

SECTION 6

WEIGHT AND BALANCE / EQUIPMENT LIST

		Page
6.1	INTRODUCTION	6-2
6.2	AIRCRAFT WEIGHING PROCEDURE	6-3
6.2.1	Aircraft Weighing Form	6-5
6.3	WEIGHT AND BALANCE DATA AND RECORD	6-6
6.3.1	Weight and Balance Record	6-6
6.4	WEIGHT AND BALANCE DETERMINATION FOR FLIGHT	6-7
6.4.1	Moment Determination	6-8
6.4.2	Weight and Balance Determination	6-9
6.4.3	Approved Center of Gravity Range and Weight Moment Limits	6-10
6.5	EQUIPMENT LIST	6-11
6.5.1	Equipment List	6-12

Document No.:	Issue:	Revised Issue:	Date:	Page:
FM-AT01-1010-100E	A.01	-	5.6.02	6-1

6.1 INTRODUCTION

The aircraft must be flown with the weight and center of gravity position (C.G.) within the approved operating range defined in this section to guarantee a safe operation, the specified flight performances and the described flight behavior.

It is the responsibility of the pilot to ensure the aircraft is loaded properly. Always the C.G. position shifting in result of fuel consumption during flight should be considered.

The section describes the aircraft weighing procedure and the procedure for establishing the empty weight and moment of the aircraft, and the C.G. position.

At the time of licensing, the manufacturer provides each aircraft with the basic empty weight and moment, and C.G. location. This data is supplied by the Aircraft Weighing Report (6.2.1), and by the Weight and Balance Record (6.3.1).

Aircraft weighing should be accomplished within the prescribed intervals.

Whenever new equipment is added the new basic empty weight, the moment, and the new C.G. position should be determined and entered in the Weight and Balance Record.

The following pages provides forms used in weighing the aircraft and computing the required mass and balance data, such as the Aircraft Weighing Report (6.2.1), the Weight and Balance Record (6.3.1), and the Weight and Balance Loading Form (6.4.2).

NOTE

If any modification work or repair is done the new basic empty weight must be determined in accordance to the respective national aviation regulations.

An authorized person should certify basic empty weight and moment, C.G. position and the maximum useful load in the Weight and Balance Record.

<i>Document No.:</i>	<i>Issue:</i>	<i>Revised Issue:</i>	<i>Date:</i>	<i>Page:</i>
FM-AT01-1010-100E	A.01	-	5.6.02	6-2

6.2 AIRCRAFT WEIGHING PROCEDURE

At the time of determination empty weight, the aircraft and its equipment must be defined clearly by the weighing conditions.

Weighing Conditions:

- a) Aircraft with:
- Brake Fluid
 - Engine Oil (3 liters)
 - Coolant (2,5 liters)
 - Unusable Fuel (10,4 liters)
- b) Equipment accordingly to equipment list (Para. 6.5).

The determination of the empty weight and the associated empty weight C.G. position should be accomplished as follows:

Prepare the aircraft so the above described weighing conditions are established.

Place scales under each wheel and level the aircraft longitudinally, refer to leveling diagram provided in the Aircraft Weighing Report (Para. 6.2.1). Ensure the aircraft is also laterally approx. in level.

When the aircraft is level, drop a plump from the right wing leading edge at the fuselage-wing intersection. Repeat this on left side of fuselage, and then stretch a line between the obtained points. From this reference line measure the distances D_L , D_R , and D_N (refer to leveling diagram in the Aircraft Weighing Report).

The basic empty weight, the empty weight moment and the empty weight C.G. position can be determined by the following formulas:

Empty Weight m_{empty} (kg):

$$m_{empty} = m_L + m_R + m_N$$

Empty Weight Moment MO_{empty} (Kgm):

$$MO_{empty} = m_L \cdot D_L + m_R \cdot D_R + m_N \cdot D_N$$

Empty Weight C.G. Position D_{CG} [m]:

$$D_{CG} = \frac{MO_{empty}}{m_{empty}}$$

Document No.:	Issue:	Revised Issue:	Date:	Page:
FM-AT01-1010-100E	A.01	-	5.6.02	6-3

NOTE

The lever arms of the main landing gear wheels D_L and D_R have a positive (+) value and that of the nose gear wheel D_N a negative (-) one.

<i>Document No.:</i>	<i>Issue:</i>	<i>Revised Issue:</i>	<i>Date:</i>	<i>Page:</i>
FM-AT01-1010-100E	A.01	-	5.6.02	6-4

6.2.1 Aircraft Weighing Report

Model: AT01

Serial No: AT01-162

Registration No: **OE-CUU**

Data in accordance with AFM

Reference Datum:

Horizontal Reference Line:

Occasion for Weighing: manufacturing

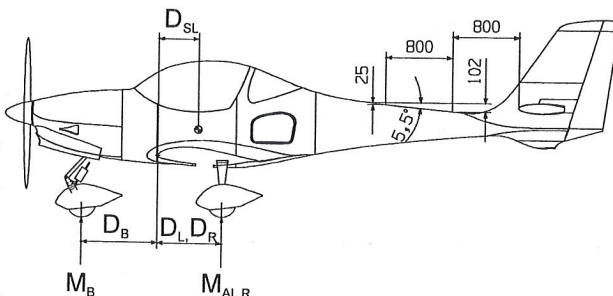
Leading edge of wing root rib.

Place a wedge on fuselage tube as described in the sketch below, and align longitudinal axis using a spirit level.

Weighing Conditions:

Including brake fluid, eng. oil and coolant, unusable fuel (10,4 liters).

Equipment List - dated: 12.03.2007



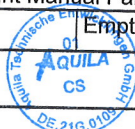

Position	Gross (kg)	Tare (Kg)	Net Weight(kg)	Lever Arm (m)
Nose Wheel	--	--	$m_N = 109,7$	$D_N = - 0,840$
Left Main Wheel	--	--	$m_L = 200,0$	$D_L = + 0,773$
Right Main Wheel	--	--	$m_R = 202,3$	$D_R = + 0,780$
Empty Weight $m_{empty} = m_N + m_L + m_R =$			512,0	(kg)

Empty Weight Moment: $MO_{empty} = m_N \cdot D_N + m_L \cdot D_L + m_R \cdot D_R = 220,2$ [Kgm]

Empty weight C.G. position: = Empty Weight Moment / Empty Weight =
 $D_{CG} = MO_{empty} / m_{empty} = 0,430$ [m]

Maximum Useful Load	+ MTOW (kg)	+ 750
	- Empty Weight (kg)	- 512
	= Max. Useful Load (kg)	= 238

Data for Entering in the Airplane Flight Manual Para. 6.3.

Empty Weight (kg) 512	Empty Weight Moment (Kgm) 220,2
Location / Date Schönhausen, 12.03.2007	Stamp 
	Signature 

Document No.:	Issue:	Revised Issue:	Date:	Page:
FM-AT01-1010-100E	A.01	-	5.6.02	6-5

6.3 WEIGHT AND BALANCE DATA AND RECORD

The current status of the aircraft basic empty weight and a complete history of previous modifications are provided in the Weight and Balance Record.

Any change to the empty weight and/or empty weight C.G. position due to repair or modification of equipment must be entered in the Weight and Balance Record.

The new empty weight can be determined by calculation, if the changed weights and their lever arms known (modification of the equipment), and if unknown by aircraft weighing (e.g. after repair).

In case of determination of the empty weight and C.G. position by way of calculation, ensure the current data are used.

6.3.1 Weight and Balance Record

The Form shows the history of changes to the empty weight and in result to the C.G. position due to modification in equipment and/or structure.

The first entry has been made for the aircraft as licensed at the factory.

AQUILA AT01			Registration Number		Serial Number:			Page No.:	
			OE-CUU		AT01-162			1 /	
			Weight Change				Running Basic Empty Weight		
No.	Date	Description of Article or Modification	Added or Removed	Weight	Arm	Moment	Weight	C.G. Position	Moment
			"+" or "-"	[Kg]	[m]	[Kgm]	[Kg]	[m]	[Kgm]
1	12.03.07	As delivered	--	--	--	--	512	0,430	220,2

Document No.:	Issue:	Revised Issue:	Date:	Page:
FM-AT01-1010-100E	A.01	-	5.6.02	6-6



6.4 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

In order to operate the aircraft within the approved weight and C.G. limits, the takeoff weight and the associated C.G. position must be determined dependent on the loading for the planned flight.

Use the tables and charts provided on the following pages for the weight and C.G. position determination:

Paragraph 6.4.1 Loading Graph

Paragraph 6.4.2 Weight and Balance Loading Form

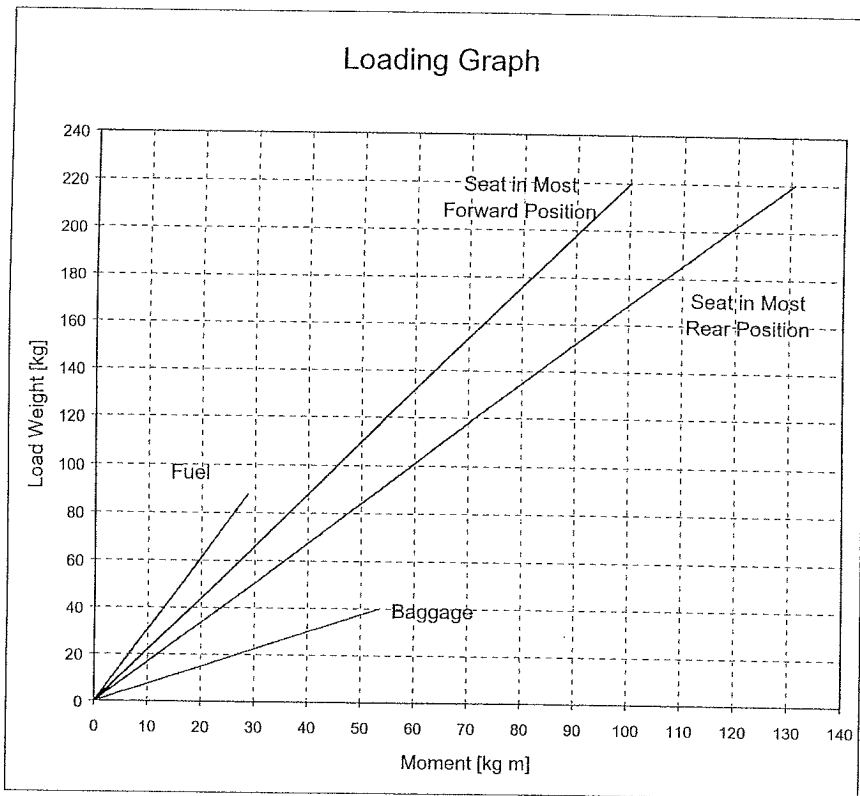
Paragraph 6.4.3 C.G. Range and Moment Graph

Use those as follows:

1. Take the basic empty weight m_{empty} and the empty weight moment MO_{empty} from the current Aircraft Weighing Report or the Weight and Balance Record and enter them in the *Weight and Balance Loading Form* (6.4.2).
2. Use the *Loading Graph* (6.4.1) to determine the moment of all items to be carried in the aircraft (Pilot, Fuel, Baggage) and enter those data also in the *Weight and Balance Loading Form* (6.4.2).
3. Add the weight of all items to be loaded to the basic empty weight, and the moment of all items to be loaded to the basic empty weight moment. Then by using the obtained values locate a point in the *C.G. Range and Moment Graph* (6.4.3) and verify the C.G. falls within the approved C.G. limits.

Document No.:	Issue:	Revised Issue:	Date:	Page:
FM-AT01-1010-100E	A.01	-	5.6.02	6-7

6.4.1 Moment Determination



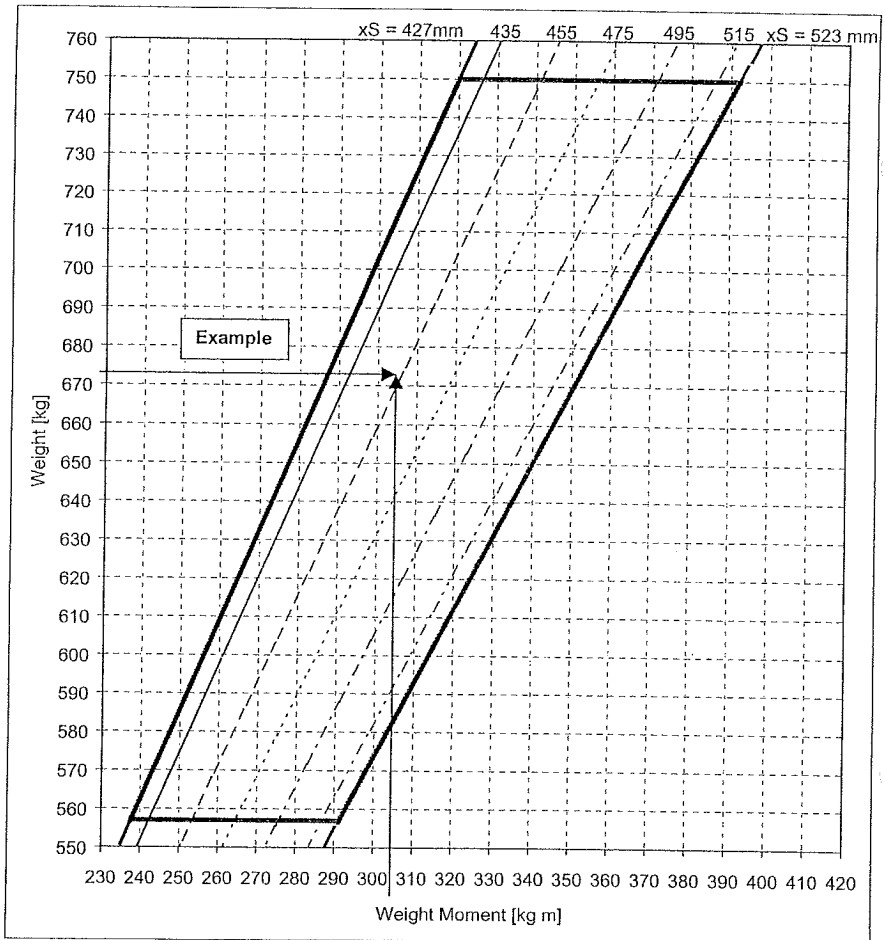
Document No.:	Issue:	Revised Issue:	Date:	Page:
FM-AT01-1010-100E	A.01	-	5.6.02	6-8

6.4.2 Weight and Moment Determination

Weight and Moment Determination	AT01 - Example		Registration No.	
	Weight (kg)	Moment (kgm)	Weight (kg)	Moment (kgm)
1. EMPTY WEIGHT and MOMENT (take from the Aircraft Weighing Report or from the Weight and Balance Record) incl. unusable fuel, engine oil, and coolant	490	210		
2. PILOT + PASSENGER Arm 0,515 (m)	82	42,2		
3. BAGGAGE Arm 1,3 (m)	20	26		
4. WEIGHT and MOMENT without Fuel (= total of 1-3)	592	278,2		
5. LOADED FUEL (loaded usable Fuel) (0,72 kg/l) Arm 0,325 (m)	86	28		
6. WEIGHT and MOMENT including Fuel (= total of 4-5)	678	306,2		
7. Using those values locate the C.G. position in the C.G. Range and Moment Graph.	Falls within the approved range. Refer to Example on the C.G. Range and Moment Graph			

Document No.:	Issue:	Revised Issue:	Date:	Page:
FM-AT01-1010-100E	A.01	-	5.6.02	6-9

6.4.3 Approved Center of Gravity Range and Weight Moment Limits



Document No.:	Issue:	Revised Issue:	Date:	Page:
FM-AT01-1010-100E	A.01	-	5.6.02	6-10

Type: Aquila AT01		Registration: OE-CUU		Serial-No: AT01-162	
*)	Equipment	Manufacturer	Type / Part-No	Serial-No	Position **)
X	Battery	Licence 12V /29Ah	8210-123	n.a.	Firewall RH
X	Ignition-Switch	ACS Products	A510-2	n.a.	Instr.-Panel
X	Voltmeter	VDO	332030001	2642	Instr.-Panel
X	Amperemeter	VDO	190037002	2242	Instr.-Panel
X	Revolution-Indicator	Rotax	IM 428 912	50764	Instr.-Panel
X	Oilpressure-Gauge	VDO	350030004	1361	Instr.-Panel
X	Oiltemperature-Gauge	VDO	310030003	2462	Instr.-Panel
X	CHT-Gauge	VDO	310030003	2462	Instr.-Panel
X	Manifold-Pressure-Gauge	Yuma	7-100-20	B 7912	Instr.-Panel
X	Fuel-Quantity-Gauge	Westach	2DA4 12V	1929	Instr.-Panel
X	Engine-Hour-Meter	VDO	FSZM	2002	Instr.-Panel
X	Airspeed-Indicator	Winter	6 FMS 523 200kts	125376	Instr.-Panel
X	Stall-Warning	Aquila	4020-028	n.a.	LH wing
X	Altimeter 1	United Instruments	5934PD3A 130	457248	Instr.-Panel
X	Variometer	Winter	5 VM / 5162	62263	Instr.-Panel
X	Compass	Airpath	C2300	WW-2912	Instr.-Panel
X	Cockpit Watch	Davtron	M800	22066	Instr.-Panel
X	OAT Indicator	Davtron	301C	A6756	Instr.-Panel
X	Turn Coordinator	Mid-Continent	1394T100-7Z	L06-10163	Instr.-Panel
X	Directional Gyro	RC Allen	RCA15AK2	36K0288G	Instr.-Panel
X	Gyro Horizon	Mid-Continent	4300-311	H05-10801	Instr.-Panel
X	GPS, portable	Garmin	GPSmap 496	19801352	Instr.-Panel
X	GPS, Moving Map	Garmin	GNS 430	97137547	Instr.-Panel
X	Radio COM/VOR	Garmin	GNS 430	97137547	Instr.-Panel
X	Audio Panel	Garmin	GMA 340	96280053	Instr.-Panel
X	VOR-Indicator	Garmin	GI 106 A	M06-10384	Instr.-Panel
X	Transponder	Garmin	GTX 330	84125508	Instr.-Panel
X	Alt. Encoder	ACK	A-30 (Mod4)	103447	Instr.-Panel
X	ELT	Kannad 406 AF	S1821502-02	362575	Baggage comp.
X	Avionic Fan	Garmin	GCF 314	12472	Instr.-Panel
X	Seat-Belts LH	Schroth, 3-point	1-10-510402	33/06	Seat LH
X	Seat-Belts RH	Schroth, 3-point	1-10-515402	33/06	Seat RH
X	Strobe-Light-box	Whelen	A413AHDA-CF14	12472	Fuselage floor

*)cross when installed

**)installation position or lever arm

Schönhagen, 13.03.2007

Place, Date



Stamp

[Handwritten Signature]

Signature CS

6.5 EQUIPMENT LIST

The following equipment list contains all equipment items, which may be installed in the AQUILA AT01. The current status shows the "Inst" column. Items marked with an „X“ were installed on the aircraft.

The equipment list provided contains the following information:

- In the "Item No." column, each item is assigned a letter and a unique sequence number. Read letters as follows:

A	Avionics
I	Instruments
V	Misc. Equipment

In the "Weight" and "Arm" columns, information is provided on the weight (in kg) and arm (in m) of the equipment item relative to the datum. Positive arms are distances aft of the aircraft datum; negative arms are distances forward of the datum.

NOTE

If additional equipment is to be installed, it must be done in accordance with the related information in the Maintenance Manual.

Document No.:	Issue:	Revised Issue:	Date:	Page:
FM-AT01-1010-100E	A.01	-	5.6.02	6-11

EQUIPMENT LIST		Serial No.	Regist. No.		Date
		AT01-			
Item No	Description	Serial Number	Inst.	Weight (kg)	Arm (m) + or -
I 1	Attitude Gyro RCA 26 AK-4				
I 2	Directional Gyro RCA 15 AK-2				
I 3	Turn Coordinator RCA 82 A-11				
I 4	Airspeed Indicator Winter 6 FMS 523				
I 5	Altimeter Winter				
I 6	Vertical speed Indicator Winter 5 VM 10-2				
I 7	Compass Airpath C2300				
I 8	Manifold Press. Indicator Yuma 7-100-20				
I 9	Tachometer Rotax electron.				
I 10	Oil Pressure Indicator VDO				
I 11	Oil Temperature Indicator VDO				
I 12	Cylinder Head Temperature Indicator VDO				
I 13	Ammeter VDO				
I 14	Voltmeter VDO				
I 15	Fuel Level Indicator Westach				
I 16					
I 17	VOR Antenna (made by AQUILA)				
I 18	VHF Antenna VHF5T Co. ACU				
I 19					
I 20					
I 21					
I 22					
I 23					
I 24					
I 25					

<i>Document No.:</i>	<i>Issue:</i>	<i>Revised Issue:</i>	<i>Date:</i>	<i>Page:</i>
FM-AT01-1010-100E	A.01	-	5.6.02	6-13

