PREPARED	PIPER AIRCRAFT CORP.	
CHECKED	DEVELOPMENT CENTER, VERO BEACH, FLA.	
APPROVED		PAGE

AIRPLANE FLIGHT MANUAL

MODEL PA-28-180

FAA IDENTIFICATION NO. N4946L

SERIAL NO. 28-4315

THIS DOCUMENT MUST BE KEPT IN AIRPLANE AT ALL TIMES.

FAA APPROVED: Original signed by Walter R. Haldeman *
Walter R. Haldeman
Chief, Engineering & Manufacturing Branch
Southern Region - - - Atlanta, Georgia

DATE: August 3, 1962

* FAA APPROVED: Gene Dearing For Retype Only.
Gene Dearing
Aerospace Engineer

DATE: August 12, 1964

Log of Revisions

REVISION NO.	PAGE	DESCRIPTION	APPROVED	DATE
1	1	Deleted Propeller Pitch Information. Added Static R.P.M. Information	for J. A. Logan H. E. Waterman Supervisor SO-EMDO-42	5/25/64
2	2	Placards Section: Added Placard No. 5	H. E. Waterman Supervisor SO-EMDO-42	7/8/64
3	2	Added to Placard No. 3: "BAGGAGE, MAX. 200 LBS., SEE WEIGHT AND BALANCE DATA FOR BAGGAGE LOADINGS BETWEEN 150 LBS. AND 200 LBS."	for Robert H. Lesher H. C. Faller Supervisor SO-EMDO-43	8/5/64
	1	Added Sensenich M76EMMS		
4	3	Item 5 added to Procedures Section.	H. C. Faller Supervisor SO-EMDO-43	10/20/64
5	1	Limitations Section: Revised Oil Temperature and Fuel Pressure Range	for Robert H. Lesher H. C. Faller Supervisor, SO-EMDO-43	6/23/65
6	1	Limitation Section: Add note to Engine Limits	H. C. Faller Supervisor, SO-EMDO-43	1/5/66
7	2	C. G. Range: 1975 lbs. 85.9 In. 95.9 In. 1650 lbs. 84.0 In. 95.9 In. Was 18.50 lbs. 85.1 In. 95.9 In.		
	4	Added Procedures Section And Item 6	H. C. Faller Supervisor SO-EMDO-43	5/20/66
	2	Added Placard No. 6		

FAA APPROVED 8/3/62

Log of Revisions

Revision No.	Page	Description	Approved	Date
8	1	Revised Oil Temperature, Oil Pressure and Fuel Pressure Limitations		
	2,3	Revised Placards No. 3 and No. 5		
	5	Added Page 5		
		Procedures Section - Added Item 7		
	6	Added Page 6	for Henry C. Faller Supervisor SO-EMDO-43	7/15/66
9	1	Limitations Section Add "or 0-360-A4A	Henry C. Faller Supervisor SO-EMDO-43	8/2/66
10	2,3	C.G. Range - Placard No. 1 and Placard No. 3 revised to include utility category operations. Added utility category max. wt. and approved maneuvers		
	4	Procedures Section - Added to Item 3 "For Normal Category Operation". Added Placard No. 7.		
	3	Placards Section - Added utility category operation to Item 4.		
	1	Added Utility Category		
	2	Added maximum positive load factor for Utility Category. Added Baggage Capacity.	Henry C. Faller Supervisor SO-EMDO-43	12/6/66

Log of Revisions

REVISION NO.	PAGE	DESCRIPTION	APPROVED	DATE
11	3	Placards Section: Revised Placard No. 1 to read, "In Full View of the Pilot"	H. C. Faller Supervisor SO-EMDO-43	5/12/67

AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 2

CENTER OF GRAVITY RANGE

FOR

MODEL PA-28-180

THIS AIRPLANE FLIGHT MANUAL SUPPLEMENT IS APPLICABLE TO AIRCRAFT WITH SERIAL NUMBERS 28-671 TO 28-3072, INCLUSIVE, WHEN PIPER PART NO. 65280-00 TUBE-LANDING GEAR STRUT PISTON IS INSTALLED.

SERIAL NUMBERS 28-3073 TO 28-5859 MAY USE THIS SUPPLEMENT WITH NO ADDITIONAL MODIFICATION TO THE AIRCRAFT.

THIS DOCUMENT MUST BE ATTACHED TO THE AIRPLANE FLIGHT MANUAL

FAA APPROVED: Glenn C. Stephen

G. C. Stephen, FAA DOA SO-1
Piper Aircraft Corporation

DATE: September 14, 1970

Log of Revisions

REVISION NO.	PAGE	DESCRIPTION	APPROVED	DATE

FAA APPROVED 9/14/70

Piper Model PA-28-180

Normal and Utility Categories

AIRPLANE FLIGHT MANUAL

1. Limitations Section — The following limitations must be observed in the operation of this airplane:

Engine	Lycoming 0-360-A3A or 0-360-A4A
Engine Limits	Maximum permissible RPM for takeoff, 2475. For all other operations, 2700 rpm, 180 hp, (A/C S/N 28-671 to 1760A). For all operations, 2700 rpm, 180 hp, (A/C S/N 28-1761 & up).
Fuel	91/96 minimum octane aviation fuel.
Propeller	Sensenich M76 EMM (S/N 671 to 1760A) Sensenich M76 EMMS (S/N 1761 and up) Maximum diameter 76 inches, minimum diameter 76 inches. Static RPM at maximum permissible throttle setting. Not over 2450, not under 2275. No additional tolerance permitted.
Power Instruments	Oil temperature: GREEN arc (normal operating range) 120° F to 245° F; YELLOW arc (caution range) 60° F to 120° F; RED line (maximum) 245° F (S/N 671 to S/N 1760A) Oil Temperature: GREEN arc (Normal operating range) 75° F to 245° F; RED line (maximum) 245° F (S/N 1761 and up). Oil Pressure: GREEN arc (normal operating range) 60 psi to 90 psi; YELLOW arc (caution range) 25 psi to 60 psi; RED line (minimum) 60 psi; RED line (maximum) 90 psi. Fuel Pressure: GREEN arc (normal operating range) .5 psi to 5 psi; RED line (minimum) .5 psi; RED line (maximum) 5 psi (S/N 671 to S/N 1760A) Fuel Pressure: GREEN arc (normal operating range) .5 psi to 8 psi; RED line (minimum) .5 psi; RED line (maximum) 8 psi (S/N 1761 and up) Tachometer: GREEN arc (normal operating range) 500 to 2700 rpm; RED line (maximum continuous power) 2700 rpm.

Airspeed Limits

Never exceed	171 mph
Maximum structural cruise	140
Maneuvering	129
Flaps extended	115
Maximum positive load factor	3.8 Normal Category
Maximum positive load factor	4.4 Utility Category
Maximum negative load factor	No inverted maneuvers approved

Maximum Weight

2400 lbs. - Normal Category; 1950 lbs. - Utility Category.

Baggage Capacity

200 lbs.

C. G. Range

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

1. Normal Category

Weight (Pounds)	Forward Limit (In. aft of datum)	Rearward Limit (In. aft of datum)
2400	92.1	94.5
2200	89.2	95.9
1975	85.9	95.9
1650	84.0	95.9

2. Utility Category

Weight (Pounds)	Forward Limit (In. aft of datum)	Rearward Limit (In. aft of datum)
1950	86.5	86.5
1850	85.1	86.5
1650	84.0	86.5

Straight line variation between points given.

NOTE: It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. See weight and balance section for proper loading instructions.

Maneuvers

1. Normal Category - All acrobatic maneuvers including spins prohibited.
2. Utility Category - Approved maneuvers for Utility Category only.

	Entry Speed
Spins (Flaps Up)	Stall
Steep Turns	129 mph
Lazy Eights	129
Chandelles	129

Placards

1. In full view of the pilot:

   "THIS AIRPLANE MUST BE OPERATED AS A NORMAL OR UTILITY CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.

   ALL MARKINGS AND PLACARDS ON THIS AIRPLANE APPLY TO ITS OPERATION AS A UTILITY CATEGORY AIRPLANE. FOR NORMAL AND UTILITY CATEGORY OPERATIONS, REFER TO THE AIRPLANE FLIGHT MANUAL.

   FOR SPIN RECOVERY, USE FULL RUDDER AGAINST SPIN, FOLLOWED IMMEDIATELY BY FORWARD WHEEL.

   NO ACROBATIC MANEUVERS (INCLUDING SPINS) ARE APPROVED FOR NORMAL CATEGORY OPERATIONS."

2. Adjacent to upper door latch:

   "ENGAGE LATCH BEFORE FLIGHT."

3. On the inside of the baggage compartment door:

   "MAXIMUM BAGGAGE 125 LBS." (S/N 671 to 1760A)
   (MAXIMUM BAGGAGE MAY BE INCREASED TO 200 LBS. IN ACCORDANCE WITH PIPER SERVICE SPARES LETTER NO. 242)

   UTILITY CATEGORY OPERATION - NO BAGGAGE OR AFT PASSENGERS ALLOWED. NORMAL CATEGORY OPERATION - SEE AIRPLANE FLIGHT MANUAL WEIGHT AND BALANCE SECTION FOR BAGGAGE AND AFT PASSENGER LIMITATIONS.

4. On the instrument panel in full view of the pilot:

   "ROUGH AIR OR MANEUVERING SPEED 129 MPH."

   "UTILITY CATEGORY OPERATION - NO AFT PASSENGERS ALLOWED."

5. On the instrument panel in full view of the pilot when the oil cooler winterization kit is installed:

   "OIL COOLER WINTERIZATION PLATE TO BE REMOVED WHEN AMBIENT TEMPERATURE EXCEEDS 50^{o} F."

6. On the instrument panel in full view of the pilot when the autoflite is installed:

   "FOR HEADING CHANGES: PRESS DISENGAGE SWITCH ON CONTROL WHEEL. CHANGE HEADING, RELEASE DISENGAGE SWITCH.

Placards (Cont'd)

7. On the instrument panel in full view of the pilot: "UTILITY CATEGORY ONLY." Acrobatic maneuvers are limited to the following:

	Entry Speed
Spins (Flaps Up).....	Stall
Steep Turns.....	129 mph
Lazy Eights.....	129
Chandelles.....	129

Airspeed Instrument Markings

RED radial line	Never exceed	171 mph (148 knots)
YELLOW arc	Caution Range (Smooth Air Only)	140 to 171 mph (121 to 148 knots)
GREEN arc	Normal Operating Range	67 to 140 mph (58 to 121 knots)
WHITE arc	Flap Down Range	57 to 115 mph (50 to 100 knots)

2. Procedures Section

1. The stall-warning system is inoperative with the master switch off.
2. Electric fuel pump must be on for both landing and takeoff.
3. The PA-28-180 airplane is approved under FAA Regulation CAR 3 which prohibits intentional spins for normal category operation. The following information is noteworthy:
   a. The stall characteristics of the PA-28-180 are normal with the nose pitching down moderately following the stall, occasionally with a moderate roll which can be corrected by normal use of ailerons and rudder against the roll.
   b. Prolonged use of full rudder during stall practice may result in a rapid roll followed by a spin and should be avoided. Recovery from an incipient spin may be effected in less than one additional turn by use of opposite rudder followed by full forward control wheel.
   c. In the event that a fully developed spin is inadvertently experienced, recovery is best made by using full opposite rudder followed by full forward wheel and full opposite aileron. The control positions against the spin should be maintained during the entire recovery, which may require several turns and a substantial loss of altitude if the airplane is loaded heavily with a rearward center of gravity.
4. Except as noted above, all operating procedures for this airplane are normal.

FAA APPROVED 8/3/62

REVISED 12/6/66 Rev. No. 10

Procedures Section (Cont'd.)

5. (Electric Pitch Trim Installation Only)
The following emergency information applies in case of electric pitch trim malfunction:

   a. In case of malfunction, disengage electric pitch trim by pulling out circuit breaker on instrument panel.

   b. In emergency, electric pitch trim may be overpowered using manual pitch trim.

   c. In cruise configuration, malfunction results in 10^{o} pitch change and 30 Ft. altitude variation.

6. (Autoflite Installation Only)
The following emergency information applies in case of autoflite malfunction:
   a. In case of malfunction PRESS disconnect switch on pilot's control wheel.

   b. Rocker switch on instrument panel - OFF.

   c. Unit may be overpowered manually.

   d. In cruise configuration malfunction, 3 seconds delay results in 60^{o} bank, and 100 Ft. altitude loss.

   e. In approach configuration malfunction, 1 second delay results in 10^{o} bank and 0 Ft. altitude loss.

7. (AutoControl III Installation Only)
   I. Limitations:
   Pilot off during take off and landing.
   II. Procedures:
      a. Normal Operation
      Refers to Manufacturer's Operation Manual.

      b. Emergency
         1. In case of malfunction, disengage manual controls.
         2. In emergency, pilot may be overpowered manually.
         3. In cruise configuration malfunction, 3 seconds delay results in 60^{o} bank and 100 Ft. altitude loss.
         4. In approach configuration malfunction, 1 second delay results in 10^{o} bank and 0 Ft. altitude loss.

3. Performance Section

The following performance figures were obtained during FAA Type tests and may be realized under conditions indicated with the airplane and engine in good condition and with average piloting technique. All performance is given for 2400 pounds.

Loss of altitude during stalls varied from 125 to 200 feet, depending on configuration and power.

Stalling speeds, in mph, power off, versus angle of bank (Calibrated Airspeed):

Angle of bank	0	20	40	50	60
Flaps Up	67	69	76	83	94
Flaps Down	57	--	--	--	--

PREPARED	PIPER AIRCRAFT CORP.	Weight and Balance Data
CHECKED	DEVELOPMENT CENTER, VERO BEACH, FLA.	Model PA 28-180
APPROVED		PAGE 1 Section 1

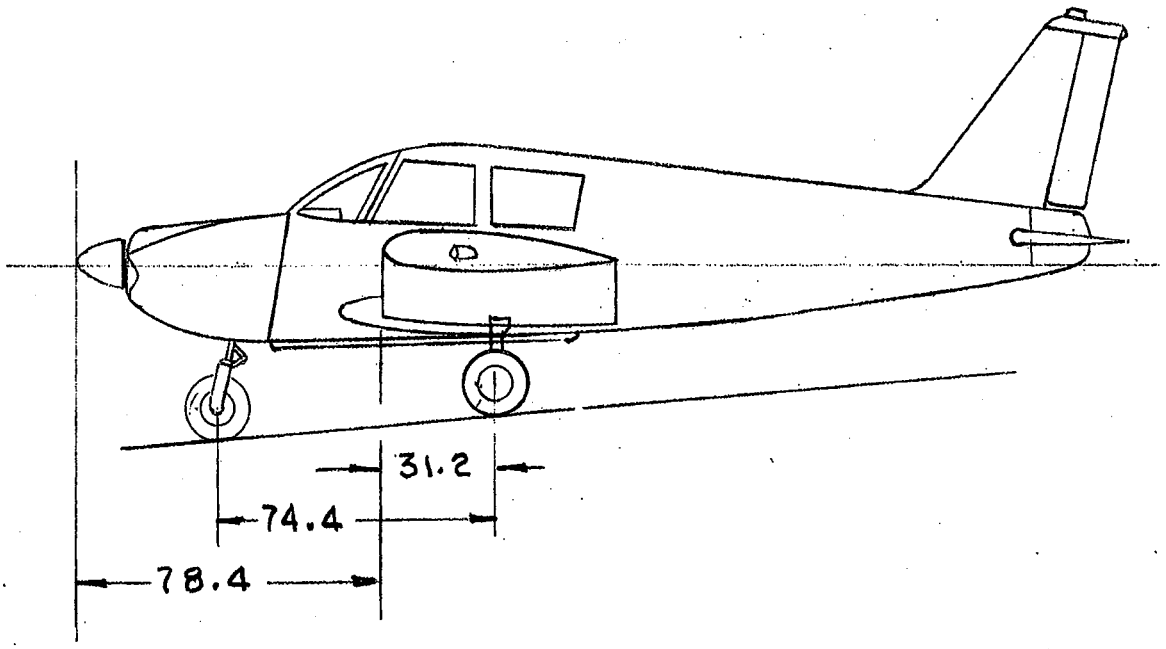
COMPUTED
~~ACTUAL~~ WEIGHT AND BALANCE

MODEL PA 28-180

SERIAL NUMBER 28- 4315

CERTIFICATE NUMBER N4946L

DATE SEP 18 1967



Richard B. Osmer

INSPECTION REPRESENTATIVE

WEIGHT AND BALANCE
STANDARD EQUIPMENT LIST
MODEL PA 28-180

Check if Installed	ITEM	WEIGHT (LBS.)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Engine Accessories			
	Engine - Lycoming Model O-360-A3A	274.4	26.1	6962
X	Engine - Lycoming Model O-360-A4A	282.4	26.1	7371
X	Fuel Pump, Electric Auxiliary, Bendix Model 478360	1.8	41.8	75
X	Fuel Pump, Engine Driven Lycoming Dwg. No. 73297, 74082, 75148 or 75246	1.6	41.3	66
X	Oil Cooler, Piper Dwg. Harrison #C-8526250	2.6	18.1	47
X	Filter, Fram Model CA-161 PL or AC No. A48C or Purolator AFP-2	.9	20.1	18
	Alternator, 35 Amp., Chrysler No. 2098615	12.5	19.0	238
X	Alternator, 60 Amp., Chrysler No. 2642210 or 2642997	12.5	19.0	238
	Starter - Lycoming 74092 (Delco Remy 1109511)	* 18.0	19.5	351
X	Starter - Lycoming 76211 (Prestolite MZ4206)	* 18.0	19.5	351
	Propeller and Propeller Accessories			
	Propeller, Sensenich M76EMM	34.5	10.1	348
X	Propeller, Sensenich M76EMMS60	38.5	8.8	339
X	Spinner and Attachment Plates	2.0	8.0	16

* Included in Engine Weight

Check if Installed	ITEM	WEIGHT (LBS)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Landing Gear and Brakes			
_____	Two Main Wheel Assemblies 6.00-6	32.0	109.6	3507
	(a) Cleveland Aircraft Products Wheel Assembly No. 40-28 Brake Assembly No. 30-18			
	(b) Two Main 4-Ply Rating Tires 6.00-6 with Regular Tubes			
X	Two Main Wheel Assemblies	32.3	109.6	3540
	(a) Cleveland Aircraft Products Wheel Assembly No. 40-86 Brake Assembly No. 30-55			
	(b) Two Main 4-Ply Rating Tires 6.00-6 with Regular Tubes			
X	One Nose Wheel 6.00-6	14.0	34.3	480
	(a) Cleveland Aircraft Products Wheel Assembly No. 38501 (Less Brake Drum)			
	(b) One Nose Wheel 4-Ply Rating Tire 6.00-6 with Regular Tubes			
	Electrical Equipment			
X	Stall Warning Device, Safe Flight Inst. Corporation No. C52207-4	.2	80.2	16
_____	Voltage Regulator, Delco Remy #118704	1.5	168.5	253
_____	Voltage Regulator, Chrysler #2098613	.5	57.8	29
X	Voltage Regulator, Wico Electric #X-16300	.5	57.8	29
_____	Battery 12V, 25 A.H., Rebat Model S-25	22.0	160.9	3540

PREPARED	PIPER AIRCRAFT CORP.	Weight and Balance Data
CHECKED	DEVELOPMENT CENTER, VERO BEACH, FLA.	Model PA 28-180
APPROVED		PAGE 4 Section 1

Check if Installed	ITEM	WEIGHT (LBS.)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Instrument			
X	Compass - Airpath No. C2350-L41	.9	66.6	60
	Airspeed Indicator, PAC 63205-2	.6	67.7	41
	Tachometer, AC 1548302	.8	67.7	54
X	Tachometer, Stewart Warner PAC 62177-2 or 62177-3	.7	67.7	47
	Altimeter, Aero Marine No. 522	1.4	66.8	94
	Engine Cluster, PAC 63922-2	.8	68.8	55
X	Engine Cluster, PAC 63426	.8	68.8	55
	Engine Cluster, PAC 63426-2	.8	68.8	55
	Miscellaneous			
X	Fwd. Seat Belts	1.0	86.9	87
X	Aft Seat Belts	.8	123.0	98
X	Flight Manual	----	----	----

TOTAL

AIRCRAFT EMPTY WEIGHT AS COMPUTED	1289	84.4	109270
Less Batt.	22.0	160.9	3540
	1267.0	83.4	105730

(INCLUDES ITEMS CHECKED ON STANDARD EQUIPMENT LIST, UNUSABLE FUEL AND UNDRAINABLE OIL)

OPTIONAL EQUIPMENT LIST
MODEL PA-28-180

Check if Installed	ITEM	WEIGHT (LBS)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Engine Accessories			
X	Vacuum Pump, Airborne Mechanisms Model No. 10-113A1, 113A5 or 200 cc and Drive	5.0	37.0	185
X	Oil Filter - Lycoming #74911 (AC 81-A #6437032)	3.3	40.5	134
X	Vacuum Regulator and Filter	2.2	57.0	125
	Electrical Equipment			
X	#40-0101-7-12 Rotating Beacon, Grimes Model XXXXXX	1.5 XXXX	263.4 XXXXXXXX	395 XXXXX
X	Landing Light, G. E. Model 4509	.5	18.1	9
X	Navigation Light (Rear) (1) Grimes Model 2064 (White)	.2	281.0	56
X	Navigation Lights (2) Grimes Model A1285 (Red and Green)	.4	106.6	43
X	Battery 12V, 35 A.H., Reading R-35	27.0	160.9	4344
X	Cabin Light	.3	104.0	31
X	Cabin Speaker	.8	104.0	83
	Rotating Beacon, Whelen Model WRM L-12	1.6	264.0	422

Check if Installed	ITEM	WEIGHT (LBS)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Electrical Equipment (Cont'd)			
X	Auxiliary Power Receptacle PAC 62225	2.7	168.0	454
X	External Power Cable PAC 62355-2	4.6	142.8	657
X	Piper Pitch Trim	4.0	158.0	632
	Heated Pitot Head	.4	100.0	40
	Instruments			
	Turn and Bank, Pioneer A-5	1.5	66.4	100
	Turn and Bank, Electric	2.7	65.8	178
	Suction Gauge, AN5771-11	.5	68.1	34
X	Suction Gauge, Airborne Mechanisms 1G3-4	.5	68.1	34
	Suction Gauge, U.S. Gauge AW1821AFO3	.5	68.1	34
X	Altimeter, AN5760-2 (C-12 or C-13)	Same as Standard Equipment Weight		
	Rate of Climb, Pioneer C-7	1.0	66.8	67
	Rate of Climb, AN5825	1.0	66.8	67
	Directional Gyro, Jack & Heintz	2.6	66.6	173
	Directional Gyro, Sperry	3.9	66.6	260
	Directional Gyro, Garwin (3")	2.4	65.6	157
X	Directional Gyro, AIM (3")	3.1	64.9	201

Check if Installed	ITEM	WEIGHT (LBS)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Instruments (Cont'd)			
____	Artificial Horizon, Jack & Heintz	2.8	66.1	185
____	Artificial Horizon, Garwin (3")	1.8	65.8	118
X	Artificial Horizon, AIM (3")	2.2	65.3	144
X	Air Temperature Gauge, Rochester Manufacturing Co., No. 1592-C2 or NHM-70 (Manning, Maxwell & Moore)	.2	82.6	17
X	Clock, 8-Day, MIL-C-7939	.4	68.3	27
X	Tru-Speed Indicator, PAC 62143-2	Same as Standard Equipment Weight		
____	Piper Course Selector PAC 31058	3.0	66.6	200
____	Electric Turn and Bank	2.7	65.8	178
X	Pictorial Rate of Turn, Mitchell 52D69	1.3	66.2	86
X	Rate of Climb, Karnish AC 135-3	1.0	66.8	67
____	Brittain Turn Coordinator #TC-100(12)	2.6	65.6	171
	AutoPilots			
____	AutoControl II			
____	Roll Servo, Mitchell #1X221E-CH-1	2.8	60.6	170
____	Console, Mitchell #1X224E-3	1.3	66.6	87
____	Directional Gyro, Mitchell #52B15E	4.3	66.6	286
____	or Directional Gyro, Course Selector PAC Drawing 31058-2	3.0	66.6	200

Check if Installed	ITEM	WEIGHT (LBS)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	AutoPilots (Cont'd)			
_____	Artificial Horizon, Mitchell #52B9	4.5	66.1	298
_____	AutoControl III			
_____	Roll Servo, Mitchell #1D363-183R	2.5	122.2	306
_____	Console, Mitchell #1C338	1.2	66.6	80
_____	Cables	.7	95.5	67
_____	Attitude Gyro, Mitchell #52D66 (Garwin)	1.9	65.8	125
_____	Attitude Gyro, Mitchell #52D66 (AIM)	2.3	65.3	150
_____	Directional Gyro, Mitchell #52D54P (Garwin)	2.5	65.6	164
_____	Directional Gyro, Mitchell #52D54P (AIM)	3.2	64.9	208
_____	Omni Coupler	.9	65.8	59
X	AutoFlite			
X	Roll Servo, Mitchell #1D363-153	2.6	122.2	318
X	Gyro Amplifier, Mitchell #1C359	1.8	111.8	201
X	Cables	1.0	95.5	96
X	Panel Unit	.3	68.8	21

Check if Installed	ITEM	WEIGHT (LBS)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Radio			
	PM-1 Marker Beacon			
	Receiver	1.1	121.3	133
	Panel Unit	.3	69.0	21
	Cable	.3	85.0	26
	Piper Radio Compass PRC-3	4.5	64.4	290
	Piper VHF Transceiver PTR-1	5.0	64.8	324
	Piper Omni Convertor O-1	2.5	65.3	163
	King KX150B	9.1	62.8	572
X	Omni Receiving Antenna, Narco VTP-37	1.4	203.0	284
X	VHF Antenna, Transmitting VHF-1	.3	157.8	47
X	VHF Antenna, Transmitting VHF-2	.3	192.8	58
X	Cable, VHF-1	.4	118.0	47
X	Cable, VHF-2	.5	135.0	68
X	Low Frequency Antenna	.5	167.0	84
	Loop Antenna (PRC-3)	.3	54.5	16
X	Narco Mark 12A			
X	Transceiver, Single	6.0	62.8	377
	Transceiver, Dual	12.0	62.8	754
X	Modulator-Power Unit, Single	4.0	56.0	224
	Modulator-Power Unit, Dual	8.0	186.0	1488

Check if Installed	ITEM	WEIGHT (LBS)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Radio (Cont'd)			
X	Cable, Single	.3	58.0	17
	Cable, Dual	3.4	120.0	408
	Narco VOA-6 Omni Convertor	1.8	65.3	118
	Narco VOA-5 Omni Convertor	3.1	65.3	202
X	Narco VOA-4 Omni Convertor	3.0	65.3	196
	Narco ADF-30	9.9	107.9	1068
	Narco Omnigator VTR-2A Installation (Less Antenna)	14.0	58.0	812
X	Marker Antenna	1.2	64.8	78
	Piper Radio Compass PRC-4	4.9	64.4	316
	Loop Antenna (PRC-4)	.4	112.6	45
	Piper Omni Convertor OL-1	2.8	65.3	183
X	Narco ADF-31			
X	Receiver	5.1	64.4	328
X	Loop Antenna	2.7	162.0	437
X	Cable Antenna	1.7	108.0	184
	Bendix ADF-T-12C			
	Receiver	3.8	64.9	247
	Audio Amplifier	.8	64.9	52
	Radio Compass	1.7	67.3	114

Check if Installed	ITEM	WEIGHT (LBS)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Radio (Cont'd)			
_____	Loop Antenna	1.2	160.8	193
_____	Cable, Antenna	1.5	108.0	162
_____	Narco - UDI-III DME	8.6	62.6	538
X	Narco Mark III Removed 11/3/82	7.5	63.6	477
_____	Narco UDI-4 DME			
_____	Receiver	8.5	62.6	532
_____	Antenna	.3	113.9	34
_____	Cable, Antenna	.4	100.0	40
_____	UGR-2 Glide Slope			
_____	Receiver	2.4	173.8	417
_____	Cable	2.1	128.0	269
_____	Antenna	.4	92.4	37
_____	Cable, Antenna	.5	145.0	73
X	Transmitter Selector (Dual VHF Only)	.7	67.2	47
X	Microphone	.5	75.0	38
X	Headset	.5	66.0	33
~~X~~	Junction Box	.6	67.2	40
X	~~Bendix TPR 610 Xponder~~ Removed 1-25-82	3.8	62.2	
X	KT 76A Transponder	3.0	63.2	

PREPARED	PIPER AIRCRAFT CORP.	Weight and Balance Data
CHECKED	DEVELOPMENT CENTER, VERO BEACH, FLA.	Model PA-28-180
APPROVED		PAGE 12 Section 1

Check if Installed	ITEM	WEIGHT (LBS)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
	Miscellaneous			
X	Nose Wheel Fairing	3.5	34.8	122
X	Main Wheel Fairing	7.4	109.6	811
X	Assist Step	1.8	156.0	281
	Toe Brakes (Dual)	10.5	54.6	573
X	Toe Brakes (Single)	5.0	54.6	273
	Fire Extinguisher-Stop Fire #A-20	7.5	93.0	698
	Inertia Safety Belt PAC 65766	2.5	111.6	279
X	Assist Strap and Coat Hooks	.2	109.5	22
X	Lighter	.2	68.8	14
	TOTAL	102.0		11186

EMPTY C.G. AFT DATUM IS 85.4

AIRCRAFT EMPTY WEIGHT	1267.0	105730
OPTIONAL EQUIPMENT WEIGHT	102	11186
LICENSED EMPTY WEIGHT	1369.0	116916

REVISED

IT IS THE RESPONSIBILITY OF THE PILOT AND AIRCRAFT OWNER TO INSURE THAT THE AIRPLANE IS LOADED PROPERLY. THE EMPTY WEIGHT C. G. IS FOR THE AIRPLANE AS DELIVERED FROM THE FACTORY. REFER TO FORM FAA-337 WHEN ALTERATIONS HAVE BEEN MADE.

C. G. RANGE AND WEIGHT INSTRUCTIONS

1. Add the weight of all items to be loaded to the licensed empty weight.
2. Use the loading graph to determine the moment of all items to be carried in the airplane.
3. Add the moment of all items to be loaded to the licensed empty weight moment.
4. Divide the total weight moment by the total weight to determine the C. G. location.
5. By using the figures of item 1 and item 4, locate a point on the C. G. range and weight graph. If the point falls within the C. G. envelope, the loading meets all weight and balance requirements.

SAMPLE LOADING PROBLEM (NORMAL CATEGORY)

	WEIGHT (LBS.)	ARM AFT DATUM (INCHES)	MOMENT (POUND-INCHES)
LICENSED EMPTY WEIGHT	1369.0	85.4	116916
OIL (2 GAL.)	15	32.5	488
PILOT & PASSENGER	340	85.5	29070
FUEL 41.7 gal.	250	95.0	23750
PASSENGERS * (REAR SEAT)	340	118.1	40154
BAGGAGE *	86	142.0	12281
TOTAL LOADED AIRPLANE	2400	REVISED	222659

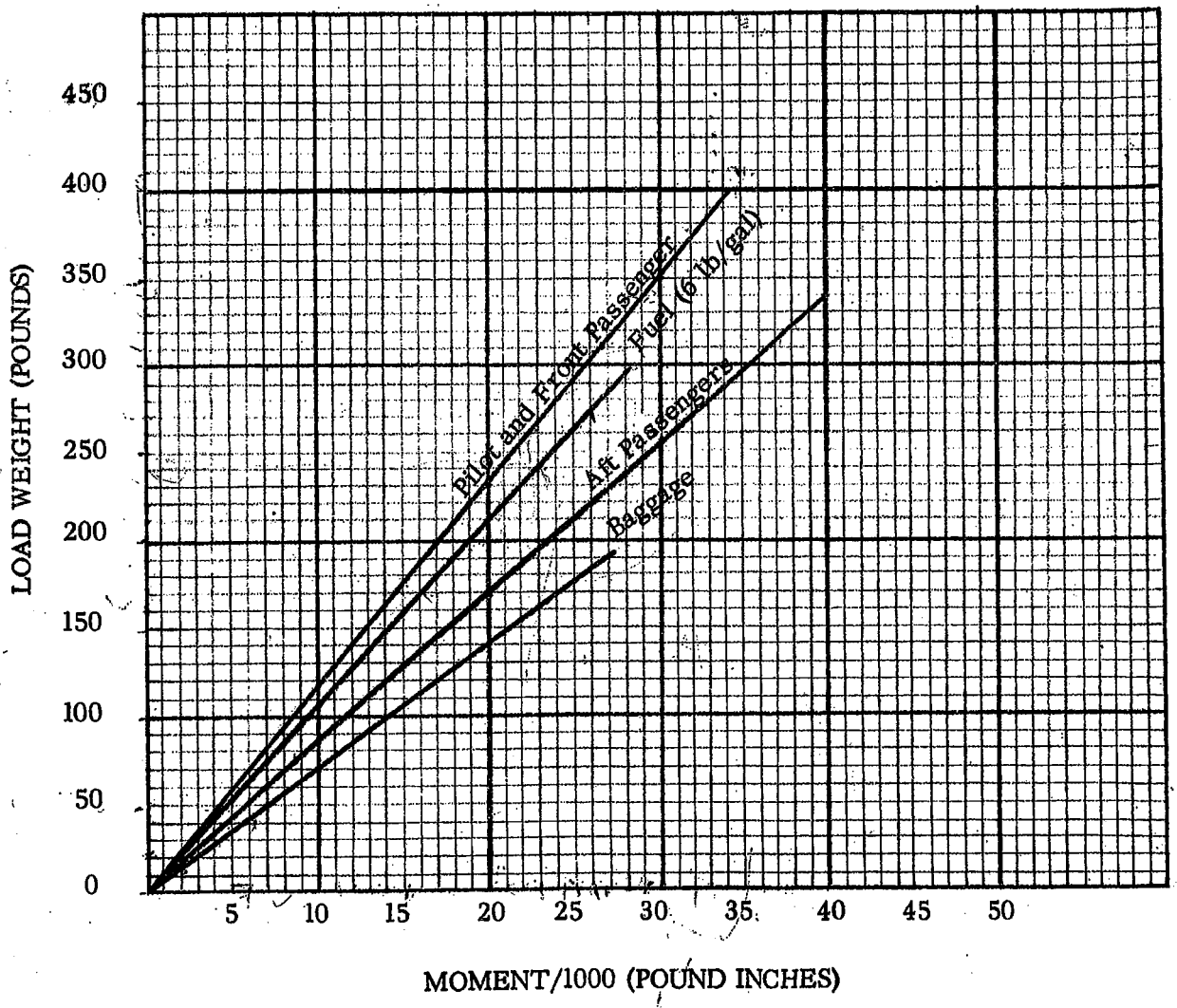
$\frac{222659}{2400} = 92.8$ INCHES (ARM AFT DATUM)

LOCATE THIS POINT (92.8) ON THE C. G. RANGE AND WEIGHT GRAPH. SINCE THIS POINT FALLS WITHIN THE C. G. ENVELOPE THE LOADING MEETS ALL WEIGHT AND BALANCE REQUIREMENTS.

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

Normal Category Operation - Maximum baggage 125 lbs. (S/N 671 to 1760A).
Maximum baggage 200 lbs. (S/N 1761 and up).
Check aft C. G. between 150 lbs. and 200 lbs.

LOADING GRAPH



PIPER MODEL PA-28-180
NORMAL AND UTILITY CATEGORIES

AIRPLANE FLIGHT MANUAL SUPPLEMENT

This supplement must be attached to the Airplane Flight Manual dated August 3, 1962 or August 12, 1964 or April 22, 1969, when the expanded C. G. Envelope is used. The information contained herein supplements the information of the basic Airplane Flight Manual; for limitations, procedures, and performance data not contained in this document, consult the manual proper.

1. Limitations Section — The following limitations must be observed in the operation of this airplane with this center of gravity range:

Maximum Weight — 2400 lbs.

C. G. Range — The datum used is 78.4 inches ahead of wing leading edge at the intersection of the straight and tapered section.

1. Normal Category

Weight (Pounds)	Forward Limit (In. Aft of Datum)	Rearward Limit (In. Aft of Datum)
2400	91.0	94.5
2200	87.8	95.9
2150	87.0	95.9
1650	84.0	95.9

2. Utility Category

Weight (Pounds)	Forward Limit (In. Aft of Datum)	Rearward Limit (In. Aft of Datum)
1950	85.8	86.5
1650	84.0	86.5

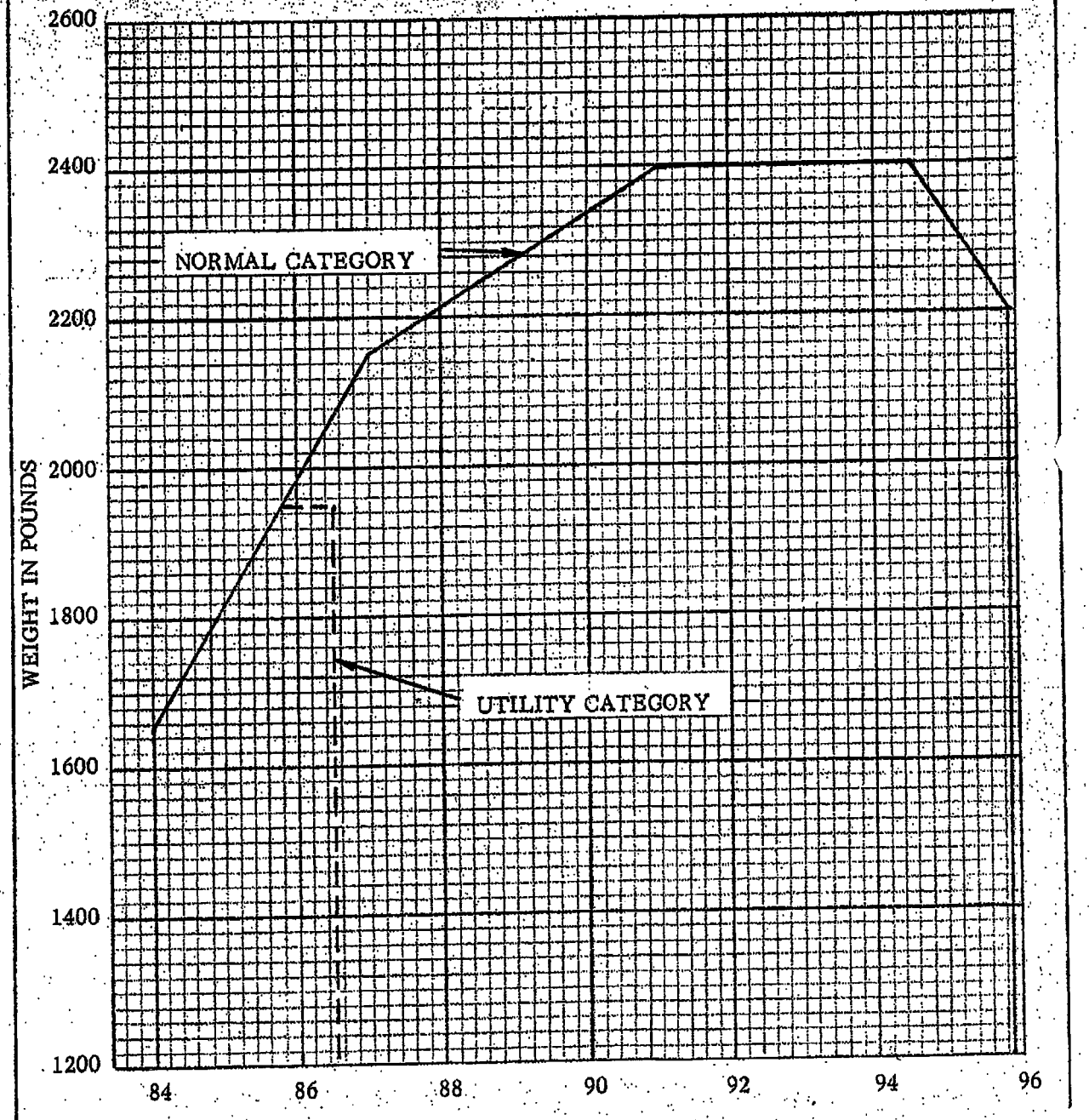
2. Procedures — "No Change"

3. Performance — "No Change"

FAA APPROVED 9/14/70

REVISED

C. G. RANGE AND WEIGHT



FAA Approved 9/14/70

WEIGHT AND BALANCE FORM - EQUIPMENT CHANGE

Andrews University Airpark Griggs Dr. Berrien Springs, Mich 49104 Phone: (269) 471-3265 Fax: (269) 471-6004	**Customer:** Andrews University **N No:** N4946L **Make:** Piper **Model:** PA28-180 **Serial No:** 28-4315

A.	**OLD Empty Weight:**	1394.70	Lbs
B.	**OLD Empty CG:**	84.59	Inches
C.	**OLD Empty Weight CG Moment:**	117984.76	Inch/Lbs
D.	**Max Gross Weight:**	2400.00	Lbs
E.	**OLD Useful Load:**	1005.30	Lbs

	ITEMS DESCRIPTION	WEIGHT Lbs	Arm Inches	Moments Inch/Lbs
	Removed			
1	R50 Loran C	3.3	64.8	210.6
2	Antenna/Preamp	1.3	203.0	253.75
3	ADF Antenna 325A2	1.8	162.0	292
4	ADF cable	1.7	108.0	184
5	Wing leveler harness	1.0	95.5	96
6	Wing leveler panel unit	0.3	68.8	21
7	Roll servo Mitchell 1D363-153	2.6	122.2	318
	Installed:			
1				
2				
3				
4				

TOTALS

A.	**NEW Empty Weight:**	1382.7	Lbs
B.	**NEW Empty CG:**	84.33	Inches
C.	**NEW Empty Weight CG Moment:**	116609.41	Inch/Lbs
D.	**Max Gross Weight:**	2400	Lbs
E.	**NEW Useful Load:**	1017.3	Lbs

This new weight and balance information supersedes all previous weight and balance information.
For aircraft loading, see instructions in Weight & Balance Section of the Aircraft Flight Manual

Previous Weight and Balance	Date: 10/20/2013
FAA FORM 337 Completed	Date N/A
LOG BOOK ENTRY Completed	Date: 1/13/2015

David Muth AP/IA 2799081

Signed David Muth Date: 1/13/2015

Form W&B2

WEIGHT AND BALANCE FORM - EQUIPMENT CHANGE

Andrews University Airpark Griggs Dr. Berrien Springs, Mich 49104 Phone: (269) 471-3265 Fax: (269) 471-6004	**Customer:** Krystian Zygowiec **N No:** N4946L **Make:** Piper **Model:** PA28-180 **Serial No:** 28-4315

A.	**OLD Empty Weight:**	1398.20	Lbs
B.	**OLD Empty CG:**	84.70	Inches
C.	**OLD Empty Weight CG Moment:**	118425.10	Inch/Lbs
D.	**Max Gross Weight:**	2400.00	Lbs
E.	**OLD Useful Load:**	1001.80	Lbs

	ITEMS DESCRIPTION	WEIGHT Lbs	Arm Inches	Moments Inch/Lbs
	Removed			
1	Dual strobe power supply unit	1.8	150.0	270
2	Wng-leveler control box/tray	1.7	100.2	170.34
3				
4				
5				
	Installed:			
1				
2				
3				
4				
5				
	TOTALS			

A.	**NEW Empty Weight:**	1394.70	Lbs
B.	**NEW Empty CG:**	84.59	Inches
C.	**NEW Empty Weight CG Moment:**	117984.76	Inch/Lbs
D.	**Max Gross Weight:**	2400.00	Lbs
E.	**NEW Useful Load:**	1005.30	Lbs

Superseded 1/13/15 David Muth AP/IA 2799081

This new weight and balance information supersedes all previous weight and balance information.
For aircraft loading, see instructions in Weight & Balance Section of the Aircraft Flight Manual

Previous Weight and Balance	Date: 7/01//2013
FAA FORM 337 Completed	Date N/A
LOG BOOK ENTRY Completed	Date: 10/20//2013

David Muth AP/IA 2799081

Signed David Muth Date: 10/20//2013

WEIGHT AND BALANCE FORM - EQUIPMENT CHANGE

Andrews University Airpark Griggs Dr. Berrien Springs, Mich 49104 Phone: (269) 471-3265 Fax: (269) 471-6004	**Customer:** Krystian Zygowiec **N No:** N4946L **Make:** Piper **Model:** PA28-180 **Serial No:** 28-4315

A.	**OLD Empty Weight:**	**1402.00**	Lbs
B.	**OLD Empty CG:**	**84.96**	Inches
C.	**OLD Empty Weight CG Moment:**	**119109.10**	Inch/Lbs
D.	**Max Gross Weight:**	**2400.00**	Lbs
E.	**OLD Useful Load:**	**998.00**	Lbs

	ITEMS DESCRIPTION	WEIGHT Lbs	Arm Inches	Moments Inch/Lbs
	Removed			
1	Artex model ELT 110-4 S/N 42131	-5.1	180.0	-918
2				
3				
4				
5				
	Installed:			
1	ACK model E-04 S/N 02606	1.3	180.0	234
2	RCPI			
3	Audio Alert			
4	Antenna			
5	Harness/coax			

TOTALS

A.	**NEW Empty Weight:**	**1398.20**	Lbs
B.	**NEW Empty CG:**	**84.70**	Inches
C.	**NEW Empty Weight CG Moment:**	**118425.10**	Inch/Lbs
D.	**Max Gross Weight:**	**2400.00**	Lbs
E.	**NEW Useful Load:**	**1001.80**	Lbs

Revised 10-20-2013

This new weight and balance information supersedes all previous weight and balance information.
For aircraft loading, see instructions in Weight & Balance Section of the Aircraft Flight Manual

Previous Weight and Balance — Date: 1/18/2012
FAA FORM 337 Completed — Date N/A
LOG BOOK ENTRY Completed — Date: 7/01//2013

Pertinent details of the work that was performed are on file under:

Work Order Number: 411D **David Muth AP/IA 2799081**

Signed David Muth Date: 7/01//2013

WEIGHT AND BALANCE FORM

Andrews University Airpark Griggs Dr. Berrien Springs, Mich 49104 Phone: (269) 471-3265 Fax: (269) 471-6004	**Customer:** Krystian Zygowiec **N No:** N4946L **Make:** PIPER **Model:** PA-28-180 **Serial No:** 28-4315

OLD Empty Weight:	1402	Lbs
OLD Empty CG:	84.96	Inches
OLD Empty Weight CG Moment:	119,109.1	Inch/Lbs
Max Gross Weight:	2300	Lbs
OLD Useful Load:	998.00	Lbs

As weighed:

Item:	Weight	Tare	Net Weight	Arm	Moment	
Clock, 8 -Day MIL-C-7939	-0.40		-0.40	68.30	-27.32	Removed
Davtron M8009-MV-Batt	0.40		0.40	68.30	27.32	Installed
			0.00		0.00	
			0.00		0.00	
Total			0.00		0.00	

Empty weight:		Gross Weigh	2,300.00
EWCG	84.96	Useful load	998.00
EW Moment	0.00		

Note: Aircraft weighed with full engine oil and fuel. Fuel was mathematically removed

NEW Empty Weight:	1402.0	Lbs
NEW Empty CG:	84.96	Inches
NEW Empty Weight CG Moment:	119,109.10	Inch/Lbs
Max Gross Weight:	2300.00	Lbs
NEW Useful Load:	998.0	Lbs

Revised 7-1-2013

This new weight and balance information supersedes all previous weight and balance information.
For aircraft loading, see instructions in Weight & Balance Section of the Aircraft Flight Manual

Previous Weight and Balance Date: 8/13/1990
Log Book Entry Completed Date: 5/25/2006

Pertinent details of the work that was performed are on file at this repair station under

Work Order Number: 297D **FAA Authorized Repair Station # LW 5R030N**

Signed: CLETUS J. DUNLAP Date: 1/16/2012

Form W&B1

AMR COMBS

APA Denver • Centennial
BDL Hartford/Springfield • Bradley
BHM Birmingham
DEN Denver • Stapleton
FLL Ft. Lauderdale
GRR Grand Rapids • Kent County
IND Indianapolis
MEM Memphis
PSP Palm Springs

Kent County International Airport • P.O. Box 380 Grand Rapids, MI 49588-0380 • 616/949-5000 • 616/949-0732 FAX

DATE 08/13/90 WEIGHT AND BALANCE REPORT
W.O.# 18292 SUPERSEDES REPORT DATED 6-12-89

AIRCRAFT MAKE & MODEL	SERIAL NUMBER	N NUMBER
PIPER PA28-180	28-4315	N4946L

NEW USEFUL LOAD	NEW C of G	NEW EMPTY WEIGHT
998.00	84.96	1402.00

DESCRIPTION	WEIGHT	ARM	MOMENT
NOSE WHEEL	517.00	34.30	17733.10
LEFT MAIN WHEEL	585.00	109.60	64116.00
RIGHT MAIN WHEEL	600.00	109.60	65760.00
REMOVED 50 GAL. FUEL	-300.00	95.00	-28500.00
			0.00
			0.00
			0.00
			0.00
			0.00
TOTALS	1402.00		119109.10
NEW C of G		84.96	

AIRCRAFT WEIGHED WITH FULL FUEL AND OIL AND FUEL WAS MATHMATICALLY REMOVED

SIGNATURE Wayne J Bishop for AMR Combs Grand Rapids Inc.
CRS# EAJR 431D

NOTE = EQUIPMENT CHANGED. SEE NEW WEIGHT & BALANCE DATED 01-16-2012.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
Budget Bureau No. 04-R060.1

FOR FAA USE ONLY
OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE: Piper	MODEL: PA28-180
	SERIAL NO.: 28-4315	NATIONALITY AND REGISTRATION MARK: N4946L
2. OWNER	NAME (*As shown on registration certificate*): Timothy P. Hartley	ADDRESS (*As shown on registration certificate*): 3220 Buckhaven Ada, Michigan 49301

3. FOR FAA USE ONLY

4. UNIT IDENTIFICATION / **5. TYPE**

UNIT	MAKE	MODEL	SERIAL NO.	5. TYPE: REPAIR	5. TYPE: ALTERATION
AIRFRAME	◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ (*As described in item 1 above*) ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆				X
POWERPLANT					
PROPELLER					
APPLIANCE	TYPE				
	MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS	B. KIND OF AGENCY		C. CERTIFICATE NO.
Mayday Avionics, Inc. 5500 44th Street S.E. Grand Rapids, Michigan 49508		U.S. CERTIFICATED MECHANIC	C08-21
		FOREIGN CERTIFICATED MECHANIC	
	X	CERTIFICATED REPAIR STATION	
		MANUFACTURER	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE	SIGNATURE OF AUTHORIZED INDIVIDUAL
6-12-89	Ken Malone

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is [X] APPROVED [ ] REJECTED

BY							OTHER (*Specify*)
		FAA FLT. STANDARDS INSPECTOR		MANUFACTURER		INSPECTION AUTHORIZATION	
		FAA DESIGNEE	X	REPAIR STATION		CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	

DATE OF APPROVAL OR REJECTION	CERTIFICATE OR DESIGNATION NO.	SIGNATURE OF AUTHORIZED INDIVIDUAL
6-12-89	C08-21	Ken Malone

FAA Form 337 (7-67) (8320)

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. DESCRIPTION OF WORK ACCOMPLISHED *(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

Installed Terra AT3000 encoder. Unit is interfaced with a King KT76A transponder . Unit was installed per Terra installation manual PN 1900-4099-00 in accordance with FAA AC43-13-1A and AC43-13-2A. This system meets or exceeds the specificaitons of 91.36.

Installed Arnav R-50 Loran C. System consists of the receiver and the antenna/ preamp. System is not interfaced with an external CDI or an autopilot. Installation was done per Aranv installation manual PN 570-0052 in accordance with FAA AC43-13-1A and AC43-13-2A. This system is approved for VFR flight only and the aircraft panel has been placarded accordingly.

Weight and balance has been revised and log book entry completed.

----------END----------

☐ ADDITIONAL SHEETS ARE ATTACHED

★1975-G.P.O.-1703-M/673-200/175

MAYDAY AVIONICS INC.
5500 44th St. S.E.
Kent County Airport
Grand Rapids, MI. 49508

MINOR ALTERATIONS

DATE : 06/12/89

OWNER : Tim Hartley

ADDRESS: Kentwood, MI 49508

DESCRIPTION OF WORK:

INSTALLED: ARNAV R-50 Loran C, Antenna/Preamp, Terra AT3000 Encoder

AIRCRAFT MAKE: Piper

YEAR:

MODEL: PA28-180

SERIAL NO: N4946L

REG. NO:

ITEM		WEIGHT	ARM	MOMENT
OLD AIRCRAFT EMPTY WEIGHT:		1399.05	84.97	118,877.95
INSTALLED:	R-50 Loran C	3.25	64.80	210.60
	Anenna/Preamp	1.25	203.00	253.75
	AT3000 Encoder	.90	56.00	50.58
		1404.45	85.01	119,392.88

THIS DOCUMENT SUPERSEDED DATE 8-13-90

AIRCRAFT GROSS WEIGHT: 2400.00

NEW A/C EMPTY WEIGHT : 1404.45

NEW A/C E.W.C.G. : 85.01

NEW A/C USEFUL LOAD : 995.55

NEW MOMENT : 119,392.88

FAA REPAIR STATION C08-21

AUTHORIZED SIGNATURE: Ken Malone

REPAIRMAN'S NUMBER: 2320488

MAYDAY AVIONICS INC.
5500 44th St. S.E.
Kent County Airport
Grand Rapids, MI. 49508

MINOR ALTERATIONS

DATE : November 3, 1982

OWNER : Tim Hartley

ADDRESS: 3268 Coach Lane Apt. 2A
Kentwood, MI. 49508

DESCRIPTION OF WORK:

AIRCRAFT MAKE: Piper

YEAR:

MODEL: PA28-180

SERIAL NO: 28-4315

REG. NO: 4946L

Removed Mark 3. Installed King KMA-24, KX-155 and KI-209.

ITEM	WEIGHT	ARM	MOMENT
OLD AIRCRAFT EMPTY WEIGHT:	1394.55	85.03	118590.85
REMOVED:			
Mark 3	-4.70	63.00	-296.10
INSTALLED:			
King KMA-24	1.70	64.00	108.80
King KX-155	5.60	63.00	352.80
King KI-209	1.90	64.00	121.60

Revised
6-12-1989

AIRCRAFT GROSS WEIGHT: 2400.00

NEW A/C EMPTY WEIGHT : 1399.05

NEW A/C E.W.C.G. : 84.97

NEW A/C USEFUL LOAD : 1000.95

NEW MOMENT : 118877.95

FAA REPAIR STATION C08-21

AUTHORIZED SIGNATURE:
K R Malone

REPAIRMAN'S NUMBER:
232-0488

MAYDAY AVIONICS INC.
5500 44th St. S.E.
Kent County Airport
Grand Rapids, MI. 49508

FAA-C08-21

Date Jan. 25, 1982

WEIGHT AND BALANCE DATA

AIRCRAFT OWNER

Tim Hartley
3268 Coach Lane Apt. 2A
Kentwood, MI. 49508

AIRCRAFT

MAKE Piper
MODEL PA28-180
SERIAL NO. 28-4315
REGISTRATION N-4946L

COMPUTATION

	WEIGHT	ARM	MOMENT
Original	1390.6	85.08	118312.24
REMOVED:			
Bendix TPR-601	-3.8	62.2	-236.36
INSTALLED:			
Stereo Player	4.75	68.5	325.37
King KT76A Transponder	3.00	63.2	189.6
	1394.55	85.03	118590.85

New Moment	118590.85
New C of G	85.03
New Empty Weight	1394.55
New Useful Load	1005.45

Superseded
11-2-82
K Malone
C08-21

A logbook entry has been made this date.

Authorized Signature Kenneth P Malone

Repairmans No. 363-30-9478

AVANTGARDE

WEIGHT AND BALANCE

DATE 7/26/23 WORK ORDER _____ MAKE + MODEL PA-28-180 REG. NO 49161

OWNER'S NAME MR. GOWN ADDRESS _____

POSITON	SCALE READING	TARE	NET WEIGHT
LEFT WING			
RIGHT WING			
NOSE			

NOSE WT. X DIST. WT / TOTAL WEIGHT X DIST. = / TOT WT. = CG.

ITEM	REM	INST	WEIGHT	ARM	+ MOM −	LOCATION
A/C E/W			1388.6	85.4	118637.	
			2 ~~#~~		394.6	
	INST WT			SUB TOTAL MOM		
	REM WT					
	TOTAL WT			TOTAL MOM		

REMARKS

CATEGORY	GROSS WT	EMPTY WT	EGG	USEFUL LOAD
NORMAL	2400	1350.6	85.08	1009.4

DATE	REVISED WEIGHT AND BALANCE	N-4946L 28-4315
16 Dec. 69		X

Installed Heated Pitot, KS Mixture-Mizer EGT-1L, Bendix TPR 610 Transponder, and Narco ADF-31 Loop Antenna Model CN 325A2.

	WGT (Lbs)	ARM (In.)	Moment
Aircraft Empty Weight	1388.6	85.42	118637
Heated Pitot	.4	100	40
KS Model EGT-1L Mixture-Mizer	.4	68	27
Bendix TPR 610 Transponder	3.8	62.2	236
Antenna	.12	142.8	17
Cable	1.16	99.8	116
Mounting Bracket	.37	64.4	24
Narco ADF Antenna CN 325A (Removed)	-2.7	162.0	- 437
Narco ADF Antenna CN 325A2	1.8	162.0	292
	1393.95	84.5	118952

New Empty Weight: 1393.95 Lbs.

New Empty Weight C.G.: 85.3 Inches

Above equipment installed per Manufacturer's recommendations.

REVISED BY: [signature] A&P 1543495

DATE	REVISED WEIGHT AND BALANCE	N-4946L 28-4315 32-
2 Oct 67		

Installed Narco Mark III, #2 VHF antenna, Narco ADF-31, and antennas.

Aircraft Empty Weight	1369.0	85.4	116916
#2 VHF Antenna	.3	192.8	58
#2 Antenna cable	.5	135.0	68
Narco Mark III	7.5	63.6	477
Narco ADF-31: Receiver	5.1	64.4	328
Loop antenna	2.7	162.0	437
Loop Cable	1.7	108.0	184
LF Antenna	.5	167.0	84
Marker Antenna	1.2	64.8	78
Radio Junction (Removed)	- .6	67.2	- 40
Transmitter selector box	.7	67.2	47
	1388.6		118637

REVISED 12-16-69

New Empty Weight 1388.6

New Empty Weight C G 85.4

Revised by:

SUNTRONICS, INC.
FAA CERT. NO. 540
MUNICIPAL AIRPORT
VERO BEACH, FLA.