APPENDIX D Aerobatic Ratings – Jet and Turbine Aircraft

INTRODUCTION

Any pilot who wishes to fly recreational aerobatics or to incorporate aerobatics into a display at an airshow, including any member of a formation team performing aerobatics or who as part of a non-aerobatic formation display who breaks away and displays aerobatics on their own, will require to hold an Aerobatic Rating.

With the inclusion of ex-military type aircraft on the civilian register, the SACAA has instructed the Aero Club of South Africa (AeCSA) to ensure that operators of such types have appropriate skills and qualification. In the interest of safety of both the individual and the general public, it has been deemed essential to incorporate an aerobatic rating for jet and turbine powered aircraft. This process is administered by the SACAA.

Historically, the issue of an aerobatic rating was restricted primarily to piston engined powered aircraft. The Sports Aerobatic Club (SAC) acknowledges that jet/turbine aircraft types will not participate in competition flying, however, in an effort to ensure that a safe operation is maintained, pilots of jet and turbine aircraft have from 1st November 2005 been required to be the holders of an Aerobatic Rating for jet or turbine powered aircraft before being permitted to perform aerobatics.

Pilots requiring a jet/turbine Aerobatic Rating will be able to liaise with a panel of AeCSA approved Designated Aerobatic Examiners (DAE) near to their location. A list of approved DAE's may be obtained from Air Show South Africa (ASA) a section of the Aero Club of South Africa.

LEGISLATION

Government Gazette 25194 R999 11/07/03 gave force to what is referred to as an "Aerobatic Rating". The Civil Aviation Authority (CAA) of South Africa have transferred the task of the issuing of "aerobatic ratings" to the Aero Club of SA, who in turn, have delegated this responsibility to the Sport Aerobatic Club (SAC), categorised as an "approved organisation" in terms of SA-CATS-FCL 61.38.1. Furthermore, in terms of CAR Part 149, the CAA has designated the responsibility for regulating certain areas of aerobatic flying to the Sport Aerobatic Club (SAC), a section of the Aero Club of South Africa. Therefore, the SAC is empowered to examine pilots wishing to gain an Aerobatic Rating whilst SACAA will be responsible to administer, record and issue said ratings.

The SAC has developed and adopted from the international body governing aerobatics (CIVA), a clearly defined, tried and tested set of criteria, syllabi and rules and regulations governing aerobatic flight. This accumulated body of knowledge is summarised in a comprehensive document (CAA ARO 002), which has SACAA approval. The Manual of Procedures has been amended to also incorporate activities governing jet and turbine powered aircraft. Guidelines from certain military operations have been incorporated to formulate an attainable and safe performance. In terms of CATS 61.38.3, pilots are to conduct a "skills test" prior to the issue of an aerobatic rating. A "skills test" report in terms of Document CAA/ARO 0002 *et al* will be submitted on application.

RESTRICTION ON OPERATION

By form of reference, the following Part 91 Regulation (CAR) is brought to the attention of all operators;

CIVIL AVIATION REGULATION

91.02.32 except when necessary for taking off and landing, or except with prior written approval of the Commissioner, no aircraft

(a) Shall be flown over built up areas or over open-air assembly of persons at a height less than 1000 feet above the highest obstacle, within a radius of 2000 feet from the aircraft;

(b) when flown elsewhere than specified in paragraph (a), shall be flown at a height less than 500 feet above the ground or water, unless the flight can be made without hazard or nuisance to persons or property on the ground or water; and

(c) Shall circle over or do repeated over-flights over an open-air assembly of persons at a height less than 3,000 feet above the surface.

MINIMUM ENTRY QUALIFICATION FOR A JET/TURBINE AEROBATIC RATING

In order to satisfy the SAC, and before a jet/turbine aerobatic rating is issued, flight crew are to produce proof that they have completed a formal **Type Training Course** following the guidelines as spelled out in CAR Part 94 *et al.* The Civil Aviation Technical Standard CATS-OPS-94 specifies the training syllabus that is to be followed for ex-military aircraft.

CIVIL AVIATION REGULATION

94.01.1 (5)

Notwithstanding the provision of sub-regulation (4), non-type certificated aircraft operated in terms of this Part may be used for the training of its registered owner: Provided the training is provided by an approved ATO and the airworthiness requirements in respect of a non-type certificated aircraft used in training are met.

Although, the initial training has no part on the issuing of an aerobatic rating per se, the requirement for the issue of an aerobatic rating for jet/turbine aircraft is based on the prior knowledge that the applicant satisfies the minimum requirements for a solid foundation in their training on type. The basis of the training is broadly spelled out below;

94.01.2 (1) No person shall operate a non-type certificated aircraft unless –

(a) In the case of aircraft classified in the paragraphs (a) to (g) of sub-regulation 24.01.1(2) for such aircraft an Authority to Fly or Proving Flight Authority has been issued in terms of these regulations;
(b) The aircraft is in an airworthy condition; and
(c) The pilot-in-command is the holder of a valid pilot licence with the appropriate rating for the particular category and type of non-type certificated aircraft.

61.09.2 (1) an applicant for a class or type rating must have successfully completed the appropriate training as prescribed in Document SA-CATS 61.

(2) In the case of training for a single-pilot multi-engine class rating, or the applicant's first Single-pilot multi-engine type rating, the training must consist of at least –

(a) 7 hours of theoretical knowledge instruction in multi-engine aeroplane operation;

and

(b) 6 hours' dual flight training in multi-engine aeroplane operation, including not less than 2 hours 30 minutes' dual flight training under normal conditions and at least 3 hours 30 minutes' dual flight training in engine failure procedures and asymmetric 260 flight. At most 3 hours of the dual flight training may be acquired in an approved FSTD.

(3) An applicant for a type or class rating on a high performance single pilot aeroplane who is not the holder of an ATPL, or who has not obtained credit for the ATPL theoretical knowledge

Examinations must undergo additional training as set out in Document SA-CATS 61.

(4) An applicant for a Warbird type rating –

(a) Who is the holder of an ATPL with applicable military type experience may be

endorsed with the applicable Warbird type rating.

(b) Who is the holder of an ATPL without applicable military type experience must undergo training as described in Document SA-CATS 61 for endorsement of the

Warbird type rating contemplated.

(c) Who is the holder of all ATPL theoretical knowledge credits and has applicable

Military type experience may be endorsed with the applicable Warbird type rating.

(d) Who is the holder of all ATPL theoretical knowledge credits but who does not have applicable military type experience, must undergo training as described in

Document SA-CATS 61 for endorsement of the Warbird type rating contemplated.

(5) Pilots operating in terms of Parts 91, 94, 96, 121, 127, 135 and 138, who are operating aircraft which require two or more pilots for the operation, must undergo a multi-crew cooperation training course detailed in Document SA-CATS 61.

Note: In terms of the Regulation, the Commissioner has the privilege to exempt the requirement for an ATPL to operate a "Warbird".

Ground Training

Ground training should ideally have been conducted on a formal classroom lecture basis, although with certain less sophisticated types, academic self-study could be considered. On completion of the ground training, the applicant shall successfully complete a ***written*** examination to prove his or her knowledge of all aircraft systems. Reference shall be made to the relevant sections of the approved Flight Manual, Performance Manual and Technical Manuals.

61.01.16 (1) Training for the purpose of acquiring a licence, rating or validation as required by this Part, may only be provided by the holder of an aviation training organisation approval issued in terms of Part 141 and under the provisions set out in Document SA-CATS-FCL 61.

Normal and Emergency Procedure Training

Normal and Emergency procedures shall ideally be conducted on a simulator, but where impractical, they shall be conducted *in situ* in the form of practice drills and practical tests on and in the aircraft. Blindfold cockpit touch drills are to be conducted to simulate emergency procedures to ensure students have complete familiarity with the positioning of essential switch ology and systems.

Initial Type Training Requirements

The Chief Instructor of the approved ATO will investigate and interview the applicant for a type rating and will prepare a letter of recommendation for the SACAA regarding the amount of training required.

CIVIL AVIATION REGULATION

94.02.01 (5)

Once the Director has studied the information submitted in terms of sub-paragraphs (3), (4) and (5), and is satisfied that the training will be done in a responsible and safe manner, minimum requirements regarding the training of the particular individual will be supplied in writing by the Commissioner on Form CA94.02.1.

61.01.19 *(1)* An applicant for a licence, revalidation, class or type rating or any familiarisation or differences training for an aircraft must have the applicable rating endorsed in his or her pilot

logbook as described in Document SA-CATS-FCL 61.(2) The endorsement must include, but is not limited to, the following details –(a) Date of the skills test;(b) Aircraft registration and type;(c) Name and licence number of examiner;(d) Name of the aviation training organisation (ATO).(3) The flight instructor or designated flight examiner conducting a skills test or revalidation check shall stamp, sign and date each page of the applicable form before forwarding to the South African Civil Aviation Authority for processing and record keeping. The stamp shall include the following details –(a) Initials and surname of flight instructor or examiner;(b) Pilot licence number of flight instructor or examiner;(c) Designation applicable to the flight instructor or examiner, such as Grade II Instructor or DFE I (A), as the case may be.

Extracts from the guidelines established in CATS-OPS-94 section 94.02.01 (3) are included below for reference:

EXPERIENCE LEVEL	QUALIFICATION MILESTONES
*Candidate has **less than**;* ***300** hours total flying time.*	*Minimum of;* ***40** hours' instruction on type, of which 5 hours could be on a simulator of that type.* *Minimum of;* ***15** hours with a "check pilot" who should be a qualified instructor on type.* ***Note**: If an instructor is not available, it must be someone who has done the conversion to the instructor's position on type.*
*Candidate has **less than**;* ***300** hours total flying time of which;* ***100** hours are on jet- engine aircraft.*	*Minimum of;* ***30** hours' instruction on type, of which 5 hours could be on a simulator of that type.* *Minimum of;* ***10** hours with a "check pilot".*
*Candidate has **more than**;* ***500** hours total flying time including more than;* ***100** hours as pilot-in-command on a civilian jet aircraft.*	*Minimum of;* ***10** hours' instruction on type.* *Minimum of;* ***10** hours with a "check" pilot.*
Candidate has; *a **military jet rating** obtained as a civilian on a similar aircraft type.*	*Minimum of;* ***7** hours' instruction on type.* *Minimum of;* ***5** hours with a "check" pilot.*

Basic Flight Training Syllabus

It is recommended that a basic minimum number of aspects are covered during the initial aircraft conversion. The basic elements of a proposed flying training syllabus (as applicable) for a type rating are specified below.

- *Aircraft Familiarization*
- *Effect of Controls (including spoilers, boundary layer control, airbrakes, etc.)*
- *Climb and Descent Profiles*
- *Low Speed Handling and Aircraft Behaviour*
- *Stalling (if applicable) at Various Speeds and Configurations*
- *Medium, Steep Turns and Maximum Rate Turns*
- *Accelerated Stalling*
- *Inertial Cross-Coupling*
- *Aerodynamic Cross-Coupling and Divergence*
- *Incipient Spinning and Spinning (if permitted)*
- *Precautionary Landings*
- *Forced Landings*
- *Approaches (different speeds and configurations)*
- *Landings (different speeds and configurations)*
- *Introduction to instrument flying (if applicable)*

- *Aircraft Emergencies:*
    - *Engine failures/ flame-outs during different stages of flight*
    - *Engine fire/overheat during different stages of flight*

- *Generator/Alternator Failure*
- *Hydraulic/Pneumatic Failures*
- *Flight Control Failures*
- *Flap/Lift Augmentation Device failures*
- *Undercarriage Failures*
- *Smoke in Cockpit*
- *Pressurization Failure*
- *Loss of Canopy in Flight*
- *Ejection Procedure and "Bail-out" Limitations*

MINIMUM QUALIFICATION FOR A JET/TURBINE RATING

Given that jet and turbine powered aircraft have a much larger performance envelope than most piston powered aircraft, it is essential that candidates comply with a minimum number of exercises as spelled out in the table below in order to obtain a jet/turbine aerobatic rating.

ENTRY CRITERIA	MINIMUM TRAINING REQUIREMENT
*Candidate has **no** previous aerobatic **experience**.*	***A minimum of 10 hours aerobatic training on the aircraft type.*** *Note: During the conversion to type, aerobatics may form parts of the training*
*Candidate **has an aerobatic rating** issued in terms of Part 61 **and** has **flown more than 6 hours** of aerobatics during the preceding twelve months.*	***Minimum of 6 hours aerobatic training on type.***
*Candidate has **previous military** aerobatic experience but does not have a civilian aerobatic rating.*	***A minimum of 4 hours aerobatic training on aircraft type.***

*Candidate has **more than 6 hours' aerobatic experience on military jet/turbine aircraft** during the preceding twelve months and has an aerobatic rating.*	***A minimum of 2-hour aerobatic training on type.***

***Important Note**: A comprehensive training file or similar records reflecting the history of training for the candidate shall be kept for presentation to the AeCSA, SAC, or the SACAA if so required.*

Procedures for Recurrent Training and Validation

Recurrent Training

The pilots are expected to verify that they comply with the currency training requirements. When recurrent training is undertaken, the pilot shall make the relevant entry in his flying logbook. The flight shall be logged as a dual flight with the name of the instructor as the pilot-in-command.

i. Procedures if Pilots Fail to Maintain the Required Standards

An approved jet/turbine Safety Officer or Designated Aerobatic Examiner (DAE) performs the check and balance function to ensure that pilots maintains the minimum standard required. Where the Safety Officer/DAE is not satisfied with the standard, they shall discuss the issue with the pilot and suggest the required remedial actions that need to be taken. Should the pilot not comply with the suggestions/recommendations, the Safety Officer/DAE should then notify the South African Civil Aviation Authority.

ii. Procedures for the Issue of an Initial Jet/Turbine Rating for Pilots already Operating Jet/Turbine Aircraft

The AeCSA is mindful of the cost of jet/turbine aircraft operations and acknowledges that some pilots have already gained experience in jet/turbine aerobatics. In an effort to satisfy a suitable standard, pilots wishing to obtain a jet/turbine aerobatic rating are to validate their capabilities in the form of a "skills test" before a select panel of appointed DAE's from the AeCSA. The format of the skills test is spelled out in the lesson plan for training which is attached to this document.

iii. Procedures for Single Seat Aircraft

Certain variants on the civil aviation register may only be available as single seat aircraft. In such cases, pilots are to demonstrate their currency on the dual seat variant of that type or on an aircraft of similar performance and handling qualities. Should such type or similar type not be available for this purpose, the pilot is to request, in writing, a waiver from SACAA to demonstrate his currency on that particular type.

REQUIREMENTS FOR THE ISSUE OF AN INITIAL JET/TURBINE AEROBATIC RATING

For the issue of an initial Jet/Turbine aerobatic rating, the following criteria shall be complied with;

- The candidate must be a member of the Aero Club.
- The candidate must be a member of the Sports Aerobatic Club (SAC).
- The candidate must be in possession of a valid PPL, CPL or ALTP as issued or validated by the SACAA.
- A suitably qualified Designated Aerobatic Examiner (DAE) for Jet/Turbine aircraft must have authorised and signed out the candidate.
- Successful candidates will be issued with a Graduate Aerobatic Rating.
- The candidate must lodge this form with SACAA which will issue the appropriate certificate.
- The candidate must pay SACAA the required fee for the aerobatic rating.
- **Important Note**: It is the responsibility of the candidate/applicant to comply with the above criteria.

RENEWAL OF AEROBATIC RATINGS

Aerobatics Ratings are renewable annually. In order to renew the jet/turbine aerobatic certificate, the following criteria must be met.

- The applicant must be a fully paid up member of the Aero Club of SA.
- The applicant must be a fully paid up member of the SAC.
- The applicant must be in possession of a valid PPL, CPL or ALTP as issued or validated by the SACAA.
- The applicant must produce proof of his participation in at least six (6) aerobatic displays in that particular/or similar aircraft type over the past twelve (12) months.
- The applicant must produce proof of his/her competency, signed by a DAE, clearly indicating the limitations to which that pilot may operate. (Exception to this clause may only be granted with the express consent of the SAC committee).

- The applicant must pay SACAA the required fee for the renewal of the aerobatic rating.
- **Important Note**: It is the responsibility of the candidate/applicant to comply with the above criteria.

LAPSE, SUSPENSION OR AMENDMENT TO THE JET/TURBINE AEROBATIC RATING

The issue of an aerobatic rating is subject to certain privileges. However, due consideration is given to the issue thereof. In accordance with the responsibilities transferred from the SACAA to the AeCSA, and therefore the SAC as the responsible entity for Aerobatic Ratings, the following aspects are to be adhered to

- The SAC committee reserves the right to revoke any SAC issued aerobatic rating.
- The aerobatic rating as issued by SACAA is valid for 12 months from date of issue.
- The aerobatic rating as issued by the SAC, automatically lapses should the pilots' flying license as issued by the SACAA, expire in this period.
- A pilot who is the holder of a jet/turbine aerobatic rating who has not presented their aircraft at all during the year, shall forfeit the privileges as the holder of a jet/turbine aerobatic rating and will need to validate before a panel of a minimum of three (3) DAEs before a jet/turbine aerobatic rating is re-issued.
- **Important Note**: It is the responsibility of the candidate/applicant to comply with the above criteria

MANAGEMENT OF THE JET/TURBINE AEROBATIC RATING

In order to retain visibility and ensure a safe operation by holders of a jet/turbine aerobatic rating, the following procedures are to be followed;

Guidelines to Management

- A record is to be kept of all the pilots' participation throughout the year.
- A list of pilots, sanctioned by the SAC committee, who may give jet/turbine aerobatic instruction for the SAC, will be published by SACAA from time to time.

These instructors may, charge for their services, provided that they hold the necessary qualifications as issued by the SACAA i.e. they are commercial pilots with instructor ratings. Candidates may only log dual time when they have flown with commercial instructors.

- Aerobatic instructors as appointed by the SAC who are not commercially rated may not charge for their services but must be rated on the type of aircraft on which they provide coaching.
- Instructors in the completion of the "skills test" form are urged to do so in as much detail as possible since this form will be kept on record at SACAA. The knowledge and skills imparted in these early aerobatic sessions will form the foundation of the candidate's aerobatic career. These evaluation forms are open to inspection by the SACAA and the committee.
- The jet/turbine aerobatic rating is a proficiency qualification on only jet/turbine aircraft and is **not valid** for aerobatic displays, formation aerobatics, and any manoeuvre not specified for by its manufacturer. A separate display authorisation issued by SACAA is required for the purpose of display flying.
- These rules, regulations and considerations may be amended from time to time. It is the responsibility of the holder of an aerobatic rating issued by SACAA to keep abreast of any changes or new developments.
- The attached syllabus and appropriate rating form is based on the SAC Manual of Procedure as approved by the SACAA, a copy of which may be requested from the SAC Committee.

Discipline

The aerobatic rating confers the privilege of aerobatic flight on the holder. By the same token there exist certain responsibilities. Supporting the club and its activities, setting an example to other pilots by being totally professional in one's approach to the sport and flying in general by never practising new figures or manoeuvres at insufficient altitude.

Levels of Qualification for Jet/Turbine Display Competency

All initial jet/turbine aerobatic ratings will be issued in accordance with the Civil Aviation Regulations governing aerobatic flight. However, should candidates wish to present their aircraft at a show/display there are certain constraints that will be applied. The SAC recognises and endorses additional ratings, which bear witness to the pilot's ability to fly more and more complicated figures and sequences.

The candidate is examined by a panel of SAC designated aerobatic examiners (DAE's), who will, if successful, recommend to SACAA that he/she be issued with a Jet/Turbine Rating.

The limits of Jet/Turbine Aerobatic Ratings with their lower manoeuvring limits are listed below:

- Initial Issue - lower limit 1,000ft
- 2nd Level - lower limit 750 ft.
- 3rd Level - lower limit 500 ft.
- 4th Level - lower limit 300 ft.

Subsequent applications after the initial display authorisation was granted do not guarantee that a lower limit will automatically be granted. As experience is gained, the candidate may appeal to the Display Authorisation Committee (DAC) for a lower limit which will be taken under review. The applicant should have presented his sequence on at least six (6) occasions at any Air Show South Africa (ASSA) sanctioned show within a 12-month period to come into consideration for the granting of a lower limit. Pilots may receive a lower limit provided that at least three (3) members of the DAC reach consensus on approving the lower limit. Furthermore, the candidate's displays must have been observed by at least two (2) DAC members in the preceding year.

Before being allowed onto the air show circuit, the candidate must have completed a full aerobatic training programme and have demonstrated a full solo sequence of linked manoeuvres. This sequence is to be assessed by the instructor and a panel of at least two other jet/turbine instructors (or SACAA approved DAE's in the absence of jet/turbine instructors or DAE's).

When a pilot wishes to display his aircraft at a show or an event he is to obtain a Display Authorisation from SACAA on recommendation of the instructor.

Under *no* circumstance is the candidate to use an air show venue as a training environment where either the instructor is flying from the rear seat or a candidate has not yet shown adequate competency before the panel of three DAE's.

- Pilots who are the holder of aerobatic ratings shall only be permitted to display their aircraft within the privileges detailed in their certification documentation. Should pilots not have presented their aircraft within the previous 12 months, they shall automatically revert to the next higher level authorised for displays.

Mentorship Programme

Owing to the potential risk of display flying of high- performance jet/turbine aircraft it is recommended that candidates select a mentor (or alternatively "shepherd") for the development of their skills. If the aircraft is a dual seat type, then the mentor will also fly together with the candidate on the first few displays to assess and guide the candidate in the execution of a safe and presentable display.

This mentor shall be a pilot who has had previous military jet/turbine experience and who is already a holder of a jet/turbine aerobatic rating and who has experience on the particular type of aircraft (or an aircraft of similar performance) on which the candidate wishes to obtain a jet/turbine rating. The mentor should possess at least 3,000 hours' total time and have previously flown jet/turbine displays. The pilot under supervision will log the flight hours while the supervising pilot will not log the hours if he is not a qualified SACAA approved instructor.

The mentor will be required to give a brief verbal assessment and sketch of the candidates' training and general approach to display flying to the Display Authorisation Committee (DAC). This assessment will be given in strictest confidence and will not be in writing. In the event of any dispute between the mentor and his protégé or the mentor and the DAC the dispute will be referred to the ethics committee.

It will be the mentor's responsibility to refer the candidate to psychological evaluation/coaching if he has any doubts with respect to the candidates' mental approach to display flying.

Qualification Check List

Pilots who are holders of a jet/turbine aerobatic rating are to have the following items available;

- Valid Pilots Licence
- Membership of Aero Club of South Africa
- Sports Aerobatic Club Membership
- Jet/Turbine Rating

Display Authorisation

Before pilots may display their aircraft at a show or an event, they will in addition to the jet/turbine rating is required to obtain a Display Authorisation from SACAA. Any applicant for the issue of a "Warbird" category display authorisation should satisfy the DAE that he/she;

- Is the holder of a Jet/Turbine Aerobatic Rating?

- Is fully conversant with the systems and technical limitations that pertain to that particular type of aircraft.

- Is cognisant and conversant in the looping, rolling and pitching capabilities of the aircraft.

- Is fully conversant with the performance limitations in terms of height and speed required to execute the required manoeuvres.

- Is familiar with the procedures for a successful egress (ejection/bail-out) from the aircraft should this become necessary?

Lower Level Waiver.

The lower level waiver is established and granted by Aero Club of South Africa appointed Display Authorization Examiners who will council, advise and mentor and observe the candidate's attitude and ability as an aerobatic display pilot. Due cognisance will be taken of the level to which the candidate has progressed within the discipline of display aerobatics.

The DAC reserves the right to issue lower level waivers. Only in exceptional cases will authority be granted by the DAC to a lower level than what is reflected in the jet/turbine rating.

Formation Aerobatic Displays

Pilots with a Jet/Turbine endorsement **may not** be involved in any aerobatic formation flying displays without prior formalised training in formation aerobatics. The issue of an aerobatic rating is **strictly** for solo displays. Should a pilot wish to participate in any formation conducting aerobatic manoeuvres, this will only be permitted should the candidate have proven experience in high performance formation aerobatics or alternatively have undergone a formalised training and development programme for formation aerobatics.

RECOMMENDED SYLLABUS FOR JET/TURBINE AEROBATIC RATINGS

At present, the SAC does not have a school where jet/turbine aerobatics are formally taught. A candidate wishing to learn jet/turbine aerobatics will need to approach an ATO or SAC approved instructor(s) that teach jet/turbine aerobatics. SACAA has a list of professional aerobatic instructors or approved aerobatic instructors who could be approached for aerobatic instruction on these specific types. It is highly recommended for candidates to adopt a mentor as discussed in Par 9.4 above for the development of his/her skills.

As part of document CAA ARO 002 there is an amended syllabus for jet/turbine aircraft, developed for the SAC, which should be followed. The syllabus below addresses all safety aspects pertaining to aerobatic flight including recovery from unusual attitudes. The initial aerobatic training course will consist of *a minimum* of six (6) sessions each covering a specific manoeuvre with constant revision of recovery from potentially high-risk situations.

This syllabus should cover the basic aerobatic and recovery manoeuvres viz:

- *performance investigation for high performance aircraft*
- *loss of control*
- *auto-rotative manoeuvres*
- *low speed manoeuvring*
- *rolling*
- *looping*
- *turn reversals*
- *inverted flight*

The course should also cover aerobatic notation, sequence construction, energy management and display flying. The overall objective of the initial jet/turbine aerobatic training course is to prepare the candidate to fly a solo, linked sequence of basic manoeuvres.

The issue of a jet/turbine aerobatic rating would depend upon the level of sophistication of the type of aircraft to be displayed.

Training Syllabus

This document cannot be deemed to be entirely prescriptive should certain of the recommended training exercises fall outside of the aircraft's flight envelope. Discretion will be used to determine a satisfactory training regime.

The recommended expanded syllabus for jet/turbine is attached as an appendix to this document.

Operators are urged to submit alternative training programmes to SAC for their specific aircraft types should the recommended manoeuvres fall outside of the operating envelope of the specific aircraft for which a jet/turbine aerobatic rating is sought.

Prescribed Reading Matter

The following reference material and recommended reading is deemed to form part of the training syllabus for jet/turbine aerobatics;

- "*Flight Unlimited*" by Annette Carson & Eric Mueller
- "*Aerobatics*" by Neil Williams
- "*Better Aerobatics*" by Alan Cassidy
- *"Aerospace Physiological Training Program"* by Secretary of the US Air Force. (A good website for the above can be sourced on http://afpubs.hq.af.mil)

The following book is deemed to be mandatory reading for aspirant jet/turbine aerobatic pilots.

- African Aviation Series book *"Zero Error Margin"* by Des Barker