

AIRWORTHINESS APPROVAL NOTE NO: 28929

APPLICANT: Mr R Howell

AIRCRAFT TYPE: Yak-52

REGISTRATION NO: G-CCJK CONSTRUCTOR'S NO: 9612001

OPERATOR: -

INSTALLER: -

DESIGN ORGANISATION -

CERTIFICATE CATEGORY: Permit to Fly

MODIFICATION NO: -

MODIFICATION TITLE: **To Approve the Yak-52 Registration G-CCJK,
Serial No. 9612001 for the issue of a Permit To Fly**

1. **Introduction**

The YAK-52 is a two seat piston engined primary trainer aircraft which is a tandem cockpit variant of the single seat Yak-50 aeroplane. It was announced in 1978 as a replacement for the Yak-18 and made it's first flight less than a year after commencement of the design work. The Yak-52 is designed by the Russian company, Yakovlev, although all Yak-52 aeroplanes have been produced in Romania under license. Manufacture of the type began in 1979 and the 1000th aeroplane was delivered in 1987.

This Yak-52 was constructed in 1996 and after initial flight testing in Romania was delivered to the UK. The aircraft has operated in the UK since new being registered RA-02622. Total airframe time to date is 357 hours 52 minutes. The manufacturer's release to service for new aircraft is for 600 hours to first overhaul.

The purpose of this AAN is to approve this Yak-52 for the issue of a Permit to Fly.

2. **Aircraft Build Standard**

This aircraft has not been type-certificated and there is no TCDS.

The Yak-52 is a single engined two seat (tandem configuration) low wing primary trainer aeroplane of nominally all-metal construction with full aerobatic capability.

The fuselage is of a conventional light alloy semi-monocoque construction with a cantilever light alloy tail structure. The wings are of a single spar all metal stressed skin construction with trailing edge split flaps. The control surfaces are fabric covered. There is a ground adjustable tab on each aileron and on the rudder, and a controllable trim tab in the port elevator.

The landing gear is semi-retractable and is pneumatically operated. The nose gear retracts rearwards and the main gear forwards but all remain exposed against the under surface of the aeroplane to offer greater safety in the event of a wheels up landing. Emergency operation of the landing gear is via an independent pneumatic system which is charged on the ground. The pneumatic system works at a pressure of 50 bars (720psi). The brakes system are also operated by the pneumatic system via a pressure reducer to 8 bars (120psi).

The aeroplane is powered by a nine cylinder Vedeneyev M-14P air cooled radial engine nominally 360 hp manufactured by Ivchenko. The aircraft/ engine has a fully inverted fuel and oil system. The propeller is a two blade V530TA-D35. Cowl flaps are fitted to assist in the warming up of the engine by selecting them closed. Once at running temperatures, they must be selected open. The controls are in the front cockpit which is the "command" cockpit.

The basic fuel system consists of two tanks in the wings, each of 60 litres capacity feeding a small collector tank in the fuselage. The engine draws its fuel from the collector tank. There is a single on-off fuel cock in each cockpit. Engine priming is accomplished by a two position injector pump operated from the front cockpit. A fuel drain is provided under the aircraft centre section and drains from the collector tank.

The electrical system is supplied by a nominal 28 volt engine driven generator with an associated voltage regulator. The system is protected by cartridge fuses.

Other modifications installed on this aircraft are:

- | | | |
|----|------------------|--|
| a) | Yak/7/AEROBUILD | Replacement batteries (via AAN 24740) |
| b) | Yak/13/AEROBUILD | Training springs removed (via AAN 24351 Add 1) |

3. Approval Procedures

This aircraft approval has been carried out in accordance with BCAR A3-7. Although this is a foreign product, the absence of a foreign type approval requires reference to BCAR Section A rather than BCAR Section B.

4. Basis of Approval

4.1 CAA Approval Basis For The Aircraft

This aeroplane is an example of the same type granted a Permit to fly by virtue of the issue of AAN 24089. The basis of approval for this aeroplane is the extensive operating experience of the type as a basic training aeroplane for the Russian military (over 1800 examples of this type have been produced), together with an investigation of the design standard and operational aspects of the aeroplane. In addition, a significant number have been operating on the UK register for a number of years, and have demonstrated appropriate standards of airworthiness.

This aircraft, while it has not seen military service, is acceptable to the CAA for the issue of a Permit to Fly on the basis that the manufacturer has declared that the build standard is identical to that for aircraft that did see service with the Russian DOSAAF Military Sport Aviation Organisation and were subsequently issued with a Permit to Fly by the CAA.

4.2 CAA Design Requirements For Permit to Fly

Airworthiness Notices as applicable: Nos 33 and 88.

Any installed equipment for which the Air Navigation Order requires approval must be approved by the CAA.

4.3 Environmental Requirements

A Noise certificate is not currently required for an ex-military aircraft operating on a Permit to Fly.

4.4 Design Requirements Associated With Operational Approvals

Not applicable.

5. Compliance With The Basis Of Approval

5.1 Compliance With The Approval Basis For The Aircraft

The generic design of this aeroplane was accepted under AAN 24089 - on the basis of satisfactory service history.

5.1.1 Manufacturers Modifications required for Airworthiness

The data sheet for the aeroplane generated by the aircraft manufacturer defines a V_{NE} of 450 km/hour for aeroplanes modified in accordance with their "Bulletins 59R, 60R & 107BD". This aeroplane is modified in accordance with the above bulletins but the applicant has elected to maintain a V_{NE} of 420 km/hr.

The applicant has provided a check list of manufacturers modifications/service bulletins required for airworthiness and confirmed that all applicable to this aircraft (on serial number basis) have been embodied.

The applicant has also confirmed compliance with MPDs to date.

MPD 1998-017 requires that the overhaul life of the airframe is assessed. This aircraft is within its flying hours overhaul life but outside its 5 year calendar overhaul life, not having had an overhaul since manufacture in 1996. It is acceptable for the overhaul to be deferred until the first annual inspection after Permit to Fly issue.

5.1.2 Modifications required for CAA Approval

A review of the first aeroplane revealed a number of features of the design of this aeroplane which were deemed unacceptable for approval on the aeroplane for the issue of a Permit to Fly. These features concerned the ability to disable or override a number of control and instrumentation functions from the rear cockpit, given that the front cockpit is designated as the "command" cockpit.

These concerns have been addressed by a number of modifications initiated by the applicant which have been reviewed by CAA and have been found acceptable.

Modification No.	Description
YAK/01/AEROBUILD	To disable the simulated failure switches (rear cockpit)
YAK/02/AEROBUILD	To disable the starter isolation switch (rear cockpit)
YAK/03/AEROBUILD	To disable the brake arming switch (rear cockpit)
YAK/06/AEROBUILD	English Placarding

The aircraft must have its original fabric-covered control surfaces recovered with appropriate western materials, unless it can be shown that this has been carried out since import (see MPD 1998-020). The aircraft has been recovered with ceconite in 2004.

5.1.3 Other Modifications

Modifications carried out to comply with manufacturer's SBs are covered in 5.1.1 above.

- a) The original 'Varley' Battery is not suitable for aerobatics unless drained of acid prior to each flight. It has been replaced by two smaller Yausa NPC17-12 batteries. As this mod is similar to modification YAK/07/AEROBUILD, Replacement of Varley Battery (CAA Minor Modification 9/217/9103AV refers) it was approved under AAN 28450 without further investigation. The batteries are installed in the port wing and there are two static inverters providing AC power for additional services.
- b) The "training springs" in the control circuits have been removed from this aircraft in accordance with modification YAK/13/AEROBUILD, AAN 24351 Addendum No. 1 refers.

5.1.4 Structural Life Limits

The airframe structural limitations and life are determined by the modification standard as follows.

Yak-52 serial numbers are made up as follows:

Example 866703	made up of	86	Year of manufacture
		67	Series
		03	Sequential aircraft number

Group	Series	Modification State	Limitations
1	01 to 64 inclusive	Without Bulletins 59-R, 60-R and 107-BD incorporated	Load factors +5/-3g, non-aerobatic, initial airframe life 1000 flying hours, 5000 landings or 15 years from new.
2	01 to 64 inclusive	With Bulletins 59-R and 60-R incorporated and without Bulletin 107-BD incorporated	Load factors +7/-5g, aerobatic, no flick manoeuvres, initial airframe life 1000 flying hours, 6000 landings or 15 years from new.

Cont'd

Group	Series	Modification State	Limitations
3	1 to 64 inclusive	With Bulletins 59-R, 60-R and 107-BD incorporated	Load factors +7/-5g, aerobatic, initial airframe life 1500 flying hours, 7000 landings or 20 years from new.
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	65 to 112 inclusive	With Bulletin 107-BD incorporated	
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	113 and later	As factory built	

Modifications listed above are:

- (59-R) Reinforcement of wing junction
- (60-R) Replacement of fuselage beam
- (107-BD) Fitting of reinforcement strap for the wing spar

This example is Series 120 and this aircraft is therefore in Group 3. To extend the airframe life beyond 1500 flying hours from new, see CAA MPD 1998-017.

5.1.5 Life Limited parts

The applicant has presented a list of lifed items applicable to the aeroplane as generated by the aircraft manufacturer. These lives (as follows) must be incorporated in the maintenance schedule for the aeroplane. **[The items in bold have been permitted as 'on condition' items by the Chief Designer at the Yakovlev Design Bureau in letter Ref: Mcx. 01-221/2058 although the ASI is still subject to LAMS requirements]**

Description	Part Number	Life Limit hr's/years
Propeller	V530TA-D35	500/6
Air Bottle	LM-375a-11-50	-/5
Air Bottle	LM-375a-3-50	-/5
Speed Indicator	US-450K	Per LAMS
Meter	AM-9S	On condition
Vacuum Pressure Gauge	MV-16K	On condition
Cylindrical Thermometers	TTT-13	On condition
Fuel Pressure Transducers	P-1B	On condition
Oil Pressure Transducers	PM-15B	On condition
Bottles Pressure Gauge	2M-80K	On condition
Flexible pipes*	as fitted	-/6

* The flexible pipes have a finite life of 10 years from date of manufacture with no limit on the number of flight hours. Within this period the use of the pipes is subject to the requirements in LAMS.

5.1.6 Engine and Propeller

The Vedeneyev M-14P engine Serial No 442007 was manufactured in 1985 and overhauled in 2000 at a total engine time of 55 hours 40 minutes. It was fitted to the aircraft in April 2002 and it has now run to a total time of 105 hours 4 minutes and 47 hours 25 minutes since overhaul. Subsequent overhauls are due every 500 hours to a maximum life of 2250 hours in accordance with MPD 1998-001.

Engine modifications required for airworthiness are embodied at the time of overhaul of the aircraft.

The standard V530TA-D35 propeller is newly overhauled and has an overhaul life of 500 hours or 6 years.

5.1.7 Radio

The following avionics equipment is installed:

Manufacturer	Type	Category	Approval No
Artex Inc	Baklan 5	VHF Comm	LA301034
Garmin	GTX 320	Transponder	VC01108
-	ARK 15M	ADF	LA301308

5.2 Compliance With Design Requirements For Permit to Fly

Airworthiness Notice 33 is not applicable as the engine employs a compressed air start system.

A generator failure light is fitted along with a voltmeter as standard, and Notice 88 is satisfied as loss of electrical power would not prejudice continued safe flight and landing and the aircraft is restricted to Day/VMC. In the case of generator failure appropriate load shedding gives in excess of 2:0 hrs operation given 75% battery condition. The u/c is all pneumatic as per all services, the U/C has mechanical indicators that protrude from the wings when gear is down.

Other Airworthiness Notices may be applicable to individual aircraft.

5.3 Compliance with Environmental Requirements

Not applicable.

5.4 Compliance with Design Requirements Associated With Operational Approvals

Not applicable.

5.5 Required Manuals And Other Documents Including Mandatory Placards

- a. Flight Manual - The applicant has prepared a set of Pilot's notes based on a translation of the original Pilots Notes for the aeroplane as modified (Ref: RGA/YK52/1998 Issue 4) which are considered acceptable.

Later issues accepted by CAA are also considered appropriate provided the limitations as defined in this section of the AAN are not changed.

- b. Placards - see section 6 below
- c. Electrical Load Analysis - An electrical load analysis in accordance with Airworthiness Notice No 88 shall be carried out – results are shown in 5.2 above.

- d. Maintenance Manual - The applicant has proposed to use a Maintenance Manual translated from original data recommended by the aircraft manufacturer. The schedule is defined as RGA/Yak52/Maint Issue 2.5. This schedule must include the list of life items as specified in Section 4 of this AAN.
- e. Maintenance Schedule - see (d) above
- f. MMEL - *not applicable*
- g. Weight and Balance Schedule - This aeroplane has been weighed to establish the empty weight and cg position and confirm the relative cg positions of fuel and pilots. Loadmasters report number 04MA1945 dated 8 March 2004 refers.
The applicant has presented a weight and balance schedule reference LW1945 dated 9 March 2004 based on the Loadmasters report.
- h. Type Certificate Data Sheet(s) - *not applicable*

6. **Conditions Affecting This Approval**

The applicant has placarded the aeroplane where appropriate in English. The placarding reviewed by CAA by inspection in conjunction with the applicant's modification leaflet (YAK/06 AAN 24089) is accepted.

The following limitations shall apply:

Maximum Take-off Weight	1315 kg (2899 lbs)
*Manoeuvre load limits	+7g/-5g
Centre of Gravity Limitations	One Pilot 17.5%-27% MAC Two Pilots 23%-27% MAC

This corresponds to: 17.2cm -32.8 cm forward of datum (One Pilot)
17.2cm -23.78cm forward of datum (Two Pilots)

Where the datum is a point 61.5 cm aft of the leading edge of the wing
210.8cm from the centreline of the aircraft corresponding to frame 5.

*Never Exceed Speed (V_{NE})	420km/hr (227 knots)
*Maximum Manoeuvring Speed (V_A)	360 km/hr (194 knots)
*Maximum Speed Flaps Extended (V_{FE})	170 km/hr (92 knots)
*Maximum Speed Gear Extended (V_{LE})	200 km/hr (108 knots)

Solo flight from front cockpit only

Aerobatics and spinning are permitted except as detailed below:

Aerobatics are prohibited	a) with flaps and/or landing gear extended
	b) With a fuel load of 20 litres or less

Maximum permitted altitude	10,000 feet
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Powerplant Limitations:

	Prop Actual	Gauge rpm
*Maximum	1975 rpm	100% (5 minutes max.)
Maximum Continuous	1580 rpm	82%

Those limitations above marked (*) must be indicated in both cockpits (where appropriate) by means of appropriate placards or instrument markings.

Additional placards stating the non certified nature of this aeroplane must be installed in both cockpits and defined on the Permit to Fly

7. Continued Airworthiness

All relevant Service Bulletins and MPDs shall be complied with.

8. Survey

In the particular areas examined during the survey the aircraft was found to conform with the standard recorded by this AAN.

9. Issue of Permit to Fly

The following actions must be completed prior to initial issue of the Permit to Fly:

- a. All actions and ground test procedures specified by the maintenance schedule must be completed satisfactorily.
- b. It must be verified that the documents or amendments to documents, and the placards defined under Section 5.5 above are as specified, including any changes specified under Section 8 above.
- c. The first aeroplane of this type was the subject of a flight test by CAA. The performance and handling of the aeroplane was considered to be acceptable. Flight Test Report FTR 8838P refers. Other examples have been flown by CAA. CAA flight test of this example is not required.

The aircraft has been flight tested by A. Bickmore, a pilot accepted by the CAA for the purpose, to CAA Schedule ref. AFTS No 2 at issue 8.2 and found to be satisfactory. The flight test report dated 16/03/04 has been reviewed by the CAA and was accepted on 16/03/04.

10. Approval

Subject to the conditions of Section 6 above, this aircraft is approved for the issue of a Permit to Fly, provided that it is operated in accordance with the limitations specified/referenced and that it conforms with the contents of this AAN. and provided it is maintained in accordance with the Maintenance Schedule as specified in Section 9.0 of this AAN.

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N J DAVIS
For the Civil Aviation Authority

Date 18th March 2004