REPUBLICA DE CABO VERDE

AGÊNCIA DE AVIAÇÃO CIVIL

Circular Nº 17/DSV/2015

SUBJECT: AIRCRAFT PERFORMANCE MANUAL REVIEW PROCESS

DATE: 24/09/2015

1. OBJECTIVE

1.1.1 This circular provide guidance and directions to determine that the Certificate Holder's Aircraft Performance Operating Limitations and Airport/Runway Performance Data Analysis System meet AAC regulatory requirements.

2. PERFORMANCE DATA COMPUTATION, PRESENTATION, AND APPROVAL

2.1.1 *Performance Data Computation Systems*. A performance data computation system is defined as the system the operator uses to produce the data required to operate an aeroplane within the performance limitations specified in the Aircraft Flight Manual (AFM). The performance data computation system consists of at least the following components:

(1) An airport data acquisition, maintenance, and dissemination system (a necessary subsystem for all aeroplanes operated under CV-CAR 9).

Note: The majority of this data is available from commercial and government aeronautical charting services. Operators of large transport and commuter category aeroplanes, however, require obstacle data for takeoff computations that are more detailed than those usually supplied by a standard charting service. Operators may contract for obstacle data from commercial sources or may collect the data themselves. Performance data for each variant aircraft the operator operates should be in a format readily usable by the flightcrew (This data may be obtained from the AFM directly or purchased in a digital format suitable for computer processing.)

(2) Manual computation procedures or a computer algorithm is used for converting aircraft performance data from the AFM format to the format used by the flightcrew (The system must make all necessary computations for determining the maximum allowable weight for takeoff and for determining the V speeds to be used at the selected weight.)

2.1.2 *Current Industry Practices*. There are a wide range of methods for collecting airport and obstacle data; preparing airport analyses; and, for preparing, publishing, and distributing the performance data sections of Aircraft Operating Manuals (AOM). To implement each or all of these functions, operators may either establish a department within the company or contract the work out. Operators may contract for the collection of airport and obstacle data but produce the airport analysis in-house. Other operators may supply airport data to aircraft manufacturers or other contractors who prepare the airport analysis. Generally, major operators do more of this process in-house, while smaller operators contract for these services.

2.1.3 *Approval Criteria*. Inspectors may approve any method of performance data computation and presentation that meets the following criteria:

(1) The system must make all of the computations required in the AFM and in the pertinent operating rules;

(2) Provisions must be made in the system for all makes, models, and variations of aircraft used by the operator;

(3) The system must account for all pertinent variables such as temperature, weight, thrust, runway condition, and obstacles;

(4) The system must be appropriate to the operator's requirements. Large, highly complex aeroplanes usually require very different systems from those required for small, simple aeroplanes;

(5) The system must be reliable in that identical answers must be generated each time the process is entered with identical parameters;

(6) The system must be accurate in that it generates performance data that agrees with AFM data within the degree of accuracy inherent in the original AFM data. For example, when the AFM data is accurate to ±2%, the operator's system must produce results that do not deviate from the AFM data by more than ±2%;

(7) The system should be relatively simple, easy to use, and not error prone;

(8) When simplifying assumptions are made, those assumptions must be clearly and completely stated in the operator's AOM or Operations Manual as operator imposed limitations (for example a maximum field elevation of 4,000 feet and minimum runway length of 5,000 feet). When the assumptions cannot be met, the actions to be taken by the flightcrew, flight followers, and dispatchers must be clearly specified. In such cases, operations must be prohibited or alternate procedures specified;

(9) The flightcrew procedures for generating, obtaining, and verifying data must be thoroughly described in the procedures section of the Operations Manual. In the case of the same procedure applying to all aeroplanes, the flightcrew procedures must be described in a section of the Operations Manual.

3. MANUAL COMPUTATION SYSTEM FROM AFM DATA

3.1.1 Operators may choose to have flight crewmembers, dispatchers, or flight followers conduct manual data computations from the AFM performance section for each takeoff. Equipment is not necessary to establish the manual computation system. This system is flexible because it can be used for any runway for which the required input parameters can be obtained. The disadvantage of such a system is that computations can be difficult, complex, time consuming, and error prone. Flight crewmembers, flight followers, and dispatchers must be carefully and thoroughly trained in such a system. Flightcrew must be supplied with the location of the controlling obstacle for each runway used. While this system is widely used for small aeroplanes, it is impractical for the routine operations of large aeroplanes because of the complexity of the required computations and the high probability of human error. The system is, however, available to the operator for backup in the case of computer failure and for special one-time requirements.

3.2 TABULATED DATA METHOD

3.2.1 AFM data may be combined with airport and runway data and published in tabular format. The product of this tabulated data method is usually termed an airport analysis. Typically, the flightcrew is provided with a table for each runway and flap setting. The flight crewmember enters the temperature on the table to determine maximum allowable takeoff weight and then enters the actual weight to determine the V speeds. Additional corrections are required for factors such as wet or contaminated runways and winds.

3.2.2 Tabulated data is easier to use, less error prone and requires less training than is required for AFM data. A properly designed AOM system retains most of the operating flexibility of the AFM system. A tabulated data system reduces, but does not eliminate, human error. A disadvantage of the tabulated data system is that crewmembers must maintain an up to date chart for each runway from which operations are authorised. A means must be available to transmit current charts to the flightcrew before they are needed. Provisions must be made for temporarily shortened runways.

3.2.3 The operator must be capable of generating performance data tables which retain the degree of accuracy inherent in the AFM data. Generally, this must be done manually, by carefully picking data points from a graph, entering the data into a computer, and carefully verifying the generated points. The amount of work required to prepare tabulated data from an AFM often precludes operators from generating their own data packages. Most often the operator will be required to buy a digital data package from the manufacturer from which to generate the required tables. inspectors may approve other sources, however, when the operator can adequately establish the accuracy of the data.

3.2.4 The operator's system must be capable of performing all of the required computations for each takeoff situation, including the selection of the correct controlling obstacle for each flap setting.

3.3 SIMPLIFIED DATA METHOD

3.3.1 A simplified data system is based on a specified set of assumptions about the conditions under which the aircraft will be operated. For example, takeoffs might be limited to runways longer than 5,000 feet and less than 4,000 feet elevation. In this system, the crew is supplied with a simple chart or set of cards which gives the V speeds at specified weight increments. This chart is used on all runways. The operator performs an airport analysis for each airport served and demonstrates that when the aircraft is operated in accordance with the specified set of assumptions, it will perform either equal to, or better than, the performance required in the applicable regulations on all runways the crew is authorised to use. Some of the system's advantages are: its relative simplicity, the lack of crew error, the ease of crew training, and the speed with which the crew can determine V speeds. Some of the system's disadvantages are: it often imposes severe performance penalties on operators, it is inflexible, and operations must either be terminated or an alternate system used when the simplifying assumptions cannot be met (for such conditions as: construction, part of runway closed, ice, rain, or shortened runways). The system is best suited for operators who serve a limited number of locations regularly and who operate either at large airports, near sea level, or at moderate temperatures.

3.4 REAL TIME METHOD

3.4.1 A real time data system is one in which the required computations are made immediately before takeoff for every flight. Usually the data is relayed to the flightcrew by radio or through Aircraft Communications Addressing and Reporting System (ACARS). The advantages of such a system are that it is extremely flexible, up to date, and efficient. Changes in obstacles due to construction, weight, temperature, and runway can be handled immediately. Also, the operator can take

maximum advantage of the performance capabilities of the aeroplane. Some disadvantages of the system are that it is expensive, it requires extensive equipment and highly trained personnel to operate, and that adequate backup must be available should the main computer go off line. The operator must be able to collect all of the required data, process it, and transmit it to the crew quickly.

4. EVALUATION OF AN OPERATOR'S SYSTEM

4.1.1 Generally, inspectors do not have the capability to verify each data point when approving the performance data section of a manual. The validity and reliability of the computation system itself, however, can be evaluated.

4.1.2 Inspectors shall require the operator to provide an analysis, with documentation, of the following:

(1) Source of the computer program;

(2) Assumptions on which the computer program is based (for example, they must determine if the correct factors are used for each type of aircraft);

(3) Source and accuracy of the databases used;

(4) Operator's capability for handling data;

(5) Results of parallel manual calculations made with AFM data to confirm results.

4.1.3 The operations usually co-ordinate with the airworthiness inspector to ensure that the operator's aeroplanes meet the specifications of the certification regulations.

4.1.4 When the operator contracts for data or computation, the operator is responsible for the validity of the results. An inspectors may find that the contractor has been previously evaluated and approved for another operator. The inspectors may approve reputable sources for these services that have been previously evaluated without the documentation discussed in previous subparagraph A. If the contractor's capabilities and qualifications have not been previously established, the inspector shall require the operator to fully substantiate the contractor's qualifications before granting approval to the operator system.

4.1.5 Operators should procure computer programs from a reliable source. The computer programmers should be qualified in both education and experience. The validity of the computer program should be validated by aeronautical engineers and computer specialists.

4.1.6 All of the calculations required in the regulations for the type of aeroplane involved (as discussed in section 1) must be performed, including en-route and destination calculations.

4.1.7 For real time systems, the operator's method of obtaining data for a specific flight and for transmitting that data to and from the individual performing the calculations must be shown to be accurate and timely.

4.1.8 The inspector should review the verification process conducted by the operator. Several runways at different airports should be selected for verification with the AFM data. Short runways with obstacles should be checked by manual calculation, particularly at airports with higher temperatures and elevations.

4.1.9 The operator should be able to identify all of the obstacles evaluated by the computer and the one selected as the limiting obstacle in each case. The operator must be aware that under different temperature and weight conditions, a different flap setting may be required, and different obstacles may be controlling. The inspector should ensure that the operator has verified the limiting obstacle under various conditions and flap settings.

4.2 PROCEDURES

4.2.1 Approval of driftdown and fuel dumping procedures

4.2.1.1 Operators may request AAC approval of driftdown or fuel dumping to show compliance with terrain clearance requirements. The inspectors may approve the driftdown and fuel dumping procedures in accordance with the guidance of this paragraph.

4.2.1.2 Approval Procedures. inspectors should grant approval of driftdown and fuel dumping procedures by means of a non-standard paragraph in the operator's operations manual which contains the procedure, the limitations, and the data.

4.2.1.3 Driftdown Data and Procedures:

(1) Operators should base their proposals on manufacturer data and recommended procedures. In the absence of such data and procedures, the operator must develop the necessary data and procedures;

(2) The inspectors should require the operator that creates driftdown procedures to validate the procedures and data through validation tests.

4.2.1.4 Training Programs and Manuals. When the operator adopts driftdown or fuel dumping procedures, the procedures, limitations, and performance data must be included in the operator's manuals and training program.

4.2.2 En-route operations with landing gear extended

4.2.2.1 This paragraph contains direction and guidance to be used by inspectors when reviewing and accepting an operator's procedures for en-route operations with the landing gear extended. There are two gear down situations for which operators may seek approval. In the first situation, the operator may seek approval to dispatch an aircraft with the landing gear secured in the down position. In the second situation, the flightcrew may not be able to retract the landing gear after takeoff. In most circumstances, an operator cannot comply with the performance requirements of CV-CAR 8 when the landing gear cannot be retracted after takeoff. The PIC of such a flight is normally forced to return to the departure airport or to divert to a takeoff alternate airport. Operators may, however, operate a revenue flight with the gear down when the operator can show compliance with regulatory requirements. Inspectors s should review the following:

(1) Procedures and Data. Operators must provide flight crewmembers with procedures and approved aeroplane performance data for gear extended operations. The procedures must include speed limitations and fuel consumption data sufficient to show compliance with regulatory requirements. Inspectors should ensure that the operator has included this information in the operator's operations manual. Instruction on procedures must be included in the operator's training program;

(2) Amended Release. inspectors should verify that the operator's Operations Manual contains adequate direction and guidance to both Pilot-in-Command (PIC) and flight control personnel for amending the dispatch or flight release.

4.2.3 High speed taxi starts with one powerplant inoperative

4.2.3.1 Safety policy is not to accept high-speed taxi start procedures due to the increased risk involved with these operations. When an operator makes a compelling case for approval for such procedures, the inspectors should co-ordinate with others as required.

4.2.4 Approval of unpaved runways for turbojet operations

4.2.4.1 This paragraph contains direction and guidance for approval of the use of unpaved runways. Although the AAC discourages the operation of turbojet equipment on other than hard surfaced runways, operation of such equipment from a well-compacted, non-paved surface is possible.

4.2.4.2 Approval of Landing Surface. Inspectors must approve the use of an unpaved runway surface for turbojet operations. Approval for this type of operation must be based on actual flight test performance data acceptable to the AAC. Before the inspectors approves turbojet operations at any airport with other than paved runways, the inspectors will determine that the following conditions are met:

(1) Takeoff and landing field lengths must be based on approved flight test data for the particular type aircraft on the type of runway surface to be used;

(2) Flight testing must show that foreign object ingestion into the engines and gravel impingement upon the aircraft structure are not significant factors;

(3) The surface of the runway to be used must be reasonably stable throughout the various weather seasons; otherwise, the operations must be restricted to particular seasons.

4.2.4.3 Approval Procedures. An airport with unpaved runways is required to have special operational procedures and flight crewmember training.

4.2.4.4 Commercial Air Transport Winter Operations.

(1) This paragraph contains guidance to be used by inspectors for reviewing those portions of manuals, procedures, and training programs concerning operations in winter weather conditions. The inspectors must ensure that the operator's manuals contain specific instructions and information to flightcrew for operating each type of aircraft operated in adverse weather conditions or prohibit such operations. The inspectors should also review the content of the operator's training program to ensure adequate coverage of adverse weather operations.

(2) Training Requirements. The following subject areas should be considered in the operator's training program that is related to winter operations. These items are neither comprehensive nor exclusive, and the inspectors may require additional criteria:

(a) The requirement for a thorough pre-flight inspection in extreme temperatures;

(b) A description of the performance and control problems that would differ from normal conditions during takeoff and landing with water, slush, or wet snow on the runway;

(c) The speed, weight, and runway length adjustments that would be made when operating on contaminated runways;

(d) Criteria for takeoff, en-route, and destination weather conditions;

(e) The causes and effects to the aircraft from hydroplaning or aquaplaning;

(f) The effects of increased viscosity of fluids in cold temperatures;

(g) Adverse effect of cold temperatures on hydraulic fittings and seals;

(h) The effects of cold weather conditions to fuel pumps and fuel filter drains;

(i) Fuel contamination, fuel leaks caused by cold weather operations;

(j) The hazards associated with wet snow or slush in wheel wells when entering freezing temperatures;

(k) Techniques and procedures for braking, steering, and reversing with water, slush or snow on taxiways and runways;

(l) De-icing and anti-icing procedures and equipment for frost, ice, or snow removal from airfoils, control surfaces, and static ports;

(m)Proper adjustment of cables and rods used to manipulate flight controls;

(n) A description of landing surface conditions and appropriate braking action.

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