GOVERNMENT/INDUSTRY AERONAUTICAL CHARTING FORUM
Instrument Procedures Group
April 18, 2006
HISTORY RECORD

FAA Control # 06-01-264

Subject: Uniform Standard for use of Climb Gradients on Public IAPs

Background/Discussion: The FAA recently charted a public SIAP at San Bernardino (KSBD, ILS Runway 6) (Exhibit #1 attached) with a 280-FPNM climb gradient (CG) specified to 5,000 feet MSL (4,009 feet above TDZ elevation). The only public precedent for this is a long-standing higher-than-standard missed approach slope for the Burbank (KBUR) ILS Runway 8 (Exhibit #2 attached). KBUR is charted in a fundamentally different manner than KSBD in that rate-of-climb is charted instead of CG, and reference is made to use the KBUR LOC Runway 8 (Exhibit #3 attached) in the event the ILS' missed approach cannot be complied with. Use of rate-of-climb as a procedural data value is archaic and inconsistent with FAA national policy. Some pilots convert CG to rate-of-climb others use AFM performance data and OEM profiles to assure CG compliance. Further, some pilots use a missed approach speed that is not available on the KBUR ILS 8 SIAP rate-of-climb table.

The CG on the new KSBD SIAP was granted by a Flight Procedures Standards Waiver, which asserts that an equivalent level of safety will be achieved simply by charting the CG. The waiver states, *"The climb gradient will be published on the procedure in feet per nautical mile which will permit users to calculate their climb requirements upon other factors."*. NBAA submits: (1) This does not provide an equivalent level of safety, (2) Does not comply with standard international practices (See Tarbes, France (LFBT) VOR/ILS Runway 20 [Exhibits #4 and #5 attached]), which similar such international procedures contain at least two line of minima, one predicated on standard missed approach surfaces, and the other (or others) based on steeper-than-standard missed approach surfaces; and, (3) Lacks reasonable guidance to pilots, which could be remedied by pertinent information via the AIM (preferred) or briefing attachment to the SIAP.

Recommendations: NBAA supports a uniform, consistent, and national policy for FAA implementation of missed approach climb gradients on all public SIAPs where the approach segments would support significantly lower minimums, and which are presently limited by obstacles within the missed approach segment that increase minimums in order to keep the standard MAS 40:1 clear. Where the GC would not exceed 300 feet per mile, there should be two lines of minima; one for 200 feet per mile (40:1 plus standard FAA additive), and one with lower minima predicated on the CG. Where a significant reduction in minima can be achieved with a CG greater than 300 feet per mile, but not to exceed 425 feet per mile, then 3 lines of minima should be published; i.e., 200 feet per mile, 300 feet per mile, and between 301-425 feet per mile.

The required AIM guidance should show an example of such dual and triple minima. The AIM guidance should explain that the pilot is responsible for assuring climb performance prior to departure (similar to pilot duties with CG ODPs or SIDs), and to reject higher-than-standard climb performance when climb performance is not assured. This type of AIM information, in conjunction with two (or where appropriate, three) lines of minima will assure an equivalent level of safety to today's operations and also increase operational capability by appropriate reductions in minimums on qualified SIAPs.

Comments: This affects all FAA SIAP construction criteria and the Aeronautical Information Manual.

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Date: April 8, 2006

KSBD/SBD EXHIBIT #1 JEPPESEN SAN BERNARDINO, CALIF

SAN BERNARDINO INTL 7 APR 06 (11-1) Eff 13 Apr ILS or LOC Rwy 6

BRIEFING STRIP™

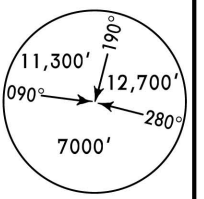
AWOS-3	SOCAL Approach (R)	SAN BERNARDINO INTL UNICOM
124.17	127.25	CTAF 122.97

LOC ISBD	Final Apch Crs	GS PETIS	ILS DA(H)	Apt Elev 1159′
109.3	057°	3118′(2027′)	1580′(489′)	TDZE 1091′

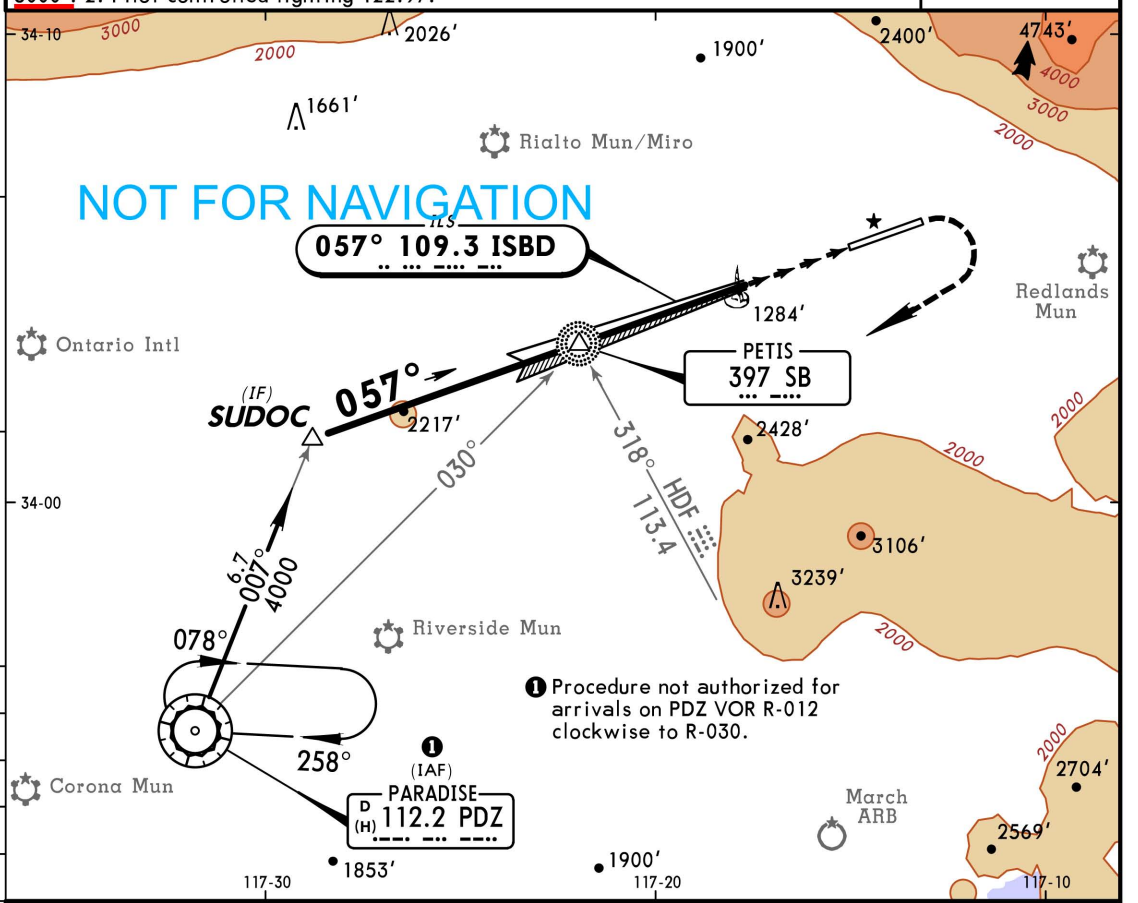
MISSED APCH: Climb to 2700′, then climbing RIGHT turn to 6000′ direct PDZ VOR and hold.

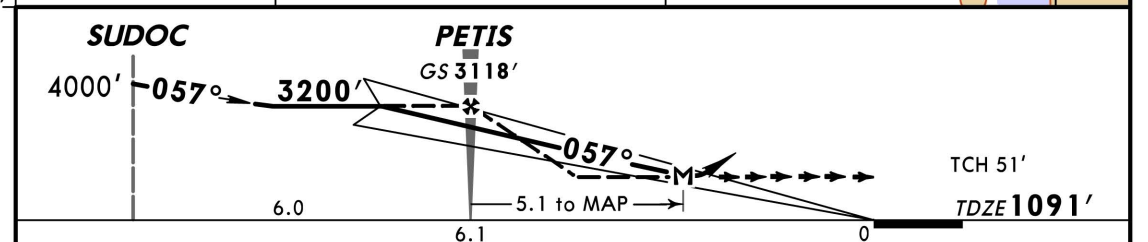
Alt Set: INCHES Trans level: FL 180 Trans alt: 18000′

1. Missed approach obstructions require a minimum climb gradient of 280′/NM to 5000′. 2. Pilot controlled lighting 122.97.



MSA SB NDB





Gnd speed-Kts	70	90	100	120	140	160
GS 3.00°	377	484	538	646	753	861
PETIS to MAP 5.1	4:22	3:24	3:04	2:33	2:11	1:55

PAPI-L	2700′	6000′ RT	D	PDZ 112.2

STRAIGHT-IN LANDING RWY 6

	ILS DA(H) 1580′(489′)	LOC (GS out) MDA(H) 1640′(549′)	Max Kts	CIRCLE-TO-LAND Not Authorized North of Rwy 6-24 MDA(H)
A	1¾	1	90	1640′(481′)-1¾
B			120	
C		1½	140	1660′(501′)-1¾
D		1¾	165	1820′(661′)-2

AMEND 1 TERPS

CHANGES: Procedure.

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KBUR/BUR EXHIBIT #2 JEPPESEN

HOPE

3 JUN 05 (11-1)

BURBANK, CALIF
ILS Rwy 8

D-ATIS	Arrival via FIM/PMD VOR only	SOCAL Approach (R)	BURBANK Tower	Ground	Helicopter
134.5	135.12	134.2	118.7	123.9	132.32

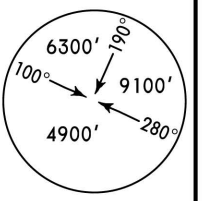
BRIEFING STRIP™

LOC IBUR	Final Apch Crs	GS BUDDE	ILS DA(H)	Apt Elev 778′
109.5	076°	2752′ (2025′)	977′ (250′)	TDZE 727′

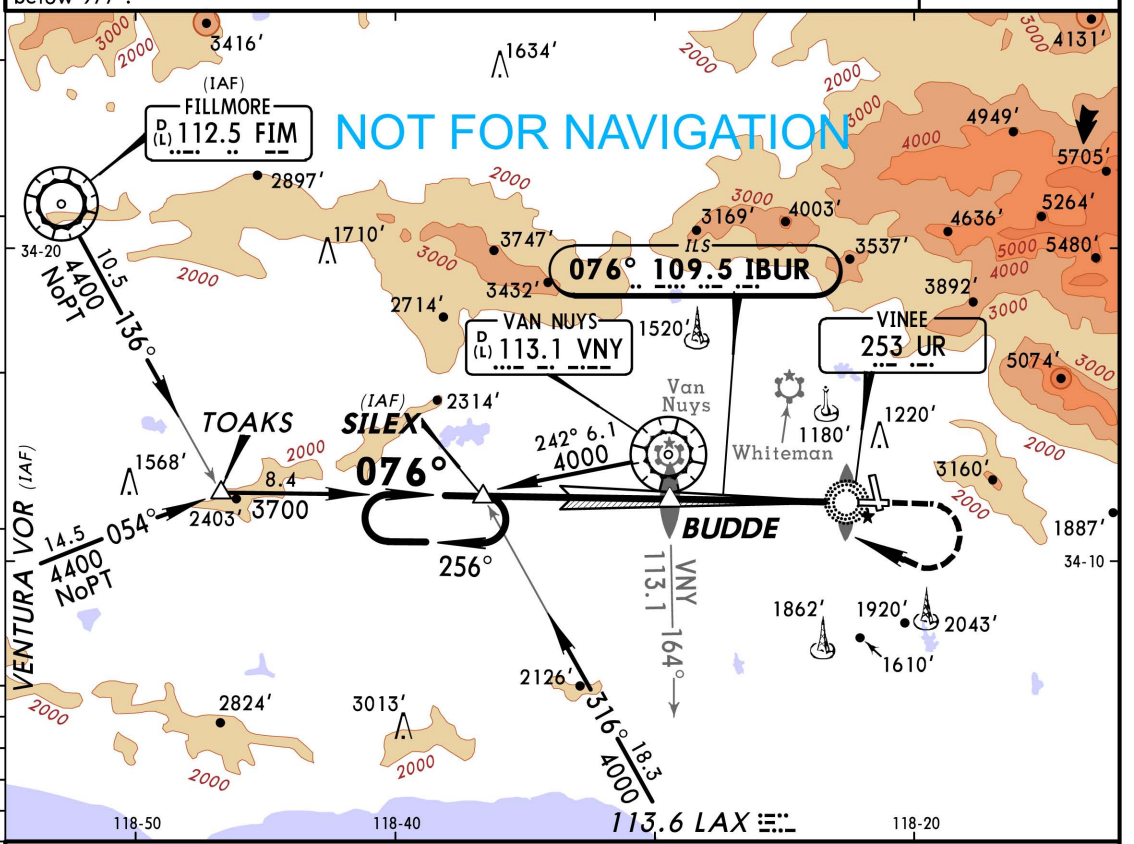
MISSED APCH: Climb to 1500′ then climbing RIGHT turn to 4000′ direct VNY VOR then outbound via VNY VOR R-242 to SILEX INT and hold. Note missed approach climb requirements: Terrain in missed approach area requires a rate of climb of at least 430′ per min/100 kts; 640′ per min/150 kts; 850′ per min/200 kts; no wind conditions; if unable to meet rate of climb, see LOC Rwy 8 (11-2).

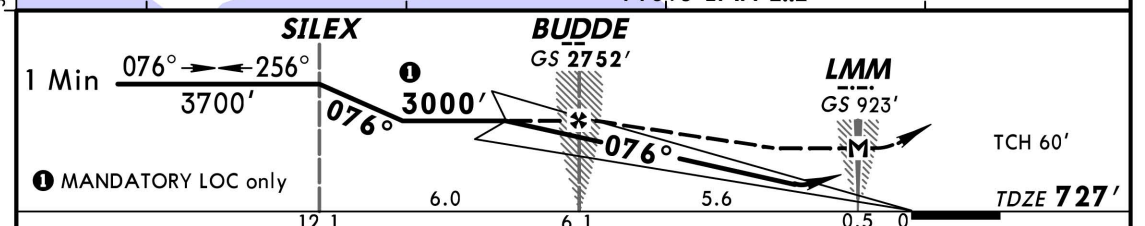
Alt Set: INCHES Trans level: FL 180 Trans alt: 18000′

1. ILS unusable from UR LMM inbound. 2. Autopilot coupled approaches not authorized below 977′.



MSA UR LMM





Gnd speed-Kts	70	90	100	120	140	160
GS 3.00°	377	484	538	646	753	861
MAP at LMM or BUDDE to MAP 5.6	4:48	3:44	3:22	2:48	2:04	2:06

MALSR PAPI | 1500′ | 4000′ RT | D | VNY 113.1

TERPS AMEND 35

STRAIGHT-IN LANDING RWY 8

	ILS DA(H) 977′ (250′) FULL	ILS DA(H) 977′ (250′) RAIL or ALS out	LOC (GS out) MDA(H) 1140′ (413′) RAIL out	LOC (GS out) MDA(H) 1140′ (413′) ALS out
A	RVR 50 or 1		RVR 50 or 1	
B				
C			RVR 60 or 1¼	
D				

CIRCLE-TO-LAND

Not Authorized Northeast of Apt Between Extended Centerlines of Rwys 15-33 & 8-26.

Max Kts	MDA(H)
90	1220′ (442′)-1
120	1300′ (522′)-1
140	1300′ (522′)-1½
165	1440′ (662′)-2

CHANGES: Charted obstructions.

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KBUR/BUR EXHIBIT #3 JEPPESEN
HOPE 3 JUN 05 (11-2)

BURBANK, CALIF
LOC Rwy 8

BRIEFING STRIP™

D-ATIS Arrival via FIM/PMD VOR only		SOCAL Approach (R)	BURBANK Tower	Ground	Helicopter
134.5	135.12	134.2	118.7	123.9	132.32

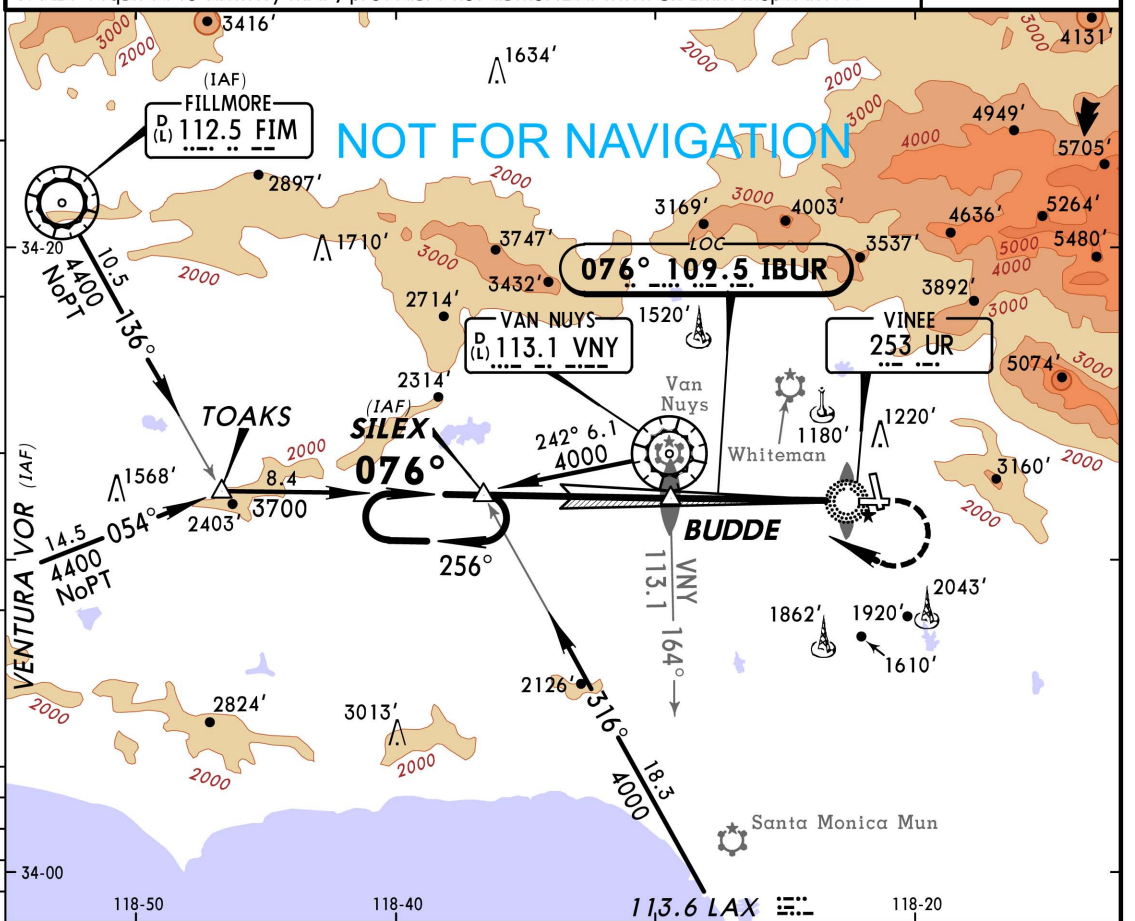
LOC IBUR	Final Apch Crs	Mandatory Alt BUDDE	MDA(H)	Apt Elev 778′
109.5	076°	3000′ (2273′)	1540′ (813′)	TDZE 727′

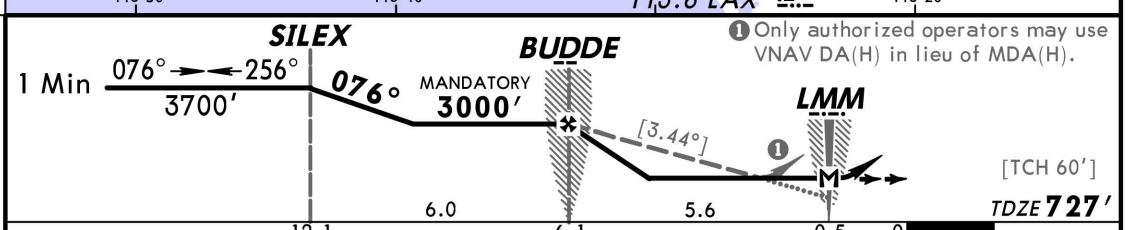
MISSED APCH: Climb to 1800′ then climbing RIGHT turn to 4000′ direct VNY VOR , then outbound via VNY VOR R-242 to SILEX INT and hold.

Alt Set: INCHES Trans level: FL 180 Trans alt: 18000′

1. ADF required to identify MAP; procedure not authorized when UR LMM inoperative.

MSA UR LMM: 6300′ (190°), 9100′ (280°), 4900′ (100°)





❶ Only authorized operators may use VNAV DA(H) in lieu of MDA(H).

Gnd speed-Kts	70	90	100	120	140	160
Descent angle [3.44°]	426	548	609	730	852	974
MAP at LMM						

MALSR PAPI 1800′ 4000′ RT D VNY 113.1

STRAIGHT-IN LANDING RWY 8

MDA(H) 1540′ (813′)

TERPS	RAIL out	ALS out
A	RVR 50 or 1	
B	RVR 60 or 1¼	
C	2½	
D	2¾	

CIRCLE-TO-LAND

Not Authorized Northeast of Apt Between Extended Centerlines of Rwys 15-33 & 8-26.

Max Kts	MDA(H)
90	1540′ (762′)-1
120	1540′ (762′)-1¼
140	1540′ (762′)-2½
165	1540′ (762′)-2¾

AMEND 2C

CHANGES: Charted obstructions.

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LFBT/LDE EXHIBIT #4 JEPPESEN
LOURDES-PYRENEES 23 JAN 04 (11-1)

TARBES, FRANCE
❶ VOR ILS Rwy 20

BRIEFING STRIP™

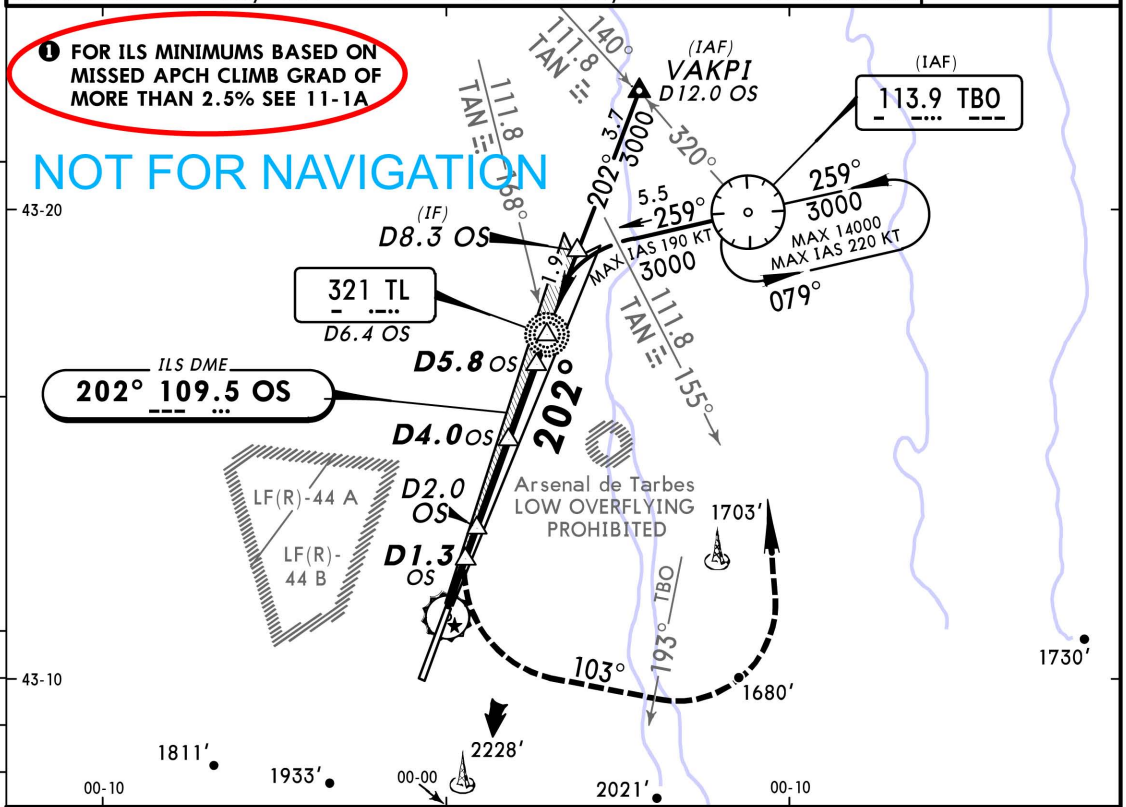
*ATIS	*PYRENEES Approach	*LOURDES Approach	*LOURDES Tower	*Ground
125.95	121.17	120.3	119.05	121.8

LOC OS	Final Apch Crs	GS D5.8 OS	ILS DA(H)	Apt Elev 1260′
109.5	202°	3000′ (1830′)	Refer to Minimums	RWY 1170′

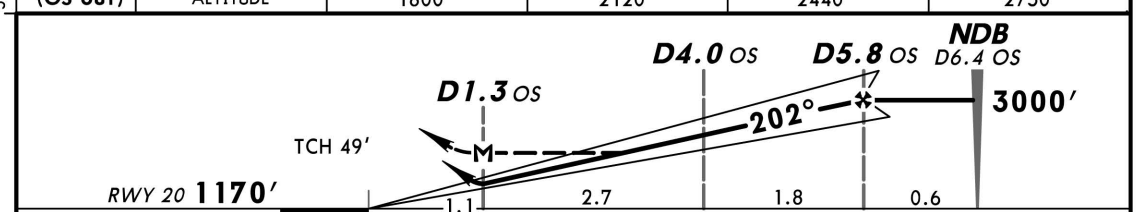
MISSED APCH: When the acft is established on climb, turn LEFT (MAX IAS 185 KT) onto 103°. At 4000′, after passing R-193 TBO turn LEFT to return to TBO VOR, or as directed.
Do not turn before passing D2.0 OS. If necessary, start level acceleration at 2600′ and turn LEFT to return to TBO VOR at 3000′.

Alt Set: hPa | Rwy Elev: 42 hPa | Trans level: By ATC | Trans alt:5000′

3000′ 089° 269° 12,200′
MSA TBO VOR



LOC (GS out)	OS DME	2.0	3.0	4.0	5.0
	ALTITUDE	1800′	2120′	2440′	2750′



Gnd speed-Kts	70	90	100	120	140	160
ILS GS 3.00° or LOC Descent Gradient 5.2%	377	485	539	647	755	862
MAP at D1.3 OS						

HIALS REIL

Refer to Missed Apch above

JAR-OPS STRAIGHT-IN LANDING RWY 20

ILS DA(H)	LOC (GS out)❶ MDA(H)
A: 1610′ (440′) C: 1630′ (460′)	A: 1620′ (450′) C: 1640′ (470′)
B: 1620′ (450′) D: 1640′ (470′)	B: 1630′ (460′) D: 1650′ (480′)

	ILS FULL	ILS ALS out	LOC (GS out)	LOC ALS out
A	RVR 800m	RVR 1200m	RVR 900m	RVR 1500m
B			RVR 1200m	
C				RVR 2000m
D			RVR 1600m	

CIRCLE-TO-LAND❷

Prohibited West of runway

Max Kts	DAY MDA(H)	DAY VIS	NIGHT
110	2140′ (970′)	1500m	NOT AUTH
135	2540′ (1370′)	1600m	
180	2640′ (1470′)	2400m	
205	3100′ (1930′)	3600m	

PANS OPS 3

❶ With OS DME. ❷ Circling height based on rwy 20 thresh elev of 1170′.

CHANGES: Communications.

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ILS RWY 20 MINIMUMS

BASED ON MISSED APCH CLIMB GRADIENT
OF MORE THAN 2.5 %

MISSED APCH CLIMB GRADIENT 4.5%

JAR-OPS

DA(H) A: **1450'** (280') B: **1460'** (290') C: **1470'** (300') D: **1480'** (310')

	FULL	ALS out
A	RVR 650m	RVR 1200m
B		
C		
D	RVR 800m	

MISSED APCH CLIMB GRADIENT 4.0%

JAR-OPS

DA(H) A: **1520'** (350') B: **1530'** (360') C: **1540'** (370') D: **1550'** (380')

	FULL	ALS out
A	RVR 800m	RVR 1200m
B		
C		
D		

MISSED APCH CLIMB GRADIENT 3.0%

JAR-OPS

DA(H) A: **1580'** (410') B: **1590'** (420') C: **1600'** (430') D: **1610'** (440')

	FULL	ALS out
A	RVR 800m	RVR 1200m
B		
C		
D		

NOT FOR NAVIGATION

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INITIAL DISCUSSION (Meeting 06-01): New issue introduced by Rich Boll, NBAA. This issue was prompted upon NBAA review of the new San Bernardino (KSBD) ILS RWY 6 public SIAP that specifies a climb gradient (CG) for the missed approach. The Burbank (KBUR) ILS RWY 8 SIAP is the only other public approach procedure with a higher than standard missed approach slope. However, the KBUR missed approach performance requirement is specified as "rate-of-climb". NBAA supports that climb requirements should be standardized as a climb gradient in feet per NM (ft/NM). NBAA also supports publishing up to three lines of minima depending on the CG requirements including a line to accommodate the standard 200 ft/NM. Tom Schneider, AFS-420, stated that draft guidance for 8260.19D will specify ft/NM and a line of minima to accommodate the standard 200 ft/NM climb. He asked whether the three-lines of minima suggestion would affect charting. Ted Thompson, Jeppesen, responded that it probably would. The JAA harmonization effort will require changes and introducing additional complexities could possibly cause minima to be placed on a separate page as is depicted on the Tarbes, France VOR ILS RWY 20 IAP attached to the NBAA paper. Kevin Comstock, ALPA, added that ALPA has concerns that this could make charts more complex. He recommended resolving charting and pilot training issues prior to implementation. Bill Hammett, AFS-420 (ISI) questioned whether a ft/NM CG or rate-of-climb was preferred by the group. The consensus was ft/NM. Ted also noted that the climb gradient notes on the KBUR and KSBD charts are in different locations due to the 8260 source. Ted believes the information should be placed in the briefing strip because under the Volpe format, the briefing strip was planned as a standard place for equipment/procedural notes that apply to the whole IAP to support a pre-approach briefing. Tom replied that the Burbank approach was developed before Order 8260.19 specified note locations. Draft Order 8260.19D will require the note in the briefing strip. Kevin also suggested the issue title be changed to "Missed Approach Climb Gradients". Tom agreed to coordinate this change with NBAA and take the issue for study within AFS-420.
ACTION: AFS-420

MEETING 06-02: Tom Schneider, AFS-420, briefed the policy in Order 8260.19 is to specify a Ft/NM gradient vice a rate of climb. Tom stated that he had spoken to Brad Rush, AVN-321, to request that all currently published procedures with a climb gradient required missed approach be amended to reflect Ft/NM. Danny Hamilton, AJW-321, took the IOU to follow up on amendments at San Francisco and Burbank. Ted Thompson, Jeppesen, stated that the wording is not as important as where the 8260 form specified the note be charted. Tom provided the background on specifying "Chart Note", Chart Planview Note", or "Chart Profile Note" on the 8260-series forms. The rationale behind the policy is to clearly identify the procedure designer's intent to the cartographers and standardize chart note placement. The NFPG will follow up procedure amendments and AFS-420 will track policy changes.
ACTION: AJW-321 and AFS-420.

MEETING 07-01: Tom Schneider, AFS-420, briefed the policy to specify a Ft/NM gradient vice a rate of climb has been included in Order 8260.19D. Tom stated that he had spoken to Brad Rush, AJW-321, to request that all currently published procedures with a climb gradient (CG) required missed approach be amended to reflect Ft/NM. Danny Hamilton, AJW-321, took the IOU at the last meeting to follow up on amendments at San Francisco and Burbank; however, the changes have not yet been published. Brad Rush briefed that both procedures are in work for amendment to revise the notes. Brad added that the change will require re-processing the associated waiver(s). Tom also briefed that the NBAA recommendation to allow up to 3 lines of minimums, each with a lower DA/MDA and a

separate CG, was discussed at the AFS-400 Technical Review Board with no consensus reached. It was proposed that AFS-410 take the issue to AFS-400 for a decision. Wally Roberts, NBAA, recommended retaining a single climb gradient pending resolution. Brad Rush, AJW-321, noted that 3 lines of minima will greatly increase workload as the missed approach for each DA/MDA would have to be evaluated, flight inspected, and require NOTAM action. Frank Flood, ACPA, recommended keeping the charts as simple as possible. Tom proposed two lines of minima, one to accommodate a standard 200 ft/NM CG and one to accommodate a single CG up to a maximum of 425 Ft/NM. Rich Boll, NBAA, asked where the CG should be depicted. Tom responded that notes are driven by Order 8260.19. A missed approach CG note should be prefaced by "Chart Note", which indicates it should be placed in the briefing strip. ACTION: AJW-321 and AFS-420.

MEETING 07-02: Tom Schneider, AFS-420, briefed the consensus of the AFS-400 Technical Review Board (TRB) was to publish only one line of minima that requires a non-standard climb gradient (CG) to support lower minimums. . A line of minima will also be published to support the 200 Ft/NM standard climb gradient. All TRB participants agreed that the NBAA recommendation to publish three lines of minimums would create excessive chart clutter and increase NFPO workload. Jeff Struyk, NGA, stated that his office is against multiple lines of minima with differing CGs. NGA prefers separate procedure charts. Rich Boll, NBAA, asked what would be the maximum allowable CG. Tom replied 425 Ft/NM. Kevin Comstock, ALPA, stated that Ft/NM is satisfactory for FAA, and requested what Jeppesen would chart. Ted Thompson, Jeppesen, agreed to provide an answer to ALPA, noting that it would probably agree with the procedure source. Ted noted that Jeppesen does publish a conversion table similar to NACO. Brian Townsend, ALPA, stated that having the table on the chart provides the pilot a quick, easy reference. A Ft/NM CG note will require aircrew training. Brad Rush, AJW-321, briefed that procedure amendments are in work for San Francisco (scheduled for February, 2008) and Burbank (scheduled for June, 2008. He agreed to track the amendments until published. ACTION: AJW-321.

MEETING 08-01: Brad Rush, AJW-321, briefed that all work has been completed for the requested procedure amendments. San Francisco was amended in February, 2008. The amendment for Burbank, which was scheduled for June, has been slipped to July 31, 2008. Kevin Comstock, ALPA, asked how Jeppesen would depict the information. Ted Thompson, Jeppesen, replied they chart procedures as indicated on the 8260-series form. Brad requested the issue be closed and Rich Boll. NBAA, agreed. Item Closed.