

AIRWORTHINESS APPROVAL NOTE NO: 28679

APPLICANT: Fox Alpha Flying Group

AIRCRAFT TYPE: Yak-52

REGISTRATION NO: G-LYFA CONSTRUCTOR'S NO: 822608

OPERATOR: -

INSTALLER: -

DESIGN ORGANISATION YAK-UK Ltd (E4 Organisation Approval)

CERTIFICATE CATEGORY: Permit to Fly

MODIFICATION NO: -

MODIFICATION TITLE: **To Approve the Yak 52 Registration G-LYFA,
Serial No. 822608 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 1982, and entered service with the Russian DOSAAF (Military Sport Aviation) organisation with first flight 21 January 1983. It served with DOSAAF until 10 April 1991 recording 918:51 hours in military service. A major overhaul was carried out at Schachty military facility in March 1993 at 928:51 hours when the aircraft was released for a further 500 hours service, therefore the next overhaul is due at 1428:51 hours. The aircraft was then ferried to the UK on the Lithuanian register with a normal Category Certificate of Airworthiness. It has now flown to a total of 1391:02 hours.

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 B530 TA 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 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 it's 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 Replacement batteries (via AAN 24740).
- b) Yak/13 Training springs removed. (via AAN 24351 add 1).
- c) Yak/56 A King KT76A is installed under minor mod no. 9/217/M/9577 Issue 2.
- d) Yak/8 Canvas stowage bag (via AAN 28301).

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.

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

This aeroplane was imported into the UK with a Lithuanian Certificate of Airworthiness. 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, 107 being fitted at overhaul.

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.

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). Applicant states that this aircraft is covered with ceconite 101, this has been verified by applicant inspection , a logbook entry dated August 2000 refers

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 "Hitachi" batteries in accordance with a customer modification approved as a minor modification. Applicants modification YAK 07 AEROBUILD, Replacement of Varley Battery (CAA Minor Modification 9/217/9103AV refers). 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 AAN 24351 Addendum No. 1.
- c) Yak/56 A King KT76A is installed under minor mod no 9/217/M/9577 Issue 2.
- d) A canvas baggage stowage bag has been added to the rear parcel shelf in accordance with modification YAK/8 which is approved via AAN 28301. No aerobatics are to be flown with baggage in this bag and maximum load is 10 kg and this is placarded

Description	Part Number	Life Limit hr's/years
Propeller	B530 TA D35	500/6
Air Bottle	LM-375a-11-50	-/5
Air Bottle	LM-375a-3-50	-/5
Speed Indicator	US-450K	1000/5
Meter	AM-9S	2000/5
Vacuum Pressure Gauge	MV-16K	1500/6
Cylindrical Thermometers	TTT-13	6000/5
Fuel Pressure Transducers	P-1B	1000/4
Oil Pressure Transducers	PM-15B	1000/4
Bottles Pressure Gauge	2M-80K	1000/4
Flexible pipes	as fitted*	-/5

* The flexible pipes have a total life of 10 years (shelf life + operating life) as defined in a service bulletin from the manufacturer.

5.1.6 Engine and Propeller

The Vedeneyev M-14P engine has completed a total time of 959:48 hours since new and 332:52 hours since first overhaul. Subsequent overhauls are due every 500 hours thereafter to 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.

An overhauled B530 TA D35 propeller is fitted (maximum of 2000 hrs and 30 years life). Current hrs are 4:10 hours since last overhaul.

5.1.7 Radio

The following avionic equipment is installed:

Manufacturer	Type	Category	Approval No
Artex Inc	Baklan 5	VHF Comm	LA301034
King	KT76A	Transponder	LA100208

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. Load shedding with mod YAK/07 (approved NOV 94) gives 2:03 hrs 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: Aerobuild Yakovlev Yak 52 Flight Manual AB/FA/52-3) 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 elected to use the maintenance manual/schedule as recommended by the aircraft manufacturer. This schedule is defined as Aerobuild Yak 52 Maintenance Schedule ref: YAK 52 at issue 1 dated 3rd December 1993. This schedule must include the list of lifed 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 03FE1479 dated 20/02/03 refers.
The applicant has presented a weight and balance schedule reference G-LYFA/1 dated 31/03/03 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)
Maximum Landing 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})	450km/hr (243 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

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 M Jefferies, a pilot accepted by the CAA for the purpose to Schedule ref. AFTS No 2 at issue 8 and found to be satisfactory. The applicant's flight test report dated 31/03/03 has been reviewed by the CAA and was accepted on 11.09.03.

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 3 April 2003