
CONTENTS

INTRODUCTION	18.2
GENERAL	18.2
OPERATION	
BASIC EMPTY WEIGHT	18.2
PREPARATION OF THE WEIGHT AND BALANCE FORM	18.2
LIMITATIONS	18.2
DIAGRAMS	
DC-3 COMPARTMENT MOMENTS	18.3
N143D WEIGHT AND BALANCE WORKSHEET	18.4
N143D %MAC WORKSHEET AND ELEVATOR TRIM TABLE	18.5
N143D FORWARD AND AFT LIMITS	18.6

INTRODUCTION

Prior to flight, proper loading must be accomplished to ensure that:

- The aircraft is loaded within the approved center of gravity limits,
- Maximum operating weight limitations are not exceeded,
- Compartment maximum weights are not exceeded, and
- All cargo is properly secured.

This chapter provides a general overview of the DC-3 Weight and Balance calculations as well as normal operations and limitations.

GENERAL

BASIC EMPTY WEIGHT

The basic empty weight for this aircraft includes the empty weight of aircraft and all installed appliances.

***NOTE:** In accordance with FAR 125.1, the aircraft carries 220 Pounds of “justifiable aircraft equipment” located at Station 580.0. This additional equipment is defined as any equipment necessary for the operation of the airplane. It consists of support equipment, tie downs, a tow bar, tools, and additional fluids.*

OPERATION

DC-3 WEIGHT AND BALANCE

A Weight and Balance Form must be completed prior to takeoff for each flight. The DC-3 Weight and Balance will be prepared by the Pilot In Command or his designated agent before takeoff. Complete all entries and verify that all limitations have been complied with. An interactive Excel spreadsheet is available to facilitate these calculations at: www.TheAviatorNetwork.com.

AFT AND FWD LIMITS

The Aft and Forward CG limits can be calculated by using the following formulas:

$$\text{Aft CG Limit} = (0.263222 \times \text{GWT}) - 3$$

$$\text{Forward CG Limit} = (0.23955 \times \text{GWT}) + 31$$

The Aft and Forward CG limits table on page 18.6 provides quick reference information based on these formulae to ascertain whether a limit is being approached. To verify the actual limits, refer to the Performance Section of the DC3 AFM.

LIMITATIONS

This aircraft will be operated in conformance with Transport Category (SR-407) limitations as specified in Aircraft Specifications #A-669 as amended, and all applicable Federal Aviation Regulations.

STRUCTURAL WEIGHT LIMITS

Maximum Takeoff Weight 25,200 lbs.
Maximum Landing Weight 25,200 lbs.

GROSS TAKEOFF WEIGHT LIMITATIONS

The maximum allowable gross takeoff weight for each flight operated shall always be the lowest of the four following weight conditions:

- The aircraft structural weight limitations.
- The maximum allowable takeoff weight for the departure airport based on runway and climb performance data.
- The maximum allowable landing weight for the destination airport plus normal fuel and oil consumption from the point of departure to the destination.
- The maximum climb/ enroute weight that will permit at least the minimum rate of climb and enroute terrain clearance requirements as specified in the Performance Chapter of this manual.

BALANCE LIMITATIONS

C.G. limits (% MAC)

Fwd. C.G. limit 11.0%
Aft. C.G. limit 28.0%

Ballast Requirements

Ballast may be required on some flights in order to obtain an acceptable center of gravity. A 55 gallon plastic drum is carried in Compartment H (Station 580.0) and is not a part of the 220 Lbs of “justifiable aircraft equipment” as noted above. On flights where no cargo or payload is carried, it may be necessary to fill the plastic drum with water in order to provide adequate loading conditions.

Weight Limitations

<u>Condition</u>	<u>Weight</u>
Max. Takeoff	25,200 lbs
Max. Landing	25,200 lbs
Max. Compartment A	600 lbs
Max. Compartment B	800 lbs
Max. Compartment C	1,000 lbs
Max. Compartment D & E	3,000 lbs
Max. Compartment F	2,300 lbs
Max. Compartment G	1,300 lbs
Max. Compartment H	520 lbs

DC-3 Compartment Moments (x1000 ft.-lbs.) <Max. Compartment Wt.>								
Comp.	A <600>	B <800>	C <1000>	D <3000>	E <3000>	F <2300>	G <1300>	H <520>
WT. Arm	70	115	154	226	323	411	493	569
20	1	2	3	5	6	8	10	11
40	3	5	6	9	13	16	20	23
60	4	7	9	14	19	25	30	34
80	6	9	12	18	26	33	39	46
100	7	12	15	23	32	41	49	57
200	14	23	31	45	65	82	99	114
300	21	35	46	68	97	123	148	171
400	28	46	62	90	129	164	197	228
500	35	58	77	113	162	206	247	285
600	42	69	92	136	194	247	296	Max-520
700	Max-600	81	108	158	226	288	345	
800		92	123	181	258	329	394	
900		Max-800	139	203	291	370	444	
1000			154	226	323	411	493	
1100			Max-1000	249	355	452	542	
1200				271	388	493	592	
1300				294	420	534	641	
1400				316	452	575	Max-1300	
1500				339	485	617		
1600				362	517	658		
1700				384	549	699		
1800				407	581	740		
1900				429	614	781		
2000				452	646	822		
2100				475	678	863		
2200				497	711	904		
2300				520	743	945		
2400				542	775	Max-2300		
2500				565	808			
2600				588	840			
2700				610	872			
2800				633	904			
2900				655	937			
3000				678	969			
Max-3000				Max-3000	Max-3000			

N143D Weight & Balance Worksheet

Date: _____ From: _____ To: _____

Maximum Takeoff Weight: 25,200 Lbs.

	Weight (Lbs.)	X	Arm (Inches)	=	Moment (In.-Lbs.) (X 1000)
Basic Empty Weight	17,345.2	X	240.046	=	4,163.6
Additional Equipment	220.0	X	580.000	=	127.6
Crew		X	70.000	=	
Jump Seat Occupant		X	85.000	=	
Oil	435.0	X	184.000	=	80.0
Fuel (Mains) [6#/ Gal.]		X	245.000	=	
Fuel (Aux) [6#/ Gal.]		X	275.900	=	
Compartment A		X	70.000	=	
Compartment B		X	115.000	=	
Compartment C		X	154.000	=	
Compartment D		X	226.000	=	
Compartment E		X	323.000	=	
Compartment F		X	411.000	=	
Compartment G		X	493.000	=	
Compartment H		X	569.000	=	
TOTAL	_____ Lbs.			=	_____

<i>DC3 - % MAC Worksheet and Elevator Trim Table</i>
% MAC Formula: $\%MAC = ((\underline{X} * 17) / \underline{Y}) + 11$
Where: \underline{X} = (Actual Loaded Moment - Fwd. CG Limit), and \underline{Y} = (Aft CG Limit - Fwd. CG Limit).

<i>% MAC Worksheet</i>
Gross Takeoff Weight = _____ Actual Loaded Moment _____ Fwd. CG Limit (–) _____ \underline{X} (=) _____ Aft CG Limit _____ Fwd. CG Limit (–) _____ \underline{Y} (=) _____

<i>Elevator Trim Table</i>		
<u>CG</u>	<u>Elevator Trim</u>	
11	-4.0	ANU
12	-3.5	ANU
13	-3.0	ANU
14	-2.5	ANU
15	-2.0	ANU
16	-1.5	ANU
17	-1.0	ANU
18	-0.5	ANU
19	0.0	Balanced
20	0.5	AND
21	1.0	AND
22	1.5	AND
23	2.0	AND
24	2.5	AND
25	3.0	AND
26	3.5	AND
27	4.0	AND
28	4.5	AND

<i>% MAC Calculations</i>	
%MAC =	$((\underline{X} * 17) / \underline{Y}) + 11$
%MAC =	$((\underline{\hspace{1cm}} * 17) / \underline{\hspace{1cm}}) + 11$
%MAC =	$((\underline{\hspace{1cm}}) / \underline{\hspace{1cm}}) + 11$
%MAC =	$(\underline{\hspace{1cm}}) + 11$
%MAC =	_____

N143D Aft & Fwd. CG Limits						
GW	AFT	FWD		GW	AFT	FWD
18,100	4761	4367		22,000	5787	5302
18,200	4787	4391		22,100	5814	5326
18,300	4813	4415		22,200	5840	5350
18,400	4840	4439		22,300	5866	5373
18,500	4866	4463		22,400	5893	5397
18,600	4892	4487		22,500	5919	5421
18,700	4919	4511		22,600	5945	5445
18,800	4945	4535		22,700	5972	5469
18,900	4971	4559		22,800	5998	5493
19,000	4998	4583		22,900	6024	5517
19,100	5024	4607		23,000	6051	5541
19,200	5050	4631		23,100	6077	5565
19,300	5077	4655		23,200	6103	5589
19,400	5103	4679		23,300	6130	5613
19,500	5129	4703		23,400	6156	5637
19,600	5156	4727		23,500	6182	5661
19,700	5182	4751		23,600	6209	5685
19,800	5208	4775		23,700	6235	5709
19,900	5235	4799		23,800	6261	5733
20,000	5261	4822		23,900	6288	5757
20,100	5287	4846		24,000	6314	5781
20,200	5314	4870		24,100	6340	5805
20,300	5340	4894		24,200	6366	5829
20,400	5366	4918		24,300	6393	5853
20,500	5393	4942		24,400	6419	5877
20,600	5419	4966		24,500	6445	5900
20,700	5445	4990		24,600	6472	5924
20,800	5472	5014		24,700	6498	5948
20,900	5498	5038		24,800	6524	5972
21,000	5524	5062		24,900	6551	5996
21,100	5550	5086		25,000	6577	6020
21,200	5577	5110		25,100	6603	6044
21,300	5603	5134		25,200	6630	6068
21,400	5629	5158				
21,500	5656	5182				
21,600	5682	5206				
21,700	5708	5230				
21,800	5735	5254				
21,900	5761	5278				

Note: Refer to the DC3 AFM Performance Section for the actual Weight and Balance Operating Envelope.

———— End of Chapter ————