General

Contents

1.1 Introduction

1.2 Certification basis

1.3 Warnings, cautions and notes

1.4 Descriptive data

1.5 Three - view drawing

1.1 INTRODUCTION

The sailplane flight manual has been prepared to provide pilots with information for the safe and efficient operation of the L 33 sailplane. This manual includes the material required to be furnished to the pilot by JAR - 22. It also contains supplemental data supplied by the sailplane manufacturer.

1.2 CERTIFICATION BASIS

This type of sailplane has been approved by the Civil Aviation Inspectorate of the Czech Republic in accordance with JAR-22, Change 4 issued April 1,1980, including Amendment 22/91/1Eff. Dec 9,1991 and AC 21.17-2.

1.3 WARNINGS, CAUTIONS AND NOTES

The following definitions apply to warnings, cautions and notes used in the Flight Manual.

WARNING

MEANS THAT THE NON - OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO AN IMMEDIATE OR IMPORTANT DEGRADATION OF THE FLIGHT SAFETY.

CAUTION

MEANS THAT THE NON - OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO A MINOR OR TO A MORE OR LESS LONG TERM DEGRADATION OF THE FLIGHT SAFETY.

NOTE

Draws the attention on any special item not directly related to safety but which is important or unusual.

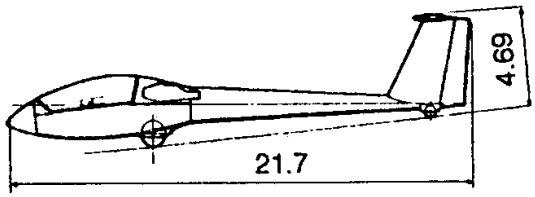
1.4 DESCRIPTIVE DATA

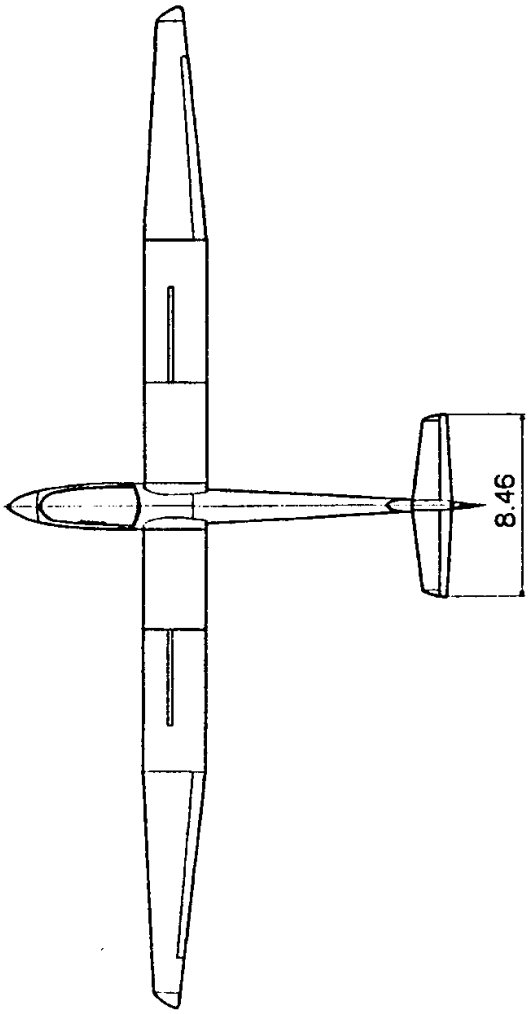
The L 33 sailplane is a cantilever single seater of all - metal structure with a T tail unit.

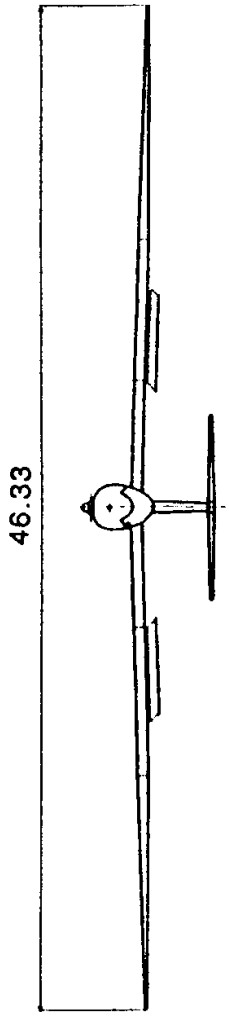
Basic dimensions

Wing span	46.33 ft (14.12 m)
Length	21.72 ft (6.62 m)
Height	4.7 ft (1.43 m)
Wing area	118 sq.ft (11.0 m^2)
Aspect ratio	18.12
Wing loading	6.33 lb/sq.ft (30.9kg/m^2)
Mean aerodynamic chord	2.7 ft (0.824 m)

1.5 THREE - VIEW DRAWING (Dimensions in ft)







Limitations

Contents

2.1 Introduction

2.2 Airspeed

2.3 Airspeed indicator markings

2.4 Weight

2.5 Centre of gravity

2.6 Approved manoeuvres

2.7 Manoeuvring load factors

2.8 Flight Crew

2.9 Kinds of operation

2.10 Minimum equipment

2.11 Aerotow and winch-launching

2.12 Other limitations

2.13 Limitations placards

2.1 INTRODUCTION

Section 2 includes operating limitations,instrument markings, and basic placards necessary for safe operation of the sailplane, its standard systems and standard equipment.The limitations in this section are FAA approved by the CAI, Czech Republic.

2.2 AIRSPEED

Speed		KIAS (km/h IAS)	Remarks
V_{NE}	Never exceed speed	134 (248)	Do not exceed this speed in any operation and do not use more than 1/3 of control deflection
V_{RA}	Rough air speed	85 (158)	Do not exceed this speed except in smooth air, and then only with caution. Examples of rough air are lee-wave rotor thunderclouds etc.
V_A	Manoeuvring speed	85 (158)	Do not make full or abrupt control movement above this speed, because under certain conditions the sailplane may be overstressed by full control movement
V_W	Maximum winch-launching speed	70 (130)	Do not exceed this speed during winch- or autotow-launching
V_T	Maximum aerotowing speed	85 (158)	Do not exceed this speed during aerotowing

Pay attention to the fact that with increasing altitude the true air speed (TAS) increases as the indicated airspeed (IAS) decreases. This fact does not interfere with the strength and load factor of the sailplane, though to protect from aeroelastic buffeting the following indicated airspeed (IAS) must not be exceeded.

V_{NE} airspeed limits above 15,000 ft Pressure Altitude are reduced as follows: * Altimeter setting at 29.92 in. Hg.

Pressure Altitude ft*	15 000	20 000	25 000	30 000	35 000
V_{NE} KIAS	134	131	129	127	125

2.3 AIRSPEED INDICATOR MARKINGS

Marking	KIAS(km/h IAS) (value -range)	Significance
Green arc	46 ÷ 85 (85 ÷ 158)	Normal Operating Range. (Lower limit is maximum weight 1.1 v_{SI} at most forward c.g. Upper limit is rough air speed)
Yellow arc	85 ÷ 134 (158 ÷ 248)	Manoeuvres must be conducted with caution and only in smooth air.
Red line	134 (248)	Maximum speed for all operations
Yellow triangle	49 (90)	Approach speed at maximum weight.

2.4 WEIGHT

Maximum take-off and landing weight . . . . . 750 lb (340 kg)

Empty weight with standard equipment . . . . 463 lb (210 kg) ± 3%

Maximum weight of all non lifting parts . . . . . 518 lb (235 kg)

Pilot's weight range . . . . . 121 ÷ 243 lb (55 ÷110 kg)

It is necessary to use a secured removable cushion with ballast of 16 lb (7 kg) when flown by a pilot (including parachute) weighing less than 137 lb (62 kg)see section 7.8.

Maximum load in baggage compartment . . . . . 44 lb (20 kg)

WARNING

SUM OF BALLAST WEIGHT, BAGGAGE WEIGHT AND PILOTS WEIGHT MUST NOT EXCEED 264 Lb (120 Kg).

(Cont.)

NOTE

Installation of the front seat ballast is described in Section 7,paragraph 7.8 this Flight Manual.

2.5 CENTRE OF GRAVITY

Reference Datum: Levelling point No. 1- red marked rivet located on the bulkhead No. 1 see fig. 6 - 1.
Centre of gravity position
corresponding to empty weight with stand. equipm. x_T = 69.5 % ± 1%MAC
i.e. 84.63 in ± 0.32 i
(2149.5 mm ± 8mm)
behind the Datum

Centre of gravity position range

forward margin . . . . . 21% i.e. 68.89 in (1750 mm) behind the Datum

rear margin . . . . . 39% i.e. 74.73 in (1898 mm) behind the Datum

2.6 APPROVED MANOEUVRES

The sailplane is certified in the Utility Category.
The following manoeuvres are permitted (see Normal Procedures Sec.4)

Manoeuvre	Entry speed KIAS (km/h IAS)	Procedures
Chandelle	97 (180)	Section 4.6 item A
Steep turn	97 (180)	Section 4.6 item B
Lazy eight	97 (180)	Section 4.6 item C
Spin	38 (70)	Section 4.6 item D
Loop	92 (170)	Section 4.6 item E
Stall turn	92 (170)	Section 4.6 item F

2.7 MANOEUVRING LOAD FACTORS

The following load factors must not be exceeded in manoeuvres.

At a speed of $v_A = 85$ KIAS(158 km/h) $n = +5.3$
$n = -2.65$

At a speed of $v_{NE} = 134$ KIAS(248 km/h) . $n = +4$
$n = -1.5$

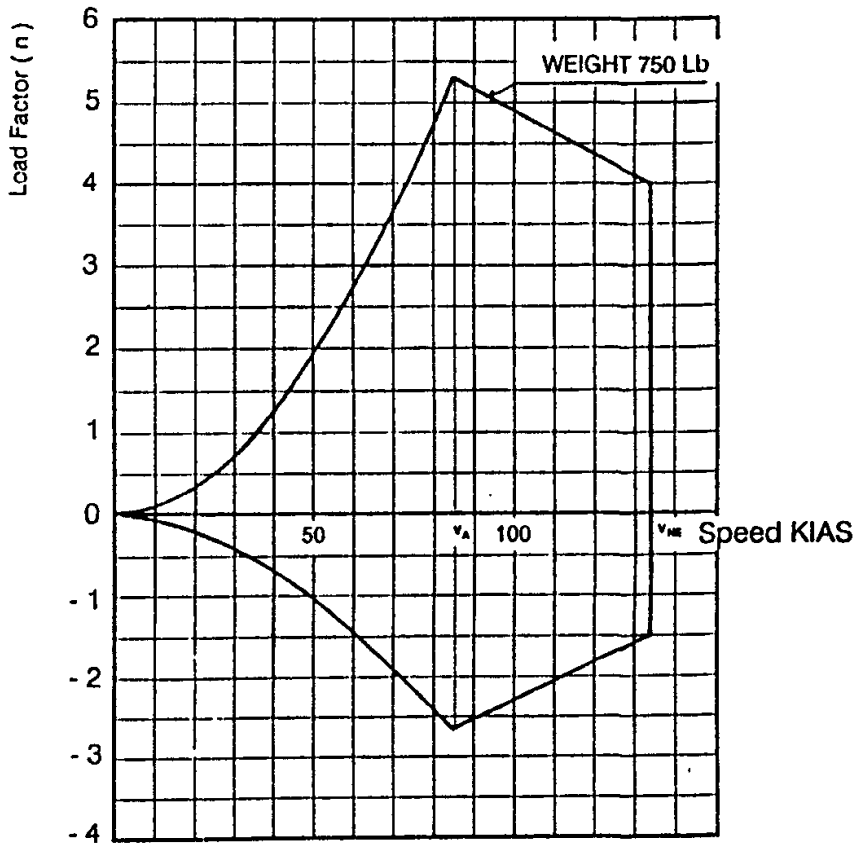


FIG. 2 - 1

2.8 FLIGHT CREW

One pilot.

2.9 KINDS OF OPERATION

The sailplane is approved for Day VFR operations. Cloud-flying is permited where operational regulations permit, and when the minimum required equipment is installed and operable. Operations in icing conditions are prohibited.

2.10 MINIMUM EQUIPMENT

Instruments and minimum equipment must be approved types.

A. VFR operations

1 Air Speed indicator with colour-marking according to sect. 2.3.

1 Altimeter

1 Four - point safety harness

1 Automatic or manual parachute and/or backrest

1 Magnetic direction indicator

1 Variometer (vertical speed indicator)

B. Cloud-flying

(added to minimum equipment as per para A)

1 Turn and bank indicator

1 VHF transceiver

Other recommended equipment for cloud-flying:

1 Attitude-gyro

1 clock

2.11 AEROTOW AND WINCH-LAUNCHING

A. Aerotow

The safety tow-hook TOST "G 88" type is used for aerotow. It is located in the lower fuselage part in front of landing gear wheel.The "E85" nose-hook may be installed,too.

- maximum strength of rope or weak-link is 1460 lb
- maximum permissible speed $v_T = 85$ KIAS (158 km/h)
- the minimum rope length is 50 ft (15 m), recommended rope length is 98 - 131 ft (30 - 40 m).

B. Winch launching

A safety launching hook TOST "G 88" type is used for winch launching. It is located in the lower fuselage part in front of the landing gear wheel.

- maximum strength of rope or weak-link is 1460 lb
- maximum permissible speed $V_W = 70$ KIAS (130 km/h)

WARNING

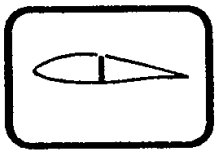
NOSE HOOK MUST NOT BE USED FOR WINCH LAUNCHING.

2.12 OTHER LIMITATIONS

Maximum crosswind component (angle 90°) for take-off and landing: 8 kt (15 km/h).

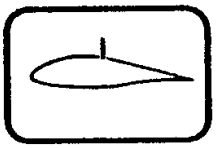
2.13 LIMITATION PLACARDS

LH side cockpit frame



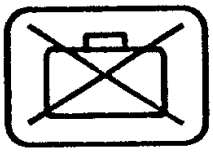
AIR BRAKES RETRACTED

LH side cockpit frame



AIR BRAKES EXTENDED

rear cockpit bulkhead



DO NOT PUT BAGGAGE

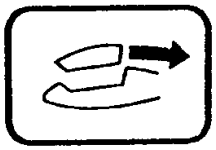
control stick

WHEEL BRAKE

release knob

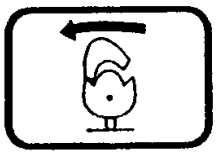
RELEASE

RH side cockpit frame



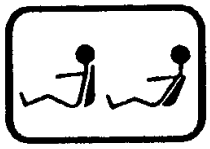
CANOPY JETTISON

LH side canopy frame



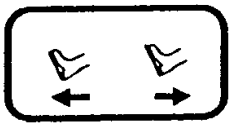
CANOPY OPEN

RH side cockpit frame



SEAT BACK

bottom of instr. panel



PEDAL ADJUSTMENT

RH side cockpit floor

OPERATING LIMITATIONS

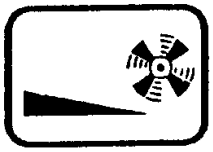
THE MARKINGS AND PLACARDS INSTALLED IN THIS SAILPLANE CONTAIN OPERATING LIMITATIONS WHICH MUST BE COMPLIED WITH WHEN OPERATING IN UTILITY CATEGORY. OTHER LIMITATIONS ARE CONTAINED IN SAILPLANE FLIGHT MANUAL.

MAX. GROSS WEIGHT	**750 LB**
EMPTY WEIGHT, STANDARD	**463 LB**

APPROVED MANOEUVRES:

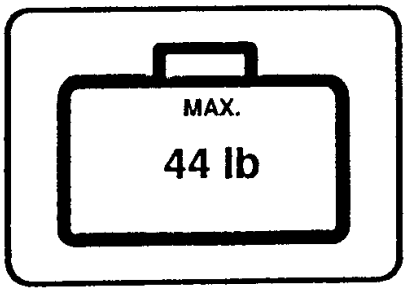
STEEP TURN	**LOOP**
CHANDELLE(CLIMBING)	**STALL TURN**
LAZY EIGHT	**SPIN**

RH side cockpit frame

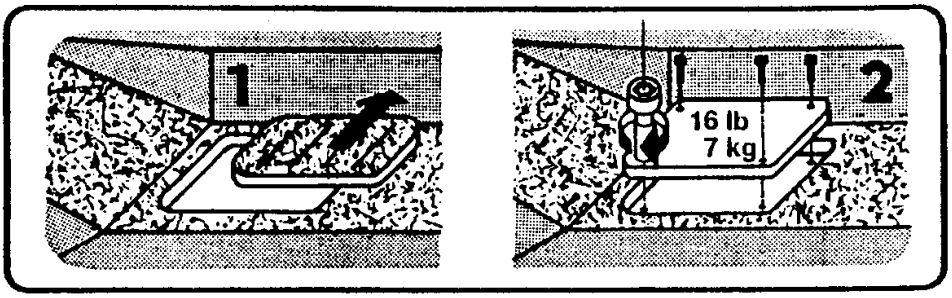


AIR VENT

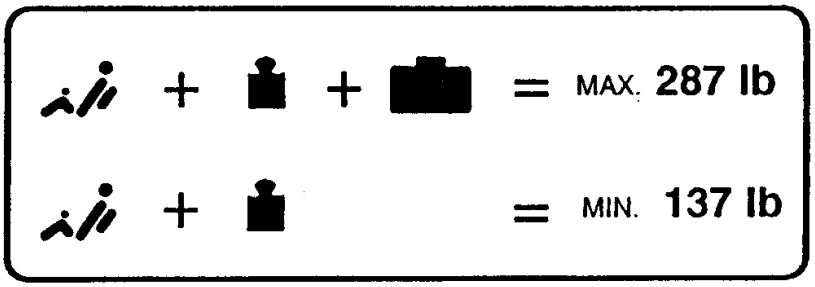
floor behind seat



RH side cockpit floor



RH side cockpit floor



LH side cockpit frame

MAX. ALLOWABLE SPEED VS ALTITUDE

PRESSURE ALTITUDE (FT) UP TO	15 000	20 000	25 000	30 000	35 000
SPEED KIAS, MAX.	134	131	129	127	125

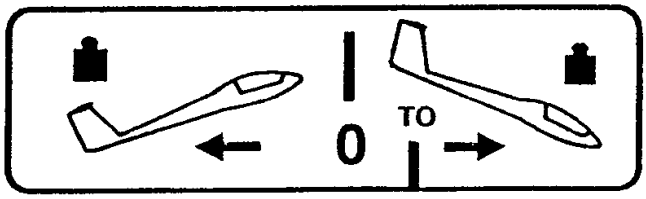
instrument panel

MAX. WINCH LAUNCHING SPEED	70 KIAS
MAX. AEROTOWING SPEED	85 KIAS
MAX. MANOEUVRING SPEED	85 KIAS

instrument panel

CENTRE OF GRAVITY RANGE	
FRONT LIMIT	21 % MAC
REAR LIMIT	39 % MAC

LH side cockpit floor



TRIMMER

instrument panel

V_{NE} . . 134 KIAS
V_{RA} . . 85 KIAS

SECTION 3

Emergency procedures

Contents

3.1 Introduction
3.2 Canopy jettison
3.3 Bailing out
3.4 Stall recovery
3.5 Spin recovery
3.6 Spiral dive recovery

3.1. INTRODUCTION

Section 3 provides checklist and amplified procedures for coping with emergencies that may occur.

3.2 CANOPY JETTISON

- pull both left hand opening handle and right hand emergency jettisoning handle by both hands backward simultaneously
- lift the canopy by both hands to be jettisoned

3.3 BAILING OUT

- release an remove safety belts from lap and shoulders
- stoop legs below you
- roll over an edge of the cockpit

3.4. STALL RECOVERY

- Low Speed Stall (One g)
  - PUSH control stick slightly; CHECK airspeed within normal operation range

Stall at Speed (Accelerated)

- PUSH control stick to reach subcritikal angle of attack; ELIMINATE bank by rudder

3.5 SPIN RECOVERY (same as for Normal Procedures)

The sailplane is approved for spins in all configurations.

- Check ailerons neutral
- Apply rudder opposite to the direction of spin

(Cont.)

- Apply the control handle forward until rotation ceases.

- Centralise rudder and apply aft stick presure to recover out of the ensuing dive.

3.6 SPIRAL DIVE RECOVERY

- recover bank by mutually co-ordinated movements of the rudder and aileron

- recover dive

Normal procedures

Contents

4.1 Introduction

4.2 Rigging and de-rigging

4.3 Preflight inspection

4.4 Important check before take-off

4.5 Normal procedures and recommended speeds

4.5.1 Take-off and climb

4.5.2 Flight

4.5.3 Approach and landing

4.5.4 High speed features

4.6 Basic aerobatics

4.1 INTRODUCTION

Section 4 provides check-lists and procedures information recommended for normal operation.

4.2 RIGGING AND DE-RIGGING

Two persons are necessary for rigging/derigging if simple wing and fuselage supports are used. After installation check if control surfaces move in proper direction and through the whole range of deflections.

A. Wing installation

Unlock the control lever of air brakes and put the spar of the left wing into the fuselage slit. Pay attention for angular lever to properly slide into the fuselage tunnel.
Fix the left wing to the bracket at the rear board by means of an auxilliary installation pin.
Support the left wing at the end by a wing support.
Put the right wing into the fuselage slit in the same way.
Connect both the left and right wing inserting first the upper pin and then the lower pin. It is possible to use an assembly lever which makes tightening both sides of the wing and inserting the pins easier.
Turn both pins so that the pins slide behind a projection at mounting of the right wing and lock both pins by means of a safety pin.
Pull the installation pin out of the bracket.

B. Wing removal

Unlock the air brakes and safety pin on wing pins. Lock the left hand wing to the fuselage by means of installation pin. Support the left wing with a support, the right wing is supported by an assistant at the wing tip. Pull the lower pin followed by upper pin out of the wing hinges. Pull carefully the right hand wing out of the fuselage slit and store. Remove the installation wing pin and pull out the left wing.

(Cont.)

C. Horizontal stabilizer installation

Take the red markes installation screw and screw it into the thread in a connecting pin. Slide horizontal empennage on the connecting pin and set to the forward fin hinge. Slide on the connecting pin, push the pin until stops and lock by turning in the hinge. The pin is properly locked if the slit coincides with drawn lines in the fin skin. Unscrew an installation screw out of the connecting pin. Check if the leading pin is slided properly into the hinge of the elevator (move the elevator upward and downward).

D. Horizontal stabilizer removal

Pull out the connecting pin by means of installation screw first turning the connecting pin by 90° and then sliding from the hinge. Tilt slightly the leading edge of the stabilizer and remove the horizontal empennage ahead.

4.3 PREFLIGHT INSPECTION

Ensure proper rigging procedures have been accomplished. It is very important to perform the preflight check before the flight take-off every flight day or after every assembly of the sailplane. Incomplete or careless preflight check can results in an accident. During preflight inspection inspect carefully the whole sailplane surface in order to find out sailplane skin damage. It is recommended to perform preflight check in the way described on the inspection check list.

(1) Check the fuselage: forward part skin, canopy surface, total pressure probe in the fuselage nose hole.

(2) Open the canopy, check the instruments.
Check proper position of wing pins and their locking.
Visual check of all control levers in the cockpit.
Check of proper operation of the elevator and rudder, check of plays and free movement of controls up to stops.

(Cont.)

Check cockpit for loose object.
Check of the landing gear wheel pressure - desired 28 + 7 psi (200 +50 kPa)
Check of a towing hook attachment.

(3) Check of the upper and lower wing surface.
Check of ailerons surface condition, ailerons hinges,easy and smooth operation to stops.
Check of air brakes, their fitting, retracting and locking.

(4) Check the rear fuselage part, lower part especially, as well as static presure vents in rear fuselage part skin

(5) Check proper assembly of the horizontal tail plan Check proper position of the horizontal tail plan pin.
Check of easy and smooth operation of the rudder and of the elevator. Their operation must be smooth within the whole range of deflections.

(6) Check the tail wheel, tyre pressure 17 + 3 psi (120 + 20 kPa).
Check the compensated pressure sensor.

(7) Upper and lower right wing surface inspection.
Refer to (3).

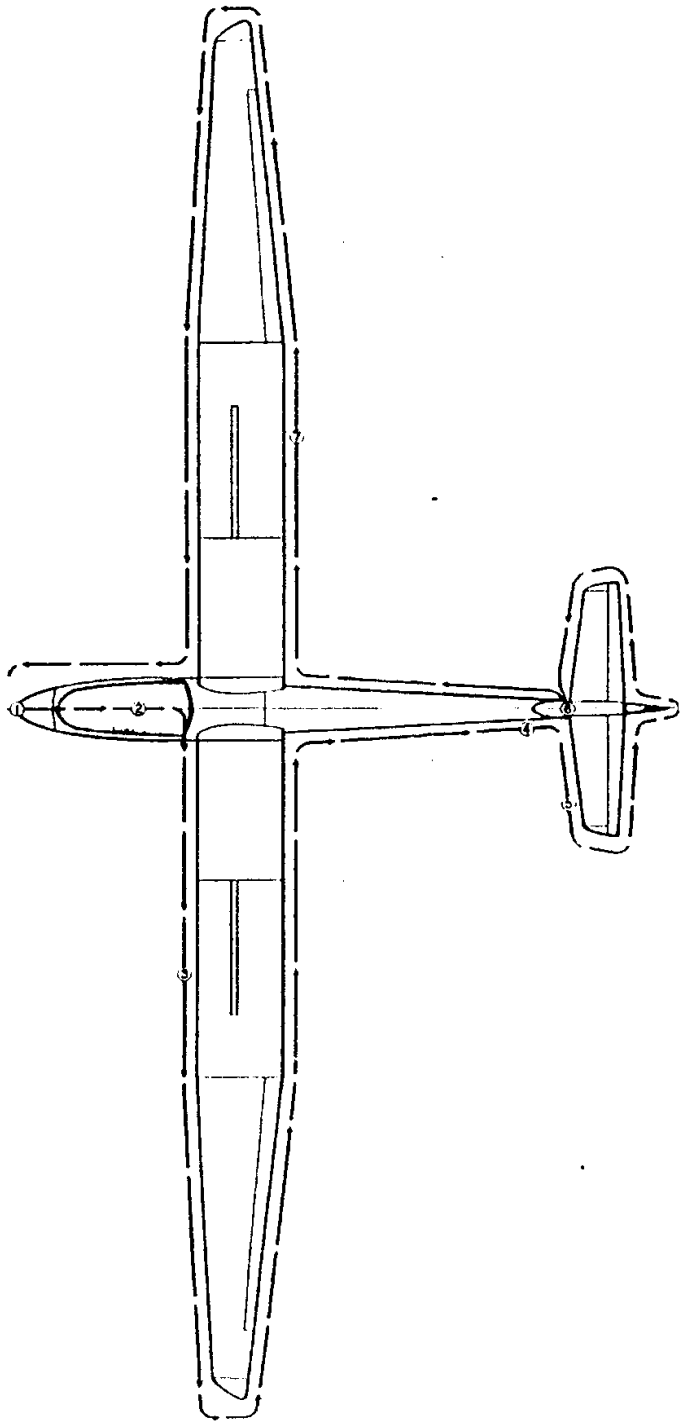


FIG. 4 -1

4.4 IMPORTANT CHECKS BEFORE TAKE-OFF

- put on a parachute, tighten the belts
- adjust the backrest and rudder pedals so that all the levers and instrument are within easy reach
- fasten and tighten safety belts
- check full deflection of the elevator and rudder to stops
- retract and lock air brakes after their check
- set longitudinal trim to proper position
- close and lock the canopy

4.5 NORMAL PROCEDURES AND RECOMMENDED SPEEDS

4.5.1 Take-off and climb

A. Aerotow launching

Aerotow maximum speed v_T = 85 KIAS (158 km/h)

Use launching hook attachment located in the centre of gravity, or the nose launching hook attachment if installed for aerotow. For take-off set the trim lever to take-off possition (TO),hold the control stick in the neutral position. To keep rope in tension, use wheel brake smoothly to avoid tow-rope overriding. After unsticking the sailplane at a speed of ≈ 42 KIAS (78 km/h),(as per weight) it is possible to trim the sailplane for climbing speed. When releasing tow-rope, pull the yellow handle of the tow-hook control several times to the stop.
Perform next manoeuvre only after you are assured that the rope is released.
In take - off with a cross wind unstick the sailplane at a higher speed than normal and bank the wing into the wind direction at the moment of unsticking.

(Cont.)

B. Winch - launching

Maximum speed for winch-launch V_w = 70 KIAS (130 km/h)

WARNING

WINCH - LAUNCHING BY THE NOSE HOOK IS PROHIBITED!.

Trim in neutral position (0). To keep rope in tension, use wheel brake smoothly to avoid tow-rope overriding. Unstick at a speed of about 42 KIAS (78 km/h) with the control stick pushed almost fully foward in case of aft centre of gravity position, or slightly pulled aft in case of forward centre of gravity position.
Having reached safe altitude increase pitch attitude for climbing by pulling slightly aft on the control stick.
After reaching maximum height the rope will be switched off automatically. If necessary to secure a manual release pull several times tow-rope handle to the stop.

WARNING

THE WINCH LAUNCH WITH TAIL-WIND IS PROHIBITED.

4.5.2 Flight

The sailplane is well manoeuvrable and controllable within whole range of airspeed, configuration and centre of gravity position. During roll from 45° bank to opposite bank the ailerons are effective without noticeable slip tendency.The ailerons and rudder can be fully deflected - at airspeeds below 85 KIAS.

4.5.3 Approach and landing

The minimum approach speed with fully extended air brakes is 49KIAS (90 km/h). Extend the air brakes slowly.
Slip is well controllable and it is possible to use it as an efficient means for landing path shortening when simultaneously extending the air brakes.
The recommended attitude for landing should allow the main gear wheel to touchdown before the tail wheel contacts the ground. To avoid long ground-run after landing touch the ground at the lowest safe speed (about 38 KIAS (70 km/h).

NOTE

Due to great effectivity of air brakes it is recommended to handle very carefully at altitudes just above the ground.

4.5.4 High speed features

In flight at a high speed up to 134 KIAS (248 km/h) the sailplane is well controllable. Full deflection of the elevator and rudder are permissible only up to speed V_A = 85 KIAS (158 km/h). One-third deflection is permissible at a speed of V_{NE}. It is necessary to avoid abrupt and violent motions of elevator.
In rough air, i.e. in lee-wave rotor, thunderclouds, visible vortices or during flight across mountain ranges maximum speed V_{RA} = 85 KIAS (158 km/h) must not be exceeded.
Air brakes may be opened up to a speed of V_{NE}. At this speed air brakes should be used only in emergency or at non-intended exceeding of the maximum airspeed. Quick opening results in high loads and abrupt air braking on account of great air brakes efficiency.
A dive should be recovered less abruptly with air brakes extended than with retracted air brakes (see section 2.7 Manoeuvring load factors).
With air brakes extended dive at a speed of 105 KIAS (195 km/h) with the nose attitude near 45° below the horizon. No loose objects should be in the cockpit.

4.6 BASIC AEROBATICS

The following manoeuvres are approved

A. Chandelle

B. Steep turn

C. Lazy eight

D. Spin

E. Loop

F. Stall turn

A. Chandelle

Increase air speed of the sailplane to 97 KIAS (180 km/h) by pushing the control stick. Do transition to a steep climb at an angle near 45° by pulling back the stick smoothly and continuously. At 54 KIAS (100 km/h IAS) apply the rudder to the selected side of the turn and by coordinated positive use of the ailerons do a transition to level gliding flight in the opposite direction at a minimum speed of 43 KIAS (80 km/h IAS).

B. Steep turn

To perform this manoeuvre keep the entry speed of 97 KIAS (180 km/h). Enter the climb simultaneously with a bank of approx 45°. After turning by about 150° start a transition to a level glide mode of flight in such a way that the manoeuvre will be finished in the opposite direction with the speed not decreasing below 43 KIAS (80 km/h IAS).

C. Lazy eight

Move the control stick slowly forward to attain an entry speed of 97 KIAS (180 km/h IAS). Perform a steep climbing turn to the selected side, smoothly pulling the control stick with simultaneous coordinated use of ailerons and rudder. At maximum bank and 54 KIAS(100 km/h IAS) do transition to a descent and after reaching 120 KIAS (222 km/h IAS) and wings level perform the steep turn to the opposite side, pulling smoothly the control stick with simultaneous coordinated use of ailerons and rudder.
The flight path intersects at the lowest point of the manoeuvre.

D. Spin

The spin manoeuvre may not be possible unless the centre of gravity is well aft in the approved centre of gravity range.
At more forward centre of gravity positions, the manoeuvre may only result in a spiral dive.

(Cont.)

Pull the control stick slowly back to approach the stall, use the full deflection of the rudder at 38 KIAS (70 km/h IAS) and pull the control stick to the stop.
To initiate recovery from the spin,check ailerons neutral,apply rudder opposite to the direction of the spin,then ease the control stick forward until rotation ceases. After rotations stops centralise rudder and apply aft stick pressure to recover from the ensuing dive.
It will require approximately 492 feet (150 m) of altitude loss for each turn in a spin. The recovery will require approximately 492 feet (150 m) to recover to a level flight altitude at about 81 KIAS (150 km/h).

E. Loop

Enter a moderate dive by pushing the control stick to gain a speed of 92 KIAS (170 km/h IAS). Raise the nose of the sailplane by slightly pulling the control stick taking care to comply with "g-load" limits. The control force drops slightly due to speed decrease. After passing the inverted position the speed will increase and the control stick must be eased aft gradually so that the flight path is smooth and regular.

F. Stall turn

This manoeuvre should begin at a speed of 92 KIAS (170 km/h IAS). Pull the control stick gently backward to bring the nose to a wings level position of about 60° to 70° above the horizon. As soon as the speed falls to 65 KIAS (120 km/h IAS) start to apply the rudder slowly in the required direction of the turn while allowing some bank into the turn direction to maintain airspeed control without entering a spin. As the force on the rudder decreases, gradually apply full rudder. To keep proper turning plane use opposite deflection of the ailerons as necessary. When approaching the reciprocal heading with the nose down, control correct direction and pitch by normal use of controls. Take care not to exceed "g" limits.

Performance

Contents

5.1 Introduction

5.2 Approved data

5.2.1 Airspeed indicator system calibration

5.2.2 Stall speeds

5.3 Non - approved further information

5.3.1 Flight polar

5.1 INTRODUCTION

Section 5 provides approved data for airspeed calibration, stall speeds and non - approved further information. The data in the charts has been computed from actual flight tests with the sailplane in good condition and using average piloting techniques.

5.2 APPROVED DATA

5.2.1 Airspeed indicator system calibration

(Assumes zero instrument error)

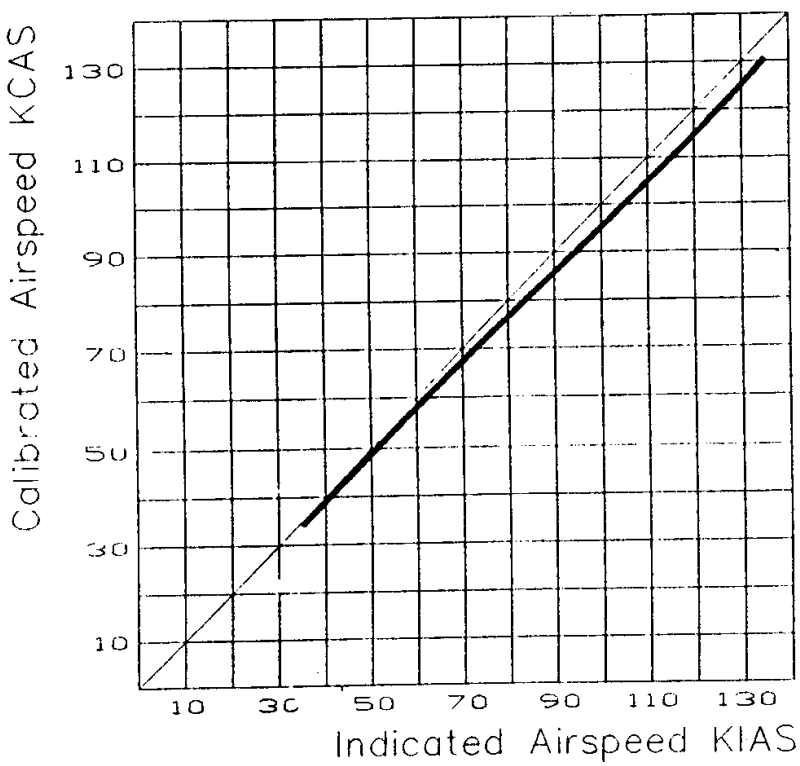


FIG 5 - 1

5.2.2 Stall speeds (KIAS)

The effect of weight on stall speed in given in Fig. 5 - 2.

There is a distinctive stall warning at the maximum take-off weight and forward centre of gravity position at a speed of 40 KIAS (75 km/h).At a speed of 38 KIAS (70 km/h) the sailplane begins to lose altitude without downward pitching motion.The full effectivity of control surfaces is maintained during this manoeuver.

Stall speed for forward c.g. position

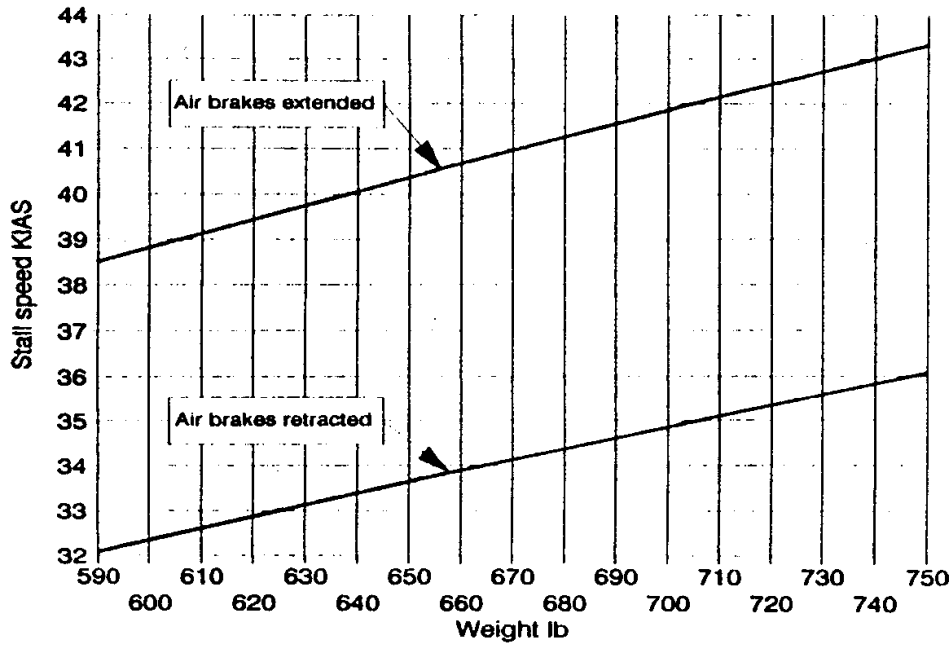


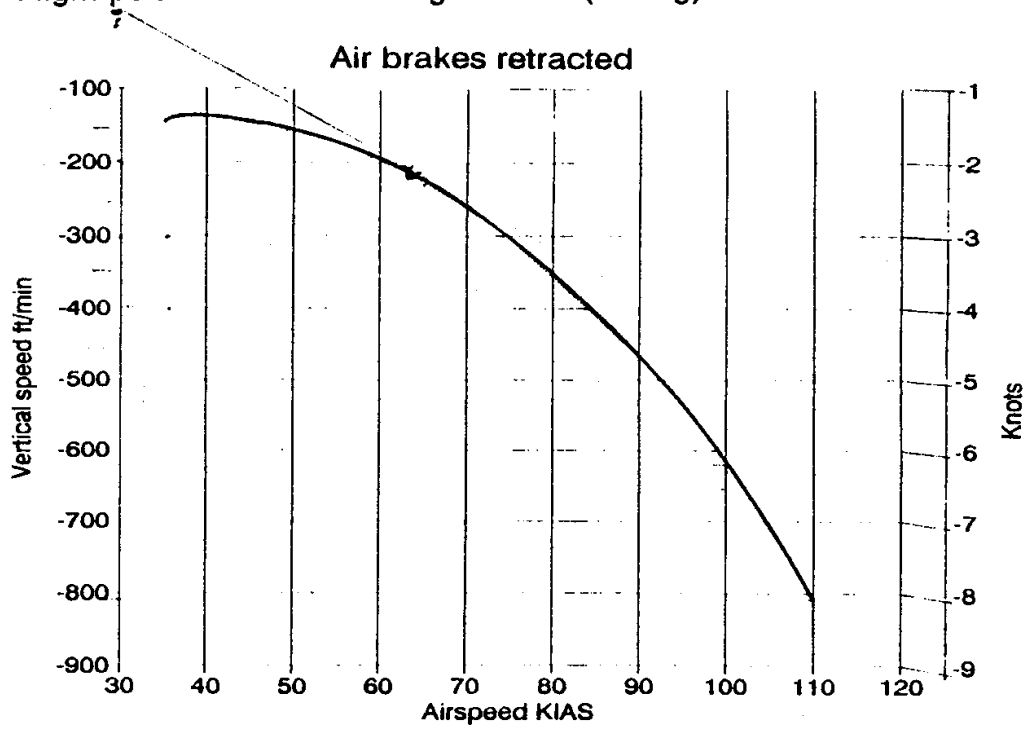
FIG. 5 - 2

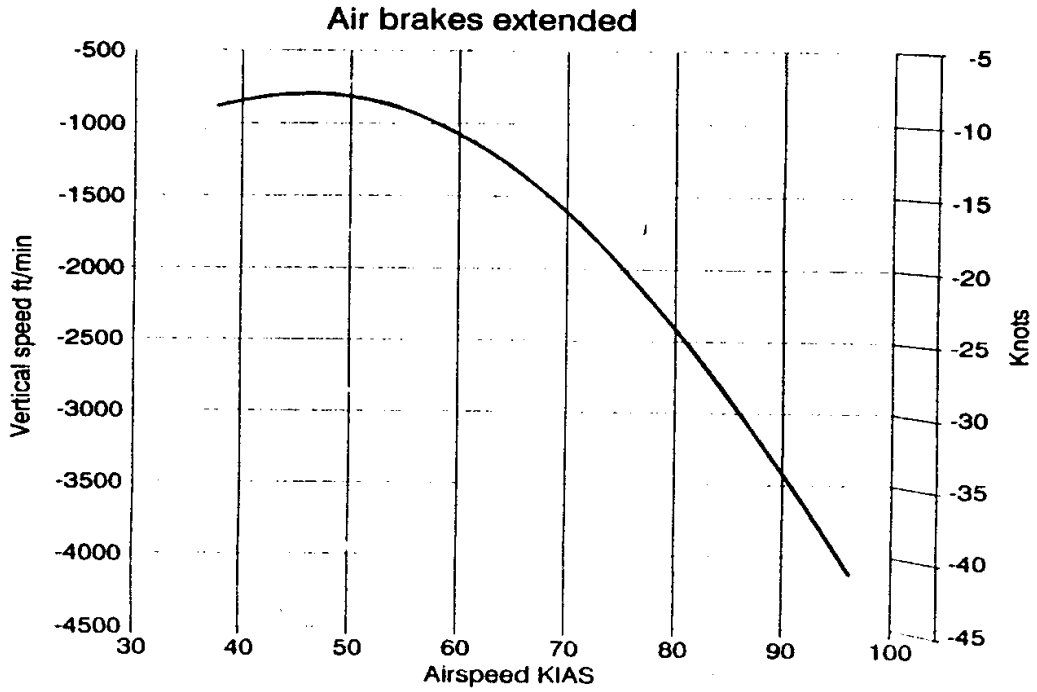
5.3 NON - APPROVED FURTHER INFORMATION

Maximum demonstrated operating altitude 18,045 ft (5500 m).

5.3.1 Flight polar

Flight polar with take off weight 750 lb (340 kg).





Weight and balance

Contents

6.1 Introduction

6.2 Weighing and moment record

6.3 Equipment list

6.1 INTRODUCTION

This Section describes the procedures for establishing the basic empty weight and moment of the sailplane. Procedures for calculating the weight and moment are also provided in "Maintenance Manual for the L 33 sailplane".

6.2 WEIGHING AND MOMENT RECORD

Empty weight (standard) . . . . . 463 lb (210 kg) ± 3%
Moment . . . . . 39 134 lb in

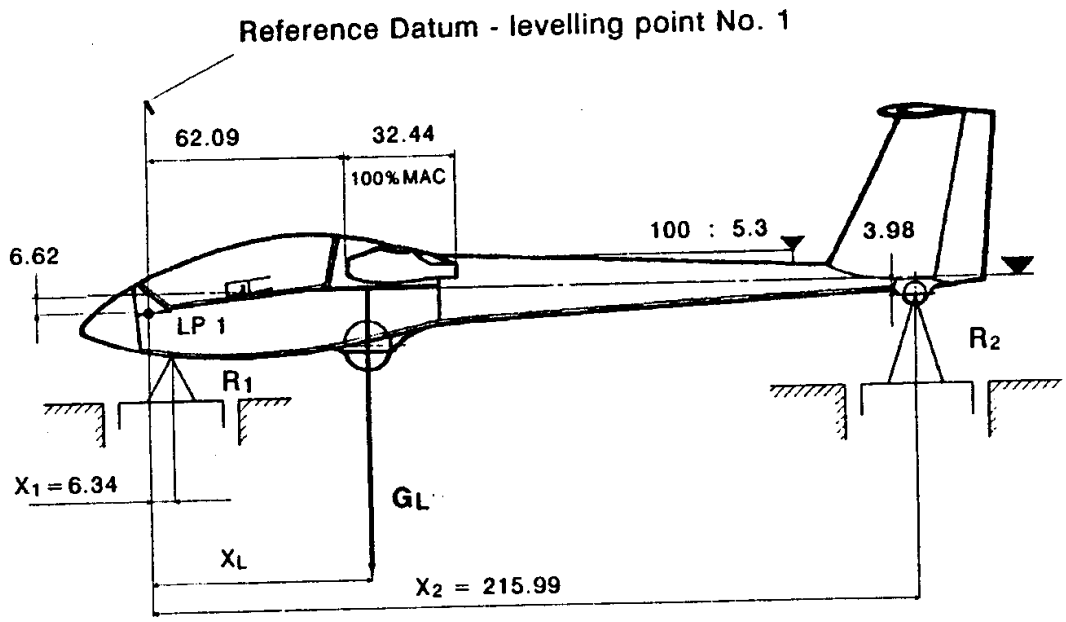


FIG. 6 - 1

The weighing record is on page 6-4 and the calculating procedure of centre of gravity position (moment) is provided in "Maintenance Manual for the L 33 sailplane".

6.3 EQUIPMENT LIST

Standard (S) items must be installed for all operations.Optional (O) items are available for installation. Installed items for each sailplane equipment list will be marked with an "X" and included in the Empty Weight/c.g. pos of the Weight and Balance Record.

	S	O	Subject	Type	Weight lb	Arm from the reference datum(rib No. 1)in	Date of installation
1	X		Airspeed indicator	LUN 1106.13-8	0.88	19.5	
2	X		Vertical speed indicator ±1000 ft/min **or** Vertical speed indicator ± 10 knots	LUN 1141.02 LUN 1141.04	1.06 1.06	19.5 19.5	
3	X		Altimeter	LUN 1124.01	1.10	19.5	
4	X		Lower hook	TOST G-88/1-83	1.98	53.0	
5		O	Eletric turn-and-bank/side indicator	LUN 1211.1	0.80	19.5	
6		O	Vertical speed indicator ± 6000 ft/min **or** Vertical speed indicator ± 60 knots	LUN 1147.12-8 LUN 1147.23-8	1.10 1.10	19.90 19.90	
7		O	Forward hook	TOST E-85/1-85	1.76	10.1	
8		O	VHF transceiver	AR 3201	13.45	92.1	
9		O	Paint	white	13.45	92.1	

Date	Empty weight lb (kg)	c/g Pos. % MAC	Permited pilot weight				Approved	
			Max. baggage 44 lb (20 kg)		No baggage			
			Max.	Min	Max.	Min.	Date	Signed
22.3.94	485	69,1	243	128	243	133	22.3.94	[illegible]

Sailplane and system description

Contents

7.1 Introduction

7.2 Airframe

7.2.1 Controls

7.3 Cockpit controls

7.4 Landing gear system

7.5 Seat and safety harness

7.5.1 Seat adjustment

7.5.2 Locking of the safety harness

7.6 Pitot and static system

7.7 Airbrake system

7.8 Ballast

7.1 INTRODUCTION

This Section provides description and operation of the sailplane and its systems. For more detailed description refer to the Maintenance Manual.

7.2 AIRFRAME

The L 33 sailplane is a cantilever single seater of all - metal structure with a T tail unit.

Fuselage

The fuselage is an oval section. It consists of two structural parts - forward and rear. The forward part is a semimonocoque reinforced with ribs and stringers. This part comprises suspensions for the attachment of wings and landing gear as well as tow-hooks for aero-towing and winch-towing. The one - part canopy can be tilted to the right. The rear part of the fuselage is formed by wound cone supporting a T tail unit. The landing gear consists of non-retractable main gear with hydro-pneumatic shock absorber and non retractable tailwheel.

Wing

The wing is one - spar construction without stringers. The plan shape is a combination of an oblong and trapezoid. The wing is equipped with a simple air brake extended on the upper side and with sandwich constructed ailerons.

Vertical tail plane

The fin is two-spar, all metal construction fixed to the rear part of the fuselage. At the top of the vertical tail plane are located suspensions for attachment of the horizontal tail plane. The light-alloy rudder is covered with fabric skin.

Horizontal tail plane

The one-part, two-spar trapezoid stabilizer with sandwich construction elevator, without trim tab.

7.2.1 Controls

A. Elevator

The elevator control consists of tie rods and bellcranks between the control lever and the steel lever on the top of the fin.
In the rear fuselage part, the elevator tie rod is led through fairleads.
Elevator stops are located in the control stick.

B. Ailerons

Control consists of the tie rods and bellcranks between the control stick and the wing control automatic connection tunnels. Ailerons stops are located on the control stick. Inside the wing the tie rods are led from the automatic hook-up lever at the root wing rib to the ailerons lever.

C. Air brakes

The control lever of air brakes is connected to the automatic hook-up tunnels by means of tie rods.
Control in the wing is performed by means of tie rods from the automatic hook-up lever at the root rib to the tie rod which controls air brakes.

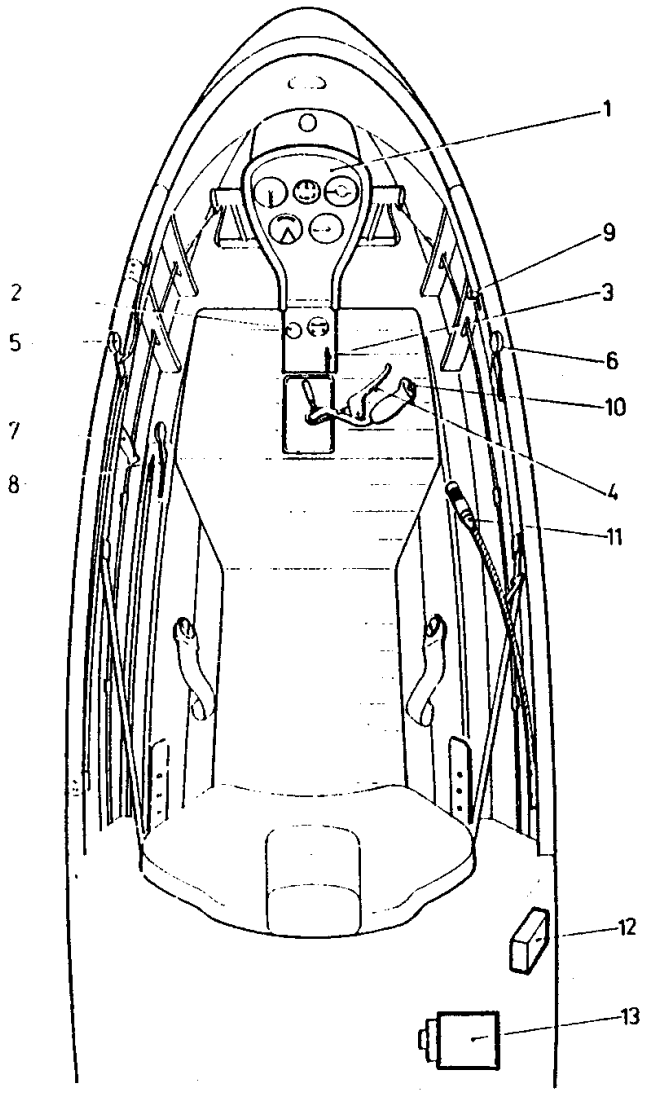
D. Rudder

Steel steering ropes connect directional control pedals direct to the rudder lever. There are rudder stops on the rudder lever. The steering ropes are led in spring fairleads along almost all their runs.

E. Elevator trim

The elevator spring-type trim lever is located in the left hand front part of the cockpit. Trim springs are connected to the tie rods of the elevator.

7.3 COCKPIT CONTROLS



1. Instrument panel

   Basic flight instruments are located on the instrument panel. This panel is fixed by means of screws to the pedestal.

2. Tow - hook control

   An yellow handle on the left hand side down in the pedestal of the instrument panel. Pulling by the handle results in releasing the tow rope.

3. Pedals adjustment

   A handle on the right hand side down in the pedestal of instrument panel. Pedals adjustment is carried out by pulling the handle and releasing the locking mechanism. Then set the pedals to the back-stop. Move the pedals with heals into desired position with a "click sound". The click sound informs you on locking of the locker of the pedal adjustment.
   The pedals may be readjusted both on the ground and in flight.

4. Landing gear wheel brake

   The brake lever is located on the control stick handle.

5. Canopy opening

   The white lever with red ring and white ball-shaped knob handle on the left hand side of the canopy frame. At canopy opening pull the lever back ward and open the canopy to the right.

6. Emergency canopy jettison

   The red ball-shaped knob handle on the right hand side of the cockpit frame. In emergency pull both left and right handles simultaneously.

(Cont.)

7. Air brakes control

The blue handle on the left hand side of cockpit frame, aiming downwards.

The forward position	- air brakes retracted and locked
1.6 in (40 mm) backward	- air brakes unlocked
The rear stop	- air brakes fully extended

8. Longitudinal trim

The handle with a green knob located in the left hand side panel.

The forward position trims the sailplane "nose-heavy"

The rear position trims the sailplane "tail-heavy".

9. Venting

The small knob on the right hand side of the cockpit frame near to the emergency canopy jettison handle.

Pull - closed

Push - opened

The slide window in the canopy or the tiltable flap in the slide window is used for venting,too.

10. Transceiver pusnbutton (if transceiver is installed)

11. Microphone (if transceiver is installed)

12. Loudspeaker (if transceiver is installed)

13. Battery (if transceiver is installed)

7.4 LANDING GEAR SYSTEM

A. Main landing gear

The non-retractable main landing gear is located in the lower fuselage part between frames No.4 and No.5. The landing gear is equipped with oleo-hydraulic shock absorber and a 13.8 x 5.3 in (350 x 135 mm) wheel.

B. Tailwheel

The tailwheel is a non-retractable type with tyre 7.87 x 1.97 in (200 x 50 mm)

7.5 SEAT AND SAFETY HARNESS

7.5.1 Seat adjustment

1. Tilt the backrest foward.
2. Pull the pins from the lower attachments.
3. Move the backrest to the required position.
4. Lock the attachment pins.
5. Adjust the backrest declination by a buckle belt att RH side.

7.5.2 Locking of the safety harness

Four Point Rotary Buckle Safety Harness System is used as a standard equipment.

1. Adjust the sitting position.
2. Put the lap and shoulder belts into central lock buckle.
3. Lock the rotary buckle by rotation to the marked position.
4. Tighten the belts.

7.6 PITOT AND STATIC SYSTEM

The pitot static pressure system consist of total, static and compensated pressure circuits.
The total pressure probe is located in the fuselage nose hole.
Two static pressure probes are located on both sides of aft fuselage part.
The compensated pressure probe for vertical speed indicator is located on the fin leading edge.
The pitot static distribution system is made of aluminium alloys and rubber hoses and incorporates the condensate sump, located aft of bulkhead No. 1.

Following instruments are connected to the pitot static system:

- Air speed indicator
- Altimeter
- Variometer (vertical speed indicator)

7.7 AIRBRAKE SYSTEM

The wing is equipped with a simple air brakes extended on the upper side. The airbrakes symmetrically located on the upper surface of the LH and RH side of the wing. They are controlled by one handle witch is located on the LH side of the cockpit (see 7.3).

7.8 BALLAST

A. Ballast installation (see Section 2.4)

- remove the central part of the seat cushion
- put a ballast of 16 lb (7 kg) in to the empty room
- screw the ballast with 4 screws to the airframe

(Cont.)

B. It is possible to install ballast in the baggage compartment to compensate for pilot weight (if desired).

- put the ballast into the baggage compartment
- secure the ballast to the baggage compartment floor by means of 6 screws and lock the screws with locking wire

Sailplane handling, care and maintenance

Contents

8.1 Introduction

8.2 Sailplane inspection period

8.3 Sailplane alterations or repairs

8.4 Ground handling / road transport

8.5 Cleaning and care

8.1 INTRODUCTION

This Section contains Manufacturer's recommended procedures for proper ground handling and servicing of the sailplane. It also identifies certain inspection and maintenance requirements which must be followed if the sailplane is to retain optimum performance and dependability. It is wise to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered.

8.2 SAILPLANE INSPECTION PERIOD

Maintenance and servicing of the sailplane are provided in the L 33 sailplane Maintenance Manual Doc - L33 .1031.3 (see Section 2).

8.3 SAILPLANE ALTERATIONS OR REPAIRS

It is essential that the responsible airworthiness Authority be contacted prior to any alterations on the sailplane to ensure that the airworthiness of the sailplane is not compromised.

8.4 GROUND HANDLING / ROAD TRANSPORT

During transport on trailer all parts of the sailplane must be firmly fixed. The wing must be fixed with the leading edge downward and supported at the wing root and at the outer part by shaped upholstered supports beneath the ribs. The fuselage must be put at a wide shaped cradle in front of tow-hook near the centre of gravity and supported at the area of the tail landing gear. The horizontal tail plane should be put on the leading edge in shaped supports.

8.5 CLEANING AND CARE

The sailplane must be stored in dry and ventilated room. Avoid exposuring to mechanical loads. In case of longer period of storage it is necessary to prevent corrosion of hinges and convecting points by proper preservation (greasing).
To clean and take care of the sailplane outer surface use water with usual soaking agents and usual cleaning and polishing materials. The canopy must be cleaned only with materials approved for organic glass treatment.

(Cont.)

The canopy may be wiped only with clean soft buckskin or similar soft material. In no case wipe the canopy dry.
The cockpit should be vacuum-cleaned regulary. For upholstery cleaning use suitable cloth-cleaners according to particular product directions for use.

CAUTION

DO NOT USE GASOLINE, SOLVENTS AND SIMILAR CHEMICALS FOR CLEANING THE CANOPY-GLASS AND OTHER PLASTICS USED IN CONSTRUCTION.