Diamond DA42 NG

Handout
DA42 NG
Systems
Diamond DA42 NG

Dimensions

Span: 13.55 m with ACL (strobe lights)
Dimensions

**Diamond Aircraft**

- **Dimensions**
  - Height: 2.49 m
  - Width: 2.20 m
  - Length: 8.56 m
  - Span: 1.74 m

**Dash-6**

- Height: 1.87 m
- Span: 2.95 m
- Length: 1.90 m

© Diamond Aircraft Industries GmbH
Compiled by Peter Schmidleitner
Minimum width for 180° turn

Full nosewheel deflection, no brake

9.5 m

46 cm safety margin

Minimum width for 180° turn

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

6.0 m

30 cm 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

Cabin roof

With SBAS
Marker antenna

Fuselage belly

DME, TXPDR antennas

Fuselage belly
ADF antenna

TAS antennas

Fuselage belly
OAT Sensor

Battery vent

OAT sensor

Intentionally blank
# Mass

## Mass (Weight)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty (typical)</td>
<td>1450 kg</td>
</tr>
<tr>
<td>Max TKOF</td>
<td>1900 kg</td>
</tr>
<tr>
<td>Max Ramp</td>
<td>+ 8 kg</td>
</tr>
<tr>
<td>Max Zero Fuel</td>
<td>1765 kg</td>
</tr>
<tr>
<td>Max LDG</td>
<td>1805 kg</td>
</tr>
<tr>
<td>Min for flight</td>
<td>1510 kg</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th></th>
<th>Nose compartment</th>
<th>30 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>45 kg</td>
<td>30 kg</td>
</tr>
<tr>
<td>&quot;Short&quot; Baggage Extension</td>
<td>18 kg</td>
<td>15 kg</td>
</tr>
<tr>
<td>Total</td>
<td>45 kg</td>
<td>45 kg</td>
</tr>
</tbody>
</table>
**CABIN BAGGAGE COMPARTMENT**
MAX: 45 kg [100 lb]
ARM: 3.89 m [153.1"]

**BAGGAGE TRAY**

**BAGGAGE EXTENSION**
MAX: 18 kg [40 lb]
ARM: 4.54 m [178.7”]

MAX. BAGGAGE TOTAL (COCKPIT BAGGAGE COMPARTMENT & EXTENSION): 45 kg [100 lb]
CAUTION: OBSERVE WEIGHT AND BALANCE LIMITATIONS
SEE AIRPLANE FLIGHT MANUAL CHAPTER 6

---

**„Short“ Baggage Extension**

**STANDARD BAGGAGE COMPARTMENT**
MAX 30 kg [66 lb]
ARM: 3.65 m [143.7 in]

**SHORT BAGGAGE EXTENSION**
MAX 15 kg [33 lb]
ARM: 3.97 m [156.3 in]

**BAGGAGE TRAY**

CAUTION: OBSERVE WEIGHT AND BALANCE LIMITATIONS
SEE AIRPLANE FLIGHT MANUAL CHAPTER 6
Mass

Attention!
JET fuel and Diesel are heavier than AVGAS!

Typical fuel weight:

<table>
<thead>
<tr>
<th>JET A1:</th>
<th>Diesel:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,8 kg/ltr</td>
<td>0,84 kg/ltr</td>
</tr>
<tr>
<td>3,03 kg/USG</td>
<td>3,2 kg/USG</td>
</tr>
</tbody>
</table>

Intentionally blank
Characteristics speeds

<table>
<thead>
<tr>
<th>V&lt;sub&gt;NO&lt;/sub&gt;</th>
<th>151 KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&lt;sub&gt;NE&lt;/sub&gt;</td>
<td>188 KIAS</td>
</tr>
<tr>
<td>V&lt;sub&gt;0&lt;/sub&gt;</td>
<td>112 KIAS</td>
</tr>
<tr>
<td></td>
<td>1700 kg</td>
</tr>
<tr>
<td></td>
<td>119 KIAS</td>
</tr>
<tr>
<td></td>
<td>1800 kg</td>
</tr>
<tr>
<td></td>
<td>122 KIAS</td>
</tr>
</tbody>
</table>
### Characteristic speeds

<table>
<thead>
<tr>
<th>VS0</th>
<th>„NG“</th>
<th>62 KIAS</th>
<th>„Dash-6“</th>
<th>62 KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS1</td>
<td>„NG“</td>
<td>69 KIAS</td>
<td>„Dash-6“</td>
<td>68 KIAS</td>
</tr>
<tr>
<td>VMCA</td>
<td>„NG“</td>
<td>76 KIAS</td>
<td>„Dash-6“</td>
<td>71 KIAS</td>
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<tr>
<td></td>
<td>Flaps UP</td>
<td>Flaps APP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vops ice</td>
<td>118-156 KIAS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For short field take-off

### Characteristic speeds

<table>
<thead>
<tr>
<th>VR</th>
<th>„NG“</th>
<th>80 KIAS</th>
<th>„Dash-6“</th>
<th>76 KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VX</td>
<td>„NG“</td>
<td>---</td>
<td>„Dash-6“</td>
<td>77 KIAS</td>
</tr>
<tr>
<td></td>
<td>Flaps UP</td>
<td>Flaps APP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VY</td>
<td>90 KIAS</td>
<td>85 KIAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VYSE Vyse „ice“</td>
<td>85 KIAS</td>
<td>88 KIAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VCRZ CLB</td>
<td>90 KIAS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Characteristic speeds

<table>
<thead>
<tr>
<th>Speed Type</th>
<th>Speed (KIAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{FE}$ (Flaps APP)</td>
<td>133</td>
</tr>
<tr>
<td>$V_{FE}$ (Flaps LDG)</td>
<td>113</td>
</tr>
<tr>
<td>$V_{LOE}$ (= $V_{NE}$)</td>
<td>188</td>
</tr>
<tr>
<td>Emergency extension</td>
<td>152</td>
</tr>
<tr>
<td>$V_{LOR}$ (=~$V_{NO}$)</td>
<td>152</td>
</tr>
<tr>
<td>$V_{LE}$ (= $V_{NE}$)</td>
<td>188</td>
</tr>
</tbody>
</table>

### Approach Speeds

<table>
<thead>
<tr>
<th>Speed Type</th>
<th>Speed (KIAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{REF}$ FLAPS UP</td>
<td>86</td>
</tr>
<tr>
<td>$V_{REF}$ FLAPS APP</td>
<td>84</td>
</tr>
<tr>
<td>$V_{REF}$ FLAPS LDG</td>
<td>84</td>
</tr>
<tr>
<td>$V_{GA}$ FLAPS UP</td>
<td>90</td>
</tr>
</tbody>
</table>
Diamond DA42 NG

Instrument Panel

Instrument panel
Instrument Panel

Garmin 1000

Airspeed Horizon Altimeter Compass

Backup Instruments
Instrument Panel

Flood Lights

Emergency Switch

Emergency Battery (non rechargeable)

IFR flights not permitted when seal on Emergency Switch is broken

Lights

ELT
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

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

- Pitot heat
- Engine master switches, Engine start
- Fuel Pumps
- Electric Master, Avionic Master
- Landing gear
- Flaps
Instrument panel („Upgrade NG“ with KAP140)

Fuel pumps

New ECU panel

Fuel pump CBs
Pitot probe

Static ports
Alternate static valve

Lift detector (Stall warning)
Diamond DA42 NG

Garmin 1000
Engine Indication System

DA42  Garmin 1000

Primary Flight Display
Multi Function Display
### Garmin 1000 MFD

**EIS / Engine Indication System**

![Image of Garmin 1000 MFD with EIS](image)

### Engine Indication System

<table>
<thead>
<tr>
<th>Default page</th>
<th>Display when pushing the SYSTEM softkey</th>
<th>Display when pushing the FUEL softkey</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Default page" /></td>
<td><img src="image" alt="Display when pushing the SYSTEM softkey" /></td>
<td><img src="image" alt="Display when pushing the FUEL softkey" /></td>
</tr>
</tbody>
</table>

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Engine Indication System

Default page

Display when pushing the SYSTEM softkey

Display when pushing the FUEL softkey

Upper part always the same

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Diamond DA42 NG

Hydraulic System

Hydraulic brakes

Pilot applies brake

- Brake pedals, pilot
- Parking brake valve
- Brake cylinder, LH
- Brake cylinder, RH

- Brake pedals, co-pilot
Hydraulic brakes

Parking brake

Locked

Hydraulic brakes

Parking brake

“Pumping”

One-way valve is closed

Pressure builds up

brake cylinder, LH

brake cylinder, RH
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

- 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 UNSAFE WARNING

If on for more than 20 seconds:

1. Airspeed............................max 152 KIAS
   In cold temperature:
2. Airspeed............................max 110 KIAS
3. Gear selector............................RECYCLE

✔️ If landing gear extension unsuccessful:
   Continue with MANUAL EXTENSION
✔️ If landing gear retraction unsuccessful:
   Consider flight with landing gear down
Landing gear

**MANUAL EXTENSION OF LANDING GEAR**

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

- Ailerons, Elevator: push rods
- Flaps: electrically by push rods
- Rudder: cables
Flight control operation

Inboard and outboard flaps have separate bellcranks, but are mechanically connected

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

### Power Levers vs. Stop Position

<table>
<thead>
<tr>
<th>Power Levers</th>
<th>Stop shall be</th>
<th>Stop is</th>
<th>Caution light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both LOW</td>
<td>unlimiting</td>
<td>limiting</td>
<td>STICK LIMIT</td>
</tr>
<tr>
<td>Split</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both HIGH</td>
<td>limiting</td>
<td>unlimiting</td>
<td>STICK LIMIT</td>
</tr>
</tbody>
</table>
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

Option: Removal of the Variable elevator stop

Normal CG limits:

Without variable elevator stop :
DA42 NG:
DA42 NG -VI:
Trim tabs

Elevator trim: bowden cable

Rudder trim: bowden cable
Optional electric rudder pedal adjustment

Intentionally blank
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

Gearbox

Oiltank

Austro Engine E4-B

Alternator
Austro Engine E4-B

Turbocharger

Prop governor
ECU – Engine Control Unit

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
2. POWER lever ........... slowly increase to 1975 RPM
   - If engine shows power loss during the
   - POWER lever increase
3. POWER lever ....................... idle for 1 second
4. POWER lever ....................... slowly increase 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 .......................
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

- 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

OSCIILLATING 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 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 switch .................................. unaffected 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

Power plant limitations

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

  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

- 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

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

Available Power Check:

<table>
<thead>
<tr>
<th>Altitude [ft]</th>
<th>-30°C</th>
<th>-20°C</th>
<th>-10°C</th>
<th>0°C</th>
<th>10°C</th>
<th>20°C</th>
<th>30°C</th>
<th>40°C</th>
<th>50°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>99%</td>
<td>99%</td>
<td>99%</td>
<td>99%</td>
<td>99%</td>
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<tr>
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<td>8000</td>
<td>98%</td>
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<td>10000</td>
<td>97%</td>
<td>97%</td>
<td>97%</td>
<td>95%</td>
<td>94%</td>
<td>89%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 inlet for engine air filter and intercooler

Air inlet for Cabin Heat

Air inlet for coolant heat exchanger and gearbox

Modified air inlet for Cabin Heat
Air inlets

Some air directed to the gearbox

Coolant heat exchanger

„Dash-6“ Air inlets

Air inlet for engine air filter and intercooler

Air inlet for Cabin heat, coolant heat exchanger, gearbox
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

- Engine Oil
- Gearbox Oil

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:

Intentionally blank
Diamond DA42 NG

Cooling System

Cooling system

Pressure Relief Valve

Expansion Tank

Thermostatic Valve

Core Engine

Water Pump

Coolant Heat Exchanger

Cabin Heater
Cooling system

L/R ENG TEMP

- 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 reqd
    - 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

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 heating and defrosting system

Defrost from LH Engine  Cabin Heat from RH Engine
Ventilation

Cockpit

Cabin

Ventilation inlet

RH wing underside
Diamond DA42 NG

Turbocharger System

Turbocharger

Bypass for excess exhaust gas

Exhaust gas drives turbine
Turbo charger

Compressor compresses intake air

Exhaust gas drives turbine

Intentionally blank
Diamond DA42 NG

Fuel System

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)
DA42 Fuel system

- Max unbalance: 5 USG
- Fuel temperature limits:
  - -30° C to +60° C
DA42 Fuel system

Drain valve in nacelle (gascolator)

Fuel cooler
DA42 Fuel system

Fuel Cooler Air Outlet

Fuel Cooler Air Inlet

„dash-6“ Fuel system

Fuel cooler
"dash-6" Fuel Cooler, Gearbox cooling

Fuel Cooler

Gearbox cooling

DA42 Fuel system

"Alternate means for fuel quantity indication"

Position: in front of drain, approx. 10cm outboard of nacelle
DA42 Fuel system

Fuel Valve "ON"

Supply

Return flow up to 71 USG/hr
Average 45 USG/hr

Fuel system is symmetric referring to the fuselage
DA42 Fuel system

Fuel Valve „X-feed“

Supply
Return flow

Fuel Valve „OFF“ opposite „X-feed“

Supply
Return flow
DA42 Fuel system

X-feed operation

Supply

Return flow

Fuel valves schematic

Supply

Return flow
Both valves closed

Supply

Return flow

ON X-FEED
OFF

ON X-FEED
OFF

Both engines running

Supply

Return flow

ON X-FEED
OFF

ON X-FEED
OFF
LH Eng. u/s, RH Eng. X-feed

Both engines from LH tank
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

**CHECK BEFORE ENGINE START**
- 7 Fuel pumps (2).................................OFF

**CHECK AFTER ENGINE START**
- 3 Fuel pumps (2).................................check OFF
- 4 Fuel selectors (2)...........................X-FEED

**BEFORE TAKE OFF CHECK**
- 21 Fuel pumps (2)..............................ON
- 22 Parking brake..............................RELEASED

**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

**DESCENT / APPROACH CHECK**
- 8 Fuel pumps (2)...............................ON

**AFTER LANDING CHECK**
- 3 Fuel pumps (2)...............................OFF

---

## Fuel pressure warning

- **Warning annunciation:**
  - L/R FUEL PRES
Fuel pressure warning

- 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

Intentionally blank
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

<table>
<thead>
<tr>
<th>Main tanks</th>
<th>AUX tanks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 25 USG</td>
<td>2 x 13,2 USG</td>
<td>2 x 38 USG</td>
</tr>
<tr>
<td>50 USG</td>
<td>26,4 USG</td>
<td>76,4 USG</td>
</tr>
</tbody>
</table>

Maximum unbalance between main tanks:

- 5 USG

- 1 USG if there is an unbalance between AUX tanks
Optional Auxiliary Fuel Tanks

Drain
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

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

**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**

<table>
<thead>
<tr>
<th>Item</th>
<th>Lever Arm (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wing tanks</td>
<td>2.63</td>
</tr>
<tr>
<td>AUX tanks</td>
<td>3.20</td>
</tr>
</tbody>
</table>
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)

Intentionally blank
DA42NG Diesel Operation

The following item is added to the Modifications checklist:

<table>
<thead>
<tr>
<th>Modification</th>
<th>Source</th>
<th>Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Operation</td>
<td>DÄM 42-251</td>
<td>□ yes □ no</td>
</tr>
</tbody>
</table>

9.2 LIST OF SUPPLEMENTS

The following item is added:

<table>
<thead>
<tr>
<th>Airplane S/N:</th>
<th>Registration:</th>
<th>Date:</th>
<th>applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sup. No.</td>
<td>Title</td>
<td>Rev. No.</td>
<td>Date</td>
</tr>
<tr>
<td></td>
<td>Diesel Operation</td>
<td>0</td>
<td>05-Dec-2013</td>
</tr>
</tbody>
</table>
DA42NG Diesel Operation

- **Fuel Temperature**
  - Diesel Operation
    - Minimum: -30°C
    - Maximum: 60°C
  - Modified G1000 Software:

<table>
<thead>
<tr>
<th>Indication</th>
<th>Red arc/bar = lower prohibited range</th>
<th>Yellow arc/bar = caution range</th>
<th>Green arc/bar = normal operating range</th>
<th>Yellow arc/bar = caution range</th>
<th>Red arc/bar = upper prohibited range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel temp.</td>
<td>below -30°C</td>
<td>-30°C to +4°C</td>
<td>+5°C to 50°C</td>
<td>55°C to 60°C</td>
<td>above 60°C</td>
</tr>
</tbody>
</table>

**Operational Limitations:**

<table>
<thead>
<tr>
<th>No engine start below</th>
<th>No take-off below</th>
<th>Diesel Fuel Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5°C (+23°F)</td>
<td>+5°C (+41°F)</td>
<td>Diesel Fuel of unknown class or unknown fuel blend</td>
</tr>
<tr>
<td>-10°C (+14°F)</td>
<td>-5°C (+23°F)</td>
<td>Diesel Fuel Class C</td>
</tr>
<tr>
<td>-15°C (+5°F)</td>
<td>-10°C (+14°F)</td>
<td>Diesel Fuel Class D, E or F</td>
</tr>
</tbody>
</table>
DA42NG Diesel Operation

Diesel Fuel Classes (EN 590)

(“Temperate“ climatic zones)

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFPP</td>
<td>° C</td>
<td>+5, 0, -5, -10, -15, -20</td>
</tr>
<tr>
<td>CFPP</td>
<td>° F</td>
<td>+41, +32, +23, +14, +5, -4</td>
</tr>
</tbody>
</table>

CFFP .... 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.

---

### Performance below 10° C OAT

<table>
<thead>
<tr>
<th>TKOF Ground Roll</th>
<th>(normal and short field) Add 7%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TKOF Distance</td>
<td></td>
</tr>
<tr>
<td>Climb</td>
<td>(Flaps UP and Flaps APP)</td>
</tr>
<tr>
<td>1-engine climb</td>
<td>Reduce by 60 ft/min</td>
</tr>
</tbody>
</table>

Reduce by 30 ft/min 1-engine climb (Flaps UP and Flaps APP)

Make calculation from the basic AFM value before calculating additional corrections from other Supplements.
Diamond DA42 NG

Electrical System

Power sources:
- LH Alternator 28V 70A
- RH Alternator 28V 70A
- Main Battery 24V 13.6Ah
- ECU backup battery 7.2Ah
- ECU backup battery 7.2Ah
- Emergency Battery

Not part of the electrical system:
- Not part of the electrical system
There are 2 versions of the electrical system

- "Modified electrical system":

<table>
<thead>
<tr>
<th>Modification of the Electrical System</th>
<th>MÄM 42-403</th>
<th>□ yes</th>
<th>□ no</th>
</tr>
</thead>
</table>

"Standard" in the "Dash-6"
"Modified" Electrical system

- Battery Bus
- LH Main Bus
to Main Battery 24V 13,6Ah
- RH Main Bus
to Main Battery 24V 13,6Ah
- LH ECU Bus
- RH ECU Bus
- LH Alternator
- RH Alternator
- Starter
- Avionic Bus
- EPU
- LH ECU Bus
to LH Main Bus
- RH ECU Bus
to RH Main Bus
- ECU backup battery 24V 7,2 Ah

Hot battery bus
- Pilot map / reading light

PARKING CHECK

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

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

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:

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

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
2. If no success:
   2. Emergency switch ........................................ ON
3. Flood light, if necessary .................................. ON
4. Power ......................................................... SET
   according power lever position and/or engine noise
5. Flaps .......................................................... VERIFY POSITION
   Land at nearest suitable airfield
   Landing gear may slowly extend
   For landing apply “Manual extension of landing gear”
Electrical malfunctions

**L/R ALTN FAIL**
- 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:

- The Centre-Zero Ammeter.
- The Left-Zero Ammeter.

Amperemeter on the G1000:
Diamond DA42 NG

Oxygen System

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)

<table>
<thead>
<tr>
<th>Number of users</th>
<th>10,000 ft (MSL)</th>
<th>15,000 ft (MSL)</th>
<th>18,000 ft (MSL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20.3</td>
<td>16</td>
<td>7.4</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>8</td>
<td>3.7</td>
</tr>
<tr>
<td>3</td>
<td>6.8</td>
<td>5.3</td>
<td>2.5</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>4</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Duration using Oxysaver® cannulas (hours)

<table>
<thead>
<tr>
<th>Number of users</th>
<th>10,000 ft (MSL)</th>
<th>15,000 ft (MSL)</th>
<th>18,000 ft (MSL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>50</td>
<td>32</td>
</tr>
<tr>
<td>2</td>
<td>29.8</td>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>16.5</td>
<td>10.6</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

- 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 cylinder

Oxygen outlets
Oxygen system

Filling table

to achieve a cylinder (system) pressure of 1850 psi

<table>
<thead>
<tr>
<th>Ambient Temperature °C (°F)</th>
<th>Filling Pressure [psi]</th>
<th>Ambient Temperature °C (°F)</th>
<th>Filling Pressure [psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-18 (0)</td>
<td>1650</td>
<td>10 (50)</td>
<td>1875</td>
</tr>
<tr>
<td>-12 (10)</td>
<td>1700</td>
<td>16 (60)</td>
<td>1925</td>
</tr>
<tr>
<td>-7  (20)</td>
<td>1725</td>
<td>21 (70)</td>
<td>1975</td>
</tr>
<tr>
<td>-1  (30)</td>
<td>1775</td>
<td>27 (80)</td>
<td>2000</td>
</tr>
<tr>
<td>4   (40)</td>
<td>1825</td>
<td>32 (90)</td>
<td>2050</td>
</tr>
</tbody>
</table>
Oxygen system

Oxygen system
Oxygen system

Flowmeter

Scale for "oxysaver" cannula

Scale for mask and "standard" cannula

Oxygen system
### Oxygen system

#### Mass and Balance

<table>
<thead>
<tr>
<th>Item</th>
<th>Lever Arm (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen cylinder</td>
<td>0.82</td>
</tr>
</tbody>
</table>

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

Ice protection system

Fluid ice protection system

Product of

CAV Aerospace Ltd
(Celtic Aerospace Ventures Ltd)

commonly knows as „TKS“
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

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

<table>
<thead>
<tr>
<th>Ethylene glycol freezing point vs. concentration in water</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight Percent EG (%)</td>
<td>Freezing Point (deg F)</td>
</tr>
<tr>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>40</td>
<td>-10</td>
</tr>
<tr>
<td>50</td>
<td>-30</td>
</tr>
<tr>
<td>60</td>
<td>-55</td>
</tr>
<tr>
<td>70</td>
<td>-60</td>
</tr>
<tr>
<td>80</td>
<td>-50</td>
</tr>
<tr>
<td>90</td>
<td>-20</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
</tr>
</tbody>
</table>

The „Eutectic-phenomenon“
„TKS“ Ice Protection DA42

Ice protection system

30 liters useable
Ice protection system

Minimum for dispatch: 22 liters
Ice protection system

2 "independent" systems

2 x 2 pumps

Normally powered from the LH Main Bus

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

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

### Approach

<table>
<thead>
<tr>
<th>Mode</th>
<th>Operating mode</th>
<th>Operating time</th>
</tr>
</thead>
<tbody>
<tr>
<td>**NORM **)</td>
<td>Climb Cruise</td>
<td>2 pumps simultaneously, but cycled 30 secs ON and 90 secs OFF</td>
</tr>
<tr>
<td>**HIGH **)</td>
<td>Approach</td>
<td>1 pump continuously ON</td>
</tr>
<tr>
<td><strong>MAX</strong></td>
<td></td>
<td>2 pumps simultaneously ON for 2 minutes</td>
</tr>
</tbody>
</table>

*) 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

30s ON, 90s OFF

Ice protection system

Airframe and Prop

Windshield

MAX
HIGH
NORMAL
PUMP 1
PUMP 2
ALTERNATE

LH Main BUS
RH Main BUS

Fluid tank
Ice protection system

Continuously ON

HIGH

Airframe and Prop

LH Main BUS

RH Main BUS

MAX

HIGH

NORM

PUMP 1

PUMP 2

ALTERNATE

Windshield

Fluid tank

© Diamond Aircraft Industries GmbH
Compiled by Peter Schmidleitner
Ice protection system

2 minutes ON

MAX

HIGH

Airframe and Prop

Windshield

LH Main BUS

RH Main BUS

Fluid tank

MAX

HIGH

NORM

PUMP 1

PUMP 2

ALTERNATE
Ice protection system

5 seconds

Windshield deice

Ice protection system

Airframe and Prop

Max
High
Norm

LH Main BUS
RH Main BUS

Fluid tank

Windshield

Pump 1
Pump 2
Alternate
Ice protection system

Main and Windshield pump selector

Airframe and Prop

Windshield

LH Main BUS
RH Main BUS
Fluid tank
Ice protection system

ALTERNATE switch connects pump #2 directly to RH main bus

System operates in HIGH mode

Ice protection system

Airframe and Prop

Windshield

MAX
HIGH
NORM

PUMP 1

PUMP 2

ALTENATE

LH Main BUS

RH Main BUS

Fluid tank

© Diamond Aircraft Industries GmbH
Compiled by Peter Schmidleitner
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

Annunciator test
(simulates system ON)

DEICE LVL LO light ON
DEIC PRES LO light ON
after 120 seconds

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
⇒ 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 13
⇒ 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
⇒ Possible reduced system performance
⇒ Filter cartridge to be replaced at next scheduled maintenance

© Diamond Aircraft Industries GmbH
Compiled by Peter Schmidleitner
Ice protection system

**UNINTENTIONAL FLIGHT INTO ICING**

Leave icing area, continue with item 1

* INADVERTENT ICING ENCOUNTER & EXCESSIVE ICE ACCUMULATION

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

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

**ICE PROTECTION FAILURE**

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

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Lever Arm (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>De-icing fluid tank</td>
<td>1.00</td>
</tr>
</tbody>
</table>

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

what defines „icing conditions“?
- visually detected ice
- visible moisture and OAT +3°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

- 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
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 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

<table>
<thead>
<tr>
<th>Rate of climb</th>
<th>reduced by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 6000 ft</td>
<td>150 fpm</td>
</tr>
<tr>
<td>6000 – 12000 ft</td>
<td>200 fpm</td>
</tr>
<tr>
<td>12000 – 18000 ft</td>
<td>250 fpm</td>
</tr>
</tbody>
</table>

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

**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
Diamond DA42 NG

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 ≤ 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:

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Bank Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0°</td>
</tr>
<tr>
<td>1510 lbs</td>
<td></td>
</tr>
<tr>
<td>Gear</td>
<td></td>
</tr>
<tr>
<td>Flaps</td>
<td></td>
</tr>
<tr>
<td>UP</td>
<td>62</td>
</tr>
<tr>
<td>DOWN APP</td>
<td>62</td>
</tr>
<tr>
<td>DOWN LDG</td>
<td>58</td>
</tr>
<tr>
<td>1700 lbs</td>
<td></td>
</tr>
<tr>
<td>Gear</td>
<td></td>
</tr>
<tr>
<td>Flaps</td>
<td></td>
</tr>
<tr>
<td>UP</td>
<td>66</td>
</tr>
<tr>
<td>DOWN APP</td>
<td>64</td>
</tr>
<tr>
<td>DOWN LDG</td>
<td>60</td>
</tr>
<tr>
<td>1900 lbs</td>
<td></td>
</tr>
<tr>
<td>Gear</td>
<td></td>
</tr>
<tr>
<td>Flaps</td>
<td></td>
</tr>
<tr>
<td>UP</td>
<td>69</td>
</tr>
<tr>
<td>DOWN APP</td>
<td>66</td>
</tr>
<tr>
<td>DOWN LDG</td>
<td>62</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>values for ISA and MSL, at 1900 kg (4189 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-off distance to 50 ft (15 m) above take-off surface</td>
</tr>
<tr>
<td>Take-off ground roll</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>values for ISA and MSL, at 1900 kg (4189 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-off distance to 50 ft (15 m) above take-off surface</td>
</tr>
<tr>
<td>Take-off ground roll</td>
</tr>
</tbody>
</table>

**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:*

<table>
<thead>
<tr>
<th>T/O Weight</th>
<th>1510 kg</th>
<th>1700 kg</th>
<th>1900 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude OAT</td>
<td>ISA -20°C</td>
<td>ISA +20°C</td>
<td>ISA -20°C</td>
</tr>
<tr>
<td>MSL</td>
<td>7%</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>5000 ft</td>
<td>8%</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>10000 ft</td>
<td>8%</td>
<td>10%</td>
<td>8%</td>
</tr>
</tbody>
</table>
### Grass Runway

<table>
<thead>
<tr>
<th>Length of grass</th>
<th>TKOF roll</th>
<th>Wet grass</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 5 cm</td>
<td>+ 10%</td>
<td></td>
</tr>
<tr>
<td>5 - 10 cm</td>
<td>+ 15%</td>
<td>additional + 10%</td>
</tr>
<tr>
<td>&gt;10 cm</td>
<td>+ 25%</td>
<td></td>
</tr>
<tr>
<td>&gt; 25 cm</td>
<td>TKOF should not be attempted</td>
<td>+ 45% on soft ground!</td>
</tr>
</tbody>
</table>

#### 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**

<table>
<thead>
<tr>
<th>Values for ISA and MSL, at 1805 kg (3979 lb), approach speed 84 KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landing distance from 50 ft (15 m) above the landing surface</td>
</tr>
<tr>
<td>Ground roll</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Values for ISA and MSL, at 1900 kg (4189 lb), approach speed 84 KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landing distance from 50 ft (15 m) above the landing surface</td>
</tr>
<tr>
<td>Ground roll</td>
</tr>
</tbody>
</table>

**Go around**

<table>
<thead>
<tr>
<th>Value for ISA and MSL, at 1805 kg (3979 lb)</th>
<th>84 KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant gradient of climb</td>
<td>7.5 % (equals 4.3 climb angle) or 612 ft/min</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value for ISA and MSL, at 1900 kg (4189 lb)</th>
<th>84 KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant gradient of climb</td>
<td>6.7 % (equals 3.8 climb angle) or 547 ft/min</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Length of grass</th>
<th>LDG run</th>
<th>Wet grass</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 5 cm</td>
<td>+ 5%</td>
<td></td>
</tr>
<tr>
<td>5 - 10 cm</td>
<td>+ 15%</td>
<td>additional + 10%</td>
</tr>
<tr>
<td>&gt;10 cm</td>
<td>min + 25%</td>
<td></td>
</tr>
</tbody>
</table>
Obstacles?

\[
\begin{align*}
\text{Gradient} [\%] &= \frac{\text{ROC} [\text{fpm}]}{\text{TAS} [\text{KTAS}]} \times 0.95 \\
\text{ROC} &= \frac{\text{Gradient} \times \text{TAS}}{0.95}
\end{align*}
\]

Intentionally blank
Performance “Dash-6”

- 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 ≤ 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

<table>
<thead>
<tr>
<th>1510 kg (3329 lb)</th>
<th>Bank Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0°</td>
</tr>
<tr>
<td>Gear</td>
<td>Flaps</td>
</tr>
<tr>
<td>UP</td>
<td>UP</td>
</tr>
<tr>
<td>DOWN APP</td>
<td>58</td>
</tr>
<tr>
<td>DOWN LDG</td>
<td>54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1700 kg (3748 lb)</th>
<th>Bank Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0°</td>
</tr>
<tr>
<td>Gear</td>
<td>Flaps</td>
</tr>
<tr>
<td>UP</td>
<td>UP</td>
</tr>
<tr>
<td>DOWN APP</td>
<td>62</td>
</tr>
<tr>
<td>DOWN LDG</td>
<td>59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1900 kg (4189 lb)</th>
<th>Bank Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0°</td>
</tr>
<tr>
<td>Gear</td>
<td>Flaps</td>
</tr>
<tr>
<td>UP</td>
<td>UP</td>
</tr>
<tr>
<td>DOWN APP</td>
<td>65</td>
</tr>
<tr>
<td>DOWN LDG</td>
<td>62</td>
</tr>
</tbody>
</table>

Most forward CG
Power OFF
KIAS values may not be accurate at stall

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.

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

Increase the ground roll by 9% for each 1% (1 m per 100 m or 1 ft per 100 ft) slope.
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
### TKOF Roll, TKOF Distance

<table>
<thead>
<tr>
<th>Weight: 1700 kg</th>
<th>Take-Off Distance - Short Field Procedure</th>
<th>1700 lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>v_{150} = 77 RAS</td>
<td>Pressure Alt. [m / ft]</td>
<td>Distance [m]</td>
</tr>
<tr>
<td>305</td>
<td>0/32</td>
<td>15 m/50 ft</td>
</tr>
<tr>
<td>200</td>
<td>0/32</td>
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<tr>
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<tr>
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<td>140</td>
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<tr>
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<tr>
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<td>0/32</td>
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<tr>
<td>30</td>
<td>0/32</td>
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<tr>
<td>20</td>
<td>0/32</td>
<td>15 m/50 ft</td>
</tr>
<tr>
<td>10</td>
<td>0/32</td>
<td>15 m/50 ft</td>
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</tbody>
</table>

### TKOF on Grass Runway

<table>
<thead>
<tr>
<th>Length of grass</th>
<th>TKOF roll</th>
<th>Wet grass</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 cm</td>
<td>+ 10%</td>
<td>additional + 10%</td>
</tr>
<tr>
<td>5 - 10 cm</td>
<td>+ 15%</td>
<td>+ 10%</td>
</tr>
<tr>
<td>&gt;10 cm</td>
<td>+ 25%</td>
<td></td>
</tr>
<tr>
<td>&gt; 25 cm</td>
<td>TKOF should not be attempted</td>
<td>+ 45% on soft ground!</td>
</tr>
</tbody>
</table>
## Climb Performance 2-eng

### Flaps: UP

<table>
<thead>
<tr>
<th>Weight [lb]</th>
<th>Press. All. [psf]</th>
<th>Rate of Climb [fpm]</th>
<th>Outside Air Temperature [°F]</th>
<th>ISA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>910</td>
<td>-19</td>
<td>-19</td>
<td>55</td>
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<td>4000</td>
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<td>6000</td>
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<td>-15</td>
<td>-21</td>
<td>55</td>
</tr>
<tr>
<td>8000</td>
<td>1839</td>
<td>-13</td>
<td>-22</td>
<td>55</td>
</tr>
<tr>
<td>10000</td>
<td>2149</td>
<td>-11</td>
<td>-23</td>
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<tr>
<td>12000</td>
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<td>-24</td>
<td>55</td>
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<tr>
<td>16000</td>
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<td>-5</td>
<td>-26</td>
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<tr>
<td>18000</td>
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<td>55</td>
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<tr>
<td>20000</td>
<td>3699</td>
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For the rate of climb in [fpm] divide by 196.0 or multiply by 0.00509.

## Climb Performance 1-eng

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</tbody>
</table>

Dark shaded areas indicate a climb rate of less than 10 fpm. For the rate of climb in [fpm] divide by 196.0 or multiply by 0.00509.
ROC to Gradient conversion

Formula in AFM:

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

Cruising speed

<table>
<thead>
<tr>
<th>Pressure Attitude [in. Hg]</th>
<th>Power [%]</th>
<th>Outside Air Temp. [\degree F]</th>
<th>Cruise Performance - KTAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>26000</td>
<td>32</td>
<td>25</td>
<td>125, 124, 162, 196, 196, 196</td>
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<tr>
<td>60</td>
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<td>20</td>
<td>125, 124, 162, 196, 196, 196</td>
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<tr>
<td>45</td>
<td>20</td>
<td>15</td>
<td>125, 124, 162, 196, 196, 196</td>
</tr>
</tbody>
</table>

Cruising speed 75%
### LDG Roll, LDG Distance

**Flaps LDG**

<table>
<thead>
<tr>
<th>Pressur. Altitude (FT)</th>
<th>Distance (FT)</th>
<th>Outside Air Temperature (°C/°F)</th>
<th>LDG Roll</th>
<th>LDG Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/52</td>
<td>91/50</td>
<td>20/68</td>
<td>549</td>
<td>363</td>
</tr>
<tr>
<td>15 m / 50 ft</td>
<td>559</td>
<td>610</td>
<td>646</td>
<td>655</td>
</tr>
<tr>
<td>305</td>
<td>91/50</td>
<td>20/68</td>
<td>549</td>
<td>363</td>
</tr>
<tr>
<td>610</td>
<td>91/50</td>
<td>20/68</td>
<td>549</td>
<td>363</td>
</tr>
<tr>
<td>914</td>
<td>91/50</td>
<td>20/68</td>
<td>549</td>
<td>363</td>
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<tr>
<td>5600</td>
<td>91/50</td>
<td>20/68</td>
<td>549</td>
<td>363</td>
</tr>
<tr>
<td>2134</td>
<td>91/50</td>
<td>20/68</td>
<td>549</td>
<td>363</td>
</tr>
<tr>
<td>10000</td>
<td>91/50</td>
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<td>549</td>
<td>363</td>
</tr>
</tbody>
</table>

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

---

**LDG Roll, LDG Distance**

**Flaps LDG**

<table>
<thead>
<tr>
<th>Pressur. Altitude (FT)</th>
<th>Distance (FT)</th>
<th>Outside Air Temperature (°C/°F)</th>
<th>LDG Roll</th>
<th>LDG Distance</th>
</tr>
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<tbody>
<tr>
<td>0/52</td>
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</tr>
</tbody>
</table>

For the distance in ft, divide by 0.3048 or multiply by 3.28.
LDG Roll, LDG Distance

Landing Distance - Abnormal Flap Position

<table>
<thead>
<tr>
<th>Weight</th>
<th>1650 kg</th>
<th>3690 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{APP}</td>
<td>85 KIAS</td>
<td>Power: IDLE</td>
</tr>
</tbody>
</table>

Press. Alt. | Distance | Outside Air Temperature - °C/°F | Runway: dry, paved, level |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 / 20</td>
<td>1650</td>
<td>430</td>
<td>473</td>
</tr>
<tr>
<td>15 m / 50 R</td>
<td>760</td>
<td>791</td>
<td>750</td>
</tr>
<tr>
<td>500</td>
<td>375</td>
<td>350</td>
<td>345</td>
</tr>
<tr>
<td>1000</td>
<td>477</td>
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<tr>
<td>500</td>
<td>375</td>
<td>350</td>
<td>345</td>
</tr>
<tr>
<td>1000</td>
<td>477</td>
<td>450</td>
<td>445</td>
</tr>
</tbody>
</table>
**LDG on wet or Grass Runway**

<table>
<thead>
<tr>
<th>Paved RWY</th>
<th>LDG roll</th>
<th>+ 15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>WET</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 5 cm          + 10%
5 - 10 cm       + 15%
> 10 cm          min + 25%

**Wet grass or soft ground**

**Additional**

+ 10%

---

**Go-Around**

<table>
<thead>
<tr>
<th>Go-Around Climb Performance</th>
<th>Power: MAX 64 KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Climb - [in/min]</td>
<td>Outside Air Temp. - [°C / °F]</td>
</tr>
<tr>
<td></td>
<td>ISA</td>
</tr>
<tr>
<td>[in]</td>
<td>[°F]</td>
</tr>
<tr>
<td>2000</td>
<td>810</td>
</tr>
<tr>
<td>4000</td>
<td>1219</td>
</tr>
<tr>
<td>6000</td>
<td>1629</td>
</tr>
<tr>
<td>8000</td>
<td>2039</td>
</tr>
<tr>
<td>10000</td>
<td>3049</td>
</tr>
<tr>
<td>SL</td>
<td>794</td>
</tr>
<tr>
<td>2000</td>
<td>810</td>
</tr>
<tr>
<td>4000</td>
<td>1219</td>
</tr>
<tr>
<td>6000</td>
<td>1629</td>
</tr>
<tr>
<td>8000</td>
<td>2039</td>
</tr>
<tr>
<td>10000</td>
<td>3049</td>
</tr>
<tr>
<td>SL</td>
<td>600</td>
</tr>
<tr>
<td>2000</td>
<td>810</td>
</tr>
<tr>
<td>4000</td>
<td>1219</td>
</tr>
<tr>
<td>6000</td>
<td>1629</td>
</tr>
<tr>
<td>8000</td>
<td>2039</td>
</tr>
<tr>
<td>10000</td>
<td>3049</td>
</tr>
<tr>
<td>SL</td>
<td>600</td>
</tr>
</tbody>
</table>

**Gradient [%] = \frac{ROC \times \text{in} \times \text{ft}}{TAS \times \text{KIAS}} \times 0.98**

The angles of climb at MSL and ISA condition are:

4.7° for Maximum Take-Off Mass (1900 kg / 4199 lb)
5.1° for Maximum Landing Mass (1805 kg / 3979 lb)

Required gradient acc. CS 23.77 (a): 3.3% at Sea Level

For the rate of climb in [m/min] divide by 195.8 or multiply by 0.0005
Obstacles?

\[ d = (\text{RWL + Obst.Dist.}) - \text{TOD} \]

Gradient = \( \frac{\text{h}}{d} \) \times 100

\[
\text{Gradient} [\%] = \frac{\text{ROC}}{\text{TAS} \times \text{TAS}} \cdot 0.98
\]

\[
\text{ROC} = \frac{\text{Gradient} \times \text{TAS}}{0.98}
\]

Intentionally blank
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**

- **Without „Variable Elevator Stop“**
- **When operating in known icing conditions**

<table>
<thead>
<tr>
<th>Item</th>
<th>Lever Arm (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front seats</td>
<td>2.30</td>
</tr>
<tr>
<td>Rear seats</td>
<td>3.25</td>
</tr>
<tr>
<td>Wing tanks</td>
<td>2.63</td>
</tr>
<tr>
<td>AUX tanks</td>
<td>3.20</td>
</tr>
<tr>
<td>De-icing fluid</td>
<td>1.00</td>
</tr>
<tr>
<td>Nose baggage</td>
<td>0.60</td>
</tr>
<tr>
<td>Cabin baggage</td>
<td>3.89</td>
</tr>
<tr>
<td>Baggage Extension</td>
<td>4.54</td>
</tr>
<tr>
<td>„Short baggage extension“:</td>
<td></td>
</tr>
<tr>
<td>Cabin baggage</td>
<td>3.65</td>
</tr>
<tr>
<td>Baggage Extension</td>
<td>3.97</td>
</tr>
</tbody>
</table>
M&B calculation

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

Center of gravity envelope

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

- 1833kg, 2.41 m
- 1683 kg, 2.39 m
Diamond DA42 NG

Emergency Equipment

Emergency equipment

© Diamond Aircraft Industries GmbH
Compiled by Peter Schmidleitner
(Optional) Emergency Axe

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## Kinds of Operation Equipment List (KOEL)

<table>
<thead>
<tr>
<th>Flight &amp; navigation instruments</th>
<th>for daytime VFR flights</th>
<th>in addition for night VFR flights</th>
<th>in addition for IFR flights</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>airspeed indicator</em> (on G1000 PFD or backup)</td>
<td><em>vertical speed indicator</em> (VSI)</td>
<td><em>second airspeed indicator</em> (both, on G1000 PFD and backup)</td>
<td></td>
</tr>
<tr>
<td>* altimeter (on G1000 PFD or backup)</td>
<td><em>attitude gyro</em> (artificial horizon; on G1000 PFD or backup)</td>
<td><em>second altimeter</em> (both, on G1000 PFD and backup)</td>
<td></td>
</tr>
<tr>
<td>* magnetic compass</td>
<td><em>turn &amp; bank indicator</em></td>
<td><em>second attitude gyro</em> (both, on G1000 PFD and backup)</td>
<td></td>
</tr>
<tr>
<td>* 1 headset, used by pilot in command</td>
<td><em>directional gyro</em></td>
<td><em>second VHF radio</em> (COM)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>VHF radio (COM)</em> with speaker and microphone</td>
<td><em>VOR-LOC-GP receiver</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>VOR receiver</em></td>
<td><em>second GPS receiver</em> (part of G1000)</td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th></th>
<th>for daytime VFR flights</th>
<th>in addition for night VFR flights</th>
<th>in addition for IFR flights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>engine instruments</strong></td>
<td>* fuel qty. (2x)</td>
<td>* ammeter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* oil press. (2x)</td>
<td>* voltmeter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* oil temp. (2x)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* coolant temp. (2x)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* coolant level indicator (2x)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* gearbox temp. (2x)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* load (2x)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* prop. RPM (2x)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* fuel temp. left &amp; right tank</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Kinds of Operation Equipment List KOEL

<table>
<thead>
<tr>
<th></th>
<th>for daytime VFR flights</th>
<th>in addition for night VFR flights</th>
<th>in addition for IFR flights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>lighting</strong></td>
<td></td>
<td>* position lights</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* strobe lights (anti-collision lights)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* landing light</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* instrument lighting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* floodlight</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* flashlight</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>for daytime VFR flights</th>
<th>in addition for night VFR flights</th>
<th>in addition for IFR flights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>other operational minimum equipment</strong></td>
<td></td>
<td>* stall warning system</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* variable elevator stop</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* alternate means for fuel quantity indication (see Section 7.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* safety belts for each occupied seat</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Airplane Flight Manual</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Pitot heating system</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* alternate static valve</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* emergency battery (for backup attitude gyro and flood light)</td>
<td></td>
</tr>
</tbody>
</table>
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

Mainwheel
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