LAA TYPE ACCEPTANCE DATA SHEET
TADS 177 - QUAD CITY CHALLENGER II
TADS 177A - BFC CHALLENGER II
TADS 177B - BFC CHALLENGER II S.E. LONGWING

Issue 2	Control range of movements updated & clarification of flap indicator requirement	Dated 08/10/18	JP

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 UK based contact for the aircraft.

The Quad City Aircraft factory can be contacted at:

Tel: +01 309 76 3515
Email: qcukaren@aol.com
Website: http://www.qcaircraft.com/index.php

Address: Quad City Aircraft Corp
3810 34th Street
Moline, IL 61265
USA

There are some online owner based forums that may provide useful reference information including Challenger BTT and Quad City Ultralight Challenger Yahoo Group. The Canadian dealer, National Ultralight Inc. also provides reference material on their website.

1.2 Description

The Quad City Challenger is a two-seat, strut-braced high-wing monoplane of simple design, with a high-mounted pusher engine. Lateral roll control is via flaperons. The aircraft has a fixed, tricycle undercarriage but also features a small tailwheel to protect the tail when the aircraft is unoccupied. The Quad City Challenger may only be built from kits supplied by Quad City, construction drawings are not available. There are around 30 of these aircraft operating on an LAA Permit to Fly, mostly of the early Quad City Challenger II type, but there are also some of the slightly modified BFC type.

The BFC Challenger II was developed by BFC (a now defunct British based company) in conjunction with Quad City that incorporated a number of modifications over the

original design. The wing tips are moulded GRP 'drooped' tips instead of the tapered tip with a tubular bow. In addition to the extended main and rear spars to suit the new wing tips, an additional compression strut and drag brace was added to each wing and the wing lift struts are longer. The main undercarriage is of a bungee-sprung tripod type (previously marketed by 'Back Forty') in place of the earlier cantilever spring leg and fitted with Matco 6" diameter wheel hubs.

A longer wingspan version of the BFC Challenger II is also available, called the BFC Challenger II Long Wing. The wings on this variant are 31.5 ft (against the 28 ft standard wing span). The longer wing is a standard option from the manufacturer. The Long Wing (and ailerons) differs also from being covered using pre-impregnated, pre-stitched and pre-coloured Dacron envelopes rather than the conventional doped and painted fabric covering of the standard wing. The Dacron covering does provide a small weight saving over the doped fabric covering.

A number of mandatory modifications were deemed necessary for UK approval. These are detailed in Section 2.6 of these TADS.

The aircraft is normally powered by the Rotax 503 or 582 although the Hirth 2705 and 2706 have also been approved. The propeller reduction drive unit is a Quad City supplied belt drive unit rather than a gearbox. The system utilises a wider than normal toothed belt in order to extend the belt life.

A number of propellers have been approved for installation including those by Arplast, Canadian Products, Ecoprop, GSC and Ivoprop. 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 (where applicable).

The aircraft is classed as a microlight in the UK.

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

There is no 'fast build' option for the type. The factory considers the standard airframe kit as a 'quick build' due to the level of completeness of the kit as shipped.

2.2 Build Manual

The aircraft kit is supplied with an assembly/owner's manual.

2.3 Build Inspections

Build inspection schedule 9.

Inspector approval codes A-A, A-M, K or M. Inspector signing off final inspection also requires 'first flight' endorsement.

2.4 Flight Manual

There is no specific Flight Manual produced for the aircraft. Various unofficial manuals can be sourced online but should be used with caution and for reference purposes only, given the different aircraft modification states, engine and propeller installations.

2.5 Mandatory Permit Directives

There are no MPDs applicable to the type at this time.

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)

MOD/177/001	Aileron pulley brackets adjacent to control column drilled though 1/16" diameter and split pins fitted to act as cable guides.
MOD/177/002	Positioning of wing tip bows (n/a to BFC versions).
MOD/177/003	Aluminium alloy flaperon control horns at wing roots replaced with identical parts made from stainless steel of the same gauge and fitted using 1/8" diameter stainless steel rivets.
MOD/177/004	Addition of flap position indicator (n/a to BFC versions) unless an alternative method of determining flap position has been agreed with LAA Engineering.
MOD/177/005	Short elevator pushrod adjacent to tailplane – fork ends replaced with spherical rod-end bearings at front end of each pushrod.
MOD/177/006	Addition of shoulder harnesses to both seat positions.
MOD/177/007	Plastic fuel pipe replaced with armoured fuel pipe between tank and pump.
MOD/177/008	Addition of nut, bolt, and plastic sleeve tube at rear throttle lever assembly to provide a positive throttle stop at full throttle.
MOD/177/009	Addition of shaped aluminium alloy cups under bolts attaching wing strut attachment brackets to fuselage longeron tubes and addition of safety ring to provide class one locking of these bolts.
MOD/177/010	Fin and rudder 10" increased height and incorporating third rudder hinge and 10" high dorsal fin. Welded fittings at base of fin vertical tubes reinforced by the addition of welded gussets. Revised fin, rudder, dorsal fin and welded assemblies are supplied by Quad City as 'UK' standard.
MOD/177/011	Mounting brackets for tailplane bracing struts remanufactured in stainless steel of the same gauge (now supplied standard in kit)
MOD/177/012	Tailplane bracing struts plugged at each end with nylon or aluminium alloy plugs to prevent wear at bolt holes and to allow bolts to be pinched up tight without crushing tubes.
MOD/177/013	Hegar reduction drive – inspect propeller nut split-pin (note: previously mis-numbered MOD/177/001 in error).
MOD/177/014 Iss 2	Propeller adaptor bolt torque check.
MOD/177/015	Inspection of lift strut lower attachment brackets. Within 5 hours of 11/04/08 and every subsequent 50 flight hours.

Modifications required for the BFC Challenger II (in addition to those required for the Quad City Challenger II listed above):

1 Extra inspection panels have been required in the lower wing surface fabric underneath both ends of the root end diagonal drag brace, so that any sign of loosening of the riveted joints on these members can be picked up on inspection in service. Drawing MW/CHAL-3 refers.

2 Front lift strut attachment bracket to fuselage - bracket rotated through 90 degrees to allow strut to rotate about pivot bolt, increase in size of attachment bolt from AN4 to AN5 with 7/16" diameter bush through fuselage tube to allow nut to be torqued up to 70 inch pounds. Square 1/4" thick aluminium alloy load spreader washers fitted under heads of bolts. Drawing MW/CHAL-5 refers.

3 Front lift strut to front wing spar joint. AN3 bolts through wing spar tube upgraded to AN4, bolt through strut upgraded from AN4 to AN5. Size of attachment plates increased to provide correct 12 mm edge margin on bolt holes. Drawing MW/CHAL-1 issue B refers.

4 Front lift struts to be internally sleeved with 1 3/8" OD 17g HT30TF tube. Drawing MW/CHAL-1 issue B refers.

5 Lift struts fairings, if fitted, are to be removable to allow periodic inspection of lift struts. PFA letter to BFC dated 09/03/95 refers.

6 Jury struts to be fitted to wing spars and wing struts using eyebolts rather than blind riveted brackets. Drawing MW/CHAL-2 refers. G-MYRH uses a slightly different arrangement as shown drawing MW/CHAL-2 revision 1 which is also considered satisfactory.

7 The tailplane strut attachments to the fuselage boom have been re-designed utilising three 8-32 bolts to attach each strut bracket to the fuselage instead of three 1/8" diameter stainless steel blind rivets. The bolts for the rear strut brackets are accessible from the rear of the fuselage boom tube and 8-32 stiffnuts are fitted. The bolts for the front strut brackets are not accessible from the rear and consequently, 'Rivsert' blind fasteners are fitted to the fuselage boom and the bolts screwed into the Rivserts.

Modifications required for the BFC Challenger II Long Wing (in addition to those required for the Quad City Challenger II listed above):

1 Attachment of tailplane strut brackets to fuselage improved using bolted and riveted connection rather than rivets only.

2 Alternative design of front and rear spar attachment and lift strut attachment.

3 Additional reinforcing plate added to cross tube 2CT-4.

4 Addition of nylon compression block to roof tube/spar bracket.

5 Increase diameter of inboard wing drag strut to 1” OD.

6 Sleeve front wing spar and increase diameter of root bolt.

7 Reinforce rear wing spar.

8 Modified attachment of strut fairings to strut tubes to avoid drilling into strut tubes.

9 Revised jury struts.

10 1/16th diameter rudder and aileron cables to be replaced by 3/32 diameter equivalents.

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

Due to the variety of engines installed on the aircraft type, refer to the relevant 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

Ailerons	Up	30° Maximum
	Down	30° Maximum
Elevators	Up	30°
	Down	25°
Elevator tab	Up	N/A
	Down	N/A
Rudder	Left	TBC
	Right	TBC
Flaps	Up	-10° Reflex
	Down	15-20°

2.9 Operating Limitations and Placards

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

Quad City Challenger II (177)

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

Non-aerobatic operation only*
Intentional spinning is prohibited

*Note: Non-aerobatic operation includes:

i. Any manoeuvre necessary for normal flight
ii. Intentional stalls from level flight
iii. Steep turns in which the angle of bank does not exceed 60°

2.2 Loading Limitations

Maximum Total Weight Authorised: 381 kg (840 lbs)
CG Range: 20.0 inches to 28.0 inches aft of datum.
Datum Point is: leading edge of the wing

2.3 Engine Limitations

Hirth 2705/2706
Maximum Engine RPM: 6200

Rotax 503/582
Maximum Engine RPM: 6800
Maximum continuous Engine RPM: 6200

2.4 Airspeed Limitations

Maximum Indicated Airspeed (V_{NE}): 100 mph (87 kts)
Max Indicated Airspeed with Flaps Extended: 50 mph (43 kts)

2.5 Other Limitations

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

BFC Challenger II (177A) and BFC Challenger II Long Wing (177B)

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

Non-aerobatic operation only*
Intentional spinning is prohibited

*Note: Non-aerobatic operation includes:

i. Any manoeuvre necessary for normal flight
ii. Intentional stalls from level flight
iii. Steep turns in which the angle of bank does not exceed 60°

2.2 Loading Limitations

Maximum Total Weight Authorised: 381 kg (840 lbs)
CG Range: 20.0 inches to 29.5 inches aft of datum.
Datum Point is: leading edge of the wing

2.6 Engine Limitations

Rotax 582
Maximum engine RPM: 6800

Rotax 582/48
Maximum engine RPM: 6800
Maximum continuous engine RPM: 6500

2.7 Airspeed Limitations

Maximum Indicated Airspeed (V_{NE}): 100 mph (87 kts)

2.8 Other Limitations

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

Additional Placards (all variants):

1. Solo flight from front seat only.
2. When flown solo by a pilot of less than 86 kg, 6 kg nose ballast must be carried.
3. When flown solo by a pilot of less than 80 kg, 12 kg nose ballast must be carried.
4. Consult weight and balance prior to flight if aircraft is reluctant to rotate onto nose wheel when pilot is seated in the cockpit.

"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

The maximum permitted empty weights are as follows:

Aircraft model	*Engine*	*Maximum empty weight*
Quad City Challenger II	Rotax 503	195 kg
BFC Challenger II	Rotax 582	192 kg

Section 3 – Advice to owners, operators and inspectors

3.1 Maintenance Manual

The aircraft kits are supplied with an assembly/owner's manual. This manual also contains useful maintenance information.

3.2 Standard Options

1. The revised fin and rudder (10" increased height plus other revisions) supplied by Quad City are accepted as standard options.
2. Pre-sewn Dacron wing and aileron coverings are acceptable as supplied by Quad City.

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

There is no specific continuing airworthiness information issued by the kit manufacturer.

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.

3.4 Special Inspection Points

1. Riveted/bolted aluminium tubular frame of very simple type, supplied largely pre-drilled and pre-assembled.
2. The aircraft is covered using conventional dope and fabric techniques, although the long span version is also available with pre-sewn Dacron envelopes for the wing and ailerons only, which are stretched over, riveted and heat-shrunk for tautness.
3. BFC Challenger II Long Wing: The use of pre-sewn Dacron covering on the tail surfaces was not accepted by LAA Engineering because the factory supply

these already fitted to the tail surface structures, which prevented inspection of the underlying structure taking place before covering.

4. The undercarriage is of tricycle type, with no springing apart from that inherent in the rod type legs. The nose leg is attached to the fuselage using an unusual system incorporating Jubilee clips - the philosophy being that in a heavy landing the nose leg attachments (which are easily repairable) will fail before any major damage is done to the airframe itself. This appears to be satisfactory in service.

5. Inspectors should check all metalwork supplied in the kit carefully for quality before construction starts, including: adequate quality of holes, edge margin on rivet holes, freedom from scratch damage etc. One or two of the detail design features seem crude and 'go against the grain' with traditionalists but nevertheless the Quad City Challenger is a well-proven design with a good structural safety record to date. Build manual diagrams are reasonably clear and few construction problems have been reported. Check any 'squashed and bent' tube ends carefully for signs of minute cracks caused during manufacture, and dress out any damage to prevent cracks growing from these points in service. Ensure that all blind rivets are 'set' squarely and fully, and check that rivet heads are seated properly with a feeler gauge. The build manual is not detailed regarding engine installation and fuel system details etc.

6. Guidance on the design of the optional cockpit doors and their hinging/latching could be improved on. Builders should refer to information sources above for advice and inspectors take particular care to check that an airworthy result is achieved.

7. An unusual feature of the Challenger is the flaperon control system, which allows the ailerons to be drooped by winding a handle above the pilot's head.

8. The type has a surprisingly, torsionally flexible tail boom.

9. It is noted that a fuel cock is not fitted to the Challenger. This departure from normal requirements has been accepted on the Challenger on the basis of arguments specific to this aircraft type.

10. Note this is a very lightweight aircraft. Addition of extra 'options' will most likely result in the aircraft being overweight.

11. Builders should preferably use an already accepted engine/propeller/exhaust combination unless they want to go through the rigmarole of noise testing with the CAA Noise Department.

12. Owners and inspectors should refer to the Owner's Manual which contains a maintenance schedule and other important maintenance information. Owners should obtain this manual, along with the maintenance manual and service bulletins etc for the installed engine and make this available to their LAA inspector. Further information can be found in the Maintenance section of the LAA website.

13. With Rotax 503 powered examples, corrosion of the fan-belt pulley must be considered during maintenance inspections. There have been occasions where corroded pulley surfaces have caused rapid wear of the cooling fan belt causing belt slippage and subsequent engine over-heating.

14. Check very carefully for signs of cracks or looseness developing in the riveted attachment of the tailplane strut brackets to the fuselage and tailplane.

15. Check for looseness of the control surface hinges and their attachment to the flying surfaces.

16. If the aircraft is stored in less than ideal conditions then corrosion, fabric damage, rodent attack etc. can all be expected and the inspection should be therefore more thorough.
17. As the aircraft advance in years, they may well be coming due for a recover. The use of a Bettsometer can be useful in determining the condition of the fabric.

3.5 Special Test Flying Issues

1. The layout of the aircraft results in a significant rearward loaded Centre of Gravity shift when flown solo by a lightweight pilot. Ensure that the Centre of Gravity is within limits.
2. Due to the pitch trim change and reduction in roll rate which occurs with flaperons drooped (and the absence of any other pitch trim system), it is recommended that the flaperons are not drooped to provide flap effect but only used as a pitch trim system.
3. No flaperon position indicator is fitted to the BFC Challenger variant but the flaperons are in full view of the pilot and the position of the flaperons in relation to the fixed wing tips, provides an adequate direct visual indication of their setting.

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