



**GOVERNMENT OF INDIA
OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION
OPP SAFDURJUNG AIRPORT, NEW DELHI**

**CIVIL AVIATION REQUIREMENTS
SECTION 8 – AIRCRAFT OPERATIONS
SERIES ' D', PART I
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**Subject: LOAD AND TRIM SHEET - REQUIREMENTS THEREOF & TRAINING OF
CONCERNED PERSONNEL**

1. APPLICABILITY:

Under sub rule 2 (b) of rule 58 of the Aircraft Rules 1937, it is stipulated that "The load of an aircraft through out the flight including take off and landing shall be so distributed that the centre of gravity position of the aircraft falls within the limitations specified or approved by the Director General." It is also necessary that the aircraft is loaded within specified limits to ensure safe operation. This CAR is issued under the provision of Rule 133 A of the Aircraft Rules to ensure compliance of the above requirements.

This CAR is issued in supersession of CAR Section 2 Series 'F' Part XXII Issue I dated 06.08.1993.

2. SCOPE:

This part of the Civil Aviation Requirement sets out the requirements for load and trim sheets,—necessary training of the **staff personnel** engaged in its preparation and their approval by DGCA

3. LOAD & TRIM SHEET AND ASSOCIATED TRAINING: OVERVIEW

In order to minimise the number of loading related incidents, operators should ensure that flight crew, cabin crew and loading **staff personnel**, or ground handling agents, are appropriately trained, qualified and periodically examined for competency to carry out their duties. Training for any **staff personnel** involved in any aspect of aircraft loading should include weight and balance planning, the use of the load sheet, aircraft loading, restraint of cargo and the carriage of dangerous goods. It is important that the training given includes an overview of the duties and responsibilities of the other **staff personnel** (whether employed by operator or agent) involved in the control and

execution of loading, and particular emphasis placed on the interfaces between staff personnel and the division of duties and responsibilities at the interfaces. Only with this understanding can they exercise vigilance for actions omitted and responsibilities not fully discharged.

4. REQUIREMENT OF QUALIFIED STAFF PERSONNEL:

Persons deputed by Airline/ Operator for preparing load and trim sheet of aircraft shall be; possess the following minimum qualification and training requirements;

4.1 PIC or co-pilot trained and current on type of aircraft,

OR the following,

- 4.2 Education- 10+2 level or holder of a flying license-
- 4.3 Basic level courses in Load Control/Ramp Handling/Dangerous Goods and basic knowledge of passenger services and Cargo handling.
- 4.4 Experience in areas of Aircraft Loading / Load Control and Documentation.
- 4.5 Experience within Load Control in providing aircraft Weight and Balance services and preparing load and trim sheets.
- 4.6 Be conversant with computerised departure control systems and with producing load sheets manually

5. DUTIES & RESPONSIBILITIES OF QUALIFIED STAFF PERSONNEL:

- 5.1 Perform all aircraft Weight and Balance and Documentation activities for the airline/operator concerned., ~~on a shift basis for arriving and departing aircrafts.~~
- 5.2 Ensure the provision of an accurate and punctual service and that activities conform to legal and safety requirements as outlined by regulatory bodies such as IATA, DGCA, Aircraft Manufacturers, Airline Weight and Balance manuals etc.
- 5.3 Review existing operational practices, systems and procedures to create work/ process efficiencies and source opportunities to maximise aircraft space utilisation and fuel uptake, in order to exploit maximum revenue capacity and performance capability per aircraft.
- 5.4 Co-ordinate the receipt, record and onward communication of relevant information from various stakeholders including outstations required for the preparation of weight and balance documentation (loading instruction report, load sheet and trim sheet) for an aircraft.

5.5 Build and maintain relationships with key stakeholders to enhance customer service standards and facilitate the exchange of information & ensure all under the wing activities are carried out in a safe & effective manner.

6. TRAINING PROGRAMME:

6.1 The training programme for the persons engaged in preparing load and trim sheet and supervising loading shall comprise of:

- (a) Basic / Initial ground training,
- (b) Conversion/Transition training,
- (c) Refresher/Recurrent training,
- (d) Differences training.

6.2 Each training shall include practical demonstration as applicable.

6.3 Each training should cover the differences between aircraft of the same type operated by the ~~airline/~~ operator to ensure that such ~~staff~~ personnel are adequately trained to perform their assigned duties on different aircraft being operated.

6.4 Upgrade training programme as required from time to time.

6.5 In addition to initial, transition, upgrade, recurrent and differences training, each training programme must also provide specific ground training, instruction and practice as necessary to ensure that each ~~staff~~ personnel :-

- (a) Remains adequately trained and currently proficient with respect to each aircraft and type of operation in which the ~~staff~~ personnel is involved.
- (b) Qualifies in new equipment, facilities, procedures and techniques, including change in loading / weight procedures as applicable to ~~staff~~ personnel.

7. BASIC INDOCTRINATION / INITIAL GROUND TRAINING:

7.1 Where type trained pilots are entrusted preparation of load & trim sheet, the initial ground training requirements may be undertaken as a part of the type training syllabus. Such syllabus shall be for a minimum of 2 programmed hours including the following topics;

- (a) Review of the company procedures and operators' ground handling manual /equivalent document including procedures Supervision of loading/unloading, baggage handling, ramp equipment, ramp safety, boarding and disembarkation of passengers, restricted articles, dead load, documentation and record keeping, etc.
- (b) Requirements for personnel involved in supervision of loading and preparing load and trim sheets including the provisions of the Aircraft Rules

1937 Rule 58 sub rule 2(b), CAR Section 8 Series D Part I etc.

- (c) AFM/POH/FCOM principles of performance and weight & balance including limitations, regulated take off weights, takeoff and landing performance charts, principles of loading, preparation of load and trim sheets etc.
- (d) Specific loading limitations, movement of center of gravity and hazards of incorrect loading.
- (e) ACARS load and trim sheet (if applicable)
- (f) Last minute changes.

The training shall include a practical demonstration followed by a competency check.

7.2 The basic indoctrination/initial ground training for ~~newly hired staff~~ newly hired personnel (other than type trained pilots) to be used for preparing load & trim sheet shall include a minimum of 40 programmed hours of instruction in at least the following:

- (a) History of Aviation.
- (b) Introduction to the airlines organizational structure and scope of operations.
- (c) Introduction to the contents of the operators certificate, difference between scheduled operations and non scheduled operations, type of aircraft permitted for operations, limitations and their significance thereof, validity of the permit.
- (d) Introduction to the airlines manual with respect to baggage handling, ramp equipment used and ramp safety boarding and disembarkation of passengers, loading and unloading of cargo, restricted articles.
- (e) Introduction of Aircraft Rules 1937 Rule 58 sub rule 2(b), CAR, Section 8 Series D Part I, on the subject – Load & Trim sheet and requirements thereof necessary training of ~~staff personnel~~ engaged in its preparation and the process of their approval by DGCA.

- (f) Company procedures regarding loading and unloading of aircraft with respect to passengers and dead load, ramp handling documentation and record keeping as specified in the relevant portion, if any in operations manual.
- (g) Aircraft flight manual, the need for mandatory documentation including their significance. Turn around times and the general procedures for ground handling.
- (h) Basic theory of Flight-Aerofoil theory. The concepts of Lift, Drag, Thrust and Weight.
- (i) Conditions of equilibrium – Introduction to Longitudinal, Normal and Lateral axis, the motions of Rolling, Pitching and Yawing.
- (j) Principles of Weight and Balance of Aircraft – The concepts of Weight, Center of Gravity, Center of Pressure, Moment, Arm and Fulcrum, Law of moment and Datum.
- (k) Weight and Balance computation, and calculations of center of gravity of aircraft – the application of the law of moments, Index units, Basic Index, Index equation. Weight and balance in an aeroplane, Mean Aerodynamic Chord.
- (l) Limitations – Structural and operational limitations. The concepts of Maximum Ramp, Take-off, Landing weight, Zero fuel Weight, regulated take off weight, laden weight, aircraft index, dry operation weight, net operation weight. Factors causing operational limitations like runway length, temperature, pressure, wind conditions, climb gradient, obstacles. Effect on payload due structural and operational limitations.
- (m) Calculation of Center of gravity of aircraft. – Application of the index equation to compute the center of gravity of the aircraft.
- (n) Introduction to important parts of the aeroplane – fuselage, wings, power plant or engines. Tail assembly or empennage, rudder, elevator, flaps, ailerons, undercarriage and flight deck and their significance in controlling the aircraft.
- (o) Introduction to the type of aeroplane, Technical description and details of flight deck, power plant, cabin configuration, design dimensions and weight.
- (p) Loading and unloading procedure for type of aircraft, limitations thereof, precautions to be followed.
- (q) Use of RTOW and take off and landing performance charts, preparation of load and trim sheet including practical training.

- (r) Regulation pertaining to carriage of arms / ammunition, dangerous goods, dead body, live animals, perishable goods etc.
 - (s) ACARS load and trim sheet (if applicable).
 - (t) Last minute changes
- 7.2 Initial ground training for such officers/ staff must include a competency check given by appropriate supervisor or ground instructor) acceptable to the DGCA. that demonstrates knowledge and ability with the subjects set forth in paragraph 7.1 of this section.

Note: Refer CAR Section 2 Series X Part II Weight and Balance of Aircraft for aspects related to weighing of aircraft

8. CONVERSION / TRANSITION TRAINING:

- 8.1 The staff performing regular duty on one type of aircraft cannot perform duties on any other type of aircraft until he/she has undergone an approved course of conversion training.
- 8.2 The conversion training shall be conducted by an approved instructor who is familiar with the type of aircraft including various procedures. The instructor shall conduct the written and practical test, in coordination with DGCA (Director of Airworthiness of the Region).

9. REFRESHER / RECURRENT TRAINING:

9.1 Recurrent training ensure that such staff personnel are adequately trained and currently proficient with respect to the type of aircraft (including differences training if applicable). Refresher training for pilots may be undertaken as a part of their annual technical / performance refresher in a 0.5 hour load and trim sheet module.

9.2 Recurrent ground training for staff must include at least the following:-

- (a) A quiz or other review to determine the state of the officers personnel's knowledge with respect to the aircraft;
- (b) Weight and Balance computation and calculations of center of gravity of aircraft – the application of the law of moments. Index units, Basic Index, Index equation, Weight and balance in an aero plane, Mean Aerodynamic Chord.
- (c) Limitations – Structural and operational limitations. The concepts of Maximum Ramp, Take-off, landing and Zero Weight, Factors causing operational limitations like runway length, temperature, pressure, wind conditions, climb gradient, obstacles, effect on payload due to structural and operational limitations.

- (d) Definition and meaning of maximum take off weight, landing weight, regulated take of weight , zero fuel weight empty weight laden weight, aircraft index, maximum landing weight, dry operating weight, net operating weight.
 - (e) Introduction to the Aeroplane and its important parts – fuselage, wings, power plant or engines, Tail assembly or empennage, rudder, elevator, flaps, ailerons, undercarriage and flight deck and their significance in controlling the aircraft.
 - (f) Technical description and details of flight deck, power plant, cabin configuration, hold configuration, design dimensions and weight.
 - (g) Loading and unloading procedure for aero plane fleet, limitations thereof, precautions to be followed.
 - (h) Use of RTOW and take off and landing performance charts, preparation of load and trim sheet.
 - (i) Regulation pertaining to carriage of arms, ammunition, dangerous goods, dead body, live animals, perishable goods etc.
 - (j) Emphasis on practical application and making of load and trim sheet for normal single sector flight, multi sector, transit flight, ferry flight and training flights.
 - (j) ACARS load and trim sheet (if applicable)
 - (k) Last minute changes
- 9.3 A competency check as specified in para 7.2 of this Civil Aviation Requirements.
- 9.4 Recurrent ground training for staff must consist of at least 10 programmed hours.
- 9.5 Recurrent training shall also be conducted for staff who have not conducted supervision of loading and preparation of load and trim due long sickness change of job etc. The course shall mainly consist of familiarization with subjects mentioned in para 7.1 and also with DGCA circulars, AICs and review of accidents/incidents due to loading problems
- 9.6 The staff instructor under whom such staff has undergone recurrent training shall submit a certificate of successful completion of training to the ~~airline~~/operator.
- 10. DIFFERENCES TRAINING:**
- 10.1 Differences training for such staff must consist of instructions in each

appropriate subject or part thereof required for initial ground training in the aircraft. ~~unless DGCA finds that particular subjects are not necessary.~~

- 10.2 The number of programmed hours for the **differences** ground training shall be 10 hours., if not included with other training courses.-
- 10.3 Differences training must include the relevant topics defined in paragraph 7 and in addition the following:
- (a) Introduction to variations.
 - (b) Instructions on each aspect of variations.
 - (c) Impact on loading and unloading due differences.
 - (d) Precautions and limitations.
 - (e) Impact on payload due differences.
 - (f) Procedure to prepare load and trim sheet.

11. COMPETENCY CHECK FOR OFFICERS **PERSONNEL:**

11.1 Written test / Examination:

Each trainee after having undergone the prescribed training shall appear in a written examination conducted by an instructor in co-ordination with the DGCA. The examination shall consist of:-

- (a) General subjects,
- (b) Specific on type of aircraft.

11.2 Oral and Practical test:

The ~~staff~~ **personnel** after having successfully undergone written test are required to demonstrate their drill and skills. The assessment in this regard shall be done by an instructor.

12. OPERATING EXPERIENCE:

The ~~staff~~ **personnel** must perform the assigned duties of preparing load and trim sheet on at least two flights under the supervision of an authorised instructor, who shall personally observe the performance of these duties. However, such check is not required for ~~staff personnel~~ who has previously acquired experience on any large passenger carrying aircraft of the same group.

13. TRAINING INFRASTRUCTURE AND PROGRAMME:

- 13.1 For the purpose of training ~~staff the airline/operator~~ must obtain approval

from the DGCA for their training course. For this purpose the airline/ operator shall submit to the DGCA

- (a) A ~~written~~ training programme for each type of aircraft which shall include:-
- (i) A list of principal training subjects covering the syllabus;
 - (ii) A list of all the training devices, methods and procedures to be followed for the proposed training;
 - (iii) The programmed hours of training that will be applied to each training;
 - (iv) List of properly qualified instructors as required for the training.
- (b) Additional information which may be required by the DGCA.

13.2 The airline/operator shall provide and keep current with respect to each aircraft type and, if applicable, the particular variation within that aircraft type, appropriate training material, examination form, instructions, printed material, instructions and procedures for use in conducting the training and checks required.

13.3 If the proposed training programme or revision omplies with this part of the CAR, DGCA may grant initial approval after which the airline/operator may conduct training in accordance with the such approved programme. DGCA will then evaluate the effectiveness of the training programme and will advise the operator of deficiencies, if any, that must be corrected.

13.4 DGCA may grant final approval of training programme or revision if the airline/operator shows that the training conducted under initial approval ensures that each person that successfully completes the training is adequately trained to perform his/her assigned duty.

13.5 Whenever DGCA finds that revisions are necessary for continued adequacy of training programme that has been granted final approval, the operator shall make changes in the programme that are found necessary by the DGCA.

13.6 Instructor: The instructor detailed to impart training to the ~~staff~~ **personnel** must possess sufficient aviation experience and knowledge of Air Safety Circulars, AICs, CAR, Aircraft Rules and other instructions issued by the DGCA from time to time.

14. DGCA may monitor the training programme, instructors and the performance of the trainees from time to time.

15. LOAD AND TRIM SHEET REQUIREMENTS:

- 15.1 Before starting operation the ~~airline~~/operator shall prepare a load/trim sheet and get the same approved from the DGCA (Dte of Airworthiness).
- 15.2 The ~~airline~~/operator shall compute the trim either manually or by use of a computer system (e.g. ACARS) in accordance with a procedure approved by the DGCA. A brief description of the ACARS is given in Appendix – A.
- 15.3 The ~~airline~~/ operator shall ensure that the loading and distribution is in accordance with the requirement of the Aircraft Rules and any special direction issued by the DGCA in conformity with the Rules.
- 15.4 It will be the responsibility of the ~~airline~~/operator to ensure that the weight of the aircraft at the time of take-off does not exceed the RTOW.
- 15.5 Each ~~airline~~/operator is responsible for the preparation and accuracy of the load/trim sheet.
- 15.6 The load/trim sheet must be prepared in duplicate and signed for each flight by an Personnel of the ~~airline~~/operator who have the duty of supervising the loading of aircraft and preparing the load and trim sheet except:
 - (a) That the same is not required for each subsequent shuttle/ leg of helicopter flight provided the load in each such shuttle does not exceed the load for the first shuttle; and
 - (b) The sequence of loading/ passenger seating is specified in the Flight and Operations Manual.
- 15.7 The load and trim sheet must be signed by the pilot-in-command.-unless the load and trim sheet is sent to the aeroplane by electronic data transfer.
- 15.8 When the load and trim sheet is sent to the aeroplane by electronic data transfer, a copy of the final load and trim sheet, as accepted by the pilot-in-command, must be available on the ground. A load and trim sheet sent by electronic data transfer shall be annotated as “final” to indicate the version to be accepted by the PIC.
- 15.9 The load and trim sheet should normally contain the following information:
 - (a) The aeroplane registration and type;
 - (b) the flight identification number and date;
 - (c) the identity of the pilot-in-command;
 - (d) the identity of the person who prepared the document;
 - (e) the dry operating mass and the corresponding CG of the aeroplane;

- (f) the mass of the fuel at take-off and the mass of trip fuel;
- (g) the mass of consumables other than fuel;
- (h) the components of the load including passengers, baggage, freight and ballast;
- (i) the take-off mass, landing mass and zero fuel mass;
- (j) the load distribution;
- (k) the applicable aeroplane CG positions; and
- (l) the limiting mass and CG values.

15.10 The load/trim sheet and passenger manifest must at least contain the following information concerning the loading of the aircraft at take-off time:

- (a) The weight of the aircraft, fuel and oil, cargo and baggage, passengers and crew members.
- (b) The maximum allowable weight for that flight that must not exceed the least of the following weights:
 - (i) Maximum allowable take off weight for the runway intended to be used (including corrections for altitude, gradient, wind, and runway surface condition and temperature conditions existing at the take-off time.
 - (ii) Maximum take off weight considering anticipated fuel and oil consumption that allows compliance with applicable en route performance limitations.
 - (iii) Maximum take off weight considering anticipated fuel and oil consumption that allows compliance with the maximum authorized design landing weight limitations on arrival at the destination airport.
 - (iv) Maximum take off weight considering anticipated fuel and oil consumption that allows compliance with landing distance limitation on arrival at the destination and alternate airports.
- (c) The total weight computed under approved procedures.
- (d) Evidence that the aircraft is loaded according to an approved schedule that ensures that the centre of gravity is within approved limits, during the flight.

- (e) Names of passenger including breakup of male, female, child/infant.
- 15.11 If after take-off, any discrepancy is observed in the load calculation by the concerned personnel on the ground, the same should be intimated to the Pilot-in-Command immediately using ACARS (if applicable)
- 15.12 The load and trim sheet needs to be updated when:
- (a) a modification which changes the aircraft certified limits is included or
 - (b) a modification (cabin layout, cargo arrangement.) which influences the operational limits is made.
- 15.13 The form "Special Load – Notification to Captain" (NOTOC) is to be used whenever it is necessary to inform the Captain of the presence of specific nature load on board of the aircraft:
- (a) dangerous goods,
 - (b) live animals,
 - (c) human remains,
 - (d) perishable cargo,
 - (e) valuable cargo, and other special load.

~~Prepare~~ Minimum of two copies of NOTOC are required; one for the Captain, and one for the loading station's file.

16. GENERAL REQUIREMENTS:

- 16.1 Before detailing a ~~staff~~ **personnel** for preparation of load / trim sheet, the ~~airline/~~ operator shall confirm to the DGCA that the ~~staff~~ **personnel** has successfully undergone an approved course in accordance to the requirement laid down in the CAR. They should also ensure that all such ~~staff~~ **personnel** undergo periodic refresher and other training courses as stipulated in ~~this~~ CAR.
- 16.2 Aircraft weight and balance calculations should be conducted carefully and load and trim sheets should be prepared ensuring that the correct data is used. Gross error checks should be made at every stage.
- 16.3 Communications should be established between ground crew and flight crew, especially where last minute change procedures are used. Passenger head counts and gender identification should be conducted carefully in order to achieve accurate passenger figures.
- 16.4 Operators must also ensure that the person responsible for supervising the loading of the aircraft has inspected the load and reconciled the actual load distribution with the aircraft loading instructions or load report, has checked that the load is properly restrained throughout the cargo compartments and then confirms, by signature, that the load and its distribution are in

accordance with the load and trim sheet. Sufficient time must be available for such checks to be carried out properly.

- 16.5 Operators should review the instructions they provide to all who can have responsibility for loading their aircraft, and the training that is required to ensure that these instructions are properly understood and implemented to ensure that the risk of incidents or accidents arising from loading errors is kept to a minimum.
- 16.6 Operators should also review their Quality Systems to ensure that their audit schedules include aspects of how aircraft are to be loaded and trims/centres of gravity are to be accurately calculated in accordance with all relevant requirements.
- 16.7 Notwithstanding the above, DGCA may specify additional requirements, if felt necessary, for safe operation of the aircraft.

(Arun Mishra)
Director General of Civil Aviation

APPENDIX – A

ACARS OVERVIEW:

Aircraft Communications Addressing and Reporting System (ACARS) is a digital datalink system for transmission of short, relatively simple messages between aircraft and ground stations via radio or satellite.

A person or a system on board may create a message and send it via ACARS to a system or user on the ground, and vice versa. Messages may be sent either automatically or manually.

A Step-by- step description of the ACARS Loadsheet Confirm procedure is described below:

Note: This instruction is intended for orientation only.

1. ACARS Initialization

Sending the INIT REQ (accessed via PREFLIGHT menu=> INIT DATA page) will trigger an automatic uplink of the Preliminary Load Info.

The Preliminary Load Info will be printed automatically upon receipt by the ACARS MU. This is indicated by the passive advisory "PRN MSG*" on the MCDU position LK6R. (Press LK6R to cancel the advisory).

```
PRELIMINARY LOAD INFO 10:00  
ZFW 48398 TOW 54708 LAW  
50741 PAX C/Y/M 1/6/103  
MACTOW 28 *DRILL 9L: CPT2:  
10KG  
DRY ICE  
END PRE-LOAD INFO
```

2. Final Loadsheet & NOTOC)

The Final Loadsheet (& Notoc) will be uplinked and printed automatically when all load releases have been made. Receipt of the Final Loadsheet is indicated by the LOADSHEET*. active advisory message in position LK6R. If desired the Final Loadsheet can be reviewed on the MCDU via the PREFLIGHT menu



LOADSHEET* active advisory on MCDU

3. Signing the Final Loadsheet

Selecting the LOADSHEET active advisory will take you to the LOAD CONFIRM 1/2 page. (The LOAD CONFIRM page is also accessible via the LOAD SHEET page on the PREFLIGHT menu.)

LOAD CONFIRM 1/2 page. A PIN code "12345" has been entered by the pilot.

The SEND* prompt indicates the Load Confirm message has not yet been sent.

Enter the 5-digit PIN code in the "CREW" field.

Press SEND*

The Final Loadsheet (and Notoc) is now signed.

4. Error Handling

If any of the following cases occur:

- LOAD CONFIRM message not received before the off-block event.
- LOAD CONFIRM message received with incorrect PIN code before the off-block event.

The SAS Datalink system will uplink an advisory message.

(SAS uses the ACARS datalink system. It is a datalink technology developed specifically for the airline industry. A network of ground radio stations ensure that our aircraft can communicate with SAS in real-time from practically anywhere in the world. Satellites are used over oceans or remote areas where no ground stations exist. ACARS is a low bandwidth link that handles text-based information of essentially the same type as can be sent via ground-ground telex.)

