It is Saturday, April 11, 2009 and a beautiful day in your home town of Elma, WA. Waking up that morning, you decide that it's a good day to take out your Cessna 172 for a quick VFR cross country around the area. You call your friends Kate and Brittany, and they decide to go with you. After a quick look at the chart, you decide to depart your home airport of Elma(4W8, located at N46 59.43 W123 25.78) fly to Olympia, WA (KOLM, located at N46 58.16 W122 54.15) to top off your fuel tanks. From Olympia, you'll fly to Paine Field (KPAE, located at N47 54.42 W122 16.89) to check out all the 777s sitting on the Boeing ramp, then to Friday Harbor (KFHR, located at N48 31.32 W123 01.46) for a picnic lunch. After lunch, you'll head back to Elma. Your information is as follows:

Aircraft Records:

Annual Inspection:	04/12/2008
ELT Inspection:	04/12/2008
Transponder Inspection:	07/15/2007
Pitot-Static Inspection:	07/15/2007
Basic Empty Weight:	1468 pounds, moment/1000 of 57.7
Fuel Arm:	47.9 inches aft of datum

Personal Records:

Date of birth:	10/31/1974
Commercial Pilot Certificate:	03/11/1996
Instrument Rating:	05/24/1994
Multi-Engine Rating:	05/17/2000
Biennial Flight Review:	01/25/2008
Class I Medical:	11/29/2004 (weight 193 pounds.)

Logbook as below:

Date	Hours	ASEL	AMEL	Day/Night	Landings	Remarks
1/09/2009	1.2	1.2		Day	1	Trip to YVR
1/10/2009	1.4	1.4		Day	1	Trip from YVR
1/11/2009	1.3	1.3		Day	2	Local flight

Passenger Information:

Kate:	Weight 135 pounds, will sit in front.
Brittany:	Weight 120 pounds, will sit in back.
Baggage:	20 pound cooler in baggage area 1.

Performance Information:

Climb (All legs)

TAS:	79 knots (Use METAR winds for departure airport during climb. On leg 1, use winds for KSHN due to no METAR at Elma.)
Fuel Flow:	11.0 GPH (Note: Each leg will use 1.1 gallons for taxi and run-up.
Rate of Climb:	500 feet per minute

Cruise (All legs) Power setting will be 2400 rpm. For Legs 1-3, use winds and temperatures aloft *closest* to your cruising altitude. On leg 4, interpolate winds and temperatures aloft as needed. On legs 1 and 2, use METAR temperature at KOLM for your cruise temperature. For all legs, use performance data for altitude *closest* to your cruising altitude. Interpolate as necessary for non-standard temperature.

Descent (All legs)

TAS:	Same as your cruise TAS. (Use METAR winds at destination for descent. On leg 4, use METAR winds at KOLM due to no METAR at Elma.)
Fuel Flow:	75% of your cruise fuel flow.
Rate of Descent:	1000 feet per minute

Takeoff and Landing Distances:

Use the chart data closest to your pressure altitude, interpolate as necessary for temperature. (For takeoff on leg 1, use METAR temperature at KSHN due to no METAR at Elma. For landing on leg 4, use METAR temperature for KOLM due to no METAR at Elma.)

Leg 1 Weather Information (4W8-KOLM)

```
METAR KSHN 111453Z AUTO 19003KT 10SM -RA FEW021 BKN058 OVC083
    06/02 A2997 RMK AO2 RAB1355E08B25 SLP151 P0000 60000 T00610050
    53014
METAR KOLM 111454Z 20006KT 10SM -RA FEW013 SCT060 OVC090 07/02 A3000
    RMK AO2 RAB02E13B36 SLP159 P0000 60000 T00720056 53015

TAF AMD KOLM 111500Z 1115/1212 21006KT P6SM SCT065 BKN090 OVC120
     TEMPO 1115/1118 -RA
     FM112200 20009KT P6SM VCSH SCT085 BKN120
     FM120400 17006KT P6SM BKN065 OVC080

WA CASCDS WWD ...UPDT
CSTL SXNS-INLAND...SCT120 BKN CI. 18Z BKN100 TOP 140. OTLK...VFR.
MTNS NW WA...SCT080 SCT CI. 15Z BKN100 TOP 140. ISOL -SHRA.
OTLK...VFR.

********  FD Winds Aloft Forecast  ********
DATA BASED ON 110000Z
REQUESTED
VALID 111200Z   FOR USE 0900-1800Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
SEA 2118 2227-04 2218-08 2222-13 2426-23 2531-35 263049 284354 283955
```

Leg 2 Weather Information (KOLM-KPAE)

```
METAR KOLM 111554Z 20006KT 10SM -RA FEW013 SCT060 OVC090 07/02 A3000
    RMK AO2 RAB02E13B36 SLP159 P0000 60000 T00720056 53015
METAR KPAE 111553Z 17016KT 10SM FEW015 OVC095 07/04 A2996 RMK AO2
    SLP148 T00720044

TAF AMD KPAE 111500Z 1115/1212 18011KT P6SM FEW010 SCT035 OVC090
     TEMPO 1115/1118 -RA
     FM112300 19009KT P6SM VCSH BKN070 OVC090
     FM120300 15008KT P6SM SCT060 OVC085

WA CASCDS WWD ...UPDT
CSTL SXNS-INLAND...SCT120 BKN CI. 18Z BKN100 TOP 140. OTLK...VFR.
MTNS NW WA...SCT080 SCT CI. 15Z BKN100 TOP 140. ISOL -SHRA.
OTLK...VFR.


********  FD Winds Aloft Forecast  ********
DATA BASED ON 110000Z
REQUESTED
VALID 111200Z   FOR USE 0900-1800Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
SEA 2118 2227-04 2218-08 2222-13 2426-23 2531-35 263049 284354 283955
```

Leg 3 Weather Information (KPAE-KFHR)

```
METAR KPAE 111753Z 17016KT 10SM SCT075 OVC095 09/04 A2996 RMK AO2
    SLP148 T00720044
METAR KFHR 111753Z AUTO 00000KT 10SM OVC100 08/05 A2996 RMK AO2
    SLP145 T00780050

TAF KNUW 1115/1215 15012KT 9999 VCSH SCT025 BKN080 OVC200 650807
     QNH2988INS
     BECMG 1200/1202 14014G22KT 9999 NSW SCT020 BKN030 BKN080
     BKN200 600000 QNH2998INS
     BECMG 1210/1212 14024G32KT 6000 -SHRA SCT010 BKN020 OVC040
     650309 QNH2989INS T11/1122Z T06/1212Z

WA CASCDS WWD ...UPDT
CSTL SXNS-INLAND...SCT120 BKN CI. 18Z BKN100 TOP 140. OTLK...VFR.
MTNS NW WA...SCT080 SCT CI. 15Z BKN100 TOP 140. ISOL -SHRA.
OTLK...VFR.


********  FD Winds Aloft Forecast  ********
DATA BASED ON 110000Z
REQUESTED
VALID 120000Z   FOR USE 1800-0500Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
SEA 2324 2419-04 2721-08 2727-12 2848-22 2973-33 309247 309353 286757
```

Leg 4 Weather Information (KFHR-4W8)

```
METAR KFHR 111953Z 17016KT 10SM SCT095 OVC110 09/04 A2996 RMK AO2
    SLP148 T00720044
METAR KOLM 111954Z 20006KT 10SM SCT090 OVC110 07/02 A3000
    RMK AO2 RAB02E13B36 SLP159 P0000 60000 T00720056 53015

TAF AMD KOLM 111500Z 1115/1212 21006KT P6SM SCT065 BKN090 OVC120
     TEMPO 1115/1118 -RA
     FM112200 20009KT P6SM VCSH SCT085 BKN120
     FM120400 17006KT P6SM BKN065 OVC080

WA CASCDS WWD ...UPDT
CSTL SXNS-INLAND...SCT120 BKN CI. 18Z BKN100 TOP 140. OTLK...VFR.
MTNS NW WA...SCT080 SCT CI. 15Z BKN100 TOP 140. ISOL -SHRA.
OTLK...VFR.


********  FD Winds Aloft Forecast  ********
DATA BASED ON 110000Z
REQUESTED
VALID 120000Z   FOR USE 1800-0500Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
SEA 2324 2419-04 2721-08 2727-12 2848-22 2973-33 309247 309353 286757
```

ELMA MUNI (4W8) 1 SW UTC−8(−7DT) N46°59.43′ W123°25.78′ SEATTLE

35 B TPA—835(800)

RWY 07–25: H2280X30 (ASPH) MIRL (NSTD)

RWY 07: Trees. Rgt tfc. **RWY 25:** Thld dsplcd 180′ Trees.

AIRPORT REMARKS: Unattended. Rwy 07–25 NSTD MIRL. Rwy 25 dsplcd thld unlgtd, 2095′ of Rwy 07–25 avbl for ngt ops. Rwy 07–25 disregard white X's on rwy. Rwy 07–25 very narrow faded centerline stripe, rwy 1D NSTD dimensions. ACTIVATE NSTD MIRL Rwy 07–25—CTAF.

COMMUNICATIONS: CTAF/UNICOM 122.8

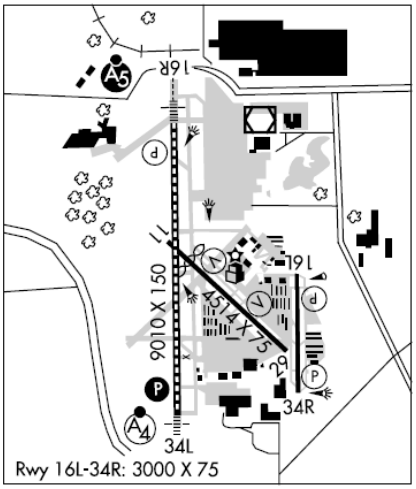
SEATTLE FSS (SEA) TF 1–800–WX–BRIEF. NOTAM FILE SEA.

EVERETT

SNOHOMISH CO (PAINE FLD) (PAE) 6 SW UTC−8(−7DT) N47°54.42′ W122°16.89′ SEATTLE

606 B S4 **FUEL** 100LL, JET A OX 1, 3 TPA–See Remarks LRA H–1B, L–13B

ARFF Index—See Remarks IAP, AD



RWY 16R–34L: H9010X150 (ASPH–GRVD) S–100, D–200, ST–175, DT–350, DDT–830 HIRL CL

RWY 16R: MALSR. PAPI(P4R)—GA 2.8°. Rgt tfc.

RWY 34L: MALSF. PAPI(P4L) GA 3.0° TCH 75′. Trees.

RWY 11–29: H4514X75 (ASPH) S–30 MIRL 0.9% up SE

RWY 11: VASI(V2L)—GA 3.25° TCH 60′. Thld dsplcd 799′. Trees.

RWY 29: VASI(V2R)—GA 4.0° TCH 57′. Trees.

RWY 16L–34R: H3000X75 (ASPH) S–12.5 MIRL

RWY 16L: REIL. PAPI(P2L)—GA 3.0°. Pole.

RWY 34R: REIL. PAPI(P2R)—GA 3.0°. Pole. Rgt tfc.

AIRPORT REMARKS: Attended 1500–0500Z‡. For jet and helicopter fuel after hrs call 425–355–6600. Helicopters prohibited at fueling islands. Flocks of large and small birds in vicinity of arpt. Class IV, ARFF Index A. Arpt CLOSED to air carrier ops with more than 30 passenger seats 0500–1500Z‡ except PPR ctc arpt director 425–353–2110/1606. For additional ARFF capability ctc arpt director 425–353–2110/1606. Rwy 11–29 and Rwy 16L–34R CLOSED between 0500–1500Z‡. Large acft fly W pattern over water, small acft fly E pattern over arpt. Be alert for converging tfc on base to final legs Rwys 16R–34L 0500–1500Z‡. Training flights discouraged after 0600Z‡. Twy A–2 restricted to 30,000 lbs. Avoid overflight of Boeing ramp NE corner of arpt due to JET blast. Rwy 34L departures discouraged in calm wind conditions. Avoid intersection departures from Rwy 16L–34R and Rwy 29. Avoid intersection departures from Rwy 11 except from Twy Delta 1 intersection. Twy Echo lgts OTS indef. Areas not visible from twr include E edge of S 1200′ of Twy A, Twy E from SE corner of west hangars to Twy A, mid section of outer terminal ramp, Twy H from NW edge of west hangars to Twy E, NE edge of inner terminal ramp. When twr clsd ACTIVATE HIRL Rwy 16R–34L, MALSR Rwy 16R and PAPI Rwy 34L—CTAF. Noise sensitive arpt, for noise abatement procedures and tfc procedures call arpt ops 425–353–2110 ext 2230. It is requested that pilots adhere to the following noise abatement procedures unless otherwise instructed by twr, itinerant arrival and low apch of small acft over 250 horsepower authorized on Rwy 29, Rwy 16L and Rwy 34R. Itinerant departure of small acft over 250 horsepower on Rwy 11 and Rwy 34R. If access to Boeing ramp required ctc Boeing Flight Dispatch 206–655–3421 for approval during normal duty hours. TPA–1606 (1000) for light acft, 2006 (1400) for heavy acft. Landing fee for acft over 30,000 lbs GWT.

WEATHER DATA SOURCES: ASOS (425) 355–6192. LAWRS.

COMMUNICATIONS: CTAF 132.95 **ATIS** 128.65 (425)355–9797. **UNICOM:** 122.95

SEATTLE FSS (SEA) TF 1–800–WX–BRIEF. NOTAM FILE PAE.

PAINE RCO 122.55 (SEATTLE FSS)

Ⓡ **SEATTLE CENTER APP/DEP CON** 128.5

PAINE TOWER 132.95 (acft arrival W of centerline or departure Rwy 16R–34L) 120.2 (acft arrival E of centerline or departure Rwy 16L–34R) (1500–0500Z‡) **GND CON** 121.8 **CLNC DEL** 126.75

AIRSPACE: CLASS D svc 1500–0500Z‡ other times CLASS G.

RADIO AIDS TO NAVIGATION: NOTAM FILE PAE.

PAINE (L) VORW/DME 110.6 PAE Chan 43 N47°55.19′ W122°16.67′ at fld. 670/20E.

RITTS NDB (LOM) 396 PA N48°03.17′ W122°17.33′ 158° 8.8 NM to fld.

ILS 109.3 I–PAE Rwy 16R Class IE. LOM RITTS NDB. LOC/GS unmonitored (0500–1500Z‡)

COMM/NAV/WEATHER REMARKS: Emerg frequency 121.5 not avbl at twr.

FRIDAY HARBOR

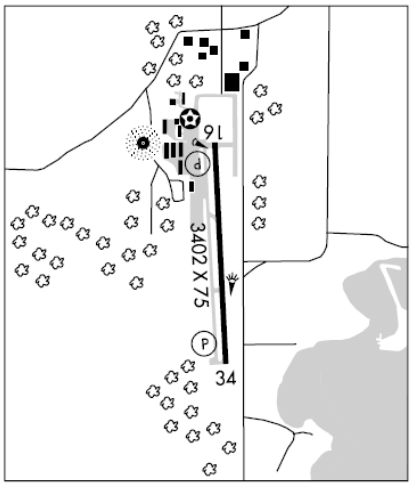
FRIDAY HARBOR (FHR) 0 SW UTC−8(−7DT) N48°31.32′ W123°01.46′ SEATTLE

113 B S4 **FUEL** 100 LRA L–1E

RWY 16–34: H3402X75 (ASPH) S–12.5 MIRL 0.8% up N IAP

RWY 16: PAPI(P4R)—GA 4.0° TCH 38′. Building. Rgt tfc.

RWY 34: REIL. PAPI(P4L)—GA 3.5° TCH 40′. Trees. Rgt tfc.



AIRPORT REMARKS: Attended 1600–0100Z‡. Fuel system self svc with credit card. Noise abatement procedures in effect ctc arpt manager 360–378–4724. Preferred Rwy 16 in calm wind conditions. Due to high concentration of tfc invof arpt recommend ldg lgts or forward visibility lgts turned on while utilizing arpt. Rwy 16 PAPI baffled W of centerline, lateral coverage has been narrowed to avoid obstacles during descent, maintain highest possible altitude and close alignment to rwy centerline. Acft in excess of 12,500 lbs charged fee based on weight and time of year—ctc arpt manager for information. Soft ground between tiedowns west parking area. Limited transient parking avbl during summer. ACTIVATE MIRL Rwy 16–34 and REIL Rwy 34—CTAF. ACTIVATE rotating bcn—CTAF.

WEATHER DATA SOURCES: ASOS 135.675 (360) 378–8491.

COMMUNICATIONS: CTAF 128.25

SEATTLE FSS (SEA) TF 1–800–WX–BRIEF. NOTAM FILE FHR.

Ⓡ **WHIDBEY APP/DEP CON** 118.2

RADIO AIDS TO NAVIGATION: NOTAM FILE BLI.

WHATCOM (H) VORTACW 113.0 HUH Chan 77 N48°56.72′ W122°34.76′ 195° 31.0 NM to fld. 83/20E. **HIWAS.**

NDB (MHW) 284 FHR N48°31.61′ W123°01.68′ at fld. NOTAM FILE FHR.

OLYMPIA (OLM) 4 S UTC−8(−7DT) N46°58.16′ W122°54.15′ SEATTLE

209 B S4 **FUEL** 80, 100, 100LL, JET A OX 1, 3, 4 LRA H–1B, L–1D

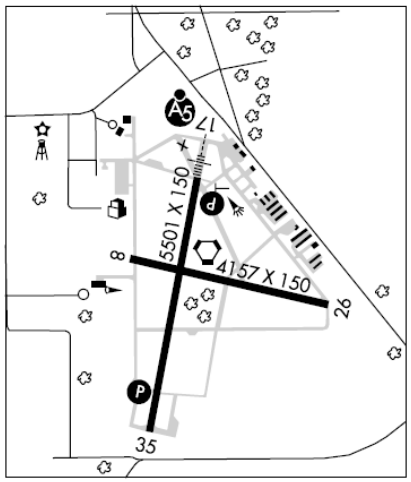
RWY 17–35: H5501X150 (ASPH–GRVD) S–75, D–94, ST–87, DT–142 HIRL IAP, AD

RWY 17: MALSR. PAPI(P4L)—GA 3.0° TCH 54′.

RWY 35: REIL. PAPI(P4L)—GA 3.0° TCH 54′. Rgt tfc.

RWY 08–26: H4157X150 (ASPH) S–30

RWY 08: Rgt tfc. **RWY 26:** Tree.



AIRPORT REMARKS: Attended 1600–0200Z‡. Twy lgts on Twy W, Twy A, Twy G, Twy L and Twy B. When twr clsd ACTIVATE HIRL Rwy 17–35, MALSR Rwy 17, PAPI Rwy 17 and Rwy 35, REIL Rwy 35, twy lgts and directional signage—CTAF. Landing fee.

WEATHER DATA SOURCES: ASOS 135.725 (360) 943–1278. **HIWAS** 113.4 OLM.

COMMUNICATIONS: CTAF 124.4 **ATIS** 135.725 **UNICOM** 122.95

SEATTLE FSS (SEA) TF 1–800–WX–BRIEF. NOTAM FILE OLM.

Ⓡ **SEATTLE APP/DEP CON** 121.1

TOWER 124.4 (1600–0400Z‡) **GND CON** 121.6

AIRSPACE: CLASS D svc 1600–0400Z‡ other times CLASS E.

RADIO AIDS TO NAVIGATION: NOTAM FILE OLM.

(H) VORTACW 113.4 OLM Chan 81 N46°58.30′ W122°54.11′ at fld. 200/19E. **HIWAS.**

DME unusable:

223°–258° byd 20 NM blo 4,100′

258°–283° byd 30 NM blo 4,100′

358°–043° byd 10 NM blo 6,000′

358°–043° byd 20 NM blo 7,000′

ILS 111.9 I–OLM Rwy 17. Unmonitored during hours twr closed. LOC unusable byd 25° right of course.

COMM/NAV/WEATHER REMARKS: Emerg frequency 121.5 not avbl at twr.

TAKEOFF DISTANCE

MAXIMUM WEIGHT 2300 LBS

SHORT FIELD

CONDITIONS:
Flaps Up
Full Throttle Prior to Brake Release
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique as specified in Section 4.
2. Prior to takeoff from fields above 3000 feet elevation, the mixture should be leaned to give maximum RPM in a full throttle, static runup.
3. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
4. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
2300	52	59	S.L.	720	1300	775	1390	835	1490	895	1590	960	1700
			1000	790	1420	850	1525	915	1630	980	1745	1050	1865
			2000	865	1555	930	1670	1000	1790	1075	1915	1155	2055
			3000	950	1710	1025	1835	1100	1970	1185	2115	1270	2265
			4000	1045	1880	1125	2025	1210	2175	1300	2335	1400	2510
			5000	1150	2075	1240	2240	1335	2410	1435	2595	1540	2795
			6000	1265	2305	1365	2485	1475	2680	1585	2895	1705	3125
			7000	1400	2565	1510	2770	1630	3000	1755	3245	1890	3515
			8000	1550	2870	1675	3110	1805	3375	1945	3670	2095	3990

Figure 5-4. Takeoff Distance (Sheet 1 of 2)

CRUISE PERFORMANCE

CONDITIONS:
2300 Pounds
Recommended Lean Mixture

PRESSURE ALTITUDE FT	RPM	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
		% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2000	2500	- - -	- - -	- - -	75	116	8.4	71	115	7.9
	2400	72	111	8.0	67	111	7.5	63	110	7.1
	2300	64	106	7.1	60	105	6.7	56	105	6.3
	2200	56	101	6.3	53	100	6.1	50	99	5.8
	2100	50	95	5.8	47	94	5.6	45	93	5.4
4000	2550	- - -	- - -	- - -	75	118	8.4	71	118	7.9
	2500	76	116	8.5	71	115	8.0	67	115	7.5
	2400	68	111	7.6	64	110	7.1	60	109	6.7
	2300	60	105	6.8	57	105	6.4	54	104	6.1
	2200	54	100	6.1	51	99	5.9	48	98	5.7
	2100	48	94	5.6	46	93	5.5	44	92	5.3
6000	2600	- - -	- - -	- - -	75	120	8.4	71	120	7.9
	2500	72	116	8.1	67	115	7.6	64	114	7.1
	2400	64	110	7.2	60	109	6.8	57	109	6.4
	2300	57	105	6.5	54	104	6.2	52	103	5.9
	2200	51	99	5.9	49	98	5.7	47	97	5.5
	2100	46	93	5.5	44	92	5.4	42	91	5.2
8000	2650	- - -	- - -	- - -	75	122	8.4	71	122	7.9
	2600	76	120	8.6	71	120	8.0	67	119	7.5
	2500	68	115	7.7	64	114	7.2	60	113	6.8
	2400	61	110	6.9	58	109	6.5	55	108	6.2
	2300	55	104	6.2	52	103	6.0	50	102	5.8
	2200	49	98	5.7	47	97	5.5	45	96	5.4
10,000	2650	76	122	8.5	71	122	8.0	67	121	7.5
	2600	72	120	8.1	68	119	7.6	64	118	7.1
	2500	65	114	7.3	61	114	6.8	58	112	6.5
	2400	58	109	6.5	55	108	6.2	52	107	6.0
	2300	52	103	6.0	50	102	5.8	48	101	5.6
	2200	47	97	5.6	45	96	5.4	44	95	5.3
12,000	2600	68	119	7.7	64	118	7.2	61	117	6.8
	2500	62	114	6.9	58	113	6.5	55	111	6.2
	2400	56	108	6.3	53	107	6.0	51	106	5.8
	2300	50	102	5.8	48	101	5.6	46	100	5.5
	2200	46	96	5.5	44	95	5.4	43	94	5.3

Figure 5-7. Cruise Performance

LANDING DISTANCE

SHORT FIELD

CONDITIONS:
Flaps 40°
Power Off
Maximum Braking
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots
3. For operation on a dry, grass runway, increase distances by 45% of the "ground roll" figure.

WEIGHT LBS	SPEED AT 50 FT KIAS	PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
			GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
2300	60	S.L.	495	1205	510	1235	530	1265	545	1295	565	1330
		1000	510	1235	530	1265	550	1300	565	1330	585	1365
		2000	530	1265	550	1300	570	1335	590	1370	610	1405
		3000	550	1300	570	1335	590	1370	610	1405	630	1440
		4000	570	1335	590	1370	615	1410	635	1445	655	1480
		5000	590	1370	615	1415	635	1450	655	1485	680	1525
		6000	615	1415	640	1455	660	1490	685	1535	705	1570
		7000	640	1455	660	1495	685	1535	710	1575	730	1615
		8000	665	1500	690	1540	710	1580	735	1620	760	1665

Figure 5-10. Landing Distance

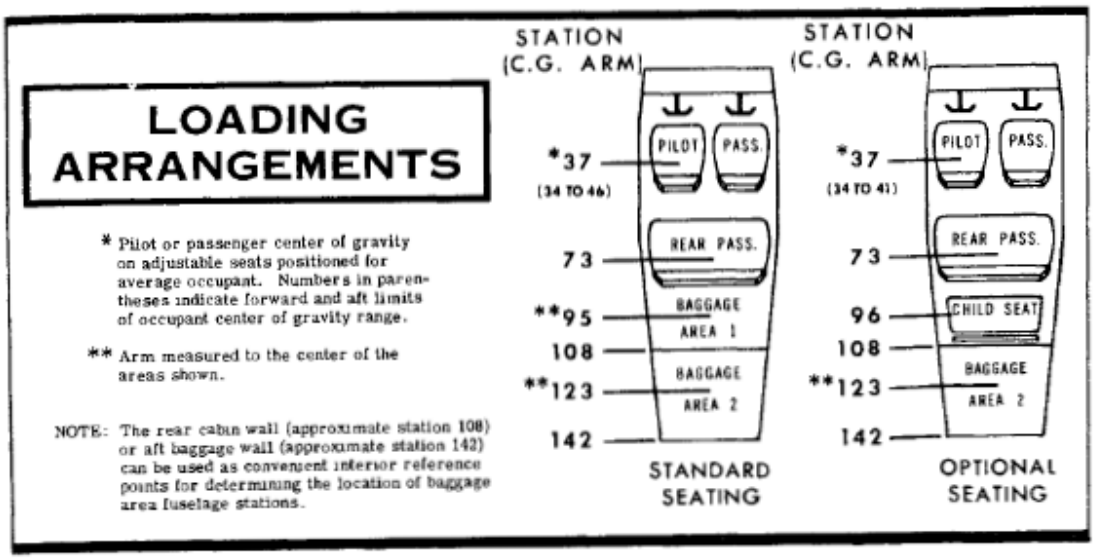


Figure 6-3. Loading Arrangements

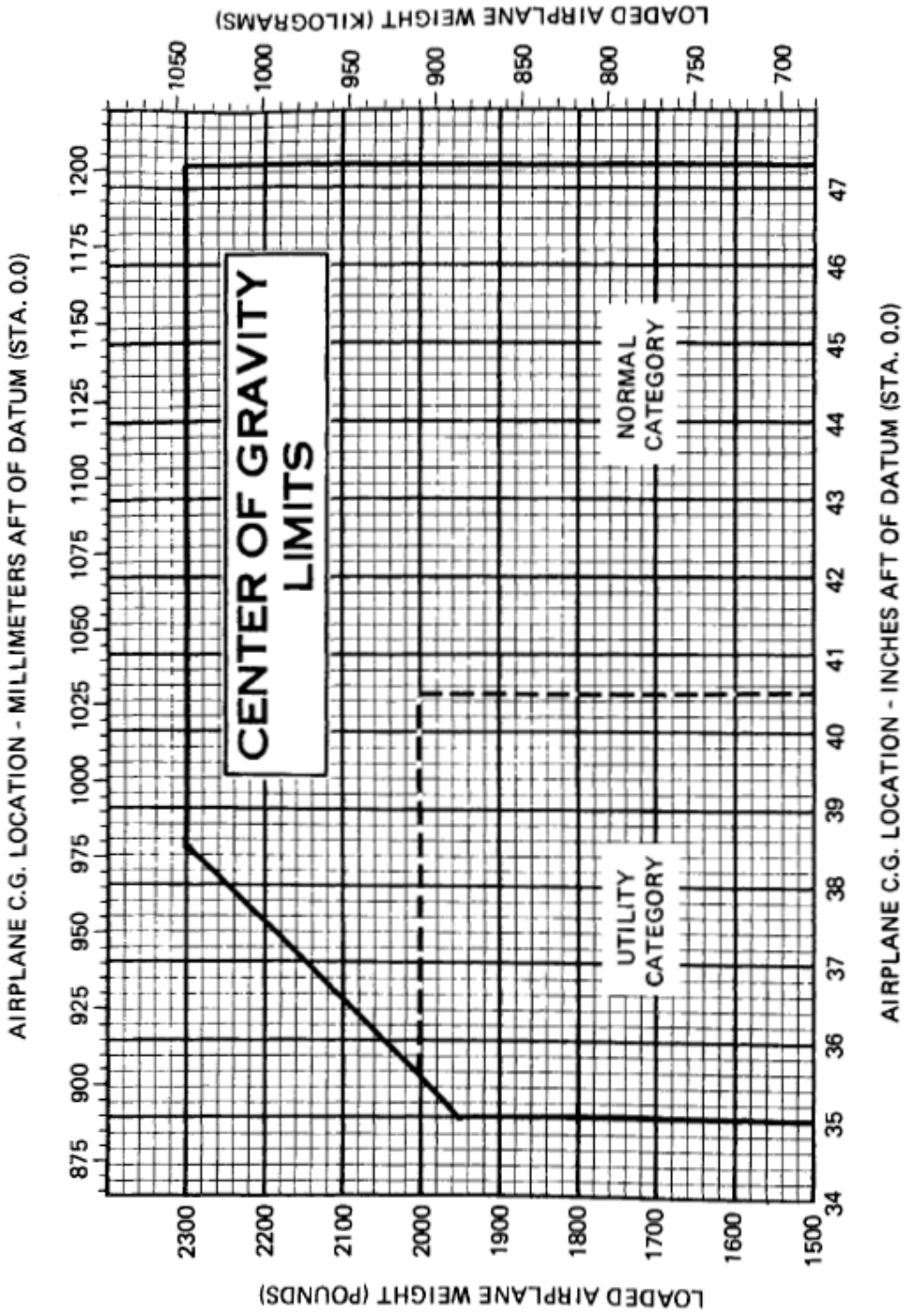


Figure 6-8. Center of Gravity Limits