LAA TYPE ACCEPTANCE DATA SHEET
TADS 242
CASA 1-131-E SERIES 1000, SERIES 2000, JUNGMANN REPLICA

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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 the aircraft in an airworthy 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

There is no official type support in the UK.

There is a comprehensive website in the USA supporting the marque called The Bücker Pages

1.2 Description

The Bücker Bü131 (and CASA 1-131-E) is an aerobatic two seat biplane with a conventional tailwheel type undercarriage, which was built for the Luftwaffe in large numbers for primary training purposes. The aircraft has two open cockpits in tandem with a steel tube fuselage covered in fabric and metal. The wings are wood, covered in fabric, with ailerons fitted to both upper and lower wings.

The original Bücker Bü131 was manufactured in Germany by Dornier Flugzeugwerke then CASA in Spain produced the 1-131-E under licence until the 1960's with the type in use as the Spanish Air Force until 1968. Genuine ex-military CASA 1-131Es imported direct from Spain are therefore still eligible for restoration and operation on the LAA Permit to Fly scheme.

Some complete replica CASA 1-131-E were manufactured in Spain with new fuselage frames and a mixture of old spare parts and new components. Having no previous 'identity' as ex-military aircraft and being built as a commercial enterprise (but apparently without supervision by the Spanish aviation authority) these replicas are not likely to qualify for a UK Permit to Fly or for a Certificate of Airworthiness - buyer beware!

There are more than round 40 CASA-built 131s operating in the UK on an LAA Permit to Fly. The majority of the CASA produced aircraft in the UK are of the 2000 Series (identified by a serial number beginning with '2', as opposed to '1'). These have fuselages manufactured from thicker tubing have a slightly increased maximum gross weight, when compared to the 1000 Series.

The engine in the CASA built aircraft is an inline, inverted, four cylinder ENMA Tigre engine produced in Spain. The Tigre G-IV A series engines are 125 hp, whereas the G-IV B series are 150 hp. A similar configuration engine (manufactured by Hirth), was installed in the Bücker aircraft and both variants use predominantly Hoffmann propellers although various other propellers are approved.

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 aircraft is classed as an SEP (Group A) type.

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. Condition No 3 of a Permit to Fly requires that: *"the aircraft shall be maintained in an airworthy condition".*

2.1 Fast Build Kit 51% Compliance

This is not applicable, as the aircraft is not available as a kit.

2.2 Build Manual

There is no build manual for the aircraft, technical information being provided in the maintenance manual, including the rigging figures.

2.3 Build Inspections

This aircraft is not deemed as available as an amateur build project. For maintenance purposes, an inspector would require approval codes A-A, A-M and A-W or V.

2.4 Flight Manual

Flight manuals should be in evidence for all factory built aircraft. Examples of flight manuals may be available online for reference purposes.

2.5 Mandatory Permit Directives

The following MPD is applicable specifically to this aircraft type:

CAA MPD 1995-087 CASA (BÜCKER)	Weld failure on undercarriage

Also check the LAA website for MPDs that are non-type specific: TL 2.22.

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

There are no mandatory LAA modifications or LAA issued AILs or SBs for this aircraft type.

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

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.

2.8 Control surface deflections

Control	Movement	CASA 1-131-E	Bücker 131
Ailerons (upper and lower)	Up	24° ±1° (78 mm)	25° ±1° (81 mm)
	Down	16° ±1° (52 mm)	17° ±1° (55 mm)
Elevators	Up	25° ±1° (165 mm)	
	Down	23° ±1° (155 mm)	
Elevator tab	Pitch trim control lever should be 5° forward of centre when the trim tabs are in the neutral position. Range of movement TBA.		
Rudder	Left	30° ±1° (330 mm)	
	Right	30° ±1° (330 mm)	

Control System Cable Tensions		
System	Cable	Tension
Aileron	Inter-aileron control cable	Initial tension 10 – 30 lbs
Elevator	Upper and lower	Initial tension 100 – 200 lb
Elevator tab	N/A	Zero backlash

Rigging		
Upper Wing	Angle of incidence at the cabane	-1.5° ±0.5°
	Angle of incidence at the strut	-1.5°
	Dihedral angle	1.5°
Lower Wing	Angle of incidence at the wing root	0.0°
	Angle of incidence at the strut	-0.5°
	Dihedral angle	3.5°
Horizontal stabilizer	Angle of incidence	Normal -2.0°

The above information is provided as a guide. For further information on airframe and control rigging refer to the aircraft maintenance manual.

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 imposing forces in excess of plus 4g and minus 2g are prohibited.
Intentional spinning is permitted.

2.2 Loading Limitations
Maximum Total Weight Authorised Series 1000: 670 kg
Maximum Total Weight Authorised Series 2000: 720 kg
Maximum Total Weight Authorised for Aerobatic Flight: 670 kg
CG Range: 17.32 inches to 24.8 inches aft of datum.
Datum Point is: Leading edge of the upper wing centre section.

2.3 Engine Limitations (Tigre)
Maximum Engine RPM: 2300

2.4 Airspeed Limitations
Maximum Indicated Airspeed (V_{NE}): 186 mph

2.5 Other Limitations
The aircraft shall be flown by day and under Visual Flight Rules only.
Smoking in the aircraft is prohibited.

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

N/A

Section 3 – Advice to owners, operators and inspectors

3.1 Maintenance Manual

Copies of maintenance manuals are still available and a must for any owner. There is quite a lot of UK based type knowledge, contact details are available via LAA Engineering.

Various maintenance, parts and flight manuals are available through Avialogs (Bücker/CASA Jungmann) for reference purposes.

Some parts and another source of type support is Bitz GmbH in Germany.

Type information is also available from The Bücker Pages in the USA, where there is also a lot of (unofficial) detailed maintenance information on the Tigre engines.

New flying wires are obtainable from Bruntons Aero Products

3.2 Standard Options

There are no standard options for the aircraft but popular modifications include the installation of the Christen inverted oil and fuel systems and the Ellison throttle body injector.

Note: Any modifications to this type of aircraft require LAA Engineering approval for that specific modification and aircraft.

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.

At this time there are no specific manufacturer's Service Bulletins or Service Letters to be complied with.

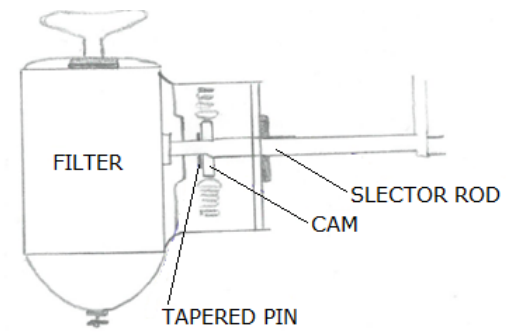
3.4 Special Inspection Points

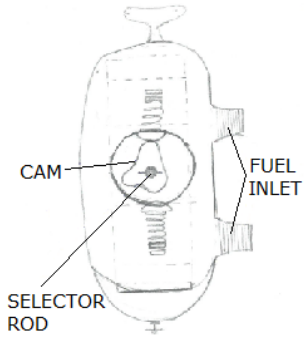
It should be noted that some metal components may be prone to corrosion and cracking. Due consideration should be given to inspecting these parts in their entirety especially were they are attached to the aircraft structure or other parts. This may mean the removal of major components (ie tailplane, wing etc) or fabric to gain access to areas not normally accessible during normal annual inspections and should be carried out on a regular basis.

Fuel Cock Failure

The cause of in-flight engine failure and subsequently during ground testing was traced to a dislodged tapered pin that locks the operating cam to the selector rod inside the fuel selector valve assembly. The tapered pin was later found inside the fuel filter bowl.

The cam locates on a square section part of the fuel selector rod. The missing pin allowed the cam to move along the shaft and thus only partially open the mushroom headed valves. As a pre-flight check it should be impossible to operate the fuel wobble pump with fuel selector in any other position than reserve. It is not known why the tapered pin in this case became dislodged. It is recommended that the valve is disassembled and the tapered pin checked for condition and security at a suitably convenient opportunity.





Undercarriage Failure

Apart from the incident giving rise to the MPD at least two other instances of undercarriage collapse resulting in damage to the aircraft have occurred in the UK. One was reported as 'failure of the forward facing landing gear bracing links' and another as 'fatigue failure of landing gear drag strut'. Also, an accident occurring to a CASA 131 at the 1996 PFA Rally may have arisen from (rather than resulted in) undercarriage failure. This is obviously an area of weakness that owners and inspectors should be alert to.

Elevator Bracket Failure

During an energetic aerobatic sequence which included tail slides a firm 'thump' was felt in the elevator circuit. After landing the damage, which is graphically displayed in the accompanying photograph, was discovered. Severe disruption to the steel structure of the starboard elevator bracket attachment had occurred, including buckling of the spar beneath, probably largely due to repeated aerodynamic loads. Similar damage, though to a lesser degree, was evident on the port side. Complete failure would likely have led to severe control difficulty. This area is difficult to examine without fabric removal but a level of inspection is possible by checking the structure for stiffness and/or disruption of the fabric. LAA Engineering recommends that that the fabric be cut away and the area properly inspected from time to time - more often if aerobatics are flown.

Wrong Cylinder/Piston CombinationRef. PFA ID 97-13

An LAA CASA 1-131-E was lucky to escape undamaged when a successful force landing was accomplished into an adjoining field after the engine seized on take-off.

It transpired that earlier routine maintenance work had determined that No. 2 cylinder was cracked, so a replacement was acquired. It is now known that the original piston and cylinder assembly had been first-oversize while the replacement cylinder was standard-size. Despite some checking the inspector did not identify the error and even though prolonged ground running was successful, inadequate clearances led to seizure on climb out.

It seems that too much reliance was placed on an inadequately translated technical manual and proper guidance on piston and cylinder identification was not available. The lesson from this is that owners and inspectors should be wary of carrying out maintenance work which they are unsure about and for which technical information is incomplete or indecipherable.

3.5 Special Test Flying Issues

None known

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