

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

May 22, 2020

Attachment 7 – Pilot Operating Handbook [Excerpt]

OPERATIONAL FACTORS

CEN20MA044



PA-31T

REFERENCE ONLY

THIS ELECTRONIC VERSION
OF THE POH IS
NOT APPROVED TO
REPLACE ANY OPERATING
INFORMATION REQUIRED
BY THE REGULATIONS.

**PILOT'S
OPERATING
HANDBOOK**

AND

**FAA APPROVED
AIRPLANE FLIGHT MANUAL**

AIRPLANE
SERIAL NO. _____

AIRPLANE
REGIST. NO. _____

PA-31T
REPORT: 2210 APPROVED BY: _____

DATE OF APPROVAL
SEPTEMBER 14, 1979

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~~D.O.A.~~ No. EA-1
PIPER AIRCRAFT CORPORATION
LOCK HAVEN, PENNSYLVANIA

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE FEDERAL AVIATION REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER AND CONSTITUTES THE FAA APPROVED AIRPLANE FLIGHT MANUAL. THIS HANDBOOK MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES.



**SECTION 1
GENERAL**

**PIPER AIRCRAFT CORPORATION
PA-31T, CHEYENNE**

1.9 OIL

- | | |
|--|--|
| (a) Oil Capacity (each engine) (U.S. gal.) | 2.3 |
| (b) Oil Specification | Refer to latest revision
of Pratt and Whitney
Service Bulletin No. 1001. |

1.11 MAXIMUM WEIGHTS

- | | |
|---|------|
| (a) Ramp Weight (lbs.) | 9050 |
| (b) Maximum Takeoff Weight (lbs.) | 9000 |
| (c) Maximum Landing Weight (lbs.) | 9000 |
| (d) Maximum Zero Fuel Weight (lbs.) | 7200 |
| (e) Maximum Weights in Baggage
Compartments (lbs.) | |
| (1) Forward | 300 |
| (2) Aft | 200 |

1.13 STANDARD AIRPLANE WEIGHTS*

- | | |
|---|------|
| (a) Standard Empty Weight (lbs.) | 5018 |
| (b) Maximum Useful Load (including
ramp fuel) (lbs.) | 4032 |

1.15 BAGGAGE SPACE

- | | |
|--|---------|
| (a) Compartment Volume (cu. ft.) | |
| (1) Forward | 20 |
| (2) Aft | 22 |
| (b) Forward Baggage Door Size
(in. wide x in. high) | 26 x 21 |
| (c) Cargo Door (if installed) | 17 x 30 |

1.17 SPECIFIC LOADINGS

- | | |
|-------------------------------------|------|
| (a) Wing Loading (lbs. per sq. ft.) | 39.3 |
| (b) Power Loading (lbs. per hp) | 7.26 |

*These values are approximate and vary from one aircraft to another. Refer to Figure 6-7 for the Standard Empty Weight value and the Useful Load value to be used for C.G. calculations for the aircraft specified.

(g) Inter Turbine Temperature	
Green Arc (Normal Operating Range)	500°C to 695°C
Radial Red Line (Maximum)	750°C
(h) Engine Torque	
Green Arc (Normal Operating Range)	0 to 1484 LB-FT
Radial Red Line	1484 LB-FT
Red Diamond	(2000 RPM Max.) 1628 LB-FT

2.13 WEIGHT LIMITS

(a) Maximum Ramp Weight	9050 LBS
(b) Maximum Takeoff Weight	9000 LBS
(c) Maximum Landing Weight	9000 LBS
(d) Maximum Zero Fuel Weight	7200 LBS
(e) Maximum Weights in Baggage Compartments	
Forward	300 LBS
Aft	200 LBS

NOTE

IT IS THE RESPONSIBILITY OF THE AIRPLANE OWNER AND PILOT TO ASSURE THAT THE AIRPLANE IS PROPERLY LOADED. MAXIMUM ALLOWABLE GROSS WEIGHT IS 9000 POUNDS. SEE "WEIGHT AND BALANCE SECTION" FOR LOADING INSTRUCTIONS.

When carrying 7 occupants, fuel or baggage may have to be relocated. Load front baggage compartment first and locate heaviest occupants forward.

When carrying 8 occupants, front baggage compartment must be loaded to bring C.G. limit within 138 inches rearward limit. Fuel must be reduced to keep total weight within 9000 lb. limit. Locate heaviest occupants forward.

**SECTION 2
LIMITATIONS**

**PIPER AIRCRAFT CORPORATION
PA-31T, CHEYENNE**

2.15 CENTER OF GRAVITY LIMITS (LANDING GEAR EXTENDED)

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
7170 or less	126.0	138.0
8500	129.6	138.0
9000 (Max. Flight and Landing)	131.9	138.0
9050 (Max. Ramp)	132.1	138.0

NOTES

Straight line variation between points indicated.

The Datum Line is located 137.0 inches forward of the wing main spar centerline.

2.17 MANEUVER LIMITS

This is a normal category airplane. No acrobatic maneuvers (including spins) approved.

2.19 FLIGHT MANEUVERING LOAD FACTOR LIMITS

(a) Positive Load Factor (Flaps Up)	3.36 G
(b) Negative Load Factor (Flaps Up)	-1.34 G
(c) Positive Load Factor (Flaps Down)	2.00 G

NOTE

No inverted maneuvers approved.

2.21 CREW LIMITS

Minimum Crew

One Pilot

**SECTION 2
LIMITATIONS**

**PIPER AIRCRAFT CORPORATION
PA-31T, CHEYENNE**

2.25 FUEL LIMITATIONS

(a) Fuel capacity when filled to tip tank fillers (U.S. gal.)	374
(b) Fuel capacity when filled to nacelle tank fillers (U.S. gal.)	336
(c) Unusable Fuel (total) (U.S. gal.)	8.0

2.27 MAXIMUM OPERATING ALTITUDE LIMIT

Maximum Approved Altitude	31,000 FT
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NOTE

In flight above 25,000 feet, oxygen masks must be connected to supply.

2.29 OUTSIDE AIR TEMPERATURE LIMITS

Aircraft shall not be operated when takeoff ambient temperature exceeds ISA + 37°C.

2.31 CABIN PRESSURIZATION LIMIT

Maximum Cabin Differential Pressure	5.5 +.1-.0 PSI
Maximum Cabin Altitude	11,140 FT

Do not land when airplane cabin is pressurized above .3 psi.

**SECTION 6
WEIGHT AND BALANCE**

6.1 GENERAL

In order to achieve the performance and flying characteristics which are designed into the airplane, it must be flown with the weight and center of gravity (C.G.) position within the approved operating range (envelope). Although the airplane offers flexibility of loading, when typically equipped it cannot be flown with the maximum number of adult passengers, full fuel tanks and maximum baggage. With the flexibility comes responsibility. The pilot must insure that the airplane is loaded within the loading envelope before takeoff, and that it stays within the loading envelope as fuel is consumed in flight..

Misloading carries consequences for any aircraft. An overloaded airplane will not take off, climb or cruise as well as a properly loaded one. The heavier the airplane is loaded, the less climb performance it will have.

Center of gravity is a determining factor in flight characteristics. If the C.G. is too far forward in any airplane, it may be difficult to rotate for takeoff or landing. If the C.G. is too far aft, the airplane may rotate prematurely on takeoff or tend to pitch up during climb. Longitudinal stability will be reduced. This can lead to inadvertent stalls and even spins; and spin recovery becomes more difficult as the center of gravity moves aft of the approved limit.

A properly loaded airplane, however, will perform as intended. Before the airplane is licensed, it is weighted, and a basic empty weight and C.G. location is computed (basic empty weight consists of the standard empty weight of the airplane plus the optional equipment). Using the basic empty weight and C.G. location, the pilot can easily determine the weight and C.G. position for the loaded airplane by computing the total weight and moment and then determining whether they are within the approved envelope.

6.7 GENERAL LOADING RECOMMENDATIONS

Load occupants from front to rear progressively and observe zero fuel weight limitations.

(a) 1 to 5 Occupants

Load rear baggage compartment to capacity first.

(b) 6 Occupants

Load front and rear baggage compartments equally.

(c) 7 Occupants

Load front baggage compartment first and locate heaviest occupants forward. Fuel or baggage may have to be reduced.

(d) 8 Occupants

Load front baggage compartment to bring C.G. within 138 inches rearward limit. Fuel must be reduced to keep the total weight within the 9050 lb. Ramp Weight limit. Locate heaviest occupants forward.

NOTE

These general loading recommendations suggest normal proper loading procedures. The charts, graphs, instructions, and plotter should be checked to assure that the airplane is within the allowable weight vs. center of gravity envelope.

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

(a) Add the weight of all items to be loaded to the Basic Empty Weight. Observe maximum zero fuel weight of 7200 pounds.

(b) Use the Loading Chart (Figure 6-15) to determine the moment of all items to be carried in the airplane.

(c) Add the moment of all items to be loaded to the Basic Empty Weight moment.

(d) Divide the total moment by the total weight to determine the C.G. location.

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
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- (e) By using the figures of item (a) and item (d) (above), locate a point on the Weight, Moment, and C.G. Limits graph(Figure 6-17). If the point falls within the C.G. envelope and the airplane's zero fuel weight does not exceed 7200 pounds, the loading meets the weight and balance requirements.
- (f) Location of the point on the Weight, Moment, and C.G. Limits graph indicates whether the airplane is slightly nose heavy or slightly tail heavy and can assist in setting pitch trim for takeoff.

IT IS THE RESPONSIBILITY OF THE PILOT AND AIRCRAFT
OWNER TO INSURE THAT THE AIRPLANE IS LOADED
PROPERLY.

OCCUPANTS

Weight Lbs.	Moment 100				
	Crew Seat Arm 119	Seats 3 & 4 Fwd Facing Arm 166	Seats 3 & 4 Aft Facing Arm 159	Seats 5 & 6 Arm 198	Seat 7 Arm 229
					Seat 8 Arm 242
120	143	199	191	238	275
130	155	216	207	257	298
140	167	232	223	277	321
150	179	249	239	297	344
160	190	266	254	317	366
170	202	282	270	337	389
180	214	299	286	356	412
190	226	315	302	376	435
200	238	332	318	396	458
					290
					315
					339
					363
					387
					411
					436
					460
					484

LOADING CHART
Figure 6-15

**SECTION 6
WEIGHT AND BALANCE**

**PIPER AIRCRAFT CORPORATION
PA-31T, CHEYENNE**

FUEL

Gal.	Weight Lbs.	Moment/100
50	335	445
100	670	893
150	1005	1361
200	1340	1844
250	1675	2320
300	2010	2782
336	2251	3113
350	2345	3243
366	2452	3391

8 gal. unusable fuel (54 lbs., 6804 in.-lbs.) included in basic empty weight.

LOADING CHART (cont)
Figure 6-15 (cont)

**REPORT: 2210
6-14**

**ISSUED: SEPTEMBER 14, 1979
REVISED: FEBRUARY 6, 1984**

BAGGAGE

Weight Lbs.	Fwd Arm = 30	Rear Arm = 255
	Moment/100	
10	3	26
20	6	51
30	9	77
40	12	102
50	15	128
60	18	153
70	21	179
80	24	204
90	27	230
100	30	255
110	33	281
120	36	306
130	39	332
140	42	357
150	45	383
160	48	408
170	51	434
180	54	459
190	57	485
200	60	510
210	63	
220	66	
230	69	
240	72	
250	75	
260	78	
270	81	
280	84	
290	87	
300	90	

LOADING CHART (cont)
Figure 6-15 (cont)