

SECTION 6

WEIGHT AND BALANCE

6.1 GENERAL

In order to achieve the performance and good 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, 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 he makes a takeoff.

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 weighed, 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.

The basic empty weight and C.G. location are recorded in the Weight and Balance Data Form (Figure 6-5) and the Weight and Balance Record (Figure 6-7). The current values should always be used. Whenever new equipment is added or any modification work is done, the mechanic responsible for the work is required to compute a new basic empty weight and C.G. position and to write these in the Aircraft Log Book and the Weight and Balance Record. The owner should make sure that it is done.

A weight and balance calculation is necessary in determining how much fuel or baggage can be boarded so as to keep within allowable limits. Check calculations prior to adding fuel to insure against overloading.

The following pages are forms used in weighing an airplane in production and in computing basic empty weight, C.G. position, and useful load. Note that the useful load includes usable fuel, baggage, cargo and passengers. Following this is the method for computing takeoff weight and C.G.

Run: 10/30/2014
11:19AM

MATHER AVIATION LLC (Van Nuys)
Aircraft Weight & Balance Report

Page:

Aircraft: N821ET

Type: PA-28R-201T

S/N: 28R-7703147

Model: PA-28R-201T

Prior Empty Weight: 1,877.1

As Of: 1/27/2012

Prior Useful Load:

1,022.9

Prior Longitudinal Moment: 159,816.2940

Arm: 85.1400

Items Removed:

Date	Description	Weight	Arm	Longitudinal Moment
10/30/2014	standby vacuum system	2.00	36.0000	72.0000
10/30/2014	Auto extend pitot mast	1.00	111.0000	111.0000
Total of Items Removed:		3.00		183.0000

New Final Figures:

Weight: 1,874.10

Useful Load: 1,025.90

Longitudinal Moment: 159,633.2940

Arm: 85.1786

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-28R-201T, CHEROKEE TURBO ARROW III

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight			
Pilot and Front Passenger		80.5	
Passengers (Rear Seats)		118.1	
Fuel (72 Gallon Maximum)		95.0	
Baggage		142.8	
Moment due to Retraction of Landing Gear			819
Total Loaded Airplane			

Totals must be within approved weight and C.G. limits. The Basic Empty Weight C.G. is noted on the Weight and Balance Data Form (Figure 6-5). If the airplane has been altered, refer to the Weight and Balance Record for this information.

NOTE

IT IS THE SOLE RESPONSIBILITY OF THE PILOT IN
COMMAND TO ENSURE THAT THE AIRPLANE IS
PROPERLY LOADED AND IS WITHIN THE ALLOWABLE
WEIGHT AND C.G. LIMITS.

WEIGHT AND BALANCE LOADING FORM

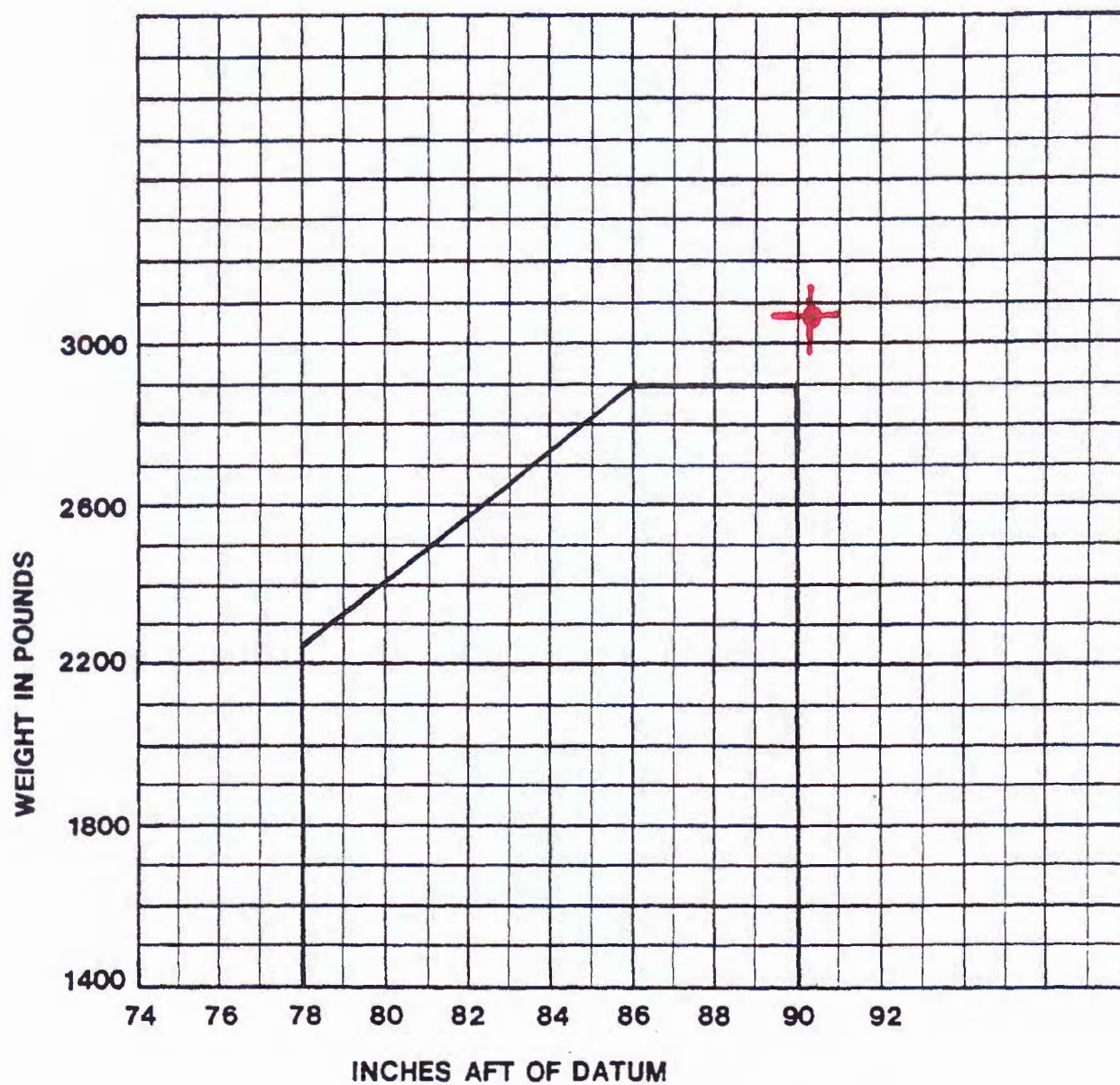
Figure 6-11

GENERAL WEIGHT AND BALANCE CHART

ITEM	WT. (LBS.)	ARM (IN.)	MOMENT (IN. LBS.)
BASIC AIRPLANE	1874.1	85.18	159633.21
PILOT'S SEAT	184.0	80.50	14812.00
COPILOT'S SEAT	264.0	80.50	21252.00
SEAT NO. 3	278.0	118.10	32831.80
SEAT NO. 4	0.0	118.10	0.00
SEAT NO. 5	0.0		0.00
SEAT NO. 6	0.0		0.00
SEAT NO. 7	0.0		0.00
SEAT NO. 8	0.0		0.00
FUEL GAL. (MAIN)	390.0	95.00	37050.00
FUEL GAL. (AUX)	0.0		0.00
BAGGAGE FORWARD	0.0		0.00
BAGGAGE AFT	88.0	142.80	12566.40
TOTAL WEIGHT <u>3078.1</u> CG <u>90.36</u> TOTAL MOMENT <u>278145.41</u>			

Maximum weight: 2900

CG; +78.0 to +90.0



Moment due to retracting landing gear = +819 in. lbs.

C. G. RANGE AND WEIGHT

Figure 6-15