Flight Replicas

L4 GRASSHOPPER

For Microsoft Flight Simulator (MSFS 2020)

To get full enjoyment of the aircraft in this package, please read this Manual thoroughly and carefully.

Warning: The manual and models in this package must not be used for real flight training purposes.

HISTORY:

The history of the L-4 is best summed up by Ken Wakefield, author of "The Fighting Grasshoppers" and "Lightplanes at War", who graciously contributed the following overview of this aircraft:

"The Piper L-4 Grasshopper of WW2 was the military version of the highly popular pre-war J3 Cub, by which name it was more widely known to service personnel. Of the 5,500 L-4 variants produced between 1942 and 1945, some went to liaison squadrons and of the USAAF, but the vast majority went to US Army Ground Forces, for use as Air Observation Posts (Air OPs) with the Field Artillery. In both air and ground forces, the L-4 was also used as a flying Jeep, among other things carrying priority mail and personnel between HQs and command posts. Its Continental engine produced only 65hp, yet the L-4's excellent short field performance enabled it to operate from the smallest of improvised airstrips, including roads, adjacent to command posts.

Unlike most other combat aircraft, the L-4 was un-armed and un-armoured. It was one of the smallest aircraft of WW2 and, with a cruising speed of only 75 mph, it was the slowest. Nevertheless, it has been claimed that a single L-4, directing the firepower of an entire Division, could bring a greater weight of explosives to bear on a target then any other aircraft of that period. With the exception of the atomic bomb carrying B-29 Superfortress, no other single aircraft had the destructive capability of the diminutive L-4. It was most widely used in Europe, where more than 2,700 served with the Field Artillery, and of these nearly 900 were lost through enemy action or in accidents. Of those that survived the war, about 150 were shipped back to the US, most of the remainder eventually being sold to civilian purchasers in Britain, France, Switzerland, Denmark and elsewhere in Europe. More than 60 years on many of these are still flying with, in recent years, an increasing number being restored to their original military configuration and markings. A truly remarkable 'warbird', long to be remembered."

So successful was the L-4 that it's military use continued on through to the Korean War, and as recently as Vietnam. Today, hundreds still fly on as civilian light aircraft, some as meticulously restored military aircraft and others in colourful civilian schemes.

CONTROLS

1. **Airspeed**
2. **RPM**
3. **Compass**
4. **Altimeter**
5. **Altimeter - Kohlsman adjustment knob**
6. **Cabin heat**
7. **Oil temperature**
8. **Oil pressure**
9. **Primer**
10. **Starting: As the model cannot be hand-propped, use Ctrl-E.**
11. **Click spot (screw) to open upper door and window**
12. **Click spot (screw) to open lower door.**
13. **Click spot (screw) remove pilots**
14. **Click spot (screw) put tie-down ropes (inop on float versions)**

Note: L-4's came with various makes of the instruments. The altimeter adjustment for ambient air pressure here works by either allowing the height above seal level to be displayed (if instrument unadjusted), or the knob can be used to bring the needle to zero, which then shows the pilot altitude above the airfield where the aircraft took off.

Note: Cabin heat and carb heat controls require some zooming in onto their knobs for the click spot to activate.

1. **Throttle**
2. **Fuel supply**
3. **Elevator trim. Red button indicates position.**

Note: Elevator trim works slowly. This is hard-coded into the sim.

1. **Carb heat**
2. **Lower door handle click spot**

1. **Magnetos**

Note: The L-4 can also be started from here, but this is not accurate to the real aircraft.

1. **Rudder retract handle (floatplane only).**

Note: Rudder is retracted before take-off run, and lowered only when the aircraft is at taxi speed on the water.

Note: Floatplane take-off: Perhaps due to the light weight of the aircraft, the L-4 tends to buck and unrealistically react to every little wave in the simulator. Keep gentle back pressure on the stick during take-off, and the aircraft will fly itself off of the water.

FLYING THE L-4 GRASSHOPPER

The L-4 has minimal instrumentation. As such, the pilot will have to pay special attention to the aircraft's environment and attitude, by observing outside of the cockpit. Overall, the best indicator of safe flight will be accurate airspeed. This, like altitude, is hard to read on the military gauges, but must be paid strict attention to.

A. **BEFORE STARTING ENGINE**

1. Make routine check of gasoline supply. Visible fuel gauge is integral part of gas tank cap; it will not show number of gallons, but will show proportion of fuel in tank by length of rod, which extends upward from cap. A full tank of 12 U. S. gallons will be indicated by 11 inches of rod extending beyond cap.

2. Check freedom of movement of flight and engine controls.

B. **STARTING ENGINE**

1. Set brakes in cabin.

2. Set throttle approximately 1/10 open.

4. Push fuel shut-off ON.

5. Ensure magneto switch BOTH.

6. Start engine by pulling the propeller.

C. **ENGINE WARM-UP**

1. As soon as engine starts, advance throttle slightly to idle at 700 R.P.M. Check engine instruments. If oil pressure gauge does not indicate pressure within 80 seconds, stop engine immediately, check and correct trouble before any further operation. Oil temperature during operating should not rise above 220°F. and oil pressure should not fall below 30pounds. With engine warm, idling speed should be 550-600 R.P.M.

2. Rev engine up to 2100 R.P.M. on both magnetos. Switch to LEFT and RIGHT magnetos. R.P.M. drop should not be over 75 R.P.M.

CAUTION—Do not operate engine on either single magneto for more than 30 seconds at a time, as this tends to foul the non-operating spark plugs in the ignition circuit of the magneto that is switched off.

D. **TAXIING**

1. Open throttle to start airplane in motion; then close throttle to a setting sufficient to keep ‘airplane rolling. Do not keep throttle advanced so that it is necessary to control taxi speed of airplane with brakes. This causes unnecessary wear and tear on brake and tires.

2. Taxi slowly (speed of a fast walk) controlling direction with rudder, which is connected to a steerable tail wheel. Use brakes only for positive, precision ground control when necessary.

3. Taxi upwind with stick back, downwind with stick forward. When ground winds are in excess of 15 M.P.H., turn into wind using ailerons in direction of turn; apply ailerons away from the turn when turning down wind. This procedure helps to prevent the wind “picking up” a wing during windy, gusty conditions. Always make ground turns slowly.

E. **GENERAL FLYING**

1. For takeoff use full throttle, headed into wind. Airplane loaded will become air-borne at approximately 39 M.P.H. Best climb speed is at an indicated 55 M.P.H.

2. Indicated R.P.M. for cruising speed of 73 M.P.H. is 2150. Take-off R.P.M. is 2800.Do not fly at full throttle over 3 minutes

3. Use CARBURETOR AIR HEAT when engine runs “rough” and tachometer shows drop in R.P.M., which may be due to ice forming in carburetor. Tachometer should re-cover to within 50 R.P.M. below normal when using carburetor heat. Push heater to “OFF” position, and if icing condition has been cleared, R.P.M. should return to normal. Continued use of carburetor heat will only cause increased fuel consumption and loss of power.

4. Maximum permissible diving speed is 122 M.P.H.

F. **APPROACH AND LANDING**

1. Push carburetor heat ON prior to throttling back for glide, or for any other flight manoeuvre.

2. Glide between 50-60 M.P.H. depending upon loading of airplane and gust conditions.

3. NOTE—"Clear" engine by opening throttle gently, every 200-250 feet of descent during along glide so that engine temperature will be maintained. Throttle action on the part of the pilot should be smooth and gentle at all times.

G. **PARKING**

1. After-termination of flight, enter flying time in aircraft and engine logbooks.

2. Turn ignition and fuel OFF.

3. Under excessively windy conditions, airplane should be tailed into wind for parking.

H. **STOPPING ENGINE**

1. Never cut switch immediately after landing as this causes engine to cool too rapidly.

2. Idle engine, especially in high temperature operating conditions, for several minutes. It is advisable to switch to each magneto for 30-second intervals to allow gradual cooling of engine. This helps to prevent overheating of spark plug insulators and will lessen tendency for "after-firing."

3. Check for carburetor heat OFF during idling.

4. Push fuel lever to off when ready to shut down engine.

For Safe Flying:

DO NOT BECOME AIRBORNE WITHOUT CHECKING THE FUEL SUPPLY: It only takes a few minutes to gas up. It may save you a forced landing.

DO NOT TAXI WITH CARELESSNESS: Taxi slowly and make turns to clear the area in front of the nose. Know the proper use of the controls for taxiing in a strong wind.

OBEY AIR TRAFFIC RULES: Keep a constant lookout for other aircraft. Follow the rules so that pilots of other planes will know what you are going to do.

DO NOT MAKE FLAT TURNS: This is particularly important when making power-off turns. You steer with the ailerons, not the rudder.

MAINTAIN SPEED: Don't be fooled by the increase in ground speed resulting from a down wind turn. Keep sufficient airspeed.

DO NOT LET YOUR CONFIDENCE EXCEED YOUR ABILITY: Don't attempt instrument flying in adverse weather conditions unless you have the proper training and the necessary instruments. Instrument flying is a highly developed science. Don't pioneer.

MAKE USE OF THE CARBURETOR HEATER: The carburetor heater is your friend. Know when to use it. Remember that it's easier to prevent ice in the carburetor than to eliminate it after it has formed.

DO NOT PERFORM AEROBATICS AT LOW ALTITUDES: Aerobatics started near the ground may be completed six feet under the ground. There's safety in altitude.

DO NOT ALLOW INDECISION IN YOUR JUDGMENT: Be certain! You can't afford to make errors of judgment. "I think I can make it" is on the list of famous last words.

THE GOOD PILOT IS THE SAFE PILOT: It's better to be an old pilot than a bold pilot.

A big “thank you!" to everyone that helped with this first aircraft for MSFS, especially to Ron (DA40CGDFQ) and Bill (lionheart) over at the FS Think Tank discord forum. Bill, aka Lionheart Creations Ltd., deserves extra mention for his tireless patience with my endless questions and for supplying gauge samples. You can find Bill’s work here: http://lionheartsimulations.com/ .

Support:

support@flight-replicas.com

All requests for support must be accompanied by the following information:

1. Place/website where your L-4 Grasshopper was purchased;
2. Order number;
3. Name used when purchasing; and
4. Date of purchase.

No support will be available without this information.