

Nit-Picking About Straight-Ins

The comments keep pouring in about doing that course reversal when it doesn't make sense.

By Wally Roberts

THE DEBATE OVER WHEN YOU can proceed straight-in during an approach rages on. Below are three good letters we received about the ever-intriguing issue of when to do the published course reversal as a result of the "IFR Quiz" in September *IFRR*. These letters typify the seeming unending confusion and debate about when it's okay to go straight-in on an IAP that has a course reversal:

"In reference to questions 2 and 3 in the September 'IFR Quiz' regarding vectors to the CXR VOR on a radial between 099 and 263, inclusive; I have a real problem with your answers.

"In looking back at 'When It's Time To Reverse Course' (July *IFRR*) and the FAA 'clarification,' it seems the FAA has problems with The English language. I would read FAR 91.175 (j) as meaning that there are three cases in which a procedure turn cannot be made:

- Receiving radar vectors to the final approach course or fix;
- Performing a timed approach from a holding pattern; or
- The procedure specifies NoPT.

"You are interpreting both the FAR and the FAA 'clarification' as meaning that all three conditions must be met in order to obviate the requirement for the course reversal. If such were the case, a lot more of the approaches would require a course reversal.

"I cannot believe I would ever do a course reversal in the circumstances of questions 2 or 3, and I don't think the ATC controller would expect me to.

"I also don't understand where it states that if one is on a published route between the 099 and 263 radials, a course reversal is not required. I don't see that on the en route chart or on the terminal procedure chart. Is there some other documentation I should be toting along?"—H. C. O'Dell

"Question 2 of the September 'IFR Quiz' got me. Even though I remember

reading the FAA letter of legal interpretation regarding the use of procedure turns in the July *IFRR*, I still thought if the IAF is approached from anywhere within the NoPT sector a procedure turn wasn't authorized. This question got me thinking about documentation.

"I have a copy of the TERPs and it has been a most valuable aid. But isn't there some document that discusses NoPT sectors? I mean, pilots shouldn't have to get an FAA letter of legal interpretation on how they should fly IAPs. I didn't find anything in FAR Part 97 or the AIM. Isn't there an official publication that explains *how* to fly IAPs?

"I thought I might try and add FAA Orders 7130.3 (Holding Pattern Criteria) and 8260.19 (Flight Procedures and Airspace), plus the U.S. Air Force Special Training Instrument Approach Procedures to my library in hopes to learn more.

"Another example is the commonly misunderstood holding pattern in lieu of a procedure turn. Most know that when approaching an IAF with such a pattern a hold entry is required, unless NoPT is specified, even if already aligned with the final approach course. But, where is this written?

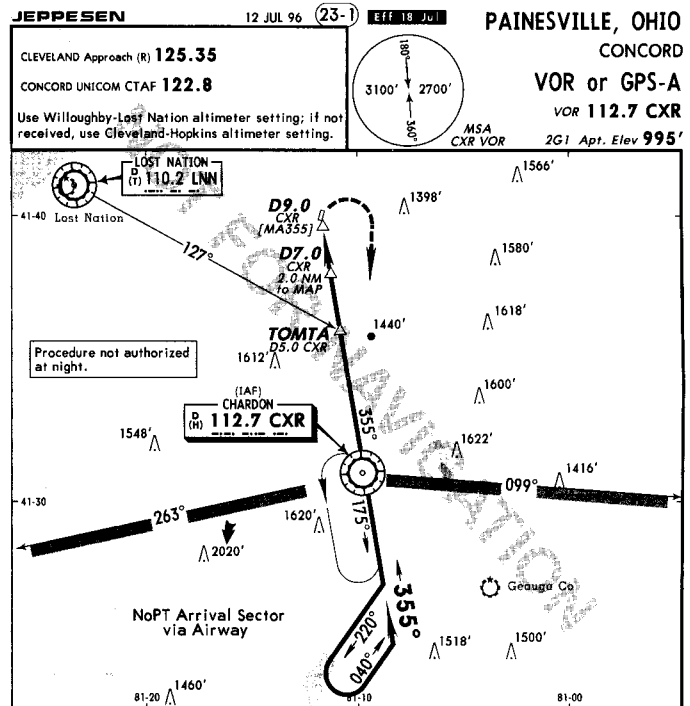
"I agree with the commentary in September *IFRR* and maybe publishing a complete library of reference titles will help us become more 'smart' on procedure. Please keep the 'TERPs Review' column."—

Bill de Groh

"Reference the September 'IFR Quiz.' You sure lost me on this one. Question 2. Here in Southern California, I very often make the VOR approach to Corona (AJO) and the controllers expect you to proceed straight to the VOR and then to the airport if at all possible, given altitude and heading. Proceeding in on the 240 radial and at the MEA, which is the inbound altitude, making a 295-degree turn followed by a 180, as opposed to a simple 115-degree turn doesn't make sense. Even in a non-radar environment it's dumb. I also don't understand question 3. What's the difference, other than some obscure rule?"—Steve Whitson

Non-radar no problem

It appears to us that most readers probably have no problem with doing a course-reversal when they obviously



The NoPT arrival sector is only for inbounds via the airways. All other arrivals must complete a course reversal UNLESS radar vectored for a straight-in.

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aren't on the controller's radar scope and aren't under one of the conditions of FAR 91.175(j).

Official ground rules

Let's restate the official ground rules:

(1) If the IAP *doesn't have* a published course reversal, you can't improvise one. In this case, every terminal route by default is an "NoPT" route, or the IAP has no terminal routes that tie to the en route structure, in which case the IAP will be annotated "Radar Required." In the latter case, the *only* authorized transition to the final approach course is a controller radar vector.

(2) Where the IAP *does have* a published course reversal, any one of the following conditions prohibits the pilot from making the published course reversal unless the pilot specifically requests, and receives approval from the controller, to fly the course reversal:

- A. Radar vectors to the final approach course.
- B. Arrival via a terminal route marked "NoPT"
- C. Timed approaches from a hold-

ing fix are being conducted.

These are the three conditions of FAR 91.175(j). If a pilot is excessively high and wants to do the course reversal to lose altitude, a specific request and approval must be granted by ATC, which approval is unlikely in Condition A, and would never be approved (and should never apply) in Condition C.

(3) Where the IAP *does have* a published course reversal, and one of the three conditions set forth in FAR 91.175(j) is not present, *then the course reversal is mandatory* as a matter of existing TERPs IAP design criteria, FAA policy, regulation, and legal interpretation.

The AIM and the ATC handbook

Let's add to the foregoing "official ground rules" the pertinent AIM and controller handbook guidance. The AIM states in Section 5-4-7 (Instrument Approach Procedures):

"e. When cleared for a specifically prescribed IAP; i.e., 'cleared ILS runway one niner approach' or when 'cleared approach' i.e., execution of any

procedure prescribed for the airport, 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 canceled.*" (Emphasis added.)

The ATC handbook Paragraph 4-8-1 (Approach Clearance) states:

"a. Clear aircraft for 'standard' or 'special' instrument approach procedures only...standard instrument approach procedures shall commence at an initial approach fix or an intermediate approach fix if there is not an initial approach fix. Where adequate radar coverage exists, radar facilities may vector aircraft to the final approach course in accordance with paragraph 5-9-1."

Paragraph 5-9-1 (Vectors to Final Approach Course) states:

"Except (for vectors for a visual approach), vector arriving aircraft to intercept the final approach course:

- "a. At least 2 miles outside the ap-

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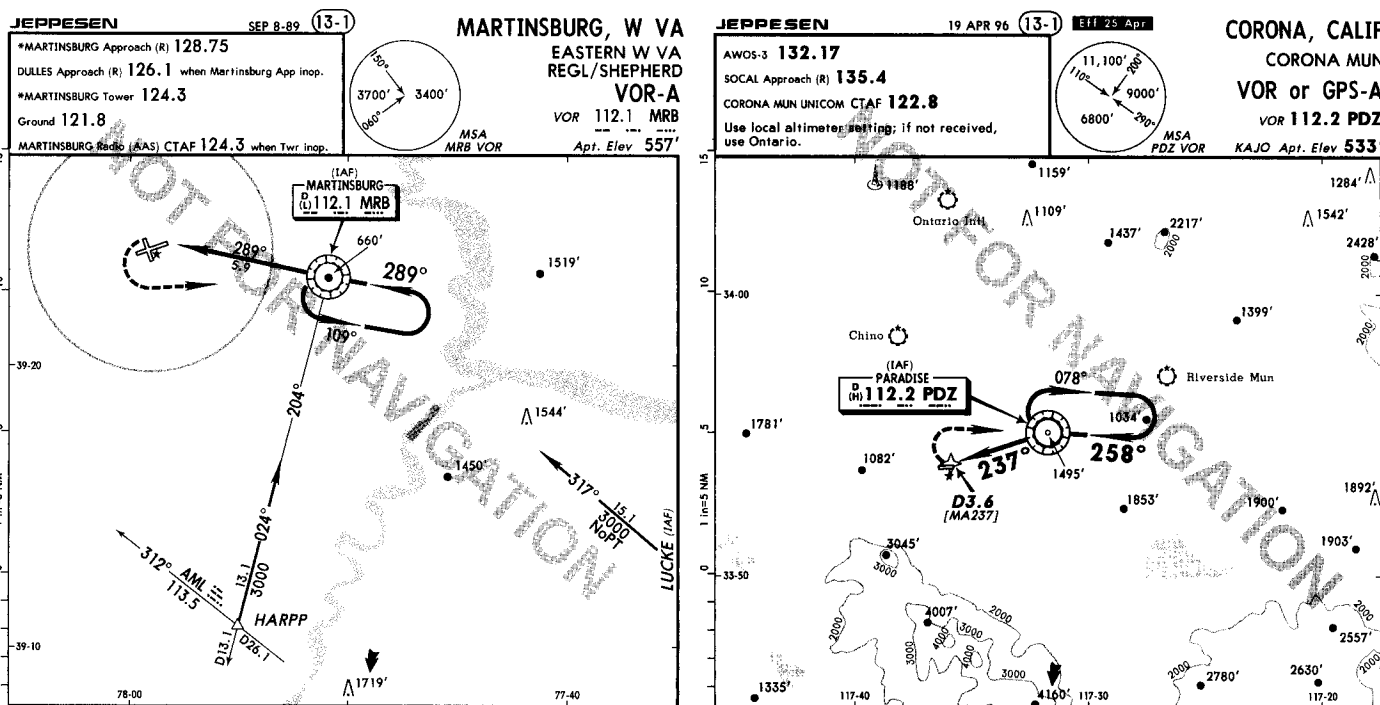


Figure 1. On both the Martinsburg (left) and Corona (right) procedures, the VOR is first the course reversal IAF, then (after the course reversal) it's the FAF. However, if ATC vectors you to the MRB 109 radial or the PDZ 078 radial, you should proceed straight-in according to the radar vector condition of FAR 91.175(j).

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proach gate [an ATC fix one mile before the FAF] unless one of the following exists:

“1. When the reported ceiling is at least 500 feet above the MVA/MIA and the visibility is at least 3 miles (report may be a pirep if no weather is reported for the airport), aircraft may be vectored to intercept the final approach course closer than 2 miles outside the approach gate but no closer than the approach gate.

“2. If specifically requested by the pilot, aircraft may be vectored to intercept the final approach course inside the approach gate but no closer than the final approach fix.

“b. For a precision approach, at an altitude not above the glideslope/glidepath or below the minimum glideslope intercept altitude specified on the approach procedure chart.

“c. For a non-precision approach, at an altitude which will allow descent in accordance with the published procedure.”

I normally avoid lengthy references to the ATC handbook because pilots

generally shouldn't be required to be knowledgeable about policy and procedure guidance for controllers. Where pilots need to know about certain aspects of ATC policy, those aspects should be covered in the AIM. However, the AIM is unclear in this regard. AIM 5-4-7e can be read that an amended ATC clearance can negate the requirement to begin an IAP at an IAF. The above-cited language from the ATC handbook hopefully clears up the issue for our readers—that ATC must either clear you over an IAF or provide you with a radar vector to the final approach course in accordance with the vector guidelines of ATC handbook 5-9-1.

The frustration factor

What about those many IAPs where it's counterintuitive to do a course reversal, even though you haven't received a radar vector and you haven't reached the IAP via one of the other two conditions of 91.175(j)? As our readers' letters point out, there are many situations where it's all lined up as intended by TERPs, yet you have to do a course reversal?

We agree that such circumstances are frustrating for two very fundamental reasons:

(1) TERPs criteria were never modified to take advantage of the flexibility that would be permitted by a NoPT arrival zone where the course reversal fix is either a VOR or NDB facility, thus where we can navigate to the fix from random directions.

(2) FAA policy makers have never provided an option for radar controllers to clear you direct for straight-in unless a vector is provided. This would require that each apparently eligible VOR or NDB IAP be evaluated and “TERPs'd” for random arrivals.

Controllers are innovative folks who can figure out intuitively where it's “okay” to just let you go direct, and then straight-in. They're covered, but the unwary pilot might not be covered if he/she tries to extend this improvisation to some other location that's not “okay,” where non-radar services are being received, for instance. Or, for instance, when it's unclear whether the controller is using radar. These are reasons why one of the fundamental cornerstones of TERPs exists: all terminal routes leading to an IAP either

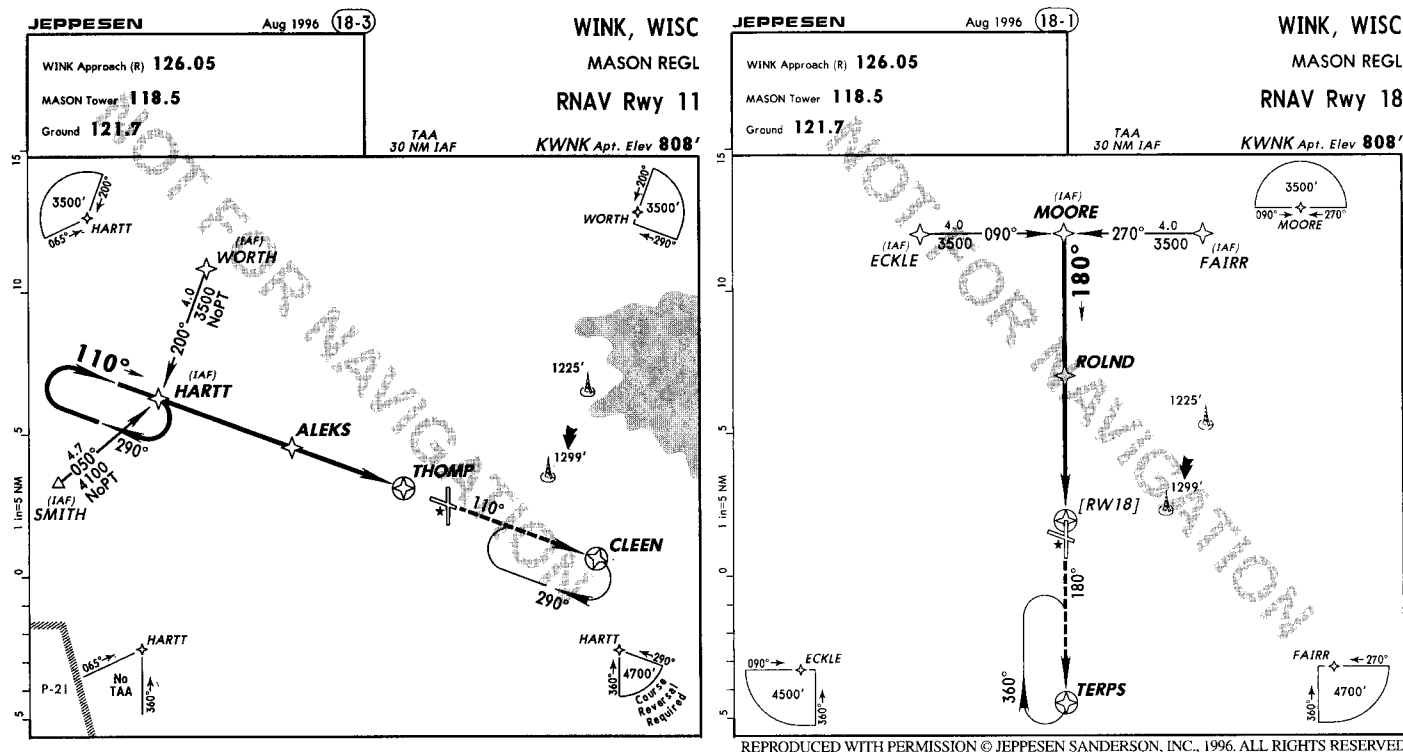


Figure 2. These two experimental charts illustrate the new terminal arrival area (TAA) concept under development for GPS/RNAV IAPs. The Runway 11 IAP (left) still has a course reversal to accommodate arrivals from the southeast. The Runway 18 IAP (right) positions all arrivals for a straight-in.

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tie to the published en route structure or radar vectors are mandatory.

Some IAP examples

Figure 1 (page 11) shows the plan views of Martinsburg, WVA and Corona, CA VOR IAPs. Also, refer to the Painesville IAP (page 10), which was discussed in the September quiz.

At both MRB and AJO the VOR facility is first the course-reversal IAF then, after the course reversal, it's the FAF. But, if the controller vectors you to the MRB R-109 or the PDZ R-078 in accordance with ATC handbook 5-9-1, then straight-in is triggered by the radar vector condition of 91.175(j).

In the case of Painesville, the intermediate fix (IF) is first the course-reversal IAF, then the IF. The "NoPT Arrival Sector *Via Airway*" increases the frustration factor. Why didn't the FAA design folks simply make a large published arrival zone here with a published zone altitude? Provided course change limitations and descent gradients are observed in the design, why not? Unfortunately, there are no criteria for this and no incentive to develop

such criteria for VOR and NDB now that GPS is on the scene.

Refer to Figure 2 (page 12). There is relief coming for GPS/RNAV IAPs, known as the terminal arrival area (TAA) concept. Note the Runway 11 IAP still has a course reversal, because it isn't possible to aim directly at any of the IAFs with the prohibited area in the way—note the nomenclature associated with the HARTT waypoint. GPS/RNAV is unique in that diverse navigation capability exists for every waypoint, unlike a course-reversal fix in a VOR or NDB IAP that isn't a nav facility. The TAA pie-shaped zones are planned to extend for 30 miles.

Turning limits

In the cases of MRB and AJO, the final approach course change limit over the course-re-

versal IAF/FAF is 30 degrees (it's 15 degrees for GPS/RNAV IAPs). Further, the succeeding final approach segment must be at least the length specified in the TERPs table shown in Figure 3 (below). Also, the FAF minimum crossing altitude must not cause an excessive descent gradient in the final segment.

Where the course reversal IAF is at the intermediate fix, the course change limit for designating an NoPT terminal route is 90 degrees, which can be extended to 120 degrees where lead radials can be provided. Also, the descent gradient for the minimum crossing altitude cannot exceed TERPs interme-

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Table 14. Minimum Length of Final Approach Segment - VOR (Miles)

| Approach Category | Magnitude of Turn over the Facility (Degrees) | | |
|-------------------|---|-----|-----|
| | 10° | 20° | 30° |
| A | 1.0 | 1.5 | 2.0 |
| B | 1.5 | 2.0 | 2.5 |
| C | 2.0 | 2.5 | 3.0 |
| D | 2.5 | 3.0 | 3.5 |
| E | 3.0 | 3.5 | 4.0 |

Figure 3. This table from TERPs handbook shows how the length of the final approach segment is dependent on the amount of turn over the facility.

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When Can You Take A Shortcut?

In Wally Roberts' article, "Authority and Command" (October *IFRR*), he says IFR departure procedures can never have ATC shortcuts. I was under the impression as soon as ATC advises you're in radar contact, they assume responsibility for terrain clearance and can give you a vector/shortcut. For instance, at an uncontrolled field whose SID calls for a climb to 1,500 feet on runway heading before making any turns, if ATC advised radar contact at 1,000 feet, they could vector you since they were assuring terrain clearance. Is that correct, or shouldn't I take a vector until I get to 1,500 feet in this example?

Robert Cicconi
Prospect Park, PA

Roberts responds: I said in the article, "It's up to the pilot to faithfully follow

all published procedures, excepting only those vectored of 'direct' shortcuts that are consistent with the published procedure, whether it be a SID, airway, or IAP (IFR departure procedures can never have ATC shortcuts.)"

In the case of Mr. Cicconi's SID, assuming FAA facility directives permit, ATC can indeed intervene with a vector as I stated, just as they can with an IAP (in accordance with the ATC Handbook), or with shortcuts to/from an airway while en route. The *IFR departure procedure* is the departure procedure that must be flown by the pilot in its entirety to assure terrain clearance. A low-traffic airport won't usually have a SID. If terrain is a problem, it will always have an IFR departure procedure,

which could be as simple as prohibiting departures in a particular direction or a full departure route description.

Generally, where SIDs or ATC departure vector capabilities exist, the pilot won't have the option to fly the published IFR departure procedure, because ATC will supersede it with either an assigned SID or departure vector. It's at those locations where ATC has neither a departure vector capability nor SID where the published IFR departure procedure becomes paramount for the pilot to use on his own. This doesn't mean ATC can't vector you in the latter stages of an IFR departure procedure, where the departing aircraft has climbed to the en route altitude, but that's effectively an en route vector.

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diate segment values.

The protected airspace

Figure 4 (on right) shows the typical protected airspace for IAPs like MRB and AJO. Although the area is narrow at the FAF, the overlying procedure turn maneuvering area provides a lot of protected airspace. (The MRB and AJO holding patterns aren't as large as the depicted standard procedure turn area, but still provide a lot of overlying protected airspace.) Note Figure 5 (on right), which is the maximum possible application of criteria where the FAF is a VOR facility, and the intermediate fix is the course-reversal fix. In this case, the procedure turn maneuvering area doesn't overlie the FAF, thus there is precious little protected airspace for someone who decides to go direct to the VOR and "whifferdill" straight-in. Just over a mile to the side could be a very high mountain.

Think of an airplane going direct to the facility/FAF in Figure 5, on a direct course which tracks at an angle slightly outside the funnel of the intermediate segment. This is exactly what happened to the Boeing 757 at Cali, Colombia.

Why not make it legal for ATC?

Where ATC has the radar coverage, why shouldn't they be able to simply clear you direct to the facility for a straight-in, instead of having to utter all those radar vector words? Well, in a word, they should—provided the area of acceptable radar monitor is "TERPs'd" IAP by IAP. One user group petitioned the FAA to do this very thing at a recent Air Traffic Procedures Advisory Committee (ATPAC) meeting, but it died for lack of strong support from the other user groups.

In the meantime, as I said in my July article, you have to be the final judge as to whether you let it slide where it seems there's "no harm, no foul." Where the controller clears you direct to a course-reversal-IAF/FAF or -IAF/IF, whether that is effectively a "radar vector" is for you to decide. At least

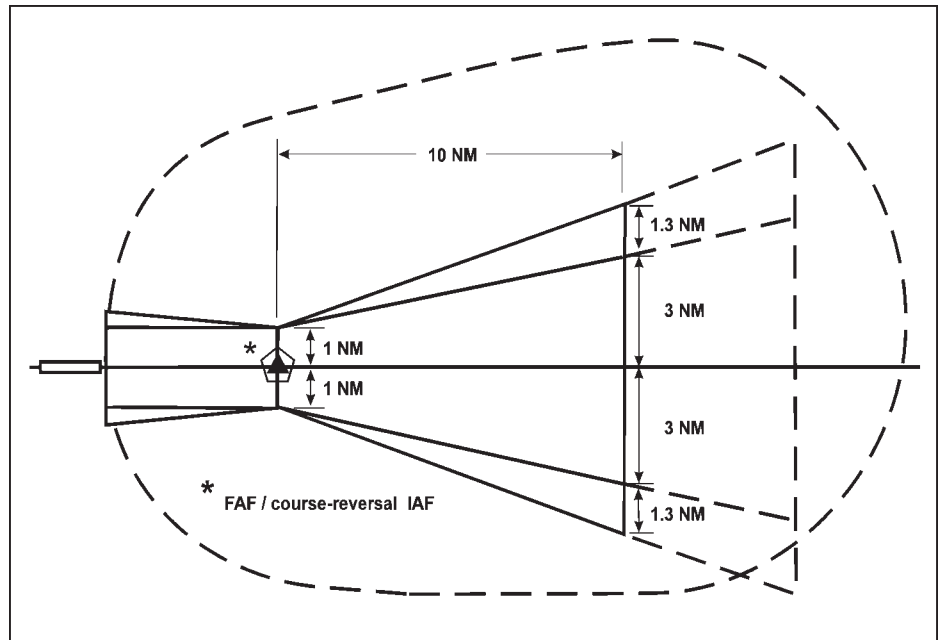


Figure 4. Typical protected airspace area for IAPs such as MRB and AJO. Although the area is narrow at the IAF/FAF, the overlying procedure turn maneuvering area provides a lot of protected airspace at the charted minimum altitude.

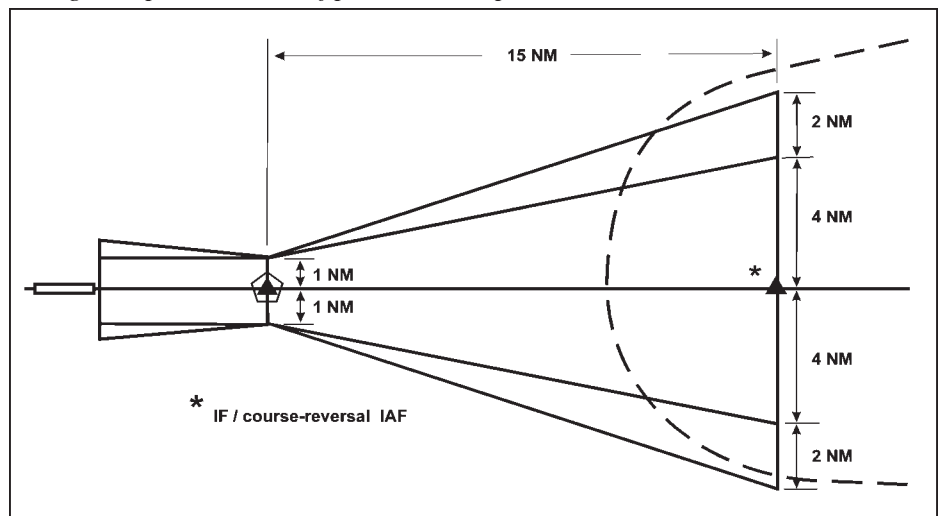


Figure 5. FAF is at VOR and course reversal is at IAF. The procedure turn maneuvering area doesn't overlie the FAF, leaving little room for someone who decides to proceed straight in.

you'll have benefit of the facts set forth in this article, from the regs to the AIM, to the radar vector/non-vector approach clearance rules the controller should follow. Keep in mind that you are the final authority (and you carry the burden of the final responsibility) on what's right for an IAP, vis-à-vis the controller.

Our monthly quizzes must follow the rules set forth in the body of regulations and policies of the FAA. If this subject were covered on the FAA instrument written, you would expect the same—

or, for that matter, during an oral from a knowledgeable FAA inspector or examiner. The fault doesn't lie so much with the rules as it does with a lack of up-to-date TERPs design criteria and lack of "TERPs'd" ATC radar-monitor policy.

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