Flight Training Division

Diamond DA42 **NG**

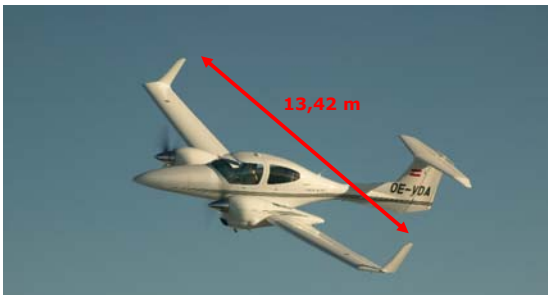
Handout
DA42 NG
Systems

DIAMOND AIRCRAFT INDUSTRIES

Diamond DA42 **NG**

Vers. 3.4

Dimensions



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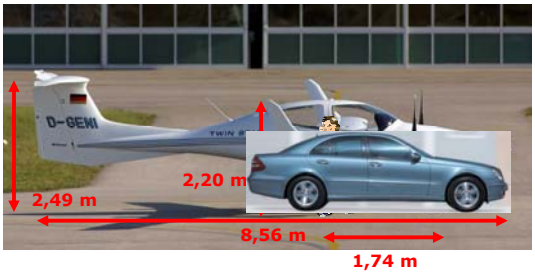

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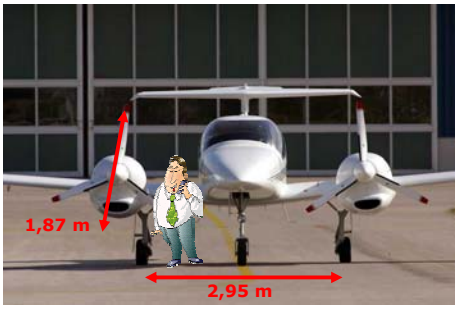
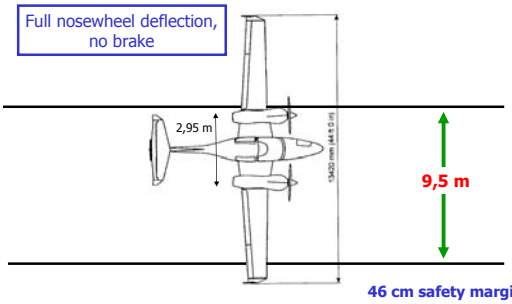


Minimum width for 180° turn

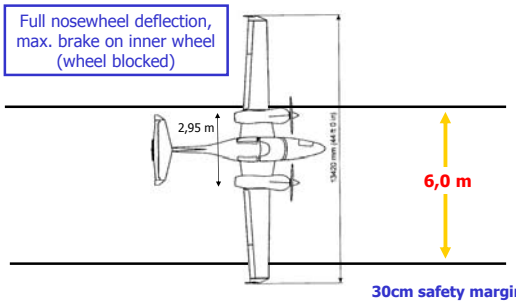
Full nosewheel deflection, no brake



46 cm safety margin

Minimum width for 180° turn

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

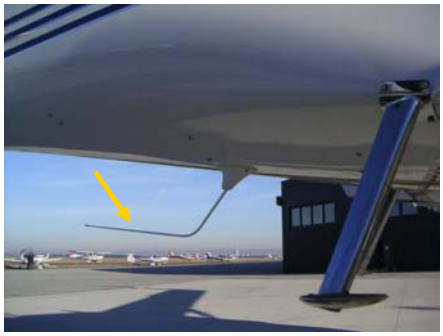


30cm safety margin

Nose bagge compartment

ELT and VHF COM 1 antenna

VHF COM 2 antenna

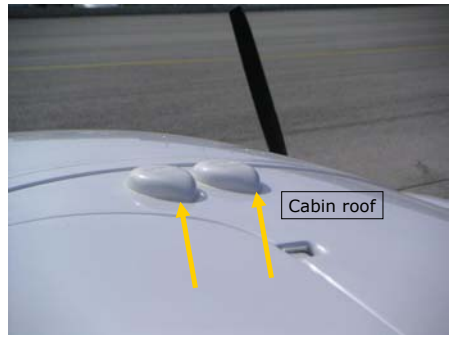


VHF NAV + GP antennas

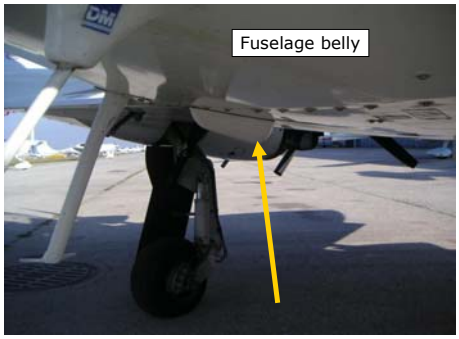
in the stabilizer

Stormscope antenna

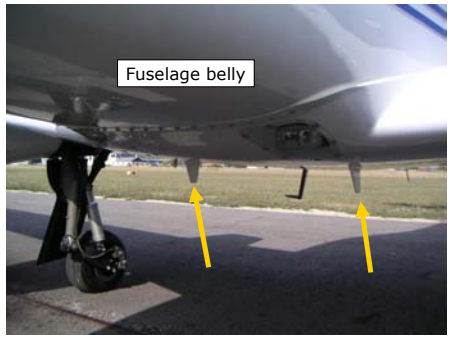
GPS antennas



Marker antenna

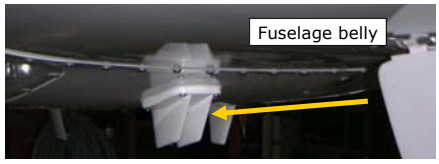


DME, TXPDR antennas

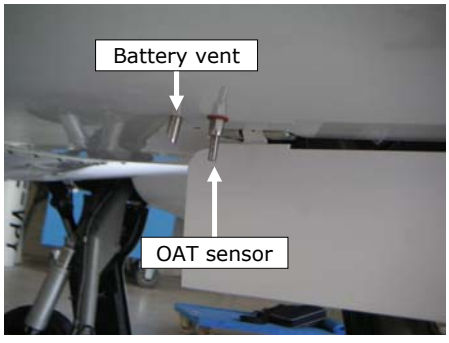


ADF antenna

TAS antennas



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

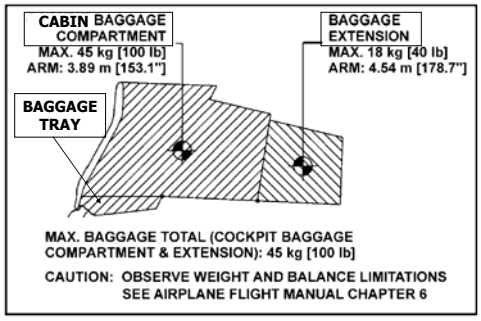
!

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 loads

Nose compartment	30 kg	
Cabin baggage compartment (behind rear seats)	45 kg	45 kg
Baggage extension	18 kg	



Mass (Weight)

Attention!

JET fuel and Diesel are heavier than AVGAS!

Typical fuel weight:

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

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}	62 KIAS
V_{S1}	69 KIAS
V_{MCA}	76 KIAS
Vops ice	118-156KIAS

Characteristic speeds

V_R	80 KIAS
V_X	---
V_Y	90 KIAS
V_{YSE}	85 KIAS
Vyse „ice"	88 KIAS
$V_{CRZ\ CLB}$	90 KIAS

Characteristic speeds

V_{FE} (Flaps APP)	133 KIAS
V_{FE} (Flaps LDG)	113 KIAS
$V_{LO\ E}$ (= V_{NE})	188 KIAS
Emergency extension	**152 KIAS**
$V_{LO\ R}$ (=~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

Instrument Panel

Instrument Panel

Instrument Panel

Instrument Panel

Instrument Panel

Instrument Panel

Alternators + ECU Control

Digital Engine Control

- **ECU (EECU)**
  - Engine Control Unit
  - Electric Engine Control Unit

this is a

- **FADEC**
  - Full Authority Digital Engine Control

Digital Engine Control

Will be explained in the „Power Plant" chapter

Instrument Panel

Pitot heat

Engine master switches, Engine start

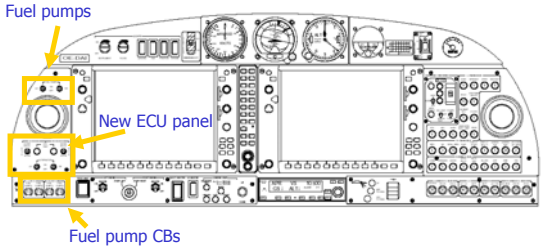
Electric Master, Avionic Master

Instrument Panel

Landing gear

Flaps

Instrument panel („Upgrade NG" with KAP140)



Instrument panel („Upgrade NG" with KAP140)

Pitot probe

Static ports

Alternate static valve

Lift detector (Stall warning)

Diamond DA42 NG

DA42 Garmin 1000

PFD
Primary Flight Display

MFD
Multi Function Display

Garmin 1000 MFD

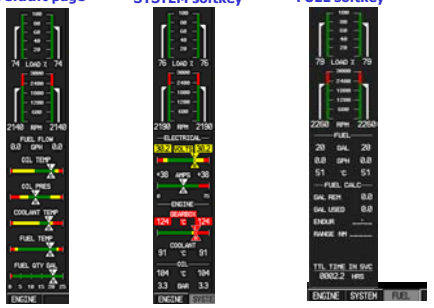
EIS / Engine Indication System

Engine Indication System

Default page

Display when pushing the SYSTEM softkey

Display when pushing the FUEL softkey

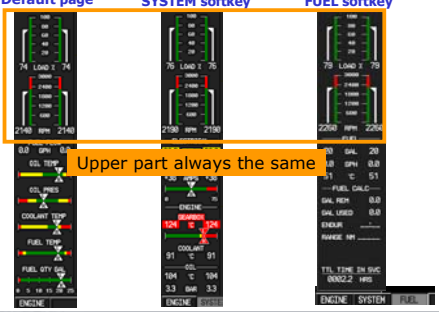


Engine Indication System

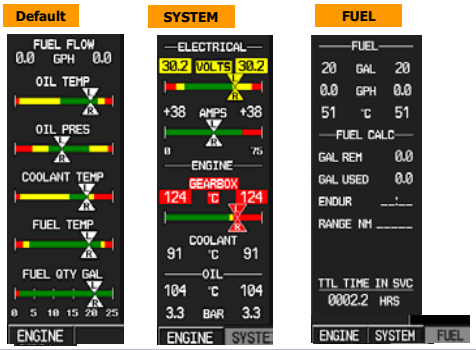
Default page

Display when pushing the SYSTEM softkey

Display when pushing the FUEL softkey



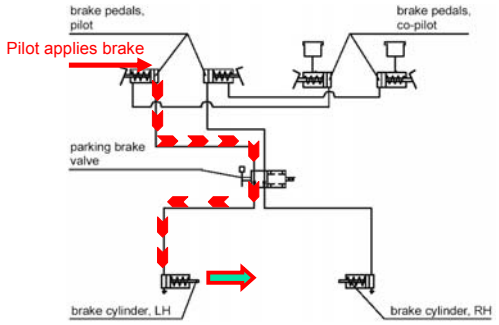
Engine Indication System



Diamond DA42 NG

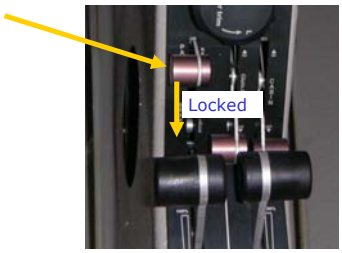
Hydraulic System

Hydraulic brakes

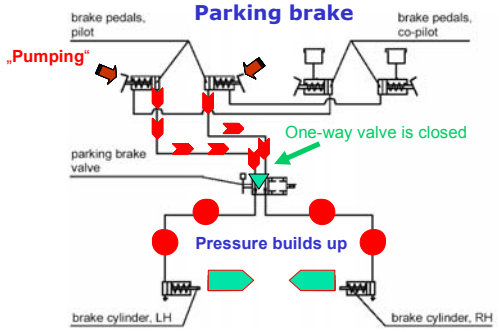


Hydraulic brakes

Parking brake



Hydraulic brakes



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

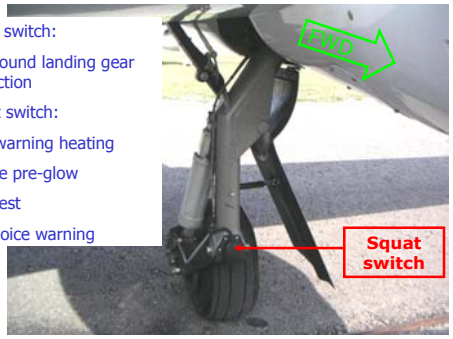
Landing gear

LH squat switch:

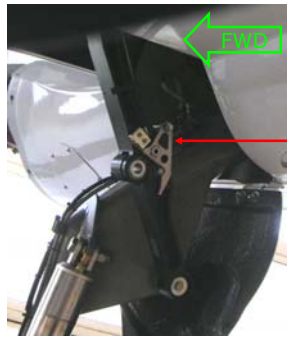
- On ground landing gear protection

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

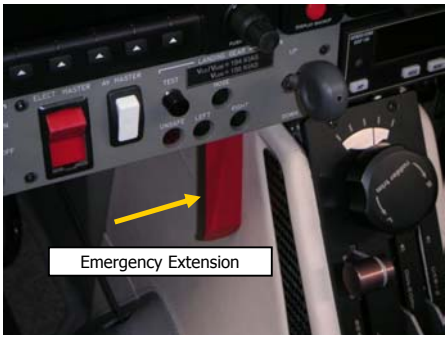
If landing gear **extension** unsuccessful:

Continue with MANUAL EXTENSION

If landing gear **retraction** unsuccessful:

Consider flight with landing gear down

Landing gear



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

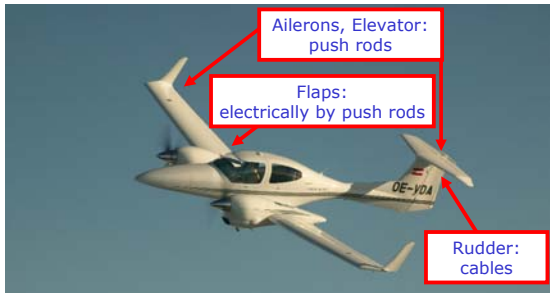
- Landing Gear Warning:
  - Gear UP
    - and
  - one power lever below ~20%
    - or
  - Flaps LDG

Nosewheel steering

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

Diamond DA42 NG

Flight control operation



Flight control operation

Flap interconnection

Variable elevator backstop

- 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 backstop

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

Variable elevator backstop Preflight check

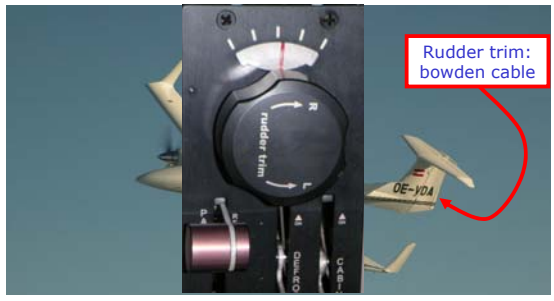
CHECK BEFORE ENGINE START continued

30	Flaps	LDG	30
31	Variable elevator backstop	CHECK	31
	Control stick	*AFT and HOLD*	
	Power levers	*MAX*	
	Check backstop limit decreasing		
	Power levers	*IDLE*	
	Check backstop limit increasing		
32	Flaps	UP	32

Optional electric rudder pedal adjustment

Trim tabs

Trim tabs



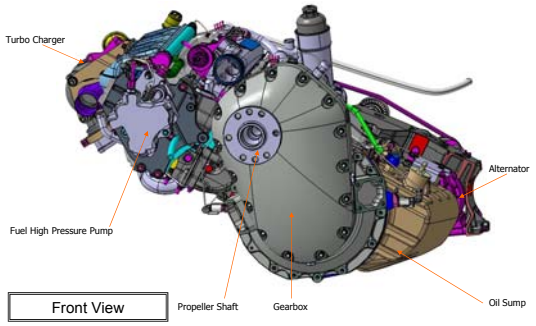
Diamond DA42 NG

Power plant

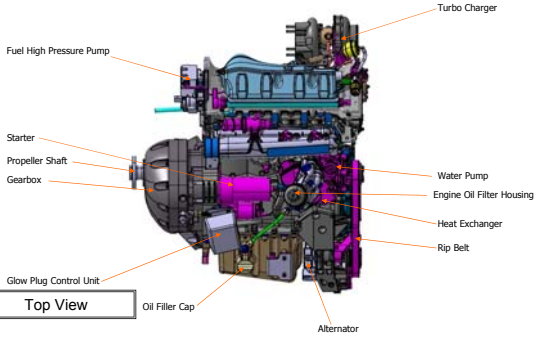
- 2 Austro Engines E4-B
- Four cylinders, liquid-cooled
  - 1991 ccm
- Common-rail direct injection
- Reduction gear 1:1,69
- Dual digital engine control
- Turbocharger
- Torsion vibration damper isolates engine from propeller
- Max. power: **100%** (5 minutes time limit)
  123,5 kW (165,6 DIN-HP) at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

Austro Engine E4-B

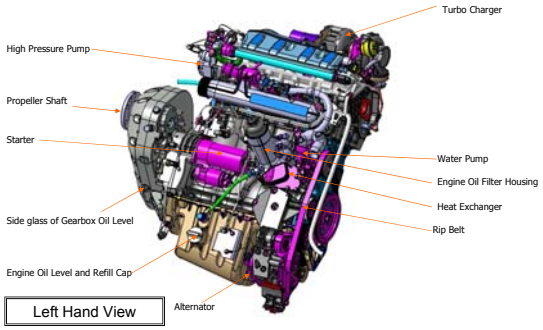
Austro Engine E4-B



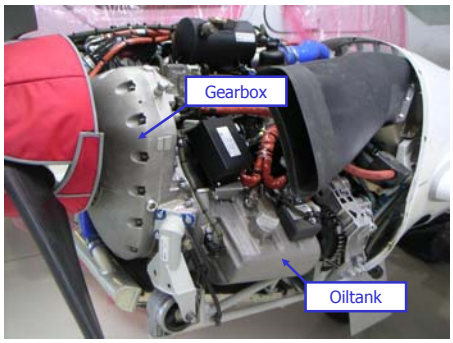
Austro Engine E4-B



Austro Engine E4-B

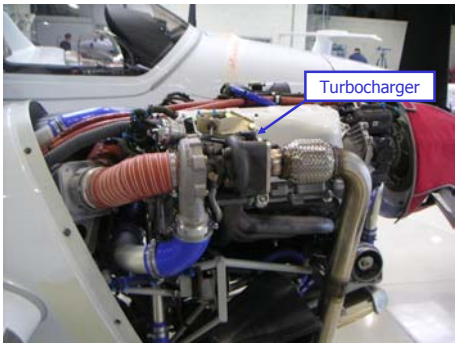


Austro Engine E4-B

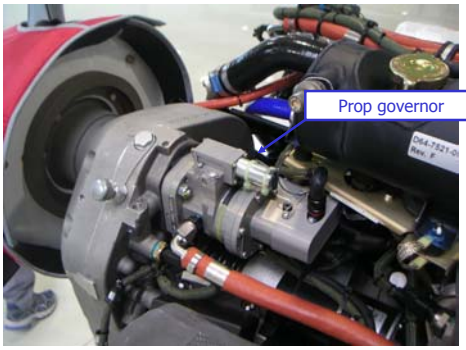


Austro Engine E4-B

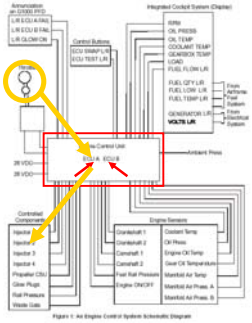
Austro Engine E4-B



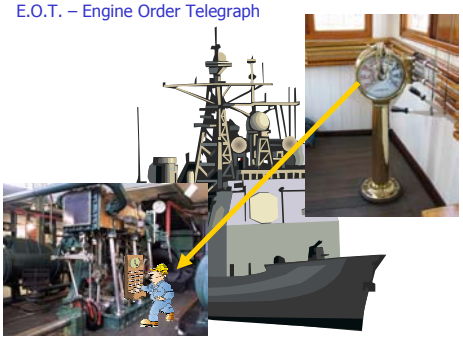
Austro Engine E4-B



ECU – Engine Control Unit



E.O.T. – Engine Order Telegraph

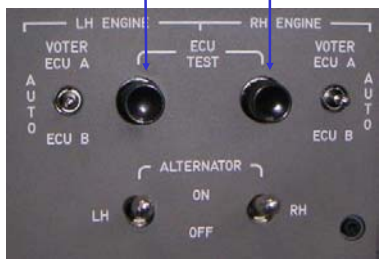


Engine Control Unit

- ECU „VOTER 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

16	Power levers (2) ..... IDLE	16
17	ECU test (2)..... PERFORMED	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	VOTER switches (2) ..... A, AUTO, B, AUTO	18

Engines checked

ECU Abnormal checklist

L/R ECU A OR B FAIL **ON GROUND**

➢ Discontinue operation, terminate flight preparation

L/R ECU A FAIL **DURING FLIGHT**

Remark: in case of ECU A fail the system automatically switches to ECU B

➢ Verify VOTER switch in position AUTO
- ❖ If ECU caution remains:
  - ⇒ Land ASAP
- ❖ If additional engine problems are observed:
  - ➢ Go to Emergency Checklist page 6 ENGINE TROUBLESHOOTING

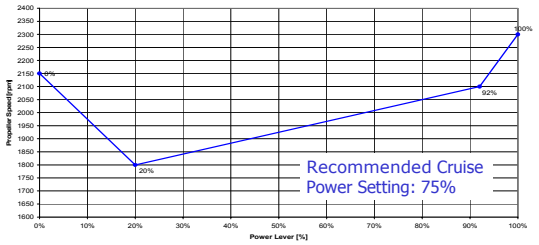
L/R ECU B FAIL **DURING FLIGHT**

Remark: in case of ECU B fail the system automatically switches to ECU A

➢ Verify VOTER switch in position AUTO
- ❖ If ECU caution remains:
  - ⇒ Land ASAP
- ❖ If additional engine problems are observed:
  - ➢ Go to Emergency Checklist page 6 ENGINE TROUBLESHOOTING

Power plant

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



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

Feathering system

- No „Auto-feather"
- Feathering by „Engine Master OFF" if RPM above 1300
- If RPM below 1300: prop pitch remains above high pitch lock
- Unfeathering by oil pressure from accumulator when Engine Master is ON

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 switch	unaffected ECU	2
	If no success:		
3	VOTER switch	AUTO	3
	Land ASAP		

RPM OVERSPEED

1	Power setting	REDUCE	1
	If no success:		
	Check G1000 for ECU FAIL caution		
	If ECU FAIL caution indicated:		
2	VOTER switch	unaffected ECU	2
	If no success:		
3	VOTER switch	AUTO	3
	Land ASAP		
	Be prepared for ENGINE FAILURE IN FLIGHT		

Fuel pumps

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

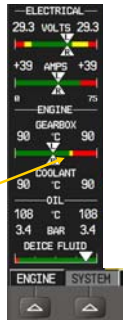
Power plant limitations

- Max overspeed: 2500 RPM, max 20 sec.
- Oil pressure:
  - < 1500 RPM: min 1,5 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 – 130°C

Power plant limitations

- Gearbox temperature:
  - Min: -30°C
  - Min at full load: 35°C
  - Max: 120 °C

The yellow cautionary range is for information only. There is no time limit associated with the cautionary temperature range.



Power plant limitations

- Coolant temperature:
  - min -30°C for start up
  - min 60°C full load
  - max 105 °C
- Fuel temperature:
  - min -25°C, max 60°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
  - Windmiling restart:
    - 125 – 145 KIAS

Power plant limitations

- No intentional shutdown below 5000ft GND or above 10000ft PA
- Intentional negative-g manoeuvers are not permitted

Starter limitations

- Operation: max 10 seconds
- 60 seconds cool down time

Power plant fluid specifications

- Fuel: JET A-1 or JET A (ASTM 1655)
  Minimum cetane number of 37
  (EN ISA 5165/ASTM D613)
  recommended
- Oil: SHELL Helix Ultra 5W30
  SHELL Helix Ultra 5W40
- Gearbox oil: Shell Spirax GSX 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

3 Warm up time ..... START 3

Warm up:
Idle.....2 minutes
50% LOAD .....until Oil > 50°C and Coolant > 60°C

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

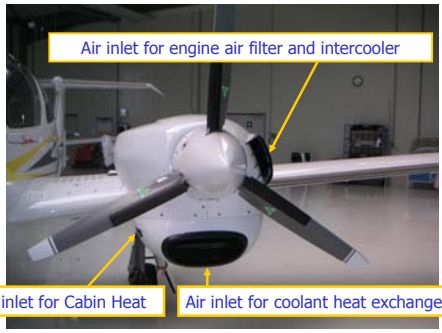
	OAT								
Altitude [ft]	-35°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
0	99%					97%	96%	93%	91%
2000						97%	96%	93%	-----
4000						97%	96%	93%	-----
6000						97%	96%	93%	-----
8000			98%	98%	98%	96%	95%	92%	-----
10000	98%	97%	97%	95%	94%	92%	89%	-----	-----

Engine operation

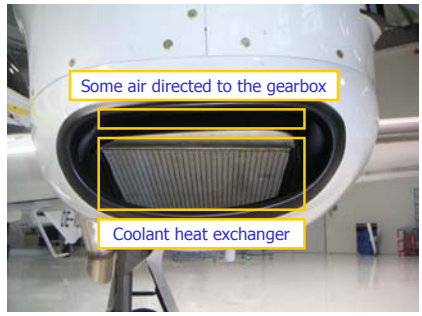
PARKING CHECK

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

Air inlets



Air inlets



Air outlet

Alternate air

Alternate air

Use of Alternate Air

ENGINE TROUBLESHOOTING

9 Alternate air..... OPEN

ENGINE RESTART

4 Alternate air.....AS REQUIRED 4

UNINTENTIONAL FLIGHT INTO ICING

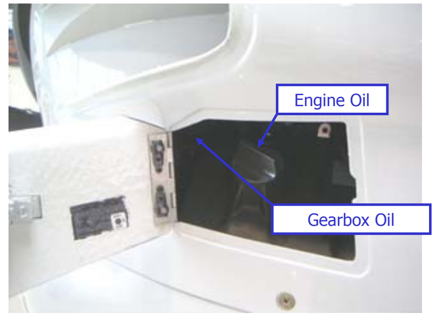
5 Alternate air ..... OPEN as required 5

Checking oil levels

Diamond AIRCRAFT

Checking oil levels

Diamond AIRCRAFT



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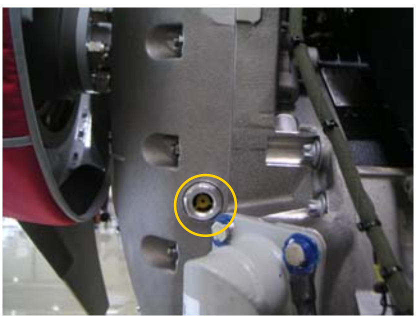
Checking oil levels

Diamond AIRCRAFT



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Checking oil levels

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Checking oil levels

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Power plant warnings

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L/R OIL PRES — **OIL PRESSURE LOW**

- Reduce power on affected engine
- Be prepared for loss of oil and an engine failure; land ASAP

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; land ASAP

L/R GBOX TEMP — **GEARBOX TEMPERATURE HIGH**

- Reduce power on affected engine
- Increase airspeed
  - If not returning to green range:
    - ⇒ Be prepared for an engine failure; land ASAP

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Power plant cautions

OIL temperature high

- Refer to Emergency Checklist page 2, "L/R OIL TEMP"

OIL temperature low

- Increase power
- Reduce airspeed

OIL pressure high

- Check oil temperature and coolant temperature
  - If within green range
    - ⇒ Oil pressure indication may be faulty; watch temperatures
  - If outside of green range
    - ⇒ Reduce power on affected engine;
    - ⇒ Be prepared for an engine faiure; Land ASAP

OIL pressure low

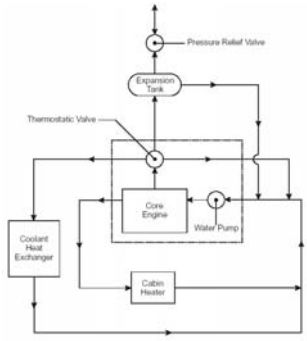
- Refer to Emergency Checklist page 2, "L/R OIL PRES"

Fire detection system

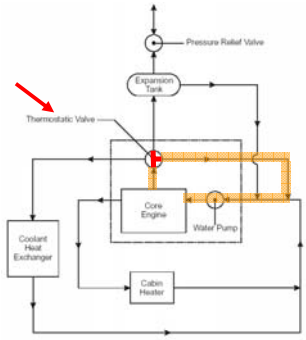
- Overheat detector in hot area of each engine
- Warning above 250°C
- Test button:

Diamond DA42 NG

Cooling system

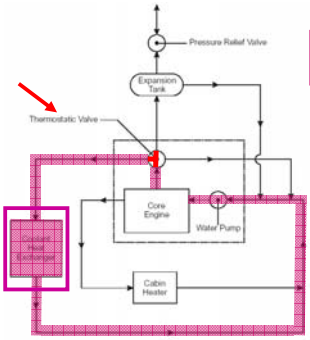


Cooling system



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 rqrd
      - ⇒ 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 ASAP
  - 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

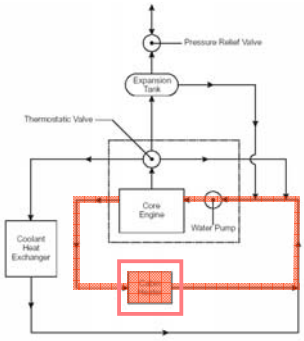
- Refer to Emergency Checklist page 3, "L/R ENG TEMP"

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



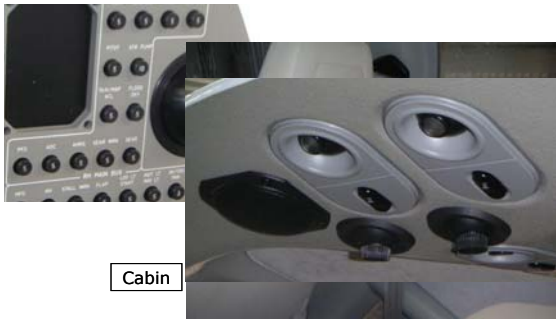
Cabin Heat

Cabin heating and defrosting system

Defrost from LH Engine

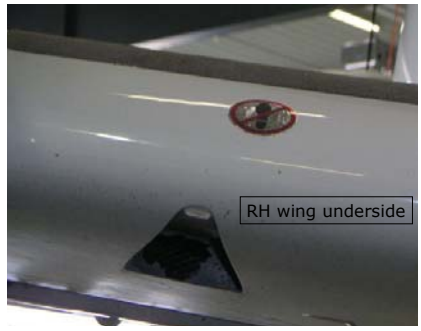
Cabin Heat from RH Engine

Ventilation



Cabin

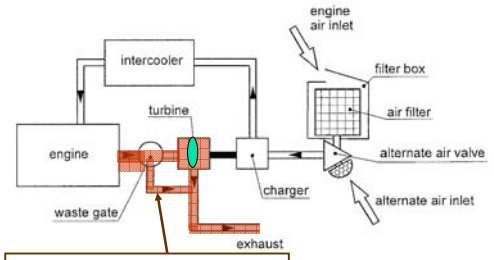
Ventilation inlet



RH wing underside

Diamond DA42 NG

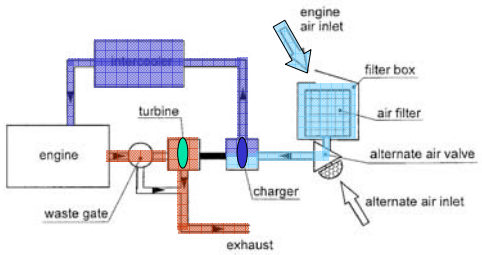
Turbo charger



Bypass for excess exhaust gas

Exhaust gas drives turbine

Turbo charger



Compressor compresses intake air

Exhaust gas drives turbine

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Diamond DA42 NG

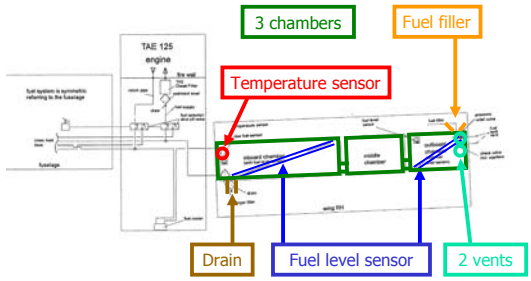
DA42 Fuel system

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

DA42 Fuel system

- Max unbalance: 5 USG
- Fuel temperature limits:
  - -25° C to +60° C

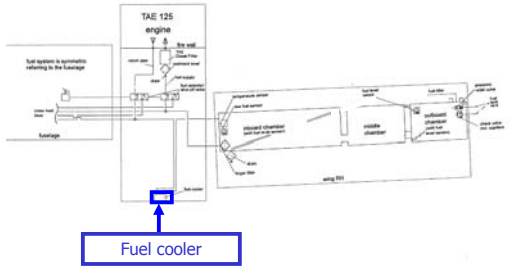
DA42 Fuel system



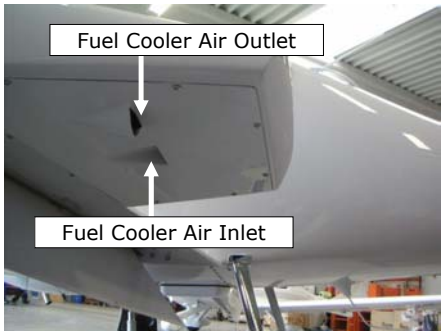
DA42 Fuel system

Drain valve in nacelle (gascolator)

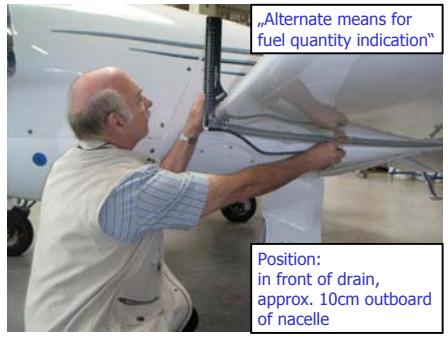
DA42 Fuel system



DA42 Fuel system

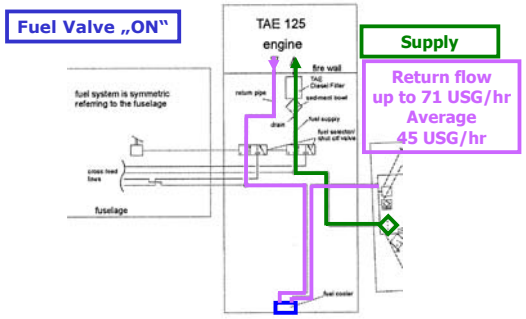


DA42 Fuel system

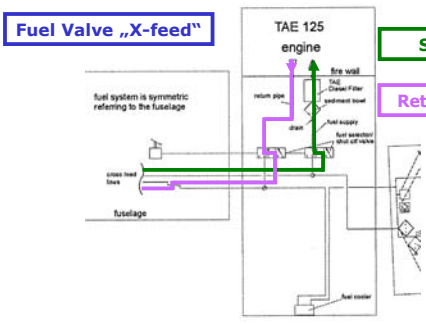


DA42 Fuel system

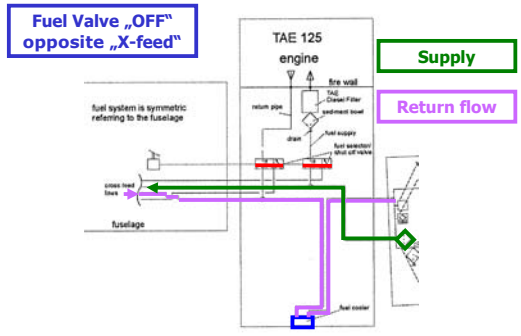
DA42 Fuel system



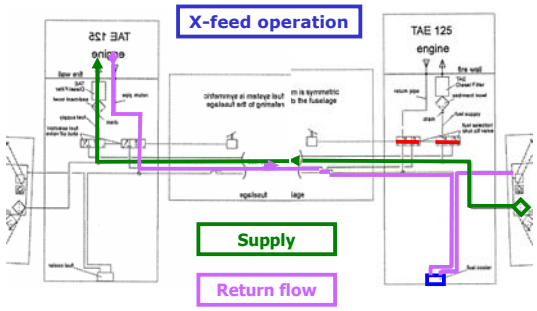
DA42 Fuel system



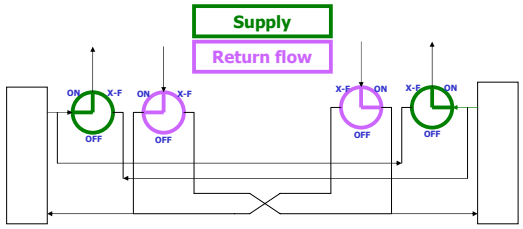
DA42 Fuel system



DA42 Fuel system



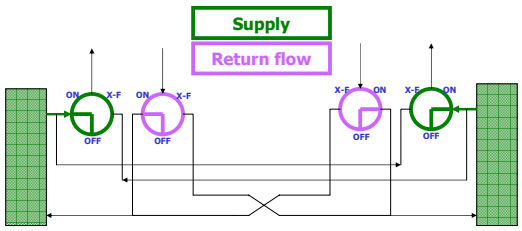
Fuel valves schematic



ON
X-FEED
OFF

ON
X-FEED
OFF

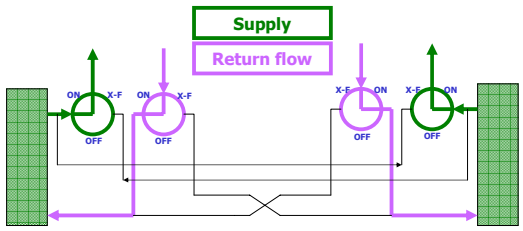
Both valves closed



ON
X-FEED
OFF

ON
X-FEED
OFF

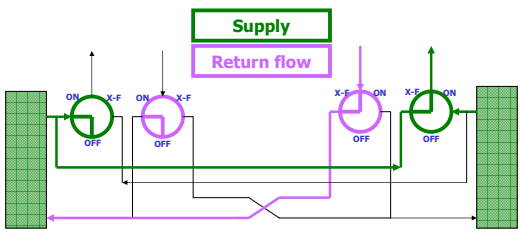
Both engines running



ON
X-FEED
OFF

ON
X-FEED
OFF

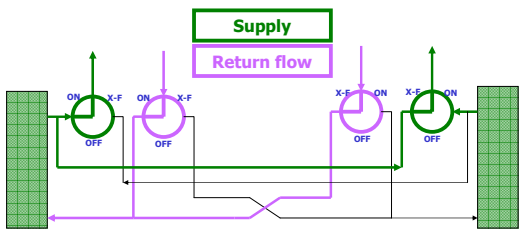
LH Eng. u/s, RH Eng. X-feed



ON
X-FEED
OFF

ON
X-FEED
OFF

Both engines from LH tank



ON
X-FEED
OFF

ON
X-FEED
OFF

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
- 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	4	Fuel pumps (2) ..... check OFF	4
	5	Fuel selectors (2) ..... X-FEED	5
BEFORE TAKE OFF CHECK	22	Fuel pumps (2) ..... ON	22
	23	Parking brake ..... RELEASED	23

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; land ASAP**

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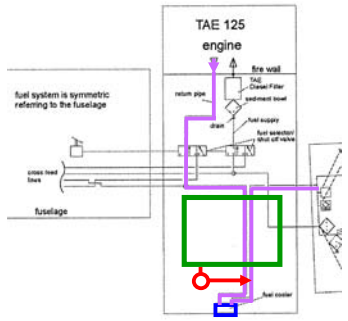
Diamond DA42 NG

Optional Auxiliary Fuel Tanks

Optional Auxiliary Fuel Tanks



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

Optional Auxiliary Fuel Tanks

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

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

Mass and Balance

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

Fuel quantity check

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

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

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

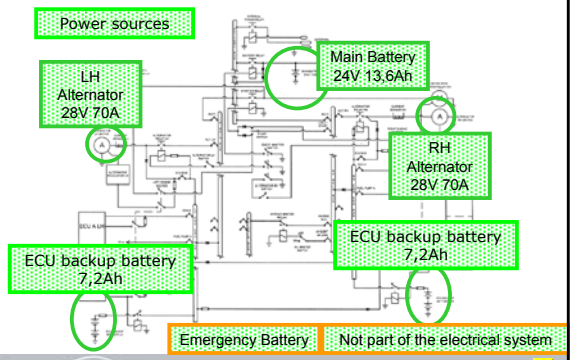
    until
  - L/R AUX FUEL E ON

    (will take 10 minutes or even longer)

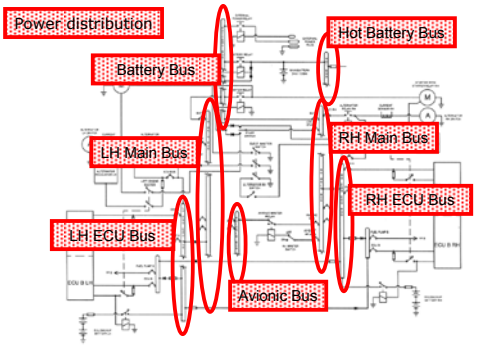
Diamond DA42 NG

Electrical System

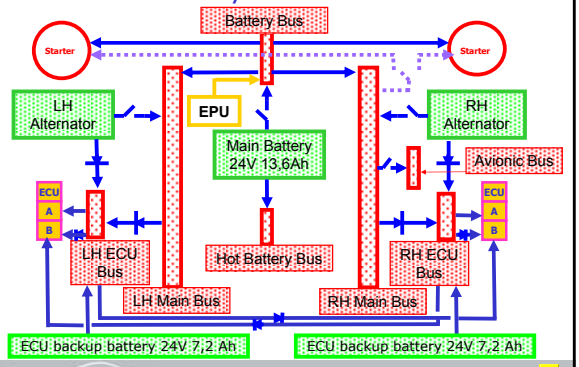
Electrical system



Electrical system



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

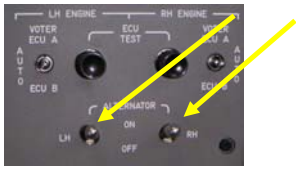
Electric Master

- 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

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

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

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	ON	3
4	Power	SET	4
	according power lever position and/or engine noise		
5	Flaps	VERIFY POSITION	5

Land ASAP

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

Diamond DA42 NG

Oxygen system

- Continous 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

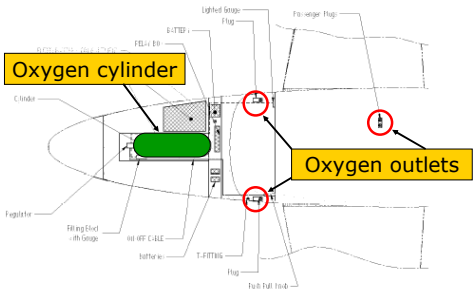
Duration using Oxysaver® cannulas (hours)

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

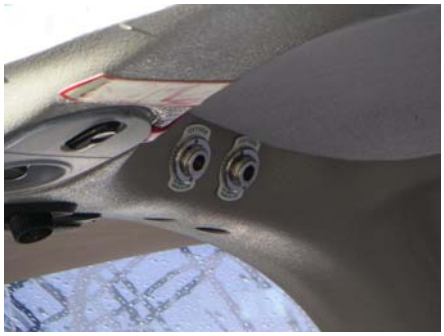
to chieve a cylinder (system) pressure of 1850 psi

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

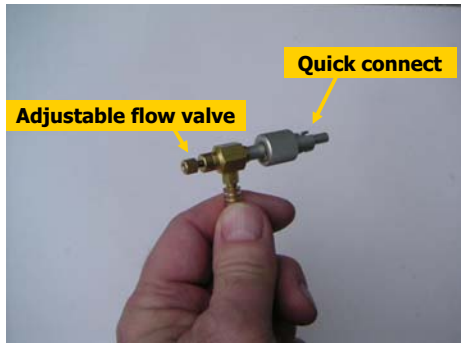
Oxygen system

Oxygen system

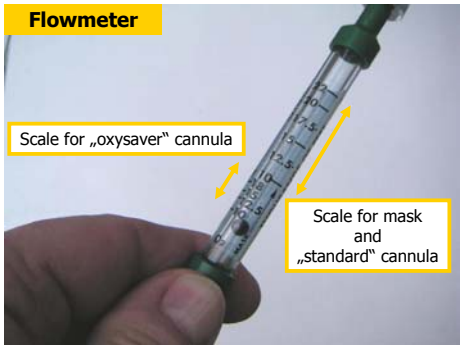
Oxygen system



Oxygen system



Oxygen system



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

If Oxygen System is installed

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 ASAP

CABIN FIRE ABOVE 10.000 FT

1 Oxygen ..... PUSH OFF 1
2 Emergency descent ..... INTITIATE 2
Land ASAP

OXYGEN PRESSURE LOSS ABOVE 10.000 FT

1 Oxygen ..... PUSH OFF 1
2 Oxygen pressure ..... CHECKED, note down 2
3 Emergency descent ..... INTIATE 3
When passing 10.000 FT:
4 Oxygen pressure ..... CHECK AGAIN 4
- If oxygen pressure constant: ... Continue flight
- If oxygen pressure dropped: ..... Land ASAP

If Oxygen System is installed

Diamond DA42 NG

Ice protection system

Fluid ice protection system

Product of

CAV Aerospace Ltd
(Celtic Aerospace Ventures Ltd)

commonly knows as
„TKS"

„TKS" Ice Protection General

Ice protection system

- How does it work?
  - Protection fluid acts 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

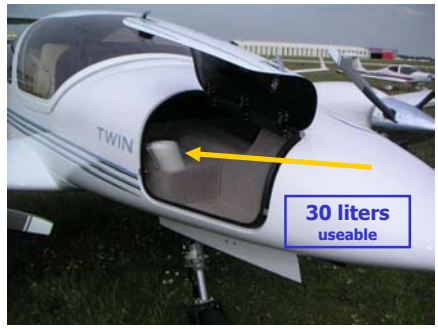
- Two means of FPD fluid application:
  - Spray nozzles (windshield, propeller)
    - Propeller:
      - Feeding into a „slinger ring"
      - Feeder tube to (rubber) leading edge
  - Porous skin panels

Ice protection system

- Freezing point of glycol:
  - -12° C
- Freezing point of glycol/water mixture:
  - -22° C to -40°C

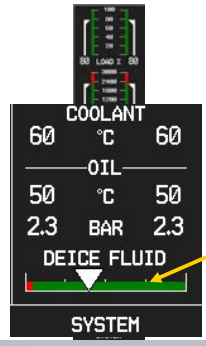
„TKS" Ice Protection DA42

Ice protection system



Ice protection system

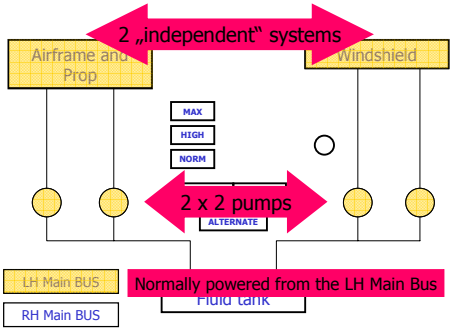
Ice protection system



Minimum for dispatch:
22 liters

3/4

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	

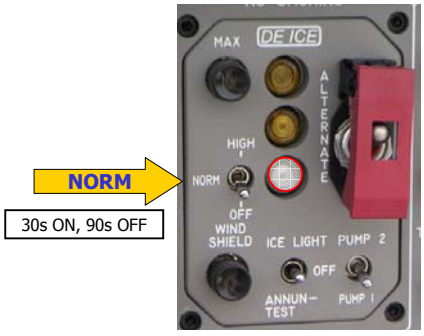
Ice protection system

Operational modes

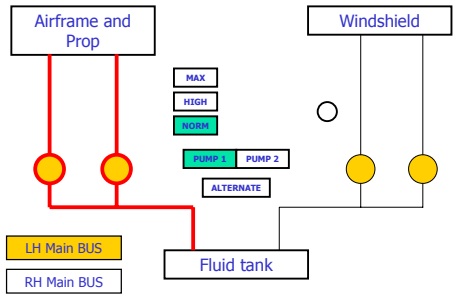
Mode			Operating mode	Operating time
NORM *)	Climb + Cruise		2 pumps simultaneously, but cycled 30 secs ON and 90 secs OFF	~ 2,5 hrs
HIGH **)		Approach	1 pump continuously ON	~ 1,0 hr
MAX			2 pumps simultaneously ON for 2 minutes	~ 0,5 hr

*)	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

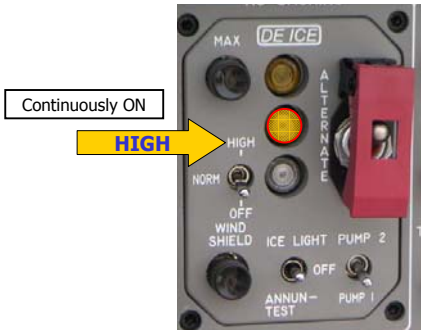
Ice protection system



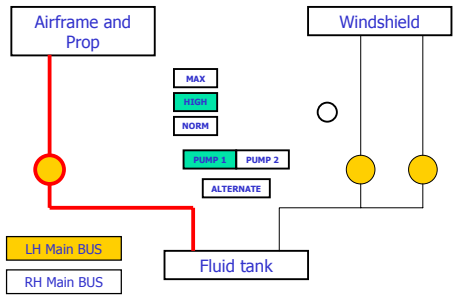
Ice protection system



Ice protection system



Ice protection system



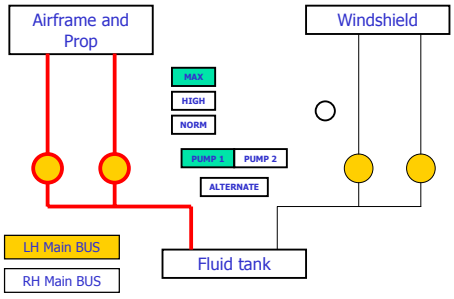
Ice protection system

2 minutes ON

MAX

HIGH

Ice protection system

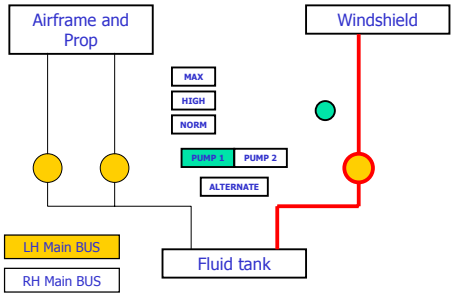


Ice protection system

5 seconds

Windshield deice

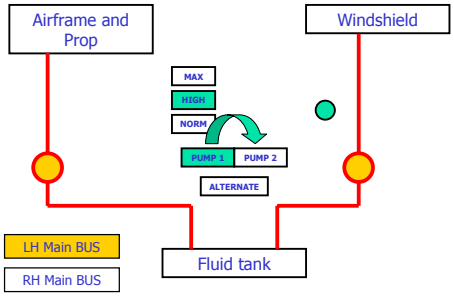
Ice protection system



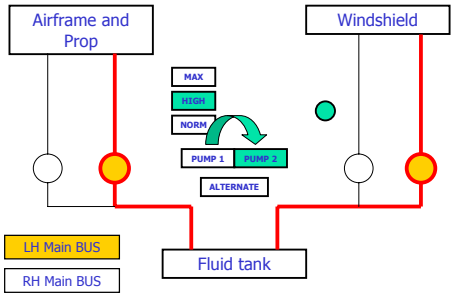
Ice protection system

Main and Windshield pump selector

Ice protection system



Ice protection system

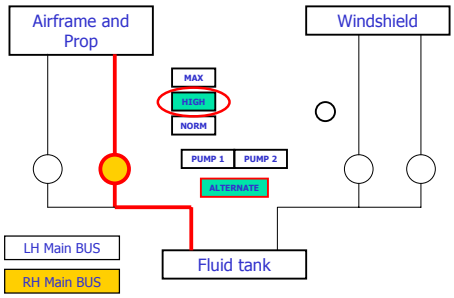


Ice protection system

ALTERNATE switch connects pump #2 directly to RH main bus

System operates in HIGH mode

Ice protection system



Ice protection system

DEICE LVL LO light ON

DEIC PRES LO light ON after 120 seconds

Annunciator test (simulates system ON)

Ice protection system

Ice lights

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

DEIC PRES LO — **DE-ICING PRESSURE LOW**

- Switch DE-ICE to HIGH
  - If DEIC PRES LO light still ON
    - ⇒ PUMP1 / PUMP2: select other pump
    - ⇒ If necessary prime pump by activating windshield pump
      - If DEIC PRES LO light still ON
        - ⇒ Activate ALTERNATE switch
          - If DEIC PRES LO light still ON
            - ⇒ Go to Emergency Checklist page 10 ICE PROTECTION FAILURE
  - If DEIC PRES LO light OFF
    - ⇒ Continue flight (de-icing fluid flow: 30 lt/hr)
    - ⇒ Monitor ice protection system operation
    - ⇒ Check de-icing fluid level periodically

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 as required	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	APP	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

Ice protection system

Mass and Balance

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

1 ltr: 1,1 kg

30 ltr: 33,0 kg

Ice protection system

- 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

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

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

Operational considerations

- what defines „icing conditions"?
  - visually detected ice
  - visible moisture and OAT +3°C or below

Operational considerations

- what indicates conditions the system my 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

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

Operational considerations

- how to detect **possible** freezing rain or freezing drizzle conditions?
  - visible rain in OAT below +5°C
  - droplets that splash on impact in OAT below +5°C
  - performance loss larger than normally experienced in icing conditions

- 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

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

Airspeeds with ice on unprotected areas

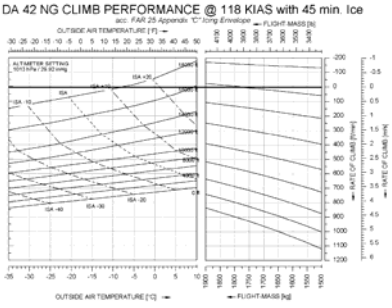
Continuous operation in icing conditions (except TKOF, LDG and maneuvers)	118 – 156 KIAS
Minimum continuous climb speed in icing conditions (flaps UP)	118 KIAS
Stalling speeds	+ 4-6 KIAS

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

- 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

Performance in icing conditions (ice on unprotected areas)
Cruise climb with 45 minutes ice accreation

DA 42 NG CLIMB PERFORMANCE @ 118 KIAS with 45 min. Ice



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	

Operational considerations

Performance in icing conditions (ice on unprotected areas)

Cruise performance

TAS -20 %

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

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

Intentionally blank

Intentionally blank

Intentionally blank

Diamond DA42 NG

Performance

- DA42 Twin Star according CS 23:
  - Normal, Utility & Aerobatic category
    - Reciprocating engine
      - Weight ≤ 2722 kg
        - VSO ≤ 61 kt
- „Light Twin"

Density altitude

No Density Altitude graph in the DA42 AFM

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

X-wind

Max demonstrated crosswind component:

25 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.

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 !		

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)

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

ROC to gradient conversion

Formula in AFM:

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

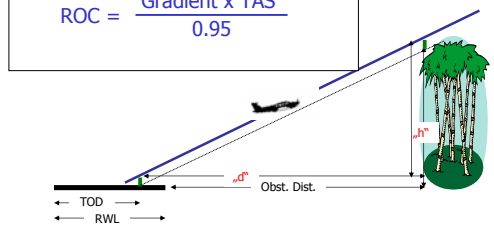
Grass Runway

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

Obstacles ?

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

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

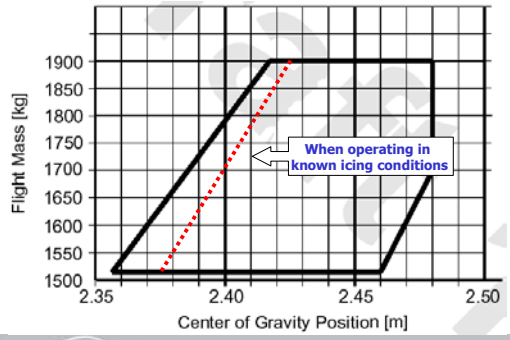


Diamond DA42 NG

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

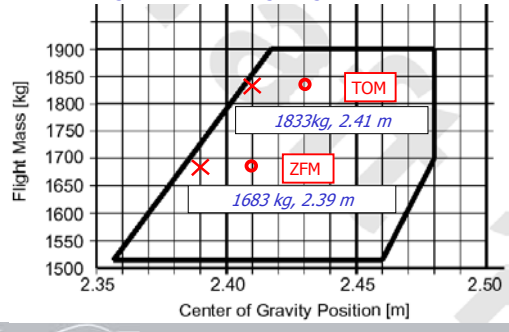
Item	Lever Arm (m)
Front seats	2.30
Rear seats	3.25
Wing tanks	2.63
AUX tanks	3.20
De-icing fluid	1.00
Nose baggage	0.60
Cabin baggage	3.89
Baggage Extension	4.54

M&B calculation

	Lever arm	Mass (kg)	Moment (kgm)
Empty mass		1450	3488.0
Front seats	*170 x 2.30 = 391.0*		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	4028.7 : 1683 = 2.39	
Fuel (main tanks)	2.63	150	394.5
Fuel (AUX tanks)	3.20		
Total TKOF Mass	2.41	4423.2 : 1833 = 2.41	

Center of gravity envelope

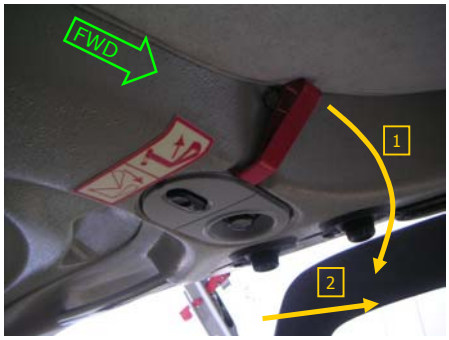
Trim weights in tail: 1-3x 5 kg; 15kg: CG shift of ~ 2cm:



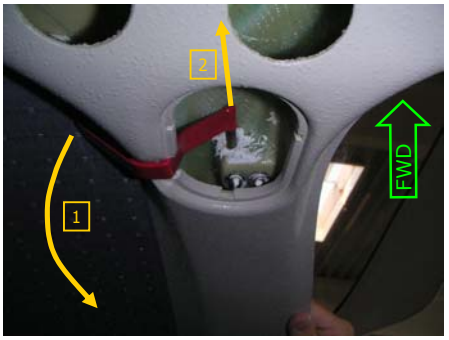
Diamond DA42 NG

Emergency equipment

Emergency Exit



Emergency Exit



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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	* airspeed indicator (on G1000 PFD or backup) * altimeter (on G1000 PFD or backup) * magnetic compass * 1 headset, used by pilot in command	* 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)	* 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

	for daytime VFR flights	in addition for night VFR flights	in addition for IFR flights
engine instruments	* 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	* ammeter * voltmeter	

Kinds of Operation Equipment List KOEL

	for daytime VFR flights	in addition for night VFR flights	in addition for IFR flights
lighting		* 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	* 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	* Pitot heating system * alternate static valve	* emergency battery (for backup attitude gyro and flood light)

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**.

Diamond DA42 NG

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

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

Control surfaces gust lock

Mooring

Mooring

Mooring