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F L I G H T M A N U A L

for the powered sailplane

model

Janus CM

Translation of the German Manual

Issue: June 1984

This manual must be carried on board at all times

It refers to the powered sailplane

Model : "Janus CM"

Registration No. : SE-UPU

Serial No. : 3

Manufacturer : Godkänd 2008-04-21

Owner :

Henrik Svensson
Besiktningsingenjör
Segelflygmateriel
För LUFTFARTSSTYRELSEN

This English edition of the "Janus CM" Flight Manual has been translated with care, and is accurate to the best of our knowledge. However, in all official matters the original German text is the authoritative and definite document.

Approval of translation has been done by best knowledge and judgement – In any case the original text in German language is authoritative.

19. Juli 1985

LUFTFAHRT-BUNDESAMT BRAUNSCHWEIG

JANUS CM FLIGHT MANUAL

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AMENDMENT LIST

(log of revisions)

Rev. No.	Description	Pages affected	Date
1.	Modif. Bulletin No. 809 - 3: affected: S/N 10 only	4,5,6,8, 10,11,12, 13,14,15, 16,18,19, 20,25,29, 30,32,33, 61,70,81, 82,87	April 1985
2.	Technical Note No. 809 - 2: Optional external power receptacle	1/2 11,13, 41,41A	July 1985
3.	Technical Note No. 809 - 4: affected: S/N 1 - 26 Modif. Bulletin No. 809 - 5: affected: S/N 27 and on Revised cockpit placards	16, 18	Dec. 1986
4.	Modif. Bulletin No. 809 - 7: High altitude flying (warning)	67 A	Oct. 1987
5.	Technical Note No. 809 - 5: Installation of a ROTAX engine model "535 C". Optional for S/N 1-28, standard for S/N 29 and up	3 30	Nov. 1987
6.	Modif. Bulletin No. 809 - 8: Optional adjustable rudder pedals for rear seat	6 7A	Nov. 1987

AMENDMENT LIST
(log of revision)

Rev. No.	Description	Pages affected	Date
7.	Modif. Bulletin No. 809 - 9: Function of red light on power plant control panel (generator control). Affected: S/N 29 and up	10	Dec. 1987
8.	Technical Note No. 809 - 6: Optional use of a propeller type HM 11 11 - HM - 150 D 127 or HM 11 11 - HM - 155 D 130 or MT 150 H 125 - 1 A	30	April 1990
9.	Modif. Bulletin No. 809 - 13: Dual-actuated hydraulic disc brake Affected: S/N 30 and up	0,20,70	Febr. 1990
10.	Technical Note No. 809 - 7: Tow release model "EUROPA G 88"	37	April 1990
11.	Modif. Bulletin No. 809 - 17: Power plant control unit affected: S/N 33 and up	1/2, 10, 11, 12, 13, 13A - 13H, 14, 18, 25, 28, 39, 40, 41, 41A, 41B	March 1992
12.	Technical Note No. 809 - 10: Safety clip for "L'Hotellier" ball and swivel joints	supplem. page	April 1993
13.	Modif. Bulletin No. 809 - 16: Enlarged fin/rudder unit, higher all-up mass (725 kg/1598 lb) affected: S/N 25 and 37	5,15,16 27,31,32 33,34, 35A, 35C 39,50,51 55,63,85 86,87	Febr. 1994

AMENDMENT LIST

(log of revisions)

Rev. No.	Reference/short title	Page	Date
14.	Technical Note No. 809 - 11: "Wedekind" safety sleeve for "L'Hotellier" ball and swivel joints	suppl. page	Febr. 1994
15.	Technical Note No. 809 - 13: Minimum seat load with two occupants - optional for all serial numbers)	32	Febr. 1998

1. General

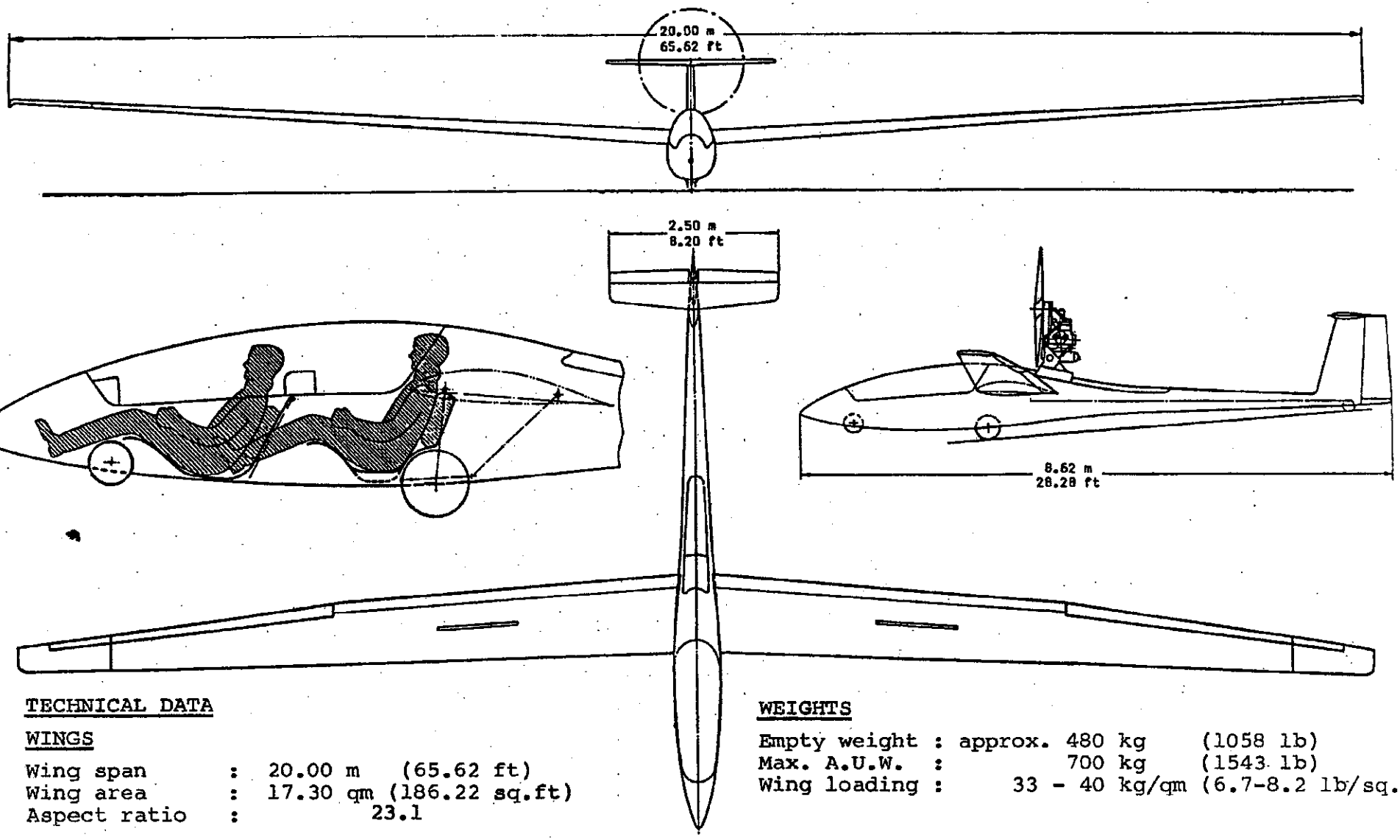
1.1 General description

The Janus CM is a high performance two-place powered sailplane, capable of self launching. It features camber-changing flaps and a T-tail with fixed horizontal stabilizer and balanced elevator.
The Janus CM was developed from the sailplane model Janus C by integrating a modern retractable power plant optimized for maximum climb performance.
In its appearance the Janus CM differs from the sailplane model Janus C only by having a slightly modified upper fuselage contour above the engine compartment. Flight characteristics and performances are identical with a correspondingly ballasted Janus C, with the Janus CM being even more maneuverable due to the more centered location of the engine weight as compared with water ballast in the wings.

The Janus CM is powered by a liquid-cooled 44 kW (59 hp) ROTAX engine (type 535 C) having a 3 : 1 belt reduction drive. Extending/retracting the power plant is by means of an electric spindle drive.

Wings

The two-piece cantilever wing with wing tip extensions has a double trapezoid planform and is fitted with Schempp-Hirth airbrakes on the upper surface. The wing shells are of CFRP/GFRP/foam-sandwich with spar flanges of carbon fiber rovings and shear webs of GFRP/foam sandwich.



TECHNICAL DATA

WINGS

Wing span	:	20.00 m	(65.62 ft)
Wing area	:	17.30 qm	(186.22 sq.ft)
Aspect ratio	:	23.1	

FUSELAGE

Length	:	8.62 m	(28.28 ft)
Width	:	0.71 m	(2.33 ft)
Height	:	1.00 m	(3.28 ft)

WEIGHTS

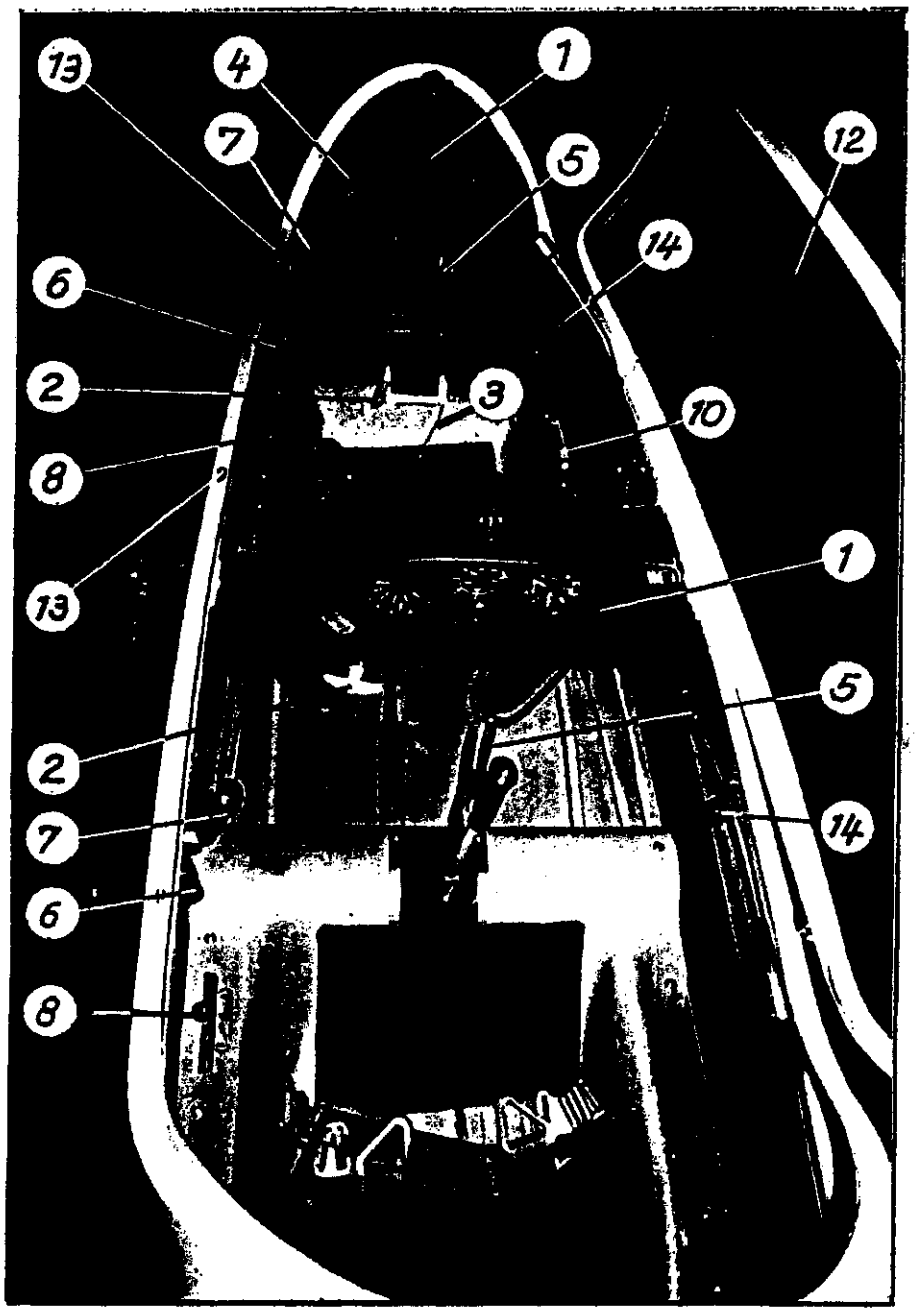
Empty weight	:	approx. 480 kg	(1058 lb)
Max. A.U.W.	:	700 kg	(1543 lb)
Wing loading	:	33 - 40 kg/qm	(6.7-8.2 lb/sq.ft)

Janus CM

June 1984

1.2 Cockpit description

a) For operation in sailplane configuration



All instruments and controls are within easy reach of the occupants.

(1) Instrument panels

With the canopy open, instruments are well accessible. The front instrument panel is attached to the canopy coaming frame of the fuselage, the rear instrument panel is attached to the steel tube frame between the seats. Instrument panels and their covers are easily detached after removing the attachment bolts.

(2) Towing hook release handle

Front seat: Yellow T-shaped handle on the left side of the control stick.
Back seat : Yellow T-shaped handle on the left side of the instrument panel

The winch cable/tow rope is released by pulling the handle.

(3) Rudder pedal adjustment (front seat)

Black T-shaped handle on the right side of the control stick.

Forward adjustment:
Release the locking device by pulling the T-handle. Push pedals with heels into desired position and let them engage the nearest notch.

Backward adjustment:
Pull pedals back with T-handle into desired position. Forward pressure with heels (not toes) will engage pedals into the nearest notch with an audible click.

The rudder pedals may be adjusted on the ground and in the air.

(4) Ventilation

Small black knob on the front instrument panel.

Pull	=	Closed
Push	=	Open

In addition, the sliding windows or their air-scoops may be used for ventilation.

(5) Wheel brake

A wheel brake handle is mounted on both control sticks.

(6) Airbrakes

Handles with blue marking, directing downwards, on the left side below GFRP side wall fairing.

Forward position	=	Airbrakes closed and locked
Pulled back approx. 50 mm (2 in.)	=	Unlocked
Pulled fully back	=	Airbrakes fully extended.

(7) Flaps

Black handles, projecting upwards, on the left GFRP side wall fairing.
Move handle inwards, select flap setting and let engage.

Forward	=	High speed range
Back	=	Low speed range

(8) Elevator trim

Green knobs on the left at the support of the seat molds.

The spring operated elevator trim is gradually adjusted by moving the green knob slightly inwards, sliding it into the desired position and moving it outwards to lock.

Forward position = nose heavy

Backward position = tail heavy

(9) Not installed

(10) Not installed

(11) Ripcord attachment points (not pictured)

Front seat: On tubular frame between the seats at red marking.
Back seat: Red ring, situated at the front of the fuselage steel tube framework, right hand side.

(12) Canopy

The one-piece plexiglass canopy hinges sideways on flush fittings. Take care that the cable restraining the open canopy is properly connected.

(13) Canopy locking device (not pictured)

Sliding red knobs on the left on the canopy frame.

Forward position = locked.

To open the canopy, pull knob back and raise canopy.

(14) Canopy emergency jettisoning device

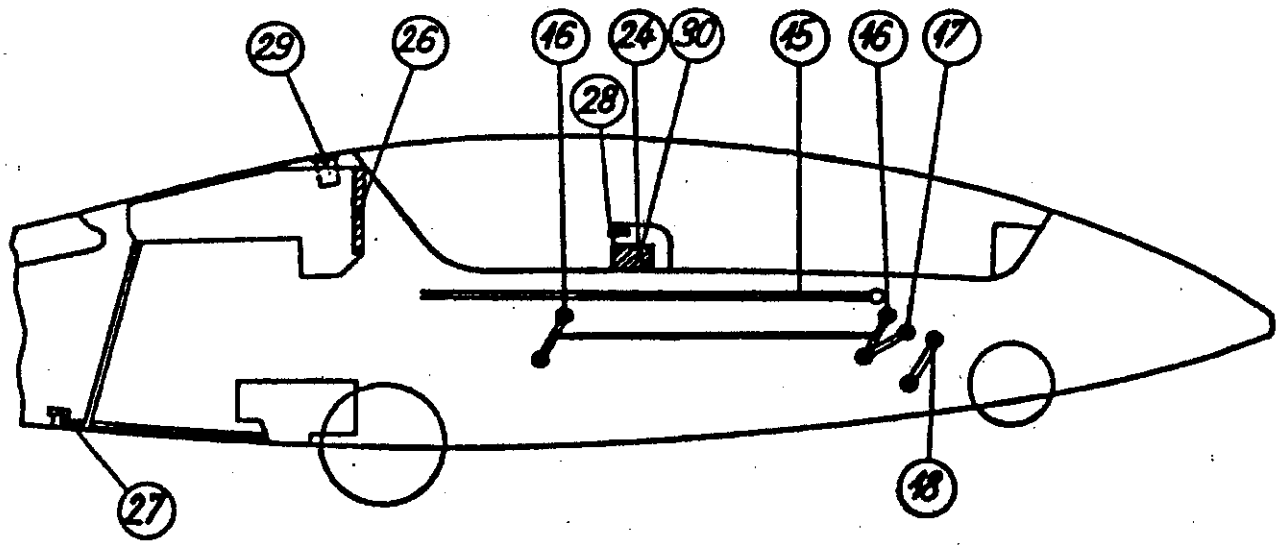
Sliding red knobs on the right on the GFRP inner skin.

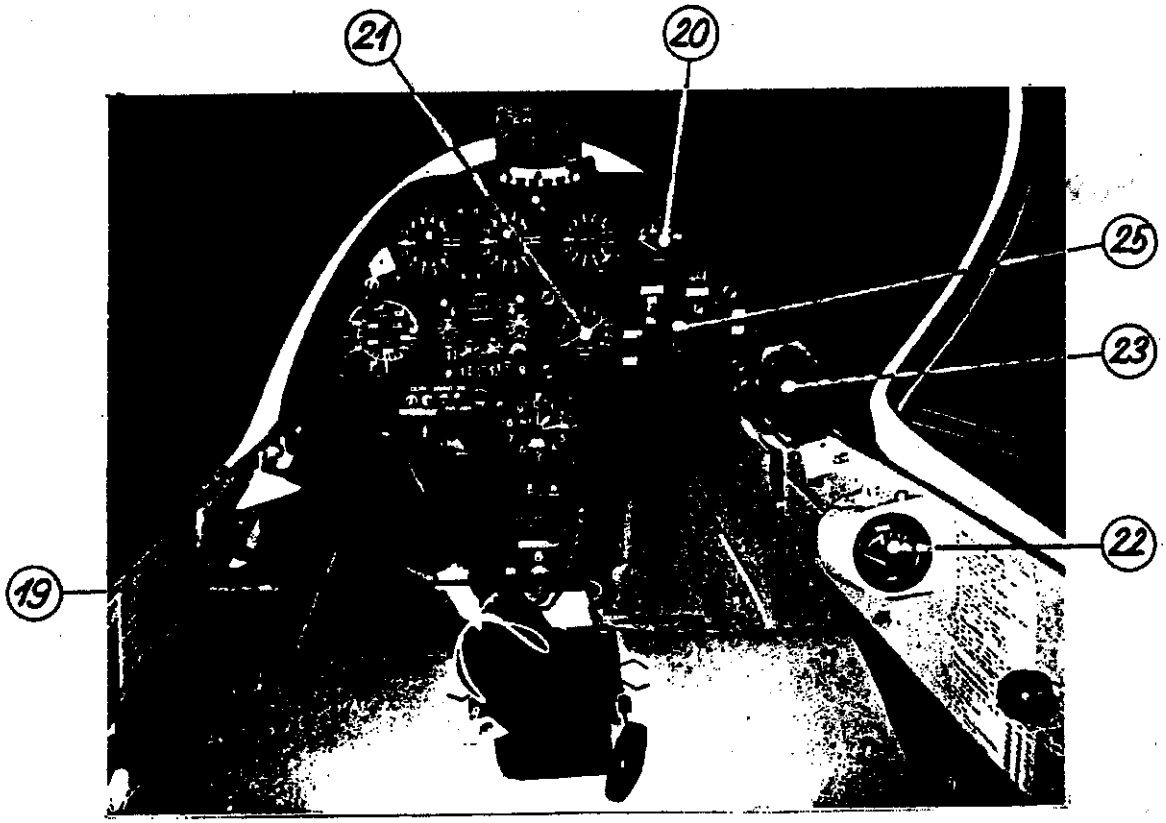
Forward position = locked.

To jettison the canopy, first pull back the red locking knob on the left on the canopy frame, raise canopy, then pull red jettison knob on the right on the GFRP inner skin back and push canopy away.

1.3 Cockpit layout and controls

b) Power plant operation





(15) Fuel shut-off valve

Black knob on sliding tube below left GFRP side wall fairing.

Forward	=	Closed
Back	=	Open

(16) Throttle

Pivoting lever on left cockpit wall, front and aft seat.

Fully forward	=	Full throttle
Fully back	=	Idle

(17) Choke

Pivoting lever, mounted on the same shaft as the throttle lever, front seat only.

Fully forward	=	Open
Fully back	=	Closed

(18) Propeller brake

Pivoting lever on right seat mold support, front seat only.

Forward	=	Prop released
Pulled back and locked	=	Brake applied

(19) Power plant master switch

Red locking toggle on front instrument panel.

Vertical	=	On

(20) Coolant temperature indicator

The instrument is on the front panel.

(21) RPM indicator

The instrument is on the front panel. It indicates the crankshaft speed of the engine, the prop is geared down 3 : 1.

(22) Fuel quantity gauge - reserve tank

The instrument is on the right hand cockpit wall, front seat only.

(23) Rear-view mirror

Adjustable mirror, mounted on the right hand cockpit wall, between front panel and reserve tank fuel quantity gauge.

(24) Engine hour meter

The instrument is on the aft panel.

(25) Power plant operating unit

The unit is on the front panel - see page 14.

(26) Fuel quantity - main tank

A scale showing the contents is attached to the tank.

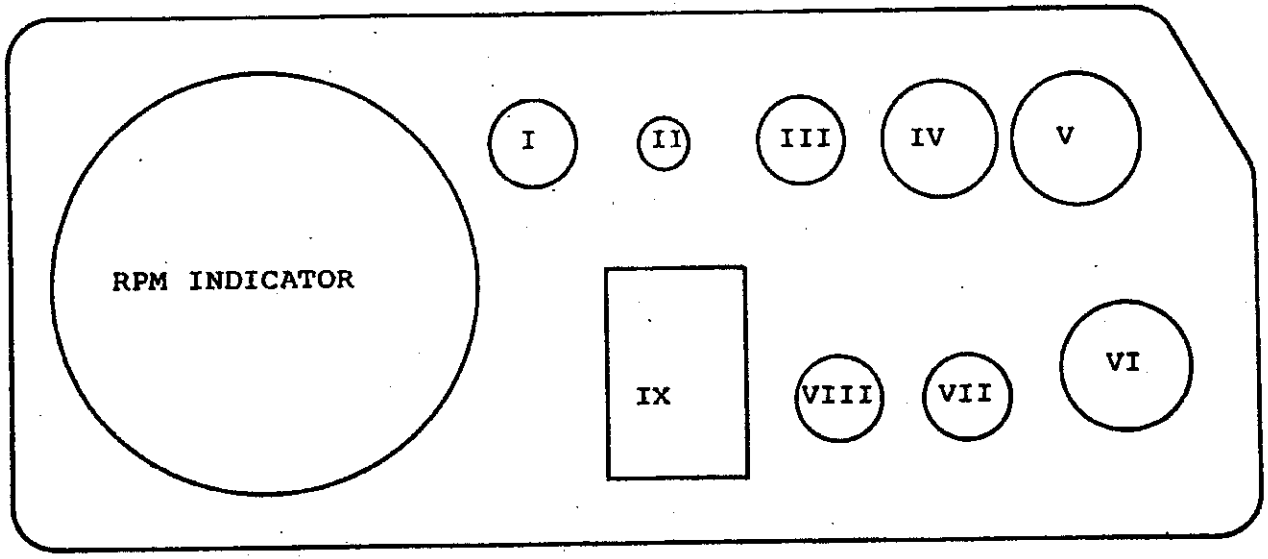
(27) Fuel drain

A drain valve is located at the forward end of the engine compartment.

(28) Battery charging receptacle (for power plant)

(29) Fuel tank filler cap

(30) External power receptacle



(25) Power plant control panel

(located on the right hand side of the front instrument panel)

I Red warning light: ON = Power plant master switch ON

II Ignition switch : UP = Ignition ON
DOWN = Ignition OFF

III Green light : ON = Power plant fully extended and prop brake released

IV Starter button : Push to start

V/VI Magneto test button (M1) (M2): Both (M1) and (M2) out = both ignition circuits ON
(M1) depressed = only ignition circuit (2) ON
(M2) depressed = only ignition circuit (1) ON
Both M1 and M2 depressed = both ignition circuits OFF

VII Automatic circuit breaker (15 A) for generator power.
Depressed = ON

VIII Automatic circuit breaker (15 A) for battery power
Depressed = ON

IX Pylon pivot drive switch
Held UP = Power plant extends
Held DOWN = Power plant retracts

Note:

Unless the green light is ON (= power plant fully extended and propeller brake released) the ignition is cut off.

Unless the ignition is switched OFF the pylon pivot drive is cut off.

Janus CM June 1984

Cockpit placards - operating data and miscellaneous

Identification plate (fire proof)

Operating limitations

Maximum permitted all-up weight: 700 kg (1543 lb)			
Maximum permitted speeds (IAS)	km/h	kt	mph
Flap settings +8, 0, -4, -7	250	135	155
Flap setting L	140	76	87
in rough air	180	97	112
Maneuvering speed	180	97	112
on Aerotow	180	97	112
Winch launch	150	81	93
for extending/retracting the power plant	105	57	65
with power plant extended	180	97	112

Weak links for towing

Maximum : 910 daN (2006 lb)

Tire pressure

Nose wheel: 2.5 bar (36 psi)
Main wheel: 4.5 bar (64 psi)
Tail wheel: 2.5 bar (36 psi)

PERMITTED AEROBATIC MANEUVERS

(only permitted with power plant removed)

(a) Inside Loops
(b) Stalled Turns
(c) Spins
(d) Lazy Eight

Baggage Compartment

Maximum load firmly screwed down:

25 kg (55 lb)

Technical Note No. 809 - 4:
affected: S/N 1 - 26
(standard on S/N 27 and on accord. Modif.Bulletin No.809 - 5)

December 1986

Load on the seats

(Occupants including parachute)

Seat load		two persons min.	two persons max.	one person min.	one person max.
front seat	kg	70*	110*	70*	110
	lb	154*	243*	154*	243
back seat	kg	- -	100*	- -	- -
	lb		220*		

Fuel at max. load on both seats	kg	lb	Ltr.	U.S. Gal.	Imp. Gal.
	10*	22*	14 *	3.7 *	3.1 *

Minimum: 10 kg/22 lb (14 Ltr./3.7 U.S. Gal./3.1 Imp. Gal.)

* As the actual minimum or maximum seat loads of the Janus CM to which this manual refers may differ from the above typical weights, the placard in the cockpit must show the actual weights which are also to be entered in the log chart - see page 36.

Check list before take-off

- Parachute securely fastened ?
- Safety harness secured and tight ?
- Back rest and pedals in comfortable position ?
- All controls and instruments accessible ?
- Airbrakes locked after functioning check ?
- All control surfaces checked with assistant for full and free movement in correct sense ?
- Elevator trim correctly set ?
- Flaps in take-off setting ?
- Canopy closed and locked ?

Check list for take-off on own power

- Fuel quantity checked ?
- Cooling liquid temperature checked ?
- Magnetos checked ?
- Take-off RPM checked ?
- Rear-view mirror properly adjusted ?

C H E C K L I S T

EXTENDING AND STARTING THE POWER PLANT

1. POWER PLANT MASTER SWITCH "ON" =
   RED LIGHT ON
2. OPEN FUEL SHUT-OFF VALVE
3. RELEASE PROPELLER BRAKE
4. PULL CHOKE (cold engine)
5. SET THROTTLE 1/4
6. HOLD PYLON DRIVE SWITCH ON "EXT"
   UNTIL POWER PLANT HAS EXTENDED =
   GREEN LIGHT ON
7. PROPELLER CLEAR ?
8. IGNITION "ON"
9. PUSH STARTER BUTTON

C H E C K L I S T

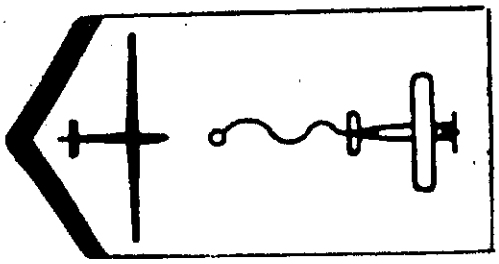
STOPPING AND RETRACTING THE POWER PLANT

1. CLOSE THROTTLE (let engine idle for
   1 minute)
2. IGNITION "OFF"
3. PULL PROPELLER BRAKE =
   GREEN LIGHT OFF
   CHECK PROP FOR VERTICAL POSITION
4. HOLD PYLON DRIVE SWITCH ON "RETR"
   UNTIL POWER PLANT HAS RETRACTED
5. POWER PLANT MASTER SWITCH "OFF"
6. CLOSE FUEL SHUT-OFF VALVE

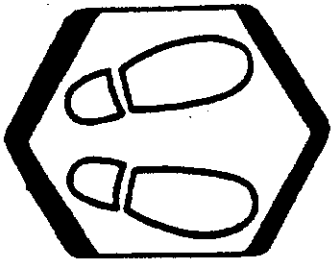
PREMIUM GASOLINE, MIN. ROZ 96.0 OCTANE, OR AVGAS 100 LL
MIXING RATIO WITH FIRST GRADE 2-STROKE OIL
1 : 50

	U.S. Gal.	Imp. Gal.	Ltr.
TANK CAPACITY :	11.6	9.7	44
USABLE :	11.3	9.4	43

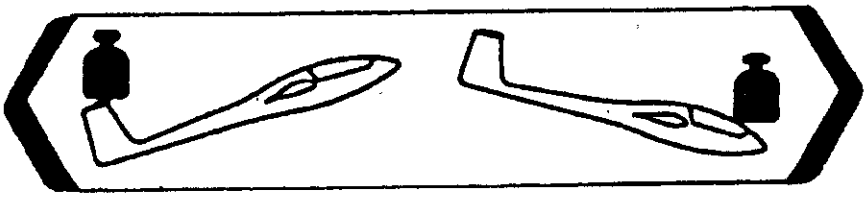
Cockpit controls - markings



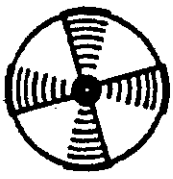
Yellow tow release handle



Pedal adjustment



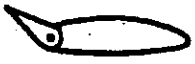
Elevator trim - green knob

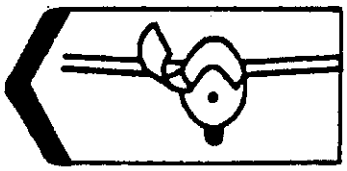


Ventilation

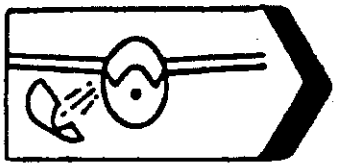
Airbrakes
handle with blue marking

Flap settings





Red
knobs



left - Canopy opening right - Canopy jettisoning

1.4 Wing flaps

The wing flaps of this powered sailplane are used to optimize its performance by keeping the airfoil within the low-drag laminar bucket at the respective airspeed.

Since the laminar buckets of the airfoil used are overlapping each other widely at different flap settings, only three settings for the normal flight range and one for very high speeds are sufficient.

Using the flaps

Flight condition	Flap setting	Optimum airspeeds, wing loading 37 kg/m^2 (7.6 lb/sqft)
Thermal flying	+8	85 - 105 km/h 46 - 57 kt 53 - 65 mph
Best glide	0	100 - 130 km/h 54 - 70 kt 62 - 81 mph
Flying between thermals	-4	120 - 170 km/h 65 - 92 kt 75 - 106 mph
High speed flying	-7	160 - 250 km/h 86 - 135 kt 99 - 155 mph

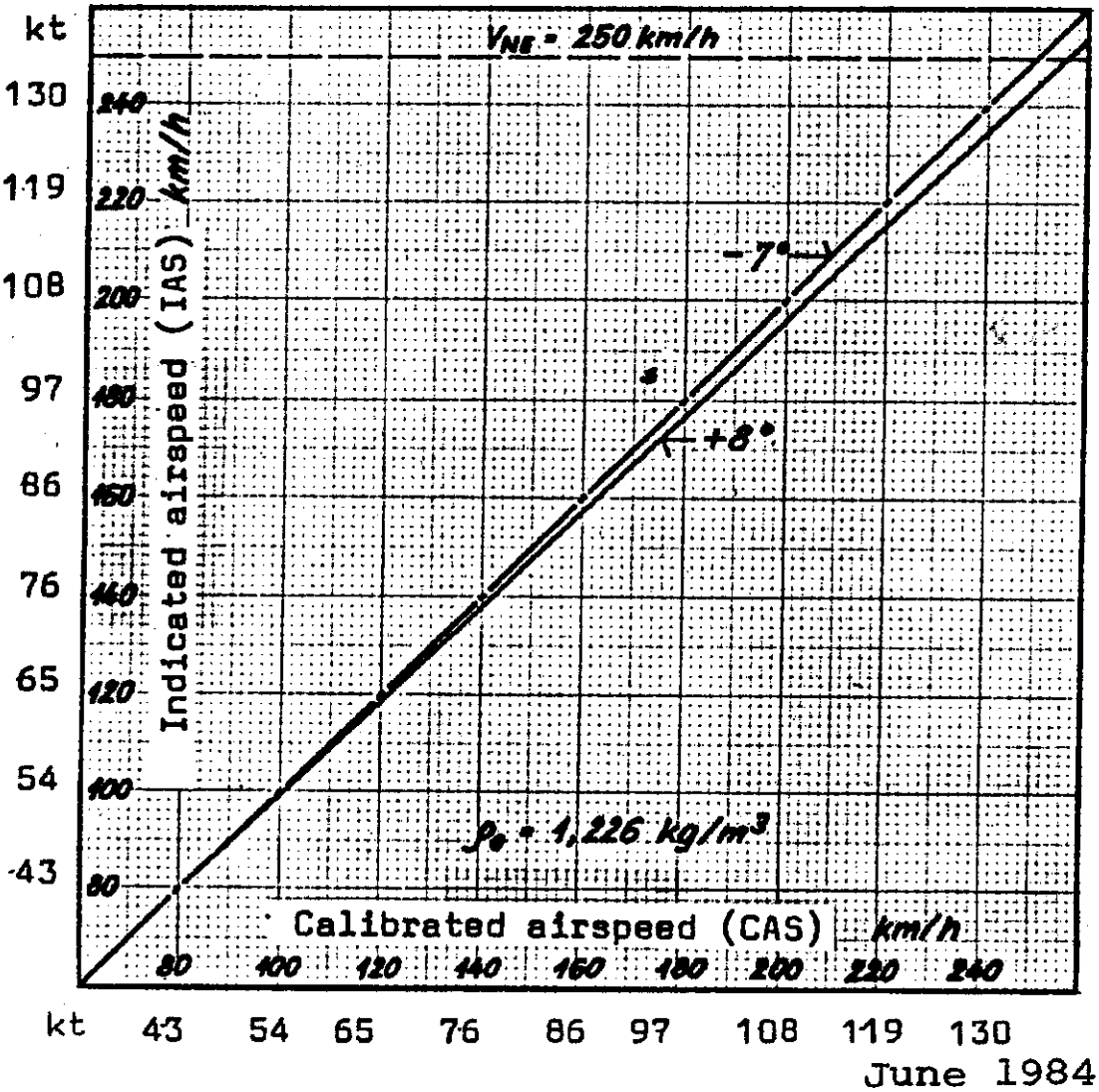
1.5 Airspeed indicator system errors

Errors in indicated airspeed caused by pitot-static pressure errors may be read off from the calibration chart below.

Position of the pressure ports:

Pitot pressure : In the nose of the fuselage.
Static pressure: For the airspeed indicator (ASI) at the rear of the fuselage, 1.0 m (3.28 ft) in front of the base of the fin; for variometer and altimeter in the canopy coaming frame of the fuselage, 6 cm (2.36 in.) forward of the front instrument panel.

All airspeeds shown in this manual are indicated airspeeds (IAS) as registered by the ASI.
The calibration curve is also valid for winch launching and aerotow using the C.G. hook.



2. Operating Limitations

2.1 Category of Airworthiness

Category "U" (Utility) according to LFSM.

In accordance with the "LFSM" requirements full control deflections may be used up to the maneuvering speed V_A.

At higher speeds, when using full control deflections, it would be possible to exceed the stress limits of the powered sailplane.

For this reason, full deflection of controls must not be used at speeds above 180 km/h (97 kt, 112 mph).

At maximum permitted speed V_{NE} = 250 km/h (135 kt, 155 mph), only a maximum of 1/3 of the full control deflection is permitted.

For the elevator, the deflections at V_{NE} are even considerably smaller and depend on the permitted maneuvering load factors.

In normal weather conditions, this powered sailplane can be flown at speeds up to V_{NE} = 250 km/h (135 kt, 155 mph) without problems.
In severe turbulence, i.e. wave rotors, thunderstorms, visible whirlwinds and when crossing mountain ridges, V_{RA} = 180 km/h (97 kt, 112 mph) must not be exceeded.

2.2 Permitted Operations

This powered sailplane is certified for:

1. VFR flights (in daytime and with the minimum equipment according section 2.3 a).

2. Cloud flying (minimum equipment according section 2.3 b).

3. Restricted aerobatics (only permitted with the power plant removed).

   The following aerobatic maneuvers are permitted:

   a) Inside Loop

   b) Spins

   c) Stalled Turn

   d) Lazy Eight

   In addition to the equipment listed in section 2.3 it is recommended that the Janus CM be equipped with an accelerometer (3 hands, resettable) if it is to be used for aerobatics.

   Aerobatic maneuvers are only permitted with the power plant removed, see section 4.4.7.

2.3 Minimum Equipment

Instruments and other basic equipment must be of an approved type and should be selected from the list in the Maintenance Manual.

a) Normal operations

2 Airspeed indicator, range up to 300 km/h (162 kt, 186 mph), with colour markings as shown on page 27

2 Altimeter

1 Magnetic compass

2 Four-piece safety harnesses (symmetrical)

2 Automatic or manual parachutes, or 2 seat-back cushions (thickness approx. 8.0 cm / 3.15 in. when compressed)

1 RPM indicator, range 0 - 10.000 RPM, with colour markings as shown on page 28

1 Coolant temperature indicator, with colour markings as shown on page 28

1 Engine hour meter

1 Fuel quantity scale (attached to main tank)

1 Fuel quantity gauge for reserve tank

1 Rear-view mirror

Note:

The three batteries, required for the operation of the power plant, must be installed in the fuselage.
For C/G reasons a fourth battery, for radio and avionics, might be necessary as well.

b) Cloud flying

In addition to the equipment listed in section a):

- Turn and bank indicator with slip ball
- Variometer
- VHF Transceiver

Note: From experience gained to date it appears that the A.S.I. system, as installed, remains fully operational when flying in clouds.

Recommended additional equipment for:

Cloud Flying

Artificial horizon

Clock

Restricted Aerobatics

Accelerometer (3 hands, resettable)

Caution:

For structural reasons the weight of the instrument panels and instruments must not exceed 10 kg (22 lb) each.

Operating Instructions

- Flight and Maintenance Manual
- Data and Reference Placards

Airspeed indicator colour markings

		kt	mph	km/h
Maximum permitted speed	V_{NE}	135	155	250
Maneuvering speed	V_A	97	112	180
1.1 x Stalling speed	$1.1 \times V_{s1}$	48	55	89
White arc (flap setting "L")		44- 76	50- 87	81-140
Green arc (normal range)		49- 97	56-112	90-180
Yellow arc (caution range)		97-135	112-155	180-250
Radial red line (maximum speed)	at	135	155	250
Yellow triangle (approach speed)	at	57	65	105

The stalling speed on which the A.S.I. markings are based, refers to the following configuration:

a) Flap setting : "L"
b) Airbrakes : Closed
c) Max. A.U.W. : 700 kg (1543 lb)

RPM indicator colour markings

Green arc (normal operating range)	2500 - 7200 RPM
Radial red line (max. revs. permitted)	at 7200 RPM

Coolant temperature indicator colour markings

Green arc (normal operating range)	40^{o} - 95^{o} C (104^{o} - 203^{o} F)
Radial red line	at 95^{o} C (203^{o} F)

2.4 Airspeed limitations (IAS)

		km/h	kt	mph
Maximum permitted speeds :				
Flaps set at +8, 0, -4, -7	V_{NE}	250	135	155
Flaps set at L	V_{FE}	140	76	87
in rough air	V_B	180	97	112
Maneuvering speed	V_A	180	97	112
on aerotow	V_T	180	97	112
on winch launch	V_W	150	81	93
with power plant extended	V_{NE}	180	97	112
for extending/retracting the power plant	V	105	57	65

Please note that with increasing altitude true airspeed (TAS) increases versus indicated airspeed (IAS).
This is of no consequence with regard to the stressing of the powered sailplane. However, for flutter prevention the following speeds (IAS) must not be exceeded:

Altitude		V (IAS)			Altitude		V (IAS)		
m	ft	km/h	kt	mph	m	ft	km/h	kt	mph
0	0	250	135	155	6000	19680	205	111	127
1000	3280	250	135	155	7000	22960	193	104	120
2000	6560	250	135	155	8000	26240	182	98	113
3000	9840	240	130	149	9000	29520	172	93	107
4000	13120	227	123	141	10000	32800	161	87	100
5000	16400	215	116	134	12000	39360	140	76	87

2.5 Power plant assembly - Limitations and data

a) Engine

Type : ROTAX 535 C

	Power kW	HP	@ RPM
Maximum continuous power	44	59	7200
Maximum take-off power	44	59	7200
Maximum permitted RPM			7200

b) Fuel - Lubrication

Premium Gasoline, min. 96.0 ROZ
or
AVGAS 100 LL

Mixing ratio with first grade 2-stroke oil:

1 : 50

Capacity of the fuel tanks:

	U.S. Gal.	Imp. Gal.	Ltr.
Fuselage main tank :	7.9	6.6	30
Fuselage reserve tank :	3.7	3.1	14
Total usable capacity :	11.3	9.5	43

c) Propeller

Optional use of type : HO 11 H - HM - 158 B 127
HO 11 H - HM - 155 B 130
MT 158 R 125 - 1 A

Prop reduction ratio : 3 : 1

2.6 Load factors

The following maneuvering load factors must not be exceeded :

at V_A = 180 km/h (97 kt, 112 mph)

n = + 5.3

n = - 2.65

at V_{NE} = 250 km/h (135 kt, 155 mph)

n = + 4.0

n = - 1.5

airbrakes closed.

Airbrakes extended: Maximum n = + 3.5

2.7 Weights

Empty weight	:	approx. 480 kg	(1058 lb)
Max. permitted gross weight	:	700 kg	(1543 lb)
Maximum weight of non-lifting parts:		510 kg	(1124 lb)

2.8 Load Table

Load on the seats

(Occupants including parachute)

Seat load		two persons min.	two persons max.	one person min.	one person max.
front seat	kg	70*	110*	70*	110
	lb	154*	243*	154*	243
back seat	kg	- -	100*	- -	- -
	lb		220*		

Fuel at max. load on both seats	kg	lb	Ltr.	U.S. Gal.	Imp. Gal.
	10*	22*	14*	3.7*	3.1*

Minimum: 10 kg/22 lb (14 Ltr./3.7 U.S. Gal./3.1 Imp. Gal.)

* Seat loads and fuel quantity of individual serial numbers may differ from the above typical weights - therefore the placard in the cockpit must show the

- actual minimum front seat load
- actual maximum front seat load
- actual maximum back seat load and
- actual maximum fuel load at maximum load on both seats.

The actual weights are also to be entered in the log chart, see page 36.

Note: When calculating the maximum load on both seats, the reserve tank fuel quantity of 10 kg (22 lb) must be deducted from the total payload.

Pilot's weight of less than the actual minimum seat load must be raised by using trim ballast on the front seat. Ballast (lead or sand cushion) must be securely held in place by attaching it to the lap belt brackets.

Only one person is allowed on either seat.

Neither the max. permitted all-up weight nor the max. weight of the non-lifting parts may be exceeded.

NOTE: With both seats occupied, the placarded minimum front seat load may be reduced by the nose-heavy moment of loads on the rear seat as follows:

Rear seat load (kg/lb) x 0.23 = load to be deducted from placarded minimum front seat load (kg/lb)

Example:

Load on:	Both seats occupied	Placarded minimum may be reduced by:
Front seat	85 (placarded minimum)	70 x 0.23 = 16 kg
Rear seat	70	

Thus the minimum front seat load of this example is

69 kg.

The seat load placard in the cockpit, however, remains unchanged!

C.G. Position of the occupants

(including parachutes or seat cushions)

Front seat : 1300 mm (51.18 in.) ahead of datum

Back seat : 190 mm (7.48 in.) ahead of datum

C.G. Position of the fuel

Fuel in main tank:

(30.0 Ltr., 7.9 U.S. Gal., 6.6 Imp. Gal. = 22.0 kg, 48.5 lb)

485 mm (19.09 in.) aft of datum

Fuel in reserve tank:

(14.0 Ltr., 3.7 U.S. Gal., 3.1 Imp. Gal. = 10.0 kg, 22.0 lb)

350 mm (13.78 in.) aft of datum

Baggage compartment

Maximum weight allowed : 25 kg (55 lb)

Baggage or equipment must be firmly attached to the mounting panel above the main wheel.

2.9 Center of gravity positions

a) Center of gravity at flight weight

Aircraft attitude: Tailskid supported such that a wedge-shaped block 100 : 4.5, placed on the fuselage tail boom, is horizontal along its top edge.

Datum plane (DP):		Wing leading edge at root rib
Max. forward C.G. position	:	90 mm (3.54 in.) aft of datum (DP)
Max. rearward C.G. position	:	270 mm (10.63 in.) aft of datum (DP)

Make sure that the maximum permitted rearward C.G. position is not exceeded - this is ensured when the minimum front seat load (pilot and parachute) is observed.
A lower seat load must be compensated by ballast, see section 2.8 "Load table".

b) Center of gravity at empty weight

After repair, repainting, installation of additional equipment, modifications etc., the center of gravity must be re-determined by weighing the powered sailplane; in any case the Janus CM should be re-weighed every four years. Make sure that the empty weight C.G. is within the permitted range. If necessary, compensating ballast weight must be installed.
When the empty weight C.G. limits and the load table are observed, the center of gravity position at flight weight will be within the permitted range.
For determination of the C.G. position refer to Maintenance Manual, section 6.

The determination of the C.G. ranges as shown in the diagrams on page 35A and 35B is done with the following seat loads:

Forward C.G. positions : With a maximum seat load of 2 x 110 kg (2 x 242.5 lb)

Rearward C.G. positions : With various minimum seat loads and with maximum fuel load (32 kg/70.5 lb)

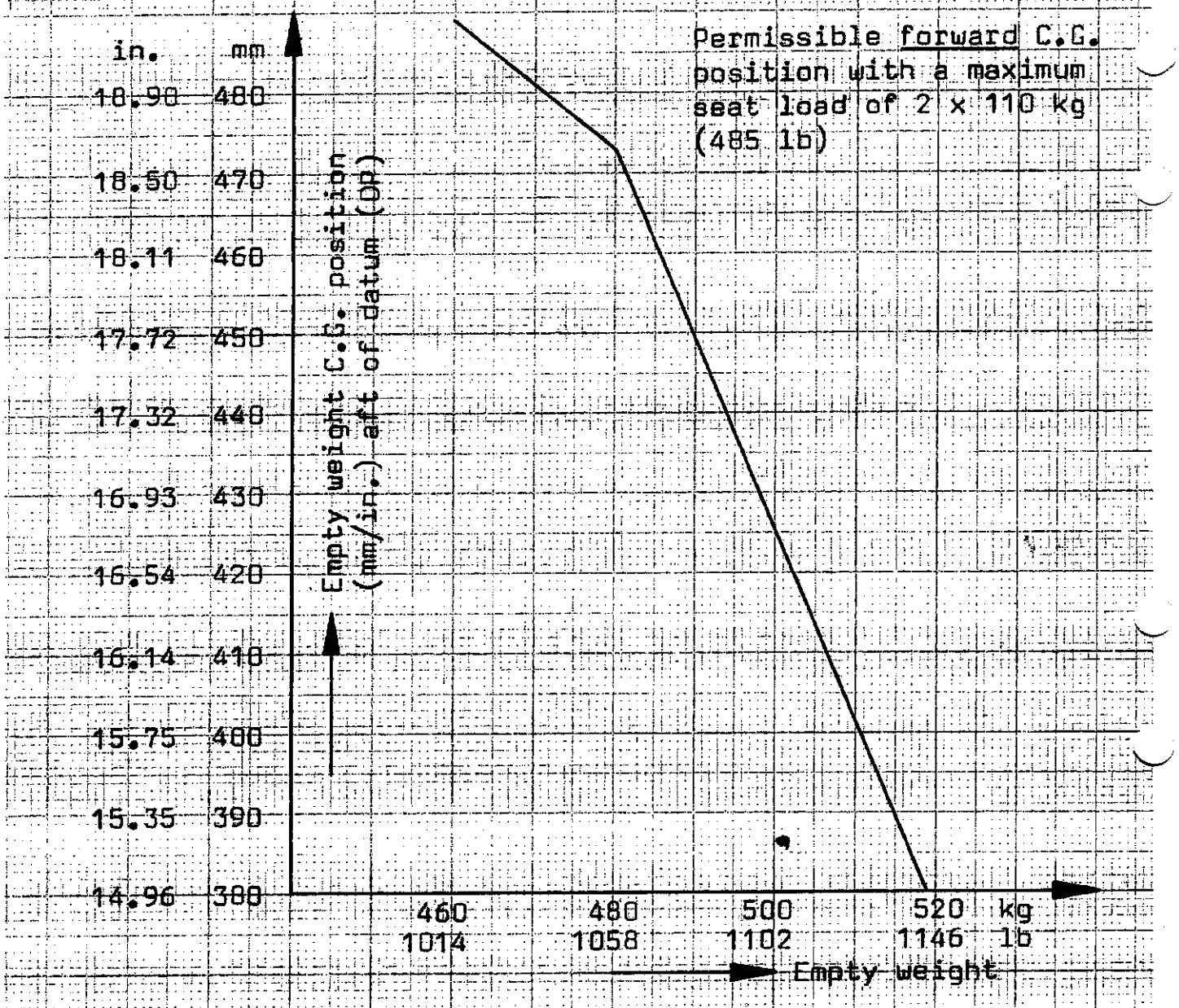
For easier determination of the center of gravity positions at empty weight the table below shows, at various empty weights, the maximum permissible tail wheel loads with various seat loads (with reference to the rearmost C.G. position).

Just determine the actual load on the tailwheel with the powered sailplane being in weighing attitude (main wheel being on the ground, tailwheel jacked up approx. 38 cm/14.96 in. above floor level) as described in section 2.9 a.

If the determined tailwheel load is below the value shown in the table below, the center of gravity position is within the permitted range.

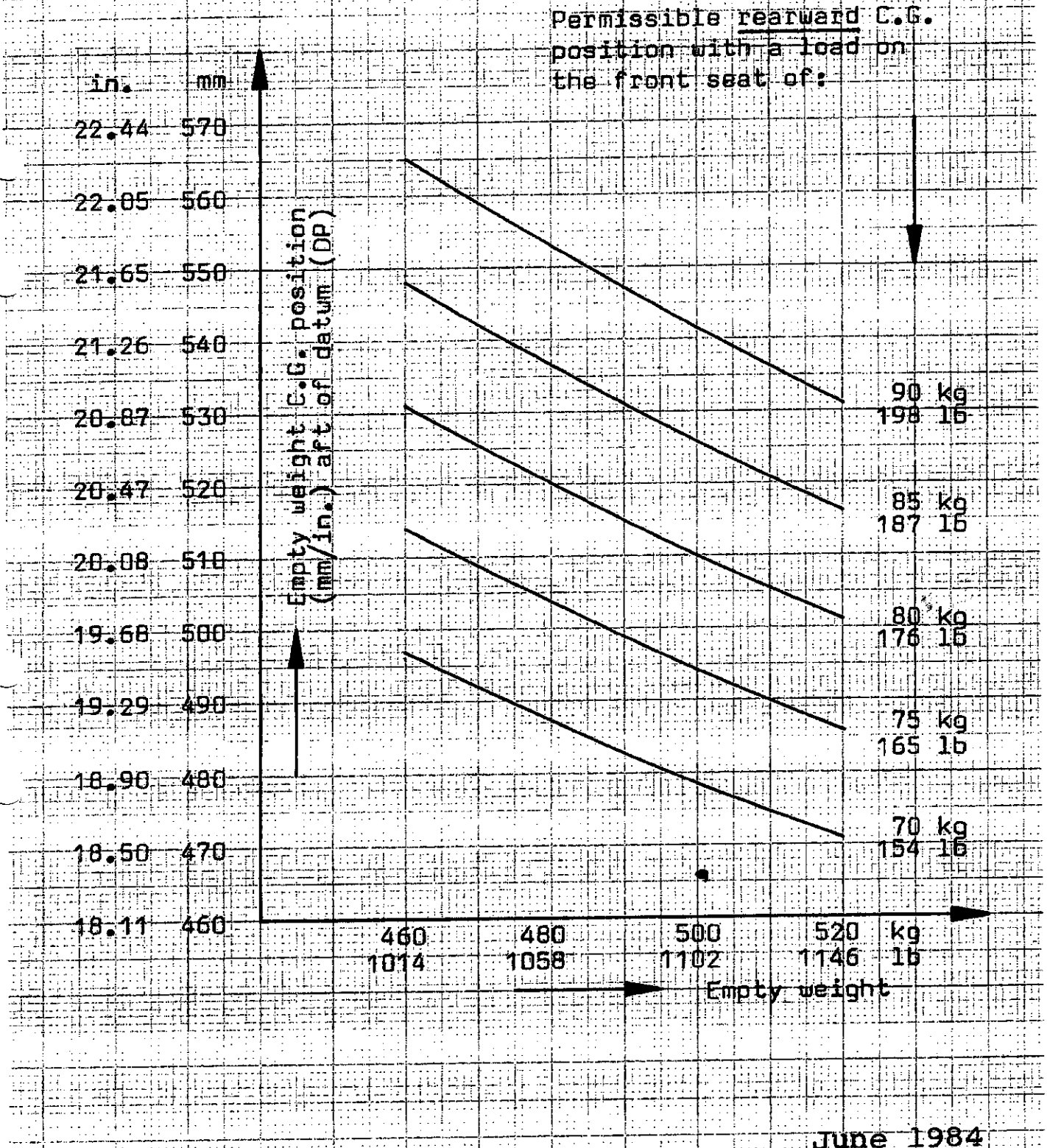
Empty weight		Load on tail wheel with a seat load of:									
		70	154	75	165	80	176	85	187	90	198
kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb
460	1014	29.2	64.4	30.7	67.7	32.2	71.0	33.6	74.1	35.1	77.4
470	1036	29.4	64.8	30.9	68.1	32.3	71.2	33.8	74.5	35.3	77.8
480	1058	29.6	65.3	31.1	68.6	32.5	71.7	34.0	75.0	35.5	78.3
490	1080	29.8	65.7	31.3	69.0	32.8	72.3	34.2	75.4	35.7	78.7
500	1102	30.0	66.1	31.5	69.4	33.0	72.8	34.4	75.8	35.9	79.1
510	1124	30.2	66.6	31.7	69.9	33.2	73.2	34.7	76.5	36.1	79.6
520	1146	30.4	67.0	31.9	70.3	33.4	73.6	34.9	76.9	36.3	80.0

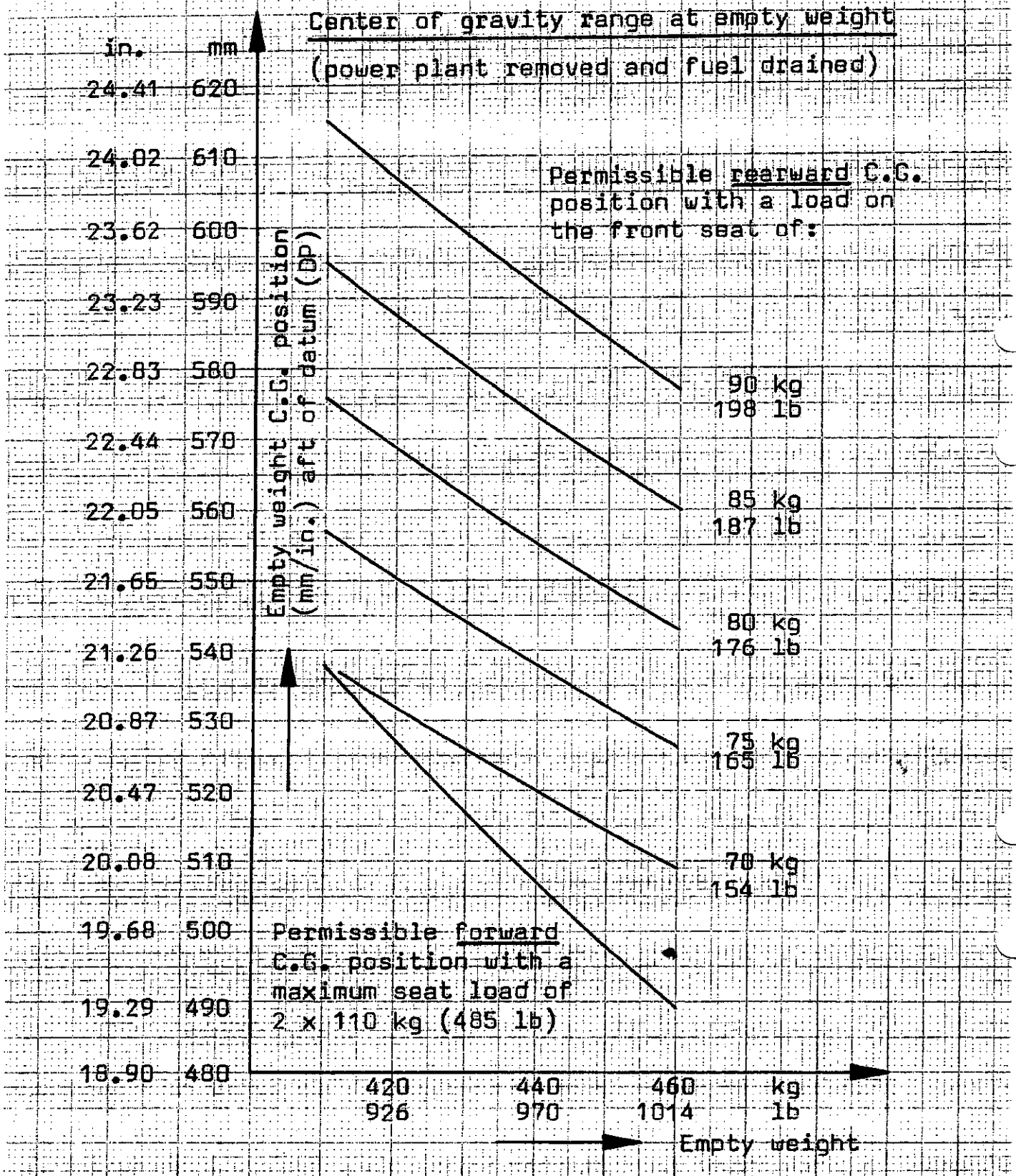
Center of gravity range at empty weight



Maximum permitted A.U.W. = 700 kg (1543 lb)

Center of gravity range at empty weight





Maximum permitted all-up weight = 700 kg
(1543 lb)

Weight and Balance Log Chart

Date of weighing	Inspector Signature Stamp	Empty weight (kg) exclud. fuel	Equipment List dated	Empty weight C.G. position aft of datum (DP) (mm)	Front seat load max.	Front seat load min.	Max. back seat load	Max. Payload (kg) incl. fuel in fuselage tanks

2.10 Tow release

For winch launching and aerotow the TOST safety tow release mechanism model

"EUROPA G 72" or
"EUROPA G 73" or
"EUROPA G 88"

is used, which is installed in front of the main landing wheel.

2.11 Weak links in winch cable and aerotow rope

For both winch launching and aerotow:

Maximum: 910 daN (2006 lb)

The minimum strength of the weak link should not be less than the value for the maximum permitted all-up weight.

2.12 Tire pressure

Nose wheel	:	2.5 bar (36 psi)
Main wheel	:	4.5 bar (64 psi)
Tail wheel	:	2.5 bar (36 psi)

2.13 Crosswind

Maximum crosswind component proven for take-off and landing:

20 km/h (11 kt).

3. Emergency Procedures

3.1 Spin Recovery

1. Apply full opposite rudder against the direction of rotation of the spin.

2. Ease the control stick forward until rotation ceases.

3. Centralize rudder and pull out smoothly from dive.

3.2 Emergency Exit

In case of danger, the roomy and uncluttered cockpit of the powered sailplane ensures a quick and safe emergency exit.

First of all, stop the engine and, if possible, retract it.

The procedure for jettisoning the canopy is as follows:

1. Pull back red canopy locking knob on the left side of the canopy frame and raise canopy.
2. Pull back red canopy jettison knob located directly below the right hand canopy frame.
3. Push canopy away.

The cable, restraining the open canopy, is released when pulling the red jettison knob below the right hand canopy frame backwards for jettisoning.

The canopy coaming frame of the fuselage is made of fiberglass laminates, strong and without sharp edges, so the pilot may use it for support when bailing out.

3.3 Engine failure

3.3.1 Engine failure on take-off

If the runway has sufficient length, land, with the power plant extended, straight ahead.

Flap setting : "L"

Fuel shut-off valve : Closed

Master switch : OFF

If the runway is too short, the procedure for the landing approach depends on position, height and terrain.

Flap setting : "L"

(at latest before touch-down)

Fuel shut-off valve : Closed

Master switch : OFF

Warning:

With the power plant extended, the rate of sink increases to approx. 1.4 to 1.5 m/s (275 - 295 fpm) and the glide ratio deteriorates to about 17 : 1, therefore be cautious when using the airbrakes.

3.3.2 Engine failure during flight

Check the following:

Fuel quantity ?

Fuel shut-off valve open ?

Choke lever pushed forward ?

If it is no longer possible to re-start the engine, land the powered sailplane with the engine being either extended or retracted.

3.4 Starting the engine

3.4.1 Starting the engine with defective starter motor

During flight

Extend power plant, pull choke lever half way back, set throttle 1/4.

Accelerate straight to 150 km/h (81 kt, 93 mph) - prop speeds up. Pull up gently and switch ignition on.
The loss of height while accelerating and initiating the pull-up is approx. 100 m (330 ft).

On the ground

With a defective starter relay the engine may be started with the aid of an external power supply:

Connect negative ground strap with the engine crankcase and hold power strap to the starter terminal (bolt M6) - starter motor runs.

3.5 Other emergencies

3.5.1 Engine fire

Master switch	-	OFF
Fuel shut-off valve	-	Closed
Throttle	-	Full power
Choke	-	Pulled

3.5.2 Safety considerations

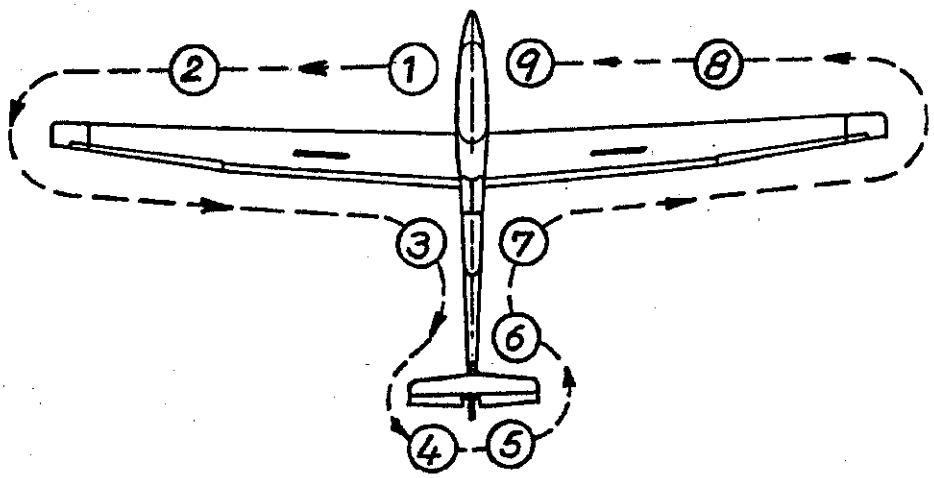
Take-off by winch-launch or aerotow from uncut grass fields must be strictly avoided.
If a wing tip is caught in high grass, release winch cable/tow rope immediately, otherwise it will be impossible to prevent the Janus CM from veering-off with the danger of a ground loop (with risk of damage).
After an emergency release at low altitude, flying straight, a speed of 95 to 105 km/h (51-57 kt, 59-65 mph), depending on wing loading and flap setting, should be maintained.

In circling flight the speed should be increased according to the bank angle. This will prevent the powered sailplane from being inadvertently and unnoticeably flown in a stalled condition.
If, in straight flight, at max. A.U.W., flaps set at "+8", light vibration and sloppy controls are felt, the powered sailplane is flying in a stalled condition, in spite of ASI readings of 75 to 81 km/h (40-44 kt, 47-50 mph).
The control stick should then be eased forward immediately.

4. Normal Operations

4.1 Daily Inspection

Before commencing the day's flying or after rigging the powered sailplane it is very im-



When walking around the powered sailplane, check all surfaces for paint cracks, dents and unevenness. In case of doubt, ask an expert for his advice.

1. a) Open the canopy and check that the main bolt is fully home and secured.

   b) Make a visual check of all control circuits in the cockpit

   c) Are all required batteries installed ?

   d) Extend power plant 1/4 so that the doors of the engine compartment are open.

e) Check fuel quantity, check function of reserve tank fuel gauge.

f) Check fuel lines for proper connection.

g) Check fuselage for the presence of foreign objects.

h) Check tire pressure: Main wheel = 4.5 bar (64 psi), nose wheel = 2.5 bar (36 psi)

i) Check condition and operation of the C.G. release hook

2. a) Check upper and lower wing surfaces for damage.

b) Check that wing tip extensions are properly connected and secured.

c) Check flaps and ailerons for proper condition and free movement. Check for excessive play by gently shaking the trailing edge. Check hinges for damage.

d) Check that the airbrakes are in good condition, fit well and lock closed.

3. a) Check fuselage for damage, especially the underside.

b) Check all controls for proper connection.

<u>Check visually the power plant:</u>

c) Check propeller for damage

d) Check all bolts, nuts and their locks and stops.

e) Check engine, accessories, lines and cables for chafing marks.

f) Check exhaust system, propeller mount, engine mount and accessories for cracks, especially the welding joints.

g) Check condition, function and tension of engine arresting wires and engine door operating wires.

h) Check engine door actuating mechanism for proper function.

i) Check throttle, choke and propeller brake controls for proper condition and operation.

j) Check ignition system, ignition harness and lead ends for proper seating.

k) Check toothed belt for wear and proper tension.
A sudden drop of the belt tension might indicate damage on the mounting frame of the propeller.

l) Check propeller mount assembly for damage or loose bolts by pushing it forward vigorously at the upper end near the propeller axis. Check engine mounting flanges for damage or loose bolts.

m) Rotate propeller by hand several times and listen for abnormal noise, check for hard motion of engine.

n) Check oil quantity for rotary valve drive.

o) Check cooling liquid quantity.
Check that the filler cap of the expansion tank is firmly attached.

p) Make a visual inspection of the oil and cooling liquid system for leaks.

q) Open fuel drain inside the engine compartment and discharge condensed water.
Check that the drain outlet on the lower side of the fuselage is clear.

4. a) Check horizontal tailplane for correct attachment and locking.

b) Check elevator and rudder for free movement.

c) Check elevator and rudder for unusual play by gently shaking the trailing edge.

5. Check tail wheel tire pressure: 2.5 bar (36 psi).

6. a) If a T.E. Compensation probe is used, mount it and check the line (when blowing gently into the probe, variometer should read "climb").

b) Check that the static ports on the fuselage tail boom (1.0 m/39.37 in. forward of the leading edge of the fin) are clear.

7. See (3).

8. See (2).

9. Check that the static pressure ports forward of the front instrument panel and the Pitot tube in the fuselage nose are clear. When blowing gently into the Pitot tube, the ASI should register.

After heavy landings or after the powered sailplane has been subjected to excessive g-loads, the resonant frequency of the wing should be checked (approx. 150/min., see also inspection report).

Check the entire powered sailplane for surface cracks and other damage. For this purpose it should be de-rigged.

If damage is found (i.e. surface cracks in the fuselage tail boom or tailplane, or if delamination is discovered at the wing roots or at the bearings in the root rib), the powered sailplane must be grounded until the damage has been repaired by a qualified person.

This inspection must also include a complete check of the power plant.

4.2 Preflight Inspection

See check list, page 17.

4.3 Flying with power on

4.3.1 Extending the power plant on the ground

See check list, page 18.

4.3.2 Starting the engine, warm-up and run-up on the ground

See check list, page 18.

As soon as the engine starts, release starter button. Open choke slowly (push lever forward) and adjust throttle so that engine runs smoothly at about 2500 RPM.
Let engine warm-up for about 2 minutes at about 2500 RPM.
Check magnetos at 3000 RPM (push buttons M1 and M2), maximum drop of engine speed = 300 RPM.

Advance to full throttle - at 6000 RPM minimum a sound two-stroke operation is achieved.

If, after about 10 seconds, the engine does not start - especially when it has not fully cooled down from the flight before - it could be flooded. Stop starting procedure, open choke fully (push lever fully forward), set throttle to full power. and press starter button. After the engine runs, slowly throttle back.

Should, after about 10 seconds, the engine fail to start, repeat normal starting procedure.

4.3.3 Taxiing

Taxiing the Janus CM unassisted, with one wing tip down on the ground (flaps set at "-4"), is possible - the trim is set to "tailheavy", the right hand actuates the wheel brake, the throttle is controlled by the left.
At higher taxiing speeds, flap setting "-4", the dragging wing can be lifted with the aileron and held level.
For tighter turning radius, or when there are obstacles along the taxiway, it is useful to have the second crew member or an assistant walking at the wing tip.

4.3.4 Take-off on own power and climb

With one wing tip dragging on the ground (full opposite rudder), or with the wings held level by an assistant (neutral rudder), advance throttle to full power.
In order to avoid that the thrust of the propeller is pushing the aircraft down on its nose wheel with unnecessary loads, the take-off run should be commenced with the elevator fully pulled back (trim set to almost fully "tail-heavy"), thus reducing the ground roll drag and the take-off distance (important for grass fields). Easing the control stick forward at higher speeds permits the Janus CM to run on its main wheel only.
For maximum aileron response the take-off run should always be commenced with the flaps set at "-4". This setting also prevents damage to the tip of the aileron when taxiing with one wing tip on the ground, despite full down deflection.

When the ASI reads approx. 40 km/h (22 kt, 25 mph) the flaps are set at "+8" for best climb. At maximum permitted gross weight the Janus CM lifts off at about 80 km/h (43 kt, 50 mph).

On soft ground (at about 40 km/h, 22 kt, 25 mph) the flaps can be set to "L" (instead of "+8") for less drag during the take-off run. After lift-off they are then gently moved to setting "+8" At max. permitted all-up weight the climb is carried out at a speed of about 90 km/h (49 kt, 56 mph), flaps set at "+8", full throttle.

With the C.G. fully forward and at max. permitted all-up weight a speed of 100 km/h (54 kt, 62 mph) should be maintained while climbing.

The rate of climb then is about 2.5 m/s (492 fpm), at MSL, 15° C (59° F), 760 h Pa (mm Hg).

Caution

Take-off in rain, with wet or iced-up wings is not permitted, as the take-off distance increases considerably and the climb performance diminishes.

Take-off distance

Maximum permitted gross weight: 700 kg (1543 lb)

The figures shown in the table below are based on the above all-up weight, in zero wind and from a level surface in good condition with short grass.

Lift-off speed : approx. 80 km/h (43 kt, 50 mph)

Speed on climb : approx. 90 km/h (49 kt, 56 mph)

	Field elev. MSL		Outside air temperature							
			-15°C 5°F		0°C 32°F		+15°C 59°F		+30°C 86°F	
	m	ft	m	ft	m	ft	m	ft	m	ft
Ground roll till lift-off	0	0	249	817	266	873	280	917	295	968
	500	1640	267	876	293	961	298	978	312	1024
	1000	3280	284	932	299	981	316	1037	333	1093
	1500	4920	300	984	317	1040	333	1093	353	1158
	2000	6560	320	1050	339	1112	356	1168	376	1234
Total distance over 50 ft obstacle	0	0	343	1125	366	1201	385	1263	406	1332
	500	1640	368	1207	388	1273	410	1345	430	1411
	1000	3280	390	1280	412	1352	435	1427	458	1503
	1500	4920	412	1352	436	1430	458	1503	485	1591
	2000	6560	440	1444	466	1529	492	1614	517	1696

4.3.5 Free flight - power on

As the propeller used is pitched for optimum climb only, the speed attained in cruise, at 7200 RPM, flaps set at "0", is just about 135 to 145 km/h (73-78 kt, 84-90 mph).
At this speed the Janus CM shows a stable behaviour and is easy to control.

The maximum permitted engine speed of 7200 RPM must not be exceeded when the Janus CM is flown in a shallow dive.

With the engine idling (throttle closed), descending flights are allowed for short periods only. Longer idling periods must be strictly avoided to prevent the engine from getting damaged by carbon accumulations on the spark plugs.
On longer flights with the throttle closed it is therefore necessary to open it momentarily at least once every minute to keep the engine clean.

Note:

As the engine installed is not equipped with a carburator heating, icing cannot be excluded.
On no flights, however, performed under various ambient conditions, has icing ever been reported.

4.3.6 Cruising flight - power on

As clearly shown by the figures in section "Flight performances" the longest range results from the "sawtooth method".

This method consists of the following flight sections being repeated as required:

- Climbing flight at a speed of about 90 km/h (49 kt, 56 mph)
- Gliding flight in sailplane configuration

The height to be consumed in the glide should not be less than 1000 m (3280 ft).

The maximum range when gliding down is achieved at a speed of about 110 km/h (59 kt, 68 mph), thus resulting in an average speed of about 100 km/h (54 kt, 62 mph).

Should the "sawtooth method" be impracticable owing to low cloud ceiling or because of air-space restrictions, cruising is also possible in level flight at a speed of approx. 140 km/h (76 kt, 87 mph) with the flaps set at "0". The range, however, is then considerably less.

For cruising the sawtooth method should be prefered on principle, as beside the longer range the occupants are much less exposed to the noise of the engine.

Heading and height should always be planned so that a suitable landing terrain is within gliding range.

!

It should always be borne in mind that the engine of this powered sailplane is not designed to such stringent specifications as that of a light aircraft, hence one should not expect the same level of reliability.

!

4.3.7 Stall behaviour - power on

The following stalling speeds have been determined:

all-up weight	612 kg 1349 lb			700 kg 1543 lb		
C.G. position aft of datum (DP)	270 mm 10.63 in.			90 mm 3.54 in.		
Stall speed,	km/h	kt	mph	km/h	kt	mph
airbrakes closed,						
flaps set at "L"	67	36	42	72	39	45
flaps set at "+8"	70	38	43	76	41	47
airbrakes extended, flaps set at "L"	72	39	45	81	44	50

When reaching stalling speed, the Janus CM, with the C.G. at forward positions, throttle fully open or closed, just enters a stalled flight condition with slight pitching motions and with the airspeed variing.

With the C.G. at the full aft position, engine idling, the Janus CM, when entering a stall, first slightly starts rolling and pitching until it gently drops a wing.
On stalling, the Janus CM, with the throttle fully open, continues to stall straight ahead with the airspeed variing.
In all cases a normal flying attitude is regained after the stall by applying control measures in the correct sense. The maximum loss of height is about 30 to 40 m (100-130 ft).

For recovery from a spin refer to section 4.4.3.

4.3.8 Stopping and retracting the power plant in flight

See check list, page 18.

Throttle back and let engine idle for 1 min.
Re-set flaps at "+8" and trim the Janus CM to a speed of about 90 km/h (49 kt, 56 mph).
Switch ignition "OFF".
Apply propeller brake gently and watch prop in rear-view mirror.
The propeller is in its correct retracting position when the red marking on the pulley of the reduction belt is completely hidden by the lower blade of the propeller - now the power plant may be retracted.
If the red pulley marking is only partially covered by the blade or for the case that the propeller is in horizontal position, release the propeller brake and increase the speed slowly.
Due to the windmilling effect the propeller will start to rotate and must be stopped again by braking at the right moment. Then the speed is reduced again for the retraction of the power plant - see check list.

4.3.9 Extending and starting the power plant in flight

1. With the dead engine in extended position, the rate of sink is increased to about 1.4 to 1.5 m/s (275-295 fpm) at a speed of approx. 90 km/h (49 kt, 56 mph), resulting in a glide ratio of 1 : 17, contrary to the best L/D of 42.5 : 1 with the power plant being retracted. Therefore the engine should only be re-started over terrain acceptable for off-field landings, and that, if possible, not below 500 m (1640 ft) AGL.
Re-starting the engine at a height of 200 m (656 ft) AGL on the down-wind leg to an acceptable landing field is safer than, for instance, starting it at 500 m (1640 ft) above a forest or the like.

   Should a flight be planned over long distances without suitable landing fields, the power plant should be extended at a height of 1000 m (3281 ft) AGL at the latest, in order to have sufficient time for all emergency procedures and, if need arises, for re-retracting the power plant.

2. Normally the loss of height from extending the power plant to the moment when the engine runs is about 60 m (197 ft).

3. Extending the power plant

   When the Janus CM is in straight flight and trimmed to maintain a speed of 85 to 90 km/h (46-49 kt, 53-56 mph), flaps set at "+8", the power plant can be extended.

4. Starting the engine

See check list, page 18.

With a cold engine, close choke (lever pulled back), otherwise, e.g. during "sawtooth"-operation, set choke to 1/2 open.

Open throttle 1/4, switch on ignition and push starter button.

When engine has fired, release starter button, advance throttle and open choke (lever pushed forward).

4.3.10 Approach and landing - power plant extended

The Janus CM may be landed with the power plant extended. With the engine idling, the approach speed is 95 to 105 km/h (51-57 kt, 59-65 mph). Apart from that, the landing behaviour is as described in section 4.4.8, see page 70.

If longer descending flights with the engine idling are unavoidable, it is necessary to open the throttle shortly at least once every minute to provide the engine with sufficient lubrication.

With the power plant extended, but propeller stopped, there is no significant difference in the approach procedure, except for the higher rate of sink (with airbrakes closed approx. 1.4 to 1.5 m/s = 275 - 295 fpm) and frequent elevator and rudder vibration due to turbulence created by the erected power plant.
Be cautious therefore, when using the airbrakes.

4.3.11 Flying in rain

Performance and aerodynamic characteristics deteriorate when flying in rain or with iced-up wings.

Be cautious when landing !

The approach speed should be increased by at least 10 km/h (5 kt, 6 mph) to 105 - 115 km/h (57-62 kt, 65-71 mph).

4.4 Flying with the power plant retracted

(sailplane configuration)

4.4.1 Take-off

Aerotow

Maximum permitted speed on aerotow with the flaps set at "0":

$$V_T = 180 \text{ km/h } (97 \text{ kt}, 112 \text{ mph}).$$

The Janus CM has been aerotowed using hemp and nylon ropes of between 30 and 60 m length (100-200 ft).

As the tow rope tightens apply the wheel brake gently so that the powered sailplane does not overrun the tow rope.

For take-off set flaps at "-4" and the trim to "neutral" for forward to intermediate C.G. positions, or to "nose heavy" for intermediate to aft C.G. positions.

With the C.G. at a forward position, the nose wheel contacts ground. It is then advisable to commence the ground run with the control stick fully pulled back until the nose wheel lifts off; then ease the stick forward and let the Janus CM run on its main wheel. With the C.G. at midway positions, the take-off should be conducted with neutral elevator and with the C.G. at an aft position, slight down elevator is recommended until the tail wheel lifts off.

During the ground run the flap lever should be moved to the take-off setting "+8". After lift-off, at a speed of about 80 to 90 km/h (43-49 kt, 50-56 mph), depending on loading, the trim can be re-set for minimum elevator control loads.

Normal towing speed is in the region of 120 to 130 km/h (65-70 kt, 75-81 mph) with the flaps set at "+8". For speeds in excess of 140 km/h (76 kt, 87 mph) it is recommended that the flaps be set at "0".

To keep station behind the tug only small control movements are necessary. It should be noted, however, that correspondingly greater control movements are required when flying the Janus CM into the tug's propeller slip stream; furthermore, tailplane vibration occurs.

When releasing the tow rope, pull the yellow grip fully several times and turn only when definitely clear of rope.

Winch launching

Maximum permitted winch launch speed:
V_W = 150 km/h (81 kt, 93 mph).

For take-off set flaps at "+8" and the trim to "neutral" for forward to intermediate C.G. positions, or to "nose heavy" for intermediate to aft C.G. positions.

As the winch cable tightens apply wheel brake gently to avoid overrunning it.

Ground run and lift-off are normal and there is no tendency to veer-off or to climb excessively steeply on leaving the ground.

If the Janus CM with two heavy occupants rests on its main and nose wheel, the ground run should be commenced with the stick fully pulled back until the nose wheel clears ground, then the stick is eased forward.
With the C.G. at intermediate positions the ground run is made with neutral elevator.
For light pilots, making their first flights, it is recommended to commence the ground run with the stick fully pushed forward.

With normal cockpit load, towing speed should not be less than 100 km/h (54 kt, 62 mph).

Reaching the top of the launch, the tow cable normally releases automatically; nevertheless, pull the release grip repeatedly to ensure that the cable has definitely released.

4.4.2 Free flight

The Janus CM has pleasant flight characteristics and can be flown effortlessly at all speeds, weights, loading conditions, configurations and C.G. positions.
The spring type trim is gradually adjustable.
With the C.G. at intermediate positions, the Janus CM can be trimmed from 80 to 180 km/h (43-97 kt, 50-112 mph).

Bank reversal from 45° to 45° is effected without any special skill and without any noticeable skidding: Ailerons and rudder may be used to the limit of their travel.

Flap setting : "+8"

Speed : 95 km/h (51 kt, 59 mph)

Reversal time: 4.2 sec.

4.4.3 Low speed handling and stall

In order to become familiar with the Janus CM it is recommended that one explores the low speed and stall characteristics at a safe height.

Stalls should be approached from straight flight and from turning flight (with approx. 45° bank) using various flap settings.

The following stalling speeds have been determined in straight flight:

all-up weight	582 kg / 1283 lb			700 kg / 1543 lb		
C.G. position aft of datum (DP)	270 mm / 10.63 in.			90 mm / 3.54 in.		
Stall speed,	km/h	kt	mph	km/h	kt	mph
airbrakes closed, flaps set at "+8"	67	36	42	73	39	45
flaps set at "0"	71	38	44	80	43	50
flaps set at "-7"	77	42	48	84	45	52
airbrakes extended, flaps set at "L"	67	36	42	81	44	50

With airbrakes closed, stall warning occurs shortly before stalling speed is reached and is indicated by a slight buffeting, vibration of the horizontal tailplane, and mushiness in ailerons.

With airbrakes extended, buffeting is increased and occurs 5 km/h (3 kt, 3 mph) before reaching stall speed.

When the control stick is pulled slowly further back, ASI reading might increase again until the Janus CM, with the C.G. at aft positions, usually drops a wing. With the C.G. at a forward position and with the stick fully pulled back, the Janus CM will simply stall straight ahead. The control stick should then be eased forward immediately.

With airbrakes extended the loss of height during recovery from stall is about 50 to 60 m (164-197 ft).

Approaching a stall from a 45^{o} banked turn and with the C.G. at an aft position will produce slight wallowing in the pitch plane which, however, is easy to control. When stalling, the Janus CM rolls slightly into the turn, but when the back pressure on the control stick is released, the nose goes down slightly and normal attitude can be regained. There is no overriding tendency to enter a spin.

With the C.G. at a forward position, the Janus CM continues to fly in a stalled condition without dropping the nose.

On stalling from turning flight, variations of the ASI reading are similar to those from straight flight.

In the case of an aft C.G. position, application of full rudder when the Janus CM is stalled will produce a spin.

The loss of height during recovery from a spin is approximately 50 to 80 m (164-262 ft) measured from the point at which recovery is initiated to the point at which horizontal flight is regained.

Safe recovery from the spin is effected by following the standard procedure, which is defined as follows:

a) apply opposite rudder, i.e. against direction of spin

b) short pause

c) ease control stick forward until rotation ceases and the airflow is restored

d) centralize rudder and pull gently out of resulting dive.

4.4.4 High speed flying

When flying at high speeds particular attention must be paid to the maximum speed limits associated with the various flap settings. These speeds are clearly visible markings on the airspeed indicator in different colours.

4.4.5 Cloud flying

This powered sailplane is sufficiently robust and stable for cloud flying. It is simple to control and is stable in a turn.
Certain basic rules, however, must be observed. Avoid flying close to stalling speed under any circumstances. Spinning is not permitted as a rescue action, because the Janus CM might enter a spiral dive. It is rather recommended that the airbrakes be fully extended if the speeds builds up to 150 km/h (81 kt, 93 mph) or if more than 2 g are pulled.

The additional equipment requirement for cloud flying must be observed (refer to section 2.3 b, page 26).

4.4.6 Flying at temperatures below freezing point

When flying in temperatures below 0^{o} C (32^{o} F), (as in wave or during the winter months) it is possible that the usual lightness and smoothness of the control circuits is reduced.
Ensure that all control elements are free from moisture so that there is no danger of them freezing solid. This applies especially to the airbrakes and to the doors of the engine compartment.
From experience gained so far it appears beneficial to cover the mating surfaces of the airbrakes and engine doors along their full length with "Vaseline" so that they cannot freeze solid. Move flaps and control surfaces occasionally.

Warning:

The polyester coating on this aircraft is known from many years experience to become very brittle at low temperatures.

Particularly when flying in wave at altitudes above about 6000 m (approx. 20000 ft), where temperatures of below -30° C (-22° F) may occur, the gel coat, depending on its thickness and the stressing of the aircraft's components, is prone to cracking.
Initially, cracks will only appear in the polyester coating, however, with time and changing environment, cracks can reach the epoxy/glass matrix.
Cracking is obviously enhanced by steep descents from high altitudes at associated very low temperatures.

Therefore, for the preservation of a proper surface finish free from cracking, the manufacturer strongly advises against high altitude flights with associated temperatures of clearly below -20° C (-4° F).

A steep descent with the airbrakes extended should only be conducted in case of emergency.

4.4.7 Restricted aerobatics

(Only permissible with the power plant being removed, refer to page 81, section 5.5 "operating conditions").

The Janus CM is permitted to carry out the following aerobatic maneuvers:

a) Inside Loops
b) Spins
c) Stalled Turn
d) Lazy Eight

Inside Loop

Enter the maneuver with the flaps set at "-7" at a speed of 180 km/h, 97 kt, 112 mph (200 km/h, 108 kt, 124 mph). At the top of the loop select flap setting "0". Speed during recovery from the maneuver: 160 km/h, 86 kt, 99 mph (175 km/h, 94 kt, 109 mph).

Stalled Turn

Enter the maneuver with the flaps set at "-7" at a speed of 180 km/h, 97 kt, 112 mph (200 km/h, 108 kt, 124 mph). In vertical climb at a speed of about 140 km/h, 76 kt, 87 mph, apply full rudder. Pull-out speed is about 160 km/h, 86 kt, 99 mph (180 km/h, 97 kt, 112 mph).

Spins

Spins are only possible with the C.G. at aft positions. Select flap setting "+8".
Enter the spin from a stall by applying full rudder. Hold the stick hard back while spinning. Recover from the spin by applying opposite rudder (against direction of rotation) and easing the control stick forward with ailerons neutral.

Speed during recovery: Between 140 and 160 km/h, 76-86 kt, 87-99 mph.

If spun with the C.G. at the aft limit, the spin will continue for approximately one turn after recovery action is initiated.

Lazy Eight

Enter the maneuver at a speed of 180 km/h, 97 kt, 112 mph (200 km/h, 108 kt, 124 mph), flaps set at "-7". After pulling up into a 30 to 45° climb, enter a turn at a speed of about 120 km/h, 65 kt, 75 mph. Recovery speed: 160 km/h, 86 kt, 99 mph (180 km/h, 97 kt, 112 mph).

Speeds (IAS) set in parenthesis ( ) are valid for two persons aboard.

4.4.8 Approach and landing

With the flaps set at "L" and a speed of about 95 to 105 km/h, 51-57 kt, 59-65 mph (depending on wing loading), approach and landing are conducted without difficulties, even in crosswind up to 20 km/h (11 kt, 12 mph).

The airbrakes open smoothly; as they are very effective, slight down elevator is required to compensate for the reduction in speed caused by the braking effect.

With airbrakes fully extended, the glide ratio is about 1 : 6.5.

A side slip is easily controlled and can be used as an effective landing aid, with the airbrakes extended as well. In order to prevent the elevator from being hit by turbulence caused by the airbrakes, a side slip should be initiated and finished, however, with the brakes closed.
The touch down is on the main wheel and tail wheel simultaneously.
The wheel brake works well. Both control sticks are fitted with a brake lever.

To avoid a long landing run make sure that the Janus CM touches down at minimum speed (75-85 km/h, 40-46 kt, 47-53 mph, depending on wing loading).
A touch down at a speed of 95 km/h (51 kt, 59 mph) instead of 70 km/h (38 kt, 43 mph) effectively doubles the kinetic energy to be dissipated by braking and therefore increases the length of the ground run considerably.

For the ground run the flaps should be re-set at "0" (neutral) or "-4" for improved aileron response.

Both the performance and the aerodynamic characteristics of the "Janus CM" are affected adversely by rain or ice on the wing.

The stalling speed increases up to 10 km/h (5 kt, 6 mph).

Caution: When landing with rain or ice on the wing, increase the approach speed by at least 10 km/h (5 kt, 6 mph) to 105 - 115 km/h (57-62 kt, 65-71 mph).

4.4.9 Operations with the power plant removed

The "Janus CM" may also be operated with the power plant removed, if, for instance, a reduced wing loading is prefered for participation in a soaring contest or if the engine is removed for maintenance or overhaul work (refer to section 5.5).

After the power plant is re-installed, an inspection must be carried out.

5. Rigging and de-rigging

5.1 Rigging

Normally the Janus CM is rigged by four people, but it can also be assembled by three persons, if a wing stand is used under one wing tip.

Prior to the assembly all wing and tailplane attachment pins and their corresponding bearings should be cleaned and greased.

Wings

Keep main bolt ready in the cockpit.
Extend power plant 1/4.
Align airbrake, flap and aileron actuating rods in the fuselage. Slide airbrake operating handle close to its front stop.
Insert left wing (with fork spar stubs) through fuselage cut-out and push it in until both wing attachment pins are fully home in their corresponding bearings on the fuselage. Then insert main wing pin about 30 to 40 mm (1.2 - 1.6 in.) and push the 8 mm ø (0.3 in.) rigging pin through the bushing on the right hand side of the fuselage into the corresponding bushing on the fork spar tip.
The wing tip can now be placed on the wing stand and the fuselage must no longer be held in place.

Now insert right wing (with tongue spar stub) and push it in until both wing attachment pins on the root rib slightly engage with their corresponding bearings on the fuselage (pins on the fork spar stubs have not yet engaged with their corresponding bearings on the right wing root rib).

Lift right wing gently up until the fork spar pins are aligned with their corresponding bearings on the right wing root rib.
Push in right wing and move it gently up and down until the fork spar pins have engaged with their bearings. Now remove the main wing pin and draw the wings together by inserting the flat side of the rigging tool into the main pin bushings.

Thereafter push in the main pin, secure it by its handle with the cowling safety pin on the GFRP bulkhead, remove the 8 mm ⌀ rigging pin and store it in the side pocket.

The connection of aileron, flap and airbrake control must be done behind the spar stubs.

Prior to rigging one should get familiar with the function of the "Hotellier" control rod couplings. Connecting requires a fine touch and some practice.

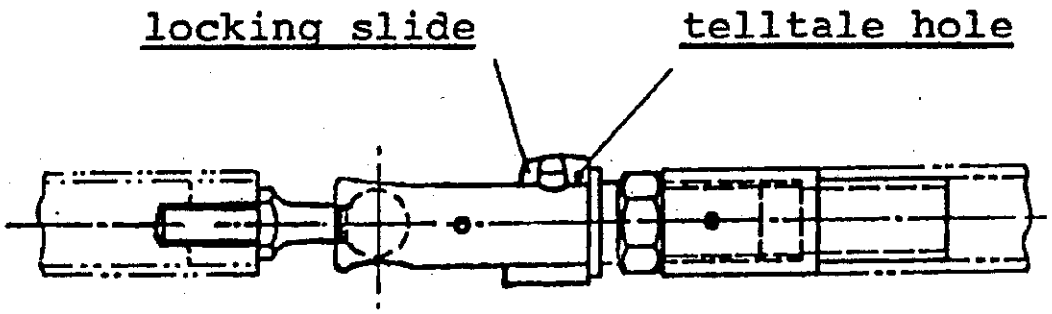
With a helper holding either aileron in neutral position so that the coupling ball on the actuating rod protrudes far enough into the fuselage first connect the aileron control.

Also, when connecting the flap control, the coupling ball on the actuating rod in the wing is easily reached by lifting either flap by hand into the proper position.

The airbrakes are connected by having a helper move the operating lever in the cockpit gently fore and aft.

Make sure that each quick connector socket is pushed fully home over the coupling ball on the actuating rod, while the locking slide is held open.

When the "Hotellier" control rod coupling is correctly locked, the locking slide moves slightly back so that it protrudes an equal amount on either side of the coupling and the hole drilled through the narrow end of the locking slide is visible, as shown on the sketch below:



Connector showing locking slide in locked position

Each quick connector ("Hotellier" control rod coupling) should be checked after locking by pulling crosswise with a hand force of about 5 daN (11 lb) in the direction of "releasing".

Additional safety measure for "Hotellier" control rod couplings

Attaching the safety device

Enlarge the hole in the locking slide to a diameter of 1.3 mm (0.051 in.).

Tie a nylon string (diameter 0.5 mm/0.02 in.) to the safety clip (diameter 1.2 mm/0.047 in.) and attach the string either at the protruding thread of the coupling socket or at the hollow rivet (making a sailor's knot on either end).

The length of the string when attached should not exceed 50 mm (1.97 in.) to avoid that it gets caught by other parts.

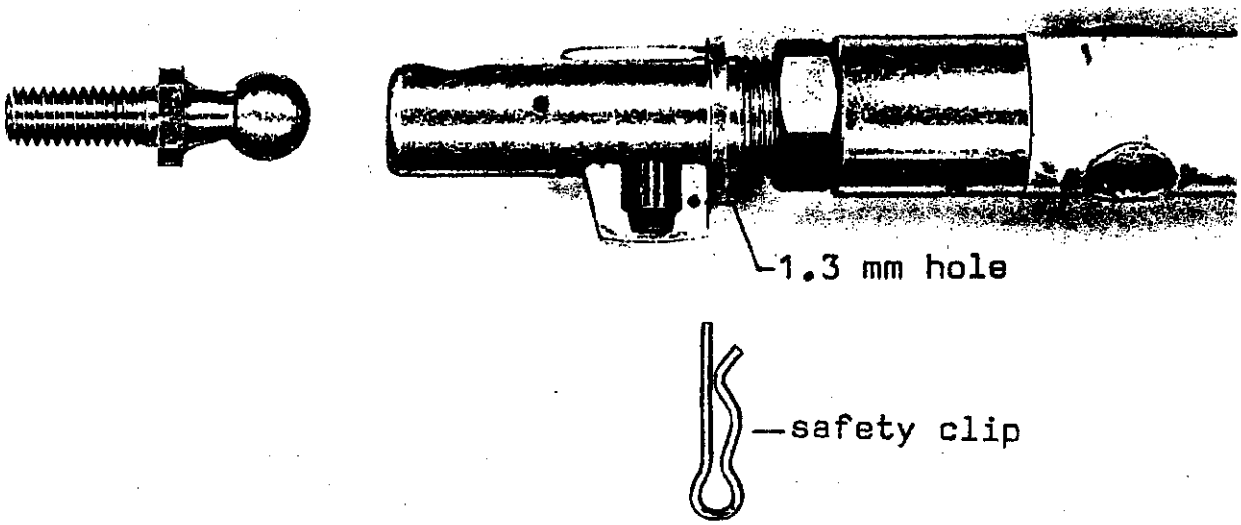
Securing method

After the coupling ball has been fully inserted and locked, the safety clip is inserted into the hole of the locking slide as illustrated on page 74 B.

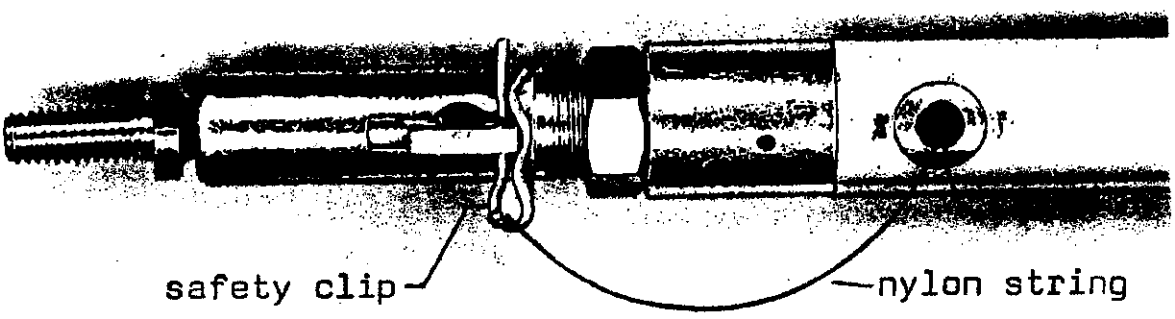
Check that neither the safety clips nor their attachment strings can get caught in any position of the control linkage.

Attachment of the safety device

"Hotellier" control rod coupling not connected



coupling ball fully inserted, control rod coupling locked, safety clip in place



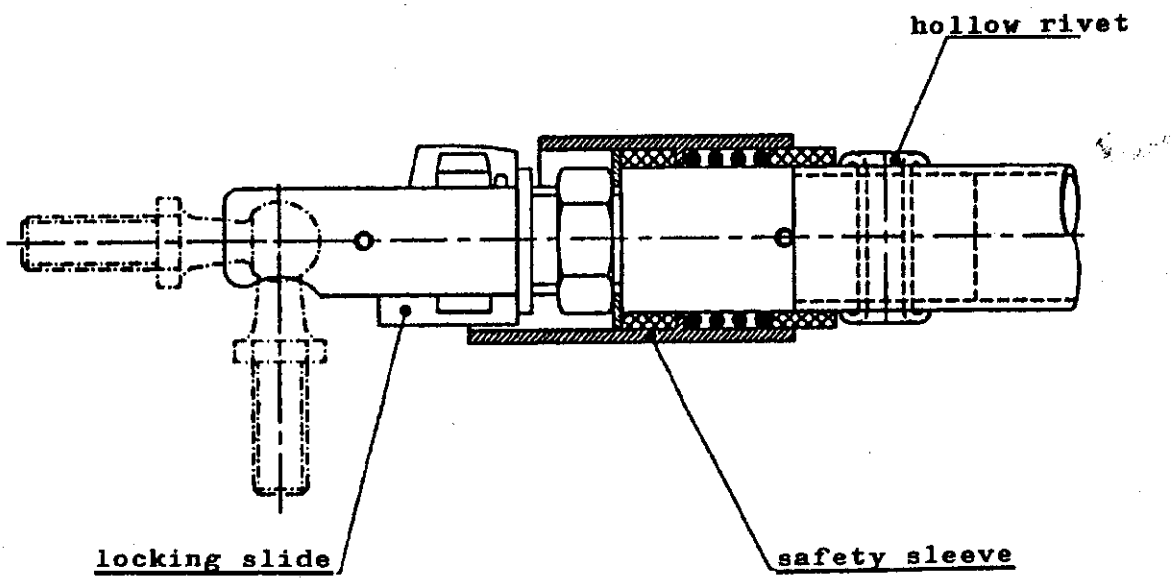
Connecting the L'Hotellier control rod couplings - securing them with a "Wedekind" safety sleeve

Pull back spring-loaded safety sleeve and push swivel joint fully home over the ball joint with the wedge-shaped locking slide held open.

When properly connected and locked, the wedge-shaped slide must have moved slightly back so that the "Wedekind" safety sleeve, once released, will be pushed over the wide end of the locking slide, thus preventing an unintentional disconnection.

Test

Check coupling(s) for proper connection by pulling crosswise with a hand force of about 5 daN (11 lb) in the direction of "releasing".



Mounting the wing tip extensions

With its spring loaded locking pin pushed down insert the tubular spar of the wing tip extension into the hole on the outboard root rib of the inboard wing panel, allow the coupling pin of the tip aileron to engage the hole on the inboard aileron and push wing tip extension fully home until the locking pin has snapped up.

Horizontal tailplane

Take the round headed rigging tool (from the side pocket) and screw it into the tailplane locating pin on the leading edge of the fin.

Slide the tailplane aft onto the two elevator actuating pins. Then pull the rigging tool and its pin forward, seat the front of the tailplane and push the pin fully home into the tailplane fitting.

Remove rigging tool. The pin must not protrude in front of the leading edge of the fin.

Check whether the elevator actuating pins are really located by moving the elevator.

After rigging

With the aid of a helper check the controls for full and free movement in the correct sense.

Use tape to seal off the wing/fuselage joint, the gap between inboard and outboard wing panels, the opening for the front tailplane attachment pin and the joint between fin and horizontal stabilizer.

Sealing with tape is beneficial in terms of performance.

5.2 De-rigging

Before the powered sailplane is de-rigged, remove sealing tape.

Horizontal tailplane

Withdraw front attachment pin with rigging tool, lift leading edge of stabilizer slightly and slide tailplane forwards and off.

Wing tip extensions

Push locking pin down with the aid of the 8 mm mounting pin and pull off wing tip extension.

Wings

Extend power plant 1/4.
Disconnect aileron, flap and airbrake controls inside the fuselage, remove cowling safety pin from main pin handle and push the 8 mm rigging pin through the bushing on the right hand side of the fuselage into the corresponding bushing on the fork spar tip.

With a helper on each wing tip pull out the main wing pin until the tongue spar stub of the right wing is free, then withdraw it by gently rocking it fore and aft if necessary (the wing may be lifted at the trailing edge of the flap).

Then remove the 8 mm rigging pin, pull out the main wing pin and withdraw the left wing.

5.3 Storage, Hangaring and Transport

The powered sailplane should always be hangared or kept in well ventilated conditions.
If it is kept in closed trailers, there must be adequate ventilation.
The powered sailplane must not be subjected to loads when not in use, especially in the case of high ambient temperatures.

As the wings have a thin airfoil section, it is important that they are well supported:
Leading edge down, with support at the spar roots and approx. 3.4 m (11.2 ft) from the wing tip in wing cradles of correct airfoil section.

The fuselage can rest on a broad cradle just forward of the C.G. hook and on its tail wheel.

The tailplane should be kept leading edge down in two cradles of correct airfoil section, about 1.5 to 2.0 m (4.9 - 6.5 ft) apart.

On no account should the tailplane be supported by its fittings in the trailer.

In the case of powered sailplanes which remain rigged permanently, it is important to ensure that the maintenance program includes rust prevention for the fittings of the fuselage, wings and tailplane.

Dust covers should be regarded as essential for a high performance powered sailplane.

If the Janus CM is being pushed by hand, it should not be pushed at the wing tips, but as near to the fuselage as possible.

5.4 Caring for the surface of the powered sailplane

For cleaning and caring it is recommended:

- Water, with or without washing agents with usual additives, polish and polish materials.
- Petrol and alcohol may be used for a short time only.

  Not recommended are thinners of all kinds.
- Never use chlorine hydrogen (i.e. Tri, Tetra, Per, etc.).
- For cleaning those fuselage and tailplane areas facing the wake of the propeller, the use of a water soluble degreaser is recommended.
- The canopy should be cleaned with "Plexiklar", "Mirror Glaze", or with a similar plexiglass cleaner and only if necessary, with warm water. The canopy should be wiped down only with a clean soft chamois leather or a very soft material.
  Never rub the canopy when it is dry!
- This powered sailplane, like any other, should be protected from the wet.
  If water has found a way in, the Janus CM should be stored in a dry environment and the components turned frequently to eliminate the water.
- The Janus CM should not be exposed unnecessarily to intense sunlight or heat and should not be subjected to continual loads in a mechanical sense.

All external portions of the powered sailplane exposed to sunlight must be painted white, except the areas for the registration numbers and anti-collision markings.

Colours other than white can lead to the GFRP or CFRP overheating in direct sunlight, resulting in a weakening of the structure.

5.5 Operations with the power plant removed

The Janus CM may also be operated with the power plant removed, if, for instance, a reduced wing loading is prefered for participation in a soaring contest or if the engine is removed for maintenance or overhaul work.

In this case the following actions are required:

1. Remove complete power plant (engine, propeller and propeller mount).
   See Maintenance Manual, section 5.15 "Removal of the power plant".
   The electric spindle drive remains in the aircraft. The doors of the engine compartment must be secured in closed position.

2. Remove those batteries required for the operation of the power plant:

   a) 1 battery from the fuselage nose
   b) 2 batteries from the mounts below the front seat pan.

   Insulate battery cable ends and secure.

3. Drain all fuel.

4. By removing power plant and batteries the empty weight is reduced by 67 kg (147.7 lb) and the load on the tail wheel $\triangle G_2$ is reduced by 7 kg (15.4 lb)

With the two values shown on page 81 (section 5.5, item 4), the new empty weight C.G. position must be determined (see Maintenance Manual).

If the new empty weight C.G. position is below the forward limit of the permitted empty weight C.G. range shown in the diagram on page 35 C, compensating ballast may be attached by

a) bolting it to the end rib on top of the fin - below the horizontal stabilizer - or by

b) securing it to the axle of the tail wheel.

Appendix

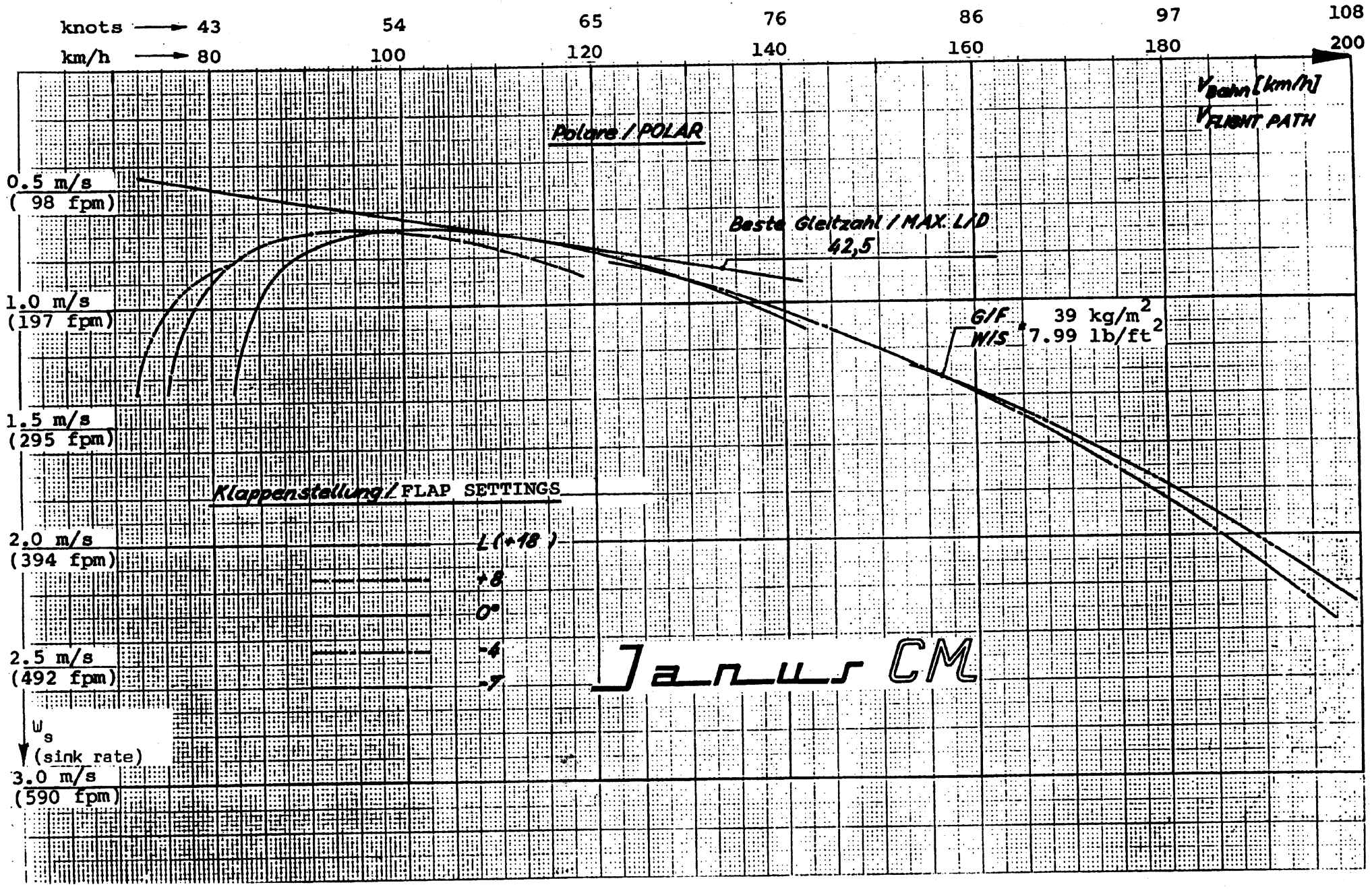
6.0 Performance data

6.1 Performance in sailplane configuration (power plant retracted)

All figures are based on a wing loading of 36.5 kg/m^2 (7.4 lb/sqft).

Stall speed (flap setting "L")	69 km/h 37 kt 43 mph
Minimum sink rate (flap setting "+8") at 90 km/h, 49 kt, 56 mph	0.65 m/s 128 fpm
Maximum L/D at 110 km/h, 59 kt, 68 mph	42.5 : 1

A speed polar diagram is shown on page 84.


knots → 43 54 65 76 86 97 108
km/h → 80 100 120 140 160 180 200
V bahn [km/h]
V FLIGHT PATH
Polare / POLAR
0.5 m/s
(98 fpm)
Beste Gleitzahl / MAX. L/D
42,5
1.0 m/s
(197 fpm)
G/F 39 kg/m²
WIS 7.99 lb/ft²
1.5 m/s
(295 fpm)
Klappenstellung / FLAP SETTINGS
2.0 m/s
(394 fpm)
L (+18°)
+8
0°
-4
2.5 m/s
(492 fpm)
-7
Janus CM
w s
(sink rate)
3.0 m/s
(590 fpm)

6.2 Performance - power plant extended - power on

6.2.1 Take-off distance

Maximum permitted all-up weight: 700 kg
1543 lb

Figures shown in the table below are based on the above weight, in zero wind and from a level surface in good condition with short grass.

Lift-off speed : 80 km/h (43 kt, 50 mph)

Speed on climb : 90 km/h (49 kt, 56 mph)

	Field elev. MSL		Outside air temperature							
			-15° C 5° F		0° C 32° F		+15°C 59°F		+30°C 86°F	
	m	ft	m	ft	m	ft	m	ft	m	ft
Ground	0	0	249	817	266	873	280	917	295	968
roll	500	1640	267	876	293	961	298	978	312	1024
till	1000	3280	284	932	299	981	316	1037	333	1093
lift-	1500	4920	300	984	317	1040	333	1093	353	1158
off	2000	6560	320	1050	339	1112	356	1168	376	1234
Total	0	0	343	1125	366	1201	385	1263	406	1332
distance	500	1640	368	1207	388	1273	410	1345	430	1411
over	1000	3280	390	1280	412	1352	435	1427	458	1503
50 ft	1500	4920	412	1352	436	1430	458	1503	485	1591
obstacle	2000	6560	440	1444	466	1529	492	1614	517	1696

6.2.2 Climbing speed - climbing time

Values shown are based on the max. permitted gross weight, at sea level, + 15° C (59° F) and flap setting "+8".

Speed for best rate of climb V_y	:	90 km/h 49 kt 56 mph
Best rate of climb W_{st}	:	2.5 m/s 492 fpm
Time required to climb to	:	
1000 m (3280 ft)	=	7 min.
2000 m (6560 ft)	=	15 min.
3000 m (9840 ft)	=	25 min.
Service ceiling	:	4000 m 13000 ft

If required for operations at high altitudes, different main jets may be used in accordance with the recommendations of the engine manufacturer.

6.2.3 Cruise speed

At maximum continuous power setting of 7200 RPM a cruise speed in horizontal flight of approx. 140 km/h (76 kt, 87 mph) is achieved.

6.2.4 Range, without fuel reserve

a) With the engine running continuously at 75% continuous power:

Cruising speed	: approx.	140 km/h 76 kt 87 mph
Fuel consumption	: approx.	21 Ltr./h 5.5 U.S. Gal./h 4.6 Imp. Gal./h
Endurance	: approx.	2 h
Range	: approx.	280 km 150 nm

b) "Sawtooth" technique

("Speed-to-fly ring" set at 0 m/s)

Average cruising speed	: approx.	100 km/h 54 kt 62 mph
Fuel consumption	: approx.	29 Ltr./h 7.7 U.S. Gal./h 6.4 Imp. Gal./h
Endurance (climb time only)	: approx.	1.5 h
Range	: approx.	470 km 250 nm