FAA APPROVED

A I R P L A N E   F L I G H T   M A N U A L

HELIO AIRCRAFT COMPANY
A DIVISION OF GENERAL AIRCRAFT CORPORATION
PITTSBURG, KANSAS

MODEL HT-295

(Serial Number 1701 and on)

SERIAL NUMBER __________

REGISTRATION NUMBER __________

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

FAA APPROVED A.R. Parduhn Jr.
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Kansas City, Missouri

DECEMBER 18, 1973

HELIO MODEL HT-295

AIRPLANE FLIGHT MANUAL

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* For Chief, Engineering & Manufacturing Branch, Central Region

HELIO MODEL HT-295

AIRPLANE FLIGHT MANUAL

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*For Chief, Engineering & Manufacturing Branch, Central Region

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I. LIMITATIONS

The following limitations must be observed in the operation of this airplane:

A. Engine: Lycoming Model GO-480-G1A6 or GO-480-G1D6

B. Engine Limits: Take Off (5 min.) 3400 RPM (295HP) Full Throttle. All other operations, 3000 RPM (280 HP)

C. Fuel: 100/130 Octane minimum grade aviation gasoline.
Standard Mains - 60.7 gal. capacity
58.2 gal. usable
Optional Auxiliary Tanks -
60.0 gal. capacity
59.8 gal. usable

D. Propeller: Hartzell, Constant Speed, Hub HC-B3Z20-1
Blade 1015C-5
Diameter: 96 in. - No decrease permitted
Pitch settings at 30 in. station; Low 11.8°
High 30.8°

E. Power Plant Instruments:

Cylinder Head Temp:	Green Arc: 250°F - 475°F (Normal Operating Range) Red Radial: 475°F
Manifold Pressure:	Green Arc: 15 - 29.1 in. Hg. (Normal Operating Range)
Oil Temperature:	Green Arc: 100° - 235°F (Normal Operating Range) Yellow Line: 100°F Red Radial: (Max.) 235°F
Oil Pressure:	Green Arc: 65 to 85 psi (Normal Operating Range) Red Radials: 25 and 85 psi Yellow Arc (Caution): 25-65 psi
Fuel Pressure:	Green Arc: 9 to 15 psi (Normal Operating Range) Red Radials: (Min.) 9 and (Max.) 15 psi
Tachometer:	Green Arc: 2200 - 3000 RPM (Normal Operating Range) Yellow (Caution): 3000 - 3400 RPM Red Radial: 3400 RPM

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I. LIMITATIONS (Continued)

F. Airspeed Limits: (Calibrated Airspeed)

Never Exceed (V_{NE})	174K(200mph) (Red Radial)
Never Exceed (V_{NE}) Left door removed	109K(125mph)
Never Exceed (V_{NE}) Right door removed	130K(150mph)
Caution Range	139-174K(160-200mph)(Yellow Arc)
Design Cruising Speed (V_C)	139K(160mph)
Normal Operating Range	52-139K(60-160mph)(Green Arc)
Max. Design Maneuvering Speed (V_P)	89K(103mph)
Max. Flap Extension Speed (V_F)	69K(80mph)
Flap Operating Range	46-69K(53-80mph)(White Arc)

NOTE: Airspeed instrument markings and their significance:

1. Radial RED line marks the never exceed speed, which is the maximum safe airspeed.

2. YELLOW arc on indicator denotes range of speeds in which operations should be conducted with caution and only in smooth air.

3. GREEN arc denotes normal operating speed range.

4. WHITE arc denotes speed range in which flaps may be safely lowered.

G. Maneuvers: Normal category maneuvers only are approved.

H. Flight Load Factors: (At Max. gross weight of 3400 lbs.)

Maneuver: Positive: 3.8g   Negative: 1.5g
Flaps extended: 2.0g

WARNING: 1. Use controls with caution above 109K(125mph) CAS.

2. In gusty air, it is advisable to reduce cruising speed, below normal, and in severe turbulence reduce speed below 82K(94 MPH) (flaps up) 56K(65MPH)(flaps down).

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I. LIMITATIONS (Continued)

I. Maximum Weight: 3400 lbs.

J. Center of Gravity Limits: (103.8) to (110.0) at 3400 lbs.
(98.9) to (110.0) at 2760 lbs.
(97.0) to (110.0) at 2330 lbs. or less
Straight line variation between points given.

Datum: Datum is 60 inches forward of fuselage station 0. (Station 0 is at upper attachment of engine mount to fuselage.)

NOTE: It is the responsibility of the airplane pilot to insure that the airplane is properly loaded. See Section IV for computation procedures.

K. Limitations with one door removed.

Flight with both doors removed is prohibited.

Intentional slips and skids prohibited.

Smoking not permitted with either door removed.

All loose items must be tied down or stowed.

No baggage may be carried.

Operations limited to VFR day operations.

L. Placards:

In full view of the pilot,
"THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATION LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUAL"

"NO ACROBATIC MANEUVERS INCLUDING SPINS APPROVED"

"THIS AIRPLANE IS NOT TO BE FLOWN INTO KNOWN ICING CONDITIONS"

In full view of the pilot, (if either door is removed)

"FOR FLIGHT WITH ONE DOOR REMOVED SEE AFM LIMITATIONS"

In vicinity of the Alternate Static Selector Valve,

"SEE FLIGHT MANUAL FOR ALTERNATE STATIC SOURCE CALIBRATION

HELIO MODEL HT-295

AIRPLANE FLIGHT MANUAL

I. LIMITATIONS (Continued)

L. Placards: (Continued)

Near Fuel Transfer Pumps Switches, (If Optional Auxiliary Tanks are installed)

"CAUTION! MONITOR MAIN FUEL QUANTITY DURING AUXILIARY TRANSFER TO AVOID OVERFLOW (LEVEL FLIGHT ONLY)"

II. PROCEDURES

A. Normal Procedures:

If Goodyear Iceguard Kit #320-639 (24V) or #320-641 (12V) are installed on the propeller blades, every preflight inspection should include a close inspection of the Iceguards.

Wing Flap Settings: Takeoff: 0^{o} - 30^{o}
Cruise: 0^{o}
Landing: 40^{o}

Maximum 90^{o} crosswind velocity demonstrated: 17K (20 MPH)

Carburetor or air filter icing:

Use carburetor air heat control - full ON.

Operate aircraft with Static Selector Valve in the Normal position.

If optional Auxiliary Fuel Tanks are installed, burn fuel in Main Fuel Tanks down to ½ full before starting to transfer fuel from Auxiliary Tanks. When Main Tanks are 3/4 full, stop transfer until Main Tanks are again ½ full. Transfer fuel from both Auxiliary Tanks simultaneously.

B. Emergency Procedures:

Engine Failure: To permit a normal landing flare-out, maintain at least 52K(60 MPH) (IAS) when using 20^{o} or more flaps.

Electric Trim System: In case of malfunction, PRESS the Trim Disconnect Switch on the pilot's control wheel and HOLD until Trim Circuit Breaker has been pulled.
Reduce speed immediately to 69K (80 MPH) (IAS) or less. Stick forces under 69K (80 MPH) (IAS) are considerable less than at higher speeds.
Maintain 69K (80 MPH) (IAS) or less and land as soon as practicle

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AIRPLANE FLIGHT MANUAL

II. PROCEDURES (Continued)

B. Emergency Procedures (Continued)

Normal Static System Failure: Select "ALTERNATE" on the Static Source Selector Valve.

ALTERNATE STATIC SOURCE CALIBRATION

INDICATED AIRSPEED		ALTITUDE		ALTITUDE	
NORMAL	ALTERNATE	NORMAL	ALT.	NORMAL	ALT.
43K(50 MPH)	55K(63 MPH)	1000	1090	7000	7095
61K(70 MPH)	72K(83 MPH)	2000	2090	8000	8100
78K(90 MPH)	89K(103 MPH)	3000	3090	9000	9100
96K(110 MPH)	107K(123 MPH)	4000	4090	10000	10100
113K(130 MPH)	126K(145 MPH)	5000	5090	11000	11100
		6000	6090	12000	12105
				13000	13105

Asymmetric Fuel Load in Auxiliary Tanks: Land with no flaps for better lateral control.

Icing or Suspected Icing: Operate Iceguards when icing or suspected icing is encountered.

III. PERFORMANCE

The Performance information given in this section has not been approved by the Federal Aviation Administration.

MINIMUM STEADY FLIGHT CHART

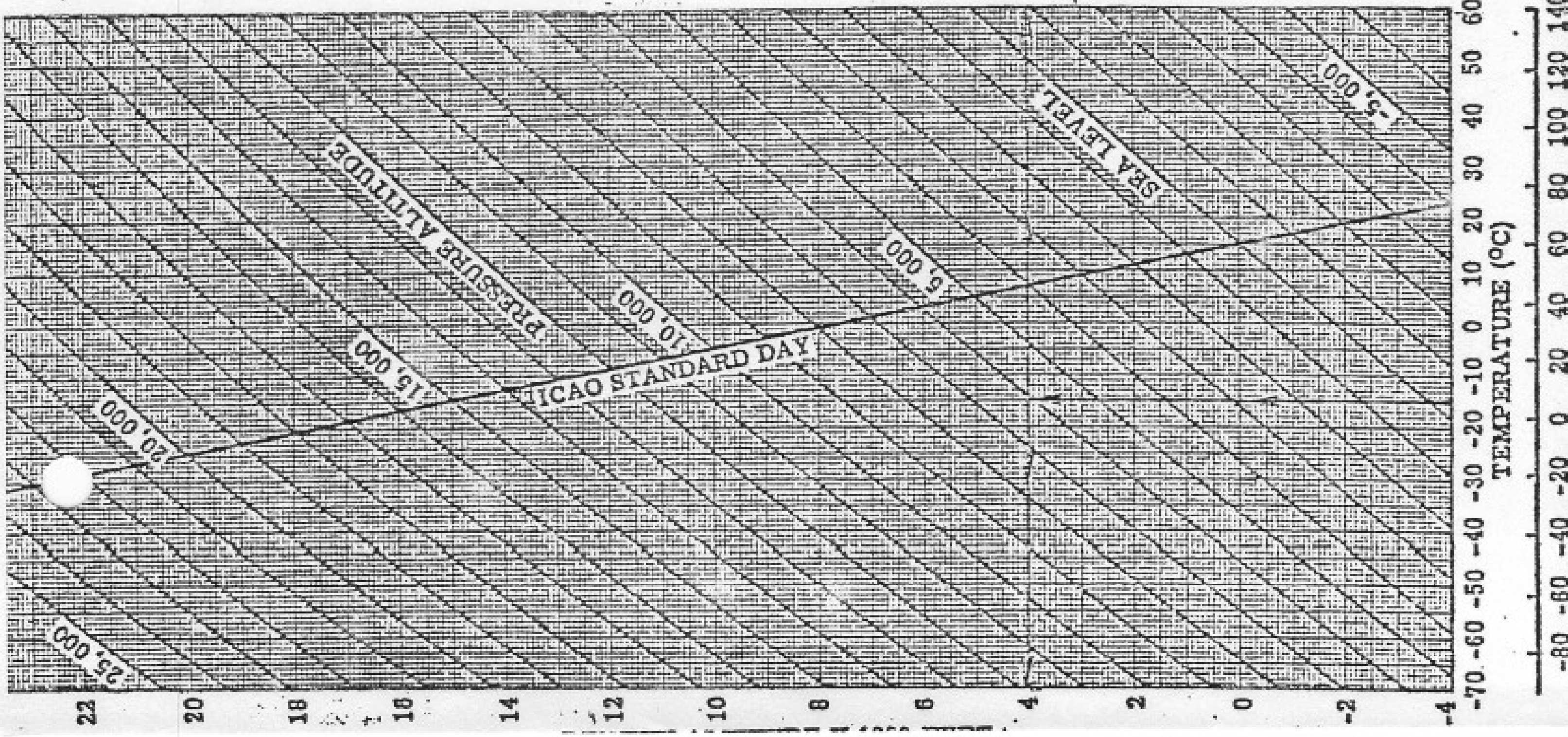
Minimum steady flight speed is determined by thrust-drag equilibrium - not by stall or loss of control. With power off, the control wheel is held almost full aft to permit the aircraft to descend steadily. The power-on minimum steady flight speed can be decreased slightly by the application of more power (beyond METO) and increasing the pitch attitude of the aircraft. The additional power offsets the increase in drag, thereby maintaining the thrust-drag equilibrium. If pitch attitude is increased further, no loss of control or wing stall will occur. The aircraft will merely lose altitude due to drag exceeding propeller thrust.

ANGLES OF BANK

	FLAP SETTING	MINIMUM STEADY FLIGHT SPEED KNOTS, IAS 0°	15°	30°	45°
Power On (METO)	0°	22	23	24	28
	20°	20	21	22	26
	40°	23	24	25	29
Power Off	0°	52	53	58	62
	40°	48	47	49	54

STEADY FLIGHT AT 3000 LBS GROSS WEIGHT
SEA LEVEL, STANDARD DAY CONDITIONS

DENSITY ALTITUDE CHART



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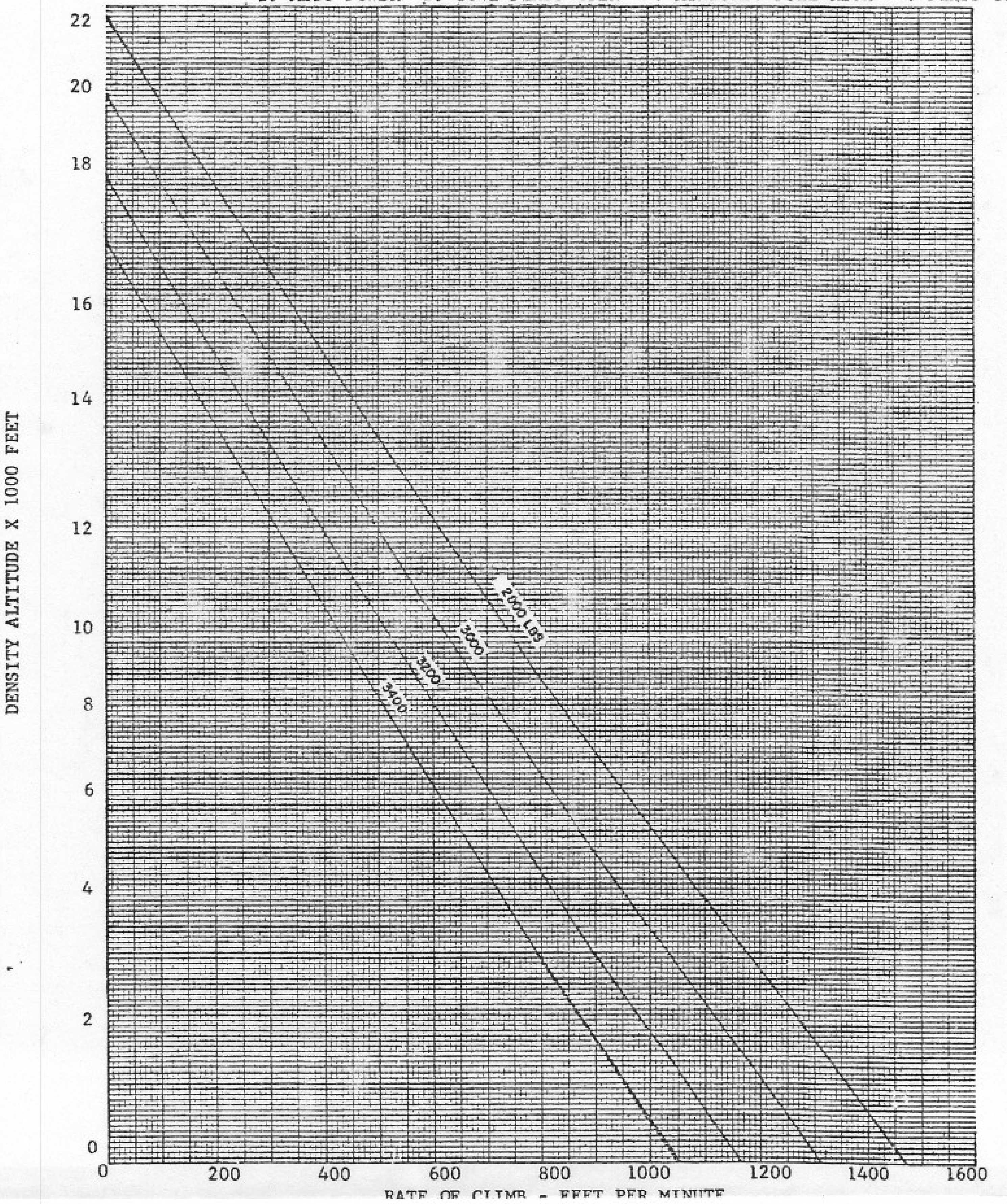
AIRPLANE FLIGHT MANUAL

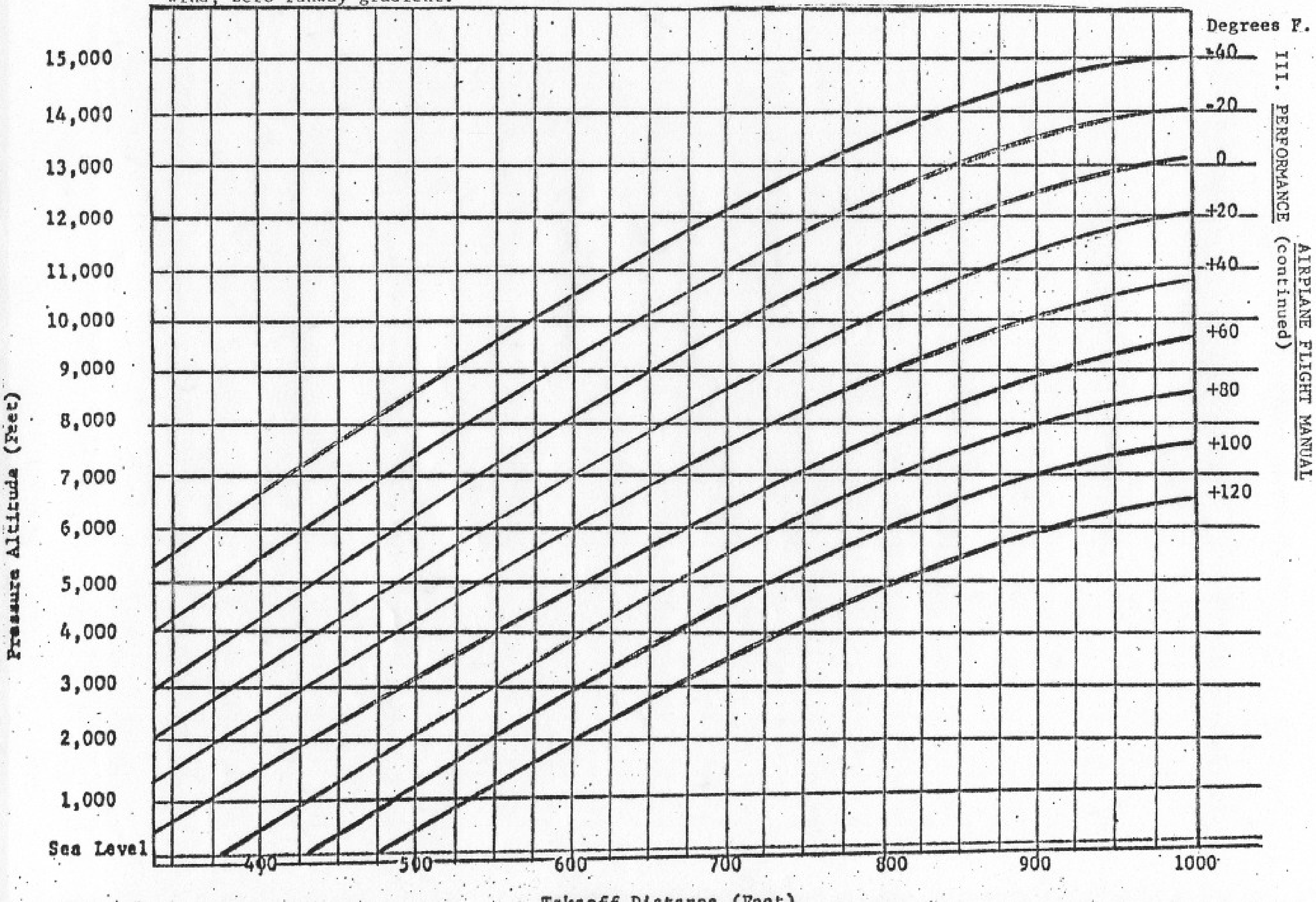
RATE OF CLIMB

CONDITIONS: 1. METO POWER 2. COWL FLAPS OPEN 3. MIXTURE: FULL RICH 4. FLAPS UP



GROUND RUN PERFORMANCE CHART

This information is for an aircraft with an engine developing full power , gross weight, no wind, zero runway gradient.



IV. WEIGHT AND BALANCE

The empty weight and center of gravity location is determined for each airplane individually and is influenced by the equipment installed. This data may vary as additions, deletions of equipment, alterations, and maintenance are completed on the airplane. The empty weight and center of gravity location must be kept current. Only the procedures used in this Section are F.A.A. Approved.

NOTE: It is the responsibility of the pilot to insure that the airplane is properly loaded.

Calculation of Weight and Balance:

1. FIGURE I is a sample Table which may be used in computing the Weight and Balance of a specific loading of the airplane.

2. List the empty weight and moment of the airplane as shown in the most current weight and balance report.

3. List applicable Item's weight and moment. These moments may be obtained from FIGURE II or by multiplying the Item's weight by the Arm length given in FIGURE I. Baggage may be listed at its arm length as determined.

4. Total weights and moments.

5. Check totals from 4 are within the limits of FIGURE III. Or divide the Total moment.

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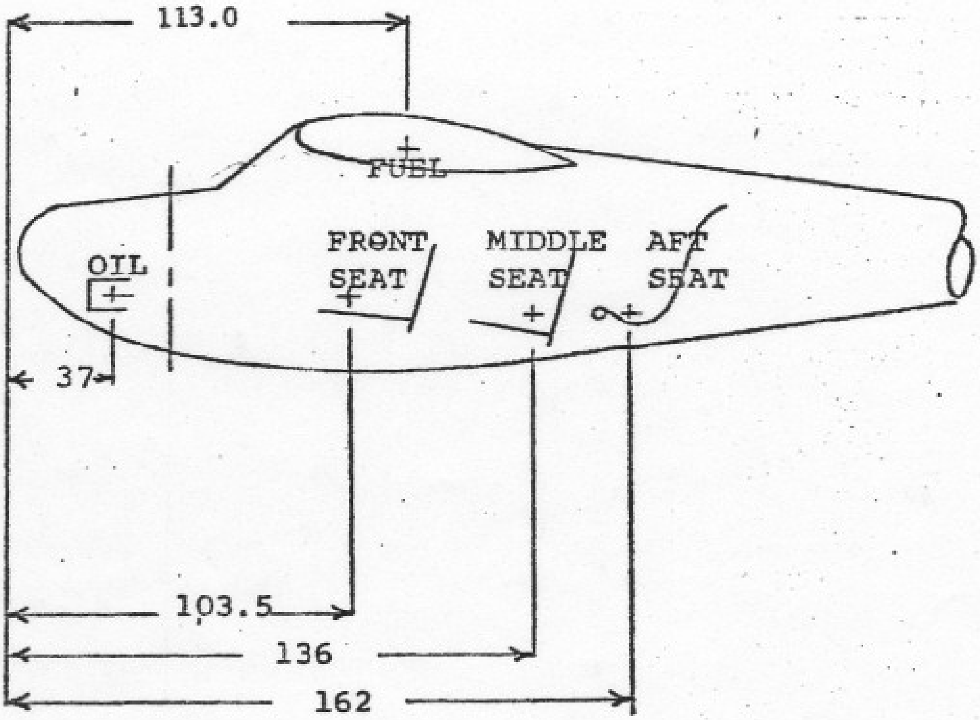
AIRPLANE FLIGHT MANUAL



	WEIGHT	ARM	MOMENT
AIRCRAFT	______	______	______
OIL	______	37.0	______
FUEL	______	113.0	______
FRONT SEAT	______	103.5	______
MIDDLE SEAT	______	136.0	______
AFT SEAT	______	162.0	______
TOTAL	______		______

$$C.G. = \frac{\text{TOTAL MOMENT}}{\text{TOTAL WEIGHT}} = \_\_\_\_\_\_\_\_ = \_\_\_\_\_$$

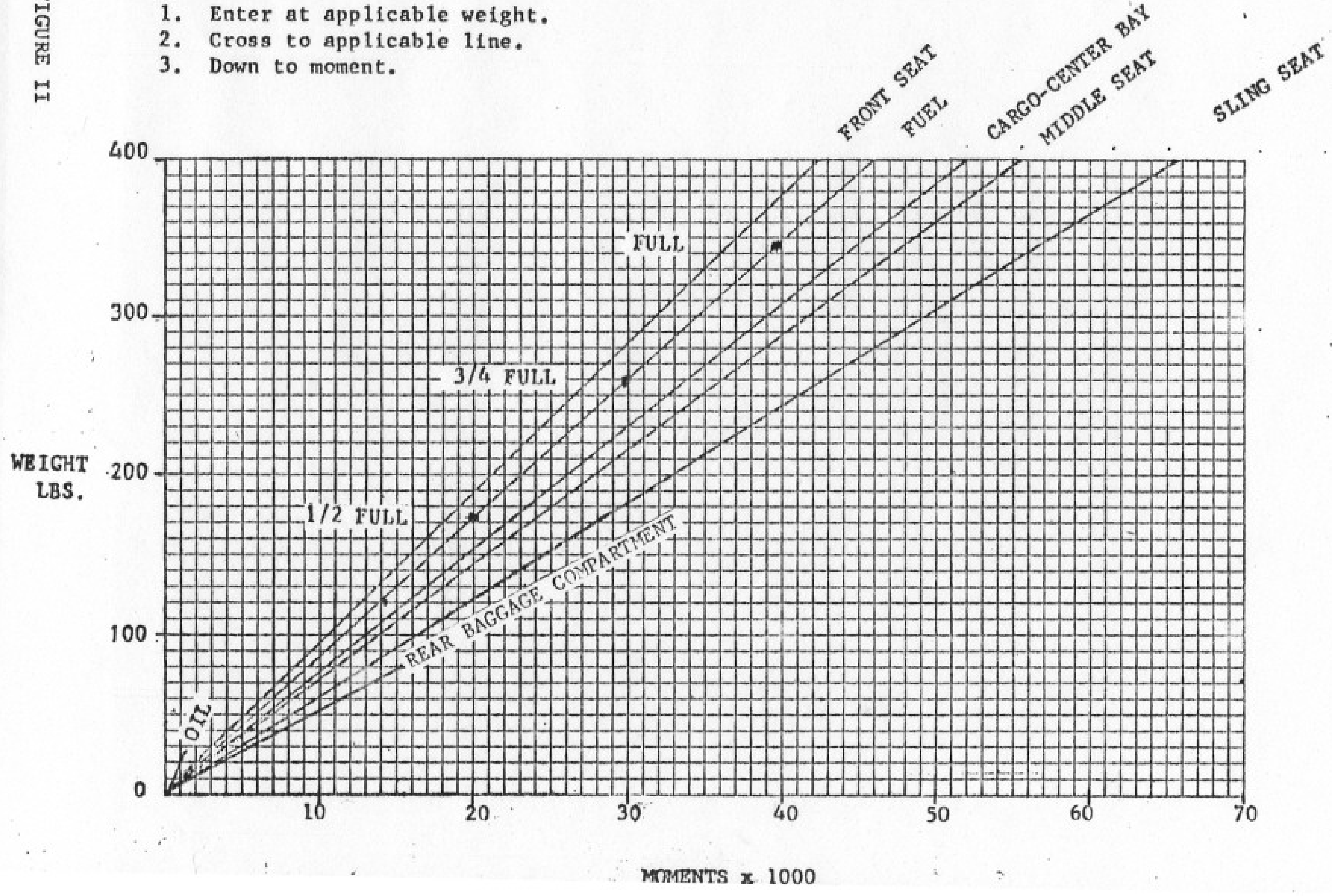
FIGURE I

FIGURE 11

LOADING GRAPH

PROCEDURE:

1. Enter at applicable weight.
2. Cross to applicable line.
3. Down to moment.



WEIGHT AND MOMENT DIAGRAM

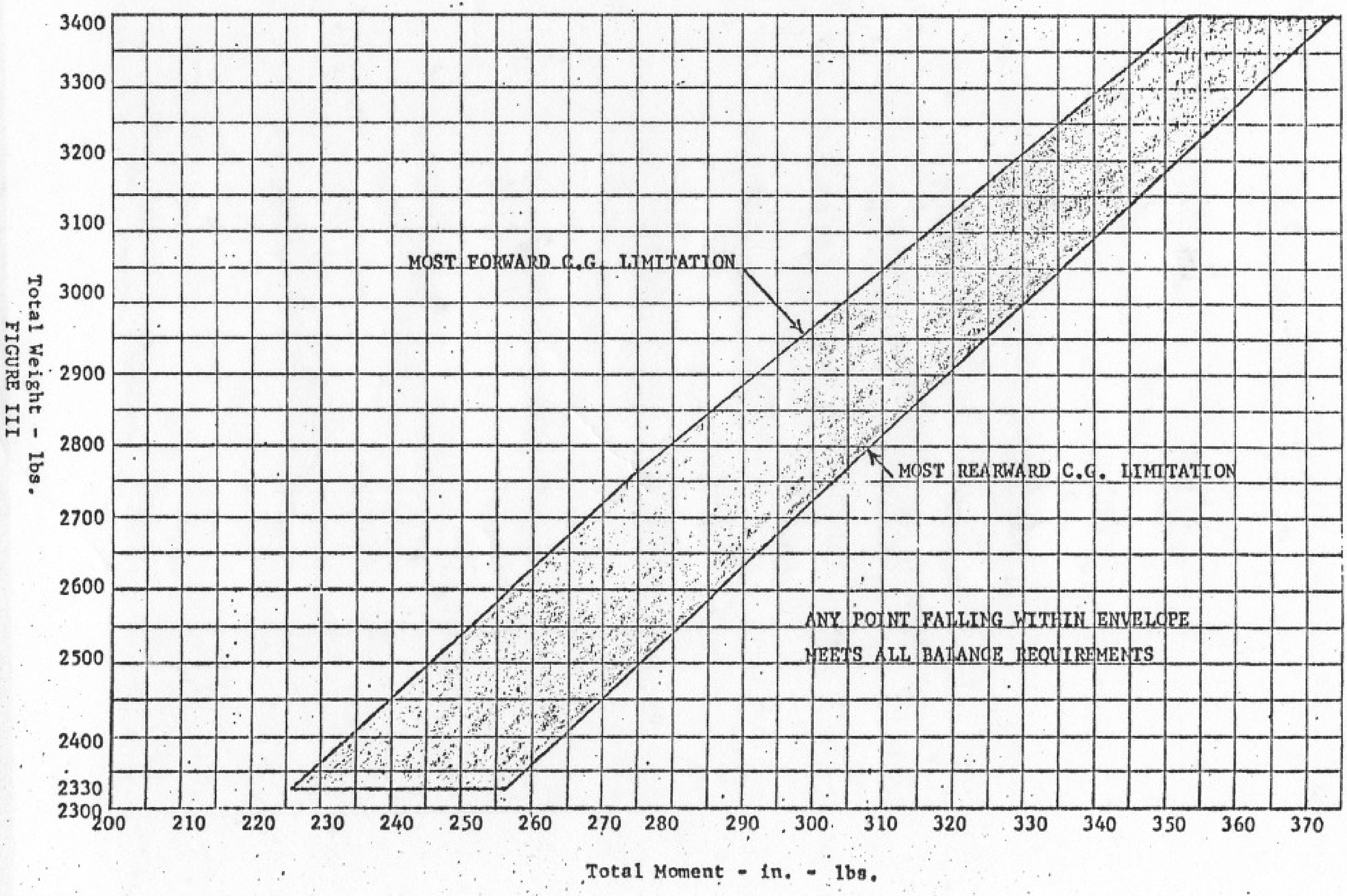


FIGURE III

HELIO AIRCRAFT COMPANY

HELIO MODEL HT-295
OWNERS MANUAL

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SECTION I

General Description of Airplane

The HT-295 is a high wing monoplane. The wing is fully cantilever and of all metal construction. The fuselage cabin section is a metal covered tubular structure and the aft section is all metal semi-monocoque. The tail surfaces are of all metal construction. Power is supplied as follows:

Model	Engine	Propeller
HT-295	Lycoming (295hp) GO-480-G1A6	Hartzell Constant speed 96" dia.

The Model HT-295 is a six place plane. The occupants are seated in two individual adjustable front seats, two individual middle seats with two reclining positions, and a two place rear seat. Entrance to the front seat is through a left front door. Entrance to the rear seats is through a rear right door, the sill of which is at floor level height for easy loading and unloading. The rear seat is easily removable for added cargo space.

Surface control is by conventional wheel and rudder pedals. Provisions are made for wheel, rudder pedals and brakes on the right side. Toe brakes are provided on the left side. (Brakes for the right side are optional.) The flaps are actuated by an electric motor on the 1700 series. Longitudinal trim is by an elevator trim tab actuated by an electric motor on the 1700 series.

The airplane is equipped with long span slotted flaps and full span leading edge slats for high lift operation. Lateral control is obtained by short span Frieze ailerons operated in conjunction with leading edge interceptors. The latter are provided for low-speed control. Pitch change is obtained with an all-moving horizontal tail. Directional control is obtained with a conventional type rudder.

The engine section is composed of the engine installation, oil cooler, carburetor, ram air filter screen, oil system piping, fuel system piping, electrical system, cowl flap system and the necessary mechanical control units. The engine section is completely enclosed by aluminum wrap-around cowl. The engine mount is a welded steel tube structure bolted to the forward end of the fuselage. The engine is suspended on the engine mount by four vibration isolators. The firewall is of stainless steel.

Description of Structure

WING PANEL. The wing is a two-panel full-cantilever unit and all metal construction. Ribs are formed 2024 alclad members. The main spar consists of 2024 alclad web and 2024 extruded angle capstrips. The rear spar is a 2024 alclad formed channel. The wings are attached to the fuselage through a welded steel truss.

AILERONS AND INTERCEPTORS. The ailerons are the Frieze type, of 2024 alclad diagonal rib truss structure, fabric covered. They are hinged at both ends and operated by a push-pull tube at the center. The interceptors consist of heavy aluminum alloy curved plates (inboard) and forward of each aileron). They emerge from the wings in conjunction with the ailerons.

FLAPS. The flaps are of a single spar all-metal construction. They are supported to the wing structure by three flap tracks and are actuated by push-pull tubes at the center and outboard tracks.

TAIL GROUP. The tail group is composed of a vertical fin and rudder, and an all-movable horizontal surface equipped with an anti-balance and trim tab. All tail surfaces are of aluminum alloy construction.

FIN:	Two-spar construction,
RUDDER:	Single-spar construction
STABILATOR:	Single-spar construction

FUSELAGE. The forward fuselage structure is a welded steel tube truss. It is covered with alclad sheet in the cabin section; the remaining portion is semi-monocoque.

LANDING GEAR. The main landing gear is the Spring Steel type mounted in a box section of the fuselage structure. The Nose Wheel is the air-oil shock strut type and is attached to the engine mount.

SPECIFICATIONS

Gross Weight	3400 lbs.	Fuel Capacity (Useable)	58.5 gals.
Empty Weight	2023 lbs.	Octane Rating	100 (Min.)
Wing Span	39 ft.	Oil Capacity	12 qts. (Max.) 10 qts. (Desired)
Wing Chord	72 in.	Power Plant	GO-480-G1A6 Lycoming
Wing Area (Slats retracted)	231 sq. ft.	Take-off Horsepower	295
Overall Length	30 ft. 4 in.	Normal Rated Horsepower	280
Aileron Area (Each Surface)	10.35 sq. ft.	Flap Area (Each Surface)	19.05 sq. ft.
Slat Span (Each Wing)	203.93 in.	Stabilator Area	37.50 sq. ft.
Rudder and Fin Area	24.40 sq. ft.	Wheel Tread	102.00 in.

SECTION II-FLIGHT AND OPERATING INSTRUCTIONS

A. FLIGHT CONTROLS

The HT-295 incorporates flight control devices to insure safe flight at slow air speeds without detriment to high-speed flight. The cockpit controls, however, are conventional and their operation is the same as in any other fixed-wing airplane. The exceptional degree of control is obtained by the use of leading edge slats, large flaps, interceptors and a fully movable horizontal tail surface with its anti-balance tab. Each control is described in detail in the following discussions.

AILERONS. The ailerons are operated in a conventional manner by either of the dual control wheels. In addition to the ailerons, the control wheels actuate interceptor blades which extend through the upper surface of the wing directly behind the outboard slat. The ailerons are conventional and they provide the normal corrective forces at high speeds. The interceptors provide the extremely positive lateral control at the slowest speeds obtainable. This control is so effective that it is possible to overcome the effect of full rudder in a stall by use of the aileron-interceptor control and roll into a turn in the opposite direction. The aileron interceptor combination produces a very high rate of roll at all speeds with comparatively small control movements. Violent, full throw control movements are not necessary to produce satisfactory rates of roll at all airspeeds.

RUDDER. The rudder and controls are conventional. The rudder pedals are ground adjustable to four positions. Toe brakes are provided on the left-hand pair of pedals.

STABILATOR. The horizontal tail surface, or stabilator, is a single movable surface instead of the usual elevator and horizontal stabilizer. The control operation is conventional and control feel and reaction in the cockpit are the same as in other aircraft.

There are two tabs attached to the horizontal surface, a trim tab and an anti-balance tab. The right hand surface has the anti-balance tab attached to it. It is an anti-balance tab because it moves in the same direction as the surface, thus providing a force which always returns the surface to the trim position. The actuating arm and pivot point for this tab, which is mounted on the fuselage directly under the fin, should be inspected as a part of the daily pre-flight inspection.

The trim tab is located on the left hand surface. It is of the conventional type with a trim tab position indicator located on the instrument panel.

SLATS. The leading edge wing slats operate fully automatically by the air-loads on them. Their use provides the very slow speeds possible with this airplane. All slats are fully visible from the cockpit, they should normally be open on the final approach. If it appears that any of the four slats have stuck, it is advisable to land about 10 MPH faster than the minimum landing speed.

It should be noted that the lateral and directional control is so effective that through their normal use, it is possible to overcome the effects of both slats remaining closed on one side.

FLAPS. All 1700 series aircraft have electric powered flaps as standard with a flap position indicator on the instrument panel. Full flap can be used for landing under all normal wind conditions. Shortest take-off runs, under standard air, sea-level conditions, are performed with 30° flaps, although 20° will give a better rate of climb once the airplane is airborne and provides better take-off at higher altitudes, or with maximum gross loads.

B. PRE-FLIGHT INSPECTION

1. Check interior of cabin for Fuel Valve "ON", ignition and Master Switch "OFF", mixture control "Idle CUTOFF", remove gust lock.

2. Pull propeller through several revolutions and inspect blades for nicks and cracks.

3. Open engine cowl; check oil level and inspect fuel and oil lines for leaks. Give engine compartment a complete visual check.

4. Check nose wheel oleo shock strut and tires for proper inflation.

5. Check main gear brakes and lines for leaks and security.

6. Drain sediment bowl. (Accessible through small door under the forward window on right side fuselage.) Drain auxiliary fuel tanks if applicable. (Drains located on the bottom of each wing.)

7. Check fuel load and make certain that the fuel caps are firmly secured on the fillernecks.

8. Check slat operation for freedom of movement and any unusual play.

9. Move all control surfaces and check security of all hinge bolts and push-pull tubes.

10. Check security of anti-balance tab on horizontal tail and its pivot point on the fuselage.

11. Remove cover if installed on pitot tube, and make sure it is free from dirt or other obstructions.

CAUTION!!! WHEN CLEANING OR WAXING AIRPLANE, DO NOT ALLOW WAX OR CLEANER TO PLUG STATIC VENT HOLES........

After entering the airplane and before starting the engine:

1. Adjust and fasten the combination seat and shoulder straps.

2. Check all controls for freedom of movement and proper direction.

3. Insure that all cargo is secured and that the load is properly located.

4. Check position of electrical and ignition switches.

5. Open cowl flaps.

ENGINE STARTING. The following starting procedure is taken from the Lycoming Operator's Manual. A copy of the Lycoming Manual is furnished with each airplane and is considered a part of this manual.

Lock the wheels by either wheel brakes or chocks.

Set the propeller control lever all the way forward in INCREASE RPM position.

Be sure fuel valve is "ON".

Set throttle to 1/4 open position.

Place mixture control in the "Idle Cut-off" position (Full out).

Turn on auxiliary fuel pump and check pressure.

Turn ignition switch to extreme right and push (this energizes starter).

NOTE

> On aircraft with control lock pin located on pilot's control wheel shaft, it is necessary to remove the pin before attempting to start the engine. The aircraft is designed so the starter circuit is inoperative with the control lockpin installed. The magneto circuits are not involved in any way.

When the engine begins to fire, immediately put mixture control in Full Rich position (full in) and allow ignition switch to return to "both" mag position. CAUTION - If engine fails to start immediately, return mixture control to Idle Cut-off position. Failure to do so will create an excessive amount of fuel in the carburetor air scoop constituting a fire hazard.

"Vapor locking is not a common occurrence on Lycoming GO-480 engines. However, under certain circumstances it can occur, i.e. when runway and ramp temperatures exceed 100°F particularly on sunny days and at airfields of high elevation where temperatures exceed 80°F. During these conditions vapor locking can occur after a hot engine has been shut-down and a start is attempted within a period of up to one hour after initial shut-down. Vapor lock symptoms are; zero fuel pressure with the electric fuel booster pump on, and by hearing an unusual sound in the booster pump which indicates it is cavitating rather than pumping.

When it is suspected that a vapor lock exists, the following procedures should be used: Fuel selector ON, electric fuel booster pump ON, throttle opened 1/4, push mixture control to full rich and leave there until fuel pressure builds up and cavitating sound disappears, then return mixture control to idle cut-off and proceed with normal starting sequence. If a solid vapor lock exists, the engine primer is usually ineffective until the vapor lock is broken by the method mentioned above."

If oil pressure does not build up after 30 seconds running, stop engine and determine trouble.

Check Engine Driven Fuel Pump for proper pressure by turning off auxiliary fuel pump.

Initial warm up should be at 1000 to 1200 RPM.

ENGINE WARM-UP

Engine is warm enough for take off when the throttle can be opened without backfiring or skipping.

Check magnetos at 2600 RPM. Drop off should not exceed 175 RPM on either magneto and should be within 50 RPM of each other.

Exercise propeller at 2200 RPM. Pull control to decrease RPM, note drop to 1275± 50 RPM.

Cowl flaps should be open for all ground operation (pull handle out). Avoid prolonged ground operation as it will cause overheating.

For further information on cold weather starting and engine operation, consult the Lycoming Operator's Manual.

C. OPERATION

TAKE-OFF: Prior to take-off, a check should be made to insure that:

1. Weight and Balance is correct.
2. All occupants have properly secured the combination seat and shoulder straps.
3. Stabilator trim tab set.
4. Flaps are extended 30° or less for take-off.
5. Cowl flap lever is pulled out to fully open cowl flaps.
6. Propeller control is pushed in for maximum RPM. (3400 Max.)
7. Fuel selector valve is "ON".
8. Parking brake control is "OFF" position.
9. Auxiliary boost pump "ON".

As soon as possible after take-off, reduce RPM to the maximum continuous setting (3000 RPM) and retract the flaps. Take-off power may be used for a maximum of five (5) minutes, but it is advisable to reduce power as soon as practical. Best rate of climb is obtained at 65 MPH IAS flaps down, and at 90 MPH IAS flaps up at METO power. A cylinder head temperature gauge is provided as standard equipment, and power, cowl flaps, and speed settings should be selected to maintain the cylinder head temperature somewhat less than 475°F. The maximum permissible is 450°F. at cruise power. For take-off and normal rated power, the limit is 475°F.

LANDING. During the let down prior to the landing approach:

1. Close the cowl flaps so that the engine does not cool too rapidly.

2. Open throttle occasionally to clear out engine and keep warm.

   Prior to turning into the base leg in the landing approach:

3. Auxiliary Boost Pump "ON".

4. Extend the flaps to the desired position (Maximum flap speed is 80 MPH).

5. Set propeller control to 3000 RPM.

TAXI

1. Retract Flap.

2. Open cowl flaps.

3. Auxiliary Boost Pump "OFF".

STOPPING ENGINE

1. Pull mixture control full out to the idle cut-off position. (Approx. 1000 RPM).

2. After the engine stops, shut off the ignition switch and then the master and generator switch.

3. Leave fuel valve in the "ON" position.

4. If the aircraft is to be parked overnight, push the mixture control in 1/3.

D. GENERAL OPERATING INSTRUCTIONS AND LIMITATIONS

This airplane is licensed in the normal category and no aerobatic maneuvers, including spins, are approved.

PROPELLER LIMITATIONS. None.

Avoid high engine speed (2800 RPM or higher) in combination with low manifold pressure operation (under 15"). Avoid rapid closing or opening of the throttle (especially from a high RPM and manifold pressure condition).

STALLS AND SPINS. The leading edge slats and the restricted motion of the stabilator makes it impossible to fully stall the wing on the HT-295. As the minimum speed obtainable is approached with the yoke full back, a center section separation causes tail buffeting. A slight aileron nibble is also noticed as the minimum speed is approached. Minimum speed power-off with the flaps down is approximately 40 MPH IAS. This varies with load and C.G. condition. Voluntary spins are prohibited.

Although the airplane can be forced, under certain conditions, into auto-rotation which is technically a spin, this maneuver is not the same as the well known "tailspin" in that it cannot occur accidentally and contrary to the pilot's movement of the controls. No dive nor forward movement of the control wheel is required for recovery. Recovery is effected by the normal use of either the aileron or rudder control.

SPEED LIMITATIONS.

The Never-Exeed Speed (Vne) for the HT-295 is 200 MPH C. A. S. A red line appears on the airspeed instrument at this speed. MAXIMUM FLAP SPEED (Vf) IS 80 MPH C. A. S. The white range on the airspeed indicator indicates the flap range. Cruising range is marked on the airspeed indicator by a green arc, which extends to the maximum structural cruising speed, 160 MPH C.A.S. In very gusty and bumpy air, the speed should be reduced to 103 MPH C.A.S., Flaps Up. This speed is known as the "maneuvering" speed.

FUEL SYSTEM

The PS-5-BD carburetor should be operated at 9 to 15 psi in accordance with manufacturer's recommendations.

ENGINE OPERATION

Complete operating instructions covering the care and use of the Lycoming engine are provided with each airplane and should be used as a guide in selecting power settings. These instructions are in the form of the Lycoming Operator's Manual.

FUEL

Use fuel with 100/130 octane rating. 58.5 gallons usable with standard wing. (See page 26 for fuel system schematic.)

OIL

Engine Model:
GO-480-G1A6
Average Anbiant

Air Temperature For Starting	Straight Mineral Type	Multi-Grade, Additive Type	Oil Inlet Temperature Desired	Max.
Above 60°F	SAE 50	SAE 40 or 50	180°	235°F
30° to 90°F	SAE 40	SAE 40	180°	235°F
0° to 70°F	SAE 30	SAE 40	180°	235°F
Below 10°F	SAE 20	SAE 40	170°	210°F
		20W30	170°	210°F

ROTATING BEACON LIGHT

If beacon light is installed, this light should be turned off before entering overcast, as reflections from the rotating anti-collision light on clouds or dense haze can produce optical illusions and severe vertigo. This is particularly true at night.

PILOT'S CHECK LIST

STARTING ENGINE

1. Brakes - SET or HOLD
2. Throttle - CRACKED ABOUT 1/10
3. Propeller - FULL INCREASE
4. Mixture - IDLE CUT-OFF
5. Carburetor Heat - COLD
6. Cowl Flaps - OPEN
7. Fuel Valve - ON
8. Trim Tab Travel - CHECK
9. All Circuit Breakers - IN
10. Master Battery & Generator Switches - ON
11. Aux. Fuel Pump - ON
12. Prime - AS REQUIRED
13. Propeller - CLEAR
14. Ignition Switch - TURN TO EXTREME RIGHT AND PUSH
15. Ignition Switch - TO BOTH AFTER ENGINE STARTS
16. Mixture - RICH (Simultaneously with 15 above)
17. Oil Pressure - CHECK
18. Aux. Fuel Pump - OFF
19. Engine Warm-Up - 1000 to 1200 RPM
20. Fuel Quantity Gauge - CHECK

ENGINE RUN-UP

1. Tachometer - SET 1500 to 1700 RPM
2. Carburetor Heat - HOT THEN COLD
3. Ammeter - CHECK
4. Fuel and Oil Pressure - CHECK
5. Oil and Cylinder Head Temperature - CHECK
6. Vacuum Gauge - CHECK
7. Propeller - SET 2200 RPM AND EXERCISE SEVERAL TIMES (Should decrease to 1275 RPM ± 50 RPM)
8. Propeller - SET 2600 RPM AND CHECK BOTH MAGS (Maximum drop 175 RPM)
9. Power Check - 3400 RPM and 28" HG @ Sea Level

BEFORE TAKE-OFF

1. Flight Controls - FREE, FULL TRAVEL
2. Flight Instruments - SET
3. Engine Instruments - CHECKED
4. Trim Tab - SET
5. Wing Flaps - 20 to 30 DEGREES AS DESIRED
6. Propeller - FULL INCREASE RPM
7. Mixture - RICH
8. Carb. Air - COLD
9. Cowl Flaps - OPEN
10. Seat and Shoulder Straps - TIGHTEN
11. Aux. Fuel Pump - ON

TAKE-OFF

1. Throttle - FULL AND TIGHTEN FRICTION NUT
2. Power Reduction - AFTER LIFT OFF FULL THROTTLE AND REDUCE TO 3000 RPM-AIRSPEED 80 MPH MAXIMUM
3. Flaps - RAISE
4. Aux. Fuel Pump - OFF
5. Cylinder Head Temp. - CHECK (AIRSPEED - CLIMB 90 MPH)
6. Cruise Climb - FULL THROTTLE AND 2750 RPM

NOTE: NORMAL CRUISE

1. Throttle - 23" HG., M.P.
2. Propeller- 2600 RPM
3. Cowl Flaps - AS REQUIRED

BEFORE LANDING

1. Seat Belts - TIGHTEN
2. Carburetor Heat - COLD (EXCEPT IN ICING)
3. Mixture - RICH
4. Propeller - 3000 RPM
5. Aux. Fuel Pump - ON
6. Wing Flaps - AS DESIRED
7. Propeller - FULL INCREASE ON FINAL APPROACH

AFTER LANDING

1. Cowl Flaps - OPEN
2. Wing Flaps - UP
3. Aux. Fuel Pump - OFF
4. Electrical Switches - UNNECESSARY SWITCHES OFF

ENGINE SHUTDOWN

1. Cylinder Head Temp. - COOL (350°F or LESS)
2. Throttle - 1000 RPM
3. Propeller - FULL LOW PITCH
4. Mixture - IDLE CUT-OFF
5. All Switches - OFF

IMPORTANT NOTE: It is strongly recommended that all pilots become thoroughly familiar with the techniques outlined in the Owners Manual before operating this aircraft in full-flapped STOL slow-flight.

PILOT'S EMERGENCY CHECK LIST

ENGINE AND PROPELLER FAILURE OR FIRE* DURING TAKE-OFF

1. Abort if BEFORE Airborne

    a. Throttle - Closed
    b. Control Wheel - Back
    c. Wheel Brakes - Apply
    d. *Propeller - Full Decrease RPM
    e. *Mixture - Idle Cut-off
    f. *Fuel Selector Valve - Off
    g. *Ignition Switch and Master Switch - Off
    h. *Bring Aircraft to Stop and Investigate

2. Abort AFTER Becoming Airborne

    a. If below 50 feet - Hold Yoke Back

    b. If above 50 feet - Nose over and attempt to pick up approximately 65 MPH to facilitate a normal landing flare-out with flaps down. When flaps are Up - Glide at 80 MPH, for best glide distance. If time permits, lower flaps, glide at 65 MPH and make Normal Landing.

    c. Throttle - Closed
    d. Mixture - Idle Cut-Off

ENGINE FAILURE OR FIRE* DURING FLIGHT

1. Throttle - Closed
2. *Propeller - Full Decrease RPM (OUT)
3. Maximum Glide Distance Airspeed - Attain 80 MPH, IAS with flaps up. Use the excess in airspeed over 80 MPH to attain altitude, if desired.
4. *Mixture - Idle Cut-Off
5. *Fuel Selectors - Off
6. *Ignition Switch - Off
7. Radio Call - Accomplish
8. Flaps - As Required
9. Generator Switch - Off
10. Master Switch - Off

PROPELLER FAILURE IN FLIGHT

1. Propeller Overspeed

    a. Throttle - Retard
    b. Airspeed - Reduce
    c. Propeller - Attempt to decrease RPM with Propeller Control
    d. If propeller governor regains control, maintain 2500 RPM and 70 MPH, IAS and land at nearest airfield. If not, use an attitude, airspeed and power combination to attempt to keep the RPM below 3400. Land at nearest landing area.

2. Propeller Underspeeding

Use power enough to maintain altitude without engine overtorque and proceed to nearest airport. If this is not possible make emergency landing. Use excess altitude and power available to extend glide to best available area.

EMERGENCY MAXIMUM DESCENT

1. Throttle - Closed
2. Propeller - Full Increase RPM
3. Wing Flaps - Full Down
4. Airspeed - Maintain Maximum of 80 MPH, IAS, Flaps Full-Down

LANDING WITH FLAT TIRE

1. Make a minimum safe-speed touch-down.
2. When landing with a flat tire on the main gear, the aircraft will turn in the direction of the flat tire. Maintain directional control with the rudder and brakes.

LANDING ON UNPREPARAED TERRAIN

1. Landing procedure is similar to Minimum Run Landings (Full STOL)
2. On soft or rough ground, use caution in applying brakes.
3. If possible, avoid having to re-start and rev-up engine in loose sand or dirt to minimize propeller damage.

E. SUMMARY OF OPERATIONAL AIRSPEEDS AT GROSS WEIGHT - 3400 LBS.

*Minimum Speed - Power Off
Flaps Up: 60 MPH I.A.S.
Flaps Down: 50 MPH I.A.S.

Never Exceed Speed: 200 MPH I.A.S.
Maximum Flap Speed: 80 MPH I.A.S.

*Minimum speeds are given because it is not possible to fully stall the airplane.

F. TAKE-OFF, CRUISE AND LANDING TECHNIQUES

1. Take-Off

It is suggested that 30 degree flaps or less be used for all take-offs. This is covered in greater detail under STOL TAKE-OFF AND LANDING.

When taking off, first align the aircraft along the intended take-off track. Release brakes and apply power smoothly.

As aircraft accelerates apply slight back pressure on control wheel. When an airspeed of approximately 40 MPH has been reached the nose wheel will rotate and the aircraft will become airborne.

When airborne, release some back pressure and allow the airspeed to increase to 64 MPH. While continuing to climb at 64 MPH, reduce to 3000 RPM and mainain full throttle (5 minutes at take-off RPM of 3400 and full throttle is permited).

Flaps may remain at 30° and an airspeed of 64 MPH used for best rate of climb, or until clear or obstructions. When operating from a clear area with no obstructions, flaps may be raised, slowly to prevent level-off or settling, and allow the air-speed to increase to 90 MPH for best rate of climb. The RPM may be reduced again to 2750 and full throttle for climb-out to insure adequate engine cooling due to enriching features of the carburetor.

Check fuel pressure and turn off fuel boost-pump. Re-adjust cowl flaps as required. Maximum permissible cylinder head temperature is 475° for climb and 450° for cruise.

Most new pilots to the Courier tend to over rotate on take-off. Due to the high lift of the wing and the large area of the all-movable horizontal tail, it is possible to assume an excessive nose high attitude when making a short field take-off. However, the new pilot quickly learns from experience how soon the aircraft may be lifted off.

2. Cruise Flight

Throttle - Set (Approximately 23" HG)
Propeller - Set at 2600 RPM
Cowl Flaps - As Required
Carburetor Heat - As Required

The above cruise power setting is considered a good average setting for cross-country flights.

Cruise power settings can be determined from the appropriate engine power schedule charts found in the Lycoming Operators Manual.

NOTE

No Manual leaning of the mixture is permitted. The AMC (Automatic Mixture Control) compensates for altitude and temperature changes.

3. Power-Off and Power-On Landings

Since the Courier, in the 20 degree flap (half-flap) configuration, has conventional or normal landing characteristics, it is appropriate to start out on half-flap landings during the first hour of familiarization. Even though the Courier, with half-flaps, handles like other conventional aircraft, it still has out-standing short field characteristics.

For half-flap landings, an approach speed of 65 to 70 miles an hour is usually desirable when instructing a pilot new to the Courier. As the pilot's proficiency increases, approach speeds with half-flaps can be reduced to 60 MPH, though use of some power then becomes advisable. When approaching for landing at this speed, the pilot should be reminded that the slats will pop out just as he begins his flare-out and that they will have no effect upon the control-ability or balance of the aircraft. With half-flaps at 60 MPH, however, the aircraft has little "float" and should be flared or rotated out fairly-close to the ground so that it will not develop too much rate-of-sink before touching down.

For full-flap landings the best technique for slowing the aircraft down in the approach is first to extend the flaps to 20° starting at 80 MPH or less. Then, when aircraft has slowed to about 65 MPH in half-flap condition, the flaps can then be brought into full-down position and a landing made by touching down on the main gear first at minimum airspeed.

One approach to the full-flap landing is to have the pilot pop out the slats by slowing the aircraft down to 50 MPH while still several hundred feet in the air and then to compensate for the increased rate-of-sink by maintaining partial power until touchdown.

As we proceed to the full-flap landings, it is well to realize the fact that when the lift of any normal wing is doubled by the use of a flap, the drag is increased four-fold. This high drag at the full-flap position not only produces a very steep rate-of-descent but also means that the aircraft will have very litt"float" once the nose is raised for flare-out. Consequently, in a full-flap no power landing, the aircraft should be held in a nose-down glide until about ten feet from the ground,if the gliding speed is higher or lower, the altitude for beginning the flare-out can be higher or lower accordingly.

As an example, if the aircraft is brought in at the relatively comfortable gliding speed of 60 MPH power off and a flare out is begun at the customary approximate thirty-feet above the terrain, speed will be lost very rapidly and a high rate-of-sink could develop. The resulting impact could be quite hard. No. matter how high the pilot levels out, the automatic slats eliminate all risk of rolling off into an uncontrolled stall or spin, although high rates of descent can occur if insufficient power is used.

<u>The best technique for full-flap landings involves the maintenance of a little power-on</u>, just sufficient to offset the added drag of the flaps and to produce a relatively normal glide angle. This is done by maintaining approximately ten to fifteen inches manifold pressure, depending upon the load and air condition. The aircraft is then flared out and landed in a conventional manner, much the same as with half-flaps. The approach speed, however, is closer to 50 MPH than to 60 MPH.

When using the lower speed landing technique, the throttle should not be closed completely until wheels make contact with the ground, at which time the yoke should be held full back. An advantage of the partial power approach is ease of glide path control by slight increases or reductions in the amount of power.

The full-flap no-power landing, while not difficult, is usually desirable only as an emergency procedure. Instruction in this type of landing is necessary. In order to make smooth landings, it involves a different technique with which Courier pilots should be familiar. For full-flap, no-power landings, it is advisable that the pilot keep the approach speed at 60 to 65 MPH, but not below 60 MPH. Maintain approach speed of 60 to 65 MPH until the aircraft is just off the runway. With power-off, the flare out should not be started until within 10 to 15 feet off the ground so that the nose barely comes up to the full landing position just as the aircraft sinks down to ground level.

There is no "float" to this type of full-flap, no-power landing, which is a safety feature for emergency or forced landings. Consequently, a slightly high flare-out will quickly result in a relatively high rate of descent, i.e., a hard landing! Use of full-flaps without power is normally done only in emergency landings, Normal STOL approaches with full-flaps are best accomplished with partial power so as to maintain essentially the same flight-path angle at about 55 MPH as results from 70 MPH at half-flaps and no power. The throttle then becomes the approach control device.

4. STOL Take-Off and Landings

The shortest ground run take-off under standard conditions at 3000 lbs, or less can usually be accomplished with full-flaps, i.e. 40°. (This will not, however, provide the best angle of climb if barrier clearance is the objective.) The use of 30° or less, depending on load and pressure altitude, is recommended for take-off.

Align aircraft along intended take-off track. Apply full power in a steady manner. Do not "jam" throttle forward. Release brake as power is applied. Holding brakes on while full power is being applied is not necessary, or desirable. Keep aircraft straight on track by using rudder. Try to avoid application of the foot brakes unless required to maintain directional control.

At approximately 35 MPH, apply back pressure on the yoke in a positive manner but not so fast that the aircraft assumes an excessive nose high attitude after lift-off. When the aircraft breaks ground, allow it to remain just above the ground for approximately 2 or 3 seconds, so that the airspeed will build up to over 50 MPH before the airplane starts full-climb-out. Establish a climb-out speed of 50 to 64 MPH as soon as practical.

Experience gained in this type of take-off will enable the pilot to determine tha amount of yoke movement and/or rapidity of action necessary to get the aircraft airborne with the minimum of ground run. This type of minimum run take-off is most useful when the ground is rough, bumpy, muddy or where very low obstacles, such as hedges, fences, ditches, etc. are present.

a. Muddy Terrain Take-Off

The Helio Courier is an unusually good "mudder". A moderately muddy field usually presents no problem. At normal pressure altitude and with loads of 3000 lbs., or less, full-flaps are usually more advantageous in breaking free from clinging mud. The following procedure is recommended: Apply full power. (Do not hold power-on so long as to overheat the engine if the aircraft fails to move.) Hold yoke full back then rock yoke abruptly, using full, but not prolonged, forward position, to help break the wheels free. When the aircraft begins to move, the oscillating movements of the stabilator should be reduced so that there is equal "floatation" on all three wheels as the aircraft moves forward. Then, when rolling free, use essentially the same technique for the minimum run take-off. Since the consistency and effect of different types and depths of mud vary greatly, no single rule or technique can substitute for experience and judgment on soft and irregular field surfaces.

b. Muddy Landing

A muddy landing or deep snow landing can usually best be made by using full-flaps and placing the aircraft onto the ground in a slight nose-high position at minimum speed. Actually touching the main wheels first may be advantageous, but the nose should not be allowed to slam down into the mud. After the nose-wheel touch-down take all power off and hold yoke fully back. If forward speed is thus held low on the touchdown, it will tend to prevent nose-over. (This procedure is essentially the same as that commonly recommended for ditching in water.)

c. Minimum Ground Run Take-Off Over Barrier (Gross Weight 3000# or Less)

Rough ground or other conditions may be a determining factor where, in spite of a barrier, the full-flap minimum ground run take-off may be necessary.

It should be re-emphasized here that even when trying to climb out of a small area at too low a speed with the Helio Courier, there is no danger of stalling, losing lateral control, or going into a spin. However, a condition can develop, especially with full-flaps down, whereby the nose is held too high and the speed too low after take-off, so that the aircraft will actually lose altitude with power full on.

IMPORTANT WARNING

The most common cause of Helio crashes and major damage -- though never with serious injury to occupants -- has been from efforts to pull the aircraft off the ground prematurely at too low a speed and/or concurrently to try to climb out with too low an airspeed with flaps down so that the resulting high-drag exceeds the reduced thrust of the propeller at low forward speeds. Thus, with power full-on, the aircraft may either sink back to the ground or fail to clear otherwise easily-surmountable obstacles.

It takes considerable experience to recognize the point at which the nose high attitude starts to reduce the rate-of-climb and then may finally progress to an actual rate-of-sink despite full power. This condition is often referred to as "the back side" of the thrust drag curve, or simply as "the back side of the power curve". Consequently, a "zoom" after take-off in order to clear a close barrier should be strictly an emergency procedure for experienced Helio pilots. Climb-out speeds below 50 MPH are not recommended.

d. Shortest Distance Take-Off Over Barrier (Gross Weight 3000# or Higher)

With 30 degree flaps allow the aircraft to accelerate as quickly as possible to 40 MPH. With the airspeed indicating at least 40 MPH, fly the aircraft off by applying the appropriate back pressure on the elevator until it is airborne. Permit the airspeed to build up for approximately two seconds to about 50 MPH, then begin rotation to the point that will climb the aircraft over the barrier without further build up of airspeed.

After considerable experience, even shorter barrier distance can be attained by holding the aircraft to about 50 MPH on a smooth runway and then "zooming" over the barrier at an angle sufficiently steep to clear the barrier without loss of airspeed after which the nose can be lowered and the normal rate-of-climb airspeed attained. Great skill is necessary, however, to avoid loss of speed and consequent momentary sinking either just before or just after crossing the barrier. Such technique is not recommended for other than emergency situations.

e. <u>Shortest Landing Over a Barrier</u>

With wing flaps full-down, cowl flaps open (this produces a little more drag wich is also helpful), and propeller set at 3000 RPM, maintain a constant airspeed of 50 MPH with variation in throttle setting to alter the flight path. Such procedure will provide an optimum balance between ease of control and minimum landing distance. For absolute minimum distances over the barrier, the more experienced pilot can, in effect, reverse the speed variations used for clearing the barrier for take-off. That is, by judicious use of power, he can bring the aircraft over the barrier at speeds as low as 40 to 45 MPH (this is the extreme limit, however, requires high skill, and is <u>not</u> recommended except in emergencies).

<u>CAUTION</u>

> Many hours of step-by-step practice to attain short field proficiency is therefore essential in advance of any effort to employ maximum techniques.

For this more advance landing technique, it is at the point of nose-over, after passing the barrier, that the pilot must determin whether to maintain the same power or to diminish power and then re-apply power at the second rotating point to avoid a hard landing. Generally, most of the originally selected barrier crossing power remains on, and, at the final round-out point, even more power may have to be applied to check the high rate-of-descent.

It is advisable, as soon as the aircraft touches down, to pull all power off immediately and to apply brakes accordingly. The brakes should be applied evenly - increasing to maximum braking but stopping short of the point where brake "chatter" occurs. If "chatter" occurs, ease up on the brakes and then immediately re-apply smoothly.

f. <u>Helpful Hints on Over-a-Barrier Landing</u>

(1) The most advisable technique is simply to maintain the recommended 50 to 55 MPH approach speed with full flaps throughout the entire sequence up to the point of touch-down. Variations in throttle setting are then used to steepen or flatten the glide angle as needed.

(2)In that most advisable technique, the aircraft approach pattern is set up as to avoid any intentional deviation from a straight line approach over the barrier. Necessary corrections for turbulence or for errors in initial judgement are then accomplished through changes in the rate-of-descent by power adjustments. The attitude of the aircraft remains more or less the same throughout the entire approach. The one and only rotation is the less abrupt round-out just prior to touch-down.

(3)It is very important - as well as easy - for the STOL pilot to develop a sensory awareness of high rates-of-sink. In the importance of this awareness, STOL techniques differ somewhat from the customary techniques with conventional aircraft. A normal, though not good, reaction with an aircraft, when it appears to be sinking a bit fast, is to raise the nose accordingly. With the STOL-type aircraft, however, when the flaps are set at or over 20 degrees and when the airspeeds are below the conventional aircraft minimums, any raising of the nose without compensating power will result in the aircraft sinking rapidly.

A conventional aircraft in that condition might then simply stall out and crash. The Helio so abused will not stall out, but if the pilot fails to recognize this condition soon enough, the aircraft will then necessitate using a substantial amount of power to arrest the rate-of-sink, otherwise, the aircraft will touch down sooner and harder than intended.

The STOL landing is essentially "throttle flying". The pilot must become "throttle-conscious". The pilot's hand should always be on the throttle during the STOL final approach and landing. The key to easy positively controlled landings with the Courier then becomes simple, even for inexperienced pilots. It lies entirely in the use of small variations in amounts of power during the approach and an awareness of the importance of the throttle to control glide-path, flare-out, and touch-down. There is nothing difficult about STOL techniques that any pilot, with proper indoctrination and instruction, cannot reasonably expect to master in a few hours.

Until STOL techniques are mastered, the use of half-flaps and conventional approach permits the easiest possible flying with least dependence on piloting skill. After STOL techniques have been mastered, short-field operations that are tough or impossible for conventional aircraft can be easily accomplished as a matter of routine with the Helio Courier.

5. Cross-Wind Take-Off and Landing Techniques

A. Cross-Wind Take-Off

The Helio Courier HT-295 is very much like other conventional aircraft in cross-wind operations. During take-offs, greater attention to directional control is required when the cross-wind is from the left. A left cross-wind amplifies the "P" factor of the propeller, and the tendency of the aircraft to weather vane into the wind.

The short take-off ground run can be used many times to eliminate some of the cross-wind component. When possible, the take-off path may be at a slight diagonal across an existing run-way. Line up the aircraft on the down wind side of the runway or take-off area facing as closely as possible, into the wind. By doing this, it is possible to decrease the cross-wind component by 10° to 15°, and still have sufficient runway for take-off. The maximum cross-wind component demonstrated is 17 knots at 90°, so many times 10° to 15° will make a difference. The aircraft should be held on the ground a little longer than normal on take-off. This increase in airspeed will insure a positive lift-off without the danger of contacting the ground again in a side drift due to the cross-wind. The side load imposed by drift produces unwanted strain on the landing gear, wheels, and tires.

B. Cross-Wind Landing

When landing in a cross-wind, either crab or slip for existing wind conditions as you would with any conventional aircraft on the approach. Just prior to touch down, align the nose straight with the flight path, or touch down on the up-wind wheel first depending on the method used. Land the aircraft without delay. When the wheels touch down, or slightly before, reduce power completely and retract flaps as soon as possible. Apply both brakes evenly and slow aircraft down to taxi speed. As with any aircraft, extra caution should be used when taxiing in gusty wind conditions.

Fuel System

The fuel system consists of the two fuel bladder cells, one located in each wing panel, one fuel shut-off valve, a fuel selector valve, one gascolator located under the right hand window, an engine driven fuel pump, one electrically driven booster pump and a hand operated engine primer. The fuel quantity transmitters are of the float type and they are located on the inboard wing ribs. Each cell is filled through a filler neck which extends above the wing panel. The fuel cells are of the collapsible type. The system is suitable for aeromatic fuels.

The main fuel valve is located on the right side of the cockpit, below the forward window. There are only 2 positions, "ON and "OFF". When "ON", the valve handle is horizontal. This valve controls the fuel flow from both wing tanks, which are interconnected.

The fuel filter is accessible for inspection and drainage from the outside of the plane through a small door located below the right forward window. A needle valve beside the filter can be used to shut off the fuel from the tanks when the filter is to removed for cleaning. This valve should be safetied.

A cross-over line is used to give both tanks a common vent, located on top of the fuselage.

Usable fuel capacity is 58.5 gallons.

The zero reading of the fuel indicators is calibrated for zero usuable fuel. Although there is 2.5 gallons left in the system at zero indicator reading, it cannot be safely used in all attitudes of flight. See page 26 for fuel system schematic.

Electrical System

A twelve volt battery and an engine driven alternator supply electrical power for the single wire electrical system. On the 1700 series aircraft the battery is located on the left side of the engine accessory section. Power from the alternator is fed to the electrical system through a voltage regulator which is limited to 50 amperes.

The master switch must be in the "ON" position before operation of the electrical system is possible.

CAUTION

> When using an auxiliary power unit the "Master Switch" should be in the "OFF" position.

Circuit breakers are installed to protect electrical components.

It is very important that the battery be properly filled at all times. Inspection of the liquid level in the battery should be made at approximately every 20 hours. The acid solution should be up to, never over, the baffle plate, (protective sheet over plate) or not more than ¼ inch above the separators. The use of an aircraft type of battery hydrometer will automatically fill to the proper height.

Starter

The starter switch is incorporated in the ignition switch. When in the start position, the right mag is grounded automatically.

NOTE

> The starter circuit is inoperative when the control wheel is held full forward by hand, or by the control lock pin. The control lock pin must be removed before the engine can be started. The magnetos are not involved in anyway.

Heating and Ventilating System

Hot or cold air enters the cabin through stainless steel valves mounted on the forward side of the firewall. Temperature regulation is obtained by use of the control knob on the instrument panel.

Hot air is obtained by passing cold outside air around one of the exhaust stacks equipped with a muff. The exhaust stack muff must be inspected every 25 hours.

If defroster is installed, hot air may be deflected from the cabin heat vent to windshield by pulling out both heat and defrost knobs. The 1700 series aircraft offers the additional ability of hot or cold or a mixture of hot and cold air knobs to adjust the temperature desired.

Brake System

See page 25 for diagram of brake system installation - Dual. Each rudder pedal on the pilot's side is equipped with a toe brake. The brakes are hydraulic,each pedal actuating a hydraulic piston.

The parking brake handle locks hydraulic pressure in the master cylinders. Acutating the parking brake control locks the fluid between the brake and the master cylinder. This system utilizes a reservoir located forward of the pilot rudder pedals and secured to the aft side of the firewall.

The brake fluid to be use is MIL-H-5606.

Engine Control System

Controls are provided for the throttle, mixture control, cowl flaps and carburetor heat. All are disigned so that they are pushed forward for takeoff conditions, except the cowl flaps, which must be pulled to open.

Landing Gear

Tire Pressures:	Nose-Tire - 600 x 6 - 42 psi
	Main Tires- 800 x 6 - 35 psi

Pitot Static System

On the 1700 series aircraft, the pressure and static ports are located in the left wing boom. An auxiliary static source valve is available as optional equipment, and when installed is located overhead to the left of the pilot.

NOTE
A heated pitot head is available as extra equipment.

MISCELLANEOUS PROVISIONS

A. AIRPLANE TIE DOWN

One tie down ring is provided on each wing panel. The aft end of the fuselage should be secured by the tie down ring provided.

Use at least a 5/8 inch manila rope.

If the control lock is used on the control wheel, be sure that it is conspicuous to the pilot on his ground check.

Flaps should be in the full up position.

B. PARKING

The parking brake control is operated in conjunction with the toe brakes. To operate, press the toe brakes to the desired pressure, then pull out the parking brake control located ON THE INSTRUMENT PANEL. Release toe brakes.

To release the parking brake, depress toe brakes and hold until pushing the parking brake control all the way in.

NOTE

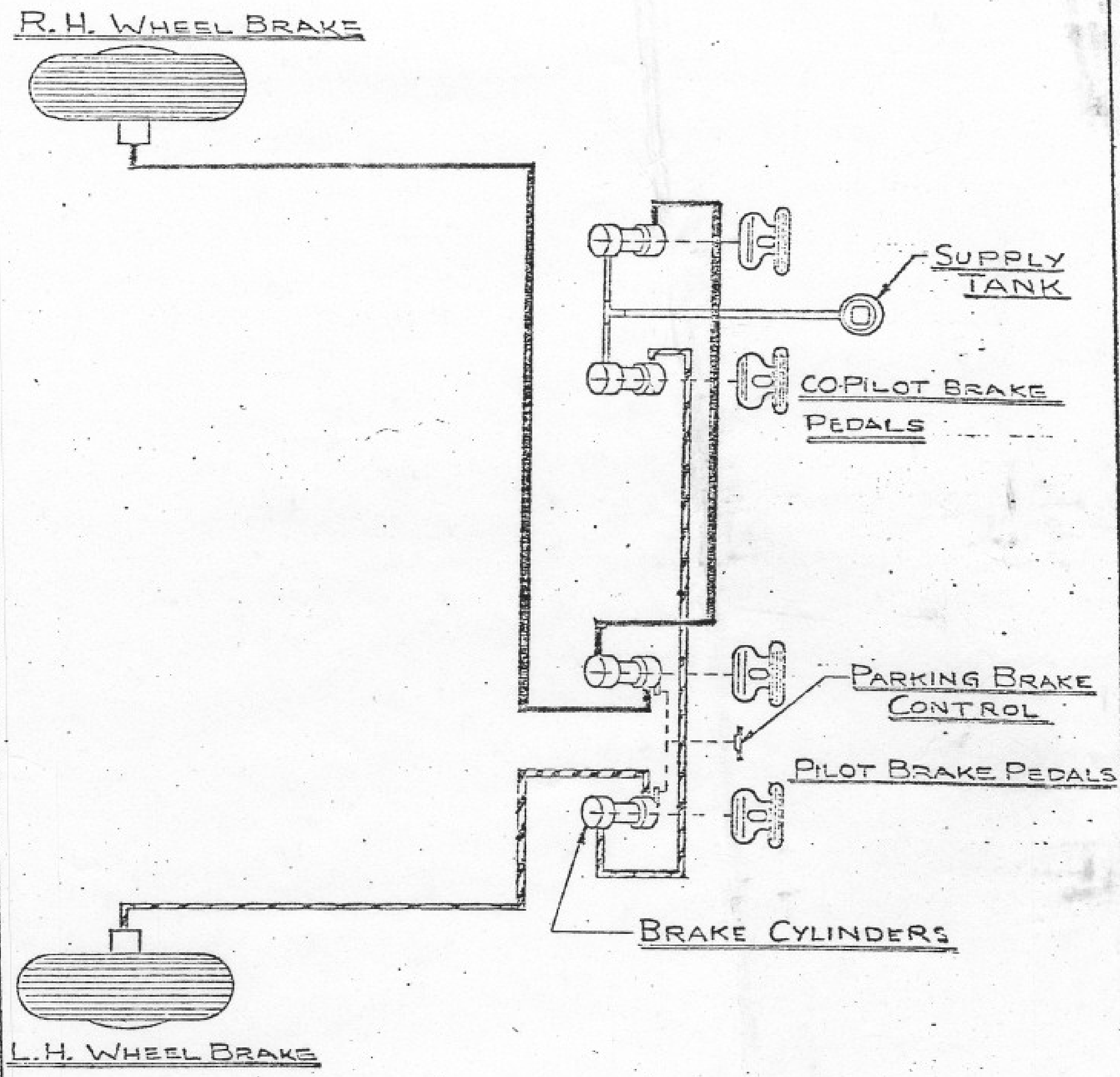
> Avoid heavy pulling forces on parking brake handle; the cable merely actuates a small lock, a mechanical mechanism, on the master brake cylinder.

C. TOWING

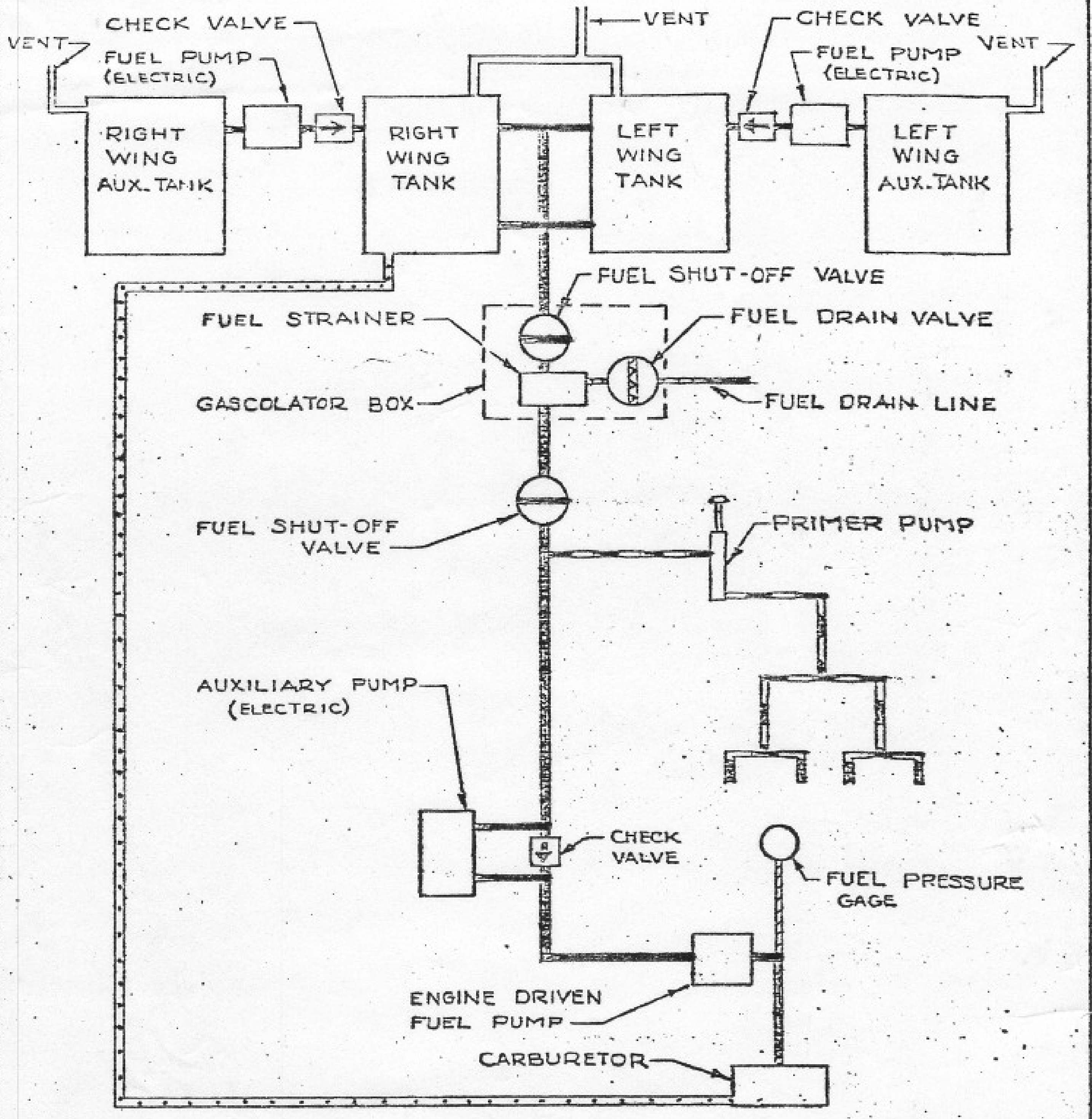
The airplane may be towed with the control wheel lock pin installed. A tow-bar that attaches to the nose wheel strut should be used.

CAUTION:

> When towing, do not exceed the turning limits of the nose gear.



DUAL BRAKE SCHEMATIC



LEGEND

- FUEL SUPPLY LINES
- PRIMER LINES
- VENT LINES
- PRESSURE LINES
- DRAIN LINES
- FUEL RETURN LINES

FUEL SYSTEM SCHEMATIC