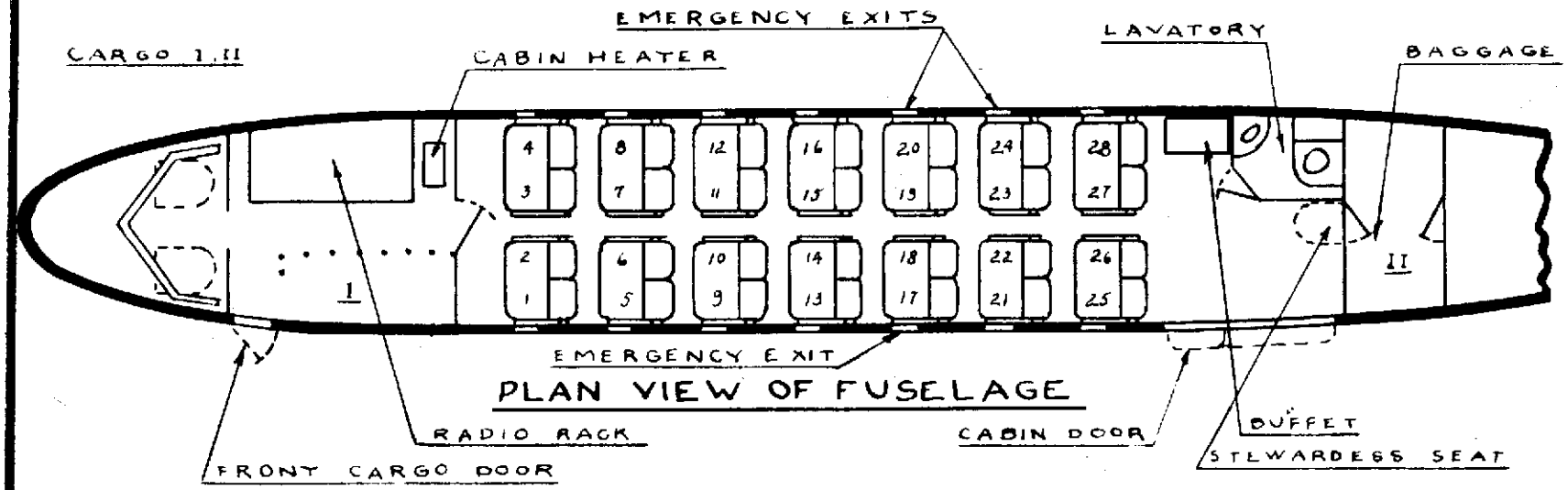
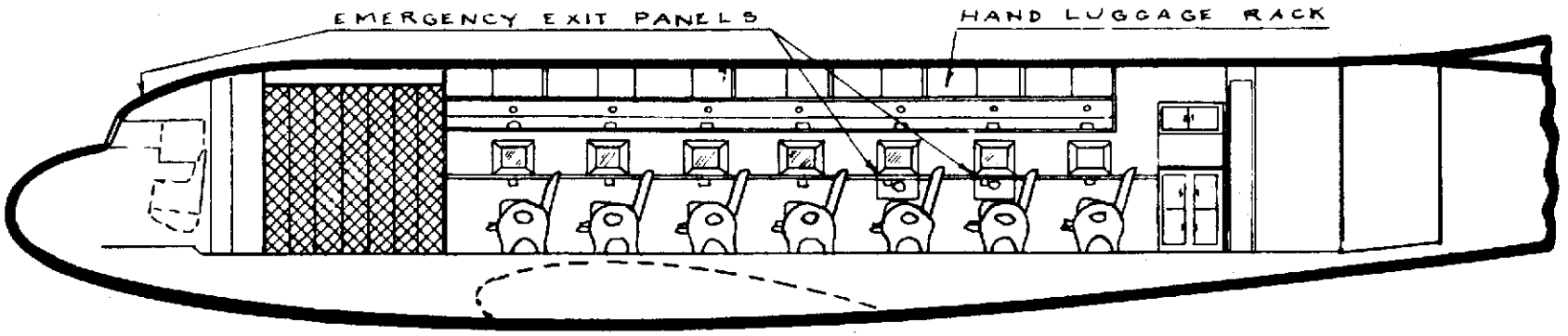
WEIGHT & BALANCE

INDEX



PLAN VIEW OF FUSELAGE



INTERIOR R.H. SIDE OF FUSELAGE

CABIN INTERIOR HEIGHT	6'6"	SEAT WIDTH	40"
CABIN WIDTH AT ARM REST	7'8"	SEAT SPACING BACK TO BACK	3'3"
CABIN LENGTH.	27'8	AISLE WIDTH	12"

INTERIOR ARRANGEMENT
DC-3-S1C3G

WEIGHT & BALANCE

INTRODUCTION

The Weight and Balance Chapter of our DC-3 Operating Manual has been developed to provide Flight Crew, and others with basic instructions and essential information which will assist them in the proper conduct of their duties.

It is not possible to cover all situations in a manual of this type, since they change from one day to an other, so there may be occasions when parts of this manual do not accurately describe current situations. Every effort will be made to issue amendments promptly when required and holders of this manual are invited to bring any discrepancies noted to the attention of your Operations Department in order that corrective action may be taken.

One Weight and Balance copy will be placed aboard each Quebecair Aircraft.

The Director of Operations.

1. GENERAL PROCEDURES:

A. This information will serve to guide personnel in the proper loading of an aircraft. Proper loading ensures that aircraft structure will not be damaged; that all cargo will be positioned to provide the best trim characteristics; that the centre of gravity will remain within the permissible limits specified on the Certificate of Airworthiness.

B. Please refer to page 31 of this Chapter for each particular aircraft Weight and Balance data.

C. Each cargo compartment in all aircraft will be clearly placarded with the permissible maximum weight which weight must not be exceeded.

D. All cargo or equipment must be properly stowed inthe cargo compartments. If cargo is carried in the cabin it must beplaced forward of the passengers and properly secured to prevent its shifting.

E. Cargo of a nature which may cause damageinthe event of spillage or breakage, such as containers of acid, or filled wet batteries, may be carried only when specially packed and marked clearly to show the nature of the contents. Explosives are subject to special regulations which are detailed in Charter andTariff Manual.

F. The gross weight at which an aircraft should be operated is determined by two factors; (i) the structural strength of the aircraft and (ii) the performance of the aircraft.

G. The Department of Transport sets up minimum structural strength and performance requirements which are based on specific gross weights and therefore, it is illegal to operate an aircraft at a gross weight exceeding those specified.

H. The responsibility for correct weight and balance data for QBA aircraft rest upon the Maintenance Department. The Operation is responsible to insure aircraft are properly loaded and according to established and approved procedures.

2. NECESSITY FOR WEIGHT AND BALANCE CONTROL

Weight and Balance Control is a prime consideration in assuring safety and efficiency of aircraft.

The following material will outline in general terms the necessity for controlling the weight and balance of an aircraft or fleet of aircraft.

By knowing, at all times, the weights and centre of gravity location it is possible to load all aircraft whithin their respective limits. Accurate control is particularly important in the operation of large modern transports. Failure to observe limits produces the following features:

A. Overloading

Causes a higher stalling speed.
Results in lowering of airplane structural safety factors.
Reduces manoeuverability.
Increases take-off run.
Lowers angle and rate of climb.
Decreases ceiling.
Lowers tire factors.
Increases fuel consumption.

B. C.G. too far forward:

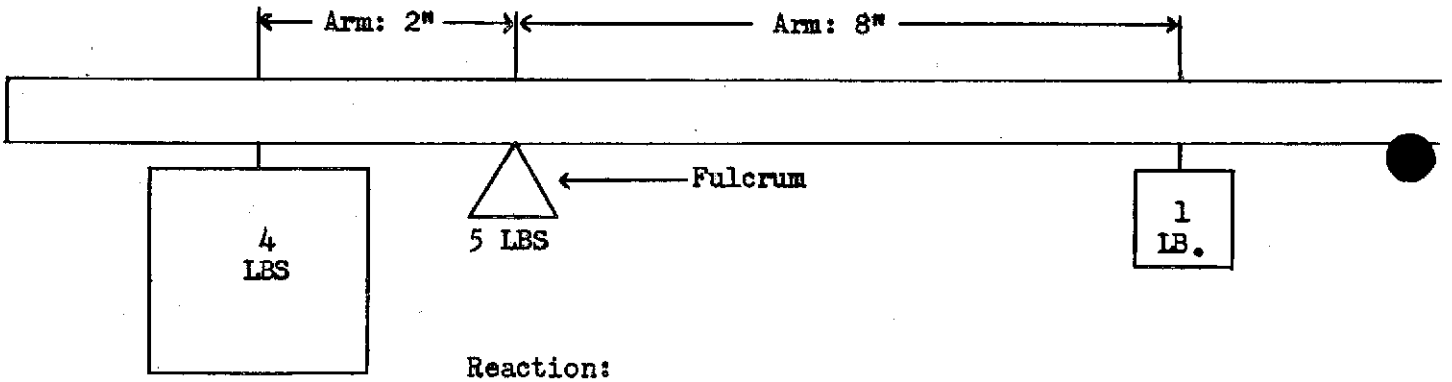
Increases oscillation tendency.
Tends to increase dive beyond control.
Might cause critical conditions during flap operation.
Increases difficulty in getting nose up during landing.
Increases fuel consumption for given load.

C.G. too far aft:

Reduces effectiveness of controls.
Increases power required for given speed.
Increases stall tendency; might cause a stall during an up-gust.
Aggravates de-icer effect on high wing aircraft.
Increases Pilot strain in instrument flying.
Increases fuel consumption for given load.

3. PRINCIPLE OF BALANCE

a. The theory of aircraft weight and balance is extremely simple. It is that of the familiar platform scale which is in equilibrium or balance when it rests on the fulcrum, or pivot, in a level position. It is apparent that the influence of a weight is directly dependent on the weight's balance from the fulcrum and that the weights must be distributed so that the turning effect is the same on one side of the fulcrum as on the other. A heavy weight nearer the fulcrum has the same effect as a lighter weight further out on the bar. The distance of any object from the fulcrum is called its "arm". This distance or arm multiplied by the weight of the object is its turning effect or moment exerted about the fulcrum.

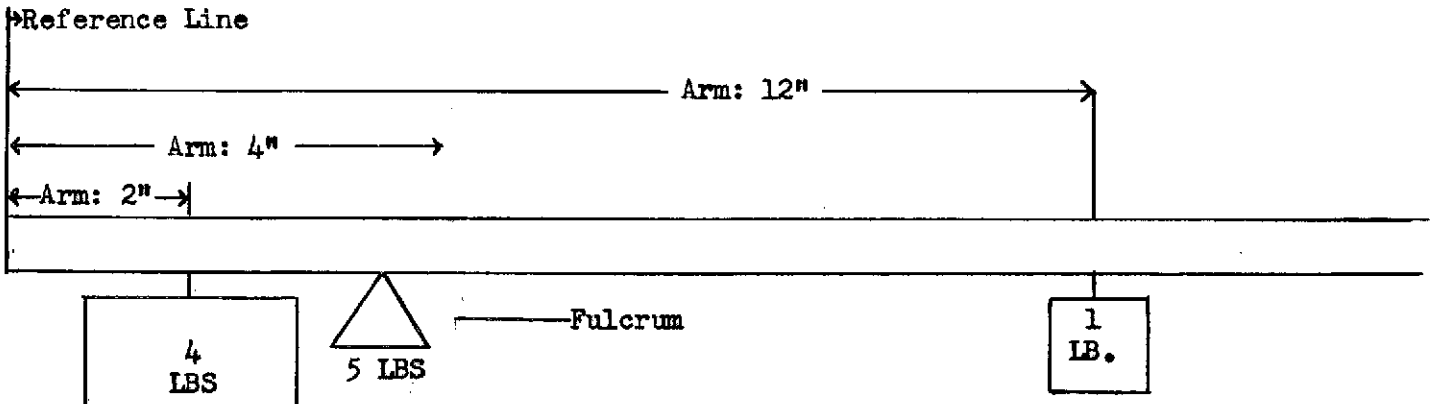


Reaction:

Weight X Arm = Moment
(The moment of both these)
2" X 4 lbs.: 8 in.-lbs. (weights is 8 inch-pounds)

In practice, it is often found desirable to measure all distances from an arbitrary reference line some distance apart from the fulcrum. This permits measuring all arms in the same direction and causes all moments except those originating from a reaction to become positive. In this manner are eliminated possible errors which might arise from adding clockwise (positive) moments any it becomes possible to calculate the balance point location for any combination of loads. A check on the previous example will show that the use of an arbitrary reference datum rather than a balance point for calculating moments in no way effects the positions or amounts of the loads required to obtain a balanced condition.

4. PRINCIPLE OF BALANCE (Cont'd.)



REACTION:- Moment of 4 lbs. weight about reference line 8 in.-lbs. Moment of 1 lb. weight about reference line 12 in-lbs. Total of moments - 20 in-lbs.

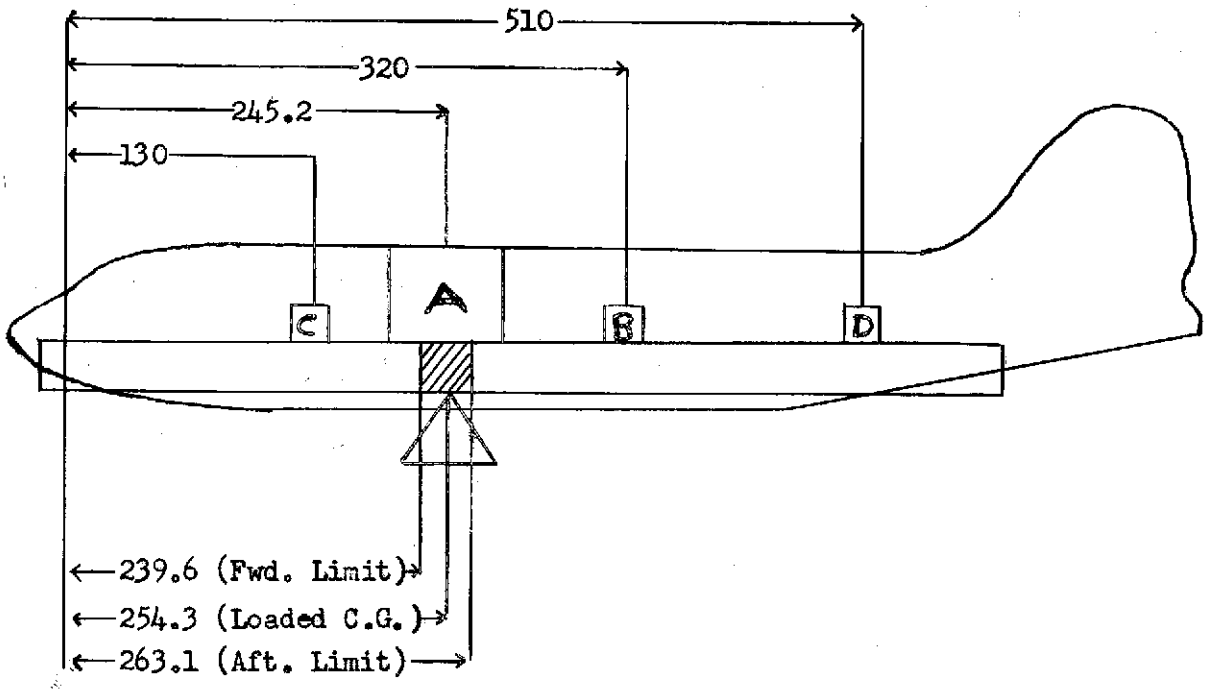
This 20 in-lbs moment is equivalent to a weight of 5 lbs. acting 4 inches away from reference line, therefore, a reaction of 5 lbs., as shown, at that latter point will produce a balanced condition.

When the total moment of the weights about this arbitrary reference datum line is divided by the total weight, the resulting arm is the distance to the centre of balance or centre of gravity from the referenced datum line. Naturally, this works out to be the location of the fulcrum on the balanced platform scale illustrated above.

Similarly, an aircraft is balanced when it remains level, if suspended at a certain point or ideal centre of gravity location. Unlike a platform scale, it is not necessary that an aircraft balance so that it is perfectly level, but it must be reasonable close to it. This allowable variation is called the C.G. range and its location which is always near the forward part of the wing, is determined by test flight of the aircraft at the time of manufacture and published in the aircraft specification.

4. PRINCIPLE OF BALANCE (Cont'd.)

c. By weighing an aircraft in flying position, and carefully noting the scale reading and distances between scales, it is simple to determine the basic empty C.G. location or the point at which the aircraft weight acts. Once this figure is known, obtaining the balance for flight noted above is simply a matter of placing loads so that the average arm of the loaded aircraft falls within its allowable C.G. range. Heavy loads forward of the C.G. range can be balanced by much lighter loads near the tail of the sip and the exact location and amount of load required can be determined by calculating moments. Shown below is a typical example for a DC-3 aircraft



i. Total Empty Weight of aircraft including crew an standard equipment acting at C.G. position of 245.2 inches from datum. (18,200 lbs).

ii. Weight of twenty passenger (3,400 lbs.) acting at their average location (cabin-mid-point) which is 320 inches from datum.

iii. Weight of 1,500 lbs. of cargo acting at the centre of the forward baggage compartment, which is 130 inches from datum.

iv. Weight of 500 lbs. of cargo acting at the centre of the rear baggage compartment, which is 510 inches aft of datum.

4. PRINCIPLE OF BALANCE (Cont'd)

CALCULATIONS

Aircraft (Including crew, etc.)	18,200 lbs.	245.2 ins.	4,462,640 in-lbs.
Passengers	3,400	350	1,088,000
	1,500	130	195,000
	500	510	255,000
	23,600 lbs.		6,000,640 in-lbs.

Loaded C.G. Position - $\frac{6,000,640}{23,600}$ - 254.26 ins.

As this figure is between limits, aircraft is obviously loaded satisfactorily.

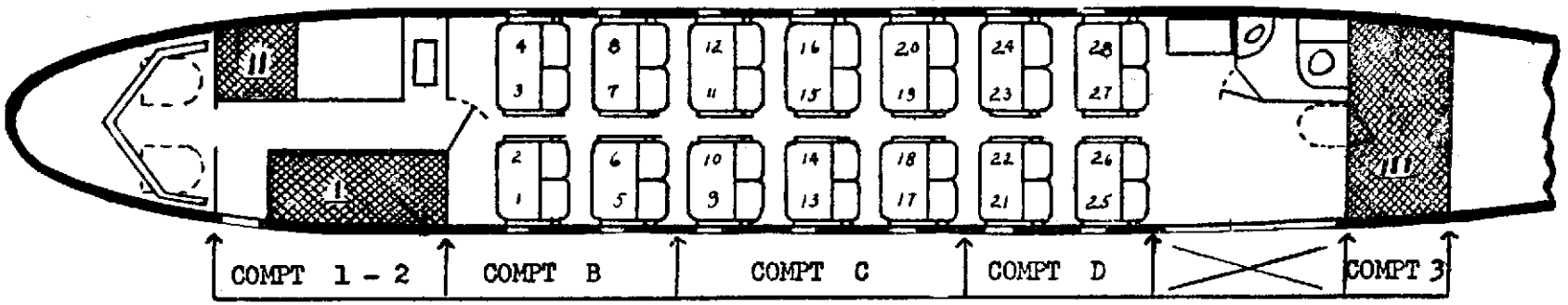
WEIGHT AND BALANCE MANIFEST

FORM 0-11

DOUGLAS DC-3

Flight No..... Aircraft..... Date.....

Station..... Captain.....



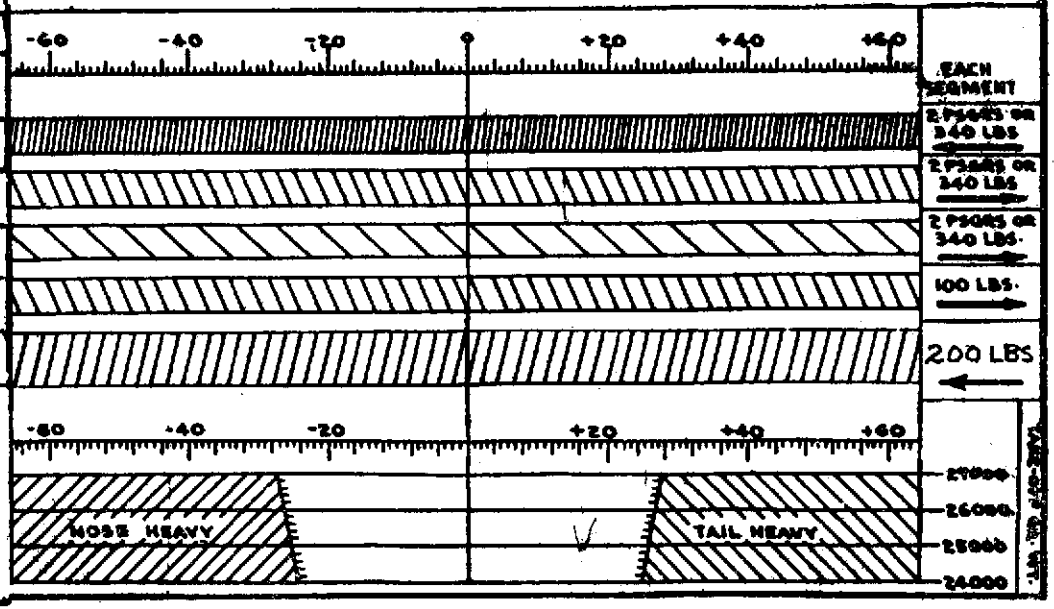
TOTAL LOAD FROM PASGRS & CARGO MANIFEST

Location	Max. Cap. Seat Row	28 Pas	Frt a/c	Station Disposition	Load Pgers	Load Cargo
Seat Row B compt.	1&2	8	3000			
Seat Row C compt.	3,4 & 5	12	3000			
Seat Row D compt.	6&7	8	2400			
Aft cargo 28, frt	X		900	900		
Fwd cargo 28, frt	X		2188	2100		

I hereby certify the distribution of the above to be in accordance with approved instructions.

Computed by.....

EMPTY WEIGHT INDEX:.....



5. GRAPHIC LOADING SYSTEM

A. The graphic system, which is in use for C.G. control on QUEBECAIR aircraft, is in a form which shows graphically the effect of loading passengers and cargo. Page 15 is a copy of our Weight and Balance Manifests.

B. Referring to this form, it will be seen that there are three lines representing the seven rows of passenger seats. There is one line representing the effect of cargo loaded in the forward cargo compartment, and one line representing cargo loaded in the aft cargo compartment.

C. The Total Empty Weight Index Scale is in effect, a method of locating the centre of gravity of the aircraft. The zero datum is a fixed point chosen midway in the allowable C.G. range, (for the DC-3 the zero datum is 251.30" aft of the nose datum of the aircraft). The total Empty Weight Index is a figure indicating where the actual C.G. of an aircraft lies in relation of this zero datum. The various seat rows scales and cargo compartment scales are designed to give the amount (in Index Units) that the C.G. moves, when loads are applied at these positions.

D. In order to correctly load a DC-3 aircraft with the aid of the graphical loading chart, the following procedure is necessary:

1. First obtain the Total Empty Weight Index for the particular aircraft.

2. Drop a line from the point of total Empty Weight Index vertically, (parallel to the zerodatum line) until it intersects the next line below (seat Row B Compartment). The arrow indicates the direction the C.G. moves due to passengers on the two front rows of seats. A line is therefore drawn to the left, one segment in length for every two additional passengers carried. Where this line terminates a vertical line is dropped to the next line below opposite C. Compartment. We notice that from there on the C.G. movement is rearward. This is indicated by the arrow pointing to the right. The remaining passengers and cargo are loaded in the same manner.

3. When the last load has been plotted on the chart, the line is then dropped vertically down through the resulted index scale and into the C.G. and Total Gross Weight chart. The shaded portion on either side of the Total Gross Weight and C.G. graph is self-explanatory and <u>in no instance</u> must an aircraft be dispatched when the intersecting point of the resultant index and Total Gross Weight line falls within either of these shaded areas.

GRAPHIC LOADING SYSTEM (Cont'd.)

D. (Cont'd.)

4. A line is drawn representing the Total Gross Weight, to intersect the vertical line. The total Gross Weight scale is shown on the right-hand side of the Graph. The short horizontal lines extending into the unshaded area represent a guide in drawing the horizontal line when the Total Gross Weight falls between the figures given on the scale.

5. The unshaded area of the Total Gross Weight and C.G. graph is the safe range. When the resultant index falls within this area, the aircraft load is satisfactorily distributed.

E. 1. The fuel load has very little effect on the C.G. and is not taken into account.

2. The oil weight is incorporated in the Total Empty Weight and its effect on C.G. included in the Total Empty Weight Index.

3. The weight of the normal crew (two pilots and steward or stewardess) is included in the Total Empty Weight and its effect on C.G. included in the Total Empty Weight Index.

NOTE: It is essential that lines drawn horizontally are parallel with the scales and those drawn vertically, parallel with the datum or 0 line.

The advantage of the graphical form of loading chart is that it provides a visual means of checking the C.G. movement as loads are applied at the various stations.

F. 1. Function

The Weight and Cargo Manifest is a record of the total load out of every station showing destination and the disposition of load. This form acts as an aid in minimizing the handling of the flight at originating and intermediate stations as well as providing a complete breakdown of the gross weight and allowable gross weight. This manifest also indicates the amount of movement of the centre of gravity position with respect to the fore and aft limits of the aircraft centre of gravity range.

2. Form Details

a. This form is headed with the following information:

1. Flight number
2. Aircraft registration
3. Date
4. Station of departure
5. Captain's name

2. Form Details (Cont'd.)

b. Late Load Adjustment-

These columns have been provided to assist the Agent in expediting flights out of originating stations or through intermediate stations. The columns headed "Late Load Adjustments" contains space for station designators, number and weight of passengers, baggage and cargo and for extra emplaning load or deplaning load for any reason. These weights are added to or deleted from the appropriate column under the Operational Weight Record section and such emplanements must not permit the total gross, or a llowable gross weight to exceed the allowable gross or maximum gross take-off weight. Apart from the addition or deletion of passengers and/or cargo to or from their respective manifests, this is the only calculation necessary to complete the Weight & Balance form.

c. Operational Weight Record-

This column contains the aircraft total empty weight, the weight of the additional crew, which when added gives the operational empty weight. To this is added the total load from Passengers & Cargo Manifest, plus the total fuel, which gives then the total gross weight. Subsequent entries in this column allows for late load adjustment to the total gross weight which is obtained from the columns on top which is headed Late Load Adjustment.

d. Total Empty Weight Index-

This boxed space is to be used for the total aircraft empty weight index.

e. Compartment Weight and Disposition-

This section of the manifest is reserved for the Agent to indicate the disposition by weight and station of the cargo loaded on the aircraft. The maximum allowable loads are shown in each line under this column for reference purposes.

f. Load Disposition Graph-

The graphic portion indicates and outlines the travel of the Centre of Gravity position with respect to the load boarded. Refer to page 17 outlining the manner in which the load is entered.

g. Preparation of Weight and Balance Manifests

1. Only authorized persons having completed a course of instruction in weight and balance procedure will prepare Weight and Balance Manifests.

2. A Weight and Balance Manifest shall be issued whenever the Captain on an aircraft, or the dispatcher sharing responsibility for the flight, shall deem it necessary. This is in addition to Passenger & Cargo Manifest.

3. The Weight and Balance Manifest shall be prepared in duplicate, the original copy will be given to the Captain and the duplicate copy will be retained by the station for inspection by representatives of the Department of Transport or authorized company personnel.

4. Persons issuing Weight and Balance Manifests or responsible for loading an aircraft, shall not exceed the maximum and minimum compartment loading schedules specified.

6. CONVERSION TABLES AND OPERATING DEFINITIONS

The following records are included in this manual to guide Operations personnel in the correct loading of all aircraft.

a. Standard Equipment

Standard equipment cover all items of removable equipment which are not included in the empty weight. These items of standard equipment may be removed from the aircraft and still leave the aircraft in an airworthy condition.

This is subject to variation due to season and route requirements.

b. Operation Definitions

In order to avoid misinterpretation of instructions the most important terms used in connection with aircraft loading are defined below:-

1. Empty Weight:- The weight of the aircraft corresponding to the scale weight for freighter version. For passenger version the weight of seats should be added.

2. Total Empty Weight:- Is the empty weight plus the weight of the passenger service equipment and crew members.

3. Maximum Gross Weight:- Is the total empty weight plus fuel, oil and useful load. It is the absolute maximum gross take-off weight permitted for a fully loaded aircraft. This weight shall not exceed 26,200 lbs. when carrying passengers, 26,900 lbs. with freight only.

4. Maximum Allowable Gross Weight:- Is the maximum gross weight authorized by Quebecair Inc., which will permit landing at the next station at the maximum allowable landing weight specified for the station.

5. Total Gross Weight:- Is the actual gross weight at take-off at any station.

6. Landing Weight:- Is the maximum permissible weight authorized for landing. This shall not exceed the landing weight shown on the Certificate of Airworthiness.

7. Useful Load:- Is the difference between the gross weight or allowable gross weight and the total empty weight plus fuel and oil. Useful Load - (Gross Weigth) - (Total Empty Weight + Fuel + Oil).

8. Overload:- Should the total empty weight plus fuel and oil and useful load exceed the gross weight or allowable gross weight then the difference is defined as an overload.

9. Centre of Gravity:- Is the point about which an aircraft would balance if suspended from that point.

10. Centre of Gravity Limits:- Are those limits specified on the Certificate of Airworthiness between which the centre of gravity must lie for each flight.

11. Fuel Weight:- The fuel weight is the weight of the total quantity of fuel on board at take-off.

8. CONVERSION TABLES AND OPERATING DEFINITIONS

FUEL WEIGHT TABLE

I. AVIATION GASOLINES 91/98 AND 100/130 OCTANE

IMP. GAL.	LBS.	IMP. GAL.	LBS.	IMP. GAL.	LBS.
1	7.2	10	72	100	720
2	14.4	20	144	200	1440
3	21.6	30	216	300	2160
4	28.8	40	288	400	2880
5	36.0	50	360	500	3600
6	43.2	60	432	600	4320
7	50.4	70	504	700	5040
8	57.6	80	576	800	5760
9	64.8	90	648	900	6480

II. ENGINE OIL GRADE 100

IMP. GAL.	LBS.	IMP. GAL.	LBS.
1	9	10	90
2	18	20	180
3	27	30	270
4	36	40	360
5	45	50	450
6	54	60	540
7	63	70	630
8	72	80	720
9	81	90	810

8. CONVERSION TABLES AND OPERATING DEFINITIONS (Cont'd.)

E. PASSENGER WEIGHT

I. The passenger weight is the weight of all passengers on board.

II. The passenger weight will be determined according to procedure laid out in D.O.T. Information Circulars 0/6/60 of September 2nd, 1960 and 0/43/62 of December 31st, 1962, which reads as follows:

a) Adult male ..... 165 lbs.
b) Adult female ..... 143 lbs.
c) Children 3-11 years inclusive ..... 77 lbs.
d) Infants ..... 22 lbs.

III. Under unusual circumstances all passengers may be weighed.

IV. Infants under three years of age are not to be considered passengers when carried on the knee of their escort. Their weight however should be calculated as stipulated in Paragraph II.

V. The weight of ALL PASSENGERS on a particular flight shall be determined in the same manner. DO NOT USE THE ACTUAL WEIGHT OF SOME PASSENGERS AND THE STANDARD WEIGHT FOR OTHER PASSENGERS ON THE SAME FLIGHT.

VI. PASSENGER WEIGHT TABLE

ADULT MALE	ADULT FEMALE	CHILDREN	INFANTS
1 - 165	1 - 143	1 - 77	1 - 22
2 - 330	2 - 286	2 - 154	2 - 44
3 - 495	3 - 429	3 - 231	3 - 66
4 - 660	4 - 572	4 - 308	4 - 88
5 - 825	5 - 715	5 - 385	5 - 110
6 - 990	6 - 858	6 - 462	6 - 132
7 - 1155	7 - 1001	7 - 539	7 - 154
8 - 1320	8 - 1144	8 - 616	8 - 176
9 - 1485	9 - 1287	9 - 693	9 - 198
10 - 1650	10 - 1430	10 - 770	10 - 220

8. CONVERSION TABLES AND OPERATING DEFINITIONS (Cont'd.)

F. CARGO

Cargo includes Baggage, Mail, Express, Freight and Company Material.

G. CREW BAGGAGE

Crew baggage shall not be weighed or shown on load manifest forms as it is included in the Standard Equipment Lists and computed into the total empty weight.

H. STANDARD WEIGHTS

Pilot	170 lbs.
Stewardess	143 lbs.
Passenger	(see page 24 of this chapter)
Fuel	7.2 lbs per Imp. Gal. 91/98 and 100/130
Oil	9.0 lbs per Imp. Gal.
Propeller and Windshield Anti-Icer Fluid	7.9 lbs per Imp. Gal.
Water	10.0 lbs per Imp. Gal.

8. CONVERSION TABLES AND OPERATING DEFINITIONS (Cont'd.)

1. EMERGENCY RATION KIT (Carried on charter flights off airways or approved routes)

ITEM	QUANTITY
Coffee	3 jars
Soda Crackers	1 box
Salt	2 lbs
Nestlé Quick Chocolate	2 lbs
Vitamine	60 pills
Oxo	4 boxes
Chocolate Baker	2 bars
Tea Bags	2 boxes
Candles	6 each
Sugar	4 lbs.
Barley	2 lbs.
Rice	3 lbs.
Matches	1 jar
Klim Powdered Milk	2 cans
Axe	1 each
Lily cups	1 box
Knives	3 each
Spoons	3 each
Forks	3 each
Pans (with handle)	2 each
Beardmore assorted dehydrated food	35 cans
Land & Sea Emergencies CAP361	1 book
Pocket Compass	1 each
Hook & Fishing line	1 each
Fishing net	1 each
Combination Knife	1 each
Net, Hooks and Weights	1 set
TOTAL WEIGHT (Emergency Ration Kit)	63 lbs.

DOUGLAS DC-3 - 28-PASSENGER AIRCRAFT

1. The following requirements are set by the Department of Transport for the operation of the Douglas DC-3 type 28-passenger aircraft equipped with Pratt & Whitney S1C3G engines.

Permissible Operating Weights

2. (1) The maximum take-off and landing weights for the DC-3 aircraft passenger version are 26,200 and 26,000 respectively, basis sea level. These weights vary with airport altitude, runway length, obstructions, and wind velocity.

   (2) For Cargo Operation only: The DC-3 Certificates of Airworthiness permit take-off and landing at 26,900 lbs. when no passengers are carried and the aircraft is utilized solely for cargo.

Permissible C.G. Range

3. Forward ..... 11% M.A.C.

   Rear ..... 28% M.A.C.

4. In order that the aircraft C.G. will remain within the prescribed limits, the following requirements must be met:

   (1) The cargo load consisting of mail, express, air cargo, passenger and crew baggage, and company material must be distributed as specified on Weight and Balance Manifest.

   (2) Passenger baggage shall be weighted.

   (3) The total number of passengers is limited to twenty-eight. Passengers may occupy any seat, except when specified on the Weight and Balance Manifest.

Passenger Loading

5. To facilitate compliance with the requirements of the Department of Transport, the following procedure outlined on page 24, will be followed to determine the weight of the passenger load.

CARGO LOADING

6. All cargo, including passenger and crew baggage, mail, express, air cargo and company material must be added and distribution determined by refering to that total cargo load for the appropriate number of passengers on board.

7. When cargo is carried in the cabin, it should be placed forward, position ahead of any passenger carried. The cargo should be well tied down and concealed by blankets or similars.

8. The total cargo load placed in any one compartment must not exceed the maximum capacity of that compartment.

9. The structural design of the DC-3 aircraft is such that the weight of cargo in the cargo compartments must not exceed 100 lbs. per square foot.

10. In the event of a shipment to be carried in any compartment weights in excess of the allowable lbs/sq. ft. of the case area for that compartment, the article must be erected in a manner which will increase the base area to a point were the above limitations are not exceeded. When a shipment weighing close to the permissible limit for its base area is loaded, care must be taken to ensure that additional cargo is not loaded on top of it to the point where the above restrictions are exceeded.

11. The cabin floor structure is much stronger than the cargo compartment, ones, but, it is recommended that the restrictions above mentioned should not be exceeded.

12. When heavy pieces of cargo are loaded they should be located between B & C Compartment for easier C.G. control. If the weight exceeds 100 lbs. per square foot, pieces of lumber should be placed underneath to distribute the load over wide flooring area.

13. Our system of securing loads in the cabin consists of tie-down rings with anchors that fit in gussets on the floor, each unit is tested for 500 pounds at 3 Gs.

14. When tying down a load a knot should be done every time the rope passes through the ring. This way, should any tie-down unit fails the rope will not loosen and the load will be held in place by the other units.

15. Considering the floor structure of Quebecair's DC-3s, the maximum capacity of cargo and cabin compartments are as follow:

(1) a) COMPT 1..... 1,300 lbs.

b) COMPT 11..... 400 lbs.

c) COMPT 111..... 950 lbs.

(2) CABIN COMPARTMENTS:

a) COMPT B ..... 3,000 lbs.

b) COMPT C ..... 4,500 lbs.

c) COMPT D ..... 2,700 lbs.

In dispatching the restrictions for structure and balance, whichever is the lowest should never be exceeded.

FUEL LOADING

1. (A) The maximum fuel tankage of DC-3 aircraft is as follows:

a) FRONT TANKS, each ..... 168 Imp. Gals.

b) REAR TANKS, each ..... 167 Imp. Gals.

(B) The minimum quantity of fuel with which it is permissible to dispatch the DC-3 aircraft is 150 Imperial gallons.

2. Under all conditions, each rear fuel tank must carry a minimum of 10 Imperial gals. of fuel for dispatch. The remainder of the fuel load must be distributed in the following order:

(a) Equally to both front tanks.
(b) Left rear tank, and
(c) Right rear tank

3. Provision is made to supply fuel to the package heater directly from the right tanks. Fuel consumed by the heater will average five Imp. Gallons per hour and therefore during climatic conditions when use of the heater is imminent, provision must be made to load the additional fuel on the basis of five gallons per hour of flight time.

4. Ten gallons of fuel (for taxiing and run-up) shall always be added to that required for the flight. This fuel will not be included in the dispatch weight of the aircraft.

FUEL LOADING (Cont'd.)

5. FLIGHT PLANNING MINIMUM FUEL

(1) For VFR flight planning minimum fuel requirement will be to destination plus one hour at cruising consumption.

(2) When flight planning IFR flights, the following equivalent quantities of fuel must be added to fuel consumed to destination:

a) Fuel for instrument approach at destination, whenever ceiling at the place of intendend landing is below minimum enroute altitude.

b) Fuel for climb and cruise to alternate.

c) One hour reserve fuel at cruise consumption.

d) Fuel for holding, if anticipated.

e) Fuel for detouring icing conditions, thunder storms etc., as required.

WEIGHT AND BALANCE DATA - INFORMATION

1. The following items have been incorporated in the Total Empty Weight and their effect on C.G. included in the Total Empty Weight Index:-

ITEM	WEIGHT	ARM	MOMENT
Pilots	340	74.0	25160
Stewardess	143	538.0	76934
Blankets/pillows	54	323.0	17442
Pilots' bags	50	90.0	4500
Stewardess bag	15	538.0	8070
Locks	8	548.0	4384
Oil	288	184.6	53165
Service Kit	40	520.0	20800
	938		210455

2. The amount of fuel aboard is given in pounds and inserted in the space provided for. The Company regulations call for a minimum of 150 gallons to dispatch a DC-3. In practice aircraft are never dispatched with less than 200 gallons, this was the reason for using this amount in computing C.G. and Index Number. However, the weight of this fuel is not included in the Total Empty Weight.

3. When an extra crew is carried on the observer seat, his weight should be included in the forward compartment cargo load.

WEIGHT AND BALANCE DATA

To be used in computing Weight & Balance Manifests

AIRCRAFT	TOTAL EMPTY WEIGHT	INDEX NUMBER	C.of G.	GROSS WEIGHT
QBB	(28 psgrs.) 19,862	0	251.8	26,200
QBC	(28 psgrs.) 19,835	+ 2	252.3	26,200
QBI	(28 psgrs.) 19,934	- 1	250.75	26,200
QBM	(28 psgrs.) 19,261	- 10	247.03	26,200
TDR	(28 psgrs.) 19,779	- 02	250.34	26,200
TDT	(28 psgrs.) 19,443	- 9	247.5	26,200
BZN	(Cargo/W). 17,888	- 10	246.85	26,900
	(Cargo/S) 18,929	- 17	243.7	26,900
	(28 psgrs/w)18,730	+ 5	253.5	26,200
	(28 psgrs/S)19,771	+ 2	252.29	26,200
ILZ	(Cargo/W) 18,303	- 18	243.34	26,900
	(Cargo/S) 19,344	- 20	242.76	26,900
	(28 psgrs/w)19,215	- 6	248.68	26,200
	(28 psgrs/S)20,256	- 8	247.85	26,200
GHQ	(Cargo/W) 18,548	- 14	245.1	26,900
	(20 psgrs/W)19,210	- 2	250.28	26,200

/W : Wheels /S : Skiis