Causes of Fatigue

Sleep loss \[\rightarrow\] Circadian rhythms

FLIGHT CREW FATIGUE

Effect of flight operations on sleep and circadian physiology
REPORT OF DR. NASIM ZAIDI COMMITTEE
ON
FLIGHT & DUTY TIME LIMITATION AND REST REQUIREMENTS
FOR
FLIGHT CREW MEMBERS
## Glossary and Acronyms

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Executive Summary

1. The aviation industry requires 24-hour activities to meet operational demands. Aircraft operate domestic and international sectors under different conditions such as short, long and ultra-long range, day and night time, periods of circadian rhythm, time zone differences, varying numbers of sectors (landings) crew, composition etc. It is essential that crew (flight/cabin) get adequate rest to mitigate fatigue and remain alert and perform aircraft operations as per requirements of safety of civil aviation. This report addresses these issues in light of available scientific knowledge on sleep and fatigue, ICAO standards and best current international practices on the subject.

2. Flight time, flight duty period, duty period limitations and rest requirements are established for the sole purpose of ensuring that the flight crew members perform at an adequate level of alertness for safe flight operations. In order to accomplish this, two types of fatigue are taken into account, namely, transient fatigue and cumulative fatigue. Transient fatigue is dispelled by a single sufficient period of rest or sleep. Cumulative fatigue occurs after incomplete recovery from transient fatigue over a period of time. For this purpose, ICAO in Annex 6, Part I requires the States to establish regulations specifying the limitations applicable to the flight time, flight duty periods, duty periods and rest periods for flight crew members. Attachment ‘A’ of the Annex 6 provides ‘Guidance Material’ to the States for developing fatigue management regulations, which stipulates prescriptive limitations to safeguard against both kinds of fatigue.

3. In India, flight time, flight duty time limitations and rest requirements are stipulated in Rule 42A of the Aircraft Rules, 1937 and AIC 28 of 1992. The latter, besides other requirements, envisages a maximum flight time of 14 hours on international routes. No difficulty in operationalisation of these provisions was felt because operators were not carrying out such operations with aircraft available at the time of formulation of the AIC and until recently.

4. Air India acquired Boeing 777-200LR type of aircraft in July 2007 and became the first Indian operator to offer from 1 August 2007 direct nonstop flights from
Mumbai, India to New York’s John F. Kennedy International Airport, USA. The flight time of these non-stop flights exceeded 14 hours, which was beyond the maximum flight time permitted under AIC 28 of 1992. In contrast, Delta Airlines of USA was operating direct non-stop flights between New York and Mumbai city pairs since November 2006, with flight time more than 16 hours because US regulations permitted such flight timings. Internationally, Singapore Airlines and Thai Airways were also operating flights having flight time of more than 16 hours.

5. The AIC 28 of 1992 was broadly based on the then prevailing US regulations. The US regulations permit flight time beyond 12 hours with “3 or more pilots and an additional flight crewmember”. In contrast, AIC 28 of 1992 permits a maximum of 12 hours flight time with “3 pilots and one additional crewmember” and a maximum of 14 hours flight time with 2 sets of crew (i.e. 4 pilots). This restriction in Indian regulations prohibited Air India to operate direct non-stop flights between India and US.

6. A change was, therefore, required in Indian regulations to address the issue of non-stop flights of Air India between city pairs of US and India and also important elements such as flight duty period and rest requirements for such long range flights and mitigating fatigue induced by such operations.

7. To address the above difficulty, DGCA formulated fresh regulations on the subject and promulgated Civil Aviation Requirements, Section 7, Flight Crew Standards, Series ’J’, Part III dated 27 July 2007, referred as ‘CAR of 2007’ in this report. The CAR was based on CAA, UK regulations. The CAR addressed the basic issue of non-stop flight beyond 14 hours. However, certain additional criteria were also added, which were represented to the Government by operators.

8. The Government, in May 2008, decided to keep CAR of 2007 in abeyance and consequentially revived AIC 28 of 1992. The Government also decided to constitute a Committee to further examine the matter with the following terms of reference:

   i. to re-examine the Flight Duty Time Limitations (FDTL) of pilots in consultation with various stakeholders keeping in view the present civil aviation environment in India, including general aviation, flying training operations and helicopter operations;
ii. to examine the prevailing international practices regarding FDTL/Flight Time Limitation (FTL) being followed by major aviation regulators worldwide; and

iii. recommend such amendments as may be suitably incorporated in the new CAR, keeping in view the availability of pilots and their optimum utilization with adequate duty time limitations in context of the growing Indian civil aviation sector, without compromising on aviation safety.

9. The Committee was also asked to examine Flight Duty Time and Flight Time Limitations of Cabin Crew.

10. It was also felt that as the subject closely relates to human functioning during flight, sleep and fatigue science, circadian physiology etc., it would be appropriate to induct an aviation medical specialist as part of the Committee to assess medical aspects relating to regulatory requirements. Accordingly, Group Captain (Dr.) Deepak Gaur, Professor in Aviation Medicine affiliated to Rajiv Gandhi University of Health Sciences, Bengaluru was nominated by DGMS (Air), IAF on the Committee. The Committee has dealt with scientific aspect of sleep and fatigue science with the help of the experts and literature. Other scientific studies conducted elsewhere by expert bodies were also taken into account during examination of the report.

11. This report contains Flight and Duty Time Limitations and Rest Requirements of flight crew engaged in scheduled/non-scheduled air transport operations and general aviation aeroplanes. Helicopters and flying training operations will be covered in a separate report of the Committee along with cabin crew.

12. The Committee after careful consideration of all available scientific knowledge, consultation with stakeholders identified basic elements and concluded that Indian regulations should be based on the most recent criteria of ICAO. The Committee, therefore, recommends that the Indian regulations be formulated on the basis of these basic elements and criteria to keep them closely aligned with ICAO standards. To achieve the same, following primary actions will be required to implement the 'Prescriptive Fatigue Management Regulations' in accordance with the ICAO Standards of Annex 6 Part I and Guidelines as prescribed in its Attachment 'A'. It may be mentioned that the Committee has carefully examined and conclude that the
recommendations when implemented will improve aviation safety and reduce risk of accidents on account of fatigue amongst pilots.

a) Amend Rule 42A of the Aircraft Rules, 1937, which in its present form appears to be anachronistic. A draft rule has also been proposed, which provides as follows:

i. Power to DGCA to establish regulations specifying the limitations applicable to the flight time, flight duty periods, duty periods and rest periods for flight and cabin crew members of aircraft engaged in commercial operations, general flying and flying training;

ii. Require operators to establish a ‘Scheme’ of flight time and duty period limitations and a rest that enable it to manage the fatigue of all its flight and cabin crew members. This scheme should comply with the regulations established by or approved by DGCA, and should be included in the operations manual;

iii. Require operators to establish a ‘means’ to permit variations from the fatigue regulations, which are acceptable and duly approved by DGCA;

iv. Require operators to maintain foolproof records for all its flight and cabin crew members of flight time, flight duty periods, duty periods and rest periods.

b) ‘Flight and Duty Time Limitations and Rest Requirements’ for scheduled, non-scheduled air transport operators and general aviation aeroplanes should be laid down in accordance with the recommendations given in this report.

c) DGCA may initiate action to implement other recommendations made in the report for future like Fatigue Risk Management Systems (FRMS) and Ultra Long Range (ULR) Operations.

13. Some of the salient features of the report are enumerated as below:

a) Adhere closely to ICAO Standards and Recommended Practices, ICAO Guidelines and best international practices.

b) Rationalisation of requirements based on scientific knowledge (where available), international best practices and complexities of variables under Indian conditions.
c) The Operators and the flight crew members to collectively address the issue of fatigue management and safety of operations in a collaborative and cooperative manner. The Committee is aware of the instances where the operators and pilots both have attempted to cross and push the limits for variety of reasons. The report is based on the basic premise that no operator will deploy a crew on flight and no flight crew will accept such a flight, which would be beyond the limits stipulated by the regulations and also if a flying crew or operator judges the flying crew as fatigued and beyond limits.

d) Introduction of new concept of “Duty”, “Duty Period” and “Flight Duty Period” in accordance with the ICAO guidelines instead of “Flight Duty Time” traditionally being used in Indian regulations. Several mitigating measures such as augmentation of crew, quality of rest facilities on board, circadian rhythm factor and qualification of pilots have been included to manage fatigue.

e) Retains distinction between operations within ‘Domestic & Neighbouring Countries’ and International operations on the basis of nature of operations, time zone differences, relationship of flight to the home base and fatigue induction.

f) The report addresses the issue of transient fatigue by providing at home base, a minimum rest of at least as long as preceding duty period, or 12 hours, or 14 hours on crossing 3 time zones, or 36 hours on crossing 8 time zones whichever is greater before undertaking the next flight duty period.

g) The issue of cumulative fatigue is being addressed by placing weekly requirement of
   i) maximum flight time (of 35 hours for domestic operations and 40 hours for international operations),
   ii) maximum duty period of 60 hours, and
   iii) minimum rest of 36 hours, which includes two local nights.

h) The report in addition to daily and weekly limitations also prescribes cumulative limitations for 30 and 365 days cycle.
i) Impact of undertaking flight operations in the ‘Window of Circadian Low’ (WOCL) i.e. between 0200 to 0600 hours is proposed to be addressed by reducing Flight Duty Period (FDP).

j) Extension of FDP can be employed through augmented crew and by providing higher levels of resting facilities during flight as well as on ground. Additionally, the concept of Spilt Duty (Break) is also being employed to address fatigue and consequently its use and linkage with extension of Flight Duty Period.

k) The report places limits on consecutive night operations in domestic and international passenger operations. However, keeping in view the difficulty experienced by domestic cargo operators, who operate only during night, night operations of cargo aeroplanes have been addressed differently by providing additional rest requirements to undertake consecutive night operations.

l) The effect of time zone differences and timing of day and night of aircraft operations on fatigue level of the pilots has been dealt with extensively on the basis of scientific knowledge, expert advise and studies.

m) Mandatory foolproof, transparent, online computerised system to maintain and monitor records relating to flight and duty time limitations and rest requirements with “Audit Trail” and a link to DGCA for oversight of the system and records has been proposed.

n) The report suggest operators to establish a ‘Scheme’ of flight time, duty period limitations and rest as per International Standards and Recommended Practices of ICAO to manage the fatigue of all its flight and cabin crew members, which shall comply with the regulations established by or approved by DGCA, and be included in the operations manual.

o) Several operations related practices such as standby, availability, positioning, unforeseen circumstances, reporting time, and transportation to/from airport
have been studied in light of ICAO and international practices to mitigate their impact on fatigue levels of pilots.

p) This report addresses need for continuous education and training on the subject to be employed by operators and crew members at company and individual levels. It is expected that education and training will improve at crew level the sleep habits and personal strategies to perform safe flight operations with alertness and also imparting necessary information and knowledge by the company to its crew members.

14. Chapters 1 & 2 provide introduction of the subject, circumstances leading to formation of the Committee, methodology and perspective used for dealing with the subject.

15. Chapter 3 covers available scientific knowledge on the subject of sleep, fatigue, time zones and circadian physiology to understand their impact on human physiology and performance of pilots during flight. This Chapter includes several scientific studies, research and experimentation on the subject by agencies like NASA, USA and Moebus Aviation in Europe. The Chapter also reflects interaction of the Committee with renowned aviation medicine experts and references deliberated by the Committee.

16. In Chapters 4 & 5, the Committee for the first time has given a historical review of evolution of Indian regulations and also compilation and comparative study of international regulations and best practices. The Committee has made extensive and intensive study of the international practices on the subject covering ICAO and all aviation regions of the world.

17. The Chapter 6 defines the basic structure of the regulations i.e. amendment to Rule 42A of the Aircraft Rules, necessity of retaining different regulations for operations in domestic including neighbouring countries and international operations, definition of neighbouring countries, whose time zone fall within ± 1½ hours of Indian Standard Time. The Committee is of the opinion that responsibility for safety of flight and that of adhering to the regulations should be shared by both the operator and the flight crew.
members. This shared responsibility should form as an umbrella regulation encompassing all stipulated requirements on the subject. Further, as extensive knowledge is available regarding fatigue, sleep, and circadian physiology as it relates to performance and aviation operations, the operators should ensure that concerned persons are trained and educated regarding dangers of fatigue, the causes of sleepiness and importance of sleep and proper sleep habits. The Committee has worked throughout by focusing on identified basic elements of fatigue and pilot alertness during flight. This is reflected in Chapter 6 and throughout the report.

18. Chapter 7 deals with the concept of flight time limitation, which is also shown in the Table – ‘A’ of the executive summary. This chapter is based on the premise that neither the operator will schedule the flight crew nor the flight crew will accept a duty if the crew has reached his flight time limitation or is fatigued or unfit to report for duty. The maximum flight time limitation ranges from 8 hours with normal 2 pilots configuration to 16 hours with augmented crew composition of four pilots i.e. 2 sets of crew. Such augmented crew configuration is provided for long-haul operations like India – USA non-stop flights and are not permitted to be used for domestic operations or to neighbouring countries. The flight time limitation is also related to number of landings because the landing of aircraft is most stressful function of aircraft operations and directly impacts the fatigue and performance of pilots.

Table – ‘A’

Maximum Flight Time Limitations
(During any 24 consecutive hours)

<table>
<thead>
<tr>
<th>Crew Complement</th>
<th>Maximum Flight Time Limitation/Max Number of Landings**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic and Neighbouring Countries Operations</td>
<td>International Operations</td>
</tr>
<tr>
<td>For day operations</td>
<td>Up to 8 hours/Max 6 landings</td>
</tr>
<tr>
<td>For night operations</td>
<td>Up to 9 Hours/Max 3 landings</td>
</tr>
<tr>
<td>Two-Pilot Operations</td>
<td>For day operations</td>
</tr>
<tr>
<td>For day operations</td>
<td>Up to 9 Hours/Max 3 landings</td>
</tr>
<tr>
<td>For night operations</td>
<td>Up to 9 Hours/Max 2 landings</td>
</tr>
</tbody>
</table>
### Maximum Flight Time Limitation/Max Number of Landings**

<table>
<thead>
<tr>
<th>Crew Complement</th>
<th>Domestic and Neighbouring Countries Operations</th>
<th>International Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-Pilot Operations</td>
<td>Not Permitted</td>
<td>Up to 12 Hours/Max 1 landing</td>
</tr>
<tr>
<td>Four-Pilot Operation</td>
<td>Not Permitted</td>
<td>Up to 16 Hours/Max 1 landing</td>
</tr>
<tr>
<td>Four-Pilot ULR Operations*</td>
<td>Not Permitted</td>
<td>More than 16 hours/Max 1 landing</td>
</tr>
</tbody>
</table>

* ULR Operations needs specific approvals of DGCA on City Pairs and case-to-case basis

** Maximum Numbers of Landings are further dependent on Flight Duty Period

19. With a view to address cumulative fatigue of the flight crew, Chapter 7 also deals with limitation of flight time limitations for cumulative period of 7, 30 and 365 consecutive days as shown in Table – ‘B’ below.

<table>
<thead>
<tr>
<th>Cumulative Period</th>
<th>Flight Time Limitation (Hours)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In 7 consecutive days</td>
<td>Domestic and Neighbouring Countries Operations</td>
<td>International Operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>125</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>In 365 consecutive days</td>
<td>1000</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

20. Chapter 8 introduces new concept of ‘Duty Period’ and ‘Flight Duty Period’ (FDP) instead of ‘Flight Duty Time’ so far used in Indian regulations. These new concepts are based on International Standards and Guidelines of ICAO. This Chapter is a very significant part of the study of the Committee. It is based on the fact that neither operator will schedule a flight crew member, who has reached limits of various ‘Duty Period’ and FDP, nor a flight crew member will offer himself/herself for duty under such circumstances. This Chapter lays down weekly, fortnightly and monthly Cumulative Duty Period limits and maximum daily FDP as shown in Tables – ‘C’ & ‘D’ of the executive summary. Maximum daily FDP with 2 pilots ranges from 11 to 12.5 hours
for domestic operations and up to 13 hours for international operations. The variation in FDP is related to maximum number of landings. Any increase in number of landings requires reduction in Flight Duty Period.

### Table – ‘C’

Maximum Daily Flight Duty Period – Two Pilot Operations

<table>
<thead>
<tr>
<th>Type of Operations</th>
<th>Maximum Daily Flight Duty Period (FDP) Limitation**</th>
<th>Maximum Number of landings</th>
<th>Maximum Flight Time Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International Operations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 hours</td>
<td>2</td>
<td>10 hours</td>
<td></td>
</tr>
<tr>
<td>12.5 hours</td>
<td>2 for night operations 3 for day operations</td>
<td>9 hours</td>
<td></td>
</tr>
<tr>
<td><strong>Domestic and Neighbouring Countries Operations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.5 hours</td>
<td>2 for night operations 3 for day operations</td>
<td>9 hours</td>
<td></td>
</tr>
<tr>
<td>12 hours</td>
<td>4</td>
<td>8 hours</td>
<td></td>
</tr>
<tr>
<td>11.5 hours</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 hours</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Reduction of Flight duty period due to operation in WOCL**

When the FDP starts in the WOCL, the maximum FDP stated in above points will be reduced by 100 % of its encroachment up to a maximum of two hours. When the FDP ends in or fully encompasses the WOCL, the maximum FDP stated in above points will be reduced by 50 % of its encroachment.

### Table – ‘D’

Cumulative Duty Period Limitation

No operator should assign and no flight crew member should accept any duty to exceed:

(a) 190 duty hours in any 28 consecutive days, spread evenly as practicable through out this period;

(b) 100 duty hours in 14 consecutive days; and

(c) 60 duty hours in any seven consecutive days.

21. A special feature relating to reduction of FDP of crew has been introduced in case operations are undertaken during ‘Window of Circadian Low’ (WOCL) i.e. from 02:00 to 06:00 hours either in part or in full period of WOCL. This feature will mitigate
the adverse impact of operations during WOCL on the sleep loss, fatigue and performance of the flight crew. This feature is reflected in Table – ‘C’ of the executive summary.

22. Higher limit of FDP from 15 to 18 hours have been prescribed under augmented crew conditions and level of sleeping facilities available (bunk/seat) during flight.

23. A concept of ‘Split Duty’ (Break) between two flights has been dealt with adequately. Based on the length of Split Duty (Break), an operator can extend FDP and the flight crew can accept the extended FDP to the extent shown in Table – ‘E’ of the executive summary. It also prescribes provisioning of suitable accommodation in case Spilt Duty is for more than 6 hours or is encroaching upon WOCL.

<table>
<thead>
<tr>
<th>Consecutive hours of break</th>
<th>Maximum Extension of the FDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 3H</td>
<td><em>NIL</em></td>
</tr>
<tr>
<td>Between 3H and 10H</td>
<td>A period equal to half the consecutive hours break taken</td>
</tr>
<tr>
<td>&gt;10H</td>
<td>No extension permitted</td>
</tr>
</tbody>
</table>

i. Post-flight and pre-flight duties should not be counted as part of rest
ii. If the break is more than 6 consecutive hours or encroach on the WOCL, then operator should provide suitable accommodation
iii. Parts of the FDP before and after the break should not exceed ten hours.

24. Chapter 9 of the report deal with the requirements relating to rest periods. The Committee proposes that no operator should deploy and no flight crew member should under take the flight duty unless rest requirements on daily and cumulative basis have been met.

25. Sleep and fatigue science has unequivocally established the role of adequate rest in mitigating fatigue. The report deals with transient and cumulative fatigue and the one caused by time zone difference and de-synchronisation of circadian rhythm. The Committee proposes that minimum rest to be provided before undertaking a flight duty should be as long as preceding duty, or 12 hours, or 14 hours on crossing more than three time zones, or 36 hours on crossing 8 or more Time Zones, whichever is greater.
The minimum rest requirement as prescribed above is considered adequate enhancement.

26. The Committee recommends that period of transportation to and from an airport should neither be counted towards duty time nor rest period but has not favoured treatment of such transportation. The Committee felt that it may not be appropriate to prescribe period of transportation to and from an airport as part of the regulations due to different location of crews in term of their living standards and also due to the fact that enhanced weekly rest is being prescribed in the regulations. However, the operator should include in the ‘Scheme’ the optimum time of transportation after taking into account various factors and on ensuring that the rest period does not get reduced below the minimum rest requirements.

27. A flight crew would have 36 hours rest requirement free from all duties including two local nights on a weekly basis. However, if a crew crosses different time zones, the crew will be given 36 hours rest with 2 local nights and 72 hours rest with 3 local nights for crossing 4 or more time zones and 8 or more time zones respectively upon reaching home base.

28. The Committee does not recommend any reduction in rest period requirements either on daily or cumulative basis under any circumstance.

29. Chapter 10 introduces certain safeguards regarding use of crew. On standby, a maximum limit of 12 hours at home or suitable accommodation and 8 hours at airport has been prescribed. A linkage has been established between standby limits, place of standby and position of standby that goes into counting towards Duty Period and FDP depending on the place of standby and also the fact whether the standby period culminates into Duty Period or Flight Duty Period.

30. The practice of positioning the flight crew (earlier term deadheading) has been brought under appropriate regulatory framework and various elements such as duty period, FDP, rest period, number of landings have been suitably dealt with to mitigate fatigue on account of positioning and performance of pilots.
31. All aircraft operations may experience unforeseen circumstances beyond the control of operator or crew such as weather, technical (equipment) delays, or ATC related delays when Flight Time and/or Flight Duty Period may be required to be extended. The Committee has clearly defined unforeseen circumstances, their impact on extension of Fight Time/ FDP and the limit per operations and laid down defined periods, while keeping the safety of aircraft operations foremost.

32. The current practice of involvement of DGCA in extension of FT/FDP under unforeseen circumstances is proposed to be done away with. It is a significant departure from the present practice and now in line with ICAO and other best international practices. The discretion of extension of FT/FDP under such circumstances would be exercised by PIC in consultation with other crew members and also head of operations of operator wherever possible. Thus a concept of joint responsibility has been introduced between crew and the operator. However, all such events will be reported to DGCA, who may determine the regulatory adherence and advise alternative strategies (such as change of operations schedule etc.) in case of excessive extensions are reported under unforeseen circumstances.

33. The issue of reporting time has also been addressed. A responsibility has been cast on operators in consultation with crew to determine reporting time and by employing models like CAA, UK and taking into account all other factors. The pre-flight reporting period and the post flight will be counted towards FDP and Duty Period respectively.

34. Night operations of passengers and cargo operators and crew members have been dealt with separately. In case of domestic and international passenger operator, neither operator nor flight crew member should engage in consecutive nights involving 0000 to 0500 hours. However, cargo operations may be permitted for two consecutive nights embracing 0000 to 05000 hours subject to rest period requirements, flight duty limitations irrespective of number of landings, additional 54 hours free from all duties at the end of the series, limitation on number of such duties in a week etc.

35. Local Night period of 8 hours between 2200 to 0800 hrs in line with the international best practices and scientific knowledge has been defined.
36. In Chapter 11, with a view to ensuring effective safety oversight and compliance of requirements, the Committee prescribes fool proof computerised system of maintenance and monitoring of requirements by the operator with a link to DGCA for online monitoring.

**Fatigue Risk Management Systems (FRMS)**

37. Chapter 12 elaborates on the need of FRMS. Civil Aviation Authorities currently use prescriptive regulations to limit flight time and duty periods. This approach has the advantage of providing clear-cut limits. It, however, is a one-size-fits-all solution and as such, it is neither the most efficient nor the most cost-effective method of managing the fatigue-related risks of any one specific aeroplane fleet or route structure.

38. ICAO has started tackling this issue aggressively and in November 2009 the Standards and Recommended Practices on the subject were updated, which now require prescriptive limitations to be developed based on scientific fatigue management principles.

39. ICAO also formed a task force to look at a Fatigue Risk Management Systems solution and a proposal for new Standards and Recommended Practices for FRMS have been drafted with suggested applicability in 2011. The proposal states that FRMS employs a multi-layered system of defences to manage operational fatigue risk, and can take advantage of established SMS processes. This non-prescriptive approach will allow greater operational flexibility and efficiency while enhancing safety and reducing costs.

40. The proposal stipulates that an operator will have the option of implementing an FRMS only in those States where FRMS regulations have been established by the State. Even in these States, depending on the nature of the operations, some operators may choose not to adopt FRMS, others may wish to implement FRMS only for limited operations and still others may wish to implement an FRMS for all operations.

41. ICAO has prepared a draft of FRMS guidance material, which would continue to be developed for some months and will need to be aligned to the final outcomes of the above ICAO proposal of new SARPs for FRMS.
42. The Committee recommends that FRMS proposal of ICAO may be evaluated in consultation with the operators to find out if any of the operators would like to adopt FRMS for their operations. Further, in view of the FRMS proposal being in draft stage only, the Committee has suggested the following:

i) DGCA in consultation with operator may formulate comments in consultation with stakeholders.

ii) As and when FRMS is finalised by ICAO, DGCA may take appropriate steps for its implementation by operators. In the meantime, it is also recommended that DGCA may take proactive steps to either train its staff on the regulatory aspects of FRMS or explore the possibilities of engaging expert agencies to evaluate FRMS proposed by operators for regulatory authority.

**Ultra Long Range (ULR) Operations**

43. Chapter 13 deals with potential ULR operations exceeding flight time of 16 hours. Ultra Long Range (ULR) Operations are defined as continuous non-stop flights between the specific city pairs having a flight time of over 16 hours and duty periods between 18 and 22 hours. Airlines of India, at present, are not operating any ULR flights.

44. The Committee also discussed the subject of ULR flights with Capt. Mitchell Fox, Chief flight Operations Section of ICAO and he agreed that even though it is possible to operate such flights under prescriptive limits with additional restrictions, it would be appropriate that such flights are operated under FRMS, which would provide continuous monitoring of the crew alertness.

45. The Committee deliberated on the availability of international regulations on ultra long flights. ICAO has not prescribed any standards and only Singapore has laid down ULR specific regulations and requires ‘City Pair Specific’ approval. The Committee also took note of the fact that none of the Indian operators fall within the category of ULR on the basis their current operations. However, keeping in view the rapid advancement in technology and demand in the aviation sector, Indian operators may plan to undertake ULR flights. The Committee, therefore, agreed that it would be appropriate for DGCA to lay down a broad framework of ULR regulations and approve such flights on case-to-case basis for specific city-pairs and the departure windows of these flights.
46. All conclusions and the 37 recommendations made by the Committee are consolidated in Chapter 14 of the report. It provides the overview of the recommendations and contains a comparison with the existing flight time and duty time regulations AIC 28 of 1992.

**Variability and Differences Preclude an Absolute Solution**

47. The scientific findings relevant to human physiological reveal that there are considerable individual differences in the magnitude of fatigue effects on performance, physiological alertness, and subjective reports of fatigue. These differences extend to the effects of sleep loss, night work, and considerations of required sleep and recovery time for an individual. Individual differences can vary as a function of age, sleep requirement, experience, overall health, and other factors. Individuals can also vary in their participation in off-duty activities that engender fatigue during a subsequent duty period. Further, the aviation industry represents a diverse range of required work demands and operational environments and flight crews' human physiology is not different from that of other humans. The guidelines and regulations, therefore, cannot completely cover all personnel or operational conditions and that there is no single absolute solution to these issues. The report of the Committee is based on wide ranging study of scientific knowledge, related studies, expert advice and consultation and international practices.

49. This report contains significant conclusions and recommendations, which will enhance safety of aviation and reduce risks associated with fatigue of crew members. Therefore, the Committee recommends that the Ministry of Civil Aviation after taking appropriate decision on the report advise DGCA to formulate and finalise draft regulations incorporating the recommendations of the Committee and as per the laid down procedure of framing the regulations.
CHAPTER – 1
Introduction

1.1 Flight time, flight duty period, duty period limitations and rest requirements are established for the sole purpose of ensuring that the flight crew members perform at an adequate level of alertness for safe flight operations. In order to accomplish this, two types of fatigue are required to be taken into account, namely, transient fatigue and cumulative fatigue. Transient fatigue is dispelled by a single sufficient period of rest or sleep. Cumulative fatigue occurs after incomplete recovery from transient fatigue over a period of time.

1.2 For the purpose of managing fatigue, ICAO in Annex 6, Part I requires the States to establish regulations specifying the limitations applicable to the flight time, flight duty periods, duty periods and rest periods for flight crew members with the aim of ensuring that flight crew members are performing at an adequate level of alertness. Attachment ‘A’ of the Annex 6 provides ‘Guidance Material’ to the States for developing fatigue management regulations, which stipulates prescriptive limitations to safeguard against both kinds of fatigue.

1.3 In India, flight time, flight duty time limitations and rest requirements are stipulated in Rule 42A of the Aircraft Rules, 1937 and AIC 28 of 1992. Rule 42A provides that a pilot will not fly more than 125 hours in 30 consecutive days. This provision has been made a part of AIC 28 of 1992. The latter envisages flight times on international routes up to a maximum of 14 hours. No difficulty in operationalisation of these provisions was felt because such operations were not being carried out by operators with aircraft available at the time of formulation of the AIC.

1.4 Air India acquired Boeing 777-200LR type of aircraft in July 2007 and became the first Indian operator to offer direct, nonstop flights between the United States and India. Air India started its services on 1 August 2007 from Mumbai, India to New York’s John F. Kennedy International Airport, USA. The flight time of these non-stop flights exceeded 14 hours, which was beyond the maximum flight time permitted under AIC 28 of 1992. In contrast, Delta Airlines of USA could operate direct non-stop flights between
New York and Mumbai city pairs, with flight time more than 16 hours because US regulations permitted such flight timings. Internationally, Singapore Airlines and Thai Airways were also operating flights having flight time of more than 16 hours.

1.5 The AIC 28 of 1992 was broadly based on US regulations. The US regulations permit flight time beyond 12 hours with “3 or more pilots and an additional flight crewmember”. In contrast, AIC 28 of 1992 permits a maximum of 12 hours flight time with “3 pilots and one additional crewmember” and a maximum of 14 hours flight time with 2 sets of crew (i.e. 4 pilots). It was this restriction in Indian regulations, which prohibited Air India to operate non-stop flights between India and US.

1.6 A change was, therefore, required in Indian regulations to address the issue of non-stop flights of Air India between city pairs of US and India and also important elements such as flight duty period and rest requirements for such long range flights and mitigating fatigue induced by such operations.

1.7 To address the above difficulty, DGCA formulated fresh regulations on the subject and promulgated Civil Aviation Requirements, Section 7, Flight Crew Standards, Series 'J', Part III dated 27 July 2007, referred as ‘CAR of 2007’ in this report. The CAR was based on CAA, UK regulations. While the CAR addressed the basic issue of non-stop flight beyond 14 hours, certain additional criteria were also added, affecting airlines operations. The operators represented to the Government against the CAR of 2007.

1.8 The Government, in May 2008, decided to keep CAR of 2007 in abeyance and consequentially reviving AIC 28 of 1992. The Government also decided to constitute a Committee to further examine the matter with the following terms of reference:

i. to re-examine the Flight Duty Time Limitations (FDTL) of pilots in consultation with various stakeholders keeping in view the present civil aviation environment in India, including general aviation, flying training operations and helicopter operations;

ii. to examine the prevailing international practices regarding FDTL/Flight Time Limitation (FTL) being followed by major aviation regulators worldwide; and
iii. recommend such amendments as may be suitably incorporated in the new CAR, keeping in view the availability of pilots and their optimum utilization with adequate duty time limitations in context of the growing Indian civil aviation sector, without compromising on aviation safety.

1.9 The Committee was also asked to examine Flight Duty Time and Flight Time Limitations of Cabin Crew.

1.10 This report contains Flight and Duty Time Limitations and Rest Requirements of flight crew engaged in scheduled/non-scheduled air transport operations and general aviation aeroplanes. Helicopters and flying training operations will be covered in a separate report of the Committee along with cabin crew.

1.11 During the course of deliberations of the Committee, the Government had to reconstitute the above Committee in July 2009 as the Chairman was posted out of the country and superannuation of a member of the Committee. At this stage, it was felt that as the subject closely relates to limitations and adjustment of human functioning during flight, it would be appropriate to induct an aviation medical specialist as part of the Committee to assess medical aspects relating to flight time limitations. A request was, therefore, made to Director General of Medical Services (Air), Indian Air Force to depute a Senior Medical Advisor of the R & D cell, which specializes in aviation medicine to be a member of the Committee for the specialised assessment of the FDTL requirements. DGMS (Air) nominated Group Captain (Dr.) Deepak Gaur, Professor in Aviation Medicine affiliated to Rajiv Gandhi University of Health Sciences, Bangaluru.

1.12 The Government then reconstituted the Committee vide Order No. AV.15029/05/2007–VE dated 15 July 2009 as follows:

- Dr. Nasim Zaidi – Chairman
  Director General of Civil Aviation

- Shri Satendra Singh – Member
  Ex-Director General of Civil Aviation

- Dr. Deepak Gaur – Member
  Director Medical Services (Aviation Medicine)

- Smt Shubha Thakur – Member
  Deputy Secretary
1.13 The terms of reference of the Committee remained unchanged. A copy of the Government Order is at Annexure ‘A’.

1.14 The Committee during its first meeting decided that Smt. Tuhinanshu Sharma, Deputy Director would function as Secretary to the Committee.
CHAPTER – 2
Methodology & Perspectives

2.1 The terms of reference of the present Committee constituted by Ministry of Civil Aviation specifically required the Committee “to examine the prevailing international practices regarding FDTL/FTL being followed by major aviation regulators worldwide”. The Committee, therefore, acquired Flight and Duty Time Limitations and Rest regulations of countries representing various regions of the world including USA, Canada, Australia, UK, regional civil aviation bodies such as EC/EASA, and ICAO.

2.2 In the first meeting of the Committee, Group Captain (Dr.) Deepak Gaur briefed the members about different types of fatigue, sleep deprivation studies, period of ‘circadian low’ (late night and early morning hours, varying in individuals and societies) and other related aviation medicine issues. Dr. Gaur furnished relevant scientific papers on the subject. The Committee considered various scientific studies like NASA Technical Memorandums 110404, TM-2001-211385, Moebus Aviation report etc. for finalising the flight time limitations and rest requirements.

2.3 The Committee extensively deliberated upon the regulations of various countries and inputs provided by Dr. Gaur. After seventh meeting, a list of criteria was finalised, which were considered relevant to the FDTL requirements. These criteria are as follows:

**Flight Time**
- Cumulative yearly, monthly, weekly and daily limits

**Flight Duty**
- Maximum Flight Duty Time Limitation
- Extension of Flight Duty Time Limitation with
  - Augmented Crew
  - Controlled Rest on Flight
  - Spilt Duty
  - Unforeseen operational circumstances beyond the control of the certificate holders (such as adverse weather conditions, unanticipated technical delays)
  - Any other conditions
- Restriction/Reduction of Flight Duty Time Limitations due
  - Flight operation in Window of Circadian Low (WOCL),
• Number of landings
• Positioning (Deadheading)
• Standby duty
• Any duty other than flight duty

**Rest Requirements**

- Minimum rest period
- Weekly rest period
- Time free from any duty
- Relationship of rest with
  - Flight duty time
  - Long flights
  - Standby duty

**Other Issues**

- Flights to Neighbouring Countries
- Ultra-Long Flights
- Monitoring System and Maintenance of FDTL records of flight crew

**Any other issue considered relevant**

2.4 The Committee also decided to invite all stakeholders to provide their views/suggestions on the subject, especially on the criteria contained in the above list. Accordingly, the following stakeholders were issued e-mails and letters (Ref. No. DG/FDTL/2009) dated 18 August 2009 with a request to submit their views/suggestions by 31 August 2009:

**Airlines**

National Aviation Company India Limited (NACIL) - Air India
National Aviation Company India Limited (NACIL) – Indian Airlines
Air India Charters Limited
Airlines Allied Services
Jet Airways (India) Pvt. Ltd.
Jetlite India Limited
Kingfisher Airlines Ltd.
Spicejet Ltd.
Paramount Airways Pvt. Ltd.
Go Airlines (India) Pvt. Ltd.
Inter Globe Aviations Pvt. Ltd. (Indigo)
MDLR Airlines
Jagson Airlines Ltd.
Blue Dart Aviation
Deccan Cargo

**Pilot Unions**
- Federation of Indian Pilots (FIP)
- Indian Pilots Guild (IPG)
- Indian Commercial Pilots’ Association (ICPA)
- Society for Welfare of Indian Pilots (SWIP)

**Office of Director General Civil Aviation**
- Flight Inspection Directorate
- Air Safety Directorate

2.5 Views/suggestions were received from Indian Pilots Guild (IPG), Indian Commercial Pilots Association (ICPA), Society for Welfare of Indian Pilots (SWIP) and Jet Airways by due date. Other stakeholders did not respond by 31 August 2009. Reminders were sent to those stakeholders who did not respond and were provided additional time up to 3 September 2009. Kingfisher responded on 1 September 2009. Blue Dart submitted their views on 2 September 2009 and Deccan Cargo on 3 September 2009. Flight Inspection Directorate of DGCA provided their comments on 08 September 2009. NACIL (Air India) provided their final views on 10 September 2009. Federation of Indian Pilots (FIP) also provided their views on 5 November 2009.

2.6 The Committee deliberated on the views/suggestions received from the stakeholders and a list of clarifications on their views was prepared. Thereafter the Committee heard each stakeholder individually and list of clarification was provided seeking further information. Details of the meetings with the stakeholders giving dates are at Annexure ‘B’.

2.7 Much later, Inter-Globe Aviations Pvt. Ltd. (Indigo) provided their views on 07 December 2009. Air Passengers Association of India and General Insurers’ (Public Sector) Association of India also provided the views on 03 and 18 December 2009.

2.8 The Committee also received additional views from the following stakeholders after the meetings, which were also considered.
2.9 During a hearing of the court case in April 2010 by the Hon’ble Supreme Court of India (Special Leave Petition (Civil) No. 27814 of 2008 by the Joint Action Committee of Airlines Pilot Association of India & Others versus the Director General of Civil Aviation & Others), Pilot’s Associations submitted the following documents:

a) NASA Technical Memorandum 110404 regarding “Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation”

b) Testimony of William R. Voss, President and CEO, Flight Safety Foundation, US Senate Committee on Commerce, Science and Transportation’s Subcommittee on Aviation Hearing on Aviation Safety: Pilot Fatigue, December 1, 2009

c) Copy of the Statement of David Learmount on ‘Boeing Study on fatigue risk management’

d) Final Report “Scientific and Medical Evaluation of Flight Time Limitations” by MOEBUS Aviation regarding some of the FTL provisions contained in Subpart Q of the EU OPS.

e) Copies of NTSB reports on air crashes due to fatigue

2.10 The Committee was provided the above documents submitted by the Pilot’s Association. The two scientific reports namely NASA TM and of Moebus Aviation were already being considered by the Committee along with other scientific studies.

2.11 The Committee, before finalising the recommendations, decided to meet persons from some airlines handling roster/scheduling of the flight crew with a view to understand procedures adopted by them and to find out if any recommendation would have conflict with their procedures.

2.12 List of documents, which were considered by the Committee, is at Annexure ‘C’.

2.13 In all, the Committee held 54 meetings and many discussions to finalise its report.
CHAPTER – 3
Scientific Principles and Knowledge

Introduction

3.1 International Standards of ICAO Annex 6 Part I requires the States of the Operator to establish regulations specifying the limitations of flight time, flight duty period, duty period and rest period for flight crew members. It further stipulates that these regulations shall be based upon scientific principles and knowledge, where available, with the aim of ensuring that flight crew members perform their duties with adequate level of alertness and is quoted below:

"9.6 Flight time, flight duty periods, duty periods and rest periods for fatigue management

For the purpose of managing fatigue, the State of the Operator shall establish regulations specifying the limitations applicable to the flight time, flight duty periods, duty periods and rest periods for flight crew members. These regulations shall be based upon scientific principles and knowledge, where available, with the aim of ensuring that flight crew members are performing at an adequate level of alertness."

3.2 The above International Standard expects that the regulations to:

(i) be based on scientific principles and knowledge, where available, and

(ii) with the aim of ensuring that flight crew members perform their duties with adequate level of alertness

3.3 In view of the above, Dr. Deepak Gaur was requested to educate the Committee about the general principles based on scientific knowledge relevant to fatigue. He explained that recent scientific consensus concluded that 15% to 20% of all transportation accidents are caused by fatigue (i.e. sleepiness, tiredness). In aviation, incident reports to the NASA Aviation Safety Reporting Systems suggest that about 21% are fatigue related, with the majority of these occurring between midnight and 0600 hours\(^1\).
3.4 In this regard, the scientific studies carried out and published by NASA\(^{2}\) as Technical Memorandum 110404 on “Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation” and NASA/TM-2001-211385 “Crew Factors in Flight Operations X: Alertness Management in Flight Operations Education Module” provides scientifically based principles related to operational issues posed by the aviation industry.

3.5 The NASA Technical Memorandum describes general principles regarding Sleep, Awake Time Off, and Recovery as primary considerations with importance being given to frequent recovery periods. The principles describe the effect of time of day/ circadian physiology on the sleep and waking performance of an individual. These have been described from the NASA report and other references in the following paragraphs.

**Sleep**

3.6 It is widely believed that sleep is a time when the brain and the body shut off and then re-engage upon awakening. Actually, sleep is a highly complex physiological process during which the brain and body alternate between periods of extreme activity and quiet, but are never “shut off.” Sleep is composed of two distinct states: NREM, or non-rapid eye movement, and REM, or rapid eye movement, sleep. These two sleep states are as different from each other as they are from wakefulness.

3.7 During NREM sleep, physiological and mental activities slow (e.g., heart rate and breathing rate slow and become regular). NREM sleep is divided into four stages, with the deepest sleep occurring during stages 3 and 4. There is usually very little mental activity during NREM stages 3 and 4. If awakened during this deep sleep, an individual may take sometime to wake up and then continue to feel groggy, sleepy, and perhaps disoriented for 10–15 minutes. This phenomenon is called sleep inertia.

3.8 REM sleep is associated with an extremely active brain that is dreaming, and with bursts of rapid eye movements (probably following the activity of the dream); during REM sleep, the major motor muscles of the body are paralyzed. If awakened during REM sleep, individuals can often provide detailed reports of their dreams.
3.9 The graph portrays a typical night of sleep for a normal adult. It exemplifies the sleep architecture. REM (indicated by darkened bars) and NREM alternating throughout the period; most deep sleep occurring in the first half of the sleep period; and REM periods becoming longer and more regular later in the sleep period.

3.10 The amount and structure of sleep change profoundly over the life span. With increased age, sleep becomes less deep (most NREM stages 3 and 4 disappears) and more disrupted (awakenings increase), and the total amount of nocturnal sleep decreases. It is not that older individuals need less sleep, but it appears that with age, our ability to obtain a consolidated and continuous period of nocturnal sleep decreases. These changes can be seen in individuals starting as early as 50 years of age. This normal part of the aging process is reflected in a recent finding from a NASA study. Long-haul flight crewmembers aged 50–60 had a daily percentage sleep loss 3.5 times greater during trip schedules than those aged 20–30 years.
3.11 Another commonly held belief is that after sleep loss, an individual has to “make up” that sleep by sleeping a number of hours equal to those lost. Scientific laboratory studies have demonstrated that following sleep deprivation, recovery sleep is deeper (more NREM stages 3 and 4), rather than extended. During recovery sleep, an individual might sleep somewhat longer, but the most notable feature is the increase in deep sleep.

3.12 Sleep is a vital physiological need and is necessary to maintain alertness and performance, positive mood, and overall health and well-being. Each individual has a basic sleep requirement that provides for optimal levels of performance and physiological alertness during wakefulness. On average, most human beings require about 8 hours of sleep in a 24-hour period, with a range of sleep needs greater than and less than this amount. Losing as little as 2 hours of sleep will result in acute sleep loss, which will induce fatigue and degrade subsequent waking performance and alertness.

3.13 Data from sleep deprivation studies indicates that individual aviators often under-estimate the impact of fatigue on performance. It has been found that just 17 hours of continuous wakefulness degrades aspects of human performance to the same extent as a blood alcohol concentration of 0.05 % (8). Also, fatigue cannot be overcome by training or experience.

3.14 Over days, sleep loss – any amount less than is required – will accrue into a cumulative sleep debt. The physiological need for sleep created by a deficit can only be reversed by sleep. An individual who has obtained required sleep will be better prepared to perform after long hours awake or altered work schedules than one who is operating with a sleep deficit.

3.15 Virtually all basic human capabilities can be degraded with sleep loss and circadian disruption, including judgement and decision making, memory, attention, reaction time, communication skills and mood (3). The performance of a drowsy pilot becomes less consistent, especially during night hours. Problem solving, reasoning and control accuracy are all known to degrade. The aviator’s ability to pay attention to flight instruments and to manage radio communications, crew coordination and navigational tasks get severely impaired.
Awake time off

3.16 Fatigue-related performance decrements are traditionally defined by declines in performance as a function of time spent on a given task. Breaks from continuous Performance of a required task, such as monitoring, are important to maintain consistent and appropriate levels of performance. Therefore, awake time off describes time spent awake and free of duty. Thus both awake-time off and sleep are needed to ensure optimum levels of performance.

Recovery

3.17 Recovery from an acute sleep deficit, cumulative sleep debt, prolonged performance requirement, or extended hours of continuous wakefulness is another important consideration. Operational requirements can engender each of these factors and it is important that a recovery period provide an opportunity to acquire recovery sleep and to re-establish normal levels of performance and alertness.

3.18 Required sleep and appropriate awake time off promote performance and alertness. These are especially critical when challenged with extended periods of wakefulness (i.e. duty) and circadian disruption (i.e. altered work/rest schedule). Recovery is important to reduce cumulative effects and to return an individual to usual levels of performance and alertness.

3.19 The total duration of sleep requirement per day varies extensively in individuals. This could vary from as little as 5 hours to as much as 10 hours per day. Also the ideal sleeping hours are at night and include the late night period and very early morning period. Many people follow early to bed and early to rise, but increasingly more individuals tend to go to bed late due to social commitments and practices. In order to ensure restful sleep for all flight crew a rest period of 12 hours in a day is considered essential. This should generally include a 'local night' that is their home base time between 0000 hours to 0500 hours. When flight crews are required to get up earlier than 0500 hours as a routine, they can get habituated to sleeping early and getting up early. However, when this is required on more than one night and not routinely, they will need to get compensated to overcome the resultant fatigue by means of additional rest.
Frequent Recovery Periods are Important

3.20 More frequent recovery periods reduce cumulative fatigue more effectively than less frequent ones. For example, weekly recovery periods afford a higher likelihood of relieving acute fatigue than monthly recovery periods. Consequently, guidelines that ensure minimum days off per week are critical for minimizing cumulative fatigue effects over longer periods of time (e.g., month, year).

Time-of-day/Circadian Physiology Affects Sleep and Waking Performance

3.21 There is a clock in the human brain, as in other organisms, that regulates 24-hour patterns of body functions. This clock controls not only sleep and wakefulness alternating in parallel with the environmental light/dark cycle, but also the oscillatory nature of most physiological, psychological, and behavioral functions. The wide range of body functions controlled by the 24-hour clock includes body temperature, hormone secretion, digestion, physical and mental performance, mood, and many others. On a 24-hour basis, these functions fluctuate in a regular pattern with a high level at one time of day and a low level at another time. The circadian \((circa = around, \text{dies} = \text{day})\) pattern of wakefulness and sleep is programmed for wakefulness during the day and sleep at night. The circadian clock repeats this pattern on a daily basis. Certain hours of the 24-hour cycle, that is 0200 to 0600, are identified as a time when the body is programmed to sleep and during which performance is degraded. Time-of-day or circadian effects are important considerations in addressing 24-hour operational requirements because circadian rhythms do not adjust rapidly to change.

3.22 For example, an individual operating during the night is maintaining wakefulness in direct opposition to physiological programming to be asleep. Physiological, psychological, and behavioral functions are set by the circadian system to a low status that cannot be compensated by being awake and active. Conversely, the same individual sleeping during the day is in direct opposition to physiological programming to be awake. The circadian system provides a high level of functioning during day that counteracts the ability to sleep. Thus, circadian disruption can lead to acute sleep deficits, cumulative sleep loss, decreases in performance and alertness, and
various health problems (e.g., gastrointestinal complaints). Therefore, circadian stability is another consideration in duty and rest scheduling.

3.23 Thus it can be said that the quality of restful sleep is best when it is availed during the night, since this coincides with the bodily diurnal hormonal cycle. It is both difficult to initiate and maintain restful sleep during forenoon hours. Similarly the requirement to perform flying duties during the period of ‘circadian low’ (late night and early morning hours, varying in individuals and societies), requires adequate restful sleep opportunities before and after such duties\(^4\).

3.24 Flying during one’s Window of Circadian Low (WOCL) is a unique situation. Although this is best avoided, it may become an operational necessity particularly in context of international operations. The situation needs to be recognized and compensated by means of added rest and sleep opportunity both in the rest period prior to and after such a requirement.

**Continuous Hours of Wakefulness/Duty Can Affect Alertness and Performance**

3.25 Extended wakefulness and prolonged periods of continuous performance or vigilance on a task will engender sleepiness and fatigue. Across duty periods, these effects can accumulate further. One approach to minimize the accumulation of these effects is to limit the duty time (i.e. continuous hours of wakefulness during operations). Acute effects can be addressed through daily limitations while cumulative effects can be addressed by weekly limitations. There is more scientific data available to support guidelines for acute limitations than to determine specific cumulative limitations. Nevertheless, cumulative limitations (weekly and beyond) remain an important consideration for minimizing accumulation of fatigue effects.

**Human Physiological Capabilities Extend to Flight Crews**

3.26 Fatigue has its basis in physiological limits and performance deficits reflect these physiological limits. Flight crews’ human physiology is not different from that of other humans. Therefore, it must be expected that the same fatigue-producing factors affecting performance and alertness in experimental subjects, physicians on-call, shift
workers, military personnel, and others also affect flight crews. It follows that scientific findings relevant to human physiological capabilities and performance deficits from fatigue, sleep loss, and circadian physiology extend to flight crews.

**Flight Crews are Made Up of Individuals**

3.27 There are considerable individual differences in the magnitude of fatigue effects on performance, physiological alertness, and subjective reports of fatigue. These differences extend to the effects of sleep loss, night work, and considerations of required sleep and recovery time for an individual. Individual differences can vary as a function of age, sleep requirement, experience, overall health, and other factors. Individuals can also vary in their participation in off-duty activities that engender fatigue during a subsequent duty period (e.g., commuting across long distances immediately prior to starting a duty period).

3.28 NASA in its TM 2001-211385 explains the two distinct components as follows:

![Sleepiness: Two Distinct Components](image)

3.29 Two distinct components of sleepiness have been described. Physiological sleepiness parallels other vital physiological functions like hunger and thirst. Deprived of food or water, the brain signals that these vital physiological needs have not been met by developing feelings of hunger and thirst. When physiologically deprived of sleep, the
brain's signal is sleepiness. Just as the only way to reduce or eliminate hunger or thirst is to eat or drink, when an individual is physiologically sleepy, only sleep will reverse this vital need.

3.30 Subjective sleepiness is an individual's introspective assessment of the feeling and a self-report of that status. An individual can rate current sleepiness on a scale from “wide awake and alert” to “extremely sleepy, ready to nod off.” However, this self-reported rating can be strongly affected by a variety of factors, such as environmental stimulation. An environment in which an individual is physically active, has consumed caffeine, or is engaged in a lively conversation can conceal the level of underlying physiological sleepiness. Whereas these factors may affect the self-reported rating of sleepiness (usually individuals will report greater alertness than is warranted), they do not affect the underlying sleep need expressed by the level of physiological sleepiness.

3.31 The above NASA TM-2001-211385 further explains the above concept as follows:

![Subjective vs Physiological Sleep and Alertness](image)

3.32 It is usually difficult for most individuals to reliably estimate their own sleep or their waking alertness, especially if they are already sleepy.
3.33 Overall, there is a tendency for individuals to subjectively overestimate how long it takes to fall asleep and underestimate total sleep time, relative to physiological measures. Generally, people fall asleep faster and sleep longer than they think. So when an individual experiences a bad night of sleep, it may not be as bad as it seemed. However, the tendency is for individuals to subjectively rate themselves as more alert than is indicated by physiological measures. That is, most individuals are more likely to be sleepier than they report or experience.

3.34 In light of above, the NASA TM concludes that there is a misconception that flight crew are the best judge of their alertness and states as follows:

![Common Misconceptions](image)

3.35 One widely held belief is that individuals can accurately and reliably estimate their alertness and performance. Many people believe that being motivated, well trained, and professional or having previous experience with sleep deprivation prepares them to combat the physiological consequences of sleep loss. As presented above the individuals (especially sleepy individuals) do not reliably estimate their alertness and performance.

3.36 It is evident from the above that flight crew, themselves, may not be the best judge regarding their state of physical and mental fitness including their adequacy or
otherwise of restful sleep. Individual flight crew and airlines can possibly get affected by financial considerations to overlook the impact of fatigue in flight duties. Flight and duty time limitations including mandatory requirements for rest are, therefore, essential to ensure those flight crews do not perform flying duties when fatigue/sleep deprivation could jeopardize flight safety.

**Differences and Variability Preclude an Absolute Solution**

3.37 NASA TM 110404 clearly spells out that the aviation industry represents a diverse range of required work demands and operational environments. Keeping in view the diverse situations, guidelines and regulations cannot completely cover all personnel or operational conditions and that there is no single absolute solution to these issues. The study, however, spells out specific principles, guidelines and recommendations to address the scheduling requirements of the aviation industry.

**Specific Principles, Guidelines and Recommendations of NASA TM 110404**

3.38 The NASA Technical Memorandum provides these recommendations intended for application to minimum flight crew complements of two or more considered it necessary to define the terms used in these guidelines as altering these definitions may invalidate the principles that follow.

3.39 NASA TM defines “Off-Duty” as a continuous period of uninterrupted time during which a crew member is free of all duties. The TM provides the specific recommendations regarding “Off-Duty Period” as follows:

**2.1 Off-Duty Period**

2.1.2 Off-duty period (acute sleep and awake-time-off requirements)- The off-duty period should allow for three components.

The first critical component of the off-duty period is an 8-hour sleep opportunity. The general principles clearly describe that an acute sleep deficit and a cumulative sleep debt can degrade performance and alertness. Also, it should be recognized that an appropriate “spin down” time may be required to fall asleep.

The second component is awake time off, an opportunity to break from the continuous performance of required tasks.
The third component is the other activities necessary during an off-duty period. These other necessary activities can include transportation to and from layover accommodations, hotel check in/out, meals, shower, and personal hygiene. Therefore, the off-duty period should be a minimum of 10 hours uninterrupted within any 24-hour period, to include an 8-hour sleep opportunity, awake time off, and time for other necessary activities. (In the case of extended flight duty period, see section 2.3.5.)

2.1.3 Off-duty period (recovery requirement) - The general principles outline the importance of recovery to minimize the cumulative effects of sleep loss and fatigue. Two consecutive nights of usual sleep is a minimum requirement to stabilize sleep patterns and return waking performance and alertness to usual levels. Two consecutive nights of recovery sleep can provide recovery from sleep loss. Therefore, the standard off-duty period for recovery should be a minimum of 36 continuous hours, to include two consecutive nights of recovery sleep, within a 7-day period.

2.1.4 Off-duty period (following standard flight duty periods during window of circadian low*) - Extensive scientific research, including aviation data, demonstrate that maintaining wakefulness during the window of circadian low is associated with higher levels of performance-impairing fatigue than during daytime wakefulness. Therefore, flight duty periods that occur during the window of circadian low have a higher potential for fatigue and increased requirement for recovery. It is recommended that if two or more flight duty periods within a 7-day period encroach on all or any portion of the window of circadian low, then the standard off-duty period (36 continuous hours within 7 days) be extended to 48 hours recovery.

3.40 The NASA TM defines “Duty” and “Duty Period” and recommends the maximum duty during 24 hours as follows:

2.2 Duty Period

2.2.1 Definition: "duty" - Any task a crew member is required by the operator to perform, including flight time, administrative work, training, deadheading, and airport standby reserve.

2.2.2 Definition: "duty period" - A continuous period of time during which tasks are performed for the operator; determined from report time until free from all required tasks.

2.2.3 Duty period - To reduce vulnerability to performance-impairing fatigue from extended hours of continuous wakefulness and prolonged periods of continuous performance requirements, cumulative duty per 24 hours should be limited. It is recommended that this limit not exceed 14 hours within a 24-hour period. (In the case of additional flight crew, see section 2.3.6.)

3.41 The NASA Technical Memorandum also defines “flight duty period” and “window of circadian low” and recommends regarding maximum “standard flight duty period”, and “extended flight duty period” within a 24 hour period and restrictions as follows:
2.3 Flight Duty Periods

2.3.1 Definition: "flight duty period" – The period of time that begins when a crew member is required to report for a duty period that includes one or more flights and ends at the block-in time of the final flight segment. At a minimum, this period includes required pre-flight activities and flight time.

2.3.2 Definition: "window of circadian low" – The window of circadian low is best estimated by the hours between 0200 and 0600 for individuals adapted to a usual day-wake/night sleep schedule. This estimate of the window is calculated from scientific data on the circadian low of performance, alertness, subjective report (i.e., peak fatigue), and body temperature. For flight duty periods that cross 3 or fewer time zones, the window of circadian low is estimated to be 0200 to 0600 home-base/domicile time. For flight duty periods that cross 4 or more time zones, the window of circadian low is estimated to be 0200 to 0600 home-base/domicile time for the first 48 hours only. After a crew member remains more than 48 hours away from home-base/domicile, the window of circadian low is estimated to be 0200 to 0600 referred to local time at the point of departure.

2.3.3 Standard flight duty period – To reduce vulnerability to performance-impairing fatigue from extended hours of continuous wakefulness and prolonged periods of continuous performance requirements, cumulative flight duty per 24 hours should be limited. It is recommended that for standard operations, this cumulative flight duty period not exceed 10 hours within a 24-hour period. Standard operations include multiple flight segments and day or night flying.

2.3.4 Extended flight duty period – An extended cumulative flight duty period should be limited to 12 hours within a 24-hour period to be accompanied by additional restrictions and compensatory off-duty periods. This limit is based on scientific findings from a variety of sources, including data from aviation, that demonstrate a significantly increased vulnerability for performance-impairing fatigue after 12 hours. It is readily acknowledged that in current practice, flight duty periods extend to 14 hours in regular operations. However, the available scientific data support a guideline different from current operational practice. The data indicate that performance-impairing fatigue does increase beyond the 12-hour limit and could reduce the safety margin.

2.3.5 Extended flight duty period: restrictions and compensatory off-duty periods – If the cumulative flight duty period is extended to 12 hours then the following restrictions and compensatory off-duty periods should be applied.

   A. Cumulative effects: maximum cumulative hours of extension. Over time, extended flight duty periods can result in cumulative effects of fatigue. To support operational flexibility and still minimize the potential for cumulative effects, it is recommended that extended flight duty periods can be scheduled for a cumulative total of 4 hours within a 7-day period. For example, there could be two 2-hour extensions of the standard lo-hour flight duty period (2 x 2 = 4 hr) or four 1-hour extensions (4 x 1 = 4 hr).

   B. Flight duty periods during window of circadian low. As described in Section 2.1.4, the window of circadian low (as defined in Section 2.3.2) is associated with higher levels of performance-impairing fatigue. Therefore, it is recommended that in a 7-day period, there be no extended flight duty period that encroaches on any portion of the window of circadian low.
C. Restricted number of landings during window of circadian low. If an extended flight duty period contains a single continuous block-to-block flight period greater than 10 hours that encroaches on any portion of the window of circadian low, then it is recommended that flight crew members be restricted to no additional landings following the flight.

D. Recovery: compensatory off-duty period. To promote recovery from the acute fatigue associated with an extended flight duty period, additional off-duty time is recommended. The subsequent 10-hour required off-duty period should be extended by the time duration of the flight duty period extension. For example, an extended flight duty period of 11.5 hours would be accompanied by the subsequent off-duty period being extended to 11.5 hours.

2.3.6 Extended flight duty period: additional flight crew – Additional flight crew afford the opportunity for each flight crew member to reduce the time at the controls and provide for sleep during a flight duty period. Consequently, with additional flight crew and an opportunity for sleep, it would be expected that fatigue would accumulate more slowly. In such circumstances, flight duty periods can be increased beyond the recommended limit of 12 hours within each 24-hour period. For each additional flight crew member who rotates into the flight deck positions, the flight duty period can be extended by 4 hours as long as the following “requirements are met: 1) each flight crew member be provided one or more on-duty sleep opportunities; and 2) when the extended flight duty period is 14 hours or longer, adequate sleep facilities (supine position) are provided that are separated and screened from the flight deck and passengers. Controlled rest on the flight deck is not a substitute for the sleep opportunities or facilities required for additional flight crew members.

If an extended flight duty period is increased according to the above requirements, the maximum flight duty period limit supersedes the 14-hour duty period limit (section 2.2).

2.3.7 Flight duty period (cumulative) – A 24-hour cumulative flight duty period limit, a minimum off-duty period per 24 hours, and a specified off-duty recovery period per 7 days focus specifically on short-term vulnerabilities and considerations. To minimize fatigue that is not compensated by short-term recovery and to reduce excessive accumulation across longer periods of time, cumulative flight duty period limitations are recommended. There is not sufficient scientific data to provide specific guidance in this area. However, the general principles apply. For example, when determining cumulative flight duty limitations, shorter time frames should be considered. Therefore, in addition to 30-day and yearly cumulative flight duty period limitations, a 2-week limit should also be set. Also, these cumulative flight duty period limitations should be adjusted downward across the longer time period. Rather than just multiplying the 2-week cumulative flight duty period limitation to calculate the 30-day and yearly amounts, the 30-day amount should be decreased a percentage from the 2-week amount. The yearly cumulative flight duty period limitation should be decreased a percentage from the 30-day amount. This will further reduce the potential for long-term accumulation of fatigue factors.

3.42 The NASA TM also provides recommendations for exceptions due to unforeseen operational circumstances, time difference (time zone crossings) and reserve status (standby period) as follows:
2.4 Exceptions Due to Unforeseen Operational Circumstances

Exceptions allow the flexibility needed to respond to unforeseen circumstances beyond the control of the operator that occur during operations. They are not intended for use in regular practice. These exceptions must not be scheduled.

2.4.1 Reduced off-duty period (exception) – To support operational flexibility, it is recognized that due to circumstances beyond the control of the operator, it may be necessary to reduce an off-duty period to 9 hours. This reduction would occur only in response to an unforeseen operational requirement. In this situation, the subsequent off-duty period should be extended to 11 hours.

2.4.2 Extended flight duty period (exception) – To support operational flexibility, an extended flight duty period can be increased by up to a maximum of 2 hours due to unforeseen circumstances beyond the control of the operator. The subsequent required off-duty period should be increased by the time by which the flight duty period is increased.

2.5 Time Differences

In general, the longer a flight crew member is away from the home-base/domicile time zone, the more recovery time is needed for readjustment back to home-base/domicile time. Therefore, it is recommended that for flight duty periods that cross 4 or more time zones, and that involve 48 hours or more away from the home-base/domicile time zone, a minimum of 48 hours off-duty be allowed upon return to home base/domicile time.

2.6 Reserve Status

Flight crew members on reserve status provide a critical element to operational flexibility and the opportunity to meet unanticipated needs. It is important that flight crew members on reserve status obtain required sleep prior to a flight duty period.

2.6.1 Definition: "airport standby reserve" – A reserve flight crew member required to be available (on standby) at an airport for assignment to a flight duty period.

An airport standby reserve flight crew member should be considered on duty and the previous duty period guidelines apply.

2.6.2 Definition: "on-call reserve" – A reserve flight crew member required to be available to an operator (away from the airport) for assignment to a flight duty period.

On-call reserve status should not be considered duty. However, it is important that the flight crew member has an opportunity to obtain sleep prior to an assigned flight duty period. Two specific principles should be applied. The flight crew member should be provided a: 1) predictable and 2) protected 8-hour sleep opportunity. "Predictable" indicates that the flight crew member should have prior information (24 hours notice is recommended) as to when the 8-hour sleep opportunity can be obtained within the 24-hour on-call reserve time. The 8-hour sleep opportunity should not vary by more than 3 hours on subsequent days to ensure circadian stability. "A protected 8-hour sleep opportunity" should be protected from interruption by assignment to a flight duty period. Any approach that meets the requirements of these two principles could be utilized.
Desynchronosis and need for adapting to new time zones

3.43 Circadian disruption is inevitable when flying across time zones and a requirement to take rest at such destinations. The quality and quantity of sleep as well as the ease with which sleep can be initiated are all affected when such disruption occurs. It can take from a few days to a couple of weeks for the circadian clock to synchronise to a new time zone. The rate of adaptation is related to the number of time zones crossed, the direction of flight and a variety of other factors (e.g. light exposure)\(^1\). The internal circadian clock adapts slowly to abrupt changes of time cues. The rate of adaptation has been reported to follow a number of models. Rates of one hour per day without countermeasures, or quicker adaptation during the first days have all been quoted. However, since the adaptation is highly dependent on the individual, to the direction of flight, to the number of time zones crossed, to exposure to environmental cues any simplistic formula is inappropriate. The direction of the time zone change is particularly important. In general adaptation after eastbound travel is much slower than after westbound flight\(^9\). For aircrew likely to suffer from shift lag or jet lag it is advisable to avoid light exposure before trying to sleep during daytime. Since aviation personnel may not get enough time at destination away from home, attempts at adaptation may not be beneficial\(^4\). It may therefore be in the interest of international flight crew at foreign destinations to try and maintain activity including sleep hours and meal timings in keeping with home base time. This permits a much quicker adaptation on return to home base, thereby enhancing the quality of sleep during the longer rest period on return.

3.44 Addressing issues of fatigue, sleep loss, and circadian disruption in the aviation industry is a shared responsibility. These principles and guidelines for duty and rest scheduling are intended to provide scientific input to the regulatory process that addresses these issues in aviation. However, there is no single solution to the challenges posed by the 24-hour demands of the aviation industry. To highlight this shared responsibility, several other industry strategies for addressing these issues have been described.
Education and Training

3.45 An important first step for the industry is to become informed about the extensive knowledge available regarding fatigue, sleep, and circadian physiology as it relates to performance and aviation operations. This knowledge can then be incorporated into daily operations. The information is useful in providing specific recommendations for personal strategies, to manage performance and alertness in flight operations. Education and training modules to meet this need are available and currently implemented successfully within the industry.

3.46 In line with the above, airlines and non-scheduled operators need to lay down a non-prescriptive policy/guideline to promote healthy practices for flight crew regarding duty and rest periods (4).

3.47 Equally important is the need to educate all personnel including flight crew, cabin crew, flight dispatchers, Air Traffic Controller and manager about the dangers of fatigue, the causes of sleepiness and importance of sleep and proper sleep habits.

Scheduling Practices

3.48 The scientific information available can be particularly useful in guiding rational and physiologically based scheduling practices. Scheduling is a complex and multi-determined process. However, it is possible and essential to include scientific data on human physiology as a factor for consideration. Obviously, priorities need to be established, and cost/benefit considerations are critical. There are examples of successful integration of scientific information on fatigue into schedule construction.

Operational Countermeasures

3.49 A variety of other strategies for use during flight operations should be examined and utilized where appropriate. This includes the design and use of technology to promote performance and alertness during operations. Varying work demands or other creative uses of flight deck automation could be developed to maintain alertness and
performance. Several activities in this area are underway with some successful applications currently in use.

**Fatigue Risk Management System (FRMS)**

3.50 A well designed, non-prescriptive (guideline aimed at improving flight safety culture and awareness) FRMS should form the basis to determine optimum flight schedules from physiological and operational standpoints\(^\text{(4)}\). This may also include:

**Controlled Rest on the Flight Deck**

3.51 Scientific data obtained during flight operations have clearly demonstrated the effectiveness of a planned cockpit rest period to promote performance and alertness in non-augmented long-haul flight operations. Controlled rest is a single operational strategy and is not an answer to all fatigue engendered by flight operations. It is absolutely not intended as a substitute for additional flight crew, appropriate rest facilities, or as support for extended duty. All possible strategies that maintain or improve the safety margin should be considered.

3.52 Controlled rest may include bunk rest opportunity or alternately best available passenger seats, for flight crew, permitting short in-flight breaks with clear guidelines on duration and requirement to ensure alertness of remaining flight crew. In-flight napping on cockpit seat with a senior cabin crew member on jump seat may be considered. This option may be used when all flight crew feel it is essential.

**Off Duty Strategies.**

3.53 Regulation of life-style by Flight crew is essential to ensure adequate sleep and naps. Flight crew operating international flights must be made aware of measures to be adopted at foreign destinations. In certain cases, prescription sleep-inducing agents may be used with caution\(^\text{(4)}\). While prescribing/recommending sleep-inducing medication, following will need to be ensured:
(i) Adequate ground trial under supervision of a Doctor trained in Aviation Medicine.
(ii) Dose strictly as prescribed
(iii) Not to be used less than 12 hours before start of duty
(iv) Not to be used In-flight

3.54 Caffeine has been universally accepted for enhancing alertness. However, care needs to taken by the flight crew that the consumption of caffeine does not exceed 1000 milligram/day.

**Future Developments**

3.55 There are a number of other possibilities that are in different stages of development. Provocative laboratory studies of several countermeasures are often cited. However, validation of their effectiveness and safety in operational settings is still needed prior to widespread implementation. Research continues and may provide further findings on countermeasures relevant to regulatory; scheduling, personal strategies, and technology approaches to manage alertness in aviation operations.

**Fatigue Risk Management in Flight Crew Scheduling**[6]

3.56 For a large airline, the process of creating crew rosters is computationally intensive, requiring specialized optimization software. The optimization software considers a range of factors, including rules imposed by the regulator, union agreements, bid preferences, cost information, and other constraints to build the final roster published to the crew. In traditional crew scheduling systems, fatigue is considered only indirectly, based on requirements contained within prescriptive Flight Time Limitations (FTLs), or within labor agreements (LBAs) between unions and the operators.

3.57 From the perspective of scientifically managing fatigue risk, FTLs and LBAs can be problematic for a number of reasons. FTLs and LBAs must be interpreted into “rules” for the optimizer and may be improperly interpreted or implemented. Over time an
airline builds a legacy of software rules, which are often difficult to comprehend and hard to maintain. Most FTLs and LBAs lack a basis in modern fatigue science and “legalize” conditions which are demonstrably more fatiguing than other conditions disallowed. FTLs and LBAs can create the illusion that fatigue risk has discrete boundaries (for example, that fatigue risk after 8 hours of duty is dramatically less than fatigue risk after 8:10); whereas current sleep science suggests that fatigue risk is a gradient function of many factors—including, but not limited to, duty time.

3.58 In the past, bio-mathematical models of fatigue have been used to analyze fatigue in flight crew schedules and to inform specific modifications to existing FTL schemes. These models typically consider an airline’s (pre-established) flight schedule and a number of other factors and return a fatigue (or alertness) score for the duties within that schedule. For the most part, modifications to the schedule must be made manually.

**Boeing Alertness Prediction Interface**

3.59 Boeing and Jeppesen have developed a draft protocol, called the “Common Alertness Prediction Interface” (CAPI). CAPI defines how a chain of legs (flights or other activities) are passed from scheduling software to a model, including the properties for each leg and the syntax for communication. After the model has processed the input parameters, CAPI defines how predicted alertness is sent back into and interpreted by the scheduling product.

3.60 As an initial demonstration of the CAPI “plug-in,” a variant of the Three Process Model of Alertness (TPMA), called “JTPMA” (Jeppesen TPMA), was programmed as a stand-alone CAPI-compliant model. JTPMA contains a number of modifications from TPMA, such as omission of the sleep inertia process (referred to as w in TPMA) and addition of a rudimentary “task load” effect based on preceding block hours flown, preceding number of sectors flown, and consecutive days on duty. JTPMA also includes sleep logic that, based on predicted alertness, upcoming work, and upcoming sleep opportunities, will trigger the crew to delay or advance sleep onset.
3.61 Jeppesen using “Carmen™” Crew Scheduling product suite has conducted an initial study with Finnair on how to introduce crew alertness for constructing crew rostering. The product uses a protocol called the ‘Common Alertness Prediction Interface’ (CAPI). Since the completion of the initial study, CAPI has been shared with a number of model providers, many of whom are in some stage of developing CAPI-compliant versions of their model. In addition, JTPMA is being improved to handle augmentation and similar studies are underway (or soon will be underway) with a number of airlines. Currently, discussions are underway with a number of airlines to collect data which will be used to first improve and then validate models implemented through CAPI. As these validation exercises are completed, it is hoped that CAPI-compliant models will be available to customers within the Carmen software.

3.62 According to a recent-released study conducted by Boeing, Airlines would do well to operate their crew rosters according to a well-constructed fatigue risk management system, because it beats reliance on flight time limitations for pilot productivity combined with pilot alertness.

3.63 The Boeing study, carried out by the manufacturer for the Chinese civil aviation authority CAAC, was applied to the rosters of three airlines that operate narrowbody short-haul fleets according to three different national flight time limitation rules.

3.64 Then Boeing compared the results with rosters for the same carriers run according to a scientifically based fatigue risk management system applicable to each network, and has found that fatigue risk management wins in all cases, judged according to a combined measure of pilot alertness and productivity.

3.65 The study involved a Chinese, a US and a European carrier, each operating to local flight time limitations. Boeing scored each of the rosters according to a scientifically derived system it calls the Boeing Alertness Model (BAM), and applied the three national sets of flight time limitations to each of the airline rosters to determine which produced the best alertness and productivity for each of the three airlines.
3.66 Boeing’s conclusion is that, at this point, fatigue risk management is not sufficiently mature to be applied without the existence of prescriptive flight time limitations as a safety net, so for the time being fatigue risk management should be employed for what it calls flight time limitation refinement.

Report of Moebus Aviation “Scientific and Medical Evaluation of Flight Time Limitations”

3.67 European Union regulations EU-OPS Subpart ‘Q’ regarding “Flight and Duty Time Limitations and Rest Requirements” have many provisions, which are required to be regulated by National Aviation Authorities of the Member States. There was no consensus on these issues.

3.68 EASA had concluded that some elements of the regulations on flight and duty time limitations and rest requirements need more attention to resolve disagreement between the main parties affected by FTL regulations. As a result, EASA decided to select MOEBUS Aviation to put various independent experts as a special panel of experts to reach a consensus on 18 points that had been identified by the FTL Advisory Group comprising the concerned stakeholders or to raise any other issues of relevance to mitigate fatigue and effect on safety of flight operations. MOEBUS Aviation was entrusted by EASA for scientific and medical evaluation to 18 open issues of flight time limitations.

3.69 Due to the high quality of medical and scientific analysis required for this project, it was apparent that only a very limited group of experts were capable of satisfying the demands. MOEBUS Aviation, therefore, obtained the cooperation of the ECASS (European Committee for Aircrew Scheduling and Safety) group for this special task.

3.70 MOEBUS Aviation and the experts of the ECASS group together produced the report on scientific and medical evaluation of the 18 open issues of flight time limitations. The questions and the conclusions of the study are as follows:
1. The permissible maximum of 180 duty hours in 3 consecutive 60 hour weeks and the 1800 block hours in 18 consecutive months (ref. EU OPS 1.1100)

   ➢ The permissible maximum of 180 duty hours in 3 consecutive weeks allows for a high density of work hours in a short period of time and should be limited through an additional provision for a maximum of 100 duty hours in 14 consecutive days (Q1);

2. The provisions for the maximum daily flight duty period (FDP), including extensions and mitigating conditions on their own, and in the framework of the entire subpart Q (ref. EU OPS 1.1105 para 1.3)

3. The use of rostered extensions including the mitigating measures (ref. EU OPS 1.1105 para 2)

4. The FDP limit of 11:45 hours in the period 22:00 to 04:59, the need for additional provisions for duties within the WOCL, and the FDP limit of 11:45 hours starting in the WOCL on consecutive early days (ref. EU OPS 1.1105 para 2.7)

   ➢ The maximum daily flight duty period (13/14 hours) exceeds reasonable limits especially under exacerbating circumstances (e.g. high workload, night flying, acclimatization) and should be reduced. Also, extensions to the maximum FDP should not be permitted (Q2 & 3). Night duties need special provisions and must not be combined with other sources of fatigue (Q4);

5. The provisions of FDP extension for cabin crew including the need for additional conditions (ref. EU OPS 1.1105 para 3.1)

   ➢ In general, the same duty/rest rules should apply to cabin crew as to cockpit crew – the fatigue of the former is often very high (Q5 & 13);

6. Which detailed provisions and guidelines are needed within Subpart Q regarding split duty (ref. EU OPS 1.1105 para 6)

   ➢ Split duty often combines several sources of fatigue (early starts, long periods of wakefulness, late bedtimes) and should be used only outside the WOCL and for a maximum of 14 hours (start of first sub-duty to end of last sub-duty) (Q6);

7. What provisions and/or guidelines are needed on rest for time zone crossings (ref. EU OPS 1.1110 para 1.3)

   ➢ Home base recovery days after time zone crossings should be provided according to the number of time zones crossed and the duration of the layover (see Table 1 below) (Q7);
Table 1
Home base recovery period
Recommended number of local nights required to readapt to within an hour of home time
(for various time zone differences and preceding layover durations)

<table>
<thead>
<tr>
<th>Layover (h)</th>
<th>Maximum time difference (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;5</td>
</tr>
<tr>
<td>&lt;36</td>
<td>1</td>
</tr>
<tr>
<td>36-60</td>
<td>2</td>
</tr>
<tr>
<td>60-84</td>
<td>3</td>
</tr>
<tr>
<td>84-132</td>
<td>3</td>
</tr>
<tr>
<td>&gt;132</td>
<td>3</td>
</tr>
</tbody>
</table>

8. **what provisions are needed for reduced rest arrangements** *(ref. EU OPS 1.1110 para 1.4.1)*

- Reduced rest periods (<12 hours) should be avoided and, if used, be applied within a FRMS, and then only if the entire WOCL is included in the rest period (Q8);

9. **the potential impact of reporting at 0400 on the effectiveness of the weekly rest period** *(ref. EU OPS 1.1110 para 2.1)*

- Permitting (as an exception) a FDP to start at 04:00h after a rest period would negate the effect of the rest period and should be omitted from EU OPS (Q9);

10. **the effects of the format of rest periods on cumulative fatigue** *(ref. EU OPS 1.1110 para 2.1)*

- The format of rest periods should include a provision for “local night”, defined as 10 hours between 22:00h and 10:00h to ensure proper rest. The length of the rest period needed after a number of consecutive days on duty is not possible to answer in a detailed way because of a lack of scientific data, but the present provision of a weekly rest period after 168 hours of duty falls short of reasonable requirements (Q10);

11. **what provisions are needed for extended FDP operations with augmented crews and/or timezone crossings** *(ref. EU OPS 1.1115 para 1.1)*

12. **the quality of rest regarding rest location / rest facilities for flight crew and cabin crew** *(ref. EU OPS 1.1115 para 1.1 and 1.2)*

- To maintain alertness during extended FDP operations, augmented crews should be allowed to take in-flight rest. The quality of on-board rest conditions (e.g. bunk-economy seat) will determine the recuperative value of the rest period and will be modified by acclimatization level (Table 2 below) (Q11 & 12);
Table 2
Recommended extensions to the unaugmented FDP
(as a percentage of the rest period)

<table>
<thead>
<tr>
<th>Quality of Accommodation</th>
<th>Acclimatized</th>
<th>Unacclimatized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bunk</td>
<td>75%</td>
<td>50%</td>
</tr>
<tr>
<td>Business Seat</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Flight deck/other seat</td>
<td>25%</td>
<td>20%</td>
</tr>
<tr>
<td>Economy seat</td>
<td>No extension</td>
<td>No extension</td>
</tr>
</tbody>
</table>

13. what provisions are needed for cabin crew regarding extended FDP operations with in-flight rest and/or time zone crossings? (re. EU OPS 1.1115 para 1.2)

- In general, the same duty/rest rules should apply to cabin crew as to cockpit crew – the fatigue of the former is often very high (Q5 & 13);

14. what provisions are needed for the calculation of maximum FDP when called out from airport standby (re. EU OPS 1.1125 para 1.3)

15. what provisions are needed for the calculation of maximum FDP and minimum post duty rest when called out from other forms of standby (re. EU OPS 1.1125 para 2.1.4)

16. what guidelines are needed for the counting of standby times for cumulative duty hours (reEU OPS 1.1125 para 2.1.5)

- Airport standby time carries approximately the same fatigue load as work and should count as FDP unless a FRMS is applied with proper rest facilities (14). Standby time with proper rest facilities is still likely to involve reduced recuperative value because of anticipatory stress influences (of imminent duty), but the quantitative effects cannot be determined because of a lack of scientific data (Q15 & 16);

17. what guidelines are needed for the provision of a meal and drink opportunity, in particular for cabin crew (re. EU OPS 1.1130)

- With respect to breaks there is a large body of research and regulation – a 20 minute meal break for each 6 hours of work may be a lower limit but for cabin crew the physical load should raise this to 30 minutes for every 6 hours of duty. To avoid dehydration problems, an additional 10 minute break should be provided in each 3 hour period that does not contain a meal break (Q17);
18. the possibility of alterations to Subpart Q for operations which are exclusively based on night time operations, particularly regarding the number of consecutive night duties and FDP provisions (ref. EU OPS Article 1 Recital 9a)

- Permanent or a large number of successive night duties should not be exempt from the present rules, since adaptation to night work probably does not occur. However, data relating to aircrew are limited (Q18).

3.71 In addition to above questions, Moebus Report deals with the issue of Acclimatisation and FRMS. Moebus report in respect of these issues states as follows:

**Acclimatisation**

Air operations often expose crews to time zone transitions, which may result in changes in alertness and performance. Acclimatisation is one term commonly used to refer to the process whereby personnel become synchronised / adapted to the local time zone. A number of questions include reference to time zone crossings or our responses refer to adaptation following time zone crossings (e.g. 7, 11, 12). For these reasons we consider that acclimatisation, though we would prefer to use the term synchronised and non-synchronised, should be included as one of the provisions within EU OPS. There are many factors that influence the direction and time taken to adapt to a new time zone. For ease of use and as a general rule, the rate of resynchronization could be approximated by the use of a factor that assumes a one-hour adjustment per day. In many cases this may overestimate the recovery time, particularly for the longer transitions, but it is a useful practical approximation.

**FRMS**

The potential use of FRMSs has been highlighted in several of our responses. The incorporation of a FRMS with an operator’s Safety Management System provides a more flexible alternative to a prescriptive FTL scheme. However, in adopting such an approach, operators should be provided with guidance on the essential elements that an FRMS must contain. The recent ICAO working paper [ICAO, 2008] provides a comprehensive guide on the development of a FRMS and its key features.

**Responsibility of the Individual Aircrew**

3.72 ICAO guidelines stipulates the responsibilities of flight crew members as follows:

"4.5.1 A flight crew member should not operate an aeroplane when he or she knows that he or she is fatigued or feels unfit to the extent that the safety of flight may be adversely affected.

4.5.2 Flight crew members should make best use of the facilities and opportunities that are provided for rest and for the consumption of meals, and should plan and use rest periods to ensure that they are fully rested."
Interactive Training Sessions with Aviation Medicine Specialist

3.73 Medical Officers qualified in Aerospace Medicine are well versed with all aspects of physiological and psychological issues in aviators including contribution of human factors in accidents and incidents. Fatigue and fatigue counter-measures (both non-pharmocological and medications) are part of the gamut of topics that could be covered by the Aviation Medicine Specialist in interactive sessions with flight crew, cabin crew and other technical and operational tradesmen. It is considered highly desirable that scheduled operators employ such Aviation Medicine specialists for the purpose. This specialist, along with reps of management and crew associations could be an integral part of the core group created within an airline to plan and implement the Fatigue Risk Management System.
References


6. **Fatigue Risk Management in Flight Crew Scheduling**, Emma Romig And Tomas Klemets, Boeing Commercial Airplanes, Seattle, WA; and Jeppesen Systems AB, Göteborg, Sweden, Aviation, Space, and Environmental Medicine • Vol. 80, No. 12 • December 2009

7. Boeing study finds that all airlines win with fatigue risk management by David Learmount – Article in Flight International dated 17/03/10


CHAPTER – 4
Overview of Indian Regulations

History & Overview of Indian Regulations

4.1 In India, Rule 42A of the Aircraft Rules, 1937 prohibits a pilot to fly more than 125 hours during any period of 30 consecutive days. The rule was inserted on 23 April 1952, prior to nationalisation of airlines in 1953 and based on the recommendation of a ‘Court of Inquiry’ investigating into an accident to a private airline, which found pilot fatigue as one of the factors for the accident. There are no other flight duty limitations or minimum rest requirements stipulated in Aircraft Rules, 1937.

4.2 In 1992, the Government permitted Air Taxi operations with large aircraft and a bill to repeal Air Corporation Act, 1953 was introduced in the Parliament to pave way for induction of private scheduled airlines. At this stage, Hon’ble High Court of Kolkata (the then Calcutta), while hearing a petition between Indian Commercial Pilots Association (ICPA) and Indian Airlines on flight duty time limitation decided that the subject matter is related to safety of aircraft operations and cannot be negotiated by the parties. Hon’ble High Court ordered DGCA to promulgate the regulations on the subject. Accordingly, DGCA promulgated AIC 28 of 1992 stipulating flight and duty time limitations and the rest requirements for flight crew members. AIC 28 of 1992 is at Annexure ‘D’.

4.3 It is noted that the AIC 28 of 1992 was essentially based on FAA, USA regulations with some additional restrictions. Further, FDTL regulations on Domestic Air Transportation in USA cover three time zones due to its geographical coverage. The Indian FDTL regulations on Domestic Operations were accordingly extended to include neighbouring countries. It suited the Indian scenario as Indian Airlines was operating on domestic routes and neighbouring countries and was not operating long sectors to Europe, USA and Japan, which were operated by Air India.

4.4 Following are some of the additional restrictions of AIC 28 of 1992, which were not part of FAA regulations for Domestic Air Operations:
a) FAA regulations are based on two parameters i.e. ‘Flight Time Limitation’ and the ‘Minimum Rest Period’. FAA does not have any regulations relating to ‘Flight Duty Time Limitations’. The AIC 28 of 1992, in addition to the above two parameters provides for ‘Flight Duty Time Limitation’ also.

b) AIC stipulates that no flight crew shall be asked to do more than 6 landings per day. There is no restriction on number of landings by FAA.

c) AIC of 1992 stipulates that flight crew shall neither be detailed nor undertake any duty between period embracing 0000 to 0500 hours local time if during the previous day he/she has performed flight duty between the period embracing 0000 to 0500 hours local time. There is no such restriction of timings in FAA regulations.

d) In accordance with AIC 28 of 1992, time spent in transportation by a flight crew member to and from an airport at which he/she was relieved from duty to return to his/her home station, is not considered a part of rest period. Similar FAA regulations are applicable only if transportation is ‘not local in character’.

e) FAA regulations accept that “A flight crewmember is not considered to be scheduled for flight time in excess of flight time limitations if the flights to which he/she is assigned are scheduled and normally terminate within the limitations, but due to circumstances beyond the control of the certificate holder (such as adverse weather conditions), are not at the time of departure expected to reach their destination within the scheduled time.” The AIC 28 of 1992 also accepts the same but limits such extension to 4 hours in any particular case and not more than 8 hours during any period of 30 consecutive days. The AIC also increases the rest period pro-rata by twice the amount of time by which the flight time was extended.

(The AIC stipulates “A flight crew member is not considered to be scheduled for duty in excess of flight duty time limitation when due to circumstances beyond the control of the air carrier (such as unanticipated technical delays, adverse weather conditions etc) the flight duty time gets inevitably extended provided that such extension shall be limited to 4 hrs in any particular case and shall not be more than 8 hours during any period of 30 consecutive days. In such a case the rest period shall be extended pro-rata by twice the amount of time by which the flight time was extended.”)

f) FAA provides ‘Minimum Rest Period’ ranging from 8 hours to 11 hours depending upon ‘Flight Time’. The AIC provides ‘Minimum Rest Period’ of 16
hours for 8 hours of ‘Flight Time’, which can be reduced where the flight time is less than 8 hours on pro-rata basis. The AIC stipulates that the rest period of twice the flight time shall be provided, but the rest period in no case shall be less than 8 hours.

4.5 The only exception in domestic operations, where AIC has a relaxed requirement than that of FAA regulations relate to ‘Flight Time’ in a period of 30 consecutive days. The FAA limitation is 100 hours in any calendar month, whereas, the AIC provides 125 hours in a period of 30 consecutive days. This stipulation of AIC is based on Rule 42A of the Aircraft Rules 1937.

Necessity For Change – International Operations

4.6 The AIC 28 of 1992 categorises ‘Flight Time Limitations’ for international operations on the basis of ‘crew composition’, which are similar to FAA regulations for ‘Flag Operations’ i.e. international flight operations. Similar to domestic operations, FAA regulations for ‘Flag Operations’ also do not have any restrictions on the basis of ‘Flight Duty Time’ and number of landings, which are a part of criteria of AIC of 1992.

4.7 The ‘Flight Time Limitation’ of AIC of 1992 are categorised as follows:

a) **Two pilots operations**: permits 9 hours of ‘Flight Time’ with 18 hours of rest period and if ‘Flight Time’ is extended than rest period is extended pro-rata twice the amount by which the ‘Flight Time’ was extended.

b) **Two pilots & one additional crewmember**: permits a maximum of 10 hours of ‘Flight Time’.

c) **Three pilots & one additional crewmember**: permits a maximum of 12 hours of ‘Flight Time’

d) **Two sets of flight crewmembers**: permits a maximum of 14 hours.

4.8 The AIC 28 of 1992 did not envisage flight times of more than 14 hours. No difficulty was felt because such operations were not possible with aircraft available at that time.
4.9 FAA regulations are more relaxed and permit as follows:

a) *Two pilots and one additional crewmember*: permits a maximum of 12 hours of 'Flight Time'.

b) *Three or more pilots and an additional crewmember*: permits 'Flight Time' beyond 12 hours.

4.10 On the basis of the above FAA regulations, Delta Airlines started operating ‘Ultra Long Range’ direct flights between JFK and Mumbai in 2006 having ‘Flight Time’ more than 16 hours with 4 pilots. Air India could not operate direct flights between India and USA because AIC 28 of 1992 did not have the provision of ‘Flight Time’ more than 14 hours.

4.11 In view of above, regulations for operating flights having ‘Flight Time” of more than 14 hours were required. To cater for such flights, DGCA issued new regulations – CAR Section 7, Series ’J’ Part III dated 27 July 2007, which became effective for scheduled airlines from 1 August 2007 i.e. within five days of its issue. This CAR of 2007 is at Annexure ‘E’.

4.12 The CAR of 2007 in addition to catering to the above requirements added the following new criteria essentially based on UK regulations:

a) *Introduced regulations for cumulative “flight duty period” limitation.*

   CAR of 2007, in addition to ‘Flight Time Limitation’ stipulated by AIC 28 of 1992, prescribed cumulative “Flight Duty Period” Limitation of 60 hours for 7 consecutive days, 190 hours for 30 consecutive days and 1600 hours for 12 consecutive months. (It may not be out of place to mention that regulations of European Union and United Kingdom have “Cumulative Duty hours” limitation of 60 hours in any 7 consecutive days and 190 hours in any 28 consecutive days, where as CAR of 2007 has similar “Cumulative Flight Duty Period” limitation instead of cumulative “Duty period”)

b) *Introduced regulation of “Dead-heading”*

   Positioning of flight crew member at another airport to operate the flight and required “Dead heading” to be counted as flight duty.
c) Introduced regulations for Standby duty i.e. a defined period of time during which a crew member is required by the operator to be available to receive an assignment for a flight, positioning or other duty without an intervening rest period.

d) Defined “Neighbouring countries” to be those countries where the Standard local time differs from the IST by maximum of one hour or where the single flight time to destination is not more than 4 hours, whichever is more restrictive. The definition of neighbouring countries thereby became more restrictive than the practiced i.e. where Indian Airlines used to operate.

e) Regulations for “unforeseen operational circumstances” made stricter.

f) Introduced regulations for “split-duty” through which flight duty period could be enhanced.

4.13 In addition to above, the CAR of 2007 enhanced rest requirements as compared to AIC 28 of 1992, especially for the international operations, as follows:

a) For domestic operations, every crew member was given rest, which would pro-rata be twice the flight time subject to minimum of 10 hours in any 24 consecutive hours. The AIC had a similar provision but the minimum rest was restricted to 8 hours.

b) For both domestic and international operations, a minimum of 24 hours rest encompassing period 20:00 to 06:00 hours was provided to all crew members in any 7 consecutive days. This rest was in addition to the rest based upon the flying in the last 24 consecutive hours. The AIC, for both domestic and international operations, requires each flight crew be relieved from all duty for at least 24 consecutive hours during any 7 consecutive days, which is similar to FAA, USA regulations.

c) CAR also provides that if flight duty time and dead heading time exceeds 18 hours, then the following rest period must include a local night for both domestic and international operations. AIC did not have such provision of the rest.
4.14 In addition to the above rest requirements, CAR also introduced following rest requirements for international operations, which were not stipulated in AIC:

a) When crew is rostered for a flight of 9 hours or more, rest period prior to operating such flight shall include a local night.

b) Minimum rest period at outstation based on crossing of time zone, which is not even followed by CAA UK, made as under:

<table>
<thead>
<tr>
<th>Time zone away from base station</th>
<th>Rest at Outstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Twice the flight time subject to minimum of 12 hours.</td>
</tr>
<tr>
<td>&gt;3-7</td>
<td>Twice the flight time subject to minimum of 20 hours.</td>
</tr>
<tr>
<td>&gt;7-12</td>
<td>72 hours cumulative</td>
</tr>
</tbody>
</table>

c) Minimum Rest on return to base station on crossing time zones to be governed as follows:

<table>
<thead>
<tr>
<th>Time zone away from base station</th>
<th>Rest at base station</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Twice the flight time of last sector subject to minimum of 12 hours.</td>
</tr>
<tr>
<td>&gt;3-7</td>
<td>48 hours which shall include two local nights.</td>
</tr>
<tr>
<td>&gt;7</td>
<td>72 hours if duration of trip is less than/or 9 days. 96 hours if duration of trip is more than 9 days.</td>
</tr>
</tbody>
</table>

d) For a single flight time exceeding 14 hours (Ultra Long Range Operation) minimum rest shall be

i. Rest Period prior to operating ULR flight shall include a local Night.

ii. Minimum Rest Period at out station shall be 60 hours.

iii. Rest on return to base station shall be 72 hours if the duration of the trip is less than or 9 days and 96 hours if the duration of the trip exceeds 9 days.

4.15 A chart comparing AIC 28 of 1992 and CAR of 2007 depicts the additional and/or stricter requirements introduced in CAR 2007 in respect of ‘Flight Time’ and ‘Flight Duty Time’ as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cumulative Period</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Months</td>
<td>1000 Hrs</td>
<td>1000 Hrs</td>
</tr>
<tr>
<td>30 consecutive Days</td>
<td>125 Hrs</td>
<td>125 Hrs</td>
</tr>
<tr>
<td>7 consecutive Days</td>
<td>30 Hrs</td>
<td>35 Hrs</td>
</tr>
<tr>
<td>24 Consecutive Hours</td>
<td>8 Hrs/6 Landings</td>
<td>8 Hrs/5 landings 7 Hrs/6 landings</td>
</tr>
</tbody>
</table>

**Domestic**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Months</td>
<td>1000 Hrs</td>
<td>1000 Hrs</td>
<td></td>
</tr>
<tr>
<td>90 consecutive</td>
<td>270 Hrs</td>
<td>270 Hrs (Applicable for more than 2 pilots)</td>
<td></td>
</tr>
<tr>
<td>30 consecutive</td>
<td>125 Hrs</td>
<td>125 Hrs</td>
<td></td>
</tr>
<tr>
<td>7 consecutive</td>
<td>30 Hrs</td>
<td>30 Hrs (Not applicable for more than 2 pilots)</td>
<td>40 Hrs</td>
</tr>
</tbody>
</table>

**International**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Consecutive</td>
<td>2 Pilots</td>
<td>9 Hrs/3 landings <strong>More than 9 Hrs require additional rest</strong></td>
<td>8 Hrs/3 landings 9 Hrs/2 landings 10 Hrs/1 landings</td>
</tr>
<tr>
<td></td>
<td>2 Pilots + 10 Hrs/3 landings</td>
<td>8 Hrs/3 landings 9 Hrs/2 landings 10 Hrs/1 landings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional Crew</td>
<td>12 Hrs/3 landings</td>
<td>12 Hrs/2 landings</td>
</tr>
<tr>
<td></td>
<td>3 pilots + 12 Hrs/3 landings</td>
<td>12 Hrs/2 landings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional Crew</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Four Pilots or 14 Hrs/3 landings</td>
<td>14 Hrs/2 landings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Sets of Crew</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flight Duty Time Limitation</th>
<th>AIC</th>
<th>CAR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cumulative Period</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Months</td>
<td>1600 Hrs</td>
<td></td>
</tr>
<tr>
<td>30 consecutive Days</td>
<td>200 Hrs</td>
<td></td>
</tr>
<tr>
<td>7 consecutive Days</td>
<td>60 Hrs</td>
<td></td>
</tr>
<tr>
<td>24 Consecutive Hours</td>
<td>2 Pilots 11 Hrs/6 landings</td>
<td>12 Hrs/6 landings (Not based on crew)</td>
</tr>
<tr>
<td></td>
<td>2 Pilots + one Flight Engineer</td>
<td>12 Hrs/6 landings (Not based on crew)</td>
</tr>
<tr>
<td></td>
<td>Flight Engineer</td>
<td></td>
</tr>
</tbody>
</table>

**Domestic**

<table>
<thead>
<tr>
<th>Cumulative Period</th>
<th>Flight Crew</th>
<th>AIC</th>
<th>CAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Months</td>
<td>1600 Hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 consecutive Days</td>
<td>190 Hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 consecutive Days</td>
<td>60 Hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 Consecutive</td>
<td>2 Pilots 12 Hrs/3 landings</td>
<td>12 Hrs/3 landings 13 Hrs/2 landings 14 Hrs/1 landing (For 8, 9 &amp; 10 Hrs of Flight Time respectively)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Pilots + one Flight Engineer</td>
<td>12 Hrs/3 landings 13 Hrs/2 landings 14 Hrs/1 landing (For 8, 9 &amp; 10 Hrs of Flight Time respectively)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flight Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 pilots + 15 hrs/3 landings</td>
<td>15 Hrs/2 landings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional Crew</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Four Pilots or 16 Hrs/3 landings</td>
<td>17 Hrs/2 landings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Sets of Crew</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**International**

4.16 A chart comparing AIC 28 of 1992 and CAR of 2007 depicts the additional and/or stricter requirements introduced in CAR 2007 in respect of ‘Rest Time’ for international operations as follows:
## Comparison between AIC 28 of 1992 and CAR of 2007 for Rest Time (INTERNATIONAL OPERATIONS)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rest in 24 consecutive hours</strong></td>
<td>Rest will be pro-rata twice the flight time subject to minimum of 8 Hrs in any 24 consecutive hours.</td>
<td>Rest will be pro-rata twice the flight time subject to minimum of 10 Hrs in any 24 consecutive hours.</td>
</tr>
<tr>
<td><strong>Weekly Rest</strong></td>
<td>Each flight crew shall be relieved from all duty for at least 24 consecutive hours during any 7 consecutive days.</td>
<td>A minimum of 24 hours rest encompassing period 2000 Hrs to 0600 Hrs shall be provided to all crew members in any 7 consecutive days. This will be in addition to the rest based upon the flying in the last 24 consecutive hours.</td>
</tr>
<tr>
<td><strong>Sleeping Quarters</strong></td>
<td>Each air carrier shall also provide adequate sleeping quarters in the aeroplane wherein a flight crew is scheduled to fly for more than 12 hours during any 24 consecutive hours.</td>
<td>If a crew is rostered for flights of more than 10 hours, operator shall provide adequate sleeping quarters in aircraft. Comfortable reclining serviceable seat of highest available class or bunk separated or screened from flight deck and passengers, shall constitute adequate sleeping quarters.</td>
</tr>
<tr>
<td><strong>Rest at Outstation</strong></td>
<td>Any flight crew who has done 12 or more hours of flight time shall be given at least 48 hours of rest before he is assigned for further duty.</td>
<td></td>
</tr>
<tr>
<td><strong>Rest at base station</strong></td>
<td>The air carrier shall give each flight crew upon return to base from any flight or series of flight, a rest period that is at least twice the total number of hours of his flight time while he was away from the base.</td>
<td></td>
</tr>
<tr>
<td><strong>Rest Prior to operating a flight</strong></td>
<td>When crew is rostered for a flight of 9 hours or more, rest period prior to operating such flight shall include a local night.</td>
<td></td>
</tr>
</tbody>
</table>

### Rest at Outstation

<table>
<thead>
<tr>
<th>Time zone away from base station</th>
<th>Rest at Outstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Twice the flight time subject to minimum of 12 hours.</td>
</tr>
<tr>
<td>&gt;3-7</td>
<td>Twice the flight time subject to minimum of 20 hours.</td>
</tr>
<tr>
<td>&gt;7-12</td>
<td>72 hours cumulative</td>
</tr>
</tbody>
</table>

### Rest at base station

<table>
<thead>
<tr>
<th>Time zone away from base station</th>
<th>Rest at base station</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Twice the flight time of last sector subject to minimum of 12 hours.</td>
</tr>
<tr>
<td>&gt;3-7</td>
<td>48 hours which shall include two local nights.</td>
</tr>
<tr>
<td>&gt;7</td>
<td>72 hours if duration of trip is less than/or 9 days.</td>
</tr>
<tr>
<td></td>
<td>96 hours if duration of trip is more than 9 days.</td>
</tr>
</tbody>
</table>
4.17 A chart comparing AIC 28 of 1992 and CAR of 2007 depicts the additional and/or stricter requirements introduced in CAR 2007 in respect of ‘Rest Time’ for domestic operations as follows:

**Comparison between AIC 28 of 1992 and CAR of 2007 for Rest Time (DOMESTIC OPERATIONS)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>AIC</th>
<th>CAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest in 24 consecutive hours</td>
<td>Rest will be pro-rata twice the flight time subject to minimum of 8 Hrs in any 24 consecutive hours.</td>
<td>Rest will be pro-rata twice the flight time subject to minimum of 10 Hrs in any 24 consecutive hours.</td>
</tr>
<tr>
<td>Weekly Rest</td>
<td>Each flight crew shall be relieved from all duty for at least 24 consecutive hours during any 7 consecutive days.</td>
<td>A minimum of 24 hours rest encompassing period 2000 Hrs to 0600 Hrs shall be provided to all crew members in any 7 consecutive days. This will be in addition to the rest based upon the flying in the last 24 consecutive hours.</td>
</tr>
<tr>
<td>Night Flying</td>
<td>Flight crew shall neither be detailed nor undertake any duty between period embracing 0000 to 0500 hours local time if during the previous day he/she performed flight duty between the period embracing 0000 to 0500 hours local time.</td>
<td>Operator shall not roster any Flight Crew Member to undertake flight for more than two consecutive nights with duty period embracing any period between 0000 to 0500 hours local time. Additional rest of two hour shall be provided for every hour or part thereof of duty period that impinges into the said period of 0000 to 0500 hrs. If any part of Flight Duty Time on second night is carried out in <strong>window of circadian low</strong> then following rest period must include a local night.</td>
</tr>
</tbody>
</table>

4.18 As a result of additional criteria including “cumulative flight duty period” and enhanced rest periods of the CAR, airlines needed additional ‘highly experienced crew’ to operate flights on international sectors. Further, the CAR became effective within five days of its issue and its implementation needed understanding of various aspects of the regulations and preparation of new crew rosters. There was little time for the airlines to have systems in place for adhering and monitoring the regulations of the CAR.

4.19 NACIL asked for time to implement these regulations and to understand its impact on the airline. DGCA agreed to defer its implementation by six months. Other operators including Pawan Hans also found it difficult to implement the regulations as implementation necessitated curtailment of their operations. The “Federation of Airlines” also represented to the Government for suitable solutions.
4.20 The Government examined the representations and decided to form a Committee to review the regulations in consultation with various stakeholders. The Government also decided to keep the CAR of 2007 in abeyance till the final view on the subject could be taken on the basis of recommendations of the Committee.

4.21 Provisions of AIC of 1992 were in line with ICAO standards at the time of its formulation and has served the purpose satisfactorily over a period of time. However, several new developments took place in terms of new operations such as long-range operations and on-going scientific studies on the subject of fatigue including further development in ICAO standards. These developments have necessitated a review of Indian regulations on fatigue to align those with prevailing international best practices and ICAO Standards, which do not lay down any numbers on parameters of fatigue. The Committee, therefore, worked extensively on formulating numbers for flight time, flight duty period, duty period and rest time requirements suitable for Indian conditions and culture.
Chapter – 5
Overview of International Regulations & Recent Developments

ICAO Standards and Guidance Material

5.1 The Council of ICAO, on 24 March 1961, adopted Amendment 144 to Annex 6, effective from 1 October 1961, introducing for the first time standards for the operator to formulate rules for flight time and flight duty period and the rest period for flight crew members to ensure that fatigue occurring during flight or successive flights or accumulated over a period of time due to these or other tasks, does not endanger the safety of a flight. The ICAO Standard required these rules to be approved by State of Registry. The standard, however, clarified that it does not preclude a State from establishing regulations. ‘Guidance Material’ for establishing the regulations was added as an Attachment to the Annex.

5.2 These standards though amended from time to time remained substantially the same. ICAO adopted, on 8 March 1995, Amendment 21 to Annex 6 Part I (6th Edition) and became applicable from 9 November 1995. The amendments to the standards relating to flight time, flight duty period and rest periods were as follows:

   a) revised the provisions concerning flight time, flight duty periods and rest periods for crew members; (Standard 9.6)

   9.6 Flight time, flight duty periods and rest periods
   The State of the Operator shall establish regulations specifying the limitations applicable to the flight time and flight duty periods for flight crew members. These regulations shall also make provision for adequate rest periods and shall be such as to ensure that fatigue occurring either in a flight or successive flights or accumulated over a period of time due to these and other tasks, does not endanger the safety of a flight.

   b) added new provisions on flight time, flight duty periods and rest periods for cabin attendants. (Standard 12.5)

   12.5 Flight time, flight duty periods and rest periods
   The State of the Operator shall establish regulations specifying the limits applicable to flight time, flight duty periods and rest periods for cabin attendants.

   c) revised the contents of the operations manual to add flight and duty time limitations to the manual;
5.3 It may be noted that the variations in standards of flight time, flight duty period and rest periods from 1961 to 1995 was minimal.

5.4 One of the major amendment to Annex 6 Part I to the Chicago Convention 1944 (Amendment 33-A) became applicable on 19 November 2009. The amended Para 9.6 casts a responsibility on the State to establish regulations “based on scientific principles” with the aim to ensure that flight crew members are operating at an adequate level of “alertness” and states as follows:

“9.6 Flight time, flight duty periods, duty periods and rest periods for fatigue management

For the purpose of managing fatigue, the State of the Operator shall establish regulations specifying the limitations applicable to the flight time, flight duty periods, duty periods and rest periods for flight crew members. These regulations shall be based upon scientific principles and knowledge, where available, with the aim of ensuring that flight crew members are performing at an adequate level of alertness.

Note.— Guidance for the development of prescriptive fatigue management regulations is given in Attachment A.”

5.5 Annex 6 Part I also cast responsibilities on the air transport operator to establish a “Scheme”, which shall be in accordance with the regulations established by the State and “means” to permit variations should the variations from the regulations become necessary and “maintain records” of flight time, flight duty periods, duty periods and rest periods for flight and cabin crew members. The relevant international standards of the Annex 6 state as follows:

“4.2.11.2 Fatigue management. An operator shall establish flight time and duty period limitations and a rest scheme that enable it to manage the fatigue of all its flight and cabin crew members. This scheme shall comply with the regulations established by the State of the Operator, or approved by that State, and shall be included in the operations manual.

“Note.— Guidance on the establishment of limitations is given in Attachment A.

“4.2.11.3 Should variations from the fatigue regulations become necessary, an operator shall establish a means, acceptable to the State of the Operator, to permit such variations. Any variations shall provide an equivalent level of safety.

“Note.— It is acknowledged that regulations may not cover every eventuality encountered in a dynamic operational environment. This provision is intended to permit the operator a degree of flexibility, in a means acceptable to the State of the Operator, in making adjustments in its fatigue management scheme to account for changing circumstances.
"4.2.11.4 To comply with the regulations established by the State of the Operator, or approved by that State, an operator shall maintain records for all its flight and cabin crew members of flight time, flight duty periods, duty periods and rest periods."

5.6 Attachment ‘A’ of Annex 6, Part I (with Amendment 33-A) may be perused at Annexure – ‘F’ of this report. It provides guidance material on the establishment of Flight Duty and Time Limitations & Rest requirements and states the “Sole Purpose” as follows:

“Flight time, flight duty period, duty period limitations and rest requirements are established for the sole purpose of ensuring that the flight crew and the cabin crew members are performing at an adequate level of alertness for safe flight operations.”

5.7 The Attachment ‘A’ of Annex 6 elucidates “Types of Limitation” and states as follows:

“Limitations are broadly divided by time. For example, many ICAO Contracting States prescribe daily, monthly and yearly flight time limitations, and a considerable number also prescribe quarterly flight time limitations. In addition, many States also prescribe cumulative duty limitations for specified periods such as consecutive days and seven-day periods. It must be understood, however, that these limitations will vary considerably taking into account a variety of situations.”

5.8 It is apparent from the above that basically two types of time limitations are followed by the Contracting States. Many Contracting States prescribe daily, monthly and yearly “Flight Time” limitations and many States in addition prescribe cumulative “Duty” limitation for seven-day periods and specified consecutive days.

5.9 The above ICAO attachment also provides a set of parameters that may be considered in the development of prescriptive limitations for fatigue management but does not provide any numerical values “because differences of culture between States can lead to different perceptions as to what is acceptable and what is not”. In the text the symbol (*) is used to indicate where each State may insert a value it considers appropriate to manage fatigue, and square brackets [ ] to indicate a typical value. The attachment, however, states that this is only one example of how prescriptive
limitations for fatigue management may be defined and encourages the States to examine the numerical values of other States’ systems for further guidance.

5.10 The above ICAO Attachment even though provides a set of parameters that may be considered in the development of prescriptive limitations for fatigue management does not provide any “numerical values” and encourages the States to examine the numerical values of other States’ systems for further guidance.

5.11 Each country, therefore, has its own regulations on the subject, which vary considerably and there is no unanimity among the States on these regulations.

5.12 A meeting was held with Capt. Mitchell Fox, Chief, Flight Safety Section, Air Navigation Bureau, ICAO, during his visit to New Delhi on 26 June 2010, to know his views on the subject, specifically regarding the ICAO Standard 9.6 which stipulates that regulations of the States shall be based upon scientific principles and knowledge, where available, with the aim to ensure alertness of the flight crew members. He advised that the scientific knowledge on the subject is still considered to be in the stage of evolution and that was one of the reasons that ICAO did not stipulate even a band for the numerical values for the prescriptive regulations to limit flight time, flight duty period and rest period. He further emphasised that in any case the prescriptive limits are a standard one-size-fit for all solutions and the ICAO approach now is to move towards fatigue risk management system which is a data-driven ongoing adaptive process based on appropriate knowledge of scientific principles and methods that can identify fatigue hazards and develop and evaluate mitigation strategies to manage any emerging fatigue induced operational risks.

**Fatigue Risk Management Systems**

5.13 The Secretary General of ICAO Mr. Raymond Benjamin during his keynote address to the IATA’s 2010 “Wings of Change” Conference held at Santiago, Chile – 24-25 March 2010, announced about new ICAO requirements to manage crew fatigue. He said that “Currently, civil aviation authorities use prescriptive regulations to limit flight time and duty period. This approach has the disadvantage of providing clear-cut limits,
but it is necessarily a one-size fit all solutions and as such, is rarely the most efficient or most cost-effective method of managing the fatigue related risk of any one specific aeroplane fleet or route structure. Additionally these prescriptive limitations have often been based more on industrial agreements than on evolving science related to fatigue and its effects on performance.”

5.14 Mr. Benjamin further informed that ICAO is tackling this issue head-on and a task force has been constituted to look at a Fatigue Risk Management Systems solution and a proposal for Standards and Recommended Practices was drafted with suggested applicability in 2011. He clarified that “Understandably, fatigue risk management systems take time to mature, so savings will manifest themselves only in long run.”

5.15 A separate chapter has been devoted to Fatigue Risk Management System (FRMS) so as to deal with the subject in detail.

**European Union Regulations**

5.16 Initially, Joint Airworthiness Requirements (JAR) OPS-1, Subpart Q governed European Union regulations on flight time and duty limitations and rest requirements but JAR OPS-1 did not have legal force and required national laws to be amended accordingly. As there was no unanimity among the Member States, JAR OPS-1 could not be fully implemented.

5.17 European Commission, therefore, amended Regulation No. 3922/91 to remove the discrepancy and added a new Annex III regarding common technical requirements and administrative procedures applicable to commercial transportation by aeroplane. The regulations contained in Annex III, known as “EU-OPS 1: Commercial Air Transportation (Aeroplanes)” are based on JAR OPS-1.

5.18 EU-OPS 1 being Commission Regulation is directly applicable and “trumps” national laws. However, regulatory oversight remains with National Aviation Authorities in Member States. EU-OPS 1 entered into force on 16 January 2007 and became applicable from 16 July 2008. “Subpart Q of EU-OPS 1” deals with flight and
duty time limitations and rest requirements for commercial air transportation with aeroplanes.

5.19 EU has recently issued second amendment to EU OPS-1 regulations dated 20/09/2009, which is used in this report. Some of the major relevant provisions of Subpart ‘Q’ of EU OPS-1 are as follows:

**Operators’ responsibilities**

- Operator shall establish a flight and duty time limitations and rest scheme (FTL) for crew members, which is in accordance with both:
  
  (a) the provisions of this Subpart; and

  (b) any additional provisions that are applied by the Authority in accordance with the provisions of this Subpart for the purpose of maintaining safety.

**Crew members’ responsibilities**

- A crew member shall not operate an aeroplane if he/she knows that he/she is suffering from or is likely to suffer from fatigue or feels unfit, to the extent that the flight may be endangered.

- Crew members should make optimum use of the opportunities and facilities for rest provided and plan and use their rest periods properly.

**Flight and duty limitations**

- **Cumulative duty hours**

  An operator shall ensure that the total duty periods to which a crew member is assigned do not exceed:

  (a) 190 duty hours in any 28 consecutive days, spread as evenly as practicable throughout this period; and

  (b) 60 duty hours in any seven consecutive days.

- **Limit on total block times**

  An operator shall ensure that the total block times of the flights on which an individual crew member is assigned as an operating crew member does not exceed

  (a) 900 block hours in a calendar year;

  (b) 100 block hours in any 28 consecutive days.
Maximum daily flight duty period (FDP)

- The maximum basic daily FDP is 13 hours.
- These 13 hours will be reduced by 30 minutes for each sector from the third sector onwards with a maximum total reduction of two hours.
- When the FDP starts in the WOCL, the maximum stated in above two points will be reduced by 100 % of its encroachment up to a maximum of two hours. When the FDP ends in or fully encompasses the WOCL, the maximum FDP stated in the above two points will be reduced by 50 % of its encroachment.

Rest

- Minimum rest

The minimum rest which must be provided before undertaking a flight duty period starting at home base shall be at least as long as the preceding duty period or 12 hours whichever is the greater;

The minimum rest which must be provided before undertaking a flight duty period starting away from home base shall be at least as long as the preceding duty period or 10 hours whichever is the greater; when on minimum rest away from home base, the operator must allow for an eight hour sleep opportunity taking due account of travelling and other physiological needs;

An operator will ensure that effects on crew members of time zone differences will be compensated by additional rest, as regulated by the National Aviation Authority of the EU Member State.

- Rest periods

An operator shall ensure that the minimum rest provided as outlined above is increased periodically to a weekly rest period, being a 36-hour period including two local nights, such that there shall never be more than 168 hours between the end of one weekly rest period and the start of the next.

Flight duty, duty and rest period records

- An operator shall ensure that crew member’s records include:
  
  (a) block times;
  
  (b) start, duration and end of each duty or flight duty periods;
  
  (c) rest periods and days free of all duties;

and are maintained to ensure compliance with the requirements of this Subpart; copies of these records will be made available to the crew member upon request.

- Records shall be preserved for at least 15 calendar months from the date of the last relevant entry or longer if required in accordance with national laws.
5.20 As stated above, addition of Annex III dealing with Commercial Air Transportation (Aeroplanes) to European Commission Regulation No. 3922/91 makes it applicable directly to Member States of European Union and “trumps” their national laws. Therefore, regulations of all Member States are compliant with the EU-OPS regulations and Subpart ‘Q’ of Annex III, which deals with “Flight and Duty Time Limitations and Rest Requirements”, is applicable to all Member States.

5.21 Subpart ‘Q’ is also not complete and casts a responsibility on EU Member States to establish requirements on various issues, which includes subjects like

- Augmentation of a basic flight crew for the purpose of extending the flight duty period,
- Compensation of additional rest due to effects of time zone differences on crew members,
- Define whether and to what extent standby is to be accounted for as duty, and
- Operations based on an extended flight duty period including a break.
5.22 European Union further permits its Member States to grant variations to the above requirements in consultation with the interested parties. Para 5.1.1 of the Subpart ‘Q’ states as follows:

“5.1.1. Subject to the provisions of Article 8, the Authority may grant variations to the requirements in this Subpart in accordance with applicable laws and procedures within the Member States concerned and in consultation with interested parties.”

5.23 The grant of above variations by the EU Member States, however, are subject to the following conditions:

“5.1.2. Each operator will have to demonstrate to the Authority, using operational experience and taking into account other relevant factors such as current scientific knowledge, that its request for a variation produces an equivalent level of safety. Such variations will be accompanied with suitable mitigation measures where appropriate.”

5.24 Some States Member like Belgium have reproduced the entire Subpart ‘Q’ and added the additional requirements expected of them. Other countries like Sweden and Iceland have simply legislated the additional requirements to be read along with Subpart ‘Q’. However, in both cases the result is same. The report uses the legislation of Belgium, Iceland, Sweden etc. to show the principles adopted in their legislation with respect to the subjects not covered in Subpart ‘Q’. The case of United Kingdom is dealt in detail as below.

**United Kingdom Regulations**

5.25 United Kingdom has recently amended their regulations and promulgated “The Air Navigation Order 2009” effective from 1st January, 2010 as a result of formal adoption by European Union of Annex III to EC Regulation 3922/91, which is commonly referred to and is defined in the Order as “EU-OPS”. Annex III contains a comprehensive set of operating rules applicable to “commercial air transport by aeroplanes”. However, EU-OPS does not apply to other categories of aircraft such as helicopters, balloons and airships.
5.26 Prior to the above amendment, Air Navigation Orders were applicable to "public transport", which apart from "commercial air transportation by aeroplane" included aerial work, operations by helicopters, balloons, airships etc. In the United Kingdom, the term “public transport” has long been used. This public transport definition has been interpreted as having a very wide scope. It includes the typical commercial passenger carrying flight, where a customer buys a ticket to fly from A to B on holiday or business, but also captures a variety of other operations. For example, if an operator is paid to carry a police observer, that observer will be a passenger on the flight, which will be a public transport flight. Similarly where a power company pays for an observer to be carried to inspect power lines or where a television company pays for a camera crew to be carried it will be a public transport flight. So the term “public transport” comprises both the typical commercial passenger carrying flight and an extended range of passenger carrying operations.

5.27 It was, therefore, essential to amend the Air Navigation Order to take into account the existence and application of EU-OPS. This means that the operating requirements in the Air Navigation Order cannot and should not be applied to any commercial air transport operation by an aeroplane, which is now regulated by EU-OPS.

5.28 This has been achieved in two main ways. First, certain articles of the Air Navigation Order contain a specific provision disapplying them from any operation, which is subject to EU-OPS. Secondly, the definition of “public transport” has been modified so as to exclude "commercial air transport by aeroplanes". This means that any article in the Air Navigation Order, which applies to public transport will, by definition, not apply to an operation, which is subject to EU-OPS regulations i.e. an operation by an aeroplane for commercial air transport.

5.29 It may help to consider this issue in the form of a matrix. There are two sets of requirements: EU-OPS for commercial air transport and the Air Navigation Order for public transport. There are two categories of aircraft: aeroplanes and other aircraft such as helicopters, balloons and airships. EU-OPS now applies to commercial air transport by aeroplanes. The Air Navigation Order applies to everything else.
5.30 Part 20 of the Air Navigation Order, 2009 deals with fatigue of crew. In accordance with format of the Air Navigation Order, Part 20 also has two sets of requirements, one to which national laws are applicable and the other to which EU-OPS regulations are applicable. However, both sets of requirements have one thing in common i.e. both stipulate the air transport operator to establish a “scheme for the regulation of flight times approved by CAA”. The details of both sets of regulations are described below.

5.31 The relevant extracts of the articles of Air Navigation Order, 2009 to which national laws are applicable having specific responsibility to establish a “scheme for the regulation of flight times approved by CAA” are reproduced below:

> 144.—(1) Subject to paragraph (2), articles 145 and 146 apply to an aircraft registered in the United Kingdom which is either—
> (a) flying on a public transport flight; or
> (b) operated by the holder of a national air operator’s certificate.

**Fatigue of crew – operator’s responsibilities**

> 145.—(1) The operator of an aircraft to which this article applies must not cause or permit that aircraft to make a flight unless—
> (a) the operator has established a scheme for the regulation of flight times for every person flying in that aircraft as a member of its crew;
> (b) the scheme is approved by the CAA;

5.32 Similarly, the article dealing with EU-OPS operator’s responsibility to establish a “scheme for the regulation of flight times approved by CAA” is also reproduced below:
Fatigue of crew – EU-OPS operator’s responsibilities

149.—The operator of an EU-OPS aeroplane must not cause or permit that aeroplane to make a commercial air transport flight unless—

(a) the scheme for the regulation of flight times required under EU-OPS has been approved by the CAA; and

(b) the operator has taken all such steps as are reasonably practicable to ensure that the provisions of the scheme will be complied with in relation to every person flying in that aeroplane as a member of its crew.

5.33 There is one more article in Part 20 (Article 147), which is applicable to members of flight crew of aircraft registered in the United Kingdom stipulating responsibility of flight crew to observe flight times specified in the article. As the article is also applicable to EU-OPS, the flight times prescribed are identical to flight times specified in EU-OPS. The article is reproduced below:

Flight times – responsibilities of flight crew

147.—(1) Subject to paragraphs (2) and (3), a person must not act as a member of the flight crew of an aircraft registered in the United Kingdom if, at the beginning of the flight, the aggregate of all that person’s previous flight times—

(a) during the period of 28 consecutive days expiring at the end of the day on which the flight begins exceeds 100 hours; or

(b) during the period of twelve months expiring at the end of the previous month exceeds 900 hours.

(2) This article does not apply to a flight which is a private flight in an aircraft which has a maximum total weight authorised of not more than 1600 kg.

5.34 It is, therefore, evident that the new Air Navigation Order, 2009 of United Kingdom, which has come into force with effect from 1st January, 2010 formally recognises Annex III to EC Regulation 3922/91. As stated above, Annex III is commonly referred to and is defined in the Order as “EU-OPS”, which is now fully applicable in United Kingdom.

5.35 The effective regulations regarding fatigue is based on the “scheme” to be established by the operator, approved by the CAA and incorporated in the operations manual (as stipulated by Article 149 of Air Navigation Order, 2009) for the regulation of flight times for every person flying in that aircraft as a member of its crew. The details
of the “scheme” are promulgated by CAA, UK in their publication “CAP 371 – The Avoidance of Fatigue In Aircrews”. CAP 371 is a “Guide to Requirements” i.e. it is guidance material for the operators for establishing the “Scheme”.


“The Status of CAP 371

European legislation provides for a Member State to continue to maintain national provisions regarding flight and duty time limitations, provided that commonly established procedures are complied with, and until Community rules based on scientific knowledge and best practices are established. CAP 371 contains the UK national provisions.”

5.37 In view of the above clarification, CAP 371 of UK continues to provide guidance material to the air transport operators for establishing a scheme for regulation of flight time limitations, but the basic legislation regarding “Flight and Duty Time Limitations and Rest Requirements” is Subpart ‘Q’ of Annex III to EC Regulation 3922/91.

US Regulations

Domestic Operations

5.38 US regulations limiting flight time and pilot rest have been in place since 1940s. The rules for domestic flights do no explicitly address the amount of time a pilot can be on duty. The rules address flight time limitations and required rest periods. Current FAA regulations for domestic flights generally limit pilots to eight hours of flight time during a 24-hour period. This limit may be extended provided the pilot receives additional rest at the end of the flight. However, a pilot is not allowed to accept, nor is an airline allowed to assign, a flight if the pilot has not had at least eight continuous hours of rest during the 24-hour period. In other words, the pilot needs to be able to look back in any preceding 24-hour period and find that he/she has had an opportunity
for at least eight hours of rest. Airline rules may be stricter than the FAA's regulations if the issue is part of a collective bargaining agreement.

**International Operations**

5.39 Flight time and rest rules for U.S. air carrier international flights are different from the rules for domestic flights. International flights can involve more than the standard two-pilot crew and are more complex due to the scope of the operations. For international flights that require more than 12 hours of flight time, air carriers must establish rest periods and provide adequate sleeping facilities outside of the cockpit for in-flight rest.

**Dual Responsibility of Air Carrier and the Flight crew**

5.40 An air carrier may not schedule any pilot and no pilot may accept an assignment for flight time in scheduled air transportation or other commercial flying if that pilot's total flight time will exceed the regulatory limits.

5.41 In 1995, the FAA proposed a rule to change flight time and rest limits. FAA received more than 2,000 comments from the aviation community and the public. Most of those comments did not favour the rule as proposed, and there was no clear consensus on what the final rule should say. Highlights of the 1995 proposal:

- Reduce the number of duty hours (the time a flight crewmember is on the job, available to fly) from the current 16 hours to 14 hours for two-pilot crews. It would have allowed up to 10 flight hours in the 14 duty hours. Current rules allow up to 16 hours continuous duty time.
- Additional duty hours would be permitted only for unexpected operational problems, such as flight delays. In no event could such delays add more than two hours to the pilot’s duty day.
- Airlines could no longer schedule pilots in advance that exceeds the duty time.
- To ensure that pilots have an adequate opportunity to rest, off-duty time would be increased from eight hours to 10 hours under the proposal.
- Pilots would have to be given at least one 36-hour off-duty period every seven days. Current rules call for a 24-hour period.
5.42 In order to move forward with a new rule, the FAA formally withdrew the old proposal by publishing a notice in the Federal Register on 23 November 2009. The notice reiterated that the 1995 proposal was outdated and raised many significant issues.

*Ultra Long-Range Flights*

5.43 In 2006, the FAA worked with Delta Air Lines to develop and approve fatigue mitigation for flights between John F. Kennedy International Airport and Mumbai, India. The flights were operated for more than 16 hours with four pilots provided that the airline followed an FAA-approved plan to manage rest and mitigate the risk posed by fatigue. The mitigation, approved as an Operations Specification issued to Delta Air Lines, was specific for that city pair. Although that specific route is no longer flown by Delta, the FAA viewed Delta’s fatigue mitigation strategy as a model program.

5.44 As a result of Delta’s efforts, the FAA proposed in November 2008 to amend Operations Specifications of Delta, American, and Continental Airlines to incorporate fatigue mitigation plans for their ultra long-range flights. Based on comments received from the three air carriers, the FAA withdrew the proposed amendments on 12 March 2009. The FAA is currently working with airlines to gather data that will help the agency enhance the safety requirements for ultra long-range flights. The agency believes that it is in the best interest of passenger and crew safety for airlines to use an FAA-approved fatigue mitigation program to reduce the risk of pilot fatigue.

*Present Status*

5.45 Recently FAA constituted an Aviation Rulemaking Committee (ARC) on Flight and Duty Time Limitations and Rest Requirements. The ARC was required submit its recommendations, in the form of a draft Notice of Proposed Rule making (NPRM) that includes regulatory language, to the Associate Administrator for Aviation Safety by September 1, 2009. It is understood that the ARC has submitted its report. DGCA had requested FAA Representative in New Delhi to make available the recommendations of the ARC to the Committee if permissible. As the recommendations of ARC are not
available and changing of law in USA takes time, the report uses the present FAA regulations only. The relevant regulations are detailed as below.

5.46 Title-14 of Federal Regulations of USA deals with Aeronautics and Space. Part 121 of these regulations deals with operating requirements of three distinct types of operations namely Domestic, Flag and Supplemental operations. Accordingly, Flight Time Limitations of these operations dealt as follows:

Subpart Q — Flight Time Limitations and Rest Requirements: Domestic Operation  
Subpart R — Flight Time Limitations: Flag Operations  
Subpart S — Flight Time Limitations: Supplemental Operations

5.47 In addition to above operations, Part 135 of above Federal regulations of deals with commuter and on demand operations and its Subpart F deals with Crewmember Flight Time and Duty Period Limitations and Rest Requirements.

5.48 Subpart Q prescribes flight time limitations and rest requirements for domestic operations, except for certificate holders conducting operations with airplanes having a passenger seat configuration of 30 seats or fewer and a payload capacity of 7,500 pounds or less may comply with the applicable requirements for commuter or on demand operations covered under Part 135 of the Federal regulations.

5.49 The regulations of Subpart R prescribes flight time limitations for flag operations, and has a similar exception for airplanes having 30 passenger seats or fewer and a payload capacity of 7,500 pounds or less, may comply with the applicable requirements for commuter or on demand operations.

5.50 The flight time limitations for domestic operations covered under Subpart Q and Flag operations covered under Subpart R are as follows:
<table>
<thead>
<tr>
<th>Cumulative Period</th>
<th>Flight Crew</th>
<th>Flight Time Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subpart Q</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Months</td>
<td></td>
<td>1000 Hrs</td>
</tr>
<tr>
<td>30 consecutive Days</td>
<td></td>
<td>100 Hrs</td>
</tr>
<tr>
<td>7 consecutive Days</td>
<td></td>
<td>30 Hrs</td>
</tr>
<tr>
<td>24 Consecutive Hours</td>
<td></td>
<td>8 Hrs</td>
</tr>
<tr>
<td><strong>Subpart R</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flag Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Months</td>
<td></td>
<td>1000 Hrs</td>
</tr>
<tr>
<td>90 consecutive days</td>
<td></td>
<td>300 Hrs (2 pilots + additional crew)</td>
</tr>
<tr>
<td>30 Consecutive days</td>
<td></td>
<td>350 Hrs (3 or more pilots + add crew)</td>
</tr>
<tr>
<td>7 consecutive days</td>
<td></td>
<td>120 Hrs (Applicable for 2 pilots)</td>
</tr>
<tr>
<td>24 Consecutive Hours</td>
<td>2 Pilots</td>
<td>8 Hrs More than 8 Hrs with intervening rest period</td>
</tr>
<tr>
<td></td>
<td>2 Pilots +</td>
<td>12 Hrs More than 12 Hrs (with 3 or more pilots and an additional flight crew)</td>
</tr>
<tr>
<td></td>
<td>Additional Crew</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 pilots +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional Crew</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Four Pilots or Two Sets of Crew</td>
<td></td>
</tr>
</tbody>
</table>

5.51 In Subpart Q, there is no provision for augmenting the flight time limitation of 8 hours by utilising 3 or more pilots, which is available under Subpart R for Flag Operations.

5.52 The rest requirements under Subpart Q for domestic Operations are as follows:

(b) Except as provided in paragraph (c) of this section, no certificate holder conducting domestic operations may schedule a flight crewmember and no flight crewmember may accept an assignment for flight time during the 24 consecutive hours preceding the scheduled completion of any flight segment without a scheduled rest period during that 24 hours of at least the following:

1. 9 consecutive hours of rest for less than 8 hours of scheduled flight time.
2. 10 consecutive hours of rest for 8 or more but less than 9 hours of scheduled flight time.
3. 11 consecutive hours of rest for 9 or more hours of scheduled flight time.

5.53 The above regulations of the rest requirements provides “look back” before scheduling for a flight by the operator and also by the flight crew member before accepting a flight to find out whether the crew member has been provided with the minimum required rest during last 24 hours.
5.54 Minimum rest requirements for flag operations vary with the crew composition. The salient points of the rest requirements is as follows:

**Two pilot crews**

i. A pilot may be scheduled to fly for eight hours or less during any 24 consecutive hours without a rest period during these eight hours.

ii. If a pilot is scheduled to fly more than eight hours during any 24 consecutive hours then the pilot shall be given an intervening rest period, at or before the end of eight scheduled hours of flight duty. This rest period must be at least twice the number of hours flown since the preceding rest period, but not less than eight hours. The certificate holder shall relieve that pilot of all duty with it during that rest period.

iii. Each pilot who has flown more than eight hours during 24 consecutive hours must be given at least 18 hours of rest before being assigned to any duty with the certificate holder.

iv. Each pilot must be relieved from all duty for at least 24 consecutive hours at least once during any seven consecutive days.

**Two pilots and one additional flight crewmember**

v. If a pilot has flown 20 or more hours during any 48 consecutive hours or 24 or more hours during any 72 consecutive hours, he must be given at least 18 hours of rest before being assigned to any duty with the air carrier. In any case, he must be given at least 24 consecutive hours of rest during any seven consecutive days.

**Three or more pilots and an additional flight crewmember**

vi. Each certificate holder conducting flag operations shall schedule its flight hours to provide adequate rest periods on the ground for each pilot who is away from his base and who is a pilot on an airplane that has a crew of three or more pilots and an additional flight crewmember. It shall also provide adequate sleeping quarters on the airplane whenever a pilot is scheduled to fly more than 12 hours during any 24 consecutive hours.

vii. The certificate holder conducting flag operations shall give each pilot, upon return to his base from any flight or series of flights, a rest period that is at least twice the total number of hours he flew since the last rest period at his base. During the rest period required by this paragraph, the air carrier may not require him to perform any duty for it. If the required rest period is more than seven days, that part of the rest period in excess of seven days may be given at any time before the pilot is again scheduled for flight duty on any route.
Canadian Aviation Regulations

5.55 Canadian Aviation Regulations stipulate the requirements of Flight Time and Flight Duty Time Limitations and Rest Periods. The relevant definitions are as follows:

“Flight Time” means the time from the moment an aircraft first moves under its own power for the purpose of taking off until the moment it comes to rest at the end of the flight.

“Flight Duty Time” means the period that starts when a flight crew member reports for a flight, or reports as a flight crew member on standby, and finishes at “engines off” or “rotors stopped” at the end of the final flight, except in the case of a flight conducted under Subpart 4 or 5 of Part VII, in which case the period finishes 15 minutes after “engines off” or “rotors stopped” at the end of the final flight, and includes the time required to complete any duties assigned by the air operator or private operator or delegated by the Minister prior to the reporting time and includes the time required to complete aircraft maintenance engineer duties prior to or following a flight.

“Minimum Rest Period” means a period during which a flight crew member is free from all duties, is not interrupted by the air operator or private operator, and is provided with an opportunity to obtain not less than eight consecutive hours of sleep in suitable accommodation, time to travel to and from that accommodation and time for personal hygiene and meals;

“Unforeseen Operational Circumstance” means an event, such as unforecast adverse weather, or an equipment malfunction or air traffic control delay, that is beyond the control of an air operator or private operator;

5.56 The Canadian regulations provide Flight Time Limitations as a criterion for the fatigue and stipulate that a flight crew member who reaches a established flight time limitation is deemed to be fatigued and shall not continue on flight duty or be reassigned to flight duty until such time as the flight crew member has had the required rest period. The established flight time limitations are as follows:

Flight Time Limitations

700.15 (1) Subject to subsection (2), no air operator shall assign a flight crew member for flight time, and no flight crew member shall accept such an assignment, if the flight crew member’s total flight time in all flights conducted by the flight crew member will, as a result, exceed

(a) 1,200 hours in any 365 consecutive days;
(b) 300 hours in any 90 consecutive days;
(c) 120 hours in any 30 consecutive days or, in the case of a flight crew member on call, 100 hours in any 30 consecutive days;
(d) where the flight is conducted under Subpart 4 or 5 using an aircraft other than a helicopter, 40 hours in any 7 consecutive days;

(e) where the flight is conducted under Subpart 2 or 3, or is conducted using a helicopter, 60 hours in any 7 consecutive days; or

(f) where the flight crew member conducts single-pilot IFR flights, 8 hours in any 24 consecutive hours.

5.57 The Canadian regulations permit maximum Flight Duty Time up to 14 consecutive hours and require the flight crew to be provided a minimum rest period i.e. as per definition an opportunity to obtain not less than eight consecutive hours of sleep in suitable accommodation, time to travel to and from that accommodation and time for personal hygiene and meals. The relevant regulations are as follows:

**Flight Duty Time Limitations and Rest Periods**

**700.16** (1) Subject to subsections (5) and (7), no air operator shall assign a flight crew member for flight duty time, and no flight crew member shall accept such an assignment, if the flight crew member's flight duty time will, as a result, exceed 14 consecutive hours in any 24 consecutive hours. Where the flight is conducted under Subpart 4 or 5 using an aircraft other than a helicopter, flight duty time shall include 15 minutes for post-flight duties.

(2) .............

(3) Following a flight duty time assignment, an air operator shall provide a flight crew member with the minimum rest period and any additional rest period required by this Part.

5.58 The Canadian regulations further require a time free from duty of at least 36 consecutive hours within each 7 consecutive days. If that is not provided, then at least 3 consecutive calendar days with each 17 consecutive days is required to be provided. The relevant regulations in this regard are as follows:

**Requirements for Time Free from Duty**

**700.19** (1) Subject to subsection (2), an air operator shall provide each flight crew member with the following time free from duty:

(a) where the operation is conducted under Subpart 4 or 5 using an aircraft other than a helicopter, one period of at least 36 consecutive hours within each 7 consecutive days or one period of at least 3 consecutive calendar days within each 17 consecutive days;
Australian Regulations

5.59 Australian flight time regulations are based on crew composition and has essentially two categories namely ‘flight crew not more than 2 pilots’ and ‘flight crew of 3 or more pilots’. There is a third category, which deals aerial agriculture operations, which are not part of the report. The salient features of the regulations in the above two categories are as follows:

Limitations with flight crew not more than 2 pilots

• A tour of duty or period of reserve time at home shall be preceded by a rest period on the ground of at least:
  
  (a) 9 consecutive hours embracing the hours between 10 pm and 6 am local time; or
  
  (b) 10 consecutive hours.

• An operator shall not roster a pilot for a tour of duty in excess of 11 hours.

• An operator shall not roster a pilot to fly in excess of 8 hours flight time in any 1 tour of duty.

• A tour of duty already commenced may be extended to 12 hours.

• The flight time in a tour of duty already commenced may be extended to 9 hours.

• Where tour of duty has been extended, a pilot shall receive a rest period on the ground of not less than:
  
  (a) 9 consecutive hours which shall include the hours between 10 pm and 6 am local time, plus 1 additional hour for each 15 minutes or part thereof by which his or her tour of duty time exceeded 11 hours; or
  
  (b) 10 consecutive hours plus 1 additional hour for each 15 minutes or part thereof by which his or her tour of duty time exceeded 11 hours.

• Where flight time has been extended, a pilot shall receive a rest period on the ground of not less than:
  
  (a) 9 consecutive hours which shall include the hours between 10 pm and 6 am local time, plus 1 additional hour for each 15 minutes or part thereof by which his or her flight time exceeded 8 hours; or
  
  (b) 10 consecutive hours plus 1 additional hour for each 15 minutes or part thereof by which his or her flight time exceeded 8 hours.

• Where a tour of duty already commenced exceeds 12 hours or the flight time exceeds 9 hours, the pilot shall have, at the completion of the tour of duty, a rest period of at least 24 consecutive hours.

• Where a pilot has completed 2 consecutive tours of duty, the aggregate of which exceeds 8 hours flight time or 11 hours duty time, and the intervening rest period is less than:
(a) 12 consecutive hours embracing the hours between 10 pm and 6 am local time; or
(b) 24 consecutive hours, if not embracing the hours between 10 pm and 6 am local time;

he or she shall have a rest period on the ground of at least 12 consecutive hours embracing the hours between 10 pm and 6 am local time or 24 consecutive hours, prior to commencing a further tour of duty.

• A pilot shall not commence a flight and an operator shall not roster the pilot for a flight unless during the 7 days period terminating co-incident with the termination of the flight he or she has been relieved from all duty associated with his or her employment for at least 1 continuous period embracing the hours between 10 pm and 6 am on 2 consecutive nights.

• An operator shall not roster a pilot to fly when completion of the flight will result in the pilot exceeding 90 hours of duty of any nature associated with his or her employment in each fortnight standing alone. For the purpose of this paragraph, duties associated with a pilot’s employment include reserve time at the airport, tours of duty, dead head transportation, administrative duties and all forms of ground training. The operator shall designate the day on which the first of the fortnightly periods shall start.

• A pilot shall not fly and an operator shall not roster him or her to fly as a flight crew member in excess of 900 hours in 365 consecutive days.

• A pilot shall not fly and an operator shall not roster him or her to fly in excess of 100 hours in 30 consecutive days.

• A pilot shall not fly and an operator shall not roster him or her to fly in excess of 30 hours in 7 consecutive days.

Limitations with flight crew of 3 or more pilots

• An operator shall ensure that bunks or berths of a type approved by CASA are provided for resting flight crew members.

• Before commencing a tour of duty a pilot shall have a rest period of not less than 12 consecutive hours.

• An operator shall not roster a pilot for a tour of duty in excess of:
  (a) 16 hours for turbo-jet type aircraft; and
  (b) 18 hours in other types of aircraft, except where specifically varied by CASA.

• An operator shall not roster a pilot in excess of a total of 14 hours of active duty in any tour of duty.

• An operator shall not roster a pilot in excess of 8 consecutive hours of active duty in any tour of duty.

• A tour of duty already commenced may be extended at the discretion of the pilot in command as follows:
  (a) turbo-jet aircraft, 20 hours; and
  (b) other types of aircraft, except where specifically varied by CASA, 22 hours.
• **Followings** a tour of duty a pilot shall have a rest period of not less than 12 consecutive hours except that, where a tour of duty exceeded 11 hours or the flight time exceeded 8 hours a pilot shall have a rest period of not less than 24 hours before being rostered for duty.

• **When a pilot has completed a tour of duty in excess of 18 hours he or she shall:**
  
  (a) have a rest period of at least 18 hours before the next tour of duty; or
  
  (b) not exceed 18 hours on following tour of duty.

• **Following 50 hours of duty of any nature associated with his or her employment, a pilot shall have a rest period of not less than 24 consecutive hours before commencing a tour of duty.**

• **Where a tour of duty is restricted to not more than 14 hours, a seat approved by CASA as capable of providing adequate rest, may be provided for resting flight crew members in lieu of bunks or berths.**

• **A pilot shall not fly and an operator shall not roster him or her to fly in excess of 100 hours in 30 consecutive days.**

• **A pilot shall nor fly and an operator shall not roster him or her to fly in excess of 900 hours in 365 consecutive days.**

### New Zealand Regulations

5.60 Air operations regulations in New Zealand are conducted under the following three categories:

- **Part 121 – Air Operations – Large Aeroplanes;**
- **Part 125 – Air Operations – Medium Aeroplanes; and**
- **Part 135 – Air Operations – Helicopters and Small Aeroplanes**

5.61 Subpart ‘K’ of all the above three parts prescribe flight time limitations and other rules to minimise fatigue in flight crew members of aeroplanes engaged in air operations. The subpart stipulates that operator shall establish a scheme acceptable to the Director for the regulation of flight and duty times for flight crew members addressing the following factors where appropriate to the operator’s type of operation:

i. rest periods before flight;

ii. acclimatisation;

iii. time zones;

iv. night operations;

v. maximum number of sectors;

vi. single pilot operations;
vii. two pilot operations:
viii. two pilots plus additional flight crew members:
ix. flight crew members' qualifications:
x. mixed duties:
xi. dead-head transportation:
xii. reserve or standby period:
iii. flight duty period:
xiv. in-flight relief:
 xv. type of operation:
xvi. cumulative duty time:
xvii. cumulative flight time:
 xviii. discretionary increase in flight time limitation or flight duty limitation or both:
 xix. circadian rhythm:
xx. days off:
xxi. record-keeping

5.62 The Subpart ‘K’ also stipulates flight crew responsibilities and prescribes the limitations as follows:

<table>
<thead>
<tr>
<th>Subpart K</th>
<th>Part 121 Large Aeroplanes</th>
<th>Part 125 Medium Aeroplanes</th>
<th>Part 135 Helicopters and Small Aeroplanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum flight time in 28 consecutive days</td>
<td>100 hours</td>
<td>100 hours</td>
<td></td>
</tr>
<tr>
<td>Maximum flight time in 30 consecutive days</td>
<td></td>
<td></td>
<td>160 hours</td>
</tr>
<tr>
<td>Maximum flight time in 365 consecutive days</td>
<td>1,000 hours</td>
<td>1,000 hours</td>
<td></td>
</tr>
<tr>
<td>In any 14 day period</td>
<td></td>
<td></td>
<td>Not less than 2 days free of duty</td>
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<tr>
<td>In any 30 day period</td>
<td></td>
<td></td>
<td>Not less than 2 consecutive days free of duty</td>
</tr>
</tbody>
</table>

5.63 The above requirements provided in Parts 121, 125 and 135 are not complete without the scheme of the operator addressing the factors of Subpart ‘K’ and the scheme has to be acceptable to the Director, CAA, New Zealand. Advisory Circular AC 119-2 dated 26 October 2006 regarding “Air Operations — Fatigue of Flight Crew” provides an
example scheme for flight and duty time scheme suitable for scheduled air operations under Parts 121 and 125 and air transport operations under Part 135. Advisory Circulars of Civil Aviation Authority, New Zealand contain information about standards, practices, and procedures that the Director, has found to be acceptable for compliance with the associated rule.

5.64 In view of the above, it is essential that Advisory Circular AC 119-2 be examined in detail to get a clearer picture of New Zealand regulations regarding flight and duty time limitations. Advisory Circular has separate schemes for “Internal Operations” and “External Operations”, which are defined as follows:

**Internal operation** means an operation that is carried out between places within New Zealand, and includes an operation between the islands of New Zealand:

**External operation** means an operation, excluding an operation to the Chatham Islands, the greater part of which is carried out outside the territorial waters of New Zealand:

5.65 The Advisory Circular AC 119-2 stipulates the following limitations:

**“Internal Operation with Two-pilot Crews”**

**Flight time**

The pilot shall not be rostered to fly in excess of 8 hours in any one duty period. A duty period already commenced may be extended in flight time to 8 hours 30 minutes to complete a disrupted schedule.

The pilot shall not fly, and an operator shall not roster the pilot to fly, in excess of:

i. 35 hours in any 7 consecutive days:

ii. 100 hours in any 28 consecutive days:

iii. 300 hours in any 90 consecutive days.

**Duty period**

The pilot shall not be rostered for a duty period of more than 11 hours but once commenced a duty may be extended to 12 hours to complete a disrupted schedule.

**Rest**

When the pilot has flown more than 8 hours, or has been on duty more than 11 hours in any 24 consecutive hours, he or she shall have, on completion of that duty period, a rest period of not less than 12 consecutive hours, including the hours between midnight and 6 am or extended to include that period, up to a maximum of 24 consecutive hours.
When the pilot has flown more than 16 hours or been on duty more than 22 hours in any 48 consecutive hours, he or she shall have, on completion of that duty period, a rest period of not less than 24 consecutive hours:

When the pilot has flown more than 20 hours or been on duty more than 29 hours in any 72 consecutive hours, he or she shall have, on completion of that duty period, a rest period of not less than 24 consecutive hours:

When, for any reason, a pilot has flown for more than 8 hours or where a duty period exceeds 11 hours, he or she shall have, on completion of that duty period and in addition to his or her rest period after that duty or series of duties, a consecutive rest period of one hour for each 15 minutes, or the greater part thereof, flight time exceeds 8 hours or duty time exceeds 11 hours:

When, for any reason outside the pilot's control, or by an approved dispensation, the pilot has flown more than 8 hours 30 minutes or has been on duty more than 12 hours in any one duty period, he or she shall have, on completion of that duty period, a rest period of not less than 24 consecutive hours:

In addition to any rest period applicable at the end of the pilot's last duty period, he or she shall have a recreational period of 24 consecutive hours at home base free of all duties at least once on every 7 days. If, because of the length of the required rest period, this is not possible he or she shall have this recreational period free of all duties at the conclusion of that rest period:

**External Operations with Two-pilot crews — turbo-jet aircraft**

**Flight time**

The pilot shall not be rostered to fly in excess of 8 hours in any one duty period. A duty period already commenced may be extended in flight time to 9 hours to complete a disrupted schedule.

A pilot shall not fly and an operator shall not roster a pilot to fly in excess of:

1. 35 hours in any 7 consecutive days:
2. 100 hours in any 28 consecutive days:
3. 250 hours in any 84 consecutive days.

**Duty period**

The pilot shall not be rostered for a duty period of more than 11 hours but once commenced a duty may be extended to 13 hours to complete a disrupted schedule.

**Rest**

When a pilot flies more than 8 hours or has been on duty more than 11 hours in any 24 consecutive hours, he or she shall have, at the completion of that duty period, a rest period of not less than 12 consecutive hours, including the hours between midnight and 6 am local time, or 14 consecutive hours:

When a pilot has flown more than 16 hours or has been on duty for more than 22 hours in any 48 consecutive hours, he or she shall have, at the completion of that duty period, a rest period of not less than 24 consecutive hours:
When a pilot has flown more than 20 hours or been on duty for more than 29 hours in any 72 consecutive hours, he or she shall have, at the completion of that duty period, a rest period of not less than 24 consecutive hours:

On return to home base after a tour of duty a pilot’s rest period shall not be less than twice the number of hours flown as an operating crew member since leaving home base on that tour of duty. Except that, when a tour of duty includes a stay in an area having a time difference of more than 2 hours, the rest period at home base on completion of the tour of duty shall not be less than 72 consecutive hours.

When a pilot is temporarily detached at a place other than home base and the tour of duty is completed at that place, the rest period applicable to home base shall apply.

When a pilot begins a tour of duty at home base and completes it at a place of detachment or begins a tour of duty at the place of detachment and completes it at home base, the rest period applicable shall be that which applies when the place of detachment is also regarded as home base.

In addition to the rest period applicable at the end of the pilot’s last duty period, he or she shall have a recreational period of 24 consecutive hours free of all duties at least once in every 7 consecutive days. If, because of the length of the required rest period, this is not possible the pilot shall have this recreational period free of all duties at the conclusion of that rest period.

When at home base, the rest period applicable and the recreational 24 hours must together include a continuous period embracing the hours between midnight and 6 am local time on two successive nights or extended to include that period.

**Three-pilot crew limitations**

**Flight time**

A pilot shall not fly, and an operator shall not roster a pilot to fly, in excess of:

- i. 35 hours in any 7 consecutive days:
- ii. 100 hours in any 28 consecutive days:
- iii. 250 hours in any 84 consecutive days.

**Duty period**

When the flight crew includes at least 2 pilots normally rostered to act as pilot-in-command for the particular class of operation:

- i. A pilot shall not be rostered for a duty period of more than 18 hours:
- ii. A duty period already commenced may be extended in duty time to 20 hours to complete a disrupted schedule:

When the flight crew includes one pilot normally rostered to act as pilot-in-command for the particular class of operation and two pilots possessing qualifications approved by the Director for the operation:

- i. A pilot shall not be rostered for a duty period of more than 14 hours:
- ii. A duty period already commenced may be extended in duty time to 16 hours to complete a disrupted schedule.
Rest

Within each duty period the pilot-in-command shall establish a roster of periods of active duty and rest for each pilot which may only be varied at the discretion of the pilot-in-command.

On completion of the duty period a pilot shall have a rest period on the ground calculated as follows:

i. For the first 11 hours duty – 10 consecutive hours:

ii. For each subsequent hour’s duty – 2 additional hours, up to a maximum of 24 consecutive hours:

When a pilot has been on duty for more than 24 hours in 48 consecutive hours he or she shall have, at the completion of that duty period, a rest period of not less than 24 consecutive hours.

When a pilot has been on duty for more than 32 hours in any 72 consecutive hours he or she shall have, at the completion of that duty period, a rest period of not less than 24 consecutive hours.

On return to home base after a tour of duty, the pilot’s rest period shall not be less than twice the number of hours flown as an operating flight crew member since leaving home base on that tour of duty. Except that, when a tour of duty includes a stay in an area having a time difference of more than two hours, the rest period at home base on completion of the tour of duty shall not be less than 72 consecutive hours.

When a pilot is temporarily detached at a place other than home base and a tour of duty is completed at that place, the rest period applicable to home base shall apply.

When a pilot begins a tour of duty at home base and completes it at a place of detachment or begins a tour of duty at the place of detachment and completes it at home base, the rest period applicable shall be that which applies when the place of detachment is also regarded as the pilot’s home base.

In addition to the rest period applicable at the end of a pilot’s last duty period, he or she shall have a recreational period of 24 consecutive hours free of all duties at least once in every 7 consecutive days. If, because of the length of the required rest period, this is not possible, the pilot shall have this recreational period free of all duties at the conclusion of that rest period.

When at home base, the rest period applicable and the recreational 24 hours must together include a continuous period embracing the hours between midnight and 6 am on two successive nights or extended to include that period.

Adequate rest facilities are to be provided on the aircraft.

Pakistan Regulations

5.66 Civil Aviation Authority, Pakistan has issued Air Navigation Order No. 91.0012 dated 25 May 2006 regarding Flight and Duty Time Limitation (FDTL).
5.67 The essential elements of the regulations on flight and Duty limitations are as follows:

8.1 Flight and Duty Time Limitations

8.1.1 Maximum FDTL shall be as follows:

<table>
<thead>
<tr>
<th>a)</th>
<th>Flight Crew Compliment- Aircraft weight category above 5700 Kgs</th>
<th>Flight time</th>
<th>Duty period</th>
</tr>
</thead>
</table>
| (i) | Single crew compliment  
§ Two crew cockpit  
§ Three crew cockpit | 09 hrs  
10 hrs | 12 hrs  
13 hrs |
| (ii) | Multiple crew compliment  
§ Two crew cockpit  
§ Three crew cockpit | 11 hrs  
12 hrs | 13 hrs  
15 hrs |
| (iii) | Double crew | 14 hrs | 16 hrs |

Note: Flight Crew undertaking single & two pilot operations within single duty will be governed by the FDTL of flight undertaken at later stage of flying.

8.1.2 Extension of FDTL:

To avoid inconvenience to passengers, duty period as given in 8.1.1 may be extended by a maximum of 4 hours in the case of unanticipated technical snags, adverse weather conditions or any other unforeseen circumstances beyond the control of the operator; in case if FDTL extension involving flight crew, the flight crew members must not feel fatigued and should feel in good physical / mental condition to operate a flight. FDTL extension is not applicable at crew base. Whenever the duty period gets extended, the rest period for flight crew shall be prorata increased by twice the amount of extended period of duty period.

8.1.3 In extraordinary circumstances, the Flight and Duty Time Limitations can be extended with the specific approval of the Director General CAA in accordance with the conditions, which the Director General may specify.

5.68 Regulations require use of multi-crew to enhance the above limits, which state as follows:

8.1.7 Augmented Operations.

Operations beyond the scope of single crew compliment shall be undertaken by augmenting the flight crew. A Multiple Crew is limited to two sectors on international and three sectors on domestic/regional flights. The following issues must be addressed:

a) The quality of the flight relief facilities.

b) The qualifications of flight crew members at the controls at all stages of flight should be such that the control and completion of the flight to a safe landing should not be dependent on the return of resting flight crew members to the flight deck.

c) The division of duty and rest between flight crew members must be kept in balance.
d) The notification of the role of the crew members must be given in advance. (i.e. flight crew member to be operating main crew of relief crew).

e) That prior notification of operating relief role must be made available to crews in order for them to take or forgo rest accordingly.

f) That full crew integrity be retained. During the Aircraft Commander’s period of relief, responsibility for the safe conduct of the flight will be delegated to the Aircraft Commander’s relief pilot who must be command qualified.

5.69 The regulations provide only cumulative flight time limitations and require both the operator and the crew member to adhere the limitations. The regulation on the subject state as follows:

8.2 Cumulative Total Time Limitations
8.2.1 Operator shall not permit an aircraft to fly and no crew member shall act as a member of the crew of an aircraft if during the planned flight, any member of the flight crew will accumulate flight time which,

a) When added to the flight time accumulated in the seven days period preceding the flight would be in excess of thirty-five hours, or

b) If added to that accumulated in the thirty days period preceding the flight would be in excess of one hundred hours, or

c) If added to that accumulated in three hundred and sixty five days period preceding the flight would be in excess of one thousand hours.

8.2.2 The Operator shall not permit an aircraft to fly, nor shall a person act as a member of the crew of an aircraft if during the planned flight the flight and duty time limitations in the approved scheme established by the operator would be exceeded.

5.70 The requirements relating to number of landings and operations during consecutive nights are as follows:

8.3 Limitation on Number of Landings
8.3.1 In any one planned duty period, no crew member of an aeroplane with weight category above 5700 Kgs, shall do or be asked to do more than a total of:

a) 6 landings in day light in one duty period, or

b) 4 landings by day 1 landing by night in one duty period, or

c) 3 landings by day and 2 landings by night in one duty period, or

d) 2 landings by day and 3 landings by night in one duty period, or

e) 4 landings by night in one duty period.

8.3.2 In any one planned duty period, no crew member of an aeroplane with weight category of 5700 Kgs and below, shall do or be asked to do more than a total of:
8.3.3 Limitation on number of landings shall not include landing for the purpose of retrieval of aircraft after diversion.

8.3.4 The restrictions in regard to number of landings during any 24 hours period are not applicable to:
   a) Helicopter operations.
   b) Flying Schools.
   c) Flight crew engaged in training flights. If the training flight is conducted after any commercial operation(s), the number of landings shall not be the limiting factor for calculation of FDTL. In such cases, total flight and duty period shall be the limiting factor. Whenever any commercial operation is conducted after a training flight, the number of landings and flight and duty time including the training flights shall be considered for calculating FDTL.

8.4 Consecutive Night Limitation
A crew member shall neither be detailed nor undertake any duty between periods embracing 2200 to 0600 hours local time for more than two consecutive nights.

5.71 Rest requirements of the regulations are as follows:

10. Rest Period
10.1 RPT Air Operator shall provide each Flight crew member of an aircraft with a minimum rest period before each flight duty period which shall not be less than twice the duration of the duty period of previous flight and not less than 12 hours, and shall provide a rest period of not less than twenty-four hours after availing his / her rest period of last flight in each period of seven consecutive days or shall provide rest periods as directed by the Director General CAA.

   Note: To avoid inconvenience to passenger on subsequent flight minimum rest period may be reduced to 12 hours on international sectors and 10 hours on domestic sectors with the consent of each flight crew member provided that the crew member does not feel fatigued and feels in good physical/mental condition to operate a flight.

10.2 A charter, Aerial Work and Flying School below weight category of 5700 Kgs operator shall provide each flight crew member of an aircraft with a minimum rest period before each flight duty period which shall not be less than twice the duration of flight time of previous flight or 10 Hours, whichever is more, and shall provide a rest period of not less than twenty four hours after availing rest period of last flight in each period of seven consecutive days or shall provide rest period as directed by the Director General CAA.
10.3 No operator shall assign any flight crew member to any duty during required rest period.

10.4 Any rest period provided under this ANO shall not include time spent as a passenger or as supernumerary crew of an aircraft on a flight made for the purpose of positioning for a subsequent period of duty. The time spent in travel as supernumerary crew 12 hrs (10 hours of Charter, Aerial Work and Flying School below weight category of 5700 Kgs) prior to operating a flight will be considered towards Flight Duty Period for that flight for which he/she is being positioned.

10.5 An operator shall not cause or permit any person to fly as a member of a crew if he knows or has reason to believe that, that person is suffering from fatigue to the extent that the safety of the aircraft would be endangered.

5.72 The regulations of Pakistan also require the operator to maintain and retain records of duty period, flight time and rest period of the crew members for as follows:

**11. Record Keeping**

11.1 Operators shall maintain records for duty period, flight time and rest periods of all the crew members that shall include:

a) For each Flight Crew:
   i) Daily flying hours
   ii) The beginning, end and duration of each duty or flying duty period,
   iii) Function performed during the period,
   iv) Duration of each rest period prior to a flying duty or standby period,
   v) Weekly, monthly and yearly totals of flight time.

b) For each Cabin Crew:
   i) The beginning, end and duration of each duty or flying duty period,
   ii) Duration of each rest period prior to a flying duty or standby period,
   iii) Weekly, monthly and yearly totals of flight duty time

11.2 Records on FDTL shall be preserved for at least 24 calendar months from the date of the last relevant entry.

**Bangladesh Regulations**

5.73 Civil Aviation Authority of Bangladesh has issued an Air Navigation Order ANO(OPS)A-10 dated 3 July 2002 regarding Flight Time, Duty Time and Rest Period for Flight Crew Members. The relevant extracts of the regulations in respect of Scheduled Commercial Operators are as follows:
3. LIMITATION OF FLIGHT TIME, DUTY PERIOD AND REST PERIOD FOR SCHEDULED COMMERCIAL OPERATORS

3.1 Maximum Flight Time

3.1.1 Maximum flight time shall be as mentioned:

<table>
<thead>
<tr>
<th>Period</th>
<th>Maximum Flight Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>11 hours</td>
</tr>
<tr>
<td>Week</td>
<td>35 hours</td>
</tr>
<tr>
<td>Month</td>
<td>120 hours</td>
</tr>
<tr>
<td>Quarter</td>
<td>300 hours</td>
</tr>
<tr>
<td>Year</td>
<td>1000 hours</td>
</tr>
</tbody>
</table>

3.1.2 In this section “Day” means a 24 hours cycle, “Week” a 7-day cycle, “Month” a 28 day cycle, “Quarter” a 90 day cycle, “Year” a 365 day cycle.

3.1.3 The maximum flight time above for “day” can be increased to 14 hours for operation with 3 pilots and 2 flight engineers; and increased to 16 hours for operation with 4 pilots and 2 flight engineer. For the purpose of this paragraph, flight crew of three or more pilots or two flight engineers shall include such crew members that to provide in-flight relief for the purpose of extending duty period, the crew shall hold qualifications at least equal to those required by the crew member that he relieves.

3.1.4 For such duty period the following conditions are to be fulfilled:

(a) Suitable facilities for flight relief are available on the aircraft.
(b) Each of the flight crew member has, during the duty period in course of which a flight is made and before the end of the flight, been afforded opportunities of resting for a reasonable time.
(c) Suitable in-flight rest facilities, like sleeping berths or bunks approved by Chairman.

3.2 Maximum Duty Period and Minimum Rest Period

3.2.1 No Operator conducting scheduled flights will assign a flight crew and no flight crew will accept an assignment to a scheduled duty period of more than 14 hours.

3.2.2 A flight crew scheduled to a duty period of 14 hours or less as provided under paragraph 3.2.1 of this ANO must be given a scheduled rest period of at least 9 consecutive hours on the ground. This rest period must occur between the completion of the scheduled duty period and the commencement of the subsequent duty period.

3.2.3 The rest period required under paragraph 3.2.2 of this ANO may be scheduled or reduced to 8 consecutive hours if the flight crew is provided a subsequent rest period of at least 10 consecutive hours; this subsequent rest period must be scheduled to begin no later than 24 hours after the beginning of the reduced rest period and must occur between the completion of the scheduled duty period and the commencement of the subsequent duty period.
3.2.4 An Operator may assign a pilot to a scheduled duty period of more than 14 hours, but no more than 16 hours, if the operator has assigned to the flight or flights in that duty period at least one pilot in addition to the minimum pilot complement required for the flight or flights in that duty period in accordance with the relevant AFM and AOM/FCOM.

3.2.5 An operator may assign a pilot to a scheduled duty period of more than 16 hours, but no more than 20 hours, and if the operator has assigned to the flight or flights in that duty period two pilots in addition to the minimum pilot complement required for the flight or flights in that duty period in accordance with the relevant Aircraft Flight Manual (AFM) and Aircraft Operating Manual (AOM)/Flight Crew Operating Manual (FCOM).

3.2.6 In any operation in which more than one flight engineer is required, the duty limitations in 3.2.5 apply to those flight engineers.

3.2.7 Except as provided in paragraph 3.2.8 of this ANO, a flight crew scheduled to a duty period of more than 14 hours but no more than 20 hours, as provided in paragraphs 3.2.4, 3.2.5 and 3.2.6 of this section, must be given a scheduled rest period of at least 12 consecutive hours. This rest period must occur between the completion of the scheduled duty period and the commencement of the subsequent duty period.

3.2.8 The rest period required under paragraph 3.2.7 of this ANO may be scheduled or reduced to 10 consecutive hours if the flight crew is provided a subsequent rest period of at least 14 consecutive hours; this subsequent rest period must be scheduled to begin no later than 24 hours after the beginning of the reduced rest period and must occur between the completion of the scheduled duty period and the commencement of the subsequent duty period.

3.2.9 Notwithstanding paragraph 3.2.4, 3.2.5 and 3.2.6 of this ANO, if an operator elects to reduce the rest period to 10 hours as authorized by paragraph 3.2.8 of this ANO, the operator may not schedule a flight crew for a duty period of more than 14 hours during the 24 hour period commencing after the beginning of the reduced rest period.

3.2.10 No operator may assign a flight crew any duty period with the operator unless the flight crew has had at least the minimum rest required under this ANO.

3.2.11 No operator may assign a flight crew to perform duty with the operator during any required rest period.

3.2.12 Time spent in transportation, not local in character, that an operator requires of a flight crew and provides to transport the flight crew to an airport at which that flight crew is to serve on a flight as a crewmember, or from an airport at which the flight crew was relieved from duty to return to the flight crew home station, is not considered part of a rest period.
3.2.13 Each operator must relieve each flight crew engaged in air transportation and each commercial operator must relieve each flight crew engaged in air commence from all further duty for at least 24 consecutive hours during any 7 consecutive calendar days.

3.2.14 A Flight crew is not considered to be scheduled for duty in excess of duty period limitations if the flights to which the flight crew is assigned are scheduled and normally terminate within the limitations but due to circumstances beyond the control of the operator (such as adverse weather conditions, technical delays or other unforeseen circumstances) are not at the time of departure expected to reach their destination within the scheduled time.

3.2.15 No flight crew that is employed as a flight crew by an air operator may do any other commercial flying if that commercial flying plus his flying in air transportation will exceed any flight time limitation in this ANO,

3.2.16 Notwithstanding all limitations mentioned in this ANO, the Chairman recognizes the right of a flight crew to refuse further duty when suffering from fatigue of such a nature as to adversely affect the safety of flight.

4. RECORDING AND REPORTING OF DUTY AND REST PERIODS

4.1 The Operator and each Pilot-in-Command are required to ensure that the flight duty and rest time limit as mentioned above are adhered to by each flight crew on duty. The Operator must maintain records showing the flight duty and rest periods for every flight crewmember at all times.

4.2 These records shall be retained by the Operator for a period of not less than 2 years and shall be produced to the Chairman or his Inspector upon demand.

5. EXECUTIVE PILOTS FLIGHT AND DUTY TIME LIMITATION

5.1 The provisions related to flight crewmember as provided for in the ANOs preceding paragraphs shall equally apply in respect of an Executive pilot of an operator.

5.2 The duties performed in the office not related to the preparation of a flight or series of flights as pilot-in-command or in any other capacity, shall not be counted within the definition of “Rest Period”.

5.3 A monthly record of office duties performed by the Executive pilots’ shall be submitted to CAAB within 10th day of each calendar month of the year in the pro-forma attached to this Air Navigation order as Appendix ‘A’.
6. **EXCEEDING OF FLIGHT TIME AND DUTY PERIOD LIMITATIONS, FLIGHT DISLOCATION AND REDUCTION OF REST PERIODS.**

6.1 **Extension of Flight Time and Duty Period:**

   6.1.1 In extraordinary cases for certain flights the Operator may request for special permission form the Chairman for extension of flight time and duty period in which case the Operator must ensure following requirements:

   (a) The flight time requested must not exceed 14 hours (with the same set of minimum required flight crew);

   (b) The flight crew duty period must not exceed 16 hours (with the same set of minimum required flight crew); and

   (c) Safety of the flight is not jeopardized.

6.2 **Flight Dislocation**

   6.2.1 Should there be any unforeseen circumstance arising out of technical or operational difficulties, the Pilot-in-Command (PIC) may decide to exceed the maximum flight time and/or maximum duty period limitations by 10% only to accomplish the flight. In such case the PIC shall carefully consider the stress on his entire crew, especially due to possible accumulation of fatigue.

   6.2.2 Pilot-in-Command of an aircraft may be permitted to reduce a scheduled rest period mentioned in the provisions of this A.N.O. The exercise of such discretion must be considered exceptional and should not be used to reduce successive rest period. Whenever the rest period is reduced, the aircraft Commander shall submit a Rest Period Reduction Report to his employer in the pro-forma attached to this Air Navigation Order as Appendix ‘B’; and if the reduction exceeds two hours the operator shall forward the report to the Chairman within ten days from such deviation.

   6.2.3 When a Pilot-in-Command has directed a deviation as stated in 6.2.2 above, he shall notify such fact to the Chairman through the operator in the form given in Appendix ‘A’ within ten days from the day the direction was issued or if the Pilot-in-Command was outside Bangladesh within four days from his return to Bangladesh whichever is earlier.

   6.2.4 It is left to the discretion of the Pilot-in-Command to deviate or direct any crew member to deviate from the provisions of the limitation specified herein if, in his opinion, the deviation is essential for the purpose of any of the following.

   (a) Safety of the aircraft;

   (b) Saving the life of a person in danger and

   (c) National requirements and security of State.

   6.2.5 Every transgression of the maximum flight time per duty period and/or maximum duty period between two consecutive rest periods has to be reported by the PIC on behalf of all crewmembers concerned. A post flight report (crew de-briefing report) has to be filed for each individual occurrence. The Operator is obliged to report in writing all transgressions for the period from January to June and for the period from July to
December (including exceedance of the duty period limitation for 7 consecutive days) on the 25th of January and the 25th of July respectively in every year. If there are no transgressions, submission of a NIL report is mandatory.

6.3 Reduction of Rest Periods.
   6.3.1 Reduction of minimum rest period is not allowed under any circumstances.

Ghana Regulations

5.74 Ghana Civil Aviation Regulations (GCARs) under its Section 8.11 of Part 08 (02) stipulates duty and rest period requirements of critical personnel engaged in commercial air transport flight operations, which includes flight crew, cabin crew and flight dispatcher. The GCARs broadly stipulate the regulations and corresponding implementing standards prescribed at Section 8.11 of Part 08(4) (IS) provide the detailed requirements. The GCARs, however, contains reference to the specific implementing standard.

5.75 The relevant GCARs on the subject are as follows:

8.11.1.3 DUTY AND REST PERIODS

(a) With respect to duty periods, no AOC holder may schedule:

   (1) A flight crew member for more than 14 hours of duty, except as prescribed in IS: 8.11.1.3

   (2) A flight crew member for more than 8 hours of flight deck duty in any 24 consecutive hours, except as prescribed in the implementing standards.

   (3) A cabin crew for more than 14 consecutive hours of duty, except as prescribed in the implementing standards.

   (4) A dispatcher for more than 10 consecutive hours of duty within a 24 consecutive hour period, unless he or she is given an intervening rest period.

   **Note:** A person is considered to be on duty if they are performing any tasks on behalf of the AOC holder, whether scheduled, requested or self initiated.

(b) If an AOC holder requires a flight crew member to engage in deadhead transportation for more than 4 hours, one half of that time shall be treated as duty time, unless they are given 10 hours of rest on the ground before being assigned to flight duty.

(c) With respect to rest periods, no AOC holder may assign, nor may any person-
(1) Perform duties in commercial air transport unless that person has had at least the minimum rest period applicable to those duties as prescribed in IS: 8.11.1.3; or

(2) Accept an assignment to any duty with the AOC holder during any required rest period.

*Note:* The minimum rest period is considered to be 8 consecutive hours.

(d) The AOC holder may exercise the option to reduce a crew member’s rest period as provided in the implementing standards, which will require that the crew member’s next rest period be longer.

(e) The AOC holder shall relieve the flight crew member, flight operations officer, or cabin crew from all duties for 24 consecutive hours during any 7 consecutive day period.

*Note:* Time spent in transportation, not local in character, that is required by the AOC holder to position crew members to or from flights is not considered part of a rest period.

*Note:* Time spent in transportation aircraft (at the insistence of the AOC holder) to or from a crew member’s home station is not considered part of a rest period.

**8.11.1.4 DUTY ALOFT**

(a) The Authority will consider all time spent on an aircraft as an assigned or relief flight crew member, whether resting or performing tasks to be duty aloft.

(b) The Authority will consider a flight crew member to be on continuous duty aloft unless he or she receives a rest period of 9 consecutive hours on the ground.

(c) Each AOC holder shall provide adequate sleeping quarters, including a berth, on the aeroplane whenever a flight crew member is scheduled to be aloft for more than 12 hours during any 24 consecutive hours.

**8.11.1.5 MAXIMUM NUMBER OF FLIGHT TIME HOURS**

No AOC holder may schedule any flight crew member and no flight crew member may accept an assignment for flight time in commercial air transport, if that crew member’s total flight time or duty time or duty aloft in commercial flying will exceed the limitations prescribed in the implementing standards.

*Implementing Standard:* See IS 8.11.1.5 for tables showing maximum flight time hours.

**8.11.1.6 SPECIAL FLIGHT DUTY SCHEMES**

(a) The Authority may approve a special flight duty scheme in the AOC holder’s Operations Manual.

(b) An AOC holder may elect to apply the flight crew member flight duty and rest requirements to the cabin crew.

(c) Crewmember records of flight time, flight duty and rest period should be kept by the operator for two years
5.76 The implementing standards IS: 8.11.1.3 and IS: 8.11.1.5 are as follows:

**IS: 8.11.1.3 DUTY AND REST PERIODS**

Each AOC holder and each crewmember shall use the following table, as appropriate, to consolidate all scheduling and actual event requirements with respect to crew member duty and rest periods for commercial air transport operations.

<table>
<thead>
<tr>
<th>Acceptable Variations to the Basic Duty vs. Rest Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>This table outlines flight crew maximum duty periods (including duty aloft) and prescribed rest periods.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consecutive Hours of Flight Deck Duty</th>
<th>Intervening Rest Period</th>
<th>Flight Deck Duty (24 hour period)</th>
<th>Duty Aloft (Hours)</th>
<th>Total Duty Period (Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Pilot Crew</td>
<td>8</td>
<td>16</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>2 Pilot Crew</td>
<td>8</td>
<td>16</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>2 Pilot + FE</td>
<td>9</td>
<td>NA</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>2 Pilots + 1 Relief Pilot</td>
<td>8</td>
<td>2X Actual Hours Flown</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>2 Pilot + 2 Relief Pilots</td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
</tbody>
</table>

No certificate holder may schedule a flight crewmember, and no flight crewmember may accept an assignment, for flight time during the 24 consecutive hours preceding the schedule completion of any flight segment without the scheduled rest period during that 24 hours of at least the following:

(a) 9 consecutive hours of rest for less than 8 hours of scheduled flight time;

(b) 10 consecutive hours of rest for 8 or more but less than 9 hours of scheduled flight time;

(c) 11 consecutive hours of rest for 9 or more hours of scheduled flight time

<table>
<thead>
<tr>
<th>Acceptable Scheduled Initial Rest Period Reduction by Lengthening the Subsequent Rest Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight Deck Duty Period (Hours)</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Less than 8</td>
</tr>
<tr>
<td>8-9</td>
</tr>
<tr>
<td>9 or more</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Situations Requiring Longer Flight Crew Member Rest Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of Time</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>1 or 2 Pilot Crew</td>
</tr>
<tr>
<td>2 Pilots + FE</td>
</tr>
<tr>
<td>2 Pilots + FE</td>
</tr>
<tr>
<td>2 Pilots + FE + Relief Crew</td>
</tr>
</tbody>
</table>
IS: 8.11.1.5 MAXIMUM ALLOWABLE FLIGHT HOURS

Each AOC holder and each pilot shall use the following tables to determine the maximum allowable flight hours.

<table>
<thead>
<tr>
<th>Maximum Allowable Flight Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>• Scheduled or Charter Flights</td>
</tr>
<tr>
<td>• Stage Lengths less than 4000 miles</td>
</tr>
<tr>
<td>• Aircraft more than 5700 kg</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>• Scheduled Flights</td>
</tr>
<tr>
<td>• Stage Lengths more than 4000 miles</td>
</tr>
<tr>
<td>• Aircraft more than 5700 kg</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Maximum Duty Aloft 2 Pilot + FE</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Maximum Duty Aloft With Relief</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

South African Regulations

5.77 South African Civil Aviation Technical Standards (SA-CATS) are issued under their Aviation Act, 1962 and the Civil Aviation Regulations, 1997. Flight Times and Duty Periods Limitations are part of SA-CATS-OPS 121 on Air Transport Operations of Large Aeroplanes. This technical standard besides its own stipulations has also a reference to requirements of the Civil Aviation Regulations, 1997 as follows:

2. Requirements of the Civil Aviation Regulations, 1997

(1) CAR 121.02.10 requires that an operator of an aeroplane must have a scheme for the regulation of flight times and duty times of his or her flight crews.

(2) CAR 121.02.10 also requires that a flight crew member may not fly, and an operator may not require that flight crew member to fly, if either has reason to believe that he or she is suffering or is likely to suffer while flying, from such fatigue as may endanger the safety of the aeroplane or of its occupants.

(3) Every flight crew member is required to inform the operator of all flying he or she has undertaken if the cumulative amount of such flying and any scheduled duties is likely to exceed the maximum laid down in the Regulations.

5.78 To ensure the compliance of the above requirements of the Civil Aviation Regulations, 1997 the SA-CATS requires as follows:
3. Operators’ schemes and their approval

(1) An operator must submit a proposed scheme for the regulation of flight time and duty periods and minimum rest periods to the Commissioner for approval.

(2) Any deviation from the approved scheme must be submitted to the Commissioner for consideration.

(3) Non-availability of auto pilot or auto stabilisation systems requires a reduction in flight time and duty period in respect of public air transport and IFR operations.

4. General principles of control of flight, duty and rest time

(1) The prime objective of any scheme of flight time limitations is to ensure that flight crew members are adequately rested at the beginning of each flight duty period. Aeroplane operators will therefore need to take account of inter-related planning constraints on –

(a) individual duty and rest periods;

(b) the length of cycles of duty and the associated periods of time off;

and

(c) cumulative duty hours within specific periods.

(2) Duties must be scheduled within the limits of the operator’s scheme. To allow for unforeseeable delays the pilot-in-command may, within prescribed conditions, use his or her discretion to exceed the limits on the day. Nevertheless, flight schedules must be realistic, and the planning of duties must be designed to avoid as far as possible exceeding the flight duty limits.

(3) Other general considerations in the sensible planning of duties are –

(a) the need to construct consecutive work patterns which will avoid as far as possible such undesirable rostering practices as alternating day/night duties and the positioning of flight crews in a manner likely to result in a serious disruption of established sleep/work patterns;

(b) the need, particularly where flights are carried out on a programmed basis, to allow a reasonable period for the preflight notification of duty to flight crews, other than those on standby; and

(c) the need to plan time off and also to ensure that flight crews are notified of their allocation well in advance.

5. Responsibilities of flight crew members

It is the responsibility of all flight crew members to make optimum use of the opportunities and facilities for rest provided by the operator, and to plan and use their rest periods properly so as to minimise the risk of fatigue.

6. Standard provisions required for an operator’s scheme

(1) The standard provisions which the Commissioner regards as the basis for an acceptable scheme of flight and duty limitations and which, if included in an operator’s scheme, will facilitate approval by the Commissioner are contained in paragraphs 7 to 13 below.
Although operators are expected to plan their schemes in accordance with the requirements, it is however, recognised that the standard provisions will not necessarily be completely adaptable to every kind of operation. In exceptional circumstances therefore operators may apply to have variations from the standard provisions included in their schemes. However, such variations should be kept to a minimum and approval will only be granted where an operator can show that these proposed provisions will ensure an equivalent level of protection against fatigue.

5.79 The above advice at para 6 (1) to the operators clearly indicate that the standard provisions for an acceptable scheme of flight and duty limitations are contained in paragraphs 7 to 13 which, if included in an operator’s scheme, will facilitate approval by the Commissioner. Accordingly para 7 to 13 of the CATS is reproduced below:

7. **Limitations of single flight duty periods – flight deck crew**

7.1 **Maximum rostered flight duty periods**

The maximum rostered flight duty period (FDP) (in hours) must be in accordance with Table 1, or Table 2 or 3, or Table 4 or 5. Rostering limits in the tables may be extended by in-flight relief or split duty under the terms of paragraphs 7.2 and 7.3. On the day, the pilot-in-command may at his or her discretion further extend the FDP actually worked in accordance with paragraph 7.6.

(1) Maximum FDP – Two pilot crews: Aeroplanes

Table 2 applies when the FDP starts at a place where the flight crew member is acclimatised to local time, and Table 3 applies to other times. To be considered acclimatised for the purpose of this technical standard, a flight crew member must be allowed three consecutive local nights free of duty within a local time zone band which is two hours wide. He or she will thereafter be considered to remain acclimatised to that same time zone band until he or she ends a duty period at a place where local time falls outside this time zone band.

(2) Maximum FDP – Two pilots plus additional flight crew member: Aeroplanes

Table 4 applies when the FDP starts at a place where the flight crew member is acclimatised to local time, and Table 5 applies at other times. To be considered acclimatised for the purposes of this technical standard, a flight crew member must be allowed three consecutive local nights free of duty within a local time zone band which is two hours wide. He or she will thereafter be considered to remain acclimatised to that same time zone band until he or she ends a duty period at a place where local time falls outside this time zone band.

(3) Limits on two flight crew long range operations (This paragraph does not apply to cabin crew members.)
When an aeroplane flight deck crew comprises only two pilots, the allowable FDP is calculated as follows: A sector scheduled for more than 7 hours is considered as a multi-sector flight, as below:

<table>
<thead>
<tr>
<th>Scheduled sector times</th>
<th>Acclimatised to local time</th>
<th>Not acclimatised to local time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector length over 7 hrs but not more than 9 hrs</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Sector length over 9 hrs but not more than 11 hrs</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Sector length over 11 hrs</td>
<td>4</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

7.2 Extension of flight duty period by in-flight relief

(1) When any additional flight crew member is carried to provide in-flight relief for the purpose of extending a FDP, he or she must hold qualifications which will meet the requirements of the operational duty for which he or she is required as a relief.

(2) When in-flight relief is provided, there must be available, for the flight crew member who is resting, a comfortable reclining seat or bunk separated and screened from the flight deck and passengers.

(3) A total of in-flight rest of less than three hours will not count towards extension of an FDP, but where the total of in-flight rest (which need not be consecutive) is three hours or more, the rostered FDP may be extended beyond that permitted in Tables 2 and 3 or 4 and 5 by:

(a) If rest is taken in a bunk, a period equal to one half of the total of rest taken, provided that the maximum FDP permissible is 18 hrs (or 19 hrs in the case of cabin crew members); and

(b) if rest is taken in a seat, a period equal to one third of the total of rest taken, provided that the maximum FDP permissible is 15 hrs (or 16 hrs in the case of cabin crew members).

The maximum extension allowable is equivalent to that applying to the basic flight crew member with the least rest.

(4) Where a flight crew member undertakes a period of in-flight relief and after its completion is wholly free of duty for the remainder of the flight, that part of the flight following completion of duty may be classed as positioning and be subject to the controls on positioning detailed in paragraph 7.4.

7.3 Extension of flying duty period by split duty

When a FDP consists of two or more duties separated by less than a minimum rest period, then the FDP may be extended beyond that permitted in the tables by the amounts indicated below:
<table>
<thead>
<tr>
<th>Consecutive hour rest</th>
<th>Maximum extension of the FDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 3</td>
<td>Nil</td>
</tr>
<tr>
<td>3 – 10</td>
<td>Period equal to half of the consecutive hours rest taken</td>
</tr>
</tbody>
</table>

The rest period must not include the time required for immediate post-flight and pre-flight duties. When the rest period is not more than six hours it will be sufficient if a quiet and comfortable place is available, not open to the public, but if the rest period is more than six consecutive hours, then a bed must be provided.

7.4 Positioning

All time spent on positioning as required by the operator is classed as duty, but positioning does not count as a sector when assessing the maximum permissible FDP. Positioning, as required by the operator, which immediately precedes a FDP, is included as part of the FDP for the purpose of paragraph 7.1.

7.5 Travelling time

(1) Travelling time other than that time spent on positioning may not be classed as duty time and may not be included in cumulative totals of duty hours.

   Note: *Travelling time from home to departure aerodrome can become an important factor if long distances are involved. If the journey time from home to the normal departure aerodrome is lengthy, flight crew members should make arrangements for accommodation nearer to their bases to ensure adequate pre-flight rest.*

(2) Where travelling time between the aerodrome and sleeping accommodation provided by the operator exceeds thirty minutes each way, the rest period must be increased by the amount of the excess, or such lesser time as is consistent with a minimum of ten hours at the sleeping accommodation.

(3) When flight crew members are required to travel from their home to an aerodrome other than the one from which they normally operate, the assumed travelling time from the normal aerodrome to the other aerodrome is classed as positioning and is subject to the controls of positioning detailed in paragraph 7.4.

7.6 Pilot-in-command’s discretion to extend a flight duty period

(1) A pilot-in-command may, at his or her discretion, extend a FDP beyond the maximum normally permitted, provided he or she is satisfied that the flight can safely be made. In these circumstances the maximum normally permitted is calculated according to what actually happens, not on what was planned to happen. The operator’s scheme must include guidance to pilots-in-command on the limits within which discretion to extend a FDP may be exercised. An extension of three hours beyond the maximum normally permitted should be regarded as the maximum, except in cases of emergency.
(2) Whenever a pilot-in-command so exercises his or her discretion, he or she must report it to the operator and, should the maximum normally permitted be exceeded by more than two hours, both the pilot-in-command and the operator must submit a written pilot-in-command’s discretion report – extension of flying duty period, to the Commissioner within thirty days.

Notes:
1. Discretion reports either concerning extension of a flight duty period or reduction of a rest period must be submitted in the form contained in Annexure A. Those reports will be used by the Commissioner when assessing the realism of particular schedules.

2. An emergency in respect of an extension of a flight duty period is a situation which in the judgement of the pilot-in-command presents serious risk to health or safety.

7.7 Delayed reporting time
When flight crew members are informed of a delay before leaving their place of rest the FDP starts at the new reporting time or four hours after the original reporting time, whichever is the earlier. The maximum FDP is based on the original reporting time. This paragraph does not apply if flight crew members are given ten hours or more notice of a new reporting time.

8. Rest periods

(1) It is the responsibility of the operator to notify flight crew members of a flight duty period so that adequate and, within reason, uninterrupted pre-flight rest can be obtained by the flight crew. Away from base the operator must provide the opportunity and facilities for the flight crew to obtain adequate pre-flight rest. It is the operator’s responsibility to ensure that rest accommodation is satisfactory. When operations are carried out at such short notice that it is impracticable for an operator to ensure that rest accommodation is satisfactory, it will be the pilot-in-command’s responsibility to obtain satisfactory accommodation.

(2)

(a) Each duty period, including flight watch and home reserve, must be preceded by a rest period of at least:

(i) Nine consecutive hours including a local night; or
(ii) ten consecutive hours; or
(iii) if the preceding FDP, adjusted for split duty, exceeds eleven hours, an additional rest period must be provided for in the operator’s scheme to the satisfaction of the Commissioner.

(b) Where a flight crew member has completed two consecutive duty periods, the aggregate of which exceeds eight hours flight time or eleven hours duty time (extensions by in-flight relief or split-duty disregarded), and the intervening rest period has been less than twelve consecutive hours embracing the hours between 11h00 and 06h00 local time, he or she must have a rest period on the ground of at least twelve consecutive hours embracing the hours between 22h00 and 06h00 local time or so much longer as to embrace these hours prior to commencing any further duties, but not necessarily larger than twenty four consecutive hours; provided that
this requirement does not apply in respect of consecutive flight watch and home reserve duties.

(c) Following fifty hours of duty of any nature associated with his or her employment, except flight watch and home reserve duty, a flight crew member must have a rest period of not less than twenty-four consecutive hours before commencing further duties.

(d) When a flight crew member has completed a flight time and duty period in excess of eighteen hours, he or she must receive a rest period of at least eighteen hours including a local night before he or she commences any further duties.

(e) Time on flight watch and home reserve duty may be counted towards the required rest periods preceding a period of duty.

(3) Pilot-in-command's discretion to reduce a rest period

A pilot-in-command may, at his or her discretion, reduce a rest period to below the minimum required by paragraph 8(2) and 12(2)(b). The exercise of such discretion must be considered exceptional and should not be used to reduce successive rest periods. A rest period must be long enough to allow flight crew members at least eight hours, at the accommodation where the rest is taken. If a rest period is reduced, the pilot-in-command must submit a report to his or her employer, and if the reduction exceeds two hours, must submit a written report to the Commissioner within thirty days. (See note 1 to paragraph 7.6(2)).

(4) For the purpose of calculating the minimum rest period before commencement of duties, the required post flight duties on completion of the previous FDP is added to such FDP.

9. Duty periods

(1) The following limits apply:

<table>
<thead>
<tr>
<th>Duty</th>
<th>Maximum duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight watch</td>
<td>No limit*</td>
</tr>
<tr>
<td>Home reserve</td>
<td>No limit*</td>
</tr>
<tr>
<td>Positioning</td>
<td>No maximum**</td>
</tr>
<tr>
<td>Standby</td>
<td>Maximum 12 hours (not necessarily consecutive) in any 24 hour period</td>
</tr>
<tr>
<td>Standby + FDP</td>
<td>20 hours</td>
</tr>
</tbody>
</table>

* However, the provisions of item (2) applies.
** However, the provisions of paragraph 7.4 applies.

(2) For the purpose of calculating duty time, the following applies:

(a) For the calculation of accumulated duty time in terms of paragraph 11, flight watch and home reserve is credited on the basis of eight hours for every period of twenty four or fewer consecutive hours, or on a one-for-one basis, whichever is the lesser.

(b) Standby duty time must count fully as duty time for the calculation of accumulated duty time in terms of paragraphs 8(2)(c) and (d) and 11.

(c) See paragraph 7.4 in respect of positioning time.
10. Days off

Flight crew members must –

(1) not work more than seven consecutive days between days off; and

(2) have two consecutive days off in any consecutive fourteen days; and

(3) have a minimum of six days off in any consecutive four weeks at the aerodrome from which they normally operate; and

(4) have an average of at least eight days off in each consecutive four week period, averaged over three such periods.

11. Cumulative duty and flying hours

Maximum cumulative duty hours: The average weekly total of duty hours may not exceed sixty hours over seven days, or fifty hours averaged over any four consecutive weeks. All types of duty, flight duty, ground duty, split duty, stand-by and positioning is counted in full for this purpose. Any period of seven or more consecutive days within which the flight crew member is employed on duties other than flight duties, flight watch or home reserve, standby, office duties or positioning is not included in calculating the above average weekly total of duty hours.

12. Cabin crew members

(1) The requirements detailed in this paragraph are applicable to all cabin crew members carried as cabin crew members.

(2) The limitations which apply to cabin crew members are those contained in paragraphs 7 to 11 applicable to flight deck crew members, but with the following adjustment:

(a) Rostered flight duty periods may not be more than one hour longer than those permitted to flight deck crew members and contained in paragraph 7.1. In order to remove anomalies which might arise when cabin crew members and flight deck crew members report at different times for the same flight, the maximum FDP for cabin crew members must be based on the time at which the flight deck crew start their flight duty period.

(b) Rostered minimum rest periods must not be more than one hour shorter than those required by flight deck crew and contained in paragraph 8(2).

(c)

(i) For the purpose of a FDP extension following in-flight rest by cabin crew members, a period of a minimum of two consecutive hours of rest must allow for the extension of such FDP by half the actual rest period.

(ii) Where in-flight rest is provided for more than three hours, the provisions of paragraph 8.2(iii) apply.

(d) The combined sum of standby duty and following FDP may not exceed twenty-one hours.

(e) The average weekly total of duty hours may not exceed fifty-five hours.

(f) The annual and monthly limits on flying hours need not be applied.

13. Records to be maintained

An operator must retain all pilot-in-command discretion reports of extended flight duty periods and reduced rest periods for a period of at least six months.
In the above technical standards, para 7.1 and 7.2 (3) refer to Table 1 to Table 5 stipulating maximum Flight Duty Period (FDP). These tables are reproduced below:

**TABLES**

**MAXIMUM FLIGHT DUTY PERIOD (FDP)**

**Table 1:**

**Single pilot crews – Aeroplanes certified for single pilot operations**

<table>
<thead>
<tr>
<th>Local time of start</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 4</td>
</tr>
<tr>
<td>0500 – 0659</td>
<td>10</td>
</tr>
<tr>
<td>0700 – 1359</td>
<td>10</td>
</tr>
<tr>
<td>1400 – 2059</td>
<td>9</td>
</tr>
<tr>
<td>2100 – 0459</td>
<td>9</td>
</tr>
</tbody>
</table>

**Note:**
Pilots engaged in repetitive short flights, with an average eight or more take-offs and landings per hour, must have a break of at least thirty minutes within any continuous period of three hours, away from the aircraft; however for the purpose of these technical standards each such series of repetitive flights must be counted as a single sector.

**Table 2:**

**Two pilot crews – Aeroplanes: Acclimatised to local time**

<table>
<thead>
<tr>
<th>Local time of start</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>0500 – 0659</td>
<td>13</td>
</tr>
<tr>
<td>0700 – 1359</td>
<td>14</td>
</tr>
<tr>
<td>1400 – 2059</td>
<td>13</td>
</tr>
<tr>
<td>2100 – 2159</td>
<td>12</td>
</tr>
<tr>
<td>2200 – 0459</td>
<td>11</td>
</tr>
</tbody>
</table>

**Table 3:**

**Two pilot crews – Aeroplanes: Not Acclimatised to local time**

<table>
<thead>
<tr>
<th>Length of preceding rest (hours)</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Up to 18 or over 30</td>
<td>13</td>
</tr>
<tr>
<td>Between 18 and 30</td>
<td>12</td>
</tr>
</tbody>
</table>
Note: The reason that available duty times are less following rest periods inside 18 – 30 hours is the aeromedical advice that the quality of rest is less due to the disturbance of the body’s natural rhythm.

Table 4:

Basic crew consisting of three flight crew members (i.e. Aeroplanes certified for three crews members)
Crew Acclimatised to local time

<table>
<thead>
<tr>
<th>Local time of start</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>0500 – 0659</td>
<td>13</td>
<td>12¼</td>
<td>11½</td>
<td>10½</td>
<td>10</td>
<td>9½</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>0700 – 1359</td>
<td>14</td>
<td>13¼</td>
<td>12½</td>
<td>11½</td>
<td>11</td>
<td>10½</td>
<td>9½</td>
<td>9</td>
</tr>
<tr>
<td>1400 – 2059</td>
<td>13</td>
<td>12¼</td>
<td>11½</td>
<td>10½</td>
<td>10</td>
<td>9½</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>2100 – 2159</td>
<td>12</td>
<td>11¼</td>
<td>10½</td>
<td>9½</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>2200 – 0459</td>
<td>11</td>
<td>10¼</td>
<td>9½</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 5:

Basic crew consisting of three flight crew members (i.e. Aeroplanes certified for three crews members)
Crew not acclimatised to local time

<table>
<thead>
<tr>
<th>Length of preceding rest (hours)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 18 or over 30</td>
<td>13</td>
<td>12¼</td>
<td>11½</td>
<td>10½</td>
<td>10</td>
<td>9½</td>
<td>9</td>
</tr>
<tr>
<td>Between 18 and 30</td>
<td>12</td>
<td>11¼</td>
<td>10½</td>
<td>9½</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: The reason that available duty times are less following rest periods inside 18 – 30 hours is the aeromedical advice that the quality of rest is less due to the disturbance of the body’s natural rhythm.

Analysis of ICAO Standards

5.81 The Committee deliberated the international regulations and developments at ICAO. It was noted by the Committee that the ICAO strategy has changed with the new Standards effective from November 2009. For a direct comparison the Standard 9.6 of Annex 6 Part I prior to and after 19 November 2009 are reproduced below:
Prior to 19 November 2009

9.6 Flight time, flight duty periods and rest periods

The State of the Operator shall establish regulations specifying the limitations applicable to the flight time and flight duty periods for flight crew members. These regulations shall also make provision for adequate rest periods and shall be such as to ensure that fatigue occurring either in a flight or successive flights or accumulated over a period of time due to these and other tasks, does not endanger the safety of a flight.

Effective 19 November 2009

“9.6 Flight time, flight duty periods, duty periods and rest periods for fatigue management

For the purpose of managing fatigue, the State of the Operator shall establish regulations specifying the limitations applicable to the flight time, flight duty periods, duty periods and rest periods for flight crew members. These regulations shall be based upon scientific principles and knowledge, where available, with the aim of ensuring that flight crew members are performing at an adequate level of alertness.”

5.82 Both Standards are still prescriptive in nature. However, there are essentially two conceptual differences between the above Standards, namely one regulations are now required to be based upon “scientific principles and knowledge, where available” and second introduction of the concept of “adequate level of alertness”.

5.83 The previous Standard expected regulations to ensure that “fatigue occurring either in a flight or ..... does not endanger safety of a flight”. This could not be ensured, as fatigue, per se, cannot be measured. However, the new Standard 9.6 expects regulations to ensure “adequate level of alertness” and it is possible to measure “alertness or degradation of alertness” and also permits to use “scientific principles” to be applied while framing the regulations.

5.84 The new ICAO Standard and its Guidance Material, however, still remains prescriptive in nature. Attachment ‘A’ to Annex 6 Part I provides Guidance Material for Development of Prescriptive Fatigue Management Regulations and requires the States to have following basic components:
4.7 Limitations for flight times and duty periods
   4.7.1 Maximum flight time
   4.7.2 Maximum duty hours for flight crew and cabin crew
   4.7.3 Maximum flight duty period for flight and cabin crew
   4.7.4 Flights operated by augmented crews and the provision of in-flight relief

4.8 Minimum rest periods

4.9 Discretion that may be exercised by the pilot-in-command

4.10 Miscellaneous provisions
   4.10.1 Standby
   4.10.2 Available
   4.10.3 Positioning

4.11 Records

5.85 The Guidance Material further elaborates these components e.g. Maximum Flight Time is not to exceed * hours during any flight duty period, [7] consecutive days or [28] consecutive days and [365] consecutive days. However, no numerical values have been provided and the figures in square brackets [] indicate a typical value. The Guidance Material states “States are encouraged to examine the numerical values of other States’ systems for further guidance.”

5.86 It is evident from the above that ICAO guidance material clearly stipulates prescriptive components required to be addressed by the States but the numerical values should be determined by the State itself based upon “scientific principles and knowledge, where available” and by examining the numerical values of other States.

5.87 The Committee, therefore, considered it appropriate to remain close to the ‘International Standards and Recommended Practices’ (SARPs) of ICAO and set the numerical values by examining scientific principles and knowledge, where available, the values adopted by other countries and the views of the stake holders.

5.88 NASA Technical Memorandum 110404 titled “Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation” is the study intended to provide scientific input to the issue of duty and rest scheduling of flight crews in commercial aviation. The study, however, clarifies in its PREFACE that “There was no intention to create
regulatory policy. This was beyond the scope of the scientific working group.” As the study provides scientifically-based principles related to operational issues posed by the aviation industry and provides specific Guidelines and Recommendations, the Committee agreed to consider its recommendations, where available.

5.89 The study states its objective as follows:

**Objectives**

The primary objective of this document is to provide empirically derived principles and guidelines for duty and rest scheduling in commercial aviation. In the first section, scientifically-based principles related to operational issues posed by the aviation industry are outlined. In the second section, the principles are applied to guidelines for duty and rest scheduling in commercial aviation, with specifics provided where appropriate and available. In the third section, a brief overview of other potential industry strategies to address these issues is provided.

5.90 The first section deals with the ‘General Principles’ relating to Sleep, Awake Time Off and Recovery and considers them to be of primary consideration. The section also explains Circadian Physiology and Human Physiological Capabilities. The section explains that there are considerable individual differences in the magnitude of fatigue effects on performance, physiological alertness, and subjective reports of fatigue. These differences extend to the effects of sleep loss, night work, and considerations of required sleep and recovery time for an individual. Individual differences can vary as a function of age, sleep requirement, experience, overall health, and other factors. The section finally concludes that due to diverse range of work demands and operational environments in the aviation industry and also the diverse situations and individuals “regulations cannot completely cover all personnel or operational conditions and that there is no single absolute solution to these issues”.

5.91 The second section on “Specific Principles, Guidelines and Recommendations” based on the General Principles are intended to provide a consistent margin of safety across aviation operations and are intended for application to minimum flight crew complements of two or more. “Summary Overview: Guidelines and Recommendations” discussed in the second section reproduced below.
5.92 Following are the three latest Standards of Annex 6 Part I

"4.2.11.2 Fatigue management. An operator shall establish flight time and duty period limitations and a rest scheme that enable it to manage the fatigue of all its flight and cabin crew members. This scheme shall comply with the regulations established by the State of the Operator, or approved by that State, and shall be included in the operations manual.

"4.2.11.3 Should variations from the fatigue regulations become necessary, an operator shall establish a means, acceptable to the State of the Operator, to permit such variations. Any variations shall provide an equivalent level of safety.
“4.2.11.4 To comply with the regulations established by the State of the Operator, or approved by that State, an operator shall maintain records for all its flight and cabin crew members of flight time, flight duty periods, duty periods and rest periods.”

5.93 The above standards lay down a foundation for Fatigue Management Scheme by the operator, which requires adherence to regulations of the State of Operator but also permits variations from the regulations by providing equivalent level of safety acceptable to the State of the operator. The above Standard also stipulates maintenance of records of flight time, flight duty period and rest periods by the operator for all its flight and cabin crew members.

**Analysis of European Union and UK Regulations**

5.94 European Union regulations stipulate all prescriptive limits of Annex 6 Part I, except maximum number of hours in any flight duty period. EU regulations also require operator to establish a flight and duty time limitations and rest scheme as required by ICAO. Further, EU limitations are almost in line with above NASA recommendations.

**Analysis of FAA Regulations**

5.95 FAA regulations do not stipulate flight duty period and the cumulative duty period limitations prescribed by ICAO. FAA regulations have only flight time limitation and the minimum rest period. Further, rest period is less than the NASA recommended limit.

**Analysis of Regulations of Countries other than EU and FAA, USA**

5.96 Almost all countries other than EU and US meet the prescribed components of fatigue management by ICAO. This is either achieved directly through the regulations or by prescribing these components to be included as part of the scheme of the operator approved by the DGCA of the country. New Zealand is one such example, which requires the operator to have a scheme approved by the CAA for which all components prescribed by ICAO are a part of the scheme.
CHAPTER – 6
Basic Elements and Criteria

Purpose and Scope

6.1 In accordance with ICAO Annex 6, flight time and flight duty period limitations and rest requirements are established for the sole purpose of ensuring that the flight crew members perform at an adequate level of alertness for safe flight operations. In order to accomplish this, two types of fatigue should be taken into account, namely, transient fatigue and cumulative fatigue. Transient fatigue may be described as fatigue that is dispelled by a single sufficient period of rest or sleep. Cumulative fatigue occurs after incomplete recovery from transient fatigue over a period of time. Regulations, therefore, should provide safeguards against both kinds of fatigue.

A) Basic Structure of Regulations

6.2 Before considering the basic elements, following issues regarding the FDTL structure need to be discussed:

i) Should Rule 42A of the Aircraft Rules, 1937 be amended?

ii) Should there be different FDTL regulations for Domestic and International operations?

iii) What should be the definition of Neighbouring Countries?

iv) Adherence to ICAO Standards

i) Amendment to Rule 42A of the Aircraft Rules, 1937

6.3 As mentioned elsewhere in the report, basic regulating framework governing flying time by pilots is laid down in Rule 42A of the Aircraft Rules, 1937. The restriction of 125 hours in any 30 consecutive days of Rule 42A was inserted in year 1952. Further, it permits the flying time of a pilot engaged as co-pilot or supernumerary pilot to be counted at 80 per cent of the flight time.
6.4 DGCA issued an AIC 28/1992 dated 10 December 1992 stipulating detailed criteria regarding Flight Time and Flight Duty Time Limitations and Rest Requirements. The AIC included the flight time limitation of 125 hours in 30 consecutive days as contained in Rule 42A as one of the criteria. Similarly, the CAR of 2007 on the subject also retained the above criterion of Rule 42A. The basic reason for retaining the criterion of Rule 42A was that both AIC and CAR drew the power from aircraft rules and as such cannot supersede the legislation made under aircraft rules.

6.5 A single criterion of flight time limitation in 30 consecutive days of the Rule 42A is not adequate and its language is not commensurate with the present regulations of flight time regulations. Further, the Aircraft Rules should provide guiding principles and powers to frame and lay down detailed technical requirements in accordance with the principles.

6.6 ICAO Annex 6 (Amendment 33A applicable with effect from 19 November 2009) stipulates ‘International Standards’ casting responsibility on the State and the air transport operator as follows:

**Responsibility of the State**

The State of the Operator shall establish regulations specifying the limitations applicable to the flight time, flight duty periods, duty periods and rest periods for flight crew members. (Para 9.6)

**Responsibility of Air transport Operator**

An operator shall establish flight time and duty period limitations and a rest “Scheme” that enable it to manage the fatigue of all its flight and cabin crew members. This scheme shall comply with the regulations established by the State of the Operator. (Para 4.2.11.2)

Should variations from the fatigue regulations become necessary, an operator shall establish a means, acceptable to the State of the Operator, to permit such variations. (para 4.2.11.3)

To comply with the regulations established by the State of the Operator, or approved by that State, an operator shall maintain records for all its flight and cabin crew members of flight time, flight duty periods, duty periods and rest periods. (para 4.2.11.4)

6.7 In light of the above amendments to Annex 6, the Committee discussed the present regulatory framework under Rule 42A of the Aircraft Rules, 1937. The
committee feels it appropriate that the above 'International Standards' are adopted and are made part of the Aircraft Rules, 1937. The present Rule 42A only mentions flight time whereas ICAO SARPs lays down responsibility of the State to frame regulations of not only flight time but also duty period, flight duty period and rest period. Rule 42A is not in line with the present ICAO SARPs and appears anachronistic. Rule 42A covers only one element i.e. flight time per 30 days and does not take into account complete set of fatigue management elements. Therefore Rule 42A needs revision to make it in line with ICAO SARPs. It may also be noted that the 'International Standard' of Annex 6 (Para 9.6) binds the State for establishing regulations in respect of flight crew only and the operator under para 4.2.11.2 is bound to establish the 'Scheme' to manage fatigue for both flight crew as well as cabin crew. The intention is also to include regulations for fatigue management of the cabin crew. Therefore, the committee was of the view that while amending Rule 42A, this intention should be kept in view. Accordingly, following is recommended.

**Recommendation No. 1**

6.8 It is recommended that Rule 42A of the Aircraft Rules, 1937 should be amended and instead of stipulating details of flight time limitation only, it should provide:

i. Power to DGCA to establish regulations specifying the limitations applicable to the flight time, flight duty periods, duty periods and rest periods for flight and cabin crew members of aircraft engaged in commercial operations, general flying and flying training;

ii. Require operators to establish a ‘Scheme’ of flight time and duty period limitations and a rest that enable it to manage the fatigue of all its flight and cabin crew members. This scheme shall comply with the regulations established by or approved by DGCA, and shall be included in the operations manual;

iii. Require operators to establish a ‘means’ to permit variations from the fatigue regulations, which are acceptable and duly approved by DGCA;

iv. Require operators to maintain foolproof records for all its flight and cabin crew members of flight time, flight duty periods, duty periods and rest periods.

6.9 To implement the Recommendation No. 1, the proposed text of Rule 42A by the Committee is at Annexure ‘G’.
ii) **Necessity of different FDTL regulations for Domestic and International operations**

6.10 Historically, DGCA had stipulated two different FDTL regulations for flight crew, one for domestic operations (including neighbouring countries) and the other for international operations. AIC 28 of 1992 has two distinct headings regarding flight time limitation and General conditions applicable to all operations as follows:

*Flight Time Limitations: Domestic Air Operations & Neighbouring Countries:*

*Flight Time Limitations: International Carriers:*

*General Conditions for all operations:*

6.11 Similarly, Civil Aviation Requirements date 27 July 2007 regarding Flight Duty Time and Flight Time Limitations also has following headings:

*Standard Provisions*

*Domestic & Neighbouring Countries Operation*

*International Operation*

6.12 In 1992, Indian Airlines and other private airlines were operating under FDTL regulations for domestic operations. Air India was operating under FDTL regulations under international operations. Later on, Jet Airways and Kingfisher Airlines received Government clearance to operate on international sectors and also started operating under FDTL regulations for international operations.

6.13 While considering FDTL regulations, the Committee noted that FAA, USA has different FDTL regulations for domestic and international operations. Australian regulations on fatigue management also differentiate between international and domestic operations. The applicability specifically states, “Where an international operation involves a time zone change of not more than three hours between ‘home base’ and all intermediate ports, the domestic standard may be used”. Therefore, Australian regulations also stipulate that domestic standards to be applicable to neighbouring countries, which is similar to Indian regulations.
6.14 Size of all European countries is relatively small and their operations are essentially international, with little domestic operations.

6.15 In Indian context, the essential difference between domestic operation (including neighbouring countries) and an international operation is length of the sectors and number of landings.

6.16 Historically, AIC 28/1992 was essentially based on FAA, USA regulations with some additional restrictions. Further, FDTL regulations on Domestic Air Transportation in USA cover three time zones due to its geographical coverage. The Indian FDTL regulations on Domestic Operations were accordingly extended to include neighbouring countries. It suited the Indian scenario as Indian Airlines was operating on domestic routes and neighbouring countries and was not operating long sectors to Europe, USA and Japan, which were operated by Air India.

6.17 In domestic operations the length of the sectors is small and does not cross many time zones but has a requirement of more number of landings, which may extend up to six landings. Increased number of landings has a direct effect and requires reduction of the 'Flight Duty Period' limitation. These operations can be operated with two flight crew members. On the other hand, international operations have long sectors, which may cross many time zones (11 time zones for direct India-USA flight) but may rarely exceed two landings. To cater for longer sectors, there would be a need for augmented crew and additional rest for crossing of many time zones including sleeping quarters (bunks) on the aircraft. The impact of crossing several time zones on fatigue of Flight Crew is well established by scientific studies.

6.18 NASA Technical Memorandum 110404 on Principles and Guidelines for duty and rest scheduling in Commercial Aviation provides scientific input to the issue of duty and rest scheduling of flight crew in commercial aviation. The Technical Memorandum on flying in different time zones recommends as follows:
“2.5 Time Differences

In general, the longer a flight crew member is away from the home-base/domicile time zone, the more recovery time is needed for readjustment back to home-base/domicile time. Therefore, it is recommended that for flight duty periods that cross 4 or more time zones, and that involve 48 hours or more away from the home-base/domicile time zone, a minimum of 48 hours off-duty be allowed upon return to home base/domicile time.”

6.19 Moebus Report on ‘Scientific and medical evaluation of flight time limitations’ states regarding the time zone crossing (Question No. 7) recommends that the minimum rest should be 14 hours during layovers after significant time crossing. In addition to the minimum rest during layovers, the report specifies the recommended recovery periods for air crew in terms of the number of local nights required to readapt to within an hour of home time, depending on the maximum time zone difference and preceding layover length as per the following table:

<table>
<thead>
<tr>
<th>Layover (h)</th>
<th>Maximum time difference (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;5</td>
</tr>
<tr>
<td>&lt;36</td>
<td>1</td>
</tr>
<tr>
<td>36-60</td>
<td>2</td>
</tr>
<tr>
<td>60-84</td>
<td>3</td>
</tr>
<tr>
<td>84-132</td>
<td>3</td>
</tr>
<tr>
<td>&gt;132</td>
<td>3</td>
</tr>
</tbody>
</table>

6.20 It is obvious that keeping in line with practices adopted elsewhere such as USA, Australia, New Zealand and also scientific evidences, different parameters (criteria) need to be employed for domestic and international operations. Making a single set of regulations applicable to both domestic and international operation would require same parameters being applied for different kind of operations. In such a case, regulations would become complicated, as large number of varying parameters (criteria) would have to be examined and employed. This is likely to lead to ambiguity and even may tilt the balance either towards domestic operations or towards international operations. Further, in India domestic and international operations are of similar size in terms of volume, which is evident from the following table. Therefore tilt towards latter of the operators would not be appropriate:
Table 6.1
Available Seat Kilometres (in Millions) of Indian Operators

<table>
<thead>
<tr>
<th>Type of Operations</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2008-09</td>
</tr>
<tr>
<td>Domestic</td>
<td>59,159</td>
</tr>
<tr>
<td>International</td>
<td>62,173</td>
</tr>
</tbody>
</table>

Note: In the above table operations to neighbouring countries is taken as international operations.

Source: DGCA publication “Air Transport Statistics for 2008-09”. Tables 3.7 and 3.8

Recommendation No. 2

6.21 The Committee, therefore, recommends that

i. Different set of regulations for domestic operations (including neighbouring countries) and international operations as has been the practice in past may be continued.

ii. FDTL regulations should be based on type of flights rather than type of operator.

iii. If all sectors of a flight are within the neighbouring countries, then domestic FDTL should be used and in case even one sector of the flight falls in international operation then full flight should be under international FDTL.

iii) Definition of Neighbouring Countries

6.22 To define neighbouring countries, the concept of Window of Circadian Low (WOCL) has been considered. EU OPS-1, Subpart ‘Q’ which deals with flight and duty time limitations and rest requirements defines WOCL as follows:

“The Window of Circadian Low (WOCL) is the period between 02:00 hours and 05:59 hours. Within a band of three time zones the WOCL refers to home base time. Beyond these three time zones the WOCL refers to home base time for the first 48 hours after departure from home base time zone, and to local time thereafter.”
6.23 Australian regulations on fatigue management also differentiate between international and domestic operations. The applicability specifically states as follows:

"Where an international operation involves a time zone change of not more than three hours between 'home base' and all intermediate ports, the domestic standard may be used”.

6.24 Standard Time Zones are expressed with respect to Coordinated Universal Time and in short form written as UTC ± n, where n is offset in hours. UTC is same as GMT (Greenwich Mean Time). Times zones East of Greenwich are UTC+1, UTC+2, UTC+3 etc. up to UTC+12 and time zones West of Greenwich are shown as UTC-1, UTC-2, UTC-3 etc. up to UTC-11.

6.25 Indian Standard Time is UTC+5:30 hours. The following table shows Standard Time Zones from UTC+2 to UTC+9, which covers a band of ±3:30 hours standard time zones from India:

<table>
<thead>
<tr>
<th>Country</th>
<th>UTC Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beirut, Istanbul, Athens, Damascus, Cairo, Cape Town, Helsinki, Jerusalem</td>
<td>UTC+2</td>
</tr>
<tr>
<td>Addis Ababa, Baghdad, Moscow, Riyadh, Saint Petersburg</td>
<td>UTC+3</td>
</tr>
<tr>
<td>Tehran</td>
<td>UTC+3:30</td>
</tr>
<tr>
<td>Baku, Dubai, Mauritius, Samara, Tbilisi</td>
<td>UTC+4</td>
</tr>
<tr>
<td>Karachi, Maldives, Tashkent, Yekaterinburg</td>
<td>UTC+5</td>
</tr>
<tr>
<td>Colombo, Madras, New Delhi, Bombay, Calcutta</td>
<td>UTC+5:30</td>
</tr>
<tr>
<td>Kathmandu</td>
<td>UTC+5:45</td>
</tr>
<tr>
<td>Almaty, Dhaka, Omsk</td>
<td>UTC+6</td>
</tr>
<tr>
<td>Cocos Islands, Yangon</td>
<td>UTC+6:30</td>
</tr>
<tr>
<td>Bangkok, Jakarta, Hanoi, Krasnoyarsk</td>
<td>UTC+7</td>
</tr>
<tr>
<td>Beijing, Hong Kong, Irkutsk, Kuala Lumpur, Manila, Perth, Taipei, Singapore</td>
<td>UTC+8</td>
</tr>
<tr>
<td>Pyongyang, Seoul, Tokyo, Yakutsk</td>
<td>UTC+9</td>
</tr>
</tbody>
</table>

6.26 A band of three standard time zones from India would mean UTC+2:30 to UTC+8:30. The above table shows that there are no standard time zones of UTC+2:30 or UTC+8:30. After deliberations Committee agreed to use a band of 3 hours (±1:30 hours on either side) from India to be considered as neighbouring countries, which then covers a band from UTC+4 to UTC+7.
Recommendation No. 3

6.27 It is recommended that those countries, whose standard times fall within a band of 3 hours (+1:30 hours on either side of India) should be defined as neighbouring countries i.e. countries covered in the standard time zone band of UTC+4 to UTC+7 and flights to these countries would follow FDTL for domestic operations.

iv) Adherence to ICAO Standards

6.28 As stated earlier, variations in International standards of ICAO in respect of flight time, flight duty period and rest periods from 1961 to 1995 was minimal and the major amendment to Annex 6 Part I on the subject became applicable in November 2009. The amended standard casts a responsibility on the State to establish regulations “based on scientific principles” with the aim to ensure that flight crew members are operating at an adequate level of “alertness” Currently, civil aviation authorities use prescriptive regulations to limit flight time and duty period. This approach has an advantage of providing clear-cut limits, but it is necessarily a one-size fit all solutions and as such, is rarely the most efficient or most cost-effective method of managing the fatigue related risk of any one specific aeroplane fleet or route structure.

6.29 ICAO is tackling this issue head-on and a task force has been constituted to look at a Fatigue Risk Management Systems solution and a proposal for Standards and Recommended Practices was drafted with suggested applicability in 2011.

Recommendation No. 4

6.30 After deliberation, the Committee concluded that the Indian regulations be formulated on the basis of these basic elements and criteria to keep them closely aligned with ICAO standards and therefore recommends:

Indian regulations should be based on the most recent criteria of ICAO.
B) Principle Regulations

v) Shared Responsibility of Operators and Crew – Adherence of Regulations

6.31 ICAO guidance material under the headings of responsibilities of the operator and of flight crew members state as follow:

4.4 The operator’s responsibilities

4.4.6 The operator should not require a flight crew member to operate an aeroplane if it is known or suspected that the flight crew member is fatigued to the extent that the safety of flight may be adversely affected.

4.5 Flight crew members’ responsibilities

4.5.1 A flight crew member should not operate an aeroplane when he or she knows that he or she is fatigued or feels unfit to the extent that the safety of flight may be adversely affected.

6.32 Present FAA regulations impose a “shared responsibility” upon the flight crew member and the operator for compliance with the flight time limits and emphatically state for example in FAR § 121.471 on Flight time limitations and rest requirements:

“No certificate holder conducting domestic operations may schedule any flight crewmember and no flight crewmember may accept an assignment for flight time in scheduled air transportation or in other commercial flying if that crewmember’s total flight time in all commercial flying will exceed” the stipulated flight time limits.

6.33 In light of the dual responsibility imposed on certificate holders and flight crews, both would be responsible for any violation of the flight time limitations.

Recommendation No. 5

6.34 The Committee deliberated the joint responsibility and agreed that the joint responsibility should be treated as an umbrella regulation encompassing all stipulated requirement and recommends as follows:
Umbrella Regulations

The operator should not require a flight crew member to operate an aeroplane if it is known or suspected that the flight crew member is fatigued to the extent that the safety of flight may be adversely affected.

A flight crew member should not operate an aeroplane when he or she knows that he or she is fatigued or feels unfit to the extent that the safety of flight may be adversely affected.

No certificate holder may schedule any flight crewmember and no flight crewmember may accept an assignment, which will exceed the prescribed limitations.

Flight crew members should make best use of the facilities and opportunities that are provided for rest and for the consumption of meals, and should plan and use rest periods to ensure that they are fully rested.

vi) Training and Education

6.35 An important first step for the industry is to become informed about the extensive knowledge available regarding fatigue, sleep, and circadian physiology as it relates to performance and aviation operations. This knowledge can then be incorporated into daily operations. The information is useful in providing specific recommendations for personal strategies, to manage performance and alertness in flight operations. Education and training modules to meet this need are available and currently implemented successfully within the industry.

6.36 In line with the above, airlines and non-scheduled operators need to lay down a non-prescriptive policy/guideline to promote healthy practices for flight crew regarding duty and rest periods.

6.37 Equally important is the need to educate all personnel including flight crew, cabin crew, flight dispatchers and managers about the dangers of fatigue, the causes of sleepiness and importance of sleep and proper sleep habits.

Recommendation No. 6

6.38 The Committee deliberated the importance of training and education for all concerned persons dealing with the operations of aircraft and agreed to recommend as follows:
Operators should ensure that persons concerned with the operations of aircraft are trained and educated regarding dangers of fatigue, the causes of sleepiness and importance of sleep and proper sleep habits.

C) Essential Elements of Fatigue Management

6.39 The basic elements and the criteria to address the fatigue of crew members are as follows:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Factors for consideration</th>
</tr>
</thead>
</table>
| i) Flight Time Limitation | – Maximum cumulative flight time limitation  
– Maximum daily flight time limitations  
• Number of landings |
| ii) Duty Period and Flight Duty Period (FDP) Limitation | – Cumulative Duty Period Limitation  
– Maximum daily Flight Duty Period Limitation,  
– Extension of Flight Duty Period  
• Augmented crew  
• Spilt Duty  
– Reduction of Flight Duty Period  
• Number of landings  
• Operations during WOCL |
| iii) Rest Period | – Minimum Rest Period  
– Weekly Rest Period  
– Rest to Compensate Time Zone |
| iv) Miscellaneous Provisions | Standby, Positioning (Deadheading), Unforeseen Operational circumstances, Reporting Time, Night Operations, Local night |
| v) Maintenance of records and Monitoring System | Fool proof computerisation system, Responsibility of both operator and flight crew member, |
| vi) Regulations for Future | Fatigue Risk Management System (FRMS) Ultra Long Range (ULR) Operations |
6.40 The above basic elements and the criteria of fatigue management have been based on the most current prescriptive criteria of ICAO Annex 6 Part I and also includes additional elements such as standby, deadheading, night flying, fool proof computerisation system etc. The above list also includes new terminology such as FDPL (thus far used as FDTL used in Indian regulations) and a new concept of Duty Period.

6.41 A detailed list of criteria, which were considered relevant to the FDTL requirements, was circulated to all stakeholders (Ref para 2.3 of the report) to obtain their views/suggestions. Thereafter, discussions were held and further clarifications were sought from the stakeholders and the views received from them on the subject were considered by the committee.

**Variability and Differences Preclude an Absolute Solution**

6.42 Scientific studies clearly establish that fatigue has its basis in physiological limits and performance deficits like reduced alertness while performing a task are linked to these physiological limits. Flight crews' human physiology is not different from that of other humans. Therefore, the same fatigue-producing factors affecting performance and alertness in experimental subjects, physicians on-call, shift workers, military personnel, and others also affect flight crews. It follows that scientific findings relevant to human physiological capabilities and performance deficits from fatigue, sleep loss, and circadian physiology extend to flight crews.

6.43 Scientific findings of human physiological capabilities also reveal that there are considerable individual differences in the magnitude of fatigue effects on performance, physiological alertness, and subjective reports of fatigue. These differences extend to the effects of sleep loss, night work, and considerations of required sleep and recovery time for an individual. Individual differences can vary as a function of age, sleep requirement, experience, overall health, and other factors. Individuals can also vary in their participation in off-duty activities that engender fatigue during a subsequent duty period (e.g., commuting across long distances immediately prior to starting a duty period).
6.44 The aviation industry requires 24-hour activities to meet operational demand. Growth in international long-haul, domestic, overnight cargo, and short-haul domestic operations will continue to increase these round-the-clock requirements and flight crews must be available to support 24-hour-a-day operations to meet these aviation industry demands. International aviation also requires crossing multiple time zones. Therefore, shift work, night work, irregular work schedules, unpredictable work schedules, and time zone changes will continue to be commonplace components of the aviation industry.

6.45 It has to be acknowledged that the aviation industry represents a diverse range of required work demands and operational environments. This coupled with scientific findings of human physiological capabilities that there are considerable individual differences in the magnitude of fatigue effects on performance, physiological alertness illustrates that guidelines and regulations cannot completely cover all personnel or operational conditions and that there is no single absolute solution to these issues.

6.46 The report of the Committee, therefore, is based on wide ranging study of scientific knowledge, related studies, expert advice and consultation and international practices. Criteria mentioned in the table needs to be discussed in detail and as such one Chapter is devoted to each criterion.
CHAPTER – 7
Flight Time Limitations

Definition of Flight Time

7.1 Flight Time is defined in ICAO Annex 6 as follows:

"Flight time — aeroplanes. The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

"Note.—"Flight time" as here defined is synonymous with the term "block to block" time or “chock to chock” time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.”

7.2 The committee examined the definitions of European Union, Australia and other countries. The committee noted that the definition under ICAO and other countries is substantially similar. Indian Pilots Guild (IPG) has suggested the following definition of flight time:

"The total time from the moment the aircraft moves under it's own power with the intention of flight to the moment it comes to rest at the end of the flight on the designated parking position. If an aircraft that has started moving under it's own power subsequently returns back prior to take-off, the same shall be counted towards flight time, but will not count as a Sector.”

7.3 The Committee deliberated the definition of Flight Time. It was noted that the first sentence of the definition suggested by IPG defines the flight time. The second sentence is actually an example for counting the flight time and is not a part of the definition. The definition of ICAO, other countries and also of IPG clearly spells out that flight time is counted when the aircraft comes to rest “at the end of the flight” while moving under its own power. In the example given by IPG, the aircraft has not completed the flight and as such the period cannot be counted as flight time. However, the time may be counted under duty period and also under flight duty period, which starts from the time the flight crew member reports for duty. These definitions of duty and flight duty period are discussed in detail in the next chapter of this report. The definition of flight time used worldwide including ICAO has similar language and does
not support the definition offered by IPG. The Committee after deliberation decided that definition suggested by IPG cannot be accepted.

**Recommendation No. 7**

7.4 The Committee recommends that the definition of flight time along with note as prescribed by ICAO be adopted for the purpose of framing regulations as follows:

"**Flight time — aeroplanes.** The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

"Note.—“Flight time” as here defined is synonymous with the term “block to block” time or “chock to chock” time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.”

**Flight Time Limitations**

7.5 Attachment ‘A’ to ICAO Annex 6, which provides guidance material for development of prescriptive fatigue management regulations, suggests the following regarding maximum flight time:

"**4.7.1 Maximum flight time**

4.7.1.1 The maximum flight time may not exceed:
   a) (*) hours in any flight duty period;
   b) (*) hours in any [7] consecutive days or (*) hours in any [28] consecutive days; and
   c) (*) hours in any [365] consecutive days."

*The symbol (*) is used above is to indicate where each State may insert a value it considers appropriate to manage fatigue.*

7.6 In accordance with the ICAO guidelines, the maximum flight time limitation must address both transient as well as cumulative fatigue of the flight crew members. The regulations should not only regulate daily flight time limitation but also address cumulative limitation of flight time for week, month and year. The discussion on flight time limitations, therefore, is divided in two parts – cumulative and daily.
i) Cumulative Flight Time Limitation

7.7 Relevant regulations of FAA, USA regarding cumulative flight time for domestic operations states as follows:

“No certificate holder conducting domestic operations may schedule any flight crewmember and no flight crewmember may accept an assignment for flight time in scheduled air transportation or in other commercial flying if that crewmember’s total flight time in all commercial flying will exceed—

1. 1,000 hours in any calendar year;
2. 100 hours in any calendar month;
3. 30 hours in any 7 consecutive days;”

7.8 The cumulative flight time regulations of FAA, USA in respect of ‘Flag Operations’ (i.e. international operations) for two pilot crews are similar, except that it permits 32 hours in any 7 consecutive days. The flight time limitation in case of more than two pilots is as follows:

“Two pilots and one additional flight crew member

No pilot may fly as a flight crewmember more than—

1. 120 hours during any 30 consecutive days;
2. 300 hours during any 90 consecutive days; or
3. 1,000 hours during any 12-calendar-month period.”

“Three or more pilots and an additional flight crew member

No pilot may fly as a flight crewmember more than—

1. 350 hours during any 90 consecutive days; or
2. 1,000 hours during any 12-calendar-month period.

7.9 International flights are longer and augmentation of crew results in even longer flights, therefore, the limitation of 7 consecutive days and even 30 consecutive days gets diluted but the limitation of 1,000 hours always remains.
7.10 Australian regulations are also based on crew composition and follow similar principle i.e. the flight time limitation of 7 consecutive days gets diluted to an extent that it removed three or more pilots. The flight time limitations are as follows:

**Limitations Where The Flight Crew Includes Not More Than 2 Pilots**

- A pilot shall not fly and an operator shall not roster him or her to fly as a flight crew member in excess of 900 hours in 365 consecutive days.
- A pilot shall not fly and an operator shall not roster him or her to fly in excess of 100 hours in 30 consecutive days.
- A pilot shall not fly and an operator shall not roster him or her to fly in excess of 30 hours in 7 consecutive days.

**Limitations Where The Flight Crew Includes Three or More Pilots**

- A pilot shall not fly and an operator shall not roster him or her to fly in excess of 100 hours in 30 consecutive days.
- A pilot shall not fly and an operator shall not roster him or her to fly in excess of 900 hours in 365 consecutive days.

7.11 The Canadian regulations regarding cumulative flight time are as follows:

"700.15 (1) Subject to subsection (2), no air operator shall assign a flight crew member for flight time, and no flight crew member shall accept such an assignment, if the flight crew member's total flight time in all flights conducted by the flight crew member will, as a result, exceed

(a) 1,200 hours in any 365 consecutive days;
(b) 300 hours in any 90 consecutive days;
(c) 120 hours in any 30 consecutive days or, in the case of a flight crew member on call, 100 hours in any 30 consecutive days;
(d) where the flight is conducted under Subpart 4 or 5 using an aircraft other than a helicopter, 40 hours in any 7 consecutive days;”

7.12 European Union regulations (Subpart 'Q') has only cumulative restrictions on flight time ('block time') and states as follows:

"Limit on total block times
An operator shall ensure that the total block times of the flights on which an individual crew member is assigned as an operating crew member does not exceed
(a) 900 block hours in a calendar year;
(b) 100 block hours in any 28 consecutive days."

7.13 It is obvious from the above that most of the countries have more or less similar limitations for maximum cumulative flight time and for international flights less weightage is given to flight time limitation during 7 consecutive days.

7.14 In India, Rule 42A of Aircraft Rules, 1937 prohibits a pilot to fly more than 125 hours during any period of 30 consecutive days. There are no restrictions for yearly flying or weekly flying associated with it.

7.15 The AIC 28 of 1992, however, stipulates additional limitations for consecutive 7 and 365 days. The flight time limitations for both domestic and international operations, therefore, are as follows:

<table>
<thead>
<tr>
<th>Limitation</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 consecutive days</td>
<td>30 hours</td>
</tr>
<tr>
<td>30 consecutive days</td>
<td>125 hours</td>
</tr>
<tr>
<td>12 months</td>
<td>1,000 hours</td>
</tr>
</tbody>
</table>

7.16 The maximum flight time limitation of 30 hours in 7 consecutive days was reviewed for international operations when Air India started operating flights between Frankfurt and Los Angeles in 2005 and the limit of 30 hours was found to be restrictive. The international regulations and practices were compared and it was decided to enhance the limit to 40 hours in 7 consecutive days for Frankfurt – Los Angeles and European operations of Air India.

7.17 The CAR of 2007 also in addition to the limitation of 125 hours during any 30 days of Rule 42A stipulated additional limitation of consecutive 7 days and 12 months. The flight time limitation for 7 consecutive days of the CAR is higher than AIC but in line with the decision of DGCA for European operations and stipulates as follows:
<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Time Limitation (Hours)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic Operations</td>
<td>International Operations</td>
<td></td>
</tr>
<tr>
<td>In 7 consecutive days</td>
<td>35</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>125</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>In 12 consecutive months</td>
<td>1000</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

**Comments Received**

7.18 The views/suggestions were sought from the stakeholders and the subject was also discussed during hearing with them. The views expressed by stakeholders on cumulative flight time limitation were as follows:

7.19 IPG has proposed only cumulative ‘Flight Time’ for 28 and 365 consecutive days. IPG has not proposed any weekly or daily time limitations and have not proposed regulations for domestic and international operations. IPG has proposed cumulative ‘Flight Time’ limitation as follows:

“28 Consecutive Days - 100 hours  
365 Consecutive Days - 900 hours”

7.20 Jet Airways also has proposed similar cumulative flight time limitations, which are in line with European Regulations EU-OPS as follows:

“900 hours for one calendar year and  
100 hours for 28 consecutive days.”

7.21 Kingfisher Airlines suggested cumulative flight time limitation as follows:

“2. Fight Time: 1000 hrs in 12 consecutive months.  
125 hrs in 30 consecutive days.  
35 hrs in 07 consecutive days.”
7.22 NACIL (Air India) made a general statement that provisions of CAR of 2007 were acceptable.

7.23 The scientific study carried out and published by NASA as Technical Memorandum 110404 on “Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation” provides specific principles, guidelines, and recommendations to address the 24-hour duty and rest scheduling requirements of the aviation industry. The study is silent regarding cumulative or daily ‘Flight Time Limitations’ but talks of duty limitations. The guidelines of ICAO, however, expect the State prescribe these limitation.

7.24 The EU regulations prescribe cumulative ‘block time’ limitations, which is same as flight time limitation but EU did not ask for a scientific study to be carried on the subject. Moebus Report, therefore, does not address any question related to Flight Time. Hence, to this extent the Moebus Report is not reflected in this chapter.

7.25 The Committee deliberated the practices of the other States and suggestions of stakeholders. The Committee noted that the maximum cumulative flight time limitation of 35 hours in 7 consecutive days for domestic operations in accordance with CAR of 2007 was acceptable to all stakeholders. The Committee also noted that the international operations have longer flights and get further extended by additional crew and in view of the Indian experience (above Para 7.16) the weekly flight time limit on international sectors needs to be enhanced. The maximum flight time limitation to 40 hours in 7 consecutive days, which was also in line with the stipulations of CAR of 2007 was acceptable to all stakeholders.

**Recommendation No. 8**

7.26 In view of the above, the Committee, agreed to follow ICAO norms (para 7.5 of this report), which are in line with the Rule 42A of the Aircraft Rules, 1937 and based on Indian experience and recommend the following cumulative flight time limitations for domestic and neighbouring countries and international operations
Cumulative Flight Time Limitations

<table>
<thead>
<tr>
<th>Cumulative Period</th>
<th>Flight Time Limitation (Hours)</th>
<th>Domestic and Neighbouring countries Operations</th>
<th>International Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>In 7 consecutive days</td>
<td>35</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>125</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>In 365 consecutive days</td>
<td>1000</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

ii) **Daily Maximum Flight Time Limitation**

7.27 As stated above in Para 7.6, ICAO in addition to cumulative maximum flight time limitation also requires stipulation of maximum daily flight time, which is based on any 24 consecutive hours. Various regulations on the subject are as follows:

7.28 FAA, USA stipulates maximum daily flight time limitations based on the crew composition as follows:

**Domestic Operations with two pilots crew**

“No certificate holder conducting domestic operations may schedule any flight crewmember and no flight crewmember may accept an assignment for flight time in scheduled air transportation or in other commercial flying if that crewmember’s total flight time in all commercial flying will exceed—

(4) 8 hours between required rest periods.”

**Flag Operations**

**Two pilots crew**

A certificate holder conducting flag operations may schedule a pilot to fly in an airplane that has a crew of one or two pilots for eight hours or less during any 24 consecutive hours without a rest period during these eight hours.

**Two pilots and one additional flight crewmember**

No certificate holder conducting flag operations may schedule a pilot to fly, in an airplane that has a crew of two pilots and at least one additional flight crewmember, for a total of more than 12 hours during any 24 consecutive hours.
Three or more pilots and an additional flight crewmember

It shall also provide adequate sleeping quarters on the airplane whenever a pilot is scheduled to fly more than 12 hours during any 24 consecutive hours.

7.29 For Ultra-Long haul operations i.e. with more than 16 hours of flight time, US carriers negotiate ‘Operation Specifications’ with FAA for that specific operation. As an example, Delta has ‘Operation Specifications’ to support their India non-stop operations of flight time more than 16 hours with 4 pilots.

7.30 Australian regulations stipulate maximum flight time limitation of 8 hours except when the flight is performed by three or more pilots. The relevant paragraphs of the regulations are as follows:

A pilot shall not exceed the flight time limitations specified in subsection 1 of section 48.1 unless all flying performed is carried out as a member of a crew consisting of 3 or more pilots.

An operator shall not roster a pilot to fly in excess of 8 hours flight time in any 1 tour of duty.

7.31 Canadian regulations stipulate maximum daily flight time limitation only for single pilot operations. The relevant regulation is as follows:

“700.15 (1) Subject to subsection (2), no air operator shall assign a flight crew member for flight time, and no flight crew member shall accept such an assignment, if the flight crew member’s total flight time in all flights conducted by the flight crew member will, as a result, exceed

(f) Where the flight crew member conducts single-pilot IFR flights, 8 hours in any 24 consecutive hours.”

7.32 The European Union regulations are primarily governed through Flight Duty Period (FDP) limitations and as reflected at para 7.12, the EU regulations have only cumulative flight time limitation. Any flight crew augmentation, therefore, does not affect the flight time because there is no maximum daily flight time limitation. The flight crew augmentation, however, enhance flight duty time limitation.
7.33 AIC 28 of 1992, for ‘Domestic and Neighbouring Countries’ operations with two pilots, stipulates maximum daily flight time limit of 8 hours. Regulations for domestic flights do not permit augmentation of flight crew to extend the flight time limitation and appropriately AIC does not cover the requirements of three or more pilots for domestic operations. Further, AIC for domestic operations has additional limiting criterion of number of landings. The AIC stipulates for domestic operations as follows:

“No flight crew shall be asked to do more than 6 landings per day. This shall not include landing for technical, ferry and for the purpose of retrieval of aircraft after diversion.”

7.34 AIC 28 of 1992, for ‘International’ operations with two pilots, stipulates maximum daily flight time limitation of 9 hours. However, para 4.1 B of the AIC provides a following rider:

“If an air carrier schedules a flight crew to do flight time of more than 9 hours during any 24 consecutive hours, the rest period at the end of this flight duty shall be extended pro rata by twice the amount of time by which the flight time was extended.”

7.35 A reading of 4.1 B of the AIC gives an impression that the flight time can be stretched to any limit beyond 9 hours by giving rest pro-rata twice the amount of time by which the flight time was extended. This open extension of flight time beyond 9 hours does not appear to be appropriate and therefore in the interest of fatigue management, this issue needs to be addressed in the current study.

7.36 It was brought to the knowledge of the committee that Air India and Jet Airways are using this provision for their international operations using two flight crew members having ‘Flight Time’ up to 10 hours by providing extended rest.

7.37 The AIC 28 of 1992 permits extension of flight time by augmenting the flight crew for ‘International Operations’. The augmented daily maximum flight time is as follows:
When flights are operated with more than two pilots and additional flight crew member, the flight time limitations shall be as follows:

i. **Two Pilots and one additional crewmember** – A maximum of 10 hours of flight time during 24 consecutive hours.

ii. **Three Pilots and one additional crewmember** – A maximum of 12 hours of flight time during 24 consecutive hours.

iii. **Four Pilots or 2 sets of crew** – A maximum of 14 hours during 24 consecutive hours.

7.38 The AIC, as in case of ‘Domestic Operations’, also restricts number of landings for ‘International Operations’. The maximum number of 3 landings is permitted for international operations.

7.39 The CAR of 2007 for Operations to ‘International’ and ‘Domestic & Neighbouring Countries’ stipulates as follows:

<table>
<thead>
<tr>
<th>Type of Operation</th>
<th>Period</th>
<th>Flight Time (Hours)</th>
<th>Number of Landings</th>
<th>Crew Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>In any 24 consecutive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>3</td>
<td>Two pilots/two pilots and one FE (1P1+1P2/1P1+1P2+FE)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>2</td>
<td>Three pilots/three pilots + 1FE (2P1+P2/2P1+P2+FE)*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14</td>
<td>2</td>
<td>Two sets of crew (2P1+2P2)</td>
</tr>
<tr>
<td>Domestic &amp;</td>
<td>In any 24 consecutive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighbouring</td>
<td>hours</td>
<td>7</td>
<td>6</td>
<td>1P1 + 1P2</td>
</tr>
<tr>
<td>Countries</td>
<td></td>
<td>8</td>
<td>5</td>
<td>1P1 + 1P2</td>
</tr>
</tbody>
</table>

* One P1 can be substituted by a Cruise Captain.

7.40 The requirements of CAR of 2007 relating to number of landings are stringent as compared to AIC for both ‘Domestic’ and ‘International’ operations.


**Comments Received**

7.41 As stated above, views/suggestions were sought from the stakeholders and the subject was also discussed during hearing with them. The views expressed by stakeholders on daily maximum flight time limitation were as follows:

7.42 IPG has proposed only cumulative ‘Flight Time’ for 28 and 365 consecutive days. IPG has not proposed any weekly or daily time limitations and have not proposed regulations for domestic and international operations. Jet Airways also has proposed only cumulative flight time limitations.

7.43 Kingfisher Airlines suggested daily maximum flight time limitation in line with CAR of 2007 as follows:

   08 hrs in any 24 hours with 5 landings.”

7.44 NACIL (Air India) made a general statement that provisions of CAR of 2007 were acceptable. However, they expressed a specific view that flight time of 9 hours with 3 landings should be permitted, as permitted by AIC 28 of 1992. It was argued by NACIL that if CAR regulations of permitting only 2 landings with 9 hours of flight time were insisted then their triangular operations between India and Gulf would be severely affected.

7.45 At the time of framing regulations in 1992, AIC 28 of 1992 did not define “neighbouring countries”. Indian Airlines were operating their international flights including flights to Gulf region under regulations for “Domestic and Neighbouring Countries”, whereas Air India was operating to Gulf region under “International Carriers” and therefore could operate 9 hours of flight time with 3 landings. The Indian Airlines could operate to Gulf region only up to 8 hours of flight time but could make 6 landings. Such operations were anomalous and needed to be addressed. CAR addressed the anomaly by declaring operations to Gulf as ‘International Operation’ but the CAR also reduced the number of landings from 3 (permitted under AIC 28 of 1992)
to 2 for 9 hours of ‘Flight Time’. This reduction in number of landings affected triangular operations to Gulf region (Mumbai – Gulf – Kerala – Mumbai) of Air India Express, which required 3 landings.

7.46 The Committee deliberated the issue and it was noted that views of both IPG and Jet Airway were similar to European regulations, which did not have any regulation for maximum daily flight time limitation. The ICAO guidelines (para 7.5 of this report), however, expect States to have a daily flight time limitation. Views of Kingfisher Airlines, were in line with ICAO, FAA regulations and CAR of 2007 for domestic operations. It was, therefore, agreed by the Committee to recommend maximum flight time limitation of 9 hours with 3 landings both for domestic and international operations and 8 hours with 6 landings for domestic operations only, which includes neighbouring countries.

7.47 The Committee deliberated on views/suggestions of IPG and Jet Airways regarding maximum flight time limitations. Their views are in line with European Union regulations, which stipulate flight time limitation only for 28 and 365 consecutive days and have no stipulation for daily and 7 consecutive days. The ICAO in its guidelines on the subject, however, expects the states to stipulate the same. It was, therefore, agreed by the Committee to recommend as follows:

7.48 The committee deliberated the practices of the other States and suggestions of stakeholders. It was agreed to follow ICAO norms (para 7.5 of this report) to prescribe maximum flight time limitation during any flight duty period.

7.49 Indian regulations have a limitation on number of landings associated with maximum flight time. ICAO guidelines, however, suggest that number of landings planned should be associated with maximum flight duty period as follows:

4.7.3 Maximum flight duty period for flight and cabin crew
4.7.3.1 The maximum flight duty period should be (*) hours.
4.7.3.1.1 This limitation should allow variation to account for matters known to impact fatigue such as: the number of sectors planned; the local time at which duty begins; the pattern of resting and sleeping relative to the crew member’s
circadian rhythm; the organization of the working time; and the augmentation of the flight crew.

7.50 Similarly, the above ICAO guidelines show that WOCL is associated with maximum flight duty period. During the deliberations the Committee agreed that number of landings should normally not be linked to maximum flight time but should be linked to flight duty period. However, in India there has been a practice that flight time is linked to maximum flight time limitation, the Committee, therefore, decided to follow the existing practice of linking number of landings to a limited extent, which further gets limited due to ‘Flight Duty Period’ (FDP) as discussed in Chapter 8 of this report.

**Recommendation No. 9**

7.51 The Committee, after deliberations, agreed to recommend the daily maximum flight time limitations for domestic and neighbouring countries and international operations during any 24 consecutive hours as follows:

<table>
<thead>
<tr>
<th>Crew Complement</th>
<th>Maximum Flight Time Limitation/Max Number of Landings**</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic and Neighbouring Countries Operations</td>
<td>International Operations</td>
</tr>
<tr>
<td>Two-Pilot Operations</td>
<td>8 hours/ up to 6 landings</td>
<td>10 hours/ up to 2 landings</td>
</tr>
<tr>
<td></td>
<td><strong>For day operations</strong> 9 Hours/ up to 3 landings</td>
<td><strong>For day operations</strong> 9 Hours/ up to 3 landings</td>
</tr>
<tr>
<td></td>
<td><strong>For night operations</strong> 9 Hours/ up to 2 landings</td>
<td><strong>For night operations</strong> 9 Hours/ up to 2 landings</td>
</tr>
<tr>
<td>Three-Pilot Operations</td>
<td>Not Permitted</td>
<td>12 Hours/1 landing</td>
</tr>
<tr>
<td>Four-Pilot Operation</td>
<td>Not Permitted</td>
<td>16 Hours/1 landing</td>
</tr>
<tr>
<td>Four-Pilot ULR Operations*</td>
<td>Not Permitted</td>
<td>More than 16 hours</td>
</tr>
</tbody>
</table>

* ULR Operations needs specific approvals of DGCA on City Pairs and case-to-case basis

** Maximum Numbers of Landings are further dependent on Flight Duty Period
CHAPTER – 8
Duty Period and Flight Duty Period Limitations

Concept and Definition of Duty and Duty Period and International Practices

8.1 ICAO Annex 6 Part I Amendment 33-A introduced concepts of “Duty” and “Duty Period” in relation to prescriptive fatigue management and defined them as follows:

“Duty
Any task that flight or cabin crew members are required by the operator to perform, including, for example, flight duty, administrative work, training, positioning and standby when it is likely to induce fatigue.”

“Duty period
A period which starts when a flight or cabin crew member is required by an operator to report for or to commence a duty and ends when that person is free from all duties.”

8.2 The concept of ‘Duty’ or ‘Duty Period’ is not part of US regulations, which are essentially based on a single criterion of ‘Flight Time’ limitation as discussed in Chapter 5.

8.3 The concepts of “Duty” and “Duty Period” are part of European Union regulations (EU Subpart ‘Q’). The EU definitions are as follows:

“Duty
Any task that a crew member is required to carry out associated with the business of an AOC holder. Unless where specific rules are provided for by this Regulation, the Authority shall define whether and to what extent standby is to be accounted for as duty.”

“Duty period
A period which starts when a crew member is required by an operator to commence a duty and ends when the crew member is free from all duties”.

8.4 There is a slight difference in language between the definition of ‘Duty’ of ICAO Annex 6 and the EU Subpart Q, but the result is same. The ICAO definition ‘Duty’ includes “…standby when it is likely to induce fatigue” i.e. all standby duties are not counted as part of duty. A standby at home, which does not culminate into a flight duty,
may not be fully counted as ‘Duty’ whereas standby duty at an airport environment should be counted as ‘Duty’. ICAO definition expects the regulatory authority to define when standby is likely to induce fatigue. Similarly, the EU Subpart Q definition of ‘Duty’ also puts an obligation on aviation authorities of Member States to define “...whether and to what extent standby is to be accounted for as duty”. Both definitions require civil aviation regulatory authorities to decide how standby would be counted towards ‘Duty’. The definition and concept of standby is important and are discussed under Chapter 10.

8.5 There is no difference in the definitions of ‘Duty Period’ of ICAO Annex 6 and EU OPS 1, Subpart Q.

8.6 DGCA regulations, AIC 28 of 1992 and CAR of 2007 do not have concept of "Duty" and “Duty Period”.

**Comments Received**

8.7 Jet Airways have recommend that EU-OPS Subpart Q (also referred to as EU-FTL) be adopted in its totality. This can be interpreted that Jet Airways accept introduction of ‘Duty’ and ‘Duty Period’ along with EU definitions.

8.8 The IPG in their comments have suggested the following definitions of ‘Duty’ and ‘Duty Period’:

**Duty:**
*Any task that flight crew members are required by the operator to perform, including but not limited to flight duty, post flight duty, standby, administrative work, training and positioning.*

**Duty Period:**
*A period which starts when flight crew members are required by an operator to report for or to commence a duty and ends when that person is free from all duties.*

8.9 Definitions of ‘Duty’ and ‘Duty Period’ suggested by IPG are almost identical to ICAO definitions. IPG in its definition of ‘Duty’ has suggested counting standby as duty, whereas ICAO in its definition states “standby when it is likely to induce fatigue”. EU regulations also expect the aviation authorities of their Member States to assess
“whether and to what extent standby is to be accounted for as duty”. The Committee, therefore, could not agree with the definition suggested by IPG in respect of standby being always counted as duty.

**Analysis**

8.10 The Committee deliberated in detail the new definitions of ‘Duty’ and ‘Duty Period’ introduced in ICAO Annex 6 Part I through Amendment 33-A. The Committee considered these additions to be essential component for fatigue management and noted definition of ‘Duty’ is very wide and includes not only flight duty but also includes for example, flight duty, administrative work, training, positioning and standby when it is likely to induce fatigue.

8.11 In contrast, AIC 28 of 1998 stipulates that “The time spent in office duty prior to operating a flight will be considered for calculation of Flight Duty Time.” Similarly, CAR of 2007 also stipulates that “Whenever a crew member flies any simulator either on check or training flight or as an instructor/training captain/examiner, all the time spent in simulator including ‘pre’ and ‘post’ briefing shall count towards Flight Duty Time.” This was an indirect way of introducing the ‘Duty Period Limitation’ and was not very effective.

8.12 The Committee also noticed that European Union regulations have also adopted provisions prescribed by ICAO.

**Recommendation No. 10**

8.13 The Committee recommends that concept and definition given by ICAO on “Duty” and “Duty Period” be adopted in relevant Indian Regulations on prescriptive fatigue management as follows:

**Duty**

*Any task that flight or cabin crew members are required by the operator to perform, including, for example, flight duty, administrative work, training, positioning and standby when it is likely to induce fatigue.*
“Duty period
A period which starts when a flight or cabin crew member is required by an operator to report for or to commence a duty and ends when that person is free from all duties.”

Concepts and Definitions of Flight Duty Period and International Practices

8.14 ICAO Annex 6 Part-I defines “Flight Duty Period” as follows:

“Flight Duty Period
A period which commences when a flight or cabin crew member is required to report for duty that includes a flight or a series of flights and which finishes when the aeroplane finally comes to rest and the engines are shut down at the end of the last flight on which he/she is a crew member.”

8.15 FAA, USA in their regulations does not use the criteria of either of “Flight Duty Time” or “Flight Duty Period”.

8.16 Australian and New Zealand regulations use a terminology of “Tour of Duty”, which is similar to ‘Flight Duty Period’ of ICAO. Tour of Duty is defined as follows:

**Australia**

“Tour of Duty means the period between the time a flight crew member commences any duties associated with his or her employment prior to making a flight or series of flights until he or she is finally relieved of all such duties after the termination of such flight or series of flights and includes reserve time at the airport.”

**New Zealand**

“Tour of duty means the period of time commencing at the start of duties at home base prior to a series of flights and ending at home base on completion of the duties associated with series of flights:

When a flight crew member is based temporarily at a place other than his home base, that place, for the period of the detachment, will be regarded as his home base:”

8.17 European Union regulations (EU OPS) uses ICAO concept of “Flight Duty Period” (FDP) and defines as follows:
"Flight Duty Period:

A Flight Duty Period (FDP) is any time during which a person operates in an aircraft as a member of its crew. The FDP starts when the crew member is required by an operator to report for a flight or a series of flights; it finishes at the end of the last flight on which he/she is an operating crew member."

8.18 There is also no difference in the definitions of ‘Flight Duty Period’ of ICAO Annex 6 and EU OPS 1, Subpart Q, except the language. The EU definition brings out clearly that a “Flight Duty Period” is counted only when a “ …. person operates in an aircraft as a member of its crew”. ICAO definition also states that “ …. flight on which he/she is a crew member”. It essentially implies that any other pilot, who is not the part of “operating crew”, does not get the credit of “flight duty period” but is credited for “duty period”.

8.19 The definition of CAA UK in their publication CAP 371 on the subject has similar concept. The definition is as follows:

"Flying Duty Period (FDP)

Any time during which a person operates in an aircraft as a member of its crew. It starts when the crew member is required by an operator to report for a flight, and finishes at on-chocks or engines off, or rotors stopped, on the final sector."

8.20 Air Transport Canada, instead of using terminology of ‘Flight Duty Period’ uses a concept of ‘Flight Duty Time’, which is defined as follows:

“Flight Duty Time” means the period that starts when a flight crew member reports for a flight, or reports as a flight crew member on standby, and finishes at “engines off” or “rotors stopped” at the end of the final flight, except in the case of a flight conducted under Subpart 4 or 5 of Part VII, in which case the period finishes 15 minutes after “engines off” or “rotors stopped” at the end of the final flight, and includes the time required to complete any duties assigned by the air operator or private operator or delegated by the Minister prior to the reporting time and includes the time required to complete aircraft maintenance engineer duties prior to or following a flight;"

8.21 Similar to Canada, DGCA India has been using terminology of “Flight Duty Time”. AIC 28 of 1998 and CAR of 2007 define “Flight Duty Time” as follows:
AIC 28 of 1992

"Flight Duty Time: Flight duty time is the total time commencing from the time of reporting at the airport for the purpose of operating a flight and ending with the termination of a flight or a series of flights (Chocks on plus 15 minutes)."

CAR of 2007

Flight Duty Time The total time commencing from the time of reporting at the airport for the purpose of operating a flight and ending minimum 15 minutes after termination of a flight or a series of flights.

8.22 The basic difference between “Flight Duty Time” used by Canada and DGCA India and “Flight Duty Period” used by ICAO is that “Flight Duty Time” includes a period of 15 minutes after the aircraft comes to rest, whereas “Flight Duty Period” does not include any period after the aircraft comes to rest. The time required to carry out checks after the aircraft comes to rest is included as part of ‘Duty’ and is not a part of “Flight Duty Period”.

Comments Received

8.23 Jet Airways accept the concept of “flight Duty Period” (FDP) in their comments but no definition has been suggested. The IPG in their comments have suggested following definition of FDP:

"Flight Duty Period:

The total time commencing from the time of reporting at the airport for the purpose of operating a flight or a series of flights and finishing when the aeroplane finally comes to rest and the engines are shut down on the designated parking position on the final sector. If a flight crew member has reported for a flight and subsequently, does not operate the said flight for reasons beyond the crew member’s control, the period spent between reporting and leaving the Airport shall be counted as being on Duty. The pilot shall note the reporting time in duplicate as per prescribed format in his own writing and retain a copy.”

8.24 The definition of “Flight Duty Period” in the IPG draft is similar to ICAO definition and accepts the concept that it is applicable to ‘operating crew’ and the words used in definition are “for the purpose of operating a flight”. The definition adds an example and wants the pilot to note reporting time in duplicate and retain a copy. Such issues are never a part of definitions.
8.25 The Committee deliberated the definitions of “flight duty time” and “flight duty period” and it was agreed to adopt ICAO definition, which is also used by European Union and to use the terminology as FDP and not FDT in Indian Regulations.

**Recommendation No. 11**

8.26 The Committee recommends that concept and definition given by ICAO on “Flight Duty Period” be adopted in relevant Indian Regulations on prescriptive fatigue management as follows:

**“Flight Duty Period**

A period which commences when a flight or cabin crew member is required to report for duty that includes a flight or a series of flights and which finishes when the aeroplane finally comes to rest and the engines are shut down at the end of the last flight on which he/she is a crew member."

**Cumulative Duty and Duty Period Limitations**

8.27 ICAO Annex 6, Attachment ‘A’ states that many Contracting States in addition to “Flight Time Limitation” also prescribe “Duty Time Limitation” and suggests the following norms:

“4.7.2.1 Duty hours may not exceed:

a) (*) hours in any [7] consecutive days or in a week; and

b) (*) hours in any [28] consecutive days or in a calendar month.

Duty includes all tasks carried out at the behest of the operator. These include, but are not limited to: pre-flight preparation; conduct of the flight (whether or not this is commercial air transport); post-flight actions; training given or received (classroom, flight simulator or aeroplane); rostered office/management time; and positioning. Standby should be included to the extent that it is likely to induce fatigue.”

8.28 FAA, USA regulations do not have the criteria of Duty Period or Flight Duty Period and as such there are no limitations of either Duty Period or Flight Duty Period.

8.29 Air Transport Canada even though uses the concept of “Flight Duty Time” but only provide that “Flight Duty Time” not to exceed 14 consecutive hours in any 24
consecutive hours. Canadian regulations do not have any cumulative limitations on “Flight Duty Time”. According to the international practice, the cumulative limitations are stipulated for “Flight Time” and “Duty Period”. There is no concept of “Duty” in the Canadian regulations and as such no cumulative limitation is stipulated for it.

8.30 New Zealand regulations also do not have a concept of “Duty” and therefore any cumulative limitation for “Duty Period” is not stipulated. The regulations, however, require operator to establish a scheme acceptable to the Director for the regulation of flight and duty times for flight crew members addressing many factors including “Cumulative Duty Time”. Advisory Circular AC 119-2 dated 26 October 2006 regarding “Air Operations — Fatigue of Flight Crew” provides an example scheme for flight and duty time scheme suitable for scheduled air operations, which contain information about standards, practices, and procedures that the Director, has found to be acceptable for compliance with the associated rule.

8.31 Australian regulations have a cumulative limit on “duty”, which is applicable for flight crew not more than 2 pilots. In case of flight crew of 3 or more pilots the cumulative duty limit results in mandatory rest. The regulations are as follows:

**Limitations with flight crew not more than 2 pilots**

An operator shall not roster a pilot to fly when completion of the flight will result in the pilot exceeding 90 hours of duty of any nature associated with his or her employment in each fortnight standing alone. For the purpose of this paragraph, duties associated with a pilot’s employment include reserve time at the airport, tours of duty, dead head transportation, administrative duties and all forms of ground training. The operator shall designate the day on which the first of the fortnightly periods shall start.

**Limitations with flight crew of 3 or more pilots**

Following 50 hours of duty of any nature associated with his or her employment, a pilot shall have a rest period of not less than 24 consecutive hours before commencing a tour of duty.

8.32 European Union Ops regulations (Subpart ‘Q’) at OPS 1.1100 prescribes following cumulative duty periods:
“1.1. Cumulative duty hours
An operator shall ensure that the total duty periods to which a crew member is assigned do not exceed:

(a) 190 duty hours in any 28 consecutive days, spread as evenly as practicable throughout this period; and
(b) 60 duty hours in any seven consecutive days.”

8.33 CAA, UK in its 'Scheme’ stipulates the following cumulative duty periods:

“22 Cumulative Duty Hours
22.1 The maximum duty hours for flight crew, excepting helicopters, shall not exceed:
– 55 hours in any 7 consecutive days, but may be increased to 60 hours, when a rostered duty covering a series of duty periods, once commenced, is subject to unforeseen delays;
– 95 hours in any 14 consecutive days; and
– 190 hours in any 28 consecutive days”

Comments Received

8.34 Jet Airways in their clarifications have suggested a maximum cumulative duty period of 190 hours in 28 consecutive days and 60 hours in 7 consecutive days, which identical to EU regulations.

8.35 IPG has suggested following cumulative duty hours:

“The Maximum Cumulative ‘Duty Period’ shall be as under:

<table>
<thead>
<tr>
<th>Type of Schedule</th>
<th>Non disruptive</th>
<th>Partially disruptive</th>
<th>Disruptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Consecutive Days</td>
<td>55</td>
<td>52 ½</td>
<td>50</td>
</tr>
<tr>
<td>14 Consecutive Days</td>
<td>95</td>
<td>83 ½</td>
<td>72</td>
</tr>
<tr>
<td>28 Consecutive Days</td>
<td>190</td>
<td>155</td>
<td>120</td>
</tr>
</tbody>
</table>

Note 1: A disruptive schedule is one in which at least 50% of the duty periods are disruptive. A partially disruptive schedule is one in which between 20% and 50% of the duties are disruptive.
8.36 The suggestion given by IPG is based on “Guidance Material for Development of Prescriptive Fatigue Management Regulations” adopted by IFALPA during in the 64th IFALPA Conference at Auckland, New Zealand from 20th – 24th March 2009. This resolution is not binding on States, which generally follow ICAO Standards or other international best practices.

8.37 As a matter of fact, for regulating the maximum cumulative duty period, United Kingdom, European Union (Subpart ‘Q’), and ICAO do not have a cumulative ‘Duty Period’ limitation based on types of schedule (i.e. non-disruptive, partially-disruptive or disruptive) as suggested by IPG. The suggestion of the IPG to have maximum cumulative duty period limitation on the basis of type of schedule does not appear to be based on any ‘Scheme’ followed by any country or any operator and therefore does not appear to be in line with any available international practice on the subject.

8.38 The Report of “Moebus Aviation” on FTL does not support such stipulations. Moebus report considers 190 hours duty limit in 28 days as “reasonable” and states as follows:

"While the scientific evidence is not sufficient to support the precise values given in OPS 1.1100, most of the values contained in it seem "reasonable", although we would prefer to see a lower limit (of perhaps 180 hours) per 28 consecutive days. Nevertheless, if it is deemed that the protection provided by the 190 hour duty limit in 28 days is "reasonable" (based on experience rather than scientific evidence), it seems unreasonable to permit almost all these hours to be worked in the first 21 days. Further, the "180 duty hours in 3 consecutive 60 hour weeks" cited in Question 1 are at odds with the requirement that the "190 duty hours in any 28 consecutive days" are "spread as evenly as practicable". In the light of these problems we feel that an additional limit per 14 consecutive days is required. This would form OPS 1.1100, para 1.1.(c), and read:

1.1.(c) and 100 duty hours in 14 consecutive days."

8.39 NACIL (Air India) expressed concerns regarding monitoring of cumulative “flight duty time” limitations and has suggested as follows:
“The maintenance and monitoring of Flight Duty Time in 7 days/30 days/12 consecutive months need not be included, as this will add to unnecessary paper work & workload. This will also not give any additional relief to the crew, as it is being monitored on a daily basis.”

8.40 The Committee did not find any merit in the argument of NACIL (Air India) that cumulative flight duty period should not be included as it would result in ‘unnecessary paper work & workload’. Elsewhere in the report, the Committee is recommending a ‘foolproof’ computerised system of monitoring. Therefore, the argument of NACIL regarding additional paperwork does not have force and cannot be accepted.

8.41 ICAO and the international practices to limit “cumulative duty period” and not to limit “cumulative flight duty time”. As CAR of 2007 does not any concept of “duty period”, it was not possible to stipulate any limit for “cumulative duty period”. Further, NACIL (Air India) stated that the limit of “cumulative flight duty time” would not provide additional relief. It was, therefore decided to examine if limiting “cumulative flight duty time” as prescribed by CAR of 2007 would provide any additional relief to the crew. The following table shows by what percentage Flight Duty Time is higher than Flight Time:

**Domestic and Neighbouring Countries Operations**

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hours)</th>
<th>Flight Time (Hours)</th>
<th>Number of Landings</th>
<th>Flight Duty Time % higher than Flight Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 consecutive hours</td>
<td>11</td>
<td>7</td>
<td>6</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>8</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td>In 7 consecutive days</td>
<td>60</td>
<td>35</td>
<td>-</td>
<td>71%</td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>200</td>
<td>125</td>
<td>-</td>
<td>60%</td>
</tr>
<tr>
<td>In 12 consecutive months</td>
<td>1600</td>
<td>1000</td>
<td>-</td>
<td>60%</td>
</tr>
</tbody>
</table>

**International Operations**

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hours)</th>
<th>Flight Time (Hours)</th>
<th>Number of Landings</th>
<th>Flight Duty Time % higher than Flight Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 consecutive hours</td>
<td>12</td>
<td>8</td>
<td>3</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>9</td>
<td>2</td>
<td>44%</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>10</td>
<td>1</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>12</td>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>Period</td>
<td>Flight Duty Time (Hours)</td>
<td>Flight Time (Hours)</td>
<td>Number of Landings</td>
<td>Flight Duty Time % higher than Flight Time</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>In 7 consecutive days</td>
<td>17</td>
<td>14</td>
<td>2</td>
<td>21%</td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>60</td>
<td>40</td>
<td>-</td>
<td>50%</td>
</tr>
<tr>
<td>In 12 consecutive months</td>
<td>190</td>
<td>125</td>
<td>-</td>
<td>52%</td>
</tr>
</tbody>
</table>

8.42 The above tables show that “Flight Duty Time” limit is much higher than the “Flight Time” limit for cumulative period (i.e. for 7 consecutive days, 30 consecutive days and 12 consecutive months) as compared to daily limits (i.e. for 24 consecutive hours). The “Flight Duty Time” limits are 51% to 71% higher as compare to “Flight Time” limit for cumulative periods and the “Flight Duty Time” limits are only 21% to 57% higher than “Flight Time” for 24 consecutive hours. In such a case only “Flight Time” limitations would be effective because cumulative “Flight Duty Time” limits would generally not be reached. Air India, therefore, has correctly stated that no useful purpose would be served by stipulating cumulative “Flight Duty Time” limitations.

Analysis

8.43 The concept of “Duty” is neither defined in AIC 28 of 1992 nor in CAR of 2007. The cumulative duty period limitation, therefore, could not be prescribed. The CAR of 2007, however, did stipulate the “cumulative flight duty period” limitation, which is not the same as “cumulative duty period” limitation prescribed by ICAO and followed internationally. In accordance with the ICAO guidelines “Cumulative Duty Period” include, but are not limited to: pre-flight preparation; conduct of the flight (whether or not this is commercial air transport); post-flight actions; training given or received (classroom, flight simulator or aeroplane); rostered office/management time; and positioning. Standby is also to be included to the extent that it is likely to induce fatigue. Such duties cannot be a part of cumulative “Flight Duty Period” stipulated by the CAR of 2007 and need to be amended to bring in line with the internationally followed practices.

8.44 The Committee deliberated in detail, whether cumulative duty hours should be included as part of the regulations. In this regard, ICAO guidelines, EU regulations,
which are applicable also to UK and other European countries, stipulate a limitation of maximum cumulative duty period. However, countries like USA and Canada do not follow these criteria. Australia and New Zealand also follow it to a limited extent.

8.45 Further, as stated earlier that the internationally accepted cumulative limiting criteria is “Duty Period”, which includes pre-flight preparation; conduct of the flight (whether or not this is commercial air transport); post-flight actions; training given or received (classroom, flight simulator or aeroplane); rostered office/management time; and positioning. ICAO guidelines also stipulate that States should adopt the criteria of cumulative “Duty Period”.

8.46 All pilot unions, FIP and Jet Airways also suggested the inclusion of cumulative “Duty Period” limitation.

8.47 The Committee after considerable deliberations decided that the criteria of cumulative “Duty Period”, which now has also been mandated by ICAO vide Amendment 33A of Annex 6 Part I should be adopted and included as part of Indian regulations. The Committee also noted that cumulative duty period is not being monitored in majority of States for periods exceeding 28 days and therefore decided to adhere to ICAO recommendation. However, keeping in view the scientific study conducted by Moebus Aviation, the Committee agreed to introduce an additional period of monitoring for 14 days between periods of 7 days and 28 days as recommended by ICAO. The Committee considers that introduction of an additional period of monitoring will help in better fatigue management.

**Recommendation No. 12**

8.48 In view of above, it is recommended that no operator should assign no flight crew member should accept any duty to exceed:

(a) 190 duty hours in any 28 consecutive days, spread evenly as practicable through out this period;
(b) 100 duty hours in 14 consecutive days; and
(c) 60 duty hours in any seven consecutive days.
Maximum Flight Duty Period

8.49 ICAO Annex 6 (Attachment ‘A’), provides the following guidelines in respect of maximum flight duty period and states as follows:

"4.7.3 Maximum flight duty period for flight and cabin crew
4.7.3.1 The maximum flight duty period should be (*) hours.
4.7.3.1.1 This limitation should allow variation to account for matters known to impact fatigue such as: the number of sectors planned; the local time at which duty begins; the pattern of resting and sleeping relative to the crew member's circadian rhythm; the organization of the working time; and the augmentation of the flight crew.
4.7.3.2 Crew report times should realistically reflect the time required to complete pre-flight duties, both safety- and service-related (if appropriate), and a standard allowance of (*) minutes is to be added at the end of flight time to allow for the completion of checks and records. For record purposes, the pre-flight report time should count both as duty and as flight duty, and the post-flight allowance should count as duty."

*Note: The symbol (*) is used above is to indicate where each State may insert a value it considers appropriate to manage fatigue.

8.50 It is evident from the above ICAO guidelines that even though the States are expected to stipulate a single value (in hours) for maximum flight duty period, the variation in the value due to various factors should also be taken into account. Some of the issues like crew augmentation and spilt duty, which permit extension of maximum flight duty period, have been considered under separate headings in this report. The other factors like number of landings, timings of the flight, circadian rhythms of crew, which reduce the maximum flight duty period, have been considered in this Chapter along with discussion for the maximum limit.

International Practices

8.51 FAA, USA does not follow ‘Flight Duty Period’ as a criterion in their regulations. US regulations follow a single criterion of ‘Flight Time Limitation’ discussed in detail in Chapter-7 of this report. Further, there is no restriction for number of landings.

8.52 Australian regulations have a concept of “tour of duty”, which is equivalent to “flight duty period”. Australian regulations, like FAA do not restrict number of landings
but has a maximum value of 11 hours for a tour of duty with two pilots and up to 16 hours with three or more pilots, which comes under augmented crew and is discussed later. The regulations for two pilots are as follows:

"1.3 An operator shall not roster a pilot for a tour of duty in excess of 11 hours."

8.53 The Canadian regulations instead of “Flight Duty Period” follow “Flight Duty Time”, which includes 15 minutes of post-flight duties. Canadian regulations stipulate a maximum flight duty limitation of 14 hours as follows:

700.16 (1) Subject to subsections (5) and (7), no air operator shall assign a flight crew member for flight duty time, and no flight crew member shall accept such an assignment, if the flight crew member’s flight duty time will, as a result, exceed 14 consecutive hours in any 24 consecutive hours. Where the flight is conducted under Subpart 4 or 5 using an aircraft other than a helicopter, flight duty time shall include 15 minutes for post-flight duties.

8.54 Canadian regulations have no restriction on landings for domestic flights. On international flights, a restriction of 3 landings is applicable in case a flight or series of flights terminates more than 4 one-hour time zone from the point of departure. Another restriction is that after a transoceanic flight one landing can be made, excluding one unscheduled technical stop. The regulations are as follows:

700.22 (1) A flight or series of flights that terminates more than 4 one-hour time zones from the point of departure, other than flights conducted entirely within Northern Domestic Airspace, shall be limited to 3 sectors and shall be followed by a rest period that is at least equal to the length of the preceding flight duty time.

(2) Where a flight referred to in subsection (1) is a transoceanic flight, the maximum number of sectors that may be completed after the transoceanic sector is one, excluding one unscheduled technical stop.

8.55 New Zealand like USA follows only flight time limitation and there is no restriction on number of landings. The regulations, however, require the operator to prepare a scheme and get it approved from the Director of Civil Aviation Authority. The scheme is to cater for the “Flight Duty Period”.

700.16 (1) Subject to subsections (5) and (7), no air operator shall assign a flight crew member for flight duty time, and no flight crew member shall accept such an assignment, if the flight crew member’s flight duty time will, as a result, exceed 14 consecutive hours in any 24 consecutive hours. Where the flight is conducted under Subpart 4 or 5 using an aircraft other than a helicopter, flight duty time shall include 15 minutes for post-flight duties.

700.22 (1) A flight or series of flights that terminates more than 4 one-hour time zones from the point of departure, other than flights conducted entirely within Northern Domestic Airspace, shall be limited to 3 sectors and shall be followed by a rest period that is at least equal to the length of the preceding flight duty time.

(2) Where a flight referred to in subsection (1) is a transoceanic flight, the maximum number of sectors that may be completed after the transoceanic sector is one, excluding one unscheduled technical stop.

8.55 New Zealand like USA follows only flight time limitation and there is no restriction on number of landings. The regulations, however, require the operator to prepare a scheme and get it approved from the Director of Civil Aviation Authority. The scheme is to cater for the “Flight Duty Period”.
8.56 EU regulations (Subpart Q) are close to ICAO guidelines and stipulate as follows:

OPS 1.1105

**Maximum daily flight duty period (FDP)**

1.1. This OPS does not apply to single pilot operations and to emergency medical service operations.

1.2. An operator shall specify reporting times that realistically reflect the time for safety related ground duties as approved by the Authority.

1.3. The maximum basic daily FDP is 13 hours.

1.4. These 13 hours will be reduced by 30 minutes for each sector from the third sector onwards with a maximum total reduction of two hours.

1.5. When the FDP starts in the WOCL, the maximum stated in point 1.3 and point 1.4 will be reduced by 100 % of its encroachment up to a maximum of two hours. When the FDP ends in or fully encompasses the WOCL, the maximum FDP stated in point 1.3 and point 1.4 will be reduced by 50 % of its encroachment."

8.57 Following chart clarifies the above EU regulations:

<table>
<thead>
<tr>
<th>Number of Sectors</th>
<th>Max daily FDP (Flight Duty Period) in hours</th>
<th>If flight duty period starts during WOCL*</th>
<th>If flight duty period ends or fully encompasses WOCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 or 2</td>
<td>13</td>
<td>Max flight duty period as stated in left column under FDP shall be reduced by 50% of WOCL encroachment. e.g. i) if FDP ends at 0430 hours then the FDP would be reduced by 45 minutes as it encroaches WOCL from 0200 to 0430 hours i.e. for 1:30 hours and 50% of this time is 45 minutes  ii) if FDP starts prior to WOCL (say 0100 hours) and ends after WOCL (say 0800 hours), then FDP would be reduced by 2 hours, which is 50% of time between 0200 to 0559 hours.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>12.5</td>
<td></td>
<td>Max flight duty period as stated in left column under FDP shall be reduced by 50% of WOCL encroachment. e.g.</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>If FDP start at 0430 hours then the FDP would be reduced by 1:30 hours as it encroaches WOCL from 0430 to 0559 hours</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>11.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 or more</td>
<td>11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Window of Circadian Low (WOCL) is a period from 02:00 to 05:59 hours.
8.58 Attachment ‘A’ of ICAO Annex 6 at para 4.7.3.1.1 of (quoted above at para 8.45 of this report) expects variation of maximum ‘Flight Duty Period’ (FDP) limitation due to local time at which duty begins.

8.59 EU regulations in this regard, stipulate that when FDP starts in the WOCL, the maximum FDP would be reduced by 100% of its encroachment up to a maximum of two hours and when the FDP ends in or fully encompasses the WOCL, the maximum FDP will be reduced by 50% of its encroachment. EU regulations, therefore, are in line with ICAO regulations.

8.60 CAA, UK regulations on the issue are very elaborate and for avoidance of fatigue in flight crew (CAP 371) specifically define maximum ‘Flight Duty Period’ (FDP) with respect to local time at which the duty starts and provides the following Table A to determine the maximum FDP (in hours) at a place where the crew member is acclimatized and Table B at other times.

<table>
<thead>
<tr>
<th>Local time of start</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>0600-0759</td>
<td>13</td>
</tr>
<tr>
<td>0800-1259</td>
<td>14</td>
</tr>
<tr>
<td>1300-1759</td>
<td>13</td>
</tr>
<tr>
<td>1800-2159</td>
<td>12</td>
</tr>
<tr>
<td>2200-0559</td>
<td>11</td>
</tr>
</tbody>
</table>

Table A: Maximum FDP (in Hours) for Two or more flight crew – Acclimatised

<table>
<thead>
<tr>
<th>Length of preceding rest (hours)</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Up to 18 or over 30</td>
<td>13</td>
</tr>
<tr>
<td>Between 18 and 30</td>
<td>11 ½</td>
</tr>
</tbody>
</table>

Table B: Maximum FDP (in Hours) for Two or more flight crew – Not Acclimatised
Views of Stakeholders

8.61 The IPG and other pilot unions have suggested Tables A & B as below to determine maximum ‘Flight Duty Period’ with respect to start at local time for ‘Acclimatised’ and ‘Not acclimatised’ crew:

Table A: Maximum ‘Flight Duty Period’ Acclimatised 2-pilot operations

<table>
<thead>
<tr>
<th>Local Time of Start</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>0100-0259</td>
<td>9</td>
</tr>
<tr>
<td>0300-0459</td>
<td>10</td>
</tr>
<tr>
<td>0500-0559</td>
<td>11</td>
</tr>
<tr>
<td>0600-0659</td>
<td>12</td>
</tr>
<tr>
<td>0700-0959</td>
<td>13</td>
</tr>
<tr>
<td>1000-1359</td>
<td>13</td>
</tr>
<tr>
<td>1400-1659</td>
<td>12</td>
</tr>
<tr>
<td>1700-2159</td>
<td>11</td>
</tr>
<tr>
<td>2200-2259</td>
<td>11</td>
</tr>
<tr>
<td>2300-0059</td>
<td>10</td>
</tr>
</tbody>
</table>

Table B: Maximum ‘Flight Duty Period’ Not Acclimatised 2-pilot operations

<table>
<thead>
<tr>
<th>Local Time of Start</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>0500-0559</td>
<td>10</td>
</tr>
<tr>
<td>0600-0659</td>
<td>11</td>
</tr>
<tr>
<td>0700-0959</td>
<td>12</td>
</tr>
<tr>
<td>1000-1359</td>
<td>12</td>
</tr>
<tr>
<td>1400-1659</td>
<td>11</td>
</tr>
<tr>
<td>1700-2159</td>
<td>10</td>
</tr>
<tr>
<td>2200-2259</td>
<td>10</td>
</tr>
<tr>
<td>2300-0059</td>
<td>9</td>
</tr>
</tbody>
</table>

8.62 IPG also provides the following Table to determine, under what conditions above Table A & B should be used.
### Time-zone transitions from acclimatized location

<table>
<thead>
<tr>
<th>Elapsed time since crewmember was last acclimatized (Hours)</th>
<th>12-36 (returning to base)</th>
<th>36-60 (not returning to base)</th>
<th>60-84</th>
<th>84-108</th>
<th>108-132</th>
<th>132-156</th>
<th>156+</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>West</td>
<td>2-4</td>
<td>Table B (home time)</td>
<td>Table B (local time)</td>
<td>Table A (local time)</td>
<td>Table A (local time)</td>
<td>Table A (local time)</td>
</tr>
<tr>
<td>3-4</td>
<td>5-6</td>
<td>Table B (home time)</td>
<td>Table B (local time)</td>
<td>Table A (local time)</td>
<td>Table A (local time)</td>
<td>Table A (local time)</td>
<td>Table A (local time)</td>
</tr>
<tr>
<td>5-6</td>
<td>7-8</td>
<td>Table B (home time)</td>
<td>Table B (home time)</td>
<td>9h less 45 min/sector</td>
<td>Table A (local time)</td>
<td>Table A (local time)</td>
<td>Table A (local time)</td>
</tr>
<tr>
<td>7-8</td>
<td>9-11</td>
<td>Table B (home time)</td>
<td>Table B (home time)</td>
<td>9h less 45 min/sector</td>
<td>9h less 45 min/sector</td>
<td>Table A (local time)</td>
<td>Table A (local time)</td>
</tr>
<tr>
<td>9+</td>
<td>12+</td>
<td>Table B (home time)</td>
<td>Table B (home time)</td>
<td>9h less 45 min/sector</td>
<td>9h less 45 min/sector</td>
<td>9h less 45 min/sector</td>
<td>Table A (local time)</td>
</tr>
</tbody>
</table>

Note: A crewmember’s elapsed time since being acclimatized begins when a crewmember ends a duty at a non-acclimatized location.

8.63 The above table suggests that crew acclimatisation would need minimum of 60 hours, 84 hours, 108 hours, 132 hours and 156 hours for WEST Time Zones of 2-4, 5-6, 7-8, 9-11 and 12+ hours respectively. EAST Time Zones need even larger time period for acclimatisation of the flight crew.

8.64 Member, Aviation Medicine on the issue of acclimatisation clarified that it can take from a few days to a couple of weeks for the circadian clock to synchronise to a new time zone. The internal circadian clock adapts slowly to abrupt changes of time cues. The rate of adaptation has been reported to follow a number of models. Rates of one hour per day without countermeasures, or quicker adaptation during the first days have all been quoted. However, since the adaptation is highly dependent on the individual, to the direction of flight, to the number of time zones crossed, to exposure to environmental cues any simplistic formula for acclimatisation is inappropriate.

8.65 In view of the above observations of Member, Aviation Medicine, it is evident that the international long-haul operations away from home base would invariably be conducted when the crew is not acclimatised. It was, therefore, considered appropriate
to compare regulations of various countries regarding maximum flight duty period for non-acclimatised crew.

8.66 It was noticed that CAP 371 of UK provides a table to determine maximum flight duty period for un-acclimatised crew, which is reproduced above at para 8.56 of this report. CAP 371 of UK deals with the scheme of the operator but as far as the regulations concerned UK has adopted EU-OPS Subpart ‘Q’, which does not have any such provisions. South Africa also in its Civil Aviation Technical Specification (SA – CATS) has an almost similar table, which is reproduced below:

FDP (in Hours) of Two pilot crews – Aeroplanes: Not Acclimatised to local time

<table>
<thead>
<tr>
<th>Length of preceding rest (hours)</th>
<th>Sectors</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 18 or over 30</td>
<td></td>
<td>13</td>
<td>12¼</td>
<td>11½</td>
<td>10½</td>
<td>10</td>
<td>9½</td>
<td>9</td>
</tr>
<tr>
<td>Between 18 and 30</td>
<td></td>
<td>12</td>
<td>11¼</td>
<td>10½</td>
<td>9¼</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: The reason that available duty times are less following rest periods inside 18 – 30 hours is the aeromedical advice that the quality of rest is less due to the disturbance of the body’s natural rhythm.

8.67 It is evident from the above that most of the countries including EU countries do not have any regulations for maximum FDP related with un-acclimatised crew and there is a vast difference between the suggestion of IPG and the scheme of CAP 371 or SA – CATS. No country or operator follows such stringent restrictions as suggested by IPG. ICAO also does not expect to have co-relation of FDP with different East/West time zones, as suggested by IPG.

8.68 Jet Airways has suggested maximum ‘Flight Duty Period’ as follows:

<table>
<thead>
<tr>
<th>Number of Pilots</th>
<th>Flight Duty</th>
<th>Number of Landings</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1P1 + 1P2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 hours</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>12.5 hours</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>12 hours</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>11 hours</td>
<td>6</td>
</tr>
</tbody>
</table>
8.69 Jet Airways suggestions are similar to EU regulations but the number of landings does not match with EU regulations. Jet Airways, in addition to above landings, have also suggested that the reduction in FDP on encroachment of WOCL, which is in accordance with EU regulations.

8.70 NACIL (Air India) has suggested as follows:

"The stipulations as detailed in the CAR Section 7, Series J, Part III dated 27th July 2007 are acceptable to NACIL with following views/suggestions:

1. The maintenance and monitoring of Flight Duty Time in 7 days/30 days/12 consecutive months need not be included, as this will add to unnecessary paper work & workload. This will also not give any additional relief to the crew, as it is being monitored on a daily basis.

2. The limit of FDTL and Flight Time in consecutive 24 hours with 2 Pilots crew should be 12(FDTL)/9 (FTL) hours and 3 landings respectively."

8.71 The first suggestion of NACIL (Air India) regarding cumulative Flight Duty Time has been discussed in detail at paras 8.39 to 8.42 above. To clarify the second suggestion of NACIL (Air India), the stipulations regarding Maximum ‘Flight Duty Time Limitation’ (FDTL) and ‘Flight Time Limitation’ (FTL) of the above CAR of 2007 is reproduced below:

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hours)</th>
<th>Flight Time (Hours)</th>
<th>Number of Landings</th>
<th>Crew Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 consecutive hours</td>
<td>12</td>
<td>8</td>
<td>3</td>
<td>1P1 + 1P2</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>9</td>
<td>2</td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>10</td>
<td>1</td>
<td>1P1 + 1P2 + FE</td>
</tr>
</tbody>
</table>

8.72 The above stipulation of CAR permits only 2 landings with 13 hours of “Flight Duty Time” and 9 hours of ‘Flight Time’. The AIC 28 of 1992, however, permits 3 landings with 12 hours of ‘Flight Duty Time’ and 9 hours of ‘Flight Time’ with 2 pilots as suggested by Air India. Air India, therefore, has requested to retain AIC limitations.
**Analysis**

8.73 ICAO guidelines and the EU Ops 1 regulations (Subpart ‘Q’), have a cumulative ‘Flight Time Limitations’. There is no daily ‘Flight Time’ limitation, in EU regulations, which is stipulated by ICAO. However, EU regulations have a daily limitation on maximum ‘Flight Duty Period’, which gets restricted with increased number of landings, subject to a maximum reduction of 2 hours, as discussed at para 8.56 and 8.57 above.

8.74 Both AIC 28 of 1992 and CAR of 2007 stipulate a combination of ‘Flight Time’ and ‘Flight Duty Time’ for restricting number of landings. Domestic and international operations have different ‘Flight Time’ and ‘Flight Duty Time’ limitations. Domestic sectors being smaller, operationally more landings are required and permitted as compared to international sectors. Further, on domestic sectors flight time and flight duty time are not permitted to be increased by crew augmentation.

8.75 The Committee considered available scientific studies including Moebus report where the current issue of maximum daily FDP has been addressed under Question No. 2. Moebus report has concluded as follows:

> "The information outlined above emphasises the complexity of flight time limitations and the fact that it is very difficult to propose simple maximum FDP limits that properly account for all the relevant variables (e.g., duty start time, number of consecutive duty days, number of sectors, duration of duty periods preceding the current duty, degree of acclimatization, etc.). In summary, the provisions for the maximum FDP proposed by EU OPS are not supported by the available data. **To formulate more precise limits further studies are required.**"

8.76 It is clear from the above that Moebus report has itself concluded that formulation of precise limits of daily FDP will require more studies. The Committee was of the view that the regulatory authority will in future consider such studies for appropriate adjustments after taking into account the complexities of variables under Indian conditions. Therefore, the Committee concluded that EU Ops Subpart Q regulation should be adopted for the purposes for the formulation of daily FDP in Indian regulations.
8.77 The Committee deliberated the issue and it was considered appropriate to follow principles adopted by European Union in their EU OPS (Sub-Part ‘Q’) regulations, which are closest to ICAO guidelines except that maximum daily flight time limitation recommended by ICAO is not part of EU OPS regulations. To integrate the principles of European Union regulations and recommendations made by the Committee in respect of Flight Time Limitation in accordance with the ICAO guidelines the following comparative chart has been prepared for two pilot operations:

**Two Pilot Operations**

<table>
<thead>
<tr>
<th>EU Regulations</th>
<th>Recommendation No. 9 Flight Time Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Sectors*</td>
<td>Max daily FDP (Flight Duty Period) in hours</td>
</tr>
<tr>
<td>1 or 2</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>12.5</td>
</tr>
<tr>
<td>3</td>
<td>12.5</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>11.5</td>
</tr>
<tr>
<td>6 or more</td>
<td>11</td>
</tr>
</tbody>
</table>

*Sectors shown in EU regulations are ‘landings’ given in Indian regulations.

8.78 Further, the Committee noted that landing is the most stressful activity of flight operations, which induces fatigue in pilots. Moebus study also concluded that the formulation of precise limits of FDP limits after taking into account all variables is a very complex process and requires further studies. Therefore, till such time the Committee decided to recommend a calibrated approach for maximum FDP limits by linking it with the number of landings. Based on feed back from investigations, aviation
experts and flight crew members, the Committee decided to limit the number of landings to 2 during night operations. The recommendation also addresses the impact of WOCL operations on circadian rhythm and its consequent impact on human physiology and fatigue.

**Recommendation No. 13**

8.79 The Committee, therefore, recommends following Flight Duty Period Limitation for two-pilot operations, which is required to be reduced for operations encroaching ‘Window of Circadian Low’ (WOCL):

<table>
<thead>
<tr>
<th>Type of Operations</th>
<th>Maximum Daily Flight Duty Period (FDP) Limitation**</th>
<th>Maximum Number of landings</th>
<th>Maximum Flight Time Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Operations</td>
<td>13 hours</td>
<td>2</td>
<td>10 hours</td>
</tr>
<tr>
<td></td>
<td>12.5 hours</td>
<td>2 <em>for night operations</em></td>
<td>9 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 <em>for day operations</em></td>
<td></td>
</tr>
<tr>
<td>Domestic and Neighbouring Countries Operations</td>
<td>12.5 hours</td>
<td>2 <em>for night operations</em></td>
<td>9 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 <em>for day operations</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 hours</td>
<td>4</td>
<td>8 hours</td>
</tr>
<tr>
<td></td>
<td>11.5 hours</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 hours</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Reduction of Flight duty period due to operation in WOCL**

When the FDP starts in the WOCL, the maximum FDP stated in above points will be reduced by 100% of its encroachment up to a maximum of two hours. When the FDP ends in or fully encompasses the WOCL, the maximum FDP stated in above points will be reduced by 50% of its encroachment.

8.80 The above Flight duty period based on two pilot operations may be enhanced by flight crew augmentation and is treated in the subsequent paragraphs.
Definition of Augmented Flight Crew

8.81 ICAO guidance material for development of prescriptive fatigue management regulations at Attachment ‘A’ of Annex 6 defines augmented flight crew as follows:

"Augmented flight crew. A flight crew that comprises more than the minimum number required to operate the aeroplane and in which each flight crew member can leave his or her assigned post and be replaced by another appropriately qualified flight crew member for the purpose of in-flight rest."

International Practices

8.82 FAA, USA does not define augmented crew but stipulates specific Flight Time Limitations for:

- Two pilots and one additional flight crewmember; and
- Three or more pilots and an additional flight crewmember

8.83 The Canadian regulations also do not define the augmented or additional crew but it permits extension of “Maximum Flight Duty Time Limitation” beyond the stipulated 14 hours by maximum of 3 hours, where flight duty time includes a rest period. Such rest, if provided during flight, would necessitate carriage of additional crew member on flight.

8.84 Australian regulations, as stated above, have a concept of “tour of duty”, which is equivalent to “fight duty period”. Australian regulations also, like FAA, USA does not define augmented crew but stipulates specific “tour of duty” of maximum 11 hours with two pilots and up to 16 hours with three or more pilots.

8.85 EU regulations (Subpart Q) defines augmented flight crew as follows:

"1.1. Augmented flight crew:
A flight crew which comprises more than the minimum number required for the operation of the aeroplane and in which each flight crew member can leave his/her post and be replaced by another appropriately qualified flight crew member."
8.86 CAA, UK, CAP 371 for extension of FDP by providing in-flight relief stipulates the qualification of an additional crew member as follows:

"When any additional crew member is carried to provide in-flight relief with the intent of extending an FDP, that individual shall hold qualifications which are equal or superior to those held by the crew member who is to be rested."

8.87 Both AIC 28 of 1992 and CAR of 2007 also like FAA, Canadian and Australian regulations do not define augmentation of crew but specify ‘flight time’ and ‘flight duty time’ limitations for two pilots, two pilots plus additional crew, three pilots plus additional crew and two sets of pilots i.e. four pilots.

Comments Received

8.88 IPG along with other pilot unions and associations have suggested the following definition of augmented crew:

"Augmented Crew:

An additional flight crew member, more than the minimum required by the manufacturer to operate the aeroplane, carried for the purpose of providing in-flight relief with the intent of extending a Flying Duty Period. That individual should be current, type-rated and route-qualified in all aspects as laid down by the Company and shall hold qualifications which are equal or superior to those held by the crew member to be rested."

8.89 Jet Airways has not suggested any definition of the augmented crew but has suggested the operations with augmented crew of 3 pilot crews as follows:

<table>
<thead>
<tr>
<th>Number of Pilots</th>
<th>Flight Duty</th>
<th>Number of Landings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented</td>
<td>2P1 + 1P2</td>
<td>Seat rest – 15 hours</td>
</tr>
<tr>
<td></td>
<td>1P1 + 2P2</td>
<td>Bunk rest – 16 hours</td>
</tr>
</tbody>
</table>

Analysis

8.90 The above suggestions of Jet Airways permits operations with one Pilot-in-Command and two Co-Pilots. Such operations with two Co-pilots are neither permitted
by ICAO nor under Aircraft Rules. However, the operations with 2 Pilots-in Command and one Co-pilot is acceptable under both ICAO and the Aircraft Rules.

8.91 Definitions of ICAO and EU regulations permit augmented crew to be “appropriately qualified flight crew member”. The definition of CAA, UK and the suggestion of IPG require the augmented crew to “hold qualifications which are equal or superior to those held by the crew member who is to be rested”. In case of 3 pilot operations, UK and IPG definitions would require at least 2 pilots to hold Pilot-in-Command rating whereas ICAO and EU definitions would permit an augmented crew who may not hold a pilot-in-command.

8.92 A concept of “cruise pilot” needs to be introduced here. On 25 February 2004, Air Navigation Commission adopted amendment number 165 to Annex 1 regarding endorsement of type rating with a limitation of privileges to the cruise phase of the flight. The amendment, which became effective from 25 November 2004, amended para 2.1.4.1.1 by inserting the relevant provision for ‘cruise pilot’ as follows:

2.1.4.1.1 When a type rating is issued limiting the privileges to act as co-pilot, or limiting the privileges to act as pilot only during the cruise phase of the flight, such limitation shall be endorsed on the rating.

8.93 At present, DGCA issues only two type ratings, namely ‘Co-Pilot’ and ‘Pilot-in-Command’.

8.94 In accordance with the Aircraft Rules, 1937, DGCA can issues only two type ratings, namely ‘Co-Pilot’ and ‘Pilot-in-Command’ and DGCA cannot be issue ‘Cruise Pilot’ type rating.

8.95 DGCA, however, has been permitting a combination of “1P1 + 2P2” for ‘3 pilot’ operations, which permits pilots with Co-Pilot rating to act as a pilot-in-command with some qualification, experience and training. The Committee is of the opinion that the practice of permitting 1P1 + 2P2 for three pilot operations is not in accordance with the present provisions of the Aircraft Rules, 1937 and need to be discontinued. This would
necessitate that two pilots should hold a qualification of a Pilot-in-Command in case of 3 pilots operations.

8.96 It is obvious from the above that internationally there are two approaches regarding crew augmentation. One is to formally define the augmented crew, his qualification and method of determining the extension of ‘flight time’ and ‘flight duty period’ and the other is to stipulate these limitations along with the requirement of the number of crew member.

8.97 The Committee deliberated both the approaches. If augmentation is not defined then the qualification of the replacement crew remains ambiguous and open to interpretation that the replacing crew can have a qualification less than the crew who has to be rested. If simply number of crew is defined say ‘3 pilots' without their qualifications like “2P1 + P2” then also the ambiguity remains about the replacing pilot.

8.98 The Committee, therefore, decided to define augmentation in line with CAA UK definition, which clearly brings out that the additional crew member “shall hold qualifications which are equal or superior to those held by the crew member who is to be rested” and while stipulating the requirement also provide the number of crew with their qualifications as an example to avoid any ambiguity about the augmented crew members which is in line with the definition suggested by pilots’ unions. However, if the Government decides to follow the ICAO norms then the Aircraft Rules, 1937 should be amended to permit a rating, which limits the privilege to act as a pilot during cruise phase.

**Recommendation No. 14**

8.99 The Committee recommends the following definitions:

*Without amendment of the Aircraft Rules*

*Augmented flight crew.* A flight crew that comprises more than the minimum number required to operate the aeroplane and in which each flight crew member can leave his or her assigned post and be replaced by another flight crew member, who shall hold qualifications which are equal to or superior to those held by the crew member who is to be replaced for the purpose of in-flight rest.*
With amendment of the Aircraft Rules

"Augmented flight crew. A flight crew that comprises more than the minimum number required to operate the aeroplane and in which each flight crew member can leave his or her assigned post and be replaced by another appropriately qualified flight crew member for the purpose of in-flight rest."

Extension of ‘Flight Duty Period’ by providing in-flight relief

8.100 ICAO guidelines provide the following guidelines for flights operated by augmented crews and the provision of in-flight relief:

4.7.4 Flights operated by augmented crews and the provision of in-flight relief

4.7.4.1 The composition and number of flight crew members carried to provide in-flight relief, and the quality of rest facilities provided, should determine the amount by which the basic flight duty period limitations may be extended. A sensible balance should be kept between the division of in-flight duty and rest.

International Practices

8.101 FAA, USA does not have a criterion of “flight duty period” but provides the limits for ‘Flight Time’ under headings ‘2 pilots and an additional crew’ and ‘3 or more pilots with an additional crew. The principle of FAA is that no pilot should have a ‘flight time’ of more than 8 hours during a flight. Therefore, if there are 3 pilots, then ‘flight time’ can be extended up to 12 hours and with 4 pilots it can be extended up to 16 hours. FAA provides special approval as part of ‘Operations Specifications’ of the Air Operators Certificate (AOC) for flights beyond 16 hours (ultra-long flights). FAA requires that operator shall “provide adequate sleeping quarters on the airplane whenever a pilot is scheduled to fly more than 12 hours during any 24 consecutive hours”. FAA has issued an Advisory Circular on the subject of “Flight crew Sleeping Quarters and Rest Facilities” regarding the adequacy of onboard sleeping quarters for compliance with regulations.

8.102 The Canadian regulations use criterion of ‘Flight Duty Time’ instead of ‘Flight Duty Period’ and the augmentation of crew results in extension of ‘Flight Duty Time’. The relevant Canadian provisions are as follows:
"700.16 (1) Subject to subsections (5) and (7), no air operator shall assign a flight crew member for flight duty time, and no flight crew member shall accept such an assignment, if the flight crew member’s flight duty time will, as a result, exceed 14 consecutive hours in any 24 consecutive hours. Where the flight is conducted under Subpart 4 or 5 using an aircraft other than a helicopter, flight duty time shall include 15 minutes for post-flight duties.

(2) ........................

(3) ........................

(4) ........................

(5) Where flight duty time includes a rest period, flight duty time may be extended beyond the maximum flight duty time referred to in subsection (1) by one-half the length of the rest period referred to in paragraph (b), to a maximum of 3 hours, if

(a) the air operator provides the flight crew member with advance notice of the extension of flight duty time;

(b) the air operator provides the flight crew member with a rest period of at least 4 consecutive hours in suitable accommodation; and

(c) the flight crew member’s rest is not interrupted by the air operator during the rest period."

8.103 The Canadian regulations stipulate that the flight duty time may be extended beyond the maximum flight duty time limitation of 14 hours by one-half the length of rest period subject to a maximum of 3 hours and also at least 4 consecutive hours of rest in a suitable accommodation is provided the flight crew member.

8.104 The Australian regulations provide an extension of tour of duty as follows:

**LIMITATIONS WHERE THE FLIGHT CREW INCLUDES NOT MORE THAN 2 PILOTS**

“1.3 An operator shall not roster a pilot for a tour of duty in excess of 11 hours.

1.4 An operator shall not roster a pilot to fly in excess of 8 hours flight time in any 1 tour of duty.”

**LIMITATIONS WHERE THE FLIGHT CREW INCLUDES 3 OR MORE PILOTS**

“3.5 An operator shall not roster a pilot for a tour of duty in excess of:

(a) 16 hours for turbo-jet type aircraft; and

(b) 18 hours in other types of aircraft, except where specifically varied by CASA.

3.6 An operator shall not roster a pilot in excess of a total of 14 hours of active duty in any tour of duty.

3.7 An operator shall not roster a pilot in excess of 8 consecutive hours of active duty in any tour of duty.”
8.105 Australian regulations permit extension of tour of duty from 11 to 16 hours with crew augmentation subject to the conditions that pilot does not carry out in excess of 8 consecutive hours of active duty and not more than 14 hours during any tour of duty.

8.106 EU OPS-1, Subpart ‘Q’ also does not provide specific values and states at para OPS 1.1115 regarding extension of flight duty period due to in-flight rest as follows:

"1.1. Flight Crew Augmentation
The Authority shall set the requirements in connection with the augmentation of a basic flight crew for the purpose of extending the flight duty period beyond the limits in OPS 1.1105 above;"

8.107 In view of the above EU regulations, Civil Aviation Authorities of Member States are required to stipulate requirements extension of FDP with augmented crew.

8.108 CAA, UK has the following stipulation in CAP 371 for extension of Flying Duty Period by in-flight relief:

15.3 A total in-flight rest of less than three hours does not allow for the extension of an FDP, but where the total in-flight rest, which need not be consecutive, is three hours or more, then the permitted FDP may be extended as follows:

<table>
<thead>
<tr>
<th>If rest is taken in a bunk</th>
<th>If rest is taken in a seat</th>
</tr>
</thead>
<tbody>
<tr>
<td>A period equal to one half of the total rest taken, provided that the maximum FDP permissible shall be 18 hours; 19 hours in the case of cabin crew.</td>
<td>A period equal to one third of the total rest taken, provided that the maximum FDP permissible shall be 15 hours; 16 hours in the case of cabin crew.</td>
</tr>
</tbody>
</table>

8.109 CAA, UK regulations do not specify the extension of FDP in terms of augmented pilots i.e. 3/4 pilots. Minimum in-flight rest of 3 hours by each crew is required for extension of FDP by 1 hr for rest taken in a seat and 1½ hour for rest taken in a bunk. FDP extension up to 18 hours for rest taken in a bunk would require 4 pilots, who have taken rest of at least 8 hours and would permit a flight time up to 16 hours.
8.110 CAA Belgium has stipulated for extension of FDP with augmented crew (3 pilots) and double crew (4 pilots) as follows:

"The maximum flight duty period can be extended in accordance with the following table in case of the flight crew is augmented;

<table>
<thead>
<tr>
<th>Rest facility available</th>
<th>Maximum extension of the FDP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Augmented crew</td>
</tr>
<tr>
<td>Rest seat</td>
<td>2H</td>
</tr>
<tr>
<td>Bunk</td>
<td>4H</td>
</tr>
</tbody>
</table>

1.1.1 In flight rest of less than 3 hours doesn’t allow for the extension of the FDP
1.1.2 In case of augmented/double flight crew, the division of duty and rest between the flight crew members being relieved will be kept in balance."

8.111 CAA Malta also follows EU OPS regulations and has the following stipulation regarding Extension of FDP with augmented crew:

"When augmented crew is carried for the purpose of facilitating in-flight rest for operating crew with the intent of extending a FDP the following shall apply:

3 Pilots: The applicable FDP may be increased by two hours up to a maximum of 16 hours.

4 Pilots: The applicable FDP may be increased by four hours up to a maximum of 18 hours.

When in-flight rest is facilitated, there must be a comfortable reclining seat or bunk for the crew members resting that is separated from the flight deck and passengers.

To take advantage of in-flight rest the division of duty and rest between crew members must be kept in balance.

When a FDP is extended due to in-flight rest, the maximum number of landings is 3."

8.112 The Iceland regulations for extension of flight duty period due to in-flight rest stipulate as follows:

1.1 If augmented flight crew is used and provided that rest facilities are available on board according to EU OPS 1.095 – 1.17 (Crew bunk/separate rest seat) for resting crew member and provided that rest could be evenly distributed among the respective crew members, the flight duty may be extended as follows:
<table>
<thead>
<tr>
<th>Augmented Crew composition</th>
<th>With Crew Bunk Acc. EU-OPS 1.1095 1.17(a)</th>
<th>With Rest Seat Acc. EU-OPS 1.1095 1.17 (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 landings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Pilots</td>
<td>n/a</td>
<td>16 hours</td>
</tr>
<tr>
<td>4 Pilots – Note 1</td>
<td>18 hours</td>
<td>16 hours</td>
</tr>
</tbody>
</table>

Note 1: Rest facilities shall be available for both pilots not on active duty

8.113 As stated above, EU-OPS regulations expects the National Aviation Authorities of the EU Member States to set the requirements in connection with the augmentation of a basic flight crew for the purpose of extending the flight duty period. The issue was also referred to Moebus Aviation as Question No. 11 as follows:

**Question No. 11** What provisions are needed for extended FDP operations with augmented crews and/or time zone crossings (re. EU OPS 1.1115 para 1.1)?

8.114 The Moebus Report, in this connection states as follows:

“....... we believe that, where in-flight relief and adequate bunk facilities are provided, the permitted FDP may be extended by a period equal to three-quarters of the total rest taken. This would apply to aircrew who are acclimatized at the point of departure. For aircrew who are not acclimatized, the recuperative effect of bunk sleep may be reduced, and the permitted extension should be only one half of the total rest taken.”

8.115 The Moebus Report further states that the above provisions are based on the following assumptions:

1. The bunk facilities are of sufficient standard;
2. Care has been taken to ensure a reasonable assignment of the rest periods to the individual crew members;
3. Crews do not return to the controls within 30 minutes of waking, after bunk rest.

8.116 In this context, another linked question (No. 12) in the Mobus Report is as follows:
Question No. 12  The quality of rest regarding rest location / rest facilities for flight crew and cabin crew (re. EU OPS 1.1115 para 1.1 and 1.2).

8.117  Moebus report, in this regard summarises its recommendations as follows:

To summarize, the recommended extensions to the unaugmented FDP, based on the quality of accommodation described below, expressed as a percentage of the rest period available to a single crew member, are as follows. The percentages have been suitably rounded for ease of application.

<table>
<thead>
<tr>
<th>In-flight Rest Facility</th>
<th>Acclimatized</th>
<th>Un-acclimatized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bunk</td>
<td>75%</td>
<td>50%</td>
</tr>
<tr>
<td>Business Seat</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Flight deck/other seat</td>
<td>25%</td>
<td>20%</td>
</tr>
<tr>
<td>Economy seat</td>
<td>No extension</td>
<td>No extension</td>
</tr>
</tbody>
</table>

Table 2: Recommended extensions to the un-augmented FDP as a percentage of the rest period

8.118  Regarding the standard of the bunk facility, Moebus Report states that the bunk facility should be completely separated from cockpit and passenger compartment and should be adequately insulated and situated to minimize random and aircraft noise and light. It should contain one or two horizontal sleeping surfaces of adequate size. Preferably, it also has a comfortable seat, climate and humidity control.

8.119  The Moebus report regarding seats recommends that seating arrangement must meet certain minimum specifications for these extensions to be justified. A business seat should be a seat reclining to at least 40° back angle to the vertical, outside the cockpit and separated from the passengers and cabin illumination by at least a dark curtain. The seat should offer sufficient leg and foot support and should have sufficient pitch and width to rest comfortably. A flight deck / other seat should be a seat in the cockpit or in the passenger cabin reclining to at least 40° from the vertical and providing sufficient leg and foot support. No data are available of comparative studies of seating arrangements; more detailed requirements may await the results of future comparative studies.
8.120 FAA regulations regarding Flight Time Limitations and Rest Requirements whenever a pilot is scheduled to fly more than 12 hours during any 24 consecutive hours. FAA Advisory Circular (No. AC-121-13) regarding Flight crew Sleeping Quarters and Rest Facilities provides detailed specifications as follows:

5. Operational Considerations.
   a. Flight crew Sleeping Quarters and Rest Facilities.
      The location of flight crew sleeping quarters or rest facilities in an aircraft is an important decision that should be based on an analysis of the following factors to ensure that adequate environment is provided to enable flight crewmembers to obtain sleep of adequate quality.

      (1) There should be a sufficient number of sleeping surfaces provided to accommodate the maximum number of flight crewmembers that would be expected to use these surfaces during the same period of time.

      (2) For flight crew sleeping quarters, adequate volume should be provided for sleeping. The recommended sleeping space volume per individual is $1.0 \text{m}^3 (35 \text{ feet}^3)$.

      (3) For flight crew rest facilities, adequate volume should be provided for sleeping, personal articles storage, and changing of clothes. The following volumes are recommended:

         (i) Individual sleeping space volume: $1.0 \text{m}^3 (35 \text{ feet}^3)$.

         (ii) Free space adjacent to the sleeping surfaces for ingress and egress and changing of clothes: $1.85 \text{m}^3 (65 \text{ feet}^3)$.

   b. Sleeping Surfaces.
      The following are acceptable criteria for sleeping surfaces:

      (1) Dimensions for each sleeping surface of $1.98 \times 0.76 \text{m} (78 \times 30 \text{ inches})$.

      (2) The sleeping surfaces should be designed so that they are as level as practicable during cruise flight.

      (3) Suitable means should be provided to ensure occupant privacy for each sleeping surface area, e.g., curtains in an over-and-under arrangement or a divider curtain in a side-by-side arrangement.

   c. Isolation.
      The flight crew rest facility or flight crew sleeping quarters should be in a location where intrusive noise, odors, and vibration have minimum affect on sleep. The spectrum of the sound within these areas should be limited to broadband without annoying tones. Special attention should be given to the existence of doors, passenger convenience systems, public address systems, etc., in the immediate area to minimize intrusive noise. A noise level during cruise flight in the range of 70 to 75 dB(A) is considered a reasonable design objective.
d. **Environmental.**

Airflow and temperature control should provide a uniformly well-ventilated atmosphere free from drafts, cold spots, and temperature gradient. The FAA recommends that the sleeping surface area be designated a non-smoking area.

e. **Public Address System.**

The FAA recommends that the public address system or an alternative means should include provisions to provide only relevant information to flight crewmembers in the flight crew rest facility (e.g., fire in flight, aircraft depressurization, preparation of compartment occupants for landing, etc.).

f. **Emergency Lighting.**

Emergency lighting should be provided in flight crew rest facilities.

g. **Stowage and Restraints.**

In accordance with the applicable FAR, suitable personal articles stowage and occupant restraint systems must be provided to each occupant of sleeping surfaces as well as each occupant of any seats located in flight crew rest facilities.

h. **Emergency and Other Equipment.**

(1) Approved oxygen equipment must be provided for each, crewmember who uses a sleeping surface and flight crew rest facility seat.

(2) There should be one or more lighted "FASTEN SEAT BELTS" signs within the view of the occupants of each sleeping surface and seat located within a flight crew rest facility.

(3) If the operating rules and the operator permit smoking in a flight crew rest facility, the following apply:

(i) One or more lighted "NO SMOKING" signs within the view of the occupants of each sleeping surface and seat located in the facility should be provided; and

(ii) An adequate number of self-contained, removable ashtrays for each seat in the facility must be provided.

(4) If the operating rules and the operator do not permit smoking in a flight crew rest facility, then one or more "NO SMOKING" placards legible to the occupants of each sleeping surface and seat located in the facility should be provided.

---

8.121 International Pilots' Associations define in-flight rest facilities in four categories. IFALPA categorises as follows:
Dr. Nasim Zaidi Committee Report  Chapter 8 – Duty Period and Flight Duty Period Limitation

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>This must be a bunk or “sleeper” seat that should provide horizontal rest as a bed. It should recline to at least 80° back angle to the vertical. Examples are “lie flat” seats or “flat bed” seats. The seat should be separated from the cockpit and passengers, by curtains or panels, and should include provisions for darkening the sleep environment and free of intrusion from exterior noise.</td>
</tr>
</tbody>
</table>
| 2        | Commonly known as a “normal” business class seat. This seat must be outside the cockpit and separated from passengers by, as a minimum, a dark curtain. A common row of seats may be shared only by another crewmember. Under no circumstance should the row be shared by a crewmember with a passenger. Minimum seat requirements are:  
  a. Reclining to at least 45° back angle to the vertical;  
  b. Seat pitch at least 55 inches;  
  c. Seat width at least 20 inches;  
  d. Sufficient leg and foot support |
| 3        | Flight deck or cabin seat which reclines by at least 40° back angle to the vertical and offers sufficient leg and foot rest. |
| 4        | Normal economy class seat |

Note:  Seat pitch is the distance between the rows of seats and is measured from the back of one seat to the back of the seat behind, the measurements being taken from the same position on each seat.

**Comments Received**

8.122 Jet Airways have suggested augmentation for three pilots as follows:

<table>
<thead>
<tr>
<th>Number of Pilots</th>
<th>Flight Duty</th>
<th>Number of Landings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented</td>
<td>2P1 + 1P2</td>
<td>Seat rest – 15 hours</td>
</tr>
<tr>
<td></td>
<td>1P1 + 2P2</td>
<td>Bunk rest – 16 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 2</td>
</tr>
</tbody>
</table>

8.123 The above augmentation of (1P1 + 2P2) suggested by Jet Airways is not possible to accept, as P2 cannot provide rest to P1. DGCA issues only P1 and P2 type rating. The augmentation, therefore, can be only 2P1 + 1P2.
8.124 IPG has suggested that when suitably qualified relief crew is provided, the duty periods "for a single sector" may be increased provided it meets following criteria:

“For a pilot who is acclimatized at home base, Table C and home base time are applicable. For other circumstances, the matrix shown below should be utilized to determine the applicability of Table C to a particular flight duty period.

<table>
<thead>
<tr>
<th>Time- zone transitions from acclimatized location</th>
<th>Elapsed time since crewmember was last acclimatized (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East - West 12- 36</td>
<td>36- 60 (returning to base)</td>
</tr>
<tr>
<td>2 - 2-4</td>
<td>Table C (home time)</td>
</tr>
<tr>
<td>3-4 - 5-6</td>
<td>Table C (home time)</td>
</tr>
<tr>
<td>5-6 - 7-8</td>
<td>Table C (home time)</td>
</tr>
<tr>
<td>7-8 - 9-11</td>
<td>Table C (home time)</td>
</tr>
<tr>
<td>9+ - 12+</td>
<td>Table C (home time)</td>
</tr>
</tbody>
</table>

Table C: Maximum ‘Flight Duty Period’ for calculating augmented maximum Flight Duty Period

<table>
<thead>
<tr>
<th>Time of Start</th>
<th>Un-augmented FDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0500-0559</td>
<td>11</td>
</tr>
<tr>
<td>0600-0659</td>
<td>12</td>
</tr>
<tr>
<td>0700-1359</td>
<td>13</td>
</tr>
<tr>
<td>1400-1659</td>
<td>12</td>
</tr>
<tr>
<td>1700-2159</td>
<td>11</td>
</tr>
<tr>
<td>2200-2259</td>
<td>11</td>
</tr>
<tr>
<td>2300-0459</td>
<td>10</td>
</tr>
</tbody>
</table>
“For acclimatised flight crews the maximum single sector Flight Duty Period utilizing in-flight rest should be in accordance with the provisions of Table D below.

Table D: Maximum ‘Flight Duty Period’ Acclimatised 3 or 4 Pilot Augmented Operations

<table>
<thead>
<tr>
<th>Acclimatised</th>
<th>Rest taken in bunk</th>
<th>Rest taken in seat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max FDP (Table C)</td>
<td>3 Pilots</td>
<td>4 Pilots</td>
</tr>
<tr>
<td>10</td>
<td>12 ¼</td>
<td>14 ¼</td>
</tr>
<tr>
<td>11</td>
<td>13 ½</td>
<td>15 ¾</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
<td>17 ½</td>
</tr>
<tr>
<td>13</td>
<td>16</td>
<td>18</td>
</tr>
</tbody>
</table>

“For non-acclimatised crew the maximum single sector Flight Duty Period utilizing in-flight relief should be in accordance with the provisions of Table E below.

Table E: Maximum ‘Flight Duty Period’ Non Acclimatised 3 or 4 Pilot Augmented Operations

<table>
<thead>
<tr>
<th>Not Acclimatised</th>
<th>Rest taken in bunk</th>
<th>Rest taken in seat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max FDP (Table C)</td>
<td>3 Pilots</td>
<td>4 Pilots</td>
</tr>
<tr>
<td>10</td>
<td>11 ¾</td>
<td>13</td>
</tr>
<tr>
<td>11</td>
<td>13</td>
<td>14 ½</td>
</tr>
<tr>
<td>12</td>
<td>14 ¼</td>
<td>15 ¾</td>
</tr>
<tr>
<td>13</td>
<td>15 ½</td>
<td>17 ¾</td>
</tr>
</tbody>
</table>

8.125 IPG has suggested further restrictions that “a total in-flight rest of less than 3 hours should not allow an extension of duty times” and defined quality of seat for rest.

8.126 EU Ops-1, Subpart ‘Q’ for extension of duty period with augmented crew casts the responsibility on the civil aviation authority to “set the requirements”. In this regard, CAA, UK CAP 371 regulations are at para 8.92 above. CAA, Belgium, CAA, Malta and CAA Iceland regulations are at paras 8.94, 8.95 and 8.96 respectively. These requirements do not restrict augmentation to “single sector” operations nor have complicated tables as suggested by IPG.
8.127 Further, no country appears to have regulations in line with the suggestions of IPG and as such Committee did not find any merit in the arguments of IPG.

**Analysis**

8.128 As stated earlier, internationally there are two approaches regarding crew augmentation. One is to define the method of determining the extension of ‘flight time’ and ‘flight duty period’ and the other is to stipulate these limitations along with the requirement of the number of crew member.

8.129 Both AIC 28 of 1992 and CAR of 2007 define the “Flight Time” and “Flight Duty Time” limitations depending upon number of flight crew members and there is no variation due to type of resting quarters i.e. seat or bunk. Further, there is no provision to enhance the “Flight Time” and/or “Flight Duty Time” limitations for operations on domestic sectors. The enhancement of “Flight Time” and “Flight Duty Time” for international operations is as follows:

<table>
<thead>
<tr>
<th>Crew</th>
<th>Flight Time</th>
<th>Flight Duty Time</th>
<th>Number of Landings</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIC 28 of 1992</td>
<td>2 Pilots OR 2 Pilots + FE*</td>
<td>9/10 hours</td>
<td>12 hours</td>
</tr>
<tr>
<td></td>
<td>3 Pilots OR 3 Pilots + FE*</td>
<td>12 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td></td>
<td>4 Pilots OR 2 Sets of crew</td>
<td>14 hours</td>
<td>16 hours</td>
</tr>
<tr>
<td>CAR 2007</td>
<td>2 Pilots OR 2 Pilots + FE</td>
<td>8 hours</td>
<td>12 hours</td>
</tr>
<tr>
<td></td>
<td>10 hours</td>
<td>14 hours</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3 Pilots OR 3 Pilots + FE</td>
<td>12 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td></td>
<td>4 Pilots OR 2 Sets of crew</td>
<td>14 hours</td>
<td>17 hours</td>
</tr>
</tbody>
</table>

*FE – Flight Engineer
8.130 The Committee deliberated the subject in detail. The European Union regulations stipulate that the civil aviation authority shall set the requirements in connection with the augmentation of a basic flight crew for the purpose of extending the flight duty period. As the basic flight duty period is stipulated by EU OPS regulations, the Member States are required to provide the method of determining the extension, which is based on type of resting quarters.

8.131 USA, Canada and Australia provide the maximum limitation of “flight time”, “flight duty time” and “tour of duty” respectively with the augmented crew and stipulate resting facilities for them.

8.132 Indian regulations have also been stipulating the “flight time” and “flight duty time” limitations for the crew composition along with maximum number of landings. It was also decided to add the criterion of resting facility while determining the limitations.

**Recommendation No. 15**

8.133 The Committee after deliberations agreed to recommend the extension of maximum flight duty period in accordance with the following table and notes in case of augmented flight crew:

The maximum flight duty period may be extended in accordance with the following table in case the flight crew is augmented

<table>
<thead>
<tr>
<th>Rest facility available</th>
<th>Maximum extension of the FDP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Augmented crew (3 Pilots)</td>
</tr>
<tr>
<td>Rest seat</td>
<td>2H</td>
</tr>
<tr>
<td>Bunk</td>
<td>4H</td>
</tr>
</tbody>
</table>

(a) In flight rest of less than 3 hours should not allow for the extension of the FDP.
(b) The applicable Flight Duty Period may be increased up to a maximum of 16 hours in case of Rest Seat and up to a maximum of 18 hours in case of Bunk. In case of double crew, rest facilities should be available for both pilots not on active duty.

(c) In case of augmented/double flight crew, the division of duty and rest between the flight crew members being relieved should be kept in balance.

(d) Rest Seat should be at least a ‘Business Class’ seat reclining to at least 40° back angle to the vertical, outside the cockpit and separated from passengers by a dark curtain.

(e) Crew should be allowed to return to controls only after 30 minutes of waking after bunk/seat rest.

**Split Duty (Break)**

**International Practices**

8.134 Split duty means a ‘flight duty period’ (FDP), which consists of two or more sectors separated by less than the prescribed minimum rest period. The rest so provided permits extension of flight duty period under certain conditions.

8.135 ICAO does not provide guidelines on ‘Split duty’, therefore Committee looked into international practices being followed in this regard.

8.136 The concept of split duty is recognised by para 6 of *OPS 1.1105* “Extended FDP (split duty)” of EU regulations Subpart ‘Q’, which permits the Civil Aviation Authority to “grant approval to an operation based on an extended FDP including a break”.

8.137 CAA, Belgium follows EU regulations and has following stipulations for extension of FDP by split duty:

"6.3 When an FDP consists of two or more sectors - of which one can be a positioning journey counted as a sector - but separated by a break, excluding travelling time, then the FDP may be extended by the amounts indicated below:
Parts of the FDP before and after the break shall not exceed ten hours.

The break period shall not include the period allowed for immediate post flight and pre-flight duties.

When the break is 6 hours or less and does not encroach on the WOCL, it will suffice if an adequate facility, is available. If break is taken in the aircraft on the ground, the crew must have adequate control of the temperature and ventilation within the aircraft, either by use of a ground power unit or the aircraft internal power units. The passengers must not be on board.

If the break is more than 6 consecutive hours or encroach on the WOCL, then suitable accommodation will be provided by the company.

7. Combined duty period - flight duty period

7.1 With the exception of standby,

7.1.1. when a duty period is followed by a flight duty period, this duty period shall be included as part of the FDP;

7.1.2 A duty period following a flight duty period, will be taken into account for the calculation of minimum rest as defined in OPS 1.1110 §1.1 and §1.2.

7.2 When a duty is combined with a flight duty, an operator should avoid scheduling a ground duty such as simulator, checks, evaluations before a flight duty."

8.138 Sweden also follows EU OPS regulations and is required to approve extension of ‘Flight Duty Period’ in case of a break (split duty). Sweden has the following stipulation:

Break on ground

§ 4 Should crew members have access to a room with a bed during a break on the ground, the maximum daily flight duty period shall be charged with 50% of the break time in accordance with OPS 1.1105 Regulation (EEC) No. 3922/91 Annex III.

§ 5 Should the break in § 4 exceed four hours and the length of the break is determined at its start, the maximum daily flight duty period shall not be charged with the break time.

In OPS 1.1095 point 1.3 of Regulation (EEC) No. 3922/91 Annex III it is stipulated that the break's length is shorter than a rest period. In OPS 1.1110 it is...
8.139 CAA, UK permits extension of flight duty period as follows:

<table>
<thead>
<tr>
<th>Consecutive Hours Rest</th>
<th>Maximum Extension of the FDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 3</td>
<td>NIL</td>
</tr>
<tr>
<td>3 – 10</td>
<td>A period equal to half the consecutive hours rest taken.</td>
</tr>
</tbody>
</table>

8.140 CAA, UK has additional restrictions on the subject as follows:

“The rest period shall not include the time allowed for immediate post-flight duties and pre-flight duties, a minimum total of 30 minutes. The actual time allowed shall be specified by the operator. When the rest period is 6 hours or less it will suffice if a quiet and comfortable place, not open to the public, is available. If the rest period is more than 6 consecutive hours, then suitable accommodation must be provided.”

8.141 Air Transport Canada also utilises this concept and “Canadian Aviation Regulations” at para 700.16 (5) states as follows:

“(5) Where flight duty time includes a rest period, flight duty time may be extended beyond the maximum flight duty time referred to in subsection (1) by one-half the length of the rest period referred to in paragraph (b), to a maximum of 3 hours, if

(a) the air operator provides the flight crew member with advance notice of the extension of flight duty time;

(b) the air operator provides the flight crew member with a rest period of at least 4 consecutive hours in suitable accommodation; and

(c) the flight crew member’s rest is not interrupted by the air operator during the rest period.”

8.142 Ryanair “Scheme” for flight crew states regarding ‘Split duty’ as follows:

“Where a flight duty period consists of two periods separated by a break, the allowable planned duty period may be increased, but only under the following conditions:
− The break must be longer than 3 hours
− The flight duty period before or after such a break must not exceed 10 hours
− The increase of the following duty must not be higher than an additional 5 hours
− The crew must be notified about such a split duty in advance”

8.143 The concept of split duty is not a part of AIC 28 of 1992.

8.144 CAR of 2007 introduced the concept and stipulates as follows:

3.11 Split Duty
3.11.1 Whenever there is a break between two flights or between positioning journey and a flight in a period of 24 hour the break period will be adjusted as under:

<table>
<thead>
<tr>
<th>Break of 0-3 hrs.</th>
<th>Will be counted fully for Flight Duty Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Break &gt;3 hrs. - 10 hrs.</td>
<td>Half of it will count as Flight Duty Time</td>
</tr>
<tr>
<td>Break &gt;10 hrs.</td>
<td>Will not be counted towards Flight Duty</td>
</tr>
</tbody>
</table>

3.11.2 Break period shall not include time required for pre-flight and post flight duties which shall be a minimum of 45 minutes plus actual time spent on transportation.

3.11.3 This clause shall be applicable only if crew member is provided with suitable accommodation/hotel facilities.

3.11.4 No extension of Flight Duty Time shall be permitted if proviso of Split Duty has been availed.

8.145 No comments have been received from stakeholders on ‘Split duty’.

Analysis

8.146 From the analysis of available regulations on ‘Split-Duty’ (Break) following elements emerge:

i. Extension of FDP is not permitted if consecutive rest period is less than 3 hours
ii. Maximum extension of FDP can be a period equal to half of the consecutive hours of rest between 3 to 10 hours

iii. If the consecutive rest is more than 10 hours, then it is not counted towards extension of FDP

iv. Post-flight and pre-flight duties would not be counted as part of rest

v. If the break is more than 6 consecutive hours or encroach on the WOCL, then operator will provide suitable accommodation

vi. Parts of the FDP before and after the break shall not exceed ten hours.

8.147 Moebus study on (Q. No. 6) *“which detailed provisions and guidelines are needed within Subpart Q regarding split duty (ref. EU OPS 1.1105 para 6)”* acknowledges that there are no scientific studies on the impact of split duty and that further studies are required. Nevertheless they made following recommendation:

1. That the break between the two sub-duties should be at least one third of the length of the total flight duty period;

2. Adequate sleeping facilities must be provided by the operator if the break does not take place where the crew lives;

3. That the total flight duty period of a split duty should never start before 06:00 or end after 22:00;

4. That in the case of consecutive split duties, the total FDP of a split duty should never be extended beyond 14 hours in order to allow an absolute minimum of 10 hours daily rest;

5. Consecutive split duties with reduced daily rest time must be accompanied by an FRMS that includes training of crews and a reporting system. Our response is limited to split duties that extend the FDP beyond 12 hours. For split duties that do not extend the FDP, we have assumed that Ops 1.1095 para 1.3 applies to the break between the two sub-duties.

8.148 Moebus study has clarified in the recommendation number 5 (above) that their response is limited to split duties that extend the FDP beyond 12 hours and for split duties that do not extend the FDP, we have assumed that Ops 1.1095 para 1.3 applies to the break between the two sub-duties. Moebus recommendations are, however, totally silent how the ‘break’ should be counted to increase the FDP even though their recommendation number 1 states “that the break between the two sub-duties should be
at least one third of the length of the total flight duty period”. Therefore, the above five Moebus recommendations are in addition to the regulations stipulated by the Member States. Further, it suggests that Moebus study accepts the stipulation of FDP may be extended by 50% of the rest time.

8.149 Moebus study also stipulates (recommendation number 3) that the total flight duty period of a split duty should never start before 06:00 or end after 22:00. The maximum FDP, therefore, can never be more than 16 hours (from 06:00 to 22:00 hours). The regulations of Member States, however, permit FDP of 19 hours with 10 hours of rest.

8.150 In addition to above, Moebus study stipulates (recommendation number 2) that adequate sleeping facilities must be provided by the operator if the break does not take place where the crew lives. CAA, UK and Belgium in this regard stipulate as follows:

**CAA, UK**

"When the rest period is 6 hours or less it will suffice if a quiet and comfortable place, not open to the public, is available. If the rest period is more than 6 consecutive hours, then suitable accommodation must be provided."

**Belgium**

"If the break is more than 6 consecutive hours or encroach on the WOCL, then suitable accommodation will be provided by the company."

8.151 It is obvious from the above that additional recommendations of Moebus study are too restrictive. Association of European Airlines has following comments in regard to Spilt Duty:

“Those additional restrictions will make split duties impossible without any safety justification. This will heavily impact short-haul flights with a short night stop. The 14h FDP limit has no scientific basis and does not take into account the rest in hotels during some split duties whereas it would have huge impact.

The requirement for adequate sleeping facilities would impact certain flights at outstations with a short stay over during day time and which therefore should not require sleeping facilities. There is no justification for this restriction.

All provisions for split duty, which were accepted by the EU NAAs for compliance with EU-OPS, should be accepted by EASA.”


**Recommendation No. 16**

8.152 The Committee deliberated the issue of spilt duty and agreed to recommend as follows:

Split Duty (Break) means a period free of all duties, which counts as duty, being less than a rest period.

<table>
<thead>
<tr>
<th>Consecutive hours of break</th>
<th>Maximum Extension of the FDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 3H</td>
<td><em>NIL</em></td>
</tr>
<tr>
<td>Between 3H and 10H</td>
<td>A period equal to half the consecutive hours break taken</td>
</tr>
<tr>
<td>&gt;10H</td>
<td>No extension permitted</td>
</tr>
</tbody>
</table>

i. Post-flight and pre-flight duties should not be counted as part of rest

ii. If the break is more than 6 consecutive hours or encroach on the WOCL, then operator should provide suitable accommodation

iii. Parts of the FDP before and after the break should not exceed ten hours.
CHAPTER – 9
Rest Periods

9.1 Rest period requirement has many aspects and inter-alia includes minimum rest period, preceding duty time, cumulative weekly rest periods and effect of time zone on rest periods. For the sake of clarity, these components of the rest period are dealt with separately.

Definition of Rest Period

International Practices

9.2 Rest period, is generally defined as a time when the crew member is relieved of all duties to essentially provide an opportunity to crew member to rest. It is the responsibility of the crew member to utilise this period appropriately for rest. The ICAO guidelines state that “Flight crew members should make best use of the facilities and opportunities that are provided for rest and for the consumption of meals, and should plan and use rest periods to ensure that they are fully rested”. The definitions used for “Rest Period” by different authorities are as follows:

ICAO
A continuous and defined period of time, subsequent to and/or prior to duty, during which flight or cabin crew members are free of all duties.

EU
An uninterrupted and defined period of time during which a crew member is free from all duties and airport standby.

CAA, UK
A period of time before starting a flying duty period which is designed to give crew members adequate opportunity to rest before a flight.

Australia
Rest period means the period of time during which a flight crew member is relieved of all duties associated with his or her employment.

New Zealand
Rest period means any period of time on the ground during which a flight crew member is relieved of all duties by the operator.
FAA, USA
Rest Period has not been specifically defined by USA.

Air Transport Canada
Canada includes the definition in 'Minimum Rest Period' and is similar to ICAO definition.

Comments Received

9.3 Comments on the definition of ‘Rest Period’ were received only from IPG and suggested following definition:

“Rest Period: A continuous and defined period of time, subsequent to and/or prior to duty, during which crewmembers are free of all duties including standby duty. The rest period will commence from the time a crewmember gets access to suitable accommodation.”

Analysis

9.4 It is clear that IPG in their definition has specifically excluded ‘standby’ from the rest period.

9.5 ICAO guidelines on the subject state “Rest periods should not include standby if the conditions of the standby would not enable flight and cabin crew members to recover from fatigue” and also state “Standby may be included as duty if it is likely to induce fatigue” and in such a case, standby cannot be part of ‘Rest Period’. Therefore, nature of standby has to be examined to determine which type of standby and how much should be counted as ‘Duty’ and as ‘Rest Period’. The international practices being followed do not indicate that standby at home or at a suitable accommodation should not to be counted for ‘Rest Period’.

9.6 EU definition of ‘Rest Period’ excludes only airport standby from the rest period but includes part of standby at home or hotel accommodation to be determined by EU Member States.
9.7 It is evident that if the standby conditions permit crew members to recover from the fatigue then it may not be excluded from the rest. Therefore, the Committee did not find merit in the suggestion of IPG to exclude all types of standby from the ‘Rest period’.

**Recommendation No. 17**

9.8 The Committee deliberated on the definition of ‘Rest Period’. The wordings of IPG definition are the same as ICAO except that standby duty is excluded from the rest period, which is not the intention of ICAO. Further, IPG has also added that the rest would commence from the time crew member gets access to suitable accommodation. After deliberations, it was agreed that the EU definition of the rest period may be adopted, which also addresses the concern of IPG for standby. The recommended definition of Rest Period is as follows:

"**Rest Period:** An uninterrupted and defined period of time during which a crew member is free from all duties and airport standby."

**Minimum Rest Period**

9.9 ICAO guidelines regarding Minimum Rest Period prescribes as follows:

4.8 Minimum rest periods

4.8.1 The minimum rest period immediately before commencing a flight duty period may not be less than (*) hours.

*Note:* The symbol (*) is used above is to indicate where each State may insert a value it considers appropriate to manage fatigue.

**International Practices**

9.10 Canadian definition of “Minimum Rest Period” provides the components to be considered to determine the rest period and defines it as follows:

“minimum rest period” means a period during which a flight crew member is free from all duties, is not interrupted by the air operator or private operator, and is provided with an opportunity to obtain not less than eight consecutive
hours of sleep in suitable accommodation, time to travel to and from that accommodation and time for personal hygiene and meals”

9.11 The above definition clearly stipulate that minimum rest period would be more than eight hours, as it includes time to travel to and from the accommodation, time for personal hygiene and meals apart from the essential element of an “opportunity to obtain not less than eight consecutive hours of sleep in a suitable accommodation”.

9.12 FAA, USA for “domestic operations” stipulates (except under certain conditions) as follows: “no certificate holder conducting domestic operations may schedule a flight crewmember and no flight crewmember may accept an assignment for flight time during the 24 consecutive hours preceding the scheduled completion of any flight segment without a scheduled rest period during that 24 hours of at least the following:

(1) 9 consecutive hours of rest for less than 8 hours of scheduled flight time.
(2) 10 consecutive hours of rest for 8 or more but less than 9 hours of scheduled flight time.
(3) 11 consecutive hours of rest for 9 or more hours of scheduled flight time.

9.13 Further, for “Domestic Operations” FAA includes time of local transportation from an airport at which the crew member was relived from duty to return to his/her home station in ‘Rest Period’ and stipulates as follows:

“Time spent in transportation, not local in character, that a certificate holder requires of a flight crewmember and provides to transport the crewmember to an airport at which he is to serve on a flight as a crewmember, or from an airport at which he was relieved from duty to return to his home station, is not considered part of a rest period.”

9.14 FAA for “Flag Operations” (international operations) permits scheduling a pilot to fly for eight hours without rest. For more than eight hours the stipulation is as follows:

(b) If a certificate holder conducting flag operations schedules a pilot to fly more than eight hours during any 24 consecutive hours, it shall give him an intervening rest period, at or before the end of eight scheduled hours of flight duty. This rest period must be at least twice the number of hours flown
since the preceding rest period, but not less than eight hours. The certificate holder shall relieve that pilot of all duty with it during that rest period.

(c) Each pilot who has flown more than eight hours during 24 consecutive hours must be given at least 18 hours of rest before being assigned to any duty with the certificate holder.

9.15 FAA regulations for domestic operations lays down at least 9 consecutive hours of rest for less than 8 hours of scheduled flight time and 11 consecutive hours of rest for 9 or more hours of scheduled flight time. For international operations the rest period must be at least twice the number of hours flown since the preceding rest period, but not less than eight hours. The rest period of 8 hours is only if flight time is 4 hours or less during any 24 consecutive hours.

9.16 “OPS 1.1110 Rest” of EU OPS, Subpart ‘Q’, prescribes ‘minimum rest’ as follows:

"1. Minimum Rest
1.1. The minimum rest which must be provided before undertaking a flight duty period starting at home base shall be at least as long as the preceding duty period or 12 hours whichever is the greater;
1.2. The minimum rest which must be provided before undertaking a flight duty period starting away from home base shall be at least as long as the preceding duty period or 10 hours whichever is the greater; when on minimum rest away from home base, the operator must allow for an eight hour sleep opportunity taking due account of travelling and other physiological needs;"

9.17 EU regulations have two basic patterns of ‘minimum rest’; one when the duty starts from home base and the other when the duty starts away from home base. The rest at outstation is less than that at home base, but the operator must allow at least “eight hour sleep opportunity” taking due account of travelling and other physiological needs. Further, in both cases the ‘minimum rest’ must not be less than the preceding ‘flight duty period’.

9.18 CAA, UK specifies rest period as follows:

“17.2 The minimum rest period which must be provided before undertaking a flying duty period shall be:
   a) at least as long as the preceding duty period, or
   b) 12 hours
   whichever is the greater."
17.2.1 When away from base, in the case when the rest period earned by a crew member is 12 hours, and suitable accommodation is provided by the operator, then that rest period may be reduced by one hour. In such circumstances, if the travelling time between the aerodrome and the accommodation is more than 30 minutes each way then the rest period must be increased by the amount the total time spent travelling exceeds one hour. The room allocated to the crew member must be available for occupation for a minimum of 10 hours. This sub-paragraph does not apply to rest periods that exceed 12 hours.

17.2.2 Exceptionally at home base, individual crew members may be asked to exercise their discretion to reduce rest by up to a maximum of one hour but only to a minimum of 12 hours for flight crew and 11 hours for cabin crew. If discretion is used, it is the responsibility of the operator and the crew member to inform the commander of the flight immediately following the rest period, that a reduced rest period has been taken.

17.3 If the preceding duty period, which includes any time spent on positioning, exceeded 18 hours, then the ensuing rest period must include a local night.”

9.19 Australian regulations regarding the minimum rest stipulates as follows:

**Flight Crew not more than 2 Pilots**

“1.2 A tour of duty or period of reserve time at home shall be preceded by a rest period on the ground of at least:

(a) 9 consecutive hours embracing the hours between 10 pm and 6 am local time; or

(b) 10 consecutive hours.”

**Flight Crew 3 or more Pilots**

3.4 Before commencing a tour of duty a pilot shall have a rest period of not less than 12 consecutive hours.

9.20 If the flight has already commenced with flight crew of not more than 2 Pilots and ‘Tour of Duty’ is extended beyond 11 hours or ‘Flight Time’ is extended beyond 8 hours, then Australian regulations prescribe additional rest of 1 hour for each extension of 15 minutes or part there of to ‘Tour of Duty’ or ‘Flight Time’.

9.21 The New Zealand regulations stipulate minimum rest as follows:

“Rest

Any duty period shall be followed by a rest period of not less than 10 hours except where it is otherwise stated in this document.
Internal Operations – Two Pilot Crews

When the pilot has flown more than 8 hours, or has been on duty more than 11 hours in any 24 consecutive hours, he or she shall have, on completion of that duty period, a rest period of not less than 12 consecutive hours, including the hours between midnight and 6 am or extended to include that period, up to a maximum of 24 consecutive hours.

When the pilot has flown more than 16 hours or been on duty more than 22 hours in any 48 consecutive hours, he or she shall have, on completion of that duty period, a rest period of not less than 24 consecutive hours:

External Operations – Two-Pilot Crews

When a pilot flies more than 8 hours or has been on duty more than 11 hours in any 24 consecutive hours, he or she shall have, at the completion of that duty period, a rest period of not less than 12 consecutive hours, including the hours between midnight and 6 am local time, or 14 consecutive hours:

When a pilot has flown more than 16 hours or has been on duty for more than 22 hours in any 48 consecutive hours, he or she shall have, at the completion of that duty period, a rest period of not less than 24 consecutive hours:

External Operations – Three-Pilot Crews

Within each duty period the pilot-in-command shall establish a roster of periods of active duty and rest for each pilot which may only be varied at the discretion of the pilot-in-command.

On completion of the duty period a pilot shall have a rest period on the ground calculated as follows:

(i) For the first 11 hours duty – 10 consecutive hours:

(ii) For each subsequent hour’s duty – 2 additional hours, up to a maximum of 24 consecutive hours:

When a pilot has been on duty for more than 24 hours in 48 consecutive hours he or she shall have, at the completion of that duty period, a rest period of not less than 24 consecutive hours.

Comments Received

9.22 Jet Airways has suggested to adopt minimum rest period requirements of EU i.e. rest of 12 hrs at home base and 10 hrs at out stations or previous FDP.

9.23 Kingfisher Airlines has suggested as follows:

“Rest Period: So far, Rest Period was actually the time away from the vicinity of the aeroplane with no co-relation to actual sleep. e.g. with a rest period of 8 hrs,
one can safely discount 2 hrs spent in transit and another 01 hr In preparation (or sleep / getting ready to depart for the airport. Sleep seldom exceeded 5 or 4 hrs. We now need to define rest period as distinct from transit time, waiting time to check into hotels etc. It is recommended that the min rest period be 10 hrs with duty time counted from 01 hrs prior to departure (as is the common practice) and 15 min after chocks ON."

9.24 IPG has suggested “Rest Periods” as follows:

“......... The minimum rest period for an acclimatized crewmember immediately before commencing a Flight Duty Period shall not be less than 12 hours. The duration of a rest period for an acclimatized crewmember that overlaps the WOCL by less than 2 hours must be at least 14 hours. If it overlaps the WOCL by at least two hours, but less than 4 hours, the minimum is 13 hours. The minimum rest period for a pilot who is not acclimatized is 14 hours. The minimum rest period should provide an eight hour sleep opportunity, at the place of rest, plus sufficient time for sustenance / the consumption of meals, and normal hygiene requirements.”

Analysis

9.25 A perusal of international regulations and practices being followed by various countries indicate following broad trends:

- The minimum rest period should allow an opportunity to sleep for eight consecutive hours.
- The minimum rest period must not be less than the preceding ‘duty period’.
- EU regulations stipulate minimum rest period at home base is at least as long as the preceding duty or 12 hours, whichever is higher. However, at out stations it may be at least as long as the preceding duty or 10 hours, whichever is higher but the operator must allow at least “eight hour sleep opportunity” taking due account of travelling and other physiological needs.
- Regulations of Canada, EU and UK include the travelling time between the aerodrome and the accommodation in the prescribed minimum rest period at out stations.
- FAA regulations stipulate a rest period of 9 to 11 hours for domestic operations and for ‘Flag’ operations the rest period must be at least twice the number of hours flown since the preceding rest period, but not less than eight hours.
- Australian regulations provide a rest of 10 hours and 12 hours for operations with ‘not more than 2 pilots’ and ‘3 or more pilots’ respectively.
• New Zealand regulations prescribe rest period not less than 10 hours and is increased to 12 hours or more, if the pilot has flown more than 8 hours, or has been on duty more than 11 hours in any 24 consecutive hours.

9.26 It is obvious from the above that most of the countries prescribe Minimum Rest Period between 10 to 12 hours or the preceding ‘duty period’ which ever is higher. It needs to be clarified that the minimum rest period stipulated by Canada, EU and UK caters for travel time, 8 hours sleep opportunity, and physiological needs of the crew members.

9.27 FAA for domestic operations stipulates rest of 9 to 11 hours and for ‘Flag’ operations rest is stipulated “at least twice the number of hours flown since the preceding rest period, but not less than 8 hours”. Further, FAA also includes local transportation as part of rest period after being relived from an airport for his/her home station.

9.28 NASA study on Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation (NASA TM 110404) defines ‘off-duty’ period as “A continuous period of uninterrupted time during which a crew member is free of all duties” which is equivalent to ‘Rest Period’. The study analyses the ‘off-duty’ period as follows:

The off-duty period should allow for three components. The first critical component of the off-duty period is an 8-hour sleep opportunity. The general principles clearly describe that an acute sleep deficit and a cumulative sleep debt can degrade performance and alertness. Also, it should be recognized that an appropriate “spin down” time may be required to fall asleep. The second component is awake time off, an opportunity to break from the continuous performance of required tasks. The third component is the other activities necessary during an off-duty period. These other necessary activities can include transportation to and from layover accommodations, hotel check in/out, meals, shower, and personal hygiene. Therefore, the off-duty period should be a minimum of 10 hours uninterrupted within any 24-hour period, to include an 8-hour sleep opportunity, awake time off, and time for other necessary activities.

9.29 The suggestion of IPG states that the rest period “shall not be less than 12 hours” for acclimatised crew member and to be increased to 14 hours for unacclimatised crew member or when the rest period does not fully overlap WOCL period. Further, IPG has suggested that the rest period comprises of two components namely eight hours sleep
opportunity and physiological requirements. IPG is not counting ground transportation as part of the rest period.

9.30 In accordance with the suggestion of IPG, the rest period of minimum 12 hours is to provide eight hours sleep opportunity and 4 hours for physiological needs. The suggestion, therefore, is not in line with international practices. As stated above, the normal components of minimum rest period of 10 to 12 hours include eight hours of opportunity to sleep, transportation from from/to airport and physiological needs. The suggestion of IPG is much beyond the international norms and may not be acceptable.

9.31 In India, AIC 28 of 1992 stipulates rest for both domestic and international operations to be pro-rata twice the flight time subject to minimum of 8 hours in any 24 consecutive hours. AIC 28 of 1992 specifically provides that transportation between airport and accommodation is not considered as rest period, whereas as stated in preceding paras, it is included in the rest period by Canada, USA and EU and also by the NASA study.

9.32 The CAR of 2007 for domestic operations uses the same principle of AIC 28 of 1992 i.e. rest should be twice the flight time but the minimum rest period has been increased from 8 hours to 10 hours in 24 consecutive hours and also specifically provides that ground transportation will not be considered as 'Rest Period'. For international operations, CAR of 2007 considerably enhances the rest period as compared to AIC 28 of 1992 and stipulates as follows:

a) When crew is rostered for a flight of 9 hours or more, rest period prior to operating such flight shall include a local night.

b) Minimum rest period at outstation based on crossing of time zone:

<table>
<thead>
<tr>
<th>Time zone away from base station</th>
<th>Rest at Outstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Twice the flight time subject to minimum of 12 hours.</td>
</tr>
<tr>
<td>&gt;3-7</td>
<td>Twice the flight time subject to minimum of 20 hours.</td>
</tr>
<tr>
<td>&gt;7-12</td>
<td>72 hours cumulative</td>
</tr>
</tbody>
</table>
c) For a single flight time exceeding 14 hours (Ultra Long Range Operation) minimum rest shall be

i. Rest Period prior to operating ULR flight shall include a local Night.

ii. Minimum Rest Period at out station shall be 60 hours.

iii. Rest on return to base station shall be 72 hours if the duration of the trip is less than 9 days and 96 hours if the duration of the trip exceeds 9 days.

9.33 It is obvious from the above that the rest requirements stipulated in the CAR of 2007 are much higher than the other countries and the NASA study.

9.34 It was also noted by the Committee that increase in rest period stipulated in CAR 2007, was beyond the current international practices and without using any scientific evidence. This situation resulted in need for additional highly qualified flight crew members by the airlines.

9.35 NASA provides specific recommendation regarding “Off-Duty Period” at para 2.1.2 of TM 110404, which is discussed at para 3.33 of this report. The recommendation is as follows:

2.1.2 Off-duty period (acute sleep and awake-time-off requirements)- The off-duty period should allow for three components.

The first critical component of the off-duty period is an 8-hour sleep opportunity. The general principles clearly describe that an acute sleep deficit and a cumulative sleep debt can degrade performance and alertness. Also, it should be recognized that an appropriate "spin down" time may be required to fall asleep.

The second component is awake time off, an opportunity to break from the continuous performance of required tasks.

The third component is the other activities necessary during an off-duty period. These other necessary activities can include transportation to and from layover accommodations, hotel check in/out, meals, shower, and personal hygiene. Therefore, the off-duty period should be a minimum of 10 hours uninterrupted within any 24-hour period, to include an 8-hour sleep opportunity, awake time off, and time for other necessary activities.
9.36 Moebus Report while addressing Question No. 7 “what provisions and/or guidelines are needed on rest for time zone crossings (ref. EU OPS 1.1110 para 1.3)” has dealt with the minimum rest during layover after crossing several time zones and recommends as follows:

Rest on layover

Many studies have shown that sleep times are displaced and sleep disrupted when aircrew have to sleep during layovers after crossing several time zones [e.g. Graeber RC, 1986; Spencer MB et al, 1990; Samel A et al, 1991; Lowden A & Åkerstedt T, 1998]. Therefore, the minimum rest should be increased to allow for the reduced period when normal sleep time on the body clock overlaps with normal sleep time in the local environment. Taking this into consideration, we recommend that the minimum rest should be 14 hours during layovers after significant time crossing.

9.37 The Committee considered the time of transportation to/from airport and was of the view that it would not be practicable to prescribe optimum time of transportation in the regulations as it would vary from city to city. The Committee, therefore, considered that the operator would be in a better position to determine the optimum time of transportation depending upon home bases of the flight crew and should ensure that rest period does not get reduced below the minimum requirements. The operator should include this as part of their scheme.

Recommendation No. 18

9.38 The Committee deliberated the issue and agreed to adopt minimum rest period as prescribed by EU as follows:

Minimum Rest

1. The minimum rest, which must be provided before undertaking a flight duty period, should be:
   a) at least as long as the preceding duty period, or
   a) 12 hours
   b) 14 hours on crossing 3 time zones, or
   c) 36 hours on crossing 8 time zones
   whichever is the greater;

2. If the preceding duty period, which includes any time spent on positioning, exceeded 18 hours, then the ensuing rest period should include a local night.
3. Period of transportation to and from an airport should neither be counted towards duty time nor rest period. The operator should include in the ‘Scheme’ the optimum time of transportation after taking into account various factors and on ensuring that the rest period does not get reduced below the minimum rest requirements.

**Additional Rest Requirements:**

**International Practices**

9.39 Additional rest requirements beyond the minimum rest requirements are stipulated to ensure recovery from the cumulative fatigue as follows:

A. **Weekly rest period**

9.40 ICAO in its guidance material provides that longer rest periods should be granted on regular basis to preclude cumulative fatigue and states as follows:

**ICAO**

4.8.1.2 Longer rest periods should be granted on a regular basis to preclude cumulative fatigue.

9.41 Nearly all countries provide for weekly rest period varying from 24 hours to 36 hours. FAA, USA prescribes at least 24 consecutive hours at least once during any seven consecutive days, both for domestic and international operations, Australia provide for 32 hours embracing 10:00 PM to 06:00 AM on two nights. The EU & Canada provide for 36 consecutive hours including 2 local nights. These regulations are quoted below:

**FAA, USA**

Domestic Operations:

“Each certificate holder conducting domestic operations shall relieve each flight crewmember engaged in scheduled air transportation from all further duty for at least 24 consecutive hours during any 7 consecutive days.”

Flag Operations (International Operations):

“No pilot may fly more than 32 hours during any seven consecutive days, and each pilot must be relieved from all duty for at least 24 consecutive hours at least once during any seven consecutive days.”

**Australian Regulations**

A pilot shall not commence a flight and an operator shall not roster the pilot for a flight unless during the 7 days period terminating co-incident with the termination of the flight he or she has been relieved from all duty associated with his or her employment for at least 1 continuous period embracing the hours between 10 pm and 6 am on 2 consecutive nights.
New Zealand

Internal Operations

In addition to the rest period applicable at the end of a pilot’s last duty period, he or she shall have a recreational period of 24 consecutive hours free of all duties at least once in every 7 consecutive days. If, because of the length of the required rest period, this is not possible, the pilot shall have this recreational period free of all duties at the conclusion of that rest period.

External Operations include the following in addition to internal operations

When at home base, the rest period applicable and the recreational 24 hours must together include a continuous period embracing the hours between midnight and 6 am on two successive nights or extended to include that period.

EU

2. Rest periods

2.1. An operator shall ensure that the minimum rest provided as outlined above is increased periodically to a weekly rest period, being a 36-hour period including two local nights, such that there shall never be more than 168 hours between the end of one weekly rest period and the start of the next. As an exception to OPS 1.1095 point 1.9, the Authority may decide that the second of those local nights may start from 20:00 hours if the weekly rest period has a duration of at least 40 hours.

Air Transport, Canada

"700.19 (1) Subject to subsection (2), an air operator shall provide each flight crew member with the following time free from duty:

(a) where the operation is conducted under Subpart 4 or 5 using an aircraft other than a helicopter, one period of at least 36 consecutive hours within each 7 consecutive days or one period of at least 3 consecutive calendar days within each 17 consecutive days;

(b) where the operation is conducted under Subpart 2 or 3 or is conducted using a helicopter, one period of at least 24 consecutive hours 13 times within each 90 consecutive days and 3 times within each 30 consecutive days; and

(c) where the flight crew member is a flight crew member on call, one period of at least 36 consecutive hours within each 7 consecutive days or one period of at least 3 consecutive calendar days within each 17 consecutive days."

9.42 The AIC/92 stipulates that each flight crew be relieved from all duty for at least 24 consecutive hours during any 7 consecutive days for both domestic and international operations, which is similar to FAA, USA regulations. The CAR of 2007 added that the 24 hours rest shall encompass the period between 2000 to 0600 hours and will be in addition to the rest based upon the flying in the last 24 consecutive hours. A comparison chart between AIC/92 and CAR 2007 regarding weekly rest is as follows:
Rest Requirements – Domestic and International Operations

<table>
<thead>
<tr>
<th>Criterion</th>
<th>AIC</th>
<th>CAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly Rest</td>
<td>Each flight crew shall be relieved from all duty for at least 24 consecutive hours during any 7 consecutive days.</td>
<td>A minimum of 24 hours rest encompassing period 2000 Hrs to 0600 Hrs shall be provided to all crew members in any 7 consecutive days. This will be in addition to the rest based upon the flying in the last 24 consecutive hours.</td>
</tr>
</tbody>
</table>

Comments Received

9.43 Kingfisher airlines has stated “A min rest period of 24 hrs encompassing the period 2000 hrs to 0600 hrs should be provided to all crew in any 07 consecutive days”. The language is identical to that of CAR but does not include the additional clause which stipulates that the weekly rest would be in addition to the rest based upon flying in the last 24 consecutive hours.

9.44 IPG has suggested 36 hours consecutive rest including two local nights once in 7 calendar day period. It has also suggested that additionally 2 consecutive days in 14 days and a minimum of 7 days off in any consecutive 4 weeks. IPG’s suggestion is as follows:

Additional ‘Days off’ at ‘Home Base’:

For crews remaining acclimatized to the home base time zone, once in every 7 calendar day period, a minimum rest period of 36 hours should be provided extended as necessary to include 2 local nights of recovery rest to minimize the effects of sleep loss and fatigue.

In addition, all crew shall have:

• 2 consecutive days off in any consecutive 14 days following the previous 2 consecutive days off, and
• a minimum of 7 days off in any consecutive 4 weeks, and
• an average of at least 8 days off in each consecutive 4 week period, averaged over 3 such periods.

9.45 The concept of ‘Days Off’ is in CAP 371 of CAA, UK, which defines as follows:

‘Days Off’

Periods available for leisure and relaxation free from all duties. A single day off shall include 2 local nights. Consecutive days off shall include a further local night for each additional consecutive day off. A rest period may be included as part of a day off.
9.46 The concept of ‘Days Off’ is to provide ‘leisure and relaxation’ and is different from the concept/definition of “Rest Period” which is essentially designed to give crew members adequate opportunity to rest before a flight. The concept of ‘Days Off’ is not a part of regulations EU, USA, Australia or Canada. As these countries strictly deal with ‘Rest Period’. ICAO also does not provide any definition/guidance for ‘Days Off’.

9.47 The Committee deliberated the issue and agreed not to recommend introduction of the concept relating to ‘Days Off’ as it essentially deals with leisure and relaxation. The latter cannot be part of the fatigue related regulations and is best left to be addressed between operator and employees. The Committee, therefore, is of the opinion that ‘days off’ may be made a part of the ‘Scheme’ of the airline and the matter would be best addressed by airlines subject to the approval of the regulator.

**Analysis**

9.48 The international practices regarding weekly rest period reveal that almost all countries, except USA, provide that the rest period is increased which covers two consecutive nights i.e. during any 7 consecutive days the minimum rest period of the flight crew is enhanced to 36 hours. USA, however, stipulates to relieve each flight crew member from all duties for at least 24 consecutive hours once during any seven consecutive days.

9.49 NASA study on Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation (NASA TM 110404) supports the weekly enhanced rest of 36 hours and states as follows:

“The general principles outline the importance of recovery to minimize the cumulative effects of sleep loss and fatigue. Two consecutive nights of usual sleep is a minimum requirement to stabilize sleep patterns and return waking performance and alertness to usual levels. Two consecutive nights of recovery sleep can provide recovery from sleep loss. Therefore, the standard off-duty period for recovery should be a minimum of 36 continuous hours, to include two consecutive nights of recovery sleep, within a 7-day period.”

9.50 The Committee considered Q10 of Moebus report on the effects of format of rest periods on cumulative fatigue.
10. the effects of the format of rest periods on cumulative fatigue (ref. EU OPS 1.1110 para 2.1)

- The format of rest periods should include a provision for “local night”, defined as 10 hours between 22:00h and 10:00h to ensure proper rest. The length of the rest period needed after a number of consecutive days on duty is not possible to answer in a detailed way because of a lack of scientific data, but the present provision of a weekly rest period after 168 hours of duty falls short of reasonable requirements (Q10)

9.51 In the absence of direct scientific evidence, it is not possible to provide clear guidance on the relationship between cumulative fatigue and the frequency of days off. Therefore, the Committee agreed to adhere to available best international practices of 36 hours in 7 days.

9.52 During hearing, various pilots associations had apprised the committee that in some quarters there is a practice of allowing double the weekly rest at the end of the corresponding fortnight. In Committee’s view this practice does not address cumulative fatigue on weekly basis. Therefore, the committee is of the view that a 36 hours period including two local nights must be mandatorily provided on weekly basis that is 168 hours.

Recommendation No. 19

9.53 The Committee deliberated the regulations regarding the weekly rest and agreed to recommend the EU formulation of enhanced weekly rest, which states as follows:

An operator should ensure that the minimum rest is increased periodically to a weekly rest period, being a 36-hour period including two local nights, such that there should never be more than 168 hours between the end of one weekly rest period and the start of the next.

B. Rest to compensate for Time Zone difference

9.54 ICAO guidelines on Minimum Rest Period stipulate that ‘Time Zone Crossings’ should be taken into account and states as follows:

4.8.1.1 Rest provisions should be introduced to take into account the impact of time zone crossings and night operations.
International Practices

9.55 EU regulations expect that effects on crew members of time zone differences will be compensated by additional rest and states as follows:

1.3. An operator will ensure that effects on crew members of time zone differences will be compensated by additional rest, as regulated by the Authority subject to the provisions of Article 8.”

9.56 In view of the above stipulation of European Union to compensate for ‘Time Zone Difference’ on rest requirements be regulated by aviation authorities, it was considered necessary by the Committee to examine the prevalent regulations of EU Member States.

9.57 Belgium regulations for time zone compensation of rest stipulate as below:

“1.3 An operator will ensure that effects on crew members of time zone differences will be compensated by additional rest as specified below.

Minimum rest including local nights will be given, according to the table below, when coming back to home base, to any crew member who has been away from the home base in such a way that the WOCL had to be modified.

<table>
<thead>
<tr>
<th>Time zone difference</th>
<th>Hours of rest</th>
<th>Local nights</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-7</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>8 and more</td>
<td>72</td>
<td>3</td>
</tr>
</tbody>
</table>

"Time zone difference” in this table is the time zone difference between the starting and finishing points of the initial duty.”

9.58 The above table of Belgium regulations do not have a stipulation up to 3 time zone difference because the EU definition of WOCL states: “Within a band of three time zones the WOCL refers to home base time”.

9.59 Iceland regulations for time zone compensation for rest stipulate as follows:

1.1110 Rest
1.3 Time Difference

Minimum rest including local nights will be given, according to the table below, when returning to home base, to any crew member who has been away from the home base in such a way that the WOCL had to be modified.
Dr. Nasim Zaidi Committee Report

Chapter 9 – Rest Periods

<table>
<thead>
<tr>
<th>Max Time zone difference</th>
<th>Hours of rest</th>
<th>Local night</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 3</td>
<td>Min rest</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Min rest + time zone difference</td>
<td></td>
</tr>
<tr>
<td>5 – 7</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>8 and more</td>
<td>72</td>
<td>3</td>
</tr>
</tbody>
</table>

“Time zone difference” means the greatest time difference at which the duties began and ended.

The hours of rest may be combined with the rest requirements defined in OPS 1.1110 art 2.1.

9.60 CAA UK provides for additional rest to compensate for crossing time zones and states as follows:

“The table below provides an easy reference for days off at base, allocated to crew members on return from a flying duty or series of flying duties. If an individual crew member requests less days off than allowed for in the table this may be granted, provided the actual time off does not contravene the provisions of the FTL scheme.

<table>
<thead>
<tr>
<th>Days Off Calculation Table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return Sector Length</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Up to 7 hours</td>
</tr>
<tr>
<td>Up to 7 hours</td>
</tr>
<tr>
<td>7 to 10 hours</td>
</tr>
<tr>
<td>7 to 10 hours</td>
</tr>
<tr>
<td>10 to 14 hours</td>
</tr>
<tr>
<td>10 to 14 hours</td>
</tr>
<tr>
<td>14 hours plus</td>
</tr>
<tr>
<td>14 hours plus</td>
</tr>
</tbody>
</table>

9.61 Regulation of the above countries namely Belgium, Iceland and UK provide additional rest to the crew members only after their return to base. An exception to the rule is Malta Civil Aviation Department, which has the following provision:

OPS 1.1110 point 1.3 – Additional rest due to the effects of time zone differences

When the location of rest is 3 time zones or more from where the FDP commenced, minimum rest following a FDP shall be increased as follows:
9.62 The above table shows that additional rest up to 3 hours is provided to the crew following the FDP when the location of rest is 8 time zones or more away from where the FDP commenced. However, no additional rest is provided after return to base.

9.63 FAA, USA also provides enhanced rest on return to base and states as follows:

“The certificate holder conducting flag operations shall give each pilot, upon return to his base from any flight or series of flights, a rest period that is at least twice the total number of hours he flew since the last rest period at his base.”

**Comments Received**

9.64 IPG has suggested about additional rest for time zone compensation as follows:

**For Non-acclimatised Crew:**

Where crew members are not acclimatized, upon return to home base, a recovery period should be provided that ensures a crew member’s body clock has recovered to home base local time before the start of the next duty. The time necessary to ensure a complete recovery of the circadian rhythm varies as a function of the elapsed time away from base and the maximum time difference from home base. The following table should be used to determine the number of local nights required to adapt within an hour of home base.

**Number of Local Nights for Recovery on return to Home Base**

<table>
<thead>
<tr>
<th>Elapsed Time since leaving Home Base (h)</th>
<th>Maximum Time Difference from Home Base (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td>60 – 84 h</td>
<td>1*</td>
</tr>
<tr>
<td>84 – 108 h</td>
<td>2*</td>
</tr>
<tr>
<td>108 – 132 h</td>
<td>2*</td>
</tr>
<tr>
<td>132 – 156 h</td>
<td>3</td>
</tr>
<tr>
<td>156+ h</td>
<td>3</td>
</tr>
</tbody>
</table>

*Note 1:* The values in the above table refer to eastward transitions (eastward outbound / westward homebound) only. * denotes that for westward transitions (westward outbound / eastward homebound) one extra day is required to be added to the value depicted.
Note 2: When the elapsed time away from home base is less than 60 hours one full local night’s recovery rest should be provided on return to base, except when the returning flight duty period encroaches the WOCL, then an additional local night’s rest will be added.

Note 3: When the time difference from base is in fractions it shall be rounded off to the next higher bracket. E.g. If the maximum time zone difference is 51/2 hours, the table for 6 hours shall be used for calculating local nights required.

9.65 IPG agrees that the additional rest for crossing the time zone is to be provided on return to the home base, which is in accordance with international practice. However, there are some fundamental differences about the number of local nights to be provided after return to home base. WOCL does not change with in 3 time zones and as such minimum rest is considered adequate up to 3 time zone difference. Beyond 3 time zones also, the international practice does not take into account separately eastwards and westward journeys.

9.66 Jet Airways have suggested the following stipulation:

<table>
<thead>
<tr>
<th>Rest Period at Home Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Zone away form the last rest station</td>
</tr>
<tr>
<td>Add 50% of zone difference</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rest Period Away from Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Zone difference from last rest station</td>
</tr>
<tr>
<td>up to 4 hrs</td>
</tr>
<tr>
<td>&gt;4 hrs</td>
</tr>
</tbody>
</table>

9.67 The suggestion of Jet Airways about the additional rest due to time zone crossing has two tables namely “Rest Period at Home Base” and “Rest Period Away from Home Base”. The table, which stipulates “rest at home base”, suggests that on return to home base the crew may be provided minimum rest at Home Base (i.e. previous FDP or 12 hours, which ever is more) plus additional rest of 50% of time zone difference. Similarly, minimum ‘Rest Away from Base’ (i.e. previous FDP or 10 hours, which ever is more) may be enhanced by 50% of the time zone difference, provided time zone difference is more than 4 hours.
9.68 The suggestion of Jet Airways has two distinct differences with the international practices, one WOCL is considered only up to 3 time zones and as such additional rest is required beyond 3 time zones and not beyond 4 time zones as suggested and second the amount of additional rest after return to home base is too less – it should be in days and not hours as suggested by Jet Airways.

**Analysis**

9.69 International practices regarding additional rest due to time zone crossing has two distinct features. Firstly, the additional rest is provided only on crossing more than 3 time zones and secondly the rest is provided to crew only after their return to home base. The WOCL does not change within a band of three time zones and as such the flight are treated to be local domestic flights.

9.70 Moebus Report also deals with need for rest time for time zone crossings and recommends as follows:

7. **what provisions and/or guidelines are needed on rest for time zone crossings (ref. EU OPS 1.1110 para 1.3)**

- Home base recovery days after time zone crossings should be provided according to the number of time zones crossed and the duration of the layover (see Table 1) (Q7):

<table>
<thead>
<tr>
<th>Layover (h)</th>
<th>Maximum time difference (h)</th>
<th>5-7</th>
<th>8-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;36</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>36-60</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>60-84</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>84-132</td>
<td></td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>&gt;132</td>
<td></td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

**Table 1 Home base recovery period**: recommended **number of local nights** required to readapt to within an hour of home time given for various time zone differences and preceding layover durations.

9.71 NASA study on Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation (NASA TM 110404) also recommends additional rest to flight crew upon return to home base as follows:
2.5 Time Differences

In general, the longer a flight crew member is away from the home-base/domicile time zone, the more recovery time is needed for readjustment back to home-base/domicile time. Therefore, it is recommended that for flight duty periods that cross 4 or more time zones, and that involve 48 hours or more away from the home-base/domicile time zone, a minimum of 48 hours off-duty be allowed upon return to home base/domicile time.

9.72 AIC 28 of 1992 did not have stipulation of increased rest for time zone crossing due to the then prevailing operations. The CAR of 2007 provided the stipulation for increased rest for time zone crossing for both at out station and return to base as follows:

<table>
<thead>
<tr>
<th>Time zone away from base station</th>
<th>Rest at Outstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Twice the flight time subject to minimum of 12 hours.</td>
</tr>
<tr>
<td>&gt;3-7</td>
<td>Twice the flight time subject to minimum of 20 hours.</td>
</tr>
<tr>
<td>&gt;7-12</td>
<td>72 hours cumulative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time zone away from base station</th>
<th>Rest at base station</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Twice the flight time of last sector subject to minimum of 12 hours.</td>
</tr>
<tr>
<td>&gt;3-7</td>
<td>48 hours which shall include two local nights.</td>
</tr>
<tr>
<td>&gt;7</td>
<td>72 hours if duration of trip is less than/or 9 days. 96 hours if duration of trip is more than 9 days.</td>
</tr>
</tbody>
</table>

9.73 It is obvious from the above and also pointed out earlier (paras 9.33 – 9.34), rest requirements stipulated in the CAR of 2007 are much higher than the other countries and the NASA study.

9.74 The Committee took note that the NASA study which states that more recovery time is required for readjustment back to home base/domicile time. The study recommends that for flight duty periods that cross 4 or more time zones, and that involve 48 hours or more away from the home-base/domicile time zone, a minimum of 48 hours off-duty be allowed upon return to home base/domicile time.
9.75 The Committee after careful deliberations agreed that there is a need to reconcile the Moebus recommendations with available best practices. Hence, the Committee decided to adhere to EU regulation, which in committee view are adequate to provide compensation for rest period of crew on return to home base after spending time away and crossing time zone.

**Recommendation No. 20**

9.76 As stated earlier, most of countries provide enhanced rest for time zone compensation only after return to base and not at outstations, it was agreed by the Committee to recommend to stay with the practice followed by other countries to provide enhanced rest for time zone after return to base. The Committee, therefore, recommends as follows:

"An operator should ensure that effects on crew members of time zone differences is compensated by additional rest as specified below.

Minimum rest including local nights should be given, according to the table below, when coming back to home base, to any crew member who has been away from the home base in such a way that the WOCL had to be modified.

<table>
<thead>
<tr>
<th>Time zone difference</th>
<th>Hours of rest</th>
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<td>2</td>
</tr>
<tr>
<td>8 and more</td>
<td>72</td>
<td>3</td>
</tr>
</tbody>
</table>

"Time zone difference" in this table is the time zone difference between the starting and finishing points of the initial duty."
CHAPTER – 10
Miscellaneous Provisions

10.1 Guidance Material of ICAO Annex 6 for development of prescriptive fatigue management regulations (para 4.10) stipulates “Miscellaneous Provisions” relating to following components:

Standby
Available
Positioning

10.2 In addition to the above three miscellaneous provisions along with other provisions such as Split Duty, Unforeseen Circumstances, Reporting Time, Night Operations and Local Night are also being dealt in this Chapter.

Standby & Availability of Flight Crew

Definitions of standby and availability

International Practices

10.3 Various definitions of standby by ICAO and other countries are as follows:

ICAO
Standby: A defined period of time during which a flight or cabin crew member is required by the operator to be available to receive an assignment for a specific duty without an intervening rest period.

EU
Standby: A defined period of time during which a crew member is required by the operator to be available to receive an assignment for a flight, positioning or other duty without an intervening rest period.

CAA, UK CAP 371
Standby Duty: A period during which an operator places restraints on a crew member who would otherwise be off duty. However, it shall not include any time during which an operator requires a crew member to be contactable for the purpose of giving notification of a duty which is due to start 10 hours or more ahead.

New Zealand
Standby period means the period of time during which a flight crew member is required to hold himself available for active duty
Australia

Australian regulations, instead of Standby use the terminology of “Reserve Time” and define it as follows:

*Reserve Time* means the period during which a flight crew member is required to hold himself or herself available for a tour of duty."

Air Transport Canada

Regulations require an air operator to provide flight crew members on reserve, within each 24-hour period but there is no definition associated with it.

FAA, USA

No regulations on standby

Comments Received

10.4 Jet Airways and IPG in their submission have suggested following definitions of ‘standby’:

Jet Airways

"Standby Duty: It is not a duty but a defined period of time during which a crew member is required by the operator to be available to receive an assignment for duty."

IPG

"Standby: “A defined period of time, at the airport, or at home, during which a crew member is required by the Operator to be available to receive an assignment for a specific duty without an intervening rest period.”

10.5 The definition suggested by Jet Airways states that ‘Standby’ is not a duty, which is not factually correct position. Standby at airport, for instance, is considered as duty. Further, some percentage of a standby period even at home may be considered as duty. The rest of the definition is in accordance with the international practice.

10.6 The definition suggested by IPG is almost in line with ICAO definition except that it is narrower as it restricts standby to only “at the airport, or at home”. Additionally, standby can be at a hotel or any other suitable accommodation as well. Therefore, it is not appropriate to restrict definition of standby period to be provided either at airport or at home.
Analysis

10.7 It is evident from the international practice that standby is a “period of time” during which the crew is required to be available for accepting a duty “without an intervening rest period”. Further, none of the international definitions restricts the place where crew would be on standby. It permits standby at airport, home, hotel, or any other accommodation including an aircraft.

10.8 AIC 28 of 1992 does not have any provision of “Standby”. It may be mentioned that AIC 28 of 1992 was formulated on the basis of FAA regulations, which also do not have such provision and ICAO guidelines also did not prescribe the same at that time. Standby crew is essentially required to cover an eventuality where the rostered crew is not available to operate a flight due to any reason or due to delay of a flight the rostered crew may exceed its flight or duty time limitations. Such provisions are part of airline operations and could be best handled by the airlines.

10.9 The CAR of 2007, stipulates the requirements of “Standby Duty” but no definition has been laid down.

10.10 The Committee deliberated upon various standby definitions. ICAO definition was considered as the most appropriate as it covers essential components i.e. standby is a “period of time” and crew to accept a duty “without an intervening rest period”. It was noticed that CAA, UK definition included an element of ‘availability’ as part of standby. The ICAO guidelines specifically deal with ‘availability’ and clarify that brief time for crew for being available for contact should not be counted as duty.

10.11 ICAO Guidelines also define availability as part of standby as follows:

4.10.2 Available

When flight and cabin crew members are required to be available for contact over a brief period of time to receive instructions concerning a possible change of roster, that requirement should not prevent that crew member from having a rest period before reporting for duty. The time spent being available should not be counted as duty.
Recommendation No. 21

10.12 In view of the above, the Committee agreed to recommend the following definition based on ICAO along with clarification of CAA, UK regarding ‘availability’:

"Standby: It is a defined period of time during which a flight crew member is required by the operator to be available to receive an assignment for a specific duty without an intervening rest period. However, it shall not include any time during which an operator requires a crew member to be contactable for the purpose of giving notification of a duty which is due to start 10 hours or more ahead."

Standby Regulations

*International Practices and Regulations on Standby*

10.13 ICAO Guidelines on Standby mentioned at para 10.1 of Attachment ‘A’ of Annex 6 Part I states as follows:

"4.10.1 Standby
4.10.1.1 The start time and end time of standby should be defined and notified at least (*) hours in advance, and the maximum length of any standby should not exceed (*) hours.
4.10.1.2 Where airport standby is immediately followed by a flight duty period, the relationship between such airport standby and the assigned flight duty should be defined. In such a case, airport standby, if it is likely to induce fatigue, should be considered as part of a duty period and should be taken into account to calculate the minimum rest preceding a subsequent flight duty period.
4.10.1.3 When flight and cabin crew members are required to be on standby at an accommodation arranged by the operator, then adequate rest facilities should be provided."

10.14 European Union stipulates standby regulations as follows:

OPS 1.1125

Standby

1. Airport standby
1.1. A crew member is on airport standby from reporting at the normal report point until the end of the notified standby period.
1.2. Airport standby will count in full for the purposes of cumulative duty hours.
1.3. Where airport standby is immediately followed by a flight duty, the relationship between such airport standby and the assigned flight duty shall be defined by the Authority. In such a case, airport standby shall be added to the duty period referred to in OPS 1.1110 under points 1.1 and 1.2 (Ref para 9.15 of this report) for the purposes of calculating minimum rest.

1.4. Where the airport standby does not lead to assignment on a flight duty, it shall be followed at least by a rest period as regulated by the Authority.

1.5. While on airport standby the operator will provide to the crew member a quiet and comfortable place not open to the public.

2. Other forms of standby (including standby at hotel)

2.1. Subject to the provisions of Article 8, all other forms of standby shall be regulated by the Authority, taking into account the following:

2.1.1. All activity shall be rostered and/or notified in advance.

2.1.2. The start and end time of the standby shall be defined and notified in advance.

2.1.3. The maximum length of any standby at a place other than a specified reporting point shall be determined.

2.1.4. Taking into account facilities available for the crew member to rest and other relevant factors, the relationship between the standby and any assigned flight duty resulting from the standby shall be defined.

2.1.5. The counting of standby times for the purposes of cumulative duty hours shall be defined.

10.15 EU expects the aviation authorities of the Member States to regulate standby as follows:

i. Where the airport standby does not lead to assignment on a flight duty, it shall be followed at least by a rest period as regulated by the Authority

ii. All other forms of standby (including standby at hotel) shall be regulated by the Authority taking into account certain parameters and conditions.

10.16 It is, therefore, considered necessary to examine the regulations of Member States of EU to fully understand the principles of EU requirements.

10.17 Belgium is an EU Member State and has stipulated the following table in respect of the two points mentioned in para 10.15 of this report:
### Airport standby

<table>
<thead>
<tr>
<th>Maximum duration of standby period</th>
<th>Airport standby (without sleeping facility nor suitable accommodation)</th>
<th>Airport standby (with Sleeping facility)</th>
<th>Home or suitable accommodation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8H</td>
<td>12H</td>
<td>12H</td>
</tr>
<tr>
<td>Standby counts for % when followed by FDP</td>
<td>less or equal to 2H = 0% upper than 2H = 100%</td>
<td>less or equal to 4H = 0% upper than 4H = 50%</td>
<td>less or equal to 6H = 0% upper than 6H = 50%</td>
</tr>
<tr>
<td>Minimum available time to report when called for a duty</td>
<td>0</td>
<td>0</td>
<td>Sign-in time</td>
</tr>
<tr>
<td>Count for cumulative duty hours where not counted in FDP</td>
<td>100%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td>Minimum rest after standby</td>
<td>See OPS1.1110</td>
<td>See OPS1.1110</td>
<td>See OPS1.1110</td>
</tr>
</tbody>
</table>

### 10.18 Swedish CAA has following stipulation:

**Airport standby**

§ 7 Should airport standby as per OPS 1.1125 point 1.3 of Regulation (EEC) No. 3922/91 Annex III be immediately followed by a flight duty, the maximum daily flight duty period shall be charged with 100% of the standby period.

§ 8 Should airport standby as per OPS 1.1125 point 1.4 of Regulation (EEC) No. 3922/91 Annex III not immediately lead to a flight duty or other duty assignment, the standby period shall be followed by at least a rest period as per OPS 1.1110 Rest periods Regulation (EEC) No. 3922/91 Annex III.

**Standby outside an airport (including at hotel)**

§ 9 Standby including start and finish times shall be scheduled and/or notified in advance.

§ 10 During standby outside an airport (including at hotel), crew members shall have access to a bed on ground.

§ 11 A standby period outside an airport (including at hotel) shall not exceed 14 hours.

§ 12 The maximum daily flight duty period and the cumulative duty hours shall be charged with 50% of the standby period of a crew member on standby outside an airport (including at hotel) with the following additions:

1. Should the crew member be called out for flight duty or any other duty, the maximum daily flight duty period and cumulative duty hours shall be charged with 50% of the period until the crew member report for flight duty or other duty.

2. Should standby be preceded by a rest period, the maximum daily flight duty period and cumulative duty hours shall not be charged with the first four hours of the standby period. Should the crew member be called out for duty during these four hours, the maximum daily flight duty period and cumulative duty hours shall be charged with 50% of the period from the point of time at which they are called out until they report for flight duty or other duty.
3. Should the crew member not be called out for flight duty or other duty during the period 22.00 to 06.00, the maximum daily flight duty period and cumulative duty hours shall not be charged with the standby time during this period.

4. Should the crew member be called out between 06.00 and 22.00 and at least five hours before reporting for flight duty or other duty, the maximum daily flight duty period and cumulative duty hours shall not be charged with the time from the call out until reporting for flight duty or other duty.

Additional rules can be found in Subpart Q, OPS 1.1105, OPS 1.1100, point 1.1 and OPS 1.1125, point 2 of Regulation (EEC) No. 3922/91 Annex III.

10.19 The above two Member States have direct reference to EU regulations in their own regulations. CAA, UK, which does not have one to one relationship with EU regulations follows CAP 371 & states as follows:

12 Standby Duty

12.1 The time of start, end and nature of the standby duty must be defined and notified to crew members. The time a standby duty starts determines the allowable FDP, except that when the actual FDP starts in a more limiting time band then that FDP limit will apply. However, when standby is undertaken at home, or in suitable accommodation provided by the operator, during the period 2200 to 0800 hours local time and a crew member is given 2 hours or less notice of a report time, the allowable FDP starts at the report time for the designated reporting place.

12.2 When a crew member is on standby duty on immediate readiness at an airport, then the allowable FDP is calculated using the start time of the standby duty.

12.3 If a crew member is called out from standby, the standby duty will cease when that individual reports at the designated reporting point.

12.4 The following limits apply:

<table>
<thead>
<tr>
<th>Duty</th>
<th>Maximum Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby Duty (all cases)</td>
<td>12 hours</td>
</tr>
<tr>
<td>Standby followed by an FDP</td>
<td>As in Case A and B below</td>
</tr>
</tbody>
</table>

Case A

If a crew member is called out from standby to conduct an FDP before completing 6 hours standby duty then the total duty period allowed is the sum of the time spent on standby and the FDP allowable from paragraph 13, Tables A, B, C, or paragraph 23, Table D.

Case B

If a crew member is called out from standby to conduct an FDP after completing 6 or more hours standby duty, then the total duty period allowed is the sum of all the time spent on standby and the allowable FDP, reduced by the amount of standby worked in excess of 6 hours.
NOTES:
1. The method of adding time spent on standby to cumulative totals is stated in paragraph 22.
2. The reference to 'total duty period' applies only to the sum of the standby time achieved + the allowable FDP obtained from paragraph 13. On the day, for cumulative duty totals and for minimum rest purposes, the total duty achieved will be standby time achieved + FDP achieved + post flight duties + any positioning.

12.5 When any period of standby finishes, during which a call-out has not occurred, at least 12 hours rest must follow prior to the next duty period. Similarly, following the end of a contactable period or periods, at least 10 hours must elapse prior to the next duty period.

10.20 Australian and CAA, New Zealand regulations on the subject are as follows:

Australia
3.1 Reserve time at home shall not exceed 1 continuous period of 16 hours. Where a flight crew member, during reserve time at home, is called to commence duty the total elapsed time from the commencement of reserve time at home to the end of that tour of duty shall not exceed 23 hours. Reserve time at home shall not be considered as tour of duty time for the purpose of these Orders.

CAA, New Zealand
“Standby
When a flight crew member is required to carry out standby at an aerodrome or at a place where adequate facilities for rest are not available the time from the beginning of the standby period until he or she is required to fly or is released from duty shall be regarded as a part of a duty period.

When standby is carried out at home or at a place away from home where adequate rest facilities are available, the standby period shall not be regarded as part of any duty period or any rest period.

Standby at home or at a place away from home where adequate rest facilities are available shall not exceed one continuous period of 16 hours. When followed by a period of active duty, the total elapsed time from the beginning of standby to the end of that duty period shall not exceed 23 hours.

A standby period shall only be considered a separate period when the intervening rest period between the standby period and a period of active duty or a further period of standby is not less than 10 hours.”

Comments Received

10.21 Jet Airways in their submission have suggested as follows:

Airport Standby
1. crew member is on standby from reporting at the normal report point until to the end of the notified standby period.
2. *Standby duty will count in full*

3. *Airport Standby duty must be followed at least by a minimum period of rest (10 Hrs)*

**Home Standby or Hotel Standby**

1. Time of start/end and nature of standby duty must be notified to a crew member in advance. Maximum duration of standby duty shall be 12 hours. No standby duty can be assigned during mandatory rest period.

2. 50% of the standby duty if undertaken at home or at a suitable accommodation provided by the operator will be considered towards flight duty period.

10.22 Blue Dart in their submission have stated as follows:

**Standby Duty Para 3.8.5 read in conjunction with Para 3.8.2**

**Para 3.8.5** Stipulates that a minimum rest of 10 hrs has to be provided to a crew member after standby duty and before start of next duty. It is recommended that minimum rest period of 10 hrs be reviewed when the crew is on stand by at his home/suitable accommodation but not utilized at all. This would contribute to better crew utilization, especially in the current environment of crew availability. Also 10 hours of minimum rest is considered to be excessive if the stand by was for only for a short period from home/suitable accommodation.

**Para 3.8.2** States that standby duty undertaken at home or in suitable accommodation will neither be considered towards flight duty nor the rest period. It is recommended that if "no duty was performed", then "no additional rest is required".

**Justification**

To effect better crew utilization, it is felt that additional rest in case of standby duty at the airport must be related to the quantum of duty done. An arbitrary figure of ten hours may be excessive in very many cases and a recommendation for rest period commensurate with the duration of stand by duty performed is appended below for consideration.

<table>
<thead>
<tr>
<th>Standby Duty Period</th>
<th>Quantum of Addition Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 hours</td>
<td>10 hours</td>
</tr>
<tr>
<td>7 hours</td>
<td>8 hours</td>
</tr>
<tr>
<td>6 hours</td>
<td>6 hours</td>
</tr>
<tr>
<td>0 – 4 hours</td>
<td>4 hours</td>
</tr>
</tbody>
</table>

10.23 IPG in their submission have given the following stipulation:

**Standby Duties:**

*The time of start, end and nature of standby must be defined and notified to crew at least 16 hours in advance if not specified on the roster. Maximum duration of*
standby duty shall be 8 hours. No standby duty will be assigned during mandatory rest period nor will any standby duty be undertaken away from home base. The time a standby duty starts determines the allowable Flight Duty Time, except that when the actual Flight Duty Time starts in a more limiting time band then the more limiting Duty Time will apply. No more than 2 standby duties in a period of 7 consecutive days encompassing the period of local night will be allowed. After being called out from a standby duty the length of the subsequent minimum rest shall be determined by the length of standby duty completed plus time spent on positioning as well as the Flight Duty Time completed.

Analysis

10.24 ICAO guidelines regarding Standby expects the States to prescribe following essential elements:

Standby period to be defined and notified in advance

10.25 ICAO, EU and its Member States require precise Standby period (both start and end points) to be defined and notified in advance.

ICAO

4.10.1.1 The start time and end time of standby should be defined and notified at least (*) hours in advance,

EU

2.1.1. All activity shall be rostered and/or notified in advance.
2.1.2. The start and end time of the standby shall be defined and notified in advance.

Belgium and Sweden

Both countries use language of EU

UK

12.1 The time of start, end and nature of the standby duty must be defined and notified to crew members.

10.26 These countries do not define the minimum notice period. Canada, Australia and New Zealand on the other hand do not have such stipulation.

10.27 Jet Airways in this regards suggest “Time of start/end and nature of standby duty must be notified to a crew member in advance.”
10.28 IPG has a specific suggestion as follows:

“The time of start, end and nature of standby must be defined and notified to crew at least 16 hours in advance if not specified on the roster.”

10.29 The Committee deliberated the ICAO requirements on the subject. It was agreed that if Standby is included as a part of roster, it then would meet the ICAO prescription. The issue is if the Standby is not a part of roster, then how much time of the notice period would be adequate. The above EU countries stipulate that the Standby should be notified in advance and leaves the operator to decide how much advance notice would be adequate depending upon their type of operations.

**Recommendation No. 22**

10.30 In view of above, the Committee considered it appropriate to recommend as follows:

i) Operator’s should include ‘Standby’ as part of their regular rosters and concerned crew should be kept notified.

ii) In case of exigencies when ‘Standby’ duty may go beyond the roster, Operator should ensure that concerned crew are notified in advance.

**Maximum length of Standby period & relationship with FDP and Cumulative Duty**

10.31 ICAO guidelines and EU regulations stipulate that

4.10.1.2 Where airport standby is immediately followed by a flight duty period, the relationship between such airport standby and the assigned flight duty should be defined.

i. Maximum period of standby be defined.

ii. Where airport standby is immediately followed by a flight duty period, the relationship between such airport standby and the assigned flight duty should be defined. In such a case, airport standby, if it is likely to induce fatigue, should be considered as part of a duty period and should be taken into account to calculate the minimum rest preceding a subsequent flight duty period.
10.32 EU further stipulates that

iii. Taking into account facilities available for the crew member to rest and other relevant factors, the relationship between the standby and any assigned flight duty resulting from the standby shall be defined.

iv. The counting of standby times for the purposes of cumulative duty hours shall be defined.

10.33 The maximum length standby, nature of standby and its relationship with FDP and cumulative duty stipulated by different countries is summarised below:

<table>
<thead>
<tr>
<th>Country</th>
<th>Maximum length of Standby</th>
<th>Counting towards Duty</th>
<th>Home/Hotel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>8 hours at airport - without sleeping quarters</td>
<td>FDP ≤ 2 Hrs = 0% &gt; 2 Hrs = 100% Cumulative Duty 100%</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>12 hours - with sleeping quarters</td>
<td>FDP ≤ 4 Hrs = 0% &gt; 4 Hrs = 50% Cumulative Duty 50%</td>
<td>FDP ≤ 6 Hrs = 0% &gt; 6 Hrs = 100% Cumulative Duty 25%</td>
</tr>
<tr>
<td>Sweden</td>
<td>14 hours</td>
<td>FDP &amp; Cumulative Duty 100%</td>
<td>FDP &amp; Cumulative duty ≤ 4 Hrs = 0% &gt; 4 Hrs = 50%</td>
</tr>
<tr>
<td>CAA, UK</td>
<td>12 hours</td>
<td>'Total duty period' For Standby &lt; 6 Hrs: Standby + FDP For Standby ≥ 6 Hrs: 6 Hours + FDP</td>
<td>'Total duty period' For Standby &lt; 6 Hrs: Standby + FDP For Standby ≥ 6 Hrs: 6 Hours + FDP</td>
</tr>
<tr>
<td>Australia</td>
<td>16 hours</td>
<td>----</td>
<td>FDP is to be decreased by the number of hours that the standby time exceeds 12 hours.</td>
</tr>
<tr>
<td>New Zealand</td>
<td>16 hours</td>
<td>----</td>
<td>Total elapsed time from beginning of standby to the end of duty period shall not exceed 23 hours.</td>
</tr>
<tr>
<td>CAR of 2007 (India)</td>
<td>8 hours</td>
<td>----</td>
<td>If 2 hours notice is given before departure time then flight duty shall start at the time of reporting at Airport.</td>
</tr>
</tbody>
</table>

10.34 The above table clearly shows that the international practice about the maximum standby period is more than 12 hours, except Belgium that stipulates normal Standby of 12 hours but 8 hours for Airport Standby without sleeping quarters. CAR 2007 lays down 8-hour limit without defining the location of standby.
10.35 The table further shows that there is a large variation in international practice with regard to relationship between standby period and assigned FDP and cumulative duty period.

Comments Received

10.36 Suggestions of Jet Airways and IPG regarding the relationship between Standby and assigned FDP are summarised as follows:

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Maximum length of Standby</th>
<th>Counting towards Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Airport Standby</strong></td>
</tr>
<tr>
<td>Jet Airways</td>
<td>12 hours</td>
<td>100%</td>
</tr>
<tr>
<td>IPG</td>
<td>8 hours</td>
<td>100%</td>
</tr>
</tbody>
</table>

10.37 Both Jet Airways and IPG have suggested that Airport Standby period should be counted 100% towards duty. Jet Airways has suggested 50% of standby should be counted towards ‘flight duty period’, whereas IPG has suggested that the time a standby duty starts determine the ‘flight duty time’ i.e. 100% of standby should be counted towards ‘flight duty time’. It may not be out of place to mention that IPG’s FDTL proposal defines ‘flight duty period’ and not ‘flight duty time’ which includes 15 minutes of post flight duty. Further, both Jet Airways and IPG do not deal with the relationship between Standby and cumulative duty period, in case standby does not culminates into flight duty.

10.38 During 64th IFALPA Conference at Auckland, New Zealand from 20th – 24th March 2009 a proposal was adopted suggesting the prescriptive requirements for ‘Flight time, flight duty periods, duty periods and rest periods for fatigue management’ based on Attachment ‘A’ to Annex 6 Part I. Except for some articles, FDTL Proposal submitted by IPG to the Committee is based on IFALPA’s proposal. The requirements of Standby are also an exception. IFALPA’s proposal states as follows:
"4.10.1 Standby

4.10.1.1 The start time and end time of standby should be defined and notified at least 12 hours in advance, and the maximum length of any standby should not exceed the flight duty period outlined in Table A for commencement of the standby duty. (See paragraph 4.7.3.1)

4.10.1.2 Where airport standby is immediately followed by a flight duty period, the cumulative time spent on standby and the assigned flight duty shall not exceed the flight duty period outlined in Table A based on the commencement of the standby duty.

4.10.1.3 On other than airport standby, the allowable flight duty period should be based upon the commencement of the standby duty and may be extended by a maximum of 3 hours.

4.10.1.4 When crew members are required to be on standby at an accommodation arranged by the operator, then adequate rest facilities should be provided.

4.10.1.5 For the purposes of cumulative duty limits; airport standby shall count fully, other standby should be counted at 50%.”

10.39 The Committee also referred to the Moebus study. The study has responded to the following three questions on issue of standby:

Q. No. 14
What provisions are needed for the calculation of maximum FDP when called out from airport standby (re. EU OPS 1.1125 para 1.3)?

Q. No. 15
What provisions are needed for the calculation of maximum FDP and minimum post duty rest when called out from other forms of standby (re. EU OPS 1.1125 para 2.1.4)?

Q. No. 16
What guidelines are needed for the counting of standby times for cumulative duty hours (re. EU OPS 1.1125 para 2.1.5)?

10.40 Moebus study in Conclusion on the above three questions on Standby states as follows:

“Airport standby time carries approximately the same fatigue load as work and should count as FDP unless a FRMS is applied with proper rest facilities (Q. 14). Standby time with proper rest facilities is still likely to involve reduced recuperative value because of anticipatory stress influences (of imminent duty), but the quantitative effects cannot be determined because of a lack of scientific data (Q. 15 & 16);”
10.41 Scientific study of Moebus states that airport standby should count as FDP (i.e. standby should be counted as 100% towards FDP) but can be reduced by applying FRMS with proper rest facilities. If the airport standby does not culminate into a flight duty, then the total period would be counted towards cumulative duty. The study further elaborates that Standby period with proper rest facilities has reduced recuperative values (as compared to proper rest period) of anticipatory stress of imminent duty. The study, however, concludes that effects cannot be quantitatively determined due to lack of scientific data.

10.42 The Committee deliberated upon Q 14 to 16 of the Moebus report. The Committee did not consider Q15 and 16 due to lack of conclusion by Moebus report on account of availability of scientific data. However, Committee considered the response of Moebus report on Q14 along with available international practice in this regard. In this background, therefore, the only alternative is to follow international practices in this regard.

**Recommendation No. 23**

10.43 The Committee deliberated the element relating to relationship between maximum length of standby period and percentage of the standby period, which should be counted as part of duty. The Committee agreed as follows:

(i) Standby period should not extend beyond 12 hours. However, a maximum standby at airport (with or without sleeping quarters) should not exceed 8 hours.

(ii) If the standby period is at the airport and

   (a) Standby culminates into a flight duty then the total period (i.e. 100%) should be counted towards the flight duty period and also towards cumulative duty period

   (b) Standby does not culminate into a flight duty then the total period (i.e. 100%) should be counted towards cumulative duty period

(iii) If the standby period is at home or in a hotel and culminates into duty

   (a) within first 6 hours then no part of standby should be considered as part of flight duty period or cumulative duty period

   (b) at 6 hours or later then flight duty period should be reduced by 50% of the standby time.

(iv) If standby period is at home or in a hotel does not culminate into a duty then, 25% of its time may be considered under cumulative duty.
Rest Period Following Standby

International Practices

10.44 Perusal of foregoing best practices (paras 10.13 to 10.20) indicate that Standby period is not a rest period. Further, if the Standby does not result in active duty even then Standby is required to be followed by a rest period.

10.45 Regulations of both Belgium and Sweden require the flight crew to have a normal rest after a duty as prescribed by EU OPS regulations.

10.46 The CAA, UK states that “When any period of standby finishes, during which a call-out has not occurred, at least 12 hours rest must follow prior to the next duty period”.

10.47 Australian regulations are silent over the rest period.

10.48 New Zealand regulations stipulate rest period and state “A standby period shall only be considered a separate period when the intervening rest period between the standby period and a period of active duty or a further period of standby is not less than 10 hours.”

10.49 CAR of 2007 also provided rest period after a standby period and states “Minimum rest of 10 hours has to be provided to crew member after standby duty and before start of next duty.”

Comments Received

10.50 Following suggestions were received from Jet Airways and IPG:

Jet Airways

Airport Standby duty must be followed at least by a minimum period of rest (10 Hrs)

Blue Dart

To effect better crew utilization, it is felt that additional rest in case of standby duty at the airport must be related to the quantum of duty done. An arbitrary figure of ten hours may be excessive in very many cases and a recommendation for rest period commensurate with the duration of stand by duty performed is appended below for consideration.
### Analysis

10.51 The basic principle for determining a rest period is ‘minimum rest period’ or the previous duty period whichever is greater. The minimum rest period is 12 hours at home station and 10 hours away from home. Standby period as recommended should not be more than 12 hours. Airport Standby is counted 100% towards the duty period and the Standby at home or a suitable accommodation is counted much less for duty period.

10.52 The rest period following a Standby should be decided based on the two conditions as follows:

i) Standby did not result in a flight duty, and  
   ii) Standby resulted in a flight duty.

10.53 In case of Airport Standby of 12 hours, which does not result into a flight duty, the rest period following a Standby would be 12 hours as Airport Standby is 100% counted towards the duty. If the Airport Standby results into a flight duty, then the basic principle outlined in Chapter 9 and at para 10.50 above should be followed after determining duty period.

10.54 In case Standby at home or a suitable accommodation does not culminate into a flight duty, then a minimum rest period of 10 hours following a Standby should be considered adequate.
Recommendation No. 24

10.55 The Committee deliberated the rest requirements after a standby period and agreed as below:

(i) When any period of standby finishes, during which a call-out has not occurred, at least 10 hours rest should follow prior to the next duty period.

(ii) When standby culminates in to a duty, then the rest period should be decided based on total period of duty i.e. the duty plus the percentage of standby counted for duty.

Positioning (Deadheading)

Definition

International Practice

10.56 Positioning as defined internationally is as follows:

ICAO

*Positioning*. The transferring of a non-operating crew member from place to place as a passenger at the behest of the operator.

*Note.*—“Positioning” as here defined is synonymous with the term “Deadheading”.

EU

*Positioning*: The transferring of a non-operating crew member from place to place, at the behest of the operator, excluding travelling time. Travelling time is defined as:

- time from home to a designated reporting place and vice versa,
- time for local transfer from a place of rest to the commencement of duty and vice versa.

CAA, UK

‘Positioning’: The practice of transferring crew from place to place as passengers in surface or air transport at the behest of an operator.

Australia

*Dead head transportation* means the period from the time a flight crew member reports for the purpose of making a positioning flight until the positioning flight is completed.

FAA, USA does not deal with the subject.
**Air Transport Canada** does deal with the subject but does not provide any definition.

**Comments Received**

10.57 The subject of 'Positioning' has been discussed but no one has provided any definition.

**Analysis**

10.58 AIC 28 of 1992 does not deal with the concept of positioning/deadheading. CAR of 2007, however defines the deadheading as follows:

*Dead Heading* The period during which a crew member travels on board any air transport belonging to the company or its agents for the purpose of positioning so as to operate a flight or after completion of flight.

10.59 The definition of positioning/deadheading has the following components:

- transferring of a non-operating crew member from place to place
- as a passenger
- at the behest of the operator

10.60 The EU definition adds the words “excluding travelling time” and defines it along with the definition of positioning. Positioning is not a period of time but an act of transferring crew. The exclusion of any time from it does not gel with definition. Similarly, in UK definition the addition of words “in surface or air transport” defines the mode of transfer, which even though elaborates the act of transfer but is not essential.

**Recommendation No. 25**

10.61 The Committee deliberated the definition of 'Positioning' and agreed to the stipulation by ICAO along with the note as it covers all the essential components as follows:

*Positioning.* The transferring of a non-operating crew member from place to place as a passenger at the behest of the operator.

*Note.*— “Positioning” as here defined is synonymous with the term “Deadheading”.

Positioning Regulations

International Practice

10.62 The regulations regarding positioning stipulated by ICAO and various States are as follows:

**ICAO**

2.3.3 Time spent positioning at the behest of the operator is part of a flight duty period when this time immediately precedes (i.e., without an intervening rest period) a flight duty period in which that person participates as a flight or cabin crew member.

4.10.3 Positioning

All time spent positioning counts as duty, and positioning followed by operating without an intervening rest period also counts as flight duty. However, positioning should not count as an operating sector when planning or calculating a flight duty period.

**EU**

5. Positioning

5.1. All the time spent on positioning is counted as duty.

5.2. Positioning after reporting but prior to operating shall be included as part of the FDP but shall not count as a sector.

5.3. A positioning sector immediately following operating sector will be taken into account for the calculation of minimum rest as defined in OPS 1.1110 points 1.1 and 1.2 below.

**UK**

11. Positioning

11.1 All time spent on positioning at the behest of an operator shall count as duty, but positioning does not count as a sector when calculating the FDP. In these circumstances the FDP commences not later than the time at which the crew member reports for the positioning journey, or positions in accordance with paragraph 9.3.

11.2 If, after a positioning journey, the crew member spends less than a minimum rest period at suitable accommodation provided by the operator, and then carries out an FDP, the positioning must be counted as a sector if a split duty is claimed when calculating the allowable FDP. If it is not, then a split duty FDP cannot be used.

**Australia**

Where dead head transportation is not followed by a prescribed rest period and precedes a tour of duty, the period from the commencement of dead head transportation to the conclusion of the tour of duty shall count as tour of duty time. Where a tour of duty is not followed by a prescribed rest period and
precedes dead head transportation, the period from the commencement of the tour of duty to the conclusion of the dead head transportation shall count as tour of duty time for the purpose of calculating the required rest period preceding a further tour of duty.

**Air Transport Canada**

700.20 Where a flight crew member is required by an air operator to travel for the purpose of positioning after the completion of flight duty time, the air operator shall provide the flight crew member with an additional rest period at least equal to one-half the time spent travelling that is in excess of the flight crew member's maximum flight duty time.

**Comments received**

10.63 Following suggestions were received from various stakeholders as follows:

**NACIL (Air India)**

Minimum rest in case of positioning of the crew (deadheading) should be 8 hours prior to operating the flights within the same time zone.

**FID, DGCA**

Dead Head Travel, Observer or Safety Pilot  The period, during which a crewmember travels on board any air transport for the purpose of positioning so as to operate a flight or after completion of flight, this shall count as flight duty. The period during which a crewmember operates as a safety pilot or an observer, shall be counted towards flight duty period.

**IPG**

Time spent in positioning is considered as part of a flight duty period if it occurs before a flight segment without an intervening required rest period.

Time spent in positioning at the behest of the operator irrespective of the mode of transport utilized is considered part of a duty period if it:

(a) Occurs after the final flight segment within a flight duty period or
(b) Consists entirely of time spent in positioning.

A flight crewmember whose duty period consists entirely of time spent in positioning must not be given a subsequent rest period less than that required by this scheme.

If the Positioning Duty exceeds 18 hours, it shall be followed by a rest period which includes a local night.

If a crew member has to be positioned to another domestic Indian city from his/her home base, the positioning including travel time to the hotel should not impinge in the period of Window of Circadian Low and preferably not impinge on the period of Local Night.

Any positioning between Airports by Surface Transport shall count as one sector towards the Flight Duty Time calculation if it occurs immediately before or
immediately at the conclusion of a flight duty period without an intervening rest period.

**Kingfisher**

Dead-Heading: This provision needs to be re-introduced. Dead-heading has become very common since airlines need to economise on hotel expenses. Dead-heading to operate a flight must be counted towards FDT. Dead-heading after operating a flight should not be counted towards rest period nor FDT.

**Analysis**

10.64 The examination of the International Practices regarding ‘Positioning’ provides the following basic principles:

- a) All the time spent on positioning on the behest of the operator is counted as duty.
- b) Positioning time is part of a flight duty period when it immediately precedes (i.e., without an intervening rest period) a flight duty period in which that person participates as a flight crew member.
- c) Positioning after operating a flight duty period without an intervening rest period should be counted for determining rest period.
- d) Positioning should not count as an ‘operating sector’ when planning or calculating a flight duty period i.e. it should not be treated as a landing (or a sector) for purposes of determining ‘Flight Duty Period’.
- e) Positioning is required to be counted as an ‘operating sector’ if, after a positioning journey, the crew member spends less than a minimum rest period at suitable accommodation provided by the operator, and then carries out an FDP and split duty is claimed i.e. the positioning will count as a landing for determination of flight duty period.

10.65 The regulations of CAR and suggestions/views of stakeholders are, therefore, analysed in relation to above basic principles.

10.66 As stated above, AIC 28 of 1992 does not deal with the subject of positioning/deadheading. The CAR of 2007 has the following provisions:

**CAR of 2007**

3.3 Whenever flight crew is scheduled on dead heading to operate the flight, this shall count as flight duty.

3.4 Dead heading done after operating the commercial flight will neither count as duty nor as rest period. In this case if flight duty time and dead heading time exceeds 18 hours, then the following rest period must include a local night.
3.5 Whenever a flight crew is deputed as safety pilot/observer the period of such duty shall be counted in his Flight Duty Time.

10.67 International practice including ICAO guideline stipulate that all the time spent on positioning is counted as duty. The CAR of 2007 does not deal with the concept of ‘Duty’ and as such stipulates dead heading as ‘flight duty period’. The positioning time is part of a flight duty period only when it immediately precedes (i.e., without an intervening rest period) a flight duty period in which that person participates as a flight crew member.

10.68 Suggestion of NACIL (Air India) to restrict minimum rest period to 8 hours after positioning is not in line with the international practice. Positioning is duty and the minimum rest should be governed in accordance with the stipulation of minimum rest. Similarly, suggestions of Kingfisher that dead-heading to be counted towards FDT and after operating a flight should not be counted towards rest period nor FDT is not in line with the international practice. Positioning time is counted as duty and accordingly even if it is after the flight, it has to be counted for determining the rest period.

10.69 Suggestion of FID, DGCA also does not take into account the concept of ‘duty’ and suggests that the period during which a crewmember operates as a safety pilot or an observer, shall be counted towards flight duty period. Only an operating crew comes under flight duty period, which starts from the time of reporting for duty and as such positioning the reports for duty and the positioning is counted as flight duty period if there is no intervening rest between positioning and FDP.

10.70 Most of the suggestions of IPG are in line with international practice of dealing positioning as ‘Duty’ and is considered as part of a flight duty period if it occurs before a flight segment without an intervening required rest period. However, the suggestion of IPG that if the Positioning duty exceeds 18 hours, it shall be followed by a rest period, which includes a local night, is not in line with international practice. Similarly, the suggestion that if a crew member has to be positioned to another domestic Indian city from his/her home base, the positioning including travel time to the hotel should not impinge in the period of Window of Circadian Low and preferably not impinge on the period of Local Night is also not in line with practices followed by any other country.
Recommendation No. 26

10.71 The Committee deliberated the subject in detail and decided to recommend provisions relating to Positioning based on ICAO guidelines and European Union regulations as follows:

Positioning

a) All the time spent on positioning on the behest of the operator should be counted as duty.

b) Positioning time should be part of a flight duty period when it immediately precedes (i.e., without an intervening rest period) a flight duty period in which that person participates as a flight crew member.

c) Positioning after operating a flight duty period without an intervening rest period should be counted for determining rest period.

d) Positioning should not count as a landing for purposes of determining ‘Flight Duty Period’.

e) Positioning should be counted as a landing if, after a positioning journey, the crew member spends less than a minimum rest period at suitable accommodation provided by the operator, and then extends FDP using ‘Split Duty’.

Unforeseen Operational Circumstances

10.72 It has been recognised that a planned flight on some occasions may experience unforeseen operational delays. ICAO guidelines and all countries, therefore, stipulate provisions to enhance flight duty period requirements and reduce rest requirements due to unforeseen operational circumstances. These stipulations are based on a basic principle that is the circumstances are beyond the control of the operator.

International Practice

10.73 Internationally, the enhancements in flight duty period and reduction of rest period are decided by the Pilot-in-Command in consultation with rest of the crew. The Commander, however, is required to report to the operator the circumstances under which he/she had taken the decision. The operator in turn is required to submit the Commander’s report to the aviation authority along with their comments.
10.74 In India, the operator takes the decision for enhancement of flight duty period due to unforeseen circumstances. AIC 28 of 1992 also stipulates that Flight and duty time imitations can be extended with the specific approval of the DGCA in extraordinary circumstances. CAR of 2007 has more stringent requirements but the decision rests with the operator and not with Pilot-in-Command, which is the international practice.

**Definition of Unforeseen Operational Conditions**

10.75 ICAO guidelines define unforeseen operational circumstances as follows:

"**Unforeseen operational circumstance.** An unplanned event, such as unforecast weather, equipment malfunction, or air traffic delay that is beyond the control of the operator."

4.7.3.4 Flight duty periods may be extended in unforeseen operational circumstances by no more than (*\) hour(s) only at the discretion of the pilot-in-command. Before exercising this discretion, the pilot-in-command should be satisfied that all members of the crew required to operate the aeroplane consider themselves fit to do so.

10.76 The Canadian regulations define unforeseen operational circumstances and permits extension if the pilot-in-command, after consultation with the other flight crew members, considers it safe to exceed the maximum flight time and flight duty time. The regulations, however, do not stipulate limitation on maximum extension. The Canadian regulations stipulate as follows:

"**unforeseen operational circumstance**" means an event, such as unforecast adverse weather, or an equipment malfunction or air traffic control delay, that is beyond the control of an air operator or private operator

**Unforeseen Operational Circumstances**

700.17 The maximum flight time referred to in paragraphs 700.15(1)(a) to (e) and the maximum flight duty time referred to in subsection 700.16(1) may be exceeded if

(a) the flight is extended as a result of unforeseen operational circumstances;

(b) the pilot-in-command, after consultation with the other flight crew members, considers it safe to exceed the maximum flight time and flight duty time; and

(c) the air operator and the pilot-in-command comply with the Commercial Air Service Standards."
10.77 FAA, USA stipulation for circumstances beyond the control of operator applies only to domestic operations and states as follows:

“A flight crewmember is not considered to be scheduled for flight time in excess of flight time limitations if the flights to which he is assigned are scheduled and normally terminate within the limitations, but due to circumstances beyond the control of the certificate holder (such as adverse weather conditions), are not at the time of departure expected to reach their destination within the scheduled time.”

10.78 The above stipulation permits late departure of the flight due to circumstances beyond the control of the operator but does not stipulate any limit for the delay.

10.79 In case of ‘Flag Operations’, however, FAA does not stipulate any requirement for circumstances beyond the control of operator.

10.80 New Zealand’s Advisory Circular (AC 119-2), which contains contain information about standards, practices, and procedures acceptable to CAA, contains definition of disrupted schedule and permits extension as follows:

**Disrupted schedule** means a schedule that by reason of circumstance outside the control of the operator is prevented from being completed within its scheduled time.

**Internal Operations – Two-Pilot Crews**

**Flight Time** – The pilot shall not be rostered to fly in excess of 8 hours in any one duty period. A duty period already commenced may be extended in flight time to 8 hours 30 minutes to complete a disrupted schedule.

**Duty Period** – The pilot shall not be rostered for a duty period of more than 11 hours but once commenced a duty may be extended to 12 hours to complete a disrupted schedule.

**Rest** – When the pilot has flown more than 8 hours, or has been on duty more than 11 hours in any 24 consecutive hours, he or she shall have, on completion of that duty period, a rest period of not less than 12 consecutive hours, including the hours between midnight and 6 am or extended to include that period, up to a maximum of 24 consecutive hours.

When the pilot has flown more than 16 hours or been on duty more than 22 hours in any 48 consecutive hours, he or she shall have, on completion of that duty period, a rest period of not less than 24 consecutive hours.
**External Operations – Two-Pilot Crews**

*Flight Time* – The pilot shall not be rostered to fly in excess of 8 hours in any one duty period. A duty period already commenced may be extended in flight time to 9 hours to complete a disrupted schedule.

*Duty Period* – The pilot shall not be rostered for a duty period of more than 11 hours but once commenced a duty may be extended to 13 hours to complete a disrupted schedule.

*Rest* – When a pilot flies more than 8 hours or has been on duty more than 11 hours in any 24 consecutive hours, he or she shall have, at the completion of that duty period, a rest period of not less than 12 consecutive hours, including the hours between midnight and 6 am local time, or 14 consecutive hours:

When a pilot has flown more than 16 hours or has been on duty for more than 22 hours in any 48 consecutive hours, he or she shall have, at the completion of that duty period, a rest period of not less than 24 consecutive hours:

**External Operations – Three-Pilot Crews**

*Duty Period* –

When the flight crew includes at least 2 pilots normally rostered to act as pilot-in-command for the particular class of operation:

(i) a pilot shall not be rostered for a duty period of more than 18 hours:

(ii) A duty period already commenced may be extended in duty time to 20 hours to complete a disrupted schedule:

*Rest* – Within each duty period the pilot-in-command shall establish a roster of periods of active duty and rest for each pilot which may only be varied at the discretion of the pilot-in-command.

On completion of the duty period a pilot shall have a rest period on the ground calculated as follows:

(i) For the first 11 hours duty – 10 consecutive hours:

(ii) For each subsequent hour’s duty – 2 additional hours, up to a maximum of 24 consecutive hours:

10.81 European Union and its Member State have the following regulations:

**OPS 1.1120**

Unforeseen circumstances in actual flight operations — commander’s discretion

1. Taking into account the need for careful control of these instances implied underneath, during the actual flight operation, which starts at the reporting time, the limits on flight duty, duty and rest periods prescribed in this Subpart may be modified in the event of unforeseen circumstances. Any such modifications must be acceptable to the commander after consultation with all other crew members and must, in all circumstances, comply with the following:
1.1. The maximum FDP referred to in OPS 1.1105 point 1.3 above may not be increased by more than two hours unless the flight crew has been augmented, in which case the maximum flight duty period may be increased by not more than three hours;

1.1.1. If on the final sector within a FDP unforeseen circumstances occur after take off that will result in the permitted increase being exceeded, the flight may continue to the planned destination or alternate;

1.1.2. In the event of such circumstances, the rest period following the FDP may be reduced but never below the minimum rest defined in OPS 1.1110 point 1.2 of this Subpart;

1.2. The Commander shall, in case of special circumstances, which could lead to severe fatigue, and after consultation with the crew members affected, reduce the actual flight duty time and/or increase the rest time in order to eliminate any detrimental effect on flight safety;

1.3. An operator shall ensure that:

1.3.1. The Commander submits a report to the operator whenever a FDP is increased by his/her discretion or when a rest period is reduced in actual operation and

1.3.2. Where the increase of a FDP or reduction of a rest period exceeds one hour, a copy of the report, to which the operator must add his comments, is sent to the Authority no later than 28 days after the event.

10.82 CAA, UK permits the aircraft commander to extend of flying duty period with in the prescribed conditions and states as follows:

**Aircraft Commander’s Discretion to Extend a Flying Duty Period**

An aircraft commander may, at his discretion, and after taking note of the circumstances of other members of the crew, extend an FDP beyond that permitted in paragraph 13, Tables A, B, C, or paragraph 23, Table D, provided he is satisfied that the flight can be made safely. The extension shall be calculated according to what actually happens, not on what was planned to happen. An extension of 3 hours is the maximum permitted, except in cases of emergency.

10.83 AIC 28 of 1992 provides for extension of flight duty time limitation due to circumstances beyond the control of air carrier with additional rest. The language used for domestic operation is different than the language used for international operations but the essence is same. The extension permitted in both cases is up to 4 hours in any particular case and shall not be more than 8 hours during any 30 consecutive days.

**Domestic Operations**

“A flight crew member is not considered to be scheduled for duty in excess of flight duty time limitation when due to circumstances beyond the control of the air
carrier (such as unanticipated technical delays, adverse weather conditions etc.) the flight duty time gets inevitably extended provided that such extension shall be limited to 4 hrs in any particular case and shall not be more than 8 hours during any period of 30 consecutive days. In such a case the rest period shall be extended pro-rata by twice the amount of time by which the flight time was extended.”

**International Operations**

“The flight duty time in all cases could be extended by a maximum of 4 hours in case of technical snags, adverse weather or any other unforeseen circumstances to avoid inconvenience to passengers. However, whenever the flight duty time gets extended, the rest period shall be pro-rata increased by twice the amount of extended period of flight duty time, provided that no flight crew shall be asked to extend flight duty time more than 8 hours in a period of 30 days.”

10.84 The CAR of 2007 permits extension due to unforeseen operational circumstances and stipulates for both domestic and international operations as follows:

**3.12 Exceptions Due to Unforeseen Operational Circumstances:**

Exceptions allow the flexibility needed to respond to unforeseen circumstances beyond the control of the operator that occur during operations. These are not intended for use in regular practice. These exceptions must not be scheduled or planned.

3.12.1 Extension of Flight Time/Flight Duty Time shall be permitted for unforeseen circumstances occurring after take off on last two sectors and maximum extension shall be limited to 3 hours of Flight Duty time and 1½ hour of flight time. However if the aircraft is landing at base station during the extended period of flight time/Duty time, crew change shall be effected.

3.12.2 If exceeded Flight Duty Time impinges window of circadian low then following rest period must include a local night.

3.12.3 In an emergency situation, which in the judgment of the commander presents a serious risk to health or safety of crew and passengers or endangers the lives, then the above limits may be exceeded till emergency situation is resolved.

3.12.4 Flight Duty Time cannot be extended if flight is operated after simulator flying or if the proviso of Split Duty has been used.

3.12.5 In case of unplanned exigencies or diversion, to retrieve aircraft and also for the crew specially positioned for this purpose rest can be reduced to minimum 8 hrs. which shall not include time allowed for preflight and post flight duties which shall be a minimum of 45 minutes plus actual time spent on transportation. After completion of flight, rest period shall be increased by twice the amount by which rest period was reduced earlier.

3.12.6 Rest Period cannot be reduced if on previous sector Flight Duty Time/Flight Time was extended.

3.12.7 In case of diversions due to weather or any unforeseen reasons for retrieval of aircraft an additional landing is permitted which may include landing for ferry flight without commercial load, but this shall not include landing for technical, commercial or operational reasons.
3.12.8 Any extension of FDTL/FTL shall be reported to DGCA within 24 hours along with the reasons and corrective action taken to prevent reoccurrence.

Comments Received

10.85 IPG has suggested the following:

“Extension of ‘Flight Duty Period’:

Extension of Flight Duty Period for exigencies will be restricted to a maximum of 1 hour for flights which fall within the Window of Circadian Low and 2 hours for all other flights. An exigency does not include occurrences which are known sufficiently in advance to allow for proper planning such as scheduled charters, planned runway shortening etc. However, this should not be construed as either permitting or interfering in the right and duty of the individual Pilot (either Commander or Co-Pilot) to refuse any Extension which he/she considers may endanger the passengers or the aircraft. Extension of duty times will not be allowed where suitably qualified crews are available for replacement. Also, no extension will be allowed where passenger convenience is not directly affected, for example in freighter operations or ferry flights. Any extensions in the period of local night will be followed by a minimum rest period of at least 2 local nights. No pilot will undertake more than 2 extensions in a period of 30 consecutive days.”

FID, DGCA

PIC Extension of Duty Time Authority – Taking into account the need for careful control of these instances, during the actual flight operation, which starts at the reporting time, the flight duty time limit (FDTL) may be extended in the event of unforeseen circumstances. Any such modifications must be acceptable to the commander after consultation with all other crew members.

Jet Airways

- Increase FDP by 1 hour
- Reduce rest by 2 hours to a minimum of 10 hours (Minimum 9 hours in Hotel)
- Increase allowable sector by one
- Discretion not allowed for consecutive rests or duties

Analysis

Definition

10.86 It is obvious from the above regulations that many countries do not elaborate the unforeseen circumstances except that the circumstances are beyond the control of the operator. FAA regulations provide only one example and states “(such as adverse weather conditions)”. ICAO and the Canadian regulations also define these unforeseen
circumstances by examples and add that events which are beyond the control of the operator. Both definitions are almost identical and state as follows:

**ICAO**

“Unforeseen operational circumstance. An unplanned event, such as unforecast weather, equipment malfunction, or air traffic delay that is beyond the control of the operator."

**Canada**

“unforeseen operational circumstance” means an event, such as unforecast adverse weather, or an equipment malfunction or air traffic control delay, that is beyond the control of an air operator or private operator.”

**Recommendation No. 27**

10.87 The Committee deliberated the issue and decided that it would be appropriate to have a definition, which provides examples, rather than keep the issue vague. It is, therefore, recommended that the definition of ICAO may be adopted as follows:

“Unforeseen operational circumstance. An unplanned event, such as unforecast weather, equipment malfunction, or air traffic delay that is beyond the control of the operator.”

**Maximum Period of Extension**

10.88 As stated above, ICAO guidelines expect States to stipulate maximum extension of Flight Duty Period ‘only at the discretion of the pilot-in-command’, who should be satisfied that all members of crew required to operate consider themselves fit to do so’. The ICAO guidelines are reproduced again:

4.7.3.4 Flight duty periods may be extended in unforeseen operational circumstances by no more than (*) hour(s) only at the discretion of the pilot-in-command. Before exercising this discretion, the pilot-in-command should be satisfied that all members of the crew required to operate the aeroplane consider themselves fit to do so.

10.89 Neither Canada nor FAA, USA stipulates maximum extension. Advisory Circular of New Zealand, which contains information about standards, practices, and procedures that are acceptable for compliance with the associated rule, permit extension as follows:
### Table: Operational Crew and Extensions

<table>
<thead>
<tr>
<th>Type of Operations</th>
<th>Crew Composition</th>
<th>Extensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Operations</td>
<td>Two-Pilot Crews</td>
<td>Flight Time: 30 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Duty Period: 1 hour</td>
</tr>
<tr>
<td>External Operations</td>
<td>Two-Pilot Crews</td>
<td>Flight Time: 1 hour</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Duty Period: 2 hours</td>
</tr>
<tr>
<td></td>
<td>Three-Pilot Crews</td>
<td>Duty Period: 2 hours</td>
</tr>
</tbody>
</table>

10.90 In case of EU OPS regulations, there is no daily limit of flight time and as such extension is limited to only ‘Flight Duty Period’. EU regulations state that any extensions must be acceptable to the commander after consultation with all other crew members and must, in all circumstances, comply with the following:

- In case flight crew is not augmented, the maximum FDP may not be increased by more than two hours
- In case flight crew is augmented, the maximum FDP may not be increased by more than three hours;
- If on the final sector within a FDP unforeseen circumstances occur after take off that will result in the permitted increase being exceeded, the flight may continue to the planned destination or alternate;

10.91 UK permits the aircraft commander to extend of flying duty period by 3 hours.

10.92 AIC 28 of 1992, as stated earlier, permits extension of ‘Flight Duty Time’ for both domestic and international operations by 4 hours in any particular case and not more than 8 hours in 30 consecutive days. On the other hand CAR of 2007 permits extension by 1½ hours of ‘Flight Time’ and extension of 3 hours of ‘Flight Duty Time’. CAR, however, does not stipulate any cumulative limit of extensions.

10.93 IPG has suggested that extension of ‘Flight Duty Period’ may be limited to 1 hour for flights, which fall within WOCL, and 2 hours for other flights.

10.94 Jet Airways has suggested extension of FDP by 1 hour and reduction of rest by 2 hours but not less than 10 hours and not less than 9 hours in a hotel.
10.95 FID, DGCA accepts extension of ‘flight duty time limit’ but has not quantified any extension limit. It, however, states that any extension must be acceptable to the commander after consultation with all other crew members.

**Recommendation No. 28**

10.96 The Committee deliberated the subject and it was noted that ICAO definition of unforeseen circumstances include ‘air traffic delay’, which may result in exceeding the limits of both ‘Flight Time’ and ‘Flight Duty Period’. It was, therefore, decided to recommend extensions for both ‘Flight Time’ and ‘Flight Duty Period’. It was considered appropriate to extend Flight Time by maximum of $1\frac{1}{2}$ hours and FDP by maximum of 3 hours subject to a cumulative limit of maximum of 3 hours and maximum of 6 hours respectively in 30 consecutive days.

10.97 The committee further deliberated upon the current practice employed by DGCA, operators and pilots with regard to extension of FDP under ‘unforeseen circumstances’. It was brought to the knowledge of the Committee that DGCA as an organisation including its senior officials get involved in matter of individual extension of FDP under unforeseen circumstances which is not considered as healthy practice. DGCA officials may not be aware of prevailing circumstances at the concerned area of operation, actual data of prevailing FDP with regarding to crew pair as well cumulative data and actual state of fatigue of crew. It is felt that DGCA may not be in the best position to decide such operational matters. Therefore committee is of the view that subject to the maximum limit of extension of FDP i.e. 3 hours on individual event and 6 hrs on cumulative basis will be decided between PIC and ‘Head of Operations’ of operator. It is expected that PIC in consultation with the other crew members and cabin crew will convey their willingness (or consent) to the ‘Head of Operations’ for operating the flight. In accordance with international practice, PIC will submit the report to Head of Operations who will file to DGCA along with his comments. It is open to DGCA to take appropriate actions if not considered within regulations and violations are brought to its notice through audit/surveillance.
Additional Rest Requirements

10.98 Neither ICAO guidelines, nor EU regulations nor CAA, UK stipulate additional rest requirements in case of extended FDP due unforeseen operational circumstances. On the other hand it is expected that rest requirement may be reduced to cover up the delay and have the regulations to reduce the rest period due to unforeseen circumstances.

10.99 New Zealand, however, stipulates additional rest as follows:

<table>
<thead>
<tr>
<th>Type of Operations</th>
<th>Crew Composition</th>
<th>Extensions</th>
<th>Extension of Rest Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Operations</td>
<td>Two-Pilot Crews</td>
<td>Flight Time: 30 minutes Duty Period: 1 hour</td>
<td>Rest period of not less than 12 consecutive hours, including the hours between midnight and 6 am or extended to include that period, up to a maximum of 24 consecutive hours.</td>
</tr>
<tr>
<td>External Operations</td>
<td>Two-Pilot Crews</td>
<td>Flight Time: 1 hour Duty Period: 2 hours</td>
<td>Rest period of not less than 12 consecutive hours, including the hours between midnight and 6 am local time, or 14 consecutive hours.</td>
</tr>
<tr>
<td></td>
<td>Three-Pilot Crews</td>
<td>Duty Period: 2 hours</td>
<td>On completion of the duty period a pilot shall have a rest period on the ground calculated as follows: For the first 11 hours duty – 10 consecutive hours: For each subsequent hour’s duty – 2 additional hours, up to a maximum of 24 consecutive hours.</td>
</tr>
</tbody>
</table>

10.100 In India, the regulations permit extension of rest period after extension of flight duty limit. AIC 28 of 1992 requires rest period to be extended pro-rata by twice the amount of time by which the flight duty time was extended. The CAR also stipulates additional rest in case of extension of Flight Time/Flight Duty Time as follows:
Crew shall be provided additional rest as under:

<table>
<thead>
<tr>
<th>Time by which FDTL/FTL exceeds</th>
<th>Additional rest to be provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 hrs. FDTL and/or 0 - ½ hr. FTL</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>&gt;1-2 hrs. FDTL and/or &gt; ½ -1 hr. FTL</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>&gt;2-3 hrs. FDTL and/or &gt; 1 - 1½ hr. FTL</td>
<td>6 hrs.</td>
</tr>
</tbody>
</table>

Recommendation No. 29

10.101 The Committee deliberated the additional rest requirements and agreed to recommend stipulation of AIC 28 of 1992, which states as follows:

*Whenever the flight duty period gets extended, the rest period shall be pro-rata increased by twice the amount of extended time of flight duty period.*

Reporting Time

10.102 ‘Reporting Time’ is defined as follows:

ICAO

*Reporting time.* The time at which flight and cabin crew members are required by an operator to report for duty.

CAA, UK (CAP 371)

‘Reporting Time’. The time at which a crew member is required by an operator to report for any duty.

10.103 Further, ICAO Annex 6, Attachment ‘A’ para 4.7.3.1.2 states

“Crew report times should realistically reflect the time required to complete pre-flight duties, both safety- and service-related (if appropriate), and a standard allowance of (*) minutes is to be added at the end of flight time to allow for the completion of checks and records. For record purposes, the pre-flight report time should count both as duty and as flight duty, and the post-flight allowance should count as duty”

*Note:* The symbol (*) is used above is to indicate where each State may insert a value it considers appropriate to manage fatigue.
10.104 EU regulations also stipulate that "An operator shall specify reporting times that realistically reflect the time for safety related ground duties as approved by the Authority". CAA UK (CAP 371) accordingly provides as follows:

“Standard reporting times prior to flight must be specified by an operator. Pre-flight duties are part of the FDP. A period of duty must be allowed for post-flight activities: the minimum for major operators is 30 minutes, 15 minutes for others.”

10.105 The CAA, UK also stipulate that in the ‘Scheme’ of large companies the crew reporting time would be “a minimum of 1 hour, but can be increased dependent on aircraft type and route to be flown” for pre-flight activities but for other smaller operators the reporting time can be in the range 30 to 60 minutes, depending on nature of operation.

**Recommendation No. 30**

10.106 The Committee deliberated the subject and it was decided to recommend the language of ICAO but the responsibility should be casted on the operator for specifying the timings and the timings of CAA UK regulations may be used for post-flight activity. The recommendation would be as follows:

**Definition and Requirements**

**Reporting time.** The time at which flight crew members are required by an operator to report for duty.

Crew report times should be specified by the operator realistically, which reflect the time required to complete pre-flight duties, both safety and service-related, but shall not be less than 45 minutes, and

A standard allowance of 30 minutes for major operators and 15 minutes for others should be added at the end of flight time to allow for the completion of checks and records. For record purposes, the pre-flight report time should count both as duty and as flight duty, and the post-flight allowance should count as duty.

**Night Operation**

10.107 AIC 28 of 1992 restricts operations during two consecutive night embracing a period between 00:00 to 05:00 hours as follows:
AIC 28 of 1992

Flight crew shall neither be detailed nor undertake any duty between period embracing 0000 to 0500 hours local time if during the previous day he/she performed flight duty between the period embracing 0000 to 0500 hours local time;

10.108 The above provision was too restrictive for cargo operators, who operate mainly during the night. With a view to ease the situation for them the CAR of 2007 permitted night operations embracing a period of 00:00 to 05:00 hours for two consecutive nights with additional rest requirements as follows:

CAR of 2007

3.7 Consecutive Night Flying:

3.7.1 Operator shall not roster any Flight Crew Member to undertake flight for more than two consecutive nights with duty period embracing any period between 0000 to 0500 hours local time.

3.7.2 Additional rest of two hour shall be provided for every hour or part thereof of duty period that impinges into the said period of 0000 to 0500 hrs.

3.7.3 If any part of Flight Duty Time on second night is carried out in window of circadian low then following rest period must include a local night.

10.109 Even though the CAR of 2007 provided relief for night operations but due to additional rest requirements it was not possible to utilise two consecutive nights fully. Para 3.7.2 stipulated additional rest of two hours for every hour or part thereof of duty, which impinges the period of 0000 to 0500 hours. If a pilot operates during a period encompassing 0000 to 0500 hours on the first night then an additional rest of 10 hours beyond the normal rest of 10 hours would be needed, which totals to 20 hours of rest. Cargo operators have reflected similar views.

Comments Received

10.110 Views/suggestions received from the cargo operators are as follows:

Blue Dart

Para 3.7.1 Clears aircrew to undertake flights on two consecutive nights with duty period embracing 0000 to 0500 hours local time. Subsequently para 3.7.2 specifies "Additional rest of two hours shall be provided for every hour or part thereof of duty period that impinges into the said period of 0000 to 0500 hrs". It
may be clarified whether this additional rest period is to be calculated only after operating the second consecutive night impinging the period 0000 to 0500 hrs. A clarification on the above point will help a night Operator like Blue Dart Aviation Ltd to plan crew utilization more effectively.

**Justification:**
AIC 28/92 does not permit consequent night operations if the flight duty embraced the period of 0000-0500 hours local time. The new CAR corrected this anomaly by permitting consecutive night operations for two nights provided additional rest is provided for flight duty during the above period. But if this rest is to be provided after the first night’s operation itself, the possibility of utilisation in the second consecutive night may not be possible at all.

It is recommended that the additional rest of double the flight time flown between 0000 to 0500 hrs must be considered after the crew has been utilized for the second consecutive night. This is also in alignment with International practice in the matter.

**Deccan Cargo**
The current AIC section 3.2 F (consecutive night duties) is most prohibitive for Cargo Operators.

We would respectfully request that this restriction be removed and that the rest period is applied to FDT and twice any extension at all times. (Minimum 8 hours)

**Rules could be split as on JAR basis as**
Majority of Duty falls between 0901-2100 = Day time operations

Majority of Duty falls between 2101-0900 = Night time operations

**Planning hours**
- Day Time - 13 hours
- Night Time - 12 hours

with extension of 1 hour applicable for execution of flights.

**International Regulations & Practices**

10.111 ICAO guidelines do not have any specific provisions regarding night operations except that States while framing the prescriptive regulations should consider all factors and amongst others night duties is one of one of the factors.

10.112 In view of the above, it was decided to examine international regulations and practices in this regard. EU OPS regulations restricts FDP for operating during night and has the following provisions:
EU

2.7. When an FDP with extension starts in the period 22.00 to 04.59 the operator will limit the FDP to 11.45.

10.113 Moebus report deals with the above provision of EU OPS and also discusses about consecutive overnight duties while dealing with Question No. 2 regarding the provisions for the maximum daily flight duty period (FDP) and states as follows:

Moebus Report (Question No. 2 on maximum flight duty period)

The development of cumulative fatigue tends to be increased during consecutive periods of duty, especially for long duties or when early starts, late finishes or overnight duties are involved that disrupt the normal pattern of sleep [Spencer MB & Robertson KA 2000; Spencer MB & Robertson KA 2002]. It is sensible therefore to limit the number of duties and/or reduce the maximum FDP of these duties when they run consecutively, especially where they are close to maximum FDP limits. Following a sequence of consecutive duties mitigating strategies could involve scheduling a rest day including one local night.

10.114 The Moebus report also deals night operations at Question No. 4 as follows:

“Question No. 4 The FDP limit of 11:45 hours in the period 22:00 to 04:59, the need for additional provisions for duties within the WOCL, and the FDP limit of 11:45 hours starting in the WOCL on consecutive early days (ref. EU OPS 1.1105 para 2.7).

“Night duty is associated with work during the circadian trough and extended time awake. During night hours fatigue increases and vigilance decreases more markedly with ongoing duty hours than during the day. Scientific investigations show that night duty hours are especially vulnerable to severe fatigue [Samel A et al, 1997b; Spencer MB & Robertson KA, 1999] and there is also evidence that pilots take involuntary naps and micro-sleeps on the flight deck [Samel A et al, 1997a; Wright NA & McGown A, 2001]. The detrimental effects of sleep deprivation, time since sleep, and the window of circadian low on alertness lead to severe fatigue with increasing time on task. Furthermore, fatigue during return night flights is often exacerbated in un-acclimatized crews, and as outlined in question 2, there is no provision for adaptation to local time in the current scheme.

“As outlined in the answer to question 2, it is recommended that night duties and duties that encompass the WOCL are limited to 10 hours. It is also proposed that the number of consecutive duties starting or ending in the WOCL should be limited. Subsequently, there should be a rest period that includes at least one local night.”
10.115 CAA, UK regulates consecutive night operations through the approval of the ‘Scheme’ of the operator, guidelines for which are stipulated in CAP 371 as follows:

'Early Start Duty' A duty is an Early Start Duty if it commences in the period 0500 to 0659 hours local time.

'Late Finish Duty' A duty is a Late Finish when the duty finishes in the period 0100 to 0159 hours local time.

'Night Duty' A duty is a Night Duty if any part of that duty falls within the period 0200 to 0459 hours local time.

'Regular' Regular, when applied to duties that are Late Finishes, Night or Early Starts, means a run of 4 or 5 consecutive duties, not broken by a period of 34 hours free from such duties, contained in a single 7 consecutive day period.

7.1 Late Finishes/Early Starts

7.1.1 The conditions set in this paragraph only apply when a crew member is acclimatised.

7.2 Sleep deprivation, leading to the onset of fatigue, can arise if a crew member is required to report early for duty, or finishes a duty late, on a number of consecutive days. Therefore, not more than 3 consecutive duties that occur in any part of the period 0100 to 0659 hours local time can be undertaken, nor may there be more than 4 such duties in any 7 consecutive days. Any run of consecutive duties (Late Finishes or Nights or Early Starts) can only be broken by a period of not less than 34 consecutive hours free from such duties. This 34 consecutive hours may include a duty that is not an Early, Late or Night duty.

7.2.1 However, crew members who are employed on a regular early morning duty for a maximum of 5 consecutive duties shall work to the following:

a) The minimum rest period before the start of such a series of duties is 24 hours.

b) The duty will not exceed 9 hours, irrespective of the sectors flown.

c) At the finish of such a series of duties, crew members will have a minimum of 63 hours free from all duties.

7.3 Should a crew member be scheduled for duty that occurs during any part of the period 0200 to 0459 hours local time, for a minimum of 2 and a maximum of 3 consecutive nights, then crew members must be free from all duties by 2100 hours local time before covering the block of consecutive night duties, such that the crew members can take a rest period during a local night.

NOTE: Operators may replace the above paragraph with one of the following choices, either Options A and B OR Options B and C. The operator may roster crew members for either 2 or 3 consecutive nights, but must ensure that the duty preceding this series of duties finishes by 2359 hours local time (2 nights) or 2100 hours local time (3 nights) as appropriate.

If it is preferred to retain the present contents then attention must be paid to the notes attached to the Options listed (below). These notes list the actions to be followed in the event that duty is inadvertently extended beyond the cut-off times (i.e. 2100 or 2359 hours).

Option A

Should any duties be scheduled to be carried out within any part of the period 0200 and 0459 hours local time, for 3 consecutive nights, then crew members will finish the duty preceding this series of duties by 2100 hours local time
before commencing the block of consecutive night duties, such that the crew members
can take a rest period during a local night. If the duty immediately prior to the 3
consecutive night duties extends beyond 2100 hours local time and the individual
crew member is willing to continue with the planned roster; (i.e. 3 consecutive
night duties) then provided that duty preceding this series of duties finishes no later
than 2359 hours local time, the schedule may continue.

NOTE: 1: Under this Option, if the crew member chooses not to continue the
planned roster (after finishing duty between 2100 and 2359 hours)
then only the planned first and second night duties that impinge on
any part of the period 0200 to 0459 hours local time may be
undertaken.

NOTE: 2: Under this Option, if the duty finishes after 2359 hours local time,
then only the first of the 3 consecutive night duties that impinge on
any part of the period 0200 to 0459 hours local time may be
undertaken.

Option B – 2 Consecutive Night Duties

Should any duties be scheduled to be carried out within any part of the period
0200 and 0459 hours local time, for 2 consecutive nights, then crew members
will finish the duty preceding this series of duties by 2359 hours local time
before commencing the block of 2 consecutive night duties, such that the crew
members can take a rest period during a local night.

NOTE: Under this Option in the event of 2359 hours being exceeded, then
only the first of the 2 planned consecutive night duties that impinge on
any part of the period 0200 to 0459 hours local time may be
undertaken.

Option C - 3 Consecutive Night Duties

Should any duties be scheduled to be carried out within any part of the period
0200 and 0459 hours local time, for 3 consecutive nights, then crew members
will finish the duty preceding this series of duties by 2100 hours local time
before commencing the block of consecutive night duties, such that the crew
members can take a rest period during a local night.

NOTES: 1 Under this Option in the event of 2100 hours being exceeded, then
only the first of the 3 planned consecutive night duties that impinge on
any part of the period 0200 to 0459 hours local time may be
undertaken.

2 In all cases the limits in paragraph 7.2 or 7.3 must not be exceeded
(i.e. maximum of 3 consecutive nights and 4 in 7 consecutive days).

7.3.1 However, crew members who are employed on a regular night duty for a
maximum of 5 consecutive nights shall work to the following:

a) The minimum rest period before the start of such a series of duties is 24
hours.

b) The duty will not exceed 8 hours, irrespective of the sectors flown.

c) At the finish of such a series of duties crew members will have a
minimum of 54 hours free from all duties.

7.3.1.1 Options For Night Operations

If an operator elects to roster 4 or 5 consecutive night duties, then the
criteria laid down in paragraph 7.3.1 (Section C Annex B paragraph 7.2.1 -
Air Taxi) must be complied with and must form part of the approved FTL
scheme. Operators are reminded that the normal days off requirements
must be met (i.e. the 54 hours off between two blocks of 5 nights is only 1
proper day off). However, if operators find that this part of the Scheme is
too restrictive then one of the following options may be employed but, if used, must be fully complied with:

a) When crew are employed on duty for a total of 20 hours or less during 5 consecutive night duties, (i.e. maximum duty each night is 4 hours) the 54 hours free from all duties will meet the "Days Off" requirements for each 28 consecutive day period. Any positioning flights must be completed within the 20 hours duty.

b) When crew are employed on duty for a total of more than 20 hours but not more than 40 hours during 5 consecutive night duties, the first 54 hours (between week 1 and week 2) may be counted as 2 "Days Off". For the 28 consecutive day period that starts on the first night of the first duty, crew must be given a minimum of a further 5 "Days Off" (average of a further 6 days). Any positioning flights must be completed within the 40 hours duty.

c) When crew are employed on duty which requires full use of 40 hours duty during 5 consecutive night duties plus a maximum of 3 hours positioning (pre- and posttotal) then:
   i) allowable flying hours (month and year) will be reduced to the following:
      1) a maximum of 75 hours in any 28 consecutive days with a maximum of 60 hours in 28 consecutive days averaged over three 28 day periods, and;
      2) 600 hours in any 12 consecutive months.
   ii) a minimum of 9 "Days Off" in any 28 consecutive days will be granted;
   iii) any increase in duty over 40 hours during the block of 5 consecutive night duties is to be added to the subsequent 54 hours rest period which may not be reduced.

7.3.1.2 General Rules

To be applied when an operator utilises a), b) or c) of paragraph 7.3.1.1.

a) The exercise of "Commander's Discretion" is limited to 1 hour per night with a total of 2 hours allowed during any 5 consecutive night cycle. Any duty worked in excess of 40 hours by use of "Commander's Discretion" must also be added to the subsequent 54 hours rest which may not be reduced.

b) The absolute maximum duty permitted during a block of 5 consecutive night duties is 45 hours (40 hours, plus 3 hours positioning, plus 2 hours "Commander's Discretion", as per paragraphs 7.3.1.1 c) and 7.3.1.2 a) above).

c) Crew cannot be rostered for more than 8 hours per night, except when working to paragraph 7.3.1.1 c) above.

d) Split duties and extension of FDP by in-flight rest are not permitted.

e) "Commander's Discretion" to reduce rest is not permitted.

NOTE: For 5 consecutive earlies, the same rule as in 7.3.1.2 a) above applies (i.e. maximum 1 hour discretion per day and a total of 2 hours in the 5 day cycle).

Analysis

10.116 It is, therefore, apparent that limited number of consecutive night duties may be permitted provided FDP is reduced and in such a case Moebus report recommends a rest period to include at least one local night. Whereas EU OPS restricts maximum FDP
to 11:45 hours for operations during 22:00 to 04:59 hours, Moebus report recommends night duties to be limited to 10 hours if they encompass the WOCL. CAA, UK also permits consecutive night landings by approving “Scheme” of flight time limitations and provides many combinations.

10.117 In India, the requirement of night flying is limited to only cargo operators and they only have given the views/suggestions about night flying. The restrictions of AIC 28 of 1992 of not permitting duty on two consecutive days between period embracing 0000 to 0500 hours local time has been acceptable to all other operators. As a matter of fact period is larger than the combined period of ‘Late Finish Duty’ and ‘Night Duty’ defined in CAP 371 of CAA, UK, definitions of which are reproduced below again for clarity:

‘Late Finish Duty’ A duty is a Late Finish when the duty finishes in the period 0100 to 0159 hours local time.

‘Night Duty’ A duty is a Night Duty if any part of that duty falls within the period 0200 to 0459 hours local time.

10.118 It may, therefore, be adequate to retain the present provisions of AIC 28 of 1992 and have special provisions for cargo operations to permit up to 2 consecutive nights subject to additional rest period.

**Recommendation No. 31**

10.119 The Committee after deliberation agreed to recommend consecutive night operations as follows:

i) No operator operating passenger flights should deploy a flight crew nor a flight crew should undertake any duty between period embracing 0000 to 0500 hours local time if during the previous day he/she performed flight duty between the period embracing 0000 to 0500 hours local time;

ii) Cargo operations may be permitted during period embracing 0000 to 0500 hours for two consecutive nights provided:

   a) The minimum rest period before the start of such a series of duties is 24 hours.

   b) The duty should not exceed 8 hours, irrespective of the sectors flown.
c) At the finish of such a series of duties crew members should have a minimum of 54 hours free from all duties.

d) There should not be 4 such duties in any 7 consecutive days.

e) Crew members should be free from all duties by 2100 hours local time before covering the block of consecutive night duties, such that they may take a rest period during a local night.

Local Night

10.120 A concept of local night is primarily enshrined in EU OPS and CAP 371 of CAA, UK. Following countries do not follow the concept of local night and no definition exists in their regulations:

- ICAO
- FAA, USA
- Air Transport Canada
- Australia
- New Zealand
- Bangladesh

10.121 However, concept of local night is important for addressing the rest requirements to reduce fatigue of crew members and is related to WOCL. The definition of local night was introduced in CAR of 2007. Various definitions of EU OPS, CAA, UK and CAR of 2007 are as follows:

**EU**

**Local night**: A period of eight hours falling between 22.00 and 08.00 local time.

**CAA, UK**

'Local Night' A period of 8 hours falling between 2200 and 0800 hours local time.

**CAR of 2007**

**Local Night** A period of ten hours from 2000 hours to 0600 hours Local standard time.

10.122 It may be noted that the period in the definition of CAR of 2007 for local night extends from 2000 to 0600 hours, which is 10 hours. Whereas in the EU and UK definitions the length of the period still remains 10 hours (from 2200 to 0800 hours) but the local night is for only 8 hours. This definition provides flexibility to the operator
to consider local night from 2200 to 0600 hours or 0000 to 0800 hours. The scientific studies show that a minimum rest period should provide opportunity to sleep for eight hours, which is adequately covered in the definitions of EU and UK and provides the most suitable time in terms of circadian rhythm.

10.123 The regulations of other countries, even though do not have concept of local night but the minimum rest is provided for eight hours, which may not be at most suitable time for sleep.

**Recommendation No. 32**

10.124 The Committee deliberated the concept of Local Night and agreed to recommend its adoption in accordance with the international practices as follows:

> **“Local night:** A period of eight hours falling between 22.00 and 08.00 local time.”

**Other Definitions**

10.125 Regulations also require some other significant issues to be defined. The Committee recommends that the following ICAO definitions may be adopted for framing the regulations on prescriptive flight and duty time limitations and are as follows:

**Recommendation No. 33**

**Home base**

**Home base.** The location nominated by the operator to the crew member from where the crew member normally starts and ends a duty period or a series of duty periods. (ICAO definition)

**Fatigue**

**Fatigue** is a physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a crew member’s alertness and ability to safely operate an aircraft or perform safety related duties. (ICAO definition)
Fatigue Risk Management System (FRMS)

Fatigue Risk Management System (FRMS) is a data-driven ongoing adaptive process based on appropriate knowledge of scientific principles and methods that can identify fatigue hazards and develop and evaluate mitigation strategies to manage any emerging fatigue induced operational risks. It employs a multi-layered system of defences to manage operational fatigue risk proactively in which data related to crew alertness as well as operational flight performance are collected on a routine basis and analyzed in a timely manner. (ICAO definition)

10.126 Circadium rhythm is extremely important issue related to fatigue. The scientific studies reported in NASA Technical Memorandum 110404 on “Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation” and states that circadian low of performance is estimated from scientific data on alertness, subjective reports (of peak fatigue) and the body temperature. The scientific study also reports the variation in period of circadian low due crossing of time zones. The Committee, after deliberation agreed to recommend adoption of following NASA definition of ‘Window of Circadian Low’ (WOCL)

Recommendation No. 34

Window of Circadian Low (WOCL):

The window of circadian low is best estimated by the hours between 0200 and 0600 for individuals adapted to a usual day-wake/night sleep schedule. This estimate of the window is calculated from scientific data on the circadian low of performance, alertness, subjective report (i.e., peak fatigue), and body temperature. For flight duty periods that cross 3 or fewer time zones, the window of circadian low is estimated to be 0200 to 0600 home-base/domicile time. For flight duty periods that cross 4 or more time zones, the window of circadian low is estimated to be 0200 to 0600 home-base/domicile time for the first 48 hours only. After a crew member remains more than 48 hours away from home-base/domicile, the window of circadian low is estimated to be 0200 to 0600 referred to local time at the point of departure. (NASA Definition)
CHAPTER – 11
Maintenance of Records and Monitoring System

11.1 In order to ensure the compliance of the limitations of Flight Time, Duty, Flight Duty Period and Rest period requirements it is essential that the operator has a foolproof computerised system in place to maintain and monitor such records in respect of each of its crew. All countries stipulate such a requirement.

International Practices

11.2 ICAO guidelines and requirements of some countries is as follows:

ICAO

4.11 Records

4.11.1 To enable the operator to ascertain that the fatigue management scheme is functioning as intended and as approved, records should be kept for (*) months of the duties performed and rest periods achieved so as to facilitate inspection by the operator’s authorized personnel and audit by the State of the Operator.

4.11.2 The operator should ensure that these records include for each flight and cabin crew member, at least:

a) the start, duration and end of each flight duty period;

b) the start, duration and end of each duty period;

c) rest periods; and

d) flight time.

4.11.3 The operator should also keep records of occasions when a pilot-in-command has exercised his or her discretion (as described in 4.9.1). If discretion has to be applied for similar reasons on more than (*) per cent of occasions when a particular route or route pattern is flown, it is likely that the intention of this guidance is not being met and undue fatigue may result. Arrangements should be made to change the schedule or the crewing arrangements so as to reduce the frequency at which such events occur. A State may require that, in addition, copies of certain records should be submitted.

4.11.4 Flight crew members should maintain a personal record of their daily flight time.

Canadian regulations

Monitoring System

700.14 (1) Every air operator shall establish a system that monitors the flight time, flight duty time and rest periods of each of its flight crew members and shall include in its company operations manual the details of that system.
(2) Where a person becomes aware that an assignment by an air operator to act as a flight crew member on a flight would result in the maximum flight time referred to in section 700.15 or the maximum flight duty time referred to in section 700.16 being exceeded, the person shall so notify the air operator.

**European Union regulations**

**OPS 1.1135 – Flight duty, duty and rest period records**

1. An operator shall ensure that crew member’s records include:
   
   (a) block times;
   
   (b) start, duration and end of each duty or flight duty periods;
   
   (c) rest periods and days free of all duties;

   and are maintained to ensure compliance with the requirements of this Subpart; copies of these records will be made available to the crew member upon request.

2. If the records held by the operator under paragraph 1 do not cover all of his/her flight duty, duty and rest periods, the crew member concerned shall maintain an individual record of his/her

   (a) block times;

   (b) start, duration and end of each duty or flight duty periods; and

   (c) rest periods and days free of all duties.

3. A crew member shall present his/her records on request to any operator who employs his/her services before he/she commences a flight duty period.

4. Records shall be preserved for at least 15 calendar months from the date of the last relevant entry or longer if required in accordance with national laws.

5. Additionally, operators shall separately retain all aircraft commander’s discretion reports of extended flight duty periods, extended flight hours and reduced rest periods for at least six months after the event.

**CAA, UK regulations**

25 Records to be Maintained

25.1 Records for the duty and rest periods of all flying staff must be kept. These records shall include:

   **For each crew member:**

   The beginning, end and duration of each duty or flying duty period, and function performed during the period. Duration of each rest period prior to a flying duty or standby duty period. Dates of days off. 7 consecutive day totals of duty.

   With the agreement of the CAA, operators employing more than 100 cabin crew need only record the information required above for a percentage of cabin crew. The size of the percentage and the rate of sampling will be agreed by the assigned Inspector and the operator.
For each flight crew member:

Daily and 7 consecutive day flying hours.

Records shall be preserved for at least 12 calendar months from the date of the last relevant entry.

25.2 Additionally, operators shall retain all aircraft commanders’ discretion reports of extended flying duty periods, extended flying hours, and reduced rest periods for a period of at least six months after the event.

In addition to the above requirements, CAA UK in its para regarding “General Principles Applied to Control of Flight, Duty and Rest Time” has a following note:

“NOTE: The CAA will conduct periodic and spot checks on operators’ records and aircraft commanders’ reports to determine if the planning of flight schedules and duty is compatible with the limitations provided for in the operator’s scheme.”

Comments Received

11.3 IPG has suggested the following for maintenance of records, which is in line with the ICAO guidelines:

Records:

To enable the operator to ascertain that the fatigue management scheme is functioning as intended and as approved, records should be kept for 60 months of the duties performed and rest periods achieved so as to facilitate inspection and audit by the DGCA.

The Operator should ensure that these records include for each crewmember, at least:

(a) The start, duration and end of each Flight Duty Period;
(b) The start, duration and end of each Duty Period;
(c) Rest Period;
(d) Flight Time;
(e) Occasions when the crewmember has exercised his/her discretion in extending a Flight Duty period

Flight crew members should maintain a personal record of their daily Flight Time.

11.4 IPG has also suggested an on-line monitoring system as follows:

Monitoring Scheme:

The DGCA, when assessing the planning of a schedule will take into account the time allowed for pre-flight duties, taxying, and the flight and turn-round times.
The Operator will have in place a real-time monitoring Scheme to monitor the Scheduled Sector Time vis-à-vis the Actual Sector Times. The 77.5 percentile of the actual Sector Times on a Monthly basis rounded up to the next five minutes will be used for scheduling crew duty periods. For new routes, the 80 percentile of estimated sector time (by means of a study) plus 18 minutes, rounded to the next 5 minutes will be used. When experience of at least one season is gained, the 77.5 percentile scheme will be used. Producing flight plans on higher speeds and/or different cruising levels from the ones normally utilized as well as providing inadequate taxi time etc. for “reducing” planned Flight Times is not permitted.

The Company shall also keep records of occasions when a pilot has exercised his discretion to extend the duty time. If discretion has to be applied for similar reasons on more than 20 percent of occasions when a particular route or route pattern is flown, it is likely that the intention of this scheme is not being met and undue fatigue may result. Arrangements should be made to change the schedule or the crewing arrangements so as to reduce the frequency at which such events occur.

Analysis

11.5 The records are required to be maintained for the following reasons:

a) To enable the operator to ascertain that the fatigue management scheme is functioning as intended and as approved

b) To facilitate inspection by the operator’s authorised personnel and audit by DGCA.

11.6 Additionally, the records of discretion to extend the prescribed limits on a particular route or route pattern provide an indicator whether the flight schedule is meeting the intension of the fatigue management scheme. ICAO guidelines, therefore, require the States to stipulate a maximum percentage of such discretions and beyond which change the schedule or the crew scheduling arrangements would be necessitated.

11.7 In order to maintain the records in respect of each flight crew member and to achieve the above objectives, it is essential that a foolproof computerised system is in place having a capability to analyse on real time basis prior to the flight of any flight crew member whether or not he/she would exceed the prescribed limits by operating the flight. It should also be possible to analysis particular routes and route patterns in which the flight crew are utilised close to the prescribed limits and number of occasions these limits were crossed.
Recommendation No. 35

11.8 The Committee deliberated the subject and agreed to follow ICAO guidelines in this regard. It was also agreed that the retention period of the records should be 18 months, so as to permit auditing of records for past six months, as any audit would need record of at least one year. The Committee also agreed that a flight schedule of a route or route pattern should be reviewed when number of occasions when the discretion to extend the limits was exercised exceeds 20%, similar to the suggestion by IPG.

11.9 The Committee agreed to recommend as follows:

**Records**

1. To enable the operator to ascertain that the fatigue management system is functioning, as intended and as approved, records should be kept for 18 months of the duties performed and rest periods provided so as to facilitate inspection by the operator’s authorized personnel and surveillance/audit by DGCA officers.

2. The operator should ensure that these records include for each flight crew member, at least:
   a) the start, duration and end of each flight duty period;
   b) the start, duration and end of each duty period;
   c) rest periods; and
   d) flight time.

3. The operator should also keep records of occasions when discretion was used by the PIC to extend the prescribed limits.

4. If discretion was used for similar reasons on more than 20 percent of occasions when a particular route or route pattern is flown, then the operator shall review and change the schedule or the crew scheduling arrangements so as to reduce the frequency at which such events occur.

5. In addition, DGCA should require submission of copies and analysis of records in the manner deemed fit.

6. Flight crew members should maintain a personal record of their daily flight time, duty period, flight duty period and rest periods.

7. Above may be achieved through a foolproof, transparent, computerised system, for which there will be an online system with a link for DGCA to monitor. The operator should evolve a system so that only designated officers of the operator and DGCA have access to the system. Further, the
system should have provision of ‘audit trail’ so that any change made in the data may be tracked down to its source.

8. The operator through the computerised system should be able to ensure that flight crew member is well within the flight time, flight duty period, duty period and rest period requirements before permitting him to operate the flight.

9. No operator should keep such records only on paper.

10. Operator should evolve a mechanism by which personal records maintained by individual pilot are reconciled with the operator’s records from time to time.
CHAPTER – 12
Fatigue Risk Management Systems (FRMS)

Introduction

12.1 Civil aviation authorities currently use prescriptive regulations to limit flight time and duty periods. This approach has the advantage of providing clear-cut limits. It, however, is a one-size-fits-all solution and as such, it is neither the most efficient nor most cost-effective method of managing the fatigue-related risks of any one specific aeroplane fleet or route structure. Additionally these prescriptive limitations have often been based more on industrial agreements than on evolving science related to fatigue and its effects on performance.

12.2 ICAO has started tackling this issue aggressively and in November 2009 the Standards and Recommended Practices on the subject were updated, which now require prescriptive limitations to be developed based on scientific fatigue management principles.

12.3 ICAO also formed a task force to look at a Fatigue Risk Management Systems solution and a proposal for new Standards and Recommended Practices for FRMS have been drafted with suggested applicability in 2011. The proposal states that FRMS employs a multi-layered system of defences to manage operational fatigue risk, and can take advantage of established SMS processes. This non-prescriptive approach will allow greater operational flexibility and efficiency while enhancing safety and reducing costs.

12.4 The proposal stipulates that an operator will have the option of implementing an FRMS only in those States where FRMS regulations have been established by the State. Even in these States, depending on the nature of the operations, some operators may choose not to adopt FRMS, others may wish to implement FRMS only for limited operations and still others may wish to implement an FRMS for all operations.
12.5 Costs to the operator are expected to be associated primarily with the administration of the FRMS programme. Costs to the regulator are expected to be associated with the addition of regulatory provisions for FRMS and for the resources to conduct assessments and surveillance of the operator’s FRMS. In both cases, the ICAO proposal states that it is anticipated that costs should be relatively low, particularly where a State already has existing criteria for auditing performance-based regulations and where an operator has an approved SMS.

12.6 Understandably, fatigue risk management systems would take time to mature, so savings will manifest themselves only in the long run.

12.7 ICAO has prepared a draft of FRMS guidance material, which would continue to be developed for some months and will need to be aligned to the final outcomes of the above ICAO proposal of new SARPs for FRMS. The following paragraphs based on ICAO draft FRMS guidance material elucidate various features of FRMS.

**Definition of Fatigue**

12.8 ICAO defines fatigue as follows:

> A physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a crew member’s alertness and ability to safely operate an aircraft or perform safety related duties.

**Sources of Fatigue**

12.9 Fatigue can have multiple sources. Effective fatigue risk management, therefore, requires range of strategies to address the different types and causes of fatigue, which can be broadly grouped as follows:

- Task-related factors (whether work or non-work), which include the type of tasks or activities being undertaken, the mental or physical demand, workload, environmental
conditions in which the tasks are being performed, and the duration of the duty or activity period;

• Circadian factors, due to changing performance capacity and susceptibility to sleep across the daily cycle of the circadian body clock; and

• Sleep-related factors, which relate to the physiological requirement for an optimal daily amount of good quality sleep, and the physiological drive for sleep, that increases with the length of time awake.

12.10 Fatigue related to sleep loss is commonly identified as either transient or cumulative. Transient fatigue may be described as fatigue that is dispelled by a single sufficient period of sleep. Cumulative fatigue occurs after incomplete recovery from transient fatigue over multiple days and nights and recovery occurs only after sufficient restorative sleep over multiple days and nights. Recent research suggests that the effects of cumulative sleep loss produce cognitive performance deficits equivalent to total sleep deprivation. However, individuals tend to be unaware of these effects.

12.11 Whatever the source(s), fatigue is associated with degraded human performance. As individuals become more fatigued they are less vigilant, they react more slowly and they respond more variably. Forgetfulness, inattention, apathy, mood swings, poor decision-making and diminished communication are all hallmarks of fatigue-affected performance. In the situation where sleepiness becomes so severe that a sleep-deprived individual falls asleep unintentionally, he or she is unable to respond at all. Such performance result in decreased safety margins and an increased risk of incidents and accidents in the workplace.

Managing Fatigue in Aviation Operations

Prescriptive Flight and Duty Limitations

12.12 Traditionally, fatigue has been broadly managed in aviation operations through prescriptive regulations that limit maximum daily, monthly and yearly flight and duty hours and requires minimum breaks within and between work periods. These prescriptive regulations were created based in part on the limitations of aircraft of the time and not necessarily with a scientific basis and knowledge. They have the advantage of providing clearly identifiable limitations that make decisions between when to fly
and when to stop flying relatively easy. Each flight crew member and every operator knows at exactly what point the relevant limitations will be exceeded and at what point the crew member should be relieved of all duties. They also make the identification of instances of non-compliance obvious to the regulator.

12.13 More recently, as scientific understanding of fatigue and alertness has increased, provisions were provided for the development of prescriptive limitations based on scientific principles regarding sleep and fatigue. Hence, current provisions require that factors such as the number of time zones crossed; the time at which a flight duty period is scheduled to begin; the number of planned and/or actual sectors within the flight duty period; the pattern of working and sleeping relative to the circadian rhythm or 24-hour physiological cycle of the flight crew; flight operation characteristics, be considered when establishing flight and duty limitations.

12.14 This is a more elaborate approach to developing flight and duty limitations than simply identifying a generic number of hours of work across a broad range of operations in a rather arbitrary way. It allows flight and duty-time limitations, which address, to some extent, issues related to transient fatigue (i.e. fatigue that is dispelled by a single sufficient period of sleep) and cumulative fatigue (i.e. fatigue that occurs after incomplete recovery from transient fatigue over a period of time). Even so, prescriptive limitations mean that broadly applicable, hard and fast numbers are identified that cannot be surpassed.

12.15 The problem with the hard and fast numbers of prescriptive limitations is that they offer a rather simplistic illusion of safety – within limits is equated with being safe but outside limits is unsafe. If this was entirely true, fatigue would be a relatively easy problem to deal with. However, many flight crews have worked within prescribed flight and duty limitations but have nevertheless been extremely fatigued at some time during a duty period. This is because prescriptive limitations, even those established on a scientific basis that consider sleep, circadian and task-related causes of fatigue, necessarily provide a one-size-fits-all fatigue management solution when particularities of operational conditions, routes and fleets, as well as individual crew members, means
that the levels of fatigue to be managed are not generic or consistent. It cannot be assumed that capping hours of work will always result in well-rested individuals who are not vulnerable to excessive fatigue-related performance decrements. Further, exemptions to prescriptive limits are often granted, which further stretches the illusory safety cut-off point.

**Fatigue Risk Management Systems**

12.16 Scientific knowledge building over the last 50 years supports a more comprehensive approach, one that aims to manage fatigue risks whatever their source, in order to improve safety in the workplace. This more comprehensive approach forms the basis for Fatigue Risk Management Systems (FRMS).

12.17 FRMS is a data-driven ongoing adaptive process based on appropriate knowledge of scientific principles and methods that can identify fatigue hazards and develop and evaluate mitigation strategies to manage any emerging fatigue induced operational risks. It employs a multi-layered system of defences to manage operational fatigue risk proactively in that data related to crew alertness as well as operational flight performance are collected on a routine basis and analyzed in a timely manner.

12.18 The primary purpose of FRMS is to enable the operator to manage its fatigue-related risk when operations are conducted within a set of data driven parameters rather than within prescribed limits. The FRMS aims to ensure that flight crew members are sufficiently alert so they can operate to a satisfactory level of performance and safety in both normal and abnormal situations. In addition, the operator may extend its FRMS to any other operations within the prescribed limits that it determines may pose significant fatigue-related risks.

12.19 An effective FRMS can allow greater operational flexibility and efficiency than prescriptive fatigue management regulations (i.e., flight time, flight duty period, duty period limitations and rest requirements) while maintaining at least an equivalent level of safety. It can do so because the operator is required to design a set of — tailored
suits specific to each of their various types of operations, e.g. regional short haul and ultra long haul, rather than wearing one suit — off the shelf that may provide a reasonable but imperfect fit. It does this by providing input throughout the entire crew scheduling process, considering both scientific data on the actual (or predicted) levels of fatigue during, and operational requirements of, different schedules. This can give rise to innovative scheduling solutions that provide adequate rest and sleep opportunities prior to flight duties, and adequate opportunities for in-flight rest and sleep, where appropriate. The States, therefore, may authorise flight and/or duty time extensions beyond the prescriptive regulations through the effective implementation of FRMS.

12.20 FRMS can also enhance the safety of operations conducted within the prescriptive fatigue management regulations. Prescriptive fatigue management regulations represent only one layer of defence for managing fatigue risk. In contrast, FRMS includes multiple defensive strategies to manage fatigue risk relevant to specific circumstances. Therefore, there may be safety benefits when an FRMS is used within the envelope of prescriptive flight and duty time limitations.

12.21 An operator's FRMS need not include all flight operations. An operator may choose to limit its application to specific types of operations or fleets for which fatigue-related risk is higher while still complying with prescriptive fatigue management regulations. An operator may also limit or extend its application to operations that deviate from the prescriptive fatigue management regulations.

12.22 Such an application requires FRMS that is consistent with the nature, extent and complexity of the particular operation and therefore adequate to manage the operational risks, which will differ between the various types of operations. Consequently, where an operator applies FRMS across various types of operations, the generic processes will be the same but the mitigations are likely to differ between them. As part of an operator's FRMS policy, it should be made clear to all stakeholders which operations are being managed under FRMS, prescriptive regulations, or both and when or if changes are made.
12.23 Since fatigue is influenced not just by work demands, but also by factors outside of work, responsibility for an FRMS must be shared by the operator and crew members. Hence, the FRMS approach moves the focus away from using State-prescribed flight and duty time limitations as targets to be aimed at, and towards cooperation between operators and flight crew to do what is safe, reasonable and responsible. This change of focus brings with it some changes in responsibilities for States, operators and flight crew members – and some new challenges.

Managing Fatigue – Who is responsible for managing the risks?

a) Regulators:

12.24 The decision by a country to allow their operators the option of using FRMS, will mean establishing performance-based regulations in accordance with the Standards for FRMS. Such regulations will require a transition from monitoring hard-and-fast, prescribed flight and duty time limitations to performance-based regulations that require analysis of the processes functioning in the FRMS, in a similar way as for SMS and other performance-based regulations. *This requires a change in the skill sets of the individuals assessing and providing the oversight of these systems.*

12.25 Whether or not a country allows their operators the option of FRMS as a means of managing their fatigue risks, prescriptive flight and duty limitations must continue to be maintained in line with existing provisions. *While the establishment of FRMS regulations is optional for States, the establishment of prescriptive flight and duty limitations is not. However, identification of prescriptive flight and duty limitations does not mean that the State has assumed the responsibility of managing an operator’s fatigue-related risks. This remains firmly with the operator.*

b) Operators:

12.26 Whether applying prescriptive flight and duty limitations or implementing an FRMS, the *operator is responsible for managing their own fatigue-related risks.*
12.27 Operators may not have the option of implementing FRMS if their State does not establish FRMS regulations. In such cases, operators must comply with State-identified prescriptive flight and duty limitations. However, where a State does establish FRMS regulations, operators may choose to comply with flight and duty limitations, or implement an FRMS for part of its operations and comply with flight and duty limitations in the remainder of its operations, or implement an FRMS for all of its operations.

12.28 Where operators comply with State-identified prescriptive flight and duty limitations for any or all of their operations, they must risk assess these regulations for those operations. *This is because a State can only set generic maximums and minimums within their regulations. They can never regulate for the complexity and the variances of the vast number of different operations undertaken or for how the operators choose to put their work together.* Hence, it is possible for operators to schedule trips that, despite being within the prescriptive limits, are extremely fatiguing, resulting in diminished operational safety margins.

12.29 An analogy can be made with speed limits set for road transport. The authority may set the speed limit at 100 km/hour for a given road, and in general when conditions are good, drivers can safely drive at that speed. But it would be dangerous to drive at that speed in a blizzard with a lot of snow on the road, or in a heavy downpour, or in a car with sticky brakes. The driver is expected to drive to the conditions and to their ability, accepting the consequences of their actions. Clearly, the responsibility is for the driver to manage his or her own risks on the road within the envelope of the speed limit.

12.30 In the same way the operators operating under State-identified prescriptive flight and duty limitations are responsible to manage their risks within the envelope of prescribed flight and duty limitations.
FRMS in a nutshell

12.31 The following 10 items describe the key points for understanding FRMS succinctly and clearly. *These key points are based on documentation prepared by the Risk Management System International Collaboration Group* (RMS ICG) and have been *adapted* to relate to the specifics of managing fatigue.

1. **What is a Fatigue Risk Management System (FRMS)?**

   A Fatigue Risk management system is a series of defined, organization-wide processes that assess the impact of fatigue on the operation to provide for effective risk-based decision-making related to the effect of fatigue on your daily business.

2. **What does the FRMS focus on?**

   FRMS focuses on maximizing opportunities to continuously improve the overall Fatigue Risk of the aviation system.

3. **What are the key processes of an FRMS?**

   - Hazard identification – a method for identifying hazards related to your organization;
   - Risk management – a standard approach for assessing risks and for applying risk controls;
   - Performance measurement – management tools for analyzing whether the organization's Risk goals are being achieved; and
   - Assurance – processes by which an operator can monitor the risk and controls in place to ensure that they are being followed and test that they are achieving a robust treatment of fatigue risks. This process, amongst other things, ensures continuous improvement.

4. **What are the roles and responsibilities within the FRMS?**

   - The senior manager/accountable executive is accountable for establishing the FRMS and allocating resources to support and maintain an effective FRMS;
   - Management is responsible for implementing, maintaining and adhering to FRMS processes in their area; and
   - Employees are responsible for arriving to work well-rested to every extent possible, for identifying fatigue risks, including assessment of their own fatigue levels and reporting them.
5. **How will FRMS benefit my organization?**

- Provides for more informed decision-making;
- Reduces fatigue risk by avoiding incidents/ accidents;
- Provides for better crew rostering that will result in increased efficiencies and reduced costs;
- Strengthens corporate culture; and
- Demonstrates corporate due-diligence.

6. **What key qualities are evident in organizations with an effective FRMS?**

- A top-down commitment from management and a personal commitment from all employees to achieve performance goals;
- A clear roadmap of what the FRMS is and what it is supposed to accomplish;
- An established practice of open communication throughout the organization that is comprehensive and transparent, and where necessary, non-punitive; and
- An organizational culture that continuously strives to improve.

7. **What FRMS is not:**

- Self-regulation / de-regulation;
- A stand alone department;
- A substitute for oversight; or
- An undue burden.

8. **What FRMS does:**

- Builds on existing processes;
- Integrates with other management systems by tailoring a flexible regulatory framework to your organisation; and
- Demonstrates good business practice.

9. **What's else does an FRMS need?**

- A Safety Promotion system is a vital element of an FRMS.
- Education and Awareness training programmes for all staff throughout the organization.
- Effective and confidential fatigue reporting processes are essential.
10. **What’s the difference between FRMS and regulatory compliance?**

- FRMS focuses on the specific fatigue risk aspects of the operation.
- Regulatory compliance focuses on the broad generic regulations taking no account of the specific operation.
- While regulatory compliance focuses on conformity, FRMS focuses on operator specific fatigue hazards. Both non-conformities and hazards can impact safety.

**What is the relationship between FRMS and SMS?**

12.32 ICAO Annex 6 Part I stipulates regarding SMS of operators as follows:

3.3.4 From 1 January 2009, States shall require, as part of their safety programme, that **an operator implement a safety management system acceptable to the State of the Operator** that, as a minimum:

   a) identifies safety hazards;
   
   b) ensures that remedial action necessary to maintain an acceptable level of safety is implemented;
   
   c) provides for continuous monitoring and regular assessment of the safety level achieved; and
   
   d) aims to make continuous improvement to the overall level of safety.

3.3.5 A safety management system shall clearly define lines of safety accountability throughout the operator’s organization, including a direct accountability for safety on the part of senior management.

12.33 Accordingly, DGCA has stipulated in its CAR Section 2 Series ‘O’ Part I that ‘**an operator shall implement a safety management system acceptable to DGCA**’ that identifies safety hazards; ensure remedial actions; provides for continuous monitoring; and aims for continuous improvement to the overall level of safety.

12.34 The function of an airline SMS can be broken into two principle domains: safety risk management and safety assurance. These two types of core operational activities are governed by the safety policy, procedures and objectives of SMS and are supported by safety promotion and feedback.
12.35 FRMS, on the other hand, adopts the core operational activities (similar to SMS) for the continuous detection, monitoring and mitigation of fatigue-related risk. FRMS thus undertakes fatigue risk management and fatigue safety assurance using fatigue risk management policy and procedures, supported by fatigue safety promotion.

12.36 Draft ICAO FRMS Guidelines recommend that before considering the use of FRMS, the operator's safety processes should be sufficiently mature to enable the fundamental process of FRMS to be readily adopted and understood. Examples of such maturity would include the routine use of hazard identification, risk assessment and mitigation tools, and the existence of an effective reporting culture. Where such systems are already in place, it should not be necessary for an operator to develop entirely new processes to implement FRMS. Rather, FRMS should be build upon the organisation's existing risk management, scheduling, and training processes.

12.37 Further, draft ICAO FRMS Guidelines also state that while an operator’s FRMS and SMS must work in a coordinated manner, it is up to the operator to determine how to best integrate these two management systems. The importance of coordinating the two systems cannot be overemphasised in order to avoid overlooking a hazard or mismanaging a risk. For example, from an SMS viewpoint, a succession of ground proximity warnings at the same point, on the same approach, and on the same flight number, may well be attributed to inadequate pilot training in altitude management and maintenance of the localizer and glide slope. It may not be as obvious that the succession of ground proximity warnings occurred on flights that were part of a particularly fatiguing sequence that resulted in tired pilots not paying enough attention. Both possibilities need to be considered and therefore the two systems designed to do this cannot work in isolation.

12.38 The operator may well choose to incorporate their FRMS within their SMS, or they may choose to have two separate but complimentary systems, which talk to each other so that the necessary focus of each is not compromised. Figure 1 illustrates how FRMS maps into the ICAO SMS framework.
Analysis

12.39 The Committee deliberated ‘Fatigue Risk Management System (FRMS) especially in the light of draft ICAO proposal. A meeting was held with Capt. Mitchell Fox, Chief, Flight Safety Section, Air Navigation Bureau, ICAO to know his views on the subject.

12.40 Capt. Fox explained that the present proposal does not make it mandatory for the States to stipulate FRMS regulations but it would be mandatory for the States to stipulate prescriptive flight and duty limitations of scientific basis, as required at present. If a State does not promulgate FRMS regulations then the operators of that State would not have option to implement FRMS. He also clarified that even if a State stipulates FRMS regulations, it would not be mandatory for the operators to have an
FRMS. The operator may have an FRMS for all its operations or for some part of its operations where other part is operated under prescriptive flight and duty limitations.

12.41 The Committee noted that the cost of adoption of FRMS to an operator would be primarily associated with the administration of FRMS but the cost to DGCA would require resources of highly skilled and trained manpower to conduct assessments and surveillance of the operator’s FRMS. Further, fatigue risk management systems would take time to mature, so savings will manifest themselves only in the long run.

12.42 The Committee, therefore, agreed to recommend that the FRMS proposal of ICAO may be evaluated in consultation with the operators to find out if any of the operators would like to adopt FRMS for their operations.

Recommendation No. 36

12.43 In view of the FRMS proposal being in draft stage only, the Committee recommends as follows:

1. DGCA may formulate comments in consultation with stakeholders.
2. As and when FRMS is finalised by ICAO, DGCA should take appropriate steps for its implementation by operators. In the meantime it is also recommended that DGCA may take proactive steps to either train its staff on the regulatory aspects of FRMS or explore the possibilities of engaging expert agencies to evaluate FRMS proposed by operators to assist the regulatory authority.
CHAPTER – 13
Ultra Long Range (ULR) Operations

Historical Perspective

13.1 Singapore Airlines (SIA) applied in 1998 for a permission to operate a non-stop flight from Singapore to Los Angeles using Airbus A340-500. Civil Aviation Authority, Singapore (CAAS) constituted a Ultra Long Range (ULR) Task Force to examine the feasibility of such flights. The ULR Task Force was made up of members from CAAS, SIA and the Airline Pilot’s Association, Singapore (ALPA-S). The objective was to arrive at a set of recommendations to permit the ULR flights. Following basic issues were required to be resolved:

1. Existing Flight Time Limit was 16 hours, whereas the estimated flight time for the Singapore – Los Angeles flight was more than 18 hours;

2. Existing Flight Duty Period (FDP) Limit was 18 hours and the estimated FDP for the flight to Los Angeles was more than 20 hours;

3. If delay of 3 hours due unforeseen operational circumstances is included then workday could become more than 23 hours.

13.2 The above issues raised questions whether flight safety will be compromised; is it possible to sustain alertness of the crew during such a long flight. Factors that moderated these fundamental issues included:

- Number of flight crew
- Composition of flight crew
- Status of circadian acclimatization
- Previous duty duration
- Opportunity for pre-flight rest/sleep
- Opportunity for in-flight rest/sleep
- Post-flight recovery and sleep
13.3 It was apparent from the beginning that it would be almost impossible to come up with “generic” recommendations that could cover all possible scenarios in ULR flights (i.e. irrespective of time of departure/landing, destination, time-zone change and flight duration). Thus the deliberations were focused on the Singapore - Los Angeles city pair with defined departure/landing windows from both Singapore and Los Angeles.

13.4 The issues associated with ULR flights were also comprehensively discussed in the three workshops organized by the Flight Safety Foundation and sponsored by Boeing and Airbus. The first workshop (Washington DC) managed to define a ULR flight and the basic approach towards formulating acceptable limits for crew alertness on these ULR flights. The second ULR workshop (Paris), underscored the need for looking at the ULR issue in a focused manner i.e. defined city-pair, defined departure windows and defined aircraft type. The third ULR workshop (Kuala Lumpur) provided the framework for an approach to ULR rule making.

13.5 In 2001, Airbus applied to JAA for certification of their A340-500 aircraft including its ULR capability. The European Committee for Aircrew Scheduling and Safety (ECASS) was tasked by JAA to conduct a computer modelling study to predict the levels of alertness on ULR flights operating with four pilots. The Singapore - Los Angeles city pair was used as this was seen as being the launch pad for ULR operations for the aircraft. The JAA invited CAAS as observers for the study.

13.6 The results of the modelling “indicated that it should be possible for a 4-man crew to operate the route without experiencing greater problems with fatigue than they are exposed to in several current long range operations”. The model predicted that crew alertness would be better if each crew member took two in-flight rest periods instead of one.

13.7 Following the findings of the ECASS study, the Singapore ULR task force decided to validate the findings based on information on current SIA schedules and Phase II study was commissioned by CAAS. It was designed to gather data from SIA pilots (as the
initial modelling was on data from European pilots only) on routes that among others, were to include those that would closely resemble the proposed ULR city pair of Singapore - Los Angeles, e.g. current flights between Singapore and the West Coast USA.

13.8 The Phase II study carried out by ECASS, validated the findings of the modelling carried out earlier. With 4 pilots, the levels of alertness for the ULR city pair Singapore - Los Angeles were projected to remain as good as those seen in the current SIA routes studied. This was based on each crew member having two in flight rest periods.

13.9 Based on the recommendations derived from the findings of the modelling study, and the subsequent validation, CAAS issued provisional rules to allow SIA to operate the Singapore - Los Angeles city pair ULR flights at the defined departure windows with a 4 man crew (two of whom must be pilot-in-command qualified).

13.10 The ULR flights to Los Angeles were launched on 3rd February 2004. ECASS and another research group from Massey University, New Zealand, were commissioned by CAAS to carry out a study on the implications of fatigue in these new ULR operations. This study, which stretched over six months between February and July 2004 had the following components:

a. Diary study where the aircrew completed a diary of their sleep and duty from two days before the outward flight from Singapore until four days after the return.

b. An objective performance vigilance task at specified times throughout the flight starting before take-off, at the top of ascent, prior to each rest period and at the top of descent as well as after landing

c. An activity monitor (Actiwatch) to provide independent estimates of sleep – in Singapore, during flight, at the layover, again during flight and upon return to Singapore

d. Polysomnographic (EEG, EOG, EMG) recordings to record the quality and quantity of sleep in the rest facilities on board the aircraft.

13.11 These studies indicated that the levels of alertness throughout the Singapore – Los Angeles – Singapore flights are no lower than those experienced by crew on other long haul flights. Alertness is sustained on the ULR flights as a result of the additional time available for rest and the ability of the crews to take two rest periods in flight.
13.12 In November 2003, SIA asked CAAS to also consider its request to launch ULR flights to New York. These flights would only be launched some months after the Los Angeles flights and would be contingent on the initial study results from the Los Angeles flights.

13.13 The same approach was adopted for this city pair. A modelling study was done in December 2003. The model was validated with preliminary ULR data from the Los Angeles flights. Approval for the New York flights was given in May 2004 after the scientists indicated that the modelling and validation results showed that these flights were possible.

13.14 The Singapore – New York ULR flights were launched on 28 June 2004. Immediately following the launch, the scientists monitored the flights for a period of 6 months.

13.15 Singapore ULR Rules can be depicted as follows:
13.16 On November 1, 2006 Delta airlines became the third international airline to operate ULR flights between JFK – Mumbai city pair. These flights were based on FAA Ops Specification, which stipulated as follows:

**FAA Ops Specifications A332**

- **City Pair Specific**
- **Duty Day 19.5 hours extendable to 22.5 under certain circumstances**
- **18 hour maximum flight time hours**
- **Crew Compliment-2 Capt 2 F/O--fully qualified**
- **24 hour pre/post rest requirement**
- **48 hour (reduce-able to 40) layover in Mumbai**
- **Prescriptive On Board Rest Scheme**
- **Education Materials**
- **Data Collection Requirements**

13.17 The prescriptive in-flight rest and meal scheme followed by Delta Airlines is as follows:

![Mumbai Ops: Crew Rest & Meal Planning Guide](image-url)

* JFK-BOM = approximately 14 hours  
  BOM-JFK = approximately 16 hours*
13.18 At present, airplanes designed for ULR operations by airlines include the Airbus A380 and A340-500, and the Boeing 777-200ER, 777-200LR and 777-300ER.

**Indian Perspective and Analysis**

13.19 Ultra Long Range (ULR) Operations defined as continuous non-stop flights between the specific city pairs having a flight time of over 16 hours and duty periods between 18 and 22 hours.

13.20 Airlines of India are not operating any ULR flights. The difficulty arose because AIC 28 of 1992 permitted maximum flight time of 14 hours with 4 pilots (2 sets of crew) and direct flights even though had a flight time of less than 16 hours could not be permitted under Indian regulations.

13.21 The recommendations of the Committee would permit present operations non-stop of Air India as these do not come under the category of the ULR Operations.

13.22 The above historical perspective shows that FAA is permitting ULR flights to India under prescriptive limits with additional requirements including ‘Data Collection’ requirements. CAA, Singapore also had their flights validated through scientific studies. The operations, therefore, comes close to FRMS approach.

13.23 The Committee also discussed the subject of ULR flights with Capt. Fox of ICAO and he agreed that even though it is possible to operate such flights under prescriptive limits with additional restrictions, it would be appropriate that such flights are operated under FRMS, which would provide continuous monitoring of the crew alertness.

13.24 The committee deliberated on the availability of international regulations on ultra long flights. It is clear from the above that ICAO has not prescribed any standards. Only USA and Singapore have laid down ULR specific regulations as described and analysed above. However, the Committee also take note of the fact that none of the Indian operators fall within the category of ULR on the basis their current operations. Keeping in view the rapid advancement in technology and demand in the aviation
sector, Indian operators may plan to undertake ULR flights. Therefore, the Committee is of the view that it would be appropriate to lay down a broad framework ULR regulations.

**Recommendation No. 37**

13.25 The Committee deliberated the subject extensively and agreed that DGCA should decide the operation of Ultra Long flights on case-to-case basis for specific city-pairs and the departure windows of the flights. The Committee also recommends that there should be requirement to get the flights validated for the crew alertness if the operator uses prescriptive regulations. It should, however, be preferable to use FRMS for continuously monitoring of the crew alertness. Following regulations may be adopted as guiding regulations: However in case of city specific pairs DGCA may formulate additional regulations to address any additional issue of FDP etc.

**Definition of ULR**

Ultra Long Range (ULR) Operations defined as continuous non-stop flights between the specific city pairs having a flight time of over 16 hours and duty periods between 18 and 22 hours.

13.26 The URL Operation should need ‘City Pair Specific’ approval of DGCA with a specific scheme having at least the following provisions:

(a) “Duty Flight Crew” means those members of the flight crew who are on duty in the cockpit.

(b) “In-flight Rest Period” means a period of time within a flying duty time, which is to give a crew member an opportunity to rest before commencing or recommencing duty as a duty flight crew.

(c) “Rostered Duty Assignment (RDA)” means a sequence of Flight Duty Periods, off-duty periods, standby duty periods, crew positioning and rest periods for which flight crew are rostered when assigned to operate a ULR flight.

(d) Designated flight crew rest facilities shall be provided on board aircraft. These rest facilities shall comprise not less than two independent rest areas with horizontal bunks and shall provide an environment that is conducive to rest/sleep. The rest facilities shall be subject to the prior approval of the DGCA.
(e) Each ULR flight is to be operated by no less than four (4) pilots of whom two (2) must be pilot-in-command qualified for the route. The duty flight crew shall comprise at least two pilots of which one crewmember is pilot-in-command qualified.

(f) The Operations Manual shall contain specific instructions to ensure that the ULR flight meets the following requirements:

   i. **ULR Pre-flight and In-flight Rest Planning**

   A scheme shall be established to provide guidance to the flight crew on the expected pre-flight preparations and in-flight rest to be taken. Flight crew are to be appropriately rested for the ULR flight.

   The in-flight rest plan shall provide for at least two (2) rest periods, one of which shall not be less than four (4) hours.

   ii. **ULR Pre-flight Rostering Requirements**

   The flight crew shall be acclimatised at base before undertaking a ULR RDA. Immediately prior to commencing the ULR RDA, the crew should be rostered for a rest period of no less than 48 hours, which shall include two (2) local nights, free from flying duties.

   iii. **ULR Flight Rest Period Away from Base**

   In the ULR RDA, the scheduled period free of flying duties away from base shall be at least 48 hours, with at least two (2) local nights.

   iv. **Post ULR RDA Rest At Base Before Embarking on the Next Flight**

   The ULR flight crew shall be provided with four (4) consecutive local nights of rest free of duty on completion of the ULR RDA, before the crew may be rostered for another ULR flight or other flights.
CHAPTER – 14
Conclusions and Recommendations

14.1 The Committee, after careful consideration and taking into account the available scientific knowledge on sleep and fatigue science, the recent criteria of ICAO, best international practices available and the interactions with the stakeholders, has made recommendations, which are consolidated in the following paragraphs. The background, basis, explanation and analysis for each of the recommendation have been dealt in the relevant chapter of the report.

14.2 In Committee’s view the recommendations made in the report would result in formulation of ‘Prescriptive Fatigue Management Regulations’ in accordance with the ICAO Standards of Annex 6 Part I and Guidelines prescribed in its Attachment ‘A, and their implementation will effectively manage fatigue and enhance aviation safety. The recommendations are in three categories and have been dealt accordingly as follows:

A. Basic Structure of Regulations
   i) Amendment to Aircraft Rules
   ii) Different regulations for Domestic (including neighbouring countries) and International Operations – Necessity thereof
   iii) Definition of Neighbouring countries
   iv) Adherence to ICAO Standards

B. Principle Regulations
   v) Umbrella Regulations – Shared Responsibility of Operator and Crew for Adherence of regulations
   vi) Training and Education

C. Essential Elements of Fatigue Management
   vii) Flight Time Limitations,
   viii) Duty and Flight Duty Period Limitations,
   ix) Rest Periods,
   x) Miscellaneous provisions, and
   xi) Maintenance and Monitoring of records

D. Regulations for future like FRMS and ULR Operations
   xii) Fatigue Risk Management Systems (FRMS)
   xiii) Ultra-Long Range (ULR) Operations
A. Basic Structure of Regulations

i) Amendment to Rule 42A of the Aircraft Rules, 1937

14.3 The Committee noted that the present Rule 42A of the Aircraft Rules, 1937 only stipulates cumulative flight time limitation of 30 days whereas the latest ICAO SARPs requires the States to frame regulations of not only for flight time but also for duty period, flight duty period, rest period and other miscellaneous provisions. Further, ICAO Standards require operators to establish a “Scheme” and maintain relevant records. The Committee is of the view that Rule 42A is not in line with the present ICAO SARPs and appears anachronistic. Rule 42A, therefore, needs amendment and recommends:

**Recommendation No. 1**
(Refer Paras 6.3 to 6.8 of Chapter No. 6)

Rule 42A of the Aircraft Rules, 1937 should be amended, to provide as follows:

i. Power to DGCA to establish regulations specifying the limitations applicable to the flight time, flight duty periods, duty periods and rest periods for flight and cabin crew members of aircraft engaged in commercial operations, general flying and flying training;

ii. Require operators to establish a ‘Scheme’ of flight time and duty period limitations and a rest that enable it to manage the fatigue of all its flight and cabin crew members. This scheme should comply with the regulations established by or approved by DGCA, and should be included in the operations manual;

iii. Require operators to establish a ‘means’ to permit variations from the fatigue regulations, which are acceptable and duly approved by DGCA;

iv. Require operators to maintain foolproof records for all its flight and cabin crew members of flight time, flight duty periods, duty periods and rest periods.

ii) Different regulations for Domestic (including neighbouring countries) and International Operations

14.4 The committee concluded that different set of regulations for domestic operations (including neighbouring countries) and international operations as has been the practice in past may be continued and recommends:
**Recommendation No. 2**
(Refer Paras 6.10 to 6.21 of Chapter No. 6)

i. Different set of regulations for domestic operations (including neighbouring countries) and international operations as has been the practice in past may be continued.

ii. FDTL regulations should be based on type of flights rather than type of operator.

iii. If all sectors of a flight are within the neighbouring countries, then domestic FDTL should be used and in case even one sector of the flight falls in international operation then full flight should be under international FDTL.

**iii) Definition of Neighbouring Countries**

14.5 The Committee after considering the international practices, the scientific principle embedded in the definition of ‘Window of Circadian Low’ (WOCL) and with a view to avoid any ambiguity recommends the following definition:

**Recommendation No. 3**
(Refer Paras 6.22 to 6.27 of Chapter No. 6)

Countries, whose standard times fall within a band of 3 hours (+1:30 hours on either side of India) should be defined as neighbouring countries i.e. countries covered in the standard time zone band of UTC+4 to UTC+7 and flights to these countries would follow FDTL for domestic operations.

**iv) Adherence to most recent criteria of ICAO**

14.6 The Committee concluded that Indian regulations should adhere to most recent criteria of ICAO and recommends the same.

**Recommendation No. 4**
(Refer Paras 6.28 to 6.30 of Chapter No. 6)

Indian regulations should be based on the most recent criteria of ICAO.
B. Principle Regulations

v) Umbrella Regulation – Shared Responsibility of Operator and flight crew

14.7 The Committee concluded that responsibility for safety of flight and that of adhering to the regulations should be shared by both the operator and the flight crew member. This shared responsibility should form as an umbrella regulation encompassing all stipulated requirements on the subject. The Committee, therefore, recommends:

Recommendation No. 5
(Refer Paras 6.31 to 6.34 of Chapter No. 6)

Umbrella Regulations

(i) The operator should not require a flight crew member to operate an aeroplane if it is known or suspected that the flight crew member is fatigued to the extent that the safety of flight may be adversely affected.

(ii) A flight crew member should not operate an aeroplane when he or she knows that he or she is fatigued or feels unfit to the extent that the safety of flight may be adversely affected.

(iii) No certificate holder should schedule any flight crewmember and no flight crewmember should accept an assignment, which would exceed the prescribed limitations.

(iv) Flight crew members should make best use of the facilities and opportunities that are provided for rest and for the consumption of meals, and should plan and use rest periods to ensure that they are fully rested for operating the flight.

vi) Training and Education

14.8 Extensive knowledge is available regarding fatigue, sleep, and circadian physiology as it relates to performance and aviation operations and industry needs to be informed about it. The Committee deliberated the importance of training and education and recommends:

Recommendation No. 6
(Refer Paras 6.35 to 6.38 of Chapter No. 6)

Operators should ensure that persons concerned with the operations of aircraft are trained and educated regarding dangers of fatigue, the causes of sleepiness and importance of sleep and proper sleep habits.
C. Essential Elements of Fatigue Management

vii) Flight Time Limitations

14.9 The Committee concluded that the flight time limitations should be aligned with ICAO SARPs and other international best practices and recommends:

Definition of Flight Time

Recommendation No. 7
(Refer Paras 7.1 to 7.4 of Chapter No. 7)

Flight time — aeroplanes. The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

Note. — “Flight time” as here defined is synonymous with the term “block to block” time or “chock to chock” time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.

Cumulative Flight Time Limitations

Recommendation No. 8
(Refer Paras 7.7 to 7.26 of Chapter No. 7)

Cumulative Flight Time Limitations

<table>
<thead>
<tr>
<th>Cumulative Period</th>
<th>Flight Time Limitation (Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic and Neighbouring Countries Operations</td>
</tr>
<tr>
<td>In 7 consecutive days</td>
<td>35</td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>125</td>
</tr>
<tr>
<td>In 365 consecutive days</td>
<td>1000</td>
</tr>
</tbody>
</table>
Daily Maximum Flight Time Limitation

14.10 The maximum daily Flight Time Limits and the maximum numbers of landings have been linked. This is based on the fact that landing is the most stressful activity of flight operations, which induces fatigue in pilots. Further, based on feedback from investigations, aviation experts and flight crew members, the Committee decided to limit the number of landings to 2 during night operations.

Recommendation No. 9
(Refer Paras 7.27 to 7.51 of Chapter No. 7)

<table>
<thead>
<tr>
<th>Crew Complement</th>
<th>Maximum Flight Time Limitation/ Max Number of Landings**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic and Neighbouring Countries Operations</td>
</tr>
<tr>
<td>Two-Pilot Operations</td>
<td>8 hours/up to 6 landings</td>
</tr>
<tr>
<td></td>
<td><strong>For day operations</strong></td>
</tr>
<tr>
<td></td>
<td>9 Hours/up to 3 landings</td>
</tr>
<tr>
<td></td>
<td><strong>For night operations</strong></td>
</tr>
<tr>
<td></td>
<td>9 Hours/up to 2 landings</td>
</tr>
<tr>
<td>Three-Pilot Operations</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>Four-Pilot Operation</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>Four-Pilot ULR Operations*</td>
<td>Not Permitted</td>
</tr>
</tbody>
</table>

* ULR Operations needs specific approvals of DGCA on City Pairs and case-to-case basis

** Maximum Numbers of Landings are further dependent on Flight Duty Period
viii) Duty and Flight Duty Period Limitations

14.11 The Committee after careful consideration decided to recommend introduction of new concepts of “Duty”, “Duty Period” and “Flight Duty Period” in accordance with the ICAO guidelines instead of “Flight Duty Time” traditionally being used in Indian regulations. Several mitigating measures such as augmentation of crew, quality of rest facilities on board, circadian rhythm factor and qualification of pilots have been included to manage fatigue, while recommending duty and flight duty period limitations.

Definition of Duty and Duty Period

Recommendation No. 10
(Refer Paras 8.1 to 8.13 of Chapter No. 8)

Duty. Any task that flight or cabin crew members are required by the operator to perform, including, for example, flight duty, administrative work, training, positioning and standby when it is likely to induce fatigue.

Duty period. A period which starts when a flight or cabin crew member is required by an operator to report for or to commence a duty and ends when that person is free from all duties.

Definition of Flight Duty Period

Recommendation No. 11
(Refer Paras 8.14 to 8.26 of Chapter No. 8)

Flight Duty Period. A period which commences when a flight or cabin crew member is required to report for duty that includes a flight or a series of flights and which finishes when the aeroplane finally comes to rest and the engines are shut down at the end of the last flight on which he/she is a crew member.

Cumulative Duty Period Limitations

14.12 The Committee also decided to recommend the cumulative limitations of Duty Period so as to bring Indian regulations in line with the latest ICAO guidelines. It was
also decided that in accordance with the recommendation of Moebus Aviation cumulative duty limitation of 14 consecutive days should also be added to ensure that duty periods are spread evenly. Accordingly, the Committee recommends:

**Recommendation No. 12**
(Refer Paras 8.27 to 8.48 of Chapter No. 8)

**Cumulative Duty Period Limitation**

No operator should assign and no flight crew member should accept any duty to exceed:

(a) 190 duty hours in any 28 consecutive days, spread evenly as practicable through out this period;
(b) 100 duty hours in 14 consecutive days; and
(c) 60 duty hours in any seven consecutive days.

**Maximum Daily Flight Duty Period Limitations**

14.13 Similar to maximum Flight Time Limit, he maximum Flight Duty Period (FDP) limits and have also been linked to maximum of landings based on the fact that landing is the most stressful activity of flight operations, which induces fatigue in pilots. Moebus study also concluded that the formulation of precise limits of FDP limits after taking into account all variables is a very complex process and requires further studies. Therefore, till such time the Committee decided to recommend a calibrated approach for maximum FDP limits by linking it with the number of landings. As the number of landings are also linked to both Flight Time as well as Flight Duty Period, the Committee decided to consolidate its recommendations containing both Maximum Flight Duty Period Limitation and Maximum Flight Time Limitation linked to maximum number of landings. As stated earlier, based on feed back from investigations, aviation experts and flight crew members, the Committee decided that for 9 hours of Flight Time number of landings be limited to 2 during for night operations and 3 for day operations. This recommendation also addresses the impact of WOCL operations on circadian rhythm and its consequent impact on human physiology and fatigue.
**Recommendation No. 13**  
(Refer Paras 8.49 to 8.79 of Chapter No. 8)

**Maximum Daily Flight Duty Period – Two Pilot Operations**

<table>
<thead>
<tr>
<th>Type of Operations</th>
<th>Maximum Daily Flight Duty Period (FDP) Limitation**</th>
<th>Maximum Number of landings</th>
<th>Maximum Flight Time Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International Operations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 hours</td>
<td>2</td>
<td>10 hours</td>
<td></td>
</tr>
<tr>
<td>12.5 hours</td>
<td>2 for night operations</td>
<td>9 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 for day operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Domestic and Neighbouring Countries Operations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.5 hours</td>
<td>2 for night operations</td>
<td>9 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 for day operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 hours</td>
<td>4</td>
<td></td>
<td>8 hours</td>
</tr>
<tr>
<td>11.5 hours</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 hours</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Reduction of Flight duty period due to operation in WOCL**

When the FDP starts in the WOCL, the maximum FDP stated in above points will be reduced by 100 % of its encroachment up to a maximum of two hours. When the FDP ends in or fully encompasses the WOCL, the maximum FDP stated in above points will be reduced by 50 % of its encroachment.

**Extension of ‘Flight Duty Period’ by Crew Augmentation**

**Definitions of Augmented Flight Crew**

**Recommendation No. 14**  
(Refer Paras 8.81 to 8.99 of Chapter No. 8)

**Without amendment of the Aircraft Rules**

**Augmented flight crew.** A flight crew that comprises more than the minimum number required to operate the aeroplane and in which each flight crew member can leave his or her assigned post and be replaced by another flight crew member, who shall hold qualifications which are equal to or superior to those held by the crew member who is to be replaced for the purpose of in-flight rest.”
With amendment of the Aircraft Rules

“Augmented flight crew. A flight crew that comprises more than the minimum number required to operate the aeroplane and in which each flight crew member can leave his or her assigned post and be replaced by another appropriately qualified flight crew member for the purpose of in-flight rest.”

14.14 The Committee after deliberations agreed to recommend the extension of maximum flight duty period in accordance with the following table and notes in case of augmented flight crew:

**Recommendation No. 15**
(Refer Paras 8.100 to 8.133 of Chapter No. 8)

The maximum flight duty period may be extended in case of the flight crew is augmented in accordance with the following table and the conditions below:

<table>
<thead>
<tr>
<th>Rest facility available</th>
<th>Maximum extension of the FDP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Augmented crew (3 Pilots)</td>
</tr>
<tr>
<td>Rest seat</td>
<td>2H</td>
</tr>
<tr>
<td>Bunk</td>
<td>4H</td>
</tr>
</tbody>
</table>

(a) In flight rest of less than 3 hours should not allow for the extension of the FDP.

(b) The applicable Flight Duty Period may be increased up to a maximum of 16 hours in case of Rest Seat and up to a maximum of 18 hours in case of Bunk. In case of double crew, rest facilities should be available for both pilots not on active duty.

(c) In case of augmented/double flight crew, the division of duty and rest between the flight crew members being relieved should be kept in balance.

(d) Rest Seat should be at least a ‘Business Class’ seat reclining to at least 40° back angle to the vertical, outside the cockpit and separated from passengers by a dark curtain.

(e) Crew should be allowed to return to controls only after 30 minutes of waking after bunk/seat rest.
**Extension of ‘Flight Duty Period’ by Split Duty (Break)**

14.15 ICAO guidelines does not deal with the concept of Split Duty. The Committee, however, noticed that many countries have the regulations on the subject and considered it important enough to deal with subject and recommends as follows:

**Definition and Requirements**

<table>
<thead>
<tr>
<th>Consecutive hours of break</th>
<th>Maximum Extension of the FDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 3H</td>
<td><em>NIL</em></td>
</tr>
<tr>
<td>Between 3H and 10H</td>
<td>A period equal to half the consecutive hours break taken</td>
</tr>
<tr>
<td>&gt;10H</td>
<td>No extension permitted</td>
</tr>
</tbody>
</table>

i. Post-flight and pre-flight duties should not be counted as part of rest.
ii. If the break is more than 6 consecutive hours or encroach on the WOCL, then operator should provide suitable accommodation.
iii. Parts of the FDP before and after the break should not exceed ten hours.

**ix) Rest Periods**

14.16 Rest period requirement has many aspects and inter-alia includes minimum rest period, preceding duty time, cumulative weekly rest periods and effect of time zone on rest periods. The Committee, for the sake of clarity, dealt these components of the rest period separately and recommends as follows:

**Definition of Rest Period**

<table>
<thead>
<tr>
<th>Recommendation No. 17</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Refer Paras 9.2 to 9.8 of Chapter No. 9)</td>
</tr>
</tbody>
</table>

**Rest Period**: An uninterrupted and defined period of time during which a crew member is free from all duties and airport standby.
Minimum Rest Period

Recommendation No. 18
(Refer Paras 9.9 to 9.38 of Chapter No. 9)

Minimum Rest

1. The minimum rest, which should be provided before undertaking a flight duty period, should be:
   a) at least as long as the preceding duty period, or
   b) 12 hours, or
   c) 14 hours on crossing 3 time zones, or
   d) 36 hours on crossing 8 time zones

   whichever is the greater;

2. If the preceding duty period, which includes any time spent on positioning, exceeded 18 hours, then the ensuing rest period should include a local night.

3. Period of transportation to and from an airport should neither be counted towards duty time nor rest period. The operator should include in the ‘Scheme’ the optimum time of transportation after taking into account various factors and on ensuring that the rest period does not get reduced below the minimum rest requirements.

Weekly Rest Period

14.17 The international practices regarding weekly rest period reveal that almost all countries provide for increased weekly rest, which covers two consecutive nights i.e. during any 7 consecutive days the minimum rest period of the flight crew is enhanced to 36 hours. The Committee, also agreed to follow a similar rest and recommends:

Recommendation No. 19
(Refer Paras 9.40 to 9.53 of Chapter No. 9)

An operator should ensure that the minimum rest is increased periodically to a weekly rest period, being a 36-hour period including two local nights, such that there should never be more than 168 hours between the end of one weekly rest period and the start of the next.
Rest to compensate Time Zone

14.18 Most of countries provide enhanced rest for time zone compensation only after return to base and not at outstations. It was agreed by the Committee to stay with the practice followed by other countries to provide enhanced rest for time zone after return to base. The Committee, therefore, recommends as follows:

**Recommendation No. 20**
(Refer Paras 9.54 to 9.76 of Chapter No. 9)

An operator should ensure that effects on crew members of time zone differences is compensated by additional rest as specified below.

Minimum rest including local nights should be given, according to the table below, when coming back to home base, to any crew member who has been away from the home base in such a way that the WOCL had to be modified.

<table>
<thead>
<tr>
<th>Time zone difference</th>
<th>Hours of rest</th>
<th>Local nights</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-7</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>8 and more</td>
<td>72</td>
<td>3</td>
</tr>
</tbody>
</table>

"Time zone difference" in this table is the time zone difference between the starting and finishing points of the initial duty.

x) **Miscellaneous Provisions**

14.19 ICAO Annex 6 Guidance Material for development of prescriptive fatigue management regulations stipulates "Miscellaneous Provisions" relating to **Standby**, **Availability and Positioning**. The Committee, in addition to these three provisions, deals with some other issues such as **Split Duty**, **Unforeseen Circumstances**, **Reporting Time**, **Night Operations and Local Night** under the heading of Miscellaneous Provisions.

**Standby and Availability**

14.20 Definition of Standby also deals with Availability. The Committee recommends the definition of Standby, its regulations and rest period following the standby as follows:
Definition of Standby

**Recommendation No. 21**  
(Refer Paras 10.3 to 10.12 of Chapter No. 10)

**Standby.** It is a defined period of time during which a flight crew member is required by the operator to be available to receive an assignment for a specific duty without an intervening rest period. However, it should not include any time during which an operator requires a crew member to be contactable for the purpose of giving notification of a duty which is due to start 10 hours or more ahead.

Standby Regulations

**Recommendation No. 22**  
(Refer Paras 10.13 to 10.30 of Chapter No. 10)

i. Operator’s should include ‘Standby’ as part of their regular rosters and concerned crew should be kept notified.

ii. In case of exigencies when ‘Standby’ duty may go beyond the roster, Operator should ensure that concerned crew are notified in advance.

**Recommendation No. 23**  
(Refer Paras 10.31 to 10.43 of Chapter No. 10)

i. Standby period should not extend beyond 12 hours. However, a maximum standby at airport (with or without sleeping quarters) should not exceed 8 hours.

ii. If the standby period is at the airport and
   
   (a) Standby culminates into a flight duty then the total period (i.e. 100%) should be counted towards the flight duty period and also towards cumulative duty period
   
   (b) Standby does not culminate into a flight duty then the total period (i.e. 100%) should be counted towards cumulative duty period

iii. If the standby period is at home or in a hotel and culminates into duty
   
   (a) within first 6 hours then no part of standby should be considered as part of flight duty period or cumulative duty period
(b) at 6 hours or later then flight duty period should be reduced by 50% of the standby time.

iv. If standby period is at home or in a hotel does not culminate into a duty then, 25% of its time may be considered under cumulative duty.

Rest Period following Standby

Recommendation No. 24
(Refer Paras 10.44 to 10.55 of Chapter No. 10)

i. When any period of standby finishes, during which a call-out has not occurred, at least 10 hours rest should follow prior to the next duty period.

ii. When standby culminates in to a duty, then the rest period should be decided based on total period of duty i.e. the duty plus the percentage of standby counted for duty.

Positioning (Deadheading)

14.21 Positioning or transferring of crew members from one place to another is often resorted by the operators for various operational reasons. Positioning, therefore, is a operational necessity and the activity not only needs to be defined but also needs to be regulated as it adds to the fatigue of the crew members. The Committee, after deliberations recommends as follows:

Definition

Recommendation No. 25
(Refer Paras 10.56 to 10.61 of Chapter No. 10)

Positioning. The transferring of a non-operating crew member from place to place as a passenger at the behest of the operator.

Note.— “Positioning” as here defined is synonymous with the term “Deadheading”.


Positioning Regulations

**Recommendation No. 26**
(Refer Paras 10.62 to 10.71 of Chapter No. 10)

a) All the time spent on positioning on the behest of the operator should be counted as duty.

b) Positioning time should be part of a flight duty period when it immediately precedes (i.e., without an intervening rest period) a flight duty period in which that person participates as a flight crew member.

c) Positioning after operating a flight duty period without an intervening rest period should be counted for determining rest period.

d) Positioning should not count as a landing for purposes of determining 'Flight Duty Period'.

e) Positioning should be counted as a landing if, after a positioning journey, the crew member spends less than a minimum rest period at suitable accommodation provided by the operator, and then extends FDP using ‘Split Duty’.

**Unforeseen Operational Circumstances**

14.22 Aircraft Operations many times encounters circumstances, which are beyond the control of an operator and may necessitate extension of the limitations. The ICAO guidelines, therefore, require that such extensions should be regulated. The Committee after careful consideration recommends as follows:

**Definition**

**Recommendation No. 27**
(Refer Paras 10.72 to 10.87 of Chapter No. 10)

**Unforeseen operational circumstance.** An unplanned event, such as unforecast weather, equipment malfunction, or air traffic delay that is beyond the control of the operator.
**Extension of Flight Time and Flight Duty Period**

**Recommendation No. 28**  
(Refer Paras 10.88 to 10.97 of Chapter No. 10)

For unforeseen operational circumstances beyond the control of the operator, ‘Flight Time’ and ‘Flight Duty Period’ may be extended as follows:

i) Flight Time by maximum of 1½ hours and FDP by maximum of 3 hours subject to a cumulative limit of maximum of 3 hours and maximum of 6 hours respectively in 30 consecutive days.

ii) Subject to the maximum limit of extension of FDP i.e. 3 hours on individual event and 6 hrs on cumulative basis, extension should be decided between PIC and ‘Head of Operations’ of operator. PIC in consultation with the other crew members and cabin crew should convey their willingness (or consent) to the ‘Head of Operations’ for operating the flight. In accordance with international practice, PIC should submit the report to Head of Operations who should file to DGCA along with his comments. It should be open to DGCA to take appropriate actions if not considered within regulations and violations are brought to its notice through audit/surveillance.

**Additional Rest Requirements due Extension**

**Recommendation No. 29**  
(Refer Paras 10.98 to 10.101 of Chapter No. 10)

Whenever the flight duty period gets extended, the rest period should be pro-rata increased by twice the amount of extended time of flight duty period.

**Reporting Time**

14.23 Latest ICAO guidelines for prescriptive fatigue management regulations require that crew report times should realistically reflect the time required to complete pre-flight duties, both safety- and service-related (if appropriate), and a standard allowance to be added at the end of flight time to allow for the completion of checks and records. For record purposes, the pre-flight report time should count both as duty and as flight
duty, and the post-flight allowance should count as duty. The Committee after careful consideration recommends as follows:

**Definition and Requirements**

**Recommendation No. 30**
(Refer Paras 10.102 to 10.106 of Chapter No. 10)

**Reporting time.** The time at which flight crew members are required by an operator to report for duty.

Crew report times should be specified by the operator realistically, which reflect the time required to complete pre-flight duties, both safety and service-related, but should not be less than 45 minutes, and

A standard allowance of 30 minutes for major operators and 15 minutes for others should be added at the end of flight time to allow for the completion of checks and records. For record purposes, the pre-flight report time should count both as duty and as flight duty, and the post-flight allowance should count as duty.

**Night Operation**

14.24 Aviation industry requires 24-hour activities to meet operational demands. Even though night operations interfere with the circadian rhythm of the crew members but crews must be available to support 24-hour-a-day operations to meet the industry demands. In India, cargo operations are generally carried out only during night to ensure their operational requirement of cargo delivery within 24 hours and all operators requested that consecutive night operations should be permitted as it is permitted under UK regulations. The Committee carefully considered the operational requirements of the industry and recommends as follows:

**Recommendation No. 31**
(Refer Paras 10.107 to 10.119 of Chapter No. 10)

Consecutive night operations:

i) No operator operating passenger flights should deploy a flight crew nor a flight crew should undertake any duty between period
embracing 0000 to 0500 hours local time if during the previous day he/she performed flight duty between the period embracing 0000 to 0500 hours local time;

ii) Cargo operations may be permitted during period embracing 0000 to 0500 hours for two consecutive nights provided:

a) The minimum rest period before the start of such a series of duties is 24 hours.

b) The duty should not exceed 8 hours, irrespective of the sectors flown.

c) At the finish of such a series of duties crew members should have a minimum of 54 hours free from all duties.

d) There should not be 4 such duties in any 7 consecutive days.

e) Crew members should be free from all duties by 2100 hours local time before covering the block of consecutive night duties, such that they may take a rest period during a local night.

**Local Night**

14.25 The recommendations of Committee require a definition of Local Night and recommends as follows:

**Definition**

<table>
<thead>
<tr>
<th>Recommendation No. 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Refer Paras 10.120 to 10.1124 of Chapter No. 10)</td>
</tr>
</tbody>
</table>

**Local night:** A period of eight hours falling between 22.00 and 08.00 local time.

14.26 The Committee considered it necessary that some significant issues to be defined as part of the regulations. The Committee, therefore, recommended the following ICAO and NASA definitions to be adopted:
**Recommendation No. 33**  
(Refer Para 10.125 of Chapter 10)

**Home base.** The location nominated by the operator to the crew member from where the crew member normally starts and ends a duty period or a series of duty periods. (ICAO definition)

**Fatigue** is a physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a crew member's alertness and ability to safely operate an aircraft or perform safety related duties. (ICAO definition)

**Fatigue Risk Management System (FRMS)** is a data-driven ongoing adaptive process based on appropriate knowledge of scientific principles and methods that can identify fatigue hazards and develop and evaluate mitigation strategies to manage any emerging fatigue induced operational risks. It employs a multi-layered system of defences to manage operational fatigue risk proactively in which data related to crew alertness as well as operational flight performance are collected on a routine basis and analyzed in a timely manner. (ICAO definition)

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**Recommendation No. 34**  
(Refer Para 10.126 of Chapter 10)

**Window of Circadian Low (WOCL):**

The window of circadian low is best estimated by the hours between 0200 and 0600 for individuals adapted to a usual day-wake/night sleep schedule. This estimate of the window is calculated from scientific data on the circadian low of performance, alertness, subjective report (i.e., peak fatigue), and body temperature. For flight duty periods that cross 3 or fewer time zones, the window of circadian low is estimated to be 0200 to 0600 home-base/domicile time. For flight duty periods that cross 4 or more time zones, the window of circadian low is estimated to be 0200 to 0600 home-base/domicile time for the first 48 hours only. After a crew member remains more than 48 hours away from home-base/domicile, the window of circadian low is estimated to be 0200 to 0600 referred to local time at the point of departure. (NASA Definition)
14.27 Maintenance of records relating to flight time, duty period, flight duty period rest period is an essential part of the regulations. These records allow the operator and the regulator to ascertain that the fatigue management system is working in accordance with the requirements, which works as the monitoring system. This also permits to know the changes required to be carried out, in case the system is not functioning as required. The Committee after deliberations recommends as follows:

**Recommendation No. 35**
(Refer Paras 11.1 to 11.9 of Chapter No. 11)

1. To enable the operator to ascertain that the fatigue management system is functioning, as intended and as approved, records should be kept for 18 months of the duties performed and rest periods provided so as to facilitate inspection by the operator’s authorized personnel and surveillance/audit by DGCA officers.

2. The operator should ensure that these records include for each flight crew member, at least:
   
   a) the start, duration and end of each flight duty period;
   b) the start, duration and end of each duty period;
   c) rest periods; and
   d) flight time.

3. The operator should also keep records of occasions when discretion was used by the PIC to extend the prescribed limits.

4. If discretion was used for similar reasons on more than 20 percent of occasions when a particular route or route pattern is flown, then the operator should review and change the schedule or the crew scheduling arrangements so as to reduce the frequency at which such events occur.

5. In addition, DGCA should require submission of copies and analysis of records in the manner deemed fit.

6. Flight crew members should maintain a personal record of their daily flight time, duty period, flight duty period and rest periods.

7. Above may be achieved through a foolproof, transparent, computerised system, for which there should be an online system with a link for DGCA to monitor. The operator should evolve a system so that only
designated officers of the operator and DGCA have access to the system. Further, the system should have provision of ‘audit trail’ so that any change made in the data may be tracked down to its source.

8. The operator through the computerised system should be able to ensure that flight crew member is well within the flight time, flight duty period, duty period and rest period requirements before permitting him to operate the flight.

9. No operator should keep such records only on paper.

10. Operator should evolve a mechanism by which personal records maintained by individual pilot are reconciled with the operator’s records from time to time.

D. Regulations for Future

14.28 At present, all countries are following prescriptive fatigue management system. ICAO has recently has proposed adoption of fatigue risk management system and has circulated a draft. The Committee on the subject recommends as follows:

**Fatigue Risk Management System (FRMS)**

**Recommendation No. 36**  
(Refer Paras 12.1 to 12.43 of Chapter No. 12)

In view of the FRMS proposal being in draft stage it is recommended:

1. DGCA may formulate comments in consultation with stakeholders.

2. As and when FRMS is finalised by ICAO, DGCA should take appropriate steps for its implementation by operators. In the meantime it is also recommended that DGCA may take proactive steps to either train its staff on the regulatory aspects of FRMS or explore the possibilities of engaging expert agencies to evaluate FRMS proposed by operators to assist the regulatory authority.
Ultra Long Range (ULR) Operations

14.29 At present, no Indian operator has ULR operations but with the significant growth in aviation it is likely that ULR Operations may be started shortly. Keeping in view of such a possibility in near future, the Committee recommends as follows:

Recommendation No. 37
(Refer Paras 13.1 to 13.26 of Chapter No. 13)

Definition

Ultra Long Range (ULR) Operations: Continuous non-stop flights between the specific city pairs having a flight time of over 16 hours and duty periods between 18 and 22 hours.

Regulations

1) DGCA should decide the operation of Ultra Long flights on case-to-case basis for specific city-pairs and the departure windows of the flights.

2) There should be requirement to get the flights validated for the crew alertness if the operator uses prescriptive regulations. It should, however, be preferable to use FRMS for continuously monitoring of the crew alertness.

3) Following regulations may be adopted as guiding regulations in case of city specific pairs. However, DGCA may formulate additional regulations to address any other issue.

4) The URL Operation should need ‘City Pair Specific’ approval of DGCA with a specific scheme having at least the following provisions:

   a) “Duty Flight Crew” means those members of the flight crew who are on duty in the cockpit.

   b) “In-flight Rest Period” means a period of time within a flying duty time, which is to give a crew member an opportunity to rest before commencing or recommencing duty as a duty flight crew.

   c) “Rostered Duty Assignment (RDA)” means a sequence of Flight Duty Periods, off-duty periods, standby duty periods, crew positioning and rest periods for which flight crew are rostered when assigned to operate a ULR flight.
d) Designated flight crew rest facilities shall be provided on board aircraft. These rest facilities shall comprise not less than two independent rest areas with horizontal bunks and shall provide an environment that is conducive to rest/sleep. The rest facilities shall be subject to the prior approval of the DGCA.

e) Each ULR flight is to be operated by no less than four (4) pilots of whom two (2) must be pilot-in-command qualified for the route. The duty flight crew shall comprise at least two pilots of which one crewmember is pilot-in-command qualified.

f) The Operations Manual shall contain specific instructions to ensure that the ULR flight meets the following requirements:

i. **ULR Pre-flight and In-flight Rest Planning**
   A scheme shall be established to provide guidance to the flight crew on the expected pre-flight preparations and in-flight rest to be taken. Flight crew are to be appropriately rested for the ULR flight.
   The in-flight rest plan shall provide for at least two (2) rest periods, one of which shall not be less than four (4) hours.

ii. **ULR Pre-flight Rostering Requirements**
   The flight crew shall be acclimatised at base before undertaking a ULR RDA. Immediately prior to commencing the ULR RDA, the crew should be rostered for a rest period of no less than 48 hours, which shall include two (2) local nights, free from flying duties.

iii. **ULR Flight Rest Period Away from Base**
   In the ULR RDA, the scheduled period free of flying duties away from base shall be at least 48 hours, with at least two (2) local nights.

iv. **Post ULR RDA Rest At Base Before Embarking on the Next Flight**
   The ULR flight crew shall be provided with four (4) consecutive local nights of rest free of duty on completion of the ULR RDA, before the crew may be rostered for another ULR flight or other flights.

14.30 The Committee has also prepared a comparative Table showing regulations of AIC/92, and the one proposed by the report as follows:
## COMPARISON BETWEEN AIC 28 OF 1992 AND RECOMMENDATIONS OF COMMITTEE REPORT

<table>
<thead>
<tr>
<th>FLIGHT TIME</th>
<th>AIC 28 of 1992</th>
<th>Committee Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative Period</td>
<td>Flight Crew</td>
<td></td>
</tr>
<tr>
<td>Domestic and Neighbouring Countries operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Months</td>
<td>1,000 Hrs</td>
<td>1,000 Hours</td>
</tr>
<tr>
<td>30 consecutive Days</td>
<td>125 Hrs</td>
<td>125 Hours</td>
</tr>
<tr>
<td>7 consecutive Days</td>
<td>30 Hrs</td>
<td>35 Hours</td>
</tr>
<tr>
<td>24 Consecutive Hours</td>
<td>Up to 8 Hrs and Max 6 Landings</td>
<td>Upto 8 Hrs Max 6 landings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For day operations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upto 9 Hrs and Max 3 landings</td>
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<tr>
<td></td>
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<td>For night operations</td>
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<tr>
<td></td>
<td></td>
<td>Upto 9 Hrs and Max 2 landings</td>
</tr>
<tr>
<td>International Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Months</td>
<td>1,000 Hrs</td>
<td>1,000 Hours</td>
</tr>
<tr>
<td>90 consecutive</td>
<td>270 Hrs (Applicable for more than 2 pilots)</td>
<td></td>
</tr>
<tr>
<td>30 Consecutive days</td>
<td>125 Hrs</td>
<td>125 Hours</td>
</tr>
<tr>
<td>7 consecutive days</td>
<td>30 Hrs (Not applicable for more than 2 pilots)</td>
<td>40 Hours</td>
</tr>
<tr>
<td>24 Consecutive Hours</td>
<td>2 Pilots</td>
<td>Upto 9 Hrs and Max 3 landings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More than 9 Hrs require additional rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For day operations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upto 9 Hrs and Max 3 landings</td>
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<tr>
<td></td>
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<td>For night operations</td>
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<tr>
<td></td>
<td></td>
<td>Upto 9 Hrs and Max 2 landings</td>
</tr>
<tr>
<td></td>
<td>2 Pilots + Additional Crew</td>
<td>10 Hrs/3 landings</td>
</tr>
<tr>
<td></td>
<td>3 pilots</td>
<td>12 Hrs/3 landings (3 pilots + Additional Crew)</td>
</tr>
<tr>
<td></td>
<td>Four Pilots or Two Sets of Crew</td>
<td>14 Hrs/3 landings</td>
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<td></td>
<td></td>
<td>Upto 16 Hours and Max 1 landings</td>
</tr>
<tr>
<td>Period</td>
<td>Flight Crew</td>
<td>AIC</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>28 Consecutive Days</td>
<td>2 Pilots</td>
<td>11 Hrs/6 landings</td>
</tr>
<tr>
<td>14 Consecutive Days</td>
<td>2 Pilots</td>
<td>12 Hrs/3 landings</td>
</tr>
<tr>
<td>7 Consecutive Days</td>
<td>2 Pilots + one Flight Engineer</td>
<td>12 Hrs/6 landings</td>
</tr>
<tr>
<td>24 Consecutive Hours</td>
<td>2 Pilots</td>
<td>13 Hrs/2 landings</td>
</tr>
<tr>
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<tr>
<td>28 Consecutive Days</td>
<td>2 Pilots</td>
<td>13 Hrs/2 landings</td>
</tr>
<tr>
<td>14 Consecutive Days</td>
<td>2 Pilots</td>
<td>12 Hrs/3 landings</td>
</tr>
<tr>
<td>7 Consecutive Days</td>
<td>2 Pilots + one Flight Engineer</td>
<td>12 Hrs/3 landings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 Consecutive Hours</td>
<td>2 Pilots</td>
<td>15 hrs/3 landings</td>
</tr>
<tr>
<td></td>
<td>3 pilots + Additional Crew</td>
<td>16 Hrs/3 landings</td>
</tr>
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</tr>
</tbody>
</table>

Notes:
2. Committee Report – Reduction of Flight duty period due to operation in ‘Window of Circadian Low (WOCL)’
   When the FDP starts in the WOCL, the maximum FDP stated in above points will be reduced by 100 % of its encroachment up to a maximum of two hours. When the FDP ends in or fully encompasses the WOCL, the maximum FDP stated in above points will be reduced by 50 % of its encroachment.
### REST PERIODS

<table>
<thead>
<tr>
<th>Criterion</th>
<th>AIC 28 of 1992</th>
<th>Committee Report</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimum Rest</strong></td>
<td>Rest will be pro-rata twice the flight time subject to minimum of 8 Hrs in any 24 consecutive hours.</td>
<td>The minimum rest should be at least as long as the preceding duty period or 12 hours, or 14 hours on crossing 3 time zones, 36 hours on crossing 8 time zones, whichever is the greater; If the preceding duty period, which includes any time spent on positioning, exceeded 18 hours, then the ensuing rest period must include a local night.</td>
</tr>
<tr>
<td><strong>Weekly Rest</strong></td>
<td>Each flight crew shall be relieved from all duty for at least 24 consecutive hours during any 7 consecutive days.</td>
<td>Minimum rest is increased periodically to a weekly rest period, being a <strong>36-hour period including two local nights</strong>, such that there shall never be more than 168 hours between the end of one weekly rest period and the start of the next.</td>
</tr>
<tr>
<td><strong>Sleeping Quarters</strong></td>
<td>Each air carrier shall also provide adequate sleeping quarters in the aeroplane wherein a flight crew is scheduled to fly for more than 12 hours during any 24 consecutive hours.</td>
<td>Flight having ‘Flight Time’ more than 10 hours need 3 pilots i.e. need augmented flight crew. The ‘Flight Duty Period’ (FDP) is based on Rest facility available (Seat / Bunk)</td>
</tr>
<tr>
<td><strong>Rest at Outstation</strong></td>
<td>Any flight crew who has done 12 or more hours of flight time shall be given at least 48 hours of rest before he is assigned for further duty.</td>
<td>The minimum rest should be at least as long as the preceding duty period or 12 hours, or 14 hours on crossing 3 time zones, 36 hours on crossing 8 time zones, whichever is the greater</td>
</tr>
<tr>
<td><strong>Rest at base station</strong></td>
<td>The air carrier shall give each flight crew upon return to base from any flight or series of flight, a rest period that is at least twice the total number of hours of his flight time while he was away from the base.</td>
<td><strong>Time zone difference</strong></td>
</tr>
<tr>
<td>4-7</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>8 and more</td>
<td>72</td>
<td>3</td>
</tr>
</tbody>
</table>

#### 14.31 It will be beneficial to highlight some of the essential improvements and differences among these regulations.

a) The Committee proposes applicability of its recommendation to aeroplanes engaged in scheduled, non-scheduled and general aviation operations on domestic and international routes for carriage of both passengers and cargo.

b) **Rest** Following proposals have been made:

i) The Committee proposes a minimum rest requirement as long as the preceding duty period, 12 hours, 14 hours for more than three time zones
and 36 hrs for crossing eight time zones, whichever is greater. This is a significant enhancement as compared with the current minimum requirements of 8 hrs.

ii) Flight crew will be given enhanced rest upon returning to home base after completing international operations and involving significant time zone difference of 4 to greater than 8. Now, it is proposed that flight crew shall have 36 hrs rest with 2 local nights with a time zone difference of 4-7 and 72 hrs and 3 local nights with a time zone difference of 8 and more which is significantly higher than AIC/92, the current rules. No longer a crew will need to undergo acclimatization at a base away from home or at outstation. According to available scientific knowledge, as an approximate estimation it takes one hour per day to synchronize the biological clock. This implies that the crew member needs several days to acclimatize away from home station and also the fact that an individual relates to circadian rhythm of home base for the first 48 hours. Now, the crew member will commence return to home base before 48 hours and will be provided sufficient rest at home base for compensating time zone differences.

iii) Weekly rest has been significantly enhanced from present 24 hours to 36 hours (50% increase) with a local nights on 168 hours cycle and not fortnightly cumulative basis.

c) **Duty Period** The Committee proposes maximum flight duty period of 13 hours which can be reduced to as low as 11 hours depending upon landings and enhanced as high as 18 depending upon augmentation of crews and level of rest facilities.

It is also proposed that maximum FDP can also be reduced if FDP encroaches partly or fully into WOCL. The current rules do not provide for WOCL compensation.

d) Operations in domestic/neighbouring/international passenger categories involving 9 hours are limited to three landings during day time and two landings during night time. This is a totally new recommendation to reduce probability of risk of accident.

e) Introduction of concept of FRMS and shared responsibility of operators and crews in mitigation of fatigue and ensuring safe operation is another significant improvement. The latter is the common trend all through out the report.

f) Fatigue factor is proposed to be regulated and managed by robust regulatory frame work, formulation of scheme by operators, shared responsibility of operators and crews, adequate flight duty period and rest requirements.

**Variability and Differences Preclude an Absolute Solution**

14.32 The scientific findings relevant to human physiological reveal that there are considerable individual differences in the magnitude of fatigue effects on performance, physiological alertness, and subjective reports of fatigue. These differences extend to the effects of sleep loss, night work, and considerations of required sleep and recovery
time for an individual. Individual differences can vary as a function of age, sleep requirement, experience, overall health, and other factors. Individuals can also vary in their participation in off-duty activities that engender fatigue during a subsequent duty period. Further, the aviation industry represents a diverse range of required work demands and operational environments and flight crews' human physiology is not different from that of other humans. The guidelines and regulations, therefore, cannot completely cover all personnel or operational conditions and that there is no single absolute solution to these issues. The report of the Committee is based on wide ranging study of scientific knowledge, related studies, expert advice and consultation and international practices.

14.33 This report contains significant conclusions and recommendations, which will enhance safety of aviation and reduce risks associated with fatigue of crew members. Therefore, the Committee recommends that the Ministry of Civil Aviation after taking appropriate decision on the report advise DGCA to formulate and finalise draft regulations incorporating the recommendations of the Committee and as per the laid down procedure of framing the regulations.

Dr. Nasim Zaidi
Director General of Civil Aviation
Chairman

Dated: 15 September 2010
ORDER

SUBJECT: AMENDMENT OF CAR REGARDING FDTL – CONSTITUTION OF COMMITTEE.

With the approval of the competent authority, the Committee constituted vide this Ministry’s order of even number dated May 7, 2008, stands re-constituted as under:

(i) Dr. Nasim Zaidi - Chairman
   Director General of Civil Aviation

(ii) Shri Satendra Singh - Member
    Ex-Director General of Civil Aviation

(iii) An Aviation Medical Expert nominated by DGMS, IAF - Member

(iv) Smt. Shubha Thakur - Member

2. The terms of reference of the Committee as contained in the order under reference remains unchanged.

Sd/-

(ALOK SINHA)
Joint Secretary to the Govt. of India

To

(i) All Members of the Committee.
(ii) DGCA
(iii) Director General of Medical Services (Air), Air Headquarter, Vayu Bhawan
(iv) Sr. PPS to Secretary, Ministry of Civil Aviation
(v) PS to JS(S)
MEETINGS HELD WITH THE STAKEHOLDERS

_Airlines_
National Aviation Company India Limited (NACIL) – Air India - 23 October 2009
Jet Airways (India) Pvt. Ltd. - 30 September 2009
Kingfisher Airlines Ltd. - 30 September 2009
Blue Dart Aviation - 23 September 2009
Deccan Cargo - 23 September 2009

_Pilot Unions_
Federation of Indian Pilots (FIP) - 18 November 2009
Indian Pilots Guild (IPG) - 28 October 2009
Indian Commercial Pilots’ Association (ICPA) - 4 November 2009
Society for Welfare of Indian Pilots (SWIP) - 27 October 2009

_Office of Director General Civil Aviation_
Flight Inspection Directorate - 12 November 2009
Air Safety Directorate - 22 September 2009
LIST OF DOCUMENTS CONSIDERED BY THE COMMITTEE

1. ICAO Annex 6 Part I (Amendment 33A) – Operation of Aircraft – International Commercial Air Transport - Aeroplanes

2. EU-OPS 1: Commercial Air Transportation (Aeroplanes)


5. FAR Part 121 (Subpart Q — Flight Time Limitations and Rest Requirements: Domestic Operation; Subpart R — Flight Time Limitations: Flag Operations; and Subpart S — Flight Time Limitations: Supplemental Operations

6. FAR Part 135 - Commuter and On Demand Operations

7. Canadian Aviation Regulations

8. Australian Regulations

9. New Zealand Regulations (Part 121 – Air Operations – Large Aeroplanes; Part 125 – Air Operations – Medium Aeroplanes; and Part 135 – Air Operations – Helicopters and Small Aeroplanes)


11. Civil Aviation Authority, Pakistan has issued Air Navigation Order No. 91.0012 dated 25 May 2006 regarding Flight and Duty Time Limitation (FDTL).


13. Ghana Civil Aviation Regulations (GCARs) Part 8


15. NASA Technical Memorandum 110404 regarding “Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation

16. Final Report “Scientific and Medical Evaluation of Flight Time Limitations” by MOEBUS Aviation regarding some of the FTL provisions contained in Subpart Q of the EU OPS.

18. Copy of the Statement of David Learmount on ‘Boeing Study on fatigue risk management’

19. Copies of NTSB reports on air crashes due to fatigue

Inputs of Medical Studies


6. Fatigue Risk Management in Flight Crew Scheduling, Emma Romig And Tomas Klemets, Boeing Commercial Airplanes, Seattle, WA; and Jeppesen Systems AB, Göteborg, Sweden, Aviation, Space, and Environmental Medicine • Vol. 80, No. 12 • December 2009

7. Boeing study finds that all airlines win with fatigue risk management by David Learmount – Article in Flight International dated 17/03/10


The following Aeronautical Information Circular is issued to all concerned for information, guidance and necessary action.

Sd/-
(M. R. Sivaraman)
DIRECTOR GENERAL OF CIVIL AVIATION

GOVERNMENT OF INDIA
OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

F. No. 8-4/90-L(1)
Dated, New Delhi, the 10th December, 1992

FLIGHT DUTY TIME AND FLIGHT TIME LIMITATIONS

1. DEFINITIONS

1.1 Flight Duty Time

Flight duty time is the total time commencing from the time of reporting at the airport for the purpose of operating a flight and ending with the termination of a flight or a series of flights (Chocks on plus 15 minutes).

1.2 Flight time

The total time from the moment the aircraft first taxies out under its own power for the purposes of take-off to the moment it comes to rest at the end of a flight.

1.3 Rest period

The period during which a flight crew is not assigned any duty.

1.4 Flight Crew

Flight crew means the pilots who fly the aircraft and shall also include a flight engineer and flight navigator.
2. **APPLICABILITY**

These flight time/flight duty time limitations shall be applicable to all flight crew personnel.

3. **FLIGHT TIME LIMITATION: DOMESTIC AIR OPERATIONS & NEIGHBOURING COUNTRIES:**

3.1 The maximum number of hours any domestic air carrier can schedule its flight crew members to do flight time shall be as follows:

1. 1000 hours in any 12 months period.
2. 125 hours in a period of 30 consecutive days.
3. 30 hours in any 7 consecutive days.

3.2 No air carrier operating domestic routes with pilots and flights to neighboring countries may schedule a flight crew member for more than 8 hours of flight time during any 24 consecutive hours without a rest period of 16 hours or more and under the following conditions:

A. Where the flight time is less than 8 hours a pro-rata rest period of twice the flight time shall be provided, but the rest period in no case shall be less than 8 hours;

B. Each flight crew shall be relieved from all duty for at least 24 consecutive hours during any 7 consecutive days;

C. No domestic air carrier may assign any flight crew member to any duty with the air carrier during any required rest period;

D. Time spent in transportation by a flight crew member to or from an airport at which he was relieved from duty to return to his home station, is not considered a part of rest period;

E. A flight crew member is not considered to be scheduled for duty in excess of flight duty time limitation when due to circumstances beyond the control of the air carrier (such as unanticipated technical delays, adverse weather conditions etc.) the flight duty time gets inevitably extended provided that such extension shall be limited to 4 hrs in any particular case and shall not be more than 8 hours during any period of 30 consecutive days. In such a case the rest period shall be extended pro-rata by twice the amount of time by which the flight time was extended.

F. Flight crew shall neither be detailed nor undertake any duty between period embracing 0000 to 0500 hours local time if
during the previous day he/she performed flight duty between the period embracing 0000 to 0500 hours local time; and

G. The flight duty time limitation for a flight crew shall be as follows:

<table>
<thead>
<tr>
<th>Crew Complement</th>
<th>Flight Duty Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Pilots</td>
<td>11</td>
</tr>
<tr>
<td>2 Pilots and one Flight Engineer</td>
<td>12</td>
</tr>
</tbody>
</table>

3.3 No flight crew shall be asked to do more than 6 landings per day. This shall not include landing for technical, ferry and for the purpose of retrieval of aircraft after diversion.

4. **Flight Time Limitations: International Carriers:**

4.1 **Two Pilot Crew operations:**

A. No air carrier may schedule a flight crew to fly in an aeroplane that has a crew of two pilots for more than 9 hours of flight time during any 24 consecutive hours without a rest period. Before a flight crew is detailed for a flight, his rest period since the last flight shall not be less than 18 hrs.

B. If an air carrier schedules a flight crew to do flight time of more than 9 hours during any 24 consecutive hours, the rest period at the end of this flight duty shall be extended pro rata by twice the amount of time by which the flight time was extended.

C. Flight time of a flight crew shall not exceed:

i. 30 hrs. in 7 consecutive days.

ii. 125 hours during a period of 30 consecutive days.

iii. 1000 hours during the preceding 12 months.

D. Each flight crew shall be relieved from all duties for at least 24 consecutive hours once during any 7 consecutive days.

4.2 **Operations with more than two pilots and additional flight crew member(s)**

A. When flights are operated with more than two pilots and additional flight crew member, the flight time limitations shall be as follows:

i. Two Pilots and one additional crewmember - A maximum of 10 hours of flight time during 24 consecutive hours.
ii. Three Pilots and one additional crewmember - A maximum of 12 hours of flight time during 24 consecutive hours.

iii. Four Pilots or 2 sets of crew - A maximum of 14 hours during 24 consecutive hours.

B. If a flight crew has flown 9 hours or more during any 24 consecutive hours, he shall be given at least 18 hours of rest before being assigned any further duty. Where the flight time is less than 9 hours a pro-rata rest period of twice the flight time shall be provided but the rest period in no case shall be less than 8 hours.

C. Each flight crew shall be relieved from all duty for at least 24 consecutive hours once during any 7 consecutive days.

D. No flight crew may fly as a flight crew member more than

i. 125 hours during any 30 consecutive days

ii. 270 hours during any 90 consecutive days

iii. 1000 hours during any 12 months period.

E. Each air carrier shall also provide adequate sleeping quarters in the aeroplane wherein a flight crew is scheduled to fly for more than 12 hours during any 24 consecutive hours.

F. Any flight crew who has done 12 or more hours of flight time shall be given at least 48 hrs. of rest before he is assigned for further duty.

4.3 The air carrier shall give each flight crew upon return to base from any flight or series of flight, a rest period that is at least twice the total number of hours of his flight time while he was away from the base.

4.4 The maximum flight duty time/flight time shall be as follows:

(i) 2 Pilot operations 12 hrs./9 hrs.
(ii) 2 Pilot and one other flight crew member 12 hrs./10 hrs.
(iii) 3 Pilots 14 hrs./10 hrs.
(iv) 3 Pilots and one other flight crew 15 hrs./12 hrs.
(v) 2 sets of flight crew 16 hrs./14 hrs.
4.5 The flight duty time in all cases could be extended by a maximum of 4 hours in case of technical snags, adverse weather or any other unforeseen circumstances to avoid inconvenience to passengers. However, whenever the flight duty time gets extended, the rest period shall be pro-rata increased by twice the amount of extended period of flight duty time, provided that no flight crew shall be asked to extend flight duty time more than 8 hours in a period of 30 days.

4.6 No flight crew operating on an international flight shall be required to do more than 3 landings during the operations of the flight. This does not include Technical landing and landing for retrieval after diversion and ferry.

5. **Other Aerial Operations:**

5.1 In agricultural spray operations, flight time on any type of aircraft, irrespective of weight or category, should not exceed four hours during a consecutive period of 24 hours.

5.2 In aerial work operations involving flight below 1500 feet AGL, the flight time shall not exceed 4 hours, or, 5 hrs. if airborne air-conditioner system is in use, during a consecutive period of 24 hours.

5.3 In executive flying operations (including State Government, V.I.P. flight operations) the maximum flight time and flight duty time in any consecutive 24 hours is as follows:

<table>
<thead>
<tr>
<th>Flight Time (Hrs.)</th>
<th>Flight Duty Time (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Single Pilot</td>
<td>6</td>
</tr>
<tr>
<td>(ii) Two or more pilots</td>
<td>8</td>
</tr>
</tbody>
</table>

5.4 After every flight every flight crewmember shall be given a minimum rest period of 10 hrs. and the time spent in transportation, to and from the place of work shall not be counted in the rest period.

5.5 The weekly, monthly and annual flight time shall be as follows:

   i. 35 hrs. in a period of 7 consecutive days.

   ii. 125 hrs. in a period of 30 consecutive days.

   iii. 1000 hrs. in any 12 months period.

5.6 Except as specified above, for executive flight operations, aerial work and other operations, monthly, quarterly and yearly flight and duty time limitations and other conditions specified in para 3 shall apply.
6. **General Conditions for all operations:**

1. The time spent in office duty prior to operating a flight will be considered for calculation of Flight Duty Time.

2. The restrictions in regard to number of landings are not applicable to flight crew engaged in training flight. If the training flight is conducted after public transport operation(s) during any 24 hour period, the number of landings shall not be the limiting factor for calculation of FDTL, but the total flight and duty time shall not exceed the specified FDTL. Whenever public transport operation is conducted after a training flight, number of landings and flight and duty time of training flight shall be considered for calculating the FDTL.

3. Flight and duty time limitations can be extended with the specific approval of the DGCA in extraordinary circumstances in accordance with the conditions, which the Director General may specify.

4. In respect of helicopter pilots, of PHL, State Governments and other than those engaged in agricultural spray operations, the Flight and Duty time limitations specified in AIC No. 17/90 dated 17.8.1990 will continue to apply.

5. In all the above cases the period of transportation shall neither be counted towards duty time or rest period.

6. Each flight crew shall be relieved from all duty for at least 24 consecutive hours during any seven consecutive day.

7. Operator shall maintain record of flight and duty time of each member of the flight crew.

AIC No. 6/90 dated 28.3.90 and AIC 22/91 dated 11.12.91 are cancelled.
# SUMMARY OF FDTL

<table>
<thead>
<tr>
<th>Type of operation</th>
<th>Crew Composition</th>
<th>Flight Time</th>
<th>Flight Duty Time</th>
<th>7 days</th>
<th>30 days</th>
<th>90 days</th>
<th>12 months</th>
<th>Remarks. Max. No. of landing in a day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.1.1 Domestic flights and flights to neighbouring countries</td>
<td>1) Two crew</td>
<td>Pilot, Co-pilot</td>
<td>8</td>
<td>11</td>
<td>30</td>
<td>125</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Three crew</td>
<td>Pilot, Co-Pilot, Flight Engineer</td>
<td>8</td>
<td>12</td>
<td>30</td>
<td>125</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>3.1.2 International flights</td>
<td>1) Two crew</td>
<td>Pilot, Co-pilot</td>
<td>9</td>
<td>12</td>
<td>30</td>
<td>125</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Three crew</td>
<td>Pilot, Co-Pilot, Flight Engineer</td>
<td>10</td>
<td>12</td>
<td>30</td>
<td>125</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Four crew</td>
<td>3 pilots, One additional crew member</td>
<td>12</td>
<td>15</td>
<td>-</td>
<td>125</td>
<td>270</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Multiple crew</td>
<td>4 pilots or 2 sets of crew</td>
<td>14</td>
<td>16</td>
<td>-</td>
<td>125</td>
<td>270</td>
</tr>
</tbody>
</table>
THE PAGE IS INTENTIONALLY LEFT BLANK
CIVIL AVIATION REQUIREMENTS
SECTION 7, FLIGHT CREW STANDARDS
SERIES 'J', PART III
27TH JULY, 2007
EFFECTIVE:
Scheduled Operators: 1.08.2007
All other Operators: 16.08.2007

SUBJECT: FLIGHT DUTY TIME AND FLIGHT TIME LIMITATIONS - FLIGHT CREW MEMBER

1. INTRODUCTION:

1.1 Flying loads body and mind with stress and strain. Depending on the type of aircraft and the type of work involved, the strain to body and mind varies. The primary issues governing fatigue and alertness on the flight deck are the amount of sleep/rest put in before subjecting the body and mind to strain; duration of work; frequency of work; phase of the sleep/wake cycle (i.e. circadian rhythm); the nature of flying and the number of crew member involved in the function and their individual competence. In a single day, a flight crew on international sectors, during the course of work may have to cross a number of time zones resulting in additional strain on the body. Moreover, modern jet aircraft flying at very high altitudes at rarified atmosphere also contributes to additional strain and consequent fatigue.

1.1.1 Unlike other materials, Human body has inbuilt capacity to recover from the effect of strain and consequent fatigue. The natural recourse to recovery from fatigue is through proper and adequate rest and sleep.

1.1.2 It is also an accepted fact that the aviation industry requires 24-hour activities to meet operational demands. Flight crew must be available to support 24-hour-a-day operation to meet the industry demand. Therefore shift work, night work, irregular/unpredictable work schedules will continue to be common components of functioning in aviation industry.

1.1.3 ICAO while recognizing the effect of fatigue on performance has recommended Contracting States to establish regulations specifying the limitations applicable to the flight time, flight duty period and rest period for flight crew members. Further it requires that these proviso should ensure that fatigue occurring either in a flight or successive flights or accumulated over a
period of time due to these and other tasks does not endanger the safety of a flight.

Even though there is no absolute or perfect solution to the demands of duty and rest scheduling in aviation but with these as guiding principles, all the Contracting States have established regulations for Flight Duty Time, Flight Time and Rest period.

1.2 Definitions:

**Flight Duty Time** The total time commencing from the time of reporting at the airport for the purpose of operating a flight and ending minimum 15 minutes after termination of a flight or a series of flights.

**Reporting Time** It is the time at which crew report at Airport/Helipad with the intention of undertaking a flight. However for the FDTL computation purposes, it shall be taken minimum 45 minutes before the planned scheduled departure.

**Flight Time** The total time from the moment the aircraft moves with the intention of flight to the moment it comes to rest at the end of the flight. In case of Helicopter it shall be time from engine “Switch On” to engine “Switch Off”.

**Rest Period** The period during which a flight crew is not assigned any duty including operational, managerial, office work and training including simulator training or instructional.

**Flight Crew Member** A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

**Split Duty** A flight duty period, which consists of two duties separated by a break.

**Break** A period free of all duties, but less than minimum rest period.

**Calendar Day** 24 hours period commencing at 0000 hr. local time.

**Suitable Accommodation** A quiet, ventilated and comfortable place with a bed and not open to public.

**Neighbouring Countries** Neighbouring countries will be those countries where the Standard local time differs from the IST by maximum of one hour or where the single flight time to destination is not more than 4 hours, whichever is more restrictive.

**Ground Transportation** The time spent by crew member between his/her place of rest and the airport in a surface transport. For the purpose of FDTL, Ground Transportation time shall be uniformly calculated as one hour each,
before commencement of flight and at the end of flight or series of flights. However, it will neither count towards rest nor for flight duty time.

**Aerial Operations** Agriculture Operation, Pipeline Survey, Airport Facilities Calibration flights, Leaflet and Flower Dropping flights, Under Sling Cargo Carriage, Rescue Hoist, Aerial Photography, Geographical survey, Heli Skiing and other like operations will constitute Aerial Operations.

**Dead Heading** The period during which a crew member travels on board any air transport belonging to the company or its agents for the purpose of positioning so as to operate a flight or after completion of flight.

**Local Night** A period of ten hours from 2000 hours to 0600 hours Local standard time.

**Window of Circadian Low** Window of Circadian Low is the time period associated with low of performance, alertness, body temperature and of peak fatigue. It is the period between 0200 to 0600 hrs. of home base time for flight duty time that cross less than 3 time zones. For flight duty time period which crosses 3 or more time zones it is 0200 to 0600 hrs. home base time for first 48 hours, thereafter it is referred to 0200 to 0600 hrs. of local time at the point of departure.

1.3 This Civil Aviation Requirement prescribes flight time/flight duty time limitations and rest requirements. An operator shall establish a flight and duty time limitation and rest scheme for crew members in accordance with the proviso of this Civil Aviation Requirement and incorporate the same in their Operations Manual.

1.3.1 Operators shall ensure that all flights are planned to be completed within the allowable flight and duty period taking into account the time necessary for pre-flight duties, the flight function including taxying, turn-around time in case of multi sector flights. The nature of operation, existing environmental conditions including winds and anticipated delays due to traffic congestion shall also be kept in consideration while planning flights. **Actual flight time shall be used for working out FDTL.**

1.3.2 Operator must prepare and publish duty rosters sufficiently in advance to provide the opportunity to crew members to plan adequate rest. Local days, free of duty shall be notified to crew members at least 7 days in advance.

1.3.3 Operator shall educate/train pilots regarding stress, sleep and fatigue management in consultation with the Aviation Medicine experts.

1.4 This CAR is issued under the provisions of Rule 133A of the Aircraft Rules, 1937 for information, guidance and compliance by all concerned.
2. APPLICABILITY

The Flight Time/Flight Duty Time limitations and rest period prescribed in the Civil Aviation Requirement shall be applicable to all operators and flight crew members as per the category of operation.

3. STANDARD PROVISION

Proviso mentioned hereunder in sub Para are applicable to all the operations.

3.1 Every crew member shall be given rest, which will be pro-rata twice the flight time subject to minimum of 10 hrs. in any 24 consecutive hrs. This sub Para shall not be applicable to International operations under Para 5.

3.2 A minimum of 24 hrs. rest encompassing period 2000 hrs. to 0600 hrs. shall be provided to all crew members in any 7 consecutive days. This will be in addition to the rest based upon the flying in the last 24 consecutive hours. This sub Para shall not be applicable to Helicopter operations under sub Para 8.4.

3.3 Whenever flight crew is scheduled on dead heading to operate the flight, this shall count as flight duty.

3.4 Dead heading done after operating the commercial flight will neither count as duty nor as rest period. In this case if flight duty time and dead heading time exceeds 18 hours, then the following rest period must include a local night.

3.5 Whenever a flight crew is deputed as safety pilot/observer the period of such duty shall be counted in his Flight Duty Time.

3.6 Simulator Training and Aircraft flying:

3.6.1 Whenever a crew member flies any simulator either on check or training flight or as an instructor/training captain/examiner, all the time spent in simulator including ‘pre’ and ‘post’ briefing shall count towards flight duty time. For purpose of FDTL, minimum time for ‘post’ and ‘pre’ flight briefing shall be taken as one hour.

3.6.2 Simulator time shall not count towards the flight time.

If a crew member flies an aircraft after simulator, flight duty time shall be counted from the reporting time at the simulator.

No extension of Flight Duty Time shall be permitted in such cases.

3.7 Consecutive Night Flying:

3.7.1 Operator shall not roster any Flight Crew Member to undertake flight for more than two consecutive nights with duty period embracing any period between 0000 to 0500 hours local time.
3.7.2 Additional rest of two hour shall be provided for every hour or part thereof of duty period that impinges into the said period of 0000 to 0500 hrs.

3.7.3 If any part of Flight Duty Time on second night is carried out in window of circadian low then following rest period must include a local night.

3.8 Standby Duty:

3.8.1 Time of start/end and nature of standby duty must be notified to crew members in advance. Maximum duration of standby duty shall be 8 hours. No standby duty can be assigned during mandatory rest period.

3.8.2 The standby duty if undertaken at home or in suitable accommodation provided by the operator will neither be considered towards Flight duty nor the rest period.

3.8.3 Crew member Standby at his Home/suitable accommodation shall be given at least 2 hours notice before departure time. In such cases flight duty shall start at the time of reporting at Airport.

3.8.4 If crew member is on standby duty or readiness at an airport then period of standby duty shall count towards duty time.

3.8.5 Minimum rest of 10 hours has to be provided to crew member after standby duty and before start of next duty.

3.9 Mixed Duties:

3.9.1 Whenever a crew member is required to report for duty in advance of the stipulated reporting time for a scheduled flight to carry out any other task at the behest of an operator, then the time spent on that task shall be part of subsequent flight duty.

3.9.2 Whenever a crew member is required to carry out additional tasks at the behest of operator; before, in between or after flight then the time spent on the task shall be part of flight duty. Training, flight planning, commercial activities, maintenance check, preparation of trim sheet, securing aircraft, compressor wash, and ground running/taxing for snag rectification/positioning of aircraft and similar work shall constitute additional tasks for the sub Para.

3.9.3 When both fixed wing and rotary wing flying is carried out, the more restrictive flight and duty time limitations shall apply.

3.9.4 If flying is carried out on two or more different types of operations having different flight/duty timings, the more restrictive flight and duty time limitations shall apply.

3.10 Training Flights

3.10.1 Whenever training flight is conducted before or after operating a public transport/commercial or private operation entire such period including training flight shall count for Flight Duty Time/Flight Time. No training flight shall be undertaken after operation of a flight embracing any period between 0000 to 0500 hours.
3.10.2 Instructor/Examiner engaged in training flight for 3 hours, in addition to non-commercial positioning flight up to maximum of two hours, shall have a break/rest of minimum period of 2 hours away from aircraft. However, if two Instructors/Examiners are on board, after 3 hours of training Instructor/Examiner can take break/rest in aircraft provided he shall not undertake flying/training thereafter.

3.10.3 If during any 24 hours period only training flight is carried out including non-commercial positioning flight, there shall be no restriction regarding number of circuits and landing. In case during any 24 hrs. period training flight is combined with public transport/commercial, private operations and training flight is conducted before such flight, then the restriction of number of landing permitted for these operations shall apply. For training flight conducted after such flights, circuits and landing during training shall be restricted to 20.

3.10.4 Proviso of Sub Para 3.10 shall not apply to Flying Training Institutions covered under Para 9.

3.11 Split Duty

3.11.1 Whenever there is a break between two flights or between positioning journey and a flight in a period of 24 hour the break period will be adjusted as under:

<table>
<thead>
<tr>
<th>Break Time</th>
<th>Flight Duty Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Break of 0-3 hrs.</td>
<td>Will be counted fully for Flight Duty Time</td>
</tr>
<tr>
<td>Break &gt;3 hrs. - 10 hrs.</td>
<td>Half of it will count as Flight Duty Time</td>
</tr>
<tr>
<td>Break &gt;10 hrs.</td>
<td>Will not be counted towards Flight Duty</td>
</tr>
</tbody>
</table>

3.11.2 Break period shall not include time required for pre-flight and post flight duties which shall be a minimum of 45 minutes plus actual time spent on transportation.

3.11.3 This clause shall be applicable only if crew member is provided with suitable accommodation/hotel facilities.

3.11.4 No extension of Flight Duty Time shall be permitted if proviso of Split Duty has been availed.

3.12 Exceptions Due to Unforeseen Operational Circumstances:

Exceptions allow the flexibility needed to respond to unforeseen circumstances beyond the control of the operator that occur during operations. These are not intended for use in regular practice. These exceptions must not be scheduled or planned.

3.12.1 Extension of Flight Time/Flight Duty Time shall be permitted for unforeseen circumstances occurring after take off on last two sectors and maximum extension shall be limited to 3 hours of Flight Duty time and 1½
hour of flight time. However if the aircraft is landing at base station during the extended period of flight time/Duty time, crew change shall be effected.

3.12.2 If exceeded Flight Duty Time impinges window of circadian low then following rest period must include a local night.

3.12.3 In an emergency situation, which in the judgment of the commander presents a serious risk to health or safety of crew and passengers or endangers the lives, then the above limits may be exceeded till emergency situation is resolved.

3.12.4 Flight Duty Time cannot be extended if flight is operated after simulator flying or if the proviso of Split Duty has been used.

3.12.5 In case of unplanned exigencies or diversion, to retrieve aircraft and also for the crew specially positioned for this purpose rest can be reduced to minimum 8 hrs. which shall not include time allowed for preflight and post flight duties which shall be a minimum of 45 minutes plus actual time spent on transportation.

After completion of flight, rest period shall be increased by twice the amount by which rest period was reduced earlier.

3.12.6 Rest Period cannot be reduced if on previous sector Flight Duty Time/Flight Time was extended.

3.12.7 In case of diversions due to weather or any unforeseen reasons for retrieval of aircraft an additional landing is permitted which may include landing for ferry flight without commercial load, but this shall not include landing for technical, commercial or operational reasons.

3.12.8 Any extension of FDTL/FTL shall be reported to DGCA within 24 hours along with the reasons and corrective action taken to prevent reoccurrence.

Crew shall be provided additional rest as under:

<table>
<thead>
<tr>
<th>Time by which FDTL/FTL exceeds</th>
<th>Additional rest to be provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 hrs. FDTL and/or 0 - ½ hr. FTL</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>&gt;1-2 hrs. FDTL and/or &gt;½ -1 hr. FTL</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>&gt;2-3 hrs. FDTL and/or&gt; 1 - 1½ hr. FTL</td>
<td>6 hrs.</td>
</tr>
</tbody>
</table>

4. DOMESTIC & NEIGHBOURING COUNTRIES OPERATION:

The Maximum Flight Duty Time/Flight Time shall be as under:

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hrs.)</th>
<th>Flight Time (Hrs.)</th>
<th>No. of Landing</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 consecutive hrs.</td>
<td>11</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>In 7 consecutive days</td>
<td>60</td>
<td>35</td>
<td>-</td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>200</td>
<td>125</td>
<td>-</td>
</tr>
<tr>
<td>In 12 consecutive months</td>
<td>1600</td>
<td>1000</td>
<td>-</td>
</tr>
</tbody>
</table>
5. INTERNATIONAL OPERATION:

5.1 The **Maximum Flight Duty Time/Flight Time** shall be as under:

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hrs.)</th>
<th>Flight Time (Hrs.)</th>
<th>No. of landings</th>
<th>Crew Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 Consecutive hrs.</td>
<td>12</td>
<td>8</td>
<td>2</td>
<td>One pilot crew</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>8</td>
<td>3</td>
<td>Two pilots/two pilots and one FE (1P1+1P2/1P1+1P2+FE)</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>9</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>12</td>
<td>2</td>
<td>Three pilots/three pilots+1FE(2P1+2P2/2P1+P2+FE)*</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>14</td>
<td>2</td>
<td>Two sets of crew (2P1+2P2)*</td>
</tr>
<tr>
<td>In 7 Consecutive days</td>
<td>60</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In 30 Consecutive days</td>
<td>190</td>
<td>125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In 12 Consecutive months</td>
<td>1600</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* One P1 can be substituted by a Cruise Captain.

5.2 In all such cases wherein more than two Crew Members are rostered for a flight, Flight Time shall be equally distributed among crew members. However, Flight Duty Time shall be taken as total time for each crew.

*e.g. if a flight is conducted by 3 crew wherein Flight Time is 12 hours and Flight Duty Time is 15 hour, each crew member will record Flight Time as 12x2/3=8 hours whereas Flight Duty Time shall be recorded as 15 hours.*

5.3 If a crew is rostered for flights of more than 10 hours, operator shall provide adequate sleeping quarters in aircraft. Comfortable reclining serviceable seat of highest available class or bunk separated or screened from flight deck and passengers, shall constitute adequate sleeping quarters.

5.4 When Flight Engineer is a crewmember on such flights, similar sleeping quarters shall be provided to him. Facility to relieve Flight Engineer by adequately qualified crew shall be ensured.

5.5 **Minimum rest period shall be adjusted as follows:**

5.5.1 When crew is rostered for a flight of 9 hours or more, rest period prior to operating such flight shall include a local night.
5.5.2 Minimum rest period at outstation shall be as under:

<table>
<thead>
<tr>
<th>Time zone away from base station</th>
<th>Rest at Outstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Twice the flight time subject to minimum of 12 hours.</td>
</tr>
<tr>
<td>&gt;3-7</td>
<td>Twice the flight time subject to minimum of 20 hours.</td>
</tr>
<tr>
<td>&gt;7-12</td>
<td>72 hours cumulative</td>
</tr>
</tbody>
</table>

e.g. Mumbai-London-New York flight require 72 hours cumulative rest at London and New York subject to minimum 20 hrs. at each station.

The rest can be split as follows:

- 20 hrs. London 52 hrs. New York
- 48 hrs. London 24 hrs. New York etc. etc.

5.5.3 Rest on return to base station shall be governed as

<table>
<thead>
<tr>
<th>Time zone away from base station</th>
<th>Rest at base station</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Twice the flight time of last sector subject to minimum of 12 hours.</td>
</tr>
<tr>
<td>&gt;3-7</td>
<td>48 hours which shall include two local nights.</td>
</tr>
<tr>
<td>&gt;7</td>
<td>72 hours if duration of trip is less than/or 9 days.</td>
</tr>
<tr>
<td></td>
<td>96 hours if duration of trip is more than 9 days.</td>
</tr>
</tbody>
</table>

5.6 Ultra Long Range Operations
Single Flight Time exceeding 14 hours shall constitute Ultra Long Range Operation (ULR).

5.6.1 The Maximum Flight Duty Time/Flight Time shall be as under:

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hrs.)</th>
<th>Flight Time (Hrs.)</th>
<th>No. of landings</th>
<th>Crew Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 Consecutive hrs</td>
<td>21</td>
<td>18</td>
<td>1</td>
<td>Four Pilots (2P1+2P2)*</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>20</td>
<td>1</td>
<td>Five pilots (3P1+2P2) *</td>
</tr>
</tbody>
</table>

* One P1 can be substituted by a Cruise Captain.

5.6.2 Limitations of Flight Time and Flight duty time in 7 consecutive days, 30 consecutive days and 12 consecutive months shall be same as in Para 5.1.
5.6.3 Proviso of Para 5.2 and Para 5.3 shall also apply.

5.6.4 Minimum rest period shall be adjusted as follows:

- **5.6.4.1** Rest Period prior to operating ULR flight shall include a local Night.
- **5.6.4.2** Minimum Rest Period at out station shall be 60 hours.
- **5.6.4.3** Rest on return to base station shall be 72 hours if the duration of the trip is less than or 9 days and 96 hours if the duration of the trip exceeds 9 days.

### 6. GENERAL AVIATION:

The maximum Flight Duty Time/Flight Time for operators engaged in executive flying/State Government flying/Election flights and charter flights shall be as under:

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hrs.)</th>
<th>Flight Time (Hrs.)</th>
<th>No. of landings</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 consecutive hrs.</td>
<td>12</td>
<td>8</td>
<td>6 (Two pilots)</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>7</td>
<td>5 (Single pilot)</td>
</tr>
<tr>
<td>In 7 consecutive days</td>
<td>60</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>200</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>In 12 consecutive months</td>
<td>1600</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

For international operation proviso of Para 5 shall apply.

### 7. AERIAL OPERATIONS:

7.1 The maximum Flight Duty Time/Flight Time for operators engaged in Aerial Operations shall be as under:

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hrs.)</th>
<th>Flight Time (Hrs.)</th>
<th>Crew Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 consecutive hrs.</td>
<td>9</td>
<td>5</td>
<td>Single Pilot Operation</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>7</td>
<td>Two Pilots Operation</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>4*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>6*</td>
<td></td>
</tr>
<tr>
<td>In 7 consecutive days</td>
<td>60</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>180</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>In 12 consecutive months</td>
<td>1500</td>
<td>900</td>
<td></td>
</tr>
</tbody>
</table>

* For operations, wherein number of low approaches/landing are more than 8 per hour or/and more than 50% of time low flying is carried out below 1000 ft. AGL (for Helicopters 500 ft. AGL or below).
7.2 No crew member shall be on controls for more than continuous period of 3 hours. Thereafter shall have break of one hour away from the aircraft.

8. HELICOPTERS OPERATIONS:

8.1 The maximum Flight Duty Time/Flight Time for Helicopter operations shall be as under:

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hrs.)</th>
<th>Flight Time (Hrs.)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 consecutive hrs.</td>
<td>10</td>
<td>7</td>
<td>For two pilots</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>6*/**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>6</td>
<td>For single pilot</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>4*</td>
<td></td>
</tr>
<tr>
<td>In 7 consecutive days</td>
<td>55</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>180</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>In 12 consecutive months</td>
<td>1300</td>
<td>800</td>
<td></td>
</tr>
</tbody>
</table>

* for demanding operations like off shore operations, winching and carrying external load etc.
** can be increased to 7 hours provided numbers of landings are less than 10.

8.2 Crew flying repetitive short sectors and doing an average of 8 or more landings per hour for two hours shall have a break of at least one hour away from helicopter.

8.3 Maximum number of landings in a calendar day shall not exceed 30.

8.4 For outstation duties minimum rest period shall be as under:

<table>
<thead>
<tr>
<th>Outstation duty</th>
<th>Rest period</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 14 days</td>
<td>⅓</td>
<td>Of number of days spent at outstation</td>
</tr>
<tr>
<td>More than 14 days</td>
<td>½</td>
<td></td>
</tr>
</tbody>
</table>

8.5 Medical evacuation flights can be undertaken for life saving mission with reduced rest period. Rest period after such flights shall be governed as:

8.5.1 If such flight is undertaken after minimum rest of 8 hours, which shall not include minimum of one hour of preflight/post flight duties plus actual time spent on transportation and if such flight duty does not impinge into any period between 0000 to 0500 hrs. local time, minimum rest of 10 hrs. shall be provided to crew members after the flight.

8.5.2 In all other conditions, minimum rest of 24 hrs. encompassing a local night shall be provided to crew members after the flight.
9. FLYING TRAINING INSTITUTIONS:

9.1 The maximum Flight Duty Time/Flight Time for Flying Training Institutions shall be as under:

<table>
<thead>
<tr>
<th>Period</th>
<th>Flight Duty Time (Hrs.)</th>
<th>Flight Time (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In any 24 consecutive hrs.</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>In 7 consecutive days</td>
<td>65</td>
<td>30</td>
</tr>
<tr>
<td>In 30 consecutive days</td>
<td>210</td>
<td>125</td>
</tr>
<tr>
<td>In 12 consecutive months</td>
<td>2000</td>
<td>800</td>
</tr>
</tbody>
</table>

9.2 An Instructor/Examiner/Trainee engaged in training flight for 2 hour and/or continuous 16 circuits and landings shall have break/rest of minimum period of one hour.

10. GENERAL CONDITIONS FOR ALL OPERATORS:

10.1 Flight and Duty time records and rest period availed shall be maintained by the operator for each of its crew. This record shall be retained for two years. Crew shall also make record of the duty time period in their logbooks in the remarks column or as separate column.

10.2 In extreme exigencies/extraordinary circumstances, the DGCA may extend Flight and Duty Time Limitations in accordance with the conditions, which the DGCA may specify.

10.3 It shall be the responsibility of the Accountable Manager to ensure the implementation, monitoring, strict adherence of this Civil Aviation Requirement and prompt reporting of any exceedence thereof. It shall also be responsibility of crew member equally to ensure adherence to proviso of this Civil Aviation Requirement.

Note: This Civil Aviation Requirement supersedes AIC 28/1992, CAR Section 7, Series ‘J’ Part II and all other instructions issued on the subject.

Sd/-
(A K Chopra)
Joint Director General of Civil Aviation
ATTACHMENT A. GUIDANCE MATERIAL FOR DEVELOPMENT OF PRESCRIPTIVE FATIGUE MANAGEMENT REGULATIONS

Supplementary to Chapter 4, 4.2.10.2, Chapter 9, 9.6 and Chapter 12, 12.5

1. Purpose and scope

1.1 Flight time, flight duty period, duty period limitations and rest requirements are established for the sole purpose of ensuring that the flight crew and the cabin crew members are performing at an adequate level of alertness for safe flight operations.

1.2 In order to accomplish this, two types of fatigue should be taken into account, namely, transient fatigue and cumulative fatigue. Transient fatigue may be described as fatigue that is dispelled by a single sufficient period of rest or sleep. Cumulative fatigue occurs after incomplete recovery from transient fatigue over a period of time.

1.3 Limitations based upon the provisions of this Part will provide safeguards against both kinds of fatigue because they will recognize:

a) the necessity to limit flight duty periods with the aim of preventing both kinds of fatigue;

b) the necessity to limit the duty period where additional tasks are performed immediately prior to a flight or at intermediate points during a series of flights in such a way as to prevent transient fatigue;

c) the necessity to limit total flight time and duty periods over specified time spans, in order to prevent cumulative fatigue;

d) the necessity to provide crew members with adequate rest opportunity to recover from fatigue before commencement of the next flight duty period; and

e) the necessity of taking into account other related tasks the crew member may be required to perform in order to guard particularly against cumulative fatigue.

2. Operational concepts

2.1 Flight time

The definition of flight time, in the context of flight time limitations, applies to flight and cabin crew members.

2.2 Duty periods

All time spent on duty can induce fatigue in flight and cabin crew members and should therefore be taken into account when arranging rest periods for recovery. Standby may be included as duty if it is likely to induce fatigue.
2.3 Flight duty periods

2.3.1 The definition of flight duty period is intended to cover a continuous period of duty that always includes a flight or series of flights for a flight or cabin crew member. It is meant to include all duties a crew member may be required to carry out from the moment he or she reports for duty until he or she completes the flight or series of flights and the aeroplane finally comes to rest and the engines are shut down. It is considered necessary that a flight duty period should be subject to limitations because a crew member’s activities over extended periods would eventually induce fatigue — transient or cumulative — which could adversely affect the safety of a flight.

2.3.2 A flight duty period does not include the period of travelling time from home to the point of reporting for duty. It is the responsibility of the flight or cabin crew member to report for duty in an adequately rested condition.

2.3.3 Time spent positioning at the behest of the operator is part of a flight duty period when this time immediately precedes (i.e., without an intervening rest period) a flight duty period in which that person participates as a flight or cabin crew member.

2.3.4 An important safeguard is for States and operators to recognize the responsibility of a crew member to refuse further flight duty when suffering from fatigue of such a nature as to adversely affect the safety of flight.

2.4 Rest periods

The definition of rest period requires that flight or cabin crew members be relieved of all duties for the purpose of recovering from fatigue. The way in which this recovery is achieved is the responsibility of the flight or cabin crew member. Extended rest periods should be given on a regular basis. Rest periods should not include standby if the conditions of the standby would not enable flight and cabin crew members to recover from fatigue. Suitable accommodation on the ground is required at places where rest periods are taken in order to allow effective recovery.

3. Types of limitations

3.1 Limitations are broadly divided by time. For example, many ICAO Contracting States prescribe daily, monthly and yearly flight time limitations, and a considerable number also prescribe quarterly flight time limitations. In addition, many States also prescribe cumulative duty limitations for specified periods such as consecutive days and seven-day periods. It must be understood, however, that these limitations will vary considerably taking into account a variety of situations.

3.2 To take account of unexpected delays once a flight duty period that has been planned within the allowable limitations has commenced, provision should be made for minimizing the extent to which exceeding the limits may be permitted. Similarly, provision should be made for controlling the extent to which any reduction of rest below that ordinarily required may be allowed in cases where flexibility to recover a delayed schedule is sought. The authority to extend a flight duty period or reduce a rest period within the limitations established is vested in the pilot-in-command.

Note.— See 4.9.2 and 4.11.2.3 for reporting requirements.

3.3 In formulating regulations or rules governing flight time limitations, the crew complement and the extent to which the various tasks to be performed can be divided among the flight or cabin crew members should be taken into account. In the case where additional flight or cabin crew members are carried and facilities in the aeroplane are such that a flight or cabin crew member can obtain recuperative rest in a comfortable reclining seat, or in a bunk, separated and screened from the flight deck and passengers, and reasonably free from disturbance, planned flight duty periods could be extended.

3.4 States should consider all relevant factors, which include: the number and direction of time zones crossed; the time at which a flight duty period is scheduled to begin; the number of planned and/or actual sectors within the flight duty period; the
pattern of working and sleeping relative to the circadian rhythm or 24-hour physiological cycle of the flight or cabin crew; the scheduling of days off; the sequence of early reporting times and late releases from duty; mixing early/late/night duties; and flight operation characteristics.

4. Guidelines for establishing prescriptive limitations for fatigue management

4.1 Purpose and scope

4.1.1 The following material comprises a set of parameters that may be considered in the development of prescriptive limitations for fatigue management.

4.1.2 No numerical values are shown in this example because differences of culture between States can lead to different perceptions as to what is acceptable and what is not. In the text that follows, the symbol (*) is used to indicate where each State may insert a value it considers appropriate to manage fatigue, and square brackets [ ] to indicate a typical value. States are encouraged to examine the numerical values of other States’ systems for further guidance.

4.1.3 When deciding what numerical values should be inserted, States should take into account the results of relevant scientific principles and knowledge, past experience in administering such regulations, cultural issues and the nature of operations intended to be undertaken.

4.1.4 States should assess the adequacy of the breadth and scope of all limitations proposed by each operator as applicable to operations before they approve an operator’s flight time and duty period limitations and rest scheme.

4.2 Definitions

4.2.1 Operators and crew members

Augmented flight crew. A flight crew that comprises more than the minimum number required to operate the aeroplane and in which each flight crew member can leave his or her assigned post and be replaced by another appropriately qualified flight crew member for the purpose of in-flight rest.

Cabin crew member. A crew member who performs, in the interest of the safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member.

Crew member. A person assigned by an operator to duty on an aircraft during a flight duty period.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

4.2.2 Flight or block times

Flight time — aeroplanes. The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.
Note.—“Flight time” as here defined is synonymous with the term “block to block” time or “chock to chock” time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.

4.2.3  Duty and flight duty

Duty. Any task that flight or cabin crew members are required by the operator to perform, including, for example, flight duty, administrative work, training, positioning and standby when it is likely to induce fatigue.

Duty period. A period which starts when a flight or cabin crew member is required by an operator to report for or to commence a duty and ends when that person is free from all duties.

Flight duty period. A period which commences when a crew member is required to report for duty that includes a flight or a series of flights and which finishes when the aeroplane finally comes to rest at the end of the last flight on which he/she is a crew member.

4.2.4  Rest period and standby

Rest period. A continuous and defined period of time, subsequent to and/or prior to duty, during which flight or cabin crew members are free of all duties.

Standby. A defined period of time during which a flight or cabin crew member is required by the operator to be available to receive an assignment for a specific duty without an intervening rest period.

4.2.5  General

Home base. The location nominated by the operator to the crew member from where the crew member normally starts and ends a duty period or a series of duty periods.

Positioning. The transferring of a non-operating crew member from place to place as a passenger at the behest of the operator.

Note.—“Positioning” as here defined is synonymous with the term “Deadheading”.

Reporting time. The time at which flight and cabin crew members are required by an operator to report for duty.

Roster. A list provided by an operator of the times when a crew member is required to undertake duties.

Note.—“Roster” as here defined is synonymous with “Schedule”, “Line of Time”, “Pattern”, and “Rotation”.

Suitable accommodation. A furnished bedroom which provides for the opportunity of adequate rest.

Unforeseen operational circumstance. An unplanned event, such as unforecast weather, equipment malfunction, or air traffic delay that is beyond the control of the operator.

4.3  The State’s responsibilities

4.3.1  The objective of any prescriptive limitations for fatigue management regulations is to ensure that flight and cabin crew members remain sufficiently alert so that they can operate to a satisfactory level of performance and safety under all circumstances. The fundamental principle is for every flight and cabin crew member to be adequately rested when he/she
begins a flight duty period and, whilst flying, be sufficiently alert to operate to a satisfactory level of performance and safety in all normal and abnormal situations.

4.3.2 The purpose of this example is to illustrate how limitations might be defined regarding variables likely to influence flight and cabin crew member alertness (e.g., allowable flight hours, duty and flight duty periods, and minimum rest periods) that may be applied when flight and cabin crew rosters are planned. Provision can be made so that some of these limitations could be exceeded, but only on such occasions as could not reasonably have been foreseen when the flight was planned.

4.3.3 This is only one example of how prescriptive limitations for fatigue management may be defined.

4.4 The operator’s responsibilities

4.4.1 Operators should reflect in their operations manuals those elements of this example that are appropriate to the operations they undertake. If operations are planned that cannot be managed within the limitations published in the example, a variation may be requested. In this case, and before a variation is approved, an operator should demonstrate to the State of the Operator that the variation provides an equivalent level of safety and that objections on grounds of safety are taken into account.

4.4.2 Duty rosters should be prepared and published sufficiently in advance to provide flight and cabin crew members the opportunity to plan adequate rest. Consideration should be given to the cumulative effects of undertaking long duty hours interspersed with minimum rest, and of avoiding rosters that result in the serious disruption of an established pattern of working and sleeping. Rosters should cover a period of at least (*) days.

4.4.3 Flights should be planned to be completed within the allowable flight duty period taking into account the time necessary for pre-flight duties, the flight and turn-around times, and the nature of the operation. Minimum rest periods needed to provide adequate rest should be based upon the actual operation.

4.4.4 In order to avoid any detriment to a flight or cabin crew member’s performance, opportunities to consume a meal must be arranged when the flight duty period exceeds (*) hours.

4.4.5 The operator should nominate a home base for each flight and cabin crew member, from where the flight and cabin crew member will normally start and end a duty period or a series of duty periods. The home base should be assigned with a degree of permanence.

4.4.6 The operator should not require a flight crew member to operate an aeroplane if it is known or suspected that the flight crew member is fatigued to the extent that the safety of flight may be adversely affected.

4.5 Flight crew members’ responsibilities

4.5.1 A flight crew member should not operate an aeroplane when he or she knows that he or she is fatigued or feels unfit to the extent that the safety of flight may be adversely affected.

4.5.2 Flight crew members should make best use of the facilities and opportunities that are provided for rest and for the consumption of meals, and should plan and use rest periods to ensure that they are fully rested.

4.6 Flight and cabin crew members

The text that follows specifies limitations that apply to operations by flight and cabin crew members.
4.7 Limitations for flight times and duty periods

4.7.1 Maximum flight time

4.7.1.1 The maximum flight time may not exceed:

a) (*) hours in any flight duty period;

b) (*) hours in any [7] consecutive days or (*) hours in any [28] consecutive days; and

c) (*) hours in any [365] consecutive days.

4.7.1.2 The limitations in 4.7.1.1 b) and c) may alternatively be calculated in calendar week, month or year. In such a case other limitations over a period of two or three calendar months should be specified.

4.7.2 Maximum duty hours for flight crew and cabin crew

4.7.2.1 Duty hours may not exceed:

a) (*) hours in any [7] consecutive days or in a week; and

b) (*) hours in any [28] consecutive days or in a calendar month.

Duty includes all tasks carried out at the behest of the operator. These include, but are not limited to: pre-flight preparation; conduct of the flight (whether or not this is commercial air transport); post-flight actions; training given or received (classroom, flight simulator or aeroplane); rostered office/management time; and positioning. Standby should be included to the extent that it is likely to induce fatigue.

4.7.3 Maximum flight duty period for flight and cabin crew

4.7.3.1 The maximum flight duty period should be (*) hours.

4.7.3.1.1 This limitation should allow variation to account for matters known to impact fatigue such as: the number of sectors planned; the local time at which duty begins; the pattern of resting and sleeping relative to the crew member’s circadian rhythm; the organization of the working time; and the augmentation of the flight crew.

4.7.3.2 Crew report times should realistically reflect the time required to complete pre-flight duties, both safety- and service-related (if appropriate), and a standard allowance of (*) minutes is to be added at the end of flight time to allow for the completion of checks and records. For record purposes, the pre-flight report time should count both as duty and as flight duty, and the post-flight allowance should count as duty.

4.7.3.3 The maximum flight duty period for cabin crew may be longer than that applicable to the flight crew by the difference in reporting time between flight crew and cabin crew.

4.7.3.4 Flight duty periods may be extended in unforeseen operational circumstances by no more than (*) hour(s) only at the discretion of the pilot-in-command. Before exercising this discretion, the pilot-in-command should be satisfied that all members of the crew required to operate the aeroplane consider themselves fit to do so.
4.7.4 Flights operated by augmented crews and the provision of in-flight relief

4.7.4.1 The composition and number of flight crew members carried to provide in-flight relief, and the quality of rest facilities provided, should determine the amount by which the basic flight duty period limitations may be extended. A sensible balance should be kept between the division of in-flight duty and rest. The number of the cabin crew should be determined taking into account the rest facilities provided and other parameters linked to the operation of the flight.

4.7.4.2 The operator should ensure that flight and cabin crew members are notified prior to commencement of the rest period preceding the flight of the role they are required to undertake (i.e., main or relief crew), so that they can plan their pre-flight rest accordingly.

4.8 Minimum rest periods

4.8.1 The minimum rest period immediately before commencing a flight duty period may not be less than (*) hours.

4.8.1.1 Rest provisions should be introduced to take into account the impact of time zone crossings and night operations.

4.8.1.2 Longer rest periods should be granted on a regular basis to preclude cumulative fatigue.

4.8.1.3 Minimum rest periods may be reduced in unforeseen operational circumstances by no more than (*) hour(s) only at the discretion of the pilot-in-command.

4.8.1.4 Travelling time spent by a flight or cabin crew member in transit between the place of rest and the place of reporting for duty is not counted as duty, even though it is a factor contributing to fatigue. Excessive travelling time undertaken immediately before commencing a flight duty period could therefore detract from a flight or cabin crew member’s ability to counter fatigue arising whilst on duty, and should therefore be taken into account when deciding where pre-flight rest should be taken.

4.9 Discretion that may be exercised by the pilot-in-command

4.9.1 The pilot-in-command, at his or her discretion in consideration of special circumstances that could lead to unforeseen levels of fatigue and after discussion with flight or cabin crew members affected, may reduce an actual flight duty period and/or increase a minimum rest period (see 4.8.1.3) in order to remove any adverse effect on flight safety.

4.9.2 The pilot-in-command should report to the operator the use of discretion to extend or reduce duty or rest.

4.10 Miscellaneous provisions

4.10.1 Standby

4.10.1.1 The start time and end time of standby should be defined and notified at least (*) hours in advance, and the maximum length of any standby should not exceed (*) hours.

4.10.1.2 Where airport standby is immediately followed by a flight duty period, the relationship between such airport standby and the assigned flight duty should be defined. In such a case, airport standby, if it is likely to induce fatigue, should be considered as part of a duty period and should be taken into account to calculate the minimum rest preceding a subsequent flight duty period.
4.10.1.3 When flight and cabin crew members are required to be on standby at an accommodation arranged by the operator, then adequate rest facilities should be provided.

4.10.2 Available

When flight and cabin crew members are required to be available for contact over a brief period of time to receive instructions concerning a possible change of roster, that requirement should not prevent that crew member from having a rest period before reporting for duty. The time spent being available should not be counted as duty.

4.10.3 Positioning

All time spent positioning counts as duty, and positioning followed by operating without an intervening rest period also counts as flight duty. However, positioning should not count as an operating sector when planning or calculating a flight duty period.

4.11 Records

4.11.1 To enable the operator to ascertain that the fatigue management scheme is functioning as intended and as approved, records should be kept for (*) months of the duties performed and rest periods achieved so as to facilitate inspection by the operator’s authorized personnel and audit by the State of the Operator.

4.11.2 The operator should ensure that these records include for each flight and cabin crew member, at least:

a) the start, duration and end of each flight duty period;

b) the start, duration and end of each duty period;

c) rest periods; and

d) flight time.

4.11.3 The operator should also keep records of occasions when a pilot-in-command has exercised his or her discretion (as described in 4.9.1). If discretion has to be applied for similar reasons on more than (*) per cent of occasions when a particular route or route pattern is flown, it is likely that the intention of this guidance is not being met and undue fatigue may result. Arrangements should be made to change the schedule or the crewing arrangements so as to reduce the frequency at which such events occur. A State may require that, in addition, copies of certain records should be submitted.

4.11.4 Flight crew members should maintain a personal record of their daily flight time.
G.S.R. .— The following draft of certain rules further to amend the Aircraft Rules, 1937, which the Central Government proposes to make in exercise of the powers conferred by section 5 of the Aircraft Act, 1934 (22 of 1934), is hereby published as required by section 14 of the said Act, for information of all persons likely to be affected thereby, and notice is hereby given that the said draft rules will be taken into consideration after a period of thirty days from the date on which copies of the Gazette of India in which this notification is published, are made available to the public;

Objection or suggestion, if any, may be sent to the Director General of Civil Aviation, Opposite Safdarjung airport, New Delhi-110003;

Any objection or suggestion which may be received from any person with respect to the said draft rules before the expiry of the period specified above, will be considered by the Central Government.

Draft rules

1. Short title and commencement. – (1) These rules may be called the Aircraft (Amendment) Rules, 2010.

(2) They shall come into force on the date of their final publication in the Official Gazette.

2. Amendment of rule 42A.— In the Aircraft Rules, 1937 (hereinafter referred to as the said rules), for rule 42A, the following rule shall be substituted, namely:-
“42A. Regulation of flight duty period and rest period – (1) The Director-General may specify the limitations for flight time, flight duty periods, duty periods and rest periods in respect of flight crew members and cabin crew members of commercial, general, training and helicopter flying.

(2) Every operator shall comply with the limitations specified under sub-rule (1).

(3) Every operator shall establish a scheme for implementation of the limitations specified under sub-rule (1) and shall also cater for any variation from the specified limitations and the scheme shall be submitted to the Director-General for approval.

(4) It shall be the duty of every operator to maintain a detailed record of the flight time, flight duty periods, duty periods and rest periods in respect of all its flight crew and cabin crew.”

[F.No. ]

[.................................]
Under Secretary to the Government of India

Note: The principal rules were published in the Gazette of India, vide notification number V-26, dated the 23rd March, 1937 and last amended by G.Z.R. 643(E), dated the 29th July, 2010, published in the Gazette of India, Extraordinary, Part II, Section (3), Sub-section (i), on the 29th July, 2010.