LANCE II

PILOT'S INFORMATION MANUAL

Lance II

PA-32RT-300

HANDBOOK PART NO. 761 637

PIPER

APPLICABILITY

The aircraft serial number eligibility bracket for application of this handbook is 32R-7885001 through 32R-7985105. The specific application of this handbook is limited to the Piper PA-32RT-300 model airplane designated by serial number and registration number on the face of the title page of this handbook.

This handbook cannot be used for operational purposes unless kept in a current status.

REVISIONS

The information compiled in the Pilot's Operating Handbook will be kept current by revisions distributed to the airplane owners.

Revision material will consist of information necessary to update the text of the present handbook and/or to add information to cover added airplane equipment.

I. Revisions

Revisions will be distributed whenever necessary as complete page replacements or additions and shall be inserted into the handbook in accordance with the instructions given below:

1. Revision pages will replace only pages with the same page number.
2. Insert all additional pages in proper numerical order within each section.
3. Page numbers followed by a small letter shall be inserted in direct sequence with the same common numbered page.

II. Identification of Revised Material

Revised text and illustrations shall be indicated by a black vertical line along the outside margin of the page, opposite revised, added or deleted material. A line along the outside margin of the page opposite the page number will indicate that an entire page was added.

Black lines will indicate only current revisions with changes and additions to or deletions of existing text and illustrations. Changes in capitalization, spelling, punctuation or the physical location of material on a page will not be identified.

ORIGINAL PAGES ISSUED

The original pages issued for this handbook prior to revision are given below:

Title, ii through v, 1-1 through 1-12, 2-1 through 2-9, 3-1 through 3-11, 4-1 through 4-17, 5-1 through 5-30, 6-1 through 6-40, 7-1 through 7-26, 8-1 through 8-13, 9-1 through 9-19 and 10-1 through 10-2.

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS

Current Revisions to the PA-32RT-300 Lance II Pilot's Operating Handbook, REPORT: VB-890 issued January 18, 1978.

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 1 - 761 637 (PR780327)	4-15	Corrected item 4.29.	
	5-4	Corrected item 5.5 (b) (5).	
	5-10	Revised Figure 5-3, Stall Speed vs Angle of Bank.	
	5-13	Revised Figure 5-9, Flaps Up Takeoff Performance.	
	5-27	Revised Figure 5-33, Landing Performance.	
	5-29	Revised Figure 5-37, Landing Performance (Heavy Duty Group).	
	6-3	Revised Figure 6-3, Leveling Diagram Items A and B.	
	6-12	Added moment change information to Figure 6-15, CG Range and Weight.	
	6-15	Revised para.; revised item (3) Weight and Moment; revised item (5) Hartzell number.	
	6-16	Revised item (13), Weight and Moment.	
	6-17	Revised item (31), Weight and Moment.	
	6-22	Revised item (121 c (a)), Weight and Moment.	
	6-28	Revised item (195), Piper Dwg. number; revised item 197, Airborne P/N.	
	6-33	Revised item 257.	
	7-16	Revised Figure 7-19.	
	9-9	Revised Section 3 Emergency Procedures, item (a) (2) was removed and item (e) was added; relocated item to pg. 9-10.	
	9-10	Added item from 9-9; revised item (1) (a); relocated items (2) and (3) to 9-11.	
	9-11	Added items (2) and (3), revised (2) (a) and (3) (a).	
	9-13	Revised item (d), added item (a) (1) from pg. 9-14.	
	9-14	Relocated item (a) (1) to 9-13, added item (b) (5); added new item (b) under Emergency Operation; changed old item (b) to (c) and revised; changed old item (c) to (d) and revised.	
	9-15	Added new item, revised paragraph under General.	Ward Evans Ward Evans March 27, 1978
	9-16	Revised (c) (3); revised (d) (3).	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 2 - 761 637 (PR780907)	1-1, 1-6	Revised spelling.	
	1-10	Revised ft.-lb and kg conversions.	
	1-11	Revised spelling.	
	2-9	Added writing table placard.	
	5-14	Revised Figure 5-11, example	
	6-1	Revised para. 6.1 info.	
	6-29	Added items 217 and 219.	
	6-30	Revised items 221 and 223.	
	6-32	Revised items 243 and 245; relocated items to pg. 6-33.	
	6-33	Added items from pg. 6-32; added items 248, 249 and 254; revised item nos.; relocated item to pg. 6-34.	
	6-34	Added item from pg. 6-33.	
	6-40	Added item 380.	
	7-15	Revised para. 7.17 info.	
	7-21, 7-22	Added work table description.	
	9-i	Added Supplements 6 and 7.	
	9-20	Added pg. (Int. left blank)	
	9-21 thru 9-30	Added pgs. (Added Supplement 6, KFC 200 AFCS with F/D.)	Ward Evans Ward Evans Sept. 7, 1978
	9-31 thru 9-40	Added pgs. (Added Supplement 7, KFC 200 AFCS without F/D.)	
Rev. 3 - 761 637 (PR781215)	3-4	Revised Spin Recovery info.	
	5-1	Revised para. 5.1, General.	
	6-16	Revised item 19.	
	6-19	Revised item 79.	
	6-21	Revised item 107; added item 111c.	
	6-27	Revised items 185c. and 187b.	
	6-28	Revised item 193.	
	6-30	Added item 230.	
	6-35	Revised item 293b.	
	6-36	Revised item 311a.; added item 314.	
	7-i	Added para. 7.41, Radar.	
	7-3	Revised para. 7.9 info.	
	7-18	Revised item 11. nomenclature.	
	7-24	Revised para. 7.35 info.	
	7-27	Added pg. (Added para. 7.41, Radar.)	Ward Evans Ward Evans Dec. 15, 1978
	8-8	Revised para. 8.15 info.	
	9-11	Revised item (d)(2)b.	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 4 - 761 637 (PR790131)	6-18	Revised items 55 and 63.	Ward Evans Ward Evans Jan. 31, 1979
	7-12	Revised para. 7.15 info.	
	7-18	Revised item 31.	
Rev. 5 - 761 637 (PR790413)	6-36	Revised item 313; added new item 315; renumbered existing item 314 to 317.	
	7-25, 7-26	Revised para. 7.39.	Ward Evans Ward Evans April 13, 1979
	7-27	Added para. 7.39 info.	
Rev. 6 - 761 637 (PR810422)	ii	Revised Warning.	
	iii	Added serial no. effectivities.	
	2-1	Revised para. 2.1 info.	
	3-1	Revised para. 3.1 info.	
	4-1	Revised para. 4.1 info.	
	4-5	Revised take-off procedure.	
	6-1	Revised para. 6.1 info.	
	6-2	Added Caution notice to para. 6.3 (a) (3).	
	6-16	Revised item 19.	
	6-26	Added item 180.	
	6-36, 6-37	Corrected numbering of existing items 314, 315, 316.	
	7-10	Removed sentence para. 7.15 step 2.	
	7-15	Revised and upgraded Note to Warning.	
	7-25	Revised para. 7.39 info.	
	9-29	Revised sec. 4 (j).	
	9-32	Revised sec. 3 (b).	Ward Evans Ward Evans April 22, 1981
	9-38	Revised sec. 4 (j).	

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GENERAL

SECTION 1

GENERAL

1.1 INTRODUCTION

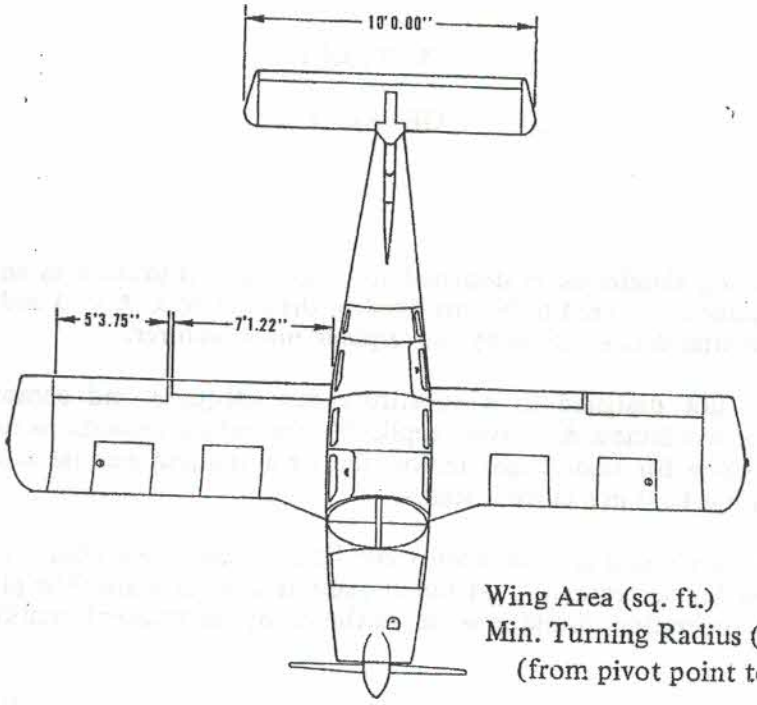
This Pilot's Operating Handbook is designed for maximum utilization as an operating guide for the pilot. It includes the material required to be furnished to the pilot by C.A.R. 3 and FAR Part 21 Subpart J. It also contains supplemental data supplied by the airplane manufacturer.

This handbook is not designed as a substitute for adequate and competent flight instruction, knowledge of current airworthiness directives, applicable federal air regulations or advisory circulars. It is not intended to be a guide for basic flight instruction or a training manual and should not be used for operational purposes unless kept in a current status.

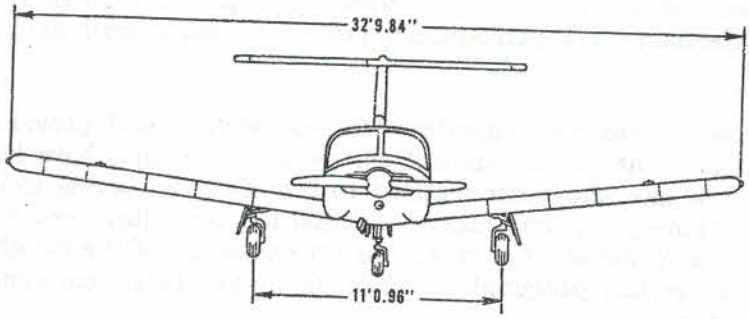
Assurance that the airplane is in an airworthy condition is the responsibility of the owner. The pilot in command is responsible for determining that the airplane is safe for flight. The pilot is also responsible for remaining within the operating limitations as outlined by instrument markings, placards, and this handbook.

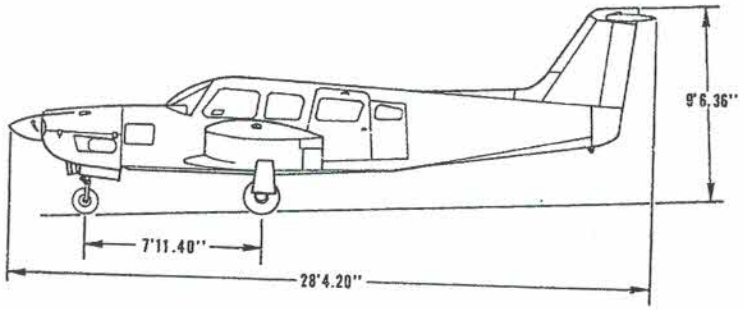
Although the arrangement of this handbook is intended to increase its in-flight capabilities, it should not be used solely as an occasional operating reference. The pilot should study the entire handbook to familiarize himself with the limitations, performance, procedures and operational handling characteristics of the airplane before flight.

The handbook has been divided into numbered (arabic) sections each provided with a "finger-tip" tab divider for quick reference. The limitations and emergency procedures have been placed ahead of the normal procedures, performance and other sections to provide easier access to information that may be required in flight. The "Emergency Procedures" Section has been furnished with a red tab divider to present an instant reference to the section. Provisions for expansion of the handbook have been made by the deliberate omission of certain paragraph numbers, figure numbers, item numbers and pages noted as being intentionally left blank.



Wing Area (sq. ft.)	174.5
Min. Turning Radius (ft.) (from pivot point to wingtip)	37.75





THREE VIEW

Figure 1-1

1.3 ENGINE

(a) Number of Engines	1
(b) Engine Manufacturer	Lycoming
(c) Engine Model Number	IO-540-K1G5D
(d) Rated Horsepower	300
(e) Rated Speed (rpm)	2700
(f) Bore (inches)	5.125
(g) Stroke (inches)	4.375
(h) Displacement (cubic inches)	541.5
(i) Compression Ratio	8.7:1
(j) Engine Type	Six Cylinder, Direct Drive, Horizontally Opposed, Air Cooled

1.5 PROPELLER

(a) Number of Propellers	1
(b) Propeller Manufacturer	Hartzell
(c) Blade Model	F8475D-4
(d) Number of Blades	2
(e) Hub Model	HC-C2YK-1( )F
(f) Propeller Diameter (inches)	
(1) Maximum	80
(2) Minimum	78.5
(g) Propeller Type	Constant Speed, Hydraulically Actuated

1.7 FUEL

(a) Fuel Capacity (U.S. gal.) (total)	98
(b) Usable Fuel (U.S. gal.) (total)	94
(c) Fuel Grade, Aviation	
(1) Minimum Octane	100/130 - Green
(2) Specified Octane	100/130 - Green
(3) Alternate Fuels	Refer to latest revision of Lycoming Service Instruction 1070.

1.9 OIL

(a) Oil Capacity (U.S. quarts)	12
(b) Oil Specification	Refer to latest issue of Lycoming Service Instruction 1014.

(c) Oil Viscosity per Average Ambient Temp. for Starting

	SINGLE	MULTI
(1) Above 60°F	50	40 or 50
(2) 30°F to 90°F	40	40
(3) 0°F to 70°F	30	40 or 20W-30
(4) Below 10°F	20	20W-30

1.11 MAXIMUM WEIGHTS

(a) Maximum Takeoff Weight (lbs.)		3600
(b) Maximum Landing Weight (lbs.)		3600
(c) Maximum Weights in Baggage Compartments	FORWARD	AFT
	100	100

1.13 STANDARD AIRPLANE WEIGHTS*

(a) Standard Empty Weight (lbs.): Weight of a standard airplane including unusable fuel, full operating fluids and full oil.	2003
(b) Maximum Useful Load (lbs.) : The difference between the Maximum Takeoff Weight and the Standard Empty Weight.	1597

1.15 BAGGAGE SPACE

	FORWARD	AFT
(a) Compartment Volume (cubic feet)	7.0	17.3
(b) Entry Width (inches)	16.0	48.0
(c) Entry Height (inches)	22.0	26.0

1.17 SPECIFIC LOADING

(a) Wing Loading (lbs. per sq. ft.)	20.6
(b) Power Loading (lbs. per hp)	12.0

*These values are approximate and vary from one aircraft to another. Refer to Figure 6-5 for the Standard Empty Weight value and the Useful Load value to be used C.G. calculations for the aircraft specified.

1.19 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

The following definitions are of symbols, abbreviations and terminology used throughout the handbook and those which may be of added operational significance to the pilot.

(a) General Airspeed Terminology and Symbols

CAS	Calibrated Airspeed means the indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KCAS	Calibrated Airspeed expressed in "Knots."
GS	Ground Speed is the speed of an airplane relative to the ground.
IAS	Indicated Airspeed is the speed of an aircraft as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.
KIAS	Indicated Airspeed expressed in "Knots."
M	Mach Number is the ratio of true airspeed to the speed of sound.
TAS	True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature and compressibility.
V_A	Maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.
V_{FE}	Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
V_{LE}	Maximum Landing Gear Extended Speed is the maximum speed at which an aircraft can be safely flown with the landing gear extended.
V_{LO}	Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.
V_{NE}/M_{NE}	Never Exceed Speed or Mach Number is the speed limit that may not be exceeded at any time.
V_{NO}	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.
V_S	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.

V_{SO}	Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.
V_X	Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

(b) Meteorological Terminology

ISA	International Standard Atmosphere in which: The air is a dry perfect gas; The temperature at sea level is 15° Celsius (59° Fahrenheit); The pressure at sea level is 29.92 inches Hg (1013 mb); The temperature gradient from sea level to the altitude at which the temperature is -56.5° C (-69.7°F) is -0.00198°C (-0.003566°F) per foot and zero above that altitude.
OAT	Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.
Indicated Pressure Altitude	The number actually read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013 millibars).
Pressure Altitude	Altitude measured from standard sea-level pressure (29.92 in. Hg) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero.
Station Pressure	Actual atmospheric pressure at field elevation.
Wind	The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

(c) Power Terminology

Takeoff Power	Maximum power permissible for takeoff.
Maximum Continuous Power	Maximum power permissible continuously during flight.
Maximum Climb Power	Maximum power permissible during climb.
Maximum Cruise Power	Maximum power permissible during cruise.

(d) Engine Instruments

EGT Gauge	Exhaust Gas Temperature Gauge

(e) Airplane Performance and Flight Planning Terminology

Climb Gradient	The demonstrated ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval.
Demonstrated Crosswind Velocity	The demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests.
Accelerate-Stop Distance	The distance required to accelerate an airplane to a specified speed and, assuming failure of an engine at the instant that speed is attained, to bring the airplane to a stop.
MEA	Minimum en route IFR altitude.
Route Segment	A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.

(f) Weight and Balance Terminology

Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Moment	The product of the weight of an item multiplied by its arm. (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
Center of Gravity (C.G.)	The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.
Usable Fuel	Fuel available for flight planning.
Unusable Fuel	Fuel remaining after a runout test has been completed in accordance with governmental regulations.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.
Basic Empty Weight	Standard empty weight plus optional equipment.
Payload	Weight of occupants, cargo and baggage.
Useful Load	Difference between takeoff weight, or ramp weight if applicable, and basic empty weight.
Maximum Ramp Weight	Maximum weight approved for ground maneuver. (It includes weight of start, taxi and run up fuel.)
Maximum Takeoff Weight	Maximum weight approved for the start of the takeoff run.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.

1.21 CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
acres	0.4047	ha
	43560	sq. ft.
	0.0015625	sq. mi.
atmospheres (atm)	76	cm Hg
	29.92	in. Hg
	1.0133	bar
	1.033	kg/cm^2
	14.70	lb./sq. in.
	2116	lb./sq. ft.
bars (bar)	0.98692	atm.
	14.503768	lb./sq. in.
British Thermal Unit (BTU)	0.2519958	kg-cal
centimeters (cm)	0.3937	in.
	0.032808	ft.
centimeters of mercury at 0°C (cm Hg)	0.01316	atm
	0.3937	in. Hg
	0.1934	lb./sq. in.
	27.85	lb./sq. ft.
	135.95	kg/m^2
centimeters per second (cm/sec.)	0.032808	ft./sec.
	1.9685	ft./min.
	0.02237	mph
cubic centimeters (cm^3)	0.03381	fl. oz.
	0.06102	cu. in.
	3.531×10^{-5}	cu. ft.
	0.001	l
	2.642×10^{-4}	U.S. gal.
cubic feet (cu.ft.)	28317	cm^3
	0.028317	m^3
	1728	cu. in.
	0.037037	cu. yd.
	7.481	U.S. gal.
	28.32	l
cubic feet per minute (cu. ft./min.)	0.472	l/sec.
	0.028317	m^3/min.

MULTIPLY	BY	TO OBTAIN
cubic inches (cu. in.)	16.39	cm^3
	1.639×10^{-5}	m^3
	5.787×10^{-4}	cu. ft.
	0.5541	fl. oz.
	0.01639	l
	4.329×10^{-3}	U.S. gal.
	0.01732	U.S. qt.
cubic meters (m^3)	61024	cu. in.
	1.308	cu. yd.
	35.3147	cu. ft.
	264.2	U.S. gal.
cubic meters per minute (m^3/min.)	35.3147	cu. ft./min.
cubic yards (cu. yd.)	27	cu. ft.
	0.7646	m^3
	202	U.S. gal.
degrees (arc)	0.01745	radians
degrees per second (deg./sec.)	0.01745	radians/sec.
drams, fluid (dr. fl.)	0.125	fl. oz.
drams, avdp. (dr. avdp.)	0.0625	oz. avdp.
feet (ft.)	30.48	cm
	0.3048	m
	12	in.
	0.33333	yd.
	0.0606061	rod
	1.894×10^{-4}	mi.
	1.645×10^{-4}	NM
feet per minute (ft./min.)	0.01136	mph
	0.01829	km/hr.
	0.508	cm/sec.
	0.00508	m/sec.

MULTIPLY	BY	TO OBTAIN
feet per second (ft./sec.)	0.6818	mph
	1.097	km/hr.
	30.48	cm/sec.
	0.5921	kts.
foot-pounds (ft.-lb.)	0.138255	m-kg
	3.24×10^{-4}	kg-cal
foot-pounds per minute (ft.-lb./min.)	3.030×10^{-5}	hp
foot-pounds per second (ft.-lb./sec.)	1.818×10^{-5}	hp
gallons, Imperial (Imperial gal.)	277.4	cu. in.
	1.201	U.S. gal.
	4.546	l
gallons, U.S. dry (U.S. gal. dry)	268.8	cu. in.
	1.556×10^{-1}	cu. ft.
	1.164	U.S. gal.
	4.405	l
gallons, U.S. liquid (U.S. gal.)	231	cu. in.
	0.1337	cu. ft.
	4.951×10^{-3}	cu. yd.
	3785.4	cm^3
	3.785×10^{-3}	m^3
	3.785	l
	0.83268	Imperial gal.
	128	fl. oz.
gallons per acre (gal./acre)	9.353	l/ha
grams (g)	0.001	kg
	0.3527	oz. avdp.
	2.205×10^{-3}	lb.
grams per centimeter (g/cm)	0.1	kg/m
	6.721×10^{-2}	lb./ft.
	5.601×10^{-3}	lb./in.
grams per cubic centimeter (g/cm^3)	1000	kg/m^3
	0.03613	lb./cu. in.
	62.43	lb./cu. ft.

MULTIPLY	BY	TO OBTAIN
hectares (ha)	2.471	acres
	107639	sq. ft.
	10000	m^2
horsepower (hp)	33000	ft.-lb./min.
	550	ft.-lb./sec.
	76.04	m-kg/sec.
	1.014	metric hp
horsepower, metric	75	m-kg/sec.
	0.9863	hp
inches (in.)	25.40	mm
	2.540	cm
	0.0254	m
	0.08333	ft.
	0.027777	yd.
inches of mercury at 0 °C (in. Hg)	0.033421	atm
	0.4912	lb./sq. in.
	70.73	lb./sq. ft.
	345.3	kg/m^2
	2.540	cm Hg
	25.40	mm Hg
inch-pounds (in.-lb.)	0.011521	m-kg
kilograms (kg)	2.204622	lb.
	35.27	oz. avdp.
	1000	g
kilogram-calories (kg-cal)	3.9683	BTU
	3087	ft.-lb.
	426.9	m-kg
kilograms per cubic meter (kg/m^3)	0.06243	lb./cu. ft.
	0.001	g/cm^3
kilograms per hectare (kg/ha)	0.892	lb./acre
kilograms per square centimeter (kg/cm^2)	0.9678	atm
	28.96	in. Hg
	14.22	lb./sq. in.
	2048	lb./sq. ft.

MULTIPLY	BY	TO OBTAIN
kilograms per square meter (kg/m^2)	2.896×10^{-3}	in. Hg
	1.422×10^{-3}	lb./sq. in.
	0.2048	lb./sq. ft.
kilometers (km)	1×10^{-5}	cm
	3280.8	ft.
	0.6214	mi.
	0.53996	NM
kilometers per hour (km/hr.)	0.9113	ft./sec.
	58.68	ft./min.
	0.53996	kt
	0.6214	mph
	0.27778	m/sec.
	16.67	m/min.
knots (kt)	1	nautical mph
	1.689	ft./sec.
	1.1516	statute mph
	1.852	km/hr.
	51.48	m/sec.
liters (l)	1000	cm^3
	61.02	cu. in.
	0.03531	cu. ft.
	33.814	fl. oz.
	0.264172	U.S. gal.
	0.2200	Imperial gal.
	1.05669	qt.
liters per hectare (l/ha)	13.69	fl. oz./acre
	0.107	gal./acre
liters per second (l/sec.)	2.12	cu. ft./min.
meters (m)	39.37	in.
	3.280840	ft.
	1.0936	yd.
	0.198838	rod
	6.214×10^{-4}	mi.
	5.3996×10^{-4}	NM
meter-kilogram (m-kg)	7.23301	ft.-lb.
	86.798	in.-lb.

MULTIPLY	BY	TO OBTAIN
meters per minute (m/min.)	0.06	km/hr.
meters per second (m/sec.)	3.280840	ft./sec.
	196.8504	ft./min.
	2.237	mph
	3.6	km/hr.
microns	3.937×10^{-5}	in.
miles, statute (mi.)	5280	ft.
	1.6093	km
	1609.3	m
	0.8684	NM
miles per hour (mph)	44.7041	cm/sec.
	4.470×10^{-1}	m/sec.
	1.467	ft./sec.
	88	ft./min.
	1.6093	km/hr.
	0.8684	kt
miles per hour square (m/hr. sq.)	2.151	ft./sec. sq.
millibars	2.953×10^{-2}	in. Hg
millimeters (mm)	0.03937	in.
millimeters of mercury at 0°C (mm Hg)	0.03937	in. Hg
nautical miles (NM)	6080	ft.
	1.1516	statute mi.
	1852	m
	1.852	km
ounces, avdp. (oz. avdp.)	28.35	g
	16	dr. avdp.
ounces, fluid (fl. oz.)	8	dr. fl.
	29.57	cm^3
	1.805	cu. in.
	0.0296	l
	0.0078	U.S. gal.

MULTIPLY	BY	TO OBTAIN
ounces, fluid per acre (fl. oz./ acre)	0.073	l/ha
pounds (lb.)	0.453592	kg
	453.6	g
	3.108×10^{-2}	slug
pounds per acre (lb./acre)	1.121	kg/ha
pounds per cubic foot (lb./cu. ft.)	16.02	kg/m^3
pounds per cubic inch (lb./cu. in.)	1728	lb./cu. ft.
	27.68	g/cm^3
pounds per square foot (lb./sq. ft.)	0.1414	in. Hg
	4.88243	kg/m^2
	4.725×10^{-4}	atm
pounds per square inch (psi or lb./sq. in.)	5.1715	cm Hg
	2.036	in. Hg
	0.06804	atm
	0.0689476	bar
	703.1	kg/m^2
quart, U.S. (qt.)	0.94635	l
	57.749	cu. in.
radians	57.30	deg. (arc)
	0.1592	rev.
radians per second (radians/sec.)	57.30	deg./sec.
	0.1592	rev./sec.
	9.549	rpm
revolutions (rev.)	6.283	radians
revolutions per minute (rpm or rev./min.)	0.1047	radians/sec.
revolutions per second (rev./sec.)	6.283	radians/sec.

MULTIPLY	BY	TO OBTAIN
rod	16.5	ft.
	5.5	yd.
	5.029	m
slug	32.174	lb.
square centimeters (cm^2)	0.1550	sq. in.
	0.001076	sq. ft.
square feet (sq. ft.)	929	cm^2
	0.092903	m^2
	144	sq. in.
	0.1111	sq. yd.
	2.296×10^{-5}	acres
square inches (sq. in.)	6.4516	cm^2
	6.944×10^{-3}	sq. ft.
square kilometers (km^2)	0.3861	sq. mi.
square meters (m^2)	10.76391	sq. ft.
	1.196	sq. yd.
	0.0001	ha
square miles (sq. mi.)	2.590	km^2
	640	acres
square rods (sq. rods)	30.25	sq. yd.
square yards (sq. yd.)	0.8361	m^2
	9	sq. ft.
	0.0330579	sq. rods
yards (yd.)	0.9144	m
	3	ft.
	36	in.
	0.181818	rod

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SECTION 2

LIMITATIONS

SECTION 2

LIMITATIONS

2.1 GENERAL

This section provides the "FAA Approved" operating limitations, instrument markings, color coding and basic placards necessary for operation of the airplane and its systems.

Limitations associated with those optional systems and equipment which require handbook supplements can be found in Section 9 (Supplements).

2.3 AIRSPEED LIMITATIONS

SPEED	KIAS	KCAS
Never Exceed Speed (V_{NE}) - Do not exceed this speed in any operation.	191	189
Maximum Structural Cruising Speed (V_{NO}) - Do not exceed this speed except in smooth air and then only with caution.	150	150
Design Maneuvering Speed (V_A) - Do not make full or abrupt control movements above this speed.		
At 3600 LBS. G.W.	132	132
At 2188 LBS. G.W.	112	113

CAUTION

Maneuvering speed decreases at lighter weight as the effects of aerodynamic forces become more pronounced. Linear interpolation may be used for intermediate gross weights. Maneuvering speed should not be exceeded while operating in rough air.

Maximum Flaps Extended Speed (V_{FE}) - Do not exceed this speed with the flaps extended.	109	109
Maximum Landing Gear Extension Speed - Do not exceed this speed when extending the landing gear.	129	130
Maximum Landing Gear Retraction Speed - Do not exceed this speed when retracting the landing gear.	106	109
Maximum Landing Gear Extended Speed (V_{LE}) - Do not exceed this speed with the landing gear extended.	129	130

2.5 AIRSPEED INDICATOR MARKINGS

MARKING	IAS
Red Radial Line (Never Exceed)	191 KTS
Yellow Arc (Caution Range - Smooth Air Only)	150 KTS to 191 KTS
Green Arc (Normal Operating Range)	53 KTS to 150 KTS
White Arc (Flap Down)	52 KTS to 109 KTS

2.7 POWER PLANT LIMITATIONS

(a)	Number of Engines	1
(b)	Engine Manufacturer	Lycoming
(c)	Engine Model No.	IO-540-K1G5D
(d)	Engine Operating Limits	
	(1) Maximum Horsepower	300
	(2) Maximum Rotation Speed (RPM)	2700
	(3) Maximum Oil Temperature	245°F
(e)	Oil Pressure	
	Minimum (red line)	25 PSI
	Maximum (red line)	100 PSI
(f)	Fuel Pressure	
	Minimum (red line)	12 PSI
	Maximum (red line)	40 PSI
(g)	Fuel Grade (minimum octane)	100/130 - Green
(h)	Number of Propellers	1
(i)	Propeller Manufacturer	Hartzell
(j)	Propeller Hub and Blade Model	HC-C2YK-1( )F/F8475D-4
(k)	Propeller Diameter	
	Minimum	78.5 IN.
	Maximum	80 IN.
(l)	Blade Angle Limits	
	Low Pitch Stop	13.5° ± .2°
	High Pitch Stop	34° ± 1°

2.9 POWER PLANT INSTRUMENT MARKINGS

(a)	Tachometer	
	Green Arc (Normal Operating Range)	500 to 2700 RPM
	Red Line (Maximum Continuous Power)	2700 RPM
(b)	Oil Temperature	
	Green Arc (Normal Operating Range)	75° to 245°F
	Red Line (Maximum)	245°F
(c)	Oil Pressure	
	Green Arc (Normal Operating Range)	60 PSI to 90 PSI
	Yellow Arc (Caution Range) (Idle)	25 PSI to 60 PSI
	Yellow Arc (Caution Range) (Start and Warm Up)	90 PSI to 100 PSI
	Red Line (Minimum)	25 PSI
	Red Line (Maximum)	100 PSI
(d)	Fuel Pressure	
	Green Arc (Normal Operating Range)	18 PSI to 40 PSI
	Red Line (Minimum)	12 PSI
	Red Line (Maximum)	40 PSI
	Yellow Arc (Idle Range)	12 PSI to 18 PSI

2.11 WEIGHT LIMITS

(a)	Maximum Weight	3600 LBS.
(b)	Maximum Baggage (100 lbs. each compartment)	200 LBS.

NOTE

Refer to Section 5 (Performance) for maximum weight as limited by performance.

2.13 CENTER OF GRAVITY LIMITS

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
3600	91.4	96.0
3000	84.0	96.0
2500	82.0	96.0

NOTES

Straight line variation between points given.

The datum used is 78.4 inches ahead of the wing leading edge at the intersection of the straight and tapered section.

It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. See Section 6 (Weight and Balance) for proper loading instructions.

2.15 MANEUVER LIMITS

No acrobatic maneuvers including spins approved.

2.17 FLIGHT LOAD FACTORS

(a) Positive Load Factor (Maximum) 3.8 G
(b) Negative Load Factor (Maximum) No inverted maneuvers approved

2.19 TYPES OF OPERATIONS

The airplane is approved for the following operations when equipped in accordance with FAR 91 or FAR 135.

(a) Day V.F.R.
(b) Night V.F.R.
(c) Day I.F.R.
(d) Night I.F.R.
(e) Non icing

2.21 FUEL LIMITATIONS

(a)	Total Capacity	98 U.S. GAL.
(b)	Unusable Fuel The unusable fuel for this airplane has been determined as 2.0 gallons in each wing in critical flight attitudes (2.0 gallons is the total per side, each side having two interconnected tanks).	4 U.S. GAL.
(c)	Usable Fuel The usable fuel in this airplane has been determined as 47.0 gallons in each wing (47.0 gallons is the total per side, each side having two interconnected tanks).	94 U.S. GAL.

2.23 FLIGHT WITH REAR CABIN DOOR OR REAR CABIN DOOR AND CARGO DOOR REMOVED

The following limitations must be observed in the operation of this airplane with the rear cabin door or rear cabin door and cargo door removed:

(a) The airplane may be flown with the rear cabin door or rear cabin door and cargo door removed. Flight with the front door removed is not approved.
(b) Maximum speed - 144 KIAS
(c) No smoking.
(d) All loose articles must be tied down and stowed.
(e) Jumper's static lines must be kept free of pilot's controls and control surfaces.
(f) Operation approved VFR flight conditions only.

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2.25 PLACARDS

In full view of the pilot:

"THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS. NO ACROBATIC MANEUVERS INCLUDING SPINS, APPROVED."

THIS AIRCRAFT APPROVED FOR V.F.R., I.F.R., DAY AND NIGHT NON-ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135.

In full view of the pilot, the following takeoff and landing check lists will be installed:

TAKEOFF CHECK LIST

Fuel on Proper Tank	Mixture - Set	Flaps - Set
Electric Fuel Pump - On	Propeller - Set	Trim Tab - Set
Engine Gauges - Checked	Fasten Belts/Harness	Controls - Free
Alternate Air - Closed		Doors - Latched
Seat Backs Erect		Air Conditioner - Off

LANDING CHECK LIST

Fuel on Proper Tank	Electric Fuel Pump - On	Gear Down (129 KIAS Max.)
Seat Backs Erect	Mixture - Rich	Flaps - Set (WHITE ARC)
Fasten Belts/Harness	Propeller - Set	Air Conditioner - Off

The "AIR CONDITIONER OFF" item in the above takeoff and landing check lists is mandatory for air conditioned aircraft only.

On the instrument panel in full view of the pilot:

MANEUVERING SPEED
132 KIAS AT 3600
LBS. (SEE P.O.H.)

On the instrument panel in full view of the pilot:

"DEMONSTRATED CROSSWIND COMPONENT 17 KTS"

In full view of the pilot: (For operation with the rear door removed)

"FOR FLIGHT WITH THE DOOR REMOVED, SEE THE LIMITATIONS AND PROCEDURES SECTIONS OF THE PILOT'S OPERATING HANDBOOK."

On instrument panel in full view of the pilot:

"GEAR DOWN	129 KIAS (MAX)"
"GEAR UP	106 KIAS (MAX)"
"EXTENDED	129 KIAS (MAX)"

Near emergency gear lever:

"EMERGENCY DOWN"

"OVERRIDE ENGAGED

TO ENGAGE OVERRIDE:
LEVER UP, LATCH DOWN
TO RELEASE OVERRIDE:
LEVER FULL UP & RELEASE"

On gear override latch:

"GEAR OVERRIDE LATCH"

Near gear selector switch:

"GEAR UP	106 KIAS MAX"
"DOWN	129 KIAS MAX"

Adjacent to upper door latch (front and rear doors):

"ENGAGE LATCH BEFORE FLIGHT"

On the instrument panel in full view of the pilot:

"WARNING – TURN OFF STROBE LIGHTS WHEN TAXIING IN VICINITY OF OTHER AIRCRAFT, OR DURING FLIGHT THROUGH CLOUD, FOG OR HAZE."

In full view of the pilot, in the area of the air conditioner controls when the air conditioner is installed:

"WARNING – AIR CONDITIONER MUST BE OFF TO INSURE NORMAL TAKEOFF CLIMB PERFORMANCE."

On the inside of the forward baggage compartment:

"MAXIMUM BAGGAGE THIS COMPARTMENT 100 LBS. SEE THE LIMITATIONS SECTION OF THE PILOT'S OPERATING HANDBOOK."

On aft baggage closeout:

"MAXIMUM BAGGAGE THIS COMPARTMENT 100 LBS. NO HEAVY OBJECTS ON HAT SHELF."

On storm window:

"DO NOT OPEN ABOVE 129 KIAS"

Adjacent to fuel tank filler caps:

"FUEL – 100/130 AVIATION GRADE – USABLE CAPACITY 47.0 GAL."

On executive writing table:

"CAUTION - THIS TABLE MUST BE STOWED DURING TAKEOFF AND LANDING."

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SECTION 3

EMERGENCY PROCEDURES

SECTION 3

EMERGENCY PROCEDURES

3.1 GENERAL

The recommended procedures for coping with various types of emergencies and critical situations are provided by this section. All of the required (FAA regulations) emergency procedures and those necessary for operation of the airplane as determined by the operating and design features of the airplane are presented.

Emergency procedures associated with those optional systems and equipment which require handbook supplements are provided by Section 9 (Supplements).

The first portion of this section consists of an abbreviated emergency check list which supplies an action sequence for critical situations with little emphasis on the operation of systems.

The remainder of the section is devoted to amplified emergency procedures containing additional information to provide the pilot with a more complete understanding of the procedures.

These procedures are suggested as the best course of action for coping with the particular condition described, but are not a substitute for sound judgment and common sense. Since emergencies rarely happen in modern aircraft, their occurrence is usually unexpected and the best corrective action may not always be obvious. Pilots should familiarize themselves with the procedures given in this section and be prepared to take appropriate action should an emergency arise.

Most basic emergency procedures, such as power off landings, are a normal part of pilot training. Although these emergencies are discussed here, this information is not intended to replace such training, but only to provide a source of reference and review, and to provide information on procedures which are not the same for all aircraft. It is suggested that the pilot review standard emergency procedures periodically to remain proficient in them.

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3.3 EMERGENCY PROCEDURES CHECK LIST

ENGINE FIRE DURING START

Starter . . . . . crank engine
Mixture . . . . . idle cut-off
Throttle . . . . . open
Electric fuel pump . . . . . OFF
Fuel selector . . . . . OFF
Abandon if fire continues

ENGINE POWER LOSS DURING TAKEOFF

If sufficient runway remains for a normal landing, leave gear down and land straight ahead.

If area ahead is rough, or if it is necessary to clear obstructions:
Gear selector switch . . . . . UP
Emergency gear lever . . . . latched in OVERRIDE ENGAGED position

If sufficient altitude has been gained to attempt a restart:
Maintain safe airspeed
Fuel selector . . . . . switch to tank containing fuel
Electric fuel pump . . . . . check ON
Mixture . . . . . check RICH
Alternate air . . . . . OPEN
Emergency gear lever . . . . . as required
If power is not regained, proceed with power off landing.

ENGINE POWER LOSS IN FLIGHT

Fuel selector . . . . . switch to tank containing fuel
Electric fuel pump . . . . . ON
Mixture . . . . . RICH
Alternate air . . . . . OPEN
Engine gauges . . . . . check for indication of cause of power loss
If no fuel pressure is indicated, check tank selector position to be sure it is on a tank containing fuel.

When power is restored:
Alternate air . . . . . CLOSED
Electric fuel pump . . . . . OFF
If power is not restored prepare for power off landing.
Trim for 92 KIAS

POWER OFF LANDING

Locate suitable field.
Establish spiral pattern.
1000 ft. above field at downwind position for normal landing approach.
When field can easily be reached slow to 75 KIAS for shortest landing.

If a gear up landing is necessary, latch emergency lever in OVERRIDE ENGAGED position - due to gear free fall at speeds below 103 KIAS.

Touchdowns should normally be made at lowest possible airspeed with full flaps.

When committed to landing:
Ignition . . . . . OFF
Master switch . . . . . OFF
Fuel selector . . . . . OFF
Mixture . . . . . idle cut-off
Seat belt and harness . . . . . tight

FIRE IN FLIGHT

Source of fire . . . . . check

Electrical fire (smoke in cabin):
Master switch . . . . . OFF
Vents . . . . . open
Cabin heat . . . . . OFF
Land as soon as practicable.

Engine fire:
Fuel selector . . . . . OFF
Throttle . . . . . CLOSED
Mixture . . . . . idle cut-off
Electric fuel pump . . . . . check OFF
Heater and defroster . . . . . OFF
Proceed with power off landing procedure.

LOSS OF OIL PRESSURE

Land as soon as possible and investigate cause.
Prepare for power off landing.

LOSS OF FUEL PRESSURE

Electric fuel pump . . . . . .ON
Fuel selector . . . . . check on full tank

HIGH OIL TEMPERATURE

Land at nearest airport and investigate the problem.
Prepare for power off landing.

ALTERNATOR FAILURE

Verify failure
Reduce electrical load as much as possible.
Alternator circuit breakers . . . . . check
Alt switch . . . . . .OFF (for 1 second), then on

If no output:
Alt switch . . . . . .OFF

Reduce electrical load and land as soon as practical.

If battery is fully discharged, the gear will have to be lowered using the emergency gear extension procedure. Position lights will not illuminate.

PROPELLER OVERSPEED

Throttle . . . . . retard
Oil pressure . . . . . check
Prop control . . . . . .full DECREASE rpm, then set if any control available
Airspeed . . . . . .reduce
Throttle . . . . . as required to remain below 2700 rpm

EMERGENCY LANDING GEAR EXTENSION

Prior to emergency extension procedure:
Master switch . . . . . .check ON
Circuit breakers . . . . . check

Radio lights . . . . . off (in daytime)
Gear indicator bulbs . . . . . check

If landing gear does not check down and locked:
Airspeed . . . . . .below 87 KIAS

Landing gear selector . . . . . DOWN
Emergency gear lever . . . OVERRIDE ENGAGED (while fishtailing airplane)

If landing gear still does not check down and locked:
Emergency gear lever . . . . EMERGENCY DOWN (while fishtailing airplane)

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

SPIN RECOVERY

Throttle . . . . . idle
Ailerons . . . . . neutral
Rudder . . . . . .full opposite to direction of rotation
Control wheel . . . . . .full forward 2 seconds after anti-spin rudder imput
Rudder . . . . . neutral (when rotation stops)
Control wheel . . . . . .as required to smoothly regain level flight attitude

OPEN DOOR

If both upper and side latches are open, the door will trail slightly open and airspeeds will be reduced slightly.

To close the door in flight:
Slow airplane to 87 KIAS
Cabin vents . . . . . .close
Storm window . . . . . .open

If upper latch is open . . . . . .latch
If side latch is open . . . . . pull on armrest while moving latch handle to latched position
If both latches are open . . . . . .latch side latch then top latch

3.5 AMPLIFIED EMERGENCY PROCEDURES (GENERAL)

The following paragraphs are presented to supply additional information for the purpose of providing the pilot with a more complete understanding of the recommended course of action and probable cause of an emergency situation.

3.7 ENGINE FIRE DURING START

Engine fires during start are usually the result of overpriming. The first attempt to extinguish the fire is to try to start the engine and draw the excess fuel back into the induction system.

If a fire is present before the engine has started, move the mixture control to idle cut-off, open the throttle and crank the engine. This is an attempt to draw the fire back into the engine.

If the engine has started, continue operating to try to pull the fire into the engine.

In either case (above), if fire continues more than a few seconds, the fire should be extinguished by the best available external means.

The fuel selector valve should be "OFF" and the mixture at idle cut-off if an external fire extinguishing method is to be used.

3.9 ENGINE POWER LOSS DURING TAKEOFF

The proper action to be taken if loss of power occurs during takeoff will depend on the circumstances of the particular situation.

If sufficient runway remains to complete a normal landing, leave the landing gear down and land straight ahead.

If the area ahead is rough, or if it is necessary to clear obstructions, move the gear selector switch to the "UP" position and latch the emergency gear lever in the "OVERRIDE ENGAGED" position.

If sufficient altitude has been gained to attempt a restart, maintain a safe airspeed and switch the fuel selector to another tank containing fuel. Check the electric fuel pump to insure that it is "ON" and that the mixture is "RICH." The alternate air should be "OPEN." Use the emergency gear lever as required.

The landing gear will extend automatically when engine power fails at speeds below approximately 103 KIAS. The glide distance with the landing gear extended is roughly halved. If the situation dictates, the landing gear can be retained in the retracted position by latching the lever in the "OVERRIDE ENGAGED" position.

If engine failure was caused by fuel exhaustion, power will not be regained after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds.

If power is not regained, proceed with the Power Off Landing procedure (refer to the emergency check list and paragraph 3.13).

3.11 ENGINE POWER LOSS IN FLIGHT

Complete engine power loss is usually caused by fuel flow interruption and power will be restored shortly after fuel flow is restored. If power loss occurs at a low altitude, the first step is to prepare for an emergency landing (refer to paragraph 3.13). An airspeed of at least 87 KIAS should be maintained.

If altitude permits, switch the fuel selector to another tank containing fuel and turn the electric fuel pump "ON." Move the mixture control to "RICH" and the alternate air to "OPEN." Check the engine gauges for an indication of the cause of the power loss. If no fuel pressure is indicated, check the tank selector position to be sure it is on a tank containing fuel.

When power is restored move the alternate air to the "CLOSED" position and turn "OFF" the electric fuel pump.

If the preceding steps do not restore power, prepare for an emergency landing.

If time permits, turn the ignition switch to "L" then to "R" then back to "BOTH." Move the throttle and mixture control levers to different settings. This may restore power if the problem is too rich or too lean a mixture or if there is a partial fuel system restriction. Try other fuel tanks. Water in the fuel could take some time to be used up, and allowing the engine to windmill may restore power. If power loss is due to water, fuel pressure indications will be normal.

If engine failure was caused by fuel exhaustion, power will not be restored after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds.

If power is not regained, proceed with the Power Off Landing procedure (refer to the emergency check list and paragraph 3.13).

3.13 POWER OFF LANDING

If loss of power occurs at altitude, trim the aircraft for best gliding angle (92 KIAS, Air Cond. off) and look for a suitable field. If measures taken to restore power are not effective, and if time permits, check your charts for airports in the immediate vicinity; it may be possible to land at one if you have sufficient altitude. At best gliding angle, with the engine windmilling, and the propeller control in full "DECREASE rpm," the aircraft will travel approximately 1.6 miles for each thousand feet of altitude. If possible, notify the FAA by radio of your difficulty and intentions. If another pilot or passenger is aboard, let him help.

When you have located a suitable field, establish a spiral pattern around this field. Try to be at 1000 feet above the field at the downwind position, to make a normal landing approach. When the field can easily be reached, slow to 75 KIAS with flaps down for the shortest landing. Excess altitude may be lost by widening your pattern, using flaps or slipping, or a combination of these.

Whether to attempt a landing with gear up or down depends on many factors. If the field chosen is obviously smooth and firm, and long enough to bring the plane to a stop, the gear should be down. If there are stumps or rocks or other large obstacles in the field, the gear in the down position will better protect the occupants of the aircraft. If, however, the field is suspected to be excessively soft or short, or when landing in water of any depth, a wheels-up landing will normally be safer and do less damage to the airplane.

Don't forget that at airspeeds below approximately 103 KIAS the gear will free fall, and will take six to eight seconds to be down and locked. If a gear up landing is desired, it will be necessary to latch the override lever in the "OVERRIDE ENGAGED" position before the airspeed drops to 106 KIAS to prevent the landing gear from inadvertently free falling.

Touchdown should normally be made at the lowest possible airspeed.

(a) Gear Down Landing

When committed to a gear down emergency landing, close the throttle control and shut "OFF" the master and ignition switches. Flaps may be used as desired. Turn the fuel selector valve to "OFF" and move the mixture to idle cut-off. The seat belts and shoulder harness (if installed) should be tightened. Touchdown should be normally made at the lowest possible airspeed.

Always remember that the automatic gear mechanism will extend the gear below approximately 103 KIAS with power off. Be prepared to latch the emergency gear lever in the "OVERRIDE ENGAGED" position before the airspeed drops to 106 KIAS to prevent the landing gear from inadvertently free falling, unless gear extension is desired.

NOTE

If the master switch is "OFF," the gear cannot be retracted.

(b) Gear Up Landing

If a gear up landing is necessary, latch the emergency gear lever in the "OVERRIDE ENGAGED" position to prevent the gear from inadvertently extending at airspeeds below 103 KIAS.

Touchdowns should normally be made at the lowest possible airspeed with full flaps.

When committed to landing, turn "OFF" the ignition and master switch. The fuel selector should be "OFF" and the mixture at idle cut-off.

Tighten the seat belts and shoulder harness (if installed).

3.15 FIRE IN FLIGHT

The presence of fire is noted through smoke, smell and heat in the cabin. It is essential that the source of the fire be promptly identified through instrument readings, character of the smoke, or other indications since the action to be taken differs somewhat in each case.

Check for the source of the fire first.

If an electrical fire is indicated (smoke in the cabin), the master switch should be turned "OFF." The cabin vents should be opened and the cabin heat turned "OFF." A landing should be made as soon as possible.

If an engine fire is present, switch the fuel selector to "OFF" and close the throttle. The mixture should be at idle cut-off. Turn the electric fuel pump "OFF." In all cases, the heater and defroster should be "OFF." If radio communication is not required select master switch "OFF." If the terrain permits, a landing should be made immediately.

NOTE

The possibility of an engine fire in flight is extremely remote. The procedure given is general and pilot judgment should be the determining factor for action in such an emergency.

3.17 LOSS OF OIL PRESSURE

Loss of oil pressure may be either partial or complete. A partial loss of oil pressure usually indicates a malfunction in the oil pressure regulating system, and a landing should be made as soon as possible to investigate the cause and prevent engine damage.

A complete loss of oil pressure indication may signify oil exhaustion or may be the result of a faulty gauge. In either case, proceed toward the nearest airport, and be prepared for a forced landing. If the problem is not a pressure gauge malfunction, the engine may stop suddenly. Maintain altitude until such time as a dead stick landing can be accomplished. Don't change power settings unnecessarily, as this may hasten complete power loss.

Depending on the circumstances, it may be advisable to make an off airport landing while power is still available, particularly if other indications of actual oil pressure loss, such as sudden increases in temperatures, or oil smoke, are apparent, and an airport is not close.

If engine stoppage occurs, proceed with Power Off Landing.

3.19 LOSS OF FUEL PRESSURE

If loss of fuel pressure occurs, turn "ON" the electric fuel pump and check that the fuel selector is on a full tank.

If the problem is not an empty tank, land as soon as practical and have the engine-driven fuel pump and fuel system checked.

3.21 HIGH OIL TEMPERATURE

An abnormally high oil temperature indication may be caused by a low oil level, an obstruction in the oil cooler, damaged or improper baffle seals, a defective gauge, or other causes. Land as soon as practical at an appropriate airport and have the cause investigated.

A steady, rapid rise in oil temperature is a sign of trouble. Land at the nearest airport and let a mechanic investigate the problem. Watch the oil pressure gauge for an accompanying loss of pressure.

3.23 ALTERNATOR FAILURE

Loss of alternator output is detected through zero reading on the ammeter. Before executing the following procedure, insure that the reading is zero and not merely low by actuating an electrically powered device, such as the landing light. If no increase in the ammeter reading is noted, alternator failure can be assumed.

The electrical load should be reduced as much as possible. Check the alternator circuit breakers for a popped circuit.

The next step is to attempt to reset the overvoltage relay. This is accomplished by moving the "ALT" switch to "OFF" for one second and then to "ON." If the trouble was caused by a momentary overvoltage condition (16.5 volts and up) this procedure should return the ammeter to a normal reading.

If the ammeter continues to indicate "O" output, or if the alternator will not remain reset, turn off the "ALT" switch, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

3.25 PROPELLER OVERSPEED

Propeller overspeed is caused by a malfunction in the propeller governor or low oil pressure which allows the propeller blades to rotate to full low pitch.

If propeller overspeed should occur, retard the throttle and check the oil pressure. The propeller control should be moved to full "DECREASE rpm" and then set if any control is available. Airspeed should be reduced and throttle used to maintain 2700 RPM.

3.27 EMERGENCY LANDING GEAR EXTENSION

Prior to proceeding with an emergency gear extension check to insure that the master switch is "ON" and that the circuit breakers have not opened. If it is daytime, the radio lights should be turned off. Check the landing gear indicators for faulty bulbs.

If the landing gear does not check down and locked, reduce the airspeed to below 87 KIAS. Move the landing gear selector to the "DOWN" position. Place the emergency gear lever in the "OVERRIDE ENGAGED" position and fishtail the airplane.

If the landing gear still does not check down and locked move the emergency gear lever to the "EMERGENCY DOWN" position while fishtailing the airplane.

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

3.29 SPIN RECOVERY

Intentional spins are prohibited in this airplane. If a spin is inadvertently entered, immediately move the throttle to idle and the ailerons to neutral.

Full rudder should then be applied opposite to the direction of rotation followed two seconds later by control wheel full forward. When the rotation stops, neutralize the rudder and ease back on the control wheel as required to smoothly regain a level flight attitude.

3.31 OPEN DOOR

The cabin door is double latched, so the chances of its springing open in flight at both the top and side are remote. However, should you forget the upper latch, or not fully engage the side latch, the door may spring partially open. This will usually happen at takeoff or soon afterward. A partially open door will not affect normal flight characteristics, and a normal landing can be made with the door open.

If both upper and side latches are open, the door will trail slightly open, and airspeed will be reduced slightly.

To close the door in flight, slow the airplane to 87 KIAS, close the cabin vents and open the storm window. If the top latch is open, latch it. If the side latch is open, pull on the armrest while moving the latch handle to the latched position. If both latches are open, close the side latch then the top latch.

3.33 ENGINE ROUGHNESS

Engine roughness may be caused by dirt in the injector nozzles, induction system icing, or ignition problems.

First adjust the mixture for maximum smoothness. The engine will run rough if the mixture is too rich or too lean.

Move the alternate air to "OPEN" and then turn "ON" the electric fuel pump.

Switch the fuel selector to another tank to see if fuel contamination is the problem.

Check the engine gauges for abnormal readings. If any gauge readings are abnormal proceed accordingly.

The magneto switch should then be moved to "L" then "R," then back to "BOTH." If operation is satisfactory on either magneto, proceed on that magneto at reduced power with full "RICH" mixture to a landing at the first available airport.

If roughness persists, prepare for a precautionary landing at pilot's discretion.

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NORMAL PROCEDURES

SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This section describes the recommended procedures for the conduct of normal operations for the Lance II. All of the required (FAA regulations) procedures and those necessary for operation of the airplane as determined by the operating and design features of the airplane are presented.

Normal procedures associated with those optional systems and equipment which require handbook supplements are provided by Section 9 (Supplements).

These procedures are provided to present a source of reference and review and to supply information on procedures which are not the same for all aircraft. Pilots should familiarize themselves with the procedures given in this section in order to become proficient in the normal operations of the airplane.

The first portion of this section consists of a short form check list which supplies an action sequence for normal operations with little emphasis on the operation of the systems.

The remainder of the section is devoted to amplified normal procedures which provide detailed information and explanations of the procedures and how to perform them. This portion of the section is not intended for use as an in-flight reference due to the lengthly explanations. The short form check list should be used for this purpose.

4.3 AIRSPEEDS FOR SAFE OPERATIONS

The following airspeeds are those which are significant to the safe operation of the airplane. These figures are for standard airplanes flown at gross weight under standard conditions at sea level.

Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of the engine, airplane and equipment, atmospheric conditions and piloting technique.

(a)	Best Rate of Climb Speed	
	gear up, flaps up	92 KIAS
	gear down, flaps up	87 KIAS
(b)	Best Angle of Climb Speed	
	gear up, flaps up	87 KIAS
	gear down, flaps up	68 KIAS
(c)	Turbulent Air Operating Speed (See Subsection 2.3)	132 KIAS
(d)	Maximum Flap Speed	109 KIAS
(e)	Landing Final Approach Speed (Full Flaps)	75 KIAS
(f)	Maximum Demonstrated Crosswind Velocity	17 KTS

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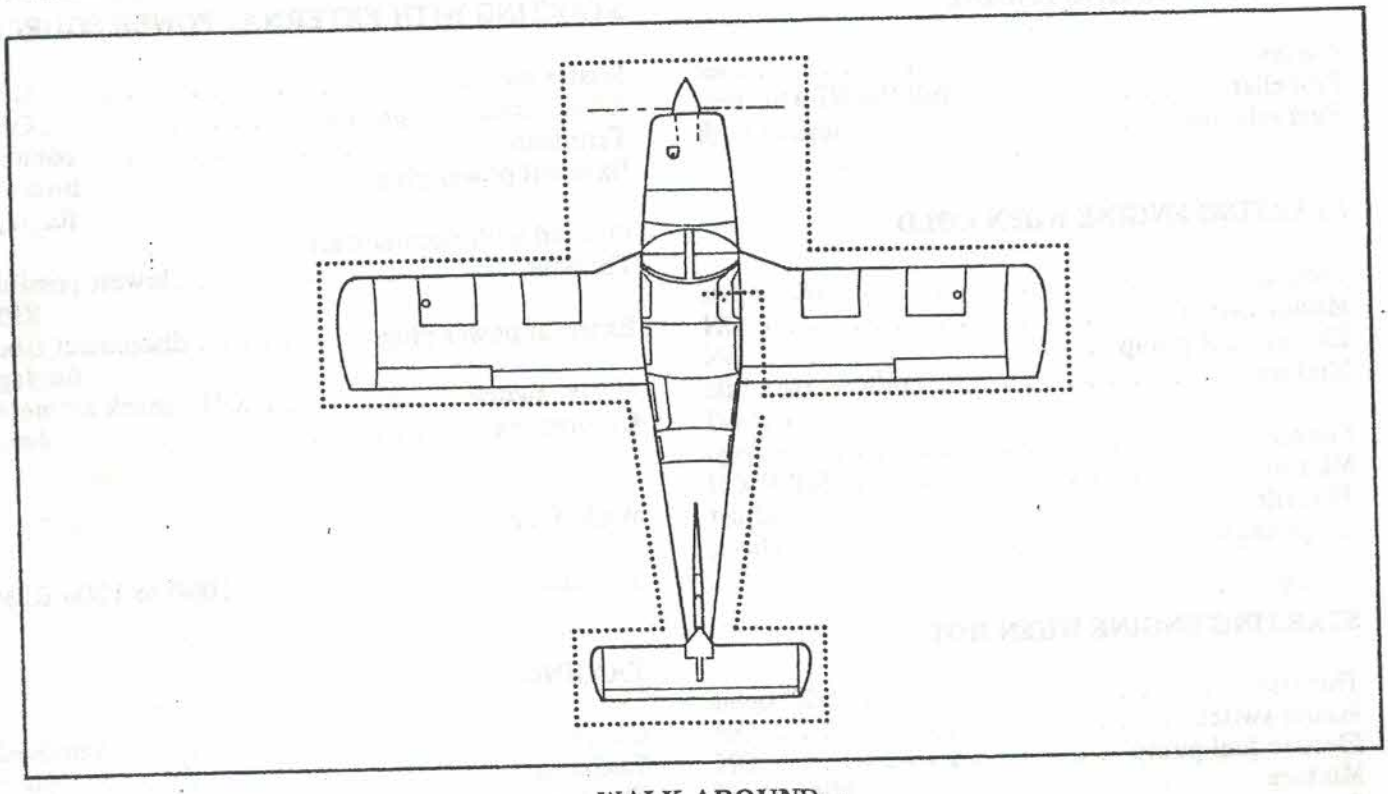

WALK-AROUND
Figure 4-1

4.5 NORMAL PROCEDURES CHECK LIST

PREFLIGHT CHECK

Control wheel . . . . . .release belts
Master switch . . . . . .ON
Fuel quantity gauges . . . . . check
Master switch . . . . . .OFF
Ignition . . . . . .OFF
Exterior . . . . . check for damage
Control surfaces . . . . . check for interference - free of ice, snow, frost
Hinges . . . . . .check for interference
Wings . . . . . free of ice, snow, frost
Stall warning . . . . . check
Navigation lights . . . . . check
Fuel tanks . . . . . check supply visually - secure caps
Fuel tank sumps . . . . . .drain
Fuel vents . . . . . .open
Main gear struts . . . . . .proper inflation (4.0 in.)
Tires . . . . . check
Brake blocks . . . . . check
Pitot head . . . . . remove cover - holes clear
Windshield . . . . . .clean
Propeller and spinner . . . . . check
Fuel and oil . . . . . check for leaks
Oil . . . . . check level
Dipstick . . . . . .properly seated
Cowling . . . . . secure
Inspection covers . . . . . secure
Nose wheel tire . . . . . check
Nose gear strut . . . . . .proper inflation (2.60 in.)
Air inlets . . . . . clear
Alternator belt . . . . . .check tension
Tow bar and control locks . . . . . stow
Baggage . . . . . stowed properly - secure
Baggage door . . . . . close and secure
Fuel strainer . . . . . .drain
Primary flight controls . . . . . .proper operation
Cabin doors . . . . . close and secure
Required papers . . . . . on board
Seat belts and harness . . . . . fastened - check inertia reel

BEFORE STARTING ENGINE

Brakes . . . . . set
Propeller . . . . . .full INCREASE rpm
Fuel selector . . . . . desired tank

STARTING ENGINE WHEN COLD

Throttle . . . . . .1/2" open
Master switch . . . . . .ON
Electric fuel pump . . . . . .ON
Mixture . . . . . .prime - then idle cut-off
Starter . . . . . .engage
Mixture . . . . . .full RICH
Throttle . . . . . .adjust
Oil pressure . . . . . .check

STARTING ENGINE WHEN HOT

Throttle . . . . . .1/2" open
Master switch . . . . . .ON
Electric fuel pump . . . . . .ON
Mixture . . . . . .idle cut-off
Starter . . . . . .engage
Mixture . . . . . .advance
Throttle . . . . . .adjust
Oil pressure . . . . . .check

STARTING ENGINE WHEN FLOODED

Throttle . . . . . .open full
Master switch . . . . . .ON
Electric fuel pump . . . . . .OFF
Mixture . . . . . .idle cut-off
Starter . . . . . .engage
Mixture . . . . . .advance
Throttle . . . . . .retard
Oil pressure . . . . . .check

STARTING WITH EXTERNAL POWER SOURCE

Master switch . . . . . .OFF
All electrical equipment . . . . . .OFF
Terminals . . . . . .connect
External power plug . . . . . .insert in fuselage
Proceed with normal start
Throttle . . . . . .lowest possible RPM
External power plug . . . . . .disconnect from fuselage
Master switch . . . . . .ON - check ammeter
Oil pressure . . . . . .check

WARM-UP

Throttle . . . . . 1000 to 1200 RPM

TAXIING

Chocks . . . . . .removed
Taxi area . . . . . .clear
Throttle . . . . . .apply slowly
Prop . . . . . .high RPM
Brakes . . . . . .check
Steering . . . . . .check

GROUND CHECK

Propeller . . . . . .full INCREASE
Throttle . . . . . .2000 RPM
Magnetos . . . . . .max. drop 175 RPM - max. diff. 50 RPM
Vacuum . . . . . .5.0" Hg. ± .1
Oil temp . . . . . .check
Oil pressure . . . . . .check
Air conditioner . . . . . .check
Annunciator panel . . . . . .press-to-test
Propeller . . . . . .exercise - then full INCREASE
Alternate air . . . . . .check
Engine is warm for takeoff when throttle can be opened without engine faltering.
Electric fuel pump . . . . . .OFF
Fuel pressure . . . . . .check
Throttle . . . . . .retard

BEFORE TAKEOFF

Master switch . . . . . .ON
Flight instruments . . . . . check
Fuel selector . . . . . .proper tank
Electric fuel pump . . . . . .ON
Engine gauges . . . . . check
Alternate air . . . . . CLOSED
Seat backs . . . . . .erect
Mixture . . . . . .set
Prop . . . . . .set
Belts/harness . . . . . .fastened
Empty seats . . . . . seat belts snugly fastened
Flaps . . . . . .set
Trim tab . . . . . .set
Controls . . . . . .free
Doors . . . . . latched
Air conditioner . . . . . .OFF

TAKEOFF

NORMAL

Flaps . . . . . retracted
Trim . . . . . slightly aft of neutral
Accelerate to 75 to 85 KIAS
Control wheel . . . . . back pressure to rotate to climb attitude

SHORT OR SOFT FIELD, OBSTACLE CLEARANCE

Flaps . . . . . .second notch
Trim . . . . . slightly aft of neutral
Throttle . . . . . .full power prior to brake release
Accelerate to 66 to 70 KIAS (depending on weight).
Control wheel . . . . . back pressure to rotate to climb attitude
After breaking ground, accelerate to 68 to 74 KIAS (depending on weight).
Gear (Override Engaged) . . . . . UP
Accelerate to climb speed.
Flaps . . . . . .retract slowly

CLIMB

Best rate (3600 lb) (gear up) (flaps up) . . . . . 92 KIAS
Best rate (3600 lb) (gear down) (flaps up) . . . . . 87 KIAS
Best angle (3600 lb) (gear up) (flaps up) . . . . . 87 KIAS
Best angle (3600 lb) (gear down) (flaps up) . . . . . 68 KIAS
En route . . . . . .104 KIAS
Electric fuel pump . . . . . OFF at desired altitude

CRUISING

Reference performance charts, Avco-Lycoming Operator's Manual and power setting table.
Normal max power 75%
Power . . . . . set per power table
Mixture . . . . . adjust

APPROACH AND LANDING

Fuel selector . . . . . .proper tank
Seat backs . . . . . .erect
Belts/harness . . . . . .fasten
Electric fuel pump . . . . . .ON
Mixture . . . . . .set
Propeller . . . . . .set
Gear . . . . . down - 129 KIAS max.
Flaps . . . . . set - 109 KIAS max.
Air conditioner . . . . . .OFF

NORMAL TECHNIQUE

Flaps . . . . . as required
Trim . . . . . 95 KIAS
Throttle . . . . . as required

SHORT FIELD TECHNIQUE

Flaps . . . . . .third notch
Trim . . . . . 75 KIAS
Throttle . . . . . as required

GO-AROUND

Throttle . . . . . .full forward
Control wheel . . . . . back pressure to rotate to climb attitude
Gear . . . . . .UP
Flaps . . . . . .retract slowly
Trim . . . . . as required

STOPPING ENGINE

Flaps . . . . . .retract
Electric fuel pump . . . . . .OFF
Air conditioner . . . . . .OFF
Radios . . . . . .OFF
Propeller . . . . . full INCREASE
Throttle . . . . . .full aft
Mixture . . . . . idle cut-off
Magnetos . . . . . .OFF
Master switch . . . . . .OFF

PARKING

Parking brake . . . . . set
Control wheel . . . . . secured with belts
Flaps . . . . . .full up
Wheel chocks . . . . . in place
Tie downs . . . . . secure

4.7 AMPLIFIED NORMAL PROCEDURES (GENERAL)

The following paragraphs are provided to supply detailed information and explanations of the normal procedures necessary for the safe operation of the airplane.

4.9 PREFLIGHT CHECK

The airplane should be given a thorough preflight and walk-around check. The preflight should include a check of the airplane's operational status, computation of weight and C.G. limits, takeoff distance and in-flight performance. A weather briefing should be obtained for the intended flight path, and any other factors relating to a safe flight should be checked before takeoff.

CAUTION

The flap position should be noted before boarding the aircraft. The flaps must be placed in the "UP" position before they will lock and support weight on the step.

Upon entering the cockpit, release the seat belts securing the control wheel. Turn "ON" the master switch and check the fuel quantity gauges for sufficient fuel. After the fuel quantity check is made turn the master switch "OFF" and check that the ignition is "OFF."

To begin the exterior walk-around, check for external damage and operational interference of the control surfaces or hinges. Insure that the wings and control surfaces are free of snow, ice, frost or any other foreign materials.

An operational check of the stall warning system and navigation lights should now be made. Turn the master switch "ON." Lift the detector while checking to determine if the horn is actuated and check that the navigation lights are illuminated. The master switch should be returned to the "OFF" position after the checks are complete.

A visual check of the fuel tank quantity should be performed. Remove the filler cap from each tank and visually check the supply and color. Be sure to secure the caps properly after the check is complete. Each inboard tank is furnished with an external fuel quantity indicator to assist the pilot in determining fuel quantities of less than 25 gallons. A visual check of this indicator should also be made.

The fuel system tank sumps and strainer should be drained daily prior to the first flight and after refueling to avoid the accumulation of water or sediment. Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer and a system quick drain valve are located in the fuselage at the lowest point of the fuel system. It is important that the fuel system be drained properly.

Drain each tank through its individual quick drain located at the lower inboard rear corner of the tank, making sure that enough fuel has been drained to insure that all water and sediment is removed.

Next, place a container under the fuel strainer drain outlet located under the fuselage.

Now drain the fuel strainer by pressing down on the lever located on the right hand side of the cabin below the forward edge of the rear seat. The fuel selector should be positioned in the following sequence while draining the strainer: "OFF," "LEFT," "RIGHT." This is done to insure that the fuel lines between each tank outlet and fuel strainer are drained as well as the strainer. When the fuel tanks are full, it will take approximately six seconds to drain all the fuel in one of the lines from a tank to the fuel strainer. When the fuel tanks are less than full, it will take a few seconds longer.

Examine the contents of the container placed under the fuel strainer drain outlet for water and sediment and dispose of the contents.

CAUTION

When draining any amount of fuel, care should be taken to insure that no fire hazard exists before starting engine.

After using the under-seat quick drain, it should be checked from outside to make sure it has closed completely and is not leaking.

Check all of the fuel tank vents to make sure they are open.

Next, complete a check of the landing gear. Check the main gear shock struts for proper inflation. There should be 4.0 inches of strut exposure under a normal static load. The nose gear should be checked for 2.60 inches of strut exposure. Check all tires for cuts and wear and insure proper inflation. Make a visual check of the brake blocks for wear or damage.

Remove the cover from the pitot head on the underside of the left wing. Check the pitot head to make sure the holes are open and clear of obstructions.

Don't forget to clean and check the windshield.

The propeller and spinner should be checked for defects or nicks.

Lift the cowling and check for any obvious fuel or oil leaks. Check the oil level. Make sure that the dipstick has properly seated after checking. Secure the cowling and check the inspection covers.

Check the air inlets for foreign matter and the alternator belt for proper tension.

Stow the tow bar and check the baggage for proper storage and security. The baggage compartment doors should be closed and secure.

Upon entering the aircraft, ascertain that all primary flight controls operate properly. Close and secure the fore and aft cabin doors and check that all the required papers are in order and in the airplane.

Fasten the seat belts and shoulder harness and check the function of the inertia reel by pulling sharply on the strap. Fasten seat belts on empty seats.

4.11 BEFORE STARTING ENGINE

Before starting the engine the brakes should be set "ON" and the propeller lever moved to the full "INCREASE" rpm position. The fuel selector should then be moved to the desired tank.

4.13 STARTING ENGINE

(a) Starting Engine When Cold

Open the throttle lever approximately 1/2 inch. Turn "ON" the master switch and the electric fuel pump. Move the mixture control to full "RICH" until an indication is noted on the fuel flow meter. The engine is now primed.

Move the mixture control to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture control to full "RICH" and move the throttle to the desired setting.

If the engine does not fire within five to ten seconds, disengage the starter and reprime.

(b) Starting Engine When Hot

Open the throttle approximately 1/2 inch. Turn "ON" the master switch and the electric fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture and move the throttle to the desired setting.

(c) Starting Engine When Flooded

The throttle lever should be full "OPEN." Turn "ON" the master switch and turn "OFF" the emergency fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture and retard the throttle.

(d) Starting Engine With External Power Source

An optional feature called the Piper External Power (PEP) allows the operator to use an external battery to crank the engine without having to gain access to the airplane's battery.

Turn the master switch OFF and turn all electrical equipment OFF. Connect the RED lead of the PEP kit jumper cable to the POSITIVE (+) terminal of an external 12-volt battery and the BLACK lead to the NEGATIVE (-) terminal. Insert the plug of the jumper cable into the socket located on the fuselage. Note that when the plug is inserted, the electrical system is ON. Proceed with the normal starting technique.

After the engine has started, reduce power to the lowest possible RPM, to reduce sparking, and disconnect the jumper cable from the aircraft. Turn the master switch ON and check the alternator ammeter for an indication of output. DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.

NOTE

For all normal operations using the PEP jumper cables, the master switch should be OFF, but it is possible to use the ships battery in parallel by turning the master switch ON. This will give longer cranking capabilities, but will not increase the amperage. CAUTION: Care should be exercised because if the ships battery has been depleted, the external power supply can be reduced to the level of the ships battery. This can be tested by turning the master switch ON momentarily while the starter is engaged. If cranking speed increases, the ships battery is at a higher level than the external power supply.

When the engine is firing evenly, advance the throttle to 800 RPM. If oil pressure is not indicated within thirty seconds, stop the engine and determine the trouble. In cold weather it will take a few seconds longer to get an oil pressure indication. If the engine has failed to start, refer to the Lycoming Operating Handbook, Engine Troubles and Their Remedies.

Starter manufacturers recommend that cranking periods be limited to thirty seconds with a two minute rest between cranking periods. Longer cranking periods will shorten the life of the starter.

4.15 WARM-UP

Warm-up the engine at 1000 to 1200 RPM. Avoid prolonged idling at low RPM, as this practice may result in fouled spark plugs.

Takeoff may be made as soon as the ground check is completed, provided that the throttle may be opened fully without backfiring or skipping, and without a reduction in engine oil pressure.

Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, gravel or any loose material that may cause damage to the propeller blades.

4.17 TAXIING

Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Ascertain that the propeller back blast and taxi areas are clear.

Power should be applied slowly to start the taxi roll. Taxi a few feet forward and apply the brakes to determine their effectiveness. Taxi with the propeller set in low pitch, high RPM setting. While taxiing, make slight turns to ascertain the effectiveness of the steering.

Observe wing clearances when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane.

Avoid holes and ruts when taxiing over uneven ground.

Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, gravel or any loose material that may cause damage to the propeller blades.

4.19 GROUND CHECK

The magnetos should be checked at 2000 RPM with the propeller set at high RPM. Drop off on either magneto should not exceed 175 RPM and the difference between the magnetos should not exceed 50 RPM. Operation on one magneto should not exceed 10 seconds.

Check the vacuum gauge; the indicator should read 5.0" ± .1" Hg at 2000 RPM.

Check the annunciator panel lights with the press-to-test button. Also check the air conditioner and the alternate air.

The propeller control should be moved through its complete range to check for proper operation, and then placed in full "INCREASE" rpm for takeoff. To obtain maximum rpm, push the pedestal mounted control fully forward on the instrument panel. Do not allow a drop of more than 500 RPM during this check. In cold weather the propeller control should be cycled from high to low RPM at least three times before takeoff to make sure that warm engine oil has circulated.

The electric fuel pump should be turned "OFF" after starting or during warm-up to make sure that the engine driven pump is operating. Prior to takeoff the electric pump should be turned ON again to prevent loss of power during takeoff should the engine driven pump fail. Check both oil temperature and oil pressure. The temperature may be low for some time if the engine is being run for the first time of the day. The engine is warm enough for takeoff when the throttle can be opened without the engine faltering.

4.21 BEFORE TAKEOFF

All aspects of each particular takeoff should be considered prior to executing the takeoff procedure.

After takeoff, if the gear selector switch is placed in the gear up position before reaching the airspeed at which the back up gear extender system no longer commands gear down*, the gear will not retract. For obstacle clearance on takeoff and for takeoffs from high altitude airports, the landing gear can be retracted after lift-off at the pilot's discretion by placing the gear selector switch in the "UP" position and then latching the emergency gear lever in the "OVERRIDE ENGAGED" position. If desired, the "OVERRIDE ENGAGED" position can be selected and latched before takeoff, and the gear will then retract as soon as the gear selector switch is placed in the "UP" position. Care should always be taken not to retract the gear prematurely, or the aircraft could settle back onto the runway. If the override lock is used for takeoff, it should be disengaged as soon as sufficient airspeed and terrain clearance are obtained, to return the gear system to normal operation.

For normal operation, the pilot should extend and retract the gear with the gear selector switch located on the instrument panel, just as he would if the back-up gear extender system were not installed.

If the airplane is to be operated with the rear cabin door removed, it is recommended that all passengers wear parachutes.

After all aspects of the takeoff are considered, a pretakeoff check procedure must be performed.

Turn "ON" the master switch and check and set all of the flight instruments as required. Check the fuel selector to make sure it is on the proper tank (fullest). Turn "ON" the electric fuel pump and check the engine gauges. The alternate air should be in the "CLOSED" position.

All seat backs should be erect.

The mixture and propeller control levers should be set and the seat belts and shoulder harness fastened. Fasten the seat belts snugly around the empty seats.

Exercise and set the flaps and trim tab. Insure proper flight control movement and response.

All doors should be properly secured and latched.

On air conditioned models, the air conditioner must be "OFF" to insure normal takeoff performance.

*Approximately 81 KIAS at sea level to approximately 100 KIAS at 10,000 ft. with a straight line variation between.

4.23 TAKEOFF

NORMAL TECHNIQUE (No Performance Chart Furnished)

When the available runway length is well in excess of that required and obstacle clearance is no factor, the normal takeoff technique may be used. The flaps should be set in the retracted position and the pitch trim set slightly aft of neutral. Align the airplane with the runway, apply full power, and accelerate to 75 to 85 KIAS. Apply back pressure to the control wheel to lift off, then control pitch attitude as required to attain the desired climb speed. Retract the landing gear when a straight-ahead landing on the runway is no longer possible. Since takeoff distances with this technique will vary, performance charts are not furnished.

MAXIMUM PERFORMANCE WITH FLAPS RETRACTED (See Chart, Section 5)

Align the airplane with the runway, set the brakes, adjust the pitch trim slightly aft of neutral, and advance the throttle to full power. Release the brakes and allow the airplane to accelerate to 66 to 70 KIAS, depending on weight, and apply back pressure to rotate for lift off. After breaking ground, accelerate to 68 to 74 KIAS and retract the gear. When clear of obstacles, increase the climb speed to that desired.

Achievement of the charted performance requires strict adherence to the associated speeds, and familiarity with the airplane's flight characteristics. Note that takeoff distances are increased for center of gravity locations forward of the 85 inch datum (See chart, Section 5).

SHORT FIELD TECHNIQUE (See Chart, Section 5)

For a short or soft field takeoff, flaps should be lowered to the second notch, and the pitch trim set slightly aft of neutral. Align the airplane with the runway, set the brakes, and advance the throttle to full power.

Release the brakes, allow the airplane to accelerate to 64 KIAS, and apply back pressure to rotate for lift off. After breaking ground, accelerate to 66 KIAS and retract the gear. Slowly retract the flaps while continuing to accelerate to the desired climb speed.

Achievement of the charted performance requires strict adherence to the associated speeds, and familiarity with the airplane's flight characteristics. Note that takeoff distances are increased for center of gravity locations forward of the 85 inch datum (See chart, Section 5).

4.25 CLIMB

The best rate of climb at gross weight will be obtained at 92 KIAS. The best angle of climb may be obtained at 87 KIAS. At lighter than gross weight these speeds are reduced somewhat *. For climbing en route, a speed of 104 KIAS is recommended.

When reaching the desired altitude, the electric fuel pump may be turned off.

* To obtain the performance presented in the Performance Section of this handbook, full power (full throttle and 2700 RPM) must be used.

4.27 CRUISING

The cruising speed of the Lance II is determined by many factors, including power setting, altitude, temperature, loading and equipment installed in the airplane.

The normal maximum cruising power is 75% of the rated horsepower of the engine. When selecting cruising RPM below 2300, limiting manifold pressure for continuous operation, as specified by the appropriate "Avco-Lycoming Operator's Manual," should be observed.

To obtain the desired power, set the manifold pressure and RPM according to the power setting table in this manual.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should be leaned during cruising operation when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the full "RICH" position for all operations under 5000 feet.

To lean the mixture, disengage the lock and pull the mixture control until the engine becomes rough, indicating that the lean mixture limit has been reached in the leaner cylinders. Then enrich the mixture by pushing the control towards the instrument panel until engine operation becomes smooth. The fuel flow meter will give a close approximation of the fuel being consumed. The low side of the power setting, as shown on the fuel flow meter, indicates best economy for that percent of power while the high side indicates best power.

If the airplane is equipped with the optional exhaust gas temperature (EGT) gauge, a more accurate means of leaning is available to the pilot. For this procedure, refer to the "Avco-Lycoming Operator's Manual."

In order to keep the airplane in best lateral trim during cruise flight, the fuel should be used alternately from each tank at one hour intervals.

Always remember that the electric fuel pump should be turned "ON" before switching tanks, and should be left on for a short period thereafter. To preclude making a hasty selection, and to provide continuity of flow, the selector should be changed to another tank before fuel is exhausted from the tank in use. The electric fuel pump should be normally "OFF" so that any malfunction of the engine driven fuel pump is immediately apparent. If signs of fuel starvation should occur at any time during flight, fuel exhaustion should be suspected, at which time the fuel selector should be immediately positioned to a full tank and the electric fuel pump switched to the "ON" position.

4.29 APPROACH AND LANDING

Accomplish the Landing Check List early in the landing approach. Depending on field length and other factors the following procedures are appropriate:

NORMAL TECHNIQUE (No Performance Chart Furnished)

When available runway length is in excess of required runway length, a normal approach and landing technique may be utilized. The aircraft should be flown down the final approach course at 95 KIAS with power required to maintain the desired approach angle. The amount of flap used during approach and landing and the speed of the aircraft at contact with the runway should be varied according to the landing surface, conditions of wind and aircraft loading. It is generally good practice to contact the ground at the minimum possible safe speed consistent with existing conditions. As landing distances with this technique will vary, performance charts are not furnished.

SHORT FIELD LANDING APPROACH POWER OFF (See Chart, Section 5)

When available runway length is minimal or obstacle clearance to landing is of major concern, this approach/landing technique may be employed. The aircraft should be flown on the final approach at 75 KIAS with full flaps, gear down and idle power. The glide path should be stabilized as early as possible. Reduce the speed slightly during landing flareout and contact the ground close to stall speed. After ground contact, retract the flaps and apply full aft travel on the control wheel and maximum braking consistent with existing conditions.

SHORT FIELD LANDING APPROACH POWER ON (No Performance Chart Furnished)

It may sometimes be advantageous to use this approach technique when obstacle clearance during landing is of concern. The aircraft should be flown with full flaps, gear down and power sufficient for an approach path that will clear the obstacle. When obstacle clearance is assured, reduce the power and assume the 75 KIAS approach speed to landing flare. After ground contact, close the throttle, retract the flaps, apply full aft travel on the control wheel and maximum braking consistent with existing conditions. As landing distances with this technique will vary, performance charts are not furnished.

4.31 GO-AROUND

To initiate a go-around from a landing approach, the throttle should be advanced to maximum power while the pitch attitude is increased. Allow the airplane to accelerate to the best angle of climb speed (87 KIAS) for obstacle clearance or to the best rate of climb speed (92 KIAS) if obstacles are not a factor. Retract the landing gear and slowly retract the flaps when a positive climb is established. Reset the longitudinal trim as required.

NOTE

When power is advanced for a go-around from a low power, full flap approach, a nose down pitch will occur which must be countered with an aft control input.

4.33 STOPPING ENGINE

At the pilot's discretion, the flaps should be raised and the electric fuel pump turned "OFF."

NOTE

The flaps must be placed in the "UP" position for the flap step to support weight. Passengers should be cautioned accordingly.

The air conditioner and radios should be turned "OFF," the propeller set in the full "INCREASE" position, and the engine stopped by disengaging the mixture control lock and pulling the mixture control back to idle cut-off. The throttle should be left full aft to avoid engine vibration while stopping. Then the magneto and master switches must be turned "OFF."

4.35 PARKING

If necessary, the airplane should be moved on the ground with the aid of the nose wheel tow bar provided with each airplane and secured behind the rear seats. The aileron and stabilator controls should be secured by looping the safety belt through the control wheel and pulling it snug. The flaps are locked when in the "UP" position and should be left retracted.

Tie downs can be secured to rings provided under each wing and to the tail skid. The rudder is held in position by its connections to the nose wheel steering and normally does not have to be secured.

4.37 STALLS

The stall characteristics of the Lance II are conventional. An approaching stall is indicated by a stall warning horn which is activated between five and ten knots above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall.

The gross weight stalling speed with power off and full flaps is 52 KIAS. With the flaps up this speed is increased 1 KT. Loss of altitude during stalls can be as great as 550 feet, depending on configuration and power.

NOTE

The stall warning system is inoperative with the master switch "OFF."

During preflight, the stall warning system should be checked by turning the master switch "ON," lifting the detector and checking to determine if the horn is actuated. The master switch should be returned to the "OFF" position after the check is complete.

4.39 TURBULENT AIR OPERATION

In keeping with good operating practice used in all aircraft, it is recommended that when turbulent air is encountered or expected, the airspeed be reduced to maneuvering speed to reduce the structural loads caused by gusts and to allow for inadvertent speed build-ups which may occur as a result of the turbulence or of distractions caused by the conditions.

4.41 LANDING GEAR

This airplane is equipped with an airspeed - power sensing system (back-up gear extender) which extends the landing gear under low airspeed - power conditions* even though the pilot may not have selected gear down. This system will also prevent retraction of the landing gear by normal means when the airspeed - power values are below a predetermined minimum. To override this system or to hold the emergency gear lever in the "OVERRIDE ENGAGED" position without maintaining manual pressure on the emergency gear lever, pull the lever full up and push the latch down. To release the override, pull lever up to disengage the latch, then release lever.

For normal operation, the pilot should extend and retract the gear with the gear selector switch located on the instrument panel, just as he would if the back-up gear extender system were not installed.

The pilot should become familiar with the function and significance of the landing gear position indicators and warning lights.

The red gear warning light on the instrument panel and the horn operate simultaneously in flight when the throttle is reduced to where the manifold pressure is approximately 14 inches of mercury or below, and the gear selector switch is not in the "DOWN" position. This warning will also occur during flight when the back-up gear extended system has lowered the landing gear and the gear selector switch is not in the "DOWN" position and the throttle is not full "OPEN."

The red gear warning light on the instrument panel and the horn will also operate simultaneously on the ground when the master switch is "ON" and the gear selector switch is in the "UP" position.

The three green lights on the instrument panel operate individually as each associated gear is locked in the extended position.

WARNING

Radio lights' dimmer switch must be off to obtain gear lights full intensity during daytime flying. When aircraft is operated at night and radio lights' dimmer switch is turned on, gear lights will automatically dim.

The yellow "Auto Ext. OFF" light immediately below the gear selector switch flashes whenever the emergency gear lever is in the "OVERRIDE ENGAGED" position.

4.43 WEIGHT AND BALANCE

It is the responsibility of the owner and pilot to determine that the airplane remains within the allowable weight vs. center of gravity envelope while in flight.

For weight and balance data, refer to Section 6 (Weight and Balance).

*Approximately 103 KIAS at any altitude, power off.