

Cawthra Joshua

From: Hirsch, Jonathon [REDACTED]
Sent: Wednesday, November 09, 2016 8:57 AM
To: Cawthra Joshua
Subject: RE: WPR16LA092 - POH

That is fine.

Thanks,
Jon Hirsch
Air Safety Investigator, D175
Textron Aviation

From: Cawthra Joshua [REDACTED]
Sent: Wednesday, November 09, 2016 9:43 AM
To: Hirsch, Jonathon
Subject: WPR16LA092 - POH

Jon,

As part of the report release, I'd like to use the attached portion of the 1957 Cessna 182 POH in our public docket (pages 1-9, 4-3, 5-1, 5-3, 5-5, 5-7). Thanks.

Josh

Joshua Cawthra
Senior Aviation Accident Investigator
National Transportation Safety Board
[REDACTED]
Federal Way, WA 98003

[REDACTED]

Cessna 182



1957

OWNER'S MANUAL

DESCRIPTION

OIL SPECIFICATION AND GRADE.

Aviation grade oil is recommended for your Cessna 182 and should be changed every 25 hours of operation. When adding or changing oil, use the grades in the following table:

Average Outside Temperature	Recommended Oil Grade
Below 40° F.	SAE 30
Above 40° F.	SAE 50

OIL TEMPERATURE GAGE.

A capillary type, oil temperature gage (11, figure 1) is mounted within the engine instrument cluster on the right side of the instrument panel. A green arc on the gage dial indicates the normal operating range of oil temperatures. Refer to Section IV for instrument markings.

OIL PRESSURE GAGE.

An oil pressure gage (17, figure 1) is mounted within the engine instrument cluster on the right side of the instrument panel. The gage is calibrated in pounds per square inch.

Refer to Section IV for instrument markings.

FUEL SYSTEM.

Fuel is supplied to the engine from two rubberized, bladder-type fuel cells, one located in each wing. From these tanks, fuel is gravity-fed through a fuel selector valve and fuel strainer to the engine carburetor.

FUEL SPECIFICATION AND GRADE.

Aviation grade fuel should always be used except under emergency conditions. The recommended fuel is 80 octane minimum rating. Highly leaded fuels are not recommended.

FUEL SELECTOR VALVE.

A rotary-type fuel selector valve is located between the front seats at the aft end of the cabin floor tunnel. The valve has four positions labeled "BOTH OFF", "LEFT TANK", "BOTH ON", and "RIGHT TANK". The "BOTH OFF" position shuts off both fuel tanks from the fuel system and allows no fuel to pass the fuel selector valve. The "LEFT TANK" or

DESCRIPTION

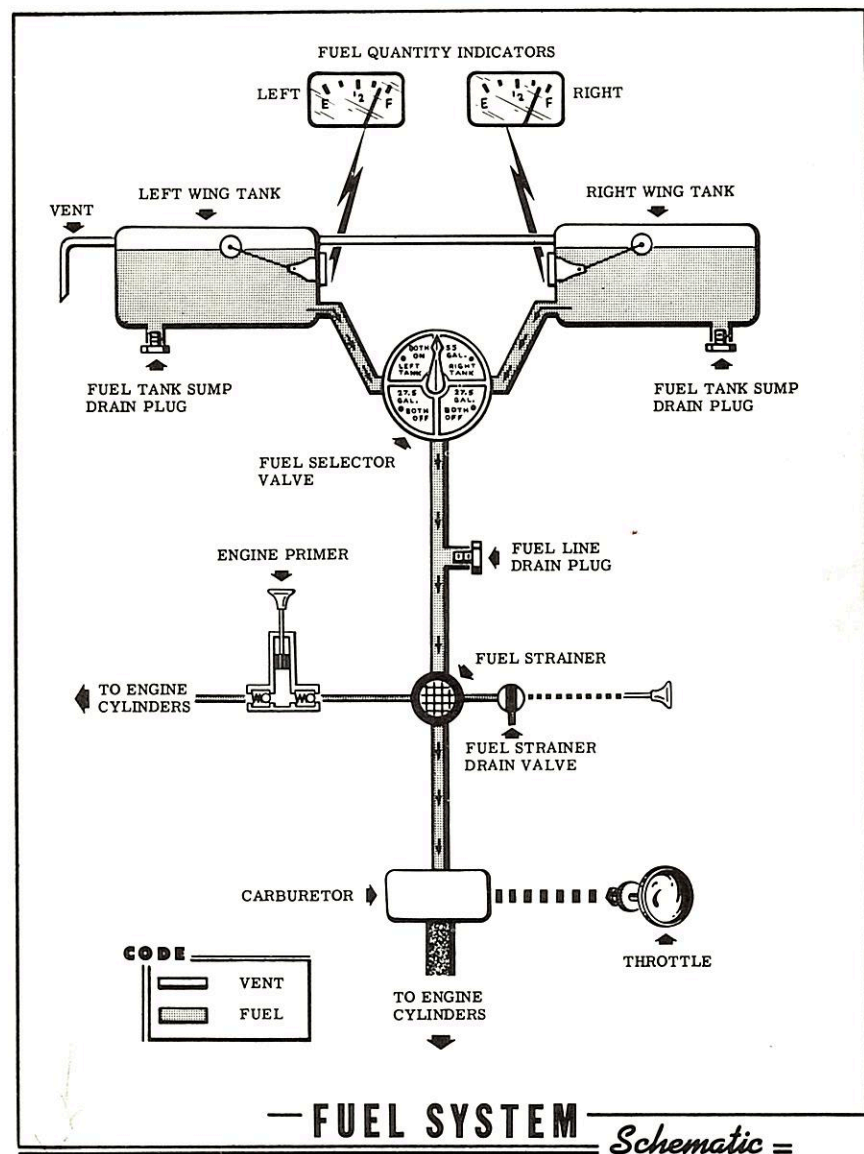


Figure 4.

FUEL QUANTITY DATA (U. S. GALLONS).

TANKS	NO	USABLE FUEL ALL FLIGHT CONDITIONS	ADDITIONAL USABLE FUEL FOR LEVEL FLIGHT ONLY	UNUSABLE FUEL	TOTAL FUEL VOLUME EACH
LEFT WING	1	27.5 gal.	3.5 gal.	1.5 gal.	32.5
RIGHT WING	1	27.5 gal.	3.5 gal.	1.5 gal.	32.5

OPERATING LIMITATIONS

Normal Operation Range.....64-160 mph (green arc)
Maximum Speed Flaps Extended.....100 mph
Flap Operation Range.....55-100 mph (white arc)
Maneuvering Speed*.....124 mph

*(The maximum speed at which you can use abrupt control travel without exceeding the design load factor.)

ENGINE OPERATION LIMITATIONS.

Power and Speed.....230 bhp at 2600 rpm

ENGINE INSTRUMENT MARKINGS.

OIL TEMPERATURE INDICATOR

Normal Operating Range.....Green Arc
Do Not Exceed.....Red Line

OIL PRESSURE GAGE

Idling Pressure.....10 psi (red line)
Normal Operating Range.....30-60 psi (green arc)
Maximum Pressure.....100 psi (red line)

MANIFOLD PRESSURE GAGE

Normal Operating Range.....15-23 in. Hg (green arc)

CYLINDER HEAD TEMPERATURE

Normal Operating Range.....300-425° F (green arc)
Do Not Exceed.....500° (red line)

TACHOMETER

Normal Operating Range.....2200-2450 rpm (green arc)
Cautionary Range.....2450-2600 rpm
Do Not Exceed (Engine rated speed).....2600 rpm (red line)

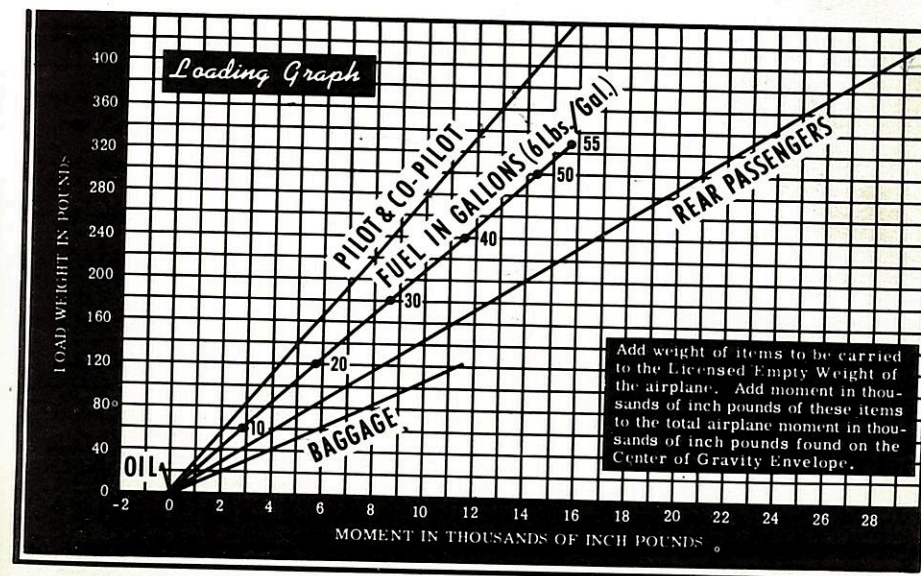
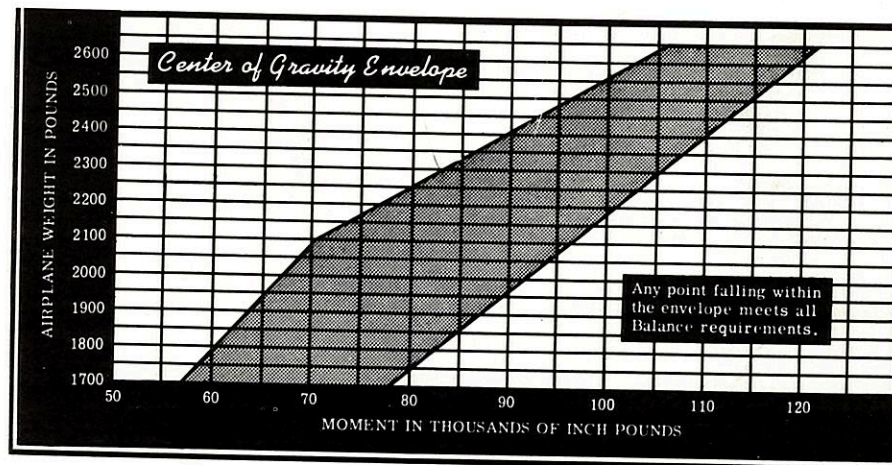
WEIGHT AND BALANCE.

All aircraft are designed for certain limit loads and balance conditions. These specifications for your 182 are charted on page 4-3.

A weight and balance report and equipment list is furnished with each airplane. All the information on empty weight c.g. and allowable limits for your particular airplane, as equipped when it left the factory, is shown. Changes in the original equipment affecting weight empty c.g. are required by the C.A.A. to be recorded in the repair and alteration form 337.

Using the weight empty, c.g. location, and moment from the weight and balance report for your airplane and following the example, the exact moment may be readily calculated which, when plotted on the upper chart will quickly show whether or not the c.g. is within limits. Refer to the loading graph for

OPERATING LIMITATIONS



~~11/14/89 E.W. 1680 MOM 62.72~~

12/18/91 E.W. 1658 MOM 60.4
6/1/00 EW 1642 MOM 61269.7

OPERATING LIMITATIONS

moment values of items to be carried.

EXAMPLE FOR AN AIRPLANE WITH A LICENSED EMPTY WEIGHT OF 1621 LBS. AND A MOMENT OF 57,047 IN. LBS.

	WT.	MOMENT
		1000
EMPTY WEIGHT (LICENSED).....	1621.0	+ 57.0
OIL (12 QTS.).....	22.5	- 0.3
PILOT & PASSENGER (1).....	340.0	+12.2
REAR PASSENGERS (2).....	290.0	+20.3
FUEL (MAXIMUM) 55 GAL.....	330.0	+15.8
BAGGAGE (TO MAKE GR. WT.).....	46.5	+ 4.4
Total.....	2650.0	109.4

Locate this point (2650.0-109.4) on the center of gravity envelope graph, and, since the point falls within the envelope, the above loading meets all balance requirements.

NOTE

The above problem is an example of only one of many different loading configurations. To best utilize the available payload for *your* airplane, the loading charts should be consulted to determine proper load distribution.

Section

V

operational data

THE OPERATIONAL DATA shown on the following pages are compiled from actual tests with airplane and engine in good condition and using average piloting technique and lean mixture. You will find this data a valuable aid when planning your flights. However, inasmuch as the number of variables involved precludes great accuracy, an ample fuel reserve should be provided. The charts make no allowance for wind, navigational error, pilot technique, warm-up, take-off, climb, etc. All of these factors must be considered when estimating reserve fuel.

In addition to the advantages of comfort and safety, airplanes are primarily an exceptionally rapid mode of transportation. Therefore, to realize the maximum usefulness from your 182, take advantage of the power your engine can develop. For normal cruising, choose a cruising power setting which gives you a fast cruising speed. If your destination is over 600 miles, it may pay you to fly at lower power settings, thereby increasing your range and allowing you to make the trip non-stop with ample fuel reserve. Use the range charts to solve flight planning problems of this nature.

MODEL 182 — Airspeed Correction Table

FLAPS UP	IAS	60	80	100	120	140	160	180
	TIAS	68	82	100	118	138	157	176
FLAPS DOWN	IAS	40	50	60	70	80	90	100
	TIAS	56	60	67	74	83	92	101

Figure 15. Airspeed Correction Table



OPERATIONAL DATA

Figure 17. Take-Off & Climb Chart

182 CRUISE & RANGE PERFORMANCE									
Altitude	RPM	M. P.	BHP	%BHP	TAS MPH	Gal./Hr.	End. Hours	Mi./Gal.	Range Miles
2500	2450	23	175	76	152	14.2	3.9	10.6	585
		22	166	72	148	13.4	4.1	11.0	605
		21	157	68	145	12.7	4.3	11.4	625
		20	148	63	142	12.0	4.6	11.8	650
	2300	23	164	71	148	13.1	4.2	11.3	620
		22	153	67	144	12.2	4.5	11.8	650
		21	143	62	140	11.5	4.8	12.2	670
		20	135	59	136	11.0	5.0	12.4	680
	2200	23	153	67	144	12.1	4.6	11.9	655
		22	144	63	140	11.4	4.8	12.2	670
		21	135	59	136	10.8	5.1	12.6	695
		20	126	55	132	10.2	5.4	12.9	710
Maximum Range Settings	2000	20	107	47	120	8.7	6.3	13.7	755
		19	99	43	115	8.2	6.7	14.0	770
		18	89	39	107	7.5	7.3	14.3	785
		17	81	35	99	7.0	7.9	14.2	780
5000	2450	23	179	78	157	14.5	3.8	10.8	595
		22	169	73	153	13.6	4.0	11.3	620
		21	161	70	150	13.0	4.2	11.5	630
		20	150	65	146	12.2	4.5	11.9	655
	2300	23	167	73	152	13.4	4.1	11.4	625
		22	158	69	149	12.6	4.4	11.8	650
		21	148	64	144	11.9	4.6	12.0	660
		20	139	60	140	11.2	4.9	12.4	685
	2200	23	157	68	149	12.4	4.4	12.1	665
		22	148	64	144	11.7	4.7	12.3	675
		21	138	60	140	11.0	5.0	12.7	700
		20	131	57	137	10.5	5.2	13.1	720
Maximum Range Settings	2000	19	103	45	120	8.5	6.5	14.1	775
		18	94	41	112	7.9	7.0	14.2	780
		17	86	37	105	7.3	7.5	14.4	790
		16	79	34	98	6.8	8.0	14.4	790
7500	2450	21	163	71	154	13.1	4.2	11.8	650
		20	153	67	150	12.4	4.4	12.0	660
		19	143	62	146	11.7	4.7	12.4	685
		18	133	58	140	11.0	5.0	12.7	700
	2300	21	151	66	149	12.2	4.5	12.2	670
		20	142	62	145	11.6	4.7	12.4	680
		19	133	58	140	11.0	5.0	12.7	700
		18	125	54	136	10.5	5.2	12.9	710
	2200	21	143	62	146	11.4	4.8	12.7	700
		20	134	58	141	10.7	5.1	13.1	720
		19	126	54	136	10.2	5.4	13.4	735
		18	118	51	132	9.7	5.7	13.6	750
Maximum Range Settings	2000	19	107	47	124	8.7	6.3	14.2	780
		18	98	43	117	8.1	6.8	14.4	790
		17	90	39	110	7.6	7.2	14.4	790
		16	82	36	101	7.0	7.8	14.4	790

Cruise performance is based on standard conditions, zero wind, lean mixture, 55 gallons of fuel, no fuel reserve, and 2650 pounds gross weight.

Figure 18.

182 CRUISE & RANGE PERFORMANCE									
Altitude	RPM	M. P.	BHP	%BHP	TAS MPH	Gal./Hr.	End. Hours	Mi./Gal.	Range Miles
10,000	2450	19	146	63	150	11.9	4.6	12.6	690
		18	137	60	146	11.2	4.9	13.0	715
		17	127	55	140	10.6	5.2	13.3	730
		16	118	51	134	10.0	5.5	13.4	735
	2300	19	137	60	146	11.1	5.0	13.1	720
		18	128	56	140	10.5	5.2	13.4	735
		17	118	51	134	9.8	5.6	13.6	750
		16	109	47	128	9.2	6.0	14.0	770
	2200	19	129	56	141	10.4	5.3	13.6	745
		18	120	52	135	9.8	5.6	13.7	755
		17	112	49	130	9.3	5.9	13.9	765
		16	103	45	122	8.7	6.3	14.0	770
Maximum Range Settings	2000	18	102	44	122	8.4	6.5	14.5	795
		17	93	40	114	7.8	7.1	14.6	805
		16	87	38	106	7.4	7.4	14.4	790
		15	80	35	99	6.9	8.0	14.4	790
15,000	2450	16	124	54	142	10.4	5.3	13.6	750
		15	114	50	135	9.8	5.6	13.7	755
		14	105	46	127	9.2	6.0	13.8	760
	2300	16	115	50	136	9.6	5.7	14.0	770
		15	107	47	129	9.1	6.0	14.1	775
		14	98	42	120	8.5	6.5	14.1	775
	2200	16	109	47	131	9.1	6.0	14.3	785
		15	101	44	124	8.6	6.4	14.5	795
		14	92	40	114	8.0	6.9	14.3	785
	Maximum Range Settings	16	93	40	115	7.8	7.1	14.8	815
		15	86	37	105	7.3	7.5	14.4	790
		14	78	34	92	6.8	8.1	13.5	745
20,000	2450	13	102	44	125	9.0	6.1	13.9	765
		12	93	40	114	8.3	6.6	13.6	750
	2300	13	96	42	118	8.4	6.6	14.1	775
		12	87	38	105	7.7	7.1	13.5	745
	2200	13	90	39	109	7.8	7.0	13.9	765
		12	81	35	89	7.2	7.7	12.4	680

Cruise performance is based on standard conditions, zero wind, lean mixture, 55 gallons of fuel, no fuel reserve, and 2650 pounds gross weight.

Range Chart

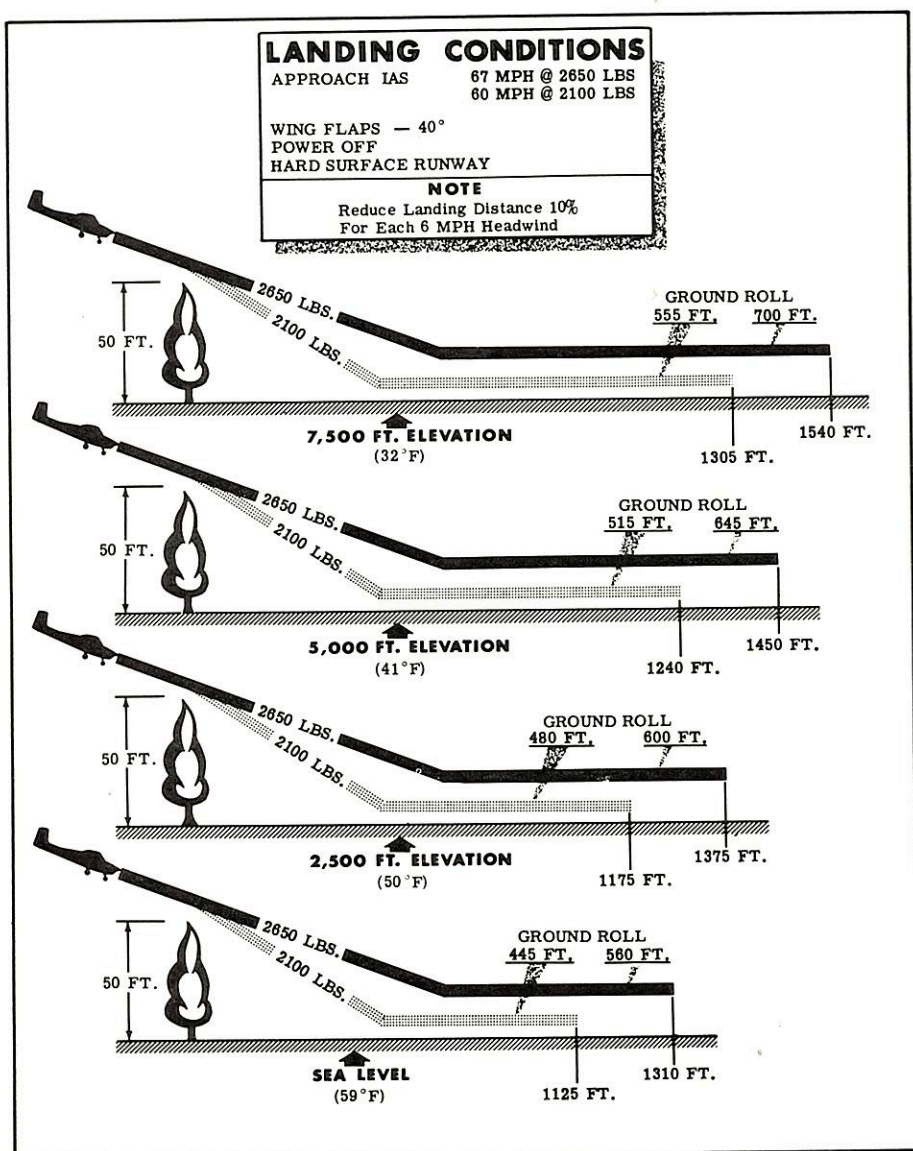


Figure 19. Landing Diagram