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### GENERAL

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## 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.

DUPLICATE

**WARNING**

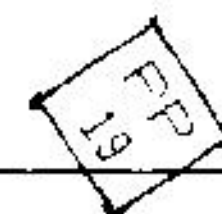
EXTREME CARE MUST BE EXERCISED TO LIMIT THE USE OF THIS MANUAL TO APPLICABLE AIRCRAFT. THIS MANUAL REVISED AS INDICATED BELOW OR SUBSEQUENTLY REVISED IS VALID FOR USE WITH THE AIRPLANE IDENTIFIED ON THE FACE OF THE TITLE PAGE WHEN OFFICIALLY APPROVED. SUBSEQUENT REVISIONS SUPPLIED BY PIPER AIRCRAFT CORPORATION MUST BE PROPERLY INSERTED.

MODEL PA-32R-300, CHEROKEE LANCE

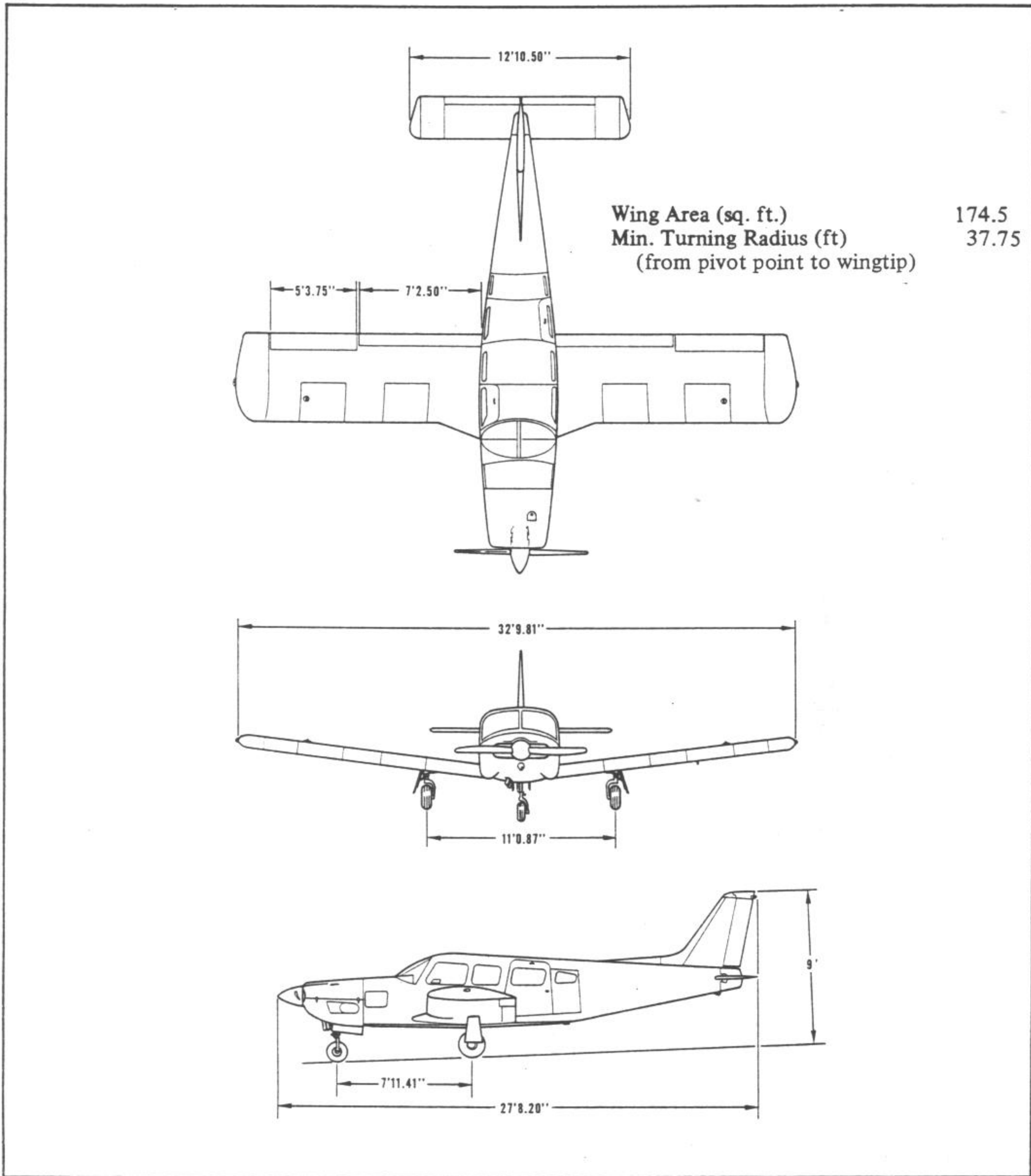
PILOT'S OPERATING HANDBOOK, REPORT: VB-750 REVISION \_\_\_\_\_ Rev. 10

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THREE VIEW

Figure 1-1

**1.3 ENGINES**

(a) Number of Engines		1
(b) Engine Manufacturer		Lycoming
(c) Engine Model Number	(Serial Nos. 32R-7680001 through 32R-7680140)	IO-540-K1A5D
	(Serial Nos. 32R-7680141 through 32R-7680525)	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 PROPELLERS**

(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**

**AVGAS ONLY**

(a) Fuel Capacity (U.S. gal) (total)		98
(b) Usable Fuel (U.S. gal) (total)		94
(c) Fuel Grade, Aviation (min. octane)		100/130 - Green

**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 100	AFT 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.		1956
(b) Maximum Useful Load (lbs): The difference between the Maximum Takeoff Weight and the Standard Empty Weight.		1644

1.15 BAGGAGE SPACE

	FORWARD	AFT
(a) Compartment Volume (cubic feet)	7.0	20.0
(b) Entry Width (inches)	16.0	48.0
(c) Entry Height (inches)	22.0	26.0

1.17 SPECIFIC LOADINGS

(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 for 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 compressability.
$V_A$	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. (1013.2 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 (-0.003564° 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 (1013.2 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 (Specific)

Takeoff Power	Maximum Rated Power (300 HP @ 2700 RPM)
Maximum Continuous Power	Maximum Rated Power (300 HP @ 2700 RPM)
Maximum Climb Power	Maximum Rated Power (300 HP @ 2700 RPM)
Maximum Cruise Power	Maximum Rated Power (300 HP @ 2700 RPM)
Flight Idle Power	Throttle Closed
Ground Idle Power	Throttle Closed

(d) Engine Instruments

EGT Gauge	Exhaust Gas Temperature Gauge
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(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.
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

<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	
acres	0.4047	ha	cubic inches (cu. in.)	16.39	cm <sup>3</sup>	
	43560	sq. ft.		$1.639 \times 10^{-5}$	m <sup>3</sup>	
	0.0015625	sq. mi.		$5.787 \times 10^{-4}$	cu. ft.	
atmospheres (atm)	76	cm Hg	0.5541		fl. oz.	
	29.92	in. Hg	0.01639		l	
	1.0133	bar	$4.329 \times 10^{-3}$		U.S. gal.	
	1.033	kg/cm <sup>2</sup>	0.01732		U.S. qt.	
	14.70	lb./sq. in.	cubic meters (m <sup>3</sup> )	61024	cu. in.	
	2116	lb./sq. ft.		1.308	cu. yd.	
bars (bar)	0.98692	atm.	35.3147	cu. ft.		
	14.503768	lb./sq. in.	264.2	U.S. gal.		
British Thermal Unit (BTU)	0.2519958	kg-cal	cubic meters per minute (m <sup>3</sup> /min.)	35.3147	cu. ft./min.	
centimeters (cm)	0.3937	in.	cubic yards (cu. yd.)	27	cu. ft.	
	0.032808	ft.		0.7646	m <sup>3</sup>	
centimeters of mercury at 0°C (cm Hg)	0.01316	atm	degrees (arc)	0.01745	radians	
	0.3937	in. Hg		degrees per second (deg./sec.)	0.01745	radians/sec.
	0.1934	lb./sq. in.	drams, fluid (dr. fl.)		0.125	fl. oz.
	27.85	lb./sq. ft.			drams, avdp. (dr. avdp.)	0.0625
	135.95	kg/m <sup>2</sup>	feet (ft.)	30.48		cm
centimeters per second (cm/sec.)	0.032808	ft./sec.		0.3048	m	
	1.9685	ft./min.		12	in.	
	0.02237	mph		0.33333	yd.	
cubic centimeters (cm <sup>3</sup> )	0.03381	fl. oz.		0.0606061	rod	
	0.06102	cu. in.		$1.894 \times 10^{-4}$	mi.	
	$3.531 \times 10^{-5}$	cu. ft.		$1.645 \times 10^{-4}$	NM	
	0.001	l	feet per minute (ft./min.)	0.01136	mph	
	$2.642 \times 10^{-4}$	U.S. gal.		0.01829	km/hr.	
cubic feet (cu.ft.)	28317	cm <sup>3</sup>		0.508	cm/sec.	
	0.028317	m <sup>3</sup>		0.00508	m/sec.	
	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 <sup>3</sup> /min.				

<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>
feet per second (ft./sec.)	0.6818 1.097 30.48 0.5921	mph km/hr. cm/sec. kts.	hectares (ha)	2.471 107639 10000	acres sq. ft. m <sup>2</sup>
foot-pounds (ft.-lb.)	0.138255 3.24 x 10 <sup>-4</sup>	m-kg kg-cal	horsepower (hp)	33000 550 76.04 1.014	ft.-lb./min. ft.-lb./sec. m-kg/sec. metric hp
foot-pounds per minute (ft.-lb./min.)	3.030 x 10 <sup>-5</sup>	hp	horsepower, metric	75 0.9863	m-kg/sec. hp
foot-pounds per second (ft.-lb./sec.)	1.818 x 10 <sup>-5</sup>	hp	inches (in.)	25.40 2.540 0.0254 0.08333 0.027777	mm cm m ft. yd.
gallons, Imperial (Imperial gal.)	277.4 1.201 4.546	cu. in. U.S. gal. l	inches of mercury at 0°C (in. Hg)	0.033421 0.4912 70.73 345.3 2.540 25.40	atm lb./sq. in. lb./sq. ft. kg/m <sup>2</sup> cm Hg mm Hg
gallons, U.S. dry (U.S. gal. dry)	268.8 1.556 x 10 <sup>-1</sup> 1.164 4.405	cu. in. cu. ft. U.S. gal. l	inch-pounds (in.-lb.)	0.011521	m-kg
gallons, U.S. liquid (U.S. gal.)	231 0.1337 4.951 x 10 <sup>-3</sup> 3785.4 3.785 x 10 <sup>-3</sup> 3.785 0.83268 128	cu. in. cu. ft. cu. yd. cm <sup>3</sup> m <sup>3</sup> l Imperial gal. fl. oz.	kilograms (kg)	2.204622 35.27 1000	lb. oz. avdp. g
gallons per acre (gal./acre)	9.353	l/ha	kilogram-calories (kg-cal)	3.9683 3087 426.9	BTU ft.-lb. m-kg
grams (g)	0.001 0.3527 2.205 x 10 <sup>-3</sup>	kg oz. avdp. lb.	kilograms per cubic meter (kg/m <sup>3</sup> )	0.06243 0.001	lb./cu. ft. g/cm <sup>3</sup>
grams per centimeter (g/cm)	0.1 6.721 x 10 <sup>-2</sup> 5.601 x 10 <sup>-3</sup>	kg/m lb./ft. lb./in.	kilograms per hectare (kg/ha)	0.892	lb./acre
grams per cubic centimeter (g/cm <sup>3</sup> )	1000 0.03613 62.43	kg/m <sup>3</sup> lb./cu. in. lb./cu. ft.	kilograms per square centimeter (kg/cm <sup>2</sup> )	0.9678 28.96 14.22 2048	atm in. Hg lb./sq. in. lb./sq. ft.