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## VERTICAL NAVIGATION (VNAV) - Concept Extension

### Background

Beginning in December 1999, Jeppesen started to include Vertical Navigation (VNAV) descent information on selected non-precision instrument approach charts. VNAV information had previously been provided in Jeppesen's electronic navigation database (NavData) only.

VNAV path information illustrates the geometric descent path with a descent angle from the Final Approach Fix (FAF) to the Threshold Crossing Height (TCH). The inclusion of VNAV angles on non-precision approach charts was done on a limited basis.

For those non-precision approach procedures for which the State authority did not specify a descent gradient or did not provide a recommended DME/Altitude table, a descent angle **derived** from the Jeppesen NavData database is to be shown on the corresponding approach chart.

This angle, if used by certified VNAV-capable avionics equipment, will ensure a stable, constant rate of descent clearing all intervening altitude restrictions (step-down fixes) established by the State authority.

### Extending the Concept

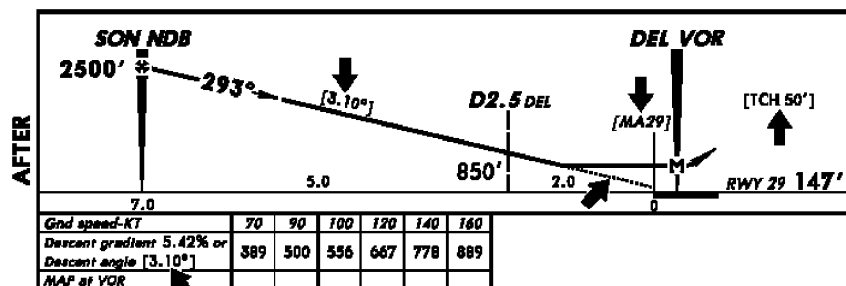
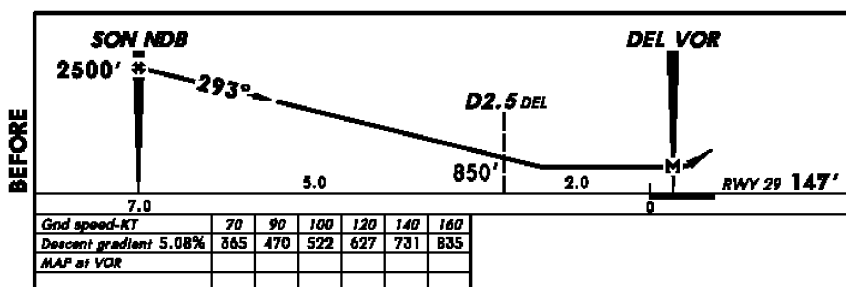
As next step of the VNAV implementation plan, Jeppesen will start providing, on a routine basis, the VNAV elements for straight-in non-precision operations when a descent gradient and/or recommended DME/Altitude information table has been specified by the controlling State authority.

In these cases, a descent angle will be **converted** from the State specified descent gradient and/or **determined** from the State specified recommended DME/Altitude table to produce a VNAV angle. The resulting VNAV angle will be coded into the database and shown on the corresponding chart. This will be done only when the Jeppesen calculated angle is equal to or within a certain tolerance of the State value (internally, it was decided that a 0.2° tolerance factor is acceptable). Generally, the elements of VNAV descent information and the charting depiction remain unchanged from established VNAV application.

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### VERTICAL NAVIGATION (VNAV) - Concept Extension (cont'd)

For illustration purposes, the sample below shows, comparatively, a fictitious procedure profile as seen "BEFORE" and "AFTER" the implementation of the VNAV angle in the profile view.



Note that the "BEFORE" descent profile and the VNAV descent path in the "AFTER" sample are identical until reaching the Minimum Descent Altitude (MDA).

In this case, the descent gradients are slightly different. The source provided descent gradient, converted to degrees and rounded up to the nearest hundredth, is 2.91°. The calculated angle (based on FAF to TCH geometry) is 3.10°. The 'steeper' value of 3.10° is coded in the database and also charted, in both the profile view and in the conversion table showing the VNAV angle relative to the recommended rate of descent and ground speed.

**END**

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