Flight Planning

Our Goal

• From: Hanscom Field, Bedford, MA (BED)
• To: Morse State Apt., Bennington, VT (DDH)
Tools

• New York sectional chart
  – alternatively, use www.skyvector.com
• Plotter
• E6B calculator (mechanical or electronic)
• Four function calculator
• Pencil
• Flight planning sheet

Plan for Our Plan

1. Check Sectional Chart for terrain and airspace
2. Research airport info in Chart Supplement
3. Check weather, including obtaining winds aloft
4. Estimate likely time and fuel burn
5. Verify weight and balance
Review Sectional

- 4100’ will clear terrain (ergo, 4500 or 6500’)
- Stay under the Boston Bravo climbing out
- Class E Airspace; No restricted areas
- Plenty of VORs if our GPS fails

Good Alternate after crossing mountains: KALB
Old School: Flight Service Stations

- Disseminate weather and aeronautical data
- Accept flight plans
- Initiate search & rescue
- Contact by phone or radio
  - 1-800-WX-BRIEF
  - “Bridgeport Radio” on 122.6
  - Can always contact local FSS on 122.2 in the US

New School: the Web and app options from the Weather Data lecture.

AIRMETs:

1. BOSS WA 272045
   AIRMET SIERRA UPDT 3 FOR IFR AND MTN OBSCN VALID UNTIL 280300
   AIRMET IFR...ME NH VT MA RI CT NY LO AND CSTL WTRS
   FROM 70NW PQI TO 20ENE HUL TO 60ENE ACK TO PVD TO ALB TO 50NE
   SYR TO YOW TO YSC TO 70NW PQI
   CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG BYD 03Z THRU 09Z.

2. AIRMET MTN OBSCN...ME NH VT MA NY
   FROM 70NW PQI TO PQI TO MLT TO CON TO ALB TO 70SW SYR TO MHS TO
   YSC TO 70NW PQI
   MTNS OBSC BY CLDS/PCPN/BR. CONDS CONTG BYD 03Z THRU 09Z.

3. BOST WA 272045
   AIRMET TANGO UPDT 3 FOR TURB VALID UNTIL 280300
   AIRMET TURB...ME NH VT MA RI CT NY LO NJ PA OH LE WV MD DE VA
   AND CSTL WTRS
   FROM YSC TO ACK TO 110S HTO TO SBY TO HNN TO CLE TO YYZ TO YOW
   TO YSC
   MOD TURB BLW 080. CONDS CONTG BYD 03Z THRU 09Z.
******** Surface Observations ********
METAR KBOS 280054Z 3001022KT 10SM OVC080 03/02 A2978 RMK 02021050 SLP989
METAR KE还得 280054Z 3001022KT 10SM OVC080 03/02 A2978 RMK 02021050 SLP989

******** Terminal Forecasts ********
TAF AMD KBOS 280119Z 2801/2906 30013G22KT P6SM FEW060 BKN080 OVC090
FM280100 27012KT P6SM SCT050
FM280140 28013G22KT P6SM BKN040
FM280100 30016G26KT P6SM VCSH BKN020
FM280100 31018G29KT P6SM OVC025
FM280100 32022G26KT P6SM VCSH BKN020
FM280100 33022G26KT P6SM OVC025
TAF KBOS 280242Z 2800/2824 30013G22KT P6SM VCSH BKN020
FM280100 27012KT P6SM SCT050
FM280140 28013G22KT P6SM BKN040
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FM280100 33022G26KT P6SM OVC025

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FM280100 31018G29KT P6SM OVC025
FM280100 32022G26KT P6SM VCSH BKN020
FM280100 33022G26KT P6SM OVC025
Winds Aloft (FD):

******** FD Winds Aloft Forecast ********
DATA BASED ON 271800Z
VALID 280000Z FOR USE 2000-0300Z.
TEMPS NEG ABV 24000
FT 3000 6000 9000 12000 18000 24000 30000 34000 39000
ACK 2719 2914-02 2523-06 2331-09 2242-20 2352-32 226047 236950 245348
PWM 1605 9900-04 2109-08 2328-13 2245-21 2249-31 214948 224950 244647
POM 1605 9900-04 2109-08 2328-13 2245-21 2249-31 214948 224950 244647
BOS 3121 2511-04 2223-08 2344-11 2244-21 2347-32 214448 224950 244647
BDL 3128 3223-08 2728-11 2344-13 2453-22 2355-32 233948 234449 254346
ALB 3227 3328-10 3232-14 3028-20 2459-22 2367-32 235946 223849 263446

VFR Weather Minimums

Source: Public Domain
Relevant NOTAMs:

- BOS 07/322 BOS NAV VOR/DME 061-104 UNUSBL BYD 18 BLK 2000
- BOS 07/323 BOS NAV VOR/DME 271-060 UNUSBL BYD 25 BLK 3500
- BDR 04/234 GDM AIRSPACE R4102B ACT WEF 1004280900-1004282200
- BDR 04/233 GDM AIRSPACE R4102A ACT WEF 1004280900-1004282200
- BTV 09/028 VMD NAV NDB OTS
- DDM 04/003 DDM RWY 31 VASI OTS

Using the Plotter
Using the Plotter

Prominent landmarks 15-25 NM apart

Route Checkpoints
Altitude

- Must be at appropriate VFR cruising altitude
  - Eastbound: Odd thousands + 500ft.
  - Westbound: Even thousands + 500ft.
- Clear terrain
- Adjust for weather
91.159 - VFR Cruising Altitudes

- When > 3,000 feet above surface (AGL)
  - Magnetic course between 0 and 179 deg.
    - Odd 1000’ s + 500 feet
    - E.g. 3,500 feet MSL
  - Mag. course between 180 and 359 deg.
    - Even 1000’ s + 500 feet
    - E.g. 4,500 feet MSL

91.211 - Supplemental Oxygen

<table>
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<th>Cabin Pressure Altitude (Feet)</th>
<th>Pilot</th>
<th>Passengers</th>
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<td>≤ 12,500</td>
<td>None</td>
<td>None</td>
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<td>&gt; 12,500 ≤ 14,000</td>
<td>After 30 min.</td>
<td>None</td>
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<td>&gt; 14,000</td>
<td>Required</td>
<td>None</td>
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<tr>
<td>&gt; 15,000</td>
<td>Required</td>
<td>Provided</td>
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</table>
Wind

- Choose nearby winds aloft reporting points
- Interpolate, if necessary

******* FD Winds Aloft Forecast *******
DATA BASED ON 271800Z
VALID 280000Z FOR USE 2000-0300Z. TEMPS NEG ABV 24000
PT 3000 6000 9000 12000 18000 24000 30000 34000 39000
ACK 2719 2914-02 2523-06 2331-09 2242-20 2352-32 226947 236950 245348
PMH 1605 9900-04 2109-08 2328-13 2245-21 2249-31 214948 214551 234247
BOG 3121 2511-04 2223-08 2344-11 2244-21 2347-32 214448 214950 246447
BDL 3128 3223-08 2728-11 2344-13 2453-22 2355-32 233948 234449 254346
ALB 3227 3328-10 3232-14 3028-20 2459-22 2367-32 235946 223849 263446

Private Pilot Ground School
Piper Warrior Performance

- **Climb:**
  - BED: +4 degC, 132 ft. field elevation = 642 ft. press. alt.
  - TOC: -4 degC, 6500 ft. cruise alt. = 7010 ft. press. alt.
  - 2.5 gal., 12.5 min., 16.5 NM (still air)
  - 75 KIAS = 75-80 KTAS

- **Descent:**
  - TOD: -10 degC, 6500 ft. cruise alt. = 6960 ft. press. alt.
  - DDH: 2 degC, 827 ft. field elevation = 1287 ft. press. alt.
  - 2 gal., 6.5 min., 15 NM (still air)
  - 124 KIAS = 124-134 KTAS
Cruise Performance

How fast will Piper PA28-151 go?
- Use performance charts or tables
- Pressure altitude = 7000 ft.
- PA28-151 @ 75% power: 112 KTAS
- Fuel Flow: 9.2 gallons per hour

Piper Cherokee Warrior with 150 hp Lycoming O-320 engine. Higher gross weight (2325 lbs.) than 1961 PA-28-150 (2150 lbs.)
Wind Correction Angle

- Use E6B (whiz wheel) or calculator
  - If you are reading wind direction: True
  - If you are hearing wind direction: Magnetic
- Fill in True Heading and Ground Speed

<table>
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<th>Checkpoints (Times)</th>
<th>Route and Course (R &amp; C)</th>
<th>Wind</th>
<th>Temp</th>
<th>WS</th>
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Source: Public Domain
Using the E6B: Wind Side

Wind Direction: 210°
Wind Speed: 20 knots
True Course: 180°
True Airspeed: 147 knots
Using the E6B: Wind Side

Wind Direction: 210°
Wind Speed: 20 knots
True Course: 180°
True Airspeed: 147 knots

Groundspeed: 129 knots
Wind Correction Angle: 4°
Using the E6B: Computer Side

10 minutes (inner ring) to fly 15nm (outer ring)
Magnetic Declination (Variation)

- Read off chart (dashed magenta lines)

Source: Public Domain
### Magnetic Deviation

- Depends on specific aircraft
- Compass correction card shows values

<table>
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Source: Public domain
Calculate Time

- For each cruise leg, calculate time based on leg distance and ground speed

Source: Public Domain
Fuel Burn

- Add up: Climb, Cruise, and Descent Fuel
- 2 gal. + 6.3 gal. + 2 gal. = 10.8 gallons
- Required Reserve: 30 minutes = 4.6 gallons
- 15.4 gallons min. required at departure

Most pilots consider a one-hour reserve to be the minimum for a cross-country flight. Add 2 gallons to get to the alternate (KALB) and another 4.6 of reserve = 22 gallons.
91.151 - VFR Fuel Requirements

- Don’t forget to order fuel!
- Minimum by regulation (FAR 91.151): Fly to first intended point of landing plus
  - 30 minutes reserve (day)
  - 45 minutes reserve (night)

Wiser to land with at least one hour of fuel.

Weight and Balance

- Empty weight: 1452.30 @ 87.53 in.
- Fuel: 22 gal @ 95 in. (6.01 lbs./gallon)
- Pilot + Pax: 400 lbs. @ 80.5 in.
- Pax: 300 lbs. @ 118.1 in.
- Baggage: 50 lbs. @ 142.8 in.

Max gross weight for PA-28-151: 2325 lbs.
Weight and Balance

<table>
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<tr>
<th>Item</th>
<th>Weight</th>
<th>Arm</th>
<th>Moment</th>
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<tr>
<td>Pax</td>
<td>300</td>
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<td>Baggage</td>
<td>50</td>
<td>142.80</td>
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<td><strong>Total</strong></td>
<td>2334.52</td>
<td>91.86</td>
<td>214451</td>
</tr>
</tbody>
</table>

Overweight! Leave the box of Travels with Samantha in the hangar and we’re under 2325 lbs.

Takeoff Performance

- Use Performance Charts, Weather Info. and Airport Info
  - Ground Roll: 1000 ft.
  - Over 50 ft.: 2000 ft.

- KBED runway 29 is 7000 ft. long
Landing Performance

- Use Performance Charts, Weather Info. and Airport Info
  - Ground Roll: 600 ft.
  - Over 50 ft. obstacle: 1500 ft.

- KDDH runway is 3700 ft. long

- Ergo: book says we can land in 40 percent of runway.

Sample Flight Plan Form

- VFR
- Aircraft Number
- Aircraft Type
- Departure Point
- Departure Time
- Altitude
- Route of Flight
- Destination
- Estimated Time Enroute

Fun in-class exercise: Google “ICAO flight plan form”
Now let’s do it the real way...

- 1800wxbrief.com
- Fltplan.com
- ForeFlight iOS app (and plan.foreflight.com)
- Garmin Pilot Android or iOS app
- skyvector.com (navlog, briefing, filing)
- www.aopa.org/flightplanner/

Suggested Reading

FAR 61/91 allow for a lot of dangerous stuff, e.g.:
- flying at night with no instrument rating
- flying single-pilot IFR with no autopilot
- planning to land on a minimum-length runway

Look at the operating limitations for FAR 135 (charter) and FAR 121 (airlines) and consider adopting some of these as personal minimums.
Questions?