



## Operations at Towered Airports

There are two kinds of airports—those with operating control towers and those without. When a part-time tower is closed, the airport is considered nontowered. Every year, there are more than 40 million arrivals and departures at FAA ATC towered airports. Nearly half of these are general aviation operations.

Although it's possible for a pilot to avoid towered airports, doing so impacts the flexibility and utility of flying. Two things distinguish a towered airport. One is the presence of air traffic controllers (ATC), whose primary function is to coordinate traffic flow and prevent collisions. The second is that a pilot must maintain two-way radio contact with ATC and obtain clearances to land, taxi, and take off.

Because ATC coordinates traffic at towered airports, pilots generally follow different procedures than at nontowered fields. For example, a pilot approaching a nontowered airport would normally plan the

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### View from the Tower

A great way to get an all-encompassing view of a towered airport and also learn about operating procedures is to visit a control tower. Because of security considerations, it's a good idea to telephone ahead to make an appointment. Take a diagram of the airport and charts (sectional or IFR enroute) with you to ask questions.



arrival to make a 45-degree entry to the downwind leg of the active runway. As you approach a towered airport, however, ATC can clear you to enter the pattern at any leg. The entry point will depend on

the runway in use, the direction of arrival, and the locations of other arriving aircraft.

The key to safe operations at towered airports, both in the air and on the ground, is **awareness**. Good preflight planning is essential. Focus on the task at hand, organize the cockpit to minimize your work load, and know where you are in relation to other aircraft in the vicinity.

## Planning Your Flight

The basic aircraft requirement for operating at a towered airport is a two-way radio. If your flight involves a takeoff or landing at a Class B or C airport, the aircraft also must be equipped with a Mode C transponder.

Basic planning should include knowledge of local departure and arrival procedures for noise abatement, obstacle clearance, and traffic flow in busy terminal areas. When obtaining your preflight weather briefing from flight service, ask for any special procedures, and if you are unsure, check with an instructor based at the airport. FBOs sometimes post notices about special noise-abatement departure procedures and routes that avoid obstacles or controlled-access airspace.

When planning your flight to or from a towered airport, look at the big picture. Is the airport near or within Class

### Noise Abatement

Flying neighborly isn't *just* a good idea. At some airports, it's *policy*. Before flying to or from an unfamiliar airport, check the Airport/Facility

Directory or call the airport manager or FBO to see if noise-abatement procedures apply. Noise-abatement procedures avoid noise-sensitive areas near the airport such as hospitals or residential areas. On arrival, that could mean adjusting course to avoid those areas or remaining above traditional pattern altitudes.

Departure noise-abatement procedures usually call for turning to a specified heading soon after takeoff to avoid noise-sensitive areas. Many airports place a sign near the departure end of noise-sensitive runways specifying noise-sensitive departure procedures pilots should fly. Use a best rate of climb speed, reduce to climb power, and retract flaps as soon as practical after takeoff to minimize the noise of your aircraft.



### Wake Turbulence

Wake turbulence is a concern whenever small aircraft share an airport with larger ones. The powerful vortices that spiral off the wing tips of heavier aircraft—turboprops and business jets, as well as airliners—can suddenly and unexpectedly toss a small airplane out of control. **Always avoid the area below and behind a large aircraft.**

Standard air traffic control spacing of four to six miles between aircraft on approach, and two or three minutes between departures from the same or closely spaced parallel runways, offer protection. For extra insurance, be aware of wind speed and direction and adjust your approach and/or departure path to stay above and upwind of where wake vortices might linger. When in doubt, ask for extra spacing or time to allow wake vortices to dissipate.



B or C airspace that will require you to communicate with approach/departure controllers, in addition to tower controllers? If you want to avoid entering Class B or C airspace (assuming that the towered airport you are using is not within the airspace), be sure you are aware of any altitude restrictions. Know the route you will use and how you will navigate—visually using landmarks depicted on the chart, or with VORs or GPS. Do large aircraft operate from your departure or destination airport? Be aware of potential jet or propeller blast from larger aircraft when taxiing, and avoid wake turbulence on takeoff and approach.

Information about individual towered airports can be found in the (Airport/Facility Directory), as well as in AOPA's *Airport Directory*. Changes will be publicized in notices to airmen—notams—which should be included in your preflight briefing from Flight Service or DUAT/DUATS.

### Charts

You'll need the appropriate sectional aeronautical charts and, if the airport is within or under Class B airspace, the appropriate terminal area chart. Towered airports are depicted in blue. Information printed next to the airport symbol includes: (see terminal area chart next page)

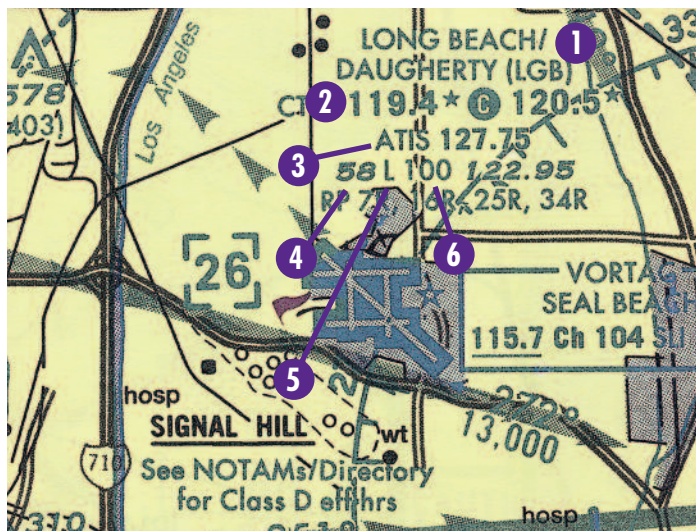
- 1 The airport name and 3-letter identifier;
- 2 Control tower frequency;
- 3 ATIS (automated terminal information service), ASOS (automated surface observation system), or

AWOS (automated weather observation system) frequency, whichever is applicable to the airport;

- 4 Airport elevation in feet;
- 5 Runway lighting; and
- 6 Length of longest runway in hundreds of feet.

VFR charts also note if a flight service station facility is on the field, airport surveillance radar is available, the tower is part-

### VFR Terminal Area Chart



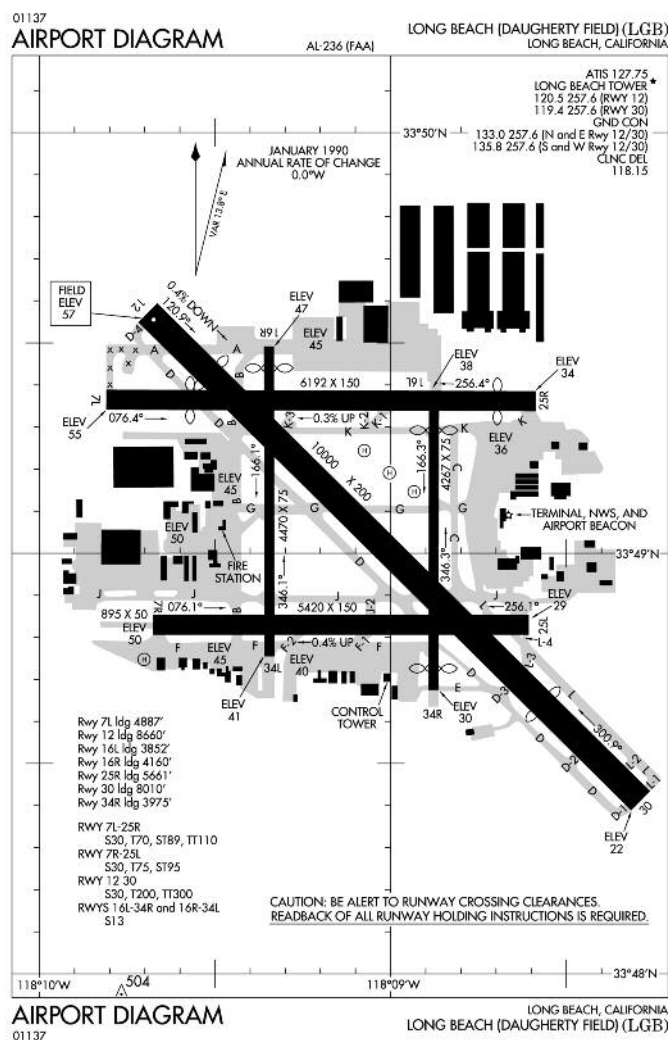
### Airport/Facility Directory

CALIFORNIA

101

| LONG BEACH (DAUGHERTY FLD) (LGB) 3 NE UTC-8(-7DT) N33°49.06' W118°09.10'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | LOS ANGELES   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------|
| 58 B S4 FUEL 100LL, JET A OX 1, 2, 3, 4 LRA ARFF Index C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | COPIER        |
| Rwy 12-30: H1000X200 (ASPH-GRVD) S-30 +, D-200, DT-300 HIRL 0.4% up NW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | H-28, L-38, A |
| Rwy 12: VASI(V4L)—GA 3.0' TCH 47'. Thid dispd 1340'. Railroad.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | IAP, AD       |
| Rwy 30: VASI(V4L)—GA 3.0' TCH 70'. Thid dispd 1990'. Tree.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |               |
| Rwy 07L-25R: H619X150 (ASPH-PFC) S-30, D-70, DT-110 MIRL 0.3% up W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |               |
| Rwy 07L: Thid dispd 1305'. Railroad.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |               |
| Rwy 25R: REIL: VASI(V4L)—GA 4.0' TCH 57'. Thid dispd 531'. Road. Rgt t/c.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |               |
| Rwy 07R-25L: H5420X150 (ASPH) S-30, D-75 HIRL 0.4% up W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |               |
| Rwy 07R: Tower. Rgt t/c.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |               |
| Rwy 16R-34L: H4470X75 (ASPH) S-12.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |               |
| Rwy 16R: VASI(V4L)—GA 4.0' TCH 36'. Thid dispd 310'. Fence. Rgt t/c.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |               |
| Rwy 16L-34R: H4267X75 (ASPH) S-12.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |               |
| Rwy 16L: Thid dispd 415'. Fence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |               |
| Rwy 34R: Thid dispd 292'. Road. Rgt t/c.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |               |
| <b>AIRPORT REMARKS:</b> Attended continuously. All rwy CLOSED 0600-1500Z except Rwy 12-30. Flocks of seagulls on and in/ovt arpt especially during rain. Airships moored in infield and operating in/ovt arpt. Rwy 07R lgt tw 152' AGL 2500' W and 500' S of rwy thid. 6' lgt chain link fence located 130' S of centerline of Twy F. Fence begins NW corner of tw and extends 400' to W. Prior request for military jets and civilian Non-Stage III jets. ctc Noise Abatement 562-570-2635 or frequency 122.85 Mon-Fri 1530-0030Z. Noise limits (decibels single event noise exposure level). Rwy 25R twf 92.0-100.0; Rwy 07L twf 88.0-100.0; Rwy 25L twf 95.0-100.0; Rwy 07R twf 95.0-100.0; Rwy 12 and 30 1500-0600Z twf 102.5-105.5; 1400-1500Z and 0600-0700Z twf 90.0-100.0; 0700-1400Z twf 79.0-100.0. Touch and go, stop and go, low apch only permitted 1500-0300Z weekdays and 1600-2300Z weekends and holidays only on Rwy 07L-25R and Rwy 07R-25L unless weather conditions require twr to direct such ops to Rwy 16R-34L and Rwy 16L-34R. Rwy 12-30 maximum lgt weights A-330 347,000 pounds; A-340 379,000 pounds; DC-10-10, DC-10 30/40 and MD-11 379,000 pounds; L-1011 354,000 pounds. Rwy 12-30 maximum twf weights DC-10 30/40 and MD-11 588,000 pounds; C-17 538,600 pounds. Maximum lgt weight for C-17 at or byd glide slope or rwy aiming point marking 538,600 pounds. Rwy 30 lgt prior to rwy aiming point marking 344,000 pounds. Taxiways D3 and L3 weight limits A-340, DC-10 30/40 and MD-11 541,000 pounds, C-17 450,000 pounds. No twy access to Rwy 07L W of Twy D, 4897' remaining on Rwy 07L from Twy D. Twy K east of Twy C clsd to a/cft with a wingspan greater than 117'. Engine run-ups other than preflight are limited to hours of 1500-0500Z weekdays and 1700-0500Z weekends and holidays. ACTIVATE MALSR Rwy 30 when tower clsd—CTAF. Rwy 12-30 HIRL lighted during hours tower clsd. NOTE: See Land and Hold Short Ops Section. |  |               |
| <b>WEATHER DATA SOURCES:</b> ASOS (562) 424-0572.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |               |
| <b>COMMUNICATIONS:</b> CTAF 119.4 ATIS 127.75 (562) 595-8564 UNICOM 122.95                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |               |
| HAWTHORNE FSS (HHR) TF 1-800-WX-BRIEF. NOTAM FILE LGB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |               |
| SOCAL APP COM 124.65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |               |
| SOCAL DEP COM 127.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |               |
| LONG BEACH TOWER: 119.4 (Rwy 30 apch, Rwy 12 dep) 120.5 (Rwy 12 apch, Rwy 30 dep) (1415-0745Z)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |               |
| GND CON 133.0 (North and East of rwy 12-30) 135.8 (South and West of rwy 12-30). CLNC DEL 118.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |               |
| AIRSPACE: CLASS D svc 1415-0745Z other times CLASS G.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |               |
| RADIO AIDS TO NAVIGATION: NOTAM FILE HHR.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |               |
| SEAL BEACH (L) VORTAC 115.7 SLI Chan 104 N33°47.00' W118°03.29' 278° 5.3 NM to fld. 23/15E.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |               |
| HIWAS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |               |
| BECCA NDB (LON) 233 LG N33°45.40' W118°04.64' 301° 5.2 NM to fld.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |               |
| ILS 110.3 L-LGB Rwy 30. LOM BECCA NDB. Unmonitored when twr clsd. MM unmonitored.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |               |
| HELIPAD H1: H20X20 (ASPH-CONC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |               |
| HELIPAD H2: H20X20 (ASPH-CONC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |               |
| HELIPAD H3: H20X20 (ASPH-CONC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |               |
| HELIPORT REMARKS: Training helipads H1, H2 and H3 located N of Rwy 12-30 midfield between Taxiways G and K.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |               |
| LONNIE POOL FLD/WEAVERVILLE (See WEAVERVILLE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |               |
| LOS ALAMITOS AAF (ARMED FORCES RESERVE CENTER) (SLI) N33°47.40' W118°03.12' LOS ANGELES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |               |
| NOTAM FILE LGB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |               |
| AIRSPACE: CLASS D svc Sat-Mon 1600-0000Z, Tue-Fri 1500-0600Z other times CLASS G.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |               |

### Airport Diagram Page



NOT TO BE USED FOR NAVIGATION

time or a non-federal facility, if special VFR is not permitted, and the unicom and VFR advisory frequencies, if applicable. A complete explanation is printed on the chart's legend and in the NACO Aeronautical Chart User's Guide.

To avoid runway incursions, and keep from getting lost, study the airport layout. **Instrument approach procedure (IAP) charts are required for IFR operations, and they are also a great reference for the VFR pilot.** All pertinent information about the airport is provided, including elevation, navigation aids and communications frequencies, as well as a small diagram of the runway, taxiways and ramps. If the airport has a complex runway or taxiway configuration, the IAP charts will include a separate, detailed airport diagram page. These airport diagrams are invaluable for finding your way around large airports, but never hesitate to ask for progressive taxi instructions if needed. Airport diagrams can also be

found online ([www.asf.org/taxi](http://www.asf.org/taxi)) or in the back of the Airport/Facility Directory (A/FD).

Navigation Aids

Become familiar with the terminal area navigation aids—the VOR, ADF, localizer, and glideslope—at the airports you’ll be using. They are critical to instrument operations and can be very helpful to VFR pilots as well. It can be a challenge to find an unfamiliar airport if it’s immersed in an urban sea of



buildings and lights or hidden among hills. On-airport nav aids, or GPS, make the job a lot less stressful.

Communication

Because two-way communication is required to operate at towered airports, good radio skills go a long way toward ensuring smooth operations.

A good communications system includes at least one 720- or 760-channel transceiver with enough power to transmit and receive communications without static or interference. If the aircraft transceiver is not working properly, the communications process will be difficult and could be unsafe. Get it fixed before operating at a towered airport. A



Controller with light gun

Light Gun Signals

| Color and Type of Signal  | Aircraft on the Ground              | Aircraft in Flight                                                     |
|---------------------------|-------------------------------------|------------------------------------------------------------------------|
| Steady green              | Cleared for takeoff                 | Cleared to land                                                        |
| Flashing green            | Cleared for taxi                    | Return for landing (to be followed by steady green at the proper time) |
| Steady red                | Stop                                | Give way to other aircraft and continue circling                       |
| Flashing red              | Taxi clear of the runway in use     | Airport unsafe do not land                                             |
| Flashing white            | Return to starting point on airport | Not applicable                                                         |
| Alternating red and green | Exercise extreme caution            | Exercise extreme caution                                               |

headset with an attached boom microphone and a push-to-talk switch greatly simplifies the task of flying and communicating simultaneously. Just be sure the airplane is equipped with a handheld microphone and speaker as backup in the event the headset or intercom system fails.

Even the best radios fail occasionally. When that happens, you can still receive tower instructions via light gun signals. Because we get very little practice with these signals, they’re easily forgotten. We suggest you copy the light gun signal chart above and tape it to your clipboard. Acknowledge the signals by rocking your wings or flashing your landing light.

Clearances

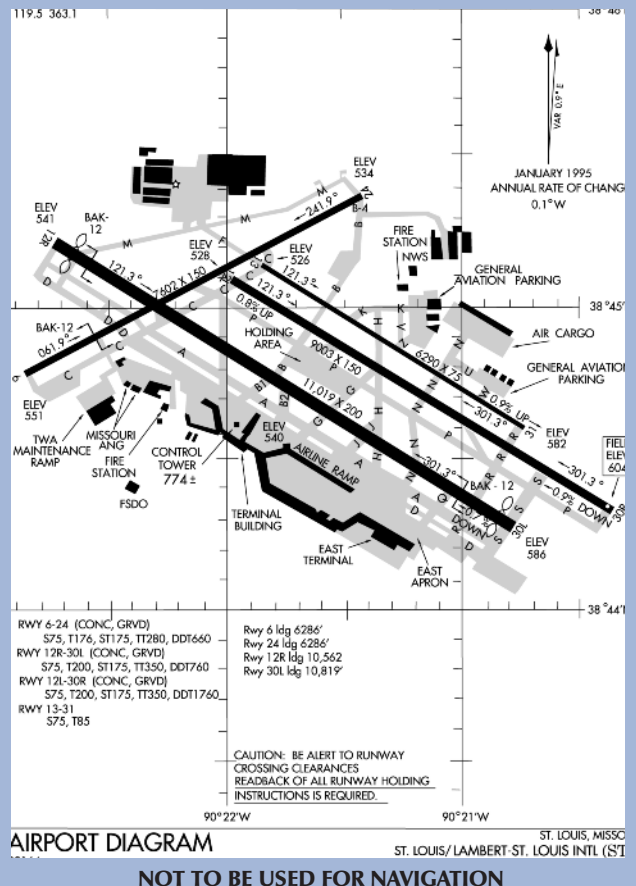
Flying to and from towered airports involves a series of controller instructions and clearances. It’s vital that both the pilot and the controller recognize and understand each instruction, clearance, and acknowledgment. Communications should be simple and clear. You’ll take up minimum time on the frequency, and controllers will understand you the first time. A misinterpretation by either party can have serious consequences. *To ensure mutual understanding, read back the clearance.* **Controllers are required to get an acknowledgment of “hold short” instructions, so a “hold short” clearance must be read back—but you should really read back every clearance.** Controllers issue clearances using specific words and phrases. If you don’t fully understand a controller’s instructions, ask for clarification. The “Pilot/Controller Glossary” in the AIM is an excellent source for reviewing the terms and phrases.

ATC instructions common at towered airports include:

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- “Cleared for the option” is usually requested by instructors during training flights. It means you are cleared for either a full-stop landing, a stop and go,

During the takeoff roll on Runway 30R, an MD-82 with 140 people on board collided with a Cessna 441 with two people on board. The Cessna pilot had received clearance to back-taxi into position and hold on Runway 31. The pilot taxied into position at an intersection of Runway 30R, which was the assigned departure runway for the MD-82. Both people aboard the Cessna were killed; there were a few minor injuries to the passengers on the MD-82.



# Departure Procedures

| P                                                                                     | R                                                                                          | O                                                                               | C                                                                                             | E                                                                                          | E                                                                                                                             | D                                                                   |
|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Plan                                                                                  | Radios                                                                                     | Organize                                                                        | Clearance                                                                                     | Exercise Caution                                                                           | Expedite                                                                                                                      | Depart                                                              |
| Plan your route. Get a preflight weather briefing. Consider filing a VFR flight plan. | Tune before taxiing or at the runup pad— <i>not</i> while taxiing or in the terminal area. | Have charts and notes handy for ready reference. Minimize cockpit distractions. | Get ATIS, AWOS, or ASOS before calling clearance or ground control. Read back all clearances. | Heed all taxiway and runway hold markings. Be extra careful at night or in low visibility. | When cleared to cross an active runway, or for takeoff, scan the area and comply quickly or notify ATC if unable to expedite. | Scan the final approach area as you taxi into position for takeoff. |

touch and go, low approach, or missed approach—whatever you or an instructor aboard the aircraft decides to do.

- **“Go around!”** Abort the final approach! The tower controller may issue the instructions, or the pilot can state the fact. Unless otherwise instructed, the pilot should overfly the runway while climbing to traffic pattern altitude and reenter the pattern on a crosswind leg.
- **“Contact....”** Switch frequencies and communicate with another specified controller.
- **“Expedite....”** Comply promptly to avoid a conflicting situation.
- **“Traffic....”** Other aircraft are in your vicinity. For example, “Traffic, nine o’clock, one-two miles, southeast bound, one thousand feet below you.”
- **“Report traffic/runway/airport in sight.”** Advise the controller when you visually identify the other aircraft, runway, or airport.
- **“Land and hold short.”** At busy airports with intersecting runways, controllers often use more than one runway for arrivals and/or departures. Be prepared for a controller to issue a “land and hold short” (LAHSO) restriction when flying to such an airport. You can ask the controller for the landing distance available to you. That information, along

with details on land and hold short operations, can be found in the (Airport/Facility Directory) listing for the airport. Configure the airplane for a short-field landing if necessary, and fly a precise final approach airspeed. If you have doubts about being able to comply with the hold-short restriction, inform the controller immediately. Don’t wait until you’re rolling out too fast and too far down the runway to stop before the hold-short line.

## Nonstandard Procedures

Be flexible. Controllers at busy airports use a variety of techniques to keep traffic flowing smoothly. You may be asked to:

- Fly a faster than normal final approach;
- Extend your downwind;
- Switch to another runway at the last minute;

## Safety Tip

A clearance to “maintain runway heading” after takeoff means that you should maintain the compass alignment of the departure runway, not track the extended runway centerline. In other words, after takeoff, do not make heading corrections to account for wind drift.

## Runway Incursion

### Burbank, CA

A Piper PA-32 was issued a landing clearance on Runway 8 and instructed to hold short of Runway 15. A Beech Baron was issued a landing clearance on Runway 15. The Piper landed and continued past the hold-short line, entering the runway intersection. The Baron was unable to stop prior to the Runway 8 hold-short bars, but did stop before the Runway 8 edge line.



## Safety Tip

To reduce work load and improve visual scan, program GPS and radios prior to departure, when clear of the terminal area, or prior to arrival in the terminal area.

- Do a 360-degree turn or S-turns on final to allow preceding traffic to clear; or
- Taxi around another aircraft in the runup area.

**Be proficient so you can handle such unusual procedures safely. Remember: The pilot in command has the right to decline *any* procedure that may put the flight in jeopardy. Cooperate, but don't hesitate to decline a request or to *change your mind* if something isn't working out.**

## How the Pros Do It

The airlines and many corporate pilots have detailed procedures for operations at towered airports. While the following list of procedures is not exhaustive, it gives many useful piloting techniques that will make all ground operations more professional.

- The airport diagram is reviewed during preflight planning.
- The current position of the aircraft is noted relative to the active runways, the most likely route to the

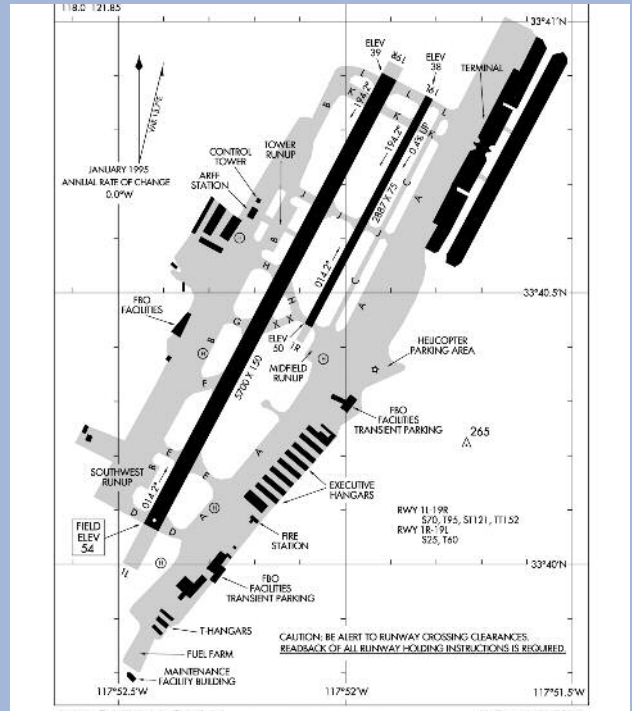
## Sterile Cockpit

This is a term coined by the airlines to limit conversation topics to flight operations when pilot work load is high—which, in high density airspace, can be as far as 20 miles from an airport. Ask passengers to avoid unnecessary conversation until safely out of the terminal area or parked on the ramp. They should, as always, point out a potential hazard, but this is not the time to talk about how small the houses look.

## Runway Incursion

### Santa Ana, CA

A C-188 Agwagon was told to taxi across 19L and hold short of Runway 19R. The pilot correctly read back the instructions but proceeded across the hold bars and did not stop. A Boeing 757 had been cleared for takeoff on Runway 19R and successfully aborted its takeoff 1,000 feet into the takeoff roll.



NOT TO BE USED FOR NAVIGATION

runway, and any special notes. (Many of the airlines provide notes and list restricted taxiways.)

- The first officer communicates with ground control, while the captain taxis the aircraft. When communicating with ATC, both pilots focus on what is being said and no other cockpit duties are accomplished during this time.

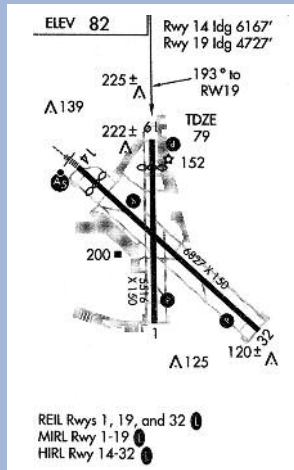
## Arrival Procedures

| A                                                                        | R                                                                                       | R                                        | I                                                                       | V                                                                                    | A                                                                               | L                                                                       |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| ATIS                                                                     | Review                                                                                  | Radios                                   | Inbound                                                                 | Visual Check                                                                         | Arrival                                                                         | Landing                                                                 |
| Before calling approach or tower controllers, check ATIS, AWOS, or ASOS. | Study the airport diagram, anticipate the active runway, and visualize your taxi route. | Preset the tower and ground frequencies. | Turn on lights when 5-10 miles out. Begin the before-landing checklist. | Look for traffic when approaching the airport. Be accurate in your position reports. | Complete the before-landing checklist. Follow tower's instructions for landing. | Clear the runway ASAP. Don't switch to ground control until instructed. |

## Midair Collision

### East Farmingdale, NY

On April 9, 1994, a Cessna 152 collided with a Piper PA-24 and crashed into a factory building in East Farmingdale, New York. The airplanes were on final approach to Runway 19 at Republic Airport. The ceiling was 25,000 feet with scattered clouds and 25-mile visibility. The pilots were in radio contact with the tower. The Cessna, occupied by a student and an instructor, was doing touch-and-go landings in a *right-hand traffic pattern on Runway 19*. The Piper pilot, with one passenger, was returning to the airport from East Hampton, New York. They were instructed to enter a *left downwind for Runway 19*. At the time, the traffic pattern extended to about a six-mile final leg. The Cessna was on final approach about 200 to 300 feet agl. The Piper was above, making a descending left turn. The Piper pilot had been advised that the Cessna was on final; he was looking, but did not see it and descended into it. All four people aboard were killed.



- If there is any doubt by either pilot about what is said or intended by ATC, they ask for clarification.
- The first officer writes down complex taxi instructions and asks for a repeat, if needed.
- A full readback of all ATC instructions on the ground is required.
- An airport diagram is used while taxiing, and both pilots listen to ATC and visualize the positions of other aircraft.
- Other cockpit duties stop just prior to crossing a runway to focus on the event. Both pilots must agree that ATC has cleared them to cross, and both pilots must visually check the runway in both directions.
- Taxi lights are used day and night to communicate with other aircraft on the ground. If the aircraft is moving, or has received clearance to taxi, the taxi light is turned ON. When the aircraft stops, the taxi light is turned OFF. When ATC issues a takeoff clearance, landing and strobe lights are turned ON to let other aircraft know they are beginning the takeoff roll.

Once you understand towered airport operating rules and procedures and have thoroughly prepared, you

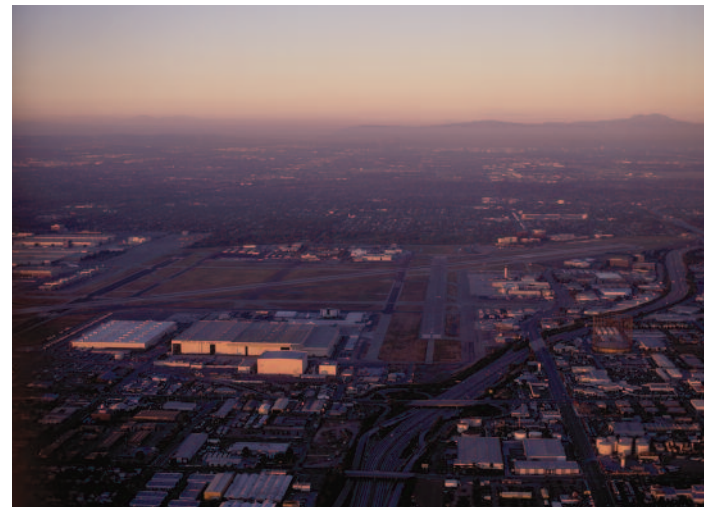
should have no trouble working with tower and approach controllers.

When things get busy in the cockpit, stay focused on the critical task—flying the airplane. Trying to do too many things at once—shuffle through charts, read the airport diagram, tune the radios, program the GPS, configure the aircraft, jot down a clearance—can quickly overwhelm a single pilot. The result may be a missed critical clearance, such as “hold short of the runway,” and a potentially disastrous runway incursion. **Aircraft control takes priority over communication.** Act first, talk second. Think ahead of the aircraft and stay flexible, ready to change to plan B if necessary.

## Let's Go Flying!

### Preflight

Our flight plan calls for flying VFR into Long Beach, California's Daugherty Field (LGB) and then departing the airport. LGB is a large Class D airport



that lies under the floor of Los Angeles Class B airspace and in close proximity to several Class C airports in the busy Los Angeles Basin. Long Beach has six published instrument approaches, scheduled airline service, and a high volume of general aviation piston and jet aircraft, including flight training activity. With two sets of parallel runways—one set perpendicular to the other—and a long, main runway that bisects the other four, LGB presents a significant challenge, both on the ground and in the air, to any pilot not familiar with it.

Our aircraft more than meets the minimum equipment requirements for operating at a Class D

airport and within a Class B Mode C veil—two-way communications transceiver and Mode C transponder. For navigation guidance, we'll use the current Los Angeles VFR Terminal Area Chart for maximum detail and scale.

Given the complexity and activity level at LGB, referring to an airport diagram from an instrument approach booklet is an excellent idea, even though we'll be flying VFR. Both *NACO Terminal Procedures* and *Jeppesen's Airway Manual* devote a separate page to a plan view graphic of LGB's airport/taxiway configuration. (Refer to the airport diagram for LGB on pg. 3.) It'll be a big help in planning the arrival and negotiating the complex taxiway layout. The frequency listing for the airport will also be helpful in planning and preparing for controller handoffs.

## Arrival

We're arriving from the east, and because of the traffic congestion, we ask for and receive traffic advisories from SoCal Approach Control. About 15 minutes east of our destination, we tune LGB's ATIS frequency on the number-two radio and listen to the current report, "Hotel," while also monitoring the approach control frequency on radio number one.

ATIS says that runways 25L, 25R, and 30 are active. Separate tower frequencies are in effect for the north and south runways. Because intersecting runways are in use, we mentally prepare for a "land and hold short" instruction.

About five miles east of the airport, we inform SoCal Approach that we have Long Beach in sight, we have ATIS information Hotel, and we're requesting 25L, the runway most convenient to our destination on the airport. The controller says to expect 25L and instructs us to switch to the Long Beach Tower—south frequency. We've already obtained the frequency from the airport diagram page and loaded it in the standby window on the number-one com, so we're prepared for the handoff.

## Safety Tip

If you have difficulty with reading runway markings or airport signs at a particular airport, contact the airport manager and report the problem. Also file a report with NASA's Aviation Safety Reporting System (<http://asrs.arc.nasa.gov>).



"Long Beach Tower, Cessna Seven-Zero-Five-Eight Quebec, five east, inbound to Two-five Left."

"Cessna Five-Eight Quebec, Long Beach Tower. Make straight in Runway Two-five Left."

"Cleared for the straight-in to Two-five Left. Five-Eight Quebec." Great! This is going to be easier than we thought. We'll be able to exit the runway right onto the ramp where we'll be parking to refuel. Then the tower controller throws us a curve.

"Cessna Five-Eight Quebec, change to Runway Two-five Right. I have an aircraft stopped on Two-five Left. Contact tower one-two-zero point five."

"Roger, contact tower on one-two-zero point five. Five-Eight Quebec." We don't know what the trouble is on 25L, but there's no point in worrying about it. As we bank into a right turn and then back to the left to line up with 25R, we tune the tower frequency and check in. The tower controller is ready for us.

"Cessna Seven-Zero-Five-Eight Quebec, Runway Two-five Right, cleared to land. Hold short Runway Three-zero."

"Cleared to land Two-five Right. Five-Eight Quebec." The controller immediately responds to my readback with an insistent voice, "Five-Eight Quebec, HOLD SHORT RUNWAY THREE-ZERO."



“Roger, hold short Three-zero. Five-Eight Quebec.”  
Oops. Fortunately, the controller caught my negligence. I shudder as I think about the potentially catastrophic consequences of rolling out on Runway Two-five Right and blithely crossing Runway Three-zero—just as another airplane comes barreling down the crossing runway.

As it turns out, the hold-short restriction is unnecessary because we easily slow and exit the runway long before reaching the intersection of 25R/30. After completing the after-landing checklist, we are told to contact ground control. “Long Beach Ground, Cessna Seven-Zero-Five-Eight Quebec off of Two-five Right at Kilo 2, going to the south ramp. Request progressive taxi instructions.” It looks like a long, complicated route to the south side of the airport, and we can use the controller’s help in getting there safely.

“Five-Eight Quebec, Ground. Taxi west on Kilo, hold short of Runway Three-zero.”

“West on Kilo, hold short of Three-zero. Five-Eight Quebec.”

Just as we roll to a stop on Kilo at the hold line for 30, a Learjet glides past on the runway. If we hadn’t stopped....

A few seconds later, the ground controller instructs us to “Cross Three-zero, then left on Bravo. Taxi south on Bravo, hold short of Runway Two-five Left.”

“Roger, cross Three-zero, left on Bravo, hold short of Two-five Left. Five-Eight Quebec.”

Evidently the problem that forced us to switch runways has cleared, because we watch an airplane slow on 25L and exit the runway to the south.

“Five-Eight Quebec, cross Two-five Left, turn left on Foxtrot. The south ramp will be on your right.”

“Cross Two-five Left, left on Foxtrot to the ramp. Five-Eight Quebec. Thanks for your help.”

After turning left on Foxtrot, we confirm that we can cross the approach end of 34L and then taxi onto the ramp. A lineman directs us to a parking spot, and we shut down. Time to refuel and grab some lunch before heading back out.

## Departure

The drill on departure will be the same as the arrival, only in reverse. After completing the appropriate checklists, starting the engine, and powering up the avionics, we configure the communications radios based on the frequencies specified on the airport diagram, with LGB ATIS in



the active window and ground control in the standby window. Next we set up the navigation radios with the appropriate VOR frequencies and radials for the outbound course. We want to have everything done before leaving the ramp so that all we have to do is taxi to the assigned runway—a difficult enough challenge when the airport is as large and complex as LGB.

The first task is to get the current ATIS information. According to “India,” land and hold-short operations are still in effect for 25 Right and 30. Because LGB

is a Class D airport, a VFR departure clearance isn't necessary, but local procedure recommends we call clearance delivery. The controller there prepares a "flight strip"—a document that includes information about our aircraft and runway assignment. This is passed to ground control. Because the strip is prepared for them, ground controllers can keep focused on the aircraft and vehicles moving on the field. So, we call clearance, tell the controller our position on the airport and that we have India, and will be departing to the east. We then contact ground control.

"Cessna Five-Eight Quebec, Long Beach Ground. Taxi to Runway Two-five Left at Delta via Foxtrot. Would you like to depart Two-five Left from intersection Delta?"

Hmmm. I study the airport diagram and see that an intersection takeoff from Delta would give me approximately 4,000 feet of runway. Based on my preflight planning, I know that's plenty of runway for the airplane's weight and the weather conditions, but if more runway is available, why not use it?

"Ground, thanks, but I'd like full length on Two-five Left."

"Five-Eight Quebec, Runway Two-five Left. Taxi via Foxtrot and Delta to Delta Three, hold short Runway Three-zero."

"Roger, taxi to Two-five Left via Foxtrot and Delta to Delta Three. Hold short of Three-zero. Five-Eight Quebec."

At the hold line on Taxiway Delta Three, we watch a DC-10 on final for 30 sink toward the runway. Twin puffs of blue smoke trailing from the main gear bogies announce the touchdown.

"Cessna Five-Eight Quebec, cross Runway Three-zero, left on Lima to Lima Four, call the tower when ready to depart."

"Roger, cross Three-zero, left on Lima to Lima Four, contact the tower. Five-Eight Quebec."

We contact the tower and are issued a clearance to take off. Following takeoff and initial climb, we turn left to an easterly heading as instructed by the tower on our takeoff clearance. Soon we've flown out of the LGB terminal area and are heading east toward our home base. It's been a hard-working lunch flight but worth it. We've negotiated Long Beach for the first time, with no trouble. In fact, the flight was virtually without error—an accomplishment we rightfully attribute to the study and preparation done before ever climbing into the airplane.

## Airport Pavement Markings

(For further information, refer to the *Aeronautical Information Manual*, Chapter 2, Section 3.)



**All runway markings are white.**



**Taxiway markings are yellow.** The centerline is a single yellow line, and the taxiway edge is marked by a double yellow line. Dashed edge markings allow the aircraft to cross to the adjoining apron.

*Runway holding position markings* consist of four yellow lines—two solid and two dashed (see picture below). Aircraft should stop on the solid-line side. **A pilot should not cross this marking without ATC clearance.** An aircraft exiting the runway is not clear of the runway until all parts of the aircraft have crossed the holding position marking. These markings are installed on runways only if the runway is normally used by ATC for Land and Hold Short (LAHSO) or taxi operations.



## Airport Signs



There are many types of signs on airfields. The information on the signs may also be painted on the airport pavement. The following examples are described as if you were on the taxiway or runway, looking at the sign.



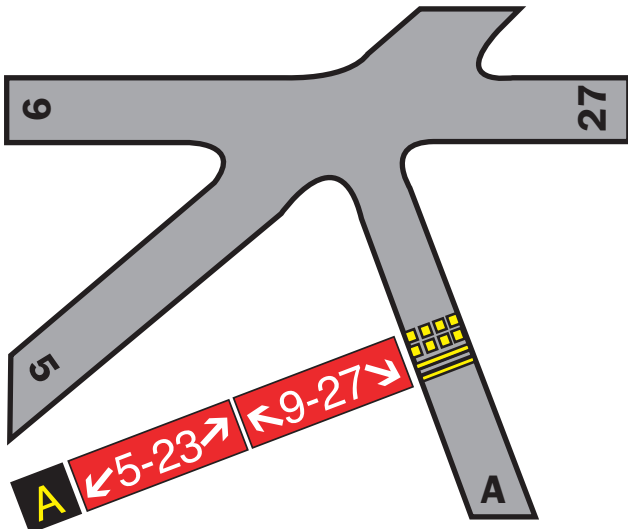
*Taxiway location sign:* Indicates the taxiway you are on.



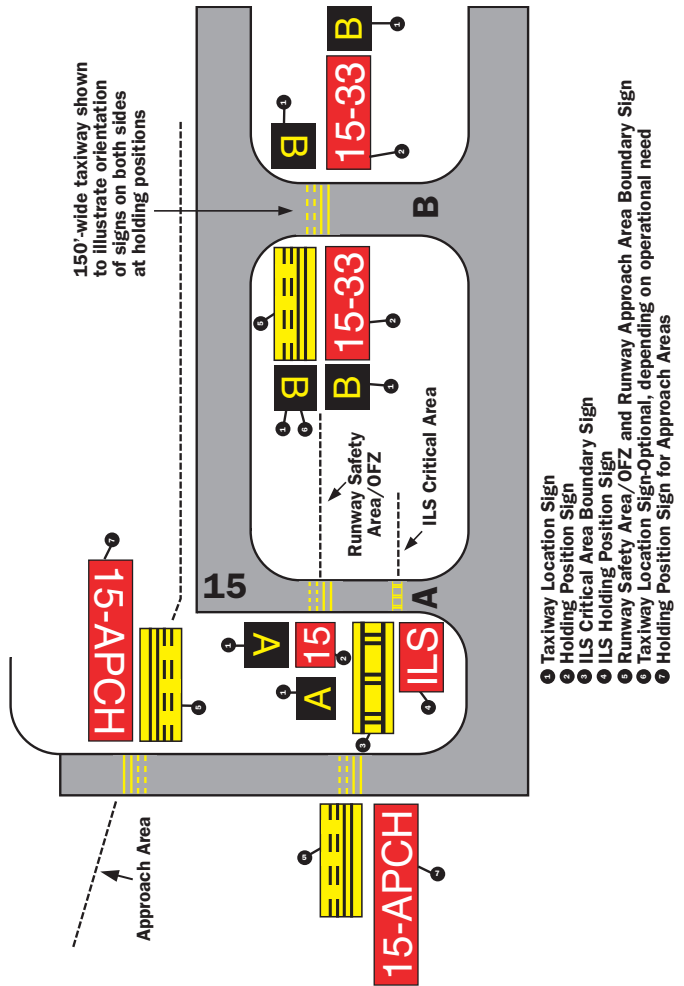
*Holding position sign:* Hold here. From your position on the taxiway, the threshold for Runway 15 is to your left and the threshold for Runway 33 is to your right. This sign is located next to the yellow holding position markings painted on the taxiway pavement.



*Runway boundary sign:* This sign faces the runway and is visible to pilots exiting the runway. Taxi past this sign ("dash past the dashed lines") to be sure you are clear of the runway.



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*ILS holding position sign:* ATC may hold you at this sign when the instrument landing system is being used at the airport. Aircraft taxiing beyond this point may interfere with the ILS signal to approaching aircraft.

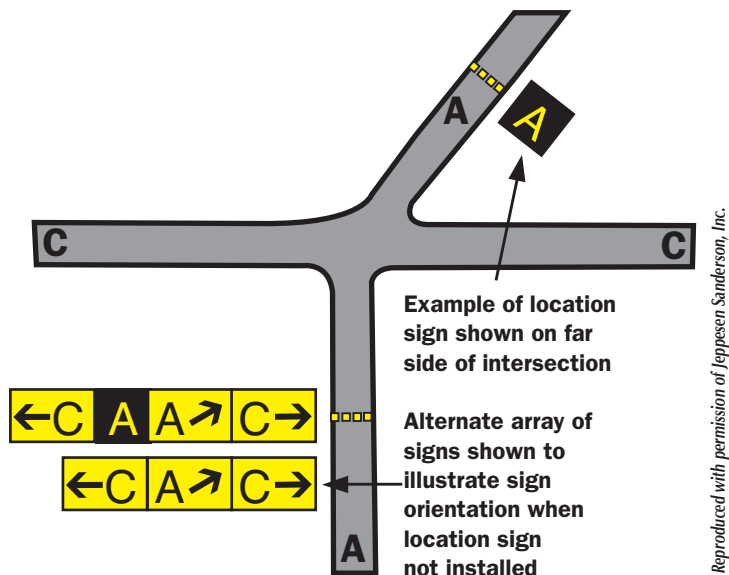


*ILS critical area boundary sign:* Seen when **exiting the runway**, this sign marks the boundary of the ILS critical area. When ILS approaches are in use, be sure your aircraft has passed beyond this sign before stopping on the taxiway.



*Holding position sign for approach areas:* If instructed by ATC, hold here until cleared to cross. Taxiing past this sign may interfere with aircraft arriving on Runway 15 or departing on Runway 33.

*Taxiway entrance at intersection of two runways* (see left). You are on Taxiway A. The arrows pointing to



Runways 5-23 and 9-27 indicate the approximate alignment of the runways relative to you and point to each runway threshold.

*Taxiway intersection* (see above). You are on Taxiway A. The orientation of these signs is from left to right in a clockwise manner. Left turn signs are on the left side of the location sign and right turn signs are on the right side of the location sign.



**No entry sign:** Do not enter this area. Aircraft are prohibited. This sign would be found at the entrance to a one-way taxiway or at the intersection of a road intended for vehicles.



**Inbound destination sign:** The military installation is to your right. Other information signs are "Cargo," "Term" (Terminal), "Ramp," etc.



**Outbound destination sign to different runways:** Runways 27 and 33 are to your right.

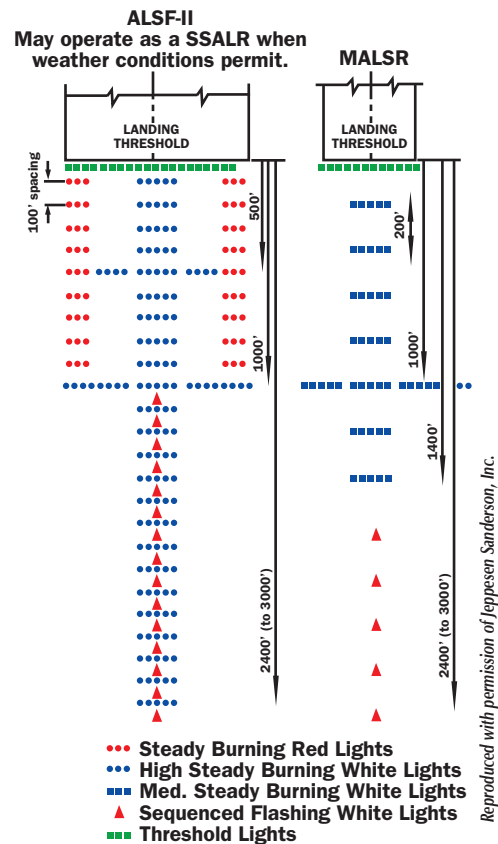
For more information, see [www.faa.gov/runwaysafety](http://www.faa.gov/runwaysafety).

## Airport Lighting

(For further information and a complete set of approach lighting system diagrams, refer to the *Aeronautical Information Manual*, Chapter 2, Section 1.)

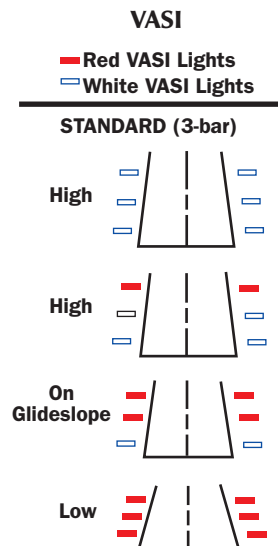
*Approach lighting systems* provide the basic means to transition from instrument flight to visual flight for landing.

## Two Kinds of Approach Lighting Systems



Approach light systems are a configuration of signal lights starting at the landing threshold and extending into the approach area a distance of 2,400 to 3,000 feet for precision instrument runways and 1,400 to 1,500 feet for nonprecision runways.

*Visual approach slope indicators (VASIs)* provide visual descent guidance during the approach to a runway. The lights are arranged in bars and vary in number from two to 16.



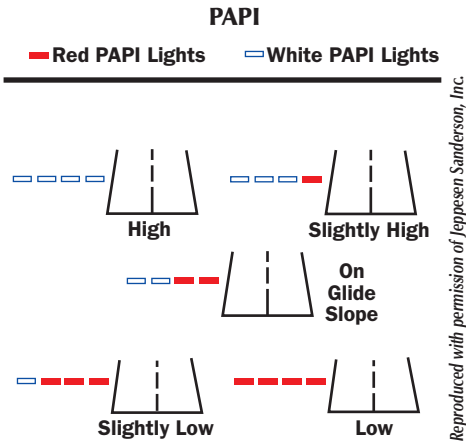
## Lights Up

Tower controllers can operate many of the airport's lights at various intensities. Ask them to turn up runway and lead-in lights when you're trying to locate the field. Most pilots prefer these lights to be dimmed for landing.

The lights are arranged so that the pilot will see the combination of lights shown here.

*Precision approach path indicators (PAPIs)*

use light units similar to the VASI but are installed in a single row of either two or four light units. They are normally installed on the left side of the runway.



*Runway end identifier lights (REILs)* consist of a pair of synchronized flashing lights located on each side of the runway threshold.



*Runway edge lights* are white and outline the edges of runways at night or in restricted-visibility conditions. On instrument runways, yellow replaces white on the last 2,000 feet or half the runway length. The lights marking the ends of the runway are red for departing aircraft and green for landing aircraft. Blue *taxiway edge lights* outline the taxiways. Green lights



mark the taxiway centerline as well as taxi paths. Yellow *clearance bar lights* are installed at holding positions on taxiways and at the location of an intersecting taxiway. Flashing yellow *runway guard lights* are installed at taxiway/runway intersections. *Stop bar lights* consist of a row of red lights that extend across the taxiway at the runway holding position. Following the ATC clearance

to proceed, the stop bar is turned off and the lead-on lights are turned on. **Pilots should never cross a red illuminated stop bar, even if an ATC clearance has been given to proceed.**

Note: Not all airports are equipped with taxiway centerline lights, yellow clearance bar lights, runway guard lights, or stop bar lights.



## Taxi Tips

- If in doubt about where you are while taxiing on the airport, bring the aircraft to a stop and ask Ground Control for progressive taxi instructions: "Ground, Five-Eight Quebec requests progressive taxi instructions." *Never stop on an active runway after landing to ask for directions. Clear the runway first, then stop on a taxiway.*
- Do not taxi onto or across a runway unless you are certain the ground controller has given you clearance to do so. *If there is the slightest doubt, ask.*
- At night, taxi with other pilots in mind. Minimize use of distracting aircraft lights. Use position lights at all times and the taxi light as needed, but keep strobes and landing lights off until the tower controller has issued you a takeoff clearance. Then turn on all lights. Adhere to operating time limits on lights if specified by the manufacturer.
- Always have an airport diagram available and check your assigned route against the chart before moving.

*Airport taxi diagrams are available via the Web at [www.asf.org/taxi](http://www.asf.org/taxi).*



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