SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Discussion Document

On The Safety & Security Concerns & Proposals Surrounding The Certification, Continued Airworthiness & Operational Aspects Pertaining To Non-Type Certified Aircraft In South Africa

The Document Is Published For Comment

SM Machobane
Commissioner For Civil Aviation (CCA)
Private Bag X73
Halfway House 1685
South Africa
Tel: +2711 545 1000
Fax: +2711 545 1461
Mail: mail@caa.co.za

Contents: **Page**

1 Purpose

The purpose of this discussion document is to highlight safety concerns and make proposals for improvement of current provisions for registration and safety regulation of Non-Type Certified Aircraft (NTCA).

2 Background

For the purposes of design and manufacturing of aircraft, aircraft are generally put in two major categories, those which have been designed and manufactured under the standards that meet or exceed those of ICAO, otherwise know as type certified aircraft (TCA) and those which are not compliant with ICAO standards, known as non-type certified aircraft (NTCA).

In the years following the end of World War II, the increase of expertise in private and non air transport industries as well as technological advancements have made it more and more feasible for the development and accessibility of NTCA to the aviation community. South Africa is one of the countries where this development has seen a rapid growth and increasing complexity of NTCA with a propensity to engage in an increasing variety of activity including those involving hire and reward.

As a result of changes in the forces that influence the development and retention of military aircraft, a large quantity of ex-military aircraft have become available for civilian use in many countries including South Africa. This is adding to the growth and sophistication of the NTCA sub-sector of aircraft.

Regulatory provisions have been developed in an attempt to properly control and regulate this class of aircraft for safety purposes. However, experience in the application of the said provisions has demonstrated a need for their improvement as early as possible, all in the interest of safety and orderly growth of the aviation industry.

3 Legislation

3.1 Current Regulations

Historically, NTCA in South Africa were regulated under a set of standards in a document called LS/1 (which were not regulations in the proper sense of the

word). With the establishment of the CAA, work commenced to transform the LS/1 standards into formal civil aviation regulations (CAR's) promulgated by the Minister under the provisions of the Aviation Act, 1962.

In November 2002, the draft regulations to take over from the LS/1 standards were completed and the Commissioner retired the LS/1 standards by way of issuing a general exemption covering all aircraft that do not meet regulations that give effect to ICAO standards.

The exemption made the draft regulations a condition i.e. the exempted aircraft had to meet provisions of the draft regulations. The regulations, which are listed below, were supposed to be considered by the Minister within a period of six months. Although the regulations were intended to be submitted to the Minister for his consideration, in time to be made law by May 2004, they were never submitted for such consideration due to factors that were evidently not adequately catered for in their current form. The following are the draft CAR's in question;

- Part 24 of the CAR's for certification and airworthiness of NTCA.
- Part 94 of the CAR's for operation of the NTCA; and
- Part 96 of the CAR's for commercial use of NTCA.

The commercial use of this type of aircraft is limited to a Class III license issued by the Domestic Air Service License Council which allows at present:

a) Acrobatic operations
b) Advertising operations
c) Aerial patrol observation and survey
d) Aerial recording by photographic or electronic means using the licensee's equipment to produce a pictorial end product
e) Agricultural spraying, seeding and dusting
f) Cloud spraying, seeding and dusting
g) Emergency medical service including the provision of casualty equipment and medical personnel
h) Fire spotting, control and fighting
i) Game and livestock selection, culling, counting and herding
j) Parachute dropping operations
k) Semi-aerobatic operations
l) Spraying, seeding and dusting operations other than for agriculture purposes and clouds
m) Tug operations
n) Underslung and winching operations

o) Other general air service operations as specified—Permitted under this category is "Flipping," i.e. carriage of passengers without landing anywhere other than point of departure

It should be borne in mind that, in allowing NTCA to undertake these activities, the intent has never been to be in direct competition with TCA that operate under stringent safety standards, or to reduce safety levels in the carrying out of the activities.

It is notable however, that some NTCA have capabilities that are comparable with TCA and may on proving such capabilities be permitted on case by case basis to carry out specific activities alongside TCA.

3.2 Shortcomings In The Regulations

Since the introduction of the abovementioned draft Parts of the CAR's as conditions to the exemption, significant shortcomings in the regulations and in their implementation have been identified. Despite the well meaning intention to facilitate the sub-sector of aviation that uses NTCA, mainly small general aviation aircraft, some basic principles of aviation safety seem to be outstanding.

As an example, the Regulations providing relief from the ICAO standards were to be framed in a way that still achieved a comparable level of safety. In most cases this would be achieved by mitigating engineering limitations of the aircraft with such measures such as;

- Aircraft operational restrictions;
- Limitations on passenger that may be carried (if at all);
- Limitation of exposure of the public on the ground, other aircraft etc.; and
- A more focused safety oversight regime

Without these measures, the public flying on the NTCA, particularly as passengers, the public and property on the ground, other aircraft (including ICAO compliant aircraft) are exposed to unacceptable risks. Consequently, the level of safety expected by the public is eroded. Furthermore, some of the shortcomings get exploited to a more pronounced detriment of not only the public at large but the NTCA sub-sector itself.

4 Safety Standards

Type Certified Aircraft (TCA) are certified/manufactured through a rigorous process by showing compliance with internationally recognized sets of design standards that usually establish an acceptable risk factor of a serious event happening at 10^{-9}. This is what has come to be expected by the second and third parties when involved in international air transport and is the intent behind ICAO Standards and Recommended Practices.

Most NTCA by their very nature are such that the risk factor is increased to a level that is not generally perceived by the passengers that may be flown in them (without a concerted education), more so the general public that is not flying or is flying in other aircraft, which is nevertheless exposed to risks of occurrences by the NTCA.

This risk factor can be controlled by adequately educating operators of these aircraft as to the various levels of risk, and imposing certain restrictions on the operation of NTCA, that will reduce the exposure of the uninformed second and third parties.

It is the responsibility of the Authority to ensure that measures are in place to ensure that the original construction of the aircraft is to an acceptable standard for the intended use and that the continued airworthiness of the aircraft can be maintained through acceptable practices.

This has been the intent of the present draft Regulations in the form of Parts 24, 94 and 96. However, it is evident that these Parts have to be improved to provide a comprehensive set of requirements that will give the general public the equivalent level of risk management as is perceived for TCA.

5 Oversight Capacity

A known acceptable level of safety can only be sustained when the resources for quality assurance, and otherwise control of a safety system, are available and effectively deployed. The growth of the NTCA sub-sector has in recent years been significant and can no longer be adequately overseen and controlled under approaches envisaged in the past years. In this context, it is to be recognized also that typically, the NTCA contribution to resources required for total national safety oversight is typically low, the highest number of occurrences (accidents and incidents) typically occurs in this area. The public perception of accidents, however, does not distinguish between NTCA and TCA.

5.1 Lack Of Manufacturer Support

In most cases of TCA, the level of safety achievable is through the participation of a number of parties, of which one of the most critical is the manufacture. Manufactures' support, which provides such invaluable components as expertise and field experience on the behaviour of their product, is relied upon by both the operator and the safety oversight authority. In the case of NTCA, where in most cases manufacture's support is not available, compensatory mechanisms are necessary.

The lack of manufacture's support does get more critical with complex aircraft, which most recent ex-military aircraft happen to be.

The lack of manufacture's support requires the CAA to ensure that the owner of the aircraft has in place suitable alternatives, and the CAA itself has to have oversight measures that are accordingly informed.

5.2 Type Certification Capacity

The type certification of NTCA requires that the CAA undertake a certain level of investigation and assessment of the design standards and criteria. The lack of such capacity in the CAA and indeed the industry (when it comes to ex-military aircraft) poses a serious safety challenge to the entire industry.

5.3 Shortage Of Expertise

Due to the high variety and differences from one aircraft to another in the NTCA sub-sector, availability of expertise per aircraft is usually low. This situation gets worse in the case of ex-military aircraft, where essential knowledge, documentation or other forms of information relating to the aircraft may be classified or simply withheld for political or other reasons. Furthermore, cognizance needs to be taken of the fact that no two ex-military aircraft may be treated as the same for the purposes of type acceptance and continuing airworthiness, due to a variety of possible modifications that may have taken place on it either as specialised deliveries or while in service, and the various often unknown fatigue levels and accidents the aircraft may have experienced while in military service. Typically, expertise on ex-military aircraft would have been in the military only, from which transfer in the form

of education is very difficult and the expert/experienced ex-military personnel is rarely adequate or available in necessary quantities.

5.4 Complexity Of The Aircraft

As a result of increasing expertise and technological advances, NTCA have since the 1970's increased rapidly in complexity, clearly outstripping the knowledge and skill levels determined to be sufficient in the initial maintenance and operating personnel provisions. Consequently, many NTCA have become more complex than even some TCA where much higher skill levels are required by law; thereby significantly increasing operational risks associated with NTCA.

It is important to highlight that more and more complex NTCA; in particular ex-military ones are becoming available to the civilian users. However, the rules and the regulations that are in existence to govern NTCA do not seem to cater for the oversight of such complex aircraft.

5.5 Size Of The NTCA Industry

It must be noted that the NTCA account for at least 40% of the aircraft register in South Africa numbering 4311 aircraft in August 2005. The growth in NTCA aircraft alone has averaged 5% a year over the last 4 years.

6 National Impact

The aviation community is well aware that without certain interventions undertaken in the design, manufacturing and operation of aircraft, consequences thereof would invariably be unacceptable rates of incidents and accidents. Any rate or absolute number of incidents and accidents perceived to be unacceptable to the public will have a negative impact on the whole of the aviation industry, particularly the air transport industry and other parts of the national economy supported by air transport, such as tourism.

NTCA on the other hand, constitute a large portion of the grassroots aviation which supports and bolsters development in upper levels of the industry.

It is prudent therefore, that measures put in place to facilitate the development and growth and participation of NTCA for social and economic reasons do not result in undermining public confidence in aviation itself.

7 Proposals to Address the Issues

As a way of mitigating the safety concerns raised earlier on in this document, the Commissioner submits the proposals reflected hereunder.

7.1 Liability

The Commissioner also proposes to insert a text in the regulations removing liability from the Government and Commissioner on the operation of design, restoration, certification, operation, etc. done or made in good faith.

7.2 Registration Aspects

Importation permits
Ex-military aircraft and other aircraft above a gross takeoff mass of 2700 kilograms or capable of carrying in excess of four persons (including a non passenger aircraft which in the passenger configuration would be capable of carrying more than four persons) shall not be imported unless with a specific written import permit issued therefore by the Commissioner

Registration Differentiation
The identification of an aircraft as an NTCA is important for the awareness of the second and third parties who may come into contact with them.

The CAA has recently utilised a policy of designating NTCA with a ZU- registration letters as against the normal South African ZS- registration letters. But there are a number of NTCA aircraft that were originally provided ZS-U--,V-- and W-- registration letters. Along with these there are also Gliders and Hot Air Balloons that bear ZS-G-- and ZS-H-- registrations letters.
It is proposed that in future all NTCA will be allocated ZU- registration letters by regulation rather than policy and they will also have near the access to the aircraft, in letters 5cm tall, the logo “NTCA”. The Commissioner may waive the requirement of bearing ZU- registration letters in certain cases for veteran aircraft where the existing original registration letters may be kept.

Registration and Authority to Fly Permit
Logically it is nonsensical to register an aircraft if the aircraft will fore see ably not be issued with an Authority to Fly Permit. It is necessary, therefore, that upon registration the intended usage of the aircraft is indicated on the application form for registration of an aircraft.
Expiration of Registration
Due to the difficult process of monitoring and tracking aircraft on the register, particularly smaller NTCA, it is proposed that the registration of an aircraft, that has not had a renewal of its Authority to Fly Permit issued for a period exceeding three years, should lapse, unless on plausible grounds from the owner thereof, the Commissioner provides otherwise.
An aircraft that has been registered for the first time or that has had its certificate of registration re-issued but has not been issued with an Authority to Fly Permit, shall have its certificate of registration valid for a period not exceeding 18 months before the registration lapses, unless on plausible grounds from the owner thereof, the Commissioner provides otherwise.

7.3 Certification Matters

One has to evaluate the risks of the various components of the types of aircraft that are catered for under the umbrella of the current draft regulations.
It is proposed that the risk associated with operation of aircraft for purposes initial and continued airworthiness should be categorise. The logic diagram attached thereto in appendix A was developed by the Australian aeronautical authorities and serves as a useful example of how to categorise the aircraft types and the maintenance thereof to arrive at a risk category. This, however, would need consultation and possible amendment to suit the South African environment.
Having categorised the aircraft the appropriate limitations for its operation as an NTCA can be addressed in regard to the carriage of passengers and area of operations that can affect second and third party issues.
The risk categorization should then be used to identify the ability of the aircraft i.e.

a) High risk, zero passengers
b) Lower risk, some commercial operations suited to the type of aircraft
c) Acceptable risk, private passengers with a total of four person on board
d) Controlled risk, commercial operation with very limited passengers, ideally one passenger

An increase of fair paying passengers above one passenger may be permitted (on exemption by Commissioner) upon specific and detailed engineering, airworthiness and operational (including organizational) capability that

approaches the requirements of TCA, being demonstrated, provided that such an increase should not exceed a total of four persons on board an aircraft.

The other risk that has to be managed is the area of operation. Since these aircraft do not meet ICAO minimum standards for international operations, it should be ensured that operation of these aircraft do not in anyway affect the safety of type certified aircraft operations and also they do not present a hazard to an unsuspecting third party.

7.4 Continued Airworthiness Issues

The continued airworthiness of the NTCA is no less important than that of TCA. The issue of expertise however, tends in most cases to be more critical for the NTCA given the variations that work against depth of skills. The various aspects associated with operation of the aircraft under conditions of limited parts, lack of manufacturers support, etc. should be clearly compensated for either in the level of maintenance, the operational restrictions or risk categorization.

7.5 Operational Issues

The proposals regarding the operation of NTCA are as follows:

The language used in the regulations should be specific by, amongst others, stating that:

i) No person shall operate an NTCA except for the purpose for which an Authority to Fly Permit has been issued;

ii) No person shall be carried on NTCA unless that person is;

a) A Flight crewmember;
b) A Flight crewmember trainee;
c) A Crew member performing an essential function in connection with the purpose of the operation for which the aircraft has an Authority to Fly Permit;
d) A Crewmember that is necessary to accomplish the work activity directly associated with that special purpose.

Carriage of passengers shall follow the concept indicated under Certification Matters above.

iii) No person shall operate NTCA;

a) Over built up areas;
b) Over or near public gatherings or populated recreational areas where the aircraft many constitute a nuisance to persons therein, unless in an activity associated with such gathering or area and under provision of Part 91 of the regulations and subject to other conditions that may be imposed by the Commissioner;
c) In or near congested airways;
d) Near a busy airport where passenger transport operations are conducted;
e) Near terminal and airways used by international air traffic

iv) The Commissioner, on merits, may exempt a person from the provision of (ii) and (iii) above provided that a request for such an exemption is made together with a motivation containing reasons behind such request.

8 Proposed Handling of Ex-Military Aircraft

Owing to the criticality of safety issues relating to ex-military aircraft, it is proposed that the Commissioner will continue to apply his powers in imposing appropriate limitations when issuing all new Authority to Fly permits for ex-military aircraft under the existing Draft/Proposed Part 24 of the Civil Aviation Regulations, inline with the proposals laid out in this document.
This is to ensure that the identified safety issues can be addressed as soon as possible

9 Public Comment

The public is invited to comment on the contents of this Discussion Document, and present comments on CAA email address mail@caa.co.za by no later than 15th of December 2005.