U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: **OPERATIONAL USE AND MODIFICATION OF ELECTRONIC CHECKLISTS**

Date: **4/24/96**
Initiated by: **AFS-400**

AC No: **120-64**

1. PURPOSE. This advisory circular (AC) provides an acceptable means, but not the only means, to address the processes for approval, operational use, and modification of electronic checklists (ECL) and ECL data by air carriers.

2. FOCUS. This AC applies to air carriers using installed ECL systems under Federal Aviation Regulations (FAR) parts 121 or 135. Operators under FAR parts 91 or 125 may also use the criteria of this AC to the extent that provisions of this AC are pertinent to their aircraft and operations. This AC is primarily intended for ECL systems that have checklist items or procedures that may be modified by the operator. Portions of this AC may be applicable to the use of ECL systems that are fixed by their type design (for example, when necessary to ensure use of compatible paper checklists). This AC does not apply to hand-held independent ECL devices, devices otherwise temporarily attached to a flight deck surface, or devices incidental to flight deck function that are added by the aircraft operator.

3. RELATED MATERIAL.

a. FAR §§ 1.1; 1.2; 91.9; FAR part 121 subparts N and 0; FAR § 125.287(b); FAR part 135 subpart H; Special Federal Aviation Regulation (SFAR) 58, Advanced Qualification Program.

b. AC 120-53, Crew Qualification and Pilot Type Rating Requirements for Transport Category Aircraft Operated Under FAR Part 121, and AC 120-45, Airplane Flight Training Device Qualification, current edition. Copies of these documents may be obtained from U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785.

c. Federal Aviation Administration (FAA) Order 8400.10, Air Transportation Operations Inspector's Handbook. Copies of this document may be purchased from: New Orders, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.

4. BACKGROUND Simple forms of ECL's have been used in various types of aircraft. In the past, these systems typically were not modifiable by the operator, and use of these ECL's often required crew action to "check off" the completion of an action item. These ECL systems have been integrated into some other flight deck display (for example, weather radar or Electronic Centralized Aircraft Monitoring (ECAM)), have been installed by an operator as an incidental flight deck aid, or have been independently displayed on a hand-held device. Recently, ECL's have become more versatile as they address more complex logic and may include closed loop responses. For example, the completion of an action item may be sensed by the ECL system, and a non-normal (abnormal or emergency) checklist may be displayed automatically upon detection of the related fault. As such, ECL's provide a means to accomplish checklists with a reduction of "head-down" time and a reduction in the possibility of crew error. ECL checklist data has also become modifiable by the operator. The information in this AC is intended to facilitate the development and modification of these operator-modifiable ECL's and to provide guidance for the operational use of ECL's to assist operators in integrating ECL's into their crew resource management (CRM) and training programs.

5. DEFINITIONS. For convenience, some definitions in this AC are repeated from other pertinent FAA references. Other definitions are unique to this AC, and their application is limited to use with ECL.

a. Aircraft Evaluation Group (AEG). FAA offices responsible for operational aspects of newly certificated, modified, or "in-service" aircraft. AEG's establish FAA criteria for new and variant aircraft for pilot qualification, master minimum equipment lists (MMEL), continuing airworthiness, and other such requirements contained in FAR parts 43, 61, 91, 121, 125, and 135.

b. Aircraft Certification Office (ACO). FAA offices responsible for the determination of aircraft airworthiness regarding issuance of type certificates (TC), supplemental type certificates (STC), and other issues related to FAR parts 21, 23, 25, 27, 29, 31, 33, 34, 35, 36, and other similar airworthiness rules. ACO's are also responsible for technical assessment of service difficulties, including development of airworthiness directives (AD).

c. Certificate Management Office/Unit (CMO/CMU). A Flight Standards office that is responsible for administration of a FAR part 121 or 135 operating certificate for a particular operator.

d. Closed Loop Checklist Items. Checklist items for which an ECL system can determine completion status (for example, by sensing the system status or switch/control position).

e. Crew Resource Management (CRM). The effective use of all available resources: human resources, hardware, and information.

f. Deferred Checklist Items. A function of some ECL systems in which line items in a non-normal checklist are automatically inserted into a normal or non-normal checklist to be accomplished later in the flight. The deferred items are typically ones that are appropriate to accomplish during a later phase of flight, such as the approach phase.

g. Electronic Checklist (ECL). A checklist that is displayed to the flightcrew by means of some electronic device.

h. Electronic Checklist Data. The menus, titles, text, and associated attributes of the checklists stored in the ECL system data base. These data may in some systems be modifiable by the operator. Attributes include items such as closed loop logic links, setting the values of time functions, and deferred item functions.

i. Electronic Checklist Data Base. The data base containing the text and attributes used to define the checklist within an ECL system.

j. Electronic Checklist Operating Software. The software that processes the data provided by the ECL data base, the sensing system, fault detection system, and crew interface controls to display and manage ECL's. This software is approved as part of the type design or STC and cannot be modified by the operator or a third party without appropriate changes to the type certification.

k. Electronic Checklist System. A system and related elements that include, but are not limited to, an electronic display, a switch and/or state sensing system, operating software, a fault detection system, crew interface controls, and a data base.

l. Flight Standardization Board (FSB). The FAA board responsible for establishing or revising crew qualification requirements (for example, training, checking, currency, and type rating(s) for new or variant aircraft). FSB's are usually established for each turbojet, turboprop, and certain other aircraft used in air transportation.

m. Maintenance Review Board (MRB). The FAA element responsible for the development, acceptance, and revision of initial minimum maintenance and inspection requirements for derivative and newly type-certificated transport category aircraft and powerplants.

n. Master Minimum Equipment List (MMEL). An MMEL contains a list of items of equipment and instruments that may be inoperative on a specific type of aircraft (for example, BE-200, Beechcraft model 200). It is also the basis for the development of an individual operator's minimum equipment list (MEL).

o. Operator-Modifiable Electronic Checklists. Refers to ECL systems having ECL data bases that are modifiable by the operator or modified for the operator by the original equipment manufacturer (OEM) or third party vendor without the requirement for an STC or change to an aircraft TC. These modifications include, but are not limited to, the ability to alter text, parameters, menus, checklist titles, and checklist groupings used to define an ECL data base, but does not include modification to the ECL operating software.

p. Open Loop Checklist Item. Checklist items that an ECL system cannot determine completion status (for example, by sensing system status or switch/control position). Crew action is required to indicate completion of these items.

q. Original Equipment Manufacturer (OEM). The manufacturer responsible for receiving the original TC for the aircraft, engines, or component requiring certification.

r. Principal Inspector. One of three FAA principal inspectors: principal avionics inspector (PAI), principal operations inspector (POI), or principal maintenance inspector (PMI).

s. Principal Avionics Inspector (PAI). The FAA inspector assigned responsibility for overseeing all avionics issues relative to a specific operator.

t. Principal Operations Inspector (POI). The FAA inspector assigned responsibility for overseeing all operational issues relative to a specific operator, such as training programs, operations specifications approval, and MEL approval.

u. Principal Maintenance Inspector (PMI). The FAA inspector assigned responsibility for overseeing all maintenance issues relative to a specific operator.

v. Supplemental Type Certificate (STC). An FAA certificate attesting to the fact that a modification to an aircraft, engine, or other component meets airworthiness requirements of the FAR.

w. Type Certificate (TC). An FAA certificate attesting to the fact that an aircraft, engine, or other component meets airworthiness requirements of the FAR.

x. Type Certification. FAA initial approval of or approval of changes in an aircraft's type design by TC, amendment to a TC, STC, or field approval.

6. ECL CERTIFICATION AND OPERATIONAL APPROVAL.

a. General.

(1) Use of ECL in Line Operations. This requires both FAA airworthiness certification and operational approval. In accordance with paragraph 6b, airworthiness certification of ECL refers to FAA approval of a type design or changes in an aircraft's type design by amendment to a TC or issuance of an STC. In accordance with paragraph 6c, operational approval pertains to initial approval or changes in the ECL data base to training and maintenance programs, manuals, operational procedures, MEL's, and other such areas necessary for safe and effective ECL use. An airworthiness TC/STC of an ECL system alone does not constitute operational approval for use of an ECL.

(2) Responsibilities of Various FAA Offices Regarding ECL. ACO's approve type designs and changes to type designs by issuing TC's and STC's. AEG's formulate operational criteria for specific aircraft types related to ECL training, checklist evaluation, operator modification of checklist data, maintenance,

MMEL's or other operational issues, as necessary. FAA Flight Standards District Offices (FSDO) use information developed by AEG's to review a particular operator's programs. FSDO's review a particular operator's training and maintenance programs, operational procedures, MEL's, etc., to determine if they are consistent with criteria specified in MMEL's, the FSB, and MRB reports. In certain instances, Flight Standards offices review and approve minor variations in ECL installations regarding use of an STC, service bulletin, or an operator's engineering order, for a particular aircraft installation when ACO approval is not required.

b. FAA Airworthiness Certification.

(1) General. FAA airworthiness certification of ECL refers to FAA approval of a type design or changes in an aircraft's type design by TC, amendment to a TC, or issuance of an STC. Airworthiness certification is required for initial installation, initial type design approval, or modification of any component of an ECL system, including ECL operating software or software used to verify the acceptability or validity of electronic checklist data bases. Airworthiness certification does not apply to ECL data, data bases, or revisions to ECL data bases. ECL data bases are addressed by operating requirements. An ECL data base, however, may be provided in conjunction with ECL operating software, before certification, to permit evaluation and verification of that operating software by the OEM.

NOTE: Criteria for ECL system airworthiness certification are as specified by the FAR for a "Type Design," a "Type Design" change for use of an aircraft manufacturer's "service bulletin," or by STC.

(2) Minor Changes Regarding Application of Provisions of STC's or Service Bulletins. Minor changes regarding application of provisions of an STC or manufacturer's service bulletin may be made in accordance with a particular operator's Engineering Change Order procedures or equivalent means. Examples of minor changes include necessary adjustment of wire routing or electrical connector pin assignments, or accommodation of different sensors otherwise meeting pertinent Aeronautical Radio, Inc. (ARINC) characteristics.

(3) Major Changes Regarding Application of Provisions of STC's or Service Bulletins. Changes other than those addressed in paragraph 6b(2) are considered "major changes" and require FAA certification. Certification involving components with ECL system part number changes are made through the STC process (for example, changes to an ECL system component such as a control, an indicator, or the operating software). For changes where applicable criteria are uncertain, or where the effects of changes are not clearly understood, changes are approved only after consultation with an appropriate ACO.

c. Operational Approval.

(1) Approval Criteria. This AC and FAA Order 8400.10 provide criteria for operational approval of ECL. Additional criteria for training and/or evaluation may also be found in FSB reports applicable to a particular aircraft type. Maintenance requirements are as described by an MRB report for a specific aircraft type or in FAA-approved maintenance instructions identified in conjunction with a TC, STC, AD, or OEM's service bulletin.

(2) Approval Methods. Operational approval for the changes and use of an operator-modifiable ECL is through an operator's POI. The POI, before to authorizing operational approval, reviews the following:

(i) The process used by the operator to modify ECL data, verify its accuracy, and incorporate ECL changes in applicable aircraft. This process review by the POI also includes the method used by the operator to track ECL revisions and their applicability to individual aircraft in the operator's fleet, and the method the operator uses to maintain consistency between the paper back-up version of the checklist and the electronic version. Appropriate revision records should be maintained for both electronic and paper checklists to ensure use of current information and to document the revision history to establish the rationale for checklist items or changes.

NOTE: Due to the nature of some ECL's, the paper and electronic versions of the checklist may not be identical; however, the resultant crew actions called for in the checklist should be the same regardless of the version in use.

(ii) The entire electronic checklist data base including the original, each proposed revision, and the corresponding paper version, is not necessary for the POI to review. The POI need only review those portions of the data base that have been changed. The POI may use suitable paper or on-screen computer reports of the revised checklist to complete necessary reviews.

NOTE: According to volume 3, chapter 15, section 2, of FAA Order 8400.10, Air Transportation Operations Inspector's Handbook, ECL operations may be initiated following appropriate review and POI approval.

(3) Approval Procedures.

(i) General. In order to take full advantage of ECL system capabilities, and enable timely changes to ECL data, operators, with POI approval, may modify ECL data using processes and procedures equivalent to those used for a paper checklist.

(ii) Modifiability. Operators may modify the ECL, or have the ECL modified by the OEM or a third party vendor. These modifications may include checklist text, checklist titles, menus, sequence of checklists or checklist items, use of and selection of closed loop or open loop logic, and deletion or addition of checklists or checklist items. Operators may not modify, without airworthiness certification, checklist operating software, software used to verify the validity of checklist data bases, hardware, and closed loop logic used by the ECL system.

(iii) Acceptable Modification Processes.

(A) General. Operators should establish a consistent and methodical process for modifying ECL data. Acceptable processes may be similar to those used to modify paper checklists. These processes will include but are not limited to those representing modification preparation, data modification, and approval and release as described in paragraph 6c(3)(iii)(B)-(D).

(B) Modification Preparation. Each modification should be the result of a documented change requirement generated by the operator, the OEM, or the Administrator. Each change requirement is reviewed for configuration applicability. Each airplane configuration should be considered for the modification's effect on ECL. With configuration effects determined, the necessary documentation to accomplish the change is compiled. The preparation process ends with an operator's approved procedure change, an update of the configuration documentation, and an assigned part number.

(C) Data Modification. While many data administration methods are available, each modification to the ECL data base should be made to a data base representing the ECL version to be modified. Each ECL modification is accompanied by a corresponding change to the paper checklist and flightcrew operations manual as applicable. Following the necessary data entry, a new data base on the appropriate media is created along with a paper and/or electronic differences report. To aid operator and POI review of ECL revisions, accurate and complete reports must be available, either on-screen or in a paper version. These reports are then submitted to the operator's POI for approval or acceptance per volume, chapter 15, section 2, of FAA Order 8400.10. Acceptable reports must include all revised material, including text, relative to the previously approved version and all data base attributes necessary for the reviewer to determine checklist suitability and technical accuracy. These attributes include the type of checklist item (note, action item, deferred item, etc.), open loop, closed loop sensing, timer functions and any other data base attributes that determine ECL function for a particular checklist. Finally, any quality assurance assessments must be included, particularly if the data modification has been performed by a party other than the certificate holder.

(D) Approval and Release. The POI review of the modification should result in approval and/or instructions for further modification. The POI will document the approval per volume 3, chapter 15,

section 2, paragraph 2109, of FAA Order 8400.10, indicating the version of ECL data base approved and the aircraft to which it applies. Upon approval, the operator will implement the modification per current policies used to implement paper checklist changes, as modified to accommodate the electronic medium.

(E) Data Transmission. The operator may electronically transmit approved ECL data bases to remote installation locations provided that a process exists to ensure that the data loaded into the airplane system is the same as that which was approved before transmission. This data integrity assurance process may or may not utilize verification software in the on-board system or verification software in a ground-based system.

(iv) Electronic Checklist Authoring Considerations. ECL's generally retain the same design considerations as paper checklists. This includes the need for the paper checklist and the ECL to appropriately account for applicable approved aircraft flight manual (AFM) procedures. However there are some unique aspects of ECL's that must be considered during the authoring process:

(A) The ECL and the paper checklist should be consistent. Minor differences, however, may exist. An example of such a difference is when the ECL version of the checklist may have a separate checklist for left and right engine failure, whereas a paper version of the checklist may combine these two procedures into a single checklist, with the notation that it may apply to either left or right engine failure (for example, L for left).

(B) To reduce the possibility of errors, interruptions, and the number of cases where the pilot is required to page forward on the display, the number of checklist items should be minimized to the extent necessary to efficiently complete the required actions.

(C) Checklist steps should be concise and simple. Common and simple words should be used whenever possible.

(D) The most important items should generally be displayed early in the checklist.

(E) The title of a checklist should be consistent with any warning/caution light and/or message terminology which alerts the crew to the fault.

(F) Deferred checklist items or other similar features may be used, if ECL design permits, to lessen flightcrew reliance on memory. This will permit the ECL system to automatically display information or checklist items later in the flight.

(G) Checklists should not be specified for very simple routine actions where the ECL contributes no safety benefit and a paper checklist would not have been used.

(H) The need to address consequential checklists should be considered. Some actions accomplished as a result of one checklist may cause automatic callup of an unnecessary checklist. Such consequential checklists should either be inhibited, or appropriate notes should be included instructing the crew not to accomplish them. An example of a consequential checklist would be "low oil pressure" or "generator failure" after accomplishing an engine shutdown procedure.

7. FLIGHTCREW QUALIFICATION FOR THE USE OF ECL's.

a. General. U.S carriers must address the following ECL flightcrew qualification issues:

(1) Initial qualification.

(2) Differences qualification (if applicable).

(3) Recurrent qualification.

(4) Currency.

(5) Requalification.

NOTE: Air carriers may address the above issues individually or as part of an integrated program. For example, if an ECL is added to an operator's existing fleet, initial ECL training may be conducted separately from initial aircraft or recurrent training. Due to the integral relationship of crew coordination and ECL operation, ECL training not associated with initial ECL introduction should be provided as a part of an operator's training program.

b. Initial Ground Training. As a minimum, the following topics are to be addressed during initial ground training:

(1) General concepts and assumptions relating to ECL.

(2) System components and operation as appropriate to the design of the particular ECL system, including controls and displays, flight crew checkoff of completed items, the use of automatic timing features (e.g., for discharge of fire extinguishing agents), open/closed loop sensing, checklist prioritization, interface with other aircraft systems, and menu structure.

(3) ECL failure indications.

(4) Applicable limitations.

(5) The air carrier's maintenance logbook or other reporting procedures for ECL failures or checklist errors, if not otherwise addressed by routine maintenance or operational reporting procedures.

c. Initial and Requalification Flight Training. Flight training is appropriate to ensure that crews have the necessary knowledge and skills to effectively use ECL's. As a minimum, the following should be addressed during initial and requalification flight training:

(1) Automatic and manual checklist access; menu operation.

(2) Use of the checklist for normal and non-normal/emergency procedures, including proper crew coordination and relationship with CRM, where appropriate.

(3) Use of deferred checklist items, if appropriate.

(4) Use of paper back-up checklists in the event of ECL failure or possible inconsistency between the ECL and paper versions.

d. Initial and Requalification ECL Checks. Individual crewmember knowledge and use of ECL should be evaluated before operational use. Acceptable means of initial assessment include:

(1) Evaluation by an authorized representative of the operator using a simulator or training device capable of modeling normal and non-normal/emergency checklists, and/or

(2) Computer-based testing, and/or

(3) Other alternate means of testing acceptable to the Administrator. For alternate methods, the air carrier must demonstrate equivalent effectiveness to one of the methods above. Alternate methods may be approved by the operator's POI.

Instructors and check airmen who have received initial or differences training on the ECL equipment may conduct initial ECL crewmember evaluations as authorized by the operator and POI.

e. Recurrent ECL Training. Recurrent training on ECL operation should be integrated into and/or conducted in conjunction with established recurrent training programs. Recurrent ECL training should address significant issues identified by line operation, system, or checklist changes.

f. ECL Recurrent Checking. Dedicated ECL recurrent checking is not required. Recurrent checking should be incorporated as an element of routine proficiency training or proficiency check programs.

g. ECL Currency. Once crews have operated ECL-equipped aircraft, and as long as recurrent training is accomplished in accordance with paragraph 7e specific ECL currency requirements are not necessary. However, for crews trained in ECL operation but who have not flown an ECL-equipped aircraft within one year from completion of initial ECL training or ECL recurrent training, ECL requalification training must be completed. An acceptable ECL requalification training curriculum should be developed in accordance with Volume III, Chapter 2, sections 6 and 9, of FAA Order 8400.10, and may be based on use of computer-based training (CBT), a training device, or a simulator. As an alternative, initial ECL operation may be supervised by those flight instructors or check airmen who have received initial or differences training on the ECL equipment and are qualified for its use.

h. ECL Requalification. Dedicated requalification training for ECL is not required. Crew member requalifying on an aircraft for the same crew position or upgraded to a different crew position should meet requirements as specified in paragraph 7c or 7g as applicable to ECL proficiency. Successful completion of a proficiency check that includes ECL use may be acceptable instead of currency or requalification ECL training in paragraph 7c or 7g.

8. METHODS FOR USE OF ECL.

a. Standard Practices. To fully benefit from the advantages of ECL technology, OEM's and operators should establish standard practices and methods for flight deck use of electronic checklists. These standards, as a minimum, should specifically address crew coordination methods for normal and non-normal/emergency checklists, callouts, use of open/closed loop items, use of deferred items and/or operational notes, if applicable, and the method for determining and declaring that a checklist item or entire checklist is complete.

b. Impact on Crew Workload. Operators should consider the impact on crew workload in determining the method of ECL use. Maximum advantage should be taken of the availability of closed loop sensing, appropriate use of checklist deferred items, and automatic annunciation of the completion of checklist items or entire checklists. For example, a requirement to call out or manually check off each item when a system can automatically annunciate completion may simply add workload and distraction without increasing benefits relative to the use of a paper checklist. However, in some limited cases, callout of certain completed items or checklists may be necessary to ensure total crew awareness of system or airplane status.

9. OTHER OPERATIONS ISSUES.

a. Paper Backup. A current paper backup checklist must be carried on board the aircraft and be readily accessible to the crew. The checklist steps in the paper backup must be equivalent to the steps in the electronic checklist data base. The exact text and format may vary to accommodate differences in the use of electronic and paper checklists, but the checklist steps must result in the same crew actions.

b. Database Identification. Means shall be provided to enable the flight crew to uniquely identify the ECL data base installed on the airplane for the purpose of confirming compatibility between the ECL data base and the paper backup, or to otherwise confirm the validity of the data base.

c. Manuals and Other Publications. AFM's, operating manuals, maintenance manuals, general policy manuals, or other manuals, publications, or written materials (e.g., operating bulletins) that may relate to ECL operation should be amended to describe ECL equipment, procedures, and policies.

d. MMEL/MEL. Operators should formulate necessary MEL revisions to accommodate ECL before activation of the ECL system for operations for each particular fleet. MEL revisions must be consistent with the MMEL established for each aircraft type. An example of an acceptable MMEL provision is provided in Appendix 1.

10. TRAINING DEVICE AND SIMULATOR CHARACTERISTICS.

a. Ground Training Methods. Appropriate methods suitable to each operator's training programs may be used.

b. Flight Training Methods. Flight training devices for initial ECL training should have the following characteristics:

(1) The ability to functionally represent ECL displays, controls, indications and integration with other aircraft systems (such as closed loop sensing).

(2) For aircraft requiring more than one cockpit crewmember, the ability to permit the demonstration of normal crew coordination in conjunction with ECL operation.

(3) The ability of the ECL system to interactively respond to crewmember inputs.

c. Acceptable Flight Training Devices/Simulators. Any one or combination of the following flight training devices or simulators which meet the characteristics of paragraph 10b(1) may be used:

(1) Level A through D simulators,

(2) Level 4 through 7 flight training devices, or

(3) Dedicated ECL training devices, including computer-based training devices, acceptable to the FAA (including those "Aircraft Systems Integration" training devices described in volume 3, chapter 2, section 5, paragraph 443, of FAA Order 8400.10, which are suitable for ECL training).

Flight training device and simulator levels are as defined by AC 120-45A and SFAR 58; and they are described in FAA Order 8400.10 and applicable FSB reports.

NOTE: Flight training devices suitable for ECL training should represent typical system interaction with the ECL system to the extent necessary to ensure trainees are capable of addressing all significant features and/or variations (e.g., deferred line items, timer functions, closed loop, open loop, notes) of normal and non-normal/emergency checklists.

d. FAA Approval of Dedicated ECL Training Devices. For the purposes of ECL flight training, dedicated training devices may use simplified ECL, display, and aircraft characteristics. The accurate modeling of specific aircraft system characteristics, of actual ECL logic, use of identical controls and displays, simulation of optional functions, and other such factors are not necessary as long as the effects of simplification do not adversely affect crew performance or the effects can otherwise be addressed during ground training, flight training, or initial line operations. Dedicated ECL training devices referenced by paragraph 10c are approved by POI's after consultation with the FSB.

e. ECL in Simulators. Unless ECL is an integral part of a type design (e.g., A320/330/340 ECAM) there is no current FAA requirement to incorporate a subsequently added ECL capability incidental to crew procedures into existing simulators (e.g., a simple lighted display of takeoff and landing checklist items). However, eventual incorporation of ECL functions in flight simulators used for initial, transition, upgrade, requalification, differences, or proficiency training and airmen certification is desirable. Since ECL training and evaluation may be enhanced by use of simulators with ECL, credit may be permitted for programs using such simulators. Simplified ECL academic training and reduced numbers of ECL practice scenario demonstrations are examples of credits which may be permitted by principal inspectors when ECL-equipped simulators are used. Operators are encouraged to consider inclusion of ECL capability in new simulators, and in modification of existing simulators when major simulator capability upgrades occur. When ECL is part of the basic type design (e.g., A320/330/340 ECAM), suitable ECL capability must be available in simulators used for that type aircraft. The ECL operating system configuration used in the simulator should reflect the ECL configuration of the aircraft to which the crews are assigned.

11. OPERATING EXPERIENCE, LINE CHECKS, AND ROUTE CHECKS. When ECL-equipped aircraft are used for line checks, route checks, or in conducting operating experience to satisfy requirements of FAR part 121, check airmen should routinely incorporate proper ECL use as a discussion, demonstration or evaluation factor. When appropriate, ECL should be addressed during FAR part 135 line checks (FAR § 135.299) or FAR part 125 pilot competency checks (FAR § 125.287(b)).

12. AIRCRAFT WITH ECL SYSTEM DIFFERENCES. Operators having aircraft with ECL systems differences in displays, controls, or procedures, or involved with interchange operations, must account for those ECL system differences. This is accomplished as part of an approved differences training program in accordance with FAR parts 121 and 135, initial and recurrent pilot testing requirements in accordance with FAR part 125, or as otherwise specified in applicable FSB reports concerning crew qualification pertaining to a particular aircraft type.

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APPENDIX 1. SAMPLE ECL MMEL ITEMS

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

MASTER MINIMUM EQUIPMENT LIST

AIRCRAFT:	REVISION NO:	PAGE:
MODEL XYZ	DATE:	31-XX

SYSTEM & SEQUENCE NUMBERS	1. ITEM	2. NUMBER INSTALLED	3. NUMBER REQUIRED FOR DISPATCH	4. REMARKS OR EXCEPTIONS
31 INDICATING & RECORDING SYSTEMS				
-61-2 Cursor Control Devices	C	2	1	
	C	2	0	(O) May be inoperative provided approved paper checklists are available and used
-61-8 Electronic Checklist System	C	1	0	(M)(O) May be inoperative or deactivated provided approved paper checklists are available and used

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