LAA TYPE ACCEPTANCE DATA SHEET
TADS 162
ZENAIR CH 601HD/HDS

Issue 7			
Revision A	New format.	Dated 07/11/11	JV
Revision B	Link to sheets referenced in section 2.2	Dated 30/04/12	JV
Revision C	Addition of Safety Spot articles. Minor editorial changes. Changes to kit supplier details.	Dated 08/10/19	JH
Revision D	Change to standard options to include standard Zenair servo-operated aileron trim tab. Additional notes on mandatory mods in section 2.6. Addition of Standard mod to section 3.6.	Dated 02/07/21	JV

This TADS is intended as a summary of available information about the type and should be used during the build, operation and permit revalidation phases to help owners and inspectors. Although it is hoped that this document is as complete as possible, other sources may contain more up to date information, e.g. the manufacturer's website.

Section 1 contains general information about the type.
Section 2 contains information about the type that is **MANDATORY** and must be complied with.
Section 3 contains advisory information that owners and inspectors should review to help them maintain and operate the aircraft in an airworthy and safe condition. If due consideration and circumstances suggest that compliance with the requirements in this section can safely be deferred, is not required or not applicable, then this is a permitted judgement call. This section also provides a useful repository for advisory information gathered through defect reports and experience.

Section 1 - Introduction

1.1 UK contact

Metal Seagulls Ltd

Tel: 07502 593671/0121 3644437
Email: info@metalseagulls.co.uk
Website: www.metalseagulls.co.uk

(Kits were previously supplied by Gary Johnson of JMS Aero.)

Manufacturer's website: www.zenair.com

1.2 Description

The Zenair CH 601HD and HDS are small two-seat low-wing aeroplanes of all riveted aluminium construction, manufactured by Zenair Aircraft in Mexico, Missourri USA and previously by Czech Aircraft Works in the Czech Republic.

The HD model has parallel chord wings while the HDS has shorter span tapered wings of lesser area. Only kits compliant with the 51% rule are acceptable in the UK. Nosewheel and tailwheel undercarriage options are available: both have been cleared by LAA. The only engine models currently approved in the UK for use in the CH 601HDS are the Rotax 912-UL and Rotax 912-ULS. In the HD, the Continental C90, O-200 and Lycoming O-235 are also accepted. For the Rotax engines, standard propeller used are the Woodcomp Varia 170-2-R 1700mm diameter and Woodcomp Klassic

170/3/R. Warp Drive and GSC propellers have also been used. Note that the only propeller(s) approved for an individual aircraft are those listed on the individual aircraft's Operating Limitations document or in the PTL/1 (Propeller Type List) for the type.

The CH 601HD and HDS are SEP Aeroplanes and cannot be a microlight. The CH 601UL is a lightweight microlight variant of the CH 601HD, previously produced by CZAW.

Section 2 – Mandatory information for owners, operators and inspectors

At all times, responsibility for the maintenance and airworthiness of an aircraft rests with the owner. A Condition of a Permit to Fly requires that: *"the aircraft shall be maintained in an airworthy condition".*

2.1 Fast Build Kit 51% Compliance

The technical leaflet TL.11 shows the contents of the accepted CZAW fast build kit. Note that it is essential that the fuselage turtle-decks and the closing skins for all flying surfaces are supplied in un-rivetted condition so that the inspector is able to inspect the 'open' assemblies and so that the builder is tasked with riveting these skins in place as part of the 'major portion' requirements.

At this time, only the standard kit from Zenair has been accepted.

2.2 Build Manual

Drawings – the drawings required are as follows:

- Zenair drawings for CH601
- For HDS model, CH601HDS wings drawings
- Six A4 sheets detailing upgrades/reinforcements required for the CH601HD/HDS as compared to the lightweight CH601 model.

Zenair Construction Manual 'Building your own Zenair CH601'.

Zenair photo supplement.

2.3 Build Inspections

Build inspection schedule 2 (Metal aircraft).
Inspector approval codes A-A, A-M or K. Inspector signing off final inspection also requires 'first flight' endorsement

2.4 Flight Manual

CH601 Flight Manual available from Zenair. However due to variations between ASI errors between different examples, Pilots Notes for individual aircraft must reflect individual indicated airspeed figures following flight test evaluation. For HDS model, pilot's notes for G-BVAB (nosewheel) and G-BYEO (tailwheel) may be used as a basis.

2.5 Mandatory Permit Directives

None applicable specifically to this aircraft type.

Also check the LAA website for MPDs that are non-type specific (TL2.22).

2.6 LAA Required Modifications (including LAA issued AILs, SBs, etc)

Several modifications were required by the LAA for acceptance of the type in the UK, as follows:

LAA-162-001	Flying control system, substitution of aircraft turnbuckles in control cables. Suitable components are AN130, 135, 140 and 150 turnbuckle assemblies as required, -22 size (2200 lbs rated tensile strength).
LAA-162-002	Modification of side-hinged canopy latching to prevent accidental opening. This involves cutting off the internal handles of the claws which have been found can snag on clothing and cause accidental opening. Alternatively, the preferred forward-hinged CH601 XL arrangement can be substituted.
LAA-162-003	Zenair water trap replaced with conventional aircraft gascolator (e.g. Aircraft Spruce ACS part number 10580, note however this is advertised as suitable for mogas use).
LAA-162-004	In-flight adjustable servo-operated aileron trim tab (standard Zenair option, see Zenair option drawings).
LAA-162-005	Mandatory inspection of engine mount lugs for cracking. Applies only to early examples that do not have reinforcing gussets welded to the mount during kit manufacture. Also issued as bulletin LAA-162 FSB-004.
MOD/162/006	Cracking of engine mount. Applies to all examples.

Additional mandatory bulletins issued by LAA:

MOD/Prop/04-005	Mandatory change to Woodcomp Klassic Propellers to replace any blades prior to serial number 600.
MOD/162/008	Zenair 601 Fuel Cocks (Andair fuel cock to be fitted if stops or detents not satisfactory with existing fuel cock).

Letter to owners dated 5.11.03 stating that a vapour return line must be fitted to the fuel system if unleaded Mogas fuel is to be used. This returns the excess fuel and vapour to the main fuel tank. Returning it to the fuel supply pipe downstream of the tank outlet is not acceptable.

Letter to owners dated 25.7.02 stressed the importance of incorporating the extra Zenair drawings/parts list (six A4 sheets) which detail the up-rated strength components needed for the CH 601HD and CH 601HDS model compared to the basic, lighter-weight CH 601.

With the centre of gravity rear limit being 17.5 inches aft of datum (and particularly as restricted by LAA to 16.5" on HD model due to longitudinal stability requirements) it is recommended that when using the Rotax 912-UL or 912-ULS engine, the option of the firewall being moved forward 50mm to improve empty cg position is used to allow more baggage to be carried in the baggage bay behind the seats without falling

outside the rear cg limit. Otherwise the baggage weight capability may be very restricted especially when flying with a passenger.

2.7 Additional engine operating limitations to be placarded or shown by instrument markings

Notes:
- Refer to the engine manufacturer's latest documentation for the definitive parameter values and recommended instruments.
- Where an instrument is not fitted, the limit need not be displayed.

With Rotax 912-ULS engine:
Maximum CHT: 135°C
Max Coolant Temp: 120°C (with 50/50 Glycol/water coolant)
Oil Temp Limits: 50°C to 130°C (Normal 90-110°C)
Oil Pressure: 2-5 Bar
Minimum Fuel Pressure: 0.15 bar

With Rotax 912-UL engine:
Maximum CHT: 150°C
Max Coolant Temp: 120°C (with 50/50 Glycol/water coolant)
Oil Temp Limits: 50°C to 140°C (Normal 90-110°C)
Oil Pressure: 2-5 Bar
Minimum Fuel Pressure: 0.15 bar

2.8 Control surface deflections

Ailerons	Up: 12-15° Down: 12-15°
Elevators	Up: 27-32° Down: 27-32°
Elevator tab	Up: 30° Down: 30°
Rudder	Left: 23-28° Right: 23-28°

2.9 Operating Limitations and Placards

(Note that the wording on an individual aircraft's Operating Limitations document takes precedence, if different.)

1. Maximum number of occupants authorised to be carried: Two

2. The aircraft must be operated in compliance with the following operating limitations, which shall be displayed in the cockpit by means of placards or instrument markings:

2.1 Aerobatic Limitations
Aerobatic manoeuvres are prohibited.
Intentional spinning is prohibited.

2.2 Loading Limitations
Maximum Total Weight Authorised: 1200 lb
CG Range, HDS: 10.5 inches to 17.5 inches aft of datum point
CG Range, HD: 10.5 inches to 16.5 inches aft of datum point
Datum Point is: the leading edge of the wing at the root

2.3 Engine Limitations
Maximum Engine RPM: 5800
Maximum continuous engine RPM: 5500

2.4 Airspeed Limitations
Maximum Indicated Airspeed (V_{NE}), HDS: 160 mph; HD: 150 mph

2.5 Other Limitations
The aircraft shall be flown by day and under Visual Flight Rules only.
Smoking in the aircraft is prohibited.
Warning placard to read as follows: "warning – to preserve aircraft centre of gravity within allowable limits, when flying with two crew members, the baggage weight must be restricted. Consult weight and balance prior to flight".

Additional Placards:
"Occupant Warning - This Aircraft has not been Certificated to an International Requirement"

A fireproof identification plate must be fitted to fuselage, engraved or stamped with aircraft's registration letters.

2.10 Maximum permitted empty weight

Model	*Engine*	*Maximum empty weight*
CH 601HD/HDS	Rotax 912-UL	800 lb
CH 601HD/HDS	Rotax 912-ULS	792 lb

Section 3 – Advice to owners, operators and inspectors

3.1 Maintenance Manual

Nil. In the absence of a manufacturer's schedule for the airframe, refer to LAMS schedule. For airframe rigging information consult build manual and drawings. For engine maintenance consult engine manufacturer's schedule.

3.2 Manufacturer's/Standard Options

Standard options:
- Nosewheel or tailwheel undercarriage
- Firewall moved forward 50mm for cg reasons
- Use of CH601XL type engine cowlings with either propshaft extension as shown on drawing 6-EO-3CZ or 6-EO-4CZ depending on propeller type
- Optional wing tanks per drawing 6-WT-1 and 6-FT-1
- CZAW forward hinged canopy, drawings CF-1 and CF-14 refer.
- Hinged rather than 'hingeless' ailerons

LAA option: 12" span extension of tailplane for improved longitudinal stability on HD model.

Some examples of type may have been issued a concession to not fit LAA Mandatory Mod LAA-162-004 *In-flight adjustable servo-operated aileron trim tab (standard Zenair option).* Owners wishing to fit this retrospectively can do so as a standard option with their inspector.

3.3 Manufacturer's Information (including Service Bulletins, Service Letters, etc)

In the absence of any over-riding LAA classification, inspections and modifications published by the manufacturer should be satisfied according to the recommendation of the manufacturer. It is the owner's responsibility to be aware of and supply such information to their Inspector.

- Zenair letter dated 29.1.01 and drawing 6SV2-4 and 6V4-7. Check edge distances of wing attachment bolt holes to ends of wing spar and centre section spar, and size and edge distances on wing spar splice plates. Some kits were supplied with edge distances less than that shown on the drawings.
- Zenair letter regarding cracking rudder pedals dated 17.2.98, describes how rudder pedals should be uprated from 0.035" wall tubing to 0.049" or 0.058" or welded reinforcing gussets added to each side of the welded joints, to drawing included with the warning letter.

Zenair's newsletter 'Zenair News' provides advice on building and operating Zenairs of all kinds, but Zenair have not promulgated service bulletins as such.

3.4 Special Inspection Points

- Elimination of undue friction in rudder control system and nosewheel steering. In order for the rudder to self-centre in flight and for the aircraft to meet normal directional stability requirements, it is essential to avoid undue friction in the rudder controls. This involves attention to the lubrication of the system, avoiding over-tight fits and the correct setting up of the rudder cable tensions, which should be carried out with the aircraft jacked up so that the nosewheel is off the ground to simulate the flight case.
- Elimination of undue friction in the elevator control system. In order to achieve positive pitch stability is important to avoid undue friction in the elevator controls. This is achieved through proper attention to lubrication, avoiding over-tight fits and correct elevator cable tensions. Elevator cable tension may tend to vary slightly with elevator position. Elevator cables which are slightly loose at extreme travel are preferable to rigging them so that they are excessively tight around the neutral position, causing additional control friction.
- The throttle spring on the carburettor must be adjusted so that the system does not have a strong tendency to spring to 'full throttle' when the throttle knob is released, or require a strong pull to keep it in the closed position.
- If Rotax engine fitted, Rotax 912 series installation checklist to be completed (apart from flight test section) as part of final inspections prior to applying for Permit to Fly.
- Cracks have been found in service of the engine mount at its attachment to the firewall, and of the brackets behind the firewall which support the engine mount bolts. Inspect these areas regularly for any signs of cracks developing. Later

engine mounts are reinforced with welded gussets (drawing 6E3-2 gussets added at drawing edition 3 and also shown on edition 4).

- Early type plastic wheel hubs supplied by Zenair are not to be used. Only the replacement later type aluminium wheel hubs to be used on the HDS model.
- Check edge distances of wing attachment bolt holes to ends of wing spar and centre section spar, and size and edge distances on wing spar splice plates. Some kits were supplied with edge distances less than that shown on the drawings. Zenair letter dated 29.1.01 and drawing 6SV2-4 and 6V4-7 refer.
- Check for cracking of rudder pedals where upright tubes are welded to pivot tubes. Zenair letter dated 17.2.98 (see service bulletins above) refers.
- Corrosion problems have been reported in service with some airframes which had not been fully primed prior to assembly of the components. Inspect airframe for signs of corrosion developing and ensure that structural integrity has not been compromised. Treat any corrosion before it becomes widespread, if necessary by replacing corroded parts with new.
- Cracks have been found in service of the engine mounts of CH601 type aircraft under the engine, inspect these areas regularly for any signs of cracks developing. See also MOD/162/006 regarding this problem.
- Riveted sheet aluminium construction. Care is required in interpreting the drawings, the dimensioning being vague in some areas with a possibility of errors creeping in on such major features as the location of the firewall bulkhead. Anticipate later build stages and check dimensions/fit of parts carefully prior to bending, cutting or drilling.
- Widespread use is made of Avex rivets using riveting techniques specially developed by Zenair and NOT APPLICABLE to other types of aircraft including use of Avex blind countersunk rivets into non-countersunk holes, and solid rivets set using flat dolly on mushroom head. Zenair permit the use of non-radiused (sharp corner) aluminium angle extrusions for primary structure (contrary to normal aviation practise using radiused material) and inspectors should be vigilant for the appearance of cracks in such structure.
- Care must be taken to avoid warps in the wings - once the wing skins are 'drilled off', any warps are there for the duration. The build manual is not detailed regarding engine installation and inspectors should take care to check that standard UK practices have been followed with regard to engine installation, fuel system, etc. Refer to engine installation manual as appropriate. For UK-built examples, it is recommend that suitable corrosion protection of the aluminium airframe is used throughout, e.g. epoxy primer on aluminium parts and assembly compound where steel parts assembled to aluminium parts.
- Maintenance is typical of riveted aluminium airframes. The only reported snags are failure of plastic nosewheel hub and wear in undercarriage sliding bearings/alignment slots. Pay attention to simple metal-to-metal bearings in the control system, undercarriage, etc, to be kept well lubricated and checked in particular for signs of wear. Plastic nosewheels, if fitted, to be checked carefully for signs of overstress/failure of hub.

3.5 Operational Issues

- Special check on directional and longitudinal stabilities/control circuit frictions.
- Special check on ASI errors (ASI significantly over-read at low speeds on G-BVAB). Produce ASI calibration curve and modify pilots' notes accordingly to show correct indicated Vne, climb and approach speeds (climb and approach speeds should be 1.3 x stall speed).

The following Safety Spot articles are relevant to aircraft

Light Aviation issue November 2012 *Rudder bar failure*

Rudder bar on plans built example of type found to be constructed from an earlier version of drawings with thinner wall thickness.

Light Aviation issue October 2013 *Woodcomp varia propeller failure*

Incorrect reassembly of propeller allowed it to rotate around its pitch axis in flight and resulting oscillation caused propeller to fail.

3.6 Standard Modifications

The following Standard Modifications have been approved on the type. The Standard Modification leaflet associated with each modification (published on the website) must be followed and an LAA/MOD1 form completed and return to LAA Engineering in each case (see also TL 3.06).

Standard Mod no.	*Issue*	*Description*
SM10366	1	Reduced friction in elevator circuit

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Please report any errors or omissions to LAA Engineering: engineering@laa.uk.com