KRUT / KLEB Ground Training

The following presentation provides important information for flying into/out of Rutland, Vermont (KRUT) and Lebanon, New Hampshire (KLEB)

Mountain Weather

Hazardous Mountain Winds

All pilots who fly near mountainous terrain must deal with the potential for mountain-induced severe wind events, particularly during takeoff and landing.

Takeoff and Landing

Takeoff and landing concerns include:

- Experiencing turbulent air with inadequate stall margins
- Loss of directional control on or near the runway
- Rolling moments that surpass aircraft roll authority
- Downdraft velocities that exceed the climb capability of the aircraft

Wind Velocities

A “strong” wind is one that is at least 20 knots.

Forecast and actual wind speeds at ridge level can be determined from the Winds and Temperatures Aloft Forecast (FD) and Pilot Reports (UA).

Mountain Wave Activity

A parcel of air within a stable air mass moving over a mountain will undergo wave motion.

There are two atmospheric characteristics that lead to mountain wave formation:

- Atmospheric stability
- Wind Strength

Note on Stability

A lower-than-standard lapse rate = *Stable*

A higher-than-standard lapse rate = *Unstable*

The less temperature decreases with altitude, the more stable the air mass is.

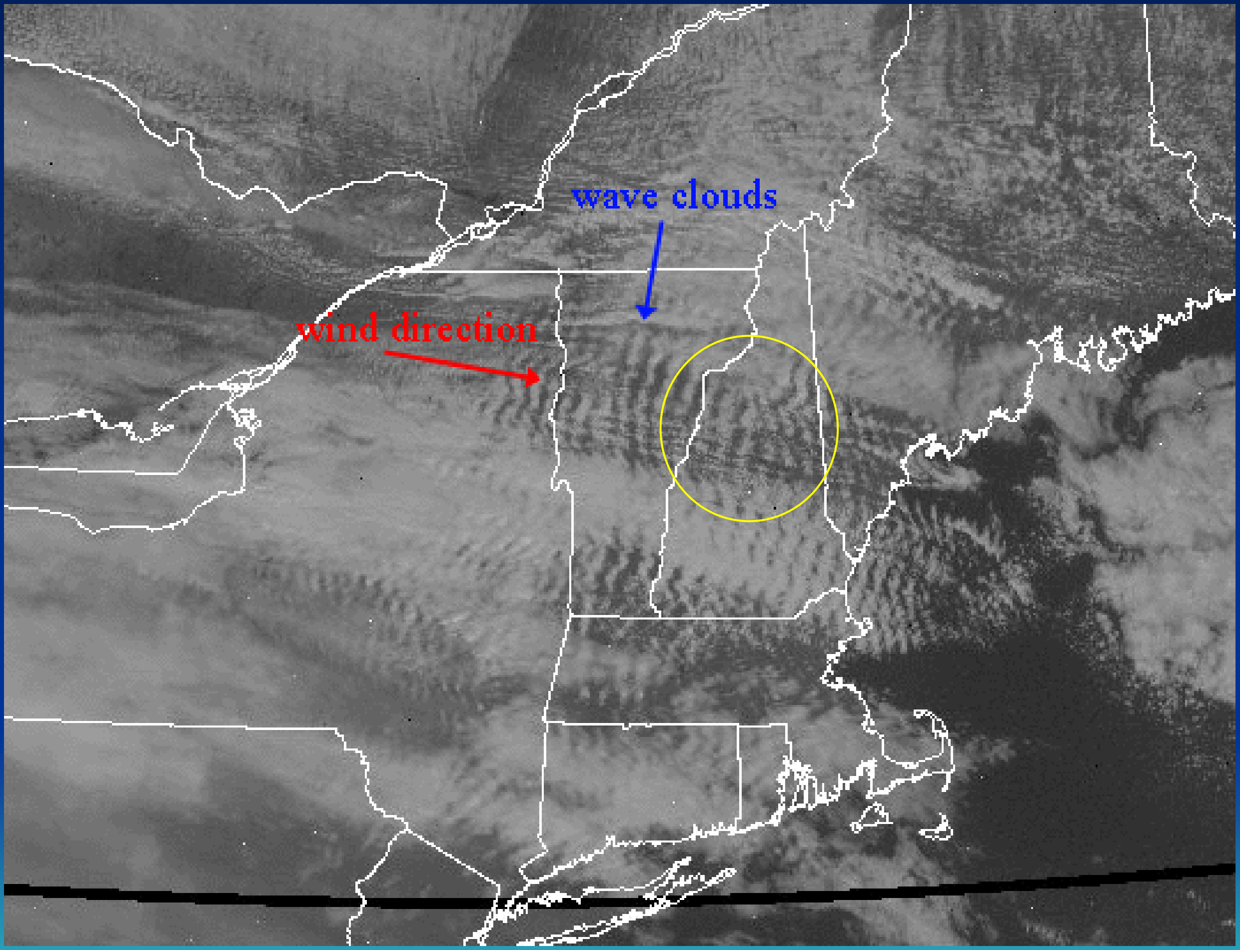
Using Satellite Imagery

Satellite imagery can indicate the likely existence of a mountain-induced gravity wave.

The image will show clouds that have a stationary upstream edge over or near the known location of a mountain range, with the orientation of this upwind edge generally parallel to the orientation of the range.

Satellite Imagery

Here's an example of a satellite image:



Persistent Horizontal Roll Vortices (Rotors)

When mountain waves are present, it is common for a rotor zone to develop near or below ridge level on the downwind side of the mountain under a wave crest and associated lenticular cloud (if sufficient moisture is present).

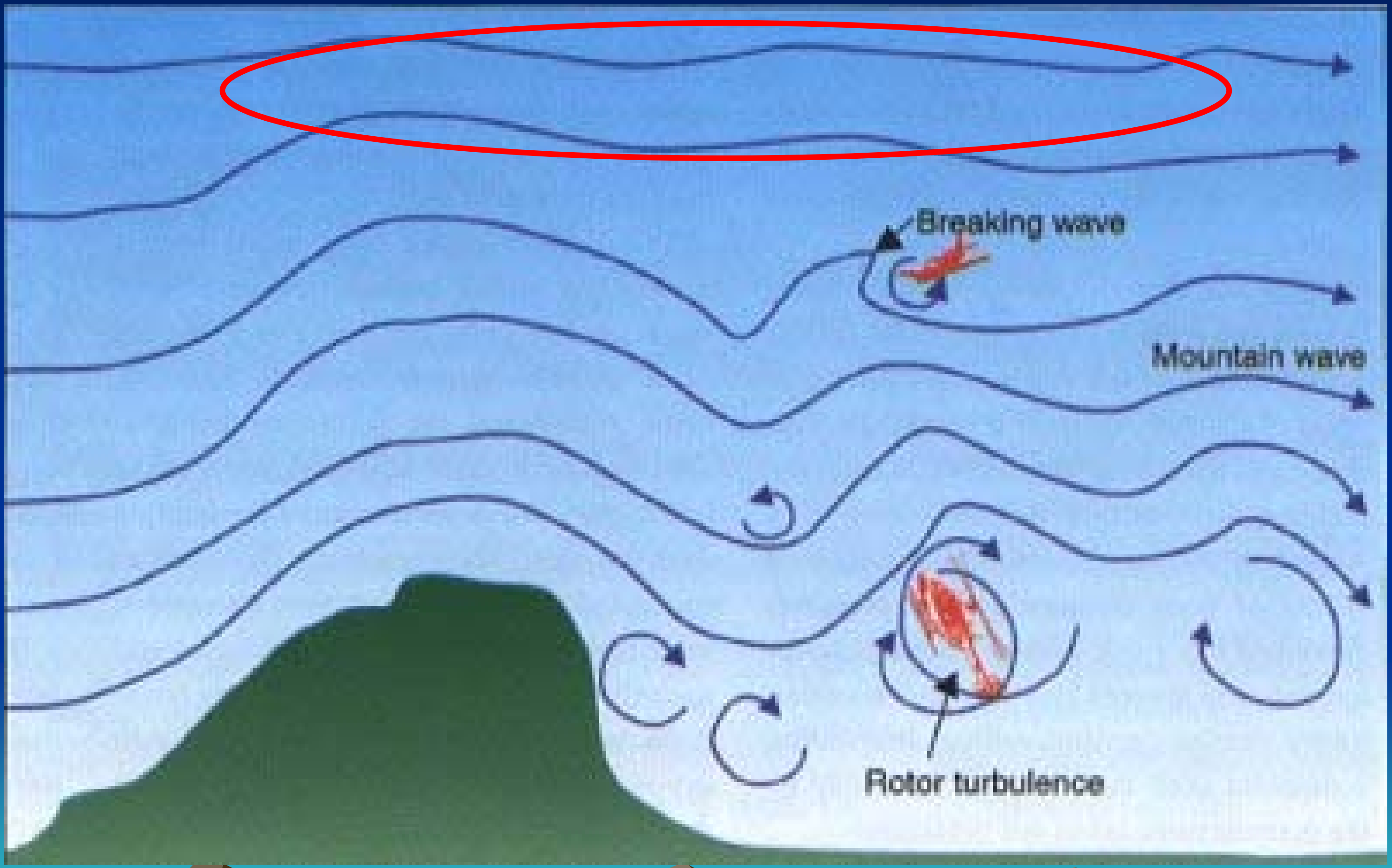
This is an area of potentially severe-to-extreme wind shear and turbulence.

Identifying Rotor Clouds

From a distance, a rotor cloud might look like a cumulus cloud. However, the downwind side of the rotor cloud will typically be rounded in the direction of rotation of the rotor, with cloud tags or streamers at the bottom of the cloud mass. The cloud tags appear to be rapidly forming and dissipating, thereby giving some sense of rotation within the cloud.

Rotors and Mountain Waves

Staying well above the terrain is the best solution!



Lenticular and Rotor Clouds

Lenticular Cloud

Rotor Clouds

Lee-Side Inversion with Shear Flow

A concentrated shear zone and turbulence can develop in the stable air associated with a temperature inversion when strong vertical shear is present above the inversion.

Check for a “cold pool of air” in the valley with strong winds aloft.

Non-Steady Horizontal Roll Vortices

The greatest chance for small-scale horizontal vortices with breaking vertically propagating waves and windstorms is when wind surges interact with foothill terrain downwind of the main topographic feature that is causing the vertically propagating wave.

Non-Steady Horizontal Roll Vortices

Roll vortices can develop in non-steady wind flow over a mountain ridge

The roll vortices develop and move downwind from the mountain

These roll vortices will occur in a generally turbulent environment

Non-Steady Horizontal Roll Vortices

Aircraft encounters can lead to locally severe turbulence and strong rolling moments

Traveling vortices may present a greater hazard for aircraft because of the added velocity components.

Pilots should watch for blowing dust, snow and debris at the surface

Icing Concerns

Orographic clouds form when moist air is lifted by flowing up the side of a mountain.

As the parcel of air is lifted, it cools and forms a cloud.

Such clouds can contain a large volume of water and, in some cases, large droplets.

The larger the droplet, the faster ice can build.

Icing Concerns

Wave clouds, recognized by their “wavy” tops, can have high liquid water contents.

Continued flight along a wave may result in airframe icing.

Avoid flight in wave clouds and check PIREPS and the freezing level before flying through orographic clouds.

Operations in a Non-Radar Environment

Arrival Navigation Concepts

The most significant and demanding navigational requirement is the need to safely separate aircraft.

In a non-radar environment, ATC does not have the means to separate air traffic and must depend entirely on information relayed from flight crews to determine an airplane’s actual position and altitude.

In a non-radar environment, precise navigation is critical to ATC’s ability to provide separation.

Arrival Navigation Concepts

In a nonradar environment, ATC has no independent knowledge of the actual position of your aircraft or its relationship to other aircraft in adjacent airspace.

ATC's ability to detect a navigational error and resolve collision hazards is seriously degraded when a deviation from a clearance occurs.

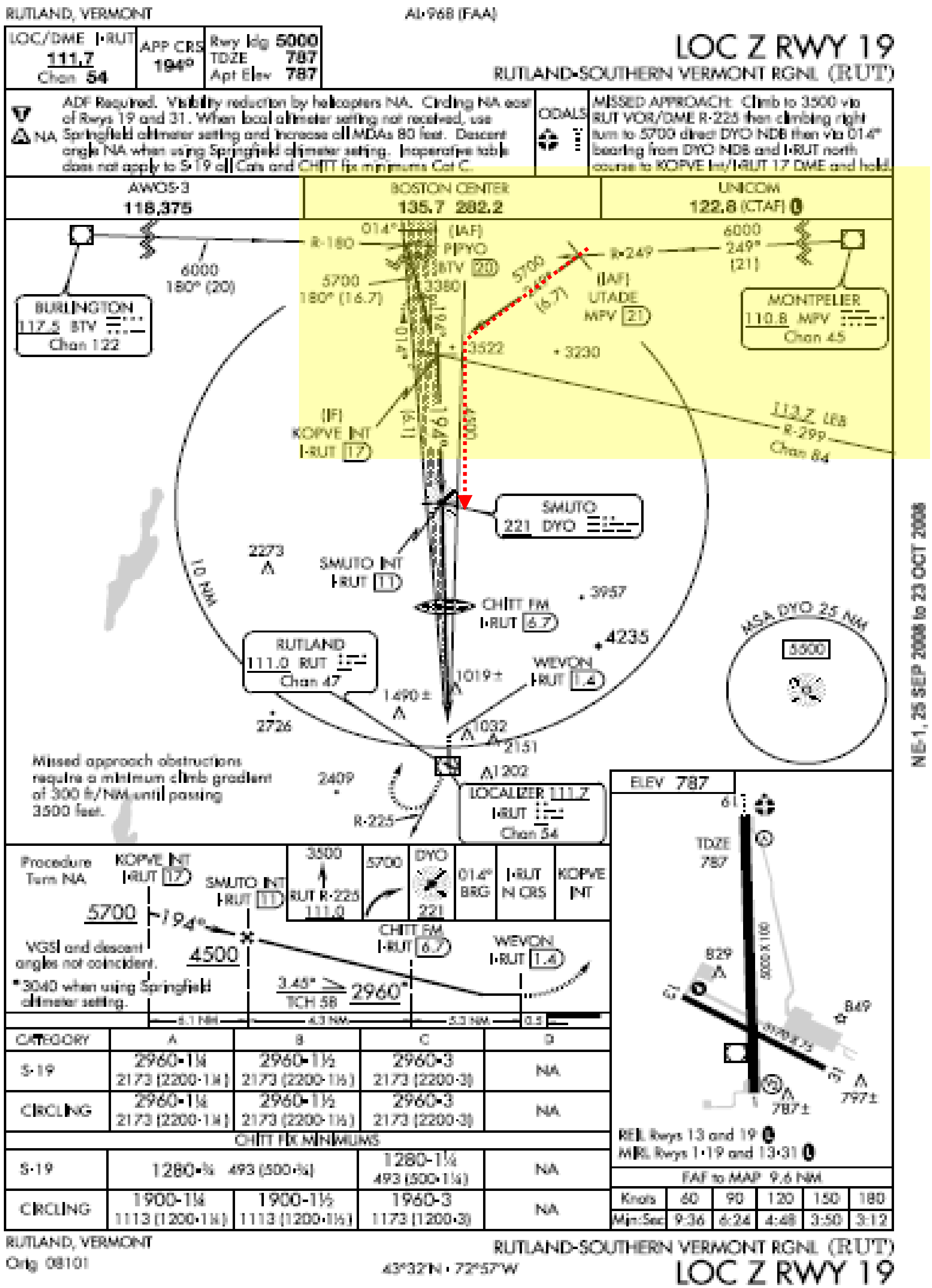
Non-Radar Environment

In the absence of radar vectors, an instrument approach begins at an IAF.

If an aircraft has been cleared to a holding fix and, prior to reaching that fix, is issued a clearance for an approach but is not issued a revised routing such as *"proceed direct to XXX,"* the aircraft is expected to proceed via the last assigned route, a feeder route (if one is published) and then fly the approach as published.

Non-Radar Environment

If, by following the route of flight to the holding fix, the aircraft would overfly an IAF or the fix associated with the beginning of a feeder route, the aircraft is expected to fly the approach using the published feeder route to the IAF or from the IAF as appropriate.



If ATC cleared you "Direct Montpelier, cleared for the LOC Z RWY 19 Approach...", what would your course of action be?

- Direct MPV.
- Get established on the MPV 249° radial.
- Descend to 6000'.
- Cross UTADE (MPV 21 DME) and descend to 5700'.
- After 6.7 more miles, join the LOC RWY 19 inbound.
- Once established, descend to 4500' until crossing SMUTO.
- Make all required position reports when not in radar contact.

Non-Radar Environment

For aircraft operating on unpublished routes, maintain your assigned altitude until you are *established* on a segment of a published route or IAP.

According to the ICAO, established means:

- Within half-scale deflection for ILS or VOR
- Within ±5° of the required NDB bearing

IFR: Takeoff, Approach and Landing Minimums

If takeoff minimums are specified for the take-off airport, a pilot may not depart under IFR when the weather conditions are less than the takeoff minimums specified for the takeoff airport or in the certificate holder's operations specifications.

At airports where straight-in instrument approach procedures are authorized, a pilot may depart under IFR when the weather conditions reported by the facility are equal to or better than the lowest straight-in landing minimums, unless otherwise restricted, if:

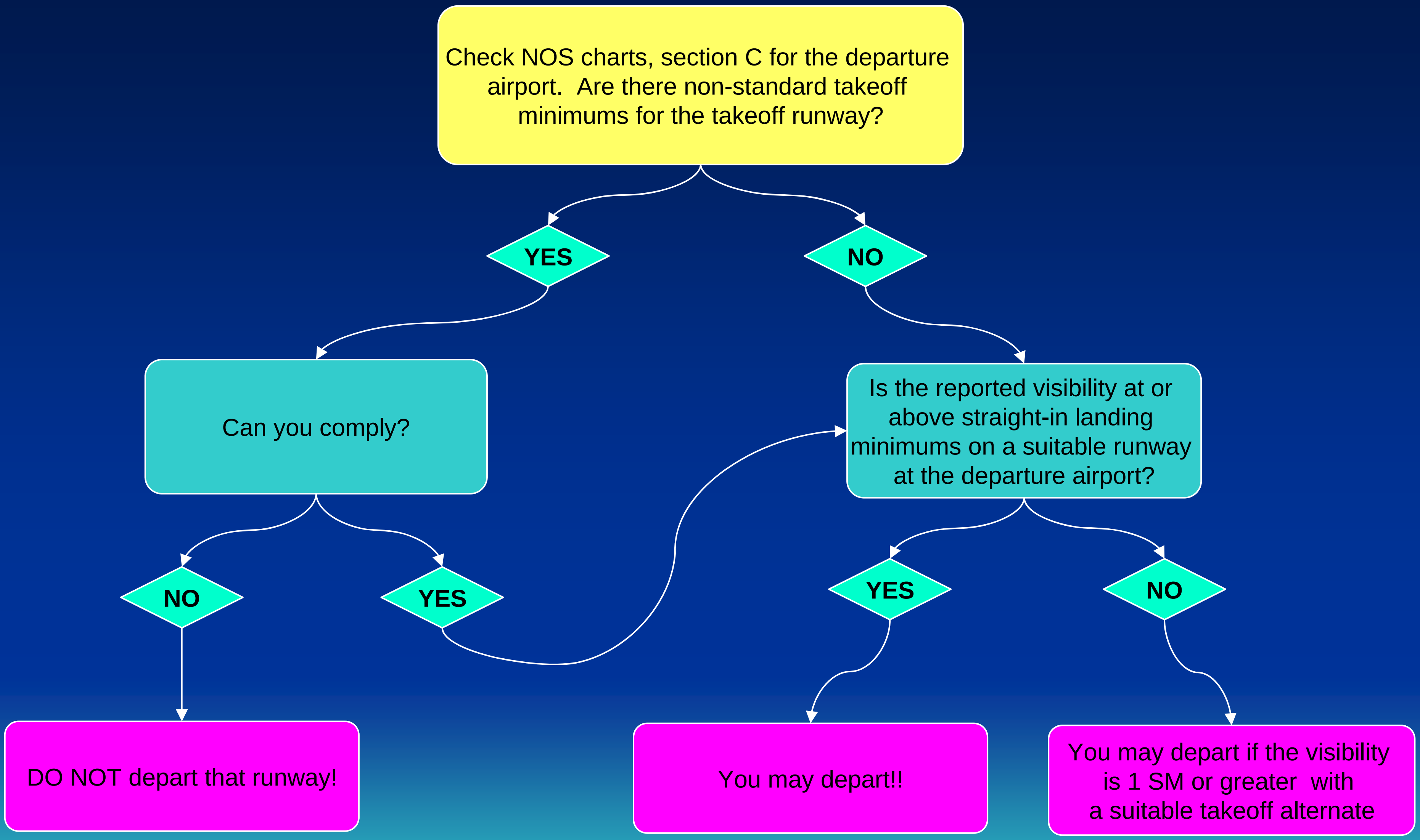
- The wind direction and velocity at the time of takeoff are such that a straight-in instrument approach can be made to the runway served by the instrument approach
- The associated ground facilities upon which the landing minimums are predicated and the related airborne equipment are in normal operation; and
- The certificate holder has been approved for such operations (see Ops Specs)

No pilot may depart under IFR from an airport where *weather conditions are at or above takeoff minimums but are below authorized IFR landing minimums* unless there is an alternate airport within 1 hour's flying time (at normal cruising speed, in still air) of the airport of departure

The following slide illustrates the decision-making process when determining Takeoff Minimums.

IFR Takeoff Minimum Determination

Note: NOTAMS apply



Abbreviated IFR Departure Clearance

In both radar and nonradar environments, the controller will state “Cleared to XXX airport as filed” or:

If a DP or DP Transition is to be flown, specify:

- the DP name
- the current number
- the DP transition name
- the assigned altitude
- Additional instructions necessary to clear a departing aircraft via the DP or DP transition route filed (departure control freq., beacon code, etc.)

Abbreviated IFR Departure Clearance (Continued)

Additionally, in a nonradar environment, the controller will specify one or more fixes, as necessary, to identify the initial route of flight.

Example:

Cessna Three One Six Zero Foxtrot cleared to Charlotte Airport as filed via Brooke, maintain seven thousand

Instrument Departure Procedures

Unless specified otherwise, required obstacle clearance for all departures is based on:

- Crossing the departure end of the runway at least 35 feet above the runway elevation
- Climbing to 400 feet above the departure end of runway elevation before making the initial turn
- Maintaining a minimum climb gradient of 200 feet per nautical mile (FPNM), unless required to level off by a crossing restriction, until the minimum IFR altitude.

Instrument Departure Procedures (Continued)

A greater climb gradient may be specified in the DP to clear obstacles or to achieve an ATC crossing restriction.

If an initial turn higher than 400 feet above the departure end of runway elevation is specified in the DP, the turn should be commenced at the higher altitude.

If a turn is specified at a fix, the turn must be made at that fix.

Fixes may have minimum and/or maximum crossing altitudes that must be adhered to prior to passing the fix.

KRUT Obstacle Departure Procedure

RUTLAND, VT

RUTLAND STATE

TAKE-OFF MINIMUMS: **Rwy 1,** 2300-3 or std. with a min. climb of 270' per NM to 3500. **Rwy 13,** NA. **Rwy 19,** 2800-3 or std. with a min. climb of 510' per NM to 4500. **Rwy 31,** 2900-3 or std. with a min. climb of 420' per NM to 4500.

DEPARTURE PROCEDURE: **Rwy 1,** climb direct DYO NDB, cross DYO NDB at or above 6000, if not at 6000, depart DYO NDB on bearing 325° to 6000 before proceeding on course. **Rwys 19,** climbing right turn direct DYO NDB, cross DYO NDB at or above 6000, if not at 6000, depart DYO NDB on bearing 325° to 6000 before proceeding on course. **Rwy 31,** climbing right turn direct DYO NDB, cross DYO NDB at or above 6000, if not at 6000, depart DYO NDB on bearing 325° to 6000 before proceeding on course.

KLEB Obstacle Departure Procedure

LEBANON, NH

LEBANON MUNI

TAKE-OFF MINIMUMS: **Rwys 7,18,** 1000-2.

Rwy 25, 1300-2 or 300-1 with a min. climb of 440' per NM to 2000. **Rwy 36,** 1200-2 or std. with a min. climb of 280' per NM to 2400.

DEPARTURE PROCEDURE: **Rwys 7,18,** climb visually over airport to cross airport at or above 1500 then proceed on course. **Rwy 25,** climb runway heading to 2000 before proceeding on course. **Rwy 36,** climb runway heading to 2400 before proceeding on course.

KLEB - Departing RWY 18

- Takeoff Runway 18 requires 1000-2 due to terrain ahead and to the sides

Operating in a Non-Radar Environment

On initial contact, the pilot should inform the controller of the aircraft's present position, altitude and time estimate for the next reporting point.

Example:

- *(Name) Center*
- *aircraft identification*
- *Position*
- *Altitude*
- *Estimating (reporting point) at (time)*

ARTCC Communications

After initial contact, the pilot should give the controller a complete position report.

Example:

- *(Name) Center*
- *Aircraft identification*
- *Position*
- *Time*
- *Altitude*
- *Type of flight plan*
- *ETA and name of next reporting point*
- *Name of the next succeeding reporting point*
- *Remarks*

Position Reporting

Position reports should include the following items:

- Identification
- Position
- Time
- Altitude or flight level (include actual altitude or flight level when operating on a clearance specifying VFR-on-top)
- Type of flight plan (not required in IFR position reports made directly to ARTCCs or approach control)
- ETA and name of next reporting point
- The name only of the next succeeding reporting point along the route of flight
- Pertinent remarks

Additional Reports

When not in radar contact, make additional position reports:

- When leaving final approach fix inbound on final approach (non-precision approach)
- When leaving the outer marker or fix used in lieu of the outer marker inbound on final approach (precision approach).
- A corrected estimate at anytime it becomes apparent that an estimate as previously submitted is in error in excess of 3 minutes.

Instrument Approach Procedures

When cleared for a specifically prescribed IAP, pilots shall execute the entire procedure commencing at an IAF or an associated feeder route as described on the IAP chart unless an appropriate new or revised ATC clearance is received or the IFR flight plan is cancelled.

Missed Approaches

Pilots must ensure they have climbed to a safe altitude prior to proceeding off the published missed approach, especially in nonradar environments.

Abandoning the missed approach prior to reaching the published altitude may not provide adequate terrain clearance.

Additional climb may be required after reaching the holding pattern before proceeding back to the IAF or to an alternate.

Operations Specifications and Additional Reminders

KRUT: Operations Specifications

Hyannis Air Service, Inc. is authorized to operate to/from Rutland. Prior to any operations to/from this airport, the operator shall require:

- All pilots receive initial ground school for KRUT Operations.
- All Captains have initial entry qualification into KRUT with a check airman.
- All Captains to have a first officer for the first 10 operations to/from KRUT
- Captain must have flown the KRUT LOC Z 19 Approach within the last 6 calendar months and have received an annual line check into KRUT in the months of November-January of each year.
- Captain to display the tailored approach plate from Jeppesen with the "Single Engine Extraction Procedure" note developed for Cape Air.
- All operations in/out of KRUT at night must be operated under IFR. Visual approaches at night are not authorized.

KRUT: Operations Specifications

Additionally, operation to/from KRUT will be limited to reported wind velocity on the ground in KRUT not to exceed 35 knots, including gusts.

Note: First Officers MUST NOT fly the LOC 19 Z Approach into KRUT.

LOC Z RWY 19
Single Engine Extraction Procedure

At anytime inside the FAF and the airport is IFR:

- Execute “engine failure in flight” boxed memory items.
- Being climb at Vyse and track localizer to MAP.
- Thence:
  - Climb via RUT VOR and outbound on RUT VOR R-221 to 2.5 DME (RUT)
  - Then climbing right turn to 5700’ via 027 degree bearing to DYO NDB,
  - Then via 014 degree bearing from DYO NDB and I-RUT north course to KOPVE Int/I-RUT 17 DME and hold.

KRUT Instrument Approach Reminders

- If an engine failure occurs inside the final approach fix and the field is IFR, the Captain must execute the single engine extraction procedure and proceed to the alternate airport.

- When flying a Localizer outbound using an HSI, the CDI should be set to the Inbound Course.

- The LOC Z Rwy 19 approach into KRUT cannot be flown with an inoperative DME

KLEB Operational Guidelines

Pilots must adhere to the following guidelines:

- We will not operate into/out of KLEB if the reported wind velocity on the ground exceeds 35 knots, including gusts.
- Runways 25 and 36 are preferred for departure due to terrain.
- Two-engine operations with weather less than 3000/ 3:
  - Vy climb,
  - full power to 4000 ft – off of any runway
  - comply with published departure procedure
- Flight crew will brief departure procedure for runway, engine failure on take off and return scenarios.

KLEB Operational Guidelines

- If KLEB is reporting IFR conditions, the Captain must fly the approach and conduct the landing and takeoff (during two-pilot operations).
- All operations in/out of KLEB at night must be operated under IFR.
- Circling Approaches at night are not authorized.
- Visual approaches at night are not authorized unless visual or electronic vertical guidance for the runway of intended landing is used.

Reminder: The VASI / PAPI systems may be visible up to 20 NM at night. They provide safe obstruction clearance within +/- 10 degrees of the extended runway centerline and within 4 nm from the runway threshold.

KLEB Engine Failure Guidelines

If there is an engine failure…

- Outside FAF and KLEB is reporting IFR conditions:
    - DO NOT continue approach into KLEB.
- Inside FAF and KLEB is VFR:
    - Continue and land.
- Inside FAF and KLEB is reporting IFR conditions:
    - Execute missed approach procedures
    - Continue to alternate airport

KLEB Arrival: Situational Awareness

Click on the following link for information on an accident that occurred when a crew lost situational awareness during approach into KLEB.

http://www.flightsafety.org/ap/ap_june03.pdf

(If the hyperlink does not work,
cut and paste the address in your browser)

KRUT and KLEB: Winter Reminders

- When checking the de-ice boots for proper operation, visually check the boots for inflation as well as monitor the annunciator panel for the "Surface De-Ice" light.

- When climbing out in light to moderate icing conditions, pilots should use cruise climb airspeeds and full power.

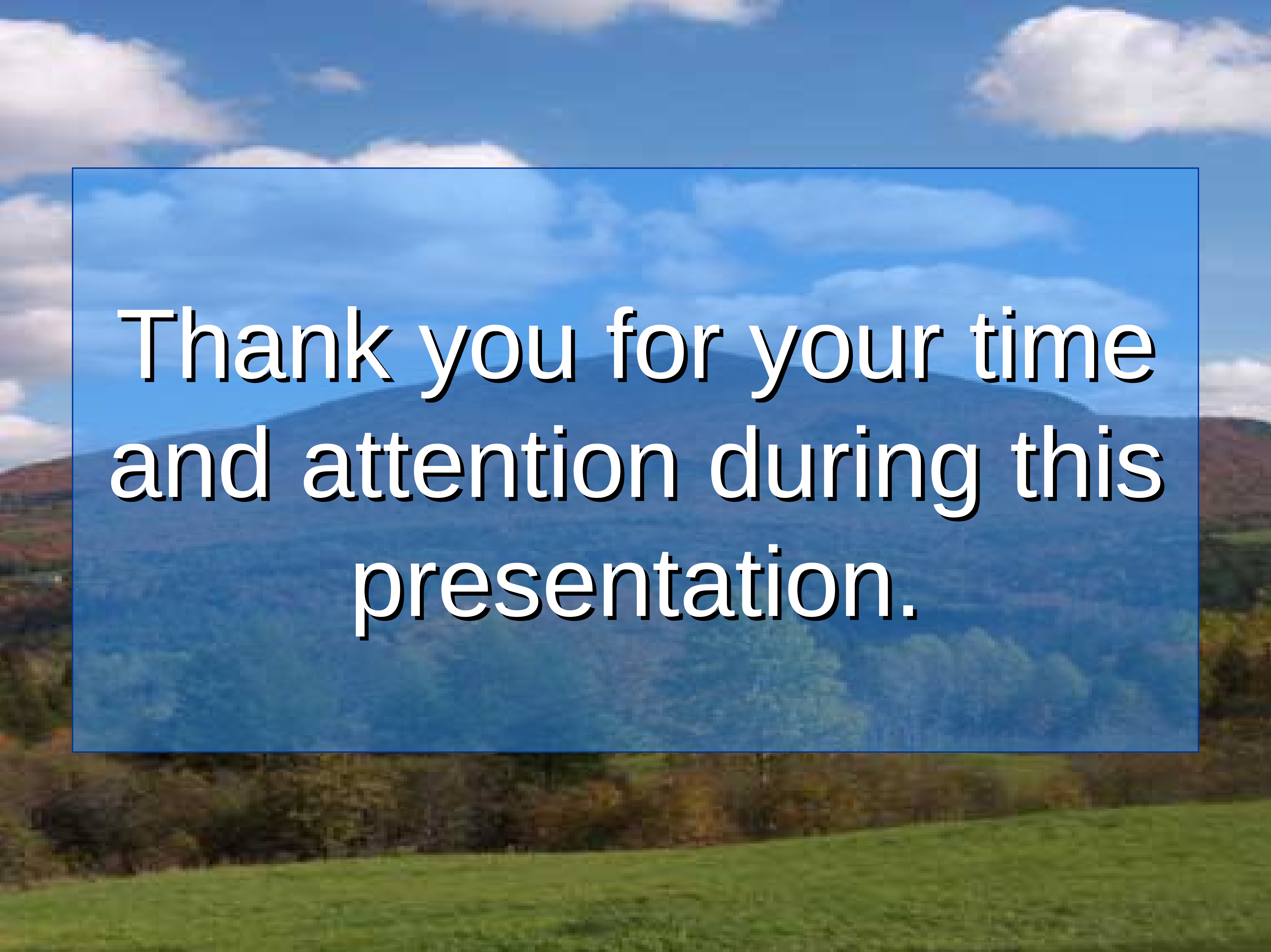
- If freezing or drizzle is being reported or is present at your departure airport, you may not depart.

- Autopilots can be hazardous in icing conditions because they may mask a control deflection.

KRUT / KLEB Winter Scenario

You have just landed at KRUT as a morning of winter weather clears to CAVU. As you taxi in, you notice the aircraft that landed behind you is kicking up a “rooster tail” of runway contamination on rollout. With this in mind, what areas should be checked more thoroughly than usual on your next walk-around?

Answer: The lower surface of the horizontal stabilizer and the nose gear downlock microswitch.


Thank you for your time and attention during this presentation.