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Stover

Operator's Manual

CT-1, CT-2, CT-3 & CT-4

Horizontal Oil-Rite

Engines

Operator's Manual

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STOVER

MFG. & ENGINE CO.

FREEPORT, ILLINOIS

U. S. A.

Turn the engine over by hand to make sure that everything is in proper working condition, checking valve timing and ignition to see that no change has taken place during shipment. Engines as shipped are in correct adjustment and ordinarily no correction is needed for some time.

STARTING HIT & MISS ENGINE:

Close starting damper.

Move spark advance lever up to retard spark and thus prevent engine kicking back when cranked.

Place starting crank on engine and crank rapidly, holding the inlet valve open with the left hand for one or two revolutions, after which, hand should be removed from inlet valve as engine will have attained sufficient speed so that it can be turned over against compression. As soon as engine has taken one explosion the starting damper should be opened, since if left closed after the engine has started too much fuel will be drawn in cylinder and mixture will be too rich to ignite.

After engine starts, the spark advance lever should be moved down to advance spark.

See that breather is working.

STARTING THROTTLING GOVERNOR ENGINE:

Close starting damper.

Move spark advance lever up to retard spark and thus prevent engine kicking back when cranked.

The throttling governing engine is provided with a gasoline reservoir for starting. In starting close the kerosene needle valve, fill the reservoir about three-fourths full of gasoline, and open the gasoline needle valve about one-half turn. After the engine has operated long enough to warm up, the gasoline needle valve should be closed, and the kerosene needle valve opened. The needle valves on both the hit and miss and throttling governing engines are marked, to show the correct running position when the engine was tested at the factory. This position will vary somewhat due to local or atmospheric conditions and altitude, therefore, the operator should adjust the needle valve so the engine will operate on the least amount of fuel without missing explosions.

After the proper location is found, needle valve should be marked with a file. This location may change, due to wear on needle valve seat and valve should be kept adjusted to use the minimum amount of fuel. If engine is run on kerosene before it is thoroughly warmed up it will probably be necessary to open the needle valve to give more fuel than will be required for best operation after engine is warmed up.

Too much fuel will be indicated by black smoke at the exhaust, and if the engine is given too much fuel in starting the engine will be flooded. Particular care should be taken when engine is hot as it is easily flooded. In case engine becomes flooded close needle valve and hold the inlet valve in with hand, turning the engine over a number of times in order to work out excess fuel.

When engine is hot it can frequently be started without using starting damper. Engine will sometimes miss explosions if it is not receiving enough fuel.

Starting is aided by priming with gasoline but this is usually not necessary. To prime engine, push open the auxiliary air valve on front of mixer with the end of oil can spout and squirt in gasoline.

STOPPING ENGINE:

Engine may be stopped by closing needle valve, pushing in on magnet switch button or by holding detent in on Hit and Miss engines.

Drain hopper whenever there is danger of freezing. When engine is to stand idle for a long time the flywheels should be turned so that the exhaust valve is closed to prevent the inside of the cylinder from rusting.

VALVES AND VALVE TIMING:

The seats on valves must always be kept in good condition, to prevent the engine from losing its compression. Should the engine turn too easily while being cranked by hand, it is evident that compression is being lost, either past the valves or past the piston. Valves should be examined occasionally to see that they are not sticking. This can be done by pushing on end of valves by hand, to see if valve stem has become gummed up. If the valve sticks, same may be cleaned with kerosene, working valve stem in and out by hand, and then oiling with lubricating oil, care being used not to place too much oil on valve stem.

Should it be necessary to regrind valves, the cylinder head should be removed, and valves ground by the use of fine emery and oil, or valve grinding compound, which can be obtained from any garage. Valves should be ground in until they show a bright seat all around. To grind valves the springs should be removed, and valves and valve seats cleaned with kerosene. When grinding, valve should be turned with a screw driver or carpenter's brace with screw driver bit, first to the right and then to the left, lifting the valve off seat occasionally to let the paste get on the seat. Care should be taken not to permit valve grinding compound to get into valve stem guides, and after grinding the valves, valve seats in cylinder head and valve guides should be cleaned with gasoline to remove grinding compound.

Before placing cylinder head on engine, the tightness of the valve seat should be tested by pouring gasoline into the intake or exhaust port, if gasoline leaks past the valve seat grinding should be continued until there is no leakage.

Loss of compression caused by a small particle of carbon lodging on valve seat, can sometimes be helped, by turning valve around a few times with a pair of pliers, without removing cylinder head from engine, or removing springs from valve stems.

The inlet valve is automatic in its action, being opened by the suction of the engine. The exhaust valve is opened by means of the exhaust cam operating through the side rod, and should open approximately 35 degrees before the crank has reached its outer center, and should close from 3 to 5 degrees after the crank has passed the dead center at the end of the exhaust stroke. The crankshaft pinion and cam gear are marked for the proper meshing of teeth, to give this opening when the screw adjustment on exhaust lever is properly set. In setting valves the adjusting screw should be set for the closing of the valve, and the engine turned over to see that the valve starts to open at approximately the right location. After setting valves the ignition should be checked. (See instructions for setting ignition.)

PISTON:

Compression may also be lost past the piston as rings may be worn or fast in grooves. Occasionally the piston should be removed and rings cleaned. To do this remove the crank enclosure, and disconnect connecting rod from crank, care being taken when removing connecting rod bolts and caps, that liners are not mixed up so that they cannot be replaced in their original position.

It is very important that Spark Plug Wire be removed before starting to remove piston.

If the rings are found to be fast in the grooves, clean them by washing in kerosene, working them up and down in the grooves until free, after which the rings should be

gages the latch block too much (more than $\frac{1}{8}$ in.), unscrew the adjusting screw to give the proper engagement. Loosen the lock nut on the adjusting screw (419) before attempting to change adjustment and be sure to set it up tight before the adjustment has been made. Before attempting to start the engine, remove the metal strip that you placed between the armature and the cores.

MOVING PARTS. All moving parts can be withdrawn from the magneto by lifting the armature (100) from its magnetic contact with the cores (107). This operation does not weaken the magnets. When replacing

the armature make sure that the felt oil pad slips over the guide rod.

REMOVAL OF COVERS. The covers of the magneto are held in place by the band which is fastened by four screws, two at each end of the magneto. The removal of these screws allows the band to be lifted and the covers to be removed.

If spark plug replacement is necessary care should be taken to use the same length of plug supplied with the engine which is extra long, $\frac{3}{8}$ in. S. A. E. measuring $1\frac{1}{4}$ in. from the shoulder to the end of the plug.

TROUBLE	POSSIBLE CAUSE	REMEDY
Engine will not start.....	Instructions not followed..... No fuel in tank..... Water in gasoline used in starting..... Water in engine cylinder..... Engine flooded with fuel.....	Read and follow instructions. Fill tank. Drain out water. See cylinder gasket is unbroken. Close fuel needle valve, hold suction valve open, crank engine.
Engine misses fire after being started	Poor Compression— Valve leaks Head gasket leaks Piston blows Engine very cold..... No spark or poor spark.....	Grind valve. Put on new gasket. Remove and clean rings. Put hot water in hopper. See magneto instruction.
Engine runs irregularly.....	Ignition Governor sticky Weak exhaust valve spring.....	See magneto instruction. Oil. Stretch spring—order new one.
Engine will not carry load....	Exhaust valve setting off..... Poor compression Too rich mixture Carbon in combustion space.....	Check valve timing—See instruction book. Grind valves Adjust needle valve. Clean carbon.
Engine smokes	Exhaust— Too much lubricating oil..... Too much fuel..... Piston— Piston blows	Check oil level Adjust needle valve. Clean rings and piston ring grooves—may need new rings.
Engine knocks	Hard Explosion Loose crank pin bearing..... Scale formation in jacket.....	Clean carbon. Take up bearings. Clean out scale.
Engine uses too much fuel....	Needle valve open too far..... Exhaust valve setting off..... Silencer choked Weak admission valve spring.....	Close slightly. Reset. Clean. Stretch spring—order new one.
Carbon forms	Too much fuel Too much lubricating oil.....	Cut down on needle valve. Adjust oil level.
Water boils away too rapidly	Mixture too rich Spark timing late	Cut down on needle valve. See instruction book for timing spark to flywheel mark.