


MIT
AEROASTRO

Definitions

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- Basic VFR
 - Visibility: Greater than 3 SM
 - Ceiling: Greater than 1000 ft AGL

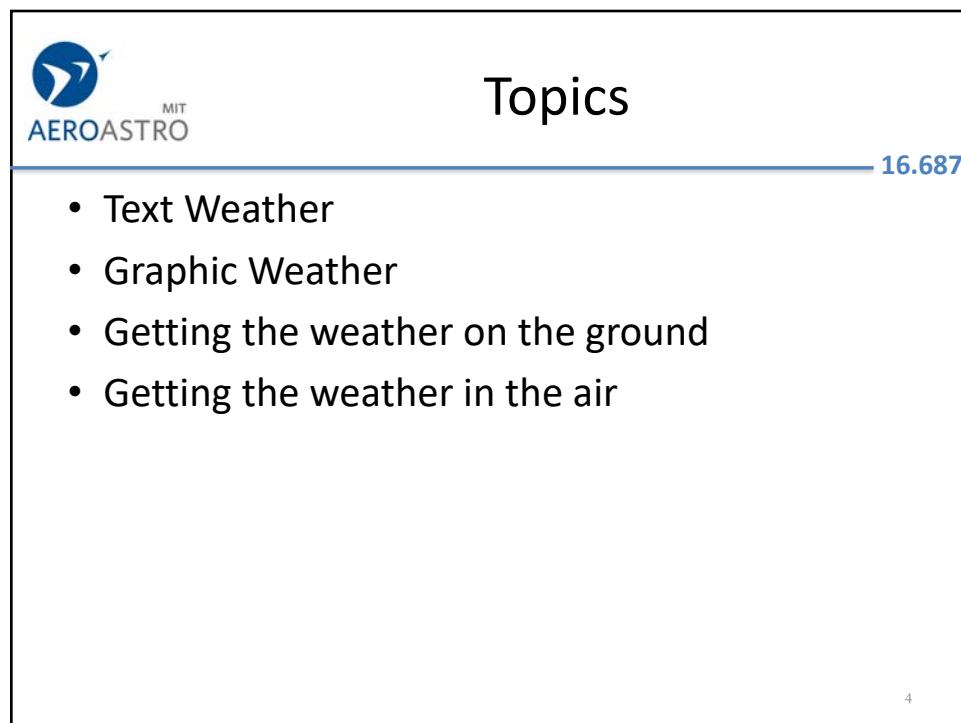
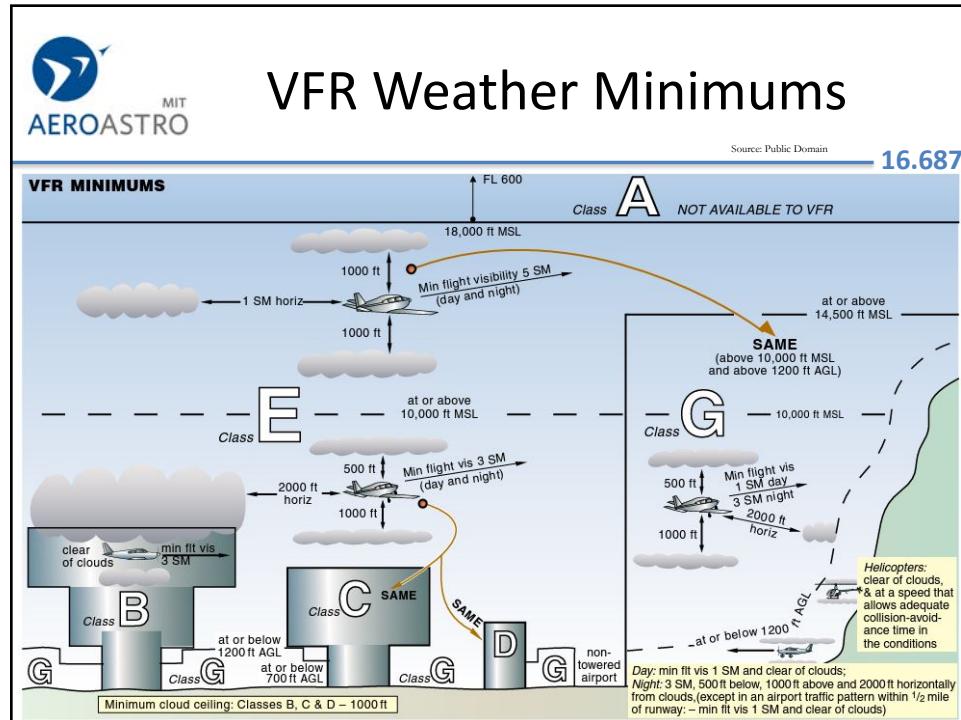
- Ceiling
 - Lowest of:
 - BKN: Broken
 - OVC: Overcast
 - VV: Vertical Visibility

SCT and FEW layers do not count as a ceiling.

Reportable Contractions	Meaning	Summation Amount of Sky Cover
VV	Vertical Visibility	8/8
SKC	SKy Clear	0
FEW	FEW	less than 1/8 to 2/8
SCT	SCaTtered	3/8 to 4/8
BKN	BroKeN	5/8 to less than 8/8
OVC	OVerCast	8/8

Source: Public Domain

2



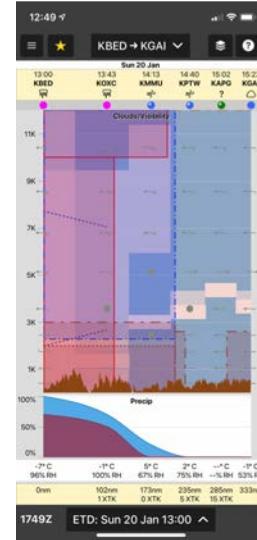


Don't Despair, Use Software

16.687

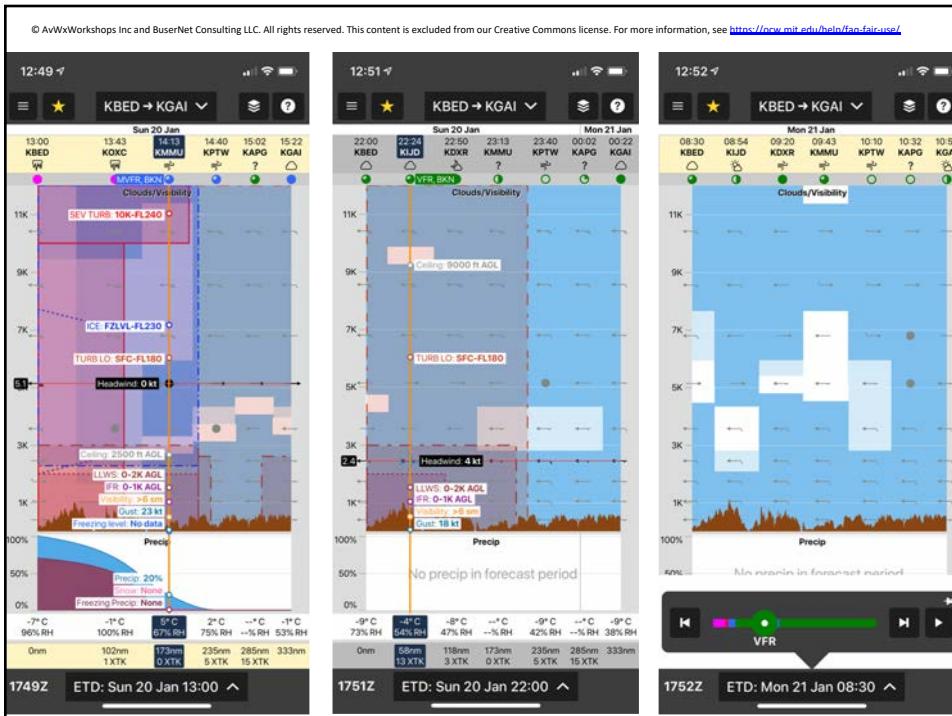
- Most of what follows can be summarized.
- Example:
WeatherSpork
app/site ->

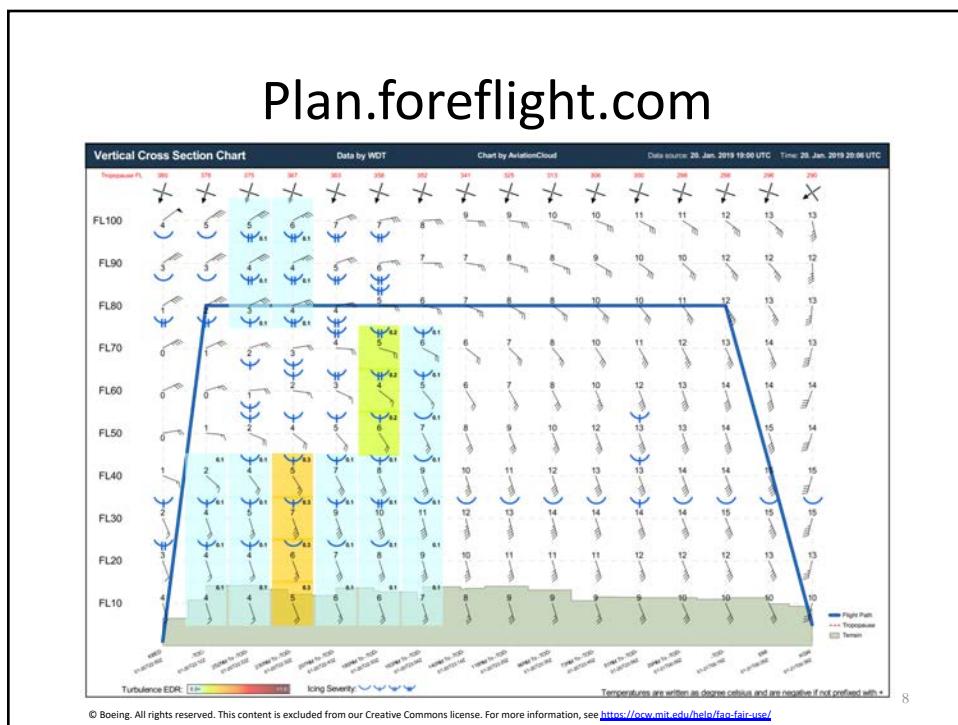
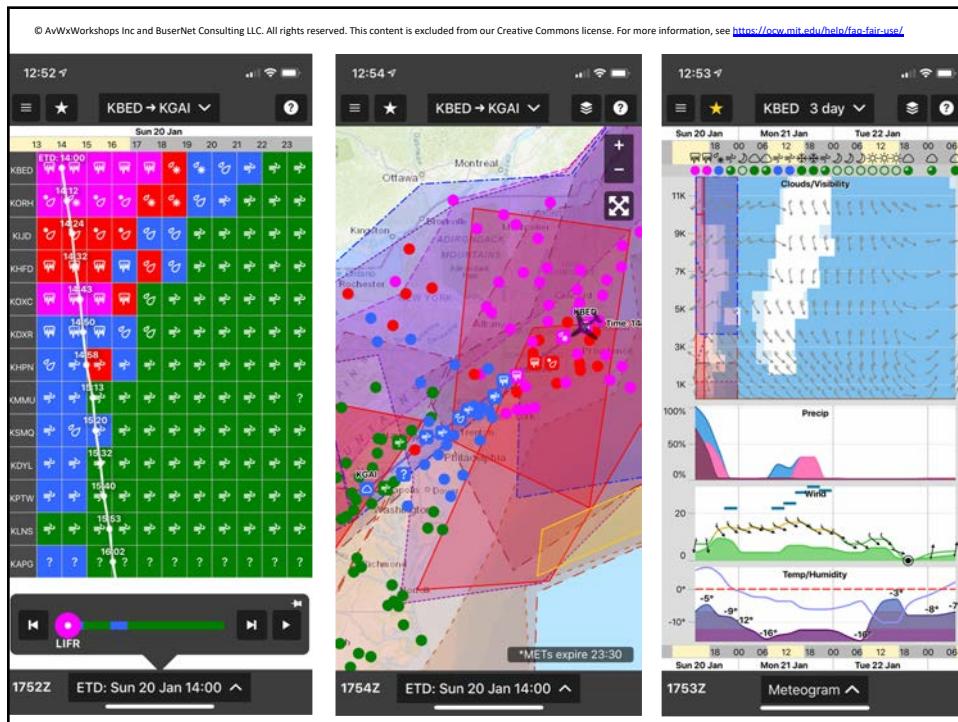
Symbols for VFR, MVFR, IFR,
and LIFR (defined in AIM 7-1-7)



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Text Reports and Forecasts



Reports vs. Forecasts

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- Report
 - CURRENT weather conditions that have been observed at a location
- Forecast
 - FUTURE weather that might exist at a location during a valid time

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Aviation Routine Weather Report (METAR)

16.687

- Time-stamped surface weather
- Wind from True North
 - if you hear it: magnetic.
 - If you read it: true.
 - *If you read it on the Internet: definitely true.*
- “Ceiling” is lowest Broken or Overcast cloud layer
- VFR
 - 3 Statute Mile Visibility
 - 1000 foot ceiling
- Report Format
 - Type of Report (METAR or SPECI)
 - Station Designator
 - Time
 - Wind
 - Visibility
 - Weather and obstructions
 - Sky Condition
 - Temperature/Dew point
 - Altimeter Setting
 - Remarks

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Aviation Routine Weather Report (METAR)

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- Abbreviations
 - TS – Thunderstorms
 - SH – Showers
 - FZ – Freezing
 - BL – Blowing
 - RA – Rain
 - DZ – Drizzle
 - SN – Snow
 - **GR – Hail**
 - FG – Fog
 - **BR – Mist**
 - HZ – Haze
 - SQ – Squall
 - SKC – Sky Clear
 - SCT – Scattered
 - OVC – Overcast
 - BKN - Broken
- Other Modifiers etc
 - - Light
 - + Heavy
 - Z – Zulu, UTC time
 - G – gusting
 - VRB – wind direction variable
 - SM – Statute Miles
 - VC – vicinity, 5 to 10 miles
 - TCU – Towering Cumulus
 - CB – Cumulonimbus
 - M – Minus degrees
 - A – Altimeter Setting
 - B – Began
 - E – Ended
 - KT - Knots

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Aviation Routine Weather Report

METAR

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- KPDK 161653Z VRB04KT 10SM OVC060 14/07 A3015 RMK AO2 ...
- Location: Peachtree Dekalb Airport
- Date: 16th of the month
- Time: 16:53 Z
- Time: 12:53 PM EDT
- Wind Direction: Variable
- Wind Speed: 04 knots
- Visibility: 10 Statute Miles
- Clouds/Wx/Remarks: Overcast 6000
- Temperature: 14 C
- Dewpoint: 07C
- Altimeter Setting: 30.15 in Hg
- Remarks ...

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AviationWeather.gov

16.687

https://www.aviationweather.gov

AVIATION WEATHER CENTER
NOAA NATIONAL WEATHER SERVICE

HOME ADVISORIES FORECASTS OBSERVATIONS TOOLS NI

Aviation Weather Overview

METARS TAFs AIR/PIREPs SIGMETs

Data Overlay View

Source: Public Domain

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AEROASTRO

Request METAR

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Request METAR data

IDs:

Format: Raw Decoded

Time:

Include TAF

15

 MIT
AEROASTRO

Read METAR

16.687

METAR Data

IDs: Format: Raw Decoded Include TAF

Data at: 1451 UTC 23 Jan 2019

METAR for: KBED (Bedford/Hanscom Fld, MA, US)
Text: KBED 231356Z 21006KT 10SM BKN065 OVC110 M04/M09 A3032 RMK AO2 SLP285 T10391094 PNO

Temperature: -3.9°C (25°F)
Dewpoint: -9.4°C (15°F) [RH = 66%]
Pressure (altimeter): 30.32 inches Hg (1026.8 mb) [Sea level pressure: 1028.5 mb]
Winds: from the SSW (210 degrees) at 7 MPH (6 knots; 3.1 m/s)
Visibility: 10 or more sm (16+ km)
Ceiling: 6500 feet AGL
Clouds: broken clouds at 6500 feet AGL, overcast cloud deck at 11000 feet AGL

TAF for: KBED (Bedford/Hanscom Fld, MA, US) issued at 1132 UTC 23 Jan 2019
Text: KBED 231132Z 2312/2412 19005KT P6SM OVC200

Forecast period: 1200 to 1900 UTC 23 January 2019
Forecast type: FROM: standard forecast or significant change
Winds: from the S (190 degrees) at 6 MPH (5 knots; 2.6 m/s)
Visibility: 6 or more sm (10+ km)
Ceiling: 20000 feet AGL



Pilot Weather Reports (PIREPS)

16.687

- Normal PIREP designated UA (“Upper Air”)
- Urgent PIREP designated UUA
- PIREPS are current weather reports by pilots to Air Traffic Controllers or Flight Service Stations

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Pilot Weather Reports PIREPS

16.687

- PIREP FORM
 - UA or UUA
 - /OV – location
 - /TM – Time
 - /FL – Altitude/Flight level
 - /TP – Type of Aircraft
 - /SK – Cloud Layers
 - /WX – Weather
 - /TA – Air Temperature
 - /WV – Wind
 - /TB – Turbulence
 - /IC – Icing
 - /RM - Remarks

UA/OV KOKC-KTUL/TM 1800/FL 120/TP BE90//SK BKN018-TOP055/OVC072-TOP089/CLR ABV/TA M7/WV 08021/TB LGT 055-072/IC LGT-MOD RIME 072-089

Figure 14. Pilot weather report.

Source: Public Domain

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Printed Weather Forecasts

16.687

- Forecasts indicate FUTURE weather conditions
 - Terminal Aerodrome Forecast (TAF)
 - Aviation Area Forecast (FA)
 - Winds and Temperature Aloft Forecast (FD)

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Terminal Aerodrome Forecast (TAF)

16.687

- Forecast weather
- For specific airport vicinity
- Only issued for certain airports (towered)
- Issued 4 times a day
- Valid for 24 hours

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Terminal Aerodrome Forecast (TAF)

16.687

- Report Format
 - Type
 - Location
 - Issuance Time
 - Valid Time
 - Forecast
 - Wind
 - Visibility
 - Weather
 - Cloud Coverage
 - Cloud Height
- Abbreviations
 - Same as in METAR
 - FM (HH) – From
 - BECMG (HHhh) – becoming from/to
 - TEMPO (HHhh) – Temporarily from/to

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MOS forecast for non-TAF airports

16.687

- nws.noaa.gov ([description](#))
- usairnet.com
- ForeFlight
- Garmin Pilot
- WeatherSpork

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Aviation Area Forecast (FA)

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- Forecast weather for a broad area, e.g., all of Hawaii or Caribbean
- Use for airports without TAF
- Contains section for clouds and visibility (including forecast tops)
- Section for other hazards (icing, turbulence)
- Since 2016, not available for the Lower 48

See <https://www.aviationweather.gov/areafcst>

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Aviation Area Forecast (FA)

16.687

- Report Format
 - Communications/Header
 - Precautionary Statements
 - Synopsis
 - VFR Clouds/Weather

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Winds Aloft Forecast (FD)

16.687

- Forecast winds from above the surface to high altitude
- Used to determine ground speed and time enroute
- Includes
 - Wind direction in relation to **True North**
 - Wind speed in Knots
 - Temperature

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Winds Aloft Forecast (FD)

16.687

FD WBC 151745
DATA BASED ON 151200Z
VALID 1600Z FOR USE 1800-0300Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
ALS		2420	2635-08	2535-18	2444-30	245945	246755	246862	
AMA		2714	2725+00	2625-04	2531-15	2542-27	265842	256352	256762
DEN		2321-04	2532-08	2434-19	2441-31	235347	236056	236262	
HLC	1707-01	2113-03	2219-07	2330-17	2435-30	244145	244854	245561	
MKC	0507	2006+03	2215-01	2322-06	2338-17	2348-29	236143	237252	238160
STL	2113	2325+07	2332+02	2339-04	2356-16	2373-27	239440	730649	731960

Figure 17. Winds and temperatures aloft forecast.

Source: Public Domain

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Severe Weather Reports

16.687

- AIRMET - WA
 - Warning of weather hazardous to aircraft
- SIGMET - WS
 - Warning of significant weather hazardous to all aircraft
- Convective SIGMET - WST
 - Warning of hazardous convective (thunderstorm) activity

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AIRMET - WA

16.687

- Warning of weather hazardous to aircraft
- Includes
 - Moderate Icing - Zulu
 - Moderate Turbulence - Tango
 - Surface winds sustained over 30 knots - Tango
 - Mountain Obscuration – Sierra
 - Widespread instrument conditions - Sierra

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AIRMET - WA

16.687

AIRMET Zulu (Icing and Freezing Level)
MAZ WA 171345
AIRMET ZULU UPDT 2 FOR ICE AND FRZLVL VALID UNTIL 172000

AIRMET ICE...NC SC GA FL ME NH VT MA RI CT NY LO NJ PA OH LE WV MD DC DE VA AND CSTL WTRS FROM 40ENE YSC TO ACK TO 120SE ILM TO CRG TO LGC TO GQO TO HMV TO BKW TO AIR TO 20NNW CLE TO 30N MSS TO 40ENE YSC OCNL MOD RIME/MXD IC/GCIP BTN FRZLVL AND FL260. FRZLVL 080-140 N SLPG 140-160 S. CONDS ENDG W OF JHW-ETX-CHS BY 20Z AFT 20Z CONDS DVLPG FWD OVR RMNDR ME AND CSTL WTRS. ELSW CONDS MOV FWD AND CONTG BYD 20Z THRU 02Z.

FRZLVL...NR 140 NERN NC AND CSTL WTRS.
NR 160 GA FL AND CSTL WTRS.

Source: Public Domain

29

SIGMET - WS

16.687

- Warning of weather hazardous to ALL aircraft
- Includes
 - Severe Icing
 - Severe or Extreme Turbulence or CAT
 - Dust or Sandstorms or Volcanic Ash with visibility less than 3 SM
 - Volcanic Eruption

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SIGMET Example

16.687

BOSR WS 050600
 SIGMET ROMEO 2 VALID UNTIL 051000
 ME NH VT
 FROM MLT TO YSJ TO CON TO MPV TO MLT
 OCNL SEV TURB BLW 080 EXP DUE TO STG NWLY FLOW. CONDS CONTG
 BYD 1000Z.

SIGMET issued for the Boston Area Forecast region on the 5th day of the month at 0600 UTC.

This is the second (2nd) issuance of SIGMET series Romeo and is valid until the 5th day of the month at 1000 UTC. The affected states are Maine (ME), New Hampshire (NH) and Vermont (VT). Within an area bounded from Millinocket, Maine; to St. Johns, New Brunswick; to Concord, New Hampshire; to Montpelier, Vermont; to Millinocket, Maine. Occasional severe turbulence below 8,000 feet due to strong northwesterly flow. Conditions are expected to continue beyond 1000 UTC.

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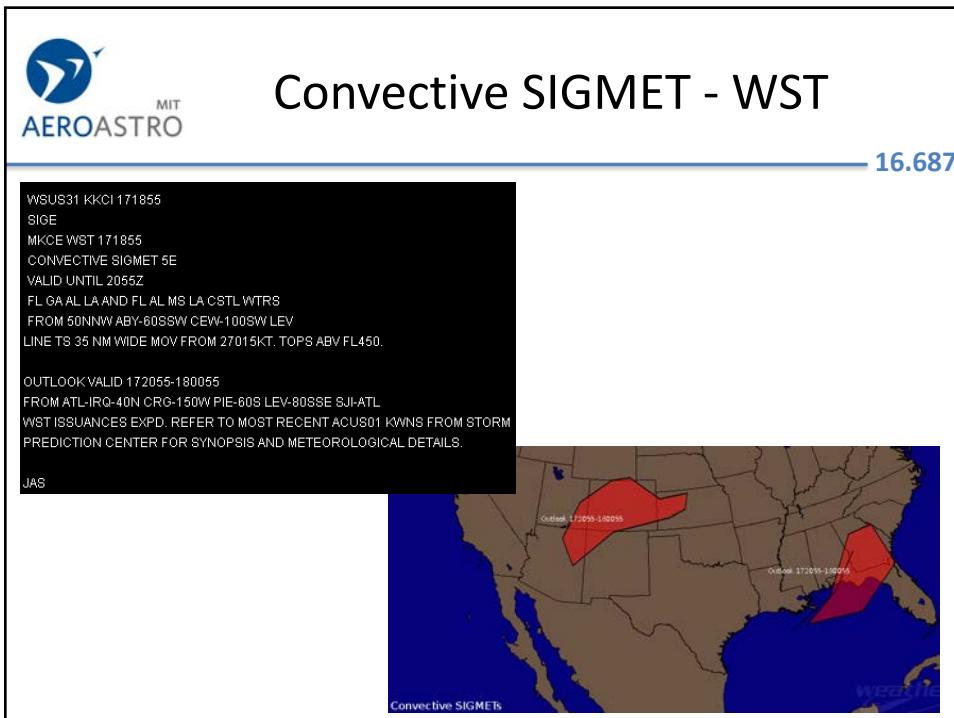


Convective SIGMET - WST

16.687

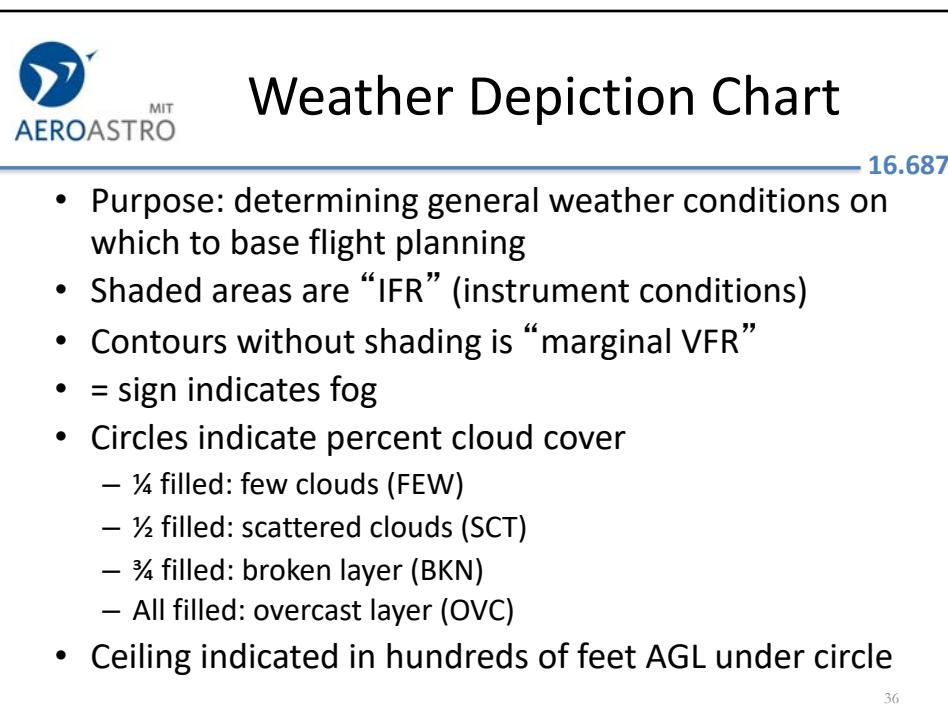
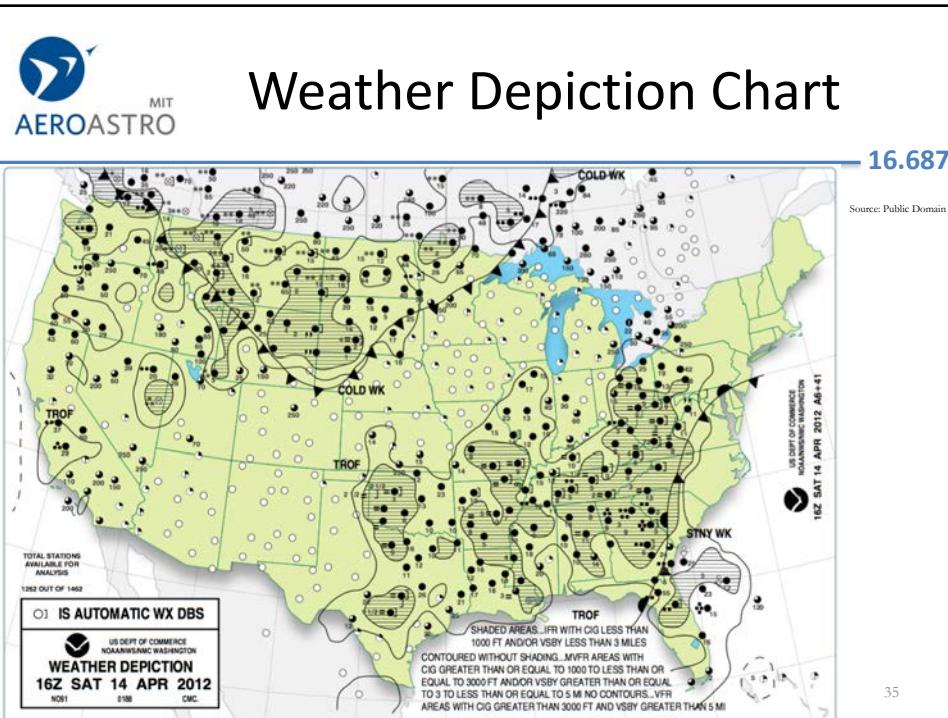
- Warning of weather hazardous to ALL aircraft
- Includes
 - Severe Thunderstorms
 - Embedded Thunderstorms
 - Line of Thunderstorms
 - Very large area of Thunderstorms (>3000 mi²)
 - Tornadoes
 - Hail ¾-inch or greater in diameter

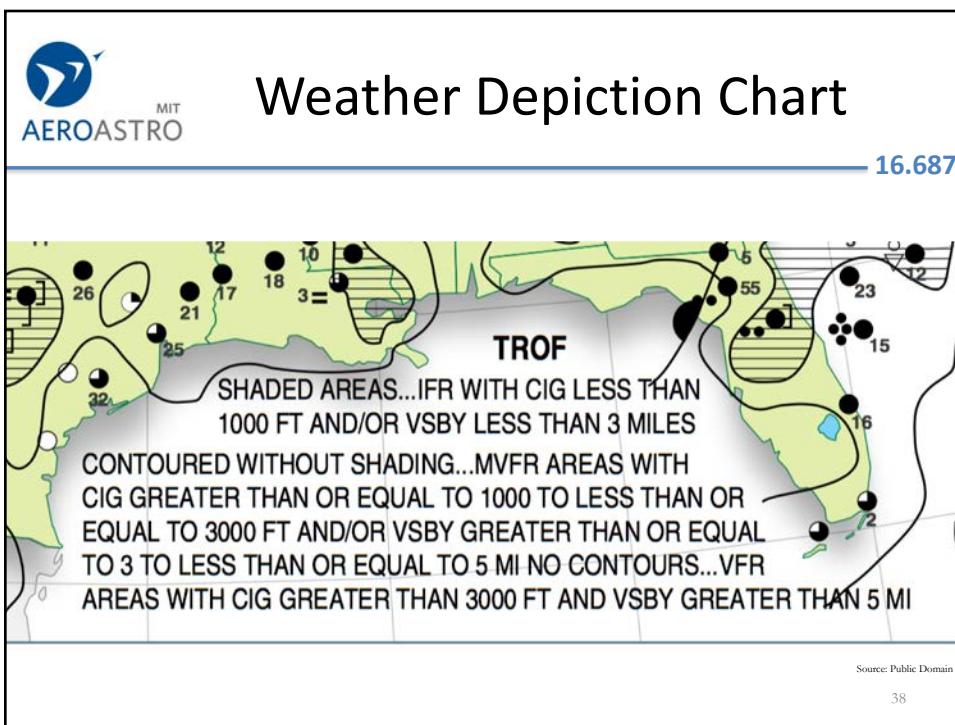
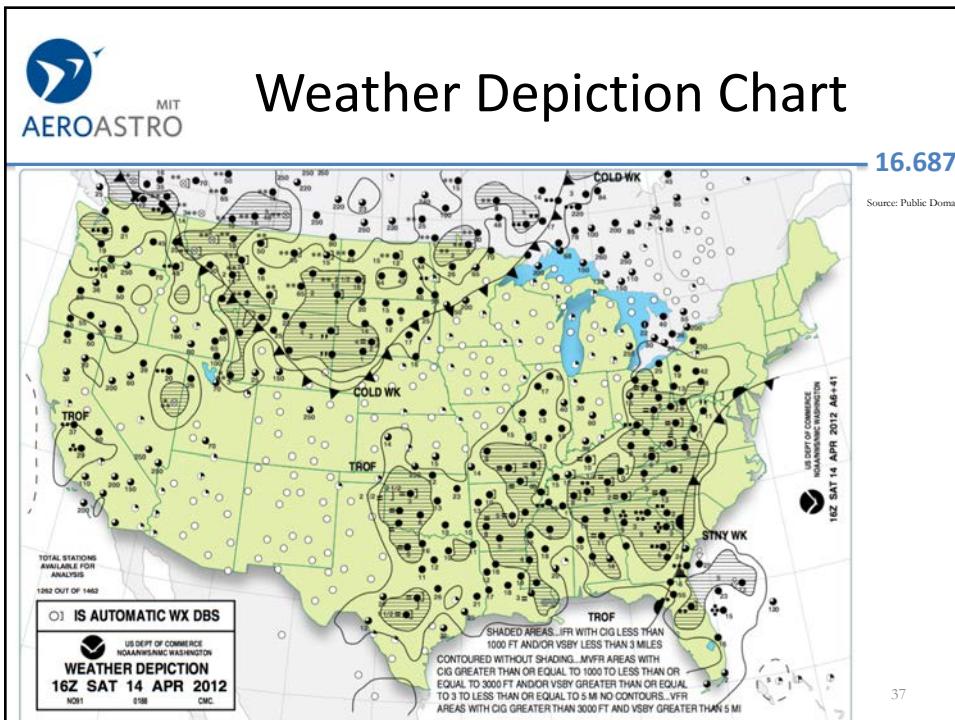
32

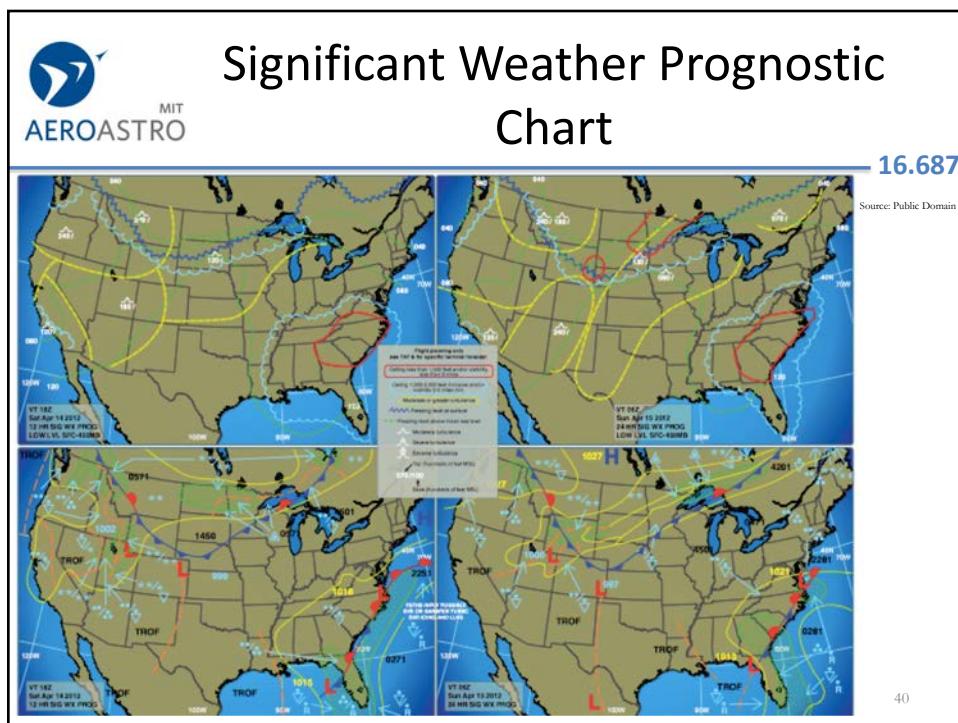
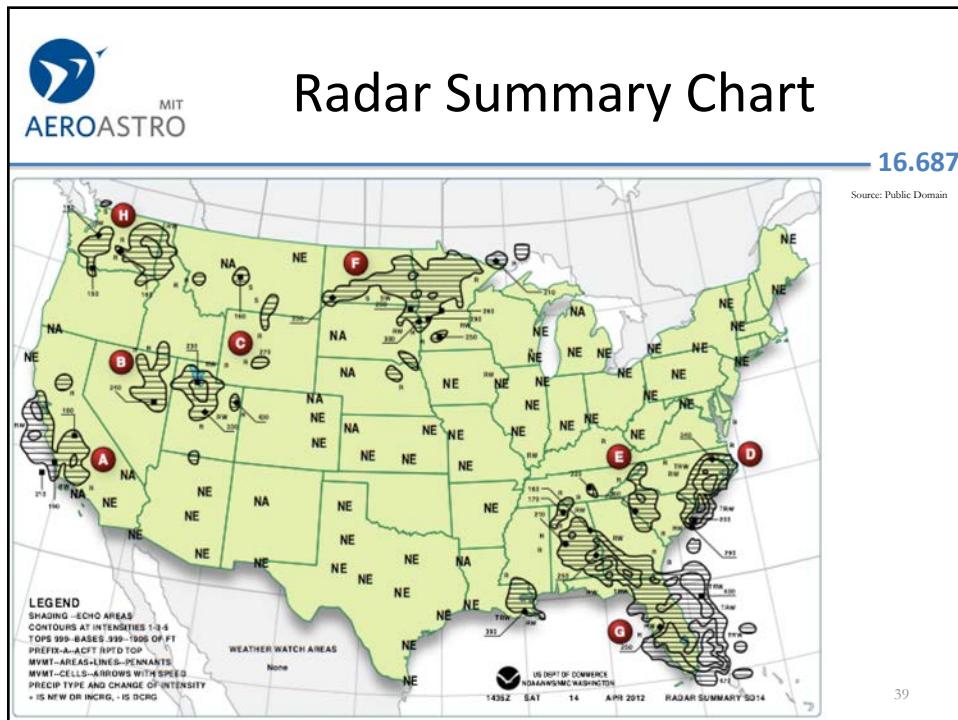


Graphic Weather Products







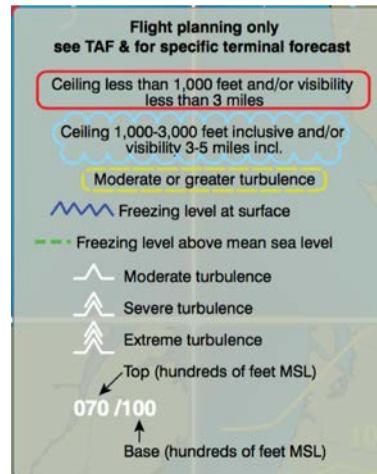




Significant Weather Prognostic Chart

16.687

- Forecast of future conditions
- Red lines enclose areas of IFR
- Light blue scalloped lines enclose areas of MVFR
- Blue zigzag and green dashed lines represent freezing levels at different altitudes
- Hat symbols and yellow dashed lines indicate turbulence



Source: Public Domain

41



Significant Weather Prognostic Chart

16.687



Significant Weather Prognostic Chart

16.687

- Symbols indicate precipitation type
- Areas enclosed by solid green lines indicate location and intensity of large areas of precipitation

..	△	◊	Rain (light,moderate,heavy)
**	~	◊	Snow (light,moderate,heavy)
⚡	⚡	⚡	Thunder (with rain,snow,no precipitation)
▽	▽	▽	Shower (rain,snow)
„	„	„	Drizzle
○	○	○	Freezing rain, Freezing drizzle
▲			Ice pellets/Sleet

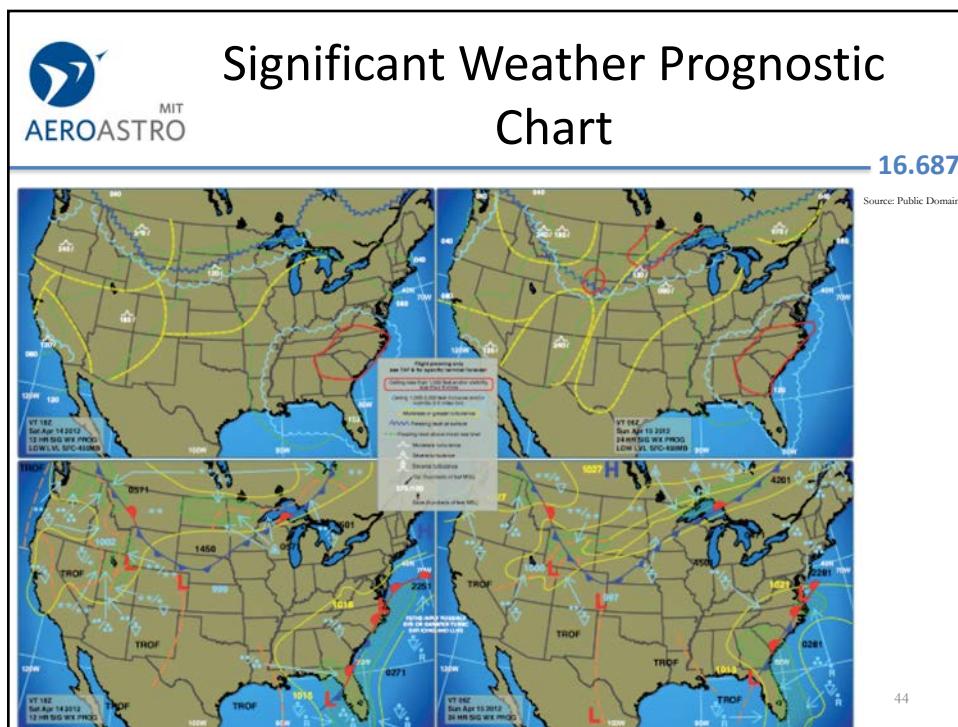
BROKEN LIGHT RAIN
COVERAGE = 50-100%

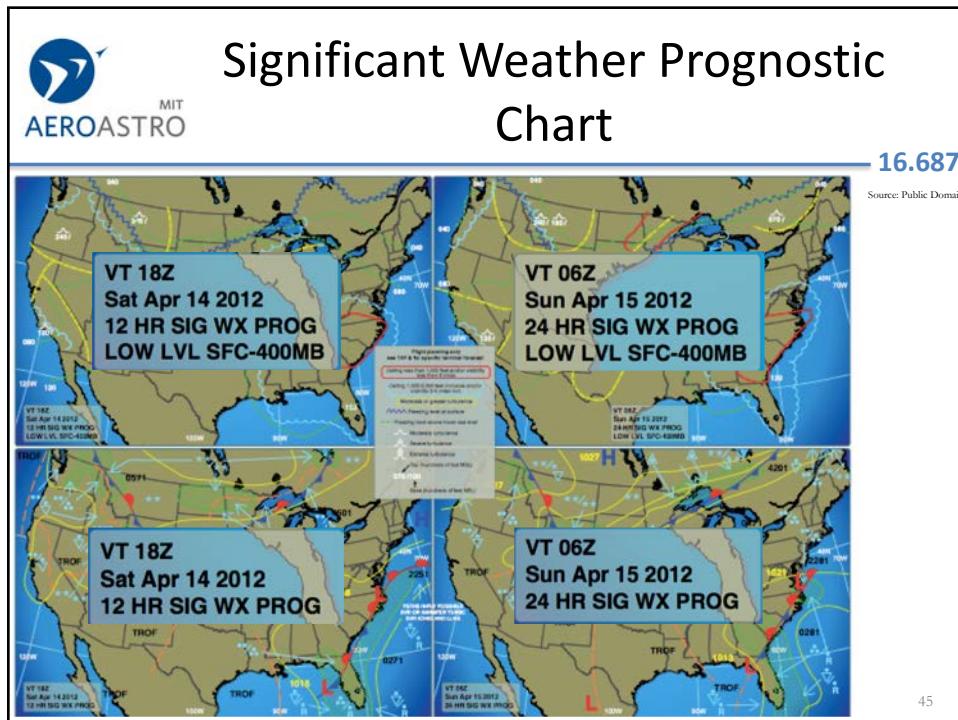
SCATTERED LIGHT SNOW
COVERAGE = 30-50%

DASHED LINE SEPARATES PRECIPITATION FROM OTHER TYPES (RAIN, FREEZING RAIN, SLEET)

Source: Public Domain

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The following are useful, but not on the knowledge test.

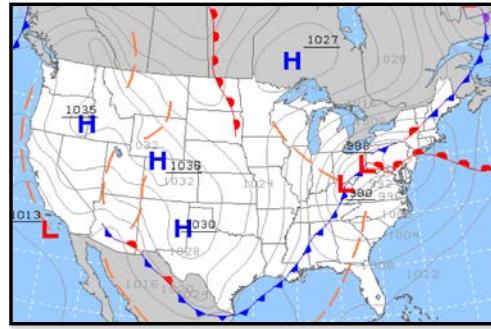




Surface Analysis Chart

16.687

- Depicts location of fronts, High and Low pressure areas, and Isobars
- Warm Front – red line with semi circles
- Cold Front – blue line with triangles
- Stationary Front – combination of warm and cold symbols



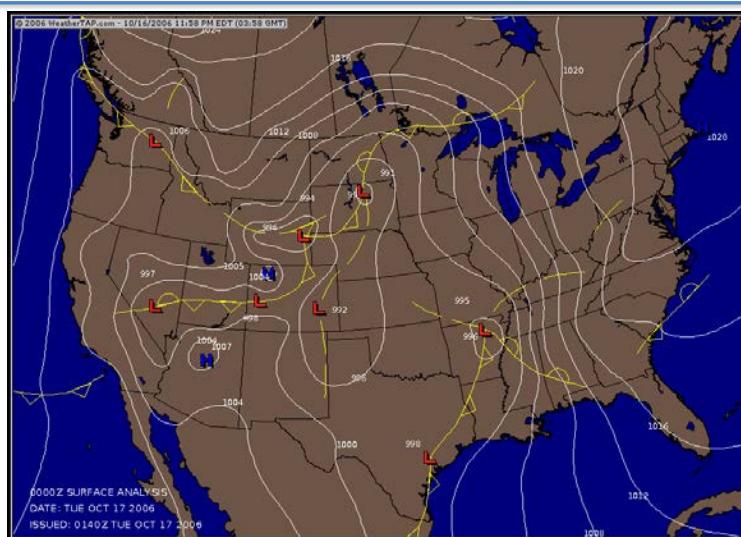
Source: Public Domain

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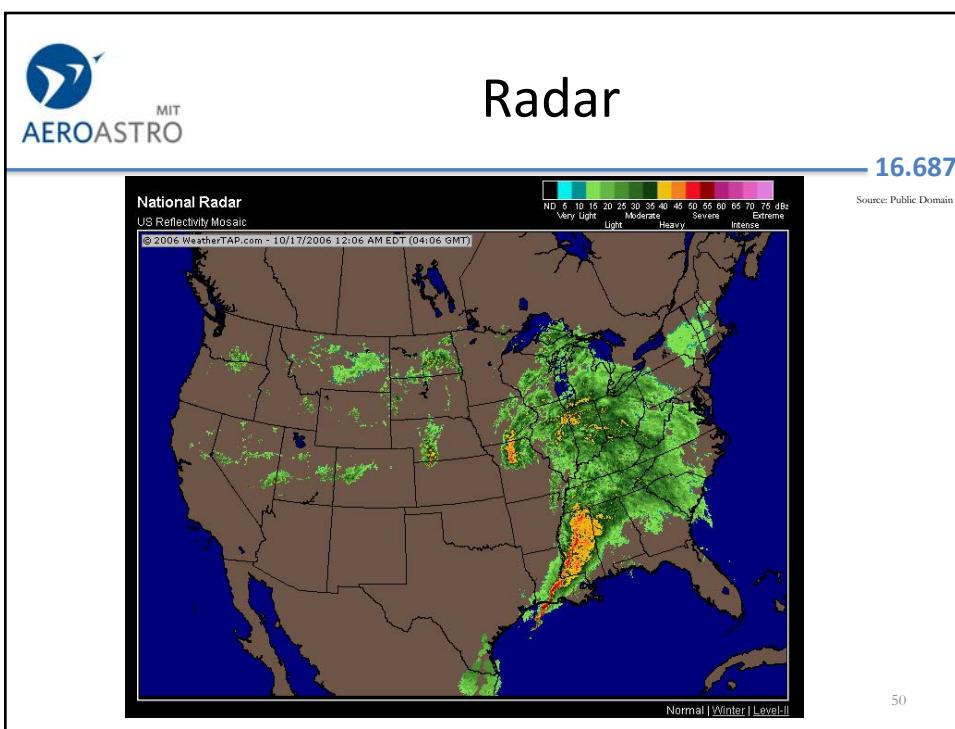
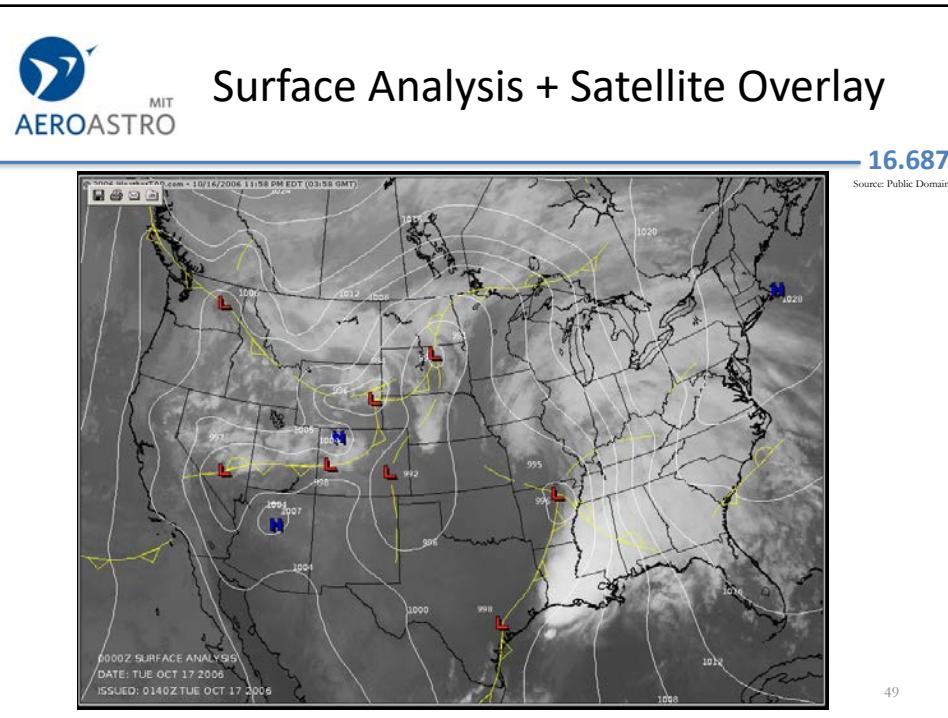
Surface Analysis

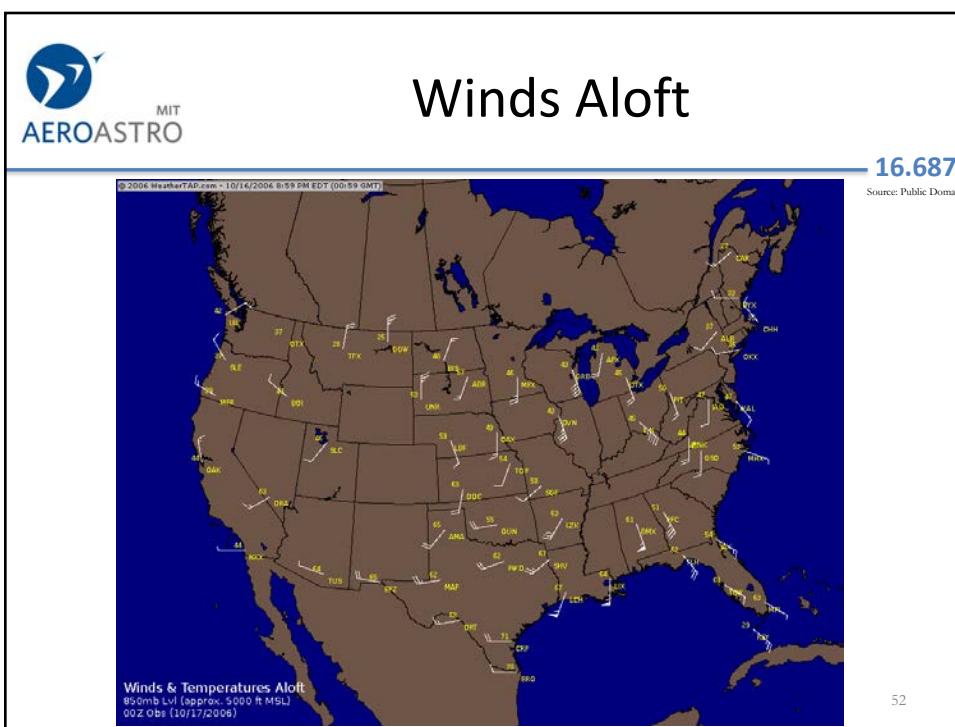
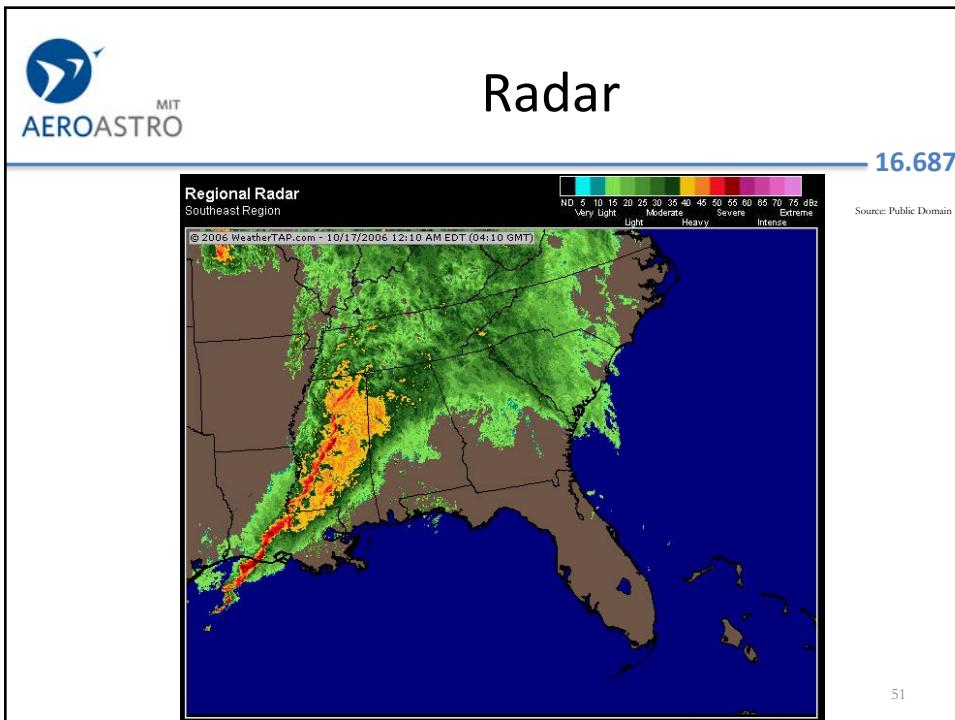
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Source: Public Domain

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Preflight Weather Sources



Call 1-800-WX-BRIEF

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1800wxbrief.com

- Started life as Flight Service Stations (FSS) run by FAA
- Trained briefers answer the phone
- Access with a tail number
- Accept and close flight plans
- Except for Alaska, outsourced to Lockheed Martin in 2005 and now "Leidos"
- They also have a web site.
- Pay attention:** "VFR Flight Not Recommended"

Better Briefings, Safer Flights

Home Weather Flight Planning & Briefing Airports UAS Account Links Help Log In

Featured Capabilities

- NGB - Next Generation Briefings
- SE-SAR - Surveillance-Enhanced Search and Rescue
- EasyActivate™ and EasyClose™
- Flight Plan Close Reminders

SE-SAR - Surveillance-Enhanced Search and Rescue

SE-SAR improves the Search and Rescue environment by adding surveillance data and monitoring for indications of an accident.

Upcoming Events

There are no upcoming events.

How-To Videos

- Register and Logging In
- Fix a Flight Plan
- Flight Plan Route Briefing

MORE VIDEOS >

Partnerships

- Honeywell spidertracks
- GARMIN DELORME
- Aeroflight NavTator
- FlightPro
- AWIRE
- FlightAware

News & Announcements

August 8, 2015 Pilot's Choice: Integrating Your Favorite Apps and Hardware with Lockheed Martin Flight Service

We continue to hear growing enthusiasm for the innovative tools available at www.1800wxbrief.com, but with that enthusiasm often comes questions. The most common we receive at our post engagement opportunity where we share the latest and greatest flight service capabilities is, "Have you developed an app for that?" and "If not, why not?"

READ MORE >

July 15, 2015 Lockheed Martin Flight Service supports NASA UAS Traffic Management Test Event – UTM 2015 July 28-30 at NASA Ames Research Center, CA

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Aviation Weather Center

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AVIATION WEATHER CENTER
NOAA NATIONAL WEATHER SERVICE

Local Forecast | Go HOME ADVISORIES FORECASTS OBSERVATIONS TOOLS NEWS SEARCH ABOUT USER

Aviation Weather Overview [INFO]

Valid at 1901 UTC 16 Mar 2016

Sat VisFog Radar METAR FitCat SIGMET CWA G-AIRMET PIREP-Ice PIREP-Turb Highways Jetroutes FIRs Hover

SIGMET CWA GARMET MOD SEV

Fit Cat: MVFR IFR LIFR PIREP Turb: LGT MOD SEV PIREP Ice: LGT MOD SEV

Disclaimer: International SIGMET locations approximated. Please refer to SIGMET text for full details

Source: Public Domain

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1800wxbrief.com

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Weather and Airport Conditions [Edit Favorites](#)

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U.S. WEATHER DEPICTION U.S. SURFACE ANALYSIS 12 HR SURFACE PROG CONUS RADAR SUMMARY

Click Weather Graphic to enlarge

Plain Text [What's this?](#)

BED [Airport Brief](#) TEB [Airport Brief](#) IAD [Airport Brief](#) *Aircraft ID: N707WT

Airport	Condition	METARS	Density Altitude
BED	VFR	KBED 210256Z 31010G25KT 10SM CLR M11/M19 A2947 RMK A02 FRWND 31031/0225 SLP998 6/// T11111189 53043 PNO S	N/A
TEB	VFR	KTEB 210251Z 33012G35KT 10SM CLR M09/M17 A2972 RMK A02 FRWND 34035/0244 SLP064 60000 T10941167 51034 S	N/A
IAD	VFR	KIAD 210252Z 32020G28KT 10SM SCT110 BKN250 M07/M18 A2999 RMK A02 FRWND 30036/0205 PRESRR SLP160 T10721183 53042 S	N/A

Airport	TAFs
BED	TAF KBED 202339Z 2100/2124 32012KT P6SM OVC040 FM210100 31013G26KT P6SM BKN045 FM211000 29014G29KT P6SM SCT050 FM211600 30016G33KT P6SM BKN020



1800wxbrief Plain Text

16.687

KBED 210256Z 31018G25KT 10SM CLR
M11/M19 A2947 RMK AO2 PKWND 31031/0225

Jan 21, 0256Z. Wind from 310° at 18 knots with gusts to 25 knots, 10 statute miles visibility, Clear Skies, Temperature -11° C, Dewpoint -19° C, Altimeter is 29.47. Remarks: automated station with precipitation discriminator peak wind from 310° at 31 knots at 0225Z

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Private web sites

16.687

- [fltplan.com](#) (free; [example briefing](#))
- [plan.foreflight.com](#) ([example briefing](#))

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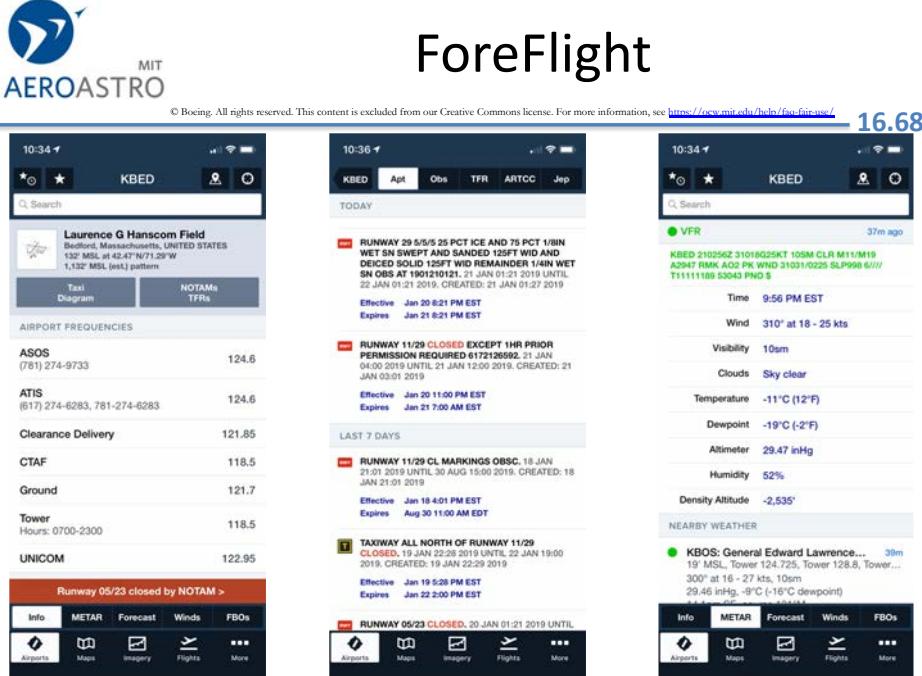
Mobile Apps

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- ForeFlight (iOS-only)
- Garmin Pilot
- NavMonster
- WeatherSpork

New apps every day!

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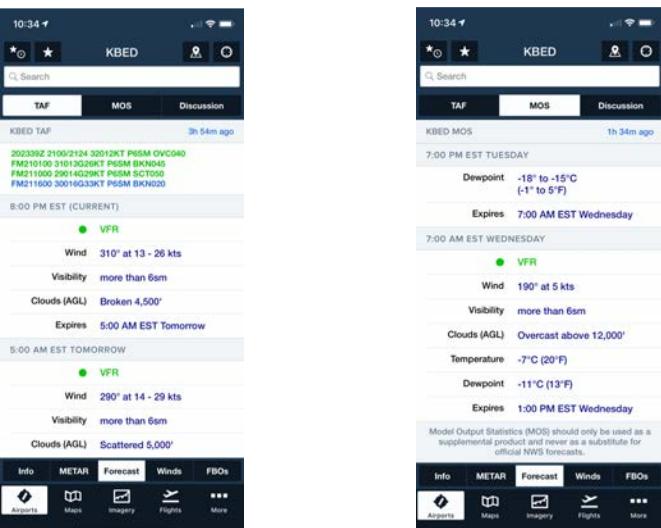
16.687

The image shows three screenshots of the ForeFlight mobile application interface. The top section displays the app's header with the AEROASTRO logo and MIT branding. Below this, the first screenshot shows the main flight deck with tabs for 'Info', 'METAR', 'Forecast', 'Winds', and 'FBOs'. The second screenshot shows a detailed NOTAM for 'RUNWAY 29 4-26 25 PCT ICE AND 75 PCT FBN WET SN SWIFT AND BANDED 125FT WID AND DEICED SOLID 125FT WID REMAINDER 14M WET SN OBS AT 1901210121', effective from Jan 20 6:21 PM EST to Jan 21 6:21 PM EST. The third screenshot shows a weather forecast for KBED, including temperature, humidity, and density altitude. The bottom section of each screenshot shows a navigation bar with icons for 'Airports', 'Maps', 'Imagery', 'Flights', and 'More'.

 **ForeFlight TAF and MOS**

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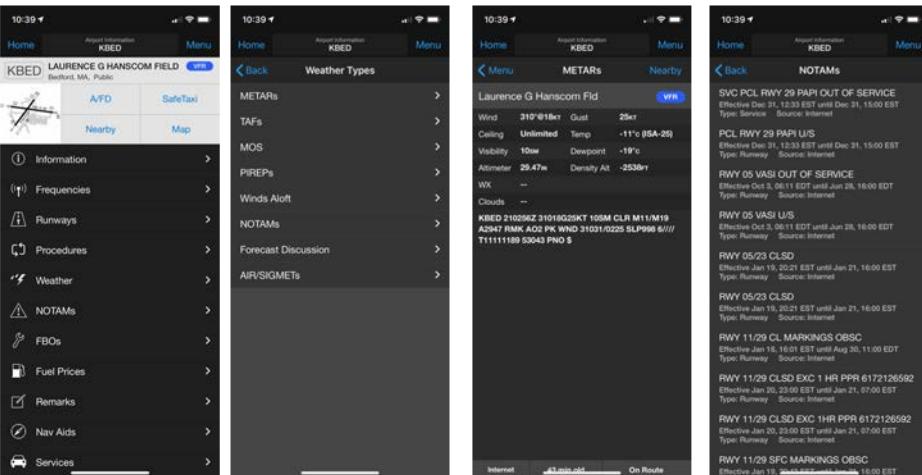
The interface displays two side-by-side weather forecasts for KBED (Bedford, MA). The left panel shows the current KBED TAF (Text Forecast) and the right panel shows the KBED MOS (Model Output Statistics). Both panels include detailed weather information such as wind direction and speed, visibility, cloud cover, and temperature/dewpoint. The MOS panel also includes a note about its use as a supplement to official NWS forecasts.

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 **Garmin Pilot**

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16.687



The interface shows three screens of the Garmin Pilot app. The first screen is the main home screen for KBED (Laurence G Hanscom Field). The second screen shows 'Weather Types' with sections for METARs, TAFs, MOS, PIREPs, Winds Aloft, NOTAMs, Forecast Discussion, and AIR/SIGMETs. The third screen shows a list of NOTAMs (Notices to Airmen) for the field, including details like effective dates, times, and types (e.g., Service, Runway).

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In Flight Weather Sources



Transcribed Weather Broadcast TWEB

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- Weather briefing for a route continuously broadcast on navigation radio frequency (e.g., VOR) along route
- Older service, mostly phased out





Hazardous Inflight Weather Advisory Service HIWAS

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- Weather briefing for a route continuously broadcast on navigation radio frequency along route
- Indicated as available on sectional charts (selected NDB or VOR frequencies)



Source: Public Domain

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FSS Enroute

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- flight plans
- weather
- NOTAMS
- call your mom
- accept PIREP

Frequencies printed in Chart Supplement and on charts.

"Nearest FSS" is a function of many GPS/COM boxes such as Garmin 430 or 650/750.



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NEXRAD via XM Subscription

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Also text such as METAR and TAF.

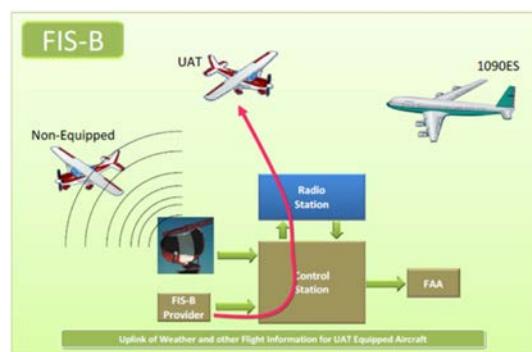
Shows TFRs, lightning, etc.



Free NEXRAD via ADS-B IN

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FIS-B is only available to aircraft who can receive data over 978 MHz (UAT). FIS-B automatically transmits a wide range of weather products with national and regional focus to all equipped aircraft. [includes NEXRAD, METAR, TAF, Lightning, etc.]



AEROASTRO

DIY ADS-B Receiver!

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- <https://www.aviationgeek.com/how-to/build-the-stratux-ads-b-receiver/>

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VFR Weather Minimums

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VFR MINIMUMS

Class A NOT AVAILABLE TO VFR

Class E

Class C SAME

Class G

Class D

Class G

Class G

Class G

Minimum cloud ceiling: Classes B, C & D – 1000ft

Day: min fit vis 1 SM and clear of clouds;
Night: 3 SM, 500 ft below, 1000 ft above and 2000 ft horizontally from clouds (except in an airport traffic pattern within 1/2 mile of runway); min fit vis 1 SM and clear of clouds)

Brandon Abel

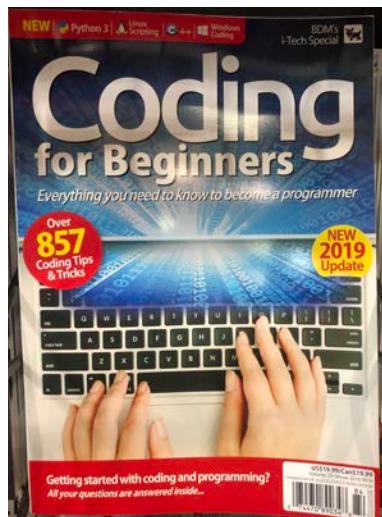
Private Pilot Ground School

Source: Public Domain

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Questions?

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16.687 Private Pilot Ground School
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