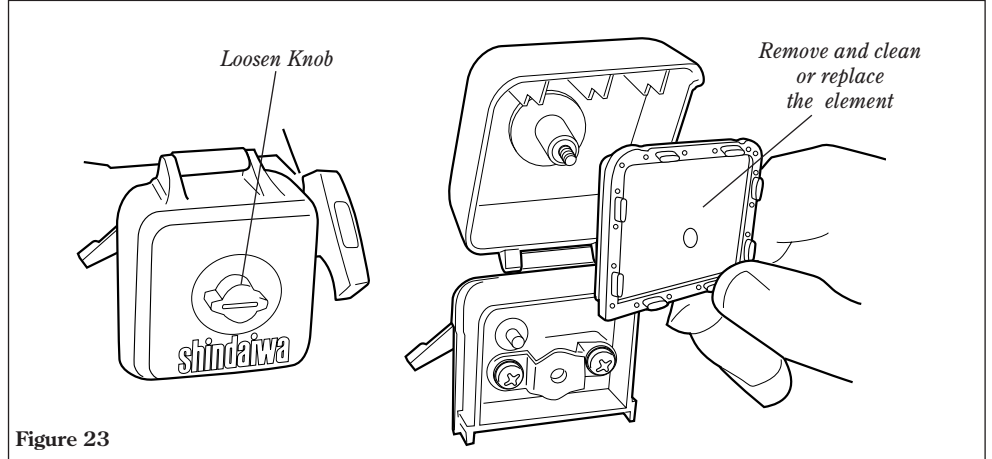


Figure 23

## 10/15-Hour Maintenance

Every 10 to 15 hours of operation:

- Remove and clean the spark plug. Adjust the spark plug electrode gap to 0.024-inch (0.6 mm). If the spark plug must be replaced, use only a Champion CJ8 or equivalent spark plug of the correct heat range. See Figure 24.

### CAUTION!

Before removing the spark plug, clean the area around the plug to prevent dirt and debris from falling into internal engine parts.

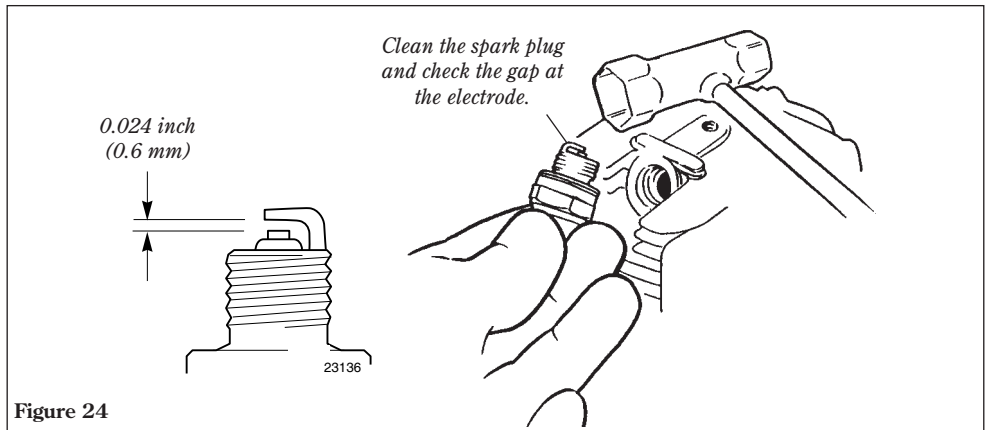
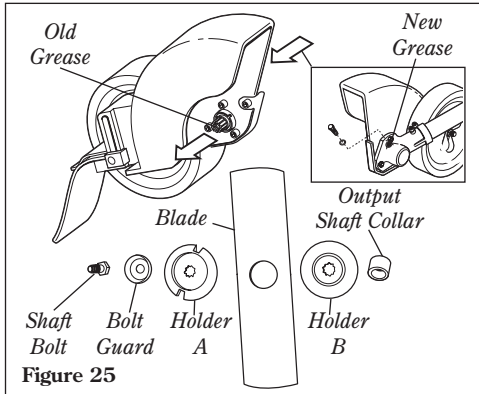


Figure 24

## 50-Hour Maintenance

Every 50 hours of operation (more frequently in dusty or dirty conditions):

- Remove the cylinder cover and clean grass and dirt from the cover and cylinder fins.
- Remove the cutting attachment, cutting attachment holder and gear shaft collar. Remove the filler plug from the side of the gearcase and press new grease into the gearcase until grease is pushed out. Use only lithium-base grease such as Shindaiwa Gear Case Lubricant or equivalent. See Figure 25.

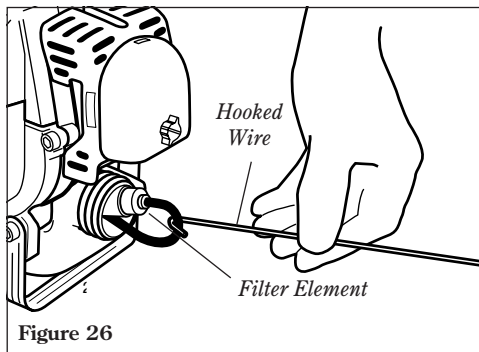


- Use a hooked wire to extract the fuel filter from inside the fuel tank. See Figure 23.

### CAUTION!

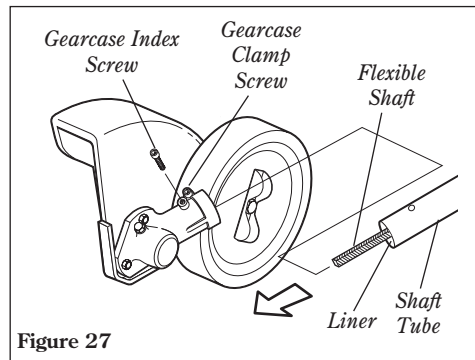
Make sure you do not pierce the fuel line with the end of the hooked wire. The line is delicate and can be damaged easily.

- Remove and replace the filter element. Before reinstalling the new filter element, inspect the condition of all the fuel system components (fuel pick-up line, fuel return line, tank vent line, tank vent, fuel cap and fuel tank). If damage, splitting or deterioration is noted, the unit should be removed from service until it can be inspected or repaired by a Shindaiwa-trained service technician.



### Lubricate the Flexible Shaft.

Lack of lubrication will cause rapid wear to the flexible shaft and also to the shaft tube liner, resulting in increased vibration and greatly decreased service life. Remove and lubricate the flexible shaft as follows: Refer to Figure 27:



1. Loosen the gearcase clamp screw.
2. Remove the gearcase index screw.
3. Slide the gearcase and shield assembly from the shaft tube.
4. Pull the flexible shaft from the shaft tube assembly, and clean the shaft thoroughly in solvent and dry with a clean shop towel.
5. Inspect the flexible shaft carefully, and replace if worn or damaged.

### NOTE:

Always replace the liner if the flexible shaft is being replaced.

6. Coat the entire length of the shaft with Shindaiwa Premium Gearcase Lube (or equivalent), and reinstall the shaft in the shaft tube assembly.

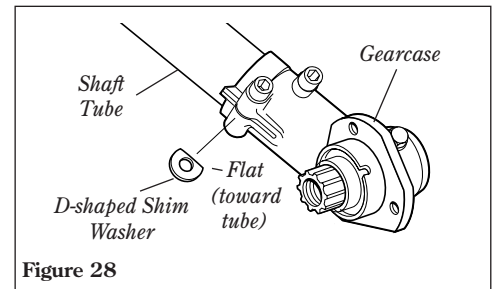
### NOTE:

For extended shaft life, the flexible cable should be reversed end-for-end during the reinstallation process.

7. Insert the flexible shaft into the female end of the gearcase pinion. See Figure 27.
8. Install the gearcase on the shaft tube in the reverse order of removal.

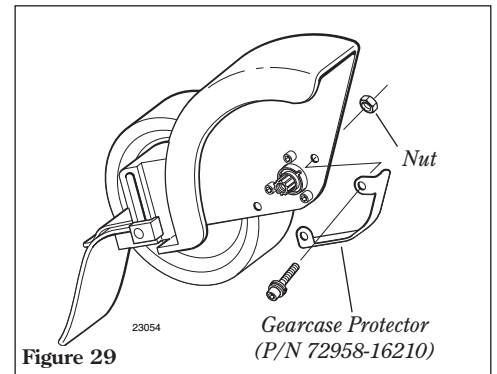
### CAUTION!

The D-shaped shim washer must be positioned with its flat edge toward the shaft tube.



### Inspect the Gearcase Protector.

The metal gearcase protector (P/N 72958-16210) is installed to protect the gearcase flange from damage when working close to sidewalks or other abrasive surfaces, and should be routinely inspected for damage or excessive wear. See Figure 29.



When replacing the protector, inspect to be sure that both of the protector mounting screws are firmly tightened and each screw is locked in place with a nut as shown in Figure 29.

## 135-Hour Maintenance

Every 135 hours of operation, remove and clean the muffler.



### WARNING!

Never operate the machine with a damaged or missing muffler or spark arrester! Operating with missing or damaged exhaust components is a fire hazard and could also damage your hearing.

1. Remove the spark plug boot.
2. Remove the two 4 mm engine cover screws (located at the top of the recoil housing).
3. Loosen the 5 mm engine top cover screw (the screw is captive) and lift the cover from the engine.
4. Remove the two 5 mm muffler screws. Remove the lower muffler screw, then lift the muffler assembly from the engine.
5. Remove the rear muffler shield socket head screw and, while noting the orientation of parts, separate the muffler shield. See Figure 30.

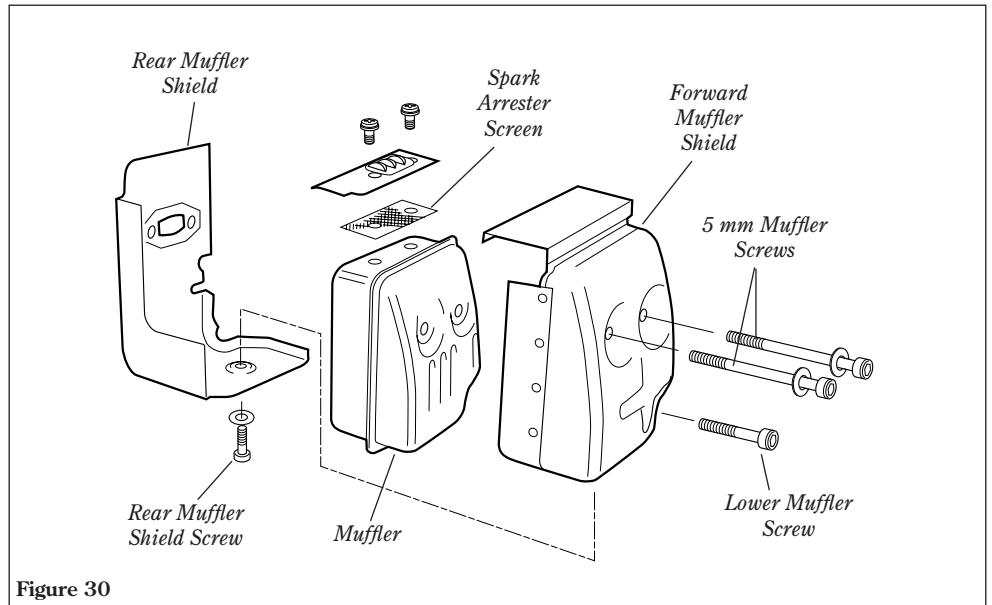


Figure 30

6. Remove the spark arrester screen and clean with a stiff bristle brush.
7. Gently tap the muffler on a wood surface to dislodge any loose carbon.
8. Inspect the cylinder exhaust port for carbon buildup.

### IMPORTANT!

If you note excessive carbon buildup, consult with an authorized servicing dealer.


9. Reassemble the muffler in the reverse order of disassembly.

## Long Term Storage

Whenever the unit will not be used for 30 days or longer, use the following procedures to prepare it for storage:

- Clean external parts thoroughly and apply a light coating of oil to all metal surfaces.
- Drain all the fuel from the fuel tank.

### IMPORTANT!

All stored fuels should be stabilized with a fuel stabilizer such as STA-BIL™, if  oil with fuel stabilizer is not used.

To remove the remaining fuel from the fuel lines and carburetor and with the fuel drained from the fuel tank.

1. Prime the primer bulb until no more fuel is passing through.
2. Start and run the engine until stops running.
3. Repeat steps 1 and 2 until the engine will no longer start.

### CAUTION!

Gasoline stored in the carburetor for extended periods can cause hard starting, and could also lead to increased service and maintenance costs.

- Remove the spark plug and pour about 1/4 ounce of 2-cycle mixing oil into the cylinder through the spark plug hole. Slowly pull the recoil starter 2 or 3 times so oil will evenly coat the interior of the engine. Reinstall the spark plug.
- Before storing the unit, repair or replace any worn or damaged parts.
- Remove the air cleaner element from the carburetor and clean it thoroughly with soap and water. Let dry and reassemble the element.
- Store the unit in a clean, dust-free area.

# Troubleshooting Guide

## ENGINE DOES NOT START

What To Check	Possible Cause	Remedy
Does the engine crank? YES ↓	NO → Faulty recoil starter. Fluid in the crankcase. Internal damage.	Consult with an authorized servicing dealer.
Good compression? YES ↓	NO → Loose spark plug. Excess wear on cylinder, piston, rings.	Tighten and re-test. Consult with an authorized servicing dealer.
Does the tank contain fresh fuel of the proper grade? YES ↓	NO → Fuel incorrect, stale, or contaminated; mixture incorrect.	Refill with fresh, clean unleaded gasoline with a pump octane of 87 or higher mixed with a 2-cycle air cooled mixing oil that meets or exceeds ISO-L-EGD and/or JASO FC classified oils at 50:1 gasoline/oil ratio.
Is fuel visible and moving in the return line when priming? YES ↓	NO → Check for clogged fuel filter and/or vent.	Clean as required; restart.
Is there spark at the spark plug wire terminal? YES ↓	NO → The ignition switch is in "O" (OFF) position. Shorted ignition ground. Faulty ignition unit.	Move switch to "I" (ON) position and re-start. Consult with an authorized servicing dealer.
Check the spark plug.	If the plug is wet, excess fuel may be in the cylinder. The plug is fouled or improperly gapped. The plug is damaged internally or of the wrong size.	Crank the engine with the plug removed, reinstall the plug, and restart. Clean and regap the plug to 0.024" (0.6 mm). Restart. Replace the plug with a Champion CJ8 or equivalent type spark plug of the correct heat range. Restart.

## LOW POWER OUTPUT

What To Check	Possible Cause	Remedy
Is the engine overheating?	Operator is overworking the unit. Carburetor mixture is too lean. Improper fuel ratio. Fan, fan cover, cylinder fins dirty or damaged. Carbon deposits on the piston or in the muffler.	Cut at a slower rate. Consult with an authorized servicing dealer. Refill with fresh, clean unleaded gasoline with a pump octane of 87 or higher mixed with a 2-cycle air cooled mixing oil that meets or exceeds ISO-L-EGD and/or JASO FC classified oils at 50:1 gasoline/oil ratio. Consult with an authorized servicing dealer.
Engine is rough at all speeds. May also have black smoke and/or unburned fuel at the exhaust.	Clogged air cleaner element. Loose or damaged spark plug. Air leakage or clogged fuel line. Water in the fuel. Piston seizure. Faulty carburetor and/or diaphragm.	Service the air cleaner. Tighten or replace. Repair or replace fuel filter and/or fuel line. Refill with fresh fuel/oil mixture. See page 8. Consult with an authorized servicing dealer.
Engine is knocking.	Overheating condition. Improper fuel. Carbon deposits in the combustion chamber.	See above. Check fuel octane rating; check for presence of alcohol in the fuel (page 8). Refuel as necessary. Consult with an authorized servicing dealer.

# Troubleshooting Guide (continued)

## ADDITIONAL PROBLEMS

Symptom	Possible Cause	Remedy
Poor acceleration.	<ul style="list-style-type: none"> <li>Clogged air cleaner element.</li> <li>Clogged fuel filter.</li> <li>Lean fuel/air mixture.</li> <li>Idle speed set too low.</li> </ul>	<ul style="list-style-type: none"> <li>Clean the air cleaner element.</li> <li>Replace the fuel filter.</li> <li>Consult with an authorized servicing dealer.</li> <li>Adjust: 2,750 (<math>\pm</math>250) RPM (<math>\text{min}^{-1}</math>).</li> </ul>
Engine stops abruptly.	<ul style="list-style-type: none"> <li>Switch turned off.</li> <li>Fuel tank empty.</li> <li>Clogged fuel filter.</li> <li>Water in the fuel.</li> <li>Shorted spark plug or loose terminal.</li> <li>Ignition failure.</li> <li>Piston seizure.</li> </ul>	<ul style="list-style-type: none"> <li>Reset the switch and re-start.</li> <li>Refuel. See page 8.</li> <li>Replace fuel filter</li> <li>Drain; replace with clean fuel. See page 8.</li> <li>Clean or replace spark plug with a Champion CJ8 or equivalent type spark plug of the correct heat range. Tighten the terminal.</li> <li>Consult with an authorized servicing dealer.</li> </ul>
Engine difficult to shut off.	<ul style="list-style-type: none"> <li>Ground (stop) wire is disconnected, or switch is defective.</li> <li>Overheating due to incorrect spark plug.</li> <li>Overheated engine.</li> </ul>	<ul style="list-style-type: none"> <li>Test and replace as required.</li> <li>Replace spark plug with a Champion CJ8 or equivalent type spark plug of the correct heat range.</li> <li>Idle engine until cool.</li> </ul>
Cutting attachment rotates at engine idle.	<ul style="list-style-type: none"> <li>Engine idle too high.</li> <li>Broken clutch spring or worn clutch spring boss.</li> <li>Loose attachment holder.</li> </ul>	<ul style="list-style-type: none"> <li>Set idle: 2,750 (<math>\pm</math>250) RPM (<math>\text{min}^{-1}</math>).</li> <li>Replace spring/shoes as required, check idle speed.</li> <li>Inspect and re-tighten holders securely.</li> </ul>
Excessive vibration.	<ul style="list-style-type: none"> <li>Warped or damaged cutting attachment.</li> <li>Loose gearcase.</li> <li>Bent main shaft/worn or damaged bushings.</li> </ul>	<ul style="list-style-type: none"> <li>Inspect and replace attachment as required.</li> <li>Tighten gearcase securely.</li> <li>Inspect and replace as necessary.</li> </ul>
Cutting attachment will not rotate.	<ul style="list-style-type: none"> <li>Shaft not installed in powerhead or gearcase.</li> <li>Broken shaft.</li> <li>Damaged gearcase.</li> </ul>	<ul style="list-style-type: none"> <li>Inspect and reinstall as required.</li> <li>Consult with an authorized servicing dealer.</li> </ul>



# Emission System Warranty Statement

## Your Warranty Rights and Obligations

The California Air Resources Board, the U.S. Environmental Protection Agency and Shindaiwa Corporation are pleased to explain the exhaust and evaporative emission control system warranty on your new small off-road (non-road) engine.

In California, new small off-road engines must be designed, built, and equipped to meet the State's stringent anti-smog standards. In other states, new 1997 and later non-road engines must meet the Federal EPA's stringent anti-smog standards.

Shindaiwa Corporation must warrant the emission control system on your small off-road engine for the periods of time listed below, provided there has been no abuse, neglect, or improper maintenance of your small off-road engine.

Your engine exhaust and evaporative emission control system includes parts such as the carburetor, fuel tank, the ignition system and, if equipped, the catalytic converter. These components are specifically listed below.

Where a warrantable condition exists, Shindaiwa Corporation will repair your small off-road engine at no cost to you including diagnosis, parts, and labor.

## Manufacturer's Warranty Coverage

When sold within the U.S., this engine's emission control system is warranted for a period of two (2) years from the date this product is first delivered to the original retail purchaser.

During the warranty period, Shindaiwa Corporation will, at their option, repair or replace any defective emission-related component on this engine. During the original Warranty Period, these Warranty Rights are automatically transferable to subsequent owners of this product.

## What is Covered by this Warranty

1. Carburetor Internal Components
  - Throttle Valve, Needle, Jet, Metering Diaphragm
2. Fuel Tank
3. Ignition System Components
  - Ignition Coil
  - Flywheel Rotor
4. Catalytic Converter (if originally equipped)

The emission control system for your particular Shindaiwa engine may also include certain related hoses and connectors.

## Owners Warranty Responsibilities

As the small off-road engine owner, you are responsible for the performance of the required maintenance listed in this owners manual. Shindaiwa Corporation recommends that you retain all receipts covering maintenance on your small off-road engine, but Shindaiwa Corporation cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

As the small off-road engine owner, you should be aware, however, that Shindaiwa Corporation may deny you warranty coverage if your small off-road engine or a part has failed due to abuse, neglect, improper maintenance, or unapproved modifications.

You are responsible for presenting your small off-road engine to an authorized Shindaiwa Dealer as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

If you have any questions regarding your warranty rights and responsibilities, you should contact a Shindaiwa customer service representative at (503) 692-3070 or your local Shindaiwa Dealer.

## Consequential Damages

In the event that other component parts of this product are damaged by the failure of a warranted part, Shindaiwa Corporation will repair or replace such component parts at no charge to you.

## What is Not Covered

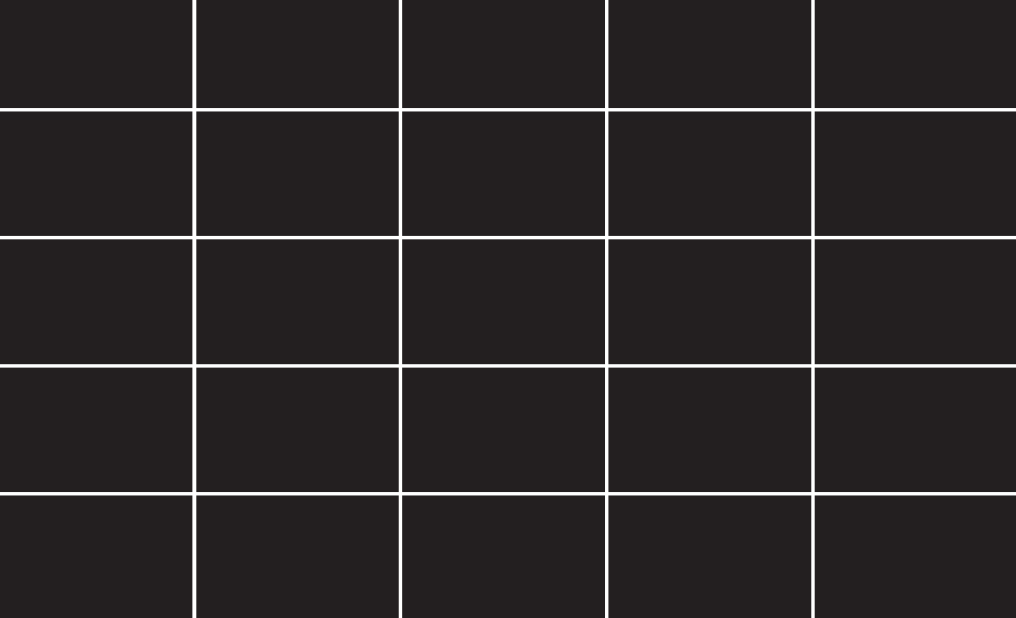
- Failures caused by abuse, neglect, or improper maintenance procedures.
- Failures caused by the use of modified or non-approved parts or attachments.

## This Warranty is Administered by:

Shindaiwa Inc.  
11975 S.W. Herman Rd.  
Tualatin, OR 97062  
(503) 692-3070







# shindaiwa<sup>®</sup>

Shindaiwa Inc.  
11975 S.W. Herman Rd.  
Tualatin, Oregon 97062 USA  
Telephone: 503 692-3070  
Fax: 503 692-6696  
[www.shindaiwa.com](http://www.shindaiwa.com)

Shindaiwa Corporation  
Head Office:  
6-2-11, Ozuka-Nishi  
Asaminami-Ku, Hiroshima  
731-3167, Japan  
Telephone: 81-82-849-2220  
Fax: 81-82-849-2481

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