

ACCEPTABLE FATIGUE MANAGEMENT SCHEME

All crewmembers are expected to manage their personal time to be well rested when they report for work.

The following guidelines and recommendations, based on Flight Safety Foundation and National Business Aviation Association *Duty/Rest Guidelines for Business Aviation*, address the 24-hour duty and rest scheduling requirements of the business aviation industry.

Table 1 Recommended Guidance for Non-Augmented Crews 24-Hour Period			
Type of Operation	Duty Period (maximum hours)	Flight Time (maximum hours)	Off-Duty Period (minimum hours)
Standard ¹	14	10	10 Weekly: Minimum of 36 continuous hours, including two consecutive nights, in seven-day period
WOCL ²	12	10 Restricted landings	12 48 continuous hours in 7-day period following multiple WOCL duty periods
Extended ³	14	12 Restricted landings and compensatory time off duty Weekly: Maximum of 4 cumulative hours of extension	12
WOCL	No extensions recommended		48 continuous hours in a 7-day period following multiple WOCL duty periods
Multiple Time Zones			48 continuous hours off duty on return home following a duty period crossing multiple time zones

- Notes**
- Standard operations* are defined as operations that do not encroach on the WOCL and are not extended operations.
 - Window of circadian low (WOCL) operations* are defined as a flight in which landing occurs during the WOCL, the flight passes through both sides of the WOCL, or the duty period starts at 0400 or earlier in the WOCL.
 - Extended operations* are defined as any operation with a duty period longer than 14 hours or flight time longer than 10 hours. Extended operations can involve duty/rest cycles longer than 24 hours.

Table 2
Recommended Guidance for Augmented¹ Crews
 24-Hour Period²

Type of Operation	Duty Period (maximum hours)	Flight Time (maximum hours)	Off-Duty Period (minimum hours)
Reclining seat available for rest	18	16	12
Supine bunk available for rest	20	18	12
		Each flight crewmember to have maximum sleep opportunity with a minimum of 4 hours total	Maximum of two consecutive duty periods with 18 hours off duty after the two consecutive duty periods
WOCL ³	No extensions recommended		
Multiple time zones	48 continuous hours off duty on return home following a duty period crossing multiple time zones		

Notes

1. *Augmented crew* is a flight crew that comprises more than the minimum number required to operate the aeroplane so that each crewmember can leave his or her assigned post to obtain in-flight rest and be replaced by another appropriately qualified crewmember.
2. Augmented operations can involve duty/rest cycles longer than 24 hours.
3. *Window of circadian low (WOCL) operations* are defined as a flight in which landing occurs during the WOCL, the flight passes through both sides of the WOCL, or the duty period starts at 0400 or earlier in the WOCL.

Definitions

Duty Period is a period that starts when a crewmember is required by an operator to report for or commence a duty and ends when that crewmember is free from all duties.

Flight Time is the total time from the moment an aircraft first moves for the purpose of taking off until the moment it finally comes to a rest at the end of the flight.

Off Duty Period is a continuous, defined period of time, subsequent to and/or prior to duty, during which time crewmembers are free of all duties.

Window of Circadian Low (WOCL) is best estimated by the hours between 0200 and 0600 for individuals adapted to a usual day-wake/night-sleep schedule. This estimate is calculated from scientific data on the circadian low of performance, alertness, subjective report (i.e., peak fatigue) and body temperature.

WOCL Operations: For purposes of scheduling, a common regulatory approach for estimating time zone adjustment is the following. For duty periods that cross three or fewer time zones, WOCL is roughly 0200 to 0600 home-based/domicile time. For duty periods that cross four or more time zones, the WOCL is estimated to remain at home-base/domicile time for the first 48 hours only. After a crewmember remains away more than 48 hours from home-base/domicile, the WOCL is roughly 0200 to 0600 local time.

Extended Flight Time

Non-Augmented Flight Crew

Cumulative flight time can be extended beyond 10 hours when accompanied by additional restrictions and compensatory off-duty periods. This extended flight time should not exceed 12 hours within a 24-hour period. If cumulative flight time is extended beyond 10 hours, the following should be applied:

Workload: Restricted Number of Landings. Accident data and research suggest that increased vulnerability and risk occur during critical phases of flight, with the highest risk levels occurring during descent and landing. Each additional landing can increase workload, further degrade performance and represent a period of increased vulnerability. If flight time for non-augmented crew operating during the WOCL contains a single, long and continuous block-to-block flight time, then it is recommended that the flight crew perform no other flight duties after landing, such as repositioning flights or short passenger drop-off flights.

Cumulative Effects: Maximum Cumulative Hours of Extension. Over time, extended flight time can result in cumulative effects of fatigue. To support operational flexibility and still minimize the potential for cumulative effects of fatigue, it is recommended that flight time can be extended by a cumulative total of four hours within a seven-day period. These extensions should not be scheduled on consecutive days.

Recovery: Compensatory Off-Duty Period. An extended off-duty period is recommended to promote recovery from the acute fatigue associated with flight time extensions. The subsequent 10-hour off-duty period should be extended to 12 hours.

Flight Time: WOCL. While operational circumstances may necessitate extended flight time into the WOCL, it is recommended that there be no planned extensions of flight time for non-augmented crew operating during the WOCL.

Augmented Flight Crew

Augmenting the flight crew provides for reduced time at the controls for each crewmember and allows for a sleep opportunity. All recommended guidelines for extended duty periods for augmented crews apply to extended flight time:

- Each crewmember should be given maximum sleep opportunities when scheduling in-flight rest periods in augmented operations. At least four total hours per duty period should be provided for these sleep opportunities.
- A minimum of 12 hours off duty should be provided following each augmented duty period.
- A maximum of two consecutive extended duty periods should be scheduled.
- Following two consecutive extended duty periods, a minimum of 18 hours off duty should be provided to crewmembers.

Controlled rest on the flight deck should not be considered as a substitute for the sleep opportunities or facilities required when additional crewmembers are assigned to a flight operation.