SEVENTEENTH SCHEDULE (Regulations 67 and 77)

MASS AND BALANCE AND PERFORMANCE FOR AIRCRAFT USED IN COMMERCIAL AIR TRANSPORT

SUBPART A: GENERAL

17.001 APPLICABILITY

(a) This Schedule prescribes mass and balance and aircraft performance and operating limitations in addition to those in the Tenth Schedule.

(b) These requirements are for aircraft used in commercial air transport by the holders of an AOC issued by Jamaica.

17.005 DEFINITIONS

For the purpose of this Schedule, the following definitions shall apply —

SEVENTEENTH SCHEDULE, *contd.*

(1) **"defined point after takeoff"**. The point, within the takeoff and initial climb phase, before which the Class 2 helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required;

(2) **"defined point before landing"**. The point, within the approach and landing phase, after which the Class 2 helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required;

(3) **"effective length of the runway"**. The distance for landing from the point at which the obstruction clearance plane associated with the approach end of the runway intersects the centreline of the runway to the far end;

(4) **"landing decision point"**. The point used in determining landing performance from which, an engine failure occurring at this point, the landing may be safely continued or a balked landing initiated;

(5) **"obstruction clearance plane"**. A plane sloping upward from the runway at a slope of 1:20 to the horizontal, and tangent to or clearing all obstructions within a specified area surrounding the runway as shown in a profile view of that area. In the plane view, the centreline of the specified area coincides with the centreline of the runway, beginning at the point where the obstruction clearance plane intersects the centreline of the runway and proceeding to a point at least 1,500 feet from the beginning point. Thereafter, the centreline coincides with the takeoff path over the ground for the runway (in the case of takeoffs) or with the instrument approach counterpart (for landings), or where the applicable one of these paths has not been established, it proceeds consistent with turns of at least 4,000 foot radius until a point is reached beyond which the obstruction clearance plane clears all obstructions. This area extends laterally 200 feet on each side of the centreline at the point where the obstruction clearance plane intersects the runway and continues at this width to the end of the runway; then it increases uniformly to 500 feet on each side of the centreline at a point 1,500 feet from the intersection of the obstruction clearance plane with the runway; thereafter, it extends laterally 500 feet on each side of the centreline;

(6) **"takeoff decision point"**. The point used in determining takeoff performance of a Class 1 helicopter from which, an engine failure occurring at this point, either a rejected takeoff may be made or a takeoff safely continued.

17.010 ACRONYMS

The following acronyms are used in this Schedule -

(1) AFM – Aeroplane Flight Manual;
(2) AGL – Above Ground Level;
(3) AOC – Air Operator Certificate;
(4) AOM – Aircraft Operating Manual;
(5) MEA — Minimum Enroute Altitude;
(6) MOCA — Minimum Obstruction Clearance Altitude;
(7) MSL – Mean Sea Level;
(8) RFM – Rotorcraft Flight Manual;
(9) PIC – Pilot-in-command;
(10) SIC – Second-in-Command;
(11) SM – Statute Miles;
(12) V_1. – Takeoff decision speed;
(13) V_{mo}. – Maximum operating speed;
(14) V_{so}. – Stalling speed or the minimum steady flight speed in the landing configuration.

17.015 MINIMUM REQUIREMENTS

(a) Every person operating an aircraft engaged in commercial air transport shall comply with the minimum performance approved or accepted by the Authority under the provisions of this Schedule.

SEVENTEENTH SCHEDULE, *contd.*

(b) The Authority may authorize deviations from the requirements of this Schedule if special circumstances make a literal observance of a requirement unnecessary for safety.

(c) Where full compliance with the requirements of this Schedule cannot be met due to specific design characteristics (e.g., seaplanes, airships or supersonic aircraft), the operator shall apply alternative performance standards that ensure a level of safety not less restrictive than those of relevant requirements of this Schedule that are acceptable to the Authority.

SUBPART B: APPLICABLE CODE OF PERFORMANCE

17.020 APPROVAL OF CODE OF PERFORMANCE

(a) For aircraft of Jamaica registry, the operators of such aircraft must comply with the comprehensive and detailed code of performance approved for their aircraft during the process of certification by the Authority.

(b) For aircraft of other States of Registry to be operated under a Jamaica AOC, the operators of such aircraft must comply with the comprehensive and detailed code of performance accepted for their aircraft during the process of certification by the Authority, provided that such codes are found to meet the minimum requirements of this Schedule.

17.025 ACCEPTABLE CODES OF PERFORMANCE

The following comprehensive and detailed codes of performance are acceptable to and may be required to be met by the Authority for commercial air transport operations with respect to the category and class of aircraft to be used –

(1) United States Federal Aviation Administration;
(2) European Joint Aviation Authority; and
(3) Canadian Transport Canada.

17.030 CONSIDERATION OF OTHER CODES OF PERFORMANCE

To be eligible for approval or acceptance by the Authority, the comprehensive and detailed code of performance issued by an ICAO Contracting State for commercial air transport may be considered provided –

(1) the Code is in conformance with the applicable Standards of ICAO Annex 6 and 8;
(2) the use of this Code will result in performance that meets the minimum requirements contained in this Schedule;
(3) this Code is in English or certified translation to English;
(4) a copy of this Code is provided with the application for including the aircraft on the AOC; and
(5) there is a satisfactory method of updating the Authority's copy of this Code throughout the period of time the aircraft is registered in Jamaica.

SUBPART C: MASS AND BALANCE

17.035 SUPERVISION OF LOADING

(a) Every AOC holder shall designate in writing the person(s) that is to –

(1) supervise the proper loading of the aircraft;
(2) make the computation of the load manifest for aircraft loading and centre of gravity; and
(3) determine that the aircraft will be capable of meeting the applicable performance requirements.

(b) This person will be trained to competence for these tasks on each aircraft type and variant before being allowed to sign the load manifest.

(c) The person supervising the loading and computing the aircraft load, centre of gravity and performance shall be provided the relevant current weights and aircraft limitations that will affect the performance of that aircraft.

SEVENTEENTH SCHEDULE, *contd.*

17.040 APPROVED METHOD REQUIRED

No person shall compute the load manifest using any method, policy or information other than that specifically approved by the Authority for the aircraft type, supplemental loading documents, seasonal issues, non-standard passengers and type of operation to be conducted.

17.045 SIGNATURE REQUIRED

(a) The person preparing the load manifest shall be named on the document.

(b) The person supervising the loading of the aircraft shall confirm by signature that the load and its distribution are in accordance with the load manifest.

17.050 LAST MINUTE CHANGES

(a) Last minute changes to aircraft loading will be provided to the PIC and the person(s) responsible for computation of the aircraft loading and CG.

(b) Unless there is an approved methodology for considering last minute changes to passenger or cargo weights, the person responsible for the computation will re-compute all factors.

(c) The effect of the last minute changes will be provided to the PIC and the person(s) responsible for the computation of the aircraft loading and CG.

(d) This information shall be noted on the load manifest that is retained at the airport of departure.

17.055 DETERMINATION OF AIRCRAFT EMPTY OPERATING MASS

(a) The holder of an Air Operator Certificate (AOC) shall not operate an aircraft unless –

(1) the aircraft has been weighed during the period of five years immediately preceding the operation, and a mass and balance report has been produced which shows the aircraft's empty operating weight and which is available in respect thereof;

(2) where equipment, with a total mass of 0.5 percent or more of the maximum take-off mass of the aircraft is added or removed, unless the aircraft is weighed and a mass and balance report is prepared and certified by an authorized person, subsequent to the installation or removal;

(3) where a modification or cabin configuration change is carried out, that causes the centre of gravity of the aircraft to move by 0.5 percent or more of the Mean Aerodynamic Chord (MAC), unless the aircraft is weighed and a new mass and balance report is prepared and certified by an authorised person; and

(4) where equipment, with a total weight less than 0.5 percent of the maximum take-off weight of the aircraft is added or removed, or a modification or configuration change results in a movement of the centre of gravity of less than 0.5 percent, unless a new determination of the empty mass and empty mass centre of gravity, is carried out by calculation, or the procedure in subparagraphs (a) (2) and (3) of this Subsection is carried out.

(5) where the aircraft is a single piston-engine aircraft of 2730kg or less MCTOW, the requirements of subparagraph (a), (1) above are not applicable. However, any aircraft being registered in Jamaica for the first time must have been weighed, and a mass and balance report completed, within the ninety-day period immediately prior to it receiving a Jamaican Certificate of Airworthiness.

(b) No person shall complete a mass and balance computation and the subsequent report for an aircraft certified for a maximum take-off mass of -

(1) 5700 kg or less, unless that person is the holder of an Aircraft Maintenance Engineer Licence, type rated for the applicable aircraft; or

(2) more than 5700 kg, unless the person certifying the mass and balance report computation is approved to do so by the Authority, either directly, or through an Approved Maintenance Organization.

(c) Where the procedures established in paragraphs (a), (b), and (c) of this Subsection have not been followed, the Certificate of Airworthiness of the aircraft ceases to be valid.

SEVENTEENTH SCHEDULE, *contd.*

(d) A copy of the latest mass and balance report shall be provided to the Authority and a copy shall be carried on board the aircraft during flight time.

17.060 DETERMINATION OF ACTUAL PASSENGER WEIGHTS

(a) When making the determination of actual weights, the passengers' personal belongings and carry on baggage shall be included.

(b) The weighing of the passengers and their items shall be conducted immediately prior to boarding and at an adjacent location.

17.065 DETERMINATION OF AVERAGE PASSENGER WEIGHTS

(a) No person may use average passenger weights in the computation of aircraft loading and CG, unless there has been a determination of the relationship between the actual weights being carried and the selected average weights to determine their validity.

(b) The method for the determination of the relationships shall be determined through the method prescribed by the Authority.

SUBPART D: COMPUTATIONS OF APPLICABLE WEIGHTS AND PERFORMANCE

17.070 AIRCRAFT PERFORMANCE CALCULATIONS

(a) No person may commence a flight in commercial air transport without ensuring that the applicable operating and performance limitations required for this Schedule can be accurately computed based on the AFM, RFM or other data source approved by the Authority.

(b) Each person calculating performance and operating limitations for aircraft used in commercial air transport shall ensure that performance data used to determine compliance with this Schedule can, during any phase of flight, accurately account for —

(1) any reasonably expected adverse operating conditions that may affect aircraft performance;
(2) one engine failure for aircraft having two engines, if applicable; and
(3) two engine failure for aircraft having three or more engines, if applicable.

(c) When calculating the performance and limitation requirements, each person performing the calculation shall, for all engines operating and for inoperative engines, accurately account for—

(1) in all phases of flight —
   (i) the effect of fuel and oil consumption on aircraft weight;
   (ii) the effect of fuel consumption on fuel reserves resulting from changes in flight paths, winds and aircraft configuration;
   (iii) the effect of fuel jettisoning on aircraft weight and fuel reserves, if applicable and approved;
   (iv) the effect of any ice protection system, if applicable and weather conditions require its use;
   (v) ambient temperatures and winds along intended route and any planned diversion; and
   (vi) flight paths and minimum altitudes required to remain clear of obstacles; and

(2) during takeoff and landing —
   (i) the condition of the takeoff runway or area to be used, including any contaminates (e.g., water, slush, snow, ice);
   (ii) the gradient of runway to be used;
   (iii) the runway length including clearways and stopways, if applicable;
   (iv) pressure altitudes at takeoff and landing sites;
   (v) Current ambient temperatures and winds at takeoff;
   (vi) forecast ambient temperatures and winds at each destination and planned alternate landing site;

SEVENTEENTH SCHEDULE, *contd.*

(vii) the ground handling characteristics (e.g., braking action) of the type of aircraft; and
(viii) landing aids and terrain that may affect the takeoff path, landing path and landing roll.

(d) Where conditions are different from those on which the performance is based, compliance may be determined by interpolation or by computing the effects of changes in the specific variables, if the results of the interpolation or computations are substantially as accurate as the results of direct tests.

(e) To allow for wind effect, takeoff data based on still air may be corrected by taking into account not more than 50 percent of any reported headwind component and not less than 150 percent of any reported tailwind component.

SUBPART E: RESTRICTED PERFORMANCE AIRCRAFT

17.075 SINGLE ENGINE AIRCRAFT

Unless approved pursuant to the Tenth Schedule, Subsection 10.718, no person may operate a single-engine aircraft used for passenger carrying operations in commercial air transport unless that aircraft is continually operated –

(1) in daylight;
(2) VMC, excluding over the top of any cloud layer; and
(3) over such routes and diversions therefrom that permit a safe forced landing to be executed in the event of engine failure.

17.080 RESTRICTED PERFORMANCE MULTI-ENGINE AIRCRAFT

(a) No person may operate a restricted performance multiengine aircraft with a passenger capacity of 9 passengers or less in commercial air transport carrying passengers that will be unable to comply with the performance limitations of this Schedule, unless that aircraft is continually operated at a weight that will allow it to climb, with the critical engine inoperative –

(1) at least 200 feet per minute immediately after takeoff;
(2) at least 50 feet a minute when operating at the MEAs of the intended route or any planned diversion, or at 5,000 feet MSL, whichever is higher; and
(3) at least 200 feet per minute in the climbout following a balked landing.

(b) If the aircraft's performance capability is computed to be less than specified in paragraph (a) of this Subsection, the person(s) operating that aircraft shall comply with the performance restrictions applicable to single-engine aircraft.

SUBPART F: TAKEOFF LIMITATIONS

17.085 AEROPLANES

No person may take off an aeroplane used in commercial air transport unless the following requirements are met when determining the maximum permitted take-off mass –

(1) the takeoff run shall not be greater than the length of the runway;
(2) for turbine engine powered aeroplanes —
  (i) the takeoff distance shall not exceed the length of the runway plus the length of any clearway, except that the length of any clearway included in the calculation shall not be greater than 1/2 the length of the runway; and
  (ii) the accelerate-stop distance shall not exceed the length of the runway, plus the length of any stopway, at any time during takeoff until reaching V_1;
(3) for reciprocating engine powered aeroplanes —
  (i) the accelerate-stop distance shall not exceed the length of the runway at any time during takeoff until reaching V_1; and

SEVENTEENTH SCHEDULE, *contd.*

(4) Where the critical engine fails at any time after the aeroplane reaches V_1, to continue the takeoff flight path and clear all obstacles either —

(i) by a height of at least 9.1 m (35 ft) vertically for turbine engine powered aeroplanes or 15.2 m (50 ft) for reciprocating engine powered aeroplanes; and

(ii) by at least 60 m (200 ft) horizontally within the aerodrome boundaries and by at least 90 meters (300 feet) horizontally after passing the boundaries, without banking more than 15 degrees at any point on the takeoff flight path.

17.090 HELICOPTERS

No person may take off a helicopter used in commercial air transport that, in the event of a critical engine failure, cannot —

(1) in the case of Class 1 helicopters —

(i) at or before the takeoff decision point, discontinue the takeoff and stop within the rejected takeoff area; or

(ii) after the takeoff decision point, continue the takeoff and then climb, clearing all obstacles along the flight path, until a suitable landing site is found; and

(2) for Class 2 helicopters —

(i) before reaching a defined point after takeoff, safely execute a forced landing within the rejected takeoff area; or

(ii) at any point after reaching a defined point after takeoff, continue the takeoff and then climb, clearing all obstacles along the flight path until a suitable landing site is found.

SUBPART G: ENROUTE LIMITATIONS

17.095 ENROUTE LIMITATIONS – ALL ENGINES OPERATING

No person may take off a reciprocating engine powered aeroplane used in commercial air transport at a weight that does not allow a rate of climb of at least 6.9 V_{so}, (that is, the number of feet per minute obtained by multiplying the aircraft's minimum steady flight speed by 6.9) with all engines operating, at an altitude of at least 300 m (1,000 ft) above all terrain and obstructions within ten miles of each side of the intended track.

17.100 AEROPLANES - ONE ENGINE INOPERATIVE

No person may take off an aeroplane used in commercial air transport having two engines unless that aeroplane can, in the event of a power failure at the most critical point enroute, continue the flight to a suitable aerodrome where a landing can be made while allowing —

(1) for reciprocating engine powered aeroplanes —

(i) at least a rate of climb of 0.079 (0.106/number of engines installed) V_{so}^2 (when V_{so} is expressed in knots) at an altitude of 300 m (1,000 ft) above all terrain and obstructions within 9.3 km (5 sm), on each side of the intended track; and

(ii) a positive slope at an altitude of at least 450 m (1,500 ft) above the aerodrome where the aeroplane is assumed to land;

(2) for turbine engine powered transport category aeroplanes —

(i) a positive slope at an altitude of at least 300 m (1,000 ft) above all terrain and obstructions within 9.3 km (5 sm), on each side of the intended track;

(ii) a net flight path from cruising altitude to the intended landing aerodrome that allows at least 600 m (2,000 ft) clearance above all terrain and obstructions within 9.3 km (5 sm), on each side of the intended track; and

(iii) a positive slope at an altitude of at least 450 m (1,500 ft) above the aerodrome where the aeroplane is assumed to land.

*(**Note:** The climb rate specified in sub-subparagraph (a) (1) (i) of this Subsection may be amended to 0.026 V_{so}^2 for large transport category aircraft issued a type certificate prior to 1953.)*

SEVENTEENTH SCHEDULE, *contd.*

*(**Note:** The 9.3 km (5 sm) clearance margin stated in paragraph (a) of this Subsection shall be increased to 18.5 km (10 sm) if navigational accuracy does not meet the 95% containment level.)*

17.105 HELICOPTERS - ONE ENGINE INOPERATIVE

No person shall take off a helicopter used in commercial air transport having two engines unless that helicopter can, in the event of the critical engine failing at any point in the enroute phase, continue the flight to the destination or alternate landing site without flying below the minimum flight altitude at any point and clearing all obstacles in the approach path by a safe margin.

17.110 AEROPLANES – TWO ENGINES INOPERATIVE

No person may take off an aeroplane used in commercial air transport having three or more engines at such a weight where there is no suitable landing aerodrome within 90 minutes at any point along the intended route (with all engines operating at cruising power), unless that aircraft can, in the event of simultaneous power failure of two critical engines at the most critical point along that route, continue to a suitable landing aerodrome while allowing —

(1) for turbine engine powered aeroplanes —

(i) a net flight path (considering the ambient temperatures anticipated along the track) clearing vertically by at least 600 m (2,000 ft) all terrain and obstructions within five statute miles (4.34 nautical miles) on each side of the intended track;

(ii) a positive slope at 450 m (1,500 ft) above the aerodrome of intended landing; and

(iii) enough fuel to continue to the aerodrome of intended landing, to arrive at an altitude of at least 450 m (1,500 ft) directly over the aerodrome, and thereafter to fly for 15 minutes at cruise power.

*(**Note:** The consumption of fuel and oil after the engine failure is the same as the consumption that is allowed for in the net flight path data in the AFM.)*

(2) for reciprocating engine powered aeroplanes —

(i) a rate of climb at 0.013 V_{so}^2 feet per minute (that is, the number of feet per minute is obtained by multiplying the number of knots squared by 0.013) at an altitude of 300 m (1,000 ft) above the highest ground or obstruction within 10 sm (8.68 nm) on each side of the intended track, or at an altitude of 1,500 m (5,000 ft), which ever is higher; and

(ii) enough fuel to continue to the aerodrome of intended landing and to arrive at an altitude of at least 300 m (1,000 ft) directly over that aerodrome.

*(**Note:** When the two engines of the reciprocating aeroplane are predicted to fail at an altitude above the prescribed minimum altitude, compliance with the prescribed rate of climb need not be shown during the descent from the cruising altitude to the prescribed minimum altitude, if those requirements can be met once the prescribed minimum altitude is reached, and assuming descent to be along a net flight path and the rate of descent to be 0.013 V_{so}^2 greater than the rate in the approved performance data.)*

*(**Note:** If fuel jettisoning is authorized (or planned), the aeroplane's weight at the point where the two engines fail is considered to be not less than that which would include enough fuel to proceed to an aerodrome and to arrive at an altitude of at least 300 m (1,000 ft) directly over that aerodrome.)*

17.115 HELICOPTERS – TWO ENGINES INOPERATIVE

No person shall take off a Class 1 or Class 2 helicopter used in commercial air transport having three or more engines unless that helicopter can, in the event of two critical engines failing simultaneously at any point in the *en route* phase, continue the flight to a suitable landing site.

SEVENTEENTH SCHEDULE, *contd.*

SUBPART H: LANDING LIMITATIONS

17.120 AEROPLANES

(a) No person may take off an aeroplane used in commercial operations unless its weight on arrival at either the intended destination aerodrome or any planned alternate aerodrome would allow a full stop landing –

(1) for turbine engine powered aeroplanes, within 60 percent of the effective length of each runway from a point 50 feet above the intersection of the obstruction clearance plane and the runway;

(2) for reciprocating engine powered aeroplanes, within 70 percent of the effective length of each runway from a point 50 feet above the intersection of the obstruction clearance plane and the runway; and

(3) for seaplanes, to a satisfactory low speed within the landing distance available from a point that safely clears all obstacles in the approach path.

(b) For the purpose of determining the allowable landing weight at the destination aerodrome, each person determining the landing limit shall ensure that —

(1) the aeroplane is landed on the most favourable runway and in the most favourable direction, in still air; or

(2) the aeroplane is landed on the most suitable runway considering the probable wind velocity and direction, runway conditions, the ground handling characteristics of the aeroplane, and considering other conditions such as landing aids and terrain; and

(3) consideration is given to variations in the approach and landing techniques if such allowance has not been made in the scheduling of performance data or if required by abnormal situations such as aircraft unserviceabilities, adverse weather conditions or other considerations.

*(**Note:** If the runway at the landing destination is reported or forecast to be wet or slippery, the landing distance available shall be at least 115 percent of the required landing distance unless, based on a showing of actual operating landing techniques on wet or slippery runways, a shorter landing distance (but not less than that required by paragraph (a) of this Subsection) has been approved for a specific type and model aeroplane and this information is included in the AFM.)*

(c) A turbine powered transport category aeroplane that would be prohibited from taking off because it could not meet the requirements of subparagraph (a) (1) of this Subsection, may take off if an alternate aerodrome is specified that meets all the requirements of paragraph (a) of this Subsection.

SEVENTEENTH SCHEDULE, *contd.*

17.125 HELICOPTERS

(a) No person may take off a helicopter used in commercial air transport unless, with all engines operating on arrival at the intended destination landing site or any planned alternate landing, it can clear all obstacles on the approach path and can land and stop within the landing distance available.

(b) No person may take off a helicopter used in commercial air transport unless, in the event of any engine becoming inoperative in the approach and landing phase on arrival at the intended destination landing site or any planned alternate landing, can —

(1) for Class 1 helicopters —

(i) before the landing decision point, clear all obstacles on the approach path and be able to land and stop within the landing distance available or to perform a balked landing and clear all obstacles in the flight path by an adequate margin; or

(ii) after the landing decision point, land and stop within the landing distance available; and

(2) for Class 2 and Class 3 helicopters —

(i) before reaching a defined point before landing, safely execute a forced landing within the landing distance available.