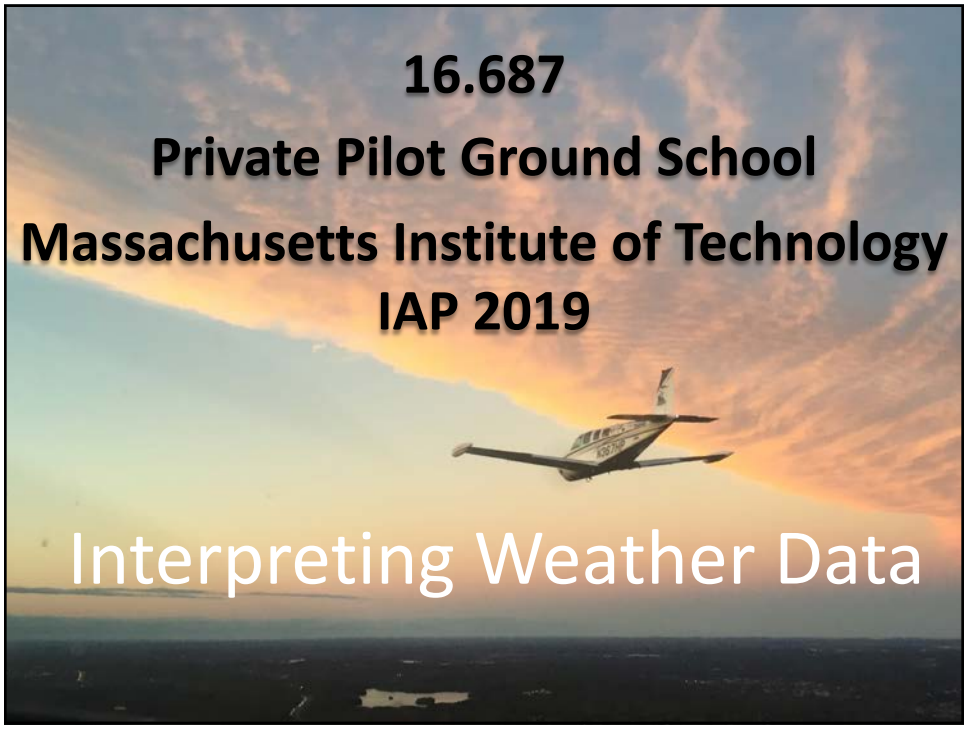


MIT AEROASTRO

Definitions

16.687

- 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

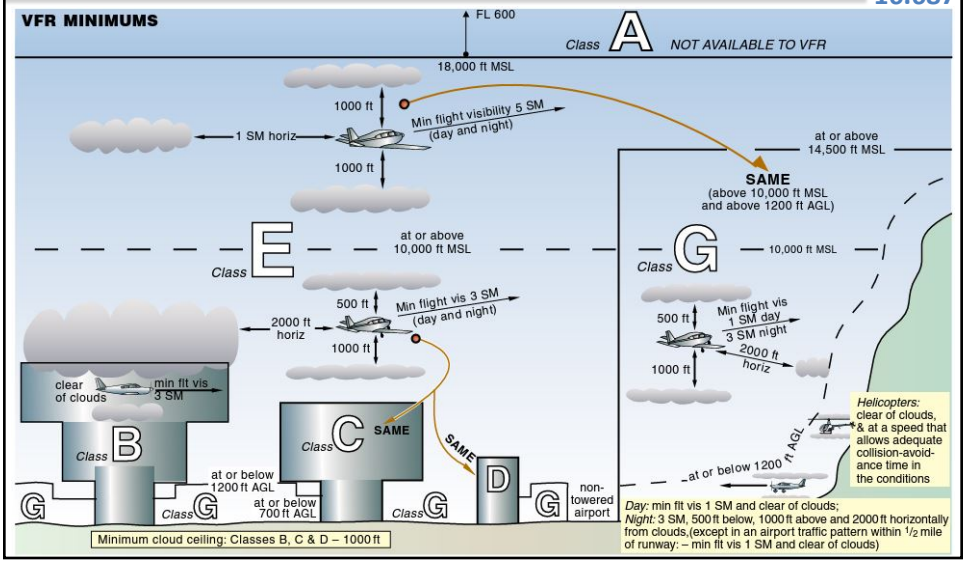
Source: Public Domain

2

VFR Weather Minimums

16.687

Source: Public Domain



Topics

16.687

- Text Weather
- Graphic Weather
- Getting the weather on the ground
- Getting the weather in the air

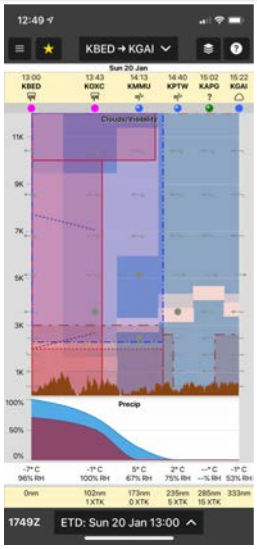
4

Don't Despair, Use Software

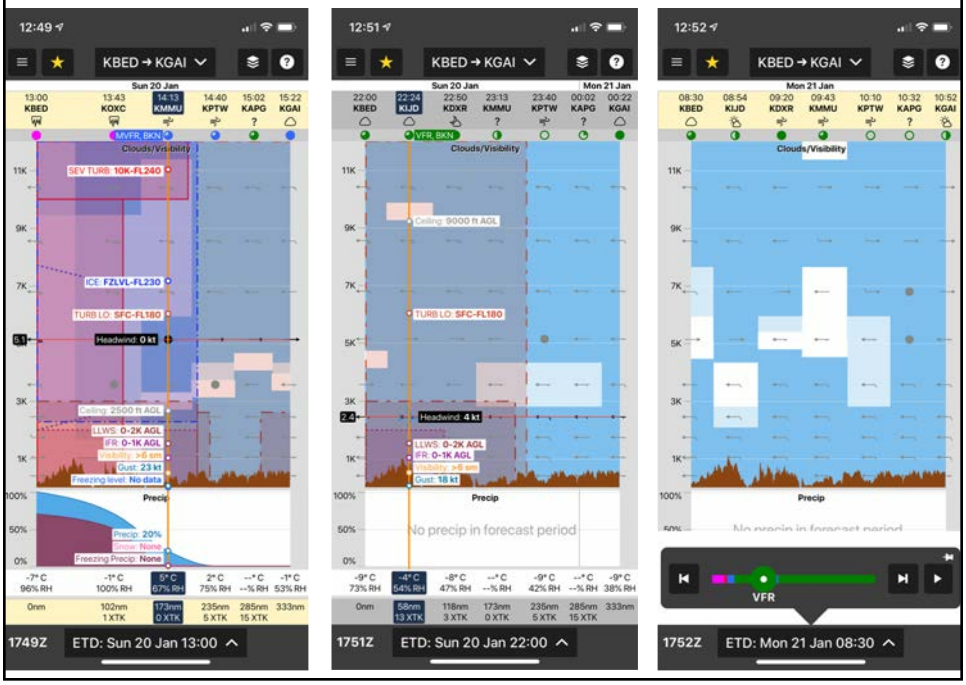
16.687

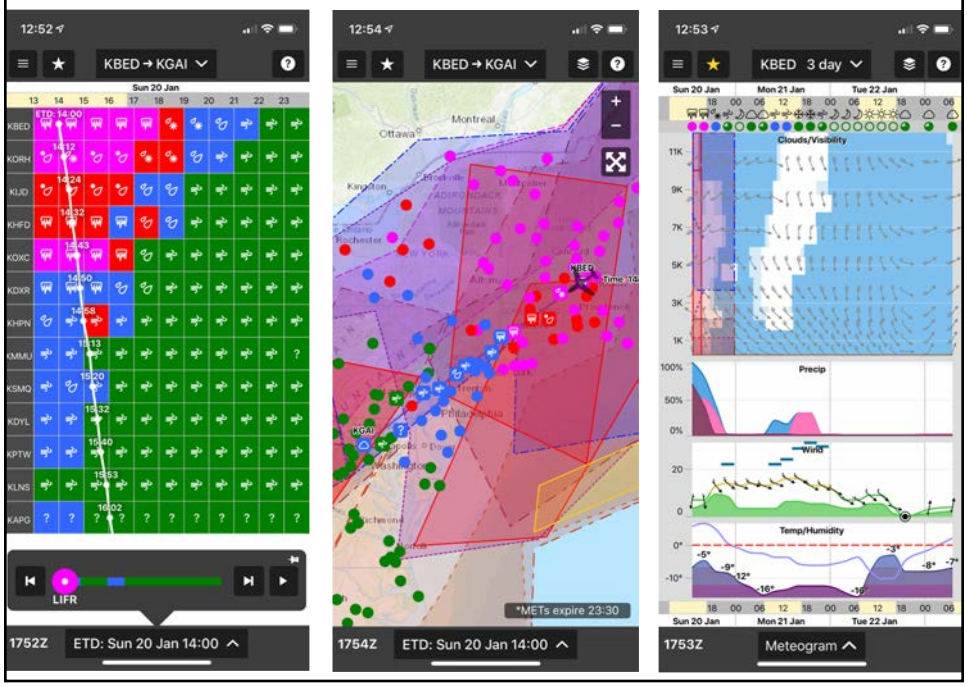
- Most of what follows can be summarized.
- Example: WeatherSpork app/site ->

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

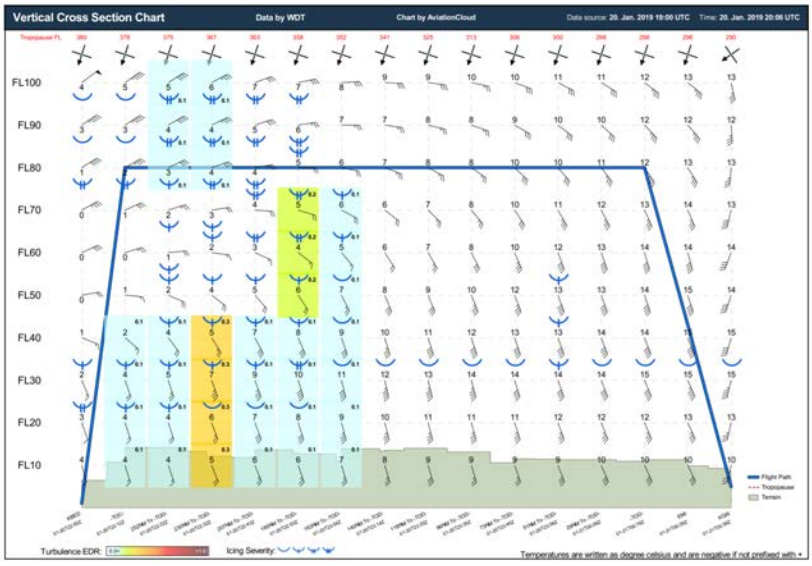


5





Plan.foreflight.com



8

Text Reports and Forecasts

Reports vs. Forecasts

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

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

11

Aviation Routine Weather Report (METAR)

16.687

- 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

12

Aviation Routine Weather Report METAR

16.687

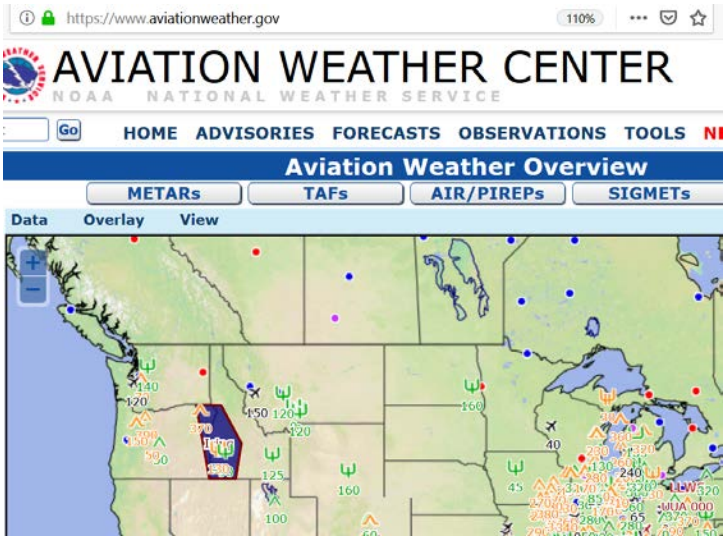
- KPDK 161653Z VRB04KT 10SM OVC060 14/07 A3015 RMK AO2 …

- 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 …

13

AviationWeather.gov

16.687



Source: Public Domain

14

Request METAR

16.687

Request METAR data

IDs: KBED

Format: ○ Raw ◉ Decoded

Time: most recent only

☑ Include TAF

Get METAR data

15

Read METAR

16.687

METAR Data METAR Home Plot Da

IDs: KBED Format: ○ Raw ◉ Decoded most recent only ☑ Include TAF Print Update

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

17

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

18

Printed Weather Forecasts

16.687

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

19

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

20

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

21

MOS forecast for non-TAF airports

16.687

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

22

Aviation Area Forecast (FA)

16.687

- 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

23

Aviation Area Forecast (FA)

16.687

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

24

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

25

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

26

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

27

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

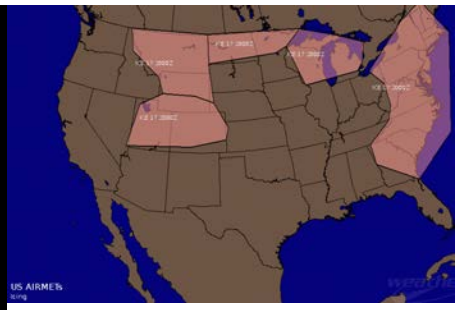
28

AIRMET - WA

16.687

AIRMET Zulu *(Icing and Freezing Level)*

MIAZ 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 ICGICIP 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 EWD OVR RMNDR ME AND CSTL WTRS. ELSW CONDS MOV EWD 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

30

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.

31

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 mi^2)
  - Tornadoes
  - Hail ¾-inch or greater in diameter

32

Convective SIGMET - WST

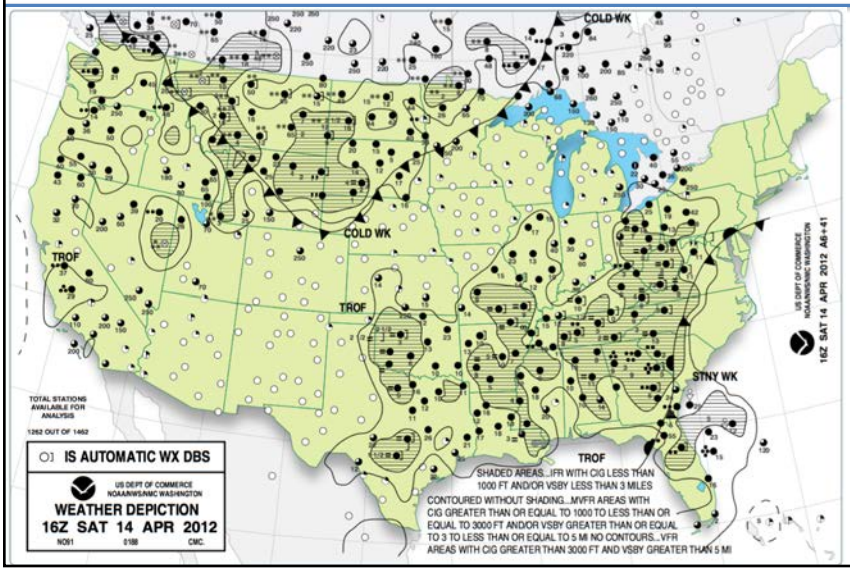
16.687

```
WSUS31 KKCI 171855
SIGE
MKCE WST 171855
CONVECTIVE SIGMET 5E
VALID UNTIL 2055Z
FL GA AL LA AND FL AL MS LA CSTL WTRS
FROM 50NNW ABY-60SSW CEW-100SW LEV
LINE TS 35 NM WIDE MOV FROM 27015KT. TOPS ABV FL450.

OUTLOOK VALID 172055-180055
FROM ATL-IRQ-40N CRG-150W PIE-60S LEV-80SSE SJI-ATL
WST ISSUANCES EXPD. REFER TO MOST RECENT ACUS01 KWNS FROM STORM
PREDICTION CENTER FOR SYNOPSIS AND METEOROLOGICAL DETAILS.

JAS
```

Graphic Weather Products

Weather Depiction Chart

16.687



Source: Public Domain

35

Weather Depiction Chart

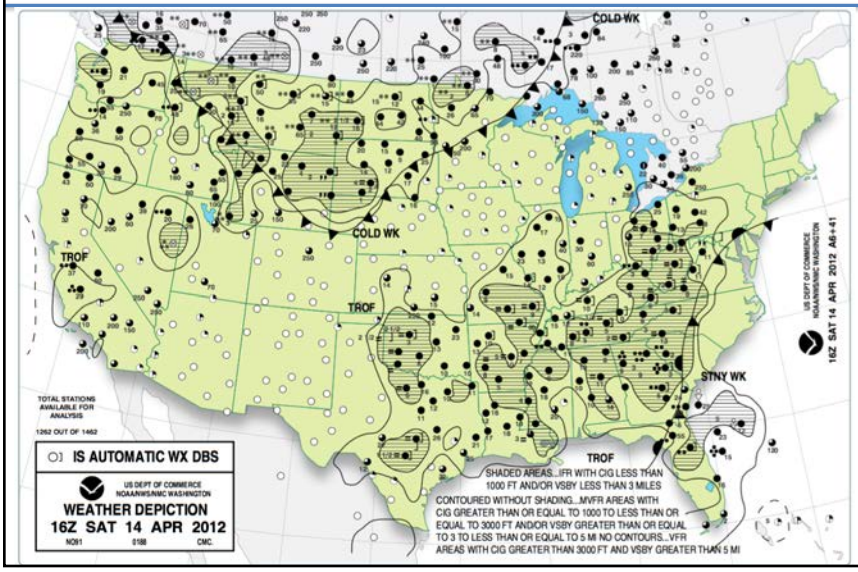
16.687

- Purpose: determining general weather conditions on which to base flight planning
- Shaded areas are "IFR" (instrument conditions)
- Contours without shading is "marginal VFR"
- = sign indicates fog
- Circles indicate percent cloud cover
  - ¼ filled: few clouds (FEW)
  - ½ filled: scattered clouds (SCT)
  - ¾ filled: broken layer (BKN)
  - All filled: overcast layer (OVC)
- Ceiling indicated in hundreds of feet AGL under circle

36

Weather Depiction Chart

16.687

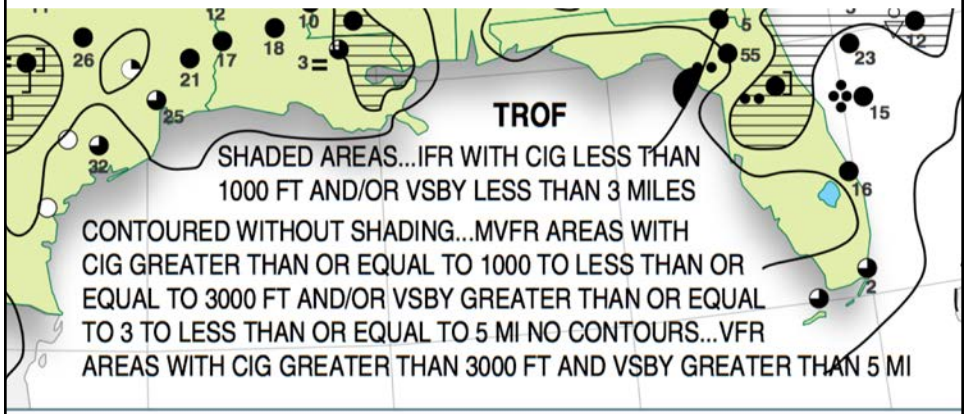


Source: Public Domain

37

Weather Depiction Chart

16.687



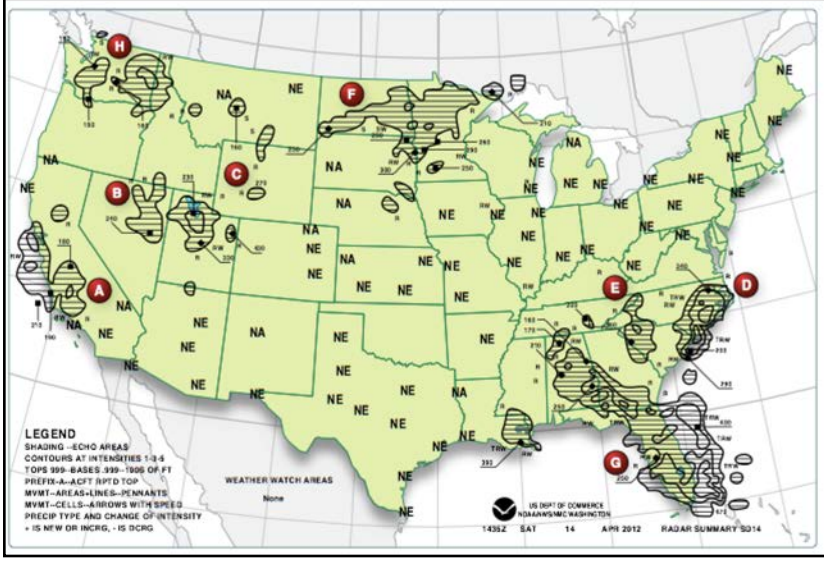
Source: Public Domain

38

Radar Summary Chart

16.687

Source: Public Domain

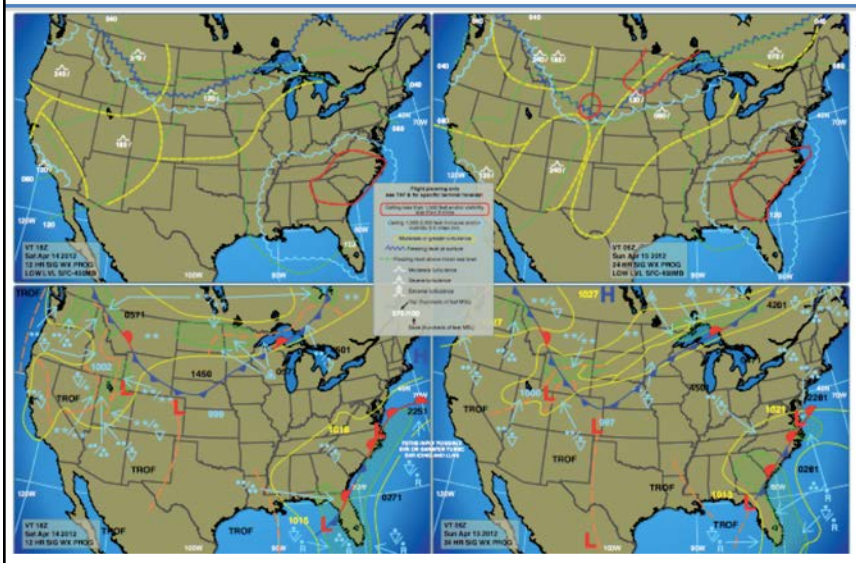


39

Significant Weather Prognostic Chart

16.687

Source: Public Domain

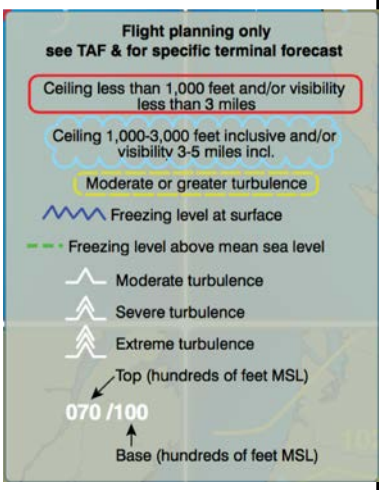


40

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

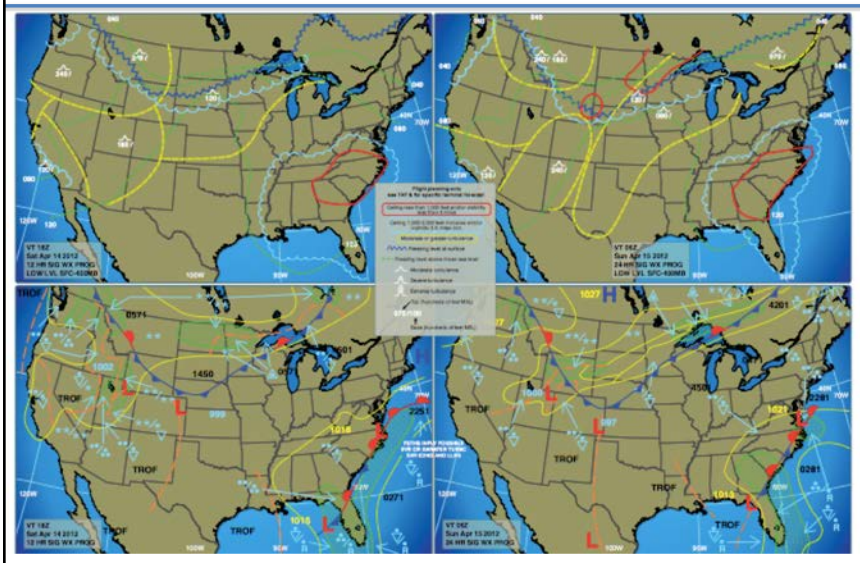


Source: Public Domain

41

Significant Weather Prognostic Chart

16.687



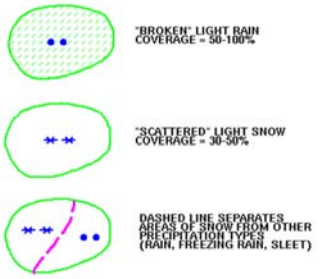
Source: Public Domain

42

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

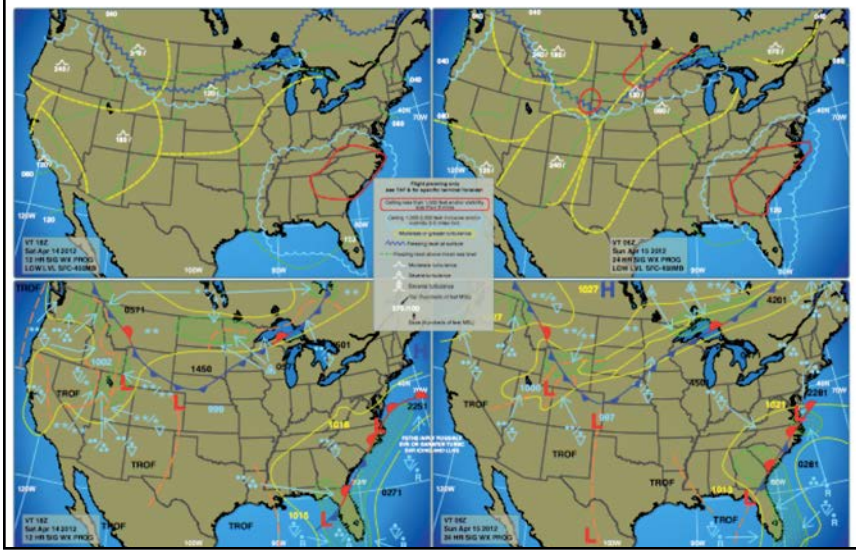


Source: Public Domain

43

Significant Weather Prognostic Chart

16.687



Source: Public Domain

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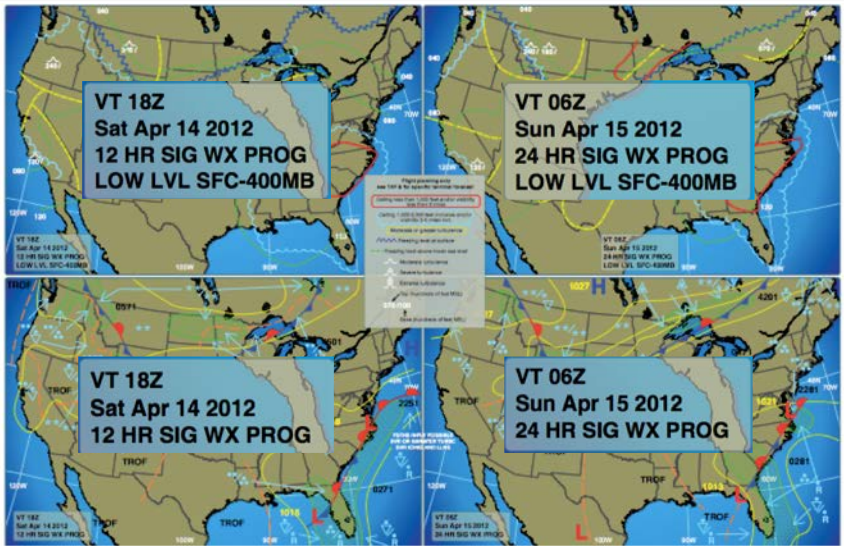
Significant Weather Prognostic Chart

16.687



Source: Public Domain

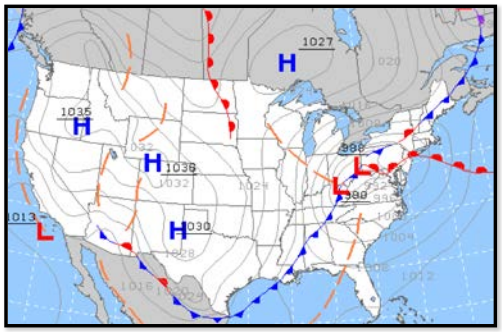
45

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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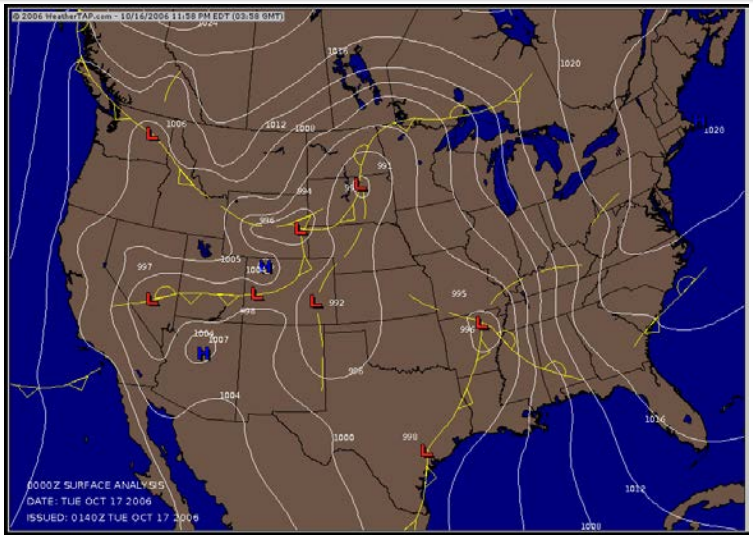
Surface Analysis

16.687

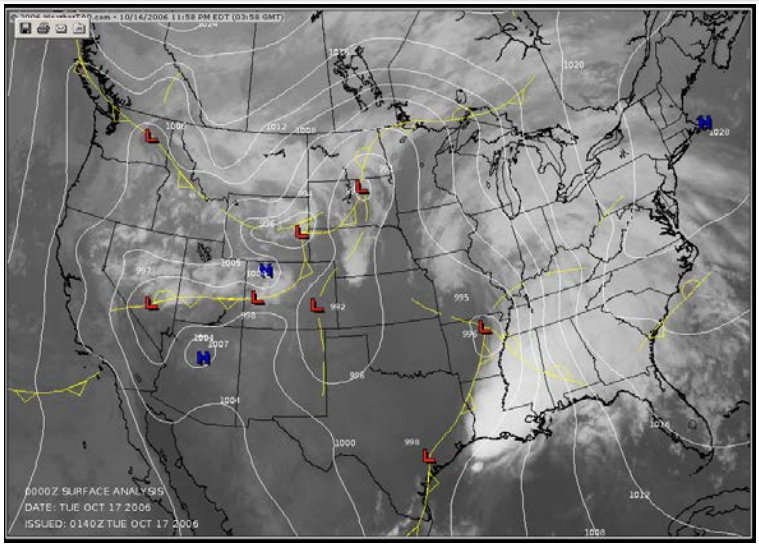


Source: Public Domain

48

Surface Analysis + Satellite Overlay

16.687



Source: Public Domain

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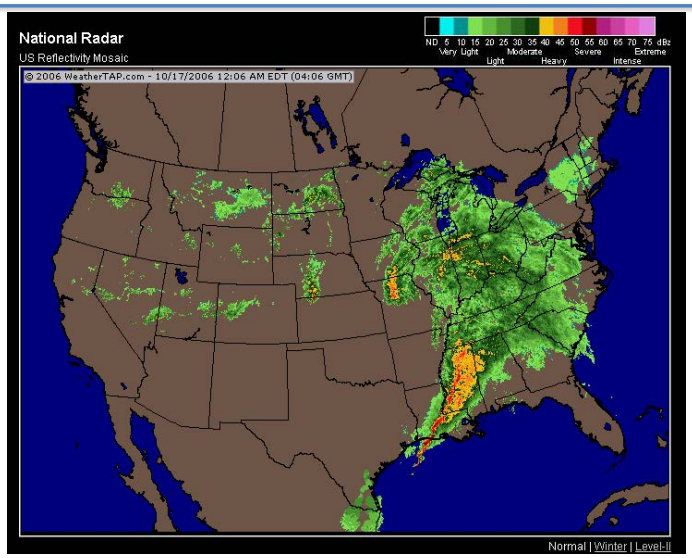
Radar

16.687

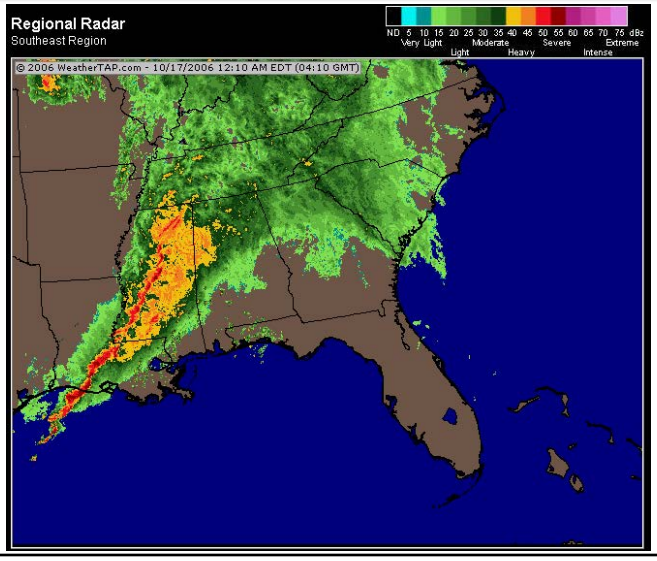


Source: Public Domain

50

Radar

16.687

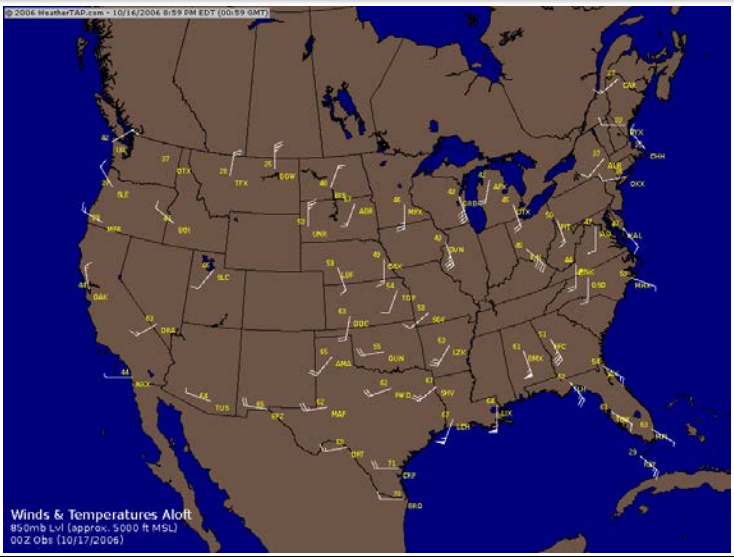


Source: Public Domain

51

Winds Aloft

16.687



Source: Public Domain

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Preflight Weather Sources

MIT AEROASTRO

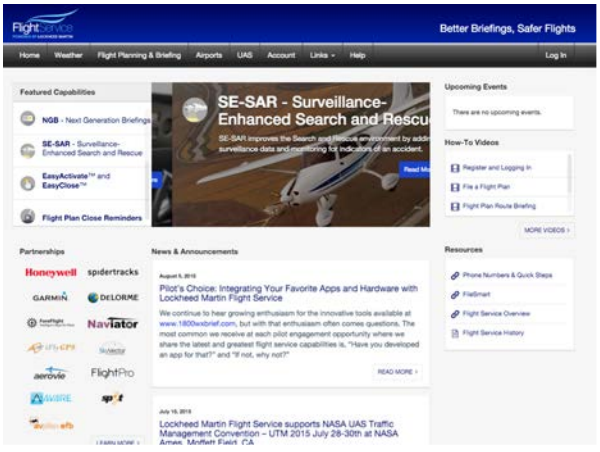
Call 1-800-WX-BRIEF

MIT AEROASTRO

16.687

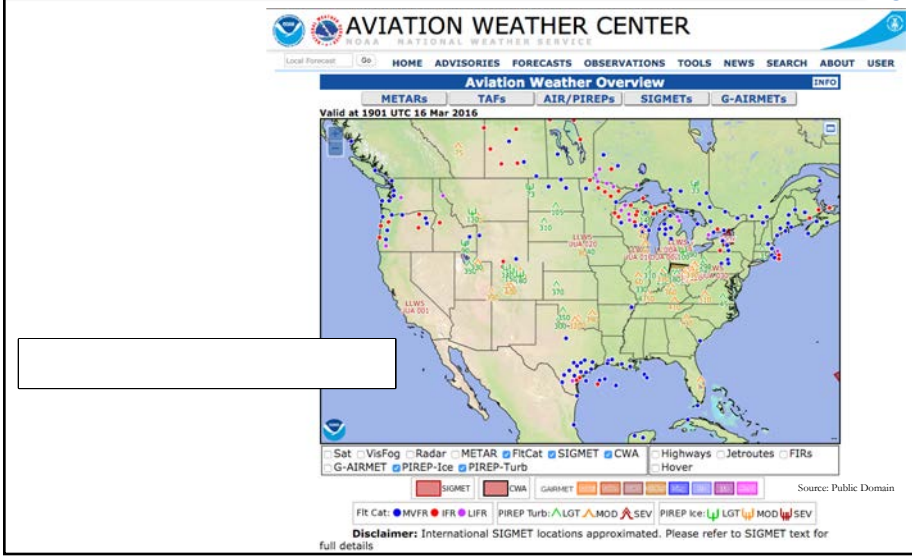
- Started life as Flight Service Stations (FSS) run by FAA
- Trained briefers answer the phone
- Access with a tail number
- Accept and close flight plans
- Except for Alaska, outsourced to Lockheed Martin in 2005 and now "Leidos"
- They also have a web site.
- **Pay attention**: "VFR Flight Not Recommended"

1800wxbrief.com



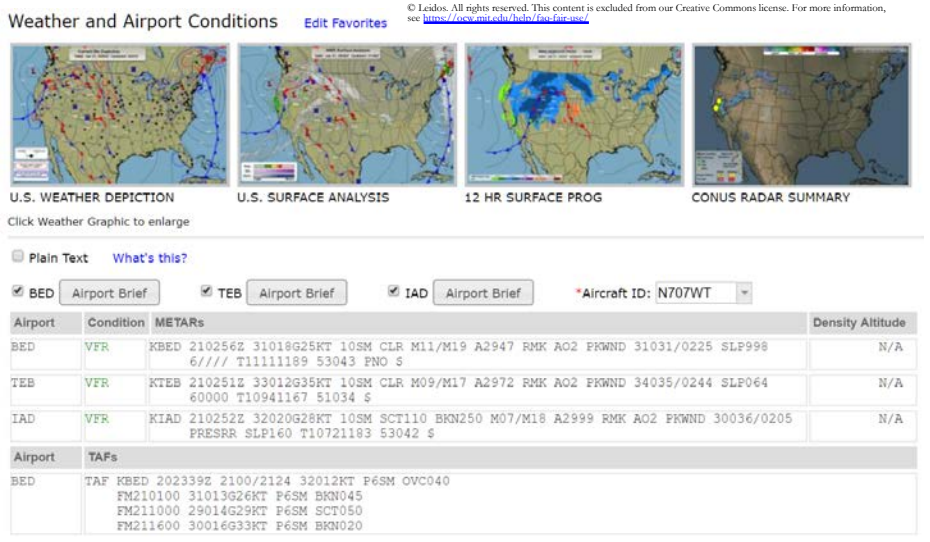
Aviation Weather Center

16.687



1800wxbrief.com

16.687



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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

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- 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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ForeFlight

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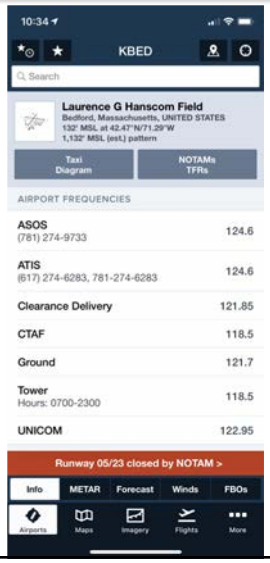

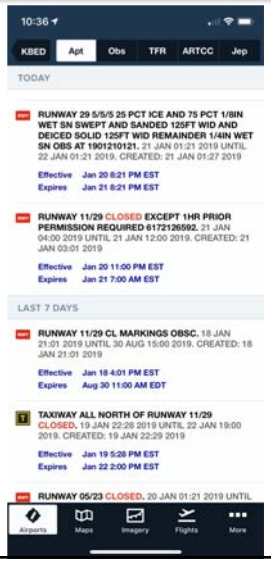

ForeFlight TAF and MOS

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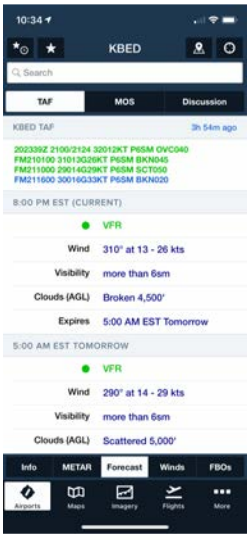

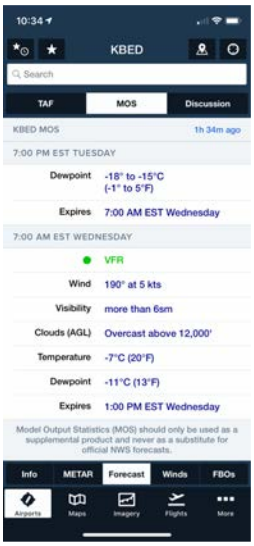

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Garmin Pilot

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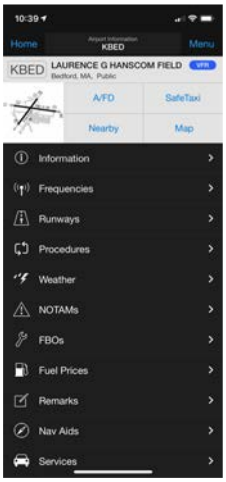

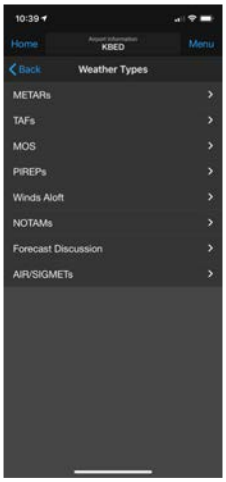

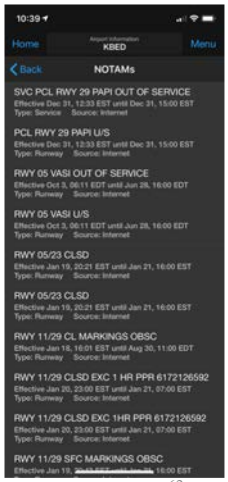

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In Flight Weather Sources

Transcribed Weather Broadcast TWEB

- 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.

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Free NEXRAD via ADS-B IN

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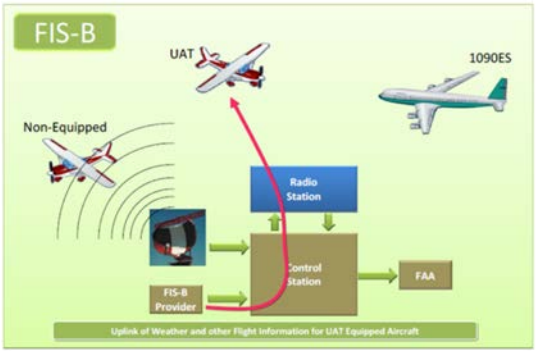
FIS-B is only available to aircraft who can receive data over 978 MHz (UAT). FIS-B automatically transmits a wide range of weather products with national and regional focus to all equipped aircraft. [includes NEXRAD, METAR, TAF, Lightning, etc.]



Source: Public Domain

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DIY ADS-B Receiver!

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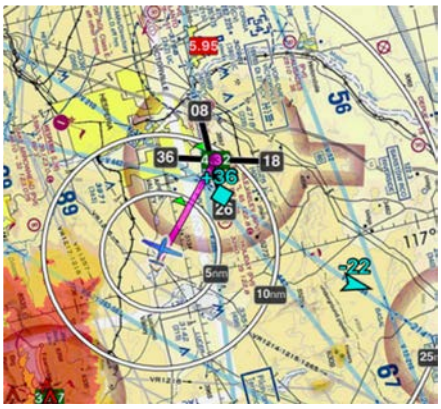
- https://www.aviationgeek.com/how-to/build-the-stratux-ads-b-receiver/



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VFR Weather Minimums

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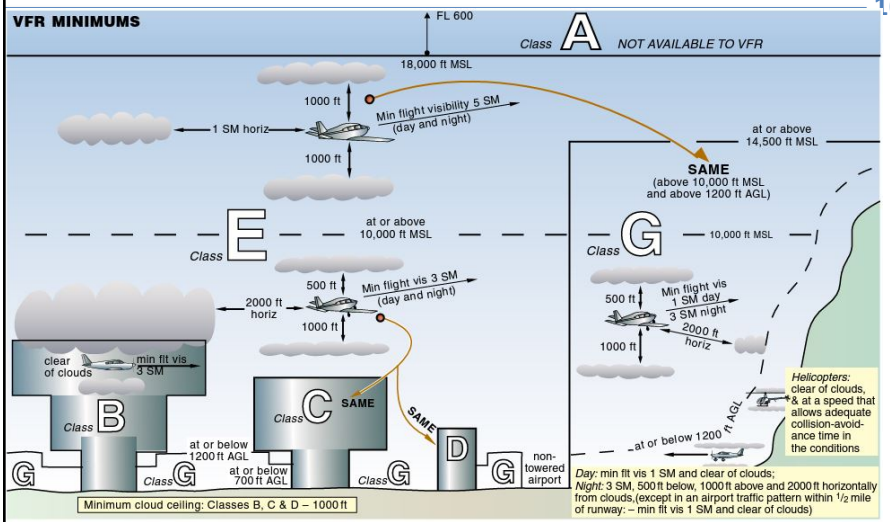

Brandon Abel Private Pilot Ground School Source: Public Domain 70

AERONAUTICS AND ASTRONAUTICS MIT

Questions?

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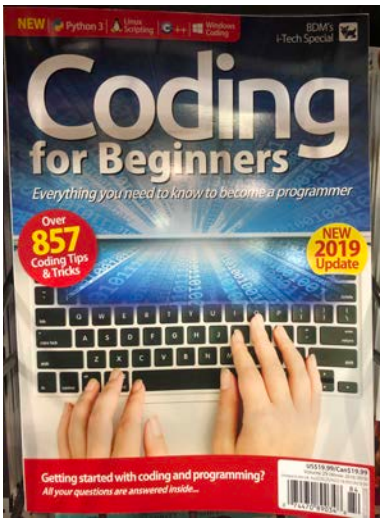

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