Federal Aviation Administration

Memorandum

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Subject: Corrections to Embedded Calculators/Formulas and References in FAA Order 8260.54A, The United States Standard for Area Navigation

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This memorandum provides updated corrections to embedded calculators in FAA Order 8260.54A, the United States Standard for Area Navigation. The March 14, 2008, Flight Technologies and Procedures Division, AFS-400, memorandum, same subject, is cancelled.

The embedded calculators for formulas 2-16c, 4-6, 4-7, 4-11, 5-4, and 5-17 in FAA Order 8260.54A produce incorrect results and must not be used in calculation examples or manual/automated procedure design. The following corrections apply:

1. Formula 2-16c. *VNAV/VNAV Angle*. Change the formula title to *"LNAV/VNAV Angle"* and the "D_{PFAF}" value reference to "D_{PFAF} = value from formula 2-16a or distance of existing PFAF".

   Note: Although the depicted formula and standard text notation are correct, the embedded calculator provides incorrect results.

2. Formula 4-6. High *Temp PFAF Alt*. The depicted formula is incorrect. Change the formula and standard text notation to read:

$$C = e^{\frac{D_{PFAF} \cdot \tan\left(MDR_{angle} \cdot \frac{\pi}{180}\right)}{r}} \cdot (r + LTP_{elev} + TCH) - r$$

C=e^((D_PFAF*tan(MDR_angle*π/180))/r)*(r+LTP_elev+TCH)-r

3. Formula 4-7. *ΔISA$_{high}$ Calculation.* The depicted formula is incorrect. Change the formula and standard text notation to read:

$$\Delta ISA_{high} = \frac{C - PFAF_{alt} + 0.032 \bullet \left(PFAF_{alt} - \left(LTP_{elev} + 250\right)\right) - 4.9}{0.19 + 0.0038 \bullet \left(PFAF_{alt} - \left(LTP_{elev} + 250\right)\right)}$$

ΔISA$_{high}$=(c-PFAF$_{alt}$+0.032*(PFAF$_{alt}$-(LTP$_{elev}$+250))-4.9)/(0.19+0.0038*(PFAF$_{alt}$-(LTP$_{elev}$+250)))

4. Formula 4-11. *DA Based on ROC Application.* The depicted formula is incorrect. Use the appropriate value from Table 4-2, *Level Surface ROC Values (hl)* in place of the value "161". Change Paragraph 4.3.4 a. *ROC application* to read "Apply the appropriate value from Table 4-2 to the higher of the following:" Change the formula and standard text notation to read:

$$DA_{ROC} = h + hL$$

DA$_{ROC}$=h+hL

5. Formula 5-4. W *OCS MSL Elevation.* The depicted formula is incorrect. Change the formula and standard text notation to read:

$$W_{MSL} = \frac{\left(r + LTP_{elev}\right) \bullet \cos\left(atan\left(\frac{\theta}{102}\right)\right)}{\cos\left(\frac{OBS_x - (200+d)}{r} + atan\left(\frac{\theta}{102}\right)\right)} - r$$

W$_{MSL}$=(r+LTP$_{elev}$)*cos(atan(θ/102))/cos((OBS$_x$-(200+d))/r+atan(θ/102))-r

6. Formula 5-17. W *OCS End Elevation.* The depicted formula is incorrect. Change the formula and standard text notation to read:

$$elev_{1aEnd} = \frac{\left(r + LTP_{elev}\right) \bullet \cos\left(atan\left(\frac{\theta}{102}\right)\right)}{\cos\left(\frac{X_{DA} - d - 1660}{r} + atan\left(\frac{\theta}{102}\right)\right)} - r$$

elev$_{1aEnd}$=(r+LTP$_{elev}$)*cos(atan(θ/102))/cos((X$_{DA}$-d-1660)/r+atan(θ/102))-r

Additionally, the following formula corrections apply:

1. Formula 3-2, *Primary Area Width.* Change the formula and standard text notation to:

$$Wp = 0.10752 \bullet D + 678.496$$

Wp=0.10752*D+678.496

2. Formula 3-3, *Secondary Area Width.* Change the formula and standard text notation to:

$$Ws = 0.15152 \bullet D + 969.696$$

Ws=0.15152*D+969.696

3. Formula 5-6, *Perpendicular Distance to X Boundary* Change the formula and standard text notation to:

$$X_{Boundary} = 0.10752 \bullet OBS_X + 678.496$$

$X_{Boundary}$=0.10752*OBS_X+678.496

4. Formula 5-8, *Perpendicular Dist to Y Boundary.* Change the formula and standard text notation to:

$$Y_{Boundary} = 0.15152 \bullet OBS_X + 969.696$$

$Y_{Boundary}$=0.15152*OBS_X+969.696

The following changes to formula and formula value references apply:

1. Formula 2-12 incorrectly references table 2-7, column 5 for the width of the azimuth signal at LTP. Change the "a" value reference to "a = width (ft) of azimuth signal at LTP (table 2-6, column 4 value)".

2. Formula 4-1 has an incorrect value reference for d1. Change the d1 value reference to "dl = value from paragraph 4.1.1b/c as appropriate".

3. Figure 4-6. *Missed Approach Flat Surface.* The formula reference under "Final Segment OCS" is incorrect. Change the formula reference under "Final Segment OCS" to "(Formula 4-9)".

4. Paragraph 5.1. *Final Segment Obstruction Evaluation Area (OEA).* There is an incorrect formula reference for GPIP in the first sentence. Change the first sentence to read: "The *OEA* originates 200 ft from LTP or FTP as appropriate, and extends to a point ≈131 ft (40 meters ATT) beyond the GPIP (GPZP is determined *using formula* 2-16a).

5. Paragraph 6.2.1 b.(2), Step 2 has an incorrect formula reference. Change Step 2 to read: "Calculate the Turn Rate (TR) using *formula 6-3a.* Maximum *TR* is 3 degrees per second. Apply the lower of 3 degrees per second or *formula 6-3a* output."

6. Paragraph 6.2.2 c.(3), Step 1 has an incorrect formula reference. Change Step 1 to read: "Construct a baseline (LL') perpendicular to the inbound track at distance $D_{earlyTP}$ (*formula* 6-7) prior to the fix."

7. Paragraph 6.2.2 d.(2), Step 1 has an incorrect formula reference. Change Step 1 to read: "Construct the late-turn baseline (PP') at distance (ATT **+ *rr*)** beyond the fix, perpendicular to the inbound nominal track. Calculate late turn distance using *formula* 6-8."

8. Paragraph 6.3.1 a.(1), Case 1, Step 1 has an incorrect formula reference. Change Step 1 to read: "Construct a baseline (LL') perpendicular to the inbound track nearer the non-turn side boundary at distance $D_{earlyTP}$ (*formula* 6-7) prior to the fix."

9. Paragraph 6.3.1 a.(2), Case 1, Step 1 has an incorrect formula reference. Change Step 1 to read: "Construct a baseline (L'L'') perpendicular to the inbound track nearer the non-turn side boundary at distance $D_{earlyTP}$ (*formula* 6-7) prior to the fix."

10. Formula 6-4 has an incorrect value reference for TR. Change the TR value reference to "TR = Formula 6-3a (Max 3 degrees/second)".

11. Paragraph 6.4.1 a. Case 1, Step 2 has an incorrect formula reference. Change Step 2 to read: "Locate the wind spiral center on PP' at distance R (no-wind turn radius, using *formula* 6-3; *see figure* 6-2) from the intersection of PP' and the inbound-segment outer-boundary extension. *See figures* 6-4, 6-12."

12. Paragraph 6.4.2 a. Case 1, Step 2 has an incorrect formula reference. Change Step 2 to read: "Locate the *WS1* center on P'P'' at distance R (no-wind turn radius, *using formula 6-3; see figure* 6-2) from the intersection of P'P'' and the inbound-segment outer-boundary extension."

13. Paragraph 6.4.2 a. Case 1, Step 2a has an incorrect formula reference. Change Step 2a to read: "Locate the *WS2* center on PP' at distance R (no-wind turn radius, *using formula* 6-3; *see figure* 6-9) from the intersection of PP' and the inbound-segment inner-boundary extension."

14. Formula 6-6 has an incorrect value reference for D_{fix}. Change the D_{fix} value reference to "D_{fix} = Distance (NM) from AB line to fix".

This memorandum is effective until canceled by a subsequent AFS-400 memorandum or publication of FAA Order 8260.54A, Change 1.

If you have any questions, please contact Mr. Harry J. Hodges, Manager, Flight Procedure Standards Branch, AFS-420, at (405) 954-4164.