SECTION 7

DESCRIPTION OF THE AIRCRAFT AND ITS SYSTEMS

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7.1 INTRODUCTION

Section 7 of the Airplane Flight Manual contains description and operation of the aircraft and its systems.
Refer to Section 9 for description and operation of optional equipment and systems.

7.2 AIRFRAME

The majority of aircraft structure is made from composite materials.
Glass fiber (GFRP) as well as carbon fiber materials (CFRP) are used, that are bedded into an epoxy resin matrix. The aircraft structure consists of monolithic GFRP or CFRP shells and structure components as well as sandwich shells, which have a rigid foam core.

7.2.1 Fuselage

The fuselage with the vertical and horizontal stabilizers represents one component. Including the vertical stabilizer, it is comprised of two half-shells. The fuselage portion of the half-shells is fabricated from solid (non foam) fiberglass laminate; the vertical stabilizer has a sandwich structure. The fuselage GFRP skin is reinforced by four carbon fiber stringers, arranged lengthwise through the entire fuselage.
Four ring frames and a baggage compartment bulkhead provides support to the fuselage shells in the tail pipe area. To carry single loads a landing gear bulkhead, a seat bulkhead, and a side force bulkhead.
The firewall closes the front of fuselage. It includes metal fittings for supporting the engine mount.
The firewall, constructed of a GFRP/CFRP composite sandwich, has on the front side a fire protection lining that consists of an especially fire-resistant ceramic fleece and a stainless-steel sheet.
The landing gear bulkhead, which is carrying together with the seat bulkhead the main landing gear struts, is complemented upwards through a compact CFRP/GFRP roll-over bar.

7.2.2 Wing

The plan view of the wing is a triple trapezoid that is complemented by a winglet at its end.
The wing has top and bottom shells, constructed of a GFRP composite sandwich and locally reinforced by CFRP straps. The aircraft has a one-piece wing because the wing spar is manufactured in one-piece and is continuous from wing tip to wing tip. The I-section spar has caps, made from uni-directional carbon fiber and a GFRP composite sandwich web.
Each wing half ends inboard with a front root rib and a rear root rib, which are mounted to the fuselage center section with a bolt each.
The four lateral force bolts are inserted from the cabin through the fuselage bushings into the wing bolt housings and secured axially with screws.

The outboard end of the wing has a winglet with the NAV Lights and the fuel tank vents.

Each inboard portion of the wing contains one integral fuel tank with a capacity of 60 liters in each wing.
The ailerons are located at the wing trailing edge near the wing tips. They are of semi-monocoque sandwich construction consisting of rigid foam core and glass and carbon fiber layers.
The flaps, of semi-monocoque CFRP sandwich construction, are mounted to the trailing edge of each wing between the inboard end of the ailerons and the fuselage.
They are attached to the wings using hinges that are located below the bottom of the wing. In result while extending the flaps the gap between wing trailing edge and flap leading edge becomes larger. That increases the lift force and simultaneously the drag force.

7.2.3 Empennage

The vertical and horizontal stabilizers, as well as the elevator and rudder are of semi-monocoque design consisting of shells fabricated from GFRP sandwich reinforced with CFRP.
The vertical as well as the horizontal stabilizers have a main spar and a rear shear web with integrated hinges.
The horizontal stabilizer is molded to the fuselage and cannot be removed.
The VHF NAV/COM antenna is integral of the vertical stabilizer.

7.3 FLIGHT CONTROLS

7.3.1 Aileron Control

The ailerons are operated by the control sticks of the dual flight control system.
The control input is transferred to the control surfaces exclusively through control rods.
The deflection ratio from positive too negative deflection of the aileron control surfaces (differentiation) is determined by means of a differentiating lever, which is mounted in the center of the main spar. The travel of the control surfaces is effectively limited by adjustable stops at the control yoke.

7.3.2 Elevator Control and Trim System

The elevator is operated by applying forward or back forces to the control sticks of the dual flight control system.
The control input is transferred to the elevator exclusively through control rods.
The travel of the control surfaces is effectively limited by adjustable stops at the control yoke.

An electrical trim system which is adjusting spring forces is installed in the aircraft. A failure of that trim system, such as trim-runaway, does not affect the aircraft controllability, only the control stick forces may be higher. Pressing the forward side of the switch will trim nose down; pressing the rear side of the switch will trim nose up.
The switch activates an electrical trim actuator that is mounted under the baggage compartment floor panel, parallel to the elevator pushrod. The trim actuator changes the preload of a pair of springs that applies a defined force to the elevator pushrod.
The electrical circuit of the trim system is protected by a circuit breaker that can be pulled in the event of a trim system malfunction.

7.3.3 Rudder Control

The right-hand rudder pedals and the left-hand rudder pedals of each seat are linked via a shared rudder control that has an actuator arm. In this way the dual rudder control system is coupled.
Rudder control is transferred by control cables that are special guided to minimize friction. The control surface travel is limited by stops at the lower rudder mounting bracket.

Precise control and a good maneuverability while taxiing on ground is guaranteed by direct linkage of the nose wheel through the rudder pedals (Refer to para. 7.5.1 of this handbook). To gain a minimum turn radius the brakes may be used simultaneously.

The distance from seat to rudder pedals can changed very easy by the seats that are infinitely adjustable fore and aft (For seat adjustment, refer to para. 7,5.1 of this handbook).

CAUTION

Check the proper seat position before every engine start to guarantee the controllability of the nose wheel steering and the toe brakes.

7.3.4 Flap Control and Flap Position Indication

The flaps are operated and fixed in desired position by an electrical flap actuator. A three-position selector switch is incorporated in the instrument panel for flap control. The switch position and the associated indicator light correspond to the position of the flap trailing edge when extended in the 35° landing position, in the 17° takeoff position and when retracted (three-position selector switch is in most up position).

If the flap switch was placed into another position, the flaps travels until the desired flap position is reached, and the surface travel will be stopped automatically. Because the flap actuator has a reduction gear and a spindle, the flaps will be fixed in position during electrical power failure.

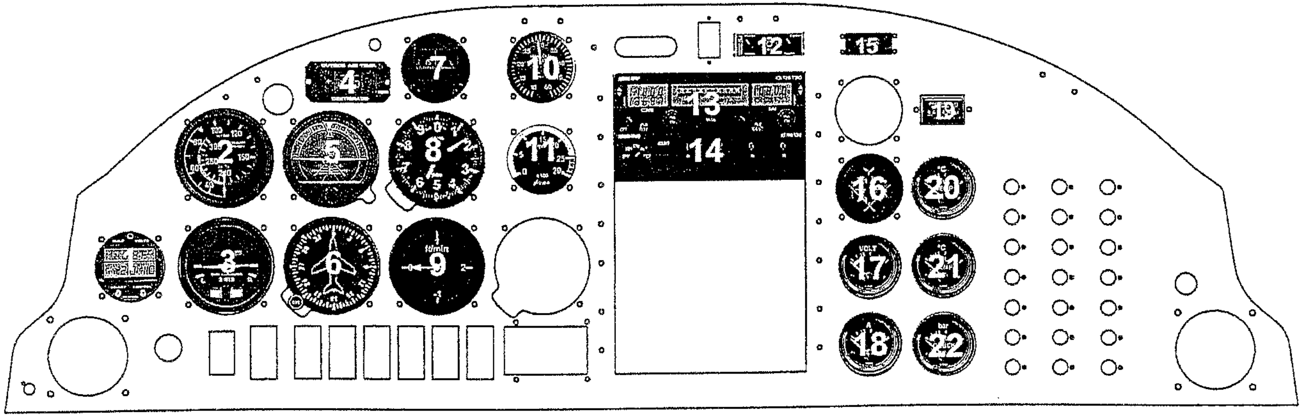
Color markings on the flap leading edge (see also page 2-10) offer a reliable possibility for a visual check of the flap position through position comparison with the trailing edge of the upper wing shell.
The electrical circuit of the flap control system is protected by a 10A circuit breaker that can be manually opened if required.
For the LED's of the flap position indicator an individual circuit breaker is provided. All related circuit breakers are installed easily accessible on the right instrument panel.

7.3.5 Control Stick Lock

While parking, the control stick should be secured to prevent damage to the parked aircraft by gusty or strong winds. For that, pull the stick to the control stop and secure the stick in this position with the safety belt by closing the safety belt locking mechanism and tightening the belt straps.

7.4 INSTRUMENT PANEL (Standard Equipment)

For minimum instrument requirements, refer to Section 2, Paragraph 2.12, of this handbook.



No	Designation	No.	Designation	No.	Designation	No.	Designation	No.	Designation
1	Clock	6	Directional Gyro	11	Tachometer	16	Fuel Level Indicator	21	Oil Temp. Ind.
2	Air Speed Indicator	7	Compass	12	Intercom	17	Voltmeter	22	Oil Press. Ind.
3	Turn Coordinator	8	Altimeter	13	COM/NAV Transceiver	18	Ammeter		
4	OAT Indicator	9	Vert. Speed. Ind.	14	Transponder	19	Operation time counter		
5	Attitude Gyro	10	Man. Press. Ind.	15	Not equipped	20	Cyl. Head Temp. Ind.		

7.4.1 Flight Instruments

The flight instruments are located in the instrument panel in front of the pilot's seat.

7.4.2 Switches and Other Controls

Various switches for systems and equipment are placed in a row below the flight instruments right of the ignition switch.
Below the instrument panel, in the center, are the carburettor heat, the choke, and the cabin heat control knobs.
Good accessible, on the center console front portion, the throttle lever and the propeller control lever (blue star-shaped knob) are located.
On the center console, between the seats the trim switch, the fuel selector /shut-off valve, and the parking brake control knob.

The pulling of the buttons of carburettor Heat, choke, cabin heat and parking brake causes the activation of the respective system.
For example; if pulling the choke knob the starting carburettors will be opened to enrich the mixture for starting a cold engine, but only if the throttle lever is in the IDLE position (rear stop). The choke control knob is spring loaded. If one releases the control knob, the choke goes automatically out of operation.
Full power and minimum propeller pitch (Takeoff) is adjusted by moving both the throttle and propeller control fully forwards up to the stops.

7.4.3 Cabin Heat

Ram air for cabin heating flows through a shroud attached to the muffler and a duct into the cabin if the heat relief valve is open. When the firewall is passed, the heated air is distributed for windshield defrosting and cabin heating.
The push-pull type control knob to open or close the door in the heat relief valve is mounted in the center console below the instrument panel.

7.4.4 Cabin Ventilation

For supply of fresh air into the cabin, two adjustable air nozzles on the instrument panel sides are provided. The amount and the direction of fresh airflow can be adjusted, individual for each seat, by pivot tabs inside the nozzles. If required, in addition the sash windows can be used for cabin ventilation.

7.5 LANDING GEAR

The landing gear incorporates a steerable nose gear that is equipped with a shock absorber. The nose wheel is linked through the rudder pedals to provide precise control of the aircraft while taxiing on ground.
The main gear struts are leaf springs. Hydraulically actuated disc type brakes are provided on the main gear wheels that can be activated by the pilot's and co-pilot's toe brake pedals.

Because of the robust landing gear and the 5.00x5 wheels on the nose and main gear, as well as the sturdy wheel fairings, the aircraft is suitable for operation on grass fields.

7.5.1 Nose Landing Gear and Nose Gear Steering

The nose gear consists of a tubular steel strut attached turnable to the engine mount.
The fuselage front structure absorbs a portion of the nose gear loads directly through two support struts, attached to the lower attachment points of the engine mount too.
Good shock absorptions and suspensions characteristics are provided by a shock absorber unit equipped with stacked rubber disks, which is installed between nose wheel fork and nose gear strut.

Nose wheel steering is accomplished by spring loaded steering rod assemblies that connect the nose gear steering arm at the upper end of the nose gear strut to arms on the rudder pedals. That linkage of the nose wheel through the rudder control is also during flight.

The nose wheel steering allows a swift taxi, precise taxi maneuvers, and small turn radii, also in crosswind conditions without braking.
To gain minimum turn radii, the brakes supplementary may be used.

7.5.2 Main Landing Gear and Brake System

The main landing gear consists of two leaf-spring struts. The main wheels are equipped with hydraulically actuated disc type brakes.
The brakes are individually activated by toe pedals located at booth pilot stations.
The operating of the left and right wheel brake is accomplished by 2 separate brake systems.
Ensure the feet are well positioned while using the combined rudder / toe brake pedals to allow the full travel of the pedals while applying brakes.

7.5.3 Parking Brake

The parking brake uses the hydraulically disc brakes of the main landing gear wheels.

For that a manually operated valve seals the brake pressure in the left and right wheel brake system.
The parking brake push-pull type control knob is located between the seats, on the center console. To set parking brake, the brakes are applied and control knob is pulled up to the stop. After releasing the foot pressure on the pedals, the control knob can be released in the pulled position.
To release the parking brake, push down the control knob up to the stop.

7.6 SEATS, SEATBELTS AND HARNESSES

The AQUILA AT01 seats are fabricated from fiber composite materials and equipped with integrated safety head rests and removable, hard-wearing seat cushions.

A stepless fore and aft seat travel corresponds to the ergonomics requirements of a wide pilot spectrum. The seat track is angled upward for forward travel so that shorter people will positioned slightly higher as they adjust the seat forward. An oil/gas spring strut with locking mechanism holds the seat in the adjusted position.
The seats as well as the floor panels that cover the control system and other in the fuselage belly installed devices may be removed for visual inspections and maintenance.
Both seats are equipped with 4-point restraint with a central rotary buckle.
The shoulder straps attaches to inertia reels. The lap belts are tightened manually at the adjustor. For extending lap belts is a lightweight tilting of the adjustor buckle necessary.
Grasp the link of the straps, and push in sequence into the associated receptacles of the rotary buckle until a distinctive "snap" sound is audible to lock them together.
To open the restraint the rotary buckle handle is rotated to the right.

7.6.1 Seat Adjustment

The seat should be adjusted best, before the seat belts and shoulder harnesses are fastened. With the seat in desired position, verify all controls are accessible and can be operated.
To position the seat, a Push Knob should be pushed to unlock the oil/gas spring strut. The push knob is located in the inner front of the seat, just under the seat bottom.

Because the oil/gas spring strut and rolling bearings, a small force is enough to move the seat into the desired direction. The seat is locked in place by releasing the push knob.

7.7 BAGGAGE COMPARTMENT

The AQUILA AT01 has behind the seats a large baggage compartment, loadable through a lockable baggage door. The baggage compartment is also accessible through cabin. Bulky baggage can be loaded through the cabin by moving the seats forward.

The baggage compartment floor with the exception of a small center tunnel is equipped with a glide impeding carpet. The maximum load is **40 kilograms**. The weight and center of gravity limits of the aircraft (refer to Section 6 of this handbook) must be considered for every loading. The baggage door must be locked during flight.

Tie-down rings for tie-down straps are provided on the baggage compartment floor for securing baggage. Suitable tie-down straps may be purchased from the manufacturer. For small, loose articles a baggage net is recommended that is available as spare part.

CAUTION

During preflight check verify the baggage door is closed and latched.

CAUTION

Weight and center of gravity position must be within the approved limits.

7.8 CANOPY

The big canopy of the AQUILA AT01 offers an excellent all around view. It consists of a rear portion with a window, which is bonded to the fuselage structure, and a large one-piece acrylic glass window that moves up and forward to open for a comfortable cabin ingress. Small sash windows on the sides serve as emergency windows and can be used for additional cabin ventilation. The canopy is connected to the fuselage by a hinge mechanism and is rotating forward around this fixed hinge.
Opening, closing and locking of the canopy can be achieved by a hand lever in the canopy frame which can be operated from the left and in case of emergency also from the right seat. Pulling and turning the hand lever backwards (to the pilot) unlocks the canopy for opening. The reverse action, pushing and turning the lever forward is locking the canopy for flight.
From outside the canopy locking mechanism is operated in the same manner but with opposite direction.
Additionally there is a handle located on the inner side of the canopy frame in the center above and between the pilots used for assistance when openening and closing the canopy.
A gas spring strut provides effective assistance while opening the canopy.
The canopy frame as well as the hinge frame are designed stably. However, because of geometry and size of the canopy window, forces affect to the hinge mechanism and the attachment brackets can become considerable in strong winds when it is open. To prevent an inadvertent closing or damage to components, never leave the canopy window open under such wind conditions. In strong winds always secure canopy window by hand while moving.
To evacuate aircraft in an emergency, a hammer to smash the acrylic glass is provided. It is located at co-pilot's seat back.

CAUTION

Before takeoff, push the handle on the top of the canopy frame upwards to make sure that it is locked.

7.9 POWER PLANT

The AQUILA AT01 is powered by a ROTAX® 912S; a four-stroke cycle engine with four cylinders horizontal opposed. The normal aspirated engine is in standard configuration equipped with a dual breakerless capacitor discharge ignition system and a reduction gear with integrated shock absorber and overload clutch. The engine drives a propeller manufactured by mt-propeller Company that is regulated by a hydraulic constant speed governor. The displacement of the engine is 1352 cm^3, the compression ratio 10,5 : 1.

The engine can be operated with AVGAS 100 LL, with leadless EN 228 Premium, and with EN 228 Premium plus. The engine manufacturer recommends use of leadless fuels in accordance with EN 228 (MOGAS).
During installation in the AQUILA AT01, the maximum engine speed is adjusted by low pitch stop setting to 5500 RPM, which results in 2263 RPM propeller speed to reduce noise emission level. This value corresponds to the maximum continuous speed authorized by the engine manufacturer. For the operation of the AT01, a maximum continuous power of 69 kilowatt (KW) is available.
The aircraft, equipped with a two blade mt wood/composite propeller and a especially designed exhaust system has a demonstrated noise level of 64,6 dB(A). This is 7,7 dB(A) below the noise level limit in accordance to "Noise Requirements for Aircraft" (LSL) Chapter X (Refer to paragraph 5.2.14 of this handbook).
For engine installation the ROTAX engine suspension frame is used, which is attached via LORD® shock mounts to the engine mount made by AQUILA Comp. The engine mount consists of welded steel tubes and carries the nose landing gear, the battery and other components too. Through this engine mount the front fuselage structure absorbs engine related loads and nose gear loads.

7.9.1 Engine

The ROTAX® 912S engine is equipped with liquid cooled cylinder heads, ram-air cooled cylinders and dry sump forced lubrication system.
The engine has two carburettors; one for the right cylinders and one for the left cylinders of the engine.
For oil and engine coolant cooling a combined oil cooler / radiator is installed in the front part of the lower engine cowling behind the main air intake.
The cooling air baffle for cylinder cooling is connected through a flexible duct with a round air inlet in the front part of the lower engine cowling. The cooling air is discharged through an opening at the bottom rear edge of the cowling, there where also the exhaust tail pipe runs to the exterior of the aircraft.
Exhaust system components are connected through ball joints that are secured with two springs each to allow movement due to heat expansion and normal operating loads at connections.
Carburettor induction air enters through a NACA air intake on the left side of the lower cowling and is carried through an air filter box, and a flexible duct to the carburettor air box.
The ignition harness of the dual capacitor discharge ignition system is connected through plug connectors (spark plug connectors) to spark plugs of each cylinder.
Engine coolant is refilled in the expansion tank, located on top of engine.
A transparent overflow bottle, mounted to the right engine mount, is connected through a hose with the expansion tank. The overflow bottle is accessible through the oil door too, located in the upper right cowling.
The oil access door allows the engine oil and coolant level check, and replenishing if required, without removal of the cowling. These checks are described in Section 4 of this handbook, paragraph "Daily Preflight Check".

The propeller reduction gear has an integrated shock absorber and overload clutch. The propeller governor is flanged to the backside of reduction gear housing.
The propeller governor and the reduction gear are integral of the engine oil circuit. Therefore, the engine oil must fulfil a series of specific characteristics.
The use of semi- or full synthetic oils for four-stroke motor cycle engines of the classification "SF", "SG" or higher with gear additives and a wide temperature range is recommended. Friction modifier additives must not be contained because this could result in a slipping clutch during normal operation. Never use aviation grade engine oil.
For complete information regarding engine oil and oil change intervals, refer to ROTAX® Operator's Manual and to the ROTAX® Service Information SI-18-1997.

CAUTION

The by ROTAX® Aircraft Engines Inc. for the 912S engine prescribed specifications for operating media must be kept.

CAUTION

Before every takeoff a check of both ignition circuits must be performed.
For more information on the engine, refer to ROTAX® Operator's Manual.

7.9.2 Throttle and Choke

The throttle control lever is located on the center console front portion, to the left of the propeller control lever (blue star-shaped knob), well accessible to both the pilot and co-pilot. During throttle lever movement, the throttle valves of both carburettors are actuated synchronously by two Bowden wires.
For full engine power (max. manifold pressure), both the throttle and the propeller control lever should be placed in full forward position. Idle run is adjusted by moving the throttle lever to the full aft position.

The starting carburettor is actuated by pulling the knob that is located as the control knobs of the carburettor heat and cabin heat, on the center pedestal just below instrument panel. When the choke is used, the starting carburettor enriches the fuel mixture, but only if the throttle lever is the IDLE position.

The choke should only short-term pulled during cold starts. After releasing, the spring loaded control knob goes automatically back to the OFF position.

CAUTION

During daily preflight check verify the throttle and starting carburettor arms reach their stops.
Before every takeoff ensure the choke control knob is full returned into the OFF position.

7.9.3 Propeller and Propeller Control

The AQUILA AT01 is equipped with a two blade wood/composite hydraulically controlled variable pitch propeller (constant speed propeller).
The propeller blades has a fiber reinforced epoxy cover, tipping from stainless steel and in the hub area PU-strips.

A propeller governor that increases the pitch against a spring preload hydraulically controls the pitch of the propeller blades. The governor keeps the preselected propeller speed at a constant value, regardless of manifold pressure and airspeed (constant-speed-control). In the case of oil pressure loss, the blades will be set into low pitch position. That assures full power is further available. Feathering system is not provided.

The propeller speed is adjusted by the propeller control lever that is located on the center console front portion, in view of pilot and well accessible, right to the throttle lever. Lowest pitch and highest propeller speed is adjusted by moving the control lever into the full forward position. With the control lever in this position and the throttle fully open maximum engine power will be reached, which is commonly required for takeoff and initial climb. For landing approach also the low pitch setting is used in order to have full climb power in case of a missed approach, and to increase the propeller drag force in idle speed. During climb and cruise the manifold pressure (throttle position) and the propeller pitch are commonly adjusted on each other. Refer to Section 5 of this handbook and to ROTAX® 912S Operator's Manual.

CAUTION

The propeller should be cycled several times before every takeoff. That is not only to bleed air out of the system, and check function; in this way oil will be spilled to avoid deposits of mud (fuel lead).

7.9.4 Carburettor Heat

Carburettor heat supplies carburettors with preheated air. The carburettor heat push-pull type control knob is located, as the control knobs of the choke and cabin heat, on the center pedestal just below instrument panel.
By pulling the carburettor heat control knob, two coupled flap valves in the air distribution box are actuated. Those valves stop the airflow from the air intake, and allow heated alternate air from the exhaust muffler area to flow to the carburettors.
Correct use of carburettor heat prevents forming of carburettor ice that may cause rough engine operation up to total engine failure.
If carburettor ice is encountered, normally it can become slowly removed by the carburettor heat, and if at the same time engine power setting isn't changed. Carburettor heat must be used in accordance to the common rules and procedures.

A carburettor heat functional check should be performed during every preflight check. After turning on the carburettor heat at 1700 RPM, the RPM drop should be at least 50 RPM.

CAUTION

Carburettor heat reduces the engine power.

7.10 FUEL SYSTEM

The aircraft has an integral fuel tank in each wing. The capacity is approx. 60 liters per tank. Unusable fuel is 5,2 liters per tank.
The fuel tanks are located at the inboard portion of each wing in front of the main spar. They are bounded by the upper and lower reinforced in this area wing skins, main spar web, and the inboard and outboard fuel tank ribs on the side. Each fuel tank has a lockable fuel filler cap which is grounded to the airframe, and which seals the fitting that is bonded flush with the upper wing skin.
Fuel is delivered to the carburettors by the engine driven fuel pump from the fuel tank that is preselected by the fuel selector / shut-off valve. An electrical fuel pump is provided in case of the failure of the engine driven fuel pump. Excessive fuel flows through return lines and the fuel selector valve back to the same tank.
Low fuel pressure in the fuel lines (below 0,15 bar / 2,2 psi) to carburettors is captured by a fuel pressure sensor and indicated by a red warning light on the instrument panel. If the fuel pressure is too low, the electrical fuel pump should be turned on.

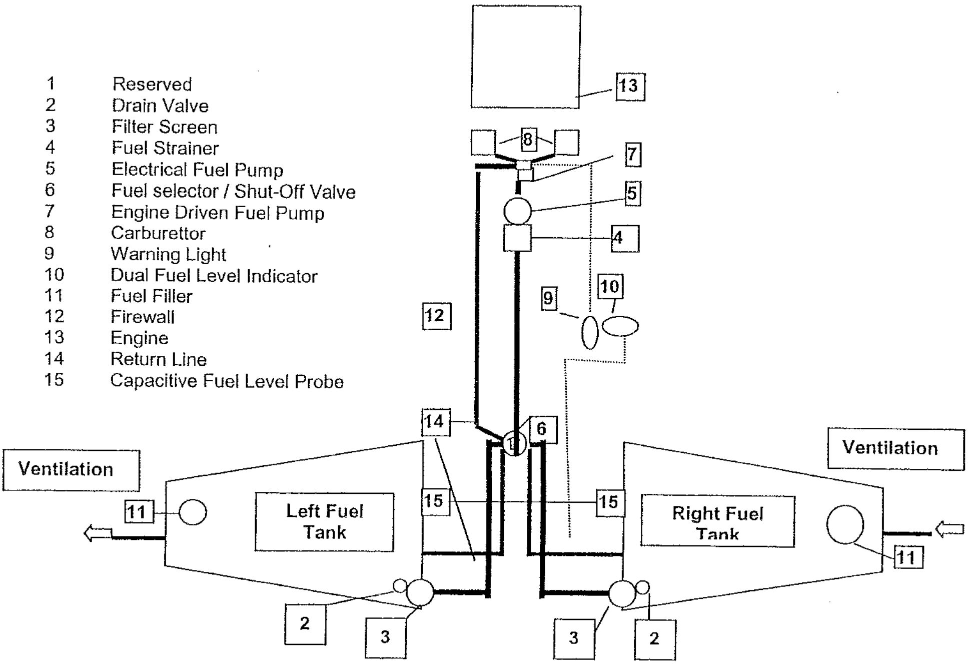
A fuel system schematic is shown below.

CAUTION

The electrical fuel pump should be ON for all takeoffs and landings, and when low fuel pressure was signalled.

Fuel System (schematic)

1 Reserved
2 Drain Valve
3 Filter Screen
4 Fuel Strainer
5 Electrical Fuel Pump
6 Fuel selector / Shut-Off Valve
7 Engine Driven Fuel Pump
8 Carburettor
9 Warning Light
10 Dual Fuel Level Indicator
11 Fuel Filler
12 Firewall
13 Engine
14 Return Line
15 Capacitive Fuel Level Probe



7.10.1 Fuel Storage and Ventilation

The inner surfaces of the composite integral tanks are sealed with a special fuel tank sealing material, to protect the fiber composite structure.
For reducing fuel slosh in the fuel outlet and the fuel probe areas a fuel baffle rib is provided.
The fuel tanks are vented from the top of each fuel tank through a vent line, connected at the outboard fuel tank rib, to a vent located on the winglets.
Each inboard fuel tank rib has an outlet over sump level that is equipped with a removable mesh strainer. From this outlet fuel flows through the fuel selector / shut-off valve located in fuselage belly, below the center console, the electrical fuel pump, the engine driven fuel pump, the fuel distributor, and then to the float chambers of carburettors. Excessive fuel returns from the fuel distributor through the fuel selector / shut-off valve into the selected fuel tank.

The inboard fuel tank ribs are well accessible for maintenance through an access panel in the lower wing skin.

Each tank has an individual manually operated drain on the lowest point to check fuel for water and sediment during preflight checks. A further drain valve is installed at the fuel system low point, at the bottom of fuselage, on the lower left front of the firewall.

7.10.2 Fuel Selector / Shut-Off Valve

For selecting the desired fuel tank and to interrupt fuel supply in case of an emergency the fuel selector / shut-off valve is provided.
The selector handle is mounted in view of the pilot and well accessible in the center console between the seats.
The red, arrow shaped handle has a LEFT, RIGHT, and OFF position. Each position has a positive detent.
To switch the valve to the OFF position, a knob located at the top of the handle must be pulled simultaneously while rotating the handle. With the valve in this position fuel flow from and to tanks is stopped. The handle points back and to the right.

In both operating positions, the fuel supply / return lines of the selected fuel tank are opened, and the fuel supply/ return lines of the other one are closed. The valve handle points in the direction of the tank being selected.

It is recommended select the fuel tanks for an approximately equal fuel level in the tanks. Changeover from the one onto the other tank should be performed in 60 min interval.

7.10.3 Electrical Fuel Pump and Fuel Strainer

The electrical fuel pump is incorporated into the system without bypass. In this way fuel flows through a fuel strainer, which is integral of the fuel pump, even if the pump is off.
The electrical fuel pump is mounted in the engine compartment, at the lower left firewall. At fuel pump base, the fuel system lowest point, is a fuel drain valve provided for drainage of water and sediments from the fuel system. The drain valve is accessible from outside the nose section.
A further filter element that is integral of the fuel pump is only renewable by replacing entire fuel pump.

12 VDC electrical power for the pump is supplied from the main electrical bus. A rocker type switch in the row of switches on the instrument panel controls the pump.
The electrical fuel pump should be ON for all takeoffs and landings, when the fuel pressure is too low, and in critical phases of flight.

The function of the pump motor may be checked on ground by the distinctive "ticking" sound. Refer to Section 4, "Daily Preflight Check" of the present handbook.

7.10.4 Fuel Level Indication

Fuel quantity is measured by two capacitive type fuel level probes, one in each tank, and indicated by a dual fuel level indicator mounted on the right side of the instrument panel.
The fuel level indicator has the markings FULL, ¾, ½, ¼, and EMPTY for each tank and has been calibrated during installation. Trough the access panels in the lower wing skin the fuel probes are well accessible for maintenance or replacement.

The aircraft attitude affects the fuel level indicator reading only insignificant.
Measuring systems never work without error and must be accepted as not safe in the case of missing redundancy because of possible defects. Therefore, a marked dip-stick for verifying the fuel level manually is delivered with the aircraft. With the aircraft level the dip-stick should be dipped completely in the fuel filler. Then by means of the "wetted" area and the markings on the dip-stick the remaining fuel can be determined and compared with the fuel level indicator reading in the cabin.
This check must be at least performed during daily preflight check. Therefore, the dip-stick should be always carried in the aircraft. It is stowed at the inboard side of the baggage compartment door.

CAUTION

Check the level in fuel tanks daily by means of the fuel dip-stick. For that level the aircraft as possible. The dip-stick markings show ½ and ¾ volume of the fuel capacity.

7.10.5 Fuel Tank Drainage System

Each tank has an individual, manually operated drain at the bottom, inboard rear corner. A further drain valve is installed at the fuel system lowest point, at the base of electrical fuel pump. The drain valve is accessible from outside the nose section without removal of any components. The holder of the fuel sampler cup is located at the inboard side of the baggage compartment door.

CAUTION

The check of the fuel tank sump for water and sediment should be performed during every preflight inspection.
Samples should be taken at all three drain points before the aircraft is moved.

7.11 ELECTRICAL SYSTEM

The AT01 is equipped with a 12-volt direct current electrical system that is powered by a alternator and a battery. The electrical equipment is controlled by rocker type switches, located on the lower left instrument panel if the red ALT / BAT switch is ON. The circuits are protected by circuit breakers, installed on a panel on the far right side of instrument panel.
The control and operation of the engine ignition system as well as the tachometer work completely independent of the aircraft power supply system.

7.11.1 Power Supply and Battery System

The 12-volt, 19-ampere hour, lead-acid battery is connected through a 50-amp circuit breaker and the red BAT switch to the aircraft electrical system. If engine runs , the battery is charged by a 40-amp alternator that is equipped with an internal regulator and protected by the 50-amp alternator circuit breaker. The air-cooled alternator is belt driven by engine with a drive ratio 1:3,15.
In the case of low charge the "Alternator" warning light, located within the annunciators on the upper center instrument panel will illuminate.
Additional, for monitoring charging rate and battery condition an ammeter and voltmeter are mounted on the right instrument panel.
In the event the alternator fails, the battery if correct maintained can supply all electrical accessories for approx. half an hour.

7.11.2 Ignition System and Starter

The engine is equipped with an electronically controlled ignition system of a capacitor discharge design that has two separate ignition circuits. The ignition system needs no external power supply and is activated by the ignition switch. The internal control unit turns ignition off if propeller speed become below 100 RPM.

The rotary type ignition switch has the positions OFF, R, L, Both, and START. When the switch is rotated to the spring loaded START position the starter will crank engine. When the switch is released, it will automatically return to the BOTH position and the starter is off.
With positions R and L selected, one ignition circuit may be turned off for checking purposes. With a propeller speed of 1700 RPM the drop off on either magneto should not exceed 120 RPM and the difference between the magnetos should not exceed 50 RPM. Further information for engine operation and preflight checks contains the Operator's Manual for all versions of ROTAX® 912 engines.

Fig.: Electrical System Schematic

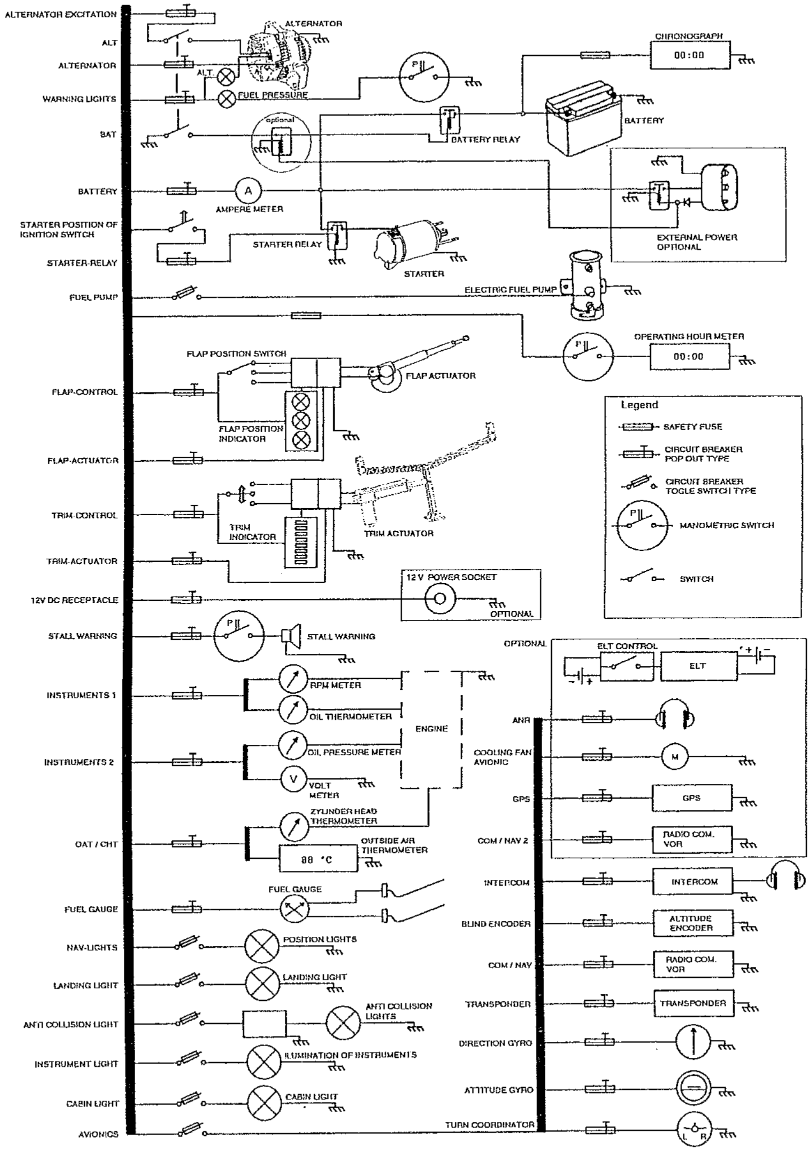


Fig.: Electrical System Schematic

7.11.3 Electrical Accessories and Circuit Breakers

All the electrical accessories may be separately turned off or on by push-pull type circuit breakers or by rocker type switches with built in circuit breaker function.
The avionics main switch controls current flow to the entire avionics equipment.
Electrical equipment that must be several times turned on and off during operation (electrical fuel pump, anti-collision lights etc.) is controlled by appropriate rocker type switches, located on the lower left instrument panel.
The circuit breakers for all other electrical accessories are located on the far right instrument panel.
(Refer to figure in 7.4)

7.11.4 Voltmeter and Ammeter

The voltmeter shows the system voltage.
The voltmeter card is subdivided into three different coloured voltage ranges.

Red	8-11,0	Volt
Red-green crosshatched	11-12	Volt
Green	12-15	Volt
Red line	15-16	Volt

The ammeter indicates the amount of current, in amperes, from the alternator to the battery or from the battery to the aircraft electrical system. When it indicates the charging rate applied to the battery, the needle is in the (+) range; when it indicates the battery discharge rate, the needle is in the (-) range.

7.11.5 Alternator Warning Light

The red alternator warning light does not illuminate in normal operation.
The warning light will illuminate if:

-The alternator switch is in OFF position or
-Alternator failure (Loss of alternator output)

In this case all electrical load is being supplied by the battery.
This does not affect operation of the engine ignition system because it depends exclusively of the function of the engine internal alternator.

7.11.6 Fuel Pressure Warning Light

If the fuel pressure in the fuel line to the carburettors drops below 0,15 bar, a pressure-controlled switch activates the red fuel pressure warning light.
Probable causes:

- Fuel low;
- Fuel vapour in the system.

7.11.7 Engine Instruments and Fuel Level Indicator

Cylinder head temperature and oil temperature as well as oil pressure are indicated by analogical pointer-type instruments. The instruments receive electrical signals from resistance-type probes, located in engine compartment, and translate them in appropriate readings.

The analogical, dual fuel level indicator receives its measurement signals by two capacitive type fuel level probes: one in each tank.

7.11.8 External Power Unit

It is recommended to use an External Power Unit (EPU) at outside air temperatures below –10° C.
The EPU receptable and the related circuits provide for the connection of an external power source for starting. The receptable is mounted on the right side below the battery. Access is provided by a service opening in the lower cowling.

Electrical power for the engine starter and the electrical buses is provided via a three pole receptable with protection for reverse polarity by a relay circuit. A second relay is disconnecting the on bord battery as long the external power source is connected not to charge or discharge the battery without control.

WARNING

Before engine start with external power check that **NO** person or objects are near the propeller disk.

Procedure for starting the engine with external power:

1. Plug in external power at the receptable
2. ALT/BAT switch ON
3. Start engine (see Normal procedures section 4.5.2 Starting Engine)
4. Unplug external power

7.12 PITOT-STATIC SYSTEM

Pitot and static pressure are picked up by a Pitot-static tube installed on the bottom of the left wing, and carried through Pitot and static pressure lines within the wing to the wing center section. There are water traps and connectors in case of wing disassembling.

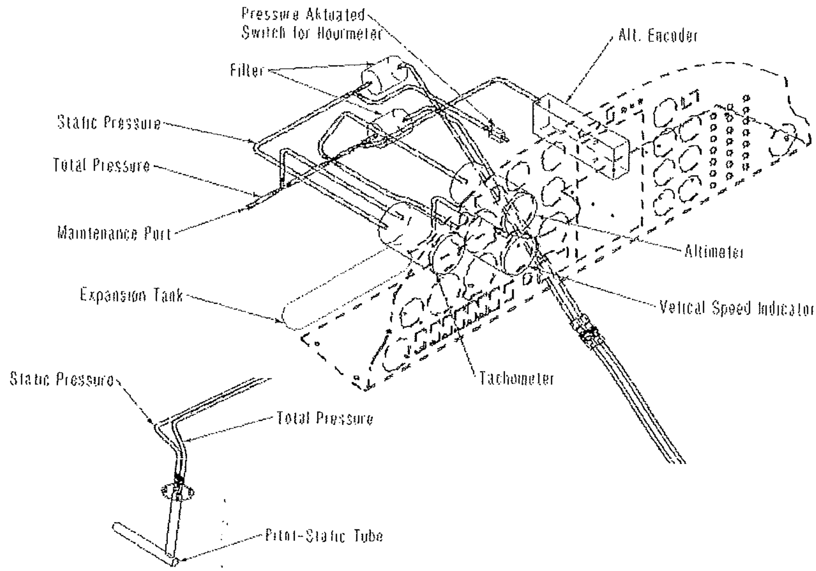


Figure: Pitot-Static System Schematic

The pressure line may be further disconnected behind the instrument panel, there where the dust filters are located too. The pitot pressure line is connected to the air speed indicator and the static pressure line is divided using tee connectors, and connected to the airspeed indicator, the altimeter, the vertical speed indicator, and the altitude blind encoder.

Additional the vertical speed indicator is connected by a pressure line with a compensation tank that is installed behind the instrument panel.

The Pitot-static system error may be ignored for the altitude measurement. An airspeed calibration chart is provided in Section 5 of this handbook.

While the aircraft is parked, always the cover delivered with the aircraft, and labelled "Remove Before Flight", should be placed over the Pitot-static tube to prevent insects and water from entering the Pitot-static tube orifices.

If erroneous instrument readings are suspected, an inspection of the Pitot-static system for obstructions (water, foreign items, damaged pressure lines etc.) and leakage must be performed. A defective instrument is rather rarely the cause.

CAUTION

During daily preflight test the Pitot-static tube cover must be removed, and a system check should be carried out. For this a person blows momentarily with a distance of approx. 10 cm in direction of the Pitot-static tube. A second person monitors the pointer deflections at the appropriate instruments in the cabin.

During preflight checks, verify the Pitot-static tube cover is removed from aircraft.

7.13 STALL WARNING SYSTEM

An approaching stall (at 1.1 times of the stall speed with flaps in all positions) is indicated by a loud audible alarm.

As the aircraft approaches a stall, the low pressure on the upper surface of the wings moves forward around the leading edge of the wings. As a result, a micro plate at the transmitter is deflected upwards. A mechanical contact is made thereby sending an electrical signal to the warning buzzer in the cockpit. The warning buzzer gives off an alerting tone until the flight condition has been changed.

CAUTION

Be careful when cleaning the wing not to damage the stall warning device mechanically or to spill to much cleaning water on it.

7.14 AVIONICS

The avionics equipment, as ordered, is installed in an avionics column, in the center of the instrument panel.
A push-to-talk button, contained in each control stick, activates the COM transmitter.
On the rear portion of the middle console Mic- and headphone jacks are provided.

The operation of avionics equipment is described in section 9.