

TECUMSEH

TECHNICIAN'S HANDBOOK

This manual covers the following basic type or model numbers dependent on age of product: AH520, AH600, AV520, AV600, HSK600, TVS600.

This manual covered many engines under an Old form of Identification which will need to be reviewed as well.
TYPE / SPECIFICATION NUMBER 638-670 1398-1642 and Craftsman 200 Series Models.

2-CYCLE ENGINES



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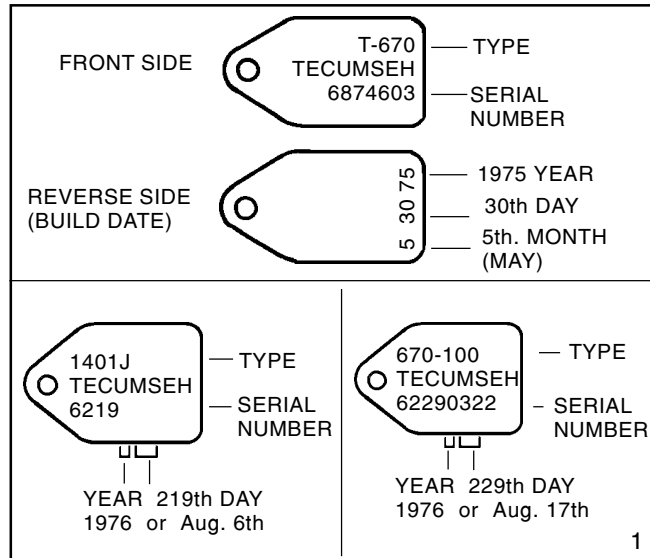
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This manual contains information on Tecumseh Engines built to comply with emission regulations. As a technician it is unlawful to modify or cause a change in the original calibration of these engines. All speed adjustments must remain within the limits that are specified for each engine, and are not to exceed the maximum. Any deviation must be specifically approved by Tecumseh Products Company.

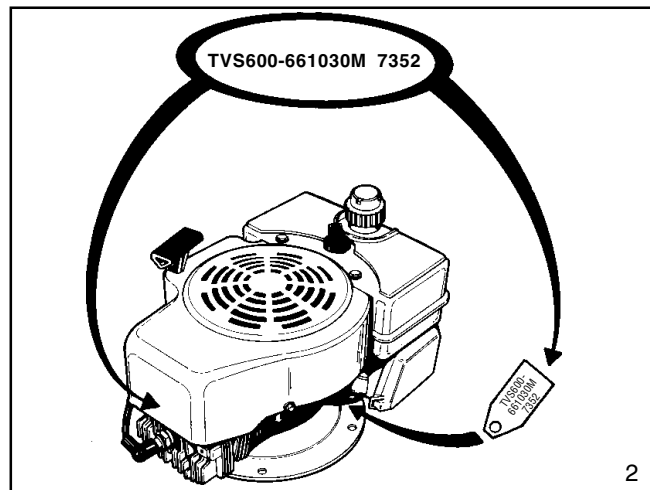
GENERAL INFORMATION

ENGINE IDENTIFICATION

Tecumseh has used two different methods of identifying 2 cycle engines. The first method was used until the mid 1980's using the base model number with a type number. The type number was used to identify variations for the OEM's specific needs (Fig. 1)



The second method was put in place to standardize 2 cycle and 4 cycle engine identification. The type number has now become the specification number, which is preceded by the engine model as illustrated in Figure 2 and 3.



INTERPRETATION OF MODEL NUMBER

The letter designations in a model number indicates the basic type of engine.

- AH - Aluminum Horizontal
- AV - Aluminum Vertical
- BV - Outboard Vertical
- HSK - Horizontal Snow King
- TVS - Tecumseh Vertical Styling

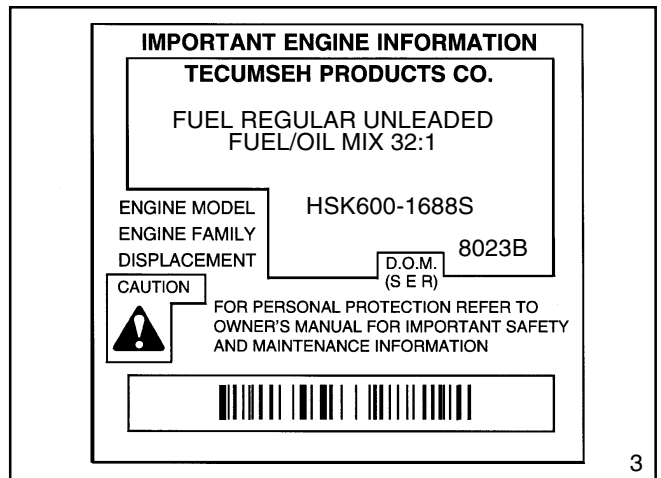
The numbers that follow the letter designations indicate the horsepower or cubic inch displacement.

Following the engine size are the engine specification numbers which are used for identification when ordering parts.

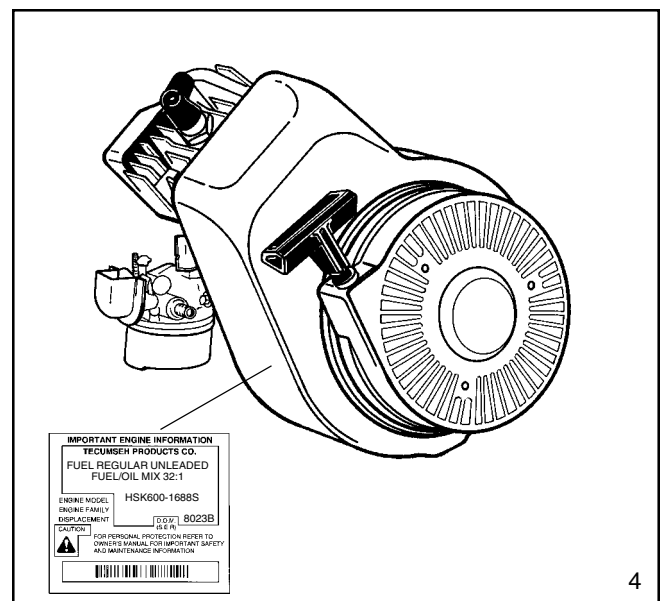
The final set of numbers are the date of manufacture (D.O.M.).

Example: HSK600 1688S

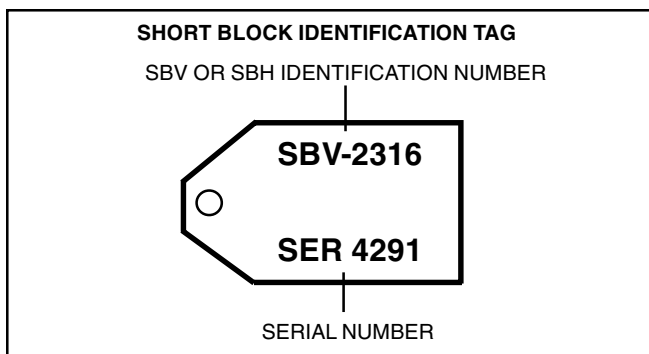
- HSK - Horizontal Snow King
- 600 - 6 Cubic Inch displacement
- 1688S - Specification number
- 8023B - Serial number D.O.M. (date of manufacturing previously serial number)
- 8 - First digit is the year of manufacturing (1998)
- 023 - Indicates the calendar day of the year (23th day or Jan. 23, 1998)
- B - Represents the line and shift on which the engine was built at the factory



Tecumseh engine model, specification, and D.O.M. number are now located on a decal adhered to the blower housing.



ENGINE CARE



SHORT BLOCKS

New short blocks are identified by a tag marked S.B.H. (Short Block Horizontal) or S.B.V. (Short Block Vertical). Original model identification numbers of an engine should always be transferred to a new short block for correct parts identification.



THIS SYMBOL POINTS OUT IMPORTANT SAFETY INSTRUCTIONS WHICH IF NOT FOLLOWED COULD ENDANGER THE PERSONAL SAFETY OF YOURSELF AND OTHERS. FOLLOW ALL INSTRUCTIONS.

ENGINE FUEL MIX				
	U.S.	U.S.	METRIC	METRIC
	Gasoline	Amount of Oil To Be Added	Petrol	Amount of Oil To Be Added
24:1	1 Gallon 2 Gallons	5.3 oz. 10.7 oz.	4 Liters 8 Liters	167 ml 333 ml
32:1	1 Gallon 2 Gallons	4 oz. 8 oz.	4 Liters 8 Liters	125 ml 250 ml
50:1	1 Gallon 2 Gallons	2.5 oz. 5.0 oz.	4 Liters 8 Liters	80 ml 160 ml

FUELS. Tecumseh Products Company strongly recommends the use of fresh, clean, UNLEADED regular gasoline in all Tecumseh Engines. Unleaded gasoline burns cleaner, extends engine life and promotes good starting by reducing the build up of carbon deposits. Premium gas or gasohol containing no more than 10% ethanol can be used if unleaded fuel is not available.

NOTE: NEVER USE GASOLINE CONTAINING METHANOL, GASOHOL CONTAINING MORE THAN 10% ETHANOL, UNLEADED REGULAR GASOLINE CONTAINING MORE THAN 15% M.T.B.E. OR ETBE, GASOLINE ADDITIVES, OR WHITE GAS BECAUSE ENGINE/FUEL SYSTEM DAMAGE COULD RESULT.

NOTE: In countries where unleaded gasoline is not available, regular gas can be used.

Make sure that gasoline and oil are stored in clean, covered, rust free containers. Dirt in fuel can clog small ports and passages in the carburetor. Use fresh gasoline only. Gasoline standing for long periods of time develop a gum that will result in fouled spark plugs, clogged fuel lines, carburetors and fuel screens.

Using fuel that is not fresh will cause engines to be hard starting, especially in cold temperatures.

Clean gas cap, tank and fuel container spout when filling fuel tank, to assure that dirt will not get into fuel system.

If gasohol is used, special care is required when the engine is to be stored for extended periods.

ENGINE OIL. Use Clean, high quality **2 CYCLE OIL. NMMA TC-WII, or TC-W3.**

FUEL/OIL MIX. Follow fuel and engine oil requirements listed in the Owner's Manual. Disregard conflicting instructions found on oil containers.

NOTE: Sears Craftsman models use a 40:1 mix which is acceptable.

NOTE: ALWAYS DOUBLE THE AMOUNT OF OIL FOR THE FIRST GALLON OF MIX FOR ENGINE BREAK IN.

To assure thorough mixing of oil and gasoline, fill container with gasoline to one quarter full, add oil as recommended, shake container vigorously and then add remainder of gasoline. **Do not mix directly in engine or equipment fuel tank.**

TWO-CYCLE FUEL/OIL MIX RATIOS	
24:1	AV520 All Basic Specifications 670 & 653 AV600 All Basic Specifications 600-10 & Up
32:1	TVS600 All Specifications AH600
50:1	HSK600

STORAGE:



NEVER STORE ENGINE WITH FUEL IN TANK INDOORS OR IN ENCLOSED, POORLY VENTILATED ENCLOSURES WHERE FUEL FUMES MAY REACH AN OPEN FLAME, SPARK OR PILOT LIGHT AS ON A FURNACE, WATER HEATER, CLOTHES DRYER, ETC.

If engine is to be stored over 30 days, prepare for storage as follows:

1. Remove all gasoline from fuel tank to prevent gum deposits from forming in tank and other fuel system components, causing possible malfunction of the engine.



DRAIN FUEL INTO APPROVED CONTAINER OUTDOORS, AWAY FROM OPEN FLAMES.

Run engine until fuel tank is empty and engine stops due to lack of fuel.

Fuel stabilizer (such as Tecumseh's Part No. 730245) is an acceptable alternative in minimizing the formation of fuel gum deposits during storage.

Add stabilizer to fuel in fuel tank or storage container. Always follow mix ratio found on stabilizer container. Run engine at least 10 minutes after adding stabilizer to allow it to reach carburetor.

If gasohol has been used, complete preceding instructions and then add a small amount, one pint or less, of unleaded regular automotive gasoline properly mixed with the specified lubricating oil and run the engine until the fuel tank is empty and the engine stops due to lack of fuel.

2. Pull starter handle slowly until resistance is felt due to compression pressure, then stop. Release starter tension slowly to prevent engine from reversing due to compression pressure. This position will close both the intake and exhaust ports to prevent corrosion of the piston and the cylinder bore.
3. Clean unit by removing any dirt from exterior of the engine and equipment.

TUNE-UP PROCEDURE. The following is a minor tune-up procedure. Repair procedures for this engine and it's components are listed in this manual if the engine does not perform to satisfaction after tune-up is performed.

CAUTION: Remove spark plug wire before doing any service work on engine.

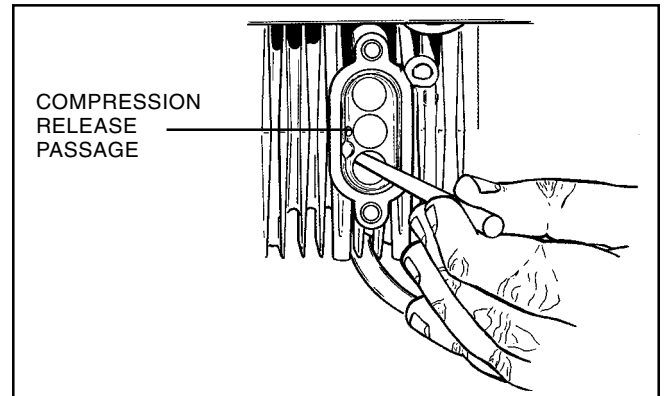
1. Service or replace air cleaner as necessary.
NOTE: Snow King® engines do not use an air filter due to the clean operating environment and to prevent filter freeze-up.
2. Remove blower housing, clean all dirt, grass or debris from air intake screen, cylinder cooling fins, and carburetor governor levers and linkage.
3. Remove carburetor, clean and install a carburetor kit, make adjustment presets where needed. Presets are found in the carburetor section of this manual. Make sure fuel tank, fuel filters and fuel lines are clean. Reinstall carburetor, replacing any worn or damaged governor springs or linkage. Make proper governor adjustment. Adjustments are found in the manual under governor linkage and adjustment and engine reassembly.
4. Replace the spark plug with a correct equivalent.
5. Make sure all ignition wires are properly routed, so they will not rub on flywheel. Inspect all ignition wires for abrasion or damage. Remove flywheel and check flywheel key, reinstall flywheel, torque flywheel nut to specifications. Set air gap between solid state module and flywheel at .0125". Air gap gauge, part no. 670297 may be used.
6. The engine must be firmly mounted to the associated equipment. On rotary lawnmowers, make sure blade is properly balanced and correctly torqued. See disassembly section for flywheel removal and air gap setting procedure.
7. Make sure all remote linkage is properly adjusted for operation.

8. Fill tank with the proper fuel/oil mix.

9. Start the engine, allow it to warm up 5 minutes, then adjust carburetor and engine R.P.M. according to Tecumseh's recommendations.

Snow King® engines should be run in outdoor temperatures for engine adjustments.

NOTE: Emissionized engines have non-adjustable carburetors in compliance with CARB (California Air Resource Board) and U.S. EPA (United States Environmental Protection Agency). These engines can not be modified without specific authorization.



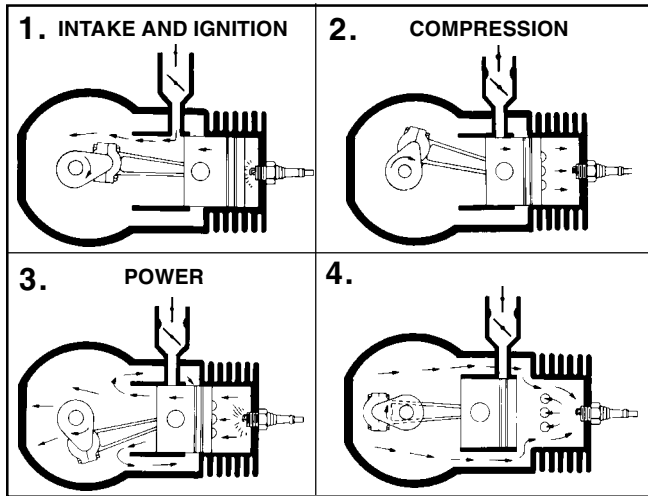
EXHAUST PORT CLEANING. The exhaust ports should be cleaned after each seventy-five (75) to one hundred (100) hours of use.

Before cleaning the ports place the piston in the Bottom Dead Center position. Then clean the ports using a pointed 3/8" diameter wooden dowel or similar tool. Be sure not to scratch the port area. Also remember to remove all the loose carbon particles from the engine.

NOTE: When cleaning the exhaust ports, check and clean the compression release passage.

2-CYCLE THEORY OF OPERATION

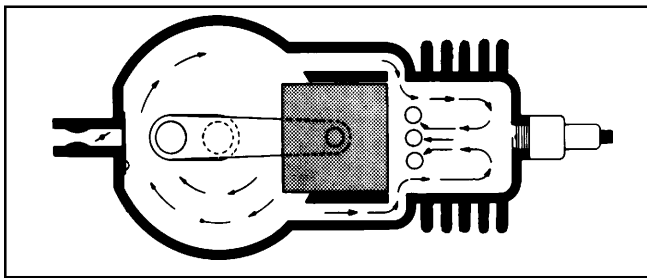
Air cooled 2-cycle engines differ from 4-cycles by having one power stroke for every revolution of the engine versus every other stroke on 4-cycles.



OPERATION OF PISTON PORT STYLE.

A low pressure area is created in the crankcase as the piston moves upward to compress the air/fuel mixture in the cylinder. When the piston moves far enough to uncover the intake port, the air/fuel mixture from the carburetor flows into the engine crankcase due to higher pressure atmospheric air. Just before the piston reaches top dead center (TDC), the spark plug ignites the air / fuel mixture in the cylinder.

The expanding combustion gases force the piston down. The downward piston travel causes a pressure buildup in the crankcase. The piston uncovers the exhaust port first, followed by the transfer ports. The exhaust flows out the exhaust port while the pressurized air/fuel mixture enters the cylinder from the crankcase through the transfer ports. As the piston travels upward the sequence is repeated.



OPERATION OF REED PORTED STYLE WITH LOOP SCAVENGING

The following illustrates the loop scavenge design which uses a vacuum-pressure activated reed valve. Here the ports are located on three sides of the cylinder; the intake ports are on two sides opposite each other, and the exhaust ports are illustrated by the three holes just above the head of the piston.

As the mixture flows into the combustion chamber through the transfer ports, it collides and is directed to the top of the combustion chamber looping when it strikes the cylinder head, thus forcing all spent gases out through the open exhaust ports.

TERMS. Listed are common terms often referred to on 2-cycle engines.

EXHAUST or SCAVENGE PHASE. The burned gases must be cleared out of the combustion chamber and replaced by a fresh charge of fuel-air mixture through the intake ports. The exhaust passes out through the exhaust ports into the outside air.

PORTS. Openings in the cylinder allow gases to pass into and out of the combustion chamber. The ports are opened or closed by the upward and downward movement of the piston.

EXHAUST PORTS. Allow the burned gases to pass out of the combustion chamber.

THIRD PORT (Sometimes called piston port). A third port is for entry of the fuel-air and oil mixture to the crankcase. From the crankcase the fuel-air mixture enters the combustion chamber through the intake ports. The third port is controlled by the piston skirt.

REED VALVE. A reed valve is activated by crankcase pressure or vacuum. A decrease in crankcase pressure opens the reed allowing the fuel air and oil mixture to enter the crankcase. Increased crankcase pressure closes the valve, preventing escape of the fuel-air and oil mixture back through the carburetor.

LUBRICATION. Tecumseh 2-cycle engines are lubricated by a gas oil mix. The correct mix ratio of oil and gas combines with air in the venturi and enters the crankcase. During engine operation the oil clings to all the internal moving parts for lubrication.

AIR CLEANERS, CARBURETORS, GOVERNORS AND LINKAGE

AIR CLEANERS

Service the air cleaner frequently to prevent clogging of the cleaner and to prevent dust and dirt from entering the engine. Dust bypassing an improper or damaged air filter can quickly damage an engine. Always make certain covers and air cleaner connections are tightly sealed to prevent entry of dirt.

NOTE: Snow King® models do not use air cleaners due to the clean environment that they operate in and also to prevent air cleaner freeze-up.

When excessive carburetor adjustment or loss of power results, inspect the air filter for clogging.

NOTE: Use factory recommended parts only.

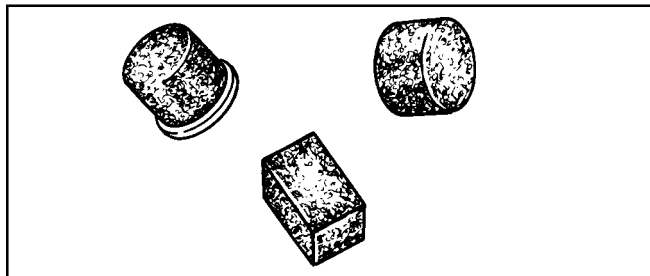
POLYURETHANE-TYPE AIR CLEANER. These serviceable air cleaners utilize a polyurethane element which will clog up with use. The element should be cleaned and serviced in the following manner.

Wash element in a detergent and water solution and squeeze (don't twist) until all dirt is removed. Rinse thoroughly.

Wrap in clean cloth and squeeze (don't twist) until completely dry.

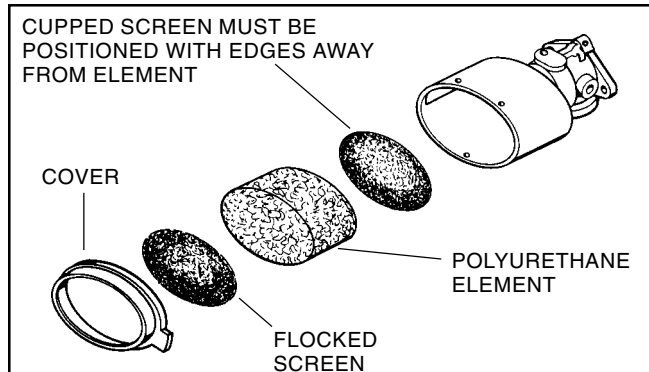
Clean air cleaner housing and cover. Dry thoroughly.

Re-oil element by applying generous quantity of oil to all sides. Squeeze vigorously to distribute oil and to remove excess oil. (S.A.E. 30)

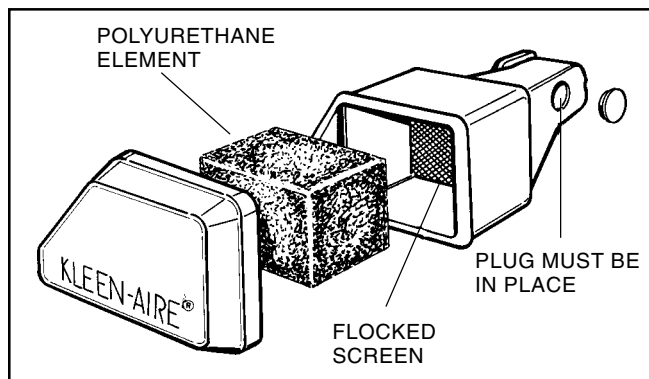


When reassembling polyurethane oval type air cleaners, place cupped screen into housing with edge against carburetor end of housing. Screen should be installed to hold element away from housing to allow full utilization of air cleaner element.

NOTE: Polyurethane type filters will lose effectiveness if stored for extended periods of time, due to oil migration (settling Down) through the filter. Re-oil filter as necessary.



KLEEN-AIRE® SYSTEM. This system uses a polyurethane type element. Service as described under polyurethane-type air cleaner. When removing air cleaner body from carburetor, remove plug in the body to gain access to the mounting screw. Make certain plug is put back in place. If it shows damage, replace.



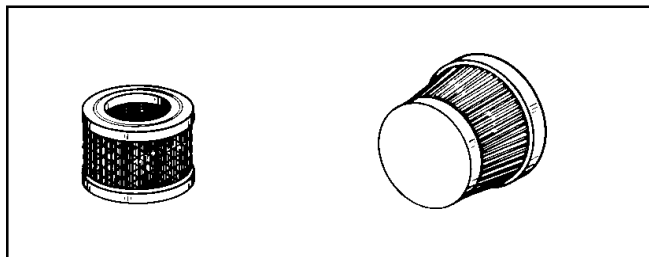
PAPER-TYPE AIR CLEANER SERVICE. Replace air filter once a year or more often in extremely dusty or dirty conditions.

DO NOT ATTEMPT TO CLEAN OR OIL PAPER-TYPE FILTER.

Be sure to clean base and cover thoroughly before installing new paper filter.

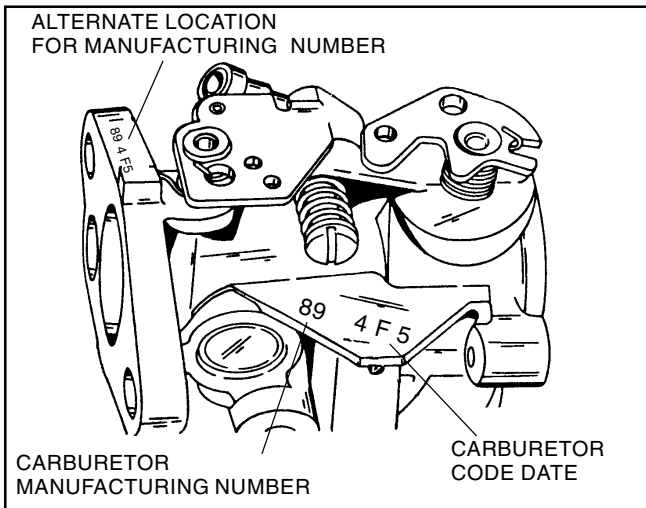
NEVER RUN THE ENGINE WITHOUT THE COMPLETE AIR CLEANER INSTALLED ON THE ENGINE.

NOTE: Serious damage to the engine may result in using any other but the specified part number filter. Use factory recommended parts only.



GENERAL CARBURETOR INFORMATION

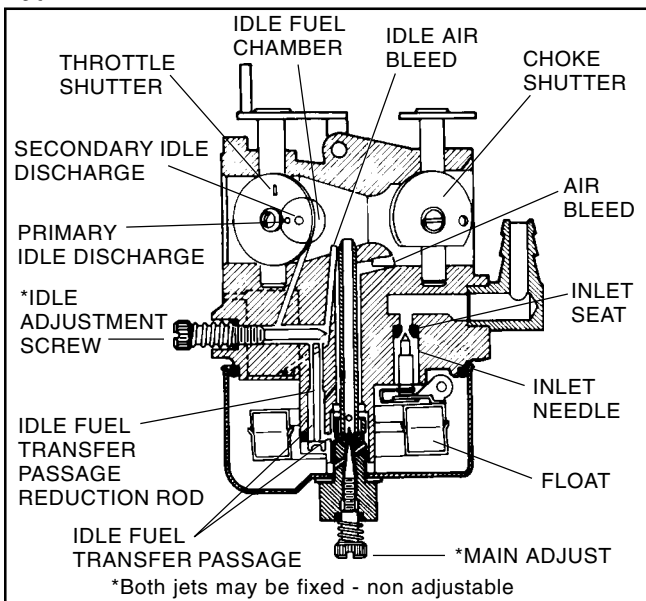
CARBURETOR IDENTIFICATION. Tecumseh carburetors are identified by a manufacturing number and code date stamped on the carburetor as illustrated.



When servicing carburetors, you may use either the engine model specification number or the manufacturing number on the carburetor to properly identify. Information regarding replacement parts or kits are available in the master parts manual, microfiche catalog or electronic parts look-up systems.

Tecumseh uses two basic types of carburetors for their 2 cycle engines, float-type and diaphragm.

FLOAT-TYPE CARBURETORS. Float-type carburetors use a hollow metal float to maintain the operating level of fuel in the carburetor. As the fuel is used, the fuel level in the carburetor bowl drops and the float moves downward. This actuates the inlet needle valve, to allow fuel to flow into the fuel bowl. As the fuel level in the bowl again rises, so will the float. This float action adjusts the fuel flow and keeps the fuel at the proper mixture level. Some carburetors are of the fixed main type. On these models, the main adjusting screw and nut are replaced by a fixed main jet bowl nut.



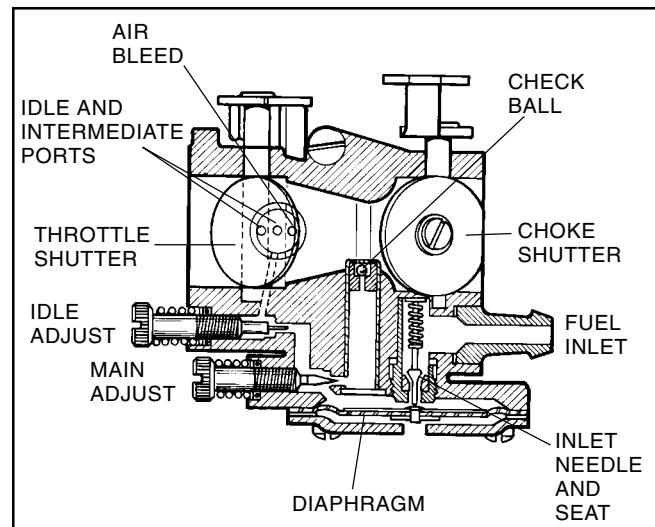
DIAPHRAGM (PRESSURE DIFFERENTIAL) CARBURETORS

This type of carburetor uses a rubber-like diaphragm which is exposed to intake manifold pressure on one side and to atmospheric pressure on the other. Tecumseh diaphragm carburetors use the diaphragm as a metering device. As the intake manifold pressure decreases due to downward piston travel, the atmospheric pressure on the vented side of the diaphragm moves the diaphragm against the inlet needle. The diaphragm movement overcomes the spring tension on the inlet needle and moves the inlet needle off the seat. This permits the fuel to flow through the inlet valve to maintain the correct fuel volume in the fuel chamber. The inlet needle return spring closes the inlet valve when the pressure on the diaphragm equalizes or a pressure higher than atmospheric exists on the intake side (upward piston travel). The diaphragm meters a correct fuel volume in the fuel chamber to be delivered to the mixing passages and discharge ports.

A main or idle adjustment needle may be replaced by an internally fixed jet on some models.

The main nozzle contains a ball check valve. The main purpose of this ball check is to eliminate air being drawn down the main nozzle during idle speeds and leaning the idle mixture.

An advantage of the diaphragm carburetor over the float system is that the diaphragm carburetor increases the angle that the engine may be operated at.



OPERATION

In the "CHOKE" or "START" position, the choke shutter is closed, and the only air entering the engine enters through openings around the shutter. As the engine starts to rotate the downward piston travel will create a low air pressure area in the engine cylinder above the piston. Higher pressure (atmospheric air) rushes into the engine to fill the created low pressure area. Since the majority of the air passage is blocked by the choke shutter, a relatively small quantity of air enters the carburetor at increased speed. The main nozzle and both idle fuel discharge ports are supplying fuel due to the low air pressure in the intake of the engine. A maximum fuel flow through the carburetor orifices combined with the reduced quantity of air that passes through the carburetor, make a very rich fuel mixture which is needed to start a cold engine.

At engine IDLE speed, a relatively small amount of fuel is required to operate the engine. The throttle is almost completely closed. A fuel / air mixture is supplied through the primary idle-fuel discharge orifice during idle.

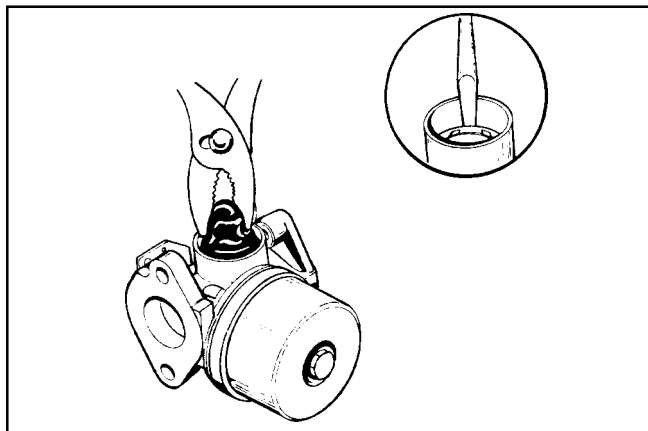
During INTERMEDIATE engine operation, a second orifice is uncovered as the throttle shutter opens, and more fuel mixture is allowed to atomize with the air flowing into the engine.

During HIGH SPEED engine operation, the throttle shutter is opened. Air flows through the carburetor at high speed. The venturi, which decreases the size of the air passage through the carburetor, further accelerates the air flow. This high speed movement of the air decreases the air pressure at the main nozzle opening. Fuel is forced out the main nozzle opening due the difference in the atmospheric air pressure on the fuel in the carburetor bowl and the reduced air pressure at the main nozzle opening.

CARBURETOR SERVICE. Carefully disassemble carburetor, removing all non-metallic parts, i.e., gaskets, viton seats and needles, "O" rings, fuel pump valves, etc.

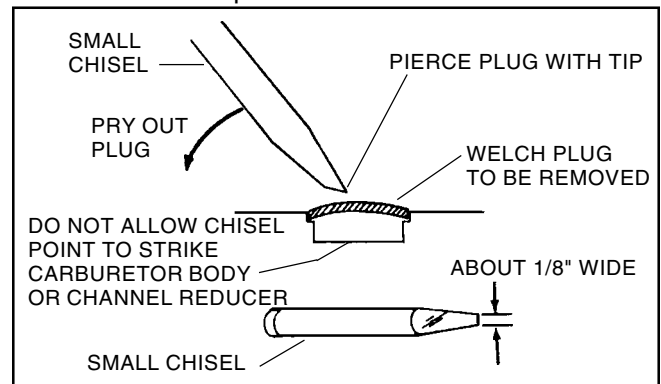
Nylon check balls used in some diaphragm carburetors are not serviceable. Nylon can be damaged if subjected to harsh cleaners for prolonged periods.

Remove the primer bulb (if equipped) by grasping with a pliers and pulling and twisting out of the body. Remove the retainer by prying and lifting out with a screwdriver. Do not re-use old bulb or retainer.

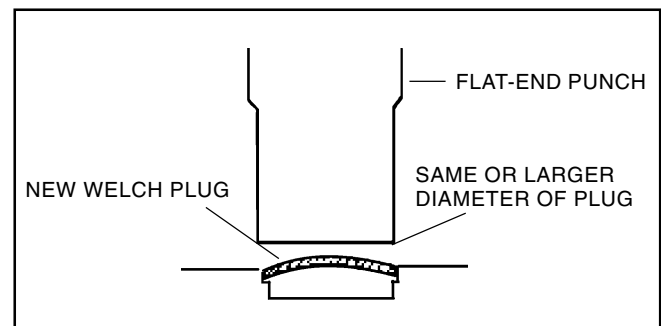


Remove all welch plugs if cleaning the carburetor. Secure the carburetor in a vise equipped with protective jaws. Use a small chisel sharpened to a 1/8" wide wedge point. Drive the chisel into the plug to pierce the metal and push down on the chisel to pry the plug out of the hole.

Clean all metallic parts with solvent.

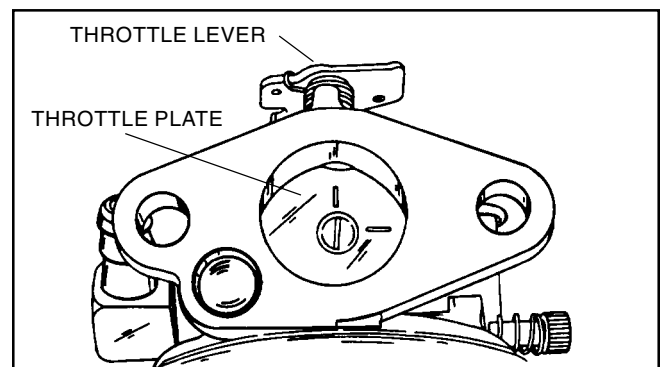


To install a new welch plug after cleaning, place welch plug into receptacle with raised portion up. With a punch equal to the size of the plug, merely flatten the plug. Do not dent or drive the center plug below the top surface of the carburetor. After installing the welch plug, seal the outer diameter with finger nail polish. (Do not use clear polish).

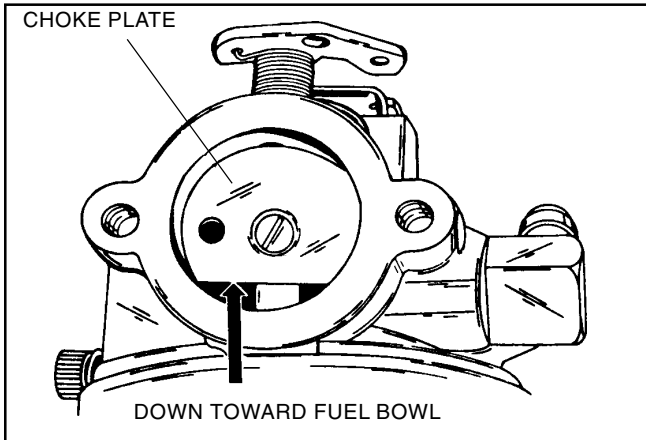


THROTTLE. Examine the throttle lever and plate prior to disassembly. Replace any worn and/or damaged parts.

When reassembling, it is important that the lines on the throttle plate are facing out when in the closed position. Position throttle plates with the two lines at 12 and 3 o'clock. If throttle plate has only one line, the line should be positioned in the 12 o'clock position. If binding occurs, correct by loosening the screws and repositioning the throttle plate.



CHOKE. Examine the choke lever and shaft at the bearing points and holes into which the linkage is fastened, and replace if worn or damaged. The choke plate is inserted into the air horn of the carburetor in such a position, that the flat side of the choke is down. Before disassembly note the direction of choke plate movement. Choke plates will operate in either direction. Make sure it is assembled properly for your engine.



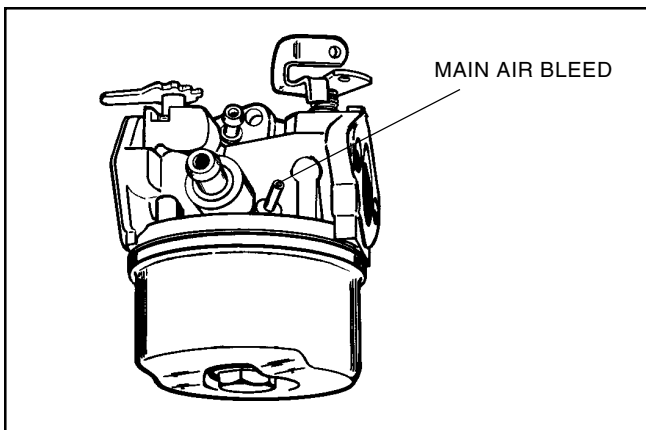
ADJUSTING SCREWS. Remove the adjusting screws from the carburetor body and examine the point, replace the screws if damaged. Tension is maintained on the screw with a coil spring. Examine and replace the "O" ring seal(s) if damaged.

NOTE: If screws are made of plastic, dip the end of the screw in oil before installation to prevent damage.

FUEL BOWL RETAINING NUT. The fuel bowl retaining nut has a fixed main jet incorporated in the nut. This small jet must be clean for proper fuel metering. Clean by using compressed air. **DO NOT USE WIRE OR HARD OBJECTS FOR CLEANING.**

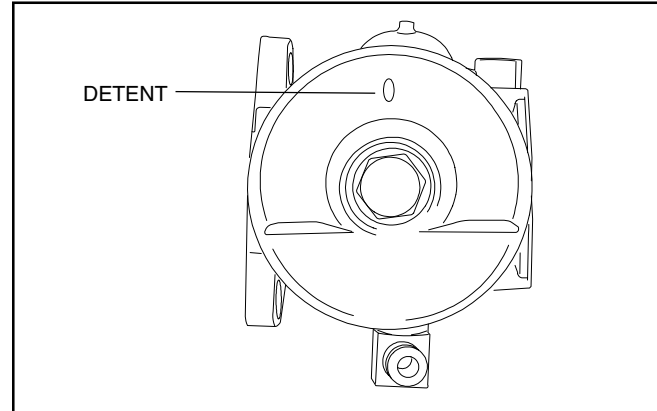
CARBURETOR VENTING. Float-type carburetors must have atmospheric air pressure acting against the fuel in the fuel bowl. These vents can be external, with a hole drilled through the side of the carburetor casting or internal where atmospheric air is picked up in the air horn near the air cleaner. Regardless of the type, these vents must be clear and free from dirt, paint, grease, etc.

HIGH TILT FLOAT STYLE carburetors use an external main air bleed.



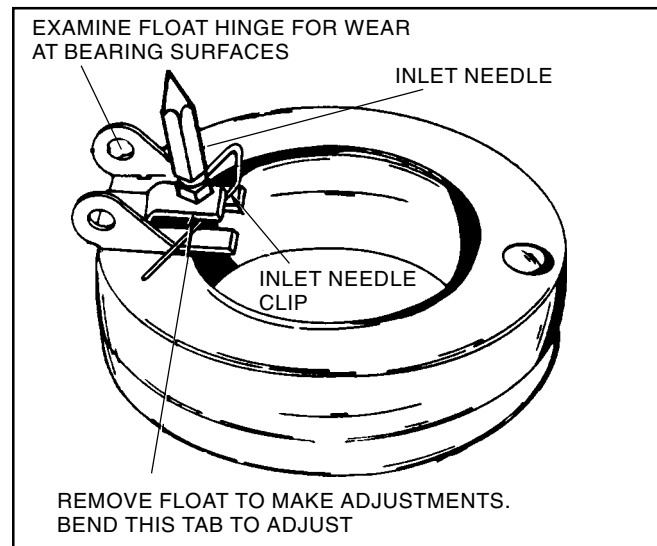
FUEL BOWL. The fuel bowl must be free of dirt and corrosion. When disassembling a carburetor for repair, always replace the fuel bowl "O" ring. Lubricate the "O" ring with a small amount of oil for easier installation.

Install the float bowl by placing the detent portion opposite of the hinge pin. Make sure the deepest end of the bowl is opposite of the inlet needle. The bowl has a small dimple located in the deepest part. The purpose of this dimple is to minimize the chances of the float sticking to the bottom of the bowl caused by stale fuel.



FLOAT. Remove the float by pulling out the float hinge pin. Lift the float away from the carburetor body. This will also lift the inlet needle out of the seat.

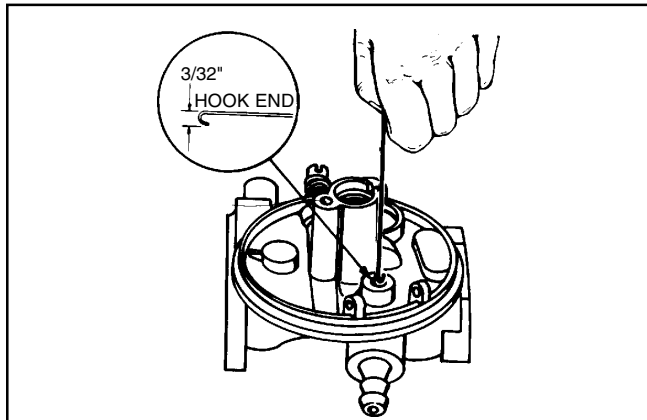
Examine the float for damage. Check the float hinge bearing surfaces for wear, as well as the tab that contacts the inlet needle. Replace any damaged or worn parts.



Float sticking can occur due to fuel deposits (gum or varnish). This can be corrected by loosening the carburetor bowl nut one full turn and rotating the bowl 1/4 turn in either direction. Return the bowl to its original position and retighten the bowl nut.

INLET NEEDLE AND SEAT (FLOAT CARBURETORS).

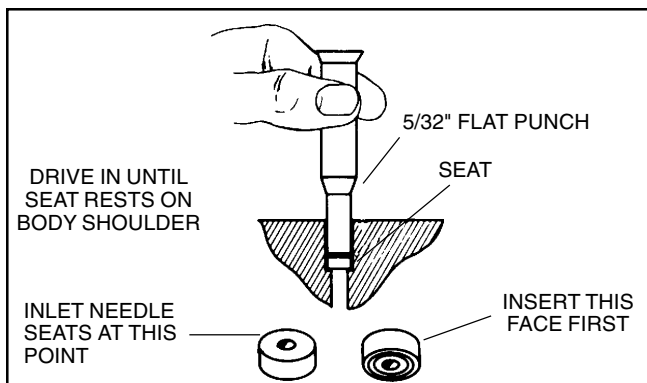
Tecumseh carburetors are built with removable seats made out of a material called VITON®. These seats are easily removed by bending the end of a paper clip or wire with a 3/32" hook or use a #4 crochet hook. Push the hook through the hole in the center of the seat and remove it. Never reuse the old seat, always replace it with a new seat.



To install a new seat, make sure the seat cavity is clean, then moisten the seat with a drop of oil to help it slide into place. Position the seat with the grooved side of the seal down and carefully push the seat into its cavity with a 5/32" flat punch until it bottoms out.

NEEDLE AND SEAT POP-OFF TEST

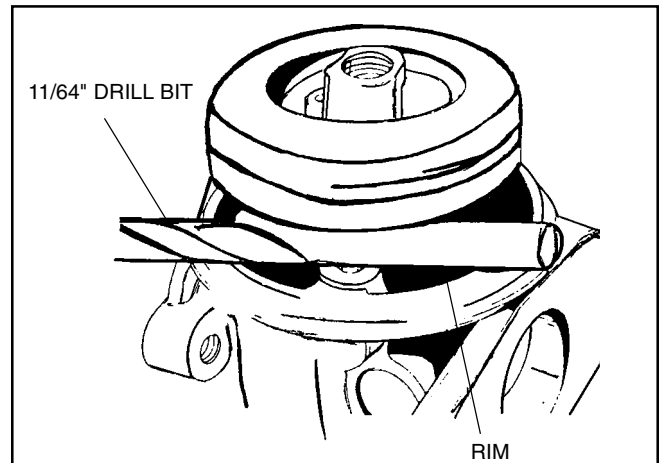
To test the pop-off pressure, remove the carburetor from the engine. Be sure to drain any fuel into an approved container. Invert the carburetor and remove the float bowl. Place a drop of an oil based product such as WD-40 on the tip of the needle valve. Using a commercially available 0-30 psi pump and gauge, attach the pumps hose to the carburetor inlet. Apply approximately 6 psi or until the needle pops off the seat. The needle should seat at 1.5 psi or greater for a minimum of 5 minutes. If the minimum 1.5 psi cannot be maintained for this period of time, then service to the needle and seat is required.



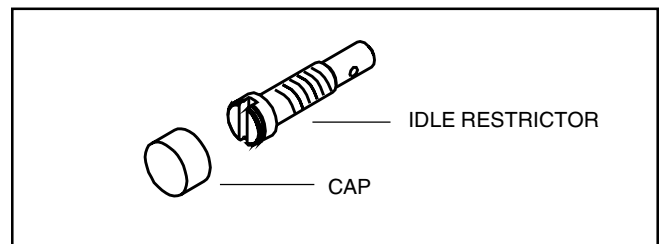
FLOAT HEIGHT SETTINGS

Previously the float height was set by using a 670253A float setting tool. The new float setting will require an 11/64" drill bit. The procedure for setting the float height is as follows. Remove the bowl gasket, then hold the carburetor in the inverted position. Place the drill bit across the carburetor body opposite and parallel to the float hinge pin. Adjust the float height by bending the tab on the float until it touches the bit.

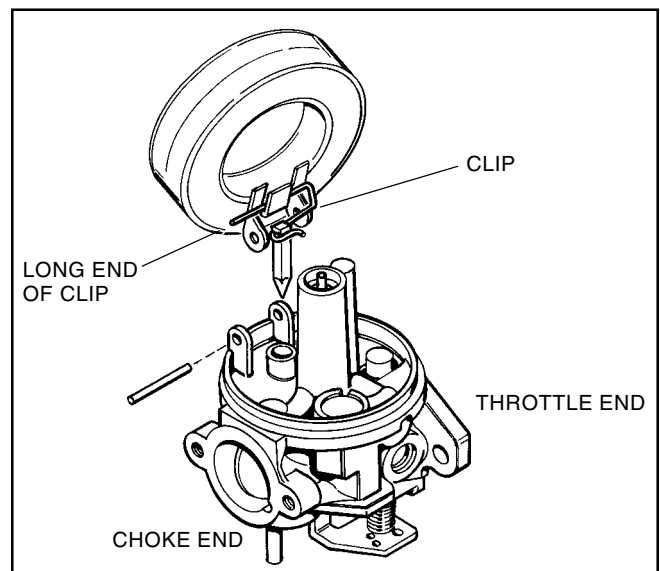
If the required adjustment is minor, the tab adjustment may be made without removing float and carefully inserting a small bladed screwdriver to bend the tab. Be careful not to damage other parts.



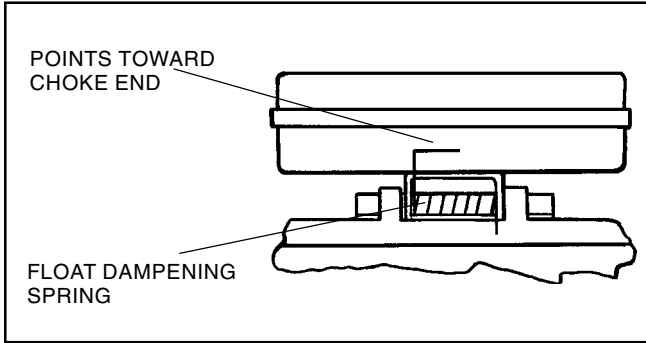
The idle on the Series 8 is metered using a threaded restrictor (See illustration). Proper torque of this restrictor is critical, it should be torqued to 5-8 in. lbs. or .5 to 1 nm, or it may vibrate loose. When the restrictor is placed in the idle circuit passage it is capped with a tamper resistant plastic cap. If the jet is removed for cleaning it must be recapped to prevent tampering when it is re-installed.



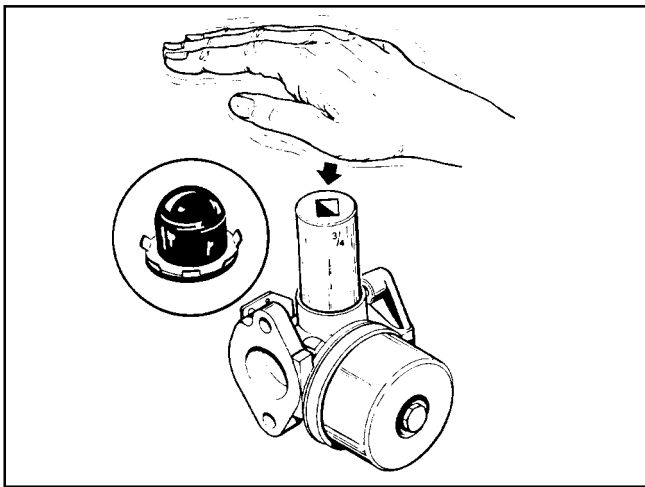
The inlet needle hooks onto the float tab by means of a spring clip. To prevent binding, the long, straight, open end of the clip must face the choke end of the carburetor as shown.



The float dampening spring on the HIGH TILT FLOAT STYLE carburetor has an extended end which must point toward the choke end of the carburetor.



PRIMER BULB. To install, start the retainer and bulb into the casting with the retainer tabs pointed out. Firmly push the bulb and retainer into position using a 3/4" (19mm) deep well socket.

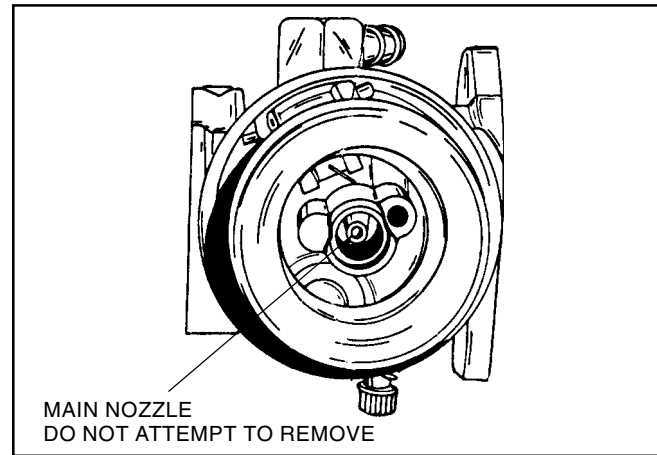


CLEANING CARBURETOR BODY. When removing choke and throttle shafts, check shafts and bearings in carburetor body for wear. Any looseness in these areas can cause dirt to enter the engine resulting in premature wear. If dust seals are present, they should be positioned next to the carburetor body. Install the dust seal, metal washer, and finally the return spring.

Welch plugs should be removed for proper cleaning of the carburetor (See welch plug service at the beginning of this section). When all accessories and shafts have been removed, soak the carburetor in carburetor cleaner for a maximum of 30 minutes. Blow out all passages with compressed air in the opposite direction of normal fuel flow.

The carburetor body on non-emission carburetors contains a main nozzle tube pressed into the carburetor body to a predetermined depth within the venturi of the carburetor. DO NOT attempt to remove this main nozzle. Any movement of this nozzle will seriously affect the metering characteristics of the carburetor. (Emissions carburetors have a serviceable plastic nozzle.)

Clean the well surrounding the main nozzle with carburetor



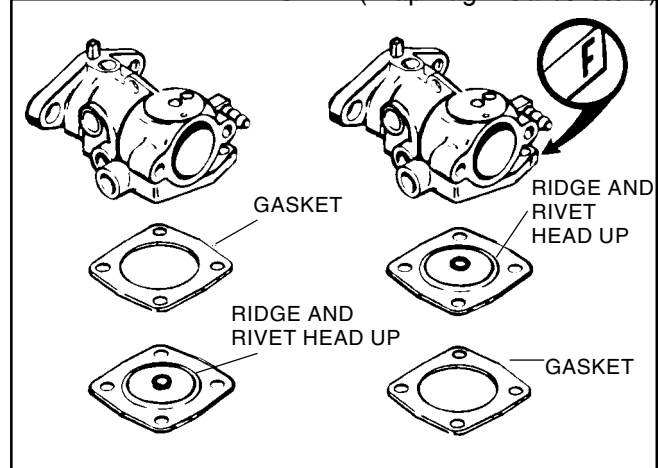
cleaner and compressed air. With the choke plate and shaft removed, blow compressed air through the high speed air bleed located just behind the lower choke shaft bearing and immediately in front of the venturi to remove any dirt that may have accumulated.

Blow compressed air through all of the passages, making sure they are free of dirt, varnish or foreign material.

DIAPHRAGMS. Inspect diaphragms for cracks, tears or brittleness. Replace if necessary. Rivet head on diaphragm must always face toward the inlet needle valve.

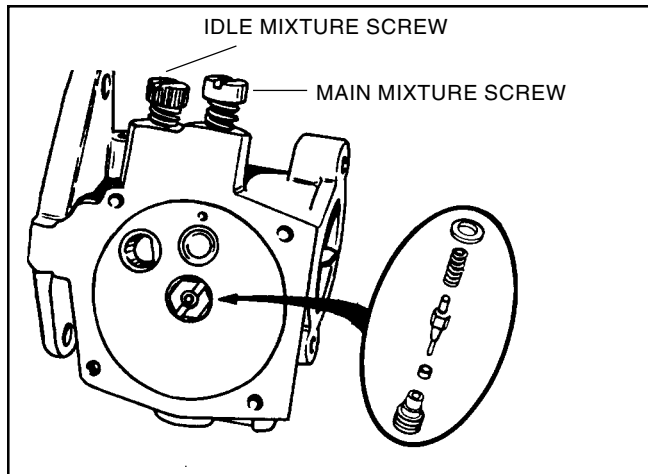
If the carburetor has an "F" designation on the casting, it will identify the installation sequence of the gasket and diaphragm on the carburetor. "F" designated carburetors have the diaphragm installed first then the gasket then the cover. If there is no designation, the sequence is gasket, diaphragm and cover.

INLET NEEDLE AND SEAT. (Diaphragm Carburetors)



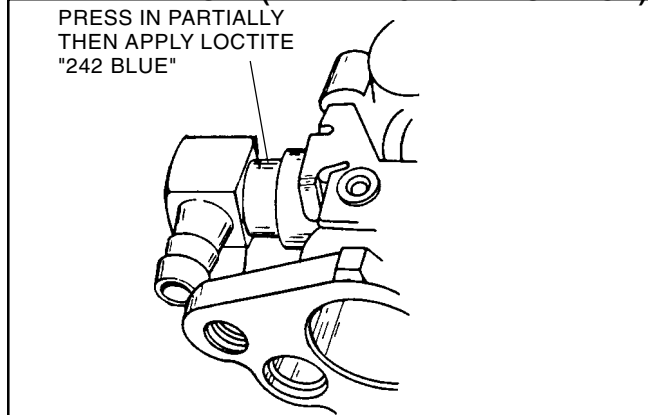
Use a socket to remove inlet needle and seat. Replace with complete assembly.

FUEL INLET FITTING. If necessary this fitting can



be removed by pulling and twisting. Be sure to install in the same position as the original. When installing fitting, insert tip into the carburetor body, then coat the exposed portion of the shank with Loctite 242 Blue; then press it in, until the shoulder contacts the carburetor body.

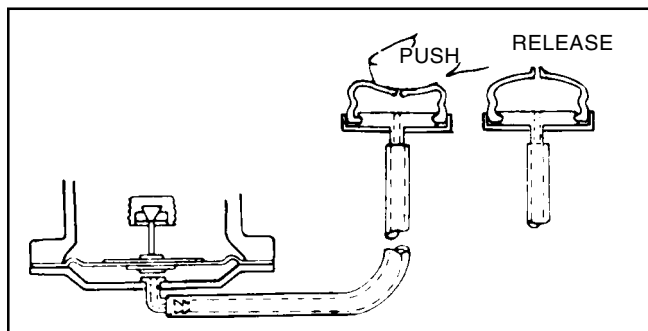
THE PRIMER BULB (DIAPHRAGM CARBURETOR)



Pressing the bulb creates air pressure against the diaphragm. Fully depress primer bulb with your thumb, making sure that the vent hole in bulb is covered. Release and allow bulb to return to original position.

As the diaphragm lifts, the inlet needle is lifted off its seat and the fuel within the reservoir is fed up through the passages into the air horn. A one-way valve in the body prevents the fuel from being forced back into the fuel tank.

CARBURETOR CHECK VALVE. Diaphragm carburetors



with primers must have a check valve located in or behind the fuel inlet fitting of the carburetor. This is to prevent fuel from being forced back to the fuel line and tank when priming.

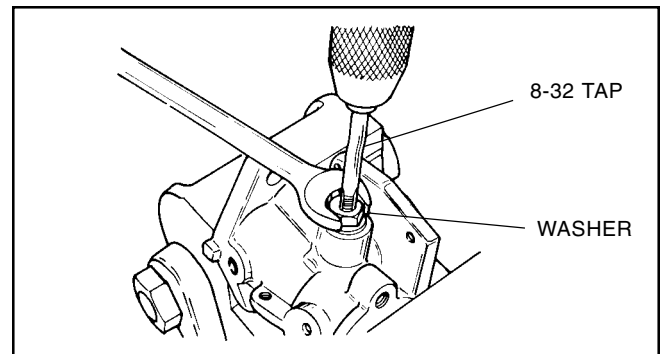
Two types of check valves have been used. One is a brass check valve pushed into the carburetor body in the fuel inlet. The other is a teflon disc located in the area under the fuel fitting. These two types of check valves are not interchangeable.

To remove the brass type check valve, drill a 9/64" (3.57 mm) hole through the center of the check valve, making sure drill does not travel more than 1/8" (3.17 mm) into the body and damage the carburetor.

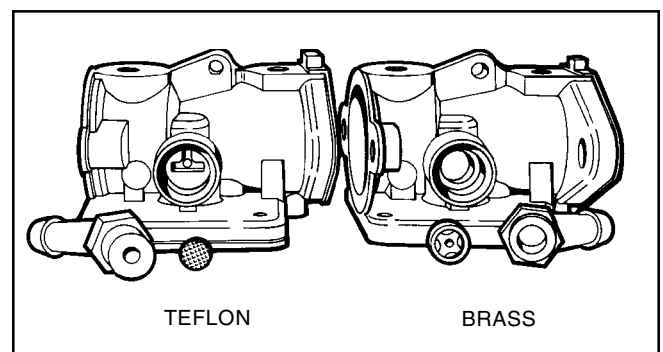
Turn a nut on to a 8-32 tap and slide a washer on after it.

Turn the tap with nut and washer into the valve until the tap begins to protrude through the valve when viewed through the inlet needle and seat opening.

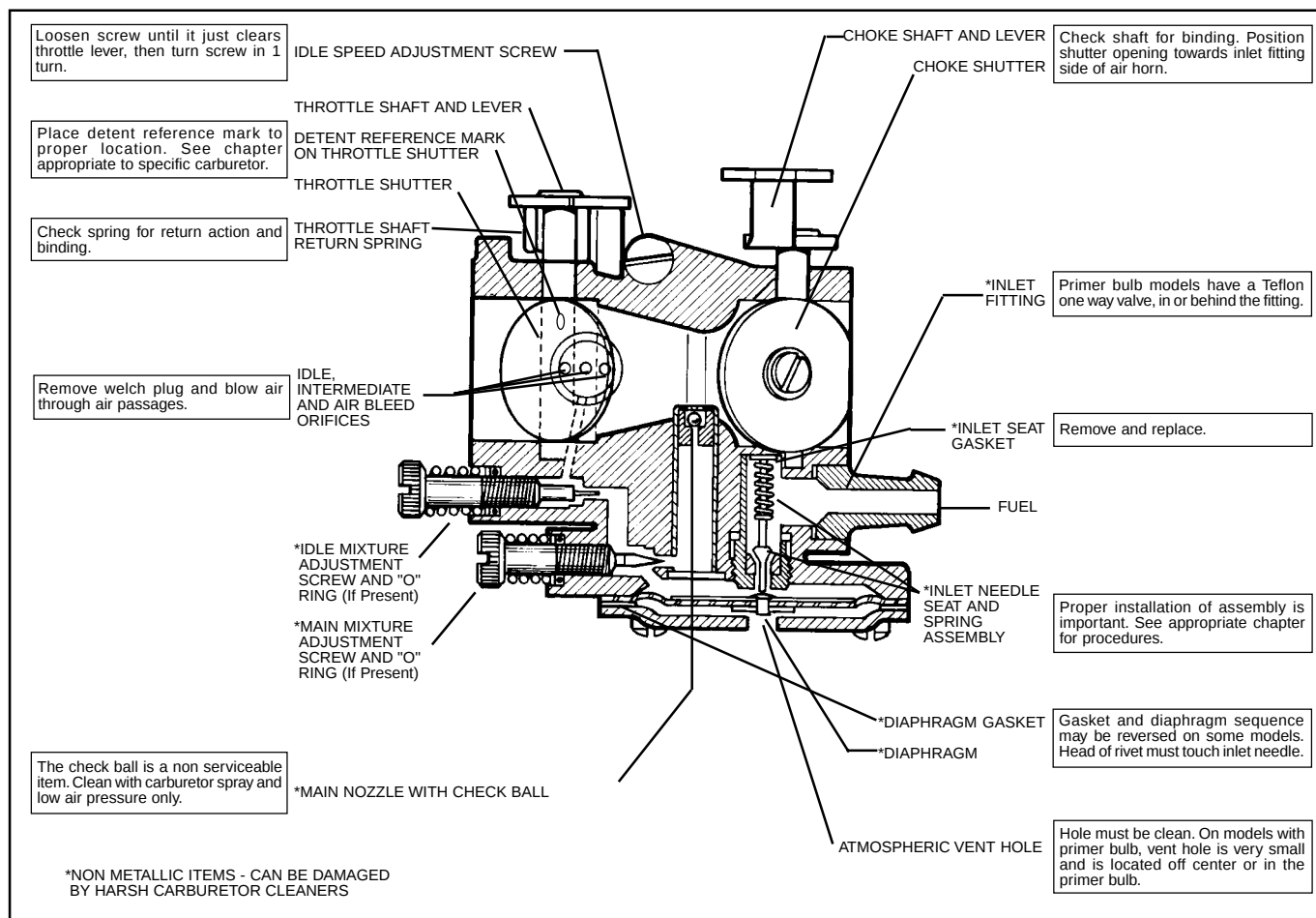
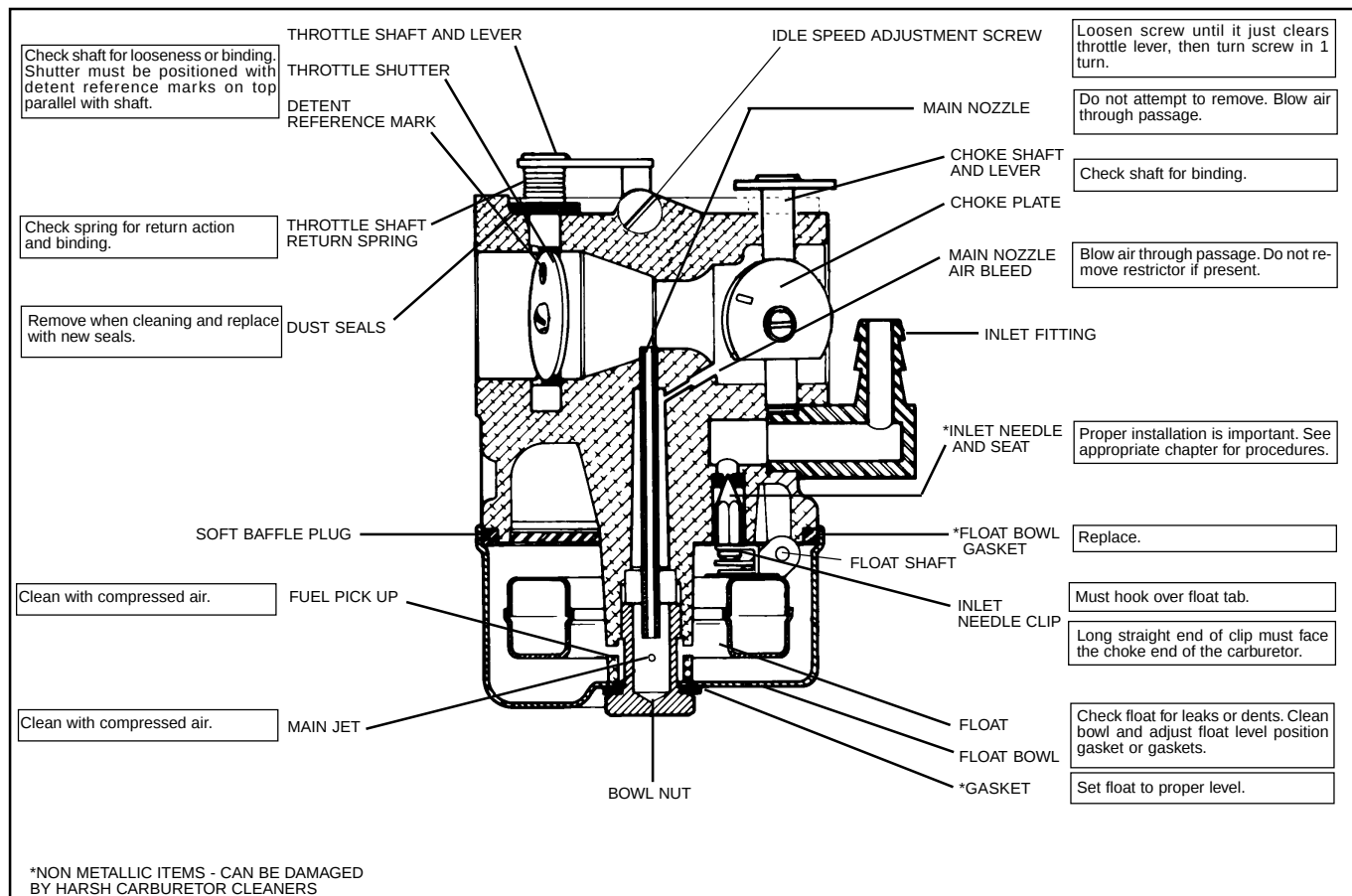
Turn the nut clockwise to pull the valve out from the carburetor body.



The teflon disc-type can be cleaned by using low air pressure forced into the inlet fitting. If service is required, pull out inlet fuel fitting and replace the teflon disc. Put a drop of oil on the disc and position in the cavity of the carburetor. Replace fuel inlet fitting as outlined in Fuel Inlet Fitting instructions.



CARBURETOR SERVICE PROCEDURE



Loosen screw until it just clears throttle lever, then turn screw in 1 turn.

Place detent reference mark to proper location. See chapter appropriate to specific carburetor.

Remove welch plug and blow air through air passages.

Loosen screw until it just clears throttle lever, then turn screw in 1 turn.

Check shaft for binding. Position shutter opening towards inlet fitting side of air horn.

Remove and replace.

Primer bulb models have a Teflon one way valve, in or behind the fitting.

Proper installation of assembly is important. See appropriate chapter for procedures.

Gasket and diaphragm sequence may be reversed on some models. Head of rivet must touch inlet needle.

Hole must be clean. On models with primer bulb, vent hole is very small and is located off center or in the primer bulb.

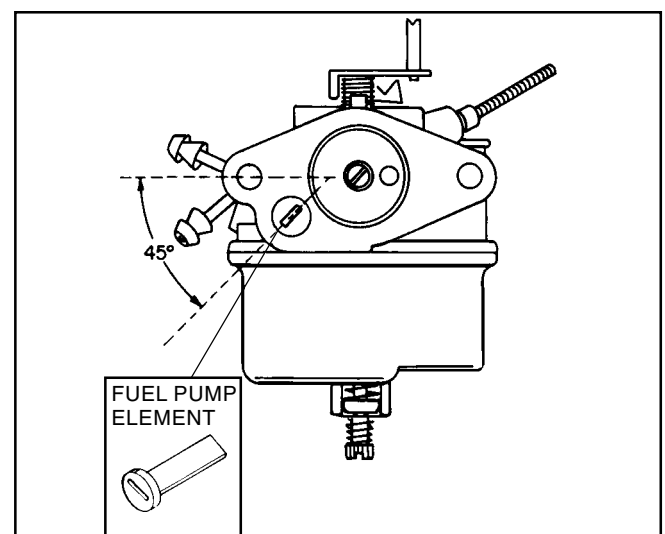
Labels and components shown in the diagram include:

- CHOKE SHAFT AND LEVER
- CHOKE SHUTTER
- HIGH SPEED AIR BLEED
- *INLET SEAT GASKET
- *INLET FITTING
- *INLET NEEDLE SEAT AND SPRING ASSEMBLY
- *DIAPHRAGM GASKET
- *DIAPHRAGM
- ATMOSPHERIC VENT HOLE
- MAIN NOZZLE WITH CHECK BALL
- FIXED MAIN JET
- FIXED IDLE RESTRICTOR JET
- BLUE THREAD LOCK SEALANT APPLIED
- TAMPER RESISTANT CAP (Pierce to Remove)
- IDLE, INTERMEDIATE AND AIR BLEED ORIFICES
- THROTTLE SHUTTER
- THROTTLE SHAFT LEVER AND RETURN SPRING
- IDLE SPEED ADJUSTMENT SCREW

Carburetors on outboard applications use float type which have a separate idle speed fuel pickup tube pressed into the casting. The idle mixture screw is located on the top of the carburetor near the engine.

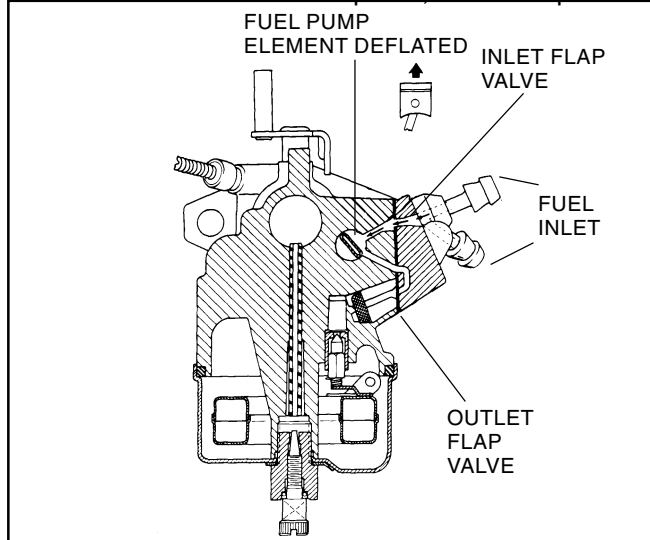
A detailed line drawing of a carburetor. A leader line points from the text 'IDLE SPEED FUEL PICKUP' to a small vertical tube located inside the carburetor body, near the base of the throttle valve assembly.

When replacing the fuel pump element, install with the slot opening at a 45° angle as illustrated.



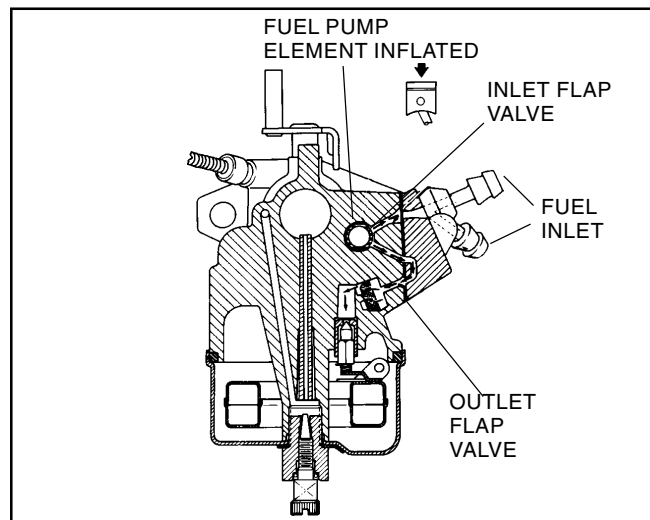
As the engine's piston, moves upward, a partial vacuum is created in the crankcase, which collapses the fuel pump element in the carburetor. On the outside of the element, suction opens the inlet flap drawing a supply of fuel from the tank and lines into the cavity created by the deflating pump element. Suction pulls the outlet flap closed, sealing the outlet port so that fuel isn't pulled from the area of the inlet needle and seat.

On the downward stroke of the piston, crankcase pressure



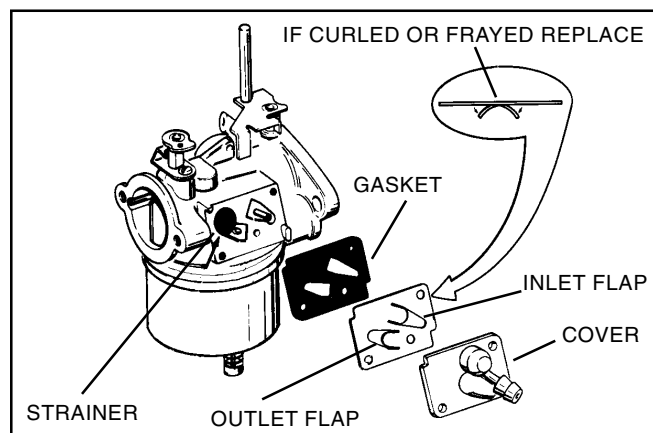
enlarges the pump element forcing fuel out of its cavity. This pressurized fuel acts against the outlet flap valve, opening it, allowing a head of pressurized fuel to be transmitted to the inlet needle and seat port. The inlet valve is pressed against the inlet port, sealing it so that pressurized fuel does not escape back into the fuel tank and lines.

The flap valves are located between the cover and



gasket. Make sure the flaps are in good condition and the strainer is not clogged or damaged. Replace as necessary. Make sure the cover is not warped; check by laying on a flat surface. If warped, replace. If not warped severely, it can be refaced using a hard surface and emery cloth. Notches on the carburetor body insure that the gasket, valve, and cover are positioned on the body correctly. When tightening screws, snug bottom screw, then top screw and torque to 6-8 in. lbs.

OUTBOARD CONTROL PANEL. Install the idle adjustment rod into the bracket then turn the setscrew



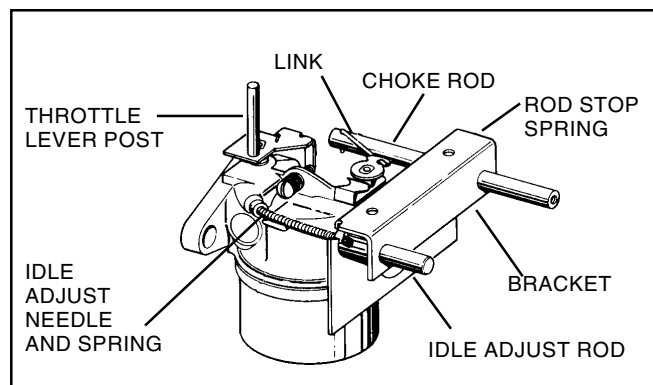
into the rod a complete 2 turns.

Then position the extended end of the choke rod spring on the idle adjustment rod and align the spring with the choke rod holes in the bracket. Press the choke rod through the bracket and spring with the link attaching hole toward the carburetor side.

Install the choke shaft link in the rod, then install the other end in the choke lever.

Install the control bracket to the carburetor, but do not tighten screw completely.

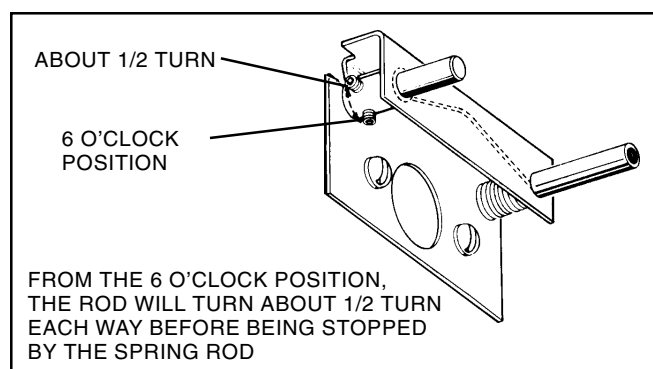
Tighten the setscrew to secure the rod to the idle



adjustment cable. The rod should turn about a half turn before contacting the extended end of the choke spring.

It is important that the idle adjustment screw be one full turn from closed, and that the rod setscrew be down (6 o'clock position) when connecting the rod and coil.

Tighten the control bracket screw. Pull the choke rod to assure that the choke shutter closes.



CARBURETOR ADJUSTMENTS

Emission grade carburetors will have fixed main and idle circuits. The absence of adjustment screws indicate fixed jets with no adjustments necessary.

CARBURETOR ADJUSTMENTS

IDLE SPEED ADJUSTMENT

This screw is located on top of the carburetor and contacts the throttle. To pre-set the idle speed, back out the screw, then turn in until the screw just touches the throttle lever. Finally, turn the screw in one (1) turn. Once the engine is running and brought up to operating temperature (3-5 minutes), the final idle R.P.M. can be adjusted with the aid of a tachometer.

FLOAT TYPE-FIXED MAIN, IDLE ADJUST

Turn the mixture adjusting screw in (clockwise) finger tight, then one (1) turn out (counterclockwise). This setting is approximate and will be enough to allow the engine to start so that final carburetor adjustments can be made. Start the engine and allow it to warm-up for approximately 5 minutes. **Do not adjust the carburetor with the engine cold.**

NOTE: If the engine falters or stops after the choke lever is moved to the "OFF" position, open the mixture adjusting screw 1/4 turn counterclockwise and restart the engine.

With the engine running, place the speed control in the "slow" position. Turn the mixture adjusting screw clockwise until the engine starts to falter, remember this location. Next turn the screw counterclockwise until the engine start to sputter or drops in R.P.M., remember this location. Now turn the screw clockwise until it is halfway between these two locations. This will be the optimum carburetor setting.

DIAPHRAGM - SINGLE AND DUAL ADJUSTMENT

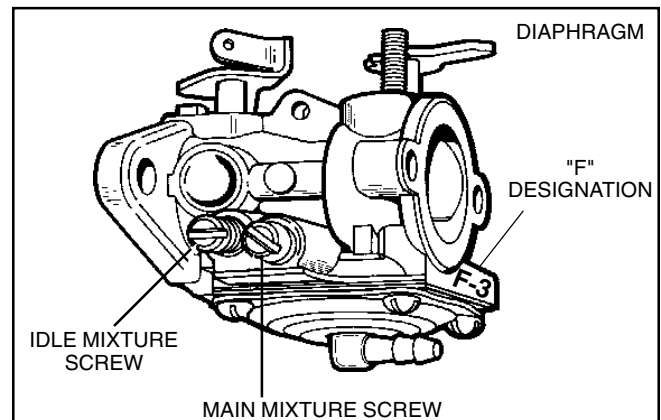
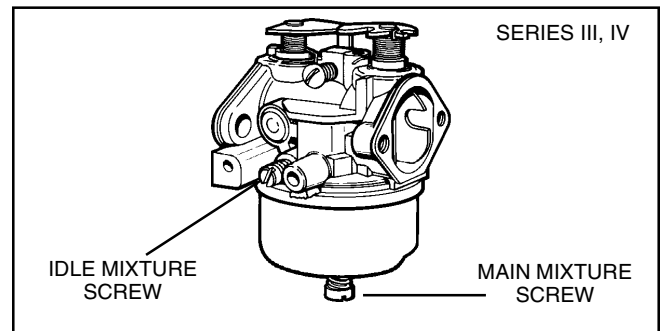
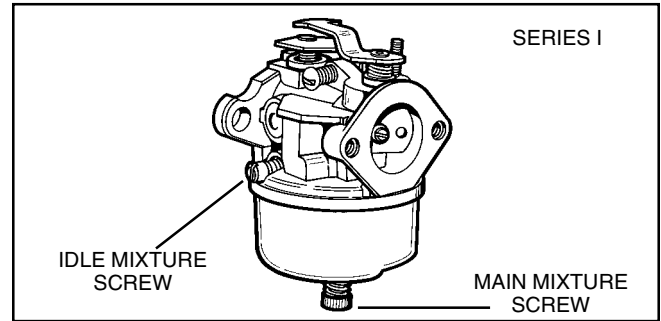
Turn the mixture adjustment screw(s) clockwise finger tight, then one (1) turn counterclockwise. This setting will allow the engine to be started so that the carburetor can be fine tuned. **Do not adjust the carburetor when the engine is cold.**

Start the engine and let it warm-up for approximately 5 minutes. If the engine falters or stops after the choke lever is moved to the "OFF" position, turn the adjusting screw 1/4 turn counterclockwise and restart the engine.

NOTE: On dual adjust, the first adjustment must be made with the main mixture screw.

With the engine running, turn the mixture adjustment screw clockwise until the engine starts to falter, remember this location. Next turn the screw counterclockwise until the engine starts to sputter or drop in R.P.M., remember this location. Now turn the screw clockwise until it is halfway between these two locations. This will be the optimum carburetor setting.

With dual adjust carburetor, repeat the above steps for the second (idle) mixture adjusting screw.



TROUBLESHOOTING CARBURETION

POINTS TO CHECK FOR CARBURETOR MALFUNCTION

TROUBLE	CORRECTIONS
Carburetor out of adjustment	3-4-11-12-13-15-20
Engine will not start	1-2-3-4-5-6-8-9-10-11-12-14-15-16-17-19-21-24-25
Engine will not accelerate	2-3-4-5-11-12-19-24
Engine hunts (at idle or high speed)	3-4-8-9-10-11-12-14-20-21-24-26-27
Engine will not idle	3-4-8-9-10-11-12-13-14-18-20-21-22-24-25-26-27
Engine lacks power at high speed	2-3-4-6-8-10-11-12-15-18-19-20-21-24-25-26
Carburetor floods	4-7-17-21-22-25-26
Carburetor leaks	4-6-7-10-17-18-23-24-25
Engine overspeeds	8-9-11-14-15-18-20
Idle speed is excessive	8-9-13-14-15-18-20-25-26-27
Choke does not open fully	8-9-14-15
Engine starves for fuel at high speed (leans out)	1-3-4-5-6-10-11-15-16-17-18-19-21-25-26
Carburetor runs rich with main adjustment	7-8-9-11-14-17-18-19-21-25-26
needle shut off	
Performance unsatisfactory after being serviced	1-2-3-4-5-6-7-8-9-10-11-12-14-15-16-17-18-19-20-21-24-25-26

- Open fuel shut off valve at fuel tank. Fill tank with fresh clean fuel.
- Check ignition, spark plug and compression.
- Clean air cleaner service as required.
- Dirt or restriction in fuel system clean tank and fuel strainers, check for kinks or sharp bends.
- Check for stale fuel or water in fuel. Fill with fresh fuel/oil mixture of correct ratio.
- Examine fuel line and pick-up for sealing at fittings.
- Check and clean atmospheric vent holes.
- Examine throttle and choke shafts for binding or excessive play remove all dirt or paint, replace shaft.
- Examine throttle and choke return springs for operation.
- Examine idle and main mixture adjustment screws and "O" rings for cracks or damage.
- Adjust main mixture adjustment screw. Some models require finger tight adjustment. Check to see that it is the correct screw.
- Adjust idle mixture adjustment screw. Check to see that it is the correct screw.
- Adjust idle speed screw.
- Check position of choke and throttle plates.
- Adjust control cable or linkage to assure full choke and carburetor control.
- Clean carburetor after removing all non-metallic parts that are serviceable. Trace all passages.
- Check inlet needle and seat for condition and proper installation.
- Check sealing of welch plugs, cups, plugs and gaskets.
- Check fuel pump operation pump element, inner and outer one way valves.
- Adjust governor linkage.

FLOAT CARBURETOR CHECKS

- Adjust float setting.
- Check float shaft for wear and float for leaks or dents.
- Check seal for fuel drain or bowl gasket.
- Is carburetor operating at excessive angle?

CHECKS FOR DIAPHRAGM

- Check diaphragm for cracks or distortion and check nylon check ball for function.
- Check sequence of gasket and diaphragm for the particular carburetor being repaired.
- Check spring tension on idle governor (if present).

STANDARD SERVICE CARBURETORS

FUEL FITTING

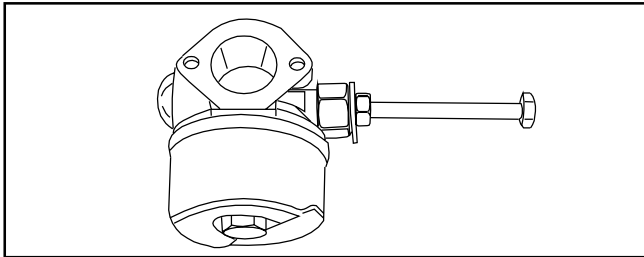
NOTE: MOST service carburetors are marked "SVC CARB NF" in the Price List. This means that the carburetor comes with NO FUEL FITTING.

Use the parts manual to obtain the same fuel inlet fitting that was installed in the original carburetor. Install the fuel fitting in the new carburetor body in the same position as on the original carburetor. Support the carburetor body with a wood block to avoid damage to other parts. Use a bench vise or press to install the fitting squarely. Press it in until it bottoms out.

NOTE: PRESS FUEL FITTING IN SQUARELY USING CAUTION SO THAT THE CARBURETOR BODY IS NOT DAMAGED.

INLET FUEL FITTING

To remove a leaking or damaged fuel inlet fitting, use a 1/4" (6 mm) bolt, 1/4" (6 mm) nut and 1/4" (6 mm) washer, along with a 1/2" (12 mm) nut. Use a pliers or vise to remove the plastic part of the inlet fitting. Tap the inside of the remaining metal portion of the fitting using a 1/4"-20 (6 mm) tap. Place a 1/2" (12 mm) nut over the fuel fitting (it may be necessary to guide one side of the nut to seat it squarely to the carburetor). Next thread the 1/4" (6 mm) nut on the bolt until it contacts the shank, add the washer, and thread the bolt into the fitting until snug. Tighten the 1/4"-20 (6 mm) nut until the fitting is removed.



CHOKE SHAFT

NOTE: Never reuse choke or throttle shutter screws, always replace with new Tecumseh service screws part number 650506.

Remove the choke shutter screw from the original carburetor and remove the choke shaft. Observe the position of the ends of the choke return spring if one is present. Also observe the position of the cut-out and/or holes in choke shutter. Some chokes turn clockwise and some turn counterclockwise, note the position of the choke shaft prior to removal from the old carburetor.

If a choke stop spring is present on the new carburetor and is not used on the old carburetor, cut it off with a side cutter or pull it out using a pliers.

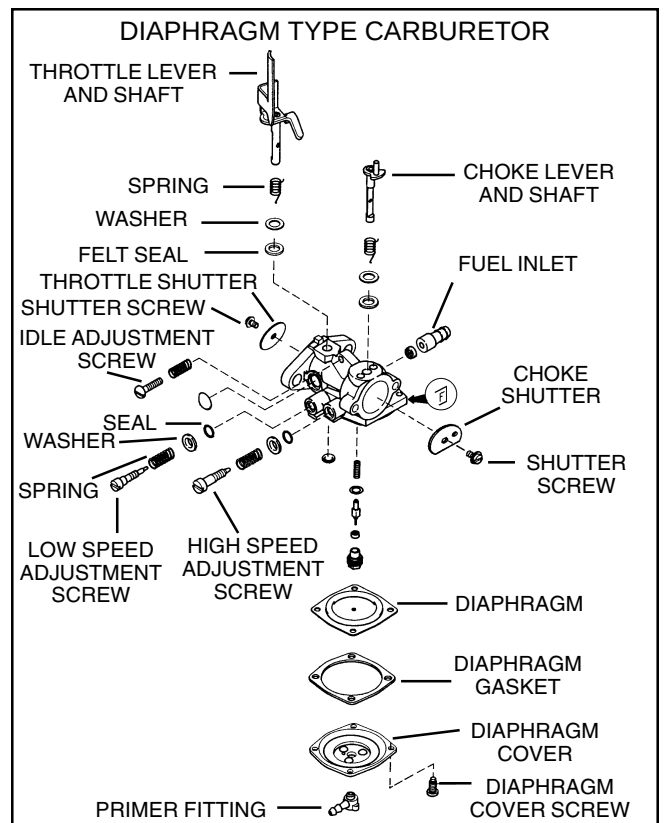
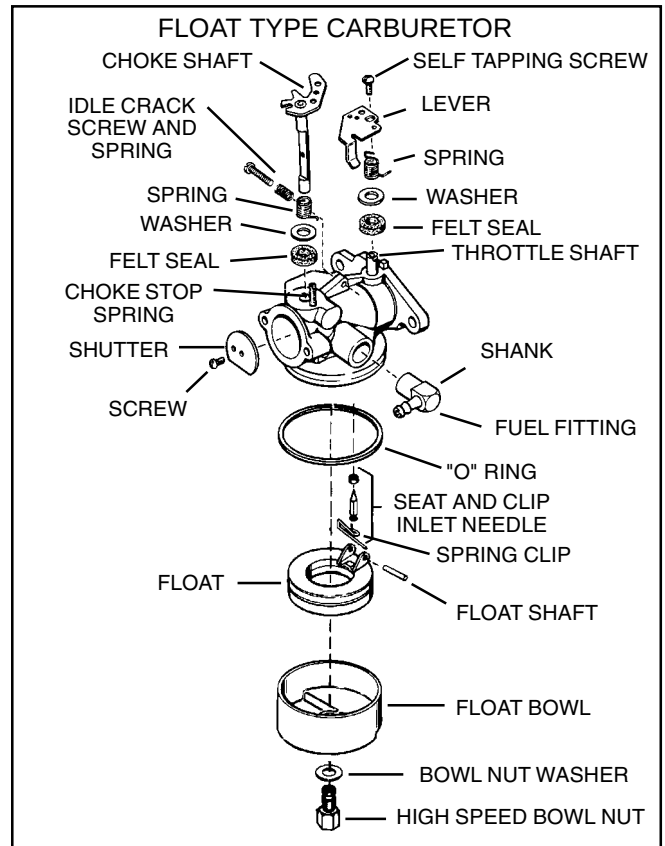
Test the action of choke shaft to make sure it moves freely and easily and does not bind in either open or closed position. If binding occurs, loosen the shutter screw; reposition the shutter and tighten the screw.

THROTTLE LEVER

Remove the throttle lever and spring and file off the peened end of the throttle shaft until the lever can be removed. Install the throttle spring and lever on the new carburetor with the self-tapping screw furnished. If dust seals are furnished, install them under the return spring.

IDLE SPEED ADJUSTMENT SCREW

Remove the screw assembly from the original carburetor and install it in the new carburetor. Turn it in until it contacts the throttle lever. Then an additional 1 turn for a static setting.



GOVERNORS AND LINKAGE

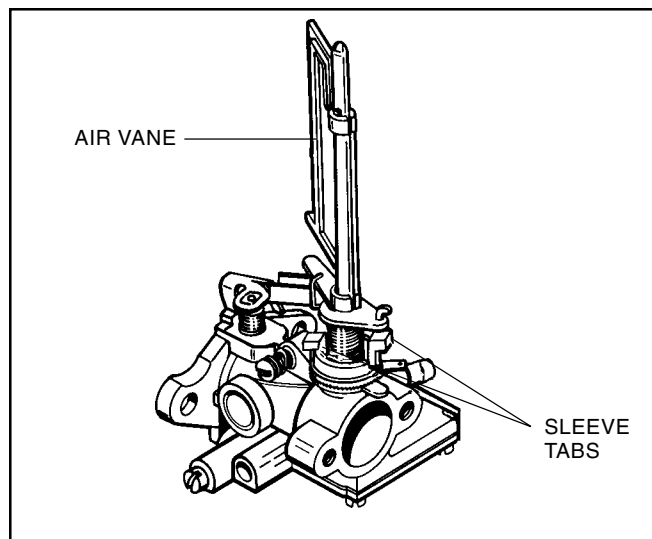
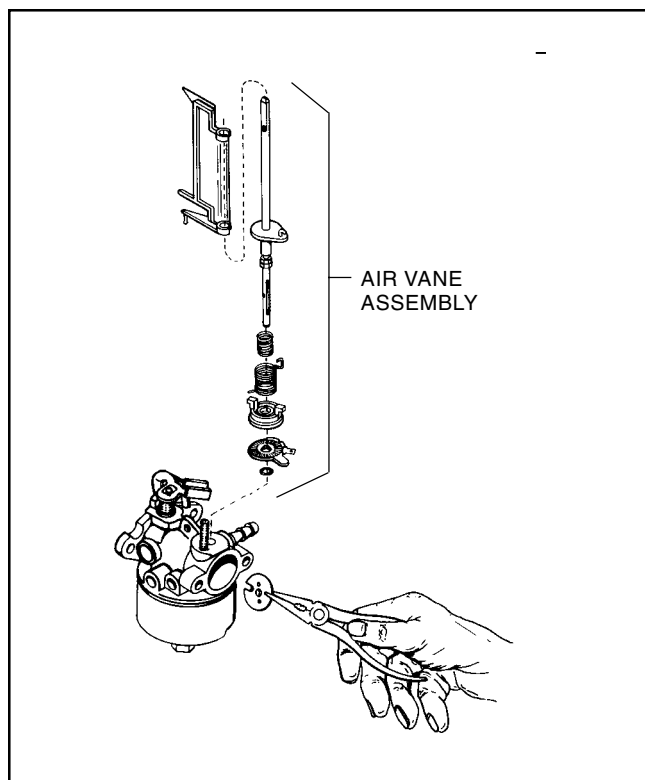
AIR VANE GOVERNORS. All Tecumseh 2 cycle engines covered in this book are equipped with pneumatic (air vane) governors. The governor's function is to maintain a R.P.M. setting when engine loads are added or taken away. Air vane governors are controlled by the air velocity created by fins on the flywheel. Changes in the engine R.P.M. cause the air vane to move. The throttle is opened as the engine R.P.M. drops and is closed as the engine load is removed.

OPERATION

Engine R.P.M. changes cause an increase or decrease in the air velocity created by the fins on the flywheel. The air velocity exerts pressure on the air vane while a governor spring exerts pressure against the air velocity force. The air vane pivots on the engine flange or is attached to the throttle shaft of the carburetor. As an engine load is applied and the engine's R.P.M. drop, the air velocity also drops, allowing the governor spring to pull open the throttle shaft and increase engine speed.

LINKAGE INSTALLATION. The best method is to record the linkage attachment points prior to disassembly and reinstall the same way.

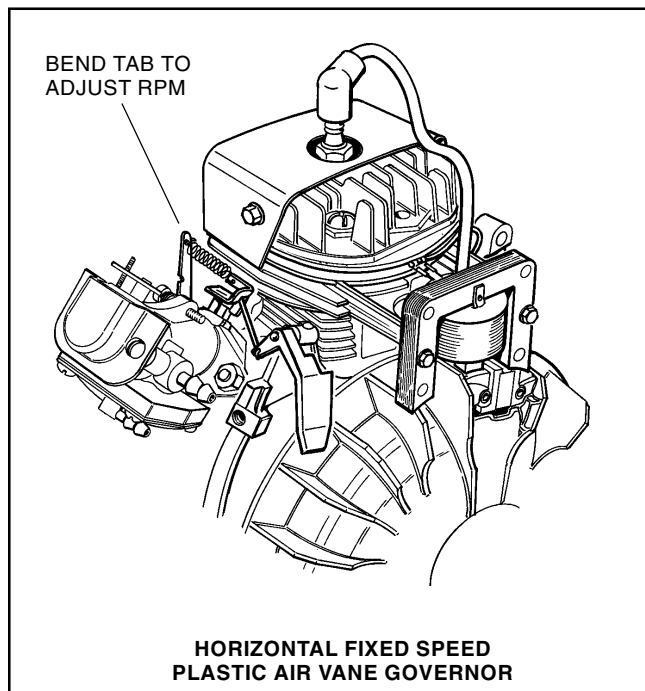
Illustrations showing most governor and linkage hookups are pictured in this section. Select the diagram that resembles the engine you are servicing. R.P.M. settings may be found in microfiche catalog, card number 30.

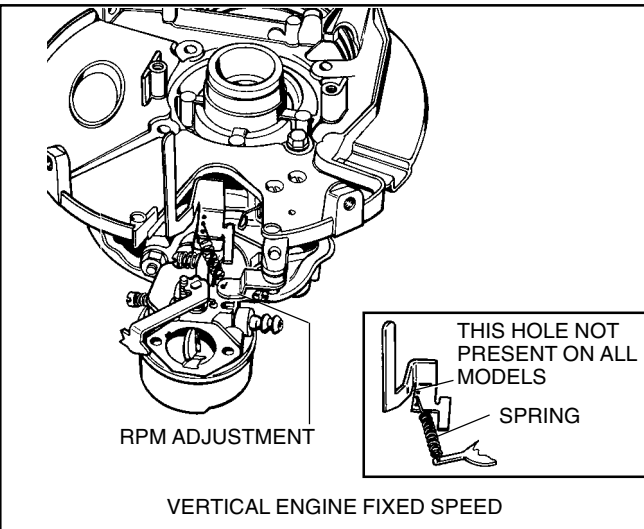
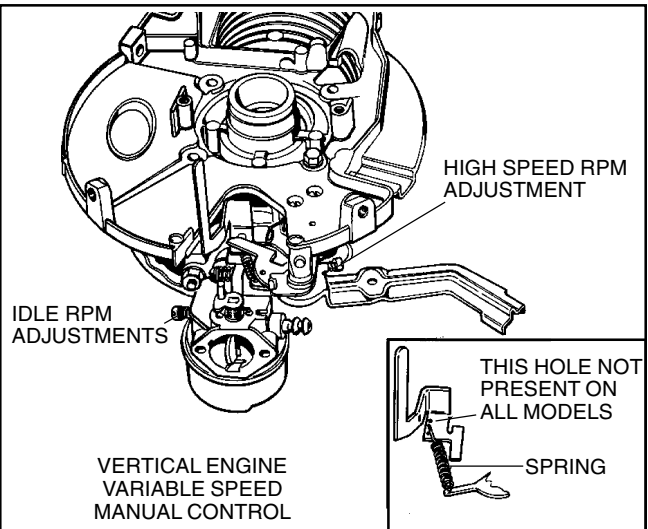
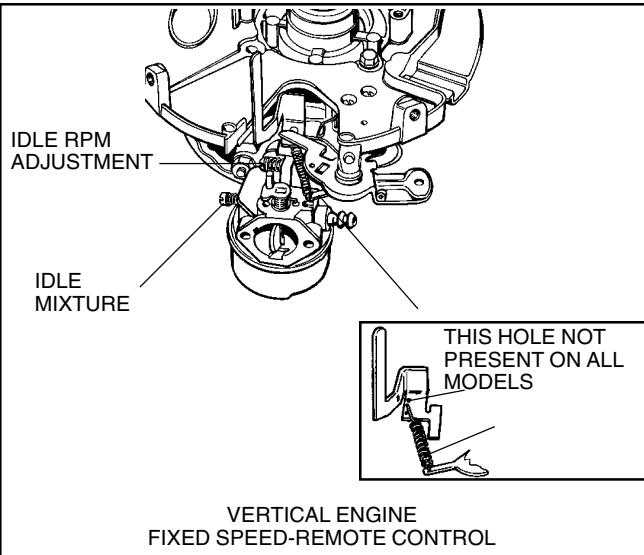
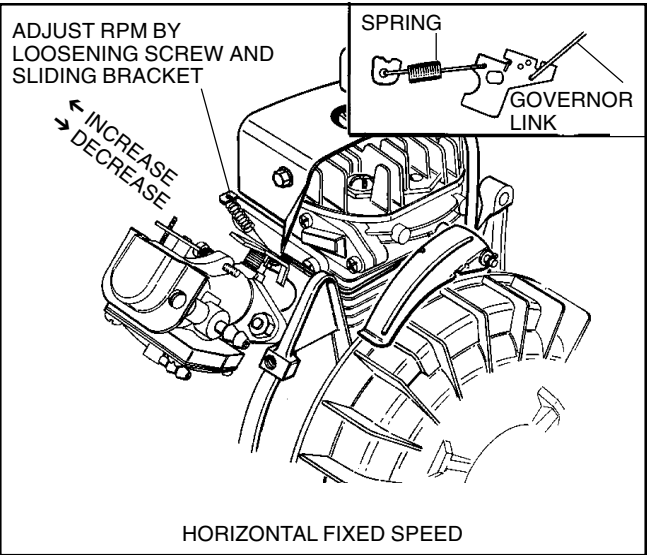
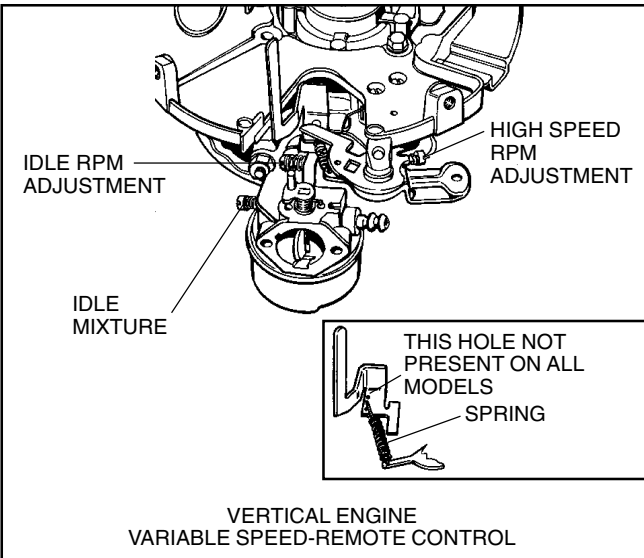
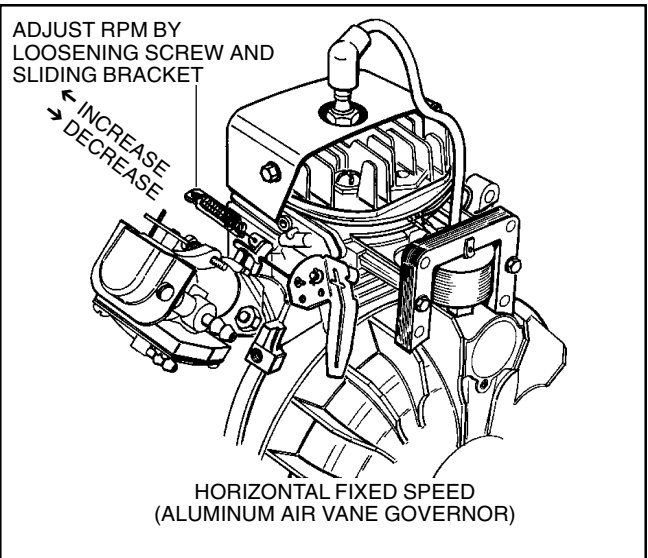


Rotate sleeve clockwise to increase R.P.M.; counterclockwise to decrease R.P.M.

NOTE: The sleeve is serrated to rotate in a clockwise direction and must be raised using the sleeve tabs before it can be rotated counterclockwise.

To disassemble, remove choke shutter with needle-nose pliers; the vane assembly may then be removed from the carburetor.





REWIND STARTERS, ELECTRIC STARTERS AND ALTERNATORS

REWIND STARTERS

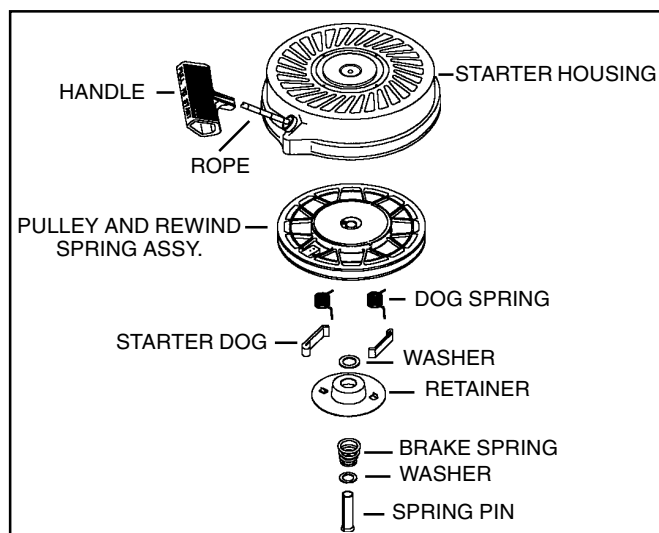
GENERAL INFORMATION

Rewind starters used on vertical shaft Tecumseh engines are top mount horizontal pull style or side mount vertical pull style. Horizontal shaft engines use side mounted starters which can be mounted to pull either vertically or horizontally. All rewind starters except the vertical pull style turn the engine over by engaging a dog(s) into the starter cup attached to the engine flywheel. The vertical pull starter engages the starter gear into the ring gear of the flywheel to turn the engine over. All starters are spring loaded to retract the dog(s) or starter gear when the engine speed exceeds the turning speed of the starter.

OPERATION

As the starter rope is pulled, the starter pulley rotates on the center pin. The starter dog(s) is pinned or pocketed in the pulley hub and extends outward when the pulley's rotation forces the starter dog(s) to contact the ears on the retainer. The retainer ears act as a ramp to fully extend the starter dog(s). The fully extended starter dog(s) locks in contact with notches in the starter cup. When the engine fires and the rotational speed of the starter cup exceeds the starter pulley, the starter dog(s) disengages from the starter cup. The starter dog spring(s) returns the starter dog(s) to the disengaged position. The recoil spring turns the starter pulley in the opposite direction, retracting the starter rope until the handle contacts the stop.

COMPONENTS



SERVICE

Starter related problems will require the starter to be removed from the engine to diagnose the cause. Visually inspect the starter dog(s), starter cup, retainer, springs, rope, washers, and the starter pulley for wear or breakage. Use one of the following procedures that applies to your application, to disassemble, repair, and assemble the starter. Always consult the Tecumseh Master Parts Manual for the correct replacement parts.

ROPE SERVICE

Rope replacement should be done using the correct part number replacement rope or braided rope of the correct diameter and length. Consult the Tecumseh Master Parts Manual to obtain the correct part number, length, and size required. Use the following rope chart to convert a numbered rope to a fractional diameter for bulk rope use.

# 4 1/2 rope	= 9/64" (3.572 mm) diameter
	Part No. 730526 - 100' (30.48 meters) spool
# 5 rope	= 5/32" (3.964 mm) diameter
	Part No. 730514 - 100' (30.48 meters) spool
# 6 rope	= 3/16" (4.762 mm) diameter
	Part No. 730516 - 100' (30.48 meters) spool

Standard rope lengths

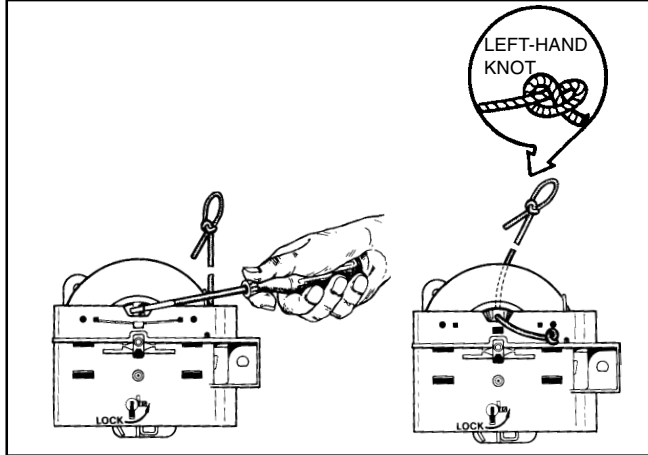
54" (16.5 meters)	standard stamped steel starter
61" (18.6 meters)	vertical pull - horizontal engagement type
65" (20 meters)	vertical pull - vertical engagement type
85" (26 meters)	extended handlebar rope start (compliance)

Check the old rope for the right length for the application. Some applications require longer lengths. The rope ends should be cauterized by burning with a match and wiping the rope end with a cloth while hot.

Rope replacement can be done without the starter being disassembled on vertical pull starters that have "V" notches in the bracket. Use the following procedure for rope replacement.

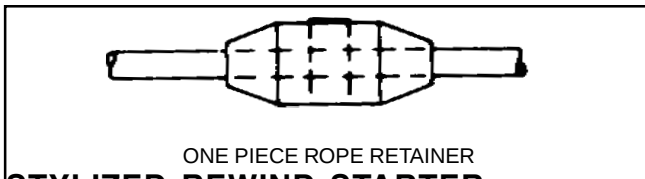
1. Remove the starter assembly from the engine.
2. Turn the pulley until the staple in the pulley lines up with the "V" notch. Pry out the staple with a small screwdriver and remove the original rope.

3. Turn the pulley counterclockwise to fully wind the starter return spring until tight. Allow the pulley to unwind until the hole in the pulley lines up with the "V" notch.
4. Hold the pulley in this position and feed the new rope through the hole and tie a left-handed knot on the rope end. Make sure the rope and knot do not protrude from the knot cavity and bind the pulley rotation.



RETAINER REPLACEMENT

1. Remove the starter handle if the retainer is a complete circle design. Remove the staple and old retainer.
2. Slide the rope retainer into the proper position and insert the staple using a pliers.
3. Install the starter handle and tie a left hand knot to secure the handle.



STYLIZED REWIND STARTER Disassembly Procedure

1. After removing the rewind assembly from the engine blower housing, release the tension on the rewind spring. This can be done by removing the starter handle and carefully allowing the rope to unwind in the starter housing assembly.
2. Place a 1" (25 mm) deep well socket under the retainer. Set the rewind on a bench, supported on the socket.
3. Use a 5/16" (7.938 mm) or 1/4" (6.35 mm) (for stamped steel) roll pin punch to drive out the center pin. The stamped steel center pin is driven out from the top, inside the center hole. Move the punch around while driving the pin to help keep the pin straight.

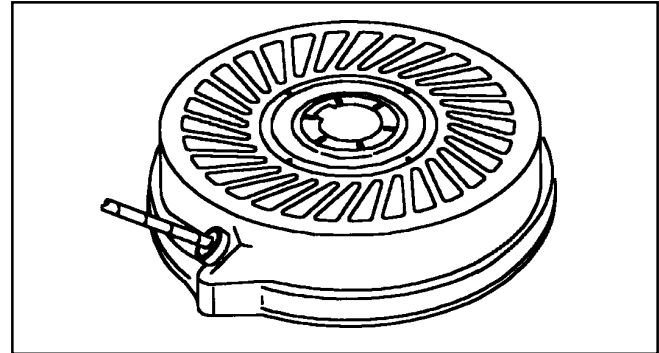
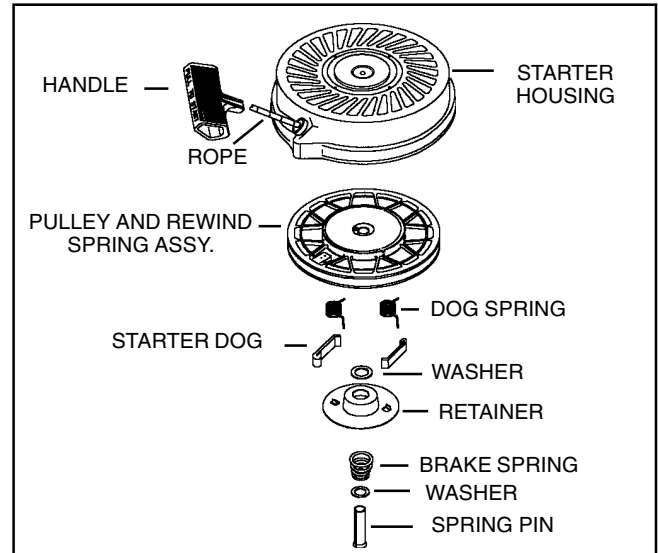


CAUTION: THIS REWIND SPRING IS NOT SECURED IN A CANISTER. PULLEY BOSSES HOLD THE REWIND SPRING AND COVER, AND CAN BE EASILY DISLODGED DURING HANDLING.

4. Remove the brake spring, spring retainer, washers, and pulley assembly (diag. 7, 8, 9 & 10)

NOTE: The starter dogs face out on the stamped steel starter and the dogs face in on the stylized rewind starter.

5. All components in need of service should be replaced.



ASSEMBLY PROCEDURE

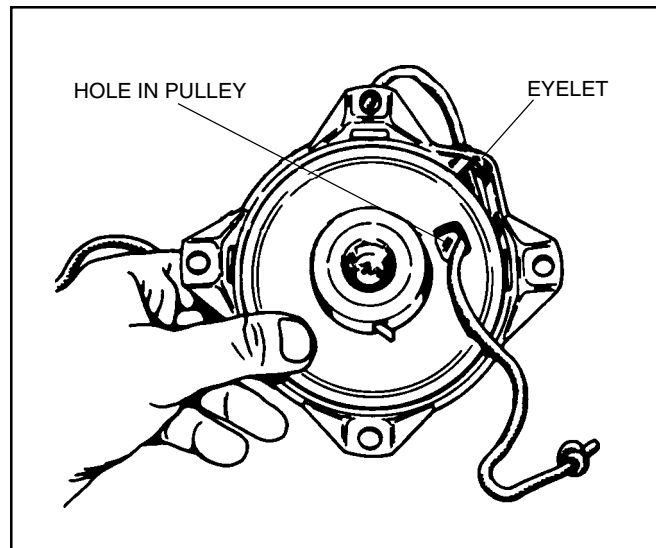
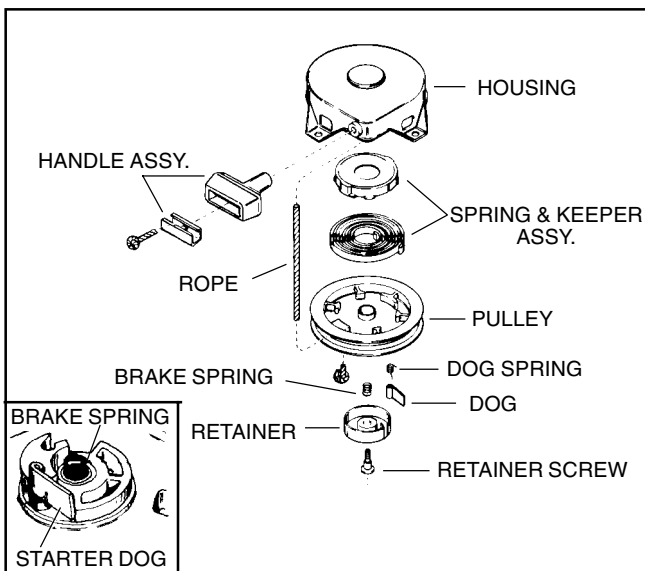
NOTE: It is critical to support the starter on a deep well socket to prevent damage.

1. Reverse the disassembly procedure. The starter dogs with the dog springs must snap back to the center of the pulley (disengaged position). When the rope is pulled, the tabs on the retainer must be positioned so that they will force the starter dogs to engage the starter cup. (diag. 7 & 8)
2. Always replace the center spring pin with a new one upon reassembly. Place the two new plastic washers between the center leg of the starter and the retainer. New plastic washers are provided with a new center spring pin. Discard the old plastic washer.
3. Place the rewind on a flat surface and drive the new center pin in until it is within 1/8" (3.175 mm) of the top of the starter.

NOTE: DO NOT DRIVE THE CENTER PIN IN TOO FAR.

The retainer will bend and the starter dogs will not engage the starter cup. On the stamped steel starter the center pin should be driven in until it contacts the shoulder in the starter body.

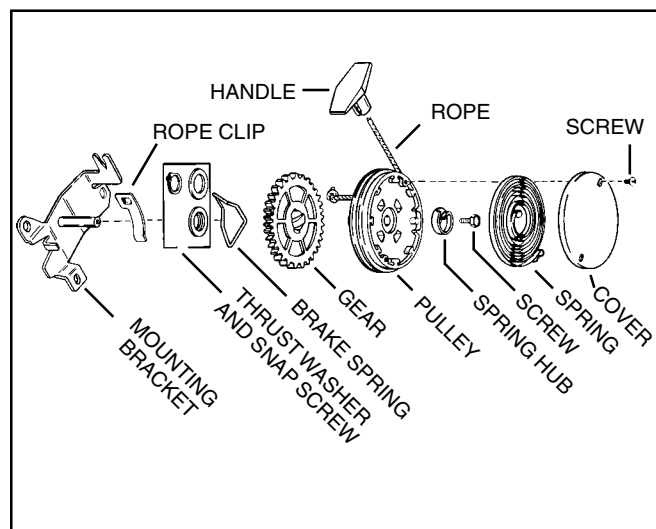
4. Wind the starter pulley counterclockwise four or five turns to pre-load the recoil spring, thread the rope through the starter housing eyelet and tie a temporary knot in the rope. Reattach the starter handle to the rope using a left-hand knot. Untie the temporary knot and allow the rope to recoil.



VERTICAL PULL STARTER HORIZONTAL ENGAGEMENT TYPE

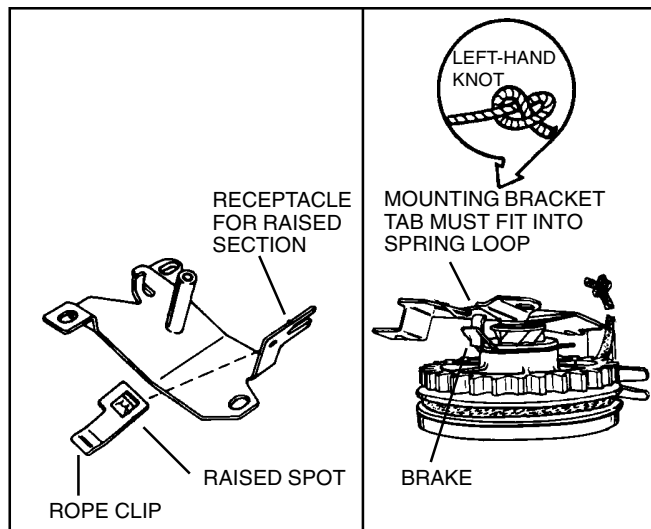
DISASSEMBLY PROCEDURE

1. Remove the handle and relieve the starter spring tension by allowing the rope to slip past the rope clip.
2. Remove the spring cover by carefully removing the two small screws. Carefully take out the spring.
3. Remove the center hub screw and the spring hub.
4. Lift off the gear and pulley assembly. Disassemble the pulley assembly by removing the snap ring and washer (diag. 13).
5. Remove the starter rope if necessary. Replace all worn or damaged parts.



Assembly Procedure

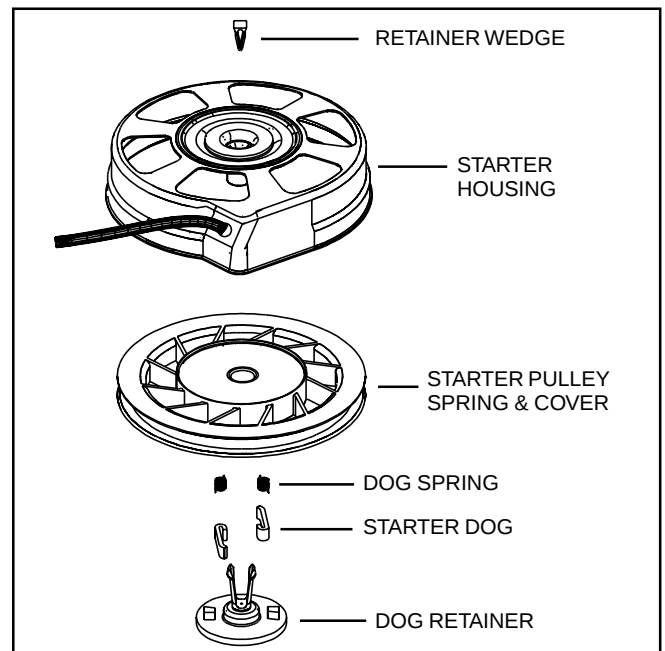
1. Insert the rope through the starter pulley.
2. Assemble the gear, pulley, washer, and snap ring.
3. Place a small amount of grease on the center shaft, place the gear and pulley into position making sure the brake spring loop is positioned over the metal tab on the bracket. The rope clip must fit tightly onto the bracket. The raised section fits into the hole in the bracket.
4. Install the hub and hub screw. Torque the hub screw to 45 - 55 in. lbs. (5 - 6 Nm). A loose hub screw will prevent the rope from retracting.
5. Install the return spring if necessary. A replacement spring is installed by placing the spring and its retainer over the top of the pulley and pushing the spring out of the retainer into the pulley's recessed area.
6. Install the spring cover and the cover screws.
7. Wind the rope onto the pulley by slipping it past the rope clip. When the rope is fully wound on the pulley, wind the pulley assembly two additional turns to put tension on the spring.
8. Mount the starter on the engine making sure the top of the starter gear teeth are no closer than 1/16" (1.59 mm) from the top of the flywheel ring gear teeth.



STYLIZED REWIND STARTER WITH PLASTIC RETAINER

DISASSEMBLY PROCEDURE

1. After removing the rewind assembly from the engine blower housing, remove the starter handle by first pulling a length of rope out using the handle, tying a temporary knot in the exposed rope, and either untying the knot in handle or prying out the staple.
2. Untie the temporary knot and slowly allow the rope to fully retract into the starter housing and the recoil spring to fully unwind.
3. Remove the decal from the center of the starter housing.
4. Use a small Phillips screwdriver or similar tool to pry the retainer legs apart and lift out the retaining wedge.
5. Pinch the legs of the retainer together and pull on the head of the retainer to remove it from the housing.
6. Remove the pulley assembly from the recoil housing.
7. Repair or replace as necessary.



ASSEMBLY

1. If replacing the starter rope, see Step 8.
2. Install a new recoil spring if necessary by pushing the new spring out of the holder into the pulley cavity while aligning the outside spring hook into the deep notch in the pulley. Push the spring cover in until seated.
3. Apply a small amount of lithium grease to the inner bore of the center shaft.
4. Replace or check that both starter dogs are in the pulley pockets and that the dog springs are hooked on the outer surface of the dog.

5. Pinch the two legs of the plastic retainer together and start into the center shaft hole.
6. Rotate the retainer so the two tabs on the bottom of the part fit between the dog and pulley hub (left side of the dog). Push the retainer in until the leg prongs pop out of the center shaft.
7. Turn the starter over and snap the locking tab between the retainer legs, replace the top decal.

NOTE: Refer to Service Bulletin 122 for metal locking tab.

8. Wind the starter pulley counterclockwise four or five turns to pre-load the recoil spring and thread the rope through the starter housing eyelet. Pull enough rope through to tie a temporary knot in the rope. Reattach the starter handle to the rope using a left-hand knot. Untie the temporary knot and allow the rope to recoil.

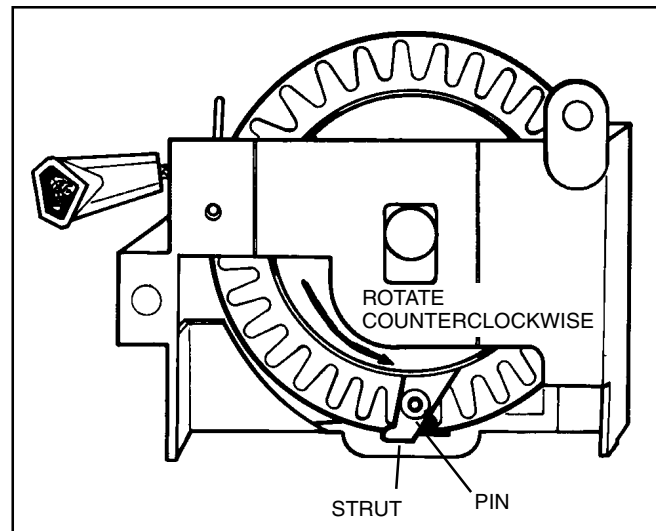
VERTICAL PULL STARTER, VERTICAL ENGAGEMENT TYPE

DISASSEMBLY PROCEDURE

1. Pull out enough rope to lock the rope in the "V" of the bracket.
2. Remove the handle if necessary by prying out the small staple in the handle with a screwdriver.
3. Place the starter bracket on the top of a deep well socket that is large enough to receive the head of the center pin. Use an arbor press to drive out the center pin.
4. Rotate the spring capsule strut until it is aligned with the legs of the brake spring. Insert a nail or pin no longer than 3/4" (19.05 mm) through the hole in the strut so it catches in the gear teeth. This will keep the capsule in the wound position.
5. Slip the sheave out of the bracket.

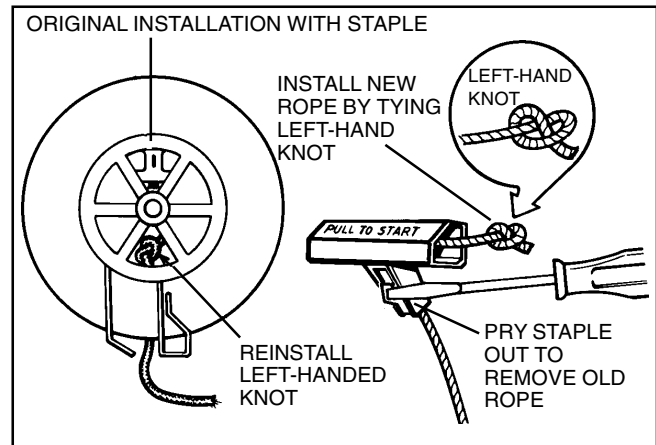
CAUTION: DO NOT ATTEMPT TO REMOVE THE SPRING CAPSULE FROM THE SHEAVE ASSEMBLY UNLESS THE SPRING IS FULLY UNWOUND.

6. Squeeze and hold tightly by hand the spring capsule at the outer edge against the gear sheave.
7. Remove the retainer pin from the strut and slowly relieve the spring tension by allowing the spring capsule to rotate slowly under control, until completely unwound. The spring capsule can now be removed from the gear sheave.

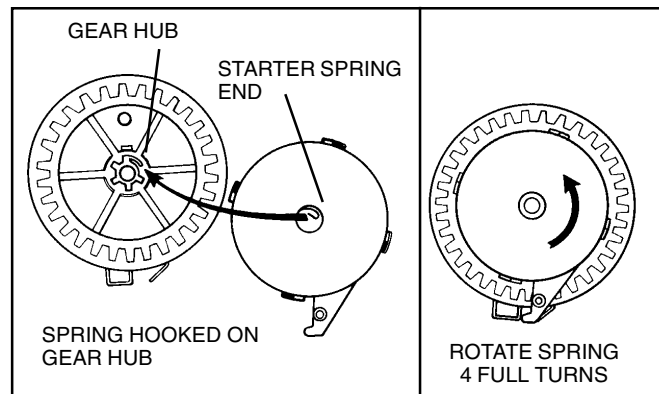


ASSEMBLY PROCEDURE

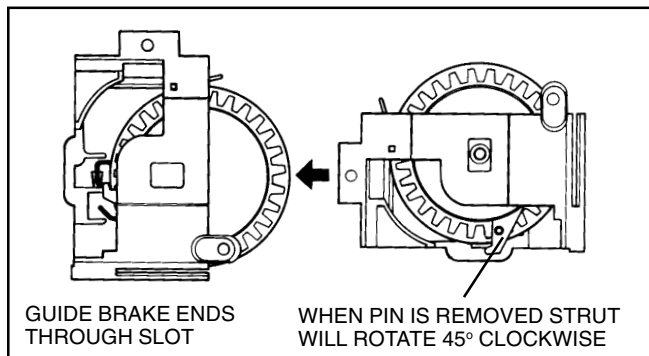
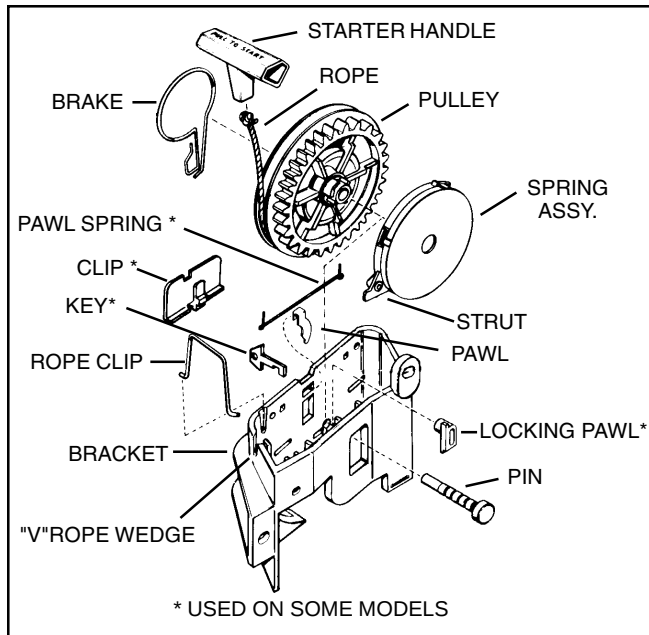
1. Feed the new rope through the hole and tie a left-handed knot on the rope end. Make sure the rope and knot do not protrude from the knot cavity and bind the pulley rotation.



2. Wind the rope on the sheave assembly clockwise, viewing the gear from the gear side of the sheave.
3. Reinstall the brake spring, being careful not to spread the spring more than necessary.
4. Install the spring capsule, making sure the starter spring end hooks on the gear hub.
5. Wind the spring four full turns and align the brake spring legs with the strut as shown. Insert the pin in the strut.

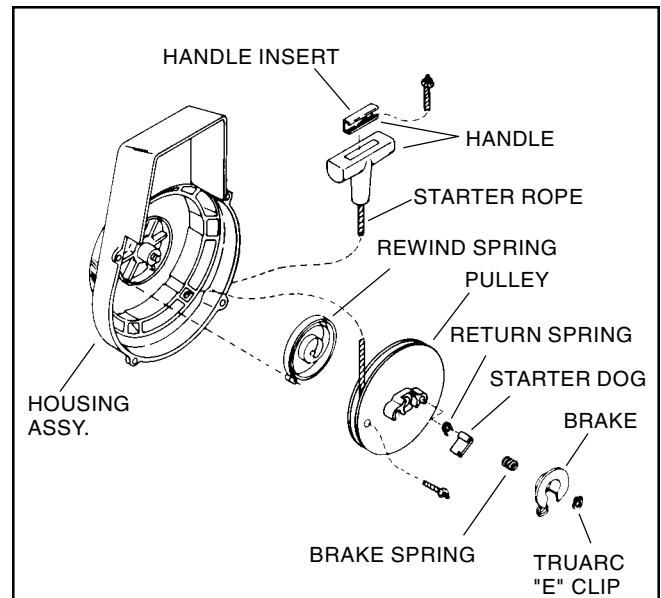


6. If the starter is equipped with a locking or delay pawl and spring, make sure these are in place before grasping the gear and spring capsule assembly and sliding it into the bracket. Make sure the legs of the brake spring are positioned in the slots of the bracket.
7. Feed the rope end under the rope guide and hook it into the "V" notch. Remove the pin and the strut will rotate clockwise against the bracket.
8. Insert the new center pin by pressing or driving the pin firmly in place. Reinstall the starter assembly on the engine.



REWIND STARTER MOUNTED IN HOUSING DISASSEMBLY PROCEDURE.

1. Pull rope out to untie knot in rope and slowly release spring tension.
2. Remove "E" clip, brake, brake spring, starter dog and return spring.
3. Lift out pulley; rewind spring is located in the housing. Replace all worn or damaged parts.

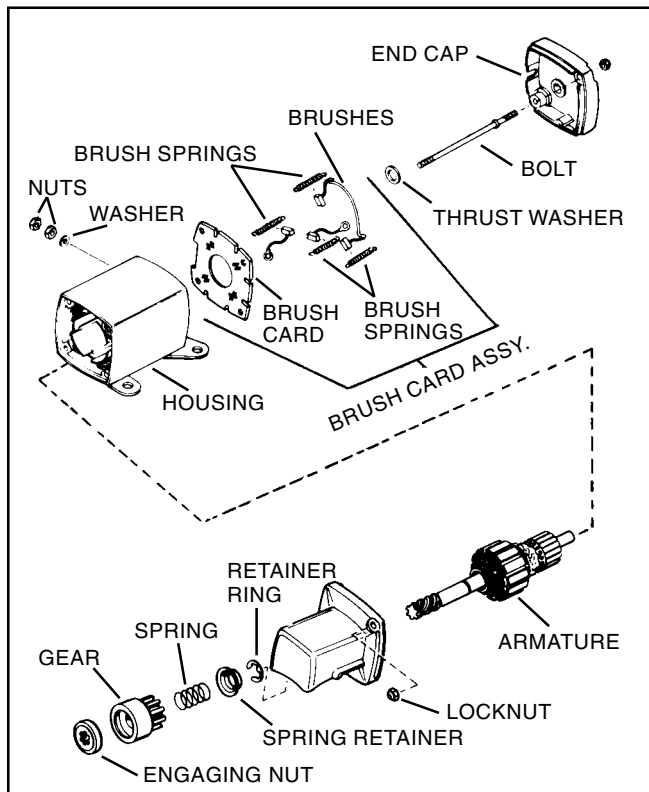


ASSEMBLY PROCEDURE.

1. Hook loop of spring into housing and wind in housing in a counterclockwise direction. The spring should have a light coating of grease on it.
2. Place pulley into housing.
3. Install dog spring and dog in starter pulley in the socket closest to the rope hole in pulley.
4. Replace brake spring, brake and install "E" clip.
5. To put tension on spring, wind pulley counterclockwise until tight, then allow to unwind until the hole in the pulley lines up with the eyelet in housing, then install rope and handle.

ELECTRIC STARTERS

The following electric starter illustrations will not be identical in configuration to the starter being serviced, but tests apply unless otherwise stated. Starters labeled CSA cannot be serviced, except for external components.



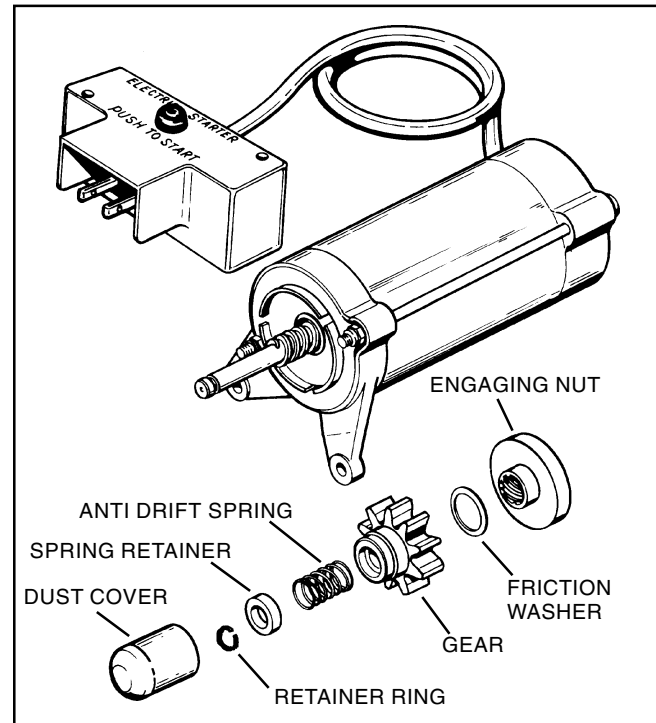
DRIVE ASSEMBLY SERVICE. Pinion gear parts should be checked for damage or wear. If the gear sticks on the shaft, it should be washed in solvent to remove dirt and grease, then dried thoroughly. If damaged, replace with new parts.

On units with the gear under the cap assembly, use the following procedure for disassembly:

1. Remove retainer ring from armature shaft.
2. Remove the two nuts from the through bolts holding on the cap assembly.
3. Slide off the cap assembly. The engaging nut, gear, spring and spring retainer will remain in the cap assembly.
4. Remove, inspect, and replace as necessary.

Use reverse procedure for assembly.

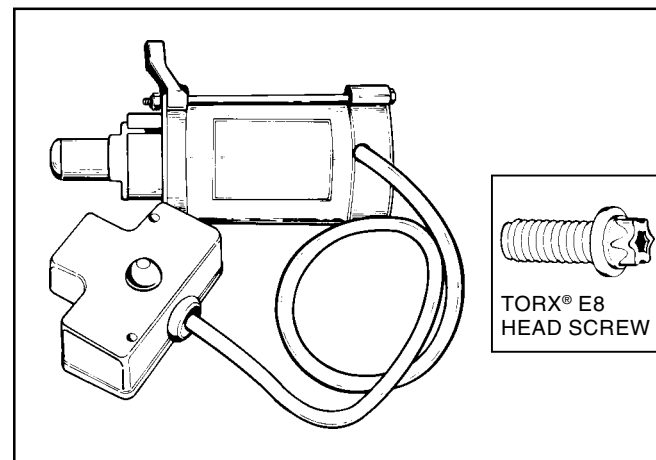
The following starter, number 590556, is a sealed UL and CSA approved starter, and the only component that can be serviced is the drive assembly.



To disassemble the drive assembly, use the following procedure:

1. Remove plastic dust cover.
2. Push down spring retainer and remove retainer ring.
3. Slide off spring retainer, anti-drift spring, gear, friction washer, and engaging nut. Inspect and replace as necessary.

Use reverse procedure for assembly.

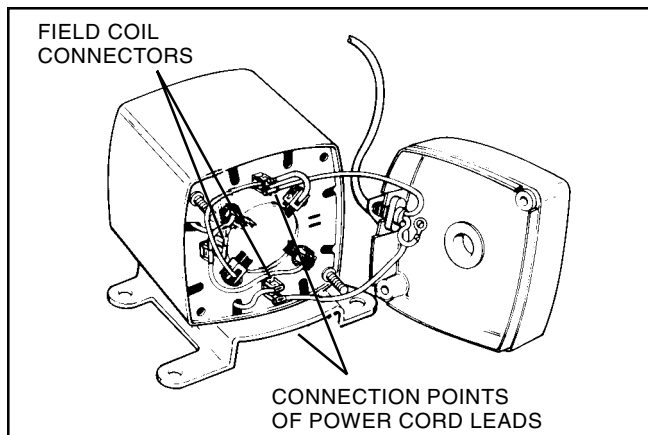


The 590556 Electric Starter uses a mounting screw with a Torx® E-8 head. To torque this screw you must use a 670307 Torx® E-8 socket.

STARTER CHECKING AND SERVICE. Remove nuts at both ends of the starter and take off rear end cap.

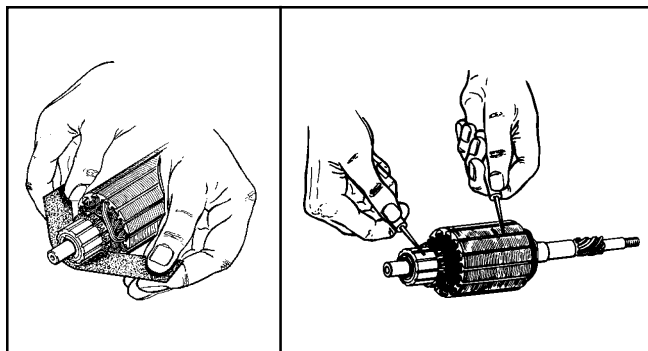
CHECK BRUSHES. Before removing the armature, check brushes for wear. Make sure brushes are not worn to the point where the brush wire bottoms out in the slot of the brush holder. Brush springs must have enough strength to keep tension on the brushes and hold them against the commutator.

If brushes need replacement, remove by unhooking the terminals or cutting the connections and then resoldering. If the brush card is warped from overheating, replace the card assembly.



CHECK FIELD. Using a continuity light or ohmmeter, check the field by attaching one lead to each field coil connection. Continuity should exist between these two points. Check continuity between each field coil connection and the starter housing. No continuity should exist.

ARMATURE CHECK. If the commutator bars are glazed or dirty they can be turned down on a lathe. While rotating, hold a strip of 00 sandpaper lightly on the commutator, and moving it back and forth. (Do not use emery cloth). Recut the grooves between the commutator bars to a depth equal to the width of the insulators.



Use a continuity tester to make certain no continuity exists between the commutator (copper) and the iron core of the armature, rotate armature and check out all commutator bars.

The armature can be thoroughly checked with a growler if available.

TROUBLESHOOTING STARTERS.

STARTER DOES NOT FUNCTION. Check for:

1. No current to the starter caused by faulty connections or blown circuit breaker.
2. Faulty safety switches, ignition, starter switch, or solenoid.
3. Engine locked up or parasitic load on engine.
4. Shorted, open, or grounded field coil.
5. Open, shorted, or bent armature.
6. Brushes sticking or damaged.
7. Dirty or oily brushes or commutator.

STARTER CRANKS ENGINE SLOWLY. Check for:

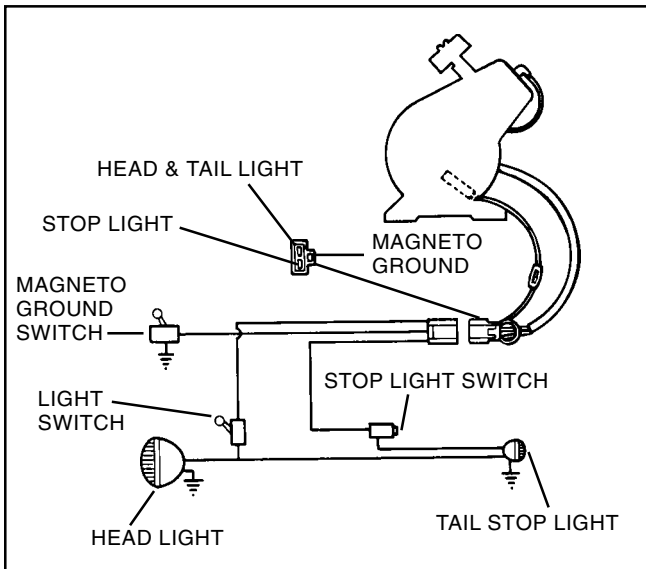
1. Parasitic load or "tight" engine.
2. Worn brushes or weak brush springs.
3. Dirty, oily, or worn commutator.
4. Worn bearings in cap assemblies.
5. Defective armature.

STARTER SPINS, ENGINE DOES NOT CRANK. Check for:

1. Pinion gear sticking on shaft.
2. Damaged pinion or flywheel ring gear.

ALTERNATORS

Some engines are equipped with an alternator and regulator to supply current to power head lights, tail lights, etc. on recreation vehicles. Shown here is a typical wiring diagram.



CHECKING THE SYSTEM. At an idle speed (2600 R.P.M.) a slight dimming of the lights will be noticed, This is normal and should not be considered faulty.

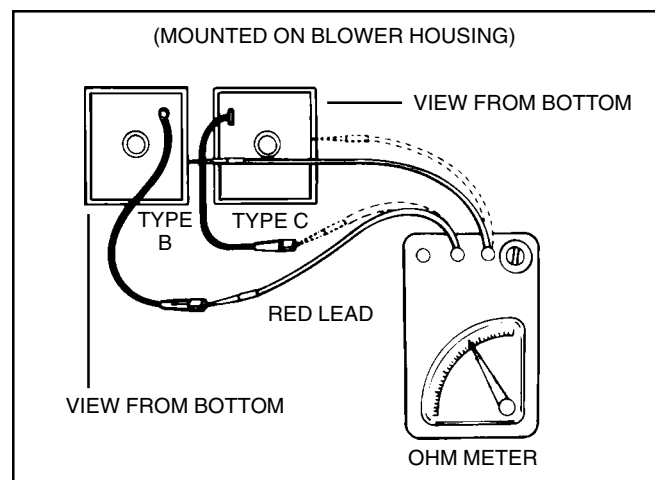
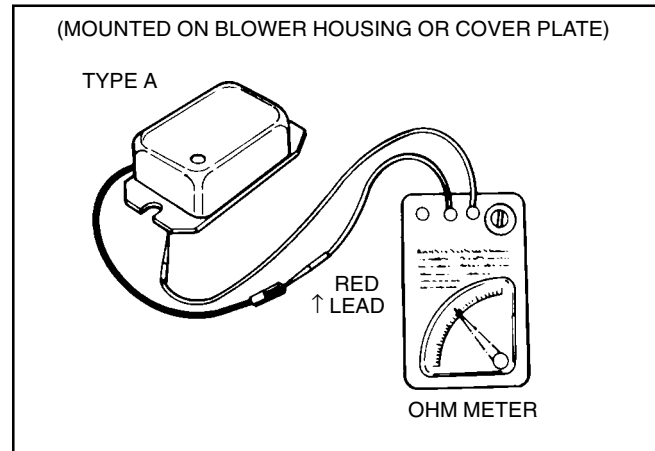
Before going into extensive checks, be sure to examine the more basic causes first, such as:

1. Make sure bulbs are good and the right ones are being used. Number 1157 for tail & stop light; 4416 or 4420 for head lights.
2. Corroded terminals.
3. Cracked wire insulation.
4. Broken wires.
5. Broken wires covered by insulation.
6. A wire grounding out the system.
7. Loose connections.
8. Make sure regulator has good ground.
9. Faulty Switch.

Check the regulator for resistance. If regulator checks out and all bulbs and wiring are ok, replace alternator coils.

Three types of regulators have been utilized. Use the ohm readings in the chart below for the type that you are servicing. Readings should be as follows:

Type A	Type B	Type C
100 to 200 Ohms	Over 50,000 Ohms	100 to 200 Ohms



FLYWHEEL (INSIDE-EDGE) BRAKE SYSTEM

Tecumseh's brake systems provide two methods of meeting compliance standards which has become a Federal law as of June 30, 1982. There are two additional methods used by equipment manufacturers that also meet compliance standards, they are:

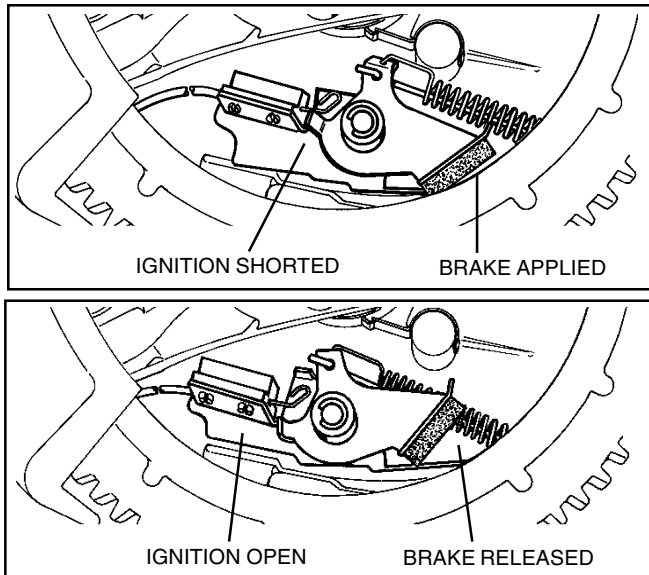
1. Use of the blade brake clutch in conjunction with either a top or side mounted recoil starter. The blade stops within three seconds after the operator lets go of the blade control bail at the operator position and the engine continues to run. Starter rope handle is on the engine.
2. Use of a recoil starter (top or side mounted) with the rope handle on the engine as opposed to within 24 inches from the operator position. This method is acceptable if the mower deck passes the 360 degree foot probe test. A specified foot probe must not contact the blade when applied completely around the entire blade housing. This alternative can be used with engine mounted brake systems and typical bail controls. The blade stops within three seconds after the operator lets go of the blade control bail at the operator position and the engine is stopped.

Tecumseh's Flywheel (Inside-Edge) Brake System provides consumer safety by shutting down the engine and lawnmower blade within seconds after the operator releases the Engine/Blade control at the handle of the lawnmower.

INSIDE EDGE SYSTEM

In the stop position the brake pad is applied to the inside edge of the flywheel, at the same time the ignition system is grounded.

In order to restart the engine, the brake control must be applied. This action pulls the brake pad away from the inside edge of the flywheel and opens the ignition kill switch. On electric start systems the starter is energized by an ignition switch or a two motion control. On non-electric start systems, the recoil starter rope must be pulled to start engine.



COMPONENTS

The Inside Edge system uses the following components:

The **brake lever and pad** assembly consists of a steel lever with a brake pad bonded to the lever.

The **ignition kill switch** is a plastic block with a wire extending out of it. The wire is attached to a terminal which is connected to the ignition kill wire. The brake lever contacts and grounds the wire of the switch when the engine / blade control is released, and the ignition module is grounded. This in turn kills the ignition.

The **interlock switch** is a push button switch that is activated by the brake lever when the engine / blade control is actuated. If there is a starter switch used to start the engine, the interlock switch acts as a safety switch and will not allow the starter to crank unless the engine / blade control is depressed.

Where a two motion control is used the interlock switch is utilized as the starter switch.

The **Torsion Spring** supplies the pressure to the brake lever and brake pad to stop the flywheel.

The **Control Cable** transfers the motion of the engine / blade control to the brake system.

SERVICE

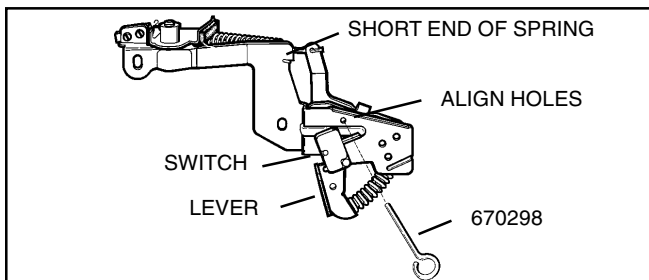
If the brake system fails to kill the ignition and stop the blade within 3 seconds the following service procedures should be followed.

Remove the flywheel as outlined in "IGNITION" section.

NOTE: BEFORE THE FLYWHEEL IS REMOVED OR REPLACED, THE BRAKE PRESSURE ON THE FLYWHEEL MUST BE RE-LEVELLED AS OUTLINED.

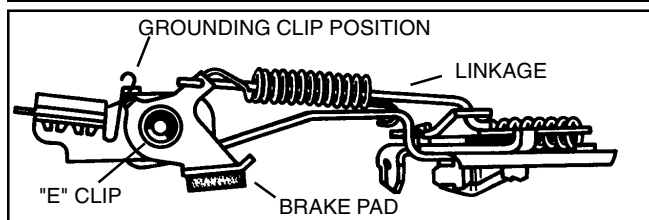
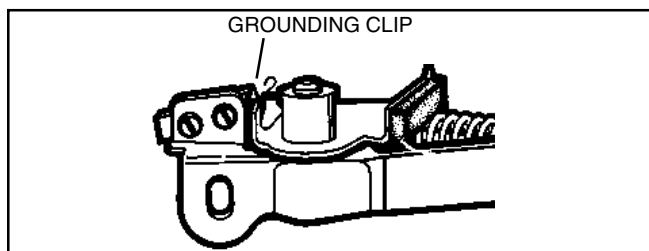
INSIDE EDGE

To relieve the brake pressure on the flywheel, compress the spring by moving the lever toward the spark plug, when the hole in the lever aligns with the hole in the bracket, secure the lever with alignment tool 670298 then remove the flywheel (diag. 7). Remove the alignment tool. Release the spring tension by unhooking the short end of the spring from bracket with a pliers. Remove the "E" clip from the brake pad shaft. Slide the pad lever from the shaft and unhook the link. Inspect the brake pad for dirt, oil or grease contamination. If the pad is contaminated, or if there is less than .060" (1.524 mm) of brake pad material at the pad's thinnest point, replacement is necessary. The brake pad is bonded to the brake lever and must be replaced as an assembly. Rehook the link, install the brake lever and pad assembly, install the "E" clip, rehook the short end of the spring and continue to reassemble the brake system in the reverse order of disassembly.



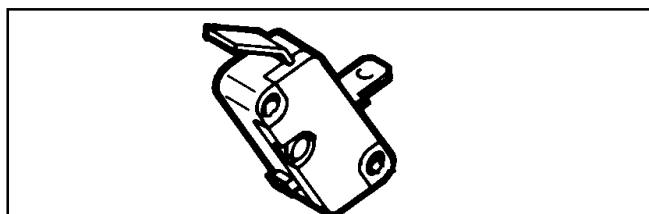
IGNITION GROUND OUT TERMINAL

Inspect the ignition kill switch grounding clip for proper alignment and contact with the brake arm. Insure that all electrical connections are clean and secure.

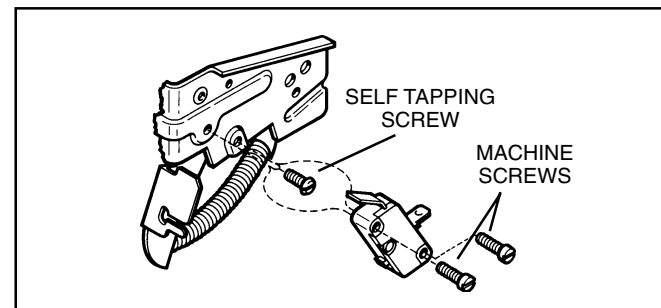


STARTER INTERLOCK SWITCH

The engine / blade control must close the interlock switch before the starter can be engaged. To check the interlock switch, use an ohmmeter or continuity light to perform a continuity check. Continuity should exist between the two terminals when the interlock switch button is completely depressed. No continuity should exist when the button is released. If the switch fails replace the switch.



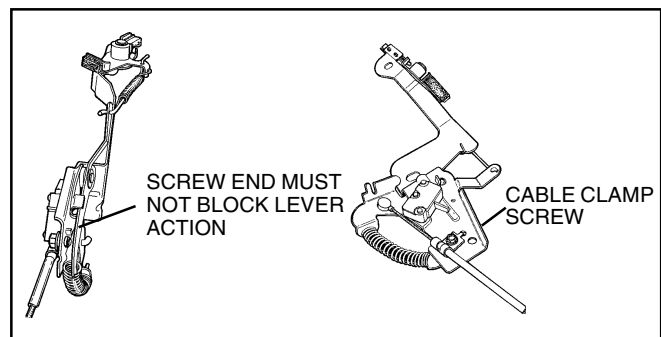
To replace the interlock switch, carefully grind the heads off of the rivets that fasten the interlock switch to the brake bracket. Remove the rivets from the back side of brake bracket. Use the self-tapping screw supplied with the new switch to make threads in the bracket. Install the interlock switch onto the brake bracket in the proper position and secure the switch to the brake bracket with the machine screws supplied. Be careful not to overtighten the screws as switch breakage can occur.



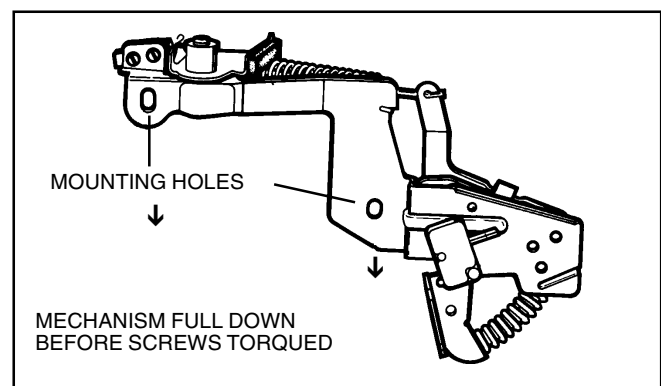
CONTROL CABLE

INSIDE EDGE

If replacing the cable conduit screw with a screw other than a service part replacement, be certain that the screw length is not too long as to prevent free travel of the lever. Make sure the button on the starter interlock switch is completely depressed when the control is fully applied. The cable must provide enough travel so the brake will contact the flywheel. Some slack should exist in the cable adjustment to compensate for brake pad wear.



When installing a inside edge brake bracket assembly, be sure the slotted holes in the brake bracket are all the way down on the fasteners. This will properly align the brake bracket to the flywheel brake surface.



IGNITION

IGNITION OPERATION

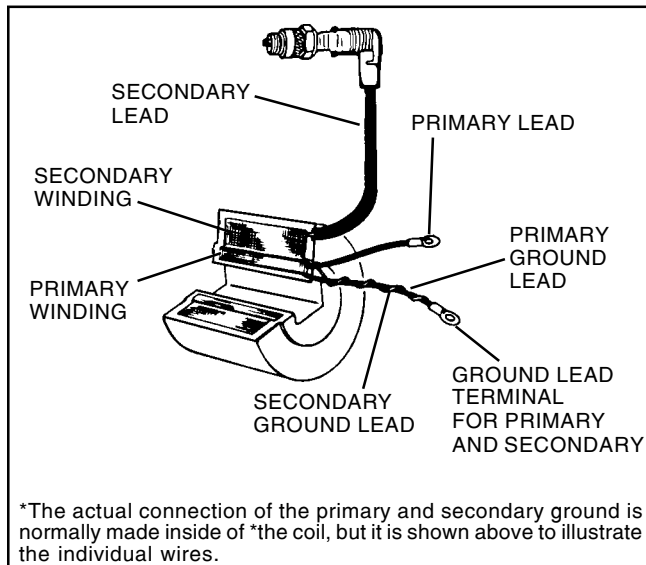
(PRE-1985 Production)

MAGNETO IGNITION. Tecumseh's magneto ignition consists of a stator assembly made up of a coil, laminations, contact points, condenser, and a permanent magnet mounted in the flywheel of the engine.

COIL: The coil consists of a primary and a secondary winding of wire. The primary is the low voltage (200-300 volts) primary winding consists of about 150 turns of heavy gage wire next to the core. One end of the primary is connected to the insulated contact point and the other end is grounded to the stator body.

The secondary winding consists of extremely fine wire with many turns (about 10,000) wrapped over the primary windings. One end connects to the spark plug and the other end is grounded to the stator body.

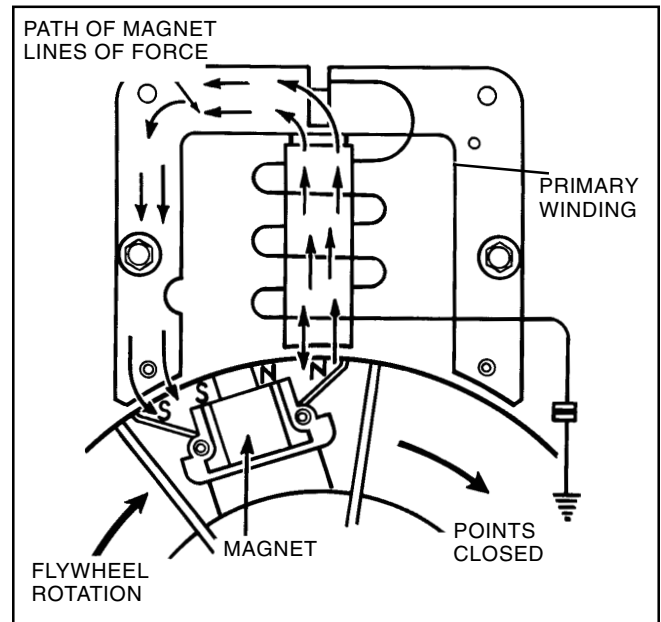
The coil is used as a transformer to increase the primary voltage to a high voltage (10,000 - 20,000 volts) which jumps across the spark plug gap.



CONTACT POINTS. The contact points consist of an insulated movable point that connects to the coil primary lead and a stationary point that is grounded to the stator body which provides the return path for the primary circuit.

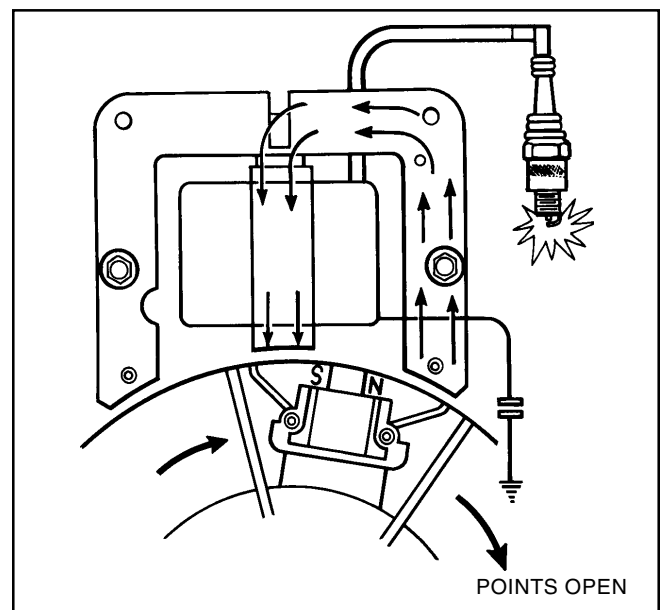
CONDENSER. The condenser acts as an electrical shock absorber to prevent arcing between the contact points as they open. Arcing lowers the voltage at the spark plug, as well as burn and pit the contact points, thus shortening point life.

OPERATION OF THE TECUMSEH MAGNETO IGNITION. As the flywheel turns, the magnets (mounted in the wheel) pass the coil mounted on the stator. As the magnet's North Pole enters the area of the center leg of the stator, a magnetic field is concentrated through the laminations to the magnet's South Pole. This causes a generation of current flow in the coil's primary winding. The ignition points are closed.



As the flywheel continues to rotate, the North Pole approaches the last leg of the lamination stack. The magnetic field through the center leg reverses, producing a large change in the magnetic field and a high current in the primary windings of the coil.

At this time, the contacts open and the primary current stops flowing. This change in current causes a voltage in the primary windings, which induces the high voltage in the secondary winding of the coil. The voltage is routed through the spark plug wire, to the spark plug, and then jumps the gap of the plug to ignite the fuel air mixture.



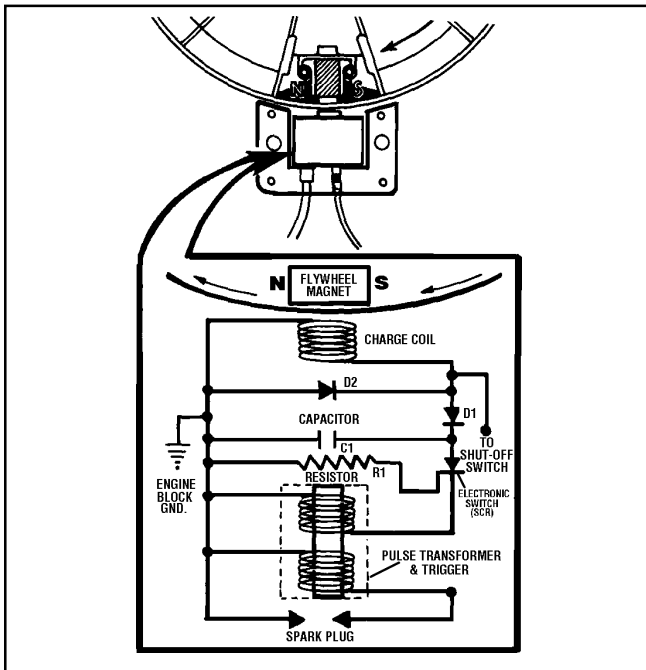
1985 to Present

SOLID STATE IGNITION. Tecumseh's solid state capacitor discharge ignition (CDI) is an all electronic ignition system and is encapsulated in epoxy for protection against dirt and moisture.

SOLID STATE IGNITION OPERATION. As the magnets in the flywheel rotate past the charge coil, electrical energy is produced in the module. This energy is transferred to a capacitor where it is stored until it is needed to fire the spark plug.

The magnet continues rotating past a trigger coil where a low voltage signal is produced and closes an electronic switch (SCR).

The energy which was stored in the capacitor is now transferred through the switch (SCR) to a transformer where the voltage is increased from 200 volts to 25,000 volts. This voltage is transferred by means of the high tension lead to the spark plug, where it arcs across the electrode of the spark plug and ignites the fuel-air mixture.



IGNITION SERVICE

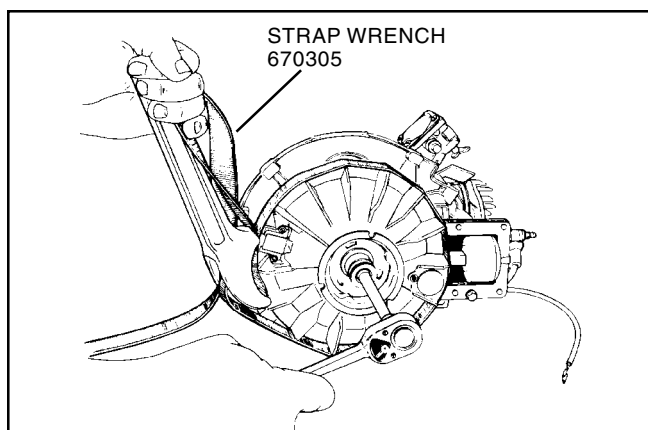
SPARK PLUG SERVICE. Spark plugs should be cleaned and adjusted periodically. Check point gap with wire feeler gauge (.030" - .762 mm) and adjust gap. Replace if points are pitted and burned or the porcelain is cracked. Refer to Master Parts Manual or Micro-Fiche for correct replacement number.

If spark plug fouls frequently, check for the following conditions:

1. Carburetor set too rich.
2. Choke not opening fully.
3. Poor grade gasoline.
4. Clogged exhaust system.
5. Incorrect spark plug.
6. Improper oil fuel ratio.
7. Inconsistent spark.

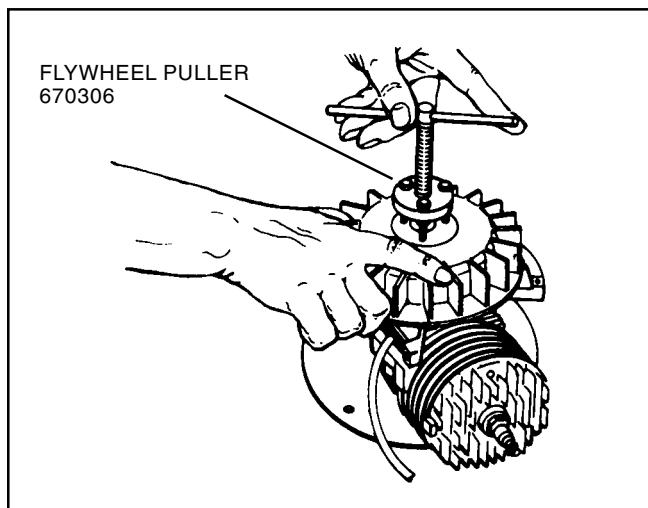
NOTE: Ensure cleaned spark plugs are free of all foreign material before installation.

FLYWHEEL REMOVAL AND SERVICE. To remove flywheel, use a strap wrench Part No. 670305 to hold the flywheel and remove the nut by turning it in the direction opposite of crankshaft rotation.



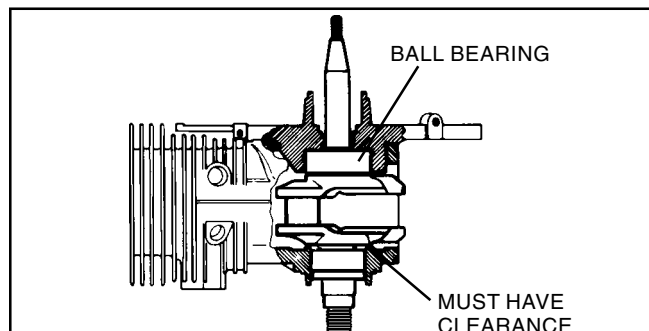
NOTE: Do not attempt to remove flywheel using a jaw type pullers on the outer diameter of the flywheel or flywheel breakage will occur.

On engines with cored holes (not tapped) use flywheel puller part No. 670306.

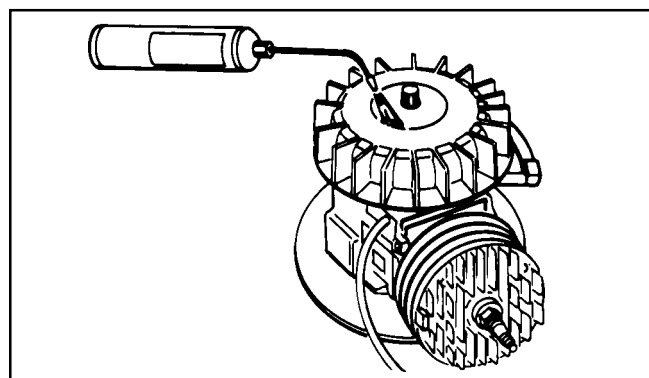


NOTE: A KNOCK-OFF TOOL IS NOT RECOMMENDED FOR ENGINES WITH A BALL BEARING ON THE MAGNETO END OF THE CRANKSHAFT.

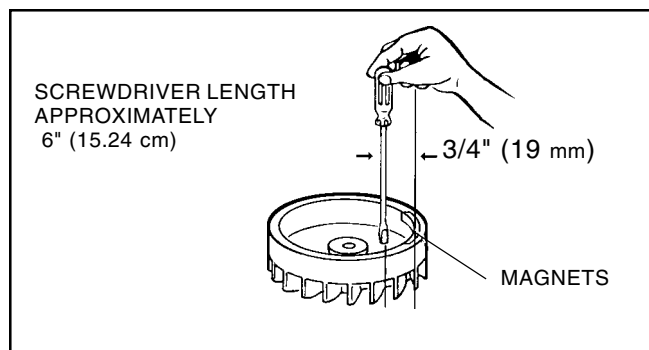
NOTE: If a knock-off tool is used, the pounding may cause the ball bearing to dislodge from the shroud base and force the lower thrust face of the crankshaft against the cylinder thrust face. TO CORRECT THIS CONDITION RAP SHARPLY WITH RAWHIDE Mallet ON THE P.T.O. END TO PROVIDE CLEARANCE BETWEEN CRANKSHAFT AND CYLINDER THRUST FACE.



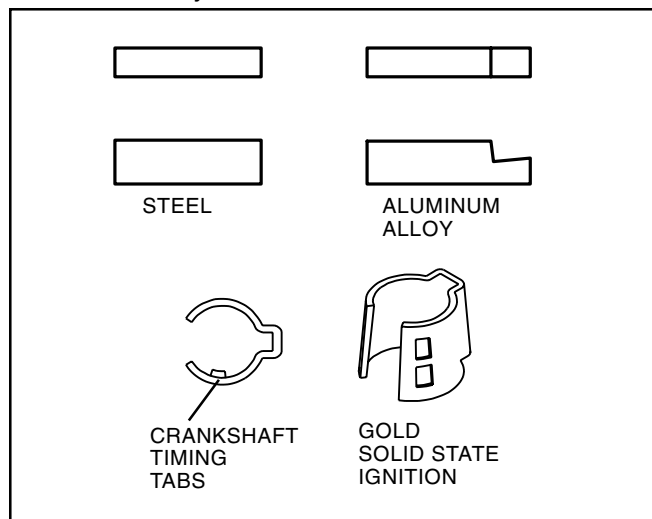
If the flywheel is difficult to remove from the crankshaft because of rust, etc., the use of a propane torch can be helpful. Heat the area immediately outside of the crankshaft. The aluminum alloy in the flywheel should expand enough to break the seal away from the steel crankshaft.



FLYWHEEL MAGNETS. The magnets in the flywheel rarely lose their magnetic strength. If magnets are suspected to be faulty, place the flywheel upside down on a wooden surface. Hold a screwdriver by the extreme end of handle with the point down. Move the blade to within 3/4 inch of magnets. The magnets should attract the screwdriver blade against the magnet.

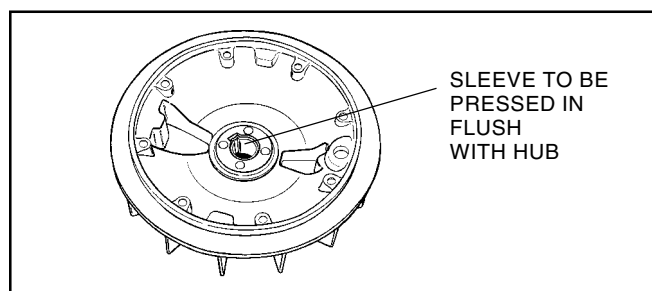


FLYWHEEL KEYS. The flywheel key locates the flywheel to the crankshaft in the proper position. If a flywheel key is sheared, or partially sheared, the engine will not start or may be difficult to start.



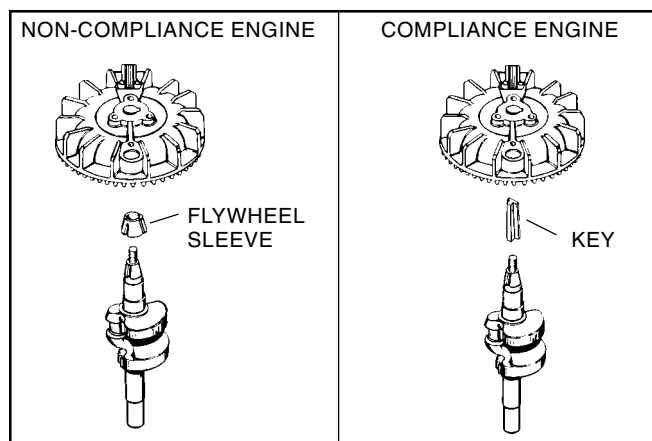
NOTE: Use the Tecumseh Master Parts Manual to determine correct key for the application.

ADAPTER KEY TO FLYWHEEL ASSEMBLY. When an adapter is used, place the adapter with its raised key area in the flywheel keyway before putting the flywheel on the engine.



FLYWHEEL SLEEVE. Some engines utilize a sleeve between the crankshaft and flywheel which acts as a flywheel key. If this sleeve becomes sheared or damaged, replace. The flywheel sleeve is pressed into the crankshaft opening in the flywheel, and should be flush or slightly below flush from the inside surface of flywheel before in stalling on crankshaft.

For engines equipped with brake system, a new key and flywheel are shown. Torque procedures are the same.



FLYWHEEL TORQUE. Torque flywheel to the proper specification. See the tables in specification section for the proper torque setting.

Loose lawn mower blades and adapters can contribute to sheared keys.

REPLACING MAGNETO BREAKER POINTS. Remove the nut holding the electrical leads to the screw on the movable portion of the breaker points.

Remove the screw from the stationary breaker point and remove point set. Reinstall the new breaker point set into position and adjust the point gap according to the specifications. Points must be adjusted, when the rubbing block of the points is on the highest spot on the breaker cam.

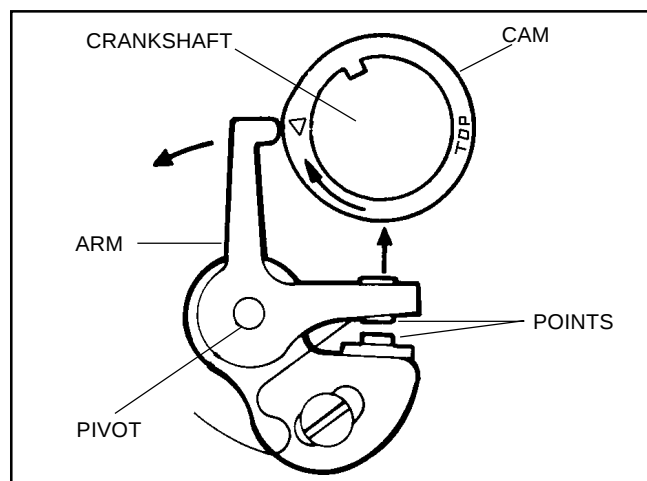
Clean points by putting lint-free paper between them and sliding it back and forth. Then open points and remove paper and any paper fiber remaining between the point set. Any oil, fingerprints or contamination will cause the points to burn prematurely.

CONDENSER CHECK. Check condenser on a good quality tester, following the test equipment manufacturer's instructions to check capacity and resistance. Replace condenser if condition is questionable.

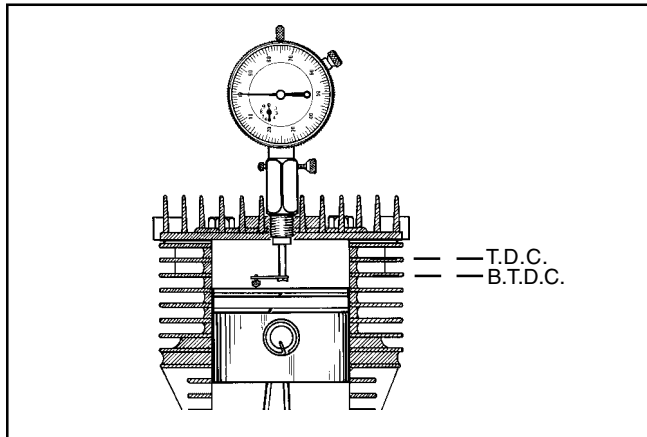
IGNITION COIL. Inspect the coil for cracks in insulation or other damage. Make sure electrical leads are intact, especially where they enter the coil.

Check operation of the coil using an approved tester following the instructions furnished with the test unit. If laminations are distorted or damaged, replace. Some coils are permanently attached to the laminations and must be serviced as an assembly.

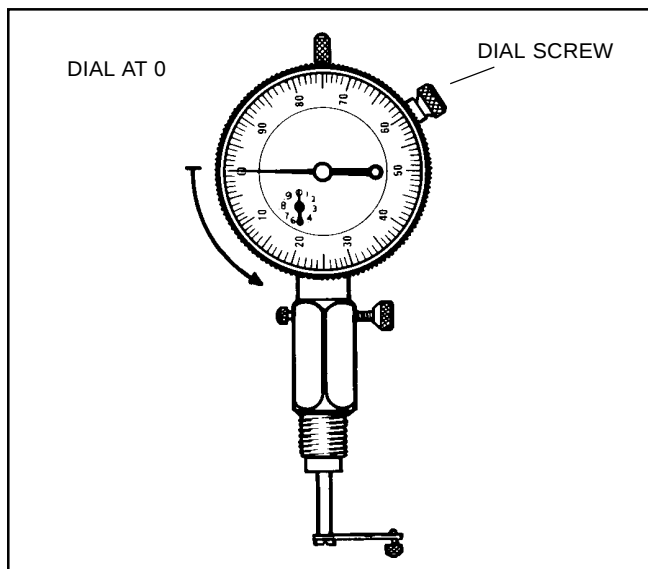
IGNITION TIMING. Begin procedure by setting the point gap. This is done by rotating the crankshaft until the point arm is resting on the high side of the ignition cam. Set the point gap by loosening the screw on the movable point, and insert a feeler gauge per specification. Tighten the screw then recheck the gap.



Install dial indicator (Part No. 670241) equipped with the correct tip on the extender leg. Use the small tip for engines with timing dimensions of between Top Dead Center and .050" (1.27 mm) BTDC. Use the large tip for engines with timing dimensions of between .051" (1.29 mm) BTDC to .150" (3.81 mm) BTDC. Loosen the screw on the side of the adaptor sleeve to allow the sleeve to be turned into the threads of the spark plug hole, not the entire dial indicator. This will ensure the proper location of the tip. Once the adapter sleeve is secured in the hole, tighten screw on sleeve adaptor to prevent the dial from moving up or down, which would give a false reading.

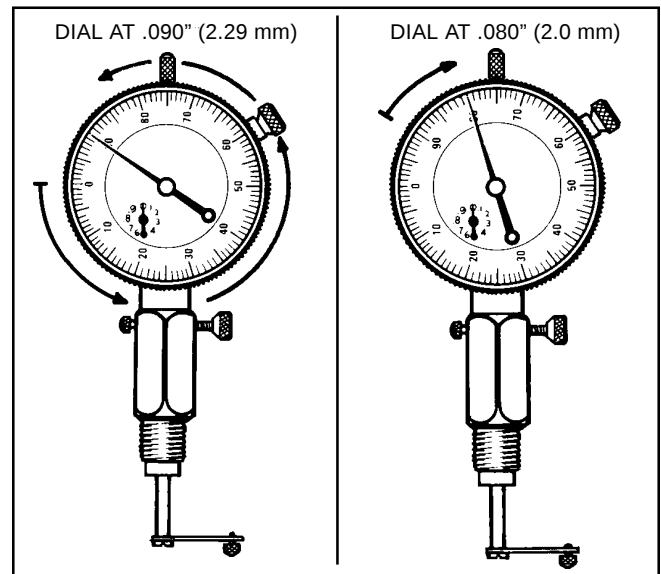


Find top dead center (TDC) by rotating the crankshaft clockwise (when looking at the magneto end of the crank) until the needle on the dial stops and reverses direction. Where the needle stops is TDC. Loosen the screw on the dial, and rotate the dial so that zero is lined-up with the needle at TDC. Tighten the screw on the dial to secure it in place.

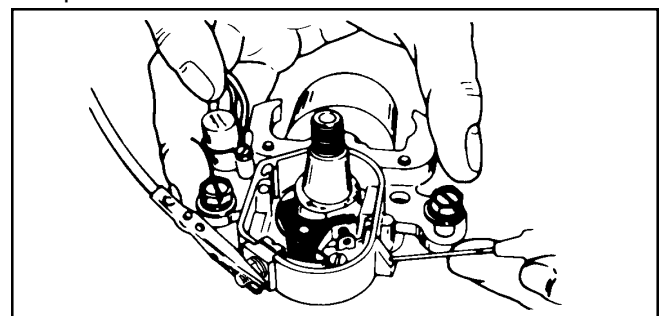


While watching the needle on the dial indicator, rotate the crankshaft counterclockwise (when looking at the magneto end of the crank) past the specified Before Top Dead Center (BTDC) dimension. Then rotate the crankshaft back clockwise to the proper dimension, this will take out any slack between the connecting rod and crankshaft assembly.

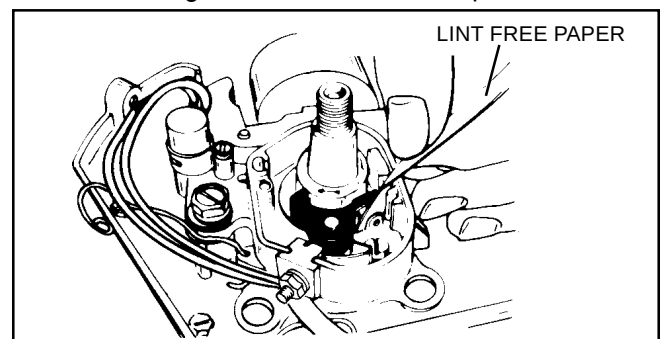
(Using .080" (2.0 mm) BTDC dimension as an example.)



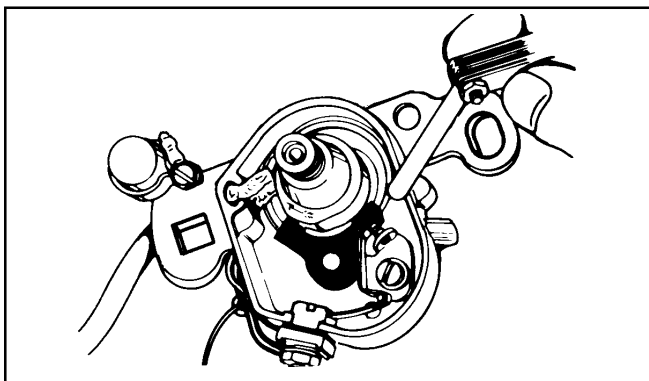
Next, disconnect the leads from the point terminal, and be sure to reinstall the securing nut & tighten it up. Connect one lead of a continuity light, or Ohmmeter to the point terminal and the other lead to a good ground. Loosen the two bolts holding down the stator and rotate the stator until the continuity light or Ohmmeter indicates a break in the circuit. At this point torque down the stator bolts and the timing procedure is completed.



Before putting the dust cover back on the points box, clean the points by sliding lint free paper back and forth between the contacts. Manually, open the points when removing the paper to eliminate paper fibers from remaining between the contact points.

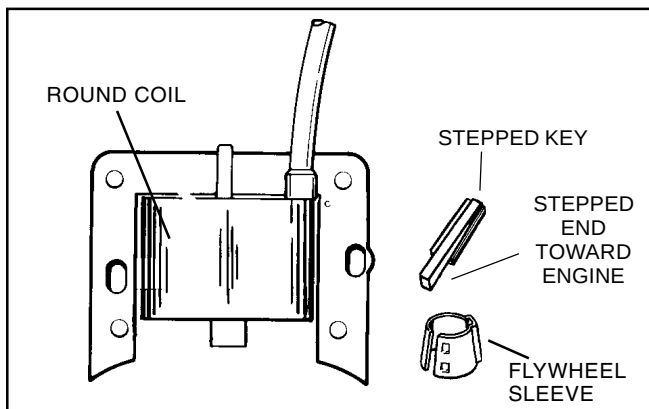


FIXED TIME SYSTEM (External Coil). This system has the contact points and condenser mounted under the flywheel with the laminations and coil mounted outside the flywheel. This system is identified by the square hole in the stator, the round configuration of the coil, and a stepped flywheel key.

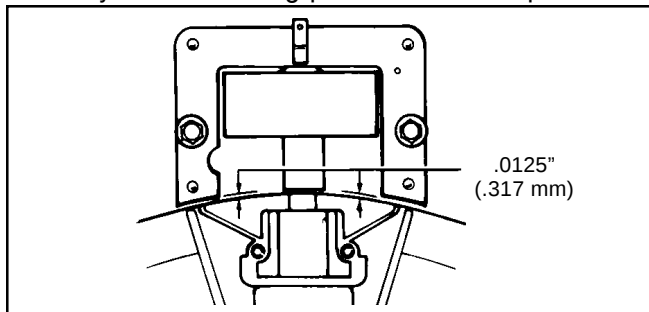


Begin the timing procedure, torque down the stator bolts to secure the stator in place. Next rotate the crankshaft until the point arm is resting on the high side of the ignition cam. Set the point gap at to the proper specification by loosening the screw on the movable point, and inserting a feeler gauge between the contact points. Tighten the screw on the movable point and then recheck the point gap. Be sure to clean the contact points with lint free paper.

Reinstall the proper flywheel key, flywheel, washer, and torque down the flywheel nut to specification. Reinstall the external coil, but do not tighten down the mounting screws.

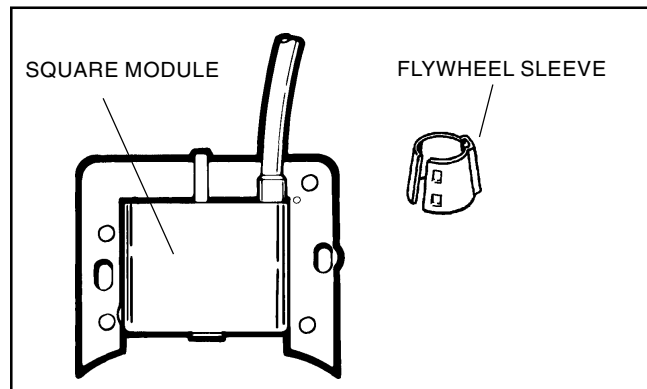


Timing this system consists of having the proper .0125" (.317 mm) air gap gauge, (Part No. 670297) between the magnets and laminations and torque down the mounting screws to specification. Remove air gap gauge and rotate flywheel to check for any possible striking points. If none are found, the air gap is set correctly and the timing procedure is completed.

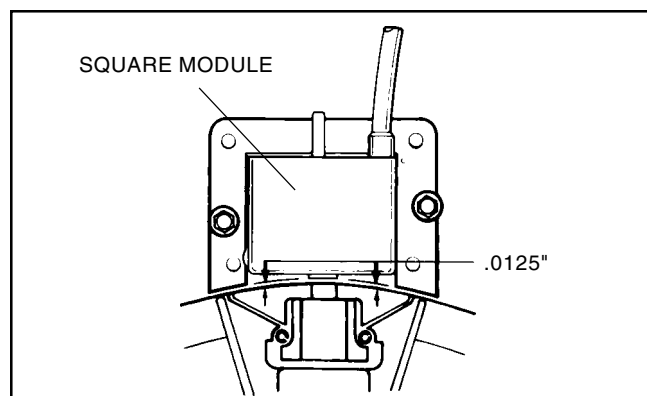


SOLID STATE (CDI). This is an all electronic ignition system with the components sealed in a module and located outside the flywheel.

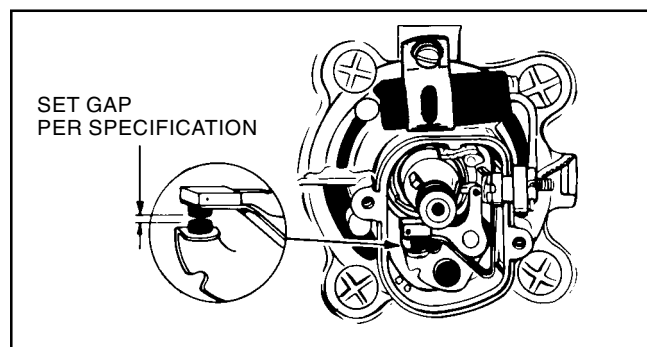
A Solid State module can be identified by its square configuration, which will identify the need for the proper flywheel key or sleeve.



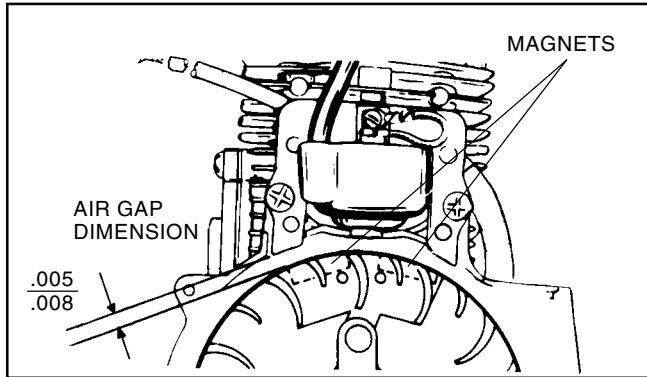
The proper air gap setting between the flywheel magnets and the laminations on both the fixed time and CDI systems is .0125". Place .0125" gauge, part No. 670297 between the magnets and laminations and torque down mounting screws to specification. Recheck gap setting to make certain there is proper clearance between the magnets and laminations. **NOTE:** Due to variations between pole shoes, air gap may vary from .005/.020" when flywheel is rotated. There is no further timing adjustment on external lamination systems.



OTHER IGNITION SYSTEMS. Ignition systems on engines with a non-adjustable stator, set the points per specification. If the coil is located under the flywheel, no other timing is required.



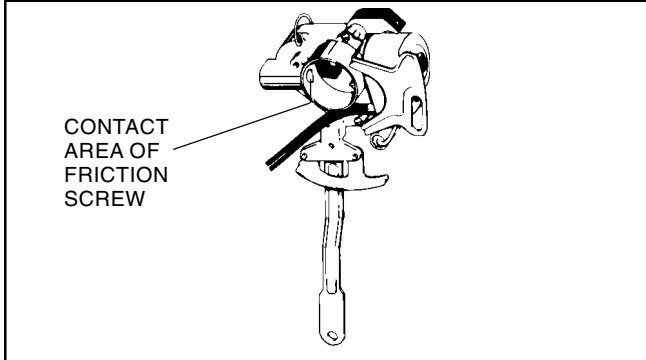
If engine has the coil and lamination outside of flywheel, set points per specification and set air gap between flywheel magnets and laminations to .005" to .008". Air gap gauge, part number 670216 which measures .0075" may be used. Use Loctite "242 Blue" on screws and torque down mounting screws to specification. Remove air gap gauge.



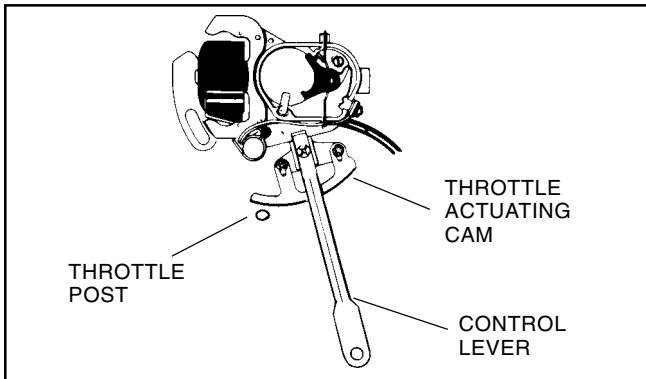
OUTBOARD TIMING

OUTBOARD TIMING. (STANDARD IGNITION). Follow the step-by-step procedure outlined for timing outboard engines with Standard ignition magnetos (non-solid state).

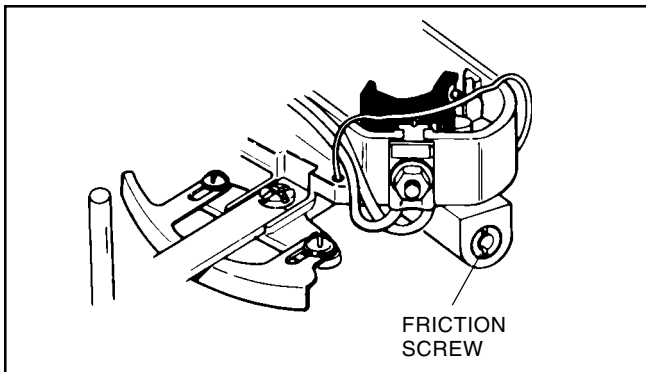
Apply a small amount of E.P. Lithium grease to the contact area of the friction screw. Do not turn the screw into the radius of the stator collar.



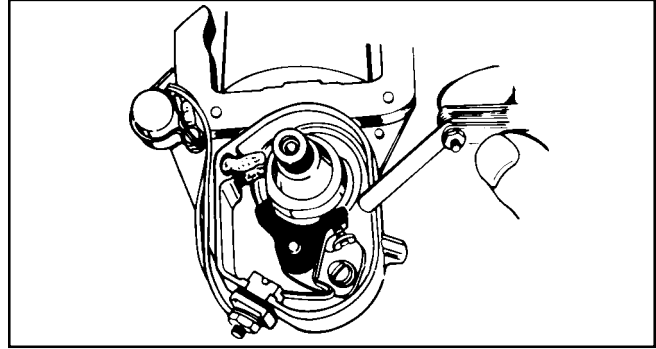
Install the stator with operating handle pointed in the direction of the carburetor. Be sure the throttle post is NOT INSIDE the arc of the throttle actuating cam. Hold the throttle open when installing the stator.



Move the control lever to full retard, then move toward full advance while tightening the friction screw until the lever will not vibrate out of position when the engine is running and yet can be easily rotated when speed is adjusted.

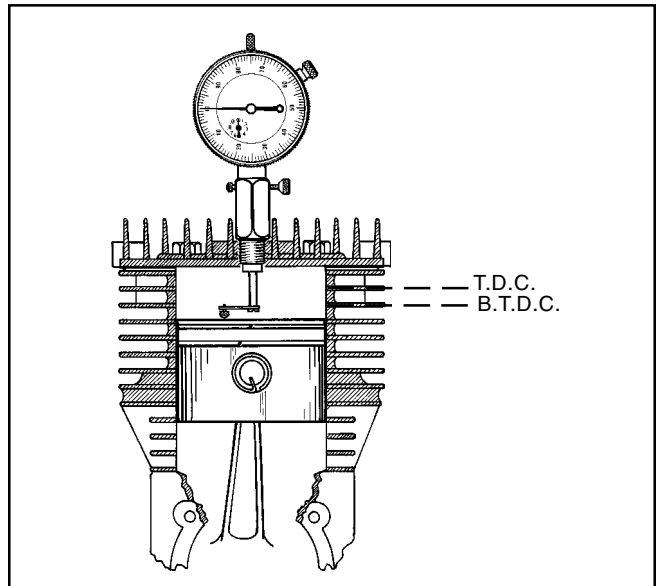


Adjust ignition points to proper specification.

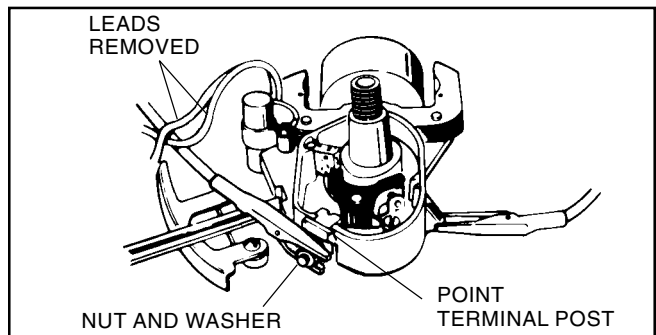


Clean points by sliding lint free paper back and forth between the contacts. Manually open points when removing paper to eliminate paper fiber from remaining between contacts.

Using a dial indicator, set the piston to the proper Before-Top-Dead-Center (BTDC) to the specified dimension.

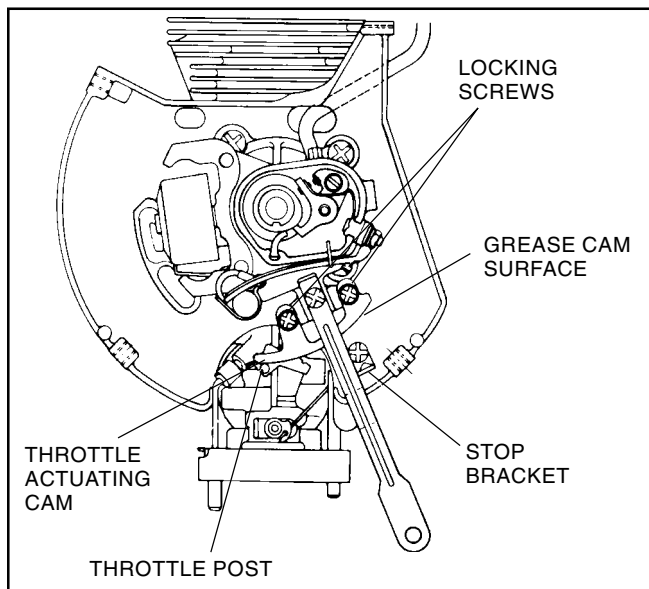


Remove leads from point terminal, then reinstall and tighten the nut and washer. Attach a continuity device to the point terminal post and to a good ground on the engine as shown.



Move the stator counterclockwise, advancing the timing until the continuity reading breaks and reads zero. Tighten the stop bracket to secure the stator.

Loosen the actuating cam locking screws just enough to allow adjustment of the cam. Move the actuating cam to open the throttle completely WITHOUT causing any binding with the throttle post.

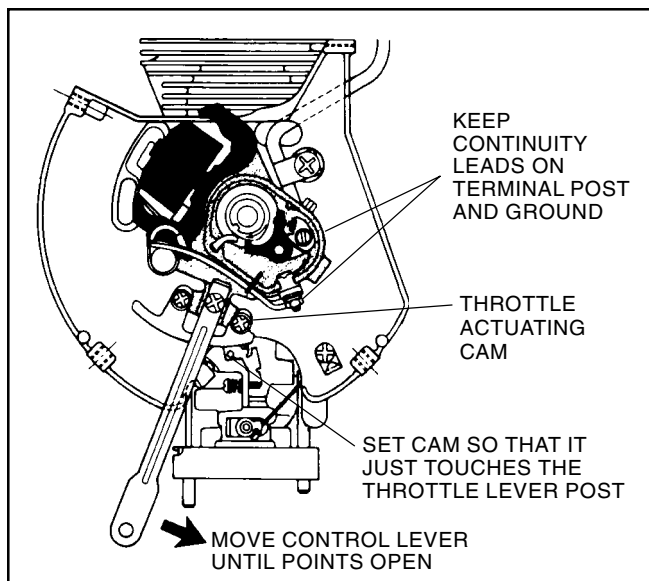


To coordinate the carburetor idle with ignition timing, rotate the crankshaft clockwise, to .003" After-Top-Dead-Center (ATDC).

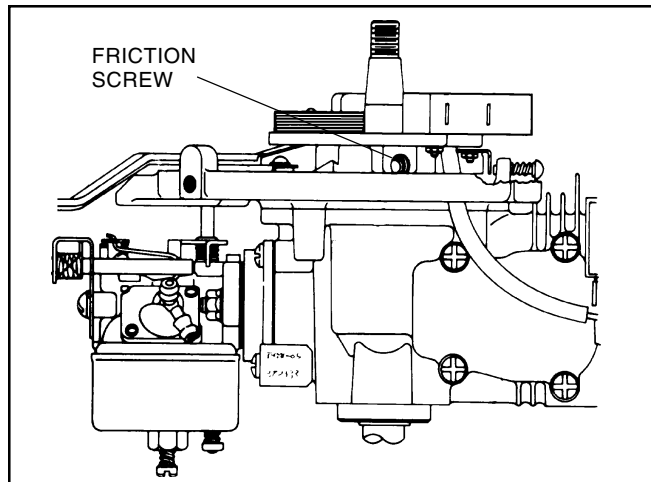
Rotate the control lever toward the idle position until continuity is obtained.

Move the throttle actuating cam until it just touches the throttle post, without moving it.

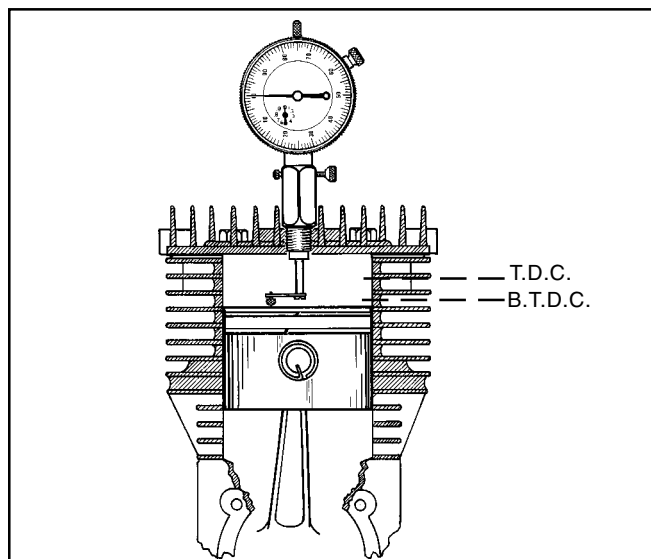
Tighten the screw slightly, then check the run position and idle position alternately to make sure the actuating cam is adjusted for both positions. Now tighten the screws.



OUTBOARD TIMING. (SOLID STATE). Follow these step-by-step procedures outlined for timing outboard engines with solid state magnetos.



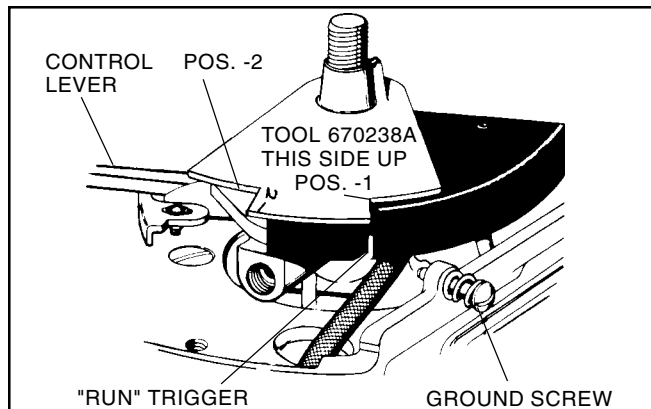
Using a dial indicator, set the piston to the specified Before-Top-Dead-Center (BTDC) dimension.



Install timing tool 670238A on the crankshaft, be careful not to distort the keyway area.

Without disturbing the BTDC piston position, move the control lever counterclockwise until the run trigger aligns with the timing tool (670238A) notch marked #1. Hold this position.

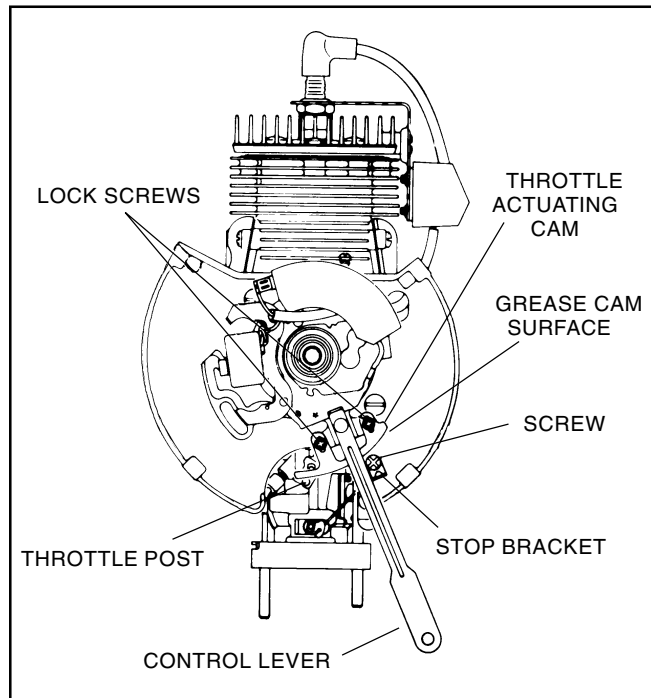
NOTE: Some models do not have the "start" trigger.



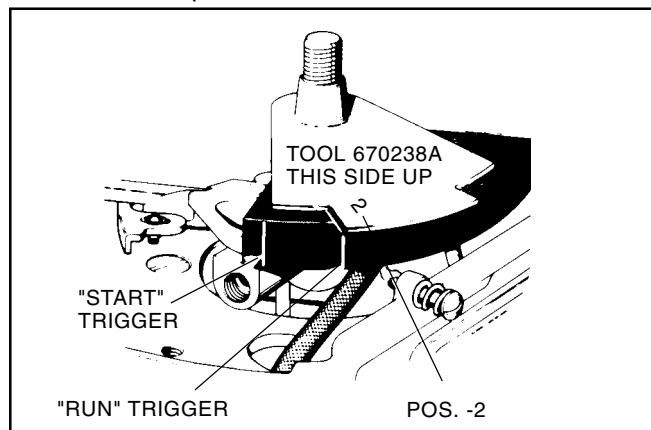
Adjust the stop bracket to prevent the control lever from moving any further counterclockwise. Then tighten the stop bracket screw.

Loosen the actuating cam lock screw enough to allow adjustment of the cam. Position the cam so that it opens the throttle completely, making sure that the cam doesn't cause binding on the post.

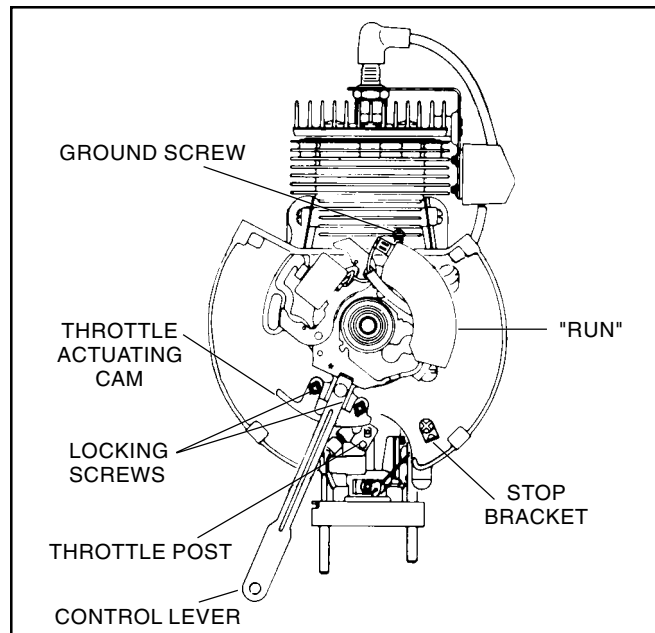
When the correct position is attained, tighten the lock screw on the "high" end to hold the cam in place.



Move the control lever to align the "RUN" trigger of the ignition unit with the number 2 position of the timing tool. Hold this position.



Adjust the actuating cam to touch the post without moving it. Tighten the lock screw to hold the cam in place.



Recheck to insure that the high speed point hasn't changed or that binding will not occur. Readjust from the high speed point to the pickup point as necessary.

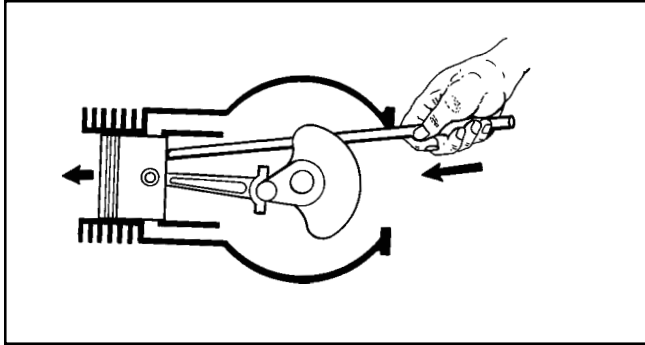
When assured that the cam position is correct at the FULL RUN and IDLE positions, torque the lock screw to 10-15 in. lbs.

CYLINDERS & INTERNAL COMPONENTS

PISTON & RING SERVICE

Before removing the piston, clean all carbon from the cylinder, making certain that the carbon ridge is removed from the top of the cylinder. This will prevent ring damage when removing the piston.

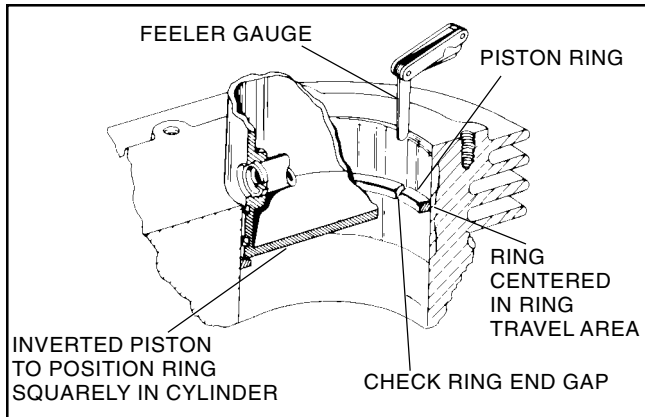
Push the piston through the top of the cylinder using a wooden dowel on the inside of the piston so that the connecting rod and other parts will not be damaged.



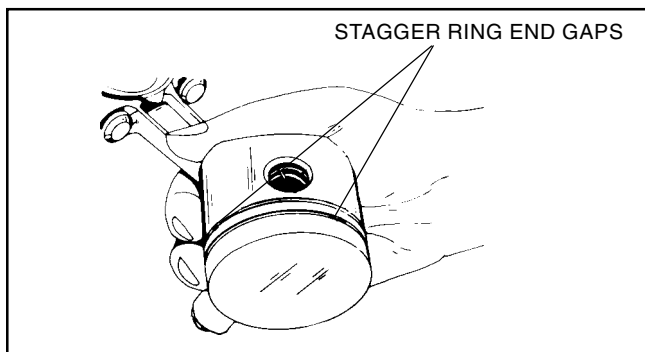
Check the piston and cylinder for scoring or other damage.

Check the piston rings for wear by inserting them into the cylinder to about 1/2 inch from the top of the cylinder. Check at various places to make sure that the gap between the ends of the ring do not exceed the dimensions indicated in the Table of Specifications.

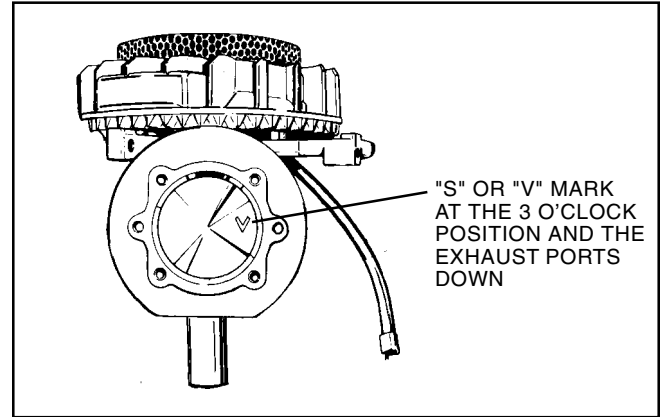
Bore wear can be checked by the same method, except, use a new ring to measure the end gap.



Before installing the piston into the bore, put oil on the rings and piston, and stagger the ring end gaps.



Most models have offset pistons. The pistons on these models have a "V" or "S" stamped on the piston head. When installing piston, this "V" mark must be in a 3 o'clock position when viewing the engine with the exhaust ports down.



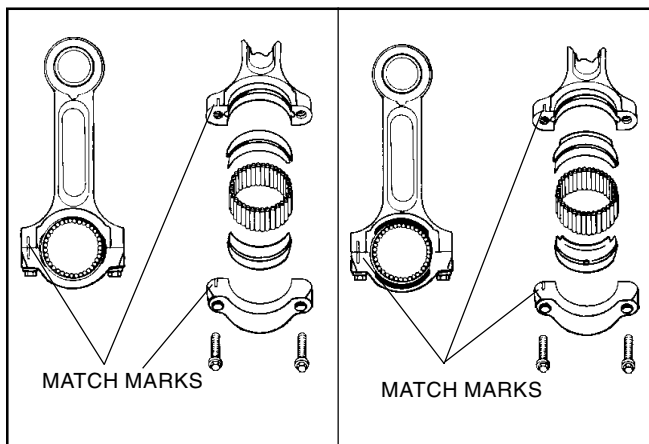
CONNECTING ROD SERVICE

Two cycle engines may be equipped with steel or aluminum connecting rods. Aluminum connecting rods use steel liners when needle bearings are utilized.

The connecting rod bolts used are Torx®, size E6. If torx sockets are not locally available, they can be purchased through your Tecumseh parts supplier under part number 670257.

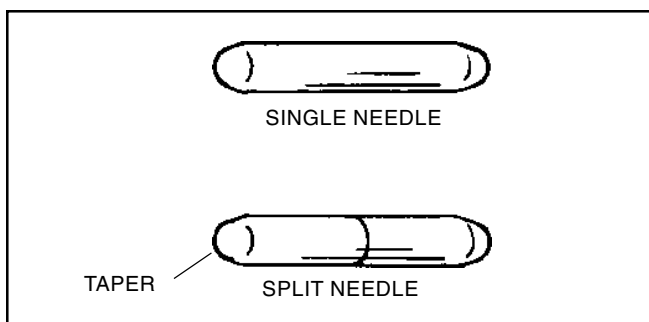
The connecting rod bolts should be tightened alternately and torqued to proper specification.

All connecting rods have match marks on the connecting rod and cap. Make certain these match marks are aligned when assembling.



NEEDLE BEARINGS. Needle bearings may be single or split row.

Split needles are to be installed with the blunt ends together and tapered ends outward.



Service needles are supplied with a coating to hold the needles together and make installation easier.

Remove the paper backing on the bearings and wrap uniformly around the crankshaft journal. Pull the connecting rod onto the crankshaft journal, place a few drops of oil onto the needle bearings and install rod cap. Torque bolts to specification.

CRANKSHAFT, BEARING AND OIL SEAL SERVICE

Check if crankshaft is bent or otherwise damaged. Make certain keyways are not worn or damaged and flywheel taper is clean and in good condition. If taper or keyways are worn or damaged, replace crankshaft.

Check oil seal contact surfaces on crankshaft for damage or scratches which would damage oil seal or cause leaks.

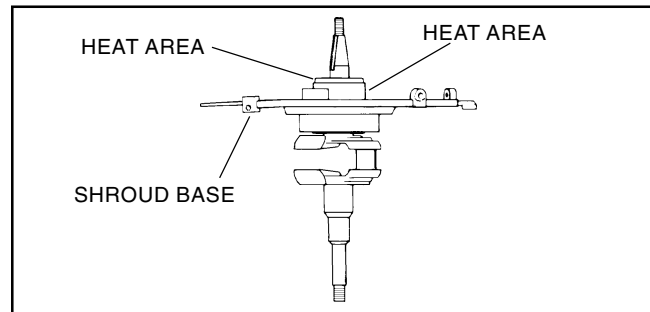
On engines that are equipped with ball bearings, the crankshaft must be removed with the shroud base.

Before removing shroud base with crankshaft, disassemble rod cap from rod and remove the piston from the bore, then remove four (4) shroud base screws and tap shroud base so base and crankshaft can be removed together.

To remove crankshaft and bearing from shroud base, use following procedure:



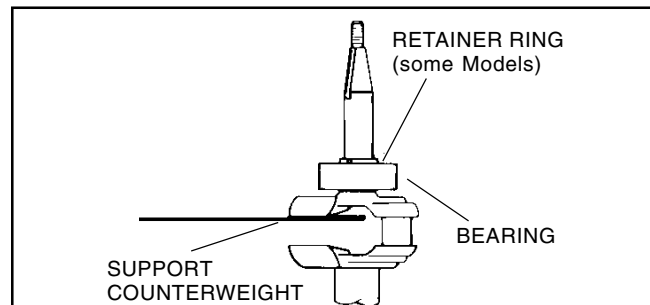
Using a propane torch, heat the area of shroud base around the bearing area, until there is enough expansion to remove the crankshaft and bearing.



To remove the bearing from crankshaft, remove retainer ring if so equipped, and use a bearing splitter to pull bearing.

Before installing bearing on crankshaft, clean out the grooves on the crankshaft where bearing locates and put Loctite in the groove. Models with the retainer ring do not require Loctite.

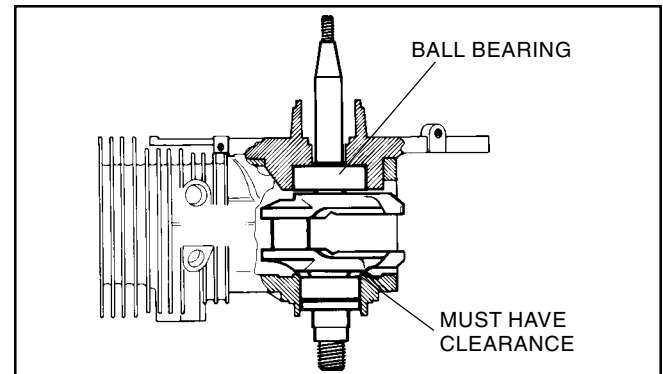
Using a sleeve over the crankshaft, press bearing into position with arbor press. Make certain crankshaft counter weight is supported and bearing is pressed on inner race only.



To reinstall crankshaft and ball bearing, heat shroud base to expand bearing seat and drop ball bearing into seat of base shroud. Allow to cool.

On outboards only, install shroud base onto cylinder but before tightening screws, rotate shroud base fully clockwise. Tighten screws.

If a ball bearing engine appears to be tight, or if the flywheel was removed with the use of a knock-off tool, the ball bearing may be dislodged from shroud base, forcing the crankshaft lower thrust face against the cylinder thrust face. To correct this condition, rap sharply on the P.T.O. end of the crankshaft with rawhide mallet to provide the clearance between the crankshaft and cylinder thrust face.



NEEDLE BEARINGS. Caged needle bearings can be removed and replaced by pressing them in and out of cylinder using an arbor press.

NOTE: Always press against the lettered side of the bearing.

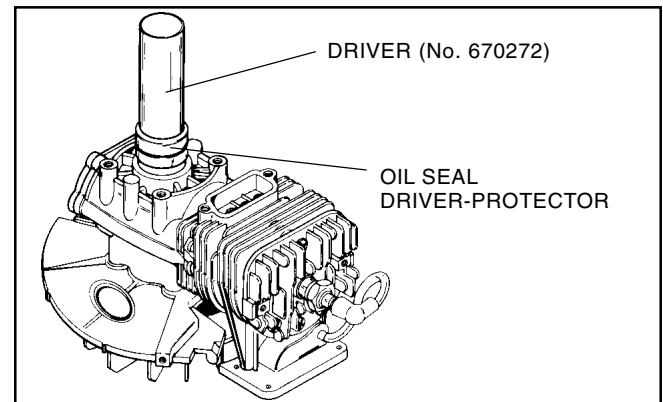
If the needles fall out of the cage, they can be reinstalled using grease to hold them in position.

OIL SEALS. It is important on 2 cycle engines that oil seals are in good condition. A leaky seal will cause hard starting, erratic running, and possible damage to internal components due to a lean fuel-oil mixture caused by extra air getting into the crankcase.

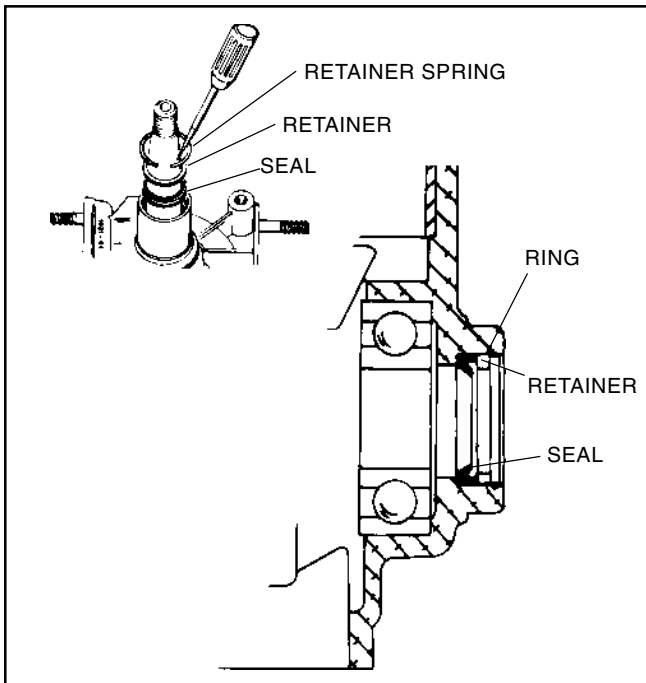
Engines could be equipped with either one piece oil seals or three pieces consisting of a seal, retainer and retainer ring; they are not interchangeable.

ONE PIECE SEALS. An oil seal remover tool can be used for seal removal in some engines. In some cases it may be necessary to disassemble engine to remove the oil seals.

Seal driver-protectors are available for most one piece oil seals. Select the proper tool from the tool list in Chapter 8. Place the oil seal over the driver protector, place over crankshaft, and drive into position using universal driver No. 670272.



THREE PIECE SEALS. To remove seals, use a sharp object such as an ice pick to pry out the retainer spring, then remove the retainer and seal. In some cases it may be necessary to remove the crankshaft to remove the oil seals.



OUTBOARD SEAL SERVICE. Oil seals on the power-take-off end of the crankshaft are installed in an inverted (upside down) position to keep water out of engine.

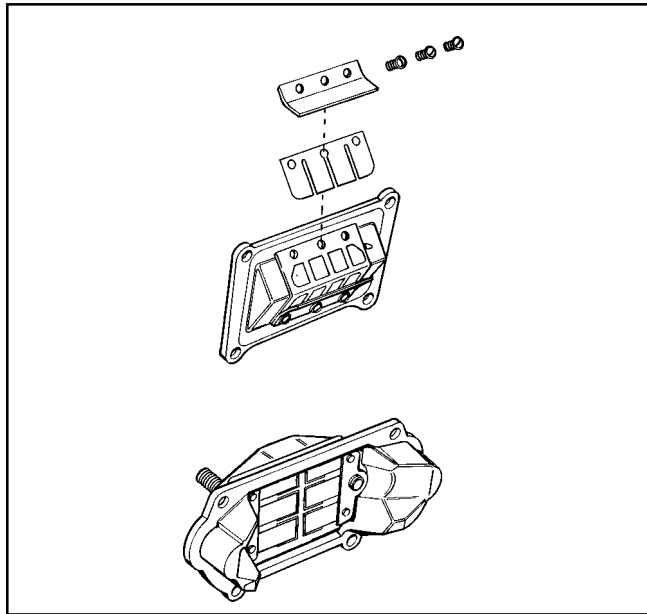
CYLINDERS, REEDS & COMPRESSION RELEASE

CYLINDER & HEAD SERVICE. Check cylinder for bore damage or scoring. Check for broken or cracked fins, warped head or head mounting surface. If warped extensively, (more than .005"/.127 mm) replace. Always replace head gasket and torque to proper specification.

GASKETS. Replace all gaskets in reassembly and make sure all sealing surfaces will not leak. A leaking gasket will cause erratic running, hard starting and could damage internal components by causing an imbalance of fuel-oil air mixture.

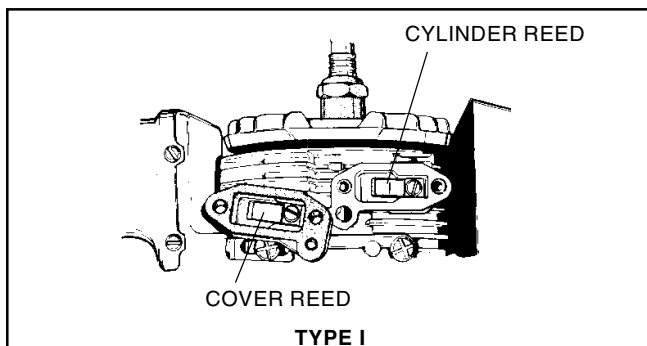
REED VALVES. Make sure reeds and sealing surfaces are free of dirt and foreign matter. Check reeds for seal against sealing surface of the adapter. Reeds should not bend away from sealing surface more than .010" (.254 mm).

If the reeds are serviceable, the smooth side of the reed must locate against the sealing surface. Service reeds have "smudge" marks on smooth side. If these marks are gone, feel for a rough edge and assemble away from sealing surface.



AUTOMATIC COMPRESSION RELEASE (DOUBLE REED TYPE).

Cranking compression pressures bleed past reeds and into muffler. Once the engine is started, a high pressure build-up between the reeds forces the reeds against their seats stopping compression bleed off and allowing engine to run at full compression.

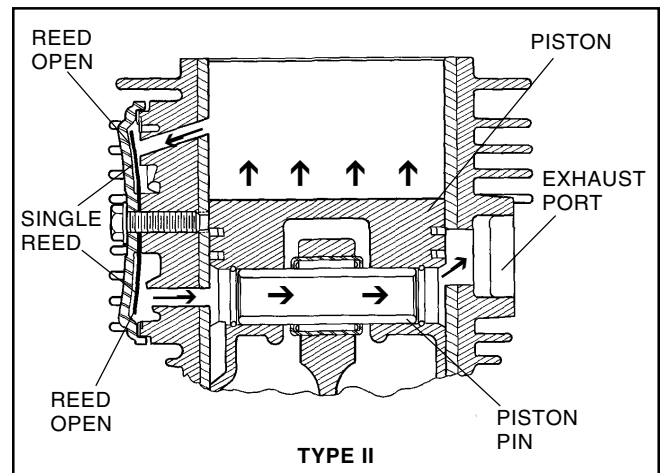


Replace both reeds if either is defective. When installing reeds be sure the colored side of the reed faces its seating surface. If in doubt, feel for a rough edge on the reed. The rough edge must be installed away from the seating surface. Assemble reed stop and hold down and tighten self-tapping screws.

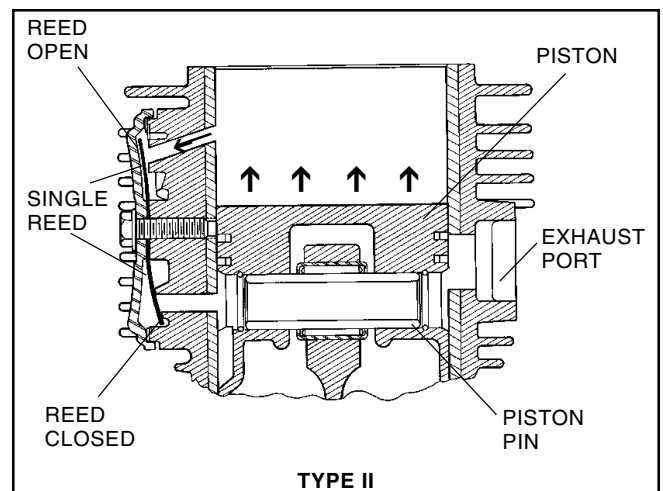
Poor running or lack of power may be caused by a leaking reed or cover gasket.

AUTOMATIC COMPRESSION RELEASE (SINGLE REED TYPE).

Cranking compression pressures bleed past reed valve, through a port, into the piston pin and out the exhaust port.



As the engine starts and compression increases, the reed will be forced against the bottom port, sealing it and the engine will run under full compression.



Install the reed cover (single reed type) with the small hole towards the spark plug.

The piston used in the single reed compression release system has a cutout at the piston pin hole. The piston must be installed with the cut-out located on the side facing the compression release.

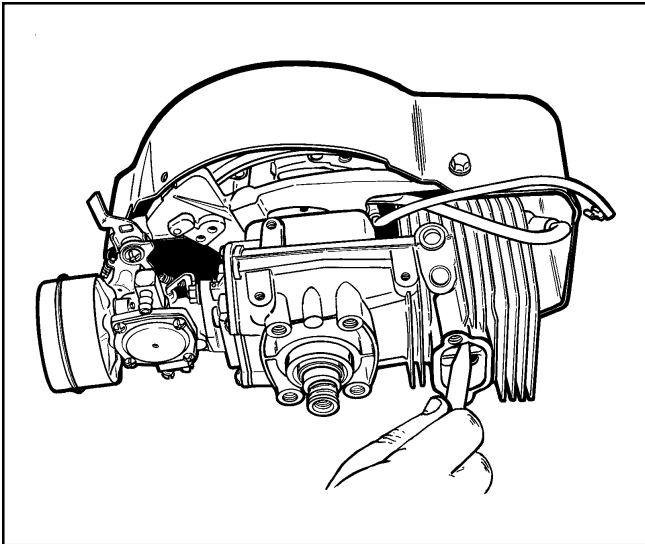
CYLINDER EXHAUST PORTS. The muffler and cylinder exhaust ports should be cleaned after each seventy-five (75) to one hundred (100) hours of operation.

It is recommended that the cylinder head be removed and carbon cleaned from the ports, cylinder head and top of piston.

CAUTION: Do Not Scratch Metal Surfaces.

With the cylinder head removed, remove any carbon deposits from the cylinder wall, head, and the top of the piston. Using a pointed 3/8" wooden dowel or similar tool, remove the carbon from the exhaust ports. Being sure to remove all loose carbon particles from the engine.

NOTE: When cleaning the exhaust ports, check and clean the compression release passage.



TROUBLESHOOTING

2 CYCLE ENGINE TROUBLESHOOTING CHART	
Cause	Remedy and Reference
ENGINE FAILS TO START OR STARTS WITH DIFFICULTY	
No fuel in tank	Fill tank with clean, fresh fuel with correct oil ratio.
Fuel shut-off valve closed	Open valve.
Obstructed fuel line	Clean fuel screen and line. If necessary, remove and clean carburetor.
Tank cap vent obstructed	Open vent in fuel tank cap or replace cap.
Water in fuel	Drain tank. Clean carburetor and fuel lines. Dry spark plug points. Fill tank with clean, fresh fuel.
Engine overchoked	Close fuel shut-off and pull starter until engine starts. Reopen fuel shutoff for normal fuel flow immediately after engine starts.
Improper carburetor adjustment	Adjust carburetor.
Loose or defective magneto wiring	Check magneto wiring for shorts or grounds; repair if necessary.
Sheared or incorrect flywheel key or adapter sleeve	Replace with correct key or adapter sleeve.
Faulty Magneto	Check timing, point gap, and if necessary, overhaul magneto.
Spark plug fouled	Clean and regap spark plug.
Crankcase seals and/or gaskets leaking	Replace seals and/or gaskets.
Spark plug porcelain cracked	Replace spark plug.
Poor Compression	Overhaul engine.
Exhaust ports plugged	Clean exhaust ports
ENGINE KNOCKS	
Carbon in combustion chamber	Remove cylinder head or cylinder and clean carbon from head and piston.
Loose or worn connecting rod	Replace connecting rod.
Loose flywheel	Check flywheel key and keyway; replace parts if necessary. Tighten flywheel nut to proper torque.
Worn cylinder	Replace cylinder.
Improper magneto timing	Time magneto.

2 CYCLE ENGINE TROUBLESHOOTING CHART (Cont.)

Cause	Remedy
ENGINE MISSES UNDER LOAD	
Spark plug fouled	Clean and regap spark plug.
Spark plug porcelain cracked	Replace spark plug.
Improper spark plug gap	Regap spark plug.
Pitted magneto breaker points	Clean and dress breaker points. Replace badly pitted breaker points.
Magneto breaker arm sluggish	Clean and lubricate breaker point arm.
Faulty condenser	Check condenser on a tester; replace if defective (see test instrument instructions and specifications).
Improper carburetor adjustment	Adjust carburetor.
Reed fouled or sluggish	Clean or replace reed.
Crankcase seal leak	Replace worn crankcase seals.
ENGINE LACKS POWER	
Choke partially closed	Open choke.
Blown head gasket	Replace head gasket.
Improper carburetor adjustment	Adjust carburetor.
Improper or partially sheared flywheel key or adapter sleeve.	Replace with new correct key or sleeve.
Magneto improperly timed	Time magneto.
Worn piston or rings	Replace piston or rings.
Air cleaner clogged	Clean air cleaner.
Reed fouled or sluggish	Clean or replace reed.
Improper amount of oil in fuel mixture	Drain tank; fill with correct mixture (See engine decal).
Carburetor improperly adjusted	Adjust carburetor.
Crankcase seals leaking	Replace worn crankcase seals
ENGINE OVERHEATS	
Engine improperly timed	Time engine.
Improper or partially sheared flywheel key or adapter sleeve.	Replace with new correct key or sleeve.
Air flow obstructed	Remove any obstructions from air passages in shrouds.
Cooling fins clogged	Clean cooling fins.

2 CYCLE ENGINE TROUBLESHOOTING CHART (Cont.)

Cause	Remedy
ENGINE OVERHEATS (continued)	
Excessive load on engine Carbon in combustion chamber Improper amount of oil in fuel mixture	Check operation of associated equipment. Reduce excessive load. Remove cylinder head or cylinder and clean carbon from head and piston. Drain tank; fill with correct mixture.
ENGINE SURGES OR RUNS UNEVENLY	
Fuel tank cap vent hole clogged Crankcase air leak Governor parts sticking or binding Carburetor throttle linkage or throttle shaft and/or butterfly binding or sticking	Open vent hole. Inspect and replace gasket or seal. Clean, and if necessary repair governor parts. Clean, lubricate, or adjust linkage and deburr throttle shaft or butterfly.
ENGINE VIBRATES EXCESSIVELY	
Engine not securely mounted Bent crankshaft Driven equipment out of balance Piston installed incorrectly. Engines with wrist pin offset.	Tighten loose mounting bolts (See equipment instructions). Replace crankshaft. Recheck driven equipment. Install piston correctly.

SPECIFICATIONS

ENGINE TYPE NUMBER AND LETTER REFERENCE

Tecumseh has used two different methods of identifying 2 cycle engines.

The first method was used until the mid 1980's using the base model number with a type number. The type number was used to identify variations for the OEM's specific needs.

The second method was put in place to standardize 2 cycle and 4 cycle engine identification. The type number has now become the specification number, which is preceded by the engine model. Example: AV520

Tecumseh type numbers are stamped into the blower housing, or are located on a nameplate or tag on the engine.

Model and Specification numbers are either stamped into the blower housing, or located on a decal on the side of the blower housing.

TYPE NO.	Column No.	TYPE NO.	Column No.	TYPE NO.	Column No.
Vertical Crankshaft Engines		Horizontal Crankshaft Engines		Horizontal Crankshaft Engines	
638 thru 638-100	6	1401J	27	1519 thru 1521	1
639 thru 639-13A	13	1402 and 1402B	7	1522	12
640-02 thru 640-06B 21		1425	7	1523	1
640-07 thru 640-21-A	22	1430A	7	1524	2
640-23	36	1432, A	7	1525A	16
641 thru 641-14	11	1440, A, B, C, D	1	1527	3
642-01,A 9A		1442, A, B,	7	1528,A,B	1
642-02, A thru G	9A	1444, A	7	1529, A, B	3
642-02E, F	9B	1448 thru 1450	16	1530, A, B	1
642-03, A, B	9A	1450A, A, B, C, D, E	16	1531	3
642-04, A, B, C	9A	1450F	17	1534A	17
642-05, A, B	9A	1454, A	1	1535B	3
642-06, A	9A	1459	7	1536	12
642-07, A, B	9A	1460, A, B ,C, D, E, F	1	1537	1
642-07C	9B	1462	1	1538 thru 1541A	12
642-08	9B	1464, A, B	12	1542	5
642-08A, B, C	9A	1465	1	1543 thru 1546	1
642-09 thru 642-14	9A	1466, A	16	1547	3
642-13 thru 14C	9B	1471, A, B	5	1549	3
642-15 thru 642-23	9B	1472, A, B, C	12	1550A	15
642-24 thru 642-33	9C	1473, A, B	1	1551	16
642-35	34	1474	12	1552	20
643-01, A, 03, A	10A	1475 thru 1476	1	1553	16
643-03B, C	10B	1479	7	1554,A	3
643-04, 05A	10A	1482, A	16	1555 and 1556	16
643-05B	10B	1483	16	1557 thru 1560	15
643-13,14	10A	1484, A, B, C, D	3	1561	19
643-14A, B, C	10B	1485	7	1562 thru 1571	23
643-15	10A	1486	4	1572	2
643-15A thru 643-32	10B	1488, A, B, C, D	1	1573	3
643-32A	32	1489 thru 1490B	3	1574 thru 1577	23
643-33	33	1491	12	1575	24
643-34	33	1493, A	7	1578	25
643-35,A,B	37	1494 and 1495A	2	1581 thru 1582A	23
650	14	1496	7	1583 thru 1599A	26
653-01 thru 653-05	31	1497	1	1600 thru 1617	28
653-07 thru 653-10	38	1498	5	1618 thru 1619	43
660-11 thru 660-38	18	1499	16	1620	30
660-39,A	39	1500	5	1622 thru 1623A	42
660-40	40	1501,A, B, C, D, E,F,G	1	1624 thru 1642	35
661-01 thru 661-29	29	1503, A, B, C, D	12		
661-30 thru 661-45	41	1506	16		
662-02	42	1506B	17		
662-623A 42		1507	16		
670-01 thru 670-109	8	1508	7		
		1509	3		
		1510	12		
		1511	3		
		1512, A	2		
		1513	12		
		1515 thru 1516C	3		
		1517	5		
		1518	4		
Horizontal Crankshaft Engines					
1398 thru 1399	11				
1400	11				
1401 thru 1401F	16				
1401G, H	17				

SEARS CRAFTSMAN CROSS REFERENCE

Craftsman Vertical Crankshaft Engines	
Craftsman No.	Column No.
200.183112	6
200.183122	6
200.193132	6
200.193142	6
200.193152	7
200.193162	7
200.203112	8
200.203172	8
200.203182	8
200.203192	8
200.213112	8
200.213122	8
200.213132	8
200.223112	41
200.233112	41
200.243112	8
200.283012	8
200.2131128	31
200.2132228	29
Craftsman Horizontal Crankshaft Engines	
Craftsman No.	Column No.
200.503111	16
200.583111	16
200.593121	16
200.602112	35
200.613111	16
200.633111	35
200.643121	35
200.672102	26
200.682102	26
200.692112	26
200.692122	26
200.692132	26
200.701001	AH600-1665N
200.711001	HSK600-1665P
200.731001	HSK600-1686R
200.731011	HSK600-1687R
143.943071	HSK600-1687S
143.953071	HSK600-1700S
143.973071	HSK600-1705S
143.973091	HSK600-1700S
143.983071	HSK600-1708T
143.993071	HSK600-1712T

TABLE OF SPECIFICATIONS

Reference Column	1		2		3		4		5	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188
Stroke	1.250	31.75	1.410	35.814	1.410	35.814	1.410	35.814	1.410	35.814
Cu. In. Displacement (in ³) (cc)	4.40	72.1	4.80	78.7	4.80	78.7	4.80	78.7	4.80	78.7
Point Gap	.017	.432	.017	.432	.017	.432	.017	.432	.017	.432
Timing B.T.D.C.	.122	3.098	.100	2.54	.135	3.429	.100	2.54	.135	3.429
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.007 .017	.178 .432	.007 .017	.178 .432	.006 .011	.15 .28	.006 .014	.15 .35	.006 .011	.15 .28
Piston Diameter	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0875 2.0885	53.023 53.048	2.0875 2.0885	53.023 53.048	2.0875 2.0885	53.023 53.048
Piston Ring Groove Width (Bot.)	(Top) .0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0975 .0985	1.664 1.689	.0655 .0665	1.664 1.689
	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0955 .0965	1.638 1.664	.0645 .0655	1.638 1.664
Piston Ring Width	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0925 .0935	2.35 2.375	.0615 .0625	1.562 1.587
Piston Pin Diameter	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.3750 .3751	9.525 9.528	.4997 .4999	12.693 12.697
Crank Pin Journal Diameter	.5611 .5618	14.252 14.270	.5614 .5621	14.260 14.277	.5614 .5621	14.260 14.277	.6857 .6865	17.417 17.437	.5611 .5618	14.252 14.270
Crankshaft P.T.O. Side Main Brg. Dia.	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005
Crankshaft Magneto Side Main Brg. Dia.	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005
Crankshaft End Play	None	None	None	None	None	None	None	None	None	None

TABLE OF SPECIFICATIONS

Reference Column	6		7		8		9A		9B	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188
Stroke	1.500	38.1	1.500	38.1	1.500	38.1	1.500	38.1	1.500	38.1
Cu. In. Displacement (in ³) (cc)	5.20	85.2	5.20	85.2	5.20	85.2	5.20	85.2	5.20	85.2
Point Gap	.018	.457	.017	.432	.020	.508	.018	.457	.020	.508
Timing B.T.D.C.	.100	2.54	.185	4.699	.070 See Note 1	1.778	.100 See Note 2	2.54	.085	2.159
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.006 .014	.153 .356	.007 .017	.178 .432	.006 .016	.153 .406	.007 .017	.178 .432	.006 .016	.153 .406
Piston Diameter	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035
Piston Ring (Top) Groove Width	.0975 .0985	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689
	.0955 .0965	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664
Piston Ring Width	.0925 .0935	2.35 2.375	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587
Piston Pin Diameter	.3750 .3751	9.525 9.528	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697
Crank Pin Journal Diameter	.6857 .6865	17.417 17.437	.5611 .5618	14.252 14.270	.8442 .8450	21.443 21.463	.6857 .6865	17.417 17.437	.8442 .8450	21.443 21.463
Crankshaft P.T.O. Side Main Brg. Dia.	.8745 .8750	22.212 22.225	.6690 .6694	16.993 17.003	.9998 1.0003	25.349 25.408	.8745 .8750	22.212 22.225	.9998 1.0003	25.349 25.408
Crankshaft Magneto Side Main Brg. Dia.	.7495 .7500	19.037 19.05	Ball Bearing .6690 .6694 See Note A	16.993 17.003	.6691 .6695	16.995 17.005	.7495 .7500	19.037 19.05	.7498 .7503	19.045 19.058
Crankshaft End Play	.003 .016	.076 .406	None	None	None	None	.003 .016	.076 .406	.003 .016	.076 .406

NOTE 1: 642-08, 14A, 14B B.T.D.C. = .110

642-16D, 19A, 20A, 21, 22 B.T.D.C. = .078

NOTE 2: 642-24, 26, 29 B.T.D.C. = .087

NOTE A: Needle Bearing
.7498
.7503

TABLE OF SPECIFICATIONS

Reference Column	9C		10A		10B		11		12	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188
Stroke	1.500	38.1	1.750	44.45	1.750	44.45	1.750	44.45	1.410	35.814
Cu.In. Displacement (in ³) (cc)	5.20	85.2	6.00	98.3	6.00	98.3	6.00	98.3	4.80	78.7
Point Gap	.020	.508	.018 See Note 4	.457	.020	.508	.018	.457	.017	.432
Timing B.T.D.C.	.078 See Note 2	1.98	.090 See Note 3	2.286	.087	2.21	.100	2.54	.135	3.429
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.006 .016	.152 .406	.007 .017	.178 .432	.006 .016	.152 .406	.006 .014	.152 .356	.007 .017	.178 .432
Piston Diameter	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0873 2.0883	53.017 53.043	2.0870 2.0880	53.01 53.035
(Top) Piston Ring Groove Width (Bot.)	.0655	1.664	.0655	1.664	.0665	1.689	.0655	1.664	.0655	1.664
	.0665	1.689	.0665	1.689	.0975	2.477	.0985	2.413	.0665	1.689
	.0645	1.638	.0645	1.638	.0645	1.638	.0955	2.426	.0645	1.638
	.0655	1.664	.0655	1.664	.0655	1.664	.0965	2.451	.0655	1.664
Piston Ring Width	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0935	1.562 2.375	.0625 .0925	1.587 2.349
Piston Pin Diameter	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697
Crank Pin Journal Diameter	.8442 .8450	21.443 21.463	.6857 .6865	12.417 17.437	.8442 .8450	21.443 21.463	.6857 .6865	17.417 17.437	.5614 .5621	14.26 14.277
Crankshaft P.T.O. Side Main Brg. Dia.	.9998 1.0003	25.395 25.408	.8745 .8750	22.212 22.225	.9998 1.0003	25.395 25.408	.8745 .8750	22.212 22.225	.6691 .6695	16.995 17.005
Crankshaft Magneto Side Main Brg. Dia.	.6691 .6695	16.995 17.005	.7495 .7500	19.037 19.05	.7498 .7503	19.045 19.058	.7495 .7500	10.037 19.05	.6691 .6695	16.995 17.005
Crankshaft End Play	None	None	.003 .016	.076 .406	.003 .016	.076 .406	.003 .016	.076 .406	None	None

NOTE 2: 642-24, 26, 29 B.T.D.C. = .087

NOTE 3: 643-13 B.T.D.C. = .095

NOTE 4: 643-93A, 05A, 13, 14 = .020

TABLE OF SPECIFICATIONS

Reference Column	13		14		15		16		17	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.375 2.376	60.33 60.35	2.093 2.094	53.162 53.188	2.4375 2.4385	61.913 61.938	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188
Stroke	1.680	42.672	1.500	38.1	1.750	44.45	1.500	38.1	1.500	38.1
Cu. In. Displacement (in ³) (cc)	7.50	122.9	5.20	85.2	8.17	133.9	5.20	85.2	5.20	85.2
Point Gap	.020	.508	.018	.457	.018	.457	.017	.432	.017	.432
Timing B.T.D.C.	.095	2.413	.100	2.54	.100	2.54	.110	2.794	.110	2.794
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.005 .013	.127 .330	.006 .014	.152 .356	.007 .017	.178 .432	.006 .016	.152 .406	.006 .016	.152 .406
Piston Diameter	2.3685 2.3695	60.16 60.185	2.0870 2.0880	53.01 53.035	2.4302 2.4312	61.727 61.753	2.0875 2.0885	53.023 53.048	2.0880 2.0890	53.035 53.061
(Top) Piston Ring Groove Width (Bot.)	.0655 .0665	1.664 1.664	.0975 .0985	1.664 1.689	.0655 .0665	1.664 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664
	.0645 .0655	1.638 1.664	.0955 .0965	2.426 2.451	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664
Piston Ring Width	.0615 .0625	1.562 1.587	.0615 .0935	1.562 2.375	.0625 .0925	1.587 2.35	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587
Piston Pin Diameter	.4997 .4999	12.692 12.697	.3750 .3751	9.525 9.528	.4997 .4999	12.692 12.698	.3750 .3751	9.525 9.528	.4997 .4999	12.692 12.697
Crank Pin Journal Diameter	.6259 .6266	15.898 15.916	.6957 .6865	17.671 17.427	.6259 .6266	15.898 15.916	.6857 .6868	17.417 17.445	.6857 .6865	17.417 17.445
Crankshaft P.T.O. Side Main Brg. Dia.	.8650 .8850	21.971 22.479	.8745 .8750	22.12 22.225	.6691 .6695	16.995 17.001	.6691 .6695	16.995 17.001	.9998 1.0003	25.349 25.408
Crankshaft Magnet Side Main Brg. Dia.	.7495 .7503	19.037 19.058	.7495 .7500	19.037 19.058	.7495 .7500	19.037 19.058	.7495 .7500	19.037 19.058	.7495 .7500	19.037 19.058
Crankshaft End Play	None	None	.003 .016	.076 .406	None	None	None	None	None	None

TABLE OF SPECIFICATIONS

Reference Column	18		19		20		21		22	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.4375 2.4385	61.913 61.938	2.437 2.438	61.900 61.925
Stroke	1.750	44.45	1.410	35.814	1.250	31.75	1.750	44.45	1.750	44.45
Cu. In. Displacement (in ³) (cc)	6.02	98.7	4.80	78.7	4.40	72.1	8.17	133.9	8.17	133.9
Point Gap	.020	.508	.017	.432	.017	.432	.020	.508	.020	.508
Timing B.T.D.C.	.070	1.778	.100	2.54	.122	3.099	.118	2.997	.115	2.921
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.006 .016	.152 .406	.007 .017	.178 .432	.007 .017	.178 .432	.007 .017	.178 .432	.007 .017	.178 .432
Piston Diameter	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.4302 2.4312	61.727 61.753	2.4302 2.4312	61.727 61.753
(Top) Piston Ring Groove Width (Bot.)	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689
	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664
	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587
Piston Ring Width	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587
Piston Pin Diameter	.4997 .4999	12.692 12.675	.4997 .4999	12.692 12.675	.4997 .4999	12.692 12.675	.4997 .4999	12.692 12.675	.4997 .4999	12.692 12.675
Crank Pin Journal Diameter	.8442 .8450	21.443 21.463	.5614 .5621	14.26 14.277	.5611 .5618	14.252 14.270	.6259 .6266	15.898 15.916	.6919 .6927	17.574 17.595
Crankshaft P.T.O. Side Main Brg. Dia.	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005
Crankshaft Magneto Side Main Brg. Dia.	Ball Bearing .9998 1.0003 See Note A	25.395 25.408	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.8745 .8750	22.212 22.225	.8748 .8753	22.223 22.233
Crankshaft End Play	None	None	None	None	None	None	None	None	None	None

NOTE A: Needle Bearing .7498
.7503

* Does not apply to units with Solid State Ignition.

TABLE OF SPECIFICATIONS

Reference Column	23		24		25		26		27	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188
Stroke	.1500	38.1	1.410	35.814	.1410	35.814	1.500	38.1	1.500	38.1
Cu. In. Displacement (in ³) (cc)	5.20	85.2	4.80	78.7	4.80	78.7	5.20	85.2	5.20	85.2
Point Gap	.017	.432	.017	.432	.020	.508	.020	.508	.017	.432
Timing B.T.D.C.	.110	2.794	.135	3.429	Fixed	Fixed	.062	1.575	.100	2.54
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.006 .016	.152 .406	.007 .017	.178 .432	.007 .017	.178 .432	.006 .016	.152 .406	.006 .016	.152 .406
Piston Diameter	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0870 2.0880	53.01 53.035	2.0875 2.0885	53.01 53.035
(Top) Piston Ring Groove Width (Bot.)	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689
	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664
Piston Ring Width	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587
Piston Pin Diameter	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697
Crank Pin Journal Diameter	.6919 .6927	17.574 17.595	.5614 .5621	14.26 14.277	.5614 .5621	14.26 14.277	.6919 .6927	17.574 17.595	.6922 .6927	17.582 17.595
Crankshaft P.T.O. Side Main Brg. Dia.	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.6691 .6695	16.995 17.005	.7498 .7503	19.045 19.058	.6691 .6695	16.995 17.005
Crankshaft Magnet Side Main Brg. Dia.	.7498 .7503	19.045 19.058	.6691 .6695	17.551 17.005	.6691 .6695	17.551 17.005	.6691 .6695	17.551 17.005	.7498 .7503	19.045 19.058
Crankshaft End Play	None	None	None	None	None	None	None	None	.003 .016	.076 .406

TABLE OF SPECIFICATIONS

Reference Column	28		29		30		31		32	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188
Stroke	1.500	38.1	1.746	44.348	1.746	44.348	1.500	38.1	1.746	44.348
Cu. In. Displacement (in ³) (cc)	5.20	85.2	6.0	98.3	6.0	98.3	5.20	85.2	6.0	98.3
Point Gap	.020	.508	.020*	.508	.020	.508	.020	.508	.020	.508
Timing B.T.D.C.	Ext. Ignition	Ext. Ignition	Ext. Ignition	Ext. Ignition	.052	1.321	Ext. Ignition	Ext. Ignition	.088	2.235
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.006 .016	.152 .152	.007 .017	.178 .432	.006 .016	.152 .152	.006 .016	.152 .152	.006 .016	.152 .152
Piston Diameter	2.0875 2.0885	53.023 53.048	2.0865 2.0875	52.997 53.023	2.0875 2.0885	53.023 53.048	2.0865 2.0875	52.997 53.028	2.0865 2.0875	52.997 53.023
(Top) Piston Ring Groove Width (Bot.)	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689
	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664
Piston Ring Width	.0615 .06251	1.652 .587	.0615 .0625	1.652 1.587	.0615 .0625	1.652 1.587	.0615 .0625	1.652 1.587	.0615 .0625	1.652 1.587
Piston Pin Diameter	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697
Crank Pin Journal Diameter	.6922 .6927	17.582 17.595	.8113 .8118	20.607 20.620	.8113 .8118	20.607 20.620	.8113 .8118	20.607 20.620	.8445 .8450	21.450 21.463
Crankshaft P.T.O. Side Main Brg. Dia.	.7498 .7503	19.045 19.058	.9998 1.0003	25.395 25.408	.7498 .7503	19.045 19.058	.9998 1.0003	25.395 25.408	.9998 1.0003	25.395 25.408
Crankshaft Magnet Side Main Brg. Dia.	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.7498 .7503	17.005 17.015	.6695 .6699	17.005 17.015
Crankshaft End Play	None	None	None	None	None	None	None	None	.003 .016	.076 .406

*Does not apply to units with Solid State Ignition.

TABLE OF SPECIFICATIONS

Reference Column	33		34		35		36		37	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.437 2.438	61.90 66.925	2.093 2.094	53.162 53.188
Stroke	1.746	44.348	1.746	44.348	1.500	38.1	1.746	44.348	1.750	44.45
Cu. In. Displacement (in³) (cc)	6.0	98.3	6.0	98.3	5.20	85.2	6.0	98.3	6.0	98.3
Point Gap	.020	.508	.020	.508	*.020	.508	.020	.508	.020	.508
Timing B.T.D.C.	.073	1.854	.078	1.854	Ext. Ignition	Ext. Ignition	.112	2.845	.088	2.235
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.006 .016	.152 .406	.006 .016	.152 .406	.006 .016	.152 .406	.007 .017	.178 .432	.006 .016	.152 .406
Piston Diameter	2.0865 2.0875	52.997 53.023	2.0865 2.0875	52.997 53.023	2.0882 2.0887	53.04 53.05	2.4307 2.4317	61.74 61.765	2.0880 2.0885	53.035 53.049
(Top) Piston Ring Groove Width (Bot.)	.0655	1.664	.0655	1.664	.0655	1.664	.0655	1.664	.0655	1.664
	.0665	1.689	.0665	1.689	.0665	1.689	.0665	1.689	.0665	1.689
	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664	.0645 .0655	1.638 1.664
Piston Ring Width	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587
Piston Pin Diameter	.4997 .4999	12.692 12.698	.4997 .4999	12.692 12.698	.4997 .4999	12.692 12.698	.4997 .4999	12.692 12.698	.4997 .4999	12.692 12.698
Crank Pin Journal Diameter	.8113 .8118	20.607 20.620	.8445 .8450	21.450 21.463	.8113 .8118	20.607 20.620	.6922 .6927	17.582 17.595	.8445 .8450	21.450 21.463
Crankshaft P.T.O. Side Main Brg. Dia.	.9998 1.0003	25.395 25.408	.9993 1.0003	25.295 25.408	.7498 .7503	19.045 19.058	.6695 .6699	17.005 17.015	.9998 1.0003	25.395 25.408
Crankshaft Magneto Side Main Brg. Dia.	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.8748 .8753	22.22 22.233	.6695 .6699	17.005 17.015
Crankshaft End Play	.003 .016	.076 .406	.003 .016	.076 .406	None	None	None	None	.003 .016	.076 .406

TABLE OF SPECIFICATIONS

Reference Column	38		39		40		41		42	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188	2.093 2.094	53.162 53.188
Stroke	1.828	46.431	1.500	38.1	1.828	46.431	1.746	44.348	1.500	38.1
Cu. In. Displacement (in ³) (cc)	6.0	98.3	5.20	85.2	6.0	98.3	6.0	98.3	5.20	85.2
Point Gap	*		.020	.508	.020	.508	*		.020	.508
Timing B.T.D.C.	Ext. Ignition	Ext. Ignition	.088	2.235	.070	1.778	Ext. Ignition	Ext. Ignition	Ext. Ignition	Ext. Ignition
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.006 .016	.152 .406	.006 .016	.152 .406	.006 .016	.152 .406	.006 .016	.152 .406	.006 .016	.152 .406
Piston Diameter	2.0880 2.0885	53.035 53.049	2.0880 2.0885	53.035 53.049	2.0880 2.0885	53.035 53.049	2.0880 2.0885	53.035 53.049	2.0880 2.0885	53.035 53.049
(Top) Piston Ring Groove Width (Bot.)	.0655	1.664	.0655	1.664	.0655	1.664	.0655	1.664	.0655	1.664
	.0665	1.689	.0665	1.689	.0665	1.689	.0665	1.689	.0665	1.689
	.0645	1.638	.0645	1.638	.0645	1.638	.0645	1.638	.0645	1.638
	.0655	1.664	.0655	1.664	.0655	1.664	.0655	1.664	.0655	1.664
Piston Ring Width	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587
Piston Pin Diameter	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697	.4997 .4999	12.692 12.697
Crank Pin Journal Diameter	.8113 .8118	20.607 20.620	.8113 .8118	20.607 20.620	.8445 .8450	21.450 21.463	.8113 .8118	20.607 20.620	.8113 .8118	20.607 20.620
Crankshaft P.T.O. Side Main Brg. Dia.	.9998 1.0003	25.395 25.408	.9998 1.0003	25.395 25.408	.9998 1.0003	25.395 25.408	.9998 1.0003	25.395 25.408	.7498 .7503	19.045 19.058
Crankshaft Magneto Side Main Brg. Dia.	.7498 .7503	19.045 19.058	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015
Crankshaft End Play	None	None	None	None	None	None	None	None	None	None

* Does not apply to units with Solid State Ignition.

TABLE OF SPECIFICATIONS

Specification	43		AV520		AV600		AH600		HSK600		TVS600	
	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm	U.S.	Metric mm
Bore	2.093 2.094	53.162 53.188	2.09	53	2.09	53	2.09	53	2.09	53	2.09	53
Stroke	1.5	38.1	1.5	38	1.75	44	2.09	44	1.75	44	1.75	44
Cu. In. Displacement (in ³) (cc)	5.20	85.2	5.2	85 cc	6.0	98 cc	6.0	98 cc	6.0	98 cc	6.0	98 cc
Point Gap	.020	.508										
Timing B.T.D.C.	Ext. Ignition	Ext. Ignition										
Ignition Module Air Gap			.0125	.3175	.0125	.3175	.0125	.3175	.0125	.3175	.0125	.3175
Spark Plug Gap	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762	.030	.762
Piston Ring End Gap	.006 .016	.152 .406	.006 .016	.152 .406	.006 .016	.152 .406	.006 .016	.152 .406	.006 .016	.152 .406	.006 .016	.152 .406
Piston Diameter	2.0880 2.0885	53.035 53.049	2.0877 2.0882	53.03 53.04	2.0877 2.0882	53.03 53.04	2.0877 2.0882	53.03 53.04	2.0877 2.0882	53.03 53.04	2.0877 2.0882	53.03 53.04
(Top) Piston Ring Groove Width (Bot.)	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689
	.0645 .0655	1.638 1.664	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689	.0655 .0665	1.664 1.689
Piston Ring Width	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587	.0615 .0625	1.562 1.587
Piston Pin Diameter	.4997 .4999	12.692 12.697	.5005 .5007	12.713 12.718	.5005 .5007	12.713 12.718	.5005 .5007	12.713 12.718	.5005 .5007	12.713 12.718	.5005 .5007	12.713 12.718
Crank Pin Journal Diameter	.6922 .6927	17.582 17.595	.8445 .8450	21.450 21.463	.8445 .8450	21.450 21.463	.8445 .8450	21.450 21.463	.8445 .8450	21.450 21.463	.8445 .8450	21.450 21.463
Crankshaft P.T.O. Side Main Brg. Dia.	.7498 .7503	19.045 19.058	.9998 1.0003	25.395 25.408	.9998 1.0003	25.395 25.408	.7498 .7503	19.045 19.058	.7498 .7503	19.045 19.058	.9998 1.0003	25.395 25.408
Crankshaft Magneto Side Main Brg. Dia.	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015	.6695 .6699	17.005 17.015
Crankshaft End Play	None	None	.003 .016	.076 .406	.003 .016	.076 .406	.003 .016	.076 .406	.003 .016	.076 .406	.003 .016	.076 .406

TABLE OF TORQUE LIMITS

	INCH POUNDS	NEWTON METERS
Cylinder	80 - 100	9 - 11
Flywheel Nut	264 - 324	30 - 37
Connecting Rod Screws		
Aluminum Rods	40 - 50	4.5 - 5.5
Steel Rods	70 - 80	8 - 9
Spark Plug	192 - 264	21.5 - 30
Fuel Tank Screws	12 - 20	1.5 - 2
Blower Housing Mounting Screws	80 - 100	9-11
Muffler Mounting Screws	80 - 100	9 - 11
Muffler Cover (Snowthrowers)	20 - 30	2 - 3.5
Stator to Base (Except Outboards)	80 - 100	9 - 11
External Screws to Laminations	30 - 40	3.5 - 4.5
Point Screw	15 - 25	1.5 - 3
Air Filter or Carburetor Baffle (Metal)	30 - 40	3.5 - 4.5
Air Filter (Plastic)	18 - 25	2 - 3
Carburetor Mounting Nuts	60 - 75	7- 8.5
Reed Plate, Cover Plate	35 - 45	4-5
Reed Hold down	15 - 25	1.5- 3
Compression Release Cover	30 - 40	3.5 - 4.5
Shroud Base to Block	80 - 100	9 - 11
Starter Mounting Screws (Metal)	50 - 70	5.5- 8
Starter Mounting Screws (Plastic)	30 - 40	3.5 - 4.5
Electric Starter Mounting Screws	65 - 85	7.5 - 9.5
Stop Lever to Head	80 - 100	9 - 11
Speed Control to Shroud Base	30 - 40	3.5 - 4.5
Compliance Brake Bracket to Cylinder	60 - 80	7 - 9
Compliance Brake Bracket to Base	35 - 50	4 - 5.5

"Torque specifications listed on this page should not be confused with the torque value observed on engines which have been run. Torque relaxation occurs on all engines from thermal expansion and contraction. The torque specifications take relaxation into account so a sufficient clamping force exists after an engine has been run."

EDUCATIONAL MATERIALS AND TOOLS

AVAILABLE TECHNICIAN'S HANDBOOKS

692508

Covers the diagnosis and repair of Tecumseh 2-cycle engines. Except the TC Engine and TVS840.

692509

Covers the diagnosis and repair of the Tecumseh 4-cycle light/medium frame engines.

691462A

Covers the diagnosis and repair of Tecumseh 4-cycle large frame engines.

691218

Covers the diagnosis and repair of Peerless® power train components.

694782

Contains technical information for the repair of the TC series, 2-cycle engines.

694988

Contains diagnosis and technical information for the repair of TVS840, HSK/HXL845/850, 2-cycle engines.

695244A

Covers the diagnosis and repair of the OVRM/OVM/OHH/OHM/OHV 4-cycle overhead valve engines.

695578

Covers the diagnosis and repair of the Vector Series, 4-cycle engines.

AVAILABLE FOREIGN TECHNICIAN'S HANDBOOKS

694732 Spanish

This manual covers the following models: VH80, VH100, HH80, HH100, HH120, OH120-180. Model numbers are located on the engine shroud.

695555 Spanish

Covers the diagnosis and repair of the Tecumseh 4-cycle light/medium frame engines.

695657 German

Covers the diagnosis and repair of the Tecumseh 4-cycle light/medium frame engines.

695562 French

Covers the diagnosis and repair of the Tecumseh 4-cycle light/medium frame engines.

VIDEO PROGRAMS

695015

Carburetor Troubleshooting. Covers identification of carburetors used on Tecumseh engines and how to troubleshoot and repair them. VHS only.

695059

Understanding Tecumseh Ignition Systems. A basic program designed to give the small engine technician first hand knowledge of Tecumseh ignition systems so the technician can understand the system and perform repairs to it. VHS only.

695148

Teardown and reassembly of the 900 series transaxles. This video will show a complete step-by-step procedure for teardown and reassembly of the 900, 910 and 920 series transaxles.

695185

Electrical Troubleshooting. This video training program will assist the small engine technician in the proper procedures for troubleshooting electrical systems on outdoor power equipment.

695285

An in-depth look at the 800 series transaxles. Detailing the teardown and reassembly procedures for the 800, 801 and 820 transaxles.

SPECIALTY / TROUBLESHOOTING BOOKLETS

INSTRUCTIONAL GUIDE

692738

Assists in the use and understanding of the Tecumseh Master Parts Manual. Illustrates time saving features incorporated into the manual. Explains new carburetor parts breakdown format.

4-CYCLE ENGINE FAILURE ANALYSIS

695590

This booklet is designed as a tool for the average technician to correctly assess the cause of failure.

CARBURETOR TROUBLESHOOTING BOOKLET

695907

This booklet is designed as a quick reference to carburetion problems and related repair procedures.

IGNITION SYSTEMS TROUBLESHOOTING BOOKLET

694903

This booklet contains information on the identification, possible problems and related repair procedures of Tecumseh Ignition Systems.

SPECIAL TOOLS BOOKLET

694862

This booklet depicts all specialty tools offered by Tecumseh which can be used on 2 and 4 cycle engines and Peerless units.

QUICK REFERENCE CHART BOOKLET

695933

This booklet contains the quick reference information found on Tecumseh wall charts.

This booklet is designed to be used as a work bench quick reference guide when servicing Tecumseh engines and motion drive systems.

TESTER BOOKLETS

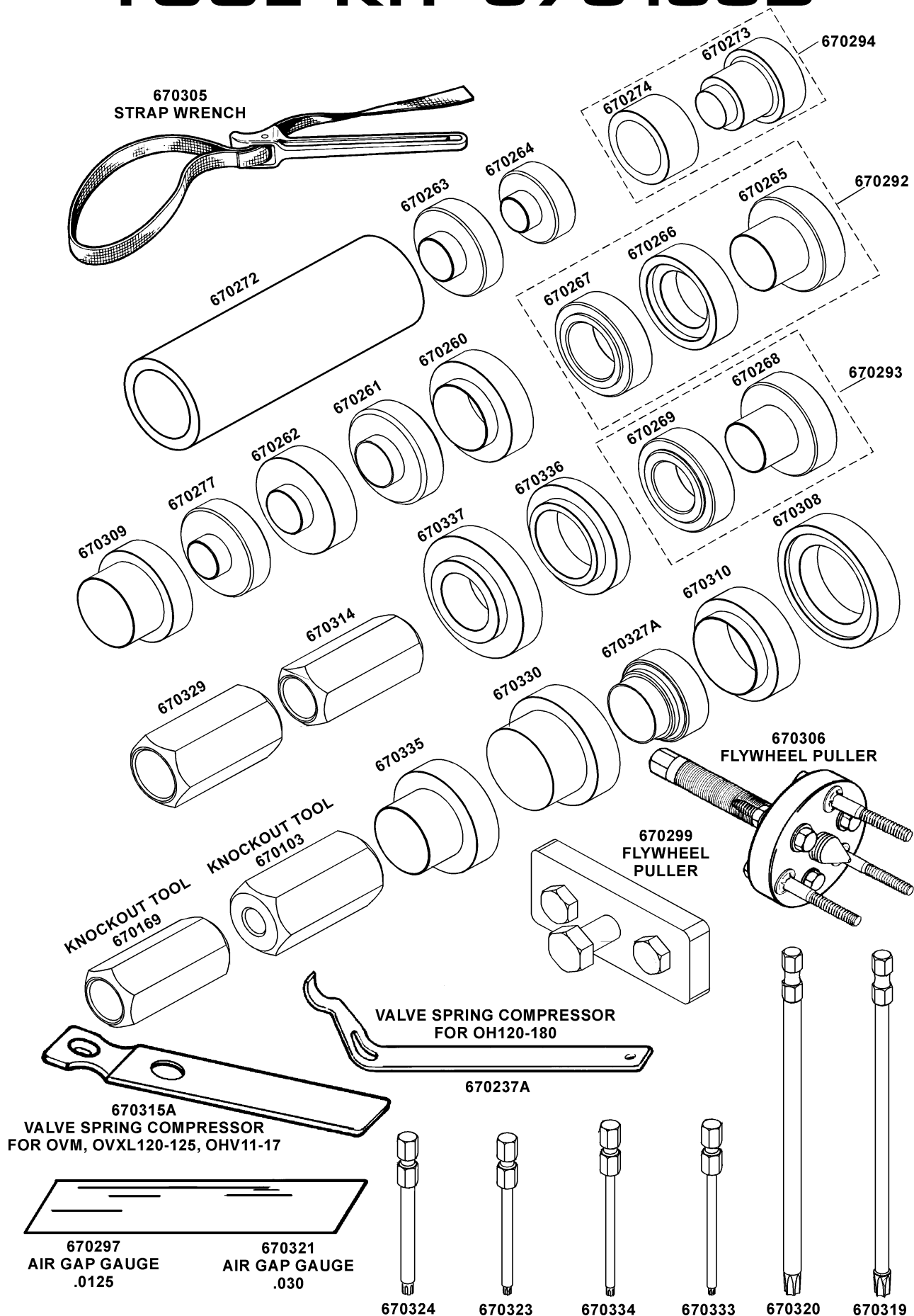
694529

Test procedures for Tecumseh electrical components using Graham-Lee Tester 31-SM or 31-SMX-H.

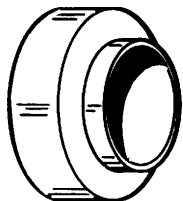
694530

Test procedures for Tecumseh electrical components using Merco-O-Tronic Tester 9800. (Tests are similar for 98, 98A and 79.)

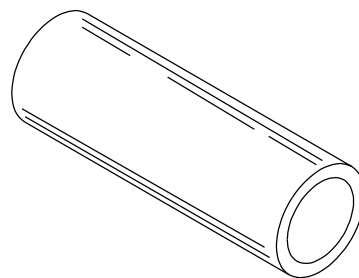
TOOL KIT 670195D



OIL SEAL DRIVER - PROTECTOR

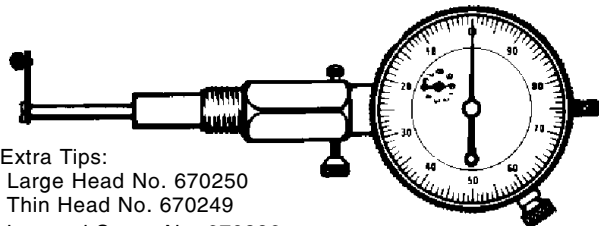


BALL BEARING DRIVER



No. 670258

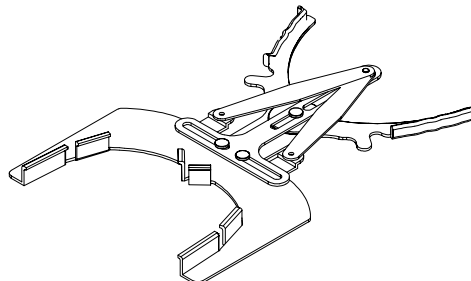
DIAL INDICATOR



Extra Tips:
Large Head No. 670250
Thin Head No. 670249
Leg and Screw No. 670296

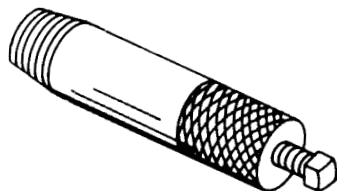
No. 670241 - Dial Indicator.

PISTON RING EXPANDER



No. 670117 - Piston ring expander

OIL SEAL REMOVER



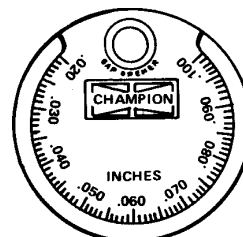
No. 670286. Used on P.T.O. end of single cylinder outboards with one piece oil seals. Includes tool No. 670285 and center screw.

No. 670291. Used on magneto end of all two cycle engines with one piece oil seals and P.T.O. end of 1600 series. Includes tool No. 670280 and center screw.

No. 670257. Used on 2 cycle connecting rod screws.

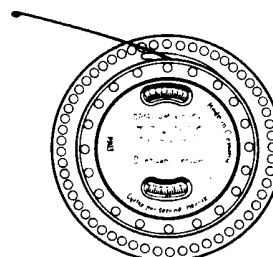
No. 670307. Used on 590556 electric starter mounting screws.

TAPER GAP GAUGE



No. 670256 - Taper Gap Gauge

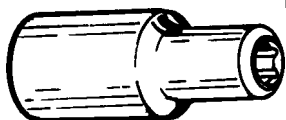
VIBRATION TACHOMETER



No. 670156 - Vibration tachometer.

TORX® E-6 SOCKET
No. 670257

TORX® E-8 SOCKET
No. 670307



No. 670298 - Aligning Pin