EKU AVIATION

SEL Instrument Flight
(AVN 221A/222A)
Maneuver Description Guide (MDG)
05/03/2021

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Single Engine (SEL) Instrument Procedures

FAA INSTRUMENT RATING AIRMAN CERTIFICATION STANDARDS (ACS) – Excerpt

A. TASK: Instrument Flight

REFERENCES: 14 CFR part 61; FAA-8083-2, FAA-H-8083-15.

Objective: To determine the applicant exhibits satisfactory knowledge, risk management, and skills associated with performing basic instrument flight maneuvers solely by reference to instruments.
Skills (S):
(S1). Maintains **altitude within ±100 feet** during level flight, **headings within ±10°, airspeed within ±10 knots, and bank angles within ±5° during turns.**
(S2). Uses proper instrument cross-check and interpretation, and apply the appropriate pitch, bank, power, and trim corrections when applicable.
(S11). For the final approach segment, maintain **no more than ¾ scale deflection of the CDI, maintain airspeed ±10 knots, and altitude, if applicable, above MDA, +100/-0 feet, to the Visual Descent Point (VDP) or Missed Approach Point (MAP).**

Complete ACS:https://www.faa.gov/training_testing/testing/acs/media/instrument_rating_acs.pdf

MANEUVERS – Flight by Reference to Instruments

Instrument Takeoff (ITO) & Climb

- On runway centerline , align DG heading bug with runway
- While maintaining an outside scan, once power is set for takeoff, check engine output appropriate to atmospheric conditions. All scans from takeoff power to liftoff will be as per the Private Pilot MDG.
- After liftoff set pitch attitude to climb attitude (6 to 8 degrees pitch up on attitude indicator).
- Maintaining takeoff attitude, allow aircraft to accelerate to climb schedule airspeed.
- After liftoff, introduction of visual restriction equipment will be at the instructor's discretion.
- Passing 1000 feet AGL, adjust power to climb power setting.
- **Note: hand must stay on throttle until passing 1000 feet AGL. The purpose of this is to prevent throttle rollback or in the event an aborted takeoff is required.**

Level off from Climb

- At 50 feet or 10% of rate of climb (ROC) prior to cruising altitude, lower pitch to cruise level flight on attitude indicator.
- Maintain climb power until achieving cruise airspeed, **then** reduce power to cruise setting.
- Trim for straight and level flight.
- Maintain altitude and heading by referencing only the normal flight instruments (attitude indicator, airspeed indicator, VSI, altimeter, turn coordinator, and DG). Trim aircraft for fingertip flying.

Trim Control Practice (Level Speed Change)

- For every power change, an adjustment in both attitude and trim will be required. Remember acronym **PAT (Power Attitude Trim)**.
- **IMPORTANT**: **Do not** chase altitude or move pitch up or down using the trim control ("flying with trim"). Set pitch, **THEN** trim control pressures out while maintaining appropriate pitch attitude on the attitude indicator. For example, level flight attitude on the attitude indicator shows the symbolic aircraft situated evenly on the artificial horizon. **Remember, we trim for airspeed, not pitch!**
- While maintaining altitude and heading, reduce power to 2000 RPM until reaching assigned speed.
- Re-trim.
- Stabilize at slower airspeed until directed to resume speed.

- While maintaining altitude and heading, increase power to normal cruise setting. At cruise airspeed reset trim. Maintain a light control touch (fingertip flying).

Shallow / Medium Angle of Bank (AOB) level altitude turns

- Begin on an assigned heading.
- Set Cruise power and speed.
- Set trim.
- Roll into 20° angle of bank (AOB) – Trim for level flight.
- After 180° or 360° of turn, lead rollout by using ½ the AOB (1/2 of 20 = 10); re-trim.
- Repeat using 30° angle of bank, and 10° angle of bank.

Standard Rate Level Altitude Turns (SRT)

- Set Cruise power.
- Trim for fingertip flying.
- Begin on a cardinal heading or assigned radar vector heading.
- Roll into 15-17 degrees angle of bank (AOB).
- Verify turn coordinator is indicating standard rate and re-trim.
- Very small control pressures are required to maintain altitude.
- On assigned heading, lead rollout by using ½ the AOB (1/2 of 17 = 8.5).
- Note: Calculate approximate SRT AOB by (IAS/10) +5, i.e., 100 KIAS/10 + 5 = 15 degrees AOB is SRT.

Standard Rate, Level Timed Turns (SRT)

- On cardinal heading or assigned radar vector heading, set cruise power.
- Fly full panel standard rate turns (SRT) timing for 90° turn (30 seconds), 180° turn (1 minute), or 360° turn (2 minutes).
- **Remember: Roll-in, start time; stop time, roll-out.**

Steep Turns

- **Speed: At or below Maneuvering speed (Va).**
- From cardinal heading, roll into a 45° bank in either direction and begin a turn to 180° or 360° from the starting cardinal heading.
- Add back pressure to set pitch (approximately 5° pitch up on attitude indicator). Trim.
- Begin rollout at heading equal to ½ of AOB and roll into turn in opposite direction. Repeat using a 180° or 360° turn in the opposite direction.
- Remember to adjust control pressure to maintain level altitude as you roll from one direction to the other. Common student errors occur when switching directions of turn by not compensating for nose up trim and letting the aircraft climb during the transition. Use nose down control force to counter this.

Constant Airspeed/Rate Climbs

- Pitch-up approximately 7 degrees to begin climb.
- As airspeed approaches assigned speed, add full power and maintain a climb of 500 – 700 feet per minute.
- Trim for fingertip flying.
- Correct for assigned airspeed/rate using small pitch corrections.
- After established in the climb, execute standard rate turns of 90° to left and to the right. Return to level flight after a 2000 foot climb.
- Adjust power to maintain cruise airspeed. Re-trim.

Constant Airspeed/Rate Descents

- Reduce power to clean configuration, descent power setting (approximately 2000 RPM)
- As airspeed approaches assigned speed, pitch down 1-2 degrees to establish a rate of descent on the VSI that will hold the assigned airspeed (approximately 500 – 700 feet per minute).
- Trim for fingertip flying.
- Make small corrections in pitch and power to maintain assigned airspeed/rate.
- After established in the descent, execute standard rate turns of 90° to the left and to the right. Return to level flight after a 2000 foot descent.
- Adjust power to maintain cruise airspeed. Re-trim.

Partial-Panel, Standard Rate, Level <u>Timed Turns</u> (SRT)

- Simulate a vacuum system failure and the associated loss of the Directional Gyro (DG) and Attitude Indicator (AI), requiring timed turns at a standard rate.
    - Covering DG and/or Attitude Indicator, use turn coordinator to establish SRT and trim.
    - **Roll-in, start time; stop time, roll-out**.
    - Begin timing to determine when to rollout on desired heading (timing the turn for 90° (30 seconds), 180° (1 minute), or 360° (2 minutes).
    - Use VSI to maintain a zero rate of climb/descent (be mindful of instrument lag). Use altimeter to maintain altitude. Adjust power to maintain airspeed. Roll out based on SRT timing. With "wings level," cross check magnetic compass for correct heading, once the compass stabilizes.
    - For 10° or less correction, use SRT with turn coordinator and time with a mental count of "one thousand one, one thousand two, one thousand three" (Remember, SRT is equal to 3°/sec.
    - Set cruise power and re-trim.

Partial Panel Climbs

- With the DG and/or Attitude Indicator covered, pitch up using VSI to set 500 FPM climb
- As airspeed approaches 85 KIAS, smoothly apply full power and climb at 80 KIAS
- Re-Trim for fingertip flying:
    - **Small corrections only**
    - Increases in power will require right rudder to center the ball. Decreases in power will require left rudder to center the ball.
    - Pitch controls airspeed and power controls rate of climb.
    - Include turn coordinator in the scan to maintain wings level.
- Scan VSI, Airspeed (A/S), Altimeter, and wet compass
- Climb 1000 feet, level off, return to straight and level with partial panel, re-trim for fingertip flying.

Partial Panel Descents

- Reduce power.
- **Note: Aircraft in approach configuration with gear and flaps down 10° will require higher power setting to maintain 500 FPM descent. In the C172 using a 90 KIAS approach speed, approximately 1800 RPM will establish a standard rate descent.**
- As airspeed approaches 90 KIAS, pitch down using VSI to set 500 FPM descent. Note: Remember that **only 1-2 degrees pitch down** will be required to establish a 500 FPM descent.
  Re-Trim for fingertip flying:
    - **Small corrections only.**
    - Increases in power will require right rudder to center the ball.
    - Decreases in power will require left rudder to center the ball.
    - Pitch controls airspeed and power controls rate of descent.
- Descend for 1000ft. At 50ft or 10% of the rate of descent adjust pitch until VSI approaches zero (remember lag)
- Smoothly increase power to cruise setting, retract flaps (if extended), and re-trim for level flight.

Unusual Attitudes (Full panel)

- Recognize Pitch high with bank:
  - Airspeed decreasing.
  - Simultaneously add **full power**, maintain bank angle while lowering pitch on the attitude indicator (AI) through horizon to slight nose low, level the wings and raise the nose to the artificial horizon (Maintaining bank while lowering the nose will avoid the aircraft experiencing negative "Gs").
  - Reduce power to normal cruise setting.
- Recognize Pitch low with bank:
  - Airspeed increasing.
  - **Power to idle.**
  - Level wings.
  - Raise nose to horizon.
  - Resume normal cruise power setting.

Unusual Attitudes (partial panel)

- Recognize Pitch High with bank:
  - Simultaneously add **full power**, maintain bank angle and lower pitch to horizon using VSI and altimeter (altimeter stops and VSI indicates zero rate of climb) Maintaining bank while lowering the nose will avoid the aircraft experiencing negative "Gs".
  - Level wings using turn coordinator and magnetic compass as discussed above.
  - Reduce power to normal cruise setting.
  - Return to correct heading by dividing degrees off heading by 3 and timing turn to the correct heading (1 sec equals 3°). Remember that the magnetic compass reads turns in the opposite direction from what the DG reads
  - Maneuver is complete when in level flight and on course.
- Recognize Pitch Low with bank:
  - **Power to idle**.
  - Level wings using turn coordinator.
  - Raise nose to horizon using VSI and altimeter (altimeter stops and VSI indicates zero rate of climb).
  - Resume normal cruise power setting.
  - Return to correct heading by dividing degrees off heading by 3 and timing turn to the correct heading (one sec equals 3°).
  - Maneuver is complete when in level flight and on course.

Stall Recovery-Full Panel (Power on or off)

- At sound of stall warning horn, recognize pitch high on attitude indicator and airspeed decreasing
- Recover by simultaneously lowering pitch and adding full power. Apply rudder as necessary
- Level wings using attitude indicator, VSI, airspeed indicator, and DG

Stall Recovery-Partial Panel (Power on or off)

- At sound of stall warning horn, recognize pitch high using VSI, altimeter and airspeed decreasing.
- Recover by simultaneously lowering pitch using VSI and altimeter and adding full power. Apply rudder as necessary
- Level wings using turn coordinator and magnetic compass
- Return to correct heading by dividing degrees off heading by 3 and timing turn to the correct heading

Navigation Orientation

VOR

- Tune and identify NAVAID
- Identify radial on which aircraft is located
    - Turn OBS to center CDI needle with FROM indication. Read radial at top of CDI
- Identify heading to FLY to station
    - Turn OBS to center CDI needle with TO indication
    - Read heading to station at top of CDI
    - Turn aircraft heading to match CDI heading to fly TO the station
- Identify second NAVAID on #2 navigation receiver
- Center CDI needle with from indication
- Verify position with reference to intersecting radials and appropriate chart

GPS

- Enter or select a waypoint
- Select CDI selector button to GPS
- Select “Direct to”
- Select “Enter”
- Navigate to the waypoint

VOR Radial Interception and Tracking

- Tune and identify a VOR.
- Determine the radial you are on.
- Determine the radial you wish to track.
- Turn to an intercept heading (45°or 60°).
- When the CDI needle begins to move to center with a TO indication, fly that heading and track to the VOR, correcting for wind to maintain centerline of the radial.
- At station passage, continue to track outbound on the radial ("From" indication on the OBS). Initially maintain the same heading flown inbound and after emerging from the cone of confusion continue to track the outbound course.
- Wings level, **time outbound for two minutes.**
- After timing is complete, turn right 45° (to simulate a Procedure Turn (PT).
- Wings level, **time for one minute**.
- After timing is complete, turn left 180 degrees to re-intercept the radial inbound.
- Rotate the OBS to indicate the reciprocal of the course that was flown outbound.
- When the CDI begins to center turn inbound to the VOR and track inbound.
- At station passage, track a radial outbound that is 90° from the radial just tracked inbound.
    - After becoming established on the radial outbound, repeat the procedure turn exercise just performed**.**
- (To simulate a non-precision approach descent) Reduce power to clean configuration descent power setting while tracking on the radial inbound.
- At radial intercept inbound add 10° of flaps and maintain 90 KIAS.
    - Crossing the VOR (and out of the "cone of confusion") adjust pitch and power to establish a 500 FPM descent.
- Descend 2000 feet.
- Return to level cruise flight. (Clean configuration)

NAVIGATION

IFR Ground procedures and taxi checks

- Copy ATIS/ASOS/AWOS.
- Contact ground, clearance delivery, or Flight Service and request clearance to destination. Example:
  "ATC clears Cessna 1055M to Clyde A. Thomas Regional airport (M97). After departure, turn left heading 090, vectors to intercept V-4. Climb to and maintain 5000. Expect 7000 10 minutes after departure. Contact Indianapolis center on 126.375. Squawk 4673."
- Copy clearance and read back.
- Identify and tune radios, as required per clearance.
- Contact Ground Control (if at tower controlled airport) to request taxi clearance – read back.
- Complete checklists and verify instrumentation.
- Contact Tower frequency for takeoff clearance.
- At Tower direction, change to Departure Control frequency, or if at uncontrolled airport contact appropriate ATC facility when airborne
- If at uncontrolled airport announce intentions on CTAF
- **Note: If at an uncontrolled airport, you MUST not depart until ATC releases you (with a release plus void time). This is not always given in the clearance, but might be received when you are number one for departure.**

Practice Instrument Flight

Pilot receives and copies clearance - "ATC clears Cessna 1055M to Huntington, West Virginia, via direct Lexington VOR, V4 Newcombe, Direct. Maintain 3000, expect 5000 10 minutes after departure, departure frequency is 120.15, squawk 4713". Pilot reads back clearance.

- Pilot to set radios as follows:
  - Set Clearance Delivery or FSS Active on number 1 COM.
  - Ground Control or CTAF in standby on number 1 COM.
  - ATIS or ASOS Active on number 2 COM.
  - Tower in standby on number 2 COM (to be followed later by flight following in the active and 121.5 guard in standby).
  - Lexington VOR active on number 1 NAV.
  - Newcombe VOR in standby on number 1 NAV.
  - Approach for departure airport (or nearest alternate) active on number 2 NAV
  - Clearance loaded into the GPS for backup routing verification.
  - Transponder set to 4713.
  - After run-up and checklists complete, call Tower for takeoff clearance, or obtain release from ATC
- All navigation radios to be identified.
- **Confirm Directional Gyro is aligned with runway heading and wet compass.**

After Takeoff

- No turns prior to 400 feet AGL.
- Contact appropriate ATC facility when safely established in the initial climb.
- ATC directs a turn direct to HYK VOR (112.6) and requests pilot squawk "Ident".
- At 1000 feet AGL, pilot turns in the direction of the VOR and centers the CDI needle for course alignment "TO" Lexington VOR.
- Pilot tracks radial to HYK VOR and levels at 3000 feet MSL.
- LEX Departure Control instructs pilot to contact Indianapolis Center.
- Pilot calls Center and reports level at 3000.
- Center clears Cessna 1055M to climb and maintain 5000. Pilot reads back clearance (reports leaving 3000ft for 5000ft).

Station Passage

- Pilot tracks inbound to HYK VOR.
- Approaching the VOR and its associated "cone of confusion," **do not chase CDI.** Wait for station passage (indication changes from "TO" to "FROM") before turning to outbound heading. Initially turn direct to heading of outbound radial.
- After emerging from "cone of confusion," (CDI begins to move to center) turn to intercept V4 outbound using CDI and heading bug. For this flight, turn out bound to track the 081 radial of the HYK VOR.
- At 37 miles from HYK on 081 Radial, change NAV radio to ECB VOR (110.4) and set OBS to read 084 degree radial "TO" ECB.

Enroute

- Continuously monitor Indianapolis center frequency.
- Continue to track the 084 degree radial "To" ECB VOR.
- Plan a re-clearance to the HYK VOR (Procedure turn reversal to re-establish on the HYK 081R).
- Turn 45 ° from the radial in either direction.
- After wings level time for one minute.
- Turn 180° in the opposite direction of the original turn to re-intercept the radial.
- Reset OBS to the inbound radial.
- Track the radial inbound to the HYK VOR.

The flight can be complete after the station passage inbound.

HOLDING

Holding Entries (Determined by Direction of Turns and Aircraft Heading to the Holding Fix)

- Teardrop
- Parallel
- Direct

Crossing a Holding Fix

- **Time**-Note time crossing the holding fix (non-radar environment).
- **Turn-**Turn to holding entry heading based on parallel, teardrop, or direct entry procedure.
- **Time-**Wings level, begin timing for 1 minute on entry outbound course (for non DME hold).
- **Transition**- Slow to holding airspeed (90 KIAS for C172) and/or descend in holding if required.
- **Twist-** Set holding inbound course in OBS/CDI.
- **Talk-** If required, report entering the holding procedure with PTA (Position, time crossing the fix, and vacating altitude).

GPS Unpublished Holds

1) Upon receipt of Hold instruction from ATC, draw/ visualize the Hold to determine Hold Entry (Direct, Teardrop, Parallel)

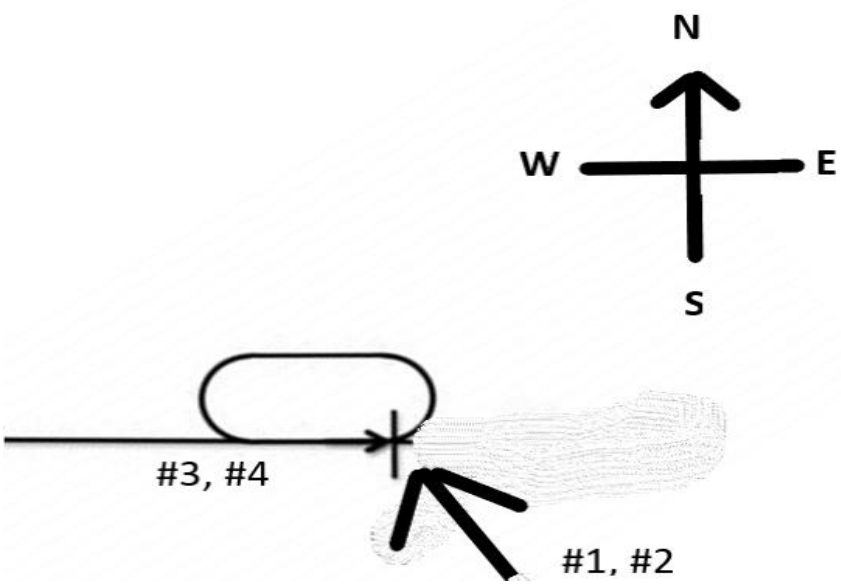
2) Fly to the Fix (Ensure GNS430/530 is in GPS Mode) and

3) Just prior to crossing the Fix, Press the OBS soft key

4) Set OBS Selector to the Inbound Course/ Bearing
- This will provide CDI sensitivity and guidance while flying the hold
- You can verify the guidance on the GNS 430/ 530

5) Upon Completion of the Hold, Press the OBS to resume Navigation.

Example: Hold West of FIX on a 090 Bearing (TO FIX)



VOR Interception and Holding

- Tune and identify a VOR (frequency and ident).
- Maintain altitude.
- Intercept and track a radial to the VOR.
- When issued a clearance to hold verify elements of the holding clearance.
  - Fix and radial
  - Direction of turns
  - Altitude
  - Distance of legs (or duration of legs)
  - Expect further clearance time (and current time)
- Within 3 NM or 2 minutes of the holding fix, slow to recommended holding speed (90 KIAS for the C172)
- At the fix turn to the appropriate heading for the entry to the holding pattern.
- Wings level, begin timing outbound for one minute.
- Set the inbound course in the OBS and verify the correct direction of turn to intercept
- Timing complete, turn to intercept the inbound course.
- Verify the appropriate inbound radial to the fix. If an intersection hold, verify the correct radial and "to-from" indication for the cross radial.
- Wings level, begin timing to check inbound time to be one minute. At fix passage, turn right (or left accordingly) toward outbound leg.
- Note: Fly outbound timing to adjust inbound timing to one minute. **NOTE:** All outbound leg timing should begin only when wings level and abeam the station ("to" indicator disappears and "from" indicator is not yet visible).
- Note: Do not forget to apply appropriate wind correction on both legs to maintain radial tracking (double the inbound wind correction on the outbound leg).

APPROACHES

Approach Brief

- **A**-ATIS
    - Anticipating a switch from ATC to destination airport approach control, switch to ATIS (AWOS, ASOS) prior to ATC change and confirm forecast WX, altimeter and active runway **(WAR**). When checking in with approach, advise that you have the current ATIS (AWOS, ASOS)
    - Check for current and correct approach plate (type and date).
    - Review approach procedure briefing strip.
    - Review profile view to include FAF altitude, time, and DH (or MDA)
    - Initial heading and altitude for the missed approach.
    - Recommend setting MAP courses and radial into second CDI.
- **A**-Airspeed (90 KIAS for C172).
- **R**- Radio Frequencies (COM and NAV).
- **T** – Times
    - Timing or DME if Glide Slope (GS) is lost, based on approach airspeed (90 KIAS for C172).
- **H**- Headings
    - Final approach course heading/radial inbound.
- **A**- Altitudes (DH or MDA)
- **N**- Notes
    - MSA for the quadrant flown or anticipated, etc.

Procedures

- **Crossing Initial Approach Fix (IAF) for Procedure Turn (PT) Approach**

  Time-Wings level begin, timing for 2 minutes on outbound course. (Two minutes should ensure that you stay within the required distance of the fix for the course reversal)
  Turn- After two minutes turn to heading 45 degrees off outbound heading in the direction depicted on the approach chart.
  Time for one minute, turn in opposite direction 180 degrees to intercept the radial inbound to the FAF as published.
  Twist- Set inbound course in OBS/CDI and intercept radial.
  Throttle (Transition) - Slow to approach airspeed and/or descend if required.
  Talk- If required, report crossing IAF PT outbound and vacating altitude.

- **Crossing Initial Approach Fix (IAF) for Hold Pattern Course Reversal (in lieu of PT)**

    - Same as holding procedures above, except aircraft will descend in holding pattern to align aircraft heading with final approach course.
    - Holding pattern course reversal **MUST** be flown as depicted on approach chart.
    - **IMPORTANT:** In a hold pattern course reversal, additional turns in the hold **MUST** be requested and approved by ATC.

- **Approaching Final Approach Fix (FAF) for precision and non-precision approaches**

    - **3/2 Check**: 3nm OR 2 minutes from FAF: Pre-Landing Check.
        - **Precision Approach**-Complex: Gear Down at 1 dot above G/S intercept, approach flaps at intercept (10° for the C172)
        - **Non-Precision Approach-**Complex: Gear down prior to the final approach fix, **a**pproach flaps over the FAF (10° for the C172)
    - **Time**- IF applicable, start time at the FAF required to fly from FAF to MAP based on aircraft category groundspeed.
    - **Turn**-Turn to parallel or intercept the final approach course/ heading.
    - **Twist**-Verify/Set Final approach course in OBS/CDI and intercept radial.
    - **Throttle (Transition)** set for 90 KIAS for C172
        - Begin descent to MDA or DA upon glideslope intercept and/or passing the final approach fix.
        - If MDA, descend to MDA as quickly as possible, not to exceed 1000 FPM rate of descent. This procedure ensures best possible chance of acquiring airport prior to MAP.
        - IF DA, smoothly reduce throttle to precision approach setting. Trim the airplane for stabilized approach.
    - **Talk-**Contact tower or CTAF and report "'FAF' inbound on Runway __ approach."
- **Missed Approach**
    - If missed approach is indicated, Full power and pitch up 3-5°
    - When positive rate of climb is established, Gear Up (if complex A/C)
    - At 1000 ft AGL, flaps up

Missed Approach Considerations (For ALL Instrument Approaches)

- Heading and altitude to fly the MAP.
- Heading or course to fly to the holding fix.
- Entry to anticipate at holding fix.
- Fuel requirements-Reserve was 45 minutes. How much will remain when I reach the alternate?
- Is it prudent to commit to an approach if weather is questionable?
- Does the pilot have sufficient instrument skills for the expected approach and should he/she raise their personal minimums?
- Would it be better to proceed directly to the alternate and forego the approach?

VOR

VOR Approach (Based on KLEX VOR A Approach) [See Appendix A]

- Tune and identify HYK VOR (112.6).
- Orient and fly direct to HYK and track inbound at 3100 feet or as assigned by approach control. (Note: Center CDI with TO indication and fly that heading to HYK).
- At station passage, track outbound on the 124 radial (124 on OBS). Initially fly heading 124 and after emerging from the cone of confusion set course to intercept the 124radial outbound.
- Wings level, **time outbound for two minutes.**
- After timing is complete, turn right to Procedure Turn (PT) barb heading of 169 degrees.
- Wings level, **time for one minute**.
- After timing is complete, turn left to 349 degrees heading.
- Reset OBS to 304.
- When intercepting the 304 radial turn left inbound to HYK and track inbound.
- Reduce power to approach setting (for gear down & flaps set to approach setting of 10°) at approximately 2250 RPM (for C172) and fly 90 KIAS approach.
- When advised by ATC contact Bluegrass Tower and report, “Bluegrass Tower, this is Cessna XXXXX, FAF inbound on the VOR A approach.” If lost communications make report on tower frequency “in the blind” over the FAF.
- At station passage, begin timing to Bluegrass airport of 4:56 (based 90 KIAS final approach speed.) Also, note that because we are using the HYK VOR, DME is available and may be used in place of the timing.
- **Note:** Altitude restriction at IMRIC
- Once positive indication of station passage is observed, descend, on profile, to the circling MDA altitude of 1460 feet. **(Note: For non-precision approaches, descend as quickly as possible to MDA altitude, not to exceed 1000 FPM rate of descent. Once level, “drive in” at MDA altitude. This ensures greatest chance of acquiring runway environment at or before the missed approach point.)**
- **In some instances, the pilot may elect to descend using a constant rate descent path (approximately 3°)**
- At missed approach point, based on MDA (1460 feet) and timing (4:56 or 7.4 DME) and airport environment **not in sight**, execute missed approach procedure. Which is:
    - Climb on present heading to 3100 feet then,
    - Turn left direct HYK VORTAC and hold
- With the field insight, turn to left or right base, as cleared by tower.

VOR Approach with Lost Communication

Pilot is vectored to the published holding pattern at HYK VOR.

- Pilot to request LEX VOR-A approach from LEX Approach Control.
- While in holding, pilot loses radio communication.
- Communication failure considerations:
    - Tendency will be apprehension.
    - Requires a calm systematic approach to resolving the problem, while maintaining a calm presence of mind.
    - An approach can still me made and expected.
    - Lost communication procedures from FAR/AIM (FAR 91.185).

- Pilot should:
    - Confirm correct radio frequency.
    - Confirm using the correct radio (COM 1 or COM 2 selected).
    - Check squelch and radio volume is set correctly.
    - Switch to secondary COM; verify/set frequency; attempt contact.
    - Try alternate frequency.
    - Contact another A/C.

- If no contact:
    - Squawk 7600.
    - Depart holding fix at the EFC time.
    - Transmit in the blind and continue the approach.
    - When elapsed time is up and LEX is in sight, anticipate light gun signals from tower and circle to land.
    - If airport environment is not in sight, fly the published missed approach procedure, and proceed to the alternate airport filed in the flight plan.

ILS Approach (based on KLEX ILS 22 Approach) [See Appendix B]

- Brief for ILS (within 10nm or soon a practical):
  - Check for current and correct approach plate (Date).
  - Frequencies.
  - Profile view to include OM altitude, time, and DH.
  - Initial heading and altitude for the missed approach.
  - Timing or DME if Glide Slope (GS) is lost.
  - MSA for the quadrant flown or anticipated.
- Tune and ID radios:
  - May not receive LOC IDENT until nearing LOC intercept.
  - Select MKR BCN on audio panel and test OM lights if applicable.
- 3/2 Check: 3nm or 2 minutes from FAF, Pre-landing check (hold gear until 1 dot above on GS).
- Introduce 5T's at outer marker (OM) or Final Approach Fix (FAF):
  - Time (for non-precision approach).
  - Turn to heading.
  - Twist OBS.
  - Throttle-adjust power to precision approach power setting for 500 FPM descent (for C172 with gear down and flaps to approach (10°). Maintain 90 KIAS.
  - Talk-communicate with tower.
- Instructor or approach control to provide radar vectors to final approach course and radar descent or climb to 3200 feet.
- When on the final vector ("dogleg") to intercept the LEX ILS 22 approach course of 226 degrees, ATC will clear the pilot for the approach, "Cessna XXXXX turn right (or left) to _____, cleared for the ILS 22 approach, contact tower when established on final (or at BRIDL, the FAF)."
- Intercept and track inbound on the final approach course of 226 degrees (set OBS to 226) maintain 3200 feet.
- Report "CDI alive" (CDI moving toward center).
- Report "GS alive" (Moving down from top of CDI. Cannot intercept glide slope from above)
- With GS one dot above on CDI, lower landing gear, set flaps to approach (10°), and set power for approach with gear/flaps down to achieve a 500 FPM rate of descent.
- Intercept glide slope and begin descent.
- At Outer Marker (OM) passage (Blue light and audible ident), confirm OM altitude is correct
- Begin timing to airport and when advised by ATC contact tower, reporting "Cessna XXXXX is Outer Marker or FAF inbound on the ILS 22 approach."
- At decision height of 1252', and airport environment not in sight, execute missed approach by applying full power and 7 degrees nose up. Adjust attitude for climb schedule airspeed (for C172 80 KIAS)
- Passing 1000 feet adjust power to climb power setting (for C172 set 2500 RPM) and retract flaps
- Climb to 2000 then climbing left turn to 3100 direct HYK VORTAC and hold, continue climb-in hold to 3100.
- If airport environment in sight at decision height, reduce power and make a normal landing.

RNAV / GPS

RNAV/GPS Approach (Based on KRGA RNAV (GPS) RWY 36 Approach) [See Appendix D]

- Aircraft will be positioned at 3100 feet altitude and 2 miles southwest of JUMOP (IAF)
- Compete Approach & Landing checklist and brief approach
- At JUMOP, turn to course of 090 degrees toward ANETT intersection
- Pilot receives clearance to hold over ANETT, as published, maintain 3100 feet altitude
- Initiate a direct entry. Outbound leg 180 degrees
- At 4 NM point, turn right intercept 360 course to ANETT
- Complete 2 turns in holding
- Clearance to continue approach over ANETT. Configure to approach speed (90 KIAS, flaps 10°)
- Passing ANETT, start descent to 2600 feet altitude toward CICJO (FAF)
- Passing CICJO, follow vertical guidance keeping it centered on pipit of CDI
- Continue descent to Decision Height (DA) of 1264 feet
- If airport environment not in sight at DA, initiate missed approach procedure
  Climb to 3100 feet altitude direct to QEFFO and hold. If airport environment is in sight, proceed with a normal landing.

  If performing an RNAV/GPS approach without vertical guidance (LNAV, LNAV/VNAV), descend as quickly as possible to MDA altitude, not to exceed 1000 FPM rate of descent. Once level, "drive in" at MDA altitude. This ensures greatest chance of acquiring runway environment at or before the missed approach point.) In some instances, the pilot may elect to descend using a constant rate descent path (approximately 3°)

Missed Approach Procedure Climbs

- At missed approach point, add full power
- Pitch up 7 degrees on the attitude indicator (AI)
- Climb at 80 KIAS to assigned altitude

ARCING APPROACH

ARCING Approach (Based on KAAS VOR/DME-A Approach) [See Appendix E]

- Pilot intercepts and tracks the 069R (V178) of EWO VOR inbound at least 30 miles from the VOR.
- Pilot tracks the 069 radial (249 degrees on CDI OBS) toward EWO
- Prior to DEMSE intersection, configure to approach and brief the approach. Maintain 90 kts, Flaps 10°
- Maintain 3100 feet altitude
- At DEMSE make a 90 degree left turn to heading 159 degrees to begin a 10 mile arc clockwise around EWO VOR. Use **"Turn 10, Twist 10"** method
- Rotate the CDI OBS to read 259 degrees
- The method creates a flat-segmented arc 10 degrees at a time. When the course line of the CDI centers on 259 degrees, turn the plane right **"10"** degrees and advance the CDI **"10"** degrees to 269 degrees
- Repeat the process until within 10 degrees of the approach course of 132 degrees (302 on the CDI)

  NOTE: Monitor the DME to maintain a distance of 10 miles from EWO. If the distance increases, turn more than 10 degrees at the next radial interception in order to correct back toward the 10 mile arc. If the distance decreases to less than 10 miles, turn less than 10 degrees at the next radial interception.
- Rotate the CDI OBS to 132 degrees, begin left turn to intercept, track and begin descent at DUMON (10 DME from EWO) to 2600 feet altitude. **(Note: For non precision approaches, descend as quickly as possible to the next approach altitude, or MDA altitude, not to exceed 1000 FPM rate of descent. Once level, "drive in" at MDA altitude. This ensures greatest chance of acquiring runway environment at or before the missed approach point.)**
- Maintain 2600 feet to RAGUE (19 DME from EWO).
- At RAGUE, descend to MDA (1540 feet).
- If no contact with the airport at MUMOE (23.9 DME from EWO), execute published missed approach.
- If airport environment is in sight at MUMOE, proceed with a normal landing.

Missed Approach Procedure Climbs

- At missed approach point, add full power
- Pitch up 7 degrees on the attitude indicator (AI)
- Climb at 80 KIAS to assigned altitude

LOCALIZER BACKCOURSE Approach – (based on LOC BAC Rwy 13 at Salem, OR. [KSLE]) See App. F

- **Simulator** – Instructor positions aircraft over Newberg VOR (UBG) on heading 183°, on radial at 3100 feet.
- Student tracks UBG 183° radial to intercept the I-SLE LOC BC Rwy 13 final approach course
- Intercepting final approach course (133°, I-SLE freq. 110.3), descend to 2200 feet
- Tracking Backcourse – ○ Disregard any glide slope indication for the entire approach
- **CDI** – Tracking with a CDI, expect reverse sensing. Remember – "Needle left, fly right, Needle right, fly left"

  HSI – When flying a backcourse approach with an HSI, set the inbound ILS course in the course window and fly "to" the needle.

- Prior to ARITY – gear down, approach flaps (10°), set power, and checklist. Note**: for C 172, 2300 RPM achieves cruise airspeed. However, with gear and flaps to approach, and nose adjusted down to maintain 90 KIAS, the extra drag creates an ideal initial power setting.**
- At ARITY – configured for landing, stabilized on approach speed (C172 – 90kts), mark time to Missed Approach Point (MAP) and report Final Approach Fix (FAF) to tower.
- Descend on profile
- At WIPIR, if no runway contact, execute a missed approach as published.
- If airport environment in sight, proceed with a normal landing.

Missed Approach Procedure Climbs

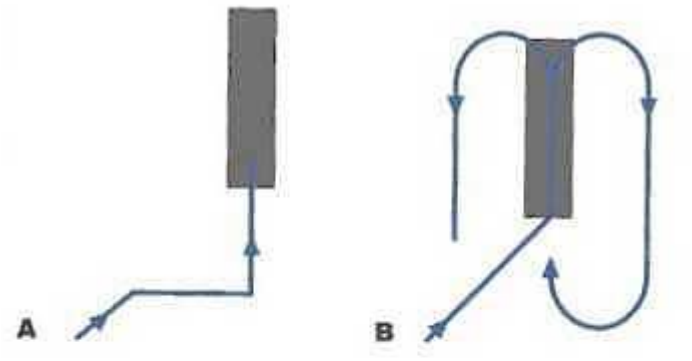
- At missed approach point, add full power
- Pitch up 7 degrees on the attitude indicator (AI)
- Climb at 80 KIAS to assigned altitude

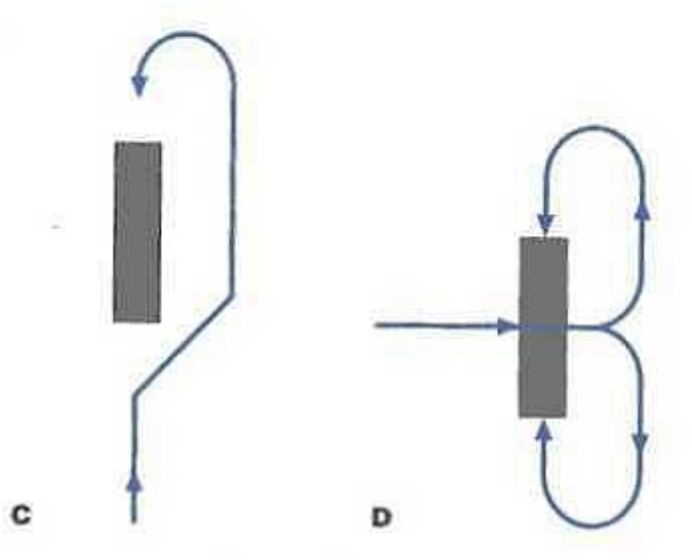
Circle to Land Maneuvers

When it is necessary to circle the airport to maneuver for landing, or when no straight in minimums are specified on the approach chart, the circling minimums published on the instrument approach chart shall be used. Note that a "C" with a box around it in the circling minimums indicates a greater protected area for the circling maneuver. During the circling maneuver the pilot shall maintain visual contact with the runway of intended landing, and fly no lower than the circling minimums until in a position to make a final descent for landing**. Note: per FAR 91.126 in class G airspace all turns MUST be to the left unless otherwise indicated.**

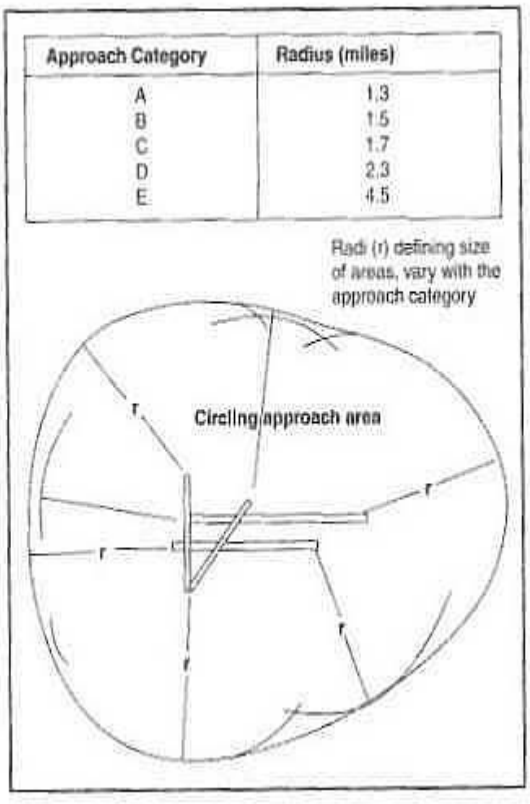
Circling patterns -

Pattern "A" can be flown when your final approach course intersects the runway early enough to establish a base leg. If you sight the runway too late to fly pattern "A," you can circle as shown in "B." You can fly pattern "C" if it is desirable to land opposite the direction of the final approach, and the runway is sighted in time for turn to a downwind leg. If the runway is sighted too late for a turn to downwind, you can fly pattern "D." Regardless of the pattern flown, you must maneuver the aircraft so as to remain within the designated circling area.

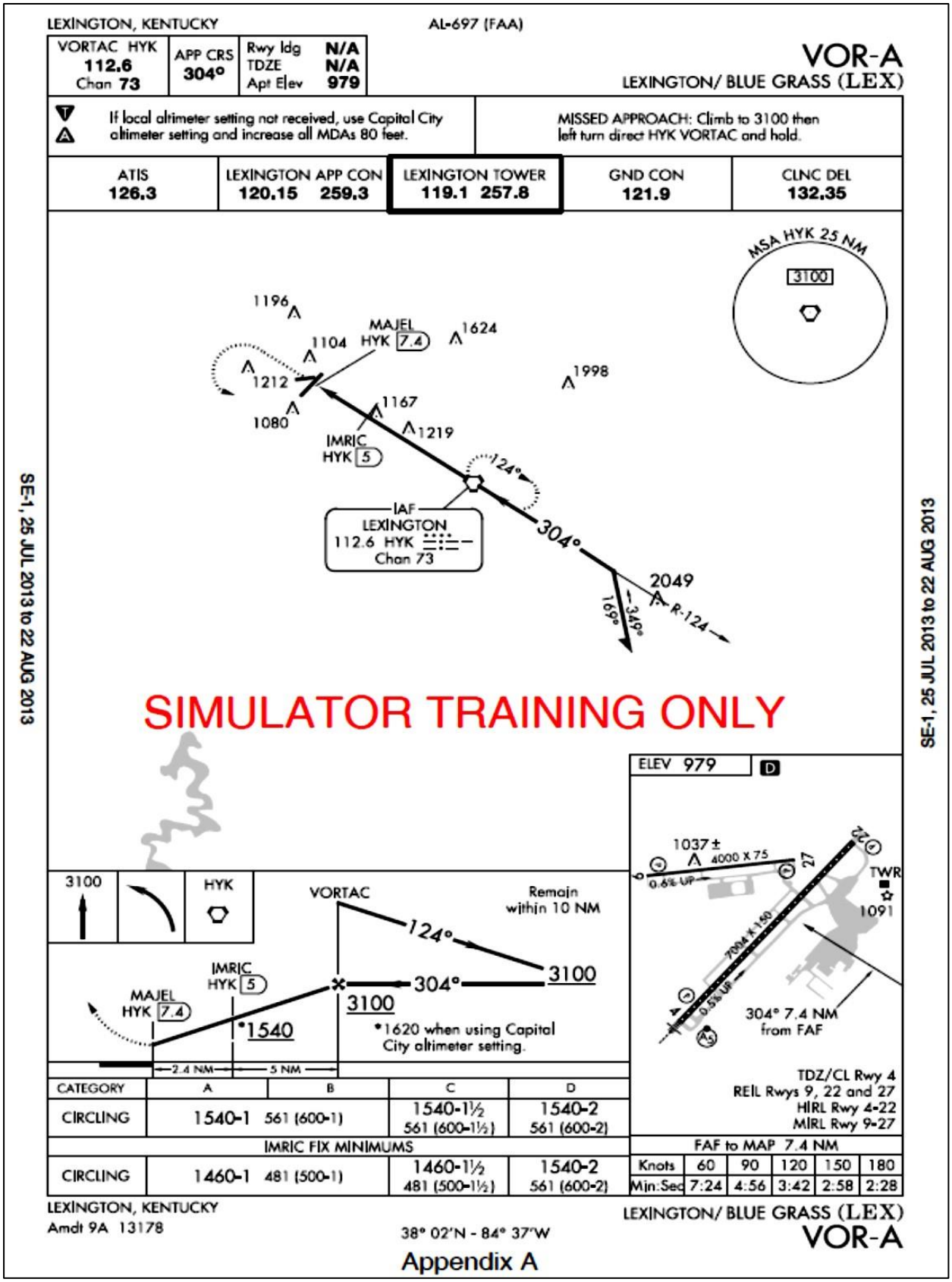




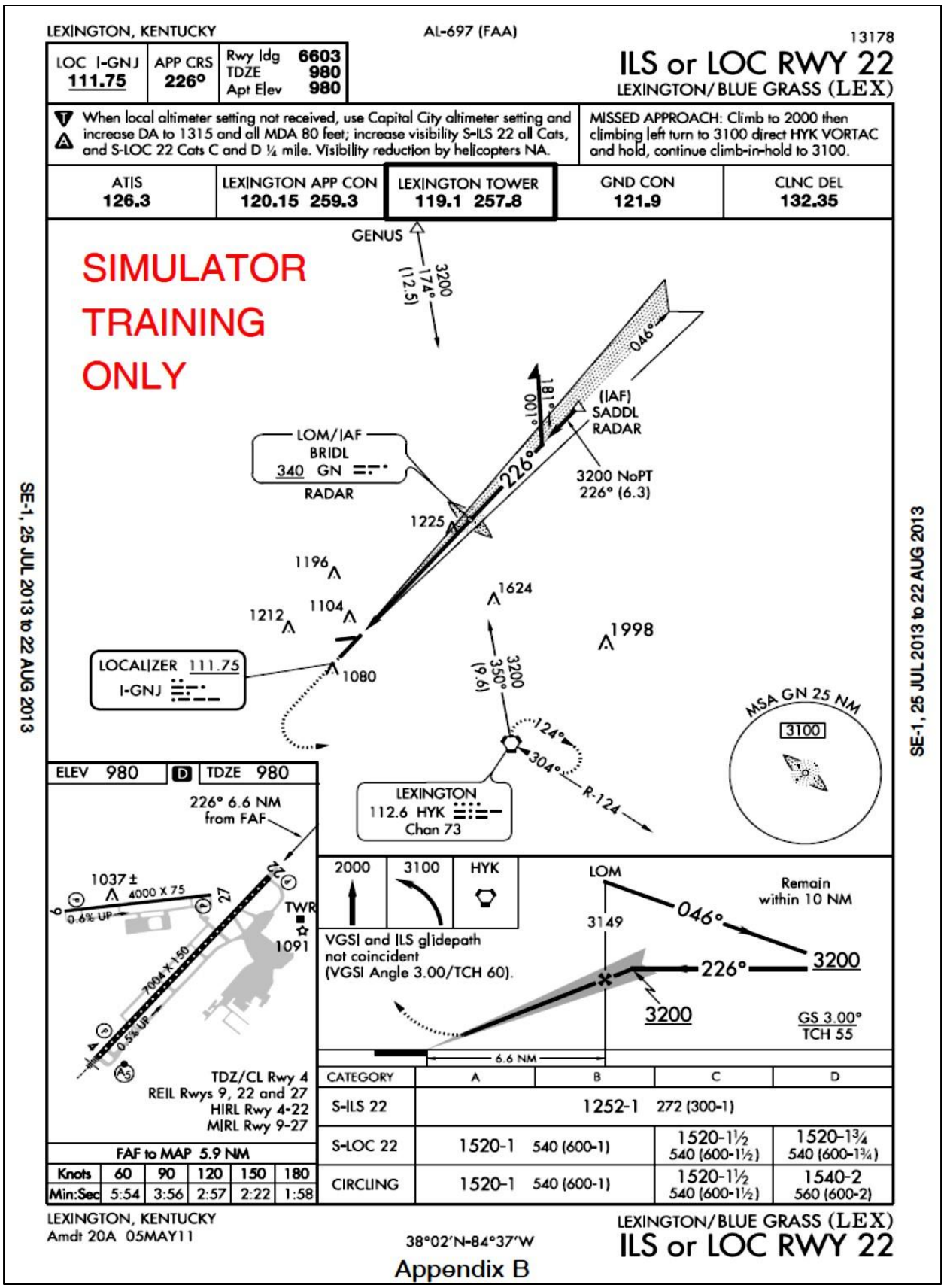
Approach Category	Radius (miles)
A	1.3
B	1.5
C	1.7
D	2.3
E	4.5



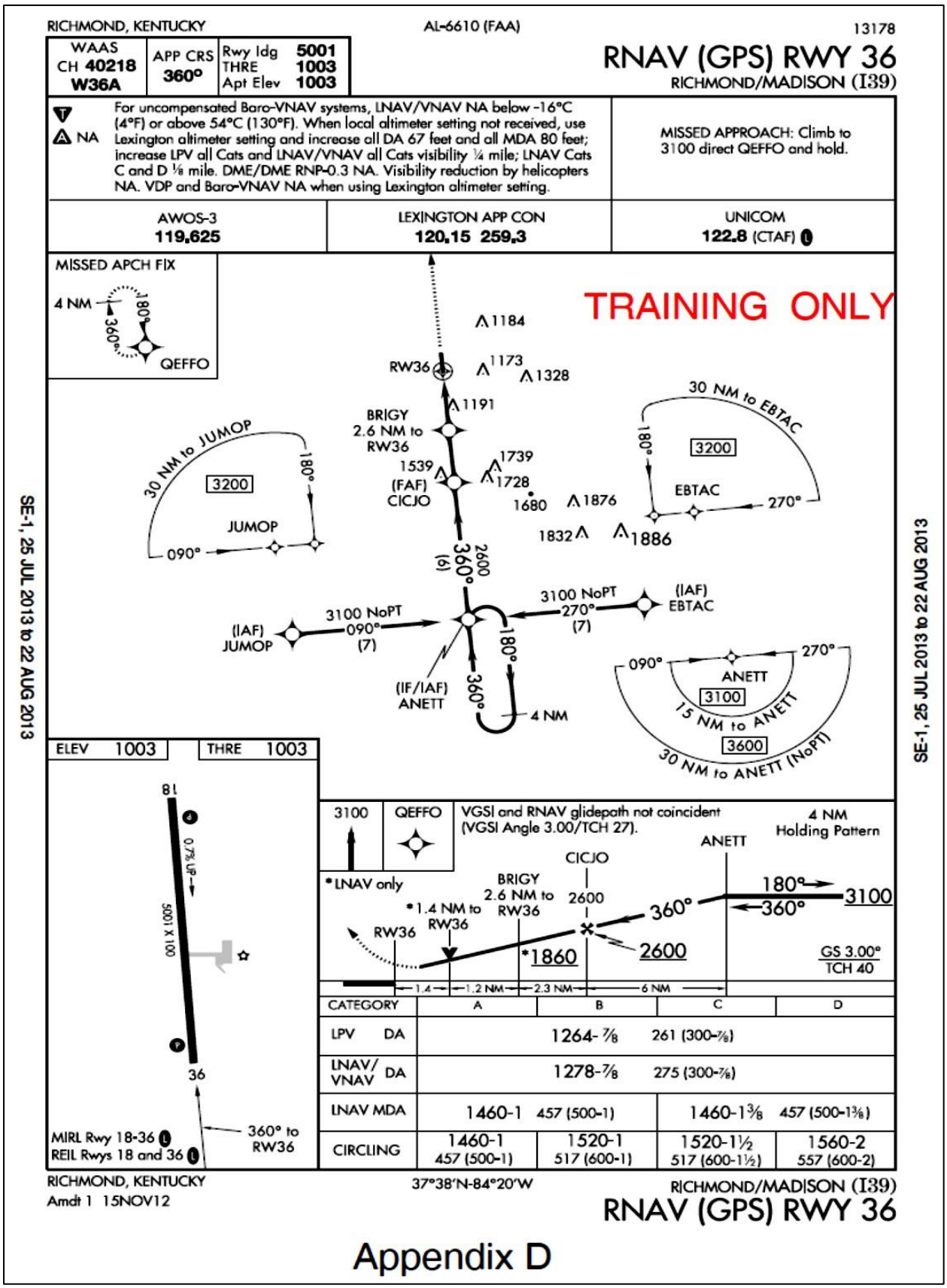
Based on the aircraft category, you must remain within a certain radius of each runway threshold. While circling, if at any time you lose visual contact with the runway, you must fly a missed approach.


LEXINGTON, KENTUCKY
AL-697 (FAA)
VOR-A
LEXINGTON/ BLUE GRASS (LEX)
VORTAC HYK 112.6 Chan 73
APP CRS 304°
Rwy Idg N/A
TDZE N/A
Apt Elev 979
If local altimeter setting not received, use Capital City altimeter setting and increase all MDAs 80 feet.
MISSED APPROACH: Climb to 3100 then left turn direct HYK VORTAC and hold.
ATIS 126.3
LEXINGTON APP CON 120.15 259.3
LEXINGTON TOWER 119.1 257.8
GND CON 121.9
CLNC DEL 132.35
MSA HYK 25 NM
3100
1196
MAJEL HYK 7.4
1104
1624
1212
1998
1080
1167
1219
IMRIC HYK 5
124°
304°
IAF LEXINGTON 112.6 HYK Chan 73
2049
R-124
169°
349°
SIMULATOR TRAINING ONLY
SE-1, 25 JUL 2013 to 22 AUG 2013
SE-1, 25 JUL 2013 to 22 AUG 2013
ELEV 979
D
1037±
4000 X 75
0.6% UP
TWR
1091
7004 X 150
0.5% UP
304° 7.4 NM from FAF
3100
HYK
VORTAC
Remain within 10 NM
124°
304°
3100
3100
IMRIC HYK 5
MAJEL HYK 7.4
*1540
*1620 when using Capital City altimeter setting.
2.4 NM
5 NM
TDZ/CL Rwy 4
REIL Rwys 9, 22 and 27
HIRL Rwy 4-22
MIRL Rwy 9-27
CATEGORY A B C D
CIRCLING 1540-1 561 (600-1) 1540-1½ 561 (600-1½) 1540-2 561 (600-2)
IMRIC FIX MINIMUMS
CIRCLING 1460-1 481 (500-1) 1460-1½ 481 (500-1½) 1540-2 561 (600-2)
FAF to MAP 7.4 NM
Knots 60 90 120 150 180
Min:Sec 7:24 4:56 3:42 2:58 2:28
LEXINGTON, KENTUCKY
Amdt 9A 13178
38° 02'N - 84° 37'W
LEXINGTON/ BLUE GRASS (LEX)
VOR-A

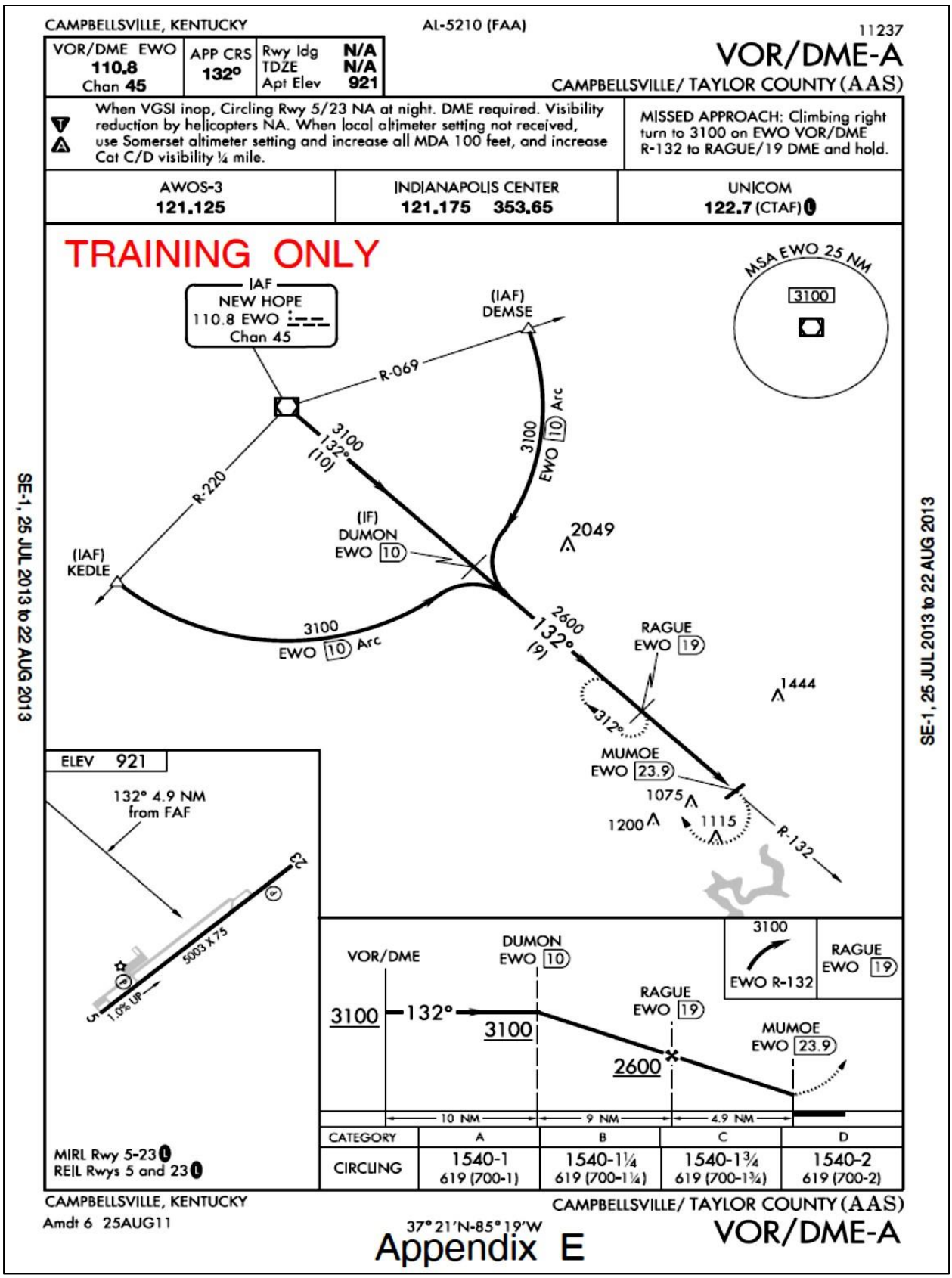
Appendix A

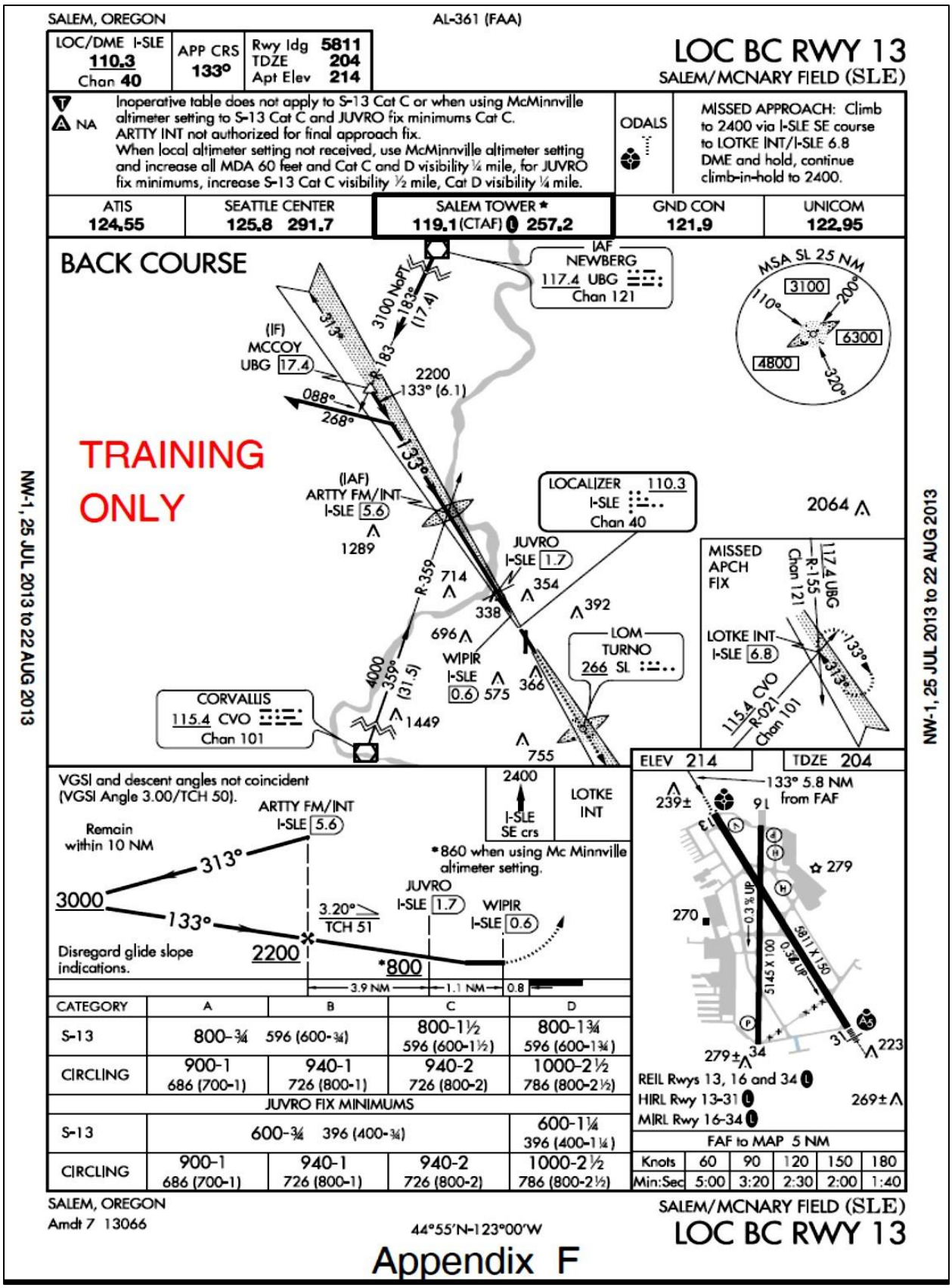

LEXINGTON, KENTUCKY
AL-697 (FAA)
13178
ILS or LOC RWY 22
LEXINGTON/BLUE GRASS (LEX)
LOC I-GNJ 111.75
APP CRS 226°
Rwy Idg 6603
TDZE 980
Apt Elev 980
When local altimeter setting not received, use Capital City altimeter setting and increase DA to 1315 and all MDA 80 feet; increase visibility S-ILS 22 all Cats, and S-LOC 22 Cats C and D ¼ mile. Visibility reduction by helicopters NA.
MISSED APPROACH: Climb to 2000 then climbing left turn to 3100 direct HYK VORTAC and hold, continue climb-in-hold to 3100.
ATIS 126.3
LEXINGTON APP CON 120.15 259.3
LEXINGTON TOWER 119.1 257.8
GND CON 121.9
CLNC DEL 132.35
SIMULATOR TRAINING ONLY
GENUS
3200 174° (12.5)
046°
181°
001°
(IAF) SADDL RADAR
LOM/IAF BRIDL 340 GN RADAR
226°
3200 NoPT 226° (6.3)
1225
1196
1104
1212
1624
1998
3200 350° (9.6)
1080
LOCALIZER 111.75 I-GNJ
124°
304°
R-124
LEXINGTON 112.6 HYK Chan 73
MSA GN 25 NM 3100
ELEV 980
D
TDZE 980
226° 6.6 NM from FAF
1037 ±
4000 X 75
0.6% UP
27
9
TWR
1091
7004 X 150
0.5% UP
TDZ/CL Rwy 4
REIL Rwys 9, 22 and 27
HIRL Rwy 4-22
MIRL Rwy 9-27
FAF to MAP 5.9 NM
Knots 60 90 120 150 180
Min:Sec 5:54 3:56 2:57 2:22 1:58
2000
3100
HYK
VGSI and ILS glidepath not coincident (VGSI Angle 3.00/TCH 60).
LOM
Remain within 10 NM
3149
046°
226°
3200
3200
GS 3.00°
TCH 55
6.6 NM
CATEGORY A B C D
S-ILS 22 1252-1 272 (300-1)
S-LOC 22 1520-1 540 (600-1) 1520-1½ 540 (600-1½) 1520-1¾ 540 (600-1¾)
CIRCLING 1520-1 540 (600-1) 1520-1½ 540 (600-1½) 1540-2 560 (600-2)
LEXINGTON, KENTUCKY
Amdt 20A 05MAY11
38°02'N-84°37'W
LEXINGTON/BLUE GRASS (LEX)
ILS or LOC RWY 22
SE-1, 25 JUL 2013 to 22 AUG 2013
SE-1, 25 JUL 2013 to 22 AUG 2013

Appendix B


RICHMOND, KENTUCKY
AL-6610 (FAA)
13178
RNAV (GPS) RWY 36
RICHMOND/MADISON (I39)
WAAS CH 40218 W36A
APP CRS 360°
Rwy Idg 5001
THRE 1003
Apt Elev 1003
NA
For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -16°C (4°F) or above 54°C (130°F). When local altimeter setting not received, use Lexington altimeter setting and increase all DA 67 feet and all MDA 80 feet; increase LPV all Cats and LNAV/VNAV all Cats visibility ¼ mile; LNAV Cats C and D ⅛ mile. DME/DME RNP-0.3 NA. Visibility reduction by helicopters NA. VDP and Baro-VNAV NA when using Lexington altimeter setting.
MISSED APPROACH: Climb to 3100 direct QEFFO and hold.
AWOS-3 119.625
LEXINGTON APP CON 120.15 259.3
UNICOM 122.8 (CTAF)
MISSED APCH FIX
4 NM
180°
360°
QEFFO
TRAINING ONLY
1184
RW36
1173
1328
1191
BRIGY
2.6 NM to RW36
1539
(FAF)
CICJO
1739
1728
1680
1876
1832
1886
30 NM to JUMOP
3200
180°
JUMOP
090°
30 NM to EBTAC
3200
180°
EBTAC
270°
360°
2600
(6)
3100 NoPT
090°
(7)
(IAF)
JUMOP
3100 NoPT
270°
(7)
(IAF)
EBTAC
(IF/IAF)
ANETT
180°
360°
4 NM
090°
270°
ANETT
3100
15 NM to ANETT
3600
30 NM to ANETT (NoPT)
SE-1, 25 JUL 2013 to 22 AUG 2013
SE-1, 25 JUL 2013 to 22 AUG 2013
ELEV 1003
THRE 1003
18
0.7% UP
5001 X 100
36
MIRL Rwy 18-36
REIL Rwys 18 and 36
360° to RW36
3100
QEFFO
VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 27).
4 NM Holding Pattern
*LNAV only
*1.4 NM to RW36
BRIGY 2.6 NM to RW36
CICJO
2600
ANETT
180°
3100
360°
360°
RW36
*1860
2600
GS 3.00°
TCH 40
1.4
1.2 NM
2.3 NM
6 NM
CATEGORY A B C D
LPV DA 1264-⅞ 261 (300-⅞)
LNAV/VNAV DA 1278-⅞ 275 (300-⅞)
LNAV MDA 1460-1 457 (500-1) 1460-1⅜ 457 (500-1⅜)
CIRCLING 1460-1 457 (500-1) 1520-1 517 (600-1) 1520-1½ 517 (600-1½) 1560-2 557 (600-2)
RICHMOND, KENTUCKY
Amdt 1 15NOV12
37°38'N-84°20'W
RICHMOND/MADISON (I39)
RNAV (GPS) RWY 36

Appendix D


CAMPBELLSVILLE, KENTUCKY
AL-5210 (FAA)
11237
VOR/DME-A
CAMPBELLSVILLE/ TAYLOR COUNTY (AAS)
VOR/DME EWO 110.8 Chan 45
APP CRS 132°
Rwy Idg N/A
TDZE N/A
Apt Elev 921
When VGSI inop, Circling Rwy 5/23 NA at night. DME required. Visibility reduction by helicopters NA. When local altimeter setting not received, use Somerset altimeter setting and increase all MDA 100 feet, and increase Cat C/D visibility ¼ mile.
MISSED APPROACH: Climbing right turn to 3100 on EWO VOR/DME R-132 to RAGUE/19 DME and hold.
AWOS-3 121.125
INDIANAPOLIS CENTER 121.175 353.65
UNICOM 122.7 (CTAF)
TRAINING ONLY
MSA EWO 25 NM
3100
IAF
NEW HOPE
110.8 EWO
Chan 45
(IAF)
DEMSE
R-069
3100
132°
(10)
3100
EWO 10 Arc
R-220
(IF)
DUMON
EWO 10
2049
(IAF)
KEDLE
3100
EWO 10 Arc
2600
132°
(9)
RAGUE
EWO 19
1444
312°
MUMOE
EWO 23.9
1075
1200
1115
R-132
SE-1, 25 JUL 2013 to 22 AUG 2013
SE-1, 25 JUL 2013 to 22 AUG 2013
ELEV 921
132° 4.9 NM
from FAF
23
5003 X 75
1.0% UP
MIRL Rwy 5-23
REIL Rwys 5 and 23
VOR/DME
DUMON
EWO 10
RAGUE
EWO 19
3100
EWO R-132
RAGUE
EWO 19
3100
132°
3100
2600
MUMOE
EWO 23.9
10 NM
9 NM
4.9 NM
CATEGORY
A
B
C
D
CIRCLING
1540-1
619 (700-1)
1540-1¼
619 (700-1¼)
1540-1¾
619 (700-1¾)
1540-2
619 (700-2)
CAMPBELLSVILLE, KENTUCKY
Amdt 6 25AUG11
CAMPBELLSVILLE/ TAYLOR COUNTY (AAS)
37°21'N-85°19'W
VOR/DME-A
Appendix E


SALEM, OREGON
AL-361 (FAA)
LOC BC RWY 13
SALEM/MCNARY FIELD (SLE)
LOC/DME I-SLE 110.3 Chan 40
APP CRS 133°
Rwy Idg 5811
TDZE 204
Apt Elev 214
Inoperative table does not apply to S-13 Cat C or when using McMinnville altimeter setting to S-13 Cat C and JUVRO fix minimums Cat C.
ARTTY INT not authorized for final approach fix.
When local altimeter setting not received, use McMinnville altimeter setting and increase all MDA 60 feet and Cat C and D visibility ¼ mile, for JUVRO fix minimums, increase S-13 Cat C visibility ½ mile, Cat D visibility ¼ mile.
NA
ODALS
MISSED APPROACH: Climb to 2400 via I-SLE SE course to LOTKE INT/I-SLE 6.8 DME and hold, continue climb-in-hold to 2400.
ATIS 124.55
SEATTLE CENTER 125.8 291.7
SALEM TOWER * 119.1 (CTAF) 257.2
GND CON 121.9
UNICOM 122.95
BACK COURSE
TRAINING ONLY
IAF NEWBERG 117.4 UBG Chan 121
3100 NoPT
183° (17.4)
313°
183
(IF) MCCOY UBG 17.4
088°
268°
2200
133° (6.1)
133°
(IAF) ARTTY FM/INT I-SLE 5.6
1289
LOCALIZER 110.3 I-SLE Chan 40
JUVRO I-SLE 1.7
R-359
714
354
338
392
696
WIPIR I-SLE 0.6
575
366
LOM TURNO 266 SL
4000
359° (31.5)
1449
CORVALLIS 115.4 CVO Chan 101
755
MSA SL 25 NM
3100
200°
110°
6300
4800
320°
2064
MISSED APCH FIX
117.4 UBG Chan 121
R-155
LOTKE INT I-SLE 6.8
133°
313°
115.4 CVO Chan 101
R-021
VGSI and descent angles not coincident (VGSI Angle 3.00/TCH 50).
Remain within 10 NM
ARTTY FM/INT I-SLE 5.6
313°
3000
133°
3.20°
TCH 51
JUVRO I-SLE 1.7
WIPIR I-SLE 0.6
2200
*800
Disregard glide slope indications.
3.9 NM
1.1 NM
0.8
2400 I-SLE SE crs
LOTKE INT
*860 when using Mc Minnville altimeter setting.
ELEV 214
TDZE 204
133° 5.8 NM from FAF
239±
91
279
270
0.3 % UP
5811 X 150
5145 X 100
0.3 % UP
279±
34
31
223
REIL Rwys 13, 16 and 34
HIRL Rwy 13-31
MIRL Rwy 16-34
269±
FAF to MAP 5 NM
Knots 60 90 120 150 180
Min:Sec 5:00 3:20 2:30 2:00 1:40
CATEGORY A B C D
S-13 800-¾ 596 (600-¾) 800-1½ 596 (600-1½) 800-1¾ 596 (600-1¾)
CIRCLING 900-1 686 (700-1) 940-1 726 (800-1) 940-2 726 (800-2) 1000-2½ 786 (800-2½)
JUVRO FIX MINIMUMS
S-13 600-¾ 396 (400-¾) 600-1¼ 396 (400-1¼)
CIRCLING 900-1 686 (700-1) 940-1 726 (800-1) 940-2 726 (800-2) 1000-2½ 786 (800-2½)
SALEM, OREGON
Amdt 7 13066
44°55'N-123°00'W
SALEM/MCNARY FIELD (SLE)
LOC BC RWY 13
NW-1, 25 JUL 2013 to 22 AUG 2013
NW-1, 25 JUL 2013 to 22 AUG 2013

Appendix F