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SHINDAIWA SERVICE MANUAL

SERVICE MANUAL

T2500/T2510/T3410 Trimmer/Brushcutter with C^{4}™ Technology Four-Stroke Engine

Edition 2 • September 2007

shindaiwa

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Shindaiwa T2500 Trimmer/Brushcutter With C^{4}™ Technology Four-Stroke Engine

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Contents

C4 Engine: Its Intake & Lubrication Systems

Air/fuel charge is pressure charged through the second reed valve, into the boost chamber, en route to the intake valve. Along the way, the fuel mix lubricates all valve train components.

The intake charge is pressurized because during each cycle, the piston makes two down-strokes, but the intake valve only opens once. This constant pressure behind the intake valve improves C4 performance compared to ordinary four-strokes.

2. Two-Stroke Lubrication System: To help reduce weight and complication, and to eliminate the problems that oil reservoirs bring to all-position engines, the C4 engine is lubricated by a gas/oil fuel mixture, just like a two-stroke. Gasoline containing low-smoke oil mixed at a ratio of 50:1 bathes all critical moving parts as it moves from crankcase, past cam assembly to rocker box and valves. The gas/oil mix is not an emissions problem because of the lean ratio (98% gas, 2% oil) and fact that intake and exhaust functions are controlled by valves. The two-stroke's high exhaust emissions occur due to exhaust scavenging (unburned fuel) not the fuel/oil mix.

Unlike conventional four-strokes, the C4 engine can run in any position, all day long. No dipsticks, oil filling, breathers, or spilled oil to worry about.

E. Service Considerations:

Because of its many two-stroke similarities, many of the C4's service functions are the same as Shindaiwa two-strokes. And, wherever possible, Shindaiwa used the same components and/or construction methods found on Shindaiwa two-strokes. Thus, for many service functions, such as carburetor diagnostics and repair, shaft/gearcase maintenance, recoil service, ignition service, flywheel/clutch service, etc., technicians may consult Shindaiwa's master trimmer / brushcutter service manual.

The information in this service update will deal primarily with functions related specifically to the C4 engine.

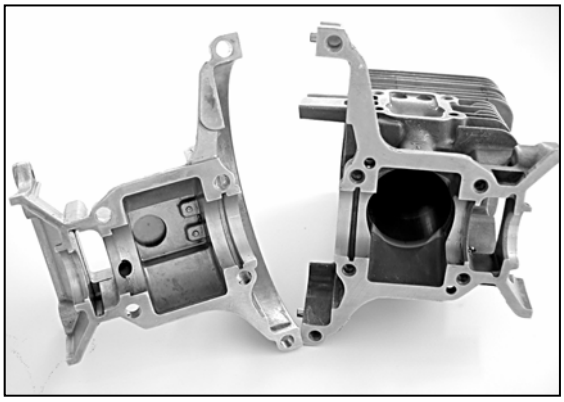
Special C4 logo and color scheme set T2500 apart from other Shindaiwa trimmers.

■ **The T2500 engine requires mixing oil with an ISO FC or JASO EG-D rating. For best possible results, Shindaiwa recommends Shindaiwa *One* oil at 50:1.**

Parts That Distinguish The T2500 Powerhead

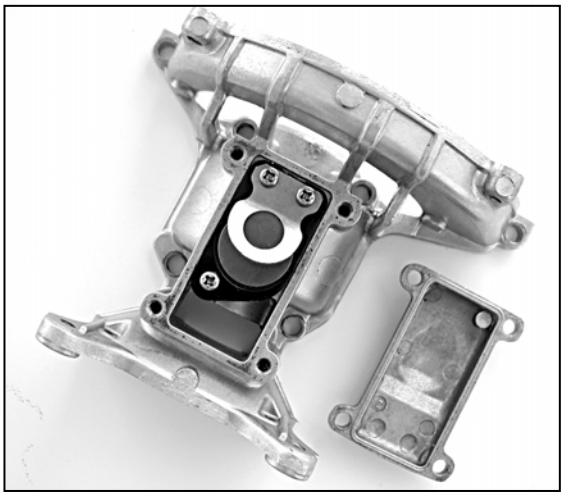
A. Crankcase:

The T2500 has a horizontally-split crankcase with upper half also comprising cylinder. Bottom half contains boost port, reed valve, and boost chamber cover.



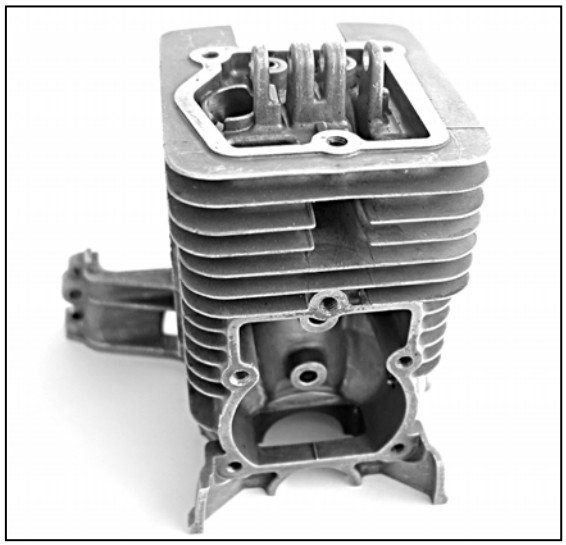
B. Cylinder:

In addition to incorporating the upper crankcase half, the cylinder also has compartments for cam/gear assembly and overhead valve components (rocker arms, valves, and valve springs).



Differences: 2510/3410:

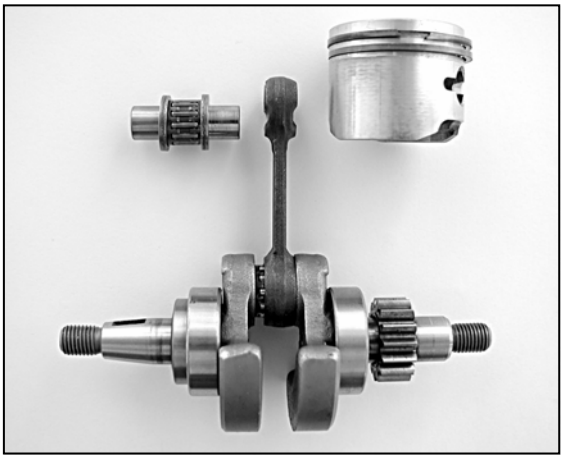
The 3410 engine has a larger bore and stroke. Piston, cylinder, crankshaft and crankcase are unique to that model.



Parts That Distinguish The T2500 Powerhead

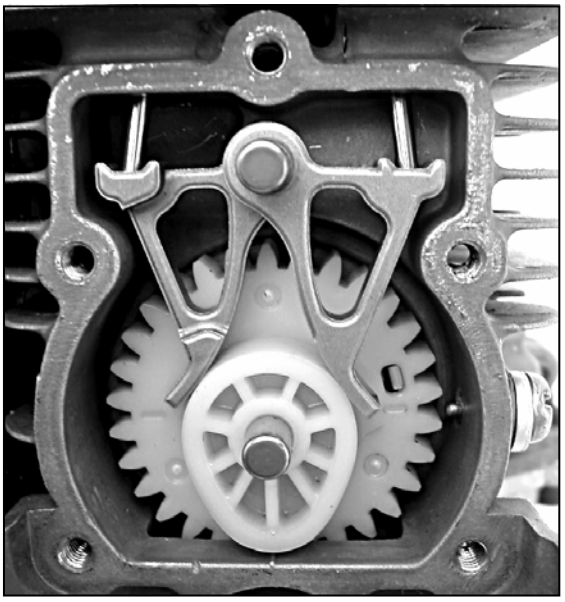
C. Crankshaft/Connecting Rod, Piston:

Forged three-piece crankshaft and connecting rod resemble two-stroke assemblies, but with these key differences: **(1)** A metal timing gear is pressed onto the recoil side, between main bearing and shaft end, and **(2)** the piston rings are not pinned. (Migration of end gap is not a problem because four-stroke cylinder does not have port openings.)



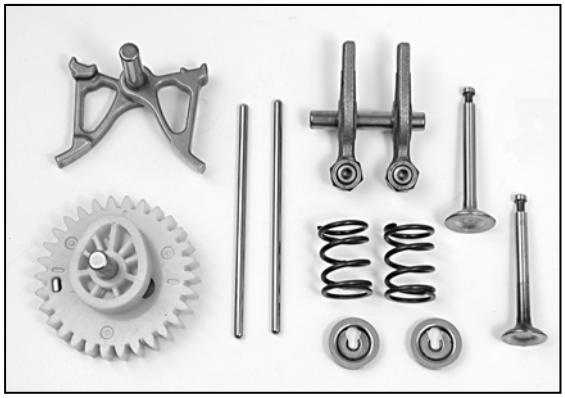
D. Cam/Gear & Valve Train:

Four-stroke intake and exhaust functions are controlled by a single-lobe, nylon, cam/gear. Cam lobe activates followers that raise and lower pushrods. Pushrods tilt rocker arms, which open and close valves.



E. Insulator Block:

As part of the C4 power boost system, the T2500 insulator block is equipped with a reed valve.



Attention Statements; Technical Resources & Issues

A. Attention Statements

Throughout this manual are special "attention" statements surrounded by boxes and preceded by the triangular "Attention" symbol. They indicate situations where your safety or the integrity of your repair may be in jeopardy. Follow the advice in these statements carefully. The purpose of these statements and their formatting are shown in the adjacent column.

B. Advisory Statements

This manual also contains three other types of statements that provide important or noteworthy advice. They are "IMPORTANT!," "NOTE:" and ☞. The purpose of these statements and their formatting are shown in the adjacent column.

C. Additional Resources

The relevant illustrated parts list (IPL) is a helpful companion to this service manual. It shows the installation order of all components and assemblies, and gives part numbers for items that may need replacing. Also, refer to any technical bulletins that may have been issued to update the contents of this manual.

D. Special Tools

Some of the repair procedures described in this manual involve special Shindaiwa tools. These tools are identified by name and part number in the step-by-step explanations. A complete listing of all the special tools required for this product can be found in the "Special Tools" IPL (P/N 80390).

E. Exclusive Use

This service manual has been created for the exclusive use of trained Shindaiwa technicians. It should not be reproduced or shared with others.

F. Original Replacement Parts

Always use original Shindaiwa replacement parts. They have been engineered and manufactured specifically for this product and they guarantee optimum performance, safety and service life.

WARNING!
A statement preceded by 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 avoid damaging the machine or parts that are being repaired.

IMPORTANT!

A message preceded by "IMPORTANT" is one that possesses special significance.

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

☞ *A statement preceded by a pointing finger is a tip, suggestion, or other "trick of the trade" that just might ease your task.*

Tools/Specs

A. When To Adjust

Valve clearance should be checked and adjusted after **135** hours of operation, or as a possible remedy for low compression. Normal compression range for this engine is 90-125 PSI. (See master repair manual for test procedure and other causes of low compression.)

B. Tools Required:

- 8 mm combination or box-end wrench (never use open-end or adjustable end (Crescent-type) wrench.
- .003" and .004" (.08 mm and .11 mm) feeler gauges.
- 2.5 mm Allen driver

C. Cold Specifications:

- Intake clearance: .003" / .08 mm
- Exhaust clearance: .004 / .11 mm

IMPORTANT!

Do not exceed .014" / .35 mm clearance.

Preliminary Measures

D. Before Proceeding

- Make sure engine is cold.
- Reassemble engine (except valve cover) before loosening adjusting hardware.
- Loosen rocker arm adjusting nut just prior to performing adjustment procedure.

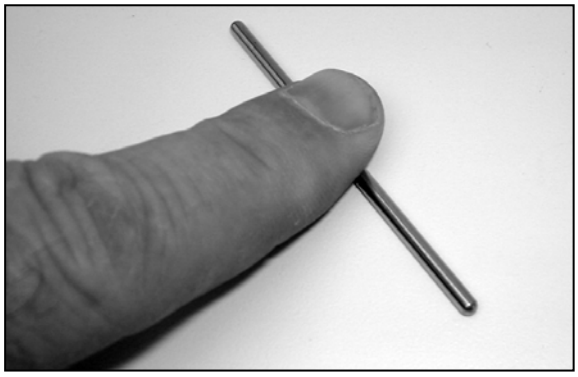
E. Preliminary Inspections

Before making valve clearance adjustments, it is important to first inspect the pushrods and the cam lobe. If these components are defective, it will be impossible to obtain the correct clearance adjustments.

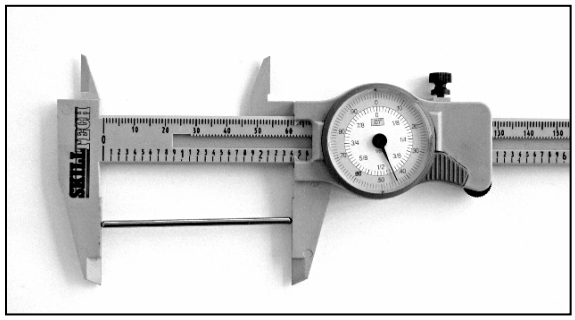
F. Pushrod Inspection

- Check the ends for wear; replace if wear is visible.

Visually Inspect end of pushrod



Roll pushrod over flat, hard surface to assure that it is straight.



Measuring pushrod length.

Inspecting Pushrod & Cam Lobe

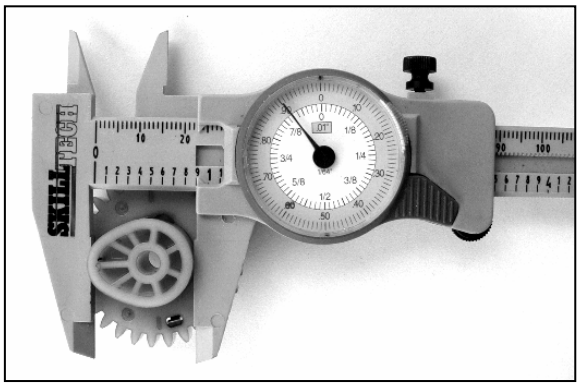
Pushrod Inspection (cont.)

- Check for straightness by rolling pushrods across a flat surface, such as glass plate. If any wobble is detected, replace.

Check overall length with caliper or micrometer. Length should be 2.453" (62.3 mm). If length is less than 2.449 (62.2), pushrod should be replaced.

G. Cam Lobe Inspection

- Inspect cam lobe/gear for signs of wear, roughness, burning, and/or damaged teeth.
- Measure lobe height with a caliper or micrometer. Height should be .898" - .910" (22.85 mm -23.15 mm). If height is less than .887" (22.5 mm) cam lobe/gear should be replaced.



Measuring cam lobe height.

Locating Top-Dead-Center, Compression

H. Locate TDC-Compression Stroke

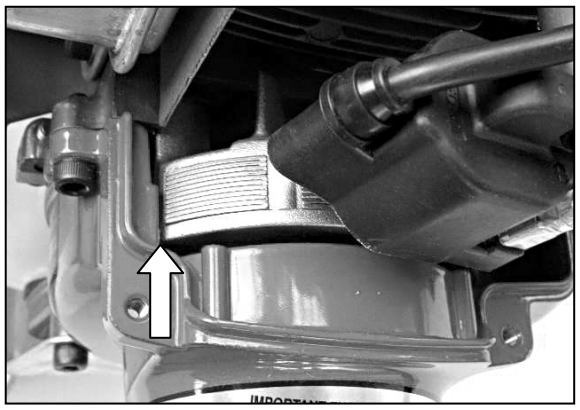
Valve clearance adjustments should be performed with piston at top-dead-center (TDC) of the compression stroke. In this position, the cam lobe faces straight down and both valves are closed. To distinguish this crankshaft position from TDC--exhaust stroke (cam lobe facing up), follow these simple steps:

STEP 1. Prepare engine for valve clearance adjustment by removing cylinder cover and rocker arm cover.

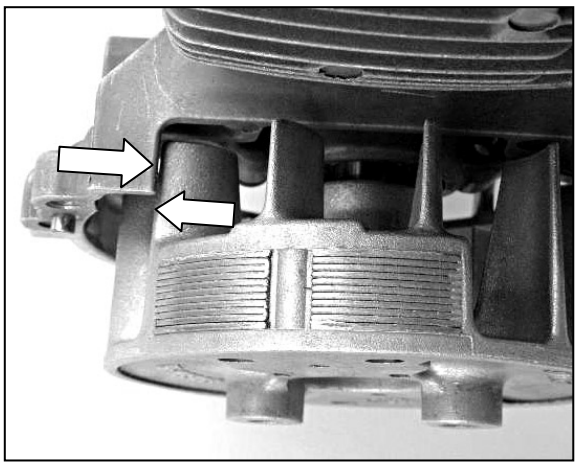
STEP 2. Looking down from front of power-head, rotate crankshaft until left edge of flywheel magnet cluster aligns with left, inside edge of clutch drum housing. (If housing has been removed, align adjacent flywheel fin with edge of cylinder casting.)

STEP 3. Rotate flywheel back and forth while observing rocker arms. If rocker arms move, piston is at TDC-exhaust. Rotate crankshaft one complete revolution, again aligning edge of magnets or flywheel fin as described above. Now piston should be set at TDC-compression stroke.

☞ *TDC -compression can be determined without removing rocker arm cover. At TDC-exhaust (cam lobe up), a noticeable resistance can be felt when rotating crankshaft back and forth. At TDC-compression, lobe is down so there is little or no resistance.*



Turn crankshaft until left edge of flywheel magnet cluster aligns with edge of clutch drum housing (arrow). In this position, piston is at TDC. Rotate crankshaft back and forth to determine whether it is TDC-compression or TDC-exhaust. Adjustments should be made at TDC-compression.



If clutch drum housing has been removed, flywheel fin adjacent to left edge of magnet cluster can be used to locate TDC. When edge of fin aligns with parallel edge of cylinder casting (arrows), piston is at TDC.

Adjustment Procedure

I. Adjustment Procedure

STEP 1. Remove cylinder cover, rocker arm cover, and set piston at TDC-compression (see point "H" above).

STEP 2. (Optional.) To lock crankshaft/cam position at TDC-compression stroke, activate timing screw (see pg. 12).

STEP 3. Loosen adjuster locknut so that 2.5 mm Allen socket head adjustment screw can turn freely.

STEP 4. Insert feeler gauge (.003 for intake; .004 for exhaust) between valve stem tip and rocker arm.

STEP 5. Turn adjustment screw (clockwise = tighter, counter-clockwise = looser) until feeler gauge is almost snug. Back off just enough to allow gauge to slip out with limited resistance.

STEP 6. While holding adjustment screw in place with Allen driver, tighten locknut with wrench.

STEP 7. Deactivate timing screw if used.

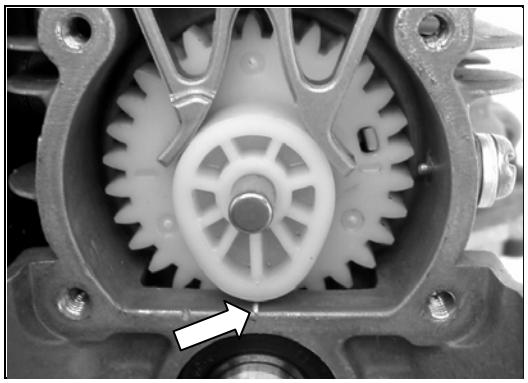
STEP 8. Turn engine over several times, and return to TDC-compression. Recheck with proper feeler gauge to make sure clearance adjustment did not change as a result of tightening locknut. Readjust as necessary.

STEP 9. Replace rocker arm cover gasket to assure proper sealing and install cover.

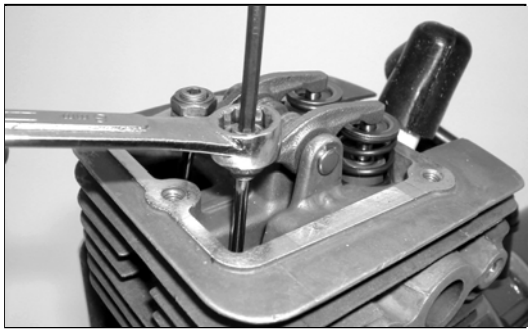
☞ *If new gasket is not available and old gasket is not damaged, old gasket may be reused if coated with threeBond #1207-C sealant upon reassembly.*

IMPORTANT!

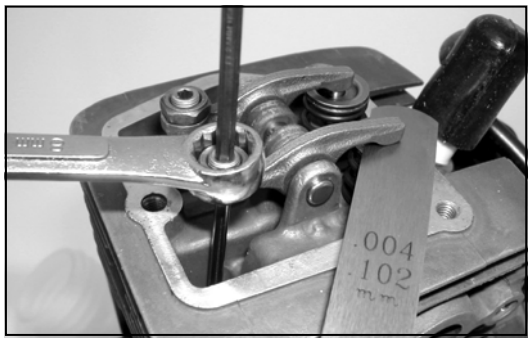
Never use cracked or damaged gaskets!



At TDC-compression, cam lobe is straight down. Rib aligns with mark on casting.



Loosen adjuster locknut with 8 mm box-end wrench.



Insert appropriate feeler gauge between rocker arm and valve stem tip. Turn adjustment screw with 2.5 mm Allen driver until gauge is held snugly between rocker arm and valve stem. Tighten locknut.

To ensure proper sealing, always use a new gasket when replacing covers.

Removing & Installing Pushrods, Rocker Arms & Followers

A. Remove Pushrods

STEP 1. Remove rocker arm cover.

STEP 2. Rotate crankshaft so that piston is at top-dead-center (TDC) of compression stroke (cam lobe facing down).

NOTE:
To identify TDC-compression vs. TDC-exhaust without opening cam cover, turn crankshaft until piston reaches top of stroke. Now rotate crankshaft back and forth. If pushrods and rocker arms move, piston is at top of exhaust stroke and lobe is facing up. Make full rotation of crankshaft, again locating piston at top of stroke. Now cam lobe should be in correct position for valve train assembly and adjustments.

STEP 3. Push valve-contact side of rocker arm against valve spring to lift opposite end off pushrod. Pop pushrod out of cupped adjustment screw retainer and lift out. Repeat process for other pushrod.

B. Install Pushrods

Reverse steps above to install pushrods.

☞ *Use needle nose pliers or hemostat to move upper end of pushrod into position.*

IMPORTANT!

When installing pushrods, verify that they are properly seated in cupped receivers in follower and rocker arm adjustment screw.

C. Remove Rocker Arms

STEP 1. Remove pushrods.

STEP 2. Slide rocker arm pivot pin out of journals in casting.

STEP 3. Remove rocker arms.

D. Install Rocker Arms

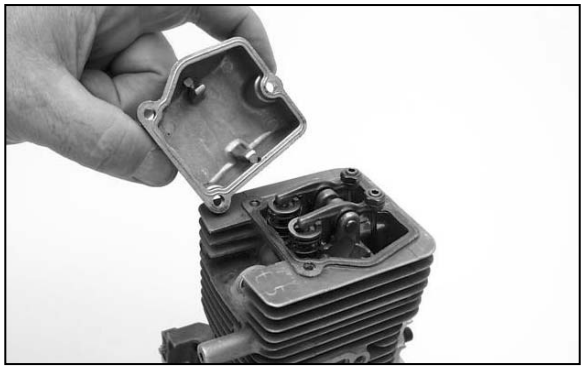
Reverse steps above to install rocker arms.

E. Remove Cam Followers

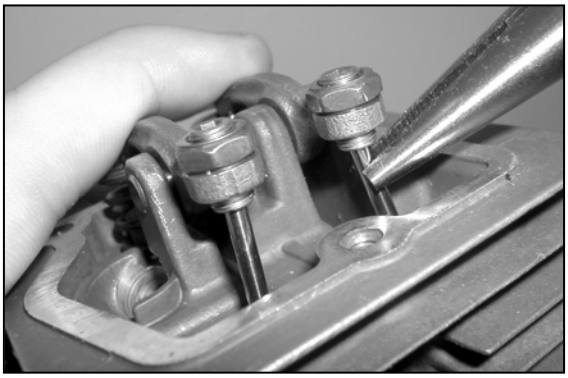
STEP 1. Remove pushrods.

STEP 2. Remove recoil housing, starter pulley, and cam cover

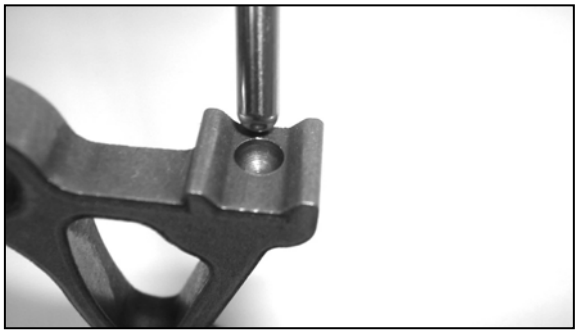
STEP 3. Remove follower axle pin and followers.



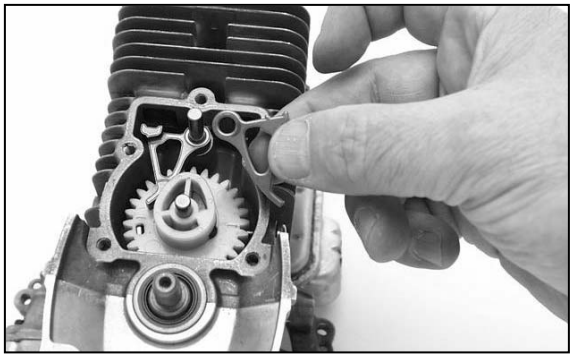
Remove rocker arm cover to expose rocker arms and upper ends of pushrods.



Push rocker arm against valve spring to release tension on pushrod. Use needle nose pliers or hemostat to position end of pushrod in cupped receiver in valve clearance adjustment screw.



Make sure pushrods are seated in retainer cups in followers and rocker arms upon reassembly.



Left (intake) follower should be installed first.

Removing & Installing Cam Gear

F. Install Cam Followers

Reverse steps above to in stall followers.

IMPORTANT!

Install left-hand (intake valve) follower first.

G. Remove Cam Gear

STEP 1. Remove pushrods and followers.

STEP 2. Remove cam axle pin.

STEP 3. Lift cam gear out of cam compartment.

H. Install Cam Gear

STEP 1. Rotate crankshaft so that piston is situated at top-dead-center (TDC).

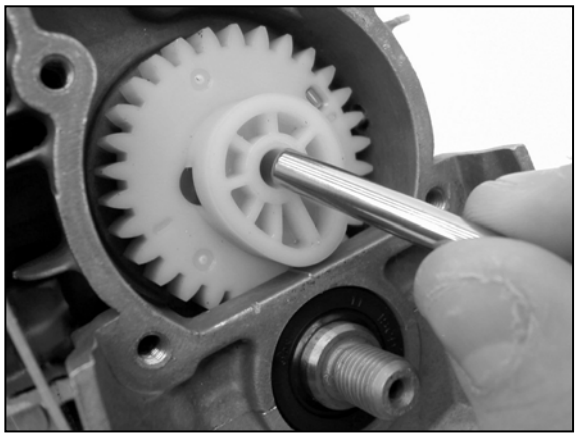
STEP 2. Place cam gear in cam compartment, with narrow, lobe-end pointing down. Make sure that lobe's center rib aligns with ridge on cylinder casting and that horizontal marks on face of cam align with tip of timing screw on right side of cam compartment.

STEP 3. Align cam center hole with journal in cylinder casting and insert axle pin.

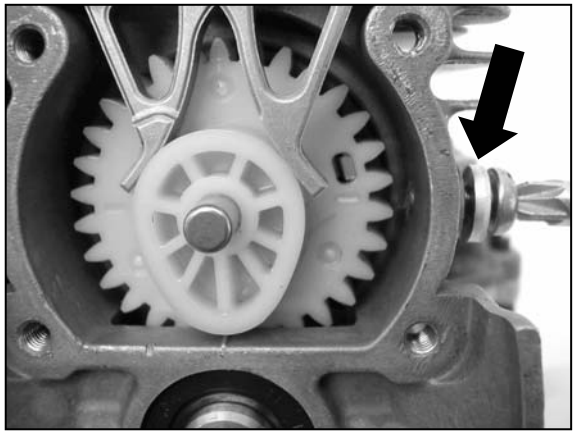
> **CAUTION!**
> Be certain that the cam gear is installed correctly, with piston at TDC and cam timing marks aligned exactly. Failure to do so will result in incorrect valve timing and an engine that either will not run or that runs erratically.

STEP 4. Replace cam followers and pushrods.

STEP 5. Replace cam cover and rocker arm cover. Be sure to use new gaskets.



When installing cam gear, place piston at TDC, and insert cam with lobe down using timing marks to assure proper alignment. Insert pin.



Timing screw can be used to preserve cam position during reassembly. To use, remove screw and reinstall without spacer washer (arrow). Screw tip should mesh with marked notch on cam gear.

Locking Cam Position With Timing Screw

NOTE:

Timing screw on right side of cam compartment can be used to maintain proper cam alignment during reassembly. To use, (1) remove muffler to gain access. (2) Back out timing screw and remove spacer washer. (3) Set cam in proper alignment and reinstall screw. Tip of screw should mesh with marked notch on cam gear. (4) Complete engine assembly. (5) Remove timing screw, install original washer and reinstall with thread-locking compound. *Always use the correct washer (P/N 15401-10028) or damage to cam gear may result!*

Tip of timing screw should engage cam gear at marked notch. It prevents changes in cam position during reassembly. DON'T FORGET TO REMOVE SCREW, REPLACE SPACER WASHER AND ADD SEALANT AFTER REASSEMBLY!

Inspecting & Replacing Reed Valves

A. Reed Valve Locations

The T2500 engine relies on two steel reed valves as a key element of its C4 technology. The intake reed valve is mounted on the back (engine) side of the insulator block. The crankcase/boost chamber reed valve is mounted beneath the crankcase in the boost chamber.

B. Accessing Reed Valves

To inspect intake reed valve, air filter cover, filter element, filter base and carburetor must first be removed. Detach insulator block. Reed valve is mounted on inside surface.

To inspect crankcase/boost chamber reed valve, fuel tank and tank guard must first be removed. Detach boost chamber cover on bottom of crankcase. Reed valve is mounted to base of boost chamber.

C. Reed Valve Inspection

Trapped debris, or damage that prevents proper reed valve operation, can affect engine performance. For example, a faulty intake reed can cause excessive spit-back and poor performance. Inspect reed valves for:

- Flatness (maximum gap = .004" - .012" (0.1 mm - 0.3 mm)
- Cracking or warping
- Discoloration or corrosion
- Debris accumulation

Replace reed valves that exceed gap specification or those with indications of warping, discoloration, corrosion or debris build-up.

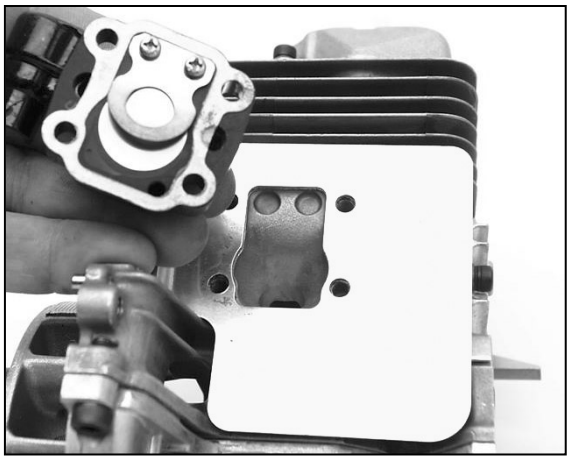
D. Replacing Reed Valves

- Intake reed valve/insulator block is a complete assembly. Parts cannot be replaced individually.

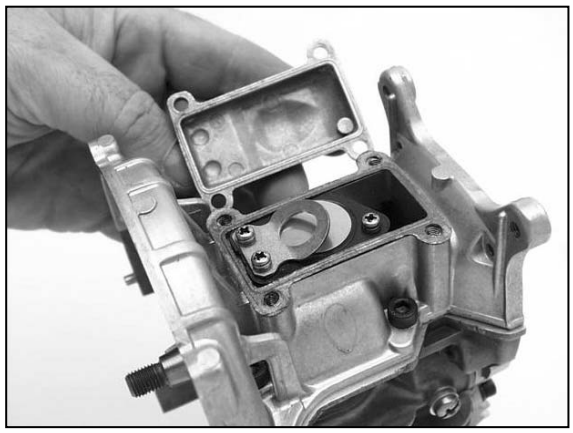
- Crankcase/boost chamber reed valve components (block, reed, stop) may be replaced individually.

E. Reed Valve Replacement Interval

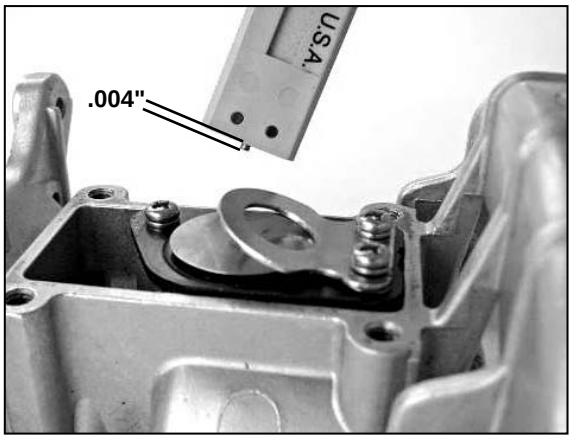
- Both intake and crankcase/boost chamber reed valves should be replaced after **400** hours of operation.



Intake reed valve is mounted on back (engine) side of carburetor insulator block. Reed valve/ insulator block must be replaced as a complete assembly.



Crankcase/boost chamber reed valve is mounted beneath crankcase. To access, remove boost chamber cover. Valve, block and stop may be replaced separately.



Small gap, .004" - .012", between reed block and petal, is permissible. Boost chamber reed petal (above) is replaceable as a separate part. When installing, make sure it aligns with recessed seat in reed block.

Crankcase Sealing Principles

A. C4 Crankcase Principles

Shindaiwa C4 engine technology relies on a sealed crankcase, just like a two-stroke. That means air leaks can lead to serious operational problems, just like they do in two-strokes.

In addition to the usual two-stroke sealing sites (crankcase, spark plug and external bearing seals), the four-stroke T2500 engine has these additional sealing points:

- Cam gear cover
- Rocker arm cover
- Sealed bearings

For proper engine operation, all these points must be properly sealed.

IMPORTANT!

Always install new cam gear and rocker arm cover gaskets whenever covers are removed. Never use cracked or damaged gaskets!

☞ *If new gaskets are not available, old undamaged gaskets can be used if coated with threeBond #1207-C sealant upon reassembly.*

Pressure Testing Crankcase

B. Pressure Testing Crankcase

Test sequence is similar to two-stroke pressure test. Requires crankcase pressure testing kit: P/N 72174-99200.

STEP 1. Remove carburetor, but leave insulator block/reed valve in position.

STEP 2. Remove muffler.

STEP 3. Install intake reed test plate.

STEP 4. Install exhaust test plate.

STEP 5. Check spark plug for proper torque.

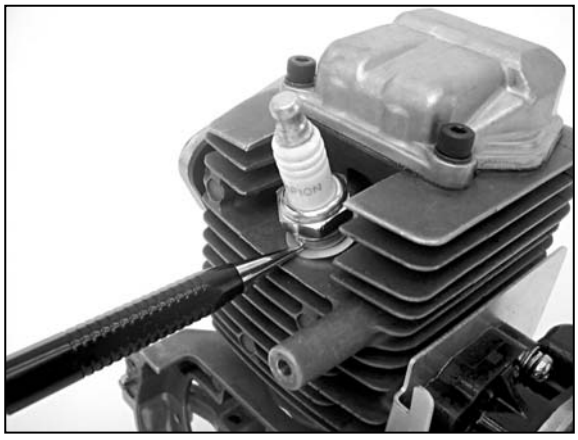
STEP 6. Install pressure gauge.

STEP 7. Pressurize to 4-6 PSI. Pressure loss should not exceed 1 PSI in 60 seconds. If loss exceeds this figure, proceed to Step 8.

STEP 8. Check common pressure-leak areas first. They are:

- Spark plug and plug sealing washer
- Crankcase seals
- Gasket areas

To pressure-test, mount block-off plates to intake and exhaust ports and apply 6-8 PSI to crankcase. Pressure loss should not exceed 1 PSI per 60 seconds.



The spark plug is a common area for leakage during a pressure test. Always test with a new plug installed.

Testing For Air Leaks

☞ *When pressure testing, always use a new plug, properly torqued*.

STEP 9. To check crankcase seals and gasket areas for leakage, maintain pressure in crankcase and spray soapy water on suspect surfaces. Observe. Formation of bubbles indicates leakage.

STEP 10. If soapy water test does not reveal leaking component, submerge pressurized crankcase in water and observe. Air bubbles will identify leaking seals or gaskets.

Inspecting Intake Sealing Points

C. Confirm Intake Sealing

Air-tight Integrity of intake components is critical for all aspects of engine performance. Inspection points include:

- Insulator block/reed valve
- Carburetor casting (throttle side)
- Cylinder casting at intake port

Mating surfaces should be smooth, perfectly flat and free of cracks.

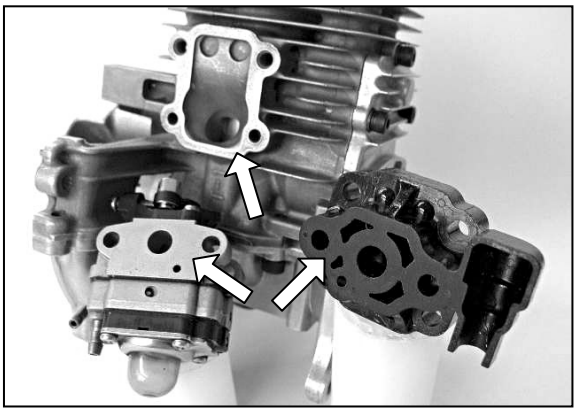
Check insulator block/reed valve to make sure there is:

- no warping or distortion
- no cracking
- no rough sealing surfaces
- no pulled inserts/cast-in nuts

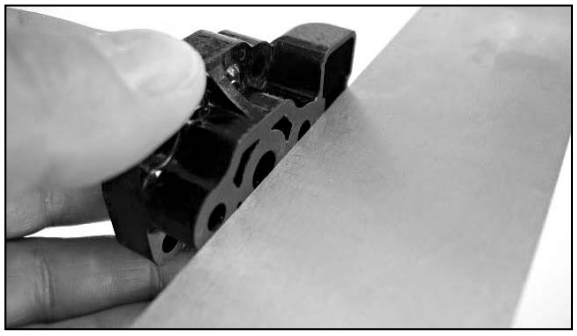
☞ *Always remove insulator block/reed valve and inspect venturi/impulse side for cracking. Cracks in this area are rare, but do occur!*

- Check venturi/impulse surface with a straight-edge to assure that it is not warped.

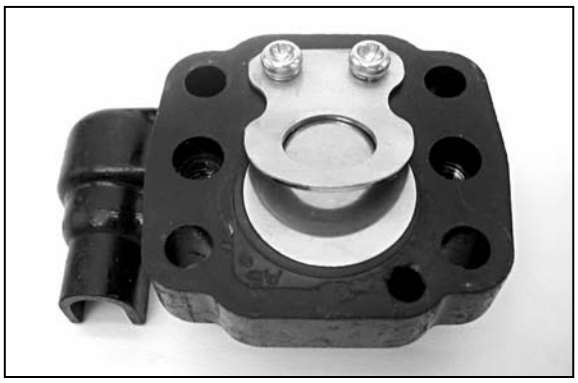
☞ *Insulator blocks that are warped, but not cracked, can often be salvaged by resurfacing. Use emery cloth held to a flat surface, or a wide, smooth, flat file. Clean mounting surface carefully after resurfacing. Recheck with straight-edge to make sure surface is true.*



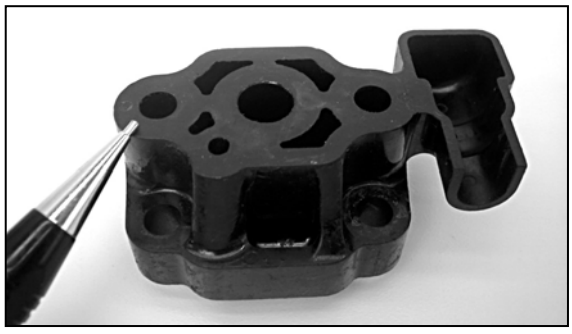
Intake sealing surfaces must be clean, smooth, and perfectly flat to prevent air leaks.



Use a straight edge to assure that insulator block mounting surfaces are true.



Reed valve assembly is permanently installed on insulator reed block; must be replaced as an assembly.



Integrity of carburetor mounting surface is critical to engine performance.

Checking Impulse Passage

A. Impulse Function Critical

Like a two-stroke, the T2500 C4 engine relies on crankcase impulses (positive/negative pressure) to operate the carburetor's fuel pump diaphragm. Impulses are delivered to the carburetor through a passage in the insulator block/reed valve component.

NOTE:
An engine **can run** with a plugged impulse passage!

Impulse blockages are often overlooked because the engine will start and run. However, poor high-RPM performance can result from a blocked impulse passage.

B. Impulse Blockage Test

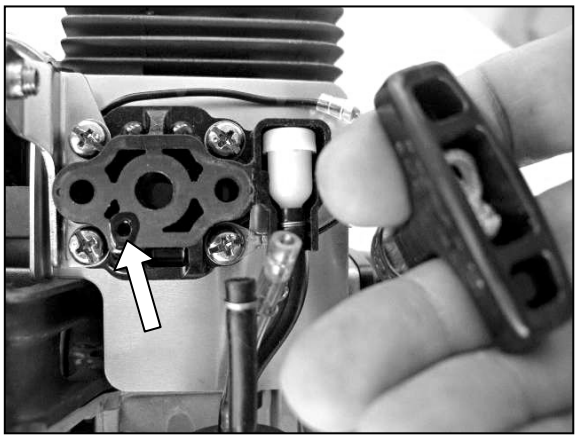
STEP 1. Remove carburetor.

STEP 2. Add a drop of oil to the impulse opening on the insulator block.

STEP 3. Crank the engine over slowly and watch impulse passage. (Remove spark plug if easier cranking desired.) If impulse passage is working properly, the drop of oil should suck in and blow out as the engine revolves.

STEP 4. If test shows no, or low impulse, inspect the following:

- Cracked insulator block (venturi/impulse).
- Mismatched or homemade gaskets. Always check gasket for telltale impressions made by mismatched alignment with port. Enlarge as necessary.
- Carburetor diaphragm. Dry-side build-up of soot/carbon deposits can affect pump performance. These deposits from crankcase gasses are more likely in well-used engines (worn rings).



To test impulse passage, place drop of oil in opening (arrow) and crank engine. Oil will suck in and blow out if passage is clear.

COMPONENT:	*SPECIFICATION:*
ENGINE	**T2500/T2510**
Displacement	24.5 cc / 1.48 cu. in.
Bore/stroke	34 mm X 27 mm
Horsepower	1.1 HP
RPM @ maximum HP	8000 HP
Maximum no-load RPM	10,500 RPM
Weight (less accessories)	11.3 lb. / 5.1kg
Specific output (cc per hp)	22.3 cc per HP
Idle RPM	3,200 RPM (+300)
Clutch engagement RPM	4,100 RPM (+250)
Valve actuation	Cam gear/follower/pushrod/rocker arm
Cam gear material	HLP nylon
Rocker arm	Forged, adjustable
Rocker adjustment	Intake: .003"/.08 mm • Exhaust: .004"/ .11 mm
Crankshaft	3-piece
Crankshaft bearings	Ball bearings
Conrod	Forged, 1-piece
Conrod bearings: large & small	Caged needle bearing
Conrod thrust control	Small end of conrod
Piston	Aluminum/silicon alloy
Rings	2
Cylinder	Chrome plated, etched
FUEL SYSTEM	
Carburetor	Walbro
Model	**WYL 162**
Jet size	**#36**
Primer/air purge	Yes
Adjustment: H	n/a
Adjustment: L	n/a
Mounting method	Captive-nut insulator block
Filtration	Felt
Fuel tank location	Under engine
Tank mounting system	Cushion
Number of elements	4
Tank capacity	20.3 fl. oz. / 600 cc
Fuel Vent	Duckbill
Vent location	Remote
Recommended fuel	Unleaded regular
Fuel/oil ratio	50 to 1
CLUTCH	
Material	Bonded
Number of shoes	2
Number of springs	1

RECOIL	
Housing material	Nylon
Attachment points	4
Cord diameter	3 mm
Cord length	700 mm / 27.5 in.
IGNITION	
Ignition t ype	STCI (2510: PCI with rev limiter)
Components	1
Minimum output voltage	18 kV
Coil wire	Replaceable: 6 mm x 75 mm
Coil/flywheel air gap	0.012"-0.014"
Ignition timing	Transistorized advance
Spark plug, recommended	NGK CMR5H
Spark plug, alternative	Champion RZ7C
Spark plug gap	0.025
MUFFLER	
Muffler type	Sealed, 1-piece
Attachment points	3
Spark arrester	Replaceable stainless steel screen
ANTI-VIBRATION	Full A-V system
Engine/lower unit	Rubber cushion
Front handle	Soft-grip
Rear handgrip	Soft-grip
Spring/rubber on harness	n/a
LOWER UNIT	
Drive type	Gearcase with 4 bearings; spiral bevel gears
Gearcase ratio	1.286:1
Gearcase paint	None
Outer tube material	6061 T-6 Aircraft alloy aluminum; extruded and drawn
Diameter	24 mm
Wall thickness	1.5 mm
Overall length	1450 mm
Mainshaft type	1-piece;splined
Shaft/cable diameter	6 mm
Shaft/cable length	1495 mm
Number of bushings	5
CONFIGURATION	
Loop front handle	Yes
Handlebars	No
Grip-mounted throttle	Yes
Handlebar throttle	No
Grip stop switch	Yes
Engine-mounted stop switch	No

COMPONENT:	*SPECIFICATION:*
ENGINE	**T3410**
Displacement	34cc/ 2.1 cu. in.
Bore/stroke	38 mm X 30 mm
Horsepower	1.4 HP
RPM @ maximum HP	8000 HP
Maximum no-load RPM	10,500 RPM
Weight (less accessories)	12.9 lb. / 5.8 kg
Specific output (cc per hp)	24.3 cc per HP
Idle RPM	3,000 RPM (+300)
Clutch engagement RPM	4,500 RPM (+250)
Valve actuation	Cam gear/follower/pushrod/rocker arm
Cam gear material	HLP nylon
Rocker arm	Forged, adjustable
Rocker adjustment	Intake: **.003"/.08 mm • Exhaust: .004"/ .11 mm**
Crankshaft	3-piece
Crankshaft bearings	Ball bearings
Conrod	Forged, 1-piece
Conrod bearings: large & small	Caged needle bearing
Conrod thrust control	Small end of conrod
Piston	Aluminum/silicon alloy
Rings	2
Cylinder	Chrome plated, etched
FUEL SYSTEM	
Carburetor	Walbro
Model	WYL 208B
Jet size	#41
Primer/air purge	Yes
Adjustment: H	n/a
Adjustment: L	n/a
Mounting method	Captive-nut insulator block
Filtration	Felt
Fuel tank location	Under engine
Tank mounting system	Cushion
Number of elements	4
Tank capacity	20.3 fl. oz. / 600 cc
Fuel Vent	Duckbill
Vent location	Remote
Recommended fuel	Unleaded regular
Fuel/oil ratio	50 to 1
CLUTCH	
Material	Bonded
Number of shoes	2
Number of springs	1

RECOIL	
Housing material	Nylon
Attachment points	4
Cord diameter	3 mm
Cord length	700 mm / 27.5 in.
IGNITION	
Ignition t ype	STCI (2510: PCI with rev limiter)
Components	1
Minimum output voltage	18 kV
Coil wire	Replaceable: 6 mm x 75 mm
Coil/flywheel air gap	0.012"-0.014"
Ignition timing	Transistorized advance
Spark plug, recommended	NGK CMR5H
Spark plug, alternative	Champion RZ7C
Spark plug gap	0.025
MUFFLER	
Muffler type	Sealed, 1-piece
Attachment points	3
Spark arrester	Replaceable stainless steel screen
ANTI-VIBRATION	Full A-V system
Engine/lower unit	Rubber cushion
Front handle	Soft-grip
Rear handgrip	Soft-grip
Spring/rubber on harness	n/a
LOWER UNIT	
Drive type	Gearcase with 4 bearings; spiral bevel gears
Gearcase ratio	1.286:1
Gearcase paint	None
Outer tube material	6061 T-6 Aircraft alloy aluminum; extruded and drawn
Diameter	26 mm
Wall thickness	1.5 mm
Overall length	1500 mm
Mainshaft type	1-piece;splined
Shaft/cable diameter	7 mm
Shaft/cable length	1550 mm
Number of bushings	5
CONFIGURATION	
Loop front handle	Yes
Handlebars	No
Grip-mounted throttle	Yes
Handlebar throttle	No
Grip stop switch	Yes
Engine-mounted stop switch	No

SPECIFICATION:	***STANDARD DIMENSION:***		***LIMIT:***	
UNIT OF MEASUREMENT:	**inches**	**mm**	**inches**	**mm**
Spark plug gap;	.026"	.65	.023~.028”	0.6~0.7
Coil/flywheel gap:	.014"	.35	.012~.016”	0.3~0.4
Valve adjustment (cold):				
Intake:	.003"	0.08	0.002"	0.008
Exhaust:	.004"	0.10	0.002"	0.008
Piston diameter:	1.334"	33.9	1.332"	33.85
Piston pin bore diameter:	.354"	9	0.354"	9.01
Ring groove width:	.559"	1.5	.061”	1.56
Piston/cylinder clearance:	.0039"	.10	---	---
Ring/groove clearance:	.00276~.00511"	.07~.13	0.008"	0.2
Cylinder inside (bore) diameter:	1.338"	34.0	1.339"	34.02
Cylinder out-of-round:	.00039"	.010	0.0012"	.03
Cylinder taper:	.00059"	.015	0.002"	0.05
Piston ring width:	.059"	1.5	.057"	1.45
Piston ring thickness:	.059"	1.5	0.055"	1.4
Piston ring end gap:	.0039~.0118"	0.1~0.3	0.024"	0.6
Piston pin diameter	.354"	9.0	0.354"	8.994
Connecting rod small end diameter:	.472"	12.0	.471"	11.98
Cam lobe height:	.898~.910"	22.85~23.15	0.887"	22.5
Pushrod length:	2.453"	62.3	2.449"	62.2 (-.1)
Cam gear/rocker/follower shaft dia.	.1965~.1967"	4.997~5.00	0.195	4.957
Cam gear inside diameter:	.197~.199"	5.03~5.06	0.2"	5.10 (+- .040)

SPECIFICATION:	***STANDARD DIMENSION:***		***LIMIT:***	
	inches	**mm**	**inches**	**mm**
Follower bore diameter:	.196~.197"	5.005~5.025	0.198"	5.05 (+.025)
Cam cover shaft bore diameter	.196~.197"	5.005~5.025	0.199"	5.057 (+.032)
Cylinder Block:				
Cam gear shaft bore diameter:	.1971~.1976"	5.000~5.012	0.199"	5.05 (+.038
Follower shaft bore diameter:	.1966~.1971"	5.000~5.012	0.199"	5.05 (+.038
Rocker shaft bore diameter:	.1966~.1971"	5.000~5.012	0.199"	5.05 (+.038
Rocker arm inside diameter:	.1968~1980"	5.005~5.035	0.199"	5.06 (+.025)
Valve spring free length:	.692"	17.6	0.685"	17.0 (-.6)
Valve stem OD:				
Intake:	.1365~.1370"	3.470~3.485	0.135"	3.435 (-.035)
Exhaust:	.1353~.1359"	3.440~3.455	0.134"	3.405 (-.035)
Valve guide ID:	.137~.138"	3.5~3.514	0.139"	3.544 (+.03)
Valve stem to guide clearance:				
Intake:	.0059~.0173"	.015~.044	0.0291"	.074 (+.03)
Exhaust:	.0177~.0291"	.045~.074	0.049"	.104 (+.03)
Maintenance/Inspection Intervals:				
Valve clearance:	135 hours			
Piston/ring:	Annual			
Reed valve:	Annual; replace: 400 hours			
Spark plug:	100 hours			
Crankcase pressure test:	4 - 6 PSI, maximum			
Crankcase sealant type:	1207-C			

SPECIFICATION:	***STANDARD DIMENSION:***		***LIMIT:***	
UNIT OF MEASUREMENT:	**inches**	**mm**	**inches**	**mm**
Spark plug gap;	.026"	.65	.023~.028”	.06~.07
Coil/flywheel gap:	.014"	.35	.012~016”	.3~.4
Valve adjustment (cold):				
Intake:	.003"	0.08	0.002"	0.008
Exhaust:	.004"	0.10	0.002"	0.008
Piston diameter:	1.492"	37.9	1.490"	37.85
Piston pin bore diameter:	.394"	10	0.3941"	10.01
Ring groove width:	.056"	1.5	.065”	1.56
Piston/cylinder clearance:	.0039"	.10	---	---
Ring/groove clearance:	.001~.0026”	.025~.065	0.006"	0.15
Cylinder inside (bore) diameter:	1.496"	38.0	1.497"	38.02
Cylinder out-of-round:	.00039"	.010	0.0012"	.03
Cylinder taper:	.00059"	.015	0.002"	0.05
Piston ring width:	.059"	1.5	.057"	1.45
Piston ring thickness:	.059"	1.5	0.055"	1.4
Piston ring end gap:	.0039~.0118"	0.1~0.3	0.024"	0.6
Piston pin diameter	.394"	10.0	0.3935"	9.994
Connecting rod small end diameter:	.551"	14.0	.552"	14.02
Cam lobe height:	.898~.910"	22.85~23.15	0.887"	22.5
Pushrod length:	2.559"	65	2.551"	64.9
Cam gear/rocker/follower shaft dia.	.1965~.1967"	4.997~5.00	0.195	4.957
Cam gear inside diameter:	.197~.199"	5.03~5.06	0.2"	5.10 (+- .040)

SPECIFICATION:	***STANDARD DIMENSION:***		***LIMIT:***	
	inches	**mm**	**inches**	**mm**
Follower bore diameter:	.196~.197"	5.005~5.025	0.198"	5.05 (+.025)
Cam cover shaft bore diameter	.196~.197"	5.005~5.025	0.199"	5.057 (+.032)
Cylinder Block:				
Cam gear shaft bore diameter:	.1971~.1976"	5.000~5.012	0.199"	5.05 (+.038
Follower shaft bore diameter:	.1966~.1971"	5.000~5.012	0.199"	5.05 (+.038
Rocker shaft bore diameter:	.1966~.1971"	5.000~5.012	0.199"	5.05 (+.038
Rocker arm inside diameter:	.1968~1980"	5.005~5.035	0.199"	5.06 (+.025)
Valve spring free length:	.692"	17.6	0.685"	17.0 (-.6)
Valve stem OD:				
Intake:	.1365~.1370"	3.470~3.485	0.135"	3.435 (-.035)
Exhaust:	.1353~.1359"	3.440~3.455	0.134"	3.405 (-.035)
Valve guide ID:	.137~.138"	3.5~3.514	0.139"	3.544 (+.03)
Valve stem to guide clearance:				
Intake:	.0059~.0173"	.015~.044	0.0291"	.074 (+.03)
Exhaust:	.0177~.0291"	.045~.074	0.049"	.104 (+.03)
Maintenance/Inspection Intervals:				
Valve clearance:	135 hours			
Piston/ring:	Annual			
Reed valve:	Annual; replace: 400 hours			
Spark plug:	100 hours			
Crankcase pressure test:	4 - 6 PSI, maximum			
Crankcase sealant type:	1207-C			

Section 11 T2500/2510/3410 Torque Values

PART (THREADS INTO)	*PART NO.*	*DESCRIPTION*	*DIMENSION*	*QTY.*	*IN/LB*	*(KGF.CM)*
Crankcase (cylinder)	01020-05160	Allen screw	M5X16	6	50~70	60-80
Intake reed valve (cylinder)	11206-05220	Phillips screw	M5X22	4	25-35	30-40
Muffler (cylinder)	62901-15310	Allen screw	M5X25	2	60~80	70-90
Muffler (crankcase)	01020-05160	Allen screw	M5X16	1	60~80	70~90
Tail plate (muffler)	11204-04060	Phillips screw	M4X6	2	25-35	30-40
Reed valve-S (crankcase)	01211-03100	Phillips screw	M3X10	3	7-10	8-12
Boost cover (crankcase)	11022-04120	Allen screw	M4X12	4	13-20	15-25
Fan cover (cylinder)	01020-05160	Allen screw	M5X16	2	45~60	50-70
Fan cover (crankcase)	01020-05350	Allen screw	M5X35	2	45~60	50-70
Cylinder cover (fan cover)	11022-04140	Allen screw	M4X14	2	13-20	15-25
Cylinder cover (cylinder)	11024-04160	Allen screw	M4X16	2	13-20	15-25
Joint (shaft clamp)	11020-05220	Allen screw	M5X22	1	45~60	50~70
Plate (cam gear)	01280-04062	Tapping screw	M4X6	1	7-10	8-12
Cam gear cover (cylinder)	11022-04140	Allen screw	M4X14	5	20~40	25-45
Timing screw (cylinder)	62901-43310	Phillips screw	M5X7	1	35-45	40-50
Adjust screw (rocker arm)	62901-44230	Nut	M5XPO.5	2	25-45	30-50
Rocker arm cover (cylinder)	11022-04140	Allen screw	M4X14	3	13-20	15-25
Clutch Shoe A (rotor)	20087-51210	Allen screw	M6XP1.0	2	60~85	70-100
Rotor (crankshaft)	20035-71220	Nut	M8XP1.0	1	120~150	140-170
Coil (cylinder)	11024-04261	Allen screw	M4X26	2	35-45	40-50
Spark plug (cylinder)	13001-00007	Spark Plug	M10XP1.0	1	90-130	100-150
Recoil Starter (crankcase)	11022-04140	Allen screw	M4X14	2	13-20	15-25
Starter pulley (crankshaft)	70064-75310	Starter Pulley	M8XP1.0	1	25-45	30-50
Nut (crankshaft)	01511-08051	Nut	M8XP1.0	1	105~120	120-140
Cleaner body (reed valve)	11203-05608	Phillips screw	M5X60	2	15-25	20-30
Cleaner cover (cleaner body)	62901-82330	Knob	M5XPO.8	1	13-20	15-25
Tank guard (crankcase)	01020-05080	Allen screw	M5X8	2	45~60	50~70