



SIERRA LEONE CIVIL AVIATION AUTHORITY

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Flight Engineer Skill Test Standards

Director General
Sierra Leone Civil Aviation Authority

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FOREWORD

The Sierra Leone Civil Aviation Authority (SLCAA) has developed skill test standards for airmen licences and ratings and these are published as Advisory Circulars (ACs). This AC establishes the standards for the Flight Engineer licence skill tests. Sierra Leone inspectors and designated flight engineer examiners shall conduct skill tests in compliance with these standards. Flight engineer instructors and applicants should find these standards helpful in skill test preparation. Other ACs have been developed for other airmen licences and can be obtained from the SLCAA website: <http://www.slcaa.gov.sl>

Information considered directive in nature is described in this skill test AC in terms such as “shall” and “must”, indicating the actions are mandatory. Guidance information is described in terms such as “should” and “may” indicating the actions are desirable or permissive, but not mandatory.

The Sierra Leone Civil Aviation Regulations (SLCARs) can be obtained from the SLCAA at the address listed below. SLCARs Part 1A covers the requirements for personnel licensing.

This Skill Test Standard may be downloaded from the SLCAA website at <http://www.slcaa.gov.sl> Subsequent changes to the Skill Test Standard will also be available on the SLCAA web site.

Comments regarding this publication should be sent to
Sierra Leone Civil Aviation Authority
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SECTION ONE: INSTRUCTIONS

1.1 GENERAL

The SLCAA has developed this skill test AC as the standard that shall be used by SLCAA inspectors and designated flight test examiners when conducting Flight Engineer skill tests. Flight instructors are expected to use this book when preparing applicants for skill tests. Applicants should be familiar with this book and refer to these standards during their training.

1.2 PURPOSE

The purpose of this AC is to prescribe the standards that shall be used by SLCAA inspectors and designated flight test examiners when conducting Flight Engineer skill tests. Flight instructors are expected to use this document when preparing applicants for skill tests. Applicants should be familiar with this document and refer to these standards during their training.

1.3 SKILL TEST STANDARD CONCEPT

The SLCARs specify the areas in which knowledge and skill must be demonstrated by the applicant before the issuance of a licence or rating. The SLCARs provide the flexibility to permit the SLCAA to publish Skill Test Standards (STS) containing the AREAS OF OPERATION and specific TASKS in which flight engineer competency shall be demonstrated. The SLCAA will revise this STS whenever it is determined that changes are needed in the interest of safety. Adherence to the provisions of the regulations and the STS is mandatory for evaluation of flight engineer applicants

1.4 SKILL TEST DESCRIPTION

- 1) This AC contains the STS for the initial issuance of a Flight Engineer licence and for the addition of class ratings to that licence. The flight engineer STS including the AREAS OF OPERATION and TASKS.
- 2) AREAS OF OPERATION are phases of the skill test arranged in a logical sequence within each standard. Section Two is conducted on the ground and contains TASKS to determine the applicant’s knowledge of the aircraft, applicable equipment, documents, operating manuals, performance, and limitations. Section Three contains TASKS to determine the applicant’s knowledge and skill during preflight, ground, flight, and post flight procedures. The examiner may conduct the skill test in any sequence that results in an efficient and valid test.
- 3) TASKS list the required knowledge and skills appropriate to an AREA OF OPERATION.
- 4) NOTE is used to emphasize special considerations required in the AREA OF OPERATION or TASK.

REFERENCE identifies the publication(s) that describe(s) the TASK. Descriptions of TASKS are not included in the standards because this information can be found in the current issue of the listed references. Publications other than those listed may be used for references if their content conveys substantially the same meaning as the referenced publications. The STSs are based on the following references:

SLCARs Part 1A	Personnel Licensing
SLCARs Part 6A	Operations
SLCARs Part 8A	Airworthiness of Aircraft
SLCARs Part 22	General Policies, Procedures, and Definitions
SLCARs Part 25	Instruments and Equipment
SLCARs Part 26	Air Operator Certification

FMS	Flight Management System
FSTD	Flight Simulation Training Device
GLS	GNSS Landing System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
IAP	Instrument Approach Procedure
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IPC	Instrument Proficiency Check
LAHSO	Land and Hold Short Operations
LCD	Liquid Crystal Display
LDA	Localizer-type Directional Aid
LED	Light Emitting Diode
LOC	ILS Localizer
LORAN	Long Range Navigation
MAP	Missed Approach Point
ACA	Minimum Descent Attitude
METAR	Aviation Routine Weather Report
MLS	Microwave Landing System
NAVAID	Navigational Aid
NDB	Non-Directional Beacon
NOTAM	Notice to Airmen
NPA	Non precision Approach
PA	Precision Approach
RAIM	Receiver Autonomous Integrity Monitoring
RMI	Radio Magnetic Indicator
RNAV	Area navigation
SAS	Stability Augmentation System
SDF	Simplified Directional Facility
SIGMETS	Significant Meteorological Advisory
SRM	Single Pilot Resource Management
STAR	Standard Terminal Arrival
STS	Skill Test Standards
TCAS	Traffic Alert and Collision Avoidance System
VDP	Visual Descent Point
VHF	Very High Frequency
VNAV	Vertical Navigation
VOR	Very High Frequency Ominidirectional Range

1.5 USE OF THE SKILL TEST STANDARDS

- (1) The TASKS contained in this skill test standard apply to applicants for an initial flight engineer licence or when adding a class rating to an existing flight engineer licence. With certain exceptions, some described by NOTES, all TASKS are required; however, when a particular element is not appropriate to the aircraft or its equipment, that element, at the discretion of the examiner, may be omitted.
- (2) It is not intended that the examiner follow the precise order that the AREAS OF OPERATION and TASKS appear in this skill test standard. The examiner may change the sequence or combine TASKS with similar OBJECTIVES to conserve time. Although TASKS with similar OBJECTIVES may be combined to conserve

time, the OBJECTIVES of all TASKS must be demonstrated and evaluated at some time during the skill test. Examiners must develop a written plan of action that includes the order and combination of TASKS to be demonstrated by the applicant in a manner that results in an efficient and valid test. It is of utmost importance that the examiner accurately evaluates the applicant, placing special emphasis on operations considered critical to flight safety.

1.5.1 Testing in TASKS and in Normal, Abnormal, and Emergency Procedures

Inspectors and examiners should be guided by the following when conducting the flight test phase of the skill test:

- (1) **Skill Test Standards.** The TASKS and procedures that must be evaluated are shown in the skill test standards, as amended.
- (2) **Operator's Manual or Aircraft Flight Manual.** The specific manner that TASKS and procedures must be accomplished by the applicant is shown in the operator's manual or aircraft flight manual.
- (3) **Selection of Procedures.** Examiners shall evaluate as many procedures as necessary to determine that the applicant meets the knowledge and skill set forth in the OBJECTIVE of each TASK. Examiners shall vary the selection and sequence of procedures on successive flight tests in order to evaluate the effectiveness of the operator's training program.
- (4) **Combining, Compounding, and Overloading.** Good judgement is essential to avoid overloading the applicant with unrealistic combinations of TASKS. On the other hand, if the applicant should fail to accomplish a TASK or procedure satisfactorily, it would be realistic to introduce an additional problem that would logically result from the unsatisfactory accomplishment of an earlier TASK. This

1.6 SPECIAL EMPHASIS AREAS [RESERVED]

1.7 SKILL TEST PREREQUISITES

An applicant for a Flight Engineer Licence Skill Test is required to:

- a) Meet the applicable requirements in SLCARs Part 1A for a flight engineer licence rating;
- b) Hold the appropriate medical certificate;
- c) Pass the required knowledge test; and
- d) **Instructor Authorisation:** Obtain a written endorsement from an authorised instructor certifying that the applicant has met the flight training requirements for the skill test. The endorsement shall also state that the instructor finds the applicant competent to pass the skill test and that the applicant has satisfactory knowledge of the subject area(s) in which a deficiency was indicated by the Airman Knowledge Test Report.

1.8 AIRCRAFT AND EQUIPMENT REQUIRED FOR THE SKILL TEST

If appropriate to a specific TASK listed in Section 2.0 of this skill test standard, the applicant is required to provide an appropriate and airworthy aircraft for the skill test. Its operating limitations must not prohibit the TASKS required on the skill test. The aircraft and crew complement must require a flight engineer.

1.9 USE OF SLCAA-APPROVED FLIGHT SIMULATION TRAINING DEVICE (RESERVED)

1.10 FLIGHT INSTRUCTOR RESPONSIBILITY

- (1) An appropriately rated flight instructor is responsible for training the pilot applicant to acceptable standards in all subject matter areas, procedures, and maneuvers included in the TASKS within the appropriate skill test standard.
- (2) Because of the impact of their teaching activities in developing safe, proficient pilots, flight engineer instructors should exhibit a high level of knowledge, skill, and the ability to impart that knowledge and skill to students. Additionally, the flight engineer instructor must certify that the applicant is able to perform safely as an pilot and is competent to pass the required skill test.

- (3) Throughout the applicant's training, the flight engineer instructor is responsible for emphasizing the performance of effective visual scanning, collision avoidance, and runway incursion avoidance procedures

1.11 EXAMINER RESPONSIBILITY

- (1) The inspector or examiner conducting the skill test is responsible for determining that the applicant meets the prerequisites for certification and the standards outlined in this skill test standard. The examiner shall meet this responsibility by determining that the applicant's knowledge and skill meet the OBJECTIVES in all required TASKS.

1.12 SATISFACTORY PERFORMANCE

The skill test is passed if, in the judgement of the examiner, the applicant demonstrates satisfactory performance with regard to:

- (1) Executing TASKS within the aircraft's performance capabilities and limitations, including use of its systems;
- (2) Executing normal, abnormal, and emergency procedures TASKS appropriate to the aircraft;
- (3) Executing procedures expeditiously and accurately;
- (4) Demonstrating crew resource management;
- (5) Applying systems knowledge; and
- (6) Showing mastery of the aircraft systems and procedures, within the standards outlined in this skill test standard, with the successful outcome of a TASK never in doubt.

1.13 UNSATISFACTORY PERFORMANCE

- (1) Consistently exceeding tolerances or limitations stated in the TASK, Objective, or aircraft operating manual(s), or failure to take prompt corrective action when tolerances or limitations are exceeded, are indicative of unsatisfactory performance. Any action or lack thereof, by the applicant that requires corrective intervention by the examiner or another crewmember to maintain safe flight, shall be disqualifying.

NOTE: It is vitally important that the applicant, other crewmembers, and the examiner use proper and effective scanning techniques to observe other traffic in the area throughout the flight regime.

- (2) If, in the judgment of the examiner, the applicant's performance of any TASK is unsatisfactory, the associated AREA OF OPERATION is failed; therefore, the skill test is failed. Examiners shall not repeat TASKS that have been attempted and failed. The examiner or the applicant may discontinue the test at any time after the failure of a TASK makes the applicant ineligible for the licence or rating sought. The skill test will be continued only with the consent of the applicant. In such cases, it is usually better for the examiner to continue with the skill test to complete the other TASKS. If the examiner determines that the entire skill test must be repeated, the skill test should not be continued, but should be terminated immediately. If the skill test is either continued or discontinued, the applicant is entitled to credit for AREAS OF OPERATION satisfactorily completed; however, during a retest, and at the discretion of the examiner, any TASK may be reevaluated including those previously passed. Whether the remaining parts of the skill test are continued or not after a failure, a notice of disapproval must be issued
- (3) When the examiner determines that a TASK is incomplete, or the outcome uncertain, the examiner may require the applicant to repeat that TASK, or portions of that TASK. This provision has been made in the interest of fairness and does not mean that instruction or practice is permitted during the certification process.

When skill, the remaining TASKS of the skill test phase should be completed before repeating the questionable TASK. If the second attempt to perform a questionable TASK is not clearly satisfactory, the examiner shall consider it unsatisfactory.

- (4) If the skill test must be terminated for unsatisfactory performance and there are other TASKS that have not been tested or still need to be repeated, a notice of disapproval shall be issued listing the AREAS OF OPERATION that have not been successfully completed.
- (5) This skill test standard uses the terms AREA OF OPERATION and TASK to denote areas in which competency must be demonstrated. When a disapproval notice is issued, the examiner must record the applicant's unsatisfactory performance in terms of AREA OF OPERATION and TASK appropriate to the skill test conducted. In addition, the examiner should document the date of satisfactory completion of the oral evaluation. Recording the date of successful oral completion on the disapproval notice is essential for determining when the oral must be re-accomplished.

1.14 DISCONTINUANCE OF A SKILL TEST

When a skill test is discontinued for reasons other than unsatisfactory performance (i.e., equipment failure, weather, or illness) SLCAA Airman Licence and/or Rating Application, and, if applicable, the Airman Knowledge Test Report, shall be returned to the applicant. The examiner at that time shall prepare, sign, and issue a Letter of Discontinuance to the applicant. The Letter of Discontinuance should identify the AREAS OF OPERATION and their associated TASKS of the skill test that were successfully completed. The applicant shall be advised that the Letter of Discontinuance shall be presented to the examiner when the skill test is resumed, and made part of the certification file.

1.15 AERONAUTICAL DECISION MAKING AND RISK MANAGEMENT

- (1) The examiner shall evaluate the applicant's ability throughout the skill test to use good aeronautical decision making procedures in order to evaluate risks. The examiner shall accomplish this requirement by developing scenarios that incorporate as many TASKS as possible to evaluate the applicants risk management in making safe aeronautical decisions. For example, the examiner may develop a scenario that incorporates weather decisions and performance planning.
- (2) The applicant's ability to utilize all the assets available in making a risk analysis to determine the safest course of action is essential for satisfactory performance. The scenarios should be realistic and within the capabilities of the aircraft used for the skill test.

1.16 CREW RESOURCE MANAGEMENT

- (1) CRM refers to the effective use of all available resources; human resources, hardware, and information. Human resources include all other groups routinely working with the cockpit crew (or pilot) who are involved in decisions that are required to operate a flight safely. These groups include, but are not limited to: flight operations officers, cabin crew members, maintenance personnel, and air traffic controllers. CRM is not a single TASK. CRM is a set of skill competencies which must be evident in all TASKS in this skill test standard as

applied to the single-pilot or the multi-crew operation. CRM competencies, grouped into three clusters of observable behaviour, are:

- (a) **COMMUNICATIONS PROCESSES AND DECISIONS**
 - 1. Briefing
 - 2. Inquiry/advocacy/assertiveness
 - 3. Self-critique
 - 4. Communication with available personnel resources
 - 5. Decision making
- (b) **BUILDING AND MAINTENANCE OF A FLIGHT TEAM**
 - 1. Leadership/followership
 - 2. Interpersonal relationships
- (c) **WORKLOAD MANAGEMENT AND SITUATIONAL AWARENESS**
 - 1. Preparation/planning
 - 2. Vigilance
 - 3. Workload distribution
 - 4. Distraction avoidance
 - 5. Wake turbulence avoidance

- (2) CRM deficiencies almost always contribute to the unsatisfactory performance of a TASK. Therefore, the competencies provide an extremely valuable vocabulary for debriefing. These markers consider the use of various levels of automation in flight management systems.
- (3) The standards for each CRM competency as generally stated and applied are subjective. Conversely, some of the competencies may be found objectively stated as required operational procedures for one or more TASKS. Examples of the latter include briefings, radio calls, and instrument approach callouts. Whether subjective or objective, application of CRM competencies is dependent upon the composition of the crew

1.17 SINGLE-PILOT RESOURCE MANAGEMENT

Single-Pilot Resource Management refers to the effective use of ALL available resources: human resources, hardware, and information. It is similar to Crew Resource Management (CRM) procedures that are being emphasized in multi-crewmember operations except that only one crewmember (the pilot) is involved. Human resources "...include all other groups routinely working with the pilot who are involved in decisions that are required to operate a flight safely. These groups include, but are not limited to: dispatchers, weather briefers, maintenance personnel, and air traffic controllers." Pilot Resource Management is not a single TASK; it is a set of skill competencies that must be evident in all TASKS in this skill test standard as applied to single-pilot operation.

1.18 HOW THE EXAMINER APPLIES CREW RESOURCE MANAGEMENT

- (1) Examiners are required to exercise proper CRM competencies in conducting tests as well as expecting the same from applicants.
- (2) Pass/Fail judgments based solely on CRM issues must be carefully chosen since they may be entirely subjective. Those Pass/Fail judgments which are not subjective apply to CRM-related procedures in SLCAA-approved operations manuals that must be accomplished, such as briefings to other crewmembers. In such cases, the operator (or the aircraft manufacturer) specifies what should be briefed and when the briefings should occur. The examiner may judge objectively whether the briefing requirement was or was not met. In those cases where the

operator (or aircraft manufacturer) has not specified a briefing, the examiner shall require the applicant to brief the appropriate items from the following note. The examiner may then judge objectively whether the briefing requirement was or was not met.

- (3) The majority of aviation accidents and incidents are due to resource management failures by the pilot/crew; fewer are due to technical failures. Each applicant shall give a crew briefing before each takeoff/departure and approach/landing. If the operator or aircraft manufacturer has not specified a briefing, the briefing shall cover the appropriate items, such as runway, SID/STAR/IAP, power settings, speeds, abnormal or emergency prior to or after takeoff, emergency return intentions, missed approach procedures, FAF, altitude at FAF, initial rate of descent, DH/ACA, time to missed approach, and what is expected of the other crewmembers during the takeoff/SID and approach/landing. If the first takeoff/departure and approach/landing briefings are satisfactory, the examiner may allow the applicant to brief only the changes, during the remainder of the flight.

1.19 APPLICANT'S USE OF CHECKLISTS

Throughout the skill test, the applicant is evaluated on the use of an appropriate checklist. Proper use is dependent on the specific TASK being evaluated. The situation may be such that the use of the checklist, while accomplishing elements of an Objective, would be either unsafe or impracticable, especially in a single-pilot operation. In this case, a review of the checklist after the elements have been accomplished would be appropriate. Division of attention and proper visual scanning should be considered when using a checklist.

SECTION TWO: FLIGHT ENGINEER LICENCE SKILL TEST STANDARDS

1. EXAMINER'S SKILL TEST CHECKLIST FLIGHT ENGINEER

APPLICANT'S NAME _____

LOCATION _____

DATE/TIME _____

I. PREFLIGHT PREPARATION

- A. Equipment Examination—Systems Knowledge
- B. Aircraft Handbooks, Manuals, Minimum Equipment List (MEL), Configuration Deviation List (CDL), and Operations Specifications
- C. Performance and Limitations

II. PREFLIGHT PROCEDURES

- A. Preflight Inspection and Cockpit Setup
- B. Preflight Inspection—Exterior

III. GROUND OPERATIONS

- A. Powerplant Start
- B. Taxi and Pre takeoff Checks

IV. NORMAL PROCEDURES

- A. Takeoff
- B. Inflight
- C. Approach and Landing
- D. Engine and Systems Monitoring

V. ABNORMAL AND EMERGENCY PROCEDURES

- A. Takeoff
- B. Inflight
- C. Approach and Landing
- D. Engine and Systems Monitoring

VI. POSTFLIGHT PROCEDURES

- A. After Landing
- B. Parking and Securing

1.2 AREAS OF OPERATION

I. AREA OF OPERATION: PRE-FLIGHT PREPARATION

A. TASK: EQUIPMENT EXAMINATION – SYSTEMS KNOWLEDGE

REFERENCES: SLCARs Part 1A; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant exhibits adequate knowledge appropriate to the aircraft; its systems and components; its normal, abnormal, and emergency procedures; and uses the correct terminology with regard to the following items:

1. Flight controls—ailerons, elevator(s), rudder(s), control tabs, stabilizer, flaps, spoilers, leading edge flaps/slats, and trim systems.
2. Landing gear—indicators, brakes, antiskid, tires, nose-wheel steering, and shock absorbers.
3. Powerplant—controls and indicators, induction system, carburetor and fuel injection, turbocharging, cooling, fire detection and protection, mounting points, thrust reversers, turbine wheels, compressors, deicing, anti-icing, and other related components.
4. Propellers—type, controls, feathering/unfeathering, auto feather, negative torque sensing, synchronizing, and synchrophasing.
5. Fuel system—capacity, drains, pumps, controls, indicators, cross feeding, transferring, jettison, fuel grade, color and additives, fueling and defueling procedures, and substitutions, if applicable.
6. Oil system—capacity, grade, quantities, and indicators.
7. Hydraulic system—capacity, pumps, pressure, reservoirs, grade, and regulators.
8. Electrical system—alternators, generators, battery, circuit breakers and protection devices, controls, indicators, external and auxiliary power sources, and priority of electrical power distribution and ratings.
9. Environmental systems—heating, cooling, ventilation, oxygen and pressurization, controls, indicators, and regulating devices.
10. Pneumatic systems.
11. Avionics and communications—autopilot, flight director, Electronic Flight Indicating Systems (EFIS), Flight Management System(s) (FMS), Long Range Navigation (LORAN) systems, Doppler Radar, Inertial Navigation Systems (INS), Global Positioning System (GPS/DGPS/WGPS), VOR, NDB, ILS/MLS, RNAV systems and components, indicating devices, transponder, and emergency locator transmitter.
12. Crewmember and passenger equipment—oxygen system(s), survival and emergency equipment and exits, smoke and firefighting equipment, evacuation procedures and crew duties, and quick donning oxygen mask for crewmembers and passengers.

B. TASK: AIRCRAFT HANDBOOKS, MANUALS, MINIMUM EQUIPMENT LIST (MEL), CONFIGURATION DEVIATION LIST (CDL), AND OPERATIONS SPECIFICATIONS

REFERENCES: SLCARs Parts 1A and 6; Aircraft Operating Manual, AFM, Master and Company MEL, Manufacturer's MEL Procedures,

Objective: To determine that the applicant exhibits adequate knowledge of the contents of the Aircraft Operating Manual or AFM with regard to the systems and components listed in TASK A (above), the MEL and CDL, the

MEL Procedures Manual or Dispatch Deviation Guide, if appropriate, and the Operations Specifications, if applicable.

C. TASK: PERFORMANCE AND LIMITATIONS

REFERENCES: SLCARs Parts 22, 1A and 6; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of performance and limitations, including a thorough knowledge of the adverse effects of exceeding any limitation.
- (2) Demonstrates proficient use of (as appropriate to the aircraft) performance charts, tables, graphs, or other data relating to items such as:
 - (a) Accelerate-stop distance
 - (b) Accelerate-go distance
 - (c) Take-off performance and calculations, all engines and engine(s) inoperative
 - (d) Climb performance, including segmented climb performance, with all engines operating, with one or more engine(s) inoperative, and with other engine malfunctions as may be appropriate
 - (e) Service ceiling, all engines, engine(s) inoperative, including drift down, if appropriate
 - (f) Cruise performance
 - (g) Fuel planning, loading, consumption, range, and endurance
 - (h) Descent performance
 - (i) Go-around performance
 - (j) Other performance data (appropriate to the aircraft)
- (3) Describes (as appropriate to the aircraft) the airspeeds used during specific phases of flight.
- (4) Describes the effects of meteorological conditions upon performance characteristics and correctly applies these factors to a specific chart, table, graph, or other performance data. Demonstrates the ability to read METAR weather data and interpret ATIS.
- (5) Computes the weight and balance and centre-of-gravity location for a specific load condition (as specified by the examiner), including adding, removing, or shifting weight.
- (6) Determines if the computed centre of gravity is within the forward and aft centre-of-gravity limits, and that lateral fuel balance is within limits for take-off, cruise, and landing.
- (7) Demonstrates good planning and knowledge of procedures in applying operational factors affecting aircraft performance, such as high-altitude aerodromes, cluttered/contaminated runways, ground and in-flight icing precautions, and MEL/CDL corrections.

II. AREA OF OPERATION: PRE-FLIGHT PROCEDURES

A. TASK: PRE-FLIGHT INSPECTION AND COCKPIT SETUP

REFERENCES: SLCARs Parts 1A and 6; Aircraft Operating Manual, AFM.

Note: When the cockpit pre-flight is accomplished in a flight training device (FTD) or flight simulator, the examiner should include typical failures and inoperative items.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the pre-flight inspection procedures, while explaining briefly:
 - (a) The purpose of inspecting the items which must be checked;
 - (b) How to detect possible defects; and
 - (c) The corrective action to take.
- (2) Exhibits adequate knowledge of the operational status of the aircraft by locating and explaining the significance and importance of related documents such as:
 - (a) Airworthiness and registration certificates and radio station licence;

- (b) Operating limitations, handbooks, and manuals;
 - (c) Minimum equipment list (MEL) and configuration deviation list (CDL), if appropriate;
 - (d) Weight and balance data, aircraft performance data, and aerodrome analysis information, as appropriate; and
 - (e) Maintenance requirements, tests, and appropriate records applicable to the proposed flight or operation, and maintenance that may be performed by the pilot or other designated crew member.
- (3) Uses the approved checklist to inspect the aircraft internally, including the passenger cabin, and configures the aircraft in preparation for flight.
 - (4) Uses the challenge-and-response (or other approved) method with the other crew members, where applicable, to accomplish the checklist procedures.
 - (5) Verifies the aircraft is safe for flight by emphasising (as appropriate) the need to look at and explain the purpose of inspecting items such as:
 - (a) Powerplant – including controls and indicators;
 - (b) Fuel quantity – grade, type, contamination safeguards, and normal and alternate servicing procedures;
 - (c) Oil quantity – grade and type;
 - (d) Hydraulic fluid quantity – grade, type, and servicing procedures;
 - (e) Oxygen quantity – pressures, servicing procedures, and associated systems and equipment for crew and passengers;
 - (f) Landing gear – brakes and steering system;
 - (g) Tires – condition, inflation, and correct mounting, where applicable;
 - (h) Fire protection/detection systems – proper operation, servicing, pressures, and discharge indications;
 - (i) Pneumatic system – pressures and servicing;
 - (j) Ground environmental systems – proper servicing and operation;
 - (k) Auxiliary power unit (APU) – servicing and operation;
 - (l) Flight control systems – trim, spoilers, and leading/trailing edge devices; and
 - (m) Anti-ice, de-ice systems – servicing and operation.
 - (6) Coordinates with ground crew and ensures adequate clearance prior to powering any system which results in device movement such as door hatches and flight control surfaces.
 - (7) Complies with the provisions of the appropriate Operations Specifications, if applicable, as they pertain to the particular aircraft and operation.
 - (8) Demonstrates proper operation of all applicable aircraft systems.
 - (9) Notes any discrepancies, determines if the aircraft is airworthy and safe for flight, or takes the proper corrective action.

B. TASK: PRE-FLIGHT INSPECTION – EXTERIOR

REFERENCES: SLCARs parts 1A and 6; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the pre-flight inspection procedures, while explaining briefly:
 - (a) The purpose of inspecting the items that must be checked;
 - (b) How to detect possible defects; and
 - (c) The corrective action to take.
- (2) Exhibits adequate knowledge of the operational status of the aircraft by locating and explaining the significance and importance of exterior aircraft components.
- (3) Checks the general area around the aircraft for hazards to the safety of the aircraft and personnel.

Note: For initial certification and issuance of an unrestricted flight engineer licence,

the exterior and interior pre-flight must be observed by the examiner or inspector on an actual, airworthy aircraft of the type used during training.

III. AREA OF OPERATION: GROUND OPERATIONS

A. TASK: POWERPLANT START

REFERENCES: SLCARs Part 1A; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the correct powerplant start procedures, including the use of an auxiliary power unit (APU) or external power source, starting under various atmospheric conditions, normal and abnormal starting limitations, and the proper action required in the event of a malfunction.
- (2) Exhibits adequate knowledge of normal starts, battery starts, bottle starts, cross-bleed starts, start valve failures, ignition failure, hot/hung starts, fire during start, and APU failure during start.
- (3) Ensures the ground safety procedures are followed during the before-start, start, and after-start phases.
- (4) Ensures the use of appropriate ground crew personnel during the start procedures.
- (5) Performs all items of the start procedures by systematically following the approved checklist items for the before-start, start, and after-start phases.
- (6) Demonstrates sound judgement and operating practices in those instances where specific instructions or checklist items are not published.

B. TASK: TAXI AND PRETAKE-OFF CHECKS

REFERENCES: SLCARs Part 1A; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the correct taxi and pre-take-off procedures (as appropriate to the aircraft), including pushback or powerback, as applicable, by stating the reason for checking the items outlined on the approved checklist, and explaining how to detect possible malfunctions.
- (2) Accomplishes the applicable checklist items and performs the recommended procedures.
- (3) Ensures that all systems are within their normal operating range prior to beginning, during the performance of, and at the completion of those checks required by the approved checklist.
- (4) Explains, as may be requested by the examiner, any normal or abnormal system operating characteristic or limitation, and the corrective action for a specific malfunction.
- (5) Determines if the aircraft is safe for the proposed flight or requires maintenance.
- (6) Determines the aircraft's take-off performance, considering such factors as wind, density altitude, weight, temperature, pressure altitude, and runway condition and length.
- (7) Determines airspeeds/V-speeds and properly sets all applicable instrument and systems references.
- (8) Upon request, reviews procedures for emergency and abnormal situations which may be encountered during take-off, and states the corrective action required of the other concerned crew members.
- 9) Monitors and correctly interprets the take-off and departure clearance as issued by ATC and other radio communications.

IV. AREA OF OPERATION: NORMAL PROCEDURES

A. TASK: TAKE-OFF

REFERENCES: SLCARs parts 1A and 6; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of normal take-off and climbs, including (as appropriate to the aircraft), airspeeds, configurations, meteorological considerations, and normal procedures.
- (2) Takes into account, prior to beginning the take-off, operational factors that could affect the manoeuvre such as Take-off Warning Inhibit Systems or other aircraft characteristics; runway length, surface condition, obstructions, and other hazards; wind, wake turbulence, and other related factors that could adversely affect safety.
- (3) Verifies and correctly computes take-off performance requirements and applies correction for the existing wind component to the aircraft speeds.
- (4) Adjusts the powerplant controls as recommended by the FAA-approved guidance for the existing conditions.
- (5) Accomplishes or calls for and verifies the accomplishment of the appropriate checklist items to ensure that the aircraft systems are operating properly.

B. TASK: IN-FLIGHT

REFERENCES: SLCARs parts 1A and 6; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of instrument procedures, including SID's, Low and High-Altitude Charts, STAR's and related pilot/crew/controller responsibilities.

Note: Although not explicitly required by part 63, knowledge of this OBJECTIVE is necessary by flight crew positions, including flight engineers.

- (2) Accomplishes or calls for and verifies the accomplishment of the appropriate checklist items to ensure that the aircraft systems are operating properly.
- (3) Exhibits adequate knowledge of high-altitude performance and specific flight characteristics appropriate to the specific aircraft. FSB reports should be used when applicable.
- (4) Possesses adequate knowledge of the aircraft systems, subsystems, and devices relative to the aircraft type (as determined by the examiner).
- (5) Demonstrates the proper use of the aircraft systems, subsystems, and devices (as determined by the examiner) appropriate to the aircraft such as:
 - (a) Powerplant
 - (b) Fuel system
 - (c) Electrical system
 - (d) Hydraulic system
 - (e) Environmental and pressurisation systems
 - (f) Fire detection and extinguishing systems
 - (g) Navigation and avionics systems
 - (h) Automatic flight control system, electronic flight instrument system, and related subsystems
 - (i) Flight control systems
 - (j) Anti-ice and de-ice systems
 - (k) Aircraft and personal emergency equipment
 - (l) Other systems, subsystems, and devices specific to the type aircraft, including make, model, and series
 - m) Pneumatic system(s)

C. TASK: APPROACH AND LANDING

REFERENCES: SLCARs parts 1A and 6; Aircraft Operating Manual, AFM

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of descents, precision and non-precision instrument approaches, visual approaches, missed approach, and other procedures; and aircraft performance requirements, including (as appropriate to the specific aircraft), airspeeds, configurations, meteorological considerations, and normal procedures.

Note: Although not explicitly required by part 63, knowledge of this OBJECTIVE is necessary by flight crew positions, including flight engineers.

- (2) Takes into account, prior to beginning the descent, approach and/or landing, operational factors that could affect the manoeuvre such as inoperative aircraft systems or other aircraft characteristics; runway length, surface condition, obstructions, and other hazards; and wind, wake turbulence, and other related factors that could adversely affect safety.
- (3) Verifies and correctly computes approach and landing performance requirements, and applies correction for the existing wind component and aircraft configuration to the aircraft speeds.
- (4) Adjusts the powerplant controls and aircraft systems as recommended by the FAA-approved guidance for the existing conditions.
- (5) Accomplishes or calls for and verifies the accomplishment of the appropriate checklist items to ensure that the aircraft systems are operating properly.

D. TASK: ENGINE AND SYSTEMS MONITORING

REFERENCES: SLCARs parts 1A and 6; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the aircraft systems, including normal procedures and checklists.
- (2) Adjusts the powerplant controls and aircraft systems, as recommended by the FAA-approved guidance, for the existing conditions.
- (3) Accomplishes or calls for and verifies the accomplishment of the appropriate checklist items to ensure that the aircraft systems are operating properly.

V. AREA OF OPERATION: ABNORMAL AND EMERGENCY PROCEDURES

NOTE: Abnormal or emergency procedures should be tested for engines and each major system such as hydraulic, pneumatic, and electrical.

A. TASK: TAKE-OFF

REFERENCES: SLCARs parts 1A and 6; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the technique and procedure for accomplishing a rejected take-off after powerplant/system(s) failure/warnings, and related safety factors.
- (2) Exhibits adequate knowledge of the procedures used during powerplant failure on take-off, the appropriate reference airspeeds, aircraft performance requirements, and the specific crew actions required.
- (3) Exhibits adequate knowledge of abnormal and emergency procedures, including, as appropriate, airspeeds, configurations, and meteorological considerations.
- (4) Adjusts the powerplant controls as recommended by the FAA-approved guidance for the existing conditions.
- (5) Accomplishes immediate action items; calls for and verifies the accomplishment of the appropriate checklist.

B. TASK: IN-FLIGHT

REFERENCES: SLCARs parts 1A and 6; Aircraft Operating Manual, AFM.

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the emergency procedures relating to the particular aircraft type (as may be determined by the examiner).
- (2) Exhibits adequate knowledge of two-way radio communication failure procedures.

- (3) Identifies malfunctions and applies the proper procedure relating to abnormal operation of aircraft systems, subsystems, and devices relative to the aircraft type (as determined by the examiner) such as:
 - (a) Powerplant
 - (b) Fuel system
 - (c) Electrical system
 - (d) Hydraulic system
 - (e) Environmental and pressurisation systems
 - (f) Fire detection and extinguishing systems
 - (g) Navigation and avionics systems
 - (h) Automatic flight control system, electronic flight instrument system, and related subsystems
 - (i) Flight control systems
 - (j) Anti-ice and de-ice systems
 - (k) Aircraft and personal emergency equipment
 - (l) Other systems, subsystems, and devices specific to the type aircraft, including make, model, and series
 - (m) Pneumatic system(s)
- (4) Demonstrates the proper emergency procedures relating to the particular aircraft type, including:
 - (a) Emergency descent
 - (b) In-flight fire and smoke removal
 - (c) Rapid decompression
 - (d) Emergency evacuation
 - (e) Engine fire
 - (f) Others (as required by the AFM)
- (5) Adjusts the powerplant controls, as recommended by the FAA-approved guidance, for the existing conditions.
- (6) Accomplishes immediate

C. TASK: APPROACH AND LANDING

REFERENCES: SLCAR Parts 1A and 6; Aircraft Operating Manual, AFM

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the emergency procedures relating to the particular aircraft type (as determined by the examiner).
- (2) Correctly computes approach and landing performance requirements taking into account operational factors that may affect the manoeuvre such as malfunctioning aircraft systems, abnormal or emergency situations, or other related factors that could adversely affect safety.
- (3) Adjusts the powerplant controls and aircraft systems as recommended by the FAA-approved guidance for the existing conditions.
- (4) Accomplishes or calls for and verifies the accomplishment of the appropriate checklist items to ensure that the aircraft systems are operating properly.

D. TASK: ENGINE AND SYSTEMS MONITORING

REFERENCES: SLCAR Parts 1A and 6; Aircraft Operating Manual, AFM

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the aircraft systems, including malfunctions, abnormal and emergency procedures, and checklists.
- (2) Identifies and applies the appropriate procedure relating to subtle system failures such as slow leaks in the lubricating or hydraulics system(s), minor electrical overloads, inadequate pressurisation, fuel imbalance/transfer/jettison, and abnormal procedures specified by the AFM.

- (3) Adjusts the powerplant controls and aircraft systems as recommended by the FAA-approved guidance for the existing conditions.
- (4) Accomplishes or calls for and verifies the accomplishment of the appropriate checklist items to ensure that the aircraft systems are operating properly.

VI. AREA OF OPERATION: POST-FLIGHT PROCEDURES

A. TASK: AFTER LANDING

REFERENCES: Aircraft Operating Manual, AFM

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of safe after-landing/taxi procedures, as appropriate.
- (2) Accomplishes the applicable checklist items and performs the recommended procedures.

B. TASK: PARKING AND SECURING

REFERENCES: Aircraft Operating Manual, AFM

Objective: To determine that the applicant:

- (1) Exhibits adequate knowledge of the parking and the securing aircraft procedures.
- (2) Accomplishes the applicable checklist items and performs the recommended procedures.
- (3) Has adequate knowledge of the aircraft forms/logs to record the flight time and discrepancies.

