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**AIRWORTHINESS**

**OPERATIONS**

**FLIGHT TEST EVALUATION OF AIRCRAFT PERFORMANCE**

☞ Indicates changes.

☞ This AIC replaces AIC 63.2 dated 04-02-20.

☞1. **BACKGROUND**

Regulation 21.02.7(1) of the Civil Aviation Regulations, 1997, empowers the Commissioner to call for test flights of an aircraft under such conditions and in such a manner as the Commissioner may require.

☞2. **PURPOSE**

Certification test flights are used to determine if an aircraft conforms to its type design data – in particular, the critical engine inoperative en-route climb for multiple engine aircraft or maximum rate of climb for single engine aircraft. This determination is part of the overall evaluation necessary after modifications or repairs which affect performance, power plant operation, or flight characteristics whose correct functioning cannot be checked on the ground. The following information is provided in order to facilitate collection and evaluation of data for such flight tests.

3. **GENERAL REQUIREMENTS**

☞3.1 Flight tests should only be conducted by appropriately rated test pilots in terms of Part 61 of the South African Civil Aviation Authority Regulations.

☞3.2 Weather and wind conditions can have a dramatic impact on flight tests. Tests should be conducted in fair weather conditions preferably in the cooler morning hours to minimize the effects of up/down drafts. Fair weather means a clear day with no appreciable wind. Appreciable wind means any wind which impacts the aircraft's performance. If the airplane must be tested in windy conditions due to time constraints, the pilot should conduct two tests in reciprocal directions for a given heading within 15 minutes of each other starting at the same altitude. For tests which have specific mass requirements, the mass of the aircraft at the start of the second test shall be within 2% of the requirement stated in the airplane flight manual. The mass of the aircraft at the start of the second test must be planned for before takeoff and calculated based on the aircraft's fuel consumption profile. Data for both tests should be submitted to the CAA for evaluation.

3.3 Pilots must familiarize themselves with the following prior to takeoff:

- 1) the data to be collected on the latest revision of form CA 21-18;
- 2) the aircraft configuration requirements as defined in the airplane flight manual.

3.4 Experience has shown that idle and zero thrust settings for "inoperative engines" impact en-route climb test results. As a result, inoperative engine test configuration parameters require the inoperative engine to be completely shut down –including the gas generator. The shut down procedure should be conducted in a manner which does not damage the engine. Flight tests which require an engine to be shut down should only be conducted within the vicinity of a landing strip and at an altitude which allows for a safe recovery. Data for the inoperative engine must be collected and reported on CA 21-18.

3.5 Before commencing with the test, pilots must set the altimeter to 1013.2 hPa (mbs).

3.6 Before commencing with data collection, pilots must configure the aircraft in accordance with the requirements defined in the airplane flight manual and stabilize the climb. Stabilizing the climb prior to initiating data collection minimizes any effects of forward momentum on en-route and maximum rate of climb test results.

3.7 All other flights tests necessary to the design change over and above the en-route climb test shall be specified on a flight test plan to be submitted to and approved by the SACAA certification engineering division prior to commencement of the test flight.

#### 4. DATA SUBMISSIONS

4.1 In addition to submitting a completed CA 21-18 form, pilots shall sign and date copies of the airplane flight manual pages defining:

- 1) the performance chart and aircraft configuration requirements;
- 2) definition of the engine settings.

4.2 Please note that if the information requested on CA 21-18 is lacking or the configuration parameters defined in the airplane flight manual are not strictly adhered to, the affected portions of the test will need to be repeated. The reason to this being that the SACAA will have no comparative approved data to compare the client's submitted information against. Typical parameters which may be defined for the test configuration include:

Aircraft mass  
Climb speed  
Power setting  
Engine RPM  
Flap configuration  
Temperature or torque setting  
Inoperative engine feathered  
Anti icing status  
Air conditioning status  
Aircraft degrees of bank

#### 5. ADDITIONAL INFORMATION

5.1 Prior to evaluating the test data, the CAA will compare the engine(s) and propeller(s) on the aircraft with what is listed on the type certificate data sheet. If there are any differences, the CAA will determine if the deviation has been approved by an Appropriate Authority. The purpose for conducting this check is to ensure that the appropriate performance chart is used to evaluate the test data and that an appropriate Authority has evaluated and approved the deviation for incorporation onto a specific aircraft. Any unapproved deviations will require the client to submit a modification application.

5.2 Note: Form CA 21-18 has been updated to accommodate test results previously reported on form CA 21-19. All single engine and multi engine fixed wing flight test data shall be reported on form CA 21-18.

#### 6. EXEMPT AIRCRAFT

Note: The following aircraft are therefore exempt from test flight evaluation by the SACAA:

- New aircraft where a production tests flight report has been supplied.
- Aircraft where a Supplemental Type certificate has been embodied and flight manual amendments have been supplied etc.
- Aircraft eligible for C of A issuance or renewal (Maintenance test flights shall be conducted, however evaluation by the SACAA is not necessary).

