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WEIGHT AND BALANCE

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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 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 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.

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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.

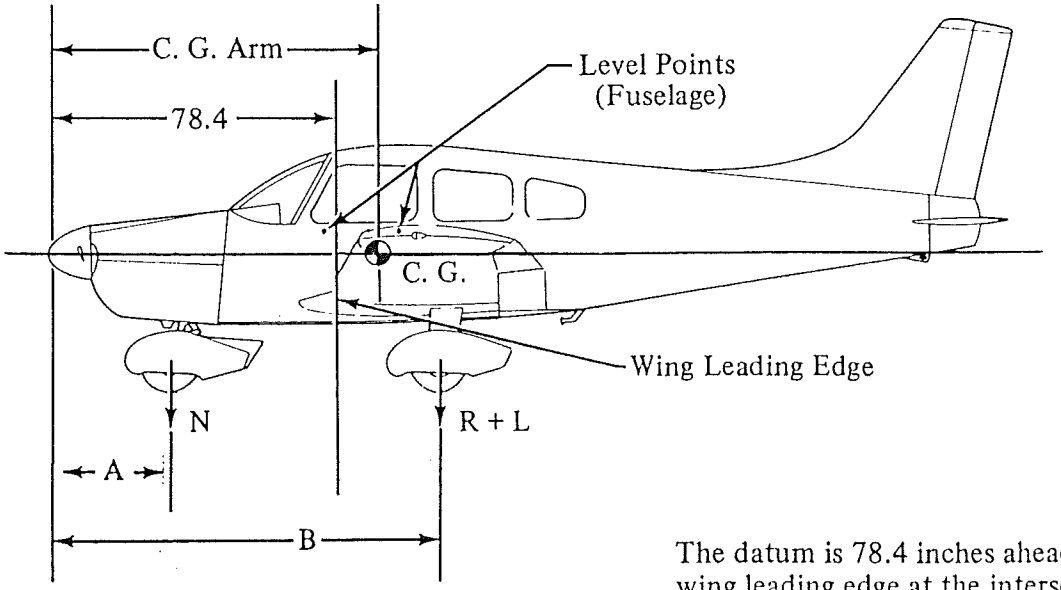
Scale Position and Symbol	Scale Reading	Tare	Net Weight
Nose Wheel (N)			
Right Main Wheel (R)			
Left Main Wheel (L)			
Basic Empty Weight, as Weighed (T)	–	–	

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).



The datum is 78.4 inches ahead of the wing leading edge at the intersection of the straight and tapered section.

A = 31.0

B = 109.7

LEVELING DIAGRAM

Figure 6-3

') 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.

MODEL PA-28-181 CHEROKEE ARCHER II

Airplane Serial Number _____

Registration Number _____

Date _____

AIRPLANE BASIC EMPTY WEIGHT

Item		Weight (Lbs)	x	C. G. Arm (Inches Aft of Datum)	=	Moment (In-Lbs)
Standard Empty Weight*	Actual / Computed					
Optional Equipment						
Basic Empty Weight						

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

AIRPLANE USEFUL LOAD

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

Normal Category (2550 lbs) - (lbs) = lbs.

Utility Category (2130 lbs) - (lbs) = 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.

WEIGHT AND BALANCE DATA FORM

Figure 6-5

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

WEIGHT AND BALANCE RECORD

Figure 6-7

PA-28-181			Serial Number	Registration Number					Page Number		
Date	Item No.		Description of Article or Modification	Weight Change						Running Basic Empty Weight	
				Added (+)			Removed (-)				
	In	Out		Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Arm (In.)	Moment /100	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			
Pilot and Front Passenger	340.0	80.5	27370
Passengers (Rear Seats)*	340.0	118.1	40154
Fuel (48 Gallon Maximum)		95.0	
Baggage*		142.8	
Total Loaded Airplane			

The center of gravity (C.G.) of this sample loading problem is at inches aft of the datum line. Locate this point ( ) 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 INSURE THAT THE AIRPLANE IS LOADED PROPERLY.

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

SAMPLE LOADING PROBLEM (NORMAL CATEGORY)

Figure 6-9

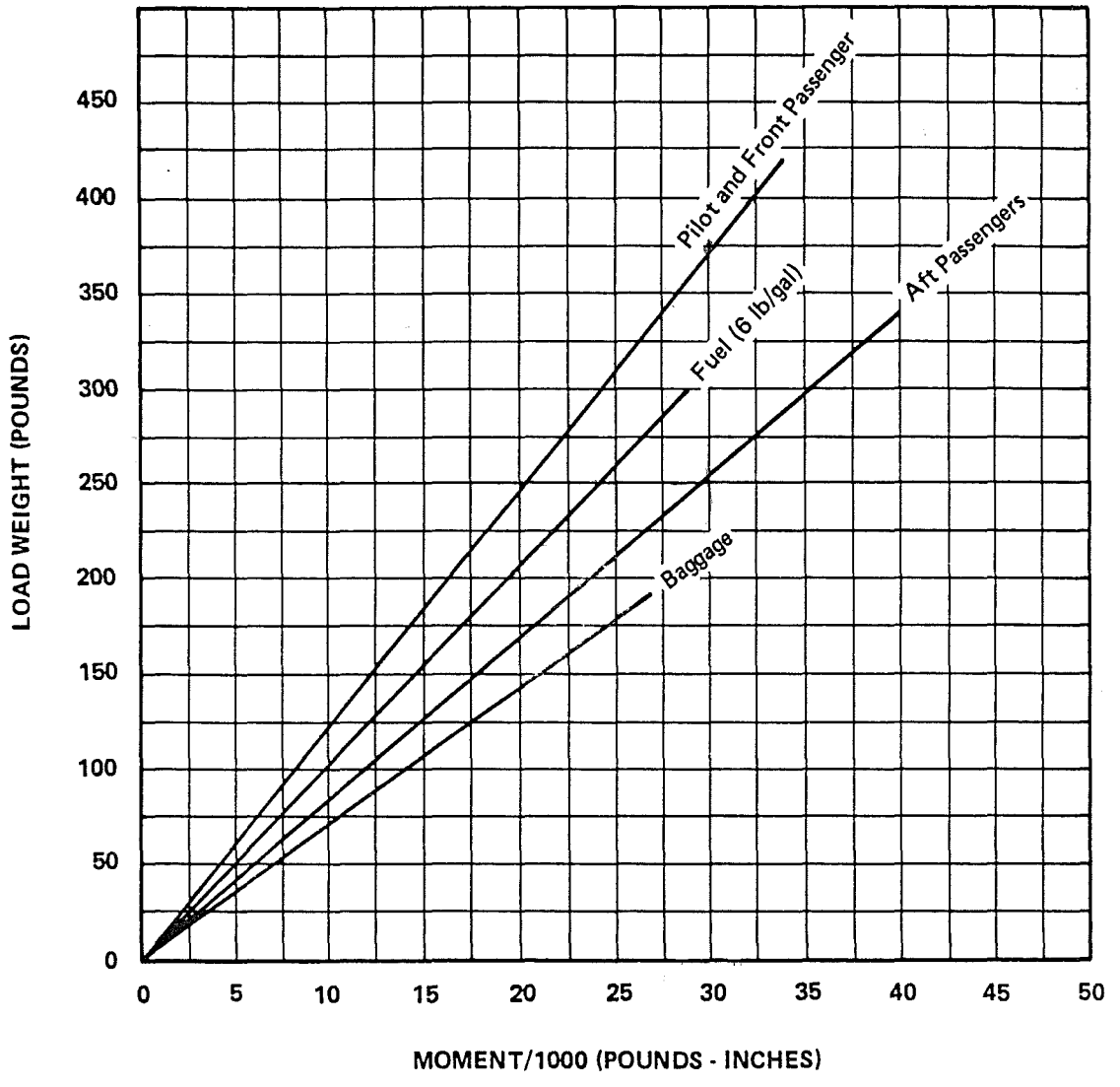
	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight			
Pilot and Front Passenger		80.5	
Passengers (Rear Seats)*		118.1	
Fuel (48 Gallon Maximum)		95.0	
Baggage*		142.8	
Total Loaded Airplane			

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.

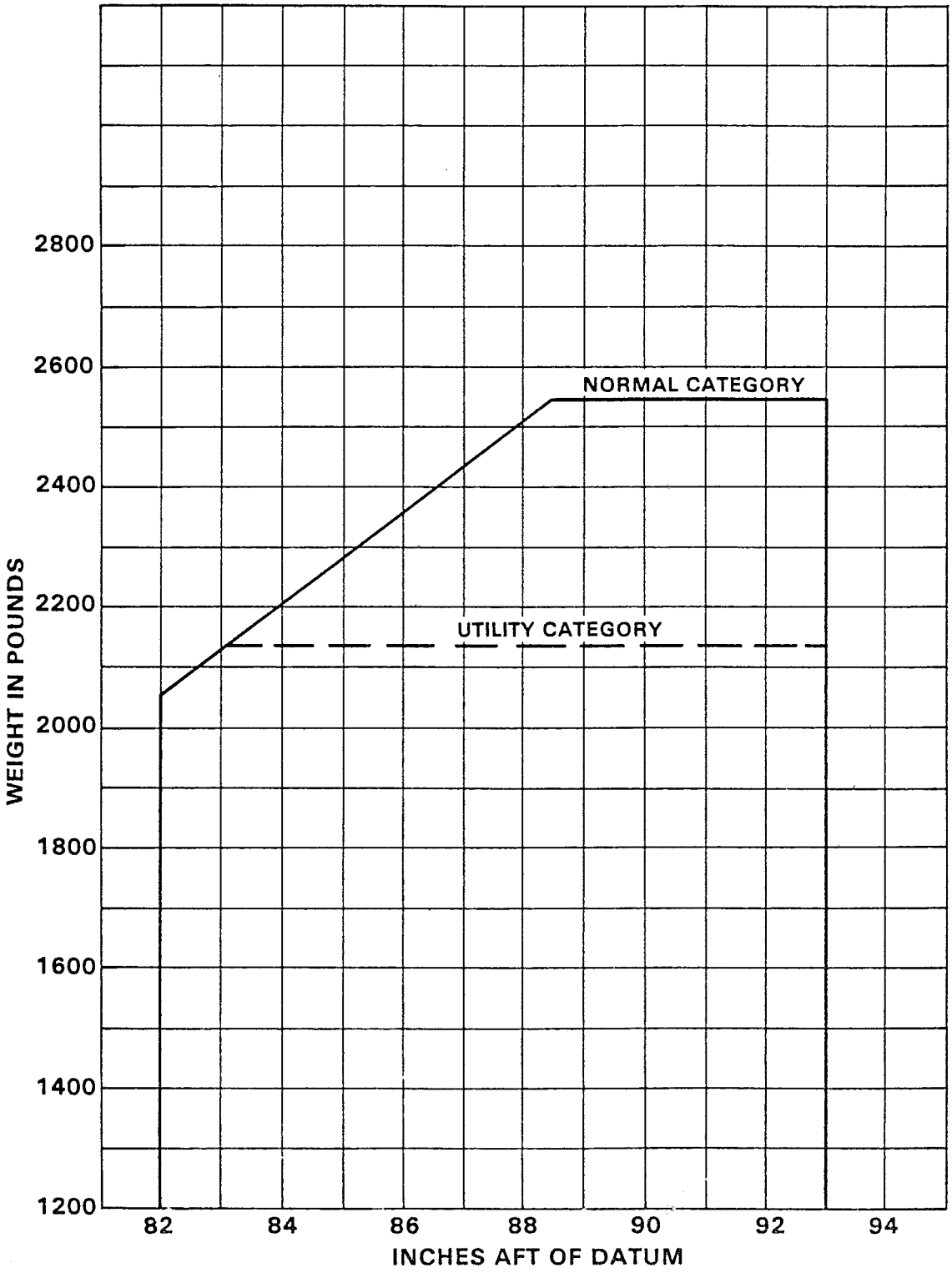
WEIGHT AND BALANCE LOADING FORM

Figure 6-11



LOADING GRAPH

Figure 6-13



C. G. RANGE AND WEIGHT

Figure 6-15

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6.9 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 certificating authority (FAA) are presented. Items marked with an "X" are those items which were installed on the airplane described below as delivered by the manufacturer.

PIPER AIRCRAFT CORPORATION PA-28-181 CHEROKEE ARCHER II

SERIAL NO. _____ REGISTRATION NO. _____ DATE: _____

(a) Propeller and Propeller Accessories

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
1	Propeller, Sensenich 76EM8S5-0-60, Piper Spec. PS50077-8 Cert. Basis - TC P4EA				
3	Propeller, Sensenich 76EM8S5-0-62, Piper Spec. PS50077-42 Cert. Basis - TC P4EA				

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(b) Engine and Engine Accessories

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
11	Engine				
	a. Piper Dwg. 62941-16 Lycoming Model O-360-A4M Cert. Basis - TC E286	_____	281.0	20.9	5873
	b. Piper Dwg. 62941-17 Lycoming Model O-360-A4A Cert. Basis - TC 286	_____	285.0	20.9	5957
13	Oil Filter - Lycoming No. 75528 (AC #OF5578770) Cert. Basis - TC E286	_____	3.3	35.5	117
15	Oil Filter - Lycoming #LW-13743 (Champion #CH-48110) Cert. Basis - TC E286	_____	2.8	35.5	99
17	Alternator 60 Amp.				
	a. Chrysler 3656624	_____	12.4	14.0	174
	b. Chrysler 4111810	_____	13.5	14.0	189

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(c) Landing Gear and Brakes

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
27	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				
29	One Nose Wheel a. Cleveland Aircraft Products Wheel Assembly No. 40-76B (Less Brake Drum) Cert Basis - TSO C26a	_____	4.3	31.0	133
	b. McCauley Industrial Corp. Wheel Assy. No. D-30625 Cert. Basis - TSO C26b	_____	5.5	31.0	171
	c. One Nose Wheel 4-Ply Rating Tire 6.00-6 with Regular Tube Cert. Basis - TSO C62				

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(d) Electrical Equipment

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

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(e) Instruments

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
53	Airspeed Indicator, Piper Spec. PS50049-30S Cert. Basis - TSO C2b				
55	Altimeter, Piper Spec. PS50008-2 or -3 Cert. Basis - TSO C10b				
57	Compass Cert. Basis - TSO C7c				

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(f) Miscellaneous

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
65	Forward Seat Belts (2) Piper Spec. PS50039-4-2A Cert. Basis - TSO C22f				
67	Rear Seat Belts (2) Piper Spec. PS50039-4-3 Cert. Basis - TSO C22f				

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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.)

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(h) Propeller and Propeller Accessories (Optional Equipment)

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

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(i) Landing Gear and Brakes
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
73	Nose Wheel Fairing Piper Dwg. 65348-2 Cert. Basis - TC 2A13	_____	3.6	36.3	131
74	Main Wheel Fairings Piper Dwg. 65237 Cert. Basis - TC 2A13	_____	7.6	113.6	863
75	Nose Wheel Fairing Piper Dwg. 37896-3 Cert. Basis - TC 2A13	_____	10.3	36.3	374
76	Main Wheel Fairings Piper Dwg. 37885-2, -3 Cert. Basis - TC 2A13	_____	20.6	113.6	2340
77	Nose Wheel Fairing Piper Dwg. 37896-3 Cert. Basis - TC 2A13	_____	3.8	36.3	138
78	Main Wheel Fairings Piper Dwg. 79893-2, -3 Cert. Basis - TC 2A13	_____	17.0	113.6	1931

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(j) Electrical Equipment
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
79	Instrument Panel Lights Cert. Basis - TC 2A13	_____	0.3	62.8	19
81	Instrument Light Grimes 15-0083-7 Cert. Basis - TC 2A13	_____	0.1	99.0	10
83	Cabin Light Cert. Basis - TC 2A13	_____	0.3	99.0	30
85	Landing Light, G. E. Model 4509 Cert. Basis - TC 2A13	_____	.5	13.1	7
87	Navigation Lights (Wing) (2) Grimes Model A1285 (Red and Green) Cert. Basis - TC 2A13	_____	0.4	106.6	43
89	Navigation Light (Rear) (1), Grimes Model 2064 (White) Cert. Basis - TC 2A13	_____	.2	281.0	56
91	Rotating Beacon Cert. Basis - TC 2A13	_____	1.5	263.4	395
93	Anti-Collision Lights (Wing Tip) (Whelen) Cert. Basis - STC SA800EA	_____	5.7	157.9	900
95	Heated Pitot Head, Piper Dwg. 69041-7 Cert. Basis - TC 2A13	_____	.4	100.0	40
97	Piper Pitch Trim Piper Dwg. 69378-3 Cert. Basis - TC 2A13	_____	4.7	145.6	684
99	Battery 12V 35 A.H. Rebat R35 (Wt. 27.2 lbs.) Cert. Basis - TC 2A13	_____	*5.3	168.0	890

*Weight and moment difference between standard and optional equipment.

(j) Electrical Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
101	Auxiliary Power Receptacle, Piper Dwg. 68815 Cert. Basis - TC 2A13	_____	2.7	178.5	482
103	External Power Cable, Piper Dwg. 62355 Cert. Basis - TC 2A13	_____	4.6	142.8	657
105	Lighter, *200462, 12 Volt Universal Cert. Basis - TC 2A13	_____	.2	62.9	13

(k) Instruments
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
113	Vacuum System Installation a. With Airborne Model 211cc Pump	———	4.5	39.1	176
	b. With Edo-Aire Model 1U128A Pump	———	4.9	39.1	192
	Cert. Basis - TC 2A13				
115	Attitude Gyro, Piper Dwg. 99002-2, -3, -4 or -8 Cert. Basis - TSO C4c	———	2.2	59.4	131
117	Directional Gyro, Piper Dwg. 99003-2, -3, -4 or -7 Cert. Basis - TSO C5c	———	2.6	59.7	155
119	Tru-Speed Indicator, Piper Spec. PS50049-30T Cert. Basis - TSO C2b	———	(same as standard equipment)		
121	Encoding Altimeter, Piper PS50008-6 or -7 Cert. Basis - TSO C10b, C88	———	* .9	60.3	54
122	Altitude Digitizer (United Instrument P/N 5125-P3) Cert. Basis - TSO C88	———	1.0	51.5	52
123	Vertical Speed Piper Dwg. 99010-2, -4 or -5 Cert. Basis - TSO C8b	———	1.0	65.9	66
125	Alternate Static Source Cert. Basis - TC 2A13	———	.4	61.0	24
127	Turn and Slip Indicator, Piper PS50030-2 or -3 Cert. Basis - TSO C3b	———	2.6	59.7	155

*Weight and moment difference between standard and optional equipment.

(k) Instruments
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
129	Exhaust Gas Temperature, Piper Dwg. 99026 Cert. Basis - TC 2A13	_____	.7	55.4	39
131	Manifold Pressure Gauge Piper Spec. PS50031-3 or -4 Cert. Basis - TC 2A13	_____	0.9	60.8	55
133	Engine Hour Meter Piper Dwg. 79548-0 Cert. Basis - TC 2A13	_____	0.3	61.2	18
135	Clock Cert. Basis - TC 2A13	_____	.4	62.4	25
137	Air Temperature Gauge, Piper Dwg. 99479-0 or -2 Cert. Basis - TC 2A13	_____	.2	72.6	15

(l) Autopilots
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
157	AutoFlite II Cert. Basis - STC SA3066SW-D	_____	5.6	91.8	514
159	AutoControl IIIB	_____	9.6	77.6	745
	a. Omni Coupler, *1C388 Cert. Basis - STC SA3065SW-D	_____	1.0	59.3	59

(m) Radio Equipment
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
169	Collins VHF-250 or VHF-251 Comm Transceiver				
	a. Single	_____	4.0	56.9	228
	b. Dual	_____	8.1	56.9	461
	Cert. Basis - TSO C37b, C38b				
171	Collins VIR-350 or VIR-351 Nav Receiver				
	a. Single	_____	3.9	57.4	224
	b. Dual	_____	7.9	57.4	453
	Cert. Basis - TSO C40a, C36c				
173	Collins IND 350 ( ) VOR/LOC Indicator				
	a. Single	_____	1.0	60.2	60
	b. Dual	_____	2.0	60.2	120
	Cert. Basis - TSO C40a, C36c				
175	Collins IND 351 ( ) VOR/LOC GS Indicator				
	Cert. Basis - TSO C40a, C36c	_____	1.3	60.2	78
177	Collins GLS-350 Glide Slope Receiver				
	Cert. Basis - TSO C34c	_____	2.0	181.8	364

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
178	Collins DCE 400 Distance Computing Equipment Cert. Basis - TSO C40a	_____	2.1	58.9	124
179	Collins RCR-650 ADF Receiver and Antenna and IND-650 Indicator Cert. Basis - TSO C41c	_____	6.6	104.8	692
180	Collins RCR - 650A ADF Receiver and antenna and IND-650A Indicator Cert. Basis - TSO C41c	_____	7.3	100.3	733
181	Collins AMR-350 Audio/Marker Panel Cert. Basis - TSO C35d, C50b	_____	**3.3	110.0	363
183	Collins TDR-950 Transponder Cert. Basis - TSO C74c	_____	*2.8	62.9	176

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

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
187	King KX 170 ( ) VHF Comm/Nav				
	a. Transceiver, Single	_____	7.5	56.6	425
	b. Transceiver, Dual	_____	15.0	56.6	849
	Cert. Basis - TC 2A13				
189	King KX 175 ( ) VHF				
	a. Transceiver	_____	9.4	56.6	532
	b. King KN 72 VOR/LOC Converter	_____	1.3	183.6	239
	c. King KN 73 Glide Slope Receiver	_____	3.2	184.3	590
	d. King KN 75 Glide Slope Receiver	_____	1.6	184.3	295
	e. King KN 77 VOR/LOC Converter	_____	3.6	183.6	661
	f. King KI-204 VOR/ILS Indicator	_____	1.7	60.5	103
	g. King KNI 520 VOR/ILS Indicator	_____	2.8	60.5	169
	Cert Basis - TSO C36c, C37b, C38b, C40a				
191	King KX 175 ( ) VHF				
	a. Transceiver (2nd)	_____	8.6	56.6	487
	b. King KN 72 VOR/LOC Converter	_____	1.3	183.6	239
	c. King KN 77 VOR/LOC Converter	_____	4.2	183.6	771
	d. King KI-203 VOR/ILS Indicator	_____	1.6	60.5	97
	e. King KNI 520 VOR/ILS Indicator	_____	2.8	60.5	169
	Cert. Basis - TSO C36c, C37b, C38b, C40a				

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
193	King KI 201 ( ) VOR/ LOC Ind.				
	a. Single	_____	2.5	59.6	149
	b. Dual	_____	5.0	59.9	300
	Cert. Basis - TC 2A13				
194	King KI 208 VOR/LOC Indicator				
	a. Single	_____	1.0	59.6	60
	b. Dual	_____	2.0	59.9	120
	Cert. Basis - TSO C34c, C36c, C40a				
195	King KI 209 VOR/LOC/GS Indicator				
	Cert. Basis - TSO C34c, C36c, C40a	_____	1.2	59.9	72
196	King KI 213 VOR/LOC/GS Indicator				
	Cert. Basis - TC 2A13	_____	2.5	60.4	151
197	King KI 214 ( ) VOR/ LOC/GS Ind.				
	Cert. Basis - TC 2A13	_____	3.3	59.9	198
199	King KN 74 R-Nav				
	Cert. Basis - TC 2A13	_____	4.7	56.6	266
201	King KN 61 DME				
	Cert. Basis - TC 2A13	_____	12.5	179.0	2237
203	King KN 65A DME				
	Cert. Basis - TSO C66a	_____	13.0	174.9	2274
205	King KR 85 Digital ADF	_____	8.6	85.2	733
	a. Audio Amplifier	_____	0.8	51.0	41
	Cert. Basis - TSO C41b				

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
207	King KR 86 ADF				
	a. First	_____	6.7	91.6	614
	b. Second	_____	9.7	107.0	1038
	c. Audio Amplifier	_____	0.8	51.0	41
	Cert. Basis - TC 2A13				
209	King KMA 20 ( ) Audio Panel				
	Cert. Basis - TSO C35c, C50b	_____	*3.7	70.8	262
211	King KT 76 ( )/78 ( ) Transponder				
	Cert. Basis - TSO C74b	_____	*3.1	58.1	180

*Weight includes antenna and cable.

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
213	Narco Comm 10A VHF Transceiver				
	Cert. Basis - TC 2A13	_____	3.9	57.4	224
215	Narco Comm 11A VHF Transceiver				
	a. Single	_____	3.6	57.4	207
	b. Dual	_____	7.1	57.4	408
	Cert. Basis - TC 2A13				
217	Narco Comm 11B VHF Transceiver				
	a. Single	_____	3.9	57.4	224
	b. Dual	_____	7.8	57.4	448
219	Narco Comm 111 VHF Transceiver				
	a. Single	_____	3.0	57.4	172
	b. Dual	_____	6.0	57.4	344
	Cert. Basis - TSO C37b, C38b				
221	Narco Comm 111B VHF Transceiver				
	a. Single	_____	3.9	57.4	224
	b. Dual	_____	7.8	57.4	448
	Cert. Basis - TSO C37b, C38b				
223	Narco Comm 120 VHF Transceiver				
	a. Single	_____	4.8	56.9	273
	b. Dual	_____	8.6	57.4	494
	Cert. Basis - TSO C37b, C38b				
225	Narco Nav 10 VHF Receiver				
	Cert. Basis - TC 2A13	_____	1.9	58.6	111
227	Narco Nav 11 VHF Receiver				
	a. Single	_____	2.8	58.6	164
	b. Dual	_____	5.6	58.6	328
	Cert. Basis - TC 2A13				
229	Narco Nav 12 VHF Receiver				
	Cert. Basis - TC 2A13	_____	3.4	58.6	199

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
231	Narco Nav 14 VHF Receiver Cert. Basis - TC 2A13	_____	2.5	57.4	144
233	Narco Nav 111 Cert. Basis - TSO C36c, C40a, C66a	_____	2.5	58.6	147
235	Narco Nav 112 Receiver Cert. Basis - TSO C36c, C40a, C66c, C34c	_____	3.3	58.6	193
237	Narco Nav 114 VHF Receiver Cert. Basis - TSO C38b, C40a, C36c, C34c, C66a	_____	2.5	57.4	144
239	Narco Nav 121 VHF Receiver a. Single b. Dual Cert. Basis - TSO C36c, C40c, C66a	_____ _____	3.1 6.2	58.4 58.4	181 362
241	Narco Nav 122 VHF Receiver a. Single b. Dual Cert. Basis - TSO C35d, C36c, C40c, C66a	_____ _____	* 5.1 * 8.6	99.4 82.9	507 713
243	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
245	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

*Weight includes marker antenna and cable

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
247	Narco ID 124 VOR/LOC/GS Indicator				
	a. Single	_____	1.2	60.5	73
	b. Dual	_____	2.4	60.5	145
	Cert. Basis - TSO C34c, C35d, C36c, C40c				
249	Narco UGR-2A Glide Slope				
	a. Single	_____	4.2	154.0	647
	b. Dual	_____	8.4	220.0	1848
	Cert. Basis - TSO C34b				
251	Narco UGR-3 Glide Slope				
	Cert. Basis - TC 2A13	_____	4.2	154.0	647
253	Narco MBT-12-R, Marker Beacon				
	Cert. Basis - TC 2A13	_____	3.1	69.1	214
255	Narco CP-125 Audio Selector Panel				
	Cert. Basis - TC 2A13	_____	2.2	55.0	121
257	Narco CP-135 Audio Selector Panel				
	Cert. Basis - TSO C50b	_____	2.2	55.0	121
259	Narco CP-135M Audio Selector Panel				
	Cert. Basis - TSO C50b, C35d	_____	* 3.7	114.3	423
261	Narco DME-190				
	Cert. Basis - TC 2A13	_____	** 5.9	60.9	359
263	Narco DME-190 TSO				
	Cert. Basis - TSO C66a	_____	** 5.9	60.9	359
265	Narco DME-195 Receiver and Indicator				
	Cert. Basis - TSO C66a	_____	**13.2	154.5	2039

*Weight includes marker antenna and cable.
**Weight includes antenna and cable.

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
267	Narco ADF-140				
	a. Single	_____	6.0	91.2	547
	b. Dual	_____	*17.9	107.6	1926
	Cert. Basis - TSO C41c				
269	Narco ADF-141				
	a. Single	_____	6.0	91.2	547
	b. Dual	_____	*17.9	107.6	1926
	Cert. Basis - TSO C41c				
271	Narco AT50A Transponder				
	Cert. Basis - TSO C74b	_____	** 3.0	57.3	172
	a. Narco AR-500 Altitude Encoder				
	Cert. Basis - TSO C88	_____	1.0	51.5	52
273	Narco AT150 Transponder				
	Cert. Basis - TSO C74c	_____	** 3.0	57.3	172
	a. Narco AR-500 Altitude Encoder				
	Cert. Basis - TSO C88	_____	1.0	51.5	52
275	Antenna and Cable				
	a. Nav Receiving	_____	1.4	195.7	274
	b. # 1 VHF Comm	_____	0.7	125.7	88
	c. # 2 VHF Comm	_____	0.8	147.5	118
	d. Glide Slope (Single)	_____	0.9	120.0	108
	e. Glide Slope (Dual)	_____	2.8	154.0	431
	f. Single ADF Sense	_____	0.4	150.0	60
	Cert. Basis - TC 2A13				
277	Anti Static Antenna and Cable				
	a. # 1 VHF Comm	_____	1.4	144.3	202
	b. # 2 VHF Comm	_____	1.5	170.7	256
	c. Single ADF Sense	_____	0.5	147.5	74
	Cert. Basis - TC 2A13				
279	Emergency Locator Transmitter (C.C.C. Model CIR-11-2)	_____	1.7	236.2	402
	a. Antenna and Coax	_____	0.2	224.4	45
	b. Shelf and Access Hole	_____	0.5	235.4	118
	Cert. Basis - TSO C91				

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

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
280	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
	Cert. Basis - TSO C91				
281	Microphone				
	a. Piper Dwg. 68856-10	_____	0.3	64.9	19
	b. Piper Dwg. 68856-11	_____	0.6	69.9	42
	c. Piper Dwg. 68856-12	_____	0.3	64.9	19
	Cert. Basis - TC 2A13				
283	Boom Microphone - Headset				
	Piper Dwg. 37921-2				
	Cert. Basis - TC 2A13	_____	0.3	80.5	24
285	Cabin Speaker				
	Cert. Basis - TC 2A13	_____	0.8	99.0	79
287	Headset, Piper Dwg. 68856-10				
	Cert. Basis - TC 2A13	_____	0.5	60.0	30

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(n) Miscellaneous
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
321	Zinc Chromate Finish Cert. Basis - TC 2A13	_____	5.0	158.0	790
323	Stainless Steel Control Cables Cert. Basis - TC 2A13	_____	–	–	–
325	Air Conditioner, Piper Dwg. 99575-3 Cert. Basis - TC 2A13	_____	68.3	103.6	7076
327	Overhead Vent System Piper Dwg. 76304-9 Cert. Basis - TC 2A13	_____	6.4	159.6	1022
329	Overhead Vent System with Ground Ventilating Blower Piper Dwg. 76304-10 Cert. Basis - TC 2A13	_____	14.9	172.2	2566
331	Assist Step, Piper Dwg. 65384 Cert. Basis - TC 2A13	_____	1.8	156.0	281
333	Super Cabin Sound Proofing, Piper Dwg. 79601-3 Cert. Basis - TC 2A13	_____	18.1	86.8	1571
335	Adjustable Front Seat (Left), Piper Dwg. 79591-0/79591-2 Cert. Basis - TC 2A13	_____	*6.6	80.7	533
337	Adjustable Front Seat (Right), Piper Dwg. 79591-1/79591-3 Cert. Basis - TC 2A13	_____	*6.8	80.0	544

*Weight and moment difference between standard and optional equipment.

(n) Miscellaneous
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
339	Headrests (2) Front, Piper Dwg. 79337-18 Cert. Basis - TC 2A13	_____	2.2	94.5	208
341	Headrests (2) Rear, Piper Dwg. 79337-18 Cert. Basis - TC 2A13	_____	2.2	132.1	291
343	Inertia Safety Belts (Rear) (2) 0.8 lbs. each, Piper PS50039-4-14 Cert. Basis - TC 2A13	_____	1.6	140.3	224
345	Assist Strap, Piper Dwg. 79455 Cert. Basis - TC 2A13	_____	0.2	109.5	22
347	Deluxe Carpeting Cert. Basis - TC 2A13	_____	*2.8	101.9	285
349	Fire Extinguisher, a. Piper Dwg. 76167-2, Scott 42211-00	_____	4.6	71.0	327
	b. Piper Dwg. 37872-2, Graviner HA1014-01	_____	5.6	57.9	324
	Cert. Basis - TC 2A13				

*Weight and moment difference between standard and optional equipment.

(n) Miscellaneous
(Optional Equipment) (cont)

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

TOTAL OPTIONAL EQUIPMENT _____ _____ _____

EXTERIOR FINISH

Base Color _____ Registration No. Color _____

Trim Color _____ Type Finish _____

Accent Color _____

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