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WEIGHT AND BALANCE

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**Equipment List (Form 240-0007)..... SUPPLIED WITH
AIRCRAFT

*For 1982 and preceding models only.

**For 1983 and subsequent models only.

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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, 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 ensure 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, 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 improper loading.

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.

6.3 AIRPLANE WEIGHING PROCEDURE

At the time of licensing, Piper Aircraft Corporation provides each airplane with the basic empty weight and center of gravity location. This data is supplied by Figure 6-5.

The removal or addition of equipment or airplane modifications can affect the basic empty weight and center of gravity. The following is a weighing procedure to determine this basic empty weight and center of gravity location:

- (a) Preparation
 - (1) Be certain that all items checked in the airplane equipment list are installed in the proper location in the airplane.
 - (2) Remove excessive dirt, grease, moisture, foreign items such as rags and tools from the airplane before weighing.
 - (3) Defuel airplane. Then open all fuel drains until all remaining fuel is drained. Operate engine on each tank until all undrainable fuel is used and engine stops. Then add the unusable fuel (2.0 gallons total, 1.0 gallons each wing).

CAUTION

Whenever the fuel system is completely drained and fuel is replenished it will be necessary to run the engine for a minimum of 3 minutes at 1000 RPM on each tank to ensure no air exists in the fuel supply lines.

- (4) Fill with oil to full capacity.
- (5) Place pilot and copilot seats in fourth (4th) notch, aft of forward position. Put flaps in the fully retracted position and all control surfaces in the neutral position. Tow bar should be in the proper location and all entrance and baggage doors closed.
- (6) Weigh the airplane inside a closed building to prevent errors in scale readings due to wind.

(b) Leveling

- (1) With airplane on scales, block main gear oleo pistons in the fully extended position.
- (2) Level airplane (refer to Figure 6-3) deflating nose wheel tire, to center bubble on level.

(c) Weighing - Airplane Basic Empty Weight

- (1) With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading.

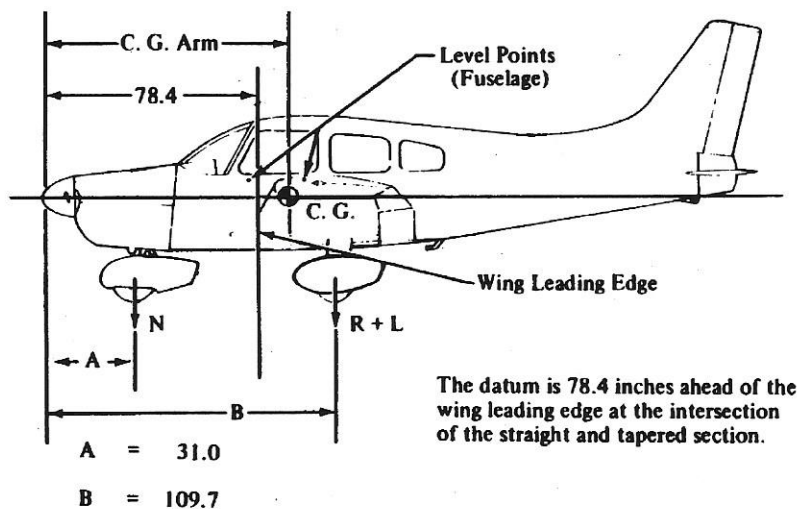
Scale Position and Symbol	Scale Reading	Tare	Net Weight
Nose Wheel (N)			
Right Main Wheel (R)			
Left Main Wheel (L)			
Basic Empty Weight, as Weighed (T)			

WEIGHING FORM

Figure 6-1

(d) Basic Empty Weight Center of Gravity

(1) The following geometry applies to the PA-28-181 airplane when it is level. Refer to Leveling paragraph 6.3 (b).



LEVELING DIAGRAM

Figure 6-3

- (2) The basic empty weight center of gravity (as weighed including optional equipment, full oil and unusable fuel) can be determined by the following formula:

$$\text{C.G. Arm} = \frac{N(A) + (R+L)(B)}{T} \quad \text{inches}$$

Where: $T = N + R + L$

6.5 WEIGHT AND BALANCE DATA AND RECORD

The Basic Empty Weight, Center of Gravity Location and Useful Load listed in Figure 6-5 are for the airplane as licensed at the factory. These figures apply only to the specific airplane serial number and registration number shown.

The basic empty weight of the airplane as licensed at the factory has been entered in the Weight and Balance Record (Figure 6-7). This form is provided to present the current status of the airplane basic empty weight and a complete history of previous modifications. Any change to the permanently installed equipment or modification which affects weight or moment must be entered in the Weight and Balance Record.

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-28-181, ARCHER II

MODEL PA-28-181 ARCHER II

Airplane Serial Number 2890141

Registration Number D-EKIN

Date 10/19/89

AIRPLANE BASIC EMPTY WEIGHT

Item	Weight (Lbs)	C.G. Arm (Inches Aft of Datum)	Moment (In-Lbs)
Standard Empty Weight* Computed ^{Actual}	<u>1451.6</u>	<u>95.0</u>	<u>123434</u>
Optional Equipment	<u>176.8</u>	<u>106.8</u>	<u>18891</u>
Basic Empty Weight	<u>1628.2</u>	<u>87.4</u>	<u>142315</u>

*The standard empty weight includes full oil capacity and 2.0 gallons of unusable fuel.

AIRPLANE USEFUL LOAD

(Ramp Weight) - (Basic Empty Weight) = Useful Load

Normal Category (2558 lbs) - (1628.2 lbs) = 929.8 lbs.

Utility Category (2138 lbs) - (1628.2 lbs) = 509.8 lbs.

THIS BASIC EMPTY WEIGHT, C.G. AND USEFUL LOAD ARE FOR THE AIRPLANE AS LICENSED AT THE FACTORY. REFER TO APPROPRIATE AIRCRAFT RECORD WHEN ALTERATIONS HAVE BEEN MADE.

PA-28-181	Serial Number 2890141	Registration Number			Page Number	
		Weight Change	Running Basic Empty Weight	Wt. (Lb.)	Moment 100	
Date	Item No.	Description of Article or Modification	Added (+) Removed (-)	Wt. (Lb.)	Arm (In.)	Moment 100
08/25/2017		As Licensed CHECK WEIGHT		1647.4		141992



WEIGHT AND BALANCE RECORD

Figure 6-7

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PA-28-181	Serial Number 2890141	Registration Number	Page Number	
			Running Basic Empty Weight	Moment / 100
Date	Item No.	Description of Article or Modification	Weight Change	
			Wt. (Lb.)	Moment / 100
		Added (+)	Removed (-)	
			Wt. (Lb.)	Moment / 100

WEIGHT AND BALANCE RECORD (cont)

Figure 6-7 (cont)

6.7 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

- (a) Add the weight of all items to be loaded to the basic empty weight.
- (b) Use the Loading Graph (Figure 6-13) 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.
- (e) By using the figures of item (a) and item (d) (above), locate a point on the C.G. range and weight graph (Figure 6-15). If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

	Weight (Lbs)	Arm Aft	
		Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	1590.0	87.5	139125
Pilot and Front Passenger	340.0	80.5	27370
Passengers (Rear Seats)*	340.0	118.1	40154
Fuel (48 Gallon Maximum)	288.0	95.0	27360
Baggage (200 Lbs. Maximum)*		142.8	
Ramp Weight (2558 Lbs. Normal, 2138 Lbs. Utility Maximum)	2558	91.5	234009
Fuel Allowance			
For Engine Start, Taxi and Run Up	-8	95.0	-760
Takeoff Weight (2550 Lbs. Normal, 2130 Lbs. Utility Maximum)	2550.0	91.5	233249

The center of gravity (C.G.) of this sample loading problem is at 91.5 inches aft of the datum line. Locate this point (91.5) on the C.G. range and weight graph. Since this point falls within the weight - C.G. envelope, this loading meets the weight and balance requirements.

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

*Utility Category Operation - No baggage or rear passengers allowed.

SAMPLE LOADING PROBLEM (NORMAL CATEGORY)

Figure 6-9

**SECTION 6
WEIGHT AND BALANCE**

**PIPER AIRCRAFT CORPORATION
PA-28-181, ARCHER II**

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight			
Pilot and Front Passenger		80.5	
Passengers (Rear Seats)*		118.1	
Fuel (48 Gallon Maximum)		95.0	
Baggage (200 Lbs. Maximum)*		142.8	
Ramp Weight (2558 Lbs. Normal, 2138 Lbs. Utility Maximum)			
Fuel Allowance For Engine Start, Taxi and Run Up	-8	95.0	-760
Takeoff Weight (2550 Lbs. Normal, 2130 Lbs. Utility Maximum)			

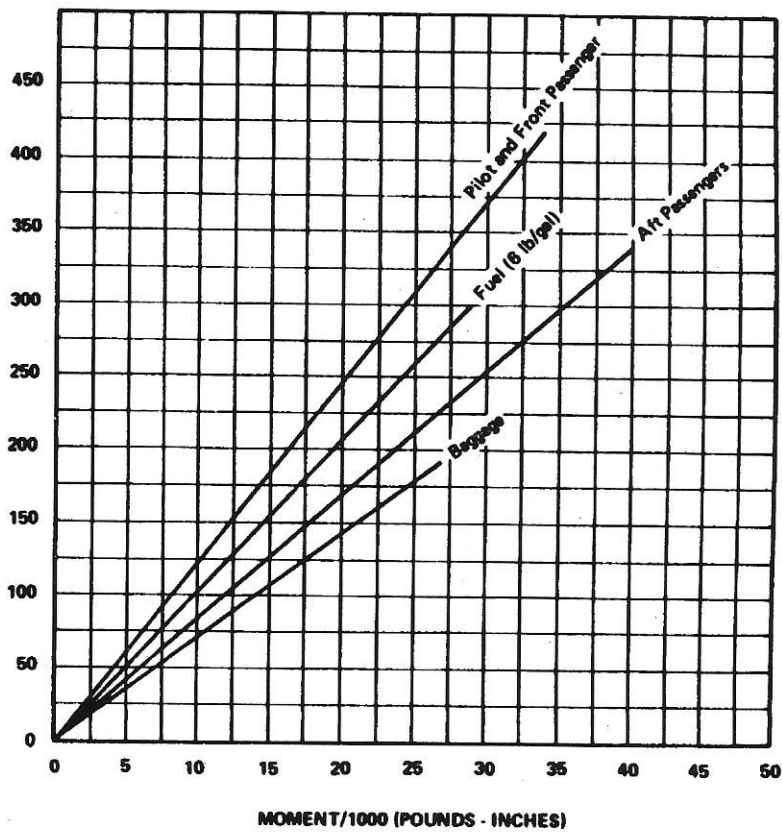
Totals must be within approved weight and C.G. limits. It is the responsibility of the airplane owner and the pilot to insure that the airplane is loaded properly. The Basic Empty Weight C.G. is noted on the Weight and Balance Data Form (Figure 6-5). If the airplane has been altered, refer to the Weight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

*Utility Category Operation - No baggage or rear passengers allowed.

WEIGHT AND BALANCE LOADING FORM
Figure 6-11

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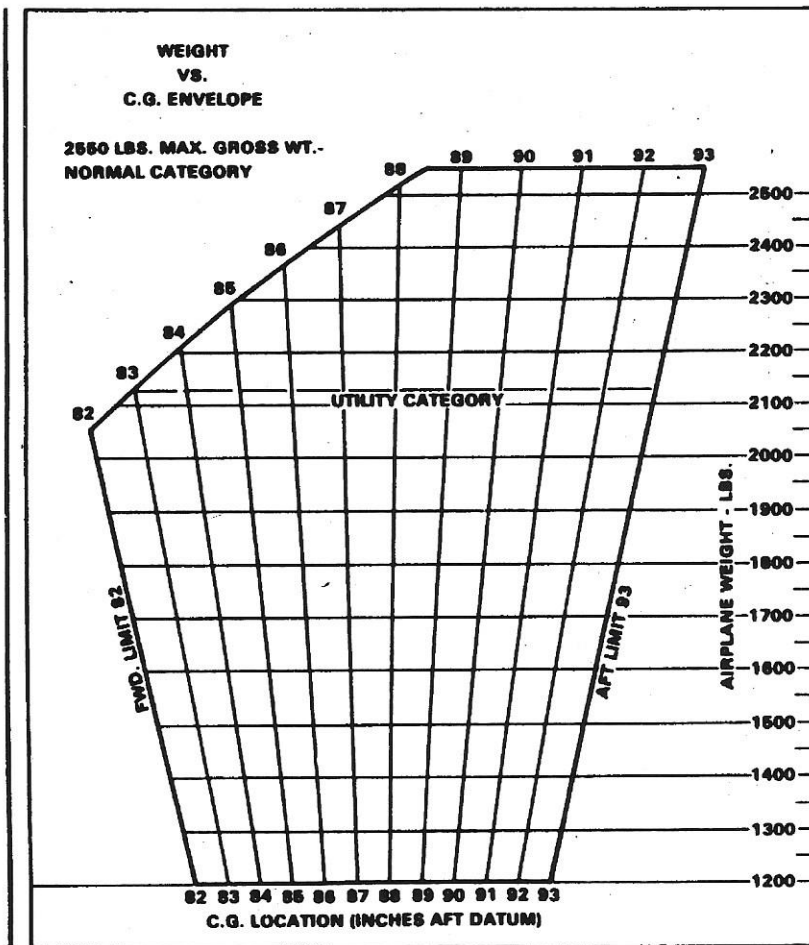
**ISSUED: JULY 2, 1979
REVISED: FEBRUARY 2, 1990**



LOADING GRAPH
Figure 6-13

ISSUED: JULY 2, 1979

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C.G. RANGE AND WEIGHT
Figure 6-15

6.9 INSTRUCTIONS FOR USING THE WEIGHT AND BALANCE PLOTTER

This plotter is provided to enable the pilot quickly and conveniently to:

- (a) Determine the total weight and C.G. position.
- (b) Decide how to change his load if his first loading is not within the allowable envelope.

Heat can warp or ruin the plotter if it is left in the sunlight. Replacement plotters may be purchased from Piper dealers and distributors.

The "Basic Empty Weight and Center of Gravity" location is taken from the Weight and Balance Form (Figure 6-5), the Weight and Balance Record (Figure 6-7) or the latest FAA major repair or alteration form.

The plotter enables the user to add weights and corresponding moments graphically. The effect of adding or disposing of useful load can easily be seen. The plotter does not cover the situation where cargo is loaded in locations other than on the seats or in the baggage compartments.

Brief instructions are given on the plotter itself. To use it, first plot a point on the grid to locate the basic weight and C.G. location. This can be put on more or less permanently because it will not change until airplane is modified. Next, position the zero weight end of any one of the loading slots over this point. Using a pencil, draw a line along the slot to the weight which will be carried in that location. Then position the zero weight end of the next slot over the end of this line and draw another line representing the weight which will be located in this second position. When all the loads have been drawn in this manner, the final end of the segmented line locates the total load and the C.G. position of the airplane for takeoff. If this point is not within the allowable envelope it will be necessary to remove fuel, baggage, or passengers and / or to rearrange baggage and passengers to get the final point to fall within the envelope

Fuel burn-off does not significantly affect the center of gravity.

SAMPLE PROBLEM

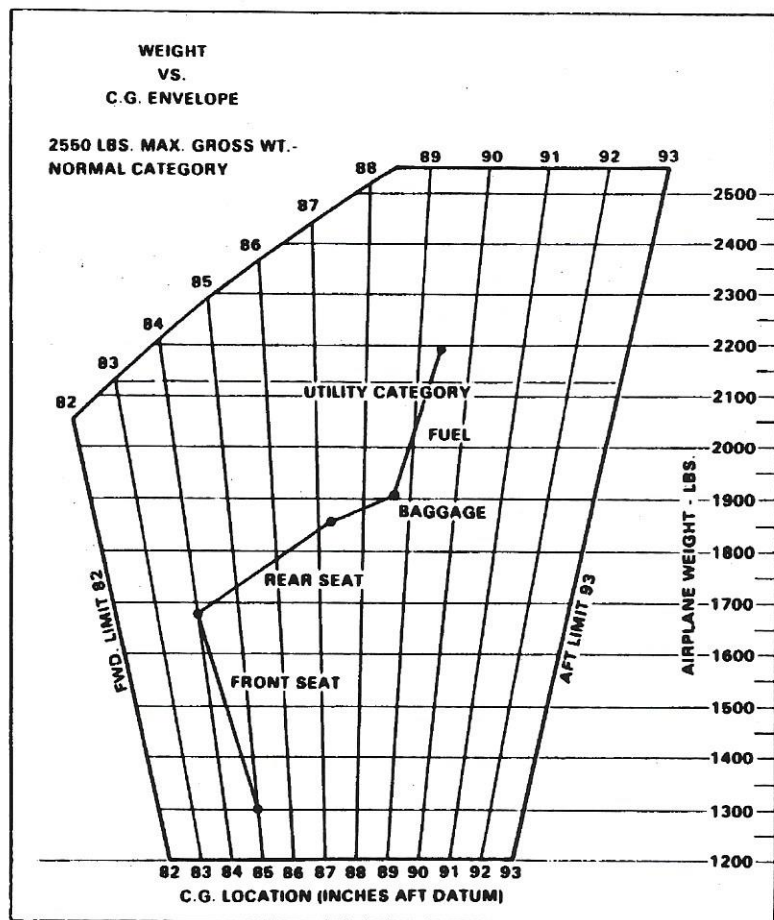
A sample problem will demonstrate the use of the weight and balance plotter.

Assume a basic weight and C.G. location of 1300 pounds at 85.00 inches respectively. We wish to carry a pilot and 3 passengers. Two men weighing 180 and 200 pounds will occupy the front seats, and two children weighing 80 and 100 pounds will ride in the rear. Two suitcases weighing 25 pounds and 20 pounds respectively, will be carried in the rear compartment. We wish to carry 48 gallons of fuel. Will we be within the safe envelope?

- (a) Place a dot on the plotter grid at 1300 pounds and 85.00 inches to represent the basic airplane. (See illustration Figure 6-17.)
- (b) Slide the slotted plastic into position so that the dot is under the slot for the forward seats, at zero weight.
- (c) Draw a line up the slot to the 380 pound position ($180 + 200$) and put a dot.
- (d) Continue moving the plastic and plotting points to account for weight in the rear seats ($80 + 100$), baggage compartment (45), and fuel tanks (288).
- (e) As can be seen from the illustration, the final dot shows the total weight to be 2193 pounds with the C.G. at 89.44. This is well within the envelope.

As fuel is burned off, the weight and C.G. will follow down the fuel line and stay within the envelope for landing.

SAMPLE PROBLEM



SAMPLE PROBLEM
 Figure 6-17

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6.11 EQUIPMENT LIST

The following is a list of equipment which may be installed in the PA-28-181. It consists of those items used for defining the configuration of an airplane when the basic empty weight is established at the time of licensing. Only those standard items which are alternate standard items and those required to be listed by the certifying authority (FAA) are presented. Items marked with an "X" are those items which were installed on the airplane described below when licensed by the manufacturer.

Where the letter "A," "B," or "C" precedes an item, "A" denotes an item which is required equipment that must be installed in the aircraft; "B" denotes an item which is required equipment that must be installed in the aircraft unless replaced by an optional equivalent item; "C" denotes an optional item which replaces a required item of standard equipment. Where no letter precedes an item, that item is not required equipment.

Unless otherwise indicated, the installation certification basis for the equipment included in this list is the aircraft's approved type design.

PIPER AIRCRAFT CORPORATION

PA-28-181, ARCHER II

SERIAL NO. 2890141

REGISTRATION NO. _____ DATE: _____

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(a) Propeller and Propeller Accessories

Item No.	Item	Mark If Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
1	A Propeller, Sensenich 76EM8S5-0-62, Piper Spec. PS50077-42 Cert. Basis - TC P4EA		34.5	3.8	131
3	Spinner Piper Dwg. 65805-0				
	A a. Bulkhead		1.9	8.6	16
	b. Dome		2.6	-0.3	-1

(D) Engine and Engine Accessories

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
11 A	Engine - Lycoming Model a. O-360-A4A Piper Dwg. 62941-17 Cert. Basis - TC 286 b. O-360-A4M Piper Dwg. 62941-16 Cert. Basis - TC E286	— —	285.0 281.0	20.9 20.9	5957 5873
13 A	Oil Filter a. Lycoming No. 75528 (AC #OF5578770) b. Lycoming No. LW-13743 (Champion CH-48110) Cert. Basis - TC E286	— —	3.3 2.8	35.5 35.5	117 99
15 B	Alternator - 60 Amp a. Chrysler 4111810 b. Prestolite ALY6408	— —	12.4 10.5	14.0 14.0	174 147
17 A	Engine Driven Fuel Pump Lycoming Dwg. 73297, 74082, 75148 or 75246 Cert. Basis - TC E286	—	1.7	36.3	62
19 A	Electric Fuel Pump Bendix Model 478360	—	1.8	36.8	66

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PA-28-181, ARCHER II

Item No.	Engine and Engine Accessories Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
21 A	Fuel Valve Piper Dwg. 66945 System Components Corp. P/N SP-2378-B3 or Allen Aircraft Products Inc. P/N 6S122		0.4	61.9	25
23 A	Oil Cooler, Piper Dwg. 18622 (Harrison P/N C-8526250) or (Niagara P/N N.D.M. 20002A)		1.9	41.3	78
25 A	Air Filter Fram Model CA-161 PL or Purolator AFP-2		0.9	29.5	27
27 A	Starter Lycoming No. 76211 (Prestolite MZ4206) Cert. Basis - TC E286		*18.0	14.5	261

* Included in engine weight.

Item No.	(c) Landing Gear and Brakes	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
35 A		Two Main Wheel Assemblies Piper Dwg. 63370-0 & -1 a. Cleveland Aircraft Products Wheel Assembly No. 40-86 Brake Assembly No. 30-55 Cert. Basis - TSO C26a b. Two Main 4-Ply Rating Tires 6.00-6 with Regular Tubes Cert. Basis - TSO C62		32.3	109.6	3540
37 A		One Nose Wheel a. Cleveland Aircraft Products Wheel Assembly No. 40-76B (Less Brake Drum) Cert. Basis - TSO C26a b. McCauley Industrial Corp. Wheel Assembly No. D-30625 Cert. Basis - TSO C26b c. One Nose Wheel 4-Ply Rating Tire 6.00-6 with Regular Tube Cert. Basis - TSO C62	— —	4.3 5.5 8.5	31.0 31.0 31.0	133 171 264

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-28-181, ARCHER II

(c) Landing Gear and Brakes (cont)						
Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)	
39 A	Handbrake Master Cylinder Piper Dwg. 65842 Cleveland Aircraft Products No. 10-22		0.6	60.9	37	
41 A	Toe Brake Cylinders					
	a. Cleveland Aircraft Product No. 10-27	---	0.7	53.0	37	
	b. Gar-Kenyon Instruments No. 17000	---	0.4	53.0	21	

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Item No.	Electrical Equipment Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
51 A	Voltage Regulator Piper Dwg. 68804-3		0.9	51.9	47
53 B	Battery Piper Dwg. 76454 (Rebat S-25)	—	21.9	168.0	3679
55 A	Starter Relay Piper Dwg. 99130-2 (RBM Controls P/N 111-111)		1.0	45.8	46
57 A	Overvoltage Relay Piper Dwg. 76454 (Wico X16799)		0.5	55.4	28
59 A	Stall Warning Device Piper Dwg. 76454 (Safe Flight P/N C52207-4)		0.2	80.2	16
61 A	Stall Warning Horn Piper Dwg. 76454 (Safe Flight P/N 35214)		0.2	58.8	12

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(e) Item No.	Instruments Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
69 B	Airspeed Indicator Piper Spec. PS50049-30S Cert. Basis - TSO C2b	—	0.6	61.8	37
71 B	Altimeter Piper Spec. PS50008-2 or -3 Cert. Basis - TSO C10b	—	1.1	60.9	67
73 A	Compass Cert. Basis - TSO C7c	✓	0.9	59.9	54
75 A	Tachometer Piper Dwg. 62177-14		0.7	61.2	43
77 A	Engine Cluster (Left) Piper Dwg. 95241-11		0.8	62.4	50
79 A	Engine Cluster (Right) Piper Dwg. 95241-14		0.8	62.4	50

(f) Item No.	Miscellaneous Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
85 A	Forward Seat Belts (2) Piper Spec. PS50039-4-2A American Safety Eqpt. Corp. 500576 Davis Acft. Prod. Inc. FDC-5900-120-5 (Black) Cert. Basis - TSO C22f		1.8	84.0	151
87 A	Rear Seat Belts (2) Piper Spec. PS50039-4-3 American Safety Eqpt. Corp. 449968 Davis Acft. Prod. Inc. FDC-5900-120-2 (Black) Cert. Basis - TSO C22f		1.6	123.0	197
89 B	Left Front Seat Piper Dwg. 79337-21	—	15.5	84.0	1302
91	Right Front Seat Piper Dwg. 79337-22	—	15.5	84.0	1302
93	Right Rear Seat Piper Dwg. 96827-23		14.5	123.0	1784

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PIPER AIRCRAFT CORPORATION
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Item No.	Miscellaneous (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
95	Left Rear Seat Piper Dwg. 96827-22		14.5	123.0	1784
97	A a. Shoulder Harness (2) (Front Seats Only) Piper PS50039 Pacific Scientific P/N 1107447-13, Black		1.4	119.5	167
	B b. Shoulder Harness - Fixed (Front) (2) Piper PS50039-4-23 American Safety Eqpt. Corp. 501385-407 Davis Acft. Prod. Inc. FDC-7275-16-4 (Black)	—	1.1	119.5	131
99	A Baggage Straps Piper Dwg. 66804-0 & 66805-0	—	1.3	142.8	186
101	Tow Bar Piper Dwg. 99458-0		1.3	156.0	203

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(g) Engine and Engine Accessories
 (Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
105	Carburetor Ice Detector Piper Dwg. 39684-2	—	0.5	59.7	30

(h) Propeller and Propeller Accessories
 (Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
----------	------	----------------	-----------------	---------------------	-----------------

(i) Landing Gear and Brakes (Optional Equipment)						
Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)	
125	Nose Wheel Fairing Piper Dwg. 37896-3	—	3.8	36.3	138	
127	Main Wheel Fairings Piper Dwg. 79893-2, -3	—	17.0	113.6	1931	

(i) Item No.	Electrical Equipment (Optional Equipment) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
135	Instrument Panel Lights Piper Dwg. 76454	—	0.3	62.8	19
137	Instrument Light, Grimes 15-0083-7 or Whelen A300-W-14	—	0.1	99.0	10
139	Cabin Light Piper Dwg. 95229	—	0.3	99.0	30
141	Landing Light, G.E. Model 4509	—	0.5	13.1	7
143	Navigation Lights (Wing) (2) Grimes Model A1285 (Red and Green)	—	0.4	106.6	43
145	Navigation Lights (Wing) (2) Red/ White & Green/ White With White Strobe Whelen Model A600	—	5.8	157.9	916

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WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-28-181, ARCHER II

(j)	Electrical Equipment (Optional Equipment) (cont)	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
147	Navigation Lights (Wing) (2) Red/White & Green/White With Red Strobe Whelen Model A600		—	5.8	157.9	916
149	Navigation Lights (Wing) (2) Red/White & Green/White Whelen Model A675		—	0.5	106.6	53
151	Navigation Light (Rear) (1) Grimes Model 2064 (White)		—	0.2	281.0	56
153	Rotating Beacon Whelen Eng. Co. P/N WRML-12 Piper Dwg. 63892 or 63518		—	1.5	263.4	395
155	Anti-Collision Lights (Wing Tip) (Whelen) Cert. Basis - STC SA800EA		—	5.7	157.9	900
157	Heated Pitot Head Piper Dwg. 69041-7		—	0.4	100.0	40

(j) Electrical Equipment (Optional Equipment) (cont)						
Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)	
159	Piper Pitch Trim Piper Dwg. 69378-3	—	4.7	145.6	684	
161 C	Battery 12V 35 A.H. Rebat R35 Piper Dwg. 76454	—	*6.5	168.0	1092	
163	Auxiliary Power Receptacle Piper Dwg. 68815	—	2.7	178.5	482	
165	External Power Cable Piper Dwg. 62355	—	4.6	142.8	657	
167	Lighter, #200462, 12 Volt Universal	—	0.2	62.9	13	

*Weight and moment difference between standard and optional equipment.

(k) Item No.	Instruments (Optional Equipment) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
181	Vacuum System Installation a. With Airborne Model 211cc Pump b. With Edo-Aire Model 1U128A Pump	—	4.5	39.1	176
183	Attitude Gyro Piper Dwg. 99002-2, -3, -4 or -8 Cert. Basis - TSO C4c	—	2.2	59.4	131
185	Directional Gyro Piper Dwg. 99003-2, -3, -4 or -7 Cert. Basis - TSO C5c	—	2.6	59.7	155
187 C	Tru-Speed Indicator Piper Spec. PS50049-30T Cert. Basis - TSO C2b	—	(same as standard equipment)		
189 C	Encoding Altimeter Piper PS50008-6 or -7 Cert. Basis - TSO C10b, C88	—	*0.9	60.3	54

*Weight and moment difference between standard and optional equipment.

(k) Item No.	Instruments (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
191	Altitude Digitizer (United Instruments P/N 5125-P3) Cert. Basis - TSO C88	—	1.0	51.5	52
193	Vertical Speed Piper Dwg. 99010-2, -4 or -5 Cert. Basis - TSO C8b	—	1.0	65.9	66
195	Alternate Static Source Piper Dwg. 35493	—	0.4	61.0	24
197	Turn and Slip Indicator Piper PS50030-2 or -3 Cert. Basis - TSO C3b	—	2.6	59.7	155
199	Exhaust Gas Temperature Piper Dwg. 99026	—	0.7	55.4	39
201	Engine Hour Meter Piper Dwg. 79548-0	—	0.3	61.2	18

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(k)	Item No.	Instruments (Optional Equipment) (cont)	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
	203	Clock		—	0.4	62.4	25
	204	Control Wheel Digital Clock Piper Dwg. 87347-3		—	0.3	71.9	22
	205	Air Temperature Gauge Piper Dwg. 99479-0 or -2		—	0.2	72.6	15
(l)		Autopilots (Optional Equipment)					
	Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)	
	215	AutoFlite II Piper Dwg. 99447 Cert. Basis - STC SA3066SW-D	—	5.6	91.8	514	
	217	AutoControl IIIB a. Omni Coupler, #IC388 Piper Dwg. 79221 Cert. Basis - STC SA3065SW-D	— — —	9.6 1.0	77.6 59.3	745 59	

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(l) Autopilots (Optional Equipment) (cont)						
Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)	
219	Autopilot - Century 21 Piper Dwg. 39726 Cert. Basis - STC SA3352SW	—	12.0	69.0	828	

(m) Radio Equipment (Optional Equipment)						
Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)	
227	Bendix - AS-2015A-7 or -9 Audio Panel	—	1.0	66.4	66	
229	Bendix - CN 2013-1 Com/Nav Cert. Basis - TSO C34c, C35d, C36c, C37b, C38b, C40a	—	7.5	61.4	461	

(m) Item No.	Radio Equipment (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
231	Bendix - CN 2013-2 Com/Nav w/G.S. Receiver Cert. Basis - TSO C34c, C35d, C36c, C37b, C38b, C40a	—	8.2	61.4	504
233	Bendix - CN 2013-4 Com/Nav w/G.S. Receiver & M.B. Receiver	—	8.5	61.4	522
235	Bendix - ADF 2070 Cert. Basis - TSO C41c, C2a	—	6.0*	105.0	630
237	Bendix - TR2060 Transponder Cert. Basis - TSO C74c	—	2.8*	63.6	178
239	Bendix - CN 2011 Dual Com/Nav Cert. Basis - TSO C34c, C35d, C37b, C40a	—	16.8	66.8	1122
241	Bendix - IN 2014B Indicator a. Single b. Dual Cert. Basis - TSO C36c, C40a, C66c	— — —	1.9 3.8	63.4 63.4	121 241

(m) Radio Equipment (Optional Equipment) (cont)							
Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)		
243	Bendix DME 2030 Cert. Basis - TSO C66a	—	10.3*	185.0	1906		
245	Collins VHF-250 or VHF-251 Comm Transceiver	—	4.0	56.9	228		
	a. Single	—	8.1	56.9	461		
	b. Dual Cert. Basis - TSO C37b, C38b	—					
247	Collins VIR-350 or VIR-351 Nav Receiver	—	3.9	57.4	224		
	a. Single	—	7.9	57.4	453		
	b. Dual Cert. Basis - TSO C40a, C36c	—					
249	Collins IND-350 () VOR/LOC Indicator	—	1.0	60.2	60		
	a. Single	—	2.0	60.2	120		
	b. Dual Cert. Basis - TSO C40a, C36c	—					

(m) Item No.	Radio Equipment (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
251	Collins IND-351 () VOR/LOC/GS Indicator Cert. Basis - TSO C40a, C36c	—	1.3	60.2	78
253	Collins GLS-350 Glide Slope Receiver Cert. Basis - TSO C34c	—	2.0	181.8	364
255	Collins DME-451 w/IND. 451/450 Cert. Basis - TSO C66a	—	8.0	174.9	1399
257	Collins DCE 400 Distance Computing Equipment Cert. Basis - TSO C40a	—	2.1	58.9	124
259	Collins RCR-650A ADF Receiver and Antenna and IND-650A Indicator Cert. Basis - TSO C41c	—	6.6	104.8	692

(m) Item No.	Radio Equipment (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
261	Collins AMR-350 Audio/Marker Panel Cert. Basis - TSO C35d, C50b	—	*3.3	110.0	363
263	Collins TDR-950 Transponder Cert. Basis - TSO C74c	—	**2.8	62.9	176
265	King - KN 53 Nav/Receiver	—	2.8	63.8	179
267	King - KN 53 Nav/Receiver w/G.S. Receiver	—			
	a. Single	—	3.1	63.8	198
	b. Dual	—	6.2	63.8	396

*Weight includes antenna and cable.

**Weight includes antenna.

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(m)	Radio Equipment (Optional Equipment) (cont)	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
268	King KX 155 VHF Comm/Nav Receiver					
	a. With Audio Amplifier			5.0	58.1	291
	b. With Glide Slope Receiver			5.3	58.1	308
	c. Without Glide Slope Receiver			4.8	58.1	279
	Cert. Basis - TSO C37b, C38b, C40a, C36a					
269	King KX 165 VHF Comm/Nav Receiver					
	a. With Glide Slope Receiver			5.7	58.0	331
	b. Without Glide Slope Receiver			5.1	58.1	296
	Cert. Basis - TSO C37b, C38b, C40a, C36a					
270	King KX 170() VHF Comm/Nav					
	a. Transceiver, Single			7.5	56.6	425
	b. Transceiver, Dual			15.0	56.6	849

(m)	Radio Equipment (Optional Equipment) (cont)	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
Item No.						
271	King KX 175() VHF a. Transceiver b. King KN 72 VOR/LOC Converter c. King KN 75 Glide Slope Receiver d. King KI-204 VOR/ILS Indicator Cert. Basis - TSO C36c, C37b, C38b, C40a		—	9.4	56.6	532
			—	1.3	183.6	239
			—	1.6	184.3	295
			—	1.7	60.5	103
273	King KX 175() VHF a. Transceiver (2nd) b. King KN 72 VOR/LOC Converter c. King KI-203 VOR/ILS Indicator Cert. Basis - TSO C36c, C37b, C38b, C40a		—	8.6	56.6	487
			—	1.3	183.6	239
			—	1.6	60.5	97

(m)	Radio Equipment (Optional Equipment) (cont)	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
274	King KY 196E Transceiver with RB 125 Power Booster	a. Single b. Dual Cert. Basis - TSO C37b, C38b	_____ _____ _____	5.7 11.4	77.0 77.0	439 878
275	King KY-197 Transceiver	Cert. Basis - TSO C37b, C38b	_____ _____	4.2 8.4	58.7 58.7	246 492
276	King KI 202 VOR/LOC Indicator	Cert. Basis - TSO C40a, C36c	_____	1.3	60.9	79
277	King KI 206 VOR/LOC Indicator	Cert. Basis - TSO C40a, C36c	_____	1.3	60.9	79
278	King KI 208 VOR/LOC Indicator	a. Single b. Dual Cert. Basis - TSO C34c, C36c, C40a	_____ _____ _____	1.0 2.0	59.6 59.9	60 120

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(m) Item No.	Radio Equipment (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
279	King KI 209 VOR/LOC/GS Indicator Cert. Basis - TSO C34c, C36c, C40a	—	1.2	59.9	72
281	King KN 62A DME	—	3.3	58.3	193
283	King KR 85 Digital ADF a. Audio Amplifier Cert. Basis - TSO C41b	— — —	8.6 0.8	85.2 51.0	733 41
285	King KR-85 ADF with KA-42B Loop and Sense Antenna a. Audio Amplifier Cert. Basis - TSO C41b	— — —	9.5 0.8	85.2 51.0	809 41
287	King KR 86 ADF a. First b. Second c. Audio Amplifier	— — — —	6.7 9.7 0.8	91.6 107.0 51.0	614 1038 41

(m)	Radio Equipment (Optional Equipment) (cont)	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
289	King KR-86 ADF with KA-42B Loop and Sense Antenna	a. First	_____	7.6	91.6	696
		b. Second	_____	10.6	107.0	1134
		c. Audio Amplifier	_____	0.8	51.0	41
291	King KR 87 ADF Receiver/ Indicator	a. Single	_____	4.0	59.0	236
		b. KA 44 Antenna (Single)	_____	2.8	147.4	413
		c. KA 44B Antenna (Single)	_____	3.6	150.6	542
		d. Audio Amplifier	_____	0.8	51.0	41
		Cert. Basis - TSO C41c				
293	King KMA 20() Audio Panel Cert. Basis - TSO C35c, C50b		_____	*3.7	70.8	262
295	King KMA-24 Audio Control Panel Cert. Basis - TSO C35d, C50b		_____	1.7	65.3	111

*Weight includes antenna and cable.

Item No.	Radio Equipment (Optional Equipment) (cont)	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-in.)
297	King KT 76()/78() Transponder Cert. Basis - TSO C74b		_____	*3.1	58.1	180
299	King KRA-10 Radio Altimeter		_____	4.3	162.6	699
301	Narco Comm 120 VHF Transceiver		_____			
	a. Single		_____	4.8	56.9	273
	b. Dual		_____	8.6	57.4	494
	Cert. Basis - TSO C37b, C38b					
303	Narco Nav 121 VHF Receiver		_____			
	a. Single		_____	3.1	58.4	181
	b. Dual		_____	6.2	58.4	362
	Cert. Basis - TSO C36c, C40c, C66a					
305	Narco Nav 122 VHF Receiver		_____			
	a. Single		_____	*5.1	99.4	507
	b. Dual		_____	*8.6	82.9	713
	Cert. Basis - TSO C35d, C36c, C40c, C66a					

*Weight includes marker antenna and cable.

(m)	Radio Equipment (Optional Equipment) (cont)	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
307	Narco Nav 122A VHF Receiver a. Single b. Dual Cert. Basis - TSO C34c, C35d, C36c, C40c, C66a	=====	*5.2 *8.8	98.5 82.2	512 723	
309	Narco Nav 124A VHF Receiver a. Single b. Dual Cert. Basis - TSO C35d, C36c, C40a, C66a	=====	*6.2 *10.9	92.3 77.2	572 841	
311	Narco ID 124 VOR/LOC/GS Indicator a. Single b. Dual Cert. Basis - TSO C34c, C35d, C36c, C40c	=====	1.2 2.4	60.5 60.5	73 145	

*Weight includes marker antenna and cable.

(m) Item No.	Radio Equipment (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
313	Narco UGR-2A Glide Slope a. Single b. Dual Cert. Basis - TSO C34b	— — —	4.2 8.4	154.0 220.0	647 1848
315	Narco CP-135 Audio Selector Panel Cert. Basis - TSO C50b	—	2.2	55.0	121
317	Narco CP-135M Audio Selector Panel Cert. Basis - TSO C50b, C35d	—	*3.7	114.3	423
319	Narco DME-190 TSO Cert. Basis - TSO C66a	—	**5.9	60.9	359
321	Narco DME-195 Receiver and Indicator Cert. Basis - TSO C66a	—	**13.2	154.5	2039
323	Narco ADF-141 a. Single b. Dual Cert. Basis - TSO C41c	— — —	6.0 *17.9	91.2 107.6	547 1926

*Weight includes dual antenna and cable.
**Weight includes antenna and cable.

Item No.	Radio Equipment (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
325	Narco AT-150 Transponder Cert. Basis - TSO C74c a. Narco AR-500 Altitude Encoder Cert. Basis - TSO C88	_____	**3.0	57.3	172
327	Antenna and Cable a. Nav Receiving VRP-37 or AV-12PPR b. #1 VHF Comm PS50040-18 c. #2 VHF Comm PS50040-18 d. ADF Sense STD-99841 e. ADF Sense All Weather 79160	_____ _____ _____ _____ _____	1.4 1.4 1.5 0.4 0.5	195.7 144.3 170.7 150.0 147.5	274 202 256 60 74
328	Marker Beacon Antenna Piper PS50040-15 King KA-23 or Narco VMA-15 or Comtant CI-102	_____			
329	Marker Beacon Antenna Comtant CI-102 Piper Dwg. 39737-4	_____	*1.2	175.0	210

Included as part of marker beacon installation

*Includes antenna coax wire to marker beacon receiver.
**Weight includes antenna and cable.

(m) Item No.	Radio Equipment (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
330	Emergency Locator Transmitter (Narco Model ELT-10)	—	3.5	236.2	827
	a. Antenna and Coax	—	0.3	224.4	67
	b. Shelf and Access Hole	—	0.5	235.4	118
331	Microphone	—	0.3	64.9	19
	a. Piper Dwg. 68856-10	—	0.6	69.9	42
	b. Piper Dwg. 68856-11	—	0.3	64.9	19
333	Boom Microphone - Headset Piper Dwg. 37921-2	—	0.3	80.5	24
	Cabin Speaker Piper Dwg. 99220	—	1.1	99.0	109
337	Headset Piper Dwg. 68856-10	—	0.5	60.0	30

(n) Item No.	Miscellaneous (Optional Equipment) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
405	Zinc Chromate Finish Piper Dwg. 79700-2	—	5.0	158.0	790
407	Stainless Steel Control Cables Piper Dwg. 79700	—	—	—	—
409	Air Conditioner Piper Dwg. 99575-3	—	68.3	103.6	7076
411	Overhead Vent System Piper Dwg. 79853-2	—	5.7	148.9	849
413	Overhead Vent System with Ground Ventilating Blower Piper Dwg. 79853-3	—	14.2	168.5	2393
415	Assist Step Piper Dwg. 65384	—	1.8	156.0	281
417	Super Cabin Sound Proofing Piper Dwg. 79601-3	—	18.1	86.8	1571

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(n) Item No.	Miscellaneous (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb.-In.)
419 C	Adjustable Front Seat (Left) Piper Dwg. 79591-0 79591-2	_____	*6.6	80.7	533
421	Adjustable Front Seat (Right) Piper Dwg. 79591-1 79591-3	_____	*6.8	80.0	544
423	Headrests (2) Front Piper Dwg. 79337-18	_____	2.2	94.5	208
425	Headrests (2) Rear Piper Dwg. 79337-18	_____	2.2	132.1	291
427	Inertia Safety Belts (Rear) (2) 0.8 lbs. each Piper PS50039-4-14 Pacific Scientific 1107319-01 American Safety Eqpt. Corp. 500853-401 (Black)	_____	1.6	140.3	224
429 C	Shoulder Harness - Inertia (Front) (2) Piper PS50039-4-20 Pacific Scientific 1107447-13 (Black)	_____	1.3	119.5	155

*Weight and moment difference between standard and optional equipment.

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Item No.	Miscellaneous (Optional Equipment) (cont)	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
431	Shoulder Harness - Fixed (Rear 2) Piper PS50039-4-22 American Safety Eqpt Corp. 501385-403 Davis Act. Prod. Inc. FDC-7275-16-2 (Black)		—	1.1	140.3	154
433	Shoulder Harness - Inertia (Rear) (2) Piper PS50039-4-19 Pacific Scientific 1107447-01 (Black)		—	1.3	140.3	182
435	Assist Strap Piper Dwg. 79455		—	0.2	109.5	22
437	Curtain and Rod Installation Piper Dwg. 67955-2		—	4.2	124.0	521
439	Luxurious Interior Piper Dwg. 67952-5		—	*17.0	101.9	1732
441	Deluxe Carpeting Piper Dwg. 66801		—	*2.8	101.9	285

*Weight and moment difference between standard and optional equipment.

Item No.	Miscellaneous (Optional Equipment) (cont) Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
443	Fire Extinguisher a. Piper Dwg. 76167-2, Scott 42211-00 b. Piper Dwg. 37872-2, Graviner HA1014-01	—	4.6	71.0	327
445	Locking Gas Cap Piper Dwg. 39830-2	—	*0.1	94.1	9

*Weight and moment difference between standard and optional equipment.

TOTAL OPTIONAL EQUIPMENT