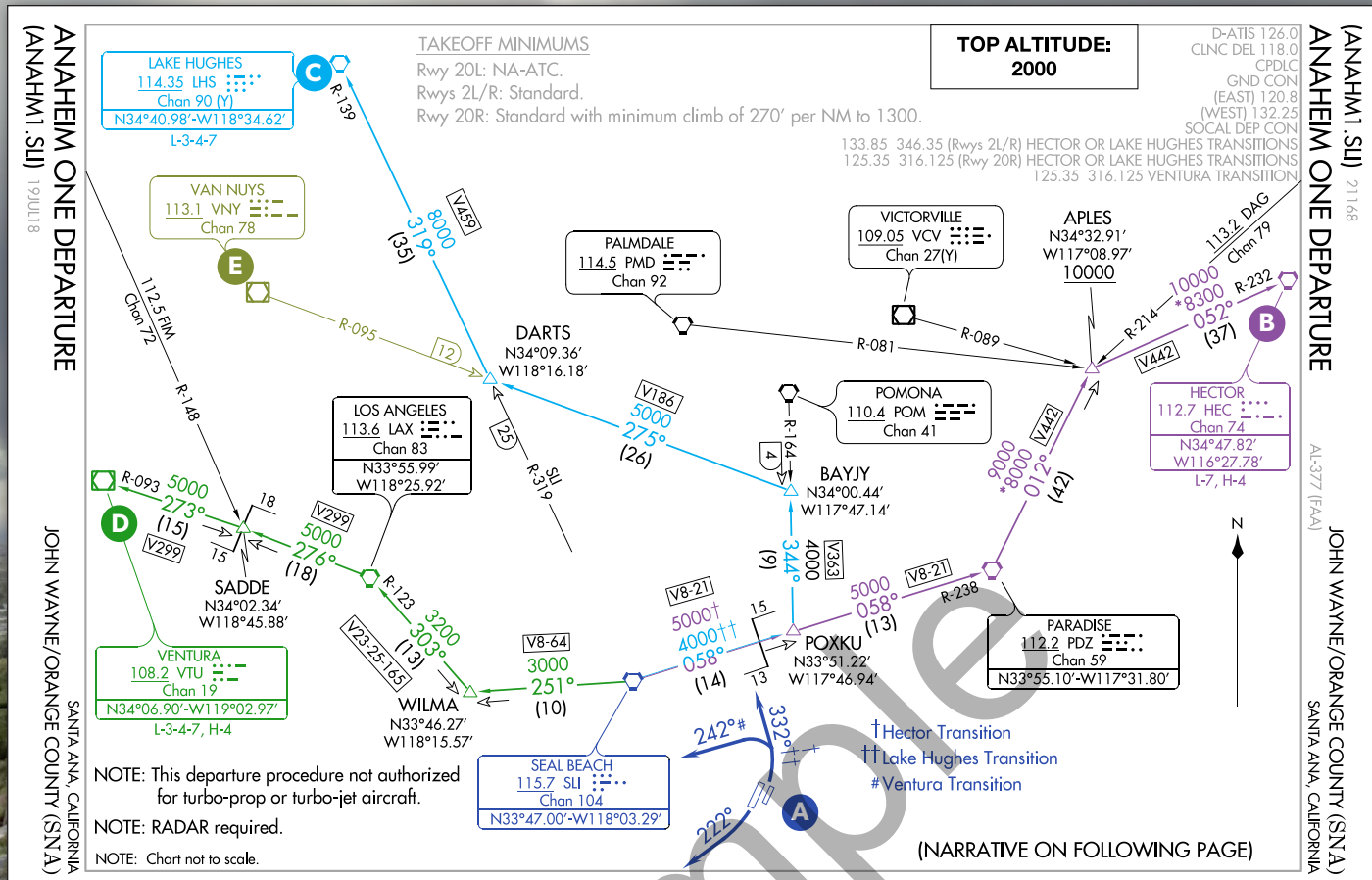


Fly a Standard Instrument Departure (SID)



SIDs can strike fear into the hearts of the uninitiated. Calm yourself. They're here to help.

- A** TAKEOFF RUNWAY 20R: Turn right heading 222° for vectors to SLI VORTAC, thence. . . . TAKEOFF RUNWAYS 2L/R (HECTOR or LAKE HUGHES TRANSITION): Turn left heading 332° for vectors to SLI VORTAC, thence. . . . TAKEOFF RUNWAYS 2L/R (VENTURA TRANSITION): Turn left heading 242° for vectors to LAX VORTAC, thence. . . . on (transition) or (assigned route). Maintain 2000 and expect filed altitude 10 minutes after departure.
- B** HECTOR TRANSITION (ANAHM1.HEC): From over SLI VORTAC on SLI R-058 and PDZ R-238 to PDZ VORTAC, then on PDZ R-012 to APLES, then on HEC R-232 to HEC VORTAC.
- C** LAKE HUGHES TRANSITION (ANAHM1.LHS): From over SLI VORTAC on SLI R-058 and PDZ R-238 to POXKU, then on POM R-164 to BAYJY, then on VNY R-095 to DARTS, then on LHS R-139 to LHS VORTAC.
- D** VENTURA TRANSITION (ANAHM1.VTU): From over SLI VORTAC on SLI R-251 to WILMA, then on LAX R-123 to LAX VORTAC, then on LAX R-276 to SADDE, then on VTU R-093 to VTU VOR/DME.

1. Replace trepidation with enthusiasm!
2. Find the right SID.
3. File a flight plan, maybe with a transition.
4. Copy a clearance.
5. Navigate the appropriate route.
6. Fly the correct altitudes.
7. Manage a vector or shortcut.

Replace Trepidation With Enthusiasm!

Standard Instrument Departures (SIDs) aren't just for jets. They can be assigned to light GA aircraft, particularly in busy airspace or a Class C primary airport. Add the complex appearance of SID charts and a fear of SIDs is born. Like it or not, SIDs are essential for organizing and optimizing complex traffic flows and clearance delivery.

Putting "No SIDs" in your flight plan remarks may make your job harder. Without a SID, your clearance from John Wayne (KSNA) to Santa Maria

(KSMX) might be: "N236PW is cleared to the Santa Maria airport via fly heading 222, vectors Seal Beach, Seal Beach 251° radial to WILMA, Los Angeles 123° radial to Los Angeles, Los Angeles 276° radial to SADDE, Ventura 093° radial to Ventura, then as filed ..."

Yikes. Wouldn't it be better for everyone if your clearance was simply: "N236PW is cleared to the Santa Maria airport via the Anaheim 1 Departure, Ventura transition, then as filed ..."

SIDs simplify your life. Sometimes the SID just contains your departure frequency and altitude, a

ForeFlight's Route Advisor for KSNA to KSMX shows the ANAHM 1 with the VTU transition has been assigned to pistons 40 times at altitudes 6000 to 15,000 feet MSL. It's a safe bet you'll get it. Congratulations, you just reduced 12 SIDs to one!

lost comm procedure, and nearby navaids arranged for easy reference.

SID charts get complex when multiple routes (transitions) are depicted. If you mentally erase all but the one you're flying (or use an EFB to annotate it) the chart simplifies. And just like ODPs, the text spells out exactly what you need to do.

Find the Right SID

The list of SIDs at KSNA is intimidating—there are 12 of them. How can you know which one to file or expect? You could just file the route you want and let ATC assign a SID, but it's helpful to know what to prepare for. And if several SIDs could work, you might have a preference.

First, eliminate any SIDs that go in the wrong direction. ATC could, and sometimes does, assign a

ATC CLEARED		
HHERO3 IKAYE RZS KOAKS	1h30m	
6,000' 173 nm	18 g	IFR
Cleared today, 78x total		
TurboProp, Jet (16,000' to FL300)		
ANAHM1 VTU RZS	1h19m	
6,000' 151 nm	16.2 g	IFR
Cleared last Sunday, 40x total		
Piston (6,000' to 15,000')		
SXC V208 VTU RZS	1h31m	
6,000' 176 nm	18.3 g	IFR
Cleared over a week ago, 25x total		
TurboProp, Jet (12,000' to 14,000')		

SID that initially goes in the “wrong” direction. That’s for traffic, airspace, or terrain. They’ll send you on course as soon as it’s possible. However, in the preparation stage, look for SIDs that go the way you want.

Many SIDs are restricted by aircraft type. You can ignore “turbojets only” if you fly a piston. This information appears on the chart notes and some EFBs.

Suppose you didn't find any previously cleared routes. ForeFlight's Procedure Advisor shows all KSNA's SIDs and every transition overlaid on a map. You can easily eliminate ones going in the wrong direction or that only apply to other aircraft types.

Finally, consider runways, climb gradients, altitudes, and speed restrictions. Some SIDs are only used from certain runways. If the runway isn't in use, neither is that SID. If you can't meet a published minimum climb gradient, you can't accept that SID. A SID with a 17,000-foot MEA and a speed restriction of 200 knots won't be assigned to your Skyhawk.

File a Flight Plan, Maybe With a Transition

The Anaheim 1 SID includes a common portion with headings and radar vectors **A** (page 36). These all go to SLI (unless you're departing Runways 2L/R and flying the Ventura transition, in which case you'll get vectors to the LAX VOR, bypassing SLI and WILMA). After SLI, the SID branches off into three transitions: Hector (HEC) **B**, Lake Hughes (LHS) **C**, and Ventura (VTU) **D**.

You can file a transition or just the common portion of a SID. For a transition, use the filing code at the beginning of the text description. That's "ANAHM1.VTU" for the Anaheim 1 SID, with the VTU transition **D**. If you wish to fly only the common portion of the SID, you can file "ANAHM1.SLI" as shown above the chart title. If you add the SID to the route in your EFB, the proper codes should be inserted if you file using that EFB.

This SID chart graphic may give the impression that there are more than three transitions. What about Van Nuys (VNY), for example **E**? The VNY VOR is charted because it's used for V186 between BAYJY and DARTS. You can tell by the absence of course, altitude, and distance on the section west of DARTS that it isn't meant to be flown all the way to VNY. Similarly, VCV is charted because its 089° radial helps identify APLES, but that radial isn't meant to be flown.

Suppose you wanted to fly the VTU transition, but get off the bus, so to speak, at LAX instead. "ANAHM1.LAX" is not a valid way to file the SID, so you're somewhat out of luck. You could instead file "ANAHM1.SLI," followed by manually entering WILMA and LAX.

Copy a Clearance

Unlike ODPs, you must have explicit clearance to fly a SID. If a SID is part of your route it will always be spelled out in the clearance, even if the rest of the clearance is "as filed." The altitude portion of the

clearance could be standard, like "maintain 2000, expect 5000, 10 minutes after departure." Or a clearance to "climb via the SID" on SIDs with altitude restrictions brings those restrictions into play. Understand the variations on climb instructions, since flying wrong altitudes is a common error.

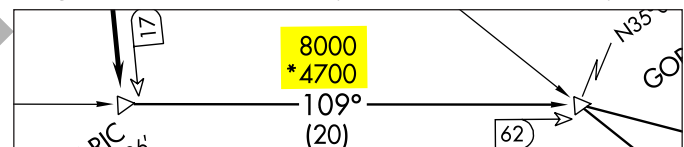
Navigate the Appropriate Route

Be sure to read the procedure text—don't just rely on the graphic or the GPS. If you only look at the graphic for the Anaheim 1 SID, it's not clear what you should do after the initial assigned heading. The text clarifies that you should expect vectors to the SLI VOR.

All modern IFR GPS navigators include SIDs in the navigation database, and the GPS can be used in lieu of ground-based nav aids when flying non-RNAV SIDs. When you load a SID, verify that the correct runway and transition are selected. Then, scan the sequence of waypoints and ensure you understand how to fly it.

Fly the Correct Altitudes

This is where many pilots go wrong. There are lots of altitudes associated with SIDs, and it's not obvious which ones you should fly. Let's break it down, beginning with some altitudes you're *not* meant to fly.



The altitudes charted above each segment are MEAs, and the ones with asterisks are MOCAs. As on IFR Low Altitude Enroute Charts, MEAs ensure obstacle clearance and navigation, although for traffic and communications reasons they're often higher than obstacles and navigation alone would require. MOCAs are for obstacle clearance alone. In the context of SIDs, these are for planning and emergency use only. You're not meant to fly them.

So what altitudes are you meant to fly? Simply, fly what ATC tells you to. If you're cleared to "climb and maintain 3000," then do that. An instruction to "expect 5000 in 10 minutes" is for lost communications, plus a notice of what's likely to come next.

This gets more complicated when ATC tells you to "Climb via the SID." That brings the published climb restrictions into play. Most instrument pilots are pretty comfortable with "at or above" altitudes

CLIMB INSTRUCTIONS ON A SID

The HAWWC 3 SID has published altitude restrictions: at or above 4000 feet at PIJIN, at or above 5000 feet at HAWWC, and at 6000 feet at WROBN. (They're all birds, get it?) It also has a top altitude of 6000 noted in the top left corner. If the SID is in your clearance, you'll fly that route, unless ATC vectors you off the SID.

However, there are different altitude instructions you might get in your clearance.

"Climb and maintain 5000"

Just do it. Climb to 5000 feet and level off there without any intermediate level-offs. Do not continue to the top altitude unless instructed to do so. None of the restrictions are in play.

"Climb via SID"

Climb to the published top altitude of 6000 feet while meeting the restrictions along the way at PIJIN, HAWWC, and WROBN. When you check in with Departure after takeoff, tell them you're "at <current altitude> climbing via the HAWWC 3."

"Climb via SID except maintain 5000"

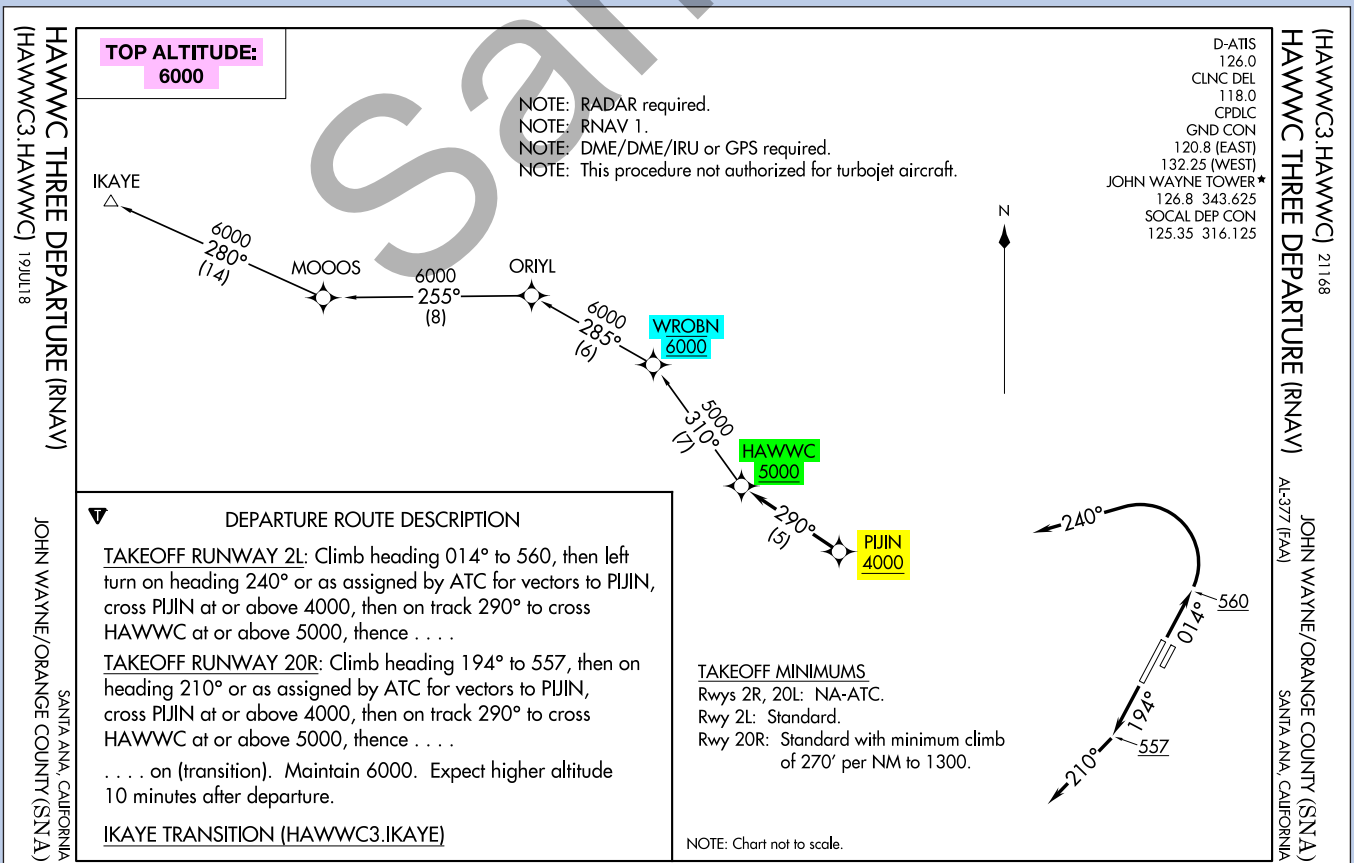
The "except" phraseology amends the top al-

titude to 5000. You're still climbing via the SID, so you need to comply with restrictions at PIJIN and HAWWC, but you don't climb beyond 5000 feet. This phraseology is not intuitive, but it helps to imagine that the word "except" as shorthand for "except amend the top altitude to ..." When you check in with Departure after takeoff, tell them you're "at <current altitude> climbing via the HAWWC 3— except maintaining 5000."

Suppose your clearance was to climb via the SID, but after takeoff Departure tells you to "climb and maintain 6000." That clearance supersedes any previous climb instruction, and you should simply climb to 6000 feet. You no longer need to worry about the SID's altitude restrictions.

If ATC later wants you to comply with the restrictions, they'll restate the "climb via SID" instruction. Similarly, if you're vectored off the SID, the crossing restrictions no longer apply.

On a related note, speed restrictions should be considered part of the lateral portion of the SID. They're always in play, regardless of the climb clearance you've been assigned.





that have a line below: 2500. Watch out for restrictions to cross “at or below” (line above: 2500) and “at” (line above and below: 2500). These can come up shockingly fast as you climb on departure.

Climb via SID also requires understanding the top altitude. This is highest you’ll climb on the SID after complying with other altitude instructions on the way. Often, the top altitude box simply says, “Assigned by ATC.” (See “Climb Instructions on a SID” on page 39 for ATC-assigned altitude restrictions in context.)

For legs that involve a climb to an altitude (and every procedure requires climbing to at least 400 feet AGL) the GPS will suspend sequencing. If your GPS has a barometric altitude input, it may automatically unsuspend when reaching the target altitude. If not, you’ll need to manually unsuspend. Similarly, vector and heading legs may need to be manually unsuspended at the appropriate time, such as when ATC clears you to PIJIN. Sometimes you’ll see “MANSEQ” where “manual sequencing” is required.

Manage a Vector or a Shortcut

SIDs are primarily designed for efficient traffic flow. However, the circuitous route of a SID may become unnecessary after takeoff and you may be given a shortcut. Be ready to accept direct to a fix, or to activate and intercept a particular leg of the SID.

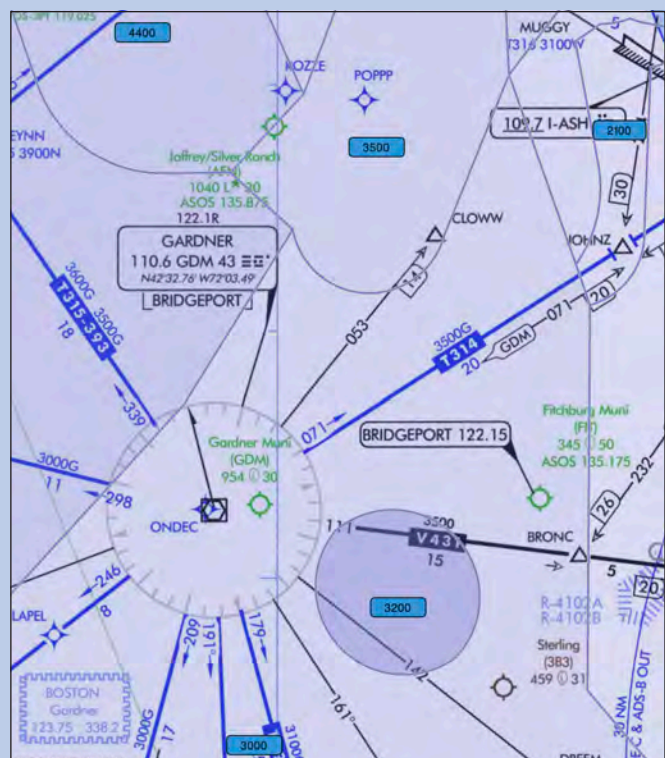
Similarly, you might be vectored off the SID for traffic reasons, and later vectored to rejoin it. When you leave the SID, any altitude and speed restrictions no longer apply. If you had been told to “climb via SID” a vector off the SID should be accompanied by a new altitude assignment. When rejoining, ATC must restate “climb via SID” if that’s what they want.

MINIMUM INSTRUMENT ALTITUDE AND MINIMUM VECTORING ALTITUDE

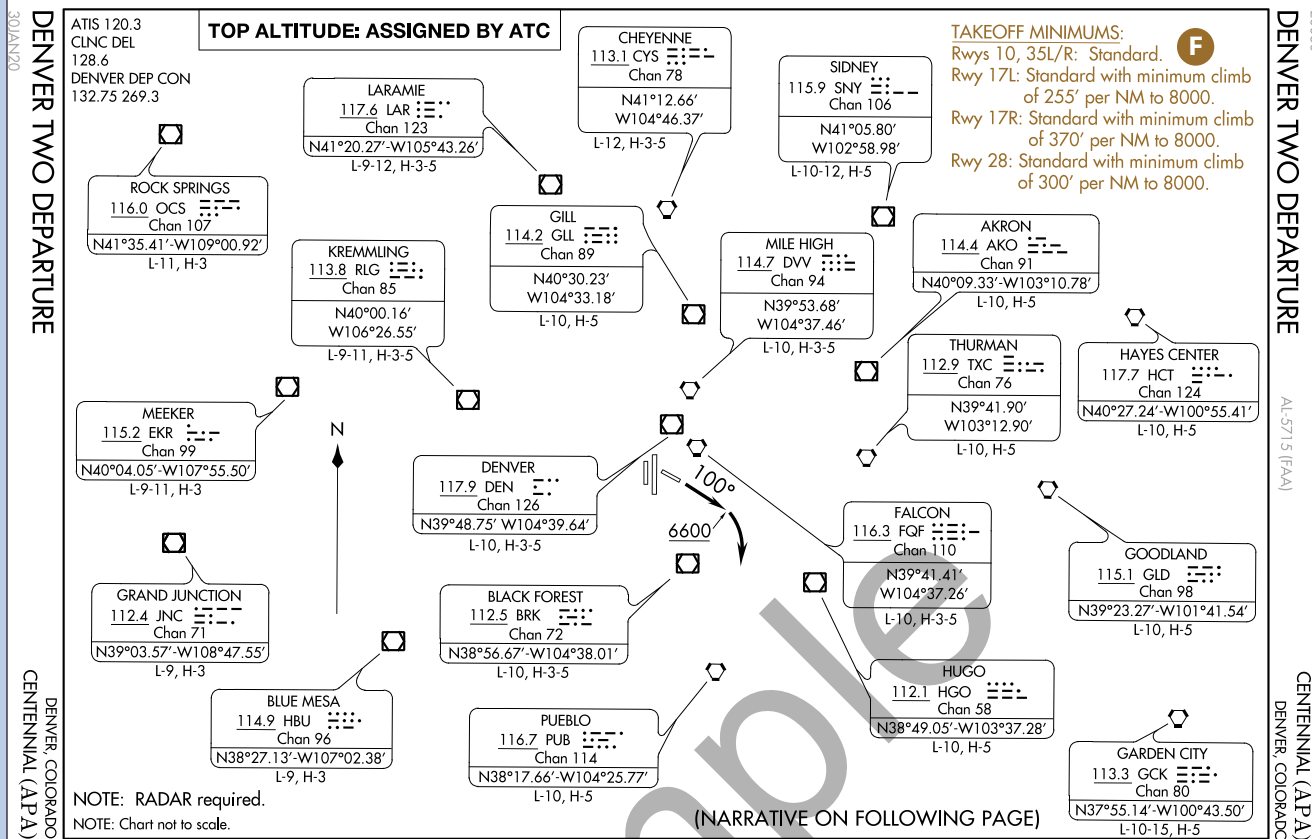
The terms Minimum Instrument Altitude (MIA) and Minimum Vectoring Altitude (MVA) are often used interchangeably and mean roughly the same thing. They represent safe altitudes for vectoring aircraft in defined sectors of airspace.

When an ARTCC uses them they’re called MIAs. For TRACONs they’re MVAs. You can find MIA and MVA charts on the FAA’s website, but not geo-referenced so they’re not too helpful. They can still offer a peek behind the ATC curtain and some insight into how high you need to get to receive vectors. This is particularly handy if you’re departing from a non-towered airport and want to know the local MVA or MIA above which you can get vectors. It’s less of an issue on SIDs, unless you’re going the wrong way for your route and wonder how long that will be true.

There are some MVA/MIA overlays for EFBs, but none are official. Your best bet is to ask ATC when you get a chance.



TYPES OF SIDS: RADAR (VECTORED)



KAPA DENVER 2

Vectored SIDs are simple, and are usually named after the airport or city. The Denver 2 SID at Centennial Airport (KAPA) says that takeoffs from all runways should fly the ATC assigned heading for vectors to the assigned route. The graphic includes a number of fixes that ATC might vector you to.

Why have a procedure for this? Because a clearance for the Denver 2 still contains more information than a clearance that's simply radar vectors. There's a required climb gradient **F**, a lost communications procedure **G**, and an additional instruction for Runway 10 departures **H**. Note that there's no filing code for this procedure. You generally can't file a purely vectored SID. Instead, it will be assigned by ATC when appropriate.

Radar SIDs are usually not included in GPS databases, but it can happen, such as the Denver 2 on a GTN using Garmin's database.

20030

DENVER TWO DEPARTURE

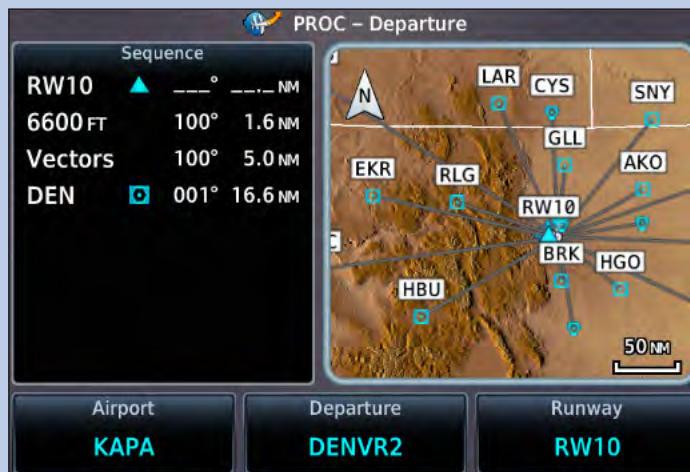
AL-5715 (FAA)

CENTENNIAL (APA)
DENVER, COLORADO

DEPARTURE ROUTE DESCRIPTION

TAKEOFF ALL RUNWAYS: Fly assigned heading and altitude for RADAR vectors to assigned route. Expect filed altitude 10 minutes after departure.

- H** **RUNWAY 10:** Climb heading 100° to 6600 before turning right.
- G** **LOST COMMUNICATIONS:** If no transmissions are received within one minute after departure, maintain assigned heading until 7000 feet, then climb to filed altitude via direct DEN VOR/DME, thence via assigned route. If filed altitude is above 10000 feet, cross DEN VOR/DME at or above 11000 feet.



TYPES OF SIDS: PILOT NAV (SOMETIMES WITH VECTORS)

KBFL MARIC4.MARIC

Pilot navigation SIDs do not require any ATC vectors. On the MARIC 4 SID, aircraft depart via heading 240 **I**, intercept a radial to MARIC **J**, and then proceed along one of two transitions: to Gorman **K** or Lake Hughes **L**.

The Anaheim 1 (page 36) combines vectored **A** and pilot nav segments **B**, **C**, and **D**. The HAWWC 3 (page 39) does as well.

Key to flying these is understanding how to resume normal GPS sequencing after the vector portion. The text specifies vectors to SLI, but don't be surprised by shortcuts. You may get vectored to a different fix or segment, so know how to activate and join a leg in your GPS flight plan.

Don't assume the vectored section will be in your GPS database. The Anaheim 1 may show direct from KSNA to SLI. It does in the Garmin database on the GTN **M**, even though there are headings and vectors between those two waypoints.

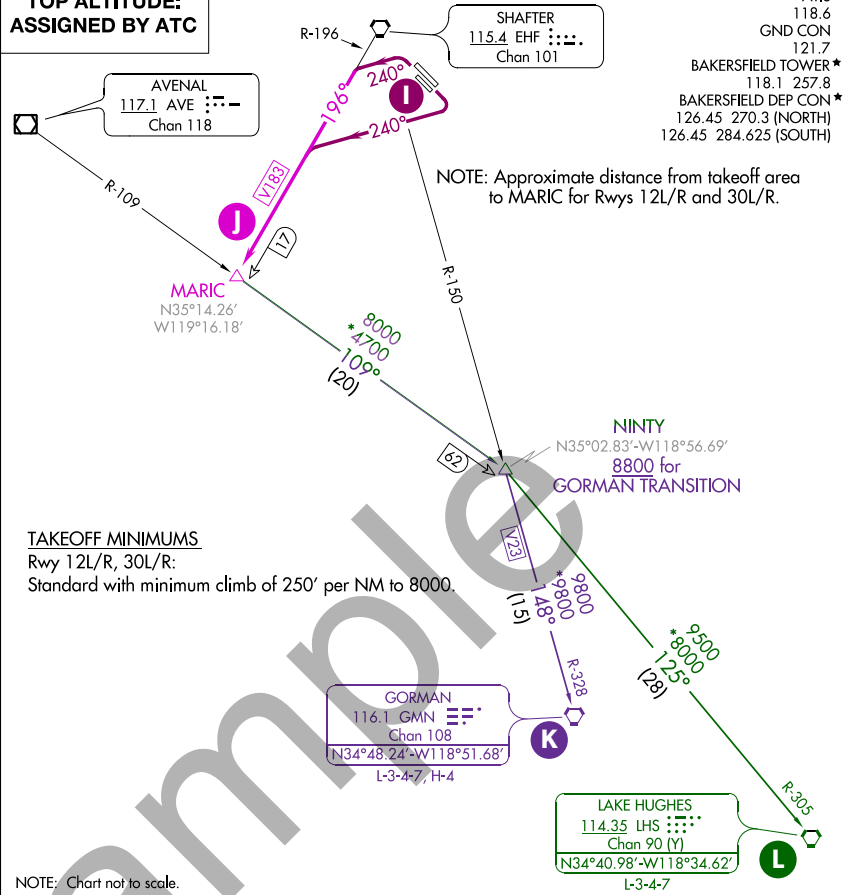
(MARIC4.MARIC) 21112

MARIC FOUR DEPARTURE

AL-36 (FAA)

MEADOWS FLD (BFL)
BAKERSFIELD, CALIFORNIA

**TOP ALTITUDE:
ASSIGNED BY ATC**



- DEPARTURE ROUTE DESCRIPTION**
- TAKEOFF RUNWAYS 12L/R:** Turn right heading 240°. Thence. . .
 - TAKEOFF RUNWAYS 30L/R:** Turn left heading 240°. Thence. . .
 - . . . intercept and proceed on the EHF R-196 to MARIC. Thence via (transition) or (assigned route).
 - GORMAN TRANSITION (MARIC4.GMN):** From over MARIC via AVE R-109 and GMN R-328 to GMN VORTAC.
 - LAKE HUGHES TRANSITION (MARIC4.LHS):** From over MARIC via AVE R-109 and LHS R-305 to LHS VORTAC.

MARIC FOUR DEPARTURE

(MARIC4.MARIC) 26MAY16

BAKERSFIELD, CALIFORNIA
MEADOWS FLD (BFL)

KBFL / GMN ALT
Departure - KBFL
RW30R.MARIC4.GMN

RW30R ▲

→ **910 FT** 910 FT 302° 1.0 NM

HDG 240° Intercept — FT — ° 2.9 NM

MARIC ▲ — FT 198° 13.6 NM

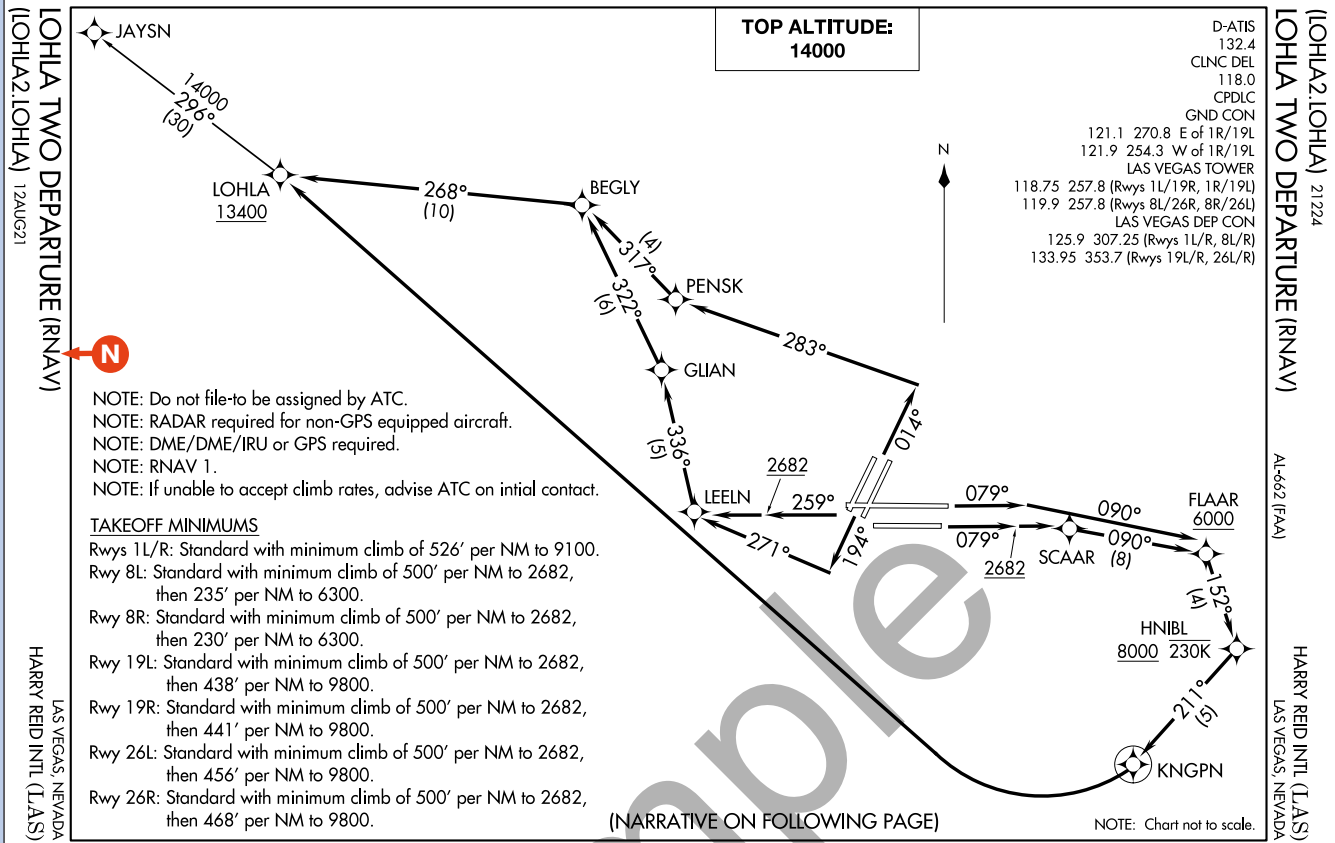
Departure - KSNA
ALL.ANAHM1.VTU APT Info

KSNA John Wayne Airport O

SLI Seal Beach — FT 293° 11.3 NM

WILMA ▲ — FT 254° 10.2 NM

TYPES OF SIDS: RNAV



(LOHLA2.LOHLA) 21224
LOHLA TWO DEPARTURE (RNAV) AL-662 (FAA) HARRY REID INTL (L.A.S) LAS VEGAS, NEVADA

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAYS 1L/R: Climb on heading 014° to intercept course 283° to PENSK, then on track 317° to BEGLY, then on track 268° to cross LOHLA at or above 13400, thence. . . .

TAKEOFF RUNWAY 8L: Climb on heading 079° to intercept course 090° to cross FLAAR at or above 6000, then on track 152° to cross HNIBL or above 8000 and at or below 230K, then on track 211° to KNGPN, then right turn direct LOHLA at or above 13400, thence. . . .

TAKEOFF RUNWAY 8R: Climb on heading 079° to 2682, then direct SCAAR, then on track 090° to cross FLAAR at or above 6000, then on track 152° to cross HNIBL or above 8000 and at or below 230K, then on track 211° to KNGPN, then right turn direct LOHLA at or above 13400, thence. . . .

TAKEOFF RUNWAYS 19L/R: Climb on heading 194° to intercept course 271° to LEEELN, then on track 336° to GLIAN, then on track 322° to BEGLY, then on track 268° to cross LOHLA at or above 13400, thence. . . .

TAKEOFF RUNWAYS 26L/R: Climb on heading 259° to 2682, then direct SCAAR, then on track 090° to cross FLAAR at or above 6000, then on track 152° to cross HNIBL or above 8000 and at or below 230K, then on track 211° to KNGPN, then right turn direct LOHLA at or above 13400, thence. . . .

. . . . on (transition), maintain 14000. Expect filed altitude 10 minutes

JAYSN TRANSITION (LOHLA2.JAYSN)

KLAS LOHLA2.LOHLA

An RNAV SID will state the need for RNAV in the title **N**. RNAV waypoints can exist anywhere, which allows for efficient design. These SIDs can be as complex as necessary—yet simple to fly with GPS guidance (although you can see how annotating this chart for your departure runway and route would help). RNAV SIDs may include numerous altitude and speed restrictions and are often for jets only.

