

## DRAFT ADVISORY CIRCULAR

Subject: CONTROLLED REST ON THE FLIGHT DECK

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AC No. 121-xx

Initiated by:

1. **PURPOSE.** This advisory circular (AC) provides guidance for the development and implementation of a Controlled Rest on the Flight Deck Program to improve crew alertness, especially during critical phases of flight, and thereby enhance flight safety. This is one strategy, but not the only one, available to manage crew alertness in flight operations. Controlled Rest is not intended to substitute for any other strategies nor to justify changes to the rest requirements or practices for working crewmembers. Application is intended for aircraft operated by three flight crewmembers. Use of Controlled Rest on such aircraft is based on the two nonresting crewmembers remaining awake and assuring each other's alertness.
2. **RELATED FAR SECTIONS.**
  - a. FAR 91.3 Captain's Authority
  - b. FAR 91.13 Careless and Reckless
  - c. FAR 121.331,333 Supplemental Oxygen Requirements
  - d. Part 121, Subpart N (Training). 121.400-405, 121.409-421, 121.424, 121.427
  - e. FAR 121.543 Crew at Duty Station
3. **RELATED READING MATERIAL.**
  - a. Crew Factors in Flight Operations: Effects of Preplanned Cockpit Rest on Crew Performance and Alertness in Long-Haul Operations. (Rosekind, M. R., Graeber, R. C., Dinges, D. F., Connell, L. J., Rountree, M. S., Spinweber, C. L., Gillen, K., NASA Technical Memorandum 103884, 1992).
  - b. Crew Factors in Flight Operations: VIII. Factors Influencing Sleep Timing and Subjective Sleep Quality in Commercial Long-Haul Flight Crews (Gander, P. H., Graeber, R. C., Connell, L. J., Gregory, K. B., NASA Technical Memorandum 103852, December, 1991).
  - c. Alertness Management in Flight Operations: Strategic Napping (Rosekind, M. R., Gander, P. H., Dinges, D. F., SAE Technical Paper Series, 912139, September, 1991).
  - d. Aircrew fatigue and circadian rhythmicity (Graeber, R. C. (1988). In E. L. Wiener & D.C. Nagel (Eds.), Human Factors in Aviation. (pp. 305-344). New York: Academic Press.)
4. **BACKGROUND.**
  - a. It is widely recognized that airline operations benefit from a well rested and alert flight deck crew. Flight time limitations and rest requirements are intended to provide adequate rest, however, some flight operations can involve multiple time zone changes, long irregular work schedules, unplanned events, sleep disturbances and/or circadian disruption, coupled with long periods of relatively low activity during flight, which may result in sleep loss and/or reduced alertness.
  - b. One natural compensatory response to the sleep loss experienced in some flight operations is the occurrence of both unplanned, spontaneous napping and non-sanctioned rest periods. The occurrence of these activities is supported by

anecdotal, observational, and subjective report data from a variety of sources (e.g., ASRS). In response to this information and concerns for maintaining flight safety, NASA developed a research program with FAA support to evaluate whether a planned flight deck rest period could provide a "safety valve" for the fatigue and sleepiness sometimes experienced in flight operations. The rest period allowed a planned opportunity to sleep during low workload periods, with the primary goal being to improve subsequent levels of alertness and performance, especially during critical phases of operation such as descent and landing. Laboratory studies have shown preplanned naps to be an effective way to maintain performance.

- c. The NASA study found that pilots given a controlled rest opportunity on the flight deck demonstrated improved vigilance and enhanced physiological alertness during the subsequent descent and landing phases of flight compared to a no-rest control group. The rest was effective as an acute inflight countermeasure but did not affect layover sleep or the overall sleep debt accumulated by the majority of crewmembers. The controlled rest procedures were implemented with minimal disruption to usual flight operations, and there were no reported or identified concerns regarding safety. The study results do not support regulatory changes in flight time and rest requirements based on the use of controlled rest on the flight deck.
- d. The primary purpose of this AC is to develop and implement a program for controlled rest on the flight deck based on the "NASA Nap" findings. While Federal Aviation Regulations do not specifically prohibit or sanction sleep on the flight deck, it is known that some operators have utilized flight deck rest periods to combat fatigue.

5. **DEFINITIONS:**

- a. **Alertness Management** - the management of resources available to improve and maintain the overall alertness of the crew, especially during critical phases of flight and non-normal operations. Resources can include those used in flight (e.g., bunks, naps, caffeine) as well as those used on the ground before and/or after the flight (e.g., scheduling, layover hotels).
- b. **Augmented Crew** - a crew that includes an additional crewmember(s) for flights which are scheduled to exceed specified international flight time limits
- c. **Circadian Rhythm** - a measurable rhythmic variation in a physiological or behavioral parameter having a period of about 24 hours (e.g., sleep/wakefulness, body temperature). Circadian rhythms are controlled by an internal body clock and usually become synchronized by time cues in the local environment.
- d. **Inflight Countermeasures** - those actions a crewmember may take inflight to reduce the negative effects on performance due to sleep loss, circadian disruption, or time-of-day.
- e. **Sleep Debt** - the cumulative effect of sleep lost over successive days and nights due to disrupted or shortened sleep. It reduces daytime alertness and increases the propensity for deep (i.e., slow wave) sleep.
- f. **Sleep Inertia** - the residual, generally brief, negative effects of sleep (e.g., sleepiness, decreased mental functioning, grogginess) sometimes experienced upon awakening. The amount of time needed to resume a usual level of functioning can vary depending on the depth of sleep immediately prior to awakening, abruptness of the awakening, and total sleep debt.

- g. Unplanned Wake-Up - when a crewmember has to be awakened prematurely from a planned rest period due to an operational need.

6. BASIC CONCEPTS OF CONTROLLED REST ON THE FLIGHT DECK.

- a. Safety First. The planning and utilization of controlled rest periods on the flight deck serves the primary purpose of enhancing flight safety. To that purpose, other factors which have unique safety implications for a particular flight should be taken into account when considering the implementation of controlled rest. The resting crewmember will be awakened if a situation develops which may affect flight safety.
- b. Captain's Authority. The captain continues to be the final authority in the operation of the aircraft. This authority, when applied to the controlled rest program, should be exercised in a manner consistent with accepted principles of Crew Resource Management (CRM).
- c. Benefit and Opportunity. A program for controlled rest on the flight deck is based upon two fundamental principles--rest will provide a potential benefit and a sufficient opportunity to rest exists; that is, when there is a benefit to be gained and an opportunity, controlled rest can be utilized.
- d. Benefits of Planning Rest. A critical component of the program is that the rest is planned. Planning enables the pre-briefed, controlled integration of rest into the total flight deck operation. Crewmembers can anticipate their own rest period, thus enabling them to manage their alertness.
- e. Overall Alertness Management. While controlled rest on the flight deck provides proven safety and crew performance benefits, it is only one strategy to manage overall alertness in flight operations. Other factors (e.g., scheduling, layover sleep, commuting, physical health, and lifestyle) known to affect overall alertness must also be considered.

7. PROGRAM ELEMENTS.

- a. Rest Opportunity Criteria.
1. Flight segment. Controlled rest should be utilized only during the cruise phase of flight between top of climb and 30 minutes prior to planned top of descent, workload permitting. Controlled rest is appropriate during both domestic and international operations.
  2. Workload. Controlled rest should be planned for low workload portions of cruise flight. Each airline should develop guidelines particular to its operations which define low workload. Factors to consider may include  
  
altitude changes, fuel transfer requirements, weather conditions, ATC communications, etc.
  3. Duty station occupancy. Flight deck rest should be taken by only one crewmember at a time. During a planned rest period all crewmembers, including the resting crewmember, must remain at their stations. Therefore, all physiological needs that require the absence of any crewmember from the flight deck should be completed prior to beginning the

pre-rest period. Controlled rest on the flight deck applies to both non-augmented and augmented crews.

**b. Rest Implementation.**

1. Planning. Planning for flight deck rest should be accomplished during the pre-flight briefing. This should include at least the following: choice of rest sequence; unplanned wake-up criteria; transfer of control procedures; and coordination with cabin staff. If the need arises, the same planning process can be accomplished in flight.
2. Pre-rest period. A short period of time (about five minutes) should be provided for rest preparation. This should include at least the following: any operational briefing; completion of tasks in progress; getting comfortable in the flight deck seat.
3. Rest period. Research indicates that a rest period up to 45 minutes should provide the desired benefit. Sleep longer than 45 minutes results in an increased likelihood of sleep inertia with its associated prolonged grogginess, therefore rest periods should be limited to a maximum of 45 minutes. There is no established minimum rest period, even five minutes may be beneficial.
4. Post-rest period. A planned recovery period, normally of at least 15 minutes, devoid of any flight duties or briefings should be implemented prior to reassuming flight deck responsibilities.

**c. Other Rest Considerations.**

1. Participation. Controlled rest is voluntary, and individual participation is optional.
2. Other Activities. Other activities (e.g. reading, listening to music) are not substitutes for sleep and will not provide the intended benefits of this controlled rest program.
3. Multiple rest periods. This program permits more than one rest period for individual crewmembers if a sufficient opportunity exists.
4. Rest equipment. To ensure optimal benefit, the operator should consider permitting the use of personal equipment which may facilitate rest. This could include eye shades, neck supports, earplugs, etc.
5. Oxygen use not required. In as much as the resting crewmember has not left his or her station at the controls, the controlled rest program does not require the use of oxygen by the non-resting or resting pilot.

**d. Transfer of Control.**

1. Operational briefing. An operational briefing should be conducted prior to and following each rest period. The operator will determine the subjects of these briefings.
2. Wakeup procedures. A non-resting crewmember will be responsible for awakening the resting crewmember at a predetermined time. *Calling out the resting crewmember's name in a normal tone of voice is usually sufficient.*

An attempt should be made not to startle. Planned and unplanned wake-up techniques are the same.

e. Safeguards.

1. Enroute equipment considerations. The operator should determine equipment malfunctions that might preclude controlled rest on a particular flight.
2. Flight deck vigilance. Measures should be taken to assure that the resting crewmember's flight deck duties and monitoring responsibilities are assumed by the non-resting crewmembers.

8. OPERATION IMPLEMENTATION.

- a. Policies and Procedures. It is recommended that operators develop company policies and procedures consistent with this advisory circular.
- b. Operational Use. The implementation of this program requires, at a minimum, that all participating crew members be familiar with the company policies and procedures.
- c. Additional Education. It is preferable that this Controlled Rest on the Flight Deck program be complemented by a training module on sleep, circadian rhythms, alertness, and fatigue countermeasures in flight operations. This training material may be incorporated into existing training programs and may take the form of presentations, written materials, or videotapes.