# FLIGHT MANUAL

# H-391B

(THIS DOCUMENT MUST BE KEPT IN AIRPLANE AT ALL TIMES)

CAA Approved E. C. Marsh
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HELIO AIRCRAFT CORPORATION
Norwood, Mass.

CAA Identification No. ..... Helio Model H-391B Normal Category

# AIRPLANE FLIGHT MANUAL

**1. Limitations:** The following limitations must be observed in the operation of this airplane:

**Engine:** Lycoming GO-435-C2B

**Engine Limits:** Take-off, 3400 rpm (260 hp)

All other operations 3000 rpm (240 hp)

**Fuel:** 80/87 minimum octane aviation gasoline

**Propeller:** Hartzell controllable propeller, hub HC-82x20-1A, blades 10133D
Diameter: Not over 101 in.; not under 95 in.
Pitch Settings at 30 in. sta.; Low 13°, high 31°.

**Power Instruments:**

**Oil Temperature:** Green Arc (Normal Operating Range 100° to 225° F; Yellow Line (Caution) 100° F; Red Line (max.) 225° F.

**Oil Pressure:** Green Arc (Normal Operating Range) 65 to 85 psi; Red Line (Min.) 25 psi; Red Line (max.) 85 psi: Yellow Arc (pre-cautionary range) 25 to 65 psi.

**Fuel Pressure:** Green Arc (Normal Operating Range) 13 to 15 psi; Red Line (Min.) 11 psi; Red Line (Max.) 15 psi.

**Cylinder Head Temperature:** Green Arc (Normal Operating Range) 350° to 475° F; Red Line (Max.) 475° F.

**Tachometer:** Green Arc (Normal Operating Range) 2200 to 2600 rpm; Green Line (Normal Fast Cruise and Climb Point) 3000 rpm; Red Arc (Restricted Continuous Operation) 2600 to 2975 rpm; Yellow Arc (Caution Range, Take-off Only) 3000-3400 rpm; Red Line Max.) 3400 rpm.

| **Airspeed Limits:** | | |
|---|---|---|
| Never Exceed | 189 | mph True Ind. |
| Max. Structural Cruising | 150 | mph True Ind. |
| Maneuvering | 98 | mph True Ind. |
| Flaps Extended | 80 | mph True Ind. |

**Flight Load Factors:** Meets Normal Category Limit Load Factors of 3.8g. flaps up, 2.0g flaps extended.

Note: 1. Use controls with caution above 150 mph.

2. In gusty air, it is advisable to reduce cruising speed below normal, and in severe turbulence reduce speed below 98 mph (flaps up) or below 65 mph (flaps down).

Maximum Weight: 3000 lbs.

C. G. range (101.3) to (106.4) 3000 lbs.
( 99.9) to (106.4) 2800 lbs.
( 96.5) to (106.4) 2200 lbs.

Straight line variation between points given.

Datum is 60" forward of fuselage Station O. (Sta. O is at upper attachment of engine mount to fuselage.)

Note: It is the responsibility of the pilot to insure that the airplane is properly loaded. (See attached loading instruction)

Maneuvers: All intentional acrobatic maneuvers, including spins, are prohibited.

Airspeed Instrument markings and their significance:

(a) Radial Red Line marks the never exceed speed which is the maximum safe airspeed. (189 mph).

(b) Yellow Arc on indicator denotes range of speeds in which operations should be conducted with caution and only in smooth air. (150 to 189 mph)

(c) Green Arc denotes normal operating speed range. (50 to 150 mph)

(d) White Arc denotes speed range in which flaps may safely be lowered. (50 to 80 mph)

Placards: In view of the pilot, "One minute limit for Take-off power; full throttle and 3400 rpm."

2. Procedures:

A. Fuel System:

Fuel valve position is simply "on" or "off", no tank selector being required.

B. Wing Flaps:

Full flaps should be used for peak performance on both take-off and landing.

## LOADING INSTRUCTIONS

1. This airplane is certificated for gross weight of 3000 lbs.
2. The owner-pilot should be familiar with the latest empty weight and C. G. position for his particular aircraft. For aircraft as delivered from the Helio plant, the weight and balance report is included at the rear of this manual. For aircraft whose empty weight or C. G. position is modified by later addition of equipment, the latest information is required by CAA to be entered on a repair and alteration form No. 337 which must be kept in the aircraft log.
3. The permissible center of gravity locations in inches are given in the CAA approved pages included at the front of this manual. A more convenient method for determining proper loading is given in paragraph 4 below.
4. Determination of Permissible Loading: Weight and C. G. Position

   A. From the factory weight and balance report, or from the latest form 337, find empty weight and moment.

   Then, empty weight index units equals $\frac{\text{Moment}}{1000}$

   B. From Fig. 7.1 find the index units for each item of useful load.

   C. With total weight and total index units, enter Fig. 7.2. Any point within the envelope meets the weight and balance requirements.

   D. EXAMPLE:

   Empty wt. equals 1960, moment equals 191,100

   Then index units equals $\frac{191{,}100}{1000}$ equals 191

| Item | Weight | Index (from Fig. 7.1) |
|---|---|---|
| Empty Weight | 1960 | 191 |
| Oil (10 qts) | 18 | 1 |
| Fuel (Full 58.2 gals. usable) | 349 | 39 |
| Pilot plus Passenger (Front) | 340 | 35 |
| 2 Passengers (Rear) | 290 | 39 |
| Baggage (To make gross weight) | 43 | 7 |
| | 3000 | 312 |

Entering Fig. 7.2 it is seen that this point (3000 lbs. and 312 index units) falls within the required envelope and therefore is satisfactory.

E. TYPICAL LOADINGS

To serve as a rough and somewhat conservative guide giving at-a-glance information for quick estimation only, Table 7.3 lists some permissible loadings for a particular airplane containing a large amount of miscellaneous optional equipment including

cross-wind gear, ADF, Omni, vacuum system with gyros, landing light, etc. A **typical** aircraft will usually carry somewhat less equipment and have a somewhat lower empty weight than the airplane upon which Table 7.3 is based. If it is apparent that the loading limits are being approached within 50 lbs. of weight, or if the owner-pilot's airplane **empty** C. G. position in inches differs by more than .40 inches from the airplane used as an example in Table 7.3 (2044 lbs. at 96.53", moment equals 197,307, index units equals 197) then the index unit method given in paragraph 4A through 4D should be used.

**Table 7.3 Typical Permissible Maximum Loadings for a Particular Airplane at 3000 lbs. Gross Weight**

| Fuel Gallons | Pilot 170 lbs. | Passenger Front 170 lbs. | Passengers Rear 170 lbs. ea. | Baggage Comp'tm't. Load. lbs | Limiting Condition |
|---|---|---|---|---|---|
| 58.2 (Full) | 1 | 1 | 1 | 79 | 3000 lb. wt. |
| 58.2 (Full) | 1 | 0 | 2 | 79 | 3000 lb. wt. |
| 58.2 (Full) | 1 | 1 | 0 | 200 | 3000 lb. wt. |
| 58.2 (Full) | 1 | 0 | 1 | 200 | 3000 lb. wt. |
| 55 | 1 | 1 | 1 | 100 | 3000 lb. wt. |
| 55 | 1 | 0 | 2 | 100 | 3000 lb. wt. |
| 51 | 1 | 1 | 2 | 0 | 3000 lb. wt. |
| 38 | 1 | 1 | 1 | 200 | 3000 lb. wt. |
| 30 | 1 | 1 | 2 | 78 | 3000 lb. wt. |
| 24 | 1 | 0 | 2 | 180 | Aft. C. G. |
| 20 | 1 | 1 | 2 | 138 | 3000 lb. wt. |

Note: 1) This table is exact only for an airplane with empty weight of 2044 lbs. at 96.53 inches (moment equals 197307, index units equals 197).

Note: 2) For aircraft with markedly different empty weight and C. G., use Figs. 7.1 and 7.2.

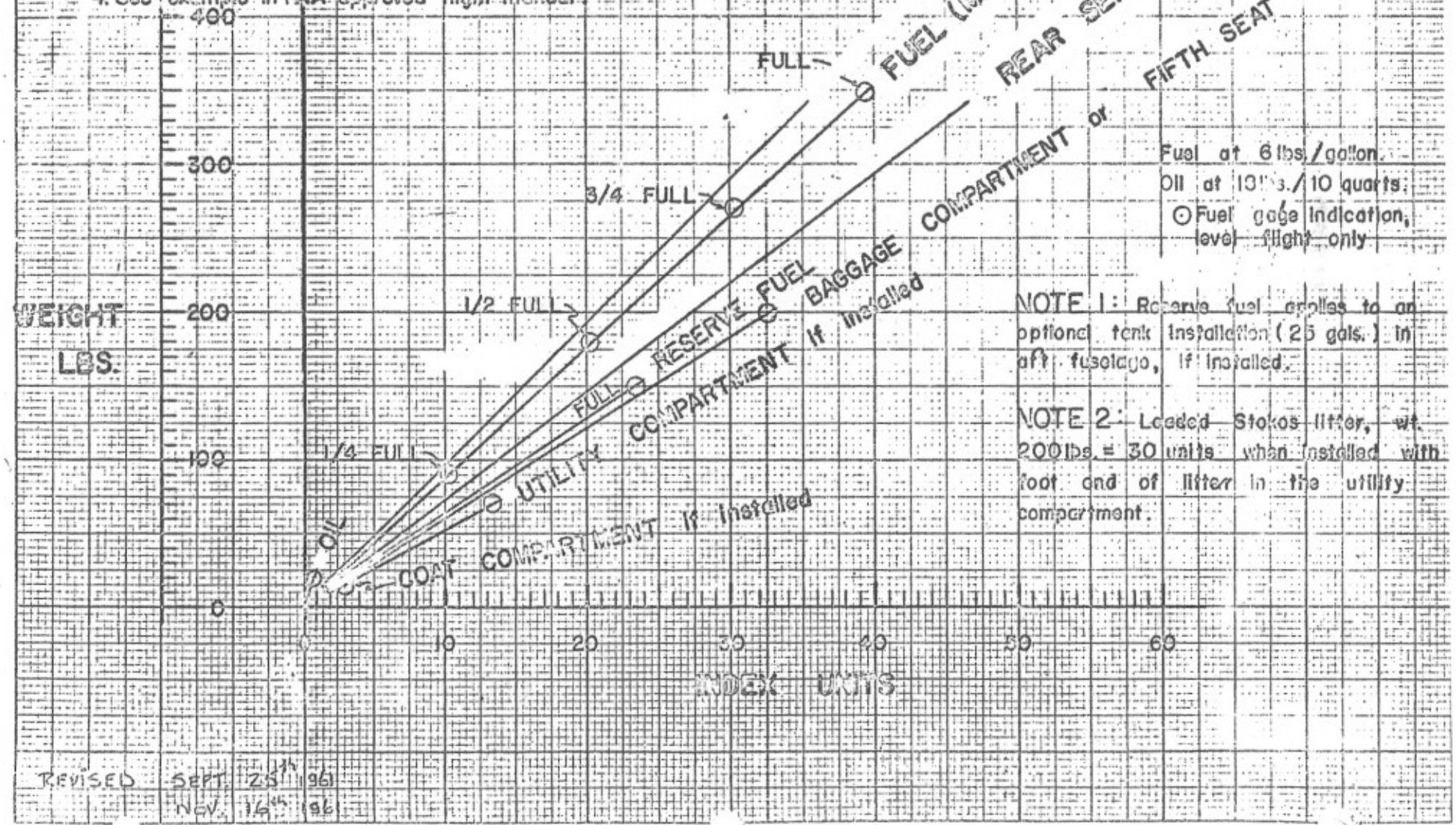
# KELLY "COUPER" MODELS 3B10, 395, 395A

## LOADING GRAPH

FIG. 7.1

PROCEDURE

1. Find total index units for all useful load items.
2. Add index units for empty wt.
3. Enter Fig 7.2 to determine allowable limit on wt. & c.g.
4. See example in FAA approved flight manual.




Fuel at 6 lbs./gallon.
Oil at 15 lbs./10 quarts.
⊙ Fuel gage indication, level flight only

NOTE 1: Reserve fuel applies to an optional tank installation (25 gals.) in aft fuselage, if installed.

NOTE 2: Loaded Stokes litter, wt. 200 lbs. = 30 units when installed with foot end of litter in the utility compartment.

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# CENTER OF GRAVITY ENVELOPE