

The ELF Engine is a gasoline engine designed to propel model airplanes. It is not a "toy" engine designed for the cheapest possible production but a fine model gasoline engine whose performance in every respect is close to that of a full size modern engine of the same type (two cycle).

The ELF Engine starts easily and quickly and continues to run smoothly and steadily until the gasoline is gone and will do so consistently. More than 100 hours actual running will not affect this performance.

The design of this engine was perfected only after many hours of actual running of test engines and scores of test flights in two airplane models of 3 foot and 5 foot wing span. The ELF Engine could be made two ounces lighter than it is. This extra weight is in the heavy aluminum frame of the engine (cylinder and crankcase castings) and the two bearing crankshaft turned from a solid bar of drill rod steel. ELF Engines invariably survive all kinds of crashes and can be seriously damaged only by being run over by an automobile or encountering some similar catastrophe. This heavy frame and the extremely light ($\frac{1}{3}$ oz.) reciprocating parts reduce vibration almost to zero. A balsa wood and silk fuselage weighing only $1\frac{1}{2}$ oz. and of the simplest construction is sufficiently strong to hold the engine. The ELF Engine is safe to run, for the amount of gasoline that it is necessary to handle to operate the engine is very small. Also, the propeller is so light that it makes only a slight cut if it hits a finger, and breaks without damage to the engine.

The ELF Engine has been given power and fuel consumption tests covering its whole range from 3000 to 6000 rpm. Its maximum power is .035 horsepower at 4700 rpm. Its best fuel economy is 2.8 lbs. per brake horsepower hour at 3500 rpm. The engine runs approximately 40 minutes on one ounce of fuel at this speed. The propeller supplied with the engine allows it to run at about 3500 rpm, develops a static thrust of 9 ounces. The carburetor has a gasoline adjustment screw but no air adjustment. The speed of the engine is controlled by the size of the propeller. For ordinary use, the propeller should be adjusted so that the engine runs between forty and fifty minutes on one ounce of fuel.

The ELF Engine is two cycle, four port, one cylinder, air cooled, lubricated by oil mixed with the gasoline. The bore is 0.542 inches, the stroke $19/32$ inches, the piston displacement $2\frac{1}{4}$ cc. or approximately $\frac{1}{8}$ cubic inch. The cylinder and crankcase are sand-cast of aluminum, the cylinder fitted with a thin steel liner. The timer is automobile type, completely enclosed, with contact metal points, hardened cam and cam plate. The spark coil is designed to operate on one dry cell. The engine runs satisfactorily with only one fountain pen cell; however, unless the extra half ounce of weight is very important, the use of two such cells connected in parallel is recommended. Two cells so connected will run the engine continuously for $1\frac{1}{2}$ hours. The carburetor is of the single jet type, fed from a float chamber. The gasoline tank is connected to the float chamber with a thin rubber tube. The

spark plug is made by the ELF Engine Company and has an insulator especially supplied by the Champion Spark Plug Company. It is a one piece plug, with $\frac{1}{4}$ "-32 thread on the base, and weighs $\frac{1}{8}$ ounce. It will not foul when used in an ELF Engine. The two-bearing crankshaft is turned from a solid piece of drill rod and fitted with steel counter weights which balance the engine as completely as it is possible. The piston is an aluminum casting and has three regulation cast-iron piston rings. The connecting rod is an aluminum casting. The full floating wristpin is made of drill rod and is hollow.

The ELF Engine weighs 4 ounces and takes a propeller weighing between $\frac{3}{8}$ and $\frac{1}{2}$ oz. The spark coil and condenser together weigh $2\frac{1}{2}$ oz. The battery (two fountain pen cells) weighs 1 oz. Additional equipment used in fitting the power plant into an airplane, such as a battery holder, wiring and screws, amount to $\frac{1}{2}$ oz. The average ELF powered airplane will weigh 12 to 18 ounces complete.

The ELF Engine can be inverted by turning the carburetor half-way around in its support and simply turning the engine over. This places the float chamber to one side. If this is not desirable, a reversed carburetor will be supplied by the ELF Company which will place the float chamber in its normal position directly behind the engine. The timer can also be inverted without changes in the engine. The engine will be supplied either upright or inverted. Inverting makes no difference in the power or efficiency of the engine.