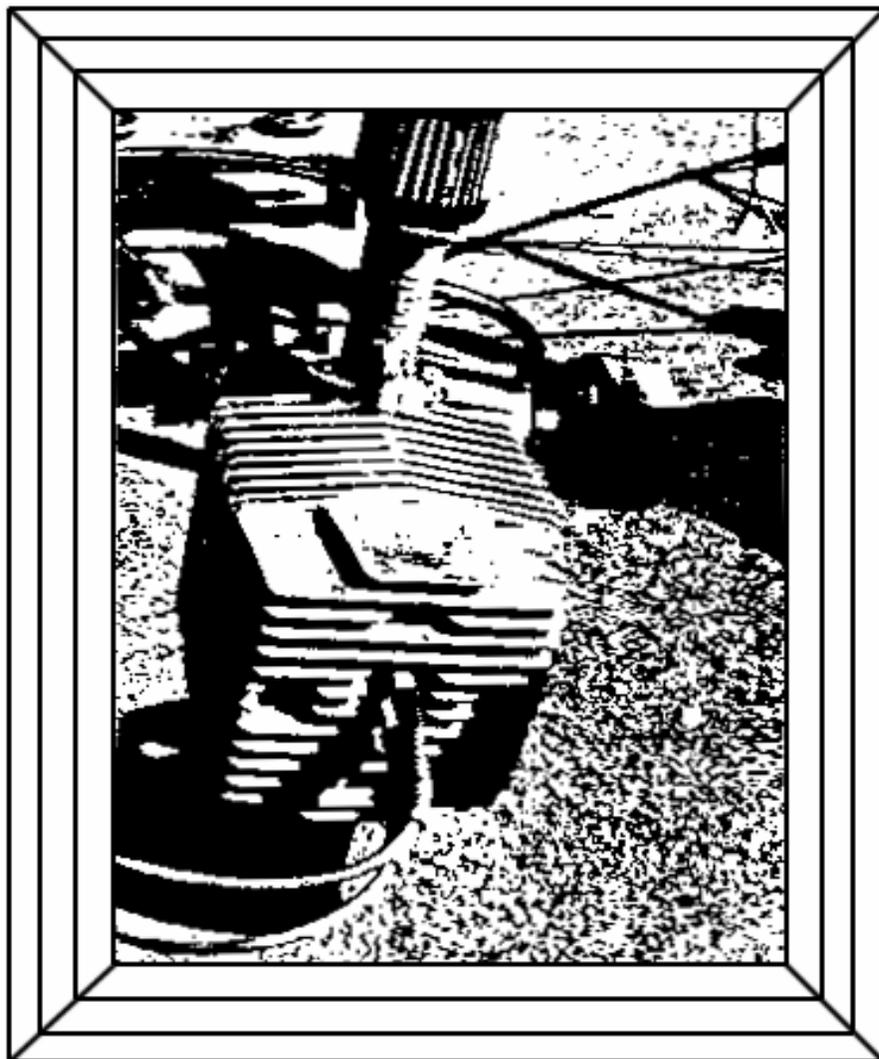


THE NEW AND IMPROVED  
**WEEDHOPPER<sup>TM</sup>**  
**CHOTIA<sup>TM</sup> – 460**  
**AIRCRAFT ENGINE**  
**OPERATION MANUAL**



# CHOTIA<sup>TM</sup> – 460 AIRCRAFT ENGINE OWNERS INSTRUCTIONS

The Chotia (Cho-da)-460 is a unique 2-cycle engine using battery ignition, super strong crank, mild timing, and manual advance ignition system. This engine fits the needs of Federal Aviation Regulations (FAR) Part 103 ultralight aircraft.

This instruction booklet will give you enough information to operate your Chotia-460 correctly.

## IGNITION PARTS

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**Power:** 4 alkaline 'D' cells or lantern battery (6 volts - gives 8 - 10 hours of service). Or upgrade to a 12 volt sealed lead-acid motorcycle battery for significantly longer service between charges.

**Points:** Most early model automotive (1960 – 1980) OEM replacement point set available from your local automotive parts store, such as item # ECHCS851 from Napa shown at right. Set gap to 0.015" to 0.020" (spark timing must be reset whenever point gap is adjusted!)



**Coil:** Two 6 volt automotive ignition coils. Or upgrade to 12 volt coils if you upgrade your battery. Do not mount directly to airframe. Use vibration isolating mounting methods.

**Spark Plug:** NGK 86ES or equivalent. Set gap to 0.030" to 0.035". Change every 40 hours maximum.

## FUEL

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**Gas:** 87 octane unleaded automotive for outside air temps less than 90 degrees F and 93 octane (premium) for outside air temps above 90 degrees F (helps the engine run cooler).

**Oil:** Most 2-cycle oil rated for air cooled engines. Marine, outboard, and *Quick Silver* brand by Mercury are not recommended as they lose viscosity at the high operating temperatures of the Chotia-460 or tend to glaze and varnish the cylinder wall.

DO NOT USE automotive engine oils such as 10W-40.

DO NOT USE any 2-stroke oils designed for racing and/or dilutions greater than 50:1 as such oils will cause pre-ignition and overheating under certain atmospheric conditions and result in severe damage to your engine.

**Mix:** Mix according to manufacturers specifications on the bottle.  
16 ounces of oil per 5 gallons of gas gives you a 40:1 ratio.  
12 ounces of oil per 5 gallons of gas gives you a 50:1 ratio.

Pour oil into 3 gallons of gas first and mix well, then add remaining 2 gallons and mix (close container and gently slosh around).

## CARBUERATOR (WALBRO)

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**Low Speed Jet Adjustment:** (on side) 1  $\frac{3}{4}$  turns open.

**High Speed Jet Adjustment:** (under float bowl) 2  $\frac{1}{2}$  to 3 turns open

The settings above are the factory default. It is impossible for the factory to tune the carb to your specific location (altitude and environment), therefore YOU must tune the carb as follows.

1. Low Speed Jet Adjustment
  - a. With engine running at idle, screw Low Speed Jet screw in (close) until engine leans out.
  - b. Note the number of turns in (factory setting minus turns you make).
  - c. Return screw to factory position, then turn out (open) until engine sputters.
  - d. Note the number of turns out (factory setting plus turns you make).
  - e. Set the screw half-way between the two figures. For example, if the number of turns from open was  $\frac{3}{4}$  in step B and 1  $\frac{1}{4}$  in step C, then half-way between them is 1 turn out.
2. High Speed Jet Adjustment
  - a. With engine running at full throttle, screw High Speed Jet screw in (close) until engine leans out. (NOTE: Do not run engine at full throttle longer than 45 seconds at a time to avoid over heating. Does not apply when flying though)
  - b. Note the number of turns in (factory setting minus turns you make).
  - c. Return screw to factory position, then turn out (open) until engine sputters.
  - d. Note the number of turns out (factory setting plus turns you make).
  - e. Set the screw half-way between the two figures.

This engine is in a moderate state of tune (combined with “schnurle” style porting) and is not overly sensitive to carburetor settings. However, do NOT over lean. Run as rich as possible before noting power loss. This will increase ring life and the engine will run cooler.

Engines between serial numbers 630 and 880 have a new modified high speed fuel tube. The High Speed Jet for these carbs should be set to  $\frac{1}{2}$  turn open. Again, do not over lean. Run as rich as possible before noting power loss.

## CARBUERATOR (TILLOTSON) - engines above serial number 880

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**Low Speed Jet Adjustment:** 1  $\frac{1}{4}$  turns open.

**High Speed Jet Adjustment:** 2  $\frac{1}{2}$  turns open

The settings above are the factory default. It is impossible for the factory to tune the carb to the customer’s specific location (altitude and environment). It is left up to the customer to tune their carb as follows.

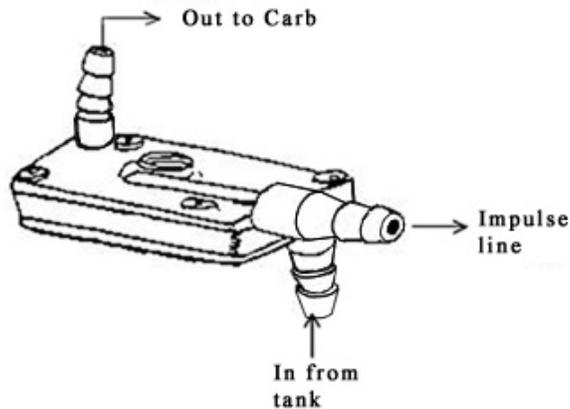
1. High Speed Jet Adjustment
  - a. With engine running at full throttle, screw High Speed Jet screw out (open) until engine runs rough.
  - b. Turn the screw in until the engine runs smooth again. This is the optimum setting. Note: On some carbs, the high speed jet cannot be opened far enough to get the engine to run rough. In this case, open the high speed jet screw 4 turns and then open the low speed jet

screw until the engine runs rough. Finally, turn the high speed jet screw in until the engine runs smooth.

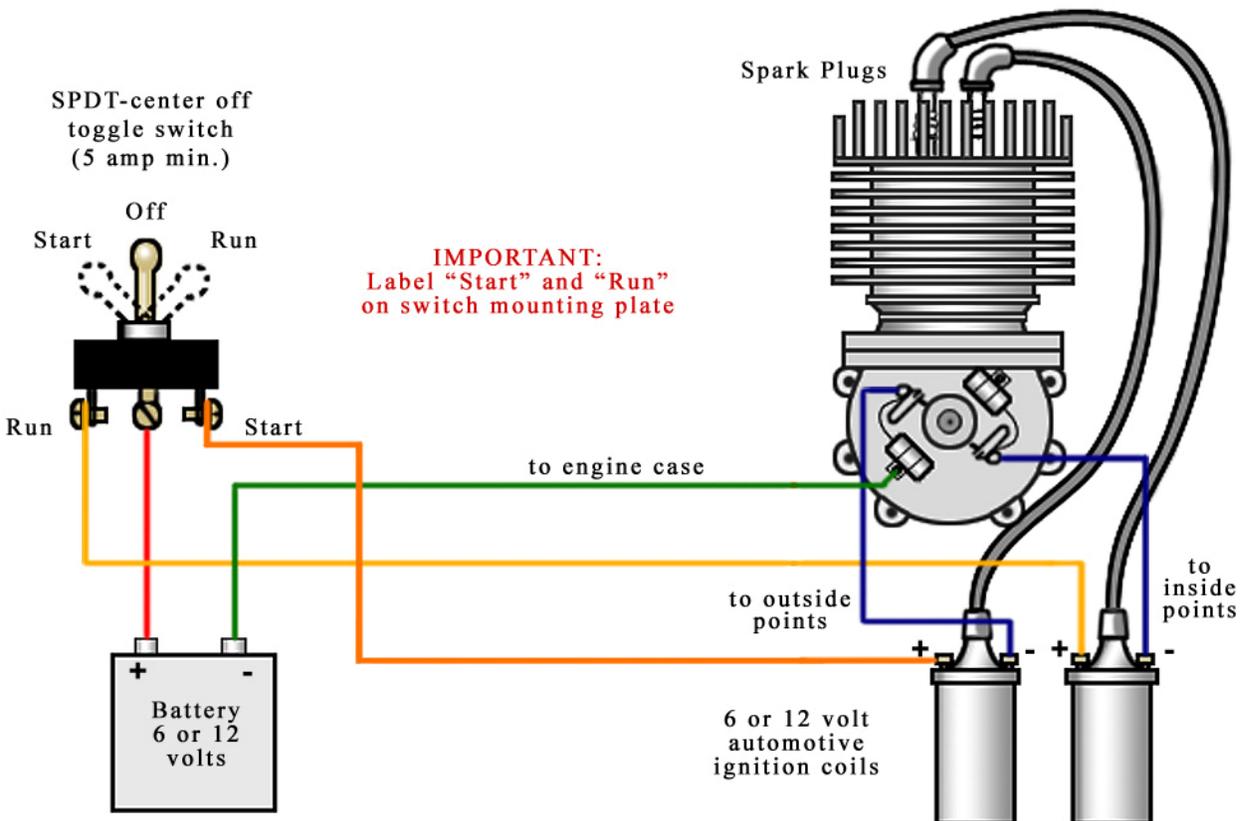
Tillotson carbs with these numbers: 136, 137, 141, 143, and 161 have **fixed** high speed jetting that can only be adjusted by changing the jet itself. These jets are available through most snowmobile and motorcycle shops. Obtain the correct jet for your altitude.

## FUEL PUMP

Connect the Impulse line to the barbed fitting at the front of the engine. Tillotson carbs have built-in fuel pumps. See supplemental instructions for hook-up.



## DUAL POINTS WIRING



## IGNITION TIMING

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**Round Head:** 0.175" Before Top Dead Center (BTDC) at full advance

**Square Head:** 0.200" BTDC at full advance (run points switch position)

0.000" TDC (start points switch position)

### Checking Start/Run Ignition Switch

- Remove spark plug(s) from cylinder.
- Ground plug threads to frame or negative terminal of battery if the battery is not grounded to the frame.
- Turn prop until OUTSIDE points just start to open on cam.
- Flip ignition switch to Start position.
- Rotate prop back and forth a few inches and note spark occurring as points open and close.
- Flip switch to Run position.
- Rotate prop a full half turn then rock back and forth and note spark occurring as the INSIDE points open and close.

## CAUTION!!!

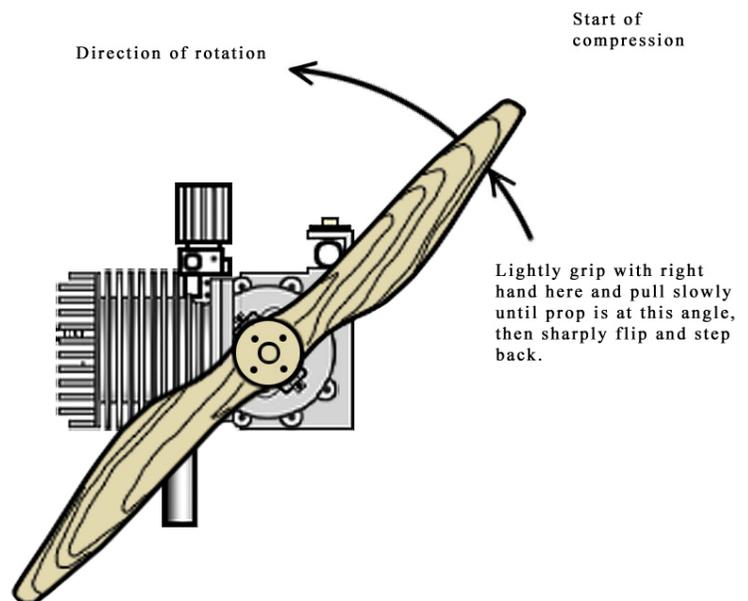
**DO NOT ATTEMPT TO START ENGINE WITH THE IGNITION SWITCH IN THE RUN POSITION!  
BACKFIRE KICKBACK WILL RESULT AND CAUSE SERIOUS INJURY.**

## STARTING

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### ALWAYS CHECK THAT THE IGNITION SWITCH IS IN THE START!

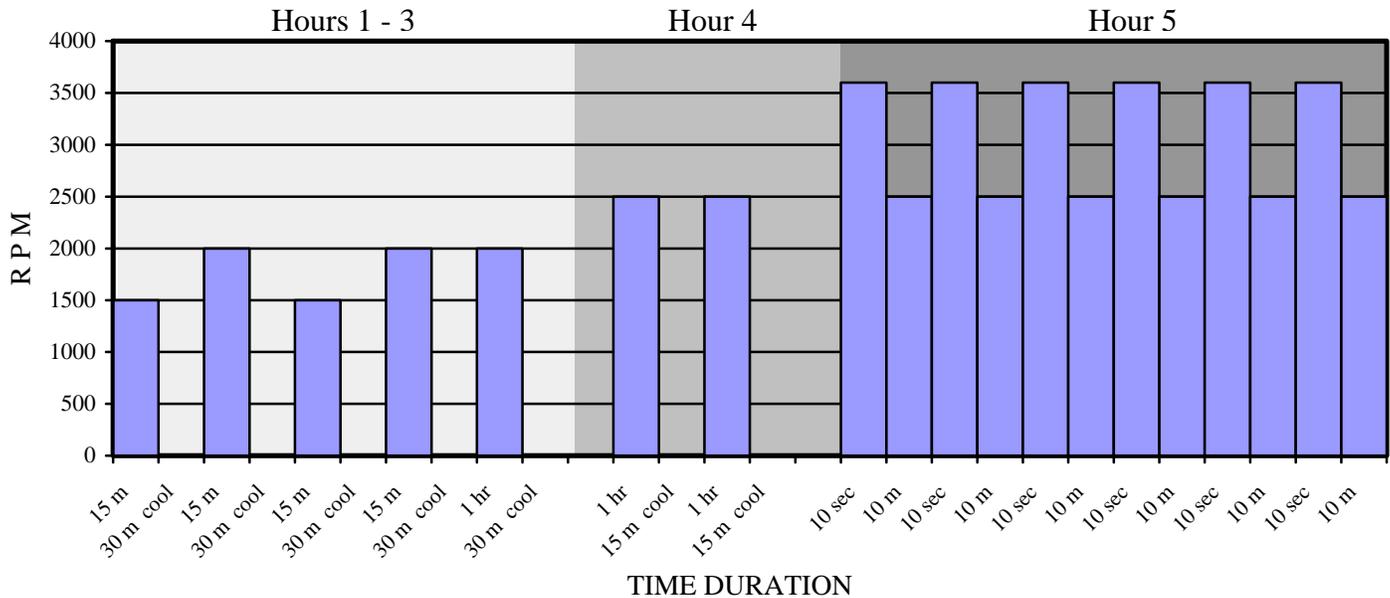
1. Tie the plane to a suitable anchor like a tree or vehicle bumper with heavy rope.
2. Set the throttle to ¼ open.
3. Prime engine with ignition OFF and spark plug wires removed from spark plug(s) by choking the carburetor and pulling the prop through 3 – 4 compression cycles.
4. Un-choke the carburetor and pull the prop through 2 – 3 more time.
5. Reconnect the plug wires.
6. Standing BEHIND the engine on the right side of the boom, pull the prop with your right hand, STOPPING at the beginning of compression. Then sharply FLIP the prop the compression.
7. If the engine does not start after 4 – 5 attempts, repeat the priming steps and try again.
8. Turn the ignition switch to the RUN position after the engine has started and allow the engine to warm up for 3 – 5 minutes at ½ throttle.



## BREAK-IN

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The Chotia-460 engine is designed for long life. To achieve best results, a careful break-in procedure should be followed for new or rebuilt/overhauled engines. Break-in slowly! The following schedule is the absolute minimum. It doesn't hurt to double the number of hours in each set. Maximum horse power and RPM will be obtained after about 50 hours of operation.



Hours 6 through 10 can be done while flying. Just back the throttle off from full-throttle (3600 RPM) to half-throttle (2500 RPM) for 5 – 10 seconds every minute or so.

## FLYING

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Never run the engine at full power for more than 45 seconds **while on the ground** or it may overheat. Avoid slow air speed climb outs at full throttle when the outside air temperature is above 85 degrees F. It is best to add 2 – 3 mph to your climb speed on hot days to avoid overheating the engine and thus seizing it up at this most critical time in your flight.

For optimum performance at take-off and cruise with pilots of average weight, the engine should develop a minimum of 3400 – 3500 RPM tied down on the ground (static RPM). Heavier pilots will need 3500 – 3600 RPM and may experience longer take-off runs, more sluggish climbs, and lower cruise speeds. Lighter pilots may get by with a bit lower static RPM. However, a properly broken-in engine should turn 3600 RPM on the ground and unload up to 3700 in the air using a 44 x 19 prop (provided). It is impossible to over-rev and harm the engine since its structural red line is 6000 RPM and it is very hard to reach 4000 even in a dive.

Note: Depending on the type of tachometer you may have installed on your plane, it may be several hundred RPM high or low.

Most engine/prop combinations will cruise well in level flight at 3000 – 3200 RPM. Of course, lighter pilots require less power and heavier pilots, more. Hold 2000 – 2500 RPM on landing approach. This will give excellent throttle response if you are forced to abort a landing and go around or need to go to lower power to shorten your glide.

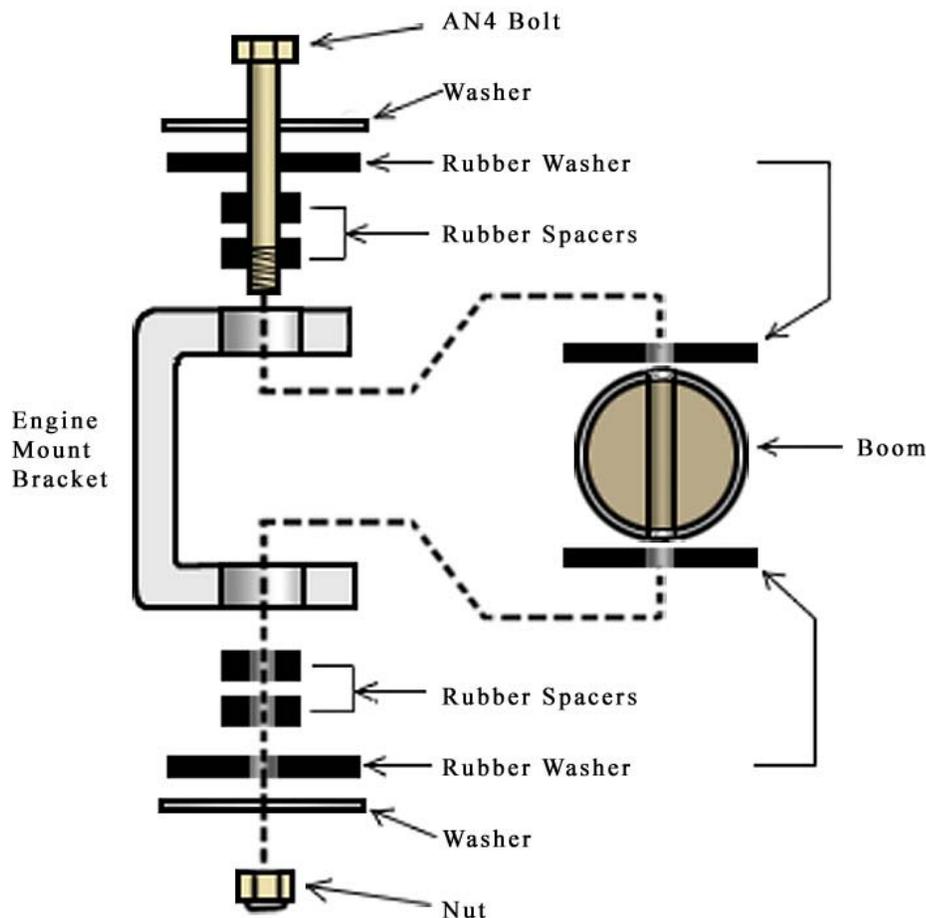
You can run full power all day with no harm as long as you keep sufficient speed for proper engine cooling. That is, don't "hang on the prop" in full power, slow flight for more than 30 seconds at a time.

Remember, **the engine can quit at any time**, so do not put yourself in a position of undue risk at any time or rely on the engine to "pull you through." Always keep an "airman's attitude" of safety first and foremost in your mind. Always have enough ALTITUDE and a LANDING SITE 45 degrees below you at all times so that you can safely glide to a landing WHEN you have such an engine out.

Two-cycle engines are more affected by altitude than four-cycle engines, so more differences in RPM will result. An engine which turns 3300 RPM at 4,200 feet Mean Sea Level (MSL) may turn 3500 RPM at sea level and gain as much as 25% more horsepower. The Weedhopper and the Chotia-460 work well at 4,200 MSL so you should not encounter any problems at lower altitudes.

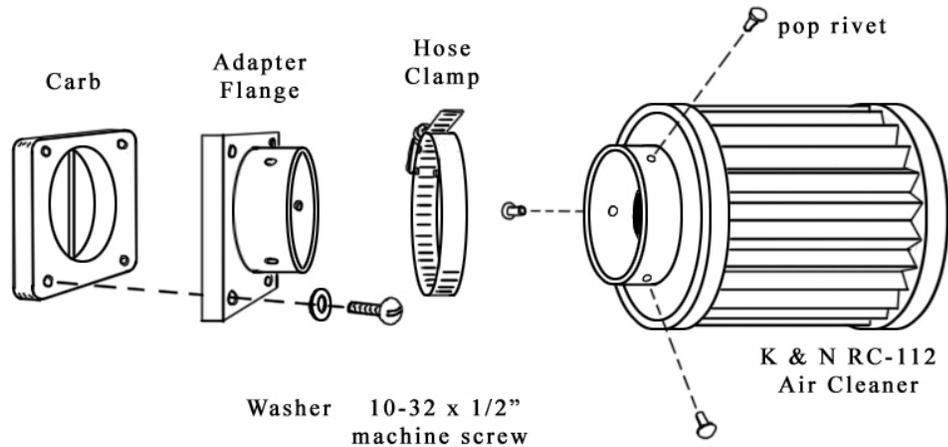
## ENGINE MOUNTING DETAILS

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## AIR CLEANER INSTALLATION

Drill and install 3 pop rivets before house clamp is put in place. Crimp pop rivets on the inside of the adapter flange with pliers to prevent the end of the rivet's shank from coming loose and falling into the engine.



## THROTTLE INSTALLATION

1. Route the throttle cable housing/jacket from the carburetor down the left front brace tube and then a short ways up the left center brace tube. Secure the housing to the tubes with a few wraps of electrical tape spaced 6" apart. Secure the end of the housing to the center brace tube with a hose clamp.

2. Clamp the throttle lever to the left center brace tube.

3. Thread the cable through the housing, through the hole in the shank of the short 1/4" bolt, through the hole in the throttle lever, and back through the bolt again.

4. Push the throttle lever to its minimum travel, that is, towards the hose clamp.

5. Pull the cable taut through the housing, bolt, and throttle lever. Place the nut on the bolt and firmly clamp the cable in place, but do not over tighten and cut strands of the cable.

6. Pushing FORWARD and UPWARD on the throttle lever gives the engine more gas. Pulling back returns to idle.

7. Tighten the lever's pivot nut enough to keep the lever in place against the pull back force of the carb's throttle return spring.

