

# MOWER ENGINE TROUBLE SHOOTING

When you pull out a trim mower in the spring and it won't start, temptation is just to replace it with a new one. Very often, a few hours labor on a rainy day and a few dollars worth of parts can give you another season from that mower. Weigh the costs of repair against the cost of replacement.

WEEDS TREES & TURF went to Morris Mower and Small Engine Repair to find out what the typical causes of small engine failure are. Clint Morris, who runs the shop, has been repairing small engines for 20 years. He attends all the manufacturers' schools to keep abreast of small engine technology.

"If a small engine has been properly taken care of, oil changed, filter cleaned, blade sharpened, and the mechanical parts are sound, getting it to run properly is simply a matter of getting the spark and fuel to meet in the right place at the right time," according to Morris.

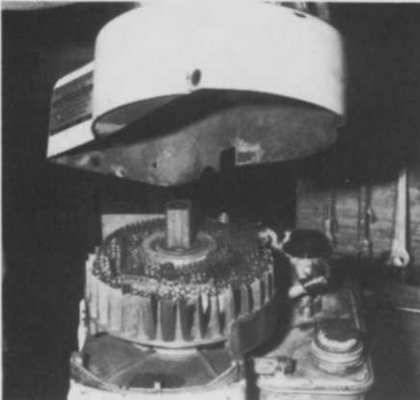


If an engine is otherwise mechanically sound, test for spark by holding the spark plug wire close to, but not touching, the spark plug. Pull the starter rope. Blue sparks should arc between the wire and the plug.



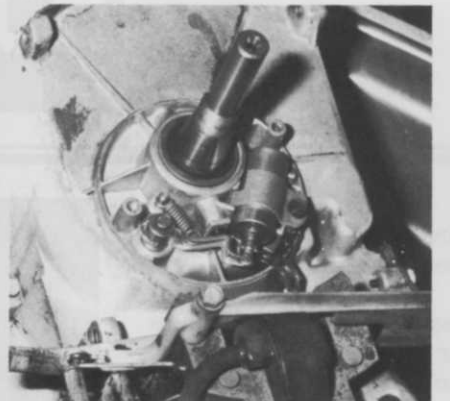
Guarding the threads on the crankshaft, place a screwdriver under the edge of the flywheel and press down. Tap the top of the crankshaft with the hammer and the flywheel will break loose. There is a cupped spring washer under the flywheel.

If there is no spark, it is necessary to replace the points and condenser and time the engine. First step is to loosen the bolt holding the air filter and remove it.



Remove the three bolts that hold the engine housing in place. Grasp the housing by the top and lift sharply.

There are special tools to remove the starter clutch, but in lieu of these; a soft wooden block and hammer will do. The clutch loosens in a counter-clockwise manner, so place the block against one of the ears of the clutch and hit the block with a hammer until the clutch is free. It should then spin off.



Two small bolts hold the dust cover over the points and condenser. Remove the cover to expose the points.



The points in this photo have a white, pitted surface, indicating they need to be replaced.

Remove the bolt holding the clamp in place over the condenser. There is a small plastic tool provided in new point and condenser kits to aid in removing the wires from the condenser. Place the piece over the spring of the condenser and compress it until the wires pull free. Install the new condenser by compressing the spring until the wires enter the hole. Reinstall clamp and tighten.

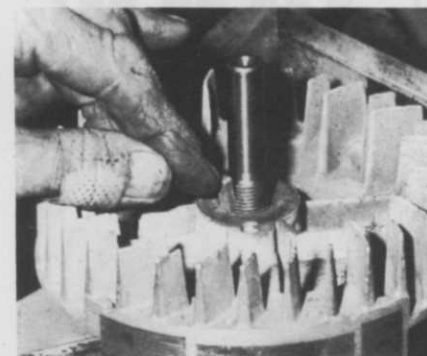




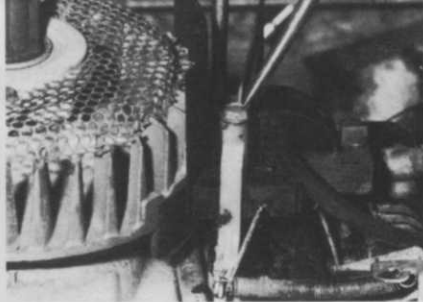
Remove the bolt holding the point assembly and remove the points, with spring attached. Install the new points in the same manner. In order to gap the points correctly at .020, it is necessary to rotate the engine so that the slot in the crank shaft points towards the rear of the engine (away from the cylinder head).



Insert a feeler gauge between the points and adjust the gap by loosening the condenser and moving it. There should be only minimum resistance as the gauge is pulled through the points.



Reinstall the dust cover and tighten it. Place the spring washer back over the crankshaft with the cup up. Line up the grooves in the crankshaft and flywheel so that the aluminum key will slip in without force. Always use an aluminum key in this slot. If the key is bent or damaged, it will affect the timing of the engine.

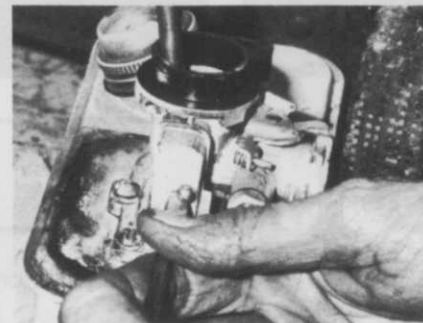


The engine is timed by adjusting the air gap between the legs of the magneto and the magnetic surface of the flywheel. A postcard is just the right thickness for this. Loosen the two screws holding the magneto and move it for the right gap. Replace the starter clutch and tap it with the wooden block and hammer in a clockwise manner until it is secure. Replace the trash screen. Clean the air filter element in kerosene or hot soapy water. Saturate it with oil and squeeze out the excess.

Fill the gas tank half full and attempt to start it. Screw in the idle mixture screw (clockwise) until snug. Back it off one and one-half turns. Unless something is wrong with the carburation, the engine should start. If it starts but fails to respond to the idle mixture screw, this indicates warping between the faces of the carburetor and gas tank. Briggs & Stratton Repair Kit#391413 will correct this.

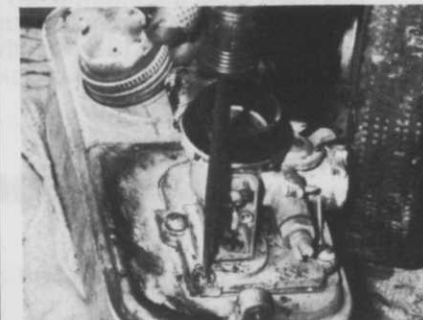


Remove the control cable from the engine housing. Lift it up and slide it out of the hole in the carburetor control plate. Remove the screw in the back and the side. Make sure you don't lose the spacer behind the side screw. Remove the spring from the control plate, being careful not to stretch it. Lift the tank and tilt it to remove the governor linkage wire.



Remove the choke linkage cover and slip the linkage free of shaft.

Remove the bolts holding the carburetor to the gas tank and lift the carburetor free.



Place the pin from the repair kit in the hole as indicated and place the small teflon washer over the pin.



Place a 5/16-inch bolt behind the choke valve as shown.



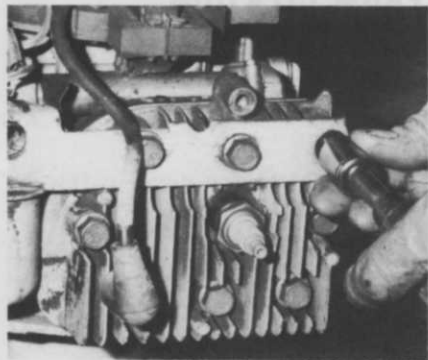
This places the proper tension on the choke valve spring. Replace the linkage in its shaft and replace the cover to hold it in place. Tighten the carburetor to the gas tank. Attach the tank-carburetor assembly to the engine, tilting it to attach the governor linkage before securing it. Attach the governor spring and the control cable.

The control plate must come into contact with the point indicated by the pliers in order to stop it. Raise it up if necessary. Refill the tank at least half full. Start with the air filter off, but replace it after the engine starts and before making any adjustments. Adjust the idle mixture until the engine is running smoothly.



Loss of compression in a small engine is a result of three things: either the cylinder head gasket is leaking, the piston rings are not sealing (engine will also burn oil), or the valves are not seating properly. To check for compression, spin the flywheel clockwise against a compression stroke. Good compression is indicated by a sharp rebound.

If valve grinding is necessary, there are six special tools required, all but two are inexpensive. A valve spring compressor runs about \$6.00. A valve refacer can cost approximately \$8.00. The wooden handle cup grinder for about \$.75. The valve seater costs approximately \$60, but there are cheaper versions available. A torque wrench is necessary to retighten the head bolts properly.



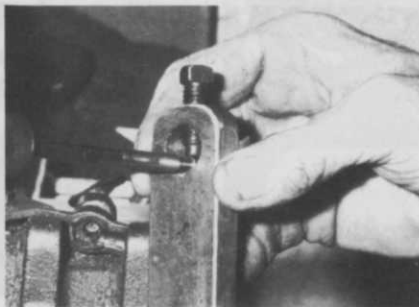
First step is to remove the head bolts. Note the positions of longer and shorter bolts as these must go back into the proper holes. Place the bracket removed to the side, being careful not to stretch the governor spring. Disconnect it if necessary. Inspect the head gasket for gaps that might cause loss of compression.



Remove the cover over the valve springs.



Insert the valve spring compressor over the spring and valve retainer clip. Tighten the tool to compress the spring and tilt it to remove the clip from the end of the valve.



Remove the valve from the engine and insert it in the refacing tool handle as shown. Both seat and valve angles are 45°.

Place it in the refacing tool and tighten the bolt shown on the right until the valve face is against the cutting unit. Turn the handle while tightening the bolt until the valve face is even.



It is also necessary to reface the valve seat. The tool shown is inserted in three pieces. First the pilot.

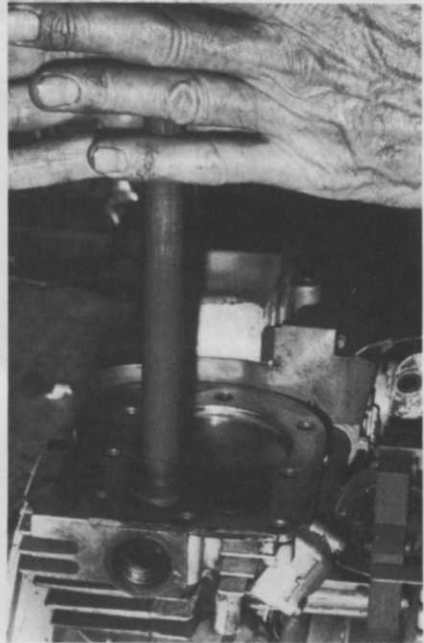


Then the counterbore.



Then the cutter handle. Rotate this unit until the seat is smooth.

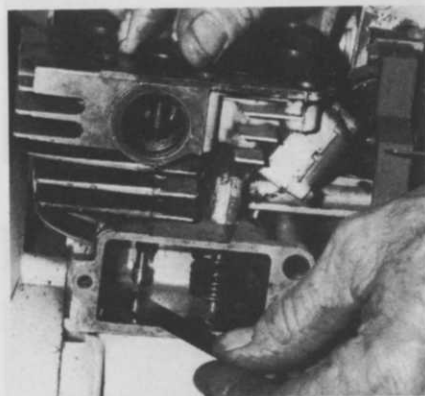
It is necessary to lap the surfaces of the seat and face together so that they mate properly. Clean the top of the valve and press the suction cup onto it. Apply grinding compound to the face of the valve.





Rotate the wooden handle between your hands while pressing down . . .

. . . until there is a smooth ring ground completely around the valve face and seat.



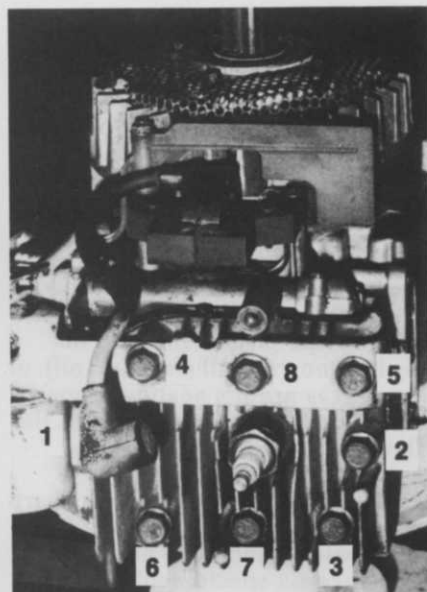
If much material was removed, it may be necessary to widen the gap between the

valve and tappet. Insert the valve into the engine and check with a feeler gauge for .005-.007 for the intake (smaller) valve and .009-.011 for the exhaust. Grind only a minimum at one time until the proper gap is reached.



Replace the valve by inserting the compressed spring into the engine and sliding

the valve through the spring and slipping the retainer clip over the end of the valve. Release the spring and remove the tool. Repeat the sequence for the other valve.



Install a new head gasket and replace the head with the proper bolts in the right holes. Tighten the bolts finger tight. Be sure and replace the bracket. Tighten the bolts in sequence, a little at a time, until the proper torque is reached. Tightening one much more than the others will result in a warped head. Proper torque is 140 inch pounds.

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