SUBJECT: Cirrus Authorized Instrument GPS Approaches

DATE: March 27, 2015

Recent Instrument Progress/Stage Checks have revealed a level of misunderstanding about the capabilities of the equipment installed in the Cirrus aircraft at WMU. Specifically, this misunderstanding relates to the types of instrument approaches which may be flown in an Avidyne R9 equipped Cirrus. While the following may apply to any aircraft with an IFR approved WAAS GPS installation (having a current database), the information provided below is specifically intended for Cirrus pilots at WMU.

With the transition from traditional ground based navigation (VOR, ILS, etc.) GPS has allowed for the development of instrument approaches in locations where there were no prior approaches and, in many cases, has superseded or supplemented instrument approaches to airports which previously had only ground based nav aids. In general, RNAV (GPS) approaches potentially allow for lower minimums than traditional ground based navigation aids and are easily created or “overlaid” with existing approaches. Depending the on the approach, it may utilize the WAAS (Wide Area Augmentation System) for accuracy improvement or may be Non-WAAS instead. In addition to greater accuracy [than Non-WAAS], WAAS can also (but not always) provide vertical guidance similar to that found with the ILS.

WAAS approaches with vertical guidance include:
- LPV – Localizer Performance with Vertical Guidance
Both of these approach types are published with minima having a Decision Altitude (DA) and are flown similar to a traditional ILS.

WAAS approaches without vertical guidance include:
- LP – Localizer Performance
- LNAV – Lateral Navigation

Note: This FIF is intended to for all pilots who are in the midst of or have completed their instrument training. This FIF is not applicable at this time to pilots that are still in their PPL training.
These approaches are published with minima having a Minimum Descent Altitude (MDA) only.

The Cirrus is capable of flying both WAAS enhanced and Non-WAAS approaches. The following excerpt from chapter 6 of the R9 pilots guide offers additional information:

- **LNAV (Lateral Navigation)** - Provides lateral (horizontal) guidance only, with standard GPS precision of 0.3 NM full-scale deflection. This is essentially the same as a non-WAAS GPS approach. It is flown as any other non-precision approach - observing step down restrictions, descend to MDA, fly at MDA altitude to the MAP, and execute the missed approach procedure if appropriate. Since there is no vertical guidance associated with this type of approach, the VDI is not displayed.
- **LP (Localizer Performance)** - These approaches have localizer performance but no vertical guidance associated with them. Use the published “LP” minimums. “LP” will be annunciacted as the HDI source.
- **LNAV+V (Lateral Navigation with Vertical Information)** - This mode provides the same lateral navigation as LNAV, but presents an ILS GS-like presentation on the VDI. The GPS draws a 3-D picture of the approach based on crossing the FAF at the depicted altitude. Then it follows a glidepath from the published approach, which is typically a 3 degree angle to the touchdown zone. This type of approach remains a non-precision approach and does not consider any step-down limitations. For this approach type, manual coupling to the autopilot is permitted. After “LNAV +V” is annunciacted as the HDI source, but prior to the FAF, the NAV (or APPR) button on the autopilot must be pressed. GS will arm or engage depending on your position relative to the glideslope. Fly coupled to the MDA, observing any step down restrictions as needed. If a level off at the MDA is desired, the ALT button must be pressed on the autopilot.

Stepping aside from the R9 pilots guide for a moment and focusing on the **LNAV+V** approach, it is extremely important to reiterate that the glideslope provided on a **LNAV+V** approach is created by the FMS itself and may not take into account terrain along the approach corridor. In short, it offers a glideslope to follow, but does not guarantee compliance with stepdown minima along the final approach course. While following the Glideslope on an **LNAV+V** approach, it is the responsibility of the Pilot in Command to monitor all stepdown altitudes to ensure terrain clearance. Although using the glideslope will contribute to a more stabilized approach, flying this type of approach as a normal non-precision approach (by disregarding the glideslope) using stepdown fixes remains an option for the PIC.

The R9 pilots guide continues with the following:

- **LNAV/VNAV (Lateral Navigation with Vertical Navigation)** - In this mode, the GPS provides lateral navigation, providing more accurate guidance than regular LNAV but easier to follow indications than a localizer. The vertical navigation is driven by GPS signals. **LNAV/VNAV** approaches are operationally different from **LNAV+V** in that the glide path is protected from obstructions but attention still must
be applied to step down fixes. Also, the minimum altitude presented is a decision altitude/height (DA/DH) – DA being what is on the altimeter, and DH being the height of the DA above the touchdown zone elevation. This is not a MDA, thus, fly it just as though it were an ILS approach: follow the glideslope all the way to the DA before initiating a missed approach, if appropriate. This type of approach is automatically coupled to the autopilot, meaning that somewhere in the vicinity of the FAF with “L/VNAV” annunciated as the HDI source, the FMS will automatically toggle the autopilot mode to NAV APPR and GS will either arm or engage depending on your position relative to the glide path.

- LPV (Localizer Precision with Vertical Guidance) – The lateral guidance is significantly more precise than LNAV, and equivalent to that of a localizer, except easier to fly. Vertical guidance is provided to minimums as low as 200’ AGL above the touchdown zone. Lateral tolerance starts out at 0.3 NM full-scale (slightly tighter than a localizer at the FAF), transitioning to 350 feet either side at the runway threshold (slightly looser than a localizer). The steering remains linear all the way so you don’t get the difficult to follow swings of a VHF localizer close to the runway. The vertical guidance is precise and has a DA/DH (shown as “DA(H)” on approach charts) rather than a MDA. This type of approach is also automatically coupled to your autopilot. In the vicinity of the FAF, with “LPV” annunciated at the HDI source, the FMS will automatically toggle to autopilot mode to NAV APPR and GS will either arm or engage depending on your position relative to the glide path.

- If the FMS has determined that satellite coverage is insufficient for use of GPS as the primary navigation source, a Caution is provided. This may occur at any time during the approach and requires that you miss.

Understanding that the above is directly from the R9 pilot’s guide, there are several important items to note: (1) the system will provide the best available guidance depending on GPS accuracy, aircraft equipment, and location of the approach. You can not “dumb it down”. (2) Approach procedures with vertical guidance will NOT include LP minima. LP approaches provide greater accuracy where vertical guidance is not available or when proximity to airspace is prohibitive. and (3) Procedures using WAAS meet the requirements for Required Navigation Performance (RNP) approaches but are not RNP A/R (meaning Authorization Required) or Baro-VNAV (Barometric Vertical Navigation) approaches. We are not authorized to conduct RNP A/R approaches or use Baro-VNAV minimums in the Cirrus.

For additional information please reference:
AIM 1-2-2
Avidyne Release 9 Pilots Guide