



## **AGRICULTURAL BACKPACK 2-CYCLE ASPIRATOR-- MODEL 1612**

WARNING - DANGER Read the rules for safe operation and instructions carefully. The following information must be read and understood for proper and safe operation.

### *Instructions*<sup>1</sup>

### **Background information**

This unit was designed by the John W. Hock Company in response to the need for a backpack-mounted aspirator for insects larger than mosquitoes and sandflies. It is used to collect resting and flying species in row crops, on ornamentals, from turf grass, etc. This unit comes complete with one of 2 types of collecting wand, a 2-cycle, single-cylinder gasoline engine with needle bearings and chromed piston and cylinder wall mounted on a welded aluminum backpack frame. It is lightweight, durable, and comfortable to use. It has been very well received by agriculture as well as medical entomology researchers and surveyors. We would be delighted to receive any comments or suggestions on how the unit could be modified to make it more useful and easy-to-use.

### **Operational Details**

#### ***Break-in period***

The motor should not be run continuously at full speed until 3 tanks of gas have been used. Be careful not to over-speed the motor by having the intake clogged and letting motor RPMs go too high. The motor uses a 50:1 oil mix. The type of oil is very important, see specifications below.

#### ***Magneto switches***

The unit has 3 ignition cut-off switches. One is built into the motor housing where the intake pipe is connected to the motor. Should the intake pipe be removed, the internal switch here will prevent the motor from running. This is a safety feature. The other 2 switches are located 1) on the top of the motor's handle and 2) on the wand itself. The top, motor switch must be in the run position and the wand switch must be in the run position, the toggle pulled toward the small tab at the base of the switch.

Installation of exhaust air pipe. The exhaust air pipe is the 18-inch long, black plastic, curved tube. Before operation it must be installed on the motor housing. Looking at the unit from the back, with the intake tube to the right and the built-in motor handle up, align the grooves in the exhaust air pipe with the pegs on the straight gray pipe coming out at you from the motor housing. As you insert the exhaust air pipe, the larger end should be at about the 4:30 position. Push the black pipe onto the gray pipe and then turn counterclockwise until it points to the 1:30 position. DO NOT operate the unit without the exhaust air pipe in place- the air velocity is very high and the blast or small particles could damage someone's eyes.

#### ***Collection bag attachment***

Model 1612a- The conical end of the collection bag is inserted within the intake bell and the edge of the bag is then stretched around the outside.

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<sup>1</sup> Instructions\_1612 Ag backpack.doc. Last modification Tuesday, July 28, 2009

Model 1612b- A small screen bag goes in the collecting bottle at the end of the wand. This is held in place by the screw cap. Once the bag is in place and the cap is attached, you can then attach the suction hose via the soft rubber collar.

## **Equipment**

### ***Safety check before each use***

Before operation a complete check of the aspirator should be preformed. Check for loose/missing nuts, bolts, and screws; tighten and/or replace as necessary. Inspect the fuel lines, tank, and the area around the carburetor for fuel leaks and DO NOT operate if leaks are found.

### ***Spark arrestor muffler***

The spark arrestor muffler control the exhaust noise and prevents hot, glowing particles of carbon from leaving the muffler. Make sure the spark arrestor screen is in good repair and properly seated in the muffler.

### ***Parts***

Do not use your aspirator if any part is missing or damaged. Have repairs done by us or a reputable small motor repair service.

## **Fuel**

### ***Fuel requirements***

Use 89 Octane [(R+M)/2] gasoline. It may contain up to 10% ethanol (grain alcohol) or 15% MTBE (methyl tertiary-butyl ether). Gasoline containing methanol (wood alcohol) is NOT approved and will damage parts in the carburetor. Gasoline currently manufactured in the United States loses its octane rating within months of sale and can harm your motor from pre-detonation (pinging). Please, always use fresh gasoline of the correct octane rating. If you are going to store the unit and its gasoline, add a gasoline treatment to your fuel. Pre-detonation damage is not covered under the warranty.

### ***Two-stroke oil***

A two-stroke engine oil meeting the proposed ISO-L-EGD Standard (ISO/CD 13738) must be used. Echo brand Premium 50:1 oil meets this proposed standard. Engine problems due to inadequate lubrication caused by failure to use an ISO-L-EGD approved oil are not covered under the warranty. Follow the mixing instructions on the container.

### ***Gasoline is very flammable***

Use extreme care when mixing, storing or handling or serious personal injury may result. Use an approved fuel container. DO NOT smoke near fuel. DO NOT allow flames or sparks near fuel. Fuel tanks/containers may become pressurized, always loosen fuel caps slowly allowing any pressure difference to equalize slowly. NEVER refuel your unit when the engine is HOT nor when it's RUNNING! DO NOT refuel the unit indoors. ALWAYS refuel the unit outdoors over bare ground.

### ***After refueling***

Wipe any spilled fuel from the unit. DO NOT let the fuel come into contact with your skin. Move at least 3 m (10 ft) from the refueling location before starting.

### *After use*

DO NOT store a unit with fuel in its tank. Leaks can occur- return unused fuel to an approved fuel storage container.

## **Motor Starting and Stopping**

### ***Important- Recoil starter***

Use short pulls- only 1/2 or 2/3 of rope for starting. Do not allow the rope to snap back in. Always hold the unit firmly.

### *Starting a cold engine*

Move magneto switch on the wand and on the top of the engine unit to ON.

Push purge bulb (B) 3-4 times (or until fuel is visible in fuel return line).

Close choke (C) by moving lever down and pull starter handle (D) until engine fires.

Open choke (C) and if necessary, restart engine.

Always allow engine to warm up before use.

### *Starting a warm engine*

Procedures are the same as above except you do not use the choke. Flooding a warm engine by using the choke can prevent starting. Most people can restart a warm engine while the unit is on their back.

### *Stopping engine*

Release the throttle trigger and allow the engine to run at idle for a few minutes to cool off. Then, move the magneto switch on the wand or on top of the motor housing to OFF.

NOTE- If the engine does not stop when the magneto switches are moved to the OFF positions, then shift choke lever to the closed position. Check and repair magneto switch(es) before starting engine again.

## **Maintenance**

Your unit is designed to provide many hours of trouble free service. Regular scheduled maintenance will help you achieve that goal. Listed below are the maintenance intervals we recommend. The time intervals shown are maximums. Actual use and your experience will determine frequency of required maintenance.

*Air filter-* Tools required are a cleaning brush (1- or 2-inch medium bristle paint brush. Parts required are the ECHO 90008 Repower air and fuel filter kit. Under dusty conditions, you may need to clean the air filter daily.

Close choke, remove wing nut, air cleaner cover and air filter.

Brush dust off filter and wash in a suitable solvent.

Dry filter before reinstalling.

*Carburetor adjustment-* Tools required are a screwdriver and tachometer. No parts are required. DO NOT adjust carburetor unless necessary.

Adjustment screws and their locations are shown on right.

Idle Speed (A)- controls throttle opening at idle.

*Low (LO) Speed (B)*- Controls amount of fuel at low speed and supplementary fuel for smooth progression from idle to high speed.

Hi (HI) Speed (C)- Controls amount of fuel at full throttle.

Before adjustment check that the air filter is clean and properly installed, that the spark arrestor screen and exhaust port are free from carbon build-up, and that the exhaust air pipe (see above) is correctly installed.

#### *Initial adjustment*

With engine off, turn HI speed screw counterclockwise to stop.

Turn LO speed screw midway between stoops.

Turn idle screw until tip of screw just touches throttle plate, then turn three (3) turns clockwise.

Final adjustment. Note that limiter caps prevent exceeding C.A.R.B and EPA emission limits and over rich adjustment, but not over lean adjustment, which can cause engine failure: Do not exceed recommended HI speed RPM during operation, or for long periods during adjustment.

Start engine, run at idle for one minute.

Complete warm up by running at full throttle for 5 minutes, operating choke twice to clear air from carburetor chambers.

Run at idle and accelerate to check for smooth transition from idle to high speed; if engine hesitates, turn LO speed screw counterclockwise 1/8th of a turn at a time until acceleration is smooth.

Adjust idle screw to 2500-3000 RPM using tachometer.

#### Cooling system-

Tools required are 3/4-inch deep spark plug socket wrench, 3 mm Allen wrench, Phillips screwdriver, pointed wooden stick, and a 1- or 2-inch medium paint brush. **IMPORTANT-** to prevent overheating and engine seizure, cooling air comes through the grill and is pushed by a cooling fan through the cylinder fin area to an opening in the front of the engine cover, taking away combustion heat. The grille and cylinder fins must be kept clean of grass, dust and any debris. Engine failure due to lack of this "Normal Maintenance" is not covered by warranty.

Clean grille by removing any accumulated debris from the crankcase intake grille above the fuel tank (see figure on right).

Clean cylinder fins by removing the spark plug and then removing the engine cover (seven screws) and cleaning the cylinder fins to allow cooling air to pass freely (see figure on left).

#### Exhaust System

Muffler and exhaust port- Tools required are a Phillips screwdriver, 3/4-inch deep spark plug socket wrench, 10 mm open end wrench, soft metal brush, wooden carbon scraper and a 3 and a 4 mm Allen wrench. Parts required are Echo Spark Arrestor screen P/N 145862240630, Gasket P/N 14586642031.

**IMPORTANT-** Carbon deposits in cylinder exhaust port and muffler will cause a drop in engine output and overheating. Muffler exhaust port and spark arrestor screen must be checked periodically.

Remove spark plug and engine cover (seven screws).

Remove muffler (E).

Clean cylinder exhaust port being careful not to scratch cylinder or piston, using a wooden or plastic scraper.

Remove spark arrestor cover (A), exhaust diffuser (B), gasket (C), and spark arrestor screen (D) from muffler. Replace screen if plugged with carbon deposits.

Install spark arrestor screen, gasket, diffuser, and cover.

Be sure gasket seals muffler spark arrestor screen to muffler.

### Spark Plug

Tools required include the 3/4-inch deep socket spark plug wrench, a feeler (preferably a wire) gauge and a brush. Parts required include a spark plug, NGK BPM-7Y, Echo P/N 99944500071.

Remove spark plug and check for fouling, worn and rounded center electrode.

Clean the plug or replace with new one. DO NOT sand blast to clean as any remaining sand will damage engine.

Adjust spark plug gap by bending the outer electrode. The gap is 0.65 mm or 0.026 inches.

### Fuel Filter

Tools required include a piece of wire some 200 mm (ca. 8 inches) in length, bent into a hook, a clean cloth, a funnel, and an approved fuel container. Parts required include Echo 90008 Repower air and fuel filter kit. **IMPORTANT-** Check fuel strainer periodically. Keep fuel tank clean, do not allow dirt or debris to enter fuel tank. A clogged fuel strainer will cause hard starting or poor engine performance.

Pick up the fuel filter through fuel tank opening with the piece of wire, bent into a hook.

Remove old filter.

Install new filter.

### Spare Parts

Extra bags and Echo replacement parts are available. If you have any questions, difficulties, or comments, please contact us via telephone, fax, or the Internet.

### Some Useful References

Clark, G. G., H. Seda, and D. J. Gubler. 1994. Use of the "CDC backpack aspirator" for surveillance of *Aedes aegypti* in San Juan, Puerto Rico. *J. Am. Mosquito Control. Assoc.* 10(1): 119-124.

Service, M. W. 1977. *Mosquito Ecology- Field Sampling Methods*. John Wiley and Sons. New York, New York.