Cushman

Operator's Manual

4 Horse Power Light Weight Engine

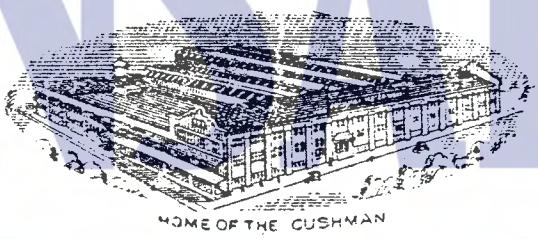
Operator's Manual

CU-O-4HP

INSTRUCTION

FOR 4 H.P. LIGHT WEIGHT

CUSHMAN ENGINE



HOME OF THE CUSHMAN

¶ Study this Book Carefully before Starting your Engine. Preserve This Book for Reference in Case of Trouble and to Order Repair Parts in future years. GIVE ENGINE NUMBER

CUSHMAN MOTOR WORKS

LINCOLN, NEBRASKA, U. S. A.

CUSHMAN 4 H. P. HAND TRUCK OUTFIT

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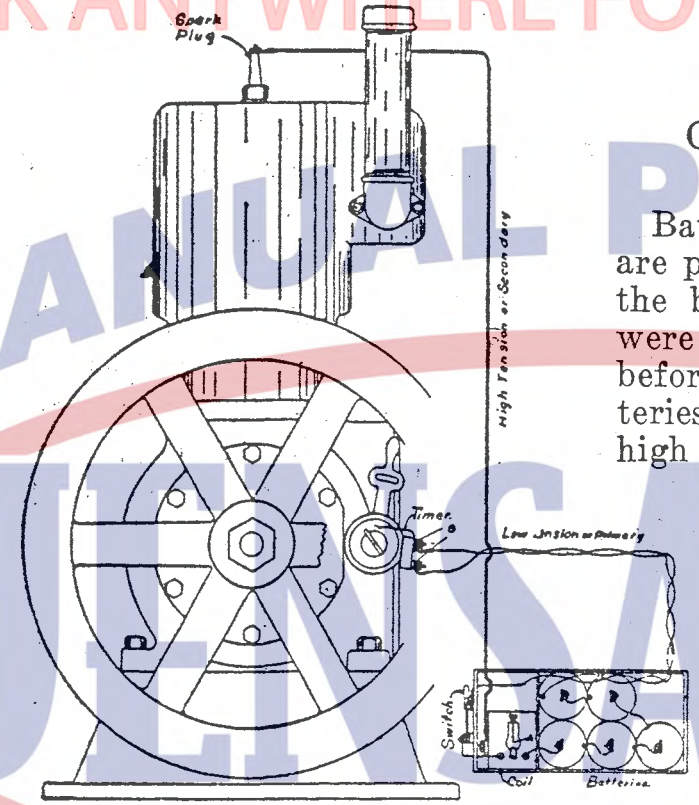
ATTENTION

The Cushman type of engine is an advanced design, very different in point of operation from the ordinary farm engine of the hit and miss type.

Therefore, we believe that in starting this engine or at any time in locating or correcting "engine trouble" the study of this book will better aid you than the service of any ordinary "engine expert."

Cushman design and quality mean exact accuracy and perfect fit and finish for every working part. This perfection of quality which you find in every item and part of the Cushman engine, deserves the best of attention and care from the operator. In this accurate and exact piece of machinery, abuse and neglect work greater havoc than with a more roughly built machine of the cheaper type. **Therefore, for your own interest and for the standing and the name of Cushman quality and service, we urge your study of this book of directions and your careful attention to the instructions and cautions herein regarding care and operation of the Cushman.**



WIRING

CONNECTIONS

Batteries and spark coil are properly connected in the battery box. They were carefully tested just before shipment. The batteries are fresh, special high grade quality and can not possibly be "dead" unless short-circuited in some manner. Always keep the switch "out" except when engine is running. One battery wire (either one low tension) is grounded to engine at timer binding post. The other goes to the other binding post to carry the current to the spring that makes contact with knife edge on engine half time shaft every other revolution.

The heavy cable connects to the spark plug and carries high tension current. The return current goes through engine when explosion takes place.

Be careful in handling this when current is running or when testing the spark, and do not touch the metal part or spark plug. Do not use over five good cells.

Note wiring diagram here shown. For information regarding spark test refer to page 16.

All Connections Must Be Tight

Spark plug must be tight and clean. Clean it by taking plug apart and wiping carbon and grease from porcelain and inside barrel with gasoline. See that the spark plug points are separated by not more than the thickness of a dime. A cracked spark plug will cause missing and lack of power.

MAGNETO INSTRUCTIONS

Full information regarding care, adjusting, timing, etc., of magneto and starter coupling are covered in separate folder attached to this instruction book.

How to Determine if All Connections are Correctly Made

Turn on switch, opening priming cup to relieve compression, disconnect the spark plug wire and hold it about ¼ inch away from any part of the motor and revolve the flywheel in the direction in which it runs. A spark should jump from wire to the motor at every other revolution as the contact is made on the timer.

These simple connections make ignition system ready for operation by simply throwing in the switch on the battery box. But every engine owner should clearly understand the exact operation of this simple ignition system and we therefore give a drawing on opposite page and further directions on page 16.

STARTING THE ENGINE

In starting, shift timer towards crank shaft. Then after starting shift toward the pump. For easy starting open priming cup to release compression. Put hands over intake of carburetor until after first explosion.

First. **Have oil in the crank case** (see oiling instructions, page 5) to a level where it just drips from pet cock in front of crank case and water in the cooling tank.

Second. Turn on gasoline. Make sure it is feeding to carburetor by pressing down on the spring button until gasoline drips from the carburetor.

Third. **Shift timer back towards the main shaft bearing** as far as it will go, so as to cause the explosion to occur a little after center, which will prevent the engine from "kicking back."

Fourth. Turn on battery switch, having attached spark cable to the spark plug, and revolve the flywheel over center, and engine should start on the first or second turn. Facing the flywheel it turns to the right like the hands of a clock. In taking hold of the engine flywheel do not try to give it a quick jerk over center from the very first, but revolve the wheels slowly until the compression can be felt, then give a quick hard

pull over center, letting go of the wheel just as it passes center. With a little practice the Cushman can be started very easily and in cold weather as well as warm. As soon as the engine is started, **move the timer forward toward the pump** to end of slot. This advances the spark for full power, but if engine pounds on full load, retard **the timer slightly until pounding** stops. If water does not start hold the governor open an instant for full speed to start water circulation. After engine takes an explosion hold the governor rod so carburetor will be but partially open until the engine gains sufficient speed **so** governor will act. For easy starting open priming cup to **relieve compression, put fingers over air intake on carburetor** until one intake stroke has passed, close pet cock, and turn engine rapidly over compression center.

PRIMING AND LUBRICATION

If the weather is cool, or engine has been idle for some time, it may be necessary to put a small amount of gasoline in the priming cup on the side of the cylinder. Then open the cup, rock the flywheel slowly back and forth, which will allow the gasoline to be sucked from the priming cup into the engine. This priming cup, which also acts as a release valve may be left partly open until engine is started, but should be closed as soon as the engine does start, or the hot gas will soon cause the valve to leak. We furnish extra squirt can for gasoline for convenience in priming. For very cold weather filling water jacket with hot water helps easy starting. Priming engine several times without engine starting will sometimes so completely wash oil out between piston and cylinder that engine will become stiff. Take out spark plugs and put small quantity of oil in on top of piston and work up and down until it feels free and properly lubricated.

The Cushman oiling system is so simple and perfect that there is **no excuse** for operator ever letting his **engine run dry**, and we will not stand repairs made necessary by this cause. The **one oil cup** on side of cylinder is the only oiling point. You must use HIGH GRADE GAS ENGINE OIL. The lighter grade such as used for **automobile engines is the proper kind for the Cushman.** This is the **most important** single point toward securing full power and **long life** from your engine.

EXCESSIVE BEARING LUBRICATION

Before starting be sure there is proper supply of oil in the

crank case. Medium weight oil should be used—grade Mobile "A" or slightly heavier. On a new engine it is well to fill crank case until oil just starts to drip from pet cock at bottom edge of front crank case cover. But this level is high and will give excessive splash and spark plug trouble for constant running. Therefore, as soon as engine is well limbered up and free from any sign of heating of bearings, oil level should be permitted to work down until there is no sign of smoke in the exhaust nor excess of oil showing around push rods, crank bearings, etc. Then a steady feed of approximately 10 to 12 drops per minute of the oil cup will maintain proper lubrication. Make adjustment of sight feed oiler while engine is running.

Remove the plug on back of crank case for supplying oil. Occasionally drain the oil down to proper level by opening drain cock. When using the engine on the binder or for steady work use two or three times as much oil.

Present low grade gasoline causes a continuous condensation of practically kerosene on the walls of any gas engine cylinder and this condensation works down the cylinder wall into the crank case. It rapidly and seriously cuts out the lubricating quality of the oil in the crank case. This effect occurs more rapidly in cold weather, or with frequent starting of the engine for short runs, etc. The oil in the crank case should be drained out as often as once a week. Under above bad conditions, or even under good steady running conditions at least once a month, and new, good, heavy consistency oil put in.

"When used on a binder the lubricating quality of oil is further affected by dust sucked into the engine. In dusty harvest time use of engine, the crank case gear cover should be taken off every night and crank case thoroughly washed out with gasoline and filled with fresh clean oil. Also clean governor working parts thoroughly and carefully oil.

Feel of the bearings often, especially when engine is new, to be sure they are not heating. If crank case gets hot it indicates a hot crank pin bearing. Try more oil. If this does not remedy trouble, it indicates poor grade of oil or dirt in the bearings. Don't continue running if bearings are heating badly. It is easier to stop and remedy the trouble than have to put in new bearings or replace a stuck and broken crank. This would indicate that the felt packing in oil duct is not properly placed. Remove square head plug nut in top of oil duct and take out

felt packing and replace so that it fills the opening, using pencil or some such instrument to push to bottom of duct. This felt packing should be placed so that the oil will seep through in sufficient quantity to properly oil the bearings and no more.

With every working part enclosed and dirt proof and working in continuous splash of oil, our method gives perfect lubrication for continuous full load service **if proper quantity and grade of oil** is supplied by the operator.

We cannot be responsible for wear or damage due to failure on the operator's part in these points.

COLD WEATHER CAUTION

Remember that a thin wall of water inside of cast iron will freeze quicker than water in the open air. So remember to keep your water cooling level below the cylinder line at least. But it is best on frosty nights to shut off the water tank, and **drain by pet cock in the pump. Turn pump a few times to get all water out,** or let engine run a few minutes after water is **out and thus dry the pump. Leave the little plug out of the intake jacket so that exhaust will pass through to keep intake pipe warm.**

GENERAL FEATURES

The Cushman is of the vertical type, and operates upon the four cycle principle, that is, an explosion every second revolution of the flywheel.

On the up-stroke of the idle revolution the piston, carried by the inertia of the flywheel, cleans the cylinder of burnt gas. On the downstroke, the charge of air and gasoline, properly mixed through the carburetor, is sucked into the cylinder. Piston coming up on the third stroke compresses this charge to proper pressure for greatest explosive force. As piston reaches highest point the charge is fired by an electric current through the spark plug, and the resulting explosion forces the piston down on its fourth, or power stroke.

EXHAUST AND INTAKE VALVES

The intake valve is automatically operated by the suction of the intake stroke. The exhaust valve is positively lifted by a simple straight push rod, operated direct from the one simple cam, without any arms or rollers to wear out and get noisy. These valves must of course maintain an airtight seat. The