

**GLIDER REPAIR AND PRODUCTION WORKSHOP**

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**FLIGHT MANUAL**  
**o f**  
**MDM-1 „FOX“ GLIDER**

**Issue III, October 1996**

Factory No	
Registration marking	

**Pages identified by "Appr." are approved by airworthiness Authority  
(Civil Aircraft Inspection Board, POLAND).**

Original date of approval:

This glider is to be operated in compliance with information and limitations contained in this Manual.

*Translated by :*

.....

*Tadeusz Zboś, MSc. Eng.*

## 0. ISSUANCES

### 0.1 RECORD OF REVISIONS

Any revision of the present Manual, must be recorded in the following table, and in case of approved pages endorsed by the responsible airworthiness Authority.

The new or amended text in the revised page will be indicated by a black vertical line in the left hand margin, and the Revision Number and the date will be shown on the bottom left hand of the page.

Revision Number	Affected Section	Affected Pages	Date of Issue	Approval	Date of Approval	Date inserted	Signature
1.		0.1.c; 1.4.c; 2.4.c; 5.3.c;	23.10.97		29.10.97		
2.		4.9	04.06.98		04.06.98		
3.		1.2			02.07.98		
4.		1.4 2.4 2.6 6.3	11.01.99		20.01.99		

**0.2 LIST OF EFFECTIVE PAGES**

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## **Section 1**

### **1. GENERAL**

#### **1.1. Introduction**

#### **1.2. Certification basis**

#### **1.3. Warnings, cautions and notes**

#### **1.4. Glider description and technical data**

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### **1.1 Introduction.**

This glider Flight Manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of the MDM-1 „FOX” glider.

This Manual includes the material required by JAR-22 requirements. It contains also supplemental data supplied by the glider manufacturer.

### **1.2 Certification basis.**

3 | This type of glider has been approved by airworthiness Authority (Civil Aircraft Inspection Board) in accordance with JAR-22, Change 4 of May 7-th, 1987, including Amendments up to 22/94/1, and with exemptions contained in Technical Data Sheet, issue III, November 1997.

Category of Airworthiness:

This glider has been classified to Aerobatic („A”) Category.

### **1.3 Warning, caution and note.**

The following definitions apply to "warnings", "cautions" and "notes" used in this 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 operation item, not directly related to flight safety but which is important or unusual.*

### **1.4 Glider description and technical data.**

MDM-1 "Fox" is a mid-wing, performance aerobatic two-seater with and conventional tail-unit arrangement. The structure of glass/epoxy and carbon/epoxy composite.

#### **Wings :**

Two-panel, tapered outline of considerable taper. Monospar structure with an auxiliary spar, and sandwich type covering. Spar of double-C shape. Monoplate air brake extended on wing upper surface only.

Large span, Frieese type aileron of constant chord, split in two panels, mass-balanced, is suspended on 7 hinges.

The overlapping spar connection with two horizontal bolts extending up to rear fittings, connects also wings to fuselage.

**Fuselage :**

Monocoque, sandwich structure with integral fin. The seat pans bonded permanently. Two-piece, side hinged canopy opening sideways to the right.

In fuselage nose the total pressure port and air intake for air conditioning are provided, static pressure ports on the fuselage sides.

The transceiver antenna installed in the fin.

The towing hook installed in the front fuselage part.

The winch-launching hook installed in front of the main undercarriage.

At front seat, on both sides on cockpit floor, the balancing weights are installed.

Pedals at front seat - adjustable with a grip (item 11 in Fig. 7.1)

Back rest of front seat - adjustable by changing the position of back rest support (item 23 in Fig. 7.2)

**Tail unit :**

Stabilizer, elevators and rudder of sandwich structure, control surfaces aerodynamic-, and mass-balanced.

**Control system :**

Elevator and aileron control system - push rod type.

Rudder control system - cable type.

Air brake control system, in wings of push rod type and in fuselage - combined.

The elevator system equipped with a spring trimming device operated with a lever at the control stick base, at front seat.

**Undercarriage :**

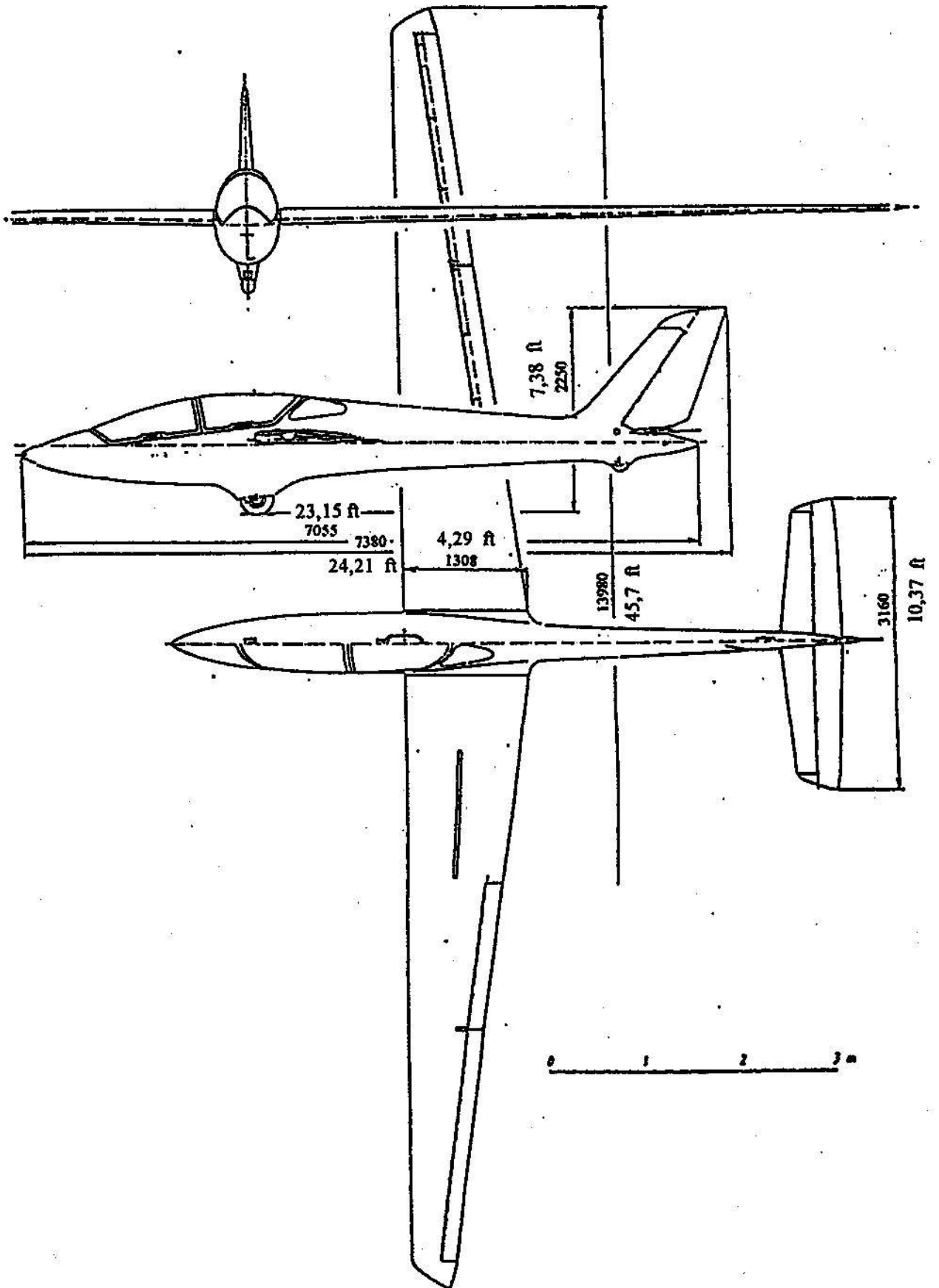
Fixed undercarriage (with main and tail wheels), faired. Hydraulic brake of main wheel coupled with air brake.

**Main technical data:**

	<i>Span</i>	14.0 [m]	45.93 [ft]
	<i>Length (up to rudder top edge)</i>	7.38 [m]	24.21 [ft]
	<i>Height (in flight attitude)</i>	2.25 [m]	7.38 [ft]
	<i>Wing dihedral</i>	0	
	<i>Wing area</i>	12.34 [m <sup>2</sup> ]	132.8 [ft <sup>2</sup> ]
	<i>Aspect ratio</i>	15.88	
	<i>Root chord</i>	1.308 [m]	4.291 [ft]
	<i>Mean Standard Chord (MSC)</i>	0.971 [m]	3.186 [ft]
	<i>Wing profile</i>	NACA 64 <sub>1</sub> 412	
	<i>Tailplane span</i>	3.160 [m]	10.37 [ft]
	<i>Tailplane area</i>	1.873 [m <sup>2</sup> ]	20.2 [ft <sup>2</sup> ]
	<i>Tailplane profiles</i>	NACA 63 <sub>1</sub> 012 ÷ 63 006 mod.	
	<i>Fin and rudder area</i>	1.123 [m <sup>2</sup> ]	12.09 [ft <sup>2</sup> ]
	<i>Fin and rudder profiles</i>	NACA 63 <sub>2</sub> 015 ÷ 63 <sub>1</sub> 012	
4	<i>C.G. position of empty glider</i>	620÷645 [mm] aft of the Datum Plane	24.43÷25.41 [in]
	<i>(Datum Plane = leading edge of wing Root Rib, see also Technical Service Manual item 2.4.)</i>		
	<i>Maximum empty glider weight:</i>		
1	<i>-without balancing weights</i>	350 [kG]	772 [lb]
4	<i>-with 11.0 kG balancing weights</i>	361 [kG]	796.3 [lb]
	<i>Max. weight of non-lifting parts (wing-less glider)</i>	165 [kG]	364 [lb]
	<i>All-up weight</i>	530 [kG]	1169 [lb]
	<i>Allowed in-flight C.G. position</i>	213÷379 [mm]	8.40÷14.93 [in]
	<i>Locations of load components:</i>		
	<i>Instrument panel at front seat</i>	1580 [mm] fore of DP	62.25 [in] fore of DP
	<i>Balancing weights</i>	1520 [mm] fore of DP	59.89 [in] fore of DP
	<i>Pilot on front seat</i>	950 [mm] fore of DP	37.43 [in] fore of DP
	<i>Instrument panel at rear seat</i>	440 [mm] fore of DP	17.34 [in] fore of DP
	<i>Pilot on rear seat</i>	60 [mm] aft of DP	2.36 [in] aft of DP
	<i>Luggage</i>	not allowed	
	<i>Max. wing surface loading</i>	42.54 [kg/m <sup>2</sup> ]	8.72 [lb/ft <sup>2</sup> ]
	<i>Limit manoeuvring load factors</i>	+7 / -5	
	<i>Limit manoeuvring load factors for solo flying (max. useful load 100 kG)</i>	+9 / -6	



1.5 Three-view drawing.



## **Section 2**

### **2. LIMITATIONS**

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**2.3. Airspeed indicator markings**

**2.4. Power plant, fuel and oil. - NOT APPLICABLE**

**2.5. Power plant instrument markings. - NOT APPLICABLE**

**2.6. Weight**

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**2.12. Minimum equipment**

**2.13. Aerotowing, winch- and autotow-launching**

**2.14. Other limitations**

**2.15. Limitations placards in cockpit**

## 2.1 Introduction.

Section 2 includes operating limitations, instrument markings and basic placards informing on limitations necessary for safe operation of the glider, its systems and standard equipment.

The limitations contained in this Section and in Section 9 have been approved by Civil Aircraft Inspection Board.

## 2.2 Airspeed.

Airspeed limitations and their operational significance, used in this Manual are shown below:

	<b>Speed (IAS)</b>	<b>[km/h]</b>	<b>[kt]</b>	<b>Remarks</b>
<b>V<sub>NE</sub></b>	Never exceed speed	282	152	Do not exceed this speed in any operation and do not use more than 1/3 of control deflection
<b>V<sub>RA</sub></b>	Rough air speed	225	122	Do not exceed this speed except in smooth air and then only with caution. Examples of rough air are: lee-wave rotor, thunderclouds etc.
<b>V<sub>A</sub></b>	Manoeuvring speed	214	116	Do not make full or abrupt control movements above this speed, because under certain conditions the glider may be overstressed by full control movement.
<b>V<sub>W</sub></b>	Maximum winch-launching speed	150	81	Do not exceed this speed during winch- or aerotow-launching.
<b>V<sub>T</sub></b>	Maximum aerotowing speed	150	81	Do not exceed this speed during aerotowing.

**WARNING** :The airspeed indicator readings are air density-dependent, thus also altitude-dependent. Due to this, the airspeed indicator readings are underrated by 6 per cent / every 1000 m of altitude.

*For flutter phenomenon, however, the true airspeed is of importance.*

*In this connection, for high altitude flying, the following limitations of maximum airspeed must be observed:*

<b>Flight altitude</b>		<b>Never exceeded airspeed V<sub>ne</sub> IAS</b>	
<b>[m]</b>	<b>[ft]</b>	<b>[km/h]</b>	<b>[kt]</b>
up to 2000	6560	282	152
3000	9840	265	143
4000	13125	248	134

### 2.3 Airspeed indicator markings

Airspeed indicator markings and their colour-code significance are shown below:

<b>Marking</b>	<b>(IAS) value or range</b>		<b>Significance</b>
	<b>[km/h]</b>	<b>[kt]</b>	
Green arc	92 ÷ 214	50 ÷ 116	<i>Normal operating range</i> - Lower limit is 1.1 V <sub>S1</sub> at maximum weight and most forward C.G. Upper limit is rough air speed.
Yellow arc	214 ÷ 282	116 ÷ 152	Manoeuvres must be conducted with caution and in smooth air only.
Red radial line	282	152	Maximum speed for all operations
Yellow triangle	115	62	Approach speed at maximum weight.

### 2.4 Power-plant - NOT APPLICABLE

### 2.5 Power-plant instrument markings - NOT APPLICABLE

**2.6 Weights**

1	Maximum take-off weight	530 [kG]	1169 [lb]
	Maximum landing weight	530 [kG]	1169 [lb]
1	Maximum empty weight without balancing weights	350 [kG]	772 [lb]
4	Maximum empty weight with balancing weights	361 [kG]	796.3 [lb]
	Maximum weight of all non-lifting parts	165 [kG]	364 [lb]
	Maximum weight in baggage compartment	0 [kG]	0 [lb]

**2.7 Centre of gravity.**

	C.G range (for flight):	22 through 39	per cent of MSC.
4	C.G. range (of empty glider) :	620 ÷ 645	[mm] aft of Datum
		(24.43 ÷ 25.41)	[in]

**2.8 Approved manoeuvres.**

This glider is certified in the Aerobatic Category.

Approved aerobatic manoeuvres, together with recommended entry airspeeds for particular manoeuvres given in Section 4.

## 2.9 Manoeuvring load factors

Limit load factors +7/-5

Limit load factors for solo flying,  
crew weight below 100 kg +9/-6

## 2.10 Flight crew

The crew consists of one, or two persons.

Solo flying on front seat only.

## 2.11 Kinds of operation

Flying in anticipated icing conditions and night flying - PROHIBITED.

Cloud flying allowed, **providing the turn indicator is installed.**

## 2.12 Minimum equipment

For normal (soaring) flight:

- altimeter,
- airspeed indicator,
- variometer,

For aerobatic flight, additionally:

- accelerometer
- 5-point pilot safety harness, at front and rear seats

For schooling in aerobatics, the accelerometer must be installed in instrument panel both at front and at rear seats.

## 2.13 Aerotow and winch- and autotow-launching

For aerotow, the nylon towing cable of 40 ÷ 60 [m] (130 ÷ 195 [ft]) length, with safety link of 677 [daN] (1525 [lb]) ± 10 per cent strength shall be used.

For winch-launching, the cable with safety link of 677 [daN] (1525 [lb]) ± 10 per cent strength shall be used.

Maximum aerotow and winch-launching speed is 150 [km/h] (81 [kt]).

**The autotow-launching is PROHIBITED.**

## 2.14 Other limitations

Cross-country flight, both in free and in aerotowed flight, in one-person crew only.

## 2.15 Limitations placards.

The following placards should be placed on the visible place in the cockpit:

<b>LIMITATIONS</b>		
1. Night flying prohibited		
2. Cloud flying allowed, providing the turn indicator is installed		
3. Flying in anticipated icing conditions prohibited		
4. Full aerobatics, according to Flight Manual item 4.5.9		

<b>SPEED LIMITATION</b>		
IAS	[km/h]	[kt]
<b>V<sub>NE</sub></b>	282	152
<b>V<sub>RA</sub></b>	225	122
<b>V<sub>A</sub></b>	214	116
<b>V<sub>T</sub></b>	150	81

For aerotow, the towing cable of 40 ÷ 60 [m] (130 ÷ 195 [ft]) length, with safety link of 677 [daN] (1525 [lb]) (± 10 per cent) strength shall be used

For winch launching, the cable with safety link of 677 [daN] (1525 [lb]) (± 10 per cent) strength shall be used

<b>BEFORE FLIGHT</b>	
- Check the cockpit, take on the place	
- Adjust the pedals, back rest and balancing weights	
- Check the deflection of control surfaces, retract air brake	
- Set the altimeter to zero reading	
- Fasten and tighten the safety belts	
- Check the setting of trimming device	
- Lock both pieces of canopy, communication test	

<b>MDM-1 „FOX” LOADING PLAN</b>								
Pilot with parachute weight						Balancing weights		Limit manoeuvring load factor
rear seat		front seat						
[kG]	[lb]	minimum [kG]	minimum [lb]	maximum [kG]	maximum [lb]	[kG]	[lb]	
0	0	55	121	91.5	202	2x5.5	2x12.2	+ 9 / - 6
0	0	70	154	100	221	0		
0	0	100	221	110	243	0		
55	121	55	121	110	243	0		+ 7 / - 5
110	243	55	121	70	154	0		

Solo flying on front seat only  
Installation of balancing weights (2\*4.25 kG) acc. to item 7.2 and Fig. 7.1.

<b>Flight altitude</b>	[m]	up to 2.000	3.000	4.000
	[ft]		6560	9840
<b>V<sub>NE</sub></b>	[km/h]	282	265	248
	[kt]	152	143	134

## **Section 3**

### **3. EMERGENCY PROCEDURES**

**3.1. Introduction**

**3.2. Canopy jettison**

**3.3. Bailing out**

**3.4. Stall recovery**

**3.5. Spin recovery**

**3.6. Spiral dive recovery**

**3.7. Power-plant failure - NOT APPLICABLE**

**3.8. Fire**

**3.9. Other emergencies**



### **3.1 Introduction.**

Section 3 provides the exact procedures for coping with emergencies that may occur.

### **3.2 Canopy jettison.**

1. Pull back with both hands simultaneously the red lever on the right hand canopy side and the canopy opening lever on the left hand side.
2. Push the canopy upwards, if necessary.

***WARNING: Both pieces of canopy cannot be jettisoned by one person. In case of training or passenger flight, each crew member shall be familiar with canopy jettison and bailing out procedures.***

### **3.3 Bailing out.**

1. Jettison the canopy.
2. Release the safety belts.
3. Holding at cockpit boards, pull up legs and bail out.
4. If the glider is rotating, e.g. spinning, bail out towards the centre of rotation.

### **3.4 Stall recovery.**

The glider, both in straight flight and in turn, gives the clear stall warning in the form of perceptible vibrations, appearing at the sufficient margin when the critical incidence angle is approached.

The nose of stalled glider gently drops down below the horizon.

The aileron control remains efficient till to the stall.

Altitude loss in symmetrical stall ranges 20 through 30 [m] (65 through 98 [ft]).

The lateral balance maintained with aileron, with stick pulled completely back leads to a deep stall condition associated with a considerable sinking (approx. 8 [m/s], i.e. 16 [kt]).

The recovery is easy and immediate by pushing the stick forwards slightly beyond the neutral, or by leaving the controls free.

### **3.5 Spin recovery.**

The spinning is unstable. During the spinning, the oscillations of both pitch and rotational speed may occur.

The recovery delay reaches its maximum value in the second turn, where both the acceleration of autorotation and spin flattening appear. The delay does not exceed one turn.

The normal recovery procedure:

1. Deflect the rudder opposite to autorotation.
2. Release the stick forwards slightly beyond the neutral.
3. Neutralize the rudder.
4. Recover the glider out of diving.

**NOTE:**        *Deflection of the aileron towards spinning increases the delay.*

*Deflecting the aileron opposite to spinning results in transition from spinning into a spiral slide.*

### **3.6 Spiral dive recovery.**

1. Deflect the aileron and rudder opposite to rotation.
2. When the symmetrical flight is obtained, neutralize the aileron and rudder.
3. Decrease the airspeed.

### **3.7 Power-plant failure - NOT APPLICABLE**

### **3.8 Fire.**

NOT EXPECTED.

### **3.9 Other emergencies.**

NO OTHER EMERGENCIES KNOWN.

## **Section 4**

### **4. NORMAL PROCEDURES**

#### **4.1. Introduction**

#### **4.2. Rigging and de-rigging**

#### **4.3. Daily inspection**

#### **4.4. Preflight inspection**

#### **4.5. Normal procedures and recommended speeds**

4.5.1. Launch, run up, ground rolling

4.5.2. Take-off and climb

4.5.3. Flight

4.5.4. Approach

4.5.5. Landing

4.5.6. Flight with water ballast - NOT APPLICABLE

4.5.7. High altitude flight

4.5.8. Flight in rain

4.5.9. Aerobatics

#### **4.1 Introduction.**

Section 4 provides the procedures for the conduct of normal operation. Normal procedures associated with optional equipment can be found in Section 9.

#### **4.2 Rigging and de-rigging.**

Four persons, having the basic technical skill, are necessary to perform the glider de-rigging after an off-field landing. Before starting the de-rigging of each set, all participants should be informed in details on the procedures to be done.

Tools necessary:

- open ended spanner 17 [mm]
- pliers
- Assembly wrench (steel rod 15 dia x 400 [mm]) with duralumin end for alignment of main fittings (supplied with glider)

The de-rigged sets preferably should be stored directly on the trailer. In case a trailer is not at disposition, the wings and tailplane may be laid on a grass for a short time, providing no protruding stones or other hard objects are present.

**DO NOT PUT THE BOLTS AND SCREWS ON THE GROUND.**

The sets should be de-rigged in the sequence as follows.

##### **4.2.1 De-rigging of the tailplane.**

Two persons are necessary for tailplane de-rigging.

- The glider is supported on the wing.
- Set the trimming device spring back onto a stop, stick free, rudder deflected sideways.
- Remove the safety pin, undo the nut and take out the main bolt of tailplane (at the nose portion of stabilizer in its plane of symmetry).
- Push the stabilizer backwards on the leading edge till the stabilizer front fitting disengages from the sleeves. Then, holding the stabilizer on both sides and allowing both elevators to drop down shift the tailplane backwards. The control system disconnects automatically.
- Put the main bolt into the fittings in fuselage, screw on the nut initially and insert the safety pin (to not lose these).
- Put the stabilizer on the trailer, or on the prepared place.

#### 4.2.2 De-rigging of the wings.

Two persons hold the glider on the wing tips.

- Take out the safety pins, unlock the main bolts rotating downwards the safety devices, protecting the bolts against shifting-off. (The safety pins and devices are located in bolt faces, accessible from the cockpit inside).
- Insert the steel pin of assembly wrench into the hole on the main bolt base.
- Unload the bolt by lifting the wing tips slightly and remove the bolt with advance-rotary motion. Repeat the same procedure for the second bolt.
- Lift one wing at its root, holding it on the leading edge and in the vicinity of rear fitting, as well as on the tip, shove it out of the fuselage. The aileron and air brake control system of the de-rigged wing will disconnect automatically. The fourth person firmly holds on the tip of the opposite wing.
- Shove the wing out of the fuselage.
- Remove the second wing in the same way. The fourth person holds the fuselage at the fin or at cockpit portion to secure it against turn over.
- The main bolts should be inserted into the fuselage main fittings, and secured by rotating the safety device upwards into vertical position (to avoid losing of the bolts).

#### 4.2.3 Final remarks.

The rigging of the glider requires the reversed sequence, preferably with 5 persons.

All the mating surfaces, main bolts and sleeves should be covered with a grease again.

**NOTE:** *The rigging of the glider should be supervised by the responsible rigger, trained in servicing the glider of this type.*

### **4.3 Daily inspection.**

Check :

1. Glider documents (validity, complete the records).
2. External inspection, structure and covering condition.
3. Securing of assembling elements and control systems connections. Locking of main bolts of wings, tailplane and control systems, where accessible.
4. Correct operation of control systems.
5. Operation of towing hooks.
6. Undercarriage condition, wheels rollability, operation of wheel brake.
7. Air pressure in tyres (by eye), the cleanness of undercarriage well.
8. Pilot's belts.  
The spring of belt clamp must be neither bent nor broken.
9. External condition of the static and total pressure ports.
10. Correct operation of board instruments, and battery condition.
11. Condition of pedals and adjustment possibility.
12. Operation of valve in air-conditioning system. This is visible through the nozzle on the fuselage nose.
13. Condition of canopy, locks and jettison system.
14. Presence, and correct installation of balancing weights.
15. Transceiver, communication test.

***WARNING: When leaving the glider in the airfield on a sunny day, the canopy perspex should be necessarily protected with a cover, to avoid a self-ignition of cockpit equipment due to the focusing effect of perspex !!!***

#### **4.4 Pre-flight inspection.**

1. Check securing of assembling elements and connections in control systems, as in item 4.3.3.
2. Remove / fasten loose items in cockpit, check the reliable installation of balancing weights (if present).
3. Put on the parachute.
4. Adjust the cockpit elements for comfortable position (pedals, back rest, cushion).
5. Take on the place in cockpit, fasten the belts.
6. Check the accessibility of all devices.
7. Check the full control movements.
8. Check if the air brake is locked in retracted position.
9. Set the altimeter to "zero" reading.
10. Set the spring trimming device to „nose heavy” position.
11. Close and correctly lock the canopy.
12. Connect the towing cable, check the reliable connection.
13. Make a communication test.

#### **4.5 Normal procedures and recommended speeds.**

##### **4.5.1 Launch, run up, ground rolling.**

1. Towing cable connection
  - Pull the release handle onto stop.
  - Insert the small ring of cable end into the hook and release the handle.
  - CHECK THE RELIABLE CABLE CONNECTION PULLING ON THE CABLE SEVERAL TIMES!
2. Winch-launching. - ON C.G. HOOK ONLY!
  - Prior to take-off, inform the winch operator that the increased launching speed must be maintained, as for gliders with water ballast.
  - Before take-off, put the trimming device into:
    - 1-st slot (counting from front) - for light pilot, solo,
    - 4-th slot (from front) - two person crew.
  - In run-up maintain the stick neutral until the tail lifts.

**DO NOT TRY THE PREMATURE LIFT-OFF.**

- When airborne, having gained the proper speed, the glider can gently pass into climbing.
- On hitching a ground with the wing, release the rope immediately.
- Recommended steep climbing airspeed is 110 through 120 [km/h] (59 through 65 [kt]).
- Before releasing the towing cable the pilot should slightly unload the cable.
- In case the cable exceeds the 80° angle, the automatic release will occur.
- After releasing the cable, pull the releasing handle in cockpit several times, and pass then into glide.

**CAUTION: Do not change the setting of trimming device, while climbing.**

### 3. Aerotowed take-off - ON FRONT HOOK ONLY!

- When tensioning the cable, brake on the wheel. This will prevent rolling with a wheel over the cable. In case of surge and loosening the cable, release it immediately.
- The ground run up with stick pushed forward is recommended, to lift the tail as soon as possible.
- Having touched the ground with a wing, release the cable immediately.

#### 4.5.2 Take-off and climb (aerotowed take-off).

- After setting the aerotow airspeed, balance the stick force with trimming device.
- The aerotowed flight below the aeroplane not recommended due to the cable friction against fuselage surface.

#### 4.5.3 Flight.

The glider controllability in free flight is correct, the deflections of control surfaces are proportional, low control forces.

The stall warning, in the form of perceptible vibration, appears at approx. 4÷5 [km/h] (2.2÷2.7 [kt]) before the stall.

The air brake can be operated up to  $V_{NE}$ . At the speed above 200 [km/h] (108 [kt]), extend the air brake gently, as pilot may be subjected to the surge fore (braking effect).

Extending the air brake results in strong buffeting at tailplane, increasing in line with a speed. This, however, does not present a problem for piloting the glider.

In acquainting flights on this type, the attention is to be paid to large forces of air brake retraction, at airspeeds exceeding 200 [km/h] (108 [kt]), and strong braking effect.

In thermal and soaring flights, due to a small margin between the warning and stalling speed, the careful piloting and attention are necessary.

Flight in thunder conditions should be avoided.

#### 4.5.4 Approach.

Approach at 115 [km/h] (62 [kt]) airspeed. In rough air, or in rain, at 125 [km/h] (67.5 [kt]). Extending the air brake results in the nose-down pitching, which requires the stick to be pulled back.

The efficiency of air brake allows for precise adjustment of approach path angle.

The operation force on air brake lever is moderate.

#### 4.5.5 Landing.

Due to the lack of shock absorber, land on the selected smooth airfield part.

Touch ground with main and tail wheels. Due to the coupling of wheel brake control avoid touching ground with fully extended air brake.

Avoid the strong wheel braking. In ground run hold the stick pulled completely back. The glider tends to nose-down pitch.



#### **4.5.6 Flight with water ballast. - NOT APPLICABLE**

#### **4.5.7 High altitude flight.**

Due to the lack of oxygen equipment, the high altitude flights are allowed up to 3000 [m] (9840 [ft]) pressure altitude only.

#### **4.5.8 Flight in rain.**

Flight in rain results neither in the considerable deterioration to glider performances, nor in the changes to its piloting characteristics.

In circling, and in approach maintain the airspeed increased by approx. 5 [km/h] (2.7 [kt]). In poor visibility, or in case of moistured perspex, open the window and the cockpit air conditioning valve.

The glider considerably wetted by rain should be wiped with a flannel cloth, and allowed to get dry with extended air brake.

**NOTE:** *After flying in rain, complete the followings:*

- ***Drain the drainage-units by removing the drainage plugs,***
- ***Disconnect the total and static pressure ducts,***
- ***Disconnect the instruments and blow the ducts through, if necessary, with a pump,***
- ***Having the ducts dried, connect the system and check the system tightness.***

On next day, the glider should be de-rigged and the fittings and bolts greased.

#### 4.5.9 Aerobatics.

Before aerobatics:

- tighten pilot's belts, and check the securing of its lock
- check locking of air brake
- trim the glider for an entry speed, proper for the planned manoeuvre

The glider performs correctly the manoeuvres listed in Table 1.

**NOTE:**     *In primary training in aerobatics:*

- *At first become familiar with the general glider characteristics both in normal and in inverted flight,*
- *Maintain an increased altitude reserve in the initial phase of training in aerobatics,*
- *Mastering the subsequent manoeuvres, increase the level of complication in proportion to the skill gained,*
- *Remember that the full potential of glider possibilities can be recognized and utilized only after matching the individual pilot's and glider characteristics.*

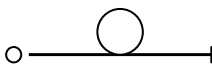
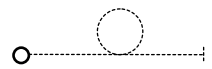
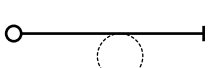


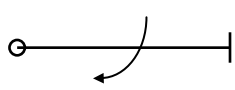
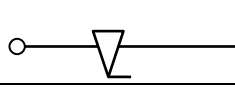
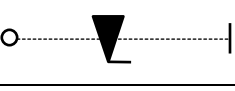

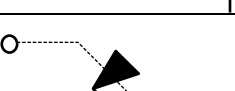

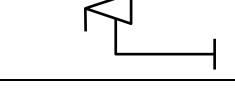
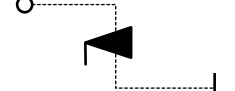
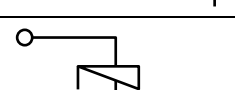
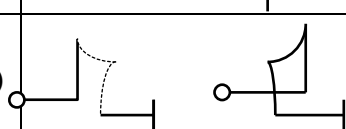
Depending on loading condition (changes to C.G. location) the glider characteristics may vary a little. Shifting the C.G. backwards results in:

- possibility of controlling with increased load factor,
- increased delay in recovery from autorotation manoeuvres.

In smooth air, the limit manoeuvring loads are practically difficult to be reached. This is to remember however that, in rough air conditions, to the manoeuvring loads the gust loads are added, which can be of the same order. Result of this summation can be beyond the design loading capability of a glider.

**Therefore, as for other glider types, aerobatics in rough air - prohibited.**

Table 1. Allowed aerobatic manoeuvres

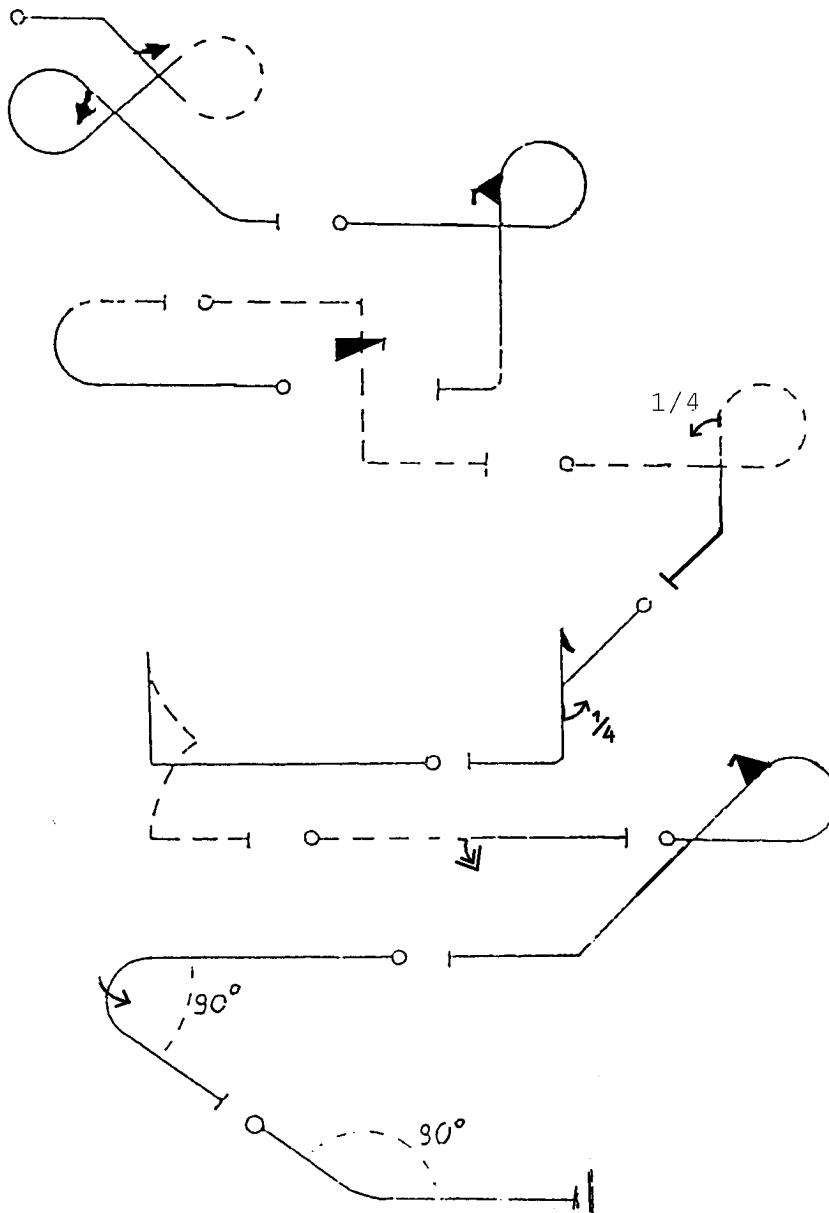
<b>Item</b>	<b>Manoeuvre</b>	<b>FAI catalogue symbol</b>	<b>(IAS) Entry airspeed [km/h] ([kt])</b>	<b>Average load factor</b>
1.	Normal loop		190÷210 (103÷113)	4
2.	Inverted loop upwards (from inverted flight)		240÷260 (130÷140)	- 4
3.	Inverted loop downwards		100 ÷110 (54 ÷59)	- 4.5
4.	Normal stall turn		200 ÷230 (108÷124)	4
5.	Inverted stall turn		230 ÷250 (124÷135)	- 4
6.	Controlled roll		180 min ( 97 min.)	
7.	Normal quick roll		160 ÷170 (86÷92)	3.5 ÷ 4.5
8.	Inverted quick roll		160 ÷170 (86÷92)	-3.0 ÷ -3.5
9.	Quick roll in downward angle		130 ÷145 max.	3.0 ÷ 3.5
10.	Inverted quick roll in downward angle		130 ÷145 max. (70 ÷78)	-3.0 ÷ -3.5
11.	Normal quick roll downwards		120 ÷145 max. (65 ÷78)	3.0 ÷ 4.0
12.	Inverted quick roll downwards		130 ÷140 max. (70 ÷76)	-2.8 ÷ -3.5
13.	Normal spinning		min.	up to 3.5
14.	Inverted spinning		min.	up to -3.5
15.	Tail-slide (not longer than 2 sec.)		In tail-slide, hold the stick firmly, do not allow a surge.	

2

*NOTE: In case of control stick being snatched away in prolonged tail-slide, inspect the glider acc. to Technical Service Manual pg. 40, Table 3.*

Fig. 9 Example of competition program

The altitude loss for this program in the smooth air should not exceed 900 [m] (2950 [ft]).



## **Section 5**

### **5. PERFORMANCE**

#### **5.1. Introduction**

#### **5.2. Approved data**

5.2.1. Airspeed indicator system calibration

5.2.2. Stall speeds

5.2.3. Take-off performance - NOT APPLICABLE

5.2.4. Additional information

#### **5.3. Non-approved further information**

5.3.1. Demonstrated cross-wind performance

5.3.2. Flight polar

**5.1 Introduction.**

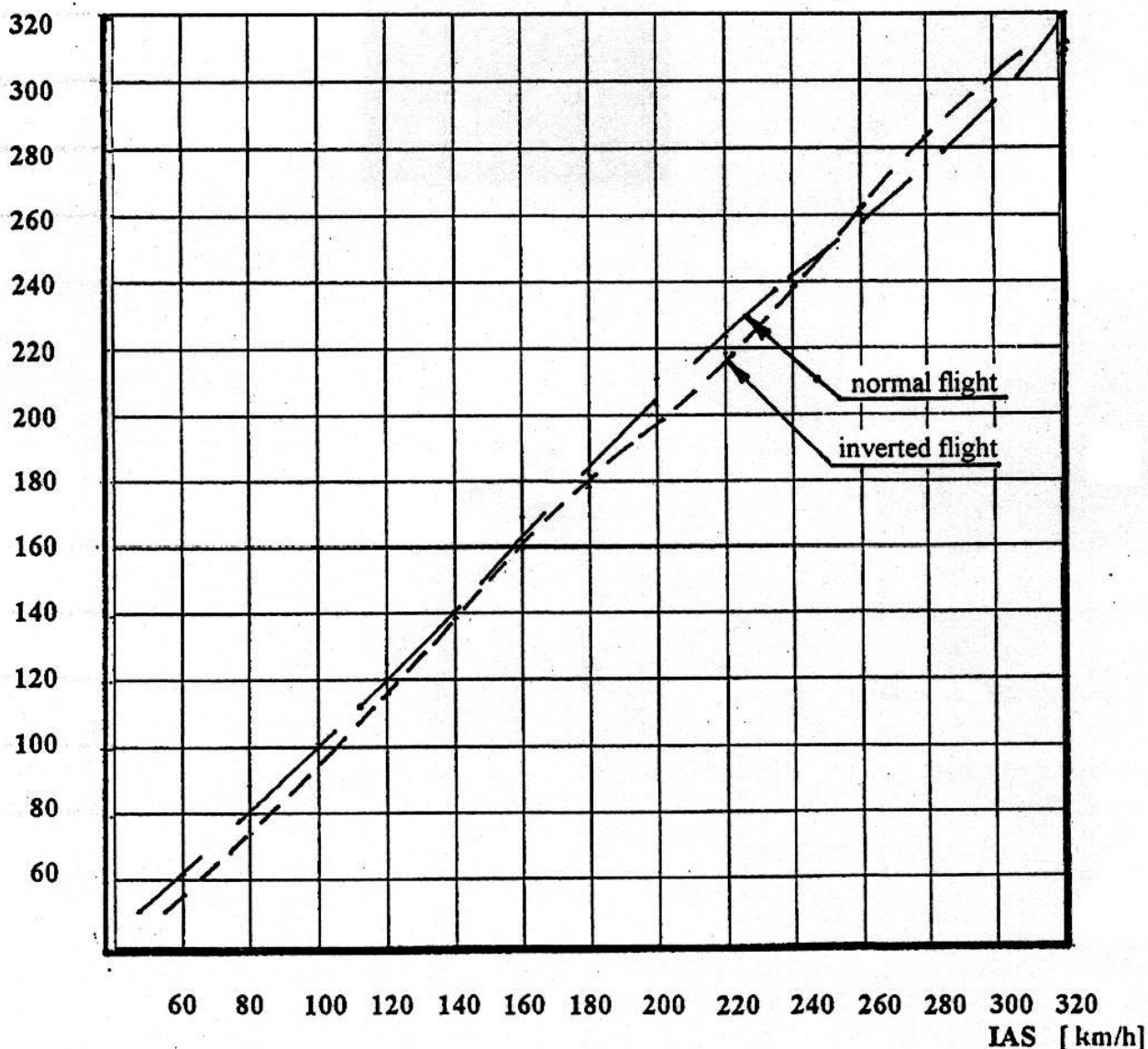
Section 5 provides approved data for airspeed calibration, stall speeds and take-off performance and non-approved further information.

The data in the charts has been computed from actual flight tests with the glider in good condition and using average piloting technique.

**5.2 Approved data.**

**5.2.1 Airspeed indicator system aerodynamic correction.**

CAS [ km/h ]



Calibration of airspeed indicator system.

MDM-1 FOX glider, Fact. No P-13.

## 5.2.2 Stall speeds.

<b>Stall speed (IAS) for in-flight weight</b>			
Crew		1 person	2 person
All-up weight	[kG]	455	530
	[lb]	1003	1169
Stall speed in smooth configuration	[km/h]	78	84
	[kt]	42	45
Stall speed with air brake extended	[km/h]	87	94
	[kt]	47	51

Approach to stall is indicated with the perceptible and audible oscillations (buffeting).

The stalled glider drops down symmetrically.

Recovery is troubleless and reliable, by releasing the stick.

The altitude loss in recovery from stall, in straight flight and in smooth configuration, does not exceed 30 [m] (98 [ft]).

**NOTE:** *Statically stalled glider, with control stick pulled completely aft, passes into a deep stall flight condition associated with a high value of sinking ( $9\div 10$  [m/s], i.e.  $18\div 20$  [kt]), at indicated speed (IAS) of approx.  $85\div 100$  [km/h] ( $46\div 54$  [kt]), whereas the lateral and directional control is retained.*

*Such a flight condition appears within the whole range of c.g. positions, with intensive use made of aileron, to maintain this flight condition.*

*Releasing, or pushing the stick slightly results in the immediate regaining the normal flight condition.*

*The above remains valid for stalling the glider in inverted flight, with stick pushed completely forwards. Also in this case, releasing the stick regains the inverted flight immediately.*

**5.2.3 Take-off performance. - NOT APPLICABLE**

**5.2.4 Additional information.**

NO ADDITIONAL INFORMATIONS.

**5.3 Non approved further information.**

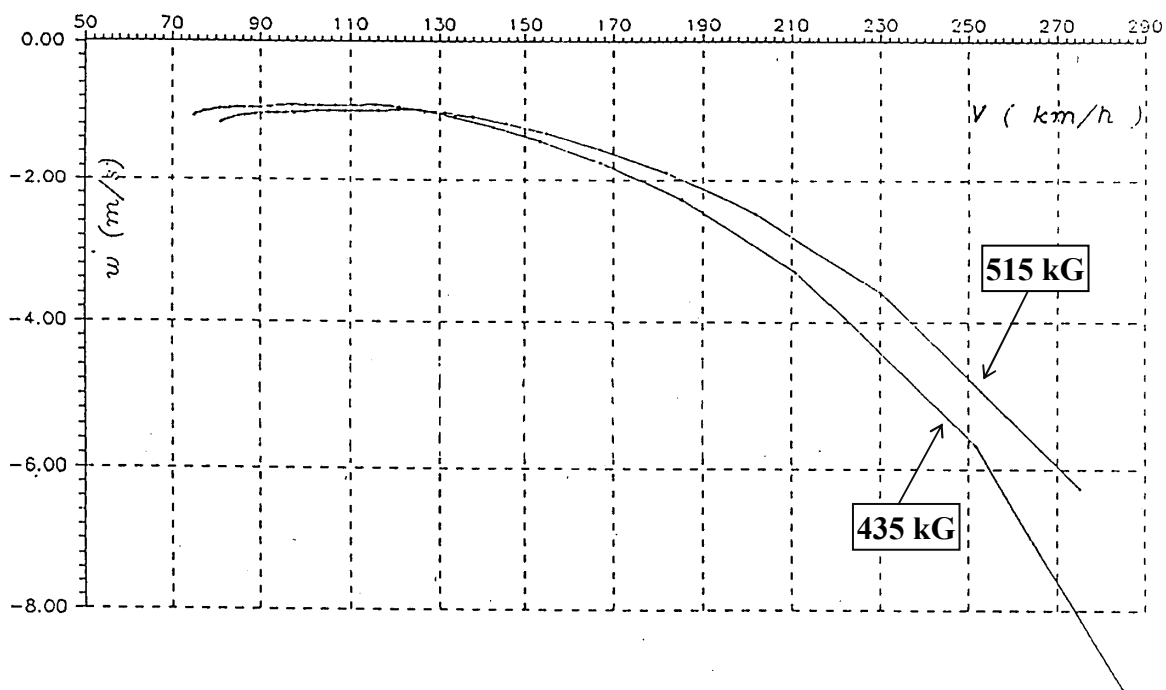
NO FURTHER INFORMATIONS

**5.3.1 Demonstrated cross-wind performance.**

The aerotowing take-offs and landings have been demonstrated with the cross wind component ranging up to 17 [km/h] (9.2 [kt]).



5.3.2 Flight polar:



Flight polar of MDM-1 FOX  
for in-flight weight of 515 [kG] and 435 [kG]  
(calculated).

## **Section 6**

### **6. WEIGHT AND BALANCE**

#### **6.1. Introduction**

#### **6.2. Records of actual weighing / permitted payload range**

### **6.1 Introduction.**

This Section contains the payload range within which the glider may be safely operated.

Procedures for weighing the glider, method of C.G. location calculation and a comprehensive list of all equipment available for this glider, as well as the equipment installed during the weighing of the glider are contained in Technical Service Manual.

**6.2 Records of actual weighing / permitted payload range.**

Date	Empty weight	C.G. position	Permitted crew weight [lb]									
			2 person crew				1 person crew				Approved	
			with balancing weights 2 x 12.2 lb		without balancing weights		with balancing weights 2 x 12.2 lb		without balancing weights		Date	Signed
			Total payload on front and rear seats		Total payload on front and rear seats		Max	Min	Max	Min		
Max	Min	Max	Min	Max	Min	Max					Min	
1	2	3	4	5	6	7	8	9	10	11	12	13

The data, calculated following the procedure given in item 2.7. of Technical Service Manual, should be recorded in columns 2 through 11 of this table (according to Appendix H of JAR-22).

## **Section 7**

### **7. GLIDER AND SYSTEMS DESCRIPTION**

**7.1. Introduction**

**7.2. Cockpit controls**

**7.3. Instrument panel**

**7.4. Landing gear retracting system - NOT APPLICABLE**

**7.5. Seats and safety harness**

**7.6. Instrument pressure system**

**7.7. Airbrake control system**

**7.8. Loading and baggage fixture - NOT APPLICABLE**

**7.9. Water ballast system - NOT APPLICABLE**

**7.10. Power-plant - NOT APPLICABLE**

**7.11. Fuel system - NOT APPLICABLE**

**7.12. Electrical system**

**7.13. Miscellaneous equipment**

### **7.1 Introduction.**

This Section provides description and operation of the glider and its systems. Refer to Section 9 for details of optional equipment.

### **7.2 Cockpit controls.**

General view from front and rear glider seat is shown in Figs. 7.1 and 7.2.

All controls are operated conventionally.

The wheel brake is coupled with air brake, the control lever (item 16 in Figs. 7.1 and 7.2) is located on the left hand cockpit side.

The elevator spring trimming device is operated with a grip on left hand side of the control stick base, at front seat only (Fig. 7.1 item 18).

The canopy panels are opened with the white lever (item 14 6 in Figs. 7.1 and 7.2) located on the left hand side.

The emergency jettison of canopy is activated by pulling simultaneously, with both hands, the red lever (item 15 in Figs. 7.1. and 7.2.) on canopy right hand side, and canopy opening lever (item 14 in Figs. 7.1. and 7.2.) on the left hand side. Jettison of canopy panel independently from front and rear seat.

The adjustment of rudder pedals at front seat - on ground only - by means of pedals adjustment handle (Fig. 7.1. item 11) located under the instrument panel.

No pedals adjustment provided at rear seat.

The front seat pilot's back rest adjustable at its support (Fig. 7.1. item 23), accessible from rear seat.

Adjusting the seat height at rear seat by means of hard cushions.

The release control tension member ended with a yellow hand-grip (item 9 in Figs. 7.1 and 7.2) located:

- at front seat, on the left hand side, and
- at rear seat, on the left hand portion of front seat back rest tube.

The air conditioning control tension member (Fig. 7.1 item 8) is located on the right hand side of instrument panel, at front seat.

Two balancing weights (Fig. 7.1. item 13), 4.25 [kG] each, are installed with clamps in the floor at front seat.

All levers are provided with the appropriate information pictographs.

Fig.7.1 Front seat view.

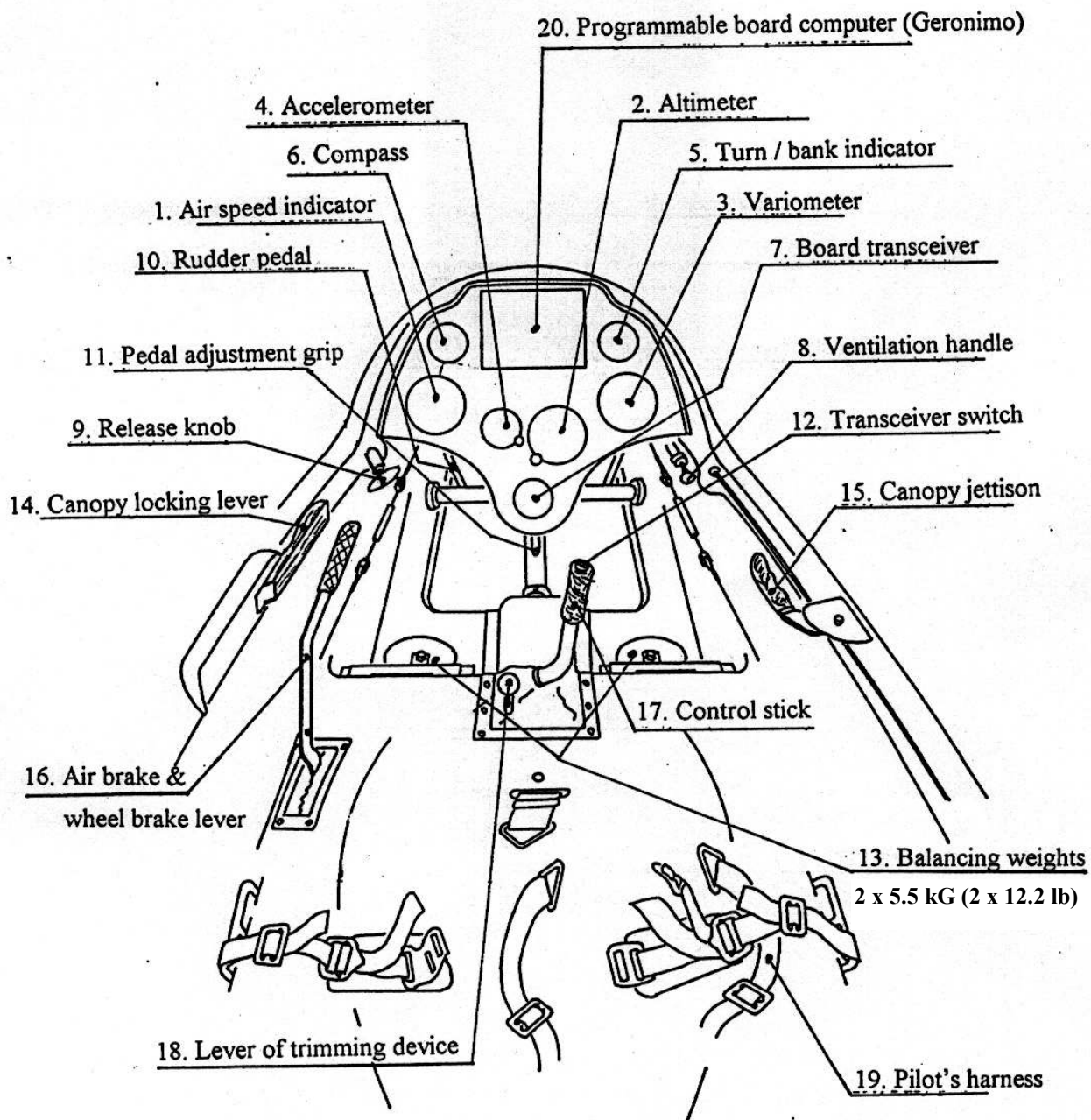
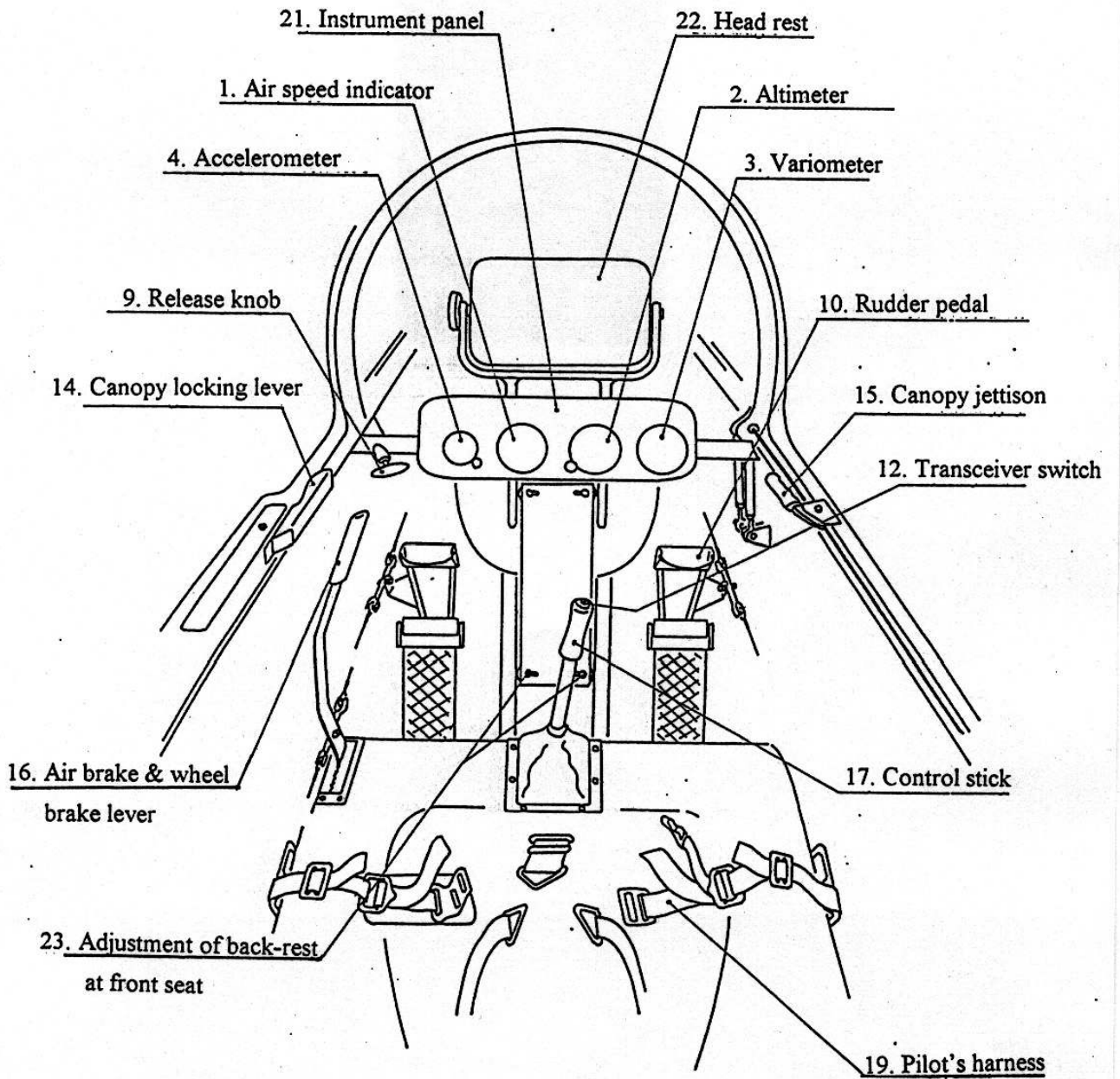


Fig.7.2 Rear seat view.





**7.3 Instrument panel.**

Instrument panel at front seat is shown in Fig. 7.1.

Instrument panel at rear seat is shown in Fig. 7.2.

**7.4 Landing gear retracting system. - NOT APPLICABLE****7.5 Seats and safety belts.**

The back-rest of front seat is adjustable on ground by means of bolts relocation (Fig. 7.2 item 23).

Rear seat is not adjustable.

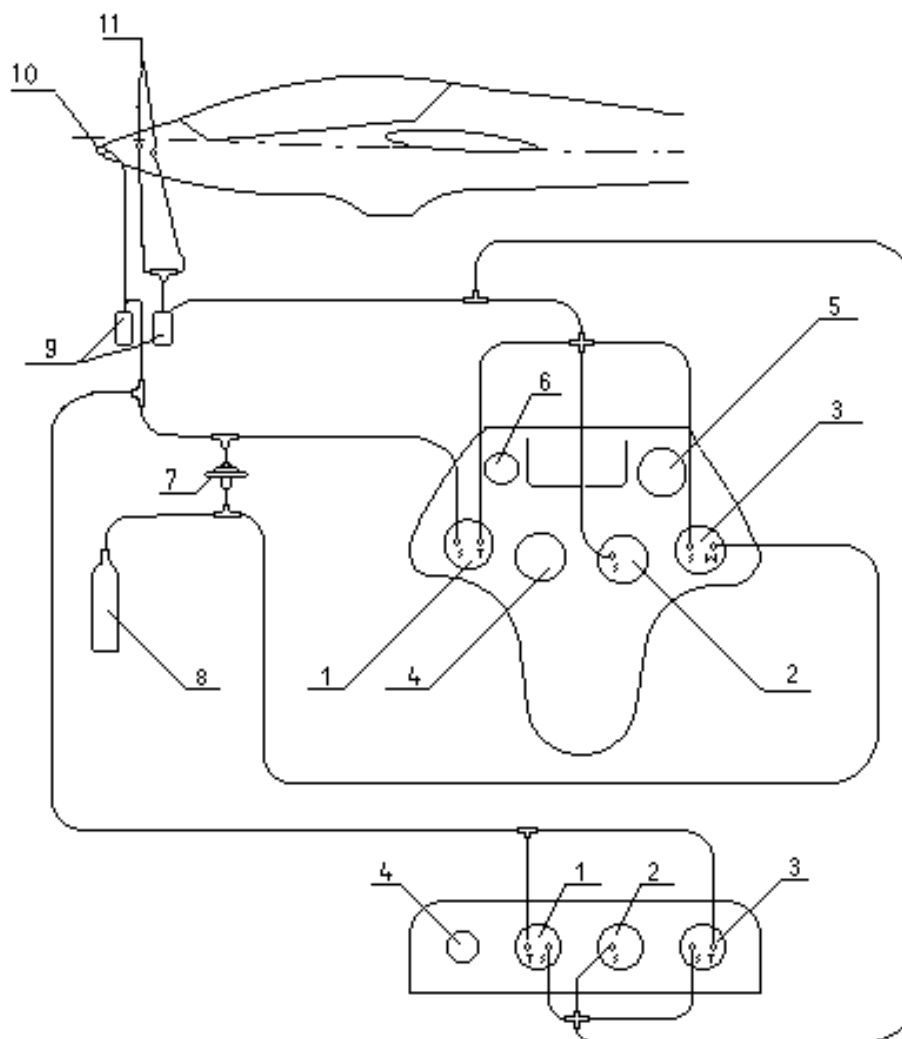
Both seats are equipped with five points safety belts (item 19 in Figs. 7.1. and 7.2.), and doubled fittings of abdomen belts.

**7.6 Instrument pressure system.**

The connection system is shown in Fig. 7.3.

**NOTE:** *After flying in rain, or if water is suspected to have entered the ducts, they should be disconnected from the instruments and blown with air.*

Fig. 7.3 Scheme of board instruments pressure system



- 1 - airspeed indicator
- 2 - altimeter
- 3 - variometer
- 4 - accelerometer
- 5 - turn or bank indicator
- 6 - compass
- 7 - total energy compensator
- 8 - compensation bottle
- 9 - drainage units
- 10 - total pressure port
- 11 - static pressure ports

**7.7 Air brake control system.**

The glider is equipped with the plate air brake, extended on the upper wing surface.

Control system is of combined type.

From cockpit lever to fuselage torque tube - cables, further, in the wings, the push rods are employed.

The air brake locking:

- in retracted position - by the skip beyond "dead point"
- in extended position - ensured by the stops installed on air brake plate.

**7.8 Loading and baggage fixture - NOT APPLICABLE.****7.9 Water ballast system - NOT APPLICABLE.****7.10 Power-plant - NOT APPLICABLE.****7.11 Fuel system - NOT APPLICABLE.****7.12 Electrical system.**

The glider is equipped with battery located behind the back rest of rear seat.

Battery is used for transceiver supply.

**7.13 Miscellaneous equipment.**

The descriptions of optional equipment (transceiver, board computer etc.) are contained in documents of these instruments, and in Section 9.

## **Section 8**

### **8. GLIDER HANDLING, CARE AND MAINTENANCE**

#### **8.1. Introduction**

#### **8.2. Glider inspection periods**

#### **8.3. Glider alterations and repairs**

#### **8.4. Ground handling and road transportation**

#### **8.5. Cleaning and care**

### **8.1 Introduction.**

The Section contains manufacturer's recommended procedures for proper servicing of the glider. It also identifies certain inspection and maintenance requirements which must be followed if the glider is to retain that new-plane.

### **8.2 Glider inspection periods.**

Glider inspection periods are specified in Technical Service Manual.

### **8.3 Glider alterations and repairs.**

Prior to introducing any alterations on the glider, the responsible Airworthiness Authority shall be contacted to ensure that the airworthiness of the glider is not compromised.

The repair procedures should be agreed with the producer and Airworthiness Authority.

***WARNING: No colour inscriptions or markings allowed on the upper surfaces of wings, fuselage and tail-unit.***

### **8.4 Ground handling and road transportation.**

#### **8.4.1 Airfield transportation.**

- Set the trimming device into "tail heavy" position.
- Retract the air brake.
- CORRECTLY LOCK THE CANOPY.
- FOR ELEVATOR PROTECTION REASONS, FASTEN THE PULLED BACK CONTROL STICK WITH SAFETY BELTS.

Mechanical transportation:

The glider should by ground towed at a speed up to 6 [km/h] (3 [kt]).

Towing cable length not less than 6 [m] (20 [ft]).

The glider can be ground towed „nose forwards” on the towing hook, or „tail forwards” on the special hook installed in the fuselage tail.

Hand transportation:

It is recommended to push the glider on the wing leading edge, at wing semi span, „tail forwards”.

Turns with tail wheel lifted, by lifting the tail with the special handle in fuselage rear part.

#### *8.4.2 Transportation in a trailer.*

To the order, the producer delivers the COBRA-FOX closed trailer, together with an instruction for loading the glider into trailer.

In case the glider is transported with other type of trailer, it is to user's responsibility.

In such a case, the followings are recommended:

- Fix the wings on spar roots near the root rib, and on leading edge at 2/3 semi span.
- The fuselage may be fixed on undercarriage wheels and wing/fuselage connection pivots, providing the mating surfaces of these are protected against damage/scratch.
- Tailplane should be fixed in clamps.
- During transportation, the mating surfaces of fittings, inspection holes and bearings should be protected against dust and dirt.
- Immobilize the control stick and control surfaces. Close the canopy, and protect with flannel cover.
- In case of transportation on the open trailer, the external surfaces of the main glider components should be protected with individual covers and, in case of rain, with foil.

### **8.5 Cleaning and care.**

The wing leading edge, and external lacquer coats should be cleaned with the soft flannel cloth, or shammy.

The canopy should be protected against a dust with the cover of soft fabric.

For canopy cleaning, a special polish for perspex should be used.

## **Section 9**

### **9. SUPPLEMENTS**

#### **9.1. Introduction**

#### **9.2. List of inserted supplements**

#### **9.3. Supplements inserted**



**9.1 Introduction.**

This Section contains the appropriate supplements necessary to safely and efficiently operate the glider when equipped with various additional devices.

**9.2 List of inserted supplements.**

Date of insertion	Issue	Title of inserted supplements

**9.3 Supplements inserted**

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