Supplement No. 003

Propeller KW-31 / Towing Operation

Aircraft Serial Number:

Aircraft Registration Number:

Date of Issue **04. 07. 2019**

This Supplement must be attached to the POH when the KW-31 propeller and towing equipment is installed in accordance with the manufacturer's approved documentation.

Information in this Supplement completes or replaces information in the basic POH for the below mentioned parts only. Limitations, procedures and information not mentioned in this Supplement and included in the basic POH stay valid.

This Supplement completes information necessary for the aircraft operation with equipment installed on the aircraft.

This supplement is EASA approved under

Approval No.: 10070607

Approval Date: 30. 07. 2019

RECORD OF REVISIONS

Revision	Date	Approved By	Note
Initial Issue	04. 07. 2019	EASA, No. 10070607	-
1	29. 01. 2020	-	Removed circuit breakers values. Supplemented demonstrated crosswind velocity. Administrative corrections.
2	12. 06. 2020	-	Corrected fuel operating ranges data. Administrative corrections.
3	24. 11 2020	EASA, No. 10075525	New Simple Throttle Controller.

Chapter 0 INTRODUCTION

0.6 Symbols, Abbreviations and Terminology

0.6.1 Speed

In addition:

V_T	Glider towing speed

Chapter 1 GENERAL INFORMATION

1.3 Introduction to the Aircraft

1.3.3 Propeller

Number of propellers	1
Propeller manufacturer	WOODCOMP s. r. o., Odolená Voda, Czech republic
Propeller model number	KW-31
Number of blades	3
Propeller diameter	1.726 m (67.95 in)
Propeller type	In-flight electrically adjustable, constant speed
Pitch range	17° - 30°

1.3.4 Three View Drawing

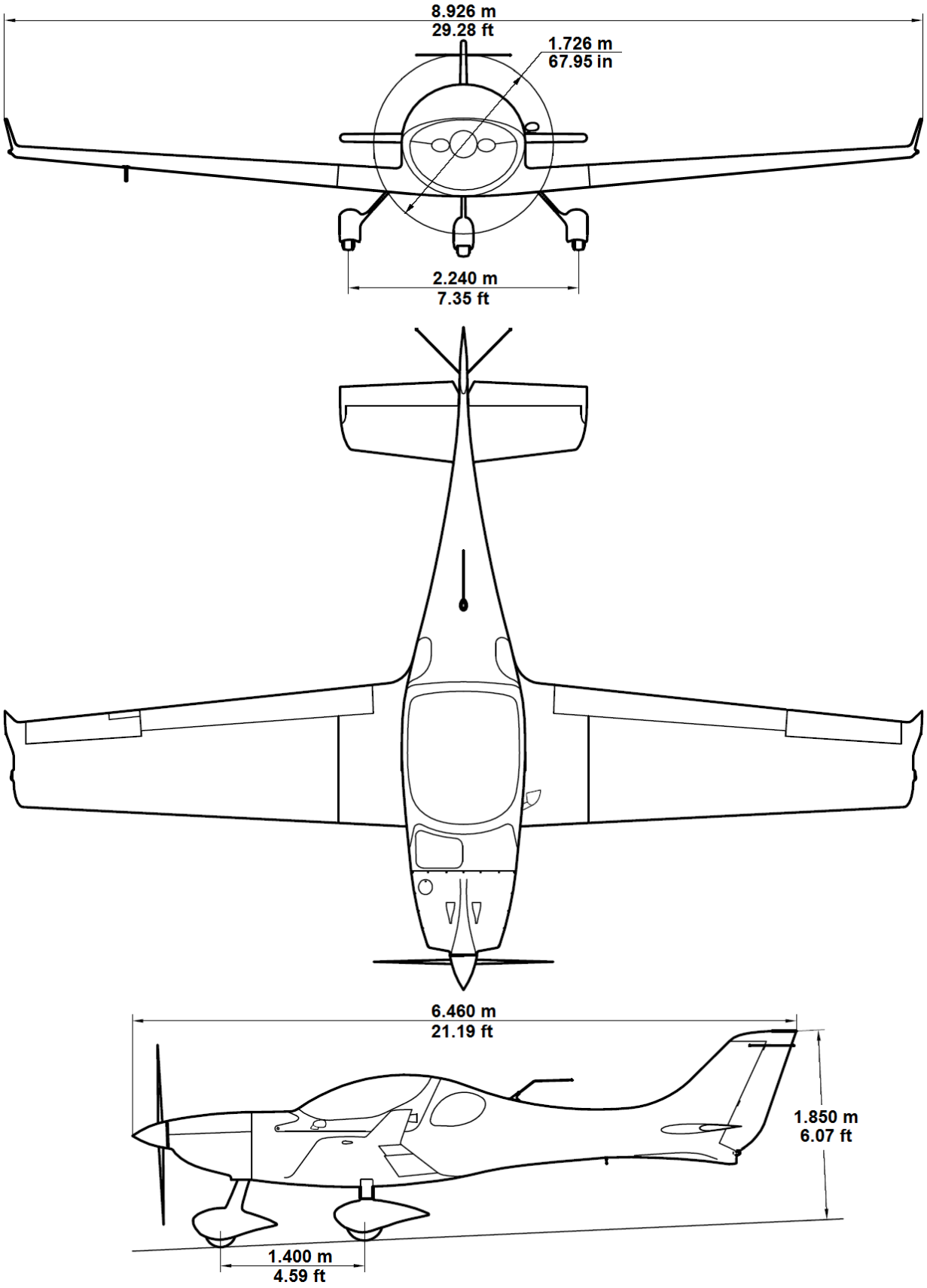


Fig. 1-1 Three view drawing

1.4 Summary of Performance

1.4.2 Top and Cruise Speeds

1.4.2.1 Top Speeds at Sea Level

		IAS	KIAS
Top speeds at sea level (full throttle)	At 5700 rpm*	250	135
	At 5500 rpm	240	130

* Propeller regulator in **CONSTANT SPEED** mode permits to set max. 5700 rpm.

1.4.2.2 Cruise Speeds at Altitudes and Power Setting

Pressure altitude	Engine speed	MAP	Cruise speeds	
ft	rpm	inHg	IAS	KIAS
2000	5 500	27.1	229	124
4000	5 500	25.1	219	118
6000	5 500	23.1	209	113
8000	5 500	21.3	199	108
10000	5 500	20.1	191	103

NOTE

For more details see Chapter 5.6.

1.4.3 Fuel Operating Ranges

Endurances and ranges at altitude 2000 ft ISA							
Engine speed		**rpm**	**5 500**	**5 500**	**5 500**	**5 500**	**5 500**
MAP		**inHg**	**27.1**	**26.1**	**25.1**	**24.1**	**23.1**
Fuel consumption		l/h	27.8	22.8	20.9	18.9	17.9
IAS		km/h	229	218	207	195	184
KIAS		knots	124	118	112	105	99
CAS		km/h	221	211	201	190	180
KCAS		knots	119	114	109	103	97
TAS		km/h	228	217	207	196	185
KTAS		knots	123	117	112	106	100
Usable fuel (l)	119	hh:mm	4:16	5:13	5:41	6:17	6:38
		km	976	1133	1179	1234	1230
		nm	527	612	636	666	664
	100	hh:mm	3:35	4:23	4:47	5:17	5:35
		km	820	952	990	1037	1034
		nm	443	514	535	560	558
	80	hh:mm	2:52	3:30	3:49	4:13	4:28
		km	656	761	792	830	827
		nm	354	411	428	448	446
	60	hh:mm	2:09	2:37	2:52	3:10	3:21
		km	492	571	594	622	620
		nm	266	308	321	336	335
	40	hh:mm	1:26	1:45	1:54	2:06	2:14
		km	328	381	396	415	413
		nm	177	206	214	224	223
	20	hh:mm	0:43	0:52	0:57	1:03	1:07
		km	164	190	198	207	207
		nm	89	103	107	112	112

1.4.4 Rate of Climb

	IAS	KIAS
Best angle of climb airspeed V_X (at SL)	104 IAS	57 KIAS
Rate of climb at V_X (at SL)	1127 fpm	
Best rate of climb airspeed V_Y (at SL)	127 IAS	69 KIAS
Rate of climb at V_Y (at SL)	1190 fpm	

Chapter 2 LIMITATIONS

2.12 Service Ceiling

Service ceiling is 17 800 ft.

2.13 System and Equipment Limitations

2.13.3 Minimum Equipment for Flight Operation

In addition:

a. Operative propeller regulator

b. Operative towing release (for towing operation only)

c. Operative rear-view camera system (for towing operation only)

2.14 Other Limitations

2.14.4 Towing Operation

• Tow aircraft crew – 1 person:	
○ Maximum tow aircraft weight	490 kg / 1080 lb
○ Maximum glider weight	545 kg / 1202 lb
• Tow aircraft crew – 2 persons, training only:	
○ Maximum tow aircraft weight	580 kg / 1278 lb
○ Maximum glider weight	380 kg / 838 lb
• Tow aircraft FWD CG limit for towing operation	2.730 m (20.5 %MAC) at 500 kg with straight line taper to 2.783 m (25 %MAC) at 600 kg
• Minimum towing speed V_{Tmin}	110 IAS / 59 KIAS
• Maximum towing speed V_{Tmax}	180 IAS / 97 KIAS
• Maximum weak link strength	400 daN
• Tow rope length	40 – 60 m / 130 – 197 ft
• Tow rope flexibility	Static rope
• Rear-view camera / MFD	Operative
• Multiple towing	Not approved

WARNING

All limitations for airframe and engine must be observed!

2.15 Placards

2.15.1 Interior Placards

In addition:

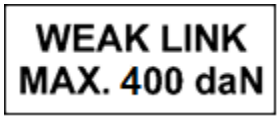
a. Placard on the left side of cabin.

WARNING		
Tow aircraft crew	1	2, Training only
Max. tow aircraft weight	490 kg / 1080 lb	580 kg / 1278 lb
Max. glider weight	545 kg / 1202 lb	380 kg / 838 lb
Max. towing speed 180 IAS / 97 KIAS Min. towing speed 110 IAS / 59 KIAS Max. weak link strength 400 daN		

2.15.2 Exterior Placards

In addition:

a. Placard is located at the tow release holder.



Chapter 3 EMERGENCY PROCEDURES

3.5 Air Start

a.	Airspeed	120 – 130 IAS / 65 – 70 KIAS
b.	Altitude	Check
c.	Field selection	Select according to available altitude
d.	**AVIONICS**	OFF
e.	**LAND** lights	Check OFF
f.	**NAV / ACL** lights	OFF
g.	**FUEL** selector	Fullest tank
h.	**CHOKE**	CLOSED
i.	**THROTTLE**	Slightly OPEN (5 mm of throttle controller travel)
j.	Propeller regulator	**CONSTANT SPEED** mode (**MIN. PITCH** LED must be illuminated)
k.	**MASTER SWITCH**	ON
l.	**FUEL PUMP**	ON
m.	**IGNITION**	ON both circuits
n.	Starter key	First **OFF**, hold **START**, after engine is started release to **CHARGE**
As soon as engine runs:		
o.	Engine parameters	Check
p.	**AVIONICS**	ON
q.	**FUEL PUMP**	OFF
Unsuccessful start:		
r.	Land	According to Chapter 3.8.3

WARNING

If fuel fumes or a fuel leak is discovered in the cabin, do not perform an air start and turn off all unnecessary equipment!

WARNING

If the air start is unsuccessful up to 500 ft (150 m) AGL, perform an emergency landing according to Chapter 3.8.3!

3.7 Emergency Descent

a.	**THROTTLE**	IDLE
b.	Propeller regulator	**CONSTANT SPEED** mode, rpm as required
c.	Airspeed	Smooth air – max. 275 IAS / 148 KIAS
		Rough air – max. 218 IAS / 118 KIAS
d.	Engine speed	Do not overrun

CAUTION

Do not exceed V_{RA} 218 IAS / 118 KIAS when descending in rough air!

3.8 Landing Emergencies

3.8.1 Precautionary Landing with Engine Power

In the event of a major failure, disorientation, shortage of fuel, dangerous deterioration of meteorological conditions (visibility, thunderstorm) or the pilot experiencing nausea which could lead to incapacitation, a precautionary landing should be conducted.

a.	Landing area	Select, determine wind direction
b.	Radio	Transmit MAYDAY (121.5 MHz) giving position and intentions
c.	Transponder	Set 7700
d.	**ELT REMOTE CONTROL**	ACTIVATE if off airfield
e.	Field check	Check the preferred area for landing carefully to inspect the terrain properties (obstructions, surface conditions)
f.	Circle pattern	At a safe altitude as permitted by cloud base, extend “down wind” position
g.	**FUEL PUMP**	ON
h.	Wing flaps	**FLAPS 3**, extend gradually, check locked
i.	Airspeed	110 – 115 IAS / 59 – 62 KIAS
j.	**THROTTLE**	As required
k.	Propeller regulator	**CONSTANT SPEED** mode (**MIN. PITCH** LED must be illuminated)
l.	Visual contact	Don’t lose sight of the selected field in the case of low visibility
m.	Touchdown	Immediately after passing the edge of the selected landing field; Avoid any obstacles in the final approach path
n.	Brake	Apply heavily until stopped (depending on the surface)
o.	**ELT REMOTE CONTROL**	If OK then OFF

3.9 System Emergencies

3.9.5 Alternator Failure

Loss of alternator output is detected through a zero or minus values reading on the ammeter and warning lamp **CHARGE** coming on. Electrical power malfunctions are accompanied by an excessive rate of charge or a discharge rate indicated by ammeter.

a.	**THROTTLE**	Increase above 3000 rpm
b.	**NAV / ACL** lights	OFF
c.	**LAND** lights	OFF
d.	**FUEL PUMP**	OFF
e.	Propeller regulator	Switch to **MANUAL** mode, adjust only if required

NOTE

The operating mode switch has a safety lock to avoid accidental operation; it must be first pulled outwards and then moved to the desired position.

f.	**MASTER SWITCH**	OFF - ON
If no increase in the ammeter reading is noted:		
g.	All unnecessary electrical equipment	OFF
h.	Voltmeter	Monitor battery voltage
i.	Land	As soon as possible

CAUTION

All electrical loads are being supplied by the battery! Turn off all unnecessary equipment! Disconnect all external equipment from the power outlets!
Operating time of battery in good condition is up to 30 minutes!

CAUTION

Be aware, if the **AVIONICS** switch is turned OFF, the radio communication is lost!

CAUTION

When the propeller regulator is switched to manual mode, automatic propeller regulation is disabled! Pay attention to not overspeed the engine!

NOTE

Operating time of battery depends on its condition.
Dynon SkyView system has its own backup battery.

3.9.6 Overvoltage

If the trouble was caused by a momentary overvoltage condition (16.5 V and up), the following procedure should return the voltmeter to a normal reading.

a.	**THROTTLE**	Reduce power to minimum for flight
b.	**AVIONICS**	OFF
c.	**NAV / ACL** lights	OFF
d.	**LAND** lights	OFF
e.	**FUEL PUMP**	OFF
f.	Propeller regulator	Switch to **MANUAL** mode, adjust as required

NOTE

The operating mode switch has a safety lock to avoid accidental operation; it must be first pulled outwards and then moved to the desired position.

g.	**MASTER SWITCH**	OFF - ON
If the overvoltage condition (16.5 V and up) is noted:		
h.	All unnecessary electrical equipment	OFF
i.	Voltmeter	Monitor battery voltage
j.	Land	As soon as possible

CAUTION

All electrical loads are being supplied by the battery! Turn off all unnecessary equipment! Disconnect all external equipment from the power outlets!

Operating time of battery in good condition is up to 30 minutes!

CAUTION

Be aware, if the **AVIONICS** switch is turned OFF, the radio communication is lost!

CAUTION

When the propeller regulator is switched to manual mode, automatic propeller regulation is disabled! Pay attention to not overspeed the engine!

NOTE

With **MASTER SWITCH** OFF, the engine will continue to run.
PFD and MFD will operate with its own backup battery.

3.13 Other Emergencies

3.13.5 Propeller KW-31

3.13.5.1 Propeller Pitch Control Failure

a.	Propeller regulator	Switch to **MANUAL** mode

NOTE

The operating mode switch has a safety lock to avoid accidental operation; it must be first pulled outwards and then moved to the desired position.

b.	**THROTTLE**	As required
c.	Propeller regulator	Adjust rpm manually as required
If the rpm regulation does not work in manual mode:		
d.	Engine parameters	Check
e.	**THROTTLE**	As required

CAUTION

When the propeller regulator is switched to manual mode, automatic propeller regulation is disabled! Pay attention to not overspeed the engine!

CAUTION

If the propeller regulation does not work in manual mode, the propeller blade pitch remains at the last set position!

If the propeller blades are set to coarse pitch, expect worse climb performance and avoid go-around when landing, if possible!

3.13.5.2 MIN PITCH LED Failure

If the green LED does not illuminate during the final approach check:

a.	Approach airspeed	120 - 130 IAS / 65 - 70 KIAS according to the weight
b.	**THROTTLE**	Increase; if the max. allowable rpm is easy to reach, the LED is defective
c.	Propeller regulator	Inspect failure after landing

3.14 Towing Operation

It is pilot's consideration when to release the glider. In the case of emergencies during glider towing perform following steps:

a.	Glider pilot	Advise the situation and intention – if situation permits
b.	Towed glider	Tow to a safe area – if situation permits
c.	Glider pilot	Give sign to release immediately (via radio or by other appropriate means) – if situation permits
d.	**TOW RELEASE**	PULL repeatedly, if the towed glider has not released
e.	MFD	Monitor the glider position to avoid collision
f.	Emergency procedure	Proceed

WARNING

Drop the tow rope above suitable area before emergency or precautionary landing to avoid of tow rope tangle with objects on the ground!

NOTE

If time and situation permit, advise the glider pilot of the situation and intended actions.

3.14.1 Abnormal Attitude of Towed Glider

If the glider is apparently out of the normal attitude behind the tow aircraft and sufficient maneuverability can no longer be maintained, release the tow rope immediately.

If the glider is getting out of the normal attitude, advise the glider pilot to return to the standard position (via radio or by other appropriate means), if this is not possible or unsuccessful, release the tow rope immediately.

WARNING

Release the tow rope immediately if sufficient maneuverability can no longer be maintained!

WARNING

The critical configuration is usually the one in which the glider climbs above the tow aircraft during the takeoff and climb, especially when using a tow rope connector located at the CG of the glider (if approved).

3.14.2 Rear-View Camera System Failure

If the rear-view on the MFD screen is frozen or no view is shown:

a.	**CAMERA** switch	OFF - ON
If the rear-view on the MFD screen is still frozen or no view is shown:		
b.	Rear-view mirror	Use for the glider position monitoring

CAUTION

The rear-view mirror does not provide the same range of visibility as the rear-view camera system!

3.14.3 Tow Rope Break

If the tow rope breaks, verify operation of control systems and land normally.

3.14.4 Towed Glider Cannot Release

In case of repeated unsuccessful attempt to release the tow rope from the glider, it is necessary to release the tow rope from the tow aircraft.
Advise the glider pilot about the intended action, tow the glider into a safe area (above the airport – if possible) and release the tow rope.

3.14.5 Tow Rope Cannot be Dropped

Repeat the attempts to drop the tow rope. If it is impossible, repeat the circuit with the tow rope, approach with tow rope and carry out a landing with tow rope.

Chapter 4 NORMAL PROCEDURES

4.2 Airspeeds for Normal Operation

Unless stated otherwise, the following speeds are based on maximum takeoff weight 600 kg / 1323 lb.

Takeoff rotation	**FLAPS 1**	65 – 70 IAS	35 – 38 KIAS
Climb	Normal	104 – 127 IAS	57 – 69 KIAS
	Best rate of climb speed (at sea level)	127 IAS	69 KIAS
	Best angle of climb speed (at sea level)	104 IAS	57 KIAS
Landing approach	**FLAPS 1, FLAPS 2**	120 – 130 IAS	65 – 70 KIAS
Balked landing	Full power (**FLAPS 1**)	110 – 130 IAS	60 – 70 KIAS
Rough air penetration	Maximum	218 IAS	118 KIAS
Demonstrated crosswind velocity	Takeoff	8.3 m/s	16.1 knots
	Landing	7.5 m/s	14.6 knots
Towing speed V_T	Minimum	110 IAS	59 KIAS
	Maximum	180 IAS	97 KIAS

4.3 Pre-Flight Inspection

1 CABIN

a.	Aircraft documents	Check, on board
b.	Baggage	Restrained
c.	Flight controls	Freedom and proper direction of movement
d.	**IGNITION**	OFF both circuits
e.	**MASTER SWITCH**	OFF
f.	**THROTTLE**	Freedom of movement, set IDLE
g.	**CARBUR. PREHEATING**	Freedom of movement, set CLOSED
h.	**CABIN VENTILATION**	Freedom of movement
i.	**CABIN HEATING**	Freedom of movement
j.	**FUEL** selector	Freedom of movement
k.	**CHOKE**	Freedom of movement, set CLOSED
l.	**RESCUE SYSTEM** actuator	Check the condition of actuator attachment, arming and locking, service dates for expiration
m.	Circuit breakers	Pressed in
n.	Brake	Freedom of movement, function, set **PARK**
o.	Wing flaps	Freedom of movement, set **FLAPS 3**, check locked
p.	**MASTER SWITCH**	ON

q.	**TEST** button	Press, check warning and check lamps illumination, control stick shaker
r.	Propeller regulator	Switch to **MANUAL** mode; Hold **INC**/**DEC**, check the propeller regulator function; Switch back to **CONSTANT SPEED** mode; Set 5700 rpm (**MIN. PITCH** LED must be illuminated)
s.	**AVIONICS**	ON
t.	Radio	ON, check, then OFF
u.	XPDR	ON, check, then OFF
v.	Intercom	Check
w.	PFD, MFD screen	Check
x.	**CAMERA** switch	ON
y.	MFD	Press the function key "**TOOLS**"; Press the function key "**VIDEO**" and check function of rear-view camera; Press the function key "**BACK**"
z.	Fuel quantity	Check (if shown 45+, use a dipstick for appropriate fuel tank)
aa.	Voltmeter	Check, min. 11.5 V
bb.	Instruments	Check
cc.	**LAND** lights	ON, check function
dd.	**NAV / ACL** lights	ON, check function
ee.	**PITCH** trim and **ROLL** trim	Check movement and indication
ff.	All switches	OFF
gg.	**MASTER SWITCH**	OFF
hh.	Canopy	Cleanness of glass, canopy lock function
ii.	Safety harness	Inspect
jj.	**TOW RELEASE** handle	Condition, attachment

2 LEFT FUSELAGE

In addition:

a.	Rear-view mirror	Condition, attachment and cleanness

3 EMPENNAGE

In addition:

a.	Rear-view camera	Condition, attachment and cleanness
b.	Tow release mechanism	Condition, attachment

4.6 Engine Starting

a.	**FUEL** selector	**LEFT** (if the fuel tank volume is 45+, see Chapter 7.16) or **RIGHT**
b.	**CHOKE** - cold engine - warm engine	 OPEN (pull to open) CLOSE (push to close)
c.	**THROTTLE** - cold engine - warm engine	 IDLE Slightly OPEN (5 mm of throttle controller travel)
d.	**MASTER SWITCH**	ON, wait until PFD and MFD start up
e.	Propeller regulator	**CONSTANT SPEED** mode (**MIN. PITCH** LED must be illuminated)
f.	Instruments	Check and set
g.	**NAV / ACL** lights	ON
h.	Starter key	**INST.**
i.	**FUEL PUMP**	ON, establish the fuel pressure and then OFF
j.	**IGNITION**	ON both circuits
k.	Propeller area	Clear
l.	Starter key	Hold **START**, after engine started release to **CHARGE**
As soon as engine runs:		
m.	**THROTTLE**	Adjust to achieve smooth running at approx. 2500 rpm, then decrease to approx. 2000 rpm
n.	Oil pressure	Minimum 2.00 bar within maximum of 10 seconds If not, shut down the engine and investigate the cause
o.	**CHARGE** warning lamp	Check OFF
p.	**CHOKE**	CLOSE and add throttle simultaneously
q.	**AVIONICS**	ON
r.	Radio	ON
s.	Transponder	ON or STBY

WARNING

Never start the engine by hand!

WARNING

Before engine starting ensure that the propeller area is clear!

CAUTION

The starter should be activated for a maximum of 10 sec, followed by 2 min pause for starter cooling!

CAUTION

Do not actuate starter key as long as the engine is running. Wait until the engine is completely stopped!

CAUTION

After engine starting, if the oil pressure does not reach the minimum pressure 2.00 bar within 10 seconds, shut down the engine and investigate the cause! The loss of lubrication can cause severe engine damage!

CAUTION

At an engine start with low oil temperature, continue to observe the oil pressure as it could drop again due to the increased flow resistance in the suction line. The number of revolutions may be only so far increased that the oil pressure remains steady!

4.9 Before Takeoff

4.9.1 Ignition and Engine Ground Tests

a.	**CARBUR. PREHEATING**	Check CLOSED
b.	Brake	**MAX**
Ignition and engine ground tests:		
c.	Propeller regulator	**CONSTANT SPEED** mode, set 5700 rpm (**MIN. PITCH** LED must be illuminated)
d.	**THROTTLE**	4000 rpm
e.	**IGNITION**	Switch OFF first ignition circuit, then back ON; Switch OFF second ignition circuit, then back ON; Engine speed drop with only one ignition circuit must not exceed 300 rpm; Max. difference of engine speed by use of either circuit A or B is 115 rpm
f.	**THROTTLE**	5000 rpm
g.	Propeller regulator	Switch to **MANUAL** mode; Hold **INC** until **MIN. PITCH** LED is illuminated (if not already); Hold **DEC** until **MAX. PITCH** LED is illuminated, check engine rpm drop; Switch back to **CONSTANT SPEED** mode; Set 5700 rpm (**MIN. PITCH** LED must be illuminated)
h.	**THROTTLE**	Short MAX
i.	Engine speed	Check, 5500 rpm ±200 rpm
j.	Engine parameters	Check
k.	**CARBUR. PREHEATING**	OPEN, check carburetor preheating function (engine speed drop min. 100 rpm); Then CLOSE
l.	**THROTTLE**	IDLE, check min. 1400 rpm

WARNING

Before engine full-power ground test ensure that the propeller area is clear!

WARNING

Position the aircraft so that the prop wash will not hurt any persons, or cause any damage! Never perform a ground test against any buildings or obstacles!

CAUTION

The engine full-power ground test should be performed with the aircraft heading upwind. Do not perform the engine full-power ground test on a gravel surface. The propeller may sucks the gravel and damage the blades!

CAUTION

After an engine full-power ground test, allow a short cooling run to prevent vapor formation in the cylinder head!

CAUTION

When performing the engine full-power ground test on grassy or slick surface, the aircraft may move despite MAX brake being used!

4.9.2 Before Line Up

a.	**RESCUE SYSTEM** actuator	Check removed lock (see Chapter 7-22, Fig. 7-34)
b.	Controls	Freedom of movement
c.	**PITCH** trim and **ROLL** trim	Set neutral
d.	Wing flaps	**FLAPS 1**, check locked
e.	**CHOKE**	Check CLOSED
f.	**CARBUR. PREHEATING**	Check CLOSED
g.	**FUEL PUMP**	ON
h.	**LAND** lights	ON
i.	**NAV / ACL** lights	Check ON
j.	**AVIONICS**	Check ON and set
k.	Transponder	ALT
l.	Engine parameters	Check
m.	Warning and check lamps	Check
n.	Circuit breakers	Check pressed in
o.	Canopy	Latched and locked (see Chapter 7.12)
p.	Safety harness	Fasten
q.	Wind	Check windsocks
r.	Propeller regulator	**CONSTANT SPEED** mode, set 5700 rpm (**MIN. PITCH** LED must be illuminated)

4.10 Takeoff

4.10.1 Normal and Short Field Takeoff

a.	Brake	**MAX**
b.	**THROTTLE**	MAX
c.	Engine parameters	Check
d.	Propeller regulator	Check
e.	Brake	Release
f.	Control stick	Slightly tail low
g.	Directional control	Maintain with rudder control
h.	Rotate	Smoothly at 68 – 70 IAS / 37 – 38 KIAS
i.	Airspeed	104 IAS / 57 KIAS for best angle of climb 127 IAS / 69 KIAS for best rate of climb

4.10.2 Soft Field Takeoff

For takeoffs from a soft or rough field, it is recommended to lift the aircraft off the ground as soon as practical. The aircraft should be leveled after lift off immediately to accelerate.

a.	Brake	Release
b.	**THROTTLE**	Smoothly MAX
c.	Engine parameters	Check
d.	Propeller regulator	Check
e.	Control stick	Slightly tail low
f.	Directional control	Maintain with rudder control
g.	Rotate	Smoothly at 68 – 70 IAS / 37 – 38 KIAS
h.	Airspeed	104 IAS / 57 KIAS for best angle of climb 127 IAS / 69 KIAS for best rate of climb

4.11 Climb

Climb is performed with flaps retracted and maximum continuous power. For maximum rate of climb establish the best rate of climb. If an obstacle clearance is required using a steep climb angle, establish the best angle of climb speed.

a.	**THROTTLE**	As required
b.	Propeller regulator	**CONSTANT SPEED** mode, set rpm as required
c.	Airspeed	104 IAS / 57 KIAS for best angle of climb 127 IAS / 69 KIAS for best rate of climb
d.	Wing flaps	**FLAPS 0** slowly at safety altitude (not below 165 ft (50 m) AGL and 127 IAS / 69 KIAS)
e.	**PITCH** trim and **ROLL** trim	As required
f.	**FUEL PUMP**	OFF
g.	**LAND** lights	OFF
h.	Engine parameters	Monitor

	IAS	KIAS
Best angle of climb airspeed V_X (at SL)	104 IAS	57 KIAS
Best rate of climb airspeed V_Y (at SL)	127 IAS	69 KIAS

CAUTION

If the coolant or oil temperature approaches or exceeds limits, reduce the climb angle to increase airspeed and possibly return within limits! If readings do not improve, troubleshoot causes other than high power setting at low airspeed!

4.12 Cruise

Normal cruising is performed in the airspeed range 180 – 230 IAS / 97 – 124 KIAS at engine speed 5500 rpm and throttle set as required. In the case of turbulence reduce the cruising airspeed below 218 IAS / 118 KIAS to avoid of aircraft overstressing.

a.	**THROTTLE**	As required
b.	Propeller regulator	**CONSTANT SPEED** mode, set rpm as required
c.	**PITCH** trim and **ROLL** trim	As required
d.	Engine parameters	Monitor
e.	Fuel flow and fuel balance	Monitor

NOTE

See OPERATORS MANUAL FOR ROTAX ENGINE TYPE 912 SERIES, Doc. No. OM-912, latest edition.

4.13 Descent

It is not advisable to reduce the engine power to idle when descending from a very high altitude. In such case the engine may become under-cooled and a loss of power may occur. It is recommended to descend at increased rpm (approximately 3000 rpm) and check the engine parameters are within permitted limits.

For increasing the rate of descent, it is recommended to extend the wing flaps.

a.	**THROTTLE**	As required
b.	Propeller regulator	**CONSTANT SPEED** mode, set rpm as required
c.	Airspeed	As required
d.	**PITCH** trim and **ROLL** trim	As required
e.	Engine parameters	Monitor

WARNING

When descending with flaps extended, do not exceed V_{FE}!

CAUTION

Engine undercooling and loss of power may occur when descent engine power is set to idle! Increase the engine power during descent to keep the engine parameters within permitted limits!

4.14 Approach

a.	Wing flaps	As required, check locked
b.	Airspeed	120 – 130 IAS / 65 – 70 KIAS
c.	**PITCH** trim and **ROLL** trim	As required
d.	**THROTTLE**	As required
e.	Propeller regulator	**CONSTANT SPEED** mode, set 5700 rpm (**MIN. PITCH** LED must be illuminated)
f.	Engine parameters	Check
g.	**FUEL** selector	Fullest tank
h.	**FUEL PUMP**	ON
i.	**LAND** lights	ON
j.	Safety harness	Fasten

4.15 Landing

4.15.4 Balked Landing

a.	**THROTTLE**	Smoothly MAX
b.	Wing flaps	**FLAPS 1** slowly, check locked
c.	Airspeed	104 IAS / 57 KIAS for best angle of climb 127 IAS / 69 KIAS for best rate of climb
d.	Wing flaps	**FLAPS 0** slowly at safety altitude (not below 165 ft (50 m) AGL and 120 IAS / 65 KIAS)
e.	**PITCH** trim and **ROLL** trim	As required

NOTE

A thrust yawing moment is manifested in the case of the rapid full throttle application.

4.19 Other Normal Procedures

4.19.3 Crosswind Takeoff

Takeoffs under strong crosswind conditions are performed with the flaps setting in position **FLAPS 1** and the ailerons partially deflected into the wind. The aircraft is accelerated to airspeed slightly higher than normal, then the elevator control is used quickly, but carefully to lift the aircraft off the ground and prevent the possibility of setting back onto the runway while drifting.

When clear of the ground, make a coordinated turn into the wind to correct the drift and continue in takeoff.

a.	Brake	Release
b.	**THROTTLE**	Smoothly MAX
c.	Engine parameters	Check
d.	Propeller regulator	Check
e.	Control stick	Slightly tail low, ailerons into the wind
f.	Directional control	Maintain with rudder control
g.	Rotate	Quickly, but carefully at 73 – 75 IAS / 40 – 41 KIAS
h.	Control stick / rudder control	Correct drift using ailerons and rudder
i.	Airspeed	127 IAS / 69 KIAS

4.20 Noise Characteristics

The noise level in accordance with requirements of the CS-36, Am. 2 (ICAO Annex 16, Volume I, Chapter 10 - 10.4 b) has been established to be 62.4 dB(A).

4.21 Towing Operation

4.21.1 Attaching Tow Rope

When attaching the tow rope to the tow aircraft, the assistance of ground staff is required.

a.	Tow rope	Condition, wear and proper weak link
Tow rope release test:		
b.	**TOW RELEASE** handle	PULL, when the rope is placed then RELEASE PULL and RELEASE (tow rope release test), if successful PULL, when the rope is placed then RELEASE

WARNING

It is not recommended to taxi with attached tow rope.

Be aware that persons or objects on ground may be hit or tangled by the tow rope!

4.21.2 Attaching the Glider

a.	**CAMERA** switch	ON
b.	MFD	Press the function key "**TOOLS**"; Press the function key "**VIDEO**" to display the rear-view on the screen; Press the function key "**BACK**"
c.	Rear-view mirror	Adjust
d.	Radio check	Perform, request glider pilot to acknowledge
e.	Tow aircraft	Position the aircraft in front of the towed glider at a 45° angle, so that the glider and all ground personnel is visible from the cabin
f.	Towed glider	Verify the ground personnel has attached the glider
g.	Tow aircraft	Align with the runway axis
h.	Tow rope	Stretch by slow taxiing
i.	MFD	Check, clear view of the glider
j.	Rear-view mirror	Check, clear view of the glider

WARNING

Always observe the actions and position of the ground personnel while attaching the glider!

Be prepared to immediately switch OFF the **IGNITION** to stop the engine, in the case that any person unexpectedly enters the propeller area or other hazardous situation arises!

4.21.3 Takeoff with Glider

a.	MFD	Check if the glider is ready for takeoff and tow rope is stretched; Monitor the actions of the ground staff
b.	Airspeed	Accelerate to minimum towing speed while still close to the ground
c.	Climb	If the glider is airborne, change to climb steadily
d.	Airspeed	Maintain towing speed (depends on glider type)

WARNING

When towing heavy gliders, acceleration must be performed close to the ground as the takeoff speed of the glider will be higher than the takeoff speed of the tow aircraft!

WARNING

Takeoff with the towed glider's wing on the ground is prohibited!

WARNING

Do not exceed the maximum weight of tow aircraft!

WARNING

Do not exceed the maximum weight of glider for selected towing speed at takeoff!

CAUTION

Takeoff distance 1640 ft / 500 m limited by certification basis is achieved by limiting of tow aircraft and glider takeoff weight. Increasing of towing speed at takeoff will result in increasing of takeoff distance!

4.21.4 Climb with Glider

a.	Airspeed	Maintain glider towing speed
b.	Flight	Straight, without abrupt maneuvers or steep turns (max. bank angle 30°)
c.	MFD	Monitor the glider position

CAUTION

If the coolant or oil temperature approaches or exceeds limits, reduce the climb angle to increase airspeed and possibly return within limits!

4.21.5 Cruise with Glider

a.	Airspeed	Maintain glider towing speed
b.	Flight	Straight, without abrupt maneuvers or steep turns (max. bank angle 30°)
c.	MFD	Monitor the glider position

4.21.6 Glider Release

a.	Towed glider	Give sign to release (via radio or by other appropriate means)
b.	MFD	Monitor the glider position
c.	After release	Perform descending turn to the opposite side than the released glider

4.21.7 Approach with Tow Rope

a.	Airspeed	130 – 140 IAS / 70 – 75 KIAS
b.	During approach	Observe all aircraft limitations according to the POH, beware of the hanging rope, avoid sudden changes of modes or steep turns and low flying above the terrain

WARNING

Do not fly low above terrain with attached tow rope. Be aware that persons or objects may be hit or tangled by the tow rope!

4.21.8 Tow Rope Drop

a.	Place of assumed drop	Check suitability (clear area, no persons)
b.	On final approach	Adjust the descent so that the altitude of 164 ft / 50 m AGL will be achieved in the place of assumed tow rope drop
c.	**TOW RELEASE**	PULL repeatedly, verify the tow rope has been released
d.	MFD	Check release of tow rope

WARNING

Always ensure that the place of assumed tow rope drop is clear, with no persons in the vicinity!

4.21.9 Landing with Tow Rope

Landing approach is conducted at a small glide slope angle due to the long distance of the float before touchdown. Avoid any obstacles before the touchdown area.

WARNING

Be aware that persons or objects may be hit or tangled by the tow rope!

WARNING

Landing with the tow-rope attached is only allowed if the final approach area is clear of obstacles and persons!

4.21.10 Shutdown

In addition:

a.	**CAMERA** switch	OFF

Chapter 5 PERFORMANCE

5.4 Takeoff Distance

Associated conditions:	
Weight	600 kg / 1323 lb
CG	Most FWD at MTOW
Flaps	**FLAPS 1** (15°)
Engine power	Max. takeoff
Procedure	Normal takeoff
Wind	Zero
Runaway slope	Zero
Speed V_{LOF}	80 IAS / 43 KIAS
Speed V_{50}	100 IAS / 54 KIAS

Example:	
Pressure altitude	2000
Outside air temperature	15 °C
Runway	Paved (dry asphalt)
Tailwind	2 knots
Takeoff ground roll	568 ft / 173 m
Distance over 50 ft (15 m) obstacle	1098 ft / 335 m

NOTE

Poor maintenance condition of the aircraft, deviation from the given procedures as well as unfavourable outside conditions (rain, unfavourable wind conditions, including crosswind) could increase the takeoff distance considerably.

RWY surface:			**PAVED (dry asphalt)**				**NON - PAVED (dry grass)**			
ISA conditions			**Ground roll**		**Takeoff distance over 50 ft (15 m)**		**Ground roll**		**Takeoff distance over 50 ft (15 m)**	
Pressure altitude	**Δ OAT ISA**	**OAT**								
ft	**°C**	**°C**	**ft**	**m**	**ft**	**m**	**ft**	**m**	**ft**	**m**
SL	-30	-15	358	109	693	211	403	123	751	229
	-20	-5	386	118	747	228	435	132	810	247
	-10	5	416	127	804	245	468	143	871	266
	0	**15**	**446**	**136**	**863**	**263**	**502**	**153**	**935**	**285**
	10	25	478	146	924	282	537	164	1001	305
	20	35	510	156	987	301	574	175	1069	326
	30	45	544	166	1052	321	612	187	1140	347
2000	-30	-19	402	122	777	237	452	138	842	257
	-20	-9	434	132	839	256	488	149	909	277
	-10	1	467	142	904	275	526	160	979	298
	0	**11**	**502**	**153**	**971**	**296**	**565**	**172**	**1052**	**321**
	10	21	538	164	1040	317	605	184	1127	344
	20	31	575	175	1112	339	647	197	1205	367
	30	41	614	187	1187	362	690	210	1286	392

Influence of wind: - Add **5%** to table distances for each **1 knots** tailwind up to **10 knots**.

RWY surface:			PAVED (dry asphalt)				NON - PAVED (dry grass)			
ISA conditions			Ground roll		Takeoff distance over 50 ft (15 m)		Ground roll		Takeoff distance over 50 ft (15 m)	
Pressure altitude	Δ OAT ISA	OAT								
ft	°C	°C	ft	m	ft	m	ft	m	ft	m
	-30	-23	451	138	873	266	508	155	946	288
	-20	-13	488	149	944	288	549	167	1023	312
	-10	-3	526	160	1018	310	592	180	1103	336
4000	**0**	**7**	**566**	**172**	**1094**	**334**	**637**	**194**	**1186**	**361**
	10	17	607	185	1174	358	683	208	1272	388
	20	27	650	198	1256	383	731	223	1361	415
	30	37	693	211	1341	409	780	238	1453	443
	-30	-27	507	155	981	299	571	174	1063	324
	-20	-17	549	167	1063	324	618	188	1151	351
	-10	-7	593	181	1147	350	667	203	1243	379
6000	**0**	**3**	**639**	**195**	**1235**	**376**	**718**	**219**	**1338**	**408**
	10	13	686	209	1326	404	771	235	1437	438
	20	23	734	224	1420	433	826	252	1539	469
	30	33	785	239	1518	463	883	269	1645	501
	-30	-31	572	174	1105	337	643	196	1198	365
	-20	-21	620	189	1198	365	697	212	1299	396
	-10	-11	670	204	1295	395	753	230	1404	428
8000	**0**	**-1**	**722**	**220**	**1396**	**425**	**812**	**247**	**1513**	**461**
	10	9	776	236	1500	457	873	266	1626	495
	20	19	832	253	1608	490	936	285	1743	531
	30	29	890	271	1720	524	1001	305	1864	568
	-30	-35	645	197	1248	380	726	221	1352	412
	-20	-25	700	213	1355	413	788	240	1468	447
	-10	-15	758	231	1466	447	853	260	1589	484
10000	**0**	**-5**	**818**	**249**	**1582**	**482**	**920**	**280**	**1714**	**522**
	10	5	880	268	1702	519	990	302	1844	562
	20	15	944	288	1826	557	1062	324	1979	603
	30	25	1011	308	1955	596	1137	347	2119	646

Influence of wind: - Add **5%** to table distances for each **1 knots** tailwind up to **10 knots**.

5.5 Rate of Climb

Associated conditions:	
Weight	600 kg / 1323 lb
CG	Most FWD at MTOW
Flaps	**FLAPS 0** (0°)
Engine power	Max. takeoff

Example:	
Pressure altitude	6000 ft
Outside air temperature	-7 °C
Climb speed	127 IAS / 69 KIAS
Rate of climb	836 fpm

Pressure altitude	**Climb speed**		**Rate of climb (fpm)**						
ft	**IAS**	**KIAS**	**ISA - 30°C**	**ISA - 20°C**	**ISA - 10°C**	**ISA**	**ISA + 10°C**	**ISA + 20°C**	**ISA + 30°C**
SL	**127**	**69**	1287	1255	1223	**1190**	1157	1123	1089
2000	**127**	**69**	1160	1127	1094	**1060**	1026	991	956
4000	**127**	**69**	1033	1000	966	**931**	896	861	825
6000	**127**	**69**	906	871	836	**801**	765	729	692
8000	**127**	**69**	778	743	707	**671**	634	597	559
10000	**127**	**69**	652	616	579	**542**	504	466	427

Best angle of climb airspeed V_X (at SL)	**104 IAS**	**57 KIAS**
Rate of climb at V_X (at SL)	**1127 fpm**	
Best rate of climb airspeed V_Y (at SL)	**127 IAS**	**69 KIAS**
Rate of climb at V_Y (at SL)	**1190 fpm**	

5.6 Cruise Performance and Fuel Consumption

Associated conditions:	
Weight	600 kg / 1323 lb
Flaps	**FLAPS 0** (0°)
Winds	Zero

Example:	
Cruise pressure altitude	6000 ft
Engine speed	5500 rpm
MAP	21.1 inHg
Airspeed	185 IAS / 181 CAS / 198 TAS
Fuel consumption	19.0 l/h 5.0 U. S. gal/h

Pressure altitude	**Engine speed**	**Airspeed**			**MAP**	**Fuel consumption**	
ft	**rpm**	**IAS**	**CAS**	**TAS**	**inHg**	**(l/h)**	**U. S. gal/h**
2000	**5 500**	229	221	228	27.1	27.8	7.3
		218	211	217	26.1	22.8	6.0
		207	201	207	25.1	20.9	5.5
		195	190	196	24.1	18.9	5.0
		184	180	185	23.1	17.9	4.7
4000	**5 500**	219	212	225	25.1	25.8	6.8
		207	201	214	24.1	22.8	6.0
		196	191	202	23.1	19.8	5.2
		184	180	191	22.1	17.8	4.7
		171	169	179	21.1	16.8	4.4
6000	**5 500**	209	203	222	23.1	26.0	6.8
		197	191	209	22.1	21.0	5.5
		185	181	198	21.1	19.0	5.0
		173	170	186	20.1	18.0	4.7
8000	**5 500**	199	194	219	21.3	24.0	6.3
		184	180	203	20.0	18.0	4.7
		173	170	192	19.0	16.0	4.2
10000	**5 500**	191	186	216	20.1	22.0	5.8
		181	177	206	19.1	19.0	5.0
		168	166	193	18.1	17.0	4.5

Associated conditions:

Weight	600 kg / 1323 lb
Flaps	**FLAPS 0** (0°)
Winds	Zero

Example:

Cruise pressure altitude	6000 ft
Engine speed	5500 rpm
MAP	21.1 inHg
Airspeed	100 KIAS / 98 KCAS / 107 KTAS
Fuel consumption	19.0 l/h 5.0 U. S. gal/h

Pressure altitude	Engine speed	Airspeed			MAP	Fuel consumption	
ft	rpm	KIAS	KCAS	KTAS	inHg	(l/h)	U. S. gal/h
2000	**5 500**	124	119	123	27.1	27.8	7.3
		118	114	117	26.1	22.8	6.0
		112	109	112	25.1	20.9	5.5
		105	103	106	24.1	18.9	5.0
		99	97	100	23.1	17.9	4.7
4000	**5 500**	118	114	121	25.1	25.8	6.8
		112	109	115	24.1	22.8	6.0
		106	103	109	23.1	19.8	5.2
		99	97	103	22.1	17.8	4.7
		93	91	97	21.1	16.8	4.4
6000	**5 500**	113	110	120	23.1	26.0	6.8
		106	103	113	22.1	21.0	5.5
		100	98	107	21.1	19.0	5.0
		93	92	100	20.1	18.0	4.7
8000	**5 500**	108	105	118	21.3	24.0	6.3
		99	97	110	20.0	18.0	4.7
		93	92	104	19.0	16.0	4.2
10000	**5 500**	103	100	117	20.1	22.0	5.8
		97	96	111	19.1	19.0	5.0
		91	90	104	18.1	17.0	4.5

5.9 Towing Operation

Takeoff distance 1640 ft / 500 m when taking off from dry, level, hard surface at sea level (ISA conditions), is achieved at following conditions:

Tow aircraft crew – 1 person:

Maximum tow aircraft weight **490 kg / 1080 lb**.

Maximum glider weight according to the table for selected towing speed at takeoff (up to 50 ft / 15 m).

Towing speed at takeoff		Maximum glider weight	
IAS	KIAS	kg	lb
110	59	545	1202
115	62	422	930
120	65	310	683

Tow aircraft crew – 2 persons, training only:

Maximum tow aircraft weight **580 kg / 1278 lb**.

Maximum glider weight **380 kg / 838 lb** for towing speed **115 IAS / 62 KIAS** at takeoff (up to 50 ft / 15 m).

WARNING

Do not exceed the maximum weight of tow aircraft!

WARNING

Do not exceed the maximum weight of glider for selected towing speed at takeoff!

CAUTION

Takeoff distance 1640 ft / 500 m limited by certification basis is achieved by limiting of tow aircraft and glider takeoff weight. Increasing of towing speed at takeoff will result in increasing of takeoff distance!

NOTE

Operating weight and forward CG limits are restricted for towing operation.

NOTE

During the flight testing the rate of climb 430 fpm (2.1 m/s) has been demonstrated for 490 kg tow aircraft and 600 kg glider (Duo Discus XLT), altitude 1400 ft (ISA conditions),
V_T = 110 IAS / 59 KIAS.

Chapter 6 WEIGHT AND BALANCE AND EQUIPMENT LIST

6.4.1 Aircraft Weight and CG Limits

In addition:

For towing operation is forward CG limited as follows:

	Metric Units	U. S. Standard Units
Forward CG (operating limit for towing operation)	2.730 m (20.5 %MAC) at 500.0 kg with straight line taper to 2.783 m (25.0 %MAC) at 600.0 kg	107.48 in (20.5 %MAC) at 1103 lb with straight line taper to 109.57 in (25.0 %MAC) at 1323 lb

NOTE

Operating weight and forward CG limits are restricted for towing operation.

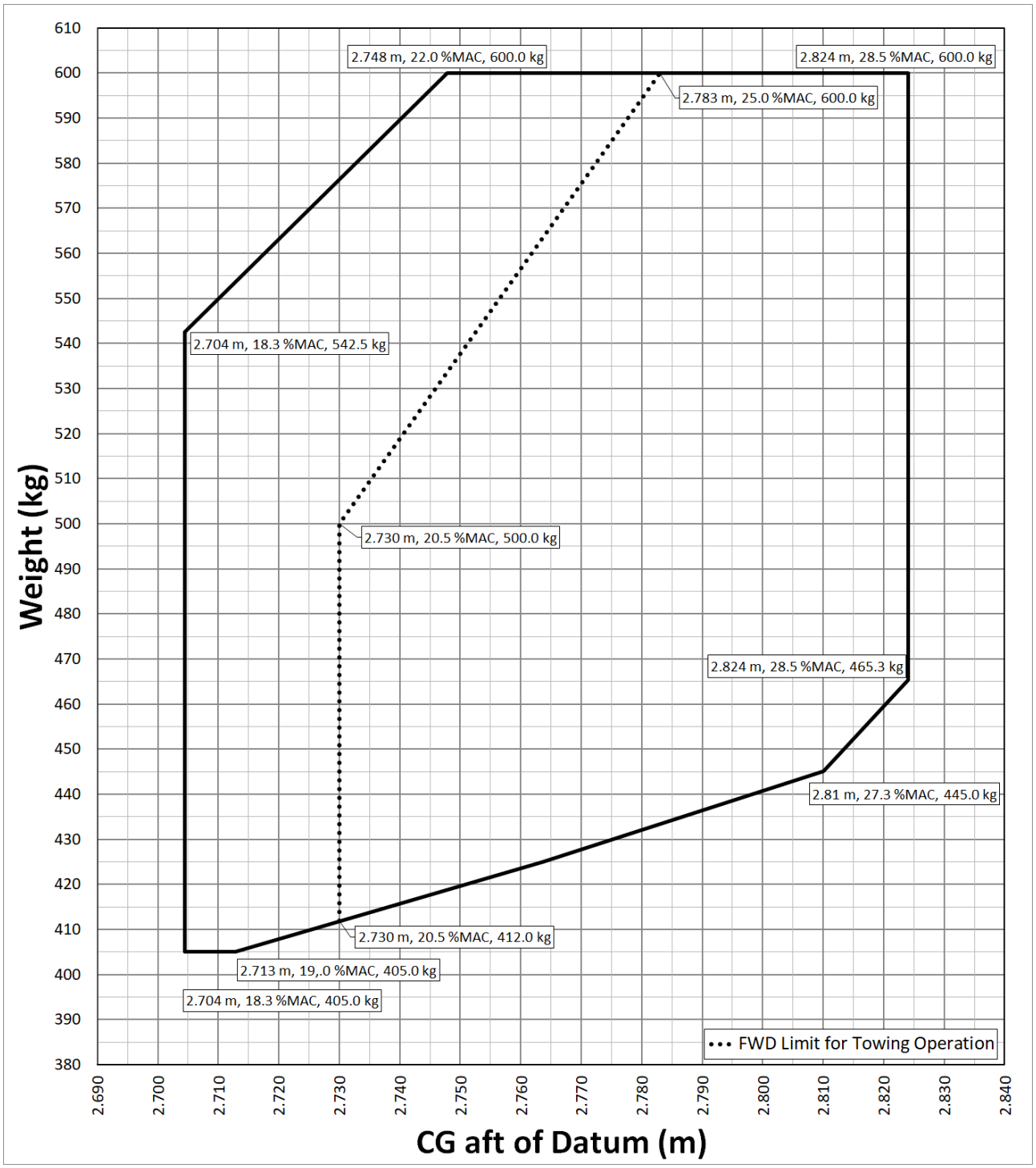


Fig. 6-1 Operating Weight /CG limit for towing operation – Metric Units

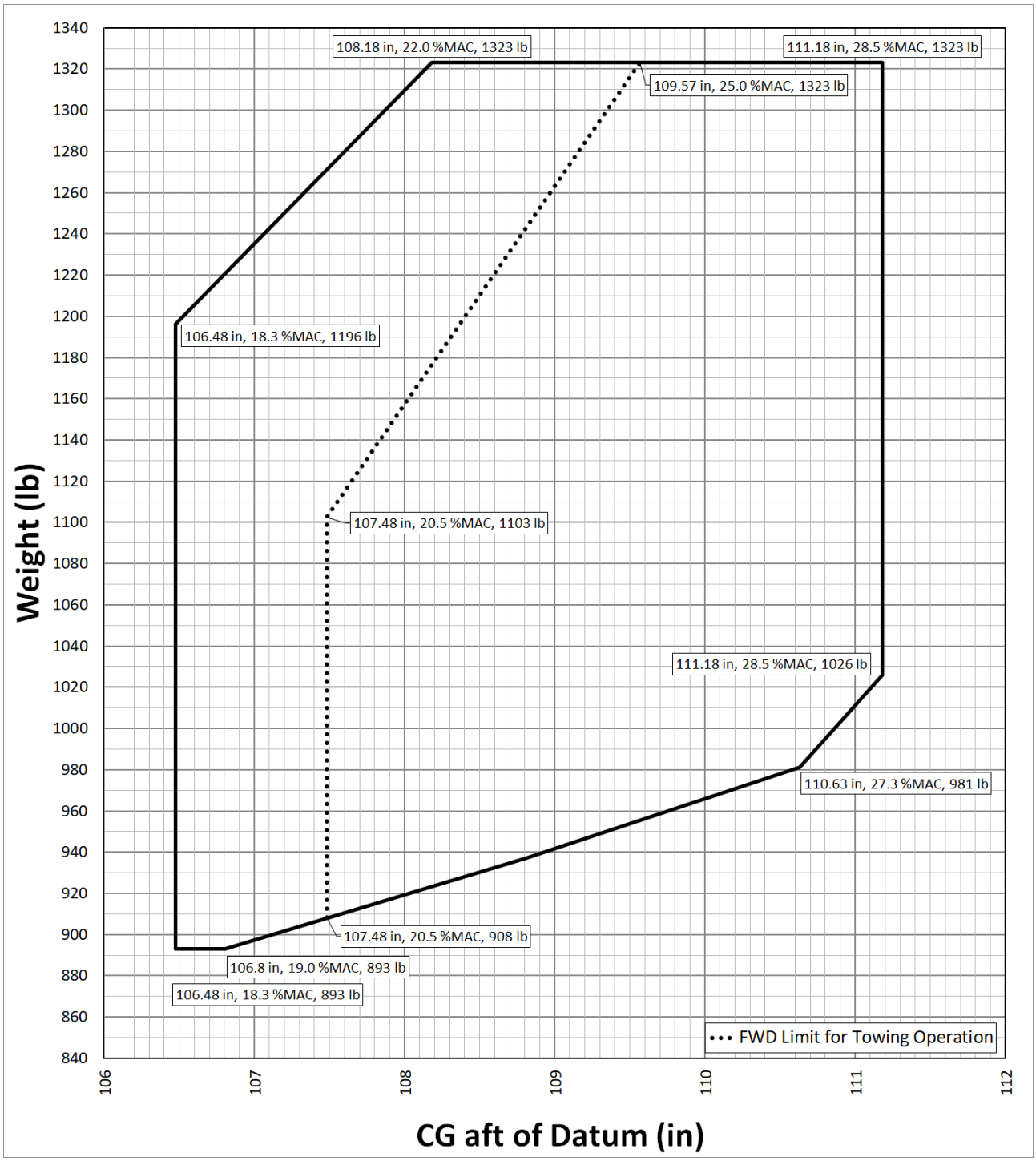


Fig. 6-2 Operating Weight /CG limit for towing operation – U. S. Standard Units

6.6 Weight and Moment Limits Charts

6.6.1 Metric Units

NOTE

Operating weight and forward CG limits are restricted for towing operation.

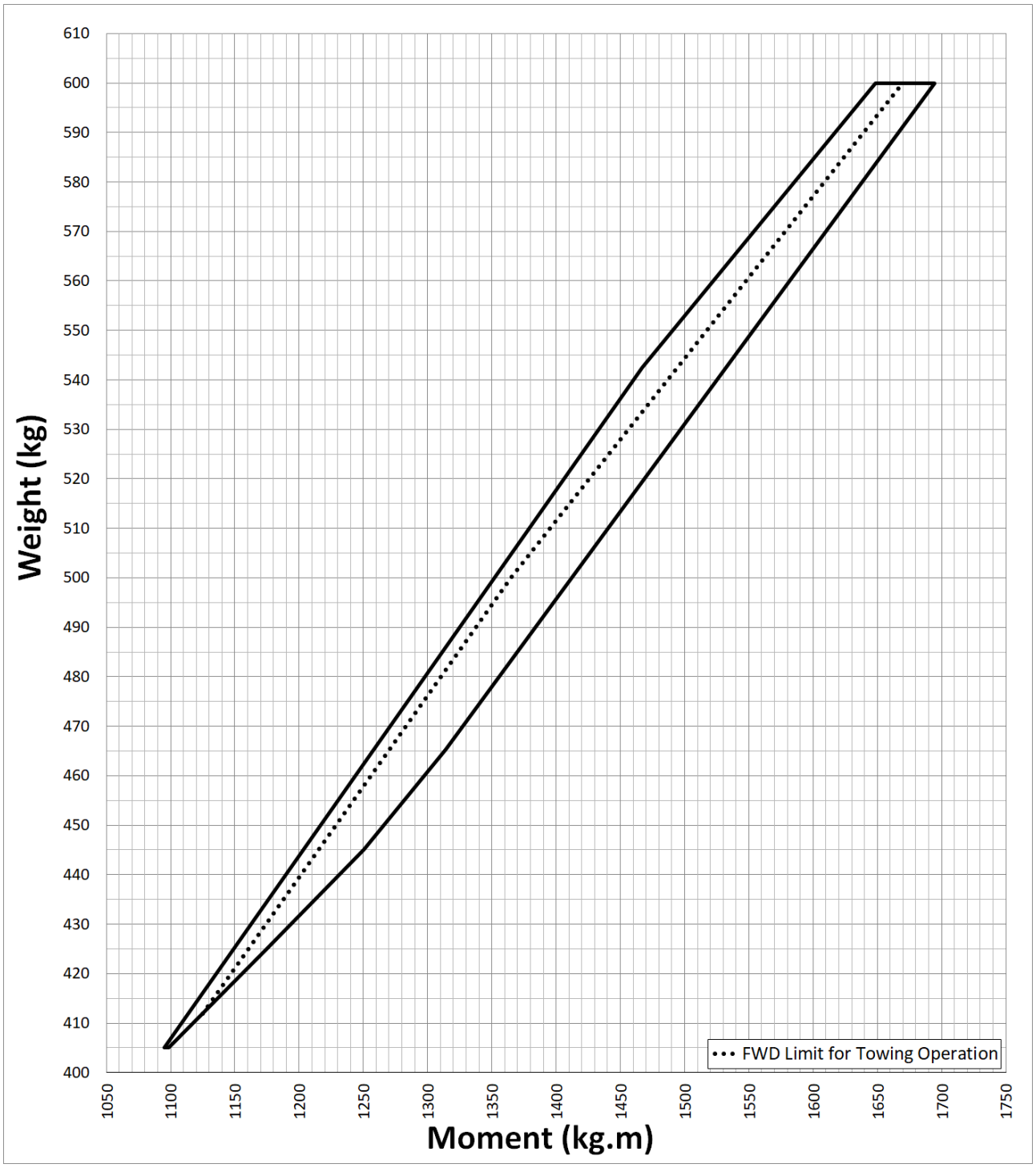


Fig. 6-3 Operating weight and moment chart – Metric Units

6.6.1 U. S. Standard Units

NOTE

Operating weight and forward CG limits are restricted for towing operation.

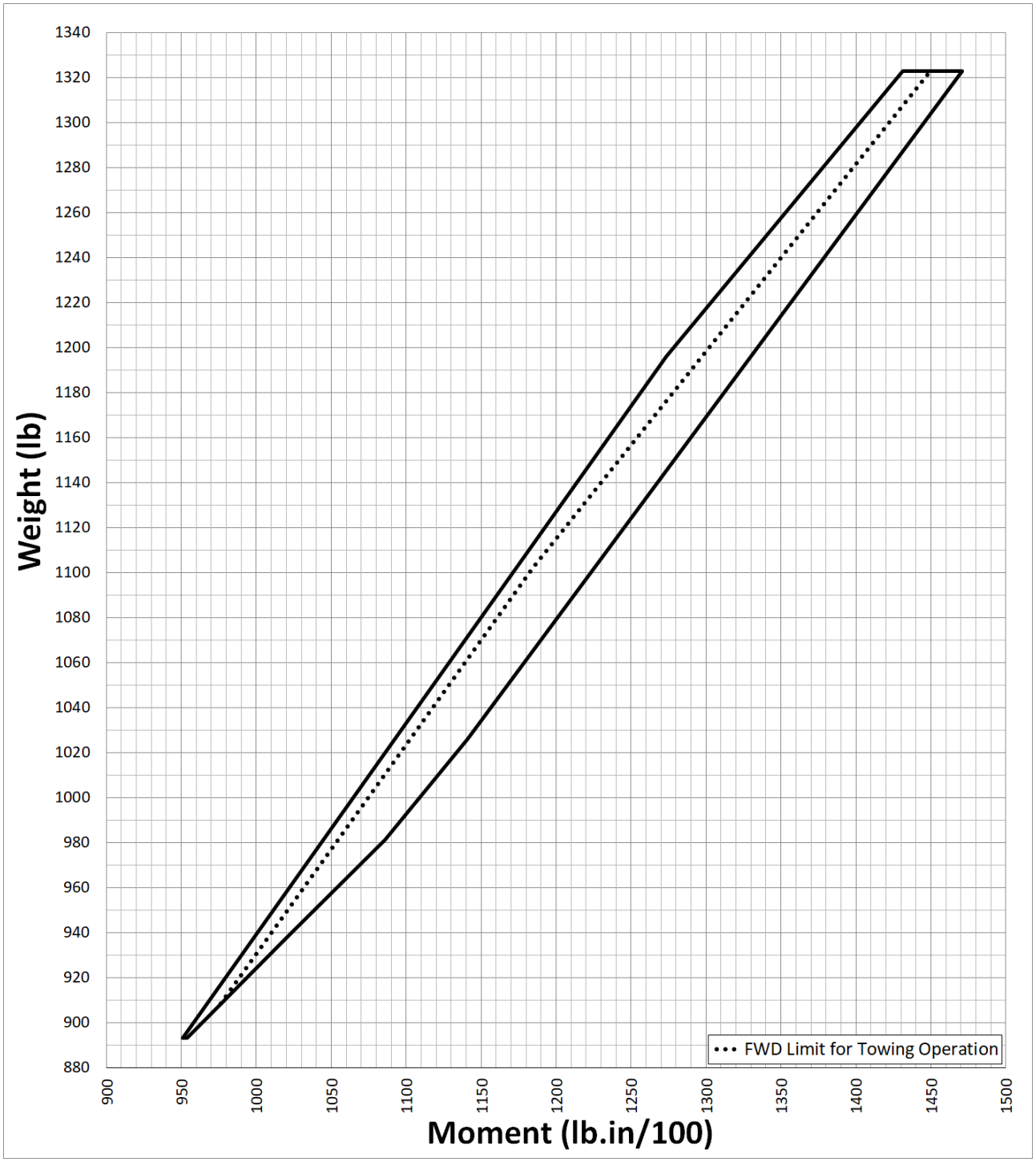
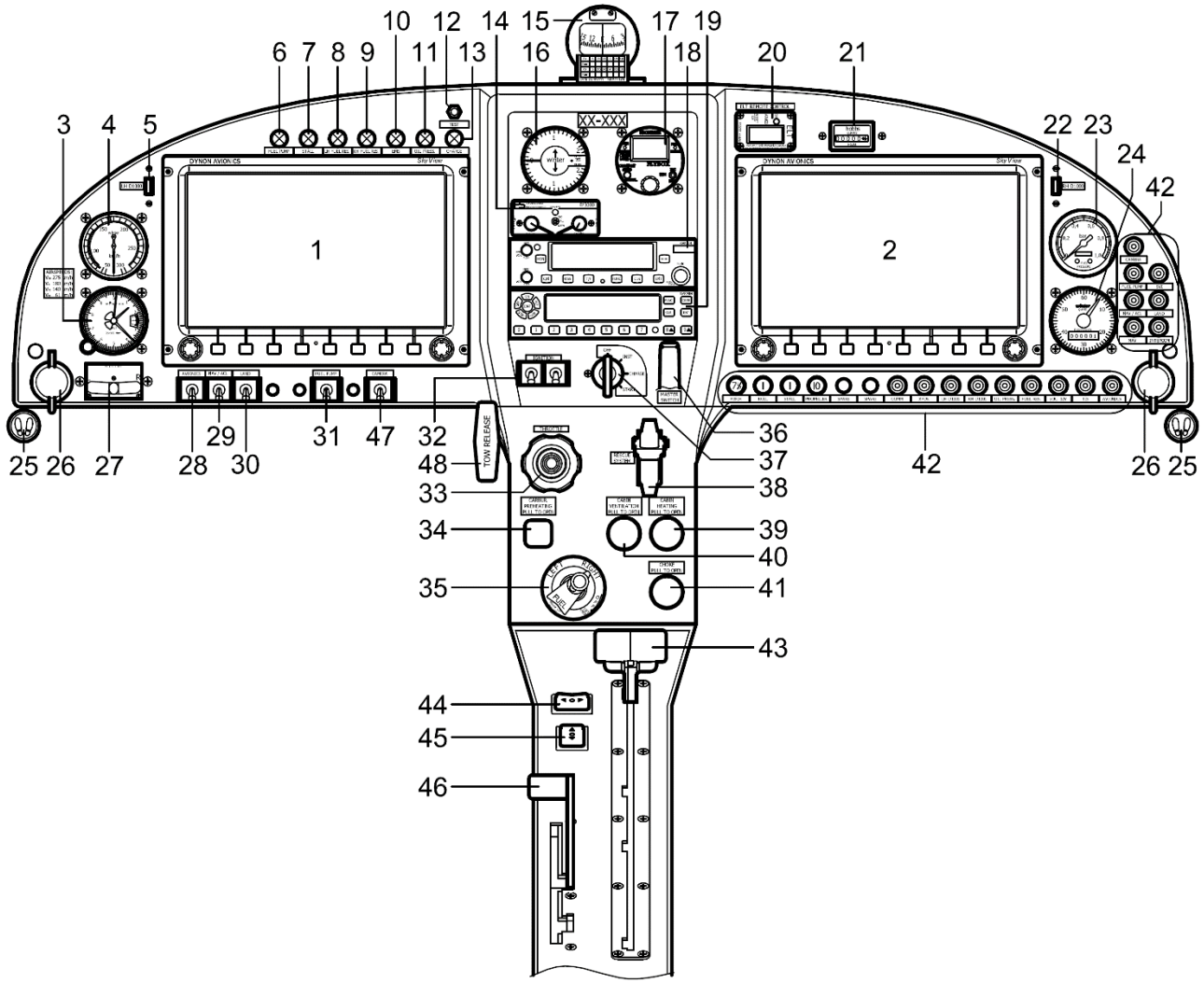


Fig. 6-4 Operating weight and moment chart – U. S. Standard Units

Chapter 7 DESCRIPTION OF AIRCRAFT AND SYSTEMS

7.4 Flight Deck Arrangement

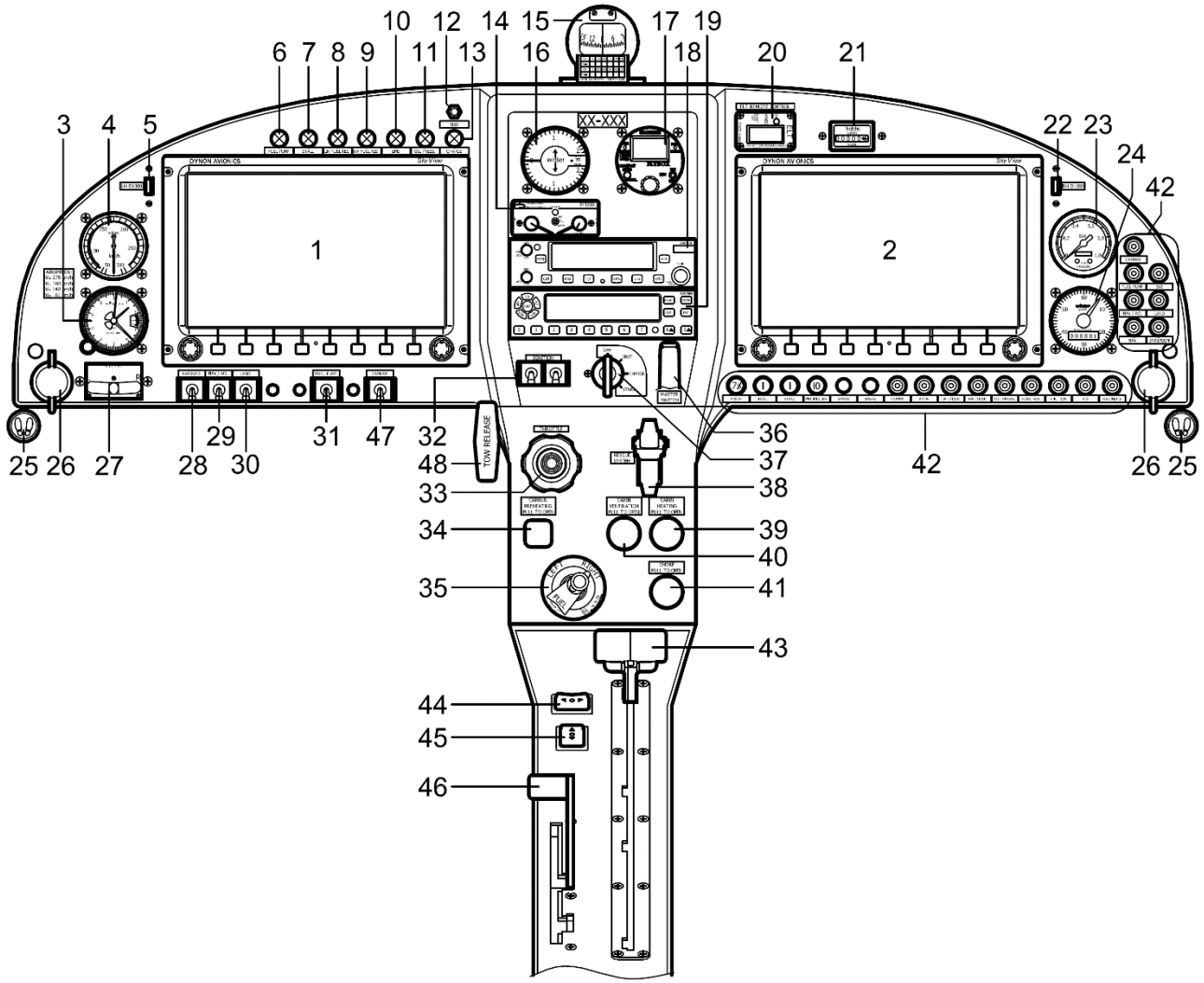
The instrument panel is glass/carbon composite construction attached to the center tunnel and both sides of fuselage. In the middle, the top edge is supported with a composite strut. Glare shield overlaps the instrument panel to limits undesirable reflections on instruments. The instrument panel is divided into three sections: left, center and right. Controls are also installed on the center console and pedestal panel. On both the left and right side under the instrument panel there are remote controls for adjustment of rudder pedals. The instrument panel is arranged primarily for use by the pilot sitting in the left seat (Fig. 7-1).



1.	PFD Dynon SkyView SV-D1000	10.	**EMS** warning lamp
2.	MFD Dynon SkyView SV-D1000	11.	**OIL PRESS.** warning lamp
3.	Standby altimeter*	12.	Lamps and stick shaker **TEST** button
4.	Standby airspeed indicator*	13.	**CHARGE** warning lamp
5.	USB connector (**LH-D1000**)	14.	Intercom*
6.	**FUEL PUMP** control lamp	15.	Magnetic compass*
7.	**STALL** warning lamp	16.	Standby variometer*
8.	**LH FUEL RES.** warning lamp - left tank	17.	Propeller regulator*
9.	**RH FUEL RES.** warning lamp - right tank	18.	Radio*

** For actual installed equipment, see Chapter 9, Supplement No. 001.*

Fig. 7-1 *Instrument panel layout (page 1 of 2)*



19.	Transponder*	34.	**CARBUR. PREHEATING** controller
20.	ELT remote control	35.	**FUEL** selector*
21.	Engine hours counter*	36.	**MASTER SWITCH**
22.	USB connector (**RH-D1000**)	37.	Starter key
23.	Standby fuel pressure indicator*	38.	**RESCUE SYSTEM** actuator
24.	Flying hours counter*	39.	**CABIN HEATING** control
25.	Pedal's adjustment handle	40.	**CABIN VENTILATION** control
26.	12 V / 10 A power outlet	41.	**CHOKE** control
27.	Standby slip indicator*	42.	Circuit breakers (see 7.4.3)
28.	**AVIONICS** switch	43.	**FLAPS** control
29.	**NAV / ACL** lights switch	44.	**ROLL** trim control
30.	**LAND** lights switch	45.	**PITCH** trim control
31.	**FUEL PUMP** switch	46.	Brake lever
32.	**IGNITION** switches	47.	Rear-view **CAMERA** switch
33.	**THROTTLE** controller	48.	Tow release handle

** For actual installed equipment, see Chapter 9, Supplement No. 001.*

Fig. 7-1 *Instrument panel layout (page 2 of 2)*

7.4.1 Left Section of Instrument Panel

PFD Dynon SkyView SV-D1000 is installed in the middle of the left section. The PFD is landscape oriented intended to primary displays the flight information. There is also a USB connector on the left side of PFD labelled **LH D1000** that is intended to import flight plans and export logs.

In this section, the following standby instruments are installed: airspeed indicator, altimeter and slip indicator.

Under the PFD in the right lower corner of left section are switches **AVIONICS**, **NAV / ACL** (navigation lights / anti-collision), **LAND** (landing lights), **FUEL PUMP** and **CAMERA**.

Above the PFD is an area for control and warning lamps **FUEL PUMP**, **STALL**, **LH FUEL RES.**, **RH FUEL RES.**, **EMS**, **OIL PRESS.** and **CHARGE.** This area includes also **TEST** button for the check of lamp's and stick shaker's function.

In the left lower corner 12 V / 10 A power socket output is located.

CAUTION

The USB connector is not intended for charging devices!

The power socket is intended for power supply of external devices only!

NOTE

For complete operating procedures of appropriate equipment refer to OEM manuals.

7.4.2 Center Section of Instrument Panel

In the center section there are installed transponder, radio, intercom, standby variometer and propeller regulator.

At the top of center section on the glare shield there is installed standby magnetic compass.

At the bottom of center section there are installed **IGNITION** switches, keyed ignition switch and **MASTER SWITCH**.

NOTE

For complete operating procedures of appropriate equipment refer to OEM manuals.

7.4.3 Right Section of Instrument Panel

MFD Dynon SkyView SV-D1000 is installed in the middle of right section. The MFD is landscape oriented intended to primary display the engine information. There is also a USB connector on the right side of MFD labelled **RH D1000** that is intended to import flight plans and export logs.

In this section is installed standby fuel pressure indicator, flying hours counter and Engine Hours Counter.

Remote control of the Emergency Locator Transmitter (ELT) is located above the MFD.

Circuit breakers are placed in a row at the lower and right side of right section. A list of circuit breakers with protected instruments is shown in the table below.

In the right lower corner 12 V / 10 A power socket output is located.

CAUTION

The USB connector is not intended for charging devices!

The power socket is intended for power supply of external devices only!

NOTE

For complete operating procedures of appropriate equipment refer to OEM manuals.

Marking	Protected instrument
PITCH	Pitch trim actuator
ROLL	Roll trim actuator
STALL	Stall warning system
PROPELLER	Propeller regulator
SPARE	-
SPARE	-
COMM	Radio (COMM)
XPDR	Transponder
LH D1000	PFD (LH Dynon SkyView SV-D1000)
RH D1000	MFD (RH Dynon SkyView SV-D1000)
OIL PRESS.	Low oil pressure warning
FUEL RES.	Low fuel level warning
SOC. 12V	LH and RH socket 12 V / 10 A
TIS	Traffic sensor
AVIONICS	Avionics relay
CAMERA	Rear-view camera system
FUEL PUMP	Fuel pump
SVI	Engine hours counter Flight hours counter
NAV / ACL	Navigation and Anti-collision lights
LAND	Landing lights
NAV	Radio (NAV)
INTERCOM	Intercom

7.4.4 Center Console and Pedestal Panel

The center console is located under the instrument panel and contains the following controls:

- Tow release handle labelled **TOW RELEASE**
- Throttle control labelled **THROTTLE**
- Emergency parachute system actuator labelled **RESCUE SYSTEM**
- Carburetor preheating control labelled **CARBUR. PREHEATING PULL TO OPEN**
- Cabin venting control labelled **CABIN VENTILATION PULL TO OPEN**
- Cabin heating control labelled **CABIN HEATING PULL TO OPEN**
- **FUEL** selector
- Choke control labelled **CHOKE PULL TO OPEN**

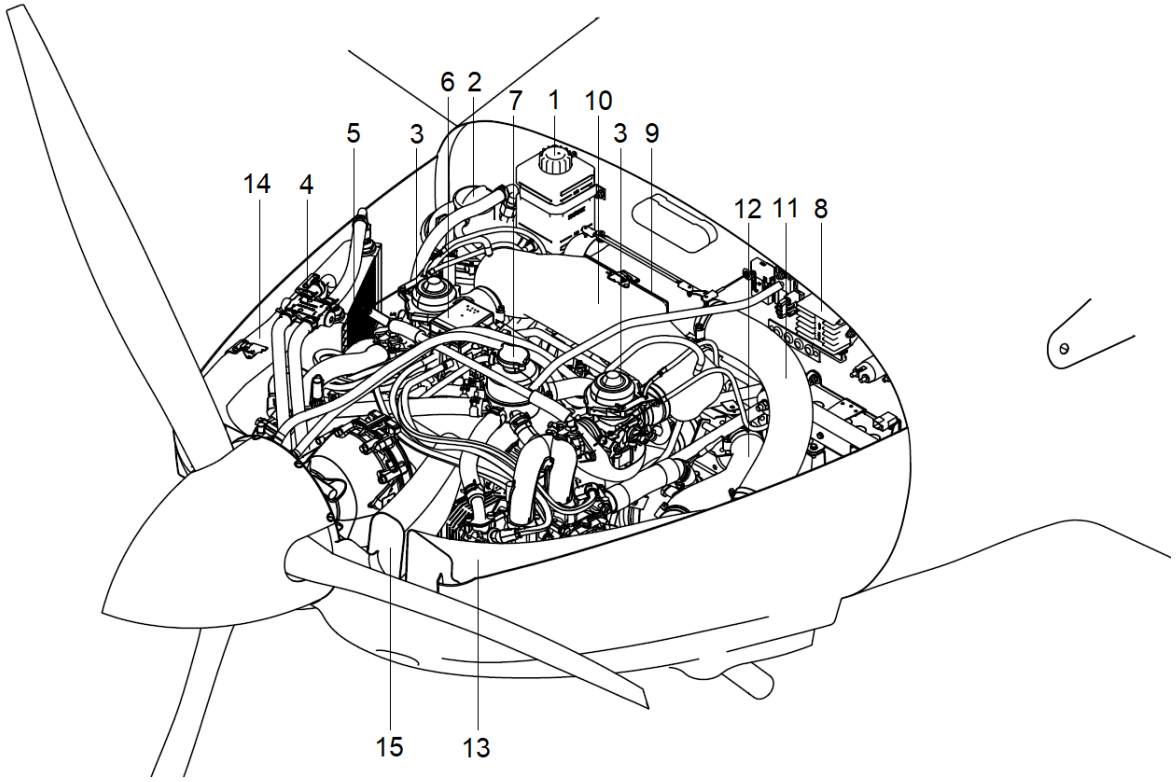
The pedestal panel is located between pilot and co-pilot and contains the following controls:

- Wing flap control with positions **FLAPS 0**, **FLAPS 1**, **FLAPS 2** and **FLAPS 3**
- Roll trim control labelled **ROLL**
- Pitch trim control labelled **PITCH**
- Brake lever with positions **PARK** and **MAX**

7.14 ENGINE

Aircraft is powered by a 4 cylinder, horizontally opposed, air and water cooled, carburetor 4-stroke engine ROTAX 912 ULS2 with maximum takeoff power 73.5 kW (100 hp) at 5800 rpm (7-2). Major accessories include gearbox, starter, dual capacitor discharge ignition, alternator, engine driven fuel pump and oil filter mounted on the left side of engine block.

Engine is attached to the airframe by means of a metal tube engine mount through the rubber engine mounts.



1.	Overflow bottle	9.	Air filter
2.	Oil tank	10.	Airbox
3.	Carburetor	11.	Engine air intake hose
4.	Oil thermostat	12.	Cabin venting air hose
5.	Oil cooler	13.	Ram air tunnel
6.	Ignition	14.	Oil cooler holder
7.	Expansion tank	15.	Cooling air distributor
8.	Regulator	-	-

Fig. 7-2 *Engine installation components*

WARNING

Never run the engine without propeller! This inevitably causes engine damage and is an explosion hazard!

NOTE

For more details refer to OPERATORS MANUAL FOR ROTAX ENGINE TYPE 912 SERIES, Doc. No. OM-912, latest edition.

7.14.2 Cooling System

The engine has both a water and an air cooling system.

The water cooling system consists of a water radiator installed in the lower engine cowling. The system is equipped with a water thermostat that keeps the coolant temperature in optimum range.

The air intakes to cool the engine compartment are located on the upper engine cowling and on the left side from spinner. The cooling air from spinner left side is distributed directly to the cylinders by means of cooling air distributor. Cooling air baffled in the engine compartment discharges under the aircraft.

WARNING

Never check the coolant level when the engine is hot! Always let the engine cool down to ambient temperature!

7.15 Propeller

The aircraft is equipped with a certified propeller KW-31 (EASA.P.177). It is a 3-bladed in-flight electrically adjustable propeller with diameter 1.726 m (67.95 in). The propeller blades are made of a wooden composite with the blade leading edges covered by a wear-resistant material. Blades are mounted in an aluminum hub. The propeller hub is attached to a flange and base plate and fixed to the engine's propeller flange. Composite spinner is fixed to the base plate.
The angle of blades setting is adjusted by servomotor controlled from the cockpit. The propeller pitch can be adjusted smoothly in range from the minimum angle intended for takeoff up to maximum angle for cruise.

NOTE

For more details refer to "User Manual UM-05EN, Aircraft propeller, Type KW-31", latest edition.

Propeller regulator (Fig. 7-3) on the instrument panel consists of a display with the indication of the propeller blades adjusting direction, together with control LED diodes of **MIN. PITCH** and **MAX. PITCH** and also the operating mode switch **CONSTANT SPEED** or **MANUAL**. The meaning of the control LED diodes signals is:

- Green LED of adjusting the fine angle (**MIN. PITCH**):
  - Shines after reaching the min. angle.
  - Blinks when adjusting the finer angle.
- Yellow LED of adjusting the rough angle (**MAX. PITCH**):
  - Shines after reaching the stop at max. angle.
  - Blinks when adjusting the rougher angle.

The propeller regulator has also a function of a standby engine rpm indicator. The engine rpm is shown on the display.

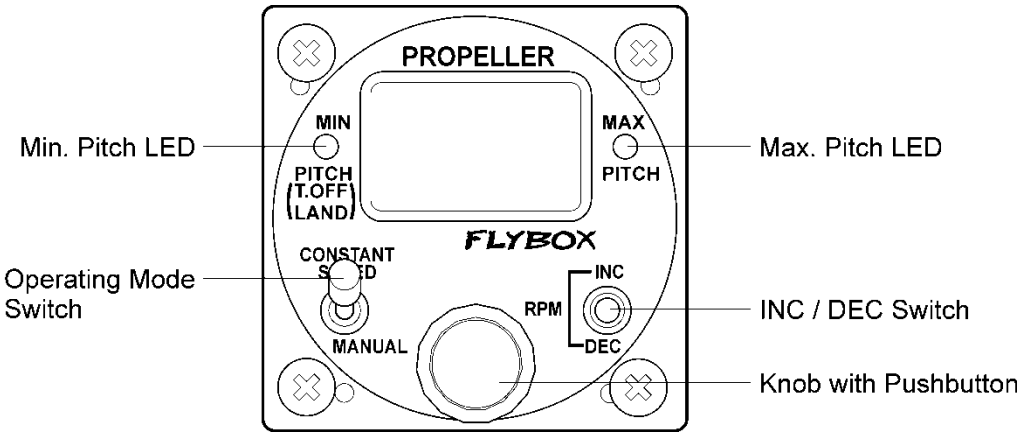


Fig. 7-3 PR1-P Propeller regulator

NOTE

For more details refer to "Propeller Regulator PR1-P, Installation and Operating Manual", Revision 2.9 17/9/2013 or later.

7.18 Electric System

The aircraft has 12 V DC system. Installation is dual-wire type.

Board network is supplied by maintenance free accumulator 12 V that is installed on firewall in the engine compartment. Network is supplied with AC generator with external rectifier regulator (12 V DC).

Circuit breakers are located at the lower and right area of instrument panel's right side.

Dual contactless ignition of the engine is a separate part of electrical installation. Each ignition circuit can be switched ON/OFF independently using corresponding switches labelled **IGNITION**.

Keyed ignition switch is connected to the accumulator through the master switch labelled **MASTER SWITCH**. It has positions **OFF** - **INST.** - **CHARGE** - **START**. In the **OFF** position, the starter is electrically isolated. In the **INST.** position are energized single value instruments (engine hours and flight hours) and fuel pump. In the **CHARGE** position also a warning lamp **CHARGE** is energized and indicates the charging status. In the **START** position, the starter is energized and will automatically return to the position **CHARGE** when released. Before repeated engine starting, it is necessary to turn the keyed ignition switch to **OFF** position first, and then to position **START**.

PFD and MFD Dynon SkyView SV-D1000 are connected through a circuit breaker directly to the **MASTER SWITCH**.

Avionics (RDST, XPDR, intercom and traffic sensor) are connected through separate circuit breakers **COMM**, **NAV**, **XPDR**, **INTERCOM** and **TIS** the avionic relay. Avionic relay is activated by separate switch **AVIONICS** and is protected by circuit breaker **AVIONICS** that is connected to the **MASTER SWITCH**.

Navigation and anti-collision lights are activated by a switch labelled **NAV / ACL** and are connected through a circuit breaker to the **MASTER SWITCH**. Landing lights are activated by a switch labelled **LAND** and are connected through a circuit breaker to the **MASTER SWITCH**.

Fuel pump is activated by a separate switch labelled **FUEL PUMP** and is connected through a circuit breaker to the **INST.** position of keyed ignition switch.

Propeller regulator is connected through a circuit breaker directly to the **MASTER SWITCH**. Propeller is power supplied and controlled by propeller regulator.

Rear-view camera is connected through a DC/DC voltage converter, switch **CAMERA** and circuit breaker to the **MASTER SWITCH**. The video signal from camera is transmitted through a video converter to the USB port of MFD.

Stall warning system consists of stick shaker handle, buzzer and warning lamp that are triggered by ACI Stall Warner (AoA flap) and Stall Warning Transducer (only buzzer and warning lamp). Stall warning system is connected through a circuit breaker to the **MASTER SWITCH**.

Function of warning lamps, control lamps, stick shaker and stall warning horn can be verified by pressing button labelled **TEST**.

12 V / 10 A sockets of an automotive type are installed at both lower corners of the instrument panel and are connected through a circuit breaker to the **MASTER SWITCH**.

Engine hours and flight hours are power supplied through a circuit breaker from the **INST.** position of keyed ignition switch.

ELT has its own battery for power supply.

Switch is ON with a lever switched UP and OFF with a lever switched DOWN (Fig. 7-4).

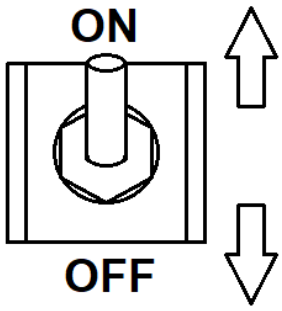


Fig.7-4 Switch ON / OFF position

7.23 Towing Equipment

The aircraft has installed equipment necessary for towing operation. Tow release system consists of:

- Tow release mechanism
- Rear-view camera (backup rear-view mirror)

The aircraft is equipped with a tow release mechanism installed in the rear section of the fuselage under the rudder (2, Fig. 7-5). It is operated by the **TOW RELEASE** handle (35, Fig. 7-1) installed on the left side of the central tunnel. **TOW RELEASE** handle is connected to the tow release mechanism by means of steel ropes.

The **TOW RELEASE** handle, when released, must be fully returned to the initial position (Fig. 7-6), otherwise there may be a problem with a tow release mechanism jamming or incorrect adjustment of tow release system.

The aircraft is equipped with a camera system for glider position monitoring. The camera is installed in the aft section of the fuselage above the tow release mechanism (1, Fig 7-5).

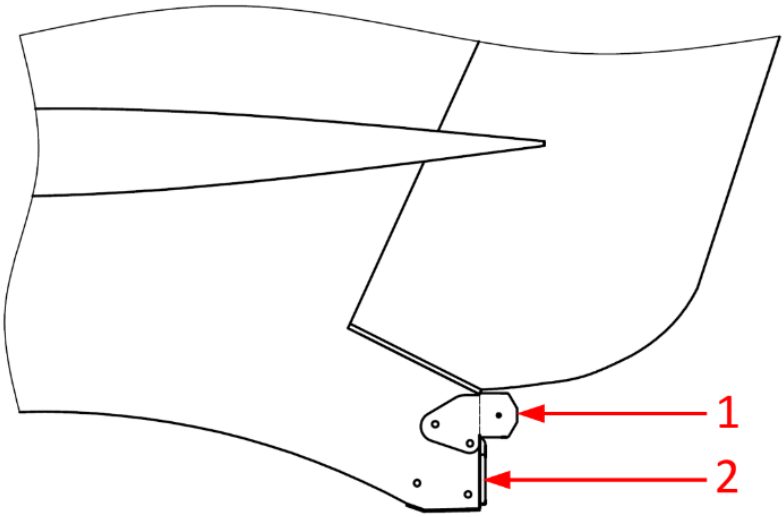
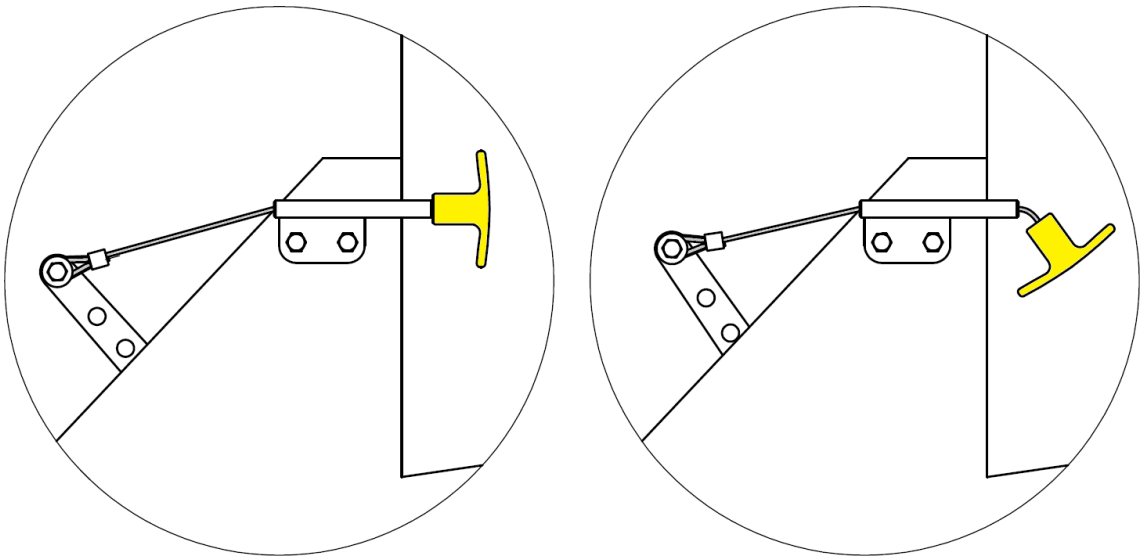


Fig. 7-5 Towing equipment



CORRECT position **WRONG** position

Fig. 7-6 Tow release handle positions

The system is activated by the **CAMERA** switch on the instrument panel (33, Fig. 7.1). To display the rear-view camera on MFD screen press **TOOLS** and then select **VIDEO**. The rear-view camera can be displayed only on the MFD.

When the rear-view camera is activated, there are available following screen layouts on the MFD:

- Fullscreen rear-view camera (Fig. 7-7)
- EFIS with compass rose / Rear-view camera (Fig. 7-8)
- EFIS with g-load indication / Rear-view camera (Fig. 7-9)
- EFIS with analogue instruments design / Rear-view camera (Fig. 7-10)
- MAP / Rear-view camera (Fig. 7-11)

Note: If g-loads (0.0 / +2.0) are exceeded, the compass rose is automatically replaced by g-load indication.

NOTE

The airspeed indicator on the screen arrangements is displayed in km/h only for illustration.

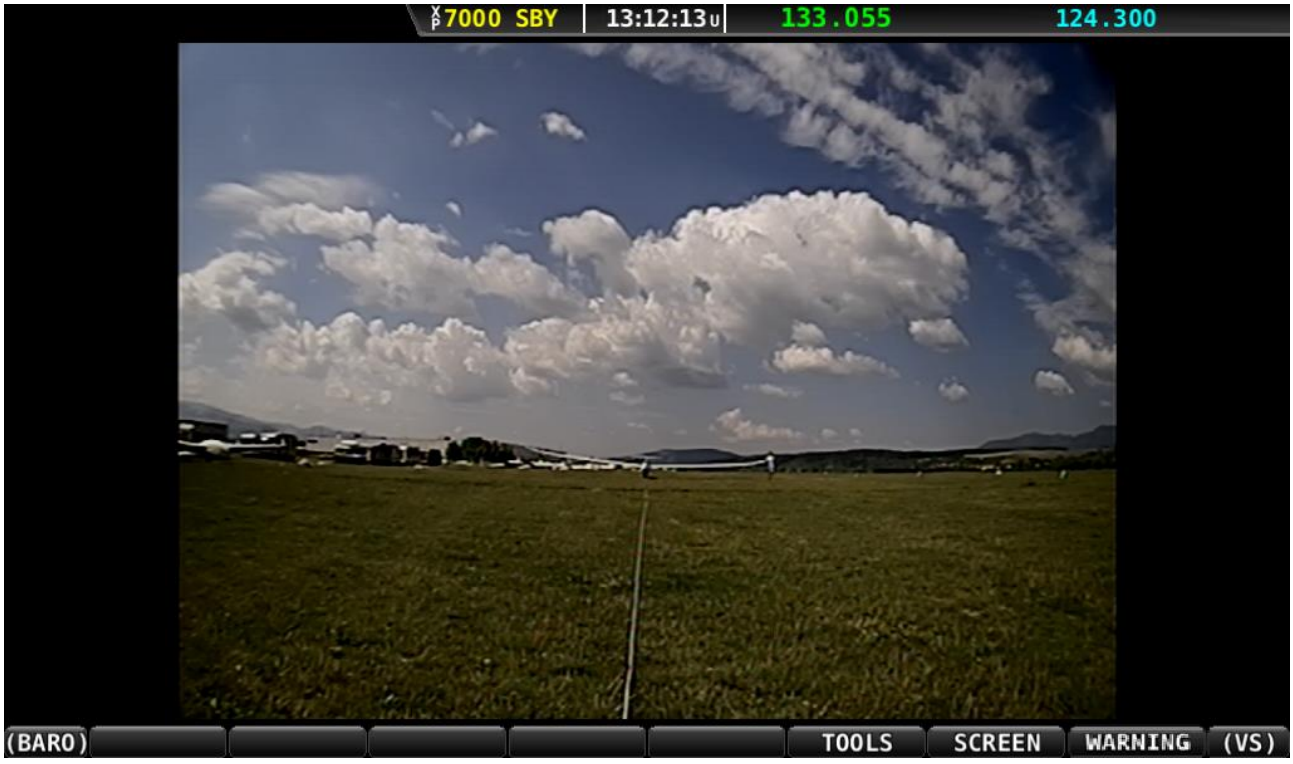


Fig. 7-7 Arrangement screen with camera view 1

Fig. 7-8 Arrangement screen with camera view 2

Fig. 7-9 Arrangement screen with camera view 3

Fig. 7-10 Arrangement screen with camera view 4

Fig. 7-11 Arrangement screen with camera view 5

NOTE

For more details refer to Dynon Avionics SkyView System Pilot's Guide, Document No. 101321-025 (revision Z or later).

The aircraft is equipped with a rear-view mirror, installed on the left side of the canopy frame. The mirror is used as a backup for glider position monitoring in case of the rear-view camera system failure.

The rear-view mirror is manually adjustable.

CAUTION

The rear-view mirror is only a backup for glider position monitoring! It does not provide the same range of visibility as the rear-view camera system!

Chapter 8 HANDLING AND SERVICING

8.5 Cleaning and Care

Cleaning the rear-view camera lens and rear-view mirror:

Clean the rear-view camera lens and rear-view mirror with a soft wet cloth to remove any dirt. Dry out the remaining moisture with a soft dry cloth.

CAUTION

Do not use a pressure washer to clean the rear-view camera lens and rear-view mirror!

Cleaning the tow release mechanism:

Remove any dirt or grass from the tow mechanism using a soft brush. Clean the outer surface with a wet cloth.

CAUTION

Do not use a pressure washer to clean the tow release mechanism!