**CHANGE**

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

**7130.3 CHG 8**

**7/29/94**

SUBJ: **HOLDING PATTERN CRITERIA**

1. PURPOSE. This change provides information involving an adjustment to holding airspace pattern size. This adjustment is the result of an increase in maximum holding airspeed for civil turbojet aircraft. This change also incorporates any editorial requirements to pages 2-7 and 2-8.

2. EFFECTIVE DATE. Pages 2-5 through 2-8 and 2-13 through 2-14 are effective April 1, 1995.

3. EXPLANATION OF CHANGES. A previous change notice provided for an increase in holding airspeed for civil turbojet aircraft from 200 to 230 knots indicated airspeed. The increase was at the request of operators who saw an operational advantage to holding at the higher airspeed. An examination of criteria indicates the need for an increase in holding pattern size.

4. ACTION. Air Traffic Control facilities and Flight Inspection Area Offices (FIAO) having civil turbojet holding procedures that provide aircraft separation and obstacle clearance based on holding pattern areas at altitudes from 7,000 feet through 14,000 feet shall effect changes necessary to accommodate the increased pattern size for a 230-knot holding airspeed.

**PAGE CONTROL CHART**

| REMOVE PAGES | DATED | INSERT PAGES | DATED |
|---|---|---|---|
| 5 thru 6 | 10/30/90 | 2-5 thru 2-6 | 7/29/94 |
| 7 | 10/30/90 | 2-7 | 7/29/94 |
| 8 | 8/28/67 | 2-8 | 7/29/94 |
| 13 | 10/30/90 | 2-13 | 7/29/94 |
| 14 | 8/28/67 | 2-14 | 7/29/94 |
| | | Appendix 4 Page 1 (and 2) | 7/29/94 |

William H. Williams, Jr.
Director of Aviation System Standards

Distribution: ZAT-713

Initiated By: AVN-210

(Figure 3. Continued)

265 Knots IAS

| 0-14.9 NM | | 15-29.9 NM | | 30 NM and Over | |
|---|---|---|---|---|---|
| Alt. No. | Alt. No. | Alt. No. | Alt. No. | Alt. No. | Alt. No. |
| 2 - (7) | 26 - 20 | 2 - (8) | 26 - 21 | 2 - (9) | 26 - 22 |
| 4 - (8) | 28 - 21 | 4 - (9) | 28 - 22 | 4 -(10) | 28 - 23 |
| 6 - (9) | 30 - 22 | 6 -(10) | 30 - 23 | 6 -(11) | 30 - 24 |
| 8 -(10) | 32 - 23 | 8 -(11) | 32 - 24 | 8 -(12) | 32 - 25 |
| 10 -(11) | 34 - 24 | 10 -(12) | 34 - 25 | 10 -(13) | 34 - 26 |
| 12 -(12) | 36 - 25 | 12 -(13) | 36 - 26 | 12 -(14) | 36 - 27 |
| 14 -(13) | 38 - 26 | 14 -(14) | 38 - 27 | 14 -(15) | 38 - 28 |
| 16 - 15 | 40 - 27 | 16 - 16 | 40 - 28 | 16 - 17 | 40 - 29 |
| 18 - 16 | 42 - 28 | 18 - 17 | 42 - 29 | 18 - 18 | 42 - 30 |
| 20 - 17 | 44 - 28 | 20 - 18 | 44 - 29 | 20 - 19 | 44 - 30 |
| 22 - 18 | 46 - 29 | 22 - 19 | 46 - 30 | 22 - 20 | 46 - 31 |
| 24 - 19 | 48 - 31 | 24 - 20 | | 24 - 21 | |

310 Knots IAS

| | | | | | |
|---|---|---|---|---|---|
| 2 -(11) | 22 - 22 | 2 -(12) | 23 - 23 | 2 -(13) | 22 - 24 |
| 4 -(12) | 24 - 22 | 4 -(13) | 24 - 23 | 4 -(14) | 24 - 24 |
| 6 -(13) | 26 - 24 | 6 -(14) | 26 - 25 | 6 -(15) | 26 - 26 |
| 8 -(14) | 28 - 24 | 8 -(15) | 28 - 25 | 8 -(16) | 28 - 26 |
| 10 -(15) | 30 - 25 | 10 -(16) | 30 - 26 | 10 -(17) | 30 - 27 |
| 12 -(17) | 32 - 26 | 12 -(18) | 32 - 27 | 12 -(19) | 32 - 28 |
| 14 -(18) | 34 - 27 | 14 -(19) | 34 - 28 | 14 -(20) | 34 - 29 |
| 16 - 19 | 36 - 28 | 16 - 20 | 36 - 29 | 16 - 21 | 36 - 30 |
| 18 - 20 | 38 - 29 | 18 - 21 | 38 - 30 | 18 - 22 | 38 - 31 |
| 20 - 21 | 40 - 30 | 20 - 22 | 40 - 31 | 20 - 23 | |

For explanation of pattern numbers in parentheses, see paragraph 36, page 16.

a. Example Problem. Assume that civil turbojet aircraft (230K) are to hold at a fix located 32 NM from the farthest NAVAID used to form the fix. Altitudes involved are 1,500 feet through 14,000 feet. By reference to figure 3, page 5, select template No. 5 to determine the area to be protected for 1,500 feet and 2,000 feet; No. 6 for 3,000 feet/4,000 feet; No. 7 for 5,000 feet/6,000 * feet; No. 10 for 7,000 feet/8,000 feet; No. 11 for 9,000 feet through 12,000 feet; No. 12 for 13,000 * feet/14,000 feet. Each template may then be applied to the fix individually to determine the effect of holding airspace on other operations. However, it is very improbable that holding situations will arise that require the critical determination of each 2,000 feet, as in this example problem.

(Figure 3. Continued)

265 Knots IAS

| 0-14.9 NM | | 15-29.9 NM | | 30 NM and Over | |
|---|---|---|---|---|---|
| Alt. No. | Alt. No. | Alt. No. | Alt. No. | Alt. No. | Alt. No. |
| 2 - (7) | 26 - 20 | 2 - (8) | 26 - 21 | 2 - (9) | 26 - 22 |
| 4 - (8) | 28 - 21 | 4 - (9) | 28 - 22 | 4 -(10) | 28 - 23 |
| 6 - (9) | 30 - 22 | 6 -(10) | 30 - 23 | 6 -(11) | 30 - 24 |
| 8 -(10) | 32 - 23 | 8 -(11) | 32 - 24 | 8 -(12) | 32 - 25 |
| 10 -(11) | 34 - 24 | 10 -(12) | 34 - 25 | 10 -(13) | 34 - 26 |
| 12 -(12) | 36 - 25 | 12 -(13) | 36 - 26 | 12 -(14) | 36 - 27 |
| 14 -(13) | 38 - 26 | 14 -(14) | 38 - 27 | 14 -(15) | 38 - 28 |
| 16 - 15 | 40 - 27 | 16 - 16 | 40 - 28 | 16 - 17 | 40 - 29 |
| 18 - 16 | 42 - 28 | 18 - 17 | 42 - 29 | 18 - 18 | 42 - 30 |
| 20 - 17 | 44 - 28 | 20 - 18 | 44 - 29 | 20 - 19 | 44 - 30 |
| 22 - 18 | 46 - 29 | 22 - 19 | 46 - 30 | 22 - 20 | 46 - 31 |
| 24 - 19 | 48 - 31 | 24 - 20 | | 24 - 21 | |

310 Knots IAS

| | | | | | |
|---|---|---|---|---|---|
| 2 -(11) | 22 - 22 | 2 -(12) | 23 - 23 | 2 -(13) | 22 - 24 |
| 4 -(12) | 24 - 22 | 4 -(13) | 24 - 23 | 4 -(14) | 24 - 24 |
| 6 -(13) | 26 - 24 | 6 -(14) | 26 - 25 | 6 -(15) | 26 - 26 |
| 8 -(14) | 28 - 24 | 8 -(15) | 28 - 25 | 8 -(16) | 28 - 26 |
| 10 -(15) | 30 - 25 | 10 -(16) | 30 - 26 | 10 -(17) | 30 - 27 |
| 12 -(17) | 32 - 26 | 12 -(18) | 32 - 27 | 12 -(19) | 32 - 28 |
| 14 -(18) | 34 - 27 | 14 -(19) | 34 - 28 | 14 -(20) | 34 - 29 |
| 16 - 19 | 36 - 28 | 16 - 20 | 36 - 29 | 16 - 21 | 36 - 30 |
| 18 - 20 | 38 - 29 | 18 - 21 | 38 - 30 | 18 - 22 | 38 - 31 |
| 20 - 21 | 40 - 30 | 20 - 22 | 40 - 31 | 20 - 23 | |

For explanation of pattern numbers in parentheses, see paragraph 36, page 16.

a. Example Problem. Assume that civil turbojet aircraft (230K) are to hold at a fix located 32 NM from the farthest NAVAID used to form the fix. Altitudes involved are 1,500 feet through 14,000 feet. By reference to figure 3, page 5, select template No. 5 to determine the area to be protected for 1,500 feet and 2,000 feet; No. 6 for 3,000 feet/4,000 feet; No. 7 for 5,000 feet/6,000 * feet; No. 10 for 7,000 feet/8,000 feet; No. 11 for 9,000 feet through 12,000 feet; No. 12 for 13,000 * feet/14,000 feet. Each template may then be applied to the fix individually to determine the effect of holding airspace on other operations. However, it is very improbable that holding situations will arise that require the critical determination of each 2,000 feet, as in this example problem.

(Figure 3. Continued)

265 Knots IAS

| 0-14.9 NM | | 15-29.9 NM | | 30 NM and Over | |
|---|---|---|---|---|---|
| Alt. No. | Alt. No. | Alt. No. | Alt. No. | Alt. No. | Alt. No. |
| 2 - (7) | 26 - 20 | 2 - (8) | 26 - 21 | 2 - (9) | 26 - 22 |
| 4 - (8) | 28 - 21 | 4 - (9) | 28 - 22 | 4 -(10) | 28 - 23 |
| 6 - (9) | 30 - 22 | 6 -(10) | 30 - 23 | 6 -(11) | 30 - 24 |
| 8 -(10) | 32 - 23 | 8 -(11) | 32 - 24 | 8 -(12) | 32 - 25 |
| 10 -(11) | 34 - 24 | 10 -(12) | 34 - 25 | 10 -(13) | 34 - 26 |
| 12 -(12) | 36 - 25 | 12 -(13) | 36 - 26 | 12 -(14) | 36 - 27 |
| 14 -(13) | 38 - 26 | 14 -(14) | 38 - 27 | 14 -(15) | 38 - 28 |
| 16 - 15 | 40 - 27 | 16 - 16 | 40 - 28 | 16 - 17 | 40 - 29 |
| 18 - 16 | 42 - 28 | 18 - 17 | 42 - 29 | 18 - 18 | 42 - 30 |
| 20 - 17 | 44 - 28 | 20 - 18 | 44 - 29 | 20 - 19 | 44 - 30 |
| 22 - 18 | 46 - 29 | 22 - 19 | 46 - 30 | 22 - 20 | 46 - 31 |
| 24 - 19 | 48 - 31 | 24 - 20 | | 24 - 21 | |

310 Knots IAS

| | | | | | |
|---|---|---|---|---|---|
| 2 -(11) | 22 - 22 | 2 -(12) | 23 - 23 | 2 -(13) | 22 - 24 |
| 4 -(12) | 24 - 22 | 4 -(13) | 24 - 23 | 4 -(14) | 24 - 24 |
| 6 -(13) | 26 - 24 | 6 -(14) | 26 - 25 | 6 -(15) | 26 - 26 |
| 8 -(14) | 28 - 24 | 8 -(15) | 28 - 25 | 8 -(16) | 28 - 26 |
| 10 -(15) | 30 - 25 | 10 -(16) | 30 - 26 | 10 -(17) | 30 - 27 |
| 12 -(17) | 32 - 26 | 12 -(18) | 32 - 27 | 12 -(19) | 32 - 28 |
| 14 -(18) | 34 - 27 | 14 -(19) | 34 - 28 | 14 -(20) | 34 - 29 |
| 16 - 19 | 36 - 28 | 16 - 20 | 36 - 29 | 16 - 21 | 36 - 30 |
| 18 - 20 | 38 - 29 | 18 - 21 | 38 - 30 | 18 - 22 | 38 - 31 |
| 20 - 21 | 40 - 30 | 20 - 22 | 40 - 31 | 20 - 23 | |

For explanation of pattern numbers in parentheses, see paragraph 36, page 16.

a. Example Problem. Assume that civil turbojet aircraft (230K) are to hold at a fix located 32 NM from the farthest NAVAID used to form the fix. Altitudes involved are 1,500 feet through 14,000 feet. By reference to figure 3, page 5, select template No. 5 to determine the area to be protected for 1,500 feet and 2,000 feet; No. 6 for 3,000 feet/4,000 feet; No. 7 for 5,000 feet/6,000 * feet; No. 10 for 7,000 feet/8,000 feet; No. 11 for 9,000 feet through 12,000 feet; No. 12 for 13,000 * feet/14,000 feet. Each template may then be applied to the fix individually to determine the effect of holding airspace on other operations. However, it is very improbable that holding situations will arise that require the critical determination of each 2,000 feet, as in this example problem.

(Figure 3. Continued)

265 Knots IAS

| 0-14.9 NM | | 15-29.9 NM | | 30 NM and Over | |
|---|---|---|---|---|---|
| Alt. No. | Alt. No. | Alt. No. | Alt. No. | Alt. No. | Alt. No. |
| 2 - (7) | 26 - 20 | 2 - (8) | 26 - 21 | 2 - (9) | 26 - 22 |
| 4 - (8) | 28 - 21 | 4 - (9) | 28 - 22 | 4 -(10) | 28 - 23 |
| 6 - (9) | 30 - 22 | 6 -(10) | 30 - 23 | 6 -(11) | 30 - 24 |
| 8 -(10) | 32 - 23 | 8 -(11) | 32 - 24 | 8 -(12) | 32 - 25 |
| 10 -(11) | 34 - 24 | 10 -(12) | 34 - 25 | 10 -(13) | 34 - 26 |
| 12 -(12) | 36 - 25 | 12 -(13) | 36 - 26 | 12 -(14) | 36 - 27 |
| 14 -(13) | 38 - 26 | 14 -(14) | 38 - 27 | 14 -(15) | 38 - 28 |
| 16 - 15 | 40 - 27 | 16 - 16 | 40 - 28 | 16 - 17 | 40 - 29 |
| 18 - 16 | 42 - 28 | 18 - 17 | 42 - 29 | 18 - 18 | 42 - 30 |
| 20 - 17 | 44 - 28 | 20 - 18 | 44 - 29 | 20 - 19 | 44 - 30 |
| 22 - 18 | 46 - 29 | 22 - 19 | 46 - 30 | 22 - 20 | 46 - 31 |
| 24 - 19 | 48 - 31 | 24 - 20 | | 24 - 21 | |

310 Knots IAS

| | | | | | |
|---|---|---|---|---|---|
| 2 -(11) | 22 - 22 | 2 -(12) | 23 - 23 | 2 -(13) | 22 - 24 |
| 4 -(12) | 24 - 22 | 4 -(13) | 24 - 23 | 4 -(14) | 24 - 24 |
| 6 -(13) | 26 - 24 | 6 -(14) | 26 - 25 | 6 -(15) | 26 - 26 |
| 8 -(14) | 28 - 24 | 8 -(15) | 28 - 25 | 8 -(16) | 28 - 26 |
| 10 -(15) | 30 - 25 | 10 -(16) | 30 - 26 | 10 -(17) | 30 - 27 |
| 12 -(17) | 32 - 26 | 12 -(18) | 32 - 27 | 12 -(19) | 32 - 28 |
| 14 -(18) | 34 - 27 | 14 -(19) | 34 - 28 | 14 -(20) | 34 - 29 |
| 16 - 19 | 36 - 28 | 16 - 20 | 36 - 29 | 16 - 21 | 36 - 30 |
| 18 - 20 | 38 - 29 | 18 - 21 | 38 - 30 | 18 - 22 | 38 - 31 |
| 20 - 21 | 40 - 30 | 20 - 22 | 40 - 31 | 20 - 23 | |

For explanation of pattern numbers in parentheses, see paragraph 36, page 16.

a. Example Problem. Assume that civil turbojet aircraft (230K) are to hold at a fix located 32 NM from the farthest NAVAID used to form the fix. Altitudes involved are 1,500 feet through 14,000 feet. By reference to figure 3, page 5, select template No. 5 to determine the area to be protected for 1,500 feet and 2,000 feet; No. 6 for 3,000 feet/4,000 feet; No. 7 for 5,000 feet/6,000 * feet; No. 10 for 7,000 feet/8,000 feet; No. 11 for 9,000 feet through 12,000 feet; No. 12 for 13,000 * feet/14,000 feet. Each template may then be applied to the fix individually to determine the effect of holding airspace on other operations. However, it is very improbable that holding situations will arise that require the critical determination of each 2,000 feet, as in this example problem.

c. Problem 3. The holding course is away from the NAVAID. Application of criteria to these situations are handled in the same manner as outlined in subparagraphs a. and b., with two exceptions:

(1) Appendix 2, Holding Course away from the NAVAID, shall be used to determine leg length and numbered area information.

(2) Templates shall be used to determine:

(a) That appropriate numbered areas do not infringe on the no-course-signal zone, and/or,

(b) The location of a holding point which will keep the holding area from infringing on the no-course-signal zone.

## SECTION 5. OPTIONAL REDUCTION AREAS

30. FIX END REDUCTION AREA. Figure 8 depicts an area that may be eliminated when entry is made from directions within the Area of Entry shown in figure 9.

**Figure 8. OPTIONAL AREA**

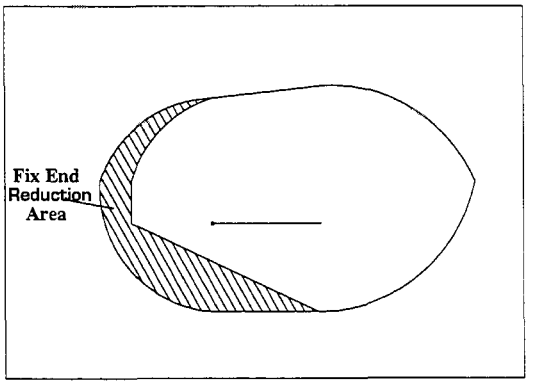
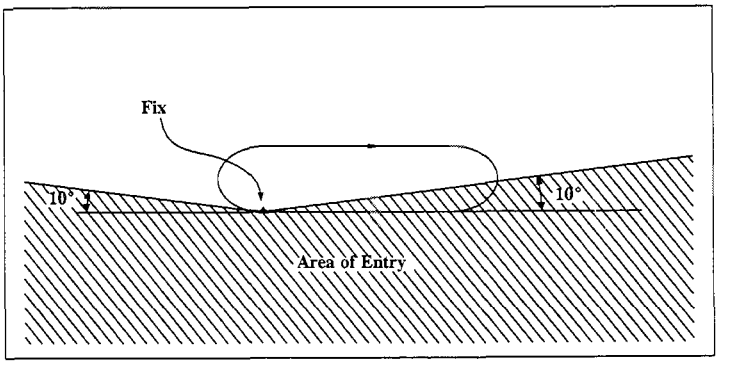



**Figure 9. AREA OF ENTRY**



c. Problem 3. The holding course is away from the NAVAID. Application of criteria to these situations are handled in the same manner as outlined in subparagraphs a. and b., with two exceptions:

(1) Appendix 2, Holding Course away from the NAVAID, shall be used to determine leg length and numbered area information.

(2) Templates shall be used to determine:

(a) That appropriate numbered areas do not infringe on the no-course-signal zone, and/or,

(b) The location of a holding point which will keep the holding area from infringing on the no-course-signal zone.

## SECTION 5. OPTIONAL REDUCTION AREAS

30. FIX END REDUCTION AREA. Figure 8 depicts an area that may be eliminated when entry is made from directions within the Area of Entry shown in figure 9.

**Figure 8. OPTIONAL AREA**

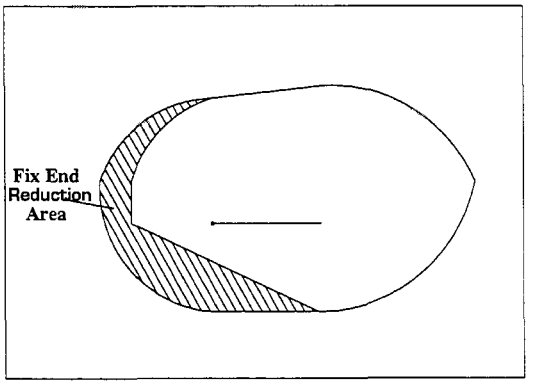
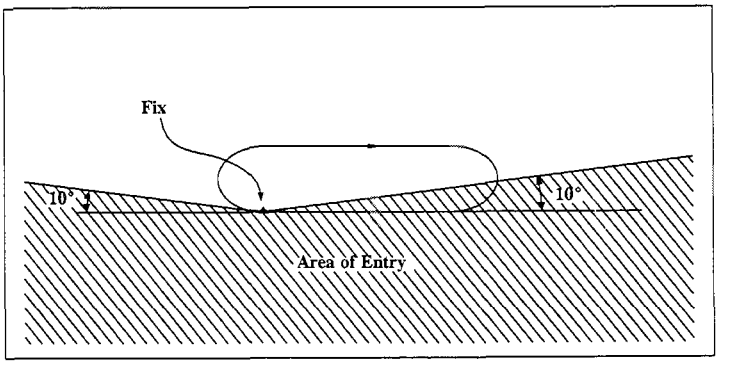



**Figure 9. AREA OF ENTRY**



c. Problem 3. The holding course is away from the NAVAID. Application of criteria to these situations are handled in the same manner as outlined in subparagraphs a. and b., with two exceptions:

(1) Appendix 2, Holding Course away from the NAVAID, shall be used to determine leg length and numbered area information.

(2) Templates shall be used to determine:

(a) That appropriate numbered areas do not infringe on the no-course-signal zone, and/or,

(b) The location of a holding point which will keep the holding area from infringing on the no-course-signal zone.

## SECTION 5. OPTIONAL REDUCTION AREAS

30. FIX END REDUCTION AREA. Figure 8 depicts an area that may be eliminated when entry is made from directions within the Area of Entry shown in figure 9.

**Figure 8. OPTIONAL AREA**

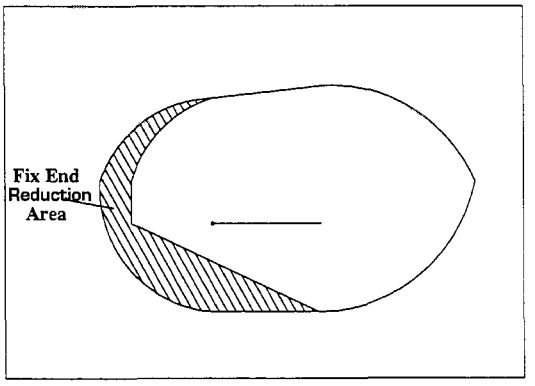



**Figure 9. AREA OF ENTRY**