SECTION 1 - GENERAL

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1.1 GENERAL

1.1.1 Classification of the aircraft

The Z 242 L aircraft is designed for basic and advanced training, touring flights and acrobatics training. When equipped with appropriate optional equipment it is suitable for training in night and instrument flights, radio navigation flights, flight acc. to IFR conditions and glider and banner towing.

The Z 242 L is a low wing, single engine cantilever monoplane of all-metal structure, two-seat arrangement, with tricycle fixed landing gear with nose leg.

The power plant consists of the TEXTRON Lycoming AEIO-360-A1B6 piston engine and three-blade constant-speed hydraulically controlled MTV-9-B-C/C-188-18a or Hartzell HC-C3YR-4BF/FC 6890 propeller.

1.1.2 Manufacturer

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1.3 INTRODUCTION

THIS FLIGHT MANUAL CONTAINS INFORMATION NECESSARY FOR THE PILOT WHICH SHOULD BE PROVIDED IN COMPLIANCE WITH THE REQUIREMENTS OF THE FAR PART 23, INCLUSIVE THE COMPLEMENTARY DATA, CONSIDERED BY THE AIRCRAFT MANUFACTURER.

This Flight manual contains operational procedures which allow to meet the output characteristics as given below in this manual.

Additionally, this manual contains the basic information for the necessary maintenance works which are necessary to maintain the performance and characteristic of the aircraft during its operation at the level as it was at a new aircraft.

Before a flight, the pilot is required to read the whole content of this Manual, including all Supplements, as listed in the Chapter 9.

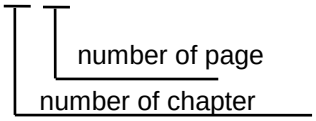
DESCRIPTION OF MANUAL

AIRCRAFT FLIGHT MANUAL OF THE Z 242L AIRCRAFT meets the requirements specification for pilot manual **GAMA SPECIFICATION No. 1**, issued: February 15, 1975 Revised: October 18, 1996 Revision No. 2.

NUMBERING OF PAGES AND FIGURES

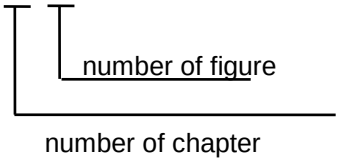
PAGES NUMBERING

Example: page 1-10



FIGURES NUMBERING

Example: *Fig. 7 - 4*



NOTE

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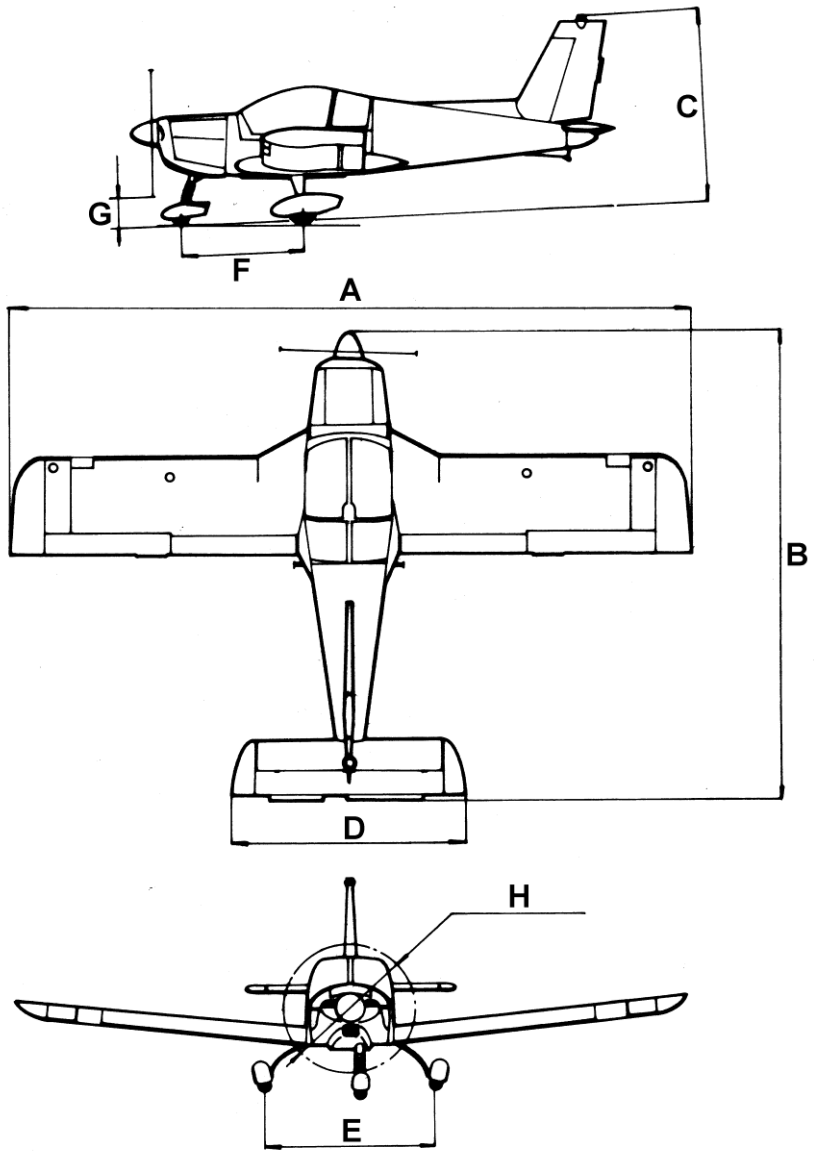
1.5 THREE-VIEW DRAWING



Data	Note	Dimension in	
		m	**ft**
A		9.340	30.64
B		6.940	22.77
C		2.950	9.68
D		3.200	10.50
E		2.330	7.64
F		1.755	5.76
G with propeller	MTV-9-B-C/C-188-18a	330	1.10
	Hartzell HC-C3YR-4BF/FC 6890	380	1.24
H with propeller	MTV-9-B-C/C-188-18a	1.880	6.17
	Hartzell HC-C3YR-4BF/FC 6890	1.780	5.84

Fig. 1-1

1.11 REQUIRED DESCRIPTIVE DATA

1.11.1 Dimensions

Wing span		9,340 m	30,64 ft
Length		6,940 m	22,77 ft
Height		2,950 m	9,68 ft
Wing:	- depth (constant)	1,420 m	4,66 ft
	- dihedral	6^o	
	- MAC length	1,5044 m	4,94 ft
	- area	13,860 m^2	149,19 sq.ft
Ailerons:	- deflection up	$21^o \pm 1^o$	
	- deflection down	$17^o \pm 1^o$	
	- area 2 x 0,704 m^2	1,408 m^2	15,16 sq.ft
Wing flaps:			
	- position: RETRACTED	0^o	
	TAKE-OFF	$14^o \pm 1$	
	LANDING	$37^o \pm 1^o$	
	- area 2x0,704 m^2	1,408 m^2	15,16 sq.ft
Horizontal tail unit (HTU):			
	- elevator deflection:	$^{+0^o}_{-1^o}$	
	- up	34^o	
	- down	$31^o \pm 1^o$	
	- stabiliser area	1,230 m^2	13,24 sq.ft
	- elevator area	1,368 m^2	14,73 sq.ft
	- HTU total area	2,598 m^2	27,97 sq.ft
Vertical tail unit (VTU) :			
	- rudder deflection:		
	- right	$30^o \pm 2^o$	
	- left	$30^o \pm 2^o$	
	- fin area	0,540 m^2	5,81 sq.ft
	- rudder area	0,810 m^2	8,72 sq.ft
	- VTU total area	1,350 m^2	14,53 sq.ft
Landing gear:			
	- wheel track	2,330 m	7,64 ft
	- wheel base	1,755 m	5,76 ft
	- wheel size:		
	a) with BARUM tires		
	- main landing gear tire	420 x 150 mm (16,5 x 5,9 inch)	
	- nose wheel tire	350 x 135 mm (13,8 x 5,3 inch)	
	b) with GOODYEAR tires		
	- main landing gear tire	6.00-6.5 inch	
	- nose wheel tire	5.00-5 inch	

Tire pressure:

- main landing gear tire (is identical for wheels both with BARUM tires and with GOODYEAR tires):
  190±10 kPa 28±2 p.s.i.
- nose wheel tire (wheel with BARUM tire):
  250±10 kPa 36±2 p.s.i.
  (wheel with GOODYEAR tire):
  180±10 kPa 26±2 p.s.i.

Air-pressure in the hydropneumatic nose shock absorber: $400\ ^{+10}_{-40}$ kPa $58\ ^{+2}_{-6}$ p.s.i.

1.13 ENGINE

Manufacturer:	**TEXTRON Lycoming, Williamsport, Pennsylvania, USA**	
Type:	Lycoming AEIO - 360 - A1B6	
Cylinder bore:	130,175 mm	5,125 inch
Stroke:	111,125 mm	4,375 inch
Total cylinder volume:	5,92 litres	360,97 cu.inch
Compression ratio:	8.7 : 1	

Rotating as viewed from the rear: clockwise

Engine Power - Speed - Consumption - Manifold Pressure:

Power setting	Power		Engine speed	Consumption		Manifold Pressure		Mixture
	kW	HP	R.P.M.	l/h	US gal./h	kPa	in. Hg	
Maximum continuous **MC**	149	200	2700	61	16,1	MAX (FULL)		Mixture set for maximal power
Cruising **PC** (75% MC)	112	150	2450	46,5	12,3	82,0	25,0	
Economy **EC** (65% MC)	94	126	2350	40	10,6	78,0	23,0	
Best Economy **B.E.** (65% MC)	86	115	2350	32	8,5	78,0	23,0	Mixture leaned for B.E. power setting

Nominal values in 0 ft (0 m) ISA.

Fig. 1-2

1.15 PROPELLER

a) Type: **MTV-9-B-C/C-188-18a**
Manufacturer: MT-PROPELLER ENTWICKLUNG GmbH Germany
Number of blades: 3
Propeller diameter: 1880 mm 74,0 inch

b) Type: **Hartzell HC-C3YR-4BF/FC 6890**
Manufacturer: HARTZELL PROPELLER INC. U.S.A
Number of blades: 3
Propeller diameter: 1780 mm 70,1 inch

1.17 FUEL

Aviation gasoline **100** or **100 LL** (100/130 octane).

CAUTION:

(1) USE OF AVGAS OF OCTANE GRADE LESS THAN 100 OCTANES AND USE ANY AUTOMOTIVE GAS IS PROHIBITED.

(2) PERMANENT USE OF THE AVIATION GASOLINE WITH CONTENT OF **TETRAETHYL LEAD** (TEL) GREATER THAN 0,05% BY VOLUME (2 ml TEL/U.S.GAL) MAY CAUSE INCREASED SEDIMENTATION OF LEAD. THIS MUST BE CONSIDERED IN THE COURSE OF MAINTENANCE PROCEDURES.

NOTE:

Supplementary information about use of aviation gasoline other than 100 or 100LL are contained in the engine manufacturer's Service Instruction No. 1070 (latest applicable issue).

Item	Category					
	Acrobatic (A)		Utility (U)		Normal (N)	
	litres	U.S.gal	litres	U.S.gal	litres	U.S.gal
Total fuel quantity	120	32,0	120	32,0	230	61
Usable fuel quantity	116	30,6	116	30,6	224	59,1

Fig. 1-3

1.19 OIL

1.19.1 For the first 50 flight hours only mineral aviation oil of the viscosity class according to the table for the Lycoming AEIO-360-A1B6 engine should be used.

For further operation mineral, ashless dispersant or synthetic aviation oils of viscosity class according to the table or equivalent oil types approved by the engine manufacturer may be used.

1.19.2 Table of recommended oils and inlet oil temperatures

Average outside air temperature		Recommended oil viscosity class-SAE		Inlet oil temperatures			
				Desired		Maximum	
^{O}C	^{O}F	Mineral oils	Dispersive oils (ashless)	^{O}C	^{O}F	^{O}C	^{O}F
above +27	above +80	60	60	82	180	118	244
above +16	above +60	50	40 or 50				
-1 to +32	+30 to +90	40	40				
-18 to +21	0 to +70	30	40, 30 or 20W40	77	170	107	225
under -12	under +10	20	30 or 20W30	71	160	99	210
Whole operation temperature range		-	15W50 or 20W50	71 - 82	160 - 180	118	244

Fig. 1-4

NOTE:

(1) Synthetic and semi-synthetic oils shall not be added and mixed with the other kinds of oil.

(2) Low oil temperature may be particularly increased by installation of winterization screens in the front engine cowl.

(3) The other supplementary information for using the oils are currently published in the Textron Lycoming Service Instruction No. 1014 (last issue).

(4) Inlet oil temperature values are applied for oils published in the “Table of recommended oils” only. Maximal inlet temperature for MS 20 engine oil is 85 ^{O}C (185 ^{O}F)

(5) Inlet oil temperatures are affected by outside air temperature.

1.19.3 Oil Quantity in Sump

Kinds of operations	Maximum quantity		Minimum quantity	
	litres	quarts	litres	quarts
Normal operation	7.6	8	3.8	4
Acrobatic operation	5.7	6	4.7	5

Fig. 1-5

1.21 MAXIMUM CERTIFIED WEIGHTS

1.21.1 Maximum Take-off and Landing Weight

Category		Maximum take-off weight		Maximum landing weight	
		kg	lb	kg	lb
Acrobatic	(**A**)	970	2140	970	2140
Utility	(**U**)	1020	2250	1020	2250
Normal	(**N**)	1090	2400	1050	2315

Fig. 1-6

1.21.2 Maximum Permissible Variable Load

Category		Maximum permissible variable load	
		kg	lb
Acrobatic	(**A**)	240	530
Utility	(**U**)	290	640
Normal	(**N**)	360	795

Fig. 1-7

CAUTION:

MAXIMAL PERMISSIBLE VARIABLE LOAD:

(1)	PILOT SEATS	- L242.8110/8120	2x100 kg (2x220 lb)
		- E242.8110/8120	2x100 kg (2x220 lb)
(2)	BAGGAGE COMPARTMENT NORMAL category only	20 kg (44 lb)	
(3)	MAXIMUM PERMISSIBLE TOTAL LOAD (1)+(2) NORMAL category only	- L242.8110/8120 - E242.8110/8120	220 kg (485 lb) 220 kg (485 lb)

CAUTION:

IF ANY APPROVED ADDITIONAL EQUIPMENT (e.g. APPLIANCES, NAV SYSTEM, ELT, etc.), IS INSTALLED IN THE BAGGAGE COMPARTMENT, REDUCE THE BAGGAGE WEIGHT BY THE INSTALLED EQUIPMENT WEIGHT.

1.23 TYPICAL AIRCRAFT WEIGHTS

1.23.1 Theoretical Basic Empty Weight

Category		Basic empty weight (theoretical)	
		kg	lb
Acrobatic	(**A**)	745 ± 2 % *	1642 ± 2 % *
Utility	(**U**)	755 ± 2 % **	1664 ± 2 % **
Normal	(**N**)		

* applicable for aircraft equipped with MTV propeller
** applicable for aircraft equipped with Hartzell propeller

Fig. 1-8

1.23.2 Actual Basic Empty Weight

The actual basic empty weight is described in Subsection 6.3 of this AFM.

1.25 CABIN AND ENTRY DIMENSIONS

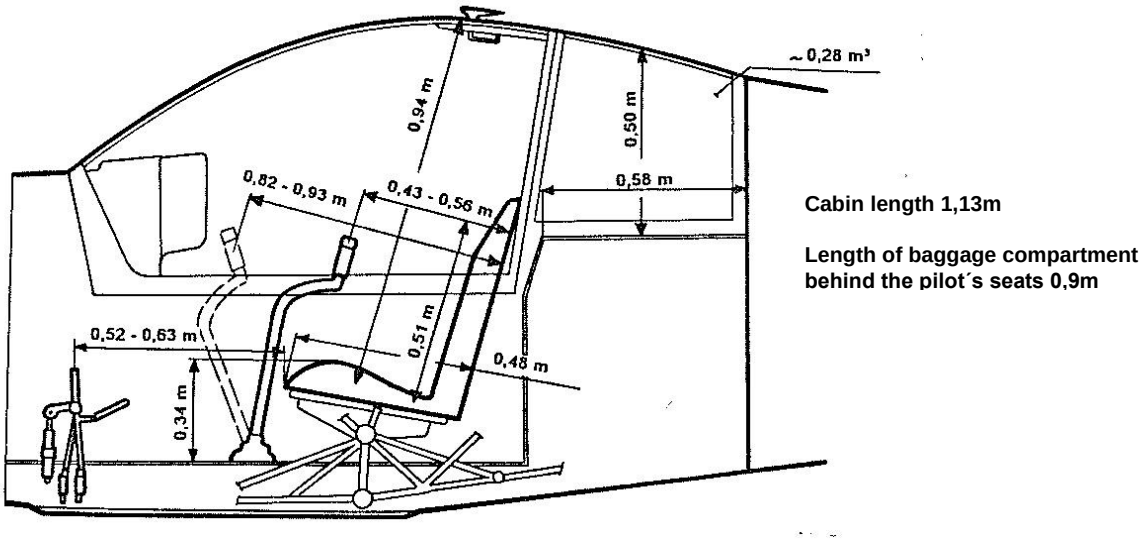


Fig. 1-9

1.27 BAGGAGE SPACE AND ENTRY DIMENSIONS

The dimensions of aircraft baggage compartment are described on Figure 1-9.

1.29 SPECIFIC LOADINGS

Category		Loading			
		Specific wing loading		Specific power loading	
		kg/m2	lb/sq.ft	kg/kW	lb/HP
Acrobatic	(**A**)	70	14.3	6.51	10.7
Utility	(**U**)	73.6	15.1	6.85	11.3
Normal	(**N**)	78.6	16.1	7.32	12.0

Fig. 1-10

1.31. SYMBOLS, ABBREVIATION AND TERMINOLOGY

(a) Airspeed Symbols and General Terminology:

IAS - Indicated Airspeed means the speed of an aircraft as shown on its pitot static airspeed indicator calibrated to reflect standard atmosphere adiabatic compressible flow at sea level uncorrected for airspeed systems errors.

CAS - Calibrated Airspeed means the Indicated Airspeed of an aircraft, corrected for position and instrument error. Calibrated Airspeed is equal to the True Airspeed in standard atmosphere at sea level.

EAS - Equivalent Airspeed means the calibrated airspeed of an aircraft, corrected for adiabatic compressible flow for the particular altitude. Equivalent airspeed is equal to calibrated airspeed in standard atmosphere at sea level.

TAS - True Airspeed means the airspeed of an aircraft relative to undisturbed air.
True airspeed is equal to equivalent airspeed multiplied by $(\rho_0/\rho)^{1/2}$, where:
ρ_0 = specific weight of air in zero altitude
ρ = specific weight of air in given altitude

V_A - Design Manoeuvring Speed is the maximum speed at which application of full available aerodynamic control will not overstress the aircraft.

V_{NE} - Never Exceed Speed 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 in smooth air and then only with caution.

V_{s0} - Stalling Speed or the Minimum Steady Flight Speed at which the aircraft is controltable in the landing configuration.

V_{s1} - Stalling Speed or the Minimum Steady Flight Speed at which the aircraft is controltable.

V_{FE} - Maximum Flaps Extended Speed is the highest speed permissible with wing flaps in prescribed extended position.

V_x - Means speed for max. angle of climb.

V_y - Means speed for max. rate of climb.

(b) Meteorological Terminology:

ISA -
International Standard Atmosphere

a. Air is a perfectly dry gas;

b. Temperature at sea level is 15°C;

c. Pressure at sea level is 1,013250 x 10^3Pa (29.92 in Hg) (1013.25 millibar);

d. The temperature gradient from sea level up to an altitude at which the temperature reaches the value of – 56.5°C, is 3.25°C/500 m (1.98°C/1 000 ft);

e. Density (specific gravity) at sea level, under the above conditions, is 1.2250 kg/m3; ρ is the density corresponding to the given altitude; and relative density ρ/ρ_0 is designated as σ.

OAT -
Outside Air Temperature is the free air static temperature, obtained either from in-flight temperature indications or ground meteorological sources, corrected for instrument error and compressibility effects.

Indicated Pressure Altitude -
The figure actually indicated by the altimeter when the barometric subscale is adjusted to **1013,2** hPa (**29,92 in.Hg**)

Pressure Altitude -
It is the indicated pressure altitude corrected for position and instrument error. In this Flight Manual, altimeter instrument errors are assumed to be zero.

(c) Weights and centre of gravity position terminology:

Reference Datum -
An imaginary plane (vertical when the aircraft is positioned horizontally) from which all-horizontal distances are measured for balance purposes. At the Z 242 L aircraft this plane is equal to the firewall rear side.

Arm -
The horizontal distance from the reference datum to the centre of gravity (C.G.) of an item or the whole aircraft.

Static Moment -
The product of a particular item weight or the total aircraft weight multiplied by its arm.

Centre of Gravity (C.G.) –
The position of the resultant of all mass forces.

C.G. Position –
The position of the aircraft's centre of gravity expressed in percentage of Mean Aerodynamic Chord (MAC) length.

Mean Aerodynamic Chord (MAC) -
The chord of an imaginary rectangular wing with the same area and the same aerodynamic parameters as the real wing.

C.G. Limits -
The extreme centre of gravity positions within which the aircraft may be operated at a given weight.

Usable Fuel Quantity -
The fuel available for flight planning.

Unusable Fuel Quantity -
The fuel that can not be used for operation.

Standard Empty Weight (theoretical) -
Weight of a standard aircraft including unusable fuel full operating fluids and full oil.

Basic Empty Weight (actual)-
Standard empty weight plus optional equipment (it is given on production placard in aircraft and entered in the current Weighing Record and in Section 6. of this Flight Manual.

Variable load -
Individual loading weights (or the sum of them) which vary for each particular flight (or during the flight). The term "Variable load" includes weights of aircraft's crew, fuel and baggage.

Useful load -
The difference between the maximum take-off and the basic empty weight (as placard in the cockpit).

Maximum Take-off Weight -
Maximum weight approved for the take-off run.

Maximum Landing Weight -
Maximum weight approved for the landing.

(d) Miscellaneous terminology:

ADF - Automatic Direction Finder

AFM - Aircraft Flight Manual

B.E. - Best economy mixture proportion

CHT - Cylinder Head Temperature

COMM - general designation of the radiocommunication equipment

C.G. - Centre of Gravity

DA - Decision Altitude (above **sea level**)

DME - Distance Measuring Equipment

ELT - Emergency Locator Transmitter

EGT - Exhaust Gas Temperature

EC - Economical Cruise

EHSI- Electronic Horizontal Situation Indicator

GIC - Gyroinduction Compass

GPS - Global Position System

HSI - Horizontal Situation Indicator

HTU - Horizontal Tail Unit

IFR - Instrument Flight Rules

ILS - Instrument Landing System

IMC- Instrument Meteorological Condition

MAC - Mean Aerodynamic Chord

MDA - Minimum Descent Altitude (above **sea level**)

MKR - (radio) Marker 75 MHz

MC - Maximum Continuous

MTP - Maximal Take-off Power

MM - Maintenance Manual

NAV - General designation of the navigation equipment

PC- Performance Cruise

RMI - Radiomagnetic Indicator

RNAV - Area Navigation

RWY - Runway

S/N - Serial Number

SAE - Oil Viscosity Grade

TEL - Tetraethyl Lead

VOR - VHF Omnidirectional radio Range

VTU - Vertical Tail Unit

XPDR - ATC Transponder

1.41 CONVERSION OF UNITS

Following table is helpful for metric to the Imperial (and vice-versa) units conversion.

Conversion factors						
UNITS	Dimension, Distance	m	- ft	3.2808	ft	- m	0.3048
		km	- Nm	0.5396	Nm	- km	1.8532
		km	- Stm	0.6214	Stm	- km	1.6093
		cm	- inch	0.3937	inch	- cm	2.5400
		mm	- inch	0.03937	inch	- mm	25.4000
	Area, Surface	m^2	- sq.ft	10.7643	sq.ft	- m^2	0.0929
		m^2	- sq.inch	1550.0000	sq.inch	- m^2	0.0006
	Volume, Capacity (l = litre)	m^3	- cu.ft	35.3100	cu.ft	- m^3	0.0283
		cm^3	- cu.inch	0.0610	cu.inch	- cm^3	16.39
		l	- cu.ft	0.0353	cu.ft	- l	28.32
		l	- cu.inch	60.9756	cu.inch	- l	0.0164
		l	- U.S.gal.	0.2642	U.S.gal.	- l	3.7850
		l	- quart	1.0570	quart	- l	0.9460
	Speed	km/h	- knots	0.5396	knots	- km/h	1.8532
		m/s	- ft/min	196.8000	ft/min	- m/s	0.0051
		m/s	- knots	1.9426	knots	- m/s	0.5148
		m/min	- ft/min	3.2810	ft/min	- m/min	0.3048
	Pressure	kPa	- p.s.i.	0.1450	p.s.i.	- kPa	6.8966
		kPa	- in.Hg	0.2953	in.Hg	- kPa	3.3864
	Weight	kg	- lb	2.2046	lb	- kg	0.4536
	Static moment	kgm	- lbft	7.2333	lbft	- kgm	0.1382
		kgm	- lbinch	86.7950	lbinch	- kgm	0.01152
	Engine power	kW	- HP	1.3410	HP	- kW	0.7457
	Temperature	^oC	- ^oF	(9/5x ^oC)+32	^oF	- ^oC	(^oF-32)x5/9

Fig. 1-11

SAMPLE PROBLEM:

Task:

Weight of variable load is M = 700 lb ..... ? kg

Computation:

M = 700 x 0,4536 = 317,5 kg

Result:

M = 700 lb = 317,5 kg

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