

Diamond DA42 NG



Handout DA42 NG Systems

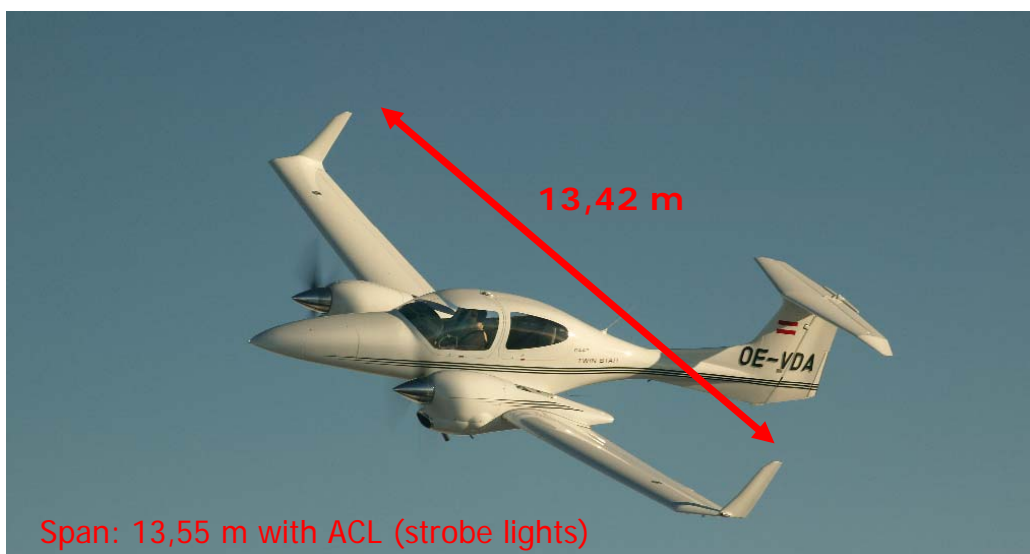
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Diamond DA42 NG

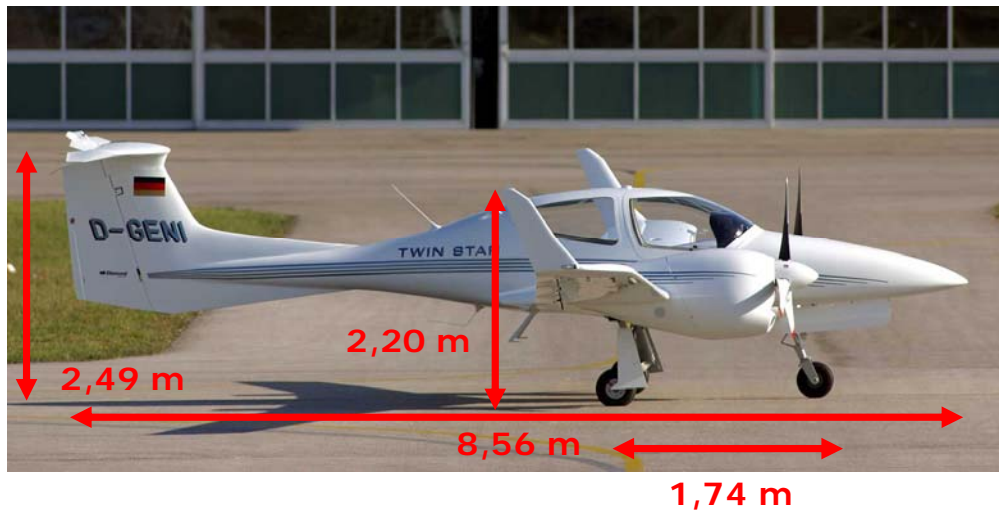


Vers. 4

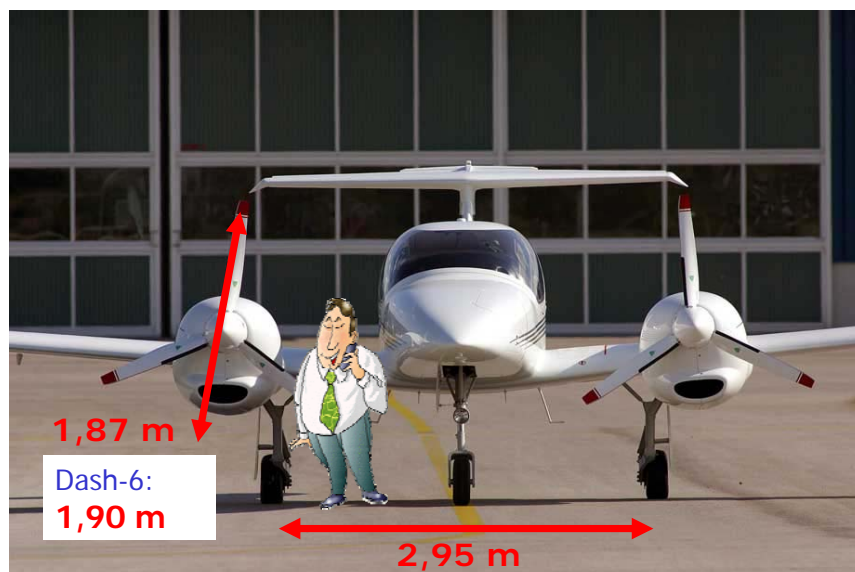
Dimensions



Dimensions



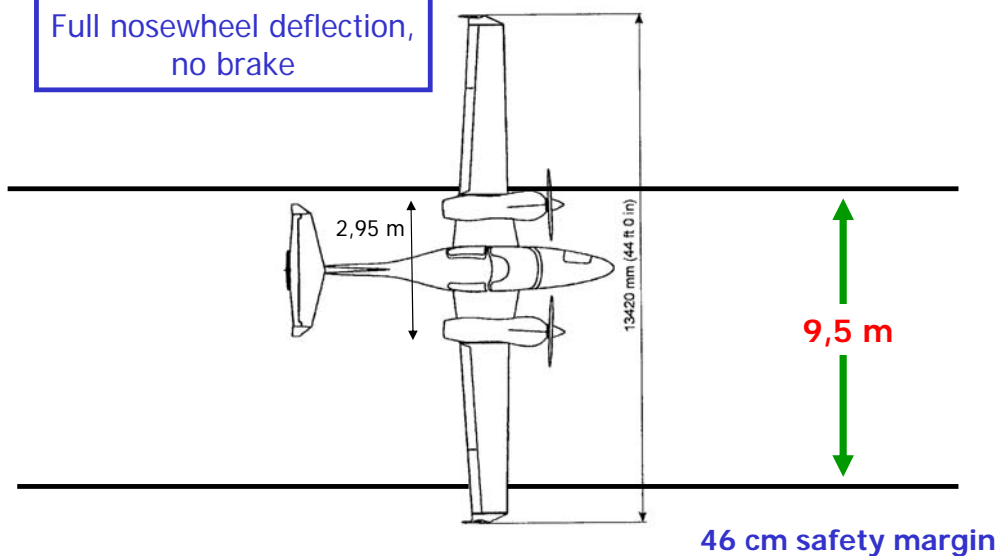
Dimensions



Minimum width for 180° turn



Full nosewheel deflection,
no brake



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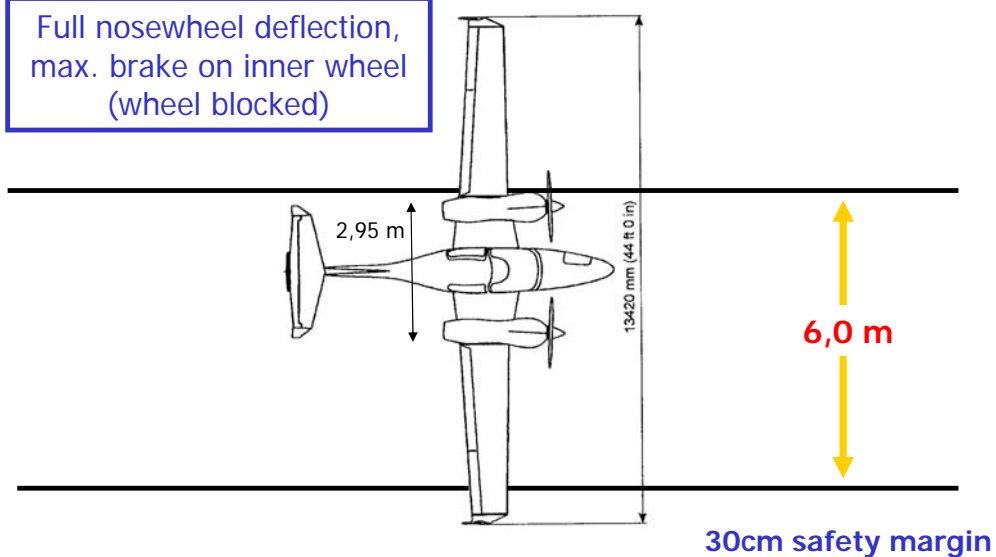
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Minimum width for 180° turn



Full nosewheel deflection,
max. brake on inner wheel
(wheel blocked)



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Nose baggage compartment



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ELT and VHF COM 1 antenna



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VHF COM 2 antenna



VHF NAV + GP antennas



in the stabilizer



Stormscope antenna



GPS antennas

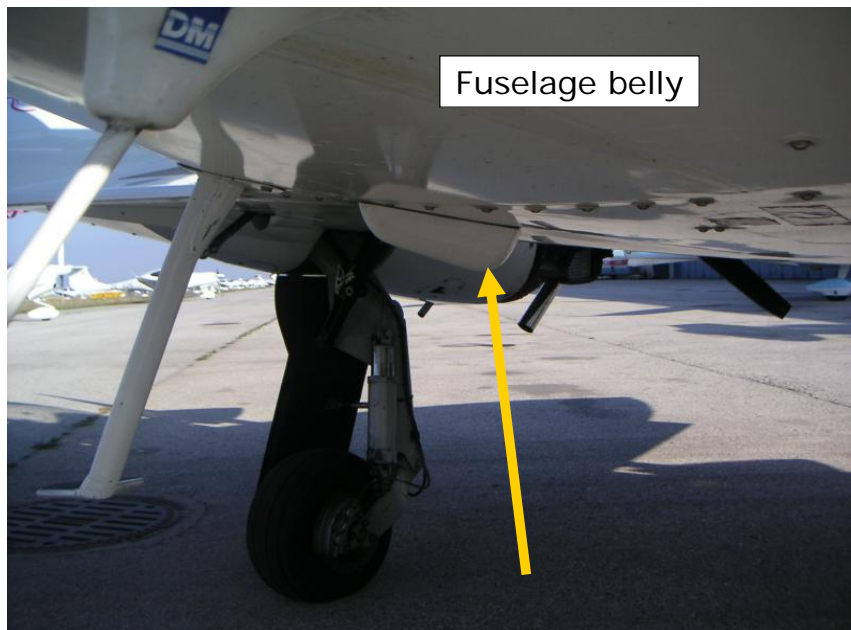


Cabin roof



With SBAS

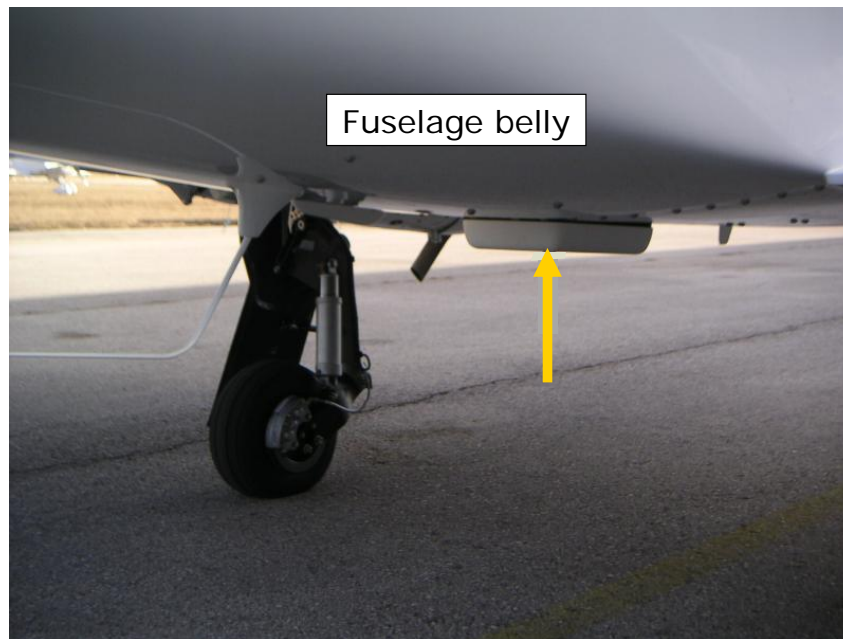
Marker antenna



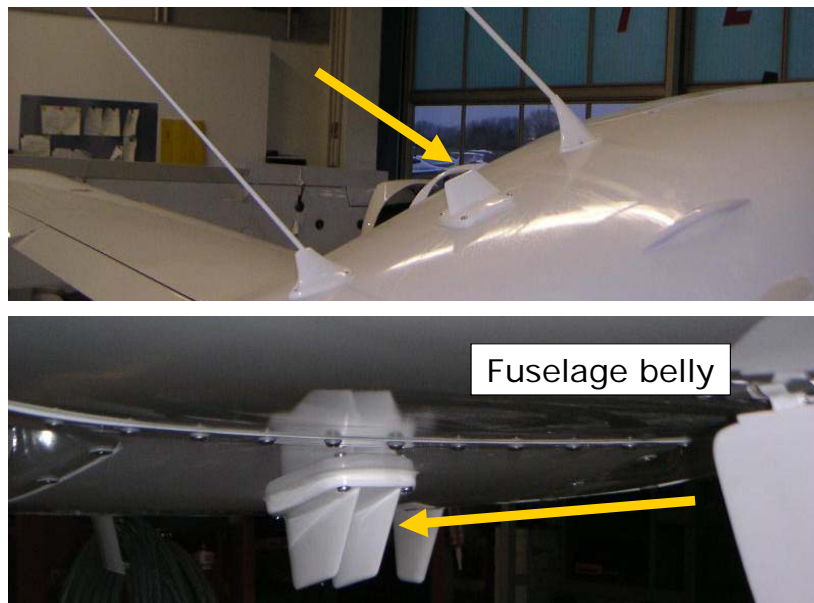
DME, TXPDR antennas



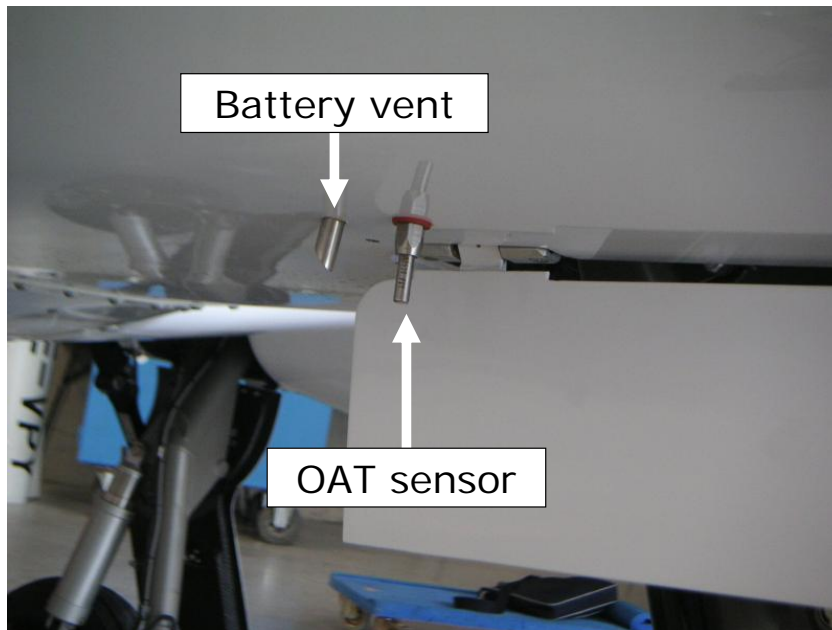
ADF antenna



TAS antennas



OAT Sensor



Battery vent

OAT sensor



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Mass

Mass (Weight)

Empty (typical)	1450 kg
Max TKOF	1900 kg
Max Ramp	+ 8 kg
Max Zero Fuel	1765 kg
Max LDG	1805 kg
Min for flight	1510 kg

!

Max Landing Mass

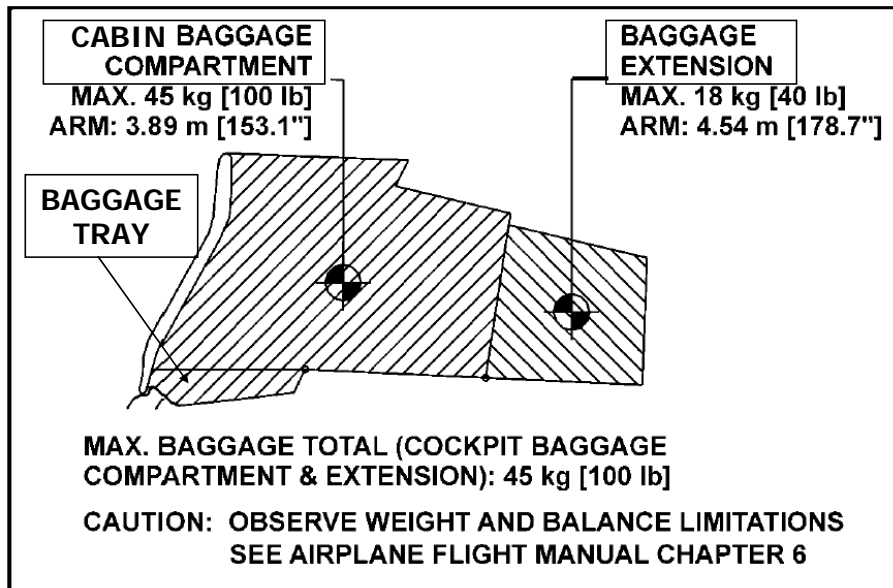


- Landing with a mass higher than 1805 kg is an „Abnormal Operating Procedure“
- **However:**
- „Hard LDG Check“ only required after a hard LDG, regardless of LDG mass

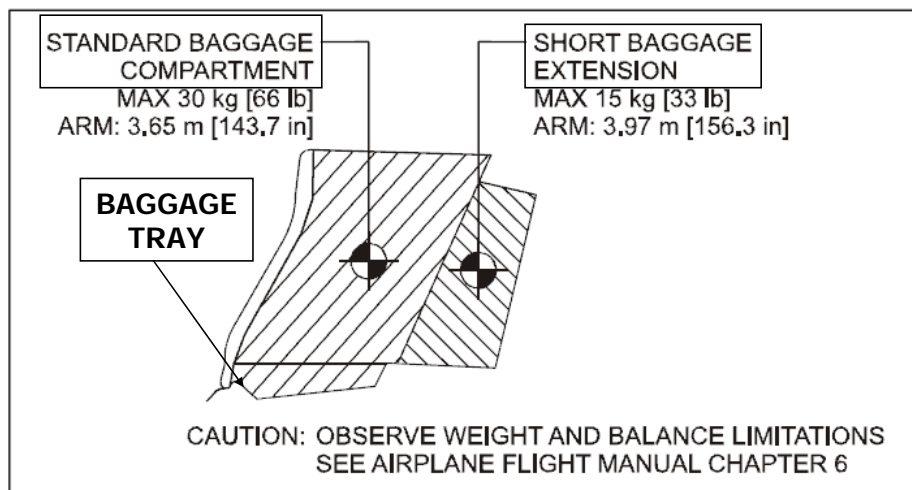
Max. Baggage Load



Nose compartment		30 kg
	Standard	„Short“ Baggage Extension
Standard compartment	45 kg	30 kg
Baggage Extension	18 kg	15 kg
Total	45 kg	45 kg



„Short“ Baggage Extension



Mass



Attention!

JET fuel and Diesel are heavier than AVGAS!

Typical fuel weight:



JET A1: 0,8 kg/ltr 3,03 kg/USG	Diesel: 0,84 kg/ltr 3,2 kg/USG
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Speeds


Characteristic speeds

V_{NO}		151 KIAS
V_{NE}		188 KIAS
V_O		112 KIAS
		1700 kg
		119 KIAS
		1800 kg
		122 KIAS

Characteristic speeds



V_{SO}	„NG“	62 KIAS
	„Dash-6“	62 KIAS
V_{S1}	„NG“	69 KIAS
	„Dash-6“	68 KIAS

		Flaps UP	Flaps APP
V_{MCA} 	„NG“	76 KIAS	73 KIAS
	„Dash-6“	71 KIAS	68 KIAS


$V_{ops\ ice}$	118-156 KIAS
----------------	--------------

For short field take-off

Characteristic speeds



For short field take-off

		Flaps UP	Flaps APP
V_R	„NG“	80 KIAS	76 KIAS
	„Dash-6“	76 KIAS	71 KIAS
V_X	„NG“	---	82 KIAS
	„Dash-6“	---	77 KIAS
V_Y		90 KIAS	85 KIAS
V_{YSE} $V_{yse\ „ice“}$		85 KIAS 88 KIAS	
$V_{CRZ\ CLB}$		90 KIAS	

Characteristic speeds



V_{FE} (Flaps APP)	133 KIAS
V_{FE} (Flaps LDG)	113 KIAS
V_{LOE} (= V_{NE})	188 KIAS
Emergency extension	152 KIAS
V_{LOR} (= $\sim V_{NO}$)	152 KIAS
V_{LE} (= V_{NE})	188 KIAS

Characteristic speeds



Approach Speeds

V_{REF} FLAPS UP	86 KIAS
V_{REF} FLAPS APP	84 KIAS
V_{REF} FLAPS LDG	84 KIAS
V_{GA} FLAPS UP	90 KIAS

Diamond DA42 NG



Instrument Panel



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Instrument panel



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Instrument Panel



Garmin 1000

Instrument Panel



Airspeed

Horizon

Altimeter

Compass

Backup Instruments

Instrument Panel



Emergency Switch

Emergency Battery
(non rechargeable)

IFR flights not permitted when seal on Emergency Switch is broken

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Lights

ELT

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Alternators + ECU Control

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- **ECU (EECU)**

- Engine Control Unit
- Electric Engine Control Unit

this is a

- **FADEC**

- Full Authority Digital Engine Control

*Will be explained in the
„Power Plant“ chapter*

Instrument Panel



Pitot heat

Engine master switches,
Engine start

Fuel Pumps

Electric Master,
Avionic Master

Instrument Panel



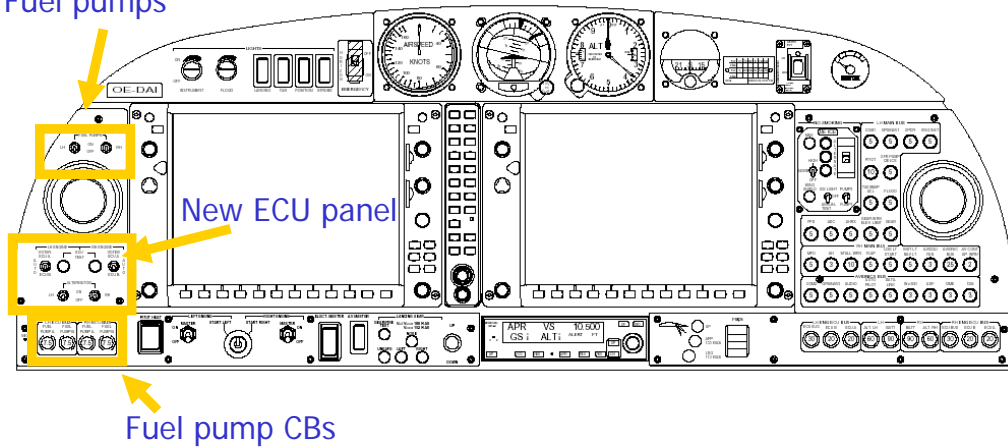
Landing gear

Flaps

Instrument panel („Upgrade NG“ with KAP140)



Fuel pumps



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Instrument panel („Upgrade NG“ with KAP140)



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Pitot probe



Static ports



Alternate static valve



Lift detector (Stall warning)



Diamond DA42 NG



Garmin 1000

Engine Indication System



DA42 Garmin 1000



PFD

Primary Flight Display

MFD

Multi Function Display

Garmin 1000 MFD



EIS / Engine Indication System



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Engine Indication System



Default page



Display when pushing the SYSTEM softkey



Display when pushing the FUEL softkey

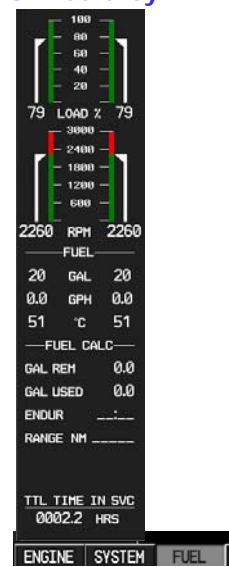


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Engine Indication System

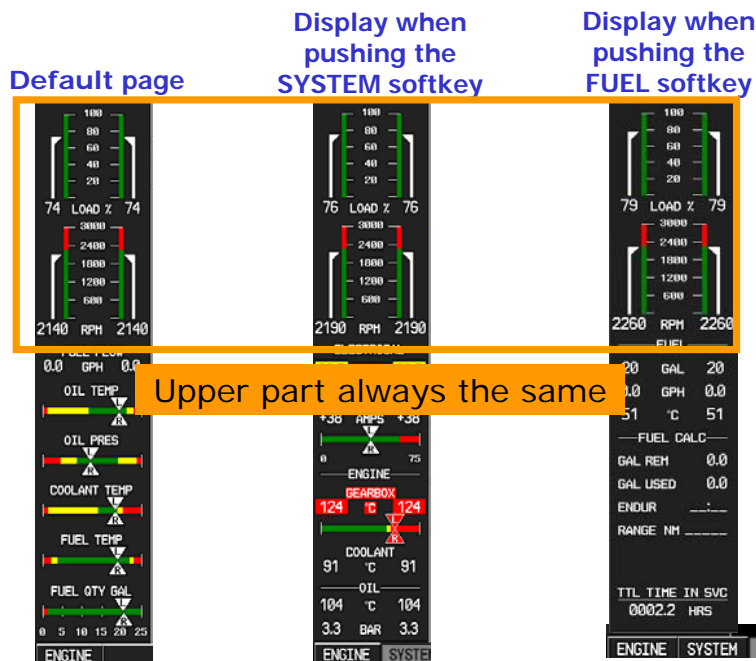


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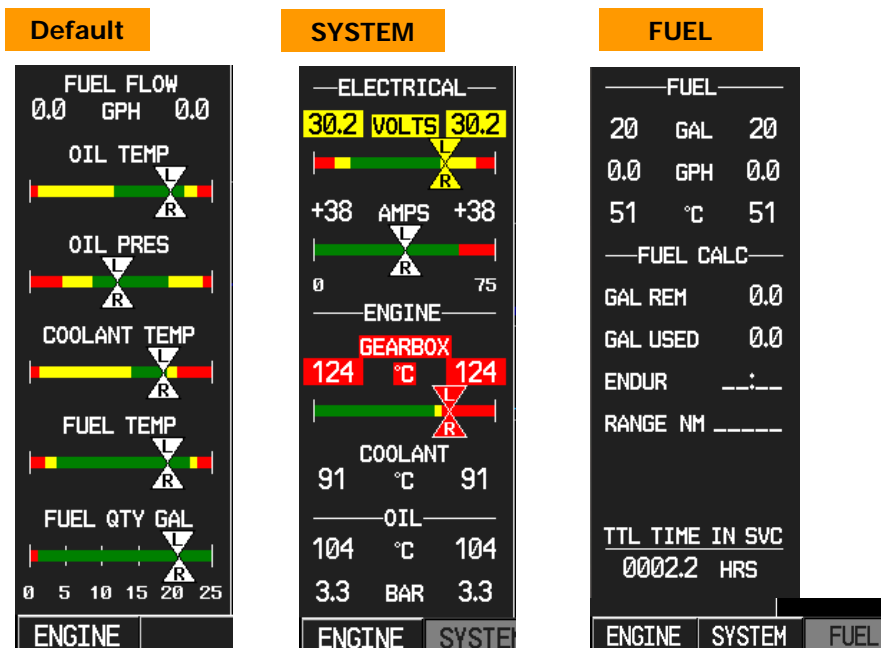


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Diamond DA42 NG



Hydraulic System

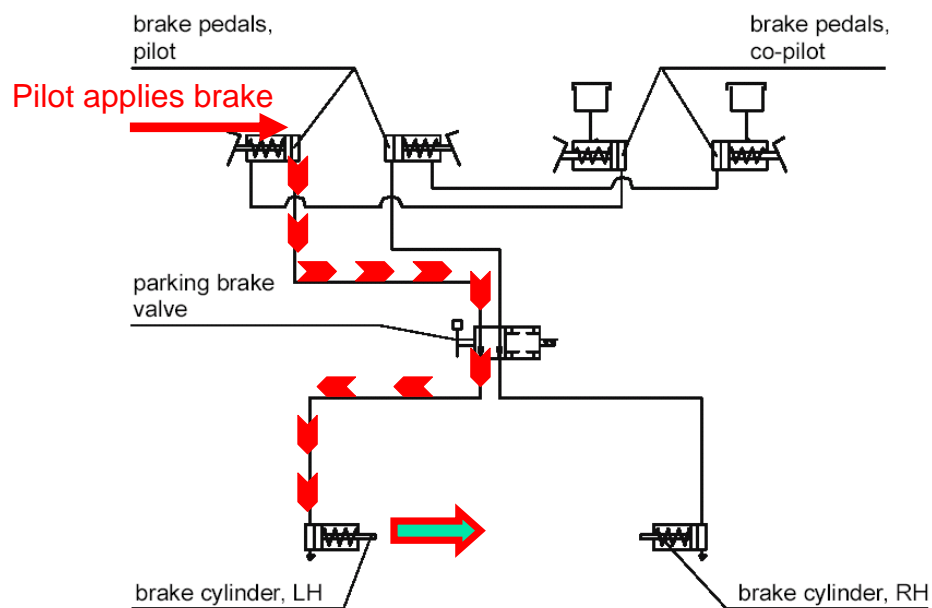


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Hydraulic brakes



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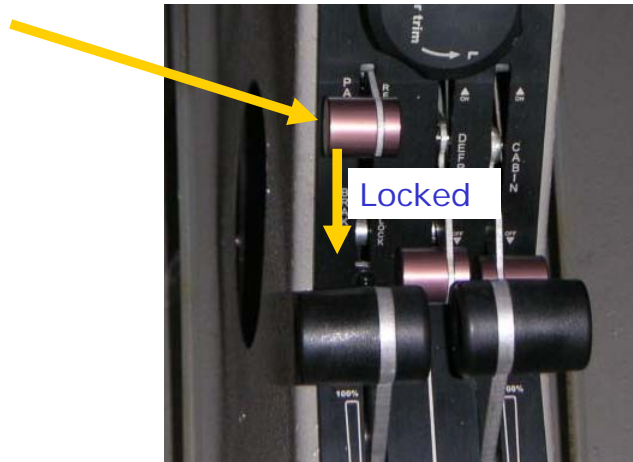
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Hydraulic brakes



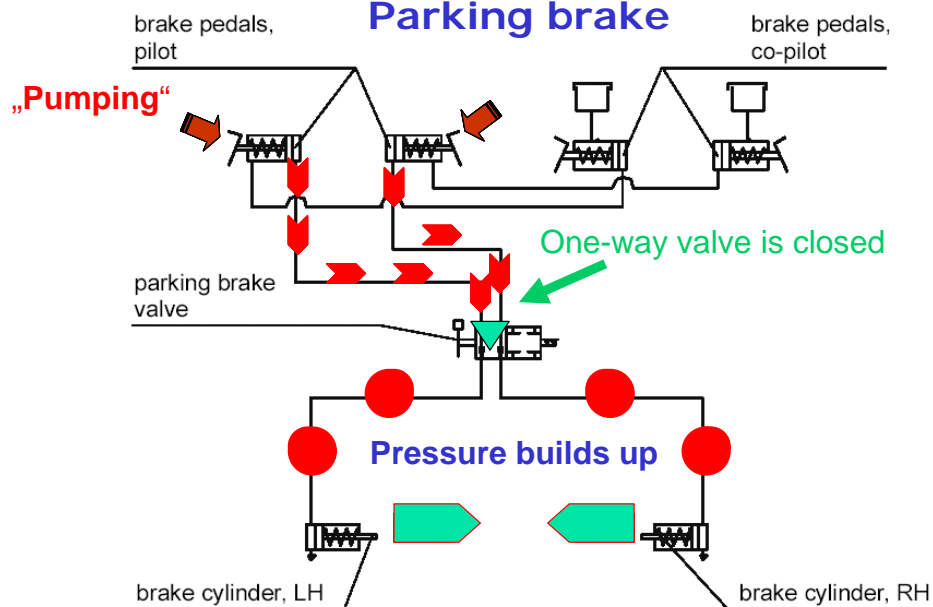
Parking brake



Hydraulic brakes



Parking brake



Landing gear



Landing gear

- Hydraulically operated
- Electrically powered hydraulic pump
- Electrically actuated hydraulic valves operated by gear selector switch
- „Squat switch“ prevents retraction on ground

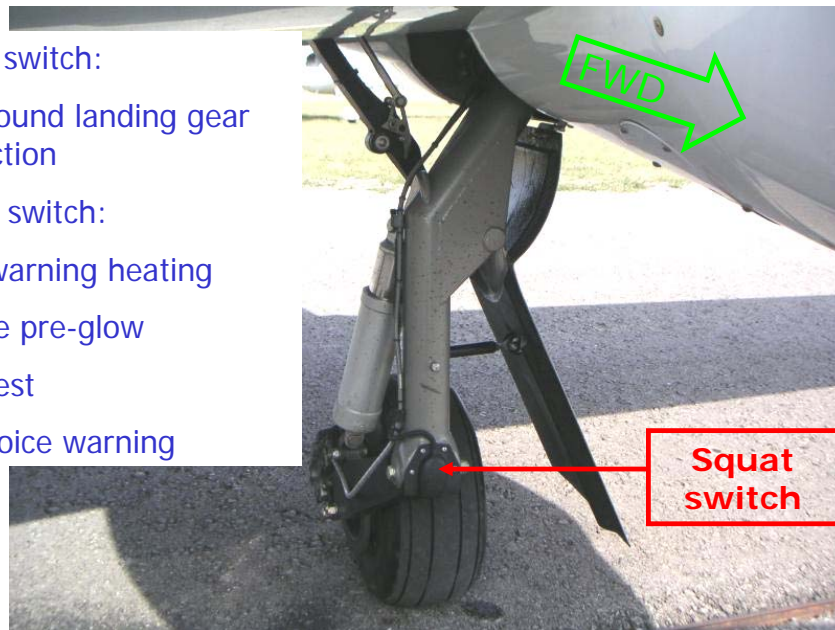
Landing gear

LH squat switch:

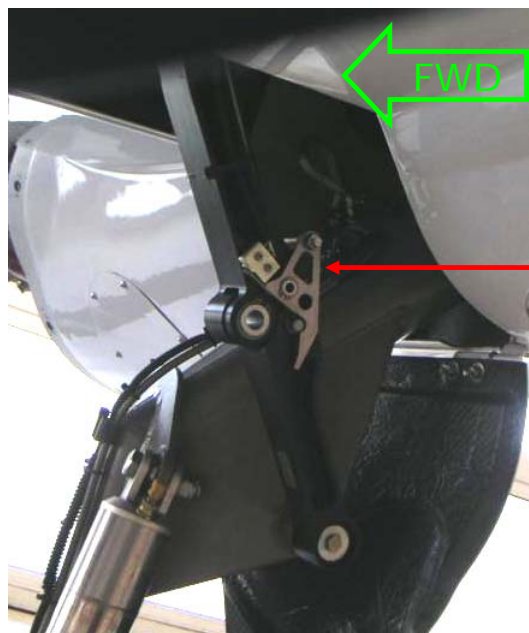
- On ground landing gear protection

RH squat switch:

- Stall warning heating
- Engine pre-glow
- ECU test
- TAS voice warning



Landing gear



Landing gear



- Gear downlock = spring loaded
- Downlock released by hydraulic pressure for retraction
- Green lights = gear down and locked
- Red light = gear neither down nor up
- Gear held up hydraulically
- **Emergency operation = free fall (by releasing hydraulic pressure)**

Landing gear



LANDING GEAR UNSAFE WARNING

If on for more than 20 seconds:

1 Airspeed.....max 152 KIAS 1

In cold temperature:

2 Airspeed.....max 110 KIAS 2

3 Gear selector RECYCLE 3

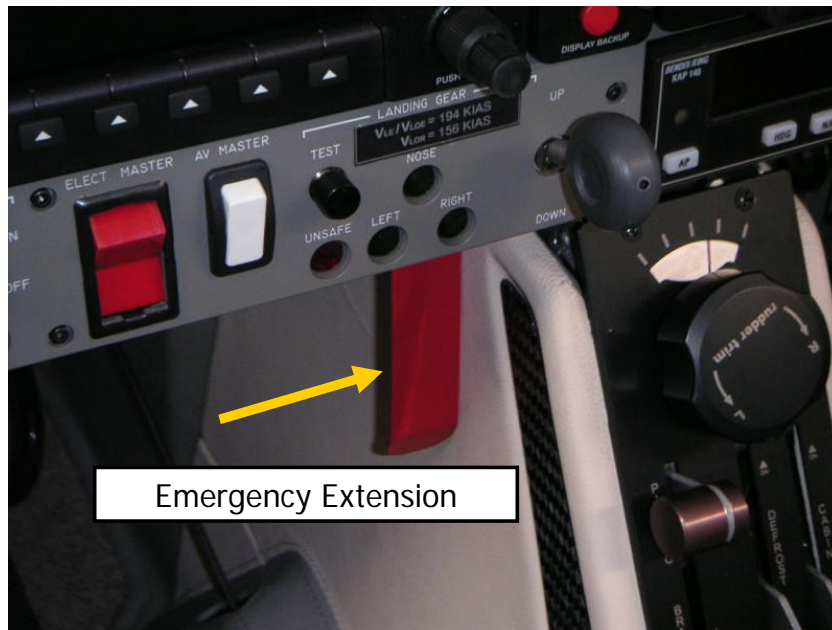
❖→If landing gear **extension** unsuccessful:

Continue with MANUAL EXTENSION

❖ If landing gear **retraction** unsuccessful:

Consider flight with landing gear down

Landing gear



Emergency Extension

Landing gear

MANUAL EXTENSION OF LANDING GEAR

- | | | | |
|-----------------------|-------------------------------|----------------|---|
| 1 | Airspeed | max 152 KIAS | 1 |
| 2 | Gear indicator lights | TEST | 2 |
| 3 | Electric master..... | CHECK ON | 3 |
| 4 | Bus voltage..... | CHECK NORMAL | 4 |
| 5 | Circuit breaker..... | CHECK | 5 |
| 6 | Gear selector..... | DOWN | 6 |
| 7 | Manual extension handle | PULL | 7 |
| If necessary | | | |
| 8 | Airspeed | max 110 KIAS | 8 |
| Apply moderate yawing | | | |
| 9 | Gear indicator lights | CHECK 3 GREENS | 9 |

Landing gear



■ Landing Gear Warning:

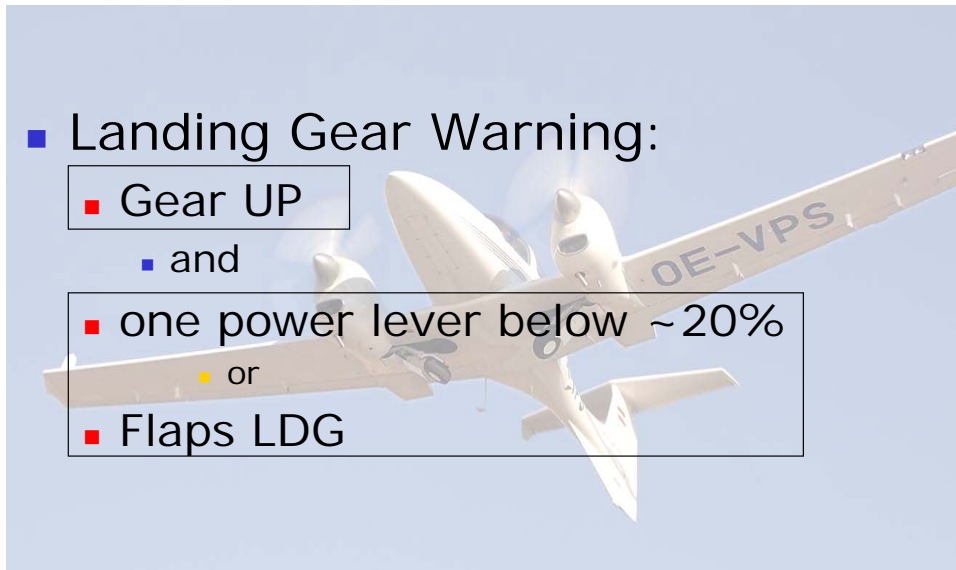
- Gear UP

- and

- one power lever below ~20%

- or

- Flaps LDG



Nosewheel steering



- Nosewheel steered with rudder pedals
- Steering angle:
 - 30° without use of brakes
 - 52° with one wheel fully braked

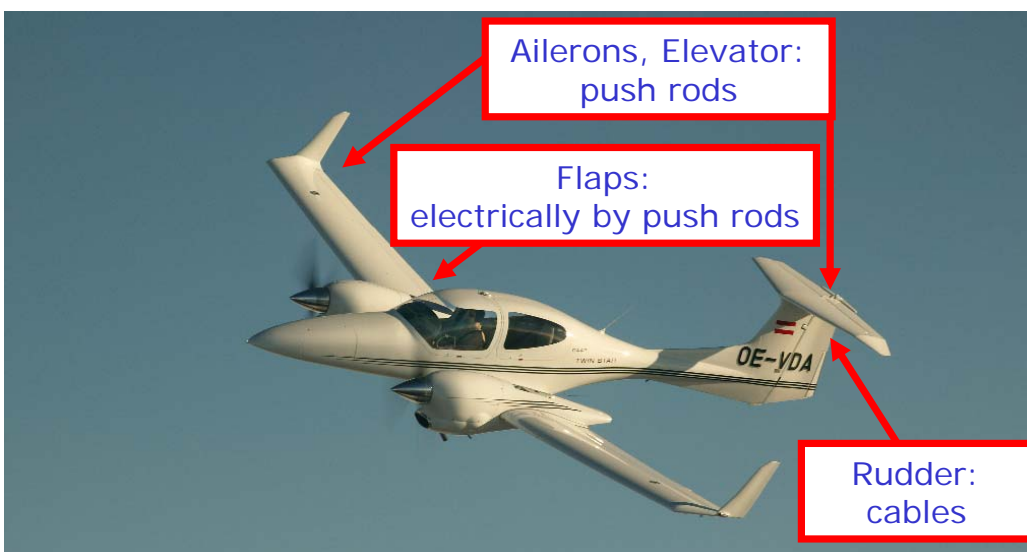
Diamond DA42 NG



Flight Controls



Flight control operation



Flight control operation



Flap interconnection



Variable elevator stop



- Normal elevator „up“ deflection: 15,5°
- Limited to „13° up“ when both power levers above 20% (approach power setting)
- Reason: With full elevator deflection in case of stalling the handling qualities and stall characteristics are degraded
- Preflight check of this device is mandatory!
- „STICK LIMIT“ caution when variable stop not in proper position

Variable elevator stop



Power levers	Stop shall be	Stop is	Caution light
Both LOW	unlimiting	limiting	STICK LIMIT
Split			
Both HIGH	limiting	unlimiting	STICK LIMIT

Variable elevator stop Preflight check



CHECK BEFORE ENGINE START continued

30	Flaps	LDG	30
31	Variable elevator stop	CHECK	31

Control stick AFT and HOLD

Power levers MAX

Check stop limit decreasing

Power levers IDLE

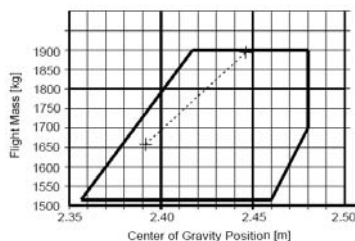
Check stop limit increasing

32	Flaps	UP	32
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Option: Removal of the Variable elevator stop

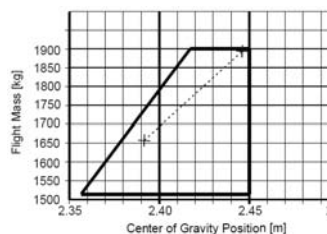


Normal CG limits:

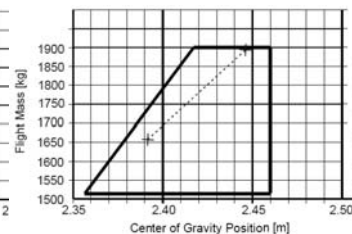


Without variable elevator stop :

DA42 NG:



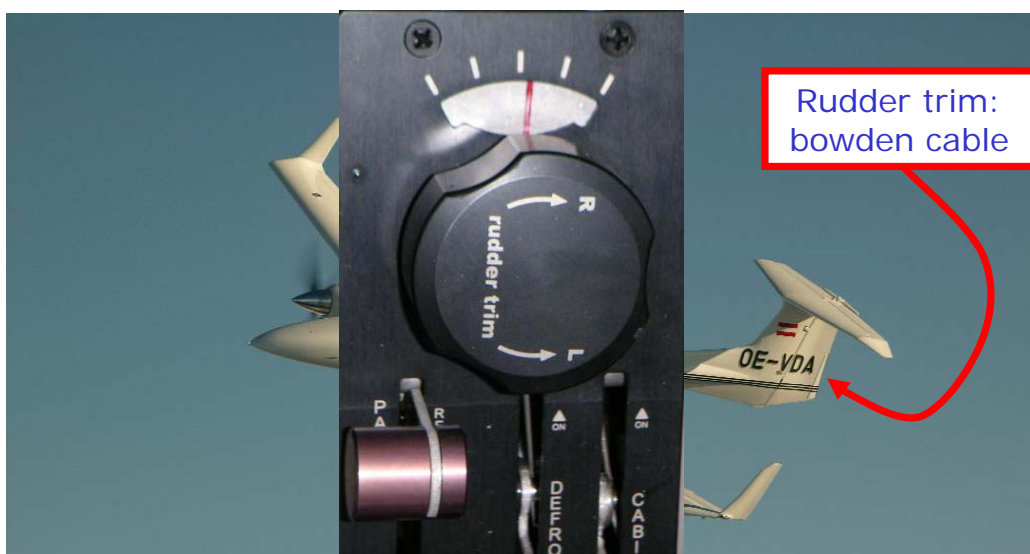
DA42 NG -VI:



Trim tabs



Trim tabs



Optional electric rudder pedal adjustment



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Power Plant



Power plant

- 2 Austro Engines E4-B („Dash-6“: E4-C)
- Four cylinders, liquid-cooled
 - 1991 ccm
- Common-rail direct injection
- Reduction gear 1:1,69
- Dual digital engine control
- Turbocharger
- Torsion vibration damper isolates engine from propeller
- Max. power limitation: **100%, 2300 RPM**
(5 minutes time limit)
123,5 kW (165,6 DIN-HP)
- Max cont. power limitation: **92%, 2100 RPM**
(„Dash-6“: **2300 RPM**)
113,6 kW (152,3 DIN-HP)

Austro Engine E4-B



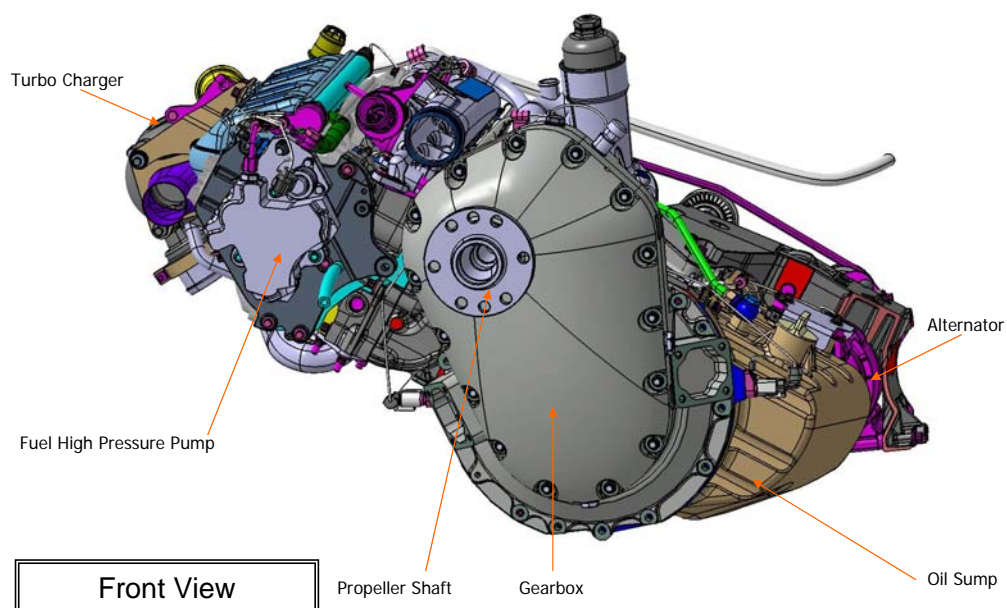
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Austro Engine E4-B



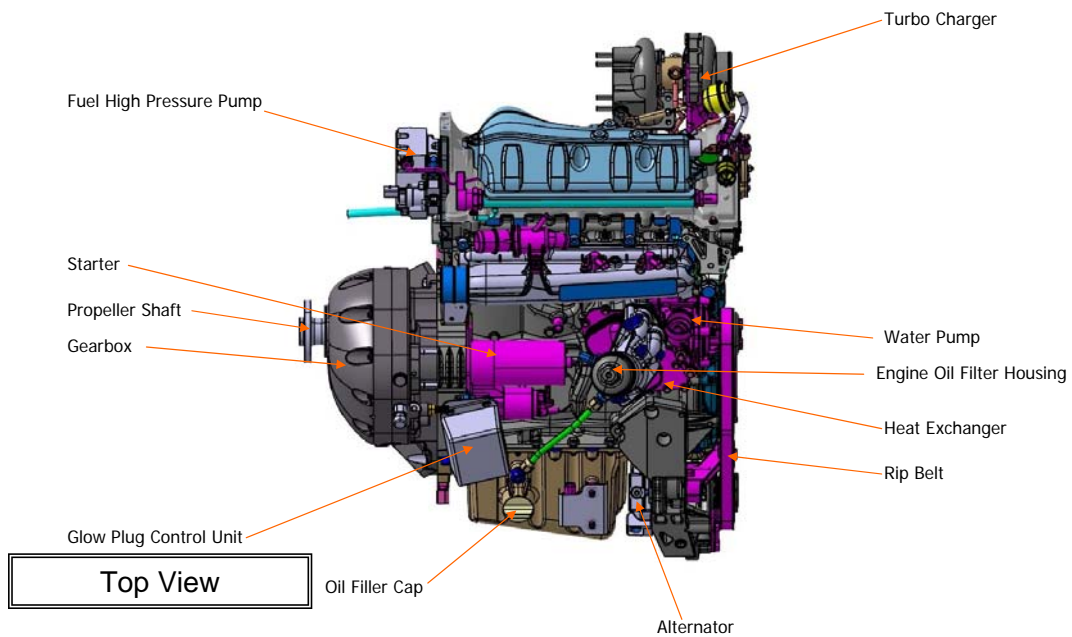
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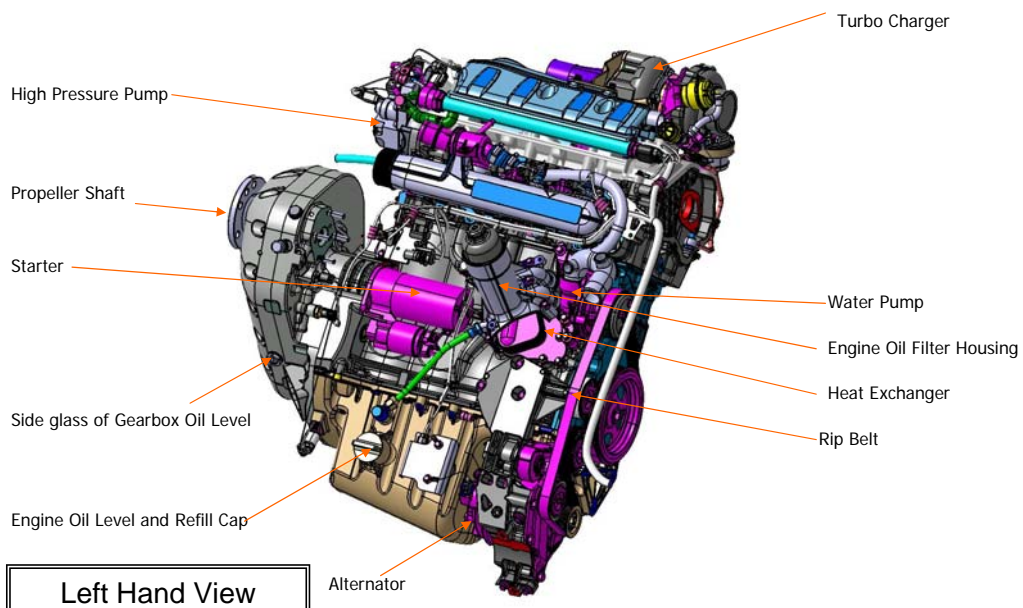
Austro Engine E4-B



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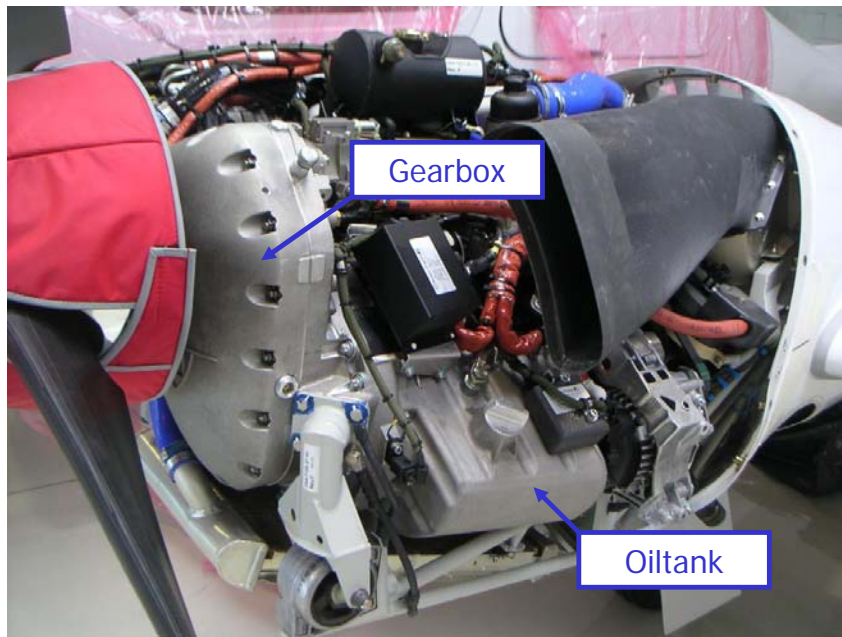
Austro Engine E4-B



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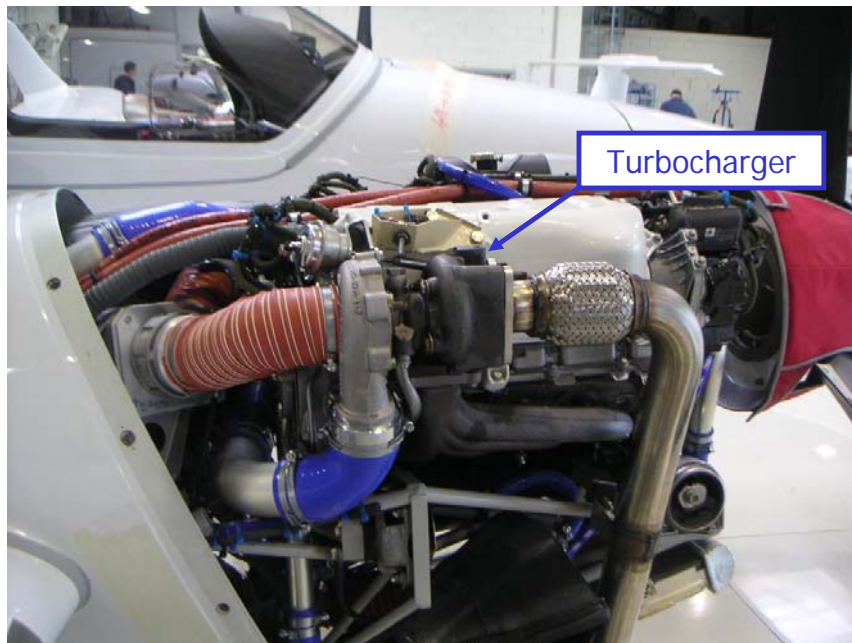
Austro Engine E4-B



Austro Engine E4-B



Austro Engine E4-B



Austro Engine E4-B



ECU – Engine Control Unit

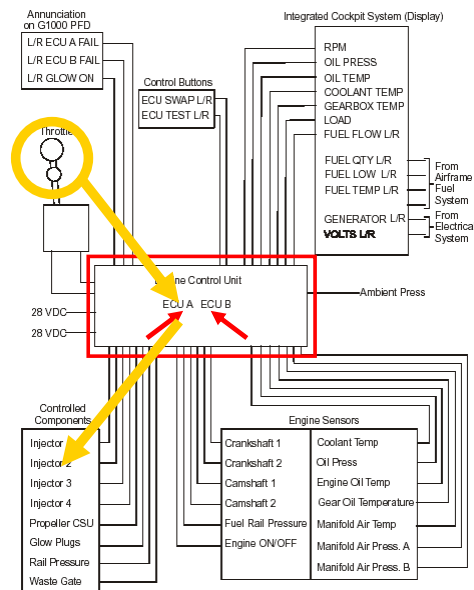
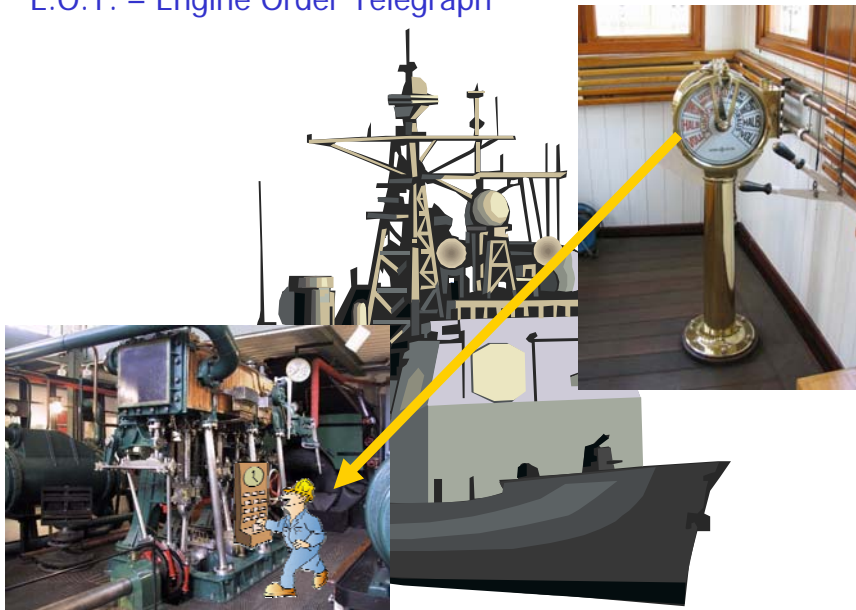


Figure 1: An Engine Control System Schematic Diagram

E.O.T. – Engine Order Telegraph



Engine Control Unit



- ECU „VOTER switches“
- 3-position switches
- Normally in AUTO position
- Working ECU is automatically selected according operating hours or in case of malfunction

ECU test buttons



Test on ground (PWR lever idle)



ECU test



BEFORE TAKE OFF CHECK

14	Power levers (2).....	IDLE	14
15	MFD	EIS – SYSTEM	15
16	Engine instruments.....	CHECKED	16

*Engine temperatures must be in green range before performing ECU test.
(For gearbox min.38° recommended). For warm up max power 50%.*

17	VOTER switches (2)	A, AUTO, B, AUTO	17
----	--------------------------	------------------	----

ECU TEST

ECU test buttons (2) press and hold
 "L/R ECU A/B fail" ON
 Props cycling
 "L/R ECU A/B fail" OFF
 ECU test button release

18	ECU test (2).....	PERFORMED	18
----	-------------------	-----------	----

■ ECU Test will not start when:

- Power levers not in IDLE
- VOTER switch not in AUTO
- Gearbox temperature not in green range
- „Air/Ground“ sensor transmits „aircraft in the air“

ECU FAIL indication



An ECU FAIL CAUTION is caused by various types of malfunctions. These include internal ECU problems, sensor failures or insufficient performance of air-, fuel-, or electrical supply system (e.g. air filter icing).

ECU Abnormal checklist



L/R ECU A or B FAIL ON GROUND

- Discontinue operation, terminate flight preparation

L/R ECU A or B FAIL DURING FLIGHT

Remark: in case of ECU A or B fail the system automatically switches to the other ECU (B or A)

- **Alternate Air: OPEN**
 - **Fuel pumps L/R: ON**
 - **Circuit breakers: CHECK, RESET if necessary**
 - **Verify VOTER switch in position AUTO**
 - If ECU caution remains:
 - ➔ Land at nearest suitable airfield
 - If additional engine problems are observed:
 - ➔ Go to **Emergency Checklist page 7**
- ENGINE TROUBLESHOOTING**

**L OR R
ECU A FAIL and ECU B FAIL
SIMULTANEOUSLY**

- Go to **Emergency Checklist page 7** **ENGINE TROUBLESHOOTING**

Simultaneous ECU fail indication



ENGINE TROUBLESHOOTING

❖ If

**L OR R
ECU A AND B FAIL
simultaneously**

and ALL of the following conditions exist:

- **indicated LOAD unchanged**
- **perceived thrust is reduced**
- **engine noise level changes or engine running rough**

- 1 POWER lever IDLE for 1 second 1
- 2 POWER lever slowly increase to 1975 RPM 2
 - If engine shows power loss during the POWER lever increase
- 3 POWER lever idle for 1 second 3
- 4 POWER lever slowly increase 4
 - stop prior to the RPM where former engine power loss was observed**

Do not increase the POWER lever past the propeller speed of 1975 RPM or the setting determined in step 4. An increase of engine power beyond this setting leads into another power loss.

With this power setting the engine can provide up to 65% at the maximum propeller speed of 1975 RPM

- 5 Land at nearest suitable airfield..... 5

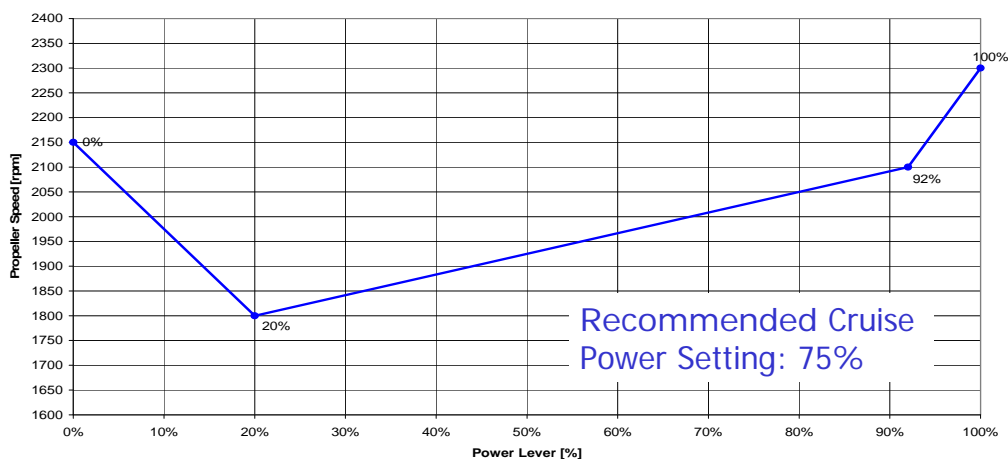
End of Checklist

❖ Otherwise:

Power plant



- Power lever selects „LOAD“ in %
- RPM automatically determined by selected power



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Propeller



- 3-blade wooden propeller
- Constant speed, feathering
- Prop pitch set by ECU via an electro-mechanical actuator on the governor
- Governor operated by gearbox oil
 - Oil pressure up = pitch down = RPM up
 - Oil pressure down = pitch up = RPM down



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Feathering system



- Feathering by „Engine Master OFF“ if RPM above 1300
- Feathers when gear oil pressure is lost
- If RPM below 1300: prop pitch remains above high pitch lock
- Unfeathering:
 - With unfeathering accumulator:
 - by oil pressure from accumulator when Engine Master is ON
 - Without unfeathering accumulator:
 - by building up system oil pressure when cranking the starter

RPM malfunctions



OSCILLATING RPM

- 1 Power lever change setting 1
 - If no success:
Check G1000 for ECU FAIL caution
 - If ECU FAIL caution indicated:
- 2 VOTER switchunaffected ECU 2
 - If no success:
- 3 VOTER switch AUTO 3
 - Land at nearest suitable airfield

RPM OVERSPEED

- 1 Power setting REDUCE 1
 - If no success:
Check G1000 for ECU FAIL caution
 - If ECU FAIL caution indicated:
- 2 VOTER switchunaffected ECU 2
 - If no success:
- 3 VOTER switch AUTO 3
 - Land at nearest suitable airfield
 - Be prepared for ENGINE FAILURE IN FLIGHT

Fuel pumps



- 1 engine driven pump
- this high pressure pump feeds the common rail
- (additional electrical fuel pumps are part of the fuel system)

Power plant limitations



- Max overspeed: 2500 RPM, max 20 sec.
- Oil pressure:
 - < 1500 RPM: min 0,9 bar
 - ≥ 1500 RPM: min 2,5 bar
 - Max: 6,5 bar
 - Normal: 2,5 – 6 bar
- Oil quantity (per engine): 5.0 – 7.0 liters
 - Max. oil consumption: 0.1 liters/hr
- Oil temperature: -30°C – 140 °C
 - Normal: 50°C – 135°C

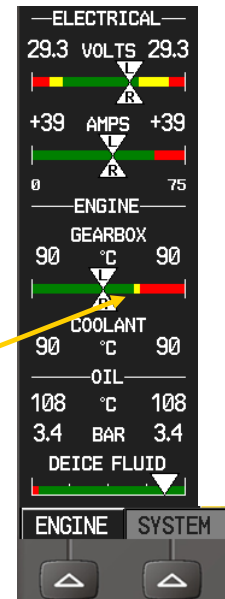
Power plant limitations



■ Gearbox temperature:

- Min: -30°C
- Min at full load: 35°C
- Max: 120°C
- Normal: 35°C – 115°C

The yellow cautionary range is for information only. There is no time limit associated with the cautionary temperature range. However, prolonged operation is not recommended



Power plant limitations



■ Coolant temperature:

- min -30°C for start up
- min 60°C full load
- max 105°C
- Normal 60°C – 95°C

■ Fuel temperature:

- min -30°C, max 60°C
- Normal: -20°C – 55°C

■ Fuel pressure:

- min 4 bar, max 7 bar
 - no indication on G1000, but warning if below limit

Power plant limitations



AFM 3.7.4:

UNFEATHERING & RESTARTING THE ENGINE IN FLIGHT

If the reason for the shutdown has been ascertained and there is no indication of malfunction or engine fire a restart may be attempted.

- Max. restart altitude:
 - 18.000 ft for immediate restart
 - 10.000 ft for restart within 2 minutes
- **No restart attempt if shut down for more than 2 minutes!**
- Restart airspeeds:
 - starter assisted restart:
 - Max 100 KIAS or stationary prop, whichever is lower
 - Windmilling restart (**only possible when unfeathering accumulator is installed**) :
 - 125 – 145 KIAS



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Power plant limitations



- **Intentional negative-g manoeuvres are not permitted**
- **No intentional shutdown**
 - below 3000ft AGL or above 10000ft PA
 - without unfeathering accumulator



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Starter limitations



- Normal operation on ground:
 - max 10 seconds
 - 60 seconds cool down time
- Restarting in the air:
 - max 5 seconds
 - 30 seconds cool down time
 - max 3 attempts

Power plant fluid specifications



- Fuel:
 - JET A, JET A-1 (ASTM D 1655)
 - TS-1 (Russia, GOST 10227-86)
 - TS-1 (Ukraine, GSTU 320.00149943.011-99)
 - RT (Russia, GOST 10227-86)
 - RT (Ukraine GSTU 320.00149943.007-97)
 - No. 3 Jet Fuel (China, GB 6537-2006)
 - JP-8 (F34) (USA, MIL-DTL-83133G-2010)
 - and blends thereof
 - Minimum cetane number of 37*
 - (EN ISA 5165/ASTM D613)*
 - recommended*

Power plant fluid specifications



- Oil:
 - SAE Grade 5W-30:
 - SHELL HELIX ULTRA
 - ADDINOL SUPER POWER MV 0537
 - BP VISCO 5000 5W-30
 - REPSOL ELITE COMMON RAIL 5W30
 - GULF FORMULA GMX
 - SAE Grade 5W-40:
 - SHELL HELIX ULTRA
 - LIQUI MOLY 5W-40 LEICHTLAUF HIGH TECH
 - MEGOL MOTORENOEL HIGH CONDITION
 - SYNTIUM 3000
 - LUKOIL LUXE SYNTHETIC
 - SAE Grade 0W-40:
 - CASTROL SLX PROFESSIONAL LONGTEC

Power plant fluid specifications



- Gearbox oil: Shell Spirax GSX 75W-80
Shell Spirax S6 GSXME 75W-80
- Coolant: Destilled water + cooler protection 1:1
(BASF Glysantin Alu Protect Plus/G48)
(freezing point -38 °C)

Engine operation



CHECK AFTER ENGINE START

- | | | | |
|----|---------------------------|----------|----|
| 16 | Engine temperatures | CHECKED | 16 |
| 17 | Parking brake | RELEASED | 17 |

Max power 50% until engine temperatures
in green range

End of Checklist

BEFORE TAKE OFF CHECK

after line-up

Available power check (see pg.10)..... PERFORMED

Available Power Check:

10 sec. power MAX, RPM 2250 – 2300, min. load acc. table below

Altitude [ft]	OAT								
	-35°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
0	99%					97%	96%	93%	91%
2000						97%	96%	93%	-----
4000						97%	96%	93%	-----
6000						97%	96%	93%	-----
8000			98%	98%	98%	96%	95%	92%	-----
10000	98%	97%	97%	95%	94%	92%	89%	-----	-----

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Engine operation



PARKING CHECK

- | | | | |
|---|--|-----------------------|---|
| 1 | Parking brake..... | SET | 1 |
| 2 | Power levers (2) | max. 10% for 1 min. | 2 |
| 3 | ELT | 121,5 CHECKED | 3 |
| 4 | Engine / System page | CHECKED | 4 |
| 5 | Engine / Fuel page | TTL TIME IN SVC NOTED | 5 |
| 6 | Avionic master..... | OFF | 6 |
| 7 | Electrical consumers except ACL (strobe) | OFF | 7 |
| 8 | Engine Masters (2) | OFF | 8 |
| 9 | ACL (strobe) | OFF | 9 |

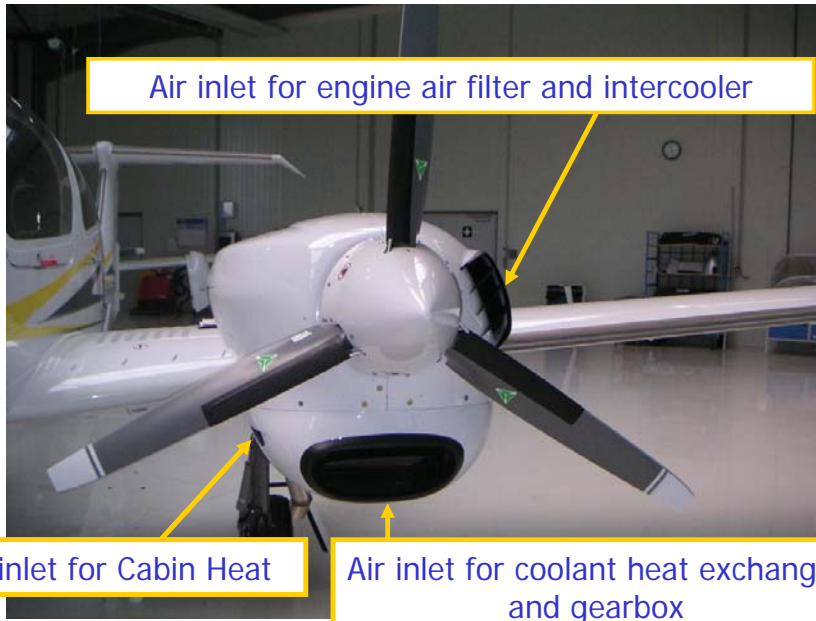
When engine indications x-ed out red:

- | | | | |
|----|----------------------|-----|----|
| 10 | Electric Master..... | OFF | 10 |
|----|----------------------|-----|----|

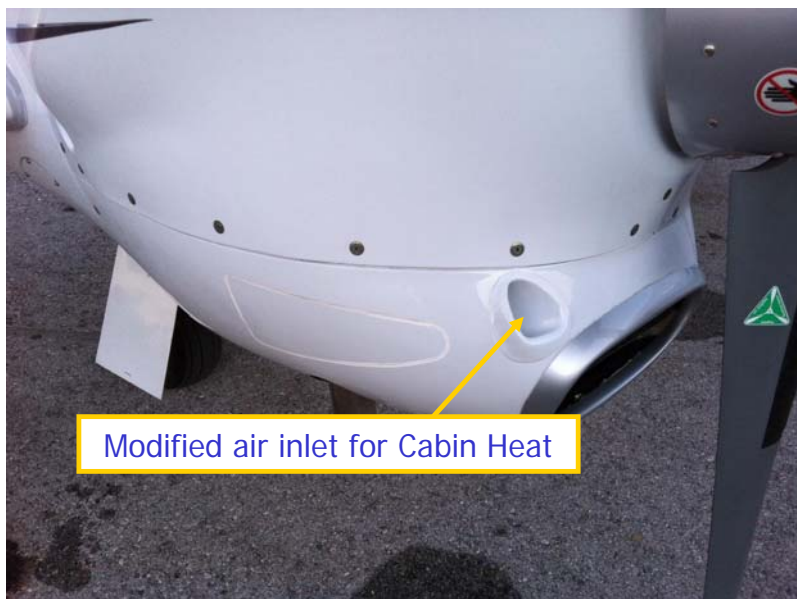
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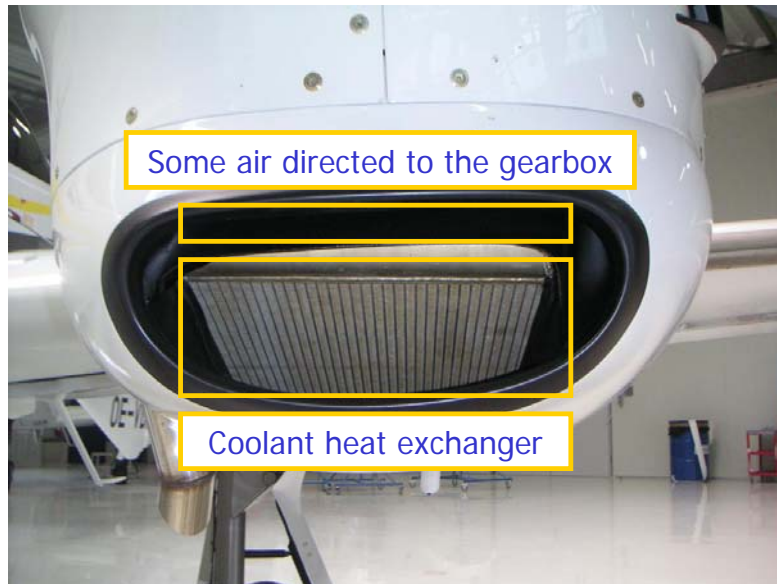
Air inlets



Air inlets



Air inlets



„Dash-6“ Air inlets



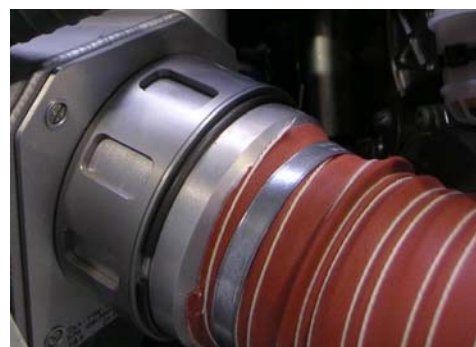
Air outlet



Alternate air



Alternate air lever



Alternate air valve

Use of Alternate Air



AFM:

4A.6.18 OPERATION IN RAIN, SNOW OR VISIBLE MOISTURE

1. ALTERNATE AIR OPEN

CAUTION

During operation on ground ALTERNATE AIR must be CLOSED.

Use of Alternate Air



ENGINE TROUBLESHOOTING

- 8 Alternate air OPEN 8

ENGINE RESTART

- 3 Alternate air AS REQUIRED 3

UNINTENTIONAL FLIGHT INTO ICING

- 5 Alternate air OPEN 5

L/R ECU A or B FAIL

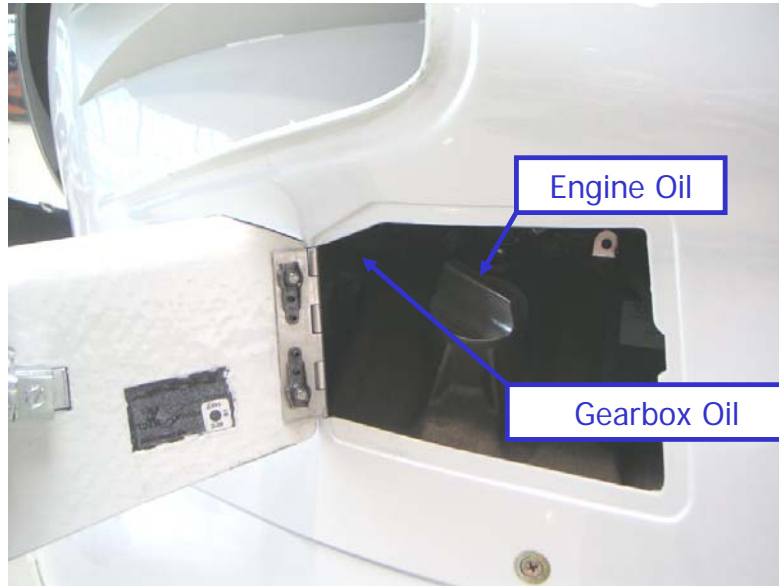
DURING FLIGHT

Remark: in case of ECU A or B fail the system automatically switches to the other ECU (B or A)

- Alternate Air: OPEN
- Fuel pumps L/R: ON
- Circuit breakers: CHECK, RESET if necessary
- Verify VOTER switch in position AUTO
 - If ECU caution remains:
 - ⇒ Land at nearest suitable airfield
 - If additional engine problems are observed:
 - ⇒ Go to **Emergency Checklist page 7**

ENGINE TROUBLESHOOTING

Checking oil levels



Checking oil levels



Power plant warnings



L/R OIL PRES

OIL PRESSURE LOW

- Reduce power on affected engine
- Be prepared for loss of oil and an engine failure; land at nearest suitable airfield

L/R OIL TEMP

OIL TEMPERATURE HIGH

- Check oil pressure
 - ❖ If oil pressure too low (outside green range):
 - ⇒ Reduce power on affected engine
 - ⇒ Expect loss of engine oil
 - ⇒ Be prepared for an engine failure
 - ❖ If oil pressure in green range
 - ⇒ Reduce power on affected engine
 - ⇒ Increase airspeed
 - If oil temperature not returning to green range:
 - ⇒ Be prepared for an engine failure;

L/R GBOX TEMP

GEARBOX TEMPERATURE HIGH

- Reduce power on affected engine
- Increase airspeed
 - If gearbox temperature still in red range:
 - ⇒ Land at nearest suitable airfield
 - ⇒ Be prepared for an engine failure

Power plant cautions



OIL temperature high

- Refer to **Emergency Checklist page 3, "L/R OIL TEMP"**

OIL temperature low

- Increase power
- Reduce airspeed

OIL pressure high

- ❖ On ground during warm up with low oil temperature
 - Reduce power until oil press. green, continue warm up at reduced power
- ❖ During flight
 - Check oil temperature
 - Check coolant temperature
 - ❖ If temperatures within green range
 - ⇒ Oil press. indication may be faulty; watch temperatures
 - ❖ If temperatures outside of green range
 - ⇒ Reduce power on affected engine;
 - ⇒ Land at nearest suitable airfield, be prepared for engine fail

OIL pressure low

- Refer to **Emergency Checklist page 3, "L/R OIL PRES"**

Fire detection system

- Overheat detector in hot area of each engine
- Warning above 250°C
- Test button:



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Diamond DA42 NG



Cooling System

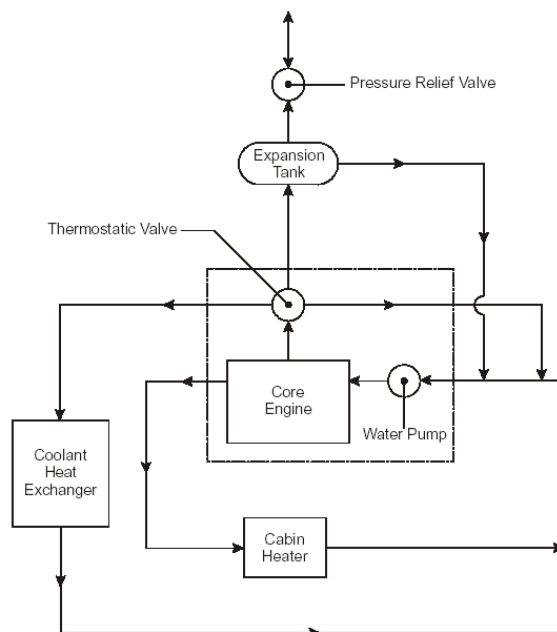


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Cooling system

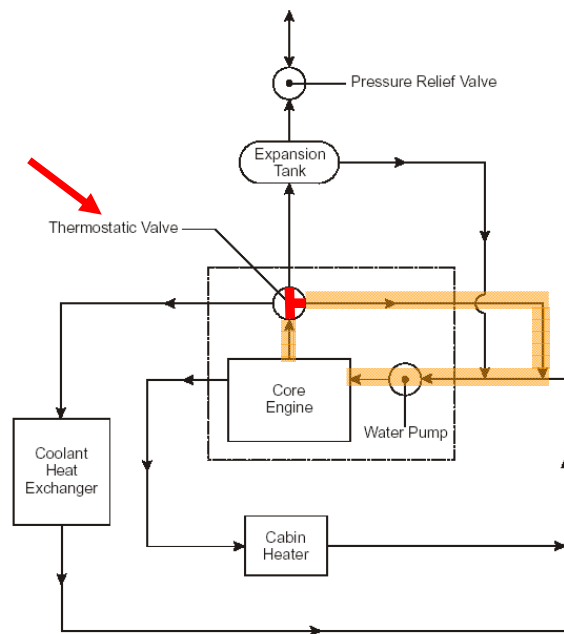


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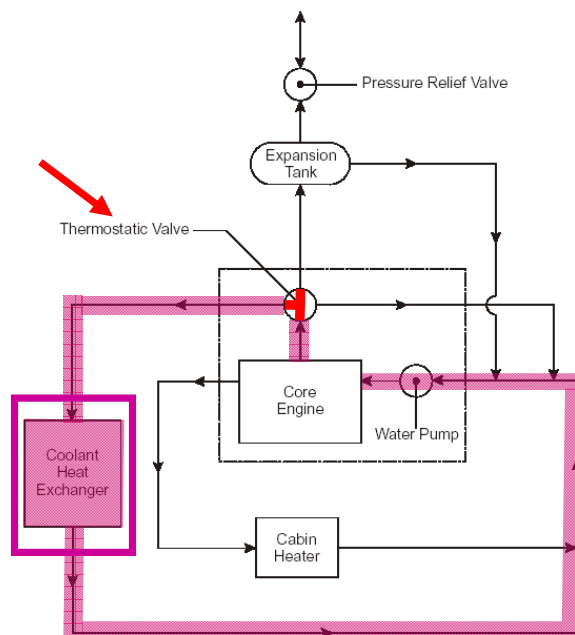
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Cooling system



Coolant Temp.
< 88°

Cooling system



Coolant Temp.
> 88°

Cooling system



L/R ENG TEMP

COOLANT TEMPERATURE HIGH

- Check G1000 for **LOW COOL LVL** caution light
 - ❖ If **LOW COOL LVL** caution light OFF
 - ❖ During climb:
 - ⇒ Reduce power on affected engine by 10% or more as reqrd
 - ⇒ Increase airspeed by 10 KIAS or more as required
 - If coolant temp. not returning to green range within 60":
 - ⇒ reduce power on affected engine as much as possible and increase airspeed
 - ❖ During cruise:
 - ⇒ Reduce power on affected engine
 - ⇒ Increase airspeed
 - If coolant temp. not returning to green range:
 - ⇒ Be prepared for an engine failure; land at nearest suitable airfield
 - ❖ If **LOW COOL LVL** caution light ON
 - ⇒ Reduce power on affected engine
 - ⇒ Expect loss of coolant fluid
 - ⇒ Be prepared for an engine failure

Cooling system



COOLANT temperature high

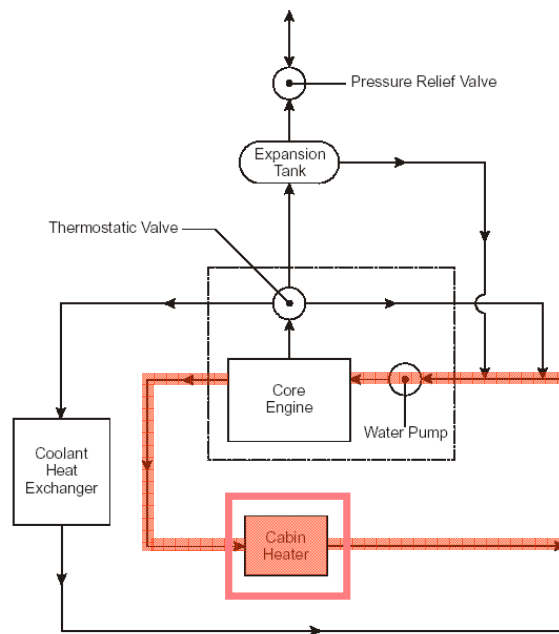
- Refer to **Emergency Checklist page 4, "L/R ENG TEMP"**

COOLANT temperature low

Remark: During low power descent from high altitude coolant temperature may decrease. Consider increasing power.

- Check G1000 for **LOW COOLANT LVL** caution light
 - If "LOW COOLANT LVL caution light" ON
 - ⇒ Reduce power on affected engine
 - ⇒ Expect loss of coolant fluid
 - ⇒ Be prepared for an engine failure

Cooling system



Cabin Heat

Cabin heating and defrosting system



Defrost from LH Engine

Cabin Heat from RH Engine



Ventilation



Cockpit

Cabin



Ventilation inlet

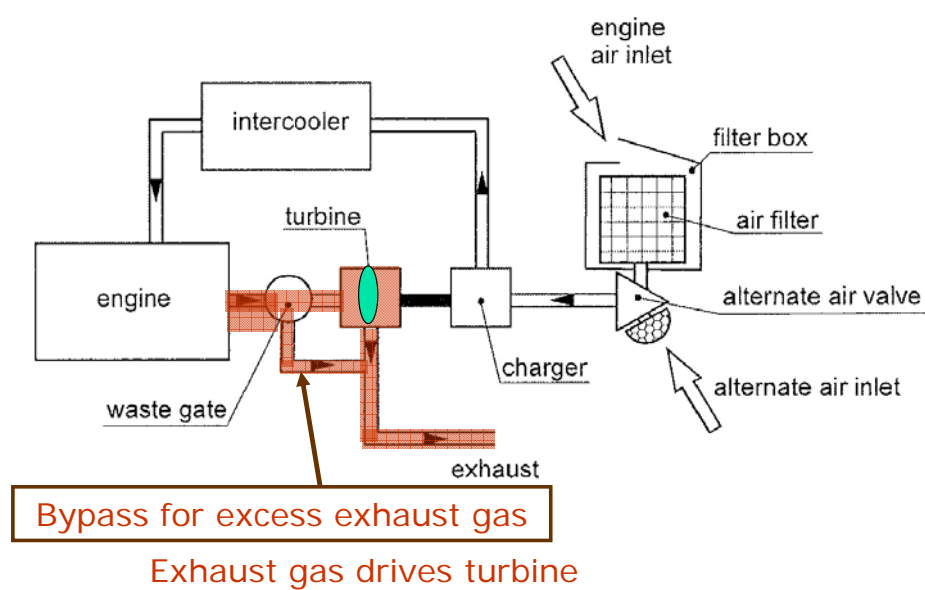


RH wing underside

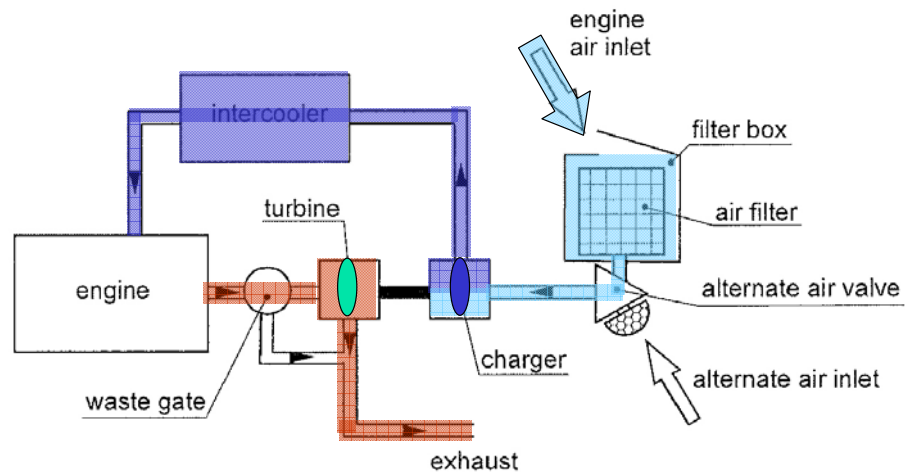
Turbocharger System



Turbo charger



Turbo charger



Compressor compresses intake air

Exhaust gas drives turbine

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Fuel System



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DA42 Fuel system



- 2 Tanks (left and right), each with 3 chambers:
- 2 x 26 USG capacity
- 2 x 25 USG usable
- = 50 USG (189 ltr)
- = 152 kg (at 0,80 kg/ltr)

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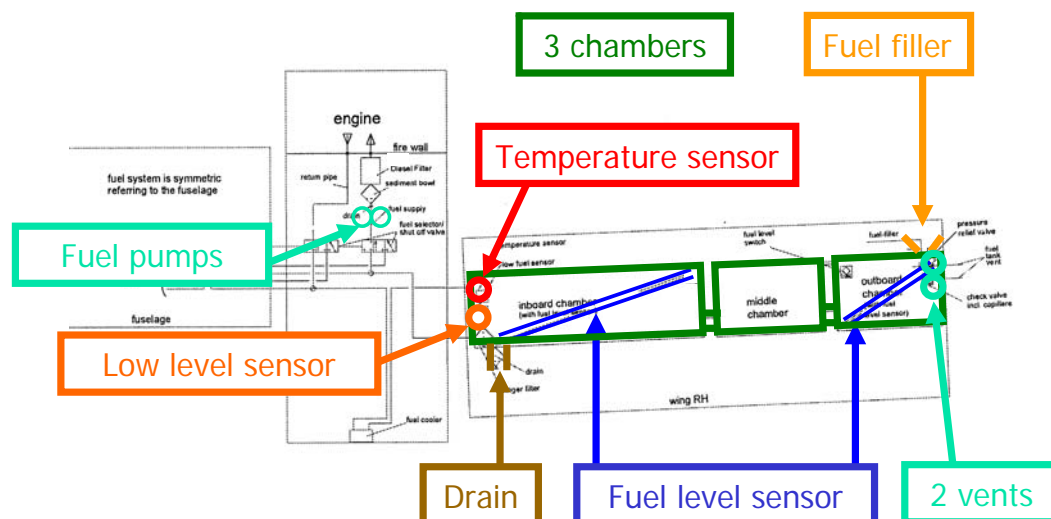
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DA42 Fuel system



- Max unbalance: 5 USG
- Fuel temperature limits:
 - -30° C to +60° C

DA42 Fuel system



DA42 Fuel system



Drain valve in nacelle (gascolator)



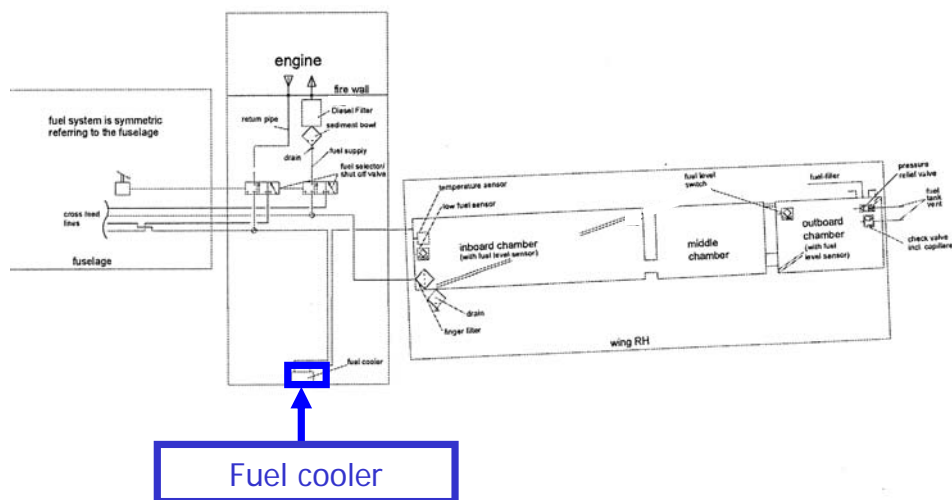
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DA42 Fuel system



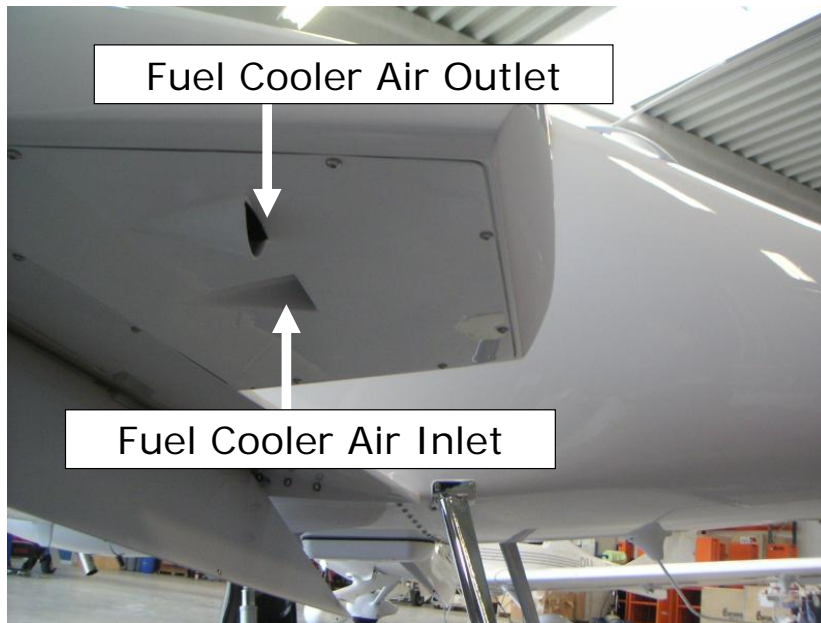
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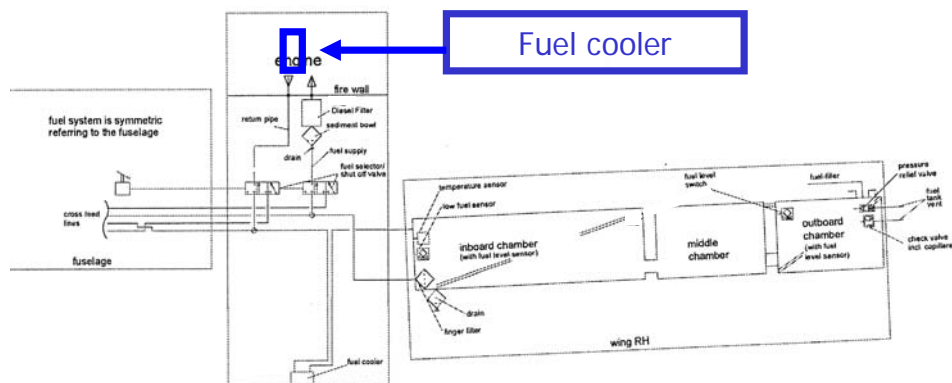
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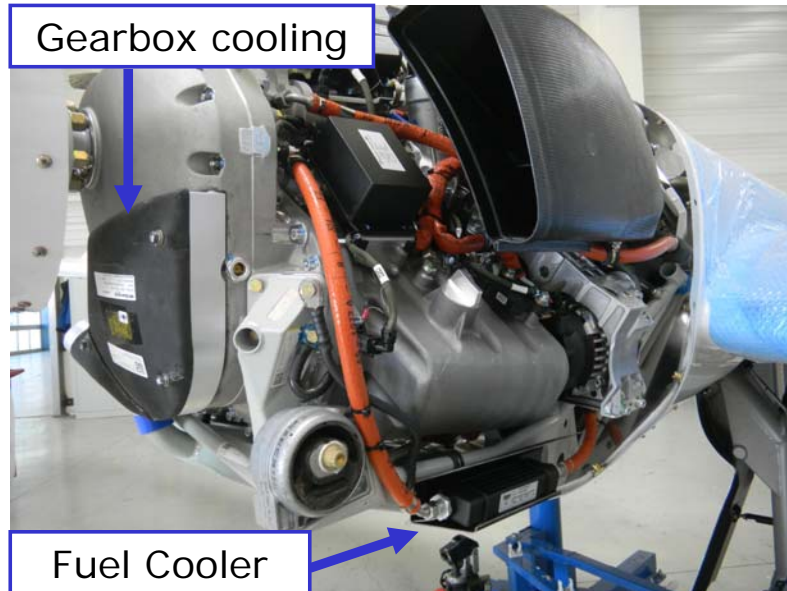
DA42 Fuel system



„dash-6“ Fuel system



„dash-6“ Fuel Cooler, Gearbox cooling

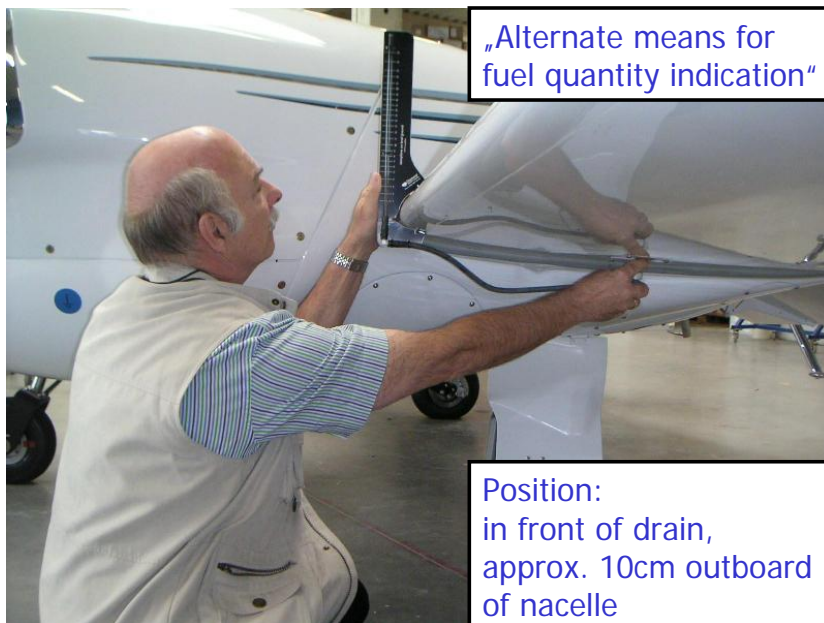


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DA42 Fuel system

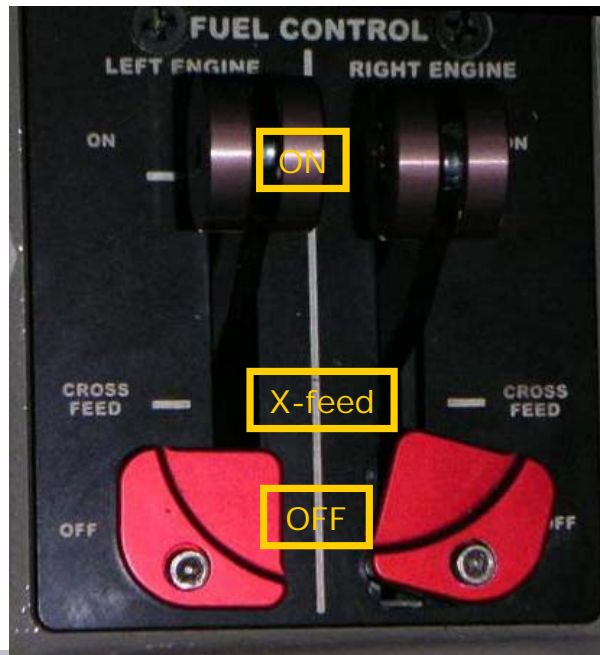


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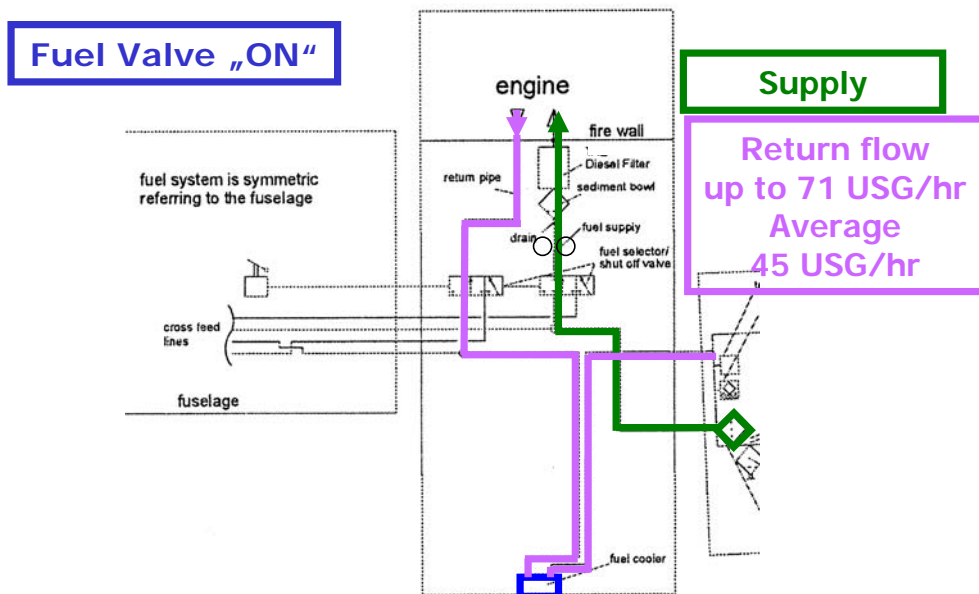
DA42 Fuel system



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DA42 Fuel system

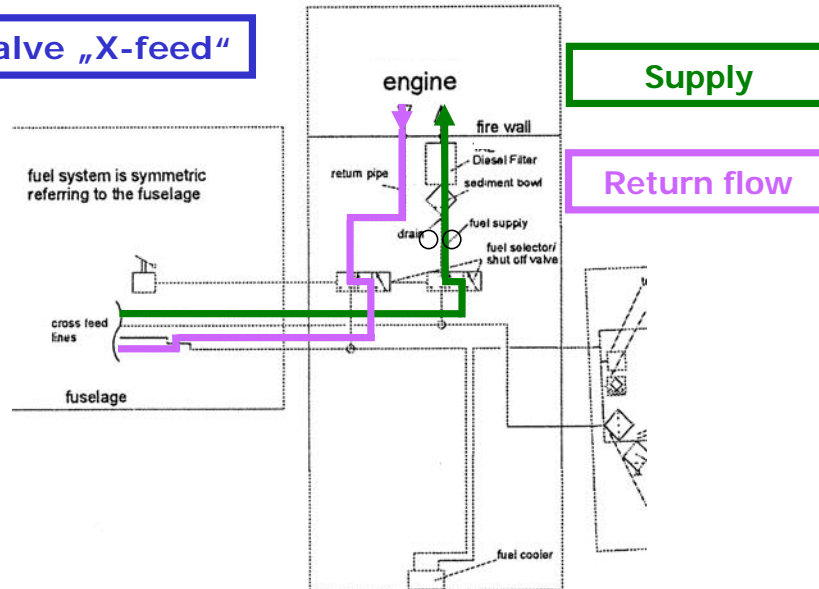


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DA42 Fuel system

Fuel Valve „X-feed“

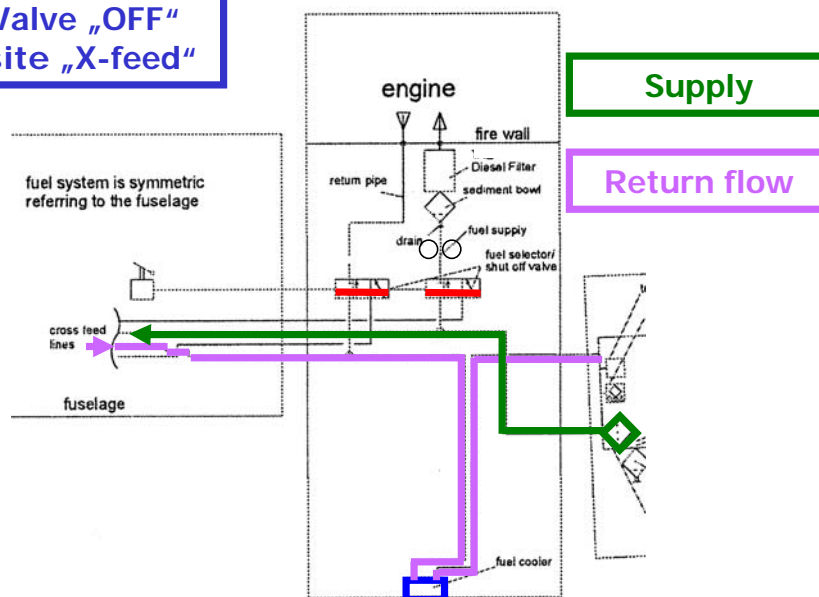


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DA42 Fuel system

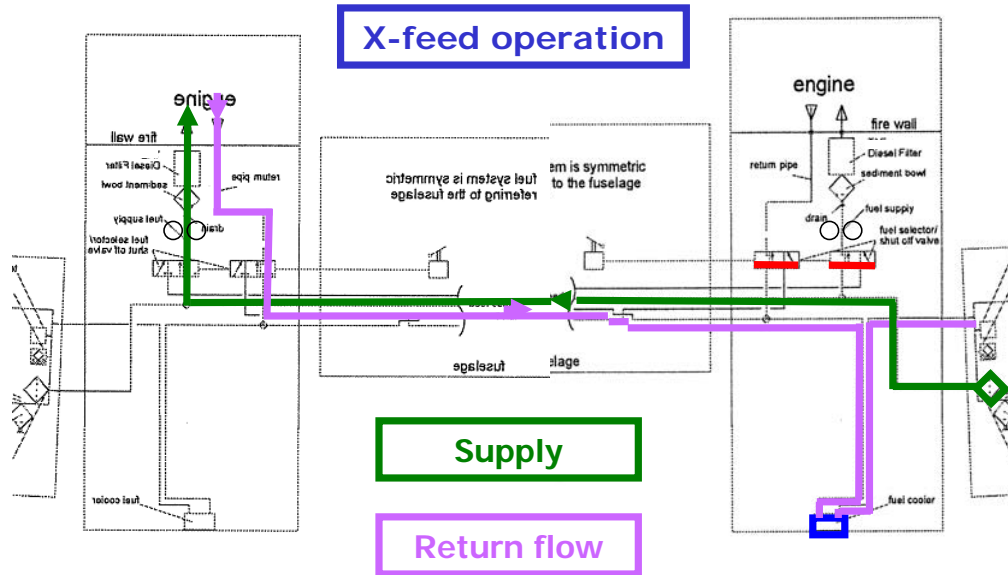
Fuel Valve „OFF“ opposite „X-feed“



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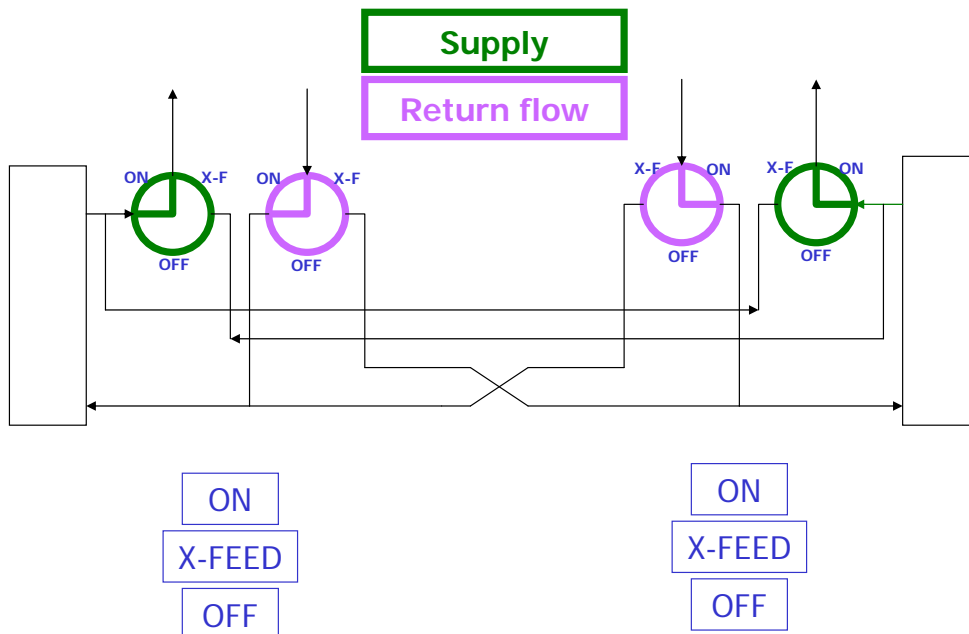
DA42 Fuel system



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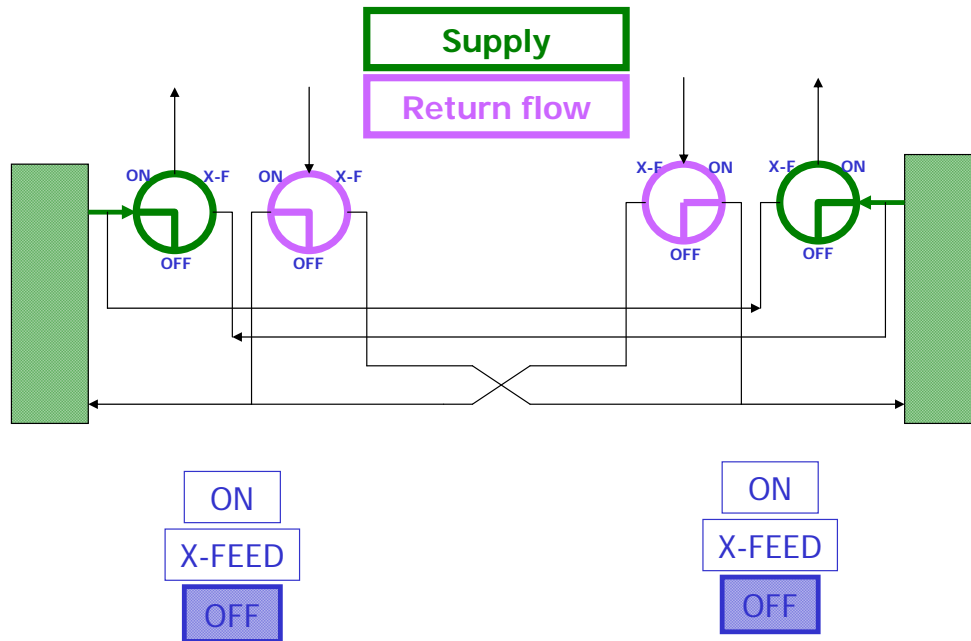
Fuel valves schematic



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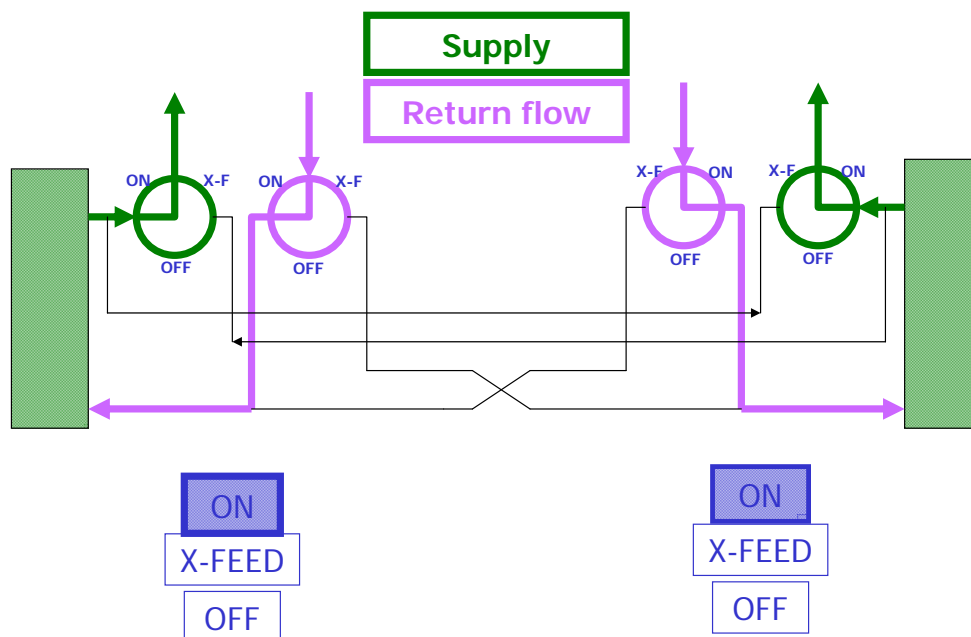
Both valves closed



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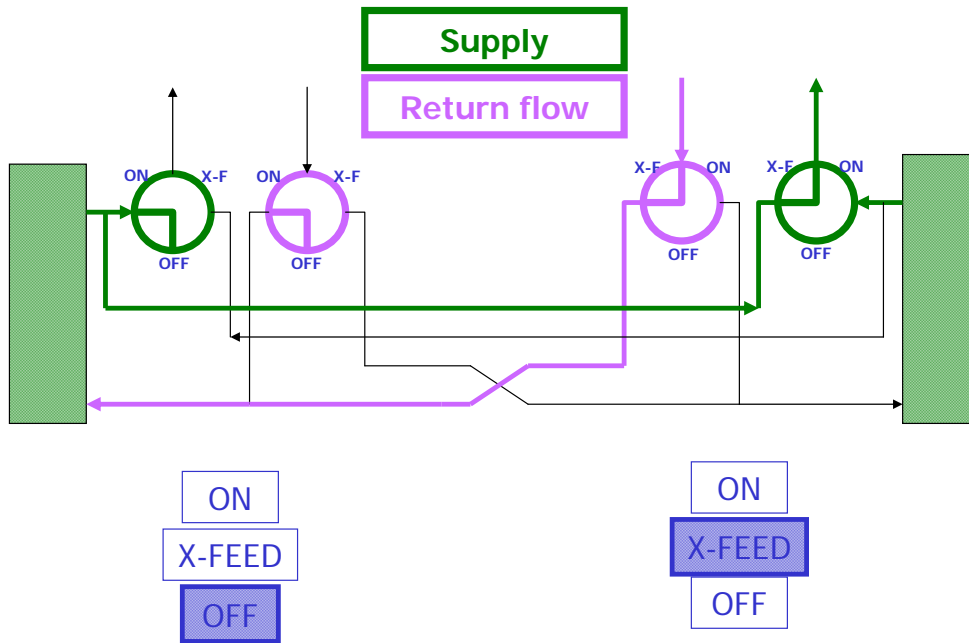
Both engines running



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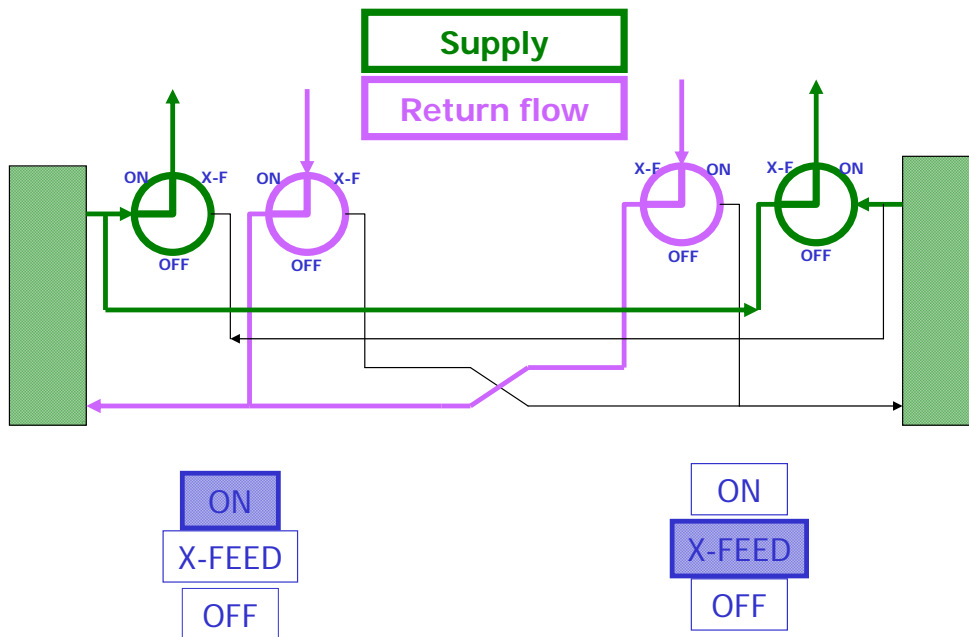
LH Eng. u/s, RH Eng. X-feed



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Both engines from LH tank



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Fuel system



- For each engine: 2 parallel electrical low pressure fuel pumps
 - Normal Ops: only one pump working
- When pump fails (low fuel pressure): automatic switch over to other pump
 - When ECU switches over: fuel pumps switch over as well
- For TKOF, LDG and with fuel press failure: both pumps switched on manually with FUEL PUMP switch
- DA42NG (NOT for „Dash-6“):
FUEL PUMP ON with CROSSFEED normally prohibited (only for emergency; special maintenance of high pressure pump required)

Fuel pumps



Fuel pumps



CHECK BEFORE ENGINE START	7 Fuel pumps (2).....OFF	7
CHECK AFTER ENGINE START	3 Fuel pumps (2) check OFF	3
	4 Fuel selectors (2) X-FEED	4
BEFORE TAKE OFF CHECK	21 Fuel pumps (2) ON	21
	22 Parking brakeRELEASED	22
End of Checklist		
AFTER TAKE-OFF PROCEDURE		
Brakes APPLY		
Gear UP		
Fuel pumps (2) OFF		
Climb power 92% / 2100 RPM		
Landing light..... OFF		
CLIMB TO CRUISE CHECK	3 Fuel pumps (2)..... CHECKED OFF	3
DESCENT / APPROACH CHECK	8 Fuel pumps (2)..... ON	8
AFTER LANDING CHECK	3 Fuel pumps (2).....OFF	3

Fuel pressure warning



- Warning annunciation:
L/R FUEL PRES

Fuel pressure warning



L/R FUEL PRES

FUEL PRESSURE LOW

- Check fuel quantity
- FUEL SELECTOR of affected engine: check ON
- FUEL PUMP of affected engine: ON
 - If warning remains:
 - ⇒ FUEL PUMP of affected engine: OFF
 - ⇒ FUEL SELECTOR of affected engine: CROSSFEED
 - If warning still remains:
 - ⇒ Be prepared for an engine failure



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Diamond DA42 NG



Optional Auxiliary Fuel Tanks

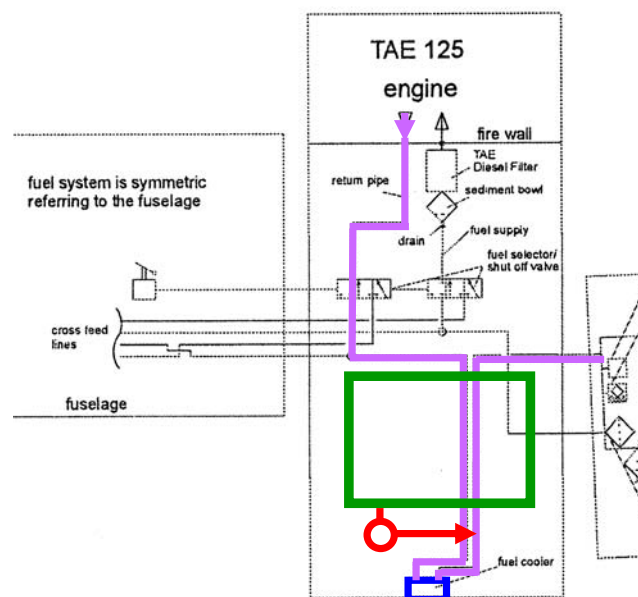


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Optional Auxiliary Fuel Tanks



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Optional Auxiliary Fuel Tanks



- One tank in each nacelle
- Capacity: 13,7 USG per side
- Useable: 13,2 USG per side

Optional Auxiliary Fuel Tanks



- Electrical transfer pump (auxiliary pump, „AUX PUMP“) feeds fuel from the AUX tank to the main tank
- Transfer must be initiated manually
- Transfer in 2 steps:
 - First half when main tank 17 USG or less (up to full main tank)
 - Second half when main tank again 17 USG or less

Optional Auxiliary Fuel Tanks



- AUX PUMP switched OFF automatically when:
 - Main tank is full
 - AUX tank is empty

Optional Auxiliary Fuel Tanks



Main tanks	AUX tanks	Total
2 x 25 USG	2 x 13,2 USG	2 x 38 USG
50 USG	26,4 USG	76,4 USG
Maximum unbalance between main tanks:		
5 USG		
1 USG if there is an unbalance between AUX tanks		

Optional Auxiliary Fuel Tanks



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Optional Auxiliary Fuel Tanks



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Optional Auxiliary Fuel Tanks



Optional Auxiliary Fuel Tanks



CAUTION light

- L/R AUX FUEL E
 - L/R AUX tank empty and fuel transfer pump ON

Optional Auxiliary Fuel Tanks



DA42 Twin Star

ABNORMAL PROCEDURES

L/R AUX FUEL E

AUXILIARY FUEL TANK EMPTY

⇒ L/R auxiliary fuel pump OFF

Optional Auxiliary Fuel Tanks



In case of a L or R AUX pump failure:
(AUX PUMP does not operate)

- Use x-feed function to keep fuel balance
- Amend flight plan for reduced amount of available fuel

Optional Auxiliary Fuel Tanks



DA42 Twin Star

ABNORMAL PROCEDURES

L/R Auxiliary fuel XFER FAIL

- **Both AUX PUMPS: OFF**
- **Check fuel pumps OFF**
- **Check fuel quantity**
- **Use X-feed to keep main tank fuel unbalance within 1 USG**
- **Switch remaining x-fer pump ON**
- **Use X-feed to keep main tank fuel unbalance within 1 USG**
- **Amend flight plan to allow for reduced amount of available fuel**

Optional Auxiliary Fuel Tanks



Mass and Balance

Item	Lever Arm (m)
Wing tanks	2.63
AUX tanks	3.20

Optional Auxiliary Fuel Tanks



Fuel quantity check

- Verify AUX empty
 - Electrical Master ON
 - Fuel transfer ON
 - L/R AUX FUEL E CHECKED
- Verify AUX full
 - Visual check

Optional Auxiliary Fuel Tanks



DA42 Twin Star

PREFLIGHT PROCEDURES

PREFLIGHT INTERIOR + EXTERIOR.

- 10 ** Fuel transfer ON – if L/R
AUX FUEL E caution ON:
AUX tank(s) empty
Fuel transfer OFF

PREFLIGHT EXTERIOR Left engine nacelle

- ** Check AUX tank full ?

Right engine nacelle

- ** Check AUX tank full ?

- Fuel quantity between „FULL“ and „EMPTY“ cannot be determined

Optional Auxiliary Fuel Tanks



Preflight fuel management

- If possible transfer all AUX fuel to main tanks
 - Use external power or one engine running
 - Electrical Master ON
 - Fuel transfer ON
- until
- **L/R AUX FUEL E** ON
- (will take 10 minutes or even longer)



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Diamond DA42 NG

Diesel Operation



DA42NG Diesel Operation

The following item is added to the Modifications checklist:

Modification	Source	Installed	
Diesel Operation	OÄM 42-251	<input type="checkbox"/> yes	<input type="checkbox"/> no

9.2 LIST OF SUPPLEMENTS

The following item is added:

Airplane S/N:		Registration:		Date:	
Sup. No.	Title	Rev. No.	Date	applicable	
				YES	NO
O05	Diesel Operation	0	06-Dec-2013	<input type="checkbox"/>	<input type="checkbox"/>

DA42NG Diesel Operation



■ Fuel Temperature

■ Diesel Operation

- Minimum: -30°C
- Maximum: 60°C

■ Modified G1000 Software:

Indi- cation	Red arc/bar = lower prohibited range	Yellow arc/bar = caution range	Green arc/bar = normal operating range	Yellow arc/bar = caution range	Red arc/bar = upper prohibited range
Fuel temp.	below -30°C	-30° to +4°C	+5° to 55°C	55° to 60°C	above 60°C

DA42NG Diesel Operation



■ Operational Limitations:

No engine start below	No take-off below	Diesel Fuel Class
-5°C (+23°F)	+5°C (+41°F)	Diesel Fuel of unknown class or unknown fuel blend
-10°C (+14°F)	-5°C (+23°F)	Diesel Fuel Class C
-15°C (+5°F)	-10°C (+14°F)	Diesel Fuel Class D, E or F

DA42NG Diesel Operation



Diesel Fuel Classes (EN 590)

(„Temperate“ climatic zones)

Property	Unit	Limits					
		Class A	Class B	Class C	Class D	Class E	Class F
CFPP	° C	+5	0	-5	-10	-15	-20
CFPP	° F	+41	+32	+23	+14	+5	-4

CFPP Cold filter plugging point

„Winter Diesel“: Class F

„Arctic“ climatic zones: other classes

DA42NG Diesel Operation



- Diesel Fuel or a blend of Diesel Fuel with JET Fuel is not permitted in the auxiliary tanks.
- If JET Fuel is used, make sure that no Diesel Fuel is remaining in the tanks.
- Otherwise the temperature limitations for Diesel Fuel operation must be observed.
- The fuel filter is not heated!

DA42NG Diesel Operation



- If the airplane is operated in a cold environment, it must be changed from Diesel Fuel operation to JET Fuel operation.
- To ensure that no blend of JET Fuel with Diesel Fuel is in one of the tanks, each tank must be refilled at least twice with more than 17.2 US gal (65 l) of JET Fuel. Otherwise both tanks must be drained before refueling with JET Fuel.

NOTE

- In order to provide information about the fuel grade it is recommended to enter the fuel grade in the airplane log each time fuel is refilled.

DA42NG Diesel Operation



Performance below 10° C OAT

TKOF Ground Roll	(normal and short field)
TKOF Distance	Add 7%
Climb	(Flaps UP and Flaps APP) Reduce by 60 ft/min
1-engine climb	Reduce by 30 ft/min

Make calculation from the basic AFM value before calculating additional corrections from other Supplements.

Diamond DA42 NG



Electrical System



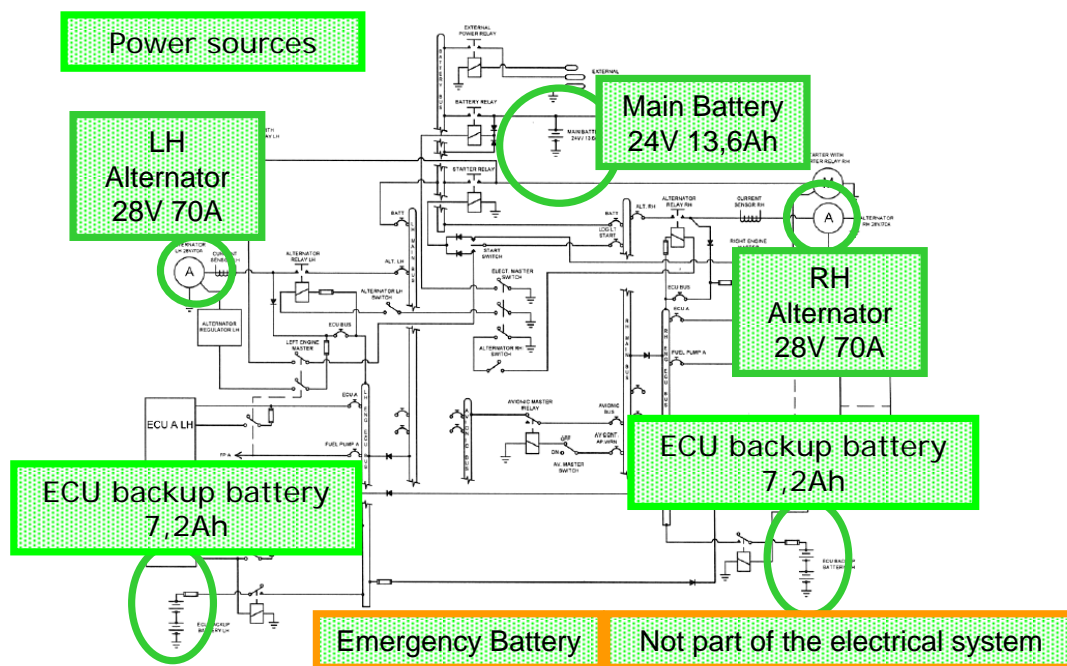
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Electrical system



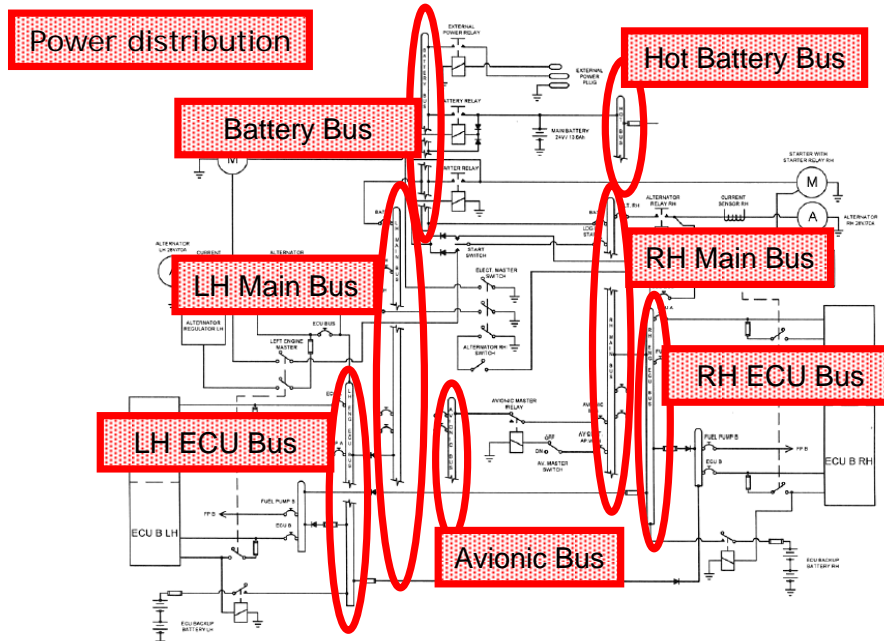
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Electrical system



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Electrical system

There are 2 versions of the electrical system

- „Modified electrical system“:

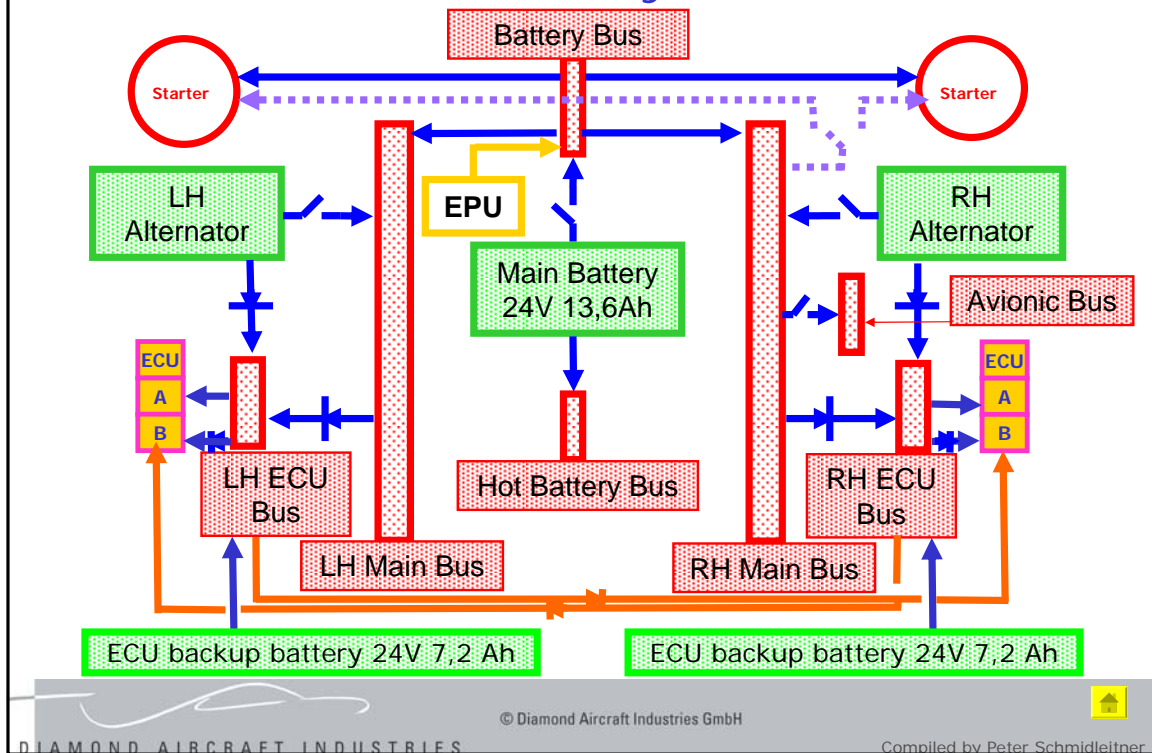
Modification of the Electrical System	MÄM 42-403	<input type="checkbox"/> yes	<input type="checkbox"/> no
---------------------------------------	------------	------------------------------	-----------------------------

„Standard“ in the „Dash-6“

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„Modified“ Electrical system



Hot battery bus



- Pilot map / reading light

PARKING CHECK

10	Electric Master.....	OFF	10
11	Interior light	CHECKED OFF	11

Battery bus

- LH / RH Main Bus
- LH / RH starter heavy duty power
- LH / RH ECU BUS (via diode)

LH Main bus



- PFD
- Air Data Computer
- AHRS
- COM 1
- GPS/NAV 1
- Transponder
- Engine Instruments
- Pitot heating
- Oxygen system
- Gear control
- Gear warning
- Map light
- Flood light
- Taxi light
- Anticollision lights

RH Main bus



- Avionic Bus
- MFD
- Horizon
- Starter control
- Flap system
- Avionic/CDU cooling fan
- Stall warning
- Autopilot warning
- Landing light
- Navigation lights
- Instrument lights

Avionic bus



- COM 2
- GPS/NAV 2
- Audio panel
- Autopilot
- (Data Link)
- (WX 500)
- (ADF)
- DME
- (Weather Radar)

Electrical system



Electric Master

- Connects Battery Bus to Battery (Battery Bus powers L/R Main Bus)
- Enables Alternator Switches



Electrical system



L/R Alternator switch

- Connects L/R Alternator to L/R Main Bus
- (In normal operation Alternator switches are always ON)



Electrical system



L/R Engine Master

- Enables starter activation
- Connects L/R ECU (A+B) to L/R ECU Bus
- Provides power for „GLOW“ and unfeathering accumulator
- Connects L/R alternator field to the ECU Backup Battery



Electrical system



Avionic Master Switch

- Connects Avionic Bus to RH Main Bus



External power connection



Engine start with external power



DA 42 NG AFM



Abnormal Operating
Procedures

4B.8 STARTING ENGINE WITH EXTERNAL POWER

- 4. ENGINE MASTER ON, LH side
- 12. Idle RPM check, 740 ±30 RPM
- 13. External power disconnect
- 14. RH engine start with normal procedure



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Engine start with external power



Checklist:

If starting with external power:

- | | | | |
|---|----------------------|-------------|---|
| a | Prop area | CHECK CLEAR | a |
| b | External power | CONNECT | b |

21 Electric master ON 21

ENGINE START PROCEDURE

Normal sequence: first start LH engine

If external power was used:

External power DISCONNECT

Start RH engine, procedure as above



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Engine start with external power



■ Why?

- With the start of the RH engine using the aircraft electrical system you check the battery status.
- If the battery is too weak it will not „buffer“ the load of the RH starter motor, the LH alternator voltage will drop considerably, and the RH starter will not operate

No Night VFR or IFR with empty battery!

Therefore:

No Night VFR or IFR if engine start with external power was necessary.

Electrical malfunctions



COMPLETE ELECTRICAL FAILURE

* Leave icing area

- | | | | |
|---|--|-----------------|---|
| 1 | Circuit breakers..... | CHECK all IN | 1 |
| | ● If no success: | | |
| 2 | Emergency switch | ON | 2 |
| 3 | Flood light, if necessary..... | ON | 3 |
| 4 | Power | SET | 4 |
| | according power lever position and/or engine noise | | |
| 5 | Flaps | VERIFY POSITION | 5 |

Land at nearest suitable airfield

Landing gear may slowly extend

For landing apply "Manual extension of landing gear"

Electrical malfunctions



L/R ALTN FAIL

ALTERNATOR FAILED

- If in icing conditions:
 - ⇒ Leave icing area as soon as practicable
- Alternator on affected side OFF
- Monitor bus voltage
- Reduce electrical consumers
 - If both alternators failed:
 - ⇒ See Abnormal Checklist "Both Alternators failed", page 19

L/R VOLTS LOW

BUS VOLTAGE TOO LOW

Remark: possible reasons are

- fault in the electrical power supply
- Alternators OFF

- Continue with "Engine instrument indications outside of green range" – VOLTS low, page 19

Electrical malfunctions



VOLTS low

- ❖ On ground:
 - ⇒ Check alternators ON
 - ⇒ Check circuit breakers
 - If LOW VOLTS CAUTION still indicated on the G1000:
 - ⇒ Discontinue operation; terminate flight preparation
- ❖ In flight:
 - ⇒ Check alternators ON
 - ⇒ Check circuit breakers
 - ⇒ Switch off unnecessary electrical equipment
 - If LOW VOLTS CAUTION still indicated on the G1000:
 - ⇒ Apply L/R ALTN FAIL caution procedure, page 15

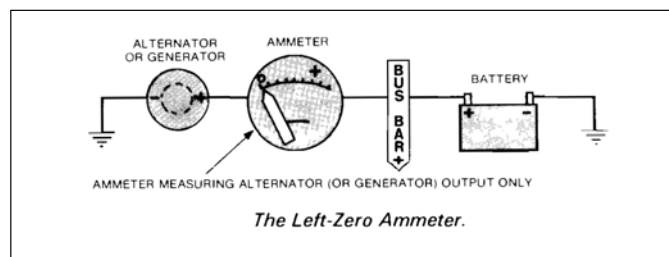
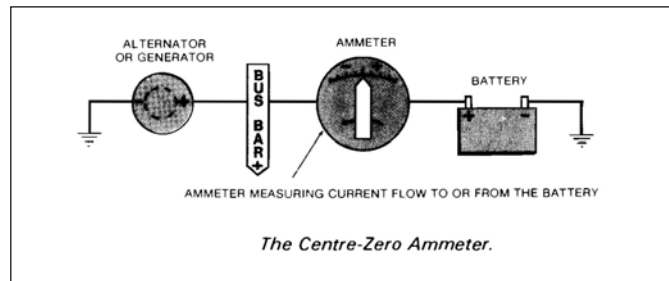
Both alternators failed

- Avionic Master: OFF
- LH/RH Alternator: OFF
- Transponder: STBY
- Gear: DOWN
 - When down and locked:
 - ⇒ Pull manual gear extension handle
- Stall/Pitot heat: OFF
- All lights: OFF
 - ⇒ Expect battery power to last for 30 minutes
 - ⇒ Expect engine stoppage after this time
 - ⇒ Land ASAP

Electrical system



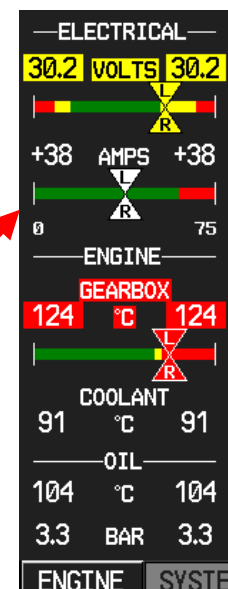
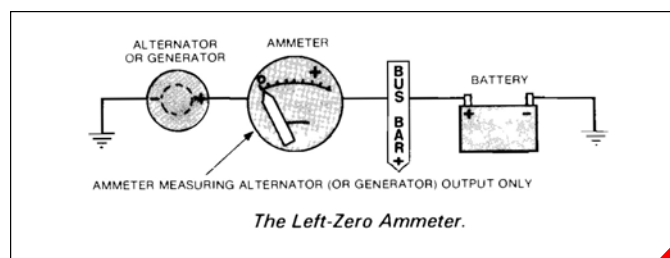
2 types of amperemeter:



Electrical system



Amperemeter on the G1000:





Oxygen System

Oxygen system

- Continuous Flow System
- Operation up to 18.000 ft
- Oxygen cylinder (system) pressure:
MAX 1850 psi at 21° C
(i.e. 50 cubic feet, 1.41 cubic meters)
- 4 cannulas plus 1 mask
- Acc. AFM to be used above 10.000 ft

Oxygen system



Duration using masks and standard cannulas (hours)

Number of users	10,000 ft (MSL)	15,000 ft (MSL)	18,000 ft (MSL)
1	20.3	16	7.4
2	10	8	3.7
3	6.8	5.3	2.5
4	5	4	1.8

Duration using Oxysaver® cannulas (hours)

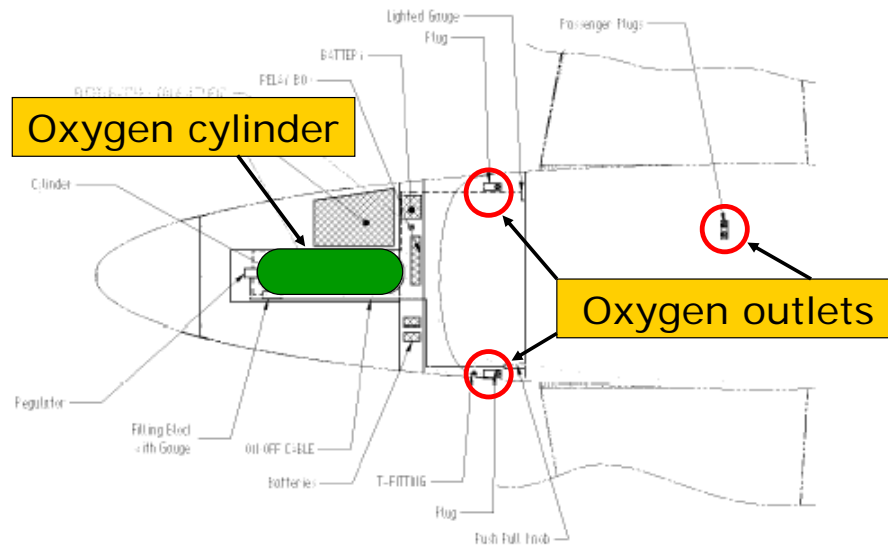
Number of users	10,000 ft (MSL)	15,000 ft (MSL)	18,000 ft (MSL)
1	60	50	32
2	29.8	25	16
3	20	16.5	10.6
4	15	12	8

Oxygen system



- Exact calculation of duration :
 - see AFM supplement
 - it depends on the
 - oxygen cylinder pressure
 - number of users and types of dispensing equipment
 - flight altitude

Oxygen system



Oxygen system



Oxygen system



Oxygen system

Filling table

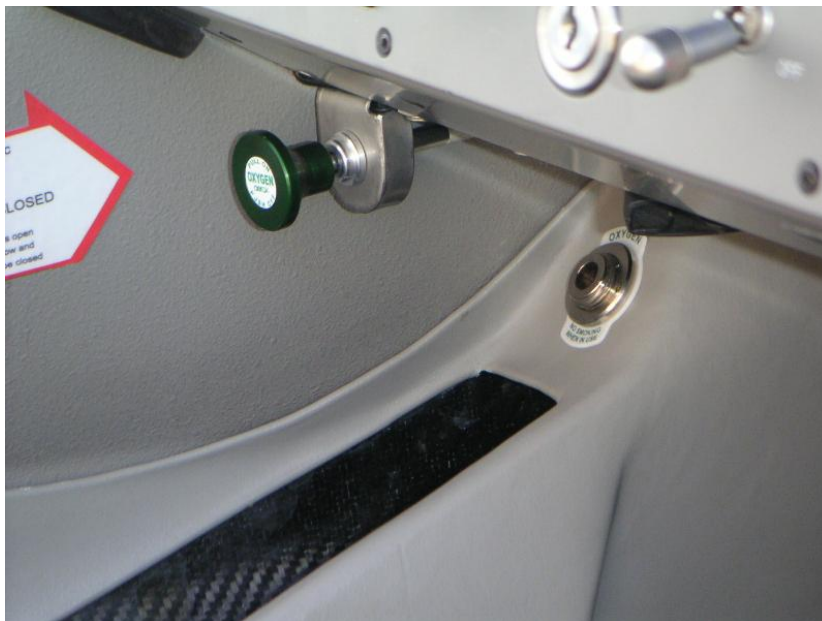
to achieve a cylinder (system) pressure of 1850 psi

Ambient Temperature °C (°F)	Filling Pressure [psi]	Ambient Temperature °C (°F)	Filling Pressure [psi]
-18 (0)	1650	10 (50)	1875
-12 (10)	1700	16 (60)	1925
-7 (20)	1725	21 (70)	1975
-1 (30)	1775	27 (80)	2000
4 (40)	1825	32 (90)	2050

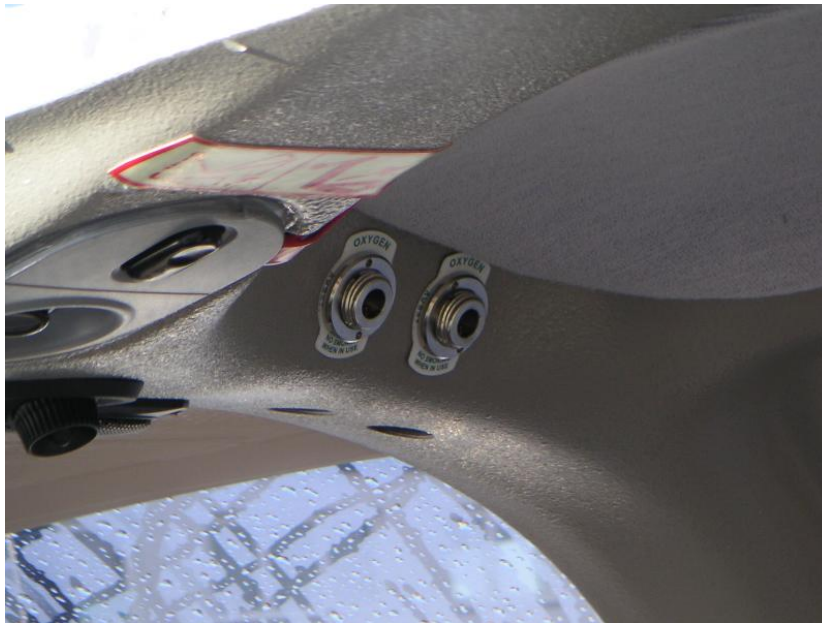
Oxygen system



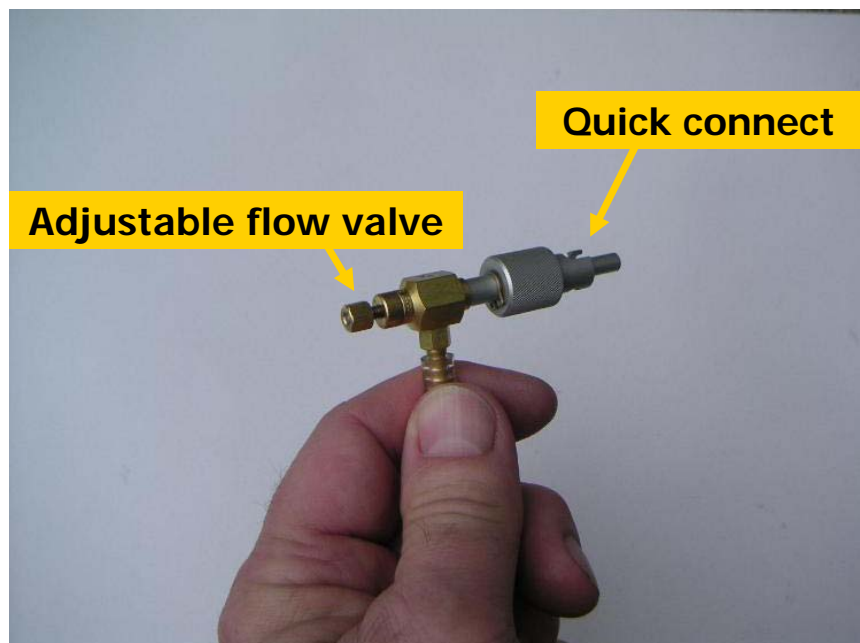
Oxygen system



Oxygen system



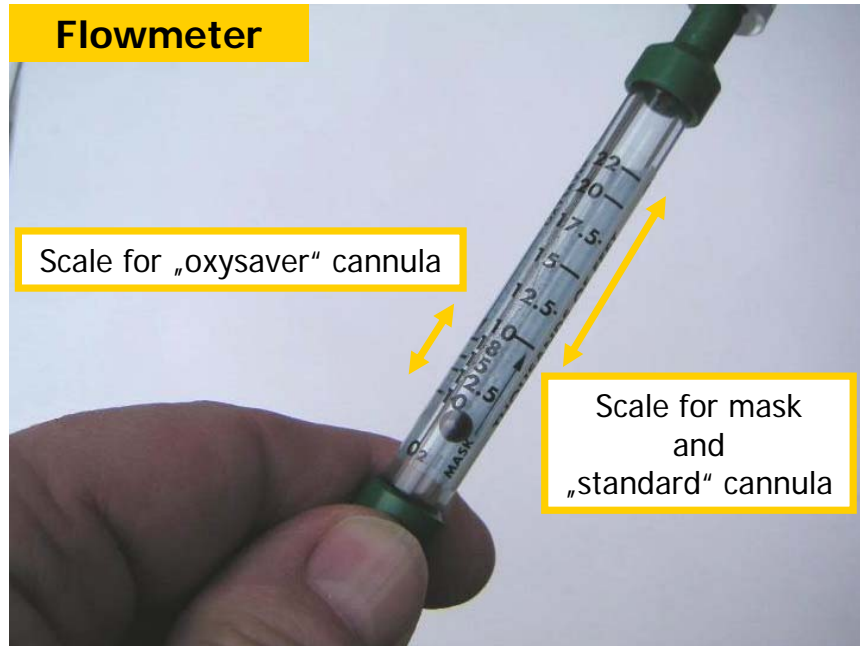
Oxygen system



Oxygen system



Flowmeter



Oxygen system



Oxygen system



Mass and Balance

Item	Lever Arm (m)
Oxygen cylinder	0.82

In fact relevant for removal only.
Full Oxygen: CG moves FWD ~ 2mm

Oxygen system



CABIN SMOKE ABOVE 10.000 FT

- | | | | |
|---|-----------------------------------|----------|---|
| 1 | Oxygen | CHECK ON | 1 |
| 2 | Emergency descent | INITIATE | 2 |
| | When passing 10.000 ft | | |
| 3 | Oxygen | OFF | 3 |
| | Land at nearest suitable airfield | | |

CABIN FIRE ABOVE 10.000 FT

- | | | | |
|---|-----------------------------------|----------|---|
| 4 | Oxygen | PUSH OFF | 1 |
| 5 | Emergency descent | INITIATE | 2 |
| | Land at nearest suitable airfield | | |

OXYGEN PRESSURE LOSS ABOVE 10.000 FT

- | | | | |
|---|--|--------------------|---|
| 1 | Oxygen | PUSH OFF | 1 |
| 2 | Oxygen pressure | CHECKED, note down | 2 |
| 3 | Emergency descent | INITIATE | 3 |
| | When passing 10.000 FT: | | |
| 4 | Oxygen pressure | CHECK AGAIN | 4 |
| | ✦ If oxygen pressure constant: Continue flight | | |
| | ✦ If oxygen pressure dropped: Land at nearest suitable airfield | | |

Diamond DA42 NG



Ice Protection System



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Ice protection system



Fluid ice protection system

Product of

**CAV Aerospace Ltd
(Celtic Aerospace Ventures Ltd)**

commonly known as
„TKS“



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„TKS“ Ice Protection General

Ice protection system

- How does it work?
 - Protection fluid acts as a „freezing point depressant“ (FPD)
 - Water droplets in the air combine with FPD fluid to form a mixture with a freezing temperature below the temperature of the ambient air

Ice protection system



- Two means of FPD fluid application:
 - Spray nozzles (windshield, propeller)
 - Propeller:
 - Feeding into a „slinger ring“
 - Feeder tube to (rubber) leading edge
 - Porous skin panels

Ice protection system



- Freezing point of glycol:
 - -12° C
- Freezing point of glycol/water mixture:
 - is lower !!!

Ethylene glycol freezing point vs. concentration in water

Weight Percent EG (%)	Freezing Point (deg F)	Freezing Point (deg C)
0	32	0
10	25	-4
20	20	-7
30	5	-15
40	-10	-23
50	-30	-34
60	-55	-48
70	-60	-51
80	-50	-45
90	-20	-29
100	10	-12

The „Eutectic-phenomenon“

„TKS“ Ice Protection DA42

Ice protection system



Ice protection system

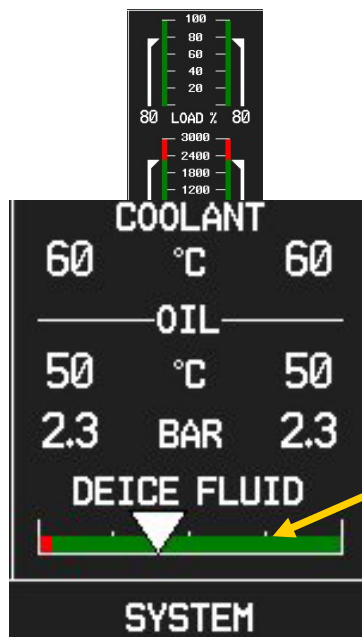


DIAMOND AIRCRAFT INDUSTRIES

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Ice protection system



Minimum for dispatch:
22 liters

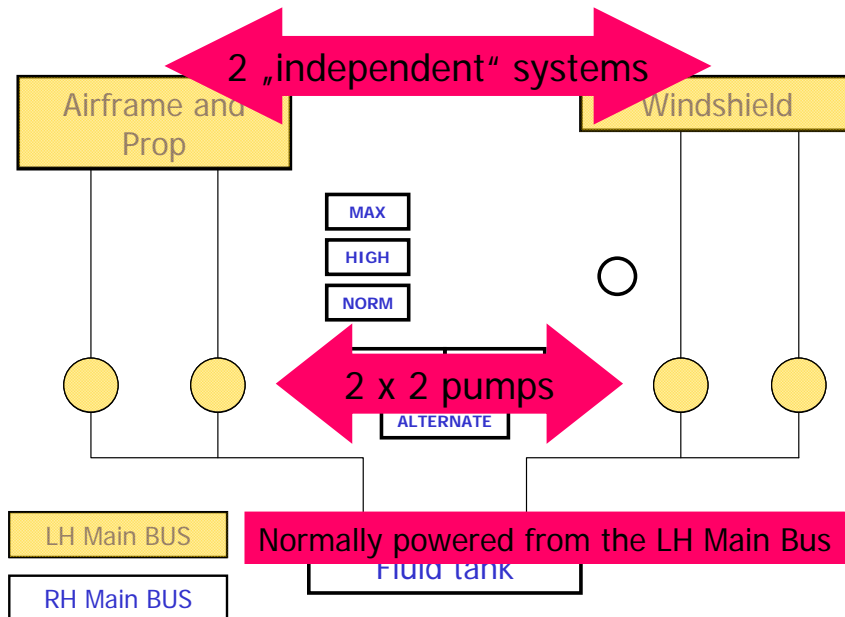
3/4

DIAMOND AIRCRAFT INDUSTRIES

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Ice protection system



Ice protection system



Windshield ice protection

- 2 pumps for redundancy
- Only one pump operative at a time
- Operated for 5 seconds by a push button

Ice protection system



Operational modes

Mode	Designed to	Selected when
NORM	cover the more frequent but less severe known icing conditions as defined by CS25/FAR Part 25, Appendix C	icing conditions are encountered and prior to ice formation
HIGH	cover all known icing conditions as defined by CS25/FAR Part 25, Appendix C	icing conditions are more demanding or ice has already accumulated
MAX	provide maximum possible protection for conditions outside the icing envelope as defined by CS25/FAR Part 25, Appendix C	

Ice protection system

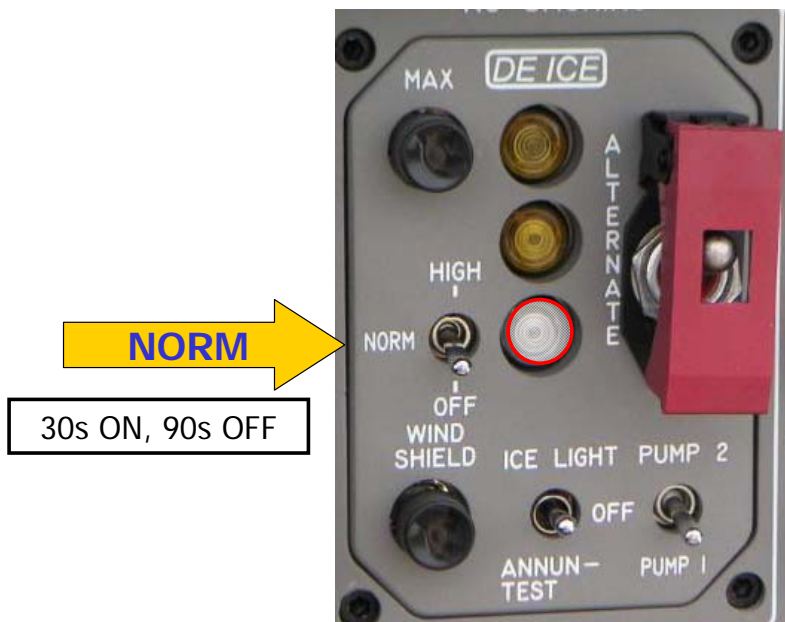


Operational modes

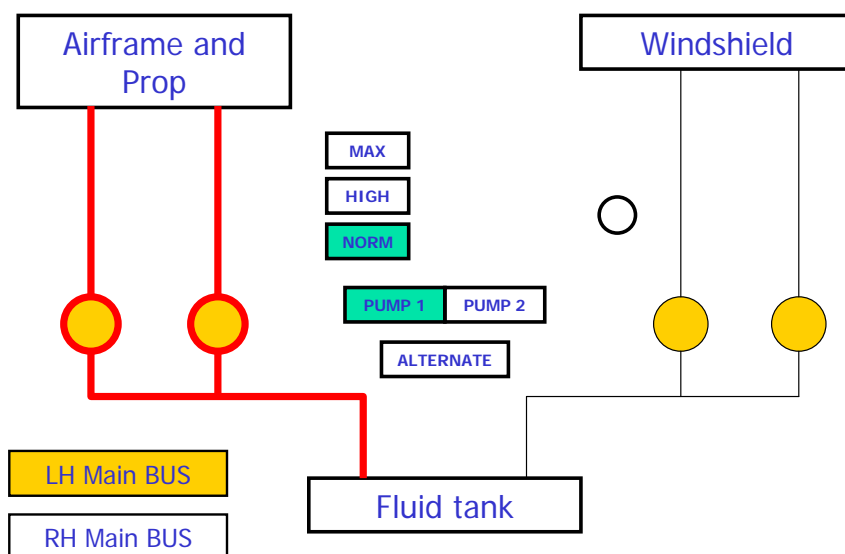
Mode			Operating mode	Operating time
NORM *)	Climb + Cruise		2 pumps simultaneously, but cycled 30 secs ON and 90 secs OFF	~ 2,5 hrs
HIGH **)		Approach	1 pump continuously ON	~ 1,0 hr
MAX			2 pumps simultaneously ON for 2 minutes	~ 0,5 hr

*)	If no shedding of the ice in NORM mode → HIGH
**)	If no shedding of the ice in HIGH mode → proceed with checklist INADVERTENT ICING ENCOUNTER & EXCESSIVE ICE ACCUMULATION

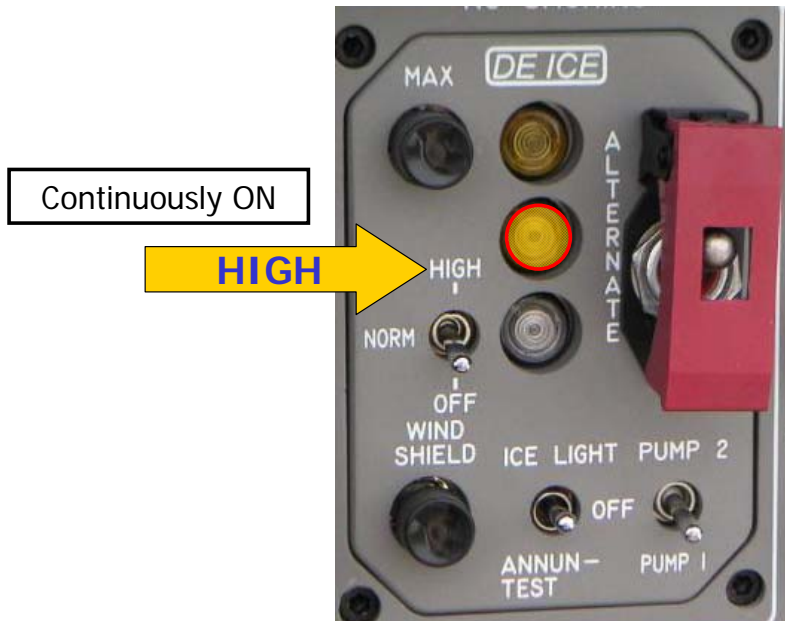
Ice protection system



Ice protection system



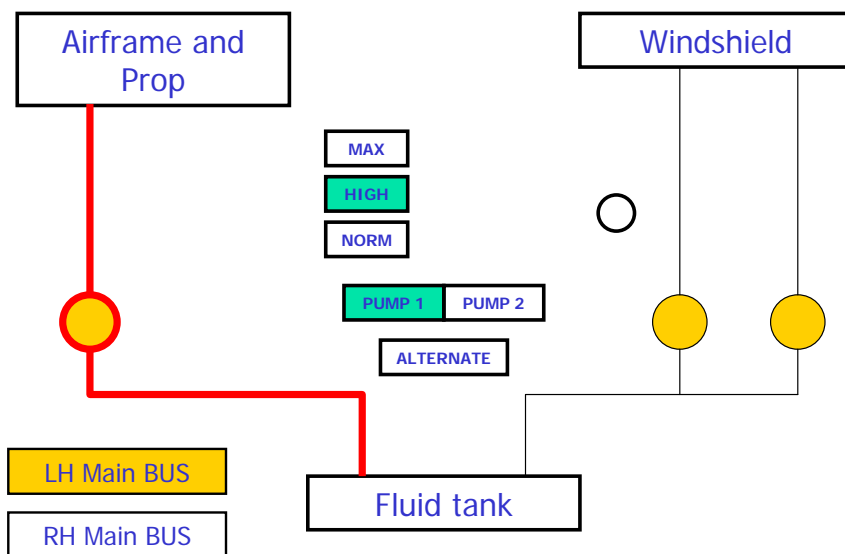
Ice protection system



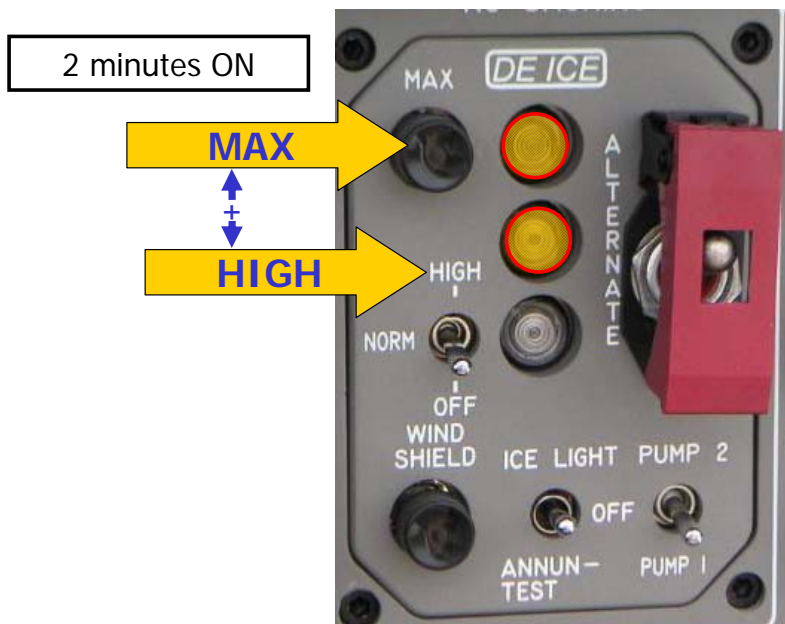
Continuously ON

HIGH

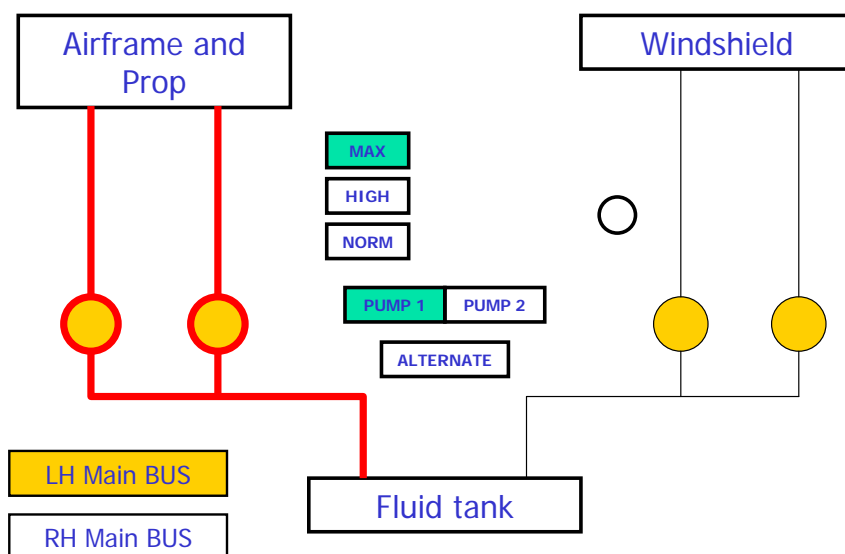
Ice protection system



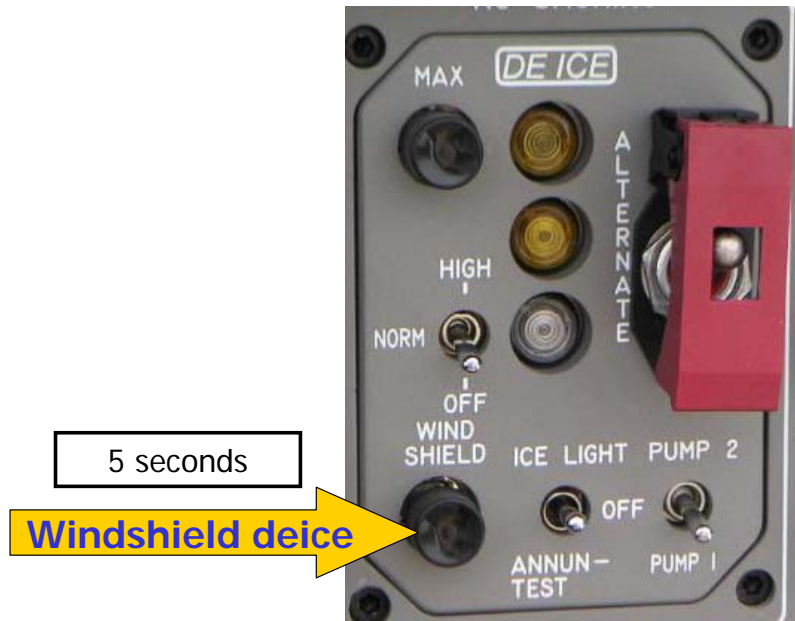
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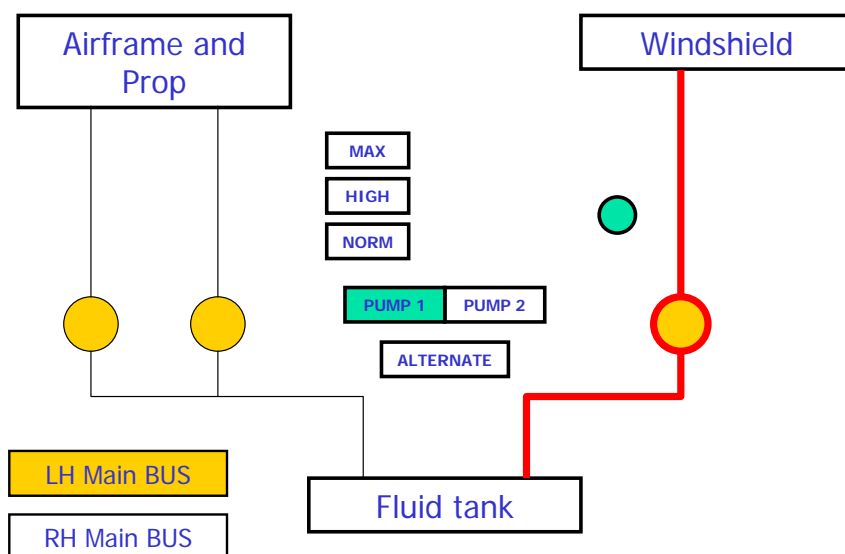
Ice protection system



Ice protection system



Ice protection system

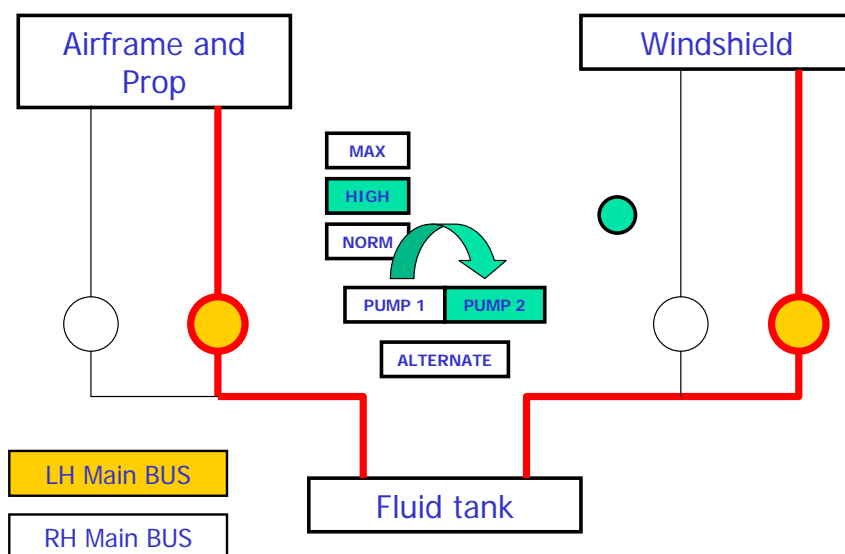


Ice protection system



Main and Windshield pump selector

Ice protection system



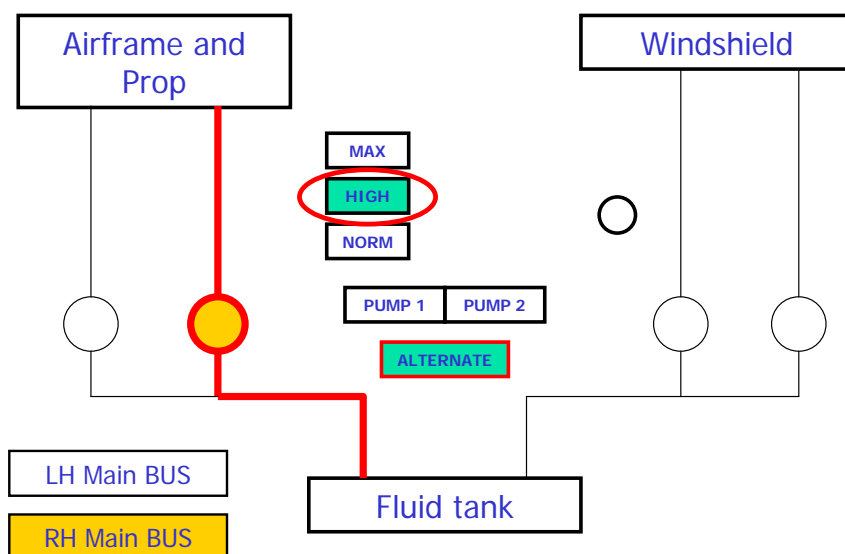
Ice protection system



ALTERNATE switch connects pump #2 directly to RH main bus

System operates in HIGH mode

Ice protection system



Ice protection system



Ice protection system



CAUTION lights

- DEIC PRES LO
 - De-icing pressure is low
- DEIC PRES HI
 - De-icing pressure is high
- DEICE LVL LO
 - De-icing fluid level is low (below 10 ltrs)
 - max 45 mins in NORM mode,
 - max 22 mins in HIGH mode

Ice protection system



DEICE LVL LO light ON

DEIC PRES LO light ON
after 120 seconds

Annunciator test

(simulates system ON)

Ice protection system



CHECK BEFORE ENGINE START

27	* De-ice ANNUN TEST.....	ON	27
28	* DEICE LVL LO caution ...	CHECKED ON if applic.	28
29	* Windshield de-icing.....	PUMP 1 + 2 CHECKED	29



2 minutes

44	* DEIC PRESS LO caution.....	CHECKED ON	44
45	* De-ice ANNUN TEST.....	OFF	45

Ice protection system



PREFLIGHT INTERIOR + EXTERIOR.

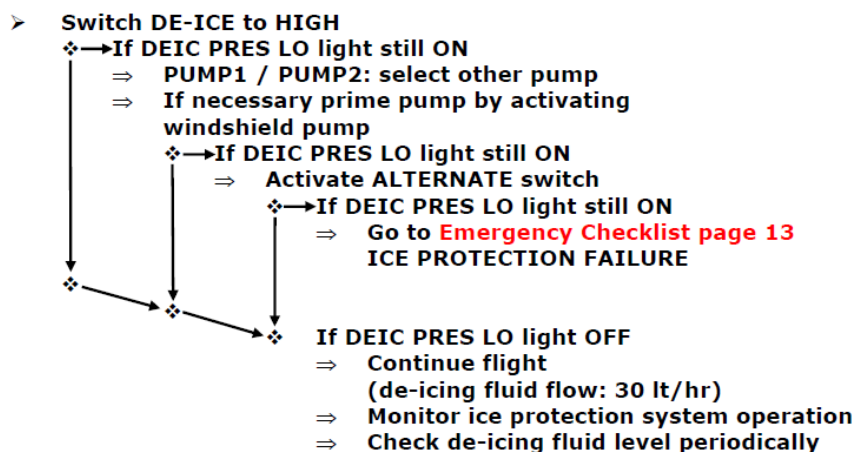
- 7 Electric Master ON
- 13 * Check de-ice fluid quantity
- 14 * Select de-ice pump 1
- 15 * De-ice HIGH/MAX
- 16 * Check DEIC PRES LO+HI out
- 17 * Select de-ice pump 2
- 18 * Check DEIC PRES LO+HI out
- 19 * Ice lights ON
- 20 * Check de-ice function
- 21 Check external lights
- 22 Check stall warning
- 23 Check pitot tube heat
- 24 Pitot heat OFF
- 25 External lights OFF
- 26 * De-ice, ice lights OFF
- 27 Electric Master OFF

Ice protection system



DEIC PRES LO

DE-ICING PRESSURE LOW



DEIC PRES HI

DE-ICING PRESSURE HIGH

- Possible reduced system performance
- Filter cartridge to be replaced at next scheduled maintenance

Ice protection system



UNINTENTIONAL FLIGHT INTO ICING

Leave icing area, continue with item 1

* INADVERTENT ICING ENCOUNTER & EXCESSIVE ICE ACCUMULATION

- | | | | |
|---|---------------------------|-----------------------|---|
| 1 | Pitot heat..... | ON | 1 |
| 2 | Cabin heat & defrost..... | ON | 2 |
| 3 | Power | INCREASE PERIODICALLY | 3 |
| 4 | * De-ice systems | USE as appropriate | 4 |
| 5 | Alternate air..... | OPEN | 5 |
| 6 | Emergency windows | OPEN as required | 6 |

- * When de-ice system does not work properly:
Continue with ICE PROTECTION FAILURE

* ICE PROTECTION FAILURE

- | | | | |
|---|----------------------------------|-------------------------|---|
| 1 | Airspeed | MIN 118 KIAS | 1 |
| 2 | Flaps..... | limited to APP position | 2 |
| 3 | Slip angle | MINIMIZE | 3 |
| 4 | Approach with residual ice | 90 KIAS | 4 |
| 5 | Landing distance | CHECK AFM | 5 |

Ice protection system



Approved fluids

- For use in the system:
 - AL-5 (DTD 406B)
 - Aeroshell Compound 07
- For de-icing on ground:
 - AL-5 (DTD 406B)
 - Aeroshell Compound 07
 - Kilfrost TKS 80

Mass and Balance

Item	Lever Arm (m)
De-icing fluid tank	1.00

1 ltr: 1,1 kg

30 ltr: 33,0 kg

■ YES on panels

- Water, soap
- Isopropyl alcohol
- Ethyl alcohol
- Methylated spirit
- De-icing fluids
- AVGAS
- Jet fuel

■ NO on panels

- Wax
- Methyl ethyl ketone (MEK)
- Lacquer thinner
- Other thinners and solvents

Ice protection system Operational considerations



- approved for flight into known icing conditions („fiki“)
- DA42 Ice protection system is
 - NOT a „de-icing“ system
 - but an „anti-ice“ system, preventing accretion of ice
- minimum operating temperature for the ice protection system: **-30°C**

Ice protection system Operational considerations



- what defines „icing conditions“?
 - visually detected ice
 - visible moisture and OAT $+3^{\circ}\text{C}$ or below

Ice protection system
Operational considerations



- what indicates conditions the system may be unable to cope with?
 - heavy ice accumulation on windshield
 - ice on side areas of canopy
 - rapid formation and shedding of bars thicker than 6mm from porous panels
- what to do?
 - select HIGH/MAX
 - leave icing conditions

Ice protection system
Operational considerations



- flight in „freezing rain“ or „freezing drizzle“ is prohibited !
 - Exit icing conditions immediately
- how to detect freezing rain or freezing drizzle ?
 - unusually extensive ice where normally not observed
 - ice on upper surface of wing aft of protected area
 - ice on spinner further back than normally observed

Ice protection system Operational considerations



■ Autopilot

- may be used in icing conditions, but:
 - disconnect every 10 – 15 minutes to detect out of trim conditions
- **PROHIBITED** with
 - ice aft of protected area
 - unusual lateral trim
 - autopilot trim warning

Ice protection system Operational considerations



- „Ice on unprotected areas“
(„normal“ in icing conditions)
 - not the same as:
- „Residual ice“:
 - Ice that remains on a protected surface immediately following the actuation of a deicing system

Ice protection system
Operational considerations



Airspeeds with ice on unprotected areas

Continuous operation in icing conditions (except TKOF, LDG and maneuvers)	118 – 156 KIAS
Minimum continuous climb speed in icing conditions (flaps UP)	118 KIAS
Stalling speeds	+ 4-6 KIAS

App/Ldg Vref in icing conditions, 2-eng or 1-eng	
Flaps UP	94 KIAS
Flaps APP	90 KIAS
Flaps LDG	prohibited

Ice protection system
Operational considerations



- **Flaps LDG prohibited:**
 - in icing conditions (ice on unprotected surfaces)
 - with residual ice
- **Intentional 1-eng operation under known or forecast icing conditions is prohibited**

Ice protection system
Operational considerations



Performance with residual ice or in icing conditions (ice on unprotected areas)

Vyse: 88 KIAS

One engine inoperative climb performance

Rate of climb	reduced by
Up to 6000 ft	150 fpm
6000 – 12000 ft	200 fpm
12000 – 18000 ft	250 fpm
positive ROC may not be achieved	

Ice protection system
Operational considerations



Performance in icing conditions (ice on unprotected areas)

Cruise performance

TAS -20 %

Max demonstrated crosswind component in icing conditions:

20 kts

Ice protection system Operational considerations



- Approach, landing in icing conditions (ice on unprotected surfaces):
 - Gear down
 - Flaps UP: Vapp min 94 KIAS
 - Flaps APP: Vapp min 90 KIAS
 - LDG distance acc. AFM !
- When ice protection system fails:
 - 118 KIAS until on final
 - approach with flaps APP, minimum slip
 - Vapp with residual ice min 90 KIAS
- Go around in icing conditions (ice on unprotected surfaces):
 - with Flaps APP, gear down, 1900 kg, 88 KIAS:
 - 8,2% (4,7°), 746 fpm climb

Ice protection system Technical considerations



- To avoid the need for repriming:
 - Maintain at least 2 ltrs in the tank
 - Operate system at least once a month
- Priming of the system:
 - main pumps:
 - primed by windshield pumps
 - porous panels:
 - MAX mode in intervals of 5 minutes until fluid dissipates from all panels

Performance



Performance

- DA42 NG according CS 23:
 - Normal, Utility & Aerobatic category
 - Reciprocating engine
 - Weight ≤ 2722 kg
 - VSO ≤ 61 kt

Performance



For commercial operation:

- DA42 NG according „Regulation Air Operations – OPS“:
 - Propeller driven
 - MAPSC max 9
 - Weight \leq 5700 kg
- Performance Class B

The „DA42“ and „Density altitude“



- **Attention!**
 - Performance data which are engine-power dependant cannot be determined by just using „Density Altitude“!
 - Reason: the engine power output does not correspond to density altitude but pressure and temperature have their own, independent influence
 - This is a feature of the ECU controlled, turbocharged Diesel-engine

Stalling speeds



Airspeeds in KIAS at idle power:

1510 kg (3329 lb)		Bank Angle			
Gear	Flaps	0°	30°	45°	60°
UP	UP	62	66	73	85
DOWN	APP	62	67	73	86
DOWN	LDG	58	63	70	83

1700 kg (3748 lb)		Bank Angle			
Gear	Flaps	0°	30°	45°	60°
UP	UP	66	70	77	90
DOWN	APP	64	69	75	89
DOWN	LDG	60	65	72	86

1900 kg (4189 lb)		Bank Angle			
Gear	Flaps	0°	30°	45°	60°
UP	UP	69	74	81	95
DOWN	APP	66	71	78	92
DOWN	LDG	62	67	75	89

X-wind



Max demonstrated crosswind component:

Flaps UP: 25 kts

Flaps APP: 20 kts

For short field take-off

Max demonstrated crosswind component in icing conditions:

20 kts

TOD, TOR tabular format



values for ISA and MSL, at 1900 kg (4189 lb)	
Take-off distance to 50 ft (15 m) above take-off surface	733 m (2405 ft)
Take-off ground roll	458 m (1503 ft)

NOTE

The rate of climb with a power setting of 100% is 1180 ft/min (6.0 m/s) at MSL and ISA standard conditions.

Short Field TKOF, Flaps APP, 82 KIAS

values for ISA and MSL, at 1900 kg (4189 lb)	
Take-off distance to 50 ft (15 m) above take-off surface	660 m (2165 ft)
Take-off ground roll	458 m (1503 ft)

NOTE

The rate of climb with a power setting of 100% is 1150 ft/min (5.84 m/s) at MSL and ISA standard conditions.

TKOF distance



Short Field TKOF, Flaps APP, 82 KIAS

Reduce Take-Off distance given in the Take-Off diagram by the following percentage:

T/O Weight	1510 kg			1700 kg			1900 kg		
Altitude OAT	ISA -20°C	ISA	ISA +20°C	ISA -20°C	ISA	ISA +20°C	ISA -20°C	ISA	ISA +20°C
MSL	7%	8%	7%	8%	9%	8%	9%	10%	10%
5000 ft	8%	9%	8%	8%	9%	10%	10%	11%	12%
10000 ft	8%	10%	8%	8%	10%	12%	11%	14%	17%

Grass Runway

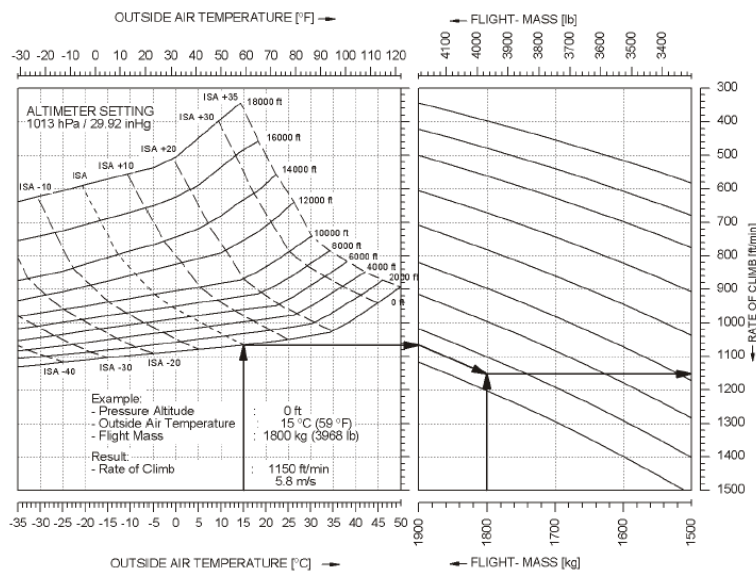


Length of grass	TKOF roll	Wet grass
- 5 cm	+ 10%	additional + 10%
5 - 10 cm	+ 15%	
> 10 cm	+ 25%	
> 25 cm	TKOF should not be attempted	
+ 45% on soft ground !		

Climb performance 2-eng



DA 42 NG - CLIMB PERFORMANCE - TWO ENGINES



Short field
take-off
(Flaps APP
85 KIAS):
Reduce climb
performance
by 30 ft/min

LD, LR tabular format



Values for ISA and MSL, at 1805 kg (3979 lb), approach speed 84 KIAS	
Landing distance from 50 ft (15 m) above the landing surface	598 m (1962 ft)
Ground roll	353 m (1158 ft)

Values for ISA and MSL, at 1900 kg (4189 lb), approach speed 84 KIAS	
Landing distance from 50 ft (15 m) above the landing surface	618 m (2028 ft)
Ground roll	369 m (1211 ft)



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Go around



Value for ISA and MSL, at 1805 kg (3979 lb)	
84 KIAS	
Constant gradient of climb	7.5 % (equals 4.3 climb angle) or 612 ft/min

Value for ISA and MSL, at 1900 kg (4189 lb)	
84 KIAS	
Constant gradient of climb	6.7 % (equals 3.8 climb angle) or 547 ft/min

Required gradient acc. CS 23.77 (a): 3,3% at Sea Level



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ROC to gradient conversion



Formula in AFM:

$$\text{Gradient [\%]} = \frac{\text{ROC [fpm]}}{\text{TAS [KTAS]}} \cdot 0.95$$

Grass Runway

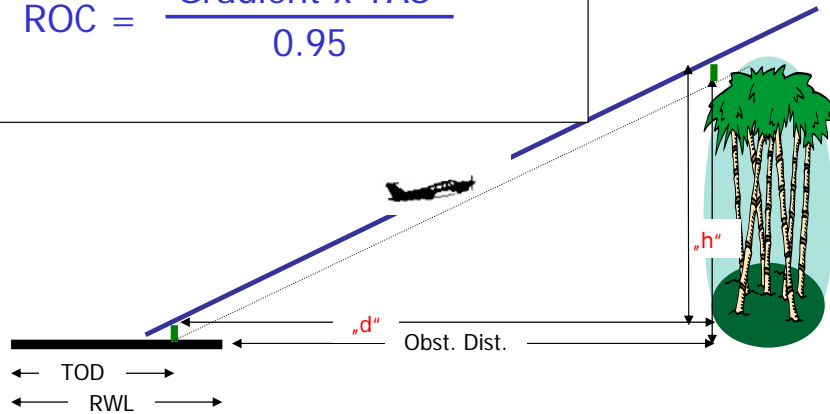


Length of grass	LDG run	Wet grass
- 5 cm	+ 5%	additional + 10%
5 - 10 cm	+ 15%	
>10 cm	min + 25%	

Obstacles ?

$$\text{Gradient [\%]} = \frac{\text{ROC [fpm]}}{\text{TAS [KTAS]}} \cdot 0.95$$

$$\text{ROC} = \frac{\text{Gradient x TAS}}{0.95}$$



Intentionally blank

Diamond DA42 NG



Performance „Dash-6“



DIAMOND AIRCRAFT INDUSTRIES

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Performance



- DA42 NG according CS 23:
 - Normal, Utility & Aerobatic category
 - Reciprocating engine
 - Weight ≤ 2722 kg
 - VSO ≤ 61 kt

DIAMOND AIRCRAFT INDUSTRIES

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Performance



For commercial operation:

- DA42 NG according „Regulation Air Operations – OPS“:
 - Propeller driven
 - MAPSC max 9
 - Weight \leq 5700 kg
- Performance Class B

The „DA42“ and „Density altitude“



- **Attention!**
 - Performance data which are engine-power dependant cannot be determined by just using „Density Altitude“!
 - Reason: the engine power output does not correspond to density altitude but pressure and temperature have their own, independent influence
 - This is a feature of the ECU controlled, turbocharged Diesel-engine

Stalling speeds



1510 kg (3329 lb)		Bank Angle							
		0°		30°		45°		60°	
Gear	Flaps	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	UP	61	59	66	64	72	71	84	84
DOWN	APP	58	57	63	62	69	68	81	81
DOWN	LDG	54	54	60	59	67	65	79	77

1700 kg (3748 lb)		Bank Angle							
		0°		30°		45°		60°	
Gear	Flaps	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	UP	64	62	69	67	75	74	88	88
DOWN	APP	62	61	67	66	74	73	87	87
DOWN	LDG	59	58	64	63	71	69	86	83

1900 kg (4189 lb)		Bank Angle							
		0°		30°		45°		60°	
Gear	Flaps	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	UP	68	66	72	71	80	79	93	94
DOWN	APP	65	64	70	69	78	77	91	91
DOWN	LDG	62	61	68	66	75	73	90	87

Most forward CG

Power OFF

KIAS values may not be accurate at stall

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TKOF, LDG Performance general



For temperatures, altitudes and weights between those provided, use a linear interpolation between the neighboring values.

For weights below 1700 kg (3748 lb), use data for the lowest weight.

For operation in outside air temperature lower than provided in these tables, use data for lowest temperature shown.

For operation in outside air temperature higher than provided in these tables, use extreme caution.

Effect of wind

The effect of 50% of the headwind component and 150% of the tailwind component is already incorporated in the head- and tailwind factors.

Headwind: minus 10% for each 14 kt

Tailwind: plus 10% for each 3 kt

TKOF uphill slope,
LDG downhill slope

Increase the ground roll by 9% for each 1% (1 m per 100 m or 1 ft per 100 ft) slope.

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X-wind



Max demonstrated crosswind component:

Flaps UP: 25 kts

Flaps APP: 20 kts

For short field take-off

Max demonstrated crosswind component in icing conditions:

20 kts



TKOF Roll, TKOF Distance



Take-Off Distance - Normal Procedure 1900 kg 4189 lb									Take-Off Distance - Normal Procedure 1700 kg 3748 lb								
Weight: 1900 kg / 4189 lb									Weight: 1700 kg / 3748 lb								
V _R : 76 KIAS									V _R : 76 KIAS								
V ₅₀ : 83 KIAS									V ₅₀ : 83 KIAS								
Flaps: UP									Flaps: UP								
Power: MAX									Power: MAX								
Runway: dry, paved, level									Runway: dry, paved, level								
Press. Alt.	Distance	Outside Air Temperature - [°C] / [°F]							Press. Alt.	Distance	Outside Air Temperature - [°C] / [°F]						
[ft] / [m]	[m]	0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122	ISA	[ft] / [m]	[m]	0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122	ISA
SL	Ground Roll	369	388	410	444	519	631	400	SL	Ground Roll	324	342	360	389	455	552	350
	15 m / 50 ft	670	701	730	798	960	1202	716		15 m / 50 ft	574	598	625	680	810	1007	613
1000	Ground Roll	388	410	435	473	566	685	417	1000	Ground Roll	342	360	382	417	497	600	367
	15 m / 50 ft	701	732	774	854	1053	1308	743		15 m / 50 ft	598	625	663	728	885	1092	633
2000	Ground Roll	412	434	462	507	616	742	435	2000	Ground Roll	362	382	405	446	540	650	384
	15 m / 50 ft	732	769	819	914	1143	1420	773		15 m / 50 ft	625	657	698	778	962	1184	661
3000	Ground Roll	433	457	490	547	670	805	456	3000	Ground Roll	382	402	431	479	587	707	401
	15 m / 50 ft	768	808	864	984	1243	1544	803		15 m / 50 ft	659	691	739	837	1045	1283	689
4000	Ground Roll	459	484	522	594	727	873	477	4000	Ground Roll	404	427	457	523	638	763	420
	15 m / 50 ft	808	849	920	1074	1350	1667	838		15 m / 50 ft	693	728	784	910	1132	1389	717
5000	Ground Roll	486	514	558	649	788		500	5000	Ground Roll	427	452	490	571	691		439
	15 m / 50 ft	849	896	982	1172	1470		874		15 m / 50 ft	728	768	838	995	1231		748
6000	Ground Roll	514	547	596	709	855		523	6000	Ground Roll	452	481	523	621	752		461
	15 m / 50 ft	897	950	1048	1280	1595		910		15 m / 50 ft	768	814	893	1084	1334		779
7000	Ground Roll	545	582	637	771	930		549	7000	Ground Roll	479	512	560	678	816		483
	15 m / 50 ft	947	1007	1122	1395	1732		951		15 m / 50 ft	810	864	952	1179	1448		815
8000	Ground Roll	578	620	687	837	1007		577	8000	Ground Roll	511	545	603	736	886		507
	15 m / 50 ft	999	1071	1208	1518	1880		995		15 m / 50 ft	855	918	1027	1281	1569		853
9000	Ground Roll	615	661	752	919	1105		606	9000	Ground Roll	541	582	661	807	970		532
	15 m / 50 ft	1059	1143	1326	1674	2082		1040		15 m / 50 ft	908	977	1130	1407	1731		891
10000	Ground Roll	660	719	837	1028			638	10000	Ground Roll	581	632	737	903			560
	15 m / 50 ft	1133	1249	1499	1907			1094		15 m / 50 ft	972	1064	1267	1591			935



TKOF Roll, TKOF Distance



Take-Off Distance - Short Field Procedure - 1900 kg / 4189 lb										Take-Off Distance - Short Field Procedure - 1700 kg / 3748 lb									
Weight: 1900 kg / 4189 lb					Flaps: APP					Weight: 1700 kg / 3748 lb					Flaps: APP				
V _R : 71 KIAS					Power: MAX					V _R : 71 KIAS					Power: MAX				
V ₅₀ : 77 KIAS					Runway: dry, paved, level					V ₅₀ : 77 KIAS					Runway: dry, paved, level				
Press. Alt.	Distance	Outside Air Temperature - [°C] / [°F]								Press. Alt.	Distance	Outside Air Temperature - [°C] / [°F]							
[ft] / [m]	[m]	0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122	ISA	[ft] / [m]	[m]	0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122	ISA		
SL	Ground Roll	324	344	363	394	465	567	354	SL	Ground Roll	286	303	320	347	409	500	311		
	15 m / 50 ft	557	587	618	677	814	1023	603		15 m / 50 ft	481	508	534	581	696	867	521		
1000	Ground Roll	344	364	386	424	508	621	371	1000	Ground Roll	303	320	340	374	449	544	326		
	15 m / 50 ft	587	620	658	729	896	1124	630		15 m / 50 ft	508	536	569	627	767	950	544		
2000	Ground Roll	364	384	411	454	557	677	388	2000	Ground Roll	322	341	362	401	490	595	342		
	15 m / 50 ft	620	655	697	786	987	1234	657		15 m / 50 ft	536	565	601	674	839	1039	567		
3000	Ground Roll	386	409	439	493	607	738	407	3000	Ground Roll	341	360	387	434	534	648	358		
	15 m / 50 ft	655	690	743	852	1082	1357	686		15 m / 50 ft	565	596	641	730	917	1137	592		
4000	Ground Roll	408	435	469	539	665	806	427	4000	Ground Roll	361	383	413	475	584	706	376		
	15 m / 50 ft	693	733	798	936	1190	1486	718		15 m / 50 ft	596	633	687	801	1005	1242	622		
5000	Ground Roll	435	462	505	592	727	886	448	5000	Ground Roll	384	408	444	520	639	786	396		
	15 m / 50 ft	735	780	856	1033	1308	1608	755		15 m / 50 ft	632	673	736	879	1100	1368	651		
6000	Ground Roll	464	494	540	650	794	974	472	6000	Ground Roll	408	435	476	571	698	868	416		
	15 m / 50 ft	778	832	923	1139	1439	1819	793		15 m / 50 ft	673	717	793	968	1209	1519	684		
7000	Ground Roll	493	529	582	712	866	1066	496	7000	Ground Roll	435	466	513	626	762	942	437		
	15 m / 50 ft	826	889	996	1257	1585	1985	833		15 m / 50 ft	713	764	851	1066	1325	1625	719		
8000	Ground Roll	525	567	632	779	949	1154	524	8000	Ground Roll	465	499	556	685	831	1011	461		
	15 m / 50 ft	881	952	1084	1384	1748	2148	877		15 m / 50 ft	759	819	925	1167	1454	1754	755		
9000	Ground Roll	562	607	697	860	1049	1274	551	9000	Ground Roll	496	535	612	757	921	1101	487		
	15 m / 50 ft	943	1023	1206	1547	1972	2424	924		15 m / 50 ft	812	879	1025	1298	1626	1976	797		
10000	Ground Roll	606	664	784	973	1197	1467	583	10000	Ground Roll	532	585	688	854	1044	1254	513		
	15 m / 50 ft	1016	1134	1379	1801	2241	2741	977		15 m / 50 ft	873	969	1163	1495	1845	2245	839		
For the distance in [ft] divide by 0.3048 or multiply by 3.28.										For the distance in [ft] divide by 0.3048 or multiply by 3.28.									

For the distance in [ft] divide by 0.3048 or multiply by 3.28.

For the distance in [ft] divide by 0.3048 or multiply by 3.28.

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TKOF on Grass Runway



Length of grass	TKOF roll	Wet grass
5 cm	+ 10%	additional + 10%
5 - 10 cm	+ 15%	
>10 cm	+ 25%	
> 25 cm	TKOF should not be attempted	
+ 45% on soft ground !		

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Climb Performance 2-eng



All Engines Operating Climb - Flaps UP													
Flaps: UP										Power: 92%			
V _Y : 90 KIAS										Gear: retracted			
Weight [kg] / [lb]	Press. Alt. [ft]	Press. Alt. [m]	Rate of Climb - [ft/min]										
			Outside Air Temperature - [°C] / [°F]										ISA
			-20 -4	-10 14	0 32	10 50	20 68	30 86	40 104	50 122			
1900 / 4189	SL	1215	1212	1208	1205	1201	1195	1132	964	1203			
	2000	610	1208	1205	1201	1193	1187	1183	1055	897	1193		
	4000	1219	1201	1193	1186	1179	1172	1147	987	834	1181		
	6000	1829	1186	1179	1172	1165	1159	1083	921		1169		
	8000	2438	1172	1164	1157	1150	1139	1018	862		1158		
	10000	3048	1157	1149	1138	1132	1083	906			1144		
	12000	3658	1137	1125	1120	1114	936	759			1124		
	14000	4267	1118	1113	1058	920	740	597			1113		
	16000	4877	1108	1032	915	763	612				1102		
18000	5486	984	892	789	639	486				986			
1700 / 3748	SL	1389	1386	1382	1380	1376	1371	1299	1109	1378			
	2000	610	1383	1380	1376	1369	1362	1358	1214	1035	1368		
	4000	1219	1376	1369	1361	1355	1348	1320	1139	965	1357		
	6000	1829	1362	1355	1347	1341	1335	1249	1066		1345		
	8000	2438	1347	1340	1333	1326	1314	1177	1001		1334		
	10000	3048	1333	1325	1314	1308	1252	1053			1320		
	12000	3658	1313	1301	1296	1290	1089	890			1299		
	14000	4267	1294	1290	1229	1075	872	710			1289		
	16000	4877	1285	1201	1072	901	730				1278		
	18000	5486	1149	1047	933	764	591				1151		
For the rate of climb in [m/s] divide by 196.8 or multiply by 0.00508.													

All Engines Operating Climb - Flaps APP													
Flaps: APP										Power: 92%			
V _Y : 85 KIAS										Gear: retracted			
Weight [kg] / [lb]	Press. Alt. [ft]	Press. Alt. [m]	Rate of Climb - [ft/min]										
			Outside Air Temperature - [°C] / [°F]										ISA
			-20 -4	-10 14	0 32	10 50	20 68	30 86	40 104	50 122			
1900 / 4189	SL	1165	1154	1144	1134	1124	1114	1094	1054	888	1129		
	2000	610	1145	1134	1124	1113	1104	1094	967	811	1119		
	4000	1219	1124	1113	1103	1093	1079	1050	891	742	1096		
	6000	1829	1103	1092	1077	1064	1054	979	822		1073		
	8000	2438	1077	1062	1048	1033	1020	906	751		1049		
	10000	3048	1047	1031	1017	1006	958	783			1024		
	12000	3658	1016	999	989	978	802	629			998		
	14000	4267	987	977	917	780	604	463			978		
	16000	4877	965	887	769	618	467				957		
18000	5486	835	739	632	481	329				838			
1700 / 3748	SL	1331	1320	1309	1299	1289	1279	1211	1023	1294			
	2000	610	1310	1299	1288	1278	1268	1257	1114	937	1277		
	4000	1219	1289	1277	1267	1257	1242	1210	1030	862	1260		
	6000	1829	1267	1256	1240	1226	1216	1131	953		1236		
	8000	2438	1240	1224	1209	1193	1180	1050	875		1210		
	10000	3048	1208	1192	1176	1165	1111	914			1184		
	12000	3658	1175	1158	1148	1136	938	743			1164		
	14000	4267	1146	1135	1069	916	718	558			1136		
	16000	4877	1122	1036	907	737	566				1114		
	18000	5486	980	874	755	585	414				983		
For the rate of climb in [m/s] divide by 196.8 or multiply by 0.00508.													

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Climb Performance 1-eng



One Engines Inoperative Climb													
Flaps: UP							Power: feathered / 92%						
V _{YSE} : 85 KIAS							Gear: retracted						
Weight [kg] / [lb]	Press. Alt. [ft]	Press. Alt. [m]	Rate of Climb - [ft/min]										ISA
			Outside Air Temperature - [°C] / [°F]										
			-20 -4	-10 14	0 32	10 50	20 68	30 86	40 104	50 122			
1900 / 4189	SL		324	312	300	289	278	268	240	171	284		
	2000	610	301	289	277	266	255	244	191	127	265		
	4000	1219	278	266	254	242	229	213	147	85	246		
	6000	1829	254	242	227	214	202	171	105		223		
	8000	2438	227	213	198	184	172	126	61		199		
	10000	3048	198	182	168	155	132	57			175		
	12000	3658	167	151	138	125	47	-27			149		
	14000	4267	136	123	86	17	-59	-119			126		
	16000	4877	108	62	-3	-73	-138				101		
18000	5486	27	-28	-87	-152	-218				29			
1700 / 3748	SL		407	394	382	371	360	348	317	238	365		
	2000	610	383	371	359	347	336	324	263	189	346		
	4000	1219	359	347	334	322	309	291	215	143	326		
	6000	1829	335	322	307	293	281	244	168		302		
	8000	2438	307	291	276	261	249	195	121		278		
	10000	3048	276	260	245	231	206	119			252		
	12000	3658	244	227	214	200	111	26			225		
	14000	4267	212	198	158	81	-6	-75			201		
	16000	4877	183	133	62	-18	-92				176		
18000	5486	96	35	-30	-104	-180				98			

Dark shaded areas indicate a climb rate of less than 50 ft/min.
For the rate of climb in [m/s] divide by 196.8 or multiply by 0.00508

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ROC to Gradient conversion



Formula in AFM:

$$Gradient [\%] = \frac{ROC [fpm]}{TAS [KTAS]} \cdot 0.98$$

Cruising speed



75%

Cruise Performance - KTAS						
Press. Alt. [ft] / [m]	Power %	Outside Air Temperature - [°C]				
		ISA-10	ISA	ISA+10	ISA+20	ISA+30
2000 610	92	163	165	167	171	168
	75	150	152	154	156	157
	60	137	139	140	142	143
	45	123	125	126	127	128
4000 1219	92	166	168	170	175	172
	75	153	155	157	159	160
	60	140	141	143	144	146
	45	125	127	128	129	130
6000 1829	92	169	172	174	178	176
	75	156	158	160	162	163
	60	142	144	145	147	148
	45	127	129	130	131	132
8000 2438	92	173	175	177	182	181
	75	159	161	163	165	167
	60	145	147	148	150	151
	45	125	127	128	129	130
10000 3048	92	176	179	181	186	183
	75	163	164	166	168	170
	60	148	149	151	152	154
	45	121	122	122	123	124
12000 3658	92	180	182	187	187	183
	75	166	168	169	171	173
	60	150	152	153	155	156
	45	117	118	118	118	119
14000 4267	92	186	189	189	185	180
	75	169	171	172	174	176
	60	153	154	156	157	159
	45	115	115	115	115	114
16000 4877	92	190	191	188	183	179
	75	172	174	176	177	179
	60	155	157	158	160	161
	50	136	137	138	139	140
18000 5486	85	188	188	187	182	179
	75	175	177	179	182	179
	60	158	160	161	162	164
	50	137	138	139	139	140

LDG Roll, LDG Distance



Flaps LDG

Landing Distance - Flaps LDG					1900 kg / 4189 lb			
Weight:	1900 kg / 4189 lb			Flaps:	LDG			
V _{REF} :	84 KIAS			Power:	IDLE			
				Runway: dry, paved, level				
Press. Alt. [ft] / [m]	Distance [m]	Outside Air Temperature - [°C] / [°F]						
		0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122	ISA
SL	Ground Roll	349	363	376	387	419	472	369
	15 m / 50 ft	592	610	627	646	695	778	618
1000	Ground Roll	363	377	388	402	443	495	381
	15 m / 50 ft	610	628	647	666	729	817	634
2000	Ground Roll	377	389	403	417	465	523	390
	15 m / 50 ft	628	648	667	686	766	856	650
3000	Ground Roll	389	404	416	435	492	551	402
	15 m / 50 ft	649	669	689	715	804	900	667
4000	Ground Roll	404	417	432	460	519	578	415
	15 m / 50 ft	669	691	711	751	847	945	684
5000	Ground Roll	417	433	449	486	545		426
	15 m / 50 ft	691	712	733	793	890		702
6000	Ground Roll	434	451	466	512	577		439
	15 m / 50 ft	713	735	760	834	934		720
7000	Ground Roll	457	471	489	546	614		456
	15 m / 50 ft	745	769	792	885	989		749
8000	Ground Roll	486	504	527	595	668		484
	15 m / 50 ft	788	813	844	951	1062		786
9000	Ground Roll	525	545	577	653	729		519
	15 m / 50 ft	838	864	915	1029	1149		831
10000	Ground Roll	569	590	639	718			561
	15 m / 50 ft	897	924	995	1118			882
For the distance in [ft] divide by 0.3048 or multiply by 3.28.								

For the distance in [ft] divide by 0.3048 or multiply by 3.28.

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LDG Roll, LDG Distance



Landing Distance - Flaps LDG - 1805 kg / 3979 lb									
Weight: 1805 kg / 3979 lb		Flaps: LDG							
V _{REF} : 84 KIAS		Power: IDLE							
Runway: dry, paved, level									
Press. Alt. [ft] / [m]	Distance [m]	Outside Air Temperature - [°C] / [°F]							
		0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122	ISA	
SL	Ground Roll	334	347	360	370	401	451	353	
	15 m / 50 ft	573	590	607	625	672	753	598	
1000 305	Ground Roll	347	360	371	384	423	473	364	
	15 m / 50 ft	590	608	626	644	705	790	613	
2000 610	Ground Roll	360	371	385	399	445	500	373	
	15 m / 50 ft	608	627	645	663	741	827	629	
3000 914	Ground Roll	372	386	400	415	470	528	385	
	15 m / 50 ft	628	646	665	691	777	866	645	
4000 1219	Ground Roll	386	401	413	440	494	553	397	
	15 m / 50 ft	647	667	687	726	816	909	661	
5000 1524	Ground Roll	399	414	429	463	522		407	
	15 m / 50 ft	668	689	709	764	856		679	
6000 1829	Ground Roll	415	431	444	490	552		420	
	15 m / 50 ft	690	710	732	803	898		696	
7000 2134	Ground Roll	435	451	465	523	588		437	
	15 m / 50 ft	719	741	764	852	952		721	
8000 2438	Ground Roll	466	484	503	571	638		465	
	15 m / 50 ft	760	783	814	917	1025		758	
9000 2743	Ground Roll	506	522	556	626	703		500	
	15 m / 50 ft	809	835	884	995	1109		802	
10000 3048	Ground Roll	550	570	615	694			540	
	15 m / 50 ft	868	894	964	1082			855	
For the distance in [ft] divide by 0.3048 or multiply by 3.28									

Landing Distance - Flaps LDG - 1700 kg / 3748 lb									
Weight: 1700 kg / 3748 lb		Flaps: LDG							
V _{REF} : 84 KIAS		Power: IDLE							
Runway: dry, paved, level									
Press. Alt. [ft] / [m]	Distance [m]	Outside Air Temperature - [°C] / [°F]							
		0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122	ISA	
SL	Ground Roll	318	330	341	353	379	427	335	
	15 m / 50 ft	549	565	583	599	646	723	575	
1000 305	Ground Roll	330	341	354	363	401	451	345	
	15 m / 50 ft	565	584	601	618	677	757	589	
2000 610	Ground Roll	341	354	365	377	424	473	356	
	15 m / 50 ft	584	602	620	637	710	794	603	
3000 914	Ground Roll	355	365	379	396	445	499	364	
	15 m / 50 ft	602	621	639	663	746	832	619	
4000 1219	Ground Roll	366	380	394	416	470	527	376	
	15 m / 50 ft	622	640	659	697	782	871	635	
5000 1524	Ground Roll	380	392	406	441	494		388	
	15 m / 50 ft	641	661	680	732	822		651	
6000 1829	Ground Roll	393	408	423	463	522		397	
	15 m / 50 ft	662	682	702	770	862		668	
7000 2134	Ground Roll	414	428	443	498	557		416	
	15 m / 50 ft	689	711	732	816	914		691	
8000 2438	Ground Roll	443	460	481	542	609		441	
	15 m / 50 ft	731	753	782	881	984		729	
9000 2743	Ground Roll	482	501	530	600	674		477	
	15 m / 50 ft	780	804	851	957	1067		773	
10000 3048	Ground Roll	527	547	582	665			521	
	15 m / 50 ft	839	864	930	1045			826	
For the distance in [ft] divide by 0.3048 or multiply by 3.28									

For the distance in [ft] divide by 0.3048 or multiply by 3.28.

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LDG Roll, LDG Distance



Flaps APP or UP

Landing Distance - Abnormal Flap Position - 1900 kg / 4189 lb									
Weight:	1900 kg / 4189 lb			Flaps: APP or UP					
V _{REF} :	86 KIAS			Power: IDLE					
Runway: dry, paved, level									
Press. Alt.	Distance	Outside Air Temperature - [°C] / [°F]							ISA
		0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122		
SL	Ground Roll	482	499	515	533	577	647	508	
	15 m / 50 ft	813	837	863	887	954	1070	849	
1000	Ground Roll	500	516	535	553	607	683	522	
	15 m / 50 ft	837	864	889	913	1002	1121	871	
2000	Ground Roll	516	536	553	572	642	718	538	
	15 m / 50 ft	864	890	918	943	1051	1176	893	
3000	Ground Roll	536	554	574	599	675	757	552	
	15 m / 50 ft	891	919	946	981	1105	1232	917	
4000	Ground Roll	554	575	594	631	710	796	569	
	15 m / 50 ft	920	948	977	1032	1161	1292	940	
5000	Ground Roll	576	595	617	666	751		587	
	15 m / 50 ft	949	979	1007	1086	1217		963	
6000	Ground Roll	596	619	639	704	790		603	
	15 m / 50 ft	980	1010	1041	1141	1279		990	
7000	Ground Roll	627	648	672	751	845		630	
	15 m / 50 ft	1024	1056	1087	1215	1357		1027	
8000	Ground Roll	669	694	722	818	915		669	
	15 m / 50 ft	1087	1119	1164	1309	1464		1082	
9000	Ground Roll	721	746	793	894	1002		714	
	15 m / 50 ft	1157	1194	1262	1421	1584		1147	
10000	Ground Roll	782	808	872	984			769	
	15 m / 50 ft	1242	1281	1381	1548			1224	
For the distance in [m] divide by 0.3048 or multiply by 3.28									

For the distance in [ft] divide by 0.3048 or multiply by 3.28.

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LDG Roll, LDG Distance



Landing Distance - Abnormal Flap Position - 1805 kg / 3979 lb									
Weight: 1805 kg / 3979 lb		Flaps: APP or UP							
V _{REF} : 86 KIAS		Power: IDLE							
Runway: dry, paved, level									
Press. Alt. [ft] / [m]	Distance [m]	Outside Air Temperature - [°C] / [°F]							
		0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122	ISA	
SL	Ground Roll	462	477	494	511	551	621	485	
	15 m / 50 ft	780	804	827	850	916	1025	816	
1000 305	Ground Roll	477	495	513	528	582	652	500	
	15 m / 50 ft	804	828	852	877	961	1076	835	
2000 610	Ground Roll	495	514	530	548	613	688	516	
	15 m / 50 ft	829	853	879	904	1010	1127	856	
3000 914	Ground Roll	514	531	550	572	647	723	529	
	15 m / 50 ft	854	881	906	942	1059	1182	879	
4000 1219	Ground Roll	532	552	569	605	681	763	546	
	15 m / 50 ft	882	908	936	989	1112	1239	901	
5000 1524	Ground Roll	552	571	591	638	720	860	560	
	15 m / 50 ft	909	938	966	1041	1167	1325	925	
6000 1829	Ground Roll	572	593	612	675	757	897	578	
	15 m / 50 ft	940	968	998	1093	1226	1394	948	
7000 2134	Ground Roll	599	622	642	720	810	960	602	
	15 m / 50 ft	963	1013	1044	1165	1302	1487	987	
8000 2438	Ground Roll	643	667	694	786	880	1040	641	
	15 m / 50 ft	1044	1075	1118	1258	1406	1604	1041	
9000 2743	Ground Roll	693	719	762	862	963	1123	688	
	15 m / 50 ft	1116	1150	1217	1368	1527	1744	1104	
10000 3048	Ground Roll	755	783	844	953	1073	1253	742	
	15 m / 50 ft	1201	1236	1332	1494	1684	1924	1183	
For the distance in [ft] divide by 0.3048 or multiply by 3.28									

Landing Distance - Abnormal Flap Position - 1700 kg / 3748 lb									
Weight: 1700 kg / 3748 lb		Flaps: APP or UP							
V _{REF} : 86 KIAS		Power: IDLE							
Runway: dry, paved, level									
Press. Alt. [ft] / [m]	Distance [m]	Outside Air Temperature - [°C] / [°F]							
		0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	50 / 122	ISA	
SL	Ground Roll	439	453	470	486	524	590	461	
	15 m / 50 ft	746	770	791	813	876	981	781	
1000 305	Ground Roll	453	470	487	502	553	619	475	
	15 m / 50 ft	770	792	815	839	919	1029	799	
2000 610	Ground Roll	471	488	503	521	562	653	490	
	15 m / 50 ft	793	816	841	865	965	1078	819	
3000 914	Ground Roll	489	504	523	543	615	686	503	
	15 m / 50 ft	817	843	867	901	1012	1131	840	
4000 1219	Ground Roll	505	524	540	575	646	724	518	
	15 m / 50 ft	844	869	895	946	1064	1184	861	
5000 1524	Ground Roll	525	542	561	606	683	783	532	
	15 m / 50 ft	870	897	923	995	1115	1259	885	
6000 1829	Ground Roll	543	563	581	641	719	829	549	
	15 m / 50 ft	899	926	954	1045	1172	1329	907	
7000 2134	Ground Roll	572	591	613	685	770	895	575	
	15 m / 50 ft	939	969	997	1114	1245	1425	942	
8000 2438	Ground Roll	613	636	662	749	838	974	611	
	15 m / 50 ft	1000	1031	1071	1205	1347	1544	998	
9000 2743	Ground Roll	666	688	732	825	925	1069	659	
	15 m / 50 ft	1071	1105	1168	1314	1465	1684	1061	
10000 3048	Ground Roll	727	753	812	917	1027	1194	714	
	15 m / 50 ft	1158	1192	1264	1440	1624	1874	1141	
For the distance in [ft] divide by 0.3048 or multiply by 3.28									

For the distance in [ft] divide by 0.3048 or multiply by 3.28.

For the distance in [ft] divide by 0.3048 or multiply by 3.28.

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LDG on wet or Grass Runway



	LDG roll	
Paved RWY WET	+ 15%	
Length of grass		Wet grass or soft ground
- 5 cm	+ 10%	additional + 10%
5 - 10 cm	+ 15%	
>10 cm	min + 25%	

Go-Around



Go-Around Climb Performance											
Flaps: LDG						Power: MAX					
V _{REF} : 84 KIAS						Gear: extended					
Weight [kg] / [lb]	Press. Alt. [ft]	Press. Alt. [m]	Rate of Climb - [ft/min]								
			Outside Air Temperature - [°C] / [°F]								
			-20 -4	-10 14	0 32	10 50	20 68	30 86	40 104	50 122	ISA
1900 / 4189	SL		735	718	702	686	670	605	472	328	678
	2000	610	703	686	669	653	620	527	377	242	652
	4000	1219	670	653	636	615	558	441	292	163	622
	6000	1829	637	614	592	560	486	348	210		585
	8000	2438	592	569	546	505	414	266	134		548
	10000	3048	545	521	487	417	291	136			509
1805 / 3979	SL		794	777	760	744	728	659	518	366	735
	2000	610	761	744	726	710	675	578	420	276	708
	4000	1219	727	709	693	671	611	488	330	193	677
	6000	1829	693	670	647	614	536	390	244		640
	8000	2438	647	623	600	557	462	304	165		602
	10000	3048	599	574	539	465	333	169			562
1700 / 3748	SL		866	848	831	814	797	725	575	413	805
	2000	610	832	814	796	779	743	640	471	317	777
	4000	1219	797	779	761	739	676	545	376	229	746
	6000	1829	762	738	714	680	598	442	286		707
	8000	2438	714	689	665	620	520	351	202		667
	10000	3048	664	639	602	524	383	208			626
For the rate of climb in [m/s] divide by 196.8 or multiply by 0.00508											

For the rate of climb in [m/s] divide by 196.8 or multiply by 0.00508.

$$\text{Gradient} [\%] = \frac{\text{ROC} [\text{fpm}]}{\text{TAS} [\text{KTAS}]} \cdot 0.98$$

The angles of climb at MSL and ISA condition are:

4.7° for Maximum Take-Off Mass (1900 kg / 4189 lb)

5.1° for Maximum Landing Mass (1805 kg / 3979 lb).

Required gradient acc. CS 23.77 (a):
3,3% at Sea Level

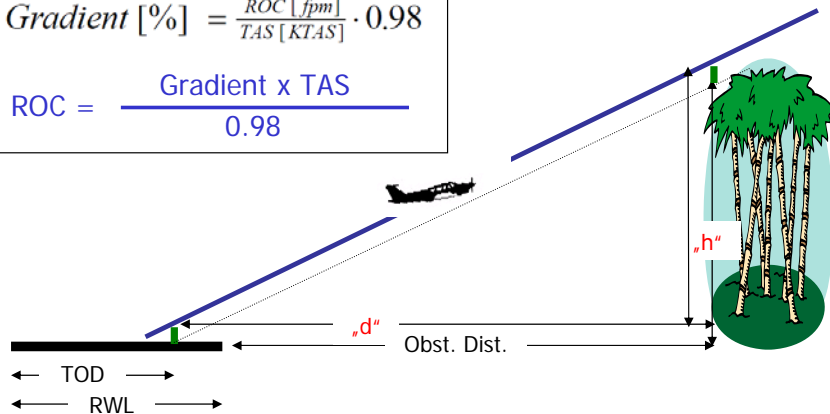
Obstacles ?

„d“ = (RWL + Obst. Dist.) - TOD

Gradient = („h“ / „d“) * 100

$$\text{Gradient} [\%] = \frac{\text{ROC} [\text{fpm}]}{\text{TAS} [\text{KTAS}]} \cdot 0.98$$

$$\text{ROC} = \frac{\text{Gradient} \times \text{TAS}}{0.98}$$



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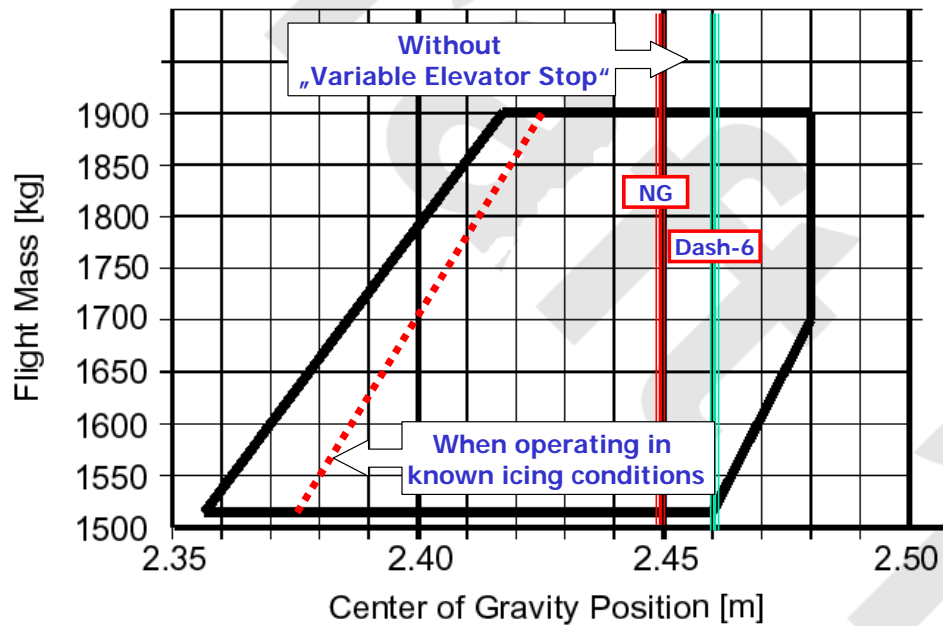
Mass and Balance



Empty mass

- Empty Mass includes:
 - Equipment as per Equipment Inventory
 - Brake fluid
 - Hydraulic fluid
 - Engine oil (2 x 7.0 liters)
 - Coolant (2 x 7.5 liters)
 - Gearbox oil (2 x 2.1 liters)
 - Unusable fuel in main tanks (2 USG)
 - Unusable fuel in AUX tanks (1 USG)

Center of gravity envelope



Moment arms

Item	Lever Arm (m)
Front seats	2.30
Rear seats	3.25
Wing tanks	2.63
AUX tanks	3.20
De-icing fluid	1.00
Nose baggage	0.60
Cabin baggage	3.89
Baggage Extension	4.54
„Short baggage extension“:	
Cabin baggage	3.65
Baggage Extension	3.97

M&B calculation

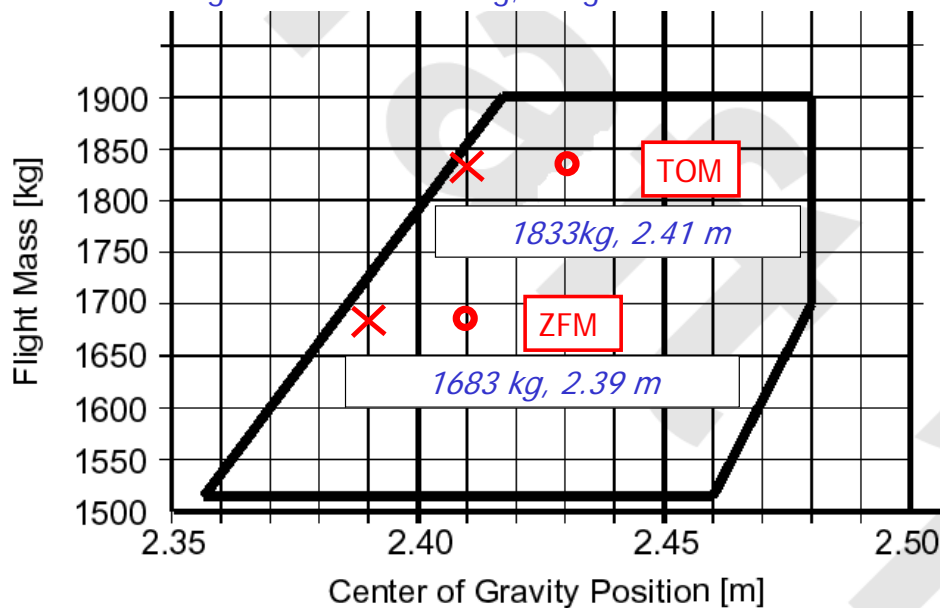


	Lever arm	Mass (kg)	Moment (kgm)
Empty mass		1450	3488.0
Front seats	2.30	170	391.0
Rear seats	3.25	0	0.0
Nose baggage	0.60	0	0.0
Cabin baggage	3.89	30	116.7
Baggage extension	4.54	0	0.0
De-icing fluid	1.00	33	33.0
Zero Fuel Mass	2.39	1683	4028.7
Fuel (main tanks)	2.63	150	394.5
Fuel (AUX tanks)	3.20		
Total TKOF Mass	2.41	1833	4423.2

Center of gravity envelope



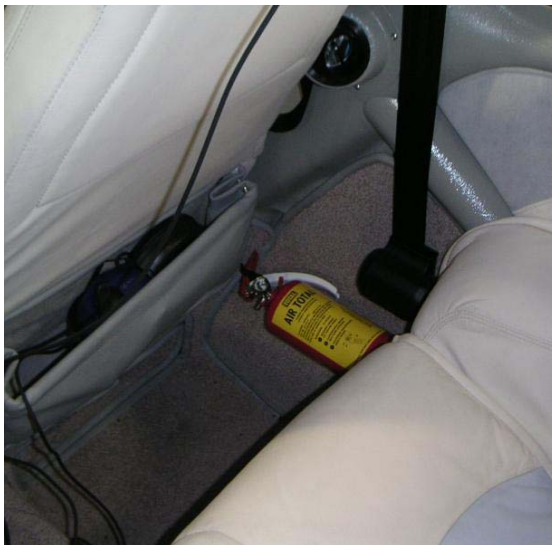
Trim weights in tail: 1-3x 5 kg; 15kg; CG shift of ~ 2cm: ●



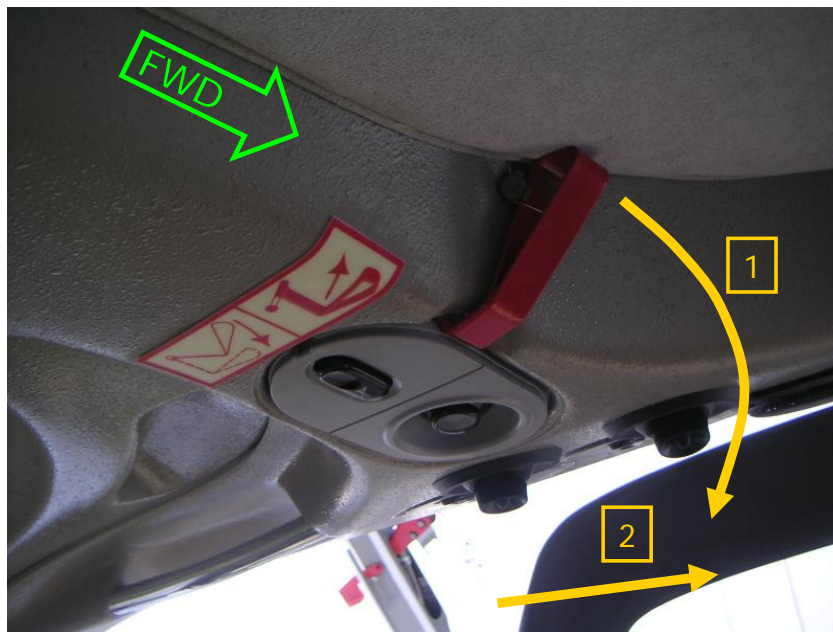
Diamond DA42 NG



Emergency equipment



Emergency Exit

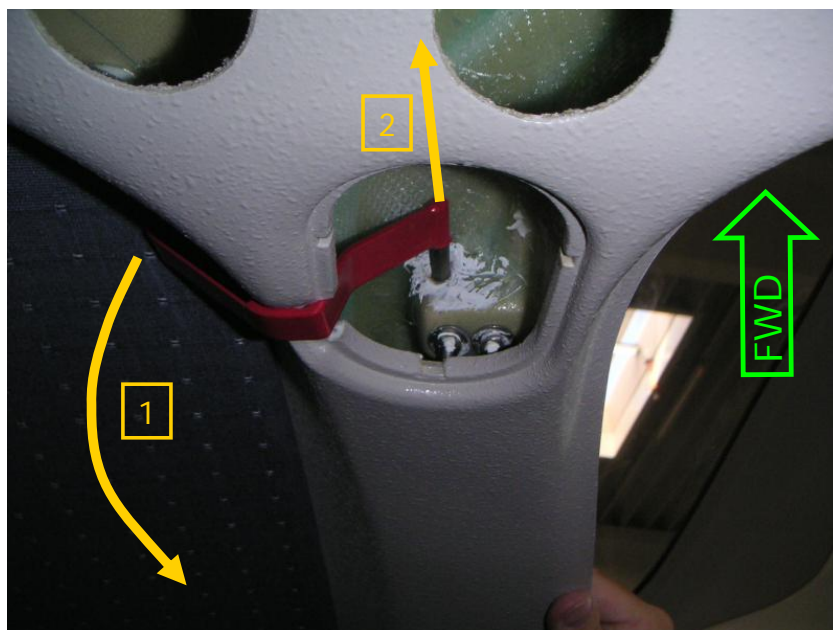


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Emergency Exit

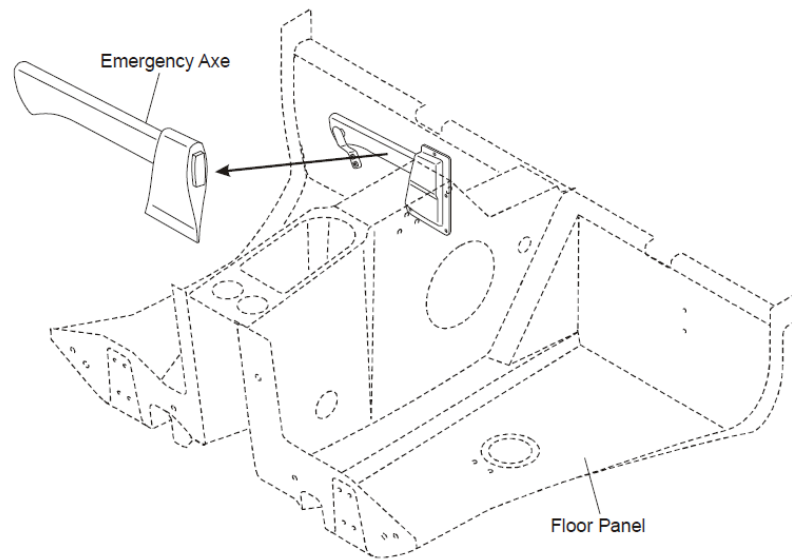


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(Optional) Emergency Axe



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Diamond DA42 NG



Kinds of Operation Equipment List (KOEL)

Kinds of Operation Equipment List KOEL



	for daytime VFR flights	in addition for night VFR flights	in addition for IFR flights
Flight & navigation instruments	<ul style="list-style-type: none"> * airspeed indicator (on G1000 PFD or backup) * altimeter (on G1000 PFD or backup) * magnetic compass * 1 headset, used by pilot in command 	<ul style="list-style-type: none"> * vertical speed indicator (VSI) * attitude gyro (artificial horizon; on G1000 PFD or backup) * turn & bank indicator * directional gyro * VHF radio (COM) with speaker and microphone * VOR receiver * transponder (XPDR), mode A and mode C * GPS receiver (part of G1000) 	<ul style="list-style-type: none"> * second airspeed indicator (both, on G1000 PFD and backup) * second altimeter (both, on G1000 PFD and backup) * second attitude gyro (both, on G1000 PFD and backup) * second VHF radio (COM) * VOR-LOC-GP receiver * second GPS receiver (part of G1000)

Kinds of Operation Equipment List KOEL



Additional minimum equipment for the intended operation may be required by **national operating rules** and also depends on the **route to be flown**.

Kinds of Operation Equipment List KOEL



	for daytime VFR flights	in addition for night VFR flights	in addition for IFR flights
engine instruments	<ul style="list-style-type: none"> * fuel qty. (2x) * oil press. (2x) * oil temp. (2x) * coolant temp. (2x) * coolant level indicator (2x) * gearbox temp. (2x) * load (2x) * prop. RPM (2x) * fuel temp. left & right tank 	<ul style="list-style-type: none"> * ammeter * voltmeter 	

Kinds of Operation Equipment List KOEL



	for daytime VFR flights	in addition for night VFR flights	in addition for IFR flights
lighting		<ul style="list-style-type: none"> * position lights * strobe lights (anti collision lights) * landing light * instrument lighting * flood light * flashlight 	

Kinds of Operation Equipment List KOEL



	for daytime VFR flights	in addition for night VFR flights	in addition for IFR flights
other operational minimum equipment	<ul style="list-style-type: none"> * stall warning system * variable elevator stop * alternate means for fuel quantity indication (see Section 7.9) * safety belts for each occupied seat * Airplane Flight Manual 	<ul style="list-style-type: none"> * Pitot heating system * alternate static valve 	<ul style="list-style-type: none"> * emergency battery (for backup attitude gyro and flood light)

Diamond DA42 NG



Servicing

Unscheduled maintenance



- Required after
 - Hard landings
 - Propeller strike
 - Engine fire
 - Lightning strike
 - Other malfunctions and damage

Scheduled maintenance

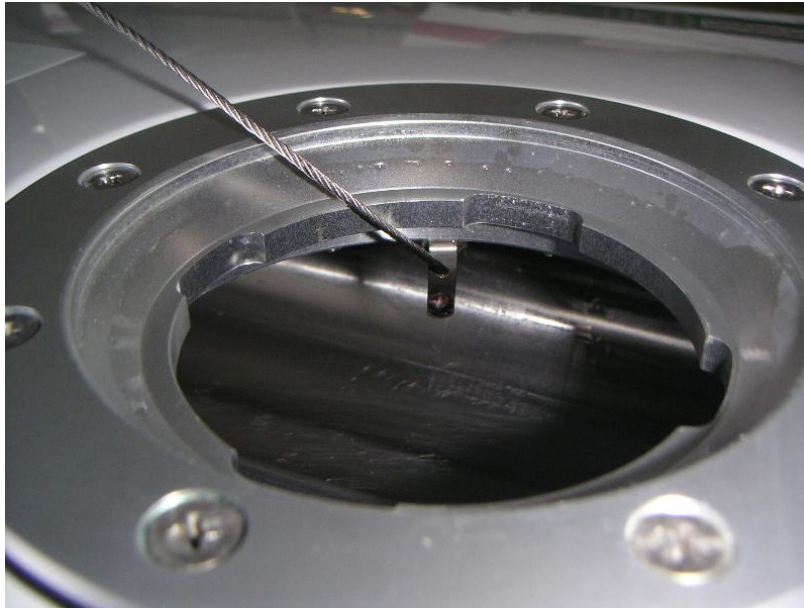


- Every
 - 100 hours
 - 200 hours
 - 1000 hours
 - 2000 hours
- Annually

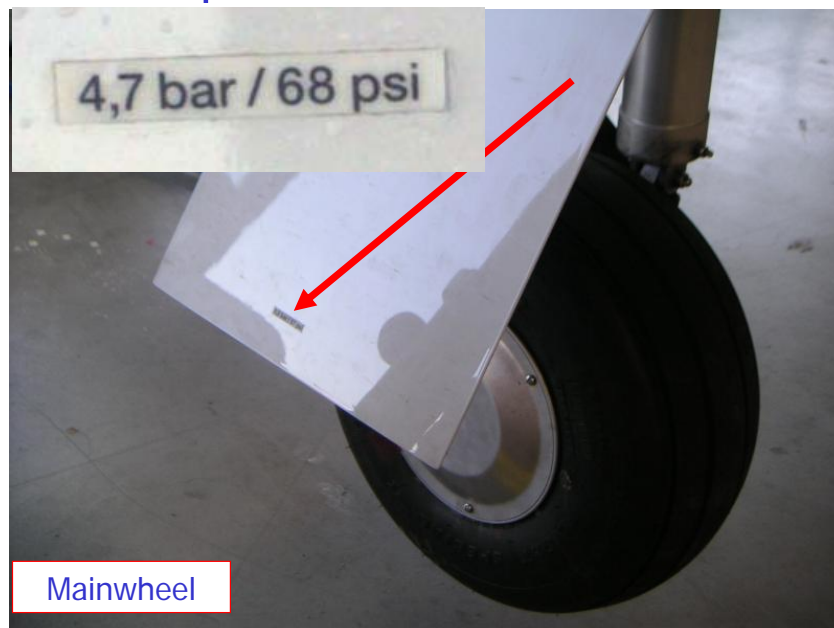
Refuelling



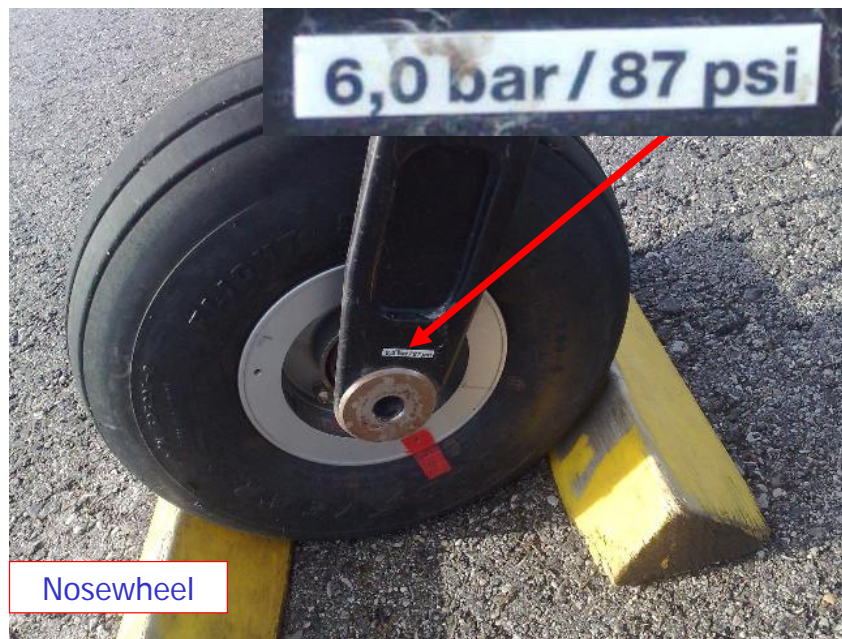
Refuelling



Tire pressure



Tire pressure



De-icing

- Approved de-icing fluids:
 - Kilfrost TKS 80
 - Aeroshell Compound 07
 - AL-5 (DTD 406B)
- Procedure:
 - Remove snow with brush
 - Spray de-icing fluid
 - Wipe dry

Tow bar



existing picture is replaced by the following picture:



Control surfaces gust lock



Mooring



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Mooring



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