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HUMAN FACTOR AND CREW RESOURCE MANAGEMENT TRAINING REQUIREMENTS

1. Purpose. This Advisory Circular (EAC) presents requirements for developing, implementing, reinforcing, and assessing crew resource management (CRM) training for flight crewmembers and other personnel essential to flight safety. CRM training is designed to become an integral part of training and operations. These requirements are intended for Title Egyptian Regulations Parts 91, 121, 139, 145, 171, 172, 173, 174 and 301 certificate holders besides security programs of Egyptian Regulations Parts 107 and 108 who are required by regulation to provide CRM training for pilots and cabin crews, maintenance resource management (MRM) training for aircraft maintenance personnel, dispatch resource management (DRM) training for aircraft dispatchers and team resource management (TRM) for ATC personnel in addition to human factor training for security and accident investigation personnel. This EAC presents one way, but not necessarily the only way, that CRM training may be addressed. CRM training focuses on situation awareness, communication skills, teamwork, task allocation, and decision making within a comprehensive framework of standard operating procedures (SOP).

2. Related regulations.
ECAR Parts 91, 107, 108, 121, 145, 171, 172, 173, 174 and 301.

3. Definitions. The human factors safety challenge and the CRM training response may be defined as follows:
   a. Human Factors. The multidisciplinary field of human factors is devoted to optimizing human performance and reducing human error. It incorporates the methods and principles of the behavioral and social sciences, engineering, and physiology. It is the applied science that studies people working together in concert with machines. It embraces variables that influence individual performance and variables that influence team or crew performance. It is recognized that inadequate system design or inadequate operator training can contribute to individual human error that leads to system performance degradation. Further, it is recognized that inadequate design and management of crew tasks can contribute to group errors that lead to system performance degradation.
   b. CRM Training. The application of team management concepts in the flight deck environment was initially known as cockpit resource management. As CRM training evolved to include cabin crews, maintenance personnel and others, the phrase "Crew Resource Management" was adopted.
   (1) As used in this AC, CRM refers to the effective use of all available resources: human resources, hardware, and information. Other groups routinely working with the cockpit crew, who are involved in decisions required to operate a flight safely, are also essential participants in an effective CRM process. These groups include but are not limited to:
   (i) Aircraft dispatchers.
   (ii) Cabin Crew.
   (iii) Maintenance personnel.
   (iv) Air traffic controllers.
   (v) Security personnel
   (vi) Accident investigation personnel
   (2) CRM training is one way of addressing the challenge of optimizing the human/machine interface and accompanying interpersonal activities. These activities include team building and maintenance, information transfer, problem solving, decision-making, maintaining situation awareness, and dealing with automated systems. CRM training is comprised of three components: initial indoctrination/awareness, recurrent practice and feedback, and continual reinforcement.

4. Related reading material. International Civil Aviation Organization (ICAO) Annexes and documents related to human factors. This document may be obtained from ICAO document sales unit, Montreal, Quebec, Canada, 514-954-8022.

5. Background. Investigations into the causes of air carrier accidents have shown that human error is a contributing factor in 60 to 80 percent of all air carrier incidents and accidents. Many problems encountered by flight crews have very little to do with the technical aspects of operating in a multi-person cockpit. Instead, problems are associated with poor group decision making, ineffective communication, inadequate leadership, and poor task or resource management. Pilot training programs historically focused almost exclusively on the technical aspects of flying and on an individual pilot's performance; they did not effectively address crew management issues that are also fundamental to safe flight.

6. The mission of CRM training. CRM training has been conceived to prevent aviation accidents by improving crew performance through better crew coordination.

7. Basic concepts of CRM. CRM training is based on an awareness that a high degree of technical proficiency is essential for safe and efficient operations. Demonstrated mastery of CRM concepts cannot overcome a lack of proficiency. Similarly, high technical proficiency cannot guarantee safe operations in the absence of effective crew coordination.

    a. Experience has shown that lasting behavior changes in any environment cannot be achieved in a short time, even if the training is well designed. Trainees need awareness, practice and feedback, and continuing reinforcement: in brief, time to learn attitudes and behaviors that will endure. To be effective, CRM concepts must be permanently integrated into all aspects of training and operations.

    b. While there are various useful methods in use in CRM training today, certain essentials are universal:

      (1) CRM training is most effective within a training program centered on clear, comprehensive SOPs.

      (2) CRM training should focus on the functioning of crewmembers as teams, not as a collection of technically competent individuals.

      (3) CRM training should instruct crewmembers how to behave in ways that foster crew effectiveness.

      (4) CRM training should provide opportunities for crewmembers to practice the skills necessary to be effective team leaders and team members.

      (5) CRM training should include effective team behaviors during normal, routine operations.

    c. Good training for routine operations can have a strong positive effect on how well individuals function during times of high workload or high stress. During emergency situations, it is highly unlikely (and probably undesirable) that any crewmember would take the time to reflect upon his or her CRM training in order to choose the appropriate behavior. But practice of desirable behaviors during times of low stress increases the likelihood that emergencies will be handled effectively.

    d. Effective CRM has the following characteristics:

      (1) CRM is a comprehensive system of applying human factors concepts to improve crew performance.

      (2) CRM embraces all operational personnel.

      (3) CRM can be blended into all forms of crew training.

      (4) CRM concentrates on crewmembers' attitudes and behaviors and their impact on safety.

      (5) CRM uses the crew as the unit of training.

      (6) CRM is training that requires the active participation of all crewmembers. It provides an opportunity for individuals and crews to examine their own behavior, and to make decisions on how to improve cockpit teamwork.

8. Fundamentals of CRM training implementation. Research programs and airline operational experience suggest that the greatest benefits are achieved by adhering to the following practices:

    a. Assess the status of the organization before implementation. It is important to know how widely CRM concepts are understood and practiced before designing specific training. Surveys of crewmembers, management, training, and standards personnel, observation of crews in line observations, and analysis of incident/accident reports can provide essential data for program designers.

b. Get commitment from all managers, starting with senior managers. CRM programs are received much more positively by operations personnel when senior managers, flight operations managers, and flight standards officers conspicuously support CRM concepts and provide the necessary resources for training. Flight operations manuals and training manuals should embrace CRM concepts by providing crews with necessary policy and procedures guidance centered on clear, comprehensive SOPs. A central CRM concept is communication. It is essential that every level of management support a safety culture in which communication is promoted by encouraging appropriate questioning. It should be made perfectly clear in pilots' manuals, and in every phase of pilot training, that appropriate questioning is encouraged and that there will be no negative repercussions for appropriate questioning of one pilot's decision or action by another pilot.

c. Customize the training to reflect the nature and needs of the organization. Using knowledge of the state of the organization, priorities should be established for topics to be covered, including special issues, such as the effects of mergers or the introduction of advanced technology aircraft. Other special issues might include topics specific to the particular type of operation, such as the specific characteristics that exist in commuter operations, in long-haul international operations or night operations. This approach increases the relevance of training for crewmembers.

d. Define the scope of the program and an implementation plan. Institute special CRM training for key personnel, including check airmen, supervisors, and instructors. It is highly beneficial to provide training for these groups before beginning training for crewmembers. CRM training may be expanded to combine pilots, cabin crews, and aircraft dispatchers. It may also be expanded to include maintenance personnel and other company team members, as appropriate. It is also helpful to develop a long-term strategy for program implementation.

e. Communicate the nature and scope of the program before startup. Training departments should provide crews, managers, training, and standards personnel with a preview of what the training will involve together with plans for initial and continuing training. These steps can prevent misunderstandings about the focus of the training or any aspect of its implementation.

f. Institute quality control procedures. It has proved helpful to monitor the delivery of training and to determine areas where training can be strengthened. Monitoring can be initiated by providing special training to program instructors (often called facilitators) in using surveys to collect systematic feedback from participants in the training.

9. Components of CRM training. The topics outlined below have been identified as critical components of effective CRM training. They do not represent a fixed sequence of phases, each with a beginning and an end. Ideally, each component is continually renewed at every stage of training.

a. Initial indoctrination/awareness.

(1) Indoctrination/awareness typically consists of classroom presentations and focuses on communications and decision making, interpersonal relations, crew coordination, leadership, and adherence to SOPs, among others. In this component of CRM training, the concepts are developed, defined, and related to the safety of line operations. This component also provides a common conceptual framework and a common vocabulary for identifying crew coordination problems.

(2) Indoctrination/awareness can be accomplished by a combination of training methods. Lectures, audiovisual presentations, discussion groups, role-playing exercises, computer-based binstruction, and videotaped examples of good and poor team behavior are commonly used methods.

(3) Initiating indoctrination/awareness training requires the development of a curriculum that addresses CRM skills that have been demonstrated to influence crew performance. To be most effective, the curriculum should define the concepts involved and relate them directly to operational issues that crews encounter. Many organizations have found it useful to survey crewmembers. Survey data have helped identify embedded attitudes regarding crew coordination. The data have also helped to identify operational problems and to prioritize training issues.

(4) Effective indoctrination/awareness training increases understanding of CRM concepts. That understanding, in turn, often influences individual attitudes favorably regarding human factors issues. Often the training also suggests more effective communication practices.

(5) It is important to recognize that classroom instruction alone does not fundamentally alter crewmember attitudes over the long term. The indoctrination/awareness training should be regarded as a necessary first step towards effective crew performance training.

b. Recurrent Practice and Feedback.

(1) CRM training must be included as a regular part of the recurrent training requirement. Recurrent CRM training should include classroom or briefing room refresher training to review and amplify CRM components, followed by practice and feedback exercises, such as LOFT, preferably with taped feedback; or a suitable substitute, such as role-playing in a flight training device and taped feedback. It is recommended that these recurrent CRM exercises take place with a full crew, each member operating in his or her normal crew position. A complete crew should always be scheduled, and every attempt should be made to maintain crew integrity. Recurrent training LOFT, which includes CRM, should be conducted with current line crews, and preferably not with instructors or check airmen as stand-ins.

(2) Recurrent training with performance feedback allows participants to practice newly improved CRM skills and to receive feedback on their effectiveness. Feedback has its greatest impact when it comes from self-critique and from peers, together with guidance from a facilitator with special training in assessment and debriefing techniques.

(3) The most effective feedback refers to the coordination concepts identified in Indoctrination/ Awareness training or in recurrent training. Effective feedback relates to specific behaviors. Practice and feedback are best accomplished through the use of simulators or training devices and videotape. Taped feedback, with the guidance of a facilitator, is particularly effective because it allows participants to view themselves from a third-person perspective. This view is especially compelling in that strengths and weaknesses are captured on tape and vividly displayed. Stop action, replay, and slow motion are some of the playback features available during debriefing. Behavioral patterns and individual work styles are easily seen, and appropriate adjustments are often self-evident.

c. Continuing Reinforcement.

(1) No matter how effective each curriculum segment is (the classroom, the role-playing exercises, the LOFT, or the feedback), one-time exposures are simply not sufficient. The attitudes and norms that contribute to ineffective crew coordination may have developed over a crewmember's lifetime. It is unrealistic to expect a short training program to reverse years of habits. To be maximally effective, CRM should be embedded in every stage of training, and CRM concepts should be stressed in line operations as well.

(2) CRM should become an inseparable part of the organization's culture.

(3) There is a common tendency to think of CRM as training only for captains. This notion misses the essence of the CRM training mission: the prevention of crew-related accidents. CRM training works best in the context of the entire crew. Training exercises are most effective if all crewmembers work together and learn together. In the past, much of the flight crew training has been segmented by crew position. This segmentation has been effective for meeting certain training needs such as seat dependent technical training and upgrade training, but segmentation is not appropriate for most CRM training.

(4) Reinforcement can be accomplished in many areas. Training such as joint cabin and cockpit crew training in security can deal with many human factors issues. Joint training with aircraft dispatchers, maintenance personnel, and gate agents can also reinforce CRM concepts, and is required.

10. Minimum requirements for human factor training curriculums. Details are given in relevant parts of the Egyptian Civil Aviation Human Standards Handbook (ECAHSH).

11. Specialized training in CRM concepts. As CRM programs have matured, some organizations have found it beneficial to develop and implement additional courses dealing with issues specific to their operations.

a. After all current crewmembers have completed the Initial Indoctrination/Awareness component of CRM training, arrangements are needed to provide newly hired crewmembers with the same material. A number of organizations have modified their CRM initial courses for inclusion as part of the initial training and qualification for new hire crewmembers.

b. Training for upgrading to captain provides an opportunity for specialized training that deals with the human factors aspects of command. Such training can be incorporated in the upgrade process.

c. Training involving communications and the use of automation can be developed for crews operating aircraft with advanced technology cockpits, or for crews transitioning into them.

12. Assessment of CRM training. It is vital that each training program be assessed to determine if CRM training is achieving its goals. Each organization should have a systematic assessment process. Assessment should track the effects of the training program so that critical topics for recurrent training may be identified and continuous improvements may be made in all other respects. Assessment of the training program should include observation and feedback by program administrators and self-reports by participants using standard survey methods.

(a) The emphasis in this assessment process should be on crew performance. The essential areas of CRM-related assessment include communications, decision-making, team building and maintenance, workload management, and situation awareness, always in balance with traditional technical proficiency. An additional function of such assessment is to determine the impact of CRM training and organization-wide trends in crew performance.

(b) For optimal assessment, data on crewmembers' attitudes and behavior should be collected before CRM indoctrination and again at intervals after the last component of CRM training, to determine both initial and enduring effects of the program. The goal should be to obtain an accurate picture of the organization's significant corporate personality traits before formal adoption of CRM training, and to continue to monitor those traits after implementation.

13. Instructor Requirements. A CRMI shall meet the minimum standards contained in the relevant ECARs and should at least;

15.1 All CRMI shall meet the following minimum standards:
(a) Have completed a basic instructional technique course.
(b) Have or have had commercial air transport experience as a flight crew member; or a rated license for non-flight crew members; and
  (1) Have successfully passed the Human Performance and Limitations (HPL) examination; or
  (2) If holding a License acceptable under ECAR 61,63,65 prior to the introduction of HPL into their syllabus, have completed a theoretical HPL course covering the whole syllabus of that course; or
  (3) Have theoretical experience in the subject of CRM or Human Factors training.

15.2 Notwithstanding 15.1, and when acceptable to the ECAA:
(a) A flight crew member holding a recent qualification as a CRM trainer may continue to be a CRM trainer after the cessation of active flying duties;
(b) An experienced non-flight crew CRM trainer having a knowledge of HPL, may also be, and continue to be, a CRM trainer;
(c) A former flight crew member having knowledge of HPL may become a CRM trainer if he maintains adequate knowledge of the operation and aircraft type and meets the provisions of paragraphs 15.1 (a) to (b) above.

15.3 Instructors ground school. Shall have satisfied the conditions in 15.1 or .2 above, and:
(a) Have completed initial CRM training; and
(b) Be supervised by a suitably qualified CRM instructor when conducting their first initial CRM training sessions; and

(c) Have the knowledge and ability to teach the subjects detailed in relevant parts of the Egyptian Civil Aviation Human Standards Handbook (ECAHSH).
(d) Complete the arrangements detailed in paragraph 16.

15.4 Instructors simulator/base. Shall have satisfied the conditions in 15.1 or .2 above, and:
(a) Have the knowledge detailed in relevant parts of the Egyptian Civil Aviation Human Standards Handbook (ECAHSH).
(b) Complete the arrangements detailed in paragraph 16.

15.5 Instructors line. Shall have satisfied the conditions in 15.1 or .2 above, and:
(a) Have the knowledge detailed in relevant parts of the Egyptian Civil Aviation Human Standards Handbook (ECAHSH).
(b) Complete the arrangements detailed in paragraph 16.

14. Authorization. All instructors will need to demonstrate that;
(a) They have the knowledge specified for their relevant role, and
(b) They have the necessary instructional skills, and
(c) They are able to assess crews' CRM performance, and
(d) They are able to facilitate a constructive debrief of the above.

15. CRM Instructor Examiners (CRMIE). The ECAA will authorize suitably experienced and qualified ECAA inspectors and accredited instructors as being competent to carry out CRM training, to be approved CRMIE.

16. Revalidation criteria
18.1 Instructors Ground School. The accreditation will be for an initial period of three years. Thereafter, re-accreditation will be at the discretion of the ECAA and subject to the following:
(a) The instructor shall have conducted at least two courses of training in every yearly period within the three year accreditation period,
(b) For re-accreditation, one course of training, or a part thereof, within the last 12 months of the accreditation period will be observed by a CRMIE.

18.2 Line training captains will be accredited by a company CRMIE on a three yearly renewal basis. The accreditation process may be done as a workshop or during actual line training.

17. Record Keeping. Records of all training courses conducted by instructors must be kept for a period of three years. Records of all checks conducted by examiners must also be kept for a period of three years. These records should show the instructional course dates, the type of course or check, the name(s) of the candidate(s) and the type of simulator or aircraft (if any) that was used.

18. Company Approval. All certificate holders shall fulfill the minimum requirements of this human factor circular and all related regulatory materials in order to be recertified. The human factors concepts shall be reflected in all the SOPs used within the company. All safety, IEP and quality audits and checklists shall address the issues related to human factors and identify their effectiveness.

19. Charges. The charge for the observation and the issue of a CRMI authorization will be £E???????.