

SECTION 9

AIRPLANE FLIGHT MANUAL - SUPPLEMENT AVE28

**GLASS COCKPIT
equipped with
ASPEN EFD1000 PFD**

This AFM supplement is applicable and must be inserted into Section 9 of the Airplane Flight Manual when the Aspen Avionics Evolution Flight Display (EFD 1000 PFD) is installed in the AQUILA AT01 as the Primary Flight Display. The information in this supplement adds to or replaces information in the basic Airplane Flight Manual and, in the case of night VFR, information in Supplement AVE 23.



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0.1 LIST OF REVISIONS AND AMENDMENTS

Issue	Reason for Amendment/Revision	Affected Pages	Date of Issue
A.01	Initial Issue	All	02.04.2012

0.2 LIST OF EFFECTIVE PAGES

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1. General

1.1. Introduction

The information contained in this supplement must be used in conjunction with the basic Airplane Flight Manual. Aircraft approved for N/VFR must also be operated in accordance with AFM Supplement AVE 23.

This supplement provides the information necessary for the safe operation of the AQUILA AT01 when the ASPEN Avionics Primary Flight Display (PFD) EFD 1000 is installed.

It is **NOT** applicable to the ASPEN EFD 1000/500 **MFD**.

This supplement has been arranged in the same way as the basic Airplane Flight Manual, i.e. only the chapters listed are affected by the change Aquila AT01-00497 "Glass cockpit" with respect to the installed ASPEN EFD 1000 PFD.

For a detailed description and full operating instructions refer to the effective issue of the ASPEN EFD 1000 (PFD) Pilot's Guide, P/N 091-00005-001.

NOTE

Operating instructions for the ASPEN Avionics EFD 1000 PFD are available in English only. They must be kept on board the aircraft at all times.

1.11. Terminology and Abbreviations

PFD	Primary Flight Display (electronic flight instrument system)
MFD	Multi-function Flight Display
SI	Service Information
AI	Attitude Indicator
OAT	Outside Air Temperature

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2. Limitations

2.1 Introduction

ASPEN Document 091-00005-001, EFD1000 PFD Pilot's Guide, Revision A or later must be kept on board the aircraft and be available to the pilot in command at all times.

ATTENTION

The Aspen EFD 1000 must be switched off during engine start-up and shut-down. Non-compliance could destroy the equipment. All warranty and guarantee claims will become void!

ATTENTION

All primary functions of the Aspen EFD 1000, including the attitude indicator, are only available as long as the pitot/static system of the aircraft is functioning properly. The aircraft must be operated in such a manner as to prevent blockage to the pitot/static system, for example by ice!

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2.12 Kinds of Operation Limits / Minimum Equipment

Approved kinds of operation:

- a) VFR day only
- b) Night VFR

Table 1	VFR day only**	Additional for Night VFR**
Flight and navigation instruments	<ul style="list-style-type: none"> • ASPEN EFD 1000 PFD • magnetic compass • clock with seconds displayed**** • VHF radio* 	<ul style="list-style-type: none"> • attitude indicator (standby AI) • transponder with altitude indication or transponder with no altitude indication plus an analog altimeter • VOR navigation receiver or area navigation equipment*** • CDI (with ASPEN EFD 1000 Pilot only)***
Engine instruments	<ul style="list-style-type: none"> • fuel indicator • oil temperature indicator • fuel pressure warning light • oil pressure indicator • cylinder head temperature indicator • suction pressure indicator • ammeter • rpm indicator • voltmeter • alternator warning light (ALT 1) 	<ul style="list-style-type: none"> • alternator warning light (ALT 2) • low voltage indicator
Lighting		<ul style="list-style-type: none"> • navigation lights • anti-collision lights (ACL) • landing light • instrument lighting • cockpit lighting • flashlight for every crew member
Miscellaneous equipment	<ul style="list-style-type: none"> • 2 x safety belts • hand-held fire extinguisher • emergency hammer • emergency locator transmitter (ELT) for 406 MHz and 121.5 MHz 	<ul style="list-style-type: none"> • battery $\geq 28\text{Ah}$

* Not required for flights at airfields with no air traffic control, provided they are carried out by day and remain in the near vicinity of the airfield (§ 3a Abs. 3 Luftverkehrs-Ordnung). Local regulations of the competent authority (§ 21a Abs. 1 Luftverkehrs-Ordnung) remain intact.

** The functional operational minimum equipment is listed in Table 1 (above). Additional minimum equipment for a particular kind of operation may be required at national level and is also dependent upon flight route.

*** For night VFR flights out of sight of an airfield approved for night flight with appropriate lighting.

**** In Germany, this can also be a watch with seconds displayed. Attention should be paid to national derogations.

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2.16 Placards

- 5.) On the instrument panel, to the right of the relevant circuit breaker or beneath the switch.



for night VFR



If the aircraft is approved for night flight, the placards shown in Supplement AVE 23, Chapter 2.16 are applicable.

2.18 Internal battery Aspen EFD1000

ATTENTION

Take-off is not permitted when the voltage displayed in the EFD display is below 12.3 V.

ATTENTION

The EFD1000 has an internal battery which automatically supplies power when there is a drop in aircraft system voltage (<12.3V).

The back-up battery offers a function which is not certified but can be helpful in the case of an emergency. Under no circumstances should one reckon with the availability of this function.

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3. Emergency Procedures

3.1 Introduction

This section provides checklists and recommended procedures for coping with various emergency situations, especially during night VFR operation.

Should an emergency occur, the basic procedures provided here are recommended to master the situation.

It is not possible to account for all kinds and combinations of emergencies that may arise in this manual. The pilot must, therefore, be familiar with the aircraft and its flight behavior and possess sufficient knowledge to counter any problems which may occur.

3.4 Precautionary landing

Most of the recommendations made in the emergency procedures section of the main Airplane Flight Manual with respect to precautionary landings put a greater demand on the pilot during night VFR operations as the choice of an appropriate landing area is more difficult in the dark.

The general recommendation to switch off the **BAT** switch before touch-down/standstill should only be followed if there is a real danger of colliding with obstacles.

Switching off the **BAT** switch also turns off the landing light. The landing area is no longer illuminated.

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3.5 Smoke and Fire

3.5.4 In-flight electrical fire

The first indication of a cable fire is the smell of burning or smoldering insulation material.

1. **ALT 1/BAT** switch OFF
2. Press any key (excepting REV) on the EFD1000 PFD to prevent the instrument from switching itself off (unless the EFD 1000 is the cause of the fire)
3. **Alternator 2** circuit breaker PULL
4. **Avionics Master** switch OFF
5. All other switches (except ignition switch) OFF
6. Cabin vents and side window OPEN
7. Hand-held flashlight (NVFR) remove from side pocket - ON
8. Fire extinguisher activate, as required
9. Land immediately see 3.4 PRECAUTIONARY LANDING

CAUTION

In case of extreme formation of smoke and after using the fire extinguisher, unlatch the canopy for ventilation (refer to 3.15.1).

After using the fire extinguisher fix it in its holder, if possible, or secure it otherwise.

CAUTION

Switching **ALT1/BAT** to OFF and pulling the **Alternator 2** circuit breaker simultaneously leads to a total loss of all electrical and electronic devices.

This also effects the Standby Attitude Indicator (AI) and stall warning.

When airplane has stopped:

10. Canopy open
11. Airplane evacuate immediately

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3.10 Electrical Power Supply System Malfunctions

3.10.1 Complete Failure of Electrical System

1. Press any key (excepting REV) on the EFD1000 PFD to prevent the instrument from switching itself off
2. Hand-held flashlight (if available) remove from side pocket - ON
3. **Alternator 2** circuit breaker RESET if tripped
4. **Battery** circuit breaker RESET if tripped
5. **ALT 1/BAT** circuit breaker CHECK if IN
6. **Alternator 1** circuit breaker RESET if tripped

If the power failure has not been rectified, illuminate the instruments using the flashlight and execute a precautionary landing at the next operational airfield.

NOTE

The Aspen EFD1000 PFD has an internal back-up battery which allows the instrument to function for approx. 30 minutes. If supply voltage is lost, the instrument automatically switches to the internal back-up battery. To ensure that the instrument does not automatically switch itself off after a few seconds, a key must be pressed (not the red "REV" key). The back-up battery offers a function which has not been certified. Refer to Section 2.18 of this supplement.

Pay attention to information on display!!

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3.10.2 Alternator Failure

NOTE

If the aircraft is approved for night operations, it is equipped with two alternators. Alternator 1 is installed in aircraft which are not approved for night VFR. If this alternator fails, it should be treated as if all alternators have failed.

3.10.2.1 Alternator 1 (external alternator) – warning light illuminates

- | | |
|--|------------------|
| 1. ALT 1 switch | switch OFF – ON |
| 2. Alternator 1 circuit breaker | RESET if tripped |

If Alternator 1 warning light remains on:

- | | |
|--|--------------------|
| 1. Alternator 1 circuit breaker | PULL |
| 2. ALT 1 switch | OFF |
| 3. Anti-collision lights switch | OFF |
| 4. Audio panel | OFF (if installed) |
| 5. COM/NAV2 | OFF (if installed) |
| 6. Devices connected at receptacle | OFF (if installed) |

NOTE

Alternator 2 (internal alternator) takes over the power supply for the entire aircraft system (excepting instruments listed above). The flight may be continued as limited power supply is available. However, the battery will no longer be charged and could indeed discharge. The ammeter must be monitored and a landing at the next suitable airfield considered. If Alternator 2 also fails, the emergency procedures described under "both alternator warning lights illuminate" or "low voltage warning light illuminates" must be followed.

Despite the audio panel being switched off, the pilot can use the COM 1 radio and his headset. The fail-safe design of the audio panel ensures that COM 1 is still active when the audio panel is switched off. The intercom is no longer functional.

WARNING

The problem must be ascertained and eliminated before the next flight!

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3.10.2.2 Alternator 2 (internal alternator) – warning light illuminates

NOTE

Alternator 2 is only installed if the aircraft is approved for night VFR.

1. **Alternator 2** circuit breaker RESET if tripped

If the **Alternator 2** warning light remains on:

1. **Alternator 2** circuit breaker PULL

NOTE

Alternator 1 (external alternator) takes over the power supply for the entire aircraft system. The flight may be continued, reducing electrical power consumption to a minimum (monitor ammeter) as sufficient power is available. If Alternator 1 also fails, the emergency procedures described under "both alternator warning lights illuminate" or "low voltage warning light illuminates" must be followed.

WARNING

The problem must be ascertained and eliminated before the next flight!

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3.10.2.3 Both alternator warning lights illuminate

When both alternator warning lights illuminate, the low voltage warning light will simultaneously illuminate indicating that neither alternator is supplying power to the electrical system.

- | | |
|--|--------------------|
| 1. ALT 1 switch | switch OFF then ON |
| 2. Alternator 1 circuit breaker | RESET if tripped |
| 3. Alternator 2 circuit breaker | RESET if tripped |

If both alternator warning lights remain on: :

- | | |
|--|---------------------|
| 1. Alternator 1 circuit breaker | PULL |
| 2. Alternator 2 circuit breaker | PULL |
| 3. ALT 1 switch | OFF |
| 4. Anti-collision lights switch | OFF |
| 5. MFD circuit breaker | PULL (if installed) |
| 6. Audio panel | OFF (if installed) |
| 7. COM/NAV2 | OFF (if installed) |
| 8. Devices connected at receptacle | OFF (if installed) |

NOTE

The instruments required for safe operation and landing of the aircraft can be supplied with power from the battery for at least 30 minutes. The 30 minute period begins when the low voltage warning light illuminates.

Economical use of the radio and switching off all non-essential instruments extends the period the essential instruments remain functional.

A landing must be carried out at a suitable operational airfield within the 30 minute period.

WARNING

The problem must be ascertained and eliminated before the next flight!

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3.10.3 Low Voltage Warning Light illuminates

Neither alternator supplies power to the electrical system.

- | | |
|--|--------------------|
| 1. ALT 1 switch | switch OFF then ON |
| 2. Alternator 1 circuit breaker | RESET if tripped |
| 3. Alternator 2 circuit breaker | RESET if tripped |

If the low voltage warning light remains on:

- | | |
|--|---------------------|
| 1. Alternator 1 circuit breaker | PULL |
| 2. Alternator 2 circuit breaker | PULL |
| 3. ALT 1 switch | OFF |
| 4. Anti-collision lights switch | OFF |
| 5. MFD circuit breaker | PULL (if installed) |
| 6. Audio panel | OFF (if installed) |
| 7. COM/NAV2 | OFF (if installed) |
| 8. Devices connected at receptacle | OFF (if installed) |

NOTE

The instruments required for safe operation and landing of the aircraft can be supplied with power from the battery for at least 30 minutes. The 30 minute period begins when the low voltage warning light illuminates.

Economical use of the radio and switching off all non-essential instruments extends the period the essential instruments remain functional.

A landing must be carried out at a suitable operational airfield within the 30 minute period.

NOTE

Despite the audio panel being switched off, the pilot can use the COM 1 radio and his headset. The fail-safe design of the audio panel ensures that COM 1 is still active when the audio panel is switched off. The intercom is no longer functional.

WARNING

The problem must be ascertained and eliminated before the next flight!

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3.13.4 Primary Flight Display Failure

- | | |
|-------------------------------|------------------------|
| 1. Attitude | STABILIZE (STANDBY AI) |
| 2. PFD circuit breaker | RESET if tripped |
| 3. PFD switch | ON (if OFF) |

If the PFD failure cannot be rectified, the flight may be continued using the remaining indicators. A landing at the next suitable airfield should be considered.

The following indicators are available as alternatives to the failed PFD:

Attitude:	standby attitude indicator (for night VFR), natural horizon
Altitude:	GPS altitude, transponder altitude, ground view
Course:	magnetic compass, GPS track
Air speed:	GPS ground speed, stall warning, propeller rpm, attitude (standby attitude indicator)

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4.0 Normal Procedures

4.5.3. Before Taxiing

2. Avionics and flight instruments

SET UP

5. Internal Battery PFD

Verify battery status is not shown as "FAIL" (normally this shows "CHARGING" or "READY").

Take Off with less than 80% capacity remaining is not permitted.

NOTE

Immediately after switching on the master switch, the "pull to cage" button on the attitude indicator (if installed) must be pulled. It should be pulled again 3 to 4 minutes later.

Do not allow the "pull to cage" button to snap back. Allow it to slowly return to its starting position!

NOTE

Pay attention to any messages on the PFD monitor during the start-up phase!

4.5.3.1 Dimming display brightness

The ASPEN PFD has a light sensor which automatically adjusts the brightness of the display to ambient light conditions. In addition, it is also possible to alter the brightness using the instrument menu. Press the "menu" key to access settings mode. After pressing the left rotary knob once, the brightness level can be adjusted by turning the knob. Pressing the "menu" key saves the brightness level and exits the settings mode.

4.5.5. Before Take-off

1. Attitude indicator

Check for correct setting

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NOTE

The artificial horizons (ADAHRS module and standby attitude indicator) require several minutes (approx. 5 mins.) to stabilize. Watch for relevant messages on the PFD monitor.

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4.5.13 Engine Shut-down

The Aspen EFD1000 PFD must be switched off **before** engine shut-down.

NOTE

The PFD may also be switched off using the red "REV" key.

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5.0 Performance

There is no change regarding the information in the basic Airplane Flight Manual.

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6.0 Weight and Balance

There is no change regarding the information in the basic Airplane Flight Manual.

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7.0 Systems Description

NOTE

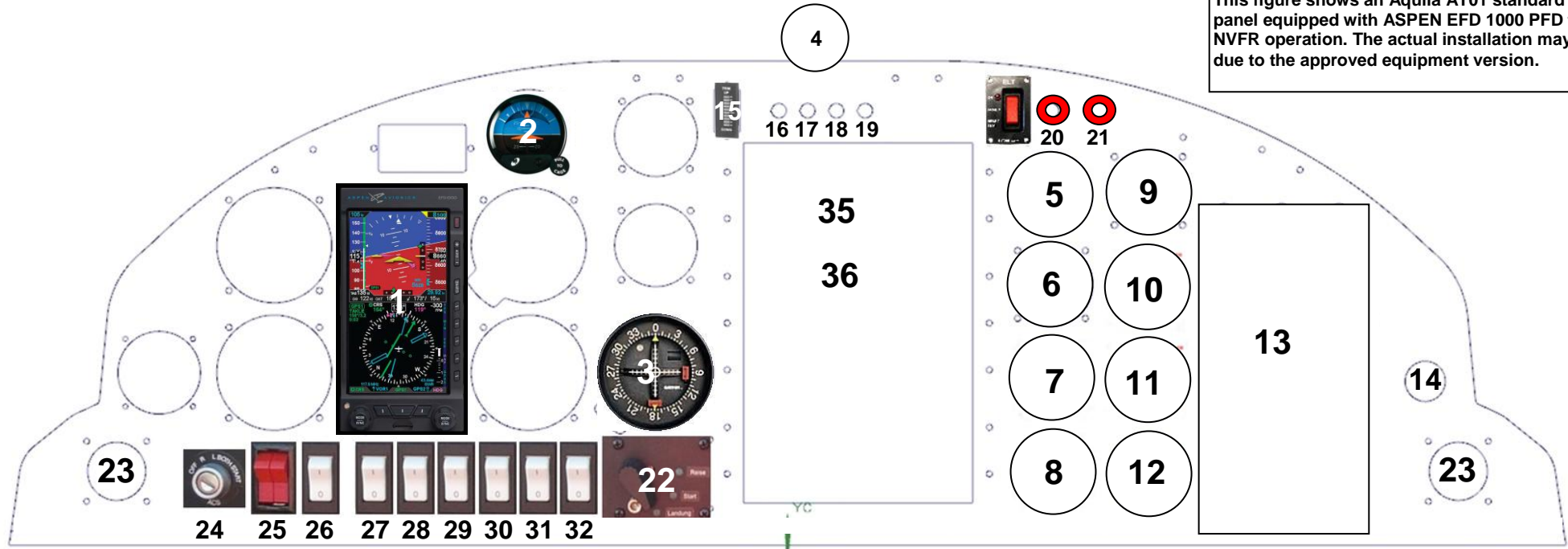
This supplement contains a general description of the integration of the PFD into the instrument panel of the AQUILA AT01. For a detailed description and full operating instructions refer to the effective issue of the ASPEN EFD 1000 (PFD) Pilot's Guide, P/N 091-00005-001.

The Aspen EFD 1000 PFD is supplied with power via its own switch and circuit breakers which are labeled with PFD and which are active once the master switch is switched on.

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7.4 INSTRUMENT PANEL ASPEN EFD 1000 PFD

Note:
This figure shows an Aquila AT01 standard panel equipped with ASPEN EFD 1000 PFD for NVFR operation. The actual installation may vary due to the approved equipment version.



For minimum instrument requirements in accordance with kind of operation, refer to Section 2.12 of this AFM supplement.

No.	Description	No.	Description	No.	Description	No.	Description	No.	Description	No.	Description
1	ASPEN EFD 1000 PFD	7	Voltmeter	13	Circuit breakers	19	Low voltage indicator	25	ALT/BAT switch	31	Landing light
2	Attitude indicator (NVFR)	8	Ammeter	14	12V receptacle	20	Dimmer instr. Panel (NVFR)	26	Electrical fuel pump	32	Instrument light
3	CDI (ASPEN EFD 1000 PILOT and C/NVFR only)	9	Rpm indicator (prop.)	15	Trim indicator	21	Dimmer instr./post light (NVFR)	27	Master switch PFD	33	COM/NAV/(B-RNAV)
4	Compass	10	Cylinder head temperature	16	Alternator warning ALT1	22	Flaps switch	28	Master switch AVIONICS	34	Transponder
5	Manifold press. indicator	11	Oil temperature	17	Alternator warning ALT2	23	Ventilation nozzle	29	NAV lights		
6	Fuel indicator	12	Oil pressure indicator	18	Fuel pressure warning	24	Ignition switch	30	Anti-collision lights		

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7.11.3 Electrical Equipment and Circuit Breakers

All electrical equipment may be turned on or off by push-pull circuit breakers or by rocker switches with built-in circuit breaker function.

The instrument panel lighting (flood light) is protected by a push-pull circuit breaker and is switched on and/or dimmed using the rotary knob in the dimming unit (cf. Chapter 7.4, item 23).

Individual instrument lighting and the post lights are switched on by the instrument lighting switch and can be individually dimmed using a dual dimmer.

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8. Handling, Service and Maintenance

8.6 Handling Avionics

The Aspen EFD 100 must be switched off during engine start-up and shut-down. Non-compliance could destroy the equipment. All warranty and guarantee claims will become void!

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