

# INSTRUCTIONS FOR DIESEL CONVERSION of your Cox .049 and .09

Designed for the Cox Tee Dee and Medallion, this conversion unit may be used on the Cox Killer Bee .049 and Norvel .049/.061. You may experience crankshaft breakage on on Baby Bee or other "Product" type engines.

It is best if your engine has a good piston/cylinder fit (good compression) to allow easy starting, since it is the heat of the compressed air that fires the fuel. Be sure your engine is thoroughly cleaned and devarnished before conversion.

## **BASIC OPERATION OF MODEL DIESEL ENGINES**

The model diesel engine operates on a fuel based with ether and kerosene as they are a rapidly vaporizing fuel. Combustion takes place from the heat brought about by the compressing of air within the engine. The timing of combustion is altered by varying the compression via the adjustment. The adjustment lever moves the contra piston varying the size of the combustion chamber. Since model diesels are of two cycle design, oil must be included in the fuel mixture.

## **INSTALLING YOUR DIESEL CONVERTER**

Remove head and carefully clean the cylinder ledge. Using your screws, secure the diesel head assembly. Be sure the contra-piston is in place, and cross torque the screws. Tighten the screws slightly at first, then further tighten in a cross torque fashion. Leak test the head by spraying some light oil (WD40) around base of the head and adjustment lever. If leakage is detected at base of head, remove the head and be sure the mating surfaces are absolutely clean. Reassemble and be sure to tighten the screw slightly and equally in the cross torque pattern, then fully tighten.

**DO NOT REMOVE THE CONTRA PISTON UNLESS ABSOLUTELY NECESSARY.** The o-ring is very difficult to replace without damage. To remove contra piston, remove the head and screw the compression lever in and the contra piston/o-ring assembly is forced out. When installing a new o-ring, coat it with oil so it slide into the head easily. It is an extremely tight fit and is difficult to slide past the inner corner of the head. You will probably have to slowly press the o-ring into the groove with a blunt plastic rod while pushing it back into the head. Be careful not to damage the o-ring.

## **OPERATING INSTRUCTIONS**

Remember with a diesel, the engine can start anytime fuel is present. It's best to familiarize yourself with diesel operation by running it mounted on a test bench. Use a slightly larger prop than you would use for glow operation. It is important to note the running differences of the engine with different compression settings, needle settings and prop sizes. WITHOUT FUEL practice flipping the prop, while adjusting the compression knob. Screwing the knob down increases compression and in turn advances the timing, backing off the knob lowers the compression and retards timing. Start with the compression knob backed off the contra piston. A significant difference can be felt with very little rotation of the knob.

Ideally, when starting the engine, the diesel will require only slightly more compression than for glow operation. Before supplying fuel to the engine, adjust to maintain this amount of compression while flipping the prop. If you back off the adjustment lever, the contra piston may remain in the higher compression position because of the drag from the o-ring seal. The contra piston will be pushed back with the slightest combustion and normal adjustment may then be made. Never force your engine over if excessive compression is felt, damage to your engine may result. Also be careful not to flood and hydraulic lock engine.

1. Set needle valve the same as for glow operation.
2. Fill fuel tank with good, fresh diesel fuel normally consisting of equal parts of ether, kerosene and oil.
3. Prime the engine with a few drops of diesel fuel in the exhaust port.
4. The compression should feel slightly higher than it was for glow operation.
5. Reed valve models: Wind prop back on spring starter and release. Rotary valve models: Place finger over intake, slowly rotate engine counter clockwise over compression to fill fuel line. Then begin flipping.
6. Start increasing compression while flipping until engine fires or pops. Only slight rotation of compression lever is necessary, about 1/8 turn increments. Reprime and continue.
7. Upon starting, slowly increase compression until engine running improves.
8. Adjust needle valve until engine is running as smoothly as possible.
9. Rich setting or excessive compression will cause engine to slow down. Lean setting or inadequate compression will cause engine to run irregularly ('burping').
10. You will have to adjust the compression and the needle valve for the smoothest setting. Always use a little more compression to take up for airborne unloading. Decreased compression settings for lower power requirements and this slower running requires richer needle valve settings. Just the opposite is true for higher power settings. When correct compression setting is achieved, lock the adjustment lever with locking arm.
11. In normal operation, your engine will start to speed up after running for a few seconds due to warm-up which serves to advance the timing. You should always rotate the compression knob back and forth to determine the proper running position.
12. Electric starting: Be careful, damage is easily done to small engines.