

June 27, 1997

Thanks to Captain Tom Young, chairman of the Air Line Pilots Association (ALPA) Charting and Instrument Procedures (CHIPs) Committee, and ALPA staff engineer Kevin Comstock, the following CHIPs position papers are being made available on the Bluecoat Reports Web site:

1. Charted visual flight procedures
2. Electronic charting/moving maps
3. Continuation of flight inspection
4. Retention of ILS
5. Conversion of MSAs to DH on non-precision approaches
6. Obstacle clearance training
7. Outline for obstacle clearance video
8. Qualifications for non FAA procedures development specialists
9. The use of special approach procedures
10. Instrument departure procedure climb gradients
11. Stabilized constant descent approaches
12. Stabilized descent non precision approaches (non FMS procedures)
13. Letter to Patricia Lane regarding Lack of performance data in cockpit to determine climb gradients

May 2, 1997

## ALPA CHIPS POSITION

### CHARTED VISUAL FLIGHT PROCEDURES

#### BACKGROUND/POSITION

ALPA is opposed to Chared Visual Flight Procedures because of the inherent increase in workload associated with flying a charted procedure while attempting to execute a stabilized visual approach and the inability of the pilot to maintain required wake turbulence separation under certain meteorological conditions unless the following conditions are met:

1. Any charted visual flight procedure shall be so designed as to permit a large turbine-engine-powered aircraft to be stabilized on the runway centerline extended, at a minimum of 500 ft above and no less than two nautical miles from the landing threshold, with wings level, and descending on a 3 degree slope (318 ft per nautical mile). The minimum cloud ceiling authorized shall be at least 500 ft above the highest altitude specified in the procedure and the minimum authorized visibility shall be not less than 6 statute miles (5.2 nautical miles) and permit a clear identification of successive visual cues used in the construction of the procedure.
2. The designed descent gradient from CVFP entry to interception of the runway centerline extended shall be an optimum of 300 ft per nautical mile and a maximum of 400 ft per nautical mile. From the designated point of the runway centerline intercept to the runway threshold, the descent gradient shall not exceed a 3 degree slope (318 ft per nautical mile). The minimum length of the runway centerline segment shall be two nautical miles.
3. Visual Landmarks - The landmarks used will be very prominent and readily discernible during all conditions the approach is expected to be used (i.e., if the approach is to be used at night the landmark must be readily discernible by lights or lighting patterns).
4. Visual tracks depicted on CVFPs shall include along-track mileage from the procedure entry to the runway threshold.
5. Class B Airspace - Both the vertical and lateral limits of Class B airspace must be shown on the CVFP chart so as to allow the aircraft to remain within Class B Airspace at all times during the approach. In addition, the lateral limits of the class B airspace must be shown by radial and DME or RNAV waypoints.

6. The criteria for the construction of CVFPs should be standard and must be available in pertinent documentation such as 8260.19C.
7. Allowable Track or Altitude Deviation Criteria - This issue must be answered to our satisfaction in view of the stream of violations which have been filed against our members for alleged violations of track and altitude.
8. No ATC Alterations of Track while executing CVFP's. This issue has caused considerable confusion and has lead to perceived overshoots when extended even further away from already difficult to see visual points.
9. Course Guidance - Is this a visual approach or is it an instrument maneuver? Should we be expected to use all available nav aids while executing the approach. Do we wish to have our heads in the cockpit while we are attempting to fly over points on the ground and to locate other aircraft. If an ILS or LOC is available, it needs to be used to prevent overshoots and to provide vertical guidance as an aid while executing the CVFP. A VOR Radial, FMS or GPS position could also be used as a means to prevent overshoots and aid alignment on the final approach. A FMS CVFP could also be used in a coupled mode to provide safer operating conditions at night or in difficult visual conditions such as sun in your eyes or haze.
10. Operating Radar - This must be a requirement when dual stream operations are in progress to multiple runways.
11. Obstacle Clearance - One thousand feet AGL should be the minimum allowable altitude until necessary to descent on a 3 degree glideslope to the runway.
12. Flyability Check - The procedure must be evaluated for the most critical aircraft expected to use the procedure prior to its implementation.
13. Missed Approach - Since this is a visual maneuver there is not requirement for a missed approach to be charted. However, the ATC facility must include in its procedures instructions for aircraft which lose sight of the airport during the CVFP or are required to go around for any reason while executing this approach. Should any aircraft lose sight of the airport due to deteriorating weather conditions, ATC will immediately cease CVFP operations.
14. Vertical Guidance - VASI or PAPI are required.
15. Approach Lighting Aids - Approach lights or REIL should be required if the approach is to be used at night or if the CVFP delivers the aircraft on a heading more than 15 degrees misaligned with the runway centerline or more than 2 miles from the runway threshold.

May 2, 1997

## ALPA CHIPS POSITION

## ELECTRONIC CHARTING/MOVING MAPS

### BACKGROUND

For a considerable period of time there has been a strong desire for pilots to utilize the unique safety benefits of electronic charting and moving maps to better enhance situational awareness and to reduce pilot work load during critical operational periods.

### POSITION

Advantages - Cost, Weight, Bag Storage Elimination, No need for Chart revisions by envelope.

### IDEAS FOR ELECTRONIC CHARTING

1. Jeppview and company manuals on a CD ROM.
2. Computer type screen on the yoke.
3. Necessary for there to be separate CD ROMs for each side with back up power sources (aircraft power plus battery backup).
4. Updates- Via Modem with crosslink to CD ROM or via writeable ROM?
5. Is a keyboard needed?

May 2, 1997

## ALPA CHIPS POSITION

### CONTINUATION OF FLIGHT INSPECTION

#### BACKGROUND

As the NATIONAL AIRSPACE SYSTEM moves toward the use of SPACE BASED NAV AIDS IN LIEU OF GROUND BASED NAV AIDS, the FAA has adopted the policy that these approaches do not require the same level of flight inspection as the current ground based navigation aids. The current FAA flight inspections policies on flight inspection of CAT II/III ILS sets the standard for appropriate and prudent care. At the present time since the FAA does not have the airborne equipment to verify space based navigation aids they have adopted the defacto standard that these approaches do not require flight inspection. This position has been arrived at as a matter of expediency rather than as the result of scientific testing. The only testing currently accomplished on these procedures is to have the proponent of special space based or FMS approaches to fly the approach in their own airplane and have the Principal Operations Inspector sitting in the jump seat to indicate that it meets his approval. In our opinion this is a far different standard and level of care than what has been previously applied to the NAS. In addition, as the FAA has reorganized its flight inspection assets, there have been serious questions raised about the adequacy of continuing checks for obstacles on approaches and about the flyability of certain approaches. Both of these are needed as the development of instrument procedures are being shifted away from pilot procedure developers to non pilots using automated computer programs.

#### POSITION

We believe that FAA Flight Inspection (or its certified equivalent) of the navigational system must be retained for the following reasons:

1. Space Based Nav Aids can and do go out of tolerance on a regular basis.
2. There is an increasing threat from intentional or unintentional RF/EMI interference.
3. Space based nav aids may be used to site approaches where geographic features may shade or block navigation signals.
4. Space based nav aids deliver you to a point in space. It must be verified that this point is indeed the intended point which will allow you to make a normal landing on a runway.

We are rapidly moving to a single source of navigation signal (GPS). It is projected that GPS will provide both the navigation signal as well as supplying position data for use in ADS-B (automatic dependent surveillance) which is projected to replace the current radar system. Thus if you lose GPS under this system, you lose both NAV and ATC radar capability

May 2, 1997

## ALPA CHIPS POSITION

## RETENTION OF ILS

## BACKGROUND

It is the intention of the FAA to shut down all ILS in The US between 2005 and 2010. At the present time, GPS has not shown the capability to provide the same level of accuracy and integrity as ILS particularly, CAT II/III ILS.

## POSITION

At the present time we view it as premature to even consider shutting down the current ILS system until a suitable replacement has been proven to be equal to the current level of safety provided by ILS.

May 2, 1997

## ALPA CHIPS POSITION

### CONVERSION OF MDAs to DH ON NON-PRECISION APPROACHES

#### BACKGROUND

As the airline industry moves toward the use of the STABILIZED DESCENT NON PRECISION APPROACH, certain proponents have attempted to gain operational advantage by attempting to convince the FAA to treat MDAs as DA's under this concept. This requires clarification and is discussed under the following points:

#### POINTS/POSITION

1. If there is an underlying VASI/PAPI, VDP or Standard Minimums ILS We have no objection to treating the MDA as a DH under this circumstance because the momentary "dip through" has already been compensated for.
2. If there is not one of the conditions noted in Point 1, we strongly object to using MDAs as Decision Heights unless the underlying terrain has been reliably surveyed to be 34:1 clear. If the underlying terrain is not 34:1 we believe that a serious degradation of obstacle clearance may result. The precision approach normally provides 200 ft of required obstacle clearance (ROC) based on the use of an electronic glideslope. The current non-precision criteria uses 250 ft of required obstacle clearance based on barometric altimetry, the necessity for pilots to VISUALLY Acquire obstacles which may penetrate a normal three degree glideslope, and no electronic glideslope or visual guidance. This 250 ft of ROC is based on clearance from the highest obstacle in the final approach segment. Making MDAs into DHs in this case may be a serious reduction in safety and margin.
3. It must also be assessed if the approach is to be flown using RNP RNAV values, these RNP values will not place the aircraft outside the current obstacle protected trapezoids.

February 13, 1997

ALPA CHIPS POSITION

OBSTACLE CLEARANCE TRAINING

BACKGROUND/POSITION

We believe that the FAA and the Airlines are deficient in not requiring training for pilots on issues of obstacle clearance training. The following two papers have been submitted to two potential makers of aviation videos in an attempt to convince them to produce a video which would be suitable for this purpose.

January 30, 1997

## ALPA CHIPS POSITION

### OUTLINE FOR OBSTACLE CLEARANCE VIDEO

#### BACKGROUND/POSITION

The recent series of CFIT Accidents and the introduction of space based navigation aids has created a tremendous need for additional pilot educational material on the subject of how the system provides lateral and vertical obstacle clearance and adequate descent gradient for aircraft during IFR Flight.

I propose covering the following items:

1. Introduction- to cover the need for additional knowledge on the subject. Perhaps a dramatic CFIT accident and or startling statistic might get their attention. Perhaps even a short quiz at this point. Then show the following by planning and flying a flight from Jackson Hole, Wyoming to Missoula, Montana. The use of actual photography and superior graphics would be compelling.
2. Preflight Planning- The issue of choosing the route depending on MEAs, MOCAs, OROCs and aircraft performance to ensure the safest route possible.
3. IFR Departures-IFR Departure, SIDs, Radar Vectors and VMC climbs and why pilots would use each. In the Jackson Hole C-130 accident the pilots did not know what an IFR Departure Procedure was.
4. Vertical clearance on obstacles on Departure, Enroute, Approach (initial, intermediate, final segments) TERPS Para 289 (7:1 for one mile past FAF), Missed Approach, Holding, Course reversal and Circling.
5. Engine out considerations-show how the airlines meet this requirement.
6. Show where you must start an instrument approach from and why. Quote FAA General Council letter to me.
7. Cover the Pilot Perception that controllers can provide obstacle clearance when not in radar contact. Pilots need to understand that an IAP is a contract between the pilot and the procedures developer-not between the pilot and ATC. ATC will only keep you free of other known IFR traffic.

8. Climb Gradients- Discuss what they are, how to comply and what to do if you can not comply.

9. Discussion of pitfalls of making up your own approaches and of using non data base RNAV approaches.

I have had discussions with Bob Van Dell of the Flight Safety Foundations and he is interested in having his organization being involved. Perhaps other aviation organizations would also be interested in sponsoring this video for its safety value. It would be an excellent follow on to the just released FSF CFIT Training Video produced for airline crews by Boeing.

Please let me know how I might further assist you in ensuring that this essential safety device is produced.

May 2, 1997

## ALPA CHIPS POSITION

### QUALIFICATIONS FOR NON FAA PROCEDURES DEVELOPMENT SPECIALISTS

#### BACKGROUND

With the FAA now allowing carriers to develop their own FMS, GPS and RNAV Procedures there is increasing concern about the fundamental and overall knowledge level of individuals developing these procedures. We are very concerned that essential elements of TERPS, Obstacle Clearance, Adequate Descent Gradient, Human Factors and other issues may be overlooked creating less than desirable and potentially unsafe approaches.

#### POSITION

We believe that the FAA must develop criteria and implement a qualification program for those individuals who will be developing FMS, GPS and other RNAV Approaches outside the quality control processes of the FAA. We believe the current FAA Designated Engineering Representative (DER) System provides an excellent role model for such a program.

May 2, 1997

## ALPA CHIPS POSITION

### THE USE OF SPECIAL APPROACH PROCEDURES

#### BACKGROUND

There is an increasing trend on the part of the FAA and ATA to use “Special Approach” procedures as a routine method of providing instrument approach procedures to air carrier airports. We believe this approach to be fundamentally flawed for the following reasons:

#### POSITION

1. The special procedure concept was meant to provide an approach at specific locations where some unique feature or features prevented the use of standard criteria to develop a useable approach.
2. We still believe that the special procedure is an acceptable tool for the purpose which it is intended. We do not believe that it should be used to routinely develop approach procedures which could and should be developed utilizing standard development criteria which has been adequately tested and is published in the appropriate FAA technical directives.
3. We see the continued use of individual airlines developing their own approaches under non published and non tested criteria to conduct approaches under routine operations at non terrain impacted airports as being an invitation to a non standard system which is very difficult for crews to fly.
4. Many of these approaches are being developed by personnel who are not trained in instrument procedures development. We believe this to be a fundamental flaw and not in keeping with FAA practice of licensing highly skill technical positions. We believe that if the FAA wishes to abdicate their responsibility to publish approach procedures at the major air carrier airports, they must also appropriately license those persons who will develop the procedures and then regulate these procedures development designers as they now regulate pilots, mechanics and designated engineering representatives.
5. We also believe that any special approach must pass a flight check flown to the same appropriate level of accuracy as a CAT II/III ILS by FAA Flight Check pilots. We believe the use of non TERPS trained POIs sitting on the jump seat indicating that it “looks pretty good” to them is unacceptable in view of the very careful manner in which CAT II/III ILS was developed and is currently being operated.

6. It must also be recognized that when entities other than the US Government design and publish approach procedures they then become liable for the procedure. Currently the US Government assumes responsibility for all approaches they develop.

June 10, 1997

## ALPA CHIPS POSITION

### INSTRUMENT DEPARTURE PROCEDURE CLIMB GRADIENTS

#### BACKGROUND

FAR 121.189 (and related sections of FAR 135) mandates that certain performance calculations be completed prior to each takeoff in revenue operations. These calculations assure that the airplane will either be able to takeoff or stop in the remaining runway in the event of the failure of an engine at the most critical point in the takeoff. The calculation also assures that the airplane will clear all obstacles along a narrow, hypothetical flight path to 1,500 feet above airport elevation, both with all engines operating and with an engine failure after takeoff commit speed.

But, this “FAR 121.189 performance calculation” does not address whether the aircraft, with all engines operating, can comply with a SID or IFR departure procedure climb gradient that often goes far higher than 1,500 feet above airport elevation, and along a flight track far different than the academic, narrow flight path required by the FAR 121.189-type calculation. At some mountain airports, very steep climb gradients (3 to 4 times steeper than a 40:1 slope) extend for many miles and to elevations 3 to 4 times greater than 1,500 feet above the airport elevation.

In addition to obstacle clearance requirements of SIDs and IFR departure procedures, some SIDs specify climb gradients for ATC vertical traffic clearance purposes, but the flight crew does not know what component of the FAA-specified gradient is for obstacles, if any, and what component of the specified gradient is for ATC vertical separation purposes.

Yet, the flight crew really doesn't know whether they can comply with FAA-specified climb gradients. Commercial transport aircraft have very wide ranges of takeoff and climb performance capabilities, which vary between type of aircraft, and vary within type of aircraft depending upon runway length, airport elevation, ambient air temperature, surface and winds aloft, and aircraft weight. The result, especially in aircraft that have takeoff weight ranges in the 50,000 to 100,000s of pounds range, are performance data that are extremely complex. Further, both the airframe manufacturers and airline companies, with the support of the FAA, consider these performance data to be confidential, proprietary data.

In the standard operations specifications issued to all carriers there is terse language in Paragraphs C56 and C57, which states, “*When a published takeoff minimum is greater than the applicable standard takeoff minimum and an alternate procedure (such as a*

*minimum climb gradient compatible with aircraft capabilities) is not prescribed, the certificate holder shall not use a takeoff minimum lower than the published minimum.”*

The only clear meaning in the foregoing language is that the certificate holder cannot use FAR 91.175(f)(1) and (2) standard (or ops specs lower-than-standard) takeoff minimums on a runway that has, for instance “300 and 1” listed under takeoff minimums, and without a climb gradient. Most runways that have a climb gradient specify standard takeoff minimums with the climb gradient and a usually fairly high ceiling and visibility requirement for aircraft that do not comply with the climb gradient. Further, it is confusing whether the various minimums apply only to the airport’s IFRDP or to any SID for that runway.

The AIM states that the IFR departure procedures’s minimums apply to any SID that can be used from that runway, unless a different minimum is set forth on the SID. But, the SID minimum, if any, is merely a part of a graphical/textual air traffic clearance, as opposed to the IFRDP’s FAR 97 takeoff minimums. In any case, air carrier flight crews are not provided with “go/no-go” performance data for any departure that has a climb gradient, whether it be an IFR departure procedure or a SID.

## POSITION

Flight crews need carrier-provided performance data for every takeoff that involves a climb-gradient IFR departure procedure or SID, and they need to be provided by their airline with the flight profile required throughout the climb gradient portion of the IFR departure procedure/SID in order to assure that calculated performance data is actually achieved.

We believe the standard operations specifications need to include language similar to the following: “For any runway that has an instrument departure procedure of any kind, which specifies a required climb gradient, the carrier shall provide flight crews with specific ‘go/no-go’ performance data (all engines operating) that will account for actual weight, ambient temperature, and actual wind conditions, and which the flight crew can readily calculate before takeoff whether the aircraft can make good the specified climb gradient for the departure procedure to be used. Further, the carrier shall provide the flight crew with the departure profile to be flown to assure conformance with the assumptions contained in the performance data for that departure procedure.” Similar language should be included in standard operations specifications for climb-gradient missed approach procedures. Related to this would be a mandate to supervising FSDOs to allow carriers to include in their operations manual only those IFR departure procedures and SIDs for which the required performance data is generated and provided as a matter of operational dispatch to flight crews.

Finally, SIDs with close-in climb-crossing restrictions such as the MSP SIX should not be allowed by the FAA for a carrier to include in its operations manual unless the SID contains a specific climb gradient.

In the event the FAA decides to make the missed approach segment of instrument approach procedures steeper than today's ICAO standard 40:1 (2.5%), the same type of air-tight, specific performance data must be provided to flight crews for climb-gradient missed approaches as we propose be provided for climb-gradient departure procedures. Further, in the case of missed approach procedures, the carriers must be mandated to provide engine failure escape procedures from any missed approach procedure that is too steep to be flown in the event an engine fails at the beginning of the missed approach maneuver.

January 27, 1997

## CHIPS POSITION PAPER

### STABILIZED CONSTANT DESCENT APPROACHES

#### BACKGROUND:

The recent series of Controlled Flight Into Terrain Accidents at Bradley, Cali, Dubrovnic and the move toward using FMS and GPS to fly 3d RNAV approaches as well as NTSB recommendations is causing several airlines to at least consider adopting a stabilized continuous descent method of executing non precision approaches. The current popular method of flying non precision approaches is to descend to the charted minimum altitude published for the segment, level off and repeat the same procedure for each segment of the approach until hopefully sighting the field prior to the published missed approach point.

#### POINTS/POSITION

1. We believe the title should be “STABILIZED CONSTANT DESCENT METHOD” OF EXECUTING NON PRECISION APPROACHES. Every one understands the concept of the stabilized approach. We believe this method greatly contributes to the stabilization of non precision approaches. We believe the underlying philosophy should be to commence the approach and to fly a continuous descent so as to not get below published step down fixes until reaching the MDA (or MDA equivalent). At this point the aircraft is hopefully at a position to continue to descent to a landing on an ideal three degree glideslope just as one would fly an ILS. In the event that the aircraft arrived at MDA and the crew does not see the airport or is not in a position to transition to a stabilized landing a missed approach must be immediately executed. We believe that it is unsafe to attempt to establish a stabilized approach from level flight at minimums with landing gear and landing flaps extended. We consider the current method to be the equivalent of flying an ILS, leveling at minimums until you see the field then diving toward the runway in limited visibility conditions in an attempt to land in the FAR required touch down zone all without the benefit of a glide slope. If we were to attempt this on an ILS with a 200 ft DH with an air carrier inspector onboard we would be busted. Why is it expected that we should attempt this from a 250 ft MDA without the benefit of a glideslope?
2. Not all currently published approaches should be eligible for this method. Particularly those approaches whose missed approach point is located beyond the MAP need to be closely scrutinized and likely eliminated. Those approaches which do not qualify should be immediately identified to the appropriate FAA region so as to be redesigned as soon as possible to be compatible for this procedure.

3. The stabilized constant descent method should not be used until the appropriate approach chart contains the necessary information to note the appropriate approach angle and altitude information at each DME Fix or Timing point.
4. All pilots must be trained in the simulator on this method prior to executing non precision approaches in this manner.
5. Each Carrier should design their STABILIZED CONSTANT DESCENT METHOD so as to mirror their RNAV and ILS procedures as much as possible.
6. Each carrier needs to design their own version of the STABILIZED CONSTANT DESCENT APPROACH to meet their own unique culture and experience.

May 2, 1997

## ALPA CHIPS POSITION

### STABILIZED DESCENT NON PRECISION APPROACHES (NON FMS PROCEDURES)

#### BACKGROUND

The recent series of Controlled Flight Into Terrain Accidents at Bradley, Cali, Dubrovnic and the move toward using FMS and GPS to fly 3D RNAV approaches as well as NTSB recommendations is causing several airlines to at least consider adopting a stabilized descent method of executing non-precision approaches. The current popular method of flying non-precision approaches is to descend to the charted minimum altitude published for the segment, level off and repeat the same procedure for each segment of the approach until hopefully sighting the field prior to the published missed approach point.

#### POINTS/POSITION

1. We believe the title should be “STABILIZED DESCENT METHOD” OF EXECUTING NON PRECISION APPROACHES. Every one understands the concept of the stabilized approach. We believe this method greatly contributes to the stabilization of non-precision approaches. We believe the underlying philosophy should be to commence the approach and to fly a continuous descent so as to not descend below published step down fixes until reaching the MDA (or MDA equivalent). At this point, the aircraft is hopefully at a position to continue to descend to a landing on an ideal three degree glideslope just as one would fly an ILS. In the event that the aircraft arrived at MDA and the crew does not see the airport or is not in a position to transition to a stabilized landing, a missed approach must be immediately executed. We believe that it is undesirable and very difficult to establish a stabilized approach from level flight at minimums with landing gear and landing flaps extended. We consider the “fly level, dive to the next segment altitude” to be the equivalent of flying an ILS, leveling at minimums until you see the field then diving toward the runway in limited visibility conditions in an attempt to land in the FAR required touch down zone all without the benefit of a glide slope.
2. Not all currently published approaches should be eligible for this method. Particularly those approaches whose missed approach point is located beyond the MAP need to be closely scrutinized and likely eliminated. Those approaches which do not qualify should be immediately identified to the appropriate FAA region so as to be redesigned as soon as possible to be compatible with this procedure.

3. The stabilized constant descent method should not be used until the appropriate approach chart contains the necessary information to note the appropriate approach angle and altitude information at each DME Fix or Timing point.
4. All pilots must be trained in the simulator on this method prior to executing non precision approaches in this manner.
5. Each Carrier should design their STABILIZED DESCENT METHOD so as to mirror their RNAV and ILS procedures.
6. Each carrier needs to design their own version of the STABILIZED DESCENT APPROACH to meet their own unique culture and experience.

A description of this method needs to be included in the FAA Instrument Flying Handbook.

June 27, 1997

Ms. Patricia Lane  
Office of the Chief Council, AGC-200  
Federal Aviation Administration  
800 Independence Ave, SW  
Washington, DC 20591

Subject: Lack of Performance Data in Cockpit to Determine Climb Gradients

Dear Ms. Lane:

This concerns a legal and operational issue of increasing concern to ALPA with respect to FAA-specified climb gradients on Standard Instrument Departure Procedures (SIDs) and IFR Departure Procedures (IFRDP). We believe your office would be the proper lead office within the agency to address this issue. Our concern is the lack of an FAA mandate to compel FAR 121 and 135 air carriers to provide flight crews with a consistent, specific method for determining for every takeoff and departure whether an aircraft can comply with a specified climb gradient during normal operations.

Where SIDs or IFRDP are not free of obstacles along a 40:1 (2.5%) departure slope, the FAA generally publishes a required climb gradient value on the procedure. Further, at a meeting in Oklahoma City last April, AFS-420 advised us that the FAA is considering making some instrument approach missed approach procedures steeper than the international standard of 40:1.

Also, there are several departure procedure initiatives being considered by AFS-420, and related agency departments, the most notable of which are RNAV instrument departure procedure criteria and the movement of SID development responsibilities from field ATC facilities to AVN-100 in Oklahoma City. Although these are positive initiatives by the FAA, which ALPA would very much like to support, the issue of providing flight crews with the performance tools needs to first be resolved.

FAR 121.189 (and related sections of FAR 135) mandates that certain performance calculations be completed prior to each takeoff in revenue operations. These calculations assure that the airplane will either be able to takeoff or stop in the remaining runway in the event of the failure of an engine at the most critical point in the takeoff. The calculation also assures that the airplane will clear all obstacles along a narrow, hypothetical flight path to 1,500 feet above airport elevation, both with all engines operating and with an engine failure after takeoff commit speed.

But, this "FAR 121.189 performance calculation" does not address whether the aircraft, with all engines operating, can comply with a SID or IFRDP climb gradient that often goes far higher than 1,500 feet above airport elevation, and along a flight track far different than the academic, narrow flight path required by the FAR 121.189-type calculation. At some mountain airports, very steep climb gradients (3 to 4 times steeper than a 40:1 slope) extend for many miles and to elevations 3 to 4 times greater than 1,500 feet above the airport elevation.

In addition to obstacle clearance requirements of SIDs and IFRDPs, some SIDs specify climb gradients for ATC vertical traffic clearance purposes, but the flight crew does not

know what component of the FAA-specified gradient is for obstacles, if any, and what component of the specified gradient is for ATC vertical separation purposes.

Recently, Minneapolis Airport's primary SID was revised to require crossing a close-in DME ARC at 3,500 feet, msl, yet no climb gradient was specified in the procedure. We calculated the gradient on the most critical runway to be 550 feet per mile, a value which we suspect some heavy jet and commuter aircraft would be unable to meet. Another example is the Runway Coney Climb on the LGA SEVEN SID at New York La Guardia Airport -- it has a 900-foot per mile climb gradient requirement, which exceeds most, but certainly not all, aircraft performance capabilities.

Yet, the flight crew really does not know whether they can comply with FAA-specified climb gradients. Commercial transport aircraft have very wide ranges of takeoff and climb performance capabilities, which vary between type of aircraft, and vary within type of aircraft depending upon runway length, airport elevation, ambient air temperature, surface and winds aloft, and aircraft weight. The result, especially in aircraft that have takeoff weight ranges in the 50,000 to 100,000s of pounds range, are performance data that are extremely complex. Further, both the airframe manufacturers and airline companies, with the support of the FAA, consider these performance data to be confidential, proprietary data.

The airline provides the flight crews with tabular data that is tailored to the "FAR 121.189 performance calculation" requirement, thus crews are able to determine "go/no-go" capability for every takeoff, but only for runway capabilities and the hypothetical narrow takeoff flight path to 1,500 feet. There is no way the crew can relate these data to, say, the SEATTLE NINE FMS Departure, which may have several turns and a 600-foot-per-mile climb gradient for several thousand feet of altitude.

In the standard operations specifications issued to all carriers there is terse language in Paragraphs C56 and C57, which states, "*When a published takeoff minimum is greater than the applicable standard takeoff minimum and an alternate procedure (such as a minimum climb gradient compatible with aircraft capabilities) is not prescribed, the certificate holder shall not use a takeoff minimum lower than the published minimum.*"

The only clear meaning in the foregoing language is that the certificate holder cannot use FAR 91.175(f)(1) and (2) standard (or ops specs lower-than-standard) takeoff minimums on a runway that has, for instance "300 and 1" listed under takeoff minimums, and without a climb gradient. Most runways that have a climb gradient specify standard takeoff minimums with the climb gradient and a usually fairly high ceiling and visibility requirement for aircraft that do not comply with the climb gradient. Further, it is confusing whether the various minimums apply only to the airport's IFRDP or to any SID for that runway.

The AIM states that the IFRDP's minimums apply to any SID that can be used from that runway, unless a different minimum is set forth on the SID. But, the SID minimum, if any, is merely a part of a graphical/textual air traffic clearance, as opposed to the IFRDP's FAR 97 takeoff minimums.

In any case, air carrier flight crews are not provided with "go/no-go" performance data for any departure that has a climb gradient, whether it be an IFRDP or a SID. Not only do the crews need such performance data for every takeoff that involves a climb-gradient IFRDP or SID, they need to be provided by the airline with the flight profile required throughout the climb gradient portion of the IFRDP/SID in order to assure that calculated performance data is actually achieved.

We believe the standard operations specifications need to include language similar to the following: “For any runway that has an instrument departure procedure of any kind, which specifies a required climb gradient, the carrier shall provide flight crews with specific ‘go/no-go’ performance data (all engines operating) that will account for actual weight, ambient temperature, and actual wind conditions, and which the flight crew can readily calculate before takeoff whether the aircraft can make good the specified climb gradient for the departure procedure to be used. Further, the carrier shall provide the flight crew with the departure profile to be flown to assure conformance with the assumptions contained in the performance data for that departure procedure.” Similar language should be included in standard operations specifications for climb-gradient missed approach procedures. Related to this would be a mandate to supervising FSDOs to allow carriers to include in their operations manual only those IFRDPs and SIDs for which the required performance data is generated and provided as a matter of operational dispatch to flight crews.

Finally, SIDs with close-in climb-crossing restrictions such as the MSP SIX should not be allowed by the FAA for a carrier to include in its operations manual unless the SID contains a specific climb gradient.

In summary, we have this problem today because the FAA has not made a coordinated, concise effort to have these IFRDPs and SIDs fully comply with air carrier safety mandates. One department in the FAA develops the procedures, then another department—the carrier’s FSDO, perfunctorily allows the carrier to include the IFRDP or SID into the carrier’s operations manual, No where in these processes of FAA procedures development and FAA oversight of carriers’ required flight manuals does the FAA assure that flight crews of air carrier aircraft have a ready means of determining whether the aircraft can make the specified climb gradient.

We believe these legal, operational, and safety of flight issues need to be resolved as soon as possible. We would be pleased to meet with you, and appropriate representatives from AFS-200, AFS-400, AFS-420 and any other party you feel would be beneficial to work out the details.

Sincerely,

Tom Young, Chairman  
Charting and Instrument Procedures Committee

TY:amr

cc: Thomas E. Stuckey, Director, AFS-1  
Ronald Morgan, Director, AAT-1  
Katherine Hakala, Manager, AFS-200  
Quentin Smith, Manager, AFS-400  
James H. Enias, Manager, AFS-410  
Paul J. Best, Manager, AFS-420