CHAPTER 1

GENERAL

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1. GENERAL

1.1. CLASSIFICATION OF THE AIRCRAFT

The Z 143 LSi aircraft is designed for basic and advanced training and touring flights. When equipped fitted with appropriate optional equipment it is suitable for training in night and instrument flights, radionavigation flights, IFR flights and glider and banner towing.

The Z 143 LSi is four-seat, a single engine cantilever monoplane low wing of all-metal structure, with 2+2 seats arrangement, with tricycle fixed landing gear.

The power plant consists of the TEXTRON Lycoming IO-540-C4D5 piston engine and three-blade constant-speed hydraulically controlled MTV-9-B/195-45a propeller.

1.2. MANUFACTURER

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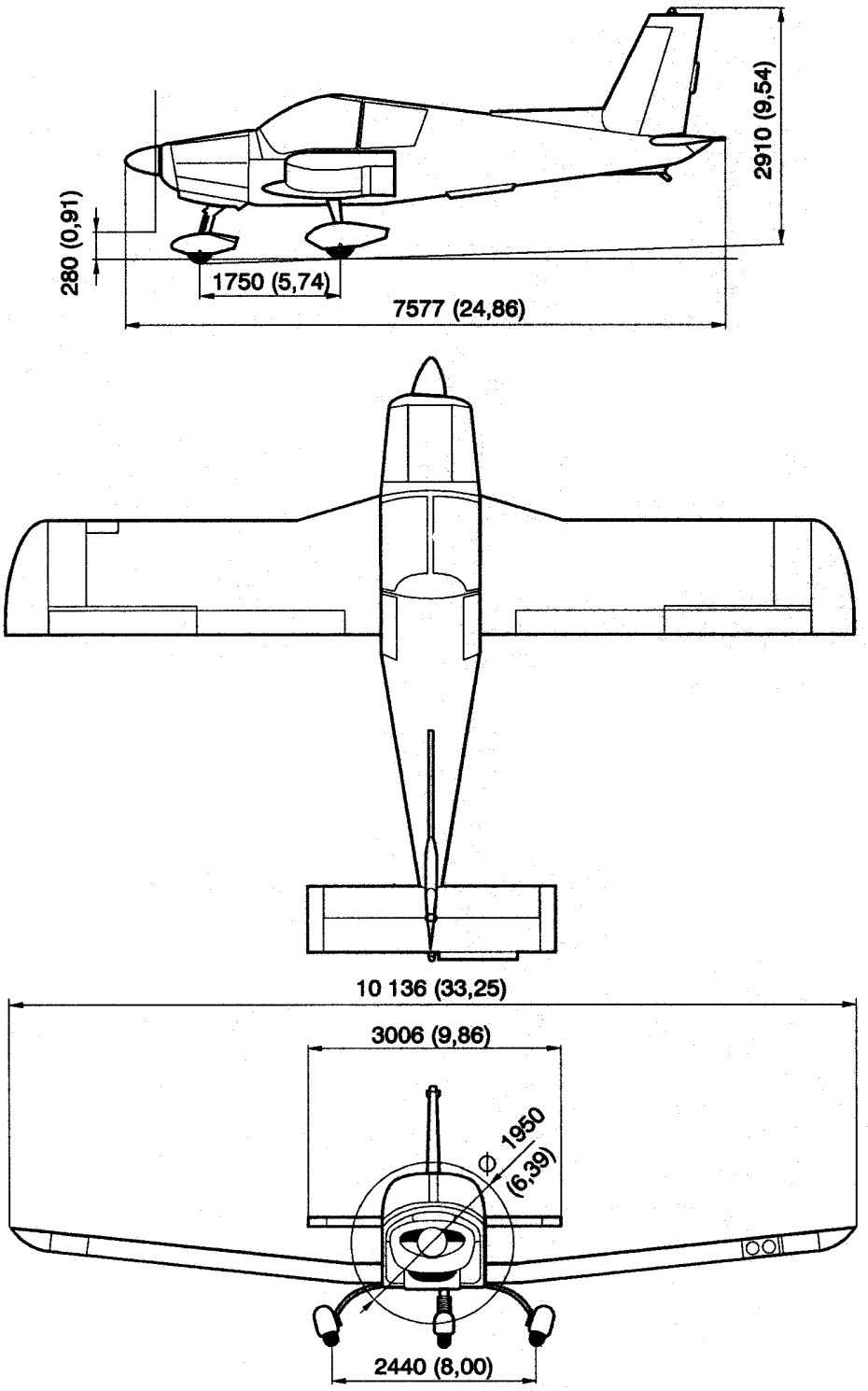
1.3. THREE-VIEW DRAWING



NOTE

The dimensions are described in milimetres (feets).

1.4. BASIC TECHNICAL DATA

1.4.1. Dimensions

Wing Span		10.136 m	33,25 ft
Length		7,577 m	24,86 ft
Height		2,910 m	9,55 ft
Wing:	- depth (constant)	1,420 m	4,66 ft
	- dihedral	6^o	
	- MAC length	1,4895 m	4,89 ft
	- area	14,776 m^2	159,05 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	15,15 sq.ft
Wing Flaps:			
	- position: **RETRACTED**	0^o	
	TAKE-OFF	$14^o \pm 1$	
	LANDING	$37^o \pm 1^o$	
	- area 2 x 0,704 m^2	1,408 m^2	15,15 sq.ft
Horizontal Tail Unit (HTU):			
	- elevator deflection:		
	- up	$30^o \pm 1^o$	
	- down	$27^o \pm 1^o$	
	- stabiliser area	1,230 m^2	13,24 sq.ft
	- elevator area	1,368 m^2	14,72 sq.ft
	- HTU total area	2,598 m^2	27,96 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	2,440 m	8,01 ft
- wheel base	1,750 m	5,74 ft
- wheel size BARUM tires		
- main landing gear wheel	420 x 150 mm	
- nose landing gear wheel	350 x 135 mm	
- wheel size GOODYEAR tires		
- main landing gear wheel	6.00 - 6.5 inch	
- nose landing gear wheel	5.00 - 5 inch	
- tire pressure (is identical for wheels both tires)		
- main landing gear wheel	250 $\pm$ 10 kPa	36 $\pm$ 2 p.s.i.
- nose landing gear wheel	250 $\pm$ 10 kPa	36 $\pm$ 2 p.s.i.
- air-pressure in the hydropneumatic shock absorber:	400 $^{+10}_{-40}$ kPa	58 $^{+2}_{-6}$ p.s.i.

1.4.2. Specific Loadings

Category		Loading			
		Specific Wing Loading		Specific Power Loading	
		kg/m2	lb/sq.ft	kg/kW	lb/HP
Utility	**U**	73,09	14,97	5,81	9,52
Normal	**N**	91,36	18,71	7,26	11,90

1.5. POWER PLANT

1.5.1. Engine

Manufacturer:	TEXTRON Lycoming, USA	
Type:	Lycoming IO - 540 - C4D5	
Cylinder bore:	130,175 mm	5,125 inch
Stroke:	111,125 mm	4,375 inch
Total cylinder volume:	8,875 litres	541,5 cu.in
Compression ratio:	8,5 : 1	

Rotating as viewed from the rear - clockwise.

1.5.2. Propeller

Manufacturer:	MTV PROPELLER ENTWICKLUNG GmbH, Germany	
Type:	MTV-9-B/195-45a	
Number of blades:	3	
Propeller diameter:	1950 mm	76,8 in

Engine Power – Speed – Consumption – Manifold Pressure:

Power setting	Power		Engine speed	Consumption		Manifold Pressure		Mixture
	kW	HP	RPM	l/h	US gal./h	kPa	in. Hg	-
Maximum continoues (MC)	175	235	2400	73	19,2	max.	max.	maximum power setting
Cruising (75 % MC)	130	175	2200	55	14,6	84,7	25,0	
Economy (60 % MC)	104	140	2000	39	10,3	82,9	24,5	B.E. power setting

NOTE

Nominal values in 0 ft (0 m) ISA is provided by the engine manufacturer are described in table.

1.6. ABBREVIATIONS AND DEFINITIONS

1.6.1. 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.

NOTE

As values published in this Flight Manual assume zero instrument error.

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:

$$(\rho_0/\rho)^{1/2}$$

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 except in smooth air and then only with caution.

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

V_S - **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 best angle of climb.

V_y - Means speed for best rate of climb.

1.6.2. Meteorological Terminology

ISA - International Standard Atmosphere

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.

Density Altitude - Altitude in international standard atmosphere, which is relevant to the same density of air as at the level in question.

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.

1.6.3. 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 143 LSi 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 (teoretical) - 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 placard in the cockpit and entered in the current Weighing Record and in Chapter 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 the aircraft's pilot´s, 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.

1.6.4. Miscellaneous terminology

ASPS - Alternate Static Pressure Source
ADF - Automatic Direction Finder
B.E. - Best Economy Cruising Power
CHT - Cylinder Head Temperature

COMM	-	Communication Equipment
DA	-	Decisive Altitude above sea level
DME	-	Distance Measuring Equipment
EC	-	Economical Cruising Power
ELT	-	Emergency Locator Transmitter
EGT	-	Exhaust Gas Temperature
GIC	-	Gyroinduction Compass
GPS	-	Global Position System
HSI	-	Horizontal Situation Indicator
HTU	-	Horizontal Tail Unit
IFR	-	Instrument Flight Rules
ILS	-	Instrument Landing System
FM	-	Flight Manual
MAC	-	Mean Aerodynamic Chord
MC	-	Maximum Continuous Power
MDA	-	Minimum Descent Altitude
MKR	-	Marker Receiver
MT	-	Maximum Take-off Power
MM	-	Maintenance Manual
NAV	-	Navigation Equipment
RMI	-	Radio-magnetic Indicator
RNAV	-	Area Navigation
SAE	-	Oil Viscosity Grade
VFR		Visual flight Rules
VTU	-	Vertical Tail Unit
TEL	-	Tetraethyl Lead
S/N	-	Serial Number
VOR	-	VHF Omni-directional radio Range
RWY	-	Runway
XPDR	-	ATC Transponder
IMC	-	Instrument Meteorological Conditions
VMC	-	Visual Meteorological Conditions

1.7. CONVERSION OF UNITS

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

Conversion factors					
Dimension, Distance	m	- ft	3.2808	ft	- m	0.3048
	km	- Nm	0.5400	Nm	- km	1.8520
	km	- Stm	0.6214	Stm	- km	1.6093
	cm	- inch	0.3937	inch	- cm	2.5400
	mm	- inch	0.0394	inch	- mm	25.4000
Area, Surface	m^2	- sq.ft	10.7639	sq.ft	- m^2	0.0929
	m^2	- sq.inch	1550.0031	sq.inch	- m^2	0.0006
Volume, Capacity (l = litre)	m^3	- cu.ft	35.3147	cu.ft	- m^3	0.0283
	cm^2	- cu.inch	0.0610	cu.inch	- cm^2	16.3871
	l	- cu.ft	0.0353	cu.ft	- l	28.3169
	l	- cu.inch	61.0238	cu.inch	- l	0.0164
	l	- U.S.gal.	0.2642	U.S.gal.	- l	3.7854
	l	- quart	1.0567	quart	- l	0.9464
Speed	km/h	- knots	0.5400	knots	- km/h	1.8520
	m/s	- ft/min	196.8504	ft/min	- m/s	0.0051
	m/s	- knots	1.9438	knots	- m/s	0.5144
	m/min	- ft/min	3.2808	ft/min	- m/min	0.3048
Pressure	kPa	- p.s.i.	0.1450	p.s.i.	- kPa	6.8948
	kPa	- in.Hg	0.2961	in.Hg	- kPa	3.3769
Weight	kg	- lb	2.2046	lb	- kg	0.4536
Static moment	kgm	- lbft	7.2333	lbft	- kgm	0.1383
	kgm	- lbinch	86.7962	lbinch	- kgm	0.0115
Engine power	kW	- HP	1.3410	HP	- kW	0.7457
Temperature	^oC	- ^oF	$(9/5 \cdot {}^oC)+32$	^oF	- ^oC	$({}^oF-32) \cdot 5/9$

Sample Problem:

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

Computation:

M = 700 · 0,4536 = 317,5 kg

Result:

M = 700 lb = 317, 5 kg